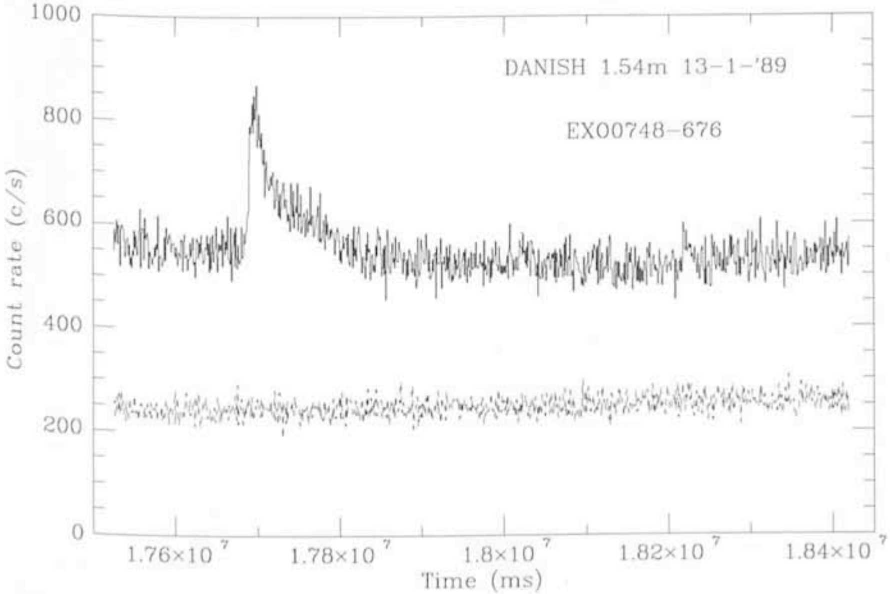

Figure 2: *The light curve of a burst from UY Vol, observed on January 13, 1989. The axes have the same definition as in Figure 1. Each point is a one-second integration. The sky counts are corrected for the difference in sensitivity of the two detectors.*

two following nights the count rates had risen to between ~400 and ~600 c/s. In this respect it is interesting to note that the shape of the "first" burst in Figure 2 is very simular to the "slow" X-ray burst profile seen in the low X-ray state.

Also, the source intensity during the second part of the third night was higher than during the first part. This can be seen by comparing the lower curve of Figure 1, which was observed during the first part of that night, and the upper curve, observed in the second part of that night, which is higher by more than the upward shift of +70 c/s. This would then also indicate an increase in the persistent X-ray flux and naturally explains the detection of only one burst at the beginning of that night and the lack of any further detection for the rest of the night.

In Figure 1 it can be seen that also during the X-ray eclipse the optical intensity of the source is significantly increased in the second part (upper curve in the Figure) of the night. Following the picture given above, this is in turn fully consistent with the idea that the disk radiates through reprocessing of X-rays, giving a rise in the optical emission with a rise in the X-ray flux also when only the side of the companion turned away from the X-ray source and (part) of the disk are visible. The depth of the eclipse also shows that the disk is a major source of optical light in the system.

To look further into the relation between optical and X-ray behaviour of this source, a separate night of observations, simultaneous with the X-ray satellite GINGA, was made on March 25 this year. Unfortunately, only three hours of data could be collected and a first quick look at the data did not show any special activity of the source, though a closer look, also at the X-ray data, will be necessary.

However, it still would be very interesting to follow this source closely in the future, if possible simultaneously in X-ray and optical, to further study this very unusual object.

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NEWS ON ESO INSTRUMENTATION

The VLT Adaptive Optics Prototype System: Status July 1989

F. MERKLE, ESO

In June 1986 the conceptual design of the VLT Adaptive Optics Prototype system was started, based on the collaboration between the Observatoire de Paris (Meudon), ONERA, the Laboratoires de Marcoussis, and ESO after funding was assured by ESO and supporting French authorities.

