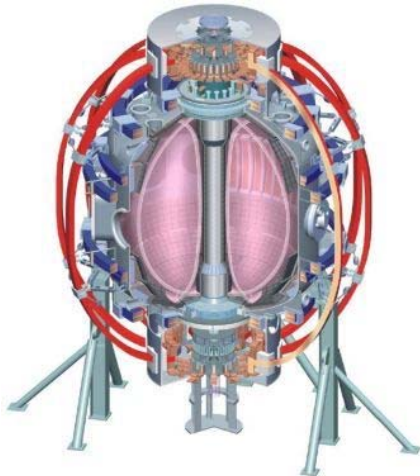


# XP proposal (XP1018) : Error Field Threshold Study with Reduced Input torques

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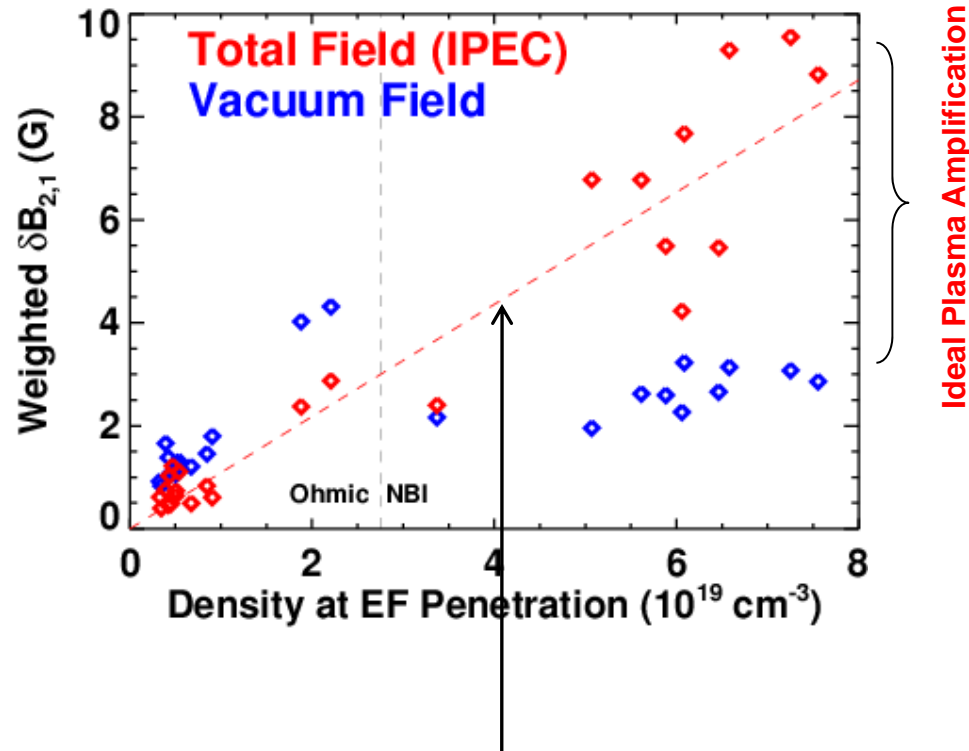
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# Motivation

- Locking threshold has been studied in NSTX :
  - XP703 (Ohmic plasmas : Linear density scaling)
  - XP903 (NBI high- $\beta$  plasmas : Role of plasma amplification)
  - XP915 (NBI high- $\beta$  plasmas with braking : Role of rotation)
- Missing points :
  - XP addressing HHFW mid- $\beta$  range plasmas, which can
    - Provide H-mode locking without any external input torques
    - Provide indirectly rotation information in HHFW plasmas
- This XP was planned as XP1018, but not tested
- Supporting Richard's WG9 – ITER error field correction

