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THE MASSIVE STAR NEWSLETTER

formerly known as the hot star newsletter

*

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Jobs

Closed (original deadline passed):

PhD Studentships (STFC/Keele funding) in Astronomy/Astrophysics

Open:

PhD Position on Quantitative Stellar Spectroscopy
Job opening for two post-doctoral and two PhD positions in the field of evolved stars and laboratory experiments

Meetings

Stellar End Products: The Low Mass - High Mass Connection
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St Andrews Monte Carlo Summer School
Science with large spectroscopic surveys of Galactic OB stars: getting ready for Gaia
Stellar Behemoths: Red Supergiants Across the Local Universe
Massive Stars and the Gaia-ESO Survey

News

Fizeau exchange visitors program - call for applications

The Fizeau exchange visitors program in optical interferometry funds (travel and accommodation) visits of researchers to an institute of his/her choice (within the European Community) to perform collaborative work and training on one of the active topics of the European Interferometry Initiative. The visits will typically last for one month, and strengthen the network of astronomers engaged in technical, scientific and training work on optical/infrared interferometry. The program is open for all levels of astronomers (Ph.D. students to tenured staff), non-EU based missions will only be funded if considered essential by the Fizeau Committee. Applicants are strongly encouraged to seek also partial support from their home or host institutions.

The deadline for applications is March 15. Fellowships can be awarded for missions starting in May.

NOTE: a special Fizeau call will be issued in late April for financial support requests for the VLTI school 2015 in Cologne:
http://www.astro.uni-koeln.de/vltischool2015

Further informations and application forms can be found at
www.european-interferometry.eu

The program is funded by OPTICON/FP7.

Please distribute this message also to potentially interested colleagues outside of your community!

Looking forward to your applications,
Josef Hron & Laszlo Mosoni
(for the European Interferometry Initiative)

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PAPERS

Abstracts of 11 accepted papers

First detections of FS CMa stars in clusters. Evolutionary state as constrained by coeval massive stars

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FS CMa stars are low-luminosity objects showing the B[e] phenomenon whose evolutionary state remains a puzzle. These stars are surrounded by compact disks of warm dust of unknown origin. Hitherto, membership of FS CMa stars to coeval populations has never been confirmed. The discovery of low-luminosity line emitters in the young massive clusters Mercer 20 and Mercer 70 prompts us to investigate the nature of such objects. We intend to confirm membership to coeval populations in order to characterize these emission-line stars through the cluster properties. Based on ISAAC/VLT medium-resolution spectroscopy and NICMOS/HST photometry of massive cluster members, new characterizations of Mercer 20 and Mercer 70 are performed. Coevality of each cluster and membership of the newly-discovered B[e] objects are investigated using our observations as well as literature data of the surroundings. Infrared excess and narrow-band photometric properties of the B[e] stars are also studied. We confirm and classify 22 new cluster members, including Wolf-Rayet stars and blue hypergiants. Spectral types (O9-B1.5 V) and radial velocities of B[e] objects are compatible with the remaining cluster members, while emission features of Mg II, Fe II], and [Fe II] are identified in their spectra. The ages of these stars are 4.5 and 6 Myr, and they show mild infrared excesses. We confirm the presence of FS CMa stars in the coeval populations of Mercer 20 and Mercer 70. We discuss the nature and evolutionary state of FS CMa stars, discarding a post-AGB nature and introducing a new hypothesis about mergers. A new search method for FS CMa candidates in young massive clusters based on narrow-band Paschen-alpha photometry is proposed and tested in photometric data of other clusters, yielding three new candidates.

Reference: Accepted for publication in A&A
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1412.7988

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Spectroscopic variability of two Oe stars

G. Rauw^{1,2}, T. Morel^{1,2}, Y. Naze^1, T. Eversberg^{2,3}, F. Alves^2, W. Arnold^2, T. Bergmann^2, N.G. Correia Viegas^2, R. Fahed^{2,4}, A. Fernando^2, J.N. Gonzalez-Perez^5, L.F. Gouveia Carreira^2, A. Hempelmann^5, T. Hunger^2, J.H. Knapen^{2,6,7}, R. Leadbeater^2, F. Marques Dias^2, M. Mittag^5, A.F.J. Moffat^{2,4}, N. Reinecke^2, J. Ribeiro^2, N. Romeo^2, J. Sanchez Gallego^{2,6,8}, E.M. Dos Santos^2, L. Schanne^2, J.H.M.M. Schmitt^5, K.-P. Schroeder^9, O. Stahl^{2,10}, Ba. Stober^2, Be. Stober^2, K. Vollmann^{2,3}

