COOLNEWS

A RESEARCH NEWSLETTER DEDICATED TO COOL STARS AND THE SUN

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We present the first Doppler images of the single G1.5V-star EK Draconis from high-resolution CFHT spectra obtained in 1995. EK Dra is an important target for investigating the evolution of stellar magnetism because it resembles the rapidly-rotating young Sun. From the inversion of a total of 12 spectral lines we reconstruct several cool spots at low and medium latitudes but the dominating feature is located consistently at a latitude of ≈70–80 degrees, thus at far higher latitudes than where our Sun shows spots. In fact, our data indicate that this feature could be an appendage of a larger polar cap-like spot as seen on other rapidly-rotating stars, however, due to the small $v \sin i$ of just 17.3±0.4 km/s, the cap's existence remains inconclusive. Spot temperatures between ΔT ≈1200 K and 400 K are recovered. We have used the non-parametrized convective-flux description of Canuto & Mazzitelli for our input model atmospheres and found good agreement with local line profiles computed from standard mixing-length atmospheres.

New phase-resolved $UBVRI$ data spanning the 1996/97 observing season indicate a surprisingly short photometric period of 2.599±0.001 days, which is different by 7% from the longest seasonal period found so far but in good agreement with the long-term photometric period of 2.605 days. We interpret these differences as being due to differential surface rotation and adopt the long-term photometric period to be the rotation period of EK Dra. Our data also confirms the continuing decline of the mean brightness seen since 1994 and we suspect the high-latitude feature to be the cause.

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Doppler Imaging of Stellar Surface Structure. V. The Long-period RS CVn binary HD 81410 = IL Hydrae

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Multiwavelength Doppler images of the long-period RS CVn binary IL Hydrae from March 1994 and Feb.-March 1995 reveal a cool polar spot and several features at low latitudes. Their average temperature is approximately 500 K below the photospheric temperature of 4700 K. Due to the relatively small rotational velocity of 26.5±1 km/s and the relatively cool, low-gravity atmosphere with many weak absorption blends, Doppler imaging of IL Hydrae is challenging but resulted in encouragingly similar maps from altogether seven spectral regions near 6400 Å.

Latitude-dependent differential rotation is detected from our Doppler maps and indicates faster rotation at the stellar equator as compared to the polar regions. Lines from the secondary component are sometimes seen in our red-wavelength spectra and a double-lined spectroscopic orbit is presented. We also give a more precise rotational period from three consecutive years of V-band photometry. A spectral classification of K0III-IV and a mass of 2.2±0.2 $M_\odot$ for the primary, and mid to late F main sequence or maybe ≈G0V-IV and a mass of 1.3±0.2 $M_\odot$ for the secondary, are suggested.

Hα equivalent widths measured over a single rotation cycle exhibit a sinusoidal variation in phase with the photospheric V-band light curve. The maximum of the residual Hα emission coincides with the lightcurve minimum and is thus likely linked to the starspot-covered stellar surface. A steady, redshifted absorption component possibly indicates an isotropic inward flow at the Hα line-forming region at approximately 60 km/s.

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Mg II h&k Line Diagnostics of IM Peg

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We have analysed the Mg II h&k resonance lines of IM Peg (KII-III) on 14 high resolution IUE LWR spectra and compared the results coming from visual spectroscopic and $UBV(RI)_C$ photometric data. The 'clean' spectra (free from interstellar absorption) were modelled using a convolution of the rotational profile with a Gaussian profile, that represents macroturbulence and broadenings of other origin, the former dominating.

Significant variations in the h&k line fluxes and widths were found throughout the orbital phase range. A line broadening effect is found at maximum spot visibility both in the k and h lines. The Mg II line widths increase linearly with the flux of the transition region lines as a function of rotational phase. Anticorrelations as a function of phase were found between the Mg II line fluxes and the higher temperature lines. The k line is broader than the h line, correlated with a slope greater than unity, in keeping with a greater radiation transfer effect in the k line, and a non-optically thin medium at all phases. We observe a systematic asymmetry in the ratio of the h to k line profiles at all phases. The spectral diagnostics thus suggest the appearance of a plage region on the stellar disc.

We obtained new orbital elements of the IM Peg system, deriving a small, but non-zero eccentricity.

