

THE MASSIVE STAR NEWSLETTER

formerly known as *the hot star newsletter*

★

No. 96 2006 November–December

eenens@astro.ugto.mx

editor: Philippe Eenens

http://www.astroscu.unam.mx/massive_stars

University of Guanajuato

<ftp://ftp.sron.nl/pub/karelh/UPLOADS/WRBIB/>

Contents of this newsletter

| | |
|---|----|
| Obituary | 1 |
| Abstracts of 12 accepted papers | 3 |
| Abstract of 1 submitted paper | 10 |
| Abstracts of 2 proceedings papers | 10 |
| Abstract of 1 dissertation thesis | 11 |
| Jobs | 12 |
| Meetings | 13 |

Obituary

Virpi Niemela (1936 - 2006)

Born in Helsinki, Finland on Dec. 26, 1936, Virpi moved to Argentina with her family at the age of 17, where she lived most of her life and became a citizen. Her involvement in massive star astrophysics started early in her career, when her mentor was Prof. Jorge Sahade (now 91), with whom she subsequently remained a close collaborator.

It is hard to make a list of Virpi's many contributions throughout her fruitful scientific career. Her work had a strong influence in the field of massive stars and close binary research. Especially interested in systems harbouring Wolf-Rayet (WR) components, she contributed a great deal to our present understanding of WR + O systems, their evolution and interaction with the ISM, and the nature of the most massive WR stars. Equally important was her role in the development of Astronomy in Argentina. She strongly influenced the careers of many students and colleagues, with her deep scientific insight always accompanied by her enthusiasm and passionate attitude toward observational astrophysics (the countless observing runs at CASLEO, CTIO, and La Silla testify to that). After working for many years at the Instituto de Astronomía y Física del Espacio (IAFE, Buenos Aires),

she became a professor at La Plata University and worked at the Facultad de Ciencias Astronomicas y Geofisicas, recently being honoured with a designation as Emeritus Professor. In December 11-14, 2006, an international scientific meeting was held in Carilo (Argentina) in celebration of Virpi's 70th birthday. On that occasion friends, colleagues, and former students from all over the world gathered to show Virpi their friendship, love, and admiration. She was tremendously pleased about having 'her own' conference and made an enormous effort to attend every scientific session (though she wasn't able to join us at the conference dinner, so serious was her medical condition at that time). During the conference two special announcements were made: that Virpi was elected as a Member of the Royal Astronomical Society; and that an asteroid (discovered at El Leoncito, San Juan) was named after her (5289 Niemela); so widely spread was the appreciation for her work and personality. However, few or none of the attendees were aware that it was the very last time her friends would spend with Virpi, and that the long applause given to her at the closing session, with tears in most eyes, was the goodbye to this extraordinary woman. Virpi passed away on December 18, only a few days after the meeting ended.

Virpi is gone, well before her time; we will all terribly miss her. But her work in Astronomy, her enthusiasm, her way of enjoying every new discovery and interpretation of the data, will remain with all of us who had the chance to meet her, learn from her, and work alongside her.

Nidia Morrell
nidia@lcoeps1.lco.cl

★ ★ ★

It was with great tristesse that we all learned of Prof. Virpi Niemala's passing on Monday December 18, 2006, right after the international massive-star meeting that her colleagues and students lovingly and very efficiently organized on December 11-14, 2006 at Carilo, Argentina to honour her 70th birthday. And what a meeting it was! Although somewhat frail, Virpi gave the opening address, modestly (as always) noting the important role Argentina has played in massive-star research over the years, including hosting the first massive-star "beach" (IAU) symposium in Buenos Aires in 1971, which set the pace for so many symposia and other very popular meetings that have since followed. She especially emphasized the influence of her all-time mentor Jorge Sahade (now 91 and in whose honour she was pivotal in honouring his 80th birthday in 1995 at a La Plata meeting that I also had the honour of attending), who back in the 1970s gave her some photographic spectra of gamma Velorum and told her to see if she could find the orbital period. Well, of course she did, and so began her long and fruitful career in astronomy. Now, some 230 papers later, we know a lot more about O and WR stars, thanks to Virpi's dedicated efforts, especially in massive-star binaries, clusters and nebulae. And like Jorge, she has had a tremendous impact on a long list of students that followed her wonderful guidance.

