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THE MASSIVE STAR NEWSLETTER

formerly known as the hot star newsletter

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CONTENTS OF THIS NEWSLETTER:

Abstracts of 3 conference proceedings

Closed Jobs

Meetings

News

New URL for the Galactic O-Star Catalog

The Galactic O-Star Catalog (GOSC) has been updated with the latest results of Maíz Apellániz & Barbá (2018). More importantly, the main URL has been finally changed to http://gosc.cab.inta-csic.es and is now sited at the institution where I moved three years ago. For the time being, the old URL (http://gosc.iaa.es) will be left as a mirror. Merry Christmas to all.

Weblink: http://gosc.cab.inta-csic.es

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Back to contents

PAPERS

Abstracts of 14 accepted papers

Observational properties of massive black hole binary progenitors

R. Hainich (1), L. M. Oskinova (1), T. Shenar (1), P. Marchant (2,3), J. J. Eldridge (4), A. A. C. Sander (1), W.-R. Hamann (1), N. Langer (2), and H. Todt (1)

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The first directly detected gravitational waves (GW 150914) were emitted by two coalescing black holes (BHs) with masses of ~36Msun and ~29Msun. Several scenarios have been proposed to put this detection into an astrophysical context. The evolution of an isolated massive binary system is among commonly considered models. Various groups have performed detailed binary-evolution calculations that lead to BH merger events. However, the question remains open as to whether binary systems with the predicted properties really exist. The aim of this paper is to help observers to close this gap by providing spectral characteristics of massive binary BH progenitors during a phase where at least one of the companions is still non-degenerate. Stellar evolution models predict fundamental stellar parameters. Using these as input for our stellar atmosphere code (PoWR), we compute a set of models for selected evolutionary stages of massive merging BH progenitors at different metallicities. The synthetic spectra obtained from our atmosphere calculations reveal that progenitors of massive BH merger events start their lives as O2-3V stars that evolve to early-type blue supergiants before they undergo core-collapse during the Wolf-Rayet phase. When the primary has collapsed, the remaining system will appear as a wind-fed high-mass X-ray binary. Based on our atmosphere models, we provide feedback parameters, broad band magnitudes, and spectral templates that should help to identify such binaries in the future. While the predicted parameter space for massive BH binary progenitors is partly realized in nature, none of the known massive binaries match our synthetic spectra of massive BH binary progenitors exactly. Comparisons of empirically determined mass-loss rates with those assumed by evolution calculations reveal significant differences. The consideration of the empirical mass-loss rates in evolution calculations will possibly entail a shift of the maximum in the predicted binary-BH merger rate to higher metallicities, that is, more candidates should be expected in our cosmic neighborhood than previously assumed.

Reference: Astronomy & Astrophysics (arXiv:1707.01912)
Status: Manuscript has been accepted

Weblink: https://arxiv.org/abs/1707.01912

Comments:

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Back to contents

The Structure of the Young Star Cluster NGC 6231. II. Structure, Formation, and Fate

Michael A. Kuhn (1,2), Konstantin V. Getman (3), Eric D. Feigelson (3,1), Alison Sills (4), Mariusz Gromadzki (5,1,2), Nicolas Medina (1,2), Jordanka Borissova (1,2), Radostin Kurtev (1,2)

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The young cluster NGC 6231 (stellar ages ~2-7 Myr) is observed shortly after star-formation activity has ceased. Using the catalog of 2148 probable cluster members obtained from Chandra, VVV, and optical surveys (Paper I), we examine the cluster's spatial structure and dynamical state. The spatial distribution of stars is remarkably well fit by an isothermal sphere with moderate elongation, while other commonly used models like Plummer spheres, multivariate normal distributions, or power-law models are poor fits. The cluster has a core radius of 1.2 ± 0.1 pc and a central density of ~200 stars pc^{-3}. The distribution of stars is mildly mass segregated. However, there is no radial stratification of the stars by age. Although most of the stars belong to a single cluster, a small subcluster of stars is found superimposed on the main cluster, and there are clumpy non-isotropic distributions of stars outside ~4 core radii. When the size, mass, and age of NGC 6231 are compared to other young star clusters and subclusters in nearby active star-forming regions, it lies at the high-mass end of the distribution but along the same trend line. This could result from similar formation processes, possibly hierarchical cluster assembly. We argue that NGC 6231 has expanded from its initial size but that it remains gravitationally bound.

