

# Use of Finite Larmor Radius Codes for NSTX Fast Ion Analysis

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GYROXY : FLR with collisions

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ORBIT: FLR, graphics: nonadiabaticity

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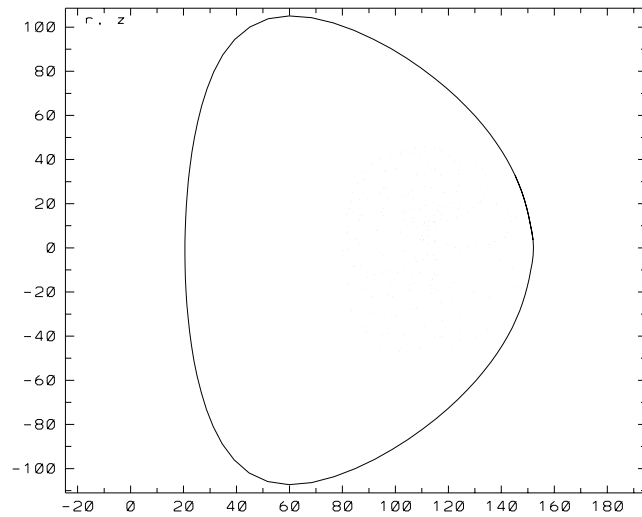
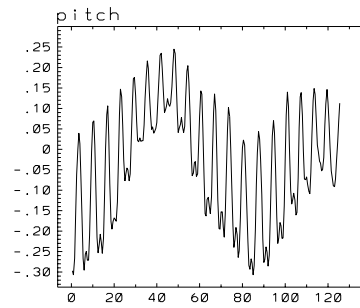
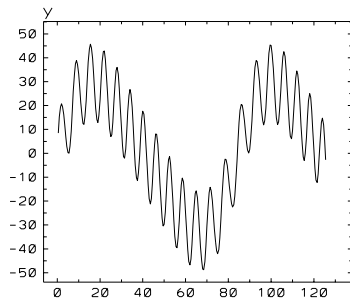
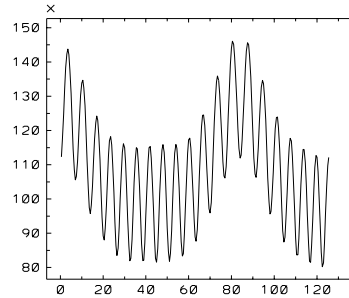
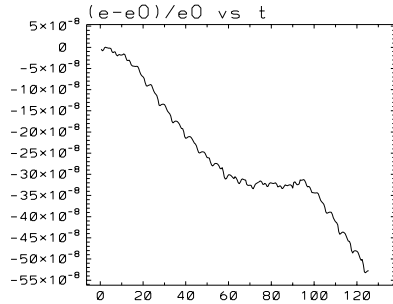
CBEAM: FLR, orbit topology

## Progress has been made in codes for modeling fast ions in NSTX

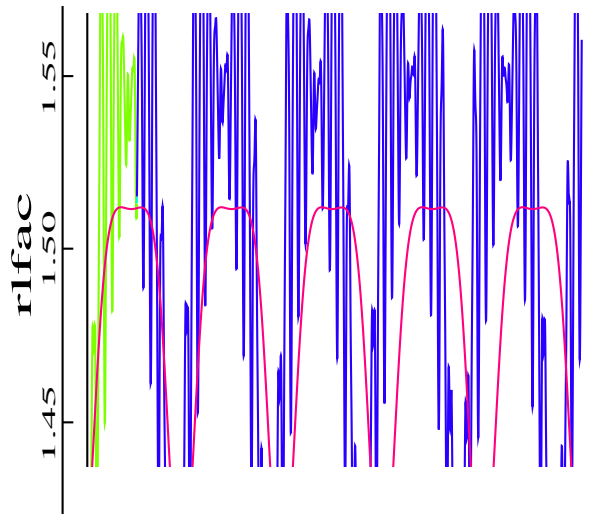
- White code: FLR
- Glasser code: guiding center vs FLR graphical display  
(White and Glasser codes have been benchmarked for GCC this year)
- Egedal: orbit phase space topology extended to FLR and beam injection
- All 3 codes are operational:
  - examples follow for ~20% beta NSTX cases and 80 keV beam ions.
- All still require initial ion profile specifications, in progress.

