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Contents of this newsletter

Book

Physics, Formation and Evolution of Rotating Stars

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Rotation is ubiquitous at each step of stellar evolution, from star formation to the final stages, and it affects the course of evolution, the timescales and nucleosynthesis. Stellar rotation is also an essential prerequisite for the occurrence of Gamma-Ray Bursts. In this book the author thoroughly examines the basic mechanical and thermal effects of rotation, their influence on mass loss by stellar winds, the effects of differential rotation and its associated instabilities, the relation with magnetic fields and the evolution of the internal and surface rotation. Further, he discusses the numerous observational signatures of rotational effects obtained from spectroscopy and interferometric observations, as well as from chemical abundance determinations, helioseismology and asteroseismology, etc. On an introductory level, this book presents in a didactical way the basic concepts of stellar structure and evolution in "track 1" chapters. The other more specialized chapters form an advanced course on the graduate level and will further serve as a valuable reference work for professional astrophysicists.... more on http://springer.com/978-3-540-76948-4

Reference: Astronomy and Astrophysics Library; ISBN 978-3-540-76948-4
On the web at:
http://www.springer.com/productFlyer_978-3-540-76948-4.pdf?SGWID=0-0-1297-173832313-0

Accepted Papers

NLTE models of line-driven stellar winds III. Influence of X-ray radiation on wind structure of O stars

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We study the influence of X-rays on the wind structure of selected O stars. For this purpose we use our non-local thermodynamic equilibrium (NLTE) wind code with inclusion of additional artificial source of X-rays, assumed to originate in the wind shocks.

We show that the influence of shock X-ray emission on wind mass-loss rate is relatively small. Wind terminal velocity may be slightly influenced by the presence of strong X-ray sources, especially for stars cooler than Teff $<$ 35 000 K.

We discuss the origin of the Lx/L $\sim 10^{-7}$ relation. For stars with thick wind this relation can be explained assuming that the cooling time depends on wind density. Stars with optically thin winds exhibiting the "weak wind problem" display enhanced X-ray emission which may be connected with large shock cooling length. We propose that this effect can explain the "weak wind problem".

Inclusion of X-rays leads to a better agreement of the model ionization structure with observations. However, we do not found any significant influence of X-rays on Pv ionization fraction implying that the presence of X-rays cannot explain the Pv problem.

We study the implications of modified ionization equilibrium due to shock emission on the line transfer in the X-ray region. We conclude that the X-ray line profiles of helium-like ions may be affected by the line absorption within the cool wind.

Reference: MNRAS

On the web at: `http://lanl.arxiv.org/abs/0901.0223`

Preprints from: `krticka@physics.muni.cz`

A first orbital solution for the very massive 30 Dor main-sequence WN6h+O binary R145

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We report the results of a spectroscopic and polarimetric study of the massive, hydrogen-rich WN6h stars R144 (HD 38282 = BAT99-118 = Brey 89) and R145 (HDE 269928 = BAT99-119 = Brey 90) in the LMC. Both stars have been suspected to be binaries by previous studies (R144: Schnurr et al. 2008b; R145: Moffat 1989). We have combined radial-velocity (RV) data from these two studies with previously unpublished polarimetric data. For R145, we were able to establish, for the first time, an orbital period of 158.8 days, along with the full set of orbital parameters, including the inclination

angle i, which was found to be i = (38 +/- 9) deg. By applying a modified version of the shift-and-add method developed by Demers et al. (2002), we were able to isolate the spectral signature of the very faint-line companion star. With the RV amplitudes of both components in R145, we were thus able to estimate their absolute masses. We find minimum masses $M_W R \sin^3(i) = (116 + / - 33)\,\mathrm{M}_\odot$ and $M_O \sin^3(i) = (48 + / - 20)\,\mathrm{M}_\odot$ for the WR and the O component, respectively. Thus, if the low inclination angle were correct, resulting absolute masses of the components would be at least 300 and 125 $\mathrm{M}_\odot$, respectively. However, such high masses are not supported by brightness considerations when R145 is compared to systems with known, very high masses such as NGC3603-A1 or WR20a. An inclination angle close to 90 degrees would remedy the situation, but is excluded by the currently available data. More and better data are thus required to firmly establish the nature of this puzzling, yet potentially very massive and important system. As to R144, however, the combined data sets are not sufficient to find any periodicity.

