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Abstracts of recently accepted papers

Collapse and Fragmentation of Molecular Cloud Cores. VI. Slowly-Rotating Magnetic Clouds

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Fragmentation during gravitational collapse has been reasonably successful at explaining the formation of binary and multiple stars, yet nearly all fragmentation calculations have ignored the effects of magnetic fields. The previous paper in this series attempted to remedy this oversight by including magnetic field effects in fully three dimensional models of cloud collapse. These models allowed for magnetic field loss by ambipolar diffusion, and showed that fragmentation is likely to occur during the resulting collapse of initially prolate, rapidly-rotating, magnetically-supported cloud cores. The main effect of the magnetic field was simply to delay the onset of the collapse phase. These calculations have now been extended to include the collapse of slowly-rotating, magnetic clouds, including clouds that rotate so slowly that binary fragmentation does not occur. The new models show that a cloud initially in either solid-body or differential rotation can fragment into a binary protostar, provided that its ratio of rotational to gravitational energy (β_i) exceeds about 0.01. Because the clouds with $\beta_i < 0.01$ fragment in the absence of magnetic fields, evidently magnetic fields can stifle fragmentation as well as delay collapse. The numerical models satisfy the Jeans conditions for physically realistic fragmentation, and a relatively high spatial resolution calculation indicates convergence to the binary fragmentation solution for rapidly-rotating clouds. Because the critical value of β_i for fragmentation falls close to the median of the observed distribution of rotational energies for dense molecular cloud cores, the results imply that roughly half of all cloud cores should form binary stars, a prediction that is consistent with the observed frequency of binary stars.

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New Three Micron Spectra of Young Stellar Objects with H_2O Ice Bands

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We present new groundbased 3 μm spectra of 14 young stellar objects with H_2O ice absorption bands. The broad absorption feature at 3.47 μm was detected toward all objects and its optical depth is correlated with the optical depth of H_2O ice, strengthening an earlier finding. The broad absorption feature at 3.25 μm was detected toward two more sources and an upper limit is given for a third source. The optical depths of the 3.25 μm feature obtained to date are better correlated with the optical depth of the refractory silicate dust than with that of H_2O ice. If this trend is confirmed, this would support our proposed identification of the feature as the C–H stretch of aromatic hydrocarbons at low temperature. An absorption feature at 3.53 μm due to solid methanol was detected for the first time toward MonR2/IRS2, as well as toward W33A and GL 2136. The wavelengths of the CH_3OH features toward W33A, GL 2136, and NGC7538/IRS9 can be fit by CH_3OH-rich ices, while the wavelength of the feature toward MonR2/IRS2 suggests an H_2O-rich ice environment. Solid methanol abundances toward GL 2136, NGC7538/IRS9, and MonR2/IRS2 are 3-5 % relative to H_2O ice. There is an additional narrow absorption feature near 3.47 μm toward W33A. For the object W51/IRS2, spatially resolved spectra from 2 to 4 μm indicate that the H_2O ice is located predominantly in front of

the eastern component and that the H_2O ice extinction is much deeper than previously estimated. For the object RNO 91, spectra from 2 to 4 μm reveal stellar (or circumstellar) CO gas absorption and deeper H_2O ice extinction than previously estimated.

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Mapping of the extinction in Giant Molecular Clouds using optical star counts

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This paper presents large scale extinction maps of most nearby Giant Molecular Clouds of the Galaxy (Lupus, ρ Ophiuchus, Scorpius, Coalsack, Taurus, Chamaeleon, Musca, Corona Australis, Serpens, IC 5146, Vela, Orion, Monoceros R1 and R2, Rosette, Carina) derived from a star count method using an adaptive grid and a wavelet decomposition applied to the optical data provided by the USNO-Precision Measuring Machine. The distribution of the extinction in the clouds leads to estimate their total individual masses M and their maximum of extinction. I show that the relation between the mass contained within an iso–extinction contour and the extinction is similar from cloud to cloud and allows the extrapolation of the maximum of extinction in the range 5.7 to 25.5 magnitudes. I found that about half of the mass is contained in regions where the visual extinction is smaller than 1 magnitude. The star count method used on large scale ($\sim$ 250 square degrees) is a powerful and relatively straightforward method to estimate the mass of molecular complexes. A systematic study of the all sky would lead to discover new clouds as I did in the Lupus complex for which I found a sixth cloud of about $10^4\,M_\odot$.

