

The IR Runs

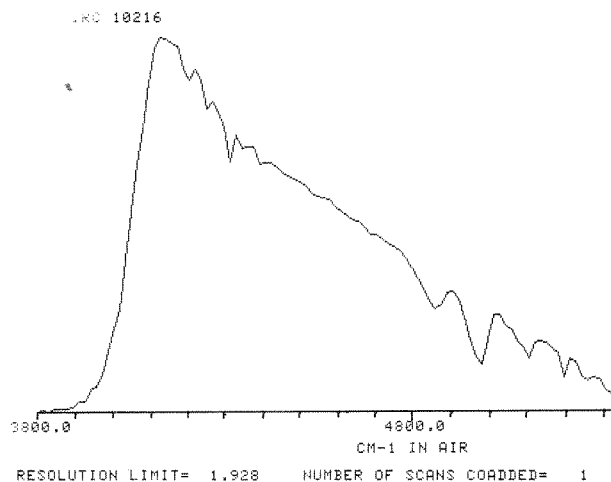
This past semester, the telescope was equipped with the IR top end for the equivalent of one month. The first semester of 1983 starts with the same configuration, which means that the infrared vocation of the telescope is well established.

The first extensive use of the focus was not without some problems. Engineering work often overtook the observations, and if the scientific results fell short of expectations, many technical problems did get solved. The mountings of the IR upper end were much smoother than in the past, thanks to the machining done on the mating surface and the improvements to the handling ring system. The chopping secondary system was extensively reworked and adjusted prior to the run. One of the principal objectives here was to make the rotation axis of the chopper assembly exactly colinear with the optic axis. The effort paid off when we later found we could rotate the chopping direction through a full 180° with less than 5 arcseconds excursion of the mid point between the two stellar images.

The first run belonged to Bob McLaren and co-workers and was nominally intended for infrared photometry of Cepheids in M33. However, most of the time was spent on engineering, including alignment of the TV-guiding optics and the correction of several dewar problems that included microphonics and a sticky aperture changer. Nonetheless, these observers were very pleased to see that photometry of Cepheids at H=16 was possible with a few minutes of integration, and objects as faint as V=19 could be seen on the TV guiding system. As a result, it was hoped that Epchtein's following run, which involved infrared photometry of maser sources, would be productive. Unfortunately, difficulties with the telescope control system and a problem with the chopping secondary wiped out the run. The chopper problem was solved in time for the Howell/Dyck run; the first use of the photometer for IR speckle interferometry. Time was lost to weather and software problems, but Howell was able to work successfully for one night. The next observers were Sibille and Chelli of Lyons, who brought their InSb CID mosaic to do bidimensional speckle interferometry. This new and not yet fully tested device, prevented them from obtaining much science on this first run. In parallel with this night-time work, R. Papoular and J.P. Maillard used the telescope during the day to analyse the IR sky noise at 4 and 5 microns and to test a 3-position chopping mode which more effectively cancels sky noise fluctuations. J.P. Maillard had charge of the second IR time devoted to the FTS. It was really the first cassegrain run of the instrument. The weather was fine and the relative humidity close to 0%. Two different scientific programs were proposed: with A. Chalabaev, the IR emissions of some hot stars: with T. Amano, C. Yamada and P. Feldman, the

detection of new radicals in the envelope of some cool stars. The two programs were almost fulfilled, but a complete reduction of the data is necessary to really evaluate the results. A serious electronic problem still plagues the instrument, preventing use of all its flexibility. However, this run allowed a stability test of the servo-system, which performed well in all the attitudes of the telescope.

At last, with the assistance of the CFH staff, T. Lebertre was able to obtain images about diffraction-limited of several late type objects at 10 microns, with a 16 elements Si-As array working for the first time at CFHT.



Display of the complete range of the spectrum of IRC 10216 in the K Filter, recorded with the Fourier Transform Spectrometer, after ten minutes of integration. The displayed spectrum, computed in real-time, is undersampled. Nonetheless, envelopes of stellar CO band and telluric CO₂ bands are easily detectable.

Emilie Experiment

This charming name is a contraction of "EMission MILLimétrique". Funded by INAG, it is a joint venture of three French institutions: Laboratoire de Physique Stellaire et Planétaire (Verrières-Le-Buisson), Institut d'Astrophysique de Paris, Centre d'Etudes Spatiales (Toulouse).

The instrumentation is composed of a servo-controlled steerable coelostat, which can do fast scannings of large amplitude. A fixed concave mirror 47 cm in diameter follows the coelostat. It feeds a photometer equipped with specially designed filters centered in the atmospheric windows located around 1 mm in wavelength, and bolometers cooled at 1°K. The entire experiment is commanded by a microprocessor equipped with a real time video display system. Emilie's goal is the observation of the millimetric emission of the Galactic plane.

