COOLNEWS

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The Praesepe open cluster represents a puzzle since it has about the same age as the Hyades, and only slightly different metallicity, yet previous *ROSAT* observations resulted in a detection rate of cluster sources significantly lower than for the Hyades. We present a new 50 ksec observation of Praesepe performed with the EPIC instrument on board XMM-*Newton*, which resulted in the detection of $\sim$ 200 sources, including 48 cluster members. We detected all solar-type (F–G) stars in the field of view, $\sim$ 90% of the K stars and $\sim$ 70% of the M stars. We find that the distribution of X-ray luminosities of solar-type Praesepe members is comparable to that of the Hyades, in contrast with the previous *ROSAT* results; however, the disagreement between the *ROSAT* and XMM-*Newton* results appears to be mostly due to X-ray faint Praesepe members falling outside the XMM-*Newton* field of view, while it is considerably reduced when considering only the subsample of stars in the *ROSAT* survey in common with the present observation. The finding supports an earlier suggestion that Praesepe may be formed by two merged clusters of different age.

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X-Ray Variability of Pleiades Late-Type Stars as Observed with the ROSAT-PSPC

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We present a comprehensive analysis of X-ray variability of the late-type (dF7-dM) Pleiades stars, detected in all ROSAT-PSPC observations; X-ray variations on short (hours) and medium (months) time scales have been explored. We have grouped the stars in two samples: 89 observations of 42 distinct dF7-dM2 stars and 108 observations of 61 dK3-dM stars.
The Kolmogorov-Smirnov test applied on all X-ray photon time series show that the percentage of cases of significant variability is quite similar on both samples, suggesting that the presence of variability does not depend on mass for the time scales and mass range explored.
The comparison between the Time X-ray Amplitude Distribution functions (XAD) of the set of dF7-dK2 and of the dK3-dM show that, on short time scales, dK3-dM stars show larger variations than dF7-dK2.
A subsample of eleven dF7-dK2 and eleven dK3-dM Pleiades stars allows the study of variability on longer time scales: we found that variability on medium - long time scales is relatively more common among dF7-dK2 stars than among dK3-dM ones.

For both dF7-dK2 Pleiades stars and dF7-dK2 field stars, the variability on short time scales depends on L_x while this dependence has not been observed among dK3-dM stars. It may be that the variability among dK3-dM stars is dominated by flares that have a similar luminosity distribution for stars of different L_x, while flaring distribution in dF7-dK2 stars may depend on X-ray luminosity. The lowest mass stars show significant rapid variability (flares?) and no evidence of rotation modulation or cycles. On the contrary, dF7-dK2 Pleiades stars show both rapid variability and variations on longer time scales, likely associated with rotational modulation or cycles.

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Solar-like Oscillations

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The five-minute oscillations in the Sun have provided a wealth of information about the solar interior. After many attempts, positive detections of similar oscillations in solar-type stars have now been made. This review discusses the properties of solar-like oscillations, the methods used to observe them and the results on individual stars. We conclude that the study of solar-like oscillations from the ground and space has an exciting future.

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SV Cam Spot Activity in February 2001 - March 2002

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We present the analysis of new BVR light curves for the active star SV Cam. The Roche model with spotted areas on the hotter primary component fits satisfactorily all filter observations yielding two spots in intermediate latitudes and covering about 1.5% each of the stellar surface. Both are ∼1000 K cooler than surrounding photosphere. The

comparison with an earlier season (January/February 2000) suggests that the spots probably evolved in area longitude and latitude but basic and preferred orientation from previous season is confirmed.

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Angular Momentum Transport by Internal Gravity Waves. I - Pop I Main Sequence Stars

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We examine the generation of gravity waves by the surface convection zone of low-mass main sequence stars with solar metallicity. It is found that the total momentum luminosity in waves rises with stellar mass, up to the quasi-disappearance of the convection zone around 6500 K (corresponding to a mass of $\sim$1.4 $M_\odot$ for solar metallicity) where the luminosity drastically drops. We calculate the net momentum extraction associated with these waves and explain how the calculated mass dependence helps resolve the enigma of the Li dip in terms of rotational mixing, forming a coherent picture of mixing in all main sequence stars.

