ISSN 1783-3426

THE MASSIVE STAR NEWSLETTER

formerly known as the hot star newsletter

*

No. 154

2016 July-August

Editors: Philippe Eenens (University of Guanajuato)

eenens@gmail.com

Raphael Hirschi (Keele University)

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

CONTENTS OF THIS NEWSLETTER:

News

``X-rays from hot stars''

The special issue of Advances in Space Research ``X-rays from hot stars" is now available on-line.

http://www.sciencedirect.com/science/journal/02731177/58/5

ALL PAPERS CAN BE DOWNLOADED FREE OF CHARGE UNTIL SEPTEMBER 9, 2016

This special issue is aimed at summarizing our current knowledge of X-ray emission from hot stars as well as at opening new avenues for investigation in anticipation of the next generation of X-ray telescopes. In this volume we assembled a collection of review papers and original contributions covering the wide range of topics on X-ray emission from hot stars. All interested members of the community were invited to contribute. Each submitted paper was peer reviewed by at least two anonymous referees, whom we would like to thank for their very important work. Please find below some links to the individual papers for a (time-limited) free download:

http://authors.elsevier.com/a/1TPuE~6OiOeh2
http://authors.elsevier.com/a/1TPuE~6OiSQrP
http://authors.elsevier.com/a/1TPuE~6OiTavT
http://authors.elsevier.com/a/1TPuE~6OiOeuZ
http://authors.elsevier.com/a/1TPuE~6OiOeM9
http://authors.elsevier.com/a/1TPuE~6OiSQqf
http://authors.elsevier.com/a/1TPuE~6OiSQqr

Weblink: http://www.sciencedirect.com/science/journal/02731177/58/5

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

Back to contents

PAPERS

Abstracts of 13 accepted papers

Spectroscopy, MOST photometry, and interferometry of MWC 314: is it an LBV or an interacting binary?

Noel Richardson et al.

Universite de Montreal

MWC 314 is a bright candidate luminous blue variable (LBV) that resides in a fairly close binary system, with an orbital period of 60.753 ± 0.003 d. We observed MWC 314 with a combination of optical spectroscopy, broad-band ground- and space-based photometry, as well as with long baseline, near-infrared interferometry. We have revised the single-lined spectroscopic orbit and explored the photometric variability. The orbital light curve displays two minima each orbit that can be partially explained in terms of the tidal distortion of the primary that occurs around the time of periastron. The emission lines in the system are often double-peaked and stationary in their kinematics, indicative of a circumbinary disc. We find that the stellar wind or circumbinary disc is partially resolved in the K'-band with the longest baselines of the CHARA Array. From this analysis, we provide a simple, qualitative model in an attempt to explain the observations. From the assumption of Roche Lobe overflow and tidal synchronization at periastron, we estimate the component masses to be $M1 \approx 5\ M_\odot$ and $M2 \approx 15\ M_\odot$, which indicates a mass of the LBV that is extremely low. In addition to the orbital modulation, we discovered two pulsational modes with the MOST satellite. These modes are easily supported by a low-mass hydrogen-poor star, but cannot be easily supported by a star with the parameters of an LBV. The combination of these results provides evidence that the primary star was likely never a normal LBV, but rather is the product of binary interactions. As such, this system presents opportunities for studying mass-transfer and binary evolution with many observational techniques.

Reference: 2016, MNRAS, 455, 244
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1510.00324

Comments:

Email: noel.richardson@UToledo.edu

Back to contents

To v∞ and beyond! The He I absorption variability across the 2014.6 periastron passage of η Carinae

Noel Richardson et al.

University of Toledo

We have monitored the massive binary star η Carinae with the CTIO/SMARTS 1.5~m telescope and CHIRON spectrograph from the previous apastron passage of the system through the recent 2014.6

periastron passage. Our monitoring has resulted in a large, homogeneous data set with an unprecedented time-sampling, spectral resolving power, and signal-to-noise. This allowed us to investigate temporal variability previously unexplored in the system and discover a kinematic structure in the P Cygni absorption troughs of neutral helium wind lines. The features observed occurred prior to the periastron passage and are seen as we look through the trailing arm of the wind-wind collision shock cone. We show that the bulk of the variability is repeatable across the last five periastron passages, and that the absorption occurs in the inner 230 AU of the system. In addition, we found an additional, high-velocity absorption component super-imposed on the P Cygni absorption troughs that has been previously un-observed in these lines, but which bears resemblance to the observations of the He~I λ10830 \AA\ feature across previous cycles. Through a comparison of the current smoothed particle hydrodynamical simulations, we show that the observed variations are likely caused by instabilities in the wind-wind collision region in our line-of-sight, coupled with stochastic variability related to clumping in the winds.

