THE AGB NEWSLETTER

An electronic publication dedicated to Asymptotic Giant Branch stars and related phenomena

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Editors: Jacco van Loon and Albert Zijlstra

Editorial

Dear Colleagues,

It is our pleasure to present you the 133$^{\rm rd}$ issue of the AGB Newsletter. Amongst the many intriguing new results announced, magnetic fields feature in several papers, be it around or inside the star. In the latter case, they may be responsible for the extra mixing that is believed to be a necessary ingredient in the models of convective stars. Or at least contribute, perhaps in combination with thermohaline mixing. With several mechanisms being proposed for the mixing, like for the mass-loss process, these might all be operating at the same time. All contributing to the final effect, one should be careful not to try to identify one "main" responsible agent and neglect the contributions from the other mechanisms.

Congratulations to Andrea Chiavassa, who produced a very interesting Ph.D. thesis at Montpellier.

If you are looking for a job, there are some great fellowships on offer to work in Australia, for example at Monash University. Whilst a full professorship is opened at Vienna.

And you can already start planning your Summer in two years' time, when the Asymmetrical Planetary Nebulae conference is held in the Lake District, UK.

The next issue will be distributed on the 2$^{\rm nd}$ of August; the deadline for contributions is the 1$^{\rm st}$ of August.

Editorially Yours,
Jacco van Loon and Albert Zijlstra

Food for Thought

This month's thought-provoking statement is:

Magnetic fields are omnipresent

Reactions to this statement or suggestions for next month's statement can be e-mailed to agbnews@astro.keele.ac.uk (please state whether you wish to remain anonymous)

Tentative detection of phosphine in IRC +10216

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The $J_K = 1_0$-0_0 rotational transition of phosphine (PH_3) at 267 GHz has been tentatively identified with a T_{MB} ∼40 mK spectral line observed with the IRAM 30-m telescope in the C-star envelope IRC +10216. A radiative transfer model was used to fit the observed line profile. The derived PH_3 abundance relative to H_2 is 6×10^{-9}, although it may have a large uncertainty due to the lack of knowledge about the spatial distribution of this species. If our identification is correct, it implies that PH_3 has a similar abundance to what is reported for HCP in this source and that these two molecules (HCP and PH_3) together take up about 5 % of phosphorus in IRC +10216. The abundance of PH_3, like that of other hydrides in this source, is not well explained by conventional gas-phase LTE and non-LTE chemical models, and may imply formation on grain surfaces.

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A Small Step on the Long Road to Understanding the R-Stars: CNO Cycling in Candidate R-Star Progenitors

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Recent work has proposed that a merger event between a red-giant and a He white dwarf may be responsible for the production of R-stars (Izzard et al. 2007). We investigate the proposed evolution and nucleosynthesis of such a model. We simulate the hypothesized late ignition of the core flash by increasing the neutrino losses until the ignition occurs sufficiently far from the centre that the subsequent evolution produces dredge-up of carbon to the extent that the post-flash ob ject is a carbon star. Detailed nucleosynthesis is performed within this approximation, and we show that the overall properties are broadly consistent with the observations. Details will depend on the dynamics of the merger event.

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On the reliability of mass-loss-rate estimates for AGB stars

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In the recent literature there has been some doubt as to the reliability of CO multi-transitional line observations as a mass-loss-rate estimator for AGB stars. Using new well-calibrated CO radio line observations, the main aim of the work

