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Using the Multi-Terawatt Laser at Laboratory for Laser Energetics to Generate a High-Yield, 0.5-MeV Deuteron Beam ARNOLD SCHWEMMLEIN, University of Rochester, CHAD FORREST, JAMES KNAUER, SEAN REGAN, CHRISTIAN STOECKL, Laboratory for Laser Energetics, UDO SCHRDER, University of Rochester — First experiments to produce particle beams on the Multi-Terawatt (MTW) laser at LLE were conducted, utilizing the target normal sheath acceleration (TNSA) mechanism with deuterated titanium foils. In the experiments, a high-power (approx. 10^{18} W/cm^2), short-pulse, (8-ps) laser beam is shone onto a thin (25-μm) foil previously exposed to varying amounts of deuterium. The electrons in the target are accelerated away from the target by the strong electromagnetic field of the laser, generating an enormous Coulomb field. This field ionizes the atoms at the rear surface of the target and accelerates them to a few hundred keV. This study focused on characterizing the beam composition and energy using a Thomson parabola ion spectrometer (TPIS). For different target finishes, the relative abundance of different ion species originating from surface contaminants, as well as the absolute yield and energy distribution of deuterons in the beam, were measured. Future studies will utilize the optimal target for nuclear reaction experiments with a secondary "physics" target. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

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