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Chromospheric Modelling of the Hα and Na I D Lines in Seven M Dwarfs of Low to High Activity Level

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We have obtained simultaneous high resolution Hα and Na I D spectra of seven dwarf M stars that span a wide range in chromospheric activity level. The observed Na I D lines exhibit behavior that is qualitatively similar to that of more well established diagnostics such as the Ca II HK lines: as the activity level, as indicated by the Hα line, increases, the absorption core brightens and then develops an emission reversal. We compare the observed profiles with previously computed non-LTE profiles from a grid of chromospheric/transition region models. For dMe stars, the best fit chromospheric model that is inferred from the Na I D lines agrees closely to that which is inferred from the Hα line. By contrast, for low activity stars, the Na I D lines indicate a mass loading at the transition region that is an order of magnitude greater than that inferred from a fit to the Hα line. We also investigate the effect of including line blanketing opacity in the non-LTE calculation on the inferred best fit.

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Surface Inhomogeneities and Line Variability on DF Tau

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We have mapped surface inhomogeneities on the classical T Tauri star DF Tau, using the Li I doublet at 670.8 nm, the Ca I lines at 612.2 nm and 643.9 nm and a calcium and iron blend at 646.3 nm. We find compelling evidence that there are hot spots with temperatures of more than 5000 K. Two of the hot spots produce line-profile deformations that can be traced as they move through the cross-correlated profiles. When one of the hot spots crosses the stellar disk, red-shifted absorption components appear in the Na D lines. As these red-shifted absorption features are usually tracers for mass-infall we interpret this hot spot as an accretion shock close to the stellar surface.

Parts of the surface of DF Tau are covered with a hot chromosphere that is visible in the Ca II IR triplet lines and the narrow component of He I. We find no correlation between the veiling and the lines that originate from the hot chromosphere, suggesting that the veiling and the chromospheric emission are produced in physically distinct regions.

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Editor's Note: The above abstract has also been submitted to the *Star Formation Newsletter* and is being cross-listed here since it may be of interest to those studying surface features on active cool stars.

Chromospherically Active Stars. XVI. The Double-Lined Binary 42 Capricorni

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New spectroscopic observations of the chromospherically active binary 42 Capricorni have resulted in the detection of lines of the secondary, improved orbital elements, and the determination of fundamental properties of the components. 42 Cap has an orbital period of 13.174004 d, an eccentricity of 0.176, and a mass ratio A/B of 1.375. No evidence for a variation of the center-of-mass velocity, suggested by earlier investigators, has been found. Spectral types of the primary and secondary are G1 IV and G2 V, respectively. The V mag difference of 1.94 and HIPPARCOS parallax result in M_v=2.79 mag for A and M_v=4.73 mag for B. The spectral type of the secondary implies a mass of 1.37 solar masses for the primary and an orbital inclination of 30 deg. The primary has begun its evolution through the

Hertzsprung Gap and has a radius of 2.6 solar radii. Comparison with evolutionary tracks results in an age of about 3.7 Gyr for the system. The subgiant has a log lithium abundance of 2.36, indicating that it is not a lithium-dip star.

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Dissecting Capella's Corona – GHRS Spectra of the Fe XXI 1354 Å and He II 1640 Å Lines from Each of the Capella Stars

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We report on moderate ($\lambda/\Delta\lambda = 20,000$) and high ($\lambda/\Delta\lambda = 90,000$) resolution spectra of the 104 day period Capella binary system (HD 34029) obtained with HST's Goddard High Resolution Spectrometer (GHRS) on 1995 September 9 and 1996 April 9. The observations include a long-duration moderate resolution spectrum of the coronal Fe XXI 1354 Å line and both moderate and high resolution spectra of the He II 1640 Å multiplet.

