COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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Stellar Abstracts

A Spatially-resolved, Semi-empirical Model for the Extended Atmosphere of α Orionis (M2 Iab)

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We have constructed a detailed mean density and temperature model for the extended outer atmosphere of the O rich supergiant Betelgeuse (α Ori; M2 Iab), which extends from 1.0 to 10.0 stellar radii. A 1-D model is based on fitting NRAO VLA cm-wavelength visibility data, and 2-D models are constructed using the intensity contours of the 0.7 cm observations of Lim et al. (1998). As one moves in towards the star from about $10R_*$ the mean electron temperature increases to a value of $\simeq$ 3800K, and then declines down below T_{eff} and then rises to photospheric values. The peak mean model temperature is less than the typical chromospheric temperatures found in previous models. Observations of Hα and chromospheric ultraviolet (UV) emission show that higher temperature components must also exist but they do not dominate the weighted mean temperature structure. We tentatively identify the radius where the temperature distribution peaks ($R \simeq 1.45R_*$) with the dominant chromospheric UV emission region and find an areal filling factor of $\leq 1/4$.

In the extended semi-empirical model the dominant source of electrons is from photoionized metals, and is dominated by carbon. The low ionization of hydrogen leads to a dominance by H$^-$(free-free) opacity at cm-wavelengths. We derive simple estimates of the radio spectral indices for other similar M supergiants.

We have constructed 2-D models to examine whether the intensity asymmetry observed at 0.7 cm is most likely to result from density or temperature variations. Adopting an elliptical 2-D model, a density asymmetry along the axes of symmetry would need to be $> 20:1$. If we assume the radial wind velocity is independent of angle the integrated mass-loss rate is only a factor of ~ 2 greater than that derived from the 1-D model. However, previous Hα speckle observations that sample the same spatial regions suggest the asymmetry observed at 0.7cm is not due to such a large

scale density asymmetry. A modest change in temperature can more easily provide the asymmetry, increasing both the opacity and the thermal source term.

If the radial density structure is assumed to be the same as in 1992 September, when HST/GHRS spectra were obtained, then the Fe II wind absorption features provide an estimate of the mass-loss rate of $3.1(\pm1.3) \times 10^{-6}$ $M_{\odot}yr^{-1}$. This further implies that the cool material dominates the mass of the extended atmosphere, and that the radio emitting region is within the base of the outflow observed in the circumstellar layers.

A simple silicate dust model is constructed and the semi-empirical model suggests an onset of dust formation at $R \simeq 33R_*$ where $T_{Dust} \sim 360$ K. This region lies outside the semi-empirical model but simple extrapolations suggest that at this radius $T_e \sim 220$ K, and the mean hydrogen density $n_H \sim 3 \times 10^6 \mathrm{cm}^{-3}$.

We address the difficult question of whether the mean thermal model based on the radio data can be consistent with the observed off-limb Hα scattering emission if inhomogeneities are present.

Accepted by ApJ

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The Galactic Mass Injection from Cool Stellar Winds of the 1 to 2.5 $M_{\odot}$ Stars in the Solar Neighbourhood

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We have computed synthetic stellar samples and HR diagrams on the basis of a fine-meshed, consistent grid of evolution tracks for given IMF and SFR(t). In order to model the galactic disk stellar component (single stars only) and to derive its IMF and apparent SFR(t), we selected the synthetic sample which is the best fit to the observed distribution of single stars in the solar neighbourhood HR diagram (complete for $d < 50$pc, $M_V \leq 4$, based on *Hipparcos* data). Most giants of this synthetic sample fall in the range of $M_i = 1$ to $2.5\ M_{\odot}$.

