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THE MASSIVE STAR NEWSLETTER

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*

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The Surface Nitrogen Abundance of a Massive Star in Relation to its Oscillations, Rotation, and Magnetic Field

This message concerns the published paper

ApJ, Vol. 781, id.88

announced earlier through the Massive Star Newsletter.

Following a concrete question: Data Table 3 was too small to be allowed to publish it as Machine-Readable Table by ApJ. An electronic version of this Table is available to the community upon request.

Weblink: http://adsabs.harvard.edu/abs/2014ApJ...781...88A

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PAPERS

Abstracts of 24 accepted papers

The XMM-Newton view of the yellow hypergiant IRC +10420 and its surroundings

De Becker M., Hutsemékers D., Gosset, E.

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Among evolved massive stars likely in transition to the Wolf-Rayet phase, IRC +10420 is probably one of the most enigmatic. It belongs to the category of yellow hypergiants and it is characterized by quite high mass loss episodes. Even though IRC +10420 benefited of many observations in several wavelength domains, it has never been a target for an X-ray observatory. We report here on the very first dedicated observation of IRC +10420 in X-rays, using the XMM-Newton satellite. Even though the target is not detected, we derive X-ray flux upper limits of the order of 1--3 10^-14 erg cm^-2 s^-1 (between 0.3 and 10.0 keV), and we discuss the case of IRC +10420 in the framework of emission models likely to be adequate for such an object. Using the Optical/UV Monitor on board XMM-Newton, we present the very first upper limits of the flux density of IRC +10420 in the UV domain (between 1800 and 2250 A, and between 2050 and 2450 A). Finally, we also report on the detection in this field of 10 X-ray and 7 UV point sources, and we briefly discuss their properties and potential counterparts at longer wavelengths.

Reference: 2014, New Astronomy (in press)
Status: Manuscript has been accepted

Weblink: http://hdl.handle.net/2268/160591

Comments: ArXiv link: http://arxiv.org/abs/1401.0707

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Suppression of X-rays from radiative shocks by their thin-shell instability

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We examine X-rays from radiatively cooled shocks, focusing on how their thin-shell instability reduces X-ray emission. For 2D simulations of collision between equal expanding winds, we carry out a parameter study of such instability as a function of the ratio of radiative vs. adiabatic-expansion cooling

lengths. In the adiabatic regime, the extended cooling layer suppresses instability, leading to planar shock compression with X-ray luminosity that follows closely the expected (Lx ∼ M^2) quadratic scaling with mass-loss rate M . In the strongly radiative limit, the X-ray emission now follows an expected linear scaling with mass loss (Lx ∼ M), but the instability deforms the shock compression into extended shear layers with oblique shocks along fingers of cooled, dense material. The spatial dispersion of shock thermalization limits strong X-ray emission to the tips and troughs of the fingers, and so reduces the X-ray emission (here by about a factor 1/50) below what is expected from analytic radiative-shock models without unstable structure. Between these two limits, X-ray emission can switch between a high-state associated with extended shock compression, and a low-state characterized by extensive shear. Further study is needed to clarify the origin of this "shear mixing reduction factor" in X-ray emission, and its dependence on parameters like the shock Mach number.

Reference: MNRAS, In Press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.2063

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The impact of rotation on the line profiles of Wolf-Rayet stars

T. Shenar, W.-R. Hamann, H. Todt

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Massive Wolf-Rayet stars are recognized today to be in a very common, but short, evolutionary phase of massive stars. While our understanding of Wolf-Rayet stars has increased dramatically over the past decades, it remains unclear whether rapid rotators are among them. There are various indications that rapidly rotating Wolf-Rayet stars should exist. Unfortunately, due to their expanding atmospheres, rotational velocities of Wolf-Rayet stars are very difficult to measure. However, recently observed spectra of several Wolf-Rayet stars reveal peculiarly broad and round emission lines. Could these spectra imply rapid rotation?

In this work, we model the effects of rotation on the atmospheres of Wolf-Rayet stars. We further investigate whether the peculiar spectra of five Wolf-Rayet stars may be explained with the help of stellar rotation, infer appropriate rotation parameters, and discuss the implications of our results. We make use of the Potsdam Wolf-Rayet (PoWR) non-LTE model atmosphere code. Since the observed spectra of Wolf-Rayet stars are mainly formed in their expanding atmospheres, rotation must be accounted for with a 3D integration scheme of the formal integral. For this purpose,
we assume a rotational velocity field consisting of an inner co-rotating domain and an outer domain, where the angular momentum is conserved. We find that rotation can reproduce the unique spectra analyzed here. However, the inferred rotational velocities at the stellar surface are large (~200 km/s), and the inferred co-rotation radii (~10 stellar radii) suggest the existence of very strong photospheric magnetic fields (~20 kG).

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Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.2159

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The yellow hypergiant HR 5171 A: Resolving a massive interacting binary in the common envelope phase

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^12 University of Leeds, UK, ^13 Las Cumbres Observatory, USA, ^14 Pontificia Universidad Catolica de Chile.

We initiated long-term optical interferometry monitoring of the diameters of unstable yellow hypergiants (YHG) with the goal of detecting both the long-term evolution of their radius and shorter term formation related to large mass-loss events. We observed HR5171 A with AMBER/VLTI. We also examined archival photometric data in the visual and near-IR spanning more than 60 years, as well as sparse spectroscopic data. HR5171A exhibits a complex appearance. Our AMBER data reveal a surprisingly large star for a YHG R*=1315+/-260Rsun (~6.1AU) at the distance of 3.6+/-0.5kpc. The source is surrounded by an extended nebulosity, and these data also show a large level of asymmetry in the brightness distribution of the system, which we attribute to a newly discovered companion star located in front of the primary star. The companion's signature is also detected in the visual photometry, which indicates an orbital period of Porb=1304+/-6d. Modeling the light curve with the NIGHTFALL program provides clear evidence that the system is a contact or possibly over-contact eclipsing binary. A total current system mass of 39^{+40}_{-22} solar mass and a high mass ratio q>10 is inferred for the system. The low-mass companion of HR5171 A is very close to the primary star that is embedded within its dense wind. Tight constraints on the inclination and vsini of the primary are lacking, which prevents us from determining its influence precisely on the mass-loss phenomenon, but the system is probably experiencing a wind Roche-Lobe overflow. Depending on the amount of angular momentum that can be transferred to the stellar envelope, HR5171 A may become a fast-rotating B[e]/Luminous Blue Variable (LBV)/Wolf-Rayet star. In any case, HR5171 A highlights the possible importance of binaries for interpreting the unstable YHGs and for massive star evolution in general.

Reference: accepted by A&A
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.2628

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Epoch-dependent absorption line profile variability in lambda Cep

Uuh-Sonda, J.M.^{1}; Rauw, G.^{2}; Eenens, P.^{1}; Mahy, L.^{2}; Palate, M.^{2}; Gosset, E. ^{2}; Flores, C.A.^{1}

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We present the analysis of a multi-epoch spectroscopic monitoring campaign of the O6Ief star lambda Cep. Previous observations reported the existence of two modes of non-radial pulsations in this star. Our data reveal a much more complex situation. The frequency content of the power spectrum considerably changes from one epoch to the other. We find no stable frequency that can unambiguously be attributed to pulsations. The epoch-dependence of the frequencies and variability patterns are similar to what is seen in the wind emission lines of this and other Oef stars, suggesting that both phenomena likely have the same, currently still unknown, origin.