Reference: MNRAS
Comments: 15 pages

On the web at: `http://arxiv.org/abs/0901.0698`

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

3D modelling of the colliding winds in Eta Carinae - evidence for radiative inhibition

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The X-ray emission from the super-massive star Eta Carinae is simulated using a three dimensional model of the wind-wind collision. In the model the intrinsic X-ray emission is spatially extended and energy dependent. Absorption due to the unshocked stellar winds and the cooled postshock material from the primary LBV star is calculated as the intrinsic emission is ray-traced along multiple sightlines through the 3D spiral structure of the circumstellar environment. The observable emission is then compared to available X-ray data, including the lightcurve observed by the Rossi X-ray Timing Explorer (RXTE) and spectra observed by XMM-Newton. The orientation and eccentricity of the orbit are explored, as are the wind parameters of the stars and the nature and physics of their close approach. Our modelling supports a viewing angle with an inclination of $\sim$ 42 degrees, consistent with the polar axis of the Homunculus nebula (Smith 2006), and the projection of the observer's line-of-sight onto the orbital plane has an angle of $\sim$ 0 - 30 degrees in the prograde direction on the apastron side of the semi-major axis.

However, there are significant discrepancies between the observed and model lightcurves and spectra through the X-ray minimum. In particular, the hard flux in our synthetic spectra is an order of magnitude greater than observed. This suggests that the hard X-ray emission near the apex of the wind-wind collision region (WCR) 'switches off' from periastron until 2 months afterwards. Further calculations reveal that radiative inhibition significantly reduces the preshock velocity of the companion wind. As a consequence the hard X-ray emission is quenched, but it is unclear whether the long duration of the minimum is due solely to this mechanism alone. For instance, it is possible that the

collapse of the WCR onto the surface of the companion star, which would be aided by significant inhibition of the companion wind, could cause an extended minimum as the companion wind struggles to re-establish itself as the stars recede. For orbital eccentricities, e $<\sim$0.95, radiative braking prevents a wind collision with the companion star's surface. Models incorporating a collapse/disruption of the WCR and/or reduced preshock companion wind velocities bring the predicted emission and the observations into much better agreement.

Reference: MNRAS
Comments: 20 pages, 24 figures

On the web at: `http://arxiv.org/abs/0901.0862`

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

Cyclic Variability of the Circumstellar Disc of the Be Star ζ Tau. II. Testing the 2D Global Disc Oscillation Model

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About 2/3 of the Be stars present the so called V/R variations, a phenomenon characterized by the quasi-cyclic variation of the ratio between the violet and red emission peaks of the $H\,I$ emission lines. These variations are generally explained by global oscillations in the circumstellar disc forming a one-armed spiral density pattern that precesses around the star with a period of a few years. In this paper we model, in a self-consistent way, polarimetric, photometric, spectrophotometric and interferometric observations of the classical Be star ζ Tauri. Our primary goal is to conduct a critical quantitative test of the global oscillation scenario. We have carried out detailed three-dimensional, NLTE radiative transfer calculations using the radiative transfer code HDUST. For the input for the code we have used the most up-to-date research on Be stars to include a physically realistic description for the central star and the circumstellar disc. We adopt a rotationally deformed, gravity darkened central star, surrounded by a disc whose unperturbed state is given by a steady-state viscous decretion disc model. We further assume that disc is in vertical hydrostatic equilibrium. By adopting a viscous decretion disc model for ζ Tauri and a rigorous solution of the radiative transfer, we have obtained a very good fit of the time-average properties of the disc. This provides strong theoretical evidence that the viscous decretion disc model is the mechanism responsible for disc formation. With the global oscillation model we have successfully fitted spatially resolved VLTI/AMBER observations and the temporal V/R variations of the Hα and Brγ lines. This result convincingly demonstrates that the oscillation pattern in the disc is a one-armed spiral. Possible model shortcomings, as well as suggestions for future improvements, are also discussed

