

NDCX-II Beam Dynamics

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The Neutralized Drift Compression Experiment-II (NDCX-II) will produce ion beams for studies of Warm Dense Matter, target physics, and intense-beam dynamics relevant to heavy-ion-driven Inertial Fusion Energy. NDCX-II will accelerate a 20-50 nC Li pulse to 1.2-3 MeV, compress it to sub-ns duration in a neutralizing plasma, and focus it onto a target. We present: the NDCX-II machine layout and “physics design” [A. Friedman, et al., Phys. Plasmas 17, 056704 (2010)], including the use of high-occupancy pulsed-solenoid focusing and modified induction cells from LLNL’s Advanced Test Accelerator; unusual aspects of the beam dynamics (such as the use of the beam’s space charge to remove the applied head-to-tail energy tilt and halt the initial non-neutral compression in the accelerator); the simulation studies that enabled the design; estimates of robustness; prospects for using dipoles to correct for residual misalignments of the magnetic axis (and thereby suppress detrimental “corkscrew” oscillations of the beam centroid); plans for commissioning over the coming months; and some possible experiments using the machine itself and extensions.

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