A Library of Theoretical Ultraviolet Spectra of Massive, Hot Stars for Evolutionary Synthesis

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We computed a comprehensive set of theoretical ultraviolet spectra of hot, massive stars with the radiation-hydrodynamics code WM-Basic. This model atmosphere and spectral synthesis code is optimized for computing the strong P Cygni-type lines originating in the winds of hot stars, which are the strongest features in the ultraviolet spectral region. The computed set is suitable as a spectral library for inclusion in evolutionary synthesis models of star clusters and star-forming galaxies. The chosen stellar parameters cover the upper left Hertzsprung-Russell diagram at L â‰³ 10^2.75 LâŠ™ and T_eff â‰³ 20,000 K. The ad elemental abundances are 0.05 ZâŠ™, 0.2 ZâŠ™, 0.4 ZâŠ™, ZâŠ™, and 2 ZâŠ™. The spectra cover the wavelength range from 900 to 3000 Ã… and have a re compared the theoretical spectra to data of individual hot stars in the Galaxy and the Magellanic Clouds obtained with the International Ultraviolet Explorer (IUE) and Far Ultraviolet Spectroscopic Explorer (FUSE) satellites and found very good agreement. We built a library with the set of spectra and implemented it into the evolutionary synthesis code Starburst99 where it complements and extends the existing empirical library towards lower chemical abundances. Comparison of population synthesis models at solar and near-solar composition demonstrates consistency between synthetic spectra generated with either library. We discuss the potential of the new library for the interpretation of the rest-frame ultraviolet spectra of star-forming galaxies. Properties that can be addressed with the models include ages, initial mass function, and heavy-element abundance. The library can be obtained both individually or as part of the Starburst99 package.

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Comments:

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