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THE MASSIVE STAR NEWSLETTER

formerly known as the hot star newsletter

*

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

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News

IAU GA Beijing: JD2, SpS5 and WG business meeting

Dear colleagues,

this is just a brief note on important dates during the GA which are of particular interest for our massive star community (i.e., for those of you who will attend the GA). For further details, have a look into the programme which can be downloaded from the IAU website (wwww.iau.org)

1. JD2 on Very Massive Stars in the Local Universe: Room 302 A+B

Monday 20th, 10:30 - 18:00
Tuesday 21st, 10:30 - 12:30
Wednesday 22nd, 10:30 - 15:30

2. SpS5 on the IR-view of massive stars: Room 303 A+B

Thursday, 23rd, 10.30 - 18:00
Friday, 24th, 8:30(!!!) - 15:30

3. Working group business meeting

Wednesday 22nd, 16:00 - 18:00, Room 405

Everbody who is interested is cordially invited to our business meeting: We intend to discuss the 'new' IAU structure, the implications for our WG, the question whether to re-apply for turning the WG into a commission, and the upcoming election of new OC members just after the GA ...

... and any other business you might be interested in!

With best regards, Jo Puls (Chair of OC)

Weblink:

Email: uh101aw@usm.uni-muenchen.de

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PAPERS

Abstracts of 7 accepted papers

Massive open star clusters using the VVV survey I. Presentation of the data and description of the approach

A.-N. Chené (AA), J. Borissova (AB), J. R. A. Clarke (AC), C. Bonatto (AD), D. J. Majaess (AE), C. Moni Bidin (AF), S. E. Sale (AG), F. Mauro (AH), R. Kurtev (AI), G. Baume (AJ), C. Feinstein (AK), V. D. Ivanov (AL), D. Geisler (AM), M. Catelan (AN), D. Minniti (AO), P. Lucas (AP), R. de Grijs (AQ)

AA: U. de Concepción, U. de Valparaíso; AB: U. de Valparaíso, The Milky Way Millennium Nucleus; AC: U. de Valparaíso, U. of Hertfordshire; AD: U. Federal do Rio Grande do Sul; AE: Saint Mary's University; AF: U. de Concepción; AG: U. de Valparaíso, PUC de Chile; AH: U. de Concepción; AI: U. de Valparaíso; AJ: IALP; AK: IALP; AL: ESO; AM: U. de Concepción; AN: The Milky Way Millennium Nucleus, PUC de Chile; AO: The Milky Way Millennium Nucleus, PUC de Chile, Vatican Observatory, Princeton University; AP: U. of Hertfordshire; AQ: Kavli Institute for Astronomy and Astrophysics

Context: The ESO Public Survey "VISTA Variables in the Vía Láctea" (VVV) provides deep multi-epoch infrared observations for an unprecedented 562 sq. degrees of the Galactic bulge, and adjacent regions of the disk. Aims: The VVV observations will foster the construction of a sample of Galactic star clusters with reliable and homogeneously derived physical parameters (e.g., age, distance, and mass, etc.). In this first paper in a series, the methodology employed to establish cluster parameters for the envisioned database are elaborated upon by analyzing a subsample of 4 known young open clusters: Danks 1, Danks 2, RCW 79, and DBS 132. The analysis offers a first glimpse of the information that can be gleaned for the final cluster database from the VVV observations. Methods: Wide-field, deep JHKs VVV observations, combined with new infrared spectroscopy, are employed to constrain fundamental parameters for a subset of clusters. Results: Results inferred from the deep near-infrared photometry which features mitigated uncertainties (e.g. the accuracy of the photometry is better than 0.1mag for Ks<18mag), the wide field-of-view of the VVV survey, and numerous high quality low resolution spectra (typically more than 10 per cluster), are used to establish independent cluster parameters which enable existing determinations to be assessed. An anomalous reddening law in the direction toward the Danks' clusters is found, i.e. E(J-H)/E(H-Ks)=2.20+/-0.06, which exceeds published values for the inner Galaxy. The G305 star forming complex, which includes the Danks' clusters, lies beyond the Sagittarius-Carina spiral arm and occupies the Centaurus arm. Finally, the first deep infrared color-magnitude diagram of RCW 79 is presented which reveal a sizable pre-main sequence population. A list of candidate variable stars in G305 region is reported.