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The Quiescent Corona of VB 10

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We present results from a *Chandra* ACIS observation of the M8 dwarf star VB 10, a star near the hydrogen-burning mass limit. Until now, VB 10 has only been detected to flare at X-ray wavelengths. We can now report that non-flare, "quiescent," X-ray emission has been detected with a luminosity, $L_X = 2.4\ (\pm 0.05) \times 10^{25}$ ergs s^{-1} and log (L_x/L_{bol}) = -4.9. This is consistent with the previous *ROSAT* non-detections of quiescent emission from VB 10. We discuss the implications of this discovery for the nature of coronae in ultracool dwarfs.

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Luminosity and Mass Function of the Galactic Open Cluster NGC 2422

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We present *UBVRI* photometry of the open cluster NGC 2422 (age $\sim 10^8$ yr) down to a limiting magnitude $V \simeq 19$. These data are used to derive the Luminosity and Mass Functions and to study the cluster spatial distribution. By considering the color-magnitude diagram data and adopting a representative cluster main sequence, we obtained a list of candidate cluster members based on a photometric criterion. Using a reference field region and an iterative procedure, a correction for contaminating field stars has been derived in order to obtain the Luminosity and the Mass Functions in the $M = 0.4 - 3.5\ M_\odot$ range. By fitting the spatial distribution, we infer that a non-negligible number of cluster stars lies outside our investigated region. We have estimated a correction to the Mass Function of the

cluster in order to take into account the "missing" cluster stars. The Present Day Mass Function of NGC 2422 can be represented by a power-law of index $\alpha = 3.07 \pm 0.08$ (rms) – the Salpeter Mass Function in this notation has index $\alpha = 2.35$ – in the mass range $0.9 \leq M/M_\odot \leq 2.5$. The index α and the total mass of the cluster are very similar to those of the Pleiades.

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An Estimate of the Sun's ROSAT-PSPC X-ray Luminosities Using SNOE-SXP Measurements

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Using solar soft X-ray irradiance measurements from the SXP instrument on the SNOE satellite, we relate the solar surface flux densities and their variability to those of stars as measured with the PSPC instrument on ROSAT. We translate SNOE-SXP measurements into equivalent ROSAT-PSPC counts using model spectra calculated from the CHIANTI package. Using the SNOE-SXP measurements has significant advantages over earlier studies: the absolute calibration is known to ±25%, SNOE measures the Sun as if it were an unresolved star, it has operated over a significant fraction of the solar cycle, and its three wavelength channels overlap substantially with that of the ROSAT-PSPC instrument. The predicted solar X-ray luminosities and surface flux densities are compared with measurements from the ROSAT database. We find that we can estimate the luminosity of the Sun as seen in the 0.1-2.4 keV (*"RASS"*) passband of ROSAT-PSPC, to within ±50%, not counting sources of systematic uncertainty mentioned in an Appendix: the result lies between $10^{27.1}$ and $10^{27.75}$ $\mathrm{ergs\,s^{-1}}$ (measured in the existing data set, only partially covering a full solar cycle) and between $10^{26.8}$ and $10^{27.9}$ $\mathrm{ergs\,s^{-1}}$ (extrapolated to the full activity range of a typical solar cycle). The solar luminosities lie close to the median behavior found for a volume limited ($d < 13$ pc) sample of G stars studied in 1997 by Schmitt, revealing the Sun to be a normal or slightly inactive G dwarf. A factor of 1.5 peak-to-peak variation in the *RASS* passband is predicted due simply to rotational modulations (i.e. those filtered to include periods $P < 81$ days). The ratio of maximum/minimum *RASS* luminosities from the magnetic activity cycle (filtered to include periods $P > 81$ days) are estimated to be 0.7-0.8 in $\log_{10} L_{RASS}$, a ratio of 5 or 6. These variations are much smaller than both recent estimates of solar X-ray variability and the range of X-ray luminosities seen within Schmitt's sample. It is suggested that the reported absence of "solar-like" cyclic emission in stellar X-rays might partly arise because the Sun is less variable than assumed in some earlier work. Repeated ROSAT observations of α Cen A during 1995-1998 show X-ray behavior reminiscent of the Sun during activity minimum conditions.

