COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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Coolnews on the Web

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Stellar Abstracts

The CARMENES Search for Exoplanets Around M Dwarfs: High-resolution Optical and Near-infrared Spectroscopy of 324 Survey Stars

A. Reiners[1], M. Zechmeister[1], J.A. Caballero[2,3], and 168 additional co-authors

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The CARMENES radial velocity (RV) survey is observing 324 M dwarfs to search for any orbiting planets. In this paper, we present the survey sample by publishing one CARMENES spectrum for each M dwarf. These spectra cover the wavelength range 520–1710 nm at a resolution of at least $R > 80,000$, and we measure its RV, Hα emission, and projected rotation velocity. We present an atlas of high-resolution M-dwarf spectra and compare the spectra to atmospheric models. To quantify the RV precision that can be achieved in low-mass stars over the CARMENES wavelength range, we analyze our empirical information on the RV precision from more than 6500 observations.

We compare our high-resolution M-dwarf spectra to atmospheric models where we determine the spectroscopic RV information content, Q, and signal-to-noise ratio. We find that for all M-type dwarfs, the highest RV precision can be reached in the wavelength range 700–900 nm. Observations at longer wavelengths are equally precise only at the very latest spectral types (M8 and M9). We demonstrate that in this spectroscopic range, the large amount of absorption features compensates for the intrinsic faintness of an M7 star. To reach an RV precision of $1\,\mathrm{m\,s^{-1}}$ in very low mass M dwarfs at longer wavelengths likely requires the use of a 10 m class telescope. For spectral types M6 and earlier, the combination of a red visual and a near-infrared spectrograph is ideal to search for low-mass planets and to distinguish between planets and stellar variability. At a 4 m class telescope, an instrument like CARMENES has the potential to push the RV precision well below the typical jitter level of $3–4\,\mathrm{m\,s^{-1}}$.

Accepted by A&A (in press)

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For preprints via WWW: http://adsabs.harvard.edu/abs/2017arXiv171106576R

The Transit Light Source Effect: False Spectral Features and Incorrect Densities for M Dwarf Transiting Planets

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Transmission spectra are differential measurements that utilize stellar illumination to probe transiting exoplanet atmospheres. Any spectral difference between the illuminating light source and the disk-integrated stellar spectrum due to starspots and faculae will be imprinted in the observed transmission spectrum. However, few constraints exist for the extent of photospheric heterogeneities in M dwarfs. Here, we model spot and faculae covering fractions consistent with observed photometric variabilities for M dwarfs and the associated 0.3–5.5 micron stellar contamination spectra. We find that large ranges of spot and faculae covering fractions are consistent with observations and corrections assuming a linear relation between variability amplitude and covering fractions generally underestimate the stellar contamination. Using realistic estimates for spot and faculae covering fractions, we find stellar contamination can be more than 10× larger than transit depth changes expected for atmospheric features in rocky exoplanets. We also find that stellar spectral contamination can lead to systematic errors in radius and therefore the derived density of small planets. In the case of the TRAPPIST-1 system, we show that TRAPPIST-1's rotational variability is consistent with spot covering fractions $f_{spot} = 8^{+18}_{-7}\%$ and faculae covering fractions $f_{fac} = 54^{+16}_{-46}\%$. The associated stellar contamination signals alter transit depths of the TRAPPIST-1 planets at wavelengths of interest for planetary atmospheric species by roughly 1–15 × the strength of planetary features, significantly complicating *JWST* follow-up observations of this system. Similarly, we find that stellar contamination can lead to underestimates of bulk densities of the TRAPPIST-1 planets of $\Delta(\rho) = -8^{+7}_{-20}\%$, thus leading to overestimates of their volatile contents.

Accepted by ApJ

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For preprints via WWW: http://arxiv.org/abs/1711.05691