presented here is to carefully evaluate the reliability of CO mass-loss-rate estimates for intermediate- to high-mass-loss-rate AGB stars with different photospheric chemistries. Mass-loss rates for 10 intermediate- to high-mass-loss-rate AGB stars are derived using a detailed non-LTE, non-local radiative transfer code based on the Monte-Carlo method to model the CO radio line intensities. The circumstellar envelopes are assumed to be spherically symmetric and formed by constant mass-loss rates. The energy balance is solved self-consistently and the effects of dust on the radiation field and thermal balance included. An independent estimate of the mass-loss rate is also obtained from the combination of dust radiative transfer modelling with a dynamical model of the gas and dust particles. We find that the CO radio line intensities and shapes are successfully reproduced for the majority of our objects when assuming a constant mass-loss rate. Moreover, the CO line intensities are only weakly dependent on the adopted micro-turbulent velocity, in contrast to recent claims in the literature. The two methods used in the present work to derive mass-loss rates are consistent within a factor of ~ 3 for intermediate- to high-mass-loss-rate objects, indicating that this is a lower limit to the uncertainty in present mass-loss-rate estimates. We find a tentative trend with chemistry. Mass-loss rates from the dust/dynamical model are systematically higher than those from the CO model for the carbon stars and vice versa for the M-type stars. This could be ascribed to a discrepancy in the adopted CO/H_2-abundance ratio, but we caution that the sample is small and systematic errors cannot be excluded.

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Mass Loss From Evolved Stars in Elliptical Galaxies

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Most of the X-ray emitting gas in early-type galaxies probably originates from red giant mass loss and here we model the interaction between this stellar mass loss and the hot ambient medium. Using two-dimensional hydrodynamic simulations, we adopt a temperature for the ambient medium of 3×10^6 K along with a range of ambient densities and stellar velocities. When the stellar velocity is supersonic relative to the ambient medium, a bow shock occurs, along with a shock driven into the stellar ejecta, which heats only a fraction of the gas. Behind the bow shock, a cool wake develops but the fast flow of the hot medium causes Kelvin-Helmholtz instabilities to grow and these fingers are shocked and heated (without radiative cooling). Along with the mixing of this wake material with the hot medium, most of the stellar ejecta is heated to approximately the temperature of the hot ambient medium within 2 pc of the star. With the addition of radiative cooling, some wake material remains cool ($< 10^5$ K), accounting for up to 25% of the stellar mass loss. Less cooled gas survives when the ambient density is lower or when the stellar velocity is higher than in our reference case. These results suggest that some cooled gas should be present in the inner part of early-type galaxies that have a hot ambient medium. These calculations may explain the observed distributed optical emission line gas as well as the presence of dust in early-type galaxies.

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and from http://www.astro.lsa.umich.edu/∼jbregman/public/ms.ps.gz

Nitrogen abundances in giant stars of the globular cluster NGC 6752

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We present N abundances for 21 bright giants in the globular cluster NGC 6752 based on high-resolution UVES spectra

of the 3360Å NH lines. We confirm that the Strömgren c_1 index traces the N abundance and find that the star-to-star N abundance variation is 1.95 dex, at the sample's luminosity. We find statistically significant correlations, but small amplitude variations, between the abundances of N and α-, Fe-peak, and s-process elements. Analyses using model atmospheres with appropriate N, O, Na, and Al abundances would strengthen, rather than mute, these correlations. If the small variations of heavy elements are real, then the synthesis of the N anomalies must take place in stars which also synthesize α-, Fe-peak, and s-process elements. These correlations offer support for contributions from both AGB and massive stars to the globular cluster abundance anomalies.

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Improved parameters of the hydrogen-deficient binary star KS Per

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Using the high resolution observations obtained with the Nasmyth Echelle Spectrograph NES of the 6m telescope we analysed the optical spectrum of the hydrogen-deficient binary star KS Per. The atmospheric parameters derived are: $T_{\rm eff} = 9500 \pm 300$ K, $\log g = 2.0 \pm 0.5$, and $V_{\rm t} = 9.5 \pm 0.5$ km s^{-1}. The hydrogen deficiency is H/He= 3×10^{-5}, iron abundance is reduced by 0.8 dex, nitrogen abundance is very high [N/Fe]=1.4, but carbon and oxygen abundances are low. The star luminosity is $\log L/{\rm L}_{\odot} = 3.3$. A complex absorption and emission structure of the Na I D doublet was revealed. We suggest that the emission component forms in the circumbinary gaseous envelope.

