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The Be Star Newsletter is open to all contributions related to matters concerning Be stars. Please send manuscripts and all correspondence to the editor's address given on the front page. In the case of very urgent late contributions directly contact the technical editor via one of the fast links listed below. The Newsletter is distributed free of charge to all astronomical institutions which request it. If you wish that the Newsletter is also received at your institute, write to the technical editor:

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Normally only one copy per institute will be mailed. By default, it will be sent to the institute's library; please name a contact person if this is not desirable.

Acknowledgements: The Be Star Newsletter is produced at and financially supported by ESO and the ST-ECF. Britt Sjöberg and Harry Neumann are thanked for their active help in administrative and technical matters.

E D I T O R I A L

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As promised in the last issue, we have prepared this special edition of the *Be Star Newsletter* just prior to the 20th IAU General Assembly, which will be held in Baltimore, Maryland, USA from August 2 - 11. Included are up-to-date information on our meeting of the Working Group on Be Stars and the usual Contributions, What's Active/Inactive?, Observations....Theoretical Support Wanted/Available, Preprints Received, and Bibliography. I extend my thanks all the researchers who contributed to this issue and am especially indebted to those who helped with bibliography. Please let me know if a recent paper of your's is not listed (or cited incorrectly), and I will correct the oversight in the next issue. I appreciate your continued comments on the *Newsletter* and encourage you to personally discuss its future direction with me in Baltimore.

The Working Group on Be Stars will hold its business/scientific meeting during the IAU General Assembly on Saturday morning, August 6 in Room 107 at the Baltimore Convention Center. The scientific program "Empirical Correlations between Observational Quantities in Be Stars" promises to be an interesting one in which some of the newest revelations about the envelopes and activity in Be stars will be presented for discussion and interpretation. Additional details, including a list of the scheduled talks, are given in this issue of the *Newsletter*. Immediately after the IAU General Assembly there will be two other meetings during which there will be at least *some* discussion on Be stars: 1) IAU Colloquium No. 107 on "Algols", which will be held near Victoria, B.C., Canada, and 2) a "Workshop on Organized, Patterned, Time-Dependent Stellar Mass Outflow" at the Space Telescope Science Institute. In addition, we call your attention to a meeting on "Recent Developments in Variable Star Research" (August 5) and IAU Colloquium No. 113 on the "Physics of Luminous Blue Variables" (August 15 - 18). Information on these meetings can be found toward the end of this issue.

We will make a decision on the publication schedule for the next few issues of the *Be Star Newsletter* during the meeting of the Working Group. However, since it is my current plan to publish the minutes of the meeting and hopefully summaries of all the invited talks in the next issue, I will make the tentative suggestion that material for Issue No. 19 should be received by:

October 1, 1988

I hope to see all of you in Baltimore and perhaps in Victoria at the Algol conference afterwards.

I thank the Space Telescope - European Coordinating Facility and the European Southern Observatory for their continued financial support.

Gerrie Peters, Editor

WORKING GROUP MATTERS

* * * * *

This special issue of the Newsletter has been scheduled to tune you for the Working Group meeting in Baltimore. The time allocated for the meeting is the full morning, i.e. **Sessions 1 and 2**, of **Saturday, August 6th**. As far as I am informed, we shall gather somewhere in the **Baltimore Convention Center** where also most of the other scientific events of the XXth General Assembly will take place. Unfortunately, I still do not know the room number, but I hope that I can a place a note with this information on the notice boards of Commissions 29 and 45 and perhaps also in the daily newspaper *IAU Today*. Please keep in mind that last-minute changes may occur.

Tradition seems to require that we begin the meeting with a bussiness session. But it is intended to keep this part of the meeting as short as possible. In fact, progress reports on observing campaigns, etc. will, I hope, already have a strong scientific flavour. On the other hand, the support that these and other activities seem to have received from the community apparently has lost part of its initial enthustiastic momentum. We should probably discuss if this symptom gives rise to general worry. It is perhaps not a bad idea if for such a discussion you have your personal views at hand what the concrete goals of a working group Be stars should be and how they can be achieved.

Let me continue with the agenda for the scientific part of the meeting. The intention behind this program has been described already in the last issue of the Newsletter. But I do want to repeat that a large fraction of the total time has been set side for discussion and that everyone is encouraged to prepare single transparencies that supplement the scheduled presentations and can be shown during the discussion.

Empirical Correlations between Observational Quantities in Be Stars

00:00 hrs	R. Hanuschik:	Photospheric v sin i and characteristics of circumstellar emission lines
00:20 hrs	Discussion	
00:35 hrs	C. Grady:	Wind and stellar v sin i
00:55 hrs	Discussion	
01:10 hrs	V. Doazan:	V/R ratio of optical emission lines and strength of UV resonance lines
01:30 hrs	Discussion	
01:45 hrs	D. McDavid:	Linear continuum polarization and H-alpha emission strength
01:55 hrs	Discussion	
02:00 hrs	D. Baade:	"Be-like" phenomena observed in early-type non-Be stars.
02:20 hrs	Discussion	
02:30 hrs	End	

All times given on this agenda are of course *relative* times. The entire scientific part of the meeting will be chaired by J.M. Marlborough.

I hope to see as many of you as possible in Baltimore – actively participating in a lively meeting.

Dietrich Baade

C O N T R I B U T I O N S

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UV MONITORING OF BRIGHT Be STARS

C. A. Grady
Astronomy Programs, Computer Sciences Corporation

IUE observations of a small group of bright Be stars will resume in 1988 September and continue into March to April 1989. We will be concentrating our observations for the upcoming observing season on the southern B0.5IVe star HD 58978 (HR 2855, FY CMa) which has been the subject of our previous observing campaigns.

