**THE HOT STAR NEWSLETTER**

⋆

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

⋆

No. 71 2002 September http://www.astro.ugto.mx/∼eenens/hot/
editor: Philippe Eenens http://www.star.ucl.ac.uk/∼hsn/index.html
eenens@astro.ugto.mx ftp://saturn.sron.nl/pub/karelh/UPLOADS/WRBIB/

# Contents of this newsletter



# Campaigns

## A five-month multitechnique, multisite campaign on the $\beta$ Cephei star $\nu$ Eridani

**G. Handler**[1] **& C. Aerts**[2]

[1] Institut für Astronomie, Türkenschanzstrasse 17, 1180 Vienna, Austria

[2] Instituut voor Sterrenkunde, Celestijnenlaan 200B, 3001 Leuven, Belgium

Asteroseismology is the technique in which the interior structure of pulsating stars is deduced from the normal modes of their pulsations. Its application already yielded a good understanding of the interior structure of the Sun and of pulsating white dwarfs. We now want to apply these successful methods to a massive main-sequence pulsator, the $\beta$ Cephei star $\nu$ Eridani (RA (2000): 04:36:19, Dec (2000): −03:21:09, $V = 3.92$, B2 III).

Such a study is only possible with a large coordinated effort using both spectroscopic and photometric observing methods. We are in the process of organising such a project running from mid-October 2002 until at least early February 2003. So far, we have been allocated a total of 121 nights for high-resolution spectroscopy at 10 telescopes up to 3.5 metres aperture on four continents. For the photometric measurements we were awarded 166 nights and we hope for $\gtrsim 80$ nights more.

We invite interested researchers to join our team. Observational requirements for spectroscopy are the ability to acquire high-resolution ($R > 30000$), high signal-to-noise ($S/N \gtrsim 200$) spectra of the stellar

Si III triplet at 4560 Å with a sampling interval no longer than 15 minutes. Photometric measurements are best acquired with photoelectric photometers and Strømgren uvy filters and a light neutral density filter, although Johnson (B)V photometry would also suffice. The photometric precision per differential target star measurement must be better than 5 mmag rms. CCD photometry would only be useful if heavy neutral density filters are available and if the field of view is larger than 20 arcminutes for acquisition of a sufficiently bright comparison star in the same field.

Interested colleagues are invited to contact the authors for more information. The spectroscopic part of the campaign is led by CA who can be reached at conny@ster.kuleuven.ac.be, whereas photometrists are requested to email GH at handler@astro.univie.ac.at.

## Accepted Papers

### Structure and Dynamics of Candidate O Star Bubbles in N44

**Yaël Nazé[1,5], You-Hua Chu[2,6], Martín A. Guerrero[2,6], M. S. Oey[3], Robert A. Gruendl[2], R. Chris Smith[4]**

[1] Institut d'Astrophysique et de Géophysique, Université de Liège, Allée du 6 Août 17, Bat. B5c, B 4000 - Liège, Belgium

[2] Astronomy Department, University of Illinois, 1002 W. Green Street, Urbana, IL 61801, USA

[3] Lowell Observatory, 1400 West Mars Hill Rd., Flagstaff, AZ 86001, USA

[4] Cerro Tololo Inter-American Observatory, Casilla 603, La Serena, Chile

[5] Research Fellow FNRS (Belgium)

[6] Visiting astronomer, Cerro Tololo Inter-American Observatory

Dynamical studies of superbubbles and Wolf-Rayet ring nebulae show discrepancies from the standard, adiabatic model for wind-blown bubbles. We therefore study the physical properties and kinematics of three candidate bubbles blown by single O stars, to evaluate whether these discrepancies are also found in these simpler objects. Our sample candidates are N44F, N44J, and N44M, in the outskirts of the HII complex N44 in the Large Magellanic Cloud. We have obtained ground-based and *HST* emission-line images and high dispersion echelle spectra for these objects. From the H$\alpha$ luminosities and the [OIII]/H$\alpha$ ratios of these nebulae, we estimate the spectral types of the ionizing stars to be O7V, O9.5V and O9.5V for N44F, N44J, and N44M, respectively. We find that the observed expansion velocity of 12 km/s for N44F is consistent with the stellar wind luminosity expected from the central ionizing star, as predicted by the standard bubble model. The observed upper limits for the expansion velocities of N44J and N44M are also compatible with the expected values, within the uncertainties. We also report the discovery in N44F of strongly-defined dust columns, similar to those seen in the Eagle Nebula. The photoevaporation of these dense dust features may be kinematically important and may actually govern the evolution of the shell. The inclusion of photoevaporation processes may thus undermine the apparent agreement between the observed bubble dynamics and the simple adiabatic models.

