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THE MASSIVE STAR NEWSLETTER

formerly known as the hot star newsletter

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News

Candidates and nominations for Organization Committee of IAU Working Group on Massive Stars

Dear members of the Working Group on Massive Stars,

time is running fast, and three years since the last election for our Organization Committee (OC) have past. According to our by-laws, 5 members have to leave (though they can be re-elected if nominated), namely

Paul Crowther
Claus Leitherer
Stan Owocki
Nicole St. Louis
and myself (Jo Puls, Chair)

Remaining OC members for the next three years are

Margaret Hanson
Artemio Herrero
Norbert Langer
Gegor Rauw
Rich Townsend

We are looking now for candidates!!!!

If you are interested in promoting our science, please step forward. Also, if you know suited candidates (and have insured yourself that they would agree to 'serve'), please nominate them.

Please note that OC members *must* be IAU members!!!

For candidates and nominations, please contact me via email:

uh101aw AT usm.uni-muenchen.de

latest until Nov. 7th.

The election will take place during mid November, and the new OC will begin its work with the new year. First action will be voting for a new chair.

Hope to receive lots of responses,

with best regards,

Jo Puls (Chair of OC MSWG)

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PAPERS

Abstracts of 16 accepted papers

A Detailed Far-Ultraviolet Spectral Atlas of O-Type Stars

Myron A. Smith

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In this paper we present a spectral atlas covering the wavelength interval 930--1188A for O2--O9.5 stars using Far Ultraviolet Spectroscopic Explorer archival data. The stars selected for the atlas were drawn from three populations: Galactic main sequence (class III-V) stars, supergiants, and main sequence stars in the Magellanic Clouds, which have low metallicities. For each of these stars we have prepared FITS files comprised of paris of merged spectra for user access via the Multi-Mission Archives at Space Telescope. We chose spectra from the first population with spectral types O4, O5, O6, O7, O8, and O9.5 and used them to compile tables and figures with identifications of all possible atmospheric and ISM lines in the region 949-1188A. Our identified line totals for these six representative spectra are 821 (500), 992 (663), 1077 (749), 1178 (847), 1359 (1001), and 1798 (1392) lines, respectively, where the numbers in parentheses are the totals of lines formed in the atmospheres, according to spectral synthesis models. The total number of unique atmospheric identifications for the six main sequence O star template spectra is 1792, whereas the number of atmospheric lines in common to these spectra is 300. The number of identified lines decreases toward earlier types (increasing effective temperature), the whlle percentages of "missed" features (lines not predicted from our spectral syntheses) drops from a high of 8% at type B0.2, from our recently published B star far-UV atlas, to 1--3% for type O spectra. The percentages of overpredicted lines are similar, despite their being much higher for B star spectra. We also discuss the

statistics of line populations among the various elemental ionization states. Finally, as an aid to users we list those isolated lines that can be used to determine stellar temperatures and the presence of possible chemical anomalies.

Reference: Astrophysical Journal Supplements (October, 2012)
Status: Manuscript has been accepted

Weblink:

Comments: The full set of plots and line identification tables will be available very shortly in the MAST archives at http://archive.stsci.edu/prepds/fuvostars/ .

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The Wolf-Rayet Content of M31

Kathryn F. Neugent (1), Philip Massey (1), and Cyril Georgy (2)

(1) Lowell Observatory, (2) Centre de Recherche Astrophysique de Lyon, E´cole Normale Sup´erieure de Lyon

Wolf-Rayet stars are evolved massive stars, and the relative number of WC-type and WN-type WRs should vary with the metallicity of the host galaxy, providing a sensitive test of stellar evolutionary theory. However, past studies of the WR content of M31 have been biased towards detecting WC stars, as their emission line signatures are much stronger than those of WNs. Here we present the results of a survey covering all of M31's optical disk (2.2 deg^2), with sufficient sensitivity to detect the weaker-lined WN-types. We identify 107 newly found WR stars, mostly of WN-type. This brings the total number of spectroscopically confirmed WRs in M31 to 154, a number we argue is complete to about 95%, except in regions of unusually high reddening. This number is consistent with what we expect from the integrated Halpha luminosity compared to that of M33. The majority of these WRs formed in OB associations around the Population I ring, although 5% are truly isolated. Both the relative number of WC to WN-type stars as well as the WC subtype distribution suggest that most WRs exist in environments with higher-than-solar metallicities, which is consistent with studies of M31's metallicity. Although the WC-to-WN ratio we find for M31 is much lower than that found by previous studies, it is still higher than what the Geneva evolutionary models predict. This may suggest that Roche-lobe overflow produces the excess of WC stars observed at high metallicity, or that the assumed rotational velocities in the models are too high.

