

THE USE OF WIDE ANGLE CAMERAS AND HIGH SPEED MEASURING MACHINES FOR GENERATING PROGRAMMES FOR SMALL TELESCOPES

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ABSTRACT. The classical method of discovering objects that vary in position and/or time is to examine well-matched pairs of plates using a blink comparator. This method, being manual, is slow, subjective and, unless several matched plate pairs are used, suffers from incompleteness. The combination of wide angle Schmidt cameras, high speed measuring machines and sophisticated computer software has enabled objective methods for searching for variable objects to be devised. Using such methods it is possible to intercompare stacks of plates digitally. The deepest plate may be used as a master in position and magnitude, eliminating the need for the rest to be well matched. Following measurement and analysis it is a relatively simple matter to prepare lists of variable objects such as RR Lyrae stars, Mira long period variables, cataclysmic variables, active galaxies, comets and asteroids which may then be used as a basis for more intensive study by smaller dedicated instruments.

This, however, is only one aspect of the cooperation possible between Schmidt telescopes, measuring machines and small telescopes. In projects involving the study of large numbers of mainly non-variable objects (stars or galaxies) the small telescope has a most important role to play in providing photoelectric magnitude calibrations to convert machine measured magnitudes to a standard system. To date this has been the principal use to which the small telescope has been put, even in the study of the distribution of faint galaxies from Schmidt plates it was a small telescope which provided the necessary measurement of the background sky brightness.

A further dimension is provided by the addition of an objective prism to the Schmidt camera. In this case objects readily detected include emission line stars and galaxies. The calibrating power of the smaller instrument is now of value in providing standard galaxy radial velocities to calibrate red shifts measured from the very low dispersion prism.

TABLES.

The following tables set out areas of research which benefit from the in-

teraction between small telescopes and the wide angle camera/high speed measuring machine combination.

TABLE 1: DIRECT PLATE PROGRAMMES

PROGRAMME	WIDE ANGLE CAMERA & H S M M	SMALL TELESCOPE
Asteroids	Detection: single plate-trailed image. Multiple plates-moving images	↳ Photometry for light curves - rotation periods
Comets	Detection: single plate - non-moving images	↳ Photometry, spectrometry
Large Proper Motion Stars	Detection: image motion	↳ Photometry, spectrometry
Variable Stars	Detection: after intensity matching plates - different image intensity at same locat.	↳ Photometry for light curves. Spectrometry for r-v curves
Polarized Objects	Detection: plate series obtained through polarizing medium	↳ Photometry, polarimetry and spectrometry
Stellar Statistics	Large numbers of instrumental stellar magnitudes & colours	↳ Magnitude & colour calibration via PE, CCD or electronographic photometry
Galactic structure	As above then selection of stars in particular colour & magnitude ranges	↳ More precise photometry. Spectrometry
Distribution of Galaxies	Positions, instrumental magnitudes, sizes, shapes & orientations of galaxy images.	↳ Magnitude calibration of sequences and/or background sky

TABLE II: OBJECTIVE PRISM PLATES

PROGRAMME	WIDE ANGLE CAMERA & H S M M	SMALL TELESCOPE
Stellar spectral classification	Measurement of large numbers of stellar spectra	↳ Detailed study, both photometric and spectrographic of objects of particular interest
Emission line objects (W-R Stars, P-N, C Stars)	Detection	↳ Photometry and spectrometry
Galaxy red-shifts	Measurement of large numbers of galaxy spectra to determine instrumental red-shifts	↳ Calibration of red-shifts for brighter galaxies using slit spectra
Quasar detection	Detection	↳ Photometry of brightest

DISCUSSION

Kumar: Has this method been used to measure the extinction towards large numbers of dark clouds?

Dodd: It has been used but there are problems with determining the extinction, e.g. crowded fields and the saturation of the images of foreground stars.