NSTX-U

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NSTX-U Disruption PAM Working Group – Controlled Shutdown XP Discussion

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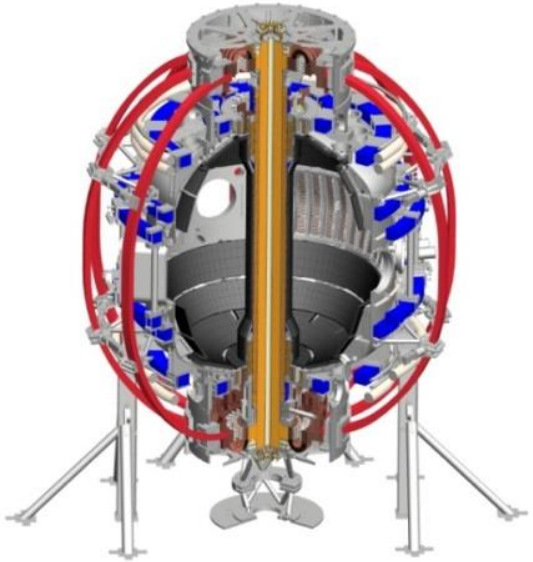
PPPL



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V1.2

An experiment creating a more controlled shutdown of NSTX-U is a capability of interest to many TSGs and Theory

- Simple overall motivation to Disruption PAM
  - Utilizing a controlled shutdown for NSTX-U plasmas strengthens and simplifies quantification of reduced disruptivity
- Overall Goal
  - Generate one or more scenarios that would reduce plasma magnetic/kinetic energies to generally accepted values defining a controlled shutdown for the plasma
- Recent initiative to run this in 2015
  - Steve Jardin's proposal to study plasma shutdown vs. $|I_p/dt|$ for comparison to M3D-C^1 simulations re-awakens motivation
  - Other scans of interest to the group could be conducted in a more general controlled shutdown experiment
    - There has been motivation to create/use a controlled shutdown for NSTX – suggest to start sooner than later

What would people be interested in / to study in an experiment creating a controlled plasma shutdown XP?

- Operational aspect
  - Controlled shutdown capability generally desired (may help maintain wall conditioning etc.; Phys. Ops. could conduct partially as piggyback
    - Multi-TSG XP; Entire XP might be possible to run in piggyback
    - Could be a pre-programmed approach – may not need (or want) automated capability (different than Automatic Shutdown XMP/XP by Stefan?)
- Plasma parameter variations / goals (for discussion/expansion)
  - Plasma shutdown vs. $|I_p/dt|$ (S. Jardin, et al.)
  - Controlled shutdown vs. plasma configuration
  - Controlled shutdown vs. plasma density
  - Attain % reduction goals for W_{tot}, W_{mag} controlled shutdown (DPAM WG)
  - Effects on particle control shot-to-shot (Particle Control Task Force?)
  - (your further ideas here…)

There has been a limited discussion already which aids our present discussion

- Some discussion points so far
  - Dennis Mueller: "it would be nice to construct a shutdown phase that we could simply append to the end of any flattop."
  - Charles Skinner: "Some attention was put to controlled shutdown during the 2009 run" (precedent)
  - Francesca Poli: "One of the (new) priorities of ITPA-IOS is ramp-down and plasma termination" (great to have ITPA connection)
    - SAS: also direct connection to a few related ITPA Stability Group "MDCs"
  - Jon Menard: "the morning fiducial is another opportunity to tune up controlled ramp-down / debug this system" (mostly piggyback?)
  - Steve Jardin's proposal to study plasma shutdown vs. $|I_p/dt|$ for comparison to M3D-C^1 simulations (cross-cutting value)
  - DPAM WG goals would strongly value general attention to create a controlled shutdown in most shots (reduced W_{tot}, W_{mag})
  - ASC TSG (SPG) has XMP / XP on automated shutdown. Should ASC champion a generalized multi-TSG XP proposal in this regard?