

NSTX Team Meeting - Physics Analysis

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Transport Studies

- **NSTX kinetic stability analysis:**
 - Work has begun on examining the effect of non-reversed central shear on ITG, TEM and ETG modes in NSTX high density H-modes with GS2 (Redi)
- **Neoclassical Theory:**
 - Modifications to neoclassical theory to include finite banana effects (Wang) and FLR effects (Gates / White) being formulated
 - Portions of modified formulations (Wang) ready to be tested with NSTX data
- **Transport Analysis**
 - Error analysis of local transport coefficients conducted to identify regions of high and low confidence (Kaye and LeBlanc)
 - Collaboration started with W. Horton to study electron critical gradient physics (LeBlanc)

HHFW Heating and CD Modeling

- **TRANSP & CURRAY Package :**
 - HHFW CD profiles are currently being integrated into the poloidal field diffusion solver in TRANSP (Kumar and Mau)
 - Generalization of adjoint package to include both toroidal effects and DC electric fields effects under consideration (Mau)
- **TORIC code development:**
 - Code being generalized to include non-Maxwellian species in plasma dielectric response (Okuda and Phillips; Wright and Bonoli; RF SciDAC project)
 - Stand-alone version of TORIC which has been generalized for HHFW studies and which uses EFIT equilibria to be installed on PPPL cluster (Wright)
 - PPPL version to be benchmarked against PSFC-MIT version using NSTX test case (Wright, Bonoli and Phillips)

HHFW Heating and CD Modeling.....

- **CQL3D for HHFW studies:**

- S. Bernabei and C. Kessel will work with R. Harvey on analysis and predictive simulation of HHFW and NBI experiments in NSTX
- Code will be upgraded to include more cyclotron harmonics in a given simulation (currently code retains 3 harmonics per simulation) (R. Harvey)