Far Beyond the Sun – I. The Beating Magnetic Heart in Horologium

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A former member of the Hyades cluster, ι Horologii (ι Hor) is a planet-hosting Sun-like star which displays the shortest coronal activity cycle known to date ($P_{\rm cyc} \sim 1.6$ yr). With an age of ∼625 Myr, ι Hor is also the youngest star with a detected activity cycle. The study of its magnetic properties holds the potential to provide fundamental information to understand the origin of cyclic activity and stellar magnetism in late-type stars. In this series of articles, we present the results of a comprehensive project aimed at studying the evolving magnetic field in this star and how this evolution influences its circumstellar environment. This paper summarizes the first stage of this investigation, with results from a long-term observing campaign of ι Hor using ground-based high-resolution spectropolarimetry. The analysis includes precise measurements of the magnetic activity and radial velocity of the star, and their multiple time-scales of variability. In combination with values reported in the literature, we show that the long-term chromospheric activity evolution of ι Hor follows a beating pattern, caused by the superposition of two periodic signals of similar amplitude at $P_1 \simeq 1.97 \pm 0.02$ yr and $P_2 \simeq 1.41 \pm 0.01$ yr. Additionally, using the most recent parameters for ι Hor b in combination with our activity and radial velocity measurements, we find that stellar activity dominates the radial velocity residuals, making the detection of additional planets in this system challenging. Finally, we report here the first measurements of the surface longitudinal magnetic field strength of ι Hor, which displays varying amplitudes within ± 4 G and served to estimate the rotation period of the

star ($P_{\rm rot} = 7.70^{+0.18}_{-0.67}$ d).

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For preprints via WWW: https://arxiv.org/abs/1710.02438

A Monster CME Obscuring A Demon Star Flare

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We explore the scenario of a Coronal Mass Ejection (CME) being the cause of the observed continuous X-ray absorption of the August 30 1997 superflare on the eclipsing binary Algol (the *Demon Star*). The temporal decay of the absorption is consistent with absorption by a CME undergoing self-similar evolution with uniform expansion velocity. We investigate the kinematic and energetic properties of the CME using the ice-cream cone model for its three-dimensional structure in combination with the observed profile of the hydrogen column density decline with time. Different physically justified length scales were used that allowed us to estimate lower and upper limits of the possible CME characteristics. Further consideration of the maximum available magnetic energy in starspots leads us to quantify its mass

as likely lying in the range 2×10^{21}–2×10^{22} g and kinetic energy in the range 7×10^{35}–3×10^{38} erg. The results are in reasonable agreement with extrapolated relations between flare X-ray fluence and CME mass and kinetic energy derived for solar CMEs.

Accepted by ApJ

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For preprints via WWW: https://arxiv.org/abs/1710.07361

Solar Abstracts

Can Superflares Occur on the Sun? A View from Dynamo Theory

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Recent data from the Kepler mission has revealed the occurrence of superflares in sun-like stars

which exceed by far any observed solar flares in released energy. Radionuclides data do not provide evidences for occurrence of superflares on the Sun over the past eleven millennia. Stellar data for a subgroup of superflaring Kepler stars are analyzed in an attempt to find possible progenitors of their abnormal magnetic activity. A natural idea is that the dynamo mechanism in superflaring stars differs in some respect from that in the Sun. We search for a difference in the dynamo-related parameters between superflaring stars and the Sun to suggest a dynamo-mechanism as close as possible to the conventional solar/stellar dynamo but capable of providing much higher magnetic energy. Dynamo based on joint action of differential rotation and mirror asymmetric motions can in principle result in excitation of two types of magnetic fields. First of all, it is well-known in solar physics dynamo waves. The point is that another magnetic configuration with initial growth and further stabilization is also possible for excitation. For comparable conditions, magnetic field of second configuration is much stronger than that of the first one just because dynamo does not spend its energy for periodic magnetic field inversions but uses its for magnetic field growth. We analyzed available data from the Kepler mission concerning the superflaring stars in order to find tracers of anomalous magnetic activity. As suggested in a recent paper [1], we find that anti-solar differential rotation or anti-solar sign of the mirror-asymmetry of stellar convection can provide the desired strong magnetic field in dynamo models. We confirm this concept by numerical models of stellar dynamos with corresponding governing parameters. We conclude that the proposed mechanism can plausibly explain the superflaring events at least for some cool stars, including binaries, subgiants and, possibly, low-mass stars and young rapid rotators.

Accepted by Astron. Rep. (in press)

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Parameterizations of Chromospheric Condensations in dG and dMe Model Flare Atmospheres