HD 58978: Analysis of the IUE SWP high dispersion spectra of this star have revealed complex variations in a cool circumstellar shell in addition to the high velocity and highly ionized stellar wind. Multiple shell episodes characterized by absorption in S III, Si III, Fe III, C II, and Aℓ III have been observed in this star with absorption extending from +29 km/s (the photospheric radial velocity) up to +150 km/s. The highest velocity redshifted features observed in these moderately ionized species were observed on 1987 May 3. The stellar wind profiles formed in C IV, Si IV, and N V are also variable, with the largest changes observed in N V. This doublet shows emission ranging from 10% up to 60% above the local continuum. The profile is also characterized by strong low velocity absorption features, which are normally visible blue-shifted with respect to line center, but which have been observed redshifed (!) in several spectra. Periodograms of the Fe III (34) 1895.456 Å line equivalent widths together with the low velocity N V absorption equivalent widths indicate a period of 138.2 days at the 98% confidence level in the low velocity N V absorption, and 139 days at the 99% confidence level in the Fe III equivalent widths. The difference between these periods is not likely to be significant since the typical separation of our more recent observations is 2 weeks. N V emission fluxes do not show periodicity on this timescale. IUE FES magnitudes obtained simultaneously with the high dispersion spectra do not show significant periodicity, which is likely to be due to the broad bandpass of the FES, and the uncertainties in the FES data. A spectrum obtained 1988 March 20 shows continuum fluxes which are 60% of the typical value at 1200 Å, but 85% of the typical at 1900 Å, and overall resembling a cooler spectral type than B0.5. The wind ionization appears to have shifted down in response to the flux decrease, with outflow visible to -200 km/s in Fe III. The most spectacular changes in the UV spectrum appear to be concentrated in phase. We suspect that this star may be an interacting binary, and hope to confirm our suspicions with additional IUE observations through the remainder of 1988 and into 1989. We plan to concentrate our IUE observations around December 24 in order to determine whether the spectrum obtained on 1988 March 20 is repeatable, or whether it represents an isolated mass transfer event. We urgently need long-term optical photometric and spectrometric monitoring of this star.

We have continued our monitoring of the other bright Be stars. Data analysis for these objects is lagging due to the effort required to understand the extremely complicated HD 58978 spectra. Lambda Eri (HD 33328) showed only weak C IV absorption in the spectrum obtained on 1988 March 20, indicating an end to the strong wind episode observed since September of the previous year. Analysis of the UV data of this object will be coordinated with Gerrie Peters, who has also been following the object. 59 Cygni continues to show strong wind absorption. Gamma Cas continues to have high velocity discrete absorption components. 6 Cep is still showing strong wind absorption.

The response to the *Be Star Newsletter* announcements for this observing program have been numerous, and are very gratifying. I will attempt to observe additional stars provided that a) only one or at most two observations are needed, and that archival IUE data would not serve equally well, b) the additional targets are not being observed under another IUE program, and most importantly, c) the addition of more targets will not compromise the monitoring programs for the other stars. These constraints are essential since with only four hours of observing time (including spacecraft overhead, slews, and reading the data down), it is typically possible to get at most 4 to 5 bright targets. Our program is not suitable for observations of comparatively short period systems, since an isolated spectrum of such stars, obtained at an unplanned phase, is not likely to help much. I will also not be observing low v sin i targets, since these stars are unlikely to show wind absorption or shell features in the UV.

Continuum Level Variability in the Be star - η Cen

K. K. Ghosh, S. Pukalenthi and K. Jaykumar

Indian Institute of Astrophysics,
Vainu Bappu Observatory, Kavalur,
Alangayam, N. A. , T. N. 635701
India

In the course of a search for rapid spectral variability in the Be star, η Cen which was observed on five nights between 29 January and 07 February 1988, it was found that continuum flux varied in this star. In total 407 H_K profiles were observed and the observed profiles were normalised at (6500 ± 6) Å and (6610 ± 6) Å. Measured continuum counts (Fc) for each profile were obtained from the average of the two continuum counts at (6500 ± 6) Å and (6610 ± 6) Å. Observed continuum counts of η Cen are presented in Figure 1. It is clearly seen from Figure 1 that the average continuum counts on 29 January, 03 and 07 February is 30700 (approximately) whereas this value increased to 35400 on 31 January and most likely it remained in the state till the begining of 02 February (average value of σ(Fc), the standard deviation value in Fc measurements, is 266). Most spectacular variations of Fc were observed on the night of 02 Feb during the interval of our observations. Rapid variations of Fc on the time scales of minutes (1 - 2 min) were also observed on this night. During the continuum emission episode there is no appreciable enhancement of H_α emission strength. But rapid variability of equivalent widths of H_α were observed after the episode.

Variations of stellar radiation field were suggested log ago by different authors (Peters 1984) and specially the rapid variations of Fc seem to be particularly interesting because it may provide us information regarding density inhomogenities in the stellar wind (Chalabaev and Maillard 1983) or variable mass flux in Be stars. Detail results will be published else where.

References:

Chalabaev, A., Maillard, J. P. : 1983, Astron. Astrophys., **127**, 279.

Peters, G. J. : 1984, Publ. Astron. Soc. Pac., **96**, 960.

