

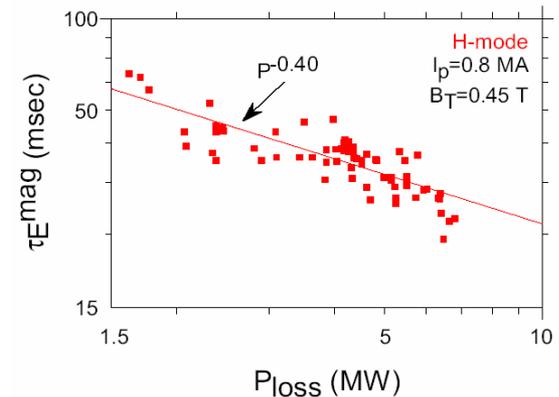
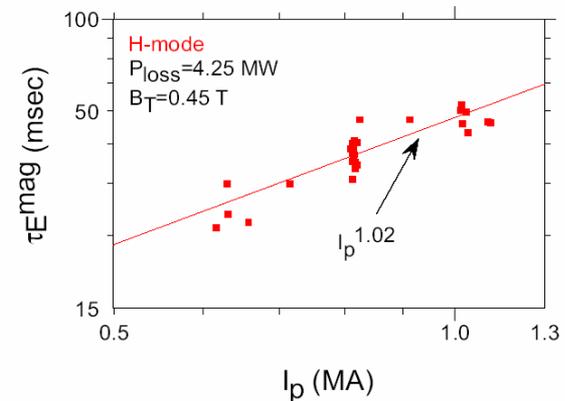
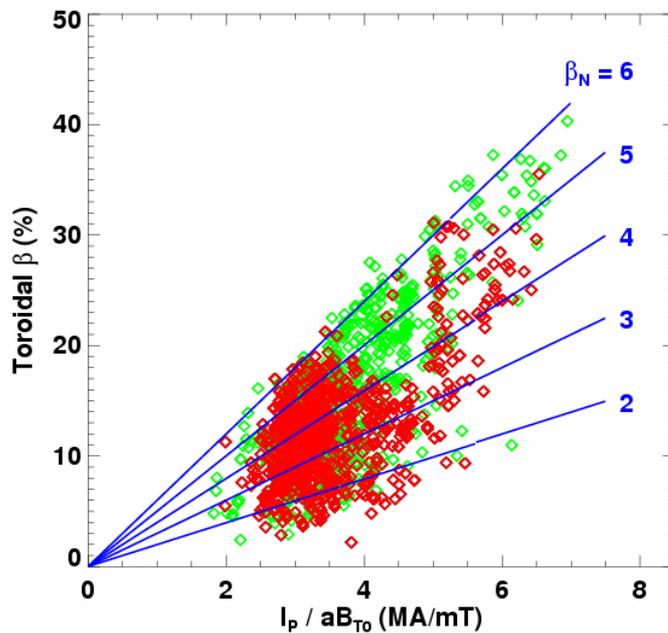
Physics Analysis

S.M. Kaye

Highest level milestone (FY04-1)

Assess confinement and stability in NSTX by characterizing high confinement regimes with edge barriers and by obtaining initial results on the avoidance or suppression of plasma pressure limiting modes in high-pressure plasmas

- Developed techniques to obtain high- β_T more frequently and for longer duration
- Performed systematic scans of H-mode plasmas to establish confinement scalings

