of an associated nebulosity. The possibility of the two sources being physically related is being investigated since the reddening of Elias 33 indicates that it is a member of the ρ Oph dark cloud. More detailed results will be presented at the conference.

103.07
On The Luminosity Functions of Embedded Stars in L1641
Karen M. Strom, Stephen E. Strom (Five College Astronomy Dept., University of Massachusetts), K. Michael Merrill (NOAO)

We report the results of an extensive near-infrared imaging survey of L1641. Our survey, which covers 0.77 deg^2 (490 pc^2) reaches 5σ limits at J, H and K of 16.8, 15.8, 14.7 mag, reveals 1) a population of ~1500 stars spread throughout the cloud (the distributed population); 2) 7 small aggregates, each comprised of 10-50 stars; and 3) a heretofore uncharted, partially embedded dense cluster comprised of ~150 stars. In all cases, the stellar populations are dominated by solar-type PMS stars which appear to contain a mix of objects analogous to weak-line and classical T-Tauri stars. Analysis of (J-H), (H-K) colors for the stars in our sample, as well as (K-S) colors for stars suffering only modest extinction, suggests that the 7 aggregates contain a significantly higher proportion of stars (~60%) surrounded by circumstellar accretion disks than do the clusters (~40%) or the distributed populations (~30%).

The evolutionary state of these populations is evaluated from analysis of reddening-corrected J-band luminosity functions. These observed luminosity functions are compared with models calculated by assuming 1) a Scalo initial mass function, and 2) all stars are born simultaneously. The aggregates appear to have ages of ~1 Myr, while the mean age of the distributed and cluster populations is estimated to be ~5 Myr. The distributed population also appears to contain some stars with ages as great as ~10 Myr. The fact that more than 65% of the stars in our sample belong to the distributed population suggests that most stars in L1641 form either 1) in isolation, via the collapse of individual prestellar cores, or 2) in unbound stellar aggregates, whose members disperse to join the distributed population on timescales of a few million years.

The observed decrease in accretion disk frequency with increasing mean age is consistent with the hypothesis that most if not all solar-type stars are initially surrounded by disks, and that those disks evolve on timescales on the order of several million years.

103.08
Spatial Distribution of Pre-Main Sequence Stars in Taurus
M. Gómez, L. Hartmann, S.J. Kenyon, R. Hewett (SAO)

We derive characteristic properties of the non-random spatial distribution of pre-main sequence stars in the Taurus-Auriga molecular cloud. We find a median projected separation of ~0.3 pc for young stars in this cloud, even after eliminating close pairs with separations less than 20° (~3000 AU at the distance of Taurus) from our sample. This result is only slightly larger than the typical size of a dense molecular core (~0.1 pc), which suggests "isolated" star formation does not occur in low-density star-forming regions like Taurus.

We find similar properties for the nearest-neighbor distributions in other star-forming regions, such as Lupus, Chamaeleon T1, ρ Ophiuchi, Orion, NGC 7000/IC 5070, and NGC 2264. Our analysis suggests that even ultimately single stars typically form with a relatively close companion. Multiple star-formation inside elongated molecular cloud cores may provide a natural mechanism for this result.

We also identify six statistically significant clumps or groups of stars in Taurus with projected radii of ~0.5–1 pc. These small groups appear distributed over the molecular cloud and harbor ~15 stellar systems each. The internal velocity dispersions in these groups are ~0.5–1 km s^{-1} for a mean stellar lifetime of ~10^9 yr if they are not gravitationally bound.

103.09
The Frequency and Effect of T Tauri Companion Stars
A. Ghéz (Steward Observatory), G. Neugebauer, K. Matthews (Caltech)

We present the final results of a magnitude limited (K ≤ 8.5 mag) multiplicity survey of T Tauri stars (TTS) in two nearby star forming regions (SFR), Taurus-Auriga and Ophiuchus-Scorpius. Each of the 69 stars in the sample was observed at K(2.2 μm) with an infrared array camera on the Hale 5-m Telescope at Palomar Observatory and imaged using two-dimensional speckle interferometric techniques.