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

Weblink: http://arxiv.org/abs/1209.1177

Comments:

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The nature of the high Galactic latitude O-star HD93521: new results from X-ray and optical spectroscopy

G. Rauw, T. Morel, M. Palate

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Owing to its unusual location and its isolation, the nature of the high Galactic latitude O9.5Vp object HD93521 is still uncertain. We have collected X-ray and optical observations to characterize the star and its surroundings. X-ray images and spectra are analyzed to search for traces of a recent star formation event around HD93521 and to search for the signature of a possible compact companion. Optical echelle spectra are analysed with plane-parallel model atmosphere codes, assuming either a spherical star or a gravity darkened rotationally flattened star, to infer the effective temperature and surface gravity, and to derive the He, C, N and O abundances of HD93521. The X-ray images reveal no traces of a population of young low-mass stars coeval with HD93521. The X-ray spectrum of HD93521 is consistent with a normal late O-type star although with subsolar metallicity. No trace of a compact companion is found in the X-ray data. In the optical spectrum, He and N are found to be overabundant, in line with the effect of rotational mixing in this very fast rotator, whilst C and O are subsolar. A critical comparison with the properties of subdwarf OB stars, indicates that, despite some apparent similarities, HD93521 does not belong to this category. Despite some ambiguities on the runaway status of the star, the most likely explanation is that HD93521 is a Population I massive O-type star that was ejected from the Galactic plane either through dynamical interactions or a result of a supernova event in a binary system.

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

Weblink: http://adsabs.harvard.edu/abs/2012arXiv1209.2606R

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Discovery of New, Dust-Poor B[e] Supergiants in the Small Magellanic Cloud

A. S. Graus, J. B. Lamb, M. S. Oey

U. Michigan, UC Irvine

We present the discovery of three new B[e] supergiants (sgB[e] stars) in the Small Magellanic Cloud (SMC). All three stars (R15, R38, and R48) were identified in the course of our Runaways and Isolated O Type Star Spectroscopic Survey of the SMC (RIOTS4). The stars show optical spectra that closely resemble those of previously known B[e] stars, presenting numerous low-ionization forbidden and permitted emission lines such as [Fe II] and Fe II. Furthermore, our stars have luminosities of log(L/L_sun) > 4, demonstrating that they are supergiants. However, we find lower infrared excesses and weaker forbidden emission lines than for previously identified B[e] supergiants. Thus our stars appear to either have less material in their circumstellar disks than other sgB[e] stars, or the circumstellar material has lower dust content. We suggest that these may constitute a new subclass of dust-poor sgB[e] stars.

Reference: Graus, A. S., Lamb, J. B., & Oey M. S., ApJ, in press; astro-ph/1208.5486
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1208.5486

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Multi-D models of circumstellar shells around evolved massive stars

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Massive stars shape their surrounding medium through the force of their stellar winds, which collide with the circumstellar medium. Since the characteristics of these stellar winds vary over the course of the evolution of the star, the circumstellar matter becomes a reflection of the stellar evolution and can be used to determine the characteristics of the progenitor star. In particular, whenever a fast wind phase follows a slow wind phase, the fast wind sweeps up its predecessor in a shell, which is observed as a circumstellar nebula. We make 2-D and 3-D numerical simulations of fast stellar winds sweeping up their slow predecessors to investigate whether numerical models of these shells have to be 3-D, or whether 2-D models are sufficient to reproduce the shells correctly. We focus on those situations where a fast Wolf-Rayet (WR) star wind sweeps up the slower wind emitted by its predecessor, being either a red supergiant or a luminous blue variable. As the fast WR wind expands, it creates a dense shell of swept up material that expands outward, driven by the high pressure of the shocked WR wind. These shells are subject to a fair variety of hydrodynamic-radiative instabilities. If the WR wind is expanding into the wind of a luminous blue variable phase, the instabilities will tend to form a fairly small-scale, regular filamentary lattice with thin filaments connecting knotty features. If the WR wind is sweeping up a red supergiant wind, the instabilities will form larger interconnected structures with less regularity. Our results show that 3-D models, when translated to observed morphologies, give realistic results that can be compared directly to observations. The 3-D structure of the nebula will help to distinguish different progenitor scenarios.

