NEWSLETTER OF CHEMICALLY PECULIAR RED GIANT STARS

Bulletin sur les Etoiles Tardives
a Spectre Particulier

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Edited by
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Denison University

I. MESSAGE FROM THE WORKING GROUP CHAIRMAN

I am pleased to announce that plans are underway to organize the next meeting to be sponsored by our Working Group. The basic parameters that have been proposed for the meeting are the following:

Proposed topic:	"Carbon Stars"
Proposed date:	September or October, 1995
Proposed site:	Antalya, Turkey
Sponsorship:	Working Group on Peculiar Red Giants. We plan to seek IAU sponsorship as a Symposium or Colloquium.

Here I would like to explain the rationale for the choices indicated above. I would also urge you to try to arrange your lives so that you can attend!

The proposed meeting may be considered a sequel to the Strasbourg meeting on "Cool Stars with Excesses of Heavy Elements" (1984) and the Bloomington, Indiana meeting on the "Evolution of Peculiar Red Giant Stars" (IAU Coll. 106, 1988). These meetings emphasized spectroscopic problems and evolutionary processes, respectively, but actually were quite general and covered a wide range of related subjects. I hope that the topic "Carbon Stars" is sufficiently general to be of interest to most astronomers who attended the Strasbourg and/or Bloomington meetings, and to most people on the mailing list for this Newsletter. I also hope that it will attract other people, especially young astronomers whose interest in stellar astronomy might be encouraged by attendance at a good meeting.

Let me say right away that the topic "Carbon Stars" should be interpreted in the broadest sense. These stars are symptomatic of the whole range of processes by which stars -- both single and binary -- can change their atmospheric compositions as they evolve. Certainly we can’t expect to understand carbon stars without discussing the many kinds of related objects -- S stars, barium stars, etc. Even the most normal-looking red giants may have changed their surface compositions since their days on the main sequence, and there are many kinds of studies of oxygen-rich stars which would be of interest at a meeting centered on the carbon-star phenomenon. Some Cepheids are carbon-rich, as are some RV Tauri variables, and even the oxygen-rich members of these groups may have altered abundances. We know of main-sequence stars with altered abundances, carbon symbiotic stars, carbon-rich stars on their way to becoming planetary nebulae, and so on. Most of these stars are variable, and I should think that variability studies might play a significant role at our meeting. And of course the classical carbon stars can be discussed from many points of view -- surveys, problems of classification, membership in clusters, binarity, compositions, opacity sources, synthetic spectra, interior structure, energy sources, and so on.

Antalya is a resort town on the Mediterranean coast of Turkey. Its main astronomical significance is that it is the nearest city to the site chosen for the Turkish National Observatory, now under construction. We will probably be able to visit this new observatory during the meeting. The tourist literature for the region shows that Antalya is very beautiful, with ample facilities for visitors and for conferences. To avoid crowding, however, it does seem advisable to hold the meeting in the autumn, after the peak of the tourist season has passed.

I thought of Turkey as a meeting site for several reasons. The country has belonged to the IAU for at least 40 years, and it now has 47 IAU members -- a moderately large contingent. Yet it has never been host to an IAU Symposium or Colloquium. The Turkish astronomers I have talked to are very enthusiastic about having a meeting and seem very willing to do the work of the local organizing. Most readers of this Newsletter are aware, I am sure, that Turkey is a fascinating country, rich in history and culture, with a mixture of Eastern and Western influences. Yet I doubt that many of us have been there. In view of the international nature of our WG and the fact that we have previously sponsored meetings in Strasbourg and Bloomington, I looked for a site that was not in Western Europe or North America, but which would not be too difficult for most of us to get to.

I believe it would be easier to organize and hold a meeting in Antalya than in Istanbul, which is an extremely crowded, busy city filled with distractions. But I would also suppose that most people attending the meeting would be interested in visiting Istanbul. This can be easily arranged; in fact, almost any route to Antalya from outside of Turkey will involve a change in Istanbul. I am also thinking of arranging a bus tour from Antalya back to Istanbul after the meeting, stopping at archaeological sites and beaches/spas along the way.