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

Weblink: http://arxiv.org/abs/1606.03655

Comments:

Email: noel.richardson@UToledo.edu

Back to contents

The CHARA Array resolves the long-period Wolf-Rayet binaries WR 137 and WR 138

Noel Richardson et al.

University of Toledo

We report on interferometric observations with the CHARA Array of two classical Wolf-Rayet stars in suspected binary systems, namely WR 137 and WR 138. In both cases, we resolve the component stars to be separated by a few milliarcseconds. The data were collected in the H-band, and provide a measure of the fractional flux for both stars in each system. We find that the WR star is the dominant H-band light source in both systems ($f_{\rm WR, 137} = 0.59\pm0.04$; $f_{\rm WR, 138} = 0.67\pm0.01$), which is confirmed through both comparisons with estimated fundamental parameters for WR stars and O dwarfs, as well as through spectral modeling of each system. Our spectral modeling also provides fundamental parameters for the stars and winds in these systems. The results on WR 138 provide evidence that it is a binary system which may have gone through a previous mass-transfer episode to create the WR star. The separation and position of the stars in the WR 137 system together with previous results from the IOTA interferometer provides evidence that the binary is seen nearly edge-on. The possible edge-on orbit of WR 137 aligns well with the dust production site imaged by the Hubble Space Telescope during a previous periastron passage, showing that the dust production may be concentrated in the orbital plane.

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

Weblink: http://arxiv.org/abs/1606.09586

Comments:

Email: noel.richardson@UToledo.edu

Back to contents

Stellar wind models of subluminous hot stars

J. Krticka, J. Kubat, I. Krtickova

Masaryk University, Brno
Astronomical Institute, Ondrejov

Mass-loss rate is one of the most important stellar parameters. We aim to provide mass-loss rates as a function of subdwarf parameters and to apply the formula for individual subdwarfs, to predict the wind terminal velocities, to estimate the influence of the magnetic field and X-ray ionization on the stellar wind, and to study the interaction of subdwarf wind with mass loss from Be and cool companions. We used our kinetic equilibrium (NLTE) wind models with the radiative force determined from the radiative transfer equation in the comoving frame (CMF) to predict the wind structure of subluminous hot stars. Our models solve stationary hydrodynamical equations, that is the equation of continuity, equation of motion, and energy equation and predict basic wind parameters. We predicted the wind mass-loss rate as a function of stellar parameters, namely the stellar luminosity, effective temperature, and metallicity. The derived wind parameters (mass-loss rates and terminal velocities) agree with the values derived from the observations. The radiative force is not able to accelerate the homogeneous wind for stars with low effective temperatures and high surface gravities. We discussed the properties of winds of individual subdwarfs. The X-ray irradiation may inhibit the flow in binaries with compact components. In binaries with Be components, the winds interact with the disk of the Be star. Stellar winds exist in subluminous stars with low gravities or high effective temperatures. Despite their low mass-loss rates, they are detectable in the ultraviolet spectrum and cause X-ray emission. Subdwarf stars may lose a significant part of their mass during the evolution. The angular momentum loss in magnetic subdwarfs with wind may explain their low rotational velocities. Stellar winds are especially important in binaries, where they may be accreted on a compact or cool companion.

