COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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Stellar Abstracts

The First Observed Stellar X-ray Flare Oscillation: Constraints on the Flare Loop Length and the Magnetic Field

Urmila Mitra-Kraev[1], Louise K. Harra[1], David R. Williams[1], and Egor Kraev[1]

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We present the first X-ray observation of an oscillation during a stellar flare. The flare occurred on the active M-type dwarf AT Mic and was observed with *XMM-Newton*. The soft X-ray light curve (0.2–12 keV) is investigated with wavelet analysis. The flare's extended, flat peak shows clear evidence for a damped oscillation with a period of around 750 s, an exponential damping time of around 2000 s, and an initial, relative peak-to-peak amplitude of around 15%. We suggest that the oscillation is a standing magneto-acoustic wave tied to the flare loop, and find that the most likely interpretation is a longitudinal, slow-mode wave, with a resulting loop length of $(2.5 \pm 0.2)\ 10^{10}$ cm. The local magnetic field strength is found to be 105 ± 50 G. These values are consistent with (oscillation-independent) flare cooling time models and pressure balance scaling laws. Such a flare oscillation provides an excellent opportunity to obtain coronal properties like the size of a flare loop or the local magnetic field strength for the otherwise spatially-unresolved star.

Accepted by A&A

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For preprints via ftp or WWW: http://www.mssl.ucl.ac.uk/~umk/publications/2005atmic_oscill.pdf

LP 349-25: A New Tight M8V Binary

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We present the discovery of a tight M8V binary, with a separation of only 1.2 astronomical units, obtained with the PUEO and NACO adaptive optics systems, respectively at the CFHT and VLT telescopes. The estimated period of LP 349-25 is approximately 5 years, and this makes it an excellent candidate for a precise mass measurement.

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For preprints via ftp or WWW: http://xxx.arxiv.org/abs/astro-ph/0503605

Metallicity of M Dwarfs. I. A Photometric Calibration and Impact on the Mass-Luminosity Relation at the Bottom of the Main Sequence

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We obtained high resolution ELODIE and CORALIE spectra for both components of 20 wide visual binaries composed of an F-, G- or K-dwarf primary and an M-dwarf secondary. We analyse the well understood spectra of the primaries to determine metallicities ([Fe/H]) for these 20 systems, and hence for their M dwarf components. We pool these metallicities with determinations from the literature to obtain a precise ($\pm$ 0.2 dex) photometric calibration of M dwarf metallicities. This calibration represents a breakthrough in a field where discussions have had to remain largely qualitative, and it helps us demonstrate that metallicity explains most of the large dispersion in the empirical V-band mass-luminosity relation. We examine the metallicity of the two known M-dwarf planet-host stars, Gl 876 (+0.02 dex) and Gl 436 ($-$0.03 dex), in the context of preferential planet formation around metal-rich stars. We finally determine the metallicity of the 47 brightest single M dwarfs in a volume limited sample, and compare the metallicity distributions of solar-type and M-dwarf stars in the solar neighbourhood.

Submitted to A&A

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For preprints via ftp or WWW: http://fr.arxiv.org/abs/astro-ph/0503260

A Large X-ray Outburst in Mira A

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We report the Chandra ACIS-S detection of a bright soft X-ray transient in the Mira AB interacting symbiotic-like binary. We have resolved the system for the first time in X-rays. Using Chandra and Hubble Space Telescope images, we determine that the unprecedented outburst is likely associated with the cool asymptotic giant branch (AGB) star, Mira A, the prototype of the Mira class of variables. X-rays have never before been detected from an AGB star, and

the recent activity signals that the system is undergoing dramatic changes. The total X-ray luminosity of the system is several times higher than the luminosity estimated using previous XMM-Newton and ROSAT observations. The outburst may be caused by a giant flare in Mira A associated with a mass ejection or a jet and may have long-term consequences on the system.

We dedicate this paper to the memory of Janet A. Mattei, who inspired this work and made these observations possible for many years.