In August 1987 began the construction of the major components. It was completed at the facilities of the various partners in May 1988. The major components are the 19-actuator deformable mirror (LdM), the Shack-Hartmann wavefront sensor (ESO), the wavefront computer and control electronics (ONERA, LdM), the tip/tilt mirror (OdM), the opto-mechanical support structure

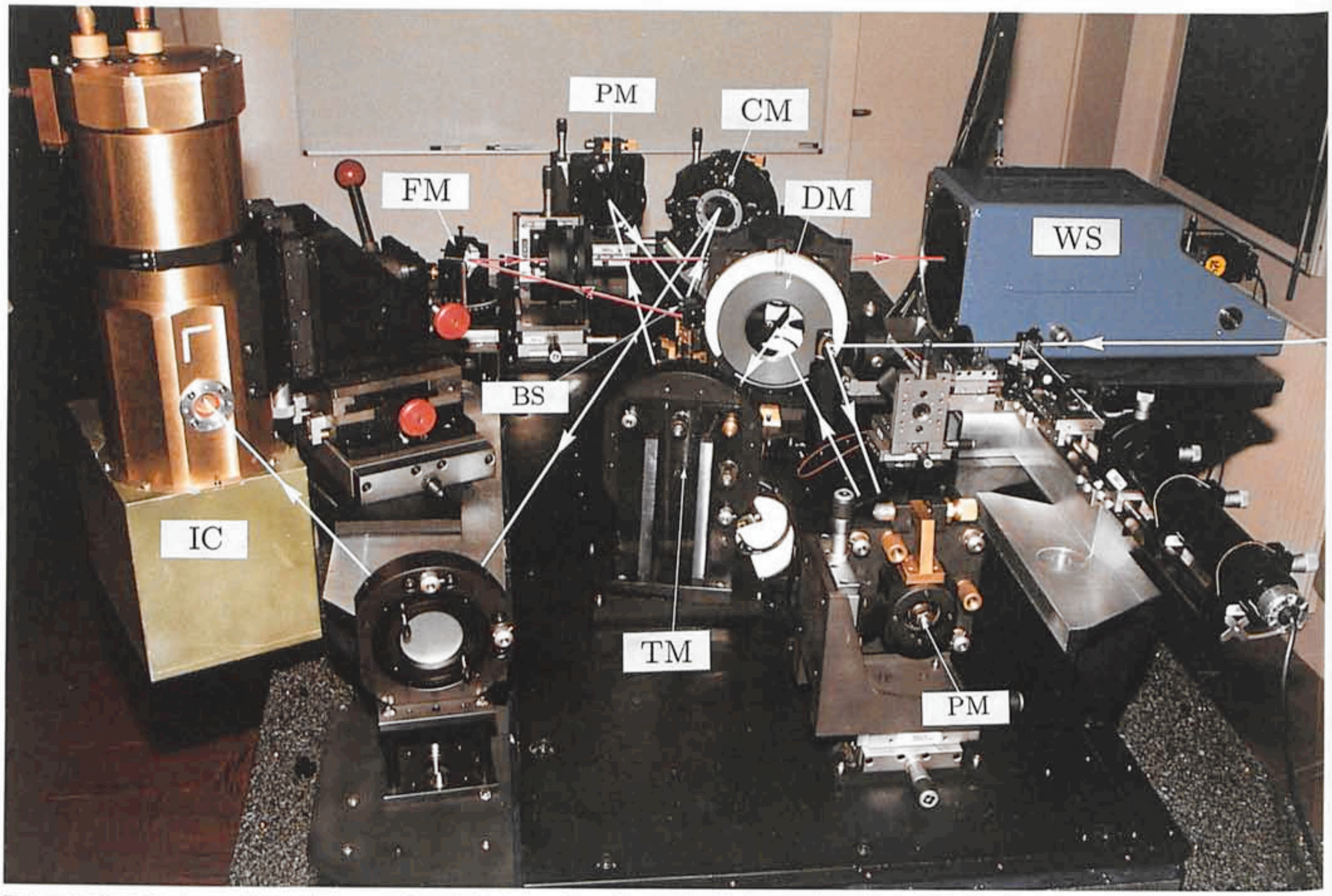

Figure 1: *The adaptive optics prototype system in the laboratory. The optical light pass is indicated. The major components are the deformable mirror (DM), the tip/tilt mirror (TM), the off-axis parabola (PM), the dichroic beamsplitter (BS), the field selection mirror for the wavefront sensor (FM), the wavefront sensor (WS), the chopping mirror (CM), and the infrared camera (IC). The electronics, including computers, occupy two standard racks and are not shown. The light path from the dichroic beam splitter to the wavefront sensor is indicated in red.*

(OdM, CNRS), and the IR array camera (OdM).

