THE HOT STAR NEWSLETTER

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An electronic publication dedicated to A, B, O, Of, LBV and Wolf-Rayet stars
and related phenomena in galaxies

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News

P CYGNI 2000: 400 Years of Progress

The Proceedings of the International Workshop "P CYGNI 2000: 400 Years of Progress", edited by Mart de Groot and Christiaan Sterken, are being published by the Astronomical Society of the Pacific in their Conference Series as Volume No. 233. Publication is expected in September 2001.

The Armagh Observatory web site at http://star.arm.ac.uk/∼mdg contains the abstracts of the papers included in these Proceedings as well as information on how to secure a copy of the Proceedings if you were unable to participate.

Accepted Papers

Interstellar Bubbles in Two Young HII Regions

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Massive stars are expected to produce wind-blown bubbles in the interstellar medium; however, ring nebulae, suggesting the existence of bubbles, are rarely seen around main-sequence O stars. To search for wind-blown bubbles around main-sequence O stars, we have obtained high-resolution Hubble Space Telescope WFPC2 images and

high-dispersion echelle spectra of two pristine HII regions, N11B and N180B, in the Large Magellanic Cloud. These HII regions are ionized by OB associations that still contain O3 stars, suggesting that the HII regions are young and have not hosted any supernova explosions. Our observations show that wind-blown bubbles in these HII regions can be detected kinematically but not morphologically because their expansion velocities are comparable to or only slightly higher than the isothermal sound velocity in the HII regions. Bubbles are detected around concentrations of massive stars, individual O stars, and even an evolved red supergiant (a fossil bubble). Comparisons between the observed bubble dynamics and model predictions show a large discrepancy (1–2 orders of magnitude) between the stellar wind luminosity derived from bubble observations and models and that derived from observations of stellar winds. The number and distribution of bubbles in N11B differ from those in N180B, which can be explained by the difference in the richness of stellar content between these two HII regions. Most of the bubbles observed in N11B and N180B show a blister-structure, indicating that the stars were formed on the surfaces of dense clouds. Numerous small dust clouds, similar to Bok globules or elephant trunks, are detected in these HII regions and at least one of them hosts on-going star formation.

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or `http://xxx.lpthe.jussieu.fr/abs/astro-ph/0104420`

Spectrum Variability of the A-Type Supergiant Star HD 223960

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HD 223960, an A0 Ia-type supergiant in the Cas OB5 association, is unusual among Galactic supergiants of its class in having an Hα profile with double-peaked emission entirely above the continuum. We analyzed twelve high-resolution échelle spectra obtained in 1993–1995 and in 1999 with the 1-m telescope of Ritter Observatory. The radial velocities of photospheric Si, C, He, Ne, and S lines were found to be constant to within ± 2 km s^{-1}, but the data suggest variability in the equivalent widths of Si 2 $\lambda\lambda$ 6347, 6371 and several other photospheric lines. The radial velocities and equivalent widths and, especially, the ratio V/R of the Hα components vary. The present data do not indicate a binary explanation for the double-peaked emission feature. Alternative explanations are considered, but none is completely satisfactory. The available evidence is consistent with the star having a weak, fast wind.

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Terminal Speeds and Ion Fractions from [CaIV] 3.207 μm in Three Single WN Stars

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We report on the forbidden emission lines of [CaIV] at 3.207μm and [NeIII] 15.56μm based on Infrared Space Observatory observations (ISO). The dataset consists of three single Wolf-Rayet stars (WR 1, WR 134, and WR 136) and three binary systems (WR 11, WR 146, and WR 147). For the single stars, only the [CaIV] line was observed. Our primary objectives are to determine the wind terminal speed from the emission line widths, derive ion number fractions, and discuss the relation between emission profile shapes and wind flow geometry. Compared to previous determinations of the terminal speed, we find values that are similar or somewhat smaller. Interestingly, the line width at the continuum level is typically 10-30% broader than at the half-maximum level. The extra broadness suggests the effect of turbulence in the wind. For the ion fraction, we assume that calcium is not enriched in any of the WR winds. Ion fractions of Ca^{3+} and Ne^{2+} are derived for the binary systems and found to be consistent with previously published values. For the new observations of the single WN stars, all of the ion fractions for Ca^{3+} have similar values, which are close to the maximum expected value thus suggesting that Ca^{3+} is the dominant ion at large radii in the wind. Finally, the line profile shapes in the binaries WR 11, WR 146, and WR 147 appear asymmetric, as might be expected from such systems. For WR 136, the [CaIV] profile is flat-topped, consistent with a spherical flow. For WR 1 and WR 134, the [CaIV] profiles are too weak to draw conclusions about the wind flow geometry.

