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Low-velocity ion stopping power measurement in Warm Dense Matter SOPHIA MALKO, Princeton Plasma Physics Laboratory, WITOLD CAYZAC, CEA, ROBERT FEDOSEJEVS, University of Alberta, JON IMANOL APINANIZ, CLPU, MATHIEU BAILLY-GRANDVAUX, KRISH BHUTWALA, CHRISTOPHER MCGUFFEY, UCSD CER, VALERIA OSPINA, CEA, ANNA TAUSCHWITZ, University of Frankfurt, XAVIER VAISSEAU, CEA, JOAO JORGE SANTOS, DIMITRI BATANI, CELIA, SUXING HU , Laboratory for Laser Energetics, Univ. of Rochester, DIEGO DE LUIS BLANCO , JOSE ANTONIO PEREZ , GIANCARLO GATTI, LUCA VOLPE, CLPU — Understanding the physics of ion stopping power in warm dense matter (WDM) at low projectile velocity is of great interest both for fundamental science and inertial confinement fusion. This regime where vp (ion velocity) ˜vth (electron thermal velocity) is theoretically and experimentally challenging. We report a first measurement of the energy loss of 500 keV protons in WDM at a low ratio vp / vth = 3. A novel platform for proton stopping power measurements by laser driven ion sources was developed for the experiment at the 30 fs 200 TW system CLPU - VEGA II (Spain). A low energy proton beam with small bandwidth and time spread probed WDM with Te =10−20 eV, generated via fs laser heating of a thin carbon foil. XUV spectroscopy and SOP provided the characterization of target temperature, which is used to benchmark 2D hydrodynamic simulations. The measured proton energy loss is enhanced in WDM compared to the same cold target, as expected from the theoretical modeling, and motivates further development of this measurement technique.

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