Several members of the WG's Organizing Committee have agreed to serve on the Scientific Organizing Committee for the meeting. Over the next couple of weeks I hope the SOC membership will be completed. It will then be the task of the SOC, over the next month or two, to define the content and emphasis of the meeting by selecting session topics and choosing invited speakers. To be eligible for IAU sponsorship in 1995 (or 1996), we must submit a complete proposal to the IAU Executive Committee by June 1, 1994.

I would be glad to hear from anyone who has thoughts about the organization of the proposed meeting. Many of the details should be pinned down in the coming months. I will report on our progress in the next issue of this Newsletter.

--- Robert f. Wing
Chairman, WG on Peculiar Red Giants

II. RESEARCH NEWS

L. Zacs (Riga) has determined the atomic abundances of the CH-like star BD+16'2188 relative to the comparison star Mu Aql (K3 III) using high dispersion spectra and model atmospheres. The abundances of the iron peak elements are found to be systematically slightly deficient (about 0.2-0.3 dex). A significant enhancement of s-process elements is found. BD+16'2188 is a faint giant, having an absolute magnitude M(V) of about +1.0, a value similar to that of barium stars and normal G-K giants. This star seems to be a member of an old disk population.

"A Spectroscopic Analysis of Barium Stars" by L. Zacs (Riga) will appear in a future issue of Astronomy & Astrophysics. This paper reports detailed abundance analyses which have been carried out for 31 barium and normal G-K giant stars using high-dispersion spectra and model atmospheres. The author finds a significant enhancement of s-process elements for 17 stars. The abundances of light and iron-peak elements are in general equal to those in the standard star Epsilon Vir. However, Na, Mg, Mn, and Co are systematically slightly deficient (by about 0.2 dex). The elements heavier than Ni are enhanced by up to about 1.5 dex compared with the standards, while the r-process element Eu has a roughly normal abundance. No substantial differences are found in abundances, atmospheric parameters, or luminosities of radial-velocity variable and nonvariable barium stars. Therefore it seems that both groups of stars belong to a single family of peculiar giants.

Comparison between the mean observed s-process abundances for this uniform barium-star sample and theoretical predictions from various neutron exposure models shows that a 13C neutron-source AGB star can best reproduce the abundance data of the observed stars. Low neutron density single neutron exposures can also result in good agreement with the barium-star observations.

Mass transfer scenarios were tested using the chemical composition and orbital parameter data of BaII stars. Since a correlation exists between s-process abundance anomalies and orbital parameters (periods, projected semi-major axes, mass functions), the author concludes that a wind accretion scenario is more promising than Roche-lobe overflow models.

A comparison of abundance patterns for barium and carbon stars shows good agreement for the iron group metals, but carbon stars show higher s-process element overabundances (0.9 dex in the mean). Therefore, the companions to the BaII stars were perhaps once carbon stars whose mass overflowed onto the presently visible star with a second dilution (the ratio of the transferred mass to the mass of the receiving envelope) of roughly 0.9.

C. Barnbaum (UC-Berkeley) has prepared a spectral atlas of six bright carbon stars (U Hya, TX Psc, RZ Peg, V Oph, Y CVn, and UV Cam) observed with the Hamilton Echelle Spectrograph at Coude focus using the 3-m telescope at Lick Observatory. The data are of high resolution (0.13 A at 6100 A) and high signal-to-noise. The spectral range spans from 5080 to 7850 A; however, there are gaps due to the unmatched size of the echelle format and the CCD. A total of 87 carbon stars in the solar neighborhood have been observed over the period from May 1988 through September 1991, with two or more observations for 67 stars of the sample. The reduced spectra (40 orders per observation for a total of nearly 9,500 individual spectra) will be available to the scientific community via the Astrophysics Data System (ADS). The current study has produced the most detailed multi-epoch observations to date of a large number of carbon stars.

