Search for GAMs

S. Kubota, D. Battaglia, et al.

- **GAMs ubiquitous on many machines**
  - "... universally observed in Ohmic and additionally heated L-mode ..."
  - Created through nonlinear turbulence interaction and are often seen to regulate low-k turbulence levels
  - Thought to influence edge barrier formation

- **Doppler backscattering uniquely suited for looking at GAMs**
  - Poloidal velocity via backscattering from intermediate-k turbulence
  - Arguably the most sensitive measurement for GAM detection
  - Doppler backscattering on NSTX
    - Usually not possible with existing antennas due to elongated plasma
    - But may be possible using strongly off-centered plasma shapes

- **Operational plan**
  - Utilize plasmas based on shapes developed for XP-1030
    - Magnetic axis shifted strongly downward
    - Operate in L-mode instead of H-mode
    - Reflectometer beam launched from bottom antenna on array can make oblique incidence at cutoff surface, acting as a Doppler reflectometer
  - If successful, investigate spatial structure, dependence on ν^*, B
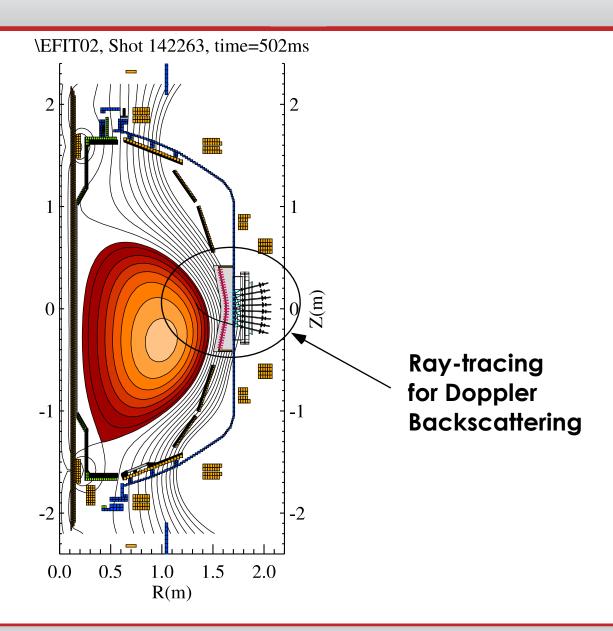
Diagnostics

- **Diagnostics**
  - Dual channel tunable correlation or fixed-frequency reflectometers
    - > Radial structure
  - BES and GPI may also be able to take advantage
- **Significance**
  - Measurements will provide valuable information for a dedicated Doppler reflectometry system to be proposed for NSTX-U

Plasma Shape for Doppler Backscattering

\EFIT02, Shot 142263, time=502ms

Ray-tracing for Doppler Backscattering

Experimental Plan

- **Requested run time: 1-1.5 days**
- **Part A: Assess feasibility of target**
  - Use shapes developed for XP-1030 but in L-mode
  - Several shots in piggyback   **0 shots**
  - Determine whether backscattering signal is detected
  - Look for GAM-like oscillations
- **Part B: GAM frequency scaling**
  - Scan B_T **15 shots**
- **Part C: Document structure**
  - Dedicated run time to look at radial and poloidal structure   **15 shots**
  - BES, GPI may also benefit
- **Part D: ν^* Scan**
  - Scaling of intensity   **??? shots**