Abstract Submitted
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Irradiation of Materials using Short, Intense Ion Beams[1] PETER SEIDL, Q. JI, A. PERSAUD, E. FEINBERG, M. SILVERMAN[2], A. SULYMAN[3], W.L. WALDRON, T. SCHENKEL, LBNL, J.J. BARNARD, A. FRIEDMAN, D.P. GROTE, LLNL, E.P. GILSON, I.D. KAGANOVICH, A. STEPANOV, PPPL, M. ZIMMER, TU Darmstadt — We present experiments studying material properties created with nanosecond and millimeter-scale ion beam pulses on the Neutralized Drift Compression Experiment-II at Berkeley Lab. The explored scientific topics include the dynamics of ion induced damage in materials, materials synthesis far from equilibrium, warm dense matter and intense beam-plasma physics. We describe the improved accelerator performance, diagnostics and results of beam-induced irradiation of thin samples of, e.g., tin and silicon. Bunches with >3x10^{10} ions/pulse with 1-mm radius and 2-30 ns FWHM duration and have been created. To achieve the short pulse durations and mm-scale focal spot radii, the 1.2 MeV He^+ ion beam is neutralized in a drift compression section which removes the space charge defocusing effect during the final compression and focusing. Quantitative comparison of detailed particle-in-cell simulations with the experiment play an important role in optimizing the accelerator performance and keep pace with the accelerator repetition rate of <1/minute.

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