Reference: A&A, in press

On the web at: `http://arxiv.org/abs/0901.1098`

Preprints from: `carciofi@usp.br`

A multiwavelength investigation of the massive eclipsing binary Cyg OB2 #5

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The properties of the early-type binary Cyg OB2 #5 have been debated for many years and spectroscopic and photometric investigations yielded conflicting results. We have attempted to constrain the physical properties of the binary by collecting new optical and X-ray observations. The optical light curves obtained with narrow-band continuum and line-bearing filters are analysed and compared. Optical spectra are used to map the location of the He II 4686 and H-α line-emission regions in velocity space. New XMM-Newton as well as archive X-ray spectra are analysed to search for variability and constrain the properties of the hot plasma in this system. We find that the orbital period of the system slowly changes though we are unable to discriminate between several possible explanations of this trend. The best fit solution of the continuum light curve reveals a contact configuration with the secondary star being significantly brighter and hotter on its leading side facing the primary. The mean temperature of the secondary star turns out to be only slightly lower than that of the primary, whilst the bolometric luminosity ratio is found to be 3.1. The solution of the light curve yields a distance of 925 +/- 25 pc much lower than the usually assumed distance of the Cyg OB2 association. Whilst we confirm the existence of episodes of higher X-ray fluxes, the data reveal no phase-locked modulation with the 6.6 day period of the eclipsing binary nor any clear relation between the X-ray flux and the 6.7 yr radio cycle. The bright region of the secondary star is probably heated by energy transfer in a common envelope in this contact binary system as well as by the collision with the primary's wind. The existence of a common photosphere probably also explains the odd mass-luminosity relation of the stars in this system. Most of the X-ray, non-thermal radio, and possibly γ-ray emission of Cyg OB2 #5 is likely to arise from the interaction of the combined wind of the eclipsing binary with at least one additional star of this multiple system.

Reference: Astronomy & Astrophysics

On the web at: `http://arxiv.org/abs/0812.3749`

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

Magnetically-Fed Hot Star 'Keplerian' Disks with Slow Outflow

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The puzzle of the origin of Be star disks is discussed. Contrary to recently published claims, it is argued that the magnetically torqued disk (MTD) type models of Cassinelli et al (2002) offer a viable scenario for a successful model with all the key ingredients. MTD models involve disk compression by equatorial collision of stellar wind streams that are steered and torqued by a dipole-like magnetic field. While the growing disk density tends to lead to the gas breaking out centrifugally from the field, it is proposed that the onset of viscous effects can lead to an eventual stable, slowly outflowing, Keplerian disk. It is then shown that the resulting very dense (wind compressed) disk need have only a very slow subsonic outflow to satisfy mass continuity. Consequently, line profile data do not preclude steadily expanding disks of high density. It is also shown that the time taken to reach the steady state would typically be of the order of 10^4 wind flow times R/v_∞. This is far longer than the run times of recent numerical MHD simulations that displayed bursty breakout behavior, which may therefore only be transients induced by unrealistic initial conditions.

Reference: Published in Ap.J., v 688, p 1320

On the web at:

Preprints from: `m.maheswaran@uwc.edu`

Spitzer View of Young Massive Stars in the LMC HII Complex N44

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The HII complex N44 in the Large Magellanic Cloud (LMC) provides an excellent site to perform a detailed study of star formation in a mild starburst, as it hosts three regions of star formation at different evolutionary stages and it is not as complicated and confusing as the 30 Doradus giant HII region. We have obtained Spitzer Space Telescope observations and complementary ground-based 4m uBVIJK observations of N44 to identify candidate massive young stellar objects (YSOs). We further classify the YSOs into Types I, II, and III, according to their spectral energy distributions (SEDs). In our sample of 60 YSO candidates, $\sim$65% of them are resolved into multiple components or extended sources in high-resolution ground-based images. We have modeled the SEDs of 36 YSOs that appear single or dominant within a group. We find good fits for Types I and I/II YSOs, but Types II and II/III YSOs show deviations between their observed SEDs and models that do not include PAH emission. We have also found that some Type III YSOs have central holes in their disk components. YSO counterparts are found in four ultracompact HII regions and their stellar masses determined from SED model fits agree well with those estimated from the ionization requirements of the HII regions. The distribution of YSOs is compared with those of the underlying stellar population and interstellar gas conditions to illustrate a correlation between the current formation of O-type stars and previous formation of massive stars. Evidence of triggered star formation is also presented.