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The origin of the near-ultraviolet and optical continuum radiation in flares is critical for understanding particle acceleration and impulsive heating in stellar atmospheres. Radiative-hydrodynamic simulations in 1D have shown that high energy deposition rates from electron beams produce two flaring layers at $T \sim 10^4$ K that develop in the chromosphere: a cooling condensation (downflowing compression) and heated non-moving (stationary) flare layers just below the condensation. These atmospheres reproduce several observed phenomena in flare spectra, such as the red wing asymmetry of the emission lines in solar flares and a small Balmer jump ratio in M dwarf flares. The high beam flux simulations are computationally expensive in 1D, and the (human) timescales for completing NLTE models with adaptive grids in 3D will likely be unwieldy for a time to come. We have developed a prescription for predicting the approximate evolved states, continuum optical depth, and the emergent continuum flux spectra of radiative-hydrodynamic model flare atmospheres. These approximate prescriptions are based on an important atmospheric parameter: the column mass ($m_{\rm ref}$) at which

hydrogen becomes nearly completely ionized at the depths that are approximately in steady state with the electron beam heating. Using this new modeling approach, we find that high energy flux density (>F11) electron beams are needed to reproduce the brightest observed continuum intensity in IRIS data of the 2014-Mar-29 X1 solar flare and that variation in $m_{\rm ref}$ from 0.001 to 0.02 g cm^{-2} reproduces most of the observed range of the optical continuum flux ratios at the peaks of M dwarf flares.

Accepted by ApJ

For preprints via WWW: arxiv.org/abs/1711.09488

The Nature of Solar Brightness Variations

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Determining the sources of solar brightness variations, often referred to as solar noise, is important because solar noise limits the detection of solar oscillations, it is one of the drivers of the Earth's climate system and is a prototype of stellar variability which is an important limiting factor for the detection of extrasolar planets. Here, we model the magnetic contribution to solar brightness variability using high-cadence observations from the Solar Dynamics Observatory (SDO) and the Spectral And Total Irradiance REconstruction (SATIRE) model. The brightness variations caused by the constantly evolving cellular granulation pattern on the solar surface were computed with the Max Planck Institute for Solar System Research (MPS)/ University of Chicago Radiative Magnetohydrodynamics (MURaM) code. We found that the surface magnetic field and granulation can together precisely explain solar noise (that is, solar variability excluding oscillations) on timescales from minutes to decades, accounting for all timescales that have so far been resolved or covered by irradiance measurements. We demonstrate that no other sources of variability are required to explain the data. Recent measurements of Sun-like stars by the COnvection ROtation and planetary Transits (CoRoT) and Kepler missions uncovered brightness variations similar to that of the Sun, but with a much wider variety of patterns. Our finding that solar brightness variations can be replicated in detail with just two well-known sources will greatly simplify future modelling of existing CoRoT and Kepler as well as anticipated Transiting Exoplanet Survey Satellite and PLAnetary Transits and Oscillations of stars (PLATO) data.

Published in Nature Astronomy, 1, 612

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For preprints via WWW: https://arxiv.org/abs/1711.04156

The Prototypical Young L/T-Transition Dwarf HD 203030B Likely Has Planetary Mass

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Upon its discovery in 2006, the young L7.5 companion to the solar analog HD 203030 was found to be unusual in being ≈200 K cooler than older late-L dwarfs. HD 203030B offered the first clear indication that the effective temperature at the L-to-T spectral type transition depends on surface gravity: now a well-known characteristic of low-gravity ultra-cool dwarfs. An initial age analysis of the G8V primary star indicated that the system was 130–400 Myr old, and so the companion between 12–31 $M_{\rm Jup}$. Using moderate resolution near-infrared spectra of HD 203030B, we now find features of very low gravity comparable to those of 10–150 Myr-old L7–L8 dwarfs. We also obtained more accurate near infrared and *Spitzer*/IRAC photometry, and find a $(J-K)_{\rm MKO}$ color of 2.56 ± 0.13 mag—comparable to those observed in other young planetary-mass objects—and a luminosity of $\log(L_{\rm bol}/L_{\odot}) = -4.75 \pm 0.04$ dex. We further reassess the evidence for the young age of the host star, HD 203030, with a more comprehensive analysis of the photometry and updated stellar activity measurements and age calibrations. Summarizing the age diagnostics for both components of the binary, we adopt an age of 100 Myr for HD 203030B and an age range of 30–150 Myr. Using cloudy evolutionary models, the new companion age range and luminosity result in a mass of 11 $M_{\rm Jup}$ with a range of 8–15 $M_{\rm Jup}$, and an effective temperature of 1040 ± 50 K.

