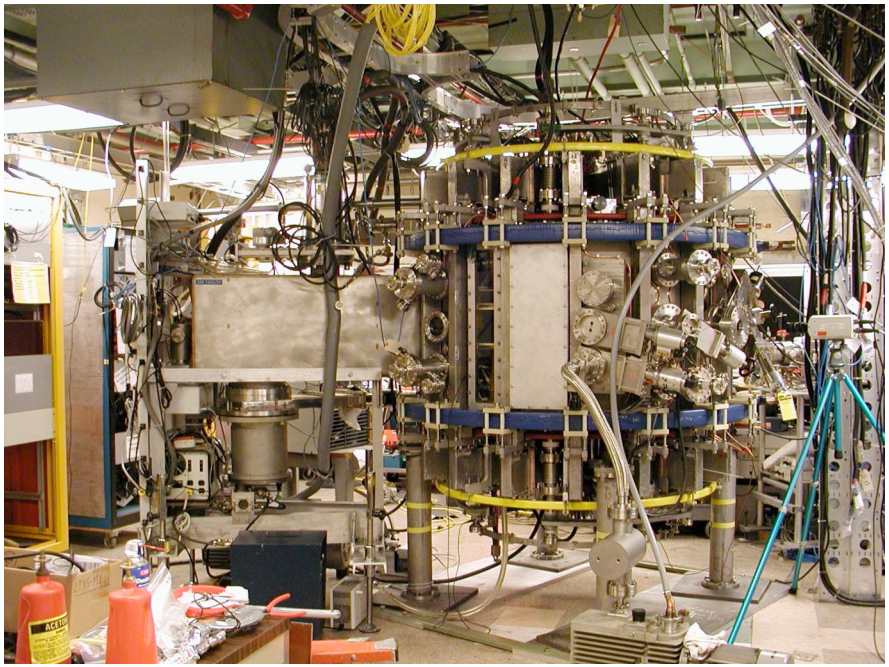
LTX status

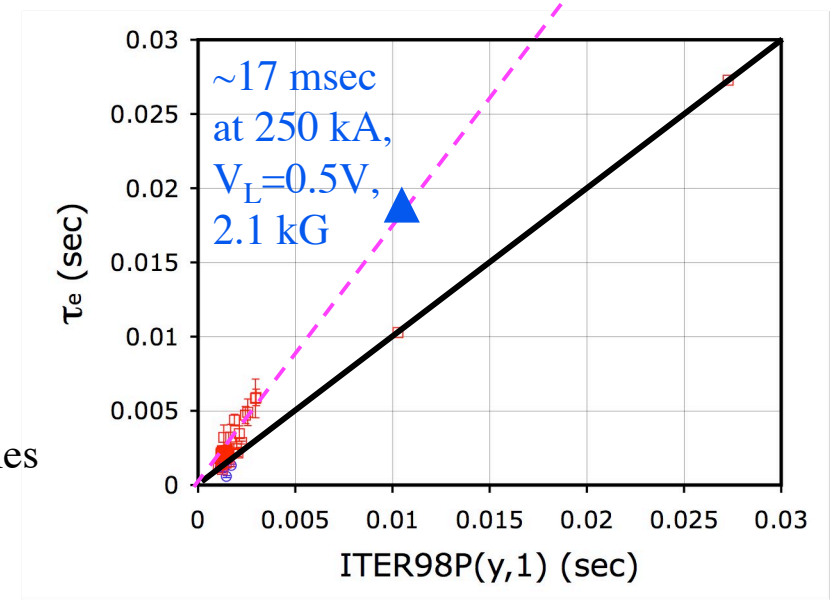
- LTX is still in the commissioning phase
  - First plasma: 3 October, 2008.
  - First operating phase designed to deal with startup issues
    - » Employing smaller OH capacitor bank from CDX-U
  - Measurement, modeling of null formation and PF rampup with thick copper shell
    - » LTX is first ST in world, first tokamak in U.S., with nearly full copper shell
- In parallel, progressing on new OH power supply
  - 28 current sharing transformers approaching completion
  - White paper on P.S. prepared, sent to ITER (P.S. is candidate to power internal PF coils)

- Preparing 5.8 GHz ECH source to aid startup
- Identified problem with existing TF joints
  - Existing (CDX) design from early 90s
  - Problems appear to be associated with new, rigid bracketing of TF coils
- Fix identified, tested, ready to go
- Exceeds requirements for full TF, OH current ops
- Review tomorrow, ~ 1 week to install