Reference: Revista Mexicana de Astronomia y Astrofisica, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.2875

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The VLT-FLAMES Tarantula Survey. XV. VFTS,822: a candidate Herbig B[e] star at low metallicity

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We report the discovery of the B[e] star VFTS 822 in the 30 Doradus star-forming region of the Large Magellanic Cloud, classified by optical spectroscopy from the VLT-FLAMES Tarantula Survey and complementary infrared photometry. VFTS 822 is a relatively low-luminosity (log ? = 4.04 ± 0.25 ? ¬ ハル) B8[e] star. In this Letter, we evaluate the evolutionary status of VFTS 822 and discuss its candidacy as a

Herbig B[e] star. If the object is indeed in the pre-main sequence phase, it would present an exciting opportunity to measure mass accretion rates at low metallicity spectroscopically, to understand the effect of metallicity on accretion rates.

Reference: Astronomy & Astrophysics Letters
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.3149

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Identification of red supergiants in nearby galaxies with mid-IR photometry

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The role of episodic mass loss in massive star evolution is one of the most important open questions of current stellar evolution theory. Episodic mass loss produces dust and therefore causes evolved massive stars to be very luminous in the mid-infrared and dim at optical wavelengths. We aim to increase the number of investigated luminous mid-IR sources to shed light on the late stages of these objects. To achieve this we employed mid-IR selection criteria to identity dusty evolved massive stars in two nearby galaxies. The method is based on mid-IR colors, using 3.6 {mu}m and 4.5 {mu}m photometry from archival Spitzer Space Telescope images of nearby galaxies and J-band photometry from 2MASS. We applied our criteria to two nearby star-forming dwarf irregular galaxies, Sextans A and IC 1613, selecting eight targets, which we followed up with spectroscopy. Our spectral classification and analysis yielded the discovery of two M-type supergiants in IC 1613, three K-type supergiants and one candidate F-type giant in Sextans A, and two foreground M giants. We show that the proposed criteria provide an independent way for identifying dusty evolved massive stars, that can be extended to all nearby galaxies with available Spitzer/IRAC images at 3.6 {mu}m and 4.5 {mu}m.

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

Weblink: http://arxiv.org/abs/1309.6320

Comments: 8 pages, 4 figures

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A High Angular Resolution Survey of Massive Stars in Cygnus OB2:
Results from the Hubble Space Telescope Fine Guidance Sensors

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We present results of a high angular resolution survey of massive OB stars in the Cygnus OB2 association that we conducted with the fine guidance sensor 1R (FGS1r) on the Hubble Space Telescope. FGS1r is able to resolve binary systems with a magnitude difference delta-V < 4 down to separations as small as 0."01. The sample includes 58 of the brighter members of Cyg OB2, one of the closest examples of an environment containing a large number of very young and massive stars. We resolved binary companions for 12 targets and confirmed the triple nature of one other target, and we offer evidence of marginally resolved companions for two additional stars. We confirm the binary nature of 11 of these systems from complementary adaptive optics imaging observations. The overall binary frequency in our study is 22% to 26% corresponding to orbital periods ranging from 20 to 20,000 yr. When combined with the known short-period spectroscopic binaries, the results support the hypothesis that the binary fraction among massive stars is >60%. One of the new discoveries is a companion to the hyper giant star MT 304 = Cyg OB2-12, and future measurements of orbital motion should provide mass estimates for this very luminous star.

Reference: AJ, 147, 40
Status: Manuscript has been accepted

Weblink: http://stacks.iop.org/1538-3881/147/40

Comments:

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Variability of Massive Stars with Known Spectral Types in the Small Magellanic Cloud Using 8 Years of OGLE-III Data

M. Kourniotis, A.Z. Bonanos, I. Soszynski, R. Poleski, G. Krikelis, A. Udalski, M.K. Szymanski, M. Kubiak, G. Pietrzynski, L. Wyrzykowski, K. Ulaczyk, S. Kozlowski, P. Pietrukowicz

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We present a variability study of 4646 massive stars in the Small Magellanic Cloud (SMC) with known spectral types from the catalog of Bonanos et al. (2010) using the light curves from the OGLE-III database. The goal is to exploit the time domain information available through OGLE-III to gain insight into the processes that govern the evolution of massive stars. This variability survey of massive stars with known spectral types is larger than any previous survey by a factor of 7. We find that 60% of our sample (2766 stars) show no significant variability and 40% (1880 stars) exhibit variability distributed as follows: 807 stars display low-amplitude stochastic variability with fluctuations in I-band of up to 0.05 mag, 443 stars present irregular variability of higher amplitude (76% of these are reported as variables for the first time), 205 are eclipsing binaries (including 101 newly discovered systems), 50 are candidate rotating variables, 126 are classical Cepheids, 188 stars exhibit short-term sinusoidal periodicity ($P < 3$ days) making them candidate "slowly pulsating B stars" and non-radial Be pulsators, and 61 periodic stars exhibit longer periods. We demonstrate the wealth of information provided in the time domain, by doubling the number of known massive eclipsing binary systems and identifying 189 new candidate early-type Be and 20 Oe stars in the SMC. In addition, we find that ~80% of Be stars are photometrically variable in the OGLE-III time domain and provide evidence that short-term pulsating stars with additional photometric variability are rotating close to their break-up velocity.

Reference: A&A in press.
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1310.5701

Comments: 46 pages, 18 figures, 11 tables.

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Kinematics of massive star ejecta in the Milky Way as traced by 26Al

Kretschmer, Karsten; Diehl, Roland; Krause, Martin; Burkert, Andreas; Fierlinger, Katharina; Gerhard, Ortwin; Greiner, Jochen; Wang, Wei

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Context. Massive stars form in groups and their winds and supernova explosions create superbubbles up to kpc in size. The fate of their ejecta is of vital importance for the dynamics of the interstellar medium, for chemical evolution models, and the chemical enrichment of galactic halos and the intergalactic medium. However, ejecta kinematics and the characteristic scales in space and time have not been

explored in great detail beyond ~10 Ka.
Aims: Through measurement of radioactive 26Al with its decay time constant at ~106 years, we aim to trace the kinematics of cumulative massive-star and supernova ejecta independent of the uncertain gas parameters over million-year time scales. Our goal is to identify the mixing time scale and the spatio-kinematics of such ejecta from the pc to kpc scale in our Milky Way.
Methods: We use the SPI spectrometer on the INTEGRAL observatory and its observations along the Galactic ridge to trace the detailed line shape systematics of the 1808.63 keV gamma-ray line from 26Al decay. We determine line centroids and compare these to Doppler shift expectations from large-scale systematic rotation around the Galaxy centre, as observed in other Galactic objects.
Results: We measure the radial velocities of gas traced by 26Al, averaged over the line of sight, as a function of Galactic longitude. We find substantially higher velocities than expected from Galactic rotation, the average bulk velocity being ~200 km s-1 larger than predicted from Galactic rotation. The observed radial velocity spread implies a Doppler broadening of the gamma-ray line that is consistent with our measurements of the overall line width. We can reproduce the observed characteristics with 26Al sources located along the inner spiral arms, when we add a global blow-out preference into the forward direction away from arms into the inter-arm region, as is expected when massive stars are offset towards the spiral-arm leading edge. With the known connection of superbubbles to the gaseous halo, this implies angular-momentum transfer in the disk-halo system and consequently also radial gas flows. The structure of the interstellar gas above the disk affects how ionizing radiation may escape and ionize intergalactic gas

Reference: Astronomy and Astrophysics, Vol 559, A99 (2013)
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2013A%26A...559A..99K

Comments: Accepted, and identified as "highlight paper" by A&A

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The Wolf-Rayet stars in the Large Magellanic Cloud: A comprehensive analysis of the WN class