Our objective in observing the Fe XXI line formed at $T = 1 \times 10^7$ K is to determine for the first time the line shape parameters and contribution of each star's corona. This is feasible because the GHRS can resolve the 53 km s^{-1} radial velocity separation of the stars. Our analysis led to four surprising results: (1) The contribution of the slowly-rotating G8 III star to the total Fe XXI 1354 Å flux is similar to that of the more active rapidly-rotating G1 III star, in contrast to other UV lines formed at lower temperatures. (2) The centroid velocities of the Fe XXI lines from both stars are near their respective photospheric radial velocities. Thus, there is no evidence for downflows or winds, and the hot coronal plasma must be confined, presumably by strong, closed magnetic fields. This is the first direct kinematic evidence for magnetic confinement in the corona of a giant star. (3) The line widths are thermal, indicating very low turbulence ($\xi < 23$ km s^{-1}) compared to the 54 km s^{-1} thermal speed. (4) Our analysis of EUVE spectra that include four Fe XXI lines shows that the volume emission measures of these lines are about a factor of 3 smaller than for the 1354 Å line, which was observed several months after the closest EUVE observation. We consider possible explanations for this discrepancy and conclude that variability of the high temperature coronal emission is the most likely explanation.

We observed the He II 1640 Å line twice with a time separation of 7 months, corresponding to about 2 orbital periods. The profiles are nearly identical, except for a large difference in flux near the expected radial velocity of the G8 III star. We believe that the broad He II emission produced by the G1 star is formed mostly by collisional excitation in its transition region, while the emission from the G8 star is produced predominantly by a photoionization/recombination process driven by EUV radiation from the G8 star's corona. The He II 1640 Å flux that we measure from the G8 star is consistent with predictions based on EUVE flux measurements. The decrease in the 1640 Å emission from the G8 star between the phase 0.73 and 0.78 measurements indicates that its EUV radiation is variable as is observed by EUVE.

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The Coronae of Moderate Mass Giants in the Hertzsprung Gap and the Clump

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We have used *ROSAT, EUVE,* and *HST* to measure X-ray and ultraviolet emissions of moderate mass ($\sim$2–3$M_\odot$) giants in the Hertzsprung gap (spectral types early F–mid G) and the post–helium-flash "clump" ($\sim$G8–K0). Our motivation was to document the evolution of hot coronae ($T > 10^6$ K) along the post–main-sequence trajectories travelled by such stars; to gain insight concerning the "X-ray deficiency" of the F–G0 giants, and the strong braking

of stellar rotation at the red edge of the Hertzsprung gap.

With few exceptions, Hertzsprung gap and clump giants observed by *ROSAT* PSPC show hot ($T \sim 10^7$ K) coronal energy distributions, regardless of any X-ray deficiency. *EUVE* spectra of gap star 31 Com (G0 III) indicate a broad coronal emission measure hump at $\sim 10^{7.2}$ K, while the active clump giant β Ceti (K0 III) displays a sharp peak at $\sim 10^{6.8}$ K, as seen previously in the mixed clump/gap binary Capella (α Aur; G8 III + G0 III). The gap giants υ Peg (F8 III) and 24 UMa (G4 III) have EUV emissions of intermediate temperature ($\sim 10^{7.0}$ K).

31 Com, ψ^3 Psc (G0 III), and β Cet exhibit redshifted transition zone (TZ; $\sim 10^5$ K) lines in *HST* GHRS spectra, as reported earlier in Procyon (α CMi; F5 IV-V) and Capella G0. Such redshifts on the Sun are thought to signify flows in magnetic loops. β Cas (F2 III)—a rare soft coronal source among the gap stars—displays blueshifts of C IV and O IV], although emissions at cooler and hotter temperatures are near the photospheric velocity. The remarkably broad line profiles of the fastest rotating gap giants suggest that the 10^5 K "subcoronal" emission zones extend to $h \sim R_\star$, about fifty scale heights.

In contrast to the TZ line redshifts, the upper chromospheric emissions (e.g., Mg II and Si III) of 31 Com and ψ^3 Psc have blueshifted cores. Blue-asymmetric peaks in the solar Mg II lines are thought to indicate dynamical heating in the chromosphere. Observations of the H I Lyα feature of 31 Com taken nine months apart reveal striking profile changes, reminiscent of those noted previously in the Lyα blue peak of the Capella G0 star.

We used the far-ultraviolet diagnostics, in combination with *ROSAT* X-ray photometry and *EUVE* high-excitation line strengths, to constrain physical models of the stellar outer atmospheres. Quasistatic magnetic loops can simulate the empirical coronal emission measures of the giant stars, but the inferred pressures for sensible loop lengths conflict with direct measurements of subcoronal densities. Furthermore, the high rate of emission at $\sim 10^5$ K cannot be explained by thermal conduction down the legs of hot quasistatic loops.