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The two Oe stars HD 45314 and HD 60848 have recently been found to exhibit very different X-ray properties: whilst HD 60848 has an X-ray spectrum and the emission level typical of most OB stars, HD 45314 features a much harder and brighter X-ray emission, making it a so-called gamma Cas analogue. Monitoring the optical spectra could provide hints towards the origin of these very different behaviours. We analyse a large set of spectroscopic observations of HD 45314 and HD 60848, extending over 20 years. We further attempt to fit the H-alpha line profiles of both stars with a simple model of emission line formation in a Keplerian disk. Strong variations in the strengths of the H-alpha, H-beta, and He I 5876 emission lines are observed for both stars. In the case of HD 60848, we find a time lag between the variations in the equivalent widths of these lines, which is currently not understood. The emission lines are double peaked with nearly identical strengths of the violet and red peaks. The H-alpha profile of this star can be successfully reproduced by our model of a disk seen under an inclination of 30 degrees. In the case of HD 45314, the emission lines are highly asymmetric and display strong line profile variations. We find a major change in behaviour between the 2002 outburst and the one observed in 2013. This concerns both the relationship between the equivalent widths of the various lines and their morphologies at maximum strength (double-peaked in 2002 versus single-peaked in 2013). Our simple disk model fails to reproduce the observed H-alpha line profiles of HD 45314. Our results further support the interpretation that Oe stars do have decretion disks similar to those of Be stars. Whilst the emission lines of HD 60848 are explained well by a disk with a Keplerian velocity field, the disk of HD 45314 seems to have a significantly more complex velocity field that could be another signature of the phenomenon that produces its peculiar X-ray emission.

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

Weblink: http://arxiv.org/abs/1501.01377

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What causes the large extensions of red-supergiant atmospheres? Comparisons of interferometric observations with 1-D hydrostatic, 3-D convection, and 1-D pulsating model atmospheres

B. Arroyo-Torres (1); M. Wittkowski (2); A. Chiavassa (3); M. Scholz (4,5); B. Freytag (6); J. Marcaide (1,7); P. H. Hauschildt (8); P. R. Wood (9); F. J. Abellan (1)

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We present the atmospheric structure and the fundamental parameters of three red supergiants, increasing the sample of RSGs observed by near-infrared spectro-interferometry. Additionally, we test possible mechanisms that may explain the large observed atmospheric extensions of RSGs. We carried out spectro-interferometric observations of 3 RSGs in the near-infrared K-band with the VLTI/AMBER instrument at medium spectral resolution. To comprehend the extended atmospheres, we compared our observational results to predictions by available hydrostatic PHOENIX, available 3-D convection, and new 1-D self-excited pulsation models of RSGs. Our near-infrared flux spectra are well reproduced by the PHOENIX model atmospheres. The continuum visibility values are consistent with a limb-darkened disk as predicted by the PHOENIX models, allowing us to determine the angular diameter and the fundamental parameters of our sources. Nonetheless, in the case of V602 Car and HD 95686, the PHOENIX model visibilities do not predict the large observed extensions of molecular layers, most remarkably in the CO bands. Likewise, the 3-D convection models and the 1-D pulsation models with typical parameters of RSGs lead to compact atmospheric structures as well, which are similar to the structure of the hydrostatic PHOENIX models. They can also not explain the observed decreases in the visibilities and thus the large atmospheric molecular extensions. The full sample of our RSGs indicates increasing observed atmospheric extensions with increasing luminosity and decreasing surface gravity, and no correlation with effective temperature or variability amplitude, which supports a scenario of radiative acceleration on Doppler-shifted molecular lines.

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

Weblink: http://adsabs.harvard.edu/abs/2015arXiv150101560A

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Code dependencies of pre-supernova evolution and nucleosynthesis in massive stars: evolution to the end of core helium burning

S. Jones(1,2,*), R. Hirschi(2,3,*), M. Pignatari(4,*), A. Heger(5,6,7,*), C. Georgy(2), N. Nishimura(2,*), C. Fryer(8,*) & F. Herwig(1,7,*)

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Massive stars are key sources of radiative, kinetic and chemical feedback in the Universe. Grids of massive star models computed by different groups each using their own codes, input physics choices and numerical approximations, however, lead to inconsistent results for the same stars. We use three of these 1D codes --- GENEC, KEPLER and MESA --- to compute non-rotating stellar models of 15, 20 and 25 M&sun; and compare their nucleosynthesis. We follow the evolution from the main sequence until the end of core helium burning. The GENEC and KEPLER models hold physics assumptions used in large grids of published models. The MESA code was set up to use convective core overshooting such that the CO core masses are consistent with those obtained by GENEC. For all models, full nucleosynthesis is computed using the NuGrid post-processing tool MPPNP. We find that the surface abundances predicted by the models are in reasonable agreement. In the helium core, the standard deviation of the elemental overproduction factors for Fe to Mo is less than 30 per cent - smaller than the impact of the present nuclear physics uncertainties. For our three initial masses, the three stellar evolution codes yield consistent results. Differences in key properties of the models, e.g. helium and CO core masses and the time spent as a red supergiant, are traced back to the treatment of convection and, to a lesser extent, mass loss. The mixing processes in stars remain the key uncertainty in stellar modelling. Better constrained prescriptions are thus necessary to improve the predictive power of stellar evolution models.

Reference: MNRAS 447, 3115-3129 (2015)
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2015MNRAS.447.3115J

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The Final Fate of Stars that Ignite Neon and Oxygen Off-center: Electron Capture or Iron Core-collapse Supernova?

