BD+39 3226: Spectral analysis of ORFEUS II and FUSE observations

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BD+39 3226 is an O-type subdwarf (sdO) exhibiting an almost pure helium-line spectrum in the optical wavelength range. High-resolution ultraviolet échelle spectra were obtained in 1996 with the Orbiting and Retrievable Far- and Extreme Ultraviolet Spectrometer (ORFEUS II mission) to measure the interstellar deuterium and molecular hydrogen column densities in the line of sight towards the sdO. To model the stellar contribution to the hydrogen Lyman lines, an effective temperature of $T_{\rm eff} = 45\,000\,{\rm K}$, a surface gravity of $\log(g\,/\,{\rm cm/s^2}) = 5.5$, and photospheric number fractions of n(He)= 0.99 and n(H)= 0.01 were used, adopted from a previous spectral analysis (Giddings 1980, $T_{\rm eff} = 44\,700 \pm 5\,000\,{\rm K}$, $\log g = 5.5 \pm 0.5$) with H+He composed model atmospheres in non-local thermodynamic equilibrium (NLTE).

Weak and narrow photospheric C III + IV, N III + V, Si III + IV, P V, and S V lines were already identified in the ORFEUS II observation. Subsequent Far Ultraviolet Spectroscopic Explorer (FUSE) spectra from 2004 were used then only to investigate D/H and D/O variations (using the same photospheric parameters for BD+39 3226 like before).

A detailed spectral analysis of BD+39 3226 by means of state-of-the-art NLTE model-atmosphere techniques is still outstanding. We employ the Tübingen Model-Atmosphere Package (TMAP) to calculate such models that consider opacities of H, He, C, N, O, Si, P, S, and the iron-group (Ca - Ni) elements. Preliminary results are a higher $T_{\rm eff} = 49\,000 \pm 2\,000\,{\rm K}$ and a significant higher $\log g = 6.2 \pm 0.2$.

We present our still ongoing analysis of the stellar and interstellar spectrum. The latter is performed with the profile-fitting procedure OWENS developed by M. Lemoine and the FUSE French Team.