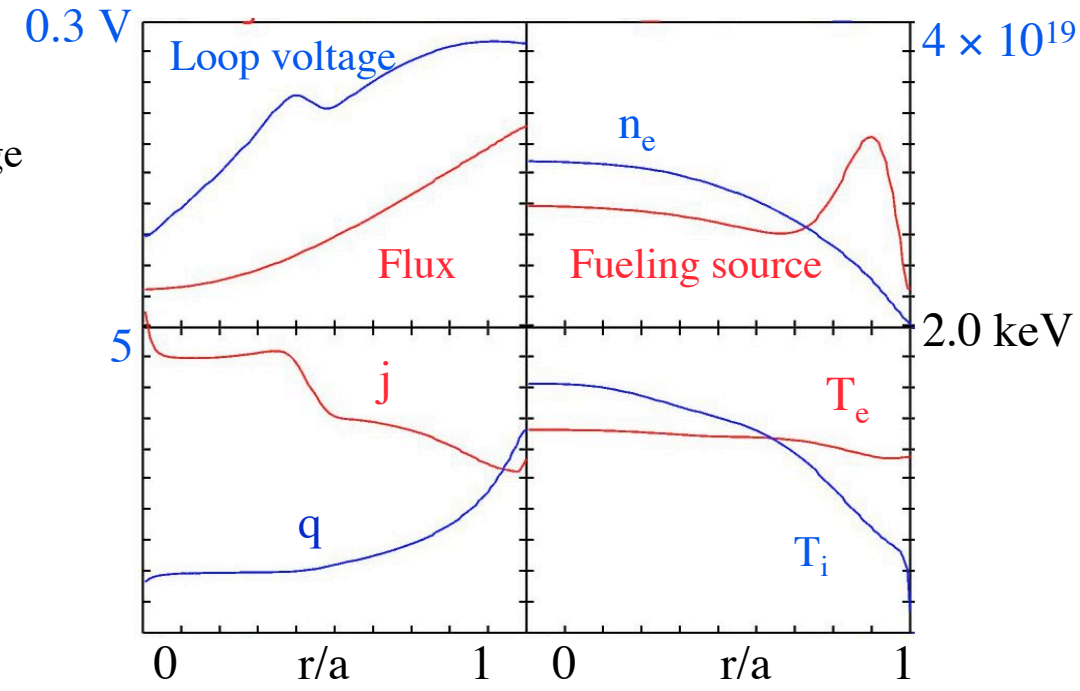
LTX research program for FY09-11

- Introduce lithium - 20g (evaporative coatings) ⇒ 100-200g (pool in lower shell)
- Investigation of spherical tokamak equilibria with a very low recycling coefficient and pulsed gas fueling
  - Fuel with SGI (existing) and a molecular cluster injector (new)
    - » Cluster injector presently in design, engineering phase
    - » Based on system implemented in HL-2M
- Employ 140 channel magnetics system, Thomson scattering
  - Global confinement, T_e profile
  - Current profile
- Employ 2 channel interferometer, pulsed fueling
  - Particle transport
  - Add digital holography in FY10-11
- Additional thrusts in FY10-11
  - 100 kW pulsed EBW for heat pulse propagation
  - Edge Thomson for near-wall T_e gradient
- Full toroidal field, plasma current aid confinement studies
  - Requires completion of OH power supply



Present plan is to implement NBI starting in FY11

- NCSX diagnostic beam (downrated to 15 - 20 keV, 5A, 1 sec)
  - Provide CHERS, initial ion heating results
  - Small beam footprint, compact system for installation in present test cell
- Install in combination with moly coated shell (SBIR - funded effort)
- ASTRA modeling shown for 100 kW NBI
  - Requires gas puffing to sustain density
- V_{loop} decreases to 0.25 V
- $T_i(0)$ increases to 1.6 keV
  - $T_i \sim T_e$
  - τ_E to 60 ms (ASTRA)
- Wider accessible parameter range
  - υ^* reduced to 0.01 - 0.1
  - Higher density operation
    - » Combine with molecular cluster injection



Further plans

- Detailed investigation of PMI with liquid lithium walls
- PMI investigations with a hot high-Z wall
  - Proposed collaboration with Purdue University, University of Illinois
  - Performed after installation of moly coated wall, before lithium
  - LTX will have first full, 500 °C, high Z wall
- Joint NSTX, LTX experiments:
  - Plasma-material interactions
    - » H retention, recycling
    - » Sputtering, thermal (evaporative) limits
  - Confinement with low recycling walls
  - Electron transport
- Move to full core fueling with NBI in LTX
  - *Full* fueling possible with two 8-12 keV, 15A, 500 msec Budker Institute beams
    - » τ_p = 60 msec, 30 A beam current, 0.8 m^3 volume $\Rightarrow$ $<n_{beam}> \sim 1.4 \times 10^{19}$ m^{-3}
  - Small volume of LTX permits access to high beam ion population
    - » Impractical without low recycling walls to eliminate charge exchange losses
- Stability with conducting wall at r~1.02a