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Be STAR NEWSLETTER

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At the Montreal General Assembly of the IAU, Commission 29 re-formed the Working Group on Be stars. The W.G. is formed by the following astronomers :

Mercedes Jaschek (chairman)
A.-M. Delplace (France)
A. Feinstein (Argentina)
P. Harmanec (Czechoslovakia)
L. Houziaux (Belgium)
A. Slettebak (USA)
A. Underhill (USA)

which constitute the Organizing Committee.

The W.G. held its first meeting (administrative and scientific) at Montreal, on August 21. It was decided to publish a "Be star newsletter", to appear twice a year. The Newsletter will be edited by M. Jaschek at Strasbourg and the present one is no. 1. It was also agreed that the first issue should contain a summary of the papers presented at the Montreal scientific meeting.

Membership. Anybody interested in Be stars (spectroscopy, photometry, infrared, UV, polarisation, X-rays, radio, models, etc.) can ask for this Newsletter, writing to the address given on the cover page.

A provisional list of interested colleagues was set up at Montreal and is given at the end. Please advice for involuntary omissions.

Contributions. This Newsletter can subsist only through the contribution of everybody; matters which can be included are :

- a) abstracts of papers to be published
- b) progress reports
- c) ideas for further work
- d) bibliographic references (see below) and observational campaigns (see below).

Contribution should be short and arrive before July 1st and January 1st.

Bibliography. Our colleague P. Harmanec proposed ...

..."I suggest to organize "Bibliographical Notes on Be Stars" on the lines of "Bibliographical Notes of Commission 42". I am aware of the fact that western astronomers have at their disposal your computerized bibliography but such notes could contain also reports on current programs at different observatories and so on. My personal experience is that the notes of Com. 42 are extremely helpful. In practice, such notes could be issued as an Appendix of the Circular Letters of W.G.. If the idea would be accepted, we are prepared to help practically by collecting and preliminary editing the contributions from Central and East Europe."

I have answered Dr. Harmanec that I will certainly follow his advice and that I hope to start the bibliographic notes with the next issue. Volunteers to cover the bibliography of western Europe, US and Latin America would be extremely welcome.

The bibliography alluded by Dr. Harmanec is the "Bibliographic Star Index" published by the Centre de Données Stellaires at Strasbourg which covers for each star the bibliography from 1950 on. Microfiches are available (see CDS Bulletins for further details).

International Photometric Observing Campaign. Dr. Harmanec proposed

..."we believe that a large international project of observations of a defined group of Be stars should be seriously taken into consideration. Our proposal for such a project is the following :

1. All Be stars from the Bright Star Catalogue (including recent discoveries) should be observed for at least ten years. This group represents about 100 objects.
2. Objects should be reasonably divided among various observers interested in the project, taking into account geographical coordinates, etc.. Each star should be observed at least at two observatories distant in local time. Provided some ten to twenty observatories would participate the number of objects per one observatory would be quite manageable.
3. A "conditio sine qua non" is that only few well-defined photometric systems should be used and that all the data would have to be reduced carefully to these systems. Many pieces of information have been lost already, only because valuable photometric data were not reduced to some defined system. At the age of computers, such a reduction cannot represent any serious obstacle. Equally important would be to define (after some experience) a set of comparison stars which would be then obligatory for each programme star.
4. Observers with the best atmospheric conditions and with the most accurate photometers should specialize themselves on search for rapid variations.
5. Rapid circulation of preprints and other pieces of information among participants should be ensured."

I answered Dr. Harmanec that since I am no photometrist, the answers concerning this point should be addressed to Dr. Harmanec.

Future Work. A very interesting proposal came from Dr. A. Underhill, who wrote

..."It seems to me that it would be helpful to review and coordinate the evidence on what causes the Be phenomenon. Since the Be stars are a very inhomogeneous group, it might be necessary to draw up a scheme listing a few different possible causes of the Be phenomenon and then see which stars have the proper properties to support one or another of the postulated possible causes of line emission. To isolate causes of a phenomenon, even in a preliminary way, of course, requires careful thought about the physics of the situation and about what spectroscopic details give information of a particular kind."

This seems to be a good idea and I am looking forward for comments.

Strasbourg Meeting. A meeting on "Be stars" was held at Strasbourg in May 4, 1979. The Proceedings (in French) are available from the Observatory, for individual astronomers at the price of 40 French Francs.

