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Overview of NSTX Facility Upgrades Status and Research Plans[1]

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— NSTX-U is undergoing a major device upgrade as well as an addition of a second more tangential Neutral Beam Injection (NBI) heating and current drive system. NSTX-U will double the toroidal field from $\sim$ 0.5 T to 1 T, the plasma current from $\sim$ 1 MA to 2 MA, the NBI heating and current drive power from $\sim$ 7 MW to 14 MW, and increase the peak field plasma pulse length from 1 sec to 7 sec. More tangential NBI system is designed to achieve 100 % non-inductive operation needed for a compact FNSF design. Innovative plasma start-up and ramp-up techniques without the central solenoid operation which is needed for a compact FNSF design will be explored. A major physics/technology goal for NSTX-U is to develop an attractive divertor solution for the very high steady-state divertor heat flux expected for FNSF. With doubling of the heat flux and plasma current, the peak divertor heat flux in NSTX-U could quadruple to $\sim$ 40 MW/m2 compared to $\sim$ 10 MW / m2 of NSTX. For divertor heat mitigation, snow-flake divertor configuration and liquid lithium divertor are being considered. The first plasma operation of NSTX-U is planned in October 2014.

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