ISSN 1783-3426

THE MASSIVE STAR NEWSLETTER

formely known as the hot star newsletter

*

No. 121

2011 January-February

Editors: Philippe Eenens (University of Guanajuato)

eenens@gmail.com

Raphael Hirschi (Keele University)

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

CONTENTS OF THIS NEWSLETTER:

News

Abstracts of 21 accepted papers

Abstracts of 4 conference proceedings

Jobs

Meetings

News

"The multi-wavelength view of Hot, Massive Stars" Proceedings available

We would like to inform you that the proceedings of the 39th Liège International Astrophysical Colloquium ("The multi-wavelength view of Hot, Massive Stars") are now online and the individual articles can be accessed from the website of the Bulletin of the Royal Scientific Society of Liège:

http://popups.ulg.ac.be/SRSL/sommaire.php?id=2361

We have also prepared a single pdf file with all the contributions of the conference that can be retrieved from

http://orbi.ulg.ac.be/bitstream/2268/82726/1/fullLIAC2010.pdf

We thank all those people who contributed in one way or the other to these proceedings (either as authors, referees or in any other way).

The editors,

Gregor Rauw, Michaël De Becker, Yaël Nazé, Jean-Marie Vreux & Peredur Williams

Weblink: http://popups.ulg.ac.be/SRSL/sommaire.php?id=2361

Email: rauw@astro.ulg.ac.be

Back to contents

PAPERS

Abstracts of 21 accepted papers

Observational Constraints on Superbubble X-ray Energy Budgets

A. E. Jaskot^1, D. K. Strickland^2, M. S. Oey^1, Y.-H. Chu^3, and G. Garc'{i}a-Segura^4

^{1}University of Michigan, Dept. of Astronomy, 830 Dennison Bldg., Ann Arbor, MI 48109, USA
^{2}Department of Physics and Astronomy, The Johns Hopkins University, 3400 N.~Charles St., Baltimore, MD 21218, USA
^{3}University of Illinois, Dept. of Astronomy, Urbana, IL 61801, USA
^{4}Instituto de Astronom'{i}a-UNAM, Apartado Postal 877, Ensenada, 22800 Baja California, M'{e}xico

The hot, X-ray-emitting gas in superbubbles imparts energy and enriched material to the interstellar medium (ISM) and generates the hot ionized medium, the ISM's high-temperature component. The evolution of superbubble energy budgets is not well understood, however, and the processes responsible for enhanced X-ray emission in superbubbles remain a matter of debate. We present Chandra ACIS-S observations of two X-ray-bright superbubbles in the Large Magellanic Cloud (LMC), DEM L50 (N186) and DEM L152 (N44), with an emphasis on disentangling the true superbubble X-ray emission from non-related diffuse emission and determining the spatial origin and spectral variation of the X-ray emission. An examination of the superbubble energy budgets shows that on the order of 50% of the X-ray emission comes from regions associated with supernova remnant (SNR) impacts. We find some evidence of mass-loading due to swept-up clouds and metallicity enrichment, but neither mechanism provides a significant contribution to the X-ray luminosities. We also find that one of the superbubbles, DEM L50, is likely not in collisional ionization equilibrium. We compare our observations to the predictions of the standard Weaver et al. model and to 1-D hydrodynamic simulations including cavity supernova impacts on the shell walls. Our observations show that mass-loading due to thermal evaporation from the shell walls and SNR impacts are the dominant source of enhanced X-ray luminosities in superbubbles. These two processes should affect most superbubbles, and their contribution to the X-ray luminosity must be considered when determining the energy available for transport to the ISM.

Reference: Accepted for publication in ApJ
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.0280

Comments:

Email: ajaskot@umich.edu

Back to contents

The Sparsest Clusters With O Stars

J. B. Lamb(1), M. S. Oey(1), J. K. Werk(1,2), L. D. Ingleby(1)

(1) University of Michigan
(2) Columbia University

There is much debate on how high-mass star formation varies with environment, and whether the sparsest star-forming environments are capable of forming massive stars. To address this issue, we have observed eight apparently isolated OB stars in the SMC using HST's Advanced Camera for Surveys. Five of these objects appear as isolated stars, two of which are confirmed to be runaways. The remaining three objects are found to exist in sparse clusters, with <10 companion stars revealed, having masses of 1-4 solar mass. Stochastic effects dominate in these sparse clusters, so we perform Monte Carlo simulations to explore how our observations fit within the framework of empirical, galactic cluster properties. We generate clusters using a simplistic -2 power-law distribution for either the number of stars per cluster (N_*) or cluster mass (M_cl). These clusters are then populated with stars randomly chosen from a Kroupa IMF. We find that simulations with cluster lower-mass limits of M_cl,lo >20 solar mass and N_*,lo >40 match best with observations of SMC and Galactic OB star populations. We examine the mass ratio of the second-most massive and most massive stars (m_max,2/m_max), finding that our observations all exist below the 20th percentile of our simulated clusters. However, all of our observed clusters lie within the parameter space spanned by the simulated clusters, although some are in the lowest 5th percentile frequency. These results suggest that clusters are built stochastically by randomly sampling stars from a universal IMF with a fixed stellar upper-mass limit. In particular, we see no evidence to suggest a m_max - M_cl relation. Our results may be more consistent with core accretion models of star formation than with competitive accretion models, and they are inconsistent with the proposed steepening of the integrated galaxy IMF (IGIMF).

Reference: ApJ, 725, 1886-1902
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2010ApJ...725.1886L

Comments: 17 pages, 12 figures

Email: joellamb@umich.edu

Back to contents

Mass and angular momentum loss via decretion disks

J. Krticka, S. P. Owocki, G. Meynet

Masaryk University, Brno, Czech Republic
Bartol Research Institute, University of Delaware, Newark, USA
Geneva Observatory, Sauverny, Switzerland

We examine the nature and role of mass loss via an equatorial decretion disk in massive stars with near-critical rotation induced by evolution of the stellar interior. In contrast to the usual stellar wind mass loss set by exterior driving from the stellar luminosity, such decretion-disk mass loss stems from the angular momentum loss needed to keep the star near and below critical rotation, given the interior evolution and decline in the star's moment of inertia. Because the specific angular momentum in a Keplerian disk increases with the square root of the radius, the decretion mass loss associated with a required level of angular momentum loss depends crucially on the outer radius for viscous coupling of the disk, and can be significantly less than the spherical mass loss the spherical, wind-like mass loss commonly assumed in evolutionary calculations. We discuss the physical processes that affect the outer disk radius, including thermal disk outflow, and ablation of the disk material via a line-driven wind induced by the star's radiation. We present parameterized scaling laws for taking account of decretion-disk mass loss in stellar evolution codes, including how these are affected by metallicity, or by presence within a close binary and/or a dense cluster. Effects similar to those discussed here should also be present in accretion disks during star formation, and may play an important role in shaping the distribution of rotation speeds on the ZAMS.