On the other hand, the possible existence of elongated ($l \sim R_\star$) emission structures on the gap giants leads to a speculative scenario to explain the X-ray deficiency. It is based on the increased importance of the dynamical filling phase ("explosive evaporation") of the loop lifecycle; conductive cooling, yielding TZ emissions at the footpoints, when the heating is interrupted; and the possibility for transitions between "hot" and "cool" energy balance solutions owing to dynamical suspension and centrifugal trapping of the cooling gas. The long loops might represent a vestigial global "magnetosphere" inherited from the MS phase, which ultimately is disrupted near $\sim$G0 by the deepening convective envelope and growth of a more solar-like dynamo. Coronal emissions might be boosted temporarily as the X-ray deficiency is removed, but soon would be quenched by wind braking previously inhibited by the magnetospheric "dead zone."

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On the Determination of Carbon Isotopic Ratios in Cool Carbon Stars

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We discuss the determination of carbon isotopic ratios in N-type Galactic carbon stars. Ohnaka & Tsuji (1996) reported ^{12}C / ^{13}C ratios smaller by a factor 2 or 3 than the determinations of Lambert et al. (1986). Using synthetic spectra of carbon stars, we analyse systematic errors in their *iso-intensity* method. It is found to be rather sentitive to model parameters and blends. Furthermore, there are large discrepancies between the effective temperatures adopted by these two studies (mean discrepancy close to 260 K for the 20 stars in common). That, together with uncertainties due to model atmospheres, to carbon enrichments and effects of the blends, could explain most of the discrepancies between these two studies. The LGEH86 analysis is, on the other hand, rather insentitive to model parameters. We therefore conclude that large ^{12}C / ^{13}C ratios in cool Galactic carbon stars should be favoured.

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Knots, Filaments, and Turbulance in Radiative Shocks

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We study the structure and stability of asymmetric colliding flows for the case where one shock is oscillating due to the radiative cooling overstability and the interaction zone undergoes no global acceleration. 2D high-resolution numerical simulations reveal a new structure formation mechanism in the wake of such shocks which has been suppressed in previous simulations due to a too coarse numerical mesh. Small scale structures – filaments and knots – are inevitably formed in such shocks. Downstream of the knots a turbulent zone establishes where cold and hot gas are mixed, probably leading to efficient X-ray emission. The bulk of the cooled gas forms a layer of irregular shape and temporally and spatially variable size. The gas in its interior is in mildly supersonic turbulent motion, having a large density and velocity dispersion. Some observed peculiarities in the optical and UV-spectra may be partly due to these characteristics. This mechanism may also contribute to the appearance of knots and filaments in PNe (e.g. in the Helix nebula), in WR ring nebulae, in other circumstellar nebulae like symbiotics, and in SNR. It has consequences for the dynamics of the ISM.

Video animations are available at http://www.astro.phys.ethz.ch/staff/walder

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A ROSAT Observation of the Eclipsing Binary System XY UMa

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The short period, eclipsing, magnetically active binary system XY UMa, has been observed over several orbital cycles at X-ray wavelengths. The X-ray light curves vary due to obvious flares and other lower level activity on timescales of days. These data caution against deducing coronal structure on the basis of a single orbit of X-ray data. In contrast to similar binary systems, XY UMa shows no significant X-ray eclipses. This is interpreted as evidence for either extended ($> 1\,R_\odot$) coronae or a compact corona at high, uneclipsed latitudes on the primary star. The extended coronal scenario is favoured by some observational features of other systems such as extended radio coronae, long duration X-ray flares and cool prominences, but unfavoured by others such as high coronal densities from EUV spectroscopy. A high latitude compact corona might be associated with the high latitude starspots seen in many active stars. Nearly simultaneous optical light curves suggest that some equatorial spots were present at the time of the X-ray observations, but fewer than in previous or subsequent years and that high latitude spots must also be present. It is speculated that the lack of X-ray eclipses and dearth of equatorial, compact coronal regions are associated with a minimum in XY UMa's magnetic activity cycle.

