The Lithium Tokamak eXperiment (LTX)*

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The Lithium Tokamak eXperiment (LTX) is now in the final stages of assembly, and is scheduled for first plasma in March 2008. LTX follows the successful experiments in the Current Drive eXperiment – Upgrade (CDX-U) with liquid lithium PFCs [R. Majeski et al., Phys. Rev. Lett. **97**(2006)075002], and will be the first tokamak experiment with nearly full liquid lithium coverage of the first wall. Design parameters for the machine are $R_0 = 0.4$ m, $a = 0.26$ m, $B_T < 0.35$ T, $I_p < 400$ kA, current flattop > 100 msec. LTX is fitted with an internal shell or liner, constructed in four segments with toroidal and poloidal gaps, and conformal to the last closed flux surface. The interior (plasma facing) surface of the shell, which will be coated with lithium in operation, is 1.5 mm stainless steel, explosively bonded to 1 cm of copper. A second shell, with a porous molybdenum inner surface, is in preparation. The copper exterior of the shell is nickel plated to reduce lithium attack, sputtering, and thermal emissivity. All four segments of the shell are resistively heated in order to ensure that lithium coatings on the interior surface will remain molten. Lithium coatings will be produced through evaporation from an in-vessel inventory of up to 300 g of lithium, which will be loaded as a liquid onto the two lower shell segments, forming a toroidal pool a few mm deep. This pool of lithium will form the lower plasma limiting surface (as was the case for the CDX-U experiments). At the operating temperature of 300 – 350C, evaporation from the pool will continuously recoat the entire shell interior. Intermittent operation of the shell at temperatures of up to 500C to promote wetting of the stainless steel by the lithium film is possible. The shell is electrically isolated from the vacuum vessel to permit argon glow discharge cleaning by applying a bias between the upper and lower shell segments. The design and construction of LTX, along with performance projections based on results from the CDX-U lithium experiments, will be discussed. Results from the first plasma discharges in LTX are also expected.

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