**Accepted by AJ**

*Preprints from* naze@astro.ulg.ac.be
*or on the web at* http://vela.astro.ulg.ac.be/Preprints/P75/index.html or astro-ph/0208430

# Emission profile variability in hot star winds. A pseudo–3D method based on radiation hydrodynamics simulations

**L. Dessart[1] and S.P. Owocki[2]**

[1] N&S Sterrenkunde Universiteit Utrecht, Princetonplein 5, NL-3584 CC Utrecht, the Netherlands

[2] Bartol Research Institute of the University of Delaware, Newark, DE 19716, USA

We present theoretical calculations of emission line profile variability based on hot star wind structure calculated numerically using radiation hydrodynamics simulations. A principal goal is to examine how well short-time-scale variations observed in wind emission lines can be modelled by wind structure arising from small-scale instabilities intrinsic to the line-driving of these winds. The simulations here use a new implementation of the Smooth Source Function formalism for line-driving within a one-dimensional (1D) operation of the standard hydrodynamics code ZEUS–2D. As in previous wind instability simulations, the restriction to 1D is necessitated by the computational costs of non–local integrations needed for the line-driving force; but we find that naive application of such simulations within an explicit assumption of spherically symmetric structure leads to an *unobserved* strong concentration of profile variability toward the line wings. We thus introduce a new "patch method" for mimicking a full 3D wind structure by collecting random sequences of 1D simulations to represent the structure evolution along radial rays that extend over a selectable patch-size of solid angle. We provide illustrative results for a selection of patch sizes applied to a simulation with standard assumptions that govern the details of instability-generated wind structure, and show in particular that a typical model with a patch size of about 3 deg can qualitatively reproduce the fundamental properties of observed profile variations.
We conclude with a discussion of prospects for extending the simulation method to optically thick winds of Wolf-Rayet (WR) stars, and for thereby applying our "patch method" to dynamical modelling of the extensive variability observed in wind emission lines from these WR stars.

**Appeared in A&A, vol. 383, p. 1113**

# Wavelet Analysis of Instability-Generated Line Profile Variations in Hot-Star Winds

**L. Dessart[1] and S.P. Owocki[2]**

[1] N&S Sterrenkunde Universiteit Utrecht, Princetonplein 5, NL-3584 CC Utrecht, the Netherlands

[2] Bartol Research Institute of the University of Delaware, Newark, DE 19716, USA

We investigate whether instability-generated structure of line-driven stellar winds can account for the emission line profile variability (LPV) observed in hot star spectra. In a previous paper, we introduced a three-dimensional (3D) "patch" method to compute the temporal evolution of the wind emissivity, based on 1D radiation hydrodynamics simulations. Here we apply a wavelet analysis to these *synthetic* LPVs, allowing a direct comparison with observations analysed in the same way, with particular focus on the characteristic velocity scale of LPVs at various frequency locations within the line profile. Wavelet analyses of observed LPV generally show this scale to *increase* from 50 to 100-200 km $s^{-1}$ from line-centre to edge. We argue here that the characteristic sub-peak broadening is dominated at line-centre by the lateral spatial extent of wind structures, while at line-edge it is controlled by their intrinsic radial velocity dispersion. We find that the wavelet transforms of synthetic LPV yield characteristic widths that are comparable to observed values at line-centre, but much narrower at line-edges. We thus conclude that the patch size of 3 deg assumed here provides a reasonable representation of the lateral coherence length associated with observed LPV, but that the 1D instability models that form the basis of the patch method have too low a radial velocity dispersion to reproduce the characteristic widths observed at line edge. We discuss how the latter limitation might be overcome by inclusion of radial velocity shear, and also outline possible approaches to developing multi-dimensional instability simulations that could account for such shear effects.

