COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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Stellar Abstracts

Chemical Abundances in 43 Metal-poor Stars

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We have derived abundances of O, Na, Mg, Al, Si, Ca, Sc, Ti, V, Cr, Fe, Ni and Ba for 43 metal-poor field stars in the solar neighbourhood, most of them subgiants or turn-off-point stars, with iron abundances [Fe/H] ranging from -0.4 to -3.0. About half of this sample has not been analysed spectroscopically in detail before. Effective temperatures were estimated from *uvby* photometry, and surface gravities primarily from Hipparcos parallaxes. The analysis is differential relative to the Sun, and carried out with plane-parallel MARCS models. Various sources of error are discussed and found to contribute a total error of about 0.1–0.2 dex for most elements, while relative abundances, such as [Ca/Fe], are most probably more accurate. For the oxygen abundances, determined in an NLTE analysis of the 7774 Å triplet lines, the errors may be somewhat larger. We have made a detailed comparison with other similar studies and traced the reasons for the, in most cases, relatively small differences.

Among the results we note the following: We find [O/Fe] to possibly increase beyond [Fe/H] $= -1.0$, though considerably less than obtained by others from abundances based on OH lines. We do not trace any tendency for strong overionization of iron. We find the excesses, relative to Fe and the Sun, of the α elements Mg, Si and Ca to be smaller than those of O. We discuss some indications that also the abundances of α elements relative to Fe vary and the possibility that some of the scatter around the trends in abundances relative to iron may be real. This may support the idea that the formation of the Halo stars occurred in smaller systems with different star formation rates. We verify the finding by Gratton et al. (2003b) that stars that do not participate in the rotation of the galactic disk show a lower mean and larger spread in [α/Fe] than stars participating in the general rotation. The latter stars also seem

to show some correlation between [α/Fe] and rotation speed. We trace some stars with peculiar abundances, among those two Ba stars, HD 17072 and HD 196944, the latter already known to be rich in s elements. We finally advocate that a spectroscopic study of a larger sample of halo stars with well-defined selection criteria is very important, in addition to the very considerable efforts that various groups have already made.

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For preprints via WWW: http://www.arxiv.org/abs/astro-ph/0505118

Three Active M Dwarfs Within 8 pc: L 449-1, L 43-72, & LP 949-15

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Three nearby star candidates were selected as bright 2MASS point sources without associated optical sources, i.e. with potentially large proper motions, subsequently confirmed by multi-epoch optical data from the SuperCOSMOS Sky Surveys. All three objects are listed in the NLTT catalogue of high proper motion stars. Follow-up spectroscopic observations allowed us to classify L 449-1 as M4.0e dwarf at 5.7 pc, L 43-72 as M4.5e dwarf at 7.2 pc, and LP 949-15 as M5.0e dwarf at 6.1 pc, using known absolute JHK_s magnitudes of dwarfs with corresponding spectral types, respectively. All three stars exhibit $H\alpha$ emission lines, and all three can be identified with bright X-ray sources. The available ROSAT light curves of two of the objects show typical flare-like variability. Thus, all three stars are active, very close potential neighbours of the Sun, previously not mentioned as such, certainly deserving further attention. In particular, these are very promising candidates for trigonometric parallax programs.

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PHOENIX Model Chromospheres of Mid- to Late-type M Dwarfs

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We present semi-empirical model chromospheres computed with the atmosphere code PHOENIX. The models are designed to fit the observed spectra of five mid- to late-type M dwarfs. Next to hydrogen lines from the Balmer series we used various metal lines, e. g. from Fe I, for the comparison between data and models. Our computations show that an NLTE treatment of C, N, O impacts on the hydrogen line formation, while NLTE treatment of less abundant metals such as nickel influences the lines of the considered species itself. For our coolest models we investigated also the influence of dust on the chromospheres and found that dust increases the emission line flux.
Moreover we present an (electronically published) emission line list for the spectral range of 3100 to 3900 and 4700 to 6800 Å for a set of 21 M dwarfs and brown dwarfs. The line list includes the detection of the Na I D lines in emission for a L3 dwarf.

