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THE M$^{\mathrm{A}}$$^{\mathrm{S}}$$^{\mathrm{S}}$$^{\mathrm{I}}V_{\mathrm{E}}$ STAR NEWSLETTER

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Contents of this newsletter

Obituary

David B. Friend 1954-2008

I was greatly saddened to learn recently of the passing of David B. Friend, from complications of Chrone's disease and cancer, on May 22, 2008, at age 54. I knew Dave from our graduate student days at the University of Colorado, from which he received his Ph.D. in 1982.

Dave's thesis on "Radiation-Driven Stellar Wind Models" was done under supervision of John Castor, with also substantial input from Dave Abbott. It made important extensions to the classic CAK model for line-driven winds, documented and extended in several key journal papers through the 80's and early 90's. His 1986 ApJ paper with Dave Abbott on rotating wind models was one of the first to document the key "finite-disk correction factor", and has nearly 300 citations. He also co-authored several pioneering papers on the role of magnetic fields on stellar winds and their effect on stellar spindown. An early (and in my opinion underappreciated) jewel is his 1983 paper with John Castor on multiline scattering, which was the first to demonstrate that the CAK mechanism is not (as is still often misperceived) fundamentally restricted to the single scattering limit.

Following his Ph.D. from Colorado, Dave worked at the National Center for Atmospheric Research, the University of Wisconsin, Williams College, and Weber State University. After becoming a professor

at the University of Montana in 1990, he turned his focus toward teaching and running the local observatory, and so gradually drifted away from hot-star research. But he was a highly successful and popular teacher, winning the University of Montana Distinguished Teaching Award in 2005.

Dave is survived by his wife Diane, who is herself an accomplished astronomy educator, and by their 24-year-old son Scott.

Further information can be found at the weblink below, which contains links to a full obituary and further information on Dave's teaching activities and award.

Stan Owocki, OC Chair IAU Working Group for Massive Stars

Weblink: `http://www.physics.umt.edu/dfriend.html`

Email contact: `owocki@bartol.udel.edu`

Accepted Papers

3D Models of Radiatively Driven Colliding Winds in Massive O+O Star Binaries: I. Hydrodynamics

J. M. Pittard

The University of Leeds, UK

The dynamics of the wind-wind collision in massive stellar binaries is investigated using three-dimensional hydrodynamical models which incorporate gravity, the driving of the winds, the orbital motion of the stars, and radiative cooling of the shocked plasma. In this first paper we restrict our study to main-sequence O+O binaries. The nature of the wind-wind collision region is highly dependent on the degree of cooling of the shocked plasma, and the ratio of the flow timescale of the shocked plasma to the orbital timescale. The pre-shock wind speeds are lower in close systems as the winds collide prior to their acceleration to terminal speeds. Radiative inhibition may also reduce the pre-shock wind speeds. Together, these effects can lead to rapid cooling of the post-shock gas. Radiative inhibition is less important in wider systems, where the winds are accelerated to higher speeds before they collide, and the resulting collision region can be largely adiabatic. In systems with eccentric orbits, cold gas formed during periastron passage can persist even at apastron, before being ablated and mixed into its surroundings and/or accelerated out of the system.

