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We present Doppler images of the young, late-type star, PZ Tel from spectroscopic observations at two epochs. The 0.95d period necessitated dual-site observations in order to obtain full phase coverage. The resulting maximum entropy reconstructions based on least-squares deconvolved profiles derived from $\sim$ 2800 photospheric absorption lines reveal the presence of starspots at all latitudes. By cross-correlation of constant-latitude strips from the images, we derive a measure of rotation as a function of latitude. Rate of surface shear is found to be in close agreement with the solar value. H α absorption transients reveal several prominences to be present at the time of observation. We also examine further evidence for the young evolutionary status of PZ Tel through radial velocity, and lithium abundance.

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Twin X-ray flares and the Active Corona of AB Dor Observed with BeppoSAX

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We present two X-ray observations of the young, active star AB Dor, performed with *Beppo*SAX on Nov 9 and Nov 29 1997, and lasting 50 ksec and 140 ksec, respectively. Two, quite similar, large flares occurred during these observations,

characterized by a 100-fold increase of the X-ray flux, peak temperatures of about 10^8 K, and peak emission measures of $\sim 5 \times 10^{54}$ cm^{-3}.

We have performed a detailed, time-resolved analysis of the LECS and MECS X-ray spectra during the flares, and also in the subsequent quiescent phases. We have derived a metal abundance of the coronal plasma about half the photospheric one, with no significant increase during the flaring events. However, abundance variations of less than a factor ~ 3 cannot be excluded, within our statistical uncertainties. The exponential decay of the X-ray light curves, and the time evolution of plasma temperature and emission measure are similar to those observed in compact solar flares. The analysis of the flare decay, following the method of Reale et al. (1997), indicates the presence of sustained heating, and yields coronal loop maximum heights smaller than (but comparable with) the stellar radius, in both cases. The flares occurred at different rotation phases, and in one case, the decay was observed for one entire rotation period with no evidence of self-eclipse by the star. We conclude that the flaring loops may be located in the circumpolar region of AB Dor, but they do not appear to be related in any way with the large magnetic structures which sustain the well-known prominences of AB Dor, at several stellar radii above the surface.

During the quiescent phase, lasting two rotation periods after the second flare, we have found evidence of significant low-level variability but no indication of rotational modulation. This variability, together with the high plasma temperature (~ 25 MK) and large emission measure ($\sim 10^{53}$ cm^{-3}), are interpreted in the framework of a saturated corona.

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ROSAT HRI Survey of the Open Cluster Stock 2

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We have obtained two deep HRI observations toward the open cluster Stock 2 in order to assess the X-ray luminosity level of the 112 high-probability cluster members falling in the area we have surveyed. Members have been selected on the basis of the result of a recent proper motion study based on the same photographic material and the same reduction scheme as the GSC-II project. We have reached a limiting sensitivity of $L_X \sim 3\ 10^{29}$ erg/sec for Stock 2 members and have detected 19 X-ray sources. The attained limiting sensitivity has prevented a complete sampling of the coronal emission level of Stock 2, and we have detected only three solar-type and one B9V members. We have derived the X-ray luminosity function for the Stock 2 stars in the $0.43 < (B\text{-}V)_o < 0.8$ color range and have compared it with the X-ray luminosity functions of the dG members of Praesepe, Hyades and Pleiades open clusters. While the limiting sensitivity of our observations and the present uncertainties in Stock 2 and other cluster distances do not allow to derive firm conclusion, yet, our data indicate that the coronal emission level of Stock 2 solar-type stars is more similar to that of the Hyades (or the Praesepe) than to the Pleiades one.

This in turn suggests that either Stock 2 is older than previously reported or that the current age-rotation-activity paradigm need to be revised. In this latter case Stock 2 would likely belong to the small group of open clusters (Praesepe, NGC6333 and IC 4675) for which recent X-ray surveys indicate a more complex age-rotation-activity relation than currently thought.