Meanwhile the system has been completely integrated at Observatoire de Meudon. First successful static tests have been performed in the laboratory and dynamic operation is under preparation. Figure 1 shows the prototype system at Meudon in June 1989. It is planned that the alignment and tuning of the system will be finished by mid-September. The major characteristics are summarized in the Table.

The first, closed-loop operation is scheduled for October 12 to 23, 1989, followed by a second observing run in November. These observations will take place at the Observatoire de Haute-Provence at the coudé focus of the 1.52-metre telescope. Currently the OHP is preparing the installation of the adaptive system in October.

Early 1990 the system will go from Garching to La Silla, after the necessary modifications for adaptation to the 3.6-metre telescope, and a series of final laboratory tests and improvements, if required. During the observations, a whole set of technical programmes will be carried out, like seeing and isoplanicity measurements in the IR and visible, partial adaptive correction at shorter wavelengths and the visible, to mention only a few of them.

This prototype system is ESO's first major step towards the adaptive optics systems required for the VLT. As a test-bench it allows to investigate the performance of all components and in particular of the control strategy. Already during the design and construction it became obvious that the computing power necessary in order to achieve the real-time control with the required bandwidth is the major constraint. A possible upgrade of the system with a mirror of approximately 64 actuators will be an important intermediate step for the specification of the VLT systems. For the VLT the current plans envisage approximately 250 actuators.

Acknowledgements

The author's thanks are due to many colleagues contributing to ESO's activities in the field of adaptive optics, particularly J.C. Fontanella (ONERA),

Table: *Major parameters of the adaptive optics prototype system*

Wavelength range:	3 to 5 micrometre (3.6-m telescope) partial correction for λ < 3 micrometre
Deformable mirror:	19 piezoelectric actuators +/– 7.5 micrometre stroke
Tip/tilt mirror:	gimbal mount piezoelectric actuators
Wavefront sensor:	Shack-Hartmann principle 5 × 5 and 10 × 10 subapertures 100 × 100 intensified Reticon detector built-in reference source additional field selection mirror
Wavefront computer:	dedicated electronics host computer based on Motorola 68020
Control algorithm:	modal correction scheme mirror eigenmodes
Camera:	32 × 32 InSb array camera (SAT detector) additional chopping mirror

J.P. Gaffard (CGE), P. Kern (Obs. de Meudon), P. Léna (Obs. de Meudon), J.C. de Miscault (CGE), G. Rousset (ONERA), and to many colleagues at ESO for stimulating discussions.

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For additional references the following papers are recommended:

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LATEST NEWS

IR Observers at the 3.6-m telescope are inormed that the new F/35 chopping secondary mirror is now available.

The F/35 chopping secondary mirror was reinstalled in August 1989 and tested with the IR Photometer/Spectrophotometer. The performance of the system proved at least identical to the one quoted in *Messenger* 39, 1, 1985. ESO's IR Specklegraph (see *Messenger* 45, 29, 1986) was also successfully used in its F/35 configuration.

A. van Dijsseldonk (ESO)

Telescope Alignment Procedures: Improved Technique in the Optical Identification of Mechanical Axes

P. GIORDANO, ESO

Introduction

In the article concerning "First Light" in the NTT in the *Messenger* No. 56, a brief description was given on page 2 of the basic steps of the alignment procedure. As was stated there, the procedure used in the NTT was essentially only a somewhat more refined form of a standard procedure which had been successfully used on a number of La Silla telescopes. The first – and most fundamental – step is the optical identification of the altitude axis (alt-az telescopes) or declination axis (equatorial telescopes).