Symposium on Be Stars. The idea of having a meeting on Be stars was discussed and approved at Montreal. Prof. Groth, on behalf of the Munich Observatory (GFR) proposed Munich as the meeting place and the date March-April 1981 was retained. The chairman of the W.G. was put in charge of further steps to organize the meeting. Com. 29 has agreed to sponsor the Symposium with Com. 45 co-sponsoring it. The following Scientific Organizing Committee was proposed :

Mercedes Jaschek (chairman), Bonsack, Delplace, Feinstein, Groth, Harmanec, Houziaux, Luud, Slettebak, and Underhill.

The next Newsletter shall provide more details on the meeting.

Scientific Contribution. The summaries of Delplace et al., Feinstein and Marraco, Percy et al., and Beeckmans and Delplace are reports of communications given at Montreal. No summary was received of the communication by G.J. Peters on "Mass transfer in HR 2142".

STATISTICS ON THE PROPERTIES OF Be STARS

A.M. Hubert-Delplace*, M. Jaschek[†], C. Jaschek[†], and H. Hubert*

*Observatoire de Paris-Meudon

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Summary

A statistical study of the variability of the emission lines has been investigated for the 140 B0-A0 emission line stars ($V < 7$) contained in "A Photographic Atlas of Be Stars" (A.M. Hubert-Delplace, H. Hubert, 1979). The observations at the 120cm telescope of the Haute-Provence Observatory have been spaced out over 23 years.

All these stars have been classified by Dr. M. Jaschek in the MK system. When data are available, a good agreement is found between the Barbier-Chalonge-Divan classification and the MK classification. The distribution of the stars of the sample by spectral type confirms the conclusions drawn by Merrill and Burwell, and Henize; a maximum of frequency is found around B2. The distribution of luminosity class indicates that there are more stars out of the main sequence among the later types than for the earlier types.

The variability of the emission features is much more important for the early Be stars than for the late Be stars. The time scale of the changes of the types $B \rightarrow Be \rightarrow B$ or $Be \rightarrow B \rightarrow Be$ is shorter for early Be stars than for later Be stars. The variability of the emission is the most often accompanied by temporary shell components.

Fe II emission lines are always observed in early Be stars when H emission lines are strong. Strong emission lines go with a continuum polarization effect, an IR excess, UBV abnormal colours and an UV flux deficiency.

More details are given by C. Jaschek et al. in *Astronomy and Astrophysics*, in press.

