to observe as large a part of the spectrum as possible quasi simultaneously with different instruments. Ideally, the process should be repeated regularly. The difficulties with this type of studies are the concentration of data from many different groups of workers and the necessity to know the absolute calibration of all the instruments involved.

The availability of the European X-ray satellite EXOSAT (2) since May 1983, and presumably until well into 1987, is an excellent opportunity to attempt several observations between the radio and X-ray ends of the spectrum. 3C 273 is an ideal candidate for this study since it is bright in all relevant wavebands. Several observations of 3C 273 have already been performed with EXOSAT (3) and it seemed useful to extend the observations to several other wavelengths.

We now have 2 quasi-simultaneous spectra of 3C 273 covering 8 decades in energy and separated by 5 months. We intend to continue this monitoring during the lifetime of EXOSAT. Two of the instruments on board EXOSAT can be used for these observations: the LE (low energy imaging telescope) and the ME (medium energy experiment). Spectral information using the LE is obtained by making observations through 3 (overlapping) filters between 0.1 and 2 keV. The Argon chamber of the ME gives the spectrum between 1 keV and 10 keV (the only data used in Fig. 3) and the Xenon chamber can be used to extend the spectrum to approximately 30 keV depending on the background during the observation.

A preliminary reduction of the data obtained in February is shown in Fig. 3. The components of the spectrum described above are clearly recognised: The IR-optical synchroton emission described by a power law of index $\alpha = 0.76$ and steepening to $\alpha \simeq 1.6$ at 10^{14} Hz, the thermal component in the optical spectrum (no UV data were available in February), and the comptonized X-ray spectrum of index $\alpha_x = 0.47$.

The data used in the compound spectrum of Fig. 3 are courtesy of D. Molteni, L.C. Botti, E. Scalise (Radio Observation); E.I. Robson, W.K. Gear, P.A.R. Ale (IR photometry); T. Courvoisier and K. Beuermann (Optical Spectrum) and M. Turner, T. Courvoisier, R. Staubert, D. Molteni and J. Trümper (X-ray Spectrum). The spectrum obtained in July includes (in addition to similar observations as in February) an IUE spectrum and a high energy X-ray measurement with which we hope to extend our energy coverage to 150 keV.

The two types of studies mentioned here, theoretical modelling and observations of overall spectrum of an object, give complementary information on the structure of an active galactic nucleus. The observations provide stringent tests and constraints for the proposed model, and the model provides a means of interpreting the measurements in terms of the physics involved in the nucleus. Once our understanding of a few well-studied objects has progressed significantly, it will be possible to use the acquired knowledge together with survey studies to describe the physical structure of active galactic nuclei in general.

References

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The Sun and α Cen A

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The closest known star apart from the Sun is a very faint object called Proxima Centauri. The next closest star is Alpha Centauri or *Rigil Kentaurus* which forms a binary system having components designated as α Cen A and α Cen B. The component called α Cen A is of particular interest because it strongly resembles the Sun. As a matter of fact, it resembles the Sun to such an extent that it has been called a solar twin. Several researchers have taken a close look at α Cen A using different means in trying to find out exactly what its properties are. Photometry of an object as bright as α Cen A with a cooler component within 18 arcsec of angular distance may suffer from systematic errors. And analysing spectra of α Cen A is hard to do with sufficient accuracy.

The preliminary result reported here is based on a very strict comparison with the Sun. That means that we cannot give very accurate numbers for example for the temperature or chemical abundance of iron for α Cen A but we can report with considerable accuracy how much hotter α Cen A is than the Sun and how much higher its abundance of iron is.

A fortunate circumstance relating to this work is that a spectrum atlas of the Sun as a star, i.e. using light from the whole solar disk, has recently been prepared by Kurucz, Furenlid, Brault, and Testerman using the Fourier Transform Spectrometer at Kitt Peak National Observatory. The atlas (publication planned for the coming year) covers the wavelength range 3000 to 13000 Å. The resolution in the visual part of the spectrum is around 500,000 and the signal-to-noise ratio typically 3,000. This unusually good spectrum provides the reference against which we compare the spectra of α Cen A, obtained at ESO with the CAT and Reticon detector. The ESO spectra are also of excellent quality, having a resolution of 100,000 and signal-to-noise ratio of around 500.

The preliminary analysis carried out so far was done in the following way. The solar spectrum was degraded to a resolution of 80,000, the continuum fitted, and a plot made on a uniform wavelength scale. The spectrum of α Cen A was given exactly the same treatment with particular emphasis on locating the continuum in a consistent way for both Sun and α Cen A. Around 25 absorption lines of iron were then selected and their equivalent widths measured. The lines were carefully chosen so that some of them originated at low energy levels and some at high levels while some of the lines are weak and some strong, and some of them arise from neutral iron and some from once ionized iron. By picking lines in this fashion we can assure high sensitivity to temperature effects, microturbulence, and pressure or surface gravity.

The data analysis made use of stellar model atmosphere programme ATLAS 6, kindly brought to us by its author, Dr. R. Kurucz. In an iterative process we varied temperature, surface gravity, and microturbulence for the solar data until all lines gave the same chemical abundance for iron. The requirement that the deduced abundance be the same whether we use lines from neutral or ionized iron places tight constraints on the stellar model fit. It was rewarding to find the solar abundance of iron in the converged model to be 7.50 ± 0.15 on the logarithmic scale where hydrogen has the abundance 12.00, as the value 7.50 equals the best modern value. At this point we changed the oscillator strengths of all our lines so that the solar iron abundance for all lines became exactly 7.50. These adjusted atomic data were then used for the iterations of α Cen A so that temperature, surface gravity, microturbulence, and iron abundance of α Cen A would be strictly differential to the same parameters in the Sun.

