

MPTS Long Term Plans

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NSTX-U facility enhancement brainstorm meeting

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CAMAC Replacement

- MPTS is a crucial diagnostic which is entirely CAMAC based
 - This is a liability that needs to be addressed in order to avoid interruption of MPTS coverage
- A modern data-acquisition electronics would permit to:
 - Do away with the our obsolete sample and hold electronics – very hard to replace parts
 - Permit higher time rate of acquisition – more later
 - Enable better understanding of stray laser light by using fast digitizers
 - Likely to enable dust measurements – Mie scattering and stray laser light are expected to have different time signatures

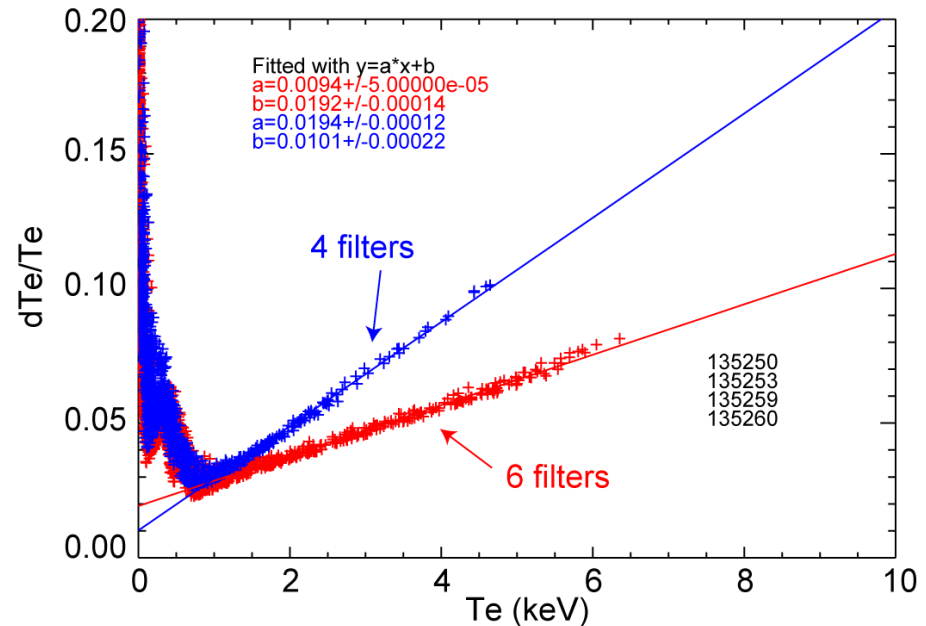
Laser Upgrade with Bursting Capability

- The MPTS configuration for NSTX-U includes input and exit flight tubes capable of handling three laser beams
- Propose installing a third laser with bursting capability:
 - Operation at 30Hz until burst of 10 to 20 pulses at a repetition rate of up to 2kHz the latter limit is set by the current data acquisition – could be faster with modern DAQ electronics
 - Similar to work done by Den Hartog at U. of Wisconsin
 - The other two – exiting – lasers would continue to operate at their normal rate *i.e.* 2 x 30Hz

Improved Core and Edge Accuracy

- Modify the filter set of some of the core polychromators in order to obtain 5% error bar at 10keV
- Modify the filter set of polychromators seeing the SOL in order to reduce error bar

Present system expected to have poor resolution at 10keV



Improved SOL Spatial Resolution

- Install a second window and optics viewing the SOL – *e.g.* at bay G
- Radial channels interwoven with exiting channels
 - Also provide channels with large tangency radii in order to improve Z-effective measurement

Additional Laser Beam Path: Vertical

- Combined horizontal and vertical $T_e(R,t)$ and $n_e(R,T)$ profiles would provide unequaled capability in equilibrium reconstruction
 - 2D internal constrain
 - e.g. local elongation measurement
- Reuse existing laser beams or implement new laser(s)
- New collection optics and detection system