Reference: AJ, 154, 214
Status: Manuscript has been accepted

Weblink: http://iopscience.iop.org/article/10.3847/1538-3881/aa9177

Comments: 2 tables and 14 figures

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Back to contents

The Evolution of Supermassive Population III Stars

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Supermassive primordial stars forming in atomically-cooled halos at z~15-20 are currently thought to be the progenitors of the earliest quasars in the Universe. In this picture, the star evolves under accretion rates of 0.1-1 Msun/yr until the general relativistic instability triggers its collapse to a black hole at masses of ~10^5 Msun. However, the ability of the accretion flow to sustain such high rates depends crucially on the photospheric properties of the accreting star, because its ionising radiation could reduce or even halt accretion. Here we present new models of supermassive Population III protostars accreting at rates 0.001-10 Msun/yr, computed with the GENEVA stellar evolution code including general relativistic corrections to the internal structure. We compute for the first time evolutionary tracks in the mass range M > 10^5 Msun. We use the polytropic stability criterion to estimate the mass at which the collapse occurs, which has been shown to give a lower limit of the actual mass at collapse in recent hydrodynamic simulations. We find that at accretion rates higher than 0.01 Msun/yr the stars evolve as red, cool supergiants with surface temperatures below 10^4 K towards masses >10^5 Msun. Moreover, even with the lower rates 0.001 Msun/yr < dM/dt < 0.01 Msun/yr, the surface temperature is substantially reduced from 10^5 K to 10^4 K for M > 600 Msun. Compared to previous studies, our results extend the range of masses and accretion rates at which the ionising feedback remains weak, reinforcing the case for direct collapse as the origin of the first quasars. We provide numerical tables for the surface properties of our models.

Reference: MN-17-1478-MJ (in press)

Status: Manuscript has been accepted

Weblink: http://arxiv.org/pdf/1705.09301.pdf

Comments:

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Back to contents

Coupling hydrodynamics with comoving frame radiative transfer: II. Stellar wind stratification in the high-mass X-ray binary Vela X-1

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CONTEXT: Vela X-1, a prototypical high mass X-ray binary (HMXB), hosts a neutron star (NS) in a close orbit around an early-B supergiant donor star. Accretion of the donor star's wind onto the NS powers its strong X-ray luminosity. To understand the physics of HMXBs, detailed knowledge about the donor star winds is required.
AIMS: To gain a realistic picture of the donor star in Vela X-1, we constructed a hydrodynamically consistent atmosphere model describing the wind stratification while properly reproducing the observed donor spectrum. To investigate how X-ray illumination affects the stellar wind, we calculated additional models for different X-ray luminosity regimes.
METHODS: We use the recently updated version of the PoWR code to consistently solve the hydrodynamic equation together with the statistical equations and the radiative transfer.
RESULTS: The wind flow in Vela X-1 is driven by ions from various elements with Fe III and S III leading in the outer wind. The model-predicted mass-loss rate is in line with earlier empirical studies. The mass-loss rate is almost unaffected by the presence of the accreting NS in the wind. The terminal wind velocity is confirmed at v_inf ≈ 600 km/s. On the other hand, the wind velocity in the inner region where the NS is located is only ≈100 km/s, which is not expected on the basis of a standard β-velocity law. In models with an enhanced level of X-rays, the velocity field in the outer wind can be altered. If the X-ray flux is too high, the acceleration breaks down because the ionization increases.
CONCLUSIONS: Accounting for radiation hydrodynamics, our Vela X-1 donor atmosphere model reveals a low wind speed at the NS location, and it provides quantitative information on wind driving in this important HMXB.

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

Weblink: https://arxiv.org/abs/1708.02947

Comments: 19 pages, 10 figures

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Back to contents

The IACOB project. V. Spectroscopic parameters of the O-type stars in the modern grid of standards for spectral classification