I personally met Virpi back in 1978 in Buenos Aires on my way home from observing at CTIO. It was clear that we had much in common research-wise, and as the visit revealed, also in our approaches. A later stay in 1983 at her gorgeous (but modest) country home, surrounded by huge exotic avocado trees and hibiscus flowers, led to what I consider a pivotal joint ApJ paper in 1984 on the presence of an unresolved binary WR star with a period of 3.771 days right smack in the dense core of the Galactic open cluster and GHR NGC 3603. Little did we know that with the later help of HST and VLT, this star would become the currently most massive star weighed in a binary, along with WR25 in Trumpler 16, which she and her former student Roberto Gamen have recently investigated along with

other colleagues. Later, as the years rolled by and we met at various international meetings, I finally succeeded in having her come to Montreal to work and charm my associates. Needless to say, I couldnt offer exotic, lush avocados waiting to be picked from giant trees (but the bright shiny icicles dangling from her temporary Montreal residence were also exotic in their own way!), but we did manage to prepare another ApJ paper in 1990 with Hugo Maraco on the 4 WC/WO + O binaries known in the Magellanic Clouds. This was based partly on the CCD spectra that Virpi and I obtained together during the last “in-the-dome” run in 1984 at the CTIO 1m telescope, longtime our mutually favourite telescope for this kind of project. A subsequent PhD thesis by Montreal student Peter Bartzakos of all the 25 known WC/WO binaries in the MCs showed that in fact, much to our surprise, there are no more detectable binaries among this subsample of WC/WO stars. The 2 papers coming out of this PhD study were co-authored by Virpi.

I know that Im not alone in saying that I will miss her terribly, both in my daily routine and at international meetings. But her legacy will live on, both in the astronomical literature and the numerous people (including myself) that she has interacted with and influenced over the years.

I offer her my perpetual “besos y abrazos”, the salutation with which we always closed off our correspondences.

Tony Moffat

Montreal, 21 December 2006

Accepted Papers

Towards an understanding of the Of?p star HD191612: Phase-resolved multiwavelength observations

Yael Nazé(1), Gregor Rauw (1), A.M.T. Pollock (2),
Nolan R. Walborn (3), Ian D. Howarth (4)

1=ULg Belgium; 2=ESA; 3=STScI; 4=UCL, UK

We present the analysis of phase-resolved X-ray and optical observations of the peculiar hot star HD191612 (Of?p). This star is known to display line-profile variations that are recurrent with a period of 538d and its spectrum was found to present the signature of a magnetic field. In the X-rays, it is slightly overluminous compared to the canonical L_X/L_{BOL} relation and appears brighter when the optical lines are strongest. Our XMM-Newton observations further reveal that the X-ray spectrum of HD191612 exhibits rather broad lines and is dominated by a ‘cool’ (0.2-0.6 keV) thermal component, two characteristics at odds with the proposed magnetic rotator model. We also report for the first time the low-level variability of the metallic (abs/em) lines and HeII absorptions that appear to be associated with radial-velocity shifts. Finally, we compare our results with observations of the early-type stars and discuss several possible scenarios.

Reference: MNRAS, in press

Comments: 10p, 10 fig

On the web at: <http://arxiv.org/abs/astro-ph/0611230>

Preprints from: naze@astro.ulg.ac.be

New Galactic Wolf-Rayet stars, and candidates. An annex to The VIIth Catalogue of Galactic Wolf-Rayet Stars

Karel A. van der Hucht

(1) SRON Netherlands Institute for Space Research, Sorbonnelaan 2, NL-3584CA Utrecht, the Netherlands E-mail: k.a.van.der.hucht@sron.nl (2) Astronomical Institute Anton Pannekoek, University of Amsterdam, Kruislaan 403, 1097 SJ Amsterdam, the Netherlands

This paper gathers, from the literature and private communication, 72 new Galactic Population I Wolf-Rayet stars and 17 candidate WCLd stars, recognized and/or discovered after the publication of The VIIth Catalogue of Galactic Wolf-Rayet Stars. This brings the total number of known Galactic Wolf-Rayet stars to 298, of which 24 (8%) are in open cluster Westerlund 1, and 60 (20%) are in open clusters near the Galactic Center.