Accepted by ApJ Letters

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Spurious 'Active Longitudes' in Parametric Models of Heavily Spotted Eclipsing Binaries

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In this paper, size distributions of starspots extrapolated from the case of the Sun, are modelled on the eclipsing binary SV Cam to synthesise images of stellar photospheres with high spot filling factors. These spot distributions pepper the primary's surface with spots, many of which are below the resolution capabilities of eclipse mapping and Doppler imaging techniques. The lightcurves resulting from these modelled distributions are used to determine the limitations of image reconstruction from photometric data. Surface brightness distributions reconstructed from these lightcurves show distinctive spots on the primary star at its quadrature points. It is concluded that two-spot modelling or chi-squared minimisation techniques are more susceptible to spurious structures being generated by systematic errors, arising from incorrect assumptions about photospheric surface brightness, than simple Fourier analysis of the light-curves.

MNRAS in press

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For preprints via WWW: http://star-www.st-and.ac.uk/ svjl/jeffers.pdf

An Assessment of the Fe XVIII and Fe XIX Line Ratios from the Chandra Grating Observations of Capella

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Observations of Fe XVIII and Fe XIX X-ray, EUV, and FUV line emission, formed at the peak of Capella's (α Aurigae) emission measure distribution and ubiquitous in spectra of many cool stars and galaxies, provide a unique opportunity to test the robustness of Fe XVIII and Fe XIX spectral models. The Astrophysical Plasma Emission Code (APEC) is used to identify over 35 lines from these two ions alone, and to compare model predictions with spectra obtained with the *Chandra* Low Energy Transmission Grating and High Energy Transmission Grating Spectrometers, the *Far Ultraviolet Spectroscopic Explorer*, and the *Extreme Ultraviolet Explorer*. Some flux discrepancies larger than factors of two are found between observations of Fe XVIII and Fe XIX lines and predictions by APEC and other models in common usage. In particular the X-ray resonance lines for both ions are stronger than predicted by all models relative to the EUV resonance lines. The multiwavelength observations demonstrate the importance of including dielectronic recombination and proton impact excitation, and of using accurate wavelengths in spectral codes. These ions provide important diagnostic tools for 10^7 K plasmas currently observed with *Chandra, XMM-Newton*, and *FUSE.*

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Solar Abstracts

Line Broadening of EUV lines Across the Solar limb: A Spicule Contribution?

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Spectral lines formed in the solar transition region show an increase in the line width, peaking at ≈10,000 km above the limb. Looking at a region off-limb with no obvious spicules, the non-spicule region has a significantly smaller line width above 6,000 km compared those taken in a spicule region. We suggest that this increase in line broadening is not due to small scale random motions but rather to unresolved line shifts due to spicules and/or macro-spicules activity.

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Coronal Oscillations in the Vicinity of a Sunspot as Observed by GIS/CDS

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In this paper, we present results from a time series analysis of data from the Grazing Incidence Spectrometer **(GIS)**, onboard SoHO. Our observations were concentrated at the boundary between the quiet Sun and an active region, close to a sunspot plume. The dominant oscillations in all the lines studied are of periods longer than 5 minutes. Although our observations were not taken directly above the sunspot, the 3-min oscillations, which are normally associated with the umbra, are seen in several spectral lines, suggesting some leakage perhaps via plume structures. The oscillations of coronal lines form wavepackets and are intermittent with no obvious decay. The average time scale of the intermittence is of the order of 20 minutes, which would correspond to a source size of 2 arcsec

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Dynamics of Solar Active Regions II. Oscillations Observed with MDI and Their Relation to the Magnetic Field Topology

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We present new results of an international joint observing campaign, which was carried out in September 2000 to study the oscillatory behaviour of solar active regions. We concentrate on oscillations in the lower layers of the solar atmosphere as observed with the Michelson Doppler Imager (MDI, Scherrer et al. 1995). The resulting photospheric oscillation power maps are compared with chromospheric maps from simultaneous UV continuum data (taken with the TRACE instrument). From a magnetic field extrapolation of the MDI magnetograms we infer that the reduction in chromospheric high frequency power and enhancement of photospheric high frequency power may be explained by the interaction of acoustic waves with the magnetic canopy.

