Although these models include line blanketing, our calculations do not, and we only estimate the effects of lines on the computed polarization. We find that a large spot, one with area about 20 percent of the disk, and with temperature excess of a few hundred degrees, can account for the magnitude of the observed broadband polarization in the blue, but a second source of scattering still appears necessary to explain the polarization at longer wavelengths. The decrease in polarization in molecular bands, which Schwarz and Clarke attribute to differences in limb darkening, occurs through the depolarizing effect of increased line opacity in our model.

This work was supported by NASA Grant NAGW-42.

09.03
Ultrapar Variability and Flux Redistribution in the Ap S1 star 56 Aletis

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Detailed light curves from 1150 to 8000 A have been derived for 56 Aletis from new IUE UV spectrophotometry and optical data from the literature. The data are made possible by the great stability of 56 Aletis' variability and the accuracy of the measured ephemeris. The wavelength dependence of the amplitude of the variation shows a sharp break at 1315 A, which we identify with photodestruction of Si II 3397 A, and a broad band at 1400 A which has been identified with Si II photodestruction. The photometric variation of the strength of the 1315 A edge, the 1400 A band, and a band at 1550 A with optical spectral lines confirms the identification of these features with S1 I. The factor of 2 variation in flux below 1131 A, in only 1/4 of a stellar rotation, indicates that a region filling about half of a hemisphere must be so rich in silicon as to be nearly perfectly black below the S1 II photodestruction edge at 1306 A. Our model atmosphere calculations allow an empirical estimate for the S1 II 3397 A cross-section of about 1 x 10^-13 cm^2; theoretical confirmation is needed. The photometric variation above and below 1600 A is roughly anti-phased. The observations confirm earlier suspicions (e.g. Leckrone 1975, in Physics of Ap stars, ed. Weiss, et al., Vienna Obs., p.655) that the variation of the strong UV features of S1 II drives the photometric variability of 56 Aletis, and presumably other Ap S1 stars as well, through the mechanism of flux redistribution. The light curves at the various wavelengths show remarkable differences in phase and shape which indicate that the mechanism of flux redistribution is complex.

09.04
The Intrinsic UV Colors of O Stars

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We obtained low resolution IUE spectra of 0 and B stars in clusters. The main sequence B stars are used to derive UV extinction curves to the program clusters and these are used to determine the intrinsic UV to visual colors of O stars in NGC 2244, Trumpler 14, and NGC 6231. These data were analyzed in conjunction with the reddened colors of O stars with color excesses less than 0.1 mag to obtain a set of reliable UV colors for O3-9, class V-I stars. The results of this study can be summarized as follows: none of the observed O stars have UV colors bluer than a normal B0 V star; the late O supergiants have significantly redder UV colors than main sequence O stars, although this distinction appears to vanish for the early O stars; several possible explanations for these unexpected results are considered, but none of the presently available non-standard models are sufficiently developed to be definitively tested.

09.05
The Many Faces of HR 1099


In December 1982, we monitored the RS CVn-type binary HR 1099 (V711 Tauri: K1 IV + G5 V) at high-dispersion with the International Ultraviolet Explorer for six consecutive days, covering two complete orbital cycles. On each day, we obtained a 420-minute exposure of the far-ultraviolet region (1150-2000 A), bracketed by two 45-minute exposures of the middle-ultraviolet region (2000-3000 A). In all cases, the spectra were taken with precautions to ensure the assignment of reliable wavelength scales. During the approximately 10 hours per day of observations, the visual magnitude of the system was sampled at regular intervals using the Fine Error Sensor onboard the IUE.

The far-ultraviolet spectra are well-exposed at H I Ly_a, and moderately well-exposed at C IV 1548, He II 1640, Si II 1808, and Si III] 1892. The middle-ultraviolet spectra are oversampled at Mg II 2796, well-exposed at Mg II 2703, and somewhat under-exposed at Mg I 2285. The record of FES visual magnitude measurements indicated a photometric wave, owing to the rotational modulation of a pair of starspot groups, of 0.10 or less.

We discuss: The unexpected weakness of the secondary star (G5 V), which is seen clearly only in the Si II and Mg II lines; the correlation of the ultraviolet emission line intensities with the optical photometric wave; and the correlation of asymmetries in the high-excitation line profiles with the projected rotational Doppler shifts of the starspot groups ("Doppler Imaging").

This work was supported by NASA grant NAGW-199, Guest Observer, International Ultraviolet Explorer.

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09.06
An Hα Survey of Short Period RS CVn and W Uma Binaries: General Characteristics

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A spectroscopic study of the Hα line was conducted for several short period RS CVn (Peake) and W Uma systems. "Non-active" comparison star spectra were used to construct composite model spectra which were subtracted from the observed spectra to yield estimates for the chromospheric emission arising from each component star. All components of the short period RS CVn systems showed enhanced chromospheric emission, while only the primary components of the W Uma systems typically showed emission enhancement. The strength of the Hα emission from the active components (log(Lα/L⊙) ranging from 3-15x10^-5) appears to be correlated to the Rossby number (the ratio between the rotational period and the convective timescale). Such a correlation would suggest that the Hα line is a good diagnostic for the study of the magnetic related activity in late type stellar systems. The shut down of activity in the W Uma secondary stars may be a result of tidal interactions which damp out the differential rotation and/or the contact nature of these systems.

09.07
Abundances of Carbon, Nitrogen, and Oxygen in Metallic-Line A Stars

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The results of an LTE fine abundance analysis for 8 A star, 2 Delta Del-type stars and 4 normal A stars is presented.