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Metallicity and Photospheric Abundances in Field K and M Dwarfs

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Elemental abundances in late type stars are of interest in several ways: they determine the location on HR diagram and therefore age determination of stars and atmospheric structure in middle and upper photosphere. Especially in the case of chromospherically active late type stars the question arises to what degree is mainly upper photosphere influenced by nearby chromosphere. Analysing S/N 200 and $\Delta\lambda/\lambda \sim$20 000 data we found mean metallicity index

[M/H]=-0.2 for programme K and M field stars based on analysis of spectra in the region 5500-9000Å. We also found the CaI 6162Å transition as potentionally a surface gravity indicator for K type stars. Given the chromospheric activity interval $4.4 < logF_{MgII} < 6.6$ we did not find any chromospheric activity impact on photospheric and upper photospheric transitions. With the derived metallicity we confirmed the Li abundance from our previous paper and thus its dependence on the Mg II chromospheric activity index. The nature of the spectrum of the active M type star Gl896A is explained by pure rotation with 14 km/s. As far as the lithium-rotation relation is concerned, the spectrum of Gl517 is rotationally broadened as well, $\sim$ 12 km/s, and the Li abundance is the second highest one in sample of stars. However, there is no link between very high Li abundance ,2.2 dex, in the K dwarf star Gl5 and stellar rotation.

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Solar Abstracts

EUV Spectroscopy of the Sunspot Region NOAA 7981 using SOHO I. Line Emission and Time Dependence

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EUV spectra of a medium size sunspot and its surroundings, NOAA 7981, were obtained on 2 August, 1996 with the Coronal Diagnostic Spectrometer (CDS) and the Solar Ultraviolet Measurements of Emitted Radiation (SUMER) on the Solar and Heliospheric Observatory (SOHO). The spectral lines formed in the transition region and corona show considerable structure and large deviations from a uniform spatial distribution over the active region. Enhanced EUV emissions in transition region lines are concentrated in small regions outside the umbra of the sunspot throughout most of the observing sequence. Only during a short, active period do we find an enhanced line emission that reaches into the umbra. Preliminary values for the umbral intensity are given.

Marked changes are detected between the spatial distribution of line emission in the transition region and the low corona. The difference is not limited to cool and hot non-flaring loops not being cospatial, but includes differences both regarding the time variability and the orientation and size of the emission features. Whereas both rapid ($\approx$ 4 and 2 min) and slow ($\approx$ 10 and 12 h) temporal variations are found in the chromosphere (He I 584 Å) and transition region (O V 629 Å), the response in the low corona (Mg IX 368 Å) is slow ($\approx$ 5 h). Furthermore, marked differences between the spatial distributions in the Mg VIII 315 Å, Mg IX 368 Å lines formed in the low corona and the coronal Fe XIV 334 Å, Fe XVI 360 Å lines are detected.

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EUV Spectroscopy of the Sunspot Region NOAA 7981 using SOHO II. Velocities and Line Profiles

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We have studied the dynamics in the sunspot transition region between the chromosphere and the corona and investigated the extension of the flow field into the corona. Based on EUV spectra of a medium size sunspot and its surroundings, NOAA 7981, observed with CDS and SUMER on SOHO, we derive line-of-sight velocities and study the line profiles for a series of emission lines.

The flow field in the low corona is found to differ markedly from that in the transition region. In the transition region the relative line-of-sight velocity shows an upflow in the umbra and relatively large areas with downflow that cover part of the penumbra. The spatial extent of these areas with upflow and downflow increases with increasing temperature in the transition region, but the whole flow field changes character as the temperature increases from the upper transition region to the low corona. Based on a calibration of the SUMER wavelength scale we find that the entire sunspot transition zone appears to be moving downwards towards the chromosphere. The relation between this finding and the general tendency for transition region lines to show a net redshift is discussed.

Several of the transition region spectral line profiles are observed to show two line components with Gaussian shape and line-of-sight velocities that differ markedly. Several of the line profiles that are composed of two spectral line components occur close to the dividing line between up- and downflow. A discussion of this observation is presented. In small regions with spatial extent of a few arcseconds we detect enhanced continuum emission underlying explosive events. The similarities between explosive events with continuum emission and the moustaches observed in H_α close to sunspots are so striking that we are tempted to introduce the notation "Transition region moustaches".