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

Weblink: http://arxiv.org/abs/1206.6104

Comments:

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Two compact HII regions at the remote outskirts of the Magellanic Clouds

R. Selier, M. Heydari-Malayeri

LERMA, Observatoire de Paris

The H II regions LMC N191 and SMC N77 are among the outermost massive star-forming regions in the Magellanic Clouds. So far, few works have dealt with these objects despite their interesting characteristics. We aim at studying various physical properties of these objects regarding their morphology (in the optical and Spitzer IRAC wavelengths), ionized gas emission, nebular chemical abundances, exciting sources, stellar content, age, presence or absence of young stellar objects, etc. This study is based mainly on optical ESO NTT observations, both imaging and spectroscopy, coupled with other archive data, notably Spitzer images (IRAC 3.6, 4.5, 5.8, and 8.0 microns) and 2MASS observations. We show the presence of two compact H II regions, a low-excitation blob (LEB) named LMC N191A and a high-excitation blob (HEB) named SMC N77A, and study their properties and those of their exciting massive stars as far as spectral type and mass are concerned. We also analyze the environmental stellar populations and determine their evolutionary stages. Based on Spitzer IRAC data, we characterize the YSO candidates detected in the direction of these regions. Massive star formation is going on in these young regions with protostars of mass about 10 and 20 M_sun in the process of formation.

Reference: A&A
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1206.5939

Comments:

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Using MOST to reveal the secrets of the mischievous Wolf-Rayet binary CV Ser

Alexandre David-Uraz (1), Anthony F. J. Moffat (1), André-Nicolas Chené (2,3), Jason F. Rowe (4), Nicholas Lange (5), David B. Guenther (6), Rainer Kuschnig (7,8), Jaymie M. Matthews (8), Slavek M. Rucinski (9), Dimitar Sasselov (10), Werner W. Weiss (7)

1) Université de Montréal
2) Universidad de Concepcion
3) Universidad de Valparaiso
4) NASA Ames
5) University of Victoria
6) Saint Mary's University
7) University of Vienna
8) University of British Columbia
9) University of Toronto
10) Harvard CfA

The WR binary CV Serpentis (= WR113, WC8d + O8-9IV) has been a source of mystery since it was shown that its atmospheric eclipses change with time over decades, in addition to its sporadic dust production. The first high-precision time-dependent photometric observations obtained with the MOST space telescope in 2009 show two consecutive eclipses over the 29d orbit, with varying depths. A subsequent MOST run in 2010 showed a seemingly asymmetric eclipse profile. In order to help make sense of these observations, parallel optical spectroscopy was obtained from the Mont Megantic Observatory (2009, 2010) and from the Dominion Astrophysical Observatory (2009). Assuming these depth variations are entirely due to electron scattering in a beta-law wind, an unprecedented 62% increase in mass-loss rate is observed over one orbital period. Alternatively, no change in mass-loss rate would be required if a relatively small fraction of the carbon ions in the wind globally recombined and coaggulated to form carbon dust grains. However, it remains a mystery as to how this could occur. There also seems to be evidence for the presence of corotating interaction regions (CIR) in the WR wind: a CIR-like signature is found in the light curves, implying a potential rotation period for the WR star of 1.6 d. Finally, a new circular orbit is derived, along with constraints for the wind collision.

Reference: MNRAS
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1207.6032

Comments: 11 pages, 11 figures, 5 tables

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Limb-Darkened Radiation-Driven Winds from Massive Stars

Michel Curé(1), Lydia Cidale(2) & Diego F. Rial(3)

(1) Universidad de Valparaıso, Chile
(2) Universidad Nacional de La Plata &
Instituto de Astrofısica La Plata, CONICET-UNLP, Argentina
(3) Universidad de Buenos Aires, Argentina

We calculated the influence of the limb-darkened finite disk correction factor in the theory of radiation-driven winds from massive stars. We solved the 1-D m-CAK hydrodynamical equation of rotating radiation-driven winds for all three known solutions, i.e., fast, Omega-slow and delta-slow. We found that for the fast solution, the mass loss rate is increased by a factor $\sim$ 10%, while the terminal velocity is reduced about 10%, when compared with the solution using a finite disk correction factor from a uniformly bright star. For the other two slow solutions the changes are almost negligible.

