NSTX-U

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Planning initial experiments in Particle Control Task Force on NSTX-U

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NSTX-U Pre-Forum Meeting
PPPL
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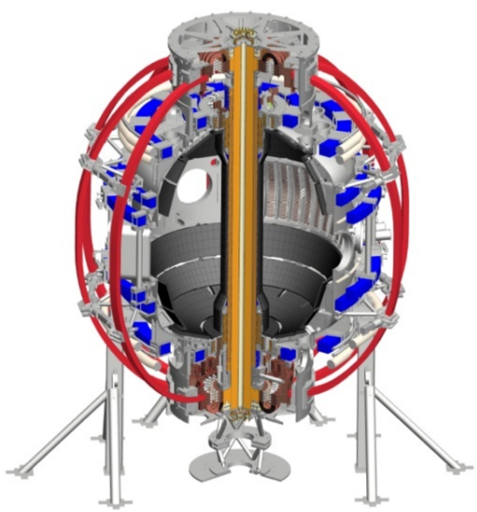

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Initial conditions for developing efficient ion and impurity density control in NSTX-U

- Main eng. differences between NSTX and NSTX-U for particles
  - Divertor and main wall power density to increase
  - SOL power and particle channel width (decreased?)
  - Pulse length to increase
  - Two NBI boxes and two NBI cryopumps
  - Geometry changed
    - Vacuum vessel volume decreased
    - Inner wall (CS) area increased
    - Pumping duct volume decreased
    - Divertor area decreased

- These changes likely to lead to modified operating space w.r.t. recycling, impurity flux, pedestal stability and ELMs, etc

Candidate experiments for initial and intermediate run phases

- Evaluate efficiency of main ion and impurity control techniques demonstrated in NSTX
  - Divertor gas injection (some ELM control, impurity flux control)
  - Snowflake divertor (ELM control, impurity flux control)
  - 3D fields (n=3 RMP for ELM control)
  - SGI ELM pacing
- Evaluate recycling, pumping and particle balance in NSTX-U for control development
  - Compare SGI pump-out time in boronized and lithium discharges
    - At different NBI power, divertor configurations, coating thickness, and flat-top timing
- Evaluate auxiliary conditioning techniques
  - Helium discharges, He GDC

Thoughts on transition from Boronization to Lithium

- Alternative opinion: do we need boronization as a run period ?
- Unlikely to be able to make a meaningful comparison
  - H-mode scenarios are likely to be developing in the first 2 months
  - Diagnostics are likely to be developing in the first 2 months
  - Not like in FY11 when the comparison was planned
- Eventually will go to lithium anyway
- Good H-mode development time is longer with boronization
- Up-to-air vent is the main issue for lithium, but it can occur any time, so need to develop mitigation strategies

- => Can we move to lithium as quickly as possible if not immediately ?
  - What do we miss if anything? Need to compile a list and evaluate
- Can we do the comparison in FY16?