the satellites, since there is no chance of finding enough stars with accurately-known positions among the faint stars in the small field around the planets. Therefore, ESO Schmidt plates will be used to measure the positions of the faint stars in relation to the brighter, standard stars, and in turn the positions of the satellites can then be measured relative to the faint stars, ensuring the astrometric tie-in to the brighter (standard) stars.

Preliminary observations were made in June 1977 at the ESO 1.5 m telescope in Cassegrain focus with the modified 16 x 16 cm camera and the TV-guiding system. In spite of rather bad weather conditions, some useful plates were obtained. However, as a greater number of stars (i. e. a larger field) would ensure a better accuracy, we hope soon to use the new Danish 1.5 m telescope with its large-field Ritchey-Chretien optics.

Finally, it should be mentioned that great care is also needed in measuring the plates on a two-dimensional coordinate measuring machine. Tests are in progress to determine what kind of machine is the best suited, the PDS-system at CDCA in Nice or perhaps the ESO S-3000 in Geneva.

"Optical Telescopes of the Future"

The Organizing Committee informs us that the preparations for this ESO conference are proceeding well. It will take place at CERN, Geneva, on December 12–15, 1977. Prospective participants who have not yet announced their arrival are requested to contact Dr. R. N. Wilson, ESO c/o CERN, CH-1211 Geneva 23, Switzerland, as soon as possible.

The programme will start on Monday 12 December with a general introduction, followed by a review of conventional large telescopes. Tuesday, 13 December, will be devoted to Incoherent Arrays and Multi-mirror Telescopes. Wednesday, 14 December, deals with Special Techniques, Coherent Arrays and Interferometers, and the last day, 15 December, is concerned with Image Processing and Live Optics and a discussion of the Astronomical Implications.

The conference is the first major, international one of its kind and has attracted a large number of well-known astronomers and experts from all continents. It is expected that the Proceedings will be published soon after, following the tradition of earlier ESO conferences.

The X-ray Cluster of Galaxies Klemola 44

On October 17, 1977, three astronomers sat together at lunch on La Silla. One, Dr. Massimo Tarenghi—newcomer to the Scientific Group in Geneva—had just returned from the Interamerican Observatory on Cerro Tololo. Another, Dr. Anthony C. Danks, recently joined ESO/Chile, and the third was the editor of this journal. By chance, Dr. Danks showed some plates of the cluster of galaxies Klemola 44 which he had obtained a few nights before with the 3.6 m telescope. Dr. Tarenghi told that he had observed the same galaxies spectroscopically the night before at Tololo. An intense exchange of information resulted. The editor smiled happily and then made the inevitable suggestion . . .

So here is the essence of that discussion, summarized by Dr. Danks.

The X-ray equipment of the University of Leicester aboard the satellite Ariel V recently detected a new X-ray source A 2344-28. The new source was quickly identified with the galaxy cluster Klemola 44 by Maccacaro et al. (1977). The cluster is shown in figure 1, reproduced from a plate which was taken at the prime focus of the 3.6 m telescope at La Silla by ESO astronomer Anthony Danks.

It is interesting to see that several of the galaxies appear to share common envelopes which are likely areas from which X-rays may be emitted. It is from such photographs that a detailed morphological study of the region can be made.

A large number of X-ray sources are now identified with clusters of galaxies thanks to the satellites Uhuru and Ariel V. But as the number of X-ray clusters of galaxies grows larger, the astronomer grows more curious and asks: "What mechanism produces such X-rays?" Already in 1972, Solinger and Tucker proposed a "thermal-bremsstrahlung" model. They were the first to show that there exists a relationship between X-ray luminosity (L_x) and the cluster velocity dispersion (ΔV).

It was noted that the brightest X-ray galaxy clusters were also the richest (more galaxies per unit area on the plate). They argued that cluster richness must be related to space density which is a measure of the gravitational field and that the gravitational field in turn must manifest itself in the velocity dispersion ΔV.

