ISSN 1783-3426

THE MASSIVE STAR NEWSLETTER

formerly known as the hot star newsletter

*

No. 134 2013 March-April

Editors: Philippe Eenens (University of Guanajuato) eenens@gmail.com

Raphael Hirschi (Keele University) http://www.astroscu.unam.mx/massive_stars

CONTENTS OF THIS NEWSLETTER:

PAPERS

Abstracts of 12 accepted papers

Self Regulated Shocks in Massive Star Binary Systems

E. R. Parkin (1) & S. A. Sim (1,2)

(1) Research School of Astronomy and Astrophysics, The Australian National University, Australia
(2) Astrophysics Research Centre, School of Mathematics and Physics, Queen's University Belfast, Belfast

In an early-type, massive star binary system, X-ray bright shocks result from the powerful collision of stellar winds driven by radiation pressure on spectral line transitions. We examine the influence of the X-rays from the wind-wind collision shocks on the radiative driving of the stellar winds using steady state models that include a parameterized line force with X-ray ionization dependence. Our primary result is that X-ray radiation from the shocks inhibits wind acceleration and can lead to a lower pre-shock velocity, and a correspondingly lower shocked plasma temperature, yet the intrinsic X-ray luminosity of the shocks, LX remains largely unaltered, with the exception of a modest increase at small binary separations. Due to the feedback loop between the ionizing X-rays from the shocks and the wind-driving, we term this scenario as self regulated shocks. This effect is found to greatly increase the range of binary separations at which a wind-photosphere collision is likely to occur in systems where the momenta of the two winds are significantly different. Furthermore, the excessive levels of X-ray ionization close to the shocks completely suppresses the line force, and we suggest that this may render radiative braking less effective. Comparisons of model results against observations reveals reasonable agreement in terms of log(LX/Lbol). The inclusion of self regulated shocks improves the match for kT values in roughly equal wind momenta systems, but there is a systematic offset for systems with unequal wind momenta (if considered to be a wind-photosphere collision).

Reference: ApJ, in press
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2013arXiv1302.6228P

Comments: 16 pages, 13 figures

Email: parkin@mso.anu.edu.au

Back to contents

Blue supergiant progenitor models of Type II supernovae

D. Vanbeveren, N. Mennekens, W. Van Rensbergen, C. De Loore

Astrophysical Institute, Vrije Universiteit Brussel

In the present paper we show that within all the uncertainties that govern the process of Roche lobe overflow in Case Br type massive binaries, it can not be excluded that a significant fraction of them merge and become single stars. We demonstrate that at least some of them will spend most of their core helium burning phase as hydrogen rich blue stars, populating the massive blue supergiant region and/or the massive Be type star population. The evolutionary simulations let us suspect that these mergers will explode as luminous hydrogen rich stars and it is tempting to link them to at least some super luminous supernovae.

Reference: A&A (in press)
Status: Manuscript has been accepted

Weblink: arXiv: 1212.4285

Email: dvbevere@vub.ac.be

Back to contents

The Photometric variability of the WC9-type Wolf-Rayet star WR 103

A.M. van Genderen1^1, S.R.G. Veijgen2^1, K.A. van der Hucht3^{2,3}

1 - Leiden Observatory, Leiden University, Postbus 9513, 2300RA Leiden, The Netherlands;
2 - Leiden Observatory, Leiden University, Postbus 9513, 2300RA Leiden, The Netherlands;
3 - SRON Netherlands Institute for Space Research, Sorbonnelaan 2, 3584CA Utrecht, The Netherlands, and Astronomical Institute Anton Pannekoek, University of Amsterdam, Science Park 904, 1098XH Amsterdam, The Netherlands

We discuss a collection of archival multi-colour photometric data of the variable WC9-type Wolf-Rayet star WR 103 = HD 164270 observed over a time interval of eleven years. The photometric systems used are Walraven $VBLUW$, Bessel UBV and Strömgren $uvby$. The purpose is to search for periodicity and to disentangle continuum and line emission variations.

The star turns out to be stochastically variable in all time intervals under considerations. The time scale of the variations hovers between a few hours to a few days. The continuum light amplitude varies from sim~0fm1 in the visual to sim~0fm2 in the UV.
Emission-line variations at the level of
1--5% are detectable in all pass bands, but are largest in the Strömgren b and Walraven V filters, due to the prominent presence of the C{sc iii} emission lines (blended with a much weaker O{sc ii} line) at 4650 and 5696 AA emission lines, respectively.

The relative large light amplitude of WR 103 resembles that of WN8-type stars; a possible link between the two is discussed.
Stellar (multi-mode) pulsations are likely the cause of the photometric variability.

We also discuss the exceptional status of WR,103 within the class of WC9-type stars which are almost

photometrically stable.

A striking phenomenon observed for the first time in WR 103: a three days lasting flux enhancement of the C{sc iii} line by at least 10% was observed in August 1998. Such strong spectroscopic flare-like events are very seldom observed in WR stars. So far, the one of WR,103 had the longest duration ever observed.