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Preprint available at http://denisexg.obspm.fr/∼cambresy/

The Mid-Infrared Properties of Three Star Forming Sites in NGC 6334

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To investigate their dust properties, we have imaged three sites of massive star formation in the giant H II region/star-forming cloud NGC 6334 with the MIRAC2 instrument. We obtained high-resolution (1 arcsec) continuum images at 12.5 and 20.6 μm toward each region, which were compared with radio and near-infrared (near-IR) continuum emission. Both compact sources and extended emission were found at all three star forming sites. The detected sources span a wide range of evolutionary states in this highly complex star forming cloud. The infrared sources near NGC 6334 I were resolved into at least four sub-sources. One such source is substantially colder, denser, and more optically thick than the other mid-IR sources in the region, and may be at the earliest stages of stellar formation. Another may be a torus or disk of dust and gas surrounding an embedded B star. NGC 6334 I was also imaged at additional wavelengths (8.8, 9.8, and 11.7 μm) to search for silicate absorption. Only at the H II region is there a deep silicate absorption feature from foreground dust. Toward the NGC 6334 IV, warm dust is associated with both the inner portions of the massive molecular torus or disk and with the bipolar continuum lobes. A compact mid-IR source, associated with the near-IR and radio source [HHS87] IRS 20, is cooler and more optically thick than the dust emission associated with the H II region. Toward NGC 6334 V, four embedded sources were found, including one previously unidentified object. This newly identified compact object, associated with a dust temperature peak and a radio source, is probably in a more advanced stage of star formation than the other compact mid-IR sources in NGC 6334.

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Preprints available from http://buast7.bu.edu/∼kraemer/

Radio emission from RASS sources south of Taurus-Auriga

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We present a 8.4 GHz VLA survey of 50 optical counterparts to 46 ROSAT All-Sky survey (RASS) X-ray sources south of the Taurus-Auriga star-forming region. This survey detected 3 sources with a sensitivity limit of ~ 0.12 mJy. Merging our sample with other radio observations of sources in and around Taurus-Auriga, we find scarce radio emission among RASS sources south of the Taurus-Auriga molecular clouds. Our data support the evidence that these sources are older than weak-lined T Tauri stars, most of them probably being close to the ZAMS.

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Preprints available at http://xxx.lanl.gov/abs/astro-ph/9903125

The ISO spectrum of the young star HD 142527

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We present a detailed analysis of SWS (2.35-45 μm) and LWS (43-200 μm) spectra obtained with the Infrared Space Observatory (ISO) (Kessler et al. 1996) of the dusty circumstellar disk surrounding the isolated young

Fe star HD 142527. Two dust populations can be clearly discriminated: a warm component which is dominated by very strong silicate emission at 10 μm, but in which C-rich dust is observable as well, and a cool component, of which the spectrum is dominated by O-rich dust features (C-rich dust not cause obvious features in the far infrared). Besides silicates, crystalline water-ice and hydrous silicates - which are also found in interplanetary dust particles - are present in the cold circumstellar environment. The ISO spectrum of HD 142527 differs markedly from that of HD 100546 (Malfait et al. 1998) and other objects in a similar evolutionary stage and with a similar broad-band energy distribution. No clear correlations between the spectral dust signatures and the stellar parameters can be found at the present stage.

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The η Cha Cluster: A Remarkable New Nearby Young Open Cluster

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A cluster of young, X-ray-emitting stars is found in the vicinity of η Chamaeleontis from a deep *ROSAT* HRI observation. The 12 X-ray sources have prominent ($R = 5 - 14$) stellar counterparts, including two early-type stars (η Cha and RS Cha) and 10 Li-rich, Hα emission-line, late-type stars (K4–M5). *Hipparcos* astrometry reveals that η Cha, RS Cha and nearby HD 75505 are co-moving at $d \simeq 97$ pc. The late-type stars have all the properties of pre-main sequence weak-lined T Tauri stars: high magnetic activity, high Li abundance and (assuming $d = 97$ pc) bolometric luminosities $1 - 2$ mag above the main sequence with ages ranging from 2 to 18 Myr. As with the TW Hya association, the η Cha cluster is far from any significant molecular cloud and thus has mysterious origins. The

cluster appears to share proper motions with other young stars in the Chamaeleon region, and may be an extension of the Sco-Cen OB association.