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CHANDRA Detection of Doppler Shifted X-ray Line Profiles from the Wind of ζ Puppis (O4f)

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We report on a 67 ks HETG observation of the optically brightest early O-star, ζ Pup (O4f). Many resolved X-ray lines are seen in the spectra over a wavelength range of 5 to 25 Å. *Chandra* has sufficient spectral resolution to study the velocity structure of isolated X-ray line profiles, and to distinguish the individual forbidden, intercombination, and resonance (fir) emission lines in several He-like ions even where the individual components are strongly Doppler broadened. In contrast with X-ray line profiles in other hot stars, ζ Pup shows blue-shifted and skewed line profiles, providing the clearest and most direct evidence that the X-ray sources are embedded in the stellar wind. The broader the line, the

greater the blueward centroid shift tends to be. The N VII line at 24.78 Å is a special case, showing a flat-topped profile. This indicates it is formed in regions beyond most of the wind attenuation. The sensitivity of the He-like ion fir lines to a strong UV radiation field is used to derive the radial distances at which lines of S XV, Si XIII, Mg XI, Ne IX, and O VII originate. The formation radii correspond well with continuum optical depth unity at the wavelength of each line complex, indicating that the X-ray line emission is distributed throughout the stellar wind. However, the S XV emission lines form deeper in the wind than expected from standard wind shock models.

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Shocked ammonia in the WR nebula NGC 2359

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We report the detection of the (1,1) and (2,2) metastable lines of ammonia (NH_3) in the molecular cloud associated with the Wolf–Rayet (WR) nebula NGC 2359. Besides the CO and H_2, this is the first molecule detected in the environs of a WR star. Width (3 km/s) and radial velocity (54 km/s) indicate that the NH_3 lines arises from the molecular cloud which is interacting with the WR star. The rotational temperature derived from the (1,1) and (2,2) line intensity ratios is about 30 K, significantly larger than the typical kinetic temperature of the ambient gas of 10 K. The derived NH_3 abundance is 10^{-8}. Linewidth, abundance and kinetic temperature can be explained if NH_3 is released from dust grain mantles to the gas phase by shocks produced by the expansion of the bubble created by the WR stellar wind. We briefly discuss the implications of the detection of warm NH_3 associated with a WR star in connection to the hot NH_3 emission detected in the Galactic Center and in the nuclei of external galaxies.

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Stellar evolution with rotation VII: Low metallicity models and the blue to red supergiant ratio in the SMC

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We calculate a grid of models with and without the effects of axial rotation for massive stars in the range of 9 to 60 $M_\odot$ and metallicity $Z = 0.004$ appropriate for the SMC. Remarkably, the ratios Ω/Ω_{crit} of the angular velocity to the break–up angular velocity grow strongly during the evolution of high mass stars, contrary to the situation at $Z = 0.020$. The reason is that at low Z, mass loss is smaller and the removal of angular momentum during evolution much weaker, also there is an efficient outward transport of angular momentum by meridional circulation. Thus, a much larger fraction of the stars at lower Z reach break–up velocities and rotation may thus be a dominant effect at low

Z. The models with rotation well account for the long standing problem of the large numbers of red supergiants observed in low Z galaxies, while current models with mass loss were predicting no red supergiants. We discuss in detail the physical effects of rotation which favour a redwards evolution in the HR diagram. The models also predict large N enrichments during the evolution of high mass stars. The predicted relative N–enrichments are larger at Z lower than solar and this is in very good agreement with the observations for A–type supergiants in the SMC.