Stellar evolution on the tip-AGB has been computed by adopting, time-step by time-step, the mass-loss rates predicted by very detailed dust-driven, pulsating wind models for carbon-rich stars. This mass-loss description causes the natural development of superwinds. Their properties are in agreement with the range of measured masses and expansion velocities of PNe, i.e. a total mass of between 0.25 $M_{\odot}$ and 0.65 $M_{\odot}$ has been ejected over the final 30 thousand years. For the preceeding mass-loss on the AGB and RGB, we use a semi-empirical approach, i.e., a re-calibrated Reimers mass-loss which yields an RGB mass-loss (for $M_* \leq 1M_{\odot}$) consistent with the formation of horizontal branch stars. Combining these approaches, we obtain a consistent grid of mass-loss histories in the mass range of $M_i = 1$ to $2.5M_{\odot}$.

By increasing the number of stars in our synthetic solar neighbourhood stellar sample by a factor of thousand, we have been able to compute a detailed, present-day, synthetic reference sample of galactic disk RGB and AGB giant stars, together with their mass-loss. The results are in good agreement with observations of cool giant stellar mass-loss, as well as with the estimated space density of carbon stars. Finally, we discuss the relative collective yields of the RGB, AGB and tip-AGB stellar mass-loss as contributions to the galactic disk mass re-injection.

Accepted by A&A

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New Neighbours: II. an M9 dwarf at d $\sim$ 4 pc, DENIS-P J104814.7$-$395606.1.

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We present the discovery of a previously unknown member of the immediate solar neighbourhood, DENIS-P J104814.7−395606.1 (hereafter DENIS 1048−39), identified while mining the DENIS database for new nearby stars. A HIRES echelle spectrum obtained with the 10-m Keck telescope shows that it is an M9 dwarf. DENIS 1048−39 has a very bright apparent magnitude (I = 12.67) for its spectral type and colour ($I - J$ = 3.07), and is therefore very nearby. If it is single its distance is only 4.1±0.6 pc, ranking it as between our 12$^{\mathrm{th}}$ and 40$^{\mathrm{th}}$ closest neighbour. It is also the closest star or brown dwarf with a spectral type later than M7V. Its proper motion was determined through comparison of Sky atlas Schmidt plates, scanned by the MAMA microdensitometer, with the DENIS images. At 1.52" yr^{-1} it primarily attests the closeness of DENIS 1048−39 and hence its dwarf status. These characteristics make it an obvious target for further detailed studies.

Accepted by A&A Letters

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For preprints via WWW: http://xxx.lpthe.jussieu.fr/abs/astro-ph/0012168

AB Dor in '94: I. HST/GHRS Observations of the Quiescent Chromosphere of an Active Star

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We analyze HST/GHRS spectra of AB Doradus, the prototypical ultra-rapidly rotating K dwarf. We observed chromospheric (Mg II) and transition region (C II, Si IV, C IV, and N V) lines periodically throughout the stellar rotation period, and provide a low dispersion stellar atlas of 78 emission lines. The quiescent line profiles of the chromospheric and transition region lines show narrow cores superposed on very broad wings. The broad wings of the Mg II k & h lines and of the transition region lines can be explained by emission from gas co-rotating with the star and extending out to near the Keplerian co-rotation radius (2.8 stellar radii). While this is not a unique solution, it is consistent with previous studies of Hα emission that are naturally explained by large co-rotating prominences. We find no evidence for rotational modulation of the emission line fluxes. The density diagnostics suggest that the transition region is formed at constant pressure, with an electron density 2–3 $\times$ 10^{12} cm^{-3} at a temperature of 3$\times$$10^4$K. The electron pressure is about 100 times larger than that for the quiet Sun. The emission measure distribution shows a minimum between log(T) = 5 and 5.5. The Mg II line exhibits three interstellar absorption components along the 15 pc line of sight. We identify the lowest velocity component with the G cloud, but the other components are not identified with any interstellar clouds previously detected from other lines of sight.

