COMMISSION No. 27

VARIABLE STARS (ETOILES VARIABLES)

Report of Meetings: August 5,9, 1988

PRESIDENT: Bela Szeidl SECRETARY: John R. Percy

BUSINESS MEETING (August 5, 1988)

1. Dr. B.G. Marsden (Central Bureau for Astronomical Telegrams) reported on the problem of the designation of extra-galactic novae. The system presently used in the IAU Circulars is ambiguous. Dr. Marsden recommended interim designations of the form "Nova LMC 1988 #2" to indicate the second nova discovered in the LMC in 1988.
   A discussion followed, in which several comments were made: the system should be (i) conveniently applicable to galaxies such as M31, M33 and the galaxies in the Virgo cluster, in which many novae may be discovered (ii) open-ended, for use in the future (iii) flexible and (iv) acceptable to the editors of the IAU Circulars. The meeting agreed to accept Dr. Marsden's recommendation.
2. Dr. M. Breger, supervisor of the IAU Archives for Unpublished Photoelectric Observations of Variable Stars, described the current status of these archives. Copies of printed files are maintained at (and can be obtained writing to) the following institutions: Centre de Données Stellaires (CDS: Strasbourg, France), the Library of the Royal Astronomical Society (London, UK) and at the Odessa Astronomical Observatory (Odessa, USSR). Electronic files (if any) are maintained in Strasbourg. The supervisor commented that he prefers printed files. Copies of data files should be sent to: M. Breger, Universitätssternwarte, Türkenschanzstrasse 17, A-1180 Wien, Austria, along with a cover sheet (see IBVS 2853 (1986) for instructions). Lists of files are published regularly in IBVS (2853 (1986)), Astron. Tsirk (1517 (1987)), and Publ. Astron. Soc. Pacific (100, 751 (1988)). At present, 196 file numbers have been assigned (45 since 1984), and 180 files have been filled. These files are now cross-referenced in the bibliographic data bases of CDS. The supervisor thanked the institutions involved in the maintenance of the Archives for their help.
3. Dr. A.M. Cherepashchuk reported on the General Catalogue of Variable Stars, which is compiled at the Sternberg Astronomical Institute in the USSR. Until now, the GCVS has been compiled from hand-written records, of which the total number is now about 500,000 and is increasing by 20,000 per annum. Less than 1 per cent of the information in the records is actually included in the GCVS, and the compilers are seeking ways to improve this situation by converting the records to machine readable form. Each GCVS file will then consist of a series of descriptive keywords, parameters and comments. The compilers are aware of the need to proceed carefully at this stage of the planning, and they would be grateful to receive suggestions from users of the catalogue.
4. Dr. B. Szeidl, co-editor of the Information Bulletin on Variable Stars, reported on the publication and distribution of the IBVS. Approximately 500 bulletins have been published in the last three years, and these have been mailed to 350 institutional addresses and 200 private addresses. The number of addresses is constantly increasing. The costs involved are very great, and the editors are seeking ways of reducing them. Various solutions (and their drawbacks) were discussed: (i) cease sending copies to "private" addresses if the recipient's institution already received a copy (private copies are more convenient and therefore more thoroughly read) (ii) charge a subscription fee (for technical reasons, it is not possible for the editors to collect subscription fees directly, though it might be done indirectly -

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through the IAU secretariat, for instance) (iii) trim the mailing list periodically (this is already done) (iv) approach the IAU for financial support (the IAU would be unlikely to begin such a costly precedent) (v) keep IBVS issues to 4 pages or less, such as by using smaller print (the print is often too small already) (vi) reject papers which could or should be published in regular journals, or which are of insufficient quality (this could increase the time delay in publishing papers, and would certainly increase the work load of the editors - which is already great). Commission Vice-President M. Breger commented that the Commission should support the editors of the IBVS in finding solutions to the current problems. The Commission also affirms its gratitude to the editors for their excellent work.