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Rotational mixing in early-type main-sequence stars

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We present quantitative observational investigations into the importance of rotationally-induced mixing in late-O stars. First, we conduct non-LTE, hydrostatic, plane-parallel H/He model-atmosphere analyses of the optical spectra of three of the most rapidly rotating late-O near-main-sequence stars known: HD 93521 (O9.5 V), HD 149757 (ζ Ophiuchi; O9.5 V), and HD 191423 (ON9 III: n), all of which have equatorial rotation velocities of $\sim$430 km s^{-1} and $\omega_e/\omega_e(\mathrm{crit}) \simeq 0.9$. The analysis allows for the expected (von Zeipel) variation of T_{eff} and $\log g$ with latitude. These three stars are found to share very similar characteristics, including substantially enhanced surface-helium abundances ($y \simeq 0.2$). Secondly, we compare the distribution of projected rotational velocities for ON and morphologically normal dwarf O stars, and demonstrate that the ON stars are drawn from a population with more rapid rotation. The results provide qualitative support for rotationally-induced mixing, although there remain discrepancies between atmospheric and evolutionary models. We show that the most rapid rotator known, HD 191423, is an ON star, and note the implied disparity between O/ON morphology and surface helium abundance; we discuss consequences for the interpretation of spectral morphology in O-type main-sequence stars. We demonstrate a new, purely spectroscopic, method of distance determination for rapid rotators, and thereby confirm that HD 93521 lies at $\sim$2 kpc, and is not, as previously suggested, a low-mass Pop. II star. Finally, our models contradict earlier claims of strongly differential surface rotation, and are consistent with uniform angular velocity at the surface.

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Formation of massive stars by growing accretion rate

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We perform calculations of pre-main sequence evolution of stars from 1 to 85 $M_{\odot}$ with growing accretion rates $\dot{M}$. The values of $\dot{M}$ are taken equal to a constant fraction $\tilde{f}$ of the rates of the mass outflows observed by Churchwell (1998) and Henning (2000). The evolution of the various stellar parameters is given, as well as the evolution of the disc luminosity; electronic tables are provided as a supplement to the articles. Typically, the duration of the accretion phase of massive stars is $\simeq 3 \cdot 10^5$ yr. and there is less than 10% difference in the time necessary

to form a 8 or 80 $M_\odot$ star. If in a young cluster all the proto–stellar cores start to accrete at the same time, we then have a relation $M(t)$ between the masses of the new stars and the time t of their appearance. Since we also know the distribution of stellar masses at the end of star formation (IMF), we can derive the star formation history $N(t)$. Interestingly enough, the current IMF implies two peaks of star formation: low mass stars form first and high mass star form later.

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The shape of η Carinae and LBV Nebulae

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Stellar winds emitted by rotating massive stars may show two main components: firstly bipolar lobes with low density and fast wind, produced by the higher T_{eff} and gravity at the poles ("g_{eff}–effect"); secondly, an equatorial disc with a slow dense wind, produced by the stronger opacities at the equator ("κ–effect"). To see the possible role of this anisotropic wind on the shape of LBV nebulae, we calculate the distribution of the ejected matter in 2 simplified cases: 1) A brief shell ejection. We find that prolate and peanut–shaped hollow nebulae naturally form due to the g_{eff}–effect in rotating stars. 2) A constant wind for a long time. This produces prolate filled nebulae, with a possible strong disc when a bi–stability limit is crossed in the equatorial region. Thus, many features of the η Carinae and LBV nebulae are accounted for by the anisotropic ejection from rotating stars.

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Research Note: Rotation and the wind momentum–luminosity relation for extragalactic distances

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The effects of axial stellar rotation on the wind–momentum relation (WLR) for determining the extragalactic distances are investigated. Despite the fact that the mass loss rates grow quite a lot with rotation, remarkably the effects on the WLR are found to be very small on average. As an example, for an average orientation angle between the rotation axis and the line of sight, the luminosity would be overestimated by 5.9 % for a star rotating at 90% of its break–up rotational velocity. Different orientation angles between the rotation axis and the line of sight produce some limited scatter.

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Near-infrared imaging of compact HII regions in Cygnus X

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We present a near-infrared imaging survey of compact HII regions in the direction of the Cygnus X complex, for which no previous observations at those wavelengths have been published so far. The targets have been selected from a catalog of sources in that region having a thermal spectral energy distribution between 408 and 4800 MHz (Wendker, Higgs, and Landecker, 1991, A&A, 241, 551), and an inferred angular size smaller than 5 arcmin across. We present images in the JHK filters, color-magnitude, and color-color diagrams for each region. We also suggest and apply a method for estimating the distance by comparing the dereddened H-band flux from all the stars in the area of the HII region and the radio-continuum flux. Many of the regions imaged are clearly associated with stellar aggregates with different degrees of concentration, whose components show varying amounts of extinction. Some objects are often found in the region of the $(J-H)$, $(H-K)$ diagram indicating excess emission of circumstellar nature. A detailed discussion on each object is provided in the context of existing published observations at different wavelengths, in particular regarding the existence of ultracompact components. A number of ultracompact HII regions are found to have clearly visible unresolved or nearly unresolved K-band counterparts characterized by very red $H-K$ colors, suggesting that the extinction may be low enough in their direction so as to allow the direct observation of the star ionizing the ultracompact component.

