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Theory and simulation of warm dense matter targets

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We present simulations and analysis of heating of warm dense matter foils by ion beams with ion energy less than one MeV per nucleon to target temperatures of order one eV. Simulations were carried out using the multi-physics radiation hydrodynamics code HYDRA** and comparisons are made with analysis and other codes. We simulate possible targets for a near-term experiment at LBNL (the so-called Neutralized Drift Compression Experiment, NDCX) and possible later experiments on a proposed facility (NDCX-II) for studies of warm dense matter. We calculate temperature uniformity and maximum temperature expected. We also compare the dynamics of ideally heated targets, under several assumed equation of states, exploring dynamics in the two-phase (fluid-vapor) regime. Various target materials (including solids and foams) will be presented. Investigations of Rayleigh Taylor instabilities induced in accelerated solid hydrogen by ion beam deposition will also be presented.

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