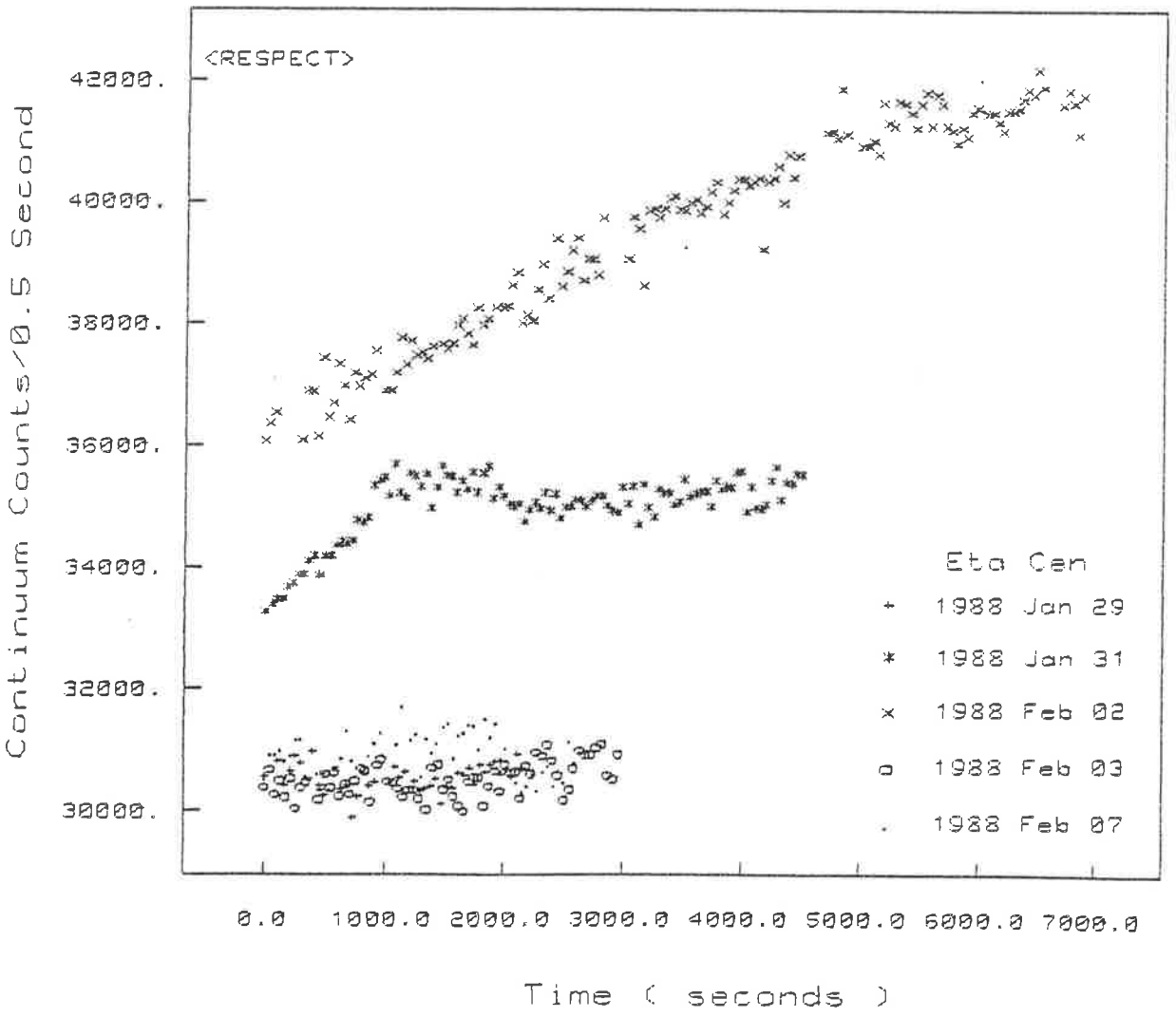

Figure 1 : Plot of continuum counts of η Cen versus time. Time axis represents the elapsed time in seconds from the time of first observation on each night.

W H A T ' S A C T I V E / I N A C T I V E ?

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RECENT Hα OBSERVATIONS AT KITT PEAK NATIONAL OBSERVATORY

This is a continuation of a series of updates on the changes in Hα and He I 6678 in selected Be stars of current interest to the community. Observations were made with the Coude Feed Telescope at KPNO from 1988 May 21 - 25 using the TI3 CCD detector with camera No. 5. The instrumental setup was identical to the one described in Peters (1986; *Ap.J.*, **301**, L61). The S/N for these observations range from 100 - 200 averaged over twenty pixels. Observations described below will be compared with those reported in Issue No. 16 of the *Be Star Newsletter* (*BSN16*) from observing runs in 1987 April, May, and August.

γ Cas - Hα continues to be a triangular emission feature with a weak core on its red side. The peak intensity remains at 4.5 ± 0.1 as it was in 1987 August. He I 6678 is still a double emission line with V > R, but it appears slightly weaker with $V/I_c = 1.05 \pm 0.01$.

HR 2855 (FY CMa) - More spectacular changes have been observed in Hα and He I 6678 in this star since 1987 August and are described below.

χ Oph - The peak intensity of Hα has increased since August 1987 to 8.2 I_c. The profile remains basically the same, however, with two weak cores flanking the central emission peak.

66 Oph - The Hα emission in this star continues to secularly increase. From 1988 May 21 - 25 it showed a peak intensity of 8.1 I_c, an all time high in recent years. On 1988 February 22 and 23, a value of 6.9 I_c was seen (observations at KPNO and the University of Toledo, the latter data provided by R. C. Dempsey) compared with 7.2 I_c in late August 1987. He I 6678 remained unchanged from the last report (*BSN16*).

59 Cyg - From 1988 May 21 - 25 the Hα emission feature showed a peak intensity of 1.8 I_c with V/R = 0.89 (the inverse of what was seen in 1987 August, cf. *BSN16*). Double emission is still evident in He I 6678 but now R > V with $R/I_c = 1.04$. Weak, violet-shifted absorption can now be seen in this line to -550 km s^{-1}.

ε Cap - There has definitely been a change in Hα and He I 6678 in this star since 1987 May - August. The recent observations reveal that its shell has weakened. The Hα emission has decreased slightly from 1.25 I_c to 1.20 I_c and its core currently displays a $r_v = 0.55$ compared with 0.46 in 1987 August. More interesting is that the width of He I 6678 has *doubled* (FWHM = 9 Å, compared with 4.7 Å before)! The feature is now more shallow ($r_v = 0.87$; 0.80 before).

π Aqr - The Hα emission continues to grow; the peak intensity recorded during the 1988 May run was 5.0 I_c, compared with 4.5 I_c in 1987 August. The profile remains triangular with weak cores evident on both sides of the line. He I 6678 is still an inverse P Cygni feature, but the V emission has increased to an impressive 1.15 I_c.