Reference: Accepted by ApJ

Comments: preprint from rchen@virginia.edu

On the web at: `http://arXiv.org/abs/0901.1328`

Preprints from: `rchen@virginia.edu`

Highly Accelerated Diamagnetic Plasmoids: A New X-ray Production Mechanism for OB Stellar Winds

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The observed X-ray source temperature distributions in OB stellar winds, as determined from high energy resolution Chandra observations, show that the highest temperatures occur near the star, and then steadily decrease outward through the wind. To explain this unexpected behavior, we propose a shock model concept that utilizes a well-known magnetic propulsion mechanism; the surface ejection of "diamagnetic plasmoids" into a diverging external magnetic field. This produces rapidly accelerating self-contained structures that plow through an ambient wind and form bow shocks that generate a range in X-ray temperatures determined by the plasmoid-wind relative velocities. The model free parameters are the plasmoid initial Alfven speed, the initial plasma-beta of the external medium, and the divergence rate of the external field. These are determined by fitting the predicted bow shock temperatures with the observed OB supergiant X-ray temperature distribution. We find that the initial external plasma-beta has a range between 0 and 2, and the assumed radially-decreasing external magnetic field strength that scales as r^{-S} has a value of S lying between 2 and 3. Most importantly, the initial plasmoid Alfven speed is found to be well-constrained at a value of 0.6 times the terminal velocity, which appears to represent an upper limit for all normal OB stars. This intriguing new limit on OB magnetic properties, as derived from Chandra observations, emphasizes the need for further studies of magnetic propulsion mechanisms in these stars.

Reference: To appear in ApJ Letters

On the web at: `http://arxiv.org/abs/0901.1405`

Preprints from: `wwaldron@satx.rr.com`

Multifrequency study of the ring nebula SG 13

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We investigate the morphology and kinematics of the interstellar medium in the environs of the open cluster Mrk 50, which includes the Wolf-Rayet star WR 157 and a number of early B-type stars. The analysis was performed using radio continuum images at 408 and 1420 MHz, and HI 21cm line data taken from the Canadian Galactic Plane Survey, molecular observations of the CO(1-0) line at 115 GHz from the Five College Radio Astronomy Observatory and available mid and far IR observations obtained with the MSX and IRAS satellites, respectively.

This study allowed identification of the radio continuum and molecular counterpart of the ring nebula SG 13, while no neutral atomic structure was found to be associated. The nebula is also detected in images in the mid and far infrared, showing the existence of dust well mixed with the ionized gas. We estimate the main physical parameters of the material linked to the nebula.

The interstellar gas distribution in the environs of Mrk 50 is compatible with a stellar wind bubble created by the mass loss from WR 157.

The distribution of young stellar object (YSO) candidates in the region shows that stellar formation activity may be present in the molecular shell that encircles the ring nebula.

Reference: MNRAS

On the web at: arXiv.org:0811.3349

Preprints from: ccappa@fcaglp.unlp.edu.ar

An Exact Integration Scheme for Radiative Cooling in Hydrodynamical Simulations

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A new scheme for incorporating radiative cooling in hydrodynamical codes is presented, centered around exact integration of the governing semi-discrete cooling equation. Using benchmark calculations based on the cooling downstream of a radiative shock, I demonstrate that the new scheme outperforms traditional explicit and implicit approaches in terms of accuracy, while remaining competitive in terms of execution speed.

Reference: ApJS, in press

On the web at: http://www.astro.wisc.edu/∼townsend/publications.php#journal-cooling

Preprints from: townsend@astro.wisc.edu

Discovery of X-ray Emission from the Wolf-Rayet star WR142 of oxygen subtype

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We report the discovery of weak yet hard X-ray emission from the Wolf-Rayet (WR) star WR142 with the XMM-Newton X-ray telescope. Being of spectral subtype WO2, WR142 is a massive star in a very advanced evolutionary stage, short before its explosion as a supernova or γ-ray burst. This is the first detection of X-ray emission from a WO-type star. We rule out any serendipitous X-ray sources within approx 1" of WR142. WR142 has an X-ray luminosity of $L_X = 7 \times 10^{30}$ erg/s, which constitutes only $\lesssim 10^{-8}$ of its bolometric luminosity. The hard X-ray spectrum suggests a plasma temperature of about 100 MK. Commonly, X-ray emission from stellar winds is attributed to embedded shocks due to the intrinsic instability of the radiation driving. From qualitative considerations we conclude that this mechanism cannot account for the hardness of the observed radiation. There are no hints for a binary companion. Therefore the only remaining, albeit speculative explanation must refer to magnetic activity. Possibly related, WR142 seems to rotate extremely fast, as indicated by the unusually round profiles of its optical emission lines. Our detection implies that the wind of WR142

must be relatively transparent to X-rays, which can be due to strong wind ionization, wind clumping, or non-spherical geometry from rapid rotation.