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A New Multiple Stellar System in the Solar Neighborhood

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Adaptive optics corrected images obtained with the CIAO instrument at the Subaru 8.2-meter telescope show the presence of two subarsecond companions to the nearby (d=19.3 pc) young star GJ 900, which was previously classified as a single member of the IC 2391 supercluster. The two companions share the same proper motion as the primary and are redder. Their projected separations from the primary are 10 AU and 14.5 AU for B and C, respectively. The estimated masses for the two new companions depend strongly on the age of the system. For the range of ages found in the literature for IC 2391 supercluster members (from 35 Myr to 200 Myr), the expected masses range from 0.2 $M_\odot$ to 0.4 $M_\odot$ for the B component, and from 0.09 $M_\odot$ to 0.22 $M_\odot$ for the C component. The determination of the dynamical mass of the faintest component of GJ 900 will yield the age of the system using theoretical evolutionary tracks. The apparent separations of the GJ 900 system components meet the observational criterion for an unstable Trapezium-type system, but this could be a projection effect. Further observations are needed to establish the nature

of this interesting low-mass multiple system..

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Interferometry and Asteroseismology: The Radius of τ Cet

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We have determined from interferometry the radius of the nearby star τ Cet, using recent observations with the VINCI instrument on VLTI using the siderostats. The limb-darkened disk diameter is determined, with an unprecedented internal precision of 0.5%, to be $1.971 \pm 0.009_{\rm (int.)} \pm 0.05_{\rm (ext.)}$ mas, corresponding to a physical radius of $0.773 \pm 0.004_{\rm (int.)} \pm 0.02_{\rm (ext.)}\,{\rm R}_\odot$. With this determination τ Cet becomes a prime target for asteroseismic campaigns to determine its internal structure, and thereby test stellar evolution theory. We discuss implications for asteroseismology and present predictions for oscillation properties.

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On the Rotational Evolution of Solar- and Late-type Stars, Its Magnetic Origins, and the Possibility of Stellar Gyrochronology

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We propose a simple interpretation of the rotation period data for solar- and late-type stars. The open cluster and Mt. Wilson star observations suggest that rotating stars lie primarily on two sequences, initially called *I* and *C*. Some stars lie in the intervening gap. These sequences, and the fractional numbers of stars on each sequence evolve systematically with cluster age, enabling us to construct crude rotational isochrones allowing 'stellar gyrochronology', a procedure, upon improvement, likely to yield ages for individual field stars.

The age and color dependences of the sequences allow the identification of the underlying mechanism, which appears to be primarily magnetic. The majority of solar- and late-type stars possess a dominant Sun-like, or *Interface* magnetic field, which connects the convective envelope both to the radiative interior of the star and to the exterior where winds can drain off angular momentum. These stars spin down Skumanich-style. An age-decreasing fraction of young G, K, and M stars, which are rapid rotators, possess only a *Convective* field which is not only inefficient in depleting angular momentum, but also incapable of coupling the surface convection zone to the inner radiative zone, so that only the outer zone is spun down, and on an exponential timescale. These stars do not yet possess large-scale dynamos.

The large-scale magnetic field associated with the dynamo, apparently created by the shear between the decoupled radiative and convective zones, (re)couples the convective and radiative zones and drives a star from the Convective to the Interface sequence through the gap on a timescale that increases as stellar mass decreases. Fully convective stars do not possess such an interface, cannot generate an Interface dynamo, and hence can never make such a transition. Helioseismic results for the present day Sun agree with this scheme, which also explains the rotational bi-modality observed by Herbst and collaborators among pre-main sequence stars, and the termination of this bi-modality when stars become fully convective. This paradigm also provides a new basis for understanding stellar X-ray and chromospheric activity, light element abundances, and perhaps other stellar phenomena that depend on rotation.

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A Connection Between the Morphology of the X-ray Emission and Rotation for Solar-type Stars in Open Clusters

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It is suggested that the three-segmented morphology of the soft X-ray emission from cluster and field stars may be understood in terms of the recent classification of rotating stars into three kinds: those lying on the *convective* sequence, on the *interface* sequence, or in the *gap* between them.

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Solar Abstracts

Alfvénic Turbulence in the Extended Solar Corona: Kinetic Effects and Proton Heating