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Context: Massive stars, although being important building blocks of galaxies, are still not fully understood. This holds especially for Wolf-Rayet stars with their strong mass loss, whose spectral analysis requires adequate model atmospheres.
Aims: Following our comprehensive studies of the WR stars in the Milky Way, we now present spectroscopic analyses of almost all known WN stars in the Large Magellanic Cloud (LMC).
Methods: For the quantitative analysis of the wind-dominated emission-line spectra we employ the Potsdam Wolf-Rayet (PoWR) model atmosphere code. By fitting synthetic spectra to the observed spectral energy distribution and the available spectra (ultraviolet and optical), we obtain the physical properties of 107 stars.
Results: We present the fundamental stellar and wind parameters for an almost complete sample of WN stars in the LMC. Among those stars which are putatively single, two different groups can be clearly

distinguished. While 12% of our sample are more luminous than 10^6 Lsun and contain a significant amount of hydrogen, 88% of the WN stars, with little or no hydrogen, populates the luminosity range between log (L/Lsun) = 5.3...5.8.
Conclusions: While the few extremely luminous stars (log (L/Lsun) > 6), if indeed single stars, descended directly from the main sequence at very high initial masses, the bulk of WN stars have gone through the red-supergiant phase. According to their luminosities in the range of log (L/Lsun) = 5.3...5.8, these stars originate from initial masses between 20 and 40 Msun. This mass range is similar to the one found in the Galaxy, i.e. the expected metallicity dependence of the evolution is not seen. Current stellar evolution tracks, even when accounting for rotationally induced mixing, still partly fail to reproduce the observed ranges of luminosities and initial masses. Moreover, stellar radii are generally larger, and effective temperatures correspondingly lower, than predicted from stellar evolution models, probably due to subphotospheric "inflation".

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Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.5474

Comments: 17+126 pages, 10+108 figures

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Near-Infrared Evidence for a Sudden Temperature Increase in Eta Carinae

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Aims. Eta Car's ultra-violet, optical, and X-ray light curves and its spectrum suggest a physical change in its stellar wind over the last decade. It was proposed that the mass-loss rate decreased by a factor of about 2 in the last 15 years. We complement these recent results by investigating the past evolution and the current state of eta Car in the near-infrared (IR).
Methods. We present JHKL photometry of eta Car obtained at SAAO Sutherland from 2004-2013 with the Mk II photometer at the 0.75-m telescope and JHKs photometry with SIRIUS at the 1.4-m IRSF telescope from 2012-2013. The near-IR light curves since 1972 are analyzed.
Results. The long-term brightening trends in eta Car's JHKL light curves were discontinuous around the 1998 periastron passage. After 1998, the star shows excess emission above the extrapolated trend from earlier dates, foremost in J and H, and the blueward, cyclical progression in its near-IR colors is accelerated. The near-IR color evolution is strongly correlated with the periastron passages. After correcting for the secular trend we find that the color evolution matches an apparent increase in blackbody temperature of an optically thick near-IR emitting plasma component from about 3500 to 6000 K over the last 20 years.
Conclusions. We suggest that the changing near-IR emission may be caused by variability in optically thick bremsstrahlung emission. Periastron passages play a key role in the observed excess near-IR emission after 1998 and the long-term color evolution. We thus propose as a hypothesis that angular

momentum transfer (via tidal acceleration) during periastron passages leads to sudden changes in eta Car's atmosphere resulting in a long-term decrease in the mass-loss rate.

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Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1401.4999

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X-ray Emission from Eta Carinae near Periastron in 2009 I: A Two State Solution

Kenji Hamaguchi(1,2), Michael F. Corcoran(1,3), Christopher Russell(4), Andrew M.T. Pollock(5), Theodore R. Gull(6), Mairan Teodoro(6,7), Thomas I. Madura(6,8), Augusto Damineli(9), Julian M. Pittard(10)

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X-ray emission from the supermassive binary system Eta Carinae declines sharply around periastron. This X-ray minimum has two distinct phases - the lowest flux phase in the first ~3 weeks and a brighter phase thereafter. In 2009, the Chandra X-ray Observatory monitored the first phase five times and found the lowest observed flux at ~1.9e-12 ergs cm-2 s-1 (3-8 keV). The spectral shape changed such that the hard band above ~4 keV dropped quickly at the beginning and the soft band flux gradually decreased to its lowest observed value in ~2 weeks. The hard band spectrum had begun to recover by that time. This spectral variation suggests that the shocked gas producing the hottest X-ray gas near the apex of the wind-wind collision (WWC) is blocked behind the dense inner wind of the primary star, which later occults slightly cooler gas downstream. Shocked gas previously produced by the system at earlier orbital phases is suggested to produce the faint residual X-ray emission seen when the emission near the apex is completely blocked by the primary wind. The brighter phase is probably caused by the re-appearance of the WWC plasma, whose emissivity significantly declined during the occultation. We interpret this to mean that the X-ray minimum is produced by a hybrid mechanism of an occultation and a decline in emissivity of the WWC shock.

Reference: Astrophysical Journal
http://arxiv.org/abs/1401.5870
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Weblink:

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The evolution of massive stars and their spectra I. A non-rotating 60 Msun star from the zero-age main sequence to the pre-supernova stage

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For the first time, the interior and spectroscopic evolution of a massive star is analyzed from the zero-age main sequence (ZAMS) to the pre-supernova (SN) stage. For this purpose, we combined stellar evolution models using the Geneva code and atmospheric models using CMFGEN. With our approach, we were able to produce observables, such as a synthetic high-resolution spectrum and photometry, aiding the comparison between evolution models and observed data. Here we analyze the evolution of a non-rotating 60 Msun star and its spectrum throughout its lifetime. Interestingly, the star has a supergiant appearance (luminosity class I) even at the ZAMS. We find the following evolutionary sequence of spectral types: O3 I (at the ZAMS), O4 I (middle of the H-core burning phase), B supergiant (BSG), B hypergiant (BHG), hot luminous blue variable (LBV; end of H-core burning), cool LBV (H-shell burning through the beginning of the He-core burning phase), rapid evolution through late WN and early WN, early WC (middle of He-core burning), and WO (end of He-core burning until core collapse). We find the following spectroscopic phase lifetimes: 3.22e6 yr for the O-type, 0.34e5 yr (BSG), 0.79e5 yr (BHG), 2.35e5 yr (LBV), 1.05e5 yr (WN), 2.57e4 yr (WC), and 3.80e4 yr (WO). Compared to previous studies, we find a much longer (shorter) duration for the early WN (late WN) phase, as well as a long-lived LBV phase. We show that LBVs arise naturally in single-star evolution models at the end of the MS when the mass-loss rate increases as a consequence of crossing the bistability limit. We discuss the evolution of the spectra, magnitudes, colors, and ionizing flux across the star's lifetime, and the way they are related to the evolution of the interior. We find that the absolute magnitude of the star typically changes by ~6 mag in optical filters across the evolution, with the star becoming significantly fainter in optical filters at the end of the evolution, when it becomes a WO just a few 10e4 years before the SN explosion. We also discuss the origin of the different spectroscopic phases (i.e., O-type, LBV, WR) and how they are related to evolutionary phases (H-core burning, H-shell burning, He-core burning)

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Status: Manuscript has been accepted

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Comments:

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Non-LTE models for synthetic spectra of type Ia supernovae III. An accelerated lambda iteration procedure for the mutual interaction of strong spectral lines in SN Ia models with and without energy deposition

