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Ion Transport in Solid and Warm Dense Targets[1] F.N. BEG, B. QIAO, C. MCGUFFEY, J. KIM, UCSD, M.-S. WEI, R.B. STEPHENS, General Atomics — High intensity proton/ion beam transport and energy deposition in solids and Warm Dense Matter (WDM) is not well understood even though it is important to several applications including heavy ion fusion and laser-produced ion beam driven fast ignition fusion. Ion stopping power models have been developed for the relevant regimes but thus far lack experimental validation. One of the challenges to understand ion beam transport and energy deposition in solid density cold matter and WDM is self-consistently accounting for the matter's response to the intense beam (heating, ionization, strong return currents and self-generated electric and magnetic fields) and in turn the beam's response to the matter (temperature gradients, current-driven fields). In this presentation, ion stopping-power module implemented in the hybrid particle-in-cell code LSP and its applications in modeling intense proton beam transport and heating in solids and WDM targets will be discussed. In addition, relevance of this work to the Matter in Extreme Condition end station with the unique capability of the combined high flux hard x-ray pulse and the high intensity short pulse optical laser at the Linac Coherent Light Source (LCLS) will be presented.

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