ESO

European Organisation
for Astronomical
Research in the
Southern Hemisphere

Annual Report 2008

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presented to the Council by the
Director General
Prof. Tim de Zeeuw

The European Southern Observatory

ESO, the European Southern Observatory, is the foremost intergovernmental astronomy organisation in Europe. It is supported by 14 countries: Austria, Belgium, the Czech Republic, Denmark, France, Finland, Germany, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Several other countries have expressed an interest in membership.

Created in 1962, ESO carries out an ambitious programme focused on the design, construction and operation of powerful ground-based observing facilities enabling astronomers to make important scientific discoveries. ESO also plays a leading role in promoting and organising cooperation in astronomical research.

ESO operates three unique world-class observing sites in the Atacama Desert region of Chile: La Silla, Paranal and Chajnantor. ESO's first site is at La Silla, a 2400 m high mountain 600 km north of Santiago de Chile. It is equipped with several optical telescopes with mirror diameters of up to 3.6 metres. The 3.5-metre New Technology Telescope broke new ground for telescope engineering and design and was the first in the world to have a computer-controlled main mirror, a technology developed at ESO and now applied to most of the world's current large telescopes. While La Silla remains at the forefront of astronomy, and remains among the most scientifically productive in ground-based astronomy, the 2600 m high Paranal site with the Very Large Telescope array (VLT) is the flagship facility of European astronomy. Paranal is situated about 130 km south of Antofagasta in Chile, 12 km inland from the Pacific coast in one of the driest areas in the world. Scientific operations began in 1999 and have resulted in many extremely successful research programmes.

The VLT is a most unusual telescope, based on the latest technology. It is not just one, but an array of four telescopes, each with a main mirror of 8.2 metres in diameter. With one such telescope, images of celestial objects as faint as magnitude 30 have been obtained in a one-hour exposure. This corresponds to seeing objects that are four billion times fainter than those seen with the naked eye.

ESO's first site at La Silla.

One of the most exciting features of the VLT is the option to use it as a giant optical interferometer (VLT Interferometer or VLTI). This is done by combining the light from several of the telescopes, including one or more of four 1.8-metre moveable Auxiliary Telescopes. In this interferometric mode, the telescope has a vision as sharp as that of a telescope the size of the separation between the most distant mirrors. For the VLTI, this is 200 metres.

Each year, about 2000 proposals are made for the use of ESO telescopes, requesting between four and six times more nights than are available. ESO is the most productive ground-based observatory in the world, which annually results in many peer-reviewed publications: in 2008 alone, 700 refereed papers based on ESO data were published.

As soon as the Sun has set the telescopes are pointed to the first sky objects to be observed that night.

The Atacama Large Millimeter/submillimeter Array (ALMA), the largest ground-based astronomy project in existence, is a revolutionary facility for world astronomy. ALMA will comprise an array of 66 giant 12-metre and 7-metre diameter antennas observing at millimetre and submillimetre wavelengths. Construction of ALMA began in 2003 and it will start scientific observations in 2011. ALMA is located on the high altitude Llano de Chajnantor, at 5000 m elevation. The ALMA project is a partnership between Europe, East Asia and North America, in cooperation with the Republic of Chile. ESO is the European partner in ALMA.

The Chajnantor site is also home to the 12-metre APEX millimetre and submillimetre telescope, operated by ESO on behalf of the Onsala Space Observatory, the Max Planck Institute for Radio Astronomy and ESO itself.

The next step beyond the VLT is to build the European Extremely Large optical/infrared Telescope (E-ELT) with a primary mirror 42 metres in diameter. The E-ELT will be "the biggest eye on the sky" — the largest optical/near-infrared telescope in the world and ESO is drawing up detailed construction plans, together with the scientific community in its member states. The E-ELT will address many of the most pressing unsolved questions in astronomy. It may, eventually, revolutionise our perception of the Universe, much as Galileo's telescope did, 400 years ago. The go-ahead for construction is expected in late 2010, with the start of operations planned for 2018.

The ESO Headquarters are located in Garching, near Munich, Germany. This is the scientific, technical and administrative centre of ESO where technical development programmes are carried out to provide the observatories with the most advanced instruments. It is also home for the Space Telescope — European Coordinating Facility, operated jointly by ESO and the European Space Agency.

The annual member state contributions to ESO are approximately 135 million € and ESO employs around 700 staff.

A view towards the west of the Japanese ALMA antenna and the Operational Support Facility at sunset.

An artist's impression of the E-ELT mirror in close-up.

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Foreword

One of the most important achievements for ESO in 2008 has been the new management organisation, put in place by the ESO Director General. With the creation of four main directorates, ESO management now has a new configuration, tailored to meet the challenges that ESO faces today: operating Paranal and La Silla, completing ALMA and preparing for the E-ELT. In addition to these challenging programmes, ESO is also increasingly becoming the leading organisation for astronomy in Europe, as the number of member states has grown continuously. In the near future, ESO may play the same role for European astronomy that CERN does for particle physics. The restructured management should help ESO to fulfil the important task of supporting the European astronomy community in the best possible way.

In this short foreword it is impossible to give proper credit to all the outstanding scientific and technical results obtained with ESO telescopes. This report highlights some of them, but it is, of course, just a small fraction of the many important research projects carried out over the year. European astronomers recognise the importance of the facilities offered by ESO to maintain their position at the forefront of astronomical research.

ESO's continued success demonstrates what can be achieved when countries decide to join together in a common effort. ESO can, and indeed should, deal with projects that exceed the capability of individual member states, but for this to happen, the support of the member states must remain at the highest level. This was true for the VLT; it should be the same for the next large endeavour, the European Extremely Large Telescope. It will be a challenging project in every respect: technically, programmatically and politically. Design studies, and the manufacturing of key subsystem prototypes have made great progress in 2008, and there are very good prospects that the end of this design phase will be completed by mid-2010. But, even if member states express their good will for this project, there is still a long way to go before achieving the final agreement to start construction, including securing its funding. The next two years are crucial for a timely start.

In this situation, the European *Astronomy Infrastructure Roadmap*, prepared by ASTRONET, is a very strong signal in favour of the E-ELT. For the first time, the whole European astronomical community has defined its priorities for new infrastructures, taking a comprehensive view, considering space-borne and ground-based observatories, and covering the entire electromagnetic spectrum from gamma rays to radio astronomy. ESO, with its VLT, VLTI and ALMA has been recognised as a key part of this future, and the ASTRONET Roadmap identifies the E-ELT as a top priority, acknowledging that everything is being put in place to enable a rapid decision. This should help in the decision process, and ESO should continue to work with the ASTRONET funding agencies on the Roadmap implementation.

The fact that several European countries who are not yet members of ESO have expressed an interest in joining ESO in the near future is also a sign of the vitality and attractiveness of the organisation. We have been very pleased with the accession of Austria, recognising the additional strength that it will bring to the organisation.

Over the recent years, ESO has been able to maintain a prominent role as an observatory, while actively pursuing new and ambitious projects like the second generation instruments for the VLT/VLTI, ALMA and the design studies for the E-ELT. This has been achieved through the immense dedication of the whole ESO staff, and the commitment of the Directors General. A good relationship between the Council and the ESO management has also been key to this success. I would like to thank the previous Council President, Richard Wade, for his work during the last three years, which has been very helpful in maintaining this collaborative spirit among the member states and with the organisation.

President of the ESO Council
Dr. Laurent Vigroux

Introduction

The year 2008 saw much progress on all aspects of ESO's ambitious programme, including major scientific discoveries, delivery of new telescopes and instrumentation and continued strong support from the member states.

New member states

In June, Austria signed the accession agreement, successfully concluding a courtship which commenced more than three decades ago. Austria will become ESO's 14th member state upon completion of the ratification procedure. It is a pleasure to welcome the Austrian scientific community to ESO, and I look forward to an active Austrian contribution to ESO's entire programme. In view of the expected further expansion of ESO's programme, Council adopted a new policy for candidate member states, which includes the possibility of non-European member states.

Science

The demand on ESO telescopes continues to increase, with 925 (Period 82) and 961 (Period 83) proposals submitted. No other observatory provides data for more refereed publications than ESO. Highlights of the past year include the accurate measurement of the motions of many stars orbiting the supermassive black hole at the Galactic Centre based on 16 years of observations with telescopes on La Silla and Paranal; the first VLTI high resolution survey with AMBER of intermediate-mass infant stars; a remarkable spectro-astrometric study of protoplanetary discs with CRIRES; direct imaging of a planet in the debris disc surrounding the star Beta Pictoris; study of the cold gas in star-forming regions with LABOCA on APEX; the deepest-ever ground-based U-band image of the Universe obtained with VIMOS; and a stunning picture of Jupiter taken by MAD.

Operations

The month of May marked ten years since First Light at the VLT, followed by the first Call for VLT (UT1+FORS1/ISAAC) Proposals in Period 63 issued in September 1998. The complete first generation infrastructure of VLT/VLTI is operational, the first second generation instrument, X-shooter, has already been installed, PRIMA is being commissioned as the next large VLTI infrastructure, and Paranal justifiably prides itself on achieving a world-leading on-sky efficiency.

A special event occurred in March, when the filming of the climactic ending of the latest James Bond movie, *Quantum of Solace*, took place on Paranal. While the telescopes do not feature in the movie, the cinematic destruction of the Residencia was seen all over the world, and the whole event generated much publicity for ESO.

VLT instrumentation developments

There was good progress on the other second generation instruments KMOS, MUSE, SPHERE, GRAVITY and MATISSE, and on the VLT Adaptive Optics Facility.

Survey telescopes

The M1 and M2 mirror units for the VLT Survey Telescope (VST) were completed in Italy, and will be installed during 2009. The wide-field camera OmegaCAM, which had been in storage at ESO Headquarters, has also been shipped to Paranal. The primary mirror of VISTA finally arrived on Paranal, by coincidence right in the middle of the shooting of *Quantum of Solace*, and the telescope achieved first light in mid-year. As the year ended, the commissioning of VISTA continued, but the hope is that regular survey operations can start late in 2009.

ALMA

ESO represents Europe in the construction of the Atacama Large Millimeter/submillimeter Array on the Chajnantor plateau in northern Chile. ALMA is a global astronomy project carried out in partnership with North America and East Asia. ESO is responsible for the front ends, antennas, roads, power supply, and various buildings. In the past year the giant Technical Building at the Observatory Support Facility south of San Pedro de Atacama was completed. The custom-built antenna transporters now routinely move antennas in Chile.

The year also saw a change in leadership at ALMA. After five years of dedicated service Massimo Tarenghi stepped down as ALMA Director. Thijs de Graauw succeeds him.

European Extremely Large Telescope

The design study for the European Extremely Large Telescope (E-ELT) made excellent progress in its second year, in close cooperation with industry. The activity includes the Active Phasing Experiment on the VLT, intended to characterise four different methods of phasing a segmented mirror.

The E-ELT is not only the highest priority new programme for ESO, it is also the highest priority near-term project for ground-based astronomy identified in the *ASTRONET Infrastructure Roadmap*, and it is one of only two astronomy projects on the high-profile ESFRI list of research infrastructures. The ESO Council is actively engaged in the development of a funding scenario that will make this possible.

Organisation

Early in the year a new management structure was implemented with four main directorates — for Science, Operations, Programmes and ALMA, as well as "cross-directorate" services (Administration, Software Development, Human Resources). A single IT Department, consisting of two groups, one in Chile and one in Garching was created within the Software Development Division. It provides IT services to the whole organisation. The Observing Programmes Office, formerly known as the Visiting Astronomers Section, the programme scientists and the Outreach Department were transferred from the Office of the Director General (ODG) to the Directorate for Science and the ODG was augmented by the International Relations Office and the Legal Service.

This year the roles of the ESO science-related committees were clarified and refocused. Council approved new terms of reference for the Scientific Technical Committee (STC) and its three subcommittees, the La Silla Paranal Committee (LSP), the European Science Advisory Committee (ESAC) for ALMA, and the ELT Science and Engineering Committee (ESE). With the help of a Finance Committee Working Group, new Financial Rules and Regulations are being prepared which include the adoption of IPSAS (International Public Sector Accounting Standards) for financial management.

Headquarters building extension

In December the ESO Council approved the selection of the Auer & Weber conceptual design for the planned Headquarters extension. It will consist of an Office Building, which includes a new auditorium and a new Council room, and a separate Technical Building, both connected to the existing building. When completed, the new signature Headquarters will house all ESO personnel in Garching.

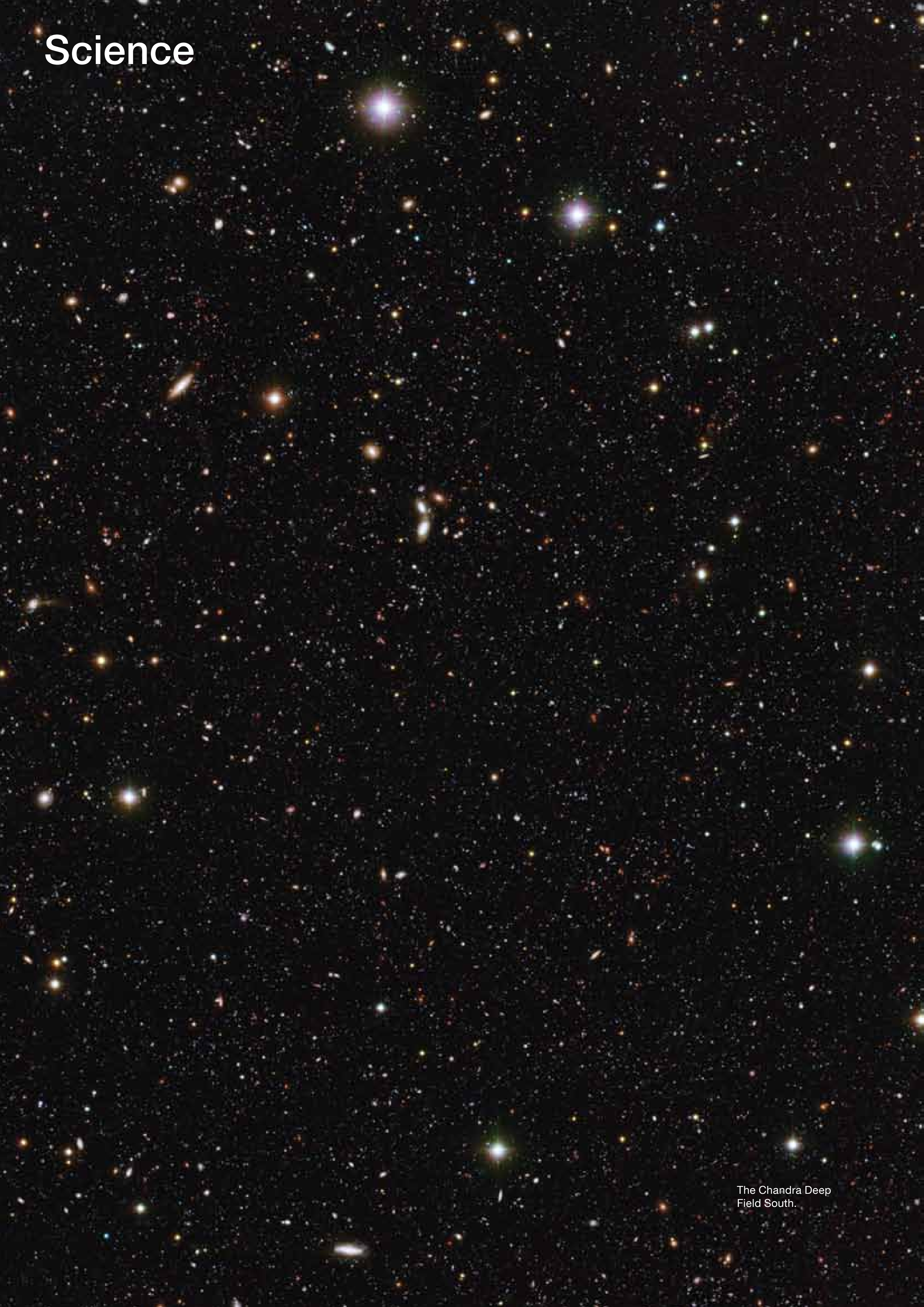
Tim de Z

Prof. Tim de Zeeuw
ESO Director General

The Orion Nebula.

Aerial view of the ESO Headquarters in Garching.

Science



The Chandra Deep
Field South.

Research Highlights

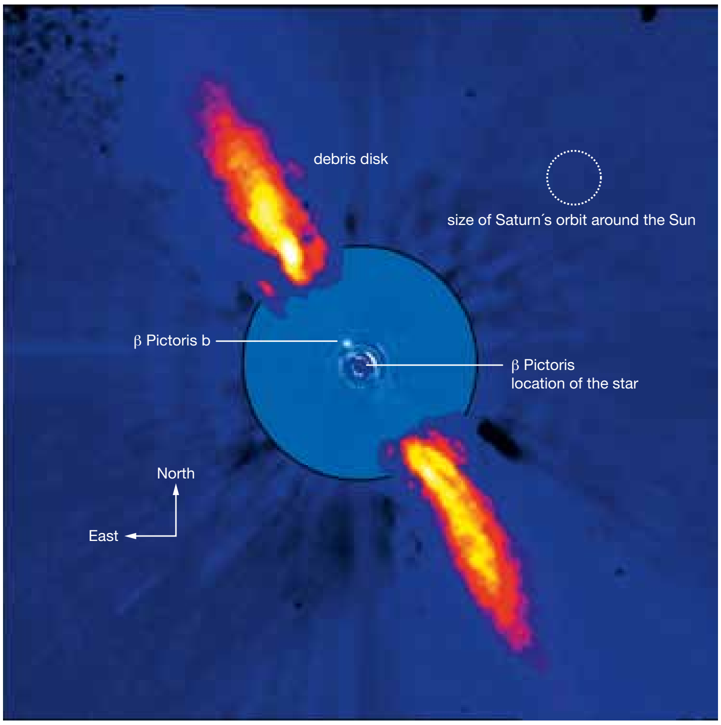
The La Silla Paranal Observatory continues to be the most productive astronomical facility in the world. The number of refereed publications per year based on data from ESO telescopes is larger than from any other astronomical organisation. There were 706 publications in refereed journals in 2008, with a marked increase in papers based on APEX observations. The impact of these publications remains high, and above average for the astronomy community in general, demonstrating that ESO telescopes make significant contributions to the understanding of the Universe and its components. The most prolific instruments remain FORS1 and FORS2, together with UVES and ISAAC, the four original instruments on the VLT. They are followed by the newer instruments NACO, VIMOS and FLAMES, which are exploring specific observational niches. The most recent additions to the instrument complement are all still in the initial data-gathering phase and will produce their publications in due course. The same is true for the VLTI instruments AMBER and MIDI, which are beginning to contribute their fair share to the publications list.

ESO has continued its successful fellowship and studentship programmes in Garching and Chile. Many of the postdoctoral fellows have moved on to prestigious positions in astronomy. A recent survey indicated that 92% of all fellows in Garching (this programme started in 1976) are still working as research astronomers. The number of applications to this programme continues to increase and well over 100 applications are received every year. The studentship programme allows young astronomers to experience the scientific environment in an observatory and to be in close contact with the development of technical and operational innovations. In addition, ESO continues to organise workshops and conferences and supports observational schools through tutoring. The visitor programme continues to attract astronomers for extended stays at either Vitacura or in Garching. These regular interactions with the community allow ESO staff to stay connected and provide a good overview of the wishes and requirements of the community.

As in previous years, the scientific highlights range across the whole Universe, with new results on Solar System objects, nearby stars, their dust discs and their planets, interstellar gas and the collective of the Milky Way. ESO telescopes have also observed out to the far reaches in the Universe, detecting molecules at an early phase of the Universe.

The technique of Adaptive Optics (AO) removes the blurring introduced into astronomical images by turbulence in the Earth's atmosphere. The method was pioneered at the 3.6-metre telescope on La Silla more than 20 years ago, and today is a standard tool, used in essentially all the large ground-based telescopes in the world. The major drawbacks of AO are that (a) it requires a relatively bright star near the targets to measure the distortions of the wavefront by atmospheric turbulence, and (b) that these corrections are accurate only over angular distances of a few arcseconds from the targets. In the past few years the use of artificial laser stars has been successfully implemented to solve the first shortcoming, but the second remains a fundamental limitation of conventional adaptive optics systems. A theoretical solution to the problem — atmospheric tomography — has been known for some time. Because the turbulence of the Earth's atmosphere extends from very close to the ground up to several kilometres altitude, several reference stars are needed to calculate the blur produced by atmospheric turbulence over wider angles by reconstructing the 3D turbulence profiles using tomographic techniques. As part of the E-ELT design studies, ESO built an instrument for the VLT to demonstrate atmospheric tomography using a technique called multi-conjugate adaptive optics (MCAO). MCAO uses several (two in the demonstrator) deformable mirrors focused on turbulent layers at two different altitudes. ESO's Multi-conjugate Adaptive-optics Demonstrator (MAD) was so successful that it was opened to proposals from the community in Science Demonstration mode for a total of 23 nights at the visitor focus of UT3. A team of astronomers from the University of Berkeley noticed that during the third MAD Science Demonstration run in August 2008, two of the Galilean moons of Jupiter — Io and Europa — were in a very favourable position to be used as AO references on either side of the planet. Using just these two reference objects MAD was able to obtain the sharpest images of Jupiter ever taken with a ground-based telescope, covering an area almost 30 times larger than that possible with conventional AO instruments. The MAD images of Jupiter are comparable in sharpness with the best images of the planet obtained with the Hubble Space Telescope. With this unique series of images, the team found a major alteration in the brightness of the equatorial haze, which lies in a 16000-km wide belt over Jupiter's equator. More sunlight reflecting from the upper atmospheric haze means that either the amount of haze has increased, or that it has moved up to higher altitudes. Comparison with images taken in 2005 by the Hubble Space Telescope revealed that the brightest portion of the haze had shifted south by more than 6000 kilometres, thus providing important clues to understanding the weather on Jupiter.

Imaging a planet within a debris disc



Detection of a candidate planet in the inner disc of Beta Pictoris.

Imaging a planet outside the Solar System is a formidable technical achievement. Finding the faint "dot" next to the bright star requires the best possible image quality and has only recently become feasible, with either the use of adaptive optics from the ground or dedicated coronagraphic observations from space. The first such planetary object was observed some years ago around a brown dwarf with NACO at the VLT. Most planets have been inferred indirectly through observations of their gravitational effects on their parent star or from the dimming of the stellar light when the planet passes in front of the star. In 2008 several direct detections, i.e., images, of exoplanets were announced by several of the major observatories. Among them is the image of a planet inside the dust disc of the famous object Beta Pictoris, the second brightest star in the constellation of Pictor and one visible to the unaided eye. This object has been known for many years to have a massive dust debris disc, which has been imaged by several groups over the past few decades. The existence of a planet was deduced from the apparent distortion in the disc and the observed infall of comets onto the star. The inner part of the disc is relatively free of matter within 50 astronomical units of the star, which could be due to the presence of a Jupiter-sized planet. Three datasets of differing image quality were extracted from a series of archival NAOS–CONICA observations at a wavelength of 3 microns and examined. By subtracting the point-spread function of an isolated star it was possible to obtain a clean image of the inner region around Beta Pictoris. All three datasets yielded a candidate object at a location of 0.4 arcseconds from the primary and a position angle of 32°.

The detection was confirmed through various tests that considered the faintness of the planet candidate. Since there are no second epoch observations, it is not yet clear whether this object could be a foreground or a background star. However, there are several lines of reasoning indicating why this is unlikely. Given the faintness and the non-detection at optical wavelengths with the Hubble Space Telescope, the object would have to be a very low mass star. Using the number density of such dwarf stars the probability of a chance superposition is about 10^{-10}. Even without restrictions on the type of object this probability would still only be 10^{-5}, making this hypothesis rather unlikely.

Given the distance and age of the parent star Beta Pictoris and the brightness of the candidate planet, its mass can be inferred. Depending on the evolutionary model for planets used, this comes out to be about 8–9 times the mass of Jupiter, orbiting at a projected distance of about eight times the Earth-Sun distance, which is about the distance of Saturn in our Solar System, and still cooling, with a temperature of about 1500 Kelvin. This very nicely confirms the predictions for the planetary-mass object required to shape the observed inner debris disc and provide the source for the comets known to fall onto Beta Pictoris. The final confirmation of this planet should come from observations of a second epoch, which are under way with the VLT.

Based on Lagrange et al. 2009, A&A, 493, L21

Star formation in a bubble

Massive stars have a profound effect on their surroundings. They ionise large regions around them through their extreme ultraviolet luminosity. However, the intense stellar wind also sweeps up the interstellar material and creates cold gas regions where intensive star formation could be expected. Studies of star formation typically require observations at many different wavelengths. Hot gas emits at ultraviolet and optical wavelengths, while warm gas, expected for the first stellar cores as they warm up deep inside a dust cocoon, is best observed in the mid-infrared at wavelengths of several microns. Cold gas needs to be observed at millimetre and submillimetre wavelengths, the domain of the current APEX and the future ALMA instruments. The ionised (H_{II}) region RCW 120 has the rather simple morphology of a bubble and lends itself to studies of star formation in the shell.

Based on Deharveng et al. 2009, A&A, 496, 177

Colour composite of RCW 120. The Hα emission is in red and the emission of cold dust at 870 microns in blue. The transition from ionised, hot inner gas to the outer cold gas is called the ionisation front and can be clearly seen when the optical Hα emission — coming from the ionised hydrogen gas — and the 870-micron thermal continuum radiation from the cold regions are displayed. The cold gas has been observed with the LABOCA on APEX. The dense, cold gas swept up by the H_{II} region encompasses about 2000 solar masses and shows signs of star formation. The H_{II} region has been observed in the thermal infrared with the Spitzer Space Telescope. The shell is clearly fragmenting and displays signs of new stars. Secondary star formation is in full swing (about 40 objects, which could evolve into stars have been detected). One particular object is still very deeply embedded in the dust, but could have a mass of 250 solar masses and appears to be the most massive fragment. Observing objects throughout the electromagnetic spectrum provides astronomers with the full range of information and for the case where the different emission regions can be resolved, gives us detailed images with the various components clearly separated.

The rotation of the Milky Way

The rotation of the Sun around the centre of the Milky Way has been well established, and is based on several different methods. One of the most accurate methods, the distances and radial velocities of Cepheid variable stars, has suffered from a nagging problem. These measurements, if taken at face value, have indicated that the Cepheids were falling towards the Sun with about 2 km/s, independent of the direction in which they were observed. This was a rather peculiar result and needed to be explained.

A small sample of Cepheids was observed with HARPS to check whether internal gas motion in the star's atmosphere could be responsible for the effect. Cepheids are pulsating stars, which means that they change size significantly in a periodic manner as a result of radiative effects. A Cepheid star cannot release energy rapidly enough to establish a stable configuration. Instead a Cepheid will heat up and expand until it is so large that the excess energy can escape, the star cools down and shrinks, and so the cycle begins again. Cepheid cycles are very regular, and the more luminous a Cepheid the longer its pulsation period. This has become known as the period–luminosity relation (sometimes also referred to as the Leavitt law) and has been used to measure the distances to Cepheid stars and hence to establish the current expansion rate of the local Universe.

The odd result concerning the distances and radial velocities of Cepheids within the Milky Way, indicated a fundamental lack in either our understanding of the Galactic rotation or the physics of Cepheids. The HARPS measurements allowed astronomers to measure the line profile of the star over their entire pulsational period. The high spectral resolution of HARPS made it possible to determine that the small line shifts are intrinsic to the Cepheids and need to be taken into account when deriving the radial velocity. The Cepheid atmosphere is strongly affected by pulsational dynamics, convective flows and a rather complex radiative transport mechanism. Which of these effects is dominant is still to be established, but the problem now rests with theorists to detail the atmospheric effects further in these pulsating stars. The observations have proven that the additional effect, when removed from the radial velocity, results in a perfectly smooth Galactic rotation field.

Based on Nardetto et al. 2008, A&A, 489, 1255

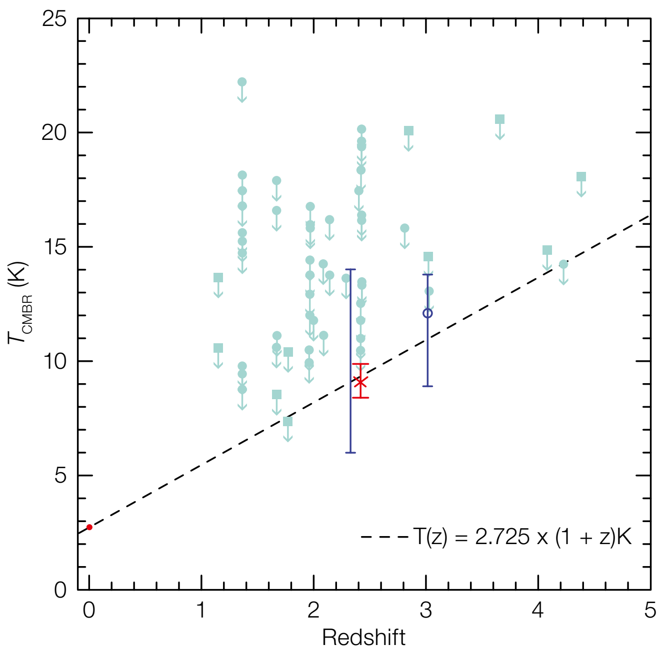
A thermometer at the end of the Universe

According to the Big Bang theory the Universe cooled down from a very hot early phase to its current 2.7 Kelvin, measured in the cosmic microwave background. This means that objects in the early Universe would experience a warmer background radiation than that measured today. It has been exceedingly difficult to measure this temperature in very distant objects.

The UVES spectrograph on UT2 can observe the absorption lines of gas in front of luminous, but very distant, quasars. A large telescope is needed to acquire a spectrum of such a faint object with sufficient signal to explore faint absorption lines. By observing molecular gas at a redshift of 2.42, which corresponds to about 80% of the look-back time to the Big Bang, it was possible to determine the temperature of the cosmic microwave background at that redshift. It corresponds exactly to the prediction of the current leading theory of cosmology.

Observing molecules at high redshift is difficult as their signature lines are very weak. However, it turns out that the number of molecules seems to correlate with the strength of atomic neutral carbon lines, a high metallicity and a particular signature of the abundances of certain elements. Damped Lyman-α absorption systems arise from the densest gas clouds, presumably the precursors of galaxies, known in the distant Universe. Some of these systems do show molecular hydrogen, but very few other molecules. A recent search of about a dozen objects with H_2 absorption for other molecules with the VLT was unsuccessful. However, a candidate object was identified from the Sloan Digital Sky Survey database of quasar spectra, which contains tens of thousands of object spectra. A high resolution spectrum was obtained as part of a Director's Discretionary Time programme with UVES. It was possible to identify lines of molecular hydrogen (H_2), deuterated hydrogen (HD — a hydrogen and a deuterium atom together), carbon monoxide (CO) and atomic neutral carbon (CI), together with many other atomic lines. This is the first detection of these molecular lines in a damped Lyman-α system at such a high redshift. Several absorption line components are blended together and a very careful analysis has been made to disentangle the different contributors to the absorption lines. With this delicate treatment the individual column densities can be derived and compared. Lines from 11 different chemical elements can be identified. Also several rotationally excited transitions from neutral and singly ionised elements have been observed. While the abundance of sulphur and zinc appears similar to that in the Sun, silicon and iron show a much lower abundance, presumably because they have been depleted onto dust grains, as is also observed in the cold gas in our Milky Way. The kinetic temperature in the gas can be derived from the molecular hydrogen transition. The density of the carbon monoxide is also determined. The ratio of these two molecules is similar to that measured along Galactic sightlines, but is much less than that derived in dense molecular clouds. The rotational energy of the carbon monoxide lines is twice what is observed in the diffuse Galactic interstellar medium. Since other excitation mechanisms can be excluded it follows that the carbon monoxide is heated by the cosmic microwave background. The measured temperature is fully consistent with the adiabatic evolution of the cosmic ray background temperature in the standard Big Bang model.

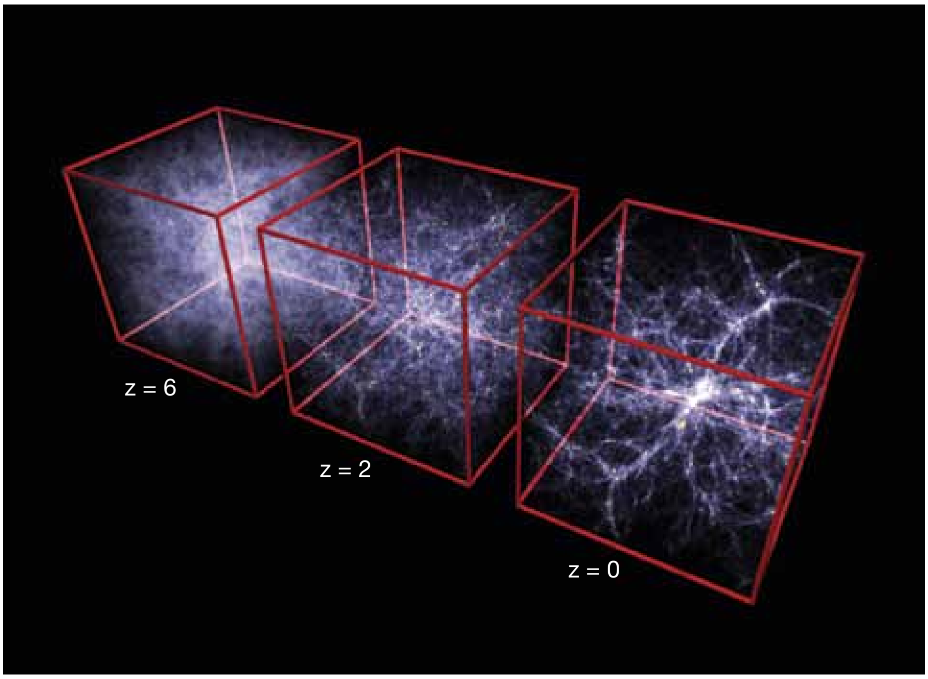
Based on Srianand et al. 2008, A&A, 482, L39



Different measurements of the cosmic microwave background temperature at different redshifts. The red point is the new determination. The blue lines are previous determinations based on UVES. The light blue arrows indicate upper limits. The line gives the expected relation of the temperature as a function of redshift, according to the standard Big Bang model.

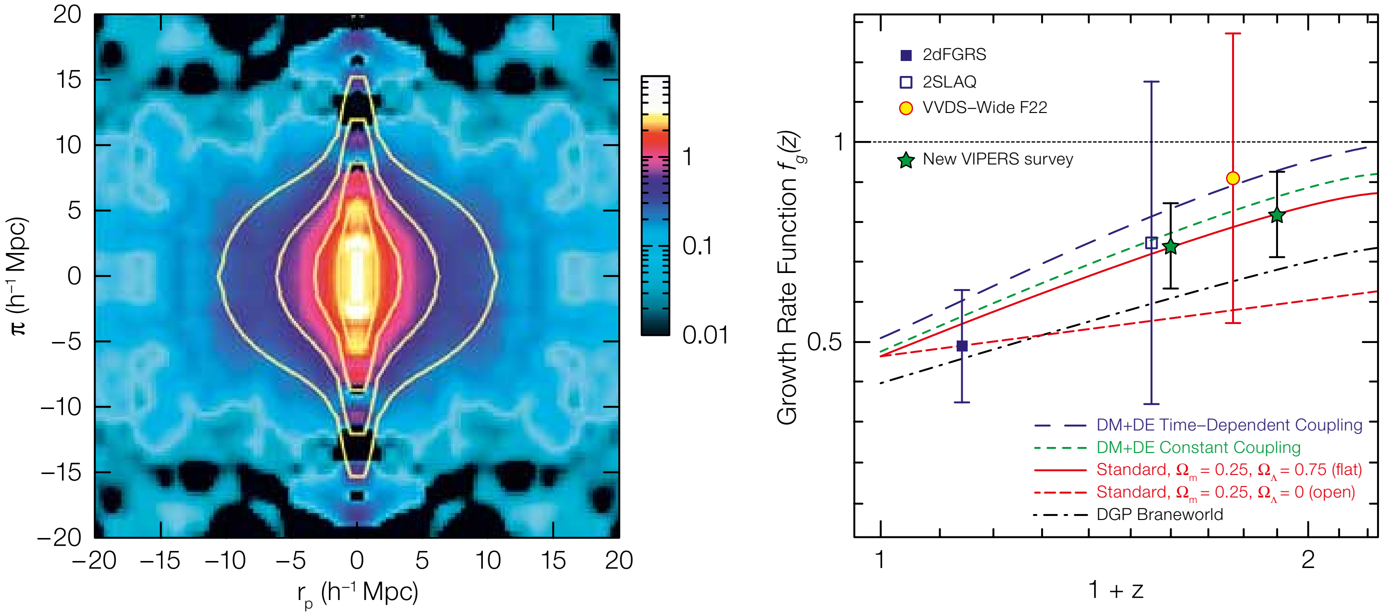
Constraining dark energy

Although astrophysics is primarily the science of gravity, there are only a handful of astrophysical problems that deal with the fundamentals of gravitation. One of them concerns the nature of the mysterious force that seems to be accelerating the expansion of the Universe. Within the framework of Einstein's general relativity, the accelerating expansion originates from a pervasive field of negative pressure, which is now universally known as dark energy. In order to accelerate the expansion, dark energy must have negative pressure, but very little is known



Credit: V. Springel et al. (MPA)

Computer simulation of the formation of structure in the Universe within a volume of 50 Mpc. The simulation starts at redshift $z = 6$, when the Universe was just a few percent of its present age and ends at the present age, $z = 0$. The rate at which structures grow in the Universe provides a way of measuring the strength of gravity.



Left: Estimate of the degree of distortion induced by coherent motions on the measured large-scale distribution of galaxies at high redshift. For a given mean density of matter, the distortion depends on the amount of dark energy and is quantified by the level of anisotropy in the correlation in position and velocity among galaxy pairs (the so-called correlation function). The figure shows a colour-coded representation of the galaxy correlation function measured using ~6000 galaxy redshifts with $0.6 < z < 1.2$ (effective redshift $\langle z \rangle = 0.77$). The intensity describes the measured degree of correlation as a function of the transverse (r_p) and radial (π) separation of galaxy pairs. The actual measurement is replicated over four quadrants to show the deviations from circular symmetry. Galactic peculiar velocities combine with the cosmological expansion to produce the distorted pattern when the redshift is used as a distance measure. In the absence of peculiar motions the contours would be perfect circles. The effect of galaxy infall caused by the growth of large-scale structure is evident in the flattening of the large-scale levels (blue-green). The small-scale elongation along π (white–yellow–red contours) is the result of the high-velocity-dispersion pairs in groups and clusters of galaxies.
Right: Estimates of the growth rate of cosmic structure as a function of redshift compared to predictions from various theoretical models as indicated in the figure. The new VLT measurement at $z = 0.77$ (red circle) is shown, together with the results from previously published observations at lower redshifts. The (DGP) braneworld model is one possible modification of gravity that adds extra dimensions to spacetime. The two stars with small error bars show the level of accuracy that will be achieved with the VIPERS survey that is now ongoing at the VLT.

about the (energy) density of this field. In particular, if the energy density, r, of the field is constant (does not change with time and is the same everywhere) and its pressure P is equal to minus one times the energy density (P = –r), then dark energy would correspond to the famous cosmological constant introduced by Einstein and would indeed be a fundamental property of the fabric of spacetime. The alternative, that dark energy is a time evolving field, is equally puzzling and fundamental because this field (also known as quintessence) would still contain more than 70% of the energy density of the Universe. In either case the observed strength of dark energy is not predicted by current theories of particle physics, so a better understanding of its properties would have profound consequences for our understanding of how nature works. Not surprisingly, dark energy has attracted a very strong interest among physicists and astronomers and large consortia are now actively involved in planning and/or executing massive surveys aimed at unravelling the mysteries of dark energy.

An alternative explanation to the accelerating expansion could be that general relativity does not hold on very large scales and needs to be modified. This corresponds to modifying the left-hand side of the Einstein equations, which would allow observations of the cosmic expansion to be described similarly well. A modification of gravity, however, also has an impact on the growth rate of structure in the Universe, allowing us to discriminate between these scenarios. The Universe as a whole expands, but locally regions that are more dense than average actually collapse to form large filaments, clusters and groups of galaxies, and other structures. Thus, as it evolves, the Universe acquires more and more structure. This growth of structure is illustrated (see page 15) by a computer simulation showing the development of structure in a region roughly 50 million parsecs (Mpc) across. The rate at which these structures get denser as a function of redshift is related to the strength of gravity. To shed light on the mystery of dark energy astronomers must determine both the expansion rate of the Universe as a function of redshift and the rate at which structures grow and become denser. This kind of study requires the redshifts of hundreds of thousands of galaxies to be measured with good accuracy over a significant range of redshifts.

Over the past few years, a consortium of astronomers has been conducting such a programme using the VLT VIMOS instrument. VIMOS allows accurate velocities to be measured simultaneously for more than 500 galaxies. VIMOS data were used to compile a catalogue of about 10 000 velocities that was then used to investigate the nature of dark energy by observing the distortions of the universal expansion over wide angular distances. The figure in the left image on the opposite page shows the galaxy auto-correlation function in redshift space plotted as a function of galaxy separation parallel (π) and perpendicular *(r_p)* to the line of sight and calculated over a volume of slightly more than 6 million cubic Mpc at an effective redshift of $z = 0.77$ (corresponding to the time when the Universe had about half its present age). The ellipticity of the outer contours (far from the centre and where the physics is dominated by strongly nonlinear effects) provides a measure of the strength of gravity in the weak-field regime.

Comparison with similar observations at lower redshifts from previous surveys using smaller telescopes allows both the equation of state of dark energy and the physics of gravity to be constrained. The comparison is shown in the graph on the opposite page. Clearly the error bars are still much too large to place useful constraints on either dark energy or gravity, but the team is now engaged in a survey ten times larger on the VLT that should collect velocities for 100 000 galaxies, and which will allow them to reduce the error bars by a factor of four, and thus begin to provide critical clues about the nature of dark energy. The expected constraints from this new survey (VIPERS) are shown as stars in the graph, assuming, of course, that the standard cosmological model with cosmological constant (red solid line) is the correct one!

Based on Guzzo et al., Nature 451, 541

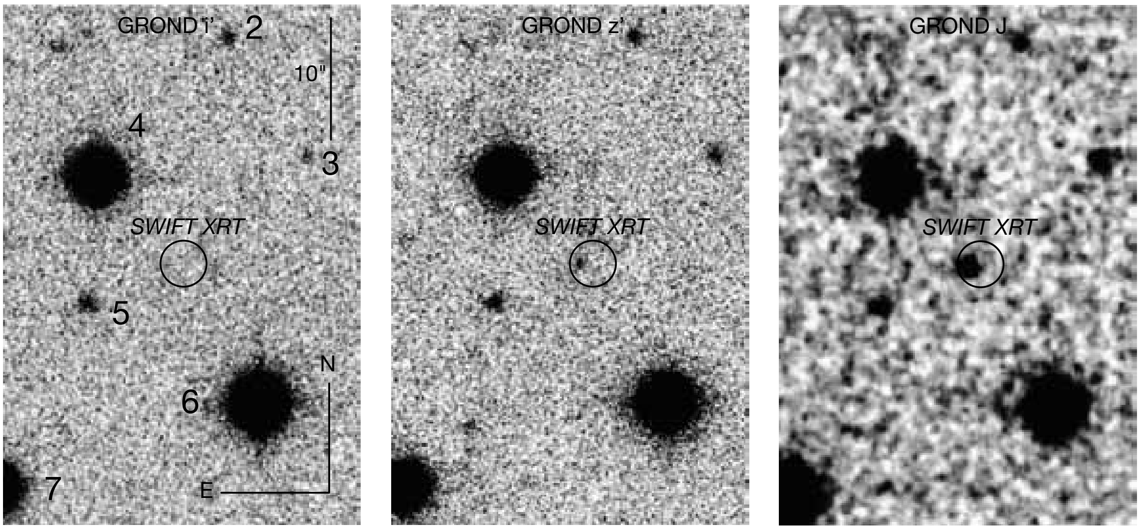
Gamma-ray bursts

For a few minutes gamma-ray bursts are the most luminous objects in the Universe. They then fade rapidly and within in a few days or weeks have disappeared beyond the reach of even the most powerful telescopes in the world. The burst of gamma rays itself is extremely short, so the identification of the sources for subsequent follow-up with large telescopes relies on X-ray images taken by instruments onboard the same satellites that detect the gamma radiation. Owing to the combination of its different instruments, and the increased sensitivity, the international Swift satellite has been incredibly successful, detecting gamma-ray bursts at an average rate of about 100/yr and occasionally more than one burst per day. Data from the previous generation of satellites showed that the progenitors of gamma-ray bursts (or GRBs as they are best known) are at cosmological distances and therefore, owing to their extremely high luminosities, can be used to probe the physics of galaxies at large redshifts, and even to measure cosmological parameters.

Understanding the physics of GRBs is a fundamental challenge to observers and theoreticians. Most researchers agree that GRBs are caused by the ejection of a highly relativistic collimated outflow of matter — a jet produced by a newly formed black hole. GRBs seem to come in two flavours: the fast and the slow, with the occasional ugly interloper. The dividing line between the short and long bursts is at about 2 seconds. There is now a substantial body of evidence, to which ESO telescopes have contributed substantially, that long bursts are produced by the extremely energetic supernova explosions that occur when massive stars collapse to form black holes at the ends of their lives. The origin of the short bursts is still debated among astronomers, but there seems to be a general consensus that they are likely to originate from the coalescence of two compact objects (such as black holes or neutron stars) in binary systems. Again ESO telescopes are contributing valuable insights to this debate.

The combination of four 8-metre-class telescopes with a large suite of instruments and the Rapid Response Mode (RRM) has made the VLT the most important player in the study of the physics of GRBs, their environment, and their use as cosmological probes. In addition, the scientific community has installed two robotic telescopes on La Silla, REM and TAROT, that can react to GRB alerts in a matter of minutes, so the light curves of these events can be followed from almost immediately after the explosions. These telescopes move extremely fast, but are also relatively small, so there are many GRBs that they cannot follow, or that they cannot detect at all. Another instrument dedicated to observing GRBs, called GROND, has been installed by a German team at the MPG/ESO 2.2-metre telescope on La Silla. GROND observes in seven bands, from the optical to the near-infrared, simultaneously, so it can detect and obtain photometric redshifts of even the most distant (and therefore reddest) objects. It is able to filter a significant number of Swift alerts before triggering follow-up observations with the VLT. With the VLT/RRM, REM, TAROT and GROND, the ESO community is at the forefront of GRB research and the results have been truly spectacular.

GROND discovered the most distant GRB known to date. GRB 080913 (the number indicates that this was discovered on 13 September 2008) has a spectroscopic redshift measured with the VLT of $z = 6.7$.

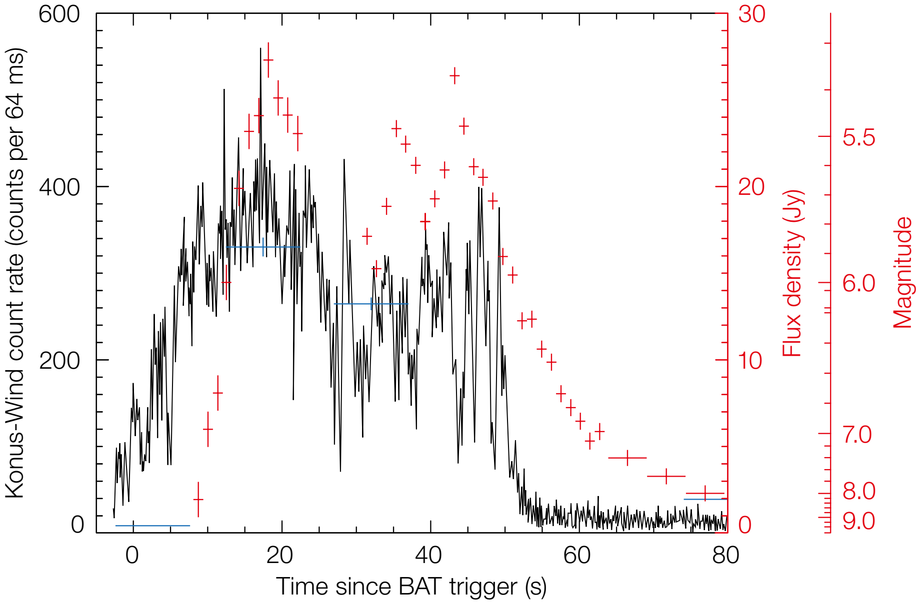


GROND images of the most distant GRB known at three different wavebands, peaked approximately at 780 nm, 900 nm and 1200 nm. Notice that the source is not detected in the shortest wavelength band.

(The previous record holder, GRB 050904, had a redshift of $z = 6.29$.) The figure above shows the GROND images of GRB 080913 in three red bands (i',z',J) from left to right. The object is not detected at wavelengths bluer than the z' band at 900 nm, providing a strong indication that it lies at a very high redshift — although GRBs highly reddened by interstellar extinction are also known to exist. The seven-band data of GROND allowed the team to estimate a photometric redshift of about $z = 6.4$ that immediately led them to trigger the observations with the VLT that obtained a spectroscopic redshift of $z = 6.7$. The light from GRB 080913 has taken almost 13 billion years to reach us.

The most distant galaxies for which a redshift has been measured spectroscopically have $z \sim 7$, so GRB 080913 is indeed close to the visible edge of the Universe. In spite of its remoteness, the intrinsic properties of GRB 080913 are typical of a long-duration burst, indicating that even when the Universe was only 6% of its present age, massive stars were not substantially different from those today. When compared with the properties of GRB 050904, the other GRB known at $z > 6$, the new record-holder has a substantially shorter duration, a lower gamma-ray luminosity, and a much dimmer afterglow, indicating that even at $z = 6.7$ GRBs show the same diversity as observed in bursts at low z.

Another striking GRB observation took place, this time serendipitously, in March 2008. The REM telescope on La Silla was following a recent burst using a wide-field-of-view host instrument called TORTORA (Telescopio Ottimizzato per la Ricerca dei Transiti Ottici RApidi) when a second burst exploded within its field of view, roughly 10 degrees from the first. So fortuitously, in a time span of 30 minutes there were two GRBs separated by less than 10 degrees in the sky! Not only that, but the second turned out to be the brightest GRB ever observed. Since GRBs are objects of great interest, there are typically several other telescopes around the world that are following any given explosion. The object observed by TORTORA was also being followed by other telescopes, and in particular, by the KONUS gamma-ray detector onboard the Wind satellite. The figure below shows



Prompt emission light curve of GRB 080319B. The optical emission observed by TORTORA (red) begins within seconds of the onset of the burst. The optical curve shows three peaks reaching a (white) magnitude of 5.3, while the gamma-ray light curve shows multiple short peaks. Although there is no detailed correlation between the gamma and the optical peaks, the optical flash begins and ends at approximately the same time as the prompt gamma-ray emission, providing strong evidence that they originate at the same site.

the optical and gamma-ray light curves in the first 80 seconds after the burst was first detected by Swift. The La Silla observations (TORTORA) are shown in red and the KONUS-Wind gamma-ray curve in black. The blue points show observations by another robotic telescope on Las Campanas. During the first minute GRB 080319B reached a (white) magnitude of 5.3, making it the brightest GRB ever observed. As it later turned out, GRB 080319B is at a redshift of $z = 0.94$, so anyone looking at the sky from a dark site in March 2008 would have been able to see an object at $z \sim 1$ — an object lying more than halfway across the Universe — with the unaided eye!

The exceedingly good time resolution provided by the TORTORA observations coupled with the gamma-ray light curve from KONUS-Wind and observations with several other telescopes from X-rays to radio has provided invaluable information about the physics of GRBs. For example, the temporal coincidence between the optical flash and the gamma-ray burst, something that had not been possible to ascertain before, suggests that the prompt optical and gamma-ray emission originate from the same physical region. However, the detailed structure of the light curve indicates that the optical flash did not arise from a reverse shock that decelerates the outflow as it sweeps up the external medium, although there is solid evidence that the explosion did indeed take place inside the wind of the progenitor star. All in all, the observations of GRB 080319B provided a wealth of invaluable information to refine our understanding of the physics of GRBs. Astronomers now know, for example, that the unusually large optical luminosity of the burst arises from the exceedingly large bulk Lorenz factor of the outflow. In other words, the flow is extremely well collimated and expands at 99.9997% of the velocity of light — the ultimate limit — pointing almost directly towards us.

Based on Racusin et al. 2008, Nature, 455, 183 and Greiner et al. 2009, ApJ, 693, 1610

The amazing intricacies of the stellar nursery Gum 29.

Allocation of Telescope Time

OPC Categories and Subcategories

The scientific categories referred to in the following tables correspond to the Observing Programmes Committee (OPC) classification given below:

A: Cosmology
A1 Surveys of AGNs and high-*z* galaxies
A2 Identification studies of extragalactic surveys
A3 Large scale structure and evolution
A4 Distance scale
A5 Groups and clusters of galaxies
A6 Gravitational lensing
A7 Intervening absorption line systems
A8 High redshift galaxies (star formation and ISM)

B: Galaxies and Galactic Nuclei
B1 Morphology and galactic structure
B2 Stellar populations: unresolved and resolved
B3 Chemical evolution
B4 Galaxy dynamics
B5 Peculiar/interacting galaxies
B6 Non-thermal processes in galactic nuclei (incl. QSRs, QSOs, blazars, Seyfert galaxies, BALs, radio galaxies, and LINERS)
B7 Thermal processes in galactic nuclei and starburst galaxies (incl. ultra-luminous infrared galaxies, outflows, emission lines, and spectral energy distributions)
B8 Central supermassive objects
B9 AGN host galaxies

C: Interstellar Medium, Star Formation and Planetary Systems
C1 Gas and dust, giant molecular clouds, cool and hot gas, diffuse and translucent clouds
C2 Chemical processes in the interstellar medium
C3 Star forming regions, globules, protostars, HII regions
C4 Pre-main-sequence stars (massive PMS stars, Herbig Ae/Be stars and T Tauri stars)
C5 Outflows, stellar jets, HH objects
C6 Main-sequence stars with circumstellar matter, early evolution
C7 Young binaries, brown dwarfs, exosolar planet searches
C8 Solar system (planets, comets, small bodies)

D: Stellar Evolution
D1 Main-sequence stars
D2 Post-main-sequence stars, giants, supergiants, AGB stars, post-AGB stars
D3 Pulsating stars and stellar activity
D4 Mass loss and winds
D5 Supernovae, pulsars
D6 Planetary nebulae, nova remnants and supernova remnants
D7 Pre-white dwarfs and white dwarfs, neutron stars
D8 Evolved binaries, black-hole candidates, novae, X-ray binaries, CVs
D9 Gamma-ray and X-ray bursters
D10 OB associations, open and globular clusters, extragalactic star clusters
D11 Individual stars in external galaxies, resolved stellar populations
D12 Distance scale stars

Percentage of scheduled observing time/telescope/instrument/discipline

Telescope	Instrument	Scientific Categories A	B	C	D	Total
2.2-metre	FEROS	0	8	27	49	84
	WFI	9	4	3	0	16
Total		**9**	**12**	**30**	**49**	**100**
3.6-metre	HARPS	0	2	78	20	100
Total		**0**	**2**	**78**	**20**	**100**
NTT	EFOSC2	16	13	16	17	62
	SOFI	4	4	13	9	30
	Special NTT	0	1	7	0	8
Total		**20**	**18**	**36**	**26**	**100**
APEX	APEX-2A	0	2	9	4	15
	LABOCA	15	18	15	5	63
	SHFI	0	10	11	1	22
Total		**25**	**30**	**35**	**10**	**100**

Telescope	Instrument	Scientific Categories A	B	C	D	Total
UT1	CRIRES	0	0	18	12	30
	FORS2	23	11	6	7	47
	ISAAC	6	3	7	7	23
Total		**29**	**14**	**31**	**26**	**100**
UT2	FLAMES	0	6	6	22	34
	FORS1	7	5	2	14	28
	UVES	7	5	10	16	38
Total		**14**	**16**	**18**	**52**	**100**
UT3	VIMOS	51	17	9	5	82
	VISIR	0	6	7	5	18
Total		**51**	**23**	**16**	**10**	**100**
UT4	HAWK-I	14	2	6	2	24
	NACO	1	5	21	7	34
	SINFONI	21	15	5	1	42
Total		**36**	**22**	**32**	**10**	**100**
VLTI	AMBER	0	0	34	36	70
	MIDI	0	5	5	20	30
Total		**0**	**5**	**39**	**56**	**100**

VLT mirror cleaning.

Credit: ESO/Y. Beletsky

Outreach

An external in-depth review of the various outreach activities at ESO was conducted in 2008. This resulted in a report with 13 detailed recommendations. One of these was to merge all the existing education and public outreach (EPO) resources at ESO into one group to benefit from the synergy that would arise. The merger began on 1 September and a new Head of Department was appointed after eight months of interim leadership by Bob Fosbury (ST-ECF). A joint strategy was written to capture the many inputs from the internal and external EPO experts involved. This detailed 100-page strategy document extends across the whole range of departmental activities from the Vision statement to details of the precise implementation, including individual objectives and deliverables. The strategy focuses on improving the operation of the new ESO education and Public Outreach Department (ePOD) in the critical areas of press releases, image production from raw science data, exhibitions, print products, web services, audiovisual production and more.

The resulting synergy has made it possible to appoint dedicated Public Information Officers (PIOs) for the most important ESO projects (ALMA/APEX, E-ELT, La Silla Paranal and the new Survey Telescopes), each developing press releases, web pages, background stories, print products and more.

The new ePOD serves four organisations: ESO, ST-ECF (ESA/Hubble), the International Year of Astronomy 2009 (IYA2009) and the International Astronomical Union (IAU).

The mission of ePOD is:

- To increase awareness of ESO and ESO's projects, ESA and ESA's involvement in the Hubble Space Telescope, the International Year of Astronomy 2009 and the International Astronomical Union through production of excellent EPO materials targeted towards the community of media, educators, decision-makers, the scientific community, local communities and the public.

- To promote astronomy and the scientific process as a fundamental part of our culture and heritage.

- To propagate the awareness that Europe is a major player in ground-based astronomy with ESO and in space-based astronomy with ESA.

- To contribute to the strengthening of European and global astronomy communication.

The department now has seven main groups: a) the PIOs, b) ePOD Chile, c) Advanced Projects (development of outreach applications and technical solutions), d) Images (scouting/acquisition, processing and archiving), e) the International Year of Astronomy Secretariat (2008—2010), f) Audiovisual Coordinators and g) Audiovisual Assistants. Individual staff assignments in the different areas are fluid and are addressed on a project-to-project basis (matrix-structure).

ePOD continues to be a horizontal service to ESO employees, but with the focus on long-term strategic gains to optimise the visibility of the organisation.

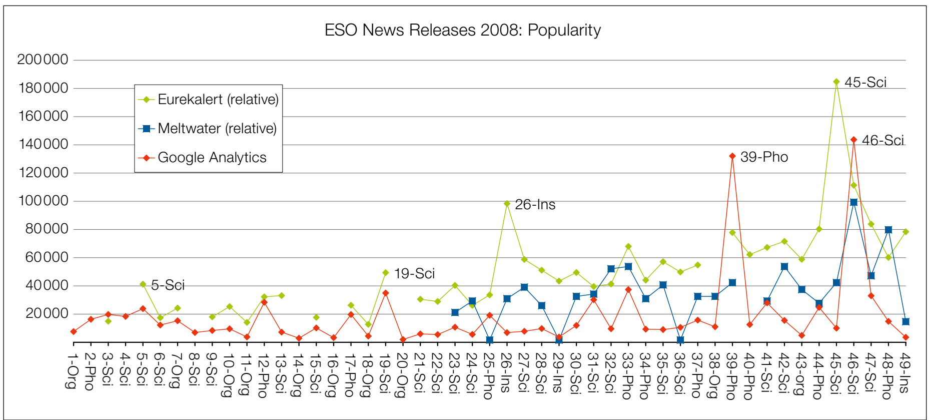
In short, all outreach at ESO has been restructured into an integrated department with a coherent strategy. Production has visibly increased, and the department can claim to be a world leader in several EPO areas such as video production/distribution, production of images from raw data and event management (as seen in the case of the International Year of Astronomy 2009).

Press activities

Press activity has been above average this year and the resulting press coverage was fully satisfactory. ESO had 49 press releases (down 11%), ESA/Hubble had 23 releases (up 15%) and the IAU had 10 releases (up 350%). In each case, great care was taken to provide high quality visual support, often including HD video material.

Targeted efforts were put into collaborating with other institutions to make co-releases, thereby amplifying the impact.

The special "Bond at Paranal" campaign coincided with the release of the James Bond movie, *Quantum of Solace*, and succeeded in raising considerable interest in both ESO and the VLT, notably reaching audiences who are not normally exposed to — and do not normally seek — information about science, such as film devotees, architecture connoisseurs and others. A dedicated website, targeted at



Relative popularity of individual ESO press releases as measured by three different methods. In blue, Meltwater online media coverage, in red, hits per release (measured with Google Analytics) and in green, Eurekalert (a portal for journalists) hits. Note that the scale is different for the three estimators.

this less mainstream astronomy audience, was set up and efforts were made on YouTube, Myspace etc. A very successful press visit by the European media to ESO sites resulted in wide coverage and long-term interest, including in new (Austria) and potential (Ireland) member states.

A “10 years of VLT” campaign celebrated the 10th anniversary of First Light at the VLT with several visible products.

ePOD was invited to present ESO’s vision on media relations at an AlphaGalileo meeting in Paris.

As part of the new workflow, a well-defined set of success estimators was set up for evaluation purposes. The figure on the opposite page shows some the estimators used for press releases.

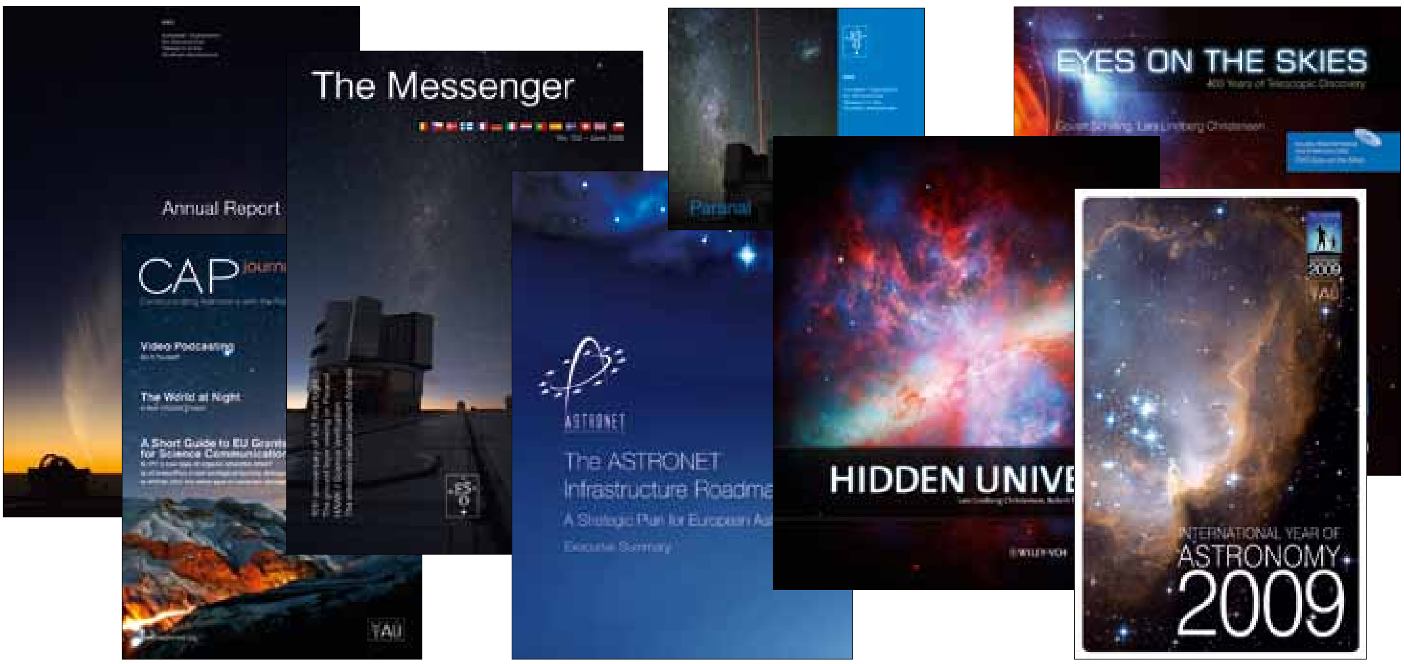
Publications

Several printed publications were published during 2008 by ESO, ESA/Hubble and IYA2009. The table on the right shows an overview. This was a fairly typical year for publications although the total production was significantly increased. Improved workflow and planning allowed the layout manpower spent on *The Messenger* to be reduced to 4—5 weeks per issue.

Periodicals	*The Messenger*: 4 issues
	ST-ECF Newsletter: 2 issues
	Capjournal: 3 issues
Books	ESA/ESO Working Groups Report no. 4
	Eyes on the Skies: in English and German (with Wiley)
	Hidden Universe: in English and German (with Wiley)
	ASTRONET Infrastructure Roadmap. The Strategic plan for European Astronomy (for ASTRONET)
	Communicating Astronomy with the Public 2007 Conference Proceedings
Brochures	Swedish version of “A Universe of Discoveries”.
	The Paranal booklet: for the release of the James Bond movie *Quantum of Solace*.
	Foldable poster/brochure about the European Extremely Large Telescope
	Foldable poster/brochure about the 10th anniversary of the VLT
	Foldable poster/brochure about ALMA
	IYA2009 Brochure v.3
	ASTRONET Brochure. A summary of the Strategic plan for European Astronomy (for ASTRONET)
	UNAWE Brochure: in English and French (for UNAWE)
Other	ESO Annual Report 2007
	ESO Calendar 2009
	New HR Staff Pack Garching
	New HR Staff Pack Chile
	6 “pretty pictures” posters
	15 posters with conference announcements
Electronic publications	ESO Style Guide
	1 poster

List of ePOD’s print publications in 2008.

Some of the publications mentioned in the table above.



Exhibitions

In 2008, a record number of 13 exhibitions were held in various venues around Europe (up 30%). 145 exhibition panels were produced in English, French, German and Italian. The estimated number of exhibition visitors exceeded 150 000 people.

Web and software development

By the end of 2008 ePOD maintained 16 websites of various sizes. A simple web Content Management System (CMS, called Simplicity) has successfully been running spacetelescope.org for several years and it was decided to apply this methodology to the new outreach websites. Simplicity's successor, Djangoplicity, was developed and deployed on new versions of iau.org (IAU) and astronomy2009.org (the International Year of Astronomy 2009). The system is tuned to deliver very high performance under great load and to deliver a first-class experience for users and an efficient workflow for content coordinators.

Several new features were developed for the IAU website, such as the Travel Grant application form, an IAU individual member nomination form, symposium proposal submission, eVoting for organising committees, mass mailing to various subsections of the members and more.

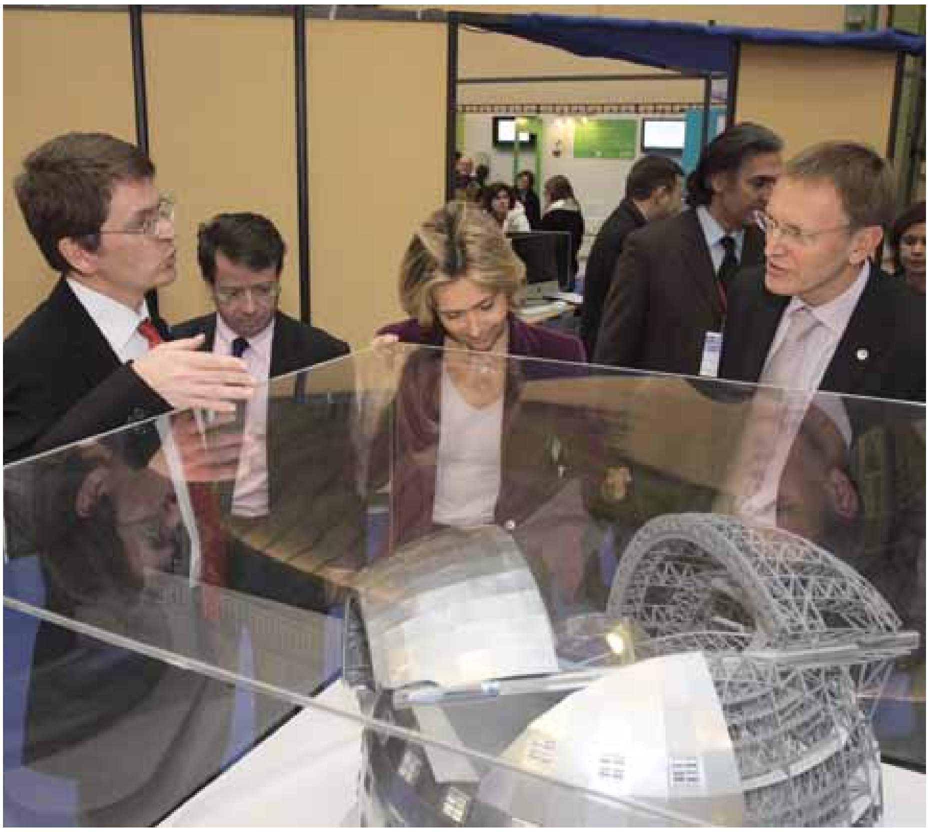
A handful of smaller websites were also set up during the year.

The ESO web CMS study, initiated in 2006/7 continues, but was transferred to the IT Department, which is a more suitable home for an IT infrastructure project of this magnitude. Selecting a CMS is a large effort that will allow ESO's many web authors easier ESO-wide publishing access and is planned for mid-2009.

A new evaluation workflow was set up using a set of standard success estimators. These use the web statistics extensively and can be studied in the figures on the next page.

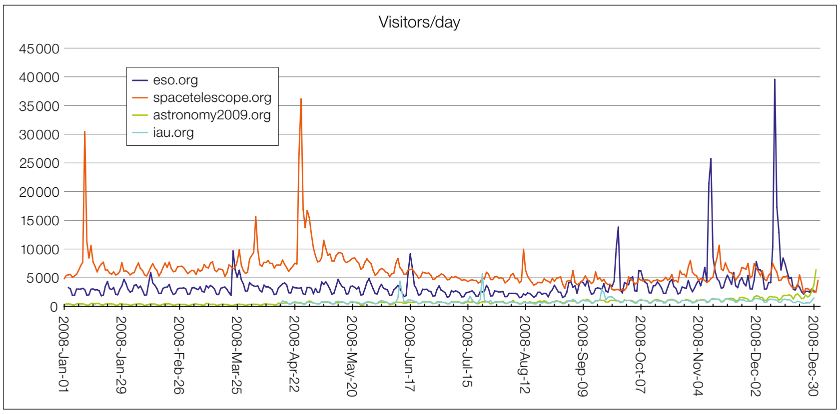
Name	Local	Date	Attendance
ECRI	Versailles, France	9-11 December	500
European City of the Sciences	Grand Palais, Paris, France	14-16 November	42 000
JENAM	Vienna, Austria	8-12 September	800
Meet the buyers	Botanical Society, London, UK	16 September	250
Solar Eclipse Event	Oslo, Norway	31 July-1 August	30 000
ESOF	Barcelona, Spain	18-22 July	4000
SPIE	Marseille, France	23-28 June	2000
Explore Science	Mannheim, Germany	8-11 June	30 000
FEST	Trieste, Italy	16-20 April	40 000
RAL - NAM	Belfast, Ireland	31 March-4 April	700
AAAS	Boston, MA, USA	26 January	6500
Galway Astronomy Festival	Galway, Ireland	26 January	100
AAS 211th Meeting	Austin, TX, USA	7-11 January	2000

ESO exhibitions in 2008.

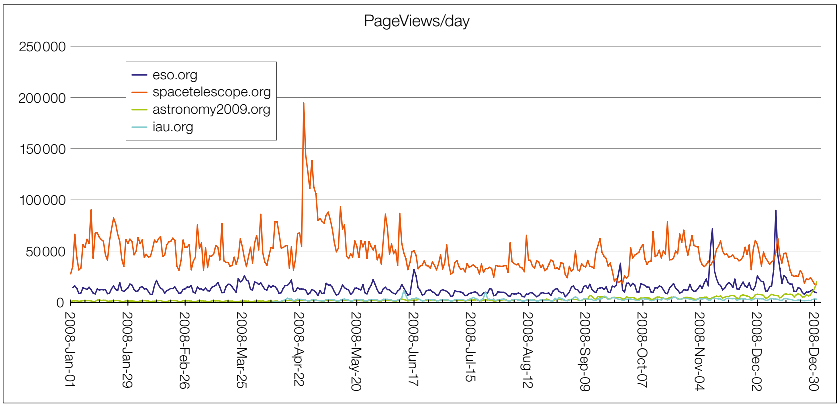


Credit: Pascal Blondé (OBSPM)

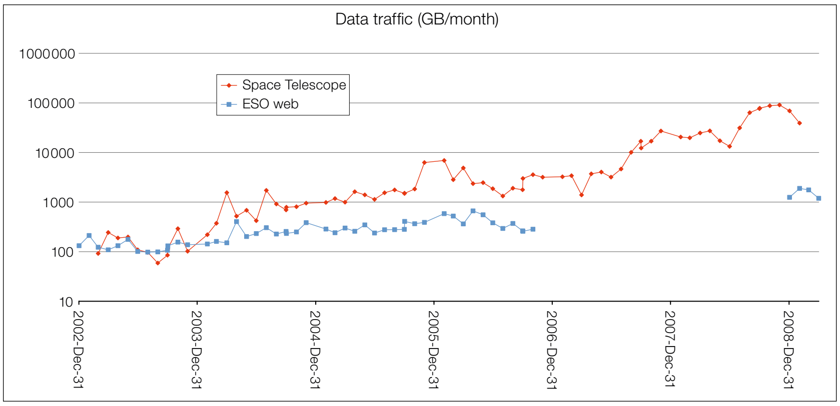
ESO at the European City of Science. Henri Boffin from ESO (left) explaining the model of the European Extremely Large Telescope to Valérie Pécresse, the French Minister of Higher Education and Research (centre) and Janez Potočnik, the European Commissioner for Science and Research (right).



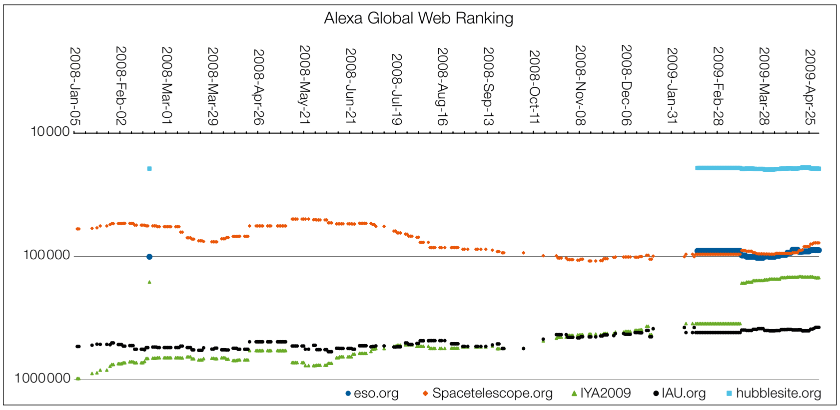
Visitors per day in 2008 for ePOD's four main websites: eso.org (dark blue), spacetelescope.org (red), astronomy2009.org (green) and iau.org (light blue).