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We present a model of magnetohydrodynamic (MHD) turbulence in the extended solar corona that contains the effects of collisionless dissipation and anisotropic particle heating. Recent observations have shown that preferential heating and acceleration of positive ions occurs in the first few solar radii of the high-speed solar wind. Measurements made by the Ultraviolet Coronagraph Spectrometer aboard *SOHO* have revived interest in the idea that ions are energized by the dissipation of ion cyclotron resonant waves, but such high-frequency (i.e., small wavelength) fluctuations have not been observed. A turbulent cascade is one possible way of generating small-scale fluctuations from a pre-existing population of low-frequency MHD waves. We model this cascade as a combination of advection and diffusion in wavenumber space. The dominant spectral transfer occurs in the direction perpendicular to the background magnetic field. As expected from earlier models, this leads to a highly anisotropic fluctuation spectrum with a rapidly decaying tail in the parallel wavenumber direction. The wave power that decays to high enough frequencies to become ion cyclotron resonant depends on the relative strengths of advection and diffusion in the cascade. For the most realistic values of these parameters, though, there is insufficient power to heat protons and heavy ions. The dominant oblique fluctuations (with dispersion properties of kinetic Alfvén waves) undergo Landau damping, which implies strong parallel electron heating. We discuss the probable nonlinear evolution of the electron velocity distributions into parallel beams and discrete phase-space holes (similar to those seen in the terrestrial magnetosphere) which can possibly heat protons via stochastic interactions.

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Solar Quadrupole Moment and General Relativity

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The perihelion advance of the orbit of Mercury has long been one of the observational cornerstone for testing General

Relativy. The main goal of this paper is to discuss how, presently, observational and theoretical constraints may challenge Einstein's theory of gravitation characterized by $\beta = \gamma = 1$. To achieve this purpose, we will first recall the experimental constraints upon the Eddington-Robertson parameters γ, β and the observational bounds for the perihelion advance of Mercury, $\Delta\omega_{obs}$.
A second point will address the values given, up to now, to the solar quadrupole moment by several authors. Then, we will briefly comment why we use a recent theoretical determination of the solar quadrupole moment, $J_2 = (2.0 \pm 0.4)\ 10^{-7}$ which takes into account both surfacic and internal differential rotation, in order to compute the solar contribution to Mercury's perihelion advance.
Further on, combining bounds on γ and J_2 contributions, and taking into account the observational data range for $\Delta\omega_{obs}$, we will be able to give a range of values for β. Alternatively, taking into account the observed value of $\Delta\omega_{obs}$, one can deduce a dynamical estimation of J_2 in the setting of G.R. This point is important as it provides a solar model independent estimation that can be confronted with other determinations of J_2 based upon solar theory and solar observations (helioseismic data, visual oblateness...). Finally, a glimpse at future satellite experiments will help us to understand how stronger constraints upon the parameter space (γ, β, J_2) as well as a separation of the two contributions (from the quadrupole moment, J_2, or purely relativistic, $2\alpha^2 + 2\alpha\gamma - \beta$ might be expected in the future.

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Active Longitudes in Sunspot Activity: Century Scale Persistence

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A novel analysis of sunspot group data for the past 120 years reveals that sunspots in both northern and southern hemispheres are formed preferably in two persistent active longitudes separated by 180°. In the Carrington reference frame, the active longitudes continuously migrate in phase with respect to the Carrington meridian with a variable rate. They remain however a quasi-rigid structure. We find that the migration of the active longitudes is determined by changes of the mean latitude of sunspots and the differential rotation. The differential rotation rate calculated from the migration is in agreement with SOHO/MDI measurements. The two active longitude periodically alternate being the dominant region, similar to the "flip-flop" phenomenon known in starspot activity. The period of the oscillations is 3.8 and 3.65 years in the north and south, respectively. The difference between the periods is significant and can be related to the known north-south asymmetry in the solar magnetic activity. Our results provide new observational constraints for current solar dynamo models and strengthen the solar paradigm for magnetic activity on cool stars.

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The Observation of Sunspot Light-Bridge Structure and Dynamics

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We present very high resolution multiwavelength images of a sunspot light bridge in NOAA Active Region 10132 taken at the Swedish 1m Solar Telescope on La Palma on 2002 September 25. The adaptive optics-corrected images resolve 100 km scale bright grains on either side of an approximately 380 km dark lane in the center of the bridge. Movies of the data show the grains in a steady unidirectional flow with an average speed of 900 m s−1 along the entire length of the bridge. Overturning motions are seen in the larger grains, suggesting a convective origin for these structures. Simultaneous 160 nm ultraviolet images from the *Transition Region and Coronal Explorer (TRACE)* satellite show a constant brightness enhancement over the light bridge, implying a steady chromospheric heat source. *TRACE* 160 nm movies do not resolve the unidirectional flow; instead, they suggest that a horizontal oscillatory motion exists in the chromosphere of the light bridge. A C2.0 flare at 16:00 UT, one ribbon of which occurs directly along the light

bridge, indicates a high level of magnetic stress and impulsive dissipation associated with the observed light-bridge dynamics.

