// COOLNEWS

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Stellar Abstracts

Spatially Resolving the Outer Atmosphere of the M Giant BK Vir in the CO First Overtone Lines with VLTI/AMBER

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The mass-loss mechanism in normal K–M giant stars with small variability amplitudes is not yet understood, although they are the majority among red giant stars. We present high-spatial and high-spectral resolution observations of the 2.3 micron CO lines in the M7 giant BK Vir with a spatial resolution of 9.8 mas and a spectral resolution of 12000, using AMBER at the Very Large Telescope Interferometer (VLTI). The angular diameters observed in the CO lines are 12–31% larger than those measured in the continuum. We also detected asymmetry in the CO line-forming region. The data taken 1.5 months apart show possible time variation on a spatial scale of 30 mas (corresponding to 3 × stellar diameter) at the CO band head. Comparison of the observed data with the MARCS photospheric model shows that whereas the observed CO line spectrum can be well reproduced by the model, the angular sizes observed in the CO lines are much larger than predicted by the model. Our model with two additional CO layers above the MARCS photosphere reproduces the observed spectrum and interferometric data in the CO lines simultaneously. This model

suggests that the inner CO layer at 1.2 stellar radii is very dense and warm with a CO column density of $\sim 10^{22}$ cm^{-2} and temperatures of 1900–2100K, while the outer CO layer at 2.5–3.0 stellar radii is characterized by column densities of 10^{19}–10^{20} cm^{-2} and temperatures of 1500–2100K. Our AMBER observations of BK Vir have spatially resolved the extended molecular outer atmosphere of a normal M giant in the individual CO lines for the first time. The temperatures derived for the CO layers are higher than or equal to the uppermost layer of the MARCS photospheric model, implying the operation of some heating mechanism in the outer atmosphere.

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Post Common-envelope Binaries from SDSS. XII: The Orbital Period Distribution

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The complexity of the common-envelope phase and of magnetic stellar wind braking currently limits our understanding of close binary evolution. Because of their intrinsically simple structure, observational population studies of white dwarf plus main sequence (WDMS) binaries can potentially test theoretical models and constrain their parameters. The Sloan Digital Sky Survey (SDSS) has provided a large and homogeneously selected sample of WDMS binaries, which we characterise in terms of orbital and stellar parameters. We have obtained radial velocity information for 385 WDMS binaries from follow-up spectroscopy and for an additional 861 systems from the SDSS subspectra. Radial velocity variations identify 191 of these WDMS binaries as post common-envelope binaries (PCEBs). Orbital periods of 58 PCEBs were subsequently measured, predominantly from time-resolved spectroscopy, bringing the total number of SDSS PCEBs with orbital parameters to 79. Observational biases inherent to this PCEB sample were evaluated through extensive Monte Carlo simulations.

We find that 21 − 24% of all SDSS WDMS binaries have undergone common-envelope evolution, which is in good agreement with published binary population models and high-resolution *HST* imaging of WDMS binaries unresolved from the ground. The bias-corrected orbital period distribution of PCEBs ranges from 1.9 h to 4.3 d and approximately follows a normal distribution in log P(orb), peaking at $\sim$ 10.3 h. There is no observational evidence for a significant population of PCEBs with periods in the range of days to weeks. The large and homogeneous sample of SDSS WDMS binaries provides the means to test fundamental predictions of binary population models, hence to observationally constrain the evolution of all close compact binaries. (*continued* →)

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The Helicity of the Cellular-convection Velocity Field in a Rotating Layer

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The helicity of a cellular convective flow in a horizontal layer of a compressible fluid (gas) heated from below and rotating about the vertical axis, is studied by finite-difference numerical simulations. The medium is assumed to be polytropically stratified. A thermal perturbation that produces a system of Bénard-type hexagonal convection cells is introduced at the initial time. The cells are further deformed by the action of the Coriolis force; however, at some stage of evolution, the flow is nearly steady (at later times, the cells break down). Given the Rayleigh and Prandtl numbers, the velocity-field helicity for this stage, averaged over the layer, increases with the decrease of the polytrope index (i.e., with the increase of the curvature of the static entropy profile) and has a maximum at a certain rotational velocity of the layer. Numerical simulations of such quasi-ordered convective flows should reduce uncertainties in the estimates of helicity, a quantity important for the operation of MHD dynamos.