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The IACOB and OWN surveys are two ambitious complementary observational projects which have made available a large multi-epoch spectroscopic database of optical high resolution spectra of Galactic massive O-type stars. As a first step in the study of the full sample of (more than 350) O stars surveyed by the IACOB/OWN projects, we have performed the quantitative spectroscopic analysis of a subsample of 128 stars included in the modern grid of O-type standards for spectral classification. We use semi-automatized tools to determine the set of spectroscopic parameters that can be obtained from the optical spectrum of O-type stars. We also benefit from the multi-epoch character of the surveys to perform a spectroscopic variability study of the sample, accounting for spectroscopic binarity and variability of the main wind diagnostic lines. We provide a general overview of the stellar and wind parameters of this reference sample, and updated recipes for the SpT-Teff/log g calibrations for Galactic O-type stars. We evaluate our semi-automatized analysis strategy with ~40 stars from the literature, and find a good agreement. The agreement between the synthetic spectra associated with fastwind best fitting models and the observed spectra is good for most targets, but 46 stars present a particular behavior of the wind diagnostic lines that cannot be reproduced by our grid of spherically symmetric unclumped models. These are potential targets of interest for more detailed investigations of clumpy winds and/or the existence of additional circumstellar components. Last, our variability study has led to the detection of signatures of spectroscopic binarity in 27% of the stars and small amplitude radial velocity variations in the photospheric lines of another 30%. Additionally, 31% of the investigated stars show variability in the wind diagnostic lines.

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

Weblink: https://arxiv.org/abs/1711.10043

Comments: 20 pages, 18 figures

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Back to contents

New massive members of Cygnus OB2

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The Cygnus complex is one of the most powerful star forming regions at a close distance from the Sun (~1.4 kpc). Its richest OB association Cygnus OB2 is known to harbor many tens of O-type stars and hundreds of B-type stars, providing a large homogeneous population of OB stars that can be analyzed. Many studies of its massive population have been developed in the last decades, although the total number of OB stars is still incomplete. Our aim is to increase the sample of O and B members of Cygnus OB2 and its surroundings by spectroscopically classifying 61 candidates as possible OB-type members of Cygnus OB2. We have obtained new blue intermediate-resolution spectra suitable for spectral classification of the 61 candidates in Cygnus OB2 and surroundings. We thus performed a spectral classification of the sample using He I-II and metal lines rates, as well as the Marxist Ghost Buster (MGB) software for O-type stars and the IACOB standards catalog for B-type stars. Out of the 61 candidates, we have classified 42 stars as new massive OB-type stars, earlier than B3, in Cygnus OB2 and surroundings, including 11 O-type stars. The other candidates are discarded as they display later spectral types inconsistent with membership in the association. However, the magnitude cutoff and dust extinction introduce an incompleteness. Many O and early B stars at B > 16 mag are still undiscovered in the region. Finally, we have studied the age and extinction distribution of our sample within the region, placing them in the Hertzsprung-Russell Diagram using different stellar models in order to assess age uncertainties. Massive star formation in Cygnus OB2 seems to have proceeded from lower to higher Galactic longitudes, regardless of the details of the models used. The correlation between age and Galactic longitude previously found in the region is now confirmed.

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Weblink: http://arxiv.org/abs/1711.06945

Comments: 20 pages, 12 figures

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Back to contents

A search for the presence of magnetic fields in the two Supergiant Fast X-ray Transients IGR\,J08408$-$4503 and IGR\,J11215$-$5952

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A significant fraction of high-mass X-ray binaries are supergiant fast X-ray transients (SFXTs). The prime model for the physics governing their X-ray behaviour suggests that the winds of donor OB supergiants are magnetized. To investigate if magnetic fields are indeed present in the optical counterparts of such systems, we acquired low-resolution spectropolarimetric observations of the two optically brightest SFXTs, IGR\,J08408$-$4503 and IGR\,J11215$-$5952 with the ESO FORS\,2 instrument during two different observing runs. No field detection at a significance level of 3σ was achieved for IGR\,J08408$-$4503. For IGR\,J11215$-$5952, we obtain 3.2σ and 3.8σ detections ($\left< B_{\rm z}\right>_{\rm hydr}=-978\pm308$\,G and $\left< B_{\rm z}\right>_{\rm hydr}=416\pm110$\,G) on two different nights in 2016. These results indicate that the model involving the interaction of a magnetized stellar wind with the neutron star magnetosphere can indeed be considered to characterize the behaviour of SFXTs.
We detected long-term spectral variability in IGR\,J11215$-$5952, while for IGR\,J08408$-$4503 we find an indication of the presence of short-term variability on a time scale of minutes.