Although, we found that the limb darkening has no effects on the wind momentum luminosity relationship, it would affect the calculation of synthetic line profiles and the derivation of accurate wind parameters.

Reference: ApJ
Status: Manuscript has been accepted

Weblink: http://xxx.lanl.gov/abs/1207.6009

Comments: 19 pages, 6 figures

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Binary interaction dominates the evolution of massive stars

H. Sana (1,*), S.E. de Mink (2,3†), A. de Koter (1,4), N. Langer (5), C.J. Evans (6), M. Gieles (7), E. Gosset (8), R.G. Izzard (5), J.-B. Le Bouquin (9), F.R.N. Schneider (5)

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The presence of a nearby companion alters the evolution of massive stars in binary systems, leading to phenomena such as stellar mergers, X-ray binaries and gamma-ray bursts. Unambiguous constraints on the fraction of massive stars affected by binary interaction were lacking. We simultaneously measured all relevant binary characteristics in a sample of Galactic massive O stars and quantified the frequency and nature of binary interactions. Over seventy per cent of all massive stars will exchange mass with a companion, leading to a binary merger in one third of the cases. These numbers greatly exceed previous estimates and imply that binary interaction dominates the evolution of massive stars, with implications for populations of massive stars and their supernovae.

Reference: Sana et al., Science, 337, 444-446 (2012)
Status: Manuscript has been accepted

Weblink: http://www.sciencemag.org/content/337/6093/444.full

Comments:

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On the formation of CIII 4647-50-51 and CIII 5696 in O star atmospheres

Fabrice Martins^1, John Hillier^2

1- LUPM, CNRS & Montpellier University; 2- University of Pittsburgh

We investigate the formation of CIII 4647-51-50 and CIII 5696 in the atmosphere of O stars to see if they can be reliably used for abundance determinations. We use atmosphere models computed with the code CMFGEN. The key physical ingredients explaining the formation of the CIII lines are extracted from comparisons of models with different stellar parameters and through examining rates controlling the level populations. The strength of CIII 5696 critically depends on UV CIII lines at 386, 574 and 884 A. These lines control the CIII 5696 upper and lower level population. CIII 884 plays a key role in late O stars where it drains the lower level of CIII 5696. CIII 386 and CIII 574 are more important at early spectral types. The overlap of these UV lines with FeIV 386.262, FeIV 574.232 and SV 884.531 influences the radiative transfer at 386, 574 and 884 A, and consequently affects the strength of CIII 5696. CIII 4650 is mainly controlled by the CIII 538 line which acts as a drain on its lower level. FeIV 538.057 interacts with CIII 538 and has an impact on the CIII 4650 profile. Low temperature dielectronic recombinations have a negligible effect on the line profiles. Given our current understanding of the stellar and wind properties of O stars, and in view of the present results, the determination of accurate carbon abundances from CIII 4647-51-50 and CIII 5696 is an extremely challenging task. Uncertainties lower than a factor of two on C/H determinations based only on these two sets of lines should be regarder as highly doubtful. Our results provide a possible explanation of the variability of CIII 4650 in Of?p stars.

Reference: Astronomy and Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1208.0152

Comments:

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On the Weak-Wind Problem in Massive Stars: X-ray Spectra Reveal a Massive Hot Wind in mu Columbae

David P. Huenemoerder, Lidia M. Oskinova, Richard Ignace, Wayne L. Waldron, Helge Todt, Kenji Hamaguchi, Shunji Kitamoto

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mu Columbae is a prototypical weak-wind O-star for which we have obtained a high-resolution X-ray spectrum with the Chandra LETG/ACIS-S instrument and a low resolution spectrum with Suzaku. This allows us, for the first time, to investigate the role of X-rays on the wind structure in a bona fide weak-wind system and to determine whether there actually is a massive, hot wind. The X-ray emission measure indicates that the outflow is an order of magnitude greater than that derived from UV lines and is commensurate with the nominal wind-luminosity relationship for O-stars. Therefore, the ``weak-wind problem"---identified from cool wind UV/optical spectra---is largely resolved by accounting for the hot wind seen in X-rays. From X-ray line profiles, Doppler shifts, and relative strengths, we find that this weak-wind star is typical of other late O dwarfs. The X-ray spectra do not suggest a magnetically confined plasma---the spectrum is soft and lines are broadened; Suzaku spectra confirm the lack of emission above 2 keV. Nor do the relative line shifts and widths suggest any wind decoupling by ions. The He-like triplets indicate that the bulk of the X-ray emission is formed rather close to the star, within 5 stellar radii. Our results challenge the idea that some OB stars are ``weak-wind" stars that deviate from the standard wind-luminosity relationship. The wind is not weak, but it is hot and its bulk is only detectable in X-rays.