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On the Physical Structure of IRC +10216. Ground-based and Herschel Observations of CO and C_2H

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Context. The carbon-rich asymptotic giant branch star IRC +10216 undergoes strong mass loss, and quasi-periodic enhancements of the density of the circumstellar matter have previously been reported. The star's circumstellar environment is a well-studied, and complex astrochemical laboratory, with many molecular species proved to be present. CO is ubiquitous in the circumstellar envelope, while emission from the ethynyl (C_2H) radical is detected in a spatially confined shell around IRC +10216. As reported in this article, we recently detected unexpectedly strong emission from the $N = 4-3$, $6-5$, $7-6$, $8-7$, and $9-8$ transitions of C_2H with the IRAM 30 m telescope and with *Herschel*/HIFI, challenging the available chemical and physical models.

Aims. We aim to constrain the physical properties of the circumstellar envelope of IRC +10216, including the effect of episodic mass loss on the observed emission lines. In particular, we aim to determine the excitation region and

conditions of C_2H, in order to explain the recent detections, and to reconcile these with interferometric maps of the $N = 1-0$ transition of C_2H.
Methods. Using radiative-transfer modelling, we provide a physical description of the circumstellar envelope of IRC +10216, constrained by the spectral-energy distribution and a sample of 20 high-resolution and 29 low-resolution CO lines — to date, the largest modelled range of CO lines towards an evolved star. We further present the most detailed radiative-transfer analysis of C_2H that has been done so far.
Results. Assuming a distance of 150 pc to IRC +10216, the spectral-energy distribution is modelled with a stellar luminosity of $11300\,L_\odot$ and a dust-mass-loss rate of $4.0 \times 10^{-8}\,M_\odot\,\mathrm{yr}^{-1}$. Based on the analysis of the 20 high-frequency-resolution CO observations, an average gas-mass-loss rate for the last 1000 years of $1.5 \times 10^{-5}\,M_\odot\,\mathrm{yr}^{-1}$ is derived. This results in a gas-to-dust-mass ratio of 375, typical for this type of star. The kinetic temperature throughout the circumstellar envelope is characterised by three powerlaws: $T_{\mathrm{kin}}(r) \propto r^{-0.58}$ for radii $r \leq 9$ stellar radii, $T_{\mathrm{kin}}(r) \propto r^{-0.40}$ for radii $9 \leq r \leq 65$ stellar radii, and $T_{\mathrm{kin}}(r) \propto r^{-1.20}$ for radii $r \geq 65$ stellar radii. This model successfully describes all 49 observed CO lines. We also show the effect of density enhancements in the wind of IRC +10216 on the C_2H-abundance profile, and the close agreement we find of the model predictions with interferometric maps of the C_2H $N = 1-0$ transition and with the rotational lines observed with the IRAM 30 m telescope and *Herschel*/HIFI. We report on the importance of radiative pumping to the vibrationally excited levels of C_2H and the significant effect this pumping mechanism has on the excitation of all levels of the C_2H-molecule.

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AMBER/VLTI Observations of Five Giant Stars

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While the search for exoplanets around main sequence stars more massive than the Sun have found relatively few such objects, surveys performed around giant stars have led to the discovery of more than 30 new exoplanets. The interest in studying planet-hosting giant stars resides in the possibility of investigating planet formation around stars more massive than the Sun. Masses of isolated giant stars up to now were only estimated from evolutionary tracks, which led to different results depending on the physics considered. To calibrate the theory, it is therefore important to measure many giant star diameters and masses as independent as possible of physical models. We aim to determine the diameters and effective temperatures of five giant stars, one of which is known to host a planet. We used optical long-baseline interferometry with the aim of testing and constraining the theoretical models of giant stars. Future time-series spectroscopic observations of the same stars will allow the determination of masses by combining the asterosimological analysis and the interferometric diameter. AMBER/VLTI observations with the ATs were executed in low-resolution mode on five giant stars. To measure highly accurate calibrated squared visibilities, a calibrator-star-calibrator observational sequence was performed. We measured the uniform disk and limb-darkened angular diameters of four giant stars. The effective temperatures were also derived by combining the bolometric luminosities and the interferometric diameters. Lower effective temperatures were found compared to spectroscopic measurements. The giant star HD12438 was found to have an unknown companion star at an angular separation of ~ 12 mas. Radial velocity measurements present in the literature confirm the presence of a companion with a very long orbital period (P $\sim$ 11.4 years).