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Long-term Monitoring of Active Stars IX. Photometry Collected in 1993

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As a part of an extensive program focused on the global properties and evolution of active stars, high-precision UBV(RI)$_c$ and UBV photometry of 31 selected stars is presented. The UBV(RI)$_c$ observations were collected at the European Southern Observatory over the 31 Dec 92 - 18 Jan 93 and 20 Nov - 03 Dec 1993 intervals. Additional UBV photometry obtained by the *"Phoenix"* and by the Catania Astrophysical Observatory automatic telescopes from 1990

to 1993 is also presented for some of the program stars. Significant evolution of the light curves, period variations and evidence for long-term variability of the global degree of spottedness are found. Some spectral classifications are revised and the inferred photometric parallaxes are compared, whenever possible, with the trigonometric parallaxes measured by the Hipparcos satellite. Here we list the observed stars: HD 7172; HD 8357 = AR Psc; HD 8358 = BI Cet; HD 16157 = CC Eri; SAO 130113 = BY Cet; HD 17925 = EP Eri; HD 20629 = XX Ari; HD 26354 = AG Dor; HD 32918 = YY Men; 1E 0505-0527 = EZ Eri; HD 293857; HD 34802 = YZ Men; HD 35850; EXO 0527-3329 = UX Col; HD 36705 = AB Dor; EXO 0532-0510 = V 1321 Ori; HD 37824 = V 1149 Ori; HD 37847 = TW Lep; HD 39917 = SZ Pic; EXO 0556-3804 = TY Col; HD 61245 = V 344 Pup; HD 72688 = VX Pyx; HD 78423; HD 81410 = IL Hya; HD 82558 = LQ Hya; HD 98712 = SZ Crt; SAO 202618 = V 858 Cen; HD 101309 = V 829 Cen; HD 106225 = HU Vir; HD 119285 = V 851 Cen; HD 197481 = AU Mic.

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Infrared Spectroscopy of Symbiotic Stars. III. First Orbits for Three S-type Systems

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Infrared radial velocities have been used to derive the first well-determined orbital elements for the cool giants of three symbiotic systems, BF Cyg, V1329 Cyg, and V343 Ser = AS 289. Periods found for BF Cyg and V1329 Cyg from the radial-velocity data are in good agreement with periods previously determined for their light variations and the orbits are circular. Masses for the components of BF Cyg and V1329 Cyg were determined by combining our orbital elements for the cool giants with elements for their hot stars. The third system, V343 Ser, has an orbital period of 450.5 days, a value that is typical for symbiotic binaries. However, the system is atypical because of its somewhat eccentric orbit with e = 0.135 and the possibility that it is a semidetached system. An orbital inclination of 18 degrees is estimated, indicating that V343 Ser does not eclipse.

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On a Starspot Radiation Deficit

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Using models recently calculated in the Crimea of zonal spottedness of red dwarf stars, we have found for the first time bolometric radiation deficits of a lot of spotted stellar photospheres. Magnitudes of these deficits are confronted with radiation losses of stellar chromospheres and coronae for quasi-simultaneous observations. As a result, linear correlations between logarithms of compared values are found, and the Sun fits these correlations.

Radiative losses for stellar outer atmospheres in quiescence and during sporadic flares which are now registered individually turned out to be essentially less than bolometric radiation deficits of spotted photospheres of active stars. In this connection we propose a hypothesis on a usage of energy of these deficits to a global reconstruction of red dwarf stars' atmospheres that is similar to a local atmospheric reconstruction during impulsive solar and stellar flares. We propose that such a process is realized by a large number of weak impulsive flares and other dynamical events which develop on these stars and heat their coronae; so, this supports the idea of microflaring as a mechnism for coronal heating.

A brief analysis of long-term variations of chromospheric and photospheric radiation of F–K stars of the HK–Project and the Sun permits us to suggest that the dynamical reconstruction discussed occurs also when the surface activity level of F–K stars increases. However, in contrast with flare stars, it is unclear now how it happens.

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A census of AGB stars in Local Group galaxies I. Photometry of a field in M31

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We present four colour CCD photometry of a field in M31. Observations were carried out in two broad band filters (V and i) and two special narrow band "Wing" filters centered on a TiO and a CN molecular band. Colour-magnitude diagrams constructed from broad band photometry show the sequence of RGB/AGB stars. Three known Cepheid variables could be identified on our frames. We used colour-colour diagrams to identify the M- and C-type AGB stars and to investigate e.g. the luminosity function of the AGB population. We found 61 new extragalactic C-stars in this field of M31.

