NSTX-U

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Discussion of possible DIII-D / NSTX-U enhanced collaboration / coordination ideas

J. Menard for the
NSTX-U research team

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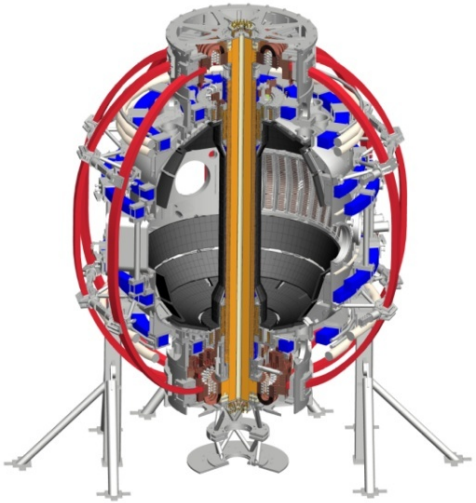

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Agenda

- Intro / overview comments from NSTX-U – J. Menard
- Overview comments from DIII-D – R. Buttery
- Richard will also represent DIII-D perspectives
- Topics for discussion - will be a bit “free-form”
  - Disruption mitigation and avoidance:
    - S. Gerhardt / R. Raman, others
  - JRT 2014:
    - Status and plans – J-K Park
  - JRT 2015:
    - Initial brainstorming – S. Gerhardt (for M. Podesta)
  - TSG / team contributions to above topics:
    - MHD: J. Berkery (for S. Sabbagh), Transport: Y. Ren
  - Anything else people may want to discuss…

Overview - 1

- Richard - thank you for visiting!
  - We know the trip here wasn't easy (and good luck getting back…)
  - Feel free to stay a bit longer…
- Aim of initial discussions is to identify areas where additional coordination / collaboration could benefit both teams
  - Disruption mitigation and avoidance:
    - Critically important to ITER, FNSF, tokamaks generally
    - Mitigation: Not tried on NSTX – will test on NSTX-U – can gain from DIII-D experience, joint analysis, develop new methods for NSTX-U (U-Wash)
    - Teams working on disruptions are relatively small on both machines → there is very likely benefit from working more together, sharing ideas
      - To start, can be a "simple" as participating in each other's experiments
    - Avoidance: Substantial work on EF/RWM/β_N control on NSTX-U – want to expand into profile control – joint work with DIII-D would also be beneficial
  - Note: not as much emphasis here on boundary/snowflake and/or EP physics since teams are already working well (enough) together

Overview - 2

- Joint Research Targets (JRT)
  - In recent years, FES and 3 facility directors have tried very hard to define important topics that include people/data from all 3 facilities
  - With NSTX-U, C-Mod not running, the "J" in JRT is increasingly difficult
  - Longer-term, default may become JRT = NSTX-U / DIII-D joint research
- Today we will also hear about JRT status, plans, ideas
  - Beneficial to get team-wide idea input early-on in process
- JRT-2014:
  - "Conduct experiments and analysis to investigate and quantify plasma response to non-axisymmetric (3D) magnetic fields in tokamaks"
    - Analysis of NSTX and DIII-D data, new experiments on DIII-D
- JRT-2015:
  - "Conduct experiments and analysis to quantify the impact of broadened current and pressure profiles on tokamak plasma confinement, stability"
    - Off-axis NBI+ECCD (DIII-D), NBI (NSTX-U), LH (C-Mod), + rotation effects

JRT-2014 Text

- “Conduct experiments and analysis to investigate and quantify plasma response to non-axisymmetric (3D) magnetic fields in tokamaks.
- Effects of 3D fields can be both beneficial and detrimental and research will aim to validate theoretical models in order to predict plasma performance with varying levels and types of externally imposed 3D fields.
- Dependence of response to multiple plasma parameters will be explored in order to gain confidence in predictive capability of the models.”

JRT-2015 Text

- “Conduct experiments and analysis to quantify the impact of broadened current and pressure profiles on tokamak plasma confinement and stability.
- Broadened pressure profiles generally improve global stability but can also affect transport and confinement, while broadened current profiles can have both beneficial and adverse impacts on confinement and stability.
- This research will examine a variety of heating and current drive techniques in order to validate theoretical models of both the actuator performance and the transport and global stability response to varied heating and current drive deposition.”