Reference: A&A 458, 453 (2006)

Preprints from: k.a.van.der.hucht@sron.nl

On the hydrogen neutral outflowing disks of B[e] supergiants

Michaela Kraus(1), Marcelo Borges Fernandes(2), Francisco X. de Araujo(3)

(1) Astronomical Institute Ondrejov, Czech Republic, (2) Observatorio do Valongo, Rio de Janeiro, Brazil, (3) Observatorio Nacional, Rio de Janeiro, Brazil

Context: B[e] supergiants are known to possess geometrically thick dusty disks. Disk-forming wind models in the literature have, however, been found to be insufficient in reproducing the observed dust emission. This problem arises due to the severe assumption that, as for classical Be stars, the near-infrared excess emission originates in the disk. Modeling of the free-free and free-bound emission therefore results in an upper limit for the disk mass loss rate as well as for the disk opacity. Dust condensation in the disk can thus severely be hampered. Aims: In order to overcome the dust formation problem, and based on our high-resolution optical spectroscopy and model results, we propose a revised scenario for the non-spherical winds of B[e] supergiants: a normal B-type line-driven polar wind and an outflowing disk-forming wind that is neutral in hydrogen at, or very close to the stellar surface. Methods: We concentrate on the pole-on seen LMC B[e] supergiant R126 and calculate the line luminosities of the optical [OI] emission lines and their emergent line profiles with an outflowing disk scenario. In addition, we compute the free-free and free-bound emission from a line-driven polar wind and model the spectral energy distribution in the optical and near-infrared. Results: Good fits to the [OI] line luminosities are achieved for an outflowing disk that is neutral in hydrogen right from the stellar surface. Neutral thereby means that hydrogen is ionized by less than 0.1%. Consequently, the free-free and free-bound emission cannot (dominantly) arise from the disk and cannot limit the disk mass loss rate. The hydrogen neutral outflowing disk scenario therefore provides an ideal environment for efficient dust formation. The spectral energy distribution in the optical and near-infrared range can be well fitted with the stellar continuum plus free-free and free-bound emission from the polar line-driven wind. Our modeling further delivers minimum values for $\dot{M}_{\text{disk}} \gtrsim 2.5 \times 10^{-5} M_{\odot} \text{yr}^{-1}$ and for the density contrast between equatorial and polar wind of ~ 10 .

Reference: A&A (in press)

On the web at: <http://arxiv.org/abs/astro-ph/0611764>

Non-thermal radio emission from O-type stars. II. HD 167971

R. Blomme(1), M. De Becker(2), M.C. Runacres(3),
S. Van Loo(4), D.Y.A. Setia Gunawan(5)

(1) Royal Observatory of Belgium; (2) Institut d'Astrophysique, Liege, Belgium; (3) Vrije Universiteit Brussel, Belgium;
(4) University of Leeds, UK; (5) ATNF, Australia

HD 167971 is a triple system consisting of a 3.3-day eclipsing binary (O5-8 V + O5-8 V) and an O8 supergiant. It is also a well known non-thermal radio emitter. We observed the radio emission of HD 167971 with the Very Large Array (VLA) and the Australia Telescope Compact Array (ATCA). By combining these data with VLA archive observations we constructed a radio lightcurve covering a 20-yr time-range. We searched for, but failed to find, the 3.3-day spectroscopic period of the binary in the radio data. This could be due to the absence of intrinsic synchrotron radiation at the colliding-wind region between the two components of the eclipsing binary, or due to the large amount of free-free absorption that blocks the synchrotron radiation. We are able to explain many of the observed characteristics of the radio data if the non-thermal emission is produced in a colliding-wind region between the supergiant and the combined winds of the binary. Furthermore, if the system is gravitationally bound, the orbital motion occurs over a period of ~ 20 years, or longer, as suggested by the long-term variability in the radio data. We argue that the variability is due to the free-free absorption that changes with orbital phase or may also in part be due to changes in separation, should the orbit be eccentric.

Reference: A&A, in press

On the web at: <http://arxiv.org/abs/astro-ph/0611768>

Preprints from: Ronny.Blomme@oma.be

A Grid of NLTE Line-Blanketed Model Atmospheres of Early B-type Stars

Thierry Lanz¹, Ivan Hubeny²

¹ University of Maryland ² University of Arizona

We have constructed a comprehensive grid of 1540 metal line-blanketed, NLTE, plane-parallel, hydrostatic model atmospheres for the basic parameters appropriate to early B-type stars. The BSTAR2006 grid considers 16 values of effective temperatures, $15,000 \text{ K} \leq T_{\text{eff}} \leq 30,000 \text{ K}$ with 1,000 K steps, 13 surface gravities, $1.75 \leq \log g \leq 4.75$ with 0.25 dex steps, 6 chemical compositions, and a microturbulent velocity of 2 km/s. The lower limit of $\log g$ for a given effective temperature is set by an approximate location of the Eddington limit. The selected chemical compositions range from twice to one tenth of the solar metallicity and metal-free. Additional model atmospheres for B supergiants ($\log g \leq 3.0$) have been calculated with a higher microturbulent velocity (10 km/s) and a surface composition that is enriched in helium and nitrogen, and depleted in carbon. This new grid complements our earlier OSTAR2002 grid of O-type stars (Lanz & Hubeny, 2003, ApJS, 146, 417). The paper contains a description of the BSTAR2006 grid and some illustrative examples and comparisons.

