

Abstract Submitted
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Overview of NSTX Facility Upgrades Status and Research Plans¹

M. ONO, Princeton Plasma Physics Laboratory, NSTX TEAM — The National Spherical Torus eXperiment (NSTX) is undergoing a major facility upgrade. The major mission of NSTX-U is to develop physics basis for an ST-based Fusion Nuclear Science Facility (FNSF). The ST-based FNSF has a promise of achieving high neutron fluence needed for reactor component testing with a relatively modest tritium consumption. At the same time, the unique operating regimes of NSTX-U provide high leverage to address several important issues in the physics of burning plasmas to optimize the performance of ITER. The NSTX-U program further aims to determine the attractiveness of the compact ST for addressing key research needs on the path toward a fusion demonstration power plant (Demo). The upgrade project will double the toroidal field, plasma current, and NBI heating power and increase the pulse length from 1-1.5s to 5-8s. More tangential NBI system is designed to attain full non-inductive operation. Innovative plasma start-up and ramp-up techniques without the central solenoid operation which is needed for a compact FNSF design will be explored. With higher fields and heating power, the NSTX-U plasma collisionality will be reduced by a factor of 3-6 to help explore the transport trend toward the low collisionality regimes expected in FNSF, ITER, and Demo.

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