COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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Stellar Abstracts

On the Magnetic Topology of Partially and Fully Convective Stars

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We compare the amount of magnetic flux measured in Stokes V and Stokes I in a sample of early- and mid-M stars around the boundary to full convection (~M3.5). Early-M stars possess a radiative core, mid-M stars are fully convective. While Stokes V is sensitive to the net polarity of magnetic flux arising mainly from large-scale configurations, Stokes I measurements can see the total mean flux. We find that in early-M dwarfs, only ~ 6 % of the total magnetic flux is detected in Stokes V. This ratio is more than twice as large, ~ 14 %, in fully convective mid-M dwarfs. The bulk of the magnetic flux on M-dwarfs is not seen in Stokes V. This is presumably because magnetic flux is mainly stored in small scale components. There is also more to learn about the effect of the weak-field approximation on the accuracy of strong field detections. In our limited sample, we see evidence for a change in magnetic topology at the boundary to full convection. Fully convective stars store a 2–3 times higher fraction of their flux in fields visible to Stokes V. We estimate the total magnetic energy detected in Stokes I and compare it to results from Stokes V. We find that in early-M dwarfs only ~0.5 % of the total magnetic energy is detected in Stokes V while this fraction is ~2.5 % in mid-M dwarfs.

Accepted by A&A

For preprints via ftp or WWW: http://xxx.uni-augsburg.de/abs/0901.1659

Calibrating M Dwarf Metallicities Using Molecular Indices: Extension to Low-metallicity Stars

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We have calculated Fe and Ti abundances in twelve low-metallicity main sequence M stars using high resolution spectra. These subdwarf and extreme subdwarf stars allow us to extend our calibration of a method to determine cool dwarf star

metallicities using molecular band strength indices from low-resolution spectra. Our calibration can now be used to determine metallicity to within ±0.3 dex for stars with [Fe/H] between −1.5 and +0.05 and temperatures between 3500 and 4000 K. We also report a method to estimate temperatures for M dwarfs using equivalent width measurements of the infrared Ca II triplet and the K I line at 7699 Å. Our metallicity measurements support the idea that the recently proposed 4-class system for low-mass stars (dwarfs, subdwarfs, extreme subdwarfs, and ultrasubdwarfs) does represent a metallicity sequence, with the ultrasubdwarfs the most metal-poor stars.

Accepted by PASP

For preprints contact: vwoolf@mail.unomaha.edu

X-ray Emission from the M9 Dwarf 1RXS J115928.5-524717 - Quasi-Quiescent Coronal Activity at the End of the Main Sequence

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We analyse an XMM-Newton observation of 1RXS J115928.5-524717, an ultracool dwarf with spectral type M9 and compare its X-ray properties to those of other similar very late-type stars. We clearly detected 1RXS J115928.5-524717 at soft X-ray energies in all EPIC detectors. Only minor variability was present during the observation and we attribute the X-ray emission to quasi-quiescent activity. The coronal plasma is described well by a two-temperature model at solar metallicity with temperatures of 2 MK and 6 MK and an X-ray luminosity of about $L_X = 1.0 \times 10^{26}$ erg/s in the 0.2 −2.0 keV band. The corresponding activity level of log $L_X/L_{bol} \approx -4.1$ points to a moderately active star. Altogether, X-ray activity from very low-mass stars shows similar trends to more massive stars, despite their different interior structure. The nearby star 1RXS J115928.5-524717 is, after LHS 2065, the second ultracool M9 dwarf that emits X-rays at detectable levels in quasi-quiescence. While faint in absolute numbers, both stars are relatively X-ray active, implying an efficient dynamo mechanism that is capable of creating magnetic activity and coronal X-ray emission.

