COOLNEWS

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Infrared Spectroscopy of Symbiotic Stars. VIII. Orbits for Three S-Type Systems: AE Ara, Y Coronae Australis and SS 73-147

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With new infrared radial velocities we have computed orbits of the M giants in three southern S-type symbiotic systems. AE Ara and SS 73-147 have circular orbits with periods of 803 and 820 days, respectively. The eccentric orbit of Y CrA has a period that is about twice as long, 1619 days. Except for CH Cyg it is currently the S-type symbiotic system with the longest period for which a spectroscopic orbit has been determined. The Paschen δ emission line velocities of AE Ara are nearly in antiphase with the M giant absorption feature velocities and result in a mass ratio of 2.7. Emission lines in the 1.005 μm region for the other two symbiotic systems are not good proxies for the hot components in those systems. There is no clear evidence that these three symbiotics are eclipsing. With spectral classes of M5.5 or M6, the three giants presumably also have velocity variations that result from pulsations, but we have been unable to identify specific pulsation periods in the absorption line velocity residuals.

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A Precessing Jet in the CH Cyg Symbiotic System

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Jets have been detected in only a few symbiotic binaries to date, and CH Cyg is one of them. In 2001, a non-relativistic jet was detected in CH Cyg for the first time in X-rays. We carried out coordinated *Chandra*, *HST*, and *VLA* observations in 2008 to study the propagation of this jet and its interaction with the circumbinary medium. We detected the jet with *Chandra* and *HST* and determined that the apex has expanded to the South from ∼300 AU to ∼1400 AU, with the shock front propagating with velocity <100 km s^{-1}. The shock front has significantly slowed down since 2001. Unexpectedly, we also discovered a powerful jet in the NE-SW direction, in the X-ray, optical and radio. This jet has a multi-component structure, including an inner jet and a counter-jet at ∼170 AU, and a SW component ending in several clumps extending out to ∼750 AU. The structure of the jet and the curvature of the outer portion of the SW jet suggest an episodically powered precessing jet, or a continuous precessing jet with occasional mass ejections or pulses. We carried out detailed spatial mapping of the X-ray emission and correlation with the optical and radio emission. X-ray spectra were extracted of the central source, inner NE counter jet, and the brightest clump at a distance of ∼500 AU from the central source. We discuss the initial results of our analyses, including the multi-component spectral fitting of the jet-components and of the central source.

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An Absolutely Calibrated Effective Temperature Scale from the InfraRed Flux Method. Dwarfs and Subgiants

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Various effective temperature scales have been proposed over the years. Despite much work and the high internal precision usually achieved, systematic differences of order 100 K (or more) among various scales are still present. We present an investigation based on the Infrared Flux Method aimed at assessing the source of such discrepancies and pin down their origin. We break the impasse among different scales by using a large set of solar twins, stars which are spectroscopically and photometrically identical to the Sun, to set the absolute zero point of the effective temperature scale to within few degrees. Our newly calibrated, accurate and precise temperature scale applies to dwarfs and subgiants, from super-solar metallicities to the most metal-poor stars currently known. At solar metallicities our results validate spectroscopic effective temperature scales, whereas for [Fe/H] < -2.5 our temperatures are roughly 100 K hotter than those determined from model fits to the Balmer lines and 200 K hotter than those obtained from the excitation equilibrium of Fe lines. Empirical bolometric corrections and useful relations linking photometric indices to effective temperatures and angular diameters have been derived. Our results take full advantage of the high accuracy reached in absolute calibration in recent years and are further validated by interferometric angular diameters and space based spectrophotometry over a wide range of effective temperatures and metallicities.