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Surface Imaging of Stellar Non-Radial Pulsations. I. Inversions of Simulated Data

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We investigate capability of the stellar surface imaging technique for studying stellar non-radial pulsations on the basis of inversions of time series of variable line profiles without making assumptions on the specific shape of the pulsations. The inversion results in an image of the stellar surface in which sectoral and tesseral modes can be distinguished in many cases, and the pulsational degree ℓ and the azimuthal order $|m|$ can be determined. We find that sectoral and tesseral modes with $\ell - |m| = 2$ (or any even number) can be successfully restored under various conditions (different inclinations of the rotational axis, surface temperature or velocity fluctuations due to pulsations). Tesseral modes with $\ell - |m| = 1$ (or any odd number) do not show significant line profile variations at higher inclinations of the rotational axis, and, thus, no information can be recovered from line profiles. At lower inclinations, only the azimuthal order $|m|$ of such modes can be recovered. We conclude that stellar surface imaging is a useful technique for pulsation-mode identification.

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Surface Imaging of Stellar Non-Radial Pulsations. II. The β Cephei Star ω^1 Sco

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We apply the surface imaging technique to high-resolution spectra of the rapidly rotating β Cep-type star ω^1 Sco which shows strong line-profile variations in the Si III λ 4552, 4567, 4574Å triplet. These variations have been interpreted in terms of non-radial pulsations by Telting & Schrijvers (1998). Their analysis of the spectral time series with traditional Fourier transforms resulted in one significant frequency, suggesting that the profile variations are due to only one dominant pulsation mode. Here we apply a spectral inversion technique to the same time series of the profiles. Assuming only temperature fluctuations due to pulsations, we obtain an image of the dominant pulsation mode. We estimate the pulsation degree from the image, put constraints on the azimuthal number of the mode, and study the latitudinal distribution of the pulsation pattern. In addition to the known dominant mode we find traces of a second pulsation mode.

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THEMIS, BBSO, MDI and TRACE Observations of a Filament Eruption

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We describe a filament destabilization which occurred on May 5, 2001 in NOAA AR 9445, before a flare event. The analysis is based on $H\alpha$ data acquired by THEMIS operating in IPM mode, $H\alpha$ data and magnetograms obtained at the Big Bear Solar Observatory, MDI magnetograms and 171 Å images taken by TRACE. Observations at 171 Å show that ~ 2.5 hours before the flare peak, the western part of the EUV filament channel seems to split into two parts. The bifurcation of the filament in the $H\alpha$ line is observed to take place ~ 1.5 hours before the flare peak, while one thread of the filament erupts ~ 10 minutes before the peak of the flare.

Our analysis of longitudinal magnetograms shows the presence of a knot of positive flux inside a region of negative polarity, which coincides with the site of filament bifurcation. We interpret this event as occurring in two-steps: the first step, characterized by the appearance of a new magnetic feature and the successive reconnection in the lower atmosphere between its field lines and the field lines of the old arcade sustaining the filament, leads to a new filament channel and to the observed filament bifurcation; the second step, characterized by the eruption of part of the filament lying on the old PIL, leads to a second reconnection, occurring higher in the corona.

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Low-Mass and Substellar Abstracts

Gravity Indicators in the Near-Infrared Spectra of Brown Dwarfs

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We investigate the sensitivity to temperature and gravity of the strong absorption features in the J- and K-band spectra of substellar objects. We compare the spectra of giants and young M dwarfs (of low gravity) to field M and L dwarfs (of high gravity) and to model spectra from the Lyon group. We find that low-resolution spectra of M4 – M9 stars and young brown dwarfs at R $\sim$ 350 and $S/N > 70$ can determine the spectral type to a precision of $\pm$ 1 subtype, using the H_2O and CO bands, and can measure the surface gravity to $\pm$ 0.5 dex, using the atomic lines of KI and NaI. This result points toward the development of photometric spectral indices to separate low-mass members from foreground and background objects in young clusters and associations. We also emphasize the complexity of the interpretation of the empirical quantities (e.g., spectral types) in terms of the physical variables (e.g., temperature, opacities) in the cool atmospheres of young brown dwarfs.

