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Stopping Power in Dense Plasmas: Models, Simulations and Experiments PAUL GRABOWSKI, CHRIS FICHTL, Los Alamos National Laboratory, FRANK GRAZIANI, ANDREW HAZI, Lawrence Livermore National Laboratory, MICHAEL MURILLO, Los Alamos National Laboratory, RONNIE SHEPERD, MIKE SURH, Lawrence Livermore National Laboratory, CIMARRON COLLABORATION — Our goal is to conclusively determine the minimal model for stopping power in dense plasmas via a three-pronged theoretical, simulation, and experimental program. Stopping power in dense plasma is important for ion beam heating of targets (e.g., fast ignition) and alpha particle energy deposition in inertial confinement fusion targets. We wish to minimize our uncertainties in the stopping power by comparing a wide range of theoretical approaches to both detailed molecular dynamics (MD) simulations and experiments. The largest uncertainties occur for slow-to-moderate velocity projectiles, dense plasmas, and highly charged projectiles. We have performed MD simulations of a classical, one component plasma to reveal where there are weaknesses in our kinetic theories of stopping power, over a wide range of plasma conditions. We have also performed stopping experiments of protons in heated warm dense carbon for validation of such models, including MD calculations, of realistic plasmas for which bound contributions are important.

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