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The magnetic field and wind confinement of β Cephei: new clues for interpreting the Be phenomenon?

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In this paper, we use the very recent spectropolarimetric observations of β Cep collected by Henrichs et al. (2001) and propose for this star a consistent model of the large scale magnetic field and of the associated magnetically confined wind and circumstellar environment. A re-examination of the fundamental parameters of β Cep in the light of the Hipparcos parallax indicates that this star is most likely a 12 $M_\odot$ star with a radius of 7 $R_\odot$, effective temperature of 26000 K and age of 12 Myr, viewed with an inclination of the rotation axis of about 60°. Using two different modelling strategies, we obtain that the magnetic field of β Cep can be approximately described as a dipole with a polar strength of 360 ± 30 G, whose axis of symmetry is tilted with respect to the rotation axis by about $85° \pm 10°$.

Although one of the weakest detected to date, this magnetic field is strong enough to confine magnetically the wind of β Cep up to a distance of about 8 to 9 R_*. We find that both the X-ray luminosity

and variability of β Cep can be explained within the framework of the magnetically confined wind shock model of Babel & Montmerle (1997a), in which the stellar wind streams from both magnetic hemispheres collide with each other in the magnetic equatorial plane, producing a strong shock, an extended postshock region and a high density cooling disc.

By studying the stability of the cooling disc, we obtain that field lines can support the increasing disc weight for no more than a month before they become significantly elongated to equilibrate the gravitational plus centrifugal force, thereby generating strong field gradients across the disc. The associated current sheet eventually tears, forcing the field to reconnect through resistive diffusion and the disc plasma to collapse towards the star. We propose that this collapse is the cause for the recurrent Be episodes of β Cep, and finally discuss the applicability of this model to He peculiar, classical Be and normal non-supergiant B stars.

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Optical Spectroscopy of X-Mega targets in the Carina Nebula III. The multiple system Tr 16-104 ($\equiv$ CPD -59° 2603)

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We discuss the orbital elements of the multiple system Tr 16-104 which is usually believed to be a member of the open cluster Trumpler 16 in the Carina complex. We show that Tr 16-104 could be a hierarchical triple system consisting of a short period (2.15 days) eclipsing O7 V + O9.5 V binary bound to a B0.2 IV star. Our preliminary orbital solution of the third body indicates that the B-star most probably describes an eccentric orbit with a period of $\sim$ 285 or $\sim$ 1341 days around the close binary. Folding photometric data from the literature with our new ephemerides, we find that the light curve of the close binary exhibits rather narrow eclipses indicating that the two O-stars must be well inside their Roche lobes. Our analysis of the photometric data yields a lower limit on the inclination of the orbit of the close binary of $i \geq 77^\circ$. The stellar radii and luminosities of the O7 V and O9.5 V stars are significantly smaller than expected for stars of this spectral type. Our results suggest that Tr 16-104 lies at a distance of the order of 2.5 kpc and support a fainter absolute magnitude for zero age main sequence O stars than usually adopted. We find that the dynamical configuration of Tr 16-104 corresponds to a hierarchical system that should remain stable provided that it suffers no strong perturbation. Finally, we also report long-term temporal variations of high velocity interstellar Ca II absorptions in the line of sight towards Tr 16-104.

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Modelling X-ray variability in the structured atmospheres of hot stars

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We describe X-ray production in the atmospheres of hot, early-type stars in the framework of a "stochastic shock model". The extended envelope of a star is assumed to possess numerous X-ray emitting "hot" zones that are produced by shocks and embedded in the ambient "cold" medium in dynamical equilibrium. It is shown that the apparent lack of X-ray variability on short ($\sim$ hours) timescales do not contradict a shock model for X-ray production. The character of the X-ray variability is found to depend on the frequency with which hot zones are generated, the cool wind opacity to X-rays, and the wind flow parameters, such as mass loss rate and terminal speed.