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Evolution and Rotation of Large-Scale Photospheric Magnetic Fields of the Sun During Cycles 21–23

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We present the results of an extensive time series analysis of longitudinally averaged synoptic maps, recorded at the National Solar Observatory (NSO/Kitt Peak) from 1975 to 2003, and provide evidence for a multitude of quasi-periodic oscillations in the photospheric magnetic field of the Sun. In the low frequency range, we have located the sources of the 3.6 yr, 1.8 yr, and 1.5 yr periodicities that were previously detected in the north-south asymmetry of the unsigned photospheric flux (Knaack et al 2004). In addition, quasi-periodicities around 2.6 yr and 1.3 yr have been found. The latter is most likely related to large-scale magnetic surges toward the poles and appeared in both hemispheres at intermediate latitudes $\sim 30°$–$55°$ during the maxima of all three cycles 21–23, being particularly pronounced during cycle 22. Periods around 1.3 yr have recently been reported in the rotation rate at the base of the convection zone (Howe et al. 2000), in the interplanetary magnetic field and geomagnetic activity (Lockwood 2001) and in sunspot data (Krivova & Solanki 2002). In the intermediate frequency range, we have found a whole series of quasi-periodicities of 349–307 d, 282 ± 4 d, 249–232 d, 222–209 d, 177 ± 2 d, 158–151 d, 129–124 d, and 103–100 d, which are in good agreement with period estimates for Rossby-type waves (Lou 2000) and occurred predominantly in the southern hemisphere. We provide evidence that the best known of these periodicities, the Rieger period around 155 d (Rieger et al 1984), appeared in the magnetic flux not only during cycle 21 but also during cycle 22, likely even during cycle 23. The high frequency range, which covers the solar rotation periods, shows a dominant (synodic) 28.1 ± 0.1 d periodicity in the southern hemisphere during cycles 21 and 22. A periodicity around 25.0–25.5 d occurred in the south during all three cycles. The large-scale magnetic field of the northern hemisphere showed dominant rotation periods at 26.9 ± 0.1 d during cycle 21, at 28.3–29.0 d during cycle 22, and at 26.4 ± 0.1 d during cycle 23.

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Spherical Harmonic Decomposition of Solar Magnetic Fields

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We have investigated the temporal evolution of large-scale magnetic fields in the solar photosphere during the time interval 1966–2004 by means of spherical harmonic decomposition and subsequent time series analysis. Two data sets of daily magnetograms recorded at the Mt. Wilson and Kitt Peak observatories were used to calculate the spherical harmonic coefficients of the radial magnetic field for axisymmetric ($m = 0$) and non-axisymmetric ($m \neq 0$) modes. Time series analysis was then applied to deduce their temporal variations. A third data set of synoptic Carrington rotation maps from Kitt Peak was also analyzed for completeness. Besides the obvious 22 yr magnetic cycle, we have found evidence for intermittent oscillations with periods of $2.1 - 2.5$ yr, $1.5 - 1.8$ yr and $1.2 - 1.4$ yr. The biennial oscillation occurred during the solar maxima of cycles 20–22 (and likely also during the current cycle 23) and was most pronounced for modes that resemble non-linear dynamo waves (Stix:1972). The $1.5 - 1.8$ yr period was stronger during the odd cycles 21 and 23 than during the even cycles 20 and 22, whereas the opposite was the case for the $1.2 - 1.4$ yr period. Similar variations of $1.5 - 1.8$ yr have recently been detected in the north-south asymmetry of the magnetic flux (Knaack et al. 2004), while quasi-periodicities of ~ 1.3 yr have been observed in the rotation rate near the base of the convection zone (Howe et al. 2000), in the heliosphere and geomagnetic activity (Lockwood 2001), in sunspot areas (Krivova & Solanki 2002), and in the large-scale photospheric magnetic field (Knaack et al. 2005). In agreement with the latter study, we have found additional quasi-periodicities in the range $320 - 100$ d and rotational periods of 29.0 ± 0.1d, 28.2 ± 0.1d, and 26.8 ± 0.1d. Compared to earlier decompositions by (Stenflo & Vogel 1986) and (Stenflo & Guedel 1988), we can confirm the main features of their results, although several modifications need to be considered.

