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THE MASSIVE STAR NEWSLETTER

formely known as *the hot star newsletter*

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Contents of this newsletter

Accepted Papers

HD 271791: An Extreme Supernova Runaway B Star Escaping from the Galaxy

Norbert Przybilla (1), Maria Fernanda Nieva (1,2), Ulrich Heber (1), Keith Butler (3)

(1) Dr. Remeis-Observatory Bamberg, (2) MPI for Astrophysics Garching, (3) University Observatory Munich

Hypervelocity stars (HVSs) were first predicted by theory to be the result of the tidal disruption of a binary system by a supermassive black hole (SMBH) that accelerates one component to beyond the Galactic escape velocity (the Hills mechanism). Because the Galactic center hosts such a SMBH it is the suggested place of origin for HVSs. However, the SMBH paradigm has been challenged recently by the young HVS HD271791 because its kinematics point to a birthplace in the metal-poor rim of the Galactic disk. Here we report the atmosphere of HD271791 to indeed show a subsolar iron abundance along with an enhancement of the alpha-elements, indicating capture of nucleosynthesis products from a supernova or a more energetic hypernova. This implies that HD271791 is the surviving secondary of a massive binary system disrupted in a supernova explosion. No such runaway star has ever been found to exceed the Galactic escape velocity; hence HD271791 is the first hyperrunaway star. Such a runaway scenario is an alternative to the Hills mechanism for the acceleration of some HVSs with moderate velocities. The observed chemical composition of HD271791 puts invaluable observational constraints on nucleosynthesis in a supernova from the core collapse of a very massive star ($M_{\rm ZAMS} \gtrsim 55 M_\odot$), which may be observed as a gamma-ray burst of the long-duration/soft-spectrum type.

Reference: ApJ, 684, L103 (2008)

On the web at: http://fr.arxiv.org/abs/0811.0576

Preprints from: przybilla@sternwarte.uni-erlangen.de

Dynamical Simulations of Magnetically Channeled Line-Driven Stellar Winds: III. Angular Momentum Loss and Rotational Spindown

Asif ud-Doula (SUNY-Morrisville State College), Stanley P. Owocki (Univ of DE), Richard H.D. Townsend (Univ of Wisconsin-Madison)

We examine the angular momentum loss and associated rotational spindown for magnetic hot stars with a line-driven stellar wind and a rotation-aligned dipole magnetic field. Our analysis here is based on our previous 2-D numerical MHD simulation study that examines the interplay among wind, field, and rotation as a function of two dimensionless parameters, one characterizing the wind magnetic confinement ($\eta_* \sim B_{eq}^2 R_*^2/\dot{M}v_\infty$), and the other the ratio ($W \sim V_{rot}/V_{orb}$) of stellar rotation to critical (orbital) speed. We compare and contrast the 2-D, time variable angular momentum loss of this dipole model of a hot-star wind with the classical 1-D steady-state analysis by Weber and Davis (WD), who used an idealized monopole field to model the angular momentum loss in the solar wind. Despite the differences, we find that the total angular momentum loss $\dot{J}$ averaged over both solid angle and time follows closely the general WD scaling $\dot{J} = (2/3)\dot{M}\Omega R_A^2$, where $\dot{M}$ is the mass loss rate, Ω is the stellar angular velocity, and R_A is a characteristic Alfvén radius. However, a key distinction here is that for a dipole field, this Alfvén radius has a strong-field scaling $R_A/R_* \sim \eta_*^{1/4}$, instead of the scaling $R_A/R_* \sim \sqrt{\eta_*}$ for a monopole field. This leads to a slower stellar spindown time that in the dipole case scales as $\tau_{spin} = \tau_{mass} 1.5k/\sqrt{\eta_*}$, where $\tau_{mass} \sim M/\dot{M}$ is the characteristic mass loss time, and k is the dimensionless factor for stellar moment of inertia. The full numerical scaling relation we cite gives typical spindown times of order 1 Myr for several known magnetic massive stars.

