Approximately ten weeks will be needed for integration of the instrument within the CFHT environment: tests to check the performances of the instrument after the shipment, compared to the DAO performances; integration of the control/user interface system; handling at the summit; preliminary tests on the telescope (day time).

### Commissioning Phase

We expect to follow the following schedule for commissioning the instrument on the sky: (gray time, 2 quarter moon):

1. First light on the telescope end of April 1992: 5 nights of engineering tests of the MOS (and SIS).
2. Five nights of engineering tests for the SIS (and MOS), end of May 1992.
3. Four nights of engineering for the MOS/SIS, including the scanning Fabry-Pérot configuration, end of June 1992.

This will complete the series of engineering tests needed for a proper check-out of the behavior of the 2 spectrographs.

We are planning on performing the full scientific performance evaluation on eight nights early in the second semester 1992.

The final commissioning and release to the general observers will then take place in August/September 1992.

*O. Le Fèvre*

# MONICA Performances

The University of Montreal's Infrared Camera, MONICA, will be opened to general use within the CFHT community during 1992. Anyone interested in using the camera should contact René Doyon, Daniel Nadeau, or Neil Rowlands, at the Université de Montréal. MONICA is intended to satisfy the immediate need for a near infrared camera while the facility cameras are completed, which is expected in late 1992. Briefly, MONICA employs a science grade NICMOS 3 256x256 pixel Hg:Cd:Te detector that is sensitive from 1-2.5 μm. Some of the basic performance characteristics of MONICA, as derived from a September 1991 run with this instrument mounted at the f/8 focus of CFHT, include:

1. plate scale: 0.22 arcsec/pixel yielding a 56" field of view
2. filters: J, H, and K available plus a CVF covering the 1.9 - 2.5 μm range with ~1.5% spectral resolution
3. detector read noise: 30 e- per read
4. dark current: ~2 e-/second
5. Throughput and Background Flux:

| Filter | Throughput (%) | Sky (mag/arcsec$^2$) |
|---|---|---|
| J | 7 | 14.9 |
| H | 14 | 13.0 |
| K | 16 | 12.1 |

   These numbers translate to K=17.9 and J=19.0 per arcsec$^2$ for a S/N=1 in 1 second of integration, when background limited.

6. Cosmetics: Approximately 250 bad pixels with most either in the form of single "hot" or "cold" pixels and a few 3x3 clumps. No bad rows or columns exist.
7. Flat Field: Typical rms deviation from the mean is ~5%. It is straightforward to remove pixel-to-pixel variations to <1% for background limited frames, which will usually be the case given the low read noise of the detector. The flatfields obtained during the September run show a 30% drop in the signal towards the corners of the array. At this time it is not clear whether this is intrinsic to the detector or due to some vignetting caused by a misalignment inside the dewar. In the latter case it will be corrected.
8. Image Quality: During the September run stellar PSFs were generally between 0.6 and 0.7" FWHM, with values of 0.5" seen occasionally. A simple reimaging lens system was used, which was appropriate for the scientific programs allocated time (narrowband imaging near 2.15 μm and imaging of a source extending over 10"). Aberrations were expected and were seen at the edge of the field, mostly in the J band. At the moment, J images have significant chromatic aberration, creating stellar PSFs that appear somewhat elliptical for stars that are >20" from the center of the field of view. J-band stellar PSFs near the corners of the field have long-axes ~50% greater than their short-axes. Also, chromatic aberration causes a non-linear change of plate scale with wavelength, yielding as much as a ~3% difference in plate scale between J and K. Therefore, programs involving accurate multi-color photometry of multiple point sources in the field (e.g., a globular cluster field) or precise astrometry are discouraged at this time.

Raw data are written in FITS format and transferred from MONICA to the CFHT computer network automatically, where they can be manipulated or stored on Exabyte tapes. A TCS link that will permit automatic beam-switching during data acquisition is expected to be available, which will help to reduce the overhead often associated with IR imaging.

*R. Doyon, D. Nadeau, N. Rowlands, Université de Montréal*
*D.A. Simons, CFHT*

# Coudé Detector Environment

In November of 1989, the initial specifications for a six motions detector environment to be used at the new F/4 spectrograph were defined. The six motions will be computer controlled, consisting of an X, Y, Z (focus), X & Y ±2 degree Tilt, and a ±15 degree Rotation. The tilt and rotation will allow precise alignment of the CCD chip during set up, and the X and Y stage will allow precise on demand positioning of the detector along the spectrum during observing.

The detector environment will be able to accommodate any dewar body up to 25 cm in diameter and 60 centimeters long. Initially, the dewar is clamped to an adapter plate in the CCD laboratory. The assembly is then inserted from below the detector environment up into the Rotation stage which supports a 30 cm diameter bayonet system conceptualized by T. Gregory. This will eliminate having to fumble around with fasteners and tools to mount the dewar. It also allows additional adapter plates to be custom fitted to any unusual dewar configurations we may encounter in the future.

