XP1512:Characterization of the Pedestal Structure as function Ip, BT, and Pnbi

A. Diallo, R. Maingi, D. Smith and many others

and the NSTX Research Team

PED Group Review
B252
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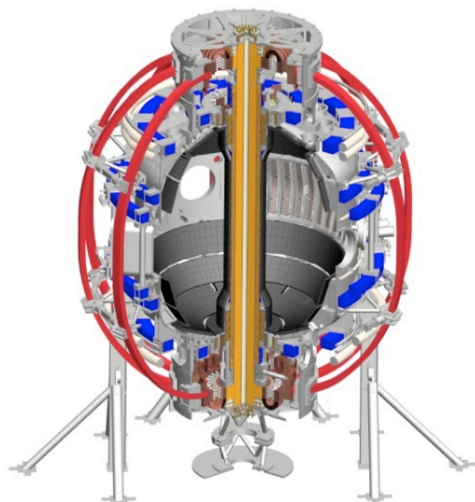
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NSTX-U goal: develop predictive capability for pedestal structure and dynamics for FNSF

- EPED (static mode) predicts limiting pedestal height and width on multiple high aspect ratio machines
  - EPED is only applicable to the pressure, therefore cannot distinguish individual transport channels

- NSTX-U will provide extensive detailed pedestal data in FY15 & FY16 to:
  - Extend the pedestal width scaling
  - Characterize the pedestal evolution
    - density and temperature separately
    - compare with standard aspect ratio
  - Control and optimize the pedestal

EPED1 Model, DIII-D 144977 (with dynamics)
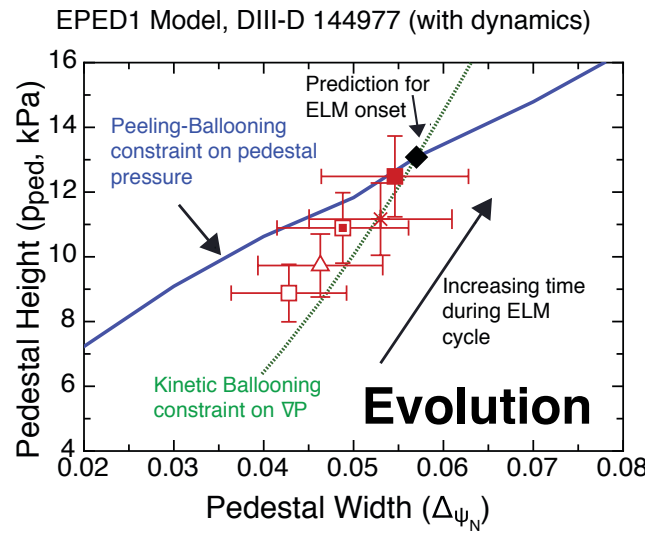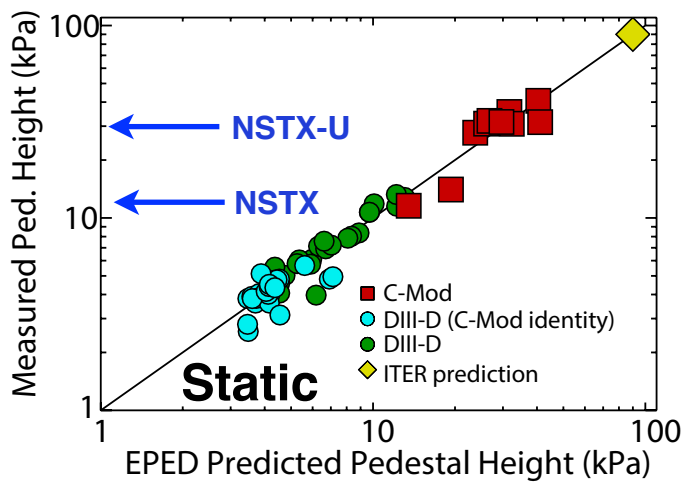
P.B. Snyder, PoP 19, 056115 (2012)

Goal of XP1512 is the characterize the pedestal structure of NSTX-U as part of R-15 milestone

- Map out the NSTX-U pedestal stability boundary prior to an ELM and test EPED1 hypotheses
    - For a range of I_p, B_t, P_{NBI}, and triangularity
        - Characterize the pedestal structure
        - Investigate the pedestal dynamics and associated turbulence
            - Assess the transport limiting the pedestal

- Investigate the above in boronized and lithiated discharges in order to understand the impact of wall coatings on the pedestal structure and its dynamics

Shot Plan: 1/2 Day experiment for each wall condition (Boron and Lithium)

- Scan I_p = [0.7, 1.0, 1.3] MA @ B_t = 0.65 T and P_{nbi} = 4 MW
  - This dataset is to be obtained during XP1520 (Kaye et al.)
  - I_p/B_t = [1.1, 1.5, 2]

- Fix I_p = 1.0 MA   **8 + (2) shots**
  - Vary P_{nbi} = [4 , 6, 8] MW @ B_t = 0.4 T
    - NBI mix: 1A+2A; 1A+2A+2B; *[1A+2A+2B+(2C) optional]*
  - Vary P_{nbi} = [6, 8] MW for B_t = 0.65 T *(4MW case is to be obtained in XP1520)*
    - NBI mix: 1A+2A+2B, *[1A+2A+2B+(2C) optional]*

- Short I_p scan at low triangularity (~0.5) at fixed B_t = 0.4 T and P_{nbi} = 4 MW
  - Ip = [1.0 ,1.2] MA   **2 + (2) shots**
    - NBI mix: 1A+[2A or 2B or *(2C)]*

                                                              Total shots per 1/2 day = 10 + (4)

- (In lithiated discharges: 100 - 150 mg lithium evaporation)