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Carbon Monoxide in the Solar Atmosphere I. Numerical Method and Two-Dimensional Models

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The radiation hydrodynamic code CO5BOLD has been supplemented with the time-dependent treatment of chemical reaction networks. Advection of particle densities due to the hydrodynamic flow field is also included. The radiative transfer is treated frequency-independently, i.e. grey, so far. The upgraded code has been applied to two-dimensional simulations of carbon monoxide (CO) in the non-magnetic solar photosphere and low chromosphere. For this purpose a reaction network has been constructed, taking into account the reactions that are most important for the formation and dissociation of CO under the physical conditions of the solar atmosphere. The network has been strongly reduced to 27 reactions, involving the chemical species H, H_2, C, O, CO, CH, OH and a representative metal. The resulting CO number density is highest in the cool regions of the reversed granulation pattern at mid-photospheric heights and decreases strongly above. There, the CO abundance stays close to a value of 8.3 on the usual logarithmic abundance scale with [H]=12 but is reduced in hot shock waves which are a ubiquitous phenomenon of the model atmosphere. For comparison, the corresponding equilibrium densities have been calculated, based on the reaction network but also under the assumption of instantaneous chemical equilibrium by applying the Rybicki & Hummer (RH) code. Owing to the short chemical timescales, the assumption holds for a large fraction of the atmosphere, in particular the photosphere. In contrast, the CO number density deviates strongly from the corresponding equilibrium value in the vicinity of chromospheric shock waves. Simulations with altered reaction networks clearly show that the formation channel via hydroxide (OH) is the most important one under the conditions of the solar atmosphere.

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Evolution of Reconnection Along an Arcade of Magnetic Loops

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RHESSI observations of a solar flare showing continuous motions of double hard X-ray sources interpreted as footpoints of magnetic loops are presented. The temporal evolution shows many distinct emission peaks of duration of some tens of seconds ('elementary flare bursts'). Elementary flare bursts have been interpreted as instabilities or oscillations of the reconnection process leading to an unsteady release of magnetic energy. These interpretations based on two-dimensional concepts cannot explain these observations, showing that the flare elements are displaced in a third dimension along the arcade. Therefore, the observed flare elements are not a modulation of the reconnection process, but originate as this process progresses along an arcade of magnetic loops. Contrary to previous reports, we find no correlation between footpoint motion and hard X-ray flux. This flare apparently contradicts the predictions of the standard translation invariant 2.5D reconnection models.

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Brightness and Magnetic Evolution of Solar Coronal Bright Points

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Ph.D dissertation directed by: J.G. Doyle

Ph.D degree awarded: December 2004

This thesis presents a study of the brightness and magnetic evolution of several Extreme ultraviolet (EUV) coronal bright points (hereafter BPs). BPs are loop-like features of enhanced emission in the coronal EUV and X-ray images of the Sun, that are associated to the interaction of opposite photospheric magnetic polarities with magnetic fluxes of $\approx 10^{18}$ – 10^{19} Mx. The study was carried out using several instruments on board the Solar and Heliospheric Observatory (SOHO): the Extreme Ultraviolet Imager (EIT), the Coronal Diagnostic Spectrometer (CDS) and the Michelson Doppler Imager (MDI), supported by the high resolution imaging from the Transition Region And Coronal Explorer (TRACE).

The results confirm that, down to $1''$ (i.e. $\approx$715 km) resolution, BPs are made of small loops with lengths of $\approx$6 Mm and cross-sections of $\approx$2 Mm. The loops are very dynamic, evolving in time scales as short as 1 - 2 minutes. This is reflected in a highly variable EUV response with fluctuations highly correlated in spectral lines at transition region temperatures (in the range 3.2×10^4 – 3.5×10^5 K), but not always at coronal temperatures. A wavelet analysis of the intensity variations reveals, for the first time, the existence of quasi-periodic oscillations with periods ranging 400 – 1000 s, in the range of periods characteristic of the chromospheric network. The link between BPs and network bright points is discussed, as well as the interpretation of the oscillations in terms of global acoustic modes of closed magnetic structures.

A comparison of the magnetic flux evolution of the magnetic polarities to the EUV flux changes is also presented. Throughout their lifetime, the intrinsic EUV emission of BPs is found to be dependent on the total magnetic flux of the polarities. In short time scales, co-spatial and co-temporal TRACE and MDI images, reveal the signature of heating events that produce sudden EUV brightenings simultaneous to magnetic flux cancellations. This is interpreted in terms of magnetic reconnection events.

Finally, a electron density study of six coronal bright points produces values of $\approx 1.6\times10^9$ cm^{-3}, closer to active region plasma than to quiet Sun. The analysis of a large coronal loop (half length of 72 Mm) introduces the discussion on the prospects of future plasma diagnostics of BPs with forthcoming solar missions like Solar-B.

