

24. STELLAR PARALLAXES AND PROPER MOTIONS (PARALLAXES STELLAIRES ET MOUVEMENTS PROPRES)

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At the Pulkovo Observatory a parallax programme has been started by Kanayev for 120 stars chosen mainly from Vyssotsky's lists and the Leningrad list of multiple systems. Proper Motions relative to galaxies have been determined by Fatchikhin for 14669 stars in 85 different fields; the magnitude equation is being investigated and secular parallaxes as well as the solar apex and the constants of galactic rotation are being calculated. The general programme on absolute proper motions is being carried out by Dežč at Pulkovo, and at Cerro Calan in Chile, by Panteleyeva at Sternberg, and by Rahimov at Tashkent.

Another major programme is concerned with the proper motions of stars in clusters, and surrounding field. At Pulkovo the original list has been increased from 75 to 340 clusters by Lavdovskij, and data for NGC 6866 and 7789 will be published by Koroleva. Motions and UBV magnitudes for 2000 stars near M 92 are being determined by Kadla, with N. Richter at Tautenburg, and by Panova at Pulkovo for M 15 and M 53.

At Sternberg proper motions for stars surrounding the Pleiades and M 92 have been determined by Artiukhina and Kalinina. At Tashkent Latypov, Ishmuhamedov and Kadyrov are determining proper motions of stars in a large number of areas containing open clusters.

Further proper motions for five novae and surrounding stars as well as for a large number of stars in Tau, and Cyg have been determined at Pulkovo by Sokolova, and Bronnikova, while at Sternberg Karimova and Pavlovskaya determined proper motions for 569 Cepheids and Am and Ap stars and are currently deriving similar motions for 200 B stars. At Tashkent Primkulov determined proper motions for 8 U Gem stars and for a large number of surrounding field stars.

In Bergedorf work is in progress to construct a catalogue of positions and proper motions comprising stars of the AGK 2 by combining the AGK 2 (revised, and brought to FK 4) AGK 3, and positions from the *Astrographic Catalogue* after systematic corrections derived by H. Kox and A. Günther while working on definitive plate constants for the *Astrographic Catalogue* north of $+32^\circ$ Decl.

In a circular area of 5° radius around Alpha Persei positions for all stars on the relevant plates of the *Astrographic Catalogue*, zones Helsingfors and Catania, were determined. The proper motions will be derived by comparison with new epoch plates taken with the Bergedorf Schmidt. The measurement of these plates with the MANN comparator is in progress.

Eichhorn reports that at the U.S. Army Map Service, and in collaboration with Googe, Lukac, and Murphy, positions for 511 stars in the Pleiades have been determined with an average mean error of 0.02 , and proper motions have been determined for 101 stars in König's list. At South Florida Sofia, Eichhorn and Gatewood have determined proper motions for 83 stars near Sco X 1 and suggest that the X-ray object belongs to the Scorpio-Centaurus Association.

Wallerstein disagrees with this, and suggests that the X-ray object is more distant.

At South Florida a new 26-inch Schmidt-Cassegrain reflector has been installed and will be used for parallax and proper motion work.

The Perth Observatory has been re-established at its new site, and concomitant instrumental difficulties have now been largely overcome. Harris states that programmes for determination of proper motions in the regions of clusters, for RR Lyrae variables, and absolute proper motions

relative to galaxies have been started. A pilot programme in the field of $M7 = \text{NGC}6475$ has been published.

From the Lowell Observatory Giclas reports that the proper motion survey of stars between magnitudes 8 and 17 and with motions larger than $0''.27$ per year has been essentially completed for the northern hemisphere. Duplicate measures from overlapping plates will be combined and a list ordered in Right Ascension, including references to identification charts will be compiled. Additional results of the survey can be found in Lowell Observatory Bulletins Nos 138 to 151. Upon completion of the catalogue in the northern hemisphere, which will contain over 10000 entries, a programme for proper motions in selected regions will be undertaken, and the survey will be continued in the southern hemisphere.

Giuse has completed the calibration of spectral and photometric parallaxes of main-sequence stars later than about F5 on the basis of reliable trigonometric parallaxes and presented preliminary results in 1968 at the Symposium on Low Luminosity Stars, and at the meeting of the Astronomische Gesellschaft. These investigations will be continued and published in the following years. A new catalogue of Nearby Stars was published as No. 22 of the *Veröffentlichungen des Astronomischen Rechen Institut* at Heidelberg in 1969. The gathering of data on Nearby Stars will be continued.

Lourens reports that at the Cape Observatory parallax plates taken between 1943 and 1951 have been measured and the results will be published soon. In the current observing programme which now includes 30 southern nearby stars 1535 plates have been taken.

The new 60-inch telescope of the Vienna Observatory, as reported by Meurer will be used in the general programme for the determination of absolute proper motions of star clusters, which programme utilizes a variety of plates taken with different telescopes. For the Pleiades this is planned in conjunction with positions derived by Eichhorn at Tampa.

