

Transient energetic charge exchange flux enhancement observed in NSTX neutral-beam-heated H-mode discharges

S. S. Medley *et al.*

- **Goal: understand the mechanism causing formation of the High-Energy Feature (HEF)**
- **HEF Phenomenology – complete**
 - E | B NPA observations for SN132800 & SN135174 (charge exchange neutral flux spectra... core-localized by NPA sightline/NB footprint intersection: $R \sim 85 \pm 10$ cm, $v_{||}/v \sim 0.8 \pm 0.1$)
 - Correlation with NTM/TAE/CAE/GAE mode evolution (Mirnov)
 - Alfvén eigenmode radial structure (BES, reflectometry, high-k scattering, FIRETIP)
 - Overview of parametric ‘dependencies’ (H-mode, I_p , B_T , R_{tan} , P_b , E_b , Lithium, etc.)
- **TRANSP analysis with Anomalous Fast Ion Diffusion (AFID) – optional**
 - TRANSP NPA simulation does not emulate HEF unless $AFID > 50$ m²/s (unrealistic?)
 - S_n , W_T excursions attending HEF are driven by profile changes, not the HEF
- **SPIRAL code analysis (G. Kramer) – pivotal, but in early stages**
 - Import TRANSP-calculated $f_i(E, v_{||}/v, r)$ and HYM-code eigenmode structure (E. Belova)
 - SPIRAL advances $f_i(E, v_{||}/v, r)$ under wave-particle interactions