Reference: ApJL in press

On the web at: arXiv:0901.4553

Preprints from: lida@astro.physik.uni-potsdam.de

Modeling Forbidden Line Emission Profiles from Colliding Wind Binaries

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This paper presents calculations for forbidden emission line profile shapes arising from colliding wind binaries. The main application is for systems involving a Wolf-Rayet (WR) star and an OB star companion. The WR wind is assumed to dominate the forbidden line emission. The colliding wind interaction is treated as an archimedean spiral with an inner boundary. Under the assumptions of the model, the major findings are as follows. (a) The redistribution of the WR wind as a result of the wind collision is not flux conservative but typically produces an excess of line emission; however, this excess is modest at around the 10% level. (b) Deviations from a flat-top profile shape for a spherical wind are greatest for viewing inclinations that are more nearly face-on to the orbital plane. At intermediate viewing inclinations, profiles display only mild deviations from a flat-top shape. (c) The profile shape can be used to constrain the colliding wind bow shock opening angle. (d) Structure in the line profile tends to be suppressed in binaries of shorter periods. (e) Obtaining data for multiple forbidden lines is important since different lines probe different characteristic radial scales. Our models are discussed in relation to em Infrared Space Observatory data for WR 147 and γ Vel (WR 11). The lines for WR 147 are probably not accurate enough to draw firm conclusions. For γ Vel, individual line morphologies are broadly reproducible but not simultaneously so for the claimed wind and orbital parameters. Overall, the effort demonstrates how lines that are sensitive to the large-scale wind can help to deduce binary system properties and provide new tests of numerical simulations.

Reference: to appear in MNRAS

On the web at: http://arxiv.org/abs/0902.0527

Preprints from: ignace@etsu.edu

Rotational mixing in massive binaries: detached short-period systems

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Models of rotating single stars can successfully account for a wide variety of observed stellar phenomena, such as the surface enhancements of N and He. However, recent observations have questioned the

idea that rotational mixing is the main process responsible for the surface enhancements, emphasizing the need for a strong and conclusive test. We investigate the consequences of rotational mixing for massive main-sequence stars in short-period binaries. In these systems the tides spin up the stars to rapid rotation. We use a state-of-the-art stellar evolution code including the effect of rotational mixing, tides, and magnetic fields. We discuss the surface abundances expected in massive close binaries (M1 ∼20 solar masses) and we propose using such systems to test the concept of rotational mixing. As these short-period binaries often show eclipses, their parameters can be determined with high accuracy, allowing for a direct comparison with binary evolution models. In more massive close systems (M1 ∼ 50 solar masses, P_{orb} <∼2 days) we find that helium is efficiently mixed throughout the envelope. The star remains blue and compact during the main-sequence phase. It stays within its Roche lobe while it gradually becomes a helium star. It is the less massive star, in which the effects of rotational mixing are less pronounced, which fills its Roche lobe first. We propose that this evolution path provides an alternative channel for the formation of tight Wolf-Rayet binaries with a main-sequence companion and might explain massive black hole binaries such as the intriguing system M33 X-7.

Reference: Astronomy & Astrophysics

On the web at: `http://xxx.lanl.gov/abs/0902.1751`

Preprints from: `S.E.deMink@uu.nl`

Analysis of Galactic late-type O dwarfs: more constraints on the weak wind problem.