Thirty three companion stars were found, of which 15 were new detections. A subset of 64 observations was sensitive to all companion stars in the projected linear range 14 to 225 AU and the magnitude difference range 0.0 to 2.0 mag. We used this subset and region to study the multiplicity of TTS, the frequency of companion stars within this region is 34 ± 9%, independent of SFR. We discovered a distinction between the classical TTS (CTTS) and the weak-lined TTS (WTTS) based on the binary star frequency as a function of separation, the WTTS dominate the binary star distribution at the closer separations and the CTTS populate the wider separations. The cross over occurs near 100 AU, the size typically quoted for a circumstellar disk. We suggest that all TTS begin as CTTS and become WTTS when accretion has ceased, and that the nearby companion stars act to shorten the accretion timescale in multiple star systems.

Integrated over all magnitude differences the binary star frequency in the projected linear separation range 14 to 225 AU for TTS (59 ± 16%) is a factor of 3.5 greater than that of the solar-type main sequence stars (17 ± 3%). Given the limited angular separation range that we are sensitive to, i.e., both the spectroscopic and wide binaries are missed, the rate at which binaries are detected suggests that most, if not all, TTS stars have companions.

103.10
He I D3 Line in T Tauri Stars
N.M. Stotl (UC Santa Cruz), C.C. Batalha (ON-CNPq, Brazil), G.S. Basri (UC Berkeley)

We present the results of a study of variations in the narrow emission component of the He I D3 line at 5875.68 Å in T Tauri Stars of spectral types K5 to M3. 20 stars with representation from the extreme, classical, and weak subclasses of TTS were observed at up to 6 different epochs between October 1986 and January 1989. Almost all of these observations contain, to some degree, narrow (averageFWHM of 38 km s^{-1}), generally symmetric He I D3 emission at rest velocity with respect to the star superimposed on a broad (averageFWHM of 177 km s^{-1}), asymmetric emission component apparently slightly blueshifted with respect to the star. The goal of this study is to measure line strengths representing only chromospheric radiative losses in the D3 line in order to gain insight as to the mechanisms of He I line formation in TTS. All observations are corrected for any veiling effects of excess continuum emission. Veiling measurements for this data set already exist in the literature. We adopt these values except in cases of high uncertainty estimates or apparent discrepancies which we find for the extreme TTS in our sample. In these cases, we recalculate the veiling by fitting analytic gaussians to weak absorption lines and comparing line depths to those of appropriate photospheric templates. We make the following conclusions: 1) Gaussian fits to weak absorption lines give lower veiling values than those in the literature due to enhanced stellar activity in the TTS whose effects are generally more pronounced in stronger lines. 2) The lithium line at 6707 Å is not a good indicator of continuum veiling since it shows variable strengths even after correcting for veiling. We find a correlation between Li I 6707 Å line strength and veiling for K5 stars is suggesting that this line is enhanced by accretion processes.

3) We find a correlation between the chromospheric radiative losses in the D3 line and veiling for veilings up to approximately 1.0 suggesting that this line as well is enhanced by accretion processes.

103.11
Balmer Jumps in T Tauri Stars
Jeff A. Valenti, G. B. Basri (UC Berkeley)

Using well measured Balmer jumps and emission line strengths, we discuss the origin of excess optical emission from classical T Tauri stars.

We present a selection of moderate resolution, moderate S/N, flux-calibrated, blue spectra from our sample of 97 T Tauri stars. They illustrate the range of observed emission levels. The spectra extend from 3400Å to 5000Å, and they include the Balmer jump and the entire Balmer series except for Hα.

We detail a new method of measuring Balmer jumps that uses a spectral model to infer the true jump, rather than attempting to measure it directly from the spectrum. A weak T Tauri star of similar spectral type is used to remove the photospheric contribution from our CTTS spectra. The remaining "excess" emission is then modelled as an isothermal rectangular slab of hydrogen against the star.

A simple slab of hydrogen does a remarkably good job of explaining contin-