Pageviews per day in 2008 for ePOD's four main websites: eso.org (dark blue), spacetelescope.org (red), astronomy2009.org (green) and iau.org (light blue).



Web traffic for eso.org (blue) and spacetelescope.org (red) in GB/month over the past six years. The top of the graph corresponds to 1 PB/month. Some data are missing for eso.org.



Alexa rank for ePOD's four main websites: eso.org (dark blue), spacetelescope.org (red), astronomy2009.org (green) and iau.org (black). The baseline comparison at the top is the hugely successful hubblesite.org from NASA (light blue).

The development of the ESA/ESO/NASA FITS Liberator v.2.3 for state-of-the-art processing of "pretty pictures" was initiated. The main features are multi-processor support (up to 5—10 times faster) and support for Planetary Data Systems (the FITS analogue of planetary science). Unfortunately the multi-threading proved more difficult to implement than expected and the release has slipped to 2009.

An Astronomy Visualization Metadata standard has been developed in collaboration with other EPO groups and is a useful tool for expanding the utility of image files and facilitates search and access. The web lends itself naturally to this purpose and all available material from ESO and Hubble should be presented through the web. Once the files are tagged, they will be available for third-party software such as Microsoft's World Wide Telescope, Google Sky, Stellarium etc.

Audiovisuals

One of the highlights of the audiovisual production was the October's launch of the ESOcast, a high-definition video podcast series dedicated to bringing the public the latest news and research from ESO. Three episodes have been released so far.

Video News Releases (VNRs) are intended for the broadcast media around Europe and two were produced in 2008.

Another large, ongoing project is the digitisation, archiving and online publishing of historical as well as recent ESO images and videos. Over 1500 new images were uploaded, bringing the image archive up to 2300 images. An elaborate video archive with ten different formats was implemented and 400 new videos, partly in high-definition were made available to the public.

The *Eyes on the Sky* HD movie was published on a standard DVD in both major video formats (PAL and NTSC). The movie is a 60-minute documentary that tells the fascinating story of the telescope through words and a wealth of stunning photographs, animations and time-lapse photography. Roughly 140 000 copies were distributed. It is presented by "Dr. J.", aka Dr. Joe Liske, from ESO. A Blu-ray version of the movie will be distributed in 2009.

Several high quality animations were produced during the year for a variety of purposes, including press releases. A short-form HD movie called "The VLT Secret Files" was produced for the *Quantum of Solace* campaign.

Several HD video products were produced for the International Year of Astronomy 2009 including a trailer in more than 50 nationalised versions and a full-dome version.

In addition, dozens of logos were produced for ePOD projects and special illustrations were often designed on short turnaround times for press releases.

Photography and HD filming was carried out on site in Chile for inclusion in the image and video archive.

Interesting stereoscopic (polarised) 3D animations were produced in collaboration with José Francisco Salgado from Adler Planetarium.

Chilean projects

Activities for local communities played a particularly important role for ePOD activities in Chile this year. A new astronomical exhibition at the MIM Interactive Museum in Santiago was inaugurated. This is partially funded by the ESO-Chile Joint Committee. The annual visitor count is around 500 000 people. The educational grant programme in Taltal provided scholarships for secondary and undergraduate students in a joint effort with the Municipality of Taltal. An outreach collaboration programme, with the Universidad Catolica del Norte in Antofagasta, resulted in a series of regular public talks, star parties and science cafes during the year.

The ESO-Chile Joint Committee provided funds for a wide variety of outreach projects: workshops for school teachers, general support for the Museum of Science and Technology in Santiago, training for astronomy guides at Mamalluca public observatory (Region of Coquimbo), and the launch of a new network of amateur astronomy academies in the Regions of Antofagasta and Copiapo.

The ESO weekend public visits programme to La Silla Paranal Observatory attracted more than 8000 tourists and students during the year.

ePOD Chile also coordinated and supported dozens of media visits to La Silla, Paranal, APEX and ALMA, for a wide range of productions, including news stories for print, electronic and audiovisual media, large science documentaries for the general public and innovative art/multimedia projects. Two major productions involved complex organisation: National Geographic´s "The World's Toughest Fixes" (detailing the delicate and exciting process of recoating of one of the UT´s primary mirrors at Paranal for the first time for the public) and the shooting of sequences in the Paranal Residence for *Quantum of Solace*.

ESO also played a prominent role at the National Science and Technology Week, the largest science popularisation event in Chile. In November, around 20 000 people visited a public expo at Quinta Normal, Santiago, where ESO held an astronomy exhibition. In the same week, more than 10 000 schools in Chile received copies of an ESO mountable planisphere, as well as VLT´s anniversary posters, flyers and ESO brochures.

Around 1300 students from 148 schools in Chile participated in the Eratostenes Project, an educational activity to measure the Earth's radius, organised by the science foundation PROFISICA and supported by ESO. Simultaneous measurements were performed in several cities in November, including an official launch in front of La Moneda, with more than 50 students taking measurements in public.

A Science Expo was organised at San Pedro de Atacama, as part of a local anniversary celebration. Around 90% of the students attending schools in the area visited the exhibition.

A new media training programme for ESO science staff in Chile was launched, in a

Students at Paranal during one of the public tours that take place every weekend.

joint effort with the Office for Science in Vitacura. More than 30 staff astronomers, fellows and post-docs were trained in how to deal with the media.

Image processing

The combination of astronomical and PR image processing experience gained from many years of work with Hubble and ESO data was applied to set up a rigorous image processing pipeline with the main aim of streamlining the exploitation of science data. A systematic search of the ESO Science Archive was initiated using advanced queries that make use of the filter equivalence table and an instrument's "photogenic qualities" to identify promising datasets.

"Complete" datasets were marked for retrieval, and "incomplete" datasets that could be supplemented by later acquisition through small Director's Discretionary Time proposals were identified. Several datasets were processed with the new pipeline, making use of the latest archive features (such as associations and advanced data products), processing with THELI to remove instrumental signatures and finally compression of the large dynamical range with the ESA/ESO/NASA FITS Liberator. All images were cosmetically cleaned and corrected and the colour balance corrected on colour-calibrated monitors. Several datasets are in the pipeline for 2009.

E-ELT EPO

As part of the new outreach strategy a handful of E-ELT products were produced with the general aim of elevating the profile of the project among the most important target groups such as decision makers and scientists. New E-ELT models received a lot of exposure and attracted considerable interest at exhibitions. One such example was the successful "European City of the Sciences" at the Grand Palais, Paris, France, organised with French partners and centred on the E-ELT and its science.

ALMA EPO

As part of a wide range of education and public outreach activities prepared for the International Year of Astronomy 2009, ESO collaborated with the Association of French-speaking Planetariums (APLF) and other partners in Europe to produce the new half-hour planetarium show, *In Search of our Cosmic Origins* (www.cosmicorigins.org).

The members of the ALMA Educational and Public Outreach Integrated Project Team, including ESO, worked to create a new, joint ALMA public website (www.almaobservatory.org). A special effort was made in December when the first antenna was handed over, with a Video News Release, an ESOCast, a press release and more.

Survey telescopes EPO

As part of the new strategy a targeted effort is being made to raise the profile of the two coming survey telescopes at Paranal, VISTA and the VST. Generic material has been prepared for the web and print (hand-outs etc.) along with draft releases for the arrival of the mirror as well as the first light/inauguration event.

Hubble EPO

During 2008, ePOD has been active in the public dissemination of the discoveries from Hubble for ST-ECF. 23 news and photo releases and 26 smaller "Hubble Updates" were produced. The European Hubble website had 2.2 million visitors (down 11%) and distributed 550 TB of multimedia materials (up more than 400%).

The production and distribution of the Hubblecasts in Full HD is running smoothly, with 14 episodes produced and distributed during 2008. The video podcast continues to be an iTunes hit, often ranking in the top five in iTunes science-related podcasts. In total, an estimated minimum of five million Hubblecast episodes were downloaded in 2008.

Another highlight of 2008 was the publication of the bestselling books, *Eyes on the Skies* and *Hidden Universe*, produced in a unique collaboration between the IAU, ESO, ESA and the international publisher Wiley–VCH (ranked second and eighth respectively on the publisher's 2008 bestseller list).

The International Astronomical Union

Several activities were carried out for the IAU, including most notably the launch of a comprehensive new website, iau.org, with a restructured membership database (10 000 members together with historical information) and much new information, including "Themes", web essays presenting the most popular IAU topics. A significant number of questions — especially on Solar System bodies, Plutoids and Pluto — were answered and archived.

Hundreds of press clippings were also archived. Early preparations for the IAU General Assembly 2009 took place, with an analysis of press office requirements. In addition, limited support to Division XII and Commission 55 were given.

The International Year of Astronomy 2009

Since early 2006 ESO has been heavily engaged in the International Year of Astronomy 2009. ESO hosts the Secretariat for the IYA2009 on behalf of the IAU, which is the central hub for the implementation and coordination of the global activities. In addition ESO leads three of the eleven Cornerstone projects: Cosmic Diary, 100 Hours of Astronomy and the Portal to the Universe. ESO will also implement specific projects to exploit the added interest in astronomy in 2009. A planned series of "Science Cafés" in Santiago and local communities close to the observatories in Northern Chile is just one of several activities.

The global coordination and planning of this enormous project increased as expected in the second half of 2008. The project grew to:

– 137 National Nodes
– 35 Organisational Nodes
– 99 National Websites
– 11 Cornerstone Projects
– 11 Special Task Groups
– 9 Special Projects
– 5 Official Products
– 3 Global Sponsors (Thales Alenia Space, Celestron and History)
– 27 Organisational Associates
– 17 Global Media Partners

At the end of 2008 around € 560 000 had been raised for the global coordination, including funding for the Cornerstone projects.

During 2008 IYA2009 developed to become the biggest network ever in astronomy and in science education and public outreach and ePOD is proud to lead this work.

Education

The Catch a Star 2008 competition took place, with 300 students entering the written categories (up ~30% over the previous year) and just over 1000 in the artwork category (up ~160% over the previous year). The top prize was a trip to the ESO VLT on Cerro Paranal in Chile. New in 2008, Garry Harwood, a volunteer from the International Association of Astronomical Artists, also awarded special prizes (www.eso.org/catchastar/cas2008).

The second ESO–EAAE Summer School took place in Granada, Spain, in July 2008, with about 50 participants. The event, which was also supported by the EC's Comenius Programme, was a success, with positive feedback from the teachers. It was co-organised by ESO and EAAE with the cooperation of the Instituto Astrofísico de Andalucía and Granada University. Scientists and educators from ESO gave talks.

EIROforum EPO

ESO has chaired the EIROforum, and the Outreach and Education Working Group (O&E WG) since 1 July.

EIROforum was present at ESOF 2008, which was held on 18–22 July in Barcelona, with a large and impressive stand. In addition, the O&E WG organised two sessions during the ESOF programme: Careers in Science and an Education session.

A major effort was undertaken to revamp the EIROforum website, to make it more appealing to visiting outsiders as well as a useful internal repository for EIROforum documents.

ESO, as a member of EIROforum, continues to support *Science in School*, the European journal for science education aimed at European teachers and educators. Three issues were published during 2008 (30 000 copies each). The *Science in School* website (www.scienceinschool.org), is, with about 250 000 visitors per month, much visited.

ESO, through EIROforum, supported the 2008 EU Contest for Young Scientists (EUCYS) in Copenhagen. This was the 20th anniversary of the competition, and thus a special occasion for celebration. EIROforum had an appealing stand. Attending the event were six previous winners of EIROforum prizes, including one of the ESO Special Award winners, and two EIROforum speakers, with one representing ESO. There was also a live video conference link to Paranal from Copenhagen, giving the young scientists a chance to ask questions to an astronomer at the VLT. At the Special Awards Ceremony at the National Museum, attended by journalists and VIPs such as Danish Education Minister Bertel Haarder, ESO presented one of the EIROforum special prizes, a visit to the VLT, to Marion Deriot, for her work on the project "Physics from breakfast". EUCYS has 300 participants (www.eurocontest.dk).

The 20th EUCYS was a clear success, in which EIROforum played a major role and in which it (and its member organisations) received significant exposure. It should be mentioned that EUCYS was also visited several times by the Minister for Science, Technology and Innovation, Mr. Helge Sander, and by Prince Joachim and Princess Marie of Denmark.

The Cone Nebula and surroundings.

Operations

The domes of the ESO 3.6-metre and the 1.4-metre Coudé Auxiliary Telescope reflecting the Moon's light.

La Silla Paranal Observatory

Operations

Ten years after "First Light" on the Antu telescope, the ESO Very Large Telescope (VLT) has four 8.2-metre Unit Telescopes (UTs) and its complete suite of eleven first generation instruments in operation. The Laser Guide Star Facility (LGSF) provides an artificial reference star to two of the three VLT instruments supported by adaptive optics. The VLT Interferometer (VLTI) combines the light of either the Unit Telescopes or the Auxiliary Telescopes (ATs) to feed one of the two first generation interferometric instruments with a coherent wavefront that is further stabilised by the VLTI fringe tracker.

The instrument suite on La Silla has been reduced to six instruments, operating on the New Technology Telescope (NTT), the 3.6-metre and the 2.2-metre telescopes.

The observatory also provides operations support for the Atacama Pathfinder Experiment (APEX), with its 12-metre sub-mm radio antenna and its recently completed suite of heterodyne and bolometer facility instruments located on the high plateau of Chajnantor at an altitude of 5100 m.

The observatory continues to operate efficiently and has maintained the high availability and low technical downtime of its telescopes and instruments — key elements for productive scientific observations. In 2008, a total of 2217 nights were scheduled for scientific observations with the four UTs at the VLT and with the three major telescopes at La Silla. This is equivalent to about 88% of the total number of nights theoretically available over the whole year. The remaining 12% of nights were scheduled for planned engineering and maintenance activities necessary to guarantee the continuous performance of the telescopes and instruments and to include time slots to commission new instruments and facilities. Out of the available science time for Paranal, only 3.5% was lost due to technical problems and about 7.5% was lost due to bad weather conditions. On La Silla bad weather accounted for losses of about 12%, technical problems for 1.5%.

In addition to its regular VLT and La Silla operations, the VLTI was scheduled for scientific observations using baselines with either the UTs or the ATs for an additional 169 nights. The remaining nights of the year were used for technical activities and for the further development and commissioning of the interferometer. The installation and commissioning of the new PRIMA facility required 88 nights alone over the course of the year. Out of the scheduled VLTI science time, 8% was lost due to technical problems.

This year the primary and tertiary mirrors of all four UTs of the VLT and the mirrors of the three major La Silla telescopes have been recoated with fresh layers of aluminium to maintain the high reflectivity and low micro-roughness of the mirror surfaces. The coating of the Kueyen telescope (UT2) in May was the 25th mirror coating in the history of the VLT and was documented in great detail by the National Geographic Channel in its "World's Toughest Fixes" series, featuring the ESO VLT as the "Giant Telescope" as it underwent its difficult but crucial mirror maintenance procedure. The extra effort of coating all the large telescopes in a single year will be rewarded in future by a mirror coating schedule that is optimised across the two observatory sites for the availability of manpower and time resources and avoids the windy season on Paranal. Strong winds have been one of the major causes for delays in the coating process of the UTs in the past because they impose tight restrictions on when the large 8.2-metre mirrors can actually be transported the four kilometres by road between the unit telescopes on the mountaintop and the mirror maintenance building at base camp.

The combination of high operational efficiency, system reliability and up-time of the La Silla and Paranal telescopes and instruments for scientific observations has again resulted in high scientific productivity. We have counted 483 peer-reviewed papers published in various scientific journals and at least partially based on data collected with the VLT and VLTI instruments at Paranal. There were 299 refereed papers published referring to La Silla observations and 17 to APEX observations.

Credit: Gianluca Lombardi/ESO

Night scene at the ESO's Very Large Telescope (VLT). This 45-minute exposure shows the trails of the stars in their dance around the Celestial South Pole.

New instruments and facilities

HAWK-I, the High Acuity Wide field K-band Imager, is the eleventh facility instrument to go into operation at the VLT. HAWK-I started science operations at the Nasmyth A focus of the Yepun (UT4) telescope from the beginning of Period 81 in April 2008. HAWK-I is a cryogenic wide-field imager operating in the near-infrared wavelength range from 0.85 to 2.5 µm with an on-sky field of view of 7.5 arcminutes x 7.5 arcminutes. This corresponds to a field of view of about nine times that of the very successful VLT infrared camera ISAAC and a field of view comparable to or even larger than that of the optical cameras FORS1 and FORS2. Whenever the atmosphere above Paranal allows it, HAWK-I routinely delivers exquisite infrared images with an almost constant full width at half maximum for the stellar point sources of about 0.2 arcseconds across the whole field of view. HAWK-I has not only been optimised for the best image quality, but also for the highest sensitivity and allows the deepest looks into the infrared sky with the VLT. The figure below shows an example of the spectacular views of the infrared sky provided by HAWK-I.

HAWK-I will be supported by the Adaptive Optics Facility (AOF), making it even less dependent on the quality of the atmosphere and able to deliver the highest resolution images constantly. The AOF will convert the Yepun telescope into an adaptive optics telescope with a large deformable secondary mirror and the Four Laser Guide Star Facility (4LGSF). An adaptive optics module named GRAAL, specially designed for HAWK-I, will provide a wide field of view corrected for the effects of the atmosphere.

The first of the second generation VLT instruments, X-shooter, started its installation and commissioning programme in the last quarter of 2008. X-shooter is a highly efficient, medium resolution spectrograph providing simultaneous spectral coverage from 300 to 2450 nm, i.e., from ultraviolet to near-infrared wavelengths. The high efficiency and unprecedented simultaneous wavelength coverage, combined with the ability of the VLT to act on external triggers and acquire targets rapidly when in the Rapid Response Mode (RRM), make X-shooter a powerful tool for studying transient phenomena in the sky, where the shape and redshift of the spectra are *a priori* unknowns. Fast follow-up of the quickly fading optical counterparts of gamma-ray burst is expected to be one of the most intensively used types of observations with X-shooter. The commissioning of X-shooter is being carried out at the Cassegrain focus of the Melipal telescope (UT3), temporarily replacing VISIR in the observing period 82. X-shooter will be transferred to the Cassegrain focus of Kueyen (UT2) at the beginning of Period 83, where regular science operation is expected to commence in Period 84, i.e., in October 2009.

The arrival of X-shooter at Kueyen will require the decommissioning of FORS1, the very first of the first generation VLT instruments, after ten years of highly successful science operations. To date FORS1 observations have contributed to more than 675 refereed publications in astronomical journals. The decommissioning of a workhorse instrument like FORS1 will undoubtedly have an impact on the ESO community, for example, by increasing pressure on FORS2. Fortunately, FORS2 will remain in operation for the foreseeable future and the polarimetry optics of FORS1 are being transferred to FORS2 at Antu to maintain this unique capability at the VLT. In addition, the high efficiency

Credit: HAWK-I Commissioning Team

The Tarantula Nebula in the Large Magellanic Cloud observed with ESO's Very Large Telescope, in the visible with FORS (to the left) and in the infrared with HAWK-I (to the right).

filters, grisms and the blue-sensitive CCD detector system of FORS1 will also move to FORS2.

The single Laser Guide Star Facility (LGSF) achieved First Light at the Yepun telescope in 2006. Since then the LGSF has provided a bright artificial reference star for the adaptive optics systems of the SINFONI and NACO instruments. The laser guide star is required to enable the AO systems to work in regions of the sky where no bright natural star can be found close enough to the scientific target.

In 2008 a major effort was made by the maintenance and operations teams in Paranal, the Garching LGSF team and the PARSEC laser team from the MPE in Garching and the MPIA in Heidelberg to increase the reliability and performance of the LGSF further. After a period when the overall performance of the system had degraded rapidly, the LGSF was taken out of regular science operation for a period of four months during which a rigorous analysis of the root causes of the instabilities experienced by the system was carried out, followed by the execution of an aggressive recovery and improvement plan to bring the LGSF back to its nominal performance and to stabilise its operation. In the course of the recovery process sophisticated monitoring systems with hundreds of sensors were introduced so as to be able to detect and counteract deviations from the nominal performance of the LGSF before they impacted on operations. In addition, based both on the experience collected during the first years of operation and maintenance, and on the findings of the recovery process, the relevant operation and maintenance procedures were optimised.

The LGSF is currently being scheduled in monthly blocks of three preparation and start-up days followed by seven nights of science operations with NACO and SINFONI. This results in 42 scheduled LGSF nights per six-month observing period, equivalent to about 25% of all available science time at the Yepun telescope. Taking into account the statistical probability of having the atmospheric conditions required for successful LGS operation (clear skies, with seeing better than 0.8 arcsec) and optimistically assuming negligible technical loss times, no more than 20 observing nights are expected to be available to the ESO community with the LGSF in each observing period.

Regular science operations using the new operating protocols were resumed with the LGSF in August and immediately resulted in considerably higher performance, stability and reliability of the LGSF. Six Watts of laser power on sky are now regularly achieved, providing a sufficiently bright artificial reference star to the AO systems of NACO and SINFONI.

Improved LGS performance and stability have meant that the commissioning of the LGS modes of NACO and SINFONI could be completed. In addition, a novel “seeing enhancer” mode has been explored: adaptive optics observations using an artificial laser guide star still require a nearby natural star to correct for tip-tilt effects introduced by the Earth’s atmosphere equally into the light paths of the science target and the laser guide star. If no such “tip-tilt” star is available near the science target no diffraction-limited images can be obtained. However, experiments with SINFONI and NACO and the LGS have shown that an image quality better than the ambient seeing can still be obtained. The “seeing enhancer” mode was offered with SINFONI for the first time, starting with Period 82.

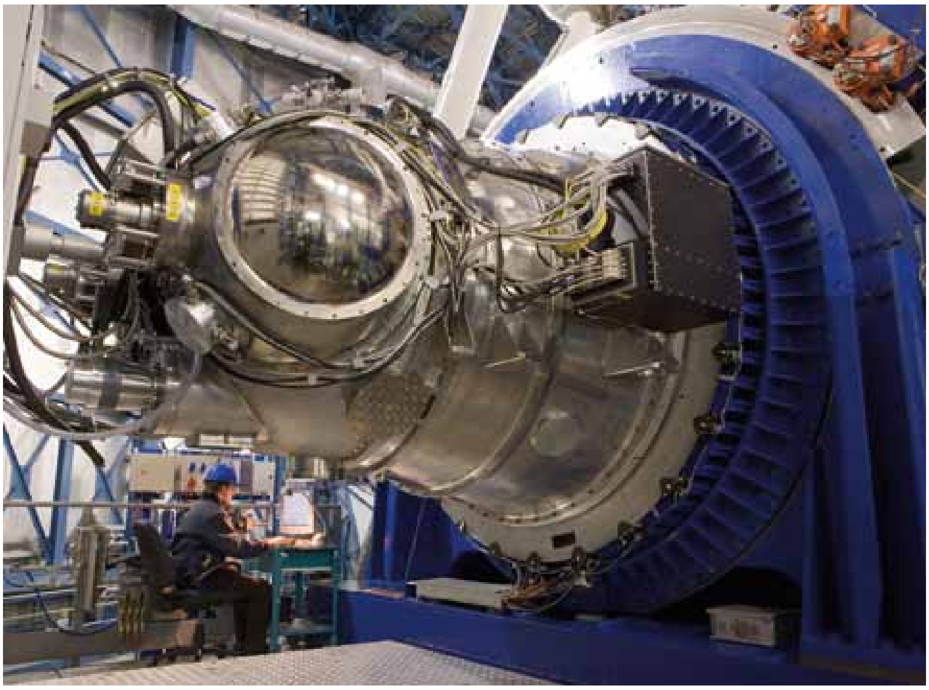
Following its spectacular success during commissioning, MAD, the Multi-Conjugate Adaptive Optics Demonstrator, returned to the Melipal telescope on Paranal as a

Credit: ESO/H. Heyer

The LGS System in operation.

visitor instrument for two additional science verification runs to allow the community to exploit these new capabilities with the VLT further. By using multiple and relatively bright natural guide stars, MAD provides multi-conjugate adaptive optics corrections in the K-band (around 2.2 μm) over a wide field of view of 2 arcminutes x 2 arcminutes, resulting in unprecedented wide-field high resolution images in the near-infrared (see the MAD image of Jupiter shown on page 11).

Another demonstrator, the Active Phasing Experiment (APE), was commissioned at the visitor focus on Melipal to evaluate different possible phasing techniques for the active wavefront control of segmented telescope mirrors. The experiment will continue into the first quarter of 2009 to collect valuable experience for the E-ELT primary mirror control.



The HAWK-I instrument mounted on the telescope's Nasmyth (side) port. HAWK-I is attached to Yepun, UT4 at the VLT.

Upgrades

To maintain the competitiveness of the VLT and VLTI it is necessary not only to continue to deliver new instruments and facilities, but also to follow a rigorous upgrade programme for the existing instruments. Several such upgrades have been carried out by the Instrumentation Division in Garching in 2008 in collaboration with the instrument builders and the observatory.

The CCD detector of the FLAMES-GIRAFFE medium-high resolution visible spectrograph was replaced in May with a deep depletion E2V CCD of 40 μm nominal thickness. The new detector has a special, custom-made two-layer coating (HfO/SiO_2) optimised for broadband sensitivity. During commissioning of the new device the overall efficiency of the instrument was measured to have increased by a factor 1.5 at 800 nm and by 2.5 at 1000 nm, while the fringing amplitude was reduced from 30% to 5%. This, together with very good "cosmetics" and linearity and unchanged geometry, readout noise and dark current of the detector, resulted in a substantial improvement of the red sensitivity of GIRAFFE. This is of great benefit to the numerous science programmes that make extensive use of this spectral region.

For NACO, the adaptive optics camera at the Yepun telescope, the new Sparse Aperture Mask Interferometry (SAM) mode was commissioned. This mode uses special aperture masks in the cold pupil wheel inside the instrument to transform the single 8-metre telescope pupil into a sparse interferometer array. The SAM mode allows observers to obtain the very highest angular resolution at the diffraction limit of the telescope. Covering baselines shorter than 8 m, SAM is a complementary mode to the longer (up to 150 m) baselines of the VLT Interferometer.

The new HAWK-I instrument at the Yepun telescope has been found to introduce additional vibrations into the telescope optics, which can affect the performance of the VLT Interferometer and the adaptive optics system of the NACO instrument at the opposite Nasmyth focus station. To minimise these vibrations, which were introduced by the instrument's cryocooler cold heads, HAWK-I was equipped with a liquid nitrogen continuous flow cooling system. This measure has considerably reduced the vibrations transmitted to the telescope and NACO can now be operated without any Strehl-ratio degradation. Vibrational effects on the VLTI have also been returned to the pre-HAWK-I level.

Increased vibrations from the CRIRES high resolution near-infrared spectrograph at the Antu telescope have also affected the interferometer. Liquid nitrogen cooling is not a viable option in this case, but new low vibration cryo-coolers have been identified and will replace the originals in early 2009. Until then, the CRIRES instrument has to be warmed up and the cryo-coolers stopped during VLTI observations that involve the Antu telescope.

The CRIRES control software was successfully upgraded over the year to improve the control and interfaces between the CRIRES instrument itself, the MACAO adaptive optics module and the telescope. The new control software correctly implements the treatment of all differential wavelength-dependent effects in the acquisition of science targets on the instrument slit, the adaptive optics field selector and the telescope guider.

Paranal's new multi-fuel power generator can provide up to 2.2 MW of electrical power. The two tanks for LPG can be seen in the background.

An upgrade of a very different nature, but of fundamental importance for the Paranal site, was completed early this year: the installation of a new Multi-Fuel Power Generator (MFPG) to upgrade the Paranal power station from diesel generators to a gas turbine generator. Continuous and reliable on-site power generation at a remote and isolated place like Paranal, which requires clean and stable electrical power and cannot be connected to the electricity grid, is absolutely crucial for the smooth operation of the observatory. Recent experience has shown that a power station based on diesel generators is a major and costly challenge to run and maintain. A very reliable, low maintenance multi-fuel gas turbine generator was purchased in 2007 and commissioned on schedule at the beginning of 2008. The new MFPG has supplied the Paranal Observatory with electricity since February and has matched all expectations for reliable and efficient low maintenance operation. The diesel generators have been retained as an automatic backup system and are only used for few hours per month to check their availability. The MFPG can be supplied by several different energy sources, from natural gas to ship diesel, and this will allow us to react more easily to the fast-changing market of available energy sources. Currently the MFPG runs on the most economical — liquefied propane gas (LPG) — for which dedicated tanks had to be installed. The observatory continues to monitor the possibility of obtaining a natural gas supply from the commercial gas pipeline passing close to the observatory.

The VLT Interferometer

The VLT Interferometer operated for about 169 nights of scientific observations with MIDI and AMBER using UT and AT baselines in 2008. The remaining time was intensively used for engineering and commissioning activities to complete and improve the interferometer infrastructure. The installation and commissioning of the new PRIMA astrometric and phase referencing facility started in July and required an investment of 88 nights over the course of the year.

The technical downtime of the VLTI has been reduced to 8% of the scheduled science time — a percentage that is still higher than for single-telescope instruments at the VLT, but a respectable number if the complexity of the VLTI system is considered. The operational efficiency of the VLTI is being continuously improved as the alignment and acquisition procedures both on AMBER and MIDI are optimised. The acquisition time is less than five minutes with the ATs and ten minutes with the UTs, including closing the active and adaptive optics loops. Fringe tracking with FINITO requires an additional four minutes.

The AMBER instrument allows up to three UT or AT beams to be combined interferometrically and was offered to the community with the FINITO fringe tracker and the ATs for the first time in 2007. After this critical milestone was achieved with the ATs, the VLTI team focused its 2008 efforts on providing FINITO fringe tracking with the UTs as well. Vibrations of the optical surfaces of the UTs transmitted to the VLTI had earlier been identified as the primary obstacle to fringe tracking with the UTs. In 2008 a vibration suppression system was deployed and fully commissioned to, at least partially, overcome the vibration problem. This included the installation of accelerometers on all the main vibrating mirrors of the UTs and the commissioning of the active Vibration Tracking (VTK) system. FINITO fringe tracking with AMBER and the UTs was delivered to the science operations team and the community after an extended characterisation period in early 2008 just in time for Period 81, starting in April 2008. While AMBER at the UTs had previoously been limited by the variability of the Earth's atmosphere to integration times of 25 milliseconds, with FINITO it is now possible to integrate for up to 10 seconds, equivalent to a theoretical gain of a factor of 400. FINITO is now fully integrated into science operations and is used on most AMBER observations with ATs and UTs and is essential for its medium- and high-resolution spectroscopic modes.

The AMBER instrument itself was also upgraded over the year. The new science detector largely removes interference noise, clearly improving data quality. Further, a fast guiding system (IFG) to stabilise the flux entering the instrument fibres was designed and commissioned for

AMBER. A new set of polarisers eliminates unwanted spectral fringes, which had affected the unique high spectral resolution mode of AMBER. In general, the stability of the instrument and the efficiency of the instrument operation improved over the year. In November, three nights of science verification of AMBER with FINITO and the UTs were scheduled to demonstrate the scientific potential of this newly offered mode. While the unique capabilities of FINITO-supported AMBER observations in its highest spectral resolution were appreciated by the science verification team, the constraints on observing sensitivity due to the limited sensitivity of FINITO itself and the still high level of vibrations became evident. The active identification and elimination of vibration sources in the UT interferometer are now the highest priority for the VLTI team.

The four Auxiliary Telescopes form the VLTI Sub Array (VISA) and have become the workhorses of the VLT Interferometer. Several improvements to the ATs have been implemented over the year, including the newly refurbished STRAP tip-tilt sensors and new focusing devices, which are expected to improve the performance of the ATs further.

La Silla

La Silla Observatory continued to prepare for the streamlined operations model that will be introduced in October 2009. In the course of these preparations the SUSI2 imager and the EMMI multi-mode instrument at the NTT were decommissioned. At the same time EFOSC2 was transferred from the 3.6-metre telescope and re-commissioned at the NTT to replace EMMI after 18 years of service. As from Period 81 (April 2008) the three large La Silla telescopes have operated with a fixed set of instruments. Instrument changes are now only made to accommodate visitor instruments. The 3.6-metre telescope now operates exclusively with HARPS, the NTT with EFOSC2 and SOFI, and the 2.2-metre telescope with FEROS, WFI and GROND.

In addition, as of Period 82, VLT-style service mode observations are no longer supported at La Silla. All observing runs are carried out in classical visitor mode with a minimum run length of three nights, providing additional opportunities for young astronomers to obtain hands-on experience with state-of-the art telescopes and instrumentation. To encourage large scientific studies extending over several years using La Silla instruments and telescopes, the NTT and the 3.6-metre telescopes have again been offered for Large Programmes with a maximum length of up to four years, i.e., two more years than are available at the VLT. These new opportunities have been welcomed by the astronomical community and a number of Large Programme proposals have been received.

The number of visitor instruments at the 3.6-metre telescope and the NTT has noticeably increased. AstraLux, ULTRASPEC, IQuEye, the Max-Planck-Institut für Radioastronomie Speckle Camera were the successful visitor instruments in 2008. All these visitor instruments used the La Silla telescopes to test novel instrumentation, detectors and observing techniques. These ranged from lucky and speckle imaging to beat the atmosphere to obtain diffraction-limited images to photon counting systems to explore the application of quantum statistics techniques to astronomy.

In June 2008 a new operations agreement was signed between ESO and the Max-Planck-Institut für Astronomie (Heidelberg, Germany) for the continued operation of the 2.2-metre telescope until 2013. As part of this agreement, the ESO community, who are regular applicants for this instrument, will receive three months of observing time per year with the FEROS and WFI instruments.

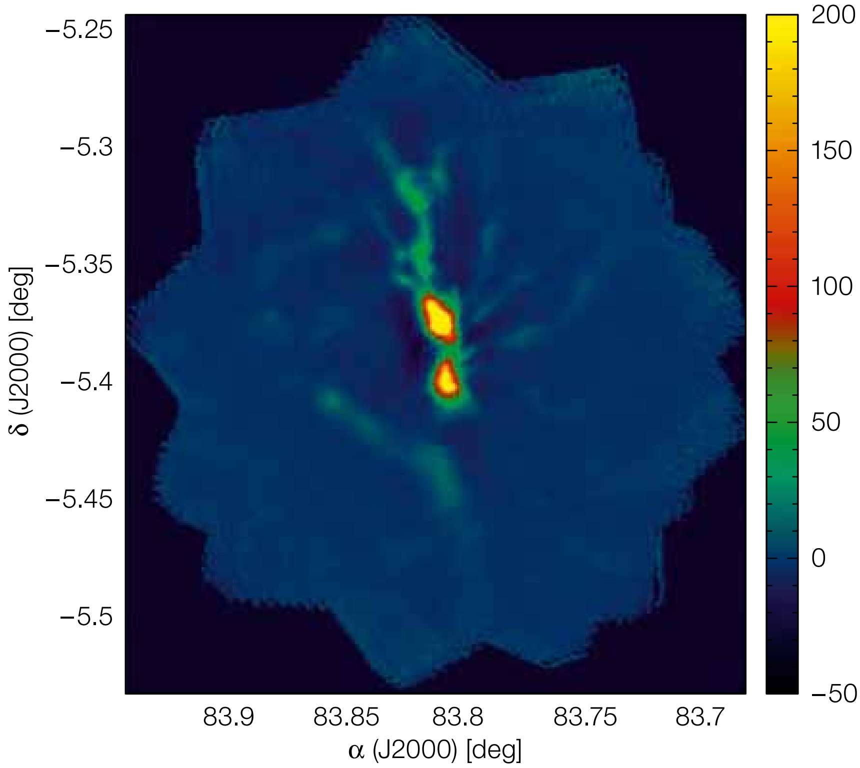
A view of a rare cloudscape over La Silla, in the southern edges of the Atacama Desert, home of ESO's first observing site.

APEX

APEX reached its full complement of facility instruments in 2008. After the arrival of LABOCA in 2007, the Swedish heterodyne facility (SHFI) receivers, covering all four atmospheric windows from 200 to 1400 GHz, were delivered by the Onsala Space Observatory and installed during the Bolivian winter break in January and February 2008. Bands 1, 2 (replacing APEX-2A) and 4 were made immediately available to the community while Band 3 will be fully commissioned in early 2009.

The Shortwave Apex BOlometer Camera SABOCA developed by the Max-Planck-Institut für Radioastronomie (Bonn, Germany) was commissioned in September. SABOCA operates at a wavelength of 370 μm and provides a field of view of approximately 1 square arcminute using an array of 37 superconducting pixels to map large areas of the sky efficiently (see figure on the right).

This complete suite of new facility instruments allows APEX to exploit fully the exceptional conditions available at the high altitude site of Chajnantor.



SABOCA 350 μm map of Orion observed during the commissioning run in October 2008. Map units are Jy/beam.

Completing a 60-km drive, from the base at Sequitor up to the APEX site, an astronomer finishes his somewhat extraordinary route to work at 5000 metres above sea level.

Data Management and Operations Division

The mission of the Data Management and Operations (DMO) Division is to provide very reliable support in the operation of ESO facilities and to its users in the framework of an integrated end-to-end system, and also to maintain the archive facility and its data holdings as a powerful resource, both scientific and operational. For the duration of the E-ELT Phase B, the DMO Division includes the E-ELT Operations Project Office, which is in charge of developing the E-ELT Science Operations plan and of coordinating Science Operations support systems studies. In 2008 the DMO went through an extensive internal restructuring so as to match its core activities better with the departmental structure.

The SABOCA instrument being filled with helium.

User Support

The User Support Department (USD) of the ESO Data Management and Operations Division released its new, overhauled web pages in mid-December. The pages had undergone a major re-styling so that navigating all the material and documentation related to the preparation and support of Service Mode observations was faster and simpler.

Preparation for the support of VISTA Public Surveys has increased during 2008. A dedicated Public Surveys Phase 2 Workshop was held in September at ESO Headquarters, attended by representatives of all survey teams. This was intended to present the observing tools to the teams and included practical sessions.

Service Mode (SM) has continued to be the most requested observing mode at the VLT: the demand for SM observing has been a factor of 2.5-3 times higher than the time requested for Visitor Mode during Periods 81 and 82. The number of SM runs supported by the USD at the VLT, VLTI and the MPG/ESO 2.2-metre telescope during 2008 has remained above 1000 (including Director's Discretionary Time proposals).

APEX Service Mode operations have reached a stable *modus operandi.* Two calls for Science Verification proposals were issued in connection with the commissioning of two new APEX instruments, the Swedish Heterodyne Facility Instrument (SHFI) and SABOCA.

The USD also supported E-ELT operations planning, participated in commissioning and upgrade activities (HAWK-I, FLAMES, AMBER+FINITO and X-shooter) and observing schools (e.g., the NEON and VLTI schools). It organised a 2.5-day Workshop on "Six years of FLAMES Operations", during which the instrument performance was thoroughly discussed by its most frequent users and ESO FLAMES staff.

European ALMA Regional Centre

The European ALMA Regional Centre (ARC) is currently set up as a network of nodes throughout Europe, coordinated by a central node located at ESO Headquarters in Garching. In this distributed network, user support and operations experience at ESO can be mixed with the existing millimetre-wave astronomy experience in the scientific community to create optimal science support services.

Core ARC activities at the central node consist of:

– assisting the user community with the technical preparation of observing proposals;

– ensuring that the observing programmes comply with the requirements set by their scientific goals and make efficient use of the facility;

– operating a helpdesk for proposal submission and the submission of observing programmes, the delivery of data to principal investigators;

– maintaining and refining the ALMA data archive; and

– providing feedback to the software development teams about the data reduction pipeline and the off-line reduction software systems and all other operational critical software.

Although full ALMA operations will only start in 2013, pre-operation activities have already started. The ARCs are organising the support system, testing the software, writing "cookbooks" and manuals and preparing the commissioning and science verification phase, which will start in the autumn of 2009. The first Call for Proposals for Early Science will be issued in 2010 and the ARCs must be functioning at full speed before then.

ARC staff have been actively involved in the following projects in 2008:

- participation in the ALMA Technical Facility activities;
- participation in user tests organised by the developers of the offline data reduction system (CASA);
- in-house testing of the offline system; and
- participation in user tests of the ALMA Observing Tool.

All the activities of the European central node and the required manpower are described in the Implementation Plan of the ALMA Operations Plan.

ARC activities in Europe coordinated by ESO

The ARC nodes will provide face-to-face help and additional support, over and above the ARC core functions. This help includes, for example, advanced user support for special projects and refining the data reduction process.

To ensure that the face-to-face help, which is a project deliverable for the first years of operations, is accomplished, a Memorandum of Understanding was signed by all partners in December 2008. Funding to support the work of the ARC nodes has been sought from the European Community FP7 call:

- Nine additional ESO Fellows have been funded through the MarieCurie COFUND programme. Six of these will be stationed at the ARC nodes to pursue their own research there and to help with user support activities.
- The European ARC will be partially included in the EC-funded RadioNet activities through a JRA (Joint Research Activity), including software integration and implementation for ALMA.
- The ESO ARC coordinates this network of nodes. Activities started in 2006 and are routinely discussed and implemented with teleconferences and visits.

The Science Operations Integrated Product Team

According to the approved version of the Operations Plan, a Science Operations Integrated Product Team, consisting of the three ARC Managers and led by the Head of Science Operations, has been established. The goal is to set up project-wide operations, define distinct tasks and common goals, supervise science requirements and provide feedback for the operations related software packages.

Data Products Department

In addition to collecting raw science and calibration data at its observatories, ESO processes this data with the dual goal of monitoring instrument performance and delivering processed data and tools to its community. Also, ESO collects highly processed data from Principal Investigators (PIs) and makes them available through its Science Archive Facility to the community at large. These activities are grouped under the umbrella of the newly created Data Products Department (DPD).

The ALMA Observing Tool (OT) is the main interface between users and the Joint ALMA Observatory (JAO) at the proposal and scheduling stage of a project. All proposals will be created and submitted to the JAO using the OT, which will also produce the observing scripts required to run the observations. The figure shows a typical view of the OT in its scheduling mode. A spectral visualisation of the receiver setup, including the atmospheric transmission curve (purple line), dominates the view. The tree on the left shows the structure of a typical project, which also includes observations with the ALMA Compact Array.

Paranal Observatory Data Processing and Quality Control

The Data Processing and Quality Control group works closely with the Paranal Science Operations Department to ensure that the VLT/VLTI instruments (including HAWK-I, in regular operations since April 2008) are always performing within the expected and published ranges. Taking advantage of the newly implemented fast data transfer link, the Quality Control loop between Paranal and Garching is now closed on a timescale of about one hour.

During 2008 the Data Processing and Quality Control group processed more than 8 TB of raw data in 190 000 processing jobs to create 1160 service mode packages with VLT/VLTI data, which were distributed to their respective PIs. The group also packages data from La Silla, but without performing quality checks on them. In 2008, 100 such packages were produced and shipped to the corresponding PIs.

Next generation VLT Instrument Control Software testing and development in the Software Development Division Instrumentation Laboratory.

Science Data Products

The data that astronomers obtain with ESO telescopes at the La Silla Paranal Observatory take a long route before they can be used by astronomers for scientific analysis. This includes taking calibration data to characterise the instrument and the Earth's atmosphere during a particular science observation, and running the ESO pipeline software to remove the instrumental and atmospheric effects from the science data themselves. The whole process from planning the observations to producing the final data product has to be carried out with the scientific use of the data in mind. To assure the highest possible data quality, a new group was formed to coordinate the various steps in this process. The Science Data Products group started its work in July 2008. Initially, the group undertook an ESO-internal survey of the status of data products from all VLT instruments. The survey revealed a number of areas that apply to several VLT instruments where the science quality can be improved. The group worked closely with the Pipeline Systems Department, in charge of the development and maintenance of ESO pipelines, to set priorities that reflect these findings. In parallel, new test data were also taken with HAWK-I, and FORS 1 and 2 data were analysed with the goal of improving the photometry accuracy attainable with these instruments.

Phase 3: Returning data products to the ESO Science Archive Facility

PIs of ESO Public Surveys carried out with the VISTA and VST telescopes, as well as PIs of all ESO Large Programmes from observing Period 75 on are required to return advanced data products to ESO. The External Data Product group is

The ESO data centre.

charged with coordinating the activity, dubbed "Phase 3" by analogy with the submission of observing proposals (Phase 1) and the specification of the detailed observing strategies (Phase 2). The data products returned as part of Phase 3 are then made available to the community at large through the ESO Science Archive Facility. This enhances the scientific value of the ESO Archive tremendously by complementing its holdings of raw data and pipeline products with highly processed data products suitable for immediate scientific exploitation. At the time of writing, the ESO Archive holds about 0.7 TB of highly processed data products, corresponding to some one and a half million files.

PIs are offered a standardised procedure with a unique entry point for returning their reduced data products to ESO. Basic functionalities are in place, including a transfer mechanism using secure copy to a dedicated staging area, and more will be added with time.

Science Archive Facility

The Archive Department (ADE) was created on 1 June 2008. ADE assumed part of the responsibilities from the Data Flow Operations (DFO) and Virtual Observatory Systems (VOS) Departments, which were reorganised.

ADE is responsible for the operations of the ESO Science Archive Facility, including the following areas:

– data ingestion from the ESO sites in Chile;

– raw data ingestion from non-ESO sites or groups as appropriate (e.g. surveys, WFCAM/UKIDSS);

– data delivery to various user communities (e.g. Paranal Service Mode users, archive researchers);

– archive/database content management; this includes management of the ESO data flow front- and back-end databases, as well as offline databases (library, weather, operations logs, etc.);

– management of archive interfaces; and

– Hubble Space Telescope (HST) archive support.

The following describes the 2008 highlights of the activities by the teams presently in the Archive Department:

– An option for the PIs to retrieve their own raw data prior to the delivery of the PI Package has been implemented, with a starting date of 1 April. More than a thousand such requests have already been served (see also "Archive Delivery" below).

– PIs can now obtain their own TAR files from the APEX query form.

– First test VIRCAM data were archived in June 2008.

– Direct data transfer from Paranal began in July 2008, replacing the old system relying on disk shipments.

– HAWK-I and AMBER are now fully supported by the archive. This includes instrument-specific archive query forms and instrument-specific database tables.

– APEX weather database in Garching has been developed and put into operation.

– The Advanced Data Product query form was released in May 2008.

– As of December 2008, fully calibrated HST data are ready for immediate download from the cache, removing the necessity for waiting for on-the-fly processing.

Data releases through the ESO Archive:

– 30 Doradus HAWK-I Commissioning Data Release
– AMBER/FINITO/UTs Science Verification Data Release
– Advanced Data Products from zCOSMOS DR2
– MAD Science Demonstration Data Release
– APEX SHFI Science Verification Data Release
– VLTI RMN recorder commissioning Data Release
– GaBoDS/WFI data release: Version 1.1
– GOODS/VIMOS Spectroscopy Data Release V1.0
– "Monitor" NGC 2547/WFI Data Release: Version 1.0

Archive holdings:

– Total holdings for ESO data: 12.3 million files, totalling 94 TB
– Total holdings for HST data: 10.1 million files, 20 TB
– New ESO data added in 2008: 2.2 million files, 19 TB
– New HST data added in 2008: 4.6 million files, 17 TB
– Total holdings of WFCAM data: 930 000 files, 16 TB
– New WFCAM data added in 2008: 190 000 files, 3 TB
– Total holdings of APEX data: 95 000 files, 645 GB
– New APEX data added in 2008: 32 300 files, 270 GB

Database holdings:

– In 2008 the ESO data flow back-end databases ingested information on ~1.25 million raw observation frames, 260 000 processed science frames and 370 000 master calibration frames, bringing the totals to 9.5 million raw files, 1.1 million master calibration files and 350 000 processed science files.
– The FITS header keywords repository database in the IQ server ingested full header information from 1.9 million frames, both raw and processed. The total number of new entries is 880 million rows and a total of 4.3 billion rows.
– The operations log database in the IQ server ingested 490 million rows, for a total of 2.9 billion rows.

Archive delivery:

– Unique archive requests from external users for ESO data in 2008: 12 250 requests for 1.5 million files, totalling 26 TB. This includes the requests by the PIs for their own raw data: 1035 requests for 48 000 files, 2 TB
– Unique archive requests from external users for HST data in 2008: 1800 requests for 240 000 files, 8 TB
– HST Data delivered via the Download Manager: 9000 files, 0.5 TB
– Number of VLT/VLTI PI packages deliveries: 1250
– Number of pre-imaging deliveries: 233

ADE will face several challenges in 2009. The beginning of science operations of the VISTA telescope will require much larger data volumes to be serviced, both in terms of the total size and in the number of files. To improve user interactions with the archive, we anticipate the implementation of several new tools/services, with the most prominent being the new request handler, the upgraded calibration selection tool, an upgrade to the back-end database scheme to provide a clean-cut separation between the operational and query databases and enhancements to the archive query forms.

Virtual Observatory

The Virtual Observatory Project Office (VOP), created in June 2008 as a successor to the former Virtual Observatory Systems Department, has the task of providing Virtual Observatory (VO) input to ESO in general, and to the DMO Archive and Data Products Departments in particular, and with coordinating ESO's involvement in the VO, namely in the Euro-VO project and the International Virtual Observatory Alliance (IVOA). The VOP ensures that ESO's data products are interoperable and up-to-date and that ESO's voice is heard at the international level when astronomical data access and exchange standards are discussed.

The VO initiative is a global collaboration of the world's astronomical communities under the auspices of the IVOA. ESO has been very active in the VO arena from the start and is a founding member of the Euro-VO project to deploy an operational VO in Europe. Euro-VO, which is partly funded by the European Community, has established three interlinked structures: the Facility Centre, which is hosted at ESO and managed in collaboration with the European Space Agency, the Data Centre Alliance, and the Technology Centre.

A number of so-called Advanced Data Products (ADPs), or reduced data that astronomers can use for scientific purposes with little or no effort, have been made available. Namely:

– A public release of the final version of the ESO/MVM data reduction software, including a configuration editor and step-by-step instructions for VLT/ISAAC reduction.

– To facilitate the location and retrieval of ADPs from the ESO archive, a unified science-oriented search interface for both imaging and spectral data was made public. The new interface provides a unique entry point to all ESO ADPs, with the same look and feel as the main archive interface.

– Several improvements were made to VirGO, the new visual browser to the ESO archive, which provides a modern and intuitive way to access ESO data by displaying the field of view of imaging detectors and slits of spectrographs on the sky. These include a new user interface, multi-resolution texture loading for very large preview image or background surveys, used for Digitized Sky Survey colour images, improved VO compatibility, and high speed optimisations.

Euro-VO Facility Centre

The Euro-VO project, through its Science Advisory Committee (SAC) and the Facility Centre, selected three projects (one of which is being supported by ESO staff), which are making use of VO tools and applications to carry out astronomical research. The projects are receiving scientific support and will be completed by October 2009.

VOP staff were present at the third NEON Archival School at ESO on 29 August at the Joint European National Astronomy Meeting (JENAM) in Vienna, 8-12 September, where they also manned a Euro-VO booth with astronomers from other Euro-VO partner projects, and at the 21st International CODATA Conference in Kiev, Ukraine, 6-9 October.

The Euro-VO Astronomical Infrastructure for Data Access (AIDA) project started in February. AIDA, with a significant contribution from VOP staff, organised its first Community Workshop on "Multi-wavelength Astronomy and the Virtual Observatory" on 1-3 December at the European Space Astronomy Centre (ESAC), Madrid. The workshop brought together experts in multi-wavelength galactic and extragalactic astronomy and scientists and engineers actively involved in the VO initiative in an effort to exchange ideas and get feedback. The Euro-VO SAC, which provides scientific advice to the project, met twice in 2008: on 11-12 March in Cambridge and on 11-12 December in Strasbourg. SAC members were also updated on the latest Euro-VO developments.

Euro-VO Data Centre Alliance

The Euro-VO Data Centre Alliance (DCA) Project mid-term review was held very successfully on 10 January in Brussels. A Euro-VO workshop on how to publish data to the Virtual Observatory was organised at ESO Headquarters by ESO and ESA, in collaboration with the other Euro-VO partners, on June 23–27. It attracted about 60 participants and 20 advisers and organisers. It was geared towards data centres and large projects to acquire the knowledge and experience necessary to allow them to become "publishers" in the VO. In hands-on sessions, participants were introduced to VO protocols in the view of publishing their data holdings through the VO.

The Euro-VO DCA project came to an end in December. DCA-like activities will continue in AIDA.

EURO-VO Technology Centre

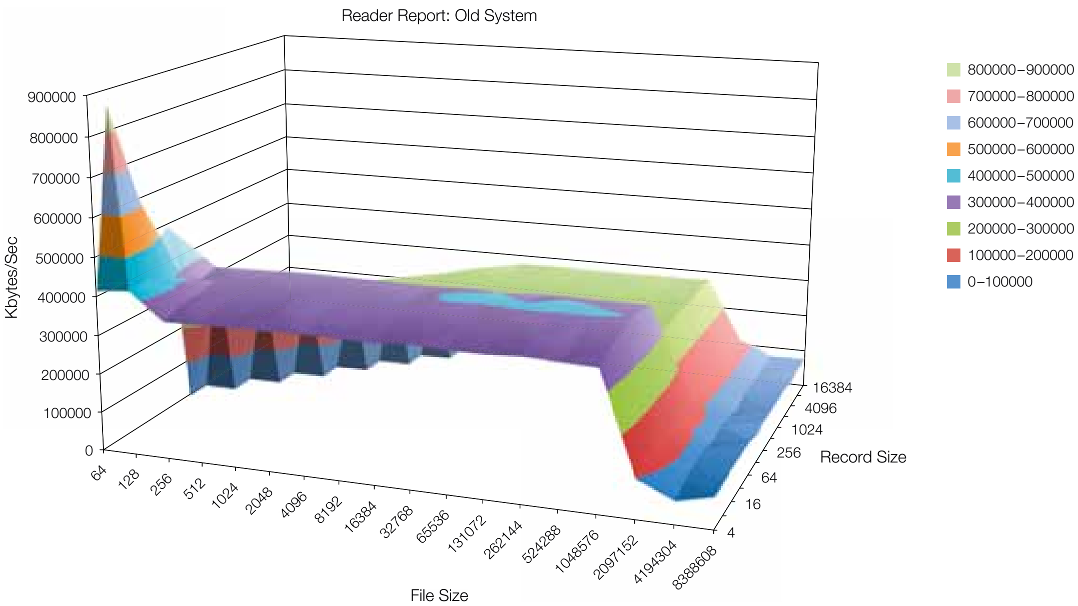
The eighth and last cycle of the VOTech project was completed in December. The project is now in the close-out phase. VOP, which is VOTech-like, maintains the Euro-VO project website, which, in seven months of 2008, served 280 GB of content resulting from 1.2 million web hits in 65 000 user sessions. VOP is also in charge of the IVOA project website, which served 295 GB of web content resulting from 6.2 million web hits in 220 000 user sessions.

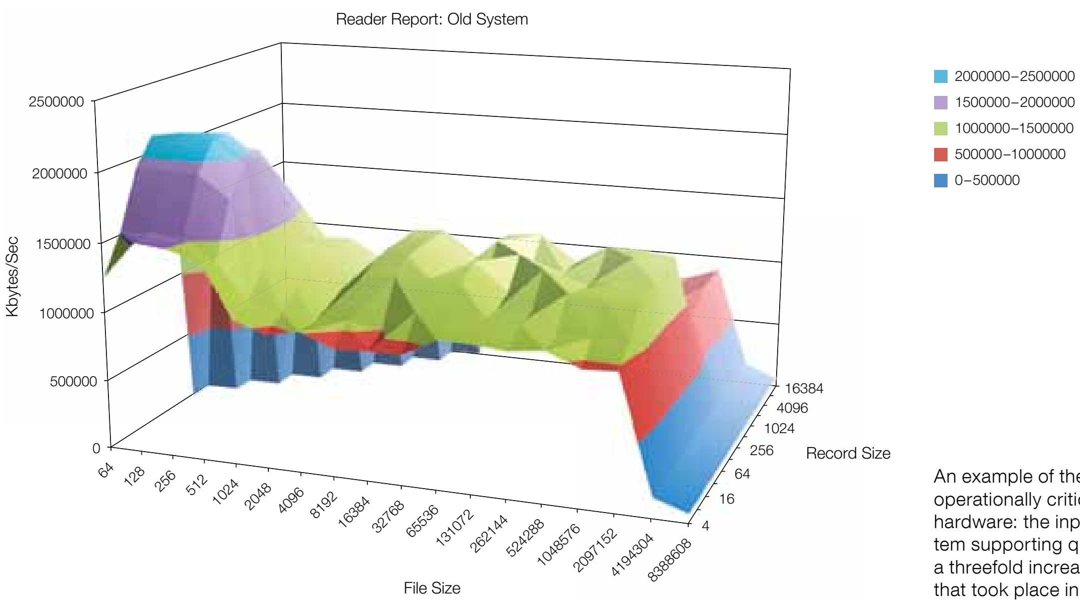
Operations technical support

ESO operations rely heavily on the use and replication of relational databases. The primary ESO relational database server was migrated to improve maintenance, ensure the support of new demands, and improve network connectivity. The migration to the new server, hosting 38 operational databases, has improved performance by a factor of five. In parallel, ways to improve and simplify database replication have been investigated.

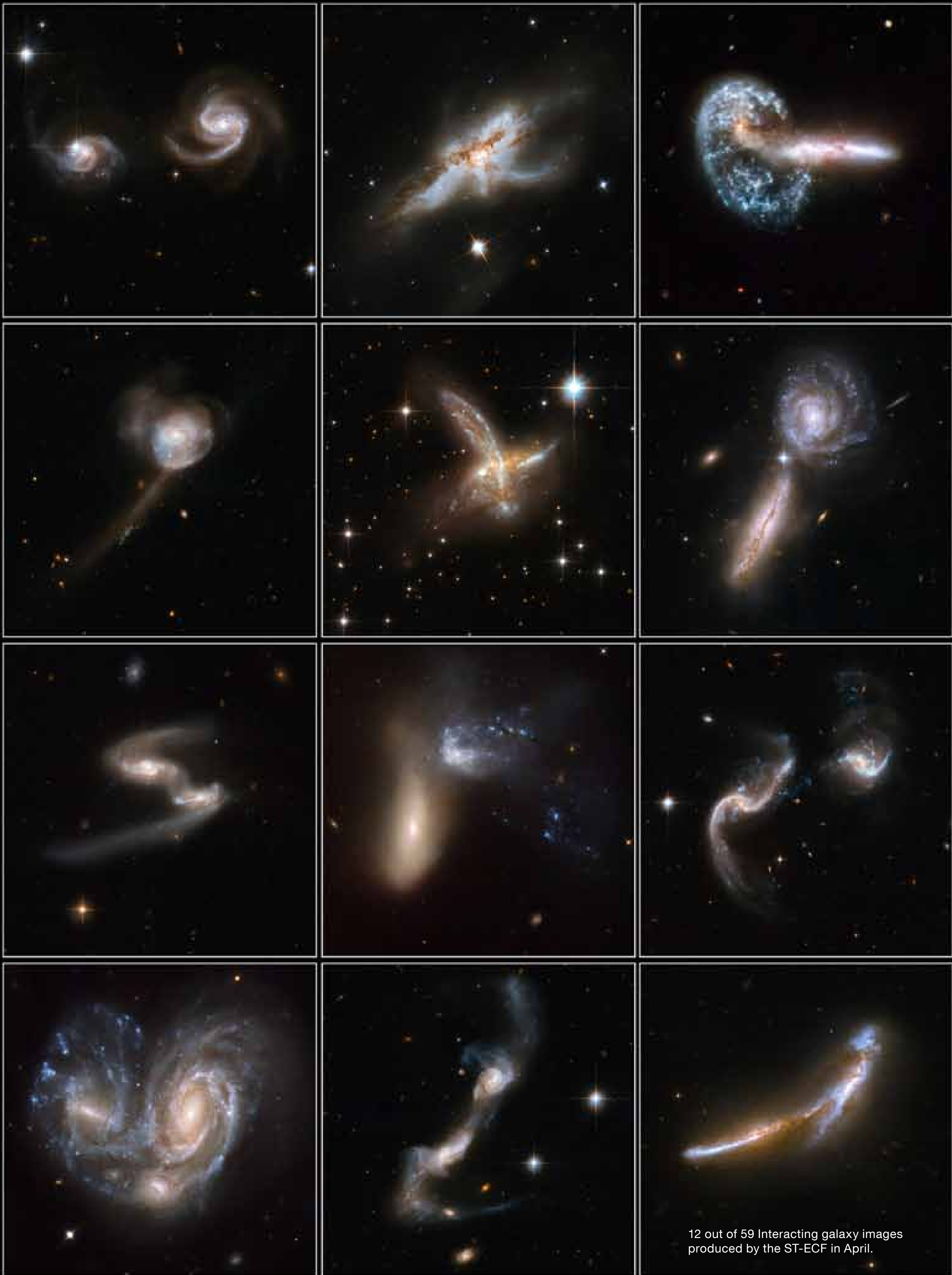
The reliability of operations around critical periods such as the late stages of the proposal submission period is ensured by providing overnight support for mission-critical computer systems, as well as by periodically migrating these systems to more reliable, higher performance hardware. Such improvements must naturally include the primary archive system, whose migration toward higher density storage media has already started to prepare for the increase in the data holdings that will take place when the survey telescopes and the VLT second generation instruments begin operations.

The path towards higher reliability of mission-critical systems extends also to the increase in the safety of the ESO Data Centre inaugurated in mid-2007, which currently hosts the vast majority of such systems. For instance, the smoke detectors, the air-conditioning and the heat exchangers have been serviced, and an extension of the cooling capacity to increase the space for new systems and related hardware is already planned.





An example of the consequences of migration of operationally critical services to higher performance hardware: the input/output performance of the system supporting quality control operations showed a threefold increase after the latest such migration that took place in 2008.



12 out of 59 Interacting galaxy images produced by the ST-ECF in April.

Credit: NASA, ESA, the Hubble Heritage Team (STScI/AURA)-ESA/Hubble Collaboration and A. Evans (University of Virginia, Charlottesville/NRAO/Stony Brook University), K. Noll (STScI), and J. Westphal (Caltech)

ST-ECF

ESO and the European Space Agency continued their collaboration through the Space Telescope — European Coordinating Facility (ST-ECF). In August, Hubble completed its one hundred thousandth orbit, celebrated with an image of NGC 2074 in the LMC taken with the WFPC2. In December, the observatory achieved its highest ever on-target efficiency of 88.5% for a week by maximising the opportunities provided by a programme that studies astroseismology.

In September, there was a failure of the NICMOS cryo-cooler system, requiring a restart. Despite repeated attempts, the cooling system is still not operating and it appears likely that further start attempts will not take place until after Servicing Mission 4 (SM4). Consequently, the current complement of operating HST instruments is limited to: WFPC2, the Solar Blind Channel of the ACS and the Fine Guidance Sensors that can be used for astrometric measurements.

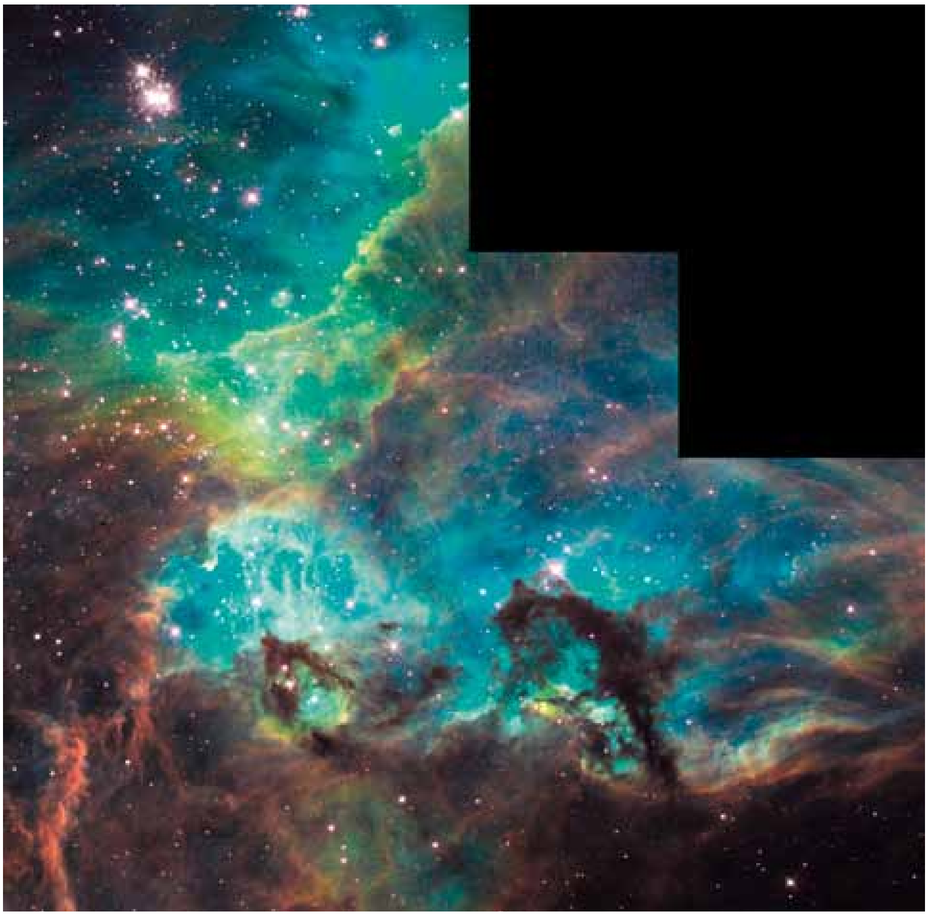
Following the delay of SM4 from October 2008, caused by the failure of redundant on-board hardware concerned with instrument commanding, data formatting and telemetry, intense preparations for the servicing mission are continuing. The launch is currently scheduled for May 2009. SM4 will restore the lost redundancy as well carry out other maintenance, including the necessary units to re-enable full three-gyro operation. In addition to the installation of the Cosmic Origins Spectrograph (COS) and the Wide Field Camera 3 (WFC3) the mission will bring STIS and ACS back to full functionality. ST-ECF staff are supporting some of these activities — notably the preparations for WFC3 spectroscopy.

Two observing time allocation processes took place during 2008. The Cycle 17 Time Allocation Committee and Panels met during May. Thirty-two of the 197 distinct principal investigators (16.2%) were from ESA member states and they received 531/3411 (15.6%) of available orbits. Also, 210 of the Cycle 17 co-investigators are from ESA member states.

Following the delay of SM4, a Cycle 16 supplementary call was issued late in the year, producing four ESA PIs and an additional 32 Co-Is.

The principal focus of ST-ECF technical activity continued to be the support of the slitless spectroscopy modes offered by several of Hubble's cameras. By formal agreement with the STScI, the ST-ECF carries responsibility for the calibration and user support for most of these modes and has developed an extensive suite of software for the optimum extraction of accurately calibrated data from grism and prism observations. Following an extensive pilot project using data from the principal NICMOS grism mode, the ST-ECF released 2470 individually validated NICMOS extracted grism (G141) spectra as part of Data Release 1 (DR1) of the Hubble Legacy Archive (HLA) in February 2008. Spectra from about 80% of all in-focus NICMOS G141 pointings up to July 2007 are available. A paper describing the NICMOS release appeared in A&A in November.

Attention then switched to enabling the extraction and calibration of the extensive set of ACS grism observations by tuning the parameters used in the software and collecting the direct images and grism exposures into their appropriate "associations". The slitless mode of the Wide Field Channel (WFC) delivers spectra with a resolving power R ~ 100 over a wavelength range of 600–1000 nm. There are about 150 ACS/WFC grism associations covering about 600 square arcminutes of the sky and capable of delivering spectra to a limiting magnitude of at least 26. The work on the pipeline processing of these data aims at a preliminary (sampler) release to the HLA of a few thousand sources early in 2009 with a full release of some 20000 spectra later in the year. This promises to be a highly significant resource of currently unexploited data of unique quality and depth. Considerable



Credit: NASA, ESA and M. Livio (STScI)

The nebula near the star cluster NGC 2074 (upper, left). The region is a firestorm of raw stellar creation, perhaps triggered by a nearby supernova explosion.

effort has been devoted to improving the accuracy of the photometry and astrometry of the targets and this now leads to agreement between spectroscopic and imaging magnitudes to a level of a few hundredths and to astrometric discrepancies with respect to the best catalogues (i.e., within the GOODS fields) of little more than 100 milliarcseconds.

In preparation for the launch and installation of WFC3, the ST-ECF has been working closely with the instrument and HST projects by collaborating on the thermal vacuum testing of the camera, by preparing the ground calibrations and orbital calibration plans for the infrared and ultraviolet-visible spectral modes, providing slitless observation simulation support in the form of the aXeSIM software for Cycle 17 proposals and making available a version of the well-known TinyTim software for computing the camera point-spread functions.

The expertise in slitless spectroscopy developed within the group has resulted in collaborations with the EUCLID and SNAP teams to investigate the suitability of the technique to attain the goals of these missions. Simulations have been carried out using the aXeSIM software and a number of comparisons have been made between ACS and FORS2 observations.

The European HST archive, housed within the ESO science archive facility infrastructure, is being shaped for low maintenance/cost operations from the end of 2010 when the ST-ECF closes. Involving both hardware and software developments, data are now being served much faster and more conveniently from an online "cache" that contains the latest versions of calibrated data products. The development of the cache has been carried out in collaboration with the Canadian Astronomy Data Centre (CADC). During this process, efforts have been made to improve the quality of the associated scientific metadata and to check the status of the calibration reference files. The STScI, CADC and ST-ECF together now serve some 35 TB of HST data per year to users.

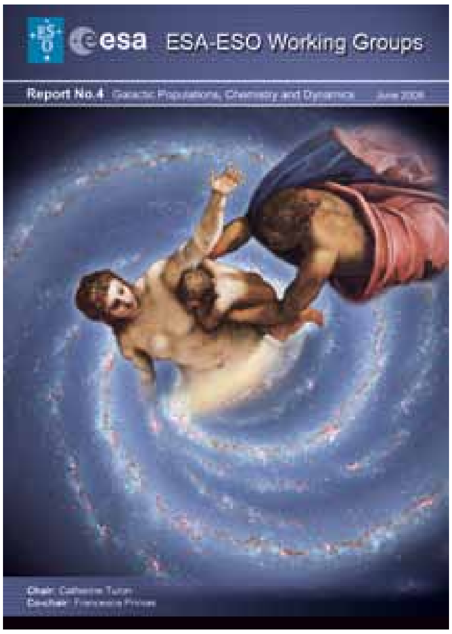
As well as working on the content, some research effort is being devoted to developing new and innovative methods for searching and retrieving data. As an alternative to the traditional "form-based" interface where the user has to specify a number of values in pre-defined fields, a more intuitive Google-like process is being developed to allow the user to exploit some of the technology used by commercial search engines, ADS etc. This can be used to enter keywords, descriptors and values in a string and have them used by an intelligent parsing mechanism to home in on the data being sought.

As part of the activity spawned by the regular meetings of the ESA and ESO executives and representatives of their science advisory structures, the fourth of the series of ESA–ESO Working Group reports has been published by the ST-ECF. Entitled: "Galactic Populations, Chemistry and Dynamics" and chaired by Catherine Turon and Francesca Primas, this study contemplates the forthcoming Gaia mission and considers the opportunities for supporting ground-based activities.

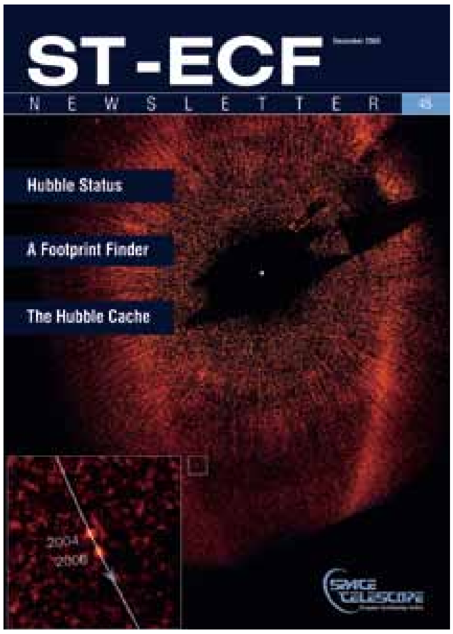
In addition to participating in the ASTRONET Infrastructure Roadmap study, ST-ECF and ESO public outreach staff were responsible for the layout, printing and distribution of the ASTRONET Roadmap book and executive summary booklet.

Most of the group's activities are described in more detail in issues of the ST-ECF Newsletter, currently published twice per year and widely distributed. This was a pioneer publication in astronomy desktop publishing and has just passed its 45th issue.

During 2008, there were changes to the way in which the Hubble-related outreach activities are carried out. Following a period of seven months during which the ESO Outreach Department was led by the head of the ST-ECF, the ESO and Hubble outreach groups have been merged into a single entity within the Science Directorate. Consequently, reports of the Hubble public information and outreach achievements appear under the Outreach heading in this Annual Report.



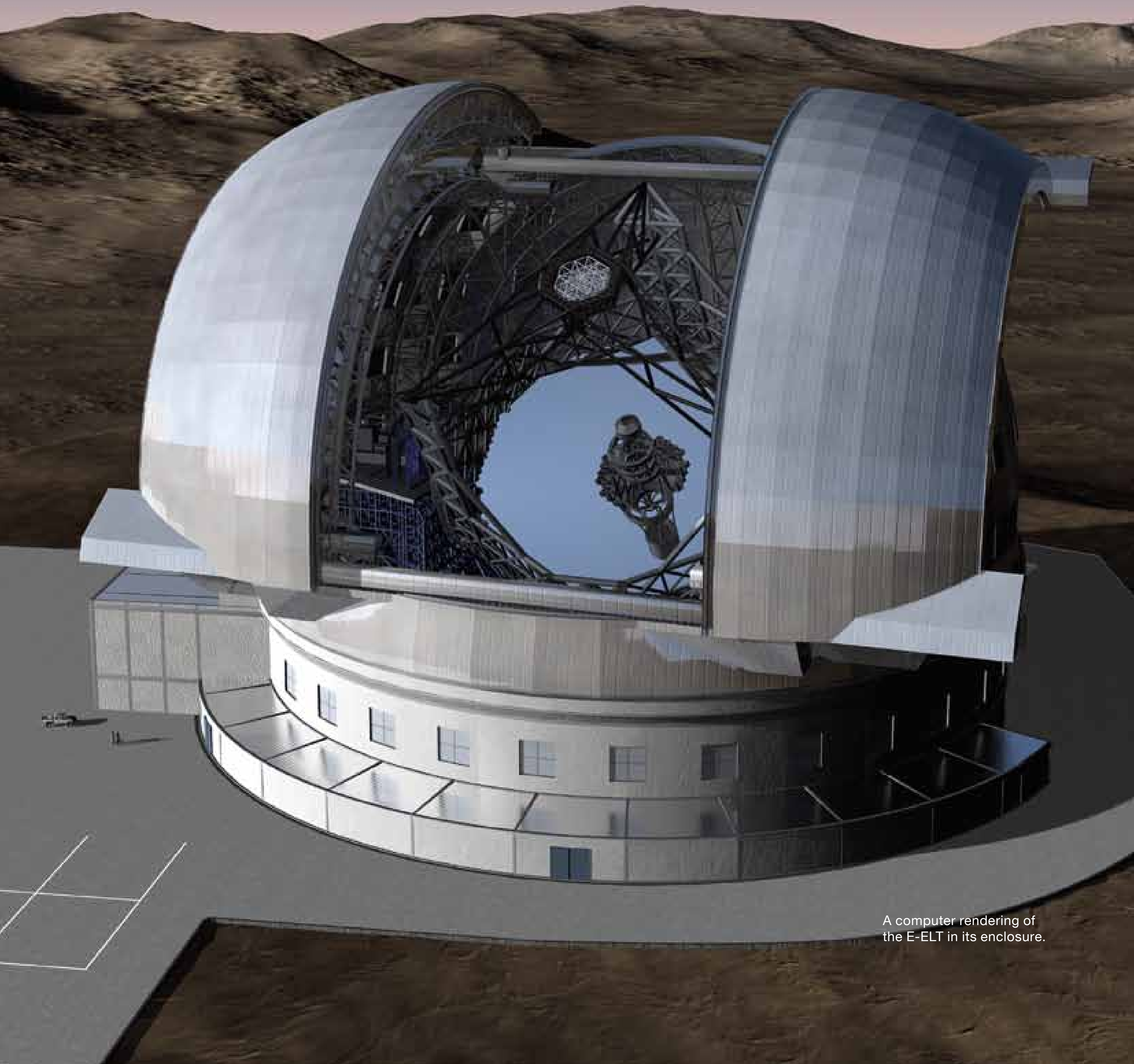
Cover of the report from the ESA–ESO Working Group on Galactic Populations, Chemistry and Dynamics.