Reference: Astrophys. Space Sci, 2013,
Status: Manuscript has been accepted

Weblink: http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s10509-013-1381-x

Email: genderen@strw.leidenuniv.nl

Back to contents

Spectral modelling of massive binary systems

M. Palate(1), G. Rauw(1), G. Koenigsberger(2), & E. Moreno(3)

(1)Institut d'Astrophysique & Geophysique, Liege, Belgium
(2)Instituto de Ciencias Fisicas, Universidad Nacional Autonoma de Mexico, Cuernavaca, Mexico
(3)Instituto de Astronomia, Universidad Nacional Autionoma de Mexico, Mexico D.F., Mexico

Context: The spectra of massive binaries may be affected by interactions between the stars in the system. These are believed to produce observational phenomena such as the Struve-Sahade effect.
Aims: We simulate the spectra of massive binaries at different phases of the orbital cycle, accounting for the gravitational influence of the companion star on the shape and physical properties of the stellar surface.
Methods: We used the Roche potential modified to account for radiation pressure to compute the stellar surface of close circular systems. We further more used the tidal interactions with dissipation of energy through shear code for surface computation of eccentric systems. In both cases, we accounted for gravity darkening and mutual heating generated by irradiation to compute the surface temperature. We then interpolated non-local thermodynamic equilibrium (NLTE) plane-parallel atmosphere model spectra in a grid to obtain the local spectrum at each surface point. We finally summed all contributions, accounting for the Doppler shift, limb-darkening, and visibility to obtain the total synthetic spectrum. We computed different orbital phases and different sets of physical and orbital parameters.
Results: Our models predict line strength variations through the orbital cycle, but fail to completely reproduce the Struve-Sahade effect. Including radiation pressure allows us to reproduce a surface temperature distribution that is consistent with observations of semi-detached binary systems.
Conclusions: Radiation pressure effects on the stellar surface are weak in (over)contact binaries and well-detached systems but can become very significant in semi-detached systems. The classical von Zeipel theorem is sufficient for the spectral computation. Broad-band light curves derived from the spectral computation are different from those computed with a model in which the stellar surfaces are equipotentials of the Roche potential scaled by the instantaneous orbital separation. In many cases, the fit of two Gaussian/Lorentzian profiles fails to properly measure the equivalent width of the lines and leads to apparent variations that could explain some of the effects reported in the literature.

Reference: Astronomy & Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1302.5201

Email: palate@astro.ulg.ac.be

Back to contents

Populations of rotating stars. - I. Models from 1.7 to 15 M⊙ at Z = 0.014, 0.006, and 0.002 with Ω/Ωcrit between 0 and 1

Cyril Georgy^{1,2}, Sylvia Ekström^3, Anahí Granada^3, Georges Meynet^3, Nami Mowlavi^3, Patrick Eggenberger^3 and André Maeder^3

1 - Astrophysics group, EPSAM, Keele University, Lennard-Jones Labs, Keele, ST5 5BG, UK
2 - Centre de Recherche Astrophysique de Lyon, Ecole Normale Supérieure de Lyon, 46, allée d'Italie, F-69384 Lyon cedex 07, France
3 - Geneva Observatory, University of Geneva, Maillettes 51, CH-1290 Sauverny, Switzerland

B-type stars are known to rotate at various velocities, including very fast rotators near the critical velocity as the Be stars. In this paper, we provide stellar models covering the mass range between 1.7 to 15 M⊙, which includes the typical mass of known Be stars, at Z = 0.014, 0.006, and 0.002 and for an extended range of initial velocities on the zero-age main sequence.
We used the Geneva stellar-evolution code, including the effects of shellular rotation, with a numerical treatment that has been improved so the code can precisely track the variation in the angular momentum content of the star as it changes under the influence of radiative winds and/or mechanical mass loss.
We discuss the impact of the initial rotation rate on the tracks in the Hertzsprung-Russell diagram, the main-sequence (MS) lifetimes, the evolution of the surface rotation and abundances, as well as on the ejected masses of various isotopes. Among the new results obtained from the present grid we find that 1) fast-rotating stars with initial masses around 1.7 M⊙ present at the beginning of the core hydrogen-burning phase quite small convective cores with respect to their slowly rotating counterparts. This fact may be interesting to keep in mind in the framework of the asteroseismic studies of such stars. 2) The contrast between the core and surface angular velocity is higher in slower rotating stars. Our results are in agreement with the very few values obtained for B-type stars from asteroseismology. 3) At Z = 0.002, the stars in the mass range of 1.7 to 3 M⊙ with a mean velocity on the MS of the order of 150 km · s−1 show N/H enhancement superior to 0.2 dex at mid-MS, and superior to 0.4 dex at the end of the MS phase. At solar metallicity the corresponding values are below 0.2 dex at any time in the MS.
An extended database of stellar models containing 270 evolutionary tracks is provided to the community.

Reference: A&A
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1303.2321

Email: c.georgy@keele.ac.uk

Back to contents

A Bake-Off Between CMFGEN and FASTIND: Modeling the Physical Properties of SMC and LMC O-type Stars

Philip Massey (1), Kathryn F. Neugent (1), D. John Hillier (2), and Joachim Puls (3)

(1) Lowell Observatory, (2) Dept of Astronomy, University of Pittsburgh, (3) Universitatssternwarte Munchen

The model atmosphere programs FASTWIND and CMFGEN are both elegantly designed to perform non-LTE analyses of the spectra of hot massive stars, and include sphericity and mass-loss. The two codes differ primarily in their approach towards line blanketing, with CMFGEN treating all of the lines in the co-moving frame and FASTWIND taking an approximate approach which speeds up execution times considerably. Although both have been extensively used to model the spectra of O-type stars, no studies have used the codes to independently model the same spectra of the same stars and compare the derived physical properties. We perform this task on ten O-type stars in the Magellanic Clouds. For the late-type O supergiants, both CMFGEN and FASTWIND have trouble fitting some of the He I lines, and we discuss causes and cures. We find that there is no difference in the average effective temperatures found by the two codes for the stars in our sample, although the dispersion is large, due primarily to the various difficulties each code has with He I. The surface gravities determined using FASTWIND are systematically lower by 0.12~dex compared to CMFGEN, a result we attribute to the better treatment of electron scattering by CMFGEN. This has implications for the interpretation of the origin of the so-called mass discrepancy, as the masses derived by FASTWIND are on average lower than inferred from stellar evolutionary models, while those found by CMFGEN are in better agreement.

