Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Dynamic Conductivity and Partial Ionization in Warm, Dense Hydrogen M. ZAGHOO, Laboratory for Laser Energetics, University of Rochester, I. F. SILVERA, Harvard University — A theoretical description for optical conduction experiments in dense fluid hydrogen is presented. Different quantum statistical approaches are used to describe the mechanism of electron transport in hydrogen's high-temperature dense phase. We show that at the onset of the metallic transition, optical conduction could be described by a strong rise in the atomic polarizability, resulting from increased ionization; whereas in the highly degenerate limit, the Ziman weak-scattering model better describes the observed saturation of reflectance. In the highly degenerate region, the inclusion of partial ionization effects provides excellent agreement with experimental results. Hydrogen's fluid metallic state is revealed to be a partially ionized free-electron plasma. These results provide a crucial benchmark for *ab initio* calculations as well as an important guide for future experiments. Research supported by DOE Stockpile Stewardship Academic Alliance Program, Grant DE-FG52-10NA29656, and NASA Earth and Space Science Fellowship Program, Award NNX14AP17H.

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Date submitted: 12 Jul 2017 Electronic form version 1.4