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A Model of the Wavelength Dependence of Solar Irradiance Variations

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The variation of the solar irradiance over the solar cycle has a strong wavelength dependence, being larger at shorter wavelengths. Here we present simple models of the spectral dependence of irradiance variations between solar activity maximum and minimum. We find that the observations (which concentrate on the UV) cannot be reproduced by a change in effective temperature of the Sun (or of parts of its surface) alone. We can, however, reproduce the data with either a 2-component or a 3-component model, of which one component is the quiet Sun, another is a facular component, and the third (in the case of the 3-component model) represents the temperature stratification of sunspots. The facular component is found to be very close to the facular models F or P of Fontenla et al. (1993). The success of these models supports the assumption underlying many studies of total solar irradiance variations that these are caused mainly by magnetic fields at the solar surface. Our investigation also allows an improved estimate of the relative contribution of the various layers in the solar photosphere and of the different wavelength regions to the total irradiance variations.

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The Physics of Twisted Magnetic Tubes Rising in a Stratified Medium: Two Dimensional Results

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The physics of a twisted magnetic flux tube rising in a stratified medium is studied using a numerical MHD code. The problem considered is fully compressible (no Boussinesq approximation), includes ohmic resistivity, and is two dimensional, i.e., there is no variation of the variables in the direction of the tube axis. We study a high plasma β case with small ratio of radius to external pressure scaleheight. The results obtained can therefore be of relevance to understanding the transport of magnetic flux across the solar convection zone.

We confirm that a sufficient twist of the field lines around the tube axis can suppress the conversion of the tube into two vortex rolls. For a tube with relative density deficit of order $1/\beta$ (the classical Parker buoyancy) and radius smaller than a pressure scale-height ($R^2 \ll H_p^2$), the minimum amount of twist necessary corresponds to an average pitch angle of order $\sin^{-1}[(R/H_p)^{1/2}]$. The evolution of a tube with this degree of twist is studied in detail, including the initial transient phase, the internal torsional oscillations and the asymptotic, quasi-stationary phase. During the initial phase, the outermost, weakly magnetized layers of the tube are torn off its main body and endowed with vorticity. They yield a trailing magnetized wake with two vortex rolls. Which fraction of the total magnetic flux is brought to the wake is a function of the initial degree of twist. In the weakly twisted case, most of the initial tube is turned into vortex rolls. At the opposite end (strong initial twist), the tube rises with only a small deformation and no substantial loss of magnetic flux. The formation of the wake and the loss of flux from the main body of the tube are basically complete after the initial transient phase.

A sharp interface between the tube interior and the external flows is formed at the tube front and sides; it has the characteristic features of a magnetic boundary layer. Its structure is determined as an equilibrium between ohmic diffusion and field advection through the external flows. It is the site of vorticity generation via the magnetic field during the whole tube evolution.

From the hydrodynamical point of view, this problem constitutes an intermediate case between the rise of air bubbles in water and the motion of a rigid cylinder in an external medium. As in the first one, the tube is deformable and the outcome of the experiment (shape of rising object and wake) depends on the value of the Weber number. Several structural features obtained in the present simulation are also observed in rising air bubbles, like a central *tail*, and a *skirt* enveloping the wake. As in rigid cylinders, the boundary layer satisfies a no-slip condition (provided for in the tube by the magnetic field), and secondary rolls are formed at the lateral edges of the moving object.

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Upcoming Meetings

A CROSSROADS for EUROPEAN SOLAR and HELIOSPHERIC PHYSICS: RECENT ACHIEVEMENTS and FUTURE MISSION POSSIBILITIES

Puerto de la Cruz, Tenerife, Spain
March 23-27, 1998
Hosted by the Instituto de Astrofisica de Canarias
http://www.iac.es/project/eshp

The time is ripe for an in-depth assessment of the most important results from SOHO, Ulysses and Yohkoh and for discussion of the next possible steps for the European solar community in space. Exciting possibilities include stereoscopic viewing, probe-sampling of the corona and ultra-high resolution observation. The workshop will therefore consist of a series of reviews on results from current space missions together with extensive poster sessions. In addition, there will be overviews of the current situation in ESA and other agencies, together with accounts of the future mission possibilities.