Samuel Jones(1), Raphael Hirschi(2,3), Ken'ichi Nomoto(3)

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In the ONeMg cores of 8.8-9.5 M ⊙ stars, neon and oxygen burning is ignited off-center. Whether or not the neon-oxygen flame propagates to the center is critical for determining whether these stars undergo Fe core collapse or electron-capture-induced ONeMg core collapse. We present more details of stars that ignite neon and oxygen burning off-center. The neon flame is established in a manner similar to the carbon flame of super-AGB stars, albeit with a narrower flame width. The criteria for establishing a flame

can be met if the strict Schwarzschild criterion for convective instability is adopted. Mixing across the interface of the convective shell disrupts the conditions for the propagation of the burning front, and instead the shell burns as a series of inward-moving flashes. While this may not directly affect whether or not the burning will reach the center (as in super-AGB stars), the core is allowed to contract between each shell flash. Reduction of the electron fraction in the shell reduces the Chandrasekhar mass and the center reaches the threshold density for the URCA process to activate and steer the remaining evolution of the core. This highlights the importance of a more accurate treatment of mixing in the stellar interior for yet another important question in stellar astrophysics---determining the properties of stellar evolution and supernova progenitors at the boundary between electron capture supernova and iron core-collapse supernova.

Reference: ApJ 797 83
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2014ApJ...797...83J

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Early-time spectra of supernovae and their precursor winds: the luminous blue variable/yellow hypergiant progenitor of SN 2013cu

Jose Groh

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We present the first quantitative spectroscopic modeling of an early-time supernova (SN) that interacts with its progenitor wind. Using the radiative transfer code CMFGEN, we investigate the recently reported 15.5 h post-explosion spectrum of the type IIb SN 2013cu. We are able to directly measure the chemical abundances of a SN progenitor and find a relatively H-rich wind, with H and He abundances (by mass) of X = 0.46 +- 0.2 and Y = 0.52 +- 0.2, respectively. The wind is enhanced in N and depleted in C relative to solar values (mass fractions of 8.2e-3 and 1.0e-5, respectively). We obtain that a slow, dense wind or circumstellar medium surrounds the precursor at the pre-SN stage, with a wind terminal velocity vwind < 100 km/s and mass-loss rate of Mdot ≃ 3e-3 (vwind/ 100 km/s) Msun/yr. These values are lower than previous analytical estimates, although Mdot/vwind is consistent with previous work. We also compute a CMFGEN model to constrain the progenitor spectral type; the high Mdot and low vwind imply that the star had an effective temperature of ~ 8000 K immediately before the SN explosion. Our models suggest that the progenitor was either an unstable luminous blue variable or a yellow hypergiant undergoing an eruptive phase, and rule out a Wolf-Rayet star. We classify the post-explosion spectra at 15.5 h as XWN5(h) and advocate for the use of the prefix "X" (eXplosion) to avoid confusion between post-explosion, non-stellar spectra, and those of massive stars. We show that the XWN spectrum results from the ionization of the progenitor wind after the SN, and that the progenitor spectral type is significantly different from the early post-explosion spectral type owing to the huge differences in the ionization structure before and after the SN event. We find the following temporal evolution: LBV/YHG -> XWN5(h) -> SN IIb. Future early-time spectroscopy in the UV will further constrain the properties of SN precursors, such as their metallicities.

Reference: Groh, J. 2014, A&A 572, L11
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2014A%26A...572L..11G

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Three-dimensional modeling of ionized gas. II. Spectral energy distributions of massive and very massive stars in stationary and time-dependent modeling of the ionization of metals in HII regions

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HII regions play a crucial role in the measurement of the chemical composition of the interstellar medium and provide fundamental data about element abundances that constrain models of galactic chemical evolution. Discrepancies that still exist between observed emission line strengths and those predicted by nebular models can be partly attributed to the spectral energy distributions (SEDs) of the sources of ionizing radiation used in the models as well as simplifying assumptions made in nebular modeling. The influence of stellar metallicity on nebular line strength ratios, via its effect on the SEDs, is of similar importance as variations in the nebular metallicity. We have computed a grid of model atmosphere SEDs for massive and very massive O-type stars covering a range of metallicities from significantly subsolar (0.1 Zsun) to supersolar (2 Zsun). The SEDs have been computed using a state-of-the-art model atmosphere code that takes into account the attenuation of the ionizing flux by the spectral lines of all important elements and the hydrodynamics of the radiatively driven winds and their influence on the SEDs. For the assessment of the SEDs in nebular simulations we have developed a (heretofore not available) 3d radiative transfer code that includes a time-dependent treatment of the metal ionization. Using the SEDs in both 1d and 3d nebular models we explore the relative influence of stellar metallicity, gas metallicity, and inhomogeneity of the gas on the nebular ionization structure and emission line strengths. We find that stellar and gas metallicity are of similar importance for establishing the line strength ratios commonly used in nebular diagnostics, whereas inhomogeneity of the gas has only a subordinate influence on the global line emission.