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

Weblink: http://adsabs.harvard.edu/abs/2011arXiv1101.1732K

Comments:

Email: krticka@physics.muni.cz

Back to contents

He-like ions as practical astrophysical plasma diagnostics: From stellar coronae to active galactic nuclei

Delphine Porquet (1), Jacques Dubau (2), Nicolas Grosso (1)

1- Observatoire Astronomique de Strasbourg, France; 2- Institut d'Astrophysique Spatiale, Orsay, France

We review X-ray plasma diagnostics based on the line ratios of He-like ions. Triplet/singlet line intensities can be used
to determine electronic temperature and density, and were first developed for the study of the solar corona. Since the launches of the X-ray satellites Chandra and XMM-Newton, these diagnostics have been extended and used (from C V to Si XIII) for a wide variety of astrophysical plasmas such as stellar coronae, supernova remnants, solar system objects, active galactic nuclei, and X-ray binaries. Moreover, the intensities of He-like ions can be used to determine the ionization process(es) at work, as well as the distance between the X-ray plasma and the UV emission source for example in hot stars. In the near future thanks to the next generation of X-ray satellites (e.g., Astro-H and IXO), higher-Z He-like lines (e.g., iron) will be resolved, allowing plasmas with higher temperatures and densities to be probed. Moreover, the so-called satellite lines that are formed closed to parent He-like lines, will provide additional valuable diagnostics to determine electronic temperature, ionic fraction, departure from ionization equilibrium and/or from Maxwellian electron distribution.

Reference: Space Science Reviews (in press)
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.3184

Comments: the final publication is available at http://www.springerlink.com

Email: delphine.porquet@astro.unistra.fr

Back to contents

An asteroseismic study of the O9V star HD 46202 from CoRoT space-based photometry

Briquet, M. (1); Aerts, C. (1,2); Baglin, A. (3); Nieva, M. F. (4); Degroote, P. (1); Przybilla, N. (5); Noels, A. (6); Schiller, F. (5); Vuckovic, M. (1); Oreiro, R. (1); Smolders, K. (1); Auvergne, M. (3); Baudin, F. (7); Catala, C. (3); Michel, E. (3); Samadi, R. (3)

1- Instituut voor Sterrenkunde, K.U.Leuven, Celestijnenlaan 200D, B-3001 Leuven, Belgium
2- Department of Astrophysics, IMAPP, University of Nijmegen, PO Box 9010, 6500 GL Nijmegen, The Netherlands
3- LESIA, CNRS UMR8109, Universite Pierre et Marie Curie, Universite Denis Diderot, Observatoire de Paris, 92195 Meudon Cedex, France
4- Max Planck Institute for Astrophysics, Karl Schwarzschild Str. 1, Garching bei Munchen D-85741, Germany
5- Dr. Karl Remeis Observatory & ECAP, University of Erlangen-Nuremberg, Sternwartstrasse 7, D-96049 Bamberg, Germany
6- Institut d'Astrophysique et de Geophysique, University of Liege, Bat. B5C, Allee du 6 Aout 17, B-4000 Liege, Belgium
7- Institut d'Astrophysique Spatiale (IAS), Batiment 121, F-91405, Orsay Cedex, France

The O9V star HD 46202, which is a member of the young open cluster NGC 2244, was observed by the CoRoT satellite in October/November 2008 during a short run of 34 days. From the very high-precision light curve, we clearly detect beta Cep-like pulsation frequencies with amplitudes of ~0.1 mmag and below. A comparison with stellar models was performed using a chi^2 as a measure for the goodness-of-fit between the observed and theoretically computed frequencies. The physical parameters of our best-fitting models are compatible with the ones deduced spectroscopically. A core overshooting parameter alpha_ov = 0.10 +- 0.05 pressure scale height is required. None of the observed frequencies are theoretically excited with the input physics used in our study. More theoretical work is thus needed to overcome this shortcoming in how we understand the excitation mechanism of pulsation modes in such a massive star. A similar excitation problem has also been encountered for certain pulsation modes in beta Cep stars recently modelled asteroseismically.

Reference: Astronomy and Astrophysics
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.3162

Comments:

Email: maryline@ster.kuleuven.be

Back to contents

A New Diagnostic of the Radial Density Structure of Be Disks

Zachary H. Draper (1), John P. Wisniewski (1,2), Karen S. Bjorkman (3), Xavier Haubois (4), Alex C. Carciofi (4), Jon E. Bjorkman (3), Marilyn R. Meade (5), Atsuo Okazaki (6)

((1) University of Washington, (2) NSF Astronomy & Astrophysics Postdoctoral Fellow, (3) University of Toledo, (4) Universidade de São Paulo, (5) University of Wisconsin, (6) Hokkai-Gakuen University)

We analyze the intrinsic polarization of two classical Be stars in the process of losing their circumstellar disks via a Be to normal B star transition originally reported by Wisniewski et al. During each of five polarimetric outbursts which interrupt these disk-loss events, we find that the ratio of the polarization across the Balmer jump (BJ+/BJ-) versus the V-band polarization traces a distinct loop structure as a function of time. Since the polarization change across the Balmer jump is a tracer of the innermost disk density whereas the V-band polarization is a tracer of the total scattering mass of the disk, we suggest such correlated loop structures in Balmer jump-V band polarization diagrams (BJV diagragms) provide a unique diagnostic of the radial distribution of mass within Be disks. We use the 3-D Monte Carlo radiation transfer code HDUST to reproduce the observed clockwise loops simply by turning ``on/off" the mass decretion from the disk. We speculate that counter-clockwise loop structures we observe in BJV diagrams might be caused by the mass decretion rate changing between subsequent ``on/off" sequences. Applying this new diagnostic to a larger sample of Be disk systems will provide insight into the time-dependent nature of each system's stellar decretion rate.

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

Weblink: http://adsabs.harvard.edu/abs/2011arXiv1101.3571D

Comments:

Email: zhd@uw.edu

Back to contents

Eccentric binaries. Tidal flows and periastron events

E. Moreno, G. Koenigsberger, D. M. Harrington

Instituto de Astronom'{i}a, Univer-sidad Nacio-nal Aut'o-noma de M'exico, M'exico D.~F. 04510, Mexico;
Instituto de Ciencias F'{i}sicas, Univer-sidad Nacio-nal Aut'o-noma de M'exico, Cuernavaca, Morelos, 62210, Mexico; Institute for Astronomy, University of Hawaii, {2680 Woodlawn Drive}, Honolulu, HI, 96822

A number of binary systems present evidence of enhanced activity around periastron passage, suggesting a connection between tidal interactions and these periastron effects. The aim of this investigation is to study the time-dependent response of a star's surface as it is perturbed by a binary companion. Here we focus on the tidal shear energy dissipation. We derive a mathematical expression for computing the rate of dissipation, dot{E}, of the kinetic energy by the viscous flows that are driven by tidal interactions on the surface layer of a binary star. The method is tested by comparing the results from a grid of model calculations with the analytical predictions of Hut (1981) and the synchronization timescales of Zahn

(1977, 2008). Our results for the dependence of the average (over orbital cycle) energy dissipation, dot{E}_ave, on orbital separation are consistent with those of Hut (1981) for model binaries with an orbital separation at periastron r_per/R_1 > 8. The model also reproduces the predicted pseudo-synchronization angular velocity for moderate eccentricities (~<0.3). In addition, for circular orbits our approach yields the same scaling of synchronization timescales with orbital separation as given by Zahn (1977, 2008) for convective envelopes.

The computations give the distribution of $dot{E}$ over the stellar surface, and show that it is generally concentrated around the equator. Maximum amplitudes occur around periastron passage or slightly thereafter for supersynchronously rotating stars. In very eccentric binaries, the distribution of dot{E} over the surface changes significantly as a function of orbital phase, with small spatial structures appearing after periastron. An exploratory calculation for a highly eccentric binary system with parameters similar to those of $delta$ Sco (e=0.94, P=3944.7 d) indicates that dot{E}_{ave} changes by ~5 orders of magnitude over the 82 days before periastron, suggesting that the sudden and large amplitude variations in surface properties around periastron may, indeed, contribute toward the activity observed around this orbital phase.

