COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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Stellar Abstracts

Star Formation in the Outer Galaxy: Membership and Fundamental Parameters of the Young Open Cluster NGC 1893

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Different environmental conditions can play a crucial role in determining final products of the star formation process and in this context, less favorable activities of star formation are expected in the external regions of our Galaxy. We studied the properties of the young open cluster NGC 1893 located about 12 Kpc from the galactic center, to investigate how different physical conditions can affect the process of star formation. By adopting a multiwavelength approach, we compiled a catalog extending from X-rays to NIR data to derive the cluster membership. In addition, optical and NIR photometric properties are used to evaluate the cluster parameters. We find 415 diskless candidate members plus 1061 young stellar objects with a circumstellar disk or class II candidate members, 125 of which are also H_α emitters. Considering the diskless candidate members, we find that the cluster distance is 3.6±0.2 kpc and the mean interstellar reddening is E(B-V)=0.6±0.1 with evidence of differential reddening in the whole surveyed region. NGC 1893 contains a conspicuous population of pre-main sequence stars together with the well studied main sequence cluster population; we found a disk fraction of about 70% similar to that found in clusters of similar age in the solar neighbour and then, despite expected unfavorable conditions for star formation, we conclude that very rich young clusters can form also in the outer regions of our Galaxy.

Accepted by A&A

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Direct Detection of a Magnetic Field in the Photosphere of the Single M Giant EK Boo. How Common is Magnetic Activity Among M Giants?

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We study the fast rotating M5 giant EK Boo by means of spectropolarimetry to obtain direct and simultaneous measurements of both the magnetic field and activity indicators, in order to infer the origin of the activity in this fairly evolved giant.

We used the new spectropolarimeter NARVAL at the Bernard Lyot Telescope (Observatoire du Pic du Midi, France) to obtain a series of Stokes I and Stokes V profiles for EK Boo. Using the Least Square Deconvolution technique we were able to detect the Zeeman signature of the magnetic field. We measured its longitudinal component by means of the averaged Stokes V and Stokes I profiles. The spectra also permitted us to monitor the Ca II K&H chromospheric emission lines, which are well known as indicators of stellar magnetic activity.

¿From ten observations obtained between April 2008 and March 2009, we deduce that EK Boo has a magnetic field, which varied in the range of -0.1 to -8 G. On March 13, 2009, a complex structure of Stokes V was observed, which might indicate a dynamo. We also determined the initial mass and evolutionary stage of EK Boo, based on up-to-date stellar evolution tracks. The initial mass is in the range of 2.0-3.6 $M_{\odot}$, and EK Boo is either on the asymptotic giant branch (AGB), at the onset of the thermal pulse phase, or at the tip of the first (or red) giant branch (RGB). The fast rotation and activity of EK Boo might be explained by angular momentum dredge–up from the interior, or by the merging of a binary.

In addition, we observed eight other M giants, which are known as X-ray emitters, or to be rotating fast for their class. For one of these, β And, presumably also an AGB star, we have a marginal detection of magnetic field, and a longitudinal component B_l of about 1G was measured. More observations like this will answer the question whether EK Boo is a special case, or whether magnetic activity is, rather, more common among M giants than expected.

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Modelling the Radio Pulses of an Ultracool Dwarf

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Recently unanticipated magnetic activity in ultracool dwarfs (UCDs, spectral classes later than M7) have emerged from a number of radio observations. The highly (up to 100%) circularly polarized nature and high brightness temperature of the emission has been interpreted as an effective amplification mechanism of the high-frequency electromagnetic waves, the electron cyclotron maser instability (ECMI). In order to understand the magnetic topology and the properties of the radio emitting region and associated plasmas in these ultracool dwarfs and interpret the origin of radio pulses

and their radiation mechanism, we built an active region model, based on the rotation of the UCD and the ECMI mechanism. ECMI mechanism is responsible for the radio bursts from the magnetic tubes and the rotation of the dwarf can modulate the integral of flux with respect to time. The high degree of variability in the brightness and the diverse profile of pulses can be interpreted in terms of a large-scale hot active region with extended magnetic structure existing in the magnetosphere of TVLM 513-46546. We suggest the time profile of the radio light curve is in the form of power law in the model. The radio emitting region consists of complicated substructure. With this model, we can determine the nature (e.g. size, temperature, density) of the radio emitting region and plasma. The magnetic topology can also be constrained. We compare our predicted X-ray flux with Chandra X-ray observation of TVLM 513-46546. Although the X-ray detection is only marginally significant, our predicted flux is significantly lower than the observed flux. We suggest more observations at multi-wavelength will help us understand the magnetic field structure and plasma behavior on the ultracool dwarf.