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Evolution of Lithium in Solar–type Stars: Clues from Intermediate Age Clusters

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We present Li abundances for 14 solar–type stars in the intermediate age (~ 2 Gyr) clusters IC 4651 and NGC 3680. The log n(Li) vs. effective temperature distributions are compared with those of the similar age cluster NGC 752, of the younger Hyades (600 Myr) and of the older M 67 (4.5 Gyr) and NGC 188 (6–7 Gyr) clusters. Neither IC 4651 nor NGC 3680 show the dispersion in Li which is observed in M 67. The 2 Gyr clusters have very similar Li vs. $T_{\rm eff}$ distributions; in addition, stars in the upper envelope of the M 67 distribution have the same Li content as stars in the 2 Gyr clusters, suggesting that either they have not suffered any significant depletion between ~ 2 and 4.5 Gyr or they had a much slower Li depletion. Mechanisms that lead to Li depletion on the main sequence are discussed in the light of these observations. None of the existing models seem to reproduce well the observed features.

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71 Tauri: Hyades Enigma Resolved?

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71 Tauri (HD 28052; F0 IV-V) is an enigmatic object for two reasons: (i) it is the second brightest X-ray source in the Hyades, yet early-F stars as a rule are not strong coronal emitters; and (ii) it lies a magnitude above the cluster main sequence, but radial velocity studies and speckle imaging suggest that it is single. Recently, long-slit ultraviolet spectra of the star, obtained with the Space Telescope Imaging Spectrograph (STIS), serendipitously have revealed the presence of a stellar companion at a distance of $0\farcs1$ directly south of the primary. The companion is seen only in its far-UV chromospheric emission lines. The nature of this object cannot be determined from our STIS spectra alone, but its high emission levels are most readily explained if it is a close binary of coronally active dG/dK stars. The presence of the secondary can account for the striking X-ray properties of 71 Tau, but not its unusual location in the cluster color-magnitude diagram. It is conceivable that the primary itself is a close double of nearly equal stars, making 71 Tau a possible quadruple system. The alternative — that 71 Tau is ~ 150 Myr older than other members of the Hyades, approaching the end of core hydrogen burning for a $2\,M_\odot$ star — would challenge the presumed synchrony of star formation in the cluster.

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A *ROSAT* HRI Study of the Open Cluster NGC 3532

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NGC 3532 is a very rich southern open cluster of age $\sim 200-350$ Myr; it is therefore a good candidate to investigate the X-ray activity–age–rotation relationship at ages intermediate between the Pleiades and the Hyades, where, to our knowledge, X-rays studies exist for only one cluster (NGC 6475). We have performed an X-ray study of NGC 3532 using HRI observations retrieved from the *ROSAT* archive. The observations have a limiting sensitivity $L_{\rm x} \sim 4\times10^{28}$ erg sec^{-1} in the center of the field. We detected ~ 50 X-ray sources above a 4σ threshold, half of which have a known optical counterpart within 10 arcsec; 15 of the X-ray sources have at least one cluster member as optical counterpart.

A comparison of NGC 3532 with the nearly coeval cluster NGC 6475 indicates that the former cluster is considerably X-ray underluminous with respect to NGC 6475. However, because of the existence of possible selection effects, additional X-ray and optical observations are needed before definitively concluding that the X-ray properties of NGC 3532 and NGC 6475 are significantly different.

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Molecular Abundances in the Atmosphere of the T Dwarf Gl 229B

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We present new, high resolution, infrared spectra of the T dwarf Gliese 229B in the J, H, and K bandpasses. We analyze each of these as well as previously published spectra to determine its metallicity and the abundances of NH_3 and CO in terms of the surface gravity of Gl 229B, which remains poorly constrained. The metallicity increases with increasing gravity and is below the solar value unless Gl 229B is a high-gravity brown dwarf with $\log g\,(\mathrm{cgs}) \approx 5.5$. The NH_3 abundance is determined from both the H and the K band spectra which probe two different levels in the atmosphere. We find that the abundance from the K band data is well below that expected from chemical equilibrium, which we interpret as strong evidence for dynamical transport of NH_3 in the atmosphere. This is consistent with the previous detection of CO and provides additional constraints on the dynamics of the atmosphere of this T dwarf.

