on-going analysis of short-period RS CVn binary star systems. Using synthetic photometric light curves of typical short-period RS CVn systems, we added the effects of a known spot and also introduced random noise to simulate various signal-to-noise ratios. The spot-fitting program could, in every case, reliably extract the longitude, latitude, and radius of the active region down to a limiting radius of 5 degrees at a signal-to-noise of 100/1. The binary star orbital parameters were likewise reliably recovered.

9.13
Long-Term Starspot Activity of Short-Period RS CVn Stars: WY Cnc

M. Zeilik and D. Cox (U. of New Mexico), N. Rhodes (U.S. Air Force Academy), E. Budding (Carter Observatory/New Zealand)

We parameterize the photometric distortion waves in the light curves of the short-period RS CVn system WY Cnc by means of a dark, circular starspot model. The light curves are drawn from archival sources (back to 1969) and our 1988 and 1989 observations. We infer the longitudes, latitudes, and areas of the active regions while carefully evaluating the information content of the archival data. We conclude that one large starspot region at low latitude (near the equator) and near quadrature longitudes accounts for the modulation effects. The low latitudes contrast to the high latitudes (near 45°) that we have found for SV Cam, RT And, and BH Vir (other members of the short-period group).

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9.14
Low Dispersion Synthetic Spectra for Binary Stars

A.P. Linnell and X. Scheick (MSU)

The temperature of the primary component of a binary system can be determined by comparison of low dispersion spectra with Kurucz model atmospheres. This procedure is valuable for hot stars, where Hα spectra may be available. However, the combined spectrum varies with orbital longitude, and the spectrum at quadrature includes contributions from both components as well as interaction effects.

An extension of an existing light synthesis program generates a composite Kurucz-type spectrum by assigning a model atmosphere to each grid point on the binary photosphere. The program integrates over the visible projected disks, with full allowance for limb darkening and other interaction effects, at each of the 362 Kurucz wavelengths. Separate spectra of the individual components are produced in addition. We are testing this program for improved determination of binary system properties.

We illustrate the program capabilities with synthetic spectra for a B1-B6 system at different orbital longitudes, together with a synthetic light curve produced by the same program.

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Session 10: Young Stars, Outflows, and HH Objects
Display Session, Grand Ballroom

10.01
Wild Spectral Variations in DP Tau

G. Basri (UC Berkeley) and A. Misch (Lick Obs.)

We present more than 30 synoptic Hamilton echelle spectrometer observations of the T Tauri star DP Tau, including simultaneous line profiles of several important strong emission lines. The Hα line changes its equivalent width by more than a factor of 5, sometimes in a single night. This is accompanied by correlated changes in the veiling which suggest the Hα is powered rather than obscured by accretion. Surprisingly, when both are low the apparent spectral type can switch from late to early K and the widths of the absorption lines decrease. The lithium resonance absorption line at this time decreases in equivalent width, while all the other absorption lines have increased. Direct involvement of the accretion flow in absorption lines is suggested. The profile of Hα is remarkably similar throughout the variations. We discuss these observations in terms of the lines being formed near to the star in the interface region between star and accretion disk. Simplified line profile models suggest that the line shape is largely determined by the range of turbulence present. The rapid variations are interpreted as due to unsteady accretion onto the star.

10.02
FU Orionis Objects: Accretion Disks and More

A.D. Welty (FCGAD, UMass), L.W. Hartmann, S.J. Kenyon (CAI), S.E. Strom (FCGAD, UMass)

A growing body of observational and theoretical evidence suggests that the FU Orionis objects are luminous accretion disks surrounding pre-main sequence stars. In an effort to test the accretion disk hypothesis further, we have obtained high signal-to-noise, high resolution 4000-8000 Å and 8030-9500 Å KPNO echelle/CCD spectra of the FU Orionis objects V1057 Cyg, Z CMa, and FU Ori itself. We have also obtained spectra of supergiant standards for the purpose of modeling our FU Ori object spectra.

The accretion disk model predicts correlations of line width with both wavelength and low excitation potential. We show that the spectra of V1057 Cyg and Z CMa are characterized by correlations sensibly the same as those predicted by disk model spectra. The correlations for FU Ori are marginal, and are not in good agreement with model prediction. We suggest that the FU Ori mismatch is due to another strong component to the spectrum.

While demonstrating impressive overall agreement, subtraction of model from object spectra reveals many residual absorption and emission features. These features are not due to any temperature or gravity sensitivity in the models. Rather, origin in a stellar or disk wind is suggested.