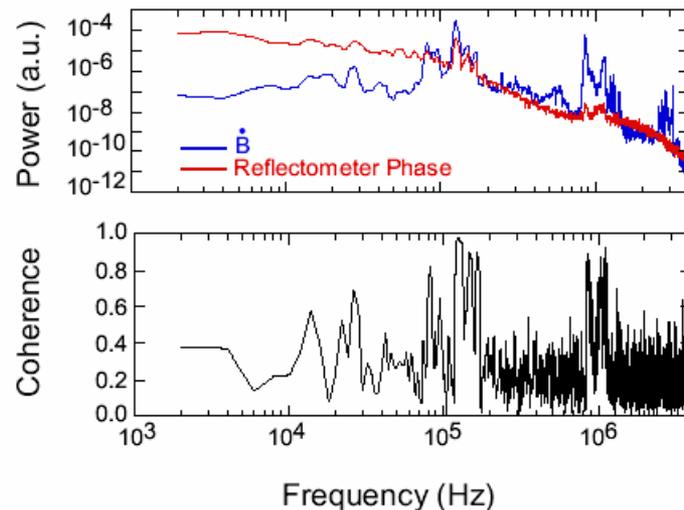


Excellent Progress Made During 2004 Experimental Campaign In Addressing NSTX Research Milestones

Transport & Turbulence (FY04-2)

Measure long-wavelength turbulence in ST plasmas in a range of plasma conditions

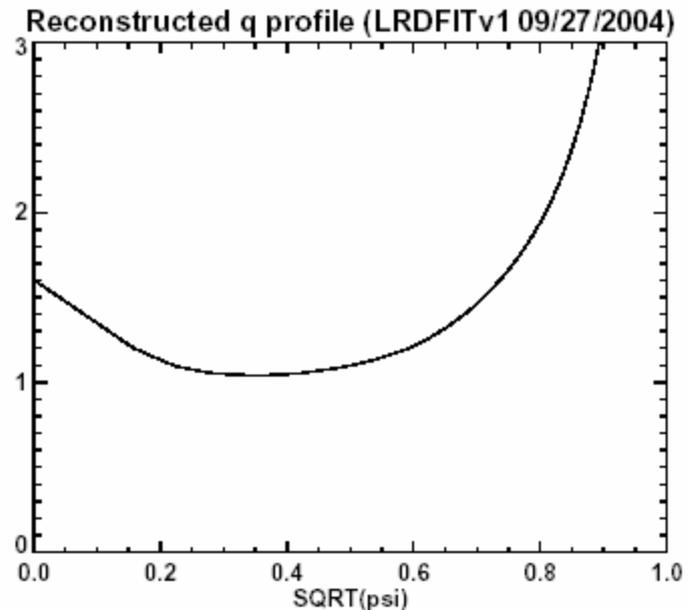
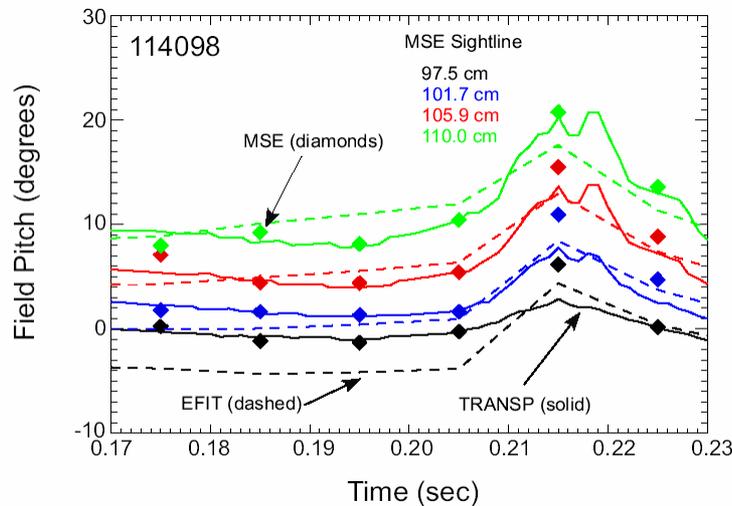
- Long- λ turbulence measured in core of plasma for first time in NSTX and in an ST
- Used correlation reflectometry with 20-40 GHz reflectometer
- Density fluctuations strongly correlated with magnetic fluctuations
- Correlation lengths, density fluctuation levels increase with decreasing B_T , consistent with confinement scaling



HHFW/EBW, T&T (FY04-3)

Measure plasma current profile modifications produced by RF, NBI and ∇p techniques

- MSE commissioned, preliminary analysis, comparison with TRANSP, magnetic reconstructions done



HHFW/EBW (FY04-5)