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Solar Abstracts

Oxygen Abundance in Coronal Streamers During Solar Minimum

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We present a study of the oxygen abundance relative to hydrogen in the equatorial streamer belt of the solar corona during the recent period of activity minimum. The oxygen abundance is derived from the spectroscopic observations of the outer corona performed during 1996 with the Ultraviolet Coronagraph Spectrometer (SOHO) in the ultraviolet region. This study shows that the depletion of oxygen, by almost one order of magnitude with respect to the photospheric values, found in the inner part of streamers by Raymond et al. (1997) is a common feature of the solar minimum streamer belt, which shows an abundance structure with the following characteristics. In the core of streamers the oxygen abundance is 1.3×10^{-4} at 1.5 $R_\odot$, then it drops to 0.8×10^{-4} at 1.7 $R_\odot$, value which remains almost constant out to 2.2 $R_\odot$. In the lateral bright structures that are observed to surround the core of streamers in the oxygen emission, the oxygen abundance drops monotonically with heliodistance, from 3.5×10^{-4} at 1.5 $R_\odot$ to 2.2×10^{-4} at 2.2 $R_\odot$. The oxygen abundance structure found in the streamer belt is consistent with the model of magnetic topology of streamers proposed by Noci et al. (1997). The composition of the plasma contained in streamers is not the same as observed in the slow solar wind. Even in the lateral branches, richer in oxygen, at 2.2 $R_\odot$ the abundance drops by a factor 2 with respect to the slow wind plasma observed with Ulysses during the declining phase of the solar cycle. Hence the slow wind does not appear to originate primarily from streamers, with the exception perhaps of the plasma flowing along the heliospheric current sheet.

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Fast Solar Wind Velocity in a Polar Coronal Hole During Solar Minimum

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We present a study of the outflow velocity of the fast wind in the northern polar coronal hole observed on May 21, 1996, during the minimum of solar activity, in the frame of a joint observing program of the SOHO (Solar Heliospheric Observatory) mission. The outflow velocity is inferred from an analysis of the Doppler dimming of the intensities of the O VI λ 1032, 1037 and H I Ly α λ 1216 lines observed between 1.5 $R_\odot$ and 3.5 $R_\odot$ with the Ultraviolet Coronagraph

Spectrometer (UVCS), operating onboard SOHO. The analysis shows that, for a coronal plasma characterized by low density, as derived for a polar hole at solar minimum by Guhathakurta et al. (1999), and low temperature, as directly measured at the base of this coronal hole by David et al. (1998), the oxygen outflow speed derived spectroscopically is consistent with that implied by the proton flux conservation. The hydrogen outflow is also consistent with flux conservation if the deviation from isotropy of the velocity distribution of the hydrogen atoms is negligible. Hence, for this cool and tenuous corona, the oxygen ions and neutral hydrogen atoms flow outward roughly at the same speed, that increases from 40 km s^{-1} at 1.5 $R_\odot$ to 360 km s^{-1} at 3.1 $R_\odot$, with average acceleration of the order of $\sim 4.5 \times 10^3$ cm s^{-2}. The highly anisotropic velocity distributions of the O VI ions found in the analysis confirm that the process which is heating the oxygen ions acts preferentially across the magnetic field.

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Multiperiodicity, Chaos, and Intermittency in a Reduced Model of the Solar Cycle

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In a recent paper, Durney (2000, *Solar Phys.*, in press) has discussed a physically plausible procedure whereby the dynamo equations describing magnetic field regeneration in Babcock-Leighton models of the solar cycle can be reduced to a one-dimensional iterative map. This procedure is used here to investigate the behavior of various dynamo-inspired maps. Durney's explanation of the so-called odd-even effect in sunspot cycle peak amplitudes, which he ascribed to a period-2 limit cycle, is found to be robust with respect the choice of nonlinearity defining the map, and to the action of strong stochastic forcing. In fact, even maps without limit cycles are found to show a strong odd-even signal in the presence of forcing. Some of the stochastically forced maps are found to exhibit a form of on-off intermittency, with periods of activity separated by quiescent phases of low cycle amplitudes. In one such map, a strong odd-even signal is found to be a good precursor to the transition from bursting to quiescent behavior.

