

Physics of ELM effects on NSTX scrape-off layer and divertor



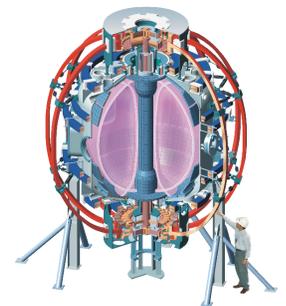
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NSTX Edge Physics ET Group Meeting

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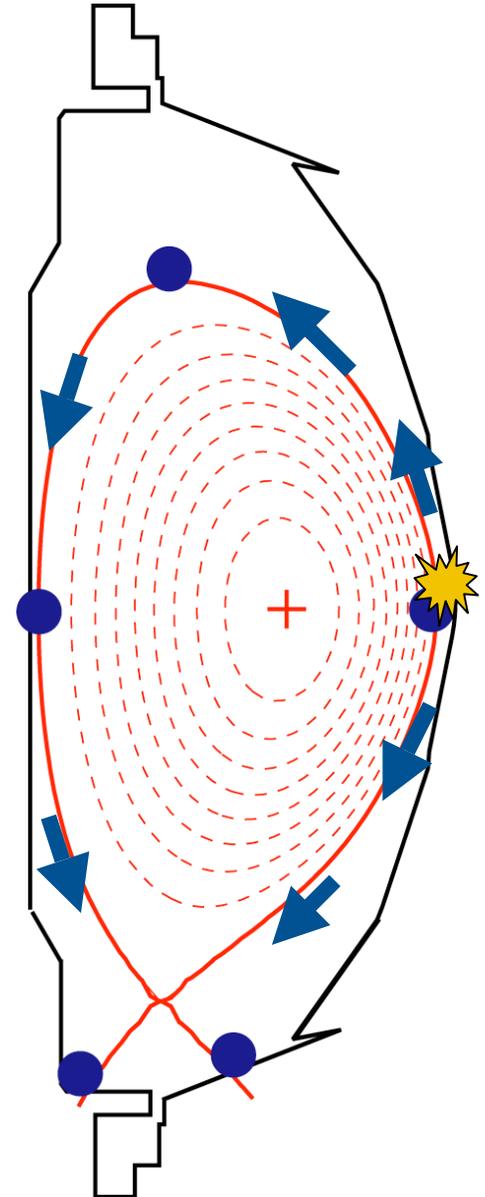
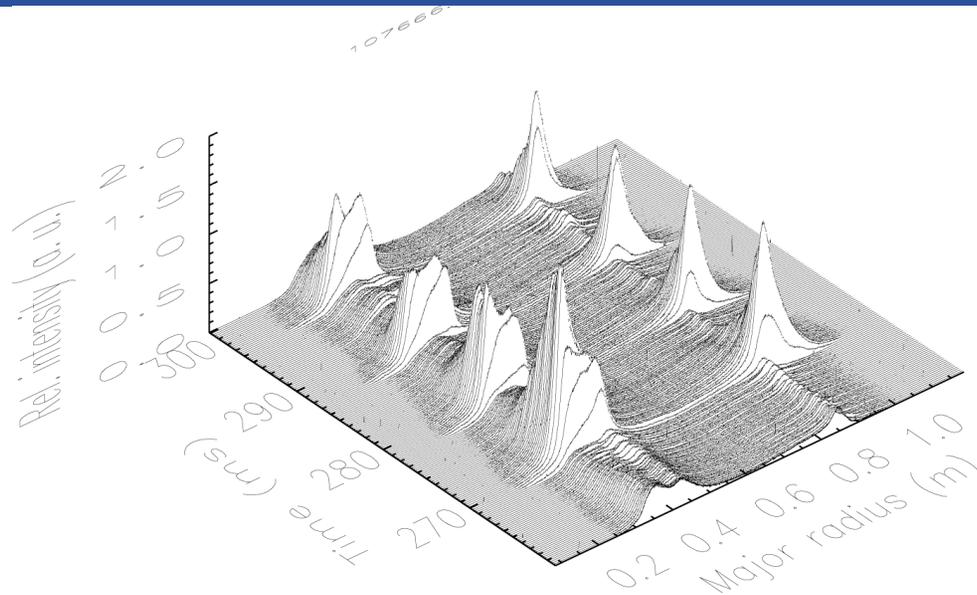
Princeton, NJ



Statement of interest: SOL and divertor response to ELMs

- SOL (open field line!) energy and particle transport of different type ELMs in NSTX
- ELM heat transport mechanism (convective, conductive, mixed)
- Response of divertor plasma states to ELMs
- Scaling of heat and particle losses
- ELM control (with Supersonic Gas Injector - 1/2 day XP in ISD ET group)
- **LLNL expertise** (much work done on DIII-D by Fenstermacher et. al.)