G. J. Peters, Space Sciences Center, USC, Los Angeles, CA 90089-1341; USA.

MORE SPECTACULAR ACTIVITY IN THE Be STAR HR 2855 (FY CMa)

HR 2855 (FY CMa, HD 58978) continues to offer us a number of surprises and distinguish itself as the most active Be star at this time. The unusual, abrupt changes in the circumstellar material that occurred in 1987 April - May have been described in Issue No. 16 of the *Be Star Newsletter* and in Peters (1988, *Ap. J. Letters*, in press, August 1 issue). Briefly, in less than *twelve* days the V lobe of the Hα emission feature increased in strength by 30%, while a previously simple He I 6678 absorption line developed into a structured, inverse P Cygni feature with a V intensity of 1.2 I_c! Contemporaneous *IUE* observations suggested that a sudden accretion event was responsible for the activity. Analysis of archival *IUE* data on this star as well as new *IUE* observations that we have accumulated since 1987 September have revealed the presence of recurrent infall events with a possible period of 138-139 days (Grady, *BSN* this issue).

There was very little change in the appearance of the optical spectrum when the star was next observed at KPNO in 1987 August. However, various reports from the community suggest that the He I emission as well as the *extra* Hα emission had vanished by Fall 1987. A Reticon observation by R. C. Dempsey, University of Toledo, on 1987 December 30 shows Hα with R > V (R/I_c = 2.0, V/R = 0.85). Other observations by Dempsey on 1988 February 14 and 22 show V > R (V/I_c = 1.45) and only weak double emission at He I 6678. A spectrum taken with the TI3 CCD + Camera No. 6 at KPNO on February 23 confirmed the latter appearance of Hα and the He I line. An interesting series of observations obtained by Dempsey from March 5 - 7 revealed the *sudden* growth of the redward emission lobe from 1.9 to 2.3 I_c in just *two* days!

HR 2855 was observed again at KPNO from 1988 May 21 - 25. During this observing run, the R emission component dominated the Hα profile (R/I_c = 2.6) and He I 6678 displayed a prominent redward-shifted emission component with an impressive intensity of 1.25 I_c! A representative spectrum is shown below (Fig. 1a). There was very little change in the spectrum during the five day observing run. A remarkable aspect of the spectrum is that it appears to be the near mirror image of the one observed in 1987 May (Fig. 1b). This implies that the line formation regions for the *extra* emission components are one and the same but viewed from opposite lines of sight (more evidence that the star is an interacting binary). Optical and UV studies of this star are continuing.

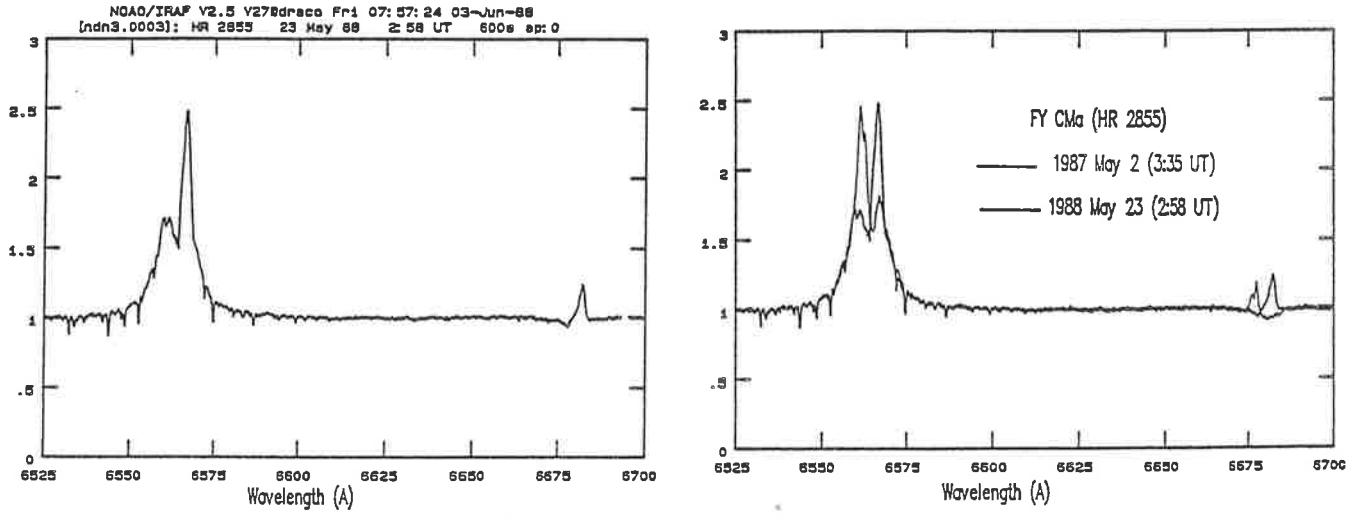

Fig. 1a, b - *Left panel:* Hα and He I 6678 observed in HR 2855 in 1988 May. *Right panel:* The spectrum seen on 1987 May 2 (*thin line*) plotted over the more recent one. Note that the two are near mirror images of each other.

G. J. Peters, Space Sciences Center, USC, Los Angeles, CA 90089-1341; USA.

OBSERVATIONS....THEORETICAL SUPPORT....WANTED/AVAILABLE

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ANNOUNCEMENT OF A CAMPAIGN ON RAPIDLY VARIABLE Be-SHELL STARS

G. J. Peters and J. R. Percy

Following the success of our coordinated multifrequency observations of o And, λ Eri, and ω Ori in 1987 (*Be Star Newsletter*, Nos. 15 and 16), we have organized a similar campaign on *selected Be-shell* stars that display rapid photometric variability in the optical region. The primary target will be ϵ Cap; the secondary target is presently o Aqr. In collaboration with Huib Henrichs, we will obtain forty continuous hours of repeated *IUE* observations of these stars (high dispersion SWP images plus a SWP + LWP pair of low dispersion exposures for information on the flux in the UV continuum). The *IUE* observations are currently scheduled to begin at 11:00 UT on September 30 and continue for five successive shifts. Many of the same investigators who contributed to the 1987 campaign will also be involved in this one. If you are interested in participating in this campaign, please contact either John Percy, Department of Astronomy, University of Toronto, Toronto, Ontario M5S 1A1; Canada (photometric observations) or Gerrie Peters, Space Sciences Center, University of Southern California, Los Angeles, Calif. 90089-1341; USA (spectroscopic observations).