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An Observational Manifestation of Magneto-Atmospheric Waves in Internetwork Regions of the Chromosphere and Transition Region

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We discuss an observational signature of magneto-atmospheric waves in the chromosphere and transition region away from network magnetic fields. We demonstrate that when the observed quantity, line or continuum emission, is formed under high-β conditions, where β is the ratio of the plasma and magnetic pressures, we see fluctuations in intensity and line-of-sight (LOS) Doppler velocity consistent with the passage of the magneto-atmospheric waves. Conversely, if the observations form under low-β conditions, the intensity fluctuation is suppressed but we retain the LOS Doppler velocity fluctuations. We speculate that mode conversion in the $\beta \approx 1$ region is responsible for this change in observational manifestation of the magneto-atmospheric waves.

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Variability in Ultra Cool Dwarfs: Evidence for the Evolution of Surface Features

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We present photometric light curves for a sample of 21 ultra cool M and L dwarfs in the field and in the young open clusters σ Orionis and the Pleiades. The list of targets includes both low mass hydrogen burning stars and brown dwarfs. Evidence for variability with RMS amplitudes (in the I band) of 0.01 to 0.055 magnitudes on timescales of 0.4 to 100 hours is discovered in half of these objects. Power spectral analysis using the CLEAN algorithm was performed to search for evidence of periodic variability. Some objects show strong periodicities at around a few hours, which could be due to rotational modulation of the light curve by surface features. However, several objects do not have any significant periodicities to explain their variability. The $v \sin i$ values of a similar population of objects makes it very likely that our time sampling was sensitive to the expected range of rotation periods, and simulations show that we would have detected these if they were caused by long-lived surface features. We argue that this absence of periodicity is due to the evolution of the brightness, and presumably also the physical size, of surface features on timescales of a few to a few tens of hours. This is supported in the case of 2M1145 for which two light curves have been obtained one year apart and show no common periodicity. The surface features could plausibly be photospheric dust clouds or magnetically-induced spots. The recently observed decline in chromospheric activity for late type M and L dwarfs hints towards the former explanation for at least our later-type objects. Furthermore, our sample suggests that variability to be more common in objects later than M9, indicating that the variability may be related to dust formation. One light curve shows a brief, but significant, dip, which could be a short-lived feature or possibly an eclipse by a companion.

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Proper Motion of Very Low Mass Stars and Brown Dwarfs in the Pleiades Cluster

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We report proper motion measurements for 25 very-low mass (VLM) star and brown dwarf (BD) candidates of the Pleiades cluster previously identified by Bouvier et al. (1998). Proper motions are measured with an accuracy of 9 mas/yr, compared to an expected tangential motion of about 50 mas/yr for Pleiades members. Of the 25 candidates, 15 have a membership probability of 95% or more and 7 are rejected as being field dwarfs. The 3 remaining candidates exhibit independent evidence for membership (lithium absorption or long-term proper motion). From the firm identification of Pleiades VLM and BD members, the cluster's substellar mass function is revised to $dN/dM \propto M^{-0.5}$ in the mass range from 0.04 to $0.3 M_{\odot}$.

Accepted by A&A

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Ph.D. Thesis Abstract

ROSAT Observations of Superflares on RS CVn Systems

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Ph.D degree awarded: August 2000

The following thesis involves the analysis of a number of X-ray observations of two RS CVn systems, made using the ROSAT satellite. These observations have revealed a number of long-duration flares lasting several days (much longer than previously observed in the X-ray energy band) and emitting energies which total *a few percent* of the available magnetic energy of the stellar system and thus far greater than previously encountered. Calculations based on the spectrally fitted parameters show that simple flare mechanisms and standard two-ribbon flare models cannot explain the observations satisfactorily and continued heating was observed during the outbursts. This is the first time that such departures from two-ribbon flare models have been identified unambiguously for such large flares, however for some of these outbursts the situation is complicated by the fact that other flaring activity may have been superimposed on the observed lightcurves. By analysing the general decay of the flares, loop heights were derived. Although these loop heights are dependendent on the amount of heating assumed, the calculations were performed for a wide range of reasonable heating values. For these cases the flare heights obtained for these outbursts were of the order of the inter-binary separation and inter-binary flares are suggested as the cause of the outbursts.

