A PECULIAR NEWSLETTER

Newsletter of the IAU Working Group on Ap and related Stars
(IAU Comissions 25, 27, 29 and 45)

A very specialized astronomical circular
founded in Vienna at JD 2 443 793.917

Issue No 29

May 12, 1998

Editor: Pierre NORTH
Institut d'Astronomie de l'Université de Lausanne
CH-1290 Chavannes-des-Bois, Switzerland
pierre.north@obs.unige.ch

Contents

1 From the Editor:

The 26th meeting and workshop of the European Working Group on CP stars, which has taken place in October 27–29, 1997 in Vienna, was a success. Over 70 participants attended, and many expressed the wish that such an experience be renewed e.g. every two years. Others pointed out, however, that the very success of this meeting was partly due to the fact that enough time has elapsed since the last IAU Colloquium dedicated to CP stars (Trieste 1992), so that really new results could be presented. A short time after the end of our meeting, Werner Weiss has proposed the idea of an IAU Symposium which would take place during the next (24th) General Assembly of the IAU in Manchester, in 2000. This project is now being taking shape, especially through Dr. Takada-Hidai, president of the IAU Working Group on CP stars.

In this issue, I have separated the abstracts received recently from those of the Vienna meeting, because the proceedings of the latter are very close to being published. I have hesitated to include them, but did so thinking they might be of interest, especially to the few readers who receive only the printed version of this newsletter; in any case, they will perhaps encourage some to order the proceedings.

In the html version on the Web, it will be possible to access to the whole paper (in postscript format), which has been submitted to the Los Alamos e-print archive, at least for the invited and contributed papers. At the time of writing, I think this issue will be released before every poster is available on the e-print archive, in order not to delay it further. The html version will be completed by adding the relevant links, and this should last no more than a week or so. The choice of posting each contribution to the e-print archive was essentially motivated by complaints of some people who feared that their contribution would not get the visibility it deserves, by being published in the Contributions of the Astronomical Observatory Skalnaté Pleso rather than in ASP Conf. Series. I hope this solution will satisfy them.

2 Table of abstracts published in this issue (Vienna meeting not included):

6.2.3 Posters

Particle diffusion in atmospheres of CP stars

A. Aret, A. Sapar

Tartu Observatory, EE2444 Tõravere, Estonia

We give concisely the formulae governing diffusion of chemical elements and their isotopes in quiescent stellar atmospheres, due to electrostatic, gravitational and radiation fields and to impacts between particles. Isotope segregation of heavy elements due to light-induced drift is emphasized.

The unusual A-star VW Ari: chemical composition revisited

I.V. Chernyshova, S.M. Andrievsky, V.V. Kovtyukh, D.E. Mkrtichian

Department of Astronomy, Odessa State University, Shevchenko Park, 270014, Odessa, Ukraine

Seven high-resolution and high S/N CCD spectra were used to derive elemental abundances in the atmosphere of VW Ari A (T_{eff}=7200, *log g*=3.7) which is the primary component of a visual binary system. The synthetic spectrum technique applied in the analysis allowed to reveal the following feature: the atmosphere of this star is strongly deficient in some metals, while light elements have solar-like abundances. Taking into account these results, one can suggest that VW Ari A is a λ Boo-type star. Another argument supporting this supposition is the following: on the diagrams "$(b-y)-c_1$", "$(b-y)-m_1$" and "$(b-y)-\beta$" (Paunzen et al. 1997) VW Ari A falls exactly in the region occupied by the λ Boo stars.

Note also, that a previous analysis (Andrievsky et al. 1995) has shown that the secondary component of VW Ari has a normal metallicity. Differences in chemical compositions of the two components appear to be due to the specific evolution of the primary VW Ari A.

Stark broadening parameter regularities and interpolation and critical evaluation of data for CP star atmospheres research: Stark line shifts

Milan S. Dimitrijević , Dragana Tankosić

Astronomical Observatory, Volgina 7, 11000 Belgrade, Serbia, Yugoslavia

In order to find out if regularities and systematic trends found to be apparent among experimental Stark line shifts allow the accurate interpolation of new data and critical evaluation of experimental results, the exceptions to the established regularities are analysed on the basis of critical reviews of experimental data, and reasons for such exceptions are discussed.

