

COMMISSION 27: VARIABLE STARS (ETOILES VARIABLES)

Report of Meetings: November 20, 21 and 26, 1985

PRESIDENT: Norman H. Baker

SECRETARY: John R. Percy

November 20, 1985

SESSION ON FLARE STARS

- C.J. Butler: "Coordinated EXOSAT and Optical Observations of Flare Stars and Coronal Heating". By considering the relation between X-ray, U-band and total luminosity, and by studying the time variability of each, the author reached the conclusion that the coronae of flaring stars may represent the superposition of large numbers of microflares.
- R. Stern: "Thermal X-ray Emission in Solar and Stellar Flares". Observations were described which were relevant to the question of the sequence of events which occur in solar and stellar flares, starting with the still-poorly-understood initial flare event. The main difference between solar and stellar flares is the large volumes occupied by the emitting material in the latter case. Hyades dwarfs have thermal X-ray temperatures similar to that of the flaring sun.
- D. Gibson: "EXOSAT Observations of YY Gem". The advantage of observing the flare stars in this system is that they form an eclipsing system; the disadvantage is that the emission cannot be separated from any from the A-type components. An eclipse of the flaring region shows that this is very small. Slow, low-level variations were also observed.
- L.N. Mirzoyan and E.S. Parsamyan: "Flare Stars in Star Clusters and Associations". The following aspects were discussed: mean flare frequency in clusters, occurrence of classical flare star activity in T Tauri stars, change of average luminosity of flare stars as a function of age of cluster, and the classification of flare types.
- M. Tsvetkov, H. Duerbeck and W. Seitter: "A Search for Flare Stars with the GPO Astrograph at La Silla - ESO". Multiple exposures on 2°×2° plates taken with this astrograph have been used to discover flare stars. The results were compared with those using other instruments.
- L.N. Mavridis and S. Avgoloupis: "The Activity Cycle of EV Lac" (read by N. Baker). From a long and homogeneous data set, the authors have discovered an interesting cycle in the mean quiescent luminosity and in the flare rate in this star. The cycle length was about five years.
- P. Feldman: "Radio Emission from FK Comae Stars". FK Comae stars are single stars of G-K III type which show high rotation and high levels of activity. High-luminosity radio flares have been detected in two of these stars, but optical observations suggest that both are binary stars, and therefore not FK Comae stars.

This session was organized by L. Mavridis. About 50 people attended.

BUSINESS MEETING

The Commission president, N.H. Baker, introduced members of the Organizing Committee, and outlined the agenda for the meeting.

1. J.R. Percy reported that, thanks to a resolution of the 1982 IAU General Assembly, and to a financial contribution by the IAU, the American Association of Variable Star Observers (AAVSO) had been able to obtain additional funds, and to begin publication of their archival data in the form of monographs on individual stars.

2. M. Breger reported on the IAU Archives of Unpublished Observations of Variable Stars. The archives serve as a depository for files of observations, thus ensuring that the observations will be available at any future time. Contributors should send three copies of the observations, with a descriptive cover sheet, to the coordinator (M. Breger), who assigns a file number. The copies are then deposited at the Royal Astronomical Society (England), Centre de Données Stellaires (France) and the Odessa Astronomical Observatory (USSR). Copies of the files may be obtained by writing to one of these institutions. A list of new files is published regularly in the IBVS and the Publications of the Astronomical Society of the Pacific. Files were received at an average rate of 16 per year from 1980-1985, with 25 being received in the most recent year. A total of 156 files has been received to date. Approximately 20 requests for copies are received each year.

The coordinator recommended that each file should contain observations of only one star, unless several stars have been described in a single publication. In these cases, observations of all stars can be included in a single file. Reference to the publication should be included on the cover sheet. This recommendation was accepted.

There was some discussion of the possibility of depositing observations on magnetic tape or diskette, but it was decided that a paper copy would be more permanent, and less likely to become technologically obsolescent!

3. N.H. Baker reported on a meeting on November 19 on the topic of the designation of astronomical objects. The situation in the field of variable stars is much better than in most other fields! Commission 5 is working on the problem, and it was recommended that Commission 27 should maintain an interest in this work. In variable star work, authors are urged to use multiple designations where possible.

4. B. Szeidl (editor) reported on the Information Bulletin on Variable Stars. A total of 2814 issues have been published since the birth of the IBVS 24 years ago; 600 have been published since 1982; the number per year continues to increase. Papers are not formally refereed, though about 1/3 are refused for one reason or another. This results in variable scientific quality, but quick "turn-around" time (3-5 weeks). The IBVS is not intended for detailed discussions, or for papers not requiring urgent publication (the latter guideline is not always adhered to). The IBVS does not accept papers based on visual observations. The IBVS is currently sent to 350 institutions and 200 individuals.

5. N. Baker reported on the current status of the General Catalogue of Variable Stars; see also IAU IB #54. The second volume of the current edition (Cyg-Ori) has just been published. Members of Commission 27 receive copies free of charge.

6. N. Baker reported on membership in Commission 27. The IAU Secretariat, in order to "clean" their membership files, has written to members to confirm their commission membership. There are presently 250 members of Commission 27. A list

of possible new members was read and approved.

7. The following symposia and colloquia are planned:

"Advances in Helio- and Astro-seismology", July 7-11, 1986 in Aarhus, Denmark, approved as IAU Symposium 123 by the IAU Executive Committee.