Reference: MNRAS, in press

On the web at: `arXiv:0904.0164`

Preprints from: `jmp@ast.leeds.ac.uk`

Polarization Variability Arising from Clumps in the Winds of Wolf-Rayet Stars

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The polarimetric and photometric variability of Wolf-Rayet (WR) stars as caused by clumps in the winds, is revisited. In the model which is improved from Li et al. 2000, the radial expansion of the thickness is accounted for, but we retain the dependence on the β velocity law, stellar occultation effects. We again search for parameters that can yield results consistent with observations in regards to the mean polarization $\bar{p}$, the ratio $\sigma_{\rm p}/\sigma_{\rm phot}$ of polarimetric to photometric variability, and the volume filling factor f_V. Clump generation and spatial distribution are randomized by the Monte Carlo method so as to produce clumps which are, in the mean, distributed uniformly in space and have time intervals with a Gaussian distribution. The generated clumps move radially outward with a velocity law determined by a β index, and the angular size of the clumps is assumed to keep fixed. By fitting the observed $\sigma_{\rm p}/\sigma_{\rm phot}$ and the volume filling factor f_V, the clump velocity law index β (~ 2) and clump ejection rate (~ 1) are inferred, and are found to be well constrained. In addition, the subpeak features on broad emission lines seem to support the clump ejection rate. Meanwhile, the fraction of the total mass loss rate that is contained in the clumps is obtained by fitting the observed polarization. We conclude that this picture for the clump properties produces a valuable diagnostic of WR wind structure.

Reference: 2009, Research in Astronomy and Astrophysics (RAA), 9, 558-576

On the web at: `https://www.raa-journal.org/raa/index.php/raa/index`

Preprints from: `qkli@bnu.edu.cn`

Does Collinder 236 host a Cepheid calibrator?

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Photoelectric UBV photometry and star counts are presented for the previously unstudied open cluster Collinder 236, supplemented by observations for stars near the Cepheid WZ Car. Collinder 236 is typical of groups associated with Cepheids, with an evolutionary age of $(3.4 \pm 1.1) \times 10^7$ years, but it is 1944 ± 71 pc distant, only half the predicted distance to WZ Car. The cluster is reddened by E(B-V)$\sim$0.26, and has nuclear and coronal radii of rn$\sim$2 arcmin (1.1 pc) and Rc$\sim$8 arcmin (4.5 pc), respectively. The Cepheid is not a member of Collinder 236 on the basis of location beyond the cluster tidal radius and implied distance, but its space reddening can be established as E(B-V)$=0.268 \pm 0.006$ s.e. from 5 adjacent stars. Period changes in WZ Car studied with the aid of archival data are revised. The period of WZ Car is increasing, its rate of $+8.27 \pm 0.19$ s yr^{-1} being consistent with a third crossing of the instability strip.

Reference: MNRAS

On the web at: http://lanl.arxiv.org/abs/0905.0834

Preprints from: turner@ap.smu.ca

Early-type stars in the young open cluster NGC 2244 and in the Mon OB2 association. I. The multiplicity of O-type stars.

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(ULg, ESO, U. de Guanajuato)

Aims. We present the results obtained from a long-term spectroscopic campaign devoted to the multiplicity of O-type stars in the young open cluster NGC2244 and in the Mon OB2 association.
Methods. Our spectroscopic monitoring was performed over several years, allowing us to probe different time-scales. For each star, several spectral diagnostic tools are applied, in order to search for line shifts and profile variations. We also measure the projected rotational velocity and revisit the spectral classification.
Results. In our sample, several stars were previously considered as spectroscopic binaries, though only a few scattered observations were available. Our results now reveal a more complex situation. Our study identifies two new spectroscopic binaries (HD46149 in NGC2244 and HD46573 in MonOB2). The first object is a long-period double-lined spectroscopic binary, though the exact value of its period remains uncertain and the second object is classified as an SB1 system with a period of about 10.67 days but the time series of our observations do not enable us to derive a unique orbital solution for this system. We also classify another star as variable in radial velocity (HD46150) and we detect line profile variations in two rapid rotators (HD46056 and HD46485).
Conclusions. This spectroscopic investigation places a firm lower limit (17%) on the binary fraction of O-stars in NGC2244 and reveals the lack of short-period O+OB systems in this cluster. In addition, a comparison of these new results with two other well-studied clusters (NGC6231 and IC1805) puts forward possible hints of a relation between stellar density and binarity, which could provide constraints on the theories about the formation and early evolution of hot stars.