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

Weblink: http://lanl.arxiv.org/abs/1607.04445

Comments:

Email: krticka@physics.muni.cz

Back to contents

The X-ray emission of the gamma Cassiopeiae stars

Myron A. Smith^1, Raimundo. Lopes de Oliveira^2, and Christian Motch^3

1 - National Optical Astronomical Observatory, USA, 2 - Universidad Fedeeralde Sergipe, Departamento de F\'isica, Brazil - 3 - Observatoire Astronomique, Universit\'e de Strasbourg,

Long considered as the "odd man out" among X-ray emitting Be stars, gamma Cas (B0.5e\,IV) is now recognized as the prototype of a class of stars that emit hard thermal X-rays. Our classification differs from the historical use of the term "gamma Cas stars" defined from optical properties alone. The luminosity output of this class contributes significantly to the hard X-ray production of massive stars in the Galaxy. The gamma Cas stars have light curves showing variability on a few broadly-defined

timescales and spectra indicative of an optically thin plasma consisting of one or more hot thermal components. By now 9--13 Galactic $\approx$B0-1.5e main sequence stars are judged to be members or candidate members of the gamma Cas class. Conservative criteria for this designation are for a $\approx$B0-1.5e III-V star to have an X-ray luminosity of10^{32}--10^{33} ergs\,s^{-1}, a hot thermal spectrum containing the short wavelength Lyα Fe\,XXV and Fe\,XXVI lines and the fluorescence FeK feature all in emission. If thermality cannot be demonstrated, for example from either the presence of these Lyα lines or curvature of the hard continuum; these are the gamma Cas {\it candidates.} We discuss the history of the discovery of the complicated characteristics of the variability in the optical, UV, and X-ray domains, leading to suggestions for the physical cause of the production of hard X-rays. These include scenarios in which matter from the Be star accretes onto a degenerate secondary star and interactions between magnetic fields on the Be star and its decretion disk. The greatest aid to the choice of the causal mechanism is the temporal correlations of X-ray light curves and spectra with diagnostics in the optical and UV wavebands. We show why the magnetic star-disk interaction scenario is the most tenable explanation for the creation of hard X-rays on these stars.

Reference: Advances in Space Research, 58, 782-808, 2016
Status: Manuscript has been accepted

Weblink:

Comments:

Email: myronmeister@gmail.com

Back to contents

e-MERLIN 21cm constraints on the mass-loss rates of OB stars in Cyg OB2

Jack Morford(1), Danielle Fenech(1), Raman Prinja(1), Ronnie Blomme(2), Jeremy Yates(1)

1. Dept. of Physics & Astronomy, University College London, Gower Street, London, WC1E 6BT.
2. Royal Observatory of Belgium, Ringlaan 3, 1180 Brussel, Belgium

We present e-MERLIN 21 cm (L-band) observations of single luminous OB stars in the Cygnus OB2 association, from the COBRaS Legacy programme. The radio observations potentially offer the most straightforward, least model-dependent, determinations of mass-loss rates, and can be used to help resolve current discrepancies in mass-loss rates via clumped and structured hot star winds. We report here that the 21 cm flux densities of O3 to O6 supergiant and giant stars are less than ~70 microJy. These fluxes may be translated into 'smooth' wind mass-loss upper limits of ~ 4.4 - 4.8 x 10^(-6) M_sol/yr for O3 supergiants and < 2.9 x 10^(-6) M_sol/yr for B0 to B1 supergiants. The first ever resolved 21 cm detections of the hypergiant (and LBV candidate) Cyg OB2 #12 are discussed; for multiple observations separated by 14 days, we detect a ~ 69% increase in its flux density. Our constraints on the upper limits for the mass-loss rates of evolved OB stars in Cyg OB2 support the model that the inner wind region close to the stellar surface (where Halpha forms) is more clumped than the very extended geometric region sampled by our radio observations.

Reference: 10.1093/mnras/stw1914
Status: Manuscript has been accepted

Email: jmorford@star.ucl.ac.uk

Back to contents

Tracing back the evolution of the candidate LBV HD 168625

L. Mahy (1), D. Hutsemékers (1), P. Royer (2), C. Waelkens (2)

(1): Institut d'Astrophysique et de Géophysique, Université de Liège, Quartier Agora, Allée du 6 Août 19C, B-4000, Liège 1, Belgium
(2): Instituut voor Sterrenkunde, KU Leuven, Celestijnenlaan 200D, Bus 2401, B-3001 Leuven, Belgium