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

Weblink: http://arxiv.org/abs/1209.4496

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The Fundamental Parameters of Four Massive Eclipsing Binaries in Westerlund 1

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Context. Only a small number of high mass stars (> 30M⊙) have fundamental parameters (i.e. masses and radii) measured with high enough accuracy from eclipsing binaries to constrain formation and evolutionary models of massive stars.
Aims. This work aims to increase this limited sample, by studying the four massive eclipsing binary candidates discovered by Bonanos in the young massive cluster Westerlund 1.
Methods. We present new follow-up echelle spectroscopy of these binaries and models of their light and radial velocity curves.
Results. We obtain fundamental parameters for the eight component stars, finding masses that span a range of 10 − 40M⊙, and contributing accurate fundamental parameters for one additional very massive star, the 33 M⊙ component of W13. WR77o is found to have a ∼ 40 M⊙ companion, which provides a second dynamical constraint on the mass of the progenitor of the magnetar known in the cluster. We also use W13 to estimate the first, direct, eclipsing binary distance to Westerlund 1 and therefore the magnetar and find it to be at 3.7 ± 0.6 kpc.
Conclusions. Our results confirm previous evidence for a high mass for the progenitor of the magnetar. In addition, the availability of eclipsing binaries with accurate parameters opens the way for direct, independent, high precision eclipsing binary distance measurements to Westerlund 1.

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

Weblink: http://arxiv.org/abs/1205.1369

Comments: 11 pages, 11 figures, 7 tables

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The 2.35 year itch of Cyg OB2 #9 - I. Optical and X-ray monitoring

Y. Naze, L. Mahy, Y. Damerdji, H.A. Kobulnicky, J.M. Pittard, E.R. Parkin, O. Absil, R. Blomme

Univ. Liege (1, 2, 3, 7), Univ. Wyoming (4), Univ Leeds (5), Austr. Nat. Univ (6), Royal Obs. Belg. (8)

Context: Nonthermal radio emission in massive stars is expected to arise in wind-wind collisions occurring inside a binary system. One such case, the O-type star Cyg OB2 #9, was proven to be a binary only four years ago, but the orbital parameters remained uncertain. The periastron passage of 2011 was the first one to be observable under good conditions since the discovery of binarity. Aims: In this context, we have organized a large monitoring campaign to refine the orbital solution and to study the wind-wind collision. Methods: This paper presents the analysis of optical spectroscopic data, as well as of a dedicated X-ray monitoring performed with Swift and XMM. Results: In light of our refined orbital solution, Cyg OB2 #9 appears as a massive O+O binary with a long period and high eccentricity; its

components (O5-5.5I for the primary and O3-4III for the secondary) have similar masses and similar luminosities. The new data also provide the first evidence that a wind-wind collision is present in the system. In the optical domain, the broad Ha line varies, displaying enhanced absorption and emission components at periastron. X-ray observations yield the unambiguous signature of an adiabatic collision because, as the stars approach periastron, the X-ray luminosity closely follows the 1/D variation expected in that case. The X-ray spectrum appears, however, slightly softer at periastron, which is probably related to winds colliding at slightly lower speeds at that time. Conclusions: It is the first time that such a variation has been detected in O+O systems, and the first case where the wind-wind collision is found to remain adiabatic even at periastron passage.

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

Weblink: http://arxiv.org/abs/1209.5622

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The Discovery of a Rare WO-type Wolf-Rayet Star in the Large Magellanic Cloud

Kathryn F. Neugent (1), Philip Massey (1), Nidia Morrell (2)

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While observing OB stars within the most crowded regions of the Large Magellanic Cloud, we happened upon a new Wolf-Rayet star in Lucke-Hodge 41, the rich OB association that contains S Doradus and numerous other massive stars. At first glance the spectrum resembled that of a WC4 star, but closer examination showed strong OVI λλ 3811, 34 lines, leading us to classify it as a WO4. This is only the second known WO in the LMC, and the first known WO4 (the other being a WO3). This rarity is to be expected due to these stars' short lifespans as they represent the most advanced evolutionary stage in a massive star's life before exploding as SNe. This discovery shows that while the majority of WRs within the LMC have been discovered, there may be a few WRs left to be found.

Reference: Astronomical Journal, in press
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1210.0062

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Clumping in the inner winds of hot, massive stars from hydrodynamical line-driven instability simulations

Jon O. Sundqvist(1), Stanley P. Owocki(1)

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We investigate the effects of stellar limb-darkening and photospheric perturbations for the onset of wind structure arising from the strong, intrinsic line-deshadowing instability (LDI) of a line-driven stellar wind. A linear perturbation analysis shows that including limb-darkening reduces the stabilizing effect of the diffuse radiation, leading to a net instability growth rate even at the wind base. Numerical radiation-hydrodynamics simulations of the non-linear evolution of this instability then show that, in comparison with previous models assuming a uniformly bright star without base perturbations, wind structure now develops much closer ($r la 1.1 R_star$) to the photosphere. This is in much better agreement with observations of O-type stars, which typically indicate the presence of strong clumping quite near the wind base.

