

The quality of the data obtained in both modes appears excellent. We will report on the detailed results with this configuration in the forthcoming issue of the

*Messenger.*

On November 10, EMMI entered regular use by visiting astronomers.

*H. DEKKER and S. D'ODORICO, ESO*

## A New Low Limit in the Read-Out Noise of ESO CCDs

In the framework of the EMMI tuning before it started regular operation, a special effort was made last October to optimize the read-out noise of the two  $1024^2$  pixels, Thomson TH31156 CCDs now in operation at the red and blue arm of the instrument with two ESO-built VME-based controllers. Due to higher tolerances in the line voltage at La Silla the main power suppliers of the CCD

controllers had to be modified to suppress pick-up noise. Further adjustment of the CCD clock's timing further improved the rejection of spurious noise.

It was finally possible to reach at the telescope values around  $3 e^-/\text{pix rms}$  in both the blue- and the red-arm CCDs. This is the lowest instrumental noise ever achieved at ESO and a wide range of astronomical observations (essential-

## Who Needs Nebular Filters?

Bruce Balick, University of Washington, is interested in soliciting an order for interference filters in imaging and spectroscopy (for order separation) of galactic nebulae. These filters are quite expensive, but significant discounts can be obtained if multiple filters are ordered together. It is suggested that interested parties contact Bruce Balick directly at the following address: Astronomy FM-20, University of Washington, Seattle WA 98195, USA (Bitnet: BALICK@UWAPHAST).

ly those which are not source or sky photon noise limited) will benefit from the improvement.

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## Results on the Testing of Ford Aerospace and Tektronix CCDs

In the second half of 1990, two new types of CCDs were tested in the detector laboratory in Garching. ESO received 6  $2048^2$ -front-illuminated CCDs from Ford Aerospace (15-micron pixels). The actual testing was carried out in collaboration by ESO staff and Martin Roth of the Munich University Observatory. The best devices of the lot have QE curves typical of thick devices with a peak value of 42% at 700 nm and read-out noise of about  $10 e^-$  without any optimization effort. They have also 3-4 hot columns or major traps. Test of three additional devices delivered by Ford is

going on with a view to select one CCD for astronomical tests at the telescope in 1991. In relation to the introduction of the large CCDs at the telescope, an upgraded software on the CCD controllers has also been tested. It makes possible to freely define windows of interests in the CCD image. Undesired pixels are skipped already during CCD read-out and therefore the read and transfer time is reduced. A windowed format, when possible, also makes the use of the IHAP data reduction system much faster.

ESO has also received three back-

illuminated  $512^2$ -Tektronix CCDs with 27-micron pixels. These CCDs are of very good cosmetic quality and of high efficiency over the useful spectral range (40% at 400 nm, 60% at 600 nm and 10% at 1000 nm). A read-out noise of  $13 e^-$  has been measured in the first laboratory tests. The La Silla staff is currently preparing the installation of one of these CCDs at the CASPEC spectrograph.

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## Celestial Mechanics

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At the beginning of this year I had the pleasure of installing the first Mikron milling computerized machine in the Astroworkshop on La Silla.

We had already made Optopus plates with this machine for a long time in the mechanical workshop at Garching Headquarters (see *The Messenger* No. 31, March 1983, and No. 43, March 1986), and during the long period of testing the machine has demonstrated its good qualities.

After having received our instructions, the personnel at the Astroworkshop on La Silla is now able to take over this work from us. According to G. Avila who