Reference: MNRAS

On the web at: http://arxiv.org/pdf/0810.4247v1;
http://www.morrisville.edu/∼uddoula/public/data/spindown_final.pdf

Preprints from: uddoula@morrisville.edu

Properties of WNh stars in the SMC: evidence for homogeneous evolution

F. Martins (1), D.J. Hillier (2), J.C. Bouret (3), E. Depagne (4), C. Foellmi (5), S. Marchenko (6), A.F. Moffat (7)

1- GRAAL-CNRS; 2- Pittsburgh; 3- LAM-CNRS; 4- Las Cumbres Observatory; 5- LAOG-CNRS; 6- Western Kentucky; 7- Montreal

We derive the physical properties of three WNh stars in the SMC to constrain stellar evolution beyond the main sequence at low metallicity and to investigate the metallicity dependence of the clumping properties of massive stars. We compute atmosphere models to derive the stellar and wind properties of the three WNh targets. A FUV/UV/optical/near-infrared analysis gives access to temperatures,

luminosities, mass loss rates, terminal velocities and stellar abundances. All stars still have a large hydrogen mass fraction in their atmosphere, and show clear signs of CNO processing in their surface abundances. One of the targets can be accounted for by normal stellar evolution. It is a star with initial mass around 40-50 Msun in, or close to, the core He burning phase. The other two objects must follow a peculiar evolution, governed by fast rotation. In particular, one object is likely evolving homogeneously due to its position blue-ward of the main sequence and its high H mass fraction. The clumping factor of one star is found to be 0.15+/-0.05. This is comparable to values found for Galactic Wolf-Rayet stars, indicating that within the uncertainties, the clumping factor does not seem to depend on metallicity.

Reference: A&A accepted

On the web at: `http://arxiv.org/abs/0811.3564`

Preprints from: `martins@graal.univ-montp2.fr`

CNO-Driven Winds of Hot First Stars

Jiri Krticka, Jiri Kubat

Masaryk University, Brno, Czech Republic Astronomical Institute, Ondrejov, Czech Republic

During the evolution of first stars, the CNO elements may emerge on their surfaces due to the mixing processes. Consequently, these stars may have winds driven purely by CNO elements. We study the properties of such stellar winds and discuss their influence on the surrounding environment. For this purpose, we used our own NLTE models and tested which stellar parameters of the first stars at different evolutionary stages result in CNO winds. If such winds are possible, we calculate their hydrodynamic structure and predict their parameters. We show that, while the studied stars do not have any wind driven purely by hydrogen and helium, CNO driven winds exist in more luminous stars. On the other hand, for very hot stars, CNO elements are too ionized to drive a wind. In most cases the derived mass-loss rate is much less than calculated with solar mixture of elements. This is because wind mass-loss rate in present hot stars is dominated by elements heavier than CNO. We conclude that, until a sufficient amount of these elements is created, the influence of line-driven winds is relatively small on the evolution of hot stars (which are not close to the Eddington limit).

Reference: A&A, in press

On the web at: `http://lanl.arxiv.org/abs/0810.2973`

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

Protodiscs around Hot Magnetic Rotator Stars

M. Maheswarani[1] and J. P. Cassinelli[2]

1 - Dept. of Mathematics, University of Wisconsin Marathon County, 518 S. 7th Avenue, Wausau, WI 54401, USA 2-Dept. of Astronomy, University of Wisconsin - Madison, 475 N. Charter St., Madison, WI 53706, USA

We develop equations and obtain solutions for the structure and evolution of a protodisc region that is initially formed with no radial motion and super-Keplerian rotation speed when wind material from a hot rotating star is channelled towards its equatorial plane by a dipole-type magnetic field.

Its temperature is around 10^7K because of shock heating and the inflow of wind material causes its equatorial density to increase with time. The centrifugal force and thermal pressure increase relative to the magnetic force and material escapes at its outer edge. The protodisc region of a uniformly rotating star has almost uniform rotation and will shrink radially unless some instability intervenes. In a star with angular velocity increasing along its surface towards the equator, the angular velocity of the protodisc region decreases radially outwards and magnetorotational instability (MRI) can occur within a few hours or days. Viscosity resulting from MRI will readjust the angular velocity distribution of the protodisc material and may assist in the formation of a quasi-steady disc. Thus, the centrifugal breakout found in numerical simulations for uniformly rotating stars does not imply that quasi-steady discs with slow outflow cannot form around magnetic rotator stars with solar-type differential rotation.