**Accepted by A&A**

*Preprints available on the WEB at* `http://www.astro.uu.nl/~dessart`

## Interferometric and spectroscopic monitoring of emission lines. Detection of CIRs in hot star winds

**L. Dessart[1] and O. Chesneau[2]**

[1] N&S Sterrenkunde Universiteit Utrecht, Princetonplein 5, NL-3584 CC Utrecht, the Netherlands

[2] Max-Planck-Institut für Astronomie, Königstuhl 17, D-69117 Heidelberg,Germany

We present a theoretical study of hot star wind variability in the presence of hypothetical large scale wind structures. Contrary to previous investigations that have focused on P-Cygni profiles, we investigate the impact on observable optical and near-infrared emission lines. Our working hypotheses assume that such extended wind structures are formed *via* a rotationally modulated stellar wind mass loss rate that gives rise to the so-called co-rotating interaction regions and that the modelled wind emissivity suffers from no opacity effect. Within this context, we find that the variability of emission lines traces an unambiguous S-shape in the frequency–time space, i.e. a spiralling pattern with positive *and* negative accelerations towards the line of sight over one stellar rotation period. Further, we demonstrate how lines forming at different heights can be used to provide dynamical and geometrical constraints on wind structures. Complementary to this spectroscopic approach, we also present theoretical expectations for VLT-AMBER interferometric observations of such a perturbed hot star outflow. For a fixed baseline orientation and length (space-based interferometer), the spectrally dispersed visibility and fringe phase output by the Differential Interferometry (DI) method show strong variable signatures, over a rotation period, of the same nature as those determined from spectroscopy. In the realistic case of both variable length and baseline orientation (ground-based interferometer), the DI method still yields a high detection sensitivity and geometrical characterisation of large scale wind structures.

**Accepted by A&A**

*Preprints available on the WEB at* `http://www.astro.uu.nl/~dessart`

## Constraints on the wind structure of OB stars from theoretical He II lines

**R. Venero[1], L. Cidale[1] and A. Ringuelet[1]**

[1] Facultad de Ciencias Astronómicas y Geofísicas - Universidad Nacional de La Plata - Paseo del Bosque s/n - 1900 La Plata - Argentina

Theoretical profiles of He II lines in OB stars with an expanding spherically symmetric atmosphere are computed. The extended atmospheric model is formed by a classical photosphere, characterized by the effective temperature and the surface gravity, and superimposed layers that have different velocity

and temperature structure. We solve rigorously the radiative transfer equation, simultaneously with the statistical equilibrium equations for multilevel atoms, by making use of Feautrier's method in the comoving frame. We discuss the influence on the He II lines of the hydrodynamic and thermodynamic structure of the atmosphere, paying special attention to those configurations that give rise to emission lines. The main conclusions of our work can be summarized as follows:

a) The shape of the profiles is determined by the velocity gradient at the base of the wind whenever a positive temperature gradient occurs.
b) In O-type stars, the emission-line intensity depends quite sensitively on $\log g$, in agreement with Walborn luminosity criterion.
c) In addition, we are able to produce emission and absorption profiles that are in qualitative agreement with those observed in O and B stars.
d) We also confirm Cidale & Ringuelet and Venero, Cidale & Ringuelet results that showed that a warm, extended and rapidly expanding atmosphere is sufficient to give rise to emission components in the line profiles.

**Accepted by Astrophysical Journal (ApJ, 578, 450, 2002 October 10)**

*Preprints from* roberto@fcaglp.unlp.edu.ar

## Fundamental parameters of Galactic luminous OB stars VI.Temperatures, masses and WLR of Cyg OB2 supergiants

**A. Herrero[1,2], J. Puls[3] and F. Najarro[4]**

[1] Instituto de Astrofísica de Canarias, E-38200 La Laguna, Tenerife, Spain

[2] Departamento de Astrofísica, Universidad de La Laguna, Avda. Astrofísico Francisco Sánchez, s/n, E-38071 La Laguna, Spain

