loaded brushless motors per axis, driven in pairs by means of an adaptive software algorithm in order to minimize losses, consumption and improve redundancy. The azimuth axis is supported by a 12-pad hydrostatic system able to guarantee a tilt stiffness of ~ 20 GN/m. The system design allows the rapid removal of a pad for maintenance, without blocking the telescope rotation, if needed. The tracking performance of each telescope axis is expected to be better than 0.05 arcsec rms (Figures 7a and 7b).

The realization of the VST started in 1998 with the signing of the MoU with ESO. The facility was scheduled to be operational at the end of 2003, but the growing complexity of the telescope design, together with the consequences on the manufacturing activities due to the accident that occurred to M1 in 2002, have caused the date of completion of the project to shift by about two and a half years.

At the time of writing, extensive inspections and tests are being performed on all subsystems in parallel to the final improvements of some devices or functions. These will be completed in the next two months in order to be ready for a full system characterization and telescope alignment verification in the workshop following the contents of the provisional error budget table.

The telescope is expected to soon enter the preliminary acceptance procedure and hopefully move to Chile within the third trimester of 2005 in order to be assembled at Paranal by the end of the year.

The GTO Surveys

The areas of astrophysics and cosmology which may take advantage of the VST/OmegaCAM potential (Arnaboldi et al. 1999) include, just as examples: Solar System bodies, extrasolar planets, Galactic sources, nearby galaxies, extragalactic and intra-cluster PNs, faint objects surveys and micro-lensing events, medium redshift supernovae, the cosmic distance scale, cosmic structures at medium-high redshift, AGNs and quasars, degenerate objects. It goes without saying that, extrapolating from previous surveys, a major outcome is expected in form of serendipitous discoveries.

A set of survey projects (CAOS = Capodimonte Observatory Surveys) has been designed for the OAC GTO.

1. STRANO: Search for TRAns Neptunian Objects

Kuiper Belt Objects (KBOs) and Centaurs are believed to be remnant planetesimals from the formation of the Solar System and to be composed of the oldest, almost untouched materials. Their cumulative luminosity distribution reflects the size and mass distribution of the matter in the outer solar nebula, and carries information on the conditions in which this region grew and evolved. Only a

OmegaCAM: The VST Camera

Enrico Cappellaro
INAF – Capodimonte Astronomical Observatory, Naples, Italy

OmegaCAM is the large-format CCD pixels imaging camera that has been designed to exploit the square degree field of view of the VST while sampling the excellent seeing of Paranal (Kuijken et al. 2002, The Messenger 110, 15). The instrument is built by a consortium which comprises institutes in the Netherlands, Germany and Italy, and is headed by PI Konrad Kuijken (Groningen and Leiden University) with co-PI's Ralf Bender (Munich USM/MPE) and Enrico Cappellaro (INAF Naples), and project management by Bernhard Muschielok and Reinhold Häfner (USM). The Optical Detector Team at ESO has designed and built the detector system.

The CCD mosaic is the heart of OmegaCAM. It consists of a 'science array' of 32 thinned, low-noise ($5e^-$) 2 k × 4 k e2v devices, for a total count of 16 384 × 16 384 pixels. The scale is 0.21 arcsec per 15 μm pixel. Around the science array lie four 'auxiliary CCDs', of the same format. Two of these are used for guiding, and the other two for online image analysis. Readout of the full mosaic takes 45 s, and is accomplished by two FIERA controllers (a third FIERA takes care of the auxiliary CCDs).

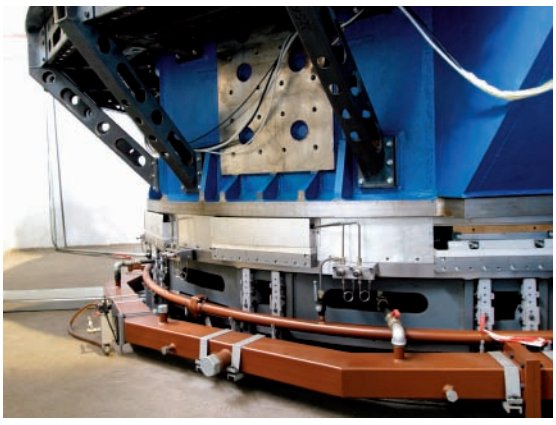
Two magazines located on either side of the focal plane can store up to 12 filters. The primary filter set of OmegaCAM will be that of the Sloan u′, g′, r′, i′ and z′ filters. In addition, there will be Johnson B- and V-filters, a Stromgren v-filter, an Hα-filter consisting of 4 segments with redshifts of up to 10 000 km/sec, and a segmented *ugri* filter for efficient photometric monitoring of the sky.