Reference: Astrophysical Journal, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1303.5469

Email: phil.massey@lowell.edu

Back to contents

The H-band Emitting Region of the Luminous Blue Variable P Cygni: Spectrophotometry and Interferometry of the Wind

N. D. Richardson, G. H. Schaefer, D. R. Gies, O. Chesneau, J. D. Monnier, F. Baron, X. Che, J. R. Parks, R. A. Matson, Y. Touhami, D. P. Clemens, E. J. Aldoretta, N. D. Morrison, T. A. ten Brummelaar, H. A. McAlister, S. Kraus, S. T. Ridgway, J. Sturmann, L. Sturmann, B. Taylor, N. H. Turner, C. D. Farrington, and P. J. Goldfinger

Universite de Montreal, Georgia State University (and others, see paper)

We present the first high angular resolution observations in the near-infrared H-band (1.6 microns) of the Luminous Blue Variable star P Cygni. We obtained six-telescope interferometric observations with the CHARA Array and the MIRC beam combiner. These show that the spatial flux distribution is larger than expected for the stellar photosphere. A two component model for the star (uniform disk) plus a halo (two-dimensional Gaussian) yields an excellent fit of the observations, and we suggest that the halo corresponds to flux emitted from the base of the stellar wind. This wind component contributes about 45% of the H-band flux and has an angular FWHM = 0.96 mas, compared to the predicted stellar diameter of 0.41 mas. We show several images reconstructed from the interferometric visibilities

and closure phases, and they indicate a generally spherical geometry for the wind. We also obtained near-infrared spectrophotometry of P Cygni from which we derive the flux excess compared to a purely photospheric spectral energy distribution. The H-band flux excess
matches that from the wind flux fraction derived from the two component fits to
the interferometry. We find evidence of significant near-infrared flux variability over the period from 2006 to 2010 that appears similar to the variations in the H-alpha emission flux from the wind. Future interferometric observations may be capable of recording the spatial variations associated with temporal changes in the wind structure.

Reference: ApJ, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1304.1560

Comments: 34 pages, 8 figures, 5 tables

Email: richardson@astro.umontreal.ca

Back to contents

Evidence for quasi-chemically homogeneous evolution of massive stars up to solar metallicity

F. Martins^1, E. Depagne^2, D. Russeil^3, L. Mahy^4

1- LUPM, CNRS & Montpellier University, 2- Leibniz-Institut fur Astrophysik Potsdam, 3- LAM, CNRS & Marseille University, 4- Liège University

Long soft gamma ray bursts (LGRBs) are usually associated with the death of the most massive stars. A large amount of core angular momentum in the phases preceding the explosion is required to form LGRBs. A very high initial rotational velocity can provide this angular momentum. Such a velocity strongly influences the way the star evolves: it is chemically homogeneously mixed and evolves directly towards the blue part of the HR diagram from the main sequence. We have shown that chemically homogeneous evolution (CHE) takes place in the SMC, at low metallicity. We want to see if there is a metallicity threshold above which such an evolution does not exist. We perform a spectroscopic analysis of H-rich early-type WN stars in the LMC and the Galaxy. We use the code CMFGEN to determine the fundamental properties and the surface composition of the target stars. We then place the stars in the HR diagram and determine their evolution. We show that both the LMC and Galactic WNh stars we selected cannot be explained by standard stellar evolution. They are located on the left of the main sequence but show surface abundances typical of CN equilibrium. In addition, they still contain a large amount of hydrogen. They are thus core-H burning objects. Their properties are consistent with CHE. We determine the metallicity of the Galactic stars from their position and Galactic metallicity gradients, and conclude that they have 0.6
Reference: Accepted in Astronomy and Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1304.3337

Email: fabrice.martins@univ-montp2.fr

Back to contents

Three-dimensional orbits of the triple-O stellar system HD 150136

H. Sana [1], J.-B. Le Bouquin [2], L. Mahy [3], O. Absil [3], M. De Becker [3], E. Gosset [3]

1. Astronomical Institute Anton Pannekoek, Amsterdam University, Science Park 904, 1098 XH, Amsterdam, The Netherlands
2. UJF-Grenoble 1 / CNRS-INSU, Institut de Planétologie et d'Astrophysique de Grenoble (IPAG) UMR 5274, Grenoble, France
3. Département d'Astrophysique, Géophysique et Océanographie, Université de Liège, Allée du 6 Août 17, B-4000 Liège, Belgium

Context. HD 150136 is a triple hierarchical system and a non-thermal radio emitter. It is formed by an O3-3.5 V + O5.5-6 V close binary and a more distant O6.5-7 V tertiary. So far, only the inner orbital properties have been reliably constrained.

Aims. To quantitatively understand the non-thermal emission process, accurate knowledge of the physical and orbital properties of the object is crucial. Here, we aim to investigate the orbital properties of the wide system and to constrain the inclinations of the inner and outer binaries, and with these the absolute masses of the system components.

Methods. We used the PIONIER combiner at the Very Large Telescope Interferometer to obtain the very first interferometric measurements of HD 150136. We combines the interferometric observations with new and existing high-resolution spectroscopic data to derive the orbital solution of the outer companion in the three-dimensional space.