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Chandra Observations of Coronal Emission from the Early-G Supergiants Alpha and Beta Aquarii

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We report *Chandra* detections of coronal X-rays from the early-G supergiants α Aquarii (HD 209750: G2 Ib) and β Aquarii (HD 204867: G0 Ib). Previous *ROSAT* observations of these archetypical "hybrid chromosphere" stars were inconclusive: in the case of α Aqr owing to a $38'$ mispointing; and for β Aqr, because of a small positional discrepancy of the apparent source. The *Chandra* High Resolution Camera (HRC-I), with its superior spatial resolution and sensitivity, has obtained a positive detection of α Aqr, and recovered faint emission at the location of β Aqr, now well separated from the stronger source to the SE that dominated the earlier *ROSAT* image. The coronal $L_{\rm X}/L_{\rm C\,IV}$ luminosity ratios of both supergiants are extremely depressed relative to early-G main sequence stars, continuing the "X-ray deficiency syndrome" originally identified in late-F/early-G luminosity class III giants of the Hertzsprung gap.

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An *XMM-Newton* Study of the Coronae of σ^2 Coronae Borealis

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We present results of *XMM-Newton* Guaranteed Time observations of the RS CVn binary σ^2 Coronae Borealis. The spectra obtained with the Reflection Grating Spectrometers and the European Photon Imaging Camera MOS2 were simultaneously fitted with collisional ionization equilibrium plasma models to determine coronal abundances of various elements. Contrary to the solar first ionization potential (FIP) effect in which elements with a low FIP are overabundant in the corona compared to the solar photosphere, and contrary to the "inverse" FIP effect observed in several active RS CVn binaries, coronal abundance ratios in σ^2 CrB show a complex pattern as supported by similar findings in the *Chandra* HETGS analysis of σ^2 CrB with a different methodology (Osten et al. 2003). Low-FIP elements (< 10 eV) have their abundance ratios relative to Fe consistent with the solar photospheric ratios, whereas high-FIP elements have their abundance ratios increase with increasing FIP. We find that the coronal Fe abundance is consistent with the stellar photospheric value, indicating that there is no metal depletion in σ^2 CrB. However, we obtain a higher Fe absolute abundance than in Osten et al. (2003). Except for Ar and S, our absolute abundances are about 1.5 times larger than those reported by Osten et al. (2003). However, a comparison of their model with our *XMM-Newton* data (and vice versa) shows that both models work adequately in general. We find, therefore, no preference over one methodology over the other to derive coronal abundances. Despite the systematic discrepancy in absolute abundances, our abundance ratios are very close to those obtained by Osten et al. (2003). Finally, we confirm the measurement of a low density in O VII ($< 4 \times 10^{10}$ cm^{-3}), but could not confirm the higher densities measured in spectral lines formed at higher temperatures derived by other studies of σ^2 CrB due to the lower spectral resolution of the *XMM-Newton* grating spectrometers.

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Large-scale Magnetic Field of the G8 Dwarf ξ Bootis A

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We investigate the magnetic geometry of the active G8 dwarf ξ Bootis A, from spectropolarimetric observations obtained in 2003 with the MuSiCoS échelle spectropolarimeter at the Télescope Bernard Lyot (Observatoire du Pic du Midi, France). We repeatedly detect a photospheric magnetic field, with periodic variations consistent with rotational modulation. Circularly polarized (Stokes V) line profiles present a systematic asymmetry, showing up as an excess in amplitude and area of the blue lobe of the profiles. A direct modeling of Stokes V profiles suggests that the global magnetic field is composed of two main components, with an inclined dipole and a large-scale toroidal field. We derive a dipole intensity of about 40 G, with an inclination of 35° of the dipole with respect to the rotation axis. The toroidal field strength is of order of 120 G. A noticeable evolution of the field geometry is observed over the 40 nights of our observing window and results in an increase of the field strength and of the dipole inclination.

