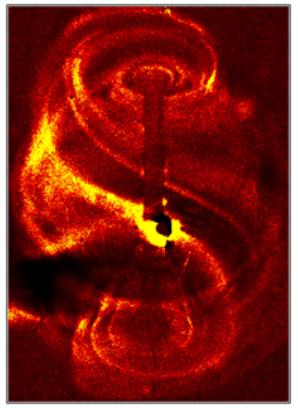
Bongard *et al.*, EX/P4-51: ELM Characterization and Dynamics at Near-Unity A in the Pegasus ST

- Scientific Quality: Recent Achievements
  - First access to, characterization of ELMs at ultra-low A < 1.3 ST geometry
    - Small (Type III-like) and large (Type I-like) ELMs observed
    - Toroidal mode number ranges in agreement with those measured on NSTX at A ~ 1.3
    - Multiple unstable n measured during ELM crashes: simultaneously unstable peeling-ballooning modes
    - Low B_T and edge T_e permit detailed edge pedestal measurements with probes
  - First measurements of nonlinear edge current dynamics during single ELM events
    - Local $J_\phi(R,t)$ shows current-carrying filaments are generated and expelled in complex multimodal collapse
    - Similar to features in ELM simulations, electromagnetic blob transport theory
  - 3D field application from local edge current injection may alter ELM stability

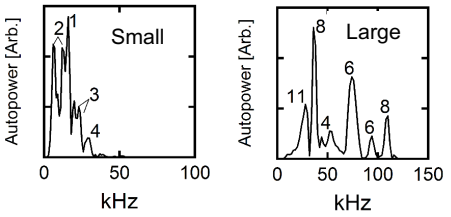
- Relevance to Fusion Energy: Critical Issues Addressed
  - ITER requires ELM suppression *based on validated physics basis* to mitigate deleterious plasma-material interactions
  - Edge pedestal profile measurements relevant to validating nonlinear ELM physics models of ELM onset, heat deposition, and mitigation mechanisms
    - Spatially- and temporally-resolved edge current density measurements through ELM cycle key experimental requirement

- Supporting Comments: Next Steps
  - Simplified edge access at A ~ 1 in Pegasus can provide a unique test bed for validating peeling-ballooning stability, ELM dynamics, and ELM mitigation through high-resolution pedestal measurements

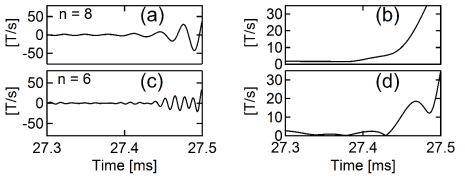
ELM at A ~ 1.2 in Pegasus



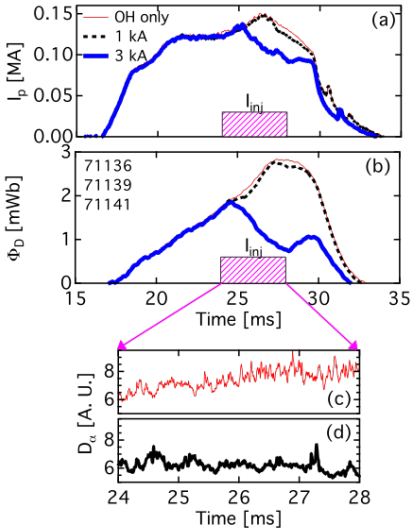
ELM Magnetic n Distributions



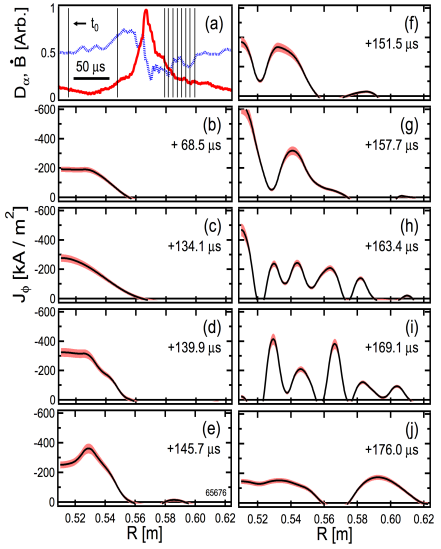
ELM Mode Growth



ELM Reduction Suggested with Helical Edge Current Injection



$J_{edge}(R, t)$ Through Type I ELM



Thome, *et al.*, Phys. Rev. Lett. 116, 175001 (2016)
Thome, *et al.*, Nucl. Fusion 2016 (in press)

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