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**The Free-free Opacity of Warm, Dense and Weakly Ionized Helium** PIOTR KOWALSKI, Vanderbilt University/LANL, DIDIER SAUMON, STEPHANE MAZEVET, LANL — We investigate the ionization and the opacity of warm, fluid helium under conditions found in the atmospheres of cool white dwarf stars. Our particular interest is in densities up to  $3\text{ g/cm}^3$  and temperatures from 1000 K to 10000 K. For these physical conditions various approaches for modeling the ionization equilibrium predict ionization fractions that differ by orders of magnitudes. Furthermore, estimates of the density at which helium pressure-ionizes varies from 1.5 to  $40\text{ g/cm}^3$ . In this context, the value of the electron-atom inverse bremsstrahlung absorption is highly uncertain. We present new results obtained from a combination of MD-DFT simulations, a non-ideal chemical model for the ionization equilibrium, and the analysis of experimental data to better understand the ionization fraction in fluid helium in the weak ionization limit.

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