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We have investigated the stellar and wind properties of a sample of five late-type O dwarfs in order to address the weak wind problem. A grid of TLUSTY models was used to obtain the stellar parameters, and the wind parameters were determined by using the CMFGEN code. We found that the spectra have mainly a photospheric origin. A weak wind signature is seen in CIV 1549, from where mass-loss rates consistent with previous CMFGEN results regarding O8-9V stars were obtained. A discrepancy of roughly 2 orders of magnitude is found between these mass-loss rates and the values predicted by theory ($M_\odot$ yr^{-1}(Vink)), confirming a breakdown or a steepening of the modified wind momentum-luminosity relation at log $L/L_\odot$< 5.2. We have estimated the carbon abundance for the stars of our sample and concluded that its uncertainty cannot cause the weak wind problem. Upper limits on $M_\odot$ yr^{-1}were established for all objects using lines of different ions, namely, PV 1118,28, CIII 1176, NV 1239,43, Si IV 1394,03, and NIV 1718. All the values obtained are also in disagreement with theoretical predictions, bringing support to the reality of weak winds. Together with CIV 1549, the use of NV 1239,43 results in the lowest mass-loss rates: the upper limits indicate that $M_\odot$ yr^{-1}must be less than about -1.0 dex $M_\odot$ yr^{-1}(Vink). Regarding the other transitions, the upper limits still point to low rates: $M_\odot$ yr^{-1} must be less than about (-0.5 ± 0.2) dex $M_\odot$ yr^{-1}(Vink). We have studied the behavior of the Hα line with different mass-loss rates. We have also explored ways to fit the observed spectra with $M_\odot$ yr^{-1}(Vink). By using large amounts of X-rays, we verified that few wind emissions take place, as in weak winds. However, unrealistic X-rays luminosities had to be used (log L_x/L_{Bol}> -3.5) (abridged).

Reference: Astronomy & Astrophysics

On the web at: `http://xxx.lanl.gov/abs/0902.1833`

Preprints from: `wagner.marcolino@oamp.fr`

Chemical abundance patterns in the inner Galaxy: the Scutum Red Supergiant Clusters

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The location of the Scutum Red-Supergiant (RSG) clusters at the end of the Galactic Bar makes them an excellent probe of the Galaxy's secular evolution; while the clusters themselves are ideal testbeds in which to study the predictions of stellar evolutionary theory. To this end, we present a study of the RSGs' surface abundances using a combination of high-resolution Keck/NIRSPEC H-band spectroscopy and spectral synthesis analysis. We provide abundance measurements for elements C, O, Si, Mg, Ti, and Fe. We find that the surface abundances of the stars studied are consistent with CNO burning and deep, rotationally enhanced mixing. The average α/Fe ratios of the clusters are solar, consistent with a thin-disk population. However, we find significantly sub-solar Fe/H ratios for each cluster, a result which strongly contradicts a simple extrapolation of the Galactic metallicity gradient to lower Galacto-centric distances. We suggest that a simple one-dimensional parameterization of the Galaxy's abundance patterns is insufficient at low Galactocentric distances, as large azimuthal variations may be present. Indeed, we show that the abundances of O, Si and Mg are consistent with independent measurements of objects in similar locations in the Galaxy. In combining our results with other data in the literature, we present evidence for large-scale ($\sim$kpc) azimuthal variations in abundances at Galacto-centric distances of 3-5,kpc. While we cannot rule-out that this observed behaviour is due to systematic offsets between different measurement techniques, we do find evidence for similar behaviour in a study of the barred-spiral galaxy NGC 4736 which uses homogeneous methodology. We suggest that these azimuthal abundance variations could result from the intense but patchy star formation driven by the potential of the central bar.

Reference: To appear in ApJ

On the web at: `http://xxx.lanl.gov/abs/0902.2378`

Preprints from: `b.davies@leeds.ac.uk`

Submitted Papers

The 2008 Luminous Optical Transient in the Nearby Galaxy NGC 300

Howard E. Bond, Luigi R. Bedin, Alceste Z. Bonanos, Roberta M. Humphreys, Berto Monard, Jose L. Prieto and Fred Walter

Space Telescope Science Institute, University of Minnesota, Bronberg Observatory, Ohio State university and Stony Brook University

A luminous optical transient (OT) that appeared in NGC 300 in early 2008 had a maximum brightness, $M_V \simeq -13$, intermediate between classical novae and supernovae. We present ground-based photometry, spectroscopy, and adaptive-optics imaging of the OT, as well as pre-and post-outburst space-based imaging with HST/ and it Spitzer. The optical spectrum at maximum showed an F-type supergiant photosphere with superposed emission lines of hydrogen, ionCa2, and [ionCa2], similar to the spectra of low-luminosity Type IIn "supernova impostors" like SN 2008S, as well as hypergiants like IRC +10420. The emission lines have a complex, double structure, indicating a bipolar outflow with velocities of $\sim$75 kms. The energy released in the outburst was $\sim 2 \times 10^{47}$ ergs, most of it emitted in the first 2 months. By registering new HST/ images with deep archival frames, we have precisely located the OT site, and find no detectable optical progenitor brighter than broad-band V magnitude 28.5. However, archival it Spitzer/ images reveal a bright mid-IR pre-outburst source. We conclude that the NGC 300 OT was a heavily optically dust-enshrouded luminous star, of roughly $10\,M_\odot$, which experienced an outburst that cleared the surrounding dust and initiated a bipolar wind. The progenitor was likely an OH/IR source which had begun to evolve on a blue loop toward higher temperatures, but the precise cause of the outburst remains uncertain.