Morgan communicates that work has continued on increasing the precision of the resolution and of the calibration of the MK classification system. A working group, composed of Blaauw, Eggen, Keenan, Morgan, Osawa, and O. C. Wilson is preparing a report on the present status of the method of spectroscopic parallaxes, to be submitted to the 1970 meeting of the IAU.

At the Royal Greenwich Observatory Murray reports the preparation of a series of computer programmes for parallax determination and the completion of parallaxes with an estimated probable error of $0''.005$ for 25 stars, mostly M dwarfs.

Proper motions have been determined for a hundred semi-regular and RV Tau variables, mainly brighter than 11 pg at maximum, partly from plate to plate comparisons, partly by using published astrophotographic catalogue coordinates as first epoch positions.

The parallax programme of low luminosity stars with the U.S. Naval Observatory's 61-inch astrometric reflector, located at Flagstaff, Arizona, has been continued, as reported by Strand. Since the start of the program in April 1964 a total of 15250 astrometric plates has been obtained. A publication is in preparation reporting on the astrometric and photometric results for the first 100 stars. The current program consists of 310 stars with emphasis on the study of the fainter degenerate dwarf, and subdwarf stars.

At the Yerkes Observatory Van Altena reports that the 40-inch refractor as well as the plate measuring machine have been modernized and their efficiency increased. The new parallax programme begun in 1966 contains some 60 objects, mainly large proper motion stars and white dwarfs of average magnitude about 15. Generally using 20–25 plates probable errors of $\pm 0''.003$ are being obtained for the parallaxes. Proper motions of M stars in the Pleiades have been published by Van Altena and accurate relative motions for 100 members of this cluster have been determined by Burton F. Jones, with errors as low as $\pm 0''.0001$ per year, and it is planned to determine the absolute motion of the cluster relative to galaxies by using cluster members of the same magnitude as these galaxies. New proper motions and probabilities of membership have been determined for faint stars in the region of the Hyades cluster. These proper motions have been combined with those from other surveys to yield the highest accuracy motions available for faint Hyades stars. Membership determinations based on proper motions obtained from 40-inch plates are under way for the clusters NGC2420, 6530, 6611, 6823, and 7062.

Van de Kamp and Lippincott report that the Sproul 24-inch refractor and its mounting were overhauled and that tests indicate no systematic differences between the positional results before and after renovation. A number of publications have appeared in the *Astronomical Journal*, dealing with positional studies of selected stars as well as one giving a summary of Sproul parallaxes determined from 1938–1968. Determination of parallaxes and mass ratios of several binaries and studies of perturbations of stars heretofore considered single, such as Ci2354, and PGC588 have been made. An alternate dynamical analysis of Barnard's star indicates the presence of two unseen companions in co-revolving co-planar circular orbits with periods of 12 and 26 years and masses close to that of Jupiter.

At the Lick Observatory, Vasilevskis has expanded the parallax programme to 207 stars, mainly nearby dwarfs, U Gem stars, Hyads, and Faint Blue Stars, 20–24 plates being obtained normally, but at least 32 plates for stars with expected small parallaxes. Data are ready for 20 stars, yielding parallaxes with probable errors of 0".003. In the proper-motion-relative-to-galaxies programme a pilot study of 106 fields was initiated and approaches completion under the direct supervision of Klemola. Its purpose is mainly to develop the techniques of measurement, to study possible systematic errors, and to derive ultimately corrections to the precession constant, the constants of galactic rotation and to determine further the proper motions of stars of the 12th and 16th magnitude and for 80 RR Lyr variables. The start of the complete coverage of the sky accessible from Lick is planned for 1970.

Wagman reports from the Allegheny Observatory that parallax observations are being continued with the 30-inch refractor on all good nights, and about 1000 plates per year are being obtained. During the last three years, and with National Science Foundation support, 47 stars have been measured. White dwarf suspects to magnitude 15 and some red stars are added to the list as they appear in Luyten's and Giclas' lists.

Working under grants from the National Science Foundation and the Office of Naval Research Luyten has completed and published the motions of 17500 stars brighter than $m = 21$ pg in the North Polar Cap, north of declination $+70$. Likewise the motions of 1300 stars between $+70$ and $+68.5$ are being published. A general list of the motions of 951 Faint Blue Stars was issued, a catalogue of 1220 Double Stars with common proper motion, and of 130 Double Stars containing degenerate components, while a list of the motions of some 3000 White Dwarfs is in press. More than 5000 proper-motion stars have been found near the South Galactic Pole; these data will probably be published within a year or so.

A re-analysis of Van Altena's catalogue of proper motions in the Hyades region has shown that several of his largest motions are spurious and that, in general, the accuracy of his motions is much less than claimed, and is, in fact, less than that of the motions determined with the Palomar Schmidt telescope.

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