extract mass data from binary spectra. Such methods are appropriate for data from electronic detectors and should be applicable to the present large collection of photographic data. We consider, in particular, the situation of classically single-spectrum binaries. Techniques for determining the mass of the secondary component are available which would use a priori knowledge. For example, if a range for the secondary's mass is assumed, we can treat the spectral data by compensating for the secondary's orbital velocity. This allows the spectra taken over the complete orbit to be co-added with respect to the secondary. The resulting integrated spectrum can then be cross-correlated with an ideal representative spectrum. The correlation peak, found by varying the assumed velocities, identifies the secondary's mass. Examples will be discussed.


Spectroscopic evidence is presented which indicates that the barium star Zeta Capricorni is a spectroscopic binary system having preliminary elements of:

- P = 2300
- V = 1.8 km/sec
- e = 0.33
- K = 3.7 km/sec

Mass limits placed on the barium star primary by these elements are discussed in light of the analysis of this star by Smith, Sneden, and Pilachowski (PASP 92, 809, 1980).

35.13 Reduction of Astrometric Binaries for Low Mass Companions, J. L. Mushell, Iowa State Univ. The astrometric system for low mass companions, those producing perturbations near the accuracy of the observations, may be extended by careful application of astrometric data reduction techniques. Power spectrum analysis and Fourier transforms can be used to determine what range of periods would be visible, based on the observations' distribution in time, and can indicate any periodicities. Careful analysis of the accuracy of the observations can then be used to determine the confidence level of any perturbations as well as to specify what possible companions and orbits for a given star have been ruled out. Some theoretical case and preliminary results from actual observations showing the advantages of this approach will be presented.

35.14 The Chromosphere and Corona of the Contact Binary Epsilon Corona Australiae, A.K. Dupree and M. Donahue, Harvard-Smithsonian Center for Astrophysics.

The eclipsing-contact binary system, ε CrA (spectral type FO V) is thought to be an evolved contact binary system with a high mass ratio although the secondary has not been detected optically. It presents a test for theories of contact configurations and also may provide an example for the evolution of chromospheres, coronae, and stellar activity. This system has been observed with the International Ultraviolet Explorer (IUE) satellite throughout its orbital period of 14.2 hours. The secondary star has been discovered through the doubling of the Mg II chromospheric emission at elongation and confirms the high mass ratio of the components. The surface fluxes of the two component stars are similar at chromospheric levels; however the phase variation of species formed at higher temperatures suggests a brighter secondary or the presence of hot plasma regions. Emission from C IV is extraordinarily strong with surface fluxes in excess of several hundred times the solar flux. The ultraviolet measurements in conjunction with X-ray observations of this system (Crudace and Dupree 1981) suggest a deficit of higher temperature material - a structure similar to that found in more luminous single stars - and an evolutionary scenario in which the high temperature emission, if associated with a corona, decays more quickly than low temperature plasma.

35.15 A Rotation Study of BY Dra Stars, D.R. Soderblom, CFA, S.S. Voigt, G.D. Penrod, Lock Obs. - We have determined v sin i's from high resolution profiles of 7 known or suspected BY Dra variables and 7 non-variable K and M dwarfs. The BY Dra stars have v sin i's that are significantly higher than field stars, and their velocities are consistent with the photometric or orbital periods of these objects. This data supports the hypothesis that rapid rotation sets BY Dra stars apart from other stars of similar spectral type. Not all of these stars are members of binaries, so that the rapid rotation in at least some cases indicates youth for these low mass stars.


We analyze the extreme-ultraviolet and far ultraviolet spectra of HR 430 to determine whether the HeII seen in absorption shortward of 228 A is photospheric or interstellar. The data were analyzed using a grid of blanketed LTE model atmospheres with a uniform composition of hydrogen with trace helium. The Interstellar medium is modeled by a two component gas consisting of a primarily neutral gas with \( T \leq 9-15,000^\circ \text{K} \) typical of the local interstellar wind together with an ionized HeII bearing gas with \( T \geq 10^5 \text{K} \). We find that the Berkeley sounding rocket EUV data can be fit either by a pure hydrogen photosphere with an interstellar HeII column density of \( 2.8 \times 10^{11} \text{ ions cm}^{-2} \) or by a trace helium photosphere with a fractional helium number density of \( 1.5-8 \times 10^{-5} \) of hydrogen. We have used the high resolution spectrometer of the International Ultraviolet Explorer to search for photospheric HeII 1640 A and highly ionized species such as CIV, SiIV and NV that are expected to be associated with a HeII bearing ISM. Despite a relatively strong exposure, we see no lines in the spectrum, either neutral, highly ionized or photospheric (except Lyman alpha). The derived upper limits on the highly ionized species indicate that there is insufficient intermediate temperature gas in the line of sight to HR 430 and hence argues for a photospheric origin of the observed HeII.