HST/COS Ultra-Violet high-resolution spectroscopic survey of DA White Dwarfs

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We present the analysis of an ultra-violet (UV) high-resolution HST/COS survey of 263 DA white dwarfs (WDs), which includes the first spectroscopic observations of 25 new WDs discovered by Gaia. We discuss in detail the comparison of our results with previous studies, and the nature of outliers identified from the UV fits. We have used an updated grid of Koester models to fit the flux-calibrated COS spectra of the WDs and to determine their effective temperatures ($T_{\rm eff}$) and surface gravities ($\log g$), which are found to range from $12,000 < T_{\rm eff} < 30,000\,{\rm K}$, and, $7 \leq \log g < 9.2$ respectively. The fit routine that we have developed uses the reddening values from 3D STILISM and Gaia EDR3 parallaxes to constrain the radius, and thereby $\log g$. We have implemented two different mass-radius (MR) relations in our fitting, that of the Montreal group (Bedard et al. 2020) and that of the Argentinian group (Althaus et al. 2013), and, compared the results. Our comparison suggests that the fit parameters obtained from the Argentinian MR relation are in better agreement with the published values than the Montreal MR for WDs with $\log g < 8$. Overall, the atmospheric parameters ($T_{\rm eff}$ and $\log g$) obtained from the UV fit are in good agreement with the previous studies, that were almost entirely based on optical data (e.g. Gentile Fusillo et al. 2021). However, $\approx 25\%$ of the sample show large deviations from the published photometric/spectroscopic estimates suggesting that these can be unresolved WD plus low-mass companions or double degenerates.