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Accuracy issues in spectroscopic modeling of K_α emission from M-shell ions in dense plasmas STEPHANIE HANSEN, HYUN CHUNG, MAU CHEN, Lawrence Livermore National Laboratory — Although K_α emission originates from simple $1s - 2p$ transitions, the many-electron ions of mid-Z materials in warm, dense matter conditions introduce significant computational complexity to K_α spectroscopic modeling. First, complete models of M-shell ions in dense plasmas are inherently complex since they must include a large number of states with open $3p$ and $3d$ shells. Next, single-temperature models for collisional-radiative kinetics are inadequate since the thermal electrons that control the distribution of charge states in the M shell have insufficient energy to participate in inner-shell processes. Finally, near-solid densities introduce physical effects such as pressure ionization, the formation of quasi-bound states, and line broadening, which are not intrinsically included in the isolated-ion structure calculations used in most spectroscopic models. These issues are explored for K_α emission from M-shell Cu using several independent models.

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