Reference: MNRAS

On the web at:

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

Spectropolarimetric Variability and Co-Rotating Structure in HD92207

R Ignace[1], S Hubrig[2], M Scholler[3]

[1] East Tennessee State University [2] European Southern Observatory, Chile [3] European Southern Observatory, Germany

We report on low resolution ($Rapprox3000$) spectropolarimetry of the A0 supergiant star HD 92207. This star is well-known for significant spectral variability. The source was observed on seven different nights spanning approximately 3 months in time. With a rotation period of approximately 1 year, our data cover approximately a quarter of the star's rotational phase. Variability in the continuum polarization level is observed over this period of time. The polarization across the H_alpha line on any given night is typically different from the degree and position angle of the polarization in the continuum. Interestingly, H$beta$ is not in emission and does not show polarimetric variability. We associate the changes at H_alpha as arising in the wind, which is in accord with the observed changes in the profile shape and equivalent width of H_alpha along with the polarimetric variability. For the continuum polarization, we explore a spiral shaped wind density enhancement in the equatorial plane of the star, in keeping with the suggestion of Kaufer etal (1997). Variable polarization signatures across H_alpha are too complex to be explained by this simple model and will require a more intensive polarimetric follow-up study to interpret properly.

Reference: to appear in AJ

On the web at: `http://lanl.arxiv.org/abs/0812.0310`

Preprints from: `ignace@etsu.edu`

A New Feature in the Spectrum of the Superluminous LMC Supergiant HDE 269896

Mariela A. Corti (1) Nolan R. Walborn (2) Christopher J. Evans (3)

(1) Instituto Argentino de Radioastronomía (IAR), Centro Científico Tecnológico de La Plata (CCT–LP), CONICET, C.C. No. 5, 1894 Villa Elisa, Argentina; and Facultad de Ciencias Astronómicas y Geofísicas, Universidad Nacional de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina (2) Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA (3) UK Astronomy Technology Centre, Royal Observatory Edinburgh, Blackford Hill, Edinburgh EH9 3HJ, UK

We have found strong selective emission of the N II 5000 AA complex in the spectrum of the LMC hypergiant HDE 269896, ON9.7 Ia^+. Since this object also has anomalously strong He II *lambda*4686 emission for its spectral type, an unusually wide range of ionization in its extended atmosphere is indicated. The published model of this spectrum does not reproduce these emission features, but we show that increased nitrogen and helium abundances, together with small changes in other model parameters, can do so. The morphological and possible evolutionary relationships of HDE 269896, as illuminated by the new spectral features, to other denizens of the OB Zoo are discussed. This object may be in an immediate pre-WNVL (Very Late WN) state, which is in turn the quiescent state of at least some Luminous Blue Variables.

More generally, the N II spectrum in HDE 269896 provides a striking demonstration of the occurrence of two distinctly different kinds of line behavior in O-type spectra: normal absorption lines that develop P Cygni profiles at high wind densities, and selective emission lines from the same ions that do not. Further analysis of these features will advance understanding of both atomic physics and extreme stellar atmospheres.

Reference: PASP

On the web at:

Preprints from: `walborn@stsci.edu`

Scattering Polarization Due to Light Source Anisotropy

R. Ignace[1], M. Al-Malki[2], J. Simmons[2], J. Brown[2], D. Clarke[2], J. Carson[1]

[1] Physics and Astronomy, East Tennessee State University [2] Physics and Astronomy, University of Glasgow

We consider the polarization arising from scattering in an envelope illuminated by a central anisotropic source. Spherical harmonics are used to describe both the light source anisotropy and the envelope density distribution functions of the scattering particles. This framework demonstrates how the net resultant polarization arises from a superposition of three basic "shape" functions: the distribution of source illumination, the distribution of envelope scatterers, and the phase function for dipole scattering. Specific expressions for the Stokes parameters and scattered flux are derived for the case of an ellipsoidal light source inside an ellipsoidal envelope, with principal axes that are generally not aligned. Two illustrative examples are considered: (a) axisymmetric mass loss from a rapidly rotating star, such as may apply to some Luminous Blue Variables, and (b) a Roche-lobe filling star in a binary system with a circumstellar envelope. As a general conclusion, the combination of source anisotropy with distorted scattering envelopes leads to more complex polarimetric behavior such that the source characteristics should be carefully considered when interpreting polarimetric data.