* *

I continue to be interested in any information on the strength and profile of the Hα emission line in 66 Oph and HR 2855 (FY CMa) during the past twenty years. I would also appreciate any photometric data that are available.

Gerrie Peters (address given above)

* *

PREPRINTS RECEIVED

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The Shell Spectrum of Pleione: Radial Velocity Evolution Between 1978 and 1987
BALLEREAU D. - CHAUVILLE J. - MEKKAS M.; Unité "Evolution Stellaire et Galactique" associée au CNRS et DASGAL, Observatoire de Paris, section de Meudon, 92195 Meudon cedex, France
Submitted to: *Astronomy and Astrophysics, Supplement Series*
Preprints: D. Ballereau, DASGAL, Observatoire de Paris, section de Meudon.

Abstract: A study of radial velocities of the shell lines of Pleione (28 Tau = HD 23862) is presented for the years 1978 to 1987, from spectra obtained with the 1.52 m telescope of the Observatoire de Haute-Provence (12.4 Å mm^{-1} dispersion). Important variations are observed in the RVs of the Balmer and metallic lines, as well as in the number of observable lines in the Balmer series. In 1985 and later, we note a gradual disappearance of these lines, and the general behavior of the star is almost exactly the same as pointed out by Merrill in the early 1950s. Harmonic analysis of shell line RVs until their disappearance in 1985 gives a period of about 136 days, roughly equal to the value calculated by Struve and Swings between 1938 and 1943. Our observations fit well with Underhill's model for the shell of Pleione.

Search for Cool Giant Companions of the Be Stars ζ Tau and KX And
FLOQUET M. - HUBERT A.M. - MAILLARD J.P. - CHAUVILLE J. - CHATZICHRISTOU H.; Observatoire de Meudon, F-92195 Meudon, France
Submitted to: *Astronomy and Astrophysics*
Preprints: M. Floquet at above address.

Abstract: A search for the cool luminous giant companions of two well-known Be shell stars ζ Tau and KX And, often proposed as prototypes of interacting binary Be stars with a cool companion, has been performed on August 27-30, 1985, in the K-band, with the CFHT Fourier Transform Spectrometer. No spectral lines susceptible to be formed in the photosphere of a cool luminous giant star have been detected in this wavelength range on high resolution spectra (40000 for ζ Tau and 24000 for KX And) with a rather good signal to noise ratio (20-40 (2σ)). The observed absolute energy distribution in the visual and the IR range of these two stars has been compared with the composite fluxes of a hot star of similar spectral type to that of ζ Tau and KX And and of a cool giant star (K0III and K0II). It has been shown that in the case of ζ Tau the observed IR flux is not sufficient to be consistent with the presence of a cool luminous star which overflows its Roche lobe. On the contrary, in the case of KX And the observed IR energy distribution is compatible with such a companion. As we do not observe in it a veiling effect due to the free-free emission of the cool envelope which would strongly reduce the narrow absorption lines of the secondary star in this wavelength range can be considered for KX And, as in late type high luminosity stars. In addition, the CO molecule can be partially destroyed by the UV radiation of the primary star.

Rapid Hα Variability Studies in Be Stars: 28 Eri, χ Oph, 66 Oph, and π Aqr
GHOSH K.K.; Indian Institute of Astrophysics, Vainu Bappu Observatory, Kavalur, Alangayam, N. A., T. N., 635701, India.
To be published in: *Astronomy and Astrophysics, Supplement Series*
Preprints: K. K. Ghosh at the above address.

Abstract: In order to search for rapid Hα variability in Be stars, a series of Hα profiles were observed on a time scale of a few minutes for 28 Eri, χ Oph, 66 Oph, and π Aqr. In total, 95 and 54 Hα profiles were obtained for the program Be stars and the standard stars, respectively. The theoretical expression of Chalbaev and Maillard (1983) was used to estimate the uncertainty of the Hα equivalent width measurements. From the results of the present observations it is found that rapid variations of continuum level and equivalent widths of the Hα line are absent in our program Be stars.

Observation of an Hα *Outburst in the Be Star HR 4123*
GHOSH K.K. - APPARAO K.M.V. - TARAFDAR S.P.; Indian Institute of Astrophysics, Kavalur, Alangayam, Tamilnadu, India, and Tata Institute of Fundamental Research, Homi Bhabha Road, Bombay 400005, India.
Preprints: K. K. Ghosh at the Indian Institute of Astrophysics

Abstract: During routine monitoring of the Be star HR 4123 during the years 1987-88, a burst of Hα emission was observed on 11 May, 1987. The increase was observed on 9 May, 1987 and lasted until 7 June, 1987 peaking to an equivalent width of 31.6 Å on 11 May 1987. This short-term burst is interpreted as due to the presence of a compact object in binary motion around the Be star, which accretes the matter ejected by the Be star to give out X-rays, which in turn produce ionization in the gas to give out Hα emission. The broad line at λ 6577.5 Å observed to accompany Hα emission during the burst is interpreted as C I emission from the C II region produced around the H II region by sub-Lyman photons.

A New Be Star in an Open Cluster: NGC 6871-8
GRIGSBY J.A. - MORRISON N.D.; Ritter Astrophysical Research Center, The University of Toledo, Toledo, OH 43606, USA
To be published in: *Publ. Astronomical Society of the Pacific*
Preprints: J. A. Grigsby at the above address.

Abstract: Spectroscopic observations of Hα show that star 8 in the open cluster NGC 6871 is a previously undiscovered Be star. The Hα profile was observed to vary from clear emission to pure absorption over a period of ten days; later observations over a five-day interval show weak emission, along with asymmetries and filling in of the profile.