Cover of the ST-ECF Newsletter.

Colour-composite image of the Carina Nebula, revealing exquisite details in the stars and dust of the region.

Programmes



A computer rendering of
the E-ELT in its enclosure.

European Extremely Large Telescope

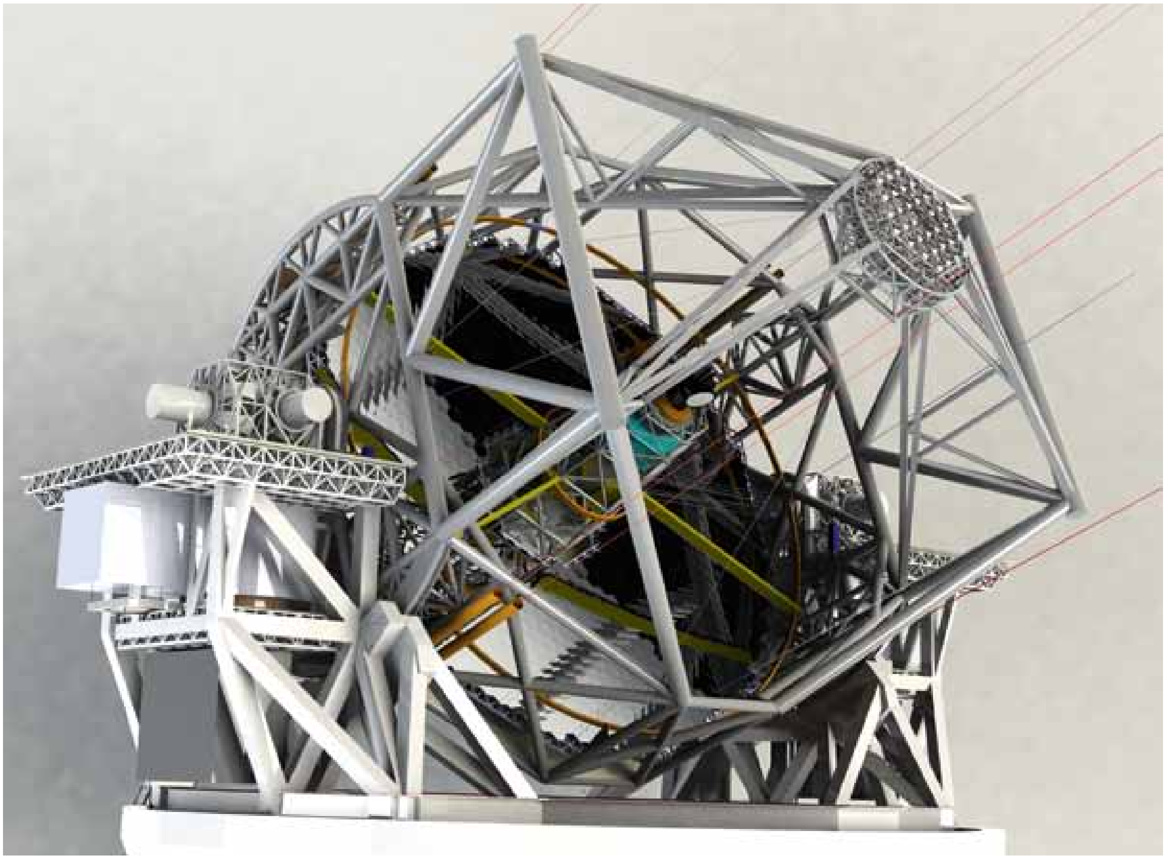
The Directorate of Programmes was created as part of ESO's management restructuring in early 2008 and has resulted in a closer working relationship between the Telescope, Instrumentation and Technology Divisions to achieve its mission of "delivering world class astronomical programmes (observatories, telescopes, instruments) necessary to fulfil the major aspirations of the ESO astronomical community". It covers E-ELT, the Survey telescope projects, instrumentation development and technology.

2008 was the second year of the E-ELT Phase B Design Study. The design phase for the telescope is largely an industrial activity orchestrated by ESO, thereby bringing the construction expertise directly into the project at the earliest possible opportunity. In early 2008, two sets each of preliminary design studies were completed for the dome and main structure of the telescope. The designers of the main structure drew strongly on their past experience of large telescopes for both the radio and optical domains. As a result of these studies the project has revised its baseline design for the main structure to one with an equally good performance, but a simpler concept, based on two rather than four cradles, seen below.

The two designs of the dome have provided interesting and profoundly different solutions for the structural support of this massive building. At the end of 2008, ESO tendered for the follow-up to the preliminary design studies, the Front End Engineering Design (FEED) studies for both the dome and the main structure.

In early 2008 the contract for the preliminary design of the primary mirror support was also completed and has also advanced to tendering for its FEED contracts. The contract for the preliminary design of the electromechanical unit for the tip-tilt M5 mirror has been running well and passed its internal milestone of preliminary design, allowing the fabrication of the scale-one prototype unit to start.

Two contracts that have been underway since mid-2007 for the preliminary design and prototyping of the quaternary adaptive mirror have made good progress in 2008. Large-scale prototypes are now under construction. Besides folding the light, the main function of these two flat mirrors (M4 and M5) is to correct wavefront aberrations, caused mainly by atmospheric turbulence, and thus to deliver diffraction-limited images to the telescope's focal plane. Image motion is corrected by the field stabilisation unit, which is a tip-tilt mechanism for the telescope's fifth mirror, M5, an ultra-lightweight elliptical mirror with a maximum



3D-CAD rendering of the 42-metre E-ELT telescope design.

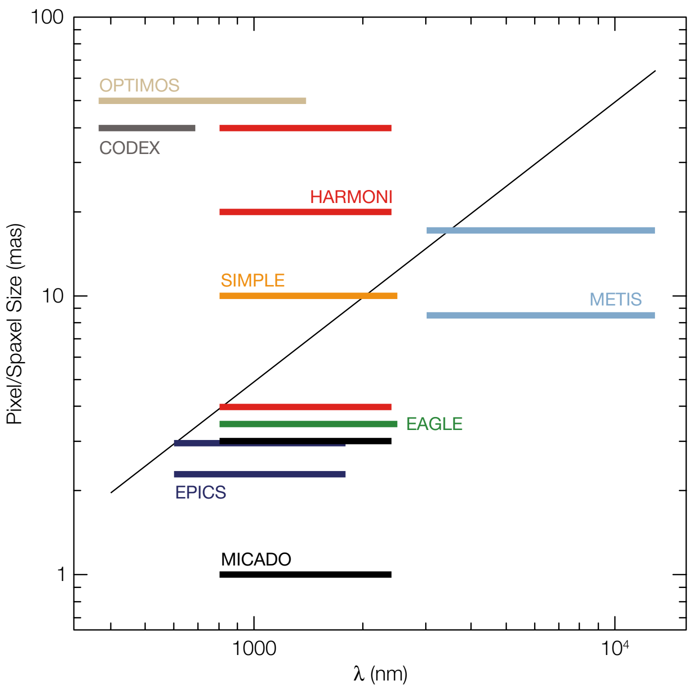
dimension of about 3 m. Higher order aberrations are corrected by the quaternary mirror, M4, an adaptive mirror with more than 6000 actuators and a maximum dimension of about 2.6 m, located close to the telescope's exit pupil.

Two contracts have been running with industrial suppliers since the beginning of the year to fabricate 14 full-scale segments (seven each) meeting the exact specifications of the final primary mirror. These activities, which include the construction of sophisticated test equipment, are advancing and the mirrors are already in the fabrication stage. Several other industrial contracts were started in 2008 and are progressing. The designs for secondary and tertiary mirror cells are contracted, as is the design for the prefocal station.

In parallel, significant effort has been placed on establishing the framework for the E-ELT work, including mechanical and electrical standards, interfaces and the basic architecture of the telescope control system. A number of studies aimed at understanding the effects of wind on large structures better have been carried out to characterise the effects of wind generated turbulence within the telescope dome. Both wind tunnel experiments and computational fluid dynamics calculations have been used.

The E-ELT instrumentation programme is advancing well, with ten phase A studies (six pre-selected instrument concepts, two identified through an open call and two post-focal adaptive optics modules) being carried out by several consortia of institutes. The scope of these studies is to verify that instruments capable of addressing the highest priority scientific goals can be built at an affordable cost. Scientists and engineers from over 30 institutes in ten ESO member states and one in Chile are involved in this phase. Two of the studies are led by ESO and eight by external PIs, in line with the successful VLT experience, when other institutes also contributed to a large fraction of the instrumentation.

The instruments under study are focused on exploiting the two unique capabilities of the E-ELT: high angular resolution and the unsurpassed photon-collecting power.



Pixel sizes currently under consideration for the different E-ELT instruments under study. MICADO is a diffraction-limited camera, EPICS a planet imager and spectrograph, EAGLE a multi-object near-infrared spectrograph, METIS a mid-infrared imager-spectrograph, SIMPLE a high resolution near-infrared spectrograph, HARMONI an integral field near-infrared spectrograph, CODEX a high stability, high resolution optical spectrograph and OPTIMOS a multi-object, optical and J-band spectrograph.

The studies are considering pixel scales for imaging and for spectroscopy (spaxels), which range from seeing-limited to the telescope diffraction limit (to be achieved with the aid of adaptive optics.

A detailed examination of the operations scenarios, staffing plans and infrastructure needs for the operations has started.

Characterisation of potential sites has continued. This activity is partly supported through the EC co-funded FP6 ELT-DS initiative and a Site Selection Advisory Committee (SSAC) has been appointed by the ESO Director General to advise him on site selection, which is foreseen for the end of 2009.

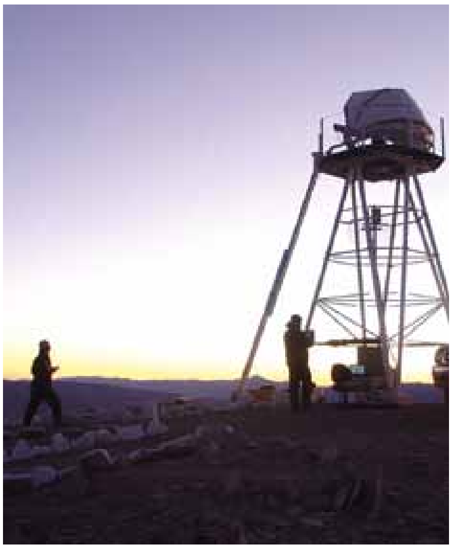
The E-ELT programme has been supporting the Science Working Group (SWG) work on the Design Reference Mission (DRM) for the observatory. Many science cases from the DRM have been extensively simulated in-house by a group of scientists partly supported by the EC through its FP7 initiative. An analysis of the impact of site characteristics on the science cases has been carried out.

A community questionnaire has been launched in order to build a Design Reference Science Plan (DRSP) to be used to explore the scientific parameter space for the E-ELT further and to provide fundamental input to establish the requirements of science operations.

Science operations mode scenarios have been further developed by considering in detail three observing modes: Service Mode (fully flexible scheduling, without real-time interaction by the user); Remote Mode (highly flexible scheduling giving the remotely located user the option to interact with the observatory in real time); and Visitor Mode (non-flexible time allocation with the presence of the observer at the facility). The baseline observing mode is Service Mode, whose case is well established as all the science projects collected in the DRM can be executed in this mode.

The requirements on telescope instruments (derived from the top level scientific requirements) and operations (which include science operations as well as day-to-day engineering and maintenance activities) and their interfaces have been consolidated.

The E-ELT programme has also focused on the overall safety aspects as the top priority for the observatory design, construction and operation; on quality



E-ELT site testing: The E-ELT programme office is currently studying the potential sites for the new observatory. Top left: Aklim (Morocco). Top right: Roque de los Muchachos (La Palma, Spain). Bottom left: Cerro Ventarones (Chile). Bottom centre: Cerro Vizcachas (Chile). Bottom right: Cerro Macon (Argentina).

policies, in relation to configuration control (hardware, software, documentation); and on performance monitoring.

The FP6 ELT Design Study initiative has been extended to June 2009 to allow all tasks and milestones to be completed. The R&D activities, originally design-independent, but realigned to the E-ELT specifications in 2006, include studies and breadboards whose results have been fed into the E-ELT design. About two thirds of the work packages completed their tasks in 2008.

The two-year FP7 E-ELT Preparatory Phase programme started on 1 January 2008. E-ELT Prep activities are conducted by ESO in collaboration with 26 third-party institutes in eight ESO member states. They complement the current detailed E-ELT design in helping to bring the project to the level of maturity needed for taking the political decision to build.

E-ELT Prep activities had their general kick-off meeting on 24 January 2008. By the end of the year, 21 of the 24 deliverables programmed in that first period had been completed. Similarly, of the 15 milestones for 2008, all but two were met and one has been re-scoped. Highlights from 2008 include speeding up the building of the E-ELT DRM with feedback from the community at large, rallying more than 200 European high-tech industries around the E-ELT, organising networks of prospective instrument builders, and preparing management tools and science access requirements for the building phase.

Four R&D areas that will bring advanced observing capabilities to E-ELT instruments are being explored with very good progress made already: 1) ultra-accurate wavelength calibration techniques, e.g. for low-mass exoplanet indirect detection; 2) wide patrol field multi-object adaptive optics concept validation e.g. to study the build-up of galaxies in the early Universe; 3) development of a high contrast diffraction-limited imaging toolbox for direct detection of low-mass exoplanets and 4) wide-field imaging multi-conjugate adaptive optics performance evaluation, e.g. to perform stellar “population archaeology”.

Survey Telescopes

The VISTA 4.2-metre infrared survey telescope, being developed for ESO by the UK Astronomy Technology Centre in Edinburgh, is part of the UK in-kind entrance contribution to ESO. A key milestone for the project in 2008 was the arrival of the primary mirror on Paranal. This is the largest F/1 mirror ever produced and proved a very challenging task for the manufacturer. Although the polishing of this mirror took significantly longer than originally anticipated, it finally passed its factory acceptance tests at the manufacturer's premises in Moscow in early March. It was then air-freighted directly to Antofagasta in an Antonov AH-124 transport plane, finally arriving at Paranal by road on 27 March. In early April the mirror was given its reflective coating of protected silver and installed in the telescope. This was the final missing piece of the telescope, but the late arrival of this mirror has had an impact on the planned schedule for bringing the telescope into operation. Starting in May, the VISTA project team began the detailed verification and commissioning phase of the project. By the end of 2008, VISTA still had a few technical problems, but was in regular night-time use for on-sky tests and commissioning of the advanced data flow system. The ESO acceptance of VISTA and the Science Verification period are scheduled for the first half of 2009, after which VISTA will start regular public survey operations.

Commissioning of the telescope structure and drives for the VST continued on Paranal and its secondary mirror unit was shipped at the end of the year, while its primary mirror cell was being prepared and tested for shipment in early 2009.

4.2-metre primary mirror being lowered into the VISTA telescope.

VISTA with all mirrors and camera installed.


The VISTA telescope at
Paranal Observatory.

Credit: ESO/H. Heyer

Instrumentation for the La Silla Paranal Observatory

Innovative, high performance instrumentation is a crucial component in the success of any modern telescope. In the case of the VLT and the VLTI, ESO maintains a large effort dedicated to the development, maintenance and upgrade of astronomical instrumentation. The commissioning of a new instrument is always an exciting milestone and the culmination of many years of work by scientists and engineers.

In 2008 the first commissioning run was completed for X-shooter, the wide-band (U- to K-band), intermediate resolution, high efficiency spectrograph and the first of the second generation VLT instruments. Activities at ESO during the first half of 2008 included integration of the instrument backbone and ultraviolet-blue and visible spectrographs from the Danish and Italian consortium partners and the near-infrared spectrograph from the Netherlands, along with the control electronics and software. The flexure compensation system, which corrects for flexure in the backbone, was tuned and made to work reliably, and the remaining hardware issues in the spectrographs were addressed with the help of consortium partners. The first commissioning run on UT3 was conducted without the near-infrared spectrograph and confirmed that all major ultraviolet/visible performance requirements had been met. The near-infrared spectrograph remained in Garching during this period so that its image quality and the reliability of the cryogenic housekeeping electronics could be improved. These issues have now been resolved and the near-infrared spectrograph will be commissioned in March 2009.

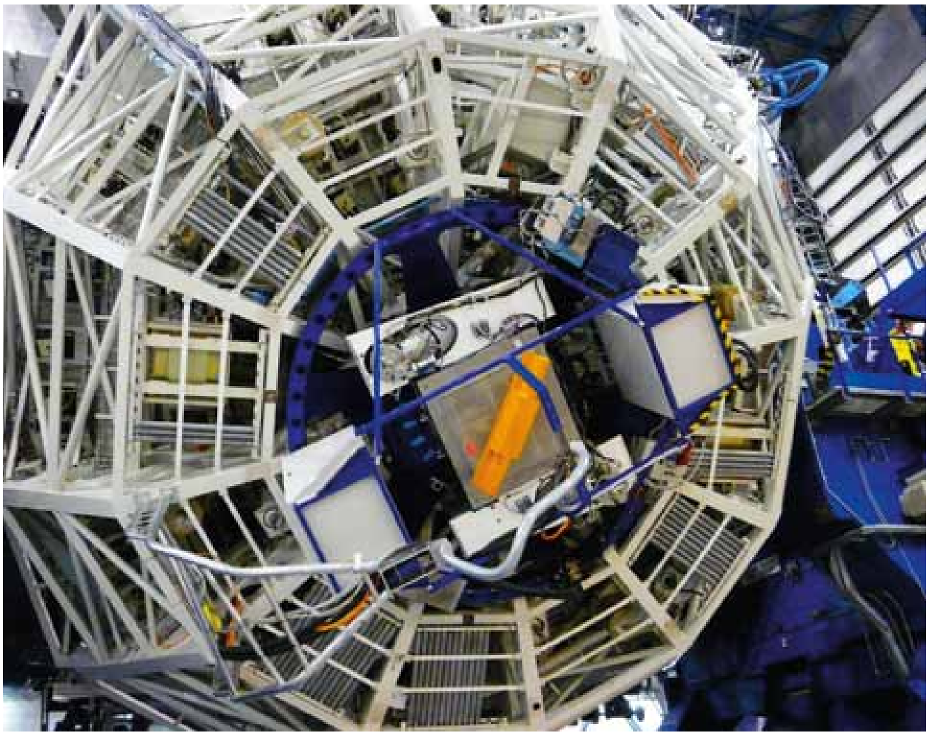
OmegaCAM, the VST camera, was shipped to Paranal in 2008 to ensure that a reliable working camera would be operational for the commissioning of the VST in 2009. Its mosaic of 8 x 4, 2k x 4k CD44-82 charge-coupled detectors (CCDs) covers a field of view of 1 degree x 1 degree on the sky. The instrument was fully assembled by staff from the instrument consortium and ESO and extensive tests confirmed that while no damage had occurred due to transport, one of the CCDs had developed a severe malfunction and will need to be replaced before the beginning of scientific operations. OmegaCAM at the VST and VIRCAM on VISTA will become ESO workhorses. Together they will enable the ESO community to perform wide-area imaging surveys from the atmospheric cut-off in the ultraviolet through to the infrared K-band.

Upgrades and repairs

An important way of improving instrument performance over time at relatively modest cost and effort is to upgrade existing components and subsystems as the technology develops. This is particularly important in the case of detectors, an area of technology that is still undergoing rapid development. The GIRAFFE medium-high resolution visible spectrograph, which is used with the FLAMES fibre-positioner, had its CCD replaced in April and May by a new E2V two-layer anti-reflection coated, deep depletion CCD, resulting in much higher red sensitivity and reduced fringing.

Interventions were made to the interferometric instrument AMBER to improve the alignment of the detector with respect to the spectrograph, as well as to make changes to the grating wheel and control electronics. An extensive commissioning run after these modifications showed much improved behaviour and performance of the instrument. A further problem, the Fabry-Perot-like beating of the phase, was fixed by replacing the polarisers in October.

As part of the ongoing effort to reduce the level of vibration seen by the VLTI, a plan has been developed for either removing or damping the closed cycle cooler vibrations in cryogenic instruments. The HAWK-I infrared imager was the first to be modified, with its radiation shield and cold structure cooling converted to circulating liquid nitrogen. Although one closed cycle cooler was still kept for the detector and filter wheel cooling, the resulting reduction in vibrations was significant and removed the



X-shooter mounted on the VLT at the Cassegrain focus of UT3. The orange mass is a 500 kg dummy weight representing the near-infrared spectrograph. It will be replaced by the real instrument in March 2009.

instrument as one of the major sources of vibration on Yepun. CRIRES will be retrofitted with low vibration closed cycle coolers early in 2009.

Instruments under development

ESO maintains an ambitious large programme of new instrument construction for the VLT and VLTI. In general, new instruments are constructed with a major involvement from consortia of European institutes.

KMOS is a cryogenic spectrometer with 24 deployable integral field units. The many motors and mechanisms mean that reliability and successful prototyping are critical. Final design approval was delayed to 2008, allowing the UK members of the KMOS team to complete cryogenic testing of its prototype robotic arms and to demonstrate excellent reliability, with thousands of movements being achieved without fail.

Similarly, the first tests of a full prototype diamond-turned integral field unit were successful. The project has now entered its manufacturing phase.

2008 was also a successful year for the MUSE instrument team and the project is now into its final design phase. MUSE is a giant optical integral field spectrograph that will slice a 1 arcminute x 1 arcminute field into slits feeding 24 spectrographs. All critical contracts for the optics, including spectrographs, VPH gratings and a derotator were awarded and started. An engineering grade detector prototype was successfully tested with ESO's new NGC controller, and full CCD procurement contract for MUSE has now been awarded. The Final Design Review is planned for March 2009.

The VLT planet finder SPHERE will use extreme adaptive optics to obtain direct images, polarimetry and spectra of planets. Prototypes of several key components have been developed and tested and the Final Design Review was passed in December. The 1377-actuator deformable mirror was also successfully tested and delivered to ESO by the manufacturer CILAS.

The Adaptive Optics Facility (AOF) is a major project to upgrade one of the VLT 8.2-metre telescopes, Yepun, with an adaptive secondary mirror, four laser guide stars and two adaptive optics modules: GRAAL for HAWK-I and GALACSI for MUSE. The aim is to provide both instruments with "enhanced seeing" performance and also to achieve diffraction-limited performance in a small field of view for MUSE. Substantial progress was achieved in the design and start of manufacture of the various subsystems during the year. The Deformable Secondary Mirror (DSM) manufacture has advanced well, with the start of machining of the 1.1-metre Zerodur back-plate, the manufacture of the hexapod components and the development of the control electronics. The GALACSI module successfully passed its preliminary design and optical Final Design Reviews. Preliminary design studies for the laser unit of the Four Laser Guide Star have been subcontracted to industry. The real-time computer platform, SPARTA, used for both the AOF and SPHERE passed its Final Design Review and a full-scale prototype demonstrating the required computing power for SPHERE and the AOF was completed. The optical test-bench, ASSIST, to be built by the Netherlands to test the complete system in Europe before shipping it to the observatory, passed its optical Final Design Review.

Both GRAVITY and MATISSE are second generation VLTI instruments designed to combine four telescopes (either UTs or ATs). They were recommended by the STC, endorsed by Council at the end of 2007 and started preliminary design as concrete ESO projects at the beginning of 2008. GRAVITY will operate in the K-band, with low-to-medium spectral resolution, and is designed primarily to detect and measure astrometric motions of stars close to Galactic Centre as well as the location and orbit of the infrared flashes seen there. It should achieve an accuracy of 10 microarcseconds, sufficient to measure the gravitational

One of the 24 cryogenic R-theta robotic pickoff arms used by KMOS to select its targets.

The 1377-actuator deformable mirror for the SPHERE instrument after delivery to ESO by the manufacturer CILAS.

potential and general relativistic effects associated with the supermassive black hole at the centre of the Galaxy. MATISSE will observe simultaneously in two different bands, at 3-5 microns (entirely new for the VLTI) and at 10 microns. It is aimed at the interferometric imaging and spectroscopy of dust around young stars, evolved stars and active galactic nuclei.

Interferometer (VLTI)

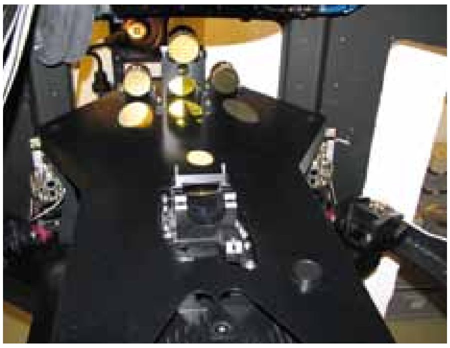
PRIMA

The year 2008 was marked by the so-called PRIMA Big Bang. All subsystems have reached completion and acceptance in Europe, been installed at Paranal and are now in commissioning. First on-sky results are very encouraging and demonstrate a stable system with good performance. The goal is to offer at least a large part of the multiple PRIMA operation modes (for faint phase referenced imaging and astrometry) to the community in 2010.

The first two star separators for the Auxiliary Telescopes have been installed on AT3 and AT4 respectively. These systems can pick up two stars anywhere in a 2 arcminute field of view and send the corresponding beams to the VLTI laboratory. They can also be used for chopping and counter-chopping.

Functionalities and performance up to auto-guiding have been successfully tested on-sky. The performance with field stabilisation will be tested in 2009. Some coating degradation problems (under warranty) delayed the tests, but with no impact on the global PRIMA planning.

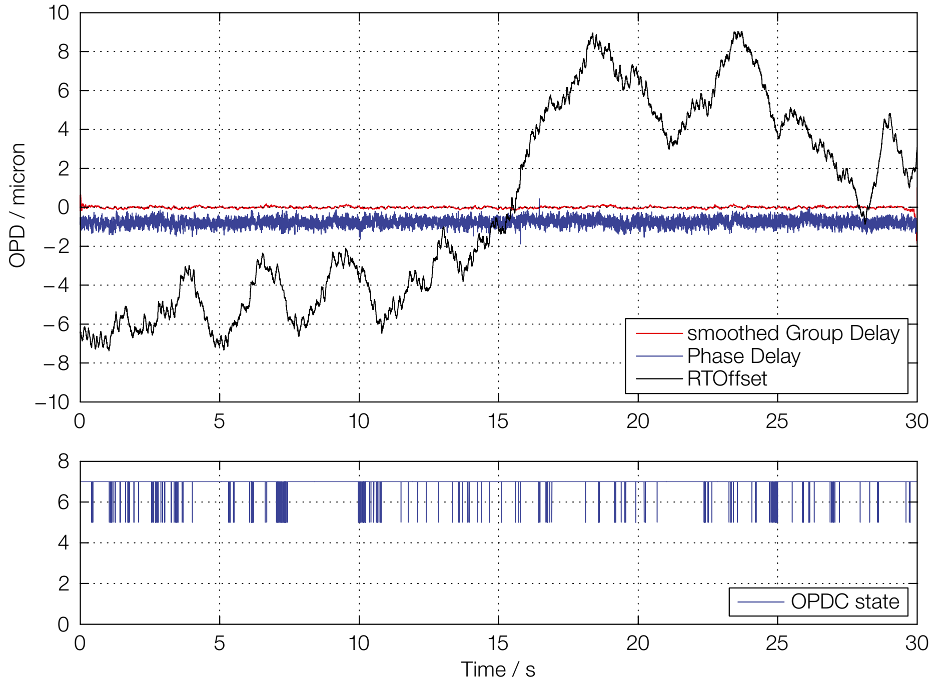
Two additional star separators have been ordered for the ATs and are being manufactured, for installation in 2011. The star separators for the Unit Telescopes are under final manufacturing and testing. Coatings were re-done preventively to avoid a repeat of the problem encountered by the Auxiliary Telescopes. The final systems should be delivered by the end of this year and installed soon after in Paranal.



PRIMA subsystems during integration on Paranal. Above are the optical bench and relay optics structure for the star separators. Below, the fringe sensor units.

The new cold camera for the fringe sensor units has been implemented and tested in Garching, recovering the stability requirement necessary for the challenging astrometric goal of PRIMA. The fringe sensor units, together with the calibration source MARCEL, the PRIMA end-to-end metrology (used on the same test bench) and the PRIMA operation software, passed their preliminary acceptance in Europe successfully in June 2008. Shortly afterwards, the PRIMA astrometric data reduction software and the differential delay lines, under development by the DDL-PAOS Consortium (Geneva Observatory, Heidelberg Observatory and Max-Planck Institute for Astronomy in Heidelberg) also passed their preliminary acceptance in Europe successfully.

All these systems were installed at Paranal during a seven-week period in July and August 2008 dedicated exclusively to the PRIMA Big Bang. The efforts



Typical fringe tracking performance (K-mag = 7.6; seeing = 0.75"; t0 = 5 ms; B = 64 m) – Top graph: measured optical path difference (blue), measured group delay (red), corrections applied to the delay lines (black) – Lower graph: status of the loop (level 7 = phase-tracking loop closed – level 5 = flux lost, waiting for fringes – level 0 = searching for fringes).

of the whole PRIMA Garching team, seconded by a very collaborative Paranal team and a motivated team from Geneva and Heidelberg, culminated in September with first fringe detection and tracking with one of the fringe sensor units ahead of schedule.

Since then, three commissioning runs have taken place. They allowed operations in single-feed (without using the star separators) and testing of the capabilities of the fringe sensor units. Fringes were observed down to magnitude 10 and tracked to magnitude 9, which represents a gain of about 2 magnitudes relative to FINITO. The tests gave also a good confidence level on the stability and reliability of the fringe sensor units as well as of the PRIMA metrology (typical results are shown above). Preliminary tests confirmed the improvement in fringe tracking performance when using a faster actuator (differential delay lines versus main delay lines).

The general interferometric control software (interferometry supervisor software) is also undergoing huge changes to adapt to the PRIMA subsystems and operation. The implementation of these fundamental changes is progressing smoothly and is also being used to introduce some improvements to the classical VLTI operations.

Naturally much work remains to be done before PRIMA can be offered to the community on a fully reliable and automatic basis. Nevertheless, both the Paranal and Garching teams are actively working to offer the new capabilities that PRIMA provides for off-axis fringe tracking for deeper imaging and astrometry with AMBER and MIDI.

In parallel with PRIMA activities, many other activities designed to improve the overall VLTI performance are underway and are described under La Silla Paranal operations.

Demonstrators

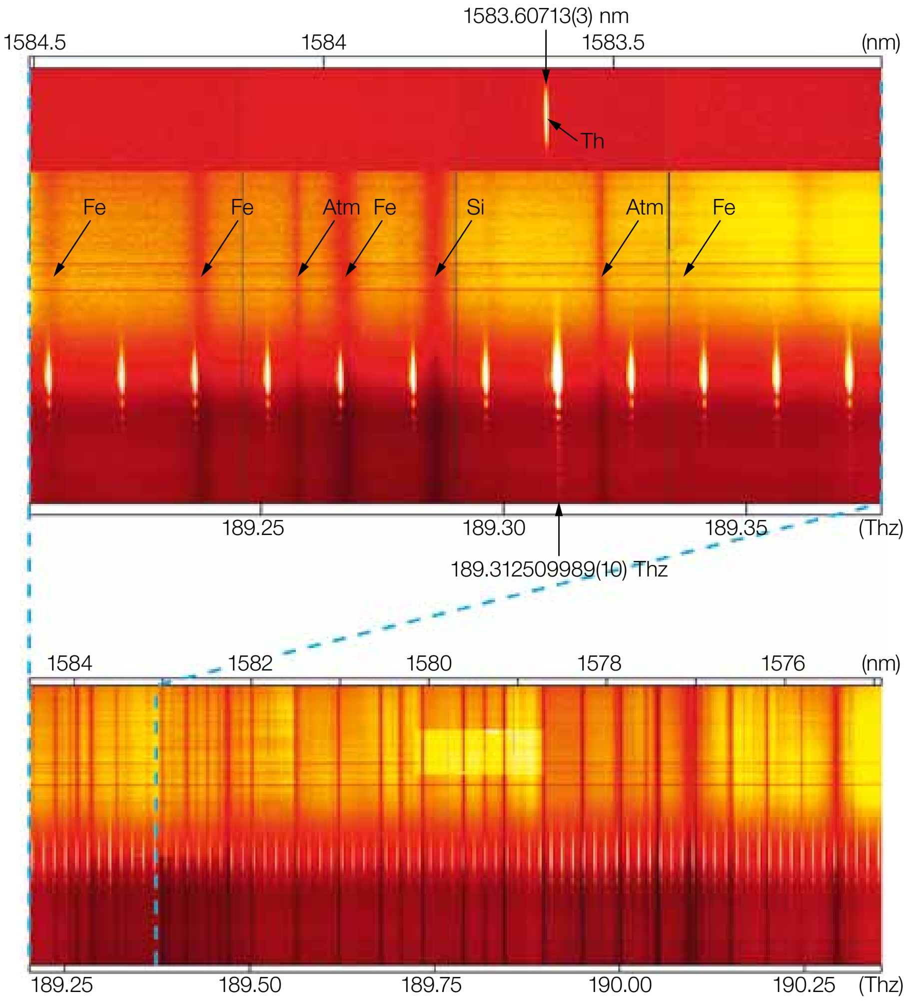
The technique of multi-conjugate adaptive optics (MCAO), first technically demonstrated on-sky in 2007 with the MCAO demonstrator MAD, went through a period of science demonstration this year. Several scientific results were obtained, confirming the power of this technique for reaching larger adaptive-optics-corrected fields of view. In particular a record two-hour infrared observation of Jupiter produced the sharpest whole-planet picture (and movie) ever taken from the ground (see photo on page 11).

The high stability and accuracy required for the new generation of high resolution spectrographs demands new calibration systems. A very promising new technique is the use of Laser Frequency Combs (LFC) developed initially by the Max-Planck-Institut für Quantenoptik (MPQ). Since 2007, ESO and the MPQ have been collaborating to adapt this principle to the specific calibration needs of high resolution astronomical spectrographs. The first major milestone of this programme was reached in March 2008 when spectra from the demonstrator unit were obtained with the high resolution spectrograph at the KIS–VTT solar telescope on Tenerife. Measurements were obtained near 1.5 µm, with a spectral resolution about 300 000. The comb line separation was exactly 10.5 GHz and establishes a "perfect ruler" for spectral calibration. Further tests of the system performance in the infrared range were made by using the infrared arm of X-shooter in the ESO lab and a 1-km long fibre which brought the comb light from MPQ. In the meantime parallel work has succeeded in bringing the LFC into the optical spectral range, and further tests are planned for January 2009 with the HARPS spectrograph.

The Active Phasing Experiment (APE) is a project that has been carried out within the scope of the FP6-supported ELT Design Study to compare methods to phase a segmented mirror. The primary mirror of the E-ELT will comprise 984 hexagonal segments, each of which has to be aligned in piston, tip and tilt with a precision of a few nanometres. APE has four different phase detectors in a single instrument to allow evaluation and comparison under realistic observing conditions. ESO was the lead organisation for the project and was responsible for the development of the test bench, the 61-segment active mirror and a Shack-Hartmann Phasing Sensor (SHAPS). The project also had three partner institutes, each of which developed and optimised one specific type of phase sensor. These were the Instituto de Astrofisica de Canarias (IAC), responsible for the Zernike Unit for Segment Phasing (ZEUS), the Osservatorio Astrofisico di Arcetri (INAF), responsible for the Pyramid Phasing Sensor (PYPS) and the Laboratoire d'Astrophysique de Marseille (LAM) that developed the Diffraction Image Phase Sensing Instrument (DIPSI). An industrial partner, Fogale Nanotech, developed a dual wavelength interferometer that was used as a metrology system to drive the active segmented mirror.

APE successfully achieved first light at the visitor focus of Melipal on 6 December 2008 when all phase sensors were able to demonstrate closure of the control loop. Measurements will continue into 2009 to be able to evaluate the performance under various conditions and with reference stars of different brightness.

A breadboard to test and characterise a friction drive, bearing and hydraulic whiffletree system was designed and built by AMOS within the framework of the FP6 ELT-DS initiative. It went through extensive testing in September and December 2008, with the emphasis on dynamic performance and friction control. With the kinematics of large-scale structures, this technology may be seen as a cost-effective alternative to hydrostatic bearings and direct drive, which are far more demanding in terms of dimensional tolerances. Results so far indicate that the (inevitable) loss of performance should be manageable. Another advantage of the friction drive and bearing technology is the reduced risk of oil pollution above the primary mirror compared to that from a hydrostatic bearing.



Spectrum of absorption lines in the solar spectrum with the superimposed regular calibration line sequence of the laser comb. The upper panel shows a zoomed-in portion of the spectrum.

The FP6 ELT-DS also includes a major effort towards developing and testing adaptive optics technologies, including mirror technologies, actuation mechanisms, sensing techniques, and control strategies and algorithms. Detailed design reviews of mirror prototypes with low and medium actuator density were passed in April 2008, and preproduction actuators were ready for integration and testing by the end of the year. A demonstrator with a high actuator density (piezo-curvature deformable mirror) was manufactured by autumn 2008 and will be tested in spring 2009.

The APE instrument being lowered onto the Nasmyth platform of the 8-metre Melipal Unit Telescope, on Paranal.

Detectors

Detector development and delivery to instrument projects remains an important area of work for the Instrumentation Division. Low noise, high speed detectors are critical to the successful operation of adaptive optics systems. Funding through FP6 OPTICON and ESO has allowed the development at E2V of the CCD220, which aims to achieve sub-electron read noise at KHz frame rates. In addition LAM (Marseille) and LAOG (Grenoble) have been developing the OCAM test controller/camera for delivery to E2V for testing and acceptance of the detector. Some 15 AO detector systems will need to be built between 2009 and 2011 with the CCD220 as the baseline detector. High performance AO detectors are also critical to the E-ELT and during 2008 three fixed-price contracts were awarded to E2V, Sarnoff and Teledyne to develop technology demonstrators that meet the noise and speed requirements. In the area of infared wavefront sensors, a contract has been placed with SELEX (UK) to extend the pre-development of HgCdTe avalanche photodiode arrays. The AQUARIUS 1k x 1k mid-infrared array, funded by ESO and developed by Raytheon, is expected to become the new state-of-the-art device for ground-based applications in the thermal infrared. The multiplexer design was completed in November, with the first devices expected next year. In the meantime, hardware is being optimised and developed in preparation for the high data throughput resulting from the 150 Hz frame rate.

The first substrate-removed Hawaii-2RG array received by ESO was installed in the infrared arm of X-shooter and has resulted in the complete disappearance of the strong fringing seen initially with an older, non substrate-removed, device. In addition complete ultraviolet-blue and visible band CCD systems were supplied for the X-shooter instrument. The first KMOS 2k x 2k detector system will be delivered in early 2009. A complete 4-channel Hawaii-1 assembly has been delivered to Observatoire de Paris/Meudon for the SPHERE instrument. A 4k x 4k engineering grade CCD231 detector for MUSE was delivered to ESO in May and found to meet requirements. A contract was signed with E2V for delivery of five deep depletion (red sensitive) CCDs for installation in VIMOS.

The development of the NGC, ESO's New General detector Controller, which combines, and significantly expands, the capabilities of its predecessors FIERA (optical) and IRACE (infrared), is reaching a steady-state production phase with first deliveries having been made to MUSE, KMOS, and SPHERE in 2008. A record low read noise of 6.9 e^- rms was achieved with simple double-correlated sampling on the first science-grade Hawaii-2RG detector for KMOS. In 2008 development continued of faster variants for use with high speed infrared detectors in the thermal infrared and for interferometric instruments, an adaptive optics version of NGC with sustained frame rates of order 1 kHz, and an interface to the AO real-time computer system SPARTA.


2

Auxiliary Telescope 2 arriving at its new observational position. This configuration with the other ATs is one of the most extreme for the interferometer.

Technology Developments

Laser guide stars are an essential requirement for advanced optical telescopes. The adaptive optics systems used to correct atmospheric turbulence require a bright reference star close to the science object being observed. Unfortunately, the number of stars available in the sky of sufficient brightness is very limited and these only allow a very small fraction of the sky to be observed in this way. A laser guide star overcomes this problem by projecting a powerful laser beam, tuned to the sodium D2 transition wavelength, along the telescope axis. This excites sodium atoms in the upper atmosphere to create an artificial reference star anywhere in the sky. ESO, together with Max-Planck Institutes in Garching and Heidelberg, developed and commissioned the Laser Guide Star Facility in 2006, as described in the 2007 Annual Report. This is currently in regular operation on UT4.

Unfortunately, lasers suitable for adaptive optics correction are not commercially available. The LGSF, although successful, is complex, requires skilled maintenance support on Paranal and does not deliver enough power for future ESO projects. The Technology Division has therefore been undertaking an R&D programme to develop the laser technologies needed to achieve powerful, robust and cost-effective sodium lasers for current projects like the VLT Four Laser Guide Star Facility and the future E-ELT laser systems. This programme comprises both computer simulations as well as the development of laboratory prototypes as technology demonstrators. We have also worked closely with industrial firms for the development of the final turn-key production units. The transfer of ESO-developed laser technology to industry, which has many potential applications outside astronomy and which led to a patent application in 2008, is a good example of how the organisation can provide indirect long-term benefits to the economies of its member states.

A significant achievement in 2008 was to obtain a stable 14.5 W CW output power at 589 nm with less than 3.5 MHz linewidth, a figure unequalled elsewhere. It is about three times brighter than the LGSF laser and yet much simpler to build and maintain. The system uses Raman fibre amplification at 1178 nm with conversion to 589 nm using a high efficiency frequency doubling LBO-based cavity.

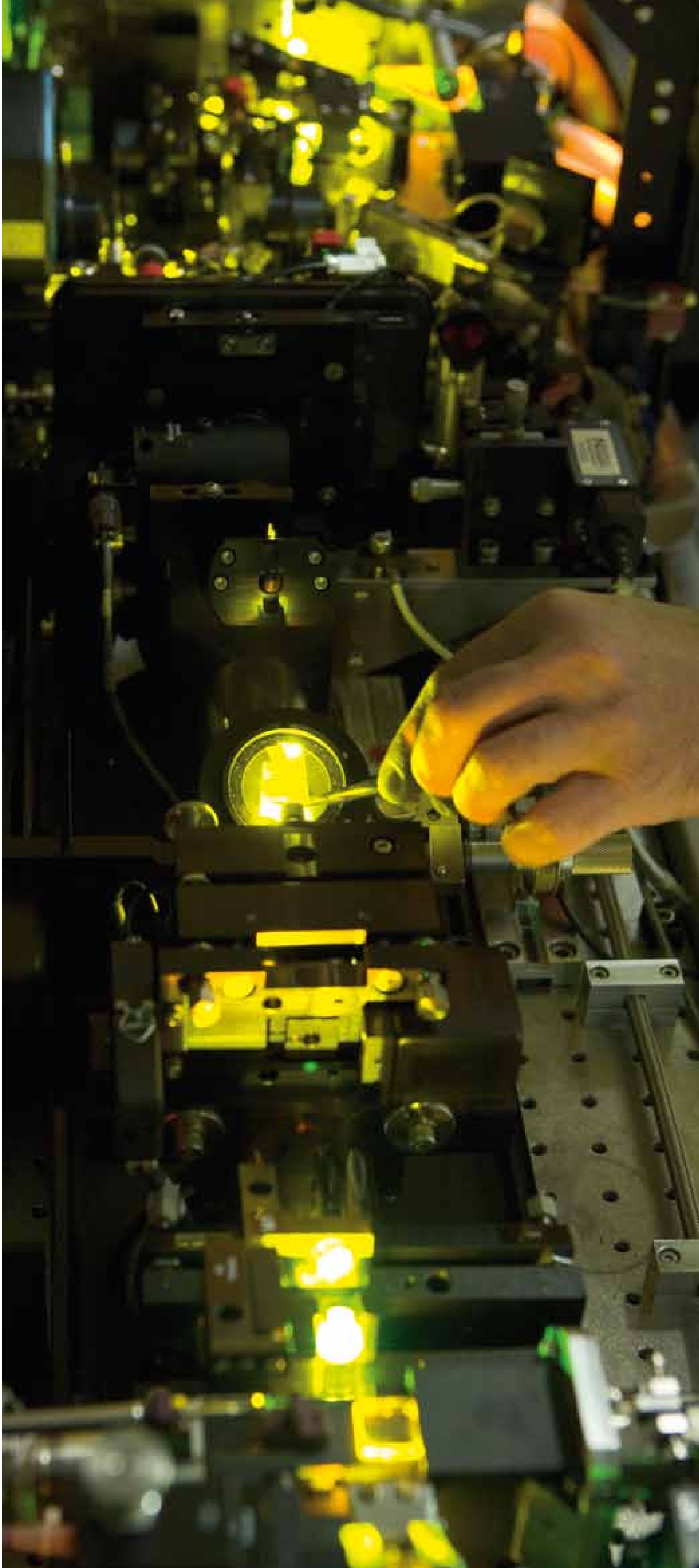
Another important breakthrough in 2008 has been the discovery, through detailed simulations of the mesospheric sodium atom transitions and atmospheric conditions, that by optimising the laser spectral and temporal formats, a substantially higher laser guide star brightness can be obtained without increasing the laser launch power. If confirmed through experimental verifications planned for 2009, this could lead to a significant reduction in the cost of the lasers for the E-ELT.

ESO technical standards, and electronic standards in particular, have always played a major role in assuring the long term serviceability and maintainability of ESO's major projects like the VLT. With a very large number of components provided by many different commercial firms and institutes, it is clearly important to maximise the commonality of the hardware to reduce the number of spare parts needed at the observatory, to minimise the training needed for maintenance staff and to simplify upgrades. The standards developed some 15 years ago for the VLT are no longer appropriate for the E-ELT project. In 2007, a programme was therefore started to test and benchmark key technologies available on the market, and to assess their suitability for the E-ELT. Under the general name, E-ELT Technology Demonstrator Programme, several studies have been carried out in 2008 to evaluate new standards, determine market trends and estimate future development potential. In many cases these studies have been backed up by laboratory evaluations. This work has already led to recommendations or decisions in several areas important for the control of the E-ELT. These include adoption of Ethernet as the future real-time field bus; the IEE 1588 standard for precise sub-microsecond time synchronisation; MIMO (Multiple Input/ Multiple Output) control systems and multi-core processor technology capable of large matrix calculation operations for the E-ELT active and adaptive optics systems. Siemens Programmable Logic Controllers (PLC) products have been an ESO standard for many years. A more recent innovation has been the certification of certain product lines for the implementation of safety critical industrial automation systems. These Safety PLCs are widely used in the industry and use certified programming blocks for safety-critical applications. They would allow a simpler and safer way to implement interlocks and other E-ELT safety systems and form a natural extension to the previous PLC standards. Siemens Safety PLCs have already been used for the implementation of interlock and safety systems for both PRIMA and the X-shooter cryo-controller.

Safety PLC Technology Demonstrator.

Although commercial off-the-shelf products are preferred wherever possible, it is sometimes necessary to develop in-house designs where no suitable products can be obtained commercially. An example in 2008 was the production of a four-channel version of the standard ESO CANbus motion controller. The first delivery of these units to second generation VLT instruments is planned for July 2009.

Telescopes are becoming more and more complicated, with a huge number of dependencies between the various subsystems. The design of such a system is largely driven by the top-level requirements of the project. These top-level requirements then generate, together with available design solutions, requirements for subsystems at lower levels. Keeping track not only of the requirements, but also the continual changes to the requirements and their dependencies, can nowadays be supported by modern dedicated software for requirement management. Essentially, the heart of such a software package is a database that is broken down into modules for every subsystem at all levels. There are many advantages related to this approach compared with the traditional approach. Firstly, each requirement can be supplemented with attributes like the rationale, the verification method and comments. Secondly, requirements can be linked, allowing the system engineer to trace the effect of a change in any particular requirement throughout the whole system. Currently, much of this information is often only in the heads of the designers and based on a variety of data sources making it difficult to retrieve and review. ESO has initiated an effort to introduce these methods into the design process of large and complex devices. The project which would profit most would be the E-ELT. In 2006, a pilot project was launched to evaluate the use of the DOORS requirement management software. This has now been applied to the E-ELT project. To date, the structure of the database has been defined and modules have been created for all the top level requirements as well as the specifications for some of the subsystems like the pre-focal station and the M4 adaptive mirror.



Routine cleaning and adjustment of the laser guide star facility.

ALMA

ALMA antennas at the Operations Support Facilities.

The Atacama Large Millimeter/submillimeter Array (ALMA) is a highly sensitive, high resolution array of telescopes being built on the high altitude plateau, Llano de Chajnantor, in northern Chile. The ALMA Observatory will operate at least 54 antennas of 12 metres in diameter and 12 antennas of 7 metres in diameter in an interferometric mode. Each antenna will be equipped with seven receiver bands, with the option of installing three more receivers, thus covering a frequency range from 30 GHz to 950 GHz (equivalent to a wavelength range of about 0.3 mm to 10 mm). ALMA construction is in full swing and 2008 marked important deliveries to the site in Chile.

The road from Chilean Highway 23 to the ALMA sites.

Site construction work

The ALMA Observatory comprises two sites. One site is the ALMA Operations Support Facilities (OSF) at an altitude of 2900 m near San Pedro de Atacama, Chile. The OSF is the operations centre for the entire ALMA Observatory and is also where the final assembly of the antennas produced by the contractors takes place. The Assembly, Integration and Verification (AIV) for the antennas and other advanced equipment will be completed there before they are moved to the Array Operations Site (AOS), located at 5000 m altitude on the Llano de Chajnantor, 28 km from the OSF.

Operations at the AOS are limited to an absolute minimum by the harsh environment. The antenna foundations, together with road links and an electrical and a fibre optic cable network are under construction there. The AOS Technical Building will house the correlator, which will process the digitised signals from the antennas before they are transmitted further via fibre optic lines to the data storage facilities at the OSF.

The OSF is connected to Chilean Highway 23 by a 15-km-long access road, which then continues for a further 28 km to the AOS. The OSF–AOS link road is up to 14 metres wide, so that the antennas can be moved between the two sites by a special transport vehicle. The new gatehouse, at the intersection of the ALMA road with the highway, was completed in 2008. Surfacing for this access road, which is still a gravel road, was planned and specified during the year 2008 and will be tendered in early 2009. Construction will start in June 2009 and be completed in late 2010.

The OSF includes multi-functional facilities that will host a number of activities over the duration of the project. During 2008 it accommodated all ALMA staff and contractors, who live in temporary camps for up to 500 people and work either at the OSF or the AOS. Most ALMA staff are involved in supervising construction activities, AIV activities or the start up of operational activities of the observatory. Contractors are mainly involved in

The two ALMA antenna transporters during tests between the OSF and the AOS. One is loaded with a "dummy antenna".

The Technical Facilities at the OSF.

antenna construction at the OSF, construction of the antenna foundations at the AOS and of the interconnecting road systems at the high site.

ESO signed the contract for the construction of the OSF Technical Facilities in August 2006. These facilities were completed in February 2008. Subsequently, and in the course of occupying the buildings, additional user requirements surfaced and are being implemented as required.

In 2008 the OSF became the central point for all antenna assembly and AIV activities. Antennas are being assembled at the OSF in three separate areas, one each for the antennas provided by North America (Vertex), Japan (Melco) and Europe (AEM Consortium) respectively. AIV activities are being carried out at the OSF after preliminary acceptance of the antennas, and prior to moving them to the AOS. The corresponding work areas for Vertex, AEM and Melco have been completed. Seven additional antenna foundations are being provided on request from Vertex, Melco and AEM. These foundations will be completed in early 2009.

Significant construction activities, led by ESO, began at the AOS area in 2008. ESO signed a contract for the construction of 192 antenna foundations on 17 October 2007. Approximately 30 foundations have been partially completed.

The AOS Technical Building and the AOS Transporter Hangar have been completed. The excavation and grading work for the ALMA central cluster is close to completion. Work on the interconnecting road network, led by our ALMA North American partner, has begun.

Supplying electrical power to an observatory at altitudes of 2900 and 5000 metres in the Chilean Atacama Desert is not a trivial task. Following a call for tender, proposals for the construction of an overhead line connecting the observatory to the electricity grid in northern Chile have been received and evaluated. Simultaneously, proposals for the supply of electricity were received and evaluated. Contract negotiations with the potential overhead line constructors and electricity companies were ongoing at the end of 2008. In view of the uncertain outcome, other options for ALMA's electricity supply were being pursued.

Proposals for a 23-kV power system (transformers, switchgear and power line from the OSF to the AOS) within the observatory have been received and evaluated. The target date for the start of permanent power availability on site is October 2010. In the meantime power is being provided to the OSF and AOS installations and facilities by temporary power generators, which will later be used as part of the permanent power back-up system of the observatory.

The design of the ALMA Santiago Central Office has been completed and the construction of this facility has been tendered. Proposals were received and evaluated in December 2008 and the

One of the 192 ALMA antenna foundations at 5000 m altitude at the AOS.

contract will be placed in early 2009, with completion scheduled for August 2010.

Antennas

In 2008 the activities of the ESO ALMA Antenna group concentrated on:

- trial assembly of the first antenna in Europe;
- follow-up of the antenna serial production; and
- testing and acceptance of the two ALMA antenna transporters at the OSF.

The Project Plan for the ALMA serial antenna contract with the AEM Consortium (Thales Alenia Space, European Industrial Engineering, and MT-Mechatronics) includes a trial assembly of the first antenna in Europe. This trial assembly started in January 2008 on the premises of the company Asturfeito (Spain), a subcontractor of the AEM Consortium and the supplier of the steel structure. One 3.6-metre diameter azimuth bearing was set on the first antenna base and the antenna yoke structure installed. In the following weeks extensive tests were performed to verify that the very tight tolerances demanded for the stability of the azimuth axis were achieved. Despite considerable efforts in adjusting the antenna it became evident that the required performance was not achieved. Based on test results and detailed analyses, intensive investigations began.

The results showed that, due to the asymmetric configuration of the system with a triangular base, deflections in the azimuth bearing were potentially affecting the performance of the antenna and the azimuth strip encoder. In late spring the AEM Consortium provided a comprehensive set of analyses and proposed a design modification inside the base that ESO approved. In parallel to manufacturing the modified bases, the AEM Consortium continued to prepare the trial assembly of the first antenna according to the original design.

The Technical Building at the AOS.

Architectural design of the ALMA Santiago Central Office.

Assembly of the receiver cabin on the steel structure for testing in Europe.

As a result of detailed studies of the assembly plan, and so as to minimise assembly time at the OSF, ESO agreed to AEM's proposal to extend the scope of the tests in Europe. As a consequence, not only the first receiver cabin (as originally planned), but also the linear motors, the encoders and the electric cabinets were shipped to Spain for trial assembly and mounted there. This allowed both the functionality and the specific performance of the system to be verified. The tests were concluded in August. The functionality of a number of interfaces has been verified and the commissioning team has benefitted from the initial training.

The trial assembly of the first AEM antenna included other elements than the steel structure and the cabin. The Back-Up Structure (BUS) was assembled at the premises of the manufacturer, Duqueine Composites (France). In late spring a complete BUS assembly, together with the quadripod legs, the apex, the subreflector and its mechanism was completed. A number of reflector panels were also mounted and assembled, with the adjusters, to the specified precision. The purpose of these activities was to verify the performance of the individual subsystems, their interfaces and the various assembly procedures, so that these could then be applied at the OSF assembly site. Personnel from the Chilean contractor in charge of assembling the antennas took part in this phase as preparation and training for the assembly in Chile.

The first modified base was manufactured and ready for trial assembly in October. The steel structure was assembled, aligned and verified for its most relevant performance parameters, including the stability of the azimuth axis. By the end of the year the structure was ready for inspection by ESO personnel.

Numerous other AEM Consortium production activities were carried out in 2008, closely monitored and inspected by the members of the ESO ALMA Antenna Integrated Product Team (IPT). The team focused on inspecting the first items and their detailed implementation, evaluating compliance with specifications, and on examining the associated data packages.

Production of other units and parts continued in parallel, incorporating any relevant recommendations from ESO. Considerable efforts have been made by European industry to reach the nominal production rate of one antenna every few weeks. By the end of 2008, four CFRP receiver cabins were completed and three BUS units were stored at the factory, ready for transport. Many parts provided by subcontractors were also internally accepted by the consortium, and were in the process of being prepared for transport. These parts include various sets of quadripods and apexes, subreflectors and associated hexapod mechanisms, electronic cabinets, heating, ventilation and air-conditioning components, feed shutters, reflector panels, etc. We are closely monitoring these activities in various ESO member states, to ensure that the quality assurance documentation is properly collected. In most cases the expected production rate for these parts has been reached or will soon be reached.

AEM put a great deal of effort into the logistics associated with the transport of equipment to Chile. Various transport jigs have been procured to ensure the continuous flow of antenna parts to the OSF. For delicate equipment, like the receiver cabin and the BUS, special jigs with damping structures have been designed and tested so as to reduce the risks of handling and transport.

The preparation of the antenna assembly area and the facility at the OSF was largely completed by the end of 2008. In August, AEM could begin to put together the assembly and alignment hangar for the BUS, the reflector panels and the apex structure. By December the work was essentially completed; in time for the arrival of the first antenna parts on site. Planning for the assembly and commissioning activities was also complete, subject to a detailed review by the ALMA project.

By the end of 2008 the antenna production had accumulated delays with respect to the original schedule. A significant part of this delay is due to a more extensive testing programme in Europe than

Antenna BUS at the manufacturer's premises.

First move of a NAOJ antenna at the OSF in December 2008.

originally planned. Meanwhile the necessary industrial structure to support the continuous delivery of antenna parts for final integration in Chile was set up.

ESO is responsible for another major component system of the ALMA Observatory, namely the two antenna transporters. This project was completed in 2008. During the northern spring, shortly after their arrival at the OSF, the two vehicles were reassembled on site by the contractor, Scheuerle Fahrzeugfabrik GmbH (Germany), and commissioning tests started. After the first series of functional tests without load, the two vehicles started their commissioning with an antenna dummy. This dummy has the same interfaces to the transporter and to the antenna stations as the real antennas. The tests lasted some weeks and included various cycles of driving to the AOS site, either unloaded or loaded with the dummy. The operation of the transporters at the chilling temperatures and in the thin air encountered at 5000 m was also tested and the engines tuned as necessary. Beyond the operational aspects linked to the time for driving up and down and manipulating antennas from and to a station, extensive tests were carried out on the safety of the system and on the braking system. When loaded, the total weight of the vehicle is about 250 tons and this sets challenging requirements on the brake systems. Redundant brake systems for the vehicle and several other safety systems, both operator-driven and automatic are built into the system.

By the end of April the formal acceptance tests were successfully completed in presence of ESO and of ALMA personnel. In June a formal review took place at Scheuerle's premises and the two transporters were accepted. Shortly afterwards ALMA moved the first antenna, relocating a Vertex antenna from inside the assembly facility to an antenna station outside the hangar. Further antennas were moved in the following months.

In 2009 the ESO Antenna group is planning to add and commission an active damping system to eliminate the risk of oscillations caused by a possible deterioration of the road profile between the OSF and the AOS. Furthermore, the transporters will be equipped with an automatic fire extinguishing system. Although these two systems have not yet been installed, both antenna transporters have been fully operational since 2008.

The front ends

The design and pre-production activities of the Front Ends (FEs) were closed and serial production started in 2008. The first products were delivered by the front end IPT to the ALMA site.

A few years ago the ALMA Project decided to manufacture a pre-production series of eight complete FE units. Following the ALMA Project Plan, ESO is in charge of providing the Band 7 (270–373 GHz) and Band 9 (602–720 GHz) receivers. By the end of 2008 all pre-production receivers had been delivered by the Institut de Radioastronomie Millimétrique (IRAM, Grenoble, France) and the Nederlandse Onderzoekschool voor Astronomie (NOVA, Groningen, The Netherlands). The pre-production phase was concluded and the full production phase began with Manufacturing Readiness Reviews, held in July 2008 (for the Band 9 receivers), and in November 2008 (for the Band 7 receivers).

During the year both IRAM and NOVA prepared for the serial production phase, hired additional staff, set up additional infrastructure and enlarged test facilities to respond to the increased production rate and to comply with the demanding project schedule. Much of the component production has been subcontracted to industry. NOVA completed the first Band 9 production receiver in December 2008. The first production Band 7 receivers were in an advanced state of integration by the end of 2008 and will be delivered to ESO in early 2009.

ESO has contracted the supply of completely functional cryostats for the ALMA FE units to the Rutherford Appleton Laboratory (RAL, Didcot, UK). In turn, RAL has placed numerous contracts with subcontractors. Some delays have been encountered as a result of late deliveries from subcontractors, but the first compliant cryostat vessel was delivered to RAL in December 2008, somewhat behind schedule.

Credit: NOVA, the Netherlands

Six Band 9 (600-720 GHz) receiver cartridges (of a total of eight) of the pre-production series.

First ALMA front end assembly ready for acceptance testing at the European Front End Integration Centre (RAL, UK).

Europe will also provide the mechanical housings for the receivers, the so-called blank cartridge bodies. ESO has placed a contract with RAL to provide these cartridge bodies. RAL has manufactured and delivered several blank cartridge bodies, according to the needs of the partners in the ALMA Project.

A first Amplitude Calibration Device (ACD) was delivered by ESO to the ALMA Observatory in September 2008. An ESO team assisted in the acceptance and installation of the hardware in an ALMA antenna at the OSF. This ACD has a prototype hot load installed, while the design of a final load continues at ESO, with support from expert groups. The design of the robotic arm used in the ACD has been finalised and a production contract was concluded with NTE SA (Barcelona, Spain) in August 2008.

Progress was made on setting up the European Front End Integration Centre (FEIC) at RAL. Unfortunately, progress has been slower than originally foreseen due to staffing issues at both STFC/RAL and ESO. ESO recruited a suitable candidate for the position of FEIC Liaison Officer at the end of 2008. He will take up his position to support the FEIC in early 2009. Several meetings between ESO and the JAO management were held with STFC/RAL to explore options for the optimal support and organisation of the FEIC. This has led to several initiatives to acquire more staff. A new project manager was allocated by STFC/RAL in September 2008 and new technical staff are being hired. ESO took over some activities, e.g. providing special test equipment.

During November and December 2008 a first complete European front end assembly was integrated and was ready for verification by the end of 2008. In consultation with the JAO, it has been decided to carry out a subset of verification tests so this front end assembly can be delivered more rapidly to the observatory in early 2009.

Omnisys Instruments AB (Gothenburg, Sweden) demonstrated a design for the Water Vapour Radiometer (WVR) operating at 183 GHz at a Critical Design Review in November 2008. The design has been optimised for production as well as operation without sacrificing the high performance needed. The expert review team scrutinised the design carefully and concluded that it was, after closing out a limited set of action items, to their satisfaction and ready for production. Delivery of a first set of two WVRs is scheduled for early 2009.

In addition to the European front end deliverables agreed between the international ALMA partners, ESO formed a consortium with European institutes which receive funding from the European Commission from 2006 to 2010 for the so-called “Enhancement of ALMA Early Science” project, regarding a number of Band 5 (171–203 GHz) receivers. The partners are ESO (coordinator) Chalmers University of Technology (Gothenburg, Sweden), IRAM (Grenoble, France), the University of Cambridge (Cambridge, UK), RAL (Didcot, UK) and the University of Chile (Santiago, Chile).

Significant progress was made on this project. The Chalmers University group successfully passed the Preliminary Design Review for the Band 5 cartridge in April 2008.

The back end

During 2008 the ALMA back end entered the production phase and the most important contracts for the manufacture of all ESO back end deliverables were placed:

- 281 digitiser assemblies;
- 68 Digitiser Clock assemblies (DGCK); and
- 500 photomixers;

which will be supplied by the University of Bordeaux, IRAM and RAL, respectively.

The digitiser and the DGCK are both part of the Data Transmission System (DTS) within the antenna back end system. They process and digitise the scientific data before transferring the data through a single optical fibre at a rate of 96 Gbit/s to the correlator located in the Technical Building at the AOS. The digitiser samples the signal produced by the front end and processed by the first stages of the back end at a rate of 4 Gsamples/second. The signal is then converted to a digital stream. The DGCK is an accurate programmable clock for the digitiser. These components can be fully remote-controlled and were custom designed to meet the functional requirements, as well as the demanding operating conditions: low air pressure, reduced power dissipation and high reliability. In 2008 we received 35 digitiser assemblies and all 68 DGCK assemblies.

The photomixers are a key component of the Photonic Local Oscillator (PLO) system that will provide a timing signal with an accuracy of femtoseconds (10^{-15} seconds) to antennas as far as 15 km away from the AOS building. They convert the double laser beam generated by the PLO and conveyed through an optical fibre into the original microwave reference in the range of 80–120 GHz. Each front end receiver cartridge is equipped with one photomixer. The preliminary photomixer production phase was concluded in 2008 and devices for the first three front end assemblies were provided. First deliveries of the serial production are planned for the first quarter of 2009.

ESO is also responsible for the production of the electro-optical components used

The ALMA patch panel, installed at the AOS. The eight fibres coming from each of the 192 antenna stations are terminated here.

in the DTS: the Multiplexer (MUX) and the Fibre Optic Amplifier/Demultiplexer (FOAD). The MUX is installed in the antenna and injects the 12 laser beams encoding the scientific data into one single fibre. The FOAD increases the power and extracts the original 12 data streams to be fed into the correlator. The production is done at ESO, based on the original design developed at the Jodrell Bank Observatory. During 2008 20 MUX and 48 FOAD were manufactured. The FOAD were shipped, installed and tested at the AOS, while four MUX were installed in the first antenna rack sets. The manufacture of the remaining 60 MUX and 32 FOAD has started.

During 2008 two complete antenna back end rack sets were assembled at the Back End Integration Centre in Socorro (New Mexico, USA). ESO staff participated in the test and acceptance process of these assembled racks, which have been delivered to the AIV team at the ALMA Observatory. One set has already been installed in an antenna. Two more sets were completed and will be shipped to the observatory in 2009.

ESO is in charge of supplying the patch panel that allows any antenna station to connect to any correlator input and to any PLO source. The patch panel and the patch cables were manufactured in Europe, shipped to the site, installed in the AOS Technical Building and tested. They contain more than 4000 optical connectors and several kilometres of fibre.

Correlator

The ALMA correlator is a specialised computer that can process data at a rate in the order of 10^{15} operations per second. It will operate at the AOS at 5000 m altitude and will be contained in 32 full-size racks. The power dissipation is roughly 200 kW. The first of four correlator quadrants was installed during the second quarter of 2008 in the Technical Building at the AOS by the North American ALMA partner.

Since its installation the correlator has been in continuous operation and has been tested with self-generated data patterns (as an actual signal from the antennas is not yet available). This testing has confirmed that no issues related to the peculiar site conditions (which could not be pre-tested in the lab, e.g. cosmic rays) are likely to affect its operations.

Each of the four correlator quadrants contains 128 Tunable Filter Bank (TFB) cards, a sophisticated high speed digital filter processor based on state-of-the-art field programmable gate array technology. The TFB was developed and produced at the University of Bordeaux under an ESO contract. The difficulties caused by the complexity of the card, in conjunction with the implementation of the ROHS (Restriction Of Hazardous Substances) requirements, encountered in the early stages of the production, were overcome. All 549 units have been delivered.

A downscaled version of the correlator, the so called “two antenna correlator”, was installed at the OSF to allow interferometry and testing of the antennas there. A similar unit was in operation at the Antenna Test Facility (ATF) in Socorro (New Mexico, USA). Once these test activities are complete this unit will most likely be recycled as a supplementary source of spare parts.

Computing

Computing work for ALMA includes not only the development of ALMA software, but also the procurement of the hardware necessary to install the software at the ALMA sites in Chile.

The ALMA software has been planned and developed from the beginning as an end-to-end system including proposal preparation, dynamic scheduling, instrument control, data acquisition and formatting, online telescope calibration, data archiving and retrieval, automatic and manual data processing and support for observatory operations. Examples of the observing tool in the observation preparation subsystem are shown on page 41. A screen snapshot of the spatial editor tool, which is used to select a portion of the sky to conduct mosaic observations, is shown in the figures on the opposite page. The figure to the right shows a view of the spectral editor tool, used to define the frequencies for observation.

Work in Europe is organised through ESO, with many software packages being developed by ESO in collaboration with European institutes, based on agreements that run until the end of 2011.

The main achievements of the computing team during 2008 have been:

– Development of software for Releases R5.1 and R6.0. This software includes functionality to support end-to-end optical pointing, holography, single field interferometry and total power observations.

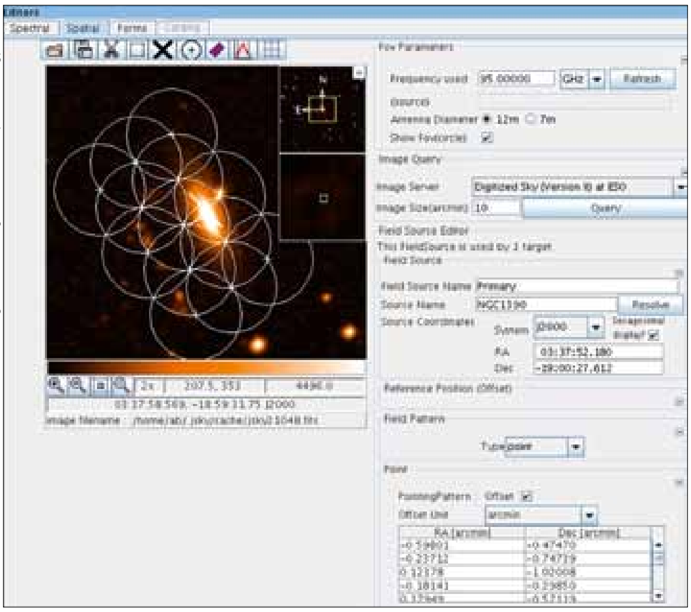
– All the above functionality has been successfully tested at the ATF, which has been in operation for all of 2008. ESO computing staff have made a substantial contribution to the tests carried out at the ATF. The ATF results have been excellent and allowed significant progress to be made in view of the integration work at the OSF foreseen for 2009.

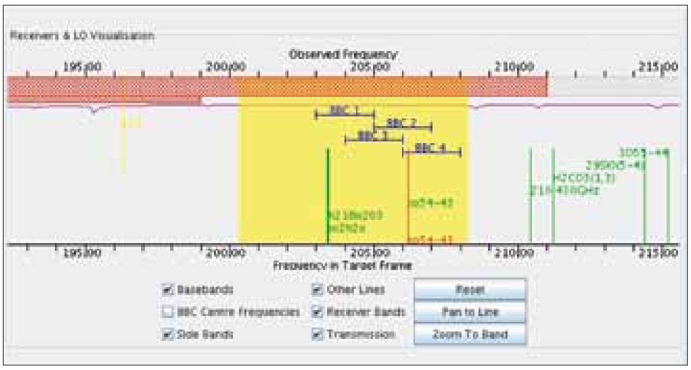
The main European development contributions have been in the area of the ALMA Common Software (ACS), archive, observing preparation tools, observatory support software and software engineering. ESO has also made a major contribution to integration and testing and will continue to play an important role once the ALMA software has been delivered to the ALMA Observatory in Chile.

(Top) The ALMA TFB cards to be installed in the correlator.

(Left) The first quadrant of the ALMA correlator installed at the AOS.

Credit: A. Bridger/United Kingdom Astronomy Technology Centre





(Top) Screenshot of the spectral editor.

(Left) Screenshot of the spatial editor.

Main events during 2008 were:

– Establishment of contracts for:

  – Archive computers needed for the OSF site in Chile. A set of 18 computers has been tested and is ready for archive deployment at the OSF.
  – Frame contract for the purchase of Oracle licenses over a period of five years for the Archive database of ALMA.
  – Frame contract for the purchase of the CISCO routers over a period of five years, to be installed at the ALMA AOS and OSF sites.

– Recruitment of two developers to work on the offline ALMA data reduction package, and also providing a link with the activities of the European ALMA Regional Centre.

– The annual Critical Design Review (CDR6) was held in Santiago in July, with ALMA observers representing integration and commissioning activities.

– Computing was also reviewed by an external review committee in November. The global result was positive. A comprehensive set of comments and recommendations was given.

System Engineering and Integration

The ALMA System Engineering and Integration (SEI) team covers a wide variety of different tasks from design and analysis of the ALMA system and subsystems. It supports the other IPT's design activities and chairs and attends design and acceptance reviews. The SEI team is also involved in equipment procurement, system integration and verification as well as system requirements verification.

The project-wide requirements and Interface Control Documents (ICDs) are now completed to a level of 95% and 97%, respectively. Maintaining and keeping requirements under control is one of the key tasks of system engineering. The next review of the system requirements will be held in 2009 and preparations for this review have started.

The requirements database DOORS is kept up to date and used for verification and acceptance. ALMA system block diagrams and the sensitivity budget were further refined and used for system design trade-offs and analysis tasks.

New activities started on the ALMA cryogenic system. Tests at the OSF and AOS were planned and set up to verify the performance of the ALMA cryogenic and vacuum system under the harsh environmental, transport and operational conditions. A design for the compressor enclosures was prepared and manufacture of a prototype is in progress. Test results are expected by mid of 2009.

The SEI team has carried out electromagnetic compatibility tests on the Vertex and MELCO antennas as part of the antenna design verification and acceptance. The team is also closely following the supply of the Computerised Maintenance Management System (CMMS). This project is carried out in close co-operation with the ALMA Operations team in Chile and will be handed over to the Observatory in 2009.

