

Core Impurity Transport Measurements at Fixed q-Profile using the new ME-SXR Diagnostic

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Turbulence and Transport

• Experimental Goals:

- To measure impurity transport in the core of NSTX-U in beam-heated H-mode plasmas at fixed q-profile.
- To compare transport results to those of NSTX.
- To explore the effects of high field/current regimes on transport.

• Key Diagnostics and Equipment:

- New Multi-Energy Soft-X-Rays (ME-SXR), and XUV/VUV TGIR diagnostics.
- MPTS.
- CHERS.
- AXUV-Bolometers.
- NBI #1.
- Ne gas-puffs.

• Experimental Outline:

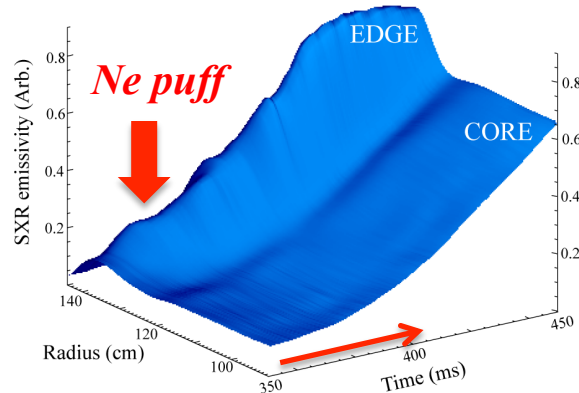
- **1 Day** for ρ^* scan at fixed q-profile conditions using medium NB-power ($P_{NB1}=4\text{MW}$). Includes 3 field/current conditions for comparison with previous NSTX measurements, and 1 high-field/current condition.
- **1/2 Day** for ν^* scan at fixed q-profile conditions using medium and high-field/current conditions. This includes 3 NB-power settings (low, medium, high).

ρ^* scan at fixed q-profile and fixed v^* ($P_{NB1}=4$ MW)

a) $I_p=0.9$ MA, $B_t=4$ kG

SXR filter: Be $10\ \mu\text{m}$

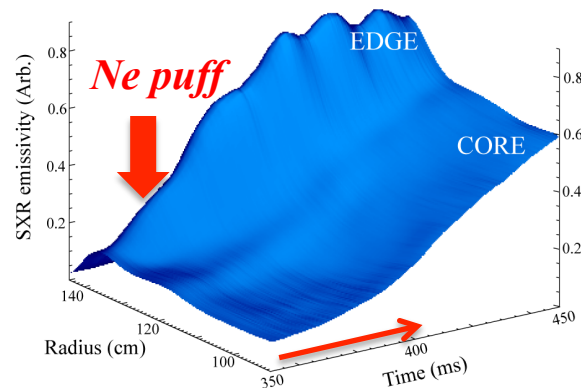
$$(\epsilon_{10\mu\text{m}} \propto n_{\text{Ne}8+} + n_{\text{Ne}9+})$$