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Circumstellar Dust Shells Around Long-period Variables VII. The Role of Molecular Opacities

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The role of molecular opacities for the structure and dynamics of winds of carbon-rich AGB stars is investigated in the frame work of time-dependent hydrodynamic models of dust forming circumstellar shells around cool pulsating stars. New Rosseland and Planck mean gas opacity tables have been calculated for $T\,\epsilon$ [500K, 10 000K] and $n_{<\mathrm{H}>}\,\epsilon$ $[10^5\mathrm{cm}^{-3}, 10^{15}\mathrm{cm}^{-3}]$ for solar, LMC and SMC abundances. Carbon-rich, static and time-dependent models have been computed using either the Planck mean or the Rosseland mean for solar and LMC metalicity or a constant gas opacity ($\chi^{\mathrm{g}} = 2 \cdot 10^{-4}\mathrm{cm}^2\mathrm{g}^{-1}$, Bowen 1988). In the model calculations, a large gas opacity (Planck mean) generally causes a less dense atmosphere than a small gas opacity (Rosseland mean, constant gas opacity) which leads to smaller amounts of dust formed, and consequently to smaller mass loss rates $\langle\dot{M}\rangle$, lower terminal wind velocities $\langle v_\infty\rangle$ and lower dust-to-gas ratios $\langle\rho_{\mathrm{dust}}/\rho_{\mathrm{gas}}\rangle$. Models with lower metalicity (LMC) form by far the smallest amount of dust and show therefore the lowest $\langle\dot{M}\rangle$, $\langle v_\infty\rangle$, and $\langle\rho_{\mathrm{dust}}/\rho_{\mathrm{gas}}\rangle$. Counteracting to the global density reduction due to strong gas absorption, the density might LOCALLY increase due to a pressure inversion. These pressure inversions are preserved even in the hydrodynamic models where the atmosphere is disturbed by the propagation of shock waves. Due to the present determination of the temperature structure by grey opacities in the time-dependent models, the occurrence of pressure inversions deserves, however, further investigations by means of a more elaborate treatment of the radiative transfer in dynamic model atmospheres.

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Surface Differential Rotation and Prominences of the Lupus Post T Tauri Star RX J1508.6–4423

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We present in this paper a spectroscopic monitoring of the Lupus post T Tauri star RX J1508.6–4423 carried out at two closely separated epochs (1998 May 06 & 10) with the UCL Echelle Spectrograph on the 3.9 m Anglo-Australian Telescope. Applying least-squares deconvolution and maximum entropy image reconstruction techniques to our sets of spectra, we demonstrate that this star features on its surface a large cool polar cap with several appendages extending to lower latitudes, as well as one spot close to the equator. The images reconstructed at both epochs are in good overall agreement, except for a photospheric shear that we interpret in terms of latitudinal differential rotation. Given the spot distribution at the epoch of our observations, differential rotation could only be investigated between latitude 15° and 60°. We find in particular that the observed differential rotation is compatible with a solar-like law (i.e. with rotation rate decreasing towards high latitudes proportionally to $\sin^2 l$ where l denotes the latitude) in this particular latitude range. Assuming that such a law can be extrapolated to all latitudes, we obtain that the equator of RX J1508.6–4423 does one more rotational cycle than the pole every 50 ± 10 d, implying a photospheric shear 2 to 3 times stronger than that of the Sun.

We also discover that the Hα emission profile of RX J1508.6–4423 is most of the time double peaked and strongly modulated with the rotation period of the star. We interpret this rotationally modulated emission to be due to a dense and complex prominence system whose circumstellar distribution is obtained through maximum entropy Doppler tomography. These maps show in particular that prominences form a complete and inhomogeneous ring around the star, just outside the corotation radius. We use the total Hα and Hβ emission flux to estimate that the mass of the whole prominence system is about 10^{20} g. From our observation that the whole cloud system surrounding the star is regenerated in less than 4 d, we conclude that the braking timescale of RX J1508.6–4423 is shorter than 1 Gyr and that prominence expulsion is thus likely to contribute significantly to the rotational spindown of young low-mass stars.