We found that such exceptions are mostly due to the situations when: (i) the energy gap between atomic energy levels within a supermultiplet is equal or comparable to the energy gap to the nearest perturbing levels; (ii) the most important perturbing level is embedded between the energy levels of the supermultiplet; (iii) the forbidden transitions have influence on Stark line shifts.

Observations of roAp stars at the Mt. Dushak-Erekdag station of Odessa Astronomical Observatory

T.N. Dorokhova, N.I. Dorokhov

Department of Astronomy, Odessa State University, Odessa 270014 Ukraine

Since 1992, observations of roAp stars have been carried out using the dual-channel photometer attached to the 0.8m telescope, which is situated in Central Asia, at the Mt. Dushak-Erekdag station of Odessa Astronomical Observatory. Some results of observations of γ Equ and of HD 134214 are presented. 5 stars were investigated as roAp candidates. The Fourier spectra of 4 stars did not show any variability in the high-frequency region. The Fourier spectrum of HD 99563 revealed a peak at a frequency f=128.9 c/d and with a semi-amplitude of 3.98 mmag.

Gallium abundances in mercury-manganese stars

M.M. Dworetsky, C.M. Jomaron, C. A. Smith

University College London, Gower Street, London, UK WC1E 6BT

There is a widespread assertion in the literature that the optical Ga lines give much higher abundances than the UV lines. We have determined Ga abundances in HgMn stars taking the observed hyperfine structure of the optical Ga II lines into account. This reduces these abundances to within 0.2 dex of the values from the resonance lines.

Isotopic composition of Hg and Pt in slowly rotating HgMn stars

S. Hubrig[1], F. Castelli[2], G. Mathys[3]

[1] University of Potsdam, Am Neuen Palais 10, D-14469 Potsdam, Germany

[2] CNR-Gruppo Nazionale Astronomia and Osservatorio Astronomico, Via G. Tiepolo 11, I-34131 Trieste, Italy

[3] European Southern Observatory, Casilla 19001, Santiago 19, Chile

Preliminary results from a study of the isotopic compositions of the elements Hg and Pt in a number of HgMn stars are presented. This work represents an improvement over previous studies thanks to the very high spectral resolution available (R = 118 000) and to the new information on wavelengths and atomic structure of Hg II and Pt II.

Radial Velocity Studies of roAp Stars

A.P. Hatzes[1], A. Kanaan[2]

[1] McDonald Observatory, University of Texas, USA

[2] Departamento de Matemática, UFSM, Brazil

We present recent results from our radial velocity (RV) studies of rapidly oscillating Ap (roAp) stars. Our measurements reveal that the pulsational amplitude of these stars depends on the spectral region that is examined. For one star, γ Equ, the pulsational RV amplitude depends on both line strength and atomic species. The elemental difference is most likely related to the abundance patches on the surface of these stars. The line strength difference is interpreted as arising form a height effect in the atmosphere. Ultimately, these measurements may provide valuable diagnostics of the atmospheres of these stars.

Spectrum synthesis of sharp-lined A and B stars

J.D. Landstreet

University of Western Ontario, London, Ontario, Canada, and Observatoire Midi-Pyrénées, Toulouse, France

I have carried out spectrum synthesis of $R = 120,000$ spectra of several A and B stars having $v \sin i$ less than about 6 km s^{-1}. The following conclusions emerge: (1) As T_e descends from 12,000 to 8,000 K, microturbulent velocity ξ deduced from abundance analysis rises steadily from 0 to about 5 km s^{-1}. (2) Stars with $\xi \geq 1$ km s^{-1} show direct evidence in their line profiles of the presence of macroscopic gas motions in the form of line asymmetry (bisector curvature) which grows with increasing ξ. (3) Above $T_e \approx 9000$ K, both weak and strong spectral lines can be modelled with reasonable accuracy by conventional LTE spectrum synthesis with a single assumed model atmosphere, abundance table, $v \sin i$, and an appropriate (constant) value of ξ. (4) In contrast, at $T_e \approx 8,000$ K the weak spectral lines are much narrower than the strong lines. If the synthesis model is constrained in $v \sin i$ and ξ by the weak lines, *no* satisfactory model can be found for the strong spectral lines. Consequently, chemical abundances for such stars based only on strong lines may be significantly in error.

