Energetic Particle-GAM in NSTX

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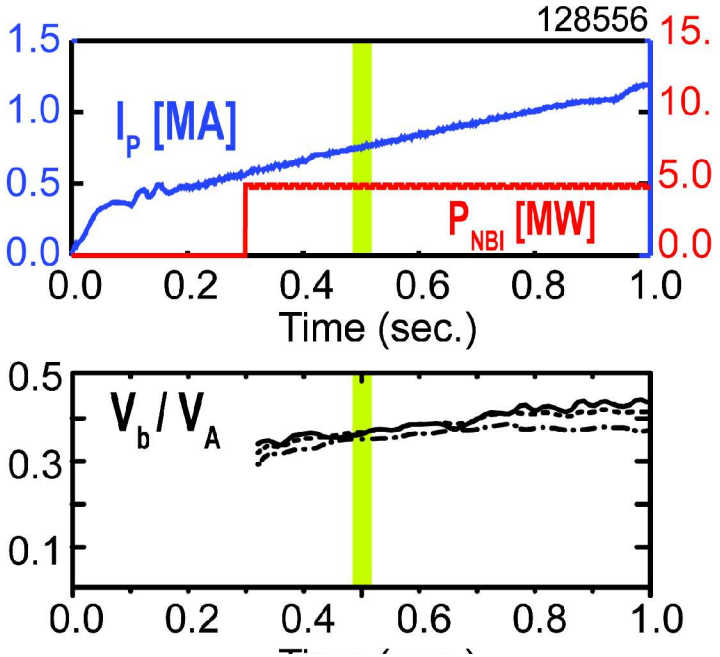
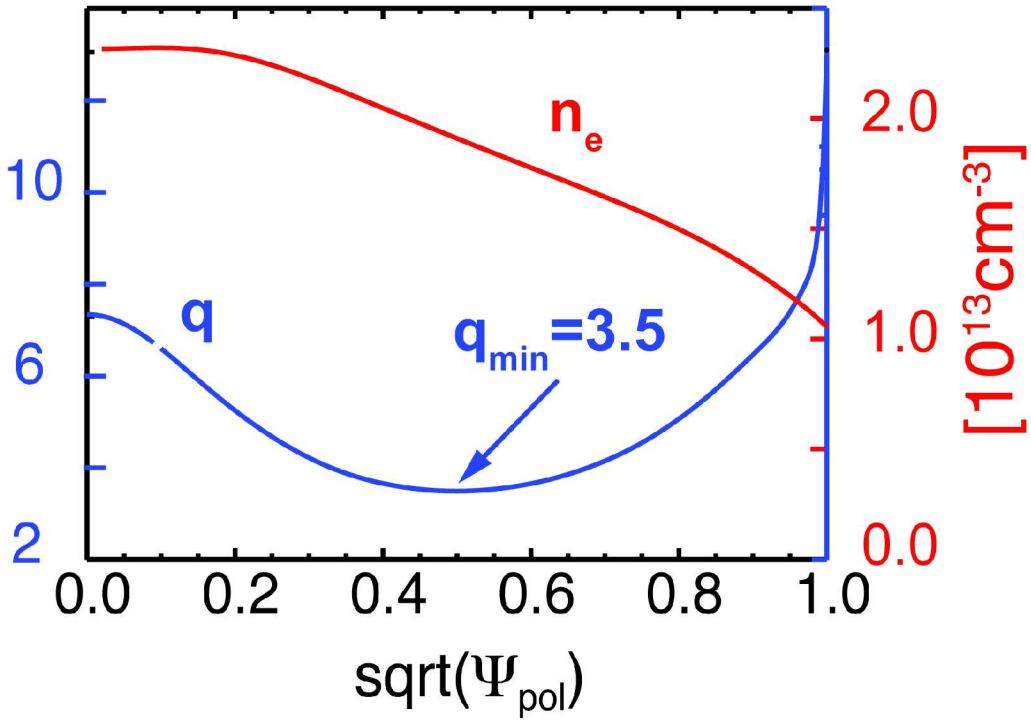
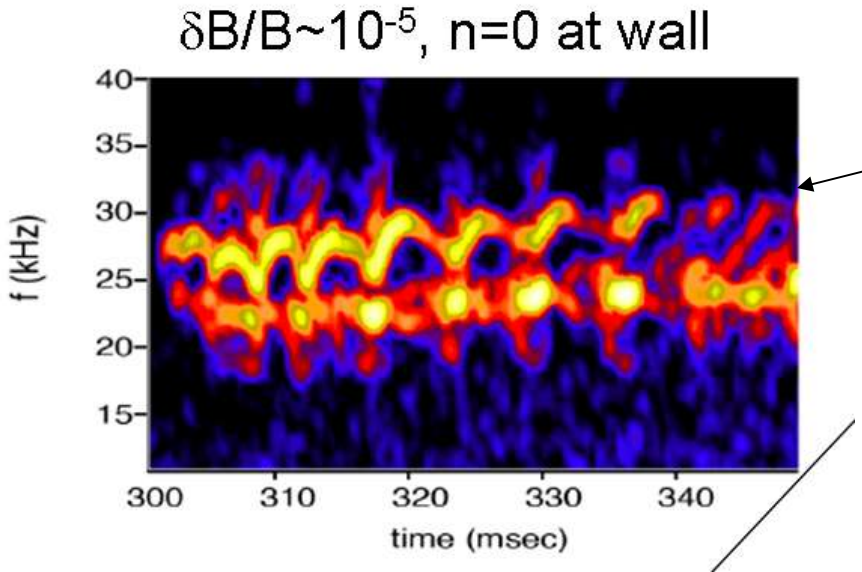
Motivation

