

NDCX-II Commissioning Highlights

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The Neutralized Drift Compression Experiment-II (NDCX-II) is a new facility that will generate ion beam pulses for experimental studies of Warm Dense Matter and heavy-ion-driven Inertial Fusion Energy, as well as intense beam dynamics and beam-plasma interactions. The machine will generate and accelerate 20-50 nC of Li⁺, starting from a 10.9 cm diameter ion source. Tailored voltage waveforms from induction accelerating cells manipulate and longitudinally compress the beam current pulse duration from ~500 ns at the source to sub-ns at the target plane, while accelerating the ions from ~100 keV to 1.2 MeV. At the end of the accelerator the ions are focused to a sub-mm spot size onto a thin foil (planar) target, assisted by a space-charge neutralizing volumetric plasma and ~8 Tesla final focus magnet.

Commissioning activities of the injector and downstream beamline have begun. We first describe the injector, accelerator, transport, final focus and diagnostic facilities. We then report on the results of early commissioning studies that characterize beam quality and beam transport, acceleration waveform shaping and beam current evolution. Corkscrew mode growth measurements based on capacitive beam position monitors and gated beam profile measurements are discussed. ASP and WARP simulation results are presented to benchmark against the experimental measurements.

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