Results. The wide system is clearly resolved by PIONIER, with a projected separation on the plane of the sky of about 9 milli-arcsec. The best-fit orbital period, eccentricity, and inclination are 8.2 yr, 0.73, and 108 degrees. We constrain the masses of the three stars of the system to 63 +/- 10, 40 +/- 6, and 33 +/- 12 Msun for the O3-3.5 V, O5.5-6 V, and O6.5-7 V components.

Conclusions. The dynamical masses agree within errors with the evolutionary masses of the components. Future interferometric and spectroscopic monitoring of HD 150136 should allow one to reduce the uncertainties to a few per cent only and to accurately constrain the distance to the system. This makes HD 150136 an ideal system to quantitatively test evolutionary models of high-mass stars as well as the physics of non-thermal processes occurring in O-type systems.

Reference: Astronomy & Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1304.3457

Email: H.Sana@uva.nl

Back to contents

R144 revealed as a double-lined spectroscopic binary

H. Sana [1], T. van Boeckel [1], F. Tramper [1], L.E. Ellerbroek [1], A. de Koter [1,2,3], L. Kaper [1], A.F.J. Moffat [4], O. Schnurr [5], F.R.N. Schneider [6], D.R. Gies [7]

1. Astronomical Institute Anton Pannekoek, Amsterdam University, Science Park 904, 1098 XH, Amsterdam, The Netherlands
2. Utrecht University, Princetonplein 5, 3584CC, Utrecht, The Netherlands
3. Instituut voor Sterrenkunde, Universiteit Leuven, Celestijnenlaan 200 D, 3001, Leuven, Belgium
4. Department de Physique, Universite de Montreal and Centre de Recherche en Astrophysique du Quebec, C. P. 6128, succ. centre-ville, Montreal (Qc) H3C 3J7, Canada
5. Leibniz Institut f□ur Astrophysik Potsdam (AIP), An der Sternwarte 16, 14482 Potsdam, Germany
6. Argelander-Institut f□ur Astronomie, Universit□at Bonn, Auf dem H□ugel 71, 53121 Bonn, Germany
7. Center for High Angular Resolution Astronomy and Department of Physics and Astronomy, Georgia State University, P.O. Box 4106, Atlanta, GA 30302-4106, USA

R144 is a WN6h star in the 30 Doradus region. It is suspected to be a binary because of its high luminosity and its strong X-ray ux, but no periodicity could be established so far. Here, we present new X-shooter multi-epoch spectroscopy of R144 obtained at the ESO Very Large Telescope (VLT). We detect variability in position and/or shape of all the spectral lines. We measure radial velocity variations with an amplitude larger than 250 km/s in Niv and Nv lines. Furthermore, the Niii and Nv line Doppler shifts are anti-correlated and the Niv lines show a double-peaked profile on six of our seven epochs. We thus conclude that R144 is a double-lined spectroscopic binary. Possible orbital periods range from 2 to 6 months, although a period up to one year is allowed if the orbit is highly eccentric. We estimate the spectral types of the components to be WN5-6h and WN6-7h, respectively. The high luminosity of the system (log Lbol/Lsun ~ 6.8) suggests a present-day total mass content in the range of about 200 to 300 Msun, depending on the evolutionary stage of the components. This makes R144 the most massive binary identified so far, with a total mass content at birth possibly as large as 400 Msun. We briefly discuss the presence of such a massive object 60 pc away from the R136 cluster core in the context of star formation and stellar dynamics.

Reference: MNRAS
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1304.4591

Email: H.Sana@uva.nl

Back to contents

The X-ray under-luminosity of the O-type supergiants HD16691 and HD14947 revealed by XMM-Newton

M. De Becker

Department of Astrophysics, Geophysics and Oceanography, University of Liège, Belgium

The members of the scarce category of Of^+ supergiants present properties that are intermediate between regular O-stars and Wolf-Rayet (WR) stars. Significant similarities between these transitional stars and WN-type objects are now clearly established, at least in the visible and near-infrared domains, pointing to common stellar wind properties. In this study, we report on the first dedicated X-ray observations of HD16691 (O4If^+) and HD14947 (O5f^+), revealing a soft thermal spectrum in agreement with the

expected X-ray emission from a single O-type star. However, the X-ray luminosity of our targets is slightly lower than expected for single O-type stars, suggesting that the particular properties of their stellar wind has also a significant impact on the X-ray emission of these objects on the way to the WN category. We argue that the X-ray under-luminosity of HD16691 and HD14947 may be interpreted as the signature in X-rays of the intermediate stage between O and WR stars, as a consequence of enhanced wind density.

Reference: 2013, New Astronomy, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1304.4253

Email: debecker@astro.ulg.ac.be

Back to contents

Three-Dimensional Modelling of Ionized Gas. I. Did very massive stars of different metallicities drive the second cosmic reionization?