A programme for electron-impact broadening parameter calculations of ionized rare-earth element lines

L. Č. Popović and M. S. Dimitrijević

Astronomical Observatory, Volgina 7, 11000 Belgrade, Serbia, Yugoslavia

In order to provide atomic data needed for astrophysical investigations, a set of electron-impact broadening parameters for ionized rare-earth element lines should be calculated. We are going to calculate the electron-impact broadening parameters for more than 50 transitions of ionized rare-earth elements. Taking into account that the spectra of these elements are very complex, for calculation we can use the modified semiempirical approach – MSE or simplified MSE. Also, we can estimate these parameters on the basis of regularities and systematic trends.

The double-lined spectroscopic binary α Andromedae: orbital elements and elemental abundances

T. Ryabchikova[1], V. Malanushenko[2], S.J. Adelman[3]

[1] Institute of Astronomy, RAS, Moscow, Russia

[2] Crimean Astrophysical Observatory, Nauchny, Crimea, Ukraine

[3] Department of Physics, The Citadel, 171 Moultrie Street, Charleston, SC 29409, USA

We performed a spectroscopic study of the SB2 Mercury-Manganese star α And. Our measurements of the secondary's radial velocities result in improved orbital elements. The secondary shows abundances typical of the metallic-line stars: a Ca deficiency, small overabundances of the iron-peak elements, and 1.0 dex overabundances of Sr and Ba.

Eu III identification and Eu abundance in cool CP stars

T. Ryabchikova[1], **N. Piskunov**[2], **I. Savanov**[3], **F. Kupka**[4]

[1] Institute of Astronomy, RAS, Moscow, Russia
[2] Uppsala Astronomical Observatory, Uppsala, Sweden
[3] Crimean Astrophysical Observatory, Nauchny, Crimea, Ukraine
[4] Institute for Astronomy, University of Vienna, Vienna, Austria

We report the first identification of the Eu III λ 6666.317 line in optical spectra of CP stars. This line is clearly present in the spectra of HR 4816, 73 Dra, HR 7575, and β CrB, while it is marginally present or absent in spectra of the roAp stars α Cir, γ Equ, BI Mic, 33 Lib, and HD 24712.

Search for the ^{3}He isotope in the atmospheres of HgMn stars

I. Stateva[1], **T. Ryabchikova**[2], **I. Iliev**[3]

[1] Institute of Astronomy, blvd. Tzarigradsko shoussee 72, Sofia 1784, Bulgaria
[2] Institute of Astronomy, Pyatnitskaya 48, 109017 Moscow, Russia
[3] NAO - Rozhen, P.O.Box 136, 4700 Smolyan, Bulgaria

No abstract

Atmospheric abundances of CP SB2 star components of equal masses. II. 66 Eridani

A.V. Yushchenko[1], **V.F. Gopka**[1], **V.L. Khokhlova**[2], **F.A. Musaev**[3], **I.F. Bikmaev**[4]

[1] Odessa Astronomical Observatory, Odessa, Ukraine
[2] Institute of Astronomy, Moscow, Russia
[3] Special Astrophysical Observatory, Zelenchuck, Russia
[4] Kazan State University, Kazan, Russia

We report the results of abundance determination for the components of the SB2 star 66 Eri (M_A/M_B=0.97) from high resolution CCD echelle spectra with S/N$\geq$100 taken with the 1-m telescope of Special Astrophysical Observatory (Zelenchuck, Rüssia). The atmospheric parameters of the components were determined using all available photometric, spectrophotometric and spectral data. The abundances of 27 elements were found. The abundances of components are different. The B component, previously classified as an Hg-Mn star, does not show anomalies typical of this group such as deficit of He, Al and excess of P, Ga but shows overabundances of heavy elements which amount up to 4-5 dex. The A component also shows moderate Mn and Ba excess. Lines of other heavy elements were not detected. Estimates of upper limits to their abundances do not permit to exclude completely the presence of fainter anomalies in the A component either.