Reference: MNRAS
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Weblink: arxiv.org/abs/1712.00345

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Back to contents

Low-frequency photospheric and wind variability in the early-B supergiant HD 2905

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Despite the important advances in space asteroseismology during the last decade, the early phases of evolution of stars with masses above $\sim$15 M$_{\odot}$ have been only vaguely explored up to now. Our goal is to detect, analyze and interpret variability in the early-B type supergiant HD 2905 using long-term, ground based, high resolution spectroscopy. We gather a total of 1141 high-resolution spectra covering some 2900 days. We complement these observations with the Hipparcos light curve, which includes 160 data points obtained during a time span of $\sim$1200 days. We investigate spectroscopic variability of up to 12 diagnostic lines by using the zero and first moments of the line profiles. We perform a frequency analysis of both the spectroscopic and photometric dataset. HD 2905 is a spectroscopic variable with peak-to-peak amplitudes in the zero and first moments of the photospheric lines of up to 15\% and 30 \kms, respectively. The amplitude of the line-profile variability is correlated with the line formation depth in the photosphere and wind. All investigated lines present complex temporal behavior indicative of multi-periodic variability with timescales of a few days to several weeks. The Scargle periodograms of the Hipparcos light curve and the first moment of purely photospheric lines reveal a low-frequency amplitude excess and a clear dominant frequency at $\sim$0.37 d^{-1}. In the spectroscopy, several additional frequencies are present in the range 0.1 - 0.4 d^{-1}. These may be associated with heat-driven gravity modes, convectively-driven gravity

waves, or sub-surface convective motions. Additional frequencies are detected below 0.1 d^{-1}. In the particular case of Hα, these are produced by rotational modulation of a non-spherically symmetric stellar wind.

Reference: A&A
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Weblink: https://arxiv.org/abs/1711.08994

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Back to contents

Detection of magnetic field in the B2 star ρ Oph A with ESO FORS2

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Circumstantial evidence suggests that magnetism and enhanced X-ray emission are likely correlated in early B-type stars: similar fractions of them (~ 10 %) are strong and hard X-ray sources and possess strong magnetic fields. It is also known that some B-type stars have spots on their surface. Yet up to now no X-ray activity associated with spots on early-type stars was detected. In this Letter we report the detection of a magnetic field on the B2V star ρ Oph A. Previously, we assessed that the X-ray activity of this star is associated with a surface spot, herewith we establish its magnetic origin. We analyzed FORS2 ESO VLT spectra of ρ Oph A taken at two epochs and detected a longitudinal component of the magnetic field of order of ~500 G in one of the datasets. The detection of the magnetic field only at one epoch can be explained by stellar rotation which is also invoked to explain observed periodic X-ray activity. From archival HARPS ESO VLT high resolution spectra we derived the fundamental stellar parameters of ρ Oph A and further constrained its age. We conclude that ρ Oph A provides strong evidence for the presence of active X-ray emitting regions on young magnetized early type stars.

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Weblink:

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Back to contents

Global hot-star wind models for stars from Magellanic Clouds

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We provide mass-loss rate predictions for O stars from Large and Small Magellanic Clouds. We calculate global (unified, hydrodynamic) model atmospheres of main sequence, giant, and supergiant stars for chemical composition corresponding to Magellanic Clouds. The models solve radiative transfer equation in comoving frame, kinetic equilibrium equations (also known as NLTE equations), and hydrodynamical equations from (quasi-)hydrostatic atmosphere to expanding stellar wind. The models allow us to predict wind density, velocity, and temperature (consequently also the terminal wind velocity and the mass-loss rate) just from basic global stellar parameters. As a result of their lower metallicity, the line radiative driving is weaker leading to lower wind mass-loss rates with respect to the Galactic stars. We provide a formula that fits the mass-loss rate predicted by our models as a function of stellar luminosity and metallicity. On average, the mass-loss rate scales with metallicity as Z^0.59. The predicted mass-loss rates are lower than mass-loss rates derived from Halpha diagnostics and can be reconciled with observational results assuming clumping factor Cc=9. On the other hand, the predicted mass-loss rates either agree or are slightly higher than the mass-loss rates derived from ultraviolet wind line profiles. The calculated PV ionization fractions also agree with values derived from observations for LMC stars with Teff<40 000 K. Taken together, our theoretical predictions provide reasonable models with consistent mass-loss rate determination, which can be used for quantitative study of stars from Magellanic Clouds.