The OmegaCAM manufacturing phase has just been completed. The CCDs have been delivered, tested and integrated into a working detector system; the mechanics has been integrated and the instrument control and data analysis software is coded. At the time of writing, extensive tests are being performed in the ESO workshop in Garching. These will be completed in early summer, and it will be soon ready for shipping to Paranal.

OmegaCAM is funded by grants from the Dutch Organization for Research in Astronomy (NOVA), the German Federal Ministry of Education, Science, Research and Technology and the Italian Istituto Nazionale di Astrofisica (INAF).

Figure 7a: The 12 pads of the VST hydrostatic support system.

Figure 7b: Details of the hydrostatic system.



small part of the ecliptic has been explored so far. The project STRANO, carried out by INAF (Naples) with the University "Parthenope", plans a search of such "Slow Moving Objects" by a monochromatic survey of ~ 50 sq. degrees along the ecliptic. The goal is to discover ~ 200 new objects, doubling the existing samples.

2. OmegaTranS: OmegaCAM Transit Survey

This is a joint project of INAF (Naples, Padua) with MPIE (Garching) and Leiden Observatory, aimed at searching for extrasolar planet transits. Each of the three countries involved will provide one week/yr of bright GTO, possibly over several years. Targets are stars in the magnitude range $13.5 < R < 17.0$, in five fields of the southern part of the Galactic disc. OmegaTranS will advance over the OGLE-III transit survey, which is arguably the most successful to date, by more than one order of magnitude. In the first year the survey will be sensitive to short-period planets, and eventually to planets with orbital periods of hundreds of days.

3. VISPO: VST Imaging Survey for Pre-main Sequence Objects, probing the low-mass end of the IMF in different environments

The goal of this collaboration between INAF (Naples, Catania, Palermo, Florence) and ESO is to investigate the IMF at very low-mass and sub-stellar regimes in outlying "cometary clouds" of Orion, where star formation may have been triggered by the strong impact of massive stars, in order to characterize the pre-Main-Sequence populations in very different environmental conditions. The sensitivity and area covered by the survey should also make it possible to single out young free-floating planetary-mass objects. The project requires 54 hours of grey-bright VST time to cover 15 sq. degrees in 3 broad bands + Hα, and ~ 30 hours of VLT for a spectroscopic follow-up of selected candidates.

4. STREGA: Structure and Evolution of the Galaxy

This multipurpose programme, coordinated with a LBT Science Verification Pilot Project, looks for the signatures of the tidal interaction with the Galactic halo of the Fornax and Sculptor galaxies, and of the globular clusters Pal 3 and Pal 12, by surveying RR Lyrae and turn-off stars in the southern part of the Fornax stream (~ 150 sq. deg. and ~ 60 VST nights). With some additional exposures, the STREGA data will be used also to: i. investigate disc and halo WDs at increasing Galactic latitudes; ii. constrain the evolution of the disc binary population; iii. clarify the nature of halo interacting binaries; iv. create a database for Galactic star counts. Follow-up observations are foreseen at the VLT (10 nights) for radial velocities and metal abundances, and at the VST itself for proper-motion measurements. The collaboration comprises INAF (Naples, Rome, Teramo), the Universities of Naples, Pisa, and Padua, ESO and CIDA.

5. STEP: The SMC in Time. Evolution of a Prototype Interacting Dwarf Galaxy

This investigation of the SMC body and of the bridge (towards the LMC) down to the turn-off of the oldest stars, carried out by INAF (Naples, Bologna, Teramo) with STScI and the Wisconsin and Basel Universities, and coordinated with complementary observing runs at the HST and VLT, consists of: 1. a deeper survey (35 sq. deg., V ~ 24.5, S/N = 10) designed to trace the star formation history of the SMC and of its stellar cluster component; 2. a shallower survey (30 sq. deg., V ~ 19.5, S/N = 100) to build homogeneous CM diagrams of the SMC wing and bridge and of most of the hosted clusters. The total request is 169 hours of VST grey-bright time, and 38 hours of VLT for spectroscopy.

6. VESUVIO: VST/OmegaCAM Exploration of Superclusters, Voids, and Intermediate Objects

This project is to understand the role of environment in galaxy evolution by the study of the detailed properties (magnitudes, colours, structure, internal distribution of stellar populations, and SFRs) of objects of all morphological types in the whole range of cosmic environment. A 100 sq. deg. region in the southern concentration of the Horologium-Reticulum supercluster, and a 10 sq. deg. spot in the Hercules supercluster, will be surveyed in 5 broad-bands to an average depth. The programme, which requires 120 VST nights + 40 nights at VLT-VIMOS, will be carried out by an international collaboration led by INAF-OAC and the Kapteyn Institute, which includes INAF (Catania,Teramo), the Universities of Naples, Athens, Innsbruck, North Carolina, and Tasmania, MPIE (Munich), and SRON (Utrecht).