Presented along with spectra of the six sample stars are separate template plots to be used as a tool for the ADS on-line database. The templates are of atomic features and of 12CN and 12C2 transitions taken from the tables of Davis & Phillips (1963) and Phillips & Davis (1968), respectively. Bandhead positions have been calculated for the isotopic species 13C14N, 12C13C, and 13C13C, whose transitions contribute significantly to the spectra of carbon stars with enhanced 13C abundance, known as J-type carbon stars.

EDITOR'S NOTE: This paper has just appeared in the January 1994 issue of the ApJ Supplement Series (vol. 90, p. 317). Dr. Barnbaum informs us that the template figures issued with the paper, which are used to identify spectral features in the Atlas, were produced at an incorrect scale. An Erratum in a future issue will point out the error, and correctly scaled templates will be made for the reprints. Anyone interested in obtaining a reprint is asked to contact Cecilia Barnbaum at NRAO, 520 Edgemont Rd., Charlottesville, VA 22903.

C. Barnbaum and K. Hinkle (NOAO/KPNO) have measured radial velocities of infrared photospheric lines observed in 37 bright carbon stars. The spectra were obtained with the Kitt Peak National Observatory 4-meter telescope with Fourier transform spectrometers between 1976 and 1988. The observations have a typical resolution of 65000 and a typical signal-to-noise ratio of 50. All the spectra cover the

2.0-2.5 micron K band with a substantial subset of observations covering the 1.6-2.5 micron region (the H and K bands). For all 37 spectra, velocities were measured of 9 Ti I lines in the K band. Also measured were velocities of CO second-overtone (delta v = 3) lines in 28 of the stars and the velocities of high-excitation (high J) lines of the CO first overtone (delta v = 2) in 27 stars. Photospheric optical velocities of both molecular (CN) and atomic absorption lines are compared with the velocities of photospheric infrared lines in a paper to be published in "Science with Astronomical Near Infrared Surveys" (Kluwer).

C. Barnbaum and M. Morris (UCLA) have work in progress on the Tc and s-process enhancement in carbon stars. The third dredge-up in Asymptotic Giant Branch stars enhances s-process elements in the atmospheres of these stars. 99Tc, an s-process element with a half-life on the order of the lifetime of an AGB star, is thereby expected to be present in oxygen- and carbon-rich AGB stars. However, Little et al. (A.J. 94, 981, 1987) found that 68% of oxygen-rich AGB stars lack Tc. On the other hand, only 38% of S and MS stars lack Tc, and yet these stars are s-process enhanced (Smith & Lambert, ApJ 333, 219, 1988). Smith & Lambert and Brown et al. (A.J. 99, 1930, 1990) conclude that these S stars are likely to be mass-transfer binaries, akin to the CH and Ba stars. To date, only 19 carbon stars have been observed for the presence of Tc. Clearly, a larger sample is needed to make adequate comparisons with the results for M and S stars. However, the relatively strong blue resonance lines of Tc are very difficult to observe in carbon stars, since carbon stars are extremely faint in the region near 4300 A. Barnbaum and Morris have determined that an easily observed intercombination line of Tc at 6085 A, although weak, appears to trace the presence of Tc in carbon stars.

The authors have Tc and s-process line depth measurements of 84 carbon stars and find that the Tc to Fe line depth ratio is generally correlated with the carbon abundance and temperature classification of the carbon stars in their sample, as are the line depths of the light s-process elements Zr and Y. That 26% of these carbon stars do not have the red feature of Tc is consistent with the results for S stars. Of these 24 carbon stars apparently lacking Tc, 8 stars do not have enhanced s-process elements and might not be on the AGB. The other 16 without Tc, yet having s-process enhancement, are candidates for mass-transfer binaries.

A study of the circumstellar envelopes of bright carbon stars, based on several years of observations of molecular emission lines with millimeter- and submillimeter-wavelength telescopes in Sweden, Chile, and Spain, has been published as a pair of papers by Olofsson, Eriksson, Gustafsson, and Carlstrom of the Onsala Space Observatory and Uppsala University (ApJS 87, pp. 267 and 305, 1993). Their survey in CO resulted in 68 detections and is considered relatively complete out to 900 pc from the Sun. They find indications that mass-loss rates calculated previously from CO line strengths have been underestimates. For many of these stars, circumstellar and photospheric abundances have been derived from observations of about a dozen other molecules. The authors also present JHK photometry for about 60 bright carbon stars.

