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The effect of approximations on atomic emission spectra JUSTIN OELGOETZ, CHRISTOPHER J. FONTES, HONG LIN ZHANG, Applied Physics Division, Los Alamos National Laboratory, ANIL K. PRADHAN, Department of Astronomy, The Ohio State University — Atomic kinetics modeling is essential if we are to understand the spectroscopy of astrophysical objects. In order to model astrophysical spectra, one must first calculate the electronic structure of the ions, calculate cross sections and rates for the processes in between the resulting levels (and ionization stages), and then solve a set of coupled collisional-radiative equations that depend on the plasma conditions. Spectra are ultimately created from the solutions to these collisional-radiative equations. The aim of this work is to benchmark the impact of some of the typical approximations employed in this modeling process. We will present results that illuminate the effects of approximations in the structure calculations (fine-structure approaches, which include configuration interaction, vs. configuration-average approaches), and in the cross section calculations (by comparing the results of data calculated using close-coupling R-Matrix method, distorted-wave methods, as well as other more approximate scaled-hydrogenic and plane-wave-Born methods).

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