NLTE ionization fractions, bolometric corrections, radiative accelerations, and effective gravities are obtained over the parameter range covered by the grid. By extrapolating radiative accelerations, we have determined an improved estimate of the Eddington limit in absence of rotation between 55,000 and 15,000 K. The complete BSTAR2006 grid is available at the TLUSTY website.

Reference: 2007, ApJS, 169, in press astro-ph/0611891

On the web at: <http://nova.astro.umd.edu>

Preprints from: lanz@astro.umd.edu

The ARAUCARIA Project: VLT-FORS spectroscopy of blue supergiants in NGC 3109 - Classifications, first abundances and kinematics

**C. J. Evans (1), F. Bresolin (2), M. A. Urbaneja (2),
G. Pietrzynski (3,4), W. Gieren (3), R.-P. Kudritzki (2)**

(1) UK Astronomy Technology Centre, Edinburgh; (2) Institute for Astronomy, Hawaii; (3) Universidad de Concepcion, Chile; (4) Warsaw University Observatory, Poland.

We have obtained multi-object spectroscopy of luminous blue supergiants in NGC 3109, a galaxy at the periphery of the Local Group at ~ 1.3 Mpc. We present a detailed catalog including finding charts, V and I magnitudes, spectral classifications, and stellar radial velocities. The radial velocities are seen to trace the rotation curves obtained from studies of the HI gas. From quantitative analysis of eight B-type supergiants we find a mean oxygen abundance of $12+\log(\text{O}/\text{H}) = 7.76 \pm 0.07$ (1-sigma systematic uncertainty), with a median result of 7.8. Given its distance, we highlight NGC 3109 as the ideal example of a low metallicity, dark-matter dominated, dwarf galaxy for observations with the next generation of ground-based extremely large telescopes (ELTs).

Reference: Accepted by ApJ, astro-ph/0612114

On the web at: <http://www.roe.ac.uk/~cje/ngc3109.ps.gz>

Preprints from: cje@roe.ac.uk

An overview of the photometric events, trends and brightenings of eta Carinae

A. M. van Genderen, C. Sterken, W. H. Allen and W. S. G. Walker

(1) Leiden University Observatory, Postbus 9513, NL-2300RA Leiden, The Netherlands (2) Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium (3) Alvine Estate, Vintage Lane, RD 3, Blenheim, New Zealand (4) 272 Heath Road, Awanui R D 1, New Zealand 0451

Using new and archived ground-based optical and near-infrared photometry (covering more than three decades) and space-based (HST) narrow-band photometry, we document the morphological character of optical and near-infrared photometric features at seven periastron passages of eta Carinae, of the secular brightening 1952-1998, of the brightening episodes after the 1997.9 and 2003.5 events, and of two types of UV oscillations, with the purpose of getting some insight in the causes of these variations.

The optical peaks could be the climax of the expansion phase of the primary due to tidal effects. The dips can be explained by obscuration of the secondary's circumstellar structure by the (polar) wind of

the primary. The wavelength dependency of the rates of the slow secular brightening (1952-1997.9), and of the fast brightenings of the central star and Homunculus after the 1997.9 and 2003.5 events are investigated. The brightenings can be interpreted as an extinction decrease with an extinction law $R \sim 5$.

The primary's luminosity and mass-loss rate were likely stable over the last 35 year. The long-term UV oscillations are interpreted as revolution-modulated H-emission variation in the equatorial plane, whereas the short-term UV oscillations are due to stellar pulsations.