Back in 1980, the people in charge of Emilie had asked to come at CFHT to set up their experiment near the dome. There they hoped to take advantage of the quality of the site and observe in the millimetric range (water vapor amount less than 1 mm), and make use of the general facilities of the telescope.

Five investigators from the lab involved (R. Gispert, J.M. Lamarre, F. Pajot, J.L. Puget, D. Serra) and three technicians (J.P. Moalic, J.C. Renard, A. Vitry), arrived in Hawaii November 12, 1982 to start installing the experiment at the top. On November 17, when everything was aligned and ready to operate, Iwa, a tropical hurricane, hit the archipelago, severely damaging one of the neighboring islands. Then, the sky cleared and the relative humidity dropped. Only occasionally were winds strong enough to

require shelter for the experiment, which ran twenty four hours a day.

This three week experiment took place in conjunction with regular observations of the telescope. Their organization was ideal and created a minimum extra load for the CFH staff.

This being their first field test, the team discovered some parasitic sources of noise in the experiment. However, once this was eliminated, their only limitation was atmospheric noise, a problem at these wavelengths. For the first time they were able to make observations of the millimetric emission of the Galactic Center, with a good signal-to-noise ratio. They also observed Orion and some nearby galaxies.

We wish them good luck with their next run which will be in a location even more difficult than Mauna Kea: The South Pole.

Herzberg Spectrograph

Known prosaically for many years as Spectrograph No. 1, this important cassegrain instrument was officially renamed after the Canadian Nobel prize laureate, Dr. Gerhard Herzberg. For the modest ceremony, held at the Dominion Astrophysical Observatory (DAO) on 22 October 1982, Dr. Herzberg himself was present.

The instrument was shipped to Hawaii in July where final integration in the CFHT environment was to be made. Unfortunately, it soon became evident that the electronic control modules were badly damaged in transit, and to ensure sufficient reliability, they had to be rebuilt. In October the instrument was returned to the DAO for repairs and further electronic and opto-mechanical tests. An engineering run on the CFHT, scheduled for late December, had to be cancelled when it became clear that the spectrograph would not be available in time.

DAO currently estimates that at least one more year will be required before all the originally planned functions of the spectrograph, can be made. However, using a simplified auxiliary controller already built by DAO, the instrument could be tested on the CFHT by mid-summer 1983. Whether efforts to release the spectrograph for use in these conditions will be justified, depends, to some extent, on the progress of the other large cassegrain spectrograph being built by INAG (see: The long slit spectrograph).

The Herzberg spectrograph features quickly interchangeable blue and red optics and is optimized for the studies of faint stellar objects. It will offer reciprocal dispersions of 42, 83 and 123 Å/mm in the blue and 83 Å/mm in the red. The primary detector, already lab tested at the CFHT, will be a 2 x 936 intensified Reticon behind a three-stage, electromagnetically focussed EMI image tube with transfer optics.

Long Slit Spectrograph

Spectrograph No. 2, or CASSHAWEC. This cassegrain instrument was shipped to Hawaii in June of 1982, in an impressive load of 17 crates. Conceived by A. Baranne from Marseille Observatory, it was built under the direction of the technical division of INAG, headed by M. Ravault. Due to the customs regulations requiring a delivery before the fatal deadline of June 30, it left the assembly point of St. Maur near Paris, without being fully completed and tested.

In order to complete the spectrograph, a large hall in Waimea was made available. However, this warehouse required some adaptations to become a clean room for optical mounting. The Observatoire de Haute Provence agreed to loan its support of instrumentation for the extent of the operation. On September 20, Y. Acker, engineer in charge of the project, was on the spot, followed soon by mechanics A. Pichon, R. Birault; opticians A. Baranne, P. Leblonchet; electronics technician, P. Levacher; and at last a programmer, J.P. Meunier. All these people worked hard to finish reassembly, mechanical modifications, and optical adjustments of the Spectrograph. When they left, a little before Christmas, most of the planned work had been done. Now, a second phase is scheduled, starting in March 1983, which will conclude the final integration of the Spectrograph. Therefore, the first test on the sky should occur in the second semester 1983.

This spectrograph is equipped with a 60mm slit giving a 7 arc-min field on the sky, and it has a blue and a red channel. The ranges of optimum transparency are from 3500 to 4700Å and 5000 to 9500Å. Good efficiency is still obtained at 3000 and 10500Å. The dispersions are of 20Å/mm in the blue, 35 in the red. An electronic camera is specially made for it, but other detectors like the photon counting camera and the image tube, can be adapted to it. An additional grating has been ordered and will provide a 100Å/mm dispersion in the red (150 with the camera) and 50Å/mm in the blue.