Reference: to appear in A&A

On the web at: astroph/0812.2772

Preprints from: ignace@etsu.edu

On the Behavior of Stellar Winds that Exceed the Photon-Tiring Limit

Allard Jan van Marle[1], Stanley P. Owocki[2], Nir, J. Shaviv[3]

1-KU Leuven, Belgium; 2-University of Delaware, USA; 3-Hebrew University, Israel

Stars can produce steady-state winds through radiative driving as long as the mechanical luminosity of the wind does not exceed the radiative luminosity at its base. This upper bound on the mass loss rate is known as the photon-tiring limit. Once above this limit, the radiation field is unable to lift all the material out of the gravitational potential of the star, such that only part of it can escape and reach infinity. The rest stalls and falls back toward the stellar surface, making a steady-state wind impossible. Photon-tiring is not an issue for line-driven winds since they cannot achieve sufficiently high mass loss rates. It can however become important if the star exceeds the Eddington limit and continuum interaction becomes the dominant driving mechanism. This paper investigates the time-dependent behavior of stellar winds that exceed the photon-tiring limit, using 1-D numerical simulations of a porosity moderated, continuum-driven stellar wind. We find that the regions close to the star show a hierarchical pattern of high density shells moving back and forth, unable to escape the gravitational potential of the star. At larger distances, the flow eventually becomes uniformly outward, though still quite variable. Typically, these winds have a very high density but a terminal flow speed well below the escape speed at the stellar surface. Since most of the radiative luminosity of the star is used to drive the stellar wind, such stars would appear much dimmer than expected from the super-Eddington energy generation at their core. The visible luminosity typically constitutes less then half of the total energy flow and can become as low as ten percent or less for those stars that exceed the photon-tiring limit by a large margin.

Reference: MNRAS

On the web at: http://arxiv.org/abs/0812.0242

Preprints from: allardjan.vanmarle@wis.kuleuven.be

Starburst99 for Windows

Claus Leitherer & Julia Chen

STScI

We describe a Windows compatible version of the evolutionary synthesis code Starburst99. Starburst99 for Windows was developed from the public UNIX based version at STScI. We converted the original Fortran77 source code into a version for a Win32 environment with an Absoft Fortran Pro x86 compiler. Extensive testing showed no significant numerical differences in comparison with the previous UNIX version. The software application consists of the source code, executable, and a number of auxiliary files. The package installs on any PC running Windows 2000, XP, or Vista and can be obtained as

freeware at http://www.stsci.edu/science/starburst/PCStarburst99.html. We give an overview of the different running modes and provide instructions for getting started with the initial set-up.

Reference: New Astronomy (in press)
Comments: See also arXiv:0811.2396

On the web at: `http://www.stsci.edu/science/starburst/PCStarburst.doc`

Preprints from: `leitherer@stsci.edu`

Proceedings

Abundances of Massive Stars: Some Recent Developments

Thierry Morel

Institut d'Astrophysique et de Geophysique, Liege University, Belgium

Thanks to their usefulness in various fields of astrophysics (e.g. mixing processes in stars, chemical evolution of galaxies), the last few years have witnessed a large increase in the amount of abundance data for early-type stars. Two intriguing results emerging since the last reviews on this topic will be discussed: (a) nearby OB stars exhibit metal abundances generally lower than the solar/meteoritic estimates; (b) evolutionary models of single objects including rotation are largely unsuccessful in explaining the CNO properties of stars in the Galaxy and in the Magellanic clouds.

Reference: Invited review presented at 'Evolution and Pulsation of Massive Stars on the Main Sequence and Close to it' (Liege, July 2008). To appear in Communications in Asteroseismology.
Comments: 8 pages and 7 colour figures.

On the web at: `http://www.astro.ulg.ac.be/~morel/preprints.html`

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

The MiMeS Project: Magnetism in Massive Stars

G.A. Wade, E. Alecian, D.A. Bohlender, J.-C. Bouret, J.H. Grunhut, H. Henrichs, C. Neiner, V. Petit, N. St. Louis, M. Auriere, O. Kochukhov, J. Silvester, A. ud-Doula, and the MiMeS Collaboration

PI affiliation: Royal Military College of Canada, Kingston, ON, Canada

The Magnetism in Massive Stars (MiMeS) Project is a consensus collaboration among the foremost international researchers of the physics of hot, massive stars, with the basic aim of understanding the origin, evolution and impact of magnetic fields in these objects. The cornerstone of the project is the MiMeS Large Program at the Canada-France-Hawaii Telescope, which represents a dedication of 640 hours of telescope time from 2008-2012. The MiMeS Large Program will exploit the unique capabilities of the ESPaDOnS spectropolarimeter to obtain critical missing information about the poorly-studied magnetic properties of these important stars, to confront current models and to guide theory.