[3] Universitäts-Sternwarte München, Scheinerstr. 1, D-81679 München, Germany

[4] Instituto de Estructura de la Materia, Consejo Superior de Investigaciones Científicas, C/ Serrano 121, E-28006 Madrid, Spain

We have analyzed six OB supergiants and one giant covering spectral types from O3 to B1 in the Galactic OB association Cyg OB2 by means of an updated version of FASTWIND ([**?**]) that includes an approximate treatment of metal line blocking and blanketing. This large coverage in spectral type allows us to derive a new temperature scale for Galactic O supergiants that is lower than the one obtained by using pure H–He models, either plane-parallel and hydrostatic or spherical with mass-loss. The lower temperatures are thus a combined effect of line blanketing and the large mass-loss rates. In some cases, the newly derived effective temperature is reduced by up to 8 000 K. Changes are larger for earlier stars with large mass–loss rates. As a consequence, luminosities are modified as well, which results in a lower number of emerging ionizing photons and reduces the mass discrepancy. Although there are still significant differences between spectroscopic and evolutionary masses, we do not find any obvious systematic pattern of those differences. We derive mass–loss rates and the corresponding wind momentum–luminosity relation for the analyzed stars. Although consistent with previous results by [**?**] for Galactic stars, our relation is better defined due to a reduction of errors related to stellar distances and points to a possible separation between extreme Of stars ($Of^+$, $Of^*$) and stars with more moderate morphologies. However this finding is only tentative, as the statistics are still scarce.

**Accepted by A&A**

*Preprints from* ahd@ll.iac.es

## A new Wolf-Rayet star in Cygnus

**A. Pasquali[1], F. Comeron[2], R. Gredel[3], J. Torra[4] and F. Figueras[4]**

[1] ESO/ST-ECF, Karl-Schwarzschild-Strasse 2, 85748 Garching bei München, Germany

[2] ESO, Karl-Schwarzschild-Strasse 2, 85748 Garching bei München, Germany

[3] Max-Planck Institut für Astronomie, Königstuhl 17, D-69117 Heidelberg, Germany [4] Departament d'Astronomia i Meteorologia, Universitat de Barcelona, Av. Diagonal 647, 08028 Barcelona, Spain

We report the discovery of a new Wolf-Rayet star in the direction of Cygnus. The star is strongly reddened but quite bright in the infrared, with $J = 9.22$, $H = 8.08$ and $K_S = 7.09$ (2MASS). On the basis of its H + K spectrum, we have classified WR 142a a WC8 star. We have estimated its properties using as a reference those of other WC8 stars in the solar neighbourhood as well as those of WR 135, whose near-infrared spectrum is remarkably similar. We thus obtain a foreground reddening of $A_V \simeq 8.1$ mag, $M_J \simeq -4.3$, $\log(L/L_\odot) \sim 5.0-5.2$, $R = 0.8$ R$_\odot$, $T \simeq 125,000$ K, $M = 7.9-9.7$ M$_\odot$, $\dot{M} = (1.4-2.3) \times 10^{-5}$ M$_\odot$ yr$^{-1}$. The derived distance modulus, $DM = 11.2 \pm 0.7$ mag, places it in a region occupied by several OB associations in the Cygnus arm, and particularly in the outskirts of both Cygnus OB2 and Cygnus OB9. The position in the sky alone does not allow us to unambiguously assign the star to either association, but based on the much richer massive star content of Cygnus OB2 membership in this latter association appears to be more likely.

**Accepted by A&A** *Preprints from* apasqual@eso.org

## On biases in the predictions of stellar population synthesis models

**M. Cerviño[1,2] and D. Valls–Gabaud[3]**

[1] Instituto de Astrofísica de Andalucia (CSIC) Camino Bajo de Huétor 24, Granada 18080, Spain

[2] Laboratorio de Astrofísica Espacial y Física fundamental (INTA) Apdo. 50272, Madrid 28080, Spain

[3] UMR CNRS 5572, Laboratoire d'Astroph., Obs. Midi-Pyrénées, 14 Avenue Edouard Belin, 31400 Toulouse, France

