

Plasma Sources for Drivers and NDCX-II

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A barium titanate ferroelectric cylindrical plasma source has been developed, tested and delivered for the Neutralized Drift Compression Experiment NDCX-II at Lawrence Berkeley National Laboratory (LBNL). The plasma source design is based on the successful design of the NDCX-I plasma source [1]. A 7 kV pulse applied across the 0.150"-thick ceramic cylinder wall produces a large polarization surface charge density that leads to breakdown and plasma formation. The plasma that fills the NDCX-II drift section upstream of the final-focusing solenoid has a plasma number density above 10^{10} cm⁻³ and an electron temperature of several eV. The operating principle of the ferroelectric plasma source will be reviewed and a detailed description of the installation plans will be given. The criteria for plasma sources with larger number density will be given and candidate plasma sources such as flashboards and laser ablation sources will be discussed. Ideas will be presented for plasma sources for driver applications. Plasma sources for drivers will need to be highly reliable, create plasmas reproducibly, and operate at several Hz for millions of shots.

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[1] Plasma Source Development for the NDCX-I and NDCX-II Neutralized Drift Compression Experiments, E. P. Gilson, R. C. Davidson, P. C. Efthimion, J. Z. Gleizer, I. D. Kaganovich, Ya. E. Krasik, Laser and Particle Beams, in press (2012).

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