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Creation of Si Warm Dense Matter using an intense proton beam by the OMEGA-EP short pulse laser and simulated with 2D particle-in-cell[1] KRISH BHUTWALA, University of California, San Diego, JOOHWAN KIM, MATHIEU BAILLY-GRANDVAUX, UCSD, ROBERT HEETER, JIM EMIG, EDWARD MARLEY, LLNL, JACQUELYNNE VAUGHAN, DANA ZIMMER, FARHAT BEG, ADAM HIGGINSON, UCSD, DEREK MARISCAL, LLNL, SARAH MULLER, General Atomics, PHIL NILSON, WOLFGANG THEOBALD, LLE, CHRIS MCGUFFEY, UCSSD — The dual OMEGA-EP short-pulse lasers were used to heat a thin Si wafer to the warm dense matter (WDM) regime and measure its temperature. The first beam (10^{18} W/cm^2, 10 ps) irradiated a CH hemispherical cap, subsequently accelerating energetic protons and ions to heat the Si face-on. The second beam (10^{18} W/cm^2, 5 ps) irradiated an adjacent Zn wire tip, generating an x-ray backlighting spectrum which passed through the Si hot spot and into a multipurpose spectrometer (MSPEC) to diagnose the instantaneous Si temperature at delays spanning 200 ps. Modeling predicts that the Si remains >30 eV and >10% solid density during this time window. We present the proton energy spectra measurements from Radiochromic film and a Thomson Parabola which are used as input to simulate the temperature evolution of the Si via the 2D particle-in-cell code LSP. We show the simulation results and compare with temperature measurements from MSPEC.

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