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Three-dimensional Hydrodynamical Simulations of Red Giant Stars: Semi-global Models for the Interpretation of Interferometric Observations

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Context. Theoretical predictions from models of red giant branch stars are a valuable tool for various applications in astrophysics ranging from galactic chemical evolution to studies of exoplanetary systems. Aims. We use the radiative transfer code Optim3D and realistic 3D radiative-hydrodynamical (RHD) surface convection simulations of red giants to explore the impact of granulation on interferometric observables. We assess how 3D simulations of surface convection can be validated against observations. Methods. We compute intensity maps for the 3D simulation snapshots in two filters: in the optical at 5000 300 Å and in the K band 2.14 0.26 μm FLUOR filter, corresponding to the wavelength-range of instruments mounted on the CHARA interferometer. From the intensity maps, we construct images of the stellar disks, accounting for center-to-limb variations. We then derive interferometric visibility amplitudes and phases. We study their behavior with position angle and wavelength, and compare them with CHARA observations of the red giant star HD 214868. Results. We provide average limb-darkening coefficients for different metallicities and wavelength-ranges. We detail the prospects for the detection and characterization of granulation and center-to-limb variations of red giant stars with today's interferometers. Regarding interferometric observables, we find that the effect of convective-related surface structures depends on metallicity and surface gravity. We provided theoretical closure phases that should be incorporated into the analysis of red giant planet companion closure phase signals. We estimate 3D-1D corrections to stellar radii determination: 3D models are $\sim 3.5\%$ smaller to $\sim 1\%$ larger in the optical with respect to 1D, and roughly 0.5 to 1.5% smaller in the infrared. Even if these corrections are small, they are important to properly set the zero point of effective temperature scale derived by interferometry and to strengthen the confidence of existing red giant catalogues of calibrating stars for interferometry. Finally, we show that our RHD simulations provide an excellent fit to the red giant HD 214868 even though more observations are needed at higher spatial frequencies and shorter wavelength.

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Observation and Modelling of Main Sequence Stellar Chromospheres; XV. New Constraints on the Dynamo Mechanisms for dM1 Stars

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With the help of measures of rotation, radius and metallicity for a selected sample of dM1 stars (with Teff=3460±60 K), we aim to set new constraints on the dynamo mechanisms.

We recovered 913 high resolution spectra for 97 different M1 dwarfs from the European Southern Observatory (ESO) and Observatoire de Haute Provence (OHP) databases. We present 660 new measurements of the Ca II resonance lines and 913 new measurements of the H_α line for dM1 stars. We also compiled other measurements available in the literature. In total, we have obtained 2216 measures of the Ca II lines for 113 different dM1 stars. This represents the largest compilation of chromospheric line measurements at a single spectral type.

We cross-correlate these magnetic activity indicators with various stellar parameters to set new constraints on the dynamo mechanisms and on the properties of the outer atmosphere.

We find a correlation between the Ca II line mean equivalent width with the absolute magnitude and the metallicity. We corrected the Ca II line measures from the metallicity effect and found that the surface flux in the Ca II lines grows roughly as the power of 3.6 of the stellar radius. This corrected flux is a direct measure of magnetic activity at the chromospheric level. We find that the total magnetic activity level grows roughly as the power of 5.6 of the stellar radius. This trend is confirmed by the correlation between the H_α line and absolute magnitude and the H_α line luminosity and stellar radius: the H_α luminosity grows roughly as the volume of the star for low activity dM1 stars, and as the power of roughly 5/2 of the stellar radius for dM1e stars. The advantage of the H_α line is that its formation in not dependant on metallicity.

On the contrary to the Ca II line, we found no correlation between L_X and the absolute magnitude. We find that L_X roughly correlates with the Ca II luminosity although the correlation is not very good. This correlation shows that L_X grows as the power of 3/2 of the Ca II luminosity, i.e., *the coronal emission grows faster than the chromospheric emission.*

We found a correlation between the corrected Ca II line equivalent width and P/sini: i.e. the Ca II surface flux grows as the power of -1.5 of the rotation period. We also found a correlation between F_X, the X-ray surface flux, and P/sini: $F_X \propto (P/sini)^{-3.7}$. In other words, the coronal emission is much more dependant on the rotation period than the chromospheric emission.

