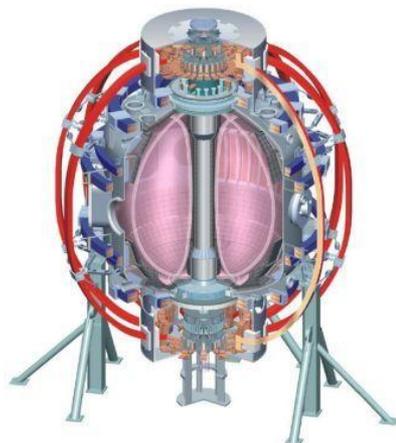


Experimental Proposals for FY10

Wayne Solomon, PPPL

College W&M
 Colorado Sch Mines
 Columbia U
 Comp-X
 General Atomics
 INEL
 Johns Hopkins U
 LANL
 LLNL
 Lodestar
 MIT
 Nova Photonics
 New York U
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 ORNL
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NSTX Research Forum FY2011
Transport and Turbulence Topical Science Group
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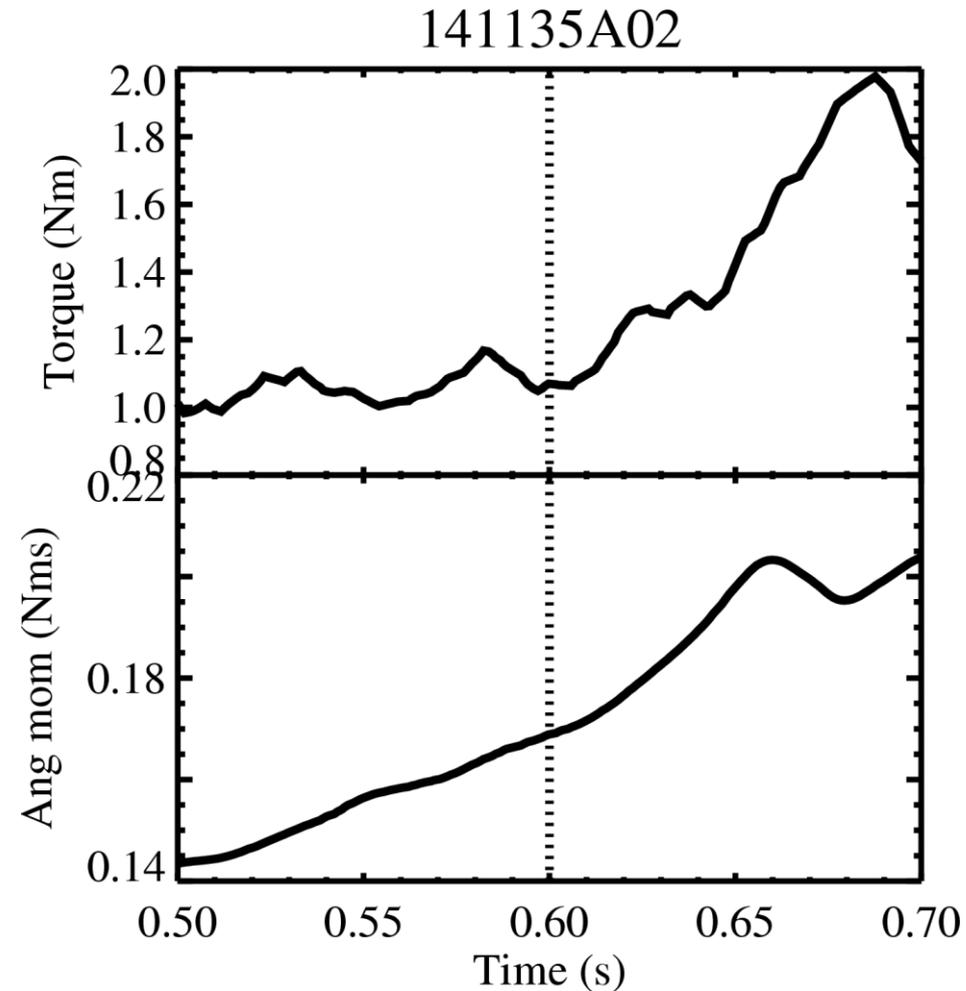
Culham Sci Ctr
 U St. Andrews
 York U
 Chubu U
 Fukui U
 Hiroshima U
 Hyogo U
 Kyoto U
 Kyushu U
 Kyushu Tokai U
 NIFS
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 U Quebec

Characterization of intrinsic torque and ρ^* scaling

- Goals
 - Measure the effective torque associated for driving intrinsic rotation.
 - Contribute to ITPA JEX TC-18 aiming to document scaling of intrinsic torque with ρ^* for extrapolation to ITER
 - Investigate modification to intrinsic torque by HHFW
- Plan
 - Use beam waveform to apply torque steps at approximately constant power (2 sources): B on steady and at reduced voltage, and switch between sources A and C.
 - Obtain as wide a variation of edge pedestal gradient as possible to compare with empirical intrinsic torque model
 - Complete I_p and B_t scans
 - Directly observe effect of the HHFW on intrinsic drive by comparing the inferred torque with and without HHFW.
- Requirements
 - The XP requires MHD quiescent plasmas, that are also resilient to changes to the plasma rotation and the NBI torque.

Requirement: Plasma Must Be MHD Quiescent (or constant) for ~300 ms to Make This Measurement

- Analysis assumes plasma is
 - steady before the NBI torque perturbation
 - responds to the step according to momentum confinement
 - settles to a new steady state
- Changes in MHD over this long-ish time window can completely violate assumption
 - Here, angular momentum is doing its own thing, independent of external torque!



XP1042 Obtained First Measurements of Intrinsic Torque in NSTX

- Data set assembled from various attempted but incomplete scans!
- Edge intrinsic torque appears to show some correlation with the pressure gradient, similar to DIII-D
 - Interestingly, seems to show anti-correlation with W/I_p intrinsic velocity scaling...?
- Total intrinsic torque seems very large 1-2 Nm
 - Comparable to all 3 sources!