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Ellipsoidal Primary of the RS CVn Binary ζ And: Investigation Using High Resolution Spectroscopy and Optical Interferometry

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We have obtained high resolution spectroscopy, optical interferometry and long term broad band photometry of the ellipsoidal primary of the RS CVn-type binary system ζ And. These observations are used to obtain fundamental stellar parameters and to study surface structures and their temporal evolution. Surface temperature maps of the stellar surface are obtained from high resolution spectra with Doppler imaging techniques. These spectra are also used to investigate the chromospheric activity using the Hα line, and to correlate it with the photospheric activity. The possible cyclicity in the spot activity is investigated from the long term broad band photometry. Optical interferometry was obtained during the same time period as the high resolution spectra. These observations are used to derive the size and fundamental parameters of ζ And. Based on the optical interferometry the apparent limb darkened diameter of ζ And is 2.55 ± 0.09 mas using a uniform disk fit. The expected $\sim$4% maximum difference between the long and short axis of the ellipsoidal stellar surface cannot be confirmed from the current data which have 4% errors. With the Hipparcos distance the limb darkened diameter obtained with a uniform disk fit gives stellar radius of $15.9 \pm 0.8 R_\odot$ and combined with bolometric luminosity it implies an effective temperature of 4665 ± 140 K. The temperature maps obtained from Doppler imaging show a strong belt of equatorial spots, and hints of a cool polar cap. The equatorial spots show a concentration around the phase 0.75, i.e., 0.25 in phase from the secondary, and another concentration spans the phases 0.0–0.4. This spot configuration is reminiscent of the one seen in the earlier published temperature maps of ζ And. The investigation of the Hα line reveals both prominences and cool clouds in the chromosphere. These features do not seem to have a clear preferred location in the binary reference frame, nor are they strongly associated with the cool photospheric spots. The investigation of the long term photometry spanning 12 years shows hints of a spot activity cycle, which is also implied by the Doppler images, but the cycle length cannot be reliably determined from the current data.

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New Precision Orbits of Bright Double-lined Spectroscopic Binaries. IV. 66 And, HR 6979, and HR 9059

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We have determined improved spectroscopic orbits for three double-lined binaries, 66 And (F4 V), HR 6979 (Am), and HR 9059 (F5 IV) using radial velocities from the 2.1 m telescope at McDonald Observatory, the coudé feed telescope at Kitt Peak National Observatory, and 2 m telescope at Fairborn Observatory. The orbital periods range from 11.0 to 14.3 days, and all three systems have eccentric orbits. The new orbital dimensions (a_1 sin i and a_2 sin i) and minimum masses (m_1 sin^3 i and m_2 sin^3 i) have accuracies of 0.2% or better. All six components of the three binary systems are rotating more slowly than their predicted pseudosynchronous rotational velocities. *Hipparcos* photometry of HR 9059 shows that this system has partial eclipses. Its components are nearly identical in mass and are at the very end of their main sequence lifetimes or perhaps have just begun to traverse the Hertsprung gap.

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StarCAT: A Catalog of Space Telescope Imaging Spectrograph Ultraviolet Echelle Spectra of Stars

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StarCAT is a catalog of high resolution ultraviolet spectra of objects classified as "stars," recorded by Space Telescope Imaging Spectrograph (STIS) during its initial seven years of operations (1997–2004). StarCAT is based on 3184 echelle observations of 545 distinct targets, with a total exposure duration of 5.2 Ms. For many of the objects, broad ultraviolet coverage has been achieved by splicing echellegrams taken in two or more FUV (1150–1700 Å) and/or NUV (1600–3100 Å) settings. In cases of multiple pointings on conspicuously variable sources, spectra were separated into independent epochs. Otherwise, different epochs were combined to enhance signal-to-noise (S/N). A post facto correction to the calstis pipeline datasets compensated for subtle wavelength distortions identified in a previous study of the STIS calibration lamps. An internal "fluxing" procedure yielded coherent spectral energy distributions for objects with broadly overlapping wavelength coverage. The best StarCAT material achieves 300 m s^{-1} internal velocity precision; absolute accuracy at the 1 km s^{-1} level; photometric accuracy of order 4%; and relative flux precision several times better (limited mainly by knowledge of spectral energy distributions of UV standard stars). While StarCAT represents a milestone in the large scale post-processing of STIS echellegrams, a number of potential improvements in the underlying 'final' pipeline are identified.