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Long-term spectroscopic monitoring of the Luminous Blue Variable AG Car

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We have extensively monitored the Luminous Blue Variable AG Car (HD 94910) spectroscopically. Our data cover the years 1989 to 1999. In this period, the star underwent almost a full S Dor cycle from visual minimum to maximum and back. Over several seasons, up to four months of almost daily spectra are available. Our data cover most of the visual spectral range with a high spectral resolution ($\lambda/\Delta\lambda \approx$ 20,000). This allows us to investigate the variability in many lines on time scales from days to years. The strongest variability occurs on a time scale of years. Qualitatively, the variations can be understood as changes of the effective temperature and radius, which are in phase with the optical light curve. Quantitatively, there are several interesting deviations from this behaviour, however. The Balmer lines show P Cygni profiles and have their maximum strength (both in equivalent width and line flux) *after* the peak of the optical light curve, at the descending branch of the light curve. The line-width during maximum phase is smaller than during minimum, but it has a local maximum close to the peak of the visual light curve. We derive mass-loss rates over the cycle from the Hα line and find the highest mass loss rates ($\log \dot{M}/(\mathrm{M}_{\odot}\mathrm{yr}^{-1}) \approx -3.8$, about a factor of five higher than in the minimum, where we find $\log \dot{M}/(\mathrm{M}_{\odot}\mathrm{yr}^{-1}) \approx -4.5$) after the visual maximum. Line-splitting is very commonly observed, especially on the rise to maximum and on the descending branch from

maximum. The components are very long-lived (years) and are probably unrelated to similar-looking line-splitting events in normal supergiants. Small *apparent* accelerations of the components are observed. The change in radial velocity could be due to successive narrowing of the components, with the absorption disappearing at small expansion velocities first. In general, the line-splitting is more likely the result of missing absorption at intermediate velocities than of excess absorption at the velocities of the components. The HeI lines and other lines which form deep in the atmosphere show the most peculiar variations. The HeI lines show a central absorption with variable blue- and red-shifted emission components. Due to the variations of the emission components, the HeI lines can change their line profile from a normal P Cyg profile to an inverse P Cyg-profile or double-peak emission. In addition, very broad ($\pm$ 1500 km sec^{-1}) emission wings are seen at the strongest HeI lines of AG Car. At some phases, a blue-shifted absorption is also present. The central absorption of the HeI lines is blue-shifted before and red-shifted after maximum. Possibly, we directly see the expansion and contraction of the photosphere. If this explanation is correct, the velocity of the continuum-forming layer is not dominated by expansion but is only slightly oscillating around the systemic velocity.

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Submitted Papers

The CHANDRA X-ray Grating Spectrum of η Carinae

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η Car may be the most massive and luminous star in the Galaxy and is suspected to be a massive, colliding wind binary system. The CHANDRA X-ray observatory has obtained a calibrated, high-resolution X-ray spectrum of the star uncontaminated by the nearby extended soft X-ray emisssion. Our 89 ksec CHANDRA observation with the High Energy Transmission Grating Spectrometer (HETGS) shows that the hot gas near the star is non-isothermal. The temperature distribution may represent the emission on either side of the colliding wind bow shock, effectively "resolving" the shock.

The pre-shock wind velocities are ~ 500 and ~ 2000 km s^{-1} in our analysis, and these velocities are interpreted as the terminal velocities of the winds from η Car and from the hidden companion star. The abundances of Si and Fe are significantly non-solar based on the strengths of the observed H- and He-like emission lines. The iron fluorescent line at 1.93Å, first detected by ASCA, is clearly resolved from the thermal iron line in the CHANDRA grating spectrum. The Fe fluorescent line is much weaker in our CHANDRA observation than in any of the ASCA spectra, and this variability may represent a real change in the circumstellar medium. The CHANDRA observation also provides the first high-time resolution lightcurve of the uncontaminated stellar emission from η Car and shows that there is no significant, coherent variability during the CHANDRA observation. The η Car CHANDRA grating spectrum is unlike recently published X-ray grating spectra of single massive stars in significant ways and is generally consistent with colliding wind emission in a massive binary.

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The Wind-Wind Collision Region of the Wolf-Rayet Binary V444 Cyg: How much optical line emission does it produce ?