"Circumstellar Material in Close Binaries", summer 1987 in Victoria, Canada. Cosponsored by Commission 42. Commission 27 agreed to cosponsor this meeting.*

"Atmospheric Phenomena as Manifestation of Internal Evolution of Stars", August 1987 in Tokyo, Japan. Cosponsored by several other commissions. Commission 27 agreed to cosponsor this meeting.

"Solar and Stellar Flares", in 1988 in Palo Alto, USA, and "Flare Stars in Stellar Clusters and Associations and in the Solar Neighbourhood" in 1988 at the Byurakan Observatory, USSR (in honour of the 80th birthday of V. Ambartsumyan). It was noted that, although both of these meetings are scientifically useful, there is overlap of content and conflict of schedule. It was agreed that the president and vice-president of Commission 27 should discuss these concerns with the organizers. Some problems were encountered in obtaining visas for a previous USSR meeting; this matter was referred to the IAU Executive Committee.

8. N. Baker proposed that the 1985-1988 Organizing Committee be the same as in 1982-1985, except that M.A. Smith be added. M. Breger becomes vice-president and B. Szeidl becomes president. This proposal was approved. The Organizing Committee therefore consists of A.N. Cox, R.E. Gershberg, M. Jerzykiewicz, L.N. Mavridis, L.N. Mirzoyan, J.R. Percy, M.A. Smith, A.M. van Genderen and B. Warner.

9. There was some discussion about the possible revival of the Working Group on Flare Stars. There is a need for cooperation and coordination of observations, especially between satellites and ground-based facilities. This matter was referred to the following session on Coordinated Multisite Observations.

SCIENTIFIC SESSION

The following two papers were presented:

A.N. Cox: "The Puzzling B Star Pulsations". The author reviewed the persistent problem of what is the pulsation mechanism in B stars, and proposed a new theory based on nuclear driving. In the presence of a molecular weight gradient (caused by the shrinking convective core), this mechanism may be capable of driving pulsations in a low-order ($\ell=1$) g mode.

H. Deasy: "Mass Loss from Cepheids". The author has used the IRAS catalogue to search for IR excesses in Cepheids and nonvariable yellow supergiants. Long-period Cepheids have such excesses, which are attributed to mass loss. The mass loss does not seem to be sufficient to explain all of the Cepheid mass discrepancy.

*Not yet approved by IAU Executive Committee.

SESSION ON COORDINATED MULTISITE OBSERVATIONS

The following report was prepared by the Secretary for publication in the XIX IAU GA Newspaper Mandakini:

"The potential value of observations from two or more sites, using different techniques or frequencies, is well known. It was noted at Joint Discussion II, for example, that thanks to a coordinated "campaign", the recent eclipse of Epsilon Aurigae was studied in unprecedented detail. Furthermore, the availability of measurements from the radio to the X-ray region has made it possible to construct greatly improved models of this and related objects. At Joint Discussion III, several speakers noted that coordinated observations from different longitudes are absolutely essential in determining accurate and reliable pulsation periods in the Sun and other stars -- particularly Delta Scuti and Be stars. The International Halley Watch is perhaps the most ambitious example of coordinated multi-site observations.

C. Sterken and J. Christensen-Dalsgaard have recently proposed that a new IAU Commission (or more likely, a working group) should be established to assist in organizing such coordinated observations. On 21 November, Commissions 12 and 27 cosponsored an informal discussion of this proposal. Several advantages were pointed out. A working group might publish a newsletter containing information on the success (or failure) of coordinated campaigns. It could circulate a list of astronomers and observatories which would be interested in and available for campaigns (many "local" observatories have far more flexibility in scheduling than do the "national" ones). It might even be possible to set up a quasi-permanent network of observatories, somewhat analogous to the *ad-hoc* VLBI network in the USA. It might devise ways to simplify the simultaneous submission of complex proposals to several ground-based or space-based observatories. At the very least, the working group could keep the astronomical community aware of the problems (and solutions) in making multi-site observations, and could encourage and assist observers to do better planning. It was realized that the success of a working group depends on having some enthusiastic and active organizers, and that a formal administrative structure can sometimes do more harm than good.

In the end, no consensus was reached about what to do, and no decisions were taken. Nevertheless, the discussion was useful in that it demonstrated the great interest in and variety of opinions about the topic. Sterken and Christensen-Dalsgaard plan to organize a workshop on 'Coordinated Multi-site Observations' in 1987, somewhere in Europe, and would be happy to hear from prospective participants."

November 26, 1985

SESSION ON T TAURI STARS

- I. Appenzeller: "High Resolution Spectroscopy of T Tauri Stars". Spectra of S CrA and VV CrA, obtained at a resolution of 20,000 and a S/N of 25 to 50, were described. They showed interesting profile shapes and variability in emission lines; absorption lines of several elements (e.g. Li) were detected. This work is in press (AA Suppl.)

V. Pirronello: "Ice Stability during Eruptive Phases in T Tauri Stars". Ice grains may be expected in T Tauri envelopes, and have been observed in HL Tau (by Cohen). This paper described calculations and experiments relevant to the destruction of grains by sublimation and sputtering during FU Ori-type outbursts. The surfaces of comet nuclei may show evidence for radiation chemistry reactions which occurred during these outbursts.

A.L. Gyulbudaghian: "Trapezium-Like Tight Systems Containing Red Dwarf Stars" (read by N. Baker). Observations of Trapezium-like systems of typical dimensions 0.1 pc were described. Since these are dynamically unstable, they must be young. Both systems containing OB stars and systems containing red dwarf stars were investigated.

This session was organized by M. Cohen. About 35 people attended.