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Bar and Disk Formation in Gravitationally Collapsing Clouds: Implications for Binary Formation

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We investigated dynamical collapse of a molecular cloud core with three-dimensional numerical simulations. Our simulations show that an initially spherical core produces a bar or disk during its dynamical collapse. The disk and bar formation are due to instability. Velocity perturbations grow in proportion to $\rho_c{}^{1/6}$ where ρ_c denotes the central density. The growing velocity perturbations are due to two effects, rotation and shear. Rotation makes the core spin faster to produce a disk at the center. On the other hand, velocity shear elongates or shortens the core in one direction to form a bar or non-rotating disk. When the core rotates non-uniformly, the collapse produces a disk containing a bar at its center by the growth of rotation and shear. This bar is much longer than the Jeans length and is likely to be unstable against fragmentation. We expect that the bar will evolve into a binary or multiple stars. The binary or multiple stars will be surrounded by a common disk. We also demonstrate the growth of an eigenmode which leads to bar and disk formation. On the basis of our numerical simulations we give a condition for formation of a disk and bar during the isothermal collapse phase of a molecular cloud core. If the core has an oblateness of 10 % or an equivalent velocity shear at $n_{\rm H_2} \simeq 10^4$ cm^{-3}, the core produces a bar by the end of its isothermal collapse phase.

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`http://meric.i.hosei.ac.jp/~matsu/99barformation/`

Self-Consistent Model of the Dusty Torus Around HL Tau

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We present the first comprehensive two–dimensional radiative transfer modeling of the circumstellar dusty environment of HL Tau, a remarkable embedded young stellar object often considered a prototype low–mass star with a circumstellar disk resembling the solar nebula at the early stages of planet formation. To recover its general structure and physical parameters, we used entire beam–matched spectral energy distribution from optical to millimeter wavelengths, the high–resolution intensity and linear polarization maps at 0.7 μm, 1.25 μm, 1.65 μm, 2.2 μm (R, J, H, K bands), aperture synthesis maps at 1.36 mm, 2.7 mm, 3.06 mm, and 7 mm, visibilities at 650 μm, 870 μm, and 1.36 mm, and large–aperture linear polarization measurements in the optical and near–infrared bands as observational constraints.

Our detailed model of HL Tau explains all these observations well, making the overall picture much more certain. The central radiation source, with a bolometric luminosity of 11 $L_\odot$, is embedded in a compact, dense torus having a $\rho \propto r^{-1.25}$ density distribution and containing predominantly very large dust particles (radii $a \geq 0.1$ mm). With two wide bipolar cones excavated by the outflow along the symmetry axis, the model torus has an opening angle of 90°, radius of ~ 100 AU, maximum molecular hydrogen density of $1.6{\times}10^{12}$ cm^{-3}, and a mass of 0.03 $M_\odot$ (assuming a dust–to–gas mass ratio of 0.01). A relatively large reservoir of circumstellar material, containing dust grains of submicron sizes, resides in an extended toroidal envelope of a similar mass, having a $\rho \propto r^{-2}$ density profile to the adopted outer radius of 10^4 AU.

The model of HL Tau strongly suggests that only the bright parts of the dense compact torus inclined towards us by $\sim 43°$ can be seen by observers at any relevant wavelength. Direct light from the central source is heavily diluted even

in the highest–resolution 0.″2 images. The dusty torus is optically thick up to millimeter wavelengths, with the total optical depth of $\tau_V \approx 33$ towards the invisible central object. The optical depth is partly due to the gray extinction by very large particles in the dense torus ($\tau_V \approx 10$) and to the wavelength–dependent extinction by submicron–sized grains in the extended envelope ($\tau_V \approx 20$). If the very broad size distribution of solid particles indeed exists in the dense torus, this might indicate that in HL Tau we are observing initial phases of accumulation of larger bodies, which may eventually lead to planet formation.