Thesis-related Publications: A&A, 425, 1083; A&A, 418, 313; http://star.arm.ac.uk/~iuu/research.html

Ph.D. Thesis Abstracts

Surface Brightness Distributions of Late-Type Stars

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Ph.D dissertation directed by: Andrew Collier Cameron

Ph.D degree awarded: November 2004

The aim of this work has been to increase our understanding of the surface brightness distributions of late-type stars through Doppler imaging and eclipse mapping techniques. Combining spectroscopic and photometric observations with the technique of Doppler Imaging, I have reconstructed surface images of the G2 V star He 699 (for 08 October 2000), which show high latitude and polar structures. In the case of the K0V star AB Dor, the Doppler images for January 1992 and November 1993 show a large polar cap with small dark features also present at intermediate to high latitudes. As the phase sampling of the observations was insufficient to apply the sheared-image method it was not possible to detect any differential rotation.

In the second part of my thesis I determine the surface brightness distribution of the primary component of the RS CVn eclipsing binary SV Cam. I have used extrapolated size distributions of sunspots to an active star to synthesize images of stellar photospheres with high spot filling factors. The resulting surface images, reconstructed with the Maxium Entropy eclipse mapping technique, show large spurious spot features at the quadrature points. It is concluded that two-spot modelling or chi-squared minimisation techniques are more susceptible to spurious structures being generated by systematic errors, arising from incorrect assumptions about photospheric surface brightness, than simple Fourier analysis of the light-curves.

Spectro-photometric data from 9 HST orbits, observed in November 2001, have been used to eclipse-map the primary component of SV Cam. In combination with its HIPPARCOS parallax it is found that the surface flux in the eclipsed low-latitude region is about 30% lower than computed from the best fitting PHOENIX model atmosphere. This flux deficit can only be accounted for if about a third of the primary's surface is covered with unresolved spots. However, when the spottedness from the eclipsed region is applied to the entire surface of the primary star, there still remains an unaccounted flux deficit. The remaining flux deficit is explained by the presence of a large polar spot extending down to latitude $48 \pm 6°$.

When the Maximum Entropy eclipse mapping technique is used to fit SV Cam's lightcurve, the observed minus computed residuals show strong spurious peaks at the quadrature points. It is only possible to reduce these peaks with the addition of a polar cap and the reduction of the primary star's temperature, to account for the star being peppered with unresolvable spots. Motivated by this result we investigate the limb darkening of the primary component of SV Cam. The wavelength dependence of the limb darkening is analysed by sub-dividing the HST lightcurve into 10 bands of equal emission flux. Flux variations between the first and fourth contact of the primary eclipse indicate that the limb darkening decreases towards longer wavelengths, in accordance with published limb darkening laws. Comparing fits of ATLAS and PHOENIX model atmospheres we find a wavelength dependence of the best fitting model. Due to its smooth cutoff at the stellar limb, the spherical geometry of the PHOENIX model atmosphere gives the best fit during partial eclipse. Between the second and third contact the difference between spherical and plane-parallel geometry is less important.

Thesis-related Publications: MNRAS, 331, 666; ApJ, 621,425; MNRAS in press

Upcoming Meeting

The Sun: Its Interior, Atmosphere and Wind

IUGG 2005 General Assembly Session GAIV.01

Toulouse, France

18 - 29 July 2005

Closing dates for electronic abstract submission: 27 March 2005.
The Preliminary Program indicates that IAGA session GAIV.01 will be held on July 27-29, 2005.
For abstract submission, registration, and more information see

http://www.iugg.org/IAGA/index.htm or

http://www.copernicus.org/IAGA/2005/index.htm

Upcoming Meeting

First announcement

Ultra-low-mass Star Formation and Evolution Workshop

June 30- July 1, 2005

La Palma, Canary Islands, Spain

The Instituto de Astrofisica de Canarias (IAC) and the Fundacion Galileo Galilei - INAF (operating the Telescopio Nazionale Galileo (TNG)) are pleased to announce the Scientific Workshop Ultralow-mass star formation and evolution which will be held from June 28th through 1st July 2005 at the Hotel La Palma Princess in the Canary Islands, Spain.

