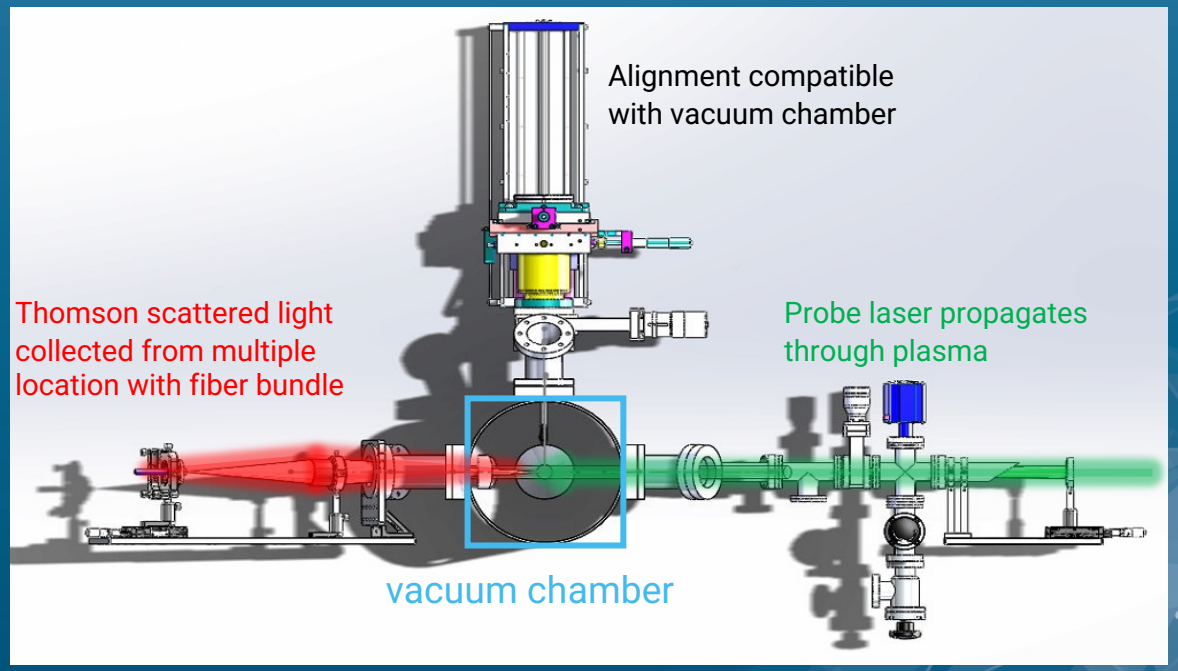
A Portable Thomson Scattering System to Measure Plasma Density and Temperature

Lawrence Livermore National Laboratory

UC San Diego

We use optical Thomson scattering to probe n_e, T_e, or T_i at several locations along the plasma depending on the fusion concept team's interests. A 1.5-ns, 532-nm, 8-J laser is used as a probe, and scattered light spectrum is measured by two spectrometers coupled to ns-gated CMOS cameras.



Contacts	**Clément Goyon**, LLNL, *goyon1@llnl.gov* **S. Bott-Suzuki**, UCSD, *sbottsuzuki@ucsd.edu*
Key Reference	*"Plasma Scattering of Electromagnetic Radiation"* Froula, D. H., et al. Academic Press. 2011

Key Properties	
Physical Property to be Measured	Electron density (n_e), electron temperature (T_e), ion temperature (T_i), and flow velocity
Technique	Spectrally resolved Thomson scattering of laser probe inside plasma
Plasma parameter range	n_e>10^{17}cm^{-3} and T_e, T_i > 10 eV
Time Resolution	Nanosecond resolution
Spatial Resolution	up to 22 signals each from a localized volume (<mm^3) inside plasma
Spectral resolution	0.09 nm for electron parameters and 0.03 nm for ion parameters
Suitable for MCF, ICF, MIF?	MIF and ICF
Set-up time	2-3 weeks
Minimum time for a measurement	2 weeks to first data
Other characteristics	Thomson scattering is the gold standard for plasma temperature and density measurements
Requirements	2 optical windows for laser input port and optical collection

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