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History of Solar Oblateness Measurements and Interpretation

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The story of the solar oblateness begins in the pre-relativity days when an explanation of the observed advance of Mercury's perihelion was searched for. Then, examination of historical records during the first decade of the twentieth century shows clearly a strong effort to measure the solar shape. Results show discrepancies, due on one hand, to the fact that physical statements in the solar case are still pending (does the solar core rotate rapidly, is the Sun an oblique rotator, how the magnetic field distort the outer shape, etc) and on the other hand, to the difficulty to measure a faint quantity, at the cutting edge of up-to-date techniques. We give a new look on the controversy which followed measurements made in Princeton (USA) in the mid-1960s, highlighting the possibility to advocate alternative theories of gravitation. Since then, the accurate shape of the Sun has been actively debated, and so far, only satellite experiments seem to achieve the required sensibility to measure the expected faint deviations to sphericity. In a close cooperation between experiments and theory, we point out how false ideas or inexact past measurements may contribute to the advance of "good" new physical concepts. A table sumurazing the observational efforts to measure the solar oblateness is given.

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Evidence for Two Separate But Interlaced Components of the Chromospheric Magnetic Field

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Chromospheric fibrils are generally thought to trace out low-lying, mainly horizontal magnetic fields that fan out from flux concentrations in the photosphere. A high-resolution ($\approx 0.1''$ pixel^{-1}) image, taken in the core of the Ca II 854.2 nm line and covering an unusually large area, shows the dark fibrils within an active region remnant as fine, looplike features that are aligned parallel to each other and have lengths comparable to a supergranular diameter. Comparison with simultaneous line-of-sight magnetograms confirms that the fibrils are centered above intranetwork areas (supergranular cell interiors), with one end rooted just inside the neighboring plage or strong unipolar network but the other endpoint less clearly defined. Focusing on a particular arcade-like structure lying entirely on one side of a filament channel (large-scale polarity inversion), we find that the total amount of positive polarity flux underlying this ??fibril arcade?? is $\approx$50 times greater than the total amount of negative-polarity flux. Thus, if the fibrils represent closed loops, they must consist of very weak fields (in terms of total magnetic flux), which are interpenetrated by a more vertical field that contains most of the flux. This surprising result suggests that the fibrils in unipolar regions connect the network to the nearby intranetwork flux, while the bulk of the network flux links to remote regions of the opposite polarity, forming a second, higher canopy above the fibril canopy. The chromospheric field near the edge of the network thus has an interlaced structure resembling that in sunspot penumbrae.

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Correlation Between the Sunspot Number, the Total Solar Irradiance, and the Terrestrial Insolation

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Our study deals with the correlations between the solar activity on the one hand and the solar irradiance above the Earth's atmosphere and at ground level on the other. We analyzed the combined ACRIM I+II time series of the total solar irradiance (TSI), the Mauna Loa time series of terrestrial insolation data, and data of terrestrial cosmic ray fluxes. We find that the correlation between the TSI and the sunspot number is strongly non-linear. We interpret this as the net balance between brightening by faculae and darkening by spots where faculae dominate at low activity and spots dominate at high activity. Such a behavior is hitherto known from stellar analogs of the Sun in a statistical manner. We perform the same analysis for the Mauna Loa data of terrestrial insolation. Here we find that the linear relation between sunspot number and insolation is with more than 1% rise much stronger than for the TSI. Our conclusion is that the Earth atmosphere acts as an amplifier between space and ground, and that the amplification is probably controlled by solar activity. We suspect the cosmic rays intensity as the link between solar activity and atmospheric transparency. A Fourier analysis of the time series of insolation shows three dominant peaks: 10.5, 20.4, and 14.0 years. However, the cosmic rays data show the same pattern of significant peaks: 10.7, 22.4, and 14.9 years. This analogy supports our idea that the cosmic rays variation has influence on the transparency of the Earth atmosphere.

