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*ab-initio* **simulations of the time-resolved optical properties of warm dense gold.** S. MAZEVET, T- Division, Los Alamos National Laboratory, J. CLEROUIN, V. RECOULES, P.M. ANGLADE, G. ZERAH, DPTA, CEA-DAM (France) — Recent experiments on gold suggest that the electrical and optical properties of metals in the warm dense matter regime can be accessed by performing time-resolved measurements after the illumination of a metallic thin film by a short-pulse laser[1]. The non-equilibrium situation created in this experimental setup poses new challenges to simulation methods as the time evolution of the atomic structure needs to be followed. We used a combination of classical and *ab-initio* molecular dynamics simulations, to calculate the evolution of the atomic structure and the electrical conductivity of warm dense gold during the first pico-seconds after a short-pulse laser illumination. The time-resolved electrical conductivities calculated under these non-equilibrium conditions are compared with recent measurements. [1] K. Widmann, T. Ao, M.E. Foord, D.F. Price, A.D. Ellis, P.T. Springer,and A. Ng, Phys. Rev. Lett. **92**, 125002 (2004).

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