Correlation of *AE bursts with fast core Te profiles

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U Wisconsin

Kevin Tritz

J Munoz Burgos, D Stutman,
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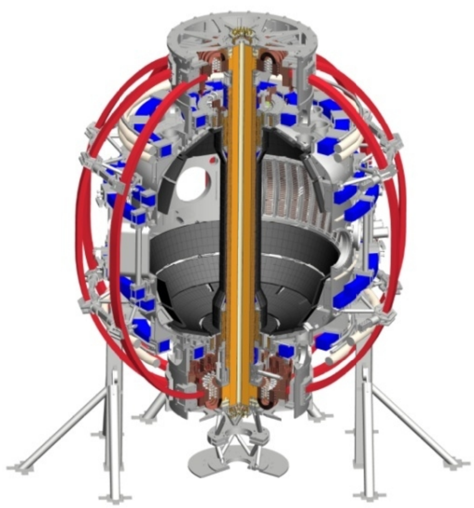
N Gorelenkov, *PPPL*
N Crocker, *UCLA*



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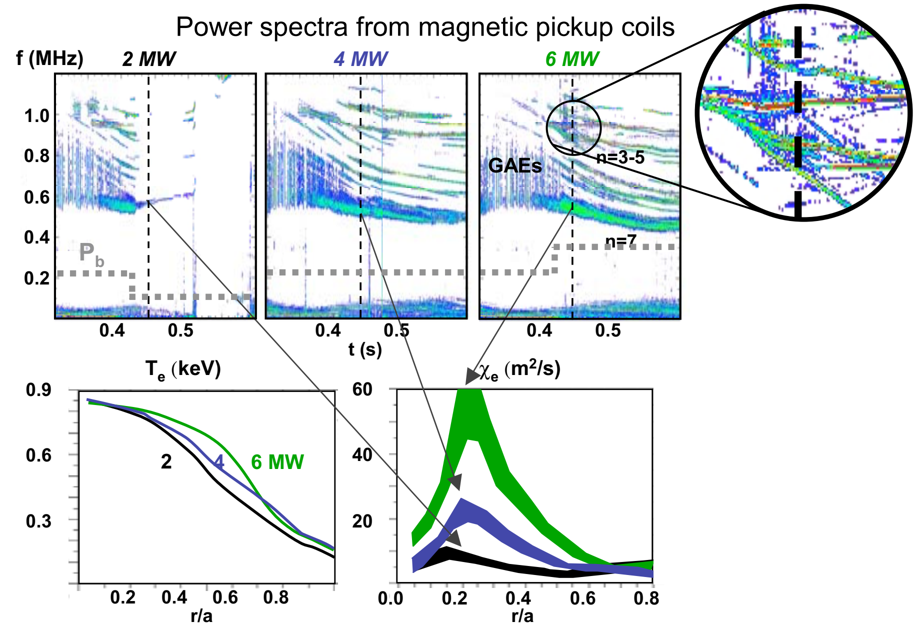
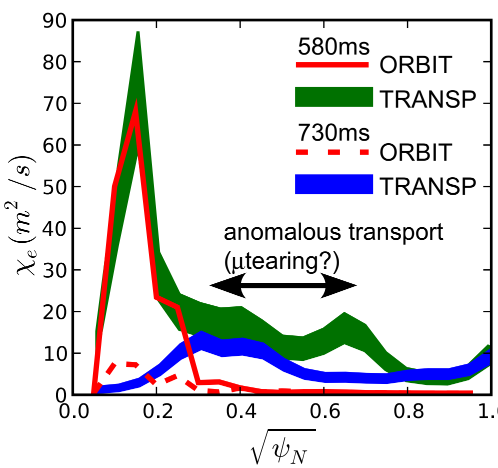
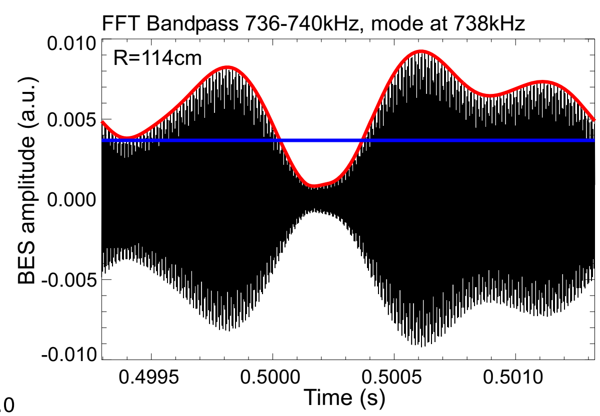
CEA/GAE activity prevalent in high-power NSTX H mode plasmas (what about NSTX-U?)

