


A Portable Thomson Scattering System

FUSION Diagnostics Program Review (Virtual)
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Our team combines expertise in pulsed power, optical diagnostics and high energy density plasmas

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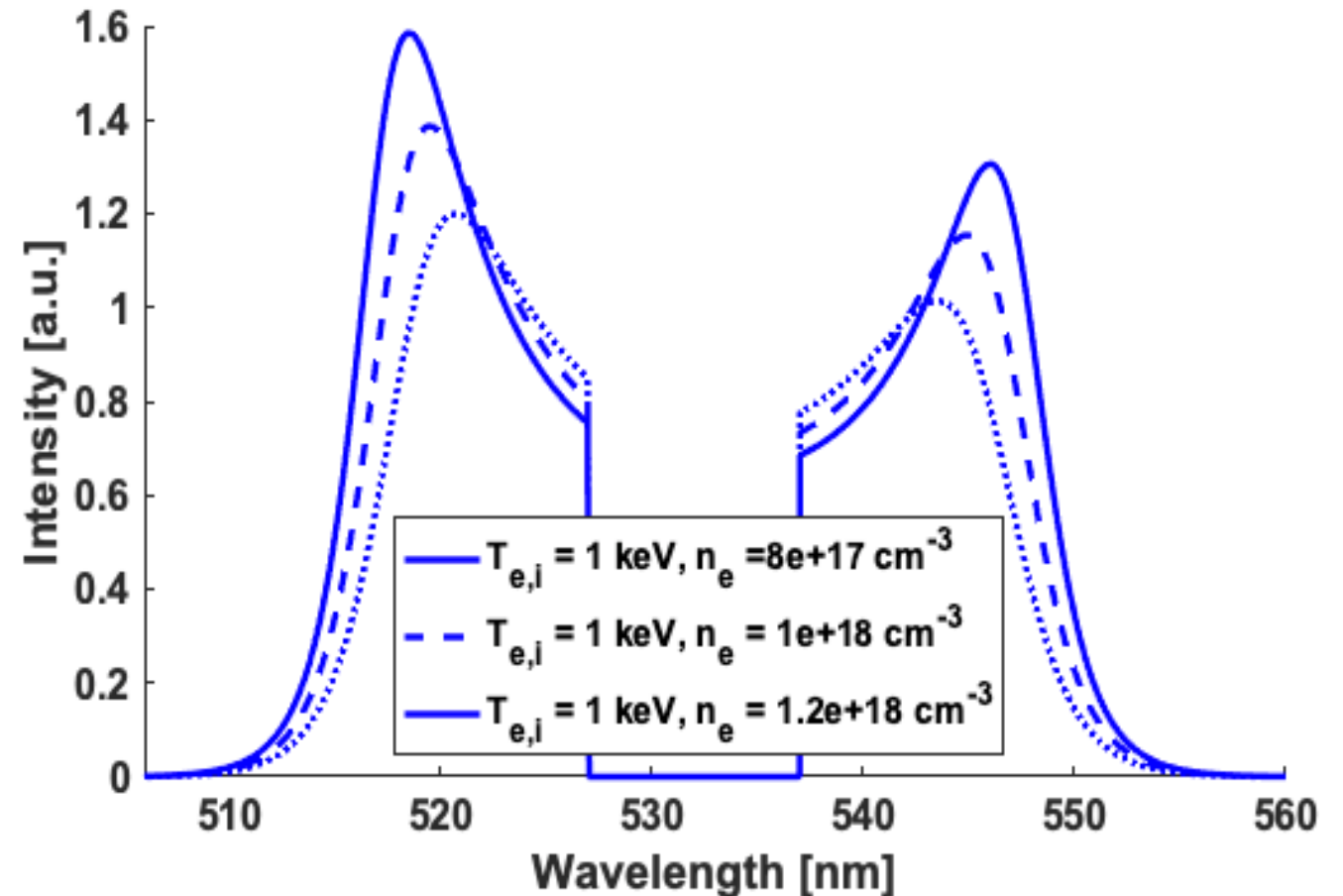
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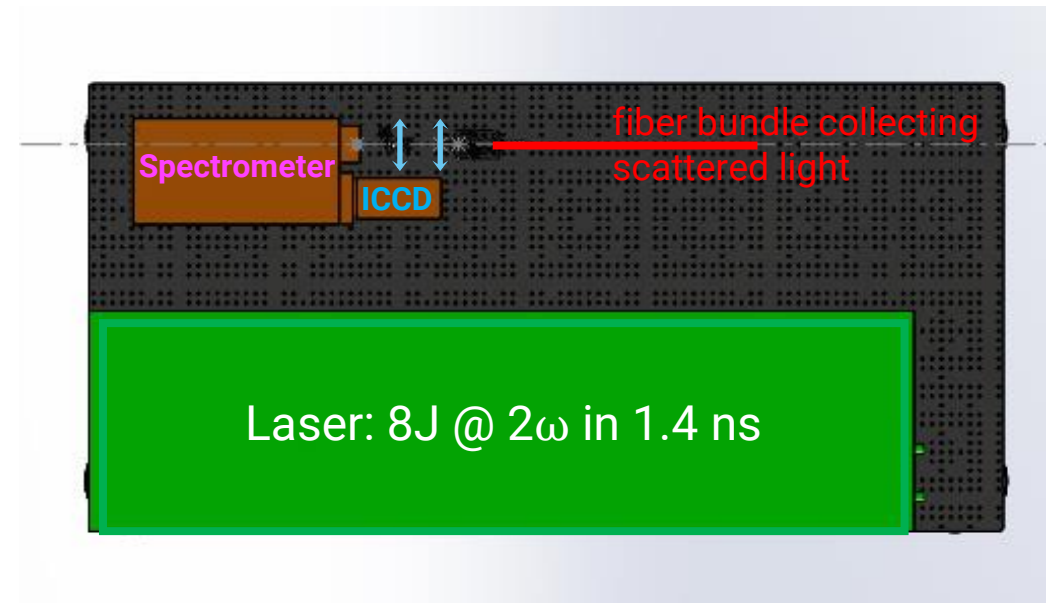
Our diagnostic can focus on ne, Te or Ti at several location along the plasma depending on the concept team's interest