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http://www.mpifr-bonn.mpg.de/div/speckle/publications.html

H_2 bipolar emission associated with the quadrupolar molecular outflow in L723

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We present near-infrared images of the quadrupolar CO outflow in L723, formed by two lobe pairs of different size. Bipolar molecular hydrogen line emission is detected, approximately centered on the Class 0 source L723 VLA2. One of the observed H_2 nebulosities coincides with the Herbig-Haro object HH 223. The H_2 bipolar outflow is projected against the large lobe pair of the quadrupolar CO outflow. Position angles of the H_2 and HH emissions, large CO lobe pair and the thermal radio jet VLA2 are similar and also close to the magnetic field direction in the region. All these phenomena are likely powered by the young protostellar object L723 VLA2. Our near-infrared images do not show any near-ir counterpart of the smaller CO pair, whose origin and driving source remain unclear.

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A Survey of the HCN J=1–0 Hyperfine Lines towards Class 0 and I Sources

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The HCN 1–0 hyperfine lines have been observed toward 24 young stellar objects (YSOs) of class 0 and I. The hyperfine lines are well separated in most cases and show such rich structures as asymmetric double peaks and strong wings. We examined how their line shapes and velocity shifts vary along with their relative optical depths and compared them with those of CS 2–1, H_2CO 2_{12}–1_{11}, and HCO^+ 4–3 & 3–2 transitions previously observed by Mardones et al. (1997) and Gregersen et al. (1997).

It is found that all these molecular species do not always exhibit the same sense of line asymmetry and the correlation of velocity shift is better between HCN and CS than between HCN and H_2CO. The most opaque transition of HCN F=2–1 has about the same velocity shift as that of CS despite of the larger beam size of this study, which suggests that HCN F=2–1 line may be more sensitive to the internal motion of YSOs than CS line. Systematic changes of the velocity shift are noted for many sources, as one goes from F=0–1 to 2–1. The monotonic decrease of velocity (blue shift) is apparently more frequent.

A detailed model of radiative transfer allowing line overlap of HCN is employed to L483 which shows convincing signatures of infall on a scale of ~ 0.1 pc. It appears that the observed line is not compatible with the standard Shu (1977) model, but is fitted with augmentations of density and infall velocity, by factors of 6 and 0.5, respectively, and with an inclusion of a diffuse, static, turbulent, and geometrically thick envelope.

The distribution of hyperfine line intensity ratios for these YSOs does not accord with the LTE condition and is essentially the same as ones previously noted in cold dark clouds or small translucent cores. Though this anomaly may be explained in terms of radiative transfer effect in the cores which are either static or under systematic motion, some of them seem to invoke an existence of scattering envelope. It is confirmed that HCN is detected more selectively in class 0 and I sources than in starless cores or class II objects, which implies that the core embedding YSO(s) form a

dense ($\sim 10^6 \mathrm{cm}^{-3}$) envelope with a significant HCN abundance in a narrow time span of their evolution (Afonso et al. 1998).

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Jets and high-velocity bullets in the Orion A outflows. Is the IRc2 outflow powered by a variable jet

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We present high sensitivity maps of the High Velocity (HV) CO emission toward the molecular outflows around IRc2 and Orion–S in the Orion A molecular cloud. The maps reveal the presence of HV bullets in both outflows with velocities between 40-80 $\mathrm{km\,s^{-1}}$ from the ambient gas velocity. The blue and redshifted CO HV bullets associated with the IRc2 outflow are distributed in thin ($12'' - 20''$, $0.02 - 0.04$ pc) elliptical ring-like structures with a size of $\sim 10'' \times 50''$ (0.02×0.1 pc). The CO emission at the most extreme blue and redshifted velocities (EHV) peaks $20''$ north of source I, just inside the rings of the HV bullets.