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Echelle long-slit optical spectroscopy of evolved stars

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We present echelle long-slit optical spectra of a sample of objects evolving off the Asymptotic Giant Branch (AGB), most of them in the pre-planetary nebula (pPN) phase, obtained with the ESI and MIKE spectrographs at the 10 m Keck II and 6.5 m Magellan-I telescopes, respectively. The total wavelength range covered with ESI (MIKE) is ∼3900 to 10900 Å (∼3600 to 7200 Å). In this paper, we focus our analysis mainly on the Hα profiles. Prominent Hα emission is detected in half of the objects, most of which show broad Hα wings (with total widths of up to ∼4000 km s^{-1}). In the majority of the Hα-emission sources, fast, post-AGB winds are revealed by P-Cygni profiles. In ∼37% of the objects Hα is observed in absorption. In almost all cases, the absorption profile is partially filled with emission, leading to complex, structured profiles that are interpreted as an indication of incipient post-AGB mass-loss. The rest of the objects (∼13%) are Hα non-detections. We investigate correlations between the Hα profile and different stellar and envelope parameters. All sources in which Hα is seen mainly in absorption have F-G type central stars, whereas sources with intense Hα emission span a larger range of spectral types from O to G, with a relative maximum around B, and also including very late C types. Shocks may be an important excitation/ionization agent of the close stellar surroundings for objects with late type central stars. Sources with pure emission or P Cygni Hα profiles have larger J–K color excess than objects with Hα mainly in absorption, which suggests the presence of warm dust near the star in the former. The two classes of profile sources also segregate in the IRAS color-color diagram in a way that intense

Hα-emitters have dust grains with a larger range of temperatures. Spectral classification of the central stars in our sample is presented. For a subsample (13 objects), the stellar luminosity has been derived from the analysis of the O I 7771-5 Å infrared triplet. The location in the HR diagram of most of these targets, which represent $\sim$30% of the whole sample, is consistent with relatively high final (and, presumably, initial) masses in the range $M_{\rm f} \sim 0.6 - 0.9$ M$_\odot$ ($M_{\rm i} \sim 3 - 8$ M$_\odot$).

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Magnetic Mixing in Red Giant and Asymptotic Giant Branch Stars

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The available information on isotopic abundances in the atmospheres of low-mass Red Giant Branch (RGB) and Asymptotic Giant Branch (AGB) stars requires that episodes of extensive mixing occur below the convective envelope, reaching down to layers close to the hydrogen burning shell (Cool Bottom Processing). Recently Busso et al. (2007) suggested that dynamo-produced buoyant magnetic flux tubes could provide the necessary physical mechanisms and also supply sufficient transport rates. Here, we present an $\alpha - \Omega$ dynamo in the envelope of an RGB/AGB star in which shear and rotation drain via turbulent dissipation and Poynting flux. In this context, if the dynamo is to sustain throughout either phase, convection must resupply shear. Under this condition, volume-averaged, peak toroidal field strengths of $\langle B_\phi \rangle \simeq 3 \times 10^3$ G (RGB) and $\langle B_\phi \rangle \simeq 5 \times 10^3$ G (AGB) are possible at the base of the convection zone. If the magnetic fields are concentrated in flux tubes, the corresponding field strengths are comparable to those required by Cool Bottom Processing.

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Molecules and dust production in the Magellanic Clouds

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We present ESO/VLT spectra in the 2.9–4.1 μm range for a large sample of infrared stars in the Small Magellanic Cloud (SMC), mainly carbon stars, massive oxygen-rich Asymptotic Giant Branch (AGB) stars, and red supergiants. Strong emission from Polycyclic Aromatic Hyrdrocarbons (PAHs) is detected in the spectrum of the post-AGB object MSX SMC 29. Water ice is detected in at least one Young Stellar Object, IRAS 01042−7215, for the first time in the SMC. The strength and shapes of the molecular bands detected in the evolved stars are compared with similar data for stars in the Large Magellanic Cloud (LMC). Absorption from acetylene in carbon stars is found to be equally strong in the SMC as in the LMC, but the LMC stars show stronger dust emission in their infrared colours and veiling of the molecular bands. This suggests that a critical link exists in the formation of dust from the molecular atmosphere in carbon stars which scales with the initial metallicity. Nucleation seeds based on a secondary element such as