Reference: Publication in A&A. Pre-print available on astro-ph.
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1501.05264

Comments: Two-column style: 35 pages, 20 figures, and 8 tables.

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Polarimetric modeling of corotating interaction regions (CIRs) threading massive-star winds

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2 University of Montreal

Context. Massive star winds are complex radiation-hydrodynamic (sometimes magnetohydrodynamic) outflows that are propelled by their enormously strong luminosities. The winds are often found to be structured and variable, but can also display periodic or quasi-periodic behavior in a variety of wind diagnostics.
Aims. The regular variations observed in putatively single stars, especially in UV wind lines, have often been attributed to corotating interaction regions (CIRs) like those seen in the solar wind. We present light curves for variable polarization from winds with CIR structures.
Methods. We develop a model for a time-independent CIR based on a kinematical description. Assuming optically thin electron scattering, we explore the range of polarimetric light curves that result as the curvature, latitude, and number of CIRs are varied. Results. We find that a diverse array of variable polarizations result from an exploration of cases. The net polarization from an unresolved source is weighted more toward the inner radii of the wind. Given that most massive stars have relatively fast winds compared to their rotation speeds, CIRs tend to be conical at inner radii, transitioning to a spiral shape at a few to several stellar radii in the wind.
Conclusions. Winds with a single CIR structure lead to easily identifiable polarization signatures. By contrast allowing for multiple CIRs, all emerging from a range of azimuth and latitude positions at the star, can yield complex polarimetric behavior. Although our model is based on some simplifying assumptions, it produces qualitative behavior that we expect to be robust, and this has allowed us to explore a wide range of CIR configurations that will prove useful for interpreting polarimetric data.

Reference: Astronomy and Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1501.07563

Comments:

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Orbital and Physical Properties of the sigma Ori Aa, Ab, B Triple System

Simón-Díaz, S.; Caballero, J. A.; Lorenzo, J.; Maíz Apellániz, J.; Schneider, F. R. N.; Negueruela, I.; Barbá, R. H.; Dorda, R.; Marco, A.; Montes, D.; Pellerin, A.; Sanchez-Bermudez, J.; Sódor, Á.; Sota, A.

IAC/ULL, CAB/CSIC, Univ. Alicante +

We provide a complete characterization of the astrophysical properties of the sigma Ori Aa, Ab, B hierarchical triple system and an improved set of orbital parameters for the highly eccentric sigma Ori Aa, Ab spectroscopic binary. We compiled a spectroscopic data set comprising 90 high-resolution spectra covering a total time span of 1963 days. We applied the Lehman-Filhés method for a detailed orbital analysis of the radial velocity curves and performed a combined quantitative spectroscopic analysis of the sigma Ori Aa, Ab, B system by means of the stellar atmosphere code FASTWIND. We used our own plus other available information on photometry and distance to the system for measuring the radii, luminosities, and spectroscopic masses of the three components. We also inferred evolutionary masses and stellar ages using the Bayesian code BONNSAI. The orbital analysis of the new radial velocity curves led to a very accurate orbital solution of the sigma Ori Aa, Ab pair. We provided indirect arguments indicating that sigma Ori B is a fast-rotating early B dwarf. The FASTWIND+BONNSAI analysis showed that the Aa, Ab pair contains the hottest and most massive components of the triple system while sigma Ori B is a bit cooler and less massive. The derived stellar ages of the inner pair are intriguingly younger than the one widely accepted for the sigma Orionis cluster, at 3 ± 1 Ma. The outcome of this study will be of key importance for a precise determination of the distance to the sigma Orionis cluster, the interpretation of the strong X-ray emission detected for sigma Ori Aa, Ab, B, and the investigation of the formation and evolution of multiple massive stellar systems and substellar objects.

Reference: 2015, ApJ 799, 169S
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2015ApJ...799..169S

Comments: IAC press release: http://www.iac.es/divulgacion.php?op1=16&id=911⟨=en

Animation (youtube): https://www.youtube.com/watch?v=t42YdyfkizI

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Multiwavelength Observations of NaSt1 (WR 122): Equatorial Mass Loss and X-rays from an Interacting Wolf-Rayet Binary

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NaSt1 (aka Wolf-Rayet 122) is a peculiar emission-line star embedded in an extended nebula of [N II] emission with a compact dusty core. This object was characterized by Crowther & Smith (1999) as a Wolf-Rayet (WR) star cloaked in an opaque nebula of CNO-processed material, perhaps analogous to Eta Car and its Homunculus nebula, albeit with a hotter central source. To discern the morphology of the [N II] nebula we performed narrowband imaging using the Hubble Space Telescope and Wide-field Camera 3. The images reveal that the nebula has a disk-like geometry tilted 12 degrees from edge-on, composed of a bright central ellipsoid surrounded by a larger clumpy ring. Ground-based spectroscopy reveals radial velocity structure (~10 km/s) near the outer portions of the nebula's major axis, which is likely to be the imprint of outflowing gas. Near-infrared adaptive-optics imaging with Magellan AO has resolved a compact ellipsoid of Ks-band emission aligned with the larger [N II] nebula, which we suspect is the result of scattered He I line emission (2.06 um). Observations with the Chandra X-ray Observatory have revealed an X-ray point source at the core of the nebula that is heavily absorbed at energies <1 keV and has properties consistent with WR stars and colliding-wind binaries. We suggest that NaSt1 is a WR binary embedded in an equatorial outflow that formed as the result of non-

conservative mass transfer. NaSt1 thus appears to be a rare and important example of a stripped-envelope WR forming through binary interaction, caught in the brief Roche-Lobe overflow phase.