Reference: Accepted for publication in MNRAS. Pre-print on astro-ph.
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1210.1861

Comments:

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A companion as the cause of latitude-dependent effects in the wind of Eta Carinae

Jose H. Groh (1, 2), Thomas I. Madura (2), D. J. Hillier (3), C. J. H. Kruip (4), and G. Weigelt (2)

(1) Geneva Observatory, Switzerland
(2) Max-Planck-Institute for Radioastronomy, Bonn
(3) University of Pittsburgh, USA
(4) Leiden University, Netherlands

We analyze spatially resolved spectroscopic observations of the Eta Carinae binary system obtained with HST/STIS. Eta Car is enshrouded by the dusty Homunculus nebula, which scatters light emitted by the central binary and provides a unique opportunity to study a massive binary system from different vantage points. We investigate the latitudinal and azimuthal dependence of H$alpha$ line profiles caused by the presence of a wind-wind collision (WWC) cavity created by the companion star. Using two-dimensional radiative transfer models, we find that the wind cavity can qualitatively explain the observed line profiles around apastron. Regions of the Homunculus which scatter light that propagated through the WWC cavity show weaker or no H alpha absorption. Regions scattering light that propagated through a significant portion of the primary wind show stronger P Cygni absorption. Our models overestimate the H alpha absorption formed in the primary wind, which we attribute to photoionization by the companion, not presently included in the models. We can qualitatively explain the latitudinal changes that occur during periastron, shedding light on the nature of Eta Car's spectroscopic events. Our models support the idea that during the brief period of time around periastron when the primary wind flows unimpeded toward the

observer, H alpha absorption occurs in directions toward the central object and Homunculus SE pole, but not toward equatorial regions close to the Weigelt blobs. We suggest that observed latitudinal and azimuthal variations are dominated by the companion star via the WWC cavity, rather than by rapid rotation of the primary star.

Reference: Groh et al. 2012, ApJ, 759, L2
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1210.2709

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An XMM-Newton view of the M17 nebula

Francois Mernier, Gregor Rauw

Institut d'Astrophysique, Liege University, Belgium

We present the analysis of an XMM-Newton observation of the M17 nebula. The X-ray point source population consists of massive O-type stars and a population of probable low-mass pre-main sequence stars. CEN1a,b and OI352, the X-ray brightest O-type stars in M17, display hard spectra (kT of 3.8 and 2.6 keV) consistent with a colliding wind origin in binary/multiple systems. We show that the strong interstellar reddening towards the O-type stars of M17 yields huge uncertainties on their Lx/Lbol values. The low-mass pre-main sequence stars exhibit hard spectra resulting from a combination of high plasma temperatures and very large interstellar absorption. We find evidence for considerable long term (months to years) variability of these sources. M17 is one of the few star formation complexes in our Galaxy producing diffuse X-ray emission. We analyze the spectrum of this emission and compare it with previous studies. Finally, we discuss the Optical Monitor UV data obtained simultaneously with the X-ray images. We find very little correspondence between the UV and X-ray sources, indicating that the majority of the UV sources are foreground stars, whilst the bulk of the X-ray sources are deeply embedded in the M17 complex.

Reference: New Astronomy
Status: Manuscript has been accepted

Weblink: arXiv:1210:2936

Comments:

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Rotating Wolf-Rayet stars in a post RSG/LBV phase. An evolutionary channel towards long-duration GRBs?

G. Gräfener^1, J. S. Vink^1, T. J. Harries^2, and N. Langer^3

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3) Argelander-Institut für Astronomie der Universität Bonn, Auf dem Hügel 71, 53121 Bonn, Germany

(shortened) We investigate the properties of Galactic Wolf-Rayet (WR) stars and their circumstellar (CS) environment to identify evolutionary channels that may lead to the formation of long-duration Gamma-Ray bursts (LGRBs). To this purpose we compile available information on the spectropolarimetric properties, the presence of CS ejecta, and the CS velocities in the environment of Galactic WR stars. We use linear line-depolarization as an indicator of rotation, nebular morphology as an indicator of stellar ejecta, and velocity patterns in UV absorption features as an indicator of increased velocities in the CS environment. We find that the ~23% WR stars with "possible ejecta nebulae" dominate the population of WR stars with spectropolarimetric signatures of rotation, while WR stars without such nebulae only rarely show indications of rotation. The corresponding objects are most likely in an early stage after a preceding RSG or LBV phase, and have not yet lost their angular momenta due to the strong mass-loss in the WR phase. From their photometric periods we estimate rotation parameters in the range omega = 0.04...0.25, corresponding to moderate rotation speeds of 36...120 km/s. These values are very uncertain, but comply with the specific surface angular momentum requirement for LGRB progenitors. Our results indicate that, in the Galaxy, mainly "young" WR stars shortly after a RSG/LBV phase show spectropolarimetric signatures of rotation. Their rotation rates are thus likely enhanced with respect to the majority of Galactic WR stars. According to their estimated specific surface angular momenta, a subgroup of stars exploding in this phase may represent an evolutionary channel towards LGRBs at high metallicities, comparable to the Galaxy.

