FUSE Observations of Accretion Processes in V356 Sgr

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Recently we obtained spectroscopic observations of V356 Sgr in the 940–1180 Å region with the FUSE satellite (R$\sim 10^4$) during primary (total) eclipse. V356 Sgr is an interacting binary system containing B2V + A2II stellar components with an orbital period of 8.896 days. The system has been known to display strong, high ionization (N V, Si IV), emission lines during the total eclipse since the first IUE observations were made by Mirek Plavec in the early 1980s. Despite the presence of these strong UV emission lines the system has never been reported to show Hα or other optical emission lines. Spacecraft and ground based observations over the past two decades have revealed that the system shows evidence of CNO processing (very low C, overabundant N) in the photospheric material of both stars and a strong, non-stellar, highly polarized continuum in the UV (shortward of 1500 Å) that can be seen during eclipse. The FUSE observations were obtained on 3 Sept 2000 from 5:37 to 14:34 UT. Six independent observing periods of 29 to 40 minutes duration span from 3 hours prior to mid-eclipse (the duration of the total eclipse phase is 10 hours) through shortly after 3rd contact. During the total eclipse phase, seen superposed on the non-stellar continuum, are seen strong, broad (FWHM 1200 km/s) emission lines (all resonance lines) of N III (λ990 Å), O VI (λ1032, 38 Å), N II (λ1085 Å), and Fe III (λ1122–32 Å). Intercomparison of the six observations suggests that these strong broad emission lines do not significantly change in overall profile or strength throughout the eclipse nor do they change crossing third contact. However, each line appears to have superposed upon it a much weaker variable component. In addition, emission is seen in the non-resonance Si III lines (λ1108–13 Å which has a 6.6 eV lower EP). These lines are substantially narrower ($\sim$ few hundred km s^{-1}) than the resonance lines and exhibit very strong variability in strength with a positive velocity component ($\sim +425$ km s^{-1}) decreasing in strength as the eclipse advances as a negative velocity component (-225 km s^{-1}) increases in strength. For both components this variation in strength is accomplished without a significant change in velocity. The variable component that is seen in each of the resonance lines appears to have identical or nearly identical profile, velocity, and variability characteristics as that of the non-resonance Si III lines.A detailed analysis of the emission lines and the non-stellar continuum is currently in progress.

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