COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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TABLE OF CONTENTS

Coolnews on the Web

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Stellar Abstracts

Metallicity of Sun-like G-Stars That Have Exoplanets

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By considering the physical and orbital characteristics of G type stars and their exoplanets, we examine the association between stellar mass and its metallicity that follows a power law. Similar relationship is also obtained in case of single and multiplanetary stellar systems suggesting that, Sun's present mass is about 1% higher than the estimated value for its metallicity. Further, for all the stellar systems with exoplanets, association between the planetary mass and the stellar metallicity is investigated, that suggests planetary mass is independent of stellar metallicity. Interestingly, in case of multiplanetary systems, planetary mass is linearly dependent on the stellar absolute metallicity, that suggests, metal rich stars produce massive ($\geq$ 1 Jupiter mass) planets compared to metal poor stars. This study also suggests that there is a solar system planetary missing mass of $\sim$ 0.8 Jupiter mass. It is argued that probably 80% of missing mass is accreted onto the Sun and about 20% of missing mass might have been blown off to the outer solar system (beyond the present Kuiper belt) during early history of solar system formation. We find that, in case of single planetary systems, planetary mass is independent of stellar metallicity with an implication of their non-origin in the host star's protoplanetary disk and probably are captured from the space. Final investigation of dependency of the orbital distances of planets on the host stars metallicity reveals that inward migration of planets is dominant in case of single planetary systems supporting the result that most of the planets in single planetary systems are captured from the space.

Published by: Journal of Astrophysics and Astronomy

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For preprints via WWW: https://link.springer.com/article/10.1007%2Fs12036-017-9443-z

A Solar Cycle Correlation of Coronal Element Abundances in Sun-as-a-Star Observations

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The elemental composition in the coronae of low-activity solar-like stars appears to be related to fundamental stellar properties such as rotation, surface gravity, and spectral type. Here we use full-Sun observations from the Solar Dynamics Observatory, to show that when the Sun is observed as a star, the variation of coronal composition is highly correlated with a proxy for solar activity, the F10.7cm radio flux, and therefore with the solar cycle phase. Similar cyclic variations should therefore be detectable spectroscopically in X-ray observations of solar analogs. The plasma composition in full-disk observations of the Sun is related to the evolution of coronal magnetic field activity. Our observations therefore introduce an uncertainty into the nature of any relationship between coronal composition and fixed stellar properties. The results highlight the importance of systematic full-cycle observations for understanding the elemental composition of solar-like stellar coronae.

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Solar Abstracts

Observations of a Radio-quiet Solar Preflare

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The preflare phase of the flare SOL2011-08-09T03:52 is unique in its long durat ion, its coverage by the *Reuven Ramaty High Energy Solar Spectroscopic Imag er (RHESSI) and the Nobeyama Radioheliograph*, and the presence of three well-de veloped soft X-ray (SXR) peaks. No hard X-rays (HXR) are observed in the preflar e phase. Here we report that also no associated radio emission at 17 GHz was fou nd despite the higher sensitivity of the radio instrument. The ratio between the SXR peaks and the upper limit of the radio peaks is larger by more than one ord er of magnitude compared to regular flares. The result suggests that the ratio b etween acceleration and heating in the preflare phase was different than in regu lar flares. Acceleration to relativistic energies, if any, occurred with lower efficiency.

Accepted by Solar Physics

For preprints contact: benz@astro.phys.ethz.ch

For preprints via WWW: https://arxiv.org/abs/1709.06417

Perihelion Precession Caused by Solar Oblateness Variation in Equatorial and Ecliptic Coordinate Systems

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Analytic solutions of planetary orbits disturbed by solar gravitational oblateness have been derived and given in the solar equatorial coordinate system, although the results usually have to be represented in the ecliptic coordinate system. The perihelion precession of interest in the solar equatorial and ecliptic coordinate systems is partly periodical and not negligible. The result shows that the difference in Mercurys perihelion precession between the solar equatorial plane and the ecliptic plane can reach a magnitude of 126708 J_2, which is even bigger than the perihelion precession itself (101516 J_2). Due to the temporal variability of the oblateness, the periodic variation of the J_2 term, instead of simply a constant, is taken into account and solutions are derived. In the case of Mercury, the periodic J_2 has an effect of nearly 0.8 per cent of the secular perihelion precession of Mercury. This indicates that a better understanding of the solar oblateness is required, which could be done through observation in the solar orbits instead of on Earth.

Accepted by MNRAS

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For preprints via WWW: https://academic.oup.com/mnras/article/472/3/2686/4191297/

Low-Mass and Substellar Abstracts

Rotation Periods and Photometric Variability of Rapidly Rotating Ultra-Cool Dwarfs

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We used the optical and near-infrared imagers located on the Liverpool, the IAC80, and the William Herschel telescopes to monitor 18 M7-L9.5 dwarfs with the objective of measuring their rotation periods. We achieved accuracies typically in the range ±1.5–28 mmag by means of differential photometry, which allowed us to detect photometric variability at the 2σ level in the 50% of the sample. We also detected periodic modulation with periods in the interval 1.5–4.4 h in 9 out of 18 dwarfs that we attribute to rotation. Our variability detections were combined with data from the literature; we found that 65 ± 18 % of M7–L3.5 dwarfs with $v \sin i \geq 30$ km s^{-1} exhibit photometric variability with typical amplitudes $\leq$20 mmag in the I-band. For those targets and field ultra-cool dwarfs with measurements of $v \sin i$ and rotation period we derived the expected inclination angle of their rotation axis, and found that those with $v \sin i \geq 30$ km s^{-1} are more likely to have inclinations $\geq$ 40 deg. In addition, we used these rotation periods and others from the literature to study the likely relationship between rotation and linear polarization in dusty ultra-cool dwarfs. We found a correlation between short rotation periods and large values of linear polarization at optical and near-infrared wavelengths.