5. Dr. J.A. Mattei, Director of the American Association of Variable Star Observers, discussed the current work and future plans of the association. There are 3,600 stars on the AAVSO visual program. In the past year, 260,000 observations were made by 550 observers - more than half from outside the USA - bringing the total number of observations to more than 6,000,000. All of those made since 1960 are edited and archived in machine-readable form. Earlier observations are now being computerized: this project is 60 per cent complete. The AAVSO receives about 150 requests for data each year: "real-time" information on the state of unpredictable stars, simultaneous optical observations of stars being observed at other wavelenghts, current optical data for correlating with other data, and archival data for analysis. A small fee is charged to cover the cost of compiling and sending the data. The AAVSO is presently engaged in several collaborative research projects, including one to provide improved predictions of Mira star magnitudes for the HIPPARCOS satellite input catalogue. The AAVSO is planning a meeting in 1990 in Belgium - its first outside North America - to which all variable star observers are cordially invited.
6. The following meetings have been proposed: some of them may be approved as IAU Symposia or Colloquia: in 1988: a workshop on "Astroseismology" in Vienna in December: in 1989: a meeting on "The Physics of Classical Novae" in Madrid in late June, a meeting on "Rotation and Angular Momentum Evolution of Low Mass Stars" in Catania, and a meeting on "Frontiers of Stellar Evolution" at the University of Texas, marking the 50th anniversary of McDonald Observatory: in 1990: a meeting on "Surface Inhomogeneities in Stars" in Armagh, a meeting on "The Magellanic Clouds" in Australia, a meeting as part of the "Los Alamos" series of meetings on stellar pulsation, possibly in Hungary, and the AAVSO meeting mentioned above.
7. The following slate of officers for Commission 27 was proposed and accepted: President: M. Breger, Vice-President: J.R. Percy, Organizing Committee: T.G. Barnes, J. Christensen-Dalsgaard, R.E. Gershberg, M. Jerzykiewicz, L.N. Mavridis, M. Rodono, M.A. Smith, B. Szeidl, A.M. van Genderen, and B. Warner. Several new members of the Commission were proposed prior to the General Assembly: these applicants were accepted. Further applications for membership will be considered by the officers of the Commission. The total membership is now approximately 350.
8. There was a brief discussion about whether Commission 27 should establish any Working Groups. A WG on Flare Stars existed in the past. M. Breger announced that he plans to publish an informal newsletter on Delta Scuti stars, to help to co-ordinate research in this field. Those interested in receiving such a newsletter should write to him at the address given above.
9. S. Dunlop (British Astronomical Association) raised the question of how significant research results based on visual observations (such as revised ephemerides of eclipsing binaries) could be published quickly. The IBVS does not publish results based on visual observations. No satisfactory solution to the question was proposed.

FIRST SCIENTIFIC SESSION (August 5, 1988)
Recent developments in variable star research
Chairmen: A.N. Cox and M. Breger

Eleven excellent talks were presented followed by discussions. The attendance is estimated to be 100 people with 70 people counted at one time. The program is listed below:

1. Effect of time-dependent convection on white dwarf radial pulsations
   A.N. Cox, S.G. Starrfield
2. High-overtone p-mode spectrum of the rapidly oscillating Ap star HR 1217
   D.W. Kurtz, J.M. Matthews, P. Martinez, J. Seeman, M.S. Cropper, C. Clemens, T.J. Kreidl, C. Sterken, H. Schneider, W.W. Weiss, S. Kawaler, S.O. Kepler, A. van der Peet, D. Sullivan, H.J. Wood
3. Multiple Close Frequencies of the δ Scuti Star Θ^2 Tau
   M. Breger, R. Garrido, L. Huang, S.-y. Jiang, Z.-h. Guo, M. Frueh, M. Paparo
4. Photometry of δ Scuti stars
   E. Antonello, E. Poretti
5. Short-Period Variability in Be stars
   L. Balona, J. Cuypers, J. Egan
6. High-galactic latitude F supergiants
   M. Parthasarathy
7. Variability of Herbig Ae shell stars HR 5999 and HD 163296
   D. Baade, O. Stahl
8. Observing the Function P(t)
   E.P. Belserene
9. A Period-Luminosity Relation for Anomalous Cepheids
   J.N. Nemec, A. Wehlau, C. Mendes de Oliveira
10. The RR Lyrae variables in ω Centauri
    R.J. Dickens
11. The Nature of Old Stars in the LMC
    S.M. Hughes, P.R. Wood, N. Reid