The ALMA Product Assurance (PA) group is organising and conducting most of the acceptance reviews. The conditional acceptances of the first Vertex and MELCO antennas were supervised by PA throughout the whole process in which regular meetings were held and inspections were done. Existing processes were refined and new processes like the Corrective Action Process was introduced. More staff was employed, mainly based in Chile, to support the on site product assurance activities. Several audits were performed and this will continue in 2009.

AIV activities in Chile increased substantially in 2008. The Observatory has made about 20 new appointments, so that there are about 45 people now working for AIV. The main tasks of the AIV staff have been the procurement of technical equipment to outfit the laboratories, and acceptance of equipment arriving at the OSF, including the first engineering front end assemblies, back end antenna components, amplitude calibration devices, etc. Much attention was given to and significant efforts were made in accepting the first Vertex and MELCO antennas:

– Support was given on testing pointing and surface setting.

– Work started on the antenna bracket and the ridge installation on the antenna station.

– The first engineering front end assembly and back end elements were installed in the MELCO antenna.

In the course of the first AIV activities we concluded that more support and training of the AIV staff by the IPTs is needed to cope with the upcoming work. Significant effort is being made to accelerate the schedule by organising parallel activities and also by starting commissioning activity, even when equipment is not yet fully accepted.

Science activities

Testing the ALMA software system and developing commissioning procedures at the ATF was one of the prime activities of the Science IPT during the year 2008. This activity culminated in December 2008. During the final few days of ATF operations the end-to-end functionality of the ALMA software system was demonstrated for a basic total power science observing mode. The ATF ceased operations after several very successful years as a facility for testing ALMA hardware and software. Testing is now being continued at the OSF in Chile.

Almost all the science IPT staff required for commissioning the ALMA array in Chile have been recruited and are participating in the initial tests at the OSF.

The ALMA Design Reference Science Plan (DRSP) was reviewed; version 2.1 is now available online. A comparison of the DRSP projects and a pool of ALMA science projects proposed by ESO astronomers was published in *The Messenger*. This comparison highlighted the scientific expectations from ALMA, expressed by a community mostly focused on optical and infrared observations.

The ALMA Science Advisory Committee has formed a working group charged with working on a preliminary report for the ALMA Board outlining the highest profile scientific projects that will not be within the grasp of the baseline ALMA, but could be carried out by upgrading the ALMA observatory in the coming decade. These upgrades could be part of the ALMA development plan during science operations. These plans and the scientific synergies between ALMA and the ELT will be discussed with the ESO community in the next few years.

As part of the FP7 COFUND Marie Curie initiative, the European Commission approved ESO's proposal to enhance the ESO Fellowship Programme with additional fellows, to be hired in 2009 and dedicated to ALMA science. These fellows will be based at institutes participating in the European ALMA Regional Centre and will be closely linked to the ALMA activities in Europe.

In 2008 ESO has organised four scientific and technical workshops related to ALMA, in collaboration with RadioNet:

– Gas and Stars Dynamics in Galaxies;
– Interstellar Medium and Star Formation with ALMA;
– Simulations for ALMA; and
– Imaging and Calibration Algorithms for EVLA, e-MERLIN and ALMA.

Credit: L. Testi/ESO

Sunset on the last day of ATF operations at the VLA site near Socorro (New Mexico, USA).

One of the ALMA antenna transporters.

Software Development

The mission of the Software Development Division (SDD) is to provide software resources and products to the VLT, ALMA and ELT projects and to maintain a high level of quality while containing the costs. In June 2008 the SDD also took over responsibility for general IT services across the organisation, with the creation of a dedicated department within the division.

The division is organised around three major development departments, a Systems Engineering Department, which provides services to all development units and, as of June 2008, an IT Department.

The IT Department

IT services at ESO were re-organised in 2008 around functions rather than location. The general IT Department consists of two groups, one in Chile and one in Garching and is responsible for providing general IT services to the whole organisation, including support for network and communication, general purpose servers and desktop/laptops, general purpose applications as well as helpdesk. IT procures, configures and maintains a high performance, secure and reliable IT infrastructure while ensuring cost-effectiveness and compliance with the ESO rules. It provides fast and quality support to all users, whatever the standard platform or operating system used.

The primary focus of the new IT Department was and will continue to be improving the service quality and user satisfaction. Changes in the helpdesk processes have already been put in place. As an example, all tickets are now logged and priorities are being assigned to each ticket so that user requests and issues can be traced and responded to in a quick and effective manner. The impact of these changes will be assessed via User Satisfaction Surveys.

A *modus operandi* with the IT User Group (ITUG) for adopting ESO-wide IT policies and standards has been defined. A first policy for Windows User rights has been adopted. IT will continue to standardise the desktop equipment used by ESO staff.

One of the main new pieces of infrastructure that will be introduced by the new IT Department will be a unified Collaboration and Messaging system, followed by the WEB Content Management System and an upgrade of the telephone system.

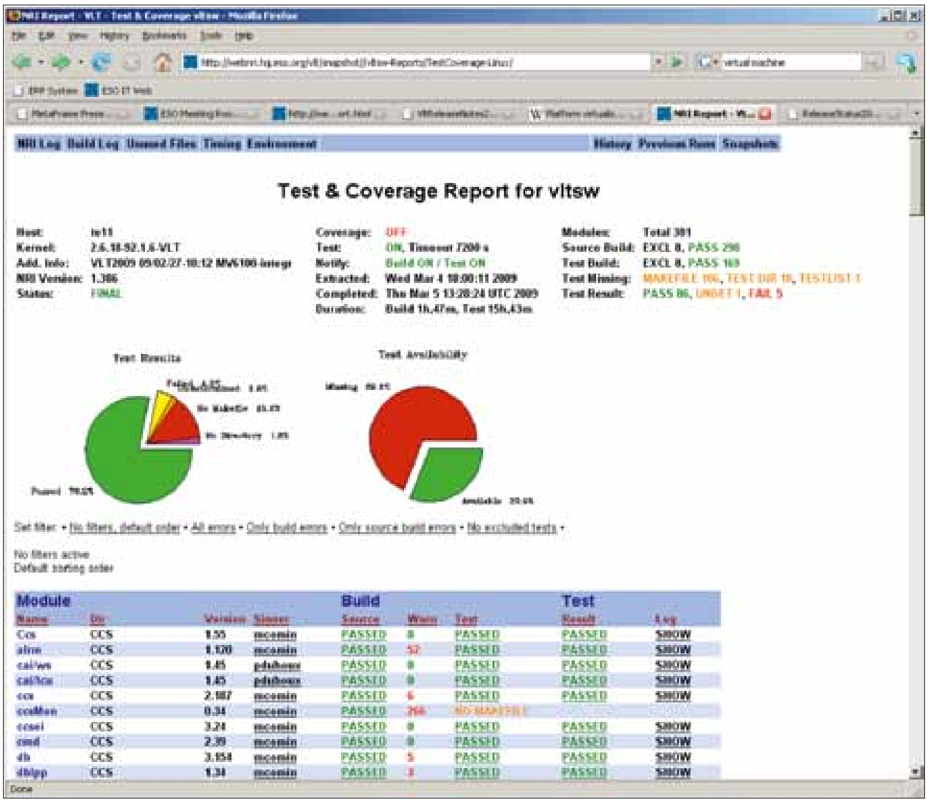
The network hardware and topology underwent a major upgrade at all Chilean ESO sites so that newer equipment could be used, redundancy implemented and future development enabled. In particular, Quality of Service (QoS) was introduced at all ESO sites to assign guaranteed bandwidth to certain applications. This is important to maintain good voice and video quality. It also ensures that enough bandwidth is available so that scientific data transfer from Paranal to Garching can be completed within 24 hours. Security is a growing issue for IT. An Intrusion Prevention System (IPS) was introduced into the ESO network to improve IT security and to cope with the constant threats. In 2008 the first IPS was installed in Garching, and a second IPS will be installed in Santiago in 2009. The IPS analyses network traffic from and to the internet. If it detects any kind of malicious traffic (e.g. viruses, worms, spyware, trojans), this is blocked to prevent any successful attack. The IPS can be seen as a kind of "network anti-virus" system.

The Systems Engineering Department

The System Engineering Department (SED) provides the development teams with software engineering services such as the environment and tools to support the software life cycle, software quality assurance and control. The department is also in charge of integrating software modules and preparing and validating releases before they are delivered to the customer. All planned VLT releases (VLTSW 2008, DFS MAR2008 and Data Transfer) and ALMA software (5.0 and 5.1) have been successfully validated and deployed.

So as to exploit synergies across projects SED has created and coordinates a few working groups, some with participation from other departments and divisions,

Automatic test report produced by NRI (example taken from VLTSW2009 integration).



focused on specific areas: software quality assurance, software quality control infrastructure, testing, virtualisation, software change control and software version control.

Platform virtualisation technologies have been extended in ALMA and introduced in the VLT development and test environments to optimise resources and investments further. Virtualisation will also be deployed on target machines, in close collaboration with the operational sites in Chile.

Proposals to streamline the software change control process and unify software version control systems have been presented for implementation in the course of 2009.

The functionality of the ESO software quality control infrastructure, called NRI, has been further enhanced and made more homogeneous between ALMA and the VLT (metrics and reports).

Testing takes up a large fraction (two-thirds) of the resources dedicated to software quality, and special efforts are being made to automate test procedures (ALMA and VLT DFS) further, so as to be able to cope with the wider range of projects and applications to be tested in the future.

The Control & Instrument Software Department

The Control & Instrument Software Department is responsible for the design, implementation and maintenance of control software for the VLT, the VLTI and their instruments, as well as for ALMA and the E-ELT. Most of the time spent on the VLT/VLTI software concerns developing control software for its new facilities. In 2008, the department was heavily involved in the development of software for PRIMA and all its subsystems, including the fringe sensor unit, fringe tracking, the metrology system and the astrometric instrument. The Active Phasing Experiment, which was installed and tested at UT3 in the last quarter of 2008 required a considerable effort on the part of our engineers.

An instrument software workshop was organised by the department in collaboration with Paranal Software. The goal of this workshop was to provide the consortia building second generation VLT/VLTI instruments with all the information needed to build control software that meets Paranal's requirements. Finally, efforts were also put into preparing a release of the VLT common software, which supports the newer version of VxWorks.

On the ALMA side, releases of the ACS are still on our priority list. In 2008, the team participated actively in the software test campaigns, with the goal of improving the robustness and quality of the software, as well as clarifying/cross-checking system requirements with the users. As a result, applications such as the Executive could be upgraded.

The E-ELT demonstrator has provided the VLT, ALMA and E-ELT teams with opportunities for sharing experience, ideas and concepts. The goal of the project is to evaluate potential hardware and software architecture and technologies that could be used to implement the E-ELT telescope control software. As an example, the teams evaluated middleware technologies suitable for a distributed real-time control system and a new data driven approach.

The Data Flow System Department

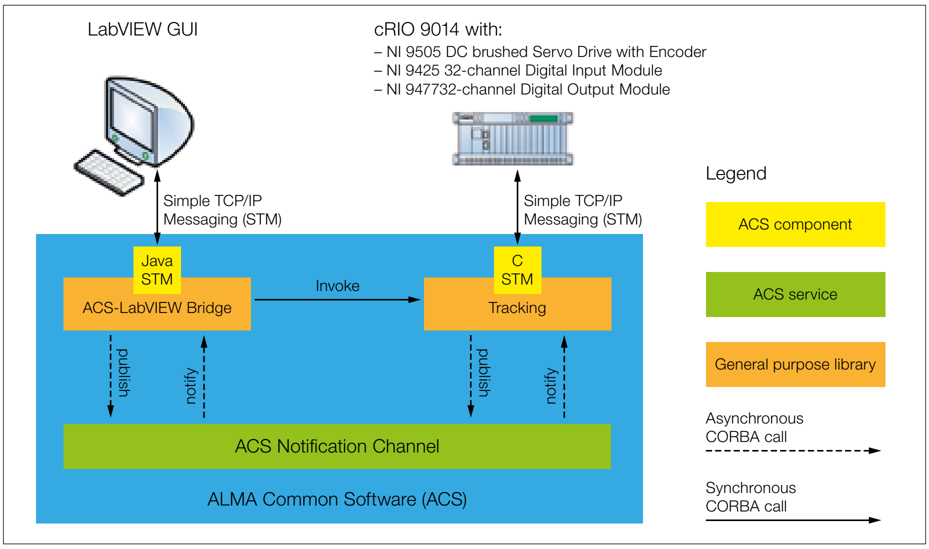
The successful deployment of the Data Transfer project was one of the highlights of the Data Flow System Department in 2008. VLT/VLTI data have been transferred to the archive at Headquarters as the data are generated at the observatory since July 2008. The Data Transfer system takes operational priorities into account (e.g. ToO data will always have a higher priority) and makes optimal usage of the high latency network between Chile and Garching. An additional web application has been developed to provide interested parties such as Quality Control or Science Operations with a convenient way of monitoring the queue of pending transfers. The introduction of the User Portal made the implementation of some of the functionalities/tools requested by the user community possible: since April 2008, PIs can get access to their observational data as soon as the data are archived. 66 000 proprietary files have been delivered since the introduction of this functionality.

The astronomical survey programmes to be carried out by VISTA and the VST will introduce a paradigm shift with respect to the classic service mode observing. There are very few programmes, but either massive, identical observations are carried out on a large set of targets, or a large set of very similar Observation Blocks (OBs) is executed. The current set of tools to support astronomers during the preparation and short-term scheduling of observations needed to be adapted to this new scenario. The concept of scheduling containers was introduced to provide the means of expressing scheduling interdependencies. As an example, a time link defines a sequence of OBs to be executed in a given order, while maintaining the relative time intervals for each link. The Phase II tools used by astronomers to prepare their Observation Blocks have been upgraded to support the concept of scheduling containers, while the observing tool generates a priority list of OBs that takes all possible scheduling information into consideration. This relieves the operator from having to sift though hundreds or thousands of OBs to select the best ones to be executed.

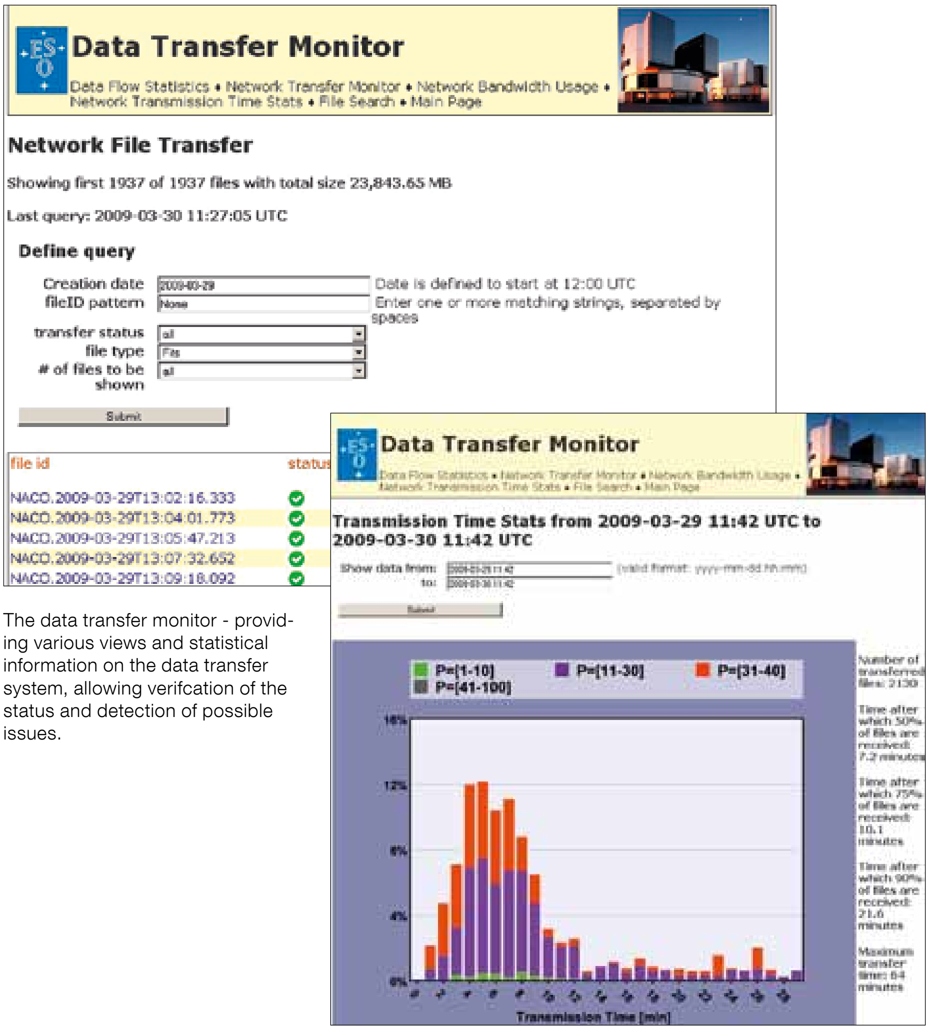
The department is increasingly involved in the development of ALMA data flow applications. In 2007, it was limited to helping to develop the ALMA archive. ALMA Observatory operations support tools started development this year and we hope that ideas and concepts from the experience with the VLT can be applied.

The Pipeline Systems Department

The Pipeline Systems Department (PSD) is responsible for designing, implementing and maintaining data reduction pipelines for the VLT and VLTI instruments. The department is also developing exposure time calculators, used by the community to prepare their observations. The PSD has also participated in the



High level architecture of the ACS/LabVIEW prototype for the E-ELT Technology Demonstrator.



The data transfer monitor - providing various views and statistical information on the data transfer system, allowing verifcation of the status and detection of possible issues.

development of the ALMA data reduction system CASA since the autumn of 2008.

Development priorities are determined by a committee involving all the product users, i.e. the Instrumentation Division, Paranal and the DMO. First priority is always given to the support of the new instruments. In 2008 the X-shooter instrument and pipeline were commissioned on Paranal. The PSD did not just work on integrating the software into the automatic pipeline environment, but also participated actively in developing some reduction recipes.

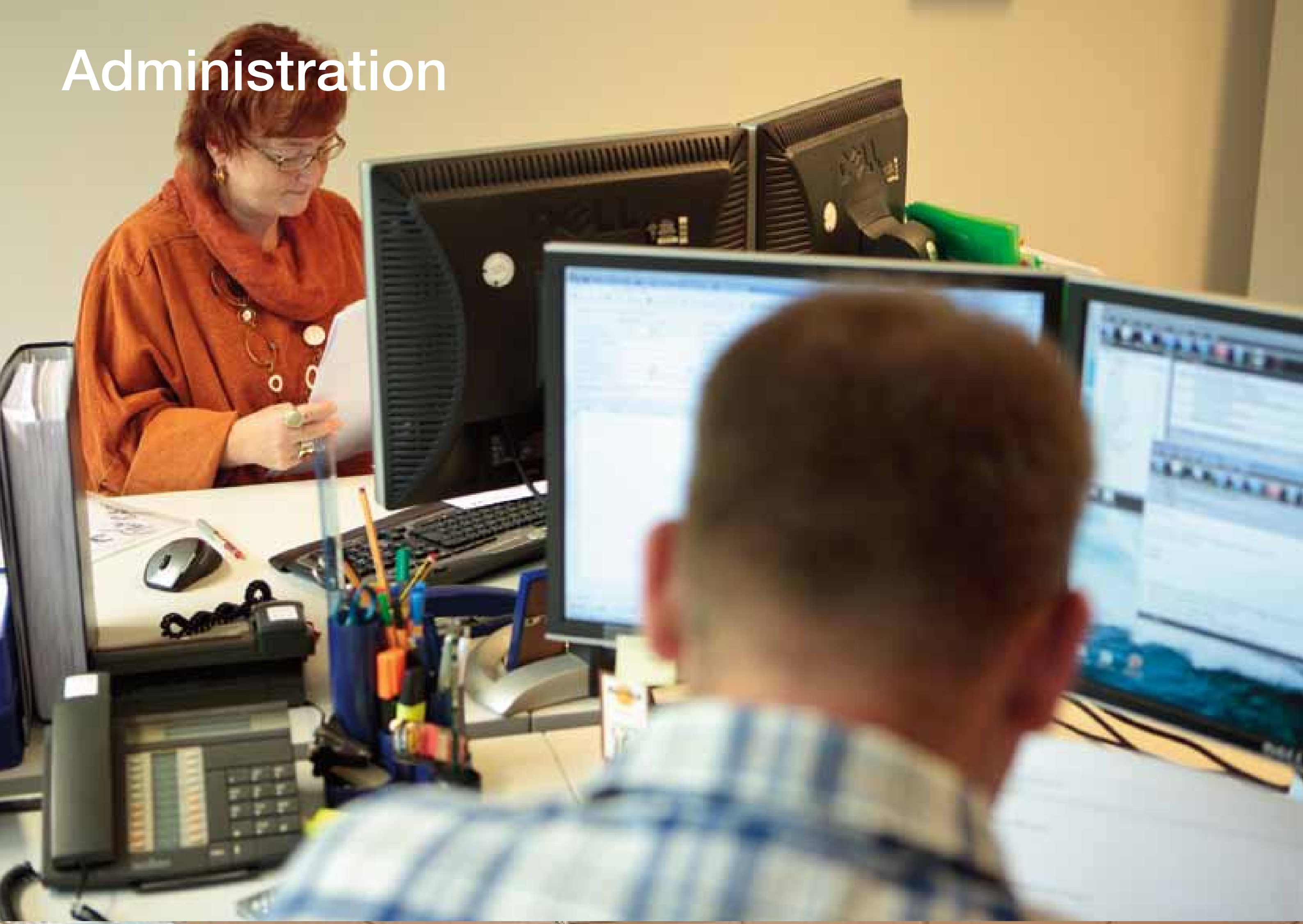
The Pipeline Committee also decided that it was time to implement support for the spectroscopy mode of NACO and the polarimetry mode of FORS. Both of these packages were delivered to the operation teams for acceptance during the course of the year.

ESO management decided in 2007 to improve the quality of the science products generated by existing pipelines on a one-to-one basis. As an example, substantial improvements in the MIDI HIGH_SENS data reduction have been obtained with a new 2D profile estimation method based on the analysis of about 100 Gigabytes of data. This recipe derives the 2D profile of the spectrally dispersed photometric signal and calculates an optimised profile-mask to apply to all observations. In many cases the visibility accuracy could be improved by a factor of 5 to 10. Moreover, the wavelength coverage was also doubled in most cases.

All ESO pipelines are based on the ESO Common Pipeline Library to facilitate maintenance and sharing of functionalities. They are released for public use www.eso.org/pipelines when they have reached an acceptable level of quality and stability.

The ALMA antennas seen
from inside the OSF building.

Administration



The Finance Department had new tasks to cover in 2008, such as the accounting and budget activities generated in Chile by the start of ALMA operations and the preparation of different scenarios for the financing of the E-ELT, which will need to be refined regularly in future; the Finance Department also contributed to the work of the Finance Committee Working Group on the Financial Governance of ESO with an evaluation of existing international accounting standards.

Much of the Contracts and Procurement effort was devoted to supporting the ALMA project, specifically, in Chile with respect to site construction activities, and in Europe in relation to the production of the antennas and the front end and back end equipment. Several competitive procurements were made in relation to the E-ELT project to complement the detailed design activities started in 2007. There has been a high staff turnover in 2008 both at Headquarters as well as in Chile.

The responsibilities of the Administration Division (Admin) were extended to the coordination of the European Union Programmes (EU Programmes) and by the Technology Transfer activities of ESO. For coordination reasons, a close collaboration with the International Relations Office is maintained.

ESO's long-standing approach towards the EU is to exploit the opportunities arising from the different EU programmes and policies for the benefit of ESO activities. In order to maximise the exploitation of EU Programmes, Admin provides ESO management and ESO staff with the necessary information about EU programmes and policies, and provides the relevant legal and contractual support and coordination. ESO reached a milestone at the EU projects level in 2008 — the first two Marie Curie fellowship contracts were signed between ESO and the EU Commission, establishing financial support for six fellows to ALMA and one fellow to the VLT.

New contract negotiations for OPTICON and RadioNet started in 2008 to ensure the continuation of the projects into the 7th Framework Programme. In addition to these new contracts ESO had fourteen EU contracts running in 2008, three under the 7th Framework Programme and eleven under the 6th Framework Programme.

A revision of ESO's Technology Transfer (TT) activities has commenced. Admin acts as the central point and coordinator of the effort, and is tasked with concluding a new Technology Transfer policy that supports the technological and financial interests of ESO as well as strengthening the competitiveness of European industry by encouraging the commercial use of technologies developed in relation to ESO activities.

The Administration Division is also in charge of general safety, facilities management and logistics. Studies have started to remedy to the scarcity of office space.

Finally, towards the end of the year, the Administration became responsible for the administrative information systems (ERP) and for Budgets and Financial Planning. A new document on the Budget 2009 and Forward Look for the years 2010—2012 was presented to the Finance Committee and Council.

Finance Department staff at work.

Finance and Budget

Financial Statements 2008
(in € 1000)

Balance Sheet	31.12.2008	31.12.2007
Assets		
Cash and short-term deposits	149 415	144 544
Claims, advances, refundable taxes and other assets	3095	4488
Total assets	152 510	149 032
Liabilities and equity		
Dues	7007	12 371
Advance payments received and other liabilities	19 538	14 627
Total liabilities	26 545	26 998
Cumulated result previous years	122 034	122 205
Annual result	3931	–171
Total equity	125 965	122 034
Total liabilities and equity	152 510	149 032

Statement of Income and Expenditure	01.01.–31.12.2008	01.01.–31.12.2007
Income		
Contributions from member states	133 583	134 649
Contributions from third parties and partners	8465	5227
Income from sales and other income	12 400	7643
Total income	154 448	147 519
Expenditure		
Expenditure for staff	56 410	51 893
Operating and other expenditure	94 107	95 797
Total expenditure	150 517	147 690
Annual Result	3931	–171

Statement of Cash flow	01.01.–31.12.2008	01.01.–31.12.2007
Cash flow from operating activities		
Receipts		
Income	154 448	147 519
Net movements on accounts receivable	1414	55 913
Total	155 862	203 432
Payments		
Expenditure	–150 516	–147 690
Net movements on accounts payable	–6127	7449
Total	–156 643	–140 241
Net cash flow from operating activities	–781	63 191
Net cash flow from financing activities	5652	–7870
Net cash flow = Net increase/decrease in cash and short-term deposits	4871	55 321

Budget for 2009
(in € 1000)

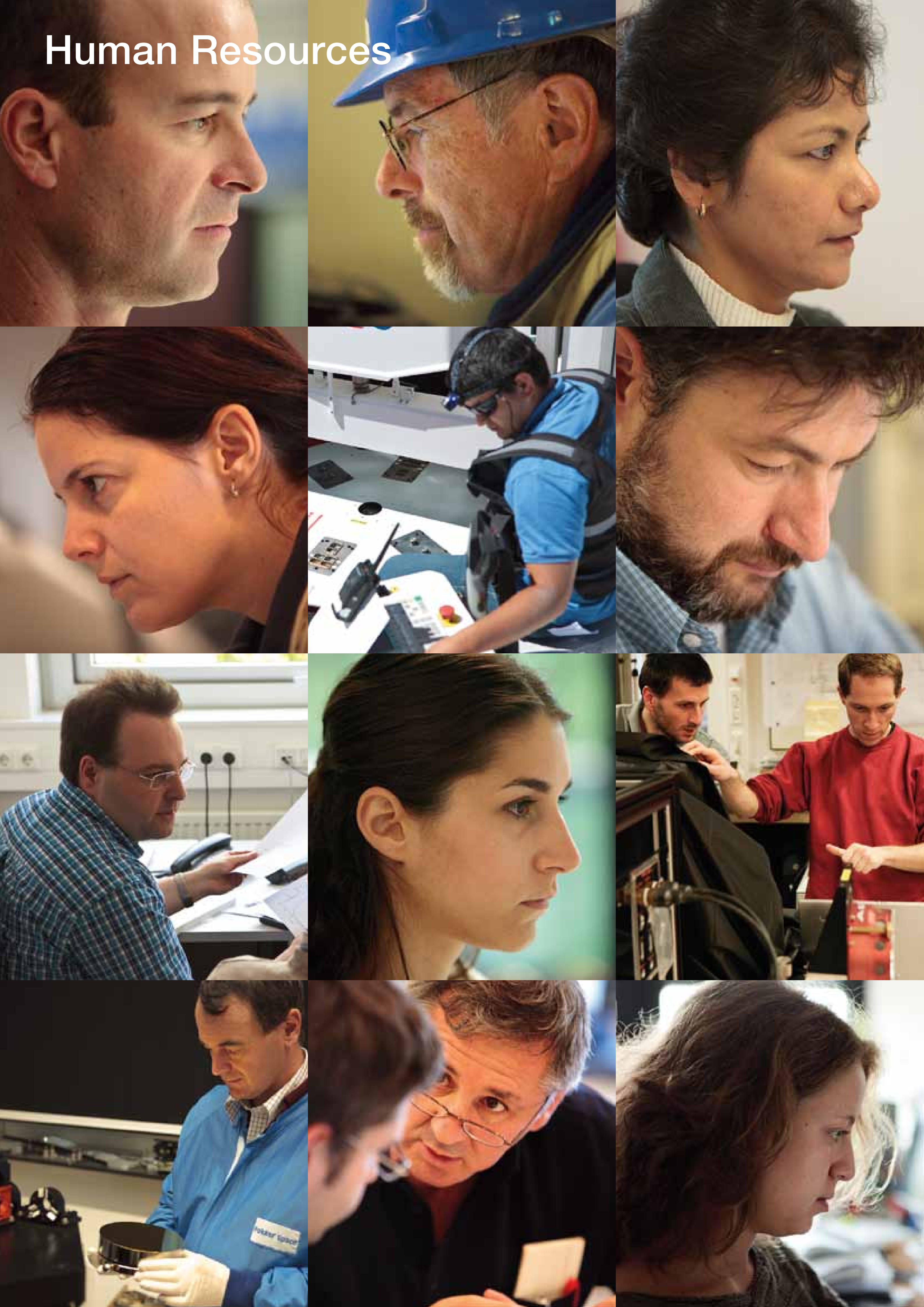
Income budget	2009
Contributions from member states	129 167
Other income from member states	11 640
Income from third parties	13 322
Various income	7700
Total income budget	161 829

Payment budget	2009
Personnel cost	59 894
Other cost	172 148
Total payment budget	232 042

Commitment budget	2009
Personnel cost	59 894
Projects commitments w/o personnel	58 047
Operations commitments w/o personnel	84 745
Total commitment budget	202 686

Spiral Galaxy Messier 83.

Human Resources



One of the main tasks for Human Resources (HR) in 2008 was to provide full support for the changes to ESO's organisational structure both overall and within the Directorates and Divisions. These changes resulted in approximately 40 individual reassignments and further definition of about 15 new or amended assignments, as well as in corresponding recruitment activities. The reorganisation of activities at La Silla continued successfully throughout 2008, in close collaboration with the staff and the unions.

Activity	In %
Accepted new position	26
Reassignment	38
Retirement	6
Planned retirement	9
Early retirement	2
Early retirement offered	11
Exiting the organisation	8

La Silla - Redeployment/Reorganisation activities at 31 December 2008.

Recruitment and selection

A new approach to recruitment and selection was introduced. A review of ESO Guidelines for the recruitment of International Staff Members and Local Staff Members in Chile led to the introduction new tools, including:

– a Competence framework;

– a Recruitment Interview Pack for Selection Board Members; and

– the inclusion of required competences in the advertisement.

Using this new approach, ESO has published vacancy notices for 92 positions and received 2560 applications in total:

Contract Type	No. of Campaigns	No. of Applications
International Staff Member	59	1584
Local Staff	20	783
Paid Associates	13	193

All positions were advertised on the ESO homepage. In addition, the positions for Staff Members and Paid Associates were sent out to all members of Council, Finance Committee and delegates of other ESO Committees, as well as to national and international research centres and observatories. High priority advertising in appropriate specialist publications/recruitment web pages was used for selected positions, with the aim of increasing the awareness of vacancies across all member states throughout the campaigns.

Training and professional development
2008 also saw the introduction of a coordinated, transparent approach to the planning, organisation and delivery of tailored training across ESO, as described below. Some corporate training activities were undertaken to provide support in improving soft-skills and creating an environment to implement and embed ESO policies.

Management development

During 2008 a Management Development Programme was introduced and started in parallel in Chile and Garching to support managers in their roles. Key areas include: managing styles and managing change; performance management; interviewing skills and managing teams in a multi-cultural environment. The delivery of the modules is over a 12-month period, and the first cohort of managers will complete the programme in mid-2009. The training will become integral to the training of all new and future managers. To supplement this training, we also delivered

Project Management training.

training on internal procedural matters in the area of Annual Performance Reviews.

Project management

Training in project management was initiated, with the aim of working towards a common terminology and processes in this area. Initial training has been developed in close collaboration with the Data Management Division and the Software Development Division to ensure that training activities address all areas for development. This has been extremely successful and plans are being developed to widen the delivery to other areas of the organisation.

Staff exchanges

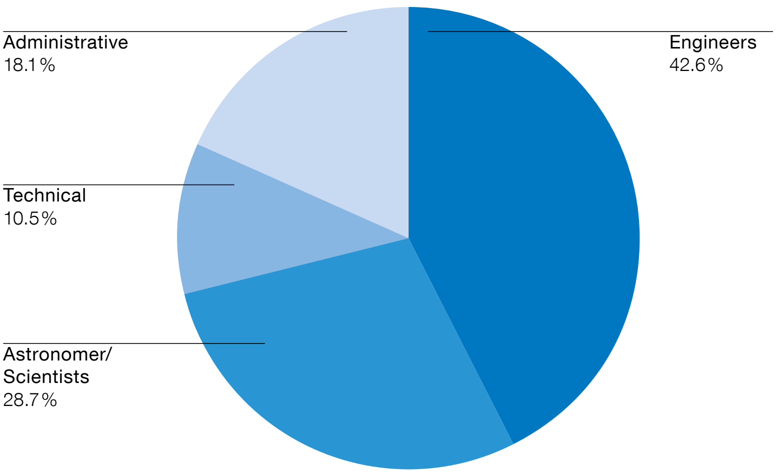
In order to maximise knowledge management and skills transfer, an exchange programme between the Observatories/the Administration in Chile and the Headquarters in Garching is being tested with a small number of staff. The programme is being implemented through longer-term missions or temporary transfers.

Summer Student Programme — Chile

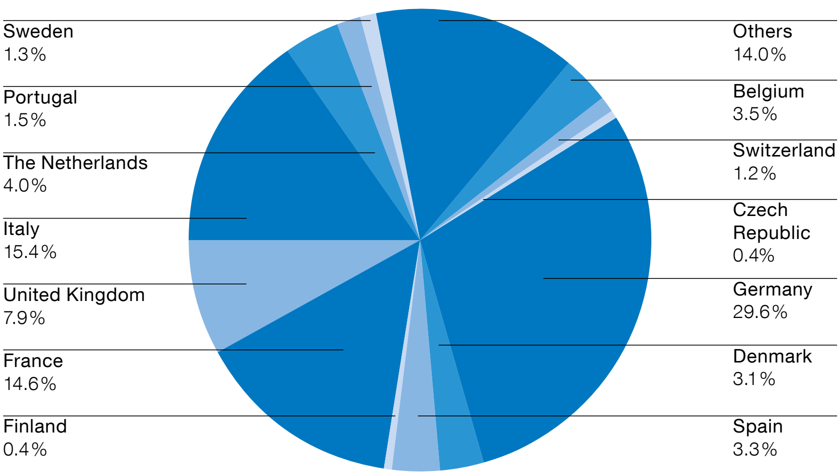
In close collaboration with the management of the La Silla Paranal Observatory, a Summer Programme has been introduced to enable university engineering students over 20 years of age to become acquainted with our organisational environment. The programme supports and enables students to practice their acquired knowledge and skills — while still studying at university — by means of a dedicated training programme, which is followed up and assessed by an ESO supervisor, who has been especially assigned to them. Ten students took part during the last quarter of 2008, gaining practical experience in the Maintenance and Engineering Departments of the Paranal Observatory.

Relations with Staff representatives and Joint Committees in Garching and Chile

Regular consultation and interaction with the International Staff Committee and the Unions in Chile took place. In 2008, a total of 20 meetings were held in Garching and Vitacura, as well as on the sites in Chile, to inform, discuss and exchange opinion in the areas of organisational developments, amendments in policies, regulations, training and individual cases. The meetings took place in a constructive and open atmosphere and a shared wish to find mutually satisfactory solutions to the various matters. In the course of the year three internal appeals were brought to the Joint Advisory Appeals Board (JAAB) and settled in line with the recommendation received. One meeting of the Standing Advisory Committee (STAC) took place to evaluate proposed amendments to the Staff Regulations and specific guidelines.



Distribution of Staff by Job Category — 31 December 2008.



Staff Members by Nationality — 31 December 2008.

Human Resources representation and collaborations

As a member of the ALMA Human Resources Advisory Group and involved in the recruitment of International Staff for the Joint ALMA Office/Observatory (JAO), the ESO Human Resource Division has participated in three meetings and contributed decisively to a revised classification system, compensation and benefit programme for JAO Local Staff and resource requirements for the JAO HR Department.

The Head of Human Resources has chaired the HR Working Group of EIROforum since 1 July 2008. Three meetings were held during the year, mainly on the following subjects:

– common training events for scientists and engineers;

– further developments/exchanges on equal opportunities, and in particular, management development for women; and

– working to improve the level of skills in the field of recruitment.

Human Resources also organised and participated in two meetings of the ESO Tripartite Group.

HR administration

Beside a comprehensive and service-oriented contract administration HR handles a wide spectrum of personnel-oriented activities, including operation of the payroll and the social security systems, the settlement of about 3700 travel claims, the practical implementation and further development of ESO Rules and Regulations, organising formal Induction Days for new staff members, providing access for the children of ESO staff to a crèche/kindergarten on the Garching Campus (now with 17 places for ESO children), organising medical examinations to ensure that staff are fit to take up employment, as well as to work at high altitude when required to do so, and many other tasks.

The Helix Nebula.

List of Staff

Office of the Director General

Tim de Zeeuw

Mary Bauerle
Laura Comendador Frutos
Mary Dinjens-D'Lazarus
Robert Fischer
Karin Hansen
Isolde Kreutle
Milla Laaksonen
Luis Felipe Lira
Claus Madsen
Igor-Félix Mirabel
Thomas Naets
Enikő Patkós
Valérie Saint-Hilaire
Rowena Sirey
Massimo Tarenghi
Elisabeth Völk

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Claudia Silvina Cerda
Tommaso Di Dio
Andrea Dinkel
Günther Dremel
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Katarina Kiupel
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Caterina Kuo
Ignacio López Gil
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Hélène Neuville
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Oscar Orrego
Thomas Penker
Rolando Quintana
Andre Ritz
Elke Rose
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Guido Serrano
Erich Siml
Beatrice Sivertsen
Alexandra Specht
Albert Triat
Michael Weigand
Yves Wesse
Gerd Wieland

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Angela Arndt
Samantha Austin-May
Isabell Heckel
Katharina Kammermaier
Nathalie Kastelyn
Elizabeth Kerk
Katjuscha Lockhart
Betül Meil
Anna Michaleli
Jorge Moreno
Mauricio Quintana
Rosa Ivonne Riveros
Francky Rombout
Marcia Saavedra
Nadja Sababa
Heidi Schmidt
María Soledad Silva
Roswitha Slater
Lone Vedsø Marschollek

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Roberto Abuter
Luigi Andolfato
Pascal Ballester
Klaus Banse
Thierry Beniflah
Peter Biereichel
Thomas Bierwirth
Reynald Bourtembourg
Alessandro Caproni
Sandra María Castro
Maurizio Chavan
Gianluca Chiozzi
Mauro Comin
Livio Condorelli
Paulo Correia Nunes
Dario Dorigo
Philippe Duhoux
Sylvie Feyrin
Vincenzo Forchi
Robert Frahm
Bruno Gilli
Percy Glaves
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Birger Gustafsson
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Carlo Izzo
Bogdan Jeram
Yves Jung
Robert Karban
Mario Kiekebusch
Maurice klein Gebbinck
Jens Knudstrup
Jonas Larsen
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Henning Lorch
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Moreno Pasquato
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Fabio Sogni
Heiko Andreas Sommer
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Jakob Vinther
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Stefano Zampieri
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Jorge Ibsen
Andreas Kempf
Hervé Kurlandczyk
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Paul Lilley
Robert Lucas
Massimiliano Marchesi
Pascal Martínez
Rainer Mauersberger
Ferdinand Patt
Gianni Raffi
Silvio Rossi
Hans Rykaczewski
Joseph Schwarz
Stefano Stanghellini
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Gie Han Tan
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Pavel Yagoubov
Elena Zuffanelli

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Josef Strasser

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Dina Arbogast
Mustafa Basbilir
Bertrand Bauvir
Annalisa Calamida
Marc Cayrel
Françoise Delplancke
Frédéric Derie
Philippe Dierickx
Giorgio Filippi
Szymon Gladysz
Bertrand Koehler
Aybüke Küpcü Yoldaş
Samuel Lévêque
Jochen Liske
Gianluca Lombardi
Serge Menardi
Samantha Milligan
Guy Monnet
Markus Patig
Duc Thanh Phan
Florence Puech
Johannes Sahlmann
Marc Sarazin
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Dominik Schneller
Jason Spyromilio
Isabelle Surdej
Gerard van Belle
Daniela Villegas Mansilla
Nataliya Yaitskova

Directorate of Operations

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Robert Donaldson
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Mark Desmond Downing
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Siegfried Eschbaumer
Enrico Fedrigo
Gert Finger
Christoph Geimer
Andreas Glindemann
Juan Carlos González
Norbert Hubin
Olaf Iwert
Gerd Jakob
Lieselotte Jochum
Markus Kasper
Hans-Ulrich Käufl
Florian Kerber
Jean Paul Kirchbauer
Johann Kolb
Paolo La Penna
Miska Kristian Le Louarn
Jean-Louis Lizon à L'Allemand
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Antonio Ramón Manescau Hernandez
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Manfred Meyer
Luca Pasquini
Jérôme Paufique
Jean-François Pirard
Suzanne Ramsay
Roland Reiss
Javier Reyes
Andrea Richichi
Gero Rupprecht
Markus Schöller
Ralf Siebenmorgen
Christian Sönke
Jörg Stegmeier
Stefan Ströbele
Marcos Suárez Valles
Mirko Todorovic
Sebastien Tordo
Elise Vernet
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Henri Bonnet
Roland Brast
Enzo Brunetto
Bernard Buzzoni
Ralf Dieter Conzelmann
Bernard-Alexis Delabre
Nicola Di Lieto
Canio Dichirico
Martin Dimmler
Michel Duchateau
Toomas Erm
Yan Feng
Gerhard Fischer
Christoph Frank
Domingo Gojak
Frédéric Yves Joseph Gonte
Iván María Guidolin
Ronald Guzmán
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Andreas Haimerl
Volker Heinz
Guy Hess
Renate Hinterschuster
Ronald Holzlöhner
Georgette Hubert
Georg Igl
Paul Jolley
Andreas Jost
Lothar Kern
Barbara Klein
Franz Koch
Maximilian Kraus
Christian Lucuix
Ruben Mazzoleni
Jean-Michel Moresmau
Michael Müller
Frank Nittel
Lothar Noethe
Edouard Pomaroli
Marco Quattri
Jutta Quentin
Michael Schneermann
Babak Sedghi
Armin Silber
Arkadiusz Swat
Roberto Tamai
Luke Taylor
Arno Van Kesteren
Véronique Ziegler

La Silla Paranal Observatory

Andreas Kaufer

Sergio Abadie
Luis Aguila
Claudio Agurto
Bernardo Ahumada
Yazan Al Momany
Mario Alfaro
Jaime Alonso
Nilso Alquinta
José Luis Alvarez
Paola Amico
Andreas Andersson Lundgren
Gaetano Andreoni
Iván Aranda
Ernesto Araya
Juan Carlos Arcos
Javier Argomedo
Pablo Arias
Karla Aubel
Francisco Azagra
José Báez
Pedro Baksai
Rogelio Bascunan
Juan Beltrán
Guillaume Blanchard
Carlos Bolados
Pierre Bourget
Stéphane Brillant
Armando Bruna
Erich Bugueno
Francisco Cáceres
Blanca Camucet
Luis Alejandro Caniguante
Michael Cantzler
Ruben Carcamo
César Cárdenas
Mauricio Cárdenas
Giovanni Carraro
Duncan Castex
Mónica Castillo
Roberto Castillo
Jorge Castizaga
Susana Cerda
Cecilia Ceron
Claudia Cid
Alex Correa
Angela Cortes
José Ignacio Cortés
Jaime Costa
Reinaldo Donoso
Javier Duk
Christophe Dumas
Michael Dumke
Carlos Durán
Carlos Ebensperger
Cristian Elao
Cristian Esparza
Lorena Faundez
José Figueroa
Erito Flores
Juan Carlos Fluxa
Eloy Fuenteseca
Sergio Gaete
Javier Gallardo
Leonardo Gallegos
Rodrigo Gesswein
Gordon Gillet
Alain Gilliotte
Philippe Gitton
Andrés González
Domingo González
Javier Andrés González
Leonardo González
Sergio González
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Serge Guniat
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Paul Le Saux
Cedric Ledoux
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Dieter Nürnberger
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Kieran O'Brien
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Ernesto Orrego
Juan Osorio
Juan Carlos Palacio
Ricardo Parra
Rodrigo Parra
Andrés Parraguez
Marcus Pavez
Eduardo Peña
Jorge Pilquinao
Juan Pineda
Andrés Pino
Aldo Pizarro
Andrés Pizarro
Manuel Pizarro
Emanuela Pompei
Hugo Quijón
David Rabanus
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Claudia Reyes
Miguel Riquelme
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Chester Rojas
Cristian Romero
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Ricardo Schmutzer
Oliver Schuetz
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Waldo Siclari
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Nicolas Slusarenko
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Jonathan Smoker
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Sandra Strunk
Thomas Szeifert
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Karen Vallejo
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Enrique Vera
Jorge Vilaza
Stefan Wehner
Ueli Weilenmann
Luis Wendegass
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Fabien Chereau
Thomas Dall
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Nausicaa Delmotte
Danuta Dobrzycka
Adam Dobrzycki
Nathalie Fourniol
Wolfram Freudling
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Reinhard Hanuschik
Evanthia Hatziminaoglou
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Jesús Rodríguez Ulloa
Martino Romaniello
Remco Slijkhuis
Dieter Suchar
Lowell Tacconi-Garman
Mario Van Den Ancker
Eelco van Kampen
Ignacio Vera Sequeiros
Andreas Wicenec
Markus Wittkowski
Burkhard Wolff
Bodo Ziegler
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Space Telescope-ECF

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Jonas Haase
Richard Hook
Martin Kümmel
Harald Kuntschner
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Mariya Lyubenova
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Andrea Verónica Ahumada
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Giuseppina Battaglia
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Michaela Döllinger
Brigitta Eder
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María Eugenia Gómez
Luis Gonçalves Calçada
Uta Grothkopf
Olivier Hainaut
Camilla Juul Hansen
Hans Hermann Heyer
Frank Heymann
Renate Hoppe-Lentner
Marc Huertas-Company
Gaitee Hussain
Yara Lorena Jaffe Ribbi
Behrang Jalali
Gaël James
Edmund Janssen
Paulina Jiron
Iva Karovicova
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Ulf Seemann
Raquel Yumi Shida
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Thomas Stanke
Josef Stöckl
Christina Stoffer
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Masayuki Tanaka
Paula Stella Teixeira
Leonardo Testi
Svea Teupke
Sune Toft
Elena Valenti
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Laura Ventura
Rein Warmels
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Lars Å. Nyman
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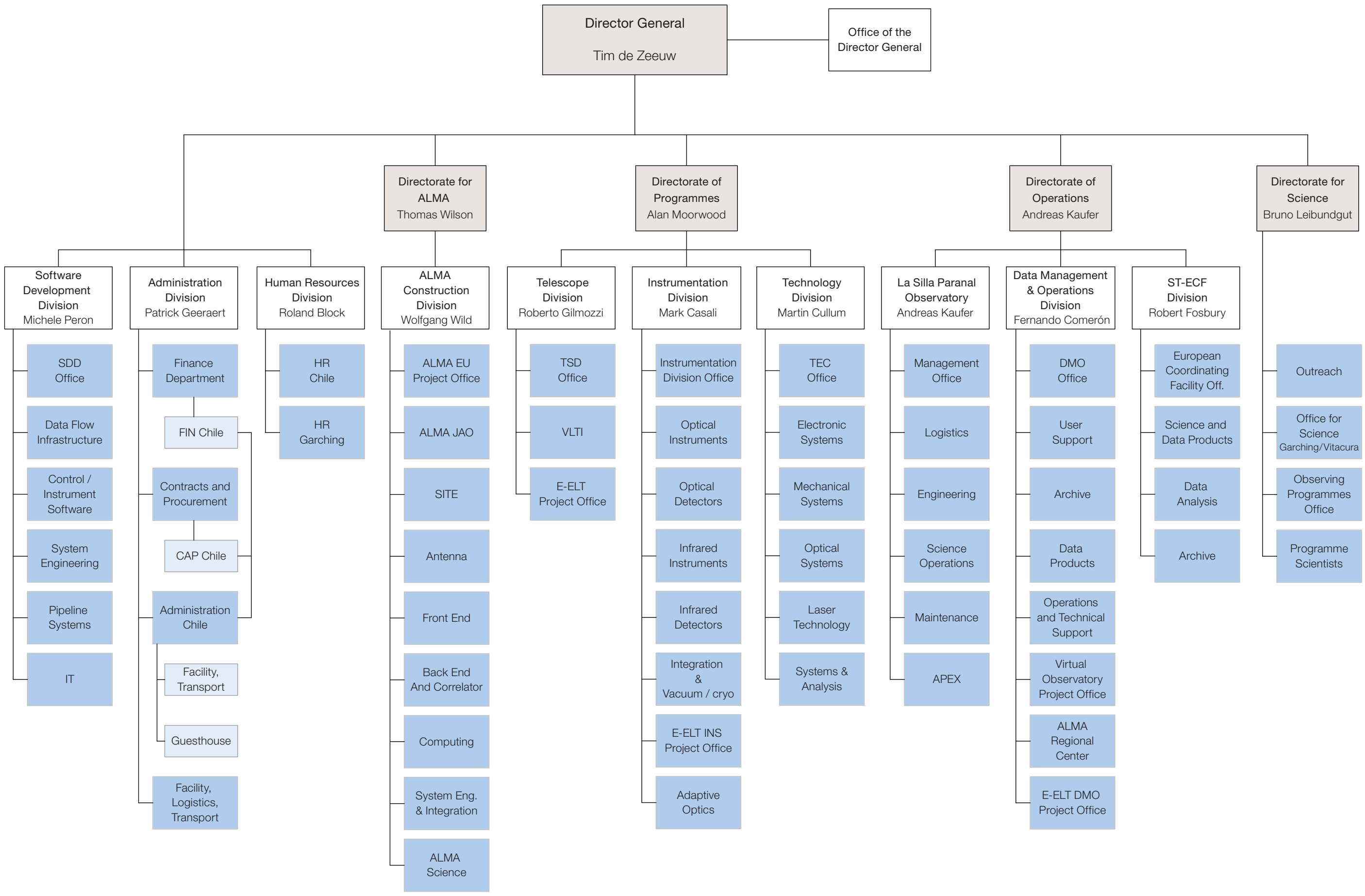
Russell Smeback
Nicholas Whyborn

Top view of the Paranal
Residencia at the ESO
VLT Observatory.

Organigram



This Organigram shows the status of the Organisation as of December 2008.

The main organisational and managerial units of ESO are the Directorates which currently include: the Directorate of Programmes, Operations, Science and ALMA. The Directorates are organised in Divisions. Because of their matrix functionalities the Divisions Software Develoment, Administration and Human Resources have a special status.

ESO Headquarters in Vitacura, Chile.

Committees

Flags of the ESO member states flying outside the Headquarters in Garching.

Council

The Council is ESO's ruling body. It delegates the day-to-day responsibility for the Organisation to the Executive under ESO's Director General. The Director General, in turn, reports back to Council on a quarterly basis via two Council Meetings and Committee of Council Meetings, respectively. In 2008, Council held its ordinary meetings in Prague on 3 and 4 June and in Garching on 2 and 3 December. Committee of Council met in Stockholm on 3 and 4 March and in Copenhagen on 6 and 7 October. All meetings were chaired by the President, Prof. Richard Wade.

At the June meeting, Council unanimously approved the accession of Austria to ESO from 1 July 2008. The delegations welcomed Austria as ESO's 14th member state. Council also approved the Terms of Reference and Rules of Procedure for the STC and the Terms of Reference for STC subcommittees.

At the same meeting Council unanimously agreed to the reappointment of Prof. Roger Davies as Chair of the E-ELT Standing Review Committee for a period of two years.

Council commended the successful implementation of the recommendations made by the Visiting Committee the previous year and reported by the Director General at the June meeting.

Council received the usual VLT/VLTI, Instrumentation and ALMA Biannual Reports, and the reports from the Chairs of the Finance Committee, the Scientific Technical Committee and Observing Programmes Committee.

At its meeting in December, Council bid farewell to Prof. Richard Wade whose term of office as President had come to an end. Council subsequently elected Dr. Laurent Vigroux as President of Council for 2009. Prof. Thomas Henning was re-elected Vice-President for the same period. Mr. Alain Heynen was reappointed Chair of the Finance Committee for 2009. Prof. Elias Brinks was appointed Chair of the Observing Programmes Committee for 2009 and Prof. Willy Benz was appointed Chair of the STC for the same period.

Ex officio membership of the ALMA Board was confirmed for one year for Dr. Laurent Vigroux and the Director General. Additionally, Prof. Ewine van Dishoeck was reappointed to the ALMA Board for two years, Prof. Xavier Barcons was elected to the Board for two years and Prof. Patrick Roche was appointed assessor to the Board for the same period.

At the December meeting Council welcomed the merged VLT Biannual Progress Report that was presented for the first time and the verbal report from the ALMA Director.

In December Council approved a joint agreement with Uppsala University and the Geneva Observatory to carry out upgrades to HARPS to maintain its leadership in the domain of high precision radial velocity studies and to extend its scientific capabilities in return for specified amounts of guaranteed observing time.

The E-ELT Standing Review Committee, chaired by Prof. Roger Davies met twice in 2008 to receive updates on progress with the Phase-B design study, site selection activities, funding and instrument studies, which were subsequently reported to Council.

The Scientific Strategy Working Group, chaired by Prof. Bruno Marano, met twice in 2008. In February it met to reach consensus on a number of issues, including composition of the STC and STC subcommittees, its nomination and Terms of References for both committees.
In September it convened to discuss the policy of ESO "operating beyond its budget" for surveys, and address the issue of spectroscopic surveys (e.g., follow up of VISTA, VST, Gaia, etc.). Reports on the outcome were presented to Council.

In 2008 the ESO Tripartite Group met in May and in October. The meetings were chaired by Dr. Patricia Laplaud. The Group received updates on developments on the work of the CERN Pension Fund Governing Board, on the terms of appointment for the members of the Governing Board as well as on the CERN-ESO Agreement. A summary report and conclusions of the ESO Management on the possibility of introducing a two-fold Pension scheme as well as the proposed salary adjustment for international staff were discussed and recommended to the Finance Committee and Council. Changes to the Staff Rules and Regulations regarding special leave, adoption leave and unemployment benefits were discussed and further developed with the aim to provide corresponding recommendations to the Finance Committee and Council in spring 2009. The Tripartite Group received information concerning the results of the annual advancement review and the progress on measures (reassignments, early retirement scheme) taken to adjust the staffing on La Silla to meet the requirements of the La Silla 2010+ operation.

ESO ended the year on a high note when Council approved with a large majority the recommendations put forward to extend the Headquarters building.

Council and Committee of Council 2008

President	Richard Wade
Austria (as of 1 July*)	Sabine Schindler Daniel Weselka
Belgium	Monnik Desmeth Christoffel Waelkens
Czech Republic	Jan Marek Jan Palouš
Denmark	Jens Viggo Clausen Henrik Grage
Finland	Kalevi Mattila Pentti Pulkkinen
France	Julien Galabru Laurent Vigroux
Germany	Andreas Drechsler Thomas Henning
Italy	Vicenzo Dovì Bruno Marano
The Netherlands	Jan A. C. van de Donk Konrad H. Kuijken
Portugal	Fernando Bello Teresa Lago
Spain	Xavier Barcons Jordi Torra
Sweden	Claes Fransson Sofie Björling (until 31 August 2008) David Edvardsson (as of 1 September 2008)
Switzerland	Georges Meylan Martin Steinacher
United Kingdom	Patrick Roche Rowena Sirey (until 31 May 2008) John Womersley (as of 1 June 2008)

* as observers, pending completion of the ratification procedure

Finance Committee

In 2008 the Finance Committee held two ordinary meetings and one extraordinary meeting, which were chaired by Alain Heynen. The meetings took place at ESO Garching. Austria joined ESO as a member state on 1 July 2008. However, until completion of the ratification procedure, Austria maintained an observer status on ESO Committees. Accordingly, an observer from Austria attended the last ordinary meeting of the Finance Committee in November.

The Finance Committee approved the awarding of 22 contracts exceeding € 300 000, 15 single-source procurements exceeding € 150 000 and six amendments to existing contracts. Four contracts concerning the Headquarters extension and the E-ELT have been approved by written procedure. Information was received concerning procurement statistics, forthcoming calls for tenders and price enquiries exceeding € 150 000. The Finance Committee also dealt with financial issues (annual accounts, budget, cash-flow situation, financial statements, member state and Austrian contributions) and personnel subjects, concerning International and Local Staff as well as the Pension Fund. These themes were discussed in detail and recommendations were made to Council.

At its extraordinary meeting on 19 February 2008, the Finance Committee appointed the Finance Committee Working Group on the Financial Governance of ESO. The Working Group made suggestions on procurement document structure and content, among other issues, as well as on the drafting of new Financial Rules and Regulations.

Finance Committee 2008

Chair	Alain Heynen
Austria	Daniel Weselka (observer)
Belgium	Robert Renier
Czech Republic	Jaroslava Jeslínková Jiri Toifl
Denmark	Cecilie Tornøe
Finland	Jaana Aalto
France	Patricia Laplaud
Germany	Matthias Nagel
Italy	Emanuela De Lauretis
The Netherlands	Coen J. van Riel
Portugal	Fernando Bello
Spain	Luis Ruiz López
Sweden	Johan Holmberg
Switzerland	Jean-Pierre Ruder
United Kingdom	Colin Vincent

A meeting of the Finance Committee.

Scientific Technical Committee

The Scientific Technical Committee 2008

José Afonso (P) (ESAC Chair, ASAC)
Rafael Bachiller (ES)
Willy Benz (CH)
Joris Blommaert (B) (VLT/I)
Jean-Gabriel Cuby (F) (ESE)
Raffaele Gratton (I) (ESE)
Lauri Haikala (FIN)
Thomas Herbst (D) (ESE Chair)
Hans Kjeldsen (DK) (VLT/I Chair)
Yannick Mellier (F)
Dante Minniti (CH)
Goran Olofsson (SE) (ESE)
Michael Prouza (CZ)
Patrick Roche (UK)
Linda Tacconi (D) (Chair)
Huib Jan van Langevelde (NL)

New STC structure

A new Scientific Technical Committee (STC) structure has been implemented this year to reflect the breadth of ESO's activities better and to improve interaction at the technical level. Former *ad hoc* committees are now formally identified as advisory to the STC. These include the VLTI Implementation Committee, which has been expanded to become the La Silla Paranal Committee, the ALMA European Science Advisory Committee (ESAC) and the ELT Science and Engineering Committee (ESE). Council approved the new Terms of Reference of the STC and its subcommittees at its June 2008 meeting. The member state representation on the STC has been maintained, but membership of the subcommittees should reflect the necessary specific expertise. At its December meeting Council approved the new members of the STC, who are replacing several long-serving STC members who had reached the end of their terms.

STC-68

On 16 and 17 April the STC met for its 68th meeting in Garching. It discussed the new STC and subcommittee structure as proposed by the Council Science Strategy Working Group. It welcomed the new Terms of Reference and the strengthening of the STC links to its subcommittees by making sure that there are at least two STC members on each subcommittee.

The STC was concerned about the difficulties in the operations of the Laser Guide Star Facility (LGSF) and urged ESO to devise a recovery plan to re-establish nominal adaptive optics with laser guide star operations at the VLT and bring the system to the same level of quality prevailing at Paranal. The STC felt that the success of the current generation LGSF is critical to the success of the many other laser guide star systems planned in the ESO programme, starting with the Adaptive Optics Facility (AOF) and the projects GRAAL and GALACSI on the VLT and later the E-ELT, for which laser guide star operation is critical. The STC further urged ESO to inform the astronomical community about the limitations on the availability of the LGSF in Calls for Proposals until normal operations can be recovered.

The STC further discussed strategies for ESO to secure the scientific eminence of the VLT into the ELT era. In particular, upgrades of current VLT instruments and La Silla facilities were evaluated. The STC welcomed the detailed and clear upgrade plan for La Silla and Paranal presented by ESO. It recommended that ESO look for cost-effective ways to enable and maintain wide-field imaging and spectroscopic facilities for the ESO community without jeopardising the other major approved ESO projects. Complementing spectroscopic surveys would significantly increase the scientific impact of the new survey telescopes, VISTA and the VST. Replacement of the four VIMOS red detectors with CCDs of improved red sensitivity will enable spectroscopic surveys to be carried out in an efficient manner, opening up new science opportunities for the ESO community. The STC ranked the VIMOS upgrade as the highest priority.

The STC was presented with upgrade proposals for HARPS, which included a polarimetric unit, a laser comb for wavelength calibration, a new Fabry–Pérot calibration unit, new fibres and a new ultrastable cryostat. The STC recommended that a single upgrade plan be presented, which would outline the scientific priorities, whether they would be compatible with each other, and describe the required resources and a timescale for the upgrade. The STC further supported the plans for continued operations of the 2.2-metre telescope (with FEROS, WFI and GROND) and the NTT (SOFI, EFOSC2 and visitor instruments).

The STC was pleased by the progress of PRIMA at the VLTI and with the contracts for the second generation VLTI instruments, MATISSE and GRAVITY. It welcomed the news that ESO had issued a Call for Proposals for the ultra-stable spectrograph at the combined VLT focus as the first element in the overall instrumentation plan for the VLT in the ELT era. It encouraged a well-defined sequence of calls for a wide-field, very high multiplex spectrograph facility for a Nasmyth focus and an additional concept for future instruments. In addition, ESO should investigate how it can upgrade or replace the work horse instruments. The STC emphasised that these new instrument concepts are meant as long-term enhancements and upgrades to the VLT in the era of the ELT and should not compromise the suite of approved second generation instrumentation in the short- and mid-term.

STC-69

At its 69th meeting on 21 and 22 October in Garching, the STC dealt with the Budget and Forward Look for 2008–2012, together with the upgrade plan for HARPS, giving its recommendation to both.

The budget document was delivered to the STC only shortly before the meeting, but it was able to discuss its contents during several extended closed sessions. The STC was pleased that the budget provided for the highest priority components of the ESO programme, including the E-ELT design activities, the operation of the La Silla Paranal facilities, development of the approved second generation instruments, the construction and early operation of ALMA, operation of APEX and the commissioning and operation of the survey telescopes. The STC was confident that this programme will keep ESO at the forefront of world astronomy.

The STC noted that the third VLTI instrument, VSI, was not included in this plan, in line with the priority set by the STC, and that the savings from the revised operation of La Silla begin in this period. The STC regarded the provision of a new Headquarters building in Garching as especially important so as to co-locate all ESO Garching personnel and projects on a single site, and, in particular, to improve communications between the optical/infrared and ALMA science communities at ESO.

Based on input from the La Silla Paranal subcommittee report, the STC proceeded with the strategic discussions for securing and maintaining the scientific eminence of the VLT into the ELT era. The STC was pleased with the progress made on the implementation of the near-term upgrade plan for La Silla and Paranal instrumentation recommended in STC-68.

The STC and the La Silla Paranal subcommittee were both satisfied that the installation of a recovery plan for the LGSF had led to a significant improvement in the on-sky performance and reliability of the system, but was concerned that when the atmospheric conditions are taken into consideration, the operational efficiency of the LGSF will be insufficient to eliminate the backlog of observations still in the service queue. It encouraged ESO to continue to investigate ways to increase the laser guide star observing efficiency. The progress of the LGSF and the positive outcome of the Multi-conjugate Adaptive-optics Demonstrator were considered encouraging signs of a healthy AO programme at ESO. The STC reiterated that success of the present AO programme is a necessary stepping stone for the success of the other more complicated laser guide star systems planned in the ESO programme, firstly for the AOF and the projects GRAAL and GALACSI, and later the E-ELT.

Following the STC's recommendation from the 68th meeting, the STC welcomed the single, coherent HARPS upgrade proposal from ESO, Geneva Observatory and Uppsala University. The proposal included a three-part short-term upgrade plan consisting of a new guiding system, a polarimeter and a wavelength calibration unit. The STC recommended proceeding with this short-term upgrade, which would enable HARPS to maintain its leading position in high precision radial velocity studies and add new polarimetric scientific capabilities. The proposal also outlined plans for a medium-term upgrade consisting of a new detector system and a fibre link. The STC and the consortium agreed to wait before making a recommendation on this more expensive, invasive part of the upgrade until experience with similar components in HARPS-N has been gained.

The STC was informed of progress on the High Resolution Ultra-Stable Spectrograph concept for the next generation of VLT instrumentation. The STC strongly supported ESO's intent to maintain the scientific eminence of the VLT. In this connection, the STC noted the absence of progress on other aspects of the next generation instrumentation. Specifically, it repeated its recommendation to see a plan for further VLT instrumentation as formulated in the previous meeting.

With the upgrades of GIRAFFE and VIMOS, ESO will provide a set of highly competitive facilities to run wide-field spectroscopic surveys. These instruments will be unique for the next five years and will clearly put the ESO community in a leading position in the field. The STC then requested that a joint STC-ESO workshop be organised as early as possible to review the scientific potential of these instruments for public wide-field spectroscopic surveys. The workshop would also be an opportunity for the community to propose new concepts for the next generation wide-field instruments on ESO telescopes consistent with the STC recommendations from STC-67 and STC-68. Depending on the outcome of the workshop, ESO could then call for Large Programmes or Public Surveys so as to begin wide-field spectroscopic surveys as soon as the VIMOS upgrade is completed successfully.

The E-ELT site selection schedule is a concern of both the STC and the ESE. As one of the advisory committees of ESO, the STC needs to ensure that it has sufficient information to evaluate whether the telescope and instrument designs are optimal for the site that is ultimately selected. Both the ESE and the STC requested clarification on the process of instrument selection at the end of Phase B. Both committees acknowledged, however, that it will not be possible to bring all eight instrument studies forward to Phase B immediately.

The STC welcomed the news of the excellent choices in the new ALMA Director and Project Managers. It also received significant input from the ESAC on the ALMA project. Based on this input, the STC found that, although there was significant progress in all aspects of the programme, there were several areas that gave cause for concern. The STC and ESAC were worried by the continued lack of a permanent solution to supplying power to the ALMA sites, the delays in the European Front End Integration Centre, and concerns over the possible limitations of the current local oscillator design to baselines of less than 5 km.

Observing Programmes Committee

The Observing Programmes Committee 2008

Danielle Alloin
Svetlana Berdyugina (P82, Vice-chairperson)
François Boulanger (P83)
Jan Brand (P82)
Elias Brinks
Enrico Cappellaro (P83)
Francisco Castander (P83)
Cathie Clarke (P83)
Adriano Fontana
Roland Gredel (P82)
Leopoldo Infante
Mika Juvela
Leon Koopmans (P83)
Claes-Ingvar Lagerkvist
John Landstreet
Daniel Lennon (P83)
Claudia Maraston (P82)
Huub Röttgering
Sabine Schindler (P82)
Monica Tosi (Chairperson)
Esko Valtaoja
Sylvie Vauclair (P82)
Kim Venn (Vice-chairperson in P83)

In 2008, the Observing Programmes Committee (OPC) held its two semi-annual meetings in May and in November. It had to evaluate 925 proposals received for Period 82 (P82; 1 October 2008 to 31 March 2009), and 961 proposals for Period 83 (P83; 1 April 2009 to 30 September 2009). The latter represents the highest number of proposals ever submitted to the OPC for a single period. Since the introduction in 2000 of the OPC scientific categories currently in use, the number of proposals dealing with "Galactic" scientific areas — interstellar medium, star formation and planetary systems (OPC category C), and stellar evolution (OPC category D) — has almost doubled. The number of "extragalactic" proposals of categories A (cosmology) and B (galaxies and galactic nuclei) has not significantly changed over the same time interval.

For the third year in a row, Antu (VLT UT1) has been the telescope with the most requested time. The pressure factor on this telescope, i.e. the ratio of the requested to the available time, reached 6.6 in P82; this is an all-time record for the VLT. Pressure on the other ESO telescopes ranged between 2.5 and 5 in 2008. Among the VLT instruments, FORS2 remains the most demanded, as it has been since 2004. In P83, the requested amount of time on FORS2 was 2.5 to 3.5 times larger than on any VLT instrument, excluding VISIR, which is in low demand (40% of the average of the VLT instruments) due to the very specific type of scientific applications for which it can be used. Among La Silla instruments, HARPS (especially for Large Programmes) and EFOSC2 are in high demand. Visitor instruments were scheduled at the NTT in both P82 and P83: AstraLux, ULTRASPEC, and a visible-infrared camera of the Max-Planck-Institut für Radioastronomie. On APEX, the prototype bolometer camera P-Artemis was allocated time in P83.

Joint telescope time applications for coordinated observations with the VLT and with the XMM-Newton X-ray observatory were invited again in P83. These proposals fall within the framework of an agreement between ESO and ESA for a joint telescope time allocation scheme, which was in its fifth year in 2008. It aims to take full advantage of the complementarity of ground-based and space-borne observing facilities. No joint applications were submitted to ESO in P83, but two of the five applications evaluated by the XMM Time Allocation Committee were allocated telescope time.

Targets of Opportunity

An unprecedented number of 53 proposals for observations of Targets of Opportunity (ToO) were submitted for evaluation by the OPC in P83. The number of such proposals that are received each period is, on average, almost twice as high as it was five years ago, and four times greater than ten years ago. In 2008, about 40% of the successful ToO proposals were dedicated to studies of gamma-ray bursts (GRBs). Of these, about half involved observations made in the Rapid Response Mode (RRM) of the VLT. With this mode, observation of a transient phenomenon can be started automatically within minutes of its activation. Thanks to the unique performance of the VLT in RRM, combined with ESO's policy of overriding both Visitor and Service Mode observations, the VLT and the GRB community of the ESO member states remain at the forefront of this field of research.

Calibration Programmes

As of P82, a new proposal type was introduced, for Calibration Programmes (CP). Such programmes are aimed at complementing the existing coverage of the calibration of ESO instruments. In the proposal evaluation, the OPC considers the potential enhancement of the outcome of future science programmes that would be enabled by execution of the proposed CP against the immediate return of current period science proposals directly competing for use of the same resources. In P82, three CP proposals were received; the OPC recommended two of them to be implemented. The OPC also approved two of the ten CPs evaluated at its P83 meeting.

Large Programmes

Large Programmes (LPs) are projects requiring a minimum of 100 hours of observing time and that have the potential to lead to a major advance or breakthrough in the considered field of study. LP execution is spread over several observing periods. Until P82, the maximum duration of an LP was two years; as of P83, this limit was raised to four years for programmes to be carried out on the La Silla NTT or 3.6-metre telescope. Since the introduction by ESO in 2001 of this type of programme, the number of such proposals submitted each period has steadily increased, reaching an all-time record of 30 in P83. Of the 21 LP proposals that were evaluated by the OPC in P82, five were recommended for implementation and scheduled accordingly. Six LP proposals were approved in P83, three of them with HARPS on the 3.6-metre telescope, taking advantage of the increased maximum duration of LPs on La Silla. In total, between the start of VLT science operation in 1999 and 2008 (P83), 90 LP proposals that were favourably evaluated by the OPC were allocated time on the La Silla Paranal Observatory telescopes. They cover almost all current astronomical topics, from the Solar System to cosmological studies. Scientific reports on the outcome of those LPs that were completed between 2003 and 2007 were presented at a workshop that took place at ESO in Garching in October 2008 upon the OPC's request. The reports given at this workshop illustrate the success and usefulness of the LP proposal scheme.

ESO/GTC programmes

The accession agreement of Spain into ESO includes the allocation of 122 clear nights with the new 10.4-metre Gran Telescopio Canarias (GTC) to proposals by Principal Investigators from ESO member countries. The first Call for Proposals for these ESO/GTC programmes was issued with the ESO P82 Call for Proposals. Users were invited to submit proposals for programmes whose execution required at least 20 nights, spread over a maximum duration of two years. Sixteen proposals were received. For their evaluation, which was carried out in the same way as for LP proposals requesting time on ESO telescopes, two members-at-large appointed by Spain joined the OPC. Following the OPC recommendations and review of the technical and operational constraints by the Liaison Committee between ESO and Spain, two programmes were approved.

OPC procedures

Over the past two years, four new advisory panels have been added to the OPC, so as to allow referees to cope with the increasing number of proposals to be evaluated while keeping their workload manageable. The OPC now consists of twelve panels, each with six members. The number of meeting rooms available at ESO Headquarters in Garching is no longer sufficient to accommodate all of them. Accordingly, as of P82, the panel meetings were transferred to a venue outside ESO Headquarters, offering adequate meeting rooms and allowing the participants to perform their work under appropriate conditions. Before and after the panel meetings, the OPC itself continues to hold its sessions at the ESO Headquarters.

The VLT at sunset.

Users Committee

The Users Committee 2008	
Belgium	Griet Van de Steene
Czech Republic	Jiří Grygar
Denmark	Johan Fynbo
Finland	Merja Tornikoski
France	Vanessa Hill
Germany	Jochen Heidt
Italy	Bianca Poggianti
The Netherlands	Walter Jaffe (Chairperson)
Portugal	Nuno Santos
Spain	Ignacio Negueruela
Sweden	Nils Ryde
Switzerland	Frédéric Courbin
United Kingdom	Jacco van Loon (Vice-chairperson)
Chile	Wolfgang Gieren

The annual meeting of the Users Committee (UC) took place at the ESO Headquarters in Garching on 14 and 15 April.

Following an introductory talk by the Director General on ESO's long-term strategies and priorities, presentations were given by ESO on the La Silla Paranal Observatory (with emphasis on the revised model of operations of La Silla as of 2010), ALMA, the observing proposals handling and evaluation process, the data reduction pipelines, the ESO User Portal, and the E-ELT project. The UC presented the feedback from the user community, on the basis both of a global survey across all member states and of direct input from the astronomers in the countries to their respective representatives. In general, users are very satisfied with the actual execution of observations at the La Silla Paranal Observatory, both in Service Mode and in Visitor Mode. Their main concerns rest with the proposal evaluation process and the feedback that they receive about it, the difficulties encountered by certain categories of users to find needed information in ESO documents and web pages, and the prospects for future development and distribution of data reduction pipelines.