- Validation of energetic particle simulation model (wave particle resonances, nonlinear dynamics, source/sink effects)
- Finite beta and low aspect ration effects on EGAM (i.e., NSTX v.s. DIII-D);
- Effects of EGAM on background turbulence?

n=0 GAM-like mode has been excited by counter-beam in DIII-D





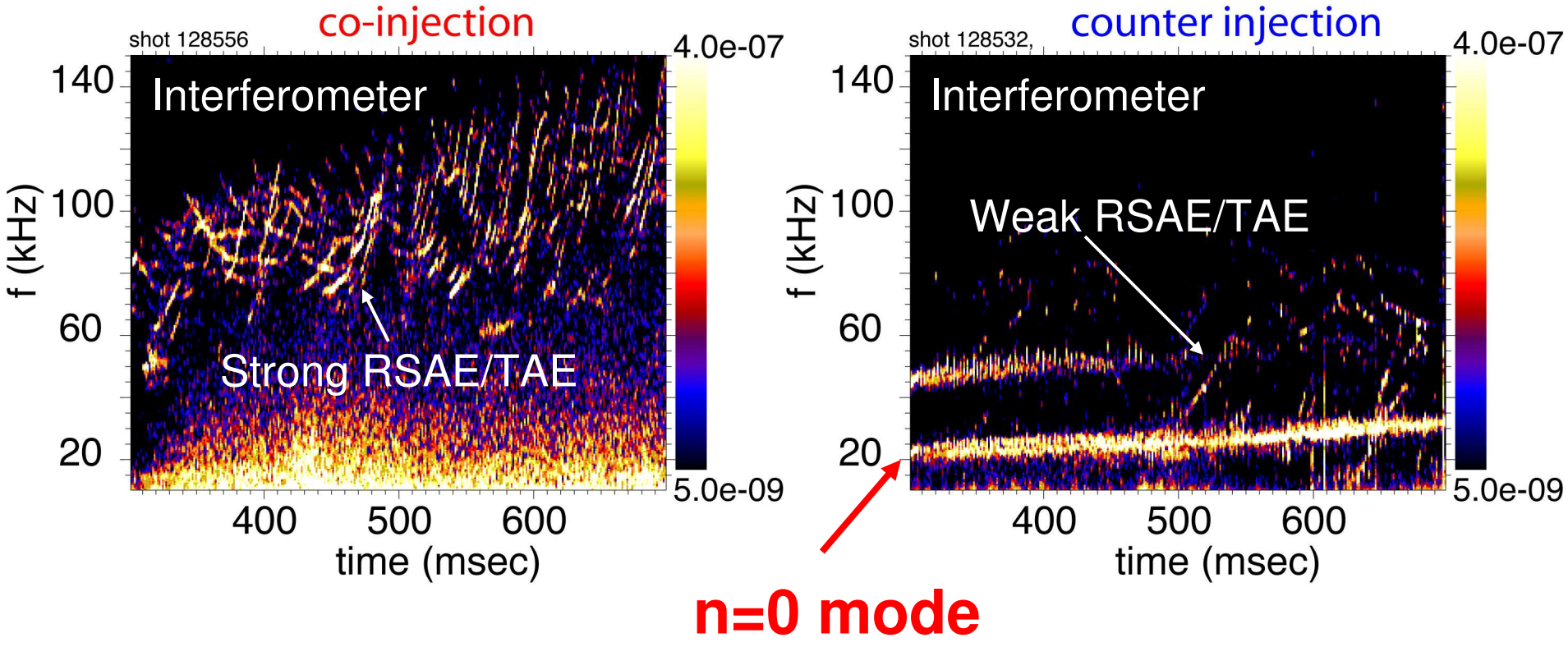


Energetic particle –GAM (EGAM)