Accepted by MNRAS

For preprints contact: ppaez@uwo.ca

For preprints via WWW: https://arxiv.org/abs/1708.07777

Characterizing The Cloud Decks of Luhman 16AB with Medium-Resolution Spectroscopic Monitoring

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We present results from a two-night $R \sim 4000$ 0.9–2.5 μm spectroscopic monitoring campaign of Luhman 16AB (L7.5 + T0.5). We assess the variability amplitude as a function of pressure level in the atmosphere of Luhman 16B: the more variable of the two components. The amplitude decreases monotonically with decreasing pressure, indicating that the source of variability—most likely patchy clouds—lies in the lower atmosphere. An unexpected result is that the strength of the K I absorption is higher in the faint state of Luhman 16B and lower in the bright state. We conclude that either the abundance of K I increases when the clouds roll in, potentially because of additional K I in the cloud itself, or that the temperature-pressure profile changes. We reproduce the change in K I absorption strengths with combinations of spectral templates to represent the bright and the faint variability states. These are dominated by a warmer L8 or L9 component, with a smaller contribution from a cooler T1 or T2 component. The success of this approach argues that the mechanism responsible for brown dwarf variability is also behind the diverse spectral morphology across the L-to-T transition. We further suggest that the L9–T1 part of the sequence represents a narrow but random ordering of effective temperatures and cloud fractions, obscured by the monotonic progression in methane absorption strength.

Accepted by ApJ

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For preprints via WWW: https://arxiv.org/abs/1709.08679

Long Term Datasets for the Understanding of Solar and Stellar Magnetic Cycles (IAUS 340)

19 - 24 Feb. 2018

Jaipur, India

http://www.iiap.res.in/iaus340/

Email: iaus340@iiap.res.in

SECOND CIRCULAR

Dear Colleagues,

Abstracts for talks and posters should be sent via the submission form

https://www.iiap.res.in/iaus340/Abstract_Submission

by 30 September 2017, because the space for contributed talks is very limited. Later submissions will still be accepted, and will be reviewed as poster contributions.

Applications for IAU travel grants can be made on the form

https://www.iiap.res.in/iaus340/IAU_travel_grants

by 30 September 2017.

Registration is now open for IAU Symposium 340. The deadline for early registration (200 EUR) is November 30th 2017. Late registration (250 EUR) is possible until December 30th 2017. Very late registration, on-site registration fee 300 EUR.

Jaipur is a popular tourist destination and February is the peak season so please book your accommodation at the earliest. Check the web site

https://www.iiap.res.in/iaus340/Accommodation for details.

Looking forward to welcoming you in Jaipur, India.

The IAUS 340 Scientific Organizing Committee: Dipankar Banerjee, Jie Jiang, Kusano Kanya, Sami Solanki (Co-Chairs) & Paul Charbonneau, Frederic Clette,Ilaria Ermolli, Sarah Gibson, Todd Hoeksema, Haisheng Ji, Alexei Pevtsov, Leonid Kitchatinov, P.K. Manoharan, Ralph Neuhaeuser, Nandita Srivastava, Ilya Usoskin

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Job Opening

Ph.D. Positions in Solar System Science

International Max Planck Research School for Solar System Science

Göttingen, Germany

Dear Colleagues:

CALL FOR APPLICATIONS: IMPRS PhD Positions in Solar System Science in Göttingen, Germany.

Deadline: November 15, 2017

https://www.mps.mpg.de/phd/applynow

Dear Colleagues:

The International Max Planck Research School for Solar System Science at the University of Göttingen in Germany (Solar System School) offers a research-oriented doctoral programme covering the physical aspects of Solar system science. It is jointly run by the Max Planck Institute for Solar System Research (MPS) and the University of Göttingen. Research at the MPS covers three main research areas: Sun and Heliosphere (director S. Solanki), Solar and Stellar Interiors (director L. Gizon) and Planets and Comets (director U. Christensen). Solar System School students collaborate with leading scientists in these fields and graduates are awarded a doctoral degree from the renowned University of Göttingen or, if they choose, another university.

The Solar System School is open to students from all countries and offers an international three-year PhD programme in an exceptional research environment with state-of-the-art facilities on the Gttingen Campus. Successful applicants will be offered a three-year doctoral support contract as well as postdoc wrap-up funding.

The language of the structured graduate programme is English, with German language courses offered (optional). The programme includes an inspiring curriculum of scientific lectures and seminars as well as advanced training workshops and provides a relocation cost subsidy, travel funds to attend international conferences.

Applicants to the Solar System School should have a keen interest in Solar system science and a record of academic excellence. They must have, or must be about to obtain, an M.Sc. degree or equivalent in physics, earth sciences or a related field, including a written Masters thesis, and must document a good command of the English language.

* Applicants can register immediately at the online application portal.

* Applications should be submitted between October 1 and November 15.

* The School will contact the referees named by the candidate upon submission of the application and will ask referees to submit their letters through the online portal no later than November 20.

To start your application, please see the following pages:

Solar System School http://www.solar-system-school.de

Call for Applications 2017 https://www.mps.mpg.de/phd/applynow

Frequently Asked Questions https://www.mps.mpg.de/phd/faq

List of Open PhD Projects https://www.mps.mpg.de/phd/open-projects

Online Application Portal https://www.application.mps.mpg.de/

Dr. Sonja Schuh (info@solar-system-school.de) IMPRS Scientific Coordinator

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.***