of the detector in the EMMI red arm and at the edge of the field of the NTT. The small differences both in the coefficients and the d_{80} values at the edge of the EMMI detector between the corrected and a perfectly aligned NTT will be virtually undetectable. Therefore, for all practical purposes, the NTT can now be regarded as a perfectly aligned telescope. The improved optical quality of the NTT has been confirmed by subsequent observers.

Reference

[1] Collimation of Fast Wide-Field Telescopes, McLeod, B.A., 1996, *PASP* **108**, 217–219.

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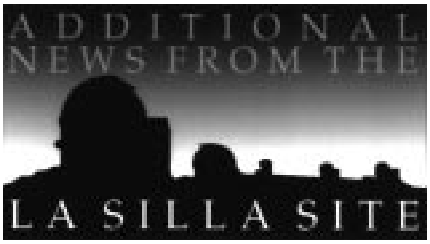

The La Silla News Page

The editors of the La Silla News Page would like to welcome readers of the tenth edition of a page devoted to reporting on technical updates and observational achievements at La Silla. We would like this page to inform the astronomical community of changes made to telescopes, instruments, operations, and of instrumental performances that cannot be reported conveniently elsewhere. Contributions and inquiries to this page from the community are most welcome. *(R. Gredel, C. Lidman)*

CES Very Long Camera Installed

M. KÜRSTER, ESO, Chile

After a general overhaul of the Coudé Echelle Spectrometer (CES), its new Very Long Camera was successfully installed between April 9 and 20. It consists of a new f/12.5 camera mirror that was mounted in the frame of the old scanner mirror and an x-y table on new pillars which hold a new 45° folding mirror and the CCD mount. The new Very Long Camera was jointly built by Uppsala Astronomical Observatory (optics) and the University of Liège (mechanics). It replaces the previous Long Camera (f/4.7) which was decommissioned.

During a first series of test measurements with the thorium-argon lamp, resolving powers of R = 235,000 were obtained at different wavelengths. At this resolving power the sampling was determined to be ≈ 2.45 pixels/FWHM.

The Very Long Camera will be commissioned during May 14–20 together with the new fibre link to the Cassegrain focus of the 3.6-m telescope and image slicers built by ESO Garching (optics) and ESO La Silla (mechanics). A sliding carriage with housings for up to four different image slicers has already been installed. The slit unit was also integrated on this sledge. The weeks before the commissioning will see the installation of the fibre in the Cassegrain adapter, and the installation of the fibre exit unit in the CES pre-slit area. The latter unit will be movable (with very accurate repositioning capabilities) to permit the continued use of the CAT telescope with the CES.

Improving Image Quality at the Danish 1.54-m Telescope

J. BREWER, ESO, La Silla
J. ANDERSEN, Copenhagen University Observatory, Denmark

The image quality achieved at a telescope depends on many factors, not the least of which is the thermal environment of the dome, telescope, and mirror. During the daytime, the dome, telescope and mirror heat up; at night this heat is released, causing air turbulence which degrades the seeing by causing the starlight to be diffracted along different paths. As part of the seeing improvement campaign at the major La Silla telescopes, it has been decided to address these problems also at the Danish 1.54-m telescope, which was once known for its excellent images (e.g. *The Messenger* No. 17, p. 14, 1979).

After a lengthy period of measurements and analysis by Danish and ESO staff (in particular M.I. Andersen and A. Gilliotte), it was concluded that both charge diffusion effects in the (thinned Loral 2K) CCD and thermal problems near the mirror and in the dome and building were responsible for the currently observed image degradation. Considering that the contract between ESO and Copenhagen University on the operation of the telescope had been extended for a ten-year period from 1996, a substantial investment in reducing daytime heating of the dome, telescope and mirror was found justified.

There are two ways to address this problem. One solution is to estimate the nighttime temperature and to maintain the dome, telescope and mirror at this temperature during the daytime by use of a cooling system. The other solution is to increase the natural ventilation in the

Figure 1: View of the open ports from the inside of the dome.

evening and during the night, while at the same time reducing the radiative heat flux from the concrete surfaces of the dome interior. Both approaches have advantages and disadvantages, and they are not mutually exclusive: An already partly cool dome reaches equilibrium faster when ventilated, and good ventilation in the evening and during the night reduces demands on the cooling system. A main advantage of the natural ventilation approach is, however, that it is simple to implement, requires little maintenance, and has no significant operational cost (unlike a large refrigeration plant).

