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Pellet injector for ELM pacing and core fueling

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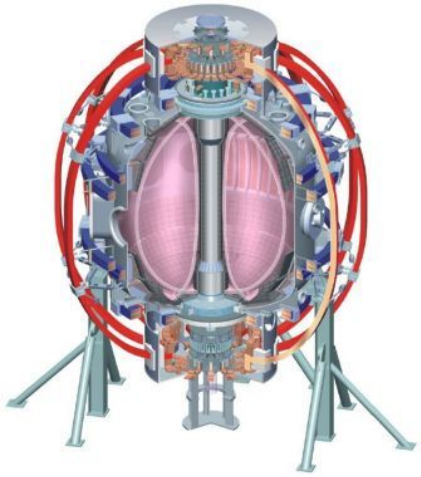
NSTX-U Facility Enhancement Brainstorming Meeting

Feb 7-8, 2012

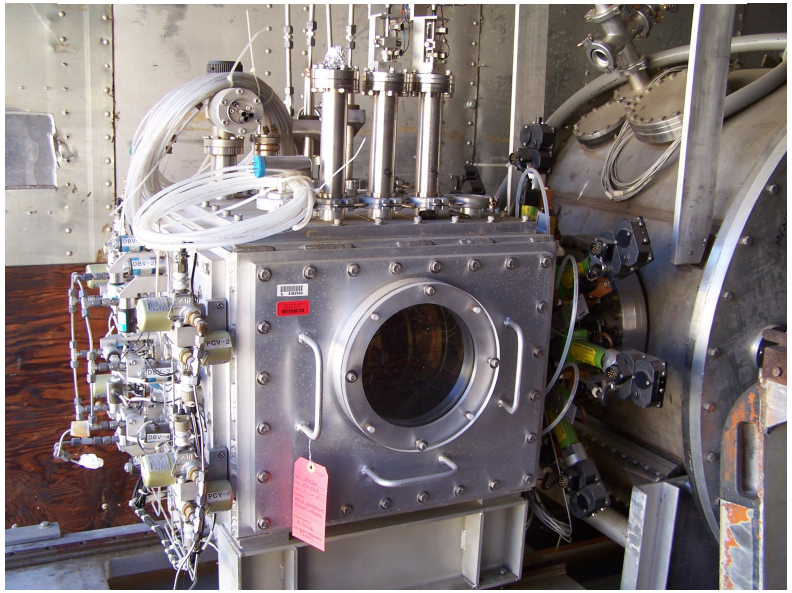


Increased Core Fueling Moves NSTX-U away from High Edge Fueling Scenarios when Lithium is used

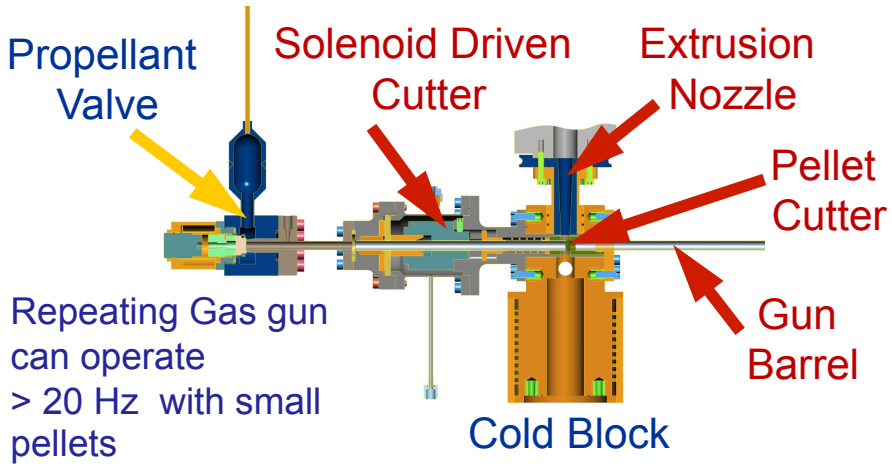
- PBX pellet injector can be resurrected for low-cost
  - Simple gas gun design
  - 8 - barrels, 1.0 - 2.7 mm diameter
  - $5x10^{19}$ – $9x10^{20}$ atoms
  - 200-1500 m/s pellet speed
  - Can upgrade to an internal cryo-cooler for simple operation

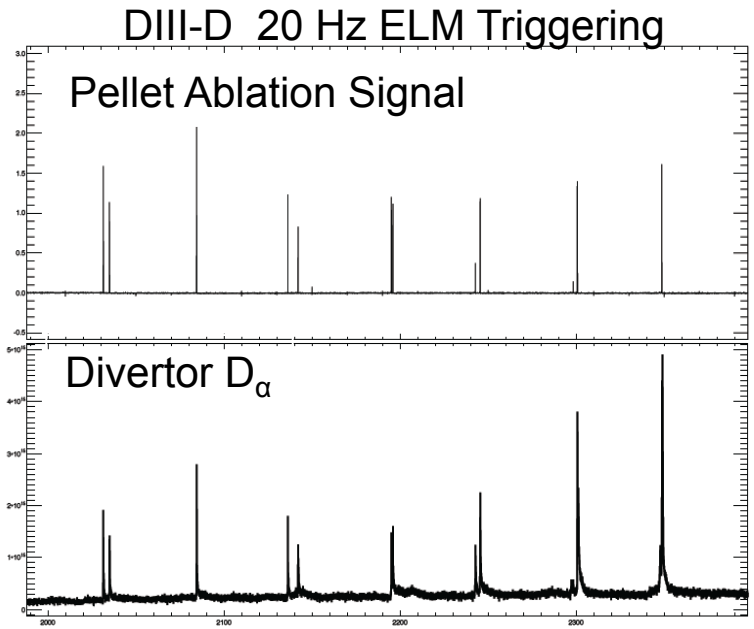
- Optimized new fueling system for NSTX is one that provides:
  - Central fueling
  - Minimized recycling – HFS vertical injection
  - Repetitive - 10 Hz with ~10% perturbations
  - Reliable operation

PBX Pellet Injector
(currently on site @ PPPL)



Demonstration of Impurity Control in NSTX-U is a Top Priority – Pellet ELM Pacing a Possible Technique





- ELM pacing is also a top ITER priority
- Best results on NSTX so far have come with lithium + triggered ELMs
- Pellet pacing on DIII-D has been shown to trigger rapid small ELMs
  - Pellets 1.3mm injected on LFS midplane and near divertor
  - **Impurity accumulation strongly reduced**
- High rep rate, small pellets are needed to trigger small ELMs
  - Not perturb the core density
  - Create smaller ELMs than natural ELMs or triggered ELMs
  - Flush impurities to the divertor