Context. The luminous blue variable phase is a crucial transitory phase that is not clearly understood in the massive star evolution.
Aims. We have obtained far-infrared Herschel/PACS imaging and spectroscopic observations of the nebula surrounding the candidate LBV HD168625. By combining these data with optical spectra of the central star, we want to constrain the abundances in the nebula and in the star and compare them to trace back the evolution of this object.
Methods. We use the CMFGEN atmosphere code to determine the fundamental parameters and the CNO abundances of the central star whilst the abundances of the nebula are derived from the emission lines present in the Herschel/PACS spectrum.
Results. The far-infrared images show a nebula composed of an elliptical ring/torus of ejecta with a ESE-WNW axis and of a second perpendicular bipolar structure composed of empty caps/rings. We detect equatorial shells composed of dust and ionized material with different sizes when observed at different wavelengths, and bipolar caps more of less separated from the central star in Halpha and mid-IR images. This complex global structure seems to show two different inclinations: ~40° for the equatorial torus and ~60° for the bipolar ejections. From the Herschel/PACS spectrum, we determine nebular abundances of N/H = 4.1 +/- 0.8 x 10^-4 and C/H = 1.6^{+1.16}_{-0.35} x 10^-4, as well as a mass of ionized gas of 0.17 +/- 0.04 Msun and a neutral hydrogen mass of about 1.0 +/- 0.3 Msun which dominates. Analysis of the central star reveals Teff = 14000 +/- 2000K, log g = 1.74 +/- 0.05 and log(L/Lsun) = 5.58 +/- 0.11. We derive stellar CNO abundances of about N/H = 5.0 +/- 1.5 x 10^-4, C/H = 1.4 +/- 0.5 x 10^-4 and O/H = 3.5 +/- 1.0 x 10^-4, not significantly different from nebular abundances. All these measurements taken together are compatible with the evolutionary tracks of a star with an initial mass between 28 and 33 Msun and with a critical rotational rate between 0.3 and 0.4 that has lost its material during or just after the Blue Supergiant phase.

Reference: 14 pages, 16 figures, A&A, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1608.01087

Comments:

Email: mahy@astro.ulg.ac.be

Back to contents

X-ray emission from interacting massive binaries: a review of 15 years of progress

Gregor Rauw, Yael Naze

University of Liege, Belgium

Previous generations of X-ray observatories revealed a group of massive binaries that were relatively bright X-ray emitters. This was attributed to emission of shock-heated plasma in the wind-wind interaction zone located between the stars. With the advent of the current generation of X-ray observatories, the phenomenon could be studied in much more detail. In this review, we highlight the

progress that has been achieved in our understanding of the phenomenon over the last 15 years, both on theoretical and observational grounds. All these studies have paved the way for future investigations using the next generation of X-ray satellites that will provide crucial information on the X-ray emission formed in the innermost part of the wind-wind interaction.

Reference: Advances in Space Research, 58, 761-781
Status: Manuscript has been accepted

Weblink: http://authors.elsevier.com/a/1TPuE~6OiOeML

Comments: Paper can be downloaded free of charge until September 9, 2016

Email: rauw@astro.ulg.ac.be

Back to contents

X-ray and optical spectroscopy of the massive young open cluster IC1805

Gregor Rauw, and Yael Naze

University of Liege, Belgium

Very young open clusters are ideal places to study the X-ray properties of a homogeneous population of early-type stars. In this respect, the IC1805 open cluster is very interesting as it hosts the O4If+ star HD15570 thought to be in an evolutionary stage intermediate between a normal O-star and a Wolf-Rayet star. Such a star could provide a test for theoretical models aiming at explaining the empirical scaling relation between the X-ray and bolometric luminosities of O-type stars. We have observed IC1805 with XMM-Newton and further collected optical spectroscopy of some of the O-star members of the cluster. The optical spectra allow us to revisit the orbital solutions of BD+60° 497 and HD15558, and provide the first evidence of binarity for BD+60° 498. X-ray emission from colliding winds does not appear to play an important role among the O-stars of IC1805. Notably, the X-ray fluxes do not vary significantly between archival X-ray observations and our XMM-Newton pointing. The very fast rotator BD+60° 513, and to a lesser extent the O4If+ star HD15570 appear somewhat underluminous. Whilst the underluminosity of HD15570 is only marginally significant, its amplitude is found to be compatible with theoretical expectations based on its stellar and wind properties. A number of other X-ray sources are detected in the field, and the brightest objects, many of which are likely low-mass pre-main sequence stars, are analyzed in detail.