b) $I_p=1.0$ MA, $B_t=4.5$ kG

SXR filter: Be $10\ \mu\text{m}$

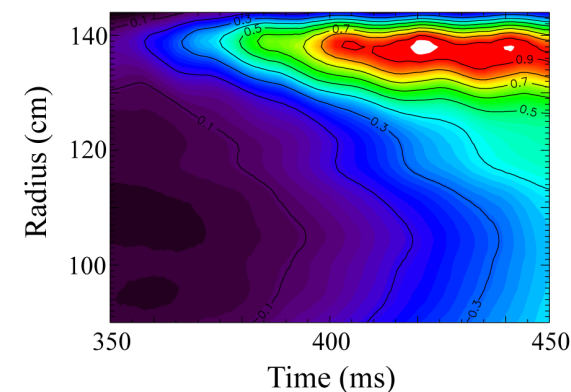
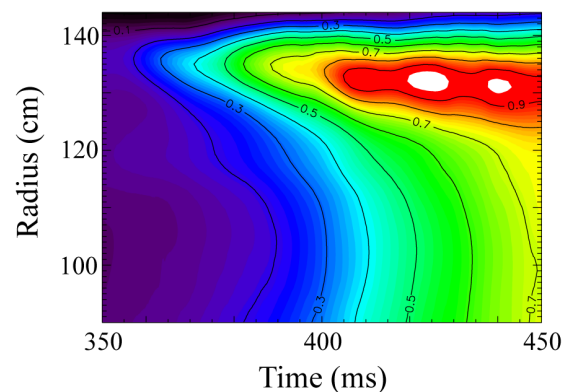
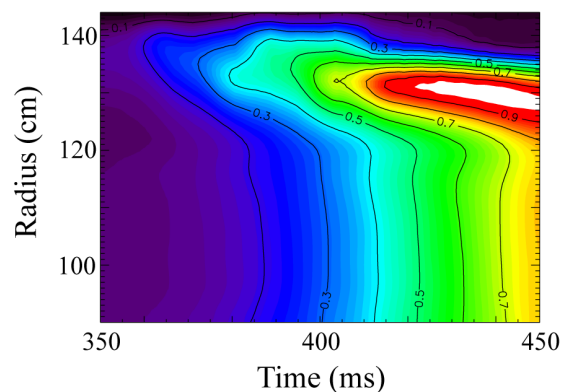
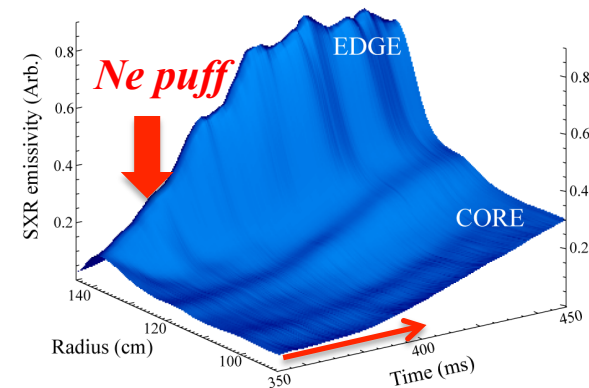
$$(\epsilon_{10\mu\text{m}} \propto n_{\text{Ne}8+} + n_{\text{Ne}9+})$$



