NSTX-U

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Particle control task force proposals

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and the NSTX Research Team

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Princeton, NJ
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Columbia U
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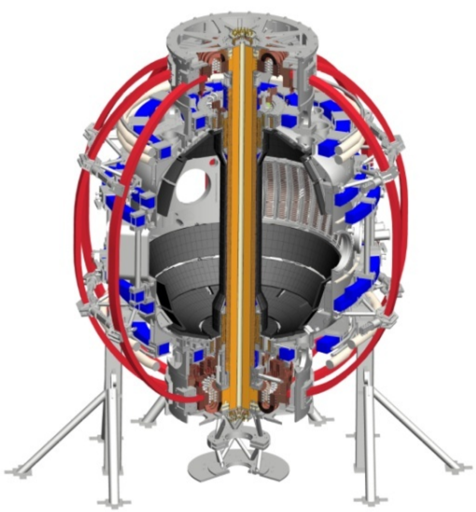

Culham Sci Ctr
York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
Kyushu Tokai U
NIFS
Niigata U
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ENEA, Frascati
CEA, Cadarache
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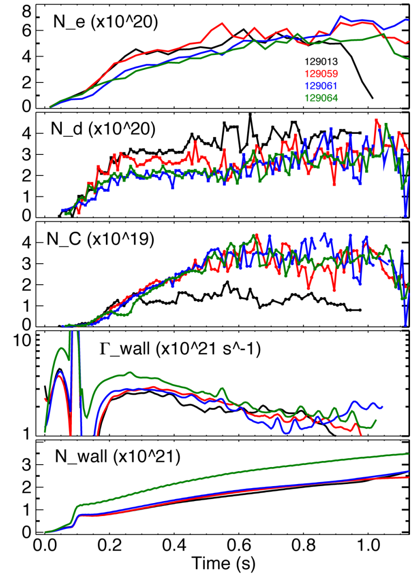
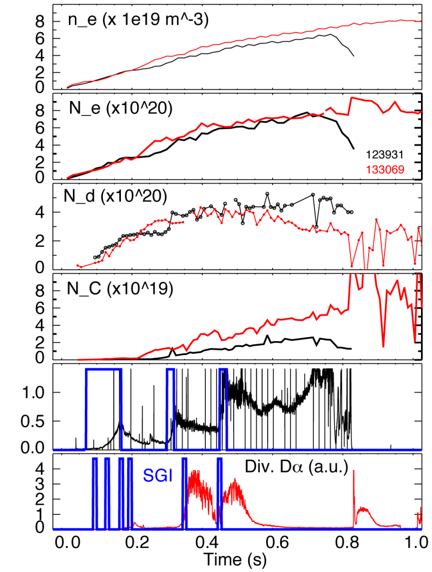
IPP, Garching
ASCR, Czech Rep

1. Recycling and pumping with lithium coatings

- During B2Li transition
  - Document poloidal distribution of recycling
  - Measure relative recycling coefficients in different poloidal locations
  - Apply particle balance model to infer wall pumping
  - Use SGI pulse technique to infer pump-out times using LPs and D-α
  - Use spectroscopy to measure H/D ratios
  - Correlate measurements with MAPP retention measurements if possible
- Goals
  - Lithium coatings and amount vs pumping rate, recycling levels and distribution
  - B2Li effect on fuel particle balance
  - Correlate with MAPP XPS and retention measurements

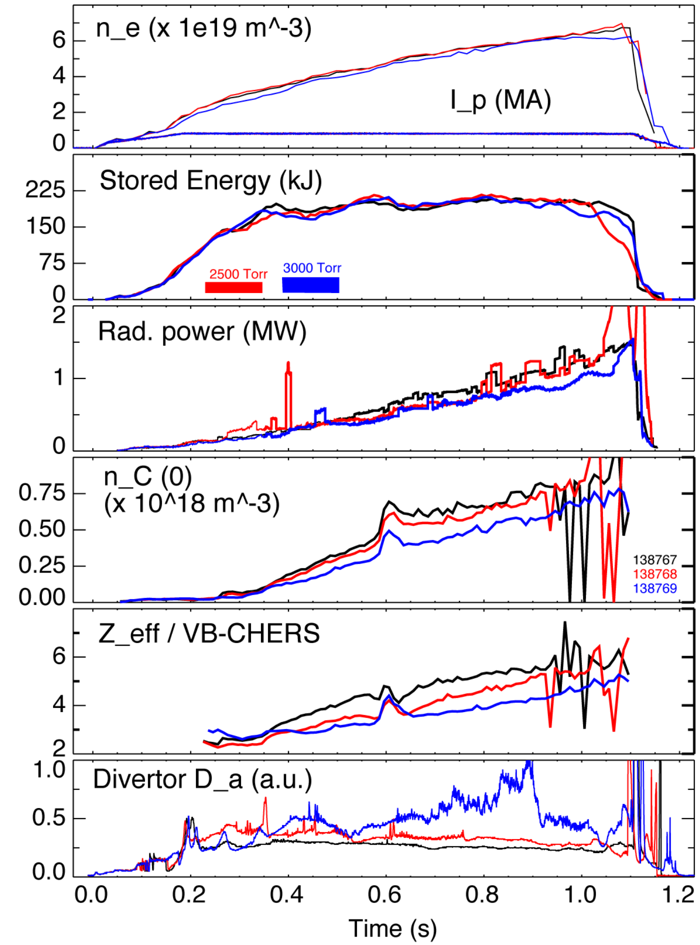


No lithium, 140 mg Li



2. Divertor gas puff effect on impurity reduction

- In NSTX, weak divertor gas puffing was used to significantly reduce core carbon, metal concentrations and P_{rad}.
- UEDGE modeling, contrary to expectations did not show much physical and chemical carbon source reduction
- Need to understand mechanism
  - SOL/divertor impurity sputtering reduction
  - Parallel SOL force balance
    - ion thermal gradient force
    - impurity entrainment in increased SOL viscous flow
  - edge neoclassical pinch reduction
- Repeat the experiment before and after lithium
- Compare to UEDGE model with drifts
- Potential solution to high-Z erosion



3. Assess high-Z granule injection and compare with UEDGE-DUSTT ablation model

- Collaboration with R. Lunsford (PPPL), R. Smirnov, S. Krasheninnikov (UCSD)
- Use the last day of the FY2015 run to inject Mo and W granules
  - 1-10 granules per injection
  - 150-300 um, 800um, 7e19 particles each
  - 300 ms duty cycle
- Goals
  - Measure granule penetration, high-Z emission from edge and core charge states, radiated power
  - assess if LGI can be used for high-Z transport experiments
  - Measure Mo and W fluxes in the divertor w.r.t. magnitude of material injected
  - Benchmark UEDGE-DUSTT code
    - Dynamics of ablation along granule trajectory
    - High-Z transport to core and divertor