titanium or silicon provide a plausible explanation. In oxygen-rich stars, both the nucleation seeds and molecular condensates depend on secondary elements (in particular titanium, silicon, and/or aluminium), which explains the observed lower molecular abundances and lower dust content in the SMC stars. Emission from silicon monoxide seen in some oxygen-rich AGB stars and red supergiants in the SMC suggests that these metal-poor stars are able to drive strong pulsation shocks through their molecular layers. Data for pulsating dusty AGB stars and supergiants in the LMC are used to show that pulsation is likely the critical factor in driving mass loss, as long as dust forms, rather than the stellar luminosity. Finally, we suggest that the reduced dust production and consequently slower winds of metal-poor AGB stars and red supergiants are more likely to result in chemical inhomogeneities and small-scale structure in the interstellar medium.

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Infrared Photometry and Evolution of Mass-Losing AGB Stars. II. Luminosity and Colors of MS and S Stars

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Asymptotic Giant Branch (AGB) phases mark the end of the evolution for Low- and Intermediate-Mass Stars. Our understanding of the mechanisms through which they eject the envelope and our assessment of their contribution to the mass return to the Interstellar Medium and to the chemical evolution of Galaxies are hampered by poor knowledge of their Luminosities and mass loss rates, both for C-rich and for O-rich sources. We plan to establish criteria permitting a more quantitative determination of luminosities (and subsequently of mass loss rates) for the various types of AGB stars on the basis of infrared fluxes. In this paper, in particular, we concentrate on O-rich and s-element-rich MS, S stars and include a small sample of SC stars. We reanalyze the absolute bolometric magnitudes and colors of MS, S, SC stars on the basis of a sample of intrinsic (single) and extrinsic (binary) long period variables. We derive bolometric corrections as a function of near- and mid-infrared colors, adopting as references a group of stars for which the Spectral Energy Distribution could be reconstructed in detail over a large wavelength range. We determine the absolute HR diagrams, and compare luminosities and colors of S-type giants with those, previously derived, of C-rich AGB stars. Luminosity estimates are also verified on the basis of existing Period-Luminosity relations valid for O-rich Miras. S star bolometric luminosities are almost indistinguishable from those of C-rich AGB stars. On the contrary, their circumstellar envelopes are thinner and less opaque. Despite this last property the IR wavelengths remain dominant, with the bluest stars having their maximum emission in the H or K(short) bands. Near-to-Mid infrared color differences are in any case smaller than for C stars. Based on Period-Luminosity relations for O-rich Miras and on Magnitude-color relations for the same variables we show how approximate distances (hence intrinsic parameters) for sources of so far unknown parallax can be inferred. We argue that most of the sources have a rather small mass (< 2 $M_{\odot}$); dredge-up might then be not effective enough to let the C/O ratio exceed unity.

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Are oxygen and neon enriched in PNe and is the current solar Ne/O abundance ratio underestimated?

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A thorough critical literature survey has been carried out for reliable measurements of oxygen and neon abundances of

planetary nebulae (PNe) and H II regions. By contrasting the results of PNe and of H II regions, we aim to address the issues of the evolution of oxygen and neon in the interstellar medium (ISM) and in the late evolutionary phases of low- and intermediate-mass stars (LIMS), as well as the currently hotly disputed solar Ne/O abundance ratio. Through the comparisons, we find that neon abundance and Ne/O ratio increase with increasing oxygen abundance in both types of nebulae, with positive correlation coefficients larger than 0.75. The correlations suggest different enrichment mechanisms for oxygen and neon in the ISM, in the sense that the growth of neon is delayed compared to oxygen. The differences of abundances between PNe and H II regions, are mainly attributed to the results of nucleosynthesis and dredge-up processes that occurred in the progenitor stars of PNe. We find that both these alpha-elements are significantly enriched at low metallicity (initial oxygen abundance < 8.0) but not at metallicity higher than the SMC. The fact that Ne/O ratios measured in PNe are almost the same as those in H II regions, regardless of the metallicity, suggests a very similar production mechanism of neon and oxygen in intermediate mass stars (IMS) of low initial metallicities and in more massive stars, a conjecture that requires verification by further theoretical studies. This result also strongly suggests that both the solar neon abundance and the Ne/O ratio should be revised upwards by about 0.22 dex from the Asplund, Grevesse & Sauval values or by about 0.14 dex from the Grevesse & Sauval values.