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StarCAT website: http://archive.stsci.edu/prepds/starcat/

Four-colour Photometry of EY Dra: A Study of an Ultra-fast Rotating Active dM1-2e Star

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We present more than 1000-day long photometry of EY Draconis in $BV(RI)_C$ passbands. The changes in the light curve are caused by the spottedness of the rotating surface. Modelling of the spotted surface shows that there are two large active regions present on the star on the opposite hemispheres. The evolution of the surface patterns suggests a flip-flop phenomenon. Using Fourier analysis, we detect a rotation period of $P_{rot} = 0.45875$d, and an activity cycle with $P \approx 350$d, similar to the 11-year long cycle of the Sun. This cycle with its year-long period is the shortest one ever detected on active stars. Two bright flares are also detected and analysed.

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Highly Ionized Potassium Lines in Solar X-ray Spectra and the Abundance of Potassium

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The abundance of potassium is derived from X-ray lines observed during flares by the RESIK instrument on the solar mission *CORONAS-F* between 3.53 Å and 3.57 Å. The lines include those emitted by He-like K and Li-like K dielectronic satellites, which have been synthesized using the CHIANTI atomic code and newly calculated atomic data. There is good agreement of observed and synthesized spectra, and the theoretical behavior of the spectra with varying temperature estimated from the ratio of the two *GOES* channels is correctly predicted. The observed fluxes of the He-like K resonance line per unit emission measure gives $\log A(\mathrm{K}) = 5.86$ (on a scale $\log A(\mathrm{H}) = 12$), with a total range of a factor 2.9. This is higher than photospheric abundance estimates by a factor 5.5, a slightly greater enhancement than for other elements with first ionization potential (FIP) less than ~ 10 eV. There is, then, the possibility that enrichment of low-FIP elements in coronal plasmas depends weakly on the value of the FIP which for K is extremely low (4.34 eV). Our work also suggests that fractionation of elements to form the FIP effect occurs in the low chromosphere rather than higher up, as in some models.

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The Solar X-ray Continuum Measured by RESIK

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The solar X-ray continuum emission at five wavelengths between 3.495 Å and 4.220 Å for 19 flares in a seven-month period in 2002–2003 was observed by the RESIK crystal spectrometer on *CORONAS-F*. In this wavelength region, free–free and free–bound emissions have comparable fluxes. With a pulse-height analyzer having settings close to optimal, the fluorescence background was removed so that RESIK measured true solar continuum in these bands with an uncertainty in the absolute calibration of ±20%. With an isothermal assumption, and temperature and emission measure derived from the ratio of the two *GOES* channels, the observed continuum emission normalized to an emission measure of 10^{48} cm^{-3} was compared with theoretical continua using the CHIANTI atomic code. The accuracy of the RESIK measurements allows photospheric and coronal abundance sets, important for the free–bound continuum, to be discriminated. It is found that there is agreement to about 25% of the measured continua with those calculated from CHIANTI assuming coronal abundances in which Mg, Si, Fe abundances are four times photospheric.

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The Distance to the Cool T9 Brown Dwarf ULAS J003402.77-005206.7

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We demonstrate the feasibility of determining parallaxes for nearby objects with the Wide Field Camera on the United Kingdom Infrared Telescope (UKIRT) using the UKIRT Infrared Deep Sky Survey as a first epoch. We determine physical parameters for ULAS J003402.77-005206.7, one of the coolest brown dwarfs currently known, using atmospheric and evolutionary models with the distance found here. Observations over the period 10/2005 to 07/2009 were pipeline processed at the Cambridge Astronomical Survey Unit and combined to produce a parallax and proper motion using standard procedures. We determined $\pi = 79.6 \pm 3.8$ mas, $\mu_\alpha = -20.0 \pm 3.7$ mas/yr and $\mu_\delta = -363.8 \pm 4.3$ mas/yr for ULAS J003402.77-005206.7. We have made a direct parallax determination for one of the coolest objects outside of the solar system. The distance is consistent with a relatively young, $1-2$ Gyr, low mass, $13-20$ M_J, cool, 550-600K, brown dwarf. We present a measurement of the radial velocity that is consistent with an age between 0.5 and 4.0 Gyr.