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Simulations of the Solar Near-surface Layers With the CO5BOLD, MURaM, and Stagger Codes

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Radiative hydrodynamic simulations of solar and stellar surface convection have become an important tool for exploring the structure and gas dynamics in the envelopes and atmospheres of late-type stars and for improving our understanding of the formation of stellar spectra. We quantitatively compare results from three-dimensional, radiative hydrodynamic simulations of convection near the solar surface generated with three numerical codes CO5BOLD, MURaM, and STAGGER and different simulation setups in order to investigate the level of similarity and to cross-validate the simulations. For all three simulations, we considered the average stratifications of various quantities (temperature, pressure, flow velocity, etc.) on surfaces of constant geometrical or optical depth, as well as their temporal and spatial fluctuations. We also compared observables, such as the spatially resolved patterns of the emerging intensity and of the vertical velocity at the solar optical surface as well as the center-to-limb variation of the continuum intensity at various wavelengths. The depth profiles of the thermodynamical quantities and of the convective velocities as well as their spatial fluctuations agree quite well. Slight deviations can be understood in terms of differences in box size, spatial resolution and in the treatment of non-gray radiative transfer between the simulations. The results give confidence in the reliability of the results from comprehensive radiative hydrodynamic simulations.

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The Solar Photospheric-to-Coronal Fe Abundance from X-ray Fluorescence Lines

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The ratio of the Fe abundance in the photosphere to that in coronal flare plasmas is determined by X-ray lines within the complex at 6.7 keV (1.9 Å) emitted during flares. The line complex includes the He-like Fe (Fe XXV) resonance line w (6.70 keV) and Fe Kα lines (6.39, 6.40 keV), the latter being primarily formed by the fluorescence of photospheric material by X-rays from the hot flare plasma. The ratio of the Fe Kα lines to the Fe XXV w depends on the ratio of the photospheric-to-flare Fe abundance, heliocentric angle θ of the flare, and the temperature T_e of the flaring plasma. Using high-resolution spectra from X-ray spectrometers on the *P78-1* and *Solar Maximum Mission* spacecraft, the Fe abundance in flares is estimated to be 1.6 ± 0.5 and 2.0 ± 0.3 times the photospheric Fe abundance, the *P78-1* value being preferred as it is more directly determined. This enhancement is consistent with results from X-ray spectra from the *RHESSI* spacecraft, but is significantly less than a factor 4 as in previous work.

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Low-Mass and Substellar Abstracts

A Substellar Common Proper Motion Companion to the Pleiad HII 1348

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We announce the identification of a proper motion companion to the star HII 1348, a K5 V member of the Pleiades open cluster. The existence of a faint point source 1.1 arcsec away from HII 1348 was previously known from adaptive optics imaging by Bouvier et al. However, because of a high likelihood of background star contamination and in the absence of follow-up astrometry, Bouvier et al. tentatively concluded that the candidate companion was not physically associated with HII 1348. We establish the proper motion association of the pair from adaptive optics imaging with the Palomar 5 m telescope. Adaptive optics spectroscopy with the integral field spectrograph OSIRIS on the Keck 10 m telescope reveals that the companion has a spectral type of M8±1. According to substellar evolution models, the M8 spectral type resides within the substellar mass regime at the age of the Pleiades. The primary itself is a known double-lined spectroscopic binary, which makes the resolved companion, HII 1348B, the least massive and widest component of this hierarchical triple system and the first substellar companion to a stellar primary in the Pleiades.

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Habitability of Super-Earth Planets Around Main-Sequence Stars Including Red Giant Branch Evolution: Models Based on the Integrated System Approach

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In a previous study published in *Astrobiology*, we focused on the evolution of habitability of a 10 $M_\oplus$ super-Earth planet orbiting a star akin to the Sun. This study was based on a concept of planetary habitability in accordance to the integrated system approach that describes the photosynthetic biomass production taking into account a variety of climatological, biogeochemical, and geodynamical processes. In the present study, we pursue a significant augmentation of our previous work by considering stars with zero-age main-sequence masses between 0.5 and 2.0 $M_\odot$ with special emphasis on models of 0.8, 0.9, 1.2 and 1.5 $M_\odot$. Our models of habitability consider again geodynamical processes during the main-sequence stage of these stars as well as during their red giant branch evolution. Pertaining to the different types of stars, we identify so-called photosynthesis-sustaining habitable zones (pHZ) determined by the limits of biological productivity on the planetary surface. We obtain various sets of solutions consistent with the principal possibility of life. Considering that stars of relatively high masses depart from the main-sequence much earlier than low-mass stars, it is found that the biospheric life-span of super-Earth planets of stars with masses above approximately 1.5 $M_\odot$ is always limited by the increase in stellar luminosity. However, for stars with masses below 0.9 $M_\odot$, the life-span of super-Earths is solely determined by the geodynamic time-scale. For central star masses between 0.9 and 1.5 $M_\odot$, the possibility of life in the framework of our models depends on the relative continental area of the super-Earth planet.