A. W. A. Pauldrach, T. L. Hoffmann, and P. J. N. Hultzsch

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Context. In type Ia supernova (SNIa) envelopes a huge number of lines of different elements overlap within their thermal Doppler widths, and this problem is exacerbated by the circumstance that up to 20% of these lines can have a line optical depth greater than 1. The stagnation of the lambda iteration in such optically thick cases is one of the fundamental physical problems inherent in the iterative solution of the non-LTE problem, and the failure of a lambda iteration to converge is a point of crucial importance whose physical significance must be understood completely.
Aims. We discuss a general problem related to radiative transfer under the physical conditions of supernova ejecta that involves a failure of the usual non-LTE iteration scheme to converge when multiple strong opacities belonging to different physical transitions come together, similar to the well-known situation where convergence is impaired even when only a single process attains large optical depths. The convergence problem is independent of the chosen frequency and depth grid spacing, independent of whether the radiative transfer is solved in the comoving or observer's frame, and independent of whether a common complete-linearization scheme or a conventional accelerated lambda iteration (ALI) is used. The problem appears when all millions of line transitions required for a realistic description of SNIa envelopes are treated in the frame of a comprehensive non-LTE model. The only way out of this problem is a complete-linearization approach which considers all ions of all elements simultaneously, or an adequate generalization of the established ALI technique which accounts for the mutual interaction of the strong spectral lines of different elements and which thereby unfreezes the "stuck" state of the iteration.
Methods. The physics of the atmospheres of SNIa are strongly affected by the high-velocity expansion of the ejecta, dominating the formation of the spectra at all wavelength ranges. Thus, hydrodynamic explosion models and realistic model atmospheres that take into account the strong deviation from local thermodynamic equilibrium are necessary for the synthesis and analysis of the spectra. In this regard one of the biggest challenges we have found in the modeling of the radiative transfer in SNIa is the fact that the radiative energy in the UV has to be transferred only via spectral lines into the optical regime in order to be able to leave the ejecta. However, convergence of the model toward a state where this is possible is impaired when using the standard procedures. We report on improvements in our approach of computing synthetic spectra for SNIa with respect to (i) an improved and sophisticated treatment of many thousands of strong lines that interact intricately with the "pseudo-continuum" formed entirely by Doppler-shifted spectral lines, (ii) an improved and expanded atomic database, and (iii) the inclusion of energy deposition within the ejecta arising from the radioactive decay of mostly 56Ni and 56Co.
Results. We show that an ALI procedure we have developed for the mutual interaction of strong spectral lines appearing in the atmospheres of SNe Ia solves the longstanding problem of transferring the radiative energy from the UV into the optical regime. Our new method thus constitutes a foundation for more refined models, such as those including energy deposition. In this regard we further show synthetic spectra obtained with various methods adopted for the released energy and compare them to observations. In detail we discuss applications of the diagnostic technique by example of a standard type Ia supernova, where the comparison of calculated and observed spectra revealed that in the early phases the consideration of the energy deposition within the spectrum-forming regions of the ejecta does not qualitatively alter the shape of the emergent spectra.
Conclusions. The results of our investigation lead to an improved understanding of how the shape of the spectrum changes radically as function of depth in the ejecta, and show how different emergent spectra are formed as a result of the particular physical properties of SNe Ia ejecta and the resulting peculiarities in the radiative transfer. This knowledge provides an important insight into the process of extracting

information from observed SNIa spectra, since these spectra are a complex product of numerous unobservable SNIa spectral features which are thus analyzed in parallel to the observable SNIa spectral features.

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Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1307.3067v2

Comments: 27 pages

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Non-LTE models for synthetic spectra of type Ia supernovae. IV. A modified Feautrier scheme for opacity-sampled pseudo-continua at high expansion velocities and application to synthetic SN Ia spectra

T. L. Hoffmann, D. N. Sauer, A. W. A. Pauldrach, P. J. N. Hultzsch

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Context. Type Ia supernovae (SN Ia) have become an invaluable cosmological tool as their exceptional brightness makes them observable even at very large distances (up to redshifts around z~1). To investigate possible systematic differences between local and distant SN Ia requires detailed models whose synthetic spectra can be compared to observations, and in which the solution of the radiative transfer is a key ingredient. One commonly employed method is the Feautrier scheme, which is generally very robust, but which can yield wrong results under certain conditions that frequently occur in the modelling of supernova ejecta or even in the radiatively driven expanding atmospheres of hot stars.
Methods. We use a sophisticated model atmosphere code which takes into account the non-LTE effects and high velocity gradients that strongly affect the physics of SN Ia atmospheres at all wavelengths to simulate the formation of SN Ia spectra by the thousands of strong spectral lines which intricately interact with the "pseudo-continuum" formed entirely by these Doppler-shifted lines themselves. We focus to an investigation of the behavior of the Feautrier scheme under these conditions.
Results. Synthetic spectra of SN Ia, a complex product of computer models replicating numerous physical processes that determine the conditions of matter and radiation in the ejecta, are affected by large spatial jumps of the line-dominated opacities and source functions for which the application of even well-established methods may harbor certain pitfalls. We analyze the conditions that can lead to a breakdown of conventional procedures and we derive for the Feautrier radiative transfer solver a modified description which yields more accurate results in the given circumstances.

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Weblink: http://arxiv.org/abs/1307.3105

Comments: 11 pages

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X-ray emission from massive stars in Cyg OB2

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We report on the analysis of the Chandra-ACIS data of O, B and WR stars in the young association Cyg OB2. X-ray spectra of 49 O-stars, 54 B-stars and 3 WR-stars are analyzed and for the brighter sources, the epoch dependence of the X-ray fluxes is investigated. The O-stars in Cyg,OB2 follow a well-defined scaling relation between their X-ray and bolometric luminosities: log(Lx/Lbol) = -7.2 +/- 0.2. This relation is in excellent agreement with the one previously derived for the Carina OB1 association. Except for the brightest O-star binaries, there is no general X-ray overluminosity due to colliding winds in O-star binaries. Roughly half of the known B-stars in the surveyed field are detected, but they fail to display a clear relationship between Lx and Lbol. Out of the three WR stars in Cyg OB2, probably only WR144 is itself responsible for the observed level of X-ray emission, at a very low log(Lx/Lbol) = -8.8 +/- 0.2. The X-ray emission of the other two WR-stars (WR145 and 146) is most probably due to their O-type companion along with a moderate contribution from a wind-wind interaction zone.

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Status: Manuscript has been accepted

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A Chandra Grating Observation of the Dusty Wolf-Rayet Star WR48a

Svetozar A. Zhekov, Marc Gagne and Stephen L. Skinner

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We present results of a Chandra High Energy Transmission Grating (HETG) observation of the carbon-rich Wolf-Rayet (WR) star WR48a. These are the first high-resolution spectra of this object in X-rays.

Blue-shifted centroids of the spectral lines of about -360 km/s and line widths of 1000 - 1500 km/s (FWHM) were deduced from the analysis of the line profiles of strong emission lines. The forbidden line of Si XIII is strong and not suppressed, indicating that the rarefied 10-30 MK plasma forms far from strong sources of far-UV emission, most likely in a wind collision zone. Global spectral modeling showed that the X-ray spectrum of WR48a suffered higher absorption in the October 2012 Chandra observation compared to a previous January 2008 XMM-Newton observation. The emission measure of the hot plasma in WR48a decreased by a factor ~ 3 over the same period of time. The most likely physical picture that emerges from the analysis of the available X-ray data is that of colliding stellar winds in a wide binary system with an elliptical orbit. We propose that the unseen secondary star in the system is another WR star or perhaps a luminous blue variable.

