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Simulations of ion beams for NDCX-II

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NDCX-II, the second neutralized drift compression experiment, is a moderate energy, high current accelerator that is designed to drive targets for warm dense matter and IFE-relevant energy coupling studies and to serve as a testbed for high current accelerator physics. Much of the design and characterization of the accelerator has depended on simulation. Various areas will be discussed. An overview of past work will be given, focussing on ensembles of simulations carried out to understand the effect of machine errors on the performance of the beam on the target. Thorough modelling ofthe performance requires a fully kinetic simulation of the beam and plasmainteractions. Such simulations will be discussed, showing the presence of theelectron-ion two stream instability, and illustrating some ramifications on the beam performance. The initial operation of NDCX-II was done with both single solenoid and five solenoid scenarios. Simulations that were used to help understand the results will be shown, including the effect of source-limited emission. A fit to emission data from a source test stand was developed and used inthese simulations. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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