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The Benchmark Ultracool Subdwarf HD 114762B: A Test of Low-Metallicity Atmospheric and Evolutionary Models

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We present a near-infrared spectroscopic study of HD 114762B, the latest-type metal-poor companion discovered to date and the only ultracool subdwarf with a known metallicity, inferred from the primary star to be [Fe/H] = –0.7. We obtained a medium-resolution (R $\sim$ 3800) Keck/OSIRIS 1.18-1.40 μm spectrum and a low-resolution (R $\sim$ 150) IRTF/SpeX 0.8-2.4 μm spectrum of HD 114762B to test atmospheric and evolutionary models for the first time in this mass-metallicity regime. HD 114762B exhibits spectral features common to both late-type dwarfs and subdwarfs, and we assign it a spectral type of d/sdM9 $\pm$ 1. We use a Monte Carlo technique to fit PHOENIX/*GAIA* synthetic spectra to the observations, accounting for the coarsely-gridded nature of the models. Fits to the entire OSIRIS J-band and to the metal-sensitive J-band atomic absorption features (Fe I, K I, and Al I lines) yield model parameters that are most consistent with the metallicity of the primary star and the high surface gravity expected of old late-type objects. The effective temperatures and radii inferred from the model atmosphere fitting broadly agree with those predicted by the evolutionary models of Chabrier & Baraffe, and the model color-absolute magnitude relations accurately predict the metallicity of HD 114762B. We conclude that current low-mass, mildly metal-poor atmospheric and evolutionary models are mutually consistent for spectral fits to medium-resolution J-band spectra of HD 114762B, but are inconsistent for fits to low-resolution near-infrared spectra of mild subdwarfs. Finally, we develop a technique for estimating distances to ultracool subdwarfs based on a single near-infrared spectrum. We show that this "spectroscopic parallax" method enables distance estimates accurate to $< \sim 10\%$ of parallactic distances for ultracool subdwarfs near the hydrogen burning minimum mass.

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For preprints via ftp or WWW:http://arxiv.org/abs/0910.1604

SDSS J141624.08+134826.7: A Nearby Blue L Dwarf From the Sloan Digital Sky Survey

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We present the discovery of a bright ($J = 13.1$ mag) nearby L6 dwarf found in a search for L-type ultracool subdwarfs in the Sloan Digital Sky Survey (SDSS) Data Release 7. SDSS J141624.08+134826.7 exhibits blue near-infrared colors compared to other optically-typed L6 objects, but its optical and near-infrared spectra do not show metal-poor features characteristic of known L-type ultracool subdwarfs. Instead, SDSS J141624.08+134826.7 is probably a nearby example of the class of L dwarfs with low condensate opacities which exhibit unusually blue near-infrared colors for a given spectral type. Its deep 1.4 and 1.9 μm H_2O absorption bands, weak 2.3 μm CO feature, strong 0.99 μm FeH band, and shallow optical TiO and CaH bands resemble the spectra of other blue L dwarfs which are believed to have unusually thin or large-grained cloud structure. The luminosity of SDSS J141624.08+134826.7 implies that it is either a high-mass brown dwarf or a low mass star, depending on its age, and its UVW space motion suggests a thin-disk membership. With a spectrophotometric distance of 8.4 $\pm$ 1.9 pc, SDSS J141624.08+134826.7 is one of the nearest L dwarfs to the Sun and is therefore an excellent target for high resolution imaging, spectroscopic, and astrometric follow-up observations.

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A Scenario of Planet Erosion by Coronal Radiation

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Context: According to theory, high-energy emission from the coronae of cool stars can severely erode the atmospheres of orbiting planets. No observational tests of the long term effects of erosion have yet been made.

Aims: To analyze the current distribution of planetary mass with X-ray irradiation of the atmospheres in order to make an observational assessment of the effects of erosion by coronal radiation.