SCIENCE TOPICS:

- Very low-mass cores and the core mass function
- Initial conditions of brown dwarf and planet formation
- Very young brown dwarfs and planets
- Spectroscopy of substellar-mass objects
- Models of ultralow-mass star formation and evolution
- Brown dwarf companions and binary brown dwarfs

A special evening session will be dedicated to celebrating the 10th anniversary of the discoveries of Gl 229B and Teide 1

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Early registration deadline: 11 May 2005

To keep a "small atmosphere" and to foster interactions among all participants, no more than 60 people will be selected to attend. The early registration fee will be 140 euros, and the late registration fee will be 180 euros. Researchers from developing nations and students can apply for financial assistance. For logistics, registration and additional information please check:

http://www.iac.es/workshop/ulmsf05

Announcement (New Book)

High-Energy Spectroscopic Astrophysics

(30th Saas-Fee Advanced Course in Astrophysics)

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Edited by M. Güdel (PSI, Switzerland) and R. Walter (ISDC, Geneva, Switzerland)

The lecture notes of the 30th Saas-Fee Advanced Course in Astrophysics provide a detailed overview of spectroscopic astrophysics in the X-ray and gamma-ray range. The text discusses the theoretical foundations of line and continuum emission in the context of many astrophysical sources. Observational methods and instrumentation are also discussed. The book is addressed to graduate students and researchers in various fields of high-energy astrophysics. Several sections (e.g., soft X-ray spectroscopy) are relevant for stellar and solar astronomers.

Steven Kahn's lecture on soft X-ray spectroscopy reviews the large field of atomic physics in low-density cosmic plasmas from a strict quantum mechanics point of view. Details of ionization and recombination processes, atomic transitions, and equilibria relevant for the interpretation of soft X-ray spectra from cosmic sources are discussed. Peter von Ballmoos presents the basic science of detector and telescope systems for high-energy astrophysics. The precise understanding of detector characteristics is emphasized. Rashid Sunyaev gives a comprehensive review of fundamental processes in high-energy plasmas, concentrating on radiation processes in extreme environments such as compact objects. Much emphasis is put on Comptonization mechanisms.

Chapters:

– Soft X-Ray Spectroscopy of Astrophysical Plasmas (S. M. Kahn)
– Instruments for Nuclear Astrophysics (P. von Ballmoos)
– Hard X-Ray and Gamma-Ray Spectroscopy (R. Sunyaev)

Published by Springer, ISBN: 3-540-40501-1. 295 pages, 90 illustrations (some in color)

List Price: Euro 74.85

WWW: `http://www.springeronline.com/sgw/cda/frontpage/0,11855,1-10100-72-37644259-0,00.html`

Announcement (New Book)

The Sun, Solar Analogs and the Climate

(34th Saas-Fee Advanced Course in Astrophysics)

J. D. Haigh[1], **M. Lockwood**[2], **and M. S. Giampapa**[3]

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[3] National Solar Observatory, Tucson, USA

Edited by I. Rüedi (PMOD/WRC, Davos, Switzerland), M. Güdel (PSI, Switzerland), and W. Schmutz (PMOD/WRC)

This book presents the lectures notes of the 34th Saas-Fee Advanced Course on"The Sun, Solar Analogs and the Climate" given by three leading scientists in the field. Emphasis is put on the observed variability of the Sun and the present understanding of the origin of this variability, as well as its impact on the Earth's climate. Solar variability is then studied in the broader context of solar-type stars, allowing for a better *(continued next page →)*

understanding of the solar-activity cycle and magnetic activity in general. This book provides an accessible and up-to-date introduction to the field for graduate students and serves as a modern source of reference for active researchers in this area.

Chapter contents:

- The Earth's Climate and its Response to Solar Variability (J. D. Haigh)
- Solar Outputs, Their Variations and Their Effects on Earth (M. Lockwood)
- Stellar Analogs of Solar Activity: The Sun in a Stellar Context (M. Giampapa)

Published by Springer, ISBN: 3-540-23856-5. 425 pages, 288 illustrations (some in color)

List Price: Euro 74.85

WWW: `http://www.springeronline.com/sgw/cda/frontpage/0,11855,1-10100-72-36722111-0,00.html`

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` .

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