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Dynamics of electrical conductivity and structure of warm dense aluminum probed by single-shot THz spectroscopy and electron diffraction BENJAMIN OFORI-OKAI, ZHIJIANG CHEN, ADRIEN DESCAMPS, MIANZHEN MO, XIEYU NA, SLAC National Accelerator Laboratory, LARS SEIPP, Universitt der Bundeswehr Mnchen, XIAOZHE SHEN, STEPHEN WEATHERSBY, SLAC National Accelerator Laboratory, ANTHEA WEINMANN, Universitt der Bundeswehr Mnchen, JIE YANG, XIJIE WANG, SIEGFRIED GLENZER, SLAC National Accelerator Laboratory — We used single-shot terahertz time-domain spectroscopy and mega-electron-volt ultrafast electron diffraction (MeV-UED) to study the electrical conductivity and structure of Warm Dense aluminum. By measuring changes in the THz field, we determine the conductivity of the WD-Al at different electron temperatures. We combine these results with studies using MeV-UED, which is ideally suited to probe of the structure of thin films because of the high scattering cross section, short wavelength, and sub-picosecond pulse duration of relativistic electron bunches. These measurements provide crucial characterization of the state and density of the WD-Al probed by the THz pulse, as well as the timescale of melting of Al films at high excitation densities. This work is supported by DOE Office of Science, Fusion Energy Science under FWP 100182, and the DOE BES Accelerator and Detector R&D program. B. K. Ofori-Okai, Rev. Sci. Instrum. 89(10), 10D109 (2018) N. W. Ashcroft and N. D. Mermin, Solid State Physics, 1st ed. (Brooks/Cole, 1976) M. Z. Mo, Rev. Sci. Instrum. 87(11), 11D810 (2016) M. Z. Mo,* Z. Chen*, Science 360(6396), 1451–1455 (2018)

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