The "thermal-bremsstrahlung" model predicting that L_x is proportional to $(\Delta V)^4$ was reasonably consistent with the observations. By using this model, the mass of the galaxy cluster can also be calculated from the observed X-ray flux and is generally larger than the sum of the masses of the galaxies in the cluster. This leads to the suggestion that the additional mass is in intra-cluster matter, and that the X-ray flux is due to this radiating matter. Some evidence for such intra-cluster matter can be seen in figure 1.

Since this interpretation was published in 1972 many new X-ray clusters have been discovered. Some of the more recent clusters contain relatively few galaxies, raising the question "Are other X-ray production mechanisms possible?".

It appears that Klemola 44 is such a case. Maccacaro et al. (1977) already noted that the velocity dispersion ΔV was too low to fit the Solinger and Tucker relationship. But their value of ΔV was based on measurements of only 8 galaxies in the cluster. More measurements were needed to be certain of the ΔV value and Chincarini et al. (1977) have now confirmed the low ΔV value with redshift measurements of 24 of the galaxies in Klemola 44. They have convincingly argued that an Inverse-Compton scattering of synchrotron electrons by the microwave background could produce the observed X-ray flux. Of course, a source of relativistic electrons is necessary, but it could easily be supplied by one of the cD galaxies in the field. Confirmation of this