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

Weblink: http://arxiv.org/abs/1608.04499

Comments:

Email: rauw@astro.ulg.ac.be

Back to contents

G11.92-0.61 MM1: A Keplerian disc around a massive young proto-O star

J. D. Ilee (1), C. J. Cyganowski (2), P. Nazari (2), T. R. Hunter (3), C. L. Brogan (3), D. H. Forgan (2) and Q. Zhang (4)

(1) Institute of Astronomy, Madingley Road, Cambridge CB3 0HA, UK;
(2) SUPA, School of Physics & Astronomy, University of St Andrews, North Haugh, St Andrews, Scotland, KY16 9SS, UK;
(3) NRAO, 520 Edgemont Rd, Charlottesville, VA 22903, USA;
(4) Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138, USA

The formation process of massive stars is not well understood, and advancement in our understanding benefits from high resolution observations and modelling of the gas and dust surrounding individual high-mass (proto)stars. Here we report sub-arcsecond (<1550 au) resolution observations of the young massive star G11.92-0.61 MM1 with the SMA and VLA. Our 1.3 mm SMA observations reveal consistent velocity gradients in compact molecular line emission from species such as CH$_3$CN, CH$_3$OH, OCS, HNCO, H$_2$CO, DCN and CH$_3$CH$_2$CN, oriented perpendicular to the previously reported bipolar molecular outflow from MM1. Modelling of the compact gas kinematics suggests a structure undergoing rotation around the peak of the dust continuum emission. The rotational profile can be well fit by a model of a Keplerian disc, including infall, surrounding an enclosed mass of 30-60M$_{\odot}$, of which 2-3M$_{\odot}$ is attributed to the disc. From modelling the CH$_3$CN emission, we determine that two temperature components, of 150 K and 230 K, are required to adequately reproduce the spectra. Our 0.9 and 3.0cm VLA continuum data exhibit an excess above the level expected from dust emission; the full centimetre-submillimetre wavelength spectral energy distribution of MM1 is well reproduced by a model including dust emission, an unresolved hypercompact H{\i}{\i} region, and a compact ionised jet. In combination, our results suggest that MM1 is an example of a massive proto-O star forming via disc accretion, in a similar way to that of lower mass stars.

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

Weblink: http://adsabs.harvard.edu/abs/2016arXiv160805561I

Comments:

Email: jdilee@ast.cam.ac.uk

Back to contents

The nature of the light variability of magnetic Of?p star HD 191612

J. Krticka

Masaryk University, Brno, Czech Republic

A small fraction of hot OBA stars host global magnetic fields with field strengths of the order of 0.1-10 kG. This leads to the creation of persistent surface structures (spots) in stars with sufficiently weak winds as a result of the radiative diffusion. These spots become evident in spectroscopic and photometric variability. This type of variability is not expected in stars with strong winds, where the wind inhibits the radiative diffusion. Therefore, a weak photometric variability of the magnetic Of?p star HD 191612 is attributed to the light absorption in the circumstellar clouds. We study the nature of the photometric variability of HD 191612. We assume that the variability results from variable wind blanketing induced by surface variations of the magnetic field tilt and modulated by stellar rotation. We used our global kinetic equilibrium (NLTE) wind models with radiative force determined from the radiative transfer equation in the comoving frame (CMF) to predict the stellar emergent flux. Our models describe the stellar atmosphere in a unified manner and account for the influence of the wind on the atmosphere. The models are calculated for different wind mass-loss rates to mimic the effect of magnetic field tilt on the emergent fluxes. We integrate the emergent fluxes over the visible stellar surface for individual rotational phases, and calculate the rotationally modulated light curve of HD 191612. The wind blanketing that varies across surface is able to explain a part of the observed light variability in this star. The mechanism is able to operate even at relatively low mass-loss rates. The remaining variability is most likely caused by the flux absorption in circumstellar clouds. The variable wind blanketing is an additional source of the light variability in massive stars. The presence of the rotational light variability may serve as a proxy for the magnetic field.

