Abstract Submitted
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Electron-Ion Equilibration in Warm Dense Gold[1] JACOB MOLINA, THOMAS WHITE, University of Nevada, Reno — With the advent of ultrafast MeV electron diffraction, experiments are now able to observe the structural evolution of laser excited systems of gold on a nanometer scale. After excitation, on a picosecond timescale, these systems form a complex non-equilibrium state of matter that cannot be fitted by a linear equilibration model. For example, the importance of bond hardening has been hotly debated. In fact, three separate research groups have observed the structural dynamics of commensurate systems of warm dense gold and come to opposing conclusions, at least partly due to the number of assumptions that must be made to fit the data [1-3]. We have performed thousands of molecular dynamics simulations that make use of a highly optimized interatomic potential derived from quantum mechanics. We are able to match the published time-resolved electron diffraction data, and demonstrate that, regardless of the assumptions, considerable laser energy is transported out of the interaction region. From our results we validate various theoretical models for the electron-ion equilibration rate in warm dense gold. 1. Szymon L. Daraszewicz et al. Phys. Rev. B 88, 184101 (2013). 2. M. Z. Mo et al. Science 360, 1451 (2018). 3. R. Ernstorfer et al. Science 323, 10331037 (2009).

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