Reference: A&A
Status: Manuscript has been accepted

Weblink: http://www.fis.unam.mx/~gloria/

Comments:

Email: gloria@astro.unam.mx

Back to contents

The H-alpha Variations of the Luminous Blue Variable P Cygni: Discrete Absorption Components and the Short S Doradus Phase

Noel D. Ricahrdson, Nancy D. Morrison, Douglas R. Gies, N. Markova, Erica N. Hesselbach, J. R. Percy

Georgia State University, University of Toledo, Georgia State University, Bulgarian Academy of Sciences, University of Notre Dame, University of Toronto

P Cygni is a prototype of the Luminous Blue Variables (or S Doradus variables), and the star displays photometric and emission line variability on a timescale of years (known as the "short S Doradus phase" variations). Here we present new high resolution H-alpha spectroscopy of P Cyg that we combine with earlier spectra and concurrent V-band photometry to document the emission and continuum flux variations over a 24 y time span. We show that the emission and continuum fluxes vary in concert on timescales of 1.6 y and longer, but differ on shorter timescales. The H-alpha profile shape also varies on the photometric timescales, and we describe the observed co-variations of the emission peak and absorption trough properties. We argue that the episodes of photometric and emission brightening are caused by increases in the size of the emission region that are related to variations in wind mass loss rate and outflow speed. We find evidence of blueward accelerating, Discrete Absorption Components (DACs) in the absorption trough of the H-alpha profile, and these features have slower accelerations and longer durations than those observed in other lines. The DAC strengths also appear to vary on the photometric timescales, and we suggest that the propagation of the DAC-related wind structures is closely related to changes in the overall wind mass loss rate and velocity.

Reference: Accepted by AJ.

Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.4319

Comments: 43 pages, including a large data table, and 11 figures.

Email: richardson@chara.gsu.edu

Back to contents

Discovery of the first tau Sco analogues: HD 66665 and HD 63425

V. Petit (1), D. L. Massa (2), W. L. F. Marcolino (3), G. A. Wade (4), R. Ignace (5) and the MiMeS Collaboration

(1) Department of Geology & Astronomy, West Chester University, West Chester, PA 19383, USA.
(2) Space Telescope Science Institute, 3700 N. San Martin Drive, Baltimore, MD 21218, USA.
(3) Observatorio Nacional-MCT, Rua Jose Cristino, 77, CEP 20921-400, Sao Cristovao, Rio de Janeiro, Brasil.
(4) Department of Physics, Royal Military College of Canada, PO Box 17000, Station Forces, Kingston, ON K7K 4B4, Canada.
(5) Department of Physics & Astronomy, East Tennessee State University, Box 70652, Johnson City, TN 37614, USA.

The B0.2 V magnetic star tau Sco stands out from the larger population of massive OB stars due to its high X-ray activity, peculiar wind diagnostics and highly complex magnetic field. This Letter presents the discovery of the first two tau Sco analogues – HD 66665 and HD 63425, identified by the striking similarity of their ultraviolet (UV) spectra to that of tau Sco. ESPaDOnS spectropolarimetric observations were secured by the Magnetism in Massive Stars CFHT Large Program, in order to characterize the stellar and magnetic properties of these stars. cmfgen modelling of optical ESPaDOnS spectra and archived IUE UV spectra showed that these stars have stellar parameters similar to those of tau Sco. A magnetic field of similar surface strength is found on both stars, reinforcing the connection between the presence of a magnetic field and wind peculiarities. However, additional phase-resolved observations will be required in order to assess the potential complexity of the magnetic fields and verify if the wind anomalies are linked to this property.

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

Weblink: http://adsabs.harvard.edu/doi/10.1111/j.1745-3933.2010.01002.x

Comments:

Email: veronique.petit.1@gmail.com

Back to contents

Mass loss from inhomogeneous hot star winds
II. Constraints from a combined optical/UV study

J.O. Sundqvist(1), J. Puls(1), A. Feldmeier(2), S.P. Owocki(3)

1 - Universitätssternwarte München, Germany; 2 - Institut für Physik und Astronomie, Potsdam, Germany; 3 - University of Delaware, Bartol Research Institute, Newark, USA

Context: Mass loss is essential for massive star evolution, thus also for the variety of astrophysical applications relying on its predictions. However, mass-loss rates currently in use for hot, massive stars have recently been seriously questioned, mainly because of the effects of wind clumping. Aims: We investigate the impact of clumping on diagnostic ultraviolet resonance and optical recombination lines often used to derive empirical mass-loss rates of hot stars. Optically thick clumps, a non-void interclump medium, and a non-monotonic velocity field are all accounted for in a single model. The line formation is first theoretically studied, after which an exemplary multi-diagnostic study of an O-supergiant is performed. Methods: We used 2D and 3D stochastic and radiation-hydrodynamic wind models, constructed by assembling 1D snapshots in radially independent slices. To compute synthetic spectra, we developed and used detailed radiative transfer codes for both recombination lines (solving the `formal integral') and resonance lines (using a Monte-Carlo approach). In addition, we propose an analytic method to model these lines in clumpy winds, which does not rely on optically thin clumping. Results: The importance of the `vorosity' effect for line formation in clumpy winds is emphasized. Resonance lines are generally more affected by optically thick clumping than recombination lines. Synthetic spectra calculated directly from current radiation-hydrodynamic wind models of the line-driven instability are unable to in parallel reproduce strategic optical and ultraviolet lines for the Galactic O-supergiant LCep. Using our stochastic wind models, we obtain consistent fits essentially by increasing the clumping in the inner wind. A mass-loss rate is derived that is approximately two times lower than what is predicted by the line-driven wind theory, but much higher than the corresponding rate derived when assuming optically thin clumps. Our analytic formulation for line formation is used to demonstrate the potential importance of optically thick clumping in diagnostic lines in so-called weak-winded stars and to confirm recent results that resonance doublets may be used as tracers of wind structure and optically thick clumping. Conclusions: We confirm earlier results that a re-investigation of the structures in the inner wind predicted by line-driven instability simulations is needed. Our derived mass-loss rate for LCep suggests that only moderate reductions of current mass-loss predictions for OB-stars are necessary, but this nevertheless prompts investigations on feedback effects from optically thick clumping on the steady-state, NLTE wind models used for quantitative spectroscopy.

Reference: Accepted for publication in Astronomy and Astrophysics, pre-print available on astro-ph.
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.5293

Comments:

Email: jon@usm.uni-muenchen.de

Back to contents

Red Supergiants, Luminous Blue Variables and Wolf-Rayet stars: the single massive star perspective

Georges Meynet[1], Cyril Georgy[1], Raphael Hirschi[2], Andre Maeder[1], Phil Massey[3], Norbert Przybilla[4], M.-Fernanda Nieva[5]

[1] Geneva Observatory, University of Geneva, Maillettes 51, 1290 Sauverny, Switzerland
[2] Astrophysics Group, EPSAM Institute, University of Keele, Keele, ST5 5BG, UK
[3] Lowell Observatory, 1400 W Mars Hill Road, Flagstaff, AZ 86001, USA
[4] Dr. Karl Remeis-Observatory & ECAP, Sternwartstr. 7, 96049 Bamberg, Germany
[5] Max-Planck-Institut fur Astrophysik, Karl-Schwarzschild-Str. 1, 85741 Garching, Germany