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

Weblink: http://lanl.arxiv.org/abs/1608.07157

Comments:

Email: krticka@physics.muni.cz

Back to contents

The IACOB project: IV. New predictions for high-degree non-radial mode instability domains in massive stars and connection with macroturbulent broadening

Godart, M.; Simón-Díaz, S.; Herrero, A.; Dupret, M. A.; Grötsch-Noels, A.; Salmon, S. J. A. J.; Ventura, P.

IAC, ULL, IAG-Liege, CEA/DSM-CNRS, INAF

Asteroseismology is a powerful tool to access the internal structure of stars. Apart from the important impact of theoretical developments, progress in this field has been commonly associated with the analysis of time-resolved observations. Recently, the so-called macroturbulent broadening has been proposed to be a complementary and less expensive way -- in terms of observational time -- to investigate pulsations in massive stars. We assess to what extent this ubiquitous non-rotational broadening component shaping the line profiles of O stars and B supergiants is a spectroscopic signature of pulsation modes driven by a heat mechanism. We compute stellar main sequence and post-main sequence models from 3 to 70Msun with the ATON stellar evolution code and determine the instability domains for heat-driven modes for degrees l=1-20 using the adiabatic and non-adiabatic codes LOSC and MAD. We use the observational material presented in Sim\'on-D\'iaz et al. (2016) to investigate possible correlations between the single snapshot line-broadening properties of a sample of ~260 O and B-type stars and their location inside/outside the various predicted instability domains. We present an homogeneous prediction for the non-radial instability domains of massive stars for degree l up to 20. We provide a global picture of what to expect from an observational point of view in terms of frequency range of excited modes, and investigate the behavior of the instabilities with stellar evolution and increasing degree of the mode. Furthermore, our pulsational stability analysis, once compared to the empirical results of Sim\'on-D\'iaz et al. (2016), indicates that stellar oscillations originated by a heat mechanism can not explain alone the occurrence of the large non-rotational line-broadening component commonly detected in the O star and B supergiant domain.

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

Weblink: http://adsabs.harvard.edu/abs/2016arXiv160805520G

Comments:

Email: melanie.godart@gmail.com

Back to contents

The IACOB project: III. New observational clues to understand macroturbulent broadening in massive O- and B-type stars

Simón-Díaz, S.; Godart, M.; Castro, N.; Herrero, A.; Aerts, C.; Puls, J.; Telting, J.; Grassitelli, L.

IAC/ULL, AIfA-Bonn, IvS-KULeuven, LMU-USM-Munich, NOT

We aim to provide new empirical clues about macroturbulent spectral line broadening in O- and B-type stars to evaluate its physical origin. We use high-resolution spectra of ~430 stars with spectral types in the range O4-B9 (all luminosity classes). We characterize the line-broadening of adequate diagnostic metal lines using a combined FT and GOF technique. We perform a quantitative spectroscopic analysis of the whole sample using automatic tools coupled with a huge grid of FASTWIND models. We also incorporate quantitative information about line asymmetries to our observational description of the characteristics of the line-profiles, and present a comparison of the shape and type of line-profile variability found in a small sample of O stars and B supergiants with still undefined pulsational properties and B main sequence stars with variable line-profiles. We present a homogeneous and statistically significant overview of the (single snapshot) line-broadening properties of stars in the whole O and B star domain. We find empirical evidence of the existence of various types of non-rotational broadening agents acting in the realm of massive stars. Even though all of them could be quoted and quantified as a macroturbulent broadening from a practical point of view, their physical origin can be different. Contrarily to the early- to late-B dwarfs/giants, which present a mixture of cases in terms of line-profile shape and variability, the whole O-type and B supergiant domain (or, roughly speaking, stars with M_ZAMS > 15 M_sol) is fully dominated by stars with a remarkable non-rotational broadening component and very similar profiles (including type of variability). We provide some examples illustrating how this observational dataset can be used to evaluate scenarios aimed at explaining the existence of sources of non-rotational broadening in massive stars.