M. Sevenster (Leiden), H.J. Habing (Leiden) and H. Dejonghe (Gent) are carrying out a large survey of our Galaxy with the VLA and ATCA in 1612 MHz in a search for OH/IR stars. They will try to model the dynamics of the Galaxy by fitting orbital families to the observed density and velocity distributions. As a preliminary exercise they have modeled the distribution functions of two existing sets of OH/IR stars -- one in the very center of the Galaxy and one extended over most of the bulge and the disk. The center stars seem to belong to a small, rapidly rotating disk, whereas the more extended sample has a high dispersion. Together with the observation that on the average the central sample has a higher outflow velocity -- which in this case indicates higher metallicity since it has been shown that the luminosity does not differ much -- this provides good evidence that the two samples are taken at least partly from really different populations, in the sense that they have very different structures in phase space, not just different kinematics, distribution on the sky, or colors.

J. Kastner (MIT Center for Space Research) and D. Weintraub (Vanderbilt) have obtained polarimetric, coronagraphic near-infrared images of the reflection nebula surrounding the carbon star IRC +10216. These images, which provide an order of magnitude increase in spatial resolution over that of the earlier-epoch aperture polarimetry observations that established the presence of the nebula, demonstrate convincingly that the dust envelope is axisymmetric. In unocculted images at J (1.25 microns) and in occulted images at H (1.65 microns) and K (2.2 microns), the nebula appears elongated, with the major axis lying roughly at position angle 20 degrees. The position angle of elongation is the same as that previously inferred via near-infrared speckle interferometry for the inner 1 arcsec of the envelope. The elliptical symmetry of the J polarimetric map offers additional evidence of the axial symmetry of the envelope and indicates that the equatorial plane of IRC +10216 lies perpendicular to the major axis of the nebula. The authors conclude that their images support a model in which the envelope of IRC +10216 is weakly bipolar and is viewed at an intermediate angle of inclination. A re-examination of previous near-infrared and millimeter-wave mapping observations strongly supports this hypothesis; in each of these maps, the envelope displays a position angle and degree of ellipticity similar to that in the current images. These observations appear to constrain models of the onset of bipolar structure in the pre-planetary-nebula phase of intermediate-mass stars.

As part of a long-term project to investigate the photometric variability of bright red giants, J. R. Percy (Toronto) has used the Automatic Photoelectric Telescope Service in Arizona to monitor 49 of the more than 200 K giants in the Yale Catalogue of Bright Stars which are named or suspected photometric variables. Only two -- HR 3275 and HR 5219 -- are clearly variable; they are most likely RS CVn stars. A few K and early M giant comparison stars are marginally variable.

As part of the same project, Percy and the AAVSO Photoelectric Photometry Program have monitored 61 "known" or suspected small-amplitude M giant variables. About two-thirds appear to be variable; several suspected variable comparison stars were also identified. The incidence and average amplitude of variability increase rapidly from M1 III to M6 III, as found in previous studies.

T. Kipper (Tartu) and U. G. Jorgensen (Niels Bohr Institute) have analyzed the chemical composition of the metal-poor CH star HD 187216 from the halo of our Galaxy. They found [Fe/H] = -2.48, C/O = 2.1, and 12C/13C = 7. This composition is in conflict with the usual scenario of mass transfer in CH and Ba stars, and searches for binarity have also failed. HD 187216 may be an intrinsic carbon star with some similarities to the carbon stars in metal-poor galaxies.

U. G. Jorgensen has extended the TiO line list from the thesis work of J. Collins (Krupp, Collins, & Johnson, 1978, ApJ 219, 963), so that it contains, in addition to the original data, also the epsilon system and lines from all relevant isotopes, and is consistent with the most recent molecular constants. The list now contains frequency, gf-value, and excitation energy for 12 million lines from 5 isotopes of TiO, and it is available on request.