This study is the first step of a long-term monitoring of ξ Bootis A and other active solar-type stars, with the aim to investigate secular fluctuations of stellar magnetic geometries induced by activity cycles.

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For preprints via WWW: http://arXiv.org/abs/astro-ph/0505438

XMM-Newton Spectroscopy of the Metal Depleted T Tauri Star TWA 5

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We present results of X-ray spectroscopy for TWA 5, a member of the young TW Hydrae association, observed with *XMM-Newton*. TWA 5 is a multiple system which shows Hα emission, a signature typical of classical T Tauri stars, but no infrared excess. From the analysis of the RGS and EPIC spectra, we have derived the emission measure distribution vs. temperature of the X-ray emitting plasma, its abundances, and the electron density. The characteristic temperature and density of the plasma suggest a corona similar to that of weak-line T Tauri stars and active late-type main sequence stars. TWA 5 also shows low iron abundance (~ 0.1 times the solar photospheric one) and a pattern of increasing abundances for elements with increasing first ionization potential reminiscent of the inverse FIP effect observed in highly active stars. The especially high ratio Ne/Fe ~ 10 is similar to that of the classical T Tauri starTW Hya, where the accreting material has been held responsible for the X-ray emission. We discuss the possible role of an accretion process in this scenario. Since all T Tauri stars in the TW Hydrae association studied so far have very high Ne/Fe ratios, we also propose that environmental conditions may cause this effect.

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Editor's Note: The above abstract is being cross-listed with the *Star Formation Newsletter*.

Radial Velocity Jitter in Stars from the California and Carnegie Planet Search at Keck Observatory

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I present an empirical model for predicting a star's radial velocity jitter from its B-V color, activity level, and absolute magnitude. This model is based on observations of 450 well- observed stars from Keck Observatory for the California and Carnegie Planet Search Program. The model includes noise from both astrophysical sources and systematic errors, and describes jitter as generally increasing with a star's activity and height above the main sequence.

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Chromospheric Models of Solar Analogues with Different Activity Levels

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We computed chromospheric models of the Sun as a star and of nine solar analogues. The atmospheric models were constructed to obtain the best possible match with the Ca II K and Hβ lines, including the asymmetry of the lines due to macroscopic velocity fields. The stars were chosen with 0.62 ¡ B-V¡ 0.68 (the solar B-V=0.65) and have a wide variety of magnetic activity levels, which allows us to study the differences in atmospheric structures induced by activity. For the less active stars we found that the changes with activity are in the region of the temperature minimum, while the most active stars show changes all along their atmospheric structures, mainly in the upper chromosphere. Regarding the macroscopic velocity fields, we can distinguish between the two groups. The most active group have a velocity field in the temperature-minimum region, and the other group in the chromospheric plateau. We also computed the net radiative losses for each model, and found that they depend linearly on the usual index of chromospheric activity.

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Convective Dynamos and the Minimum X-ray Flux in Main Sequence Stars

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The objective of this paper is to investigate whether a convective dynamo can account quantitatively for the observed lower limit of X-ray surface flux in solar-type main sequence stars. Our approach is to use 3D numerical simulations of a turbulent dynamo driven by convection to characterize the dynamic behavior, magnetic field strengths, and filling factors in a non-rotating stratified medium, and to predict these magnetic properties at the surface of cool stars. We use simple applications of stellar structure theory for the convective envelopes of main-sequence stars to scale our simulations to the outer layers of stars in the F0–M0 spectral range, which allows us to estimate the unsigned magnetic flux on the surface of non-rotating reference stars. With these estimates we use the recent results of Pevtsov et al. (2003) to predict the level of X-ray emission from such a turbulent dynamo, and find that our results compare well with observed lower limits of surface X-ray flux. If we scale our predicted X-ray fluxes to Mg II fluxes we also find good agreement with the observed lower limit of chromospheric emission in K dwarfs. This suggests that dynamo action from a convecting, non-rotating plasma is a viable alternative to acoustic heating models as an explanation for the basal emission level seen in chromospheric, transition region, and coronal diagnostics from late-type stars.