We discuss, in the context of the single star scenario, the nature of the progenitors of Red Supergiants (RSG), of Luminous Blue Variables (LBV) and of Wolf-Rayet (WR) stars. These three different populations correspond to evolved phases of Main Sequence (MS) OB stars. Axial rotation and mass loss have a great influence on massive star evolution in general and more specifically on the durations of these different phases. Moderate rotation and mass loss, during the MS phase, favor the evolution towards the RSG stage. Fast rotation and strong mass loss during the MS phase, in contrast, prevent the star from becoming a RSG and allow the star to pass directly from the OB star phase into the WR phase. Mass loss during the RSG stage may make the star evolve back in the blue part of the HR diagram. We argue that such an evolution may be more common than presently accounted for in stellar models. This might be the reason for the lack of type IIP SNe with RSG progenitors having initial masses between 18 and 30 $M_\odot$.
The LBVs do appear as a possible transition phase between O and WR stars or between WNL and WNE stars. Fast rotation and/or strong mass loss during the Main-Sequence phase prevent the formation of LBV stars. The mechanisms driving the very strong ejections shown by LBV stars are still unknown. We present some arguments showing that axial rotation together with the proximity of the Eddington limit may play a role in driving the shell ejections. Rotation and mass loss favor the formation of Wolf-Rayet stars.
The fact that WR stars and RSGs rarely occur in the same coeval populations indicates that the mass range of these two populations is different, WR stars originating from more massive stars than RSGs. Single star evolution models predict variations with the metallicity of the number ratios of Type Ibc to Type II supernovae, of Type Ib to Type II and of Type Ic to Type II, which are compatible with observations, provided that many stars leaving a black hole as a remnant produce an observable supernova event.

Reference: Société Royale des Sciences de Liège, Bulletin, vol. 80, p. 266-278 (Proceedings of the 39th Liège Astrophysical Colloquium, held in Liège 12-16 July 2010, edited by G. Rauw, M. De Becker, Y. Nazé, J.-M. Vreux, P. Williams)
Status: Manuscript has been accepted

Weblink: http://popups.ulg.ac.be/SRSL/document.php?id=2738

Comments:

Email: georges.meynet@unige.ch

Back to contents

The Galactic O-Star Spectroscopic Survey. I. Classification System and Bright Northern Stars in the Blue-Violet at R~2500

A. Sota, J. Maíz Apellániz, N. R. Walborn, E. J. Alfaro, R. H. Barbá, N. I. Morrell, R. C. Gamen, and J. I. Arias

IAA-CSIC, IAA-CSIC, STScI, IAA-CSIC, ULS, LCO, IALP-CONICET, ULS

We present the first installment of a massive spectroscopic survey of Galactic O stars, based on new, high signal-to-noise ratio, R ~ 2500 digital observations from both hemispheres selected from the Galactic O-Star Catalog of Maíz Apellániz et al. (2004) and Sota et al. (2008). The spectral classification system is rediscussed and a new atlas is presented, which supersedes previous versions. Extensive sequences of exceptional objects are given, including types Ofc, ON/OC, Onfp, Of?p, Oe, and double-lined spectroscopic binaries. The remaining normal spectra bring this first sample to 184 stars, which is close to complete to B = 8 and north of delta = -20 degrees and includes all of the northern objects in Maíz Apellániz et al. (2004) that are still classified as O stars. The systematic and random accuracies of these classifications are substantially higher than previously attainable, because of the quality, quantity, and homogeneity of the data and analysis procedures. These results will enhance subsequent investigations in Galactic astronomy and stellar astrophysics. In the future we will publish the rest of the survey, beginning with a second paper that will include most of the southern stars in Maíz Apellániz et al. (2004).

Reference: Accepted for publication in ApJS
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.4002

Comments:

Email: jmaiz@iaa.es

Back to contents

First detection of a magnetic field in the fast rotating runaway Oe star $zeta$,Ophiuchi

S. Hubrig^1, L.M. Oskinova^2, M. Sch"oller^3

^{1} Astrophysikalisches Institut Potsdam, An der Sternwarte 16, 14482~Potsdam, Germany
^{2} Universit"at Potsdam, Institut f"ur Physik und Astronomie, 14476~Potsdam, Germany
^{3} European Southern Observatory, Karl-Schwarzschild-Str. 2, 85748~Garching, Germany

The star $zeta$,Ophiuchi is one of the brightest massive stars in the northern hemisphere and was intensively studied in various wavelength domains. The currently available observational material suggests that certain observed phenomena are related to the presence of a magnetic field.
We acquired spectropolarimetric observations of $zeta$,Oph with FORS,1 mounted on the 8-m Kueyen telescope of the VLT to investigate if a magnetic field is indeed present in this star.
Using all available absorption lines, we detect a mean longitudinal magnetic field $left< B_zright>_{rm all}= 141pm45$,G, confirming the magnetic nature of this star.
We review the X-ray properties of $zeta$,Oph with the aim to understand whether the X-ray emission of $zeta$,Oph is dominated by magnetic

or by wind instability processes.

Reference: AN, in print
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1101.5500

Comments:

Email: mschoell@eso.org

Back to contents

Title: Rotating Massive Main-Sequence Stars II: Simulating a Population of LMC early B-type Stars as a Test of Rotational Mixing

Ines Brott (1,2), Chris J. Evans (3), Ian Hunter (4), Alex de Koter (5,1), Norbert Langer (6,1), Philip L. Dufton (4), Matteo Cantiello (6), Carrie Trundle (4), Danny J. Lennon (7), Selma E. de Mink (6-8), Sung-Chul Yoon (6), Peter Anders (1)

1 - Astronomical Institute, Utrecht University, The Netherlands
2 - University of Vienna, Department of Astronomy, Austria
3 - UK Astronomy Technology Centre, Royal Observatory Edinburgh, UK
4 - Astrophysics Research Centre, School of Mathematics & Physics, The Queens University of Belfast, UK
5 - Astronomical Institute Anton Pannekoek, University of Amsterdam, The Netherlands
6 - Argelander-Institut for Astronomy, University Bonn, Germany
7 - Space Telescope Science Institute, Baltimore, USA
8 - Hubble Fellow

Rotational mixing in massive stars is a widely applied concept, with far reaching consequences for stellar evolution. Nitrogen surface abundances for a large and homogeneous sample of massive B-type stars in the LMC were obtained by the VLT-FLAMES Survey of Massive Stars. This sample is the first covering a broad range of projected stellar rotational velocities, with a large enough sample of high quality data to allow for a statistically significant analysis. We use the sample to provide the first rigorous test of the theory of rotational mixing in massive stars. We calculated a grid of stellar evolution models, using the FLAMES sample to calibrate some of the uncertain mixing processes. We developed a new population-synthesis code, which uses this grid to simulate a large population of stars with masses, ages and rotational velocity distributions consistent with those from the FLAMES sample. The synthesized population is then filtered by the selection effects in the observed sample, to enable a direct comparison between the empirical results and theoretical predictions. Our simulations reproduce the fraction of stars without significant nitrogen enrichment. The predicted number of rapid rotators with enhanced nitrogen is about twice as large as found observationally. Furthermore, a group of stars consisting of slowly rotating, nitrogen-enriched objects and another consisting of rapidly rotating un-enriched objects can not be reproduced by our single-star population synthesis. Additional physical processes appear to be required to understand the population of massive main-sequence stars from the FLAMES sample.We discuss the possible role of binary stars and magnetic fields in the interpretation of our results. We find that the population of slowly rotating nitrogen-enriched stars is unlikely produced via mass transfer and subsequent tidal spin-down in close binary systems

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

Weblink: http://arxiv.org/abs/1102.0766

Comments:

Email: ines.brott@univie.ac.at

Back to contents

Rotating Massive Main-Sequence Stars I: Grids of Evolutionary Models and Isochrones

