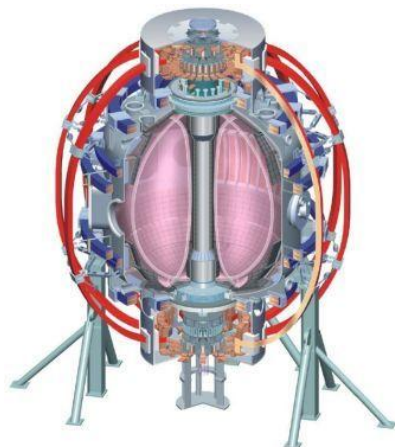


Effect of Radiated Power Fraction on Divertor Power Load and Core Confinement

Jeremy Lore
ORNL/ORISE

NSTX Research Forum
Princeton, NJ
Mar. 15-18, 2011

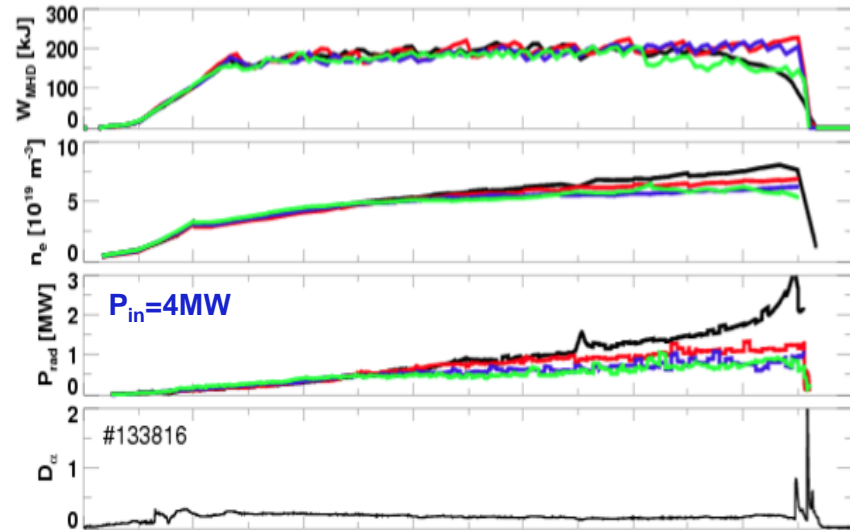


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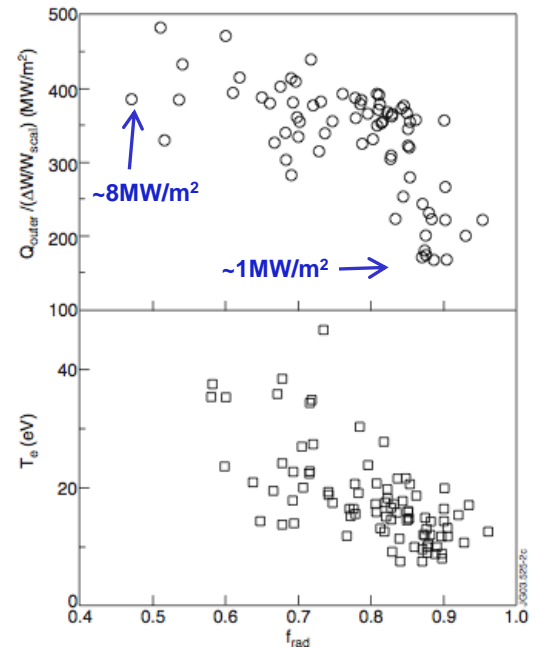
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Background and Motivation

- NSTX can achieve high $f_{\text{rad}} = P_{\text{rad}}/P_{\text{in}}$ before confinement is affected
- Operate with high core P_{rad} to investigate:
 - Mitigation of divertor fluxes
 - Stiffness of core transport
- Ideally find a scenario with low divertor fluxes and good core confinement
 - If possible, operate with NSTX-U shape
- Other experiments have demonstrated reduced divertor fluxes with gas injection (edge radiation)
 - DIII-D (Deuterium injection)
 - JET (Nitrogen seeding)

