

DESIDERATA FOR NEARBY-STAR QUANTITIES OBSERVABLE WITH SMALL TELESCOPES

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At the General Assembly of the IAU at New Delhi van Altena reported on the new General Catalogue of Trigonometric Stellar Parallaxes (GCTSP) which was completed recently at the Yale Observatory. Time seems to be ripe now for the compilation of a Third Catalogue of Nearby Stars which will include all objects known to be nearer than 25 parsecs. This catalogue will contain positions, proper motions, radial velocities, spectral types, broad-band photometry, and parallaxes - quantities won by observations.

A preliminary version of the new GCTSP, available in 1984, yielded 1957 stars with parallaxes exceeding $0''.0395$ (singles and systems with altogether nearly 2400 components). However on the basis of the luminosity function derived by Wielen et al. (1983) the total number of stars in a 25-pc sphere around the Sun is estimated at more than 7000 objects.

Uguren and Armandroff (1981) have shown that our nearby star sample is statistically complete for the objects absolutely brighter than $M_V = +8$. Beyond this limit incompleteness of our knowledge is rapidly increasing and we cannot hope that the situation will be remarkably improved by trigonometric programs alone in the near future. Significant progress can be expected from observations of second-order distance indicators as spectral types, luminosity-sensitive quantities, colours. Today we know already more than 700 objects with spectroscopically and/or photometrically determined distance moduli $m-M < +2.02$.

Some programs observed with small telescopes which have contributed remarkably to our knowledge of objects in the solar neighbourhood will demonstrate potentialities, value and benefit of such series.

To overcome the "high-proper-motion selection effect" in trigonometric parallax programs Vyssotsky et al. (1943, 1946, 1952, 1956) searched for K and M dwarf stars on the collection of objective prism plates at McCormick Observatory. The supplement in southern declinations was observed with the Michigan Curtis Schmidt Telescope at Cerro Tololo (Uguren et al., 1972). Both series are restricted to stars brighter than 10th or 11th mag. Up to now the potential of the data in the Michigan Spectral Catalogues (Houk, 1975, 1978, 1982) is not yet fully analysed.

A certain weight and importance has to be assigned to objective prism

programs for red stars down to $m_V = 13$. Several series were observed with the Schmidt telescope (61/91 cm) at Warner and Swasey Observatory. The spectral classes of the individual objects seem to be uncertain but in combination with their proper motions the discrimination between dwarfs and giants is possible in many cases. Dwarf stars and suspected dwarf stars can be investigated later on by photometric programs.

In recent years the importance of photometric parallaxes for distance determinations in the solar neighbourhood has grown steadily. Broad-band photometry (UBV, RI) is observable with small telescopes also for stars fainter than 10th magnitude.

Eggen has found numerous nearby objects down to $V = 15$ from photometric observations with a 40-inch reflector.

Large and valuable sources for further detections are the proper motion catalogues of Luyten. The four NLTT volumes (Luyten, 1979 - 1980) contain probably about eighty percent of the stars existing within 25 pc of the Sun. Series with a 0.9-m telescope at Kitt Peak (Weis, 1984) and with the 70-cm Swiss telescope at La Silla (Grenon, 1984) are in full activity now, but further programs with small telescopes will find many more NLTT objects for observation.

Reliable radial velocity measurements with small telescopes seem to be possible only for objects of $m_V \leq 10$. However Griffin (1971 and following years) showed how spectroscopic binaries can be observed with a 36-inch reflector with photoelectric equipment.

The programs above were mentioned as examples how observations with small telescopes may support the compilation of data of objects in the solar neighbourhood. Further catalogues of nearby stars can be supplemented with new data and additional objects especially in the magnitude range around $m_V = 10$ observed with small telescopes.

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DISCUSSION

McCarthy: The Schmidt telescopes are migrating around the world. The one to which you refer is the Burrell Schmidt (used by Stephenson and Sanduleak) in Cleveland, now at Kitt Peak, whereas the Curtis Schmidt was at Ann Arbor and is now at Cerro Tololo.

Penhallow: Most of the stars you mentioned had their parallaxes determined by small telescopes. What comment do you have about this?

Gliese: This is true, most telescopes for trigonometric parallaxes have apertures less than one metre.

Djorgovski: What do you think about the hypothesis that the Sun has a companion star which killed the dinosaurs?

Gliese: It may in some way have been confirmed by observation and it is now a matter of believing it or not.