The dipole moment surface and the vibrational transition moments of 85,000 transitions in the water molecule have been computed by U. G. Jorgensen and P. Jensen (J. Mol. Phys. 1993, 161, 219). Application of these new data to stellar atmospheres is in progress (a preliminary report on the results is published by Jorgensen, Jensen and Sorensen in the Poster Proceedings on IAU Coll. 146). A full line list will be available in the near future.

M. Sevenster (Leiden) has provided the following short overview of the present state of the OH/IR survey of the galactic plane being done by Sevenster, Habing, Lindqvist, Chapman, and Killeen. Currently they are doing the observations with the Australia Telescope, surveying the region $-3 < b < 3$ and $-45 < l < 10$. Their original estimate of finding one or two sources per field (30"x30") turns out to be completely justified, and they expect to find a total of about 2000 sources in this region. The region surveyed with the VLA ($10 < l < 45$) should yield another 1000 stars at least. The observations are proceeding very well; GLONASS interference is significantly reduced in the 4 MHz band around 1612 MHz though still present. The data reduction will be fully automated, using a detection algorithm that only finds the characteristic double-peaked spectra, since for the purpose of dynamics accurate radial velocities are needed. The detection is not straightforward due to a beam pattern with high point-like sidelobes far from the central peak, that causes ghost-OH/IR stars to appear even in neighboring fields, a problem that has not (often) been encountered before. The reduction algorithm deals with this effect and it is expected that all data will be reduced and catalogued by the end of 1994.

-- Call for observations of DY Per --

DY Per, a variable carbon star suspected to be of the R Coronae Borealis type, was declining rapidly (0.065 mag/d in red light) during November 1993. According to observations made with the Baldone Schmidt telescope (Nov. 27, 1993), DY Per's red magnitude R(0.63) was 12.5. This is 2.8 magnitudes fainter than was observed during June-September 1993. If the current fading of DY Per continues with the same rate as mentioned, the star on New Year's Day will reach the faintest level observed during the previous deep minimum of December 1991 (IAU Circ. No. 5400).

If DY Per is not an RCB star, it is a carbon star with unique light variations (Alksnis & Jumike, 1990, Investigations of the Sun and Red Stars, No. 33, p. 83). Its spectrum has been classed as R8 or C5,4, but in 1985 J. Dominy classified DY Per as C4,5 and emphasized that it represents "a spectroscopic hybrid of the J-type and non-J-type C4 star".

To determine the nature of this interesting star, it seems very important to make spectroscopic observations during the current minimum. Infrared and polarimetric observations would also be very desirable. A finding chart for DY Per has been published by Alksnis and Jumike in the reference cited above. About 13 arcsec to the west of DY Per there is another red star (V = 13.9, B = 15.9, and U = 17.8). It can be expected that during December 1993 the brightness of DY Per would be between the limits of the November observations (about V = 14.1 and B = 16.5) and the faintest observed in the minimum of 1991 (V = 15.8, B = 17.1). Unfortunately, because of its high declination (RA = 02h 31m 42s, Dec = +55 deg 55.6 min, 1950), DY Per is an object good only for Northern Hemisphere observers. Please contact A. Alksnis at the Latvian Radioastrophysical Observatory for further information. His e-mail address is astra@mii.lu.lv

III. SPECIAL TOPICS

THE NEED FOR A CARBON STAR PROJECT

Philip C. Keenan
The Ohio State University

The classification recently proposed for the red carbon stars in order to bring them into in Revised MK system (Keenan 1993) cannot be regarded as complete at this time.

In the first place (as one of the referees of that paper pointed out), in order to be really useful it should be accompanied by an atlas illustrating the changes in the criteria as the temperature, luminosity, and composition vary. It was not possible to prepare such an atlas from the limited number of photographic spectrograms available for setting up the system, and the atlas should in any case be made up of linear intensity plots of digitized spectra obtained with CCD detectors. The minimum resolution should be about 2000, but a resolution of 5000 (1 A at 5000 A) would be much better, for that would permit Ba II 4554 and Sr I 4607 to be at least partially separated from the nearby CN bandheads of the delta(v) = -2 sequence of Violet System that lie slightly less than 1 A from each of these lines. Thus the observations for the atlas would require a considerable amount of time with a telescope of moderate size, equipped with a modern spectrograph.