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Weblink: http://arxiv.org/abs/1402.1280

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Optical and infrared observations of the young SMC "blob" N26 and its environment

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High-excitation compact HII regions of the Magellanic Clouds are sites of recent massive star formation in low metallicity environments.
Detailed study of these regions and their environments using high-spatial resolution observations is necessary to better understand massive star formation, which is still an unsolved problem. We aim at a detailed study of the Small Magellanic Cloud compact HII region N26, which is only sim4" in diameter.
This study is based on high spatial resolution imaging (sim 0".1-0".3) in JHKs and L' bands, using the VLT equipped with the NAOS adaptive optics system. A larger region (sim 50 $times$ 76 pc) was also imaged at medium-spatial resolution, using the ESO 2.2m telescope in optical wavelengths. We also used the textit{JHKs} archival data from the IRSF survey and the textit{Spitzer} Space Telescope SAGE-SMC survey.
Our high-resolution textit{JHKs} data of the compact high-excitation HII region N26 reveal a new, bright

component (C) between the two already known optical components A and B. Components A and C are resolved into several stars. Component A is the main ionization source of N26 and coincides with the radio continuum source B0046-7333. A new compact HII region with very faint oiii $lambda$5007 emission is discovered. In the mid-IR, our field resembles a shell formed by filaments and dust clumps, coinciding with the molecular cloud SMCB2. N22, located in the center of the shell, is the most excited HII region of the complex and seems to have created a cavity in SMCB2. We derive nebular parameters from spectra, and using color-magnitude and color-color diagrams, we identify stellar sources that show significant near-IR excess emission, in order to identify the best YSO candidates.

Reference: Astronomy and Astrophysics
Status: Manuscript has been accepted

Weblink: http://aramis.obspm.fr/~heydari/n26-fin.pdf

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The Wolf-Rayet stars in M31: I. Analysis of the late-type WN stars

Andreas Sander, Helge Todt, Rainer Hainich, Wolf-Rainer Hamann

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CONTEXT: Comprehensive studies of Wolf-Rayet stars were performed in the past for the Galactic and the LMC population. The results revealed significant differences, but also unexpected similarities between the WR populations of these different galaxies. Analyzing the WR stars in M31 will extend our understanding of these objects in different galactic environments.
AIMS: The present study aims at the late-type WN stars in M31. The stellar and wind parameters will tell about the formation of WR stars in other galaxies with different metallicity and star formation histories. The obtained parameters will provide constraints to the evolution of massive stars in the environment of M31.
METHODS: We used the latest version of the Potsdam Wolf-Rayet model atmosphere code to analyze the stars via fitting optical spectra and photometric data. To account for the relatively low temperatures of the late WN10 and WN11 subtypes, our WN models have been extended into this temperature regime.
RESULTS: Stellar and atmospheric parameters are derived for all known late-type WN stars in M31 with available spectra. All of these stars still have hydrogen in their outer envelopes, some of them up to 50% by mass. The stars are located on the cool side of the zero age main sequence in the Hertzsprung-Russell diagram, while their luminosities range from 10^5 to 10^6 Lsun. It is remarkable that no star exceeds 10^6 Lsun.
CONCLUSIONS: If formed via single-star evolution, the late-type WN stars in M31 stem from an initial mass range between 20 and 60 Msun. From the very late-type WN9-11 stars, only one star is located in the S Doradus instability strip. We do not find any late-type WN stars with the high luminosities known in the Milky Way.

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Comments: 11+11 pages, 13+18 figures

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The VLT-FLAMES Tarantula Survey XVI. The optical+NIR extinction laws in 30 Doradus and the photometric determination of the effective temperatures of OB stars

J. Maíz Apellániz, C. J. Evans, R. H. Barbá, G. Gräfener, J. M. Bestenlehner, P. A. Crowther, M. García, A. Herrero, H. Sana, S. Simón-Díaz, W. D. Taylor, J. Th. van Loon, J. S. Vink, and N. R. Walborn

IAA-CSIC, UKATC, ULS, AO, US, CAB, IAC, STScI, IAC, UKATC, KU, AO, and STScI

Context: The commonly used extinction laws of Cardelli et al. (1989) have limitations that, among other issues, hamper the determination of the effective temperatures of O and early B stars from optical+NIR photometry.
Aims: We aim to develop a new family of extinction laws for 30 Doradus, check their general applicability within that region and elsewhere, and apply them to test the feasibility of using optical+NIR photometry to determine the effective temperature of OB stars.
Methods: We use spectroscopy and NIR photometry from the VLT-FLAMES Tarantula Survey and optical photometry from HST/WFC3 of 30 Doradus and we analyze them with the software code CHORIZOS using different assumptions such as the family of extinction laws.
Results: We derive a new family of optical+NIR extinction laws for 30 Doradus and confirm its applicability to extinguished Galactic O-type systems. We conclude that by using the new extinction laws it is possible to measure the effective temperatures of OB stars with moderate uncertainties and only a small bias, at least up to E(4405-5495) ~ 1.5 mag.

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Status: Manuscript has been accepted

Weblink: http://jmaiz.iaa.es/files/MaízApellánizetal14.pdf

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Measuring mass-loss rates and constraining shock physics using X-ray line profiles of O stars from the Chandra archive

David H. Cohen(1), Emma E. Wollman(1,2), Maurice A. Leutenegger(3,4), Jon O. Sundqvist(5,6), Alex W. Fullerton(7), Janos Zsarg'{o}(8), Stanley P. Owocki(5)

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We quantitatively investigate the extent of wind absorption signatures in the X-ray grating spectra of all non-magnetic, effectively single O stars in the Chandra archive via line profile fitting. Under the usual assumption of a spherically symmetric wind with embedded shocks, we confirm previous claims that some objects show little or no wind absorption. However, many other objects do show asymmetric and blue shifted line profiles, indicative of wind absorption. For these stars, we are able to derive wind mass-loss rates from the ensemble of line profiles, and find values lower by an average factor of 3 than those predicted by current theoretical models, and consistent with H-alpha if clumping factors of f_cl ~ 20 are assumed. The same profile fitting indicates an onset radius of X-rays typically at r ~ 1.5 Rstar, and terminal velocities for the X-ray emitting wind component that are consistent with that of the bulk wind. We explore the likelihood that the stars in the sample that do not show significant wind absorption signatures in their line profiles have at least some X-ray emission that arises from colliding wind shocks with a close binary companion. The one clear exception is zeta Oph, a weak-wind star that appears to simply have a very low mass-loss rate. We also reanalyse the results from the canonical O supergiant zeta Pup using a solar-metallicity wind opacity model and find Mdot = 1.8 X 10^{-6} solar masses per year, consistent with recent multi-wavelength determinations.

