

BOOK REVIEW

The Study of Variable Stars Using Small Telescopes

John R. Percy, Editor, 1986, Cambridge University Press, 265 pages. ISBN 0 521 33300 8, cloth \$34.50.

This handsome, cleanly-printed volume contains the proceedings of the symposium of the same name held at the University of Toronto July 11 - 14, 1985, and co-sponsored by the RASC, AAVSO, and IAPPP. Like the symposium, this book is intended for a broad audience of professional and amateur astronomers as well as for teachers of astronomy. For this reader, whose experience lies almost entirely in visual observing, **The Study of Variable Stars Using Small Telescopes** has proved to be a deep source of education and inspiration. Readers will find in this volume valuable information at various technical levels.

The book opens with a review by John Percy and J. Donald Fernie of the variable star work being done at the host university's David Dunlap Observatory. The twenty-two papers and case studies, written by eminent pioneers and practitioners, are organized in seven sections.

For visual observers, Section I, Visual Observations, contains a valuable overview of visual variable star observing programs and the AAVSO by Director Janet Mattei, including a review of how AAVSO data are shared with the scientific community and relied on by many professional astronomers. E. R. Seaquist's paper on CH Cygni is an example of the fruits that the relationship between the AAVSO and the professional can bear. David Williams' paper on V1010 Ophiuchi demonstrates how high a degree of accuracy can be achieved by visual means.

Although photography is no longer the major mode of data acquisition, it remains a valuable research tool in many ways. In Section II, Photographic Observations, Emilia Belserene gives a detailed comparison of plate and CCD capabilities and outlines useful projects and strategies for astronomical educators. She allows that there are still variables waiting to be discovered photographically by small telescopes. The paper on RR Lyrae research from Las Campanas by Christine Clement and James Nemec is rich with photographically acquired data.

The number of pages devoted to photoelectric photometry in Section III, Photoelectric Observations, reflects its ascendancy in our decade. Two of its most able practitioners share their wealth of knowledge. Douglas Hall, founder of the IAPPP, recalls his beginnings in photometry and catalogues many valuable lessons learned and current projects underway. Edward Guinan and colleagues contribute procedures and a BASIC program which will insure professional quality data. The case studies of P Cygni and oscillating Ap stars are fine examples of carefully executed photometry.

The "Other Techniques" of Section IV includes the extension of photometry to the infrared region, only recently accessible to small telescope users. Robert Wing's major paper on Mira stars contains much basic information on infrared science and demonstrates that multi-wavelength photometry can yield spectroscopic information as well. Douglas Welch's paper has astonishing implications: by improving the accuracy of Cepheid light curves small telescope infrared photometrists can refine the cosmic distance scale! Robert Garrison outlines variable star research carried out with the 0.6m (24") telescope at Las Campanas, emphasizing how much valuable work may be accomplished with small telescopes because of greater availability. S. Jeffers and W. G. Weller exemplify this fact in a paper rich with data on a star which changes its spectral profile on a time scale of hours.

Section V on Coordination and Archiving of Data opens with a highly inspirational paper by Chris Sterken. Before describing and promoting long-term, coordinated, multi-site observing programs, he formulates the most eloquent definition of the amateur-professional astronomer relationship that I have ever read. In a nutshell he concludes that the major distinction is not between so-called amateurs and professionals, but between those who do trivial and non-trivial work. In the latter category are those who 1) have good scientific motivation for making specific observations, 2) make long strings of accurate data measurements, and 3) organize, coordinate, analyze, and publish the data. Bravo! A fine example of an internationally coordinated photometric campaign is reported by Percy and commented on by participant Christopher Stagg. Elizabeth Waagen's examination of the processing and archiving of AAVSO visual and photoelectric observations deserves high praise. She also discusses the general concept and implications of archiving data.

Section VI, Period Analysis, deals with the correct interpretation of variable star data. Editor Percy assures us that the concepts are simple, even if the math looks difficult. Alex Fullerton provides an overview of the main period search techniques: string length, phase binning, Fourier transform, periodogram, and least-squares methods. A basic tool of period analysis, the O-C diagram, is thoroughly expounded by L. A. Willson, and Emilia Belserene describes how the Fourier transform is performed in a FORTRAN program written for an IBM PC. These papers form a textbook of periodicity theory.

Section VII, New Directions, has a futuristic focus, centering largely on the development of automatic photoelectric telescopes (APT's) by David Skillman and Louis Boyd and the Fairborn Observatory APT by author Russell Genet. S. M. Rucinski deals with automated spectroscopy as well, leaving the reader wondering at the prospect that one automated, computerized, panoramic CCD detector might one day (one night) do the work of scores of visual observers, simultaneously monitoring every known variable in the entire celestial hemisphere.

The dominant theme which runs throughout the many excellent papers is certainly this: telescope size and site are secondary in importance to careful, accurate data acquisition techniques by coordinated observers using the best technology available to them. This conclusion is an encouraging one for the AAVSO. For the sake of balance, perhaps a bit more space could have been devoted to the half-thousand observers who do the bulk of the routine nightly data collection. This is a personal bias, perhaps, rather than a weakness in the book, which I have found to be a wonderful source of information and inspiration. I am confident that other serious observers will find **The Study of Variable Stars Using Small Telescopes** an important addition to their libraries.

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