Ines Brott (1,2), Selma E. de Mink (3,4,9), Matteo Cantiello (4), Norbert Langer (4,1), Alex de Koter (5,1), Chris J. Evans (6), Ian Hunter (7), Carrie Trundle (7), Jorick S. Vink (8)

1- Astronomical Institute, Utrecht University, The Netherlands
2 - University of Vienna, Department of Astronomy, Vienna, Austria
3- Space Telescope Science Institute, Baltimore USA
4 -Argelander-Institut for Astronomy, University Bonn, Germany
5 - Astronomical Institute Anton Pannekoek, University of Amsterdam, The Netherlands
6- UK Astronomy Technology Centre, Royal Observatory Edinburgh, UK
7- Astrophysics Research Centre, School of Mathematics & Physics, The Queens University of Belfast, Northern Ireland, UK
8- Armagh Observatory, College Hill, Northern Ireland
9- Hubble Fellow

We present a dense grid of evolutionary tracks and isochrones of rotating massive main-sequence stars. We provide three grids with different initial compositions tailored to compare with early OB stars in the Small and Large Magellanic Clouds and in the Galaxy. Each grid covers masses ranging from 5 to 60 Msun and initial rotation rates between 0 and about 600 km/s. To calibrate our models we used the results of the VLT-FLAMES Survey of Massive Stars. We determine the amount of convective overshooting by using the observed drop in rotation rates for stars with surface gravities log g < 3.2 to determine the width of the main sequence. We calibrate the efficiency of rotationally induced mixing using the nitrogen abundance determinations for B stars in the Large Magellanic cloud. We describe and provide evolutionary tracks and the evolution of the central and surface abundances. In particular, we discuss the occurrence of quasi-chemically homogeneous evolution, i.e. the severe effects of efficient mixing of the stellar interior found for the most massive fast rotators. We provide a detailed set of isochrones for rotating stars. Rotation as an initial parameter leads to a degeneracy between the age and the mass of massive main sequence stars if determined from its observed location in the Hertzsprung-Russell diagram. We show that the consideration of surface abundances can resolve this degeneracy.

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

Weblink: http://arxiv.org/abs/1102.0530

Comments:

Email: ines.brott@univie.ac.at

Back to contents

An interesting candidate for isolated massive star formation in the Small Magellanic Cloud

R. Selier (1), M. Heydari-Malayeri (1), D. A. Gouliermis (2)

1 - LERMA, Observatoire de Paris, France
2 - Max-Planck-Institut fur Astronomie, Heidelberg, Germany

The SMC region with which this paper is concerned has the particularity of containing the highest concentration of IRAS/Spitzer sources, H I emission, and molecular clouds in this neighboring galaxy. However very few studies have been devoted to it, despite these signs of star formation. We present the first detailed study of the compact H II region N33 in the SMC by placing it in a wider context of massive star formation. Moreover, we show that N33 is a particularly interesting candidate for isolated massive star formation. This analysis is based mainly on optical ESO NTT observations, both imaging and spectroscopy, coupled with other archive data, notably Spitzer images (IRAC 3.6, 4.5, 5.8, and 8.0 mic) and 2MASS observations. We derive a number of physical characteristics of the compact H II region N33 for the first time. This gas and dust formation of 7".4 (2.2 pc) in diameter is powered by a massive star of spectral type O6.5-O7 V. The compact H II region belongs to a rare class of H II regions in the Magellanic Clouds, called high-excitation blobs (HEBs). We show that this H II region is not related to any star cluster. Specifically, we do not find any traces of clustering around N33 at scales larger than 10" (~ 3 pc). On smaller scales there is a marginal stellar concentration, the low density of which, below the 3 sigma level, does not classify it as a real cluster. We also verify that N33 is not a member of any large stellar association. Under these circumstances, N33 is therefore attractive also because it represents a remarkable case of isolated massive star formation in the SMC. Various aspects of the relevance of N33 to the topic of massive star formation in isolation are discussed.

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

Weblink: http://arxiv.org/abs/1102.1257

Comments:

Email: romain.selier@obspm.fr

Back to contents

Binary progenitor models of type IIb supernovae

J.S.W. Claeys^{1,2}, S.E. de Mink^{1,3,4}, O.R. Pols^1, J.J. Eldridge^5, M.Baes^2

1-Sterrekundig Insituut, Universiteit Utrecht, PO Box 800000, 3508 TA Utrecht, The Netherlands; 2-Sterrenkundig Observatorium, Universiteit Gent, Krijgslaan 281-S9, B-9000 Gent, Belgium; 3-Argelander Institute for Astronomy, University of Bonn, Auf dem Huegel 71, D-53121 Bonn, Germany; 4-Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA; 5-Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge CB3 0HA

Massive stars that lose their hydrogen-rich envelope down to a few tenths of a solar mass explode as extended type IIb supernovae, an intriguing subtype that links the hydrogen-rich type II supernovae with the hydrogen-poor type Ib and Ic. The progenitors may be very massive single stars that lose their envelope due to their stellar wind, but mass stripping due to interaction with a companion star in a binary system is currently considered to be the dominant formation channel.

Anticipating the upcoming automated transient surveys, we computed an extensive grid of binary models with the Eggleton binary evolution code. We identify the limited range of initial orbital periods and mass ratios required to produce type IIb binary progenitors. The rate we predict from our standard models, which assume conservative mass transfer, is about six times smaller than the current rate indicated by observations. It is larger but still comparable to the rate expected from massive single stars. We evaluate extensively the effect of various assumptions such as the adopted accretion efficiency, the binary fraction and distributions for the initial binary parameters. To recover the observed rate we must generously allow for uncertainties and consider low accretion efficiencies in combination with limited angular momentum loss from the system.

Motivated by the claims of detection and non-detection of companions for a few IIb supernovae, we investigate the properties of the secondary star at the moment of explosion. We identify three cases: (1) the companion is predicted to appear as a hot O star in about 90% of the cases, as a result of mass accretion during its main sequence evolution, (2) the companion becomes an over-luminous B star in about 3% of the cases, if mass accretion occurred while crossing the Hertzsprung gap or (3) in systems with very similar initial masses the companion will appear as a K supergiant. The second case, which applies to the well-studied case of SN 1993J and possibly to SN 2001ig, is the least common case and requires that the companion very efficiently accretes the transferred material -- in contrast to what is required to recover the overall IIb rate. We note that relative rates quoted above depend on the assumed efficiency of semi-convective mixing: for inefficient semi-convection the presence of blue supergiant companions is expected to be more common, occurring in up to about 40% of the cases.

Our study demonstrates that type IIb supernovae have the potential to teach us about the physics of binary interaction and about stellar processes such as internal mixing and possibly stellar-wind mass loss. The fast increasing number of type IIb detections from automated surveys may lead to more solid constraints on these model uncertainties in the near future.