Accepted by A&A

For preprints via WWW: http://arxiv.org/abs/0901.3027

The Cycles of α Centauri

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The main AB pair of the nearby α Centauri triple system has one of the most extensive X-ray records of any cosmic object, stretching over thirty years. The primary, α Cen A (G2 V), is a near twin of the Sun, with a similarly soft (1–2 MK) corona. The secondary, α Cen B (K1 V), is more active than the Sun, with a generally harder coronal spectrum. Here, more than a decade of spatially resolved measurements from *ROSAT, XMM–Newton,* and *Chandra* are compared on a common basis, with careful attention to conversion factors that translate count rates of the different instruments into absolute energy fluxes. For the latter purpose, two epochs of *Chandra* transmission grating spectra, which fully resolve the binary, were modeled using a differential emission measure formalism. The aggregate time series suggests that α Cen B was near X-ray maximum in the mid-1990's, minimum in the late-1990's, then peaked again in 2004–2005, and more recently has been declining toward another minimum. Meanwhile, α Cen A showed minimal variability 1995–2000, and like the secondary presently is mired in an activity lull (in fact, as seen by *XMM–Newton*, the primary "fainted" from view in the 2005 time frame). Comparisons between X-ray luminosities in the 0.2–2 keV (6-60 Å) *ROSAT* "WGACAT" band and a softer counterpart 0.06–1.2 keV (10–200 Å) reinforce the idea that cycle depth is strongly dependent on the energy span of the measurement, and that much of the coronal luminosity of cool-corona objects like the Sun falls at longer wavelengths than are recorded efficiently by contemporary instruments. Consequently, one must be careful in discussing X-ray cycles, their amplitudes, and coronal heating requirements unless one can demonstrate good control over the out-of-band component.

Accepted by Astrophysical Journal

For preprints contact: Thomas.Ayres@Colorado.edu
For preprints via anonymous ftp: **casa.colorado.edu/pub/ayres/Cycles_AlpCen.pdf**

Upcoming Meeting

NAM/JENAM Joint Session on MHD Seismology of Solar, Space and Astrophysical Plasmas

20 - 23 April 2009

Univ. of Hertfordshire (United Kingdom)

Magnetohydrodynamic waves and oscillations are an intrinsic feature of various natural plasma systems, from ionospheres and magnetospheres of the Earth and other planets to the solar and stellar coronae and winds, and magnetospheres of pulsars and magnetars. The waves, being natural probes of plasma systems, provide us with an excellent and often unique approach to the diagnostics of physical conditions in the plasmas and processes operating in them. The stunning recent progress in observational and theoretical studies of MHD wave phenomena in natural plasmas gave rise to novel and rapidly developing branches of Astrophysics and Space Science: solar coronal seismology, Earth's and Ganymed's magneto-seismologies, and MHD seismology of astrophysical objects: magnetars, disks, CV, clouds. The aim of the session is to create a joint forum for the specialists working on various aspects of MHD wave diagnostics of space and astrophysical plasmas. The session covers observational detection of MHD waves and oscillations, and quasi-periodic pulsations in energy releases; data analysis; theoretical modelling of MHD wave interaction with plasmas and MHD oscillations, including oscillatory magnetic reconnection and triggering of flares by MHD waves; and wave-based diagnostics of plasma parameters.

Organizing committee: Valery Nakariakov (Warwick), Mathioudakis Mihalis (Belfast), Ineke De Moortel (St Andrews) and Martin Volwerk (Graz).

Programme: Four 1.5-hour blocks. Each session consists of an invited review (IR, 25+5 min) and four contributed talks (CT 10+5 min);

Session 1 (together with MIST): Earth's and planetary magneto-seismology Session 2 (together with UKSP): Solar coronal seismology Session 3: Magnetohydrodynamic seismology of stellar coronae Session 4: Magnetohydrodynamic seismology of astrophysical objects

The website for NAM/JENAM is: http://www.jenam2009.eu/

Upcoming Meeting

Heliophysics Summer School 2009

22 - 29 July 2009

Boulder, Colorado

The third of a three-year NASA-sponsored Heliophysics Summer School will be hosted by the UCAR Visiting Scientist Programs in Boulder, CO, 22-29 July 2009.

The summer school has two principal aims: 1) to deepen the appreciation of the basic science of heliophysics for a select group of students as teachers take them through highly interactive seminars and hands-on working groups, and 2) to produce a series of textbooks from which heliophysics may be taught at universities worldwide.

The three-year program comprises three thematic clusters that together cover the scientific basis of the physical processes that play a role in coupling the Sun's interior to the planetary environments and atmospheres through the vast heliosphere.

The third year of the program will focus on long-term processes, from the Sun's modulated activity to its influences on the climate systems of the heliosphere, Earth's atmosphere, and planetary environments. The first year covered the plasma physics of the local cosmos, i.e., the science that is uniquely enabled by our existence within an environment of ionized gases. The second year covered explosive energy conversion and energetic particles. Thus, the three-year program of the summer school encompasses the entire scientific discipline that is now called heliophysics, which was borne out of the need for interdisciplinary research in the context of NASA's Living with a Star (LWS) Program.

Approximately 30 students (chosen from graduate students through first or second year postdoctoral fellows) will be selected each year through a competitive process to participate in the summer school. Each participant will receive air travel, lodging and per diem. Attendants will be selected for the 2009 summer school independent of their participation in earlier schools.