Reference: Astronomy & Astrophysics, in press
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Weblink: http://adsabs.harvard.edu/abs/2017arXiv171203321K

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Back to contents

A changing wind collision

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We report on the first detection of a global change in the X-ray emitting properties of a wind-wind collision, thanks to XMM-Newton observations of the massive SMC system HD5980. While its lightcurve had remained unchanged between 2000 and 2005, the X-ray flux has now increased by a factor of ~2.5, and slightly hardened. The new observations also extend the observational coverage over the entire orbit, pinpointing the lightcurve shape. It has not varied much despite the large overall brightening, and a tight correlation of fluxes with orbital separation is found, without any hysteresis effect. Moreover, the absence of eclipses and of absorption effects related to orientation suggests a large size for the X-ray emitting region. Simple analytical models of the wind-wind collision, considering the varying wind properties of the eruptive component in HD5980, are able to reproduce the recent hardening and the flux-

separation relationship, at least qualitatively, but they predict a hardening at apastron and little change in mean flux, contrary to observations. The brightness change could then possibly be related to a recently theorized phenomenon linked to the varying strength of thin-shell instabilities in shocked wind regions.

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Status: Manuscript has been accepted

Weblink: https://arxiv.org/abs/1712.05625

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Back to contents

Detection of a centrifugal magnetosphere in one of the most massive stars in the rho Oph star-forming cloud

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Recent XMM-Newton observations of the B2 type star rho Oph A indicated a periodicity of 1.205d, which was ascribed to rotational modulation. Since variability of X-ray emission in massive stars is frequently the signature of a magnetic field, we investigated whether the presence of a magnetic field can indeed be invoked to explain the observed X-ray peculiarity. Two FORS2 spectropolarimetric observations in different rotation phases revealed the presence of a negative (B_z_all=-419+-101G) and positive (B_z_all=538+-69G) longitudinal magnetic field, respectively. We estimate a lower limit for the dipole strength as B_d = 1.9+-0.2kG. Our calculations of the Kepler and Alfven radii imply the presence of a centrifugally supported, magnetically confined plasma around rho Oph A. The study of the spectral variability indicates a behaviour similar to that observed in typical magnetic early-type Bp stars.

Reference: AN
Status: Manuscript has been accepted

Weblink: https://arxiv.org/abs/1712.05939

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Back to contents

Astrophysics of Red Supergiants

Emily M. Levesque

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'Astrophysics of Red Supergiants' is the first book of its kind devoted to our current knowledge of red supergiant stars, a key evolutionary phase that is critical to our larger understanding of massive stars. It provides a comprehensive overview of the fundamental physical properties of red supergiants, their

evolution, and their extragalactic and cosmological applications. It serves as a reference for researchers from a broad range of fields (including stellar astrophysics, supernovae, and high-redshift galaxies) who are interested in red supergiants as extreme stages of stellar evolution, dust producers, supernova progenitors, extragalactic metallicity indicators, members of massive binaries and mergers, or simply as compelling objects in their own right. The book is accessible to a range of experience levels, from graduate students up to senior researchers.

Reference: AAS-IOP eBook series
Status: Manuscript has been accepted

Weblink: http://iopscience.iop.org/book/978-0-7503-1329-2

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Back to contents

Optical-NIR dust extinction towards Galactic O stars

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Context. O stars are excellent tracers of the intervening ISM because of their high luminosity, blue intrinsic SED, and relatively featureless spectra. We are currently conducting the Galactic O-Star Spectroscopic Survey (GOSSS), which is generating a large sample of O stars with accurate spectral types within several kpc of the Sun.
Aims. To obtain a global picture of the properties of dust extinction in the solar neighborhood based on optical-NIR photometry of O stars with accurate spectral types.
Methods. We have processed a carefully selected photometric set with the CHORIZOS code to measure the amount [E(4405-5495)] and type [R_5495] of extinction towards 562 O-type stellar systems. We have tested three different families of extinction laws and analyzed our results with the help of additional archival data.
Results. The Maíz Apellániz et al. (2014, A&A 564, A63) family of extinction laws provides a better description of Galactic dust that either the Cardelli et al. (1989, ApJ 345, 245) or Fitzpatrick (1999, PASP 111, 63) families, so it should be preferentially used when analyzing samples similar to the one in this paper. In many cases O stars and late-type stars experience similar amounts of extinction at similar distances but some O stars are located close to the molecular clouds left over from their births and have larger extinctions than the average for nearby late-type populations. In qualitative terms, O stars experience a more diverse extinction than late-type stars, as some are affected by the small-grain-size, low-R_5495 effect of molecular clouds and others by the large-grain-size, high-R_5495 effect of H II regions. Late-type stars experience a narrower range of grain sizes or R_5495, as their extinction is predominantly caused by the average, diffuse ISM. We propose that the reason for the existence of large-grain-size, high-R_5495 regions in the ISM in the form of H II regions and hot-gas bubbles is the selective destruction of small dust grains by EUV photons and possibly by thermal sputtering by atoms or ions.