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Seismic Study of Stellar Convective Regions: The Base of the Convective Envelope in Low-mass Stars

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The possibility of observing solar-type oscillations on other stars is of great relevance to investigating the uncertain aspects of the stars' internal structure. One of these aspects is convective overshoot that takes place at the borders of the envelopes of stars of mass similar to, or lower than, the Sun. It affects the temperature stratification, mixing, rotation and magnetic-field generation. Asteroseismology can provide an observational test for the studies of the structure of such overshoot regions.

The seismic study of the transition in the Sun, located at the base of the convection zone, has been successful in determining the characteristics of this layer in the Sun. In this work we consider the extension of the analysis to other solar-type stars (of mass between 0.85 and 1.2 solar masses) in order to establish a method for determining the characteristics of their convective envelopes. In particular, we hope to be able to establish seismologically that a star does indeed possess a convective envelope, to measure the size of the convective region and also to constrain the properties of an overshoot layer at the bottom of the envelope. The limitations in terms of observational uncertainties and stellar characteristics, and the detectability of an overshoot layer, are discussed.

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Rosat HRI Observations of the Open Cluster NGC 2516

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We present ROSAT HRI observations of NGC 2516, a young southern open cluster with low metallicity. We detect 73 X-ray sources already detected with the PSPC and 12 new X-ray sources. The higher HRI spatial resolution allows us to improve the position of the previous known sources, and to better determine the optical counterparts of X-ray sources with respect to the PSPC data.

We find 28 sources with no catalogued counterparts, most with faint objects within their X-ray positional error circle. Multiband CCD photometry of these possible counterparts shows that about half of them are consistent with being dK and dM cluster members. Assuming that they are true NGC 2516 members, the derived X-ray luminosity is consistent with that observed in dK and dM stars in more metal-rich open clusters of similar age, suggesting that the activity level at which X-ray saturation occurs is insensitive to a change of a factor two in stellar metallicity.

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Building Reliable Models of M dwarf Chromospheres: the Spectral Diagnostics

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As part of an ongoing project to study how reliable are the chromospheric models constructed semiempirically to fit the chromospheric spectrum of cold stars, in this paper we study how changes in the assumed chromospheric structure of a dM and a dMe stars affect the emitted spectrum. In this way, we study if a given set of features can wholly determine the atmospheric structure, how large are the indeterminations in the atmospheric parameters deduced, and to what extent the atmospheric model computed can be considered unique. We find that the profiles of the Ca II K line or the Na D lines can be used to determine the structure of the T_{min} region, and the H_α profile can provide good information on the structure of the chromosphere. The Ly-α flux, in turn, can be used to constrain the position of the transition region.

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Orbital Period Variation in Close Binaries from radial Velocity Data and Magnetic Activity Cycles I. AR Lacertae: The Test Case

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We check the possibility of detecting orbital period changes in non-eclipsing close binaries by means of spectroscopic orbit determinations. In order to test our method, we selected the eclipsing binary AR Lacertae for which the spectroscopically determined epochs of superior conjuctions can be compared with those provided by the light minima photometry. It is found that intermediate-resolution spectroscopy and IUE archive spectra can be used to build radial-velocity curves which allow us to estimate the epoch of superior conjunction T_0 with an uncertainty of 0.01 days. We present the data-reduction procedure and the method of analysis, based on fitting a sinusoid to the radial-velocity curve, discussing the accuracy of T_0-value determinations and the possible sources of errors, notably those related to surface inhomogeneities, such as spots and faculae. The possibility of testing the hypothesis of a light-time effect for

the orbital period modulation is also addressed by means of radial-velocity measurements.