Reference: A&A in press

On the web at: http://arxiv.org/abs/0905.1592

Preprints from: mahy@astro.ulg.ac.be

Characteristics of the Galaxy according to Cepheids (& Young Massive Stars)

Daniel J. Majaess, David G. Turner, David J. Lane

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Classical and Type II Cepheids are used to reinvestigate specific properties of the Galaxy. A new Type II reddening-free Cepheid distance parameterization is formulated from LMC Cepheids (OGLE), with uncertainties typically no larger than 5-15%. A distance to the Galactic centre of R0=7.8+-0.6 kpc

is derived from the median distance to Type II Cepheids in the bulge (OGLE), R0=7.7+-0.7 kpc from a distance to the near side of the bulge combined with an estimated bulge radius of 1.3+-0.3 kpc derived from planetary nebulae. The distance of the Sun from the Galactic plane inferred from classical Cepheid variables is Zsun=26+-3 pc, a result dependent on the sample's distance and direction because of the complicating effects of Gould's Belt and warping in the Galactic disk. Classical Cepheids and young open clusters delineate consistent and obvious spiral features, although their characteristics do not match conventional pictures of the Galaxy's spiral pattern. The Sagittarius-Carina arm is confirmed as a major spiral arm that appears to originate from a different Galactic region than suggested previously. Furthermore, a major feature is observed to emanate from Cygnus-Vulpecula and may continue locally near the Sun. Significant concerns related to the effects of metallicity on the VI-based reddening-free Cepheid distance relations used here are allayed by demonstrating that the computed distances to the Galactic centre, and to several globular clusters (M54, NGC 6441, M15, and M5) and galaxies (NGC 5128 and NGC 3198) which likely host Type II Cepheids: agree with literature results to within the uncertainties.

Reference: MNRAS

Comments: alt. contact: turner@ap.smu.ca

On the web at: `http://lanl.arxiv.org/abs/0903.4206`

Preprints from: `dmajaess@ap.smu.ca`

Effect of Partial Mixing of Matter on the Hydrodynamic Angular Momentum Transport Processes in Massive Main-Sequence Stars.

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We consider the evolution of a rotating star with a mass of $16M_{\odot}$ and an angular momentum of $3.25 \times 10^{52}\mathrm{g} \cdot \mathrm{cm}^2 c^{-1}$, along with the hydrodynamical transport of angular momentum and chemical elements in its interiors. When the partial mixing of matter of the turbulent radiative envelope and the convective core is taken into account, the efficiency of the angular momentum transport by meridional circulation in the stellar interiors and the duration of the hydrogen burning phase increase. Depending on the Schmidt number in the turbulent radiative stellar envelope, the ratio of the equatorial rotational velocity to circular one increases with time in the process of stellar evolution and can become typical of early-type Be stars during an additional evolution time of the star on the main sequence. Partial mixing of matter is a necessary condition under which the hydrodynamic transport processes can increase the angular momentum of the outer stellar layer to an extent that the equatorial rotational velocity begins to increase during the second half of the evolutionary phase of the star on the main sequence, as shown by observations of the brightest stars in open star clusters with ages of 10–25 Myr. When the turbulent Schmidt number is 0.4, the equatorial rotational velocity of the star increases during the second half of the hydrogen burning phase in the convective core from 330 to 450 $\mathrm{km\,s}^{-1}$.

Reference: Astronomy Letters

Preprints from: `Eugenij.Staritsin@usu.ru`

12 New Galactic Wolf-Rayet Stars Identified via 2MASS+Spitzer/GLIMPSE

Jon Mauerhan, Schuyler Van Dyk, Pat Morris

IPAC, Caltech

We report new results from our effort to identify obscured Wolf-Rayet stars in the Galaxy. Candidates were selected by their near-infrared (2MASS) and mid-infrared (Spitzer/GLIMPSE) color excesses, which are consistent with free-free emission from ionized stellar winds and thermal excess from hot dust. We have confirmed 12 new Wolf-Rayet stars in the Galactic disk, including 9 of the nitrogen subtype (WN), and 3 of the carbon subtype (WC); this raises the total number of Wolf-Rayet stars discovered with our approach to 27. We classify one of the new stars as a possible dust-producing WC9d+OBI colliding-wind binary, as evidenced by an infrared excess resembling that of known WC9d stars, the detection of OBI features superimposed on the WC9 spectrum, and hard X-ray emission detected by XMM-Newton. A WC8 star in our sample appears to be a member of the stellar cluster Danks 1, in contrast to the rest of the confirmed Wolf-Rayet stars that generally do not appear to reside within dense stellar clusters. Either the majority of the stars are runaways from clusters, or they formed in relative isolation. We briefly discuss prospects for the expansion and improvement of the search for Wolf-Rayet stars throughout the Milky Way Galaxy.