Accepted by AJ

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For preprints via WWW: https://arxiv.org/abs/1710.11274

Photometry and Proper Motions of M, L, and T Dwarfs from the Pan-STARRS13π Survey

William M. J. Best[1,7], Eugene A. Magnier[1], Michael C. Liu[1], Kimberly M. Aller[1], Zhoujian Zhang[1], W. S. Burgett[2], K. C. Chambers[1], P. Draper[3], H. Flewelling[1], N. Kaiser[1], R.-P. Kudritzki[1], N. Metcalfe[3], J. L. Tonry[1], R.J. Wainscoat[1], C. Waters[1]

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We present a catalog of 9,938 M, L and T dwarfs detected in the Pan-STARRS1 3π Survey (PS1), covering three-quarters of the sky. Our catalog contains nearly all known objects of spectral types L0-T2 in the PS1 field, with objects as early as M0 and as late as T9, and includes PS1, 2MASS, and AllWISE photometry. We have rigorously vetted the association of PS1 measurements to previously identified objects, in particular to detections in the 2MASS and AllWISE surveys. We analyze the different types of photometry reported by PS1 and use two types in our catalog in order to maximize both depth and accuracy. Using parallaxes from the literature, we construct empirical SEDs for field ultracool dwarfs spanning 0.5-12 μm. We determine typical colors of M0-T9 dwarfs and we highlight the distinctive colors of subdwarfs and young objects. Our catalog includes 492 L dwarfs detected in $r_{\rm P1}$, the largest sample of L dwarfs detected at such blue wavelengths. We combine astrometry from PS1 (a multi-epoch survey), 2MASS, and Gaia when available to calculate new proper motions for our catalog, achieving a median precision of 3.5 mas yr^{-1}. Our catalog contains proper motions for 2,394 M6-T9 dwarfs and includes the largest set of homogeneous proper motions for L and T dwarfs published to date, 409 objects for which there were no previous measurements, and 1,140 objects for which we improve upon previous literature values. We analyze the kinematics of ultracool dwarfs in our catalog and find evidence that bluer but otherwise generic late-M and L field dwarfs (i.e., not subdwarfs) tend to have tangential velocities higher than those of typical field objects. With the public release of the PS1 data, this survey will continue to be an essential tool for characterizing the ultracool dwarf population.

Accepted by ApJS

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For preprints via WWW: https://arxiv.org/abs/1701.00490

Editor's Note: The abstracts below are being cross-listed with the *Star Formation Newsletter.*

More Rapidly Rotating PMS M Dwarfs with Light Curves Suggestive of Orbiting Clouds of Material

John Stauffer[1], Luisa Rebull[2], Trevor David[3], Moira Jardine[4], Andrew Collier Cameron[4], Ann Marie Cody[5], Lynne Hillenbrand[3], David Barrado[6], Julian van Eyken[7], Carl Melis[8], Cesar Briceno[9]

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In a previous paper, using data from K2 Campaign 2, we identified 11 very low mass members of the ρ Oph and Upper Scorpius star-forming region as having periodic photometric variability and phased light curves showing multiple scallops or undulations. All the stars with the "scallop-shell" light curve morphology are mid-to-late M dwarfs without evidence of active accretion, and with photometric periods generally $<$1 day. Their phased light curves have too much structure to be attributed to non-axisymmetrically distributed photospheric spots and rotational modulation. We have now identified an additional eight probable members of the same star-forming region plus three stars in the Taurus star-forming region with this same light curve morphology and sharing the same period and spectral type range as the previous group. We describe the light curves of these new stars in detail and present their general physical characteristics. We also examine the properties of the overall set of stars in order to identify common features that might help elucidate the causes of their photometric variability.

Accepted by AJ

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For preprints via WWW: https://arxiv.org/abs/1712.04390

Upcoming Meeting

IAU Symposium 343

Why Galaxies Care About AGB Stars. A Continuing Challenge through Cosmic Time

20 - 23 August 2018

Vienna, Austria

During the XXXth General Assembly of the International Astronomical Union (IAU) we will have the 4th incarnation of our GALAGB meeting series from 20-23 August 2018.

This IAU Symposium 343 aims to build a bridge between research on Asymptotic Giant Branch (AGB) stars themselves and its application to the modelling of stellar populations and the chemical evolution of galaxies and the Universe as a whole. Current developments and challenges seen from both domains will be discussed to reach an understanding of possibilities, limitations, and needs in both areas, and hence to improve our understanding of the role of AGB stars in the context of galaxies over cosmic time.