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Disk-Loss and Disk-Renewal Phases in Classical Be Stars II. Contrasting with Stable and Variable Disks

Zachary H. Draper(1,2), John P. Wisniewski(3), Karen S. Bjorkman(4), Marilyn R. Meade(5), Xavier Haubois(6,7), Bruno C. Mota(6), Alex C. Carciofi(6), Jon E. Bjorkman(4)

(1) University of Victoria; (2) HIA-NRC Canada; (3) University of Oklahoma; (4) University of Toledo; (5) University of Wisconsin; (6) Universitaria de Sao Paulo; (7) University of Sydney

Recent observational and theoretical studies of classical Be stars have established the utility of polarization color diagrams (PCD) in helping to constrain the time-dependent mass decretion rates of these systems. We expand on our pilot observational study of this phenomenon, and report the detailed analysis of a long-term (1989-2004) spectropolarimetric survey of 9 additional classical Be stars, including systems exhibiting evidence of partial disk-loss/disk-growth episodes as well as systems exhibiting long-term stable disks. After carefully characterizing and removing the interstellar polarization along the line of sight to each of these targets, we analyze their intrinsic polarization behavior. We find that many steady-state Be disks pause at the top of the PCD, as predicted by theory. We also observe sharp declines in the Balmer jump polarization for later spectral type, near edge-on steady-state disks, again as recently predicted by theory, likely caused when the base density of the disk is very high, and the outer region of the edge-on disk starts to self absorb a significant number of Balmer jump photons. The intrinsic V-band polarization and polarization position angle of gamma Cas exhibits variations that seem to phase with the orbital period of a known one-armed density structure in this disk, similar to the theoretical predictions of Halonen & Jones. We also observe stochastic jumps in the intrinsic polarization across the Balmer jump of several known Be+sdO systems, and speculate that the thermal inflation of part of the outer region of these disks could be responsible for producing this observational phenomenon. Finally, we estimate the base densities of this sample of stars to be between ~8x10^{-11} to ~4 times

10^{-12} g cm^{-3} during quasi steady state periods given there maximum observed polarization.

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

Weblink: http://arxiv.org/abs/1402.5240

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Rotating massive O stars with non-spherical 2D winds

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(2) School of Physical and Geographical Sciences, Keele University, Staffordshire, UK

We present solutions for the velocity field and mass-loss rates for 2D axisymmetric outflows, as well as for the case of mass accretion through the use of the Lambert W-function. For the case of a rotating radiation-driven wind the velocity field is obtained analytically using a parameterised description of the line acceleration that only depends on radius r at any given latitude theta. The line acceleration g(r) is obtained from Monte-Carlo multi-line radiative transfer calculations. The critical/sonic point of our equation of motion varies with latitude theta. Furthermore, an approximate analytical solution for the supersonic flow of a rotating wind is derived, which is found to closely resemble the exact solution. For the simultaneous solution of the mass-loss rate and velocity field, we use the iterative method of our 1D method extended to the non-spherical 2D case. We apply the new theoretical expressions with our iterative method to the stellar wind from a differentially rotating 40 M_sun O5-V main sequence star as well as to a 60 M_sun O-giant star, and we compare our results to previous studies that are extensions of the Castor et al. (1975, ApJ, 195, 157) CAK formalism. Next, we account for the effects of oblateness and gravity darkening. Our numerical results predict an equatorial decrease of the mass-loss rate, which would imply that (surface-averaged) total mass-loss rates are lower than for the spherical 1D case, in contradiction to the Maeder & Meynet (2000, A&A, 361, 159) formalism that is oftentimes employed in stellar evolution calculations for rotating massive stars. To clarify the situation in nature we discuss observational tests to constrain the shapes of large-scale 2D stellar winds.

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

Weblink: http://arxiv.org/abs/1402.5929

Comments: 20 pages, 4 figures, 7 tables

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Abstracts of 2 conference proceedings

Interacting winds in massive binaries

Gregor Rauw

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Massive stars feature highly energetic stellar winds that interact whenever two such stars are bound in a binary system. The signatures of these interactions are nowadays found over a wide range of wavelengths, including the radio domain, the optical band, as well as X-rays and even gamma-rays. A proper understanding of these effects is thus important to derive the fundamental parameters of the components of massive binaries from spectroscopic and photometric observations.

Reference: Proceedings of the conference "Setting a new standard in the analysis of binary stars", Leuven, Sept 2013, EAS Publication Series, in press
Status: Conference proceedings

Weblink: http://arxiv.org/abs/1401.3508

Comments:

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New Stellar Models - Boon or Bane?

Claus Leitherer

STScI

The impact of new stellar evolution models with rotation on the predictions of population synthesis models is discussed. Massive rotating stars have larger convective cores than their non-rotating counterparts, and their outer layers are chemically enriched due to increased mixing. Together, these two effects lead to hotter and more luminous stars, in particular during later evolutionary phases. As a result, stellar populations containing massive stars are predicted to become more luminous for a given mass and to emit more ionizing photons. Depending on the assumed rotation velocity, rotation causes profound changes in the properties of young stellar populations. These changes are most noticeable at later evolutionary phases and at shorter wavelengths of the spectral energy distribution. Most strikingly, the Lyman continuum luminosity increases by up to a factor of five in O- and Wolf-Rayet stars. Care is required when comparing these models to observations, and some fine-tuning of the models is still required before recalibrations of star-formation indicators should be attempted.

Reference: Proc. "Massive Young Star Clusters Near and Far: From the Milky Way to Re-ionization", eds. D. Rosa, D. Mayya, & E. Terlevich, Puebla (2014)
Status: Conference proceedings

Weblink: http://arxiv.org/abs/1402.0824

Comments:

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Closed JOB offers

(original deadline passed)

Research Position at the Astronomical Institute of the Academy of Sciences of the Czech Republic

Jiri Kubat

Astronomical Institute
251 65 Ondrejov
Czech Republic

The Astronomical Institute of the Academy of Sciences of the Czech Republic (www.asu.cas.cz) opens one temporary position in its Stellar department in the field of NLTE radiative transfer to work on a project "Transfer of polarized radiation in stellar atmospheres". The applicant is expected to have experience in the field of the proposed project and to have a university degree, preferably PhD, at the time of arrival.

The Stellar Department of the Astronomical Institute (http://www.asu.cas.cz) is located on the observatory campus in Ondrejov, which is situated approximately 30 km south-east of Prague.

The stellar department (http://stelweb.asu.cas.cz) operates a 2m telescope with a coude spectrograph, which is suitable for studies of bright objects (e.g., B stars, hot subdwarfs). Czech Republic is a member state of both ESO and ESA, and has access to ESO facilities. The department includes about a dozen active researchers, with a total of about 60 scientists working at the Astronomical Institute. The department offers excellent computing facilities, running under Linux. Researchers of the stellar department also have free access to the computer cluster (http://wave.asu.cas.cz/ocas/).

The salary will be based on the standard domestic scale. The starting date is as soon as possible and the appointment is initially for 1 year. Further extension will be possible upon satisfactory scientific results, publication output, and availability of funding.

The candidates should send their applications (list of publications, curriculum vitae, and summary of their research work) and arrange two letters of recommendation to be sent to Dr. J. Kubat, Astronomical Institute, Fricova 298, 251 65 Ondrejov, Czech Republic; (phone +420 323620328, fax +420 323620250), preferrably via e-mail kubat@sunstel.asu.cas.cz. Applications should be received before 20th January 2014.

Attention/Comments:

Weblink: http://www.asu.cas.cz/news/497_konkurz-na-misto-post-doktoranda-ve-stelarnim-oddeleni/

Email: kubat@sunstel.asu.cas.cz

Deadline: 20th January 2014

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Stellar evolution and asteroseismology of massive stars

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Liege University
Allee du 6 Aout, 17, 4000 Liege, Belgium

The group ASTA (Theoretical Stellar Astrophysics and Asteroseismology) of the University of Liège, Belgium offers a postdoctoral grant of 18 months to work on stellar evolution and asteroseismology of massive stars (see details below). The postdoc should begin between April and December 2014. The administrative eligibility criterium for this postdoctoral grant requires that the candidate must have worked more than 1 year out of Belgium during the 3 years before this postdoc.
Applicants are invited to send to Marc-Antoine Dupret (MA.Dupret@ulg.ac.be) before 1st of March:
- A motivation letter
- A CV
- At least two recommendation letters

Details of the postdoc.
The postdoc is expected to contribute to the characterization of poorly modeled processes in massive stars evolution such as the transport of chemicals and angular momentum, mass loss and exchanges in binaries, magnetic field, … using e.g. asteroseismology. He/she will work on the improvement of current numerical codes modeling the evolution and oscillations of massive stars, and apply these tools by confronting their predictions to current observations. Candidates are expected to have a strong experience in the modeling of stellar interiors and their oscillations.