J. A. Weber, A. W. A. Pauldrach, J. S. Knogl, T. L. Hoffmann

Institut fuer Astronomie und Astrophysik der Universitaet Muenchen, Scheinerstraße 1, 81679 Muenchen, Germany

Context. The first generation of stars, which formed directly from the primordial gas, is believed to have played a crucial role in the early phase of the epoch of reionization of the universe. Theoretical studies indicate that the initial mass function (IMF) of this first stellar population differs significantly from the present IMF, being top-heavy and thus allowing for the presence of supermassive stars with masses up to several thousand solar masses. The first generation of population III stars was therefore not only very luminous, but due to its lack of metals its emission of UV radiation considerably exceeded that of present stars. Because of the short lifetimes of these stars the metals produced in their cores were quickly returned to the environment, from which early population II stars with a different initial mass function and different spectral energy distributions (SEDs) were formed, already much earlier than the time at which the universe became completely reionized (at a redshift of $z > 6$).
Aims. Using a state-of-the-art model atmosphere code we calculate realistic SEDs of very massive stars (VMSs) of different metallicities to serve as input for the 3-dimensional radiative transfer code we have developed to simulate the temporal evolution of the ionization of the inhomogeneous interstellar and intergalactic medium, using multiple stellar clusters as sources of ionizing radiation. The ultimate objective of these simulations is not only to quantify the processes which are believed to have lead to the reionized state of the universe, but also to determine possible observational diagnostics to constrain the nature of the ionizing sources.
Methods. The multi-frequency treatment in our combination of 3d radiative transfer – based on ray-tracing – and time-dependent simulation of the ionization structure of hydrogen and helium allows, in principle, to deduce information about the spectral characteristics of the first generations of stars and their interaction with the surrounding gas on various scales.
Results. As our tool can handle distributions of numerous radiative sources characterized by high resolution synthetic SEDs, and also yields occupation numbers of the required energy levels of the most important elements which are treated in NLTE and are calculated consistently with the 3d radiative transfer, the ionization state of an inhomogeneous gaseous density structure can be calculated accurately. We further demonstrate that the increasing metallicity of the radiative sources in the transition from population III stars to population II stars has a strong impact on the hardness of the emitted spectrum, and hence on the reionization history of helium.

Conclusions. A top-heavy stellar mass distribution characterized by VMSs forming in chemically evolved clusters of high core mass density may not only provide the progenitors of intermediate-mass and supermassive black holes (SMBHs), but also play an important role for the reionization of He II. The number of VMSs required to reionize He II by a redshift of z ~ 2.5 is astonishingly close to the number of VMSs required to explain galactic SMBHs if one assumes that these have been formed by mergers of smaller black holes.

Reference: 2013, A&A, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1304.4824

Comments: 23 pages, 26 figures

Email: uh10107@usm.lmu.de

Back to contents

Abstracts of 2 conference proceedings

Betelgeuse and the red supergiants

Jacco Th. van Loon

Keele University, UK

Betelgeuse is one of the most magnificent stars in the sky, and one of the nearest red supergiants. Astronomers gathered in Paris in the Autumn of 2012 to decide what we know about its structure, behaviour, and past and future evolution, and how to place this in the general context of the class of red supergiants. Here I reflect on the discussions and propose a synthesis of the presented evidence. I believe that, in those four days, we have achieved to solve a few riddles.

Reference: European Astronomical Society Publications Series, editors: Pierre Kervella, Thibaut Le Bertre and Guy Perrin
Status: Conference proceedings

Weblink: http://arxiv.org/abs/1303.0321

Comments: Summary talk of the Betelgeuse workshop, November 2012, Paris.

Email: j.t.van.loon@keele.ac.uk

Back to contents

Very Massive Stars in the Local Universe

Jorick S. Vink^1, Alexander Heger, Mark R. Krumholz, Joachim Puls, S. Banerjee, N. Castro, K.-J. Chen, A.-N. Chene, P.A. Crowther, A. Daminelli, G. Grafener, J. H. Groh, W.-R. Hamann, S. Heap, A. Herrero, L. Kaper, F. Najarro, L. M. Oskinova, A. Roman-Lopes, A. Rosen, A. Sander, M. Shirazi, Y. Sugawara, F. Tramper, D. Vanbeveren, R. Voss, A. Wofford, Y. Zhang (and the other participants of Joint Discussion 2 IAU-GA)

^1 Armagh Observatory, College Hill, BT61 9DG, Armagh, United Kingdom

Recent studies have claimed the existence of very massive stars (VMS) up to 300 solar masses in the local Universe. As this finding may represent a paradigm shift for the canonical stellar upper-mass limit of 150 Msun, it is timely to discuss the status of the data, as well as the far-reaching implications of such objects.

We held a Joint Discussion at the General Assembly in Beijing to discuss:

(i) the determination of the current masses of the most massive stars,
(ii) the formation of VMS,
(iii) their mass loss, and
(iv) their evolution and final fate.

Reference: Astro-ph 1302.2021
Status: Conference proceedings

Weblink: http://arxiv.org/abs/1302.2021

Comments: 29 pages. To be published in Highlights of Astronomy

Email: jsv@arm.ac.uk

Back to contents

JOBS

PhD Position in Astrophysics

Panos Boumis

Institute of Astronomy, Astrophysics, Space Applications and Remote Sensing
National Observatory of Athens
Greece

Applications are invited for a 3-year PhD position, combining optical instrumentation with studies of the interstellar medium (ISM). Applicants with previous experience in optical instrumentation, observing and analysis of data, and the field of evolved stars and/or supernova remnants (SNRs) are particularly encouraged to apply.

The successful candidate is expected to be highly motivated and will work under the supervision of Dr. P. Boumis at the Institute of Astronomy, Astrophysics, Space Applications and Remote Sensing of the National Observatory of Athens. A master's degree in astrophysics or optics is a prerequisite for the PhD position. The appointment is part of a large program that involves the construction, testing and use of a new wide field camera (AWFC) for the 2.3m Aristarchos telescope, at Helmos Observatory, Greece. The position will be funded by the “KRIPIS” program of the Greek Secreteriat of Research and Technology.