XPs: Effects on beam ion heating efficiency of 3T vs 6T  
Effects on beam ion heating efficiency of Beta Scan  
Effects on beam ion heating efficiency of Field Errors

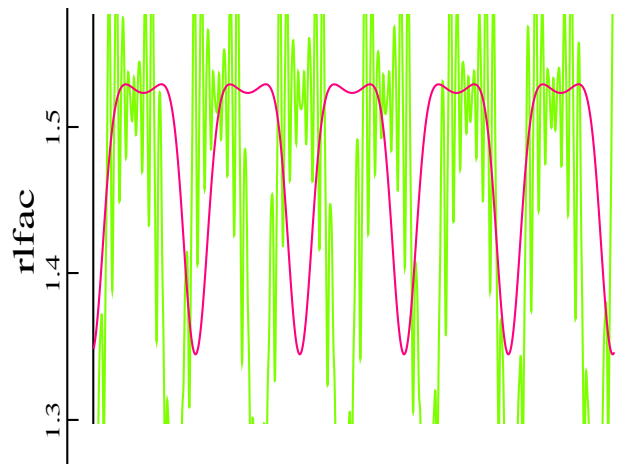
White ORBIT code now  
has full Larmor radius and collisionality  
Code development  
for all three underway for beam profiles



Glasser code shows ratios of larmor radius to radius of curvature for 50cm and 70 cm beam ions



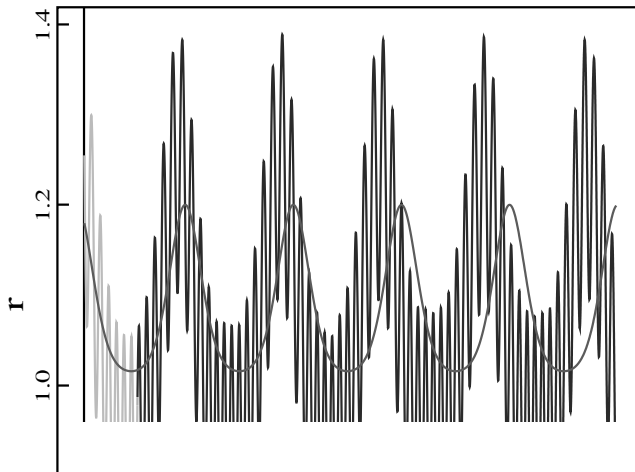
Larmor Radius / Radius of Curvature



# Glasser Code shows guiding center and FLR orbits

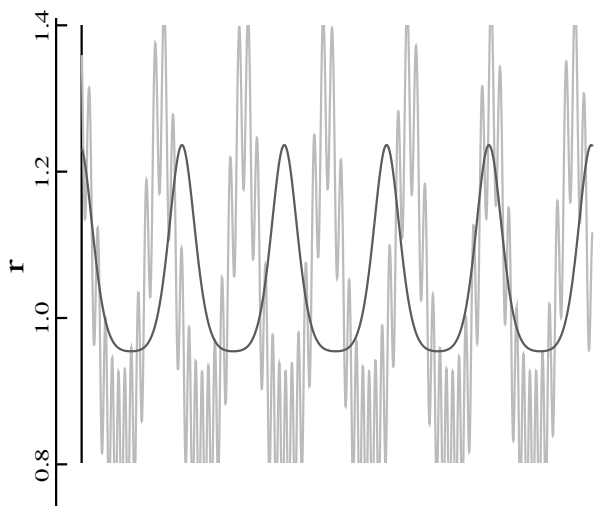
21% Beta Glasser Code, 80kev, 50cm

## Radial Position



21% Beta Glasser Code, 80kev, 70cm

## Radial Position



# Egedal Code; Topology Map of Confined and Lost Orbits

Turquoise: Boundaries of lost and confined orbits of guiding centers  
Green: Boundaries of confined orbits for full larmor radius beam ions

Red and Blue: for injected beams

80keV, NSTX 23% beta