Reference: Astronomy & Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1210.1153

Comments:

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On the influence of the companion star in Eta Carinae: 2D radiative transfer modeling of the ultraviolet and optical spectra

Jose H. Groh (1), D. John Hillier (2), Thomas I. Madura (1), Gerd Weigelt (1)

(1) Max-Planck-Institute for Radioastronomy, Germany, (2) Univ. of Pittsburgh, USA

We present 2D radiative transfer modeling of the Eta Carinae binary system accounting for the presence of a wind-wind collision (WWC) cavity carved in the optically-thick wind of the primary star. By comparing synthetic line profiles with HST/STIS spectra obtained near apastron, we show that the WWC cavity has a strong influence on multi-wavelength diagnostics. This influence is regulated by the modification of the optical depth in the continuum and spectral lines. We find that H-alpha, H-beta, and

Fe II lines are the most affected by the WWC cavity, since they form over a large volume of the primary wind. These spectral lines depend on latitude and azimuth since, according to the orientation of the cavity, different velocity regions of a spectral line are affected. For 2D models with orientation corresponding to orbital inclination angle 110deg < i < 140deg and longitude of periastron 210deg < omega < 330deg, the blueshifted and zero-velocity regions of the line profiles are the most affected. These orbital orientations are required to simultaneously fit the UV and optical spectrum of Eta Car, for a half-opening angle of the cavity in the range 50-70deg. We find that the excess P-Cygni absorption seen in H-alpha, H-beta and optical Fe II lines in spherical models becomes much weaker or absent in the 2D models, in agreement with the observations. The observed UV spectrum of Eta Car, dominated by Fe II absorption lines, is superbly reproduced by our 2D cavity models. Small discrepancies still remain, as H-gamma and H-delta absorptions are overestimated by our models. We suggest that photoionization of the wind of the primary by the hot companion star is responsible for the weak absorption seen in these lines. Our CMFGEN models indicate that the primary star has a mass-loss rate of 8.5x10e-4 Msun/yr and wind terminal velocity of 420 km/s around the 2000 apastron.

Reference: Groh et al. (2012), MNRAS, 423, 1623
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2012MNRAS.423.1623G

Comments:

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First 3D MHD simulation of a massive-star magnetosphere with application to Hα emission from θ1 Ori C

A. ud-Doula, J. O. Sundqvist, S. P. Owocki, V. Petit and R.H.D. Townsend

Penn State W. Scranton

We present the first fully 3D MHD simulation for magnetic channeling and confinement of a radiatively driven, massive-star wind. The specific parameters are chosen to represent the prototypical slowly rotating magnetic O star θ1 Ori C, for which centrifugal and other dynamical effects of rotation are negligible. The computed global structure in latitude and radius resembles that found in previous 2D simulations, with unimpeded outflow along open field lines near the magnetic poles, and a complex equatorial belt of inner wind trapping by closed loops near the stellar surface, giving way to outflow above the Alfv´en radius. In contrast to this previous 2D work, the 3D simulation described here now also shows how this complex structure fragments in azimuth, forming distinct clumps of closed loop infall within the Alfv´en radius, transitioning in the outer wind to radial spokes of enhanced density with characteristic azimuthal separation of 15 − 20◦. Applying these results in a 3D code for line radiative transfer, we show that emission from the associated 3D ‘dynamical magnetosphere’ matches well the observed Hα emission seen from θ1 Ori C, fitting both its dynamic spectrum over rotational phase, as well as the observed level of cycle to cycle stochastic variation. Comparison with previously developed 2D models for Balmer emission from a dynamical magnetosphere generally confirms that time-averaging over 2D snapshots can be a good proxy for the spatial averaging over 3D azimuthal wind structure. Nevertheless, fully 3D simulations will still be needed to model the emission from magnetospheres with non-dipole field components, such as suggested by asymmetric features seen in the Hα equivalent-width curve of θ1 Ori C.