Measure EBW emissions to assess heating and current drive requirements

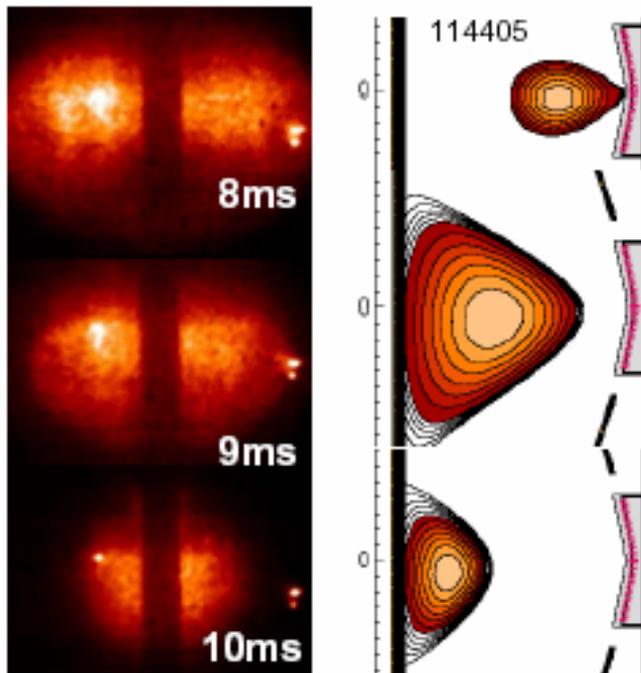
- Emission assessment, modeling supports >80% conversion efficiency requirement for viability of high power system

Solenoid-free startup (FY04-4)

Conduct initial tests combining available techniques to achieve solenoid-free initiation to substantial currents

1) PF-only startup

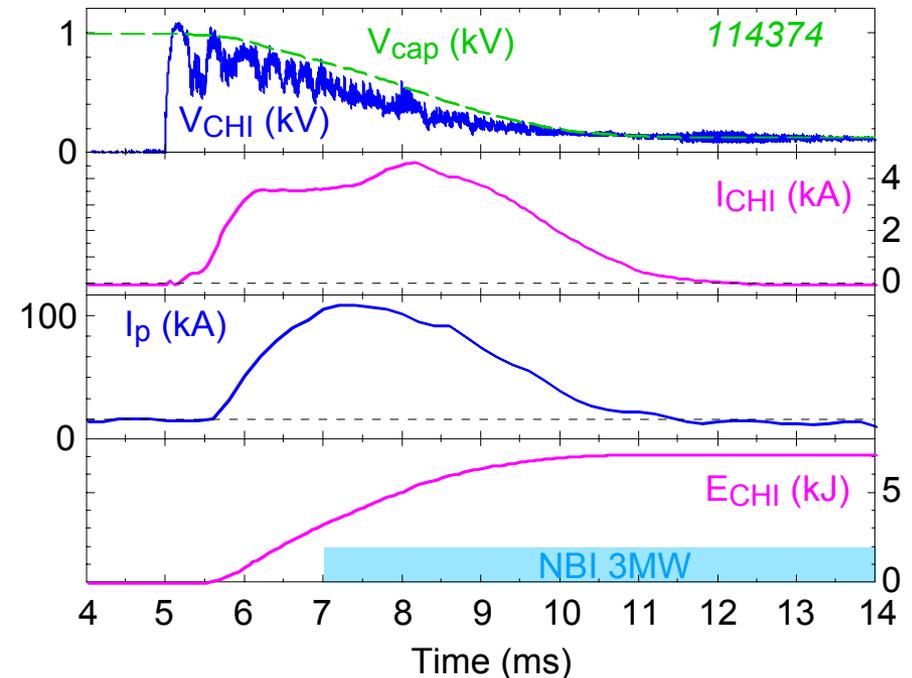
- 20 kA generated



Need to maintain plasma on outside where V_{loop} is high

2) Transient Co-Axial Helicity Injection

- I_p up to 140 kA, $I_p/I_{injector}$ up to 40



Need to extend I_p beyond duration of $I_{injector}$