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High-Resolution Spectroscopy of Ursa Major Moving Group Stars

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We use new and extant literature spectroscopy to address abundances and membership for UMa moving group stars. We first compare the UMa, Coma, and Hyades H-R diagrams via a homogeneous set of isochrones, and find that these three aggregates are essentially coeval; this (near) coevality can explain the indistinguishable distributions of UMa and Hyades dwarfs in the chromospheric emission versus color plane. Our spectroscopy of cool UMa dwarfs reveals striking abundance anomalies–trends with $T_{\rm eff}$, ionization state, and excitation potential–like those recently seen in young cool M34, Pleaides, and Hyades dwarfs. In particular, the trend of rising λ7774-based OI abundance with declining $T_{\rm eff}$ is markedly subdued in UMa compared to the Pleiades, suggesting a dependence on age or metallicity.

Recent photometric metallicity estimates for several UMa dwarfs are markedly low compared to the group's canonical metallicity, and similar deviants are seen among cool Hyads as well. Our spectroscopy does not confirm these curious photometric estimates, which seem to be called into question for cool dwarfs. Despite disparate sources of Li data, our homogeneous analysis indicates that UMa members evince remarkably small scatter in the Li-$T_{\rm eff}$ plane for $T_{\rm eff}\geq$5200 K. Significant star-to-star scatter suggested by previous studies is seen for cooler stars. Comparison with the consistently determined Hyades Li-$T_{\rm eff}$ trend reveals differences qualitatively consistent with this cluster's larger [Fe/H] (and perhaps slightly larger age). However, quantitative comparison with standard stellar models indicates the differences are smaller than expected, suggesting the action of a fourth parameter beyond age, mass, and [Fe/H] controlling Li depletion. The UMa-Coma cool star Li abundances may show a slight 0.2 dex difference; however, this may be mass-independent, and thus more consistent with a modest initial Li abundance difference.

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The Solar Model Problem Solved by the Abundance of Neon in Stars of the Local Cosmos

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The interior structure of the Sun can be studied with great accuracy using observations of its oscillations, similar to seismology of the Earth. Precise agreement between helioseismological measurements and predictions of theoretical solar models has been a triumph of modern astrophysics (Bahcall et al. 2005). However, a recent downward revision by 25-35% of the solar abundances of light elements such as C, N, O and Ne (Asplund et al. 2004) has broken this accordance: models adopting the new abundances incorrectly predict the depth of the convection zone, the depth profiles of sound speed and density, and the helium abundance (Basu & Antia 2004, Bahcall et al. 2005). The discrepancies are far beyond the uncertainties in either the data or the model predictions (Bahcall et al. 2005b). Here we report on neon abundances relative to oxygen measured in a sample of nearby solar-like stars from their X-ray spectra. They are all very similar and substantially larger than the recently revised solar value. The neon abundance in the Sun is quite poorly determined. If the Ne/O abundance in these stars is adopted for the Sun the models are brought back into agreement with helioseismology measurements (Antia & Basu 2005, Bahcall et al. 2005c).

Nature, in press

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Constraining the Properties of Spots on Pleiades Very Low Mass Stars

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We present results of a multi-filter monitoring campaign for very low mass (VLM) stars in the Pleiades. Simultaneous to our I-band time series (Scholz & Eislöffel 2004), which delivered photometric periods for nine VLM stars, we obtained light curves in the J- and H-band. One VLM star with $M \approx 0.15\,M_{\odot}$ (BPL129) shows a period in all three wavelength bands. The amplitudes in I, J, and H are 0.035, 0.035, and 0.032 mag. These values are compared to simulations, in which we compute the photometric amplitude as a function of spot temperature and filling factor. The best agreement between observations and models is found for cool spots with a temperature contrast of 18-31% and a very low surface filling factor of 4-5%. We suggest that compared to more massive stars VLM objects may have either very few spots or a rather symmetric spot distribution. This difference might be explained with a change from a shell to a distributed dynamo in the VLM regime.