Sampling fluctuations in stellar populations give rise to dispersions in observables when a small number of sources contribute effectively to the observables. This is the case for a variety of linear functions of the spectral energy distribution (SED) in small stellar systems, such as galactic and extragalactic HII regions, dwarf galaxies or stellar clusters. In this paper we show that sampling fluctuations also introduce systematic biases and multi-modality in non-linear functions of the SED, such as luminosity ratios, magnitudes and colours. In some cases, the distribution functions of rational and logarithmic quantities are bimodal, hence complicating considerably the interpretation of these quantities in terms of age or evolutionary stages. These biases can be only assessed by Monte Carlo simulations. We find that biases are usually negligible when the effective number of stars, $\mathcal{N}$, which contribute to a given observable is larger than 10. Bimodal distributions may appear when $\mathcal{N}$ is between 10 and 0.1. Predictions from any model of stellar population synthesis become extremely unreliable for small $\mathcal{N}$ values, providing an operational limit to the applicability of such models for the interpretation of integrated properties of stellar systems. In terms of stellar masses, assuming a Salpeter Initial Mass Function in the range 0.08 – 120 M$_\odot$, $\mathcal{N}$=10 corresponds to about $10^5$ M$_\odot$ (although the exact value depends on the age and the observable). This bias may account, at least in part, for claimed variations in the properties of the stellar initial mass function in small systems, and arises from the discrete nature of small stellar populations.

**Accepted by M.N.R.A.S.**

*Preprints from* mcs@laeff.esa.es *or on the web at* astro-ph/0209307

## Wolf-Rayets in IC10: Probing the Nearest Starburst

**Philip Massey[1] and Shadrian Holmes [2]**

[1] Lowell Observatory, 1400 W. Mars Hill Road, Flagstaff, AZ 86001

[2] Now at Univ of Texas at Austin

IC10 is the nearest starburst galaxy, as revealed both by its H$\alpha$ surface brightness and the large number of Wolf-Rayet stars (WRs) per unit area. The relative number of known WC- to WN-type WRs has been thought to be unusually high ($\sim 2$), unexpected for IC10's metallicity. In this *Letter* we report the first results of a new and deeper survey for WRs in IC10. We sucessfully detected all of the spectroscopically known WRs, and based upon comparisons with a neighboring control field, estimate that the total number of WRs in IC10 is about 100. We present spectroscopic confirmation of two of our WR candidates, both of which are of WN type. Our photometric survey predicts that the actual WC/WN ratio is $\sim 0.3$. This makes the WC/WN ratio of IC 10 consistent with that expected for its metallicity, but greatly increases the already unusually high number of WRs, resulting in a surface density that is about 20 times higher than in the LMC. If the majority of these candidates are spectroscopically confirmed, IC10 must have an exceptional population of high mass stars.

**Accepted by ApJL**

*Preprints from* `ftp://ftp.lowell.edu/pub/massey/ic102.ps.gz`

## Probing the circumstellar structure of Herbig Ae/Be stars

**Jorick S. Vink[1], Janet E. Drew[1], Tim J. Harries[2], René D. Oudmaijer[3]**

[1] Imperial College, Blackett Laboratory, Prince Consort Road, London, SW7 2BZ, UK

[2] School of Physics, University of Exeter, Stocker Road, Exeter EX4 4QL, UK

[3] The Department of Physics and Astronomy, E C Stoner Building, Leeds, LS2 9JT, UK

We present H$\alpha$ spectropolarimetry observations of a sample of 23 Herbig Ae/Be stars. A change in the linear polarisation across H$\alpha$ is detected in a large fraction of the objects, which indicates that the regions around Herbig stars are flattened (disc-like) on small scales. A second outcome of our study is that the spectropolarimetric signatures for the Ae stars differ from those of the Herbig Be stars, with characteristics changing from depolarisation across H$\alpha$ in the Herbig Be stars, to line polarisations in the Ae group. The frequency of depolarisations detected in the Herbig Be stars (7/12) is particularly interesting as, by analogy to classical Be stars, it may be the best evidence to date that the higher mass Herbig stars are surrounded by flattened structures. For the Herbig Ae stars, 9 out of 11 show a line polarisation effect that can be understood in terms of a compact H$\alpha$ emission that is itself polarised by a rotating disc-like circumstellar medium. The spectropolarimetric difference between the Herbig Be and Ae stars may be the first indication that there is a transition in the Hertzsprung-Russell Diagram from magnetic accretion at spectral type A to disc accretion at spectral type B. Alternatively, the interior polarised line emission apparent in the Ae stars may be masked in the Herbig Be stars due to their higher levels of H$\alpha$ emission.