We found that *the level of magnetic activity in dM1 stars is more dependent on the stellar radius than on rotation at the chromospheric level.* We discuss the implications of these results on the models of stellar dynamos.

This work was based on observations available at Observatoire de Haute Provence and the European Southern Observatory databases and on Hipparcos parallax measurements.

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Generation of Longitudinal Flux Tube Waves in Theoretical Main-sequence Stars: Effects of Model Parameters

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Aims: We compute the wave energy fluxes carried by longitudinal tube waves along vertically oriented thin magnetic fluxes tubes embedded in the atmospheres of theoretical main-sequence stars based on stellar parameters deduced by R. L. Kurucz and D. F. Gray. Additionally, we present a fitting formula for the wave energy flux based on the governing stellar and magnetic parameters.

Methods: A modified theory of turbulence generation based on the mixing-length concept is combined with the magneto-hydrodynamic equations to numerically account for the wave energies generated at the base of magnetic flux tubes.

Results: The results indicate a stiff dependence of the generated wave energy on the stellar and magnetic parameters in principal agreement with previous studies. The wave energy flux $F_{\rm LTW}$ decreases by about a factor of 1.7 between G0 V and K0 V stars, but drops by almost two orders of magnitude between K0 V and M0 V stars.

In addition, the values for $F_{\rm LTW}$ are significantly higher for lower in-tube magnetic field strengths. Both results are consistent with the findings from previous studies.

Conclusions: Our study will add to the description of magnetic energy generation in late-type main-sequence stars. Our

results will be helpful for calculating theoretical atmospheric models for stars of different levels of magnetic activity.

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Warm Coronal Rain on Young Solar Analog EK Draconis?

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We report a moderate resolution, 1290–1430 Å spectrum of young solar analog EK Draconis (HD 129333: G1.5 V), obtained by Cosmic Origins Spectrograph on *Hubble Space Telescope.* The twenty-minute observation, remarkably, captured two distinct "flares" in the Si IV 1400 Å doublet ($T \sim 6 \times 10^4$ K); very broad profiles of Si IV and the C II 1335 Å multiplet ($T \sim 3 \times 10^4$ K); and prominent Fe XXI λ1354 coronal forbidden line emission ($T \sim 10$ MK). The bright Si IV features are significantly redshifted compared to the milder, although still redshifted, equivalent components of solar-twin α^1 Cen (HD 128620: G2 V). The broad, shifted, flaring hot-line profiles of EK Dra indicate not only that the subcoronal plasma of the young sun is highly dynamic, but also that the Si IV–bearing gas must be continually accreting onto the lower atmosphere, perhaps the stellar equivalent of warm "coronal rain."

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Stellar X-ray Sources in the Chandra COSMOS Survey

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We present an analysis of the X-ray properties of a sample of solar- and late-type field stars identified in the Chandra Cosmic Evolution Survey (COSMOS), a deep (160ks) and wide (0.9 deg2) extragalactic survey. The sample of 60 sources was identified using both morphological and photometric star/galaxy separation methods. We determine X-ray count rates, extract spectra and light curves and perform spectral fits to determine fluxes and plasma temperatures. Complementary optical and near-IR photometry is also presented and combined with spectroscopy for 48 of the sources to determine spectral types and distances for the sample. We find distances ranging from 30pc to 12kpc, including a number of the most distant and highly active stellar X-ray sources ever detected. This stellar sample extends the known coverage of the L_X-distance plane to greater distances and higher luminosities, but we do not detect as many intrinsically faint X-ray sources compared to previous surveys. Overall the sample is typically more luminous than the active Sun, representing the high-luminosity end of the disk and halo X-ray luminosity functions. The halo population appears to include both low-activity spectrally hard sources that may be emitting through thermal bremsstrahlung, as well as a number of highly active sources in close binaries.