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For preprints via ftp or WWW: http://arXiv.org/abs/astro-ph/0305147

Visual Orbit for the Low-mass Binary Gliese 22 AC from Speckle Interferometry

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Based on 14 data points obtained with near-infrared speckle interferometry and covering an almost entire revolution, we present a first visual orbit for the low-mass binary system Gliese 22 AC. The quality of the orbit is largely improved with respect to previous astrometric solutions. The dynamical system mass is $0.592 \pm 0.065\, M_{\odot}$, where the largest part of the error is due to the *Hipparcos* parallax. A comparison of this dynamical mass with mass-luminosity relations on the lower main sequence and theoretical evolutionary models for low-mass objects shows that both probably

underestimate the masses of M dwarfs. A mass estimate for the companion Gliese 22 C indicates that this object is a very low-mass star with a mass close to the hydrogen burning mass limit.

Accepted by A&A

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Rotational Periods of Very Young Brown Dwarfs and Very Low-mass Stars in Cha I

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We have studied the photometric variability of very young brown dwarfs and very low-mass stars (masses well below $0.2\,M_{\odot}$) in the Cha I star forming region. We have determined photometric periods in the Gunn i and R band for the three M6.5–M7 type brown dwarf candidates Cha Hα 2, Cha Hα 3 and Cha Hα 6 of 2.2 to 3.4 days. These are the longest photometric periods found for any brown dwarf so far. If interpreted as rotationally induced they correspond to moderately fast rotational velocities, which is fully consistent with their $v \sin i$ values and their relatively large radii. We have also determined periods for the two M5–M5.5 type very low-mass stars B 34 and CHXR 78C. In addition to the Gunn i and R band data, we have analysed JHK_S monitoring data of the targets, which have been taken a few weeks earlier and confirm the periods found in the optical data. Upper limits for the errors in the period determination are between 2 and 9 hours. The observed periodic variations of the brown dwarf candidates as well as of the T Tauri stars are interpreted as modulation of the flux at the rotation period by magnetically driven surface features, on the basis of a consistency with $v \sin i$ values as well as (R-i) color variations typical for spots. Furthermore, the temperatures even for the brown dwarfs in the sample are relatively high ($> 2800\,K$) because the objects are very young. Therefore, the atmospheric gas should be sufficiently ionized for the formation of spots on one hand and the temperatures are too high for significant dust condensation and hence variabilities due to clouds on the other hand. A comparison with rotational properties of older brown dwarfs shows that most of the acceleration of brown dwarfs takes place within the first 30 Myr or less. If magnetic braking plays a role this suggests that the disk dissipation for brown dwarfs occurs between a few Myrs and 36 Myr.

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or astro-ph/0305397

The CORALIE Survey for Southern Extra-solar Planets XI. The return of the Giant Planet Orbiting HD 192263

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The presence of a planet around the K dwarf HD 192263 was recently called into question by the detection of a periodic photometric signal with the same period as the one observed in radial velocity. In this paper, we investigate this possibility, using a combination of radial-velocity, photometry, and bisector measurements obtained simultaneously. The results show that while the observed radial-velocity variation is always very stable in phase, period, and amplitude, the photometric signal changes with time. The combined information strongly suggests that the observed radial-velocity variation is being produced by the presence of a planet, as firstly proposed. The photometric variations are either not connected to the planetary companion, or can eventually be induced by the interaction between the planet and the star. Finally, the radial-velocity data further show the presence of a long term trend, whose origin, still not clear, might be related to the presence of another companion to the system.

Accepted by A&A

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Chemical Abundances of Planet-host Stars: Results for Alpha and Fe-group Elements

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In this paper, we present a study of the abundances of Si, Ca, Sc, Ti, V, Cr, Mn, Co, and Ni in a large set of stars known to harbor giant planets, as well as in a comparison sample of stars not known to have any planetary-mass companions. We have checked for possible chemical differences between planet hosts and field stars without known planets. Our results show that overall, and for a given value of [Fe/H], the abundance trends for the planet hosts are nearly indistinguishable from those of the field stars. In general, the trends show no discontinuities, and the abundance distributions of stars with giant planets are high [Fe/H] extensions to the curves traced by the field dwarfs without planets. The only elements that might present slight differences between the two groups of stars are V, Mn, and to a lesser extent Ti and Co. We also use the available data to describe galactic chemical evolution trends for the elements studied. When comparing the results with former studies, a few differences emerge for the high [Fe/H] tail of the distribution, a region that is sampled with unprecedented detail in our analysis.

