

Spectroscopic and Polarimetric Observations of AC Her and UU Her

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We present preliminary results obtained between March and August of 1987 of a two-year spectropolarimetric study of 10 RV Tauri stars. The observations were made at the University of Wisconsin's Pine Bluff Observatory using the 36 inch cassegrain telescope with a Lyot polarimeter. The spectral resolution of the instrument was 6 Å and covered the range between 4350 Å and 7500 Å. The polarimetry covered the same wavelength range but is binned in four broad bands at 4828 Å, 5361 Å, 6025 Å, and 6877 Å.

AC Her shows strong phase dependent variations in the hydrogen lines and metal lines. Period-to-period variations in the line strengths are interesting in that the light and color curves for AC Her are remarkably stable. H α is seen in absorption during one period at phases 0.67 and 0.80. Mantegazza (1983) reports that AC Her is never observed with H α in absorption, but it appears that H α is partially filled in at all times, and this emission is generally attributed to residual emission from post-shock gas at most if not all phases (Cardelli and Howell, 1988). Polarimetrically, AC Her shows both phase dependent and wavelength dependent variations. The strongest wavelength dependence is seen following primary minimum, with a similar, though less strong, wavelength dependence near secondary minimum. The polarization near minima shows sharp increases towards the blue, suggesting the possible formation of very small dust grains and/or molecules within a few stellar radii of the surface.

The light curve for UU Her is much more erratic than that of AC Her and makes phase dependent discussions impossible. The best that can be done is to make comparisons based on the derivative of the light curve (i.e. increasing, decreasing, maximum, or minimum light) at the particular time of observation. Variations of the hydrogen and various metal lines are evident.

Time dependent polarization shows a clear increase during rising light, as is seen for AC Her, U Mon and R Sct. Wavelength dependence of the polarization was not observed for UU Her. The variations of the polarization in AC Her show a strong connection with the propagation of shocks through an extended atmosphere or circumstellar dust layer following minima, and a similar connection may exist for UU Her.

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Mantegazza, L., 1983, Astron. Astrophys. Supp. Ser., 54, 379.