The White Dwarf in SS Cygni: FUSE + HST Spectral Analysis

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We have carried out a combined Hubble Space Telescope (HST/GHRS) and Far Ultraviolet Spectroscopic Explorer (*FUSE*) analysis of the prototype dwarf nova SS Cygni during quiescence. The *FUSE* and HST spectra were obtained at comparable times after outburst and have matching flux levels where the two spectra overlap. In our synthetic spectral analysis, we have used SS Cygni's accurate HST FGS parallax giving $d = 166$ pc, a newly determined mass for the accreting white dwarf (Bitner et al. 2007, ApJ) of $M_{wd} = 0.81 M_{\odot}$ (lower than the previous, widely used $1.2 M_{\odot}$) and the reddening (E_{B-V}) values 0.04 & 0.07 derived from the 2175 Å absorption feature in the IUE LWP spectra. From the best-fit model solutions to the combined HST + *FUSE* spectral energy distribution, we find that the white dwarf is reaching a temperature $T_{eff} \approx 45 - 55,000$ K in quiescence, assuming $\log(g) = 8.3$ with a solar composition accreted atmosphere. The exact temperature of the WD depends on the reddening assumed and on the inclusion of a quiescent low mass accretion rate accretion disk. Accretion disk models alone fit badly in the *FUSE* range while, and if we take the distance to be a free parameter, the only accretion disk model which fits well is for a discordant distance of at least several hundreds pc and an accretion rate ($\sim 10^{-8} M_{\odot}$/yr) which is unacceptably high for a dwarf nova in quiescence. We discuss the implications of the white dwarf's temperature on the time-averaged accretion rate and long term compressional heating models.