U.S. DEPARTMENT OF ENERGY | Office of Science

NSTX-U

Core Science Group FY17-18 Milestone Discussion

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For the NSTX-U Core Science Group

January 6th, 2017

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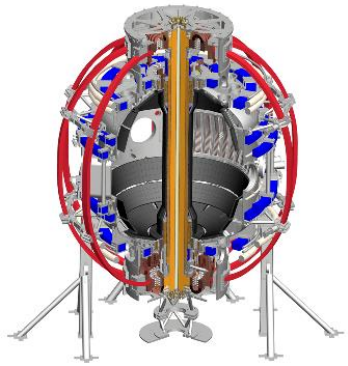

V1.3

Some guidelines for NSTX-U FY17-18 Milestone Brainstorming and Preparation

- No NSTX-U operation in FY17; operation time in FY18 unknown
  - Need to use NSTX-U data that we have now
- Should err on the side of mostly modelling/ simulation in the milestones
  - Use NSTX-U data as much as possible
- Use NSTX-U/DIII-D National Campaign / other collaborations
  - This to enable bringing in new data
- Focus on modelling and prep-work that
  - builds on data we obtained in FY16
  - gets us to high-current/field high-performance H-modes
  - exploits the 2nd neutral beam

Brief summary of initial discussion of Core SG Milestones (I)

- T&T TSG
  1. Validate reduced transport models for electron thermal transport with NSTX and NSTX-U plasmas (FY17)
     - Very broad idea: Could use NSTX-U L-mode equilibria; lacks Zeff though
  2. Assess importance of multi-scale effects in NSTX, NSTX-U plasmas (FY18)
     - This one may have the most scientific impact on transport community (WG)
  3. Validate ion scale simulations with 2D BES data for NSTX-U L-modes
  4. Assess importance of global/non-local transport effects in NSTX and NSTX-U plasmas

- Macrostability TSG
  1. Assess the sources of, and potential methods for correcting, error fields on NSTX-U (FY17)
     - Vacuum field data / analysis during the outage
  2. Tearing mode analysis (JKP/LM) (FY17 or FY18)
  3. Improvement of global MHD stability through rotation profile control (FY17? 18?)
  4. NTM Entrainment in the ST (FY18)
     - Theoretical scoping study would be included

Brief summary of initial discussion of Core SG Milestones (II)

- Energetic Particles TSG
  1. Optimization of the EP distribution function for improved plasma performance (FY18)
     - Lower frequency modes TAE/RSAE, perhaps even sawteeth
     - Focus on ramp-up, early flat-top to optimize NB mix
     - Would rely heavily on TRANSP predictions (e.g. we don't have MSE)
     - Potential cross-cutting with ASC TSG?
  2. CAE/GAE (de)stabilization with NSTX-U NBI (FY17)
     - This will include Eric's NSTX-U results on *AE stabilization with 2nd NBI
     - Will include HYM code simulations
     - Possibility to include DIII-D data if DIII-D National Campaign Experiment on this topic is approved
     - Possibly include thermal transport – link with T&T TSG (unclear who would champion this work?) Neil Crocker? Possibility to use TRANSP in the analysis role. How to include anomalous energy channel? Power channeling vs. electron transport.