Thesis-related Publications: MNRAS,275,129.

UPCOMING MEETING

First Announcement

THE FUTURE OF COOL-STAR ASTROPHYSICS
12th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun

July 30 - August 3, 2001
University of Colorado, Boulder, Colorado, USA

This is a first announcement for the 12th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, to be held on the campus of the University of Colorado, Boulder between July 30 and August 3, 2001. Below we provide preliminary details of the meeting and important deadlines. Also, an "expression of interest" form is available on the workshop website at http://casa.colorado.edu/~cs12/ which can be returned to receive future mailings concerning the workshop.

Meeting Context

The Cambridge Workshops have been held biennially since 1980. They represent an important venue for cool star researchers to present their work, meet with colleagues from around the world, and evaluate the current state of the field.

This is an exciting time for solar-stellar astronomy with spectacular results from space missions, such as the Chandra X-ray Observatory, XMM-Newton, Hubble Space Telescope, FUSE, SOHO, and TRACE, and from ground-based facilities, including new ventures into helio- and astero-seismology, adaptive optics, interferometry, and IR spectroscopy.

The aim of this workshop is to provide a timely forum for discussion of a range of topics related to cool stars and the Sun, and the future directions that our field might follow. Currently, the detailed scientific program is being established by the Scientific Organizing Committee and will be described fully in the Second Announcement.

Meeting Venue

The Workshop will take place on the campus of the University of Colorado in Boulder, Colorado. The plenary and breakout sessions will be held in the new Humanities Building, which features a 300 seat state-of-the-art auditorium and a number of smaller rooms suited to spliter sessions of 30-50 people. Posters will be displayed in the same building.

Social events will include an opening reception, an outdoor cook-out in the Boulder Mountain Parks, a half-day excursion to Brainard Lake in the Indian Peaks Wilderness west of Boulder, and a conference dinner, plus a range of other occasions to facilitate interaction between the participants. Activities for accompanying persons also will be available.

Scientific Organizing Committee

T. R. Ayres (CASA, U. of Colorado, USA – co-chair) A. Brown (CASA, U. of Colorado, USA – co-chair) T. Brown (High Altitude Observatory, USA) D. Buzasi (U S Air Force Academy, USA) K. G. Carpenter (NASA - Goddard Space Flight Center, USA) J. Drake (Harvard-Smithsonian Center for Astrophysics, USA) A. K. Dupree (Harvard-Smithsonian Center for Astrophysics, USA) R. Garcia Lopez (IAC Tenerife, Spain) M. Giampapa (National Solar Observatory, USA) B. Gustafsson (Uppsala University, Sweden) G. M. Harper (CASA, U. of Colorado, USA) S. Hawley (University of Washington, USA) I. Hubeny (Goddard Space Flight Center, USA) C. Jordan (University of Oxford, UK) J. L. Linsky (JILA, U. of Colorado & NIST, USA) R. Pallavicini (University of Palermo, Italy) R. Rebolo (IAC Tenerife, Spain) R. Rutten (University of Utrecht, Netherlands) C. J. Schrijver (Stanford-Lockheed Institute for Space Research, USA), J. Schmitt (University of Hamburg, Germany), T. Simon (University of Hawaii, USA), K. G. Strassmeier (Astrophysical Institute Potsdam, Germany), S.M. White (University of Maryland, USA)

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Important deadlines

1 February 2001 - expressions of interest (i.e. get on the mailing list)
15 February 2001 - second announcement
1 April 2001 - Financial assistance request deadline
1 May 2001 - Abstract submission for contributed oral papers
1 May 2001 - Meeting Registration with reduced rate
1 June 2001 - Abstract submission for poster papers
1 June 2001 - Hotel Registration with preferential rates
3 September 2001 - Submission of camera-ready papers

Further information can be found at

http://casa.colorado.edu/~cs12/

or by contacting the LOC at

cs12@casa.colorado.edu .