Reference: Arxiv e-print 1102.1732 (A&A)
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1102.1732

Comments:

Email: j.claeys@astro-uu.nl

Back to contents

Exploring the origin of magnetic fields in massive stars: A survey of O-type stars in clusters and in the field

S.~Hubrig^1, M.~Sch"oller^2, N.~V.~Kharchenko^{1,3}, N.~Langer^4, W.~J.~de Wit^5, I.~Ilyin^1, A.~F.~Kholtygin^6, A.~E.~Piskunov^{1,7}, N.~Przybilla^8, the MAGORI collaboration

^{1} Astrophysikalisches Institut Potsdam, An der Sternwarte 16, 14482~Potsdam, Germany
^{2} European Southern Observatory, Karl-Schwarzschild-Str.~2, 85748~Garching, Germany
^{3} Main Astronomical Observatory, 27~Academica Zabolotnogo Str., 03680~Kiev, Ukraine
^{4} Argelander-Institut f"ur Astronomie, Universit"at Bonn, Auf dem H"ugel~71, 53121~Bonn, Germany
^{5} European Southern Observatory, Alonso de Cordova~3107, Santiago, Chile
^{6} Astronomical Institute, Saint-Petersburg State University, Saint-Petersburg, Russia

^{7} Institute of Astronomy of the Russian Acad. Sci., 48 Pyatnitskaya Str., 109017 Moscow, Russia
^{8} Dr.-Karl-Remeis-Sternwarte Bamberg & ECAP, Universit"at Erlangen-N"urnberg, Sternwartstr.~7, 96049~Bamberg, Germany

Although important effects of magnetic fields in massive stars are suggested by recent models and observations, only a small number of massive O-type stars have been investigated for magnetic fields until now. Additional observations are of utmost importance to constrain the conditions which enable the presence of magnetic fields and give first trends about their occurrence rate and field strength distribution.

To investigate statistically whether magnetic fields in massive stars are ubiquitous or appear in stars with specific spectral classification, certain ages, or in a special environment, we acquired 41 new spectropolarimetric observations for 36 stars. Among the observed sample roughly half of the stars are probable members of clusters at different ages, whereas the remaining stars are field stars not known to belong to any cluster or association.

Spectropolarimetric observations were obtained during three different nights using the low-resolution spectropolarimetric mode of FORS,2 (FOcal Reducer low dispersion Spectrograph) mounted on the 8-m Antu telescope of the VLT. To assess the membership in open clusters and associations, we used astrometric catalogues with the best currently available kinematic and photometric data.

A field at a significance level of 3$sigma$ was detected in ten O-type stars. Importantly, the largest longitudinal magnetic fields were measured in two Of?p stars: $langle$$B_z$$rangle$,=,$-381pm$122,G for CPD$-$28,2561 and $langle$$B_z$$rangle$,=,$-297pm$62,G for HD,148937, previously detected by us as magnetic. The obtained observations of HD,148937 on three different nights indicate that the magnetic field is slightly variable. Our new measurements support our previous conclusion that large-scale organized magnetic fields with polar field strengths in excess of 1,kG are not widespread among O-type stars. Among the stars with a detected magnetic field, only one star, HD,156154, belongs to an open cluster at high membership probability. According to previous kinematic studies, four magnetic O-type stars in the sample are well-known candidate runaway stars.

Reference: to be published in A&A
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1102.2503

Comments:

Email: mschoell@eso.org

Back to contents

Three-dimensional simulation of massive star formation in the disk accretion scenario

Rolf Kuiper (1,2), Hubert Klahr (2), Henrik Beuther (2), Thomas Henning (2)

1) Argelander Institute for Astronomy, Bonn University, Auf dem Huegel 71, D-53121 Bonn, Germany
2) Max Planck Institute for Astronomy, Koenigstuhl 17, D-69117 Heidelberg, Germany

The most massive stars can form via standard disk accretion - despite of the radiation pressure generated - due to the fact that the massive accretion disk yields a strong anisotropy in the radiation field, releasing most of the radiation pressure perpendicular to the disk accretion flow. Here, we analyze the self-gravity of the forming circumstellar disk as the potential major driver of the angular momentum transport in such massive disks responsible for the high accretion rates needed for the formation of massive stars.
For this purpose, we perform self-gravity radiation hydrodynamics simulations of the collapse of massive pre-stellar cores. The formation and evolution of the resulting circumstellar disk is investigated in
1.) axially symmetric simulations using an alpha-shear-viscosity prescription and
2.) a three-dimensional simulation, in which the angular momentum transport is provided self-consistently by developing gravitational torques in the self-gravitating accretion disk.
The simulation series of different strength of the alpha-viscosity shows that the accretion history of the forming star is mostly independent of the alpha-viscosity-parameter. The accretion history of the three-dimensional run driven by self-gravity is more time-dependent than the viscous disk evolution in axial symmetry. The mean accretion rate, i.e. the stellar mass growth, is nearly identical to the alpha-viscosity models.
We conclude that the development of gravitational torques in self-gravitating disks around forming massive stars provides a self-consistent mechanism to efficiently transport the angular momentum to outer disk radii. Also the formation of the most massive stars can therefore be understood in the standard accretion disk scenario.

Reference: Accepted at ApJ
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2011arXiv1102.4090K

Comments:

Email: kuiper@mpia.de

Back to contents

The Luminosity Functions and Timescales of MYSOs and Compact HII regions

Joseph~C.~Mottram[1,2], Melvin~G.~Hoare[2], Ben~Davies[5,2], Stuart~L.~Lumsden[2], Rene~D.~Oudmaijer[2], James~S.~Urquhart[3], Toby~J.~T.~Moore[4], Heather~D.B.~Cooper[2], Joseph~J.~Stead[2]

1: School of Physics, University of Exeter, Exeter, Devon, EX4 4QL, UK
2: School of Physics and Astronomy, University of Leeds, Leeds, LS2 9JT, UK
3: Australia Telescope National Facility, CSIRO Astronomy and Space Science, Sydney, NSW 2052, Australia
4: Astrophysics Research Institute, Liverpool John Moores University, Twelve Quays House, Egerton

Wharf, Birkenhead, CH41 1LD, UK
5: Rochester Institute of Technology, 54 Lomb Memorial Drive, Rochester, NY 14623, USA

We present a determination of the luminosity functions of massive young stellar objects (MYSOs) and compact (C)HII regions within the Milky Way Galaxy using the large, well-selected sample of these sources identified by the Red MSX Source (RMS) survey. The MYSO luminosity function decreases monotonically such that there are few with $Lgtrsim 10^{5}$Lsol, whilst the CHII regions are detected up to ~10$^{6}Lsol. The lifetimes of these phases are also calculated as a function of luminosity by comparison with the luminosity function for local main-sequence OB stars. These indicate that the MYSO phase has a duration ranging from 4x10^{5} yrs for 10^{4}Lsol to ~7x10^{4} yrs at 10^{5}Lsol, whilst the CHII region phase lasts of order 3x10^{5} yrs or ~3-10% of the exciting star's main-sequence lifetime. MYSOs between 10$^{4} Lsol and ~10^{5} Lsol are massive but do not display the radio continuum or near-IR HI{} recombination line emission indicative of an HII region, consistent with being swollen due to high ongoing or recent accretion rates. Above ~10^{5} Lsol the MYSO phase lifetime becomes comparable to the main-sequence Kelvin-Helmholtz timescale, at which point the central star can rapidly contract onto the main-sequence even if still accreting, and ionise a CHII region, thus explaining why few highly luminous MYSOs are observed.

Reference: accepted to ApJL
Status: Manuscript has been accepted

Weblink: http://adsabs.harvard.edu/abs/2011arXiv1102.4702M

Comments: 16 pages in pre-print format, 4 figures, 1 table

Email: joe@astro.ex.ac.uk

Back to contents

A hard and variable X-ray emission from the massive emission line star HD 157832

Raimundo Lopes de Oliveira (1) and Christian Motch (2)

(1) Universidade de São Paulo, IFSC/USP, Brazil; (2) Observatoire Astronomique de Strasbourg, France

We report the discovery of a hard-thermal (T sim 130 MK) and variable X-ray emission from the Be star HD 157832, a new member of the puzzling class of $gamma$-Cas-like Be/X-ray systems. Recent optical spectroscopy reveals the presence of a large/dense circumstellar disc seen at intermediate/high inclination. With a B1.5V spectral type, HD 157832 is the coolest $gamma$-Cas analog known. In addition, its non detection in the ROSAT all-sky survey shows that its average soft X-ray luminosity varied by a factor larger than sim 3 over a time interval of 14 yr. These two remarkable features, ``low'' effective temperature and likely high X-ray variability turn HD 157832 into a promising object for understanding the origin of the unusually high temperature X-ray emission in these systems.

