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Shifts in characteristic K- and L-shell lines as temperature diagnostics for warm, dense matter STEPHANIE HANSEN, Lawrence Livermore National Laboratory — An atomic model has been developed for use as a temperature diagnostic of warm, dense matter. Starting from a Wigner-Seitz cell whose size is determined by the ion density, self-consistent solutions for non-relativistic bound and free wavefunctions, electric and chemical potentials, and average ion charge are obtained. This average atom model is then split into individual ions. The reduced screening of the nuclear charge as the neutral atoms are ionized leads to shifts in the transition energies of characteristic lines in modeled emission spectra, which could be used to determine ionization balances and estimate electron temperatures through comparison with experimental spectra. Sample calculations for K-shell Ti and Cu and L-shell Xe are presented and comparisons with emission features calculated using the relativistic multiconfiguration atomic structure code FAC are given.

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