Nazikian et al, PRL, 2008
Fu, PRL, 2008

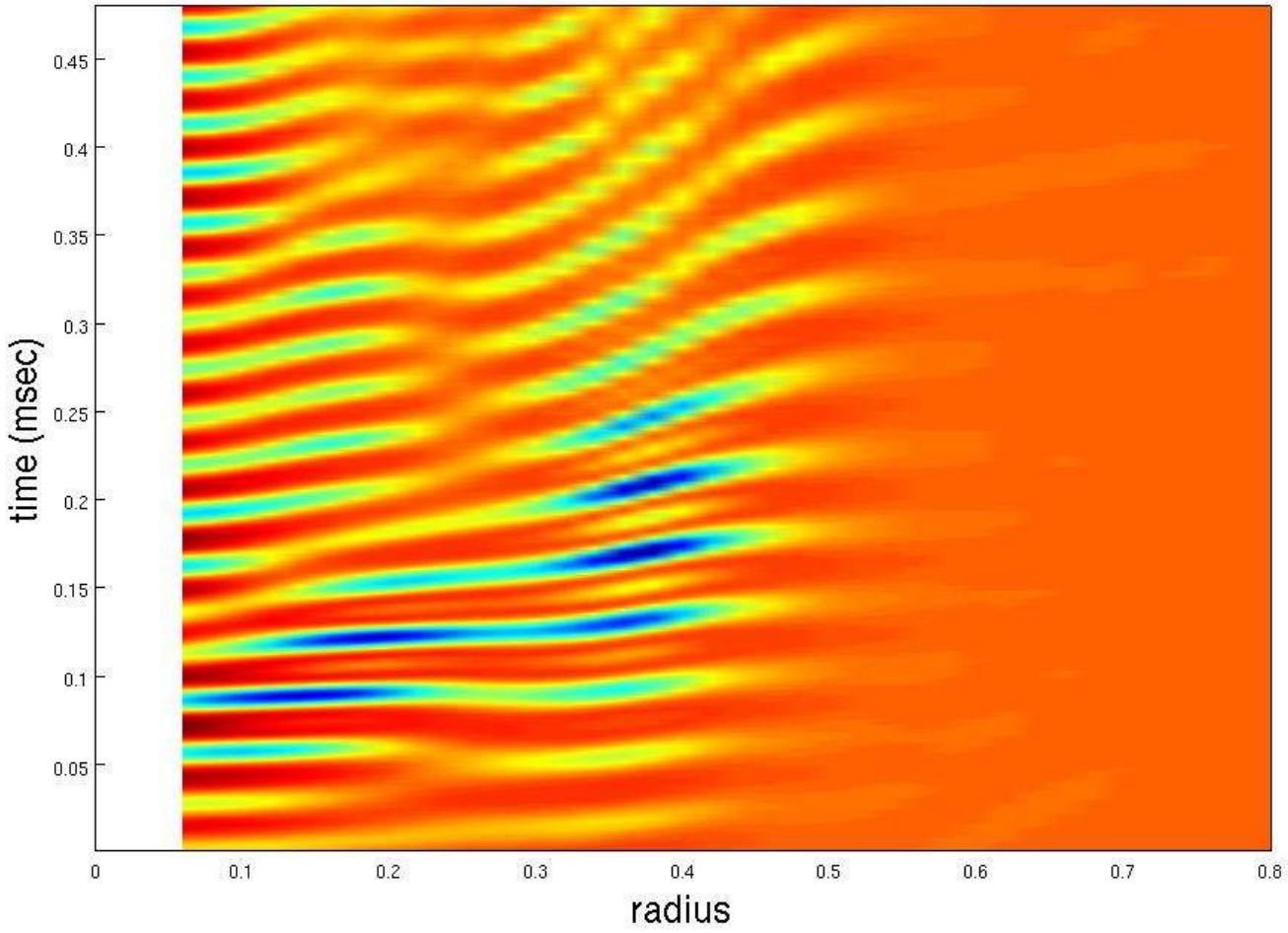
Counter injection is strongly favored for EGAM excitation

Nazikian et al.



- **P_{inj} = 5 MW co/counter injection, starting at 300 ms**
- **weak n=0 transiently observed with co injection**

Nonlinear modeling reproduces key features of EGAM observed in DIII-D



The goal of this XP is to excite EGAM in NSTX using conditions similar to DIII-D's

- DIII-D parameters: $q_{min} > 2$, Te ~ Ti ~ 1kev, $n_e \sim 10^{13}$ /cm^3, B~2T, E_{beam}~75kev.
- NSTX:

  $q_{min} > 3$, Te~Ti~1kev, B~0.5T, ne~ 10^{13}/cm^3, $E_{beam} < 70$kev.

  Counter-injection;

  Pre-heat using HHFW to increase plasma temperature so that T~1kev at the start of NBI injection and $q_{min} > 3$.