Attention/Comments:

Weblink:

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Deadline: 1 March 2014

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Postdoctoral position in extragalactic stellar spectroscopy

Ben Davies

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Liverpool L3 5RF
United Kingdom

Applications are invited for a postdoctoral research position working with Ben Davies at the Astrophysics Research Institute, Liverpool John Moores University. The aim of the project is to develop and exploit the use of massive stars as probes of their host galaxy's abundances and chemical evolution. This will be done using state-of-the-art model atmospheres in conjunction with near-IR spectroscopy from the VLT and Keck.

Candidates should have a PhD in astronomy/astrophysics or a closely related field. Experience with model atmospheres of cool stars, massive stars, near-infrared spectroscopy, and automated spectral fitting is especially desirable.

The position is guaranteed for a period of two years in the first instance, with a possibility of extension subject to funding. The expected start date will be from 1 April 2014 or as near as possible. The salary will be in the range £30,727 - £36,661 per annum

For further information, and to apply for this position on-line, please visit http://www.ljmu.ac.uk/working-at-ljmu/ and enter the vacancy reference number 708. Alternatively contact the HR Department on 0151 904 6130/6131, or email: jobs@ljmu.ac.uk

For informal inquires, please contact Ben Davies at b.davies@ljmu.ac.uk

LJMU is committed to achieving equality of opportunity.

Attention/Comments:

Weblink: http://jobregister.aas.org/job_view?JobID=47667

Email: b.davies@ljmu.ac.uk

Deadline: 28 Feb 2014

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Researcher position in astrophysics

Anna Aret

Tartu Observatory
Observatooriumi 1
Tõravere 61602
Tartu county
Estonia

Tartu Observatory (Estonia) invites applications for a researcher position in astrophysics.

The position is initially for 2 years, but has good prospects of developing into a long-term career, depending on the performance of the applicant and on the availability of funding. The starting time is negotiable, but not earlier than September 2014.

Applicants must possess a Ph.D. in astrophysics, or a closely related area, and should have spent at least 2 years as a postdoc at an internationally recognised research institution. Candidates with the background in any of the following topics: early or late evolutionary stages of stars, massive stars, first stars, stellar population synthesis, chemical enrichment of the Universe, interstellar matter, intergalactic matter, galaxy formation and evolution, galactic structure, are especially encouraged to apply. The successful candidate will be able to conduct his or her own research as well as participate in the current research at Tartu Observatory and in the national and European funding schemes.

The deadline for applications is March 10th 2014. Applications including a CV, publications list and a statement of research interests (max. 5 pages in total) should be sent to jobs@to.ee.

Tartu Observatory is among the leading astronomical research institutes in North-Eastern Europe, its strongest research being carried out in the field of the large-scale structure of the Universe. It offers a modern and friendly work environment and conducts research in wide international collaboration. It currently hosts 20 staff members and 6 PhD students in astrophysics. The new position is intended to develop the stellar and/or galaxy physics research at Tartu Observatory to an internationally competitive level through broadening the collaboration network and through advancing the local teamwork.

The successful applicant is offered a gross salary starting from 2000 Euros per month (subject to 21% income tax and 2% unemployment security tax), depending on his/her work experience. Further uprating is possible.

Please feel free to send inquiries to: jobs@to.ee.

Attention/Comments:

Weblink: http://www.to.ee/en/researcher-position-astrophysics

Email: jobs@to.ee

Deadline: March 10, 2014

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Open JOB offers

Research Professorship in Time-Domain Astronomy of Variable Stars

Conny Aerts

Institute of Astronomy
KULeuven
Celestijnenlaan 200D
300q Leuven
Belgium

The recent past has seen an immense revolution in stellar physics, driven by asteroseismic studies performed with the spacemissionsMOST, CoRoT, and Kepler in combination with ground-based high-precision spectroscopy and interferometry. This area of research will get further boosts the coming decade thanks to the K2, Gaia, TESS, and PLATO space missions as well as ground-based astronomy projects.

In light of these future activities, we are searching for a motivated scientist with international recognition in observational astronomy, and with outstanding capabilities of independent fundraising and people-management, to apply for a Research Professorship at KULeuven and join the Institute of Astronomy to build up his/her own team. Applicants need to have a PhD degree in astrophysics and at least three years of postdoctoral experience
by 1 October 2015, which is the starting date of the position. We expect applicants to be well embedded in international instrument consortia of relevance for studies of variability of stars, binaries, clusters, associations, and other time-variable phenomena in the Milky Way.

A KULeuven Research Professorship is a tenure-track or a permanent faculty position with a limited teaching assignment during the first five years, which gradually increases to a full teaching assignment after ten years.

This mail is a call for an Expression of Interest (EoI) to apply for such a position. Interested applicants should send a one-page motivation letter, the name and email address of three reference persons, and a full CV as a single PDF file to the director of IoA: Prof. Conny Aerts:
conny@ster.kuleuven.be, by 22 May 2014.

The staff members of IoA and the Board of the Department of Physics and Astronomy will
screen the EoIs, organise interviews, and select maximally three candidates to go through the university-wide competition led by the Research Council of KULeuven. The final decision whether the post will actually be filled depends on the ranking of candidates across all the faculties of the university. This decision will be taken in February 2015.

Attention/Comments:

Weblink: http://fys.kuleuven.be/ster

Email: conny@ster.kuleuven.be

Deadline: 22 May 2014

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MEETINGS

Magnetism and Variability in O stars

*** SCIENTIFIC ORGANISING COMMITTEE:**

Huib Henrichs
Ed van den Heuvel
Lex Kaper (chair)
Alex de Koter
Tony Moffat (Montreal, Canada)
Stan Owocki (Delaware, USA)
Gregg Wade (Kingston, Canada)

*** LOCAL ORGANISING COMMITTEE:**

Susan Franzen
Olga Hartoog
Martin Heemskerk
Milena Hoekstra
Lex Kaper (chair)
Bertrand Lemasle

==
FIRST ANNOUNCEMENT
Magnetism and Variability in O stars
17-19 September 2014
Amsterdam (Netherlands)
==
* CONTACT:

email: h.f.henrichs@uva.nl
webpage: www.astro.uva.nl/ostars/

* IMPORTANT DATES:

First announcement and pre-registration: December 20th, 2013
Second announcement and registration: February 15th, 2014
Early payment fee (275 €): before May 1st, 2014
Regular payment fee (325 €)
Registration closed: June 15th, 2014
Conference: 17 -19 September 2014

* SCIENTIFIC RATIONALE:

For more than 30 years, spectroscopic observations from space have shown that wind variability in massive OB stars is a widespread phenomenon. This variability is not strictly periodic, but cyclic (like sunspots) with a dominant quasi period that scales with the estimated rotation period. The underlying cause or trigger of this variability is not known. The major time-variable wind features likely find their origin close to, or at the surface and have been suggested to be connected to non-radial pulsations or bright magnetic star spots.