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^{26}Al production from magnetically induced extramixing in AGB Stars

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We discuss nucleosynthesis results obtained following the recent suggestion that extramixing phenomena in red giants might be driven by magnetic buoyancy. We explore for this model the production of the short-lived radioactive isotope ^{26}Al and of stable light nuclei, considering both the case of the general buoyancy of flux tubes and that of the intermittent release of magnetized unstable structures. We show that abundant ^{26}Al can be produced, up to, and above, the highest levels measured in presolar grains. This level would be also sufficient to explain the early solar system ^{26}Al as coming from a nearby AGB star of low mass. The case of fast-moving instabilities is the most efficient, reaching almost the same effectiveness as hot bottom burning (HBB).

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An occultation event in a triple post-AGB star

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Eclipses and occultations of post-AGB stars provide a powerful method to explore the near-stellar environment, including close companions and circumstellar debris disks. Only six eclipsing systems and one dust-occultation system are currently known. New cases are important for our understanding of binary evolution during the AGB mass-loss phase.

We study the post-AGB central star of the (bipolar) Galactic bulge planetary nebula M 2-29. We have obtained additional HST imaging and SAAO spectroscopy of the object. The star showed a pronounced, long-lasting occultation with subsequent recovery. The event lasted for almost 3 years, with a secondary minimum 9 years later. The photometric behaviour of M 2-29 resembles the dust-occultation events seen in NGC 2346, and is modeled as an occultation by a circumbinary disk, where the binary period is 18 yr. Modulation during the decline shows evidence for another companion with a period of 23 days.

M 2-29 is the first eclipsing disk system among post-AGB stars. Close binaries with periods of order 1 months have been proposed to supply the energy needed to create the tori of bipolar planetary nebulae.

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Probing the Magnetized Interstellar Medium Surrounding the Planetary Nebula Sh 2-216

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We present 1420 MHz polarization images of a $2.5^\circ \times 2.5^\circ$ region around the planetary nebula (PN) Sh 2-216. The images are taken from the Canadian Galactic Plane Survey (CGPS). An arc of low polarized intensity (size $0.2^\circ \times 0.7^\circ$) appears prominently in the north-east portion of the visible disk of Sh 2-216, coincident with the optically identified interaction region between the PN and the interstellar medium (ISM). The arc contains structural variations down to the $\sim 1'$ resolution limit in both polarized intensity and polarization angle. Several polarization-angle "knots" appear along the arc. By comparison of the polarization angles at the centers of the knots and the mean polarization angle outside Sh 2-216, we estimate the RM through the knots to be -43 ± 10 rad m^{-2}. Using this estimate for the RM and an estimate of the electron density in the shell of Sh 2-216, we derive a line-of-sight magnetic field in the interaction region of 5.0 ± 2.0 μG. We believe it more likely the observed magnetic field is interstellar than stellar, though we cannot completely dismiss the latter possibility. We interpret our observations via a simple model which describes the ISM magnetic field around Sh 2-216, and comment on the potential use of old PNe as probes of the magnetized ISM.

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The magnetic field of the proto-planetary nebula candidate IRAS 19296+2227

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Context: Magnetic fields are thought to be one of the possible mechanisms responsible for shaping the generally spherical outflow of evolved stars into often aspherical planetary nebulae. However, direct measurements of magnetic fields during the transition to the planetary nebula phase are rare.
Aims: The aim of this project is to expand the number of magnetic field measurements of stars in the (proto-)planetary nebula phase and find if the magnetic field strength is sufficient to affect the stellar outflow.
Methods: We used Very Long Baseline Array observations to measure the circular polarization due to the Zeeman splitting of 22 GHz water masers in the envelope of the proto-planetary nebula candidate star IRAS 19296+2227 and the planetary nebula K 3-35.
Results: A strong magnetic field of $B_{||} = -135 \pm 28$ is detected in the water maser region of the proto-planetary nebula candidate IRAS 19296+2227. The water masers of K 3-35 are too weak to detect circular polarization although we do present the measurements of weak linear polarization in those masers.
Conclusions: The field measured in the masers of IRAS 19296+2227 is dynamically important and, if it is representative of the large scale field, is an important factor in driving the stellar mass loss and shaping the stellar outflow.

