# NSTX Team Meeting - Physics Analysis

## February 12, 2004

C.K. Phillips, S. Kaye and J. Manickam

# Transport Studies

- **NSTX kinetic stability analysis:**

  - Linear GS2 simulations for non-reversed q profiles in high density H-modes have been found to predict different microinstability behavior in the plasma core. Rather than stability of all ITG/TEM and ETG drift modes, initial simulations show stable ETG and unstable ITG/TEM with tearing parity in the plasma core. The results are complex and have different character than the ITG/TEM linear microtearing found outside the plasma core last year. Further linear as well as nonlinear analyses are needed. (Redi)

  - Discussions on non-linear calculations with W. Dorland will start this week

- **Neoclassical Theory:**

  - Modifications to neoclassical theory to include finite banana effects (Wang) have been formulated and are being used to analyze NSTX data provides by TRANSP runs

  - Analysis of FLR corrections has been completed and journal articles have been submitted; testing on NSTX data will follow (Gates / White)

# HHFW Heating and CD Modeling

- **TRANSP & CURRAY Package :**
  - Algorithm for power absorption is being refined to improve code reliability
    - Upgraded package should be ready soon
    - DC electric field corrections needed to properly advance the current diffusion package in TRANSP
      - Generalization of adjoint package to include both toroidal effects and DC electric fields effects under consideration (Mau)

- **HHFW code development:**
  - non-Maxwellian species being included in plasma dielectric response in TORIC (Okuda,Phillips, Wright and Bonoli; RF SciDAC project)
  - Stand-alone version of TORIC, specialized for HHFW studies, which uses EFIT equilibria to be installed on PPPL cluster (Wright)
  - Coupling of CQL3D (Harvey) with AORSA (Jaeger and Berry) and TORIC (Bonoli and Wright) field codes is starting (RF SciDAC)

# HHFW Heating and CD Modeling…….

- **EBW Heating and Current Drive studies:**
  - GENRAY has been parallelized >> will substantially decrease cpu and real time required for NSTX-EBW simulations (Harvey)
  - CQL3D/GENRAY modeling at 14, 21 and 28 GHz EBW H&CD indicates that 28 GHz may be "best" frequency choice for NSTX with a 40% beta equilibrium, but studies are continuing (Taylor, Kessel and Harvey)
  - CQL3D/GENRAY simulations to be benchmarked against MAST EBW codes later on this year (Taylor and Shevchenko)

- **EBW Coupling Studies**
  - M. Carter and F. Jaeger (ORNL) are adapting AORSA-1D to study launch frequencies above the second EC harmonic, which is necessary to study coupling at 28 GHz.

# Equilibrium Studies

- ## Equilibrium
  - Plans to benchmark FLOW code against new EFIT with rotation under discussion (L. Guazzotto, J. Manickam, S. Kaye, S. Sabbagh)
- ## Stability
  - Benchmarking of M3D with resistive walls has commenced
  - Rotation effects will be studied