The Lives and Death-Throes of Massive Stars
Proceedings IAU Symposium No. 329, 2016
J.J. Eldridge, J.C. Bray, L.A.S. McClelland & L. Xiao, eds.

doi:10.1017/S1743921317003106

Analysis and fit of stellar spectra using a mega-database of CMFGEN models

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Abstract. We present a tool for analysis and fit of stellar spectra using a mega database of 15,000 atmosphere models for OB stars. We have developed software tools, which allow us to find the model that best fits to an observed spectrum, comparing equivalent widths and line ratios in the observed spectrum with all models of the database. We use the H_α, H_β, H_γ, and H_δ lines as criterion of stellar gravity and ratios of He II λ4541/He I λ4471, He II λ4200/(He I+He II λ4026), He II λ4541/He I λ4387, and He II λ4200/He I λ4144 as criterion of $T_{\rm eff}$.

Keywords. stars: atmospheres, stars: abundances, stars: rotation, stars: winds

1. Database and results

The models were calculated with the CMFGEN code (Hillier, D. J. & Miller, D., 1998); database is a matrix arrangement in a 6-dimensional space: surface temperature ($T_{\rm eff}$), luminosity (L), terminal velocity of the wind (V_∞), beta exponent of the wind velocity law (β), clumping filling factor (F_{cl}), and metallicity (Z). The synthetic spectra in the UV (900-2000Å), optical (3500-7000Å) and near IR (10000-30000Å) were rotationally broaden using ROTIN3 (Hubeny & Lanz, 1995) by covering the range between 10 and 350, km/s with steps of 10 km/s. Models were calculated using the ABACUS I super- computer of Centro de Matemáticas Aplicadas y Cómputo de Alto Rendimiento ABACUS-CINVESTAV, México. Software tools allow us to find in the database the model with the best fit to an observed spectrum in a only minutes.

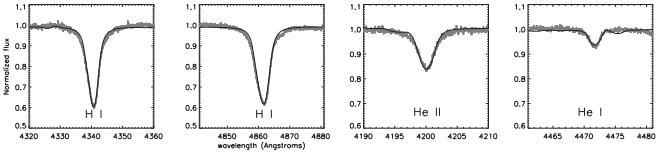

Figure 1. Adjustment example: HD 46223, spectral type O4 V (f) (Sota, A. *et al.* 2011) observed spectrum from public data of the IACOB project, 2016. Parameters of model: $T_{\rm eff}$=40 000K, $logL/L_\odot$=6.05, V_∞=2 370km/s, β=1.1, F_{cl}=0.05, Z=$Z_\odot$

References

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