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For preprints via ftp or WWW: http://arxiv.org/abs/1011.0443

RACE-OC Project: Rotation and Variability in Young Stellar Associations Within 100 pc

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Examining the angular momentum of stars and its interplay with their magnetic fields represent a promising way to probe the stellar internal structure and evolution of low-mass stars. We attempt to determine the rotational and magnetic-related activity properties of stars at different stages of evolution. We focused our attention primarily on members of clusters and young stellar associations of known ages. In this study, our targets are 6 young loose stellar associations within 100 pc and with ages in the range 8-70 Myr: T W Hydrae (∼8 Myr), β Pictoris (∼10 Myr), Tucana/Horologium, Columba, Carina (∼30 Myr), and AB Doradus (∼70 Myr). Additional rotational data of α Persei and the Pleiades from the literature are also considered. Rotational periods of stars exhibiting rotational modulation due to photospheric magnetic activity (i.e., starspots) were determined by applying the Lomb-Scargle periodogram technique to photometric time-series data obtained by the All Sky Automated Survey (ASAS). The magnetic activity level was derived from the amplitude of the V lightcurves. The statistical significance of the rotational evolution at different ages was inferred by applying a two-sided Kolmogorov-Smirnov test to subsequent age-bins. We detected the rotational modulation and measured the rotation periods of 93 stars for the first time, and confirmed the periods of 41 stars already known from the literature. For an additional 10 stars, we revised the period determinations by other authors. The sample was augmented with periods of 21 additional stars retrieved from the literature. In this way, for the first time we were able to determine the largest set of rotation periods at ages of ∼8, ∼10 and ∼30 Myr, as well as increase by 150% the number of known periodic members of AB Dor. The analysis of the rotation periods in young stellar associations, supplemented by Orion Nebula Cluster (ONC) and NGC 2264 data from the literature, has allowed us to find that in the 0.6 - 1.2 $M_\odot$ range the most significant variations in the rotation period distribution are the spin-up between 9 and 30 Myr and the spin-down between 70 and 110 Myr. Variations between 30 and 70 Myr are rather doubtful, despite the median period indicating a significant spin-up. The photospheric activity level is found to be correlated with rotation at ages greater than ∼70 Myr and to show some additional age dependence besides that related to rotation and mass.

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Solar Abstracts

Search for Rapid Changes in the Visible-Light Corona during the 21 June 2001 Total Solar Eclipse

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Some 8000 images obtained with the SECIS fast-frame CCD camera instrument located at Lusaka, Zambia, during the total eclipse of 21 June 2001 have been analyzed to search for short-period oscillations in intensity that could be a signature of solar coronal heating mechanisms by MHD wave dissipation. Images were taken in white-light and Fe XIV green-line (530.3 nm) channels over 205 seconds (frame rate 39 per sec), approximately the length of eclipse totality at this location, with a pixel size of four arcseconds square. The data are of considerably better quality than were obtained during the 11 August 1999 total eclipse, observed by us (Rudawy et al.: Astron. Astrophys. 416, 1179, 2004), in that the images are much better exposed and enhancements in the drive system of the heliostat used gave a much improved image stability. Classical Fourier and wavelet techniques have been used to analyze the emission

at 29518 locations, of which 10714 had emission at reasonably high levels, searching for periodic fluctuations with periods in the range 0.117 seconds (frequencies 0.0610 Hz). While a number of possible periodicities were apparent in the wavelet analysis, none of the spatially and time-limited periodicities in the local brightness curves was found to be physically important. This implies that the pervasive Alfven wave-like phenomena (Tomczyk et al.: Science 317, 1192, 2007) using polarimetric observations with the CoMP instrument do not give rise to significant oscillatory intensity fluctuations.

Accepted by Solar Physics

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Latitude Dependency of Solar Flare Index-Temperature Relation Occuring Over Middle and High Latitudes of Atlantic-Eurasian Region

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By applying multitaper methods and Pearson test on the surface air temperature and flare index used as a proxy data for possible solar sources of climate-forcing, we investigated the signature of these variables on middle and high latitudes of the Atlantic-Eurasian region (Turkey, Finland, Romania, Ukraine, Cyprus, Israel, Lithuania, and European part of Russia). We considered the temperature and flare index data for the period ranging from January 1975 to the end of December 2005, which covers almost three solar cycles, 21st, 22nd, and 23rd. We found significant correlations between solar activity and surface air temperature over the 50-60 and 60-70 degree zones for cycle 22, and for cycle 23, over the 30-40, 40-50, and 50-60 degree zones. The most pronounced power peaks for surface air temperature found by multitaper method are around 1.2, 1.7 and 2.5 years which were reported earlier for some solar activity indicators. These results support the suggestion that there is signature of solar activity effect on surface air temperature of mid-latitudes.