JOB OPENING

Postdoctoral Fellowship
Star Formation Group
Laboratoire d'Astrophysique de l'Observatoire de Grenoble

In the framework of the European Commission Research Training Network entitled "The Formation and Evolution of Young Stellar Clusters" (see `http://www.aip.de/~mjm/ecrtn_clusters/`), a postdoctoral position is available for two years in the Star Formation Group of the Laboratoire d'Astrophysique de l'Observatoire de Grenoble (LAOG), France.

LAOG is a major CNRS-University research institute involving about 70 staff members, post-docs and students with a strong focus on stellar astrophysics and the development of instrumentation for high angular resolution imaging. It is located about 100 km south of Lyon at the foot of the Alps.

The Star Formation Group includes 9 permanent staff members, 2 post-docs and 2 students. A description of the activities of the institute and of the Star Formation Group can be found at: http://www-laog.obs.ujf-grenoble.fr/

Our main interests are the study of:

- brown dwarfs and the substellar IMF in young clusters and star forming regions (visual and IR wide-field imaging).
- the formation and pre-main sequence evolution of binary systems (high angular resolution imaging and spectroscopy with adaptive optics).
- the structure and evolution of disks and outflows around young stars (integral field spectroscopy with adaptive optics, near-IR and mm interferometry).

Predominantly an observational group, we have direct access to the ESO facilities, as well as to IRAM, CFHT and national observatories. We also benefit from the development of instrumentation at LAOG for the ESO VLT/VLTI (NAOS, AMBER). As part of the EC Research Training Network, the star formation group also has collaborative access to British, German, Italian, and Portuguese facilities.

Our group also develops radiative transfer models for the circumstellar environment of young stars (circumstellar and circumbinary disks, extended envelopes), closely collaborates with other groups at LAOG that study field brown dwarfs and Beta Pic-like circumstellar disks, and develops stellar evolution codes and MHD models of the accretion-ejection structure of young stars.

We welcome people interested in the study of brown dwarfs in young clusters, young binaries, and/or circumstellar disks around young stars. While experience with astronomical observations, especially wide field imaging and/or high angular resolution imaging/spectroscopy in the near-IR is certainly welcomed, we are also interested in applications from theoreticians/modellers, in particular in the area of radiative transfer in complex geometries (disks, stellar magnetospheres), and the dynamical evolution of clusters.

The successful applicant is expected to take an active role in an ongoing effort to improve our understanding of the formation and early evolution of young stars and their circumstellar environment. He/She will work primarily on the acquisition and interpretation of visual, near-IR and/or (sub-)mm observations, and/or on related theoretical modelling, in collaboration with other teams of the network, which include Arcetri, Cambridge, Cardiff, Lisbon, Potsdam, and Saclay.

Applicants should have a Ph.D. and observational or theoretical experience in young stellar objects, or related fields. They should be 35 or under at the time of appointment, be a national of a European Community member or associated state other than France or have lived in the EC for at least five years before appointment; and not have lived in France

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for more than 12 of the 24 months prior to appointment. The position is available immediately but the starting date is very flexible.

The net salary, after deduction of charges, medical coverage, etc. will be around 14,000-15,000 FF/month (2150-2250 euros/month).

Interested scientists should submit a curriculum vitae, a list of publications and a statement of research interests, and should arrange for three letters of reference to be sent to:

Jérôme Bouvier,
Laboratoire d'Astrophysique,
Observatoire de Grenoble,
Université Joseph Fourier,
B.P. 53,
38041 Grenoble Cedex, France
(Phone: + 33 4 76 51 47 90; FAX: + 33 4 76 44 88 21; E-mail: jbouvier@obs.ujf-grenoble.fr)

Review of applications will begin on 15 December 2000 and continue until the position is filled.

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), brown dwarfs, 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 .`