LATEST NEWS ON INSTRUMENTATION

MOS/SIS Project Status

By the time you read this article, a good fraction of the mechanical assembly of the MOS/SIS spectrograph will be on its way to DAO, Victoria. This focal reducer type instrument (description in Bulletin #20) will have two ports, one for long slit and multi-aperture spectroscopy over large fields (10' diameter) at low to medium spectral resolution (MOS), the other for slit spectroscopy at high spatial resolution with atmospheric seeing compensation from an active mirror.

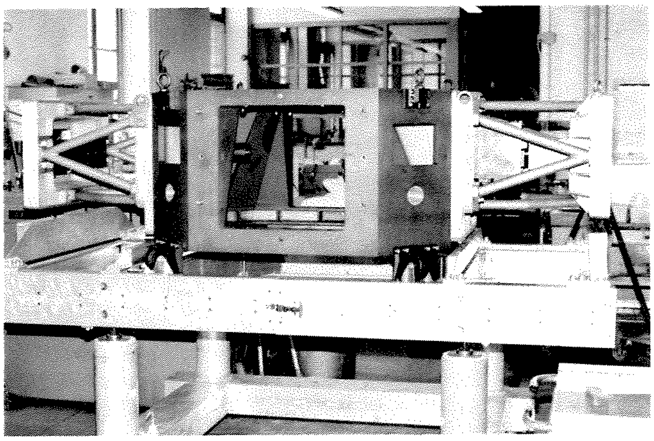

Figure 4: The MOS/SIS spectrograph mechanical structure being assembled in the Paris-Meudon workshop (June 1990). One can identify the central octagonal structure, with the MOS and SIS structures installed on two symmetrical ports.

Most of the work that was contracted to the Paris-Meudon Observatory under the responsibility of P. Felenbok, is completed. The central mechanical structure (octagon), the MOS and SIS structures, as well as sub-units like the central mirrors slide, filter and grism wheels, mask/slit holders, have been completed. The MOS and SIS optical lenses have been successfully manufactured by Arnolds Optics and Applied Physics Specialties in Canada, and were anti-reflection coated in France by MATRA. They are currently being cemented in Canada, before being installed in their mechanical mounts at DAO.

The integration phase will be in full swing by the beginning of February in the DAO workshops, under the responsibility of D. Crampton. First the MOS path will be assembled, then the SIS, followed by extensive testing. CFH staff members will be visiting DAO at frequent intervals for acceptance tests. The final integration of the whole instrument, including the control software, will end early in the fall of 1991 at DAO. In the mean time, the user interface will be designed at CFH with several key features that are already in operation, like accurate offsets and instrument/telescope fast focussing. We expect to receive the instrument at CFHT shortly after final integration at DAO to work toward the instrument's commissioning.

Olivier Le Fèvre and Guy Monnet

First Light With Lick1 2048x2048 CCD

On November 5 the Lick1 2048x2048 CCD saw first (star) light. While the weather was less than perfect, the images generated were outstanding. Mounted at prime focus with FOCAM this CCD offers a field of view of about 7x7 arcminutes at 0.2 arcseconds per pixel (15 micron pixels).

The Lick1 CCD was fabricated at the Ford Aerospace foundry and behaves much like PHX1 or SAIC2. The uncoated chip operated as a front-side imager and shows a quantum efficiency quite similar to SAIC2. Data is linear up to the chip's current full well of about 60,000 electrons.

While this device is quite clean cosmetically (only a few column blemishes — all near edges, and some low-level traps), there exists a number of challenges to it becoming a "workhorse" chip:

- the readout time is excessive at ~5 minutes per frame.
- it is not possible to readout more than one amplifier (the chip has 4).
- subarrays in the x (row) direction are not possible.
- increasing readout rate degrades serial transfer efficiency.

These problems will not be solved until the deployment of next-generation CCD controllers under development now.

Future plans for this device include faster readout rates using multiple amplifiers, access to the chips ultra low-noise amplifiers (skippers), increasing the full well, and upgrading the QE response with a blue-sensitive coating.

LICK1 2048x2048 CCD Specifications

- ~12 electrons Read noise (target ~ 6 electrons)
- ~60,000 electrons full well (to be increased)
- ~40% peak QE at 6500 Å
- ~10e-/pixel/hour at -95°C (MPP operation)
- Better than 1% linearity to full well

Christopher Clark and Olivier Le Fèvre

LAMA Mask Selection Software

With the introduction of the laser machine (LAMA) as a replacement for the aging punching machine (PUMA), the software group has taken the opportunity to improve the mask selection tools. Beginning with the SAOimage code from the Smithsonian Astrophysical Observatory, we have extended it to allow interactive selection of masks.

All the functionality of SAOimage has been retained: color lookup tables, pan, zoom and scaling. Our additions have centered on a new menu level which provides all the tools necessary for mask definition. In each mask to be cut, the astronomer may define circular holes, slits and curves. Further, for each mask the dimensions of each type of cut is separately definable.

On Figure 5, three holes have been defined on the right side, a number of slits are located across the top and a curve runs along the bottom. The actual mask area cut away for a hole is represented by the small circle, and the resultant "spectrum" is shown (vertical rectangles), while for slits, the rectangular area in the center will be cut from the mask. Although the curve is shown on screen as a sequence of points connected by line segments, the LAMA will generate the cut by fitting a spline to the points.

