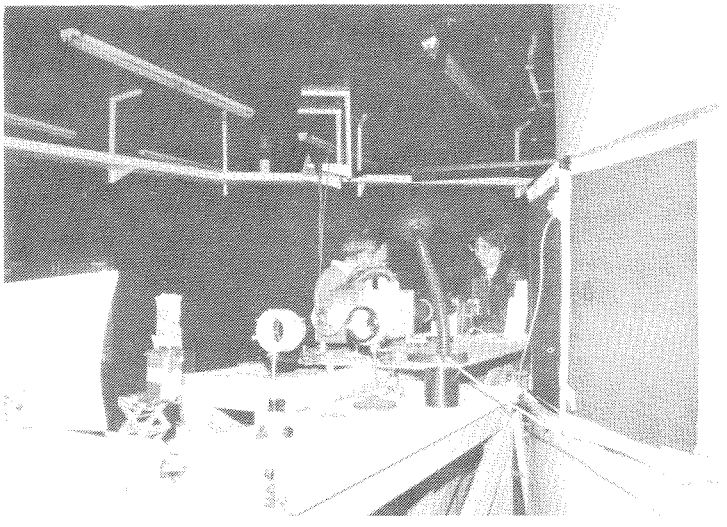
STRATEGY FOR SPECKLE OBSERVATIONS AT CFHT

Since the beginning of the scientific life of the CFH Telescope several speckle experiments have been granted time. Three French teams (Roddier, Aime, Foy) with different visible speckle devices had telescope time in the recent past. In addition Sibille from France and Dyck from UH obtained time to do speckle observations in the infrared. This telescope is attractive for such kind of observation because of its reputation to offer the chance of good seeing conditions. But it is also well-known that the efficiency of diffraction-limited observation is strongly seeing-quality dependent. The signal-to-noise ratio for measuring structure on a scale near the size of the seeing disk depends on the fourth power of the inverse of the seeing-disk diameter. Therefore the standard process of telescope time allocation seems poorly adequate. Observing time, even clear, can be completely wasted if the seeing is not excellent much more than for any other kind of observation.



The Roddiers, baffling their smart shearing interferometer in the coudé room during their run in November 1983 to measure the wavelength dependence of the diameter of Betelgeuse.

Since we so far have to deal with the present allocation time system, it is proposed to devise a systematic strategy to optimize speckle observation: the coupling with another kind of observation less demanding in terms of seeing conditions. This has been tried for the first time during the second semester 1983. A run with a speckle interferometer at coudé focus (Roddier) was coupled with a run with the coudé spectrograph. The seeing conditions were never exceptional, which means the speckle run was not very successful, but the coudé run was. For the speckle runs using the Prime Focus it should be a rule to be able to switch easily to a program of direct imagery. In the infrared, at least with the scanning device, the switching is immediate to the regular photometric mode.

Another improvement of the efficiency of speckle measurements is possible. In the different devices, an "instantaneous" image, or profile is recorded in a short time (about 20 millisec). The length of video tape, photographic film, magnetic tape recorded becomes rapidly enormous. The first step of the data reduction is a sorting of the images to select only the small fraction on which the speckles were frozen. In the case of a photographic method, the data reduction becomes a interminable nightmare, the preliminary step being a digitalization of meters of films. If the speckle interferometers were mounted after a VHR Camera (see Info Bulletin #8) a maximum of usable images could be recorded. The principle of the Very High Resolution camera, which the design has been started at CFH, is a "smart" shutter. A guiding star is used as seeing estimator to command the opening of a shutter when the seeing disk is below an adjustable threshold. Then, only images sharper than this threshold are integrated on the panoramic detector. A VHR camera coupled with a speckle interferometer would insure that only images with the largest r_o would be recorded. That could be an ideal combination. When the seeing becomes exceptional the system would be used in speckle mode; when it is not it could be switched to direct imagery, the threshold being adjusted to some intermediate seeing condition at the time the observations are taken.

J.P. Maillard

OBSERVING TIME ON THE CFH TELESCOPE IS ALLOCATED TWICE A YEAR BY THE TIME ALLOCATION COMMITTEE.

REQUESTS FOR OBSERVING TIME FOR THE SECOND SEMESTER OF 1984 SHOULD BE SUBMITTED BEFORE MAR. 1, 1984 TO THE AGENCIES.

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