# Locking threshold study between Ohmic and H-mode plasmas is missing

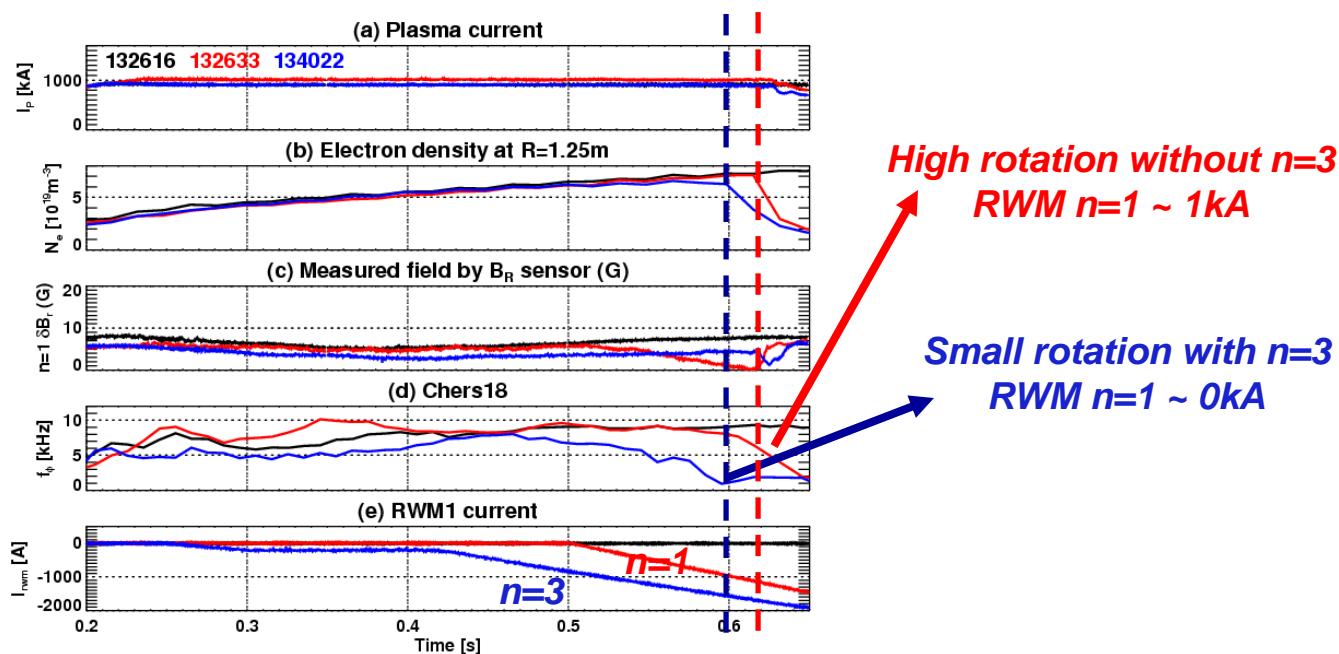
- XP703 and XP903 addressed :



- Large gap exists for data between Ohmic and NBI plasmas

# Rotations have an important role in locking, but NSTX addressed it with large NTV

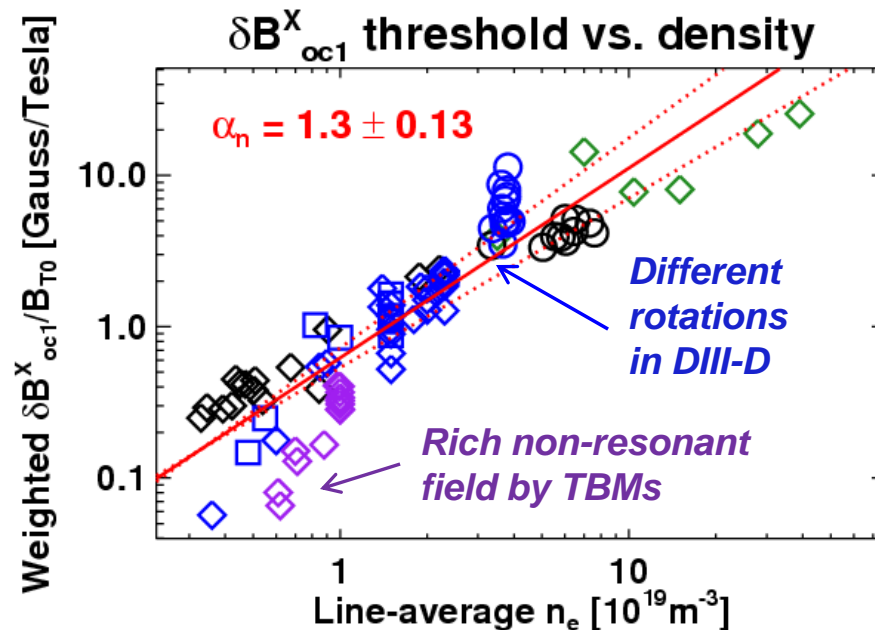
- XP915 showed locking threshold decreases with NTV braking
  - Effects by rotations and non-resonant fields are mixed



- HHFW plasmas can provide low rotation without any braking

# Locking database needs to address effects by rotation and non-resonant field

- Locking threshold has reliable density correlation, but large deviation occurs by different rotation and by non-resonant fields



- HHFW plasmas can help

# Shot plan (0.5~1 day)

- Develop H-mode targets with 1~3 MW HHFW
  - This XP is desired after HHFW commissioning but before large LITER evaporation
- Ramp-up the  $n=1$  currents for each target
  - Initial timing, ramp-up rates should be determined depending on flat-top duration of HHFW plasmas
  - SPA waveforms:
    - Short NBI blips are required for diagnostics :