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An HST/WFPC2 Survey for Brown Dwarf Binaries in the αPersei and the Pleiades Open Clusters

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We present the results of a high-resolution imaging survey for brown dwarf binaries in two open clusters. The observations were carried out with the Wide Field Planetary Camera 2 onboard the Hubble Space Telescope. Our sample consists of 8 brown dwarf candidates in αPersei and 25 brown dwarf candidates in the Pleiades. We have resolved 4 binaries in the Pleiades with separations in the range $0''.094$–$0''.058$, corresponding to projected separations between 11.7 AU and 7.2 AU. No binaries were found among the αPersei targets. Three of the binaries have proper motions consistent with cluster membership in the Pleiades cluster, and for one of them we report the detection of H_α in emission and LiI absorption obtained from Keck II/ESI spectroscopy. One of the binaries does not have a proper motion consistent with Pleiades membership. We estimate that brown dwarf binaries wider than 12 AU are less frequent than 9% in the αPersei and Pleiades clusters. This is consistent with an extension to substellar masses of a trend observed among stellar binaries: the maximum semimajor axis of binary systems decreases with decreasing primary mass. We find a binary frequency of 2 binaries over 13 brown dwarfs with confirmed proper motion membership in the Pleiades, corresponding to a binary fraction of $15^{+15}_{-5}\%$. These binaries are limited to the separation range 7-12 AU and their mass ratios are larger than 0.7. The observed properties of Pleiades brown dwarf binaries appear to be similar to their older counterparts in the solar neighborhood. The relatively high binary frequency ($\geq 10\%$), the bias to separations smaller than about 15 AU and the trend to high mass ratios (q$\geq$0.7) are fundamental properties of brown dwarfs. Current theories of brown dwarf formation do not appear to provide a good description of all these properties.

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The Spectra of T Dwarfs. II. Red Optical Data

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We present 6300–10100 Å spectra for a sample of 13 T dwarfs observed using LRIS mounted on the Keck I 10m Telescope. A variety of features are identified and analyzed, including pressure-broadened K I and Na I doublets; narrow Cs I and Rb I lines; weak CaH, CrH, and FeH bands; strong H_2O absorption; and a possible weak CH_4 band. Hα emission is detected in three of the T dwarfs, strong in the previously reported active T dwarf 2MASS 1237+6526 and weak in SDSS 1254−0122 and 2MASS 1047+2124. None of the T dwarfs exhibit Li I absorption. Guided by the evolution of optical spectral features with near-infrared spectral type, we derive a parallel optical classification scheme, focusing on spectral types T5 to T8, anchored to select spectral standards. We find general agreement between optical and near-infrared types for nearly all of the T dwarfs so far observed, including two earlier-type T dwarfs, within our classification uncertainties (~1 subtype).

These results suggest that competing gravity and temperature effects compensate for each other over the 0.6–2.5 μm spectral region. We identify one possible means of disentangling these effects by comparing the strength of the K I red wing to the 9250 Å H_2O band. One of our objects, 2MASS 0937+2931, exhibits a peculiar spectrum, with a substantial red slope and relatively strong FeH absorption, both consequences of a metal-deficient atmosphere. Based on its near-infrared properties and substantial space motion, this object may be a thick disk or halo brown dwarf.

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The First Substellar Subdwarf? Discovery of a Metal-poor L Dwarf with Halo Kinematics

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We present the discovery of the first L-type subdwarf, 2MASS J05325346+8246465. This object exhibits enhanced collision-induced H_2 absorption, resulting in blue NIR colors ($J - K_s = 0.26 \pm 0.16$). In addition, strong hydride bands in the red optical and NIR, weak TiO absorption, and an optical/J-band spectral morphology similar to the L7 DENIS 0205−1159AB imply a cool, metal-deficient atmosphere. We find that 2MASS 0532+8246 has both a high proper motion, $\mu = 2.60 \pm 0.15$ " yr^{-1}, and a substantial radial velocity, $v_{rad} = -195 \pm 11$ km s^{-1}, and its probable proximity to the Sun (d = 10–30 pc) is consistent with halo membership. Comparison to subsolar-metallicity evolutionary models strongly suggests that 2MASS 0532+8246 is substellar, with a mass of $0.077 \leq M \leq 0.085$ M_{sun} for ages 10–15 Gyr and metallicities $Z = 0.1 - 0.01$ Z_{sun}. The discovery of this object clearly indicates that star formation occurred below the Hydrogen burning mass limit at early times, consistent with prior results indicating a flat or slightly rising mass function for the lowest-mass stellar subdwarfs. Furthermore, 2MASS 0532+8246 serves as a prototype for a new spectral class of subdwarfs, additional examples of which could be found in NIR proper motion surveys.