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X-ray Diagnostics of Grain Depletion in Matter Accreting onto T Tauri Stars

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Recent analysis of high resolution *Chandra* X-ray spectra has shown that the Ne/O abundance ratio is remarkably constant in stellar coronae. Based on this result, we point out the utility of the Ne/O ratio as a discriminant for accretion-related X-rays from T Tauri stars, and for probing the measure of grain-depletion of the accreting material in the inner disk. We apply the Ne/O diagnostic to the classical T Tauri stars BP Tau and TW Hya—the two stars found to date whose X-ray emission appears to originate, at least in part, from accretion activity. We show that TW Hya appears to be accreting material which is significantly depleted in O relative to Ne. In constrast, BP Tau has an Ne/O abundance ratio consistent with that observed for post-T Tauri stars. We interpret this result in terms of the different ages and evolutionary states of the circumstellar disks of these stars. In the young BP Tau disk (age $\sim$ 0.6 Myr) dust is still present near the disk corotation radius and can be ionized and accreted, re-releasing elements depleted onto grains. In the more evolved TW Hya disk (age $\sim$ 10 Myr), evidence points to ongoing coagulation of grains into much larger bodies, and possibly planets, that can resist the drag of inward-migrating gas, and accreting gas is consequently depleted of grain-forming elements.

ApJL, in press

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For preprints via ftp or WWW: see astro-ph after June 7.

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Solar Abstracts

Size Dependence of Solar X-ray Flare Properties

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Non-thermal and thermal parameters of 85 solar flares of GOES class B1 to M6 (background subtracted classes A1 to M6) have been compared to each other. The hard X-ray flux has been measured by RHESSI and a spectral fitting provided flux and spectral index of the non-thermal emission, as well as temperature and emission measure of the thermal emission. The soft X-ray flux was taken from GOES measurements. We find a linear correlation in a double logarithmic plot between the non-thermal flux and the spectral index. The higher the acceleration rate of a flare, the harder the non-thermal electron distribution. The relation is similar to the one found by a comparison of the same parameters from several sub-peaks of a single flare. Thus small flares behave like small subpeaks of large flares. Thermal flare properties such as temperature, emission measure and the soft X-ray flux also correlate with peak non-thermal flux. A large non-thermal peak flux entails an enhancement in both thermal parameters. The relation between spectral index and the non-thermal flux is an intrinsic feature of the particle acceleration process, depending on flare size. This property affects the reported frequency distribution of flare energies.

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Is There a Phase Constraint for Solar Dynamo Models?

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The spatio-temporal relationship between the sign of the observed radial component of the magnetic field at the solar surface and the sign of the toroidal field as inferred from Hale's polarity rules for sunspots is usually interpreted as signifying the phase relation between the poloidal and the toroidal magnetic field components involved in the solar dynamo process. This has been taken as a constraint for models of the solar dynamo. This note draws attention to the fact that the observed phase relation is naturally and inevitably produced by the emergence of tilted bipolar regions and flux transport through surface flows, without any necessity of recourse to the dynamo process. Consequently, there is no constraint on dynamo models resulting from the observed phase relation.

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For preprints via ftp or WWW: http://arxiv.org/abs/astro-ph/0505596

Long-term Variability in the Length of the Solar Cycle

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We have analyzed archival data of sunspot numbers from 1700 - 2005 and sunspot areas from 1874 - 2005 to derive the solar activity cycles based on these variables. This re-examination was motivated by the unexpectedly high level of solar activity during Solar Cycle 23 which occurred three years after the predicted cycle maximum. Two independent techniques were used in this analysis, namely power spectrum analysis and phase dispersion minimization. Our analyses confirmed the ~11-year Schwabe Cycle and the ~22-year Hale Cycle, and illustrated that the Schwabe Cycle is actually the average of a varying cycle which typically ranges from ~10 – 12 years. Archival data from 1610 - 1990 were used to identify long-term cycles from median trace analyses of the length of the sunspot cycle, and also from power spectrum analyses of the (O-C) residuals of the dates of sunspot minima and maxima. The median trace analysis suggests that the length of the sunspot cycle varies with a period of 183 - 243 years, while the power spectrum analysis identified a secular period of 188 ± 38 years. We found a correlation between the times of historic minima and the length of the sunspot cycle. In particular, the length of the sunspot cycle was usually highest when the actual number of sunspots was lowest. The existence of long-term solar cycles with periods of ~ 200 years is not new to the literature. However, our study of the variations in the length of the sunspot cycle is new and demonstrates that the 188-year cycle is a modulation of the Schwabe Cycle.