Reference: MNRAS, 2015, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1502.01794

Comments:

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No breakdown of the radiatively-driven wind theory in low-metallicity environments

J.-C. Bouret, T. Lanz, D. J. Hillier, F. Martins, W. L. F. Marcolino, E. Depagne

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We present a spectroscopic analysis of HST/COS observations of three massive stars in the low metallicity dwarf galaxies IC 1613 and WLM. These stars, were previously observed with VLT/X-shooter by Tramper et al. (2011, 2014) who claimed that their mass-loss rates are higher than expected from theoretical predictions for the underlying metallicity. A comparison of the FUV spectra with those of stars of similar spectral types/luminosity classes in the Galaxy, and the Magellanic Clouds provides a direct, model-independent check of the mass-loss - metallicity relation. Then, a quantitative spectroscopic analysis is carried out using the NLTE stellar atmosphere code CMFGEN. We derive the photospheric and wind characteristics, benefiting from a much better sensitivity of the FUV lines to wind properties than Ha. Iron and CNO abundances are measured, providing an independent check of the stellar metallicity. The spectroscopic analysis indicates that Z/Zsun = 1/5, similar to a SMC-type environment, and higher than usually quoted for IC 1613 and WLM. The mass-loss rates are smaller than the empirical ones by Tramper et al. (2014), and those predicted by the widely used theoretical recipe by Vink et al. (2001). On the other hand, we show that the empirical, FUV-based, mass-loss rates are in good agreement with those derived from mass fluxes computed by Lucy (2012). We do not concur with Tramper et al. (2011, 2014) that there is a breakdown in the mass-loss - metallicity relation.

Reference: MNRAS
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1502.05641

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Abstracts of 1 conference proceedings

From the atmosphere to the circumstellar environment in cool evolved stars

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(2) Institut d'Astronomie et d'Astrophysique, Universite Libre de Bruxelles, ULB, CP.226, Boulevard du Triomphe, 1050 Brussels, Belgium

We discuss and illustrate contributions that optical interferometry has made on our current understanding of cool evolved stars. We include red giant branch (RGB) stars, asymptotic giant branch (AGB) stars, and red supergiants (RSGs). Studies using optical interferometry from visual to mid-infrared wavelengths have greatly increased our knowledge of their atmospheres, extended molecular shells, dust formation, and winds. These processes and the morphology of the circumstellar environment are important for the further evolution of these stars toward planetary nebulae (PNe) and core-collapse supernovae (SNe), and for the return of material to the interstellar medium.

Reference: To appear in the Book of the VLTI School 2013, held 9-21 Sep 2013 Barcelonnette (France), "What the highest angular resolution can bring to stellar astrophysics?", Ed. Millour, Chiavassa, Bigot, Chesneau, Meilland, Stee, EAS Publications Series (2015)
Status: Conference proceedings

Weblink:

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JOBS

Closed Job Offers (original deadline passed)

PhD Studentships (STFC/Keele funding) in Astronomy/Astrophysics

Raphael Hirschi

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The Astrophysics Group at Keele University has several funded studentships (STFC/Keele funding) in astronomy/astrophysics to start in September 2015.

Possible projects include (title, main supervisor):
- Nuclear astrophysics: impact and sensitivity studies, Dr Raphael Hirschi
- Nucleosynthesis in rotating stars, Dr Raphael Hirschi
- Transiting extra-solar planets with WASP-South, Prof Coel Hellier
- High-precision studies of eclipsing binary stars observed using space telescopes (Southworth)
- Laboratory astrophysics at the Diamond Light Source, Prof Nye Evans
- Star formation and stellar ages from the Gaia-ESO Spectroscopic Survey (Prof. R. D. Jeffries)
- Outer solar system chemistry (Dr Jacco van Loon, Prof. A. Evans)
- Star formation in the Magellanic Clouds (Dr. Joana Oliveira)
- Atmospheric properties of A, F and G stars (Dr Barry Smalley)

Notes: applications open to EU students (non-EU students can apply for a self-funded PhD position). More information on the projects, the Keele astrophysics group and how to apply can be found here: http://www.keele.ac.uk/researchsubjects/astrophysics/

If you have questions, please do not hesitate to contact
Dr Raphael Hirschi
(PhD students coordinator)

Attention/Comments:

Weblink: http://www.keele.ac.uk/researchsubjects/astrophysics/

Email: r.hirschi@keele.ac.uk

Deadline: Closing Date 28th February 2015 (applications received by the deadline will receive first consideration)

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Open JOB offers

PhD Position on Quantitative Stellar Spectroscopy

Pierre Royer

Institute of Astrophysics
KU Leuven
Celestijnenlaan 200D
3001 Leuven
Belgium

We are looking for a motivated PhD student to join our institute to pursue a research program aiming at a. producing a reference catalog of high-resolution stellar spectroscopy from a large amount of data covering the entire HRD (existing in house), b. model these spectra and compare them with the observations in order to critically assess the quality of existing databases of fundamental atomic parameters.