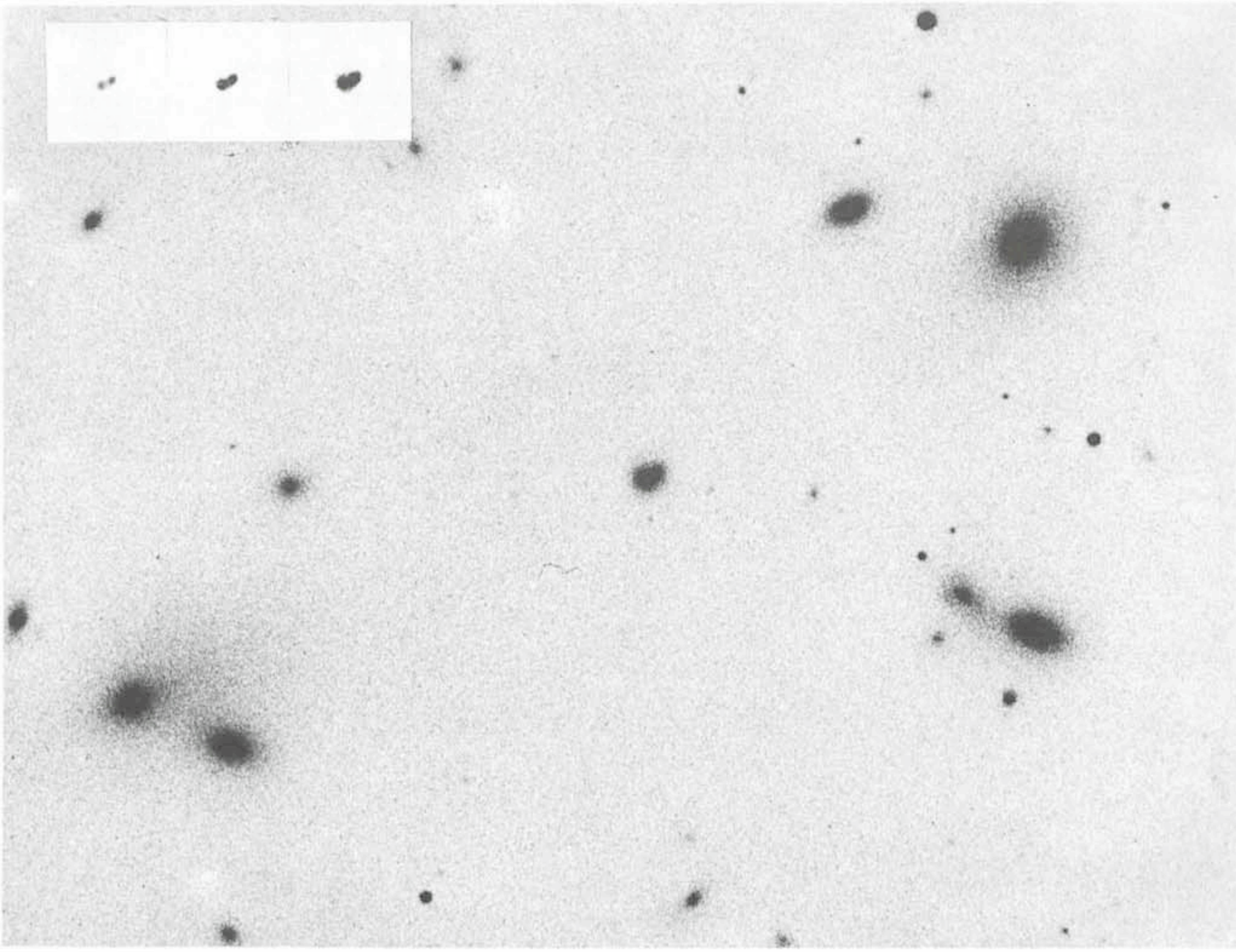

Fig. 1. — *This plate of the cluster of galaxies Klemola 44 was obtained by Dr. Danks at the prime focus of the 3.6 m telescope on IIa-O emulsion behind an ultraviolet-cutting filter GG385. Plate No. 985; exposure time 10 minutes. It is here reproduced in negative, i.e. as the original plate looks like, in order to bring out better the halos around the galaxy pairs. Note that the central object is a very close pair of galaxies, cf. the insert of that object printed at various central densities (from the same original plate).*

must await radio observations of the region. However, this is clearly a very exciting subject that brings together all fields of astronomy.

References:

Chincarini G., Tarenghi M., Bettis C., 1977, *Ap. J.* (to be published).

Maccacaro T., Cooke, B. A., Ward M. J., Penston M. V., Hayes R. F., 1977, M. N. R. A. S. **180,** 465.

Solinger A. B., Tucker W. M., 1972, *Ap. J.* **175,** L107.

Reference Positions of Southern Stars: PERTH70

A new catalogue, *Perth70,* containing one star per square degree has appeared: E. Høg and J. von der Heide, 1976, Abhandl. aus der Hamburger Sternwarte IX, and also available on magnetic tape from the Strasbourg Data Centre. The catalogue was observed about 1970 with a mean error 0.″17 and contains approximate proper motions giving positional accuracy of ± 0.″3 at the epoch 1980. The accuracy of the widely used SAO catalogue is about ± 1″.

Perth70 is part of an international effort to determine positions of a Southern Reference System (SRS). Altogether 12 observatories have taken part in the meridian-circle observations, and all observations are being compiled to a SRS catalogue by the US Naval Observatory in Washington and by the Pulkovo Observatory. Perth70 was observed by the Hamburg Observatory expedition to Perth, West Australia, from 1967 to 1972, directed by J. von der Heide. The meridian circle was equipped with a novel photoelectric slit micrometer developed at Hamburg and it had an automatic data-acquisition system so that reductions could keep up with observations with only a few days delay—quite a new situation for meridian techniques. The instrument has given 180,000 observations during its ten years at the Perth Observatory, where it continues to be used by I. Nikoloff.

The Perth70 catalogue contains 4,800 stars with $m < 8$ and $\delta < +35°$ and 20,100 faint SRS stars about $m = 9$ and $\delta < +5°$. This is 98 per cent of all SRS stars. The coordinate system is a smoothed FK4 system since some local systematic errors of FK4 have been removed.

There are 8,000 bright stars in the catalogue common with Boss' General Catalogue. For these stars improved proper motions are being derived at Copenhagen with errors about ± 0.″004 per year. This is part of a joint effort by Danish astronomers obtaining photometric data and radial velocities of bright stars. The improved space velocities will be used to study galactic structure.

Erik Høg