Submitted to ApJ

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The Influence of Internal Magnetic Layers on the Frequencies of Solar p-Modes

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Buried magnetic fields at the base of the convection zone and in the anchoring zones of sunspots are presumed to vary over the solar activity cycle. Their effect on p-mode oscillations is explored in detail, through theoretical modelling. The helioseismic signature from a 'tachocline' or 'shallow' horizontal layer of magnetic field, buried in a plane-stratified model of the Sun, is explored by examining frequency shifts of various order and degree. p-modes propagating perpendicular to the magnetic field lines are found to yield the largest frequency shifts. However, frequency shifts due to buried magnetic fields are considerably smaller than observationally determined shifts over the solar cycle. Nonetheless, an analytical approach to the problem provides useful insight for solar and stellar applications.

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Predicted Light Curves for a Model of Solar Eruptions

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We determine the thermal radiation generated by a loss-of-equilibrium model for coronal mass ejections (CMEs) and eruptive solar flares. The magnetic configuration of the model consists of an outward moving flux rope with a vertical current sheet below it. Reconnection at the sheet releases magnetic energy, some of which is converted into thermal energy that drives chromospheric evaporation along the newly connected field lines exiting the current sheet. The thermal energy release is calculated by assuming that all of the Poynting flux flowing into the reconnection region is eventually thermalized. We find that the fraction of the released magnetic energy that goes into thermal energy depends on the inflow Alfvén Mach number. The evolution of the temperatures and densities resulting from chromospheric evaporation are calculated using a simple evaporative cooling model. Using these temperatures and densities, we calculate simulated flare light curves for the *Transition Region and Coronal Explorer* (*TRACE*), the Soft X-ray Telescope (SXT) on the *Yohkoh* satellite and the *Geostationary Operational Environmental Satellite* (*GOES*). We find that when the background magnetic field strength is weak, the radiation emitted by the reconnected X-ray loops beneath a CME is faint. Additionally, it is possible to have two CMEs with nearly the same trajectories and speeds that have a significant difference in the peak intensities of their light curves. We also examine the relationship between the thermal energy release rate and the derivative of the soft X-ray light curve and discuss the implications for the Neupert effect.

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Ph.D. Thesis Abstracts

Oscillatory Phenomena in Solar and Stellar Atmospheres

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Ph.D degree awarded: May 2005

This thesis presents varying studies into the nature of intensity oscillations observed both on the Sun and two active cool stars. The first part concentrates on the detection of correlated oscillations occurring between differing heights in the solar atmosphere above quiet–Sun magnetic network bright points (NBPs), interpreted as signatures of energy propagation. This is achieved through correlating in time the wavelet power spectra of lightcurves from images obtained in several optical wavelengths. In four of the eleven NBPs studied, evidence is found for upwardly–propagating, low–frequency waves (1.4 mHz, 2.1 mHz) in the lower chromosphere, decreasing in oscillatory power with the onset, or increase in power, of higher–frequency waves (2.9 mHz, 4.0 mHz) within the upper chromosphere. Moving higher into the atmosphere two of the four cases of higher frequency waves also show a decrease in power. These observational detections are interpreted as transverse–mode magnetohydrodynamic (MHD) waves undergoing non–linear mode coupling to longitudinal–modes at double the frequency, which shock or otherwise dissipate in the high chromosphere. Evidence is also found for additional upward– and downward– directed waves within all the NBPs studied.

