components have characteristic line strengths that are \( \frac{1}{3} \) to \( \frac{1}{2} \) of the strengths of the Ly-\( \alpha \) and Mg II emission lines seen in IUE spectra of 17 Lep. The EUV “feature” is also clearly a complex of multiple (>3) emission lines, with a total line flux of \( \sim 8 \times 10^{-12} \) erg cm\(^{-2}\) s\(^{-1}\). In addition, over the 7 days of observation the EUV lines appeared to vary significantly (>75%) with time, whereas the FUV lines were statistically constant. The existence of EUV emission in 17 Lep suggests a very low neutral hydrogen column density of \( \leq 5 \times 10^{17} \) cm\(^{-2}\).

This very low neutral hydrogen column density is not unreasonable since 17 Lep lies in the direction of the Canis Major “hole” and is very nearby (~75 pc). We discuss the line identifications, observed and intrinsic line strengths, and possible origins for the FUV and EUV emissions along with the implications for the interstellar neutral hydrogen column density along this line of sight.

18.05

A Pre-Periadron UV Look and Estimate of the Mass Loss Rate of the Be Companion of PSR 1259-63

B. McCollum (CSC)

PSR 1259-63 was recently found to be the first radio pulsar with a massive nondegenerate companion, the Be star SS 2883. In January, 1994, the pulsar in its highly eccentric, long-period orbit will reach periastron, at which time it is expected to collide with the wind and the circumstellar material of SS 2883. A large multiwavelength campaign has been set up to observe this event. I obtained IUE observations of SS 2883 in 1992, when the stars in this system were near maximum separation. A deep blueshifted C IV 1550Å absorption feature is evident, demonstrating that there is a wind. The terminal velocity of the wind is estimated to be 1350 +/- 200 km/s. An approximate mass loss rate is derived, and the spectral type of SS 2883 is estimated based on the IUE spectrum.

18.06

A GHRS/HST Spectral Atlas of Sirius-A

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The Goddard High Resolution Spectrograph (GHRS) onboard the Hubble Space Telescope has been used to obtain a spectral atlas, covering the wavelength range 1270 - 3200 Å, of the bright star Sirius-A (A1 V). The use of the GHRS first-order gratings provides spectral resolutions between R = 20000 - 35000; however, the rotational velocity (\( v \sin i = 16 \) km sec\(^{-1}\)) limits the spectral resolution. The signal-to-noise ratio over most of the spectrum is approximately 200 by photon statistics. The data are being used to understand the ultraviolet line opacity in warm stars. As a result of this work a new model atmosphere for Sirius will be determined, along with corrections to its bolometric correction and elemental abundances. The spectrum also allows us to test and improve current atomic models. A by-product of our work will be more accurate wavelengths and oscillator strengths for the second spectra of the iron-peak elements that will serve as templates for studying the ultraviolet spectra, obtained at lower spectral resolutions, of other warm stars.

18.07

HST/GHRS Spectroscopy of the Hybrid Star Alpha Aquarii

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GHRS observations were made in July 1993 of the luminous hybrid supergiant Alpha Aqr (HD 209750, G2 Ib). This cool supergiant gives evidence for both high temperature emission from N V and C IV (\( T = 2 \times 10^{5} \) K) and a massive wind. In addition, the He I \( \lambda 10830 \) transition indicates supersonic wind velocities in the chromosphere. To identify the emitting regions, and determine the profile of wind acceleration, we obtained moderate resolution (G160 M) observations and wavelength calibration exposures at four grating positions centered on He II (\( \lambda 1640 \)), C II (\( \lambda 1335 \)), C IV (\( \lambda 1550 \)), and N V (\( \lambda 1240 \)). All four species were detected. The IUE obtained simultaneous ultraviolet spectra including profiles of Mg II (\( \lambda 2800 \)). The C IV and N V lines appear blue-shifted (\( \approx 30 \) km s\(^{-1}\)), and broad, with FWHM ranging from 125 to 180 km s\(^{-1}\), similar to those found previously in \( \alpha \) TGr, another hybrid star, and interpreted as arising from wind expansion. Hydrostatic and dynamic atmospheric models are calculated with and spherical geometry in order to interpret the observed line profiles.

18.08

HST/GHRS Studies of \( \zeta \) Aurigae.

I. GHRS Observations of the 1993 Eclipse

Alexander Brown, Jeffrey L. Linsky, Phillip D. Bennett, Graham M. Harper (JILA, U. of Colorado & NIST), Robert Baade, Thomas Kirsch, Dieter Reimers (Hamburg University, Germany)

The eclipsing binary \( \zeta \) Aurigae (K4 Ib + B5 V) was observed using the Goddard High Resolution Spectrograph (GQRS) on Hubble Space Telescope (HST) at five epochs immediately preceding and one following the April 1993 eclipse of the hotter, B-type secondary by the K supergiant primary. A combination of echelle-B and medium resolution G160M spectra were obtained at phases 0.78, 0.948, 0.957, 0.972, 0.978 and 1.13. These observations sample the absorption of the hot star’s photospheric spectrum by the extended intervening cool star atmosphere. The GHRS spectra are presented and the circumstances of the individual observations are described. Fundamental parameters of the binary system derived from these data are discussed. This work is supported by HST grant GO-3626.01-91A to the University of Colorado.

18.09

HST/GHRS Studies of \( \zeta \) Aurigae

II. A Non-LTE Model Atmosphere Analysis of the B-Type Secondary

Philip D. Bennett, Alexander Brown, Jeffrey L. Linsky (JILA, U. Colorado & NIST)

The TLUSTY model code of Hubeny & Lanz are used to compute the B star photospheric spectrum in the ultraviolet and optical regions. These models treated H and He continua in NLTE, but the lines were assumed to be in detailed balance. A few models were computed with 5 levels of H and 14 levels of He I, plus continua, in NLTE. There were no significant differences between the models with the lines treated in detailed balance and in explicit NLTE. Solar abundances were assumed throughout this study. Effective temperatures are derived by fitting line profiles observed by the Hubble Space Telescope to the computed synthetic spectra. We find \( T_{\text{eff}} = 15300 \) K, and a rotational velocity of about 150 km s\(^{-1}\). The strengths of the Si II resonance lines in the ultraviolet are shown to be anomalously weak in the observed spectra, consistent with an overionization of Si II by 1.1 dex. Additional model atmospheres were computed treating the bound levels of Si II and Si III and the corresponding continua explicitly in NLTE. We will report on the results of these ongoing model studies of \( \zeta \) Aur B and present the latest estimates of the stellar parameters (\( T_{\text{eff}}, \log g \), and \( v_{\infty} \)).

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