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Advanced Scenarios and Control TSG Goals for First Weeks of FY15

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PPPL
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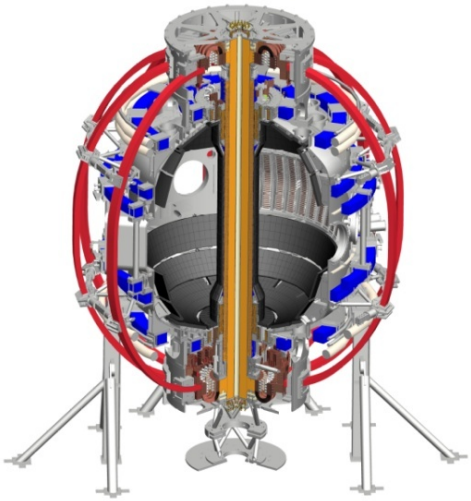

Four ASC Research Thrusts Identified in 5 Year Plan

- Scenario development and optimization
  - Demonstrate 100% non-inductive operating points
  - Develop stationary high-current partially-inductive scenarios
- Axisymmetric control development
  - Advance control capabilities (divertor heat flux, profiles, etc.)
- Controlled termination of high-β_N ST discharges
  - Disruption detection and intervention
- Examine critical issues for next-step STs
  - Regimes of classical beam current drive
  - Transport modeling verification and validation

FY15 Scientific Goals

- Identify mechanisms limiting vertical stability and what additional capabilities are required for achieving vertical stability at high κ
  - ELMs, li evolution, latency, actuator saturation, measurement noise, …
- Evaluate access and scalability of three scenarios:
  - High non-inductive fraction (I_P ~ 0.7MA, B_T = 0.75T)
  - High current (I_P ~ 1.5MA, B_T = 0.75T, 1s)
  - Long pulse (I_P ~ 1MA, B_T = 0.75T, 5s)
- Advance capabilities of tokamak control and disruption avoidance
- Achieve scenarios that optimize the verification and validation of transport and confinement modeling and predictive tools
  - Coordinate with Core Science Group
- Achieve steady-state density and radiation at fraction of n_{GR}
  - Coordinate with Particle Control Task Force

Activities (XMP/XP) for Initial Operations in FY15 (priority order)

- XP: Optimize vertical control algorithm and assess limitations on vertical stability at larger A (*Boyer*) [0.5 x 3]
- XMP: Extend H-mode operations to 1.5 MA, 0.75 T (*Mueller*) [1]
- XP: Connect to NSTX high non-inductive fraction database at new A, beam tangency, I_p ~ 700kA (*Gerhardt*) [1]
- XP: Scope q_{min} control via changes in the beam sources in partially non-inductive scenarios (*Boyer, Poli*) [1]
- Restore existing NSTX control capabilities and prepare for FY15
  - XMP: Beam power and β_N control (*Boyer*) [0.5]
  - XMP: X-point control (*Kolemen*) [0.5]
  - XMP: Checkout real-time diagnostic (rotation, MSE,…) connections into PCS (*Kolemen*) [0.5 or piggy-back]
- XP: Steady-state n_e = 0.5 – 0.75 n_{GR} with B conditioning (*Battaglia*) [1]