The extension of wavelet power techniques into the analysis of phase difference and phase coherence is also presented, utilising UV intensities obtained from above a weak solar network element. The problems associated with the quantification of phase coherence values are outlined and a comparison of two differing methods is carried out. Changes observed in the evolution of phase difference between oscillations detected in the UV emission of the temperature minimum and low transition region are shown to be due to the alteration of the underlying magnetic topology, occurring when same polarity flux emerges nearby.

The final part of this thesis concerns the differing situation of intensity variations during energetic flare phenomena on two active cool stars. Repeated fluctuations are analysed in broad–band optical flare emission from the RS CVn binary II Peg and the B component of binary star EQ Peg, yielding medium– (220 s) and short– (10 s) oscillation periods, respectively. These periods are discussed in terms of a simplified model of standing waves within a closed coronal loop. In both cases the observed decrease of oscillation period up to flare peak and subsequent increase during initial flare decay follows the inverse proportionality to loop temperature expected by the simple model.

Thesis-related Publications: Mathioudakis et al. 2003, A&A, 403, 1101; Bloomfield et al. 2004, ApJ, 604, 936; Bloomfield et al. 2004, ApJ, 617, 623; http://star.pst.qub.ac.uk/~sdb/publications.html

Upcoming Meeting

Living With a Star 1: A New Era in Understanding Our Space Environment

Please mark your calendars for LWS1/SOHO19, organized by the LWS/SDO science team, hosted by the High Altitude Observatory in Boulder, Colorado, 26-29 March 2007.

http://www.lws1.org or http://www.soho19.org

The launch of the first Living With a Star mission, the Solar Dynamics Observatory, is planned for 2008. That year also marks the 100th anniversary of the discovery of magnetic fields on the Sun, and the 50th anniversary of NASA. This new global solar observatory in space will mean a major change for solar and heliospheric physics, moving away from SOHO and TRACE towards a dramatically improved view of the Sun, from its deep interior to its high corona. The LWS1/SOHO19 science meeting, to be hosted by HAO in Boulder, Colorado, 26-29 March 2007, presents us with a unique opportunity to combine an overview of our understanding of solar magnetic activity with a vision for the future.

There will be a pre-cursor session to the LWS1/SOHO19 meeting during the SOHO17 meeting (the SOHO 10th anniversary) near Taormina, Sicily, 7 - 12 May, 2006. The SOHO17 web site will go live soon at http://www.soho17.org/.

Submitted by: Dr. C.J. Schrijver (schryver@lmsal.co)

Job Opening (Student Fellowships)

PhD Student Fellowships
Solar System Physics
Max Planck Inst.; Univ. of Braunschweig & Goettingen (Germany)

Fellowships for PhD Students in Solar System Physics

The *International Max Planck Research School on Physical Processes in the Solar System and Beyond* at the Max Planck Institute for Solar System Research in Katlenburg-Lindau, and the Universities of Braunschweig and Goettingen, Germany, offers excellent research possibilities for students to obtain a PhD degree in a 3-years graduate program.

The program covers the full range of physics inherent in the field of solar system science from geophysics and planetary science to solar physcis as well as the underlying fundamental physics. The science program is complemented by training in computational physics, space technology and project management.

High-profile space missions, outstanding projects for ground-based instruments and data analysis, as well as theoretical and extensive numerical modeling provide a wide range of research possibilities for PhD students.

Applications for the program are open to students from all countries. A prerequisite is a diploma or a master of science degree in physics or a related field, including a corresponding thesis.

The next PhD program will start in January 2006, review of application begins on 1 July 2005. Successful applicants will receive adequate financial support.

For details on the IMPRS program and the application procedure, please visit
http://www.solar-system-school.de or email to info@solar-system-school.de

Address applications to: Dr. Dieter Schmitt, Coordinator IMPRS Solar System School, Max Planck Institute for Solar System Research, Max-Planck-Str. 2 37191 Katlenburg-Lindau Germany

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web page: www.solar-system-school.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 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.***