Reference: PASP, in press

On the web at: `http://arxiv.org/abs/0905.2443`

Preprints from: `mauerhan@ipac.caltech.edu`

A Systematic Search for Corotating Interaction Regions in Apparently Single Galactic WR Stars. I. Characterizing the Variability.

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2 National Research Council Canada,

3 University of Sheffield,

4 Max Planck Institute for Astronomy

We present the results of a systematic search for large-scale spectroscopic variability in apparently single Wolf-Rayet stars brighter than ∼12.5. In this first paper we characterize the various forms of variability detected and distinguish several separate groups. For each star in our sample, we obtained 4-5 high-resolution spectra with a signal-to-noise ratio ∼100. Our ultimate goal is to identify new candidates presenting variability that potentially comes from Co-rotating Interaction Regions (CIR).

Out of a sample of 25 stars, 10 were found to display large-scale changes of which 4 are of CIR-type (WR1, WR115, WR120 and WR134). The star WR134 was already known to show such changes from previous studies. Three WN8 stars present a different type of large-scale variability and we believe deserve a group of their own. Also, all three WC9d stars in our sample present large-scale variability, but it remains to be checked if these are binaries, as many dust-making WR stars are double. Finally, of the remaining stars, 10 were found to show small-amplitude spectral changes which we attribute

to normal line-profile variability due to inhomogeneities in the wind, and 5 were found to show no spectral variability, as far as can be concluded from the data in hand.

Follow-up studies are required to identify potential periods for our candidates showing CIR-type changes and eventually estimate a rotation rate for these WR stars.

Reference: ApJ, 696, in press

On the web at: `http://www.astro.umontreal.ca/~stlouis/papers/NSURV09/stlouisetal09.pdf`

Preprints from: `stlouis@astro.umontreal.ca`

Spectroscopic study of the O-type runaway supergiant HD 195592

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The scope of this paper is to perform a detailed spectroscopic study of the northern O-type supergiant HD 195592. We use a large sample of high quality spectra in order to investigate its multiplicity, and to probe the line profile variability. Our analysis reveals a clear spectroscopic binary signature in the profile of the He I lambda 6678 line, pointing to a probable O + B system. We report on low amplitude radial velocity variations in every strong absorption line in the blue spectrum of HD 195592. These variations are ruled by two time-scales respectively of 5.063 and about 20 days. The former is firmly established, whilst the latter is poorly constrained. We report also on a very significant line profile variability of the Hbeta line, with time scales strongly related to those of the radial velocities. Our results provide significant evidence that HD 195592 is a binary system, with a period that might be the variability time-scale of about 5 days. The second time scale may be the signature of an additional star moving along a wider orbit provided its mass is low enough, even though direct evidence for the presence of a third star is still lacking. Alternatively, the second time-scale may be the signature of a variability intrinsic to the stellar wind of the primary, potentially related to the stellar rotation.

Reference: To be published in New Astronomy

On the web at: `http://arxiv.org/abs/0905.3981`

Preprints from: `debecker@astro.ulg.ac.be`

VLT/SINFONI time-resolved spectroscopy of the central, luminous, H-rich WN stars of R136

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Using the Very Large Telescope's Spectrograph for INtegral Field Observation in the Near-Infrared (VLT/SINFONI), we have obtained repeated AO-assisted, NIR spectroscopy of the six central luminous, Wolf-Rayet (WR) stars in the core of the very young (∼1 Myr), massive and dense cluster

R136, in the Large Magellanic Cloud (LMC). We also de-archived available images that were obtained with the Hubble Space Telescope's Space Telescope Imaging Spectrograph (HST/STIS), and extracted high-quality, differential photometry of our target stars to check for any variability related to binary motion.

