**INTRODUCTION**

Here we report details of electron temperature diagnostics at General Fusion for the SPECTOR (SPhEnical Compact TORAd) device. SPECTOR is the latest reduced-scale plasma injector at General Fusion designed to enable more spherical, self-similar compressions of candidate plasma targets for our MFT program. Two versions of SPECTOR have been built: an uncompressed laboratory version for diagnosing the pre-compressed plasma, and a version compatible with compression (PCS) tests. A six-point Thomson scattering diagnostic is installed only on the laboratory version while a two filter soft x-ray diagnostic is installed on both versions. One of the major goals of the uncompressed machine is to validate a temperature diagnostic usable on a compression test.

**THOMSON SCATTERING RESULTS**

A typical, high temperature spectral profile is shown above left. The central channel is lower because it contains the laser line block, but allows some non-laser light (see spectral response in Detectors section).

With current signal levels, radial profiles are difficult to resolve on a single shot, but ensemble similar shots together to resolve some profile, and is in agreement with a parabolic profile (ensemble of 10 shots shown above right).

The Thomson scattering diagnostic has been calibrated for density, and is compared against the FIR interferometer density below. The TS data uses a weighted average that matches the geometry of FIR’s chord averaging of density.

**DETECTORS**

The diagnostic uses a frequency double Nd/YAG laser, with 1.3-1.8 J pulse energy at 532 nm. The laser operates at 10 Hz, with a single, asynchronous pulse per plasma shot for measurements. A recently upgraded computer controlled beamline maintains laser position between shots.

There are six Thomson scattering viewpoints at 1 cm radial spacing and 90 degree scattering angle. These range from the vacuum magnetic axis at r=12cm to r=17cm, 2 cm within the vacuum vessel inner radius.

Five of the views are staggered vertical (external side view: above, right), to maximize collection without using a single, large hole in the conducting vessel. All viewports are of the same angle and appear to have different sizes due to the angled, exterior face.

**THOMSON SCATTERING OPTICS**

- Two filter X-ray spectroscopy
- Ion Doppler Spectroscopy
- VUV Spectroscopy
- Multi-point Thomson Scattering
- Multi-chord FIR Polarimeter & Interferometer
- Physical line block

**SPECTOR DIAGNOSTICS**

- Magnetic probe blocks
- NIR Interferometers
- Visible light spectroscopy
- Visible light photodiodes
- X-ray photodiodes
- Scintillators
- X-ray phosphor camera

**ION DOPPLER SPECTROSCOPY**

Ion Doppler spectroscopy can be performed on a variety of impurity lines using a Horiba spectrometer and PMT array (similar to TS setup to left). This diagnostic is available on both compressed and uncompressed versions of SPECTOR.

Temperatures can be estimated by using the ratios of signals from above models, with example temperature calibration curves shown below for thicker vs thinner filters.

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