7. VST-16

This deep survey of a total area of ~ 20 sq. degrees in 5 broad bands plus 11 medium bands, parallel to COMBO-17, is meant to provide photometric redshifts for over one million galaxies at $0.2 < z < 1.2$, some 10 000 galaxies at $1.2 < z < 2.5$, and ~ 10 000 quasars at $0.5 < z < 6$. Science goals include QSO evolution up to z ~ 6, galaxy evolution in relation to the environment, DM distribution, and large-scale structure. Part of the VST-16 survey fields will be chosen to coincide with those observed also by IR and X-ray surveys. At present, 65 nights of GTO (40 from OAC and 25 from the OmegaCAM Consortium) are planned for the VST-16 project, which is led by INAF-OAC, the Munich Observatory and MPIA (Heidelberg).

8. SUDARE @ VST: Supernova Rate Evolution at the VST

This project is to gauge the evolution of the rates of the different SN types in the range $0.3 < z < 0.8$, still poorly known despite the interest of high-z SNe for cosmology. To this aim the frequent monitoring of 1 sq. degree will be carried out for a period of 3 years, which should lead to an estimated discovery and accurate photometric characterization of a sample of 100-200 SNe. Real-time data processing and analysis is contemplated to allow for spectroscopic follow-up at the VLT. The time required for this survey is 80 h/yr, half of which comes out of the OAC GTO and the remaining out of the OmegaCAM GTO. The project is a collaboration between INAF (Naples, Padua, Teramo) and ESO.

Acknowledgements

The proposal, study, design, and realization of the VST telescope are the result of the joint efforts of a number of persons who are acknowledged here. In particular: the members of the scientific steering committee for the VST proposal, Magda Arnaboldi, Jacques Boulesteix, Kenneth C. Freeman, Loretta Gregorini, Angela Iovino, Giuseppe Longo, Tommaso Maccacaro, Yannick Mellier, Georges Meylan, Giampaolo Piotto, Roberto Scaramella, and Giampaolo Vettolani (chairman); the ESO representatives and major consultants for the project, Bernard Delabre, Philippe Dierickx, Sandro D'Odorico, Roberto Gilmozzi, Franz Koch, Richard Kurz, Lothar Noethe, Alvio Renzini, Jason Spyromilio, Roberto Tamai, and Massimo Tarenghi; for the optics, Piero Rafanelli.

Besides the authors of this paper, the VST design, assembly, and management was the responsibility of (alphabetical order): Ciro Belfiore, Massimo Brescia, Oreste Caputi, Giancarmine Castiello, Mariano Concilio, Fausto Cortecchia, Gennato Cretella, Sergio D'Orsi, Luigi Ferragina, Debora Ferruzzi, Davide Fierro, Valentina Fiume Garelli, Riccardo Leto, Guido Mancini, Gabriella Marra, Laurent Marty, Germana Mazzola, Pierluigi Mavar, Cesare Molfese, Claudio Parrella, Leopoldo Parisi, Lorenzo Pellone, Francesco Perrotta, Vincenzo Porzio, Emilio Rossi, Fabrizio Rovedi, Maria Grazia Russo, Riccardo Russo, Pietro Schipani, Giovanni Sciarretta, Gianfranco Spirito, Annalisa Terracina, and Michele Valentino.

The Italian Ministry of University and Research (MIUR), the Italian National Consortium for Astronomy and Astrophysics (CNAA), the Regione Campania, INAF, and ESO, are acknowledged for their support.

References

Arnaboldi M., Capaccioli M., Mancini D. et al. 1998, The Messenger 93, 30

Arnaboldi M., Capaccioli M., Mancini D. et al. 1999, "Wide Field Surveys in Cosmology", XIV IAP Symp., Colombi, Mellier & Raban (eds.), Edition Frontières, 343

Alcalà J. M., Pannella M., Puddu, E. et al. 2004 A&A 428, 339

Capaccioli M., Mancini D., Sedmak G. 2003a, Mem. SAIt 74, 450

Capaccioli M., Cappellaro E., Mancini D., Sedmak G., 2003b, Mem. SAIt Suppl. 3, 286

Radovich, M., Arnaboldi, M., Ripepi, V. et al. 2004, A&A 417, 51

Mancini D., Sedmak G., Brescia M. et al. 2000, SPIE-ESO Conf. on Astronomical Telescopes & Instrumentation, SPIE 4004, 79