Reference: Accepted for publication in ApJL
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1102.4625

Comments:

Email: rlofilho@gmail.com

Back to contents

Abstracts of 4 conference proceedings

3-D simulations of shells around massive stars

Allard Jan van Marle^1, Rony Keppens^1, and, Zakaria Meliani^1

1 - Centre for Plasma Astrophysics, K.U. Leuven, Belgium

As massive stars evolve, their winds change. This causes a series of hydrodynamical interactions in the surrounding medium. Whenever a fast wind follows a slow wind phase, the fast wind sweeps up the slow wind in a shell, which can be observed as a circumstellar nebula. One of the most striking examples of such an interaction is when a massive star changes from a red supergiant into a Wolf-Rayet star. Nebulae resulting from such a transition have been observed around many Wolf-Rayet stars and show detailed, complicated structures owing to local instabilities in the swept-up shells. Shells also form in the case of massive binary stars, where the winds of two stars collide with one another. Along the collision front gas piles up, forming a shell that rotates along with the orbital motion of the binary stars. In this case the shell follows the surface along which the ram pressure of the two colliding winds is in balance. Using the MPI-AMRVAC hydrodynamics code we have made multi-dimensional simulations of these interactions in order to model the formation and evolution of these circumstellar nebulae and explore whether full 3D simulations are necessary to obtain accurate models of such nebulae.

Reference: Société Royale des Sciences de Liège, Bulletin, vol. 80, p. 266-278 (Proceedings of the 39th Liège Astrophysical Colloquium, held in Liège 12-16 July 2010, edited by G. Rauw, M. De Becker, Y. Nazé, J.-M. Vreux, P. Williams)
Status: Conference proceedings

Weblink: http://popups.ulg.ac.be/SRSL/document.php?id=2770

Comments:

Email: Allardjan.vanmarle@wis.kuleuven.be

Back to contents

Radio observations of massive stars

Ronny Blomme

Royal Observatory of Belgium

Detectable radio emission occurs during almost all phases of massive star evolution. I will concentrate on the thermal and non-thermal continuum emission from early-type stars. The thermal radio emission is due to free-free interactions in the ionized stellar wind material. Early ideas that this would lead to an easy and straightforward way of measuring the mass-loss rates were thwarted by the presence of clumping in the stellar wind. Multi-wavelength observations provide important constraints on this clumping, but do not allow its full determination. Non-thermal radio emission is associated with binarity. This conclusion was already known for some time for Wolf-Rayet stars and in recent years it has become clear that it is

also true for O-type stars. In a massive-star binary, the two stellar winds collide and around the shocks a fraction of the electrons are accelerated to relativistic speeds. Spiralling in the magnetic field these electrons emit synchrotron radiation, which we detect as non-thermal radio emission. The many parameters that influence the resulting non-thermal radio fluxes make the modelling of these systems particularly challenging, but their study will provide interesting new insight into massive stars.

Reference: "The multi-wavelength view of hot, massive stars", 39th Liège Astrophysical Colloquium, Eds. G. Rauw, M. De Becker, Y. Nazé, J.-M. Vreux, P. Williams, Société Royale des Sciences de Liège, Bulletin, 2011, vol. 80, p. 67-80 (http://popups.ulg.ac.be/SRSL/sommaire.php?id=2361)
Status: Conference proceedings

Weblink: http://arxiv.org/abs/1102.0386

Comments:

Email: Ronny.Blomme@oma.be

Back to contents

New Results from the Project MASGOMAS: Near-IR Study of the Stellar Population of Sh2-152

S. Ramírez Alegría (1,2), A. Herrero (1,2), A. Marín-Franch (3,4), E. Puga (5) and F. Najarro (5)

(1) Instituto de Astrofísica de Canarias, E-38205, Tenerife, Spain
(2) Universidad de La Laguna, E-38207, Tenerife, Spain
(3) Centro de Estudios de Física del Cosmos de Aragón (CEFCA), E-44001, Teruel, Spain
(4) Departamento de Astrofísica, Universidad Complutense de Madrid, E-28040, Madrid, Spain
(5) Centro de Astrobiología (CSIC-INTA), E-28850, Torrejón de Ardoz, Madrid, Spain

We present a near-IR and optical spectrophotometric characterization of the stellar population of Sh2-152, as part of our MASGOMAS project.

Using new broad band photometry (J , H and Ks) for the cluster and a control field, we have constructed CMD in order to select OB-candidates for H and K spectroscopy. Also, we have obtained the cluster mass function, with the disc population subtracted using the control field mass function.

From the 13 spectroscopically observed stars, 6 were classified as B-dwarfs and with individual distance and extinction estimations. With these values we have obtained estimations for the distance (3.01 ± 0.11) kpc, mass $(1.86 \pm 0.83) \cdot 10^3 M_\odot$ and age < 8.1 Myr for Sh2-152.

We also present a new optical spectrum for the central ionizing star of Sh2-152, showing some peculiarities associated to this central object and shed some light over the interesting star deeply embedded into the bright Ks nebulosity close to the IRAS source IRAS 22566+5828.

Reference: "The multi-wavelength view of hot, massive stars"; Proceedings of the 39th Liège Int. Astroph. Coll., 12-16 July 2010, edited by G. Rauw, M. De Becker, Y. Nazé, J.-M. Vreux, P. Williams, vol. 80, p. 415-419
Status: Conference proceedings

Weblink: http://popups.ulg.ac.be/SRSL/document.php?id=2896

Comments:

Email: sramirez@iac.es

Back to contents

Radiation pressure feedback in the formation of massive stars

Rolf Kuiper (1,2), Hubert Klahr (2), Henrik Beuther (2), and Thomas Henning (2)

1) Argelander Institute for Astronomy, Bonn University
2) Max Planck Institute for Astronomy, Heidelberg

We investigate the radiation pressure feedback in the formation of massive stars in 1, 2, and 3D radiation hydrodynamics simulations of the collapse of massive pre-stellar cores. In contrast to previous research, we consider frequency dependent stellar radiation feedback, resolve the dust sublimation front in the vicinity of the forming star down to 1.27 AU, compute the evolution for several 10^5 yrs covering the whole accretion phase of the forming star, and perform a comprehensive survey of the parameter space. The most fundamental result is that the formation of a massive accretion disk in slowly rotating cores preserves a high anisotropy in the radiation field. The thermal radiation escapes through the optically thin atmosphere, effectively diminishing the radiation pressure feedback onto the accretion flow. Gravitational torques in the self-gravitating disk drive a sufficiently high accretion rate to overcome the residual radiation pressure. Simultaneously, the radiation pressure launches an outflow in the bipolar direction, which grows in angle with time and releases a substantial fraction of the initial core mass from the star-disk system.
Summarized, for an initial core mass of 60, 120, 240, and 480 Msol these mechanisms allow the star to grow up to 28.2, 56.5, 92.6, and at least 137.2 Msol respectively.