Radial Velocity Variations of the Shell Star V923 Aql (HD 183656) in the Past Sixty Years

KOUBSKY P. - GULLIVER A.F. - HARMANEC P. - BALLEREAU D. - CHAUVILLE J. - GRAF T. - HORN J. - ILIEV L.H. - LYONS R.W.; Astronomical Institute, Czechoslovak Academy of Sciences, 251 65 Ondrejov, Czechoslovakia; Department of Physics and Astronomy, Brandon University, Brandon, Manitoba R7A 6A9, Canada; Observatoire de Paris-Meudon, UA 337, 5 Place Jules Jansen, 92190 Meudon, France; Department of Astronomy, Purkyne University, 611 37 Brno, Czechoslovakia; Department of Astronomy and National Astronomical Observatory Rozhen, Bulgarian Academy of Sciences, 7 Noemvri, Sofia 1000, Bulgaria; David Dunlap Observatory, University of Toronto, P.O. Box 360, Richmond Hill, Ontario L4C 4Y6, Canada.

Submitted to: *Bull. Astron. Inst. Czechoslovakia*
Preprints: P. Koubsky at the first address.

Abstract: A detailed analysis of 149 radial velocities of V923 Aql (HD 183656) from 1927 to 1987 led to the discovery that the object is a spectroscopic binary with an orbital period of 214.75 days and semiamplitude of 6.2 km s^{-1}. The overlapping long-term radial velocity variations persisted throughout the whole sixty-year period; the velocity varied from -60 to +20 km s^{-1} with a quasiperiod of 2120 days (5.8 years), but with large cycle-to-cycle variations in amplitude and cycle length. In particular, the behavior after 1969, when the amplitude was progressively growing, is reminiscent of the onset of a new episode of long-term variability in ζ Tau. V923 Aql thus becomes the second object, after ζ Tau, for which the long-term variations could possibly be explained by the revolution of an elongated envelope in the sense predicted by the binary model of the Be phenomenon.

Short-Term Wind Variability in the Nonradially Pulsating Be Star 28 Cyg

PETERS G.J. - PENROD G.D.; Space Sciences Center, University of Southern California, University Park, Los Angeles, CA 90089-1341, USA; Lick Observatory, University of California, Santa Cruz, CA 95064, USA.

To be published in: *A Decade of UV Astronomy Research with the IUE Satellite*, ESA Publications (ESA SP-281), 1988.
Preprints: G. J. Peters at the above address.

Abstract: *Simultaneous* high resolution *IUE* and ground-based Reticon observations have been combined to look for a modulation of the wind in the Be star 28 Cyg as a function of the phases of its nonradial modes. Throughout the observing run, the star was found to be pulsating in two well-behaved modes (ℓ = 2, 10) with periods of 16.5 hr and 3.23 hr, respectively. The strength and profile of the C IV wind line varied on a time scale of 0.5 - 1 hr, but showed no evidence of repeating with the phase of the ℓ = 10 mode. However, the equivalent width of the C IV feature *did* appear to correlate with the phase of the ℓ = 2 mode. C IV tended to be stronger and show more prominent structure on its violet wings ($-400 < V_r < -300$ km s^{-1}) as a hot wave crest was coming into view ($0.0 < \phi_2 < 0.2$) on the limb of the star's approaching hemisphere.

New Insights into the Cause(s) for the Mass Loss in Be Stars
PETERS G.J.; Space Sciences Center, University of Southern California, University Park, Los Angeles, CA 90089-1341, USA.
To be published in: *New Directions in Spectrophotometry*, L. Davis Press, 1988.
Preprints: G. J. Peters at the above address.

Abstract: Spectroscopic and photometric observations of Be stars in the optical and ultraviolet regions have recently confirmed interesting long-term (months-years) and short-term (≈ one day) variations which can potentially give us some insight into the cause(s) for the mass loss in these stars. The current consensus is that rapid rotation alone cannot be responsible for the mass loss and that other mechanisms such as nonradial pulsations, magnetic fields, and binary mass transfer might be important. Selected observations that show the nature of the episodic mass loss and long-term variations are presented and some ways in which intensive monitoring of a *limited number of objects* with an Automated Spectrophotometric Telescope could advance our understanding of these incredibly active stars are enumerated.

Fe II Line Emission from Be Stars
TARAFDAR S.P. - APPARAO K.M.V.; Tata Institute of Fundamental Research, Homi Bhabha Road, Bombay 400005, India
Preprints: S. P. Tarafdar at the above address.

Abstract: We have shown that the Fe II line emission observed from Be stars arises in the C II region which is formed in the gas envelope surrounding the star by the ultraviolet photons from the Be star. The C II region is outside the H II region.

Optical and Ultraviolet Line and Continuum Emission from the LMC X-Ray Be Star A0538-66
TARAFDAR S.P. - APPARAO K.M.V.; Tata Institute of Fundamental Research, Homi Bhabha Road, Bombay 400005, India
To be published in: *Astrophysical Journal*
Preprints: S. P. Tarafdar at the above address.

Abstract: The X-ray Be star object A)538-66 in the LMC is a binary with a neutron star emitting X-rays in flares when active. It is shown that the enhanced continuum and line emission in the optical and ultraviolet is from the ionized region formed by the X-rays in the gas ring around the Be star.

B I B L I O G R A P H Y

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(Compiled by A. M. Hubert, J. Jugaku, P. Koubsky, and A. Slettebak)

Thirteen-Color Photometry of HD 184279
ALVAREZ M. - BALLEREAU D.: TERAM, 63 (1987)

Calcium Line Emission from Be Stars
APPARAO K.M.V. - TARAFDAR S.P.: AA 192, 255 (1988)

Doppler Imaging of Variable Early-Type Stars
BAADE D.: IAU Symp. No. 132, p. 193 (1988)

Nonradial Pulsations and the Be Phenomenon
BAADE D.: IAU Symp. No. 132, p. 211 (1988)

Spectroscopy of Unusual Emission-Line Stars
BOPP B.W.: AJ 95, 1543 (1988)

Temporal Polarization Variations of Be Stars. III. The Polarimetric Behavior of X Persei
CLARKE D. - McGALE P.A.: AA 190, 93 (1988)

Optical and Infrared Continua of Southern Be Stars
DACHS J. - ENGELS D. - KIEHLING R.: AA 194, 167 (1988)