Drs. Karel Schrijver (Lockheed Martin Advanced Technology Center) and George Siscoe (Boston University) are the Deans of the summer school. The summer school lectures will be given by teachers from the US, Canada, and Europe - see the schedule at the UCAR website: http://www.vsp.ucar.edu/HeliophysicsSummerSchool.

The summer school is sponsored by the Living With a Star program of the Heliophysics Division in NASA's Science Mission Directorate. The UCAR Visiting Scientist Programs office administers the summer school.

The deadline for application submission by students is 1 April 2009.

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

Upcoming Meeting

Solar Analogs II

20 - 23 September 2009

Lowell Observatory

Flagstaff, AZ

In October 1997, astronomers from around the world attended the Solar Analogs workshop at Lowell Observatory. Invited talks covered all aspects of the solar-stellar connection, and the working groups settled on 18 Scorpii as the then best solar twin. Exactly one solar cycle later, we invite the solar-stellar community to Solar Analogs II, to discuss the latest developments in the study of the activity and variations of the most Sun-like stars, and their implications for solar studies and solar influences on climate. This will be a highly interactive workshop, with extended time after talks for questions and discussion and ample time for poster viewing. We will publish a complete online proceedings after the meeting. The workshop is the 2009 installment of our annual Lowell Fall Workshop series and will occur over the fall equinox, one of the most beautiful times of year to visit the high country of northern Arizona.

Further information, a list of confirmed invited speakers, and registration is available at the Solar Analogs II web site: http://www.lowell.edu/workshops/SolarAnalogsII/index.php.

JOB OPENING

Research Fellows in Solar Physics

Queen's University

Belfast, N. Ireland

Applications are invited for two 3-year Postdoctoral Research Fellowship positions in Solar Physics (Ref. 09/100816). The posts are located within the Astrophysics Research Centre (ARC) of the School of Mathematics and Physics.

The successful candidates will be expected to develop and support research within the Solar Physics Group in ARC. This group makes extensive use of a wide range of solar satellites and ground-based telescopes, with current activities including the study of oscillatory phenomena and reconnection events. Recently, we have built and commissioned the Rapid Oscillations in the Solar Atmosphere (ROSA) imaging system that can observe the solar atmosphere in as many as 6 wavelengths simultaneously, and with a cadence of up to 200 Hz. ROSA is currently at the National Solar Observatory in New Mexico USA. The group makes extensive use of image reconstruction techniques for the analysis of ground-based solar observations from ROSA and other instruments.

Applicants must have a PhD in a relevant subject either awarded or submitted by the time of taking up the post. Experience in either (i) the reduction and analysis of solar observations from satellite-borne or ground-based instruments, or (ii) the development of theoretical models of the solar atmosphere, is essential. Also essential is a reasonable number of high quality publications commensurate with stage of career.

An application pack for the post, containing further details and guidelines on how to submit your application online, is available at:

http://www.qub.ac.uk/sites/QUBJobVacancies/ResearchJobs/

under post reference 09/100816.

Salary: 29,704-34,435 per annum.

Closing date: 4.00 pm, Friday 24 April 2009

JOB OPENING

Research Associate in Young Stars and Their Circumstellar Environments

Keele University

Keele, UK

Applications are invited for a Research Associate researching the properties and environments of young, planet-forming stars. Keele has a world class stellar astrophysics group focussing on questions surrounding stellar birth and death (see http://www.astro.keele.ac.uk). The group has been strengthened by its participation in the WASP exoplanetary transit project and leadership of the WASP-South survey. The Research Associate will join a successful observational research programme investigating the properties of young, low-mass stars, their circumstellar and birth environments and how these influence the planet-forming process. Research methods will include multi-wavelength (optical, infrared, X-ray) observations of stars in young clusters using facilities such as the VLT, Spitzer and XMM-Newton.

Applicants should have a PhD in astrophysics or a related area, or an expectation of gaining a PhD within a year of appointment, as well as experience in the collection and analysis of astrophysical data or similar datasets and have a demonstrated aptitude for research in astrophysics and the publication of journal papers. Ideally applicants will have a background in researching young stars and their environments and will also have experience of the operation of astronomical telescopes and spectrographs and/or analysing X-ray and infrared datasets from satellites.

The appointment will be made for a term of up to three years with a likely starting date of October 2009 or earlier. To apply see:

http://www.keele.ac.uk/depts/uso/hr/cwisvacs.htm

Please quote post reference: RE09/05.

Please copy any application to Dr. Rob Jeffries at rdj@astro.keele.ac.uk.

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.***