Reference: Bulletin de la Societe Royale des Sciences de Liege, 2011 vol. 80 pp. 211-216
Status: Conference proceedings

Weblink: http://arxiv.org/abs/1102.3567

Comments:

Email: kuiper@mpia.de

Back to contents

JOBS

Post-doc position in B[e] star research

Michaela Kraus

Astronomical Institute AVCR, v.v.i.
Fricova 298
251 65 Ondrejov
Czech Republic

Post-doctoral position in B[e] star research

Applications are invited for a post-doctoral position in the Stellar Physics Department of the Astronomical Institute. The successful applicant will work with Dr. Michaela Kraus on the disks and winds of B[e] stars. The applicant should have experience with observations (spectroscopy and/or interferometry), data reduction, and data analysis of optical and/or infrared data and have a background in massive star evolution, stellar winds, and circumstellar disks. The applicant should have a university degree, preferably PhD, at the time of arrival.

The Stellar Physics Department of the Astronomical Institute is located on the observatory campus in Ondrejov, which is situated approximately 30 km south-east of Prague. The stellar department operates a 2m telescope with a coude spectrograph, which is suitable for studies of bright objects (e.g., B-type stars). Czech Republic is a member state of both ESO and ESA, and has access to ESO facilities. The department includes about a dozen active researchers, with a total of about 60 scientists working at the Astronomical Insititute. The department offers excellent computing facilitities, running under Linux, and including data reduction programmes such as IRAF. Researchers of the Stellar Physics Department also have free access to the computer cluster (http://wave.asu.cas.cz/ocas/).
The salary will be based on the standard domestic scale. The starting date is expected to be earliest in Summer 2011 (subject to negotiation) but not later than January 2012. The position is initially for one year but extension will be possible upon satisfactory scientific results and publication output until at least the end of 2013.

Applicants should send their curriculum vitae, including a list of publications and a summary of the research interests and plans, and arrange to have two letters of recommendation sent to the director of the Institute at the following address:

Astronomical Institute of the ASCR, v.v.i.
Att. Prof. Petr Heinzel, director
Fricova 298
CZ-251 65 Ondrejov
Czech Republic
director@asu.cas.cz

The closing date for applications is 11th March 2011. For informal inquiries please feel free to contact Dr. Michaela Kraus (kraus@sunstel.asu.cas.cz)

Attention/Comments:

Weblink: http://www.asu.cas.cz/news/271_post-doctoral-position-in-b-e-star-research/

Email: kraus@sunstel.asu.cas.cz

Deadline: 11 March 2011

[Back to contents]

MEETINGS

7th Potsdam Thinkshop on "MAGNETIC FIELDS IN STARS AND EXOPLANETS: Future directions in observational and theoretical studies

August 22-25, 2011

Venue: Potsdam, Germany

FIRST ANNOUNCEMENT

Dear colleagues,

We would like to inform you about the 7th Potsdam Thinkshop on "MAGNETIC FIELDS IN STARS AND EXOPLANETS: Future directions in observational and theoretical studies". The meeting will take place in Potsdam, Germany, on August 22-25, 2011.

The conference is focused on stellar magnetic fields, stellar activity cycles and their interactions with exoplanets. The direct comparison of numerical simulations and observational results has special emphasis in this meeting. The program will be very open to discussions and vivid interactions between the scientists. It is planned to give fairly short talks to be able to hear as many news from the field as possible.

Registration is open on the web site

http://www.aip.de/thinkshop7

The list of invited speakers includes
Axel Brandenburg, Stockholm
Matthew Browning, Toronto,
Thorsten Carroll, Potsdam
Scott Gregory, Pasadena
Jean-Mathias Griessmeier, Dwingeloo
Huib Henrichs, Amsterdam
Swetlana Hubrig, Potsdam
Gaitee Hussain, Garching
Petri Kapyla, Helsinki
Leonid Kitchatinov, Irkutsk
Renada Konstantinova-Antova, Sofia
Norbert Langer, Bonn
Gautier Mathys, Garching
Ansgar Reiners, Goettingen
Markus Schoeller, Garching

The conference fee will be 220 EUR if paid before July 1, 2011.
A special rate of 180 EUR will apply to students as well as PhD

students if paid before July 1, 2011.

We are looking forward to your exciting news and a lively Thinkshop!

Sincerely,
Rainer Arlt
Swetlana Hubrig
Klaus G. Strassmeier

Weblink: http://www.aip.de/thinkshop7

Email: shubrig@aip.de

Back to contents

Four Decades of Research on Massive Stars
A Scientific Meeting in the Honour of Anthony F.J. Moffat

Second announcement -- Erratum+updated version

11-15 July 2011

Venue: Auberge du Lac Taureau , Lanaudière, Québec, Canada

THERE HAS BEEN A MISTAKE IN THE DATES OF SELECTION OF THE TALKS IN OUR SECOND ANNOUNCEMENT; IT WILL BE IN LATE APRIL/EARLY MAY. WE ARE ALSO EXTENDING THE DEADLINE FOR EARLY REGISTRATION TO 10 APRIL. HERE IS THE CORRECTED VERSION OF THE ANNOUCEMENT.

We are organizing a meeting to celebrate four decades of contributions of Professor Anthony F.J. Moffat to massive-star research. Since his first papers on open clusters in the early 70’s, Tony’s research interests have expanded in many directions to cover a multitude of aspects of massive stars. The meeting will encompass the main subjects on which he has worked during his career. Please go to our Web site for more details.

We invite you to the Auberge du Lac Taureau in the beautiful region of Lanaudière, Québec, Canada to present your latest research and for stimulating presentations and discussions.

Official registration is now open! For those who have pre-registered please note that it is not considered an official registration, but only a statement of interest. You will be able to submit an abstract and appear on the list of participants only after you have officially registered and paid the registration fees. We will have posters, 20-minute contributed talks (around 50) and about a dozen 30-minute invited talks. If necessary, the SOC will decide by LATE APRIL/EARLY MAY, which participants are chosen for contributed talks and which will present a poster.

Our registration fee will be 230$CAN (late fee=300$CAN) and will include a printed copy of the proceedings, which will be published by the Astronomical Society of the Pacific in their Conference Series, taxes, programs and an abstract book.

Important dates:

Web site opens and start of pre-registration: 18 October 2010
Deadline for early registration: 10 April 2011
Abstract submission deadline: 15 April 2011
Registration fee and hotel reservation deadline: 16 May 2011
Deadline for registration (higher registration fee): 10 June 2011

The Scientific Organizing Committee

Nicole St-Louis, Université de Montréal
Laurent Drissen, Université Laval
Carmelle Robert, Université Laval
Paul Crowther, The University of Sheffield
Doug Gies, Georgia State University, CHARA
Stan Owocki, The Bartol Research Institute, University of Delaware
Julian Pittard, The University of Leeds
Mike Shara, The American Museum of Natural History, New York
Gregg Wade, Royal Military College of Canada, Kingston
Hans Zinnecker, Astrophysikalisches Institut Potsdam
Contact: stlouis@astro.umontreal.ca

The Local Organising Committee:

Nicole St-Louis, Université de Montréal
Laurent Drissen, Université Laval
Carmelle Robert, Université Laval
Robert Lamontagne, Université de Montréal
Luc Turbide, Université de Montréal
Antoine de la Chevrotière, Université de Montréal
Rémi Fahed, Université de Montréal
Alexandre David-Uraz, Université de Montréal
Sébastien Desforges, Université de Montréal
Contact: stlouis@astro.umontreal.ca

Weblink: http://craq-astro.ca/moffat/

Email: stlouis@astro.umontreal.ca

Back to contents