As usual, the morning of the second day of the meeting was devoted to a special topic, which this year was Advanced Data Products (ADP). After a brief introduction by ESO, three users who had submitted ADPs gave an account of their experience. They commented on the submission procedure, explained the motivation behind their decision to submit an ADP, and reported on their interactions with colleagues who had actually retrieved and used these ADPs for their own research.

The VLT control room.

La Silla Observatory

International Relations

The Signing Ceremony with Austria.

The International Relations Office (IRO) was established in early 2008 within the Office of the Director General, bringing together activities previously handled by various departments and offices across the organisation. The growth of ESO, both in terms of the number of member states and projects, as well as the increasing internationalisation of research, called for the establishment of a dedicated office to deal with these matters. The IRO supports and works closely with the Directorates in pursuit of ESO's mission.

One of the most important developments for ESO in 2008 in international relations was the finalisation of the membership negotiations with Austria. This led to the signing of the accession agreement by the Austrian Minister for Science and Research, Johannes Hahn and ESO's Director General at a ceremony in Vienna on 30 June. Unfortunately, the ratification procedure was delayed by early elections and the process of forming a new government, so that the formal conclusion of the ratification was still pending at the end of the year, though with encouraging signs for completion in early 2009.

The continued success of ESO and its exciting future plans continue to draw interest in many countries beyond the current member states. The ESO Council responded positively, adopting new policy guidelines making it possible to undertake discussions with several countries — including some outside of Europe — who had expressed an interest either in full membership of ESO or in some form of collaboration in the E-ELT project.

ESO has continued its programme of interaction with industries in the member states, organising further information days aimed at raising the awareness in industry of the opportunities offered by ESO projects and giving enterprises an opportunity to interact directly with ESO specialists. These events are organised in close collaboration between the IRO and the Contracts and Procurement Department. In 2008, events took place in Copenhagen (May) and in Prague (December). An event in Berlin was in preparation for January 2009 in connection with the opening of the International Year of Astronomy.

On 1 July, ESO assumed the rotating Chairmanship of the EIROforum collaboration, the partnership of Europe's seven intergovernmental research organisations operating major infrastructures. The regular Autumn meeting of the EIROforum Council (the Directors General of the partner organisations), which was held at Paranal, began a review of the partnership and its past activities as the first step in developing a forward plan for EIROforum that builds on its solid achievements to date.

The International Relations Office has also kept abreast of the evolution of European science policies, particularly with regard to research infrastructures and has ensured an ESO presence at relevant meetings and events, including conferences organised by the rotating EU Presidency.

At the 51st Session of the UN Committee for Peaceful Uses of Outer Space, ESO was granted the status as permanent observer, supported by several member states and Chile. The status was confirmed in December by the UN General Assembly.

Visit of the EIROforum Council to Paranal.

The Austrian Minister for Science and Research, Dr Johannes Hahn, Prof. Sabine Schindler (University of Innsbruck) and ESO's Director General, Prof. Tim de Zeeuw at the press conference at the Vienna Observatory on 24 April, where the Austrian government announced its decision to join ESO.

Chile Relations

Throughout the year, ESO continued its close interaction with the Chilean authorities and Chilean society in several areas.

An important component of ESO's Cooperation Programme with Chile, the ESO/Government of Chile Joint Committee, continued its work in 2008. This year, 28 proposals from universities and institutions were reviewed and funding of US$ 618 000 was allocated.

The Office of the ESO Representative started negotiations with the Rector of the Universidad Católica del Norte over a project involving a permanent astronomy exhibition at the Ruinas de Huanchaca, a national monument area in Antofagasta, which had been gradually abandoned over the years. This project is now underway and inauguration is expected in 2009.

The annual meeting at CONICYT to allocate funding that is provided by ESO/AUI and NAOJ on behalf of ALMA for astronomy in Chile took place in October. US$ 504 000 was allocated by the Committee to Chilean universities who had presented their projects.

In August a Cooperation Agreement concerning the continued operation of the Laser Guide Star in Paranal was signed with the Chilean Aviation authorities (DGAC & DASA) during a visit by the Director of Civil Aeronautics, General José Huepe and the Director of Airport Services Hector Barrientos. This Agreement foresees scientific and technological collaboration and a mutual exchange of information, allowing ESO to continue to operate the Laser Guide Star System safely in the future, and the DGAC to monitor the safety of airborne operations adequately.

Director of Civil Aeronautical Services, General José Huepe and the ESO Representative, Felix Mirabel, sign the Collaboration Agreement.

Delegation from Civil Aeronautical Services visit Paranal.

ALMA – Security issues

In view of some security problems that have been encountered on the Chajnantor Plateau, two officials from the Ministry of Foreign Affairs were invited to the ALMA OSF, providing the opportunity to see the site and giving some background to discussions of security plans for the area. As a result, the Ministry of Foreign Affairs worked with other national authorities to increase security, including the Carabineros and the Direction of Frontiers on this issue.

La Silla

Mining requests continued to be filed by individuals and companies seeking to establish mining rights within the La Silla protected area. This year alone, 80 letters were sent opposing these claims and reporting each case to the Mining Authorities in Region IV.

Two officials from the Ministry of Foreign Affairs visited La Silla to see the problem first-hand, particularly the La Esperanza mine, and they followed up the issue with the Ministry's Legal Department. The Vice-Minister of Foreign Affairs asked the Ministry of Mines to close the mines operating within the protected area around La Silla. Meanwhile, the Ministry of Mines has taken legal action against the owner of the La Esperanza mine. This action will serve as a precedent to speed up the resolution of other cases that may arise in the future.

Light pollution

On 11 July, a large workshop was held in Antofagasta, co-organised by ESO and the Office Against Light Pollution, to increase awareness of this problem. The workshop was attended by representatives of the Intendencia Region II, the Chilean Environmental Agency, CONAMA, Senator Carlos Cantero, Rector of Universidad Católica del Norte and a representative from the Ministry of Foreign Affairs, amongst others.

A meeting was held between the Representatives of the Observatories in Chile, to discuss joint actions and in support of the Light Pollution Office. ESO will increase its funding to cover more activities in Region II.

Ventarrones – A possible site for the E-ELT

The Ministry of National Assets signed the concession for this land for five years. Procedures were initiated to ensure proper protection against mining rights claims.

Outreach

On 12 July, the town of Taltal, neighbours to the Paranal Observatory, celebrated its 150th Anniversary. The ESO Representative participated in the celebrations, along with the main regional and local authorities. The Mayor emphasised ESO's scholarship programme for school children and university students in his speech. A detailed account of ESO's public outreach activities is given on page 22 of the Annual Report.

VIP visitors

Also in 2008, ESO — and especially Paranal — hosted many important visitors, including the Chilean Under-Secretary for Foreign Affairs, Ambassador Alberto Van Klaveren (former Chilean Ambassador to the European Union) who visited Paranal. Also, officials from the Dirección de Política Especial visited La Silla and Paranal. In December 2008, the President of Switzerland and his delegation visited the ESO Vitacura Office. Finally, as in the previous years, several ambassadors from ESO member state countries visited Paranal.

The President of Switzerland and his delegation visited the ESO Vitacura Office.

Four Seasons at a Glance

January

The two-year FP7 E-ELT Preparatory phase programme starts.

ESO is present at the winter AAS meeting in Austin, USA.

The European ALMA Science Advisory Committee meets in Garching.

ESO is present at the Galway Astronomy Festival, Galway, Ireland.

February

The NTT is used to measure, at the 1% precision level, the distance of a Cepheid star.

A new multi-fuel power generator is installed at Paranal.

121st meeting of the Finance Committee.

A two-day meeting is held by the ALMA Science Advisory Committee in Santiago de Chile.

ESO is present at the annual AAAS meeting in Boston, USA.

EIROforum participates in the MIT European Career Fair and Science Policy Meeting in Boston, USA.

March

GRB 080319B, the brightest explosion ever seen, is observed from La Silla.

A new observing proposal type for Calibration Programmes is introduced.

The first Band 7 and Band 9 receivers are delivered to the East Asian Front End Integration Centre.

VISTA primary mirror arrives in Chile.

First light of the laser comb calibration demonstrator on Tenerife.

Committee of Council meets in Stockholm, Sweden.

An ESO workshop on "Star Formation across the Milky Way Galaxy" is held at ESO Santiago.

ESO participates in NAM, Belfast, UK.

James Bond filming at Paranal, including international and Chilean press events.

April

VISTA mirror arrives at Paranal.

Start of science operation of HAWK-I at UT4, AMBER + FINITO at the UTs, EFOSC2 at NTT.

EMMI and SUSI2 decommissioned at the NTT.

Upgrade of the GIRAFFE CCD detector.

925 observing proposals are received for Period 82.

32nd Meeting of the Users Committee.

Scientific Technical Committee meets for its 68th session in Garching.

A four-day ALMA Board meeting is held in Santiago de Chile.

The European ALMA Science Advisory Committee meets in Garching.

ESO is present at FEST in Trieste, Italy.

May

ESO celebrates 10 years since First Light at the VLT.

VLT makes the most precise measurement of the temperature of the Universe as it was less than three billion years after Big Bang.

The NEON 3D Spectra School, "The First Practical Workshop on IFU Observations and Data Reduction", is held in Potsdam, Germany.

The ESO/EAAE Catch a Star competition awards prizes.

122nd Finance Committee Meeting.

VISTA primary mirror arrives in Chile in March.

82nd meeting of the Observing Programme Committee.

National Geographic Channel "World's Toughest Fixes" series is filmed at Paranal.

First media training workshop for ESO Chile astronomers.

June

Austrian Minister for Science and Research, Johannes Hahn and the ESO Director General, Tim de Zeeuw, sign the formal Accession Agreement between Austria and ESO.

A new agreement is signed between ESO and the Max-Planck-Institut für Astronomie for the continued operation of the MPG/ESO 2.2-metre telescope until 2013.

European astronomers find a system of three super-Earths using HARPS.

ALMA antenna transporters are ready for operation at the ALMA Observatory.

The Technical Facilities at the ALMA Operations Support Facilities at 2900 m altitude are accepted and ready for use.

The ESO workshop "Gas and Stars in Galaxies: a Multi-Wavelength 3D Perspective" and the Euro-VO DCA Workshop 2008 "How to Publish Data in the VO" take place in Garching.

The seventh NEON Observing School is held on La Palma, Spain.

ESO participates very actively in SPIE, Marseille, France.

ESO is present at Explore Science, Mannheim, Germany.

112th Council Meeting in Prague in the Czech Republic.

A three-day ALMA Board meeting is held in Marseille, France.

Participants in the Euro-VO DCA Workshop 2008.

July

Austria becomes 14th ESO member state.

Start of direct data transfer from Paranal to the Science Archive in Garching.

Start of PRIMA installation and commissioning.

First ALMA antenna is transported at the ALMA Operations Support Facility.

Light Pollution Workshop in Antofagasta, co-organised by ESO and the Chilean Office Against Light Pollution.

The MPA/ESO/MPE/USM 2008 Joint Astronomy Conference, "Chemical Evolution of Dwarf Galaxies and Stellar Clusters" takes place in Garching.

ESO takes over the chairmanship of EIROforum for one year.

EIROforum participates in ESOF, Barcelona, Spain.

ESO exhibition at Taltal for the 150th anniversary of the town.

August

The first front end assembly arrives at the ALMA Observatory in Chile.

The Cooperation Agreement for the LGS system at Paranal is signed with the Chilean Aviation authorities.

The third NEON Archive Observing School is held in Garching.

ESO is present at the Solar Eclipse Event in Oslo, Norway.

An international press event takes place at Paranal with the History Channel for the TV Series "The Universe".

September

CRIRES probes in unsurpassed detail the inner regions of discs around infant stars, where Earth-like planets may be forming.

First light of PRIMA on the VLTI at Paranal.

Commissioning of SABOCA on APEX.

Trial assembly of the first European ALMA antenna is carried out in Spain.

The European ALMA Science Advisory Committee meets in Garching.

A two-day meeting is held by the ALMA Science Advisory Committee in Charlottesville, USA.

The ALMA Band 9 Cartridge Manufacturing Readiness Review is held in Groningen in the Netherlands.

An ESO workshop on "Public Surveys" is held in Garching.

A workshop on "Future Ground based Solar System Research: Synergies with Space Probes and Space Telescopes" is held in Italy.

ESO is present at JENAM, Vienna, Austria.

Inauguration of a new permanent astronomical exhibition at MIM Interactive Museum in Santiago (Chile), supported by the ESO-Chile Joint Committee.

October

MAD, on the VLT, produces the sharpest whole-planet picture ever taken from the ground of Jupiter.

Professor Thijs de Graauw takes up duty as the new ALMA Director.

The first amplitude calibration device is accepted and installed at the OSF.

961 observing proposals are received for Period 83.

ESO workshop on "Large Programmes", Garching.

Committee of Council meets in Copenhagen, Denmark.

69th meeting of the Scientific Technical Committee in Garching.

83rd meeting of the Observing Programme Committee.

November

Professor Wolfgang Wild becomes the Head of the ALMA Division and takes up duty as the new European ALMA Project Manager. Dr. Richard Kurz takes up duty as the new ALMA Project Manager.

ASTRONET presents the *ASTRONET Infrastructure Roadmap*, a 20-year strategy for the future of European astronomy, identifying the E-ELT as a top priority.

ESO hosts the EIROforum Council at Paranal.

First light of X-shooter on Melipal.

The Band 7 Pre-Production Review is held at IRAM in Grenoble, France.

The ALMA Band 9 Cartridge Pre-Production Review is held in Groningen, the Netherlands,

The ALMA water vapour radiometer Critical Design Review is held in Gothenburg, Sweden.

The PRIMA instrument of the ESO Very Large Telescope Interferometer.

A three-day ALMA board meeting is held in San Pedro de Atacama.

123rd Meeting of the Finance Committee.

The 22nd James Bond adventure, *Quantum of Solace*, featuring the Paranal Residencia, is released.

A workshop on "Using the VLT Interferometer at the present time and in the near future" is held in Granada, Spain.

ESO, together with French partners, participates in the highly successful "European City of Science", Paris, France.

ESO organises a science expo at San Pedro de Atacama for the anniversary of the village.

ESO exhibition at Quinta Normal Park, Santiago, during the Chilean National Science Week.

ESO informal meeting on "Six years of FLAMES operations" is held in Garching.

A three-day ALMA Annual External Review is held in San Pedro de Atacama.

ESO participates in EU Presidency Conference on Research Infrastructures, Versailles, France.

First light of APE on the VLT.

December

ALMA observatory equipped with its first antenna

SPHERE passes its Final Design Review.

First light of APE on Melipal.

Visit by the President of Switzerland to the ESO Vitacura Office.

Three undergraduate students, from Leiden University in the Netherlands, discover an extrasolar planet using the VLT.

First production ALMA Band 9 Cartridge is ready for acceptance.

The Technical Building at the ALMA Array Operations Site at 5000 m altitude is accepted and ready for use.

Delivery of tunable filter boards for the ALMA correlator to the ALMA project is completed.

Closure of the Antenna Test Facility in Socorro (USA).

113th Council Meeting in Garching.

The first ALMA antenna to be handed over to the observatory.

ESO's Paranal Observatory was used as the key location for *Quantum of Solace*, the latest James Bond movie.

A close up view of one of the
VLT Unit Telescopes.

Publications

Publications in refereed journals based on ESO data (2008)

Abia, C., de Laverny, P. & Wahlin, R. 2008, *Chemical analysis of carbon stars in the Local Group. II. The Carina dwarf spheroidal galaxy*, A&A, 481, 161

Absil, O., di Folco, E., Mérand, A., Augereau, J. C., Coudé Du Foresto, V., Defrère, D., Kervella, P., Aufdenberg, J. P., Desort, M., Ehrenreich, D., Lagrange, A. M., Montagnier, G., Olofsson, J., Ten Brummelaar, T. A., McAlister, H. A., Sturmann, J., Sturmann, L. & Turner, N. H. 2008, *A near-infrared interferometric survey of debris disc stars. II. CHARA/FLUOR observations of six early-type dwarfs*, A&A, 487, 1041

Acke, B., Verhoelst, T., van den Ancker, M. E., Deroo, P., Waelkens, C., Chesneau, O., Tatulli, E., Benisty, M., Puga, E., Waters, L. M., Verhoeff, A. & de Koter, A. 2008, *MWC 297: a young high-mass star rotating at critical velocity*, A&A, 485, 209

Aguirre, A., Dow-Hygelund, C., Schaye, J. & Theuns, T. 2008, *Metallicity of the Intergalactic Medium using Pixel Statistics. IV. Oxygen*, ApJ, 689, 851

Aharonian, F., Akhperjanian, A. G., Barres de Almeida, U., Bazer-Bachi, A. R., Behera, B., Beilicke, M., Benbow, W., Bernlöhr, K., Boisson, C., Bolz, O., Borrel, V., Braun, I., Brion, E., Brown, A. M., Bühler, R., Bulik, T., Büsching, I., Boutelier, T., Carrigan, S., Chadwick, P. M., Chounet, L. M., Clapson, A. C., Coignet, G., Cornils, R., Costamante, L., Dalton, M., Degrange, B., Dickinson, H. J., Djannati-Ataï, A., Domainko, W., O'C. Drury, L., Dubois, F., Dubus, G., Dyks, J., Egberts, K., Emmanoulopoulos, D., Espigat, P., Farnier, C., Feinstein, F., Fiasson, A., Förster, A., Fontaine, G., Funk, S., Füßling, M., Gallant, Y. A., Giebels, B., Glicenstein, J. F., Glück, B., Goret, P., Hadjichristidis, C., Hauser, D., Hauser, M., Heinzelmann, G., Henri, G., Hermann, G., Hinton, J. A., Hoffmann, A., Hofmann, W., Holleran, M., Hoppe, S., Horns, D., Jacholkowska, A., de Jager, O. C., Jung, I., Katarzyński, K., Kendziorra, E., Kerschhaggl, M., Khélifi, B., Keogh, D., Komin, N., Kosack, K., Lamanna, G., Latham, I. J., Lemière, A., Lemoine-Goumard, M., Lenain, J. P., Lohse, T., Martin, J. M., Martineau-Huynh, O., Marcowith, A., Masterson, C., Maurin, D., Maurin, G., McComb, T. L., Moderski, R., Moulin, E., de Naurois, M., Nedbal, D., Nolan, S. J., Ohm, S., Olive, J. P., de Oña Wilhelmi, E., Orford, K. J., Osborne, J. L., Ostrowski, M., Panter, M., Pedaletti, G., Pelletier, G., Petrucci, P. O., Pita, S., Pühlhofer, G., Punch, M., Ranchon, S., Raubenheimer, B. C., Raue, M., Rayner, S. M., Renaud, M., Ripken, J., Rob, L., Rolland, L., Rosier-Lees, S., Rowell, G., Rudak, B., Ruppel, J., Sahakian, V., Santangelo, A., Schlickeiser, R., Schöck, F., Schröder, R., Schwanke, U., Schwarzburg, S., Schwemmer, S., Shalchi, A., Sol, H., Spangler, D., Stawarz, L., Steenkamp, R., Stegmann, C., Superina, G., Tam, P. H., Tavernet, J. P., Terrier, R., van Eldik, C., Vasileiadis, G., Venter, C., Vialle, J. P., Vincent, P., Vivier, M., Völk, H. J., Volpe, F., Wagner, S. J., Ward, M., Zdziarski, A. A. & Zech, A. 2008, *HESS observations and VLT spectroscopy of PG 1553+113*, A&A, 477, 481

Alcalá, J. M., Spezzi, L., Chapman, N., Evans, N. I., Huard, T. L., Jørgensen, J. K., Merín, B., Stapelfeldt, K. R., Covino, E., Frasca, A., Gandolfi, D. & Oliveira, I. 2008, *The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds. X. The Chamaeleon II Pre-Main-Sequence Population as Observed with IRAC and MIPS*, ApJ, 676, 427

Alonso, R., Auvergne, M., Baglin, A., Ollivier, M., Moutou, C., Rouan, D., Deeg, H. J., Aigrain, S., Almenara, J. M., Barbieri, M., Barge, P., Benz, W., Bordé, P., Bouchy, F., de La Reza, R., Deleuil, M., Dvorak, R., Erikson, A., Fridlund, M., Gillon, M., Gondoin, P., Guillot, T., Hatzes, A., Hébrard, G., Kabath, P., Jorda, L., Lammer, H., Léger, A., Llebaria, A., Loeillet, B., Magain, P., Mayor, M., Mazeh, T., Pätzold, M., Pepe, F., Pont, F., Queloz, D., Rauer, H., Shporer, A., Schneider, J., Stecklum, B., Udry, S. & Wuchterl, G. 2008, *Transiting exoplanets from the CoRoT space mission. II. CoRoT-Exo-2b: a transiting planet around an active G star*, A&A, 482, L21

Alvarez-Candal, A., Fornasier, S., Barucci, M. A., de Bergh, C. & Merlin, F. 2008, *Visible spectroscopy of the new ESO large program on trans-Neptunian objects and Centaurs. Part 1*, A&A, 487, 741

Ammler-von Eiff, M. & Santos, N. C. 2008, *New constraints from the Hα line for the temperature of the transiting planet host star OGLE-TR-10*, AN, 329, 573

Andersen, D. R., Walcher, C. J., Böker, T., Ho, L. C., van der Marel, R. P., Rix, H. W. & Shields, J. C. 2008, *Caught in Formation: The Nuclear-Cluster-to-Be in NGC 2139*, ApJ, 688, 990

Anderson, D. R., Gillon, M., Hellier, C., Maxted, P. L., Pepe, F., Queloz, D., Wilson, D. M., Collier Cameron, A., Smalley, B., Lister, T. A., Bentley, S. J., Blecha, A., Christian, D. J., Enoch, B., Hebb, L., Horne, K., Irwin, J., Joshi, Y. C., Kane, S. R., Marmier, M., Mayor, M., Parley, N. R., Pollacco, D. L., Pont, F., Ryans, R., Ségransan, D., Skillen, I., Street, R. A., Udry, S., West, R. G. & Wheatley, P. J. 2008, *WASP-5b: a dense, very hot Jupiter transiting a 12th-mag Southern-hemisphere star*, MNRAS, 387, L4

André, P., Minier, V., Gallais, P., Revéret, V., Le Pennec, J., Rodriguez, L., Boulade, O., Doumayrou, E., Dubreuil, D., Lortholary, M., Martignac, J., Talvard, M., De Breuck, C., Hamon, G., Schneider, N., Bontemps, S., Lagage, P. O., Pantin, E., Roussel, H., Miller, M., Purcell, C. R., Hill, T. & Stutzki, J. 2008, *First 450 μm dust continuum mapping of the massive star-forming region NGC 3576 with the P-ArTéMiS bolometer camera*, A&A, 490, L27

Andreon, S., Puddu, E., de Propris, R. & Cuillandre, J. C. 2008, *Galaxy evolution in the high-redshift, colour-selected cluster RzCS 052 at z = 1.02*, MNRAS, 385, 979

Andreon, S., de Propris, R., Puddu, E., Giordano, L. & Quintana, H. 2008, *Scaling relations of the colour-detected cluster RzCS 052 at z = 1.016 and some other high-redshift clusters*, MNRAS, 383, 102

Andrievsky, S. M., Spite, M., Korotin, S. A., Spite, F., Bonifacio, P., Cayrel, R., Hill, V. & François, P. 2008, *NLTE determination of the aluminium abundance in a homogeneous sample of extremely metal-poor stars*, A&A, 481, 481

Anguita, T., Faure, C., Yonehara, A., Wambsganss, J., Kneib, J. P., Covone, G. & Alloin, D. 2008, *Integral field spectroscopy of four lensed quasars: analysis of their neighborhood and evidence for microlensing*, A&A, 481, 615

Antoniucci, S., Nisini, B., Giannini, T. & Lorenzetti, D. 2008, *Accretion and ejection properties of embedded protostars: the case of HH26, HH34, and HH46 IRS*, A&A, 479, 503

Apai, D., Janson, M., Moro-Martín, A., Meyer, M. R., Mamajek, E. E., Masciadri, E., Henning, T., Pascucci, I., Kim, J. S., Hillenbrand, L. A., Kasper, M. & Biller, B. 2008, *A Survey for Massive Giant Planets in Debris Disks with Evacuated Inner Cavities*, ApJ, 672, 1196

Arav, N., Moe, M., Costantini, E., Korista, K. T., Benn, C. & Ellison, S. 2008, *Measuring Column Densities in Quasar Outflows: VLT Observations of QSO 2359-1241*, ApJ, 681, 954

Aravena, M., Bertoldi, F., Schinnerer, E., Weiss, A., Jahnke, K., Carilli, C. L., Frayer, D., Henkel, C., Brusa, M., Menten, K. M., Salvato, M. & Smolcic, V. 2008, *Properties of the molecular gas in a starbursting QSO at z = 1.83 in the COSMOS field*, A&A, 491, 173

Arentoft, T., Kjeldsen, H., Bedding, T. R., Bazot, M., Christensen-Dalsgaard, J., Dall, T. H., Karoff, C., Carrier, F., Eggenberger, P., Sosnowska, D., Wittenmyer, R. A., Endl, M., Metcalfe, T. S., Hekker, S., Reffert, S., Butler, R. P., Bruntt, H., Kiss, L. L., O'Toole, S. J., Kambe, E., Ando, H., Izumiura, H., Sato, B., Hartmann, M., Hatzes, A., Bouchy, F., Mosser, B., Appourchaux, T., Barban, C., Berthomieu, G., Garcia, R. A., Michel, E., Provost, J., Turck-Chièze, S., Martić, M., Lebrun, J. C., Schmitt, J., Bertaux, J. L., Bonanno, A., Benatti, S., Claudi, R. U., Cosentino, R., Leccia, S., Frandsen, S., Brogaard, K., Glowienka, L., Grundahl, F. & Stempels, E. 2008, *A Multisite Campaign to Measure Solar-like Oscillations in Procyon. I. Observations, Data Reduction, and Slow Variations*, ApJ, 687, 1180

Arlot, J. E., Dumas, C. & Sicardy, B. 2008, *Observation of an eclipse of U-3 Titania by U-2 Umbriel on December 8, 2007 with ESO-VLT*, A&A, 492, 599

Arnaboldi, M., Doherty, M., Gerhard, O., Ciardullo, R., Aguerri, J. L., Feldmeier, J. J., Freeman, K. C. & Jacoby, G. H. 2008, *Expansion Velocities and Core Masses of Bright Planetary Nebulae in the Virgo Cluster*, ApJ, 674, L17

Arribas, S., Colina, L., Monreal-Ibero, A., Alfonso, J., García-Marín, M. & Alonso-Herrero, A. 2008, *VLT-VIMOS integral field spectroscopy of luminous and ultraluminous infrared galaxies. I. The sample and first results*, A&A, 479, 687

Atek, H., Kunth, D., Hayes, M., Ostlin, G. & Mas-Hesse, J. M. 2008, *On the detectability of Lyα emission in star forming galaxies. The role of dust*, A&A, 488, 491

Baan, W. A., Henkel, C., Loenen, A. F., Baudry, A. & Wiklind, T. 2008, *Dense gas in luminous infrared galaxies*, A&A, 477, 747

Bagnulo, S., Belskaya, I., Muinonen, K., Tozzi, G. P., Barucci, M. A., Kolokolova, L. & Fornasier, S. 2008, *Discovery of two distinct polarimetric behaviours of trans-Neptunian objects*, A&A, 491, L33

Bailer-Jones, C. L. 2008, *Correlated spectral variability in brown dwarfs*, MNRAS, 384, 1145

Balog, Z., Rieke, G. H., Muzerolle, J., Bally, J., Su, K. L., Misselt, K. & Gáspár, A. 2008, *Photoevaporation of Protoplanetary Disks*, ApJ, 688, 408

Barblan, F., Burki, G. & Carrier, F. 2008, *Physical parameters of the Algol system V621 Centauri from simultaneous analysis of GENEVA 7-colour light curves*, NewA, 13, 255

Barbosa, C. L., Blum, R. D., Conti, P. S., Damineli, A. & Figuerêdo, E. 2008, *High Spatial Resolution Spectroscopy of W51 IRS 2E and IRS 2W: Two Very Massive Young Stars in Early Formation Stages*, ApJ, 678, L55

Barnes, J. R., Barman, T. S., Jones, H. A., Leigh, C. J., Cameron, A. C., Barber, R. J. & Pinfield, D. J. 2008, *HD179949b: a close orbiting extrasolar giant planet with a stratosphere?*, MNRAS, 390, 1258

Barucci, M. A., Merlin, F., Guilbert, A., de Bergh, C., Alvarez-Candal, A., Hainaut, O., Doressoundiram, A., Dumas, C., Owen, T. & Coradini, A. 2008, *Surface composition and temperature of the TNO Orcus*, A&A, 479, L13

Bassa, C. G., Pooley, D., Verbunt, F., Homer, L., Anderson, S. F. & Lewin, W. G. 2008, *X-ray and optical observations of M55 and NGC 6366: evidence for primordial binaries*, A&A, 488, 921

Bassino, L. P., Richtler, T. & Dirsch, B. 2008, *VLT photometry in the Antlia cluster: the giant ellipticals NGC3258 and NGC3268 and their globular cluster systems*, MNRAS, 386, 1145

Battaglia, G., Irwin, M., Tolstoy, E., Hill, V., Helmi, A., Letarte, B. & Jablonka, P. 2008, *Analysis and calibration of CaII triplet spectroscopy of red giant branch stars from VLT/FLAMES observations*, MNRAS, 383, 183

Battaglia, G., Helmi, A., Tolstoy, E., Irwin, M., Hill, V. & Jablonka, P. 2008, *The Kinematic Status and Mass Content of the Sculptor Dwarf Spheroidal Galaxy*, ApJ, 681, L13

Bauer, F. E., Dwarkadas, V. V., Brandt, W. N., Immler, S., Smartt, S., Bartel, N. & Bietenholz, M. F. 2008, *Supernova 1996cr: SN 1987A's Wild Cousin?*, ApJ, 688, 1210

Bauer, M., Pietsch, W., Trinchieri, G., Breitschwerdt, D., Ehle, M., Freyberg, M. J. & Read, A. M. 2008, *XMM-Newton observations of the diffuse X-ray emission in the starburst galaxy NGC 253*, A&A, 489, 1029

Baumont, S., Balland, C., Astier, P., Guy, J., Hardin, D., Howell, D. A., Lidman, C., Mouchet, M., Pain, R. & Regnault, N. 2008, *PHotometry Assisted Spectral Extraction (PHASE) and identification of SNLS supernovae*, A&A, 491, 567

Beckert, T., Driebe, T., Hönig, S. F. & Weigelt, G. 2008, *Probing the dusty environment of the Seyfert 1 nucleus in NGC 3783 with MIDI/VLTI interferometry*, A&A, 486, L17

Bedregal, A. G., Aragón-Salamanca, A., Merrifield, M. R. & Cardiel, N. 2008, *The link between the masses and central stellar populations of S0 galaxies*, MNRAS, 387, 660

Beelen, A., Omont, A., Bavouzet, N., Kovács, A., Lagache, G., De Breuck, C., Weiss, A., Menten, K. M., Colbert, J. W., Dole, H., Siringo, G. & Kreysa, E. 2008, *Submillimeter observations of the J2142-4423 Lyα protocluster at z = 2.38*, A&A, 485, 645

Bellazzini, M., Ibata, R. A., Chapman, S. C., Mackey, A. D., Monaco, L., Irwin, M. J., Martin, N. F., Lewis, G. F. & Dalessandro, E. 2008, *The Nucleus of the Sagittarius Dsph Galaxy and M54: a Window on the Process of Galaxy Nucleation*, AJ, 136, 1147

Belskaya, I., Bagnulo, S., Muinonen, K., Barucci, M. A., Tozzi, G. P., Fornasier, S. & Kolokolova, L. 2008, *Polarimetry of the dwarf planet (136199) Eris*, A&A, 479, 265

Ben Bekhti, N., Richter, P., Westmeier, T. & Murphy, M. T. 2008, *Ca II and Na I absorption signatures from extraplanar gas in the halo of the Milky Way*, A&A, 487, 583

Bennett, D. P., Bond, I. A., Udalski, A., Sumi, T., Abe, F., Fukui, A., Furusawa, K., Hearnshaw, J. B., Holderness, S., Itow, Y., Kamiya, K., Korpela, A. V., Kilmartin, P. M., Lin, W., Ling, C. H., Masuda, K., Matsubara, Y., Miyake, N., Muraki, Y., Nagaya, M., Okumura, T., Ohnishi, K., Perrott, Y. C., Rattenbury, N. J., Sako, T., Saito, T., Sato, S., Skuljan, L., Sullivan, D. J., Sweatman, W. L., Tristram, P. J., Yock, P. M., Kubiak, M., Szymański, M. K., Pietrzyński, G., Soszyński, I., Szewczyk, O., Wyrzykowski, L., Ulaczyk, K., Batista, V., Beaulieu, J. P., Brillant, S., Cassan, A., Fouqué, P., Kervella, P., Kubas, D. & Marquette, J. B. 2008, *A Low-Mass Planet with a Possible Sub-Stellar-Mass Host in Microlensing Event MOA-2007-BLG-192*, ApJ, 684, 663

Bergemann, M. & Gehren, T. 2008, *NLTE abundances of Mn in a sample of metal-poor stars*, A&A, 492, 823

Bernet, M. L., Miniati, F., Lilly, S. J., Kronberg, P. P. & Dessauges-Zavadsky, M. 2008, *Strong magnetic fields in normal galaxies at high redshift*, Natur, 454, 302

Berta, S., Rubele, S., Franceschini, A., Held, E. V., Rizzi, L., Rodighiero, G., Cimatti, A., Dias, J. E., Feruglio, C., La Franca, F., Lonsdale, C. J., Maiolino, R., Matute, I., Rowan-Robinson, M., Sacchi, N. & Zamorani, G. 2008, *The ESO-Spitzer Imaging extragalactic Survey (ESIS). II. VIMOS I, z wide field imaging of ELAIS-S1 and selection of distant massive galaxies*, A&A, 488, 533

Beuermann, K. & Reinsch, K. 2008, *High-resolution spectroscopy of the intermediate polar EX Hydrae. I. Kinematic study and Roche tomography*, A&A, 480, 199

Beuther, H., Semenov, D., Henning, T. & Linz, H. 2008, *Ethynyl (C2H) in Massive Star formation: Tracing the Initial Conditions?*, ApJ, 675, L33

Bianchi, S., La Franca, F., Matt, G., Guainazzi, M., Jimenez Bailón, E., Longinotti, A. L., Nicastro, F. & Pentericci, L. 2008, *A broad-line region origin for the iron Kα line in NGC 7213*, MNRAS, 389, L52

Bibby, J. L., Crowther, P. A., Furness, J. P. & Clark, J. S. 2008, *A downward revision to the distance of the 1806-20 cluster and associated magnetar from Gemini Near-Infrared Spectroscopy*, MNRAS, 386, L23

Blondin, S., Davis, T. M., Krisciunas, K., Schmidt, B. P., Sollerman, J., Wood-Vasey, W. M., Becker, A. C., Challis, P., Clocchiatti, A., Damke, G., Filippenko, A. V., Foley, R. J., Garnavich, P. M., Jha, S. W., Kirshner, R. P., Leibundgut, B., Li, W., Matheson, T., Miknaitis, G., Narayan, G., Pignata, G., Rest, A., Riess, A. G., Silverman, J. M., Smith, R. C., Spyromilio, J., Stritzinger, M., Stubbs, C. W., Suntzeff, N. B., Tonry, J. L., Tucker, B. E. & Zenteno, A. 2008, *Time Dilation in Type Ia Supernova Spectra at High Redshift*, ApJ, 682, 724

Boccaletti, A., Chauvin, G., Baudoz, P. & Beuzit, J. L. 2008, *Coronagraphic near-IR photometry of AB Doradus C*, A&A, 482, 939

Boehnhardt, H., Tozzi, G. P., Bagnulo, S., Muinonen, K., Nathues, A. & Kolokolova, L. 2008, *Photometry and polarimetry of the nucleus of comet 2P/Encke*, A&A, 489, 1337

Böhnhardt, H., Mumma, M. J., Villanueva, G. L., DiSanti, M. A., Bonev, B. P., Lippi, M. & Käufl, H. U. 2008, *The Unusual Volatile Composition of the Halley-Type Comet 8P/Tuttle: Addressing the Existence of an Inner Oort Cloud*, ApJ, 683, L71

Böker, T., Falcón-Barroso, J., Schinnerer, E., Knapen, J. H. & Ryder, S. 2008, *a Sinfoni View of Galaxy Centers: Morphology and Kinematics of Five Nuclear Star-Formation Rings*, AJ, 135, 479

Bolatto, A. D., Leroy, A. K., Rosolowsky, E., Walter, F. & Blitz, L. 2008, *The Resolved Properties of Extragalactic Giant Molecular Clouds*, ApJ, 686, 948

Bonanos, A. Z., López-Morales, M., Hunter, I. & Ryans, R. I. 2008, *Low Metallicity Indicates That the Hypervelocity Star HE 0437-5439 was Ejected from the Large Magellanic Cloud*, ApJ, 675, L77

Bonnet-Bidaud, J. M. & Pantin, E. 2008, *ADONIS high contrast infrared imaging of Sirius-B*, A&A, 489, 651

Bono, G., Stetson, P. B., Sanna, N., Piersimoni, A., Freyhammer, L. M., Bouzid, Y., Buonanno, R., Calamida, A., Caputo, F., Corsi, C. E., Di Cecco, A., Dall'Ora, M., Ferraro, I., Iannicola, G., Monelli, M., Nonino, M., Pulone, L., Sterken, C., Storm, J., Tuvikene, T. & Walker, A. R. 2008, *On the Relative Distances of ω Centauri and 47 Tucanae*, ApJ, 686, L87

Boogert, A. A., Pontoppidan, K. M., Knez, C., Lahuis, F., Kessler-Silacci, J., van Dishoeck, E. F., Blake, G. A., Augereau, J. C., Bisschop, S. E., Bottinelli, S., Brooke, T. Y., Brown, J., Crapsi, A., Evans, N. I., Fraser, H. J., Geers, V., Huard, T. L., Jørgensen, J. K., Öberg, K. I., Allen, L. E., Harvey, P. M., Koerner, D. W., Mundy, L. G., Padgett, D. L., Sargent, A. I. & Stapelfeldt, K. R. 2008, *The c2d Spitzer Spectroscopic Survey of Ices around Low-Mass Young Stellar Objects. I. H2O and the 5-8 μm Bands*, ApJ, 678, 985

Borissova, J., Ivanov, V. D., Hanson, M. M., Georgiev, L., Minniti, D., Kurtev, R. & Geisler, D. 2008, *The young Galactic star cluster [DBS2003] 179*, A&A, 488, 151

Botticella, M. T., Riello, M., Cappellaro, E., Benetti, S., Altavilla, G., Pastorello, A., Turatto, M., Greggio, L., Patat, F., Valenti, S., Zampieri, L., Harutyunyan, A., Pignata, G. & Taubenberger, S. 2008, *Supernova rates from the Southern inTermediate Redshift ESO Supernova Search (STRESS)*, A&A, 479, 49

Bouchy, F., Queloz, D., Deleuil, M., Loeillet, B., Hatzes, A. P., Aigrain, S., Alonso, R., Auvergne, M., Baglin, A., Barge, P., Benz, W., Bordé, P., Deeg, H. J., de La Reza, R., Dvorak, R., Erikson, A., Fridlund, M., Gondoin, P., Guillot, T., Hébrard, G., Jorda, L., Lammer, H., Léger, A., Llebaria, A., Magain, P., Mayor, M., Moutou, C., Ollivier, M., Pätzold, M., Pepe, F., Pont, F., Rauer, H., Rouan, D., Schneider, J., Triaud, A. J., Udry, S. & Wuchterl, G. 2008, *Transiting exoplanets from the CoRoT space mission. III. The spectroscopic transit of CoRoT-Exo-2b with SOPHIE and HARPS*, A&A, 482, L25

Boué, G., Durret, F., Adami, C., Mamon, G. A., Ilbert, O. & Cayatte, V. 2008, *An optical view of the filament region of Abell 85*, A&A, 489, 11

Bournaud, F., Daddi, E., Elmegreen, B. G., Elmegreen, D. M., Nesvadba, N., Vanzella, E., di Matteo, P., Le Tiran, L., Lehnert, M. & Elbaz, D. 2008, *Observations and modeling of a clumpy galaxy at z = 1.6. Spectroscopic clues to the origin and evolution of chain galaxies*, A&A, 486, 741
Bouvier, J., Kendall, T., Meeus, G., Testi, L., Moraux, E., Stauffer, J. R., James, D., Cuillandre, J. C., Irwin, J., McCaughrean, M. J., Baraffe, I. & Bertin, E. 2008, *Brown dwarfs and very low mass stars in the Hyades cluster: a dynamically evolved mass function*, A&A, 481, 661
Bouwens, R. J., Illingworth, G. D., Franx, M. & Ford, H. 2008, *z ~ 7–10 Galaxies in the HUDF and GOODS Fields: UV Luminosity Functions*, ApJ, 686, 230
Bouy, H., Martín, E. L., Brandner, W., Forveille, T., Delfosse, X., Huélamo, N., Basri, G., Girard, J., Zapatero Osorio, M. R., Stumpf, M., Ghez, A., Valdivielso, L., Marchis, F., Burgasser, A. J. & Cruz, K. 2008, *Follow-up observations of binary ultra-cool dwarfs*, A&A, 481, 757
Bouy, H., Kolb, J., Marchetti, E., Martín, E. L., Huélamo, N. & Barrado Y Navascués, D. 2008, *Multi-conjugate adaptive optics images of the Trapezium cluster*, A&A, 477, 681
Bouy, H., Huélamo, N., Pinte, C., Olofsson, J., Barrado Y Navascués, D., Martín, E. L., Pantin, E., Monin, J. L., Basri, G., Augereau, J. C., Ménard, F., Duvert, G., Duchêne, G., Marchis, F., Bayo, A., Bottinelli, S., Lefort, B. & Guieu, S. 2008, *Structural and compositional properties of brown dwarf disks: the case of 2MASS J04442713+2512164*, A&A, 486, 877
Bradač, M., Schrabback, T., Erben, T., McCourt, M., Million, E., Mantz, A., Allen, S., Blandford, R., Halkola, A., Hildebrandt, H., Lombardi, M., Marshall, P., Schneider, P., Treu, T. & Kneib, J. P. 2008, *Dark Matter and Baryons in the X-Ray Luminous Merging Galaxy Cluster RX J1347.5-1145*, ApJ, 681, 187
Bragaglia, A., Sestito, P., Villanova, S., Carretta, E., Randich, S. & Tosi, M. 2008, *Old open clusters as key tracers of Galactic chemical evolution. II. Iron and elemental abundances in NGC 2324, NGC 2477 NGC 2660, NGC 3960, and Berkeley 32*, A&A, 480, 79
Brandner, W., Clark, J. S., Stolte, A., Waters, R., Negueruela, I. & Goodwin, S. P. 2008, *Intermediate to low-mass stellar content of Westerlund 1*, A&A, 478, 137
Bronfman, L., Garay, G., Merello, M., Mardones, D., May, J., Brooks, K. J., Nyman, L.-A. & Güsten, R. 2008, *Discovery of an Extremely High Velocity, Massive, and Compact Molecular Outflow in Norma*, ApJ, 672, 391
Brookes, M. H., Best, P. N., Peacock, J. A., Röttgering, H. A. & Dunlop, J. S. 2008, *A Combined EIS-NVSS Survey Of Radio Sources (CENSORS) - III. Spectroscopic observations*, MNRAS, 385, 1297
Bruntt, H., De Cat, P. & Aerts, C. 2008, *A spectro' scopic study of southern (candidate) γ Doradus stars. II. Detailed abundance analysis and fundamental parameters*, A&A, 478, 487
Bruntt, H., North, J. R., Cunha, M., Brandão, I. M., Elkin, V. G., Kurtz, D. W., Davis, J., Bedding, T. R., Jacob, A. P., Owens, S. M., Robertson, J. G., Tango, W. J., Gameiro, J. F., Ireland, M. J. & Tuthill, P. G. 2008, *The fundamental parameters of the roAp star α Circini*, MNRAS, 386, 2039
Burningham, B., Pinfield, D. J., Leggett, S. K., Tamura, M., Lucas, P. W., Homeier, D., Day-Jones, A., Jones, H. A., Clarke, J. A., Ishii, M., Kuzuhara, M., Lodieu, N., Zapatero Osorio, M. R., Venemans, B. P., Mortlock, D. J., Barrado Y Navascués, D., Martin, E. L. & Magazzù, A. 2008, *Exploring the substellar temperature regime down to ~550K*, MNRAS, 391, 320
Buyle, P., De Rijcke, S., Debattista, V. P., Ferreras, I., Pasquali, A., Seth, A. & Morelli, L. 2008, *Radio Continuum Observations of the Candidate Supermassive Black Hole in the Dwarf Elliptical VCC 128*, ApJ, 685, 915
Cabanac, R. A., Valls-Gabaud, D. & Lidman, C. 2008, *Medium-resolution spectroscopy of FORJ0332-3557: probing the interstellar medium and stellar populations of a lensed Lyman-break galaxy at z = 3.77*, MNRAS, 386, 2065
Caccianiga, A., Severgnini, P., Della Ceca, R., Maccacaro, T., Cocchia, F., Barcons, X., Carrera, F. J., Matute, I., McMahon, R. G., Page, M. J., Pietsch, W., Sbarufatti, B., Schwope, A., Tedds, J. A. & Watson, M. G. 2008, *The XMM-Newton bright serendipitous survey. Identification and optical spectral properties*, A&A, 477, 735
Campbell, R. K., Harrison, T. E., Mason, E., Howell, S. & Schwope, A. D. 2008, *Cyclotron Modeling Phase-Resolved Infrared Spectroscopy of Polars. II. EQ Ceti, AN Ursa Majoris, and VV Puppis*, ApJ, 678, 1304
Capelato, H. V., Proust, D., Lima Neto, G. B., Santos, W. A. & Sodré, L. J. 2008, *The structure and dynamics of Abell 1942*, A&A, 492, 345
Caputi, K. I., Lilly, S. J., Aussel, H., Sanders, D., Frayer, D., Le Fèvre, O., Renzini, A., Zamorani, G., Scodeggio, M., Contini, T., Scoville, N., Carollo, C. M., Hasinger, G., Iovino, A., Le Brun, V., Le Floc'h, E., Maier, C., Mainieri, V., Mignoli, M., Salvato, M., Schiminovich, D., Silverman, J., Surace, J., Tasca, L., Abbas, U., Bardelli, S., Bolzonella, M., Bongiorno, A., Bottini, D., Capak, P., Cappi, A., Cassata, P., Cimatti, A., Cucciati, O., de la Torre, S., de Ravel, L., Franzetti, P., Fumana, M., Garilli, B., Halliday, C., Ilbert, O., Kampczyk, P., Kartaltepe, J., Kneib, J. P., Knobel, C., Kovac, K., Lamareille, F., Leauthaud, A., Le Borgne, J. F., Maccagni, D., Marinoni, C., McCracken, H., Meneux, B., Oesch, P., Pellò, R., Pérez-Montero, E., Porciani, C., Ricciardelli, E., Scaramella, R., Scarlata, C., Tresse, L., Vergani, D., Walcher, J., Zamojski, M. & Zucca, E. 2008, *The Optical Spectra of 24 μm Galaxies in the COSMOS Field. I. Spitzer MIPS Bright Sources in the zCOSMOS-Bright 10k Catalog*, ApJ, 680, 939
Cardamone, C. N., Urry, C. M., Damen, M., van Dokkum, P., Treister, E., Labbé, I., Virani, S. N., Lira, P. & Gawiser, E. 2008, *Mid-Infrared Properties and Color Selection for X-Ray-Detected Active Galactic Nuclei in the MUSYC Extended Chandra Deep Field-South*, ApJ, 680, 130
Carlberg, R. G., Sullivan, M., Le Borgne, D., Conley, A., Howell, D. A., Perrett, K., Astier, P., Balam, D., Balland, C., Basa, S., Hardin, D., Fouchez, D., Guy, J., Hook, I., Pain, R., Pritchet, C. J., Regnault, N., Rich, J. & Perlmutter, S. 2008, *Clustering of Supernova Ia Host Galaxies*, ApJ, 682, L25
Carmona, A., van den Ancker, M. E., Henning, T., Pavlyuchenkov, Y., Dullemond, C. P., Goto, M., Thi, W. F., Bouwman, J. & Waters, L. M. 2008, *A search for mid-infrared molecular hydrogen emission from protoplanetary disks*, A&A, 477, 839
Carquillat, J. M. & Prieur, J. L. 2008, *Contribution to the study of F-G-K-M binaries: XII. Orbital elements of seven new spectroscopic binaries*, AN, 329, 44
Carrera, R., Gallart, C., Aparicio, A., Costa, E., Méndez, R. A. & Noël, N. D. 2008, *The Chemical Enrichment History of the Small Magellanic Cloud and its Gradients*, AJ, 136, 1039
Carvalho, L., Saurin, T. A., Bica, E., Bonatto, C. & Schmidt, A. A. 2008, *Structures in surface-brightness profiles of LMC and SMC star clusters: evidence of mergers?*, A&A, 485, 71
Carvano, J. M., Barucci, M. A., Delbó, M., Fornasier, S., Lowry, S. & Fitzsimmons, A. 2008, *Surface properties of Rosetta's targets (21) Lutetia and (2867) Steins from ESO observations*, A&A, 479, 241
Casassus, S., Dickinson, C., Cleary, K., Paladini, R., Etxaluze, M., Lim, T., White, G. J., Burton, M., Indermuehle, B., Stahl, O. & Roche, P. 2008, *Centimetre-wave continuum radiation from the ρ Ophiuchi molecular cloud*, MNRAS, 391, 1075
Casebeer, D., Baron, E., Leighly, K., Jevremovic, D. & Branch, D. 2008, *A Self-consistent NLTE-Spectra Synthesis Model of FeLoBAL QSOs*, ApJ, 676, 857
Casewell, S. L., Jameson, R. F. & Burleigh, M. R. 2008, *Proper motions of field L and T dwarfs - II*, MNRAS, 390, 1517
Cassata, P., Cimatti, A., Kurk, J., Rodighiero, G., Pozzetti, L., Bolzonella, M., Daddi, E., Mignoli, M., Berta, S., Dickinson, M., Franceschini, A., Halliday, C., Renzini, A., Rosati, P. & Zamorani, G. 2008, *GMASS ultradeep spectroscopy of galaxies at z ˜2. III. The emergence of the color bimodality at z ˜2*, A&A, 483, L39
Castro, N., Herrero, A., Garcia, M., Trundle, C., Bresolin, F., Gieren, W., Pietrzyński, G., Kudritzki, R. P. & Demarco, R. 2008, *The Araucaria Project: VLT-spectroscopy of blue massive stars in NGC 55*, A&A, 485, 41
Castro-Tirado, A. J., de Ugarte Postigo, A., Gorosabel, J., Jelínek, M., Fatkhullin, T. A., Sokolov, V. V., Ferrero, P., Kann, D. A., Klose, S., Sluse, D., Bremer, M., Winters, J. M., Nuernberger, D., Pérez-Ramírez, D., Guerrero, M. A., French, J., Melady, G., Hanlon, L., McBreen, B., Leventis, K., Markoff, S. B., Leon, S., Kraus, A., Aceituno, F. J., Cunniffe, R., Kubánek, P., Vítek, S., Schulze, S., Wilson, A. C., Hudec, R., Durant, M., González-Pérez, J. M., Shahbaz, T., Guziy, S., Pandey, S. B., Pavlenko, L., Sonbas, E., Trushkin, S. A., Bursov, N. N., Nizhelskij, N. A., Sánchez-Fernández, C. & Sabau-Graziati, L. 2008, *Flares from a candidate Galactic magnetar suggest a missing link to dim isolated neutron stars*, Natur, 455, 506
Catanzaro, G. 2008, *Helium stratification in HD 145792: a new helium strong star*, MNRAS, 385, L33
Chadid, M., Vernin, J. & Gillet, D. 2008, *Hypersonic shock wave evidence in RR Lyrae stars. First detection of neutral line disappearance in S Arae*, A&A, 491, 537

Chary, R. R., Cooray, A. & Sullivan, I. 2008, *Contribution to Unresolved Infrared Fluctuations from Dwarf Galaxies at Redshifts of 2–3*, ApJ, 681, 53
Chaty, S., Rahoui, F., Foellmi, C., Tomsick, J. A., Rodriguez, J. & Walter, R. 2008, *Multi-wavelength observations of Galactic hard X-ray sources discovered by INTEGRAL. I. The nature of the companion star*, A&A, 484, 783
Chen, H. W. & Tinker, J. L. 2008, *The Baryon Content of Dark Matter Halos: Empirical Constraints from Mg II Absorbers*, ApJ, 687, 745
Cheng, A. F., Simon-Miller, A. A., Weaver, H. A., Baines, K. H., Orton, G. S., Yanamandra-Fisher, P. A., Mousis, O., Pantin, E., Vanzi, L., Fletcher, L. N., Spencer, J. R., Stern, S. A., Clarke, J. T., Mutchler, M. J. & Noll, K. S. 2008, *Changing Characteristics of Jupiter's Little Red SPOT*, AJ, 135, 2446
Chesneau, O., Banerjee, D. K., Millour, F., Nardetto, N., Sacuto, S., Spang, A., Wittkowski, M., Ashok, N. M., Das, R. K., Hummel, C., Kraus, S., Lagadec, E., Morel, S., Petr-Gotzens, M., Rantakyro, F. & Schöller, M. 2008, *VLTI monitoring of the dust formation event of the Nova V1280 Scorpii*, A&A, 487, 223
Chilingarian, I. V., Cayatte, V., Durret, F., Adami, C., Balkowski, C., Chemin, L., Laganá, T. F. & Prugniel, P. 2008, *Kinematics and stellar populations of low-luminosity early-type galaxies in the Abell 496 cluster*, A&A, 486, 85
Chilingarian, I. V., Cayatte, V. & Bergond, G. 2008, *Stellar population constraints on the dark matter content and origin of ultra-compact dwarf galaxies*, MNRAS, 390, 906
Chiu, K., Liu, M. C., Jiang, L., Allers, K. N., Stark, D. P., Bunker, A., Fan, X., Glazebrook, K. & Dupuy, T. J. 2008, *Four faint T dwarfs from the UKIRT Infrared Deep Sky Survey (UKIDSS) Southern Stripe*, MNRAS, 385, L53
Christensen, L., Vreeswijk, P. M., Sollerman, J., Thöne, C. C., Le Floc'h, E. & Wiersema, K. 2008, *IFU observations of the GRB 980425/SN 1998bw host galaxy: emission line ratios in GRB regions*, A&A, 490, 45
Christlein, D. & Zaritsky, D. 2008, *The Kinematic Properties of the Extended Disks of Spiral Galaxies: A Sample of Edge-on Galaxies*, ApJ, 680, 1053
Christlieb, N., Schörck, T., Frebel, A., Beers, T. C., Wisotzki, L. & Reimers, D. 2008, *The stellar content of the Hamburg/ESO survey. IV. Selection of candidate metal-poor stars*, A&A, 484, 721
Chrysostomou, A., Bacciotti, F., Nisini, B., Ray, T. P., Eislöffel, J., Davis, C. J. & Takami, M. 2008, *Investigating the transport of angular momentum from young stellar objects. Do H_2 jets from class I YSOs rotate?*, A&A, 482, 575
Cimatti, A., Cassata, P., Pozzetti, L., Kurk, J., Mignoli, M., Renzini, A., Daddi, E., Bolzonella, M., Brusa, M., Rodighiero, G., Dickinson, M., Franceschini, A., Zamorani, G., Berta, S., Rosati, P. & Halliday, C. 2008, *GMASS ultradeep spectroscopy of galaxies at z ~ 2. II. Superdense passive galaxies: how did they form and evolve?*, A&A, 482, 21
Clariá, J. J., Piatti, A. E., Mermilliod, J. C. & Palma, T. 2008, *Photometric membership and metallicities of red giant candidates in selected open clusters*, AN, 329, 609
Clark, J. S., Muno, M. P., Negueruela, I., Dougherty, S. M., Crowther, P. A., Goodwin, S. P. & de Grijs, R. 2008, *Unveiling the X-ray point source population of the Young Massive Cluster Westerlund 1*, A&A, 477, 147
Clarke, F. J., Hodgkin, S. T., Oppenheimer, B. R., Robertson, J. & Haubois, X. 2008, *A search for J-band variability from late-L and T brown dwarfs*, MNRAS, 386, 2009
Clausen, J. V., Torres, G., Bruntt, H., Andersen, J., Nordström, B., Stefanik, R. P., Latham, D. W. & Southworth, J. 2008, *Absolute dimensions of eclipsing binaries. XXVI. Setting a new standard: Masses, radii, and abundances for the F-type systems AD Bootis VZ Hydrae, and WZ Ophiuchi*, A&A, 487, 1095
Clausen, J. V., Vaz, L. R., García, J. M., Giménez, A., Helt, B. E., Olsen, E. H. & Andersen, J. 2008, *Four-colour photometry of eclipsing binaries. XLI. uvby light curves for AD Bootis, HW Canis Majoris, SW Canis Majoris, VZ Hydrae, and WZ Ophiuchi*, A&A, 487, 1081
Coccato, L., Swaters, R. A., Rubin, V. C., D'Odorico, S. & McGaugh, S. S. 2008, *VIMOS-VLT integral field kinematics of the giant low surface brightness galaxy ESO 323-G064*, A&A, 490, 589
Compiègne, M., Abergel, A., Verstraete, L. & Habart, E. 2008, *Dust processing in photodissociation regions. Mid-IR emission modelling*, A&A, 491, 797
Cooke, R., Bland-Hawthorn, J., Sharp, R. & Kuncic, Z. 2008, *Ionization Cone in the X-Ray Binary LMC X-1*, ApJ, 687, L29
Courbin, F., North, P., Eigenbrod, A. & Chelouche, D. 2008, *Deep optical spectroscopy of extended Lyα emission around three radio-quiet z = 4.5 quasars*, A&A, 488, 91
Covino, S., D'Avanzo, P., Klotz, A., Perley, D. A., Amati, L., Campana, S., Chincarini, G., Cucchiara, A., D'Elia, V., Guetta, D., Guidorzi, C., Kann, D. A., Küpcü Yoldaş, A., Misra, K., Olofsson, G., Tagliaferri, G., Antonelli, L. A., Berger, E., Bloom, J. S., Böer, M., Clemens, C., D'Alessio, F., Della Valle, M., di Serego Alighieri, S., Filippenko, A. V., Foley, R. J., Fox, D. B., Fugazza, D., Fynbo, J., Gendre, B., Goldoni, P., Greiner, J., Kocevksi, D., Maiorano, E., Masetti, N., Meurs, E., Modjaz, M., Molinari, E., Moretti, A., Palazzi, E., Pandey, S. B., Piranomonte, S., Poznanski, D., Primak, N., Romano, P., Rossi, E., Roy, R., Silverman, J. M., Stella, L., Stratta, G., Testa, V., Vergani, S. D., Vitali, F. & Zerbi, F. 2008, *The complex light curve of the afterglow of GRB 071010A*, MNRAS, 388, 347
Cowley, C. R. & Hubrig, S. 2008, *HR 710 (HD 15144): an ultra-Sr-rich, magnetic Ap star with a close companion*, MNRAS, 384, 1588
Cox, N. J. & Patat, F. 2008, *Interstellar atoms, molecules and diffuse bands toward SN2006X in M 100*, A&A, 485, L9
Crowther, P. A. & Furness, J. P. 2008, *On the central ionizing star of G23.96+0.15 and near-IR spectral classification of O stars*, A&A, 492, 111
Cumming, R. J., Fathi, K., Östlin, G., Marquart, T., Márquez, I., Masegosa, J., Bergvall, N. & Amram, P. 2008, *Stellar dynamics of blue compact galaxies. II. Further indications of a merger in ESO 338-IG04*, A&A, 479, 725
Curran, P. A., Wijers, R. J., Heemskerk, M. M., Starling, R. C., Wiersema, K. & van der Horst, A. J. 2008, *Robust photometric redshift determinations of gamma-ray burst afterglows at z ≥ 2*, A&A, 490, 1047
Curran, S. J., Koribalski, B. S. & Bains, I. 2008, *The large-scale atomic and molecular gas in the Circinus galaxy*, MNRAS, 389, 63
Czoske, O., Barnabè, M., Koopmans, L. E., Treu, T. & Bolton, A. S. 2008, *Two-dimensional kinematics of SLACS lenses - I. Phase-space analysis of the early-type galaxy SDSSJ2321-097 at z ~ 0.1*, MNRAS, 384, 987
D'Odorico, V., Bruscoli, M., Saitta, F., Fontanot, F., Viel, M., Cristiani, S. & Monaco, P. 2008, *The quasar proximity effect at redshift <z> ~= 2.6 with the From Lines to Overdensities approach*, MNRAS, 389, 1727
Dalessandro, E., Lanzoni, B., Ferraro, F. R., Rood, R. T., Milone, A., Piotto, G. & Valenti, E. 2008, *Blue Straggler Stars in the Unusual Globular Cluster NGC 6388*, ApJ, 677, 1069
Dall'Aglio, A., Wisotzki, L. & Worseck, G. 2008, *An unbiased measurement of the UV background and its evolution via the proximity effect in quasar spectra*, A&A, 491, 465
Dall'Aglio, A., Wisotzki, L. & Worseck, G. 2008, *The line-of-sight proximity effect in individual quasar spectra*, A&A, 480, 359
Damineli, A., Hillier, D. J., Corcoran, M. F., Stahl, O., Groh, J. H., Arias, J., Teodoro, M., Morrell, N., Gamen, R., Gonzalez, F., Leister, N. V., Levato, H., Levenhagen, R. S., Grosso, M., Colombo, J. A. & Wallerstein, G. 2008, *A multispectral view of the periodic events in η Carinae*, MNRAS, 386, 2330
Damineli, A., Hillier, D. J., Corcoran, M. F., Stahl, O., Levenhagen, R. S., Leister, N. V., Groh, J. H., Teodoro, M., Colombo, J. A., Gonzalez, F., Arias, J., Levato, H., Grosso, M., Morrell, N., Gamen, R., Wallerstein, G. & Niemela, V. 2008, *The periodicity of the η Carinae events*, MNRAS, 384, 1649
Day-Jones, A. C., Pinfield, D. J., Napiwotzki, R., Burningham, B., Jenkins, J. S., Jones, H. A., Folkes, S. L., Weights, D. J. & Clarke, J. A. 2008, *Discovery of a widely separated ultracool dwarf-white dwarf binary*, MNRAS, 388, 838
de Grijs, R., Goodwin, S. P., Kouwenhoven, M. N. & Kroupa, P. 2008, *Open cluster stability and the effects of binary stars*, A&A, 492, 685
de Jong, J. A., Kuijken, K. H. & Héraudeau, P. 2008, *Ground-based variability surveys towards Centaurus A: worthwhile or not?*, A&A, 478, 755
de Lorenzi, F., Gerhard, O., Saglia, R. P., Sambhus, N., Debattista, V. P., Pannella, M. & Méndez, R. H. 2008, *Dark matter content and internal dynamics of NGC 4697: NMAGIC particle models from slit data and planetary nebula velocities*, MNRAS, 385, 1729
De Luca, A., Mignani, R. P., Zaggia, S., Beccari, G., Mereghetti, S., Caraveo, P. A. & Bignami, G. F. 2008, *Deep Infrared Observations of the Puzzling Central X-Ray Source in RCW 103*, ApJ, 682, 1185
de Wit, W. J., Oudmaijer, R. D., Groenewegen, M. T., Hoare, M. G. & Malbet, F. 2008, *Resolving the ionized wind of the post-red supergiant IRC +10 420 with VLTI/AMBER*, A&A, 480, 149
Debes, J. H. & López-Morales, M. 2008, *A Second Look at the Metal Line Variability of G29-38*, ApJ, 677, L43

Decin, L., Cherchneff, I., Hony, S., Dehaes, S., De Breuck, C. & Menten, K. M. 2008, *Detection of "parent" molecules from the inner wind of AGB stars as tracers of non-equilibrium chemistry*, A&A, 480, 431
Dedes, L., Dedes, C. & Kalberla, P. M. 2008, *An enigmatic H I cloud*, A&A, 491, L45
Deleuil, M., Deeg, H. J., Alonso, R., Bouchy, F., Rouan, D., Auvergne, M., Baglin, A., Aigrain, S., Almenara, J. M., Barbieri, M., Barge, P., Bruntt, H., Bordé, P., Collier Cameron, A., Csizmadia, S., de La Reza, R., Dvorak, R., Erikson, A., Fridlund, M., Gandolfi, D., Gillon, M., Guenther, E., Guillot, T., Hatzes, A., Hébrard, G., Jorda, L., Lammer, H., Léger, A., Llebaria, A., Loeillet, B., Mayor, M., Mazeh, T., Moutou, C., Ollivier, M., Pätzold, M., Pont, F., Queloz, D., Rauer, H., Schneider, J., Shporer, A., Wuchterl, G. & Zucker, S. 2008, *Transiting exoplanets from the CoRoT space mission. VI. CoRoT-Exo-3b: the first secure inhabitant of the brown-dwarf desert*, A&A, 491, 889
Della Ceca, R., Caccianiga, A., Severgnini, P., Maccacaro, T., Brunner, H., Carrera, F. J., Cocchia, F., Mateos, S., Page, M. J. & Tedds, J. A. 2008, *The cosmological properties of AGN in the XMM-Newton Hard Bright Survey*, A&A, 487, 119
Delorme, P., Delfosse, X., Albert, L., Artigau, E., Forveille, T., Reylé, C., Allard, F., Homeier, D., Robin, A. C., Willott, C. J., Liu, M. C. & Dupuy, T. J. 2008, *CFBDS J005910.90-011401.3: reaching the T-Y brown dwarf transition?*, A&A, 482, 961
Delorme, P., Willott, C. J., Forveille, T., Delfosse, X., Reylé, C., Bertin, E., Albert, L., Artigau, E., Robin, A. C., Allard, F., Doyon, R. & Hill, G. J. 2008, *Finding ultracool brown dwarfs with MegaCam on CFHT: method and first results*, A&A, 484, 469
Descamps, P. & Marchis, F. 2008, *Angular momentum of binary asteroids: Implications for their possible origin*, Icar, 193, 74
Desort, M., Lagrange, A. M., Galland, F., Beust, H., Udry, S., Mayor, M. & Lo Curto, G. 2008, *Extrasolar planets and brown dwarfs around A-F type stars. V. A planetary system found with HARPS around the F6IV-V star HD 60532*, A&A, 491, 883
Díaz, R. F., Rojo, P., Melita, M., Hoyer, S., Minniti, D., Mauas, P. D. & Ruíz, M. T. 2008, *Detection of Period Variations in Extrasolar Transiting Planet OGLE-TR-111b*, ApJ, 682, L49
Dicaire, I., Carignan, C., Amram, P., Marcelin, M., Hlavacek-Larrondo, J., de Denus-Baillargeon, M. M., Daigle, O. & Hernandez, O. 2008, *Deep Fabry-Perot Hα Observations of NGC 7793: A Very Extended Hα Disk and A Truly Declining Rotation Curve*, AJ, 135, 2038
Dicaire, I., Carignan, C., Amram, P., Hernandez, O., Chemin, L., Daigle, O., de Denus-Baillargeon, M. M., Balkowski, C., Boselli, A., Fathi, K. & Kennicutt, R. C. 2008, *Hα kinematics of the Spitzer Infrared Nearby Galaxies Survey - II*, MNRAS, 385, 553
Domiciano de Souza, A., Bendjoya, P., Vakili, F., Millour, F. & Petrov, R. G. 2008, *Diameter and photospheric structures of Canopus from AMBER/VLTI interferometry*, A&A, 489, L5
Domiciano de Souza, A., Kervella, P., Bendjoya, P. & Niccolini, G. 2008, *High-resolution thermal infrared imaging of MWC300. VLT/VISIR observations in BURST mode*, A&A, 480, L29
Dotto, E., Perna, D., Barucci, M. A., Rossi, A., de Bergh, C., Doressoundiram, A. & Fornasier, S. 2008, *Rotational properties of Centaurs and Trans-Neptunian Objects. Lightcurves and densities*, A&A, 490, 829
Drake, N. A. & Pereira, C. B. 2008, *Light Element Abundances in Two Chemically Peculiar Stars: HD 104340 and HD 206983*, AJ, 135, 1070
& Dravins, D. 2008, *"Ultimate" information content in solar and stellar spectra. Photospheric line asymmetries and wavelength shifts*, A&A, 492, 199
Ducourant, C., Teixeira, R., Chauvin, G., Daigne, G., Le Campion, J. F., Song, I. & Zuckerman, B. 2008, *An accurate distance to 2M1207Ab*, A&A, 477, L1
Dunham, M. M., Crapsi, A., Evans, N. I., Bourke, T. L., Huard, T. L., Myers, P. C. & Kauffmann, J. 2008, *Identifying the Low-Luminosity Population of Embedded Protostars in the c2d Observations of Clouds and Cores*, ApJS, 179, 249
Durant, M., Gandhi, P., Shahbaz, T., Fabian, A. P., Miller, J., Dhillon, V. S. & Marsh, T. R. 2008, *SWIFT J1753.5-0127: A Surprising Optical/X-Ray Cross-Correlation Function*, ApJ, 682, L45
Dworetsky, M. M., Persaud, J. L. & Patel, K. 2008, *Xenon in mercury-manganese stars*, MNRAS, 385, 1523
Eckart, A., Baganoff, F. K., Zamaninasab, M., Morris, M. R., Schödel, R., Meyer, L., Muzic, K., Bautz, M. W., Brandt, W. N., Garmire, G. P., Ricker, G. R., Kunneriath, D., Straubmeier, C., Duschl, W., Dovciak, M., Karas, V., Markoff, S., Najarro, F., Mauerhan, J., Moultaka, J. & Zensus, A. 2008, *Polarized NIR and X-ray flares from Sagittarius A**, A&A, 479, 625
Eckart, A., Schödel, R., García-Marín, M., Witzel, G., Weiss, A., Baganoff, F. K., Morris, M. R., Bertram, T., Dovčiak, M., Duschl, W. J., Karas, V., König, S., Krichbaum, T. P., Krips, M., Kunneriath, D., Lu, R. S., Markoff, S., Mauerhan, J., Meyer, L., Moultaka, J., Mužić, K., Najarro, F., Pott, J. U., Schuster, K. F., Sjouwerman, L. O., Straubmeier, C., Thum, C., Vogel, S. N., Wiesemeyer, H., Zamaninasab, M. & Zensus, J. A. 2008, *Simultaneous NIR/sub-mm observation of flare emission from Sagittarius A**, A&A, 492, 337
Eggenberger, P., Miglio, A., Carrier, F., Fernandes, J. & Santos, N. C. 2008, *Analysis of 70 Ophiuchi AB including seismic constraints*, A&A, 482, 631
Eigenbrod, A., Courbin, F., Sluse, D., Meylan, G. & Agol, E. 2008, *Microlensing variability in the gravitationally lensed quasar QSO 2237+0305 ≡ the Einstein Cross. I. Spectrophotometric monitoring with the VLT*, A&A, 480, 647
Eigenbrod, A., Courbin, F., Meylan, G., Agol, E., Anguita, T., Schmidt, R. W. & Wambsganss, J. 2008, *Microlensing variability in the gravitationally lensed quasar QSO 2237+0305 ≡ the Einstein Cross. II. Energy profile of the accretion disk*, A&A, 490, 933
Elias-Rosa, N., Benetti, S., Turatto, M., Cappellaro, E., Valenti, S., Arkharov, A. A., Beckman, J. E., di Paola, A., Dolci, M., Filippenko, A. V., Foley, R. J., Krisciunas, K., Larionov, V. M., Li, W., Meikle, W. S., Pastorello, A., Valentini, G. & Hillebrandt, W. 2008, *SN 2002cv: a heavily obscured Type Ia supernova*, MNRAS, 384, 107
Elkin, V. G., Kurtz, D. W., Freyhammer, L. M., Hubrig, S. & Mathys, G. 2008, *A search for rapid pulsations in the magnetic cool chemically peculiar star HD3980*, MNRAS, 390, 1250
Elkin, V. G., Kurtz, D. W. & Mathys, G. 2008, *Pulsation properties of the rapidly oscillating Ap star 10Aquilae (HD176232)*, MNRAS, 386, 481
Ellison, S. L., York, B. A., Pettini, M. & Kanekar, N. 2008, *A search for damped Lyman α systems towards radio-loud quasars I: the optical survey*, MNRAS, 388, 1349
Ellison, S. L., York, B. A., Murphy, M. T., Zych, B. J., Smith, A. M. & Sarre, P. J. 2008, *Diffuse interstellar bands in z < 0.6 CaII absorbers*, MNRAS, 383, L30
Emonts, B. C., Morganti, R., Oosterloo, T. A., Holt, J., Tadhunter, C. N., van der Hulst, J. M., Ojha, R. & Sadler, E. M. 2008, *Enormous disc of cool gas surrounding the nearby powerful radio galaxy NGC612 (PKS0131-36)*, MNRAS, 387, 197
Endl, M. & Kürster, M. 2008, *Toward detection of terrestrial planets in the habitable zone of our closest neighbor: proxima Centauri*, A&A, 488, 1149
Falomo, R., Treves, A., Kotilainen, J. K., Scarpa, R. & Uslenghi, M. 2008, *Near-Infrared Adaptive Optics Imaging of High-Redshift Quasars*, ApJ, 673, 694
Fassbender, R., Böhringer, H., Lamer, G., Mullis, C. R., Rosati, P., Schwope, A., Kohnert, J. & Santos, J. S. 2008, *Indications for 3 Mpc-scale large-scale structure associated with an X-ray luminous cluster of galaxies at z = 0.95*, A&A, 481, L73
Faure, C., Kneib, J. P., Covone, G., Tasca, L., Leauthaud, A., Capak, P., Jahnke, K., Smolcic, V., de la Torre, S., Ellis, R., Finoguenov, A., Koekemoer, A., Le Fevre, O., Massey, R., Mellier, Y., Refregier, A., Rhodes, J., Scoville, N., Schinnerer, E., Taylor, J., Van Waerbeke, L. & Walcher, J. 2008, *First Catalog of Strong Lens Candidates in the COSMOS Field*, ApJS, 176, 19
Fedele, D., van den Ancker, M. E., Acke, B., van der Plas, G., van Boekel, R., Wittkowski, M., Henning, T., Bouwman, J., Meeus, G. & Rafanelli, P. 2008, *The structure of the protoplanetary disk surrounding three young intermediate mass stars. II. Spatially resolved dust and gas distribution*, A&A, 491, 809
Feruglio, C., Fiore, F., La Franca, F., Sacchi, N., Puccetti, S., Comastri, A., Berta, S., Brusa, M., Franceschini, A., Gruppioni, C., Mathur, S., Matute, I., Mignoli, M., Pozzi, F., Vignali, C. & Zamorani, G. 2008, *The XMM-Newton survey of the ELAIS-S1 field. II. Optical identifications and multiwavelength catalogue of X-ray sources*, A&A, 488, 417
Figuerêdo, E., Blum, R. D., Damineli, A., Conti, P. S. & Barbosa, C. L. 2008, *The Stellar Content of Obscured Galactic Giant H II Regions. Vi. W51A*, AJ, 136, 221
Fleig, J., Rauch, T., Werner, K. & Kruk, J. W. 2008, *FUSE spectroscopy of the sdOB primary of the post common-envelope binary LB 3459(AA Doradus)*, A&A, 492, 565
Foley, R. J., Filippenko, A. V., Aguilera, C., Becker, A. C., Blondin, S., Challis, P., Clocchiatti, A., Covarrubias, R., Davis, T. M., Garnavich, P. M., Jha, S. W., Kirshner, R. P., Krisciunas, K., Leibundgut, B., Li, W., Matheson, T., Miceli, A., Miknaitis, G., Pignata, G., Rest, A., Riess, A. G., Schmidt, B. P., Smith, R. C., Sollerman, J., Spyromilio, J., Stubbs, C. W., Suntzeff, N. B., Tonry, J. L., Wood-Vasey, W. M. & Zenteno, A. 2008, *Constraining Cosmic Evolution of Type Ia Supernovae*, ApJ, 684, 68