Attention/Comments: Online application only. For additional information, contact Dr. Katrijn Clémer, tel.: +32 16 32 70 40, mail: katrijn.clemer@ster.kuleuven.be

Weblink: http://www.kuleuven.be/solliciteren/53255289&taal=E&type=VA

Email: pierre.royer@ster.kuleuven.be

Deadline: 15 April 2015

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Job opening for two post-doctoral and two PhD positions in the field of evolved stars and laboratory experiments

Leen Decin

Institute of Astronomy, Leuven University
Celestijnenlaan 200D
B-3001 Heverlee (Leuven)
Belgium

Interdisciplinary project on the stellar winds around evolved stars at the Leuven University in Belgium funded by the ERC-CoG 2014 grant AEROSOL (PI. L. Decin).

The project

At the Leuven University (Belgium), we seek candidates for two post-doctoral and two PhD research positions, ready to play a key role in a new interdisciplinary project focusing on stellar winds around evolved (low-mass) stars. The candidates will interact closely with a team consisting of astrophysicists, chemists, and computational mathematicians, as the goal of the project is to boost our understanding of the physics and chemistry characterizing these stellar winds. The project builds upon novel data (including ALMA, Herschel, etc.), detailed theoretical wind models, and targeted laboratory experiments

(see http://fys.kuleuven.be/ster/Projects/aerosol/aerosol).

Institute of Astronomy

The Institute of Astronomy of the Leuven University is a young and active research group of some 50 scientists, engineers and administrative staff (http://www.ster.kuleuven.be). The institute is involved in several international networks and research projects, involving telescopes at international observatories and space missions. The institute is also responsible for the organisation of the Master in Astronomy & Astrophysics of the Faculty of Science at the Leuven University. The institute has a long tradition in the observational and theoretical studies of the late stages of evolution of low and intermediate mass stars.

For the ERC-CoG AEROSOL project of Prof. L. Decin, we seek one post-doc and one PhD candidate to work on the reduction, analysis and (radiative transfer) modeling of a whole suit of observations ranging from the UV to mm wavelength regime with the aim to retrieve the geometrical, thermodynamical and chemical structures of stellar winds. The post-doc preferentially has experience with infrared and (sub)millimeter observations and has in any case sufficient experience in implementing and exploiting radiative transfer models. The post-doc will also be allowed to carry out (part-time) his/her own research in collaboration with affiliated group members. The successful candidates will have access to recently obtained and granted observational data, advanced radiative transfer and forward chemistry modeling tools and will have the possibility to develop their own (hydro)simulations.

Physical Chemistry

As part of this project, one post-doc and one PhD position is open in the research group of Prof. S. Carl in the field of experimental gas-phase reaction kinetics in the Department of Chemistry, division of Quantum and Physical chemistry, beginning preferably on 1st October 2015. The experimental work will be carried out in the modern and fully-equipped new research laboratories of the Department of Chemistry, opening in mid 2015. The experimental research concerns the determination of rate coefficients and product distributions of elementary gas-phase reactions involving key reactive species (Si- and S-bearing species and HCCO radicals) in stellar winds for which data is currently lacking. Specifically, several advanced laser-spectroscopic and chemiluminescence techniques will be employed by the PhD student to follow photolytically-generated reactive species in real time in a novel temperature-graded reaction vessel (200−900 K) coupled with cavity-ringdown/Fourier-transform infrared spectroscopy to elucidate reaction product channels. The post-doc will concentrate on the construction and exploitation of a novel low-temperature Laval-nozzle apparatus with the aim to obtain the rates of the same gas-phase reactions at temperatures below 200 K.
Candidates should have an interest in physical chemistry, high-resolution laser spectroscopy, and technical experimentation. The group currently enjoys and encourages further close collaboration with researches in the department employing high-level quantum chemical calculations on species related to this project.

The position

At the Leuven University, the candidates will join the Institute for Astronomy (Prof. L. Decin) or the Physical Chemistry section (Prof. S. Carl). The interdisciplinary project is carried out in collaboration with Prof. T. Millar (Belfast University) and Prof. J. Nuth (NASA, Greenbelt). The four candidates will interact closely with the other team members at the Institute of Astronomy and Department of Chemistry. At the Leuven University, we have access to parallel computing facilities, to be exploited extensively in this project.