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We model the emission line profile variations that are expected to be produced by physical and wind eclipses in the Wolf-Rayet (WR+O) binary system V444 Cyg. A comparison of the theoretical profiles with the He II 4686 Å line observed in V444 Cyg allows us to isolate the effects that are likely to be due to the wind-wind collision region, in this particular line. We estimate that the WWC region contributes no more than ∼12% of the equivalent width of the emission line, with smaller values during elongations, when part of the shock cone is being eclipsed by the O-star. The upper limit implies a maximum contribution from the wind-wind collision region of $\sim 1. \times 10^{35}$ ergs s^{-1} to the total luminosity of He II 4686 Å line. Using the analytical solution of Cantó et al. (1996), we find that the bulk of this emission seems to be arising along the shock cone walls where the flow velocity is ∼800 km s^{-1}, at a distance of ∼8 $R_\odot$ from the O-star's surface, and at Θ =60-70° from the line joining the centers of the two stars, with origin in the O-star. The derived surface density of this region is σ =0.22 gr cm^{-2}.

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In Proceedings

Confidence limits of SN, Kinetic Energy and chemical yields in evolutionary synthesis models

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When evolutionary synthesis models take into account the stochastic nature of the IMF together with the discrete number of stars in real stellar clusters, typical output turns to dispersion band (where real data can be placed) instead of narrow lines. We present here a qualitative analysis of such dispersion in the SN rate, the kinetic energy and the $^{14}N/^{12}C$ ratio for different amounts of mass transformed into stars.

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New Circumstellar Magnetic Field Diagnostics

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In this paper I will discuss new magnetic field diagnostics and instrumentation for an area of astrophysics where magnetic field observations have been difficult - circumstellar material. Such diagnostics would be particularly relevant to star formation and evolution. Stellar photosphere diagnostics include the Zeeman effect and atomic scattering diagnostics like the Hanle Effect and atomic alignment. The Zeeman Effect is in general not sensitive enough for the field strengths expected for circumstellar material, and it is easily defeated by Doppler broadening in a dynamic envelope. Atomic scattering diagnostics, pioneered recently for the Sun, are promising, but have never been applied outside the Sun. For the study of unresolved envelopes, the Hanle Effect may be applicable particularly in the ultraviolet. A medium resolution UV spectropolarimeter, for instance, would serve for such studies. Atomic alignment effects could utilize a ground-based, high signal-to-noise spectropolarimeter, with profile information from high spectral resolution. I will briefly mention several instrumentation development efforts in these directions.

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Determination of Magnetic Fields in the Winds from Hot Stars Using the Hanle Effect

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Resonance lines that are sensitive to the Hanle effect are prominent in the UV spectra of early-type stars. To understand the differences from the solar application of the Hanle effect, we focus on the formation of P-Cygni lines both as a scattering process, and as one that allows a spectral isolation of sectors in the wind. Some complications occuring in the solar case are found to be absent for the Hanle effect for hot stars. Rocket observations from the Far Ultraviolet SpectroPolarimeter (FUSP) experiment should allow for a determination of fields in the dynamically interesting range from 1 to 300 Gauss.

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Observable Effects of B fields on the Winds and Envelopes of Hot Stars

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Magnetic fields on hot stars can produce a variety of interesting effects on the velocity, density, and temperature structure in the winds from the stars. The fields can produce a longitudinal dependence of the mass flux, which would lead to cyclical variability such as that seen in optical and UV spectra of many early-type stars. The fields can channel and spin-up the outflow, which appears to be needed to explain the disk-like density enhancements around Ap and Be stars. Magnetic confinement of hot gases can occur and be responsible for the anomalously high EUV fluxes seen in B giants, and the anomalous high ion X-ray line emission that is seen in recent CHANDRA observations. Special attention is given to the reports at this meeting that A stars develop magnetic Ap phenomenon only after about 30 percent of their main sequence lifetimes. A similar delay occurs for the emission line Be stars. It is suggested that these delays are related to the time it takes for fields to rise through the sub-adiabatic envelope to the surface starting from the interface between the convective-core and radiative-envelope where they are generated.

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Hot Emission-Line Stars
After 134 Years of Study
A personal view of current problems

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A brief review of current problems in the research of hot emission-line stars is presented. Special attention is paid to problems of reliable determination of basic physical properties of underlying stars and to possible role of duplicity in the whole phenomenon. A preliminary catalogue of OBA emission-line stars in binaries is also included.

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