After commissioning a number of cost/benefit engineering studies, it was decided by Copenhagen University Observatory (CUO) to implement a natural ventilation solution by raising the entire dome by 70 cm and installing side ports in the space between the dome and the building. A similar system is already in use at the Nordic Optical Telescope on La Palma, Spain, and will be used at the new Swiss telescope at La Silla. It was agreed with ESO that this would be supplemented by an effort to improve the thermal insulation and the performance of the existing ventilation and cooling systems in the building (which, unlike the telescope itself and the dome, is ESO property).

The mechanical design and prefabrication of the dome ports was undertaken by the Danish engineering company Richard Thomsen A/S. The ports were shipped to Chile and installed at the telescope during the period 4 April – 1 May 1998 by Anders Larsen and Kjeld Olsen of Richard Thomsen A/S in collaboration with CUO staff members Morten Jensen, Hans Henrik Larsen, Niels Michaelsen and Preben Nørregaard.

Figure 1 is a view of the open ports seen from the inside of the dome. The ports are split into 8 sectors of 4 ports each, and it is possible to open or close any of the sectors separately. This will allow the system to be used in strong wind conditions when wind-borne dust is of concern and the dustladen wind must be kept from entering the telescope building. The system is mechanically simple and should require minimal maintenance. For simplicity, it is planned initially to apply the standard La Silla wind limits for domes also to the ports; i.e., all ports may remain open if the wind speed is less than 14 m/s, while ports in the wind direction should be closed when the wind speed is above 14 m/s. At wind speeds greater than 20 m/s, all ports (and, of course, the dome itself), must remain closed.

The side ports are opened and closed from a large control box located on the west wall next to the telescope. Having the control box on the dome floor will ensure that observers will not use the system blindly. The side ports can only be fully open or closed; it is not possible to open the ports partially.

The next stage of the project is to improve the internal insulation of the dome to reduce the heat flow from the concrete floors and walls of the building. The insulation work will be carried out by the La Silla Infrastructure Group in the next few months after a final design has been agreed upon and the materials purchased. Meanwhile, the ventilation system in the dome will be refurbished so as to primarily draw warm air away from the telescope, especially from the control room under the observing floor. Ways will also be investigated to use any additional capacity of the cooling plant above that needed to cool the TCS rack to reduce the daytime temperature in the dome.

In addition, with a much improved thermal monitoring system at several locations in the telescope and dome, and with improved access to the mirror, it is intended to gradually bring the mirror cooling system into operation when safe ways to avoid accidental condensation of moisture have been worked out. In parallel, the design and operation of the mirror ventilation system will be improved, drawing on the very encouraging experience from the ESO 3.6-m telescope. The final step in the process would be to replace the CCD with one that does not suffer from the degradation in resolution seen with the Loral chips, but a suitable chip with the desired combination of high spatial resolution, availability and affordable price has not yet been identified.

Additional work which has been done during this extended technical period includes:

- Clean and bake the CCD dewar and its molecular sieve (CUO).
- Move the CCD preamplifiers to the outside of the dewar (CUO).
- Re-aluminise and realign M1 (LS Optics Team).
- Refurbish the drive and install limit switches for the DFOSC rotator (CUO).
- Install new, more powerful fans with air filters for mirror ventilation (CUO).
- Drill holes in the mirror cell to improve the air flow of the mirror cooling system (CUO).
- Remove many obsolete cables and re-route many of the loose cables hanging from the telescope (CUO and 2p2 Team).
- Remove instruments that have been definitively retired from active service at the telescope (two-channel photometer, polarimeter, CORAVEL).
- Upgrade the version of VXworks for the TCS VME (2p2 Team).
- Upgrade the workstations to HP/UX 10.20 (LS Software group).
- Install 2 9-GB disks on the data-acquisition WS (LS Software group).

We trust that these major efforts by many staff members of CUO and of ESO will give this favourite workhorse of many ESO and Danish observers another long period of productive service, even in a world of stiffening competition. The substantial investment in the dome upgrade has been provided by the Danish Natural Science Research Council through its Infrastructure Centre for Ground-Based Astronomy, located at CUO.