Previous studies, relying on spatially unresolved, integrated, optical spectroscopy, had reported that one of these stars was likely to be a 4.377-day binary. Our study set out to identify the culprit and any other short-period system among our targets. However, none displays significant photometric variability, and only one star, BAT99-112 (R136c), located on the outer fringe of R136, displays a marginal variability in its radial velocities; we tentatively report an 8.2-day period. The binary status of BAT99-112 is supported by the fact that it is one of the brightest X-ray sources among all known WR stars in the LMC, consistent with it being a colliding-wind system. Follow-up observations have been proposed to confirm the orbital period of this potentially very massive system.

Reference: accepted for publication in MNRAS
Comments: 9 pages, 6 figures

On the web at: `http://arxiv.org/abs/0905.2934`

Preprints from: `o.schnurr@sheffield.ac.uk`

On the incidence of magnetic fields in slowly-pulsating B, β Cephei and B-type emission line stars

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We have obtained 40 high-resolution circular spectropolarimetric measurements of 12 slowly-pulsating B (SPB) stars, 8 Beta Cephei stars and two Be stars with the ESPaDOnS and NARVAL spectropolarimeters. The aim of these observations is to evaluate recent claims of a high incidence of magnetic field detections in stars of these types obtained using low-resolution spectropolarimetry by Hubrig (2006), Hubrig (2007) and Hubrig (2009). The precision achieved is generally comparable to or superior to that obtained by Hubrig et al., although our new observations are distinguished by their resolution of metallic and He line profiles, and their consequent sensitivity to magnetic fields of zero net longitudinal component. In the SPB stars we confirm the detection of magnetic field in one star (16 Peg), but find no evidence of the presence of fields in the remaining 11. In the Beta Cep stars, we detect a field in ξ^1 CMa, but not in any of the remaining 7 stars. Finally, neither of the two B-type

emission line stars shows any evidence of magnetic field. Based on our results, we conclude that fields are not common in SPB, Beta Cep and B-type emission line stars, consistent with the general rarity of fields in the broader population of main sequence B-type stars.

Reference: MNRAS

On the web at: `http://lanl.arxiv.org/abs/0906.1575`

Preprints from: `james.silvester@rmc.ca`

The different progenitors of type Ib, Ic SNe, and of GRB

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We discuss the properties of the progenitors of core collapse supernovae of type Ib and Ic and of long soft gamma ray bursts, as they can be deduced from rotating stellar models of single stars at various metallicities. The type of the supernova progenitor was determined from the surface abundances at the pre-supernova stage. The type of the supernova event was obtained from the masses of hydrogen and helium ejected at the time of the core-collapse supernova event. We find that the minimum amount of helium ejected by a core-collapse supernova (of whatever type) is around 0.3 $M_\odot$. There is no difference between the WC and WO stars in the ejected masses of helium, CNO elements, and heavy elements. Also no difference is expected between the chemical composition of a WC star resulting from a normal or a homogeneous evolution. The progenitors of type Ib supernovae are WNL, WNE, or less massive WC stars. Those of type Ic are WC and WO stars. WO stars are produced in a limited mass range (around 60 $M_\odot$) and only at low metallicity (for $Z \leq\sim 0.010$) as already found. The WO stars are the progenitors of only a small fraction of type Ic. Present stellar models indicate that, at solar metallicity, there is about 1 type Ib supernova for 1 type Ic, and this ratio rises to 3 type Ic for 1 type Ib SN at twice solar metallicity. At this metallicity, type Ic's are more frequent than type Ib's because most massive stars that go through a WNE stage evolve further into a WC/WO phase. Current models can account for the observed number ratios SN Ib/SN II and SN Ic/SN II and for their observed variation with the metallicity. In case no supernova occurs when a black hole is formed, single-star models can still account for more than half of the observed (SN Ib+SN Ic)/SN II ratio for $Z \geq Z_\odot$. For the gamma ray burst rate, our models produce too large a number for such an event, even if we restrict the progenitor to the WO stars. This confirms that only a fraction of the WC / WO stars evolve toward gamma ray burst event, most likely those arising from stars that were initially very rapid rotators.

