PHOTOMETRIC SUPPORT FOR FUTURE ASTRONOMICAL RESEARCH

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The purpose of this paper is to describe I.A.P.P.P. and how that organization can provide photometric support for future astronomical research projects such as the 1982-1984 eclipse of epsilon Aurigae discussed at this Workshop.

I.A.P.P.P., the initials standing for International Amateur-Professional Photoelectric Photometry, is an organization founded in Fairborn, Ohio by the authors in 1980. Its purpose is to encourage contact between amateur and professional astronomers interested in photoelectric photometry, for their mutual benefit and for the benefit of astronomical research. Aspects dealt with include instrumentation, electronics, computer hardware and software, observing techniques, data reduction, and observing programs. Starting with the June 1980 issue, I.A.P.P.P. has published the quarterly I.A.P.P.P. Communications. The Communications contain articles dealing with all the above aspects of photoelectric photometry, although it does not publish observational results as such. Photoelectric photometry obtained by amateurs is published in the same journals which publish photometry obtained by professionals. Additional communication between amateurs and professionals continues via telephone conversations, correspondence, one- on-one visits, and symposia and workshops which are held in various parts of this country and in several other countries.

Originally it was envisaged that typically amateurs would work on photoelectric observing projects described by professionals in articles in the Communications. This has proven true, especially on projects which small telescopes in backyard observatories can do best: stars too bright for large telescopes, variables with periods too long for complete coverage during short observing runs at Kitt Peak or other national observatories, and projects where wide geographical distribution is an asset: ground-based support for scheduled pointings of satellites like I.U.E. and H.E.A.O., 24-hour coverage of complicated binaries like beta Lyrae, unpredicted transient events like Nova Cygni 1975, and asteroid occultations where tens of kilometers on the Earth's surface are important. Recently, however, a significant switch in roles has occurred. Amateur astronomers who are professionals in relevant fields such as electrical engineering have made contributions to photoelectric photometry which are so valuable that professional astronomers are learning from them. An excellent example of this is the automatic photoelectric telescope developed recently by Louis J. Boyd (Boyd, Genet, Hall 1984a) and discussed at the I.A.P.P.P. Symposium held in Phoenix prior to the 165th A.A.S. meeting in Tucson.

I.A.P.P.P. has in excess of 500 members in more than 40 countries in 6 of the 7 continents. They are divided roughly 50/50 between amateurs and professionals. The December 1984 issue of the Communications was the 18th published to date. Observing projects described in the Communications have included variable stars (eclipsing binaries, Be stars, Mira variables, RV Tau variables, RS CVn variables, symbiotic variables, Cepheids), times of minimum and maximum, tumbling asteroids, the Moon, comets, asteroid and lunar occultations, galaxy nuclei, atmospheric extinction, and light pollution. Amateur telescopes equipped for photoelectric photometry and responsible for published photometric data range in aperture from 4 inches to 24 inches. A regular feature in the Communications is a listing of papers co-authored by amateurs and presenting observational results of their photoelectric photometry. To date over 120 such papers have appeared in 15 different astronomical publications. Another measure of scientific productivity, although admittedly only one such measure, is the total of 34 new variable stars discovered as a result of photoelectric photometry by amateurs. All of them are quite bright (about 2/3 are in the Yale Bright Star Catalogue) and quite a few (such as HR 1099) are important stars now well known to many astronomers. The photometric periods range from as short as 1.07 days to as long as 140.8 days. The total light variation shown by one of these new variables was only 0.01 magnitude. Amateur astronomers can achieve photoelectric accuracy equal to that of professionals. One example is the light curve of HR 1063, a helium-rich B-type star with a total amplitude of only 0.02 magnitude in V, obtained by Howard J. Landis and Howard Louth. The rms deviation from a best fit curve (Landis, Louth, Hall 1985) was only ± 0.003 magnitude and any systematic difference between Landis and Louth was less than 0.001 magnitude, indicative of the best photoelectric photometry professionals are capable of achieving on a regular basis.

Subscriptions to the quarterly I.A.P.P.P. Communications, at present still $15.00 per year, can be obtained by contacting Assistant Editor Robert C. Reisenweber, Rolling Ridge Observatory, 3621 Ridge Parkway, Erie, Pennsylvania 16510.

This recent epsilon Aurigae campaign is a prime example of what I.A.P.P.P. can do. Dana Backman made the first contact with I.A.P.P.P. After consultation with Mirek Plavec and Brad Wood, the 1982-1984 epsilon Aurigae campaign was officially announced by Genet and Stencel (1981), with I.A.P.P.P. taking responsibility for the photometry. Actual coordination of photometry and compilation of results was taken over by Jeffrey L. Hopkins, who edited and distributed most of the Epsilon Aurigae Campaign Newsletters. It is significant that, whereas photometry of the 1955-1957 eclipse (Gyldenkerne 1970) included NO observations made by amateur astronomers, photometry of the 1982-1984 eclipse was provided PREDOMINANTLY by amateurs and the light curve would have gone virtually unobserved had the professional astronomical community been relied upon exclusively.

One of the contributed papers at this Workshop was a presentation of the UBV photometry made by the automatic photoelectric telescope of Louis J. Boyd in Phoenix, Arizona, a superlative example of what can be done by an active amateur working through I.A.P.P.P. in collaboration with other astronomers. It observed virtually continuously (except when epsilon Aurigae was blocked by the Sun) for more than one year, producing differential measures accurate to approximately ±0.01 magnitude. Although not included in any of the Epsilon Aurigae Campaign Newsletters, these measures have been published in two papers by Boyd, Genet, and Hall (1984b, 1985).

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