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

Weblink: http://adsabs.harvard.edu/abs/2016arXiv160805508S

Comments:

Email: ssimon@iac.es

Back to contents

Abstracts of 1 submitted papers

Extinction law in the range 0.4 - 4.8 microns and the 8620A DIB towards the stellar cluster Westerlund 1

Augusto Damineli (1), Leonerdo A. Almeida (1), Robert D. Blum (2), Daniel S.C.Damineli (3,4), Felipe Navarete (1), Marcelo S. Rubinho (1), Miran Teodoro(5,6)

1-Instituto de Astronomia, Geofísica e Ciências Atmosféricas da USP, Rua do Matão 1226, Cidade Universitária São Paulo-SP, 05508-090, Brasil
2-NOAO, 950 N Cherry Ave., Tucson, AZ 85719 USA
3-Cell Biology and Molecular Genetics Department, University of Maryland, College Park, Maryland 20742-5815, USA
4-PhD Program in Computational Biology, Instituto Gulbenkian de Ciência, 2780-156 Oeiras, Portugal
5-Astrophysics Science Division, Code 667, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA
6-Universities Space Research Association, 7178 Columbia Gateway Dr., Columbia, MD 20146, USA

The young stellar cluster Westerlund 1 (Wd 1: l =339.6, b= 0.4 deg) is one of the most massive in the local Universe, but accurate parameters are pending on better determination of its extinction and distance. Based on our photometry and data collected from other sources, we have derived a reddening law for the cluster line-of-sight representative of the Galactic Plane (-5< b< +5 deg) in the window 0.4-4.8 micron. The power low exponent alpha=2.13 is much steeper than those published a decade ago (1.6-1.8) and our index RV=2.50 is also discrepant from them, but in very good agreement with recent results based on large deep surveys in the inner Galaxy. As a consequence, the total extinction AKs=0.74 is substantially smaller than in previous works (AKs =0.91 - 1.13), from which the interstellar component was found to be AKs=0.63 (AV=9.66). The extinction to the cluster members spans a range of AV=8.7, with a gradient increasing from SW to NE across the cluster face, following the same general trend as the warm dust distribution. The map of J-Ks colour index also shows a trend in this direction. We measured the equivalent width of the diffuse interstellar band at 8620A (the GAIA DIB) for Wd 1 cluster members, which supplemented with data taken from different sources results in the relation AKs =0.612EW - 0.191EW^2 . This extends the Munari et al. (2008) relation, valid for EB-V < 1, to the non-linear regime (AV > 4).

Reference: To appear in MNRAS
Status: Manuscript has been submitted

Weblink: http://arxiv.org/abs/1607.04639

Comments:

Email: augusto.damineli@gmail.com

Back to contents

JOBS (open positions)

Postdoc position in Sheffield: Massive Stars in Starburst Galaxies

Prof Paul Crowther

Dept of Physics & Astronomy, University of Sheffield, Sheffield, S3 7RH, UK

Postdoc position to work on a STFC-funded project entitled “Massive Stars in Starburst Regions” with Prof Paul Crowther to support an observational programme based upon ground- and space-based datasets from VLT, HST and Chandra. Key questions to be addressed involve the contribution of individual stars to the integrated light in starburst regions, the binary fraction of massive stars in starburst regions and the origin of very massive stars.

You will take a lead role in the analysis of existing spectroscopic datasets, and should have a PhD in astrophysics or a closely related field. Preference will be given to applicants with observational or theoretical experience in one or more of the following fields: stellar atmospheres, evolution of massive stars, young star clusters. A good track record of published research is also expected.

Attention/Comments: The post is fixed-term for 17 months from January 2017 in the first instance. Job Reference UOS014506

Weblink: http://www.sheffield.ac.uk/jobs

Email: Paul.crowther@sheffield.ac.uk

Deadline: 31 Oct 2016

Back to contents

Postdoc position in Theoretical Astrophysics

Raphael Hirschi

Keele University, UK

Fixed Term for 6 months

Keele University wishes to appoint a Research Associate in order to conduct research on theoretical stellar astrophysics.
The appointed Research Associate 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 a dedicated 1000+-CPU-core computer cluster, including 288 CPU-cores sharing memory via numascale technology.