Methods: We study a large sample of planet-hosting stars with XMM-Newton, Chandra and ROSAT; make a careful identification of X-ray counterparts; and fit their spectra to make accurately measurements of the stellar X-ray flux.

Results: The distribution of the planetary masses with X-ray flux suggests that erosion has taken place: most surviving massive planets, ($M_{\rm p} \sin i > 1.5\,{\rm M_J}$), have been exposed to lower accumulated irradiation. Heavy erosion during the initial stages of stellar evolution is followed by a phase of much weaker erosion. A line dividing these two phases could be present, showing a strong dependence on planet mass. Although a larger sample will be required to establish a well-defined erosion line, the distribution found is very suggestive.

Conclusions: The distribution of planetary mass with X-ray flux is consistent with a scenario in which planet atmo-

spheres have suffered the effects of erosion by coronal X-ray and EUV emission. The erosion line is an observational constraint to models of atmospheric erosion.

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The Effect of Evaporation on the Evolution of Close-in Giant Planets

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Tremendous progress in the science of extrasolar planets has been achieved since the discovery of a Jupiter orbiting the nearby Sun-like star 51 Pegasi in 1995. Theoretical models have now reached enough maturity to predict the characteristic properties of these new worlds, mass, radius, atmospheric signatures, and can be confronted with available observations. We review our current knowledge of the physical properties of exoplanets, internal structure and composition, atmospheric signatures, including expected biosignatures for exo-Earth planets, evolution, and the impact of tidal interaction and stellar irradiation on these properties for the short-period planets. We discuss the most recent theoretical achievements in the field and the still pending questions. We critically analyse the different solutions suggested to explain abnormally large radii of a significant fraction of transiting exoplanets. Special attention is devoted to the recently discovered transiting objects in the overlapping mass range between massive planets and low-mass brown dwarfs, stressing the ambiguous nature of these bodies, and we discuss the possible observable diagnostics to identify these two distinct populations. We also review our present understanding of planet formation and critically examine the different suggested formation mechanisms. We expect the present review to provide the basic theoretical background to capture the essential of the physics of exoplanet formation, structure and evolution, and the related observable signatures.

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Evidence of a Massive Planet Candidate Orbiting the Young Active K5V Star BD+20 1790

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BD+20 1790 is a young active, metal-rich, late-type K5Ve star. We have undertaken a study of stellar activity and kinematics for this star over the past few years. Previous results show a high level of stellar activity, with the presence of prominence-like structures, spots on the surface, and strong flare events, despite the moderate rotational velocity of the star. In addition, radial velocity variations with a semi-amplitude of up to 1 km s^{-1} were detected. We investigate the nature of these radial velocity variations, in order to determine whether they are due to stellar activity or the reflex motion of the star induced by a companion.

Based upon the analysis of the bisector velocity span, as well as spectroscopic indices of chromospheric indicators, Ca II H & K, Hα, and taking the photometric analysis into account, we report that the best explanation for the RV variation is the presence of a substellar companion. The Keplerian fit of the RV data yields a solution for a close-in massive planet with an orbital period of 7.78 days. The presence of the close-in massive planet could also be an interpretation for the high level of stellar activity detected. Since the RV data are not part of a planet search

programme, we can consider our results as a serendipitous evidence of a planetary companion. To date, this is the youngest main sequence star for which a planetary candidate has been reported.

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Cross-Listed Abstracts (Pre-Main Sequence Stars)

Editor's Note: The abstracts below are being cross-listed with the *Star Formation Newsletter.*