c) $I_p=1.2$ MA, $B_t=5.5$ kG

SXR filter: Be $10\ \mu\text{m}$

$$(\epsilon_{10\mu\text{m}} \propto n_{\text{Ne}8+} + n_{\text{Ne}9+})$$



L. Delgado-Aparicio, et al., PPCF, **49**, 1245 (2007),
NF, **49**, 085028, (2009), NF, **51**, 083047, (2011).

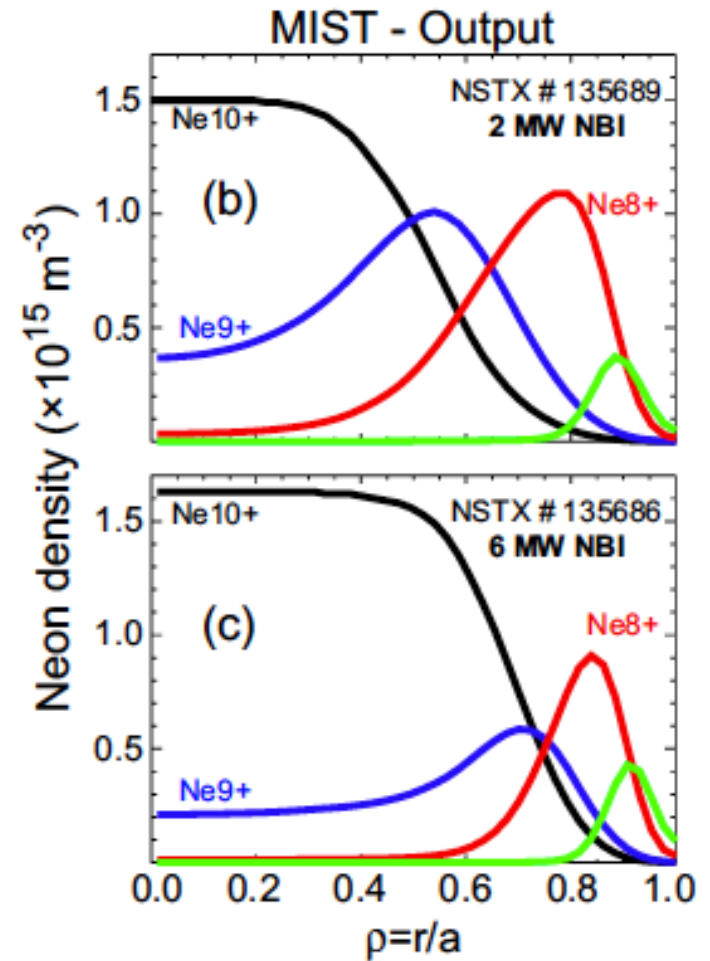
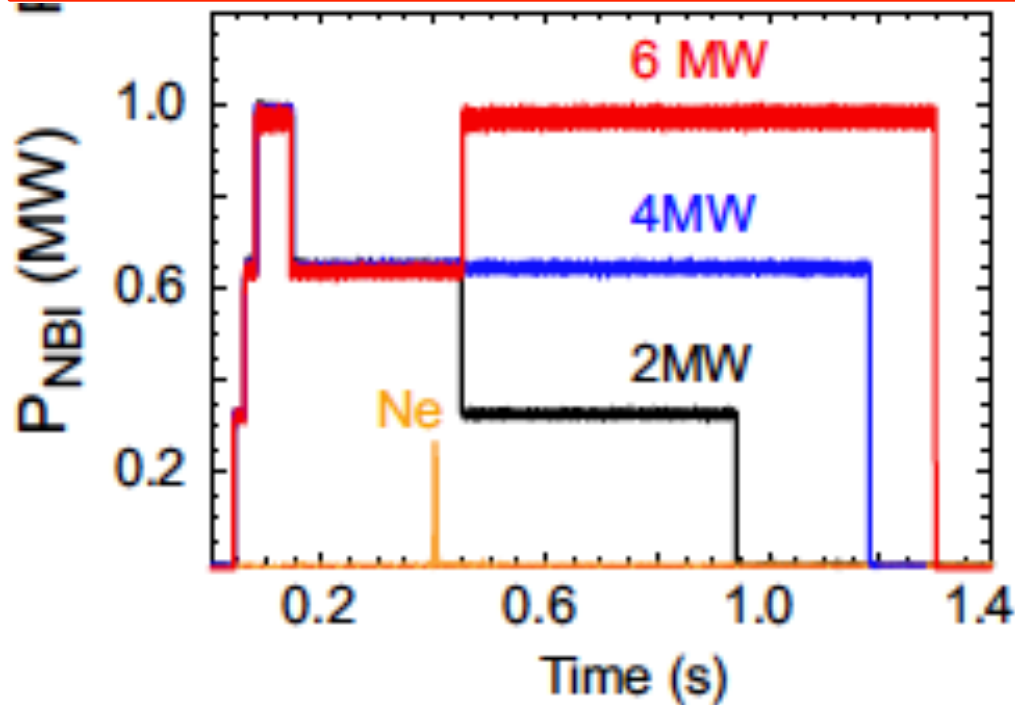
4th New Condition: High-field/current in NSTX-U

$I_p=1.4$ MA, $B_t=6.3$ kG

v^* scan ($P_{NB1}=2, 4, \text{ and } 6 \text{ MW}$) at fixed q-profile for medium and high field/current conditions

Scan at medium and high-field/current conditions

1. $I_p=1.0 \text{ MA}$, $B_t=4.5 \text{ kG}$
2. $I_p=1.4 \text{ MA}$, $B_t=6.3 \text{ kG}$



L. Delgado-Aparicio, et al., PPCF, **49**, 1245 (2007),
NF, **49**, 085028, (2009), NF, **51**, 083047, (2011).

New data analysis and modeling using STRAHL

D. J. Clayton, et al., PPCF, **54**, 105022 (2012)