Reference: The Journal of Astronomical Data 2006, Volume 12, 3

On the web at: <http://www.vub.ac.be/STER/JAD/JAD12/jad12.htm>

Preprints from: csterken@vub.ac.be

Light variations of alpha Cygni variables in the Magellanic Clouds

A. M. van Genderen, A. Jones and C. Sterken

(1) Leiden University Observatory, Postbus 9513, NL-2300RA Leiden, The Netherlands (2) Ranui Road, Nelson, New Zealand (3) Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

We present time-series monitoring of 19 Magellanic Cloud super- and hypergiants, among which 13 alpha Cygni variables, viz.: S18 = AzV154, HDE268835 = R66, HD37974 = R126, HDE268757 = R59, HDE268822 = GV505, HDE269355 = GV258, HDE269612 = GV322, HDE270025 = GV439, AzV121, HD5277 = AzV136 = R10, AzV197, AzV310 = R26 and AzV369; the LMC stars HD32034 = GV80 = R62, HDE268819 = GV91, HDE269661 = GV346 = R111, HDE269697 = GV352, HDE269953 = GV423 = R150 and HDE270111 = GV460.

Reference: The Journal of Astronomical Data 2006, Volume 12, 4

On the web at: <http://www.vub.ac.be/STER/JAD/JAD12/jad12.htm>

Preprints from: csterken@vub.ac.be

Hydrodynamic Processes of Angular Momentum Transport in the Interior of a Rotating Massive Hydrogen-Burning Star.

Staritsin E.I.

Astronomical Observatory, Ural State University, Russia

The evolution of a rotating star with a mass of $16M_{\odot}$ at the hydrogen burning phase is considered together with the hydrodynamic processes of angular momentum transport in its interior. Shear turbulence is shown to limit the amplitude of the latitudinal variations in mean molecular weight on a surface of constant pressure in a layer with variable chemical composition. The resulting nonuniformity in the mean molecular weight distribution and the turbulent energy transport along the surface of constant pressure reduce the absolute value of the meridional circulation velocity. Nevertheless, meridional circulation remains the main mechanism of angular momentum transport in the radial direction in a layer with variable chemical composition. The intensity of the processes of angular momentum transport by meridional circulation and shear turbulence is determined by the angular momentum of the star. At a fairly high angular momentum, more specifically, at $J = 3.69 \times 10^{52} g \cdot cm^2/s$, the star

during the second half of the hydrogen-burning phase in its convective core has characteristics typical of classical early Be stars.

Reference: *Astronomy Letters*, 2007, Vol.33, No.2

Preprints from: Eugenij.Staritsin@usu.ru

Time-series photometry of the open cluster NGC1817

M. Y. Bouzid¹, C. Sterken¹, T. Arentoft², L. M. Freyhammer³ and S. Frandsen²

(1) Vrije Universiteit Brussel, Pleinlaan 2, B-1050 Brussels, Belgium (2) Department of Physics and Astronomy, University of Aarhus, DK-8000 Aarhus C Denmark (3) Centre for Astrophysics, University of Central Lancashire, Preston, PR1 2HE, UK

We present light curves of 321 stars in the open cluster NGC1817. The data were obtained in a search for pulsating stars, mainly of the delta Scuti type, using CCD observations collected at the Nordic Optical Telescope at La Palma, Spain. 12 delta Scuti stars (11 of which could be confirmed as cluster members), 2 variables of unknown type and 2 eclipsing binary systems were found.

We describe the observations, data reduction and colour-transformation procedures, and give the resulting light curves in tabular form. We also present sets of B and V stacked images obtained at low air masses.

Reference: *The Journal of Astronomical Data* 2006, Vol. 12, 2

On the web at: <http://www.vub.ac.be/STER/JAD/JAD12/jad12.htm>

Preprints from: csterken@vub.ac.be

Searching for hidden Wolf-Rayet stars in the Galactic Plane - 15 new Wolf-Rayet stars

L. J. Hadfield (1), S. D. Van Dyk (2), P. W. Morris (3), J. D. Smith (4), A. P. Marston (5) and D. E. Peterson (6)

(1) University of Sheffield, (2) Spitzer Science Center, (3) NASA Herschel Science Center, (4) Steward Observatory, (5)ESA/ESAC, (6) University of Virginia.

We report the discovery of fifteen previously unknown Wolf-Rayet (WR) stars found as part of an infrared broad-band study of candidate WR stars in the Galaxy. We have derived an empirically-based selection algorithm which has selected ~ 5000 WR candidate stars located within the Galactic Plane drawn from the GLIMPSE (mid-infrared) and 2MASS (near-infrared) catalogues. Spectroscopic follow-up of 184 of these reveals eleven WN and four WC-type WR stars. Early WC subtypes are absent from our sample and none show evidence for circumstellar dust emission. Of the candidates which are not WR stars, ~ 120 displayed hydrogen emission line features in their spectra. Spectral features suggest that the majority of these are in fact B supergiants/hypergiants, ~ 40 of these are identified Be/B[e] candidates.

