

## SUMMARY

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In summarizing this meeting, let me first turn to questions of instrumentation and reduction under the following headings:

Current Schmidt Telescopes. Cannon, West, Birkle and others have stressed the great difficulties in getting a Schmidt telescope to function at the necessary performance level - that is to the limits imposed by differential refraction and similar effects. With many Schmidt telescopes, much engineering work remains to be done.

Future Large Telescopes. Angel stressed the need for a relatively large field (~1 square degree) in the future very large telescopes (NNTT, VLT, etc.). It is, however, not evident that such telescopes should be based on the Schmidt concept.

Space Schmidt. There is wide agreement on its usefulness; its feasibility was discussed by Lemaître, but funding remains a problem.

Detectors. CCD detectors may be superior in efficiency but are still very small, and electronography encounters many difficulties. It is clear that in the coming ten years photographic plates will continue to be the principal detectors in Schmidt telescopes, and the potential improvements in photographic materials outlined by Millikan are therefore most welcome.

Auxiliary Instrumentation. Fibers may perhaps have a role, if it is desired to do slit spectroscopy with a Schmidt. But the competition with large telescopes will remain severe. The Fehrenbach double prism seems to be an interesting accessory for a Schmidt telescope. The reported 4 km/sec accuracy for radial velocity measurements would be more than adequate in many galactic structure applications. One may wonder if similar methods could be used at much fainter magnitudes for quasars and galaxies. The 2000 km/sec accuracy for galaxies with a simple prism reported by Clowes seems to be just a factor of four or so lower than what one would like.

Measuring and Processing. This seems to be the real bottleneck for many Schmidt users. The availability of fast measuring machines in the U.K. has led to a prodigious output of data. It was reported that such machines will also become available in France and at ESO. Image processing and the automatic analysis of images and spectra also are of much importance but one will have to keep track with great care of what it really is what one measures "automatically".

Archiving. During this decade, the sky surveys will certainly continue to be distributed on film and glass. From Grosbøl's projections, however, it is clear that the next decade may be different.

Intermediate Steps. Problems of calibration have been stressed by several authors. Gilmore noted the non-Gaussian distribution of errors which may lead to the erroneous discovery of "interesting" objects.

The photographically enhanced pictures made by Malin are most impressive. Most of us would believe that making use of a measuring machine + image processing or using a CCD detector, the same enhancement ought to be possible. However, the CCD pictures shown here still look very fade compared to Malin's. De Vaucouleurs discussed the limits of photographic photometry: accuracies of  $0^m02$  for stellar magnitudes and surface brightness measurements at the level of  $28^m$ /sq arc second seem to be possible, but are achieved by few.

The separation of the images of stars and galaxies is essential in much of the Schmidt work at faint magnitudes, and Tyson and others described how this may be done. Much checking will be needed to ascertain the full reliability of these methods.

Incompleteness. This has been discussed long ago by van Gent and others for variable star searches. Quasars show surprisingly large incompleteness on spectral plates, and from Kinman's discussion of emission line galaxies, the situation there seems to be still worse. A full understanding of the causes would be of much importance.

Turning now to the scientific results reported at the meeting, let me summarize these - without aiming at anything like completeness - under the following headings:

Stellar Spectra. The Michigan surveys produce much valuable material. After decades of dissatisfaction with the precision of the HD classification, it is good to see a reclassification on the MK system taking place. Also the searches for peculiar stars by Bidelman will generate finding lists for much work at large telescopes.

Variables. Much work was reported to be in progress at Asiago on supernovae by Rosino and on quasars by Barbieri. The latter work needs a long time base, and its continuation would seem to be of much importance. Of particular interest are the quasars with a relatively

bright level most of the time, interrupted by occasional sharp declines. The variable quasars studied by Hawkins suggest that most faint quasars are intrinsically also rather faint. The RR Lyrae found in the same programme will be important for galactic structure, especially so if more radial velocities become available.

Galactic Structure. The monumental work reported by Becker should give much information on the distribution of stars at intermediate latitudes. Ishida's results on the distribution of giants also contribute to outlining the distribution of visible matter. Bahcall, however, concluded that near the sun about half of the matter is "invisible". Kron outlined some of the important programmes for the future: searches for very low metal stars, the luminosity function of the galactic halo, and the finding of more low luminosity stars and degenerates.

Magellanic Clouds. While many surveys have been made, Westerlund indicated that much is still to be done in searching for variables, H $\alpha$  objects and dust clouds. E. and M. Kontizas reported initial studies on the shape and content of clusters; much follow up will be needed to lower magnitudes with CCDs at large telescopes.

Quasars. Numerous searches are under way with a variety of techniques.

Other Active Galaxies. Fairall reported on searches for Seyferts on the basis of the appearance of galaxies, while Kinman reported spectroscopic searches for emission line galaxies. Takase and his associates studied uv excess galaxies. The follow up with large telescopes is very necessary, and Kachikian showed examples of several Markarian objects being just parts of larger galaxies, H II regions being much in evidence.

Astrometry. Murray's report dealt with the determination of proper motions and average parallaxes on Schmidt plates. Rather good positions in the south seem to be coming along, while in the north the situation is less good owing to obsolete catalogues. Obviously, the astrometric situation is of much concern, in connection with the Space Telescope as discussed by Lasker, and also in connection with the Hipparcos astrometry satellite.

It seems, in fact, rather clear that at the moment in several ways the southern hemisphere is favoured: some Schmidt telescopes are located there under dark skies; the sky surveys are more recent and deeper. The result is evident at the present meeting where probably more than half of the newer work reported pertained to the southern hemisphere.