Reference: Proceedings of IAUS 259: Cosmic Magnetic Fields

On the web at: `http://arxiv.org/abs/0812.4078`

Preprints from: `wade-g@rmc.ca`

The MiMeS Project: First results

J.H. Grunhut, E. Alecian, D.A. Bohlender, J.-C. Bouret, H. Henrichs, C. Neiner, V. Petit, N. St. Louis, G.A. Wade, M. Auriere, O. Kochukhov, J. Silvester, A. ud-Doula, and the MiMeS Collaboration

PI affiliation: Royal Military College of Canada, Kingston, ON, Canada

Massive stars are those stars with initial masses above about 8 times that of the sun, eventually leading to catastrophic explosions in the form of supernovae. These represent the most massive and luminous stellar component of the Universe, and are the crucibles in which the lion's share of the chemical elements are forged. These rapidly-evolving stars drive the chemistry, structure and evolution of galaxies, dominating the ecology of the Universe - not only as supernovae, but also during their entire lifetimes - with far-reaching consequences.

Although the existence of magnetic fields in massive stars is no longer in question, our knowledge of the basic statistical properties of massive star magnetic fields is seriously incomplete. The Magnetism in Massive Stars (MiMeS) Project represents a comprehensive, multidisciplinary strategy by an international team of recognized researchers to address the "big questions" related to the complex and puzzling magnetism of massive stars. This paper presents the first results of the MiMeS Large Program at the Canada-France-Hawaii Telescope.

Reference: Proceedings of IAUS 259: Cosmic Magnetic Fields

On the web at: `http://arxiv.org/abs/0812.4079`

Preprints from: `wade-g@rmc.ca`

Jobs

Postdoctoral Researcher - Rochester Institute of Technology

Donald Figer
Rochester Institute of Technology
Rochester Imaging Detector Laboratory
54 Lomb Memorial Drive
Center for Imaging Science, 76-2246
Rochester, NY 14623

Rochester Institute of Technology invites applications from postdoctoral researchers to pursue research with Dr. Don Figer and Dr. Ben Davies (Leeds). This position is for 2 years with possible extension to 3 years. The position includes funding for travel to observing facilities and conferences.

We seek an energetic postdoctoral scholar to work in the field of massive stars, young massive clusters, the recent star-forming history of the Galaxy, and supernova progenitors using existing data from HST, Spitzer, Chandra, Keck, Gemini, and the VLT. The successful candidate will be expected to lead the effort in analyzing the data, writing papers, presenting results at conferences, proposing additional observations, and supervising data analysts and graduate students.

Experience with near-infrared astronomical observations, data reduction and spectroscopy is desirable. Applicants must have a PhD.

RIT hosts a rich set of research efforts in a broad range of topics, e.g. supermassive black holes, dark energy, gravitational waves, supernovae, massive stars, the Galactic center, star formation, clusters of galaxies, Active Galactic Nuclei, astro-informatics, computational astrophysics, and instrument and detector development. The faculty regularly obtain data from the most advanced facilities in the world, through observations with HST, Gemini, VLT, VLA, Keck, XMM, Chandra and LIGO, and they are developing the next generation of exciting astrophysics facilities through currently funded programs, including JWST, LSST, JDEM, TMT, SOFIA.

Rochester
Rochester offers outstanding cultural and outdoor activities. It was recently ranked the number one city in the nation in overall quality of life, and in the top ten in affordable housing, commuting, and low crime. It is the third largest city in NY State, located in upstate NY, on the shore of Lake Ontario. Rochester is close to the Finger Lakes region, Niagara Falls, and Toronto. Rochester has a world class orchestra and outstanding museums and is listed as one of the top ten best cities for families.

Attention/Comments: Inquiries about this position may be directed to Dr. Don Figer (figer@cis.rit.edu). Apply online at `https://myinfo.rit.edu/OA_HTML/OA.jsp?OAFunc=IRC_VIS_VAC_DISPLAY&p_svid=27355&p_spid=268088`. Applications should be submitted as one PDF file that includes a cover letter, a CV, and a statement of research interests. Applicants should also provide names of three references. The post will remain open until filled.

