Optical Thomson scattering on the National Ignition Facility

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An Optical Thomson scattering diagnostic has been designed, built and fielded on the National Ignition Facility (NIF) to characterize underdense plasmas. The system spatially and temporally resolves Thomson scattered light from laser driven targets. The diagnostic design allows operation with different probe laser wavelengths. A deep-UV probe beam (λ_0 ~210 nm) is currently being developed for Thomson scatter from ICF hohlraums with an electron plasma density of $\sim 5\times10^{20}$ cm^{-3} while a 3ω probe is currently being used for plasma densities of $\sim 1\times10^{19}$ cm^{-3}. The system fields two spectrometers: the first to resolve Thomson scattering from ion acoustic fluctuations, with spectral resolution of $\delta\lambda/\lambda = 9.5\text{x}10^{-6}$ and the second to resolve scattering from electron plasma fluctuations with resolution of $\delta\lambda/\lambda = 0.0014$. We report on the design of the system and initial experimental results for different target configurations. The status of the dedicated Thomson scattering probe laser will also be presented.

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