Reference: Astrophysical Journal Letters

On the web at:

Preprints from: `roberta@umn.edu`

Eta Car 2009.0 event - on schedule

A. Damineli et al.

IAGUSP - Brazil

Spectroscopic observations collected at SOAR telescope (Chile) by A Damineli, J. Steiner, J. H. Groh and L. Fraga indicate that eta Carinae reached the phase of minimum excitation on 2009 January 11, on schedule with the predictions (Damineli et al. MNRAS 384, 1649, 2008). The doubly ionized forbidden lines and the narrow components of HeI and [NII] lines disappeared from the spectrum and P Cygni absorption in permitted transitions (HeI, HI and FeII) started to enhance. The HeII 468.6nm line, which have been increasing rapidly through December, now collapsed abruptly to the same level as it was a month before. The radial velocity reached -320 km/s and seems to be still shifting to the blue.

Such results are corroborated by observations taken at OPD/LNA (Brazil) by M. Teodoro, at Casleo (Argentina) by E. F. Lajuz, F. Gonzalez and R. Gamen, at the 2.2m-Telescope (ESO/Chile) by M. Borges, C. B. Pereira, C. A. P. C.O. Torres and M. I. Zevallos Herencia and at Las Campanas Observatory (Chile) by Nidia Morrell.

Reference: www.etacarinae.iag.usp.br

On the web at: `www.etacarinae.iag.usp.br`

Preprints from: `damineli@astro.iag.usp.br`

Meetings

Recent Directions in Astrophysical Quantitative Spectroscopy and Radiation Hydrodynamics– Dimitri-Fest!

March30 - April 3, 2009
High Altitude Observatory/NCAR, Boulder, CO, USA

A meeting to honor Dimitri Mihalas for his lifetime contributions to the fields of astrophysical quantitative spectroscopy and radiation hydrodynamics on the occasion of his 70th birthday. Topics will cover recent developments and future prospects in general radiative transfer theory, modeling stellar atmospheres, theory and modeling of stellar winds, and basic theory and applications of the astrophysical radiation hydrodynamics.

SOC: L.H. Auer (USA), J.I. Castor (USA), I. Hubeny (USA; Co-Chair), R.I. Klein (USA), M.L. Norman (USA), R.P. Kudritzki (USA), J.M. Stone (USA; Co-Chair), K. Werner (Germany)

LOC: K. MacGregor (chair), T. Ayres, M. Dikpati, T. Metcalfe, A. Trujillo

Topics:
1. Radiation Transport and Stellar Atmospheres (Day 1)
2. Stellar Winds (Day 2)
3. Radiation Hydrodynamics Basics (Day 3)
4. Radiation Hydrodynamics Applications (Day 4)
5. Future Prospects (Day 5)

Preliminary list of invited speakers:

E. Audit, L.H. Auer (t.b.c.), J.I. Castor (t.b.c.), K. Gayley, D.J. Hillier, P. Hoeflich, I. Hubeny, R.I. Klein (t.b.c), W. Kley, J.H. Krolik, A. Nordlund, M.L. Norman, D. Proga, S.P. Owocki (t.b.c), A. Pradhan, J. Puls (t.b.c.), J.M. Stone, K. Werner

(t.b.c. = to be confirmed)

Weblink: `www.hao.ucar.edu/events/dimitri-fest/`
Email contact: `kmac@hao.ucar.edu`

Joint Discussion 13: Eta Carinae in the Context of the Most Massive Stars (and followup workshop)

13, 14 August with followup 15, 16 August
IAU General Assembly in Rio de Janeiro with followup workshop

Motivation: Eta Car, with its historical outbursts and visible ejecta, continues to challenge both observers and modelers. Just in the past five years over 100 papers have been published. We now know it to be a massive binary system with a 5.54-year period. In January 2009, Eta Car entered periastron and is being followed by an intensive multi-wavelength campaign ranging from X-rays to radio. A large amount of data will be collected and used to test a number of working models, including 3-D models of the massive interacting winds.