Here, we present the optical spectra for six of the newly-detected WR stars, and the near-infrared spectra for the remaining nine of our sample. With a WR yield rate of $\sim 7\%$ and a massive star

detection rate of $\sim 65\%$, initial results suggest that this method is one of the most successful means for locating evolved, massive stars in the Galaxy.

Reference: MNRAS ; astro-ph/0612574

Comments: Full version available by anonymous ftp (ftp:astro1.shef.ac.uk, /pub/lh/hadfield.ps.gz)

Preprints from: l.hadfield@sheffield.ac.uk

Early-type stars in the core of the young open cluster Westerlund 2

G. Rauw¹, J. Manfroid¹, E. Gosset¹, Y. Nazé¹, H. Sana^{2,1},
M. De Becker¹, C. Foellmi^{3,2}, A.F.J. Moffat⁴

1 - Institut d'Astrophysique et de Géophysique, Université de Liège, Allée du 6 Août, Bât B5c, 4000 Liège, Belgium

2 - European Southern Observatory, Alonso de Cordova 3107, 19 Vitacura, Santiago, Chile

3 - Observatoire de Grenoble, 414, Rue de la Piscine, BP 53, 38041 Grenoble, France

4 - D'épartement de Physique, Université de Montréal, QC, H3C 3J7, and Observatoire du Mont Mégantic, Canada

The properties of the early-type stars in the core of the Westerlund 2 cluster are examined in order to establish a link between the cluster and the very massive Wolf-Rayet binary WR20a as well as the H II complex RCW49. Photometric monitoring as well as spectroscopic observations of Westerlund 2 are used to search for light variability and to establish the spectral types of the early-type stars in the cluster core. The first light curves of the eclipsing binary WR20a in B and V filters are analysed and a distance of 8 kpc is inferred. Three additional eclipsing binaries, which are probable late O or early B-type cluster members, are discovered, but none of the known early O-type stars in the cluster displays significant photometric variability above 1% at the $1\text{-}\sigma$ level. The twelve brightest O-type stars are found to have spectral types between O3 and O6.5, significantly earlier than previously thought. The distance of the early-type stars in Westerlund 2 is established to be in excellent agreement with the distance of WR20a, indicating that WR20a actually belongs to the cluster. Our best estimate of the cluster distance thus amounts to 8.0 ± 1.4 kpc. Despite the earlier spectral types, the currently known population of early-type stars in Westerlund 2 does not provide enough ionizing photons to account for the radio emission of the RCW49 complex. This suggests that there might still exist a number of embedded early O-stars in RCW49.

Reference: astro-ph/0612622

On the web at: <http://arxiv.org/abs/astro-ph/0612622>

Preprints from: rauw@astro.ulg.ac.be

Pismis 24-1: The Stellar Upper Mass Limit Preserved

J. Maíz Apellániz, Nolan R. Walborn, N. I. Morrell, V. S. Niemela, and E. P. Nelan

IAA-CSIC, STScI, LCO, UNLP, and STScI

Is there a stellar upper mass limit? Recent statistical work seems to indicate that there is and that it is in the vicinity of 150 solar masses. In this paper we use HST and ground-based data to investigate the brightest members of the cluster Pismis 24, which was previously inferred to have a mass greater than 200 solar masses, in apparent disagreement with that limit. We determine that Pismis 24-1 is composed of at least three objects, the resolved Pismis 24-1SW and the unresolved spectroscopic binary Pismis 24-1NE. The evolutionary zero-age masses of those two objects and that of the nearby Pismis 24-17 are all approximately 100 solar masses, very large but under the stellar upper mass limit.