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X-Ray Emission of the Late-Type Stars: Comparison with X-ray Novae in Quiescence

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A problem of the origin of the quiescent X-ray emission of low-mass X-ray binaries containing a black hole (BH-LMXB) is considered. An analysis of properties of the X-ray radiation of late-type dwarfs and subgiants is carried out. For late-type dwarfs with axial rotation velocities about of 100 km/s, which are observed for optical components of the X-ray novae with a black hole, we show that the hot plasma in stellar coronae can be kept in isolated coronal loops by weak enough magnetic fields. The quiescent soft X-ray emission of BH-LMXBs with the optical companion–red dwarf star, $\leq 10^{31}$ erg/s, can be associated with radiation of their solar-like coronae. Two of such binaries with subgiants as an optical component (V1033 Sco and V404 Cyg) are characterized by the higher X-ray luminosities ($2 \cdot 10^{32} - 2 \cdot 10^{33}$ erg/s), and in this case the X-rays from the solar-like corona is unable to provide such X-ray luminosities. However, coronae of fast rotating late-type subgiants can be transformed into non-solar type, dynamic coronae, and their X-ray emission can be in 1–2 order of magnitudes higher than it is observed from slow rotating late-type subgiants of the solar neightbourhood. It is believed that the X-rays of these two BH-LMXBs in quiescence can be also caused by coronal emission of the optical companion–late-type subgiant.

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On Stellar Activity Enhancement Due to Interactions with Extra-Solar Giant Planets

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We present a first attempt to identify and quantify possible interactions between recently discovered extra-solar giant planets (and brown dwarfs) and their host stars, resulting in activity enhancement in the stellar outer atmospheres. Many extra-solar planets have masses comparable to or larger than Jupiter and are within a distance of 0.5 AU, suggesting the possibility of their significant influence on stellar winds, coronae and even chromospheres. Beyond the well-known rotational synchronization, the interactions include tidal effects (where enhanced flows and turbulence in the tidal bulge leads to increased magneto-acoustic heating and dynamo action) and direct magnetic interaction between the stellar and planetary magnetic fields. We discuss relevant parameters for selected systems, and give preliminary estimates of the relative interaction strengths.

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A Survey for Low-mass Stars and Brown Dwarfs in the Upper-Scorpius OB Association

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The Upper-Scorpius association is the OB association nearest to the Sun (145 pc). Its young age (~5 Myr) makes it an ideal place to search for low-mass stars and brown dwarfs, as these objects should be relatively bright. We have performed a photometric search for the low-mass members of the association, using the R, I, and Z filters. The completeness limit is $I \sim 18.5$ and the saturation limit is $I \sim 13$. We obtain 138 candidate members, covering nearly

the entire M spectral type range. We find an excess of brown dwarf candidates over the number predicted by a Miller-Scalo Initial Mass Function. In addition, we have performed infrared imaging and low resolution optical spectroscopy of selected candidates. We find that the infrared observations confirm the spectral types obtained with the optical photometry. Furthermore, we find Hα in emission in 20 of the 22 objects observed spectroscopically. As Hα is an indicator of youth, we believe that these 20 objects may belong to the association. One of them, UScoCTIO 128 has a very strong and constant Hα line (equivalent width: -130 Å), and its position in the color magnitude diagram suggests that it is a brown dwarf with mass equal to 0.02 $M_\odot$. Confirmation of this and the other candidates will have to wait for higher resolution observations that can reveal spectroscopic mass indicators like Li I and gravity indicators, such as K I and the subordinate lines of Na I.

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A Multi-wavelength Study of Pre-main Sequence Stars in the Taurus-Auriga Star-Forming Region