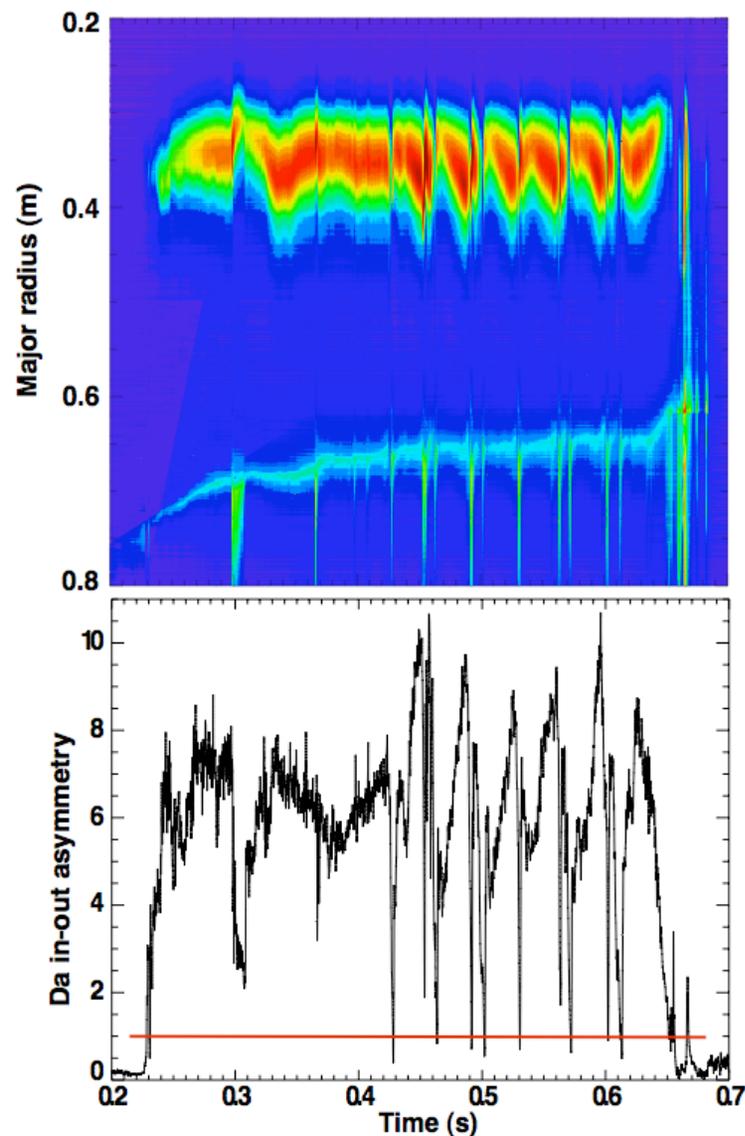
SOL response to ELMs



- *Attached* inner divertor D_α always lags behind outer divertor D_α by 200-400 μs
- Analysis in progress - look at many ELM arrival times at several locations (\bullet), develop self-consistent picture ($n_e, n_i, v^*, L_{||}$)
- *Preliminary result* - ELM Type I propagates from outboard at $c_s = (T_{e,ped} + T_{i,ped})^{1/2}/m_i$

Divertor response to ELMs

- In ELMy H-modes:
 - Inner divertor cold and dense, often detached
 - Outer divertor always attached
- Type I ELM heat pulse burns through inner leg plasma and causes transient inner leg re-attachment
- Type III, V ELMs do not change divertor state
- Need to correlate fast C III, D_α data with divertor and midplane probes



Lower divertor D_α brightness