- ▶ Focused on higher density plasmas with $n_e > 10^{17} \text{ cm}^{-3}$
- ▶ Can provide n_e , T_e , T_i or flow velocity
- ▶ Time resolution of 2 ns
- ▶ Measurement in a localized volume ($\sim \text{mm}^3$) inside plasma



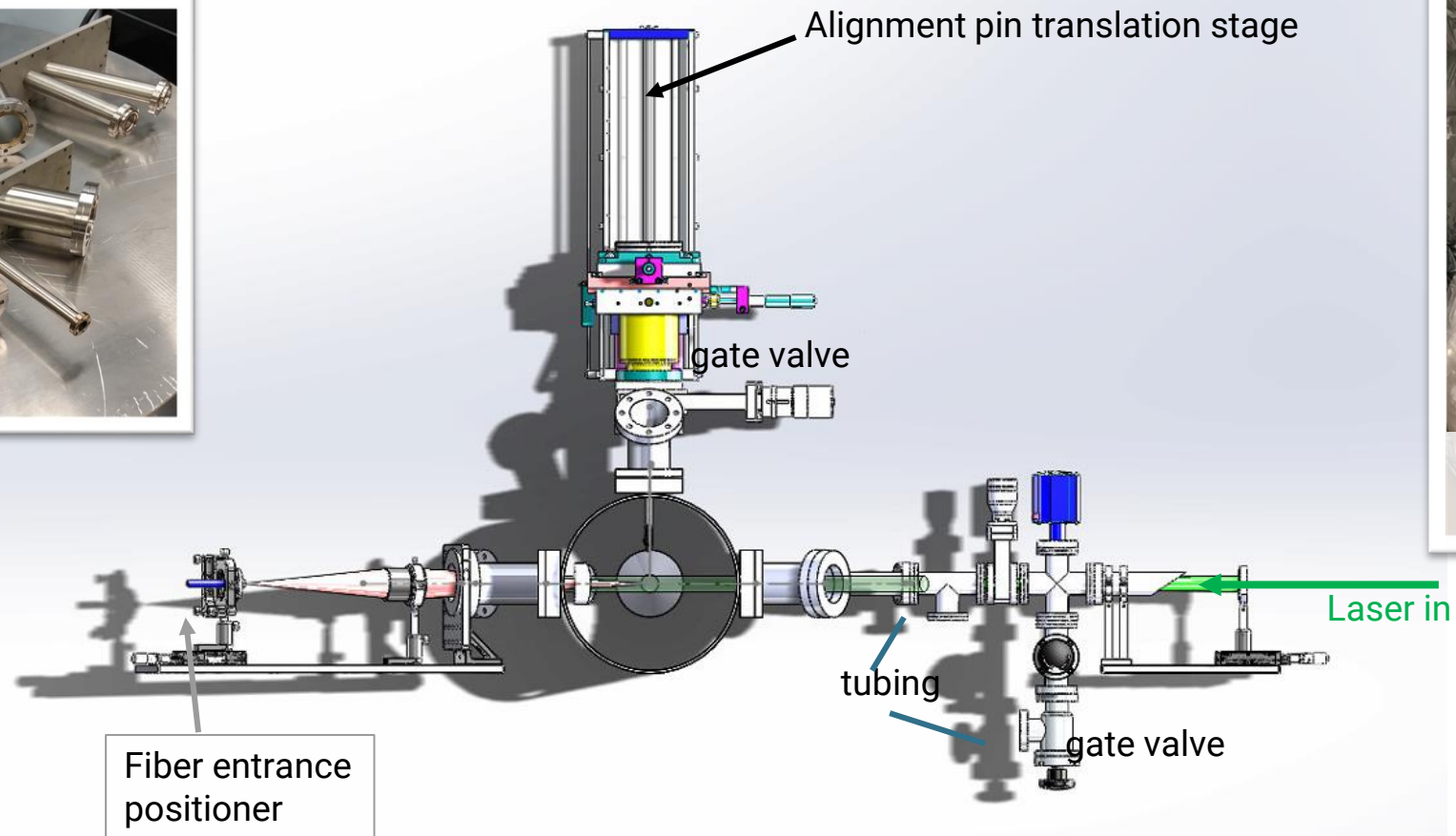
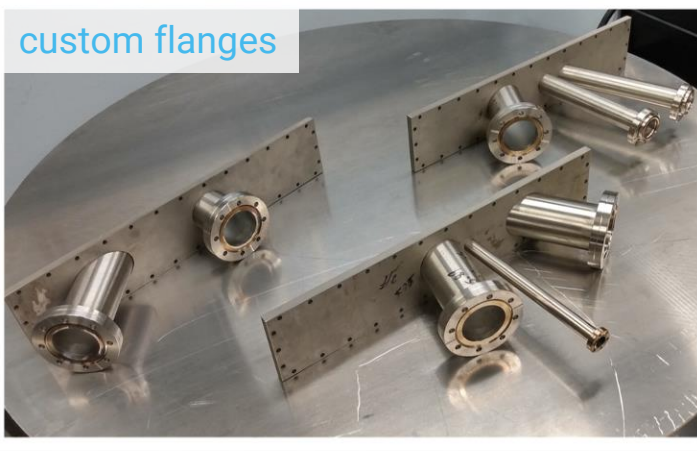
The detector is contained on a 4x8' table that can be moved around as needed

- ▶ laser and spectrometer/camera is contained on a laser table
- ▶ Scattered light is transported via fibers
- ▶ custom flanges for laser entry, scattered light collection and alignment pins
- ▶ small footprint around the chamber

