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Direct numerical simulations of structure and transport in dense plasmas HEATHER D. WHITLEY, JOHN I. CASTOR, Lawrence Livermore National Laboratory, MICHAEL S. MURILLO, Los Alamos National Laboratory, FRANK R. GRAZIANI, Lawrence Livermore National Laboratory, CIMARRON COLLABORATION — In recent years, high power laser facilities, such as NIF, and advanced diagnostics have enabled the determination of detailed properties of dense plasmas over unprecedented regimes. Understanding such plasmas, which may be partially degenerate and/or moderately coupled, represents a major challenge to the plasma physics community. We examine the accuracy and applicability of approximate effective potentials in the study of structural and dynamic properties of one and two component systems in the partially and fully ionized regimes. The diffractive Coulomb potential is derived from an exact quantum solution for a pair of particles while the fermionic character of the electrons is handled via an effective Pauli potential. We utilize classical hypernetted chain and molecular dynamics (MD) simulations to calculate static structure factors that can be compared to recent x-ray Thompson scattering experiments. We also examine whether these approximate potentials can be used to simulate electronic transport properties, such as thermal conductivity, and compare to recent quantum molecular dynamics calculations for hydrogen plasmas. Prepared by LLNL under Contract DE-AC52-07NA27344. LLNL-ABS-490775

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