Folsom, C. P., Wade, G. A., Kochukhov, O., Alecian, E., Catala, C., Bagnulo, S., Böhm, T., Bouret, J. C., Donati, J. F., Grunhut, J., Hanes, D. A. & Landstreet, J. D. 2008, *Magnetic fields and chemical peculiarities of the very young intermediate-mass binary system HD 72106*, MNRAS, 391, 901
Fontaine, M., Chayer, P., Oliveira, C. M., Wesemael, F. & Fontaine, G. 2008, *Analysis of the FUSE Spectrum of the Hot, Evolved Star GD 605*, ApJ, 678, 394
Fornasier, S., Migliorini, A., Dotto, E. & Barucci, M. A. 2008, *Visible and near-infrared spectroscopic investigation of E-type asteroids, including 2867 Steins, a target of the Rosetta mission*, Icar, 196, 119
Fox, A. J., Ledoux, C., Vreeswijk, P. M., Smette, A. & Jaunsen, A. O. 2008, *High-ion absorption in seven GRB host galaxies at z = 2-4. Evidence f or both circumburst plasma and outflowing interstellar gas*, A&A, 491, 189
Fox, A. J., Bergeron, J. & Petitjean, P. 2008, *A study of quasar proximity in OVI absorbers at z = 2-3*, MNRAS, 388, 1557
Franx, M., van Dokkum, P. G., Schreiber, N. F., Wuyts, S., Labbé, I. & Toft, S. 2008, *Structure and Star Formation in Galaxies out to z = 3: Evidence for Surface Density Dependent Evolution and Upsizing*, ApJ, 688, 770
Frebel, A., Collet, R., Eriksson, K., Christlieb, N. & Aoki, W. 2008, *HE 1327-2326, an Unevolved Star with [Fe/H]<-5.0. II. New 3D-1D Corrected Abundances from a Very Large Telescope UVES Spectrum*, ApJ, 684, 588
Freyhammer, L. M., Kurtz, D. W., Cunha, M. S., Mathys, G., Elkin, V. G. & Riley, J. D. 2008, *A search for rapid pulsations among nine luminous Ap stars*, MNRAS, 385, 1402
Freyhammer, L. M., Elkin, V. G., Kurtz, D. W., Mathys, G. & Martinez, P. 2008, *Discovery of 17 new sharp-lined Ap stars with magnetically resolved lines*, MNRAS, 389, 441
Frieman, J. A., Bassett, B., Becker, A., Choi, C., Cinabro, D., DeJongh, F., Depoy, D. L., Dilday, B., Doi, M., Garnavich, P. M., Hogan, C. J., Holtzman, J., Im, M., Jha, S., Kessler, R., Konishi, K., Lampeitl, H., Marriner, J., Marshall, J. L., McGinnis, D., Miknaitis, G., Nichol, R. C., Prieto, J. L., Riess, A. G., Richmond, M. W., Romani, R., Sako, M., Schneider, D. P., Smith, M., Takanashi, N., Tokita, K., van der Heyden, K., Yasuda, N., Zheng, C., Adelman-McCarthy, J., Annis, J., Assef, R. J., Barentine, J., Bender, R., Blandford, R. D., Boroski, W. N., Bremer, M., Brewington, H., Collins, C. A., Crotts, A., Dembicky, J., Eastman, J., Edge, A., Edmondson, E., Elson, E., Eyler, M. E., Filippenko, A. V., Foley, R. J., Frank, S., Goobar, A., Gueth, T., Gunn, J. E., Harvanek, M., Hopp, U., Ihara, Y., Ivezić, Z., Kahn, S., Kaplan, J., Kent, S., Ketzeback, W., Kleinman, S. J., Kollatschny, W., Kron, R. G., Krzesiński, J., Lamenti, D., Leloudas, G., Lin, H., Long, D. C., Lucey, J., Lupton, R. H., Malanushenko, E., Malanushenko, V., McMillan, R. J., Mendez, J., Morgan, C. W., Morokuma, T., Nitta, A., Ostman, L., Pan, K., Rockosi, C. M., Romer, A. K., Ruiz-Lapuente, P., Saurage, G., Schlesinger, K., Snedden, S. A., Sollerman, J., Stoughton, C., Stritzinger, M., Subba Rao, M., Tucker, D., Vaisanen, P., Watson, L. C., Watters, S., Wheeler, J. C., Yanny, B. & York, D. 2008, *The Sloan Digital Sky Survey-II Supernova Survey: Technical Summary*, AJ, 135, 338
Frinchaboy, P. M., Marino, A. F., Villanova, S., Carraro, G., Majewski, S. R. & Geisler, D. 2008, *Tombaugh 2: the first open cluster with a significant abundance spread or embedded in a cold stellar stream?*, MNRAS, 391, 39
Froebrich, D., Meusinger, H. & Scholz, A. 2008, *NTT follow-up observations of star cluster candidates from the FSR catalogue*, MNRAS, 390, 1598
Frye, B. L., Bowen, D. V., Hurley, M., Tripp, T. M., Fan, X., Holden, B., Guhathakurta, P., Coe, D., Broadhurst, T., Egami, E. & Meylan, G. 2008, *Observations of the Gas Reservoir around a Star-Forming Galaxy in the Early Universe*, ApJ, 685, L5
Fu, J. N., Khokhuntod, P., Rodríguez, E., Boonyarak, C., Marak, K., López-González, M. J., Zhu, L. Y., Qian, S. B. & Jiang, S. Y. 2008, *Detection of a Degenerate Companion of the SX Phoenicis Star KZ Hydrae by Studying its Long-Term Variability*, AJ, 135, 1958
Fuhrmeister, B., Liefke, C., Schmitt, J. M. & Reiners, A. 2008, *Multiwavelength observations of a giant flare on CN Leonis. I. The chromosphere as seen in the optical spectra*, A&A, 487, 293
Gabasch, A., Goranova, Y., Hopp, U., Noll, S. & Pannella, M. 2008, *A deep i-selected multiwaveband galaxy catalogue in the COSMOS field*, MNRAS, 383, 1319
Gahm, G. F., Walter, F. M., Stempels, H. C., Petrov, P. P. & Herczeg, G. J. 2008, *Unveiling extremely veiled T Tauri stars*, A&A, 482, L35
Gal-Yam, A., Maoz, D., Guhathakurta, P. & Filippenko, A. V. 2008, *Supernovae in Low-Redshift Galaxy Clusters: Observations by the Wise Observatory Optical Transient Search (WOOTS)*, ApJ, 680, 550
Galaz, G., Cortés, P., Bronfman, L. & Rubio, M. 2008, *12CO(3-2) Emission in Spiral Galaxies: Warm Molecular Gas in Action?*, ApJ, 677, L13
Galazutdinov, G. A., Locurto, G., Han, I. & Kreowski, J. 2008, *Blueshifted Diffuse Interstellar Bands in the Sco OB1 Association*, PASP, 120, 178
Galazutdinov, G. A., Curto, G. L. & Krełowski, J. 2008, *Fine structure in the profiles of strong diffuse interstellar bands*, MNRAS, 386, 2003
Galazutdinov, G. A., LoCurto, G. & Krełowski, J. 2008, *High-Resolution Profiles of Diffuse Interstellar Bands*, ApJ, 682, 1076
Galliano, E. & Alloin, D. 2008, *Embedded clusters in NGC 1808 central starburst. Near-infrared imaging and spectroscopy*, A&A, 487, 519
Galliano, E., Alloin, D., Pantin, E., Granato, G. L., Delva, P., Silva, L., Lagage, P. O. & Panuzzo, P. 2008, *Extremely massive young clusters in NGC 1365*, A&A, 492, 3
Gandhi, P., Makishima, K., Durant, M., Fabian, A. C., Dhillon, V. S., Marsh, T. R., Miller, J. M., Shahbaz, T. & Spruit, H. C. 2008, *Rapid optical and X-ray timing observations of GX 339-4: flux correlations at the onset of a low/hard state*, MNRAS, 390, L29
Gandolfi, D., Alcalá, J. M., Leccia, S., Frasca, A., Spezzi, L., Covino, E., Testi, L., Marilli, E. & Kainulainen, J. 2008, *The Star Formation in the L1615/L1616 Cometary Cloud*, ApJ, 687, 1303
Garcia Lopez, R., Nisini, B., Giannini, T., Eislöffel, J., Bacciotti, F. & Podio, L. 2008, *IR diagnostics of embedded jets: velocity resolved observations of the HH34 and HH1 jets*, A&A, 487, 1019
García-Varela, A., Pietrzyński, G., Gieren, W., Udalski, A., Soszyński, I., Walker, A., Bresolin, F., Kudritzki, R. P., Szewczyk, O., Szymański, M., Kubiak, M. & Wyrzykowski, L. 2008, *The Araucaria Project: the Distance to the Sculptor Group Galaxy NGC 247 from Cepheid Variables Discovered in a Wide-Field Imaging Survey*, AJ, 136, 1770
Garilli, B., Le Fèvre, O., Guzzo, L., Maccagni, D., Le Brun, V., de La Torre, S., Meneux, B., Tresse, L., Franzetti, P., Zamorani, G., Zanichelli, A., Gregorini, L., Vergani, D., Bottini, D., Scaramella, R., Scodeggio, M., Vettolani, G., Adami, C., Arnouts, S., Bardelli, S., Bolzonella, M., Cappi, A., Charlot, S., Ciliegi, P., Contini, T., Foucaud, S., Gavignaud, I., Ilbert, O., Iovino, A., Lamareille, F., McCracken, H. J., Marano, B., Marinoni, C., Mazure, A., Merighi, R., Paltani, S., Pellò, R., Pollo, A., Pozzetti, L., Radovich, M., Zucca, E., Blaizot, J., Bongiorno, A., Cucciati, O., Mellier, Y., Moreau, C. & Paioro, L. 2008, *The Vimos VLT deep survey. Global properties of 20,000 galaxies in the IAB < 22.5 WIDE survey*, A&A, 486, 683
Gatti, T., Natta, A., Randich, S., Testi, L. & Sacco, G. 2008, *Accretion properties of T Tauri stars in σ Orionis*, A&A, 481, 423
Gavignaud, I., Wisotzki, L., Bongiorno, A., Paltani, S., Zamorani, G., Møller, P., Le Brun, V., Husemann, B., Lamareille, F., Schramm, M., Le Fèvre, O., Bottini, D., Garilli, B., Maccagni, D., Scaramella, R., Scodeggio, M., Tresse, L., Vettolani, G., Zanichelli, A., Adami, C., Arnaboldi, M., Arnouts, S., Bardelli, S., Bolzonella, M., Cappi, A., Charlot, S., Ciliegi, P., Contini, T., Foucaud, S., Franzetti, P., Guzzo, L., Ilbert, O., Iovino, A., McCracken, H. J., Marano, B., Marinoni, C., Mazure, A., Meneux, B., Merighi, R., Pellò, R., Pollo, A., Pozzetti, L., Radovich, M., Zucca, E., Bondi, M., Busarello, G., Cucciati, O., de La Torre, S., Gregorini, L., Mellier, Y., Merluzzi, P., Ripepi, V., Rizzo, D. & Vergani, D. 2008, *Eddington ratios of faint AGN at intermediate redshift: evidence for a population of half-starved black holes*, A&A, 492, 637
Geißler, K., Chauvin, G. & Sterzik, M. F. 2008, *Mid-infrared imaging of brown dwarfs in binary systems*, A&A, 480, 193
Genzel, R., Burkert, A., Bouché, N., Cresci, G., Förster Schreiber, N. M., Shapley, A., Shapiro, K., Tacconi, L. J., Buschkamp, P., Cimatti, A., Daddi, E., Davies, R., Eisenhauer, F., Erb, D. K., Genel, S., Gerhard, O., Hicks, E., Lutz, D., Naab, T., Ott, T., Rabien, S., Renzini, A., Steidel, C. C., Sternberg, A. & Lilly, S. J. 2008, *From Rings to Bulges: Evidence for Rapid Secular Galaxy Evolution at z ~ 2 from Integral Field Spectroscopy in the SINS Survey*, ApJ, 687, 59
Gezari, S., Basa, S., Martin, D. C., Bazin, G., Forster, K., Milliard, B., Halpern, J. P., Friedman, P. G., Morrissey, P., Neff, S. G., Schiminovich, D., Seibert, M., Small, T. & Wyder, T. K. 2008, *UV/Optical Detections of Candidate Tidal Disruption Events by GALEX and CFHTLS*, ApJ, 676, 944
Gezari, S., Dessart, L., Basa, S., Martin, D. C., Neill, J. D., Woosley, S. E., Hillier, D. J., Bazin, G., Forster, K., Friedman, P. G., Le Du, J., Mazure, A., Morrissey, P., Neff, S. G., Schiminovich, D. & Wyder, T. K. 2008, *Probing Shock Breakout with Serendipitous GALEX Detections of Two SNLS Type II-P Supernovae*, ApJ, 683, L131

Giannini, T., Calzoletti, L., Nisini, B., Davis, C. J., Eislöffel, J. & Smith, M. D. 2008, *Near-infrared, IFU spectroscopy unravels the bow-shock HH99B*, A&A, 481, 123
Gielen, C., van Winckel, H., Min, M., Waters, L. M. & Lloyd Evans, T. 2008, *SPITZER survey of dust grain processing in stable discs around binary post-AGB stars*, A&A, 490, 725
Gieren, W., Pietrzyński, G., Soszyński, I., Bresolin, F., Kudritzki, R. P., Storm, J. & Minniti, D. 2008, *The Araucaria Project: Near-Infrared Photometry of Cepheid Variables in the Sculptor Galaxy NGC 55*, ApJ, 672, 266
Gieren, W., Pietrzyński, G., Szewczyk, O., Soszyński, I., Bresolin, F., Kudritzki, R. P., Urbaneja, M. A., Storm, J. & Minniti, D. 2008, *The Araucaria Project: The Distance to the Local Group Galaxy WLM from Near-Infrared Photometry of Cepheid Variables*, ApJ, 683, 611
Gies, D. R., Dieterich, S., Richardson, N. D., Riedel, A. R., Team, B. L., McAlister, H. A., Bagnuolo, W. J., Grundstrom, E. D., Štefl, S., Rivinius, T. & Baade, D. 2008, *A Spectroscopic Orbit for Regulus*, ApJ, 682, L117
Glauser, A. M., Ménard, F., Pinte, C., Duchêne, G., Güdel, M., Monin, J. L. & Padgett, D. L. 2008, *Multiwavelength studies of the gas and dust disc of IRAS 04158+2805*, A&A, 485, 531
Gnaciński, P. & Krogulec, M. 2008, *Physical conditions in CaFe interstellar clouds*, A&A, 477, 543
Gobat, R., Rosati, P., Strazzullo, V., Rettura, A., Demarco, R. & Nonino, M. 2008, *Star formation histories of early-type galaxies at z = 1.2 in cluster and field environments*, A&A, 488, 853
Goldman, B., Bouy, H., Zapatero Osorio, M. R., Stumpf, M. B., Brandner, W. & Henning, T. 2008, *Binarity at the L/T brown dwarf transition. Adaptive optics search for companions*, A&A, 490, 763
Goldman, B., Cushing, M. C., Marley, M. S., Artigau, E., Baliyan, K. S., Béjar, V. S., Caballero, J. A., Chanover, N., Connelley, M., Doyon, R., Forveille, T., Ganesh, S., Gelino, C. R., Hammel, H. B., Holtzman, J., Joshi, S., Joshi, U. C., Leggett, S. K., Liu, M. C., Martín, E. L., Mohan, V., Nadeau, D., Sagar, R. & Stephens, D. 2008, *CLOUDS search for variability in brown dwarf atmospheres. Infrared spectroscopic time series of L/T transition brown dwarfs*, A&A, 487, 277
González Hernández, J. I., Bonifacio, P., Ludwig, H. G., Caffau, E., Spite, M., Spite, F., Cayrel, R., Molaro, P., Hill, V., François, P., Plez, B., Beers, T. C., Sivarani, T., Andersen, J., Barbuy, B., Depagne, E., Nordström, B. & Primas, F. 2008, *First stars XI. Chemical composition of the extremely metal-poor dwarfs in the binary CS 22876-032*, A&A, 480, 233
González Hernández, J. I., Rebolo, R. & Israelian, G. 2008, *The black hole binary nova Scorpii 1994 (GRO J1655-40): an improved chemical analysis*, A&A, 478, 203
González, J. F., Hubrig, S., Kurtz, D. W., Elkin, V. & Savanov, I. 2008, *Discovery of pulsational line profile variations in the δ Scuti star HD21190 and in the Ap Sr star HD218994*, MNRAS, 384, 1140
Gouliermis, D. A., Chu, Y. H., Henning, T., Brandner, W., Gruendl, R. A., Hennekemper, E. & Hormuth, F. 2008, *NGC 346 in The Small Magellanic Cloud. IV. Triggered Star Formation in the H II Region N66*, ApJ, 688, 1050
Grillo, C., Lombardi, M., Rosati, P., Bertin, G., Gobat, R., Demarco, R., Lidman, C., Motta, V. & Nonino, M. 2008, *A twelve-image gravitational lens system in the z ≃ 0.84 cluster Cl J0152.7-1357*, A&A, 486, 45
Grisé, F., Pakull, M. W., Soria, R., Motch, C., Smith, I. A., Ryder, S. D. & Böttcher, M. 2008, *The ultraluminous X-ray source NGC 1313 X-2. Its optical counterpart and environment*, A&A, 486, 151
Groenewegen, M. T. 2008, *Baade-Wesselink distances and the effect of metallicity in classical cepheids*, A&A, 488, 25
Groenewegen, M. T., Udalski, A. & Bono, G. 2008, *The distance to the Galactic centre based on Population II Cepheids and RR Lyrae stars*, A&A, 481, 441
Groh, J. H., Oliveira, A. S. & Steiner, J. E. 2008, *The qWR star HD 45166. II. Fundamental stellar parameters and evidence of a latitude-dependent wind*, A&A, 485, 245
Gröningsson, P., Fransson, C., Lundqvist, P., Lundqvist, N., Leibundgut, B., Spyromilio, J., Chevalier, R. A., Gilmozzi, R., Kjær, K., Mattila, S. & Sollerman, J. 2008, *High resolution spectroscopy of the inner ring of SN 1987A*, A&A, 479, 761
Gröningsson, P., Fransson, C., Leibundgut, B., Lundqvist, P., Challis, P., Chevalier, R. A. & Spyromilio, J. 2008, *Time evolution of the line emission from the inner circumstellar ring of SN 1987A and its hot spots*, A&A, 492, 481
Grosbøl, P. & Dottori, H. 2008, *Statistics of young starforming complexes in spiral galaxies using NIR photometry*, A&A, 490, 87
Grouchy, R. D., Buta, R., Salo, H., Laurikainen, E. & Speltincx, T. 2008, *Counter-Winding Spiral Structure in ESO 297-27*, AJ, 136, 980
Grove, L. F., da Costa, L. & Benoist, C. 2008, *Multi-object spectroscopy of low-redshift EIS clusters. IV. Reliability of matched-filter results at z ˜ 0.3-0.4*, A&A, 490, 945
Grundahl, F., Clausen, J. V., Hardis, S. & Frandsen, S. 2008, *A new standard: age and distance for the open cluster NGC 6791 from the eclipsing binary member V20*, A&A, 492, 171
Gruppioni, C., Pozzi, F., Polletta, M., Zamorani, G., La Franca, F., Sacchi, N., Comastri, A., Pozzetti, L., Vignali, C., Lonsdale, C., Rowan-Robinson, M., Surace, J., Shupe, D., Fang, F., Matute, I. & Berta, S. 2008, *The Contribution of AGNs and Star-forming Galaxies to the Mid-Infrared as Revealed by Their Spectral Energy Distributions*, ApJ, 684, 136
Gullieuszik, M., Greggio, L., Held, E. V., Moretti, A., Arcidiacono, C., Bagnara, P., Baruffolo, A., Diolaiti, E., Falomo, R., Farinato, J., Lombini, M., Ragazzoni, R., Brast, R., Donaldson, R., Kolb, J., Marchetti, E. & Tordo, S. 2008, *Resolving stellar populations outside the Local Group: MAD observations of UKS 2323-326*, A&A, 483, L5
Gullieuszik, M., Held, E. V., Rizzi, L., Girardi, L., Marigo, P. & Momany, Y. 2008, *The evolved stars of LeoII dSph galaxy from near-infrared UKIRT/WFCAM observations*, MNRAS, 388, 1185
Gustafsson, M., Labadie, L., Herbst, T. M. & Kasper, M. 2008, *Spatially resolved H_2 emission from the disk around T Tau N*, A&A, 488, 235
Guzzo, L., Pierleoni, M., Meneux, B., Branchini, E., Le Fèvre, O., Marinoni, C., Garilli, B., Blaizot, J., De Lucia, G., Pollo, A., McCracken, H. J., Bottini, D., Le Brun, V., Maccagni, D., Picat, J. P., Scaramella, R., Scodeggio, M., Tresse, L., Vettolani, G., Zanichelli, A., Adami, C., Arnouts, S., Bardelli, S., Bolzonella, M., Bongiorno, A., Cappi, A., Charlot, S., Ciliegi, P., Contini, T., Cucciati, O., de La Torre, S., Dolag, K., Foucaud, S., Franzetti, P., Gavignaud, I., Ilbert, O., Iovino, A., Lamareille, F., Marano, B., Mazure, A., Memeo, P., Merighi, R., Moscardini, L., Paltani, S., Pellò, R., Perez-Montero, E., Pozzetti, L., Radovich, M., Vergani, D., Zamorani, G. & Zucca, E. 2008, *A test of the nature of cosmic acceleration using galaxy redshift distortions*, Natur, 451, 541
Gyulbudaghian, A. L. & May, J. 2008, *Investigation of the conspicuous infrared star cluster and star-forming region "RCW 38 IR Cluster"*, Ap, 51, 18
Halkola, A., Hildebrandt, H., Schrabback, T., Lombardi, M., Bradač, M., Erben, T., Schneider, P. & Wuttke, D. 2008, *The mass distribution of RX J1347-1145 from strong lensing*, A&A, 481, 65
Halliday, C., Daddi, E., Cimatti, A., Kurk, J., Renzini, A., Mignoli, M., Bolzonella, M., Pozzetti, L., Dickinson, M., Zamorani, G., Berta, S., Franceschini, A., Cassata, P., Rodighiero, G. & Rosati, P. 2008, *GMASS ultradeep spectroscopy of galaxies at z ~ 2. I. The stellar metallicity*, A&A, 479, 417
Harayama, Y., Eisenhauer, F. & Martins, F. 2008, *The Initial Mass Function of the Massive Star-forming Region NGC 3603 from Near-Infrared Adaptive Optics Observations*, ApJ, 675, 1319
Harju, J., Juvela, M., Schlemmer, S., Haikala, L. K., Lehtinen, K. & Mattila, K. 2008, *Detection of 6 K gas in Ophiuchus D*, A&A, 482, 535
Harutyunyan, A. H., Pfahler, P., Pastorello, A., Taubenberger, S., Turatto, M., Cappellaro, E., Benetti, S., Elias-Rosa, N., Navasardyan, H., Valenti, S., Stanishev, V., Patat, F., Riello, M., Pignata, G. & Hillebrandt, W. 2008, *ESC supernova spectroscopy of non-ESC targets*, A&A, 488, 383
Hasinger, G. 2008, *Absorption properties and evolution of active galactic nuclei*, A&A, 490, 905
Hatch, N. A., Overzier, R. A., Röttgering, H. A., Kurk, J. D. & Miley, G. K. 2008, *Diffuse UV light associated with the Spiderweb Galaxy: evidence for in situ star formation outside galaxies*, MNRAS, 383, 931
Hau, G. T., Bower, R. G., Kilborn, V., Forbes, D. A., Balogh, M. L. & Oosterloo, T. 2008, *Is NGC 3108 transforming itself from an early- to late-type galaxy - an astronomical hermaphrodite?*, MNRAS, 385, 1965
Healey, S. E., Romani, R. W., Cotter, G., Michelson, P. F., Schlafly, E. F., Readhead, A. S., Giommi, P., Chaty, S., Grenier, I. A. & Weintraub, L. C. 2008, *CGRaBS: An All-Sky Survey of Gamma-Ray Blazar Candidates*, ApJS, 175, 97
Heber, U., Edelmann, H., Napiwotzki, R., Altmann, M. & Scholz, R. D. 2008, *The B-type giant HD 271791 in the Galactic halo. Linking run-away stars to hyper-velocity stars*, A&A, 483, L21
Hempel, A., Schaerer, D., Egami, E., Pelló, R., Wise, M., Richard, J., Le Borgne, J. F. & Kneib, J. P. 2008, *EROs found behind lensing clusters. II. Empirical properties, classification, and SED modelling based on multi-wavelength observations*, A&A, 477, 55

Hendry, M. A., Smartt, S. J., Skillman, E. D., Evans, C. J., Trundle, C., Lennon, D. J., Crowther, P. A. & Hunter, I. 2008, *The blue supergiant Sher 25 and its intriguing hourglass nebula*, MNRAS, 388, 1127
Herbst, W., Hamilton, C. M., Leduc, K., Winn, J. N., Johns-Krull, C. M., Mundt, R. & Ibrahimov, M. 2008, *Reflected light from sand grains in the terrestrial zone of a protoplanetary disk*, Natur, 452, 194
Hinkle, K. H., Lebzelter, T., Joyce, R. R., Ridgway, S., Close, L., Hron, J. & Andre, K. 2008, *Imaging ejecta from the final flash star V605 Aquilae*, A&A, 479, 817
Hitschfeld, M., Aravena, M., Kramer, C., Bertoldi, F., Stutzki, J., Bensch, F., Bronfman, L., Cubick, M., Fujishita, M., Fukui, Y., Graf, U. U., Honingh, N., Ito, S., Jakob, H., Jacobs, K., Klein, U., Koo, B. C., May, J., Miller, M., Miyamoto, Y., Mizuno, N., Onishi, T., Park, Y. S., Pineda, J. L., Rabanus, D., Röllig, M., Sasago, H., Schieder, R., Simon, R., Sun, K., Volgenau, N., Yamamoto, H. & Yonekura, Y. 2008, *12CO 4-3 and [CI] 1-0 at the centers of NGC 4945 and Circinus*, A&A, 479, 75
Hoffmeister, V. H., Chini, R., Scheyda, C. M., Schulze, D., Watermann, R., Nürnberger, D. & Vogt, N. 2008, *The Stellar Population of M17*, ApJ, 686, 310
Holt, J., Tadhunter, C. N. & Morganti, R. 2008, *Fast outflows in compact radio sources: evidence for AGN-induced feedback in the early stages of radio source evolution*, MNRAS, 387, 639
Hönig, S. F., Smette, A., Beckert, T., Horst, H., Duschl, W., Gandhi, P., Kishimoto, M. & Weigelt, G. 2008, *Discovery of a strong Baldwin effect in mid-infrared AGN lines*, A&A, 485, L21
Horst, H., Gandhi, P., Smette, A. & Duschl, W. J. 2008, *The mid-IR - hard X-ray correlation in AGN and its implications for dusty torus models*, A&A, 479, 389
Houdebine, E. R. 2008, *Observation and modelling of main-sequence stellar chromospheres - VII. Rotation and metallicity of dM1 stars*, MNRAS, 390, 1081
Houghton, R. W. & Thatte, N. 2008, *The central region of M83*, MNRAS, 385, 1110
Hovatta, T., Nieppola, E., Tornikoski, M., Valtaoja, E., Aller, M. F. & Aller, H. D. 2008, *Long-term radio variability of AGN: flare characteristics*, A&A, 485, 51
Hovatta, T., Lehto, H. J. & Tornikoski, M. 2008, *Wavelet analysis of a large sample of AGN at high radio frequencies*, A&A, 488, 897
Hubrig, S., Schöller, M., Schnerr, R. S., González, J. F., Ignace, R. & Henrichs, H. F. 2008, *Magnetic field measurements of O stars with FORS 1 at the VLT*, A&A, 490, 793
Hubrig, S., Briquet, M., Morel, T., Schöller, M., González, J. F. & De Cat, P. 2008, *New insights into the nature of the peculiar star θ Carinae*, A&A, 488, 287
Huélamo, N., Figueira, P., Bonfils, X., Santos, N. C., Pepe, F., Gillon, M., Azevedo, R., Barman, T., Fernández, M., di Folco, E., Guenther, E. W., Lovis, C., Melo, C. F., Queloz, D. & Udry, S. 2008, *TW Hydrae: evidence of stellar spots instead of a Hot Jupiter*, A&A, 489, L9
Humphrey, A., Villar-Martín, M., Vernet, J., Fosbury, R., di Serego Alighieri, S. & Binette, L. 2008, *Deep spectroscopy of the FUV-optical emission lines from a sample of radio galaxies at z ~ 2.5: metallicity and ionization*, MNRAS, 383, 11
Humphrey, A., Villar-Martín, M., Sánchez, S. F., di Serego Alighieri, S., De Breuck, C., Binette, L., Tadhunter, C., Vernet, J., Fosbury, R. & Stasielak, J. 2008, *Spatially extended absorption around the z = 2.63 radio galaxy MRC 2025-218: outflow or infall?*, MNRAS, 390, 1505
Hunter, I., Brott, I., Lennon, D. J., Langer, N., Dufton, P. L., Trundle, C., Smartt, S. J., de Koter, A., Evans, C. J. & Ryans, R. I. 2008, *The VLT FLAMES Survey of Massive Stars: Rotation and Nitrogen Enrichment as the Key to Understanding Massive Star Evolution*, ApJ, 676, L29
Hunter, I., Lennon, D. J., Dufton, P. L., Trundle, C., Simón-Díaz, S., Smartt, S. J., Ryans, R. I. & Evans, C. J. 2008, *The VLT-FLAMES survey of massive stars: atmospheric parameters and rotational velocity distributions for B-type stars in the Magellanic Clouds*, A&A, 479, 541
Hunter, T. R., Brogan, C. L., Indebetouw, R. & Cyganowski, C. J. 2008, *Subarcsecond Submillimeter Imaging of the Ultracompact H II Region G5.89-0.39*, ApJ, 680, 1271
Hutsemékers, D., Manfroid, J., Jehin, E., Zucconi, J. M. & Arpigny, C. 2008, *The {16}OH/18OH and OD/OH isotope ratios in comet C/2002 T7 (LINEAR)*, A&A, 490, L31
Inada, N., Oguri, M., Becker, R. H., Shin, M. S., Richards, G. T., Hennawi, J. F., White, R. L., Pindor, B., Strauss, M. A., Kochanek, C. S., Johnston, D. E., Gregg, M. D., Kayo, I., Eisenstein, D., Hall, P. B., Castander, F. J., Clocchiatti, A., Anderson, S. F., Schneider, D. P., York, D. G., Lupton, R., Chiu, K., Kawano, Y., Scranton, R., Frieman, J. A., Keeton, C. R., Morokuma, T., Rix, H. W., Turner, E. L., Burles, S., Brunner, R. J., Sheldon, E. S., Bahcall, N. A. & Masataka, F. 2008, *The Sloan Digital Sky Survey Quasar Lens Search. II. Statistical Lens Sample from the Third Data Release*, AJ, 135, 496
Inskip, K. J., Villar-Martín, M., Tadhunter, C. N., Morganti, R., Holt, J. & Dicken, D. 2008, *PKS2250-41: a case study for triggering*, MNRAS, 386, 1797
in't Zand, J. M., Bassa, C. G., Jonker, P. G., Keek, L., Verbunt, F., Méndez, M. & Markwardt, C. B. 2008, *An X-ray and optical study of the ultracompact X-ray binary A 1246-58*, A&A, 485, 183
Irwin, J., Hodgkin, S., Aigrain, S., Bouvier, J., Hebb, L. & Moraux, E. 2008, *The Monitor project: rotation of low-mass stars in the open cluster NGC 2547*, MNRAS, 383, 1588
Isella, A., Tatulli, E., Natta, A. & Testi, L. 2008, *Gas and dust in the inner disk of the Herbig Ae star MWC 758*, A&A, 483, L13
Israel, F. P., Raban, D., Booth, R. S. & Rantakyrö, F. T. 2008, *The millimeter-wave continuum spectrum of Centaurus A and its nucleus*, A&A, 483, 741
Janson, M., Reffert, S., Brandner, W., Henning, T., Lenzen, R. & Hippler, S. 2008, *A comprehensive examination of the ε Eridani system. Verification of a 4 micron narrow-band high-contrast imaging approach for planet searches*, A&A, 488, 771
Janson, M., Brandner, W. & Henning, T. 2008, *Integral field spectroscopy of L449-1. A test case for spectral differential imaging with SINFONI*, A&A, 478, 597
Jaunsen, A. O., Rol, E., Watson, D. J., Malesani, D., Fynbo, J. U., Milvang-Jensen, B., Hjorth, J., Vreeswijk, P. M., Ovaldsen, J. E., Wiersema, K., Tanvir, N. R., Gorosabel, J., Levan, A. J., Schirmer, M. & Castro-Tirado, A. J. 2008, *GRB 070306: A Highly Extinguished Afterglow*, ApJ, 681, 453
Jenkins, J. S., Jones, H. A., Pavlenko, Y., Pinfield, D. J., Barnes, J. R. & Lyubchik, Y. 2008, *Metallicities and activities of southern stars*, A&A, 485, 571
Joergens, V. 2008, *Binary frequency of very young brown dwarfs at separations smaller than 3 AU*, A&A, 492, 545
Juvela, M., Pelkonen, V. M., Padoan, P. & Mattila, K. 2008, *A Corona Australis cloud filament seen in NIR scattered light. I. Comparison with extinction of background stars*, A&A, 480, 445
Kacprzak, G. G., Churchill, C. W., Steidel, C. C. & Murphy, M. T. 2008, *Halo Gas Cross Sections and Covering Fractions of Mg II Absorption Selected Galaxies*, AJ, 135, 922
Kallinger, T., Guenther, D. B., Matthews, J. M., Weiss, W. W., Huber, D., Kuschnig, R., Moffat, A. J., Rucinski, S. M. & Sasselov, D. 2008, *Nonradial p-modes in the G9.5 giant ε Ophiuchi? Pulsation model fits to MOST photometry*, A&A, 478, 497
Kanaan, S., Meilland, A., Stee, P., Zorec, J., Domiciano de Souza, A., Frémat, Y. & Briot, D. 2008, *Disk and wind evolution of Achernar: the breaking of the fellowship*, A&A, 486, 785
Karoff, C., Arentoft, T., Glowienka, L., Coutures, C., Nielsen, T. B., Dogan, G., Grundahl, F. & Kjeldsen, H. 2008, *SPB stars in the open SMC cluster NGC 371*, MNRAS, 386, 1085
Kautsch, S. J., Gonzalez, A. H., Soto, C. A., Tran, K. H., Zaritsky, D. & Moustakas, J. 2008, *Forming Early-Type Galaxies in Groups Prior to Cluster Assembly*, ApJ, 688, L5
Kaviraj, S., Khochfar, S., Schawinski, K., Yi, S. K., Gawiser, E., Silk, J., Virani, S. N., Cardamone, C. N., van Dokkum, P. G. & Urry, C. M. 2008, *The UV colours of high-redshift early-type galaxies: evidence for recent star formation and stellar mass assembly over the last 8 billion years*, MNRAS, 388, 67
Kayser, A., Hilker, M., Grebel, E. K. & Willemsen, P. G. 2008, *Comparing CN and CH line strengths in a homogeneous spectroscopic sample of 8 Galactic globular clusters*, A&A, 486, 437
Kellermann, K. I., Fomalont, E. B., Mainieri, V., Padovani, P., Rosati, P., Shaver, P., Tozzi, P. & Miller, N. 2008, *The VLA Survey of the Chandra Deep Field-South. I. Overview and the Radio Data*, ApJS, 179, 71
Kervella, P., Domiciano de Souza, A. & Bendjoya, P. 2008, *The close-in companion of the fast rotating Be star Achernar*, A&A, 484, L13
Kervella, P., Mérand, A., Szabados, L., Fouqué, P., Bersier, D., Pompei, E. & Perrin, G. 2008, *The long-period Galactic Cepheid RS Puppis. I. A geometric distance from its light echoes*, A&A, 480, 167
Kishimoto, M., Antonucci, R., Blaes, O., Lawrence, A., Boisson, C., Albrecht, M. & Leipski, C. 2008, *The characteristic blue spectra of accretion disks in quasars as uncovered in the infrared*, Natur, 454, 492
Kjeldsen, H., Bedding, T. R., Arentoft, T., Butler, R. P., Dall, T. H., Karoff, C., Kiss, L. L., Tinney, C. G. & Chaplin, W. J. 2008, *The Amplitude of Solar Oscillations Using Stellar Techniques*, ApJ, 682, 1370

Klotz, A., Harju, J., Ristorcelli, I., Juvela, M., Boudet, N. & Haikala, L. K. 2008, *An upper limit of gaseous water abundance in Chamaeleon-MMS1 as observed with ODIN*, A&A, 488, 559
Koch, A., Grebel, E. K., Gilmore, G. F., Wyse, R. G., Kleyna, J. T., Harbeck, D. R., Wilkinson, M. I. & Wyn Evans, N. 2008, *Complexity on Small Scales. III. Iron and α Element Abundances in the Carina Dwarf Spheroidal Galaxy*, AJ, 135, 1580
Koch, A., Rich, R. M., Reitzel, D. B., Martin, N. F., Ibata, R. A., Chapman, S. C., Majewski, S. R., Mori, M., Loh, Y. S., Ostheimer, J. C. & Tanaka, M. 2008, *Kinematic and Chemical Constraints on the Formation of M31's Inner and Outer Halo*, ApJ, 689, 958
Kochukhov, O. 2008, *The Paschen-Back effect in the Li I 6708 Å line and the presence of lithium in cool magnetic Ap stars*, A&A, 483, 557
Kochukhov, O., Ryabchikova, T., Bagnulo, S. & Lo Curto, G. 2008, *The discovery of high-amplitude, 10.9-minute oscillations in the cool magnetic Ap star HD 115226*, A&A, 479, L29
Köhler, R., Neuhäuser, R., Krämer, S., Leinert, C., Ott, T. & Eckart, A. 2008, *Multiplicity of young stars in and around R Coronae Australis*, A&A, 488, 997
Köhler, R., Ratzka, T., Herbst, T. M. & Kasper, M. 2008, *Orbits and masses in the T Tauri system*, A&A, 482, 929
Kollatschny, W., Kotulla, R., Pietsch, W., Bischoff, K. & Zetzl, M. 2008, *New active galactic nuclei detected in ROSAT All Sky Survey galaxies. II. The complete dataset*, A&A, 484, 897
Korista, K. T., Bautista, M. A., Arav, N., Moe, M., Costantini, E. & Benn, C. 2008, *Physical Conditions in Quasar Outflows: Very Large Telescope Observations of QSO 2359-1241*, ApJ, 688, 108
Kóspál, A., Ábrahám, P., Apai, D., Ardila, D. R., Grady, C. A., Henning, T., Juhász, A., Miller, D. W. & Moór, A. 2008, *High-resolution polarimetry of Parsamian 21: revealing the structure of an edge-on FUOri disc*, MNRAS, 383, 1015
Kotulla, R., Fritze, U. & Anders, P. 2008, *Young globular clusters in an old S0: clues to the formation history of NGC 4570*, MNRAS, 387, 1149
Kovtyukh, V. V., Soubiran, C., Luck, R. E., Turner, D. G., Belik, S. I., Andrievsky, S. M. & Chekhonadskikh, F. A. 2008, *Reddenings of FGK supergiants and classical Cepheids from spectroscopic data*, MNRAS, 389, 1336
Kowalski, M., Rubin, D., Aldering, G., Agostinho, R. J., Amadon, A., Amanullah, R., Balland, C., Barbary, K., Blanc, G., Challis, P. J., Conley, A., Connolly, N. V., Covarrubias, R., Dawson, K. S., Deustua, S. E., Ellis, R., Fabbro, S., Fadeyev, V., Fan, X., Farris, B., Folatelli, G., Frye, B. L., Garavini, G., Gates, E. L., Germany, L., Goldhaber, G., Goldman, B., Goobar, A., Groom, D. E., Haissinski, J., Hardin, D., Hook, I., Kent, S., Kim, A. G., Knop, R. A., Lidman, C., Linder, E. V., Mendez, J., Meyers, J., Miller, G. J., Moniez, M., Mourão, A. M., Newberg, H., Nobili, S., Nugent, P. E., Pain, R., Perdereau, O., Perlmutter, S., Phillips, M. M., Prasad, V., Quimby, R., Regnault, N., Rich, J., Rubenstein, E. P., Ruiz-Lapuente, P., Santos, F. D., Schaefer, B. E., Schommer, R. A., Smith, R. C., Soderberg, A. M., Spadafora, A. L., Strolger, L. G., Strovink, M., Suntzeff, N. B., Suzuki, N., Thomas, R. C., Walton, N. A., Wang, L., Wood-Vasey, W. M. & Yun, J. L. 2008, *Improved Cosmological Constraints from New, Old, and Combined Supernova Data Sets*, ApJ, 686, 749
Kramer, C., Cubick, M., Röllig, M., Sun, K., Yonekura, Y., Aravena, M., Bensch, F., Bertoldi, F., Bronfman, L., Fujishita, M., Fukui, Y., Graf, U. U., Hitschfeld, M., Honingh, N., Ito, S., Jakob, H., Jacobs, K., Klein, U., Koo, B. C., May, J., Miller, M., Miyamoto, Y., Mizuno, N., Onishi, T., Park, Y. S., Pineda, J. L., Rabanus, D., Sasago, H., Schieder, R., Simon, R., Stutzki, J., Volgenau, N. & Yamamoto, H. 2008, *Clumpy photon-dominated regions in Carina. I. [C I] and mid-J CO lines in two 4'×4' fields*, A&A, 477, 547
Kraus, M., Borges Fernandes, M., Kubát, J. & de Araújo, F. X. 2008, *From B[e] to A[e]. On the peculiar variations of the SMC supergiant LHA 115-S 23 (AzV 172)*, A&A, 487, 697
Kraus, S., Hofmann, K. H., Benisty, M., Berger, J. P., Chesneau, O., Isella, A., Malbet, F., Meilland, A., Nardetto, N., Natta, A., Preibisch, T., Schertl, D., Smith, M., Stee, P., Tatulli, E., Testi, L. & Weigelt, G. 2008, *The origin of hydrogen line emission for five Herbig Ae/Be stars spatially resolved by VLTI/AMBER spectro-interferometry*, A&A, 489, 1157
Kraus, S., Preibisch, T. & Ohnaka, K. 2008, *Detection of an Inner Gaseous Component in a Herbig Be Star Accretion Disk: Near- and Mid-Infrared Spectrointerferometry and Radiative Transfer modeling of MWC 147*, ApJ, 676, 490
Kristensen, L. E., Ravkilde, T. L., Pineau Des Forêts, G., Cabrit, S., Field, D., Gustafsson, M., Diana, S. & Lemaire, J. L. 2008, *Observational 2D model of H_2 emission from a bow shock in the Orion Molecular Cloud*, A&A, 477, 203
Krumpe, M., Lamer, G., Corral, A., Schwope, A. D., Carrera, F. J., Barcons, X., Page, M., Mateos, S., Tedds, J. A. & Watson, M. G. 2008, *X-ray absorption in distant type II QSOs*, A&A, 483, 415
Kudritzki, R. P., Urbaneja, M. A., Bresolin, F., Przybilla, N., Gieren, W. & Pietrzyński, G. 2008, *Quantitative Spectroscopy of 24 A Supergiants in the Sculptor Galaxy NGC 300: Flux-weighted Gravity-Luminosity Relationship, Metallicity, and Metallicity Gradient*, ApJ, 681, 269
Kumar, B., Sagar, R. & Melnick, J. 2008, *CCD photometric and mass function study of nine young Large Magellanic Cloud star clusters*, MNRAS, 386, 1380
Kürster, M., Endl, M. & Reffert, S. 2008, *A probable close brown dwarf companion to GJ 1046 (M 2.5V)*, A&A, 483, 869
Kurtev, R., Ivanov, V. D., Borissova, J. & Ortolani, S. 2008, *Obscured clusters. II. GLIMPSE-C02 - A new metal rich globular cluster in the Milky Way*, A&A, 489, 583
Kurtz, D. W., Hubrig, S., González, J. F., van Wyk, F. & Martinez, P. 2008, *δSct pulsation in magnetic Ap stars: the discovery of δSct pulsations in HD218994AB and measurement of the magnetic fields of HD218994A and HD21190*, MNRAS, 386, 1750
Kutdemir, E., Ziegler, B. L., Peletier, R. F., Da Rocha, C., Kronberger, T., Kapferer, W., Schindler, S., Böhm, A., Jäger, K., Kuntschner, H. & Verdugo, M. 2008, *Internal kinematics of spiral galaxies in distant clusters. III. Velocity fields from FORS2/MXU spectroscopy*, A&A, 488, 117
Lafrenière, D., Jayawardhana, R., Brandeker, A., Ahmic, M. & van Kerkwijk, M. H. 2008, *A Multiplicity Census of Young Stars in Chamaeleon I*, ApJ, 683, 844
Lagadec, E., Zijlstra, A. A., Matsuura, M., Menzies, J. W., van Loon, J. T. & Whitelock, P. A. 2008, *Dust mass-loss rates from asymptotic giant branch stars in the Fornax and Sagittarius dwarf spheroidal galaxies*, MNRAS, 383, 399
Lallement, R., Hébrard, G. & Welsh, B. Y. 2008, *Exploring interstellar titanium and deuterium abundances and other correlations*, A&A, 481, 381
Lamy, P. L., Kaasalainen, M., Lowry, S., Weissman, P., Barucci, M. A., Carvano, J., Choi, Y. J., Colas, F., Faury, G., Fornasier, S., Groussin, O., Hicks, M. D., Jorda, L., Kryszczynska, A., Larson, S., Toth, I. & Warner, B. 2008, *Asteroid 2867 Steins. II. Multi-telescope visible observations, shape reconstruction, and rotational state*, A&A, 487, 1179
Larsen, S. S. 2008, *A peculiar planetary nebula candidate in a globular cluster in the Fornax dwarf spheroidal galaxy*, A&A, 477, L17
Lawton, B., Churchill, C. W., York, B. A., Ellison, S. L., Snow, T. P., Johnson, R. A., Ryan, S. G. & Benn, C. R. 2008, *Limits on Reddening and Gas-To Ratios for Seven Intermediate Redshift Damped Lyα Absorbers from Diffuse Interstellar Bands*, AJ, 136, 994
Lefloch, B., Cernicharo, J. & Pardo, J. R. 2008, *Star formation in the Trifid Nebula. Cores and filaments*, A&A, 489, 157
Leggett, S. K., Saumon, D., Albert, L., Cushing, M. C., Liu, M. C., Luhman, K. L., Marley, M. S., Kirkpatrick, J. D., Roellig, T. L. & Allers, K. N. 2008, *HN Peg B: A Test of Models of the L to T Dwarf Transition*, ApJ, 682, 1256
Lemasle, B., François, P., Piersimoni, A., Pedicelli, S., Bono, G., Laney, C. D., Primas, F. & Romaniello, M. 2008, *Galactic abundance gradients from Cepheids. On the iron abundance gradient around 10-12 kpc*, A&A, 490, 613
Letawe, G., Magain, P. & Courbin, F. 2008, *Slit and integral-field optical spectroscopy of the enigmatic quasar HE 0450-2958*, A&A, 480, 69
Letawe, Y., Magain, P., Letawe, G., Courbin, F. & Hutsemékers, D. 2008, *Understanding the Relations between QSOs and Their Host Galaxies from Combined HST Imaging and VLT Spectroscopy*, ApJ, 679, 967
Leurini, S., Hieret, C., Thorwirth, S., Wyrowski, F., Schilke, P., Menten, K. M., Güsten, R. & Zapata, L. 2008, *High-mass star formation in the IRAS 17233-3606 region: a new nearby and bright hot core in the southern sky*, A&A, 485, 167
Levan, A. J., Tanvir, N. R., Jakobsson, P., Chapman, R., Hjorth, J., Priddey, R. S., Fynbo, J. U., Hurley, K., Jensen, B. L., Johnson, R., Gorosabel, J., Castro-Tirado, A. J., Jarvis, M., Watson, D. & Wiersema, K. 2008, *On the nature of the short-duration GRB 050906*, MNRAS, 384, 541
Levshakov, S. A., Agafonova, I. I., Reimers, D., Hou, J. L. & Molaro, P. 2008, *EUV spectral energy distribution of quasars restored from associated absorbers*, A&A, 483, 19
Leyrat, C., Ferrari, C., Charnoz, S., Decriem, J., Spilker, L. J. & Pilorz, S. 2008, *Spinning particles in Saturn's C ring from mid-infrared observations: Pre-Cassini mission results*, Icar, 196, 625
Causi, G. L., Antoniucci, S. & Tatulli, E. 2008, *Debiasing interferometric visibilities in VLTI-AMBER data of low SNR observations*, A&A, 479, 589

Li, J. Z., Smith, M. D., Gredel, R., Davis, C. J. & Rector, T. A. 2008, *The Rosette Eye: The Key Transition Phase in the Birth of a Massive Star*, ApJ, 679, L101
Libert, Y., Le Bertre, T., Gérard, E. & Winters, J. M. 2008, *H I and CO in the circumstellar environment of the oxygen-rich AGB star RX Leporis*, A&A, 491, 789
Lidman, C., Rosati, P., Tanaka, M., Strazzullo, V., Demarco, R., Mullis, C., Ageorges, N., Kissler-Patig, M., Petr-Gotzens, M. G. & Selman, F. 2008, *HAWK-I imaging of the X-ray luminous galaxy cluster XMMU J2235.3-2557. The red sequence at z = 1.39*, A&A, 489, 981
Limboz, F., Karataş, Y., Kilic, M., Benoist, C. & Aliş, S. 2008, *White dwarfs in the CFHTLS Deep fields*, MNRAS, 383, 957
Lind, K., Korn, A. J., Barklem, P. S. & Grundahl, F. 2008, *Atomic diffusion and mixing in old stars. II. Observations of stars in the globular cluster NGC 6397 with VLT/FLAMES-GIRAFFE*, A&A, 490, 777
Linder, N., Rauw, G., Martins, F., Sana, H., De Becker, M. & Gosset, E. 2008, *High-resolution optical spectroscopy of Plaskett's star*, A&A, 489, 713
Lira, P., Gonzalez-Corvalan, V., Ward, M. & Hoyer, S. 2008, *An infrared study of the double nucleus in NGC3256*, MNRAS, 384, 316
Liseau, R., Risacher, C., Brandeker, A., Eiroa, C., Fridlund, M., Nilsson, R., Olofsson, G., Pilbratt, G. L. & Thébault, P. 2008, *q1 Eridani: a solar-type star with a planet and a dust belt*, A&A, 480, L47
Littlefair, S. P., Dhillon, V. S., Marsh, T. R., Shahbaz, T., Martín, E. L. & Copperwheat, C. 2008, *Optical variability of the ultracool dwarf TVLM 513-46546: evidence for inhomogeneous dust clouds*, MNRAS, 391, L88
Liu, C. T., Capak, P., Mobasher, B., Paglione, T. D., Rich, R. M., Scoville, N. Z., Tribiano, S. M. & Tyson, N. D. 2008, *The Faint-End Slopes of Galaxy Luminosity Functions in the COSMOS Field*, ApJ, 672, 198
Loeillet, B., Bouchy, F., Deleuil, M., Royer, F., Bouret, J. C., Moutou, C., Barge, P., de Laverny, P., Pont, F., Recio-Blanco, A. & Santos, N. C. 2008, *Doppler search for exoplanet candidates and binary stars in a CoRoT field using a multi-fiber spectrograph. I. Global analysis and first results*, A&A, 479, 865
López-Sánchez, A. R. & Esteban, C. 2008, *Massive star formation in Wolf-Rayet galaxies. I. Optical and NIR photometric results*, A&A, 491, 131
Luna, R., Cox, N. J., Satorre, M. A., García \Hernández, D. A., Suárez, O. & García Lario, P. 2008, *A search for diffuse bands in the circumstellar envelopes of post-AGB stars*, A&A, 480, 133
Luo, B., Bauer, F. E., Brandt, W. N., Alexander, D. M., Lehmer, B. D., Schneider, D. P., Brusa, M., Comastri, A., Fabian, A. C., Finoguenov, A., Gilli, R., Hasinger, G., Hornschemeier, A. E., Koekemoer, A., Mainieri, V., Paolillo, M., Rosati, P., Shemmer, O., Silverman, J. D., Smail, I., Steffen, A. T. & Vignali, C. 2008, *The Chandra Deep Field-South Survey: 2 Ms Source Catalogs*, ApJS, 179, 19
Lyubenova, M., Kuntschner, H. & Silva, D. R. 2008, *Central K-band kinematics and line strength maps of NGC 1399*, A&A, 485, 425
Maeda, K., Kawabata, K., Mazzali, P. A., Tanaka, M., Valenti, S., Nomoto, K., Hattori, T., Deng, J., Pian, E., Taubenberger, S., Iye, M., Matheson, T., Filippenko, A. V., Aoki, K., Kosugi, G., Ohyama, Y., Sasaki, T. & Takata, T. 2008, *Asphericity in Supernova Explosions from Late-Time Spectroscopy*, Sci, 319, 1220
Mainieri, V., Kellermann, K. I., Fomalont, E. B., Miller, N., Padovani, P., Rosati, P., Shaver, P., Silverman, J., Tozzi, P., Bergeron, J., Hasinger, G., Norman, C. & Popesso, P. 2008, *The VLA Survey of the Chandra Deep Field-South. II. Identification and Host Galaxy Properties of Submillijansky Sources*, ApJS, 179, 95
Maiolino, R., Nagao, T., Grazian, A., Cocchia, F., Marconi, A., Mannucci, F., Cimatti, A., Pipino, A., Ballero, S., Calura, F., Chiappini, C., Fontana, A., Granato, G. L., Matteucci, F., Pastorini, G., Pentericci, L., Risaliti, G., Salvati, M. & Silva, L. 2008, *AMAZE. I. The evolution of the mass-metallicity relation at z > 3*, A&A, 488, 463
Mandelbaum, R., Seljak, U., Hirata, C. M., Bardelli, S., Bolzonella, M., Bongiorno, A., Carollo, M., Contini, T., Cunha, C. E., Garilli, B., Iovino, A., Kampczyk, P., Kneib, J. P., Knobel, C., Koo, D. C., Lamareille, F., Le Fèvre, O., Leborgne, J. F., Lilly, S. J., Maier, C., Mainieri, V., Mignoli, M., Newman, J. A., Oesch, P. A., Perez-Montero, E., Ricciardelli, E., Scodeggio, M., Silverman, J. & Tasca, L. 2008, *Precision photometric redshift calibration for galaxy-galaxy weak lensing*, MNRAS, 386, 781
Manzi, S., Randich, S., de Wit, W. J. & Palla, F. 2008, *Detection of the lithium depletion boundary in the young open cluster IC 4665*, A&A, 479, 141
Maoz, D. & Mannucci, F. 2008, *A search for the progenitors of two TypeIa Supernovae in NGC 1316*, MNRAS, 388, 421
Marchis, F., Descamps, P., Baek, M., Harris, A. W., Kaasalainen, M., Berthier, J., Hestroffer, D. & Vachier, F. 2008, *Main belt binary asteroidal systems with circular mutual orbits*, Icar, 196, 97
Marchis, F., Descamps, P., Berthier, J., Hestroffer, D., Vachier, F., Baek, M., Harris, A. W. & Nesvorný, D. 2008, *Main belt binary asteroidal systems with eccentric mutual orbits*, Icar, 195, 295
Marciniak, A., Michałowski, T., Kaasalainen, M., Kryszczyńska, A., Kwiatkowski, T., Hirsch, R., Kamiński, K., Fagas, M., Polińska, M., Velichko, F. P., Michałowski, M. J., Snodgrass, C., Behrend, R. & Bernasconi, L. 2008, *Photometry and models of selected main belt asteroids. V. 73 Klytia, 377 Campania, and 378 Holmia*, A&A, 478, 559
Marino, A. F., Villanova, S., Piotto, G., Milone, A. P., Momany, Y., Bedin, L. R. & Medling, A. M. 2008, *Spectroscopic and photometric evidence of two stellar populations in the Galactic globular cluster NGC 6121 (M 4)*, A&A, 490, 625
Marinoni, C., Saintonge, A., Contini, T., Walcher, C. J., Giovanelli, R., Haynes, M. P., Masters, K. L., Ilbert, O., Iovino, A., Le Brun, V., Le Fevre, O., Mazure, A., Tresse, L., Virey, J. M., Bardelli, S., Bottini, D., Garilli, B., Guzzo, G., Maccagni, D., Picat, J. P., Scaramella, R., Scodeggio, M., Taxil, P., Vettolani, G., Zanichelli, A. & Zucca, E. 2008, *Geometrical tests of cosmological models. III. The Cosmology-evolution diagram at z = 1*, A&A, 478, 71
Marinoni, C., Guzzo, L., Cappi, A., Le Fèvre, O., Mazure, A., Meneux, B., Pollo, A., Iovino, A., McCracken, H. J., Scaramella, R., de La Torre, S., Virey, J. M., Bottini, D., Garilli, B., Le Brun, V., Maccagni, D., Picat, J. P., Scodeggio, M., Tresse, L., Vettolani, G., Zanichelli, A., Adami, C., Arnouts, S., Bardelli, S., Bolzonella, M., Charlot, S., Ciliegi, P., Contini, T., Foucaud, S., Franzetti, P., Gavignaud, I., Ilbert, O., Lamareille, F., Marano, B., Mathez, G., Merighi, R., Paltani, S., Pellò, R., Pozzetti, L., Radovich, M., Vergani, D., Zamorani, G., Zucca, E., Abbas, U., Bondi, M., Bongiorno, A., Brinchmann, J., Buzzi, A., Cucciati, O., de Ravel, L., Gregorini, L., Mellier, Y., Merluzzi, P., Perez-Montero, E., Taxil, P., Temporin, S. & Walcher, C. J. 2008, *The VIMOS VLT Deep Survey. Testing the gravitational instability paradigm at z ~ 1*, A&A, 487, 7
Marquette, J. B., Tisserand, P., François, P., Beaulieu, J. P., Doublier, V., Lesquoy, E., Milsztajn, A., Pritchard, J., Schwarzenberg-Czerny, A., Afonso, C., Albert, J. N., Andersen, J., Ansari, R., Aubourg, E., Bareyre, P., Charlot, X., Coutures, C., Ferlet, R., Fouqué, P., Glicenstein, J. F., Goldman, B., Gould, A., Graff, D., Gros, M., Haissinski, J., Hamadache, C., de Kat, J., Le Guillou, L., Loup, C., Magneville, C., Maurice, E., Maury, A., Moniez, M., Palanque-Delabrouille, N., Perdereau, O., Rahal, Y. R., Rich, J., Spiro, M., Vidal-Madjar, A. & Zylberajch, S. 2008, *Discovery of a peculiar Cepheid-like star towards the northern edge of the Small Magellanic Cloud*, A&A, 486, 891
Martayan, C., Floquet, M., Hubert, A. M., Neiner, C., Frémat, Y., Baade, D. & Fabregat, J. 2008, *Early-type objects in NGC 6611 and the Eagle Nebula*, A&A, 489, 459
Martayan, C., Frémat, Y., Blomme, R., Jonckheere, A., Delle-Luche, C., Sartoretti, P., Katz, D., Viala, Y., Floquet, M., Hubert, A. M. & Neiner, C. 2008, *Radial velocities, dynamics of stars and nebulosities with GAIA and VLT-GIRAFFE*, AN, 329, 1033
Martín-Hernández, N. L., Peeters, E. & Tielens, A. M. 2008, *A mid-infrared study of H II regions in the Magellanic Clouds: N88 A and N160 A*, A&A, 489, 1189
Martin-Zaïdi, C., van Dishoeck, E. F., Augereau, J. C., Lagage, P. O. & Pantin, E. 2008, *Searching for molecular hydrogen mid-infrared emission in the circumstellar environments of Herbig Be stars*, A&A, 489, 601
Martins, F., Gillessen, S., Eisenhauer, F., Genzel, R., Ott, T. & Trippe, S. 2008, *On the Nature of the Fast-Moving Star S2 in the Galactic Center*, ApJ, 672, L119
Martins, F., Hillier, D. J., Paumard, T., Eisenhauer, F., Ott, T. & Genzel, R. 2008, *The most massive stars in the Arches cluster*, A&A, 478, 219
Maschietto, F., Hatch, N. A., Venemans, B. P., Röttgering, H. A., Miley, G. K., Overzier, R. A., Dopita, M. A., Eisenhardt, P. R., Kurk, J. D., Meurer, G. R., Pentericci, L., Rosati, P., Stanford, S. A., van Breugel, W. & Zirm, A. W. 2008, *[OIII] emitters in the field of the MRC0316-257 protocluster*, MNRAS, 389, 1223
Masetti, N., Mason, E., Landi, R., Giommi, P., Bassani, L., Malizia, A., Bird, A. J., Bazzano, A., Dean, A. J., Gehrels, N., Palazzi, E. & Ubertini, P. 2008, *High-redshift blazar identification for Swift J1656.3-3302*, A&A, 480, 715

Masetti, N., Mason, E., Morelli, L., Cellone, S. A., McBride, V. A., Palazzi, E., Bassani, L., Bazzano, A., Bird, A. J., Charles, P. A., Dean, A. J., Galaz, G., Gehrels, N., Landi, R., Malizia, A., Minniti, D., Panessa, F., Romero, G. E., Stephen, J. B., Ubertini, P. & Walter, R. 2008, *Unveiling the nature of INTEGRAL objects through optical spectroscopy. VI. A multi-observatory identification campaign*, A&A, 482, 113

Mashonkina, L., Zhao, G., Gehren, T., Aoki, W., Bergemann, M., Noguchi, K., Shi, J. R., Takada-Hidai, M. & Zhang, H. W. 2008, *Non-LTE line formation for heavy elements in four very metal-poor stars*, A&A, 478, 529

Mason, E., Howell, S. B., Barman, T., Szkody, P. & Wickramasinghe, D. 2008, *VV Puppis in a low state: secondary-star irradiation or stellar activity?*, A&A, 490, 279

Mattila, S., Smartt, S. J., Eldridge, J. J., Maund, J. R., Crockett, R. M. & Danziger, I. J. 2008, *VLT Detection of a Red Supergiant Progenitor of the Type II-P Supernova 2008bk*, ApJ, 688, L91

Maughan, B. J., Jones, L. R., Pierre, M., Andreon, S., Birkinshaw, M., Bremer, M. N., Pacaud, F., Ponman, T. J., Valtchanov, I. & Willis, J. 2008, *Testing the galaxy cluster mass-observable relations at z = 1 with XMM-Newton and Chandra observations of XLSSJ022403.9-041328*, MNRAS, 387, 998

Maurogordato, S., Cappi, A., Ferrari, C., Benoist, C., Mars, G., Soucail, G., Arnaud, M., Pratt, G. W., Bourdin, H. & Sauvageot, J. L. 2008, *A 2163: Merger events in the hottest Abell galaxy cluster. I. Dynamical analysis from optical data*, A&A, 481, 593

Maxted, P. L., Jeffries, R. D., Oliveira, J. M., Naylor, T. & Jackson, R. J. 2008, *A survey for low-mass spectroscopic binary stars in the young clusters around σ Orionis and λ Orionis*, MNRAS, 385, 2210

Mayer, P., Harmanec, P., Nesslinger, S., Lorenz, R., Drechsel, H., Morrell, N. & Wolf, M. 2008, *Improved estimates of the physical properties of the O-star binary V1007 Sco = HD 152248 and notes on several other binaries in the NGC 6231 cluster*, A&A, 481, 183

Mazzali, P. A., Valenti, S., Della Valle, M., Chincarini, G., Sauer, D. N., Benetti, S., Pian, E., Piran, T., D'Elia, V., Elias-Rosa, N., Margutti, R., Pasotti, F., Antonelli, L. A., Bufano, F., Campana, S., Cappellaro, E., Covino, S., D'Avanzo, P., Fiore, F., Fugazza, D., Gilmozzi, R., Hunter, D., Maguire, K., Maiorano, E., Marziani, P., Masetti, N., Mirabel, F., Navasardyan, H., Nomoto, K., Palazzi, E., Pastorello, A., Panagia, N., Pellizza, L. J., Sari, R., Smartt, S., Tagliaferri, G., Tanaka, M., Taubenberger, S., Tominaga, N., Trundle, C. & Turatto, M. 2008, *The Metamorphosis of Supernova SN 2008D/XRF 080109: A Link Between Supernovae and GRBs/Hypernovae*, Sci, 321, 1185

McBride, V. A., Coe, M. J., Negueruela, I., Schurch, M. E. & McGowan, K. E. 2008, *Spectral distribution of Be/X-ray binaries in the Small Magellanic Cloud*, MNRAS, 388, 1198

McGowan, K. E., Coe, M. J., Schurch, M. E., Corbet, R. D., Galache, J. L. & Udalski, A. 2008, *Optical and X-ray variability of two Small Magellanic Cloud X-ray binary pulsars - SXP46.6 and SXP6.85*, MNRAS, 384, 821

McSwain, M. V. 2008, *Detection of Magnetic Massive Stars in the Open Cluster NGC 3766*, ApJ, 686, 1269

Meilland, A., Millour, F., Stee, P., Spang, A., Petrov, R., Bonneau, D., Perraut, K. & Massi, F. 2008, *δ Centauri: a new binary Be star detected by VLTI/AMBER spectro-interferometry*, A&A, 488, L67

Melinder, J., Mattila, S., Ã-Stlin, G., Mencía Trinchant, L. & Fransson, C. 2008, *Detection efficiency and photometry in supernova surveys. The Stockholm VIMOS Supernova Survey I*, A&A, 490, 419

Melita, M. D., Licandro, J., Jones, D. C. & Williams, I. P. 2008, *Physical properties and orbital stability of the Trojan asteroids*, Icar, 195, 686

Méndez, R. H., Teodorescu, A. M. & Kudritzki, R. P. 2008, *A Catalog of Planetary Nebulae in the Elliptical Galaxy NGC 4697*, ApJS, 175, 522

Méndez-Abreu, J., Corsini, E. M., Debattista, V. P., De Rijcke, S., Aguerri, J. L. & Pizzella, A. 2008, *Confirmation of a Kinematic Diagnostic for Face-On Box/Peanut-shaped Bulges*, ApJ, 679, L73

Meneux, B., Guzzo, L., Garilli, B., Le Fèvre, O., Pollo, A., Blaizot, J., De Lucia, G., Bolzonella, M., Lamareille, F., Pozzetti, L., Cappi, A., Iovino, A., Marinoni, C., McCracken, H. J., de La Torre, S., Bottini, D., Le Brun, V., Maccagni, D., Picat, J. P., Scaramella, R., Scodeggio, M., Tresse, L., Vettolani, G., Zanichelli, A., Abbas, U., Adami, C., Arnouts, S., Bardelli, S., Bongiorno, A., Charlot, S., Ciliegi, P., Contini, T., Cucciati, O., Foucaud, S., Franzetti, P., Gavignaud, I., Ilbert, O., Marano, B., Mazure, A., Merighi, R., Paltani, S., Pellò, R., Radovich, M., Vergani, D., Zamorani, G. & Zucca, E. 2008, *The VIMOS-VLT Deep Survey (VVDS). The dependence of clustering on galaxy stellar mass at z ~ 1*, A&A, 478, 299

Mengel, S., Lehnert, M. D., Thatte, N. A., Vacca, W. D., Whitmore, B. & Chandar, R. 2008, *Young star clusters in interacting galaxies - NGC 1487 and NGC 4038/4039*, A&A, 489, 1091

Mennickent, R., Greiner, J., Arenas, J., Tovmassian, G., Mason, E., Tappert, C. & Papadaki, C. 2008, *The remarkable properties of the symbiotic star AE Circinus*, MNRAS, 383, 845

Mennickent, R. E., Kołaczkowski, Z., Michalska, G., Pietrzyński, G., Gallardo, R., Cidale, L., Granada, A. & Gieren, W. 2008, *The eclipsing LMC star OGLE05155332-6925581: a clue for double periodic variables*, MNRAS, 389, 1605

Menten, K. M., Lundgren, A., Belloche, A., Thorwirth, S. & Reid, M. J. 2008, *A multi-transition submillimeter water maser study of evolved stars. Detection of a new line near 475 GHz*, A&A, 477, 185

Menten, K. M., Güsten, R., Leurini, S., Thorwirth, S., Henkel, C., Klein, B., Carilli, C. L. & Reid, M. J. 2008, *Submillimeter water and ammonia absorption by the peculiar z ≈ 0.89 interstellar medium in the gravitational lens of the PKS 1830-211 system*, A&A, 492, 725

Mercurio, A., La Barbera, F., Haines, C. P., Merluzzi, P., Busarello, G. & Capaccioli, M. 2008, *Global properties of the rich cluster ABCG209 at z ~ 0.2. Spectroscopic and photometric catalogue*, MNRAS, 387, 1374

Merín, B., Jørgensen, J., Spezzi, L., Alcalá, J. M., Evans, N. I., Harvey, P. M., Prusti, T., Chapman, N., Huard, T., van Dishoeck, E. F. & Comerón, F. 2008, *The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds. XI. Lupus Observed with IRAC and MIPS*, ApJS, 177, 551

Mermilliod, J. C., Mayor, M. & Udry, S. 2008, *Red giants in open clusters. XIV. Mean radial velocities for 1309 stars and 166 open clusters*, A&A, 485, 303

Mermilliod, J. C., Platais, I., James, D. J., Grenon, M. & Cargile, P. A. 2008, *Membership, binarity, and rotation of F-G-K stars in the open cluster Blanco 1*, A&A, 485, 95

Meyer, L., Do, T., Ghez, A., Morris, M. R., Witzel, G., Eckart, A., Bélanger, G. & Schödel, R. 2008, *A 600 Minute Near-Infrared Light Curve of Sagittarius A**, ApJ, 688, L17

Middelberg, E., Norris, R. P., Cornwell, T. J., Voronkov, M. A., Siana, B. D., Boyle, B. J., Ciliegi, P., Jackson, C. A., Huynh, M. T., Berta, S., Rubele, S., Lonsdale, C. J., Ivison, R. J. & Smail, I. 2008, *Deep Australia Telescope Large Area Survey Radio Observations of the European Large Area ISO Survey S1/SPITZER Wide-Area Infrared Extragalactic Field*, AJ, 135, 1276

Mieske, S., Hilker, M., Jordán, A., Infante, L., Kissler-Patig, M., Rejkuba, M., Richtler, T., Côté, P., Baumgardt, H., West, M. J., Ferrarese, L. & Peng, E. W. 2008, *The nature of UCDs: Internal dynamics from an expanded sample and homogeneous database*, A&A, 487, 921

Mignani, R. P., Pavlov, G. G. & Kargaltsev, O. 2008, *A possible optical counterpart to the old nearby pulsar J0108-1431*, A&A, 488, 1027

Mignani, R. P., Falomo, R., Moretti, A., Treves, A., Turolla, R., Sartore, N., Zane, S., Arcidiacono, C., Lombini, M., Farinato, J., Baruffolo, A., Ragazzoni, R. & Marchetti, E. 2008, *Near-infrared VLT/MAD observations of the isolated neutron stars RX J0420.0-5022 and RX J1856.5-3754*, A&A, 488, 267

Mignani, R. P., Zaggia, S., de Luca, A., Perna, R., Bassan, N. & Caraveo, P. A. 2008, *Optical and infrared observations of the X-ray source 1WGA J1713.4-3949 in the G347.3-0.5 SNR*, A&A, 484, 457

Mignano, A., Prandoni, I., Gregorini, L., Parma, P., de Ruiter, H. R., Wieringa, M. H., Vettolani, G. & Ekers, R. D. 2008, *The ATESP 5 GHz radio survey. II. Physical properties of the faint radio population*, A&A, 477, 459

Milvang-Jensen, B., Noll, S., Halliday, C., Poggianti, B. M., Jablonka, P., Aragón-Salamanca, A., Saglia, R. P., Nowak, N., von der Linden, A., De Lucia, G., Pelló, R., Moustakas, J., Poirier, S., Bamford, S. P., Clowe, D. I., Dalcanton, J. J., Rudnick, G. H., Simard, L., White, S. M. & Zaritsky, D. 2008, *Spectroscopy of clusters in the ESO distant cluster survey (EDisCS). II. Redshifts, velocity dispersions, and substructure for clusters in the last 15 fields*, A&A, 482, 419

Minamidani, T., Mizuno, N., Mizuno, Y., Kawamura, A., Onishi, T., Hasegawa, T., Tatematsu, K., Ikeda, M., Moriguchi, Y., Yamaguchi, N., Ott, J., Wong, T., Muller, E., Pineda, J. L., Hughes, A., Staveley-Smith, L., Klein, U., Mizuno, A., Nikolić, S., Booth, R. S., Heikkilä, A., Nyman, L.-A., Lerner, M., Garay, G., Kim, S., Fujishita, M., Kawase, T., Rubio, M. & Fukui, Y. 2008, *Submillimeter Observations of Giant Molecular Clouds in the Large Magellanic Cloud: Temperature and Density as Determined from J=3-2 and J=1-0 Transitions of CO*, ApJS, 175, 485

Miranda, M., Sereno, M., de Filippis, E. & Paolillo, M. 2008, *The dynamical state of RX J1347.5-1145 from a combined strong lensing and X-ray analysis*, MNRAS, 385, 511