SCIENTIFIC ORGANIZING COMMITTEE (SOC)
E. Priest (chair), C Chiuderi, L Culhane, R Harrison, E Marsch, O Kjeldseth-Moe, F Moreno-Insertis, M Schussler, S Solanki, JC Vial.

LOCAL ORGANIZING COMMITTE (LOC)
F. Moreno-Insertis (chair), A. Jimenez, M. Murphy, P. Palle, T. Roca Cortes, H. Socas-Navarro, J.C. del Toro Iniesta, M. Vazquez, C. Westendorp Plaza

INVITED SPEAKERS
R. Bonnet, J. Christensen-Dalsgaard, M. Schussler, C. Chiuderi, E. Leer, T. Roca Cortes, R. Harrison, E. Antonucci, P. Bochsler, A. Balogh, L. Culhane, J. Davila, R. Pellinen, D. Rust, V. Bothmer, L. Dame, L. Golub, D. LeQueau, E. Marsch, W. Schmidt, S. Tsuneta.

IMPORTANT DATES
1 November 1997: Web page with scientific and local details available. It will be continuously updated as new information on participants, scientific programme or local arrangements becomes available.
Mid December 1997: Second announcement and final registration form (also available at the web page by then).
15 January 1998: Accommodation deadline to guarantee hotel room.
15 January 1998: Deadline for submission of abstracts.

CONTRIBUTIONS
This conference will feature a series of 30 min invited reviews and contributed posters. Please indicate in the registration form if you wish to present a poster contribution and, if so, a tentative title and abstract before Dec 1st.

PROCEEDINGS
The Proceedings of the workshop will be published by ESA Publications Division (EPD) as document "SP-417". The Editors for these Proceedings will be R.A.Harris (EPD), F. Moreno-Insertis and E. Priest.

REGISTRATION
WEB PAGE: http://www.iac.es/project/eshp
E-MAIL: eshpconf@ll.iac.es requesting the full version of this announcement, including a pre-registration form.

Because of logistic limitations and the nature of this conference, we may have to restrict the number of participants. An early registration is therefore encouraged. A second announcement will be sent by mid December.

Job Announcement

Postdoctoral Research Position
Keele University (U.K)

Research Area: Cool Stars (evolution of magnetic activity, rotation and light element depletion)

A PPARC funded postdoctoral post is available in the Astrophysics Group at Keele University, working with Dr R. D. Jeffries on a programme of multi-wavelength observations of cool stars in open clusters, concentrating on the evolution of magnetic activity, rotation and Lithium abundance. Further details can be found at http://www.astro.keele.ac.uk/~rdj/ or by email from rdj@astro.keele.ac.uk .

Applicants should have, or expect to be awarded in the near future, a Ph.D. A background in, or experience of, high resolution stellar spectroscopy, stellar photometry or X-ray observations of cool stars would be an advantage, but excellence in research will be the primary consideration. The appointment will be for 3 years on the RA1A scale (from 15159 pounds according to age and experience). The starting date is 1st January 1998 or as soon as possible thereafter.

The Keele Astrophysics Group has a dynamic programme of observational galactic astronomy, gaining time with HST, ASCA, XTE, Rosat, ISO, IUE, UKIRT, AAT, WHT and the INT. The six faculty are all active researchers, supported by postdoctoral fellows, graduate students, and a Starlink node consisting of DEC Alpha workstations.

Application forms can be obtained from Personnel Department, Keele University, Keele, Staffs, ST5 5BG, U.K. or fax 44-1782-583471 or email Vacancies@keele.ac.uk, quoting job reference number RE97/32. Applicants should also submit a CV, publication list, statement of research interests. Applicants should also ask two referees to write directly to (or email) Dr Jeffries (rdj@astro.keele.ac.uk) at the Physics Department, Keele University, Keele, Staffs, ST5 5BG.

Closing date: 1 December 1997
AN EQUAL OPPORTUNITIES EMPLOYER

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. The subject matter should pertain directly to cool stars (spectral types F,G,K, or M) or the sun. Both theoretical and observational abstracts are appropriate. Abstracts dealing with cool pre-main-sequence 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. 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` .