Applications should include a curriculum vitae, a brief statement of current and future research interests (in PDF format) and three letters of reference, sent directly by e-mail to Dr. P. Boumis. Consideration of applications will begin on April 5th, 2013 and will continue until the position is filled. A starting date in May or June of 2013 is anticipated. The gross monthly salary is ¤1500.

Submission and inquiries should be addressed to Dr. P. Boumis (e-mail: ptb@astro.noa.gr, tel.: +30 2108109162, fax: +30 2108040453).

Attention/Comments:

Weblink: http://www.astro.noa.gr/iaa_news.htm

Email: bonanos@astro.noa.gr

Deadline: April 5, 2013

Back to contents

Tenure Track Position in Stellar Astrophysics

Dr. Salvador Curiel

Instituto de Astronomía, Universidad Nacional Autónoma de México, Mexico City,
iasacad@astro.unam.mx

The Instituto de Astronomía of the Universidad Nacional Autónoma de México (IA-UNAM) has an opening for a tenure track position in stellar astrophysics at the Mexico City campus. Applicants should hold a Ph.D. degree in astronomy or physics, have at least two years of postdoctoral experience and preferably be less than 40 years old by October 2013.
A background in the study of stellar physics, stellar formation and evolution is preferred. Experience with optical and infrared wavelength observational projects (such as HST, VLT, HERSCHEL, SPITZER), radiative transfer modeling, the interaction between stellar winds, binaries and multiple systems, knowledge or participation in instrumentation projects and experience in parallel computing will be valuable assets.
The main selection criteria will be outstanding research accomplishments and promise of future achievement. The successful candidate is expected to carry out original research, to collaborate with faculty members and teach astronomy courses at the graduate and/or undergraduate level, as well as mentor students. The level of the appointment will depend on the curriculum of the candidate.
Candidates must send a complete curriculum vitae including a full list of publications, as well as a statement of previous experience and current and future professional interests, and arrange for three letters of recommendation to be sent to Dr. Salvador Curiel at the IA-UNAM (iasacad@astro.unam.mx) by May 27th 2013. Unsigned material can be sent by e-mail; letters can be sent by e-mail (scanned) or by courier. Please do not use regular post mail.

You can find further information using these links:
IA Main Web Page: www.astroscu.unam.mx
Additional Job Information: www.astroscu.unam.mx/job_ia
AAS Job Register: jobregister.aas.org/job_view?JobID=44810

Attention/Comments:

Weblink:

Email: gloria@astro.unam.mx

Deadline: 27 May 2013

Back to contents

MEETINGS

Putting A Stars into Context: Evolution, Environment, and Related Stars

June 3-7, 2013

Venue: Moscow, Russia

This is the third announcement for the upcoming conference:

Putting A Stars into Context: Evolution, Environment, and Related Stars,

June 3-7, 2013
Moscow, Russia

We remind all potential participants that the deadline for registration and submission of abstracts is April 1, 2013.

Registration

To register for the meeting and submit your abstract, please, point your browser to http://agora.guru.ru/astars2013/ and follow the instructions

The registration fee covers all regular meeting costs including abstract book, welcome party, coffee breaks, conference banquet, Moskva-river cruise tour, and classical music concert. Full conference registration costs 280 Euros (11 300 Rubles). Participants who pay the registration fee before April 1, 2013, benefit from a discount of 30 Euros. Payments can be made via credit card.

Program:

Overview introductory talk (John D. Landstreet)

Session 1: A-star formation

1a. Big clouds to open clusters
Invited talks:
1.1. Chemically peculiar tepid stars in the Milky Way and beyond (Martin Netopil)
1.2. Elemental abundances in open cluster A-type and related stars (Luca Fossati)

1b. Small clouds to stars
Invited talks:
1.3. Discs around A-type and related stars (Helmut Abt)
1.4. Accretion discs around magnetic stars (Caroline D'Angelo)
1.5. Planets around A stars (David Mkrtichian)
1.6. Distant sub-stellar companions of A-type and related stars
1.7. Multiplicity of A-type and related stars (Pierre North)

1c. Magnetic field generation
Invited talks:
1.8. Magnetic fields in Herbig Ae/Be stars (Evelyne Alecian)
1.9. Generation and evolution of stable stellar magnetic fields (Rainer Arlt)

1.10. The protostar merger scenario of Ap star magnetic field generation (Lilia Ferrario)

Session 2: Properties of A-type stars
Invited talks:
2.1. Determinations of fundamental parameters of (chemically peculiar) A stars through optical interferometry (Karine Perraut)
2.2. Recent results and current challenges in normal and chemically peculiar A-star model atmospheres (Denis Shulyak)
2.3. Simultaneous mapping of chemical abundances and magnetic field structure in Ap stars (Theresa Lueftinger)
2.4. Element spots in HgMn stars (Heidi Korhonen)
2.5. The origin of light variability in Ap stars (Jiri Krticka)
2.6. Vertical abundance gradients in Ap-star atmospheres (Tatyana Ryabchikova)

Session 3: Rotation and hydrodynamics of A-type and related stars
Invited talks:
3.1. Time-dependent diffusion and abundance stratification in A- and B-type stars(with and without mass-loss)
3.2. A-star rotation (Frederic Royer)
3.3. Ap stars with variable rotation periods (Zdenek Mikulasek)
3.4. Rotation and hydrodynamical processes in upper main-sequence stars (Stephane Mathis)

