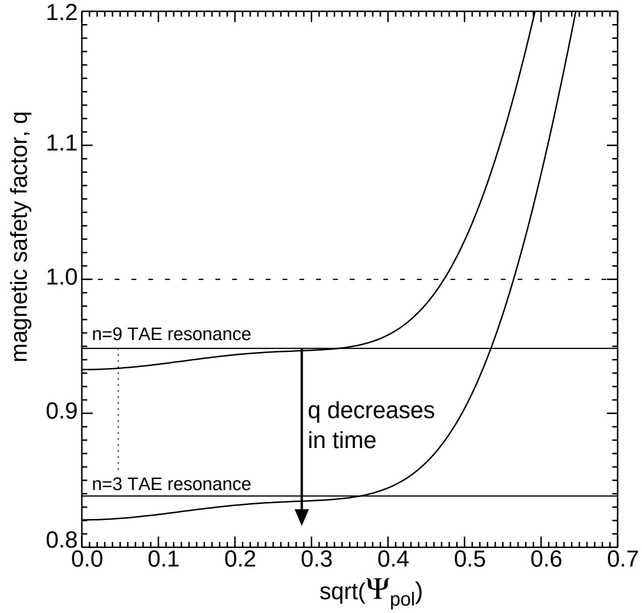
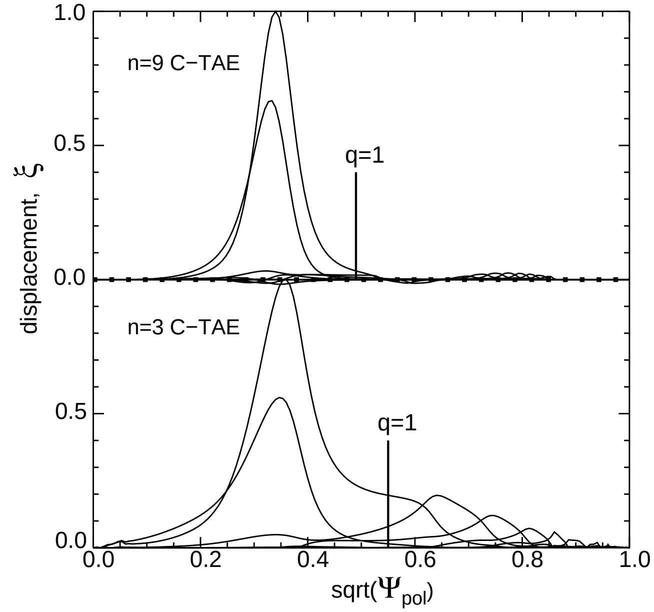
Stabilization of GST by suppressing C−TAEs

G.J. Kramer (PPPL), M.F.F. Nave (IST), A. Turnbull (GA)





- Sawteeth can be stabilized by a fast−ion population inside the q=1 surface and by low shear near the q=1 surface (Porcelli model)
- After a (giant) sawtooth crash current is diffusing to the plasma center and the q profile is decreasing
- When q decreases a series of core−localized TAEs can be excited Low−n TAEs have a broad structure and can redistribute fast ions from inside to outside the q=1 surface
- We want to stabilize ICRF driven GST by stopping the current diffusion with ECCD near the q=1 surface to avoid low−n TAEs and keep the shear at the q=1 surface low

Proposal for GST/TAE stabilization experiment

- Goal:
  - Stabilization of ICRH−induced giant sawteeth by controlling the current diffusion and avoiding low−n core−localized TAEs

- Experiment:
  - Create a sawtoothing plasma with balanced beams (no torque)
  - Vary the amount of ICRH power to create monster sawteeth and excite core−localized TAEs
  - Once monsters with C−TAEs are formed use the ECCD power near the q=1 surface to stop the current diffusion into the plasma center to avoid low−n C−TAEs

- Analysis:
  - Equilibrium reconstruction: EFIT
  - Ideal kink instability analysis: GATO
  - Sawtooth trigger analysis: Porcelli model and NOVA−K
  - TAE analysis: NOVA−K
  - Fast−ion transport analysis: ORBIT/ORBIT−RF and SPIRAL