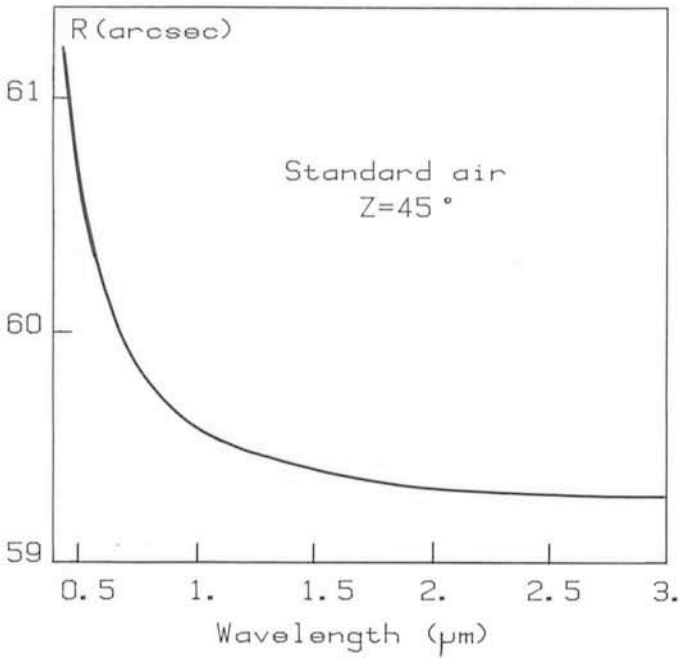

Fig. 3: *Angular deviation of light rays as a function of wavelength calculated for a standard dry atmosphere at 760 mm Hg for a zenith distance of Z = 45°.*

Note that the individual speckles are practically not lengthened by the differential atmospheric refraction, although the passband is rather large. This is because this differential effect is less severe in the infrared than in the visible. This is illustrated in Fig. 3 where we show the atmospheric dispersion as a function of wavelength (deviation angle of the light rays) calculated for a standard dry air at a pressure of 760 mm Hg and for a zenithal distance Z = 45°. This curce indicates a differential atmospheric dispersion of 3 x 10^{-2} arcsec between 1.55 and 1.8 μm. Finally, we observed more speckles than with the 1 m telescope, a sound physical result which supports the validity of our observation.

Observations at the 3.6 m Telescope

For our observations with the ESO 3.6 m telescope, we prepared a new camera completed by a video-disk and a magnetoscope. The video-disk acts as an analog memory which stores the video image which results from an integration of the target signal, a capability useful for direct imagery: in this conventional mode, the electron beam readout is cut and the target operates very much like a photographic plate. At the end of the exposure time – some 5 to 10 sec at room temperature – the readout is initiated and the video signal (one image, that is two interlaced frames) is recorded by the video-disk. Unfortunately, this video-disk was damaged during the transport and could not operate properly at the telescope, in spite of very dedicated efforts by the ESO electronic staff. Another disappointment came from the weather on La Silla which restricted our observations to episodic intervals during one night when sufficiently large holes formed in the clouds.

Direct imagery at 1.6 μm was attempted with a focal reducer working at f/1. With integration times of the order of 1 sec, Jupiter VYCMa and the η Carinae nebula were easily detected and "briefly" (for 40 msec) visualized on a TV monitor following real-time readout (no storage was possible as explained above). For the speckle observations, the focal reducer was removed and a new optical system was set up to expand the telescope focal length by a factor two (57.3 m). This moderate magnification was justified by our aim of first studying the properties of speckled images in the infrared with considerations of the signal-to-noise ratio, leaving the astrophysical aspects – which are probably even beyond the reach of a 3.6 m telescope – to a second step. Fig. 4 shows a speckled image of α Sco at 1.6 μm together with its isophote map obtained likewise that of Fig. 2. This photograph corresponds to a single frame and the size of the pixel amounts to 31 μm equivalent to 0.113 arcsec. The smallest structures have a typical size of 0.23 arcsec, in good agreement with the diameter of the Airy disk for a 3.6 m telescope at 1.6 μm. The fact that the structure of this image closely resembles that obtained at the 193 cm telescope – the number of speckles being approximately similar – remains a puzzle to us. It may be that we are reaching some limitation of the television tube. In this respect, we emphasize that all the above observations have been carried out at ambient temperature. Laboratory tests have shown that cooling the tube does have a positive effect by reducing both the lag and the thermal noise of the target; the second advantage is of particular interest for direct imagery as it allows far longer integration times. These tests are now being pursued to quantitatively assess the improved performances. We hope to come up with a better instrument and to resume our observing programme in this new and exciting field.

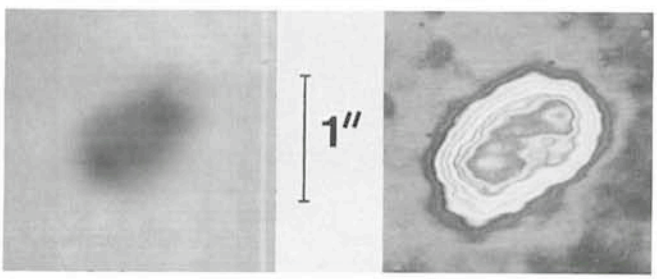

Fig. 4: *The image of α Sco at 1.6 μm obtained with the 3.6 m telescope of ESO and its isophotes. The horizontal pattern is caused by the TV raster.*

The European Space Agency (ESA) is organizing an

International Symposium on X-ray Astronomy

The symposium will take place on 22–26 June 1981 in Amsterdam. About 150 participants are expected. The deadline for applications and abstracts is 1 April 1981. The conference fee is f 150.–. For further information please contact Dr. R.D. Andresen, Space Science Department, ESTEC, Postbus 299, Noordwijk, The Netherlands.