Reference: arXiv:0906.2284v1

Comments: Accepted for publication in A&A.

On the web at: `http://arxiv.org/abs/0906.2284`

Preprints from: `Cyril.Georgy@unige.ch`

The stellar population of the star-forming region G61.48+0.09

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- Context: We present the results of a near-infrared photometric and spectroscopic study of the star forming region G61.48+0.09.
- Aims: The purpose of this study is to characterize the stellar content of the cluster and to determine its distance, extinction, age and mass.
- Methods: The stellar population was studied by using color-magnitude diagrams to select twenty promising cluster members, for which follow up spectroscopy was done. The observed spectra allowed a spectral classification of the stars.
- Results: Two stars have emission lines, twelve are G-type stars, and six are late-O or early-B stars.
- Conclusions: The cluster's extinction varies from $A_{K_S} = 0.9$ to $A_{K_S} = 2.6$, (or $A_V \sim 8$ to $A_V \sim 23$). G61.48+0.09 is a star forming region located at 2.5 ± 0.4 Kpc. The cluster is younger than 10 Myr and has a minimum stellar mass of 1500 ± 500 Solar masses. However, the actual total mass of the cluster remains undetermined, as we cannot see its whole stellar content.

Reference: http://arxiv.org/abs/0904.3202

Preprints from: amarin@iac.es

Optical spectroscopy of X-Mega targets in the Carina nebula - VII. On the multiplicity of Tr 16-112, HD 93343 and HD 93250

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3 - European Southern Observatory, Santiago, Chile

We present the results of a spectroscopic monitoring campaign devoted to three O-type stars in the Carina nebula. We derive the full SB2 orbital solution of the binary system Tr 16-112, an exceptional dissymmetrical system consisting of an O5.5-6V((f+?p)) primary and a B2V-III secondary. We also report on low-amplitude brightness variations in Tr 16-112 that are likely due to the ellipsoidal shape of the O5.5-6 primary revolving in an eccentric orbit around the system's centre of mass. We detect for the first time a clear SB2 binary signature in the spectrum of HD 93343 (O8 + O8), although our data are not sufficient to establish an orbital solution. This system also displays low amplitude photometric modulations. On the other hand, no indication of multiplicity is found in the optical spectra of HD 93250. Finally, we discuss the general properties of multiple massive stars in the Carina OB1 association.

Reference: MNRAS (in press)

On the web at: arXiv:0906.2681

Preprints from: rauw@astro.ulg.ac.be

Decoding of the light changes in eclipsing Wolf-Rayet binaries, I. A non-classical approach to the solution of light curves

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We present a technique to determine the orbital and physical parameters of eclipsing eccentric Wolf-Rayet + O-star binaries, where one eclipse is produced by the absorption of the O-star light by the stellar wind of the W-R star. Our method is based on the use of the empirical moments of the light curve that are integral transforms evaluated from the observed light curves. The optical depth along the line of sight and the limb darkening of the W-R star are modelled by simple mathematical functions, and we derive analytical expressions for the moments of the light curve as a function of the orbital parameters and the key parameters of the transparency and limb-darkening functions. These analytical expressions are then inverted in order to derive the values of the orbital inclination, the stellar radii, the fractional luminosities, and the parameters of the wind transparency and limb-darkening laws. The method is applied to the SMC W-R eclipsing binary HD 5980, a remarkable object that underwent an LBV-like event in August 1994. The analysis refers to the pre-outburst observational data. A synthetic light curve based on the elements derived for the system allows a quality assessment of the results obtained.