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The Area Distribution of Solar Magnetic Bright Points

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Magnetic bright points (MBPs) are among the smallest observable objects on the solar photosphere. A combination of G-band observations and numerical simulations is used to determine their area distribution. An automatic detection algorithm, employing one- dimensional intensity profiling, is utilized to identify these structures in the observed and simulated data sets. Both distributions peak at an area of 45,000 km^2, with a sharp decrease toward smaller areas. The distributions conform with log-normal statistics, which suggests that flux fragmentation dominates over flux convergence. Radiative magneto-convection simulations indicate an independence in the MBP area distribution for differing magnetic flux densities. The most commonly occurring bright point size corresponds to the typical width of inter-granular lanes.

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Vorticity in the Solar Photosphere

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Aims. We use magnetic and non-magnetic 3D numerical simulations of solar granulation and G-band radiative diagnostics from the resulting models to analyse the generation of small-scale vortex motions in the solar photosphere.
Methods. Radiative MHD simulations of magnetoconvection are used to produce photospheric models. Our starting point is a non-magnetic model of solar convection, where we introduce a uniform magnetic field and follow the evolution of the field in the simulated photosphere. We find two different types of photospheric vortices, and provide a link between the vorticity generation and the presence of the intergranular magnetic field. A detailed analysis of the vorticity equation, combined with the G-band radiative diagnostics, allows us to identify the sources and observational signatures of photospheric vorticity in the simulated photosphere.
Results. Two different types of photospheric vorticity, magnetic and non-magnetic, are generated in the domain. Nonmagnetic vortices are generated by the baroclinic motions of the plasma in the photosphere, while magnetic vortices are produced by the magnetic tension in the intergranular magnetic flux concentrations. The two types of vortices have different shapes. We find that the vorticity is generated more efficiently in the magnetised model. Simulated G-band images show a direct connection between magnetic vortices and rotary motions of photospheric bright points, and suggest that there may be a connection between the magnetic bright point rotation and small-scale swirl motions observed higher in the atmosphere.

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Upcoming Meeting

The First LWS Solar Dynamics Observatory Science Workshop

Theme: Solar magnetic activity from large to small: scales, couplings, and cascades from the solar dynamo into the Sun's atmosphere and heliosphere.

3 - 6 May 2011

Lake Tahoe, NV/CA (exact location t.b.d.)

Living With a Star's Solar Dynamics Observatory invites you to its First Science Workshop, to be held May 3 - 6, 2011 in the Lake Tahoe area. The theme will be: *Solar Magnetic Activity from Large to Small* and will address science questions that are fundamental to all three of SDO's science investigations:

- Atmospheric Imaging Assembly (AIA) - EUV Variability Experiment (EVE) - Helioseismic and Magnetic Imager (HMI)

The meeting will consist of both plenary sessions and working group/ discussion sessions. All members of the science community are welcome to attend.

The meeting sites are being investigated, and the precise location will be determined in mid-October. Updates will be posted to the meeting website, which will be launched in late September:

http://sdo.gsfc.nasa.gov/sdoworkshop2011/

Description of Meeting Theme:

Solar magnetism forces us to view the Sun, its atmosphere, and even the inner heliosphere as a single coupled system from the deep dynamo to the solar wind. The high resolution and global view of the Solar Dynamics Observatory, in conjunction with other ground- and space- based instruments and supported by advanced data-assimilation and modeling techniques, provide a new opportunity to study solar phenomena from near the resolution limit to the global scale, and how these are connected among themselves.

Within the broader context of the wide-ranging advances being made in solar and inner-heliospheric physics, this meeting aims to emphasize some long-standing problems to which SDO can uniquely contribute: What is the origin of self-similar behavior and power-law distribution functions for emerging bipolar regions, for flares, and for eruptions from small fibrils to large coronal mass ejections, and where and why does self-similarity break down? Why and how do distant regions interact, and how far do these interactions reach across the Sun? How, how fast, and how far do emerging bipolar regions interact with the atmosphere into which they rise? What role do large-scale field changes play in triggering or preventing impulsive and eruptive events,and vice versa? How do changes in field and plasma properties near to and distant from flares and eruptions determine global spectral irradiance variations?