The X & Y stage is a complete unit supplied by Daedal Corporation. All of the other motions as well as the structure were designed by W. Knight using his CAD system. This took the better part of 1990. Fabrication of the components commenced in November of that year by Idehara Machining in Hilo, Hawaii. With all the fabricated and vendor supplied components in place by April of 1991, final assembly began with the assistance of T. Gregory.

Initial electronic testing of the Z (focus) motion conducted by P. Papasian was a complete success. This test was critical because two servo controlled motors, electronically synchronized (slaved), lift the Tilt and Rotation stage assemblies vertically through separate recirculating ball screws. Maximum mechanical wobble as measured by digital readout gauges across about a half a meter was never more than 20 microns!

We now have a mechanically complete detector environment designed in house and built on the island just eighteen months after it was only an idea. The next phase is to thoroughly test all the motions with the Galil motor controls, which will be actuated by software developed in house.

*W. Knight*

# RECENT TECHNICAL ACTIVITIES

## The Observation of a Total Solar Eclipse with a 3.6 M Telescope

The Hawaii Total Solar Eclipse of July 11, 1991, the most publicized astronomical event of its time, is a somewhat cloudy memory, 3 months later. Locals, as well as visiting myriads, here especially for the eclipse, all can relate their "Eclipse Experience," some humorous, some not. Most frequently, they missed it because an uncharacteristic cloud cover obscured the sun over most of the Big Island, except, luckily, Mauna Kea summit.

A steady parade of requests from magazine writers, TV stations, newspapers, photographers, for ring-side seats, summit tours, special considerations, last-minute urgencies, etc., made for an unending public relations chessgame. The major effort on Mauna Kea was undertaken by a NOVA film crew, directed by Tom Levinson, of WGBH-Boston. They used some 30 cine-cameras, varying from video, 8-mm, 16-mm and 35-mm were located around the summit, with about a quarter of them in or around the CFHT building. The final TV production is expected to be shown in the USA in February, 1992. Levinson assures us that the quality is spectacular.

Nonetheless, CFHT Corporation enjoyed, some would say, endured, a memorable Solar Eclipse 91. This note summarizes the varieties of preparations, activities, and especially the finale of observing with the largest "solar telescope in the world."

### Initial Program Selection

The Call for Scientific Proposals to use CFHT for solar eclipse experiments went out in early '89, and the evaluation by an outside group of astrophysicists arrived at recommended priority ratings. Our internal operational and compatability appraisals led to the final choices, in February, 1990, for the main 5th floor telescope program as well as one secondary experiment from the ground floor adjacent to the building. These were:

- Prime Focus: Dr. Serge Koutchmy et. al., Institut d'Astrophysique, Paris: "Prominence and Coronal fine structure," using a special wide-field aerial surveillance camera, to be loaned from the French Air Force; yielding one 228 x 228 mm$^2$ photograph every 1.6 seconds, 50% of each frame occupied by the complete solar-lunar disk image. At the same time, part of the wide-field-corrected prime focus field of view was to be directed to a video CCD camera, for speckle measurements of prominences.
- Ground Floor: Dr. Philippe Lamy, Laboratoire d'Astronomie Spatiale, Marseille: "Wide-field Infrared Intensity and Polarization Observations of the solar corona," using CIRCUS camera, between 1.25 and 4.8 microns.

### February 1991 "Dry Run" with Final Instrument Arrangements

Instrument designs during 1990 evolved to final configurations considerably different in both cases. The PF solar camera that arrived in late January 1991, now included not one wide-field cine-camera, but instead, 4 different narrow-field cameras, each positioned around or near the solar limb. This arrangement was tested during a two-night Engineering Run, February 4-5, 1991, using for light sources, a waning moon, Saturn and stars. Focussing methods, pointing accuracy, and expected image spatial resolution were confirmed, and real and potential problems were identified with telescope logistics, equipment, experimenters, and operating staff. The following six months were used to solve or circumvent most such areas.

### Telescope, Instrument & Operations

At the ground level, one last-minute change was made to the infrared experiment, using J. Kuhn's new IR detector and camera, instead of CIRCUS. In addition, a 3-m celeostat, with radially graded filter and a film plate camera, were installed in the Hatchway, with a smaller 1-m focal length system providing the feed to a polarization experiment run by L. November. Finally, at ground level, near the edge of the cinder cone, Jean Moet operated Super-VHS Sony video camera, lined up on the sun, obtained the images used by the telescope control room for eclipse event timing. In addition, the video recordings have since been copied to give us spectacular sequences before, during and after totality, especially of the moon's shadow racing eastwards towards the mainland.

CFHT operated a small experiment, adjunct to the 3.6 meter, mounting an 11-inch Celestron telescope on the Caisson Centrale, together with a CCD camera, to try to obtain simultaneous eclipse and star fields during totality. Although not fully successful, the images obtained were very helpful in diagnosing some of the Koutchmy camera results.

Observations of the total Solar Eclipse with the 3.6m "(extra) galactic" CFH Telescope clearly presented some challenges. To begin with, even a 99% eclipsed Sun was still able