

# Update on the 2D FTS Project

Considerable progress has been made over the past year in the development of the optical 2D FTS. This unique instrument is designed to sequentially record CCD images through the complementary outputs of the FTS while the FTS steps through a scan. In this way spatial and spectral information about targets is acquired simultaneously in an efficient manner. The most significant recent changes of the system are centered around the fabrication of a new dewar mount that allows any of the standard CFHT CCD cameras to be coupled to the FTS optical interface. Since the CFHT CCD cameras are much lighter than the previously used UH camera, flexure in the optical interface has been greatly reduced. Furthermore, under the new system raw frames are stored directly onto a summit disk, hence large scans can be easily accommodated. In conjunction with the new hardware built for the 2D FTS, a new software package was written that controls the FTS mirror functions and CCD exposure sequence in an integrated manner. This new software runs in the X-Windows environment and is very similar in format to the standard CCD control software.

In June, 1990, this new system was operated at CFHT under excellent weather conditions, thereby permitting a detailed assessment of its performance. We used PHX1 together with reimaging optics that yielded 0.25" pixels with a ~20" field of view. Engineering observations were completed, and interesting scientific targets were also observed to verify the baseline performance of the instrument with both absorption and emission line sources. Image quality through the entire optical pathway was found to be typically 1.0 to 1.2" (FWHM). Figure 7(a,b) depicts the results of a 250 steps scan of the star HD144682 through a Ca(II) triplet filter centered at 11593 cm<sup>-1</sup> (8625 Å) with a 380 cm<sup>-1</sup> (280 Å) bandpass. The scan was double sided using 5 seconds exposures at each step. The resolving power of this scan was R ~ 1500 or ΔV ~ 200 km s<sup>-1</sup>. Obvious in the spectrum are the filter bandpass and two of the lines in the Ca(II) triplet. One line falls near the edge of the filter's transmission curve and is not well represented without a careful filter normalization. Most of the weaker absorption features in the spectrum are real and are due to various metals.

Plotted in Figure 8 are an image, interferograms, and spectra recorded through an O(III) filter of the planetary nebula NGC 7027. The contour plot in Figure 8 was made by coadding the first three frames from one of the output beams in the scan. Interferograms and spectra were derived from two points in the

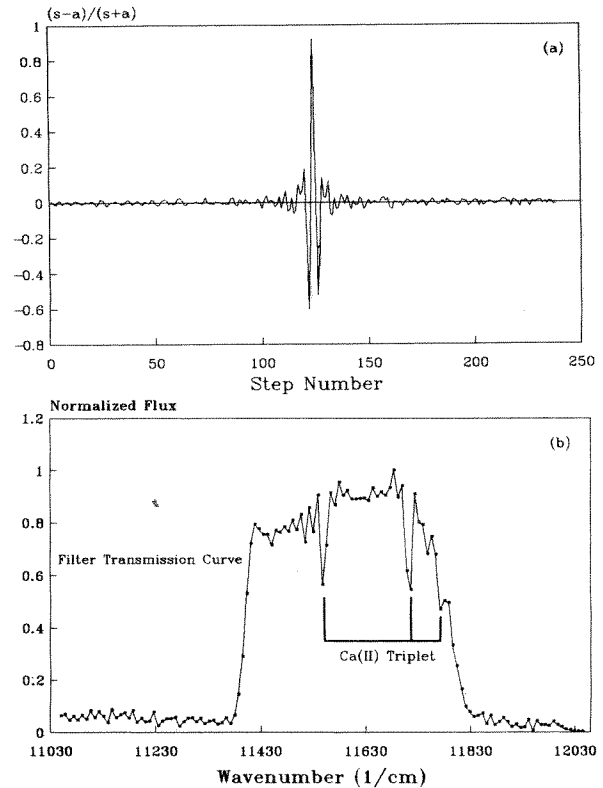


Fig. 7(a,b). A 250 steps double sided interferogram (a) and corresponding spectrum (b) of the star HD 114682 are shown. Prominent in the spectrum is the Ca(II) triplet and the filter's transmission curve.

nebula, through the equivalent of a 2.5" aperture. The spectra quite clearly show the [OIII] lines at 19972 cm<sup>-1</sup> (5007 Å) and 20165 cm<sup>-1</sup> (4959 Å). The resolution of this scan was ΔV ~ 40 km s<sup>-1</sup>, which is comparable to the expansion velocity of the emitting gas and therefore just high enough to resolve the emission lines. These scans nicely demonstrate the power of the FTS-CCD as a spectro-imaging device. In the near future, further development of the 2D FTS will be made in the near infrared. We plan to couple the University of Hawaii's 256<sup>2</sup> 1-2.5 μm camera to the FTS and test this novel system in December, 1990 and late February, 1991. The main limitation of the 2D FTS mode is the time lost due to the readout of the detector and the storage on disk. It will be solved by the development of a new data acquisition system.

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Fig. 8. Spectra and interferograms from the planetary nebula NGC 7027 are presented. The scan was made through an O(III) (80 Å bandpass) filter with 300 singlesided steps. The entire nebula fits in the instrument's 20" field of view.