Contract
The PhD candidates will be employed for a 2+2 (after positive evaluation) period at the Institute of Astronomy or a 2+1 period at the Department of Chemistry. The initial contract for the post-doc positions runs over 2 years and could be prolonged with another year after positive evaluation. The salary will be commensurate to the standard scale for PhD and post-doctoral researchers at the Leuven University. The preferred starting date is between 1 October 2015 and 1 December 2015, but will be adapted to the

selected candidate's availability. Candidates are thus requested to indicate their preferred starting date in the application.

Interested?
The successful post-doc candidates must have a PhD degree in astrophysics or chemistry, while the PhD candidates must have obtained a master degree in (astro)physics, mathematics or chemistry. The application must include
• A Curriculum Vitae (including publication list).
• A statement of research interests and future plans (maximum 3 pages).
• A letter detailing your specific qualifications for the position and your career/educational goals (maximum 1 page).
• Two letters of recommendation from professors well acquainted with your academic achievements. The letters are to be submitted separately to the address mentioned below.

DEADLINE for the application: 1 May 2015

More information can be obtained by contacting
Prof. L. Decin
Institute for Astronomy
Department of Physics and Astronomy, KU Leuven
Celestijnenlaan 200D, 3001 Heverlee, Belgium
Leen.Decin@ster.kuleuven.be
++32-16-32 70 41
http://fys.kuleuven.be/ster/staff/senior-staff/leen
See also: http://www.fys.kuleuven.be/ster/

Prof. S. Carl
Physical Chemistry Section
Department of Chemistry, KU Leuven
Celestijnenlaan 200F, 3001 Heverlee, Belgium
Shaun.Carl@chem.kuleuven.be
++32-16-32 76 13

Attention/Comments:

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

Email: Leen.Decin@ster.kuleuven.be

Deadline: 01/05/2015

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MEETINGS

Stellar End Products: The Low Mass - High Mass Connection

6-10 July, 2015

Venue: ESO Garching, Germany

Goals of the Workshop

In this workshop, we intend to bring together observers and theorists from the low mass and high mass stellar communities with the goals of:

understanding the evolved star mass loss process and the injection of energy and matter (enriched in molecules and dust) into the ISM
comparing Asymptotic Giant Branch and Red Supergiant stars – why are they observationally similar in many ways yet apparently have very different interior stellar structures and their mass loss evolves differently
determining the roles of magnetic fields, binarity, jets and collimated mass loss, metallicity, initial mass etc. upon stellar evolution and end products - how can almost spherically symmetric stars produce broadly bipolar morphologies over such a large mass loss range?

The meeting will be spread over five days, starting on Monday afternoon and ending on Friday at lunchtime. It will consist of invited and contributed talks, posters and discussion sessions.

Conference email: steps@eso.org
Important dates:

6 April: abstract submission deadline
15 April: preliminary program
1 May: notification of contributed talk
4 May: hotel block bookings expire
6 June: registration payment deadline
6 July: meeting starts

Weblink: http://www.eso.org/sci/meetings/2015/STEPS2015.html

Email: steps@eso.org

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F.O.E. Fifty-One Erg - International Conference on the Physics and Observations of Supernovae and Supernova Remnants

1-5 June 2015

Venue: NC State University, Raleigh, NC, USA

The conference will cover topic related to supernovae and supernova remnants, broadly addressing the three main questions:
- Where do supernovae come from?
- How do they explode?
- What do they leave behind?

There will be invited talks that will give a broader overview on a topic. In addition, we will have contributed talks and poster presentations. We plan to have a grand debate and a panel discussion. We strongly encourage young researchers to attend. We shall try to accommodate as many contributed talks as possible but cannot guarantee speaking slots.

Registration is now open on the website:
http://www.physics.ncsu.edu/FOE2015/
Deadline for abstract submission is 15 April 2015

A preliminary schedule will apprear around the end of April/beginning of May.

Registration deadline is 30 April 2015.

Conference info together with the important dates and housing information can be found on the website:
http://www.physics.ncsu.edu/FOE2015/

Weblink: http://www.physics.ncsu.edu/FOE2015/

Email: fifty-one_ergs@ncsu.edu

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St Andrews Monte Carlo Summer School

23rd to 28th August 2015

Venue: University of St Andrews, UK

A summer school on Monte Carlo radiation transfer techniques will be held at the University of St Andrews, UK from 23rd to 28th August 2015. The course is limited to thirty students, with priority given to STFC-funded PhD students and postdocs.

Students will be introduced to the basic techniques in Monte Carlo radiation transfer and their applications to scattered light, dust and gas radiative equilibrium, photoionization, and NLTE molecular line transfer. Several publicly available Monte Carlo codes will be introduced in detail with the goal that by the end of the school the students will have a toolbox of codes that they can use in their own astrophysical research projects. The program will comprise short introductory lectures to each topic, followed by detailed descriptions of individual codes. Lots of time will be set aside for students to become familiar with using the codes and interacting with the lecturers who developed them.