**Accepted by MNRAS**

*Preprints from* `jvink@ic.ac.uk`
*or on the web at* `http://astro.ic.ac.uk/~jvink/`

## Submitted Papers

# On the use of synthesis models to obtain the properties of low mass stellar clusters

**M. Cerviño**[1,2]

[1] Instituto de Astrofísica de Andalucia (CSIC) Camino Bajo de Huétor 24, Granada 18080, Spain

[2] Laboratorio de Astrofísica Espacial y Física fundamental (INTA) Apdo. 50272, Madrid 28080, Spain

In this paper I show that the use of synthesis models to infer the properties of stellar clusters may lead to biased results when the number of stars in observed clusters is not high enough to fill the IMF. I establish a natural theoretical limit on the initial stellar mass of the observed cluster that allows a safe use of synthesis models, imposing that the total bolometric luminosity of the cluster must be larger than the individual contribution of any of the stars included in the model. This limit is $\mathcal{M} \sim 1 \times 10^5$ $M_\odot$ in the mass range 0.09-120 $M_\odot$ with a Salpeter IMF slope. Below this limit, by construction, synthesis models cannot be used to obtain the properties (including cluster masses) of observed clusters unless they include sampling effects. I also show that a bimodal distribution of some properties is a natural effect when clusters with masses below $\mathcal{M}$ are observed. I also establish a mass value below which the results of synthesis models are biased with respect to the real properties of clusters. Finally, I point out that it is necessary to include sampling effects in synthesis models for a safe interpretation of current and future observations of small stellar clusters and that a deeper research is needed in this subject.

**Submitted to ApJ Letters**

*Preprints from* `mcs@laeff.esa.es`
*or on the web at* `http://www.laeff.esa.es/users/mcs/SED/lowmass.ps`

## In Proceedings

# Radio emission models of Colliding-Winds Binaries

**S.M. Dougherty**[1], **J.M. Pittard**[2], **R. Coker**[3], **P.M. Williams**[4], **L. Kasian**[1] **and H.M. Lloyd**[5]

[1] DRAO, PO. Box 248, 717 White Lake Road, Penticton, British Columbia, Canada V2A 6K3

[2] Dept. of Physics & Astronomy, University of Leeds, Woodhouse Lane, Leeds, LS2 9JT, UK

[3] Los Alamos National Laboratory, X-2, MS T-087, Los Alamos, NM 87545, USA

[4] Insitute for Astronomy, Blackford Hill, Edinburgh EH9 3HJ, UK

[5] Blade Interactive Studios, 274 Deansgate, Manchester M3 4JB, UK

We present initial calculations of the spatial distribution of the radio emission from a WR+OB colliding wind binary (CWB) system based on high-resolution hydrodynamical simulations and solutions to the radiative transfer equation. We account for both thermal and synchrotron radio emission assumming equipartition between the magnetic and relativisitic particle energy densities, and that the latter is a simple fraction of the thermal particle energy density. We present preliminary attempts to model the radio continuum of the very wide system WR147, and present some thoughts on modelling the radio light curve of the archetype CWB, WR140.

**Conference proceedings of Winds, Bubbles & Explosions, to be published in Rev. Mex AA**
*Preprints from* `sean.dougherty@nrc.ca`
*or by anonymous ftp to* `ftp.drao.nrc.ca/pub/smd/bubbles/dougherty.ps.gz`
*or on the web at* `http://www.drao.nrc.ca/ smd/preprint/bubbles_dougherty.ps`

## 3D-hydrodynamics of colliding winds in massive binaries

**Rolf Walder[1] and Doris Folini[2]**

[1] Steward Observatory, university of Arizona, N 933 Cherry Ave, Tucson, AZ 85721, USA
[2] Observatoire de Strasbourg, F67000 Strasbourg, France

The pinwheel nebulae observed in some WC-binaries essentially mirror a transport phenomenon. We show the importance of the central wind collision zone in setting the 'initial conditions' for this transport. In order to understand some of the newly observed features, we postulate that standard theory of colliding flows must be extended by considering radiative breaking, heat-conduction, and the clumped character of the winds. We suggest that clumped winds can be modeled by highly compressible turbulence and outline some consequences for the physics of the wind collision zone. With regard to dust production we argue that the system center is the only location where dust nucleation can happen.

