NSTX-U

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# Impurity transport vs torque in NBI heated H-Modes


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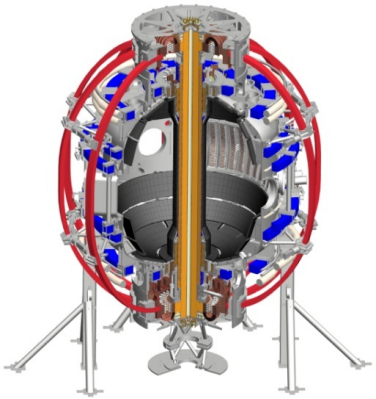
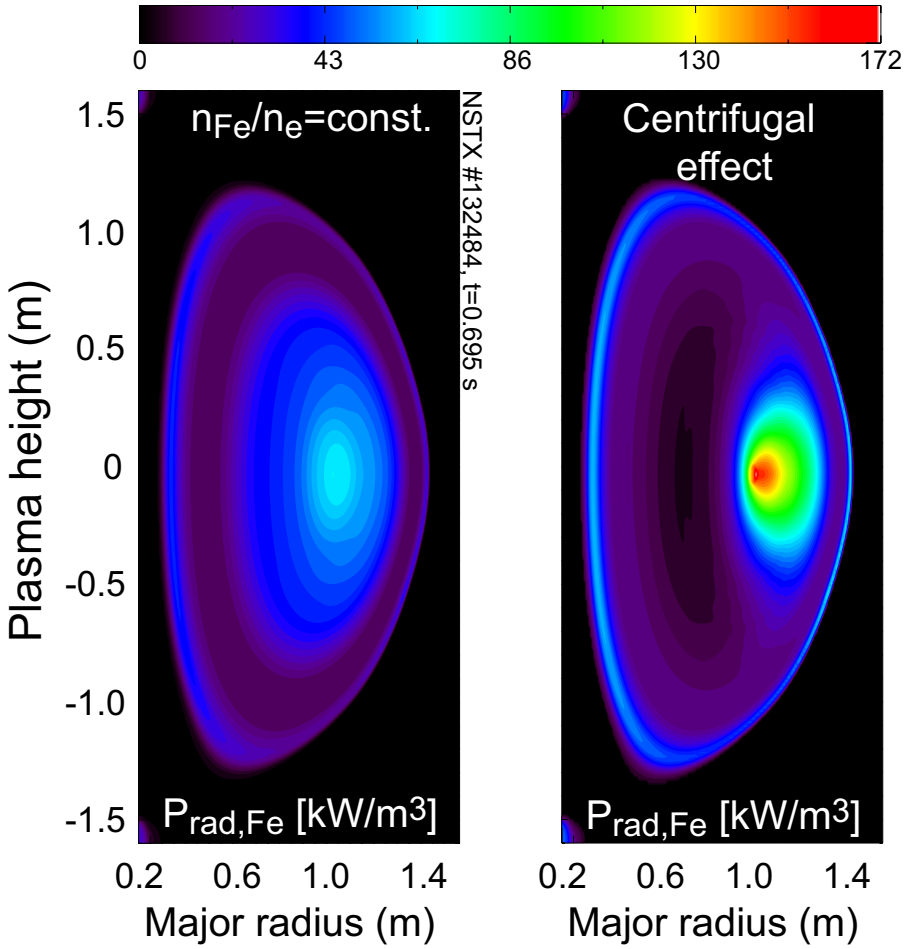


# This proposal aims to characterize impurity transport with the 2nd NBI (off-axis heating and torque)

- Other exps. will revisit the Z-transport $\rho^*$ and $\nu^*$ experiments performed with NBI #1 in NSTX (see J. Muñoz *et al.*).
- Goal is to characterize the Z-transport properties of H-mode scenarios with high toroidal velocities using the 2nd NBI.
- Off-axis beams may bring a concomitant increase of the D & Z Mach numbers providing additional momentum to the outward low temperature plasma.
- The presence of poloidal asymmetries and off-axis impurity peaking is nearly guaranteed.
- Mach correction is proportional to the $m_Z$ so the effects impurities will be easily distinguishable from that of D or C.




Synthetic $P_{rad,Fe}$ for $P_{rad,Tot}$=1 MW.
(L. Delgado-Aparicio, RSI'14)

# Off-axis NBI torque can change Z-Mach numbers leading to off-axis impurity peaking

- Understanding the radial dependence of poloidal asymmetries and its role for the outward "convection" of impurities is highly desirable.
- Impact operation with high-Z PFCs.
- Will provide valuable data for the JRT2015 ("Quantify impact of broadened *J* & *p* profiles on confinement and stability") and NSTX-U T&T thrusts #s 2 & 3, and ITPA TC #s 11 & 15 .
- Request one day of experiments w/ and w/o Ne-puffs and changing the off-axis torque density ($R_{tg}$~110, 120 and 130 cm) using the expanded NBI flexibility (e.g. at 4, 5 or 6 MW). No-Lithium.
- Key diagnostics are: CHERS, MPTS, MSE, USXR and the new ME-SXR and AXUV-based "bolometer" systems.