- CAE/GAE activity scales with beam power
- Flat T_e profiles, high electron thermal transport scales with *AE activity
- BES and reflectometer data shows ‘bursting’ character of modes with ~1ms timescale



D. Stutman, PRL 2009





Measurements from ME-SXR may detect 'bursting' *AE effects on core χ_e / T_e profiles

- $d^2 = \chi_e^* \Delta t$ ~ 10-20cm core perturbation scale length

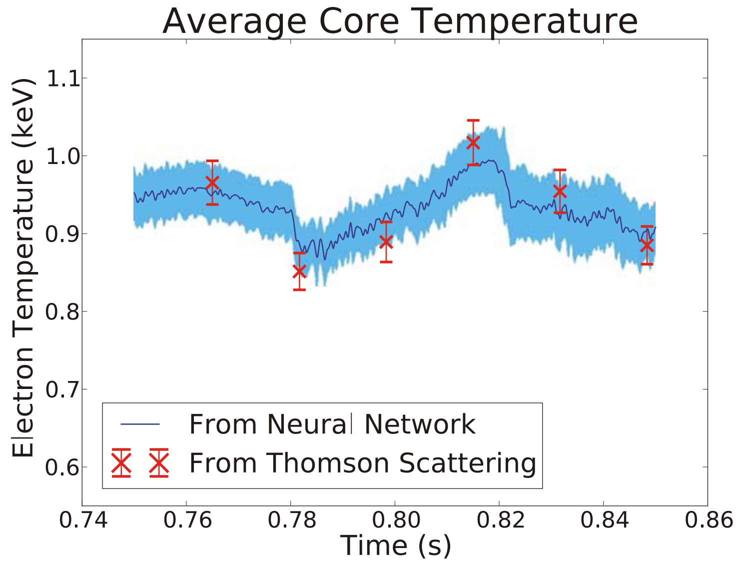
- Previous neural network analysis shows sensitivity to ~5% ΔT_e

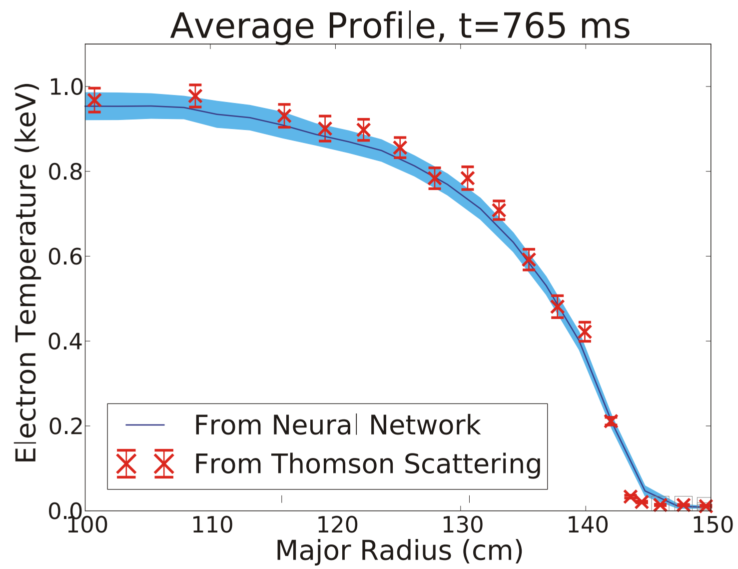
Shot plan:

Initially obtain data from piggyback
- Other *AE XPs (e.g. Crocker)
- High performance discharges

If successful, repeat 1 or 2 conditions for statistical correlations
(0.5 days)

ME-SXR, reflectometer, BES, FIReTIP





Perturbed edge impurity transport

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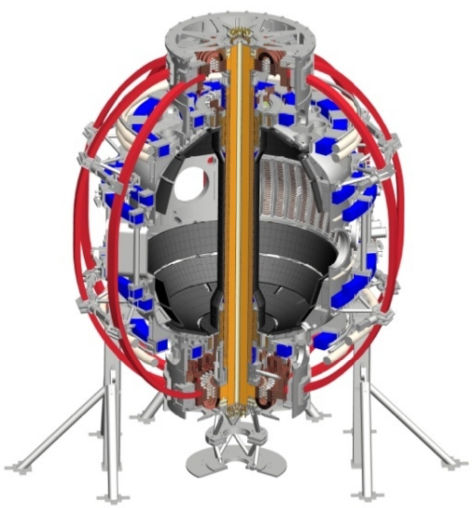