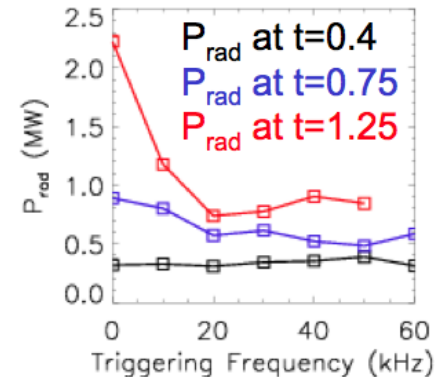
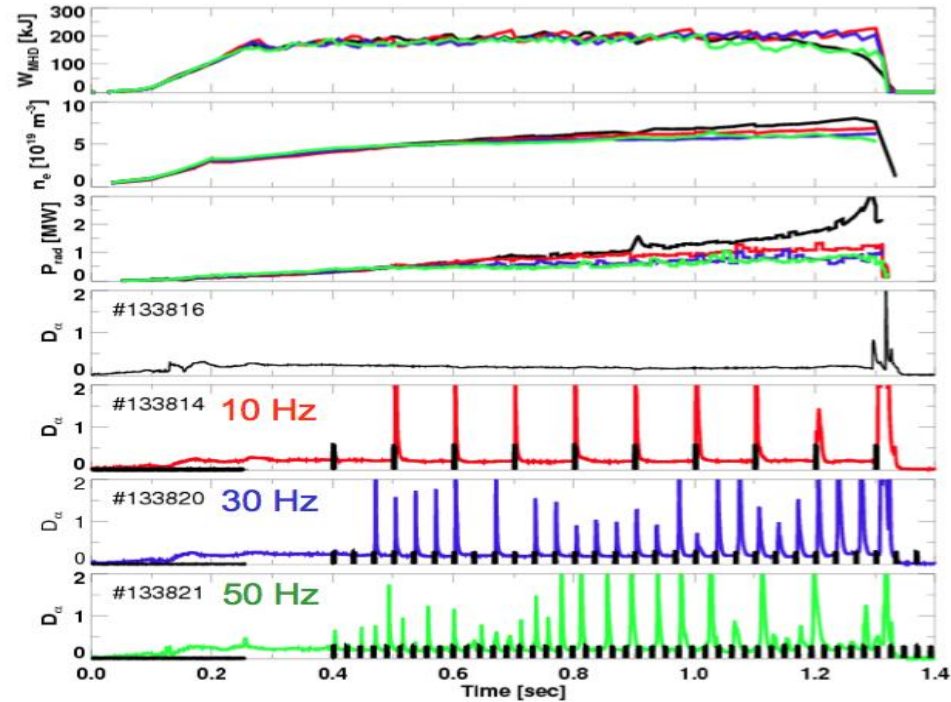


JET
*Rapp (2004)