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Weblink: https://arxiv.org/abs/1712.09228

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Back to contents

Abstracts of 1 submitted papers

Accretion from a clumpy massive-star wind in Supergiant X-ray binaries

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Supergiant X-ray Binaries (SgXB) host a compact object, often a neutron star (NS), orbiting an evolved O/B star. Mass transfer proceeds through the intense line-driven wind of the stellar donor, a fraction of which is captured by the gravitational field of the NS. The subsequent accretion process onto the NS is responsible for the abundant X-ray emission from SgXB. They also display peak-to-peak variability of the X-ray flux by a factor of a few 10 to 100, along with changes in the hardness ratios possibly due to varying absorption along the line-of-sight. We use recent radiation-hydrodynamic simulations of inhomogeneities (aka clumps) in the non-stationary wind of massive hot stars to evaluate their impact on the time-variable accretion process. For this, we run 3D hydrodynamic simulations of the wind in the vicinity of the accretor to investigate the formation of the bow shock and follow the inhomogeneous flow over several spatial orders of magnitude, down to the NS magnetosphere. In particular, we show that the impact of the wind clumps on the time-variability of the intrinsic mass accretion rate is severely tempered by the crossing of the shock, compared to the purely ballistic Bondi-Hoyle-Lyttleton estimation. We also account for the variable absorption due to clumps passing by the line-of-sight and estimate the final effective variability of the column density and mass accretion rate for different orbital separations. Finally, we compare our results to the most recent analysis of the X-ray flux and the hardness ratio in Vela X-1.

Reference: arXiv:1711.08709
Status: Manuscript has been submitted

Weblink: https://arxiv.org/abs/1711.08709

Comments:

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Back to contents

Abstracts of 3 conference proceedings

The VLT-FLAMES Tarantula Survey

Vink, Jorick S.; Evans, C. J.; Bestenlehner, J.; McEvoy, C.; Ramirez-Agudelo, O.; Sana, H.; Schneider, F.; VFTS

Armagh Observatory

We present a number of notable results from the VLT-FLAMES Tarantula Survey (VFTS), an ESO Large Program during which we obtained multi-epoch medium-resolution optical spectroscopy of a very large sample of over 800 massive stars in the 30 Doradus region of the Large Magellanic Cloud (LMC). This unprecedented data-set has enabled us to address some key questions regarding atmospheres and winds, as well as the evolution of (very) massive stars. Here we focus on O-type runaways, the width of the main sequence, and the mass-loss rates for (very) massive stars. We also provide indications for the presence of a top-heavy initial mass function (IMF) in 30 Dor.

Reference: 2017, IAUS 329: "The Lives and Death-Throes of Massive Stars", eds.
Eldridge, J.J.,Bray, J.C., McClelland, L.A.S., Xiao, L.
Status: Conference proceedings

Weblink: http://adsabs.harvard.edu/abs/2017arXiv171011220V

Comments: 7 Figures, 8 pages. Invited talk.

Email: jsv@arm.ac.uk

Back to contents

Multiple, short-lived "stellar prominences" on the O giant xi Persei: a magnetic star?

N. Sudnik(1) and H.F. Henrichs(2)

(1) Belarussian State Pedagogical University, 220050, Sovetskaya 18, Minsk, Belarus
(2) Anton Pannekoek Institute for Astronomy, University of Amsterdam, Science Park 904, 1098 XH Amsterdam, Netherlands

We present strong evidence for a rotation period of 2.0406 d of the O giant xi Persei, derived from the N IV 1718 wind line in 12 yr of IUE data. We predict that xi Per has a magnetic dipole field, with superposed variable magnetic prominences. Favorable dates for future magnetic measurements can be predicted. We also analysed time-resolved He II 4686 spectra from a campaign in 1989 by using the same simplified model as before for lambda Cephei, in terms of multiple spherical blobs attached to the surface, called stellar prominences (Sudnik & Henrichs 2016). These represent transient multiple magnetic loops on the surface, for which we find lifetimes of mostly less than 5 h.