The low velocity H_2O masers and the H_2^* bullets around IRc2 are located at the inner edges of the ring of CO HV bullets and surrounding the EHV CO emission. Furthermore, the high velocity H_2O masers are very well correlated with the EHV CO emission. This morphology is consistent with a model of a jet driven molecular outflow oriented close to the line of sight.

In the Orion–S outflow, the morphology of the CO HV bullets shows a bipolar structure in the southeast↔northwest direction, and the H_2O masers are found only at low velocities in the region between the exciting source and the CO HV bullets.

The morphology of the CO HV bullets, the radial velocities and the spatial distribution of the H_2O masers in both outflows, as well as the H_2^* features around IRc2, are consistent with a model in which these outflows are driven by a jet variable in direction. In this scenario, the large traverse velocity measured for the H_2O masers in the IRc2 outflow, $\sim 18\,\mathrm{km\,s^{-1}}$, supports the evolutionary connection between the jet and the shell-like outflows.

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A 1000 AU Rotating Disk around the Massive Young Stellar Object G192.16−3.82

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We present evidence for a circumstellar disk around the luminous young stellar object G192.16−3.82. Observations of 2.6 mm, 7 mm, and 3.6 cm continuum emission and ^{13}CO, C^{18}O, and H_2O maser line emission support the interpretation that a 1000 AU, rotating disk exists around the central B2 star. The disk major axis is roughly perpendicular to the outflow and the maser velocities are consistent with Keplerian rotation. The mass of the disk plus circumstellar envelope traced by millimeter continuum emission is ~ 15 $M_\odot$. The source is embedded in a 500 $M_\odot$ molecular cloud from which a massive outflow emerges. Updated outflow parameters yield a total flow mass of 95 $M_\odot$

and a mass flow rate of 5.6×10^{-4} $M_\odot$ yr^{-1}. The outflow opening angle, defined by a ^{13}CO shell, is approximately 90°. A weak, one-sided, ionized jet emanates from the YSO system. The estimated momentum rate of the jet ($\sim 10^{-3}$ $M_\odot$ km s^{-1} yr^{-1}) is about a factor of four too low to power the flow. These results are consistent with the idea that the G192.16 outflow mechanism can be best characterized by a combination of a weak jet and a strong, wide-angle wind. Approximately 0.5″ to the north of G192.16−3.82 is a band of 3.6 cm continuum emission and red-shifted H_2O maser components which we interpret to be due to a newly discovered jet from an embedded object G192.16−3.82 N. The jet does not affect the dynamics of the massive outflow significantly which indicates that it is probably due to a low-mass young stellar object.

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A Variable Asymmetry in the Circumstellar Disk of HH 30

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We report Hubble Space Telescope observations of variability within the reflection nebulosity of HH 30, a compact bipolar nebula which is a nearly edge-on accretion disk system. A dramatic lateral asymmetry appeared in the upper reflection nebula in the spring of 1998, but was largely absent in 1994 and 1995 images. The variability timescale is much shorter than disk dynamical timescales at the projected radius of the asymmetry, which indicates that its origin is a variable illumination pattern projected onto the outer disk by changes in the inner disk or the central star. Orbital motion of coherent clumps or voids in the inner disk at radii of a few AU might produce such an effect. Another possibility recently proposed is accretion hotspots near the star's magnetic poles which produce broad beams of light sweeping across the disk as the star rotates. Simulated images of a disk illuminated by such a central "lighthouse" are a reasonable match to the bright lateral asymmetry in the upper nebula of HH 30. However, a model with identical opposed hot spots is excluded by the absence of a prominent asymmetry in the lower reflection nebula. Further temporal monitoring of the system is needed to better characterize the nebular variability and establish its physical origin.

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Distribution of the Warm and Dense Molecular Gas Around Cepheus A HW 2

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We present VLA observations of the (J,K)=(1,1), (2,2), (3,3), and (4,4) inversion transitions of NH_3 toward the HW 2 object in Cepheus A, with $1''$ angular resolution. Emission was detected in the main hyperfine line of the first three transitions. The NH_3(2,2) emission shows a non-uniform "ring" structure, which is more extended ($3''$) and intense than the emission seen in the (1,1) and (3,3) lines. A rotational temperature of $\sim 30 - 50$ K and a lower limit to the mass of ~ 1 $(X_{NH_3}/10^{-8})^{-1}$ $M_\odot$ are derived for the ring structure. The spatio-kinematical distribution of the NH_3 emission does not seem to be consistent with a simple circumstellar disk around the HW 2 thermal biconical radio jet. We suggest that it represents the remnant of the parental core from which both the inner 300 AU ($0.4''$) disk, traced by the water maser spots previously found in the region, and the central object have formed. The complex velocity field of this core is probably produced from bound motions (similar to those of the inner disk) and from interaction with outflowing material.