Session 4: Pulsation of A-type and related stars
Invited talks:
4.1. A- and B-type star pulsations in the Kepler and CoRoT era: observational results (Katrien Uytterhoeven)
4.2. A- and B-type star pulsations in the Kepler and CoRoT era: theoretical considerations (Hideyuki Saio)
4.3. Observational studies of roAp stars (Mikhail Sachkov)
4.4. Stochastic oscillations in A-type and related stars (Victoria Antoci)

Session 5: Magnetic fields from O to early F stars
Invited talks:
5.1. Magnetic fields in O stars
5.2. Magnetic fields in beta Cep, SPB and Be stars
5.3. Recent results and current challenges in observations of Ap/Bp star magnetic fields (Iosif Romanyuk)

5.4. Magnetic fields in A stars besides Ap stars (Oleg Kochukhov)
5.5. Non-pulsational variability of A- and B-type stars as observed by Kepler (Luis Balona)
5.6. X-ray emission of Ap stars and of other A stars (Jan Robrade)
5.7. Bp star magnetospheres (Asif ud-Doula)

Session 6: A-stars at post-main-sequence stages
Invited talks:
6.1. Descendants of magnetic and non-magnetic A-type and related stars
6.2. White dwarf magnetic fields (Gennady Valyavin)
6.3. A-type blue stragglers
6.4. Horizontal-Branch A stars
6.5. Non-LTE studies of A supergiants (Maria-Fernanda Nieva)
6.6. A supergiants in the Local Group of galaxies and beyond (Miguel Urbaneja)

Summary talk and closing discussion (Charles Cowley)

Invited Speakers (confirmed):

Helmut Abt, Evelyne Alecian, Victoria Antoci, Rainer Arlt, Luis Balona, Charles Cowley, Caroline

D'Angelo, Lilia Ferrario, Luca Fossati, Oleg Kochukhov, Heidi Korhonen, Jiri Krticka, John D. Landstreet, Theresa Lueftinger, Stephane Mathis, Zdenek Mikulasek, David Mkrtichian, Martin Netopil, Maria-Fernanda Nieva, Pierre North, Karine Perraut, Jan Robrade, Iosif Romanyuk, Frederic Royer, Tatyana Ryabchikova, Mikhail Sachkov, Hideyuki Saio, Denis Shulyak, Asif ud-Doula, Miguel Urbaneja, Katrien Uytterhoeven, Gennady Valyavin

Abstract submission

Contributed talks will be selected from the submitted abstracts, and there will also be a poster session.

Scientific Organizing Committee:

Gautier Mathys (chair), Maryline Briquet, Margarida Cunha, Oleg Kochukhov, Friedrich Kupka, Francis LeBlanc, Lyudmila Mashonkina, Richard Monier, Olga Pintado, Hiromoto Shibahashi, Kazimierz Stepien, Glenn Wahlgren

Weblink: http://agora.guru.ru/astars2013/

Email: astars2013@inasan.ru

Back to contents

Massive Stars: From α to Ω

June 10-14, 2013

Venue: Rhodes, Greece

The 'Massive Stars' meetings have enjoyed more than 40 years of startling success since the first meeting in Argentina in 1971. Held every 4 to 5 years, these meetings aim to encapsulate the current state-of-the-art of our understanding of the physics of Massive Stars and their role in the Universe. For this 10th meeting in the Massive Stars series the Institute of Astronomy, Astrophysics, Space Applications and Remote Sensing of the National Observatory of Athens, invites you to the island of Rhodes, once home to one of the greatest astronomers of antiquity, Hipparchos, who is generally acknowledged as the founder of trigonometry, discoverer of precession and publisher of the first modern star catalog around 135 BC.

The conference will build on results from ongoing large-scale multi-wavelength surveys of massive stars which are being coupled with new theoretical advances dealing with stellar evolution and the processes which effect that evolution: mass-loss, rotation, convection, magnetic fields, multiplicity and environment. It will tackle important problems from birth, through main sequence evolution and until core collapse.

There will be a strong focus on relating the major theoretical uncertainties afflicting stellar evolution through these phases to the current observational picture. The impetus for this focus is derived from the realization that our understanding of massive star evolution is severely challenged by new observations powered largely by technological advances in telescopes and instrumentation. This has enabled new ways of looking at old long-standing problems enabling large-scale high-quality surveys of resolved stellar populations. As theoretical approaches try to keep pace with this increase in information the cracks in our assumptions concerning stellar evolution have become more apparent, even glaring. Whereas before it might have been possible to understand some of the stars some of the time it is now clear that understanding stellar populations is a considerable challenge and will require substantial efforts to resolve.

This is an exciting time as observations have revealed large gaps in understanding of the formation and

evolution of massive stars. The huge impact that massive stars have on their immediate environment, parent galaxies, and through the Universe, demands better understanding of massive star evolution from alpha to Omega.

Looking forward to seeing you in Rhodes!

Weblink: http://a2omega-conference.net

Email: a2omega@astro.noa.gr

Back to contents

IAU Symposium 302: "Magnetic Fields Throughout Stellar Evolution" (Second announcement)

26-30 August 2013

Venue: Biarritz, France

This is the second announcement for the Symposium 302 of the International Astronomical Union, entitled "Magnetic fields throughout stellar evolution". The conference will be held in Biarritz (France), 26-30 August 2013.

-- Presentation:

Magnetic fields are key actors in the evolution of all stellar objects, through their ability to influence the angular momentum evolution, internal mixing or mass-loss of stars, as well as their activity phenomena or star-planet interactions. The present Symposium is aimed at offering a synthetic view of recent progresses in the young and growing domain of stellar magnetism. This research area is now benefiting from the rapid, combined development of observations and numerical simulations, enabling stellar physicists to take magnetic fields into account in most models of stellar structure and evolution.