The Far UV Spectrum of the Be Star 88 Herculis
DANEZIS E. - THEODOSSIOU E.: AA Suppl. 72, 497 (1988)

The Long-Period K + Be Binary HR 2577 (MWC 827)
DEMPSEY R.C. - PARSONS S.B. - BOPP B.W.: PASP 100, 481 (1988)

On the Non-LTE Analysis of the He I Lines in the Atmospheres of Beta Lyrae
DIMITROV D.L.: TERAM, 307 (1987)

Rapid Simultaneous Observations of Fe II and Balmer Emission Lines of χ Oph
GHOSH K.K. - JAYAKUMAR K.: ASS 141, 293 (1988)

Model Atmospheres of Binary Components
HADRAVA P.: TERAM, 263 (1987)

Kinematic Properties and Density Structure of Average Be Star Envelopes Derived from Fe II Emission Line Analysis
HANUSCHIK R.W.: AA 190, 187 (1988)

Introductory Comments to the Panel Discussion on Discrimination between Various Possible Causes of Rapid Variability in Stars
HARMANEC P.: TERAM, 171 (1987)

Is Omicron Andromedae a Quadruple or Even Quintuple System?
HARMANEC P. - HILL G.M. - WALKER G.A.H. - DINSHAW N. - YANG S.: TERAM, 115 (1987)

Omicron Andromedae is Quadruple
HILL G.M. - WALKER G.A.H. - DINSHAW N. - YANG S. - HARMANEC P.: PASP **100**, 243 (1988)

Model Calculations for Photospheres and Envelopes: Applications to "Classical" Be Stars
HÖFLICH P.: AA **191**, 348 (1988)

Variability of some Be Stars on High-Resolution, High S/N Spectra
HUBERT A.M. - HUBERT H. - DAGOSTINOZ B. - FLOQUET M.: IAU Symp. No. 132, p. 131 (1988)

Short-Time Scale Variability in some Be Stars
HUBERT H. - DAGOSTINOZ B. - HUBERT A.M. - FLOQUET M.: TERAM, 45 (1987)

IRAS Excess Radiation in Be Stars and the Behavior of the Ca II Triplet (RN)
JASCHEK C. - ANDRILLAT Y. - JASCHEK M. - EGRET D.: AA **192**, 285 (1988)

A Survey of Ae and A-Type Shell Stars in the Photographic Region
JASCHEK M. - JASCHEK C. - ANDRILLAT Y.: AA Suppl. **72**, 505 (1988)

On the Ultraviolet Fluxes of Be Stars
JOSHI S.C. - RAUTELA B.S.: BASI **15**, 179 (1987)

Evidence of Rapid Variability in Early-Type Stars
KOUBSKY P.: TERAM, 25 (1987)

Models of Accretion Disks in Interacting Binaries
KRIZ S.: TERAM, 295 (1987)

The Binary Orbit of the Be Star HDE 245770=V725 Tauri and the Recurrent X-Ray Activity of A0535+26
MARGONI R. - CIATTI F. - MAMMANO A. - VITTONE A.: AA **195**, 148 (1988)

A Multifrequency Analysis of the Short-Term Variable Be Star KY Andromedae
PAVLOVSKI K.: TERAM, 69 (1987)

Ultraviolet Spectra of Algol Binaries
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On the Nature of the Component Stars in Beta Lyrae
PLAVEC M.J.: TERAM, 301 (1987)

Far-Ultraviolet Astronomical Observations with the Voyager 1 and 2 Spacecraft
POLIDAN R.S.: TERAM, 199 (1987)

Luminous Accretion Disks and High Ionization Emission Lines in Interacting Binaries
POLIDAN R.S.: TERAM, 293 (1987)

Variability in the Stellar Wind of 68 Cygni - Not "Shells" or "Puffs", but "Streams"
PRINJA R.K. - HOWARTH I.D.: TERAM, 39 (1987)

The Extended Atmosphere of Lambda Pavonis at the Time of the Emergence of H-Emissions from Minimum Intensity
SAHADE J. - ROVIRA M. - RINGUELET A.E. - KONDO Y. - CIDALE L.: APJ **327**, 335 (1988)

Is the Be Star HR 9070 Actually Pulsating?
SAREYAN J.P. - ALVAREZ M. - CHAUVILLE J. - LE CONTEL J.M. - MICHEL R.-BALLEREAU D.: AA **193**, 159 (1988)

Mass Loss in a B2 IIIe Star: Omega Orionis 1978-1984
SONNEBORN G. - GRADY C.A. - WU C.-C. - HAYES D.P. - GUINAN E.F. - BARKER P.K.-HENRICHS H.F.: APJ **325**, 784 (1988)

Duplicity of the Be Star 59 Cygni
TARASOV A.E. - TUOMINEN I.: TERAM, 127 (1987)

Nonradial Oscillations of the Be Star Gamma Cassiopeiae
YANG S. - NINKOV Z. - WALKER G.A.H.: PASP **100**, 233 (1988)

le Paramètre V sini des Etoiles et la Rotation Differentielle Cylindrique
ZOREC J. - MOCHKOVITCH R. - GARCIA A.: CRASP **306**, 1225 (1988)

Sur la Rotation des Etoiles B et Be
ZOREC J. - MOCHKOVITCH R. - DIVAN L.: CRASP **306**, 1265 (1988)

Abbreviations used for the Publications

AA	Astronomy and Astrophysics
AA Suppl.	Astronomy and Astrophysics Supplement
AAS	Acta Astrophysica Sinica
AJ	Astronomical Journal
APJ	Astrophysical Journal
APJ Suppl.	Astrophysical Journal Supplement
ASS	Astrophysics and Space Science
BAAS	Bulletin of the American Astronomical Society
BAC	Bulletin of the Astronomical Institutes of Czechoslovakia
BASI	Bulletin of the Astronomical Society of India
CRASP	Comptes-Rendus de l'Académie des Sciences de Paris