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Disc Frequencies for Brown Dwarfs in the Upper Scorpius OB Association: Implications for Brown Dwarf Formation Theories

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We have investigated the brown dwarf (BD) and stellar disc fractions in the Upper Scorpius OB Association (USco) and compared them with several other young regions. We have compiled the most complete sample of of all spectroscopically confirmed BDs in USco, and have made use of the WISE catalog to identify the disc candidates. We report on the discovery of 12 new BD discs in USco, with spectral type (SpT) between M6 and M8.5. The WISE colors for the new discs are similar to the primordial (transition) discs earlier detected in USco. Combining with previous surveys, we find the lowest inner disc fractions (∼20-25%) for a wide range in stellar masses (∼0.01-4.0 Msun) in the USco association. The low disc fractions for high-mass stars in USco (and the other clusters) are consistent with an evolutionary decline in inner disc frequency with age. However, BD disc fractions are higher than those for the stars in 1-3 Myr clusters, but very low in the ∼5 Myr old USco. Also, primordial BD discs are still visible in the ∼10 Myr TW Hydrae association, whereas the higher mass stars have all transitioned to the debris stage by this age. The disc frequencies for BDs do not show any dependence on the stellar density or the BD/star number ratio in a cluster. We suggest that the large differences in the observed BD disc fractions between regions may well be due to different BD formation mechanisms and therefore different initial disc fractions/properties. We also present a WISE SED classification scheme, based on the K_s and WISE bands of 3.4-12micron, to distinguish between the Class I/II and the Class III sequence. Our work includes a comparison of the sensitivities of WISE and Spitzer disc surveys. We estimate that WISE can be incomplete for discs at SpT later than M8 in distant clusters such as SOri. WISE should be able to recover the M8-M9 discs in the nearby young clusters.

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Molecular Diagnostics of the Circumstellar Envelopes of Asymptotic Giant Brancg Stars - Mass Loss and Chemistry

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The asymptotic giant branch (AGB) is part of the late evolution of stars with initial masses of $0.8-9\,M_{\odot}$. It is characterised by a steady wind carrying mass from the stellar surface into the interstellar medium (ISM), creating an extended circumstellar envelope (CSE) of gas and dust around the star. This matter will ultimately enrich the ISM with new chemical elements produced in the stellar interior.

The work presented in this thesis is dedicated to the study of molecular gas in the CSEs of AGB stars, by means of detailed radiative-transfer analysis. This is essential in order to constrain and understand the physical and chemical characteristics of the CSEs. The launch of the *Herschel Space Observatory* (*Herschel*) on 14 May 2009 has given astronomers access to a wavelength range which is extremely difficult to observe from ground-based observatories. atmospheric interference. A substantial part of the work presented in this thesis is based on high-quality data obtained with the HIFI instrument, a high-resolution spectrometer on board *Herschel*.

The study of carbon monoxide (CO) provides strong constraints on basic physical parameters of a star and its CSE. I show the strength in analysing CO data and apply it to a large sample of evolved stars, thereby determining the rates at which they lose mass. The star's mass-loss rate is an essential parameter in any study of late stellar evolution on the AGB. I further perform detailed radiative-transfer modelling of other molecules, such as e.g. SiO, HCN, and C_2H, leading to a better understanding of the prevalent physical conditions and chemical reactions. The chemical characteristics of the CSE of an AGB star are largely determined by the composition of the central star. Hence, this work contributes new and unique insights into the structure and evolution of stars on the AGB.

Thesis-related Publications: A&A, 523, A18; A&A 516, A69

Postdoctoral Research and Doctoral Student Positions
Program on Planetary Habitability
Univ. of Vienna and the Space Research Institute (Austria)

The University of Vienna and the Space Research Institute in Graz, Austria, announce the availability of up to 6 postdoctoral research positions (2- to 4-year contracts) and up to 5 graduate student positions in a large key national research project dedicated to the study of conditions for habitability in planetary systems. The project, led by Prof. Manuel Güdel at Vienna, is anticipated to run for 8 years and is supported by national members and international collaborators. Co-leads are Profs. E. Pilat-Lohinger, E. Dorfi, R. Dvorak (Vienna), H. Lammer and M. Khodachenko (Graz).