Reference: ApJL
Status: Manuscript has been accepted

Weblink: http://de.arxiv.org/abs/1208.0820

Comments:

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JOBS

Post-doctoral position in stellar astrophysics

Anthony Moffat

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Canada

As part of a programme to train Highly Qualified Personnel financed by a grant from the Canadian Space Agency, the Canadian wing of the BRITE-Constellation (http://www.brite-constellation.at/) science team is opening a post-doctoral position at the Université de Montréal (Québec, Canada). The candidate is expected to carry out original research in stellar variability using the soon-to-be launched BRITE nanosatellites and master the techniques of time-dependent high-precision photometry from space. Interaction with other members of the Centre for Research in Astrophysics of Québec (http://craq-astro.ca/index_en.php), as well as the three other Canadian and eight other international BRITE team members and their associates is encouraged. A PhD in physics or astronomy is required.
Potential candidates with the required expertise are encouraged to apply. Please send CV, research proposal, cover letter and contact details of two referees (including email addresses) to the Canadian BRITE PI Dr. Anthony Moffat (moffat@astro.umontreal.ca). The position is open from as early as September 1st, 2012 and no later than January 1st, 2013 for two years with a possible extension of one year.

Attention/Comments:

Weblink:

Email: moffat@astro.umontreal.ca

Deadline:

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2X Post-Doctoral Positions Available in Theoretical Astrophysics

Raphael Hirschi

Keele University, ST5 5BG, UK

Keele University expects to appoint two PDRAs for a duration of 3 years, in order to conduct research on (1) theoretical nuclear astrophysics (NUCASTRO) and (2) theoretical stellar astrophysics (3D1D). The appointed PDRAs will work in the group of Dr Raphael Hirschi within the Astrophysics Group at Keele University as part of an ERC-funded project entitled “Stellar HYdrodynamics, Nucleosynthesis and Evolution” (SHYNE). The ERC starting grant awarded to Dr Hirschi provides funding for 2 postdocs and 2 PhD students. The grant also provides funding for a dedicated 1500-CPU computer cluster, including 384 CPUs sharing memory via Numascale technology.

(1) The NUCASTRO PDRA will lead the nuclear astrophysics component of this project, which includes large-scale, Mont-Carlo based, sensitivity studies as well as impact studies of reaction rates relevant for the different nucleosynthesis processes.

Applicants for the NUCASTRO PDRA should have or expect to obtain a PhD in nuclear physics or astrophysics or a related area and should have a demonstrated aptitude for research. Experience in theoretical nuclear astrophysics is highly desirable.

(2) The 3D1D PDRA will lead the component of this project related to 3D-1D modelling of stellar interiors. This will include a range of computer simulations including 1D stellar evolution and 3D hydrodynamics simulations with as main goal to improve modelling of convection and rotation in stellar evolution.

Applicants for the 3D1D PDRA should have or expect to obtain a PhD in theoretical stellar astrophysics or a related area and should have a demonstrated aptitude for research. Experience in stellar evolution modelling and 3D hydrodynamic simulations is highly desirable.

The two PDRAs will also contribute to the other components of the project and be encouraged to develop their own research program and their leadership skills. The appointment will be made for an initial term of 3 years (with a possible extension of 2 extra years), with a likely starting date of November 1 2012 or as soon as possible after that date.

Job packs available: www.keele.ac.uk/jobs, vacancies@keele.ac.uk, Human Resources, Keele University, Staffordshire, ST5 5BG or Fax: 01782 733471.

Further details of the posts are available at http://www.keele.ac.uk/vacancies/academicandresearchvacancies. Please quote post reference when applying: (1) RE12/18NUCASTRO & (2) RE12/17 3D1D

Closing date for applications: 30 September 2012

Interview date and format: interviews will take place mid-October (most probably one of these dates: 10, 11, 17 or 18 October, to be confirmed) and interviews will be conducted remotely (e.g. via skype).

