core, the correctly guided star is observed as a "black hole" surrounded by a bright corona whose extent depends upon the TV camera gain and the actual seeing conditions. At a later date, an autoguiding system could be used directly with this TV image.

3. Output beam optics

The f/3 prime focus input beam profile is transferred through the fiber almost undisturbed, with only a few per cent of the input energy being scattered beyond the nominal f/3 beam (Fig. 4).

A cemented triplet objective produces a 10× magnified image of the fiber output end at the entrance slit of the spectrograph, thus reducing the beam aperture to f/30 which is then compatible with the spectrograph optics.

If a certain degradation in resolution can be tolerated, the normal CES input slit can be used at a wide setting so that most of the light enters the instrument. If the condition of maximal resolution is determinant for a particular observation, this slit can be replaced by an image slicer. The image slicer used during the test period was designed by H. Richardson (E. Richardson, "Image Slicers for Image-Tube Spectrographs", ESO/CERN Conference on Auxiliary Instrumentation for Large Telescopes, May 2–5, 1972, p. 275), and is essentially an image anamarphoser comprising an input cylindrical lens, an input slit, two split offset spherical mirrors and an output slit. If considered as a black box, the slicer can be thought of as allowing one direct slice of the image through the exit slit, and placing above and below this slice one (or more) slice(s) taken from each of the two remaining (and otherwise lost) crescent-shaped edges of the image. Higher order slices are also present but are not made use of in this design because of the limited diode length of the reticon. This system, if well adjusted, provides a theoretical gain of around 2.5 for an exit slit width of 230 μ and a uniformly illuminated fiber end 85 μ in diameter. Such a configuration is of course only useful if the detector pixels are sufficiently dimensioned (as is the case with the CES reticon for up to 3 slices) to make use of the elongated entrance slit spectrum.

Test Results

The 3 cabled fibers prepared for this experiment were installed on the telescope in less than a day. They were fed down through the prime focus via the Serrurier structure and one of the coudé tubes into the coudé room.

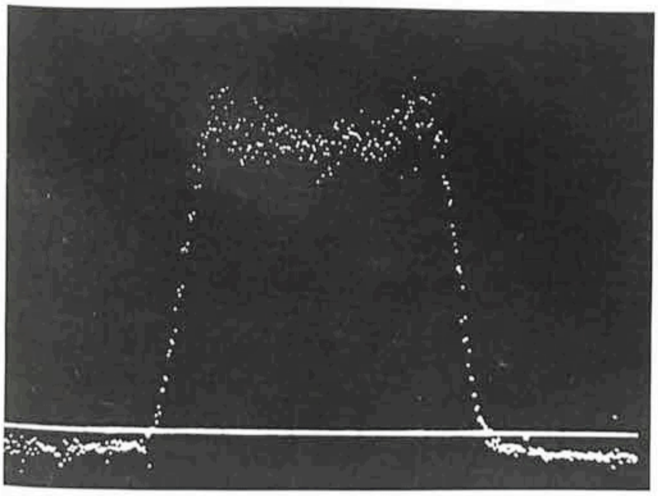

Fig. 4: *Output beam profile of the fiber. This profile was obtained with the complete fiber link and a bright star. A reticon was set at a certain distance from the fiber end and used to record the angular distribution of light at the fiber output. Calculations show that more than 95 % of the energy in this beam is admitted into an f/3 optical system.*

Tentative Time-table of Council Sessions and Committee Meetings in 1983

April 6–8	Committee of Council (Chile)
May 3–4	Finance Committee
May 5	Users Committee
May 20	Scientific and Technical Committee (Cargèse, Corsica)
June 6	Council (Observatoire de Haute-Provence)
June 8–9	Observing Programmes Committee
November 8	Scientific and Technical Committee
November 9–10	Finance Committee
November 11	Committee of Council
November 29–30	Observing Programmes Committee
December 1–2	Council

All meetings will take place at ESO in Garching unless stated otherwise.

Fig. 1 clearly illustrates that the present fibers cannot be used efficiently in the blue over relatively long distances and for this reason no attempt was made to work in this spectral region. Most of the observations were made at wavelengths greater than 5600 Å. The adapter and guiding unit developed for the prime focus were found to be totally satisfactory: star acquisition and guiding with the TV camera was extremely easy and the calibrations obtained through the fibers led to integration times equivalent to those necessary with the spectrograph calibration system. Although no adequate comparison has yet been performed, it is expected that calibrations achieved via an optical fiber should give improved overall accuracy.

1. Fiber Efficiency

Efficiency comparisons using different combinations of fiber and slit (or image slicer) were handicapped by the extreme sensitivity of the system to seeing. This is unfortunately a parameter which, by its own nature, evolves quite rapidly and unpredictably.

From the tests performed over 3 nights it seems that 2 of the fibers (Quartz and Silice 85 μm diameter and Galite 125 μm) gave comparable results whereas the 100 μm fiber, which in the laboratory exhibited considerable aperture degradation, was found to be inferior. The similarity in results obtained with the 85 μm and 125 μm fibers can be explained by the fact that although the former has a smaller collecting area, this drawback is compensated for by a superior matching of output image to entrance slit size.

2. Image Slicer Performance

The efficiency of the image slicer was measured by comparing its throughput with that obtained with a conventional slit of the same width. The gain was in this case found to be about 2, whereas a factor of 3 to 4 (depending on fiber diameter and seeing) was achieved with no image slicer by opening the spectrograph slit sufficiently to accommodate the projected image of the fiber output. This result stresses the extreme dependence of the overall system efficiency upon seeing and image slicer efficiency.

3. Astronomical Results

During the last test night, the relatively faint LMC star HD 269700 was observed (Fig. 5). This star has a magnitude of 10.54, and was observed with the 85 μm fiber together with a