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The gas turbulence in planetary nebulae: quantification and multi-D maps from long-slit, wide-spectral range echellogram

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This methodological paper is part of a short series dedicated to the long-standing astronomical problem of de-projecting the bi-dimensional, apparent morphology of a three-dimensional distribution of gas. We focus on the quantification and spatial recovery of turbulent motions in planetary nebulae (and other classes of expanding nebulae) by means of long-slit echellograms over a wide spectral range. We introduce some basic theoretical notions, discuss the observational methodology, and develop an accurate procedure disentangling all broadening components of the velocity profile in all spatial positions of each spectral image. This allows us to extract random, non-thermal motions at unprecedented accuracy, and to map them in 1-, 2- and 3-dimensions. We present the solution to practical problems in the multi-dimensional turbulence-analysis of a testing-planetary nebula (NGC 7009), using the three-step procedure (spatio-kinematics, tomography, and 3-D rendering) developed at the Astronomical Observatory of Padua. In addition, we introduce an observational paradigm valid for all spectroscopic parameters in all classes of expanding nebulae. Unsteady, chaotic motions at a local scale constitute a fundamental (although elusive) kinematical parameter of each planetary nebula, providing deep insights on its different shaping agents and mechanisms, and on their mutual interaction. The detailed study of turbulence, its stratification within a target and (possible) systematic variation among different sub-classes of planetary nebulae deserve long-slit, multi-position angle, wide-spectral range echellograms containing emissions at low-, medium-, and high-ionization, to be analyzed pixel-to-pixel with a straightforward and versatile methodology, extracting all the physical information stored in each frame at best.

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AGB Connection and Ultraviolet Luminosity Excess in Elliptical Galaxies

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Relying on infrared surface brightness fluctuactions to trace AGB properties in a sample of elliptical galaxies in the Virgo and Fornax clusters, we assess the puzzling origin of the "UV-upturn" phenomenon, recently traced down to the presence of a hot horizontal branch (HB) stellar component. The UV-upturn actually signals a profound change in the galaxy stellar populations, involving both the hot stellar component and red-giant evolution. In particular, the strengthening of the UV rising branch is always seen to correspond to a shortening in AGB deployment; this trend can be readily interpreted as an age effect, perhaps mildly modulated by metal abundance.

A comparison between galaxy $\bar{K}$ magnitudes and population synthesis models confirms that, all the way, brightest stars in ellipticals are genuine AGB members, reaching the thermal-pulsing phase, and with the AGB tip exceeding the RGB tip by some 0.5–1.5 mag. The inferred core mass of these stars is found to be $\lesssim$0.57 $M_\odot$ among giant ellipticals. Coupled with the recognized severe deficiency of planetary nebulae in these galaxies, this result strongly calls for an even more critical blocking effect due to a lengthy transition time needed by the post-AGB stellar core to become a hard UV emitter and eventually "fire up" the nebula.

The combined study of galaxy $(1550-\mathrm{V})_0$ color and integrated Hβ index points to a a bimodal temperature distribution for the HB with both a red clump and an extremely blue component, in a relative proportion $[N(\mathrm{RHB}) : N(\mathrm{BHB})] \sim [80 : 20]$. For the BHB stellar population, [Fe/H] values of either ~ -0.7 dex or $\gtrsim +0.5$ may provide the optimum ranges to feed the needed low-mass stars ($M_\star \ll 0.58$ $M_\odot$), that at some stage begin to join the standard red-clump stars.