Reference: Submitted to ApJ

On the web at: <http://arxiv.org/abs/astro-ph/0612012>

Preprints from: jmaiz@iaa.es

Proceedings

Evolution of the first stellar generations

Hirschi, R.¹, Maeder, A.², Meynet, G.², Chiappini, C.^{2,3}, Ekström, S.²

¹ University of Basel, ² Geneva Observatory, ³ Trieste Observatory

Although the theoretical study of very low metallicity (Z) and metal-free stars is not new, their importance has recently greatly increased since two related fields have been developing rapidly. The first is cosmological simulations of the formation of the first stars and of the reionisation period. The second is the observations of extremely metal poor stars. In this paper, we present pre-supernova evolution models of massive rotating stars at very low Z ($Z=1e-8$) and at $Z=0$. Rotation has a strong impact on mass loss and nucleosynthesis. Models reaching break-up velocities lose up to ten percents of their initial mass. In very low Z models, rotational and convective mixing enhances significantly the surface content in carbon, nitrogen and oxygen (CNO) when the star becomes a red supergiant. This induces a strong mass loss for stars more massive than about 60 solar masses. Our models predict type Ib,c supernovae and gamma-ray bursts at very low Z . Rotational mixing also induces a large production of CNO elements, in particular of primary nitrogen. The stellar wind chemical composition is compatible with the most metal-poor star known to date, HE 1327-2326, for CNO elements. Our models reproduce the early evolution of nitrogen in the Milky Way.

Reference: "Chemodynamics: from the first stars to local galaxies ...", Lyon, France, 10-14 July 2006

On the web at: <http://arxiv.org/abs/astro-ph/0610741>

Preprints from: raphael.hirschi@unibas.ch

Multiwavelength Systematics of OB Spectra

Nolan R. Walborn

Space Telescope Science Institute

The systematics of OB spectra are reviewed in the optical domain, dominated by photospheric lines, and in the far ultraviolet (both IUE and FUSE ranges), in which the stellar-wind profiles dominate. First, the two-dimensional (temperature, luminosity) trends in normal spectra are surveyed. Then, the normal reference frame having been established, various categories of peculiar objects can be distinguished relative to it, which reveal several phenomena of structural and/or evolutionary significance. Included are CNO anomalies at both early and late O types, three varieties of rapid rotators, hot and cool Of/WN transition objects, and the recently discovered second known magnetic O star. The importance of both optical and UV observations to understand these phenomena is emphasized; for instance, progress in understanding the structure of the new O-type magnetic oblique rotator is hampered by the current lack of a UV spectrograph. While progress in the physical interpretation of these trends and anomalies has been and is being made, increased attention to modeling the systematics would accelerate future progress in this author's opinion. Finally, preliminary results from a Chandra high-resolution survey of OB X-ray spectra (PI W. Waldron) are presented. They provide evidence that, just as emerged earlier in the UV, systematic morphological trends exist in the X-ray domain that are correlated with the optical spectral types, and hence the fundamental stellar parameters, contrary to prevailing opinion.

Reference: Proceedings, IAU XXVIth GA JD04 - THE ULTRAVIOLET UNIVERSE: STARS FROM BIRTH TO DEATH, ed. Ana I. Gomez de Castro & Martin A. Barstow (Universidad Complutense de Madrid)

On the web at: <http://arxiv.org/abs/astro-ph/0610837>

Preprints from: walborn@stsci.edu

Thesis

Estudio de binarias eclipsantes de gran masa

Eduardo Fernandez Lajus

Facultad de Ciencias Astronomicas y Geofisicas Universidad Nacional de La Plata, Argentina

Las estrellas más masivas y luminosas, de tipo espectral O, son objetos poco frecuentes tanto en nuestra y otras galaxias. Dada su gran luminosidad, son objetos detectables en galaxias cercanas y por lo tanto es posible encarar su estudio en forma individual. Para poder abordar los problemas astrofísicos vinculados a las estrellas de gran masa en otras galaxias (y por ende en regiones con diferentes abundancias químicas), es muy importante, como primer paso, determinar las propiedades fundamentales de estos objetos en la Vía Láctea. La masa es una de esas propiedades fundamentales, y es la que determina la evolución de una estrella. Para confrontar modelos de evolución estelar con datos observacionales, se necesitan valores empíricos confiables, en especial de masas y radios estelares. Este tipo de datos todavía es muy escaso para las estrellas más masivas, y para estimarlos, hacen falta estudios de sistemas binarios espectroscópicos eclipsantes. Pero en nuestra galaxia sólo se conocen

menos de una decena de estas binarias, cuyas componentes no hayan evolucionado más allá de la secuencia principal.