Misawa, T., Charlton, J. C. & Narayanan, A. 2008, *Supersolar Metallicity in Weak Mg II Absorption Systems at z ~ 1.7*, ApJ, 679, 220
Misgeld, I., Mieske, S. & Hilker, M. 2008, *The early-type dwarf galaxy population of the Hydra I cluster*, A&A, 486, 697
Miszalski, B., Acker, A., Moffat, A. J., Parker, Q. A. & Udalski, A. 2008, *Discovery of eclipsing binary central stars in the planetary nebulae M 3-16, H 2-29, and M 2-19*, A&A, 488, L79
Miszalski, B., Parker, Q. A., Acker, A., Birkby, J. L., Frew, D. J. & Kovacevic, A. 2008, *MASH-II: more planetary nebulae from the AAO/UKST Hα survey*, MNRAS, 384, 525
Mkrtichian, D. E., Hatzes, A. P., Saio, H. & Shobbrook, R. R. 2008, *The detection of the rich p-mode spectrum and asteroseismology of Przybylski's star*, A&A, 490, 1109
Molaro, P., Levshakov, S. A., Monai, S., Centurión, M., Bonifacio, P., D'Odorico, S. & Monaco, L. 2008, *UVES radial velocity accuracy from asteroid observations. I. Implications for fine structure constant variability*, A&A, 481, 559
Moll, S. L., de Grijs, R., Anders, P., Crowther, P. A., Larsen, S. S., Smith, L. J. & Portegies Zwart, S. F. 2008, *Dynamical mass of a star cluster in M 83: a test of fibre-fed multi-object spectroscopy*, A&A, 490, 125
Momany, Y., Ortolani, S., Bonatto, C., Bica, E. & Barbuy, B. 2008, *Multi-Conjugate Adaptive Optics VLT imaging of the distant old open cluster FSR1415*, MNRAS, 391, 1650
Moni Bidin, C., Catelan, M. & Altmann, M. 2008, *Is a binary fraction-age relation responsible for the lack of EHB binaries in globular clusters?*, A&A, 480, L1
Mora, M. D., Larsen, S. S. & Kissler-Patig, M. 2008, *Spectroscopy of globular clusters in the low-luminosity spiral galaxy NGC 45*, A&A, 489, 1065
Morel, T., Hubrig, S. & Briquet, M. 2008, *Nitrogen enrichment, boron depletion and magnetic fields in slowly-rotating B-type dwarfs*, A&A, 481, 453
Morel, T. & Butler, K. 2008, *The neon content of nearby B-type stars and its implications for the solar model problem*, A&A, 487, 307
Morelli, L., Pompei, E., Pizzella, A., Méndez-Abreu, J., Corsini, E. M., Coccato, L., Saglia, R. P., Sarzi, M. & Bertola, F. 2008, *Stellar populations of bulges in 14 cluster disc galaxies*, MNRAS, 389, 341
Morgan, C. W., Eyler, M. E., Kochanek, C. S., Morgan, N. D., Falco, E. E., Vuissoz, C., Courbin, F. & Meylan, G. 2008, *Simultaneous Estimation of Time Delays and Quasar Structure*, ApJ, 676, 80
Mosser, B., Deheuvels, S., Michel, E., Thévenin, F., Dupret, M. A., Samadi, R., Barban, C. & Goupil, M. J. 2008, *HD 203608, a quiet asteroseismic target in the old galactic disk*, A&A, 488, 635
Moutou, C., Bruntt, H., Guillot, T., Shporer, A., Guenther, E., Aigrain, S., Almenara, J. M., Alonso, R., Auvergne, M., Baglin, A., Barbieri, M., Barge, P., Benz, W., Bordé, P., Bouchy, F., Deeg, H. J., de La Reza, R., Deleuil, M., Dvorak, R., Erikson, A., Fridlund, M., Gillon, M., Gondoin, P., Hatzes, A., Hébrard, G., Jorda, L., Kabath, P., Lammer, H., Léger, A., Llebaria, A., Loeillet, B., Magain, P., Mayor, M., Mazeh, T., Ollivier, M., Pätzold, M., Pepe, F., Pont, F., Queloz, D., Rabus, M., Rauer, H., Rouan, D., Schneider, J., Udry, S. & Wuchterl, G. 2008, *Transiting exoplanets from the CoRoT space mission. V. CoRoT-Exo-4b: stellar and planetary parameters*, A&A, 488, L47
Mucciarelli, A., Carretta, E., Origlia, L. & Ferraro, F. R. 2008, *The Chemical Composition of Red Giant Stars in Four Intermediate-Age Clusters of the Large Magellanic Cloud*, AJ, 136, 375
Murakawa, K., Ohnaka, K., Driebe, T., Hofmann, K. H., Oya, S., Schertl, D. & Weigelt, G. 2008, *Near-IR bispectrum speckle interferometry, AO imaging polarimetry, and radiative transfer modeling of the proto-planetary nebula Frosty Leonis*, A&A, 489, 195
Murakawa, K., Preibisch, T., Kraus, S., Ageorges, N., Hofmann, K. H., Ishii, M., Oya, S., Rosen, A., Schertl, D. & Weigelt, G. 2008, *VLT/NACO and Subaru/CIAO JHK-band high-resolution imaging polarimetry of the Herbig Be star R Monocerotis*, A&A, 488, L75
Murphy, M. T., Webb, J. K. & Flambaum, V. V. 2008, *Revision of VLT/UVES constraints on a varying fine-structure constant*, MNRAS, 384, 1053
Mužić, K., Schödel, R., Eckart, A., Meyer, L. & Zensus, A. 2008, *IRS 13N: a new comoving group of sources at the Galactic center*, A&A, 482, 173
Narayanan, A., Charlton, J. C., Misawa, T., Green, R. E. & Kim, T. S. 2008, *The Chemical and Ionization Conditions in Weak Mg II Absorbers*, ApJ, 689, 782
Nardetto, N., Stoekl, A., Bersier, D. & Barnes, T. G. 2008, *High-resolution spectroscopy for Cepheids distance determination. III. A relation between γ-velocities and γ-asymmetries*, A&A, 489, 1255
Nardetto, N., Groh, J. H., Kraus, S., Millour, F. & Gillet, D. 2008, *High-resolution spectroscopy for Cepheids distance determination. IV. Time series of Hα line profiles*, A&A, 489, 1263
Nazé, Y., Walborn, N. R., Rauw, G., Martins, F., Pollock, A. T. & Bond, H. E. 2008, *Hd 148937: a Multiwavelength Study of the Third Galactic Member of the Of?p Class*, AJ, 135, 1946
Nehmé, C., Gry, C., Boulanger, F., Le Bourlot, J., Pineau Des Forêts, G. & Falgarone, E. 2008, *Multi-wavelength observations of a nearby multi-phase interstellar cloud*, A&A, 483, 471
Neichel, B., Hammer, F., Puech, M., Flores, H., Lehnert, M., Rawat, A., Yang, Y., Delgado, R., Amram, P., Balkowski, C., Cesarsky, C., Dannerbauer, H., Fuentes-Carrera, I., Guiderdoni, B., Kembhavi, A., Liang, Y. C., Nesvadba, N., Östlin, G., Pozzetti, L., Ravikumar, C. D., di Serego Alighieri, S., Vergani, D., Vernet, J. & Wozniak, H. 2008, *IMAGES. II. A surprisingly low fraction of undisturbed rotating spiral disks at z ~ 0.6. The morpho-kinematical relation 6 Gyr ago*, A&A, 484, 159
Nelemans, G., Voss, R., Roelofs, G. & Bassa, C. 2008, *Limits on the X-ray and optical luminosity of the progenitor of the Type Ia supernova 2007sr*, MNRAS, 388, 487
Nespoli, E., Fabregat, J. & Mennickent, R. E. 2008, *Unveiling the nature of six HMXBs through IR spectroscopy*, A&A, 486, 911
Nesvadba, N. H., Lehnert, M. D., De Breuck, C., Gilbert, A. M. & van Breugel, W. 2008, *Evidence for powerful AGN winds at high redshift: dynamics of galactic outflows in radio galaxies during the "Quasar Era"*, A&A, 491, 407
Nesvadba, N. H., Lehnert, M. D., Davies, R. I., Verma, A. & Eisenhauer, F. 2008, *Integral-field spectroscopy of a Lyman-break galaxy at z = 3.2: evidence for merging*, A&A, 479, 67
Neuhäuser, R., Mugrauer, M., Seifahrt, A., Schmidt, T. B. & Vogt, N. 2008, *Astrometric and photometric monitoring of GQ Lupi and its sub-stellar companion*, A&A, 484, 281
Nielbock, M., Chini, R., Hoffmeister, V. H., Nürnberger, D. A., Scheyda, C. M. & Steinacker, J. 2008, *Probing the centre of the large circumstellar disc in M17*, MNRAS, 388, 1031
Nielsen, E. L., Close, L. M., Biller, B. A., Masciadri, E. & Lenzen, R. 2008, *Constraints on Extrasolar Planet Populations from VLT NACO/SDI and MMT SDI and Direct Adaptive Optics Imaging Surveys: Giant Planets are Rare at Large Separations*, ApJ, 674, 466
Niemela, V. S., Gamen, R. C., Barbá, R. H., Fernández Lajús, E., Benaglia, P., Solivella, G. R., Reig, P. & Coe, M. J. 2008, *The very massive X-ray bright binary system Wack2134 (= WR21a)*, MNRAS, 389, 1447
Nieva, M. F. & Przybilla, N. 2008, *Carbon abundances of early B-type stars in the solar vicinity. Non-LTE line-formation for C II/III/IV and self-consistent atmospheric parameters*, A&A, 481, 199
Noterdaeme, P., Petitjean, P., Ledoux, C., Srianand, R. & Ivanchik, A. 2008, *HD molecules at high redshift. A low astration factor of deuterium in a solar-metallicity DLA system at z = 2.418*, A&A, 491, 397
Noterdaeme, P., Ledoux, C., Petitjean, P. & Srianand, R. 2008, *Molecular hydrogen in high-redshift damped Lyman-α systems: the VLT/UVES database*, A&A, 481, 327
Nowak, N., Saglia, R. P., Thomas, J., Bender, R., Davies, R. I. & Gebhardt, K. 2008, *The supermassive black hole of FornaxA*, MNRAS, 391, 1629
Ogando, R. C., Maia, M. G., Pellegrini, P. S. & da Costa, L. N. 2008, *Line Strengths of Early-Type Galaxies*, AJ, 135, 2424
Oguri, M., Inada, N., Clocchiatti, A., Kayo, I., Shin, M. S., Hennawi, J. F., Strauss, M. A., Morokuma, T., Schneider, D. P. & York, D. G. 2008, *Discovery of Four Gravitationally Lensed Quasars from the Sloan Digital Sky Survey*, AJ, 135, 520
Ohnaka, K., Izumiura, H., Leinert, C., Driebe, T., Weigelt, G. & Wittkowski, M. 2008, *Asymmetric silicate dust distribution toward the silicate carbon star BM Geminorum*, A&A, 490, 173
Ohnaka, K., Driebe, T., Hofmann, K. H., Weigelt, G. & Wittkowski, M. 2008, *Spatially resolved dusty torus toward the red supergiant WOH G64 in the Large Magellanic Cloud*, A&A, 484, 371
Origlia, L., Lena, S., Diolaiti, E., Ferraro, F. R., Valenti, E., Fabbri, S. & Beccari, G. 2008, *Probing the Galactic Bulge with Deep Adaptive Optics Imaging: The Age of NGC 6440*, ApJ, 687, L79
Ortolani, S., Bonatto, C., Bica, E., Momany, Y. & Barbuy, B. 2008, *The embedded cluster DBSB 48 in the nebula Hoffleit 18: Comparison with Trumpler 14*, NewA, 13, 508
Ortolani, S., Bica, E. & Barbuy, B. 2008, *The old metal-poor open cluster ESO 92-SC05: accreted from a dwarf galaxy?*, MNRAS, 388, 723
Otsuka, M., Izumiura, H., Tajitsu, A. & Hyung, S. 2008, *Detection of Fluorine in the Halo Planetary Nebula BoBn 1: Evidence for a Binary Progenitor Star*, ApJ, 682, L105

Ouchi, M., Shimasaku, K., Akiyama, M., Simpson, C., Saito, T., Ueda, Y., Furusawa, H., Sekiguchi, K., Yamada, T., Kodama, T., Kashikawa, N., Okamura, S., Iye, M., Takata, T., Yoshida, M. & Yoshida, M. 2008, *The Subaru/XMM-Newton Deep Survey (SXDS). IV. Evolution of Lyα Emitters from z=3.1 to 5.7 in the 1 deg2 Field: Luminosity Functions and AGN*, ApJS, 176, 301
Ovcharov, E. P., Nedialkov, P. L., Valcheva, A. T., Ivanov, V. D., Tikhonov, N. A., Stanev, I. S., Kostov, A. B. & Georgiev, T. B. 2008, *Optical monitoring of the z = 4.40 quasar Q2203+292*, MNRAS, 386, 819
Overzier, R. A., Bouwens, R. J., Cross, N. G., Venemans, B. P., Miley, G. K., Zirm, A. W., Benítez, N., Blakeslee, J. P., Coe, D., Demarco, R., Ford, H. C., Homeier, N. L., Illingworth, G. D., Kurk, J. D., Martel, A. R., Mei, S., Oliveira, I., Röttgering, H. A., Tsvetanov, Z. I. & Zheng, W. 2008, *Lyman Break Galaxies, Lyα Emitters, and a Radio Galaxy in a Protocluster at z = 4.1*, ApJ, 673, 143
Pace, G., Pasquini, L. & François, P. 2008, *Abundances of four open clusters from solar stars*, A&A, 489, 403
Pandian, J. D., Leurini, S., Menten, K. M., Belloche, A. & Goldsmith, P. F. 2008, *Detection of 6.7 GHz methanol absorption towards hot corinos*, A&A, 489, 117
Papadaki, C., Boffin, H. J. & Steeghs, D. 2008, *IP Pegasi in outburst: Echelle spectroscopy and Modulation Doppler Tomography*, JAD, 14, 2
Papadaki, C., Boffin, H. J., Steeghs, D. & Schmidtobreick, L. 2008, *V2051 Ophiuchi after superoutburst: out-of-plane material and the superhump light source*, A&A, 487, 611
Papaderos, P., Guseva, N. G., Izotov, Y. I. & Fricke, K. J. 2008, *Extremely metal-poor star-forming galaxies. New detections and general morphological and photometric properties*, A&A, 491, 113
Paron, S., Dubner, G., Reynoso, E. & Rubio, M. 2008, *High-resolution CO observations towards the bright eastern knot of the SNR Puppis A*, A&A, 480, 439
Pasquini, L., Ecuvillon, A., Bonifacio, P. & Wolff, B. 2008, *Nitrogen abundance in turn-off stars of NGC 6397 and NGC 6752*, A&A, 489, 315
Pasquini, L., Biazzo, K., Bonifacio, P., Randich, S. & Bedin, L. R. 2008, *Solar twins in M 67*, A&A, 489, 677
Pastorello, A., Mattila, S., Zampieri, L., Della Valle, M., Smartt, S. J., Valenti, S., Agnoletto, I., Benetti, S., Benn, C. R., Branch, D., Cappellaro, E., Dennefeld, M., Eldridge, J. J., Gal-Yam, A., Harutyunyan, A., Hunter, I., Kjeldsen, H., Lipkin, Y., Mazzali, P. A., Milne, P., Navasardyan, H., Ofek, E. O., Pian, E., Shemmer, O., Spiro, S., Stathakis, R. A., Taubenberger, S., Turatto, M. & Yamaoka, H. 2008, *Massive stars exploding in a He-rich circumstellar medium - I. Type Ibn (SN 2006jc-like) events*, MNRAS, 389, 113
& Patat, F. 2008, *The dancing sky: 6 years of night-sky observations at Cerro Paranal*, A&A, 481, 575
Peña, M., Ruiz, M. T., Rojo, P., Torres-Peimbert, S. & Hamann, W. R. 2008, *A New Outburst in the Extraordinary Central Star of LMC-N661,* ApJ, 680, L109
Pereira, C. B., Marcolino, W. F., Machado, M. & de Araújo, F. X. 2008, *Spectroscopic analysis of two peculiar emission-line stars: RJHA 49 and SS73 21*, A&A, 477, 877
Pérez, M. R., McCollum, B., van den Ancker, M. E. & Joner, M. D. 2008, *The enigmatic young object: Walker 90/V590 Monocerotis*, A&A, 486, 533
Perger, M., Moultaka, J., Eckart, A., Viehmann, T., Schödel, R. & Muzic, K. 2008, *Compact mid-IR sources east of Galactic Center source IRS5*, A&A, 478, 127
Péroux, C., Meiring, J. D., Kulkarni, V. P., Khare, P., Lauroesch, J. T., Vladilo, G. & York, D. G. 2008, *Metal abundances at z < 1.5: new measurements in sub-damped Lyman-α absorbers*, MNRAS, 386, 2209
Persi, P., Gómez, M., Tapia, M., Roth, M., DeBuizer, J. M. & Marenzi, A. R. 2008, *Star Formation in the Southern Dark Cloud DC 296.2-3.6*, AJ, 135, 2279
Petit, J. M., Kavelaars, J. J., Gladman, B. J., Margot, J. L., Nicholson, P. D., Jones, R. L., Parker, J. W., Ashby, M. N., Campo Bagatin, A., Benavidez, P., Coffey, J., Rousselot, P., Mousis, O. & Taylor, P. A. 2008, *The Extreme Kuiper Belt Binary 2001 QW322*, Sci, 322, 432
Petitjean, P., Ledoux, C. & Srianand, R. 2008, *The nitrogen and oxygen abundances in the neutral gas at high redshift*, A&A, 480, 349
Petrov, P. P. & Herbig, G. H. 2008, *Line Structure in the Spectrum of FU Orionis*, AJ, 136, 676
Pettini, M., Zych, B. J., Steidel, C. C. & Chaffee, F. H. 2008, *C, N, O abundances in the most metal-poor damped Lyman alpha systems*, MNRAS, 385, 2011
Pettini, M., Zych, B. J., Murphy, M. T., Lewis, A. & Steidel, C. C. 2008, *Deuterium abundance in the most metal-poor damped Lyman alpha system: converging on Ωb,0h2*, MNRAS, 391, 1499
Piatti, A. E., Geisler, D., Sarajedini, A., Gallart, C. & Wischnjewsky, M. 2008, *Seven young star clusters in the inner region of the Small Magellanic Cloud*, MNRAS, 389, 429
Pietrzyński, G., Gieren, W., Szewczyk, O., Walker, A., Rizzi, L., Bresolin, F., Kudritzki, R. P., Nalewajko, K., Storm, J., Dall'Ora, M. & Ivanov, V. 2008, *The Araucaria Project: the Distance to the Sculptor Dwarf Spheroidal Galaxy from Infrared Photometry of RR Lyrae Stars*, AJ, 135, 1993
Pignata, G., Benetti, S., Mazzali, P. A., Kotak, R., Patat, F., Meikle, P., Stehle, M., Leibundgut, B., Suntzeff, N. B., Buson, L. M., Cappellaro, E., Clocchiatti, A., Hamuy, M., Maza, J., Mendez, J., Ruiz-Lapuente, P., Salvo, M., Schmidt, B. P., Turatto, M. & Hillebrandt, W. 2008, *Optical and infrared observations of SN 2002dj: some possible common properties of fast-expanding Type Ia supernovae*, MNRAS, 388, 971
Pinfield, D. J., Burningham, B., Tamura, M., Leggett, S. K., Lodieu, N., Lucas, P. W., Mortlock, D. J., Warren, S. J., Homeier, D., Ishii, M., Deacon, N. R., McMahon, R. G., Hewett, P. C., Osori, M. Z., Martin, E. L., Jones, H. A., Venemans, B. P., Day-Jones, A. C., Dobbie, P. D., Folkes, S. L., Dye, S., Allard, F., Baraffe, I., Barrado Y Navascués, D., Casewell, S. L., Chiu, K., Chabrier, G., Clarke, F., Hodgkin, S. T., Magazzù, A., McCaughrean, M. J., Nakajima, T., Pavlenko, Y. & Tinney, C. G. 2008, *Fifteen new T dwarfs discovered in the UKIDSS Large Area Survey*, MNRAS, 390, 304
Piranomonte, S., Ward, P. A., Fiore, F., Vergani, S. D., D'Elia, V., Krongold, Y., Nicastro, F., Meurs, E. A., Chincarini, G., Covino, S., Della Valle, M., Fugazza, D., Norci, L., Sbordone, L., Stella, L., Tagliaferri, G., Burrows, D. N., Gehrels, N., Goldoni, P., Malesani, D., Mirabel, I. F., Pellizza, L. J. & Perna, R. 2008, *Probing the complex environments of GRB host galaxies and intervening systems: high resolution spectroscopy of GRB 050922C*, A&A, 492, 775
Piranomonte, S., D'Avanzo, P., Covino, S., Antonelli, L. A., Beardmore, A. P., Campana, S., Chincarini, G., D'Elia, V., Della Valle, M., Fiore, F., Fugazza, D., Guetta, D., Guidorzi, C., Israel, G. L., Lazzati, D., Malesani, D., Parsons, A. M., Perna, R., Stella, L., Tagliaferri, G. & Vergani, S. D. 2008, *The short GRB 070707 afterglow and its very faint host galaxy*, A&A, 491, 183
Pizzella, A., Tamburro, D., Corsini, E. M. & Bertola, F. 2008, *Detection of non-ordered central gas motions in a sample of four low surface brightness galaxies*, A&A, 482, 53
Pizzella, A., Corsini, E. M., Sarzi, M., Magorrian, J., Méndez-Abreu, J., Coccato, L., Morelli, L. & Bertola, F. 2008, *Structure and dynamics of galaxies with a low surface-brightness disc - I. The stellar and ionized-gas kinematics*, MNRAS, 387, 1099
Platais, I., Melo, C., Fulbright, J. P., Kozhurina-Platais, V., Figueira, P., Barnes, S. A. & Méndez, R. A. 2008, *Trumpler 20 - an old and rich open cluster†‡*, MNRAS, 391, 1482
Podio, L., Garcia, P. V., Bacciotti, F., Antoniucci, S., Nisini, B., Dougados, C. & Takami, M. 2008, *Tracing the origins of permitted emission lines in RU Lupi down to AU scales*, A&A, 480, 421
Poggianti, B. M., Desai, V., Finn, R., Bamford, S., De Lucia, G., Varela, J., Aragón-Salamanca, A., Halliday, C., Noll, S., Saglia, R., Zaritsky, D., Best, P., Clowe, D., Milvang-Jensen, B., Jablonka, P., Pelló, R., Rudnick, G., Simard, L., von der Linden, A. & White, S. 2008, *The Relation between Star Formation, Morphology, and Local Density in High-Redshift Clusters and Groups*, ApJ, 684, 888
Polletta, M., Omont, A., Berta, S., Bergeron, J., Stalin, C. S., Petitjean, P., Giorgetti, M., Trinchieri, G., Srianand, R., McCracken, H. J., Pei, Y. & Dannerbauer, H. 2008, *Obscured and powerful AGN and starburst activities at z ~ 3.5*, A&A, 492, 81
Pompéia, L., Hill, V., Spite, M., Cole, A., Primas, F., Romaniello, M., Pasquini, L., Cioni, M. R. & Smecker Hane, T. 2008, *Chemical abundances in LMC stellar populations. I. The inner disk sample*, A&A, 480, 379
Pompéia, L. & Allen, D. M. 2008, *HD 11397 and HD 14282: two new barium stars?*, A&A, 488, 723
Poncelet, A., Sol, H. & Perrin, G. 2008, *Dynamics of the ionization bicone of NGC 1068 probed in mid-infrared with VISIR*, A&A, 481, 305
Pont, F., Tamuz, O., Udalski, A., Mazeh, T., Bouchy, F., Melo, C., Naef, D., Santos, N. C., Moutou, C., Diaz, R. F., Gieren, W., Gillon, M., Hoyer, S., Kubiak, M., Mayor, M., Minniti, D., Pietrzynski, G., Queloz, D., Ramirez, S., Ruiz, M. T., Shporer, A., Soszyński, I., Szewczyk, O., Szymański, M. K., Udry, S., Ulaczyk, K., Wyrzykowski, L. & Zoccali, M. 2008, *A transiting planet among 23 new near-threshold candidates from the OGLE survey - OGLE-TR-182*, A&A, 487, 749

Pontoppidan, K. M., Blake, G. A., van Dishoeck, E. F., Smette, A., Ireland, M. J. & Brown, J. 2008, *Spectroastrometric Imaging of Molecular Gas within Protoplanetary Disk Gaps*, ApJ, 684, 1323
Pontoppidan, K. M., Boogert, A. A., Fraser, H. J., van Dishoeck, E. F., Blake, G. A., Lahuis, F., Öberg, K. I., Evans, N. I. & Salyk, C. 2008, *The c2d Spitzer Spectroscopic Survey of Ices around Low-Mass Young Stellar Objects. II. CO2*, ApJ, 678, 1005
Poretti, E., Clementini, G., Held, E. V., Greco, C., Mateo, M., Dell'Arciprete, L., Rizzi, L., Gullieuszik, M. & Maio, M. 2008, *Variable Stars in the Fornax dSph Galaxy. II. Pulsating Stars below the Horizontal Branch*, ApJ, 685, 947
Porquet, D., Grosso, N., Predehl, P., Hasinger, G., Yusef-Zadeh, F., Aschenbach, B., Trap, G., Melia, F., Warwick, R. S., Goldwurm, A., Bélanger, G., Tanaka, Y., Genzel, R., Dodds-Eden, K., Sakano, M. & Ferrando, P. 2008, *X-ray hiccups from Sagittarius A* observed by XMM-Newton. The second brightest flare and three moderate flares caught in half a day*, A&A, 488, 549
Pott, J. U., Eckart, A., Glindemann, A., Kraus, S., Schödel, R., Ghez, A. M., Woillez, J. & Weigelt, G. 2008, *First VLTI infrared spectro-interferometry on GCIRS 7. Characterizing the prime reference source for Galactic center observations at highest angular resolution*, A&A, 487, 413
Pott, J. U., Eckart, A., Glindemann, A., Schödel, R., Viehmann, T. & Robberto, M. 2008, *The enigma of GCIRS 3. Constraining the properties of the mid-infrared reference star of the central parsec of the Milky Way with optical long-baseline interferometry*, A&A, 480, 115
Pretorius, M. L. & Knigge, C. 2008, *An Hα-selected sample of cataclysmic variables - I. Observations of newly discovered systems*, MNRAS, 385, 1471
Prisinzano, L., Micela, G., Flaccomio, E., Stauffer, J. R., Megeath, T., Rebull, L., Robberto, M., Smith, K., Feigelson, E. D., Grosso, N. & Wolk, S. 2008, *X-Ray Properties of Protostars in the Orion Nebula*, ApJ, 677, 401
Prochaska, J. X., Dessauges-Zavadsky, M., Ramirez-Ruiz, E. & Chen, H. W. 2008, *A Survey for N V Absorption at z ~ zGRB in GRB Afterglow Spectra: Clues to Gas Near the Progenitor Star*, ApJ, 685, 344
Protopapa, S., Boehnhardt, H., Herbst, T. M., Cruikshank, D. P., Grundy, W. M., Merlin, F. & Olkin, C. B. 2008, *Surface characterization of Pluto and Charon by L and M band spectra*, A&A, 490, 365
Przybilla, N., Nieva, M. F., Tillich, A., Heber, U., Butler, K. & Brown, W. R. 2008, *HVS 7: a chemically peculiar hyper-velocity star*, A&A, 488, L51
Przybilla, N., Nieva, M. F., Heber, U., Firnstein, M., Butler, K., Napiwotzki, R. & Edelmann, H. 2008, *LMC origin of the hyper-velocity star HE 0437-5439. Beyond the supermassive black hole paradigm*, A&A, 480, L37
Przybilla, N., Nieva, M. F. & Butler, K. 2008, *A Cosmic Abundance Standard: Chemical Homogeneity of the Solar Neighborhood and the ISM Dust-Phase Composition*, ApJ, 688, L103
Przybilla, N., Nieva, M. F., Heber, U. & Butler, K. 2008, *HD 271791: An Extreme Supernova Runaway B Star Escaping from the Galaxy*, ApJ, 684, L103
Puech, M., Flores, H., Hammer, F., Yang, Y., Neichel, B., Lehnert, M., Chemin, L., Nesvadba, N., Epinat, B., Amram, P., Balkowski, C., Cesarsky, C., Dannerbauer, H., di Serego Alighieri, S., Fuentes-Carrera, I., Guiderdoni, B., Kembhavi, A., Liang, Y. C., Östlin, G., Pozzetti, L., Ravikumar, C. D., Rawat, A., Vergani, D., Vernet, J. & Wozniak, H. 2008, *IMAGES. III. The evolution of the near-infrared Tully-Fisher relation over the last 6 Gyr*, A&A, 484, 173
Puzia, T. H. & Sharina, M. E. 2008, *VLT Spectroscopy of Globular Clusters in Low Surface Brightness Dwarf Galaxies*, ApJ, 674, 909
Quast, R., Reimers, D. & Baade, R. 2008, *HE 0515-4414: an unusual sub-damped Lyα system revisited*, A&A, 477, 443
Raban, D., Heijligers, B., Röttgering, H., Meisenheimer, K., Jaffe, W., Käufl, H. U. & Henning, T. 2008, *The core flux of the brightest 10 μm galaxies in the southern sky*, A&A, 484, 341
Rahoui, F. & Chaty, S. 2008, *IGR J18483-0311: a new intermediate supergiant fast X-ray transient*, A&A, 492, 163
Rahoui, F., Chaty, S., Lagage, P. O. & Pantin, E. 2008, *Multi-wavelength observations of Galactic hard X-ray sources discovered by INTEGRAL. II. The environment of the companion star*, A&A, 484, 801
Rampazzo, R., Bonoli, C. & Giro, E. 2008, *Polarimetric imaging of interacting pairs*, AN, 329, 855
Rau, A., Ofek, E. O., Kulkarni, S. R., Madore, B. F., Pevunova, O. & Ajello, M. 2008, *A Survey for Fast Transients in the Fornax Cluster of Galaxies*, ApJ, 682, 1205
Rauch, M., Haehnelt, M., Bunker, A., Becker, G., Marleau, F., Graham, J., Cristiani, S., Jarvis, M., Lacey, C., Morris, S., Peroux, C., Röttgering, H. & Theuns, T. 2008, *A Population of Faint Extended Line Emitters and the Host Galaxies of Optically Thick QSO Absorption Systems*, ApJ, 681, 856
Rawat, A., Hammer, F., Kembhavi, A. K. & Flores, H. 2008, *Toward a Robust Estimate of the Merger Rate Evolution Using Near-IR Photometry*, ApJ, 681, 1089
Rawle, T. D., Smith, R. J., Lucey, J. R. & Swinbank, A. M. 2008, *Stellar population gradients in early-type cluster galaxies with VIMOS IFU*, MNRAS, 389, 1891
Rebassa-Mansergas, A., Gänsicke, B. T., Schreiber, M. R., Southworth, J., Schwope, A. D., Gomez-Moran, A. N., Aungwerojwit, A., Rodríguez-Gil, P., Karamanavis, V., Krumpe, M., Tremou, E., Schwarz, R., Staude, A. & Vogel, J. 2008, *Post-common envelope binaries from SDSS - III. Seven new orbital periods*, MNRAS, 390, 1635
Reimers, D., Hagen, H. J., Baade, R. & Braun, K. 2008, *The Antares emission nebula and mass loss of α Scorpii A*, A&A, 491, 229
Reiners, A. & Basri, G. 2008, *Chromospheric Activity, Rotation, and Rotational Braking in M and L Dwarfs*, ApJ, 684, 1390
Reiners, A. & Basri, G. 2008, *The moderate magnetic field of the flare star Proxima Centauri*, A&A, 489, L45
Richichi, A., Fors, O., Mason, E., Stegmeier, J. & Chandrasekhar, T. 2008, *Milliarcsecond angular resolution of reddened stellar sources in the vicinity of the Galactic center*, A&A, 489, 1399
Richichi, A., Fors, O. & Mason, E. 2008, *Milliarcsecond angular resolution of reddened stellar sources in the vicinity of the Galactic center. II. Additional observations*, A&A, 489, 1441
Richtler, T., Schuberth, Y., Hilker, M., Dirsch, B., Bassino, L. & Romanowsky, A. J. 2008, *The dark matter halo of NGC 1399 - CDM or MOND?*, A&A, 478, L23
Rickes, M. G., Pastoriza, M. G. & Bonatto, C. 2008, *Star formation, metallicity gradient and ionized gas: clues to the formation of the elliptical galaxies NGC6868 and 5903*, MNRAS, 384, 1427
Rivinius, T., Tefl, S. A., Townsend, R. D. & Baade, D. 2008, *The most rapidly rotating He-strong emission line star: HR 7355*, A&A, 482, 255
Rodler, F., Kürster, M. & Henning, T. 2008, *HD 75289Ab revisited. Searching for starlight reflected from a hot Jupiter*, A&A, 485, 859
Rodrigues, M., Hammer, F., Flores, H., Puech, M., Liang, Y. C., Fuentes-Carrera, I., Nesvadba, N., Lehnert, M., Yang, Y., Amram, P., Balkowski, C., Cesarsky, C., Dannerbauer, H., Delgado, R., Guiderdoni, B., Kembhavi, A., Neichel, B., Östlin, G., Pozzetti, L., Ravikumar, C. D., Rawat, A., di Serego Alighieri, S., Vergani, D., Vernet, J. & Wozniak, H. 2008, *IMAGES IV: strong evolution of the oxygen abundance in gaseous phases of intermediate mass galaxies from z ~ 0.8*, A&A, 492, 371
Roederer, I. U., Frebel, A., Shetrone, M. D., Allende Prieto, C., Rhee, J., Gallino, R., Bisterzo, S., Sneden, C., Beers, T. C. & Cowan, J. J. 2008, *The Hobby-Eberly Telescope Chemical Abundances of Stars in the Halo (CASH) Project. I. The Lithium-, s-, and r-enhanced Metal-poor Giant HKII 17435-00532*, ApJ, 679, 1549
Roelofs, G., Bassa, C., Voss, R. & Nelemans, G. 2008, *On the detection of the progenitor of the type Ia supernova 2007on*, MNRAS, 391, 290.
Rojas, G., Gregorio-Hetem, J. & Hetem, A. 2008, *Towards the main sequence: detailed analysis of weak line and post-T Tauri stars*, MNRAS, 387, 1335
Romaniello, M., Primas, F., Mottini, M., Pedicelli, S., Lemasle, B., Bono, G., François, P., Groenewegen, M. T. & Laney, C. D. 2008, *The influence of chemical composition on the properties of Cepheid stars. II. The iron content*, A&A, 488, 731
Rost, S., Eckart, A. & Ott, T. 2008, *Near-infrared polarization images of the Orion proplyds*, A&A, 485, 107
& Rousselot, P. 2008, *174P/Echeclus: a strange case of outburst*, A&A, 480, 543
Rushton, M. T., Evans, A., Eyres, S. S., van Loon, J. T. & Smalley, B. 2008, *How peculiar is the `peculiar variable' DZ Crucis (Nova Cru 2003)?*, MNRAS, 386, 289
Russell, D. M. & Fender, R. P. 2008, *Polarized infrared emission from X-ray binary jets*, MNRAS, 387, 713
Ryabchikova, T., Kochukhov, O. & Bagnulo, S. 2008, *Isotopic anomaly and stratification of Ca in magnetic Ap stars*, A&A, 480, 811
Sabbadin, F., Turatto, M., Benetti, S., Ragazzoni, R. & Cappellaro, E. 2008, *The gas turbulence in planetary nebulae: quantification and multi-D maps from long-slit, wide-spectral range echellograms*, A&A, 488, 225

Sacco, G. G., Franciosini, E., Randich, S. & Pallavicini, R. 2008, *FLAMES spectroscopy of low-mass stars in the young clusters σ Ori and λ Ori*, A&A, 488, 167
Sachkov, M., Kochukhov, O., Ryabchikova, T., Huber, D., Leone, F., Bagnulo, S. & Weiss, W. W. 2008, *Pulsations in the atmosphere of the rapidly oscillating Ap star 10Aquilae*, MNRAS, 389, 903
Sacuto, S., Jorissen, A., Cruzalèbes, P., Chesneau, O., Ohnaka, K., Quirrenbach, A. & Lopez, B. 2008, *The close circumstellar environment of the semi-regular S-type star π 1 Gruis*, A&A, 482, 561
Saito, T., Shimasaku, K., Okamura, S., Ouchi, M., Akiyama, M., Yoshida, M. & Ueda, Y. 2008, *Deep Spectroscopy of Systematically Surveyed Extended Lyα Sources at z ~ 3-5*, ApJ, 675, 1076
Saitta, F., D'Odorico, V., Bruscoli, M., Cristiani, S., Monaco, P. & Viel, M. 2008, *Tracing the gas at redshift 1.7-3.5 with the Lyα forest: the FLO approach*, MNRAS, 385, 519
Sako, M., Bassett, B., Becker, A., Cinabro, D., DeJongh, F., Depoy, D. L., Dilday, B., Doi, M., Frieman, J. A., Garnavich, P. M., Hogan, C. J., Holtzman, J., Jha, S., Kessler, R., Konishi, K., Lampeitl, H., Marriner, J., Miknaitis, G., Nichol, R. C., Prieto, J. L., Riess, A. G., Richmond, M. W., Romani, R., Schneider, D. P., Smith, M., Subba Rao, M., Takanashi, N., Tokita, K., van der Heyden, K., Yasuda, N., Zheng, C., Barentine, J., Brewington, H., Choi, C., Dembicky, J., Harnavek, M., Ihara, Y., Im, M., Ketzeback, W., Kleinman, S. J., Krzesiński, J., Long, D. C., Malanushenko, E., Malanushenko, V., McMillan, R. J., Morokuma, T., Nitta, A., Pan, K., Saurage, G. & Snedden, S. A. 2008, *The Sloan Digital Sky Survey-II Supernova Survey: Search Algorithm and Follow-Up Observations*, AJ, 135, 348
Salimbeni, S., Giallongo, E., Menci, N., Castellano, M., Fontana, A., Grazian, A., Pentericci, L., Trevese, D., Cristiani, S., Nonino, M. & Vanzella, E. 2008, *The red and blue galaxy populations in the GOODS field: evidence for an excess of red dwarfs*, A&A, 477, 763
Sana, H., Nazé, Y., O'Donnell, B., Rauw, G. & Gosset, E. 2008, *The massive binary HD 152218 revisited: A new colliding wind system in NGC 6231*, NewA, 13, 202
Sana, H., Gosset, E., Nazé, Y., Rauw, G. & Linder, N. 2008, *The massive star binary fraction in young open clusters - I. NGC 6231 revisited*, MNRAS, 386, 447
Sánchez Contreras, C., Sahai, R., Gil de Paz, A. & Goodrich, R. 2008, *Echelle Long-Slit Optical Spectroscopy of Evolved Stars*, ApJS, 179, 166
Sani, E., Risaliti, G., Salvati, M., Maiolino, R., Marconi, A., Berta, S., Braito, V., Della Ceca, R. & Franceschini, A. 2008, *3-5 μm Spectroscopy of Obscured AGNs in ULIRGs*, ApJ, 675, 96
Sansom, A. E. & Northeast, M. S. 2008, *Bimodality in low-luminosity E and S0 galaxies*, MNRAS, 387, 331
Santander-García, M., Corradi, R. M., Mampaso, A., Morisset, C., Munari, U., Schirmer, M., Balick, B. & Livio, M. 2008, *Hen 2-104: a close-up look at the Southern Crab*, A&A, 485, 117
Santos, N. C., Melo, C., James, D. J., Gameiro, J. F., Bouvier, J. & Gomes, J. I. 2008, *Chemical abundances in six nearby star-forming regions. Implications for galactic evolution and planet searches around very young stars*, A&A, 480, 889
Santos, N. C., Udry, S., Bouchy, F., da Silva, R., Loeillet, B., Mayor, M., Moutou, C., Pont, F., Queloz, D., Zucker, S., Naef, D., Pepe, F., Ségransan, D., Boisse, I., Bonfils, X., Delfosse, X., Desort, M., Forveille, T., Hébrard, G., Lagrange, A. M., Lovis, C., Perrier, C. & Vidal-Madjar, A. 2008, *ELODIE metallicity-biased search for transiting Hot Jupiters. V. An intermediate-period Jovian planet orbiting HD 45652*, A&A, 487, 369
Saviane, I., Ivanov, V. D., Held, E. V., Alloin, D., Rich, R. M., Bresolin, F. & Rizzi, L. 2008, *Luminosity-metallicity relation for dIrr galaxies in the near-infrared*, A&A, 487, 901
Schawinski, K., Justham, S., Wolf, C., Podsiadlowski, P., Sullivan, M., Steenbrugge, K. C., Bell, T., Röser, H. J., Walker, E. S., Astier, P., Balam, D., Balland, C., Carlberg, R., Conley, A., Fouchez, D., Guy, J., Hardin, D., Hook, I., Howell, D. A., Pain, R., Perrett, K., Pritchet, C., Regnault, N. & Yi, S. K. 2008, *Supernova Shock Breakout from a Red Supergiant*, Sci, 321, 223
Schegerer, A. A., Wolf, S., Ratzka, T. & Leinert, C. 2008, *The T Tauri star RY Tauri as a case study of the inner regions of circumstellar dust disks*, A&A, 478, 779
Schmidt, T. B., Neuhäuser, R., Vogt, N., Seifahrt, A., Roell, T. & Bedalov, A. 2008, *Confirmation of the binary status of Chamaeleon Hα 2 - a very young low-mass binary in Chamaeleon*, A&A, 484, 413
Schmidt, T. B., Neuhäuser, R., Seifahrt, A., Vogt, N., Bedalov, A., Helling, C., Witte, S. & Hauschildt, P. H. 2008, *Direct evidence of a sub-stellar companion around CT Chamaeleontis*, A&A, 491, 311
Schmitt, J. M., Reale, F., Liefke, C., Wolter, U., Fuhrmeister, B., Reiners, A. & Peres, G. 2008, *A coronal explosion on the flare star CN Leonis*, A&A, 481, 799
Schnurr, O., Casoli, J., Chené, A. N., Moffat, A. J. & St-Louis, N. 2008, *The very massive binary NGC 3603-A1*, MNRAS, 389, L38
Scholz, R. D., Kharchenko, N. V., Lodieu, N. & McCaughrean, M. J. 2008, *An extremely wide and very low-mass pair with common proper motion. Is it representative of a nearby halo stream?*, A&A, 487, 595
Schramm, M., Wisotzki, L. & Jahnke, K. 2008, *Host galaxies of bright high redshift quasars: luminosities and colours*, A&A, 478, 311
Schreiber, M. R., Gänsicke, B. T., Southworth, J., Schwope, A. D. & Koester, D. 2008, *Post common envelope binaries from SDSS. II: Identification of 9 close binaries with VLT/FORS2*, A&A, 484, 441
Schröder, C., Hubrig, S. & Schmitt, J. M. 2008, *Magnetic fields in A-type stars associated with X-ray emission*, A&A, 484, 479
Searle, S. C., Prinja, R. K., Massa, D. & Ryans, R. 2008, *Quantitative studies of the optical and UV spectra of Galactic early B supergiants. I. Fundamental parameters*, A&A, 481, 777
Seifahrt, A. & Käufl, H. U. 2008, *High precision radial velocity measurements in the infrared. A first assessment of the RV stability of CRIRES*, A&A, 491, 929
Seifahrt, A., Röll, T., Neuhäuser, R., Reiners, A., Kerber, F., Käufl, H. U., Siebenmorgen, R. & Smette, A. 2008, *Improved orbital solution and masses for the very low-mass multiple system LHS 1070*, A&A, 484, 429
Seperuelo Duarte, E., Alencar, S. P., Batalha, C. & Lopes, D. 2008, *Spectrophotometric analysis of the T Tauri star GQ Lupi A*, A&A, 489, 349
Serra, P., Trager, S. C., Oosterloo, T. A. & Morganti, R. 2008, *Stellar populations, neutral hydrogen, and ionised gas in field early-type galaxies*, A&A, 483, 57
Servillat, M., Dieball, A., Webb, N. A., Knigge, C., Cornelisse, R., Barret, D., Long, K. S., Shara, M. M. & Zurek, D. R. 2008, *Combined Chandra, XMM-Newton, and Hubble Space Telescope observations of the Galactic globular cluster NGC 2808*, A&A, 490, 641
Sestito, P., Bragaglia, A., Randich, S., Pallavicini, R., Andrievsky, S. M. & Korotin, S. A. 2008, *Open clusters as key tracers of Galactic chemical evolution. III. Element abundances in Berkeley 20, Berkeley 29, Collinder 261 and Melotte 66*, A&A, 488, 943
Shapiro, K. L., Genzel, R., Förster Schreiber, N. M., Tacconi, L. J., Bouché, N., Cresci, G., Davies, R., Eisenhauer, F., Johansson, P. H., Krajnović, D., Lutz, D., Naab, T., Arimoto, N., Arribas, S., Cimatti, A., Colina, L., Daddi, E., Daigle, O., Erb, D., Hernandez, O., Kong, X., Mignoli, M., Onodera, M., Renzini, A., Shapley, A. & Steidel, C. 2008, *Kinemetry of SINS High-Redshift Star-Forming Galaxies: Distinguishing Rotating Disks from Major Mergers*, ApJ, 682, 231
Sharpee, B. D., O'Neill, E. R. & Slanger, T. G. 2008, *Astronomical sky spectra from the 29-31 October 2003 geomagnetic superstorms: Observations of O+(2Do-4So) and other emissions*, JGRA, 113, 12301
Sheffer, Y., Rogers, M., Federman, S. R., Abel, N. P., Gredel, R., Lambert, D. L. & Shaw, G. 2008, *Ultraviolet Survey of CO and H_2 in Diffuse Molecular Clouds: The Reflection of Two Photochemistry Regimes in Abundance Relationships*, ApJ, 687, 1075
Shields, J. C., Walcher, C. J., Böker, T., Ho, L. C., Rix, H. W. & van der Marel, R. P. 2008, *An Accreting Black Hole in the Nuclear Star Cluster of the Bulgeless Galaxy NGC 1042*, ApJ, 682, 104
Shkolnik, E., Liu, M. C., Reid, I. N., Hebb, L., Cameron, A. C., Torres, C. A. & Wilson, D. M. 2008, *BD -22 5866: A Low-Mass, Quadruple-lined Spectroscopic and Eclipsing Binary*, ApJ, 682, 1248
Shulyak, D., Kochukhov, O. & Khan, S. 2008, *Model atmospheres of magnetic chemically peculiar stars. A remarkable strong-field Bp SiCrFe star HD 137509*, A&A, 487, 689
Sicilia-Aguilar, A., Henning, T., Juhász, A., Bouwman, J., Garmire, G. & Garmire, A. 2008, *Very Low Mass Objects in the Coronet Cluster: The Realm of the Transition Disks*, ApJ, 687, 1145
Siebenmorgen, R., Haas, M., Pantin, E., Krügel, E., Leipski, C., Käufl, H. U., Lagage, P. O., Moorwood, A., Smette, A. & Sterzik, M. 2008, *Nuclear activity in nearby galaxies. Mid-infrared imaging with the VLT*, A&A, 488, 83
Silva, D. R., Kuntschner, H. & Lyubenova, M. 2008, *A New Approach to the Study of Stellar Populations in Early-Type Galaxies: K-Band Spectral Indices and an Application to the Fornax Cluster*, ApJ, 674, 194

Silverman, J. D., Mainieri, V., Lehmer, B. D., Alexander, D. M., Bauer, F. E., Bergeron, J., Brandt, W. N., Gilli, R., Hasinger, G., Schneider, D. P., Tozzi, P., Vignali, C., Koekemoer, A. M., Miyaji, T., Popesso, P., Rosati, P. & Szokoly, G. 2008, *The Evolution of AGN Host Galaxies: From Blue to Red and the Influence of Large-Scale Structures*, ApJ, 675, 1025
Sluse, D., Courbin, F., Eigenbrod, A. & Meylan, G. 2008, *A sharp look at the gravitationally lensed quasar SDSS J0806+2006 with laser guide star adaptive optics at the VLT,* A&A, 492, L39
Słyk, K., Bondar, A. V., Galazutdinov, G. A. & Krełowski, J. 2008, *CN column densities and excitation temperatures*, MNRAS, 390, 1733
Smiljanic, R., Pasquini, L., Primas, F., Mazzali, P. A., Galli, D. & Valle, G. 2008, *Possible signature of hypernova nucleosynthesis in a beryllium-rich halo dwarf*, MNRAS, 385, L93
Smith Castelli, A. V., Faifer, F. R., Richtler, T. & Bassino, L. P. 2008, *Galaxy populations in the Antlia cluster - II. Compact elliptical galaxy candidates*, MNRAS, 391, 685
Smith, R., Wyatt, M. C. & Dent, W. F. 2008, *The nature of mid-infrared excesses from hot dust around Sun-like stars*, A&A, 485, 897
Snodgrass, C., Lowry, S. C. & Fitzsimmons, A. 2008, *Optical observations of 23 distant Jupiter Family Comets, including 36P/Whipple at multiple phase angles*, MNRAS, 385, 737
Soldi, S., Türler, M., Paltani, S., Aller, H. D., Aller, M. F., Burki, G., Chernyakova, M., Lähteenmäki, A., McHardy, I. M., Robson, E. I., Staubert, R., Tornikoski, M., Walter, R. & Courvoisier, T. J. L. 2008, *The multiwavelength variability of 3C 273*, A&A, 486, 411
Sousa, S. G., Santos, N. C., Mayor, M., Udry, S., Casagrande, L., Israelian, G., Pepe, F., Queloz, D. & Monteiro, M. G. 2008, *Spectroscopic parameters for 451 stars in the HARPS GTO planet search program. Stellar [Fe/H] and the frequency of exo-Neptunes*, A&A, 487, 373
Southworth, J., Townsley, D. M. & Gänsicke, B. T. 2008, *Orbital periods of cataclysmic variables identified by the SDSS - IV. SDSSJ220553.98+115553.7 has stopped pulsating*, MNRAS, 388, 709
Southworth, J., Gänsicke, B. T., Marsh, T. R., Torres, M. P., Steeghs, D., Hakala, P., Copperwheat, C. M., Aungwerojwit, A. & Mukadam, A. 2008, *Orbital periods of cataclysmic variables identified by the SDSS - V. VLT, NTT and Magellan observations of nine equatorial systems*, MNRAS, 391, 591
Spezzi, L., Alcalá, J. M., Covino, E., Frasca, A., Gandolfi, D., Oliveira, I., Chapman, N., Evans, N. I., Huard, T. L., Jørgensen, J. K., Merín, B. & Stapelfeldt, K. R. 2008, *The Young Population of the Chamaeleon II Dark Cloud*, ApJ, 680, 1295
Spolaor, M., Forbes, D. A., Hau, G. T., Proctor, R. N. & Brough, S. 2008, *The early-type galaxies NGC 1407 and NGC 1400 - I. Spatially resolved radial kinematics and surface photometry*, MNRAS, 385, 667
Spolaor, M., Forbes, D. A., Proctor, R. N., Hau, G. T. & Brough, S. 2008, *The early-type galaxies NGC 1407 and NGC 1400 - II. Star formation and chemical evolutionary history*, MNRAS, 385, 675
Srianand, R., Noterdaeme, P., Ledoux, C. & Petitjean, P. 2008, *First detection of CO in a high-redshift damped Lyman-α system*, A&A, 482, L39.
Stahl, O., Casassus, S. & Wilson, T. 2008, *Interstellar 12C/13C from CH+ absorption lines: results from an extended survey*, A&A, 477, 865
Stanway, E. R., Bremer, M. N., Squitieri, V., Douglas, L. S. & Lehnert, M. D. 2008, *A limit on the number density of bright z ~ 7 galaxies*, MNRAS, 386, 370
Stanway, E. R., Bremer, M. N., Lehnert, M. D. & Eldridge, J. J. 2008, *M dwarfs at large heliocentric distances*, MNRAS, 384, 348
Stark, D. P., Swinbank, A. M., Ellis, R. S., Dye, S., Smail, I. R. & Richard, J. 2008, *The formation and assembly of a typical star-forming galaxy at redshift z ~ 3*, Natur, 455, 775
Sterken, C., van Genderen, A. M., Plummer, A. & Jones, A. F. 2008, *Wra 751, a luminous blue variable developing an S Doradus cycle*, A&A, 484, 463
Stetson, P. B. & Pancino, E. 2008, *DAOSPEC: An Automatic Code for Measuring Equivalent Widths in High-Resolution Stellar Spectra*, PASP, 120, 1332
Stolte, A., Ghez, A. M., Morris, M., Lu, J. R., Brandner, W. & Matthews, K. 2008, *The Proper Motion of the Arches Cluster with Keck Laser-Guide Star Adaptive Optics*, ApJ, 675, 1278
Stott, J. P., Edge, A. C., Smith, G. P., Swinbank, A. M. & Ebeling, H. 2008, *Near-infrared evolution of brightest cluster galaxies in the most X-ray luminous clusters since z = 1*, MNRAS, 384, 1502
Szewczyk, O., Pietrzyński, G., Gieren, W., Storm, J., Walker, A., Rizzi, L., Kinemuchi, K., Bresolin, F., Kudritzki, R. P. & Dall'Ora, M. 2008, *The Araucaria Project. The Distance of the Large Magellanic Cloud from Near-Infrared Photometry of RR Lyrae Variables*, AJ, 136, 272
Tam, C. R., Gavriil, F. P., Dib, R., Kaspi, V. M., Woods, P. M. & Bassa, C. 2008, *X-Ray and Near-IR Variability of the Anomalous X-Ray Pulsar 1E 1048.1-5937: From Quiescence Back to Activity*, ApJ, 677, 503
Tamuz, O., Ségransan, D., Udry, S., Mayor, M., Eggenberger, A., Naef, D., Pepe, F., Queloz, D., Santos, N. C., Demory, B. O., Figuera, P., Marmier, M. & Montagnier, G. 2008, *The CORALIE survey for southern extra-solar planets. XV. Discovery of two eccentric planets orbiting HD 4113 and HD 156846*, A&A, 480, L33
Tanvir, N. R., Levan, A. J., Rol, E., Starling, R. C., Gorosabel, J., Priddey, R. S., Malesani, D., Jakobsson, P., O'Brien, P. T., Jaunsen, A. O., Hjorth, J., Fynbo, J. U., Melandri, A., Gomboc, A., Milvang-Jensen, B., Fruchter, A. S., Jarvis, M., Fernandes, C. C. & Wold, T. 2008, *The extreme, red afterglow of GRB 060923A: distance or dust?*, MNRAS, 388, 1743
Tatulli, E., Malbet, F., Ménard, F., Gil, C., Testi, L., Natta, A., Kraus, S., Stee, P. & Robbe-Dubois, S. 2008, *Spatially resolving the hot CO around the young Be star 51 Ophiuchi*, A&A, 489, 1151
Taubenberger, S., Hachinger, S., Pignata, G., Mazzali, P. A., Contreras, C., Valenti, S., Pastorello, A., Elias-Rosa, N., Bärnbantner, O., Barwig, H., Benetti, S., Dolci, M., Fliri, J., Folatelli, G., Freedman, W. L., Gonzalez, S., Hamuy, M., Krzeminski, W., Morrell, N., Navasardyan, H., Persson, S. E., Phillips, M. M., Ries, C., Roth, M., Suntzeff, N. B., Turatto, M. & Hillebrandt, W. 2008, *The underluminous Type Ia supernova 2005bl and the class of objects similar to SN 1991bg*, MNRAS, 385, 75
Teixeira, R., Ducourant, C., Chauvin, G., Krone-Martins, A., Song, I. & Zuckerman, B. 2008, *SSSPM J1102-3431 brown dwarf characterization from accurate proper motion and trigonometric parallax*, A&A, 489, 825
Temporin, S., Iovino, A., Bolzonella, M., McCracken, H. J., Scodeggio, M., Garilli, B., Bottini, D., Le Brun, V., Le Fèvre, O., Maccagni, D., Picat, J. P., Scaramella, R., Tresse, L., Vettolani, G., Zanichelli, A., Adami, C., Arnouts, S., Bardelli, S., Cappi, A., Charlot, S., Ciliegi, P., Contini, T., Cucciati, O., Foucaud, S., Franzetti, P., Gavignaud, I., Guzzo, L., Ilbert, O., Marano, B., Marinoni, C., Mazure, A., Meneux, B., Merighi, R., Paltani, S., Pellò, R., Pollo, A., Pozzetti, L., Radovich, M., Vergani, D., Zamorani, G., Zucca, E., Bondi, M., Bongiorno, A., Brinchmann, J., de La Torre, S., Lamareille, F., Mellier, Y. & Walcher, C. J. 2008, *The VIMOS VLT deep survey. The K-band follow-up in the 0226-04 field*, A&A, 482, 81
Testa, V., Rea, N., Mignani, R. P., Israel, G. L., Perna, R., Chaty, S., Stella, L., Covino, S., Turolla, R., Zane, S., Lo Curto, G., Campana, S., Marconi, G. & Mereghetti, S. 2008, *Adaptive optics, near-infrared observations of magnetars*, A&A, 482, 607
Thompson, H. A., Keenan, F. P., Dufton, P. L., Trundle, C., Ryans, R. I. & Crowther, P. A. 2008, *Iron abundances from optical FeIII absorption lines in B-type stellar spectra*, MNRAS, 383, 729
Thompson, S. E., van Kerkwijk, M. H. & Clemens, J. C. 2008, *Deciphering the pulsations of G 29-38 with optical time series spectroscopy*, MNRAS, 389, 93
Thöne, C. C., Fynbo, J. U., Östlin, G., Milvang-Jensen, B., Wiersema, K., Malesani, D., Della Monica Ferreira, D., Gorosabel, J., Kann, D. A., Watson, D., Michałowski, M. J., Fruchter, A. S., Levan, A. J., Hjorth, J. & Sollerman, J. 2008, *Spatially Resolved Properties of the GRB 060505 Host: Implications for the Nature of the Progenitor*, ApJ, 676, 1151
Tisserand, P., Marquette, J. B., Wood, P. R., Lesquoy, E., Beaulieu, J. P., Milsztajn, A., Hamadache, C., Afonso, C., Albert, J. N., Andersen, J., Ansari, R., Aubourg, E., Bareyre, P., Charlot, X., Coutures, C., Ferlet, R., Fouqué, P., Glicenstein, J. F., Goldman, B., Gould, A., Gros, M., Haissinski, J., de Kat, J., Le Guillou, L., Loup, C., Magneville, C., Maurice, E., Maury, A., Moniez, M., Palanque-Delabrouille, N., Perdereau, O., Rahal, Y., Rich, J., Spiro, M., Vidal-Madjar, A. & Zylberajch, S. 2008, *R Coronae Borealis stars in the Galactic bulge discovered by EROS-2*, A&A, 481, 673
Tomsick, J. A., Chaty, S., Rodriguez, J., Walter, R. & Kaaret, P. 2008, *Chandra Localizations and Spectra of INTEGRAL Sources in the Galactic Plane*, ApJ, 685, 1143

Tran, K. H., Moustakas, J., Gonzalez, A. H., Bai, L., Zaritsky, D. & Kautsch, S. J. 2008, *The Late Stellar Assembly of Massive Cluster Galaxies via Major Merging*, ApJ, 683, L17
Trevese, D., Boutsia, K., Vagnetti, F., Cappellaro, E. & Puccetti, S. 2008, *Variability-selected active galactic nuclei from supernova search in the Chandra deep field south*, A&A, 488, 73
Trippe, S., Gillessen, S., Gerhard, O. E., Bartko, H., Fritz, T. K., Maness, H. L., Eisenhauer, F., Martins, F., Ott, T., Dodds-Eden, K. & Genzel, R. 2008, *Kinematics of the old stellar population at the Galactic centre*, A&A, 492, 419
Trundle, C., Kotak, R., Vink, J. S. & Meikle, W. S. 2008, *SN 2005 gj: evidence for LBV supernovae progenitors?*, A&A, 483, L47
Tsamis, Y. G., Walsh, J. R., Péquignot, D., Barlow, M. J., Danziger, I. J. & Liu, X. W. 2008, *Integral field spectroscopy of planetary nebulae: mapping the line diagnostics and hydrogen-poor zones with VLT FLAMES*, MNRAS, 386, 22
Tubiana, C., Barrera, L., Drahus, M. & Boehnhardt, H. 2008, *Comet 67P/Churyumov-Gerasimenko at a large heliocentric distance*, A&A, 490, 377
Udalski, A., Pont, F., Naef, D., Melo, C., Bouchy, F., Santos, N. C., Moutou, C., Díaz, R. F., Gieren, W., Gillon, M., Hoyer, S., Mayor, M., Mazeh, T., Minniti, D., Pietrzyński, G., Queloz, D., Ramirez, S., Ruiz, M. T., Shporer, A., Tamuz, O., Udry, S., Zoccali, M., Kubiak, M., Szymański, M. K., Soszyński, I., Szewczyk, O., Ulaczyk, K. & Wyrzykowski, L. 2008, *OGLE-TR-211 - a new transiting inflated hot Jupiter from the OGLE survey and ESO LP666 spectroscopic follow-up program*, A&A, 482, 299
Unwin, S. C., Shao, M., Tanner, A. M., Allen, R. J., Beichman, C. A., Boboltz, D., Catanzarite, J. H., Chaboyer, B. C., Ciardi, D. R., Edberg, S. J., Fey, A. L., Fischer, D. A., Gelino, C. R., Gould, A. P., Grillmair, C., Henry, T. J., Johnston, K. V., Johnston, K. J., Jones, D. L., Kulkarni, S. R., Law, N. M., Majewski, S. R., Makarov, V. V., Marcy, G. W., Meier, D. L., Olling, R. P., Pan, X., Patterson, R. J., Pitesky, J. E., Quirrenbach, A., Shaklan, S. B., Shaya, E. J., Strigari, L. E., Tomsick, J. A., Wehrle, A. E. & Worthey, G. 2008, *Taking the Measure of the Universe: Precision Astrometry with SIM PlanetQuest*, PASP, 120, 38
Urbaneja, M. A., Kudritzki, R. P., Bresolin, F., Przybilla, N., Gieren, W. & Pietrzyński, G. 2008, *The Araucaria Project: The Local Group Galaxy WLM-Distance and Metallicity from Quantitative Spectroscopy of Blue Supergiants*, ApJ, 684, 118
Uttenthaler, S., Aringer, B., Lebzelter, T., Käufl, H. U., Siebenmorgen, R. & Smette, A. 2008, *The Fluorine Abundance in a Galactic Bulge AGB Star Measured from CRIRES Spectra*, ApJ, 682, 509
Uytterhoeven, K., Mathias, P., Poretti, E., Rainer, M., Martín-Ruiz, S., Rodríguez, E., Amado, P. J., Le Contel, D., Jankov, S., Niemczura, E., Pollard, K. R., Brunsden, E., Paparó, M., Costa, V., Valtier, J. C., Garrido, R., Suárez, J. C., Kilmartin, P. M., Chapellier, E., Rodríguez-López, C., Marin, A. J., Aceituno, F. J., Casanova, V., Rolland, A. & Olivares, I. 2008, *The γ Doradus CoRoT target HD 49434. I. Results from the ground-based campaign*, A&A, 489, 1213
Väisänen, P., Mattila, S., Kniazev, A., Adamo, A., Efstathiou, A., Farrah, D., Johansson, P. H., Östlin, G., Buckley, D. H., Burgh, E. B., Crause, L., Hashimoto, Y., Lira, P., Loaring, N., Nordsieck, K., Romero-Colmenero, E., Ryder, S., Still, M. & Zijlstra, A. 2008, *Adaptive optics imaging and optical spectroscopy of a multiple merger in a luminous infrared galaxy*, MNRAS, 384, 886
Väisänen, P., Ryder, S., Mattila, S. & Kotilainen, J. 2008, *A Pair of Leading Spiral Arms in a Luminous Infrared Galaxy?*, ApJ, 689, L37
Valenti, S., Benetti, S., Cappellaro, E., Patat, F., Mazzali, P., Turatto, M., Hurley, K., Maeda, K., Gal-Yam, A., Foley, R. J., Filippenko, A. V., Pastorello, A., Challis, P., Frontera, F., Harutyunyan, A., Iye, M., Kawabata, K., Kirshner, R. P., Li, W., Lipkin, Y. M., Matheson, T., Nomoto, K., Ofek, E. O., Ohyama, Y., Pian, E., Poznanski, D., Salvo, M., Sauer, D. N., Schmidt, B. P., Soderberg, A. & Zampieri, L. 2008, *The broad-lined Type Ic supernova 2003jd*, MNRAS, 383, 1485
Valyavin, G., Wade, G. A., Bagnulo, S., Szeifert, T., Landstreet, J. D., Han, I. & Burenkov, A. 2008, *The Peculiar Magnetic Field Morphology of the White Dwarf WD 1953-011: Evidence for a Large-Scale Magnetic Flux Tube?*, ApJ, 683, 466
van Loon, J. T., Cohen, M., Oliveira, J. M., Matsuura, M., McDonald, I., Sloan, G. C., Wood, P. R. & Zijlstra, A. A. 2008, *Molecules and dust production in the Magellanic Clouds*, A&A, 487, 1055
van Starkenburg, L., van der Werf, P. P., Franx, M., Labbé, I., Rudnick, G. & Wuyts, S. 2008, *Dynamical properties of a large young disk galaxy at $z = 2.03$*, A&A, 488, 99
van de Steene, G. C., Ueta, T., van Hoof, P. M., Reyniers, M. & Ginsburg, A. G. 2008, *Kinematics and H{2} morphology of the multipolar post-AGB star IRAS 16594-4656*, A&A, 480, 775
van der Plas, G., van den Ancker, M. E., Fedele, D., Acke, B., Dominik, C., Waters, L. M. & Bouwman, J. 2008, *The structure of protoplanetary disks surrounding three young intermediate mass stars. I. Resolving the disk rotation in the [OI] 6300 Å line*, A&A, 485, 487
van der Wel, A., Holden, B. P., Zirm, A. W., Franx, M., Rettura, A., Illingworth, G. D. & Ford, H. C. 2008, *Recent Structural Evolution of Early-Type Galaxies: Size Growth from $z = 1$ to $z = 0$*, ApJ, 688, 48
van der Wel, A. & van der Marel, R. P. 2008, *Spatially Resolved Stellar Kinematics of Field Early-Type Galaxies at $z = 1$: Evolution of the Rotation Rate*, ApJ, 684, 260
Vanzella, E., Cristiani, S., Dickinson, M., Giavalisco, M., Kuntschner, H., Haase, J., Nonino, M., Rosati, P., Cesarsky, C., Ferguson, H. C., Fosbury, R. E., Grazian, A., Moustakas, L. A., Rettura, A., Popesso, P., Renzini, A., Stern, D. & The Goods Team, T. T. 2008, *The great observatories origins deep survey. VLT/FORS2 spectroscopy in the GOODS-South field: Part III*, A&A, 478, 83
Vanzi, L., Cresci, G., Telles, E. & Melnick, J. 2008, *Integral field near-infrared spectroscopy of II Zw 40*, A&A, 486, 393
Vardoulaki, E., Rawlings, S., Simpson, C., Bonfield, D. G., Ivison, R. J. & Ibar, E. 2008, *Radio imaging of the Subaru/XMM-Newton Deep Field - II. The 37 brightest radio sources*, MNRAS, 387, 505
Vauclair, S., Laymand, M., Bouchy, F., Vauclair, G., Bon Hoa, A. H., Charpinet, S. & Bazot, M. 2008, *The exoplanet-host star ι Horologii: an evaporated member of the primordial Hyades cluster*, A&A, 482, L5
Vennes, S. & Kawka, A. 2008, *On the empirical evidence for the existence of ultramassive white dwarfs*, MNRAS, 389, 1367
Ventimiglia, G., Arnaboldi, M. & Gerhard, O. 2008, *Intracluster Planetary Nebulae in the Hydra I cluster*, AN, 329, 1057
Vergani, D., Scodeggio, M., Pozzetti, L., Iovino, A., Franzetti, P., Garilli, B., Zamorani, G., Maccagni, D., Lamareille, F., Le Fèvre, O., Charlot, S., Contini, T., Guzzo, L., Bottini, D., Le Brun, V., Picat, J. P., Scaramella, R., Tresse, L., Vettolani, G., Zanichelli, A., Adami, C., Arnouts, S., Bardelli, S., Bolzonella, M., Cappi, A., Ciliegi, P., Foucaud, S., Gavignaud, I., Ilbert, O., McCracken, H. J., Marano, B., Marinoni, C., Mazure, A., Meneux, B., Merighi, R., Paltani, S., Pellò, R., Pollo, A., Radovich, M., Zucca, E., Bondi, M., Bongiorno, A., Brinchmann, J., Cucciati, O., de La Torre, S., Gregorini, L., Perez-Montero, E., Mellier, Y., Merluzzi, P. & Temporin, S. 2008, *The VIMOS VLT Deep Survey. Tracing the galaxy stellar mass assembly history over the last 8 Gyr*, A&A, 487, 89
Verhamme, A., Schaerer, D., Atek, H. & Tapken, C. 2008, *3D L$\psi\alpha$ radiation transfer. III. Constraints on gas and stellar properties of $z \sim 3$ Lyman break galaxies (LBG) and implications for high-z LBGs and Lyα emitters*, A&A, 491, 89
Vig, S., Cesaroni, R., Testi, L., Beltrán, M. T. & Codella, C. 2008, *A multiwavelength investigation of G24.78+0.08 A2 using observations from VLA and VLT-VISIR*, A&A, 488, 605
Villforth, C., Heidt, J. & Nilsson, K. 2008, *Quasar host galaxies in the FORS deep field*, A&A, 488, 133
Vivas, A. K., Jaffé, Y. L., Zinn, R., Winnick, R., Duffau, S. & Mateu, C. 2008, *Spectroscopy of Bright Quest RR Lyrae Stars: Velocity Substructures Toward Virgo*, AJ, 136, 1645
Vlahakis, C., Baes, M., Bendo, G. & Lundgren, A. 2008, *LABOCA and MAMBO-2 imaging of the dust ring of the Sombrero galaxy (NGC 4594)*, A&A, 485, L25
Vuissoz, C., Courbin, F., Sluse, D., Meylan, G., Chantry, V., Eulaers, E., Morgan, C., Eyler, M. E., Kochanek, C. S., Coles, J., Saha, P., Magain, P. & Falco, E. E. 2008, *COSMOGRAIL: the COSmological MOnitoring of GRAvItational Lenses. VII. Time delays and the Hubble constant from WFI J2033-4723*, A&A, 488, 481
Wakker, B. P., York, D. G., Wilhelm, R., Barentine, J. C., Richter, P., Beers, T. C., Ivezić, Ž. & Howk, J. C. 2008, *Distances to Galactic High-Velocity Clouds. I. Cohen Stream, Complex GCP, Cloud g1*, ApJ, 672, 298
Walborn, N. R., Stahl, O., Gamen, R. C., Szeifert, T., Morrell, N. I., Smith, N., Howarth, I. D., Humphreys, R. M., Bond, H. E. & Lennon, D. J. 2008, *A Three-Decade Outburst of the LMC Luminous Blue Variable R127 Draws to a Close*, ApJ, 683, L33

