photometrically and found a period of 0.06196 days or its alias 0.06614 days. Duerbeck et al. (1987) analysed radial velocities from spectra, and obtained a period of 0.0614215 days. The lesson, especially if one wished to go further, was that more observations were required, if possible with more powerful instrumentation. The line flux variations also needed more study.

We again obtained time in March 1988 on the ESO 1.5-m telescope with a CCD. Reductions are not yet complete; up to now we have concentrated on the analysis of observations of the very old nova V 841 Oph (1848) for which we did not detect variations in 1984. The study of this nova is especially interesting, as theory and observation have both been used to support models in which very old novae go into "hibernation". The idea is that mass transfer decreases or stops, so the accretion disk disappears or becomes very faint. At present these ideas have run into theoretical problems, and the situation is not clear . . .

Our 1988 results for V 841 Oph are for 14 epochs. He II 4686 Å emission is stronger than that of Hβ, the latter being apparently in broad absorption. Line flux variations seem to be large. The best preliminary period is 0.385 days but 0.63 days or perhaps even a period near 2 days are possible. The semi-amplitude of the velocity variation is about 130 km $s^{-1}$ for Hβ, but only about 80 km $s^{-1}$ for He II 4686 Å. Reductions are proceeding, but in view of the probably rather long period, more observations, if possible in two runs a few weeks apart, are desirable.

The recurrent nova T Pyx also observed in the last 1988 run may be mentioned. No variations were immediately apparent.

The main conclusion that can be drawn is that far more observations are required, if one wishes to relate the properties of novae in outburst to those of their orbits. This is necessary if theoretical speculations are not to become too wild!

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# NEWS ON ESO INSTRUMENTATION

## Status of the ESO Infrared Array Camera – IRAC

IRAC is currently being tested in Garching in preparation for its installation and first test on the 2.2-m telescope at the end of June 1988. Assuming there are no unpleasant surprises, it is intended in July/August 1988 to issue a formal announcement of its availability for visiting astronomers in Period 43, i.e. as of April 1989. In the meantime, it is hoped that this article will serve as a useful introduction to this new instrument and its observational capabilities.

### IRAC Characteristics

With its presently installed Hg:Cd:Te array detector, this camera provides for direct imaging over the wavelength range 1 to 4.3 μm. In addition to the standard near infrared broad-band filters, it is also equipped with circular variable filters (CVF) for imaging spectral features and the nearby continuum at R ≃ 50. There is also a choice of four magnifications which are selectable online. Table 1 summarizes the most important parameters required for planning observational programmes. The detector performance figures quoted were derived from the first test measurements of a new array received only a few weeks ago. Some caution is therefore necessary. In principle, however, it should be possible to reach sky background limited magnitudes of 20–21 mag. in the J, H and K bands with this array. In practice, of course, this will depend on whether or not the required stability and accuracy of flat-fielding (~ 1 in $10^4$) can be achieved.

### Optical Design

Figure 1 shows the optical arrangement. The input doublet acts as the cryostat window and forms a small (2.5 mm) image of the telescope pupil at the position of the filter wheel which carries both the broad-band and CVF filters. Behind this is located a second wheel carrying the various objectives which re-image the field on the array at a variety of magnifications. For each magnification there are, in fact, two objectives which are coated and adjusted separately for the 1–2.5 μm and 2.5–5 μm ranges. In addition to positioning the various objectives, the lens

TABLE 1: *IRAC Characteristics*

| | |
|---|---|
| Array Detector: | Hg:Cd:Te/CCD<br>64 × 64 pixels, 48 μm pitch<br>Wavelength cut-off ≃ 4.3 μm<br>Overall efficiency ≃ 70%<br>Read noise ≃ 200e<br>Dark current ≃ few $10^3$ e/s (52 K)<br>Well capacity $2.10^6$e |
| Optics: | Magnifications (remotely selectable)<br>0.3, 0.5, 0.8, 1.6″/pixel (2.2 m)<br>Maximum field ∅ = 1.6′ (2.2 m) |
| Filters: | J(1.25 μm), H(1.65 μm), K(2.2 μm), L′(3.8 μm)<br>CVF(R ≃ 50) 1.45–2.65 μm, 2.5–4.5 μm |
| Magnitude Limits:<br>(3 σ, 1 hr) | 20–21 mag./pixel in J, H, K bands (highly provisional) |

wheel can also be used to micro-scan images across the array, e.g. for the purpose of removing dead pixels.

### Adapter

IRAC is designed to be mounted on the F/35 infrared adapters at the 2.2-m and 3.6-m telescopes and will therefore have the same TV acquisition and guiding facilities as the infrared photometers.

### Software

As with most of the major ESO instruments, IRAC will be controlled via menus, form-filling and typed commands at the HP instrument terminal in the control room. Images will be displayed on a RAMTEK monitor and a graphics terminal will be provided for status and IHAP displays. The actual user interface and terminology will appear very familiar to those who have used IRSPEC. It would be premature here to describe the various observing and display modes currently foreseen, however, as these may still be revised following our actual experience at the telescope.