Por ello, esta tesis consiste en un estudio de cuatro binarias eclipsantes de gran masa con componentes de tipo O en la secuencia principal: LS1135, FO15, CPD -59 2603 y CPD -59 2635. Presentamos nuevas curvas de luz y, junto con los datos de velocidades radiales obtenidos de la literatura, generamos modelos numéricos con el código de Wilson-Devinney, para determinar sus parámetros fundamentales como masa, radio, luminosidad, distancia, etc. La determinación de los parámetros fundamentales de estas cuatro binarias eclipsantes de tipo O, aumenta significativamente el número de estos sistemas con parámetros físicos empíricamente determinados. Reafirmamos que tres de estas binarias (FO15, CPD -59 2603, CPD -59 2635) se encuentran en el joven cúmulo abierto Trumpler 16, en la Gran Nebulosa de Carina, que constituye uno de los más destacados complejos de formación estelar activa de nuestra galaxia, y que en estos tres sistemas, los radios estelares, y por lo tanto también las luminosidades, son más pequeños que los de las estrellas "normales" tipo O, pero similares a las estrellas tipo O de la ZAMS. Esto también estaría de acuerdo con la pertenencia de estos objetos a la Gran Nebulosa de Carina, y sería la primer evidencia de que las estrellas jóvenes de la ZAMS, son más pequeñas y menos luminosas.

Reference: PhD Thesis, Facultad de Ciencias Astronomicas y Geofisicas Universidad Nacional de La Plata, Argentina

Comments: Full text in Spanish

On the web at: <http://lilen.fcaglp.unlp.edu.ar/~eflajus/tesis.pdf>

Preprints from: eflajus@fcaglp.unlp.edu.ar

| |
|------|
| Jobs |
|------|

Postdoctoral Research Position

Douglas Gies

GEORGIA STATE UNIVERSITY Dept. of Physics and Astronomy P. O. Box 4106 Atlanta, Georgia 30302-4106 U.S.A. Tel: (404) 651-1366 FAX: (404) 651-1389

Applications are invited for a postdoctoral research position in the Center for High Angular Resolution Astronomy (CHARA) and Department of Physics and Astronomy at Georgia State University. The successful applicant will work with Dr. Douglas Gies and collaborators on observational and computational studies of massive stars. Current projects include spectroscopic and interferometric studies of massive binaries, Be stars, and rapidly rotating stars. Observational and/or computational experience in these areas would be useful. CHARA operates the CHARA Array, an optical/IR interferometer consisting of six 1.0-m telescopes, located at Mount Wilson, California. We expect the appointee will work at Mount Wilson most of the time and will partially support the research effort there. The initial appointment is for one year, renewable to a total of three years. Curriculum vitae, a bibliography, a one-page summary of research interests, and names of three references (plus contact information) should be sent to Professor Gies at the above address. The deadline for receipt of these materials is 31 January 2007. AAE/EEO.

Email contact: gies@chara.gsu.edu

Closing date: 31 January 2007

| |
|----------|
| Meetings |
|----------|

IAU Symposium 250: Massive Stars as Cosmic Engines

10-14 December 2007

Kauai, Hawaii

IAU Symposium 250 will focus on how massive stars shape the Universe, from the nearby Universe to high-redshift galaxies and the first generation of stars. The key astrophysical problems for the symposium are:

Atmospheres of massive stars; Physics and evolution of massive stars; Massive stellar populations in the nearby Universe; Hydrodynamics and feedback from massive stars in galaxy evolution; Massive stars as probes of the early Universe.

Confirmed review speakers include Andre Maeder, Joachim Puls, Paul Crowther, Stan Owocki, Phil Massey, Tony Moffat, Georges Meynet, Norbert Langer, Adam Burrows, Andrew MacFadyen, Bryan Gaensler, Raphael Hirschi, Don Figer, Fabio Bresolin, Eva Grebel, Rolf Kudritzki, Rosa Gonzalez-Delgado, You-Hua Chu, Mike Dopita, Francesca Matteucci, Max Pettini, Yoshi Taniguchi, Johan Fynbo, Volker Bromm, Sandro D'Odorico.

Weblink: <http://www.ifa.hawaii.edu/iau250>

Email contact: Paul.Crowther@sheffield.ac.uk

Other meetings of interest

X-ray Grating Spectroscopy: Kinematics and Conditions in Hot Gas

Date: Wednesday, 11 July 2007 - Friday, 13 July 2007

Location: Cambridge, MA

Web Site: <http://cxc.harvard.edu/xgratings07>

Space Astronomy: The UV window to the Universe (Dedicated to Willem Wamsteker)

Date: Monday, 28 May 2007 - Friday, 1 June 2007

Location: El Escorial, Madrid

Web Site: <http://www.mat.ucm.es/UVConf>

From Massive Stars to Supernova Remnants

Date: Monday, 6 August 2007 - Friday, 17 August 2007

Location: Leiden, The Netherlands

Web Site: <http://www.lorentzcenter.nl/lc/web/2007/249/info.php3?wsid=249>