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For preprints via ftp or WWW: http://xxx.lanl.gov/abs/astro-ph/0304174

Upcoming Meeting (SIRTF Workshop)

SIRTF Observation Planning Workshop
Pasadena, CA
25 - 26 July 2003

Website: http://sirtf.caltech.edu/SSC/ost/workshop/2003b/

Contact: obsplan@ipac.caltech.edu

The SIRTF Science Center (SSC) is pleased to announce a 2-day observation planning workshop to be held at the SSC, Pasadena, CA, on 25-26 July 2003. The format of this workshop will be similar to the ones held at the SSC in November and December 2002 and will provide insight and information on SIRTF capabilities, plus the observation and proposal planning tools available for download from the SSC website.

There is no registration fee associated with the workshop, but we only have 40 workshop places available. Ph.D.-level astronomers and graduate students are eligible to attend. No restrictions are made as to nationality or institution. Places at the workshop will be given on a first-come-first-served basis.

If you are interested in attending, workshop information, registration and hotel information is available online at:

http://sirtf.caltech.edu/SSC/ost/workshop/2003b/

The deadline for the hotel block booking is 11 July.

Upcoming Meeting

The Coronae and Winds of the Sun and Solar-Like Stars
Freiburg, Germany
16 - 17 Sept. 2003

A splinter meeting on *The Coronae and Winds of the Sun and Solar-Like Stars* will take place at the Annual Meeting of the Astronomische Gesellschaft (AG) 2003 on "The Sun and Planetary Systems - Paradigms for the Universe" Freiburg, 15 - 20 September 2003

The Sun and solar-like stars are surrounded by a million Kelvin hot corona that by far exceeds the temperature at the stellar surface. The question of what heats the corona is one of the most interesting problems in stellar astrophysics. With recent solar and stellar space missions like SOHO, TRACE, CHANDRA or XMM/Newton as well as progress in modeling, many new findings have been added to the puzzle of coronal physics. Quite often these have raised more questions than answered.

The aim of this focused splinter meeting is to bring together different aspects of the physics of coronae and winds. How can we use observations of the solar corona to learn about stars and vice versa? What kind of observations are actually useful to compare the Sun and stars? How can we bring together concepts of MHD modeling and plasma physics to describe the relevant processes?

The splinter meeting will take place during two afternoon sessions most probably on Sept 16 and 17.

For more information please check http://www.kis.uni-freiburg.de/~peter/splinter03/

or send an e-mail to: peter@kis.uni-freiburg.de

Announcement

Summer School on Plasma Physics
Chalkidiki, Greece
22 - 27 September 2003

A summer school on "Basic Processes of Turbulent Plasmas" will take place in Chalkidiki, Greece, between 22 - 27 September 2003. The school is organized by the Research Training Network "Theory, Observations and Simulations of Turbulence in Space Plasmas" which is funded by the European Union. Researchers at the pre- and post-doctoral level are encouraged to apply to the school before the end of June 2003. Participation will be limited to 30-40 students and the lectures will be at the graduate level.

More information about the school can be found at:

http://www.astro.auth.gr/~vlahos/school.html

Job Openings

JOB OPENING (Student Positions)

Openings for Ph.D.Students in Solar System Physics
Max Planck Institute; Univ. of Braunschweig; Univ. of Goettingen
Germany

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

The program covers the full range of physics inherent in the field of solar system science from geophysics and planetary physics to solar physics as well as the underlying fundamental physics.

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

A prerequisite is a diploma or a master of science degree in physics.

The next PhD program will start on 1 January 2004, review of application begins on 1 July 2003. Successful applicants will receive adequate financial support.

For details about the Research School and the application material visit

http://www.solar-system-school.de

or email to: info@solar-system-school.de.

Address applications to:

Dr. Dieter Schmitt Coordinator of IMPRS on Solar System Physics Max Planck Institute for Aeronomy Max-Planck-Str. 2 37191 Katlenburg-Lindau Germany Tel: +49 5556 979 431 Fax: +49 5556 979 190

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.***