IAJ	The Irish Astronomical Journal
IAUC	IAU Circular
IAU Symp. No. 132	Proceedings of IAU Symposium No. 132 "The Impact of Very High S/N Spectroscopy on Stellar Physics", ed. G. Cayrel de Strobel and M. Spite, Meudon (June 29 - July 3, 1987)
IBVS	Information Bulletin on Variable Stars
IKAO	Izvestia Krimskoj Astrofiziceskoj Observatorii
MNRAS	Monthly Notices of the Royal Astronomical Society
MSAI	Memorie della Societa Astronomica Italiana
OBS	The Observatory
PAAO	Publications of the Alma-Ata Observatory
PAJ	Pisma Astronomical Journal
PASJ	Publications of the Astronomical Society of Japan
PASP	Publications of the Astronomical Society of the Pacific
QJRAS	Quarterly Journal of the Royal Astronomical Society
RMAA	Revista Mexicana de Astronomia y Astrofisica
TERAM	Proceedings of the *Tenth European Regional IAU Meeting*, Vol. 5, ed. P. Harmanec, *Publ.Astron.Inst.Czech.Acad.Sci.*, No. 70 (1987)

M E E T I N G S

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IAU COLLOQUIUM 107 - ALGOLS

University of Victoria, Victoria, B.C.; Canada

August 15-19, 1988

There is compelling evidence to suggest that *some* Be stars have acquired their circumstellar envelopes through binary mass exchange. This mechanism not only provides an explanation for the source of the material but also the large angular momentum typically associated with Be stars. There are a number of Be stars that have been confirmed to be interacting binaries and there are several eclipsing binaries of the Algol type that would be considered only as classical Be stars if they did not eclipse! The purpose of IAU Colloquium 107 is to review recent progress and consider future directions in the study of interacting binaries of the Algol type. A list of the topics to be discussed was provided in Issue No. 17 of the *Be Star Newsletter*.

This meeting will take place after the IAU General Assembly in Baltimore, MD, U.S.A. and be held at Dunsmuir Lodge in Sidney, B.C., Canada. It will be centered on a number of invited talks followed by abundant time for discussion. An extensive poster program is also planned. For additional information, contact:

Dr. Mirek J. Plavec, Chairman of the Scientific Organizing Committee
Department of Astronomy, University of California
Los Angeles, CA 90024 U.S.A.
Telephone: (213) 825-1672

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IAU COLLOQUIUM NO. 113 - PHYSICS OF LUMINOUS BLUE VARIABLES

Val Morin, Quebec; Canada

August 15-18, 1988

Contact: Dr. Kris Davidson, Astronomy Department, University of Minnesota, 116 Church Street, S.E., Minneapolis, MN 55455 U.S.A. Telephone: (612) 624-5711

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RECENT DEVELOPMENTS IN VARIABLE STAR RESEARCH

Baltimore, MD U.S.A.; August 5, 1988

Contact: Dr. Michel Breger, Astronomisches Institut, Universitat Wien, Turkenschanzstrasse 17, A-1180 Wien, Austria Telephone: 222-34-53-605

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WORKSHOP ON ORGANIZED, PATTERNED, TIME-DEPENDENT STELLAR MASS-OUTFLOW

2h30 pm 11 August 1988 through 13 August 1988. Space Telescope Institute, Baltimore

Prior to the era of observations from space, theories and models of stellar atmospheres, stellar interiors, and stellar evolution were based on the hypothesis that a star produces only radiative energy, not mass, outflow to its environment. Thus, stars were thermodynamically characterized as closed systems. According to these classical standard models/theories, the stellar radiative flux and gravity were the only parameters controlling the structure and thermodynamic state of the transition-region between star and its environment, i.e. the stellar atmosphere. Therefore, at each epoch of the star's evolution, the atmosphere, and the star's interaction with its environment, vary only if the radiative flux and gravity vary.

Prior to space observations, evidence for stellar mass-outflow was confined to only a few types of stars labelled "peculiar". Mass-outflow was directly observed in novae, P Cygni, and Wolf Rayet stars. These were entirely excluded from standard modelling. Mass-loss was indirectly inferred for a few other classes of stars. But for these stars, standard atmospheric modelling appeared to fail only in some outer atmospheric regions. These regions were therefore hypothesized to be produced by physical processes that are not present in normal stars. The question was whether such peculiar stars are radically different in thermodynamic character from normal stars, or whether they simply represent short-lived evolutionary stages of normal stars. In either event, a broader theory of stellar structure is required to model both peculiar and normal stars.

As a result of far UV observations from space, it is now recognized that mass-loss exists all across the HR diagram, in normal as well as in peculiar stars. The modelling implication is clear: all stars must be considerd to be thermodynamically-open systems. Stellar evolution, stellar internal and atmospheric structure, and the interaction between star and environment must depend on both radiative outflow and mass outflow from the star to its environment.

However, what was originally overlooked, was that such mass-outflow is often variable. Such variability is not mainly small and random. It usually occurs in organized patterns, and on both long (years, decades) and short (day(s)) time-scales. The existence of such variability shows the inadequacy of essentially all current theories of mass-outflow, which hypothesize only steady-state mass-outflow, with at most random variable aspects.

Our present body of knowledge on such variability is tantalizing but meagre. More complete data, on a larger variety of stars, are needed. Especially needed are long term observations coordinated between multiple spectral regions. Also needed are discussions between those obtaining and diagnosing, and those using such data to construct models and theories.

By courtesy of its Director, Dr. R Giacconi, the Space Telescope Institute offers us an auditorium for the days immediately following this year's IAU General Assembly, for the discussion of the facts and consequences of variable mass-outflow. We have organized the Workshop on a highly informal basis/format. In each half-day's session, there will be an introductory-summary talk. The remainder of that half-day will consist of unprogrammed discussion by attendees: <u>your</u> data, <u>your</u> ideas, <u>your</u> "disputes" will be the primary focus. So, welcome to facts/implications/disputes: join us.
Please bring this announcement to the attention of your colleagues whom you think may be interested.

Dick Thomas
Radiophysics Inc. 5475 Western Ave. Boulder CO 80301 U.S.A.