The set-up for this step in the NTT is shown in Figure 1. ST1 and ST2 are two sighting telescopes mounted at the two Nasmyth foci. Target mirrors tM1C1 and tM2C2 were mounted on the fixed parts of the fork. The observation of a central cross on these target mirrors and the observation of the ST graticule in auto-collimation against the plane faces of the target mirrors enables the two ST to be placed on the mechanical altitude axis, thereby establishing a basic reference for the whole operation. However, space reasons dictated in this case that one had to "look through" tM2C2 to observe tM1C1 with ST1 and conversely with ST2. The conventional solution using "half-coated" mirrors leads to loss of ¾ of the light and ghost images with higher intensity than the required images.

The selected solution was based on the combination of narrow band dielectric mirrors and illumination of the sighting telescope with the corresponding light using narrow band interference filters. We get in ST1, for example, a maximum of reflectivity from M2C2, in spite of 2 passages through M1C1 (see Fig. 1).

The wavelengths chosen in the realization of the 2 beams were in accordance with the laser light currently used in our laboratory:

Red beam $\lambda c = 632{,}8$ nm	HeNe laser
Green beam $\lambda c = 543{,}5$ nm	HeNe laser

Realization

The dielectric mirrors were realized and delivered on time by MELLES GRIOT (France), who, after a first study and a computer simulation, achieved in practice an excellent confirmation of the theoretical values. The front surface, with the cross-hair, is coated with the dielectric layer, while the back surface is coated with a broad band antireflective coating.

The interference filters were selected carefully from the ESO La Silla catalogue, in order to optimize the total efficiency of the delivered version of the dielectric mirrors.

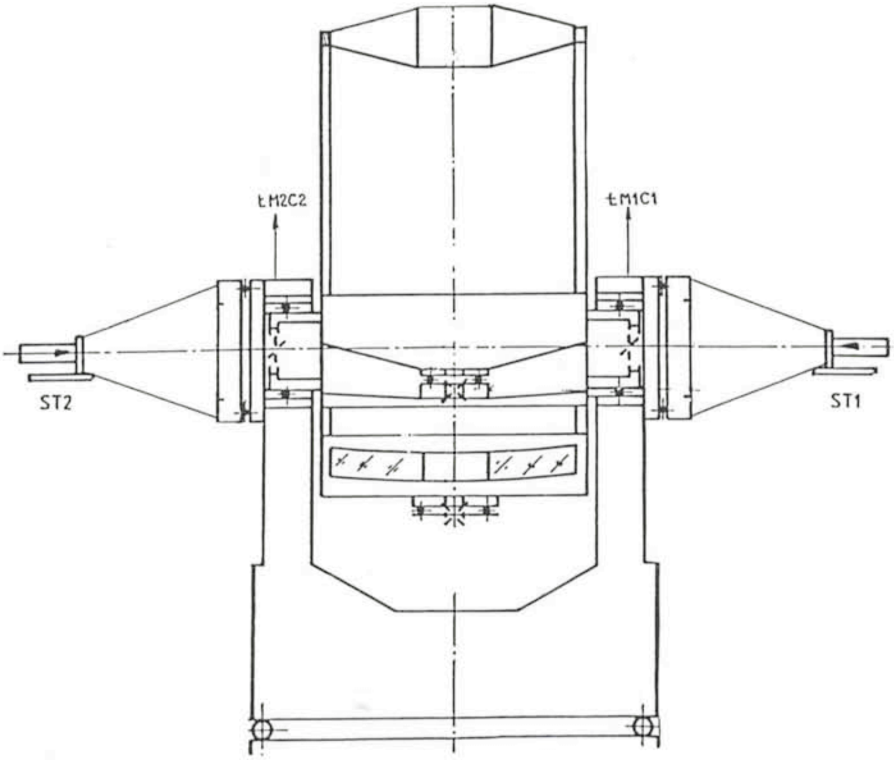

Figure 1.