A Test of Pre–Main-Sequence Li Depletion Models

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Despite the extensive study of lithium depletion during pre–main-sequence contraction, studies of individual stars show discrepancies between ages determined from the HR diagram and ages determined from lithium depletion (Song et al. 2002, White & Hillenbrand 2005) indicating open questions in the pre–main-sequence evolutionary models. To further test these models, we present high resolution spectra for members of the β Pictoris Moving Group (BPMG), which is young and nearby. We measure equivalent widths of the 6707.8Å Li I line in these stars and use them to determine lithium abundances. We combine the lithium abundance with the predictions of pre–main-sequence evolutionary models in order to calculate a lithium depletion age for each star. We compare this age to the age predicted by the HR diagram of the same model. We find that the evolutionary models under-predict the amount of lithium depletion for the BPMG given its nominal HR diagram age of ∼12 Myr (Zuckerman et al. 2001), particularly for the mid-M stars, which have no observable Li I line. This results in systematically older ages calculated from lithium depletion isochrones than from the HR diagram. We suggest that this discrepancy may be related to the discrepancy between measured M-dwarf radii and the smaller radii predicted by evolutionary models.

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A Deep Chandra X-ray Spectrum of the Accreting Young Star TW Hydrae

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We present X-ray spectral analysis of the accreting young star TW Hydrae from a 489 ks observation using the *Chandra* High Energy Transmission Grating. The spectrum provides a rich set of diagnostics for electron temperature T_e, electron density N_e, hydrogen column density N_H, relative elemental abundances and velocities and reveals its source in 3 distinct regions of the stellar atmosphere: the stellar corona, the accretion shock, and a very large extended volume of warm postshock plasma. The presence of MgXII, SiXIII, and SiXIV emission lines in the spectrum requires coronal structures at ∼10 MK. Lower temperature lines (e.g. from OVIII, NeIX, and MgXI) formed at 2.5 MK appear more consistent with emission from an accretion shock. He-like NeIX line ratio diagnostics indicate that $T_e = 2.50 \pm 0.25$MK and $N_e = 3.0 \pm 0.2 \times 10^{12}$ cm^{-3} in the shock. These values agree well with standard magnetic accretion models. However, the *Chandra* observations significantly diverge from current model predictions for the postshock plasma. This gas is expected to cool radiatively, producing OVII as it flows into an increasingly dense stellar atmosphere. Surprisingly, OVII indicates $N_e = 5.7^{+4.4}_{-1.2} \times 10^{11}$ cm^{-3}, 5 times lower than N_e in the accretion shock itself, and ∼7 times lower than the model prediction. We estimate that the postshock region producing OVII has roughly 300 times larger volume, and 30 times more emitting mass than the shock itself. Apparently, the shocked plasma heats the surrounding stellar atmosphere to soft X-ray emitting temperatures and supplies this material to nearby large magnetic structures – which may be closed magnetic loops or open magnetic field leading to mass outflow. Our model explains the soft X-ray excess found in many accreting systems as well as the failure to observe high N_e signatures in some stars. Such accretion-fed coronae may be ubiquitous in the atmospheres of accreting young stars.

the name of journal, for example: ApJ, 710, (2010) 1835-1847 (in press)

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A Detailed Study of the Rise Phase of a Long Duration X-ray Flare in the Young Star TWA 11B

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We analyzed a long duration flare observed in a serendipitous XMM-Newton detection of the M star CD-39 7717B (TWA 11B), member of the young stellar association TW Hya ($\sim$ 8 Myr). Only the rise phase (with a duration of $\sim$ 35 ks) and possibly the flare peak were observed. We took advantage of the high count-rate of the X-ray source to carry out a detailed analysis of its spectrum during the whole exposure. After a careful analysis, we interpreted the rise phase as resulting from the ignition of a first group of loops (event A) which triggered a subsequent two-ribbon flare (event B). Event A was analyzed using a single-loop model, while a two-ribbon model was applied for event B. Loop semi-lengths of $\sim 4R_\star$ were obtained. Such large structures had been previously observed in very young stellar objects ($\sim 1-4$ Myr). This is the first time that they have been inferred in a slightly more evolved star. The fluorescent iron emission line at 6.4 keV was detected during event B. Since TWA 11B seems to have no disk, the most plausible explanation found for its presence in the X-ray spectrum of this star is collisional- or photo-ionization. As far as we are concerned, this is only the third clear detection of Fe photospheric fluorescence in stars other than the Sun.