For further enquiries please contact Dr Raphael Hirschi at r.hirschi@epsam.keele.ac.uk.

Attention/Comments:

Weblink: http://www.keele.ac.uk/vacancies/academicandresearchvacancies

Email: r.hirschi@epsam.keele.ac.uk

Deadline: 30 September 2012

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MEETINGS

Annual Meeting of the Astronomische Gesellschaft: The Bright and the Dark Sides of the Universe.

Splinter Session: Hot Stars

Sept. 25.- 26.

Venue: University of Hamburg

Some stars are born and die hot, while some stars become hot as they evolve. The strong UV radiation of hot stars ionizes the surrounding medium and drives stellar winds. This input of radiative and mechanic energy affects the circumstellar matter and the ISM, and may even decide the fate of a star cluster. The advance in theory and multiwavelength observations provides new insights into the physics of hot stars, their evolution, atmospheres, winds, and feedback. This splinter meeting aims at bringing together the hot star community to review the methods and the models used for the studies of hot stars, and to discuss and plan the observational facilities and programs needed for the studies of hot stars. Special attention will be devoted to the hot topics in the field which are likely to be in the focus of the community in the near future.

Weblink: http://www.hs.uni-hamburg.de/AG2012/index.php?option=com_content&view=article&id=37&Itemid=265⟨=en

Email: htodt@astro.physik.uni-potsdam.de

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30 Doradus: The Starburst Next Door

A Mini-workshop at STScI

September 16th-19th 2012

Venue: STScI, Baltimore, USA

The 30 Doradus or Tarantula Nebula region of the Large Magellanic Cloud is synonymous with many superlatives in astronomy, hosting as it does the most massive young resolved cluster (R136), the most massive stars yet discovered, the fastest rotating O-type stars, the most massive runaway star.

Its unique accessibility to detailed study covering the electromagnetic spectrum from X-ray, UV, optical, IR through radio is reflected in the many detailed surveys of this region with facilities such as HST,

Chandra, Spitzer, VLT-Flames and VISTA. While it is certainly a challenge to understand this wealth of information for what is a very complex region it is one well worth addressing since 30 Doradus may have much to teach us about more distant unresolved starbursts and super star clusters.

The aim of this mini-workshop is to review recent results and outstanding theoretical issues and to examine the extent to which our knowledge of 30 Doradus can be used to improve our understanding of distant starbursts and star clusters. It will focus on five closely related themes; formation, environment, content, evolution, and relevance to Super Star Clusters and Starbursts.

SOC at STScI: Selma de Mink, Linda Smith, Karl Gordon, Nolan Walborn, Danny Lennon (chair), Brad Whitmore, Elena Sabbi, Aida Wofford, Sherita Hanna (coordinator)

Registration deadline: August 17th 2012

Weblink: http://www.stsci.edu/institute/conference/doradus

Email: lennon@stsci.edu

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Betelgeuse Workshop 2012

November 26-29, 2012

Venue: Paris Observatory, France

Mass loss from evolved massive stars is a major contributor to the chemical enrichment of the interstellar medium, the Galaxy, and ultimately the Universe. To have a clear view of their cosmic impact, it is essential to understand their physics, from the photosphere to the interstellar medium (ISM). Thanks to its proximity and brightness, Betelgeuse is a particularly important fiducial object to study in details the physical phenomena at play in red supergiants (RSGs).
The goal of the workshop is to assemble a comprehensive description of the different regions constitutive of Betelgeuse, to understand how they interact with each other, and eventually how red supergiants are functioning.
We aim at a genuine workshop format with many opportunities for exchanges among 50 participants who actively carry out research on Betelgeuse and similar objects. Each session will start with an invited overview talk and will be closed by a discussion.

Weblink: http://betelgeuse.sciencesconf.org/

Email: betelgeuse@sciencesconf.org

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Outstanding Problems in Massive Star Research -- the final stages

September 30 - October 3, 2012

Venue: St. Paul, MN, USA

The meeting will be a three day topical workshop to bring together theorists and observers studying very massive stars, their instabilities, SNe and their progenitors, and the outcomes of the final eruptions. The emphasis of the workshop will be on the final stages of massive star evolution and the unsolved theoretical and observational questions.

Weblink: www.astro.umn.edu/massive

Email: massive@astro.umn.edu

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