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Conference Paper

Galactic and Extragalactic Distance Scales: The Variable Star Project

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This paper summarizes the status of a large project to improve distance scales of various classes of variable stars. This is being carried out by a large group in Cape Town, Japan, England and the USA. The results are illustrated by giving the distances to the Large Magellanic Cloud and the Galactic Centre (R_0) as well as the value of the Hubble constant (H_0), based on our current results. The classes of variables considered are; Classical Cepheids, Type II Cepheids, RR Lyrae stars, O- and C-Miras.

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Thesis

Atmospheric Dynamics of Red Supergiant Stars

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Thanks to their high-peak infrared luminosity, red supergiant (RSG) stars are fundamental tracers of galactic structure, efficiently probing regions of high interstellar extinction. To understand their properties is crucial and impacts a broad segment of Astrophysics. In this thesis, the answer to the principal questions about RSGs is addressed with three-dimensional radiation hydrodynamic (RHD) models. The computer code CO5BOLD, developed by Freytag, Steffen, Ludwig and collaborators, is used. First, I have developed a three-dimensional radiative transfer code that computes spectra and intensity maps from RHD simulations. With this tool at hand, I characterize the granulation pattern of the RHD models at different wavelengths and I study the impact of the convection on spectral line in term of line shifts and asymmetries, prospecting line bisectors and photocenter variations for future observations. Then, I measure the characteristic atmospheric velocities. From the comparison with the observations I find that the simulations are in agreement with the observations even if the velocity amplitudes are smaller than what is observed. Furthermore, the convection-related surface structures show an evident departure from the circular symmetry on the visibility curves and closure phases. I seek constraints of the atmospheric movements analysing these observables and I show where and how the convection pattern can be detected and measured. I conclude that today interferometers are the best way for the characterization of the convection on RSG strars. Finally, I highlight that the principal problem of RHD simulations is the grey treatment of opacities and I explore the effects on the observables using a first non-grey testing model.

321 pages, about 150 Mb. High resolution images.
Available from http://tel.archives-ouvertes.fr/index.php?halsid=t1adlti2poqorcl5feo3b36t85&view_this_doc=tel-00291074&version=1

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The Australian government has announced new 4-year "Future Fellowships". The objectives are to attract and retain outstanding mid-career researchers. Up to 200 will be available each year from 2009 to 2013. There are two proposed salary levels
Step 1: $95,000 -$100,000
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In addition, up to $50,000 per year to each Future Fellow's administering organisation to support related infrastructure and equipment for research projects as well as travel and relocation costs. If you are interested in applying for one of these positions to work in any area of stellar astrophysics at Monash University, please contact Prof. John Lattanzio on john.lattanzio@sci.monash.edu.au

University of Vienna, Austria
Full Professor of Stellar Astrophysics

The University of Vienna announces the position of a "Full Professor of Stellar Astrophysics". All details can be found through the corresponding link.

See also http://personalabteilung.univie.ac.at/index.php?id=13683&tx_ttnews[tt_news]=6261&tx_ttnews[backPid]=11915&cHash=f378196d05

Announcement

pre-announcement
Asymmetric Planetary Nebulae V
United Kingdom, June 2010

For those of you who like to get your travel schedule in early: we are happy to announce that the next Asymmetrical Planetary Nebulae conference (APN5) is planned to be held June 20-25, 2010, in the Lake District in the UK.

The intricate structures shown by many planetary nebulae have for many years presented one of the most vexing problems in astrophysics. The origin and development of the asymmetries, both on large and small scales, is still not understood. Similar structures are now seen in a variety of circumstellar environments, including nova shells and SN 1987A. A common physics acts in these very different classes of objects. The origin of the asymmetries has been sought in, amongst others, the interaction with binary companions and the effect of magnetic fields. A combination of these effects is likely.

The rapid development of the field, and the application in many areas of astrophysics, have been the subject of a series of meetings. These large meetings have been characterized not only by spectacular images, but also animated discussions and beautiful (even volcanic) locations. The next meeting will continue this tradition, with a planned location at Lake Windermere in the UK's Lake District. Watch this space for further announcements!

See also http://www.astrophysics.manchester.ac.uk/apn5.html