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First operation of the Lithium Tokamak Experiment - β

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LTX-β, the upgrade to the Lithium Tokamak Experiment, has now been operated with full lithium coatings on all plasma-facing surfaces, and at increased toroidal fields >0.3 T. Plasma current has so far been limited to <100 kA. The upgrade includes a neutral beam injector provided by Tri-Alpha Energy Technologies. The beam is designed to operate at 20 kV, with 35A of ion current. So far >600 kW of beam power has been injected at 18.5 kV. Up to 60% of the injected power is deposited in the plasma at higher target densities, in agreement with NUBEAM modeling. However, initial modeling of the ion orbits indicates that fast ion losses are important. Significant beam fueling is observed under some conditions. New insertable lithium evaporators have been installed on LTX-β, which provide full coverage of the plasma-facing surfaces, with a rapid (10-15 minute) evaporation cycle. Additional improvements to the evaporators, including a larger lithium inventory, and between-shots operation, are planned. LTX-β retains the same plasma geometry, and the heated high-Z liner featured in LTX. Upgrades to the diagnostic set include active CHERs. Further upgrades to the Thomson scattering system and new Lyman- α arrays will permit a determination of energy confinement time as a function of recycling, which is the emphasis for the 2019 – 2020 experimental campaign.

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