Brief outline of on-going KSTAR international collaboration research – next steps

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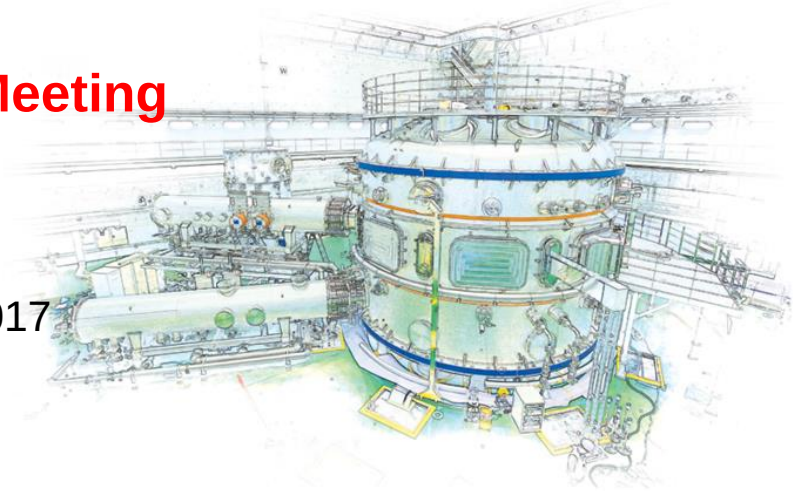

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Next-steps in KSTAR physics research will continue to advance key capabilities, start DECAF analysis

- Element 1: *Improvements and new capabilities enabling disruption characterization and forecasting (DECAF) with related experiments*
  - Equilibrium reconstruction
    - Finalize first kinetic equilibrium reconstructions with MSE, run all shots from 2016 and 2017 run campaigns to build database
    - Construct neural net processing of fast particle pressure from TRANSP
  - TRANSP analysis
    - Refine TRANSP analysis and begin predictive runs to determine impact of new 2nd NBI system on plasma β, profiles, and stability
    - Use predictive capability in “feedback” mode to determine optimal stability trajectories for disruption avoidance
  - Stability analysis
    - Begin stability analysis validation (kinetic MHD, (N)TM, kink, ballooning, RWM) for specific high performance shots and that exhibited MHD modes
  - DECAF
    - Begin disruption event characterization and forecasting (DECAF) analysis on KSTAR database
    - Expand DECAF physics modules to incorporate and utilize automated MHD mode analysis, new density limit module under development, etc.

Next-steps in KSTAR physics research will continue to advance key capabilities, enable global mode control

- Element 2: *Improvements/support to key diagnostics*:
  - Construction of 15 additional MSE background polychrometer channels to support 25 total channels for 2018 run (PPPL/MIT)
  - Continue support / interaction for Thomson diagnostic improvement

- Element 3: *Experimental active control of dynamic error fields and global MHD instability*
  - Begin generalization of model-based RWM state-space control code for the KSTAR Plasma Control System (PCS)
  - Begin generalization of synthetic diagnostics code (including for KSTAR PCS) to support disruption prediction