Reference: Contrib. Astron. Obs. Skalnat´e Pleso 48, 1 – 2, (2018)
Status: Conference proceedings

Weblink: https://arxiv.org/abs/1711.02531

Comments: Proceedings "Stars with a stable magnetic field: from pre-main sequence to compact remnants", Brno, Czech Republic, August 28 - September 01, 2017

Email: h.f.henrichs@uva.nl

Back to contents

The impact and evolution of magnetic confinement in hot stars

Zsolt Keszthelyi [1,2], Gregg A. Wade [1], Veronique Petit [3], Georges Meynet [4], Cyril Georgy [4]

1 - Royal Military College of Canada
2 - Queen's University
3 - University of Delaware
4 - Geneva Observatory

Magnetic confinement of the winds of hot, massive stars has far-reaching consequences on timescales ranging from hours to Myr. Understanding the long-term effects of this interplay has already led to the identification of two new evolutionary pathways to form `heavy' stellar mass black holes and pair-instability supernova even at galactic metallicity. We are performing 1D stellar evolution model calculations that, for the first time, account for the surface effects and the time evolution of fossil magnetic fields. These models will be thoroughly confronted with observations and will potentially lead to a significant revision of the derived parameters of observed magnetic massive stars.

Reference: to appear in proceedings of 'Stars with a stable magnetic field: from pre-main sequence to compact remnants' conference, held in Brno, Czech Republic, 28 Aug - 1 Sep, 2017, Contributions of the Astronomical Observatory Skalnate Pleso, 2017
Status: Conference proceedings

Weblink: https://arxiv.org/abs/1711.06886

Comments:

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Back to contents

CLOSED JOBS

POSTDOC POSITION in the field of Theoretical Physics and Astrophysics

Prof. Rikard von Unge unge@physics.muni.cz

Institute for Theoretical Physics and Astrophysics
Masaryk University
Kotlarska 2
Brno, Czech Republic

The Institute for Theoretical Physics and Astrophysics conducts research on a wide range of topics. In Astrophysics we focus on the physics of massive stars, star clusters and the intergalactic medium using spectroscopic data and theoretical modelling where satellite data is an increasingly important source of information. In string theory we are active in the fields of supersymmetry, D-branes, integrability and formal aspects of BRST-BV quantisation. In optics we investigate and design new optical devices based on transformation optics and on the analogy between optics and mechanics.

The successful candidate should:
-be a researcher who has received a PhD or its equivalent within the last 7 years
-be a researcher who has worked at least two whole years in the last three outside the territory of the Czech Republic in the field of research with a working time of at least 0.5 full-time equivalent, or who has been PhD student (or equivalent) abroad
-have a publishing record – in the last three years at least two publication outputs registered in the Thomson Reuters Web of Science, Scopus or ERIH PLUS databases and at the same time publications such as “articles”, “books”, “book chapters”, “letters” and “reviews”. The applicant must be the principal author of at least one publication (according to the subject specificity it may be as the first author, the corresponding/reprint author, or the role of the individual authors stated in the article).
-have experience in the field of either
Astrophysics – Experience with ESO instrumentation (VLA, ALMA) or space observatories is a strong advantage.
String theory – with a specialisation in the AdS/CFT correspondence.
Transformation optics – with specialisation in applications of metamaterials and constructing new optical instruments.
-have experience with research projects (an advantage)
-have excellent communication skills and an ability to collaborate with multiple teams

The application should include:
-a CV including a summary of work experience, -publication activity, involvement in research grants, etc.