Reference: Accepted for publication in MNRAS. Pre-print on astro-ph.

Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1210.5298

Comments:

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Rotational and Cyclical Variability in $gamma$ Cassiopeiae. II. Fifteen Seasons

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The B0.5IVe star $gamma$ Cass is of great interest because it is the prototype of a small group of classical Be stars having hard X-ray emission of unknown origin. We discuss results from ongoing B and V observations of the gamma Cas star-disk system acquired with an Automated Photometric Telescope during the observing seasons 1997--2011. In an earlier study Smith, Henry, Vishniac showed that light variations in gamma Cas are dominated by a series of comparatively prominent cycles with amplitudes of 0.02--0.03 mag and lengths of 2--3 months, superimposed on a 1.21-day periodic signal some five times smaller, which they attributed to rotation. The cycle lengths clustered around 70 days, with a total range of 50--91 days. Changes in both cycle length and amplitude were observed from year to year. These authors also found the V-band cycles to be 30--40% larger than the B-band cycles. In the present study we find a continuation of these variability patterns and that the distribution of the $Delta(B)/Delta(V)$ amplitude ratios in the long cycles to be bimodal. During the 2010 observing season, gamma Cas underwent a mass loss event ("outburst"), as evidenced by the brightening and reddening seen in our new photometry. This episode coincided with a waning of the amplitude in the ongoing cycle. The Be outburst ended the following year, and the light-curve amplitude returned to pre-outburst levels. This behavior reinforces the interpretation that cycles arise from a global disk instability. We have determined a more precise value of the rotation period, 1.215767${pm 0.00001}$ days, using the longer 15-season dataset and combining solutions from the V and B band light curves. Remarkably, we also find that both the amplitude and the asymmetry of the rotational waveform changed over the years. We review arguments for this modulation arising from transits of a surface magnetic disturbance. Finally, to a limit of 5 mmag, we find no evidence for any photometric variation corresponding to the gamma Cas binary period, 203.55 days, or to the first few harmonics.

Reference: Astrophysical Journal
Status: Manuscript has been accepted

Weblink:

Comments: To be published in the Astrophysical Journal, Nov. or Dec. 2012

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MHD Modeling of a Disk-Wind from a High-Mass Protobinary: the case of Orion Source I

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Very long baseline interferometry (VLBI) observations of SiO masers in
Orion Source I has enabled for the first time to resolve the outflow from a high-mass protostar in the launch and collimation region. Therefore, Source I provides a unique laboratory to study mass-loss and mass-accretion in a high-mass protostar.
We numerically simulate the dynamics of the disk-wind inside 100
AU from Source I.
This enables us to investigate the balance of different forces
(gravitational, magnetic, thermal) regulating gas dynamics in massive star formation. In this work, we adopt magnetohydrodynamic (MHD) disk-wind models to explain the
observed properties of the disk-wind from Orion Source I.
The central source is assumed to be a binary composed of two 10,$rm M_{odot}$ stars
in a circular orbit with an orbital separation of 7 AU. High resolution ideal MHD wind
launching simulations (which prescribe disk as a boundary) are performed using the PLUTO code. The simulations are allowed to run until a steady
state is obtained. MHD driven disk-wind provides a consistent model for the wide-angle
flow from Source I probed by SiO masers, reproducing the bipolar
morphology, the velocity amplitude and rotational profile, the
physical conditions, and the magnetic field strength.

Reference: MNRAS Letters
Status: Manuscript has been accepted

Weblink: www.arxiv.org/abs/1210.7775

Comments:

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Abstracts of 2 submitted papers

The Unprecedented Third Outburst of SN 2009ip: A Luminous Blue Variable Becomes a Supernova

Jon C. Mauerhan, Nathan Smith, Alexei Filippenko, Kyle Blanchard, Peter Blanchard, Chadwick F. E. Casper, S. Bradley Cenko, Kelsey I. Clubb, Daniel Cohen, Gary Li, and Jeffrey M. Silverman

University of Arizona, Steward Observatory;
UC Berkeley.