The speed of cutting the mask has been improved considerably by using a mask made of anodized aluminum foil (75 microns thick) instead of stainless steel (120 microns thick). This new material allowed us to increase the cutting speed from 200 microns per second to 1000 microns per second and reduce the number of passes from two to one. The quality of the cut was also ameliorated; the cuts are very clean with almost no rough edges.

We hope to integrate knowledge of the grism and CCD characteristics into the system so that all dimensions are specified by the user in "natural" coordinates rather than CCD pixels. For holes and slits, we have implemented visual display showing the extent of the spectra and the addition of this capability for curves is being investigated.

One of the great advantages to our new system is that mask selection can be done in Waimea at the user's leisure. The data files to be transferred to the LAMA are automatically generated and stored on disk. Then it is only a matter of informing the LAMA operator which masks should be cut for that night's run. We believe the current software is a great improvement over anything previously available, and we look forward to working with the LAMA users as we strive for more.

B. Grundseth, J. Wright, and T. Gregory

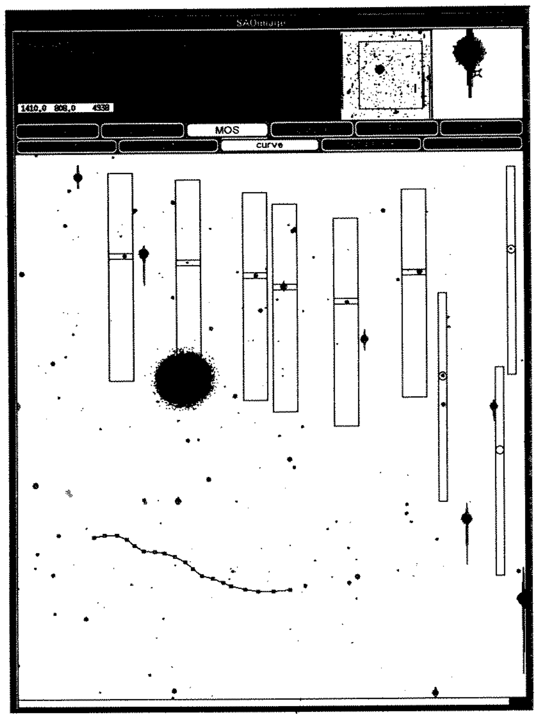

Fig. 5

Editor's note: *Unfortunately, as of this writing, the LAMA machine is in a somewhat sorry state. Due to a power failure at the summit on November 22, the LAMA machine power supply reset to and remained in its start-up mode which is intended for only momentary operation. As a result, a fair part of the power supply unit burned up. Components have been ordered, and Micro-Control Corporation has been requested to provide more detailed plans of the internal circuitry, and a solution to what is apparently a design oversight. We nevertheless think that LAMA will be available for the next MARLIN observing run in January 1991.*

New UV Grating & Optics for the Herzberg Spectrograph

A new grating is now available for use on the Herzberg spectrograph. This replicate grating has the following characteristics:

- 1200 lines/mm
- Blazed at 3000 Å
- Dispersion = 41 Å/mm
- Red limit = 6021 Å

The reflective coating is made up of aluminum and an overcoat of MgF_2 to retain the high reflective quality of fresh aluminum in the UV. This grating is now the new #2 replacing the 1200 l/mm grating blazed at 7500 Å. This latter grating is being decommissioned but can still be used on special request.

The new grating is intended for use with a new UV module and special UV optics (formerly the white optics), which have received a reflective UV enhanced coating.

During the nights of December 7 and 8, 1990, observations were made to measure the system efficiency shortward of 4500 Å. Preliminary results indicate that the gain in overall throughput due to the recoated optics and new UV module, compared with that previously available using the blue optics set, is substantial.

A more detailed discussion of UV efficiency will appear in the next Information Bulletin.

Stéphane Béland and Timothy Davidge

Coudé Autoguider

A simple autoguiding arrangement has recently been completed for the coudé focus. A beamsplitter is employed 150 mm in front of the coudé focus to deliver about 6% of the incoming starlight to an additional television camera. A good image is produced on the photocathode of the camera as the light from the star is intercepted by the beamsplitter before it passed through the cylindrical optics at the front of the Richardson image slicers normally used at the coudé focus.

The TV image is integrated in the Leaky Memory, in the 4th floor control room, and then read by the TCS computer. An image rotation algorithm, converts the leaky memory XY error signal into an error on the sky. After this operation, that point, the autoguider processing is the same as for foci with no image rotation problems. Tests were performed which demonstrated good autoguiding in all areas of the sky.

Unfortunately, the sky was quite far from photometric, and it was not possible to perform comparative throughput tests with the autoguider and hand guiding. However, it is felt that the autoguider will improve guider throughput enough to compensate for the loss incurred by the beamsplitter. Also, the relief from the tedium of hand guiding will permit coudé observers the luxury of performing other tasks during long exposures. The setup of the autoguider is relatively easy, and will be explained by the support astronomers at the beginning of each run.

Tom Gregory and William Cruise