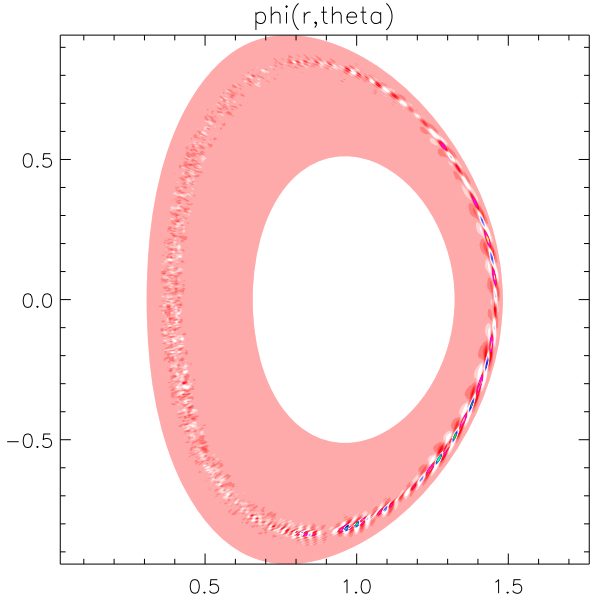
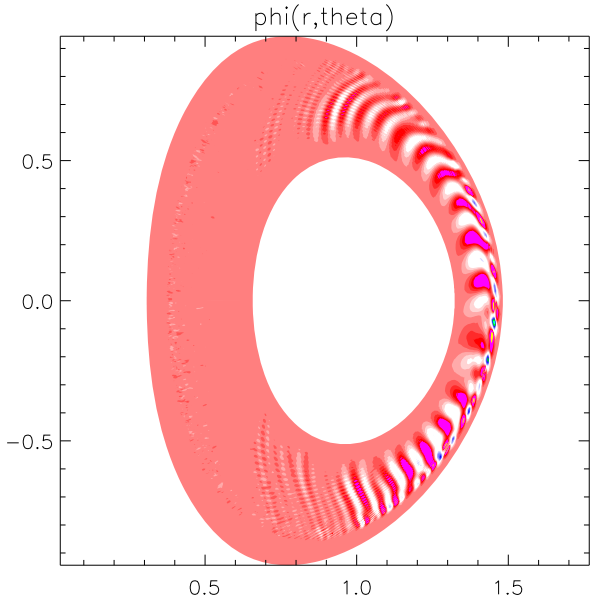
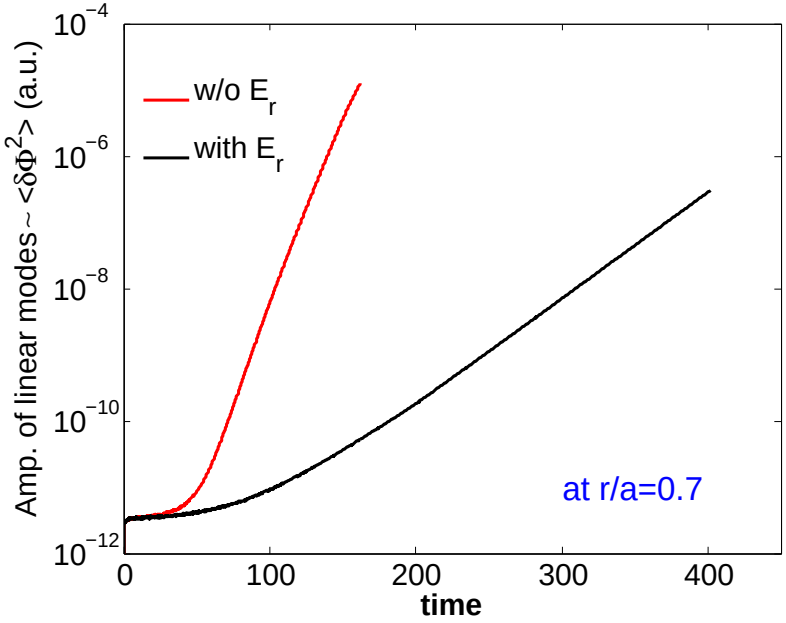
Investigation of L-mode transport shortfall in NSTX



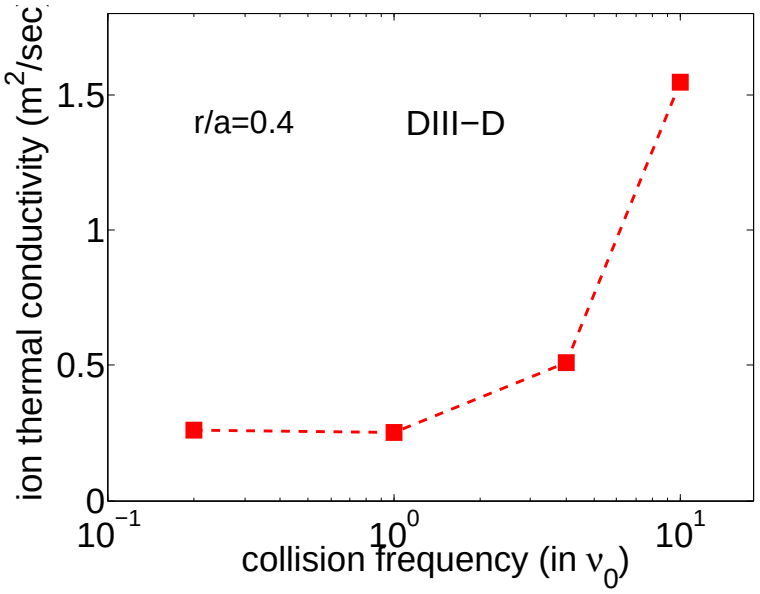




- A possible L-mode shortfall case (#141716)
- Nonlinear GTS simulations include kinetic electrons, covering [0.4, 0.8]
- Strong $\mathbf{E} \times \mathbf{B}$ suppression over wide radii
- Low-k fluctuation induced $\chi_i \sim 1$ m^2/s, but smaller for χ_e at $r/a \sim 0.7$ (preliminary)

Is electron scale turbulence responsible for NSTX confinement scaling $\sim 1/\nu_{*,e}$ (beyond micro-tearing)?

NSTX transport: strong $\mathbf{E} \times \mathbf{B}$ shear wipes out most of low-k fluctuations; electron dominated; high-k turb. contrib. seems significant



ν_* effects on fluctuations & transport via collisional zonal flow damping

- Strong ν_* dependence of ITG driven χ_i
- Significant ZF generation in ETG
- Same behavior likely for ETG driven χ_e
  $\rightarrow$ a possible origin for confinement scaling observed in NSTX $\sim 1/\nu_{*,e}$