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Time dependent evaporation of icy mantles in hot cores

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Hot cores are rich in saturated molecules that are believed to arise from the evaporation of molecular ices on dust grains. It is usually assumed that the ices are evaporated instantaneously when a nearby star is switched on. We have developed a new model in which the grain temperature rises over a time scale determined by the switch–on time of the star. This time scale is likely to be comparable to the lifetime of the hot cores. In consequence, evaporation of different species occurs at different epochs, leading to chemical differentiation in time and space within the hot core. By computing qualitative models of hot cores, we show that observations of hot cores may be able to constrain the rise time of hot stars to the Main Sequence.

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New Jobs

Postdoc Position For Study of the Interstellar Medium and Star Formation at Helsinki Observatory

Applications are invited for a postdoc position in the Interstellar Medium research group of the Observatory, University of Helsinki, to begin during spring/summer 1999 (as soon as possible).

The appointee is expected to participate in observational studies of the interstellar medium and star formation. The studies concern ISM of the Milky Way and some other galaxies using data mainly from the Infrared Space Observatory, the SEST radio telescope, and the ODIN submillimetre satellite to which the group has access. Focus is on the infrared studies of dust and (sub)millimetre molecular line studies of dense clouds, both with and without star formation. The appointment will be until the end of 2000.

The group consists currently of Prof. K. Mattila, Drs. J. Harju, A. Heikkila, M. Juvela, and K. Lehtinen, two advanced graduate students Ph. Lic. Paivi Harjunpaa and MSc P. Vaisanen and two or three beginning graduate students. We have close collaboration with the ISOPHOT PI Team at the MPIA in Heidelberg. Finland has a 5 per cent share of the SEST observing time and a ca. 7 per cent share in ODIN. Standard computing and relevant data analysis facilities are available at the Observatory. Salary will be 12236 FIM (= 2058 EURO) per month.

Applicants are requested to submit a curriculum vitae, a list of publications, and a summary of experience and research interests. They should arrange for two letters of reference to be sent directly to the above address.

Application deadline: April 30th 1999, but earlier applications are welcome.

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Attention: Prof. K. Mattila

Postdoctoral Research Associate

Observational Studies of Nearby Star-Forming Regions

ASTROPHYSICS GROUP, CAVENDISH LABORATORY, UNIVERSITY OF CAMBRIDGE

We seek a Postdoctoral Research Associate to join a group of astronomers working on studies of star formation in nearby molecular clouds. The main areas of activity are the physical structure of molecular clouds and protostars at the earliest phases of evolution. Our work encompasses observations at submm, infrared and radio wavelengths. We have an excellent record of obtaining time on the James Clerk Maxwell Telescope, where the SCUBA bolometer provides a world-leading dust imaging capability, the UKIRT, and other telescopes. The candidate would normally be expected to join one of these established projects, but we also welcome applications from candidates with their own related research programmes, or who have some relevant technical experience.

Applicants should hold a PhD in astronomy or related topic, or have submitted their PhD thesis before starting the appointment. This post is available for two years in the first instance, with potential for renewal subject to funding. The starting date is flexible, and the salary is in the range £15,735 to £21,815 depending upon age and experience. Informal enquiries about the post may be made to John Richer (jsr@mrao.cam.ac.uk) or Claire Chandler (cjc@mrao.cam.ac.uk). To apply, please send your c.v., a 2-3 page description of your research interests, and the names of two referees to Mrs P. Hicks, Astrophysics Group, Cavendish Laboratory, Madingley Road, Cambridge CB3 0HE, UK. Applications will be accepted until the post is filled. Previous applicants need not apply.