Confirmed invited speakers: Bladh, Sara; de Marco, Orsola; Gobrecht, David; Ivezic, Zeljko; Javadi, Atefeh; Kamath, Devika; Kaminski, Tomasz; Kobayashi, Chiaki; Lagadec, Eric; Ramstedt, Sofia; Rosenfield, Philip; Sahai, Ragvendra; Stanghellini, Letizia; Suh, Kyung-Won; Tolstoy, Eline; Ventura, Paolo; Whitelock, Patricia; Zhukovska, Svitlana

SOC: Boyer, Martha; Groenewegen, Martin; Höfner, Susanne; Javadi, Atefeh; Kemper, Ciska; KERSCHBAUM, FRANZ (co-chair); Lugaro, Maria; Maraston, Claudia; MARIGO, PAOLA (co-chair); Mohamed, Shazrene; Ohnaka, Keiichi; OLOFSSON, HANS (chair); Speck, Angela; Van Winckel, Hans; Wood, Peter; Zijlstra, Albert

Registration is open, we wait for your abstracts!

http://astronomy2018.univie.ac.at

Upcoming Meeting

IAU Focus Meeting 9

Solar Irradiance: Physics-Based Advances

22 - 23 August 2018

Vienna, Austria

Scientific Rationale: Understanding and modeling of solar-irradiance variability is important for solar physics and for solar-terrestrial and solar-stellar studies. Some recent irradiance measurements call into question aspects of currently-available empirical and semi-empirical models of solar-irradiance variability. A new generation of significantly more realistic physics-based irradiance models can now be created to incorporate recent advances in modeling and observing the solar atmosphere. This next generation of irradiance models will include new advances in MHD, surface flux transport, and radiative transfer simulations as well as new state-of-the-art solar data. By relying on physics-based understandings rather than merely empirical relationships established for the Sun, these new models will also allow more direct and physical extrapolations to other stars, opening a new regime for solar-stellar connection studies, as well as improved long-term estimates of historical solar variability.

Sessions: We invite you to this Focus Meeting at the 2018 IAU General Assembly in Vienna to discuss recent physics-based advances in understanding the causes of brightness variability in the Sun and stars. The following two days of oral sessions are planned:

* Overview of Solar, Climate, and Stellar Issues
Session 1: Solar-Irradiance Data Sets and Models
Session 2: Structure and Evolution of Solar-Surface Magnetic Fields
Session 3: Brightness Contrasts of Solar-Surface Magnetic Features (Data and Modeling)
Session 4: Extrapolating Solar Models to Sun-like Stars

Invited Speakers Will Ball, Serena Criscuoli, * Thierry Dudok de Wit, * Ricky Egeland, * Hideyuki Hotta, * Richard Radick (tentative), * Rob Rutten (tentative), * Tatiana Ryabchikova, * Sami Solanki

Topics * Overview of existing solar-irradiance datasets (models and observations) * Proxies of long-term solar magnetic activity * State-of-the-art in solar-irradiance modeling * Simulations of solar-surface magnetic-field distribution with surface flux transport models * Structure of solar-magnetic features: What can we learn from MHD simulations? * Radiative transfer calculations for next generation of irradiance models * Brightness contrasts of solar-magnetic features from high-resolution solar imagery (Sunrise, SDO,Hinode, etc.) * Solar-irradiance variability on timescales less than a day: magnetic and non-magnetic components * Can we use solar models to explain brightness variations of Sun-like stars? * Climate research needs for solar-irradiance time series: temporal and spectral coverage, critical issues, and priorities

Websites:
IAU GA XXX (astronomy2018.univie.ac.at/)
FM9 (astronomy2018.univie.ac.at/focusmeetings/fm9/)

Important deadlines:
1 Sep 2017 Opening of registration, abstract, and grant submission
31 Jan 2018 Early registration deadline
28 Feb 2018 Regular abstract deadline (oral and poster); IAU grant deadline
31 May 2018 Poster-submission deadline
30 Jun 2018 Deadline for regular registration

SOC: Robert Cameron MPS, Germany, Paul Charbonneau U. de Montral, Canada, Ilaria Ermolli Oss. Astron. di Roma, Italy, Juan Fontenla NWRA, USA, Mark Giampapa NSO, USA, Jie Jiang NAO, China, Greg Kopp LASP, USA (co-chair), Matthieu Kretzschmar U. of Orleans & CNRS, France, Natalie Krivova MPS, Germany, Werner Schmutz PMOD, Switzerland, Alexander Shapiro MPS, Germany (co-chair), Yvonne Unruh Imperial College, UK, Ilya Usoskin U. of Oulu, Finland, Aline Vidotto Trinity College, Ireland

ESO Workshop: A Revolution in Stellar Physics with Gaia and Large Surveys

3 - 7 September 2018

Warsaw, Poland

Web site: https://indico.camk.edu.pl/e/revolution

Contact: revolution@camk.edu.pl

First Announcement

The workshop will focus on discussions about the advances in our understanding of stellar physical processes made possible by combining the exquisite astrometry and photometry of Gaia with data of other large photometric, spectroscopic, and asteroseismic stellar surveys. These combined data will permit detailed studies of stellar physics to a level that is unprecedented in the history of stellar astrophysics.