The past few years have shown very promising new developments, both observationally and theoretically. High-precision space-based photometry reveals rapid variations, incompatible with pulsations, but consistent with the continuous presence of a multitude of co-rotating bright spots that live at most a few days. These spots are suggested to be of magnetic origin and could trigger large-scale wind variability. Theoretical studies show that magnetic fields can be generated with a short estimated turnover time in sub-surface convective layers in massive stars. These may lead to magnetic spots.

Understanding the role of magnetic fields and variability in O and early B stars is a major challenge in massive star research. This is the focus of a 3-day conference to be held in Amsterdam, organized to mark the formal retirement of Huib Henrichs, who has worked in this field throughout his scientific life.

This conference will be organized in a somewhat different way. Rather than having a skeleton with specific names of invited speakers, the community is invited to come forward on their own accord, thus giving more people a chance to provide their input. From this, a list of speakers and topics will be drawn up, with ample time for discussion. The aim is 25 and 15 min talks (each including discussion) and posters.

Reference: N/A
Status: Other

Weblink: http://www.astro.uva.nl/ostars/

Comments:

Email: h.f.henrichs@uva.nl

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Why Galaxies Care About AGB Stars III

July 28 - August 1, 2014

Venue: Vienna

Stars are conspicuous components of galaxies, and the sites of the creation of most chemical elements. Due to their high luminosity and their production of heavy elements, stars on the Asymptotic Giant Branch (AGB) play an important role in understanding stellar and galactic evolution.
This conference aims to build a bridge between AGB research and its application to the modelling of stellar populations and the chemical evolution of galaxies and the universe as a whole. Current developments and challenges on both sides will be discussed to reach an understanding of possibilities, limitations, and needs in both areas, and hence to improve our knowledge about the role of AGB stars in the context of galaxies. This is another follow-up meeting to the successful Viennese conferences on similar topics in 2006 and 2010.

The conference will be hosted by the Austrian Society for Astronomy and Astrophysics and the Department of Astrophysics at the University of Vienna. The meeting is supported by the Robert F. Wing Support Fund at Ohio State University.

This time the focus of the meeting will be:

1) Complex Atmospheres: Observation and theoretical understanding
2) Living together: Binarity, disks, ISM interaction
3) What is left: Dust, yields, AGBs in the cosmic matter cycle
4) Resolved and unresolved: AGB star populations in external stellar systems
5) Perspectives: ALMA, SKA, SOFIA, JWST, VLTI+, ELT

INVITED SPEAKERS
J. Blommaert, G. Bono, I. Cherchneff, O. Chesneau, A. Chiavassa, N. Cox, L. Girardi, S. Höfner, R. Izzard, M. Maercker, M. Marengo, P. Marigo, J. Menzies, S. Mohamed, K. Ohnaka, G. Perrin, A. Renzini, R. Riffel, R. Schneider, S. Srinivasan, O. Straniero, W. Vlemmings

SCIENTIFIC ORGANIZING COMMITTEE
H. Olofsson (chair), I. Cherchneff, M. Groenewegen, S. Höfner, R.M. Humphreys, A. Jorissen, A. Karakas, F. Kerschbaum (co-chair), T. Lebzelter, C. Maraston, M. Meixner, B. Plez, P. Whitelock, H. van Winckel, R. Wing, M. Wittkowski

LOCAL ORGANIZING COMMITTEE
F. Kerschbaum (chair), J. Hron (co-chair), T. Lebzelter, W. Nowotny, R. Ottensamer, T. Posch, et al.

MEETING FORMAT
The five sub-topics of the meeting will be presented and discussed in a series of oral and poster contributions. The sessions will be centred on invited reviews supplemented by contributed talks offering opportunities to highlight exciting new results. Posters will be on display throughout the meeting.

IMPORTANT DEADLINES

Registration for the conference is now open via our webpage http://www.univie.ac.at/galagb including the possibility to submit abstracts for invited and contributed talks and posters. Registration fee is 200 EUR for early registration and 240 EUR for late registration.

- Deadline for abstract submission for contributed talks: April 30, 2014
- Deadline for applications for financial support: April 30, 2014
- End of early registration: May 31, 2014

- Deadline for abstract submission for posters: June 15, 2014

CONTRIBUTIONS
The SOC will select a limited number of contributions for oral presentation on the basis of the submitted abstracts. Proposed oral contributions not selected for the programme can be converted to poster presentations at the author's discretion. Deadline for the submission of abstracts for oral contributions is April 30, 2014.

REGISTRATION FEE
The registration fee will be 200 EUR for early registration and 240 EUR for late registration (after May 31) and includes welcome reception, coffee breaks and a copy of the conference proceedings.

CONFERENCE PROCEEDINGS
Proceedings of the conference will be published in a similar way as 2006
and 2010 (see ASP Conf. Ser. Vols. 378 and 445).

FINANCIAL ASSISTANCE
Limited support for PhD students and young researchers will be available.
If you wish to apply for a supporting grant, please send an email justifying its need to galagb.astro@univie.ac.at. Students are asked to arrange a letter of support from their advisor to be sent independently by email. Deadline for applications is April 30, 2014. Supporting letters have to be received by that time as well. Applicants will be informed about the outcome not later than May 20. Please note that the grant can cover only the registration fee.

CONFERENCE VENUE AND FACILITIES
The conference will be held at the campus of the University of Vienna located close to the city centre. Video and computer display facilities will be available in the lecture room. WIFI is available to all participants. Special needs can be accommodated if we are advised well in advance.

SOCIAL ACTIVITIES
We invite you to our welcome reception on Sunday evening at the conference venue. Moreover there will be an evening city walk on Tuesday, a trip to the beautiful Wachau valley including a ship cruise on Wednesday afternoon and the conference dinner at the old observatory on Thursday.

CHILDCARE
We are happy to offer childcare (fee required) during the session hours of our conference. The kid’s age range must be 3-12 years (from 0 upon special arrangement).

TRAVEL INFORMATION
Vienna can be reached
1) By Air: Vienna airport is located about 20 km south-east of the town. There are shuttle trains and buses to the city centre at least every half hour. A second airport close to Vienna is Bratislava which is connected to Vienna by bus (1 hour) or by boat.

2) By Train: Vienna is connected to any major city in Europe.
3) By Road: two major European highways (E59, E60) lead to Vienna.

ABOUT VIENNA
Vienna, the capital of Austria, with 1.8 million inhabitants, situated on the banks of the Danube, is a metropolis with a unique charm and flair. The influx of visitors from all over the world has made Vienna the most popular urban tourist destination in Austria. Wander along narrow, medieval alleyways or across imperial squares, view Schönbrunn Palace or the Imperial Palace (Hofburg) and marvel at the majestic architecture along the Ring Boulevard. Vienna possesses a lively and vast array of cultural attractions. The city has been synonymous with music for centuries, and was home to Mozart, Beethoven, Schubert, Johann Strauss, Mahler, and Berg. This outstanding musical heritage has been preserved right to the present day. Down the centuries, Vienna has always produced and nurtured world-famous artists. The

collecting passion of art-loving rulers and monarchs has made Vienna a treasure house par excellence. In order to supplement these high cultural aspects you can visit one of Vienna's famous coffee houses or traditional wine taverns ("Heurige") and work your way through famous culinary specialties.

LANGUAGE
The language of the conference will be English. The spoken language in Vienna is the Austrian flavour of German. Nevertheless, there should be no difficulty in finding people with at least a basic knowledge of English outside the conference.

WEB SITE
Please visit our website for more information!
www.univie.ac.at/galagb

If you have any questions, please contact us at galagb.astro@univie.ac.at
We are looking forward to seeing you in Vienna in 2014!

Weblink: http://www.univie.ac.at/galagb

Email: galagb.astro@univie.ac.at

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