PHOTOMETRIC BEHAVIOR OF Be STARS

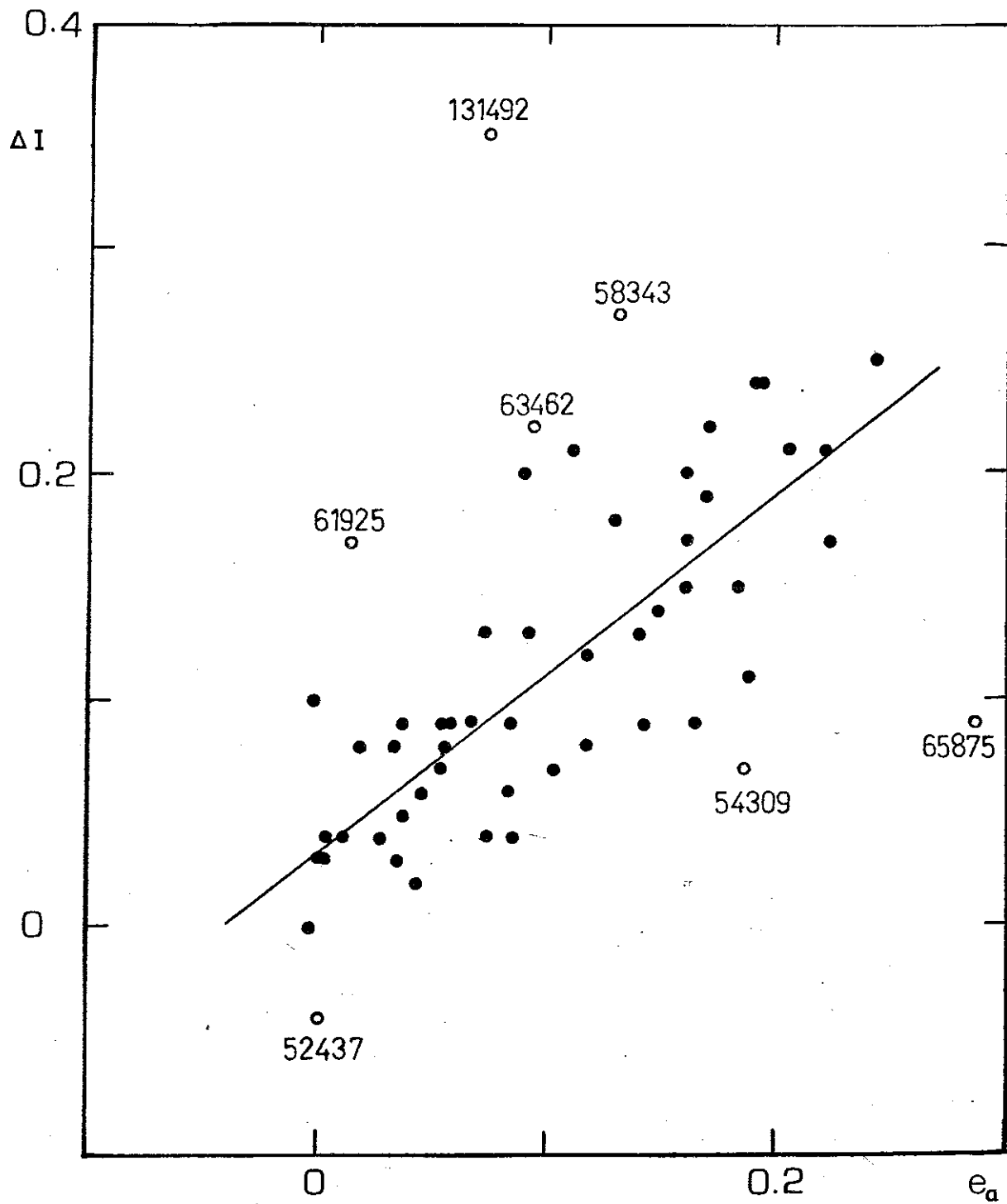
A. Feinstein and H.G. Marraco

Observatorio Astronomico,
Universidad Nacional de La Plata

During about 15 years we had obtained photometric data in the UBV system of 76 southern bright Be stars. Also we measured with interference filters the Balmer lines $H\alpha$, $H\beta$, and $H\gamma$. Nearly all them are above the main sequence in the (U-B, B-V) diagram, which is due to the ultraviolet excess. The amount of this excess is obtained from the Q value computed from the observed color minus the Q value derived from the spectral type. This ultraviolet excess appears as a common feature for nearly all Be stars.

The amounts of emission in the α and β indices, which we called e_α and e_β , are computed. It is demonstrated that both emission indices are well correlated to the spectroscopic emission features, their equivalent widths, and may be also to the ultraviolet excess. The correlation of the standard deviation of the observed V magnitudes with the projected rotational velocity is in agreement with a model where the Balmer line emission is due to a gaseous ring structure. The observed β values corrected from the emission indices become good indicators of the absolute magnitudes, as is confirmed through a sample of Be stars known to be members of clusters and associations.

On the other hand, RI photometry in the Johnson system of the same stars were also measured, in a (B-V, V-I) diagram, most of them lie to the right of the main sequence, which implies a near-infrared excess in their energy distributions. The excess in V-I is computed through the standard main sequence relation and with the observed B-V color adopted as intrinsic. This excess, ΔI , which indicates the presence of continuum infrared excess, is well correlated with the emission index e_α , defined as the emission strength of the $H\alpha$ line. No correlation is presented between the ultraviolet excess defined by the Q's and the infrared excess.



The ΔI versus e_α plot for the Be stars. The dots correspond to the Be stars employed in the computation of the solid line. Those points indicated by open circles (with HD numbers) were not employed, and also the stars HD 45677, 89890, 120307, and 120991, which are not plotted in the diagram as they are too far.

SHORT-PERIOD LIGHT VARIATIONS IN Be STARS

J.R. Percy, S.M. Jakate, and J.M. Matthews

Department of Astronomy
University of Toronto

Be stars are known to vary in brightness on a time scale of months or years, and in a few cases (V923 Aql, EW Lac) on a time scale of a day or less. Our studies of Be stars are part of a survey of short-period light variations in all the early B stars within 500 pc of the sun. We have so far observed about a dozen Be stars, and have found short-period light variations (0.02^m to 0.1^m) in almost all of them. Some of the observations are already reported in Astron. J. 82, 353 (1977) and IAU-IBVS no. 1530 (1979); others will be reported in a forthcoming paper.

Although the amplitude of the variations may vary with time, in some stars there is a persistent quasi-periodicity, ranging from 0.25^d in 25 Cyg and HR 9070, through 0.5^d in λ Eri and 28 Cyg, to 0.8^d in V923 Aql and EW Lac. We have not yet demonstrated strict periodicity in any of these stars. We have only limited information on short-period colour variations in these stars, but in most cases $\Delta(B-V)/\Delta V$ seems to be small. Our observations of these and other Be stars are continuing.

It would be premature to speculate about the cause of the variations, but the range of quasi-periods (0.25^d to 0.8^d) seems to rule out pulsation or rotation as the sole mechanism. There may be some connection between these variations and the non-radial pulsations which M.A. Smith has found in many B stars; the range of periods is quite similar.