Some reports of supernova (SN) discoveries turn out not to be true core-collapse explosions. One such case was SN 2009ip, which was recognized to be a luminous blue variable (LBV) eruption. This source had a massive (50-80 Msun) hot progenitor star identified in pre-explosion data, it had documented evidence of pre-outburst variability, and it was subsequently discovered to have a 2nd outburst in 2010. This same source rebrightened again in 2012, and early spectra showed the same narrow-line profiles as before, suggesting another LBV-like eruption. We present new photometry and spectroscopy of SN 2009ip, indicating that its 3rd observed outburst in under 4 years appears to have transitioned into a genuine SN. The most striking discovery in these data is that unlike previous reports, the spectrum exhibited Balmer lines with very broad P-Cygni profiles characteristic of normal Type II supernovae (SNe II), in addition to narrow emission lines seen in SNe IIn and LBVs. Emission components have FWHM~8000 km/s, while the P-Cygni absorption component has blue wings extending to about -13,000 km/s. These features are typical of Type II SNe, but have never been seen in a nonterminal LBV-like eruption. Initially, the peak absolute magnitude of M_V~ -14.5 seemed fainter than that of normal SNe and faded much more rapidly. However, the source quickly brightened again to M_R=-17.6 mag, indicating that it is indeed a true SN. In this bright phase, the broad lines mostly disappeared, and the spectrum became dominated by broad-winged Lorentzian profiles of H-alpha and HeI that are characteristic of the early optically thick phases of luminous SNe IIn. We conclude that the most recent 2012 outburst of SN 2009ip is most likely a true core-collapse SN IIn that was initially faint, but then rapidly achieved high luminosities, as a result of interaction with circumstellar material (abridged).

Reference: Mauerhan et al. 2012, arXiv:1209.6320
Status: Manuscript has been submitted

Weblink: http://arxiv.org/abs/1209.6320

Comments: Submitted to MNRAS on 2012 September 27
8 pages, 5 figures

Email: mauerhan@as.arizona.edu

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Proceedings business meeting IAU WG on Massive Stars during GA Beijing 2012

J. Puls, Chair IAU WG on Massive Stars

University Observatory Munich

We report on the business meeting of the IAU WG on Massive Stars held during the IAU General Assembly 2012 in Beijing. Major topics were (i) the re-structuring of the IAU Divisions and consequences for our Working Group, and (ii) a potential conversion of our WG into a Commission.

Reference: Transactions IAU, Volume XXVIIIB, Proc. XXVIII IAU General Assembly, August 2012, ed. T. Montmerle
Status: Manuscript has been submitted

Weblink: http://www.usm.uni-muenchen.de/people/puls/papers/TrB_WG_massive_stars.pdf

Comments:

Email: uh101aw@usm.uni-muenchen.de

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Abstracts of 1 conference proceedings

Summary of IAU GA SpS5

edited by Y. Naze

Univ. Liege

At the recent IAU GA, there was a session entitled "IR view of massive stars". Three main subjects were discussed :
I. Obscured and distant clusters ;
II. Stellar and Wind Parameters ;
III. Matter ejection and feedback.
Three 10p summaries will be published in Highlights of Astronomy, and they are available in arxiv. PDF files of the contributions are also available on the session website.

Reference: http://arxiv.org/abs/1210.3985
http://arxiv.org/abs/1210.4280
http://arxiv.org/abs/1210.3986
Status: Conference proceedings

Weblink: http://www.gaphe.ulg.ac.be/IAU_XXVIII/prg.html

Comments: proceedings of SpS5 which took place at IAU-GA

Email: naze@astro.ulg.ac.be

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JOBS

POSTDOC POSITION
UNIVERSITY OF SAO PAULO, BRAZIL

vacancy@astro.iag.usp.br

Instituto de Astronomia, Geofísica e Ciências Atmosféricas
IAG/USP

Several groups at the Astronomy Department of IAG/University of Sao Paulo, Brazil, invite applications for various 2-yr postdoctoral fellowships, renewable for an additional year.

The Astronomy department of IAG consists of 35 faculty members who work in many areas, including: the dynamics of exoplanets and solar systems,

astrobiology, astrometry, stellar astronomy, the interstellar medium, Galactic and extragalactic astronomy and cosmology, both theoretical and observational. Applicants with strong background in radio astronomy, high energy astrophysics or instrumentation are also encouraged to apply. IAG/USP astronomers enjoy access to international facilities including SOAR, Gemini and CFHT Observatories, as well as a 2300-core supercomputer.

Requirements are an outstanding publication list (for the career stage) and an exciting plan of work. The candidate must have interests that overlap with those of the IAG staff members (access the list of faculty members at http://www.astro.iag.usp.br/index.php?dir=inst/pessoal&file=pessoal.php?cod=docentes).

The interested candidates should send a CV, that includes a publication list, a research statement (including past work and future plans), with a maximum of five pages, and two letters of recommendation to Claudia Mendes de Oliveira at email vacancy@astro.iag.usp.br by March 31st, or until suitable candidates are found.

