NSTX-U

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ASC Chapter Discussion

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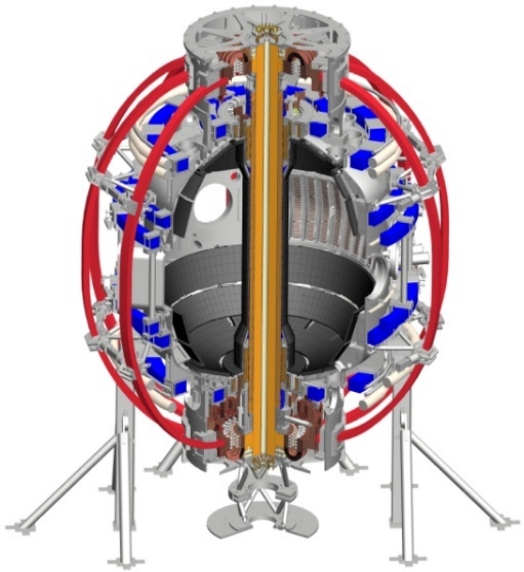

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ASC Goals and Research Elements

- Goal: Develop the basis for steady state operations and axisymmetric control for next-step STs, while helping resolve key scenario and control issues for ITER

- Research elements (and goals)
  - Scenario development for NSTX-U
  - Axisymmetric control development
  - Event handing and discharge termination automation
  - Scenario physics for next step devices.

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- Goal: Develop the basis for steady state operations and axisymmetric control for next-step STs, while helping resolve key scenario and control issues for ITER

- Research elements (and goals)
  - Scenario development for NSTX-U
    - Demonstrate 100% non-inductive operation in stationary conditions, for multiple τ_{CR}.
    - Develop scenarios for physics studies at high P_{inj}, I_P, and B_T, accessing low collisionality and challenging divertor control solutions.
    - Assess HHFW heating and EBW H&CD for advance scenarios
    - Exploit potentially new regimes such as EPH, ITB, or those provided by Li PFCs.
  - Axisymmetric control development
  - Event handing and discharge termination automation
  - Scenario physics for next step devices.

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- Research elements (and goals)
  - Scenario development for NSTX-U
  - Axisymmetric control development
  - Event handing and discharge termination automation
    - Develop realtime methods of detecting imminent disruptions in a high-β ST plasma.
    - Determine optimal, automated discharge termination strategies.
  - Scenario physics for next step devices.

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- Research elements (and goals)
  - Scenario development for NSTX-U
  - Axisymmetric control development
    - Develop robust algorithms for shape and position control relevant to next-step STs.
    - Develop methods to obtain & maintain favorable current and rotation profiles, using ST relevant actuators such as NB H&CD, NTV, HHFW heating, and EBWCD
    - Implement divertor control strategies to optimize pumping efficiencies while regulating the heat flux to manageable levels (SFD, radiation).
  - Event handing and discharge termination automation
  - Scenario physics for next step devices.

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- Research elements (and goals)
  - Scenario development for NSTX-U
  - Axisymmetric control development
  - Event handing and discharge termination automation
  - Scenario physics for next step devices.
    - Understand the conditions for classical beam current drive, and exploit anomalies for scenario development.
    - Determine the q and rotation profiles that simultaneously optimize confinement and stability.
    - Integrate pedestal control tools at steady state optimization.
    - Validate predictive models for thermal and fast ion transport in the high-β_N steady-state regime.