You 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. The PDRA will also contribute to the other components of the project and be encouraged to develop their own research program and their leadership skills.

Applicants 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, 3D hydrodynamic simulations or parallel programming (CUDA/MPI/OpenMP) is highly desirable.

For more details of this post and the Keele Astrophysics Group, and for information on how to apply, see http://www.astro.keele.ac.uk.

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

Attention/Comments:

Weblink: http://www.astro.keele.ac.uk/shyne

Email: r.hirschi@keele.ac.uk

Deadline: 31 October 2016

Back to contents

Closed Job Offers (original deadline passed)

Research Associate in Theoretical Stellar Astrophysics

Raphael Hirschi

Keele University, UK

Faculty of Natural Sciences

Faculty Research Office

Research Associate in Theoretical Stellar Astrophysics

Fixed Term until October 2017

Starting salary: Grade 7 £31,656

Keele University wishes to appoint a Research Associate starting in October 2016, in order to conduct research on theoretical stellar astrophysics.

The appointed Research Associate 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 a dedicated 1200+-CPU-core computer cluster, including 288 CPU-cores sharing memory via numascale technology.

You 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. The Research Associate will also contribute to the other components of the project and be encouraged to develop their own research program and their leadership skills. The post holder will work closely with a collaborator in America and the appointment will involve frequent travel to the USA.

Applicants 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.

For more details of this post and the Keele Astrophysics Group, and for information on how to apply, see http://www.astro.keele.ac.uk.

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

Keele University is committed to the principles of the Athena SWAN charter, and values equality and diversity across our workforce. We strive to ensure that our workforce is representative of broader society, and therefore, we would actively welcome applications from women for this role.

For full post details please visit: www.keele.ac.uk/vacancies

Keele University employees wishing to apply should login to Employee Self Service and click on the 'View current vacancies' link.

Closing date for applications: 4 August 2016

Interviews will most probably be conducted remotely (via skype or similar technology)

Post reference: KU00000093

Attention/Comments:

Weblink: https://forums.keele.ac.uk/viewtopic.php?f=14&t=15679

Email: r.hirschi@keele.ac.uk

Deadline: 4 August 2016

Back to contents

2-yr postdoctoral position on Massive Stars at IAC

Prof. Artemio Herrero

Instituto de Astrofisica de Canarias
C/ Via Lactea s/n
E-38205 La Laguna
Tenerife

The IAC (Tenerife) invites applications for ONE postdoctoral contract to work on topics within the “Massive stars in the Local Universe” (AYA2015-68012-C2-1-P) project, led by Prof. Artemio Herrero Davó.

Duties: The selected candidate will pursue research on massive stars currently underway in the group: multiwavelength observations and analysis of massive stars in the Milky Way, and nearby galaxies, comparison of results with the evolutionary model predictions, update of atomic and atmosphere models, influence of rotation, and other velocity fields in the structure and evolution of massive stars.

Expertise in the following topics will be highly valued:

· Astronomical observing, reduction and stellar analysis of massive stars, and use of model atmospheres.

· Use or calculation of evolutionary models.

· Knowledge of numerical and statistical techniques.

· Analysis of stellar pulsations, particularly when appropriate for massive stars.

Qualification requirements: To be eligible for admission, applicants must have obtained a Ph.D. degree in Astrophysics or Physics, within the application deadline (September 20, 2016). A copy of your degree or corresponding stamped certificate (issued on behalf of the University where you have obtained the degree), must be included. If the applicant has not completed the Ph.D. degree within the application deadline, will not be considered.

Duration: The starting date is expected to be in the first quarter of 2017. In any case the contract will not be extended later than December 31, 2018 (finalization of the project).

Remuneration: The gross annual salary is 32,886 Euros, subject to up to 20% tax and Social Security deductions (depending on the personal situation of the candidate). Medical insurance under the Spanish National Health Service will be provided for the candidate and will also cover spouse or registered partner (de facto partner) and children (if relevant).

Attention/Comments: Instructions on how to apply may be found in the weblink address. For administrative questions, please send an email to secinv@iac.es

Weblink: http://www.iac.es/info.php?op1=26&id=603

Email: ahd@iac.es

Deadline: September 20th, 2016

Back to contents