Weblink: `http://ridl.cis.rit.edu/`

Email contact: `figer@cis.rit.edu`

Closing date: 31-January-2009

Postdoc: Quantitative Spectroscopy as Input for Asteroseismic Modelling of Massive Stars Observed with the MOST, CoRoT and Kepler Space Missions

Conny Aerts
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University of Leuven
Celestijnenlaan 200D
B - 3001 Leuven
Belgium

Short project description

The IvS is heavily involved in ongoing and future space missions for asteroseismology and exoplanet hunting. These missions provide ultra-precise white light photometric data from which the oscillation frequencies can be derived. A vast number of new massive pulsators (both single and binary stars) has already been found from the MOST and CoRoT missions and more is to come in the near future. The goal of the present project is to provide the necessary spectroscopic information (fundamental parameters, abundances, rotational and pulsational velocity parameters, binary solutions) to perform a seismic modelling of the most interesting single and binary massive pulsators observed with space missions and/or from ground-based network campaigns.

The postdoc shall hold the responsibility to exploit approved spectroscopic observations from ESO/Paranal with FLAMES/VLT and from La Palma with HERMES/Mercator. The postdoc shall also take the responsibility to gather and exploit new spectroscopy with various open-competition telescopes throughout the project.

The gathered spectroscopy will allow an unbiased classification of the detailed spectroscopic properties of numerous massive pulsators to derive their evolutionary status independently from the asteroseismology. The overall goal of the IvS's seismology programme of massive stars is to achieve extensive seismic tuning of stars in the uppermost part of the Hertzsprung-Russell Diagram.

Required experience

The candidate
– holds a PhD in Astrophysics;
– has an excellent track record of peer-reviewed publications;
– masters all the necessary steps to fully reduce raw echelle spectroscopy;
– is a recognised expert in quantitative spectroscopy of massive stars;
– masters the use of state-of-the-art NLTE atmospheric models and line-prediction codes;
– has good knowledge of tools to interprete binary star data.

Knowledge of asteroseismology and/or automated statistical classification methods are assets, but not requirements. Experience with the reduction and interpretation of FLAMES/UVES@VLT data is an asset.

Tasks

The postdoc shall
– perform quantitative analyses of high-resolution spectroscopic data of OB stars as input for seismic modelling.
– be involved in asteroseismology research of massive stars within the IvS team, based on MOST, CoRoT and Kepler space data, as well as on ground-based data.
– perform statistical classification and clustering analyses based on spectroscopic and photometric data to derive the evolutionary status of massive stars and to delineate observational instability regions in the upper Hertzsprung-Russell diagram.
– co-develop and survey the observational monitoring programmes at the Mercator telescope and develop efficient tools to streamline the data-flow and the scientific interpretation of HERMES spectra.
– take up a teaching task in the Bachelor of Physics or in the Master of Astronomy & Astrophysics of maximum 4 hours/week (courses Research Projects).
– assist the project leader in the writing of and reporting for research grants (5% of the time).
– perform at least one observing run of two weeks per year for the pooled IvS programmes at the observatories of La Palma or La Silla.

The postdoc shall have the opportunity to act as supervisor for bachelor and master project research work and master thesis research, as well as co-supervisor of PhD students.

Contract

– Following the usual procedure at Leuven University, the initial contract runs over two years and will be prolonged with another two years after positive evaluation. The position is to be taken up as soon as possible. Applicants are requested to indicate their availability in their application (not later than 1 August 2009).
– Salary is according to the university regulations for postdoctoral researchers and depends on age and work experience.

Attention/Comments: Full information available at http://www.ster.kuleuven.be/vacancies/index_en.html

Weblink: `http://www.ster.kuleuven.be/vacancies/index_en.html`

Email contact: `conny@ster.kuleuven.be`

Closing date: 1 February 2009

Meetings

High Energy Phenomena in Massive Stars

2-5 Feb. 2009
Jaén, Spain

Massive stars are known to be sources of very high energy photons, which we conventionally define here as being more energetic than the electron's rest mass. This meeting is mainly devoted to our understanding of massive stars in this energy domain that broadly overlaps with gamma-rays. A new generation of gamma-ray satellites and Cherenkov telescopes is currently providing a great wealth of data in connection with massive stars, thus making a dedicated meeting timely and necessary. Other wavelength domains will also be covered to the extent relevant to understanding very high-energy emission.