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Although many lowmass pre-main sequence stars are strong X-ray sources, the origin of the X-ray emission is not well known. Since these objects are variable at all frequencies, simultaneous observations in X-rays and in other wavelengths are able to constrain the properties of the X-ray emitting regions. In this paper, we report quasi-simultaneous observations in X-rays, the optical, and the radio regime for classical and weak-line T Tauri stars from the Taurus-Auriga star-forming region. We find that all detected T Tauri stars show significant night-to-night variations of the X-ray emission. For three of the stars, FM Tau and CW Tau, both classical T Tauri stars, and V773 Tau, a weak-line T Tauri star, the variations are especially large. From observations taken simultaneously, we also find that there is some correspondence between the strength of Hα and the X-ray brightness in V773 Tau. The lack of a strong correlation leads us to conclude that the X-ray emission of V773 Tau is not a superposition of flares. However, we suggest that a weak correlation occurs because chromospherically active regions and regions of strong X-ray emission are generally related. V773 Tau was detected at 8.46 GHz as a weakly circularly polarised but highly variable source. We also find that the X-ray emission and the equivalent width of Hα remained unchanged, while large variations of the flux density in the radio regime were observed. This clearly indicates that the emitting regions are different. Using optical spectroscopy we detected a flare in Hα and event which showed a flare-like light-curve of the continuum brightness in FM Tau. However, ROSAT did not observe the field at the times of these flares. Nevertheless, an interesting X-ray event was observed in V773 Tau, during which the flux increased for about 8 hours and then decreased back to the same level in 5 hours. We interpret this as a long-duration event similar to those seen on the sun and other active stars. In the course of the observations, we discovered a new weak-line T Tauri star, GSC-1839-5674. Results are also presented for several other stars in the ROSAT field.

Accepted by A&A

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For preprints via ftp or WWW: http://www.tls-tautenburg.de/research/tls-research/pub00.html

Editor's Note: The above abstract has also been submitted to the *Star Formation Newsletter*.

Solar Abstracts

Solar Transition Region Line Broadening: Limb to Limb measurements

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Full disk images from SUMER/SoHO taken in He I, C IV and Ne VIII are used to investigate whether there exists a center-to-limb variation in the line width. Both C IV and He I show such a variation but the higher temperature Ne VIII line is relatively constant. For C IV, this corresponds to $\sim$ 3 km s^{-1} difference while He I is significantly larger particularly at the limb. This work may suggest that the non-thermal motions are slightly non-isotropic in the transition region and upper chromosphere, with the horizontal unresolved motions exceeding those in the vertical plane however a more probable explanation is that the lines are broadened due to opacity effects. The more slower variation in the C IV 1548 Å line width could be explained by increasing the opacity from zero at disk center to $\sim$1 at the limb. For He I the opacity is significantly grater than unity at the limb. This therefore implying all mass motions in the chromosphere, transition region and corona are isotropic.

Accepted by A&A

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What Can We Learn about Reconnection from Coronal Mass Ejections?

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It may be possible to calculate the rate of reconnection in the corona by measuring the rate at which the temporary coronal hole formed by a coronal mass ejection (CME) disappears. This calculation is possible if the disappearance of the hole is caused by the same reconnection process which creates the giant X-ray arches associated with CMEs. These arches form just below the vertical current sheet that is created as the CME drags magnetic field lines out into interplanetary space, and they are similar in form to post-flare loops, except that they often have an upward motion that is different. Instead of continually slowing with time as post-flare loops do, they move upwards at a rate which increases, or remains nearly constant, with time. This difference has raised doubts about the relevance of reconnection to the formation and propagation of the arches. Using a two-dimensional flux rope model to calculate the size and location of the current sheet as a function of time, we find that the difference between the motion of post-flare loops and giant arches can be explained simply by the variation of the coronal Alfvén speed with height.

Accepted by the Journal of Atmospheric and Solar-Terrestrial Physics

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Stochastic Fluctuations in a Babcock-Leighton Model of the Solar Cycle

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We investigate the effect of stochastic fluctuations on a flux transport model of the solar cycle based on the Babcock-Leighton mechanism. Specifically, we make use of our recent flux transport model (Dikpati & Charbonneau 1999, ApJ, 518, 508) to investigate the consequences of introducing large amplitude stochastic fluctuations in either or both the meridional flow and poloidal source term in the model. Solar cycle-like oscillatory behavior persists even for fluctuation amplitudes as high as 300%, thus demonstrating the inherent robustness of this class of solar cycle models. We also find that high amplitude fluctuations lead to a spread of cycle amplitude and duration showing a statistically significant anticorrelation, comparable to that observed in sunspot data. This is a feature of the solar cycle that is notoriously difficult to reproduce with dynamo models based on mean-field electrodynamics and only relying on various nonlinearities associated with the backreaction of the Lorentz force to produce amplitude modulation.