-a Cover Letter
-contact information for at least three referees

MU offers the opportunity to gain:
-an interesting job in a dynamically expanding university area
-diverse and challenging work in an excellent research environment
-possible tenure track with an initial appointment for two years
-a professional team and a pleasant working environment
-interaction with leading scientists in an inspiring, internationalised environment
-a Welcome Service for the successful candidate and his/her family
have excellent communication skills and an ability to collaborate with multiple teams

Attention/Comments:

Weblink: http://postdoc.muni.cz

Email: krticka@physics.muni.cz

Deadline: 28 January 2018

Back to contents

PDRA in massive star populations and the host environments of supernovae

Justyn Maund

Department of Physics & Astronomy, University of Sheffield, Hounsfield Road, Sheffield S3 7RH, UK

Applications are invited for a 3-year PDRA position in observational astronomy within the Astronomy Group based at The University of Sheffield, UK. The successful applicant will work with Justyn Maund and Paul Crowther on investigating the connections between populations of massive stars and stripped envelope core-collapse supernovae in nearby star-forming galaxies.

This research will involve the reduction, analysis and interpretation of high quality HST WFC3 observations of massive star regions in other galaxies, associated with recent stripped-envelope supernova explosions. Further information on the activities of the astronomy group can be found at: http://www.astro.group.shef.ac.uk

The PDRA will be expected to hold a PhD in astrophysics at the start of the appointment, and to have experience of the analysis and interpretation of observations of massive star populations. A good general knowledge of the astrophysics of massive star evolution and core-collapse supernovae is desirable. As part of your application, please upload a copy of your CV, including a list of publications, and a cover letter briefly explaining why you are applying for the role and how your experience is suited to the project.

Attention/Comments: Justyn Maund j.maund@sheffield.ac.uk or Paul Crowther paul.crowther@sheffield.ac.uk

Weblink: https://jobregister.aas.org/ad/25be982e

Email: paul.crowther@sheffield.ac.uk

Deadline: 12 Jan 2018

Back to contents

MEETINGS

IAU Symp. 346 "High Mass X-ray Binaries: illuminating the passage from massive binaries to merging compact objects"

27-31 August 2018

Venue: Austria Center Vienna

The IAUS 346 will be the first IAU symposium devoted to high-mass X-ray binaries (HMXBs). The Symposium will build a bridge between mature field of massive binary astrophysics and nascent field of gravitational wave astronomy. This large international meeting will consolidate our knowledge on massive stars, binary evolution, accretion physics, compact objects and gravitational wave sources to give us a new perspective on the cosmos illuminated by HMXBs.

Please help us to spread the news and share this announcement.

We are looking forward to seeing you in Vienna in 2018!

The SOC

Weblink: http://www.astro.physik.uni-potsdam.de/IAUS346

Email: lida@astro.physik.uni-potsdam.de

Back to contents

Massive stars and Supernovae:
Meeting to celebrate the 65th birthday of Nidia Morrell.

5-9 November 2018

Venue: Bariloche, Argentina

Massive stars definitely play the leading role among the cast that dictates the evolution of the Universe as we know it. Outnumbered and outlived by all their less massive support players they still manage to impose their character by dramatically transforming the stage at early times via their powerful stellar winds through an outstanding finale in core-collapse supernova explosions. Since early age, massive stars violently disrupt the interstellar medium where they were born. They erode and compress the molecular material and ionize atoms of different species, allowing to derive properties of galaxies at cosmological distances. On top of that, massive stars explode as core-collapse supernovae, and along with their thermonuclear counterparts (type Ia supernovae), are the main source of chemical enrichment as they yield the materials produced in its core and further process elements during their final blast. The connection between supernovae of different types and their stellar progenitors is currently under debate.

Multiplicity rate for these stars is detected at a rate high enough to make it a factor that has to be included when elaborating models and/or scenarios to account for any parameter derivation from observations. The implications that close binarity has in the evolution of massive stars since formation through post-main-sequence stages need further refinements of statistics in the distribution of orbital parameters and evolution models including stellar-wind interactions and mass transfer. The advent of unprecedented volumes of data on massive stars from upcoming surveys set up an excellent opportunity for intense and fruitful discussions to devise the best strategies to identify and tackle pressing issues. Throughout her active career, Nidia Morrell has dedicated to improve our knowledge on most of the topics recently outlined. Either as a passionate observer, a dedicated teacher and supervisor or an enthralling collaborator, Nidia definitely makes a difference for all of us who have the pleasure of working with her.

In this conference, we aim to review and discuss all present knowledge about massive stars and supernovae, with a view toward the coordination of efforts to advance our understanding of this important subject in years to come.

Weblink: http://nidiafest.fcaglp.unlp.edu.ar/

Email: nidiafest2018@gmail.com

Back to contents