The second release (DR2) of Gaia data is planned for April 2018. With the DR2 data available, the workshop will be a perfect moment to showcase Gaia's synergy with other surveys, discuss early science achievements and future developments.

Topics to be addressed in the workshop include:

Accuracy of stellar models, Binaries and multiple stars, Gaia and stellar physics, Low- and high-mass stars, Mixing processes, Observational tests of stellar evolution, Ongoing and future stellar surveys, Stars in all evolutionary stages (pre-main sequence to white dwarf regime), Stellar ages, Stellar clusters, Stellar variability

Registration and abstract submission will open on **January 3, 2018** with deadline April 15, 2018. More information on our website.

Confirmed Invited Speakers:

Babusiaux, Carine (Universit Grenoble Alpes, France);

Bergemann, Maria (Max-Planck Institute for Astronomy, Germany); Charbonnel, Corinne (Geneva Observatory, Switzerland); Covey, Kevin (Western Washington University, USA); Eyer, Laurent (University of Geneva, Switzerland); Feiden, Gregory (University of North Georgia, USA); Gänsicke, Boris (University of Warwick, UK); Girardi, Leo (Padova Observatory, Italy); Hillenbrand, Lynne (Caltech, USA); Huber, Daniel (University of Hawaii, USA); Karakas, Amanda (Monash University, Australia); Korn, Andreas (Uppsala University, Sweden); Soszyński, Igor (University of Warsaw, Poland); Toonen, Silvia (University of Amsterdam, Netherlands).

SOC: Ekström, Sylvia (Geneva Observatory, Switzerland); Handler, Gerald (CAMK, Poland); Hussain, Gaitee (ESO Garching); Degl'Innocenti, Scilla (University of Pisa, Italy); Jeffries, Rob (Keele University, UK); Lennon, Danny (ESA); Miglio, Andrea (University of Birmingham, UK); Pasquini, Luca (ESO Garching); Randich, Sofia (INAF/Arcetri, Italy); Smiljanic, Rodolfo (CAMK, Poland); Udalski, Andzrej (University of Warsaw, Poland).

Job Opening

Postdoctoral Position

Solar and Stellar Physics

Max Planck Institute for Solar System Research (Germany)

The Max Planck Institute for Solar System Research (MPS) invites applications for a postdoctoral position in solar and stellar physics. The successful candidate will join the recently established SOLVe group (www2.mps.mpg.de/projects/solve/) funded by an ERC Starting Grant and led by Alexander Shapiro. The group utilises state-of-the-art MHD and radiative transfer codes to extend physics-based models of solar brightnessvariations from the Sun to other stars. Building on the solar paradigm the group aims at explaining rich patterns of stellar brightness variations observed by the Kepler and CoRoT missions and at improving techniques for detecting and characterizing exoplanets.

The SOLVe group resides in the solar department of the MPS, one of the largest groups in solar physics worldwide with ample experience in MHD simulations and radiative transfer as well as with leading participations in many major solar space missions. The institute is located in Göttingen, Germany, a lively and scenic university town, in a striking new building.

Applicants must hold a Ph.D. in physics with focus on solar/stellar physics, astronomy, astrophysics or a closely related field. They should have an outstanding research record and experience in solar or stellar physics.Experience in MHD simulations and/or numerical radiative transfer modeling and/or analysis of stellar spectral and photometric data is of particular advantage.

The starting date is negotiable and the position is offered for an initial period of two years. Salary will be according to grade E13 of the TVD scale of the German public services. Applications, including a CV, a shortdescription of past research activities (max. 3 pages), and a publication list should be sent as one pdf file topds@mps.mpg.de. In addition, applicants should arrange to have two letters of reference sent separately to thesame address. Review of applications will begin February 15, 2018 and continue until the position is filled. The Max Planck Society is an equal opportunity employer and particularly encourages applications from women. The Max Planck Society is committed to employing more handicapped individuals and especially encourages them to apply.

For further information please contact Alexander Shapiro (shapiroa at mps.mpg.de) or Johannes Stecker (stecker atmps.mpg.de)

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 bimonthly call for abstracts will be issued. 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.***