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Multi-center Scattering Influences on the Equation of State of Hot Dense Plasmas.[1] JAMES ALBRITTON, BRIAN WILSON, Lawrence Livermore National Laboratory, DUANE JOHNSON, University of Illinois — A prototypical high temperature dense-plasma equation-of-state model consists of a single average ion embedded in a spherically symmetric effective field. This effective field models the influence of all the other ions and free-electrons of the plasma; and it is computed in a self-consistent manner. The internal energy of the plasma is then obtained primarily from the electronic states of the average ion, which consists of a discrete set of eigen-values and a continuum density of states deformed from that of an ideal electron gas. In such a model bound states may pressure ionize with increasing density, and initially re-appear as sharp resonances in the continuum. It is clear that in a more physically realistic model of a dense plasma, the spherically symmetric field must be replaced by a multiple centered potential from the plasma ions. The main effects are that bound states may form bands prior to pressure ionization and that multi-center scattering influences the structure in the continuum density of states. We are investigating these effects via solid-state Kohn-Korringa-Rostoker electronic structure methods with extensions to finite temperatures and many angular momentum channels. Initially we will use periodically replicated cells of ions in random configurations and average over ensembles of configurations to obtain the equation of state..

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