Successful candidates will work in one of six specialist teams, addressing hydrodynamic and chemical modeling of protoplanetary disks during their entire evolution, water transport during planet formation, evolution of the stellar radiative and particle environment, wind-magnetosphere interactions, radiative+particle interactions with upper planetary atmospheres, and related processes in binary systems. A more detailed summary of the research fields/options is available on request. Work can be observational, numerical or theoretical. For numerical work, high-performance computer clusters will be accessible. Strong scientific interactions and collaborations between the groups will be emphasized. An early starting date is encouraged, but no earlier than 1 March 2012.

Applications include a CV, a publication list, a summary of past research (for postdoc positions, max 3 pages) resp. a summary of undergraduate studies (for graduate student positions) and a brief description of the preferred research area or proposed topics the candidate would like to contribute. These documents must be submitted electronically as a PDF file to: manuel.guedel@univie.ac.at.

Review starts 1 February 2012; applications submitted thereafter will be considered until the posts are filled. Applicants should arrange for three letters of reference sent by the referees directly to the same address. For inquiries, contact Prof. M. Güdel (manuel.guedel@univie.ac.at).

For details contact: manuel.guedel@univie.ac.at

Job Opening

Postdoctoral Position

Magnetism of Young Solar-type Stars

IRAP, Toulouse University & CNRS (France)

A 18-month post-doctoral position is available at IRAP (Institut de Recherche en Astrophysique et Planétologie, Toulouse University & CNRS, Toulouse, France), in the field of magnetism and activity of young solar-type stars. The position is supported by ANR (Agence Nationale de la Recherche).

The successful candidate will investigate the surface magnetism of cool open cluster stars and weak-line T Tauri stars, using time-series collected with the NARVAL and ESPaDOnS stellar spectropolarimeters. The candidate will be involved at all stages of this ongoing survey, from the preparation of future proposals to the acquisition, analysis and interpretation of data sets. The derived magnetic properties will be employed to study the evolution of dynamo processes and the related spindown of cool active stars, prior to the main sequence. The successful candidate will be in constant interaction with the teams of Toulouse (IRAP), Grenoble (IPAG), Saclay (CEA) and Montpellier (LUPM) involved in the observational and theoretical aspects of this project.

The ideal candidate is experienced in high-resolution spectroscopy and/or spectropolarimetry and has a background or experience in high-level modeling of spectroscopic data, including multi-line analysis and tomographic imaging. The candidates, of any nationality, should have obtained by the starting date a Ph.D. in astronomy or a related field, with specialization in one of the areas of study listed above. The start date of the appointment is flexible, but should be no later than May 2012. Candidates should submit a curriculum vitae, a summary of current and future research interests, a list of publications and two letters of recommendation to Pascal Petit (ppetit@irap.omp.eu) before 2012 February 12.

Abstract Guidelines

Abstracts for *COOLNEWS* are solicited for papers that have been recently accepted by or submitted to refereed journals, and for recent Ph.D. theses. Abstracts for conference proceedings articles are *not* posted in *COOLNEWS*. The subject matter should pertain directly to cool stars (spectral types F,G,K,M or L), substellar objects, or the sun. Both theoretical and observational abstracts are appropriate.

Abstracts dealing with cool pre-main-sequence (PMS) stars will generally not be included in *COOLNEWS*, since they are already covered by the *Star Formation Newsletter*. Exceptions to this rule will be considered if the subject matter is truly cross-disciplinary. If you wish to submit a cross-disciplinary abstract on PMS stars, then first submit it to the *Star Formation Newsletter*. After doing so, submit the abstract to *COOLNEWS* accompanied by a short e-mail stating that it has already been submitted to the *Star Formation Newsletter*, and summarizing why it will be of interest to the cool star/solar community at large.

A monthly call for abstracts will be issued and abstracts received by the last day of the month will usually appear in the following month's newsletter. Announcements of general interest to the cool star and solar communities may also be submitted for posting in the newsletter. These might include (but are not restricted to) the following: (i) *Job Openings* directed toward cool star or solar researchers, (ii) announcements of *Upcoming Meetings*, (iii) announcements of *Upcoming Observing Campaigns* for which participation is solicited from the community at large, (iv) reviews of *New Books*, and (v) *General Announcements* that provide or request research-related information. Please send all correspondence to the editor at coolnews@jila.colorado.edu. Abstract templates and back issues can be obtained from the COOLNEWS Web-page at

`http://casa.colorado.edu/~skinners/coolnews.html` .

*** Please send abstracts in the body of the message and *not* as attachments.***