Walcher, C. J., Lamareille, F., Vergani, D., Arnouts, S., Buat, V., Charlot, S., Tresse, L., Le Fèvre, O., Bolzonella, M., Brinchmann, J., Pozzetti, L., Zamorani, G., Bottini, D., Garilli, B., Le Brun, V., Maccagni, D., Milliard, B., Scaramella, R., Scodeggio, M., Vettolani, G., Zanichelli, A., Adami, C., Bardelli, S., Cappi, A., Ciliegi, P., Contini, T., Franzetti, P., Foucaud, S., Gavignaud, I., Guzzo, L., Ilbert, O., Iovino, A., McCracken, H. J., Marano, B., Marinoni, C., Mazure, A., Meneux, B., Merighi, R., Paltani, S., Pellò, R., Pollo, A., Radovich, M., Zucca, E., Lonsdale, C. & Martin, C. 2008, *The VVDS-SWIRE-GALEX-CFHTLS surveys: physical properties of galaxies at z below 1.2 from photometric data*, A&A, 491, 713
Wang, L. & Wheeler, J. C. 2008, *Spectropolarimetry of Supernovae*, ARA&A, 46, 433
Wang, Z., Bassa, C., Kaspi, V. M., Bryant, J. J. & Morrell, N. 2008, *Optical/Infrared Observations of the Anomalous X-Ray Pulsar 1E 1048.1-5937 During Its 2007 X-Ray Flare*, ApJ, 679, 1443
Weiß, A., Kovács, A., Güsten, R., Menten, K. M., Schuller, F., Siringo, G. & Kreysa, E. 2008, *LABOCA observations of nearby, active galaxies*, A&A, 490, 77
Weldrake, D. F., Bayliss, D. R., Sackett, P. D., Tingley, B. W., Gillon, M. & Setiawan, J. 2008, *Lupus-TR-3b: A Low-Mass Transiting Hot Jupiter in the Galactic Plane?*, ApJ, 675, L37
Welty, D. E., Simon, T. & Hobbs, L. M. 2008, *Spatial and temporal variations in interstellar absorption towards HD 72127AB*, MNRAS, 388, 323
Weselak, T., Galazutdinov, G., Musaev, F. & Krełowski, J. 2008, *Relation between CH cation and neutral/molecular hydrogen*, A&A, 479, 149
Weselak, T., Galazutdinov, G. A., Musaev, F. A. & Krełowski, J. 2008, *The relation between CH and CN molecules and carriers of 5780 and 5797 diffuse interstellar bands*, A&A, 484, 381
Westra, E. & Jones, D. H. 2008, *Star formation density and Hα luminosity function of an emission-line-selected galaxy sample at z ~ 0.24*, MNRAS, 383, 339
Whiley, I. M., Aragón-Salamanca, A., De Lucia, G., von der Linden, A., Bamford, S. P., Best, P., Bremer, M. N., Jablonka, P., Johnson, O., Milvang-Jensen, B., Noll, S., Poggianti, B. M., Rudnick, G., Saglia, R., White, S. & Zaritsky, D. 2008, *The evolution of the brightest cluster galaxies since z ~ 1 from the ESO Distant Cluster Survey (EDisCS)*, MNRAS, 387, 1253
Wiersema, K., van der Horst, A. J., Kann, D. A., Rol, E., Starling, R. C., Curran, P. A., Gorosabel, J., Levan, A. J., Fynbo, J. U., de Ugarte Postigo, A., Wijers, R. J., Castro-Tirado, A. J., Guziy, S. S., Hornstrup, A., Hjorth, J., Jelínek, M., Jensen, B. L., Kidger, M., Martín-Luis, F., Tanvir, N. R., Tristram, P. & Vreeswijk, P. M. 2008, *Spectroscopy and multiband photometry of the afterglow of intermediate duration γ-ray burst GRB 040924 and its host galaxy*, A&A, 481, 319
Wiklind, T., Dickinson, M., Ferguson, H. C., Giavalisco, M., Mobasher, B., Grogin, N. A. & Panagia, N. 2008, *A Population of Massive and Evolved Galaxies at z > ~5*, ApJ, 676, 781
Williams, R., Mason, E., Valle, M. D. & Ederoclite, A. 2008, *Transient Heavy Element Absorption Systems in Novae: Episodic Mass Ejection from the Secondary Star*, ApJ, 685, 451
Willis, J. P., Courbin, F., Kneib, J. P. & Minniti, D. 2008, *ZEN2: a narrow J-band search for z ~ 9 Lyα emitting galaxies directed towards three lensing clusters*, MNRAS, 384, 1039
Wills, K. A., Tadhunter, C., Holt, J., González Delgado, R., Inskip, K. J., Rodríguez Zaurín, J. & Morganti, R. 2008, *Diverse young stellar populations in the intermediate-redshift radio galaxies 3C 213.1 and 3C 459: implications for the evolution of the host galaxies*, MNRAS, 385, 136
Wilson, D. M., Gillon, M., Hellier, C., Maxted, P. L., Pepe, F., Queloz, D., Anderson, D. R., Collier Cameron, A., Smalley, B., Lister, T. A., Bentley, S. J., Blecha, A., Christian, D. J., Enoch, B., Haswell, C. A., Hebb, L., Horne, K., Irwin, J., Joshi, Y. C., Kane, S. R., Marmier, M., Mayor, M., Parley, N., Pollacco, D., Pont, F., Ryans, R., Segransan, D., Skillen, I., Street, R. A., Udry, S., West, R. G. & Wheatley, P. J. 2008, *WASP-4b: A 12th Magnitude Transiting Hot Jupiter in the Southern Hemisphere*, ApJ, 675, L113
Wittkowski, M., Boboltz, D. A., Driebe, T., Le Bouquin, J. B., Millour, F., Ohnaka, K. & Scholz, M. 2008, *J, H, K spectro-interferometry of the Mira variable S Orionis*, A&A, 479, L21
Wolf, M., Zejda, M. & de Villiers, S. N. 2008, *Apsidal motion in southern eccentric eclipsing binaries: GL Car, QX Car, NO Pup and V366 Pup*, MNRAS, 388, 1836
Wolk, S. J., Spitzbart, B. D., Bourke, T. L., Gutermuth, R. A., Vigil, M. & Comerón, F. 2008, *X-Ray and IR Point Source Identification and Characteristics in the Embedded, Massive Star-Forming Region RCW 108*, AJ, 135, 693
Wolter, U., Robrade, J., Schmitt, J. M. & Ness, J. U. 2008, *Doppler imaging an X-ray flare on the ultrafast rotator BO Mic. A contemporaneous multi-wavelength study using XMM-Newton and VLT*, A&A, 478, L11
Worseck, G., Wisotzki, L. & Selman, F. 2008, *A slitless spectroscopic survey for quasars near quasars*, A&A, 487, 539
Woudt, P. A., Kraan-Korteweg, R. C., Lucey, J., Fairall, A. P. & Moore, S. W. 2008, *The Norma cluster (ACO 3627) - I. A dynamical analysis of the most massive cluster in the Great Attractor*, MNRAS, 383, 445
Wuyts, S., Labbé, I., Schreiber, N. F., Franx, M., Rudnick, G., Brammer, G. B. & van Dokkum, P. G. 2008, *FIREWORKS U38-to-24 μm Photometry of the GOODS Chandra Deep Field-South: Multi-wavelength Catalog and Total Infrared Properties of Distant Ks-selected Galaxies*, ApJ, 682, 985
Yadav, R. S., Bedin, L. R., Piotto, G., Anderson, J., Cassisi, S., Villanova, S., Platais, I., Pasquini, L., Momany, Y. & Sagar, R. 2008, *Ground-based CCD astrometry with wide-field imagers. II. A star catalog for M 67: WFI@2.2 m MPG/ESO astrometry, FLAMES@VLT radial velocities*, A&A, 484, 609
Yang, Y., Flores, H., Hammer, F., Neichel, B., Puech, M., Nesvadba, N., Rawat, A., Cesarsky, C., Lehnert, M., Pozzetti, L., Fuentes-Carrera, I., Amram, P., Balkowski, C., Dannerbauer, H., di Serego Alighieri, S., Guiderdoni, B., Kembhavi, A., Liang, Y. C., Östlin, G., Ravikumar, C. D., Vergani, D., Vernet, J. & Wozniak, H. 2008, *IMAGES. I. Strong evolution of galaxy kinematics since z = 1*, A&A, 477, 789
Yong, D. & Grundahl, F. 2008, *An Abundance Analysis of Bright Giants in the Globular Cluster NGC 1851*, ApJ, 672, L29
Yong, D., Grundahl, F., Johnson, J. A. & Asplund, M. 2008, *Nitrogen Abundances in Giant Stars of the Globular Cluster NGC 6752*, ApJ, 684, 1159
Yun, J. L., Djupvik, A. A., Delgado, A. J. & Alfaro, E. J. 2008, *A young double stellar cluster in an HII region, emerging from its parent molecular cloud*, A&A, 483, 209
Zamanov, R. K., Bode, M. F., Melo, C. F., Stateva, I. K., Bachev, R., Gomboc, A., Konstantinova-Antova, R. & Stoyanov, K. A. 2008, *Rotational velocities of the giants in symbiotic stars - III. Evidence of fast rotation in S-type symbiotics*, MNRAS, 390, 377
Zane, S., Mignani, R. P., Turolla, R., Treves, A., Haberl, F., Motch, C., Zampieri, L. & Cropper, M. 2008, *An Optical Counterpart Candidate for the Isolated Neutron Star RBS 1774*, ApJ, 682, 487
Zharikov, S. V., Shibanov, Y. A., Zyuzin, D. A., Mennickent, R. E. & Komarova, V. N. 2008, *A likely optical counterpart of the G292.0+1.8 pulsar wind nebula*, A&A, 492, 805
Zharikov, S. V., Shibanov, Y. A., Mennickent, R. E. & Komarova, V. N. 2008, *Possible optical detection of a fast, nearby radio pulsar PSR B1133+16*, A&A, 479, 793
Zheng, C., Romani, R. W., Sako, M., Marriner, J., Bassett, B., Becker, A., Choi, C., Cinabro, D., DeJongh, F., Depoy, D. L., Dilday, B., Doi, M., Frieman, J. A., Garnavich, P. M., Hogan, C. J., Holtzman, J., Im, M., Jha, S., Kessler, R., Konishi, K., Lampeitl, H., Marshall, J. L., McGinnis, D., Miknaitis, G., Nichol, R. C., Prieto, J. L., Riess, A. G., Richmond, M. W., Schneider, D. P., Smith, M., Takanashi, N., Tokita, K., van der Heyden, K., Yasuda, N., Assef, R. J., Barentine, J., Bender, R., Blandford, R. D., Bremer, M., Brewington, H., Collins, C. A., Crotts, A., Dembicky, J., Eastman, J., Edge, A., Elson, E., Eyler, M. E., Filippenko, A. V., Foley, R. J., Frank, S., Goobar, A., Harvanek, M., Hopp, U., Ihara, Y., Kahn, S., Ketzeback, W., Kleinman, S. J., Kollatschny, W., Krzesiński, J., Leloudas, G., Long, D. C., Lucey, J., Malanushenko, E., Malanushenko, V., McMillan, R. J., Morgan, C. W., Morokuma, T., Nitta, A., Ostman, L., Pan, K., Romer, A. K., Saurage, G., Schlesinger, K., Snedden, S. A., Sollerman, J., Stritzinger, M., Watson, L. C., Watters, S., Wheeler, J. C. & York, D. 2008, *First-Year Spectroscopy for the Sloan Digital Sky Survey-II Supernova Survey*, AJ, 135, 1766
Zirm, A. W., Stanford, S. A., Postman, M., Overzier, R. A., Blakeslee, J. P., Rosati, P., Kurk, J., Pentericci, L., Venemans, B., Miley, G. K., Röttgering, H. A., Franx, M., van der Wel, A., Demarco, R. & van Breugel, W. 2008, *The Nascent Red Sequence at z ~ 2*, ApJ, 680, 224
Zoccali, M., Hill, V., Lecureur, A., Barbuy, B., Renzini, A., Minniti, D., Gómez, A. & Ortolani, S. 2008, *The metal content of bulge field stars from FLAMES-GIRAFFE spectra. I. Stellar parameters and iron abundances*, A&A, 486, 177
Zurita Heras, J. A. & Chaty, S. 2008, *INTEGRAL, XMM-Newton and ESO/NTT identification of AX J1749.1-2733: an obscured and probably distant Be/X-ray binary*, A&A, 489, 657

Additional peer-reviewed publications by ESO Scientists

Alves de Oliveira, C. & Casali, M. 2008, *Deep near-IR variability survey of pre-main-sequence stars in ρ Ophiuchi*, A&A, 485, 155

Vio, R. & *Andreani, P.* 2008, *A statistical analysis of the "internal linear combination" method in problems of signal separation as in cosmic microwave background observations*, A&A, 487, 775

Bongardo, C., *Andreani, P. M.*, Okumura, K., Horeau, B., Claret, A., de Zotti, G., Giannitrapani, R. & Longo, F. 2008, *Simulations of galactic cosmic ray impacts on the Herschel/PACS bolometer arrays with Geant4 code*, ExA, 22, 109

Lutz, D., Sturm, E., Tacconi, L. J., Valiante, E., Schweitzer, M., Netzer, H., Maiolino, R., *Andreani, P.*, Shemmer, O. & Veilleux, S. 2008, *Star Formation in the Hosts of High-z QSOs: Evidence from Spitzer PAH Detections*, ApJ, 684, 853

Magliocchetti, M., *Andreani, P.* & Zwaan, M. A. 2008, *The radio properties of optically obscured Spitzer sources*, MNRAS, 383, 479

Steinmetz, T., Wilken, T., *Araujo-Hauck, C.*, Holzwarth, R., Hänsch, T. W., Pasquini, L., Manescau, A., D'Odorico, S., Murphy, M. T., Kentischer, T., Schmidt, W. & Udem, T. 2008, *Laser Frequency Combs for Astronomical Observations*, Sci, 321, 1335

Coccato, L., Gerhard, O., *Arnaboldi, M.*, Das, P., Douglas, N. G., Kuijken, K., Merrifield, M. R., Napolitano, N. R., Noordermeer, E., Romanowsky, A. J., Capaccioli, M., Cortesi, A., De Lorenzi, F. & Freeman, K. C. 2008, *Probing the kinematics of early-type galaxy halos using planetary nebulae*, AN, 329, 912

Noordermeer, E., Merrifield, M. R., Coccato, L., *Arnaboldi, M.*, Capaccioli, M., Douglas, N. G., Freeman, K. C., Gerhard, O., Kuijken, K., de Lorenzi, F., Napolitano, N. R. & Romanowsky, A. J. 2008, *Testing the nature of S0 galaxies using planetary nebula kinematics in NGC 1023*, MNRAS, 384, 943

Marcolini, A., D'Ercole, A., *Battaglia, G.* & Gibson, B. K. 2008, *The chemical evolution of dwarf spheroidal galaxies: dissecting the inner regions and their stellar populations*, MNRAS, 386, 2173

Uzpen, B., Kobulnicky, H. A., Semler, D. R., *Bensby, T.* & Thom, C. 2008, *A GLIMPSE into the Nature of Galactic Mid-IR Excesses*, ApJ, 685, 1157

Maercker, M., Schöier, F. L., Olofsson, H., *Bergman, P.* & Ramstedt, S. 2008, *Circumstellar water vapour in M-type AGB stars: radiative transfer models, abundances, and predictions for HIFI*, A&A, 479, 779

Klutsch, A., Frasca, A., Guillout, P., Freire Ferrero, R., Marilli, E., Mignemi, G. & *Biazzo, K.* 2008, *New triple systems in the RasTyc sample of stellar X-ray sources*, A&A, 490, 737

Martín-Hernández, N. L., Esteban, C., Mesa-Delgado, A., *Bik, A.* & Puga, E. 2008, *M1-78: a nitrogen-rich Galactic compact H II region beyond the Perseus arm*, A&A, 482, 215

Sauer, D. N., Mazzali, P. A., *Blondin, S.*, Stehle, M., Benetti, S., Challis, P., Filippenko, A. V., Kirshner, R. P., Li, W. & Matheson, T. 2008, *Properties of the ultraviolet flux of Type Ia supernovae: an analysis with synthetic spectra of SN 2001ep and SN 2001eh*, MNRAS, 391, 1605

Murata, H., Matsuda, T., Isaka, H., Ohsugi, Y. & *Boffin, H. J.* 2008, *Application of Molecular Hydrodynamics to Astrophysical Flows. II---Unconditional Stability and Galilean Invariance*, PThPh, 120, 347

Bono, G., Caputo, F., Fiorentino, G., Marconi, M. & Musella, I. 2008, *Cepheids in External Galaxies. I. The Maser-Host Galaxy NGC 4258 and the Metallicity Dependence of Period-Luminosity and Period-Wesenheit Relations*, ApJ, 684, 102

Evans, N. R., Schaefer, G. H., Bond, H. E., *Bono, G.*, Karovska, M., Nelan, E., Sasselov, D. & Mason, B. D. 2008, *Direct Detection of the Close Companion of Polaris with the Hubble Space Telescope*, AJ, 136, 1137

Calamida, A., Corsi, C. E., *Bono, G.*, Stetson, P. B., Prada Moroni, P., Degl'Innocenti, S., Ferraro, I., Iannicola, G., Koester, D., Pulone, L., Monelli, M., Amico, P., Buonanno, R., Caputo, F., D'Odorico, S., Freyhammer, L. M., Marchetti, E., Nonino, M. & Romaniello, M. 2008, *On the White Dwarf Cooling Sequence of the Globular Cluster ω Centauri*, ApJ, 673, L29

Trevese, D., Zitelli, V., Vagnetti, F., *Boutsia, K.* & Stirpe, G. M. 2008, *Optical spectroscopy of active galactic nuclei in SA57*, A&A, 477, 473

Baume, G., Noël, N. D., Costa, E., *Carraro, G.*, Méndez, R. A. & Pedreros, M. H. 2008, *Basic parameters of three star clusters in the Small Magellanic Cloud: Kron 11, Kron 63 and NGC 121*, MNRAS, 390, 1683

Carraro, G., Vázquez, R. A. & Moitinho, A. 2008, *Blue straggler stars in Galactic open clusters and the effect of field star contamination*, A&A, 482, 777

Parisi, M. G., *Carraro, G.*, Maris, M. & Brunini, A. 2008, *Constraints to Uranus' great collision IV. The origin of Prospero*, A&A, 482, 657

Vázquez, R. A., May, J., *Carraro, G.*, Bronfman, L., Moitinho, A. & Baume, G. 2008, *Spiral Structure in the Outer Galactic Disk. I. The Third Galactic Quadrant*, ApJ, 672, 930

Carraro, G., Moitinho, A. & Vázquez, R. A. 2008, *Stellar populations in the Canis Major overdensity*, MNRAS, 385, 1597

Montalto, M., Riffeser, A., Hopp, U., Wilke, S. & *Carraro, G.* 2008, *The comet 17P/Holmes 2007 outburst: the early motion of the outburst material*, A&A, 479, L45

Carraro, G., Villanova, S., Demarque, P., Bidin, C. M. & McSwain, M. V. 2008, *The old open cluster NGC 2112: updated estimates of fundamental parameters based on a membership analysis*, MNRAS, 386, 1625

Carry, B., Dumas, C., Fulchignoni, M., Merline, W. J., Berthier, J., Hestroffer, D., Fusco, T. & Tamblyn, P. 2008, *Near-infrared mapping and physical properties of the dwarf-planet Ceres*, A&A, 478, 235

Geach, J. E., Smail, I., Best, P. N., Kurk, J., *Casali, M.*, Ivison, R. J. & Coppin, K. 2008, *HiZELS: a high-redshift survey of Hα emitters - I. The cosmic star formation rate and clustering at z = 2.23*, MNRAS, 388, 1473

Comerón, F., Pasquali, A., Figueras, F. & Torra, J. 2008, *The outskirts of Cygnus OB2*, A&A, 486, 453

Cioni, M. L., Irwin, M., Ferguson, A. N., McConnachie, A., *Conn, B. C.*, Huxor, A., Ibata, R., Lewis, G. & Tanvir, N. 2008, *AGB stars as tracers of metallicity and mean age across M 33*, A&A, 487, 131

Conn, B. C., Lane, R. R., Lewis, G. F., Irwin, M. J., Ibata, R. A., Martin, N. F., Bellazzini, M. & Tuntsov, A. V. 2008, *The Anglo-Australian Telescope/Wide Field Imager survey of the Monoceros Ring and Canis Major dwarf galaxy - II. From l = (280-025)°*, MNRAS, 390, 1388

Da Rocha, C., Ziegler, B. L. & Mendes de Oliveira, C. 2008, *Intragroup diffuse light in compact groups of galaxies - II. HCG 15, 35 and 51*, MNRAS, 388, 1433

Seymour, N., Ogle, P., *De Breuck, C.*, Fazio, G. G., Galametz, A., Haas, M., Lacy, M., Sajina, A., Stern, D., Willner, S. P. & Vernet, J. 2008, *Mid-Infrared Spectra of High-Redshift (z > 2) Radio Galaxies*, ApJ, 681, L1

Schnerr, R. S., Henrichs, H. F., Neiner, C., Verdugo, E., *de Jong, J.*, Geers, V. C., Wiersema, K., van Dalen, B., Tijani, A., Plaggenborg, B. & Rygl, K. J. 2008, *Magnetic field measurements and wind-line variability of OB-type stars*, A&A, 483, 857

Rossi, A., *de Ugarte Postigo, A.*, Ferrero, P., Kann, D. A., Klose, S., Schulze, S., Greiner, J., Schady, P., Filgas, R., Gonsalves, E. E., Küpcü Yoldaş, A., Krühler, T., Szokoly, G., Yoldaş, A., Afonso, P. J., Clemens, C., Bloom, J. S., Perley, D. A., Fynbo, J. U., Castro-Tirado, A. J., Gorosabel, J., Kubánek, P., Updike, A. C., Hartmann, D. H., Giuliani, A., Holland, S. T., Hanlon, L., Bremer, M., French, J., Melady, G. & García-Hernández, D. A. 2008, *A photometric redshift of z = 1.8{+0.4}{-0.3} for the AGILE GRB 080514B*, A&A, 491, L29

van de Ven, G., *de Zeeuw, P. T.* & van den Bosch, R. E. 2008, *Recovery of the internal orbital structure of galaxies*, MNRAS, 385, 614

Krajnović, D., Bacon, R., Cappellari, M., Davies, R. L., *de Zeeuw, P. T.*, Emsellem, E., Falcón-Barroso, J., Kuntschner, H., McDermid, R. M., Peletier, R. F., Sarzi, M., van den Bosch, R. E. & van de Ven, G. 2008, *The SAURON project - XII. Kinematic substructures in early-type galaxies: evidence for discs in fast rotators*, MNRAS, 390, 93

Weijmans, A. M., Krajnović, D., van de Ven, G., Oosterloo, T. A., Morganti, R. & *de Zeeuw, P. T.* 2008, *The shape of the dark matter halo in the early-type galaxy NGC 2974*, MNRAS, 383, 1343

van den Bosch, R. E., van de Ven, G., Verolme, E. K., Cappellari, M. & *de Zeeuw, P. T.* 2008, *Triaxial orbit based galaxy models with an application to the (apparent) decoupled core galaxy NGC 4365*, MNRAS, 385, 647

Delabre, B. 2008, *Optical design for an adaptive anastigmatic five-mirror extremely large telescope*, A&A, 487, 389

Racusin, J. L., Karpov, S. V., Sokolowski, M., Granot, J., Wu, X. F., Pal'Shin, V., Covino, S., van der Horst, A. J., Oates, S. R., Schady, P., Smith, R. J., Cummings, J., Starling, R. C., Piotrowski, L. W., Zhang, B., Evans, P. A., Holland, S. T., Malek, K., Page, M. T., Vetere, L., Margutti, R., Guidorzi, C., Kamble, A. P., Curran, P. A., Beardmore, A., Kouveliotou, C., Mankiewicz, L., Melandri, A., O'Brien, P. T., Page, K. L., Piran, T., Tanvir, N. R., Wrochna, G., Aptekar, R. L., Barthelmy, S., Bartolini, C., Beskin, G. M., Bondar, S., Bremer, M., Campana, S., Castro-Tirado, A., Cucchiara, A., Cwiok, M., D'Avanzo, P., D'Elia, V., *Della Valle, M.*, de Ugarte Postigo, A., Dominik, W., Falcone, A., Fiore, F., Fox, D. B., Frederiks, D. D., Fruchter, A. S., Fugazza, D., Garrett, M. A., Gehrels, N., Golenetskii, S., Gomboc, A., Gorosabel, J., Greco, G., Guarnieri, A., Immler, S., Jelinek, M., Kasprowicz, G., La Parola, V., Levan, A. J., Mangano, V., Mazets, E. P., Molinari, E., Moretti, A., Nawrocki, K., Oleynik, P. P., Osborne, J. P., Pagani, C., Pandey, S. B., Paragi, Z., Perri, M., Piccioni, A., Ramirez-Ruiz, E., Roming, P. A., Steele, I. A., Strom, R. G., Testa, V., Tosti, G., Ulanov, M. V., Wiersema, K., Wijers, R. J., Winters, J. M., Zarnecki, A. F., Zerbi, F., Mészáros, P., Chincarini, G. & Burrows, D. N. 2008, *Broadband observations of the naked-eye γ-ray burst GRB 080319B*, Natur, 455, 183

Amati, L., Guidorzi, C., Frontera, F., *Della Valle, M.*, Finelli, F., Landi, R. & Montanari, E. 2008, *Measuring the cosmological parameters with the $E_{p,i}$-E_{iso} correlation of gamma-ray bursts*, MNRAS, 391, 577

Campana, S., Panagia, N., Lazzati, D., Beardmore, A. P., Cusumano, G., Godet, O., Chincarini, G., Covino, S., *Della Valle, M.*, Guidorzi, C., Malesani, D., Moretti, A., Perna, R., Romano, P. & Tagliaferri, G. 2008, *Outliers from the Mainstream: How a Massive Star Can Produce a Gamma-Ray Burst*, ApJ, 683, L9

Raskin, C., Scannapieco, E., Rhoads, J. & *Della Valle, M.* 2008, *Using Spatial Distributions to Constrain Progenitors of Supernovae and Gamma-Ray Bursts*, ApJ, 689, 358

Werner, N., Finoguenov, A., Kaastra, J. S., Simionescu, A., *Dietrich, J. P.*, Vink, J. & Böhringer, H. 2008, *Detection of hot gas in the filament connecting the clusters of galaxies Abell 222 and Abell 223*, A&A, 482, L29

Dietrich, J. P. 2008, *Disentangling Visibility and Self-Promotion Bias in the arXiv:astro-ph Positional Citation Effect*, PASP, 120, 801

Dietrich, J. P. 2008, *The Importance of Being First: Position Dependent Citation Rates on arXiv:astro-ph*, PASP, 120, 224

Mousis, O., Alibert, Y., Hestroffer, D., Marboeuf, U., *Dumas, C.*, Carry, B., Horner, J. & Selsis, F. 2008, *Origin of volatiles in the main belt*, MNRAS, 383, 1269

Feng, Y., Taylor, L. & Bonaccini Calia, D. 2008, *Multiwatts narrow linewidth fiber Raman amplifiers*, OExpr, 16, 16927

Freudling, W., Kümmel, M., Haase, J., Hook, R., Kuntschner, H., Lombardi, M., Micol, A., Stoehr, F. & Walsh, J. 2008, *The Hubble Legacy Archive NICMOS grism data*, A&A, 490, 1165

Disney, M. J., Romano, J. D., *Garcia-Appadoo, D. A.*, West, A. A., Dalcanton, J. J. & Cortese, L. 2008, *Galaxies appear simpler than expected*, Natur, 455, 1082

Haas, M. R., *Gieles, M.*, Scheepmaker, R. A., Larsen, S. S. & Lamers, H. M. 2008, *ACS imaging of star clusters in M 51. II. The luminosity function and mass function across the disk*, A&A, 487, 937

Gieles, M. & Bastian, N. 2008, *An alternative method to study star cluster disruption*, A&A, 482, 165

Gieles, M., Bastian, N. & Ercolano, B. 2008, *Evolution of stellar structure in the Small Magellanic Cloud*, MNRAS, 391, L93

Gieles, M. & Baumgardt, H. 2008, *Lifetimes of tidally limited star clusters with different radii*, MNRAS, 389, L28

Gaburov, E. & *Gieles, M.* 2008, *Mass segregation in young star clusters - can it be detected from the integrated photometric properties?*, MNRAS, 391, 190

Bastian, N., *Gieles, M.*, Goodwin, S. P., Trancho, G., Smith, L. J., Konstantopoulos, I. & Efremov, Y. 2008, *The early expansion of cluster cores*, MNRAS, 389, 223

Selvelli, P., Cassatella, A., *Gilmozzi, R.* & González-Riestra, R. 2008, *The secrets of T Pyxidis. II. A recurrent nova that will not become a SN Ia*, A&A, 492, 787

Grillo, C., Lombardi, M. & Bertin, G. 2008, *Cosmological parameters from strong gravitational lensing and stellar dynamics in elliptical galaxies*, A&A, 477, 397

Grillo, C., Gobat, R., Rosati, P. & Lombardi, M. 2008, *Stellar mass estimates in early-type galaxies from lensing+dynamical and photometric measurements*, A&A, 477, L25

Hatziminaoglou, E., Fritz, J., Franceschini, A., Afonso-Luis, A., Hernán-Caballero, A., Pérez-Fournon, I., Serjeant, S., Lonsdale, C., Oliver, S., Rowan-Robinson, M., Shupe, D., Smith, H. E. & Surace, J. 2008, *Properties of dusty tori in active galactic nuclei - I. The case of SWIRE/SDSS quasars*, MNRAS, 386, 1252

Haas, M., Willner, S. P., *Heymann, F.*, Ashby, M. N., Fazio, G. G., Wilkes, B. J., Chini, R. & Siebenmorgen, R. 2008, *Near- and Mid-Infrared Photometry of High-Redshift 3CR Sources*, ApJ, 688, 122

Dabringhausen, J., *Hilker, M.* & Kroupa, P. 2008, *From star clusters to dwarf galaxies: the properties of dynamically hot stellar systems*, MNRAS, 386, 864

Schuberth, Y., Richtler, T., Bassino, L. & *Hilker, M.* 2008, *Intra-cluster globular clusters around NGC 1399 in Fornax?*, A&A, 477, L9

Georgiev, I. Y., Goudfrooij, P., Puzia, T. H. & *Hilker, M.* 2008, *Old Globular Clusters in Magellanic-Type Dwarf Irregular Galaxies*, AJ, 135, 1858

Evstigneeva, E. A., Drinkwater, M. J., Peng, C. Y., *Hilker, M.*, DePropris, R., Jones, J. B., Phillipps, S., Gregg, M. D. & Karick, A. M. 2008, *Structural Properties of Ultra-Compact Dwarf Galaxies in the Fornax and Virgo Clusters*, AJ, 136, 461

Netopil, M., Paunzen, E., Maitzen, H. M., North, P. & *Hubrig, S.* 2008, *Chemically peculiar stars and their temperature calibration*, A&A, 491, 545

Patience, J., Zavala, R. T., Prato, L., Franz, O., Wasserman, L., Tycner, C., Hutter, D. J. & *Hummel, C. A.* 2008, *Optical Interferometric Observations of θ1 Orionis C from NPOI and Implications for the System Orbit*, ApJ, 674, L97

Dunstone, N. J., *Hussain, G. J.*, Cameron, A. C., Marsden, S. C., Jardine, M., Barnes, J. R., Ramirez Velez, J. C. & Donati, J. F. 2008, *Differential rotation on both components of the pre-main-sequence binary system HD 155555*, MNRAS, 387, 1525

Donati, J. F., Jardine, M. M., Gregory, S. G., Petit, P., Paletou, F., Bouvier, J., Dougados, C., Ménard, F., Cameron, A. C., Harries, T. J., *Hussain, G. J.*, Unruh, Y., Morin, J., Marsden, S. C., Manset, N., Aurière, M., Catala, C. & Alecian, E. 2008, *Magnetospheric accretion on the T Tauri star BP Tauri*, MNRAS, 386, 1234

Dunstone, N. J., *Hussain, G. J.*, Collier Cameron, A., Marsden, S. C., Jardine, M., Stempels, H. C., Ramirez Vlez, J. C. & Donati, J. F. 2008, *The first magnetic maps of a pre-main-sequence binary star system - HD155555*, MNRAS, 387, 481

Cioni, M. L., Bekki, K., Clementini, G., de Blok, W. G., Emerson, J. P., Evans, C. J., de Grijs, R., Gibson, B. K., Girardi, L., Groenewegen, M. T., *Ivanov, V. D.*, Leisy, P., Marconi, M., Mastropietro, C., Moore, B., Naylor, T., Oliveira, J. M., Ripepi, V., van Loon, J. T., Wilkinson, M. I. & Wood, P. R. 2008, *The Magellanic Clouds as a Template for the Study of Stellar Populations and Galaxy Interactions*, PASA, 25, 121

Woodley, K. A., Raychaudhury, S., Kraft, R. P., Harris, W. E., *Jordán, A.*, Whitaker, K. E., Jones, C., Forman, W. R. & Murray, S. S. 2008, *Globular Clusters and X-Ray Point Sources in Centaurus A (NGC 5128)*, ApJ, 682, 199

Ofek, E. O., Kulkarni, S. R., Rau, A., Cenko, S. B., Peng, E. W., Blakeslee, J. P., Côté, P., Ferrarese, L., *Jordán, A.*, Mei, S., Puzia, T., Bradley, L. D., Magee, D. & Bouwens, R. 2008, *The Environment of M85 Optical Transient 2006-1: Constraints on the Progenitor Age and Mass*, ApJ, 674, 447

Tu, H., Limousin, M., Fort, B., Shu, C. G., Sygnet, J. F., *Jullo, E.*, Kneib, J. P. & Richard, J. 2008, *Probing the slope of cluster mass profile with gravitational Einstein rings: application to Abell 1689*, MNRAS, 386, 1169

Kainulainen, J., Juvela, M. & Alves, J. 2008, *Near-infrared reddening of extra-galactic giant molecular clouds in a face-on geometry*, A&A, 482, 229

Tokovinin, A., *Kellerer, A.* & Coudé Du Foresto, V. 2008, *FADE, an instrument to measure the atmospheric coherence time*, A&A, 477, 671

Kerber, F., Mignani, R. P., Smart, R. L. & Wicenec, A. 2008, *Galactic planetary nebulae and their central stars. II. Proper motions*, A&A, 479, 155

Kerber, F., Nave, G. & Sansonetti, C. J. 2008, *The Spectrum of Th-Ar Hollow Cathode Lamps in the 691-5804 nm region: Establishing Wavelength Standards for the Calibration of Infrared Spectrographs*, ApJS, 178, 374

Kissler-Patig, M., Pirard, J. F., Casali, M., Moorwood, A., Ageorges, N., Alves de Oliveira, C., Baksai, P., Bedin, L. R., Bendek, E., Biereichel, P., Delabre, B., Dorn, R., Esteves, R., Finger, G., Gojak, D., Huster, G., Jung, Y., Kiekebush, M., Klein, B., Koch, F., Lizon, J. L., Mehrgan, L., Petr-Gotzens, M., Pritchard, J., Selman, F. & Stegmeier, J. 2008, *HAWK-I: the high-acuity wide-field K-band imager for the ESO Very Large Telescope*, A&A, 491, 941

Järvinen, S. P., *Korhonen, H.*, Berdyugina, S. V., Ilyin, I., Strassmeier, K. G., Weber, M., Savanov, I. & Tuominen, I. 2008, *Magnetic activity on V889 Herculis. Combining photometry and spectroscopy*, A&A, 488, 1047

Drake, J. J., Chung, S. M., Kashyap, V., *Korhonen, H.*, Van Ballegooijen, A. & Elstner, D. 2008, *X-Ray Spectroscopic Signatures of the Extended Corona of FK Comae*, ApJ, 679, 1522

Kubas, D., Cassan, A., Dominik, M., Bennett, D. P., Wambsganss, J., Brillant, S., Beaulieu, J. P., Albrow, M. D., Batista, V., Bode, M., Bramich, D. M., Burgdorf, M., Caldwell, J. R., Calitz, H., Cook, K. H., Coutures, C., Dieters, S., Dominis Prester, D., Donatowicz, J., Fouqué, P., Greenhill, J., Hill, K., Hoffman, M., Horne, K., Jørgensen, U. G., Kains, N., Kane, S., Marquette, J. B., Martin, R., Meintjes, P., Menzies, J., Pollard, K. R., Sahu, K. C., Snodgrass, C., Steele, I., Tsapras, Y., Vinter, C., Williams, A., Woller, K., Zub, M. & The PLANET/Robonet Collaboration, T. C. 2008, *Limits on additional planetary companions to OGLE 2005-BLG-390L*, A&A, 483, 317

Croston, J. H., Hardcastle, M. J., Birkinshaw, M., Worrall, D. M. & *Laing, R. A.* 2008, *An XMM-Newton study of the environments, particle content and impact of low-power radio galaxies*, MNRAS, 386, 1709

Laing, R. A., Bridle, A. H., Parma, P., Feretti, L., Giovannini, G., Murgia, M. & Perley, R. A. 2008, *Multifrequency VLA observations of the FR I radio galaxy 3C 31: morphology, spectrum and magnetic field*, MNRAS, 386, 657

Laing, R. A., Bridle, A. H., Parma, P. & Murgia, M. 2008, *Structures of the magnetoionic media around the Fanaroff-Riley Class I radio galaxies 3C31 and Hydra A*, MNRAS, 391, 521

Le Bouquin, J. B., Bauvir, B., Haguenauer, P., Schöller, M., Rantakyrö, F. & Menardi, S. 2008, *First result with AMBER+FINITO on the VLTI: the high-precision angular diameter of V3879 Sagittarii*, A&A, 481, 553

Thöne, C. C., Wiersema, K., *Ledoux, C.*, Starling, R. C., de Ugarte Postigo, A., Levan, A. J., Fynbo, J. U., Curran, P. A., Gorosabel, J., van der Horst, A. J., Llorente, A., Rol, E., Tanvir, N. R., Vreeswijk, P. M., Wijers, R. J. & Kewley, L. J. 2008, *The host of GRB 060206: kinematics of a distant galaxy*, A&A, 489, 37

Becker, A. C., Arraki, K., Kaib, N. A., Wood-Vasey, W. M., Aguilera, C., Blackman, J. W., Blondin, S., Challis, P., Clocchiatti, A., Covarrubias, R., Damke, G., Davis, T. M., Filippenko, A. V., Foley, R. J., Garg, A., Garnavich, P. M., Hicken, M., Jha, S., Kirshner, R. P., Krisciunas, K., *Leibundgut, B.*, Li, W., Matheson, T., Miceli, A., Miknaitis, G., Narayan, G., Pignata, G., Prieto, J. L., Rest, A., Riess, A. G., Salvo, M. E., Schmidt, B. P., Smith, R. C., Sollerman, J., Spyromilio, J., Stubbs, C. W., Suntzeff, N. B., Tonry, J. L. & Zenteno, A. 2008, *Exploring the Outer Solar System with the ESSENCE Supernova Survey*, ApJ, 682, L53

Leibundgut, B. 2008, *Supernovae and cosmology*, GReGr, 40, 221

Milisavljevic, D., Fesen, R. A., *Leibundgut, B.* & Kirshner, R. P. 2008, *The Evolution of Late-Time Optical Emission from SN 1986J*, ApJ, 684, 1170

Leurini, S., Hieret, C., Thorwirth, S., Wyrowski, F., Schilke, P., Menten, K. M., Güsten, R. & Zapata, L. 2008, *High-mass star formation in the IRAS 17233-3606 region: a new nearby and bright hot core in the southern sky*, A&A, 485, 167

Jones, P. A., Burton, M. G., Cunningham, M. R., Menten, K. M., Schilke, P., Belloche, A., *Leurini, S.*, Ott, J. & Walsh, A. J. 2008, *Spectral imaging of the Sagittarius B2 region in multiple 3-mm molecular lines with the Mopra telescope*, MNRAS, 386, 117

Menten, K. M., Güsten, R., *Leurini, S.*, Thorwirth, S., Henkel, C., Klein, B., Carilli, C. L. & Reid, M. J. 2008, *Submillimeter water and ammonia absorption by the peculiar $z \approx 0.89$ interstellar medium in the gravitational lens of the PKS 1830-211 system*, A&A, 492, 725

Zapata, L. A., *Leurini, S.*, Menten, K. M., Schilke, P., Rolffs, R. & Hieret, C. 2008, *Unveiling a Compact Cluster of Massive and Young Stars in IRAS 17233-3606*, AJ, 136, 1455

Kuznetsova, N., Barbary, K., Connolly, B., Kim, A. G., Pain, R., Roe, N. A., Aldering, G., Amanullah, R., Dawson, K., Doi, M., Fadeyev, V., Fruchter, A. S., Gibbons, R., Goldhaber, G., Goobar, A., Gude, A., Knop, R. A., Kowalski, M., *Lidman, C.*, Morokuma, T., Meyers, J., Perlmutter, S., Rubin, D., Schlegel, D. J., Spadafora, A. L., Stanishev, V., Strovink, M., Suzuki, N., Wang, L. & Yasuda, N. 2008, *A New Determination of the High-Redshift Type Ia Supernova Rates with the Hubble Space Telescope Advanced Camera for Surveys*, ApJ, 673, 981

Morokuma, T., Doi, M., Yasuda, N., Akiyama, M., Sekiguchi, K., Furusawa, H., Ueda, Y., Totani, T., Oda, T., Nagao, T., Kashikawa, N., Murayama, T., Ouchi, M., Watson, M. G., Richmond, M. W., *Lidman, C.*, Perlmutter, S., Spadafora, A. L., Aldering, G., Wang, L., Hook, I. M. & Knop, R. A. 2008, *The Subaru/XMM-Newton Deep Survey (SXDS). V. Optically Faint Variable Object Survey*, ApJ, 676, 163

Graham, M. L., Pritchet, C. J., Sullivan, M., Gwyn, S. J., Neill, J. D., Hsiao, E. Y., Astier, P., Balam, D., Balland, C., Basa, S., Carlberg, R. G., Conley, A., Fouchez, D., Guy, J., Hardin, D., Hook, I. M., Howell, D. A., Pain, R., Perrett, K., Regnault, N., Baumont, S., LeDu, J., *Lidman, C.*, Perlmutter, S., Ripoche, P., Suzuki, N., Walker, E. S. & Zhang, T. 2008, *Type Ia Supernovae Rates and Galaxy Clustering from the CFHT Supernova Legacy Survey*, AJ, 135, 1343

Liske, J., Grazian, A., Vanzella, E., Dessauges, M., Viel, M., Pasquini, L., Haehnelt, M., Cristiani, S., Pepe, F., Avila, G., Bonifacio, P., Bouchy, F., Dekker, H., Delabre, B., D'Odorico, S., D'Odorico, V., Levshakov, S., Lovis, C., Mayor, M., Molaro, P., Moscardini, L., Murphy, M. T., Queloz, D., Shaver, P., Udry, S., Wiklind, T. & Zucker, S. 2008, *Cosmic dynamics in the era of Extremely Large Telescopes*, MNRAS, 386, 1192

Driver, S. P., Popescu, C. C., Tuffs, R. J., Graham, A. W., *Liske, J.* & Baldry, I. 2008, *The Energy Output of the Universe from 0.1 to 1000 μm*, ApJ, 678, L101

Lombardi, M., Lada, C. J. & Alves, J. 2008, *2MASS wide field extinction maps. II. The Ophiuchus and the Lupus cloud complexes*, A&A, 489, 143

Lombardi, G., Zitelli, V., Ortolani, S., Pedani, M. & Ghedina, A. 2008, *El Roque de Los Muchachos site characteristics. III. Analysis of atmospheric dust and aerosol extinction*, A&A, 483, 651

Lombardi, M., Lada, C. J. & Alves, J. 2008, *Hipparcos distance estimates of the Ophiuchus and the Lupus cloud complexes*, A&A, 480, 785

Rathborne, J. M., Lada, C. J., Muench, A. A., Alves, J. F. & *Lombardi, M.* 2008, *The Nature of the Dense Core Population in the Pipe Nebula: A Survey of NH3, CCS, and HC5N Molecular Line Emission*, ApJS, 174, 396

Lada, C. J., Muench, A. A., Rathborne, J., Alves, J. F. & *Lombardi, M.* 2008, *The Nature of the Dense Core Population in the Pipe Nebula: Thermal Cores Under Pressure*, ApJ, 672, 410

Ramstedt, S., Schöier, F. L., Olofsson, H. & *Lundgren, A. A.* 2008, *On the reliability of mass-loss-rate estimates for AGB stars*, A&A, 487, 645

Fathi, K., Beckman, J. E., *Lundgren, A. A.*, Carignan, C., Hernandez, O., Amram, P., Balard, P., Boulesteix, J., Gach, J. L., Knapen, J. H. & Relaño, M. 2008, *Spiral Inflow Feeding the Nuclear Starburst in M83, Observed in Hα Emission with the GHαFaS Fabry-Perot Interferometer*, ApJ, 675, L17

Pierini, D., Zibetti, S., Braglia, F., Böhringer, H., Finoguenov, A., *Lynam, P. D.* & Zhang, Y. Y. 2008, *Diffuse stellar emission in X-ray luminous galaxy clusters at z ~ 0.3. I. Is the diffuse optical light boosted and rejuvenated in merging clusters?*, A&A, 483, 727

Magliocchetti, M., Cirasuolo, M., McLure, R. J., Dunlop, J. S., Almaini, O., Foucaud, S., de Zotti, G., Simpson, C. & Sekiguchi, K. 2008, *On the evolution of clustering of 24-μm-selected galaxies*, MNRAS, 383, 1131

Miller, N. A., Fomalont, E. B., Kellermann, K. I., *Mainieri, V.*, Norman, C., Padovani, P., Rosati, P. & Tozzi, P. 2008, *The VLA 1.4 GHz Survey of the Extended Chandra Deep Field-South: First Data Release*, ApJS, 179, 114
Lehmer, B. D., Brandt, W. N., Alexander, D. M., Bell, E. F., Hornschemeier, A. E., McIntosh, D. H., Bauer, F. E., Gilli, R., *Mainieri, V.*, Schneider, D. P., Silverman, J. D., Steffen, A. T., Tozzi, P. & Wolf, C. 2008, *Tracing the Mass-Dependent Star Formation History of Late-Type Galaxies using X-Ray Emission: Results from the Chandra Deep Fields*, ApJ, 681, 1163
Brunner, H., Cappelluti, N., Hasinger, G., Barcons, X., Fabian, A. C., *Mainieri, V.* & Szokoly, G. 2008, *XMM-Newton observations of the Lockman Hole: X-ray source catalogue and number counts*, A&A, 479, 283
Martinez, P., Boccaletti, A., Kasper, M., Cavarroc, C., Yaitskova, N., Fusco, T. & Vérinaud, C. 2008, *Comparison of coronagraphs for high-contrast imaging in the context of extremely large telescopes*, A&A, 492, 289
Mieske, S. & Kroupa, P. 2008, *An Extreme IMF as an Explanation for High M/L Ratios in UCDs? The CO Index as a Tracer of Bottom-heavy IMFs*, ApJ, 677, 276
Mieske, S., Hilker, M., Bomans, D. J., Rey, S. C., Kim, S., Yoon, S. J. & Chung, C. 2008, *Compact stellar systems in the Fornax cluster: a UV perspective*, A&A, 489, 1023
Mieske, S., Dabringhausen, J., Kroupa, P., Hilker, M & Baumgardt, H. 2008, *High M/L ratios of UCDs: A variation of the IMF?*, AN, 329, 964
Baumgardt, H. & *Mieske, S.* 2008, *High mass-to-light ratios of ultra-compact dwarf galaxies - evidence for dark matter?*, MNRAS, 391, 942
Rodriguez, J., Hannikainen, D. C., Shaw, S. E., Pooley, G., Corbel, S., Tagger, M., *Mirabel, I. F.*, Belloni, T., Cabanac, C., Cadolle Bel, M., Chenevez, J., Kretschmar, P., Lehto, H. J., Paizis, A., Varnière, P. & Vilhu, O. 2008, *2 YEARS of INTEGRAL Monitoring of GRS 1915+105. I. Multiwavelength Coverage with INTEGRAL, RXTE, and the Ryle Radio Telescope*, ApJ, 675, 1436
Rodriguez, J., Shaw, S. E., Hannikainen, D. C., Belloni, T., Corbel, S., Cadolle Bel, M., Chenevez, J., Prat, L., Kretschmar, P., Lehto, H. J., *Mirabel, I. F.*, Paizis, A., Pooley, G., Tagger, M., Varnière, P., Cabanac, C. & Vilhu, O. 2008, *2 Years of INTEGRAL Monitoring of GRS 1915+105. II. X-Ray Spectro-Temporal Analysis*, ApJ, 675, 1449
Fynbo, J. U., Prochaska, J. X., Sommer-Larsen, J., Dessauges-Zavadsky, M. & *Møller, P.* 2008, *Reconciling the Metallicity Distributions of Gamma-Ray Burst, Damped Lyα, and Lyman Break Galaxies at z ~ 3*, ApJ, 683, 321
Romano, P., Campana, S., Mignani, R. P., Moretti, A., *Mottini, M.*, Panzera, M. R. & Tagliaferri, G. 2008, *The Brera multi-scale wavelet Chandra survey. I. Serendipitous source catalogue*, A&A, 488, 1221
Correia, A. M., Udry, S., Mayor, M., Eggenberger, A., *Naef, D.*, Beuzit, J. L., Perrier, C., Queloz, D., Sivan, J. P., Pepe, F., Santos, N. C. & Ségransan, D. 2008, *The ELODIE survey for northern extra-solar planets. IV. HD 196885, a close binary star with a 3.7-year planet*, A&A, 479, 271
Martín-Hernández, N. L., Bik, A., Puga, E., *Nürnberger, D. A.* & Bronfman, L. 2008, *Spatially resolved near-infrared spectroscopy of the massive star-forming region IRAS 19410+2336*, A&A, 489, 229
Shahbaz, T., Fender, R. P., Watson, C. A. & *O'Brien, K.* 2008, *The First Polarimetric Signatures of Infrared Jets in X-Ray Binaries*, ApJ, 672, 510
Landt, H., *Padovani, P.*, Giommi, P., Perri, M. & Cheung, C. C. 2008, *A Search for Synchrotron X-Ray Emission in Radio Quasars*, ApJ, 676, 87
Ballero, S. K., Matteucci, F., Ciotti, L., Calura, F. & *Padovani, P.* 2008, *Evolution of chemical abundances in Seyfert galaxies*, A&A, 478, 335Trinchieri, G., Iovino, A., *Pompei, E.*, Dahlem, M., Reeves, J., Coziol, R. & Temporin, S. 2008, *Detection of a hot intergalactic medium in the spiral-only compact group SCG0018-4854*, A&A, 484, 195
Puech, M., Flores, H., Lehnert, M., Neichel, B., Fusco, T., Rosati, P., Cuby, J. G. & Rousset, G. 2008, *Coupling MOAO with integral field spectroscopy: specifications for the VLT and the E-ELT*, MNRAS, 390, 1089
van Grootel, V., Charpinet, S., Fontaine, G., Brassard, P., Green, E. M., Chayer, P. & *Randall, S. K.* 2008, *Testing the forward modeling approach in asteroseismology. I. Seismic solutions for the hot B subdwarf Balloon 090100001 with and without a priori mode identification*, A&A, 488, 685
Geier, S., Nesslinger, S., Heber, U., *Randall, S. K.*, Edelmann, H. & Green, E. M. 2008, *Tidal synchronisation of the subdwarf B binary PG 0101+039*, A&A, 477, L13
Shioya, Y., Taniguchi, Y., Sasaki, S. S., Nagao, T., Murayama, T., Takahashi, M. I., Ajiki, M., Ideue, Y., Mihara, S., Nakajima, A., Scoville, N. Z., Mobasher, B., Aussel, H., Giavalisco, M., Guzzo, L., Hasinger, G., Impey, C., Le Fèvre, O., Lilly, S., *Renzini, A.*, Rich, M., Sanders, D. B., Schinnerer, E., Shopbell, P., Leauthaud, A., Kneib, J. P., Rhodes, J. & Massey, R. 2008, *The Hα Luminosity Function and Star Formation Rate at z ~ 0.24 in the COSMOS 2 Square Degree Field*, ApJS, 175, 128
Robberto, M., *Ricci, L.*, Da Rio, N. & Soderblom, D. R. 2008, *Evidence for a Photoevaporated Circumbinary Disk in Orion*, ApJ, 687, L83
Ricci, L., Robberto, M. & Soderblom, D. R. 2008, *The Hubble Space Telescope/advanced Camera for Surveys Atlas of Protoplanetary Disks in the Great Orion Nebula*, AJ, 136, 2136
Fors, O., *Richichi, A.*, Otazu, X. & Núñez, J. 2008, *A new wavelet-based approach for the automated treatment of large sets of lunar occultation data*, A&A, 480, 297
Vassilev, V., Meledin, D., Lapkin, I., Belitsky, V., Nyström, O., Henke, D., Pavolotsky, A., Monje, R., *Risacher, C.*, Olberg, M., Strandberg, M., Sundin, E., Fredrixon, M., Ferm, S. E., Desmaris, V., Dochev, D., Pantaleev, M., Bergman, P. & Olofsson, H. 2008, *A Swedish heterodyne facility instrument for the APEX telescope*, A&A, 490, 1157
Sanna, N., Bono, G., Stetson, P. B., Monelli, M., Pietrinferni, A., Drozdovsky, I., Caputo, F., Cassisi, S., Gennaro, M., Prada Moroni, P. G., Buonanno, R., Corsi, C. E., Degl'Innocenti, S., Ferraro, I., Iannicola, G., Nonino, M., Pulone, L., *Romaniello, M.* & Walker, A. R. 2008, *On the Distance and Reddening of the Starburst Galaxy IC 10*, ApJ, 688, L69
Bradley, L. D., Bouwens, R. J., Ford, H. C., Illingworth, G. D., Jee, M. J., Benítez, N., Broadhurst, T. J., Franx, M., Frye, B. L., Infante, L., Motta, V., *Rosati, P.*, White, R. L. & Zheng, W. 2008, *Discovery of a Very Bright Strongly Lensed Galaxy Candidate at z ~ 7.6*, ApJ, 678, 647
Bignamini, A., Tozzi, P., Borgani, S., Ettori, S. & *Rosati, P.* 2008, *Intra cluster medium properties and AGN distribution in high-z RCS clusters*, A&A, 489, 967
Santos, J. S., *Rosati, P.*, Tozzi, P., Böhringer, H., Ettori, S. & Bignamini, A. 2008, *Searching for cool core clusters at high redshift*, A&A, 483, 35
Menci, N., *Rosati, P.*, Gobat, R., Strazzullo, V., Rettura, A., Mei, S. & Demarco, R. 2008, *The Red Sequence of High-Redshift Clusters: A Comparison with Cosmological Galaxy Formation Models*, ApJ, 685, 863
Sung, H., Bessell, M. S. & *Sana, H.* 2008, *Coronal Temperature as AN Age Indicator*, JKAS, 41, 1
Bounhir, A., Benkhaldoun, Z., Mougenot, B., *Sarazin, M.*, Siher, E. & Masmoudi, L. 2008, *Aerosol columnar characterization in Morocco: ELT prospect*, NewA, 13, 41
Saviane, I., Momany, Y., da Costa, G. S., Rich, R. M. & Hibbard, J. E. 2008, *A New Red Giant-based Distance Modulus of 13.3 Mpc to the Antennae Galaxies and Its Consequences*, ApJ, 678, 179
Schmidtobreick, L., Papadaki, C., Tappert, C. & Ederoclite, A. 2008, *RRPictoris: an old nova showing superhumps and QPOs*, MNRAS, 389, 1345
Blundell, K. M., Bowler, M. G. & *Schmidtobreick, L.* 2008, *SS 433: Observation of the Circumbinary Disk and Extraction of the System Mass*, ApJ, 678, L47
Salvadé, Y., *Schuhler, N.*, Lévêque, S. & Le Floch, S. 2008, *High-accuracy absolute distance measurement using frequency comb referenced multi-wavelength source*, ApOpt, 47, 2715
Selman, F. J. & Melnick, J. 2008, *The Scale-Free Character of the Cluster Mass Function and the Universality of the Stellar Initial Mass Function*, ApJ, 689, 816
Dominik, M., Horne, K., Allan, A., Rattenbury, N. J., Tsapras, Y., *Snodgrass, C.*, Bode, M. F., Burgdorf, M. J., Fraser, S. N., Kerins, E., Mottram, C. J., Steele, I. A., Street, R. A., Wheatley, P. J. & Wyrzykowski, L. 2008, *ARTEMiS (Automated Robotic Terrestrial Exoplanet Microlensing Search): A possible expert-system based cooperative effort to hunt for planets of Earth mass and below*, AN, 329, 248
Roederer, I. U., Lawler, J. E., Sneden, C., Cowan, J. J., *Sobeck, J. S.* & Pilachowski, C. A. 2008, *Europium, Samarium, and Neodymium Isotopic Fractions in Metal-Poor Stars*, ApJ, 675, 723

Koyama, Y., Kodama, T., Shimasaku, K., Okamura, S., *Tanaka, M.*, Lee, H. M., Im, M., Matsuhara, H., Takagi, T., Wada, T. & Oyabu, S. 2008, *Mapping dusty star formation in and around a cluster at z = 0.81 by wide-field imaging with AKARI*, MNRAS, 391, 1758

Tanaka, M., Finoguenov, A., Kodama, T., Morokuma, T., Rosati, P., Stanford, S. A., Eisenhardt, P., Holden, B. & Mei, S. 2008, *The environmental dependence of properties of galaxies around the RDCSJ0910+54 cluster at z = 1.1*, A&A, 489, 571

Qiu, K., Zhang, Q., Megeath, S. T., Gutermuth, R. A., Beuther, H., Shepherd, D. S., Sridharan, T. K., *Testi, L.* & De Pree, C. G. 2008, *Spitzer IRAC and MIPS Imaging of Clusters and Outflows in Nine High-Mass Star Forming Regions*, ApJ, 685, 1005

Molinari, S., Pezzuto, S., Cesaroni, R., Brand, J., Faustini, F. & *Testi, L.* 2008, *The evolution of the spectral energy distribution in massive young stellar objects*, A&A, 481, 345

Molinari, S., Faustini, F., *Testi, L.*, Pezzuto, S., Cesaroni, R. & Brand, J. 2008, *The pre-ZAMS nature of Mol160/IRAS 23385+6053 confirmed by Spitzer*, A&A, 487, 1119

van Dokkum, P. G., Franx, M., Kriek, M., Holden, B., Illingworth, G. D., Magee, D., Bouwens, R., Marchesini, D., Quadri, R., Rudnick, G., Taylor, E. N. & *Toft, S.* 2008, *Confirmation of the Remarkable Compactness of Massive Quiescent Galaxies at z ~ 2.3: Early-Type Galaxies Did not Form in a Simple Monolithic Collapse*, ApJ, 677, L5

Francke, H., Gawiser, E., Lira, P., *Treister, E.*, Virani, S., Cardamone, C., Urry, C. M., van Dokkum, P. & Quadri, R. 2008, *Clustering of Intermediate-Luminosity X-Ray-Selected Active Galactic Nuclei at z ~ 3*, ApJ, 673, L13

Mateos, S., Warwick, R. S., Carrera, F. J., Stewart, G. C., Ebrero, J., Della Ceca, R., Caccianiga, A., Gilli, R., Page, M. J., *Treister, E.*, Tedds, J. A., Watson, M. G., Lamer, G., Saxton, R. D., Brunner, H. & Page, C. G. 2008, *High precision X-ray log N - log S distributions: implications for the obscured AGN population*, A&A, 492, 51.

Treister, E., Krolik, J. H. & Dullemond, C. 2008, *Measuring the Fraction of Obscured Quasars by the Infrared Luminosity of Unobscured Quasars*, ApJ, 679, 140

Messineo, M., Figer, D. F., Davies, B., Rich, R. M., *Valenti, E.* & Kudritzki, R. P. 2008, *Discovery of a Young Massive Stellar Cluster near HESS J1813-178*, ApJ, 683, L155

Origlia, L., *Valenti, E.* & Rich, R. M. 2008, *High resolution infrared spectra of NGC 6440 and NGC 6441: two massive bulge globular clusters*, MNRAS, 388, 1419

Valenti, S., Elias-Rosa, N., Taubenberger, S., Stanishev, V., Agnoletto, I., Sauer, D., Cappellaro, E., Pastorello, A., Benetti, S., Riffeser, A., Hopp, U., Navasardyan, H., Tsvetkov, D., Lorenzi, V., Patat, F., Turatto, M., Barbon, R., Ciroi, S., Di Mille, F., Frandsen, S., Fynbo, J. U., Laursen, P. & Mazzali, P. A. 2008, *The Carbon-rich Type Ic SN 2007gr: The Photospheric Phase*, ApJ, 673, L155

van Belle, G. T. 2008, *Closure Phase Signatures of Planet Transit Events*, PASP, 120, 617

von Braun, K., *van Belle, G. T.*, Ciardi, D. R., López-Morales, M., Hoard, D. W. & Wachter, S. 2008, *Spitzer 24 µm Time Series Observations of the Eclipsing M Dwarf Binary GU Boötis*, ApJ, 677, 545

Engelbracht, C. W., Rieke, G. H., Gordon, K. D., Smith, J. T., Werner, M. W., Moustakas, J., Willmer, C. A. & *Vanzi, L.* 2008, *Metallicity Effects on Dust Properties in Starbursting Galaxies*, ApJ, 678, 804

Giallongo, E., Ragazzoni, R., Grazian, A., Baruffolo, A., Beccari, G., de Santis, C., Diolaiti, E., di Paola, A., Farinato, J., Fontana, A., Gallozzi, S., Gasparo, F., Gentile, G., Green, R., Hill, J., Kuhn, O., Pasian, F., Pedichini, F., Radovich, M., Salinari, P., Smareglia, R., Speziali, R., Testa, V., Thompson, D., *Vernet, E.* & Wagner, R. M. 2008, *The performance of the blue prime focus large binocular camera at the large binocular telescope*, A&A, 482, 349

Villegas, D., Kissler-Patig, M., Jordán, A., Goudfrooij, P. & Zwaan, M. 2008, *Normal Globular Cluster Systems in Massive Low Surface Brightness Galaxies*, AJ, 135, 467

Straughn, A. N., Meurer, G. R., Pirzkal, N., Cohen, S. H., Malhotra, S., Rhoads, J., Windhorst, R. A., Gardner, J. P., Hathi, N. P., Xu, C., Gronwall, C., Koekemoer, A. M., *Walsh, J.* & di Serego Alighieri, S. 2008, *Emission-Line Galaxies from the Pears Hubble Ultra Deep Field: a 2d Detection Method and First Results*, AJ, 135, 1624

Peng, E. W., Jordán, A., Côté, P., Takamiya, M., *West, M. J.*, Blakeslee, J. P., Chen, C. W., Ferrarese, L., Mei, S., Tonry, J. L. & *West, A. A.* 2008, *The ACS Virgo Cluster Survey. XV. The Formation Efficiencies of Globular Clusters in Early-Type Galaxies: The Effects of Mass and Environment*, ApJ, 681, 197

Yaitskova, N. 2008, *Adaptive optics correction of segment aberration*, JOSAA, 26, 59

Kronberger, T., Kapferer, W., Unterguggenberger, S., Schindler, S. & *Ziegler, B. L.* 2008, *The effects of ram-pressure stripping on the internal kinematics of simulated spiral galaxies*, A&A, 483, 783

Verdugo, M., *Ziegler, B. L.* & Gerken, B. 2008, *The galaxy populations from the centers to the infall regions in z ≈ 0.25 clusters*, A&A, 486, 9

Zwaan, M., Walter, F., Ryan-Weber, E., Brinks, E., de Blok, W. G. & Kennicutt, R. C. 2008, *Are the Kinematics of DLAs in Agreement with Their Arising in the Gas Disks of Galaxies?*, AJ, 136, 2886

Meyer, M. J., *Zwaan, M. A.*, Webster, R. L., Schneider, S. & Staveley-Smith, L. 2008, *Tully-Fisher relations from an HI-selected sample*, MNRAS, 391, 1712

Glossary of Acronyms

4LGSF	Four-Laser Guide Star Facility
AAAS	American Association for the Advancement of Science
A&A	Journal Astronomy & Astrophysics
AAS	American Astronomical Society
ACD	Amplitude Calibration Device
ACS	ALMA Common Software
ACS	Advanced Camera for Surveys (Hubble)
ADE	Archive Department
Admin	Administration Division
ADP	Advanced Data Products
ADS	Astrophysics Data System
AGB	Asymptotic Giant Branch
AGN	Active Galactic Nucleus
AIDA	Astronomical Infrastructure for Data Access
AIV	Assembly, Integration and Verification
ALMA	Atacama Large Millimeter/submillimeter Array
AMBER	Astronomical Multi-BEam combineR (VLTI Instrument)
AMOS	AMOS Electronics Corporation
Antu	VLT Unit Telescope 1
AO	Adaptive Optics
AOF	Adaptive Optics Facility
AOS	Array Operations Site (ALMA)
APE	Active Phasing Experiment (E-ELT)
APEX	Atacama Pathfinder Experiment
APLF	Association of French-speaking Planetariums
AQUARIUS	Mid-infrared array
ARC	ALMA Regional Centre
ASSIST	Adaptive Secondary Setup and Instrument Simulator
AstraLux	Lucky Imaging camera for the Calar Alto 2.2-metre telescope
ASTRONET	Astronomy ERA-NET
AT	Auxiliary Telescope for the VLTI
ATF	Antenna Test Facility (ALMA)
AUI	Associated Universities Inc. (NRAO)
aXeSIM	Slitless spectroscopy data extraction software
BAL	Broad Absorption Line
BE	Back End
BUS	Back-Up Structure (ALMA)
CADC	Canadian Astronomy Data Centre
CAPj	Journal "Communicating Astronomy with the Public"
CASA	Offline data reduction system (ALMA)
CCD	Charge Coupled Device
CDR	Critical Design Review
CERN	European Organization for Nuclear Research
CFRP	Carbon Fibre Reinforced Plastic
CMMS	Computerised Maintenance Management System (ALMA)
CMS	Content Management System
CODEX	High Resolution Optical Spectrograph (E-ELT)
COFUND	FP7 Marie Curie Initiative
Co-I	Co-Investigator
CONAMA	Chilean Environmental Agency
CONICA	COudé Near-Infrared CAmera (VLT)
CONICYT	Comisión Nacional de Investigación Científica y Tecnológica
CODEX	High stability high resolution optical spectrograph (E-ELT)
COS	Cosmic Origins Spectrograph (HST)
CP	Calibration Programme
CRIRES	Cryogenic InfraRed Echelle Spectrometer (VLT)
CV	Cataclysmic Variable
CW	Continuous Wave
DASA	Dirección de Aeródromos y Servicios Aeronáuticos (Chile)
DCA	Euro-VO Data Centre Alliance
DDL	Differential Delay Line
DDL-PAOS	Consortium (Geneva Observatory, Heidelberg Observatory and Max-Planck Institute for Astronomy in Heidelberg) developing DDLs for PRIMA
DFO	Data Flow Operations
DGAC	Dirección General de Aeronáutica Civil (Chile)
DGCK	Digitiser Clock Assemblies (ALMA)
DGP	DGP gravity is a braneworld model proposed by Dvali, Gabadadze and Porrati in 2000
DIPSI	Diffraction Image Phase Sensing Instrument
DMO	Data Management and Operations Division
DOORS	Requirement management software
DPD	Data Products Department
DR1/2	Data Release 1/2 (Hubble Legacy Archive)
DRM	Design Reference Mission (E-ELT)
DRSP	Design Reference Science Plan (E-ELT & ALMA)
DSM	Deformable Secondary Mirror (AOF)
DTS	Data Transmission System (ALMA)
E2V	Electronics manufacturer
EAAE	European Association for Astronomy Education
EAGLE	Multi-object NIR spectrograph (E-ELT)
EC	European Commission
E-ELT	European Extremely Large Telescope
EFOSC2	ESO Faint Object Spectrograph and Camera (v.2)
EIROforum	Organisation consisting of the seven largest scientific European international organisations devoted to fostering mutual activities
ELT	Extremely Large Telescope
e-MERLIN	Major project to upgrade the MERLIN array of radio telescopes
EMMI	ESO Multi-Mode Instrument (NTT)
EPICS	Planet imager and spectrograph (E-ELT)
EPO	Education and Public Outreach
ePOD	education and Public Outreach Department
ERA-NET	EU scheme to step up the cooperation and coordination of research activities carried out at national or regional level in the Member States and Associated States
ERP	Administrative information system
ESA	European Space Agency
ESAC	European Science Advisory Committee (for ALMA)
ESE	ELT Science and Engineering
ESFRI	European Strategy Forum on Research Infrastructures
ESO	European Organisation for Astronomical Research in the Southern Hemisphere
ESOF	Euroscience Open Forum
EU	European Union
EU FEIC	European Front-End Integration Centre (ALMA)
EUCLID	ESA dark energy mission
EUCYS	EU Contest for Young Scientists
EURO-VO	European Virtual Observatory
EVLA	Expanded Very Large Array
FE	Front End
FEED	Front-End Engineering Design (E-ELT)
FEIC	Front-End Integration Centres (ALMA)
FEROS	Fibre-fed, Extended Range, Échelle Spectrograph (2.2-metre)
FIERA	CCD controller (VLT,optical)
FINITO	Fringe Tracking Instrument Nice Torino (VLTI)
FITS	Flexible Image Transport System
FLAMES	Fibre Large Array Multi Element Spectrograph (VLT)
FOAD	Fibre Optic Amplifier/Demultiplexer (ALMA)
FORS	FOcal Reducer/low dispersion Spectrograph (VLT)
FORS1	FOcal Reducer/low dispersion Spectrograph (VLT)-1
FORS2	FOcal Reducer/low dispersion Spectrograph (VLT)-2
FP6 ELT-DS	Sixth EC Framework Programme ELT Design Study
FP7	Seventh EC Framework Programme
GaBoDs	Garching-Bonn Deep Survey
Gaia	Astrometric satellite (ESA)
GALACSI	Ground Atmospheric Layer Adaptive Optics for Spectroscopic Imaging
GHz	Gigahertz
GIRAFFE	Spectrograph (VLT/FLAMES)
GOODS	Great Observatories Optical Deep Survey
GRAAL	GRound-layer Adaptive optics Assisted by Lasers
GRAVITY	AO assisted, two-object, multiple-beam-combiner (VLTI)
GRB	Gamma-Ray Burst
GROND	Gamma-Ray burst Optical/Near-infrared Detector
GTC	Gran Telescopio Canarias
GUI	Graphical User Interface
HARMONI	Single Field, Wide Band Spectrograph (E-ELT)
HARPS	High Accuracy Radial Velocity Planetary Searcher (3.6-metre)
HAWK-I	High Acuity Wide field K-band Imager (VLT)
HD	High Definition
HLA	Hubble Legacy Archive
HR	Human Resources
HST	Hubble Space Telescope
IAC	Instituto de Astrofisica de Canarias
IAU	International Astronomical Union
ICD	Interface Control Document (ALMA)
IFG	Fast guiding controller (AMBER/VLTI)
INAF	Istituto Nazionale di Astrofisica (Italy)
IPS	Intrusion Prevention System
IPSAS	International Public Sector Accounting Standards
IPT	Integrated Product Team (ALMA)
IQ	Server system
IQuEye	Italian Quantum Eye
IR	InfraRed
IRACE	InfraRed detector high speed Array Control and processing Electronics
IRO	International Relations Office
IRAM	Institut de Radioastronomie Millimétrique
ISAAC	Infrared Spectrometer And Array Camera (VLT)
ISM	InterStellar Medium
IT	Information Technology
ITUG	IT User Group
IVOA	International Virtual Observatory Alliance
IYA2009	International Year of Astronomy 2009

JAAB	Joint Advisory Appeals Board
JAO	Joint ALMA Observatory
JENAM	Joint European and National Astronomy Meeting
JRA	Joint Research Activity
KIS-VTT	Kiepenheuer-Institut für Sonnenphysik Vacuum Tower Telescope (Canaries)
KMOS	K-band Multi-Object Spectrograph (VLT)
KONUS	Gamma-ray detector on WIND satellite
Kueyan	VLT Unit Telescope 2
LABOCA	Large APEX Bolometer CAmera
LAM	Laboratoire d'Astrophysique de Marseille
LAOG	Laboratoire d'Astrophysique de l'Observatoire de Grenoble
LBO	Lithium Triborate LiB3O5, nonlinear optical crystal
LFC	Laser Frequency Combs
LGS	Laser Guide Star
LGSF	Laser Guide Star Facility
LINER	Low-ionisation nuclear emission-line region galaxy
LMC	Large Magellanic Cloud
LP	Large Programme
LPG	Liquefied Propane Gas
LSP	La Silla Paranal Committee
M4	Mirror #4 in E-ELT AO unit
M5	Mirror #5 in E-ELT AO unit
MACAO	Multi-Application Curvature Adaptive Otics (VLT/VLTI)
MAD	Multi-conjugate Adaptive optics Demonstrator
MARCEL	PRIMA calibration source
MATISSE	Multi AperTure mid-Infrared SpectroScopic Experiment (VLTI)
MCAO	Multi-Conjugate Adaptive Optics
Melipal	VLT Unit Telescope 3
METIS	Mid-infrared imager-spectrograph (E-ELT)
MFPG	Multi-Fuel Power Generator
MICADO	Diffraction-limited camera (E-ELT)
MIDI	Mid-Infrared Interferometric Instrument (VLTI)
MIMO	Multiple Input/ Multiple Output
MPE	Max-Planck-Institute for Extraterrestrial Physics (Germany)
MPIA	Max-Planck-Institute for Astronomy (Germany)
MPIfR	Max-Planck-Institute for Radioastronomy (Germany)
MPQ	Max-Planck-Institut für Quantenoptik
MUSE	Multi Unit Spectroscopic Explorer (VLT)
MUX	Multiplexer (ALMA)
MVM	Multi-resolution Vision Model (Archive)
NACO	NAOS-CONICA (VLT)
NAOJ	National Astronomical Observatory of Japan
NAOS	Nasmyth Adaptive Optics System (VLT)
NASA	National Aeronautics and Space Administration
NEON	Network of European Observatories in the North
NGC	New General detector Controller
NICMOS	Near Infrared Camera and Multi-Object Spectrometer (Hubble)
NIR	Near-InfraRed
NOVA	Dutch Research School for Astronomy (Nederlandse Onderzoekschool voor Astronomie)
NRI	ESO quality control infrastructure
NTT	New Technology Telescope
O&E WG	Outreach and Education Working Group
OB	Observation Block
OCAM	Test/controller camera for CCD220
ODG	Office of the Director General
OmegaCAM	Optical Camera for the VST
OPC	Observing Programmes Committee
OPTICON	Optical Infrared Coordination Network for Astronomy
OPTIMOS	Multi-object, optical and J-band spectrograph (E-ELT)
OSF	ALMA Operations Support Facilities
OT	Observing Tool (ALMA)
P82	Observing Period 82
P83	Observing Period 83
P84	Observing Period 84
PA	Product Assurance
PARSEC	Sodium line laser for VLT AO
P-Artemis	Prototype bolometer camera
PB	Petabyte
PI	Principal Investigator
PIO	Public Information Officer
PLC	Programmable Logic Controllers (E-ELT)
PLO	Paranal La Silla Observatory
PMS	Pre-Main Sequence
PRIMA	Phase-Referenced Imaging and Micro-arcsecond Astrometry facility (VLTI)
PROFISICA	Chilean science foundation
PR	Press Release
PSD	Pipeline Systems Department
PYPS	PYramid Phasing Sensor
QoS	Quality of Service
QSO	Quasi Stellar Object
QSR	Quasi-Stellar Radio-source
R&D	Research and Development
RadioNet	Radio Astronomy Network in Europe
RAL	Rutherford Appleton Laboratory, Didcot (UK)
REM	Rapid Eye Movement Telescope (La Silla)
RMN	Reflective Memory Network
rms	Root mean square
ROHS	Restriction Of Hazardous Substances
RRM	Rapid Response Mode
SABOCA	Shortwave Apex BOlometer Camera
SAC	EURO-VO Science Advisory Committee
SAM	Sparse Aperture Mask (NACO)
SDD	Software Development Division
SED	System Engineering Department
SEI	System Engineering and Integration (ALMA)
SHAPS	Shack-Hartmann sensor
SHFI	Swedish Heterodyne Facility Instrument (APEX)
SIMPLE	High Spectral Resolution NIR Spectrograph
SINFONI	Spectrograph for INtegral Field Observations in the Near Infrared (VLT)
SM	Service Mode
SM4	Servicing Mission 4 (HST)
SNAP	SuperNova Acceleration Probe
SOFI	SOn oF Isaac (NTT)
SPARTA	Real-time computer platform for AOF and SPHERE
spaxels	Resolution scale for spectroscopy
SPHERE	Spectro-Polarimetric High-contrast Exoplanet Research instrument
SSAC	Site Selection Advisory Committee
STAC	Standing Advisory Committee
STC	Scientific Technical Committee
ST-ECF	Space Telescope European Coordination Facility
STFC	Science and Technology Facilities Council (UK)
STIS	Slit spectrograph (HST)
STRAP	Tip-tilt sensors (VLTI)
STScI	Space Telescope Science Institute (USA)
SUSI2	SUperb Seeing Imager-2 (NTT)
SWG	Science Working Group
Swift	NASA mission aimed at gamma-ray burst studies
TAROT	Télescope à Action Rapide pour les Objets Transitoires
TB	Terabyte
TFB	Tunable Filter Bank
THELI	Software package for the reduction of astronomical imaging data
TinyTim	Software for computing the camera point spread functions
ToO	Target of Opportunity
TORTORA	Telescopio Ottimizzato per la Ricerca dei Transiti Ottici RApidi
TT	Technology Transfer
UC	Users Committee
UK	United Kingdom
UKIDSS	UKIRT Infrared Deep Sky Survey
UKIRT	UK Infrared Telescope
ULTRASPEC	High-speed, spectroscopic camera (ESO 3.6-metre)
USD	User Support Department
UT	Unit Telescope of the VLT
UT1–4	VLT Unit Telescopes 1–4: Antu, Kueyen, Melipal and Yepun
UV	UltraViolet
UVES	UV-Visual Echelle Spectrograph (VLT)
VIMOS	VIsible MultiObject Spectrograph (VLT)
VIPERS	VIMOS Public Extragalactic Redshift Survey
VIRCAM	VISTA IR Camera
VirGO	Visual Archive Browser
VISA	VLTI Sub-Array
VISIR	VLT Mid-Infrared Imager Spectrometer
VISTA	Visible and Infrared Survey Telescope for Astronomy
VLA	Very Large Array
VLT	Very Large Telescope
VLTI	Very Large Telescope Interferometer
VNR	Video News Release
VO	Virtual Observatory
VOP	Virtual Observatory Project Office
VOS	Virtual Observatory Systems
VOTech	EU FP6 funded design study for Euro-VO
VPH	Volume phase holographic, type of grating
VSI	VLTI Spectro Imager
VST	VLT Survey Telescope
VTK	Vibration Tracking
WFC	Wide Field Channel
WFC3	Wide Field Camera 3 (Hubble)
WFCAM	Infrared wide field camera for the UK Infrared Telescope on Mauna Kea
WFI	Wide Field Imager (2.2-metre)
WFPC2	Wide-Field Planetary Camera 2 (HST)
Wind	First of two NASA spacecraft in the Global Geospace Science initiative
WVR	Water Vapour Radiometer (ALMA)
XMM-Newton	X-ray Multi-Mirror satellite (ESA)
X-shooter	Wideband ultraviolet-infrared single target spectrograph (VLT)
Yepun	VLT Unit Telescope 4
zCOSMOS	VLT LP redshift survey
ZEUS	Zernike Unit for Segment Phasing

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Front cover: Part of the ESO VLT.

Back cover: Part of the globular cluster Omega Centauri, the brightest and largest globular cluster in the sky.

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