SECOND SCIENTIFIC SESSION (August 9, 1988)
Jointly with Commission 30
The Baade-Wesselink method - recent achievements and future goals
Chairman: G. Burki

In the past 12 years, the Baade-Wesselink (BW) method was revised by many authors, mainly because the recent instrumental improvements allow to obtain simultaneous high quality data in both, radial velocity and photometry.

The surface brightness technique and the future improvements have been reviewed by T.G. Barnes III and T.J. Moffett. The main advantage of this formulation, which makes use of the useful relation between V-R and the visual surface brightness (Barnes-Evans relation), is the possibility to derive the distance to the star in addition to the mean stellar radius. B.W. Carney on the one hand, and T. Lin and K. Janes on the other hand, have presented their results obtained by applying the surface brightness technique to RR Lyrae stars. They use the theoretical model atmospheres of Kurucz to derive metallicity dependent surface brightness vs. color index relations.

J.A. Fernley, A.E. Lynas-Gray, I.S. Skillen, R.F. Jameson and A.J. Longmore have applied the Infrared Flux method to determine the radius and effective temperature of the RR Lyrae star X Ari. This method is capable of estimating angular radii with an accuracy comparable to the interferometry measurements. The estimated realistic (not internal) error is +/- 7% for the radius of X Ari.

D.D. Sasselov, J.B. Lester and M.S. Fieldus have studied the velocity structure in cepheid atmospheres from infrared spectroscopy. The radial velocity curves for X Sgr and η Aql have larger amplitudes and are phase shifted with respect to the optical radial velocity curves. Of course, this fact must have an effect on the BW radii.

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G. Burki, A. Arelano Ferro, L. Balona, T.G. Barnes III, C. Cacciari, S.L. Hawley, M. Imbert, T.G. Moffett and D. Sasselov have compared the results obtained by various BW programs analysing exactly the same data in photometry and radial velocity. The star chosen is W Sgr with data in radial velocity (CORAVEL) and Geneva photometry by Babel et al. (1988) and in UBVRI photometry by Moffett and Barnes (1980). The programs given similar results (at the 10% level) when the same magnitude and color index are used (ex: V and B-V, or V and B_2-V_1). On the contrary, there are systematic differences between the results obtained by using "red" magnitudes and indexes (ex: V and V-I, or G and B_2-G), which give R=65 $R_\odot$, and the results obtained by using V and B-V, for which R=$55_\odot$.

N. Simon has presented his inversion of BW technique. It is based on the fact that, while we are still not capable of selecting phases of equal surface brightness, modern observational techniques provide the means for determining, with high accuracy, phases of equal radius. According to Simon, given highly accurate data and extensive coverage of the cycle, the BW inversion technique can determine radii with only a few per cent of uncertainties.

The application of the BW method to the supernovae was revised by D. Branch. This method only applies to the early phases of supernova's evolution, when it is optically thick and has a photosphere. A distance is derived by matching a distance-independent photometric angular radius of the photosphere to a distance-dependent spectroscopic angular radius. SN 1987 A is a particularly interesting object in this context, and a distance of 55 +/- 5 kpc was derived. This result gives weight to a supernova-based extragalactic distance scale H $\cong$ 60 kms^{-1} Mpc^{-1}.

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