The range of astrophysical topics to be covered include:
Particle acceleration in massive stars.
Gamma-ray production mechanisms in massive binaries with a compact companion.
The stellar wind connection and feedback effects.
Gamma-rays in massive star-forming regions.
Non-thermal radio emission in massive gamma-ray emitting stars.
Gamma-rays from isolated and binary massive stars.
Gamma-rays from dying and fossil massive stars.
The new generation of gamma-ray telescopes and future perspectives for massive stars.

Weblink: `http://www.ujaen.es/congreso/massive.stars2009/`

Email contact: `mstars09@ujaen.es`

Magnetic Fields of Stars: From the Sun to Compact Objects (39th Saas-Fee Advanced Course)

March 23-28 2009 Les Diablerets (Switzerland)

Magnetic Fields of Stars: From the Sun to Compact Objects

The course addresses all aspects of stellar magnetic fields. The Sun, of which we best know and understand the magnetic field, shall serve as a reference object. Thus, lectures on the solar magnetic field will occupy about one third of the course, treating in detail the solar dynamo and all aspects of magnetic fields on the solar surface and in the outer atmosphere, and basic techniques of polarimetry of magnetic fields. In another third of the course we will turn our interest to magnetic fields of stars. On the theoretical side we will focus on stellar dynamos and magnetic fields during star formation and stellar evolution, and on the observational side on techniques and results from Doppler and Zeeman imaging of stellar magnetic fields and on the magnetic activity of different types of stars. A third of the full course will be devoted to the fate of the magnetic fields in the formation of the compact objects that emerge at the end of stellar evolution. This includes the current understanding of the observation and dynamics of magnetic fields in stellar collapse, white dwarfs and neutron stars.

The lectures will be given by three top experts in the field. These are:

Paul Charbonneau Département de Physique Université de Montréal Montréal, Canada

Sami K. Solanki Max-Planck-Institute fr Sonnensystemforschung Katlenburg-Lindau, Germany

Christopher Thompson Canadian Institute for Theoretical Astrophysics Toronto, Canada

The lectures will be held in the morning and in the late afternoon leaving free time for informal discussions, studies, and outdoor activities (skiing) in the afternoons.

The course is intended mainly for post graduate astronomers and physicists who wish to broaden their knowledge about astrophysical magnetic fields. More information on the course programme, general information, and registration is available on this course web-site (http://www.physik.unibas.ch/saasfee39).

Organisers: S. Berdyugina, R. Hirschi, M. Liebendrfer, G. Meynet, O. Steiner and F.-K. Thielemann
Contact: saasfee39-physik@unibas.ch

Weblink: `http://www.physik.unibas.ch/saasfee39/`

Email contact: `saasfee39-physik@unibas.ch`

Eta Carinae in the Context of the Most Massive Stars

JD13: 13-14 ; follow up meeting 15/Aug 2009 Rio de Janeiro, Brazil, IAU GA 2009

Motivation

Eta Car, with its historical outbursts and visible ejecta, continues to challenge both observers and modelers. Just in the past five years over 100 papers have been published. We now know it to be a massive binary system with a 5.54-year period. In January 2009, Eta Car will undergo one of these periodic low-states and will be followed by an intensive multi-wavelength campaign ranging from X-rays to radio. A large amount of data will be collected and used to test a number of working models, including 3-D models of the massive interacting winds. August 2009 is an excellent time for observers and theorists to come together and review the accumulated studies, as have occurred in four meetings since 1998 devoted to Eta Car. WR140 is also passing through periastron in early 2009. It, too, is a intensively studied massive interacting binary. Comparison of its properties with that of Eta Car will be very instructive. These well-known examples of evolved massive binary systems provide many clues as to the fate of the most massive stars. What are the effects of the interacting winds, of individual stellar rotation, and of the circumstellar material on what we see as hypernovae/supernovae?

Topics

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

Call for papers

We are receiving submissions for oral talks and posters

Follow up meeting

The 1.5 days allocated for the Joint Discussion will not cover all topics and indeed observations and modeling will continue on these systems. A one to two day workshop will immediately follow the IAU General Assembly devoted to specific topics defined by attendees of the Joint Discussion. Orbital parameters and wind-wind collision physics are two already defined topics for this workshop.

Pre-registration is open

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