-- Topics:

- Stellar structure and evolution
- Magnetized accretion and outflows in young stellar objects
- Magnetic braking of PMS stars
- Solar and stellar activity in photospheres, chromospheres and coronae, and stellar cycles
- Magnetism in very low-mass stars and brown dwarfs
- Star-planet interaction
- Stellar dynamos across the HR diagram
- Magnetic field origin and stability in massive stars
- Magnetically-confined winds of massive stars
- Cool active subgiants and giants
- Dynamo and mass-loss in giant and supergiant stars
- Final phases of stellar evolution : magnetism in compact objects

-- Scientific Organizing Committee:

- Gibor Basri (Univ. California, USA)

- Matthew Browning (Univ. Toronto,Canada)
- Corinne Charbonnel (Geneva Observatory, Switzerland)
- Jose-Dias do Nascimento (Univ. Natal, Brazil)
- Siraj Hasan (IIA, India)
- Moira Jardine (Univ. Saint Andrews, Scotland, co-chair)
- Oleg Kochukhov (Univ. Uppsala, Sweden)
- Renada Konstantinova-Antova (Bulgarian Academy of Sciences, Bulgaria)
- Hiroaki Isobe (Univ. Kyoto, Japan)
- Stephen Marsden (James Cook University, Australia)
- Pascal Petit (Univ. Toulouse, France, chair)
- Sami Solanki (MPS, Germany)
- Henk Spruit (MPA, Germany, co-chair)
- Klaus Strassmeier (AIP, Germany)
- Asif ud-Doula (Penn State, USA)
- Gregg Wade (RMC, Canada)

-- Confirmed speakers:

Jonathan Braithwaite - Sacha Brun - Rim Fares - Jason Grunhut - Gaitee Hussain - Oleg Kochukhov - Heidi Korhonen - Ryuichi Kurosawa - Norbert Langer - François Lignières - Stuart Littlefair - Stan Owocki - Ralph Pudritz - Nanda Rea - Ansgar Reiners - Andreas Reisenegger - Karel Schrijver - Saku Tsuneta - Aline Vidotto - Wouter Vlemmings - Lucianne Walkowicz

-- Venue:

The conference will be held at Casino Municipal, Biarritz (France). Situated on the French Atlantic coast, at the western end of the Pyrénées mountain range, Biarritz is a friendly and attractive town benefiting from the mild weather of southern France. It can be easily reached by plane or train and offers more than 2,300 hotel rooms. With 6 km of beaches, Biarritz is the historical capital of surfing in Europe. You can also find there the secondoldest golf course in Europe, 5 thalassotherapy centres and a casino.

The town is just a stone’s throw away from Spain and is less than 150 km away from Bilbao and its famous Guggenheim museum. Biarritz is also located at less than 200 km from Bordeaux and its world-famous wineries. It is a perfect starting point to explore the Basque country, with its authentic countryside and charming villages. A half-day excursion will bring the participants to selected spots around the town, and the symposium diner will be the opportunity to enjoy French gastronomy.

-- Accommodation:

Biarritz is very attractive during the month of August, and hotels get fully booked very early. We therefore very strongly recommend to book your hotel as soon as possible! A list of hotels is available here: http://iaus302.sciencesconf.org/resource/page/id/9

-- Social events:

The conference dinner will take place on Thursday night (29 Aug 2013), at Salle des Ambassadeurs (Casino Municipal). The banquet cost is 40€ per person.

Three optional wednesday tours are proposed, to be chosen between a visit of Domaine Brana (winery), a discovery of the Basque coast by boat, and a visit of Château-Observatory Abbadia. Additional fees of 20€ per person apply for the tours.

-- Registration:

Registration fee is 350€ per participant. The fee allows access to the conference venue, the welcome cocktail on Sunday night, the coffee breaks, four lunches, and a hard copy of proceedings. Addditionnal

fee is requested for conference dinner (40€) and Wednesday tours (20€).

The online payment interface is available here: http://iaus302.irap.omp.eu

Cancellations: Requests for cancellation with a 50% fee refund will only be accepted through 01 Jul 2013.

-- Abstract submission:

Abstracts can be submitted at the following address: http://iaus302.sciencesconf.org/submission/submit

-- Visa information:

General information for preparing your entry in France and applying to a French Visa is available here: http://www.diplomatie.gouv.fr/en/france/coming-to-france/getting-a-visa/
Invitation letters will be provided to registered participants whenever needed. Should you require a letter, we invite you to contact the organizers by email (iaus302@sciencesconf.org).

-- Proceedings:

The proceedings of the Symposium will be published by Cambridge University Press. A hardcopy of the proceedings will be sent to each registered participant. Further information will follow about page limits and LaTeX templates. The deadline for submission of the proceedings is 30 Sep 2013.

-- Important dates:

- Abstract deadline for contributed talks: 13 May 2013
- Abstract deadline for posters: 21 Jun 2013
- Deadline for registration: 15 Jul 2013
- Deadline for proceedings submission: 30 Sep 2013

-- Contact:

Any inquiry about the conference should be addressed to iaus302@sciencesconf.org

We hope to see as many of you as possible in Biarritz this summer!

Best regards,
the SOC and LOC

Weblink: http://iaus302.sciencesconf.org

Email: iaus302@sciencesconf.org

Back to contents