We are looking forward to seeing you in Lake Tahoe.

Sincerely,

The LWS/SDO -1 Scientific Organizing Committee

Aaron Birch, Phillip Chamberlin, Frank Eparvier, Sarah Gibson, Jim Klimchuk, K. D. Leka, Dana Longcope, Dean Pesnell, Jesper Schou, Karel Schrijver, Barbara Thompson, Harry Warren.

Announcement

Textbook series on **Heliophysics**

:

Edited by **Karel Schrijver** and **George Siscoe**

George Siscoe and I are pleased to announce that a series of three textbooks on heliophysics is now available from Cambridge University Press. These books resulted from three successive summer schools for graduate students and beginning postdocs (part of an ongoing series, now taught from these books; see http://www.vsp.ucar.edu/Heliophysics/, where soon problem sets will be available to complement the material in the textbooks).

The Heliophysics books aim at the advanced undergraduate and at graduate-level students, taking the perspective of heliophysics as a single intellectual discipline. The books touch on most branches of heliophysics, with particular emphasis on universal processes and on the multi-disciplinary character of many of its diverse range of specialties. The list of topics includes the formation of planetary systems, astrophysical dynamos, heliospheric perturbations, particle acceleration, cosmic-ray modulation, interactions of the solar wind with planetary magnetospheres, impulstive and explosive events, irradiance and the tropospheric climate system, ionospheric processes, and impacts of space weather on satellites and for manned space flight, among many more.

The three books are subtitled 'Plasma physics of the local cosmos', 'Space storms and radiation: causes and effects', and 'Evolving solar activity and the climates of space and Earth'. Chapter titles and (increasingly) online supporting materials can be accessed at http://www.vsp.ucar.edu/Heliophysics/science-resources-textbooks.shtml.

All three volumes of the series are now available via Cambridge University Press: http://www.cambridge.org/us/catalogue/catalogue
http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521760515 http://www.cambridge.org/us/catalogue/catalogue.a
The three-volume set can be found at: http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9781107000407

Submitted by: C.J. Schrijver (schryver AT lmsal.com)

JOB OPENING

Postdoctoral Research Position

Stellar and Exoplanetary Astrophysics

Pennsylvania State University

One postdoctoral research position in stellar and exoplanetary astrophysics is available in the Department of Astronomy and Astrophysics and the Center for Exoplanets and Habitable Worlds at the Pennsylvania State University. A PhD in astrophysics or related field is required. The initial appointment will be for one year, renewable to a total of three years contingent upon continued funding and can begin as early as summer 2011.

The ideal applicant will have:

experience acquiring and reducing optical and/or NIR spectra; a desire to work with and assist in advising graduate and undergraduate students; and a background in observational stellar astrophysics, especially cool stars, and/or exoplanet detection or characterization.

The successful applicant will: hold a 50% position working with Dr. Jason T Wright on the acquisition and interpretation of precise radial velocity data from the Hobby-Eberly Telescope and other instruments; hold a 50% position as an independent Center for Exoplanets and Habitable Worlds postdoc; pursue independent research and contribute to the vibrant scientific and public outreach efforts of the department; have access to Penn State's facilities, including the 11-m Hobby-Eberly Telescope.

Applicants should submit electronic applications (pdf, postscript, or text) containing a curriculum vitae, list of publications, brief statement of research interests and relevant experience, and contact information for three references to jtwright@astro.psu.edu. Interviews will be conducted at the 217th AAS meeting in Seattle, and the position will be filled soon thereafter.

The Department of Astronomy at Penn State University hosts 33 research and instructional faculty members, 33 research and instructional staff and postdocs, and 29 graduate students. The Department also has connections to numerous research centers on campus, including the Center for Astrostatistics and the Penn State Astrobiology Research Center. Penn State is committed to affirmative action, equal opportunity and the diversity of its workforce.

Attn: Dr. Jason T Wright, Assistant Professor of Astronomy, The Pennsylvania State University, Dept. of Astronomy & Astrophysics, 525 Davey Laboratory, University Park, PA 16802 Tel: 814 865 0418, FAX: 814 863 2842

Email Submission Address: jtwright@astro.psu.edu
Email Inquiries: jtwright@astro.psu.edu

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.***