SPECTROPHOTOMETRIC STUDY OF Be AND SHELL STARS
WITH THE TD-1 S2/68 EXPERIMENT

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European Space Agency, Noordwijk
and

A.M. Hubert-Delplace
Observatoire de Paris-Meudon

Summary

It is shown, by using the low resolution S2/68 observations, that the Be stars of spectral type B0 to B5 statistically have a deficiency of UV radiation (at 2100 \AA) as compared to the visible with respect to the normal stars of same spectral type. The size of the flux deficiency is correlated to the intensity of the visible emission lines and to the presence and the strength of a shell. The visible spectroscopic data are taken from "A photographic Atlas of Be stars" (A.M. Hubert-Delplace and H. Hubert, 1979).

The interstellar reddening is corrected using a relation established for normal B stars, between the depth of the 2200 \AA absorption bump and the interstellar colour excess $E(m_{2100}^i - v)$; a mean interstellar law is adopted for deriving the interstellar reddening of the Be stars from the 2200 \AA absorption (a discussion of a comparison criteria for Be and B stars and of different methods used to obtain the interstellar reddening for these stars is given by F. Beeckmans and A.M. Hubert, *Astronomy and Astrophysics*, in press).

It is not excluded that the flux deficiency of Be and shell stars is caused by circumstellar absorption which does not follow the mean interstellar law. The origin of the flux deficiency for the shell stars could be attributed to the hydrogen bound-free absorption in the shell.

REPORT ON THE ACTIVITY OF THE ASTRONOMICAL OBSERVATORY
OF MILANO-MERATE, ITALY

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Osservatorio Astronomico di Milano-Merate

1) - Spectrographic survey of α And.

A paper containing the results of the observations from 1976 to 1979 has been concluded. High dispersion spectrograms have confirmed the long term periodicity curve of the radial velocities found by Fracassini et al. (1977, 1980). The survey is going on.

2) - Theoretical model of α And.

On the ground of the observational results and the recent literature about the close binary stars, we are studying a theoretical model.

3) - Statistical researches on the radial velocities of Be stars.

On the ground of the results obtained for α And (Fracassini and Pasinetti, 1975; Fracassini et al., 1977) statistics of the radial velocity long term periodicity, for several Be stars, have been started.

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CORRELATIONS BETWEEN LINE PROFILE-AND PHOTOMETRIC
VARIATIONS IN THE B2 IV [e] STAR HD 45677

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Abstract

The results deduced from two sets of homogeneous simultaneous photometric and spectroscopic observations of HD 45677 in 1977 (6 nights of UBV data; 38 spectra) and in 1979 (7 nights of uvby data; 30 spectra) in a search for correlated variations are described. It appears that photometric data and some spectral features are well correlated (or anticorrelated) at certain epochs but not at all at others. Because of these conflicting results, no explanation of the behavior of the extended complex atmosphere surrounding this peculiar object can be proposed.

Provisional list

Acker A.
Andrillat Y.
Ballereau D.
Beeckmans F.
Bergeat D.
Bidelman W.P.
Bolton C.T.
Briot D.
Burton W.M.
Butler H.E.
Conti P.S.
Cowley A.P.
Coyne G.V.
Cucchiaro A.
Dachs J.
Delplace A.M.
Divan L.
Doazan V.
Dubois P.
Egret D.
Faraggiana A.
Feinstein A.
Florsch A.
Fracassini M.
Garnier R.
Garrison R.F.
Gerbaldi N.
Gorbatskij V.G.
Golay M.
Goy G.
Granes P.
Groth H.G.
Gulliver A.F.
Hack M.
Hauck B.
Haupt W.
Havlen R.J.
Heap S.R.
Heinrich H.F.
Henize K.J.

Herman R.
Hubert H.
Hummer D.J.
Hutchings J.B.
Jaschek M.
Jaschek C.
Janot-Pacheco E.
Jugaku J.
Klutz M.
Kriz S.
Leibovitz E.
Lesh J.
Lopez-Arroyo M.
Luud L.S.
Llorente de Andres F.
McConnell J.
McLean D.J.
Maitzen D.D.
Mantegazza L.
Marlborough J.M.
Martel M.T.
Merlin Ph.
Morgan T.H.
Morguleff N.
Pasinetti L.
Percy J.R.
Peters G.J.
Plavec M.
Poeckert R.
Polidan R.S.
Sanduleak N.
Schild R.
Schmidt-Kaler T.
Slettebak A.
Snijders T.
Swings J.P.
Thomas R.N.
Underhill A.
Wellmann P.