This would be a major project, but far from a routine one, for in the second place it would involve testing and refining the proposed notation of classification. Already, since the original paper was prepared, evidence has increased that in addition to the well-known CH stars belonging to the halo population there exist less extreme CH stars, and it is not now certain to which stellar population the latter belong. Another problem is presented by the carbon stars that in the past have been variously called late R stars or early N stars. In the Revised MK system these stars are now given the provisional type of C-RN, but we do not yet even know whether these stars form a homogeneous group.

Whether these problems can be solved as by-products of the preparation of an atlas, or must be attacked in separate programs, remains to be seen. What is certain is that there are opportunities for exciting research programs on carbon stars -- programs which I hope will capture the interest of younger members of this Working Group. I should be glad to give any help that I could, such as by suggesting promising stars for inclusion in such programs.

REFERENCE

Keenan, P. C. 1993, PASP, 105, 905.

AN ON-LINE SPECTRAL DATABASE OF CARBON STARS

Cecilia Barnbaum
NRAO

High-resolution echelle spectra of 87 carbon stars will soon be available through the Astrophysics Data System (ADS). An Atlas of the spectra of 6 carbon stars in this sample has been published by C. Barnbaum in the January 1994 edition of the Astrophysical Journal Supplement Series (see abstract in this Newsletter).

Optical spectra were obtained between 1988 May and 1991 September with the 120-inch (3-m) Shane Telescope at Lick Observatory using the Hamilton Echelle spectrograph at Coude. A total of 230 observations are available, with 40 spectral orders per observation. Here follows a list of the stars observed and a list of parameters describing the resolution and wavelength coverage. Details of the data reduction are described in the Atlas.

To obtain spectra, contact

Cecilia Barnbaum at:	Internet:	cbarnbau@nrao.edu
or ADS:	Internet:	ads@cuads.colorado.edu
	SPAN:	CUADS::ads

SPECTRA AVAILABLE

AQ And	R CMi	RY Hya	SY Per
EU And	HO Cas	U Hya	TX Psc
SU And	HV Cas	V Hya	Z Psc
VX And	W Cas	Y Hya	AC Pup
V Aql	X Cas	R Lep	SS Sgr
V374 Aql	S Cep	HK Lyr	SZ Sgr
AU Aur	V CrB	T Lyr	V781 Sgr
AZ Aur	RS Cyg	U Lyr	V2548 Sgr
EL Aur	TT Cyg	CL Mon	SU Sco
FU Aur	U Cyg	CZ Mon	V901 Sco
S Aur	V Cyg	DF Mon	R Scl
TX Aur	V778 Cyg	GY Mon	S Sct
UU Aur	WX Cyg	TW Oph	FO Ser
UV Aur	RY Dra	TY Oph	FX Ser
S Cam	T Dra	V Oph	TT Tau
ST Cam	UX Dra	BL Ori	TU Tau
U Cam	R For	GK Ori	Y Tau
UV Cam	BM Gem	RT Ori	IRC-30293
T Cnc	TU Gem	W Ori	VY UMa
X Cnc	VX Gem	RZ Peg	RU Vir
W CMa	ZZ Gem	AC Per	SS Vir
Y CVn	CZ Hya	DY Per	