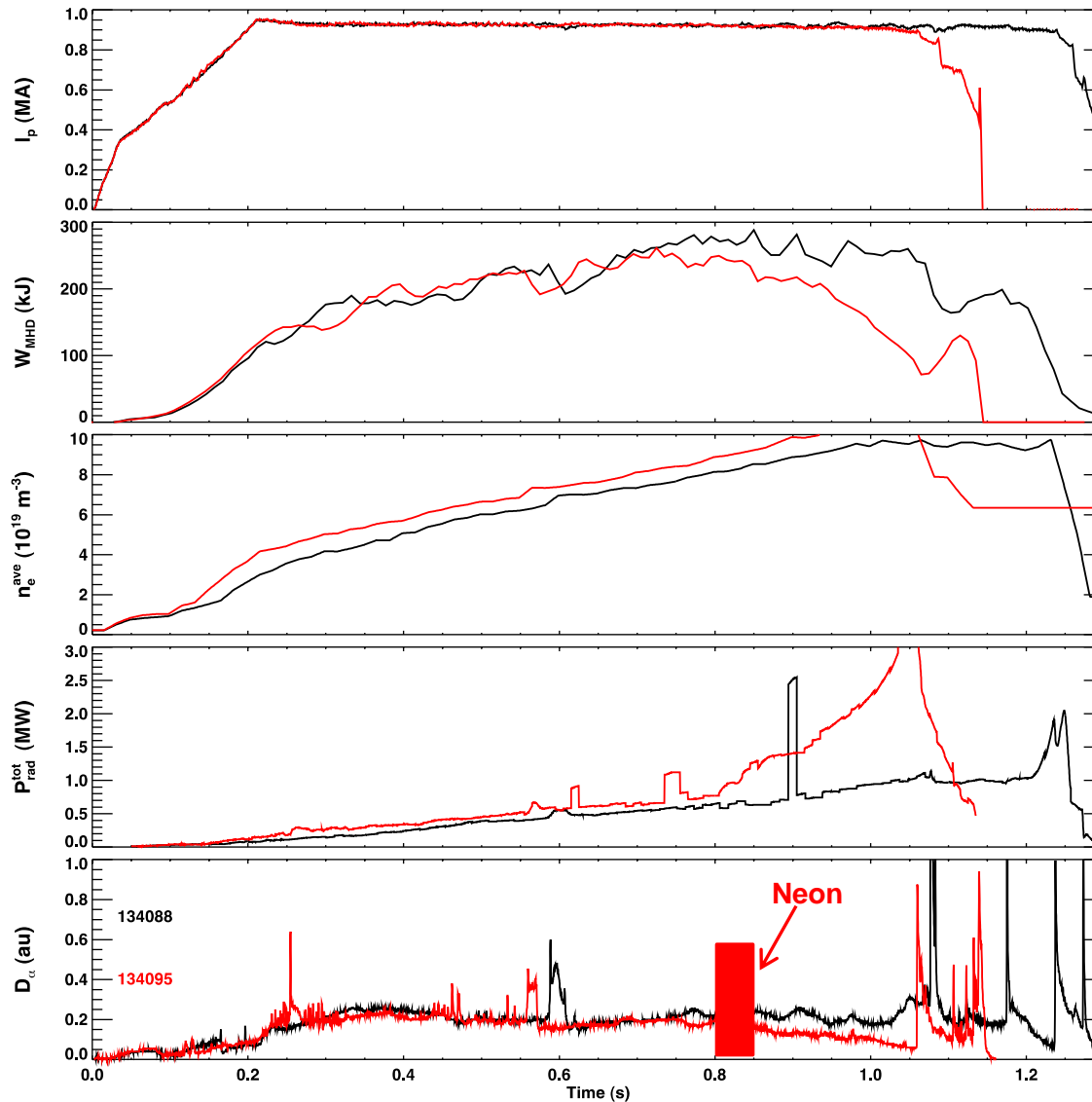


Experimental Plan

- Use Lithium to suppress ELMs and ramp P_{rad}
 - Either let P_{rad} rise naturally or puff Neon
- Use 3D field triggered ELMs to lock in P_{rad}
 - Vary timing of ELM triggering start to lock in different f_{rad} values
 - Vary triggering frequency as needed to keep f_{rad} flat after triggering starts
 - Increase dP_{rad}/dt with Neon puff to get to higher f_{rad} values (see next slide)
- Scan f_{rad} to as high as possible
 - Is strong reduction in divertor heat flux with good core confinement possible?
- Determine optimum point highest possible P_{rad} with good confinement
- Diagnostic/analysis needs
 - IR cameras and profile diagnostics
 - TRANSP for core diffusivities, SOLPS for edge diffusivities



Neon Puff Increases Ramping Rate of P_{rad}



•XP918