We show preliminary results of a 3D, full-orbit simulation of the periodic dustformer WR140 in the frame of colliding smooth winds. In this simulation, the wind-wind-interaction region (WWR) is even in periastron non radiative and high-densities cannot be reached in the WWR. However, when considering the clumpiness of Wolf-Rayet winds, the WWR in periastron is likely radiative and good conditions for dust production can be obtained. A Mpeg- or quicktime-movie of this simulation can be copied from our web-page, the simulation data is available on request.

**Proceedings IAU symposium 212, a massive star odyssey**
*Preprints from* `rwalder@as.arizona.edu`
*or on the web at* `http:/www.astro.phys.ethz.ch:/staff/walder`

## On the self-consistency of evolutionary synthesis models

**M. Cerviño[1,2]**

[1] Instituto de Astrofísica de Andalucia (CSIC) Camino Bajo de Huétor 24, Granada 18080, Spain
[2] Laboratorio de Astrofísica Espacial y Física fundamental (INTA) Apdo. 50272, Madrid 28080, Spain

Evolutionary synthesis models have been used to study the physical properties of unresolved populations in a wide range of scenarios. Unfortunately, their self-consistency are difficult to test and there are some theoretical open questions without an answer: (1) The change of the homology relations assumed in the computation of isochrones due to the effect of stellar winds (or rotation) and the discontinuities in the stellar evolution are not considered. (2) There is no a consensus about how the isochrones must be integrated. (3) The discreteness of the stellar populations (that produce an intrinsic statistical dispersion) usually are not taken into account, and model results are interpreted in a deterministic way instead a statistical one... The objective of this contribution is to present some inconsistencies in the computation and some cautions in the application of the results of such codes.

**To appear in:** *The Evolution of Galaxies III. From Simple Approaches to Self-Consistent Models*
*Preprints from* `mcs@laeff.esa.es`
*or on the web at* `astro-ph/0210078`

## The chemical evolution of the solar neighbourhood

**D. Vanbeveren and E. De Donder**

Astrophysical Institute, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

Recent models of galactic chemical evolution account for updated evolutionary models of massive stars (with special emphasis on stellar winds) and for the effects of intermediate mass and massive binaries. The results are summarised. We also present a critical discussion on possible effects of stellar rotation on overall galactic chemical evolutionary simulations.

**To appear in The Sixth Pacific Rim Conference on Stellar Astrophysics**, Xi'an, China, eds. K.S. Cheng, K.C. Leung, T.P. Li
*Preprints from* `dvbevere@vub.ac.be`
*or on the web at* `http://xxx.lanl.gov/pdf/astro-ph/0209066`

# Jobs

## Postdoc in Atmospheric Modelling

**E. Baron[1] and D. Branch[1]**

[1] Dept. of Physics and Astronomy, University of Oklahoma, Norman, OK 73019 USA

Applications are invited for a postdoctoral position in numerical radiative transfer and supernovae at the University of Oklahoma. The sucessful candidate will work on developing a general radiative transfer code and its application to supernovae and variable stars. The candidate will work in closely with Eddie Baron and David Branch at OU, but also with their collaborators at other institutions. The candidate should hold a Ph.D. in physics, astronomy, or a closely related field. Previous experience in one or more of the following areas are desired: radiative transfer, numerical methods, hydrodynamics, supernovae, or variable stars. The position is available for one year and may be renewed for up to three years subject to performance and the availability of project funds. Applicants should send a curriculum vitae, brief summary of research experience, bibliography, and three letters of recommendation sent directly to Eddie Baron, at the above address. Inquiries can be directed to baron@nhn.ou.edu. OU is an affirmative action/equal opportunity employer, and encourages applications from women, minorities, veterans, and disabled persons.