The University follows an equal opportunities policy.

New Books

Looking for Earths
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by Alan Boss

Theoretical studies of star and planet formation have for many years suggested that planetary systems could be common, and observational studies have documented the ubiquity of disks around young stars. Yet the actual discovery of extrasolar planetary systems has only occurred within the last few years. Alan Boss, of the Carnegie Institution in Washington and well known to the star and planet formation community, has written a fascinating and lively account of the struggles to detect extrasolar planets from the earliest attempts by van de Kamp to the recent successes of Mayor/Queloz and Marcy/Butler and others. Having worked his entire career on the subject of planet and star formation, Alan Boss has been in a superb position to write this book, and the result is a highly readable account of the long series of theoretical and observational steps that form the basis for the present bonanza of extrasolar planet detections. The book is addressed to the intelligent layman, and does not require special astrophysical background, but also has much to offer the professional astronomer, not least a lot of fascinating and not widely known behind-the-scenes information.

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Meetings

PRELIMINARY ANNOUNCEMENT

HIGH-MASS STAR FORMATION: AN ORIGIN IN CLUSTERS?

Elba Island (Italy), June 7-10, 2000

The Arcetri Astrophysical Observatory (Florence) is devoting an Elba Workshop to the subject "High Mass Star Formation: An Origin in Clusters". In the year 2000, this will replace the very successful Star Formation Workshop, organized by the Star Formation Center of NASA and by the Center for Astrophysics, which has been traditionally held in alternate years on either the west or the east coast of the USA. Our aim is that the Elba Workshop should be similar in style to the Star Formation Workshop with many short (15–20 min) oral contributions and posters.

The Elba 2000 workshop will address the formation and early evolution of massive stars and their effect on the surrounding gas and stars. This theme is closely related to that of the formation and evolution of stellar clusters and associations, where most stars, and certainly the massive ones, form. Specific topics covered will include:

- Initial conditions for high-mass star formation.
- Early phases of high-mass star formation.
- Interaction of massive stars with their environment.
- Theories of high-mass star formation.
- Binary, multiple and cluster star formation.
- Embedded and optically revealed clusters.
- Galactic structure and OB star formation.
- IMF in galactic and Magellanic Cloud associations.

The Workshop will take place in the Conference Center of Marciana Marina, Elba Island (Tuscany) between June 7 and June 10, 2000. The maximum number of participants will be limited at around 100.

The Scientific Organizing Committee is composed of: D. Hollenbach (NASA-AMES), C. Lada (CFA), S. Lizano (UNAM), K. Menten (MPIfR), T. Montmerle (Saclay), P. Saraceno (IFSI, Roma), F. Shu (U.C. Berkeley), M. Walmsley (Arcetri).

The local organizers are: A. Natta, R. Cesaroni, E. Masini, F. Palla, and M. Walmsley.

We have established a web page at *www.arcetri.astro.it/∼elba2000*. Those interested in taking part should send an e-mail to: *elba2000@arcetri.astro.it*

They will receive by e-mail further information about the program and practical matters. The next circular will be mailed in the fall of 1999.

PLEASE POST IN YOUR INSTITUTE.

The Star Formation Newsletter is a vehicle for fast distribution of information of interest for astronomers working on star formation and molecular clouds. You can submit material for the following sections: *Abstracts of recently accepted papers* (only for papers sent to refereed journals, not reviews nor conference notes), *Dissertation Abstracts* (presenting abstracts of new Ph.D dissertations), *Meetings* (announcing meetings broadly of interest to the star formation and interstellar medium community), *New Books* (giving details of books relevant for the same community), *New Jobs* (advertising jobs specifically aimed towards persons within our specialty), and *Short Announcements* (where you can inform or request information from the community).

Latex macros for submitting abstracts and dissertation abstracts are appended to each issue of the newsletter.

The Star Formation Newsletter is available on the World Wide Web, where you can access it via the ESO Portal (http://http.hq.eso.org/eso-homepage.html). You can also access it through the University of Massachusetts Astronomy World Wide Web server, the URL for its home page is http://www-astro.phast.umass.edu/

Moving ... ??

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