The difference in effective temperature was found to be +20°K ± 20°, surprisingly close to the Sun's value. The log of the surface gravity of α Cen A was found to be −0.1 ± 0.1 of the Sun's, pointing towards a somewhat smaller surface gravity than the Sun's. The microturbulence parameter emerges 0.2 km/sec smaller in α Cen A than in the Sun with an error of ± 0.2. The only significant difference in this analysis between α Cen A and the Sun spectroscopically occurs in the abundance of iron. We find that α Cen A has an iron abundance 65 per cent larger than the Sun's.

We may summarize this preliminary result in the following way: α Cen A has almost exactly the same surface temperature as the Sun but has a diameter around 20 per cent larger. The star is known to have slightly larger mass than the Sun and is probably somewhat more evolved. The iron abundance is sufficiently different from the Sun's that in the full and final analysis we will have to consider the impact of a higher metal abundance on the atmospheric structure of α Cen A. Still the two stars are sufficiently similar in physical properties that we can expect a very accurate differential analysis. In the continuation of this project we are in particular looking forward to the comparison of the enrichment of iron with that of other chemical elements and groups of elements.

Roaming in the Sco OB 1 Association

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OB associations are usually thought to be the youngest stars in a space volume infected by the virus of star formation. The combined effects of strong UV radiation and stellar winds quickly disperse the parent interstellar cloud and thus end the star formation episode. Details of this picture are, however, subject to debate, especially such questions as when, where and how long which types of stars are formed within the parent cloud. Only a vast amount of observations on as many associations and young open clusters as possible will allow us to draw final conclusions.

During a perusal of the literature on this subject we were struck by several discrepancies which are related to the well-known association Sco OB 1 and several open clusters and an H II region in the same area, e.g. NGC 6231, Tr 24, IC 4628, etc.

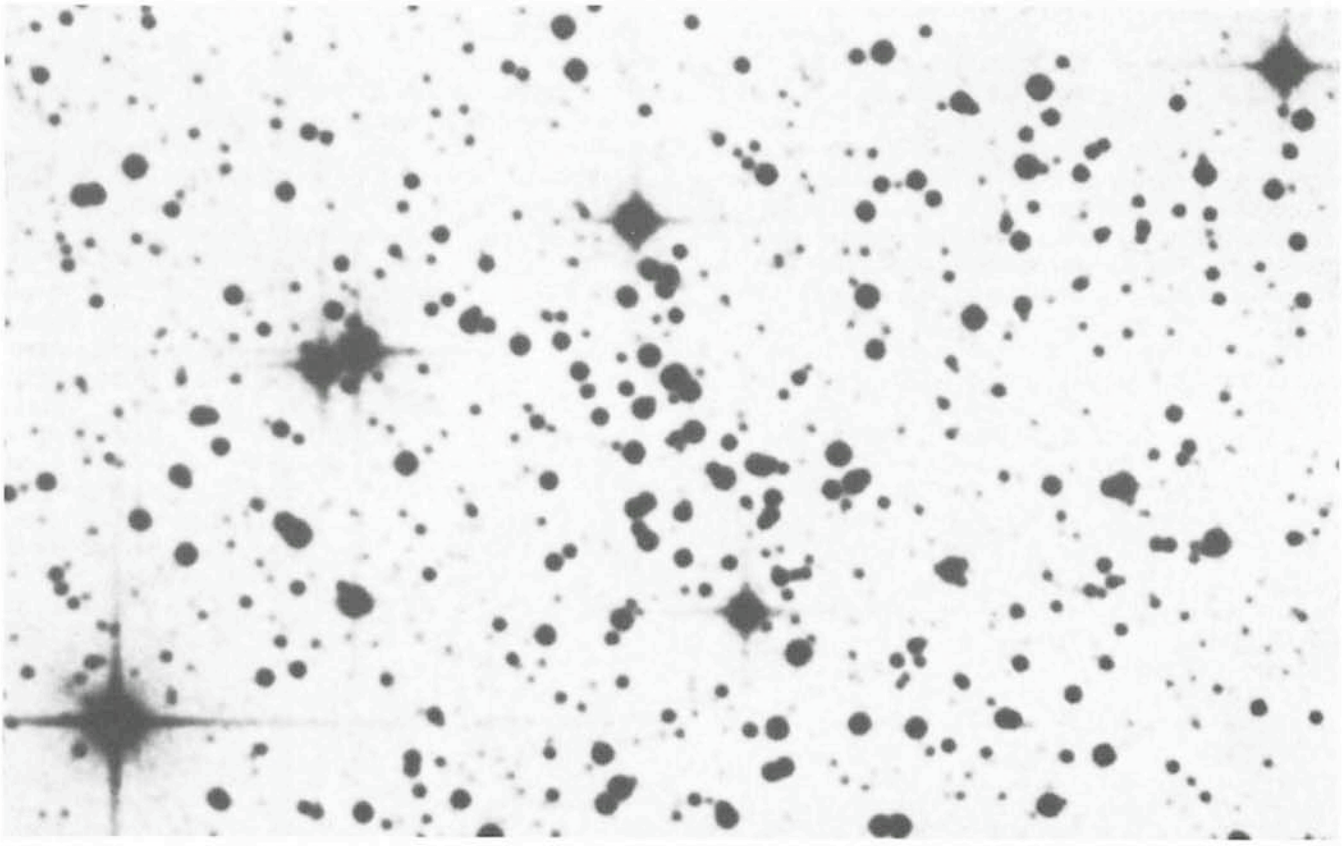

Fig. 1: *The "concentration" in Tr 24. Its angular extent is about 12′ × 4′ and its centre coordinates are roughly $16^h51^m.6/-40^\circ.8$. The bright star at lower left is SAO 227443. (Enlargement from the ESO B Sky Survey.)*