The successful candidate will have a fellowship reviewed and awarded by the Sao Paulo State funding agency FAPESP. Time for research is typically 80-90% with a small requirement for dedication to institute activities. The current, tax exempt monthly stipend is R$ 5,578.80 (about 2,200EUR or US$2,700 in Oct 2012). An additional Research Contingency fund (e.g., for travel, computers, etc.) of US$4,500 per year is also available. For further details, contact vacancy@astro.iag.usp.br.

Attention/Comments:

Weblink:

Email: vacancy@astro.iag.usp.br

Deadline:

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MEETINGS

IAUS 302 - Magnetic Fields Throughout Stellar Evolution

2013, August 26-30

Venue: Biarritz, France

http://iaus302.sciencesconf.org

Dear colleagues,

This is the first announcement for the Symposium 302 of the International Astronomical Union, entitled "Magnetic fields throughout stellar evolution". The conference will be held in Biarritz (France), 26-30 August 2013. Preregistration is now open!

Topics include:

* Stellar structure and evolution
* Magnetized accretion and outflows in young stellar objects
* Magnetic braking of PMS stars
* Solar and stellar activity in photospheres, chromospheres and coronae, and stellar cycles
* Magnetism in very low-mass stars and brown dwarfs
* Star-planet interaction
* Stellar dynamos across the HR diagram
* Magnetic field origin and stability in massive stars
* Magnetically-confined winds of massive stars
* Small-scale dynamo and mass-loss in giant and supergiant stars
* Final phases of stellar evolution : magnetism in compact objects

Confirmed speakers:

Evelyne Alecian - Jonathan Braithwaite - Jean-François Donati - Rim Fares - Oleg Kochukhov - François Lignières - Stuart Littlefair - Nanda Rea - Andreas Reisenegger - Marina Romanova - Saku Tsuneta - Aline Vidotto

Important dates:

* Early registration opens: 07 Jan 2013
* Deadline for IAU grant application: 15 Feb 2013
* Decision for IAU financial support: 08 Mar 2013
* Deadline for early registration: 01 Apr 2013
* Abstract deadline for contributed talks: 03 May 2013
* Abstract deadline for posters: 21 Jun 2013
* Deadline for proceedings submission: 30 Sep 2013

We invite you to express your interest by filling out the preregistration form on the conference webpage (http://iaus302.sciencesconf.org). You can also join us on facebook (http://www.facebook.com/events/100425383448793/).

We hope to see as many of you as possible in Biarritz next year!

Best regards,
Pascal Petit (on behalf of the SOC and LOC)

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Massive Stars: From Alpha to Omega

June 10-14, 2013

Venue: Rhodes, Greece

The conference will build on results from ongoing large-scale multi-wavelength surveys of massive stars which are being coupled with new theoretical advances dealing with stellar evolution and the processes which effect that evolution: mass-loss, rotation, convection, magnetic fields, multiplicity and environment. It will tackle important problems from birth, through main sequence evolution and until core collapse. There will be a strong focus on relating the major theoretical uncertainties afflicting stellar evolution through these phases to the current observational picture.

The impetus for this focus is derived from the realization that our understanding of massive star evolution is severely challenged by new observations powered largely by technological advances in telescopes and instrumentation. This has enabled new ways of looking at old long-standing problems enabling large-scale high-quality surveys of resolved stellar populations (e.g the FLAMES and MiMeS Surveys). As theoretical approaches try to keep pace with this increase in information the cracks in our assumptions concerning stellar evolution have become more apparent, even glaring. Whereas before it might have been possible to understand some of the stars some of the time it is now clear that understanding stellar populations is a considerable challenge and will require substantial efforts to resolve.

This is an exciting time as observations have revealed large gaps in understanding of the formation and evolution of massive stars. The huge impact that massive stars have on their immediate environment, parent galaxies, and through the Universe, demands better understanding of massive star evolution from alpha to Omega.

Scientific Program Topics:
· New observational & theoretical results from large-scale surveys (FLAMES, MiMeS, PanSTARRS, PTF), techniques (astrometry) and computation.
· Consequences of zero-age conditions on stellar evolution
· Massive star environments, massive clusters, dynamical evolution, runaway stars and mergers
· The importance of binaries for populations of massive stars
· The upper end of the IMF and the role of mergers
· Massive-star magnetism and pulsation, evolutionary consequences
· The role and evolution of stellar rotation across the H-R diagram
· Mass-loss across the H-R diagram and episodic mass-loss from LBVs and other transients
· Constraints from endpoints
· Massive stars at very low metallicity

SOC: D. Lennon (co-chair), A. Bonanos (co-chair), C. Evans, M. Hanson, R. Hirschi, E. Levesque, S. de Mink, N. Morrell, J. Puls, S. Smartt, N. Smith, G. Wade

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