Another noteworthy aspect of our flux transport model is the fact that meridional circulation in the solar convective envelope acts as a "clock" regulating the tempo of the solar cycle; shorter-than-average cycles are typically soon followed by longer-than-average cycles. In other words, the oscillation exhibits good phase locking, a property that also characterizes the solar activity cycle. This shows up quite clearly in our model, but we argue that it is in fact a generic property of flux transport models based on the Babcock-Leighton mechanism.

Submitted to ApJ

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Network and Internetwork: A Compared Multiwavelength Analysis

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We analyze the temporal behavior of Network Bright Points (NBPs) using a set of data acquired during coordinated observations between ground-based observatories (mainly at the NSO/Sacramento Peak) and the Michelson Doppler Interferometer onboard SOHO.

We find that, at any time during the observational sequence, all the NBPs visible in the NaD_2 images are co-spatial within $1''$ with locations of enhanced magnetic field. The "excess" of NaD_2 intensity in NBPs, i.e. the emission over the average value of quiet regions, is directly related to the magnetic flux density. This property implies that, in analogy with the Ca II K line, the NaD_2 line center emission can be used as a proxy for magnetic structures.

We also compare the oscillation properties of NBPs and internetwork areas. At photospheric levels no differences between the two structures are found in power spectra, but analysis of phase and coherence spectra suggests the presence of downward propagating waves in the internetwork. At chromospheric levels some differences are evident in the power spectrum between NBPs and internetwork. At levels contributing to the NaD_2 emission the NBPs show a strongly reduced amplitude of oscillations at the p - mode frequencies. At levels contributing to the $H\alpha$ core emission, the amplitude of network oscillations is higher than the internetwork ones. The power spectrum of NBPs at this wavelength shows an important peak at 2.2 mHz (7 minutes), not present in the internetwork areas. Its coherence spectrum with $H\alpha$ wings shows very low coherence at this frequency, implying that the oscillations at these chromospheric levels are not directly coupled with those present in lower layers.

Accepted by A&A

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Ph.D. Thesis Abstract

Semi-empirical NLTE Chromospheric Models of the Binary System V 711 Tau = HR 1099

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Ph.D dissertation directed by: Prof. Marcello Rodonò and Dr. Alessandro Lanzafame

Ph.D degree awarded: February 3rd 2000

I used the diagnostic power of Hα and Mg II h resonance lines in order to explore the nature of the chromospheric emission of the RSCVn-type binary system V 711 Tau (K1 IV + G5 V). Hα and Mg II lines play, infact, an unique role in the study of the chromospheric structure being very efficient diagnostics of the chromospheric physical conditions in cool stars as shown by several authors (see for example Cram & Giampapa 1987).

In particular I performed an extensive semi-empirical modelling of Hα and Mg II h lines by means of NLTE radiative transfer calculation using version 2.2 of the code MULTI (Carlsson 1986).

Chromospheric mean models are built by means of spline interpolation between a photospheric *Next-Generation* model and an Emission-Measure-constrained transition region (TR) model.

Two-component modelling is a further refinement in which the Busà et al. (1999) chromospheric Doppler Imaging is used to consider the chromospheric emission as due to two different components of known surface coverage and emission. Following Busà et al. (1999), the observed transition region Emission Measure is attributed as due to the G5 V star for 5% of the total and the remaining 95% as due to the K1 IV star. Of this latter, 30% is attributed to the active region (broad component) and 70% to the quiescent background (narrow component). Taking into account the upper limit for the active region filling factor (≈15%) I derived the br-TR and na-TR models. Chromospheric models are then built separately for the narrow and the broad components using the smooth interpolation between the temperature minimum and the base of the transition regions described above.