A. MOORWOOD, ESO

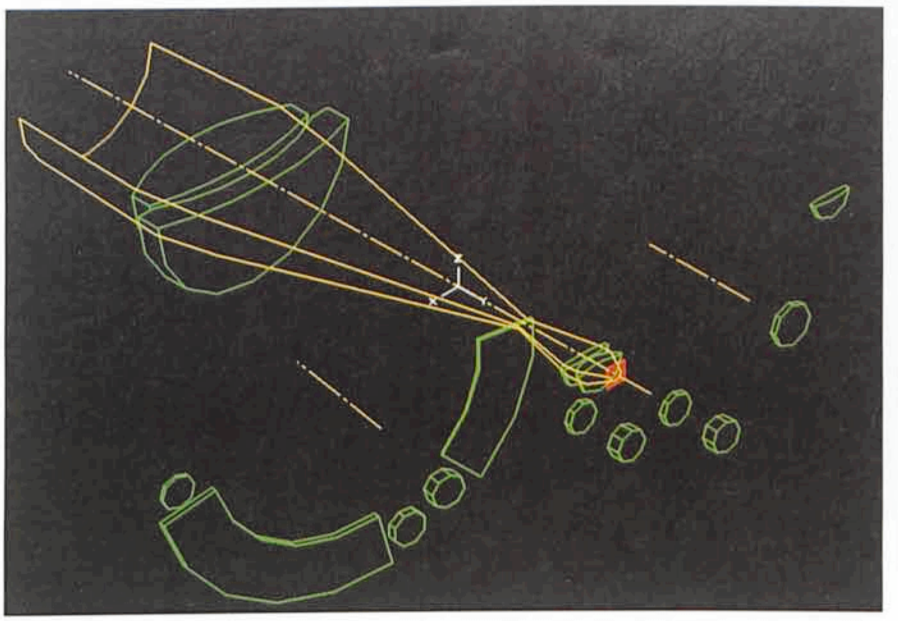

Figure 1: *IRAC optical layout. The filter wheel is located at an image of the pupil formed by the input doublet and carries both broad-band and CVF filters. Immediately behind is a lens wheel containing several objectives which provide a range of image scales at the array detector.*

# Optical Instrumentation for the NTT: EMMI and EFOSC2

With the New Technology Telescope a little more than six months from "first light", work is going on intensively at ESO on the instrumentation to be used at the two Nasmyth foci of the telescope.

A detailed, final description of the instruments will be made available after they have been tested in the laboratory and at the telescope. These specifications will be distributed as usual with the relevant Call for Observing Proposals. We give here a short preview of the main characteristics to prepare the community to their use.

Before introducing the instruments, it is important to note that an essential interface between telescope and instruments are the two adapter/rotators (one for each Nasmyth focus) designed and built under the supervision of the NTT Group. They are complex devices which include two TV guide probes, the system to analyse the quality of the optical image for the adjustment of the active supports of the main mirror and the calibration system. The adapters rotate to compensate the field rotation given by the Alt-Az configuration of the telescope.

Two optical instruments are currently being assembled for the NTT:

EMMI (ESO Multi-Mode Instrument) and EFOSC2, a revised version of the EFOSC operating at the 3.6 m. EMMI will ultimately be the NTT optical workhorse, conceived to be semipermanently mounted at the telescope to reduce the maintenance needs and stabilize its performance at an optimal level. It is a two-chanel instrument (UV-blue and Visual-Red) with 6 main observing modes: imaging in the UV-B and V-R channels, grism spectroscopy in V-R, grating, medium resolution spectroscopy in UV-B and V-R and high resolution echelle spectroscopy in V-R. The capability to do multi-object spectroscopy has also been foreseen and will be implemented in a second step. The observers will be able to switch remotely between these observing modes, thus having the greatest flexibility in tackling their scientific objectives. Flexible scheduling to adapt the observing programme to the prevailing sky conditions (transparence, but above all seeing) could also be easily implemented and thoroughly tested. The optical design and the expected capability of EMMI are described in a published article (1986, *SPIE* Vol. **627,** 339) to which we refer those who are interested in more details. The instrument will be assembled in Garching in the course of this year: we will report on its progress and on the most interesting features which characterize it.

EFOSC2 will be, if you like, an intruder at the NTT. In November 1987 we saw the possibility to satisfy two different needs with a single effort. On the one hand, there had been pressure from the community to get an EFOSC-type instrument at the 2.2 m to improve the capability at that telescope for faint object spectroscopy and imaging of nonstellar objects over a large field. On the other hand, we saw the convenience to have in the first months of operations of the NTT a simple, easily removable instrument which could be used both for the necessary tests and for scientific programmes. Add to this that the project had to be completed in one year and that the recipe for EFOSC2 was almost fully defined. The specifications for the optical layout were laid down by the Optical Instrumentation Group. It was decided that the instrument had to be optimized for use at the 2.2-m telescope, its ultimate assignment. Secondly, the overall mechanical structure and the remotely controlled slit, filter and grism wheels had to remain unchanged to minimize the redesigning of mechanics and control electronics.

Still the project could not have been realized without the involvement of the TRS staff in La Silla. They took the responsibility of the redesign and the construction of the mechanics and of the