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Review Article Abstracts

Physical Processes in Magnetically-Driven Flares on the Sun, Stars, and Young Stellar Objects

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The first flare on the Sun was observed exactly 150 years ago. During most of the long history, only secondary effects have been noticed, so flares remained a riddle. Now the primary flare products, high-energy electrons and ions can be spatially resolved in hard X-rays (HXR) and gamma-rays on the Sun. Soft X-rays (SXR) are observed from most stars, including young stellar objects. Structure and bulk motions of the corona are imaged on the Sun in high temperature lines, and are inferred from line shifts in stellar coronae. Magnetic reconnection is the trigger for reorganization of the magnetic field into a lower energy configuration. A large fraction of the energy is converted into non-thermal particles that transport the energy to higher density gas, heating it to SXR emitting temperatures. Flares on young stars are several orders of magnitude more luminous and more frequent; they significantly ionize protoplanetary disks and planetary ionospheres.

Accepted by ARAA

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Upcoming Meeting

The 16th Cambridge Workshop on Cool Stars, Stellar Systems and the Sun

29 August - 2 Septmber 2010

Seattle, WA

SECOND ANNOUNCEMENT

The 16th Cambridge Workshop on Cool Stars, Stellar Systems and the Sun (Cool Stars 16) will be held on the campus of the University of Washington, in Seattle, Washington, USA from August 29 - Sept 2, 2010. The program and invited speakers are available on the conference website

http://www.confcon.com/coolstars16

where you can also download a conference poster for display.

Proposals are now being solicited for afternoon splinter sessions. The proposal guidelines are available on the website. Splinter proposals are due by March 1, 2010.

Registration and abstract submission will open in March. Please sign up early, as our poster space is limited to 350 posters and priority will be given to those who register first. Registration and travel assistance may be available for students; submission will be accessible through the website by April.

We hope to see you in Seattle in late August, 2010.

Suzanne Hawley, for the SOC Cool Stars 16

Job Opening

Faculty Position in Observational Astronomy & Astrophysics (Tenure-Track)

Univ. of Texas at Arlington

A tenure-track opening in Observational Astronomy & Astrophysics is available at UT Arlington. Review of applications will begin immediately. For full details, see:

http://www.uta.edu/physics/main/phys_news/job_posts/index.html

Abstract Guidelines

Abstracts for *COOLNEWS* are solicited for papers that have been recently accepted by or submitted to refereed journals, and for recent Ph.D. theses. Abstracts for conference proceedings articles are *not* posted in *COOLNEWS*. The subject matter should pertain directly to cool stars (spectral types F,G,K,M or L), substellar objects, or the sun. Both theoretical and observational abstracts are appropriate.

Abstracts dealing with cool pre-main-sequence (PMS) stars will generally not be included in *COOLNEWS*, since they are already covered by the *Star Formation Newsletter*. Exceptions to this rule will be considered if the subject matter is truly cross-disciplinary. If you wish to submit a cross-disciplinary abstract on PMS stars, then first submit it to the *Star Formation Newsletter*. After doing so, submit the abstract to *COOLNEWS* accompanied by a short e-mail stating that it has already been submitted to the *Star Formation Newsletter*, and summarizing why it will be of interest to the cool star/solar community at large.

A monthly call for abstracts will be issued and abstracts received by the last day of the month will usually appear in the following month's newsletter. Announcements of general interest to the cool star and solar communities may also be submitted for posting in the newsletter. These might include (but are not restricted to) the following: (i) *Job Openings* directed toward cool star or solar researchers, (ii) announcements of *Upcoming Meetings*, (iii) announcements of *Upcoming Observing Campaigns* for which participation is solicited from the community at large, (iv) reviews of *New Books*, and (v) *General Announcements* that provide or request research-related information. Please send all correspondence to the editor at coolnews@jila.colorado.edu. Abstract templates and back issues can be obtained from the COOLNEWS Web-page at

`http://casa.colorado.edu/~skinners/coolnews.html` .

*** Please send abstracts in the body of the message and *not* as attachments.***