Reference: Astronomy & Astrophysics (in press)

On the web at: arXiv:0906.4629

Preprints from: rauw@astro.ulg.ac.be

Submitted Papers

The Zeeman Effect in the Sobolev Approximation II: Split Monopole Fields and the "Heartbeat" Stokes V Profile

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We calculate the circularly polarized Stokes V profile for emission lines, formed in hot-star winds threaded with a weak radial magnetic field. For simplicity, the field is treated as a split monopole under the assumptions that it has been radially combed by the wind, and rotation is not playing a

central role. Invoking the weak-field approximation, we find that the V profile has a characteristic "heartbeat' shape exhibiting multiple sign inversions, which might be mistaken for noise in the absence of theoretical guidance. We also conclude that there is a tendency for the V profile to integrate to zero on each side of the line separately.

Reference: Astrophysical Journal, submitted

On the web at: `http://xxx.lanl.gov/abs/0906.3048`

Preprints from: `ignace@etsu.edu`

Jobs

Professorship for Astrophysics

Prof. Dr. Friedrich Klein
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Germany

In the Faculty of Mathematics and Natural Sciences of the Bonn University, at the Argelander-Institut fuer Astronomie, a fixed term Professorship for Astrophysics (W2) will be filled as soon as possible.

The successful candidate has outstanding scientific achievements in one or more of the following fields: theoretical or observational stellar astrophysics, stellar/circumstellar hydrodynamics, nucleosynthesis and chemical evolution of the universe, or a related research field. A potential for collaborations with astrophysically oriented research groups present in Bonn, and with groups in the Department for Physics and Astronomy of Bonn University, especially with the stellar physics group at the Argelander-Institut, is desirable.

The professorship is offered for a period of five years. The successful candidate is expected to have experience in university teaching, and to contribute to the Astrophysics curriculum in Bonn.

In case of equal qualification, women will be considered preferentially, in accord with the law in North Rhine-Westphalia (NRW). Disabled candidates of equal qualifications will be appointed preferentially. The appointment requirements are according to clause 36 Hochschulgesetz (NRW).

Interested applicants should send by regular mail their curriculum vitae, a list of publications, a research statement, a statement on teaching philosophy, and carbon copies of their University Certificates (Bachelor, Master, PhD-Studies, professional life) addressed to Vorsitzender der Fachgruppe Physik/Astronomie, Endenicher Allee 11-13, 53115 Bonn, Germany. The closing date for the receipt of applications is June 30, 2009.

Attention/Comments: For inquiries contact Norbert Langer (nlanger@astro.uni-bonn.de)

Weblink: `http://www.astro.uni-bonn.de/english/index.php`
Email contact: `nlanger@astro.uni-bonn.de`

Closing date: June 30, 2009

PhD position in Astrophysics

Dr. Damien Hutsemékers
Institut d'Astrophysique
Université de Liège
Allée du six août 17, B5c,
B-4000 Liège,
Belgium

A PhD position is available at the Department of Astrophysics, Geophysics and Oceanology of the Liège University (Belgium), starting September 1, 2009. The project consists in the analysis of data that will be secured with the Herschel Space Observatory launched in May 2009. The scientific goal is a detailed study of nebulae ejected by very massive stars.

Attention/Comments: A curriculum vitae, a letter of motivation and the names of two references should be sent by e-mail

Email contact: `hutsemekers@astro.ulg.ac.be`

Closing date: June 30, 2009

Meetings

The multi-wavelength view of Hot, Massive Stars (39th Liege International Astrophysical Colloquium)

5-9 July 2010
Liège, Belgium

With the advent of new, high-performance, ground-based and space-borne facilities, the multi-wavelength investigation of massive stars has been boosted over the last decade. It is nowadays possible to study these objects in all wavelength regions from the radio to gamma-rays. The aim of this four and a half day meeting, which will be organized in the well-known series of the Liège astrophysical colloquia, is to bring astrophysicists from different backgrounds together to discuss how this multi-wavelength approach has revolutionized our view of massive stars and their surroundings in our Galaxy and beyond.

Weblink: `http://www.ago.ulg.ac.be/PeM/Coll/Liac39/`

Email contact: `liac2010@misc.ulg.ac.be`