

# EX/10-4: Effects of MHD instabilities on Neutral Beam current drive



PPPL



NSTX-U

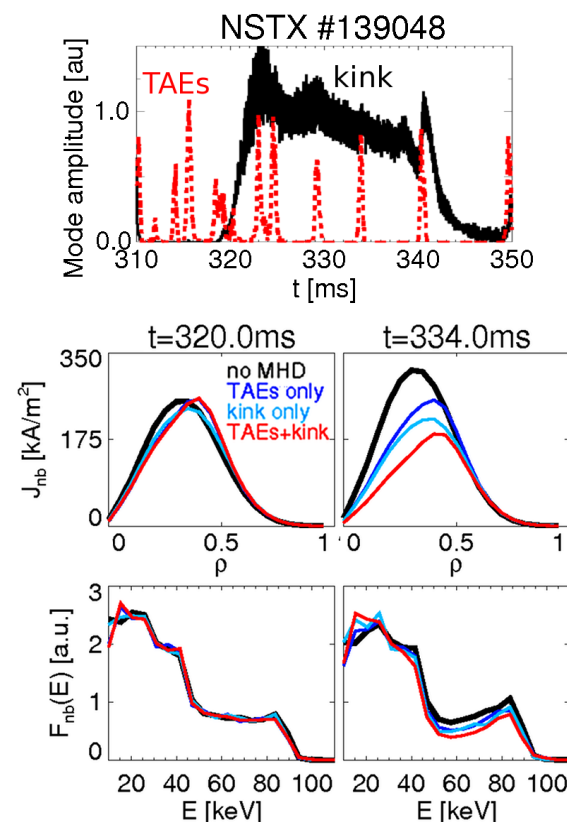
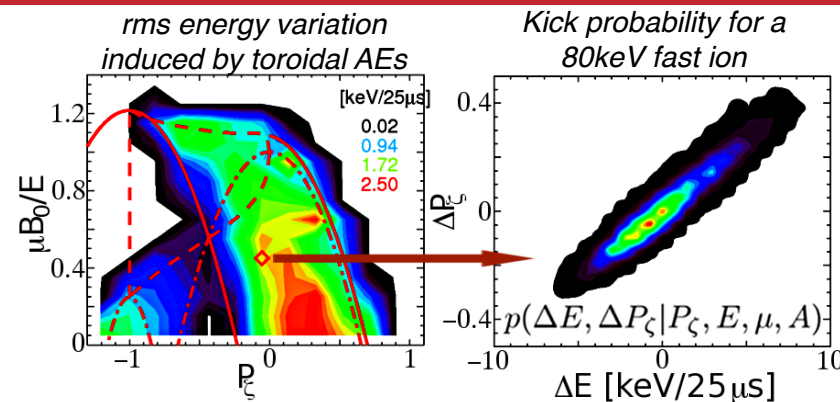


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- Neutral Beam heating and current drive are crucial for the success of ITER, Fusion Nuclear Science Facility (FNSF)
- MHD instabilities (e.g. Alfvénic modes, AEs) can reduce NB-CD efficiency
- A new model is developed to quantify and predict AE effects on NB-CD *[Podestà, PPCF 56 (2014) 055003]*
  - Fast ion evolution is consistently treated *in phase space* (energy, canonical angular momentum, magnetic moment)
  - Interactions modeled through *kick probability*  $p(\Delta E, \Delta P_\xi | E, P_\xi, \mu)$
  - Implementation in the transport code TRANSP under way
- Results from NSTX confirm strong effect of AEs on NB-CD
  - Up to 40% of local current density can be redistributed
  - Effects not correctly accounted for by models based on *ad-hoc* spatial diffusion



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MHD effects on NB current drive – M. Podestà, PPPL