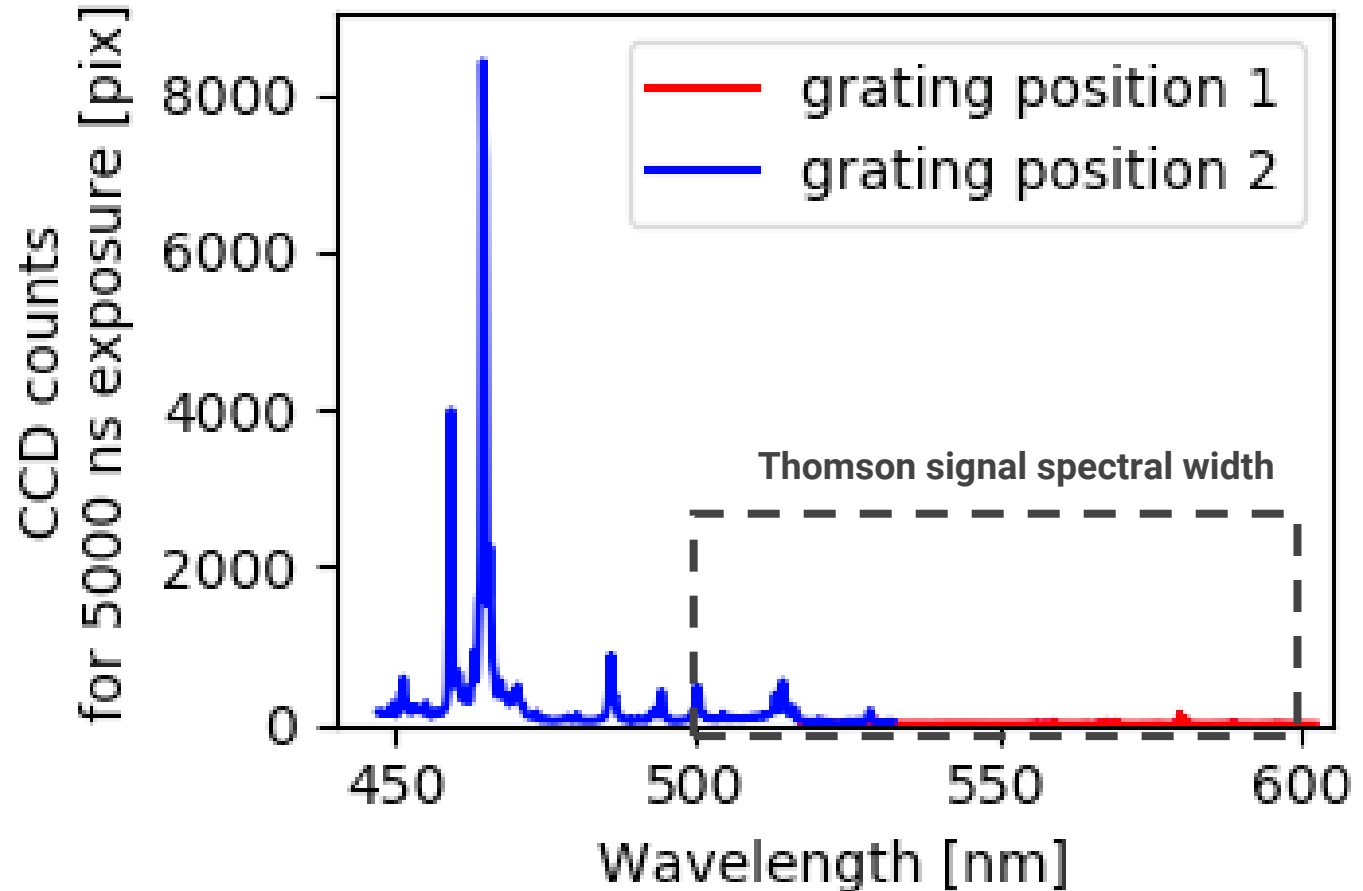
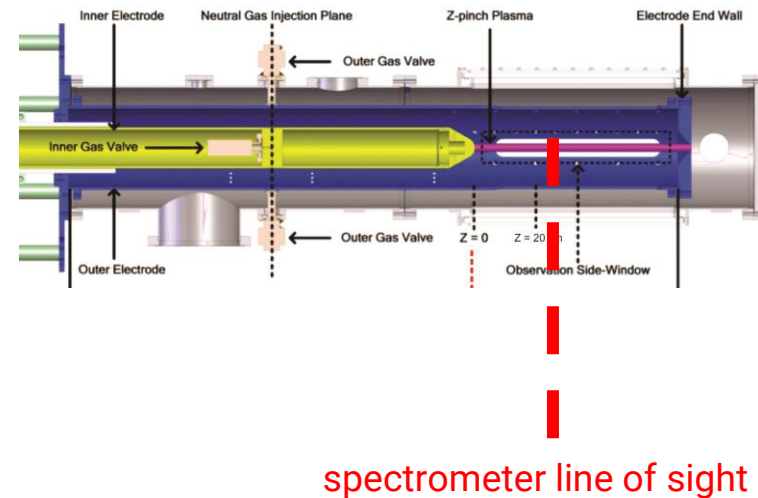


We will deploy the diagnostic on the sheared flow pinch first

- ▶ designed custom flanges
- ▶ table on wheels to support the laser and spectrometer CCD
- ▶ Targeting may/June to start deployment there



Measurements of optical background show plasma emission during a FuZE shot is low in the spectral region of interest for Thomson



- Measurement were done using a $5 \mu\text{s}$ exposure (1000 times longer than what we will use)
- Measurements are courtesy of Anton Stepanov

In the future, we want to simultaneously measure ion and electron feature and probe multiple times on a single shot

- Ion feature measurement
 - Need a second spectrometer/camera assembly
 - Split scattered single using a notch filter

- Probe multiple times on the same shot
 - Split the laser in two
 - build delay line to probe second time
 - multiplexing on a streak or use framing camera

- Simultaneous interferometry of the plasma