Comparison of the synthetic $H\alpha$ and Mg II h profiles with the observed spectra shows that no mean model is able to reproduce both the observed profiles and Hα continuum. On the other hand, the two-component synthetic line profiles reproduce the observed Hα and Mg II h and the continuum emission in the Hα region in detail.

The analysis of the broad and narrow models which best reproduce the observations give informations on the physical properties of the active region with respect to the quiescent background. I find that the active area has a chromospheric temperature and a transition region pressure higher with respect to the quiescent background implying that the broad component derives from a higher level of chromospheric heating in such localised area. Furthermore, I show that activity variability can be reproduced considering slightly different models for the active region.

This analysis indicates that the "broad" and "narrow" components that characterise the upper atmospheric emission of the binary system, as recently found by several authors (see for example Wood et al. 1996) can be interpreted in terms of radiative transfer effects in different atmospheric structures for the active and quiet regions.

Thesis-related Publications: A&A, 350, 571

ANNOUNCEMENT

2MASS Data Release

The Two Micron All Sky Survey (2MASS) Second Incremental Data Release is now available for public access. This Release includes data from the northern and southern 2MASS facilities, covering 47% of the sky. The Release data products consist of a Point Source Catalog containing positions and photometry for over 162 million objects, an Extended Source Catalog containing positions, photometry and basic shape information for over 585,000 resolved sources, approximately 1.9 million compressed 512x1024 pixel (1"/pixel) images in the three Survey bandpasses, and non-compressed "postage-stamp" images for all of the Extended Source Catalog objects.

The release data products can be accessed on-line from the IPAC/2MASS Web site at

http://www.ipac.caltech.edu/2mass/

or directly from the NASA/Infrared Science Archive site at

http://irsa.ipac.caltech.edu/.

In the near future, the release Catalogs will be available via ftp download, and on a limited distribution DVD-ROM. Access to the 2MASS Atlas Images is currently possible only via the on-line services.

The 2MASS/IPAC webpage contains general information about this data release, including an on-line Explanatory Supplement

http://www.ipac.caltech.edu/2mass/releases/second/doc/explsup.html ,

sky coverage maps, images of interesting objects in the release, catalog characteristics, etc. A tool for determining whether a specified position is included in the release area is available on the NASA/Infrared Science Archive webpage. Questions about the release can be directed to the 2MASS Help Desk at 2mass@ipac.caltech.edu.

We encourage you to notify us (at 2mass@ipac.caltech.edu) about any refereed publications or conference proceedings (even in preprint form) which make use of these or earlier 2MASS Release data products. We will gladly provide links to your papers from the 2MASS website. Thank you very much in advance.

The 2MASS Project

The Two Micron All Sky Survey is a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center/California Institute of Technology. Funding for the survey has been provided by the National Aeronautics and Space Administration and the National Science Foundation.

UPCOMING MEETING

Ultracool Dwarf Stars – Surveys, Properties and Spectral Classification

IAU General Assembly (IAU Commissions 29 and 45)

Manchester, UK

12 August 2000 (full day)

We invite you to a one day meeting on ultracool dwarf stars to be held on 12 August 2000 during the IAU General Assembly in Manchester. The meeting will consist of four sessions of 90 mins. Surveys for brown dwarfs will be allotted two sessions. Properties and spectral classification will be allotted one session each. This is a very active field so in order to represent the wide spectrum of research taking place we envisage that the sessions will consist of a number of short presentations followed by a discussion period. The spirit of these sessions is intended to allow for frequent input from the audience. All contributions will be published in a special proceedings volume. We invite all interested researchers to submit abstracts for oral presentation or as a poster to

ultra@astro.livjm.ac.uk.

The deadline for abstracts for talks or posters is 1 June 2000.

Further information about the meeting is available from

http://www.livjm.ac.uk/astro/ultra/

Organising Committee – Michele Gerbaldi, Hugh Jones and Iain Steele

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), brown dwarfs, 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 .`