DATA SPECIFICATIONS

Order No.	Central Wavelength	Total Coverage	delta lambda per pixel	Dispersion	Resolution
	Angstroms	Angstroms	A/pixel	A/mm	Angstroms
112	5101	33.9	0.0426	2.84	0.11
111	5147	34.2	0.0429	2.86	0.11
110	5194	34.5	0.0433	2.89	0.11
109	5241	34.8	0.0437	2.92	0.11
108	5290	35.1	0.0441	2.94	0.11
107	5339	35.5	0.0446	2.97	0.11
106	5390	35.8	0.0450	3.00	0.11
105	5441	36.1	0.0454	3.03	0.11
104	5493	36.5	0.0458	3.06	0.12
103	5547	36.8	0.0463	3.09	0.12
102	5601	37.2	0.0467	3.12	0.12
101	5657	37.6	0.0472	3.15	0.12
100	5713	37.9	0.0477	3.18	0.12
99	5771	38.3	0.0482	3.21	0.12
98	5830	38.7	0.0486	3.24	0.12
97	5890	39.1	0.0492	3.28	0.12
96	5951	39.5	0.0497	3.31	0.12
95	6014	39.9	0.0502	3.35	0.13
94	6078	40.4	0.0507	3.38	0.13
93	6143	40.8	0.0513	3.42	0.13
92	6210	41.2	0.0518	3.45	0.13
91	6278	41.7	0.0524	3.49	0.13
90	6348	42.2	0.0530	3.53	0.13
89	6419	42.6	0.0536	3.57	0.13
88	6492	43.1	0.0542	3.61	0.14
87	6567	43.6	0.0548	3.65	0.14
86	6643	44.1	0.0554	3.69	0.14
85	6721	44.6	0.0561	3.74	0.14
84	6801	45.1	0.0568	3.78	0.14
83	6883	45.7	0.0574	3.83	0.14
82	6967	46.3	0.0581	3.88	0.15
81	7053	46.8	0.0589	3.92	0.15
80	7141	47.4	0.0596	3.97	0.15
79	7232	48.0	0.0604	4.02	0.15
78	7324	48.6	0.0611	4.07	0.15
77	7419	49.3	0.0619	4.13	0.16
76	7517	49.9	0.0627	4.18	0.16
75	7617	50.6	0.0636	4.24	0.16
74	7720	51.3	0.0644	4.29	0.16
73	7826	52.0	0.0653	4.35	0.16

PROCEEDINGS OF IAU COLLOQUIUM 146

The proceedings of the IAU Colloquium 146, held in Copenhagen in May 1993, will be printed by Springer-Verlag under the title "Molecules in the Stellar Environment" (editor U. G. Jorgensen), as Lecture Notes in Physics, vol. 248. It is 450 pages in length and contains the invited reviews from the meeting, approximately as listed in the December 1992 issue of the Newsletter of Peculiar Red Giant Stars (No. 13, p. 14). It is expected to be in print by February 1994, and can be obtained from book stores or directly from Springer. There is also a poster proceedings (Poster Proceedings of IAU Coll. 146, editors P. Thejll and U. G. Jorgensen), printed by the University of Copenhagen, which will be available directly from U. G. Jorgensen (see address under WG Organizing Committee, this issue), also by February 1994.

FIRST ANNOUNCEMENT

Workshop on

LABORATORY AND ASTRONOMICAL HIGH RESOLUTION SPECTRA

29 August - 2 September 1994, Brussels, Belgium

in honour of the 150th birthday of Charles FIEVEZ
(13 May 1844 - 2 February 1890),
the pioneer of astronomical spectroscopy in Belgium

Scientific Organizing Committee

Arpigny (Liege), G. Blanquet (Namur), L. Delbouille (Liege), C. B. Farmer (Pasadena), A. Fayt (Louvain-la-Neuve), N. Grevesse (Liege), G. Guelachvili (Paris), M. Herman (Bruxelles), S. Johansson (Lund), U. G. Jorgensen (Copenhagen), D. L. Lambert (Texas), A. J. Sauval (Bruxelles)

Aim of the Workshop

The Workshop intends to be a very specialized meeting which will bring together laboratory and astronomical spectroscopists. Nowadays, all over the world, only a very limited number of spectroscopic laboratories exist which are interested in astrophysics. However lots of laboratory spectra are yet to be produced and studied, even for light elements and for common diatomic molecules. Experimental (atomic and molecular) spectroscopists have to be stimulated and motivated by astronomical spectroscopists to study spectra of astrophysical interest as yet unknown in the laboratory.