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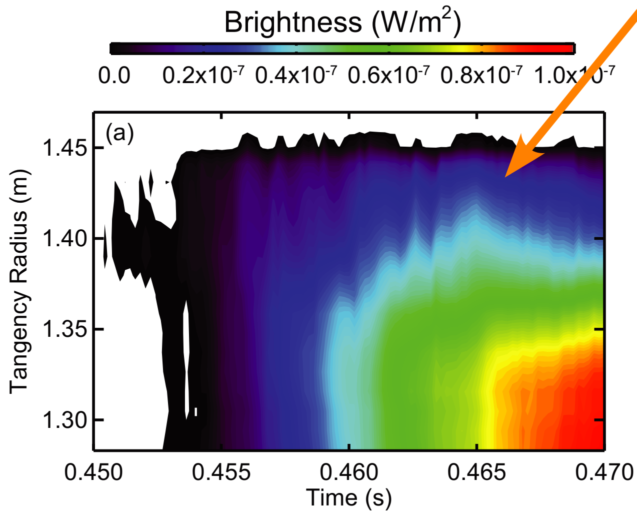
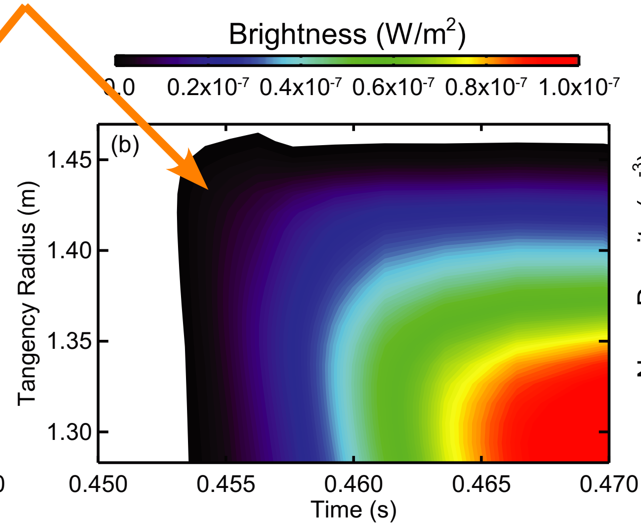
ME-SXR with active impurity seeding provides impurity transport measurements

D J Clayton, et al., Plasma Phys. Control. Fusion, 54, 105022 (2012)

compare

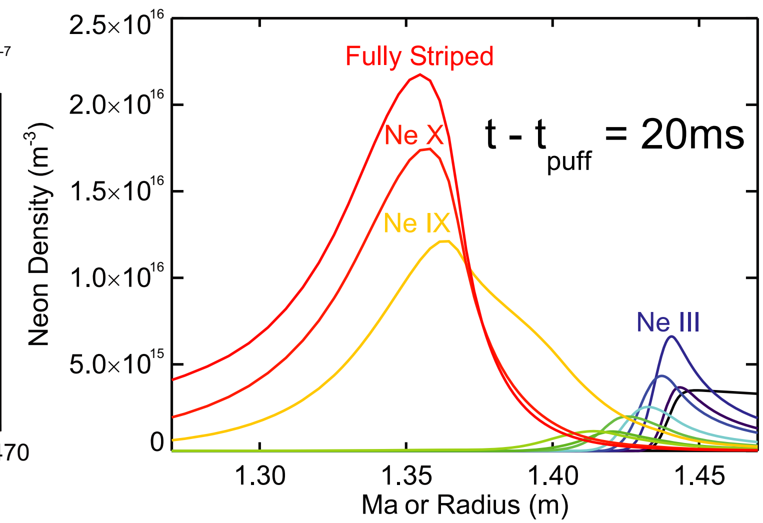


ME-SXR 5μm Be neon intensity



STRAHL computed neon intensity (uses ADAS)

STRAHL calculated Ne radial distribution



- Neon gas puff + STRAHL transport code constrained by ME-SXR
- Edge ME-SXR constrains transport calculation, high spatial resolution

Both 3D fields from RWM and LGI can induce ELMs for impurity/particle control

- ELM triggering helps mitigate impurity accumulation during Lithium operations
- ELM pacing important technique to reduce heat load on PFCs
- Important to understand how ELM pacing affects particle/impurity transport

Contributes to:

T&T Thrust 3, ITPA TC-11, ITPA TC-24

Shot plan:

Pair shots w, w/out Neon puffs and

scan RWM coil current, frequency (0.5 days)

scan LGI granule mass (0.5 days)

J Canik, Nucl. Fusion **50** (2010)