focussed star. These problems are being solved. Although the upgrade of the guide optics and of the PMTs to avalanche photodiodes has been slowed down due to other priorities within CFHT (e.g. AO bonnette), we still hope to complete the design and fabrication of the new system by the end of 1993 for testing and release in January 1994.

We have seen some observers disappointed that MOS does not provide a stable PSF in the full 10'x10' field, and this fact needs to be clarified. The MOS optics have been designed to provide an image quality better than 1" over the whole 10'x10' field: although this is the largest field available for imaging at CFHT, it is not intended to provide in the full field the superb CFHT image quality one is used to, but superb spectra. Tests show that when the internal image quality is at its best at 25 μm (0.5 arcsec) at the center of the field it is 45 μm (0.94 arcsec) at the 5 arcmin radius. This in turn convolves with the atmosphere + dome seeing, e.g. a 0.75" (CFHT mean FOCAM seeing) will be 0.9" at the center of the MOS field, 1.2" at the 5 arcmin radius. Note that the MOS focus can be set to balance center vs. corners, i.e. degrade the center and improve the corners, and this is the preferred set-up for spectroscopy. In a similar way, the MOS focus can be set to optimize the image quality at the center: this provides excellent image quality over approximately 6'x6' (almost as large as the FOCAM field with the same CCD). The image quality is therefore perfectly suitable for low resolution spectroscopy (the prime goal of the spectrograph), for aperture mask design and mask set-up on sky as well as for photometric measurements (the photometric accuracy is preserved) or for PSF sensitive measurements in 6'x6'. However, programs that need a stable PSF, and the best image quality CFHT can provide, will best be done with the imagers FOCAM or HRCam.

I have built a data reduction package for multi-object spectroscopy under the IRAF v2.10.1 environment: "multired" was designed primarily for MOS-SIS data reduction but can be used for any classical multi-slit data. It is a high level set of IRAF scripts based on the IRAF packages onedspec and twodspec.

To get and install the package, ftp to ftp.cfht.hawaii.edu and log in as anonymous. Then:

cd pub/mos
get README

Print the file and follow the instructions on how to install the package on your machine.

The package multired contains the following tasks:

- multiall: full interactive processing of multi-slit spectro data, one slit at a time. For each spectrum image in a set of exposures corresponding to one mask, the bias and flat fields are optionally corrected, the sky emission interactively removed, all corrected 2D spectra combined, the wavelength solution computed by correlation to a reference solution, a 1D spectrum is interactively extracted and then calibrated in wavelength and flux
- multibatch: automated bias/flat/sky correction, sum of indiv. 2D spectra for multi-slits
- multiextract: 1D extract., wavelength/flux calib. from 2D spec. for multi-slits
- multiview: display/plot 2D and 1D spectra for a given slit number.

O. Le Fèvre

Coudé f/4 Progress & Status

The coudé f/4 spectrograph has now been successfully used by visiting observers, although it still has important problems that need solving before it is fully commissioned. High signal-to-noise spectra at a spectral resolving power of approximately 120,000 were obtained using the Lick2 CCD at several wavelengths from 3933Å to 6190Å.

Work on the spectrograph was slowed substantially over the Winter when hydraulic fluid lost from the telescope south bearing seeped down to the slit room on the third floor, coating both mechanical and optical assemblies. Once the spectrograph was back into operation, a second echelle was found to show different focus setting relative to the reference echelle, a problem first encountered last Fall with one of the other echelles.

No definite solution to this problem has been found, although accurate testing of each echelle is taking place as this article is being written. Analysis of the problem suggests that it would take a differential mechanical loading of just over 22 kg to produce the observed deflection of about one micron of the center relative to the edge. The echelle that shows the most curvature is replicated onto a low thermal coefficient of expansion material, meaning that only an impossibly large temperature difference between the front and back surfaces could cause the observed bending.

The coudé f/4 also has the distinction of being used for the first test of remote observing from Waimea. Exposures of a reference star were obtained with the Telescope Operator guiding while the observers watched the image transmitted over the computer network connection and displayed on a window of an Xterminal adjacent to the workstation running the Pegasus session. Both the observers and the TO were using speaker phones to maintain communications.

J. Glaspey

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Questions and comments about the Bulletin should be sent to the attention of **Dr. Robin Arsenault** at CFHT.

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