- **CQL3D for EBW studies:**

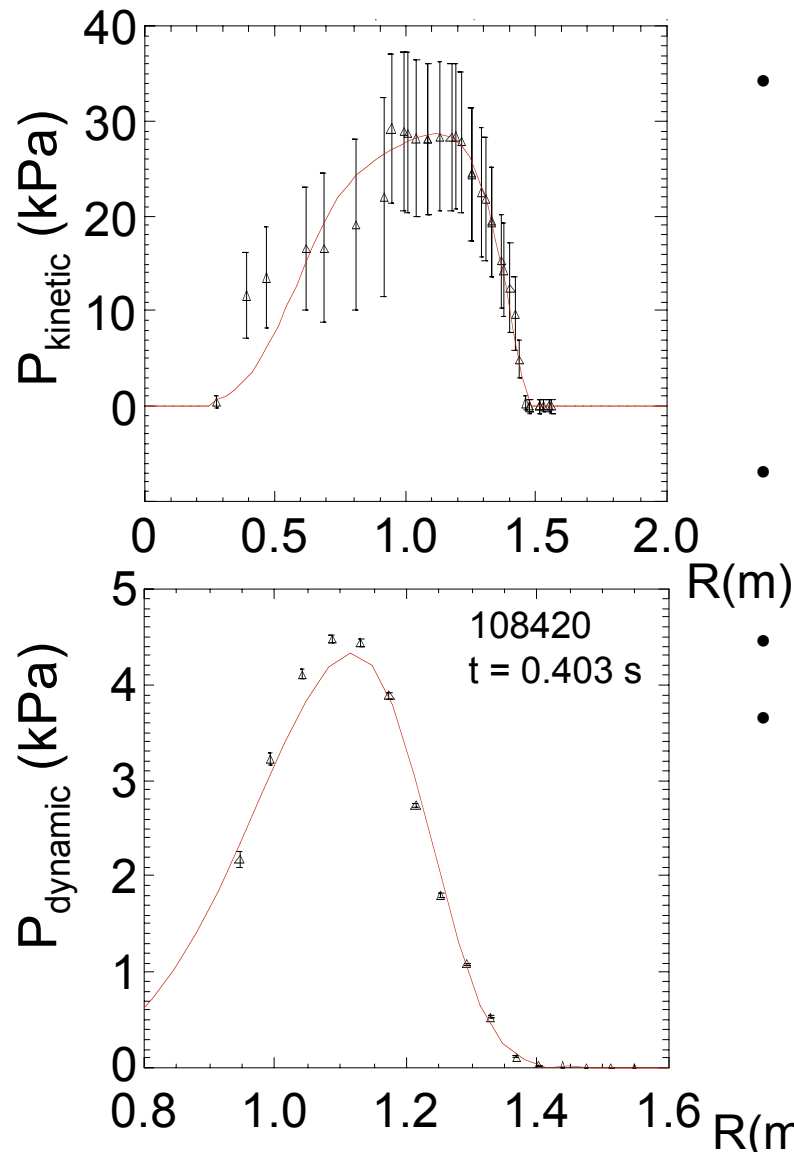
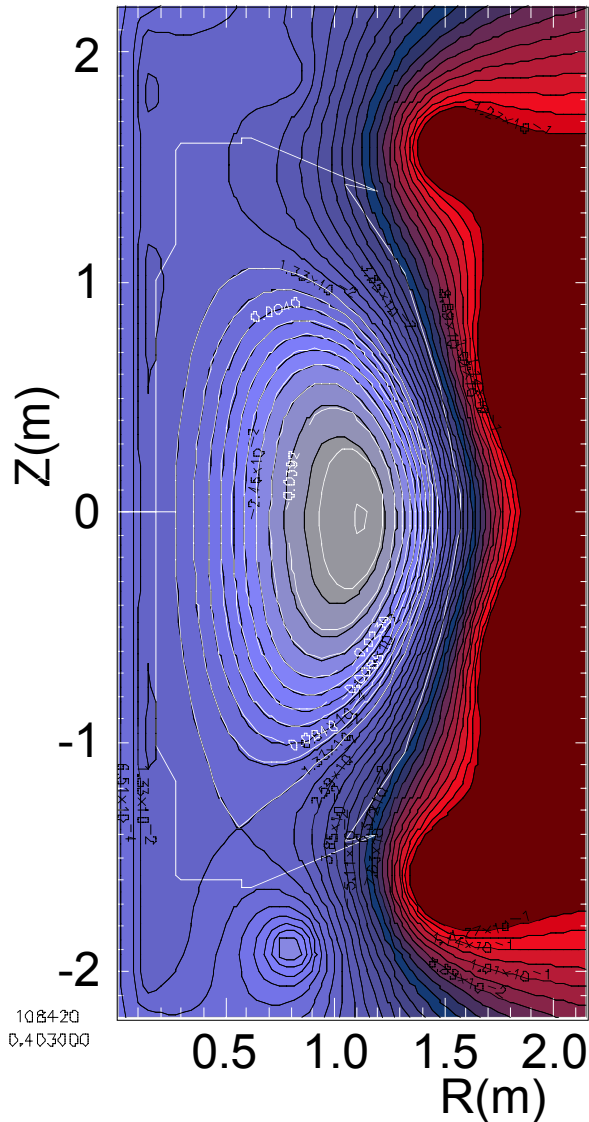
- Interface routines between data input, CQL3D and GENRAY to be streamlined (R. Harvey)
- Journal article in EBW heating and CD simulations in preparation (Harvey and Taylor)
- Improved model for radial transport to be incorporated into CQL3D over next 6 months (R. Harvey in collaboration with Y. Peysson, CEA - Cadarache)

Equilibrium Studies

- **FLOW code**
 - Plans to benchmark FLOW code against new EFIT with rotation under discussion (L. Guazzotto, J. Manickam, S. Kaye, S. Sabbagh)
- **EFIT improvements continue -- see next slide**

NSTX EFIT reconstructions now use T_i , Z_{eff} profiles, and fit to plasma toroidal rotation

Poloidal flux and pressure



- Exact rotation solution fitting total and dynamic plasma pressure at $(R, Z=0)$
 - A few thousand shot*times run
 - Estimate for P_{fast}
- Stored energy with/without $V\phi = \pm 3\%$
 - $(R_{\text{pmax}} - R_{\text{axis}})/a = 8\%$
 - Significant drop in χ_{mag}^2 and χ_p^2 even though 50% more P channels and smaller error bars