Session 7: Young Stars
9:50-5:30 (Cavalier Room)
(Display Session)

07.01
The Van Vleck Observatory T Tauri Monitoring Program: Season Four
W. Herbst, J.F. Booth (Wesleyan U.)

UBVRI and Hα photometry of 14 T Tauri stars has been obtained during the 1984/85 Milky Way season with the Perkin telescope at Van Vleck Observatory. A new, automated photometer head, has been placed in operation, significantly improving the ease and efficiency with which data can be obtained. Program stars were as follows: RT Tau, T Tau, V410 Tau, SU Aur, CO Ori, GW Ori, V880 Ori, EF Ori, T Ori, and VN Ori. Some data were also obtained on AB Aur, AN Ori, IU Ori, and RW Aur. RT Tau was observed on 30 nights and has faded somewhat from its peak brightness level of 1983/84, although it continues to be brighter than "normal" (defined as the behaviour of the previous 20 years). The behaviour of Hα and colors with brightness has been determined for the program stars and is used to constrain models of the variability. We thank the Perkin Fund, Dudley Observatory and NSF for their support of this program.

07.02
An Observational Test of Pre-Main Sequence Evolutionary Tracks

CaII (Hα404) and TiO (Hα7140) band strengths have been used to determine surface gravity (g) and effective temperature (T_eff) values for nearly 100 M-type T Tauri stars located in the Corona Australis, Lupus, Ophiuchus and Taurus-Auriga dark cloud complexes. In combination with luminosity estimates, g and T_eff permit direct comparison of the location of individual stars in the H-R diagram with pre-main sequence (PMS) tracks computed for stars of a given mass. Approximately 80 percent of the sample objects appear to have masses consistent with their observed location in the L, T plane and with conventional PMS tracks. However, 20 percent of the samples have log g values which suggest significant inconsistencies between the observed location of the T Tauri stars and the computed tracks. This latter conclusion may be affected by a) imprecise extinction estimates b) uncertainties regarding the origin of the "blue continuum" and chromospheric contributions to the measured TiO and CaII band strengths and c) possible underestimated of stellar luminosity where no far-IR measurements are available. The relative importance of each of these effects will be discussed.

07.03
Speckle Image Reconstruction of a Northern Optical Companion to T Tau
P. Nisenson, M. Karovska, R. Stachnik, R. Noyes (CFA)

A second optical component of the T Tau system has been observed by applying speckle image reconstruction techniques to data recorded November 1983, on the Steward Observatory 2.25-meter telescope with the PAPA two-dimensional photon-counting detector. This companion has a separation of 0.27 arcsecond and is located at a position angle of 358 degrees. We point out that this is not the radio and infrared source reported to be 0.6 arcsecond south of the optical T Tau.

Observations were made with a 24-nm-wide filter centered at 659 nm (includes Ha). At this wavelength, this new component has an optical magnitude fainter than T Tau by 3.7 magnitudes.

A confirming observation was made in November 1984, on the Mt. Wilson 2.5-meter telescope. The source was also observed at 520 nm, where the magnitude difference appeared to be closer to 5 magnitudes.

In this paper, we will describe these observations in more detail, and briefly discuss their implications to the T Tau system.

07.04
UBVRI Photometric Monitoring of the Late-Type PMS Stars AA Tau, DI Tau, DI Tau, and HP Tau/G2
A. E. Rydgren (CSC), F. J. Vrb (USNO), P. F. Chugainov, N. I. Shakhovskaya (Crimean Obs.)

The T Tauri stars AA Tau, DI Tau, DI Tau, and the PMS G star HP Tau/G2 were monitored with UBVRI photometry during the fall of 1984. Observations were obtained at the Flagstaff Station of the U.S. Naval Observatory and at the Crimean Astrophysical Observatory. AA Tau and DI Tau show periodic light variations with periods of 8.2 and 7.0 days respectively and full amplitudes in yellow light of about 1.4 and 0.4 mag. The brightness variations in DI Tau and GG Tau are of smaller amplitude, but a power spectrum analysis indicates a periodicity of about 7.7 days for DI Tau. The PMS G star HP Tau/G2 shows a well-defined photometric period of only 1.2 days. This star was previously found to be a nonthermal radio source (Bieging et al. 1984, Ap.J. 282, 639).

Our observations are further evidence that T Tauri variability is primarily associated with the rotation of an inhogeneous stellar surface, and that T Tauri stars of late K and early M spectral type rotate surprisingly slowly. This work is supported in part by NSF grant AST-8419556.

07.05
Emission Line Variability of RT Tau, DR Tau and SU Aur
A. Brown (JILA, Univ. of Colo. & NBS), F. M. Walter (LASP, Univ. of Colo.), K. G. Carpenter (JILA), C. Jordan and P. Judge (Oxford)

The variations of UV and optical emission line fluxes and profiles of RT Tau, DR Tau and SU Aur, particularly during mid-October 1983 are described. The degree of correlation between changes in lines formed in different atmospheric regions is discussed. For DR Tau an interesting relationship is presented between changes in chromospheric emission line profiles and chromospheric and transition region emission line fluxes.

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