The workshop is especially open to:

- all interested (atomic or molecular) LABORATORY SPECTROSCOPISTS who want to learn a lot about astronomical spectra and who wish to help in the identification of astronomical spectra.

- ASTROPHYSICISTS who are actively working in the domain of high spectral resolution (observation, measurements, line identification of astronomical spectra).

In order to have an efficient and fruitful Workshop, we have restricted the topics to THE ACQUISITION, MEASUREMENT, AND ANALYSIS of high resolution spectra in the whole spectral range (ultraviolet, visible, infrared, microwave and radio): the accurate measurement of LINE POSITIONS and INTENSITIES in observed (FTS, ...) spectra, the determination of energy levels and spectroscopic constants, and line identification in astronomical spectra.

The main purpose of the Workshop is to set up a discussion between laboratory and astronomical spectroscopists about specific problems related to high-resolution spectra such as the need for laboratory spectra which will help astronomical spectroscopists and the question of unidentified lines in astronomical spectra. As an example we mention the infrared solar spectrum, where some 20% of the lines remain unidentified.

We wish to stimulate experimental work at high spectral resolution in order to help astrophysicists. Among such work let us cite the measurement of high-excitation lines from as yet unobserved levels, and transitions in specific spectral regions of neutral elements and diatomic molecules.

Main Topics

. New Instrumental techniques (FTS, heterodyne, laser, tunable, ... spectroscopy)
. High resolution (atomic and molecular) spectra of astronomical interest
. Very high resolution SOLAR spectroscopy: atlases and line identification
. High resolution ASTRONOMICAL spectra:
stars of different spectral types - planetary atmospheres - comets - interstellar medium - ...

The final session is expected to lead to a list of priorities of spectroscopic work which is urgently needed to settle several astrophysical problems.

Spectra related to the Earth's atmosphere are beyond the scope of this Workshop.

Date and Venue

Many astronomers will probably attend the General Assembly of the International Astronomical Union at The Hague (The Netherlands) in the second half of August. We therefore decided to hold the meeting just after the General Assembly, i.e. 29 August - 2 September 1994. We hope that these dates will also be suitable to interested laboratory spectroscopists. The meeting is being organized by the Royal Observatory of Belgium in Brussels, which is only about 200 km south of The Hague. The exact venue is yet to be decided.

Scientific organization

There will be invited reviews, posters, and a limited number of contributed papers. Ample time will be made available for the display and discussion of poster papers.

Important dates

1 February 1994:	return the pre-registration form
1 May 1994:	second announcement
1 June 1994:	deadline for poster abstracts
29 August 1994:	start of Workshop

Poster/Contributed papers

Please send an abstract (max. 1 page) of the paper you wish to present. Plain ASCII files, LaTeX files sent by e-mail, or a paper copy are acceptable. Please include the title, name and affiliation of the author(s). The deadline for the abstracts is 1 June 1994. The Scientific Organizing Committee will decide which papers will be accepted as contributed papers.

Further announcements

A second announcement will be sent to all persons who express interest by responding to this first announcement. A registration form, information about the exact venue, accommodation, transport, social events, proceedings and the preliminary programme will be included with the second announcement.

Local Organizing Committee

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IV. MEETINGS

March 22-23, 1994
Hydrogen Deficient Stellar Systems
Scotland, UK
Contact: C.S. Jeffery
csj@st-and.ac.uk

June, 1994
12th International Conference on Spectral Line Shapes
Toronto, Canada
Contact: Dr. A.D. May
Univ. Toronto

August 15-18, 1994
Stellar Populations
The Hague, The Netherlands
Contact: Piet C. van der Kruit
vdkruit@astro.rug.nl

August 15-27, 1994
IAU General Assembly
The Hague, The Netherlands

August 29 - September 2, 1994
Laboratory and Astronomical High Resolution Spectra
Brussels, Belgium
Contact: A. Jacques Sauval
jacques@astro.oma.be

V. THE WG ORGANIZING COMMITTEE

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