Within a few days of Eta Carinae's event, WR140 also passed through periastron. Comparison of its properties, and that of HD5980 and other massive binaries - and isolated massive stars - with that of Eta Car will be very informative, providing many clues as to the fate of the most massive stars. What are the effects of binarity, of the interacting winds, of individual stellar rotation, and of the circumstellar material on what we see? Does this provide insight on hypernovae, supernovae and γ ray bursters?

Contributed talks and posters are strongly encouraged by the organizing committee. Abstracts shall be submitted through the IAU General Assembly website: http://www.astronomy2009.com.br/abstract.html The JD is allocated up to thirty pages in the proceedings of the IAU. Short summaries of invited and abstracts of contributed talks and posters will be included with space allocated in advance proportionate to the number of participants. Because of the very short time allocated to publication, published contributions will be due at the end of the joint discussion with no extensions.

Topics
-Eta Carinae: the 2009.0 event: Monitoring campaigns in X-rays, optical, radio, interferometry
-WR140 and HD5980: similarities and differences to Eta Carinae
-LBVs and Eta Carinae: What is the relationship?
-Massive binary systems, wind interactions and 3-D modeling
-Shapes of the Homunculus and Little Homunculus: what do we learn about mass ejection?
-Massive stars: the connection to supernovae, hypernovae and γ ray bursters
-Where do we go from here? (future directions)

Follow up meeting at Observatoria Nacional August 15-16: The 1.5 days allocated for the Joint Discussion will not cover all topics. More focused sessions addressing specific topics of interest to JD13 participants will continue on these systems after closing of the IAU General Assembly. A one to two day workshop will immediately follow the IAU General Assembly devoted to specific topics defined organized by request from attendees of the Joint Discussion. Orbital parameters, wind-wind collision physics and spectroscopic needs are three planned topics for this workshop. We encourage suggestions of additional topics well in advance of the IAU General Assembly. These might include discussion of molecular and dust formation in massive binary systems and future observational opportunities.

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Email contact: `Ted.Gull@nasa.gov`

Binaries – Key to Comprehension of the Universe

8 to 12 June 2009
Masaryk University, Brno, Czech Republic

On the occasion of the 90th anniversary of Masaryk University foundation and International Year of Astronomy a conference will be held from 8 to 12 June, 2009 in the estates of Masaryk University in the Moravian city Brno, Czech Republic.

PROGRAM TOPICS
– Binary Star Formation and Evolution
– Chemically Peculiar Binaries, Active Binaries, Colliding Winds
– Binaries with Intrinsically Variable Components
– Low-Mass Components (Brown Dwarfs, Giant Planets)
– X-Ray Binaries, Compact Objects in Binaries
– Binaries in Clusters, Extragalactic Binaries
– Astrometric Binaries, Resolved Binaries
– Modern Data Acquisition Methods (Surveys, RVs, Instrumentation)
– Calibrations, Distances, Astrophysical EB Laboratories
– Modeling Techniques and New Approaches to Solving the Inverse Problem

INVITED SPEAKERS:
– Bisikalo:CV hydrodynamics
– Bonanos:Extragalactic/high-mass binaries
– Burgasser:Low-mass binaries/brown dwarfs
– Eggleton:Binary/multiple star formation and evolution
– Guinan:Review of novel EB approaches/results
– Hubrig:CP binaries
– Mkrtichian:Intrinsically variable components
– Pavlovski/Hensberge:Spectroscopic analysis II (critical analysis, classification, applications)
– Piirola:Polarimetric analysis
– Rauw/Pols:Evolution and colliding winds in massive binaries
– Rucinski:Spectroscopic analysis I (DDO, broadening)
– Tokovinin:Instrumentation and missions in the 21st Century
– van den Berg/Cherepashchuk:X-ray binaries
– Wilson/Van Hamme:Modeling in the 21st Century
– Vanbeveren:The influence of binaries on galactic chemical evolution

Weblink: `http://astro.physics.muni.cz/binkey/`

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