

Photoelectric Astrolabe and Astrolabe Star Catalogues

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At the Shaanxi Observatory, regular observations with the prototype of the photoelectric astrolabe PAI have been carried out since 1973. Three photoelectric astrolabes of type Mark II (PAII) were mounted at the Shanghai, Beijing and Yunnan Observatories in 1974, 1976 and 1978, respectively. Details of the instruments and the results of the observation were published previously. (Photoelectric Astrolabe Developing Group 1973 and 1975, Second Group, First Division Shaanxi Observatory 1974, Astrolabe Data Analysis Group, First Division, Shaanxi Observatory 1975, Wang, L-j 1979, Astrolabe Group, First Division, Shanghai Observatory 1976, Wang, L-z and Luo 1979, Lu and Luo 1979). Time and latitude determinations by these sets of photoelectric astrolabes form a part in the international cooperation of BIH, IPMS as well as in the short campaign of project MERIT.

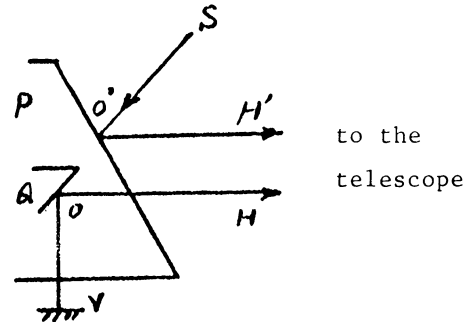
Guinot and others (1961) have first pointed out that astrolabe observations, beside giving good results for time and latitude determinations, may also contribute to the improvement of fundamental catalogues. Thereafter, many astrolabe based catalogues and the "catalogue général des étoiles observées à l'astrolabe (1957-1975)", (Billaud & al., 1978) were published. Since 1978, we have compiled six catalogues at three Danjon astrolabes and eight catalogues on four photoelectric astrolabes in China and studied the methods developed for the construction of astrolabe catalogues (Zhu & al. 1982, Li 1981, Li & al. 1983). astrolabe catalogue A more comprehensive general catalogue of stars observed mainly with photoelectric astrolabes (CCPA Working Group 1983) has been completed with the help of the analytic method developed in Astronomisches Rechen-Institut (Heidelberg) (Bien & al. 1978) and Beijing Observatory (Zhang 1985).

The development in radio astrometry in recent years has opened up a possible way to establish an inertial reference system referred to extragalactic radio sources. At the same time, the relative positions of about 100,000 stars with unprecedented precision of the order of 0".002 will be obtained by HIPPARCOS in the early 90's of this century. With such prospects it is essential now to procure a great number of optical astrometric observations which will serve to establish the relation between the astrometric system of QSOs, the HIPPARCOS system and the fundamental reference system now in use. This is the reason that we are building a photoelectric astrolabe with even larger aperture and better automation

(APA) for the determination of star positions. The designs have recently been completed at the Nanjing Astronomical Instrument Factory at the Academia Sinica, and the instrument itself is now under construction.

This new photoelectric astrolabe uses a Richey-Chretien optical system with an aperture of 26 cm and a focal length of 500 cm. It will be controlled by an on-line computer and operated automatically. This instrument will be able to observe stars of at least 10.

The optical system with a prism-mercury horizon device is shown in the figure. P and Q are two reflecting prisms of different sizes, OV is the normal direction to the mercury surface, determined by means of auto-collimation, OH is the reflection of OV, O'H' is the direction of the star light SO' as reflected from O'.



The new photoelectric astrolabe will be used in the observation for the compilation of a global astrolabe catalogue which was firstly suggested by the authors at the Shanghai Symposium of Astrometry in 1980.

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Discussion:

GUINOT: I would like to recall that two astronomers of Pulkovo Observatory, Murri and Krejnin, have described, some 20 years ago, a number of methods in order to locate the equator in the astrolabe catalogues.

HUGHES: The geometry and concepts covered here appear to be similiar to work by van Herk of Leiden Observatory some years ago. Do you wish to comment on this?