Further information, including details of how to register, can be found here: http://www-star.st-and.ac.uk/samcss

Weblink: http://www-star.st-and.ac.uk/samcss

Email: kw25@st-andrews.ac.uk

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Science with large spectroscopic surveys of Galactic OB stars: getting ready for Gaia

22 June 2015

Venue: La Laguna, Tenerife, Canary Islands, Spain

Dear colleagues,

We are pleased to announce the EWASS 2015 Special Session #7

Science with large spectroscopic surveys of Galactic OB stars: getting ready for Gaia

to be held in La Laguna, Tenerife, Spain on Monday 22 June 2015

Feel free to share this announcement with anybody who may be interested on this topic

Deadline for abstract submission: 10 March 2015
Deadline for early registration: 30 April 2015

See the EWASS2015 webpage (http://eas.unige.ch/EWASS2015/index.jsp) for more info about registration, abstract submission, and the complete programme for the European Week of Astronomy and Space Science 2015

Aims and scope

In the last decade, several spectroscopic surveys of Galactic OB stars have been conducted independently by different groups (GOSSS, OWN, IACOB, CAFE-BEANS, NoMaDs, GES, MiMeS, BOB). The scientific exploitation of this unique observational material, using the most modern tools, is currently under way and will without any doubt quantitatively change our view of the properties (temperature, gravities, abundances...) and evolution of massive stars. However, the picture will not be complete until we have access to accurate distances (hence being able to compute luminosities, stellar radii, masses, and ages).

The Gaia mission will provide the needed key to open the frontiers of a new era in the study of Galactic OB stars. Successfully launched in 2013 december 19, the first data release (not yet including distances) is planned for summer 2016. Hence time is ripe to:

(a) establish synergies between the various on-going spectroscopic surveys of Galactic OB stars;
(b) discuss the best strategy to share all available observational information about Galactic OB stars in preparation for the Gaia era;
(c) identify the best tools to extract information about rotation, stellar and wind parameters and abundances from large samples of Galactic OB stars; and
(d) identify the interplay between current spectroscopic surveys and Gaia in the context of the

understanding of massive stars properties and evolution.

This special session aims at gathering experts in observations, analysis, and modelling of massive OB stars and key speakers involved in the Gaia mission with this scope.

Programme

- Modern tools and techniques for the investigation of Galactic OB stars
- Past, on-going, and future surveys of Galactic OB stars: getting ready for Gaia
- Open questions in our knowledge of Galactic OB stars in the Gaia context

Both contributed talks and posters are foreseen

Invited speakers

- Y. Frémat (Royal Observatory of Belgium)
- J. Maíz Apellániz (Astrobiology Centre, Spain)
- G. Meynet (University of Geneva, Switzerland)
- J. Puls (Munich University Observatory, Germany)
- F.N.R. Schneider (University of Oxford, UK)
- M.A. Urbaneja (University of Innsbruck, Austria)

We are looking forward to receiving your abstracts!

The organizers

S. Simón-Díaz (IAC, Spain) & F. Martins (LUPM, France)

Weblink: http://eas.unige.ch/EWASS2015/session.jsp?id=Sp7

Email: ssimon@iac.es

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Stellar Behemoths: Red Supergiants Across the Local Universe

Aug 3-5, 2015

Venue: Honolulu, USA

Despite their significance in the massive star life-cycle, Red Supergiants are arguably the least well-understood class of massive stars. This is largely due to historical reasons: massive star research has tended to focus on hot stars, such as O stars and Wolf-Rayets. At the 2015 IAU-GA we aim to bring together the leading researchers in the fields of massive stars, cool stars, and supernovae, to discuss the latest observational and theoretical advances, and to encourage and stimulate further cross-disciplinary collaboration.

Topics to be discussed at the meeting:

* The evolution of massive stars
* The physics of cool stellar atmospheres, and quantitative spectroscopy
* Spatially resolved observations of cool stars
* Simulations and observations of stellar convection
* Mass-loss processes in cool stars

* The progenitors of supernovae

Weblink: http://astronomy2015.org/focus_meeting_16

Email: b.davies@ljmu.ac.uk

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Massive Stars and the Gaia-ESO Survey

5-7 May 2015

Venue: Royal Observatory of Belgium, Brussels, Belgium

This is a reminder about this workshop, which will take place in a few months. Deadline for abstract submission is 1 March!

Thanks to projects such as the ongoing Gaia-ESO Survey (GES) and the VLT-Flames Tarantula Survey (VFTS) progress in the number of massive stars with accurate parameters is rapidly growing.

In order to bring together the European expertise in massive-star spectral analysis and evolution it is timely to organise a Workshop on massive stars in the context of the Gaia-ESO Survey.

By the time of the meeting about two-thirds of the GES data will have been collected. The data reduction and analysis techniques will have been refined to handle these data and produce significant science output.

One aim of the workshop is to present the GES results to a wider community of massive-star experts. The interaction between the various European massive-star groups will allow us to extract the best science from the GES data. A second purpose is to interact with the other GES Co-Is to provide them with the information they need related to e.g. cluster studies. Finally, it is a timely moment to measure the progress we have made in achieving the science cases listed in the GES proposal and to address future directions.

Weblink: http://ges-ms.oma.be

Email: Ronny.Blomme@oma.be

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