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2.13 Development of an optical Thomson scattering system for the Orion laser

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Optical Thomson scattering (OTS) can be used to provide temporally and spectrally-resolved information on under-dense, high temperature plasmas. Scattering from the high-frequency collective excitations of the electrons can be used to constrain the temperature and number density of the electrons based on the width, amplitude and location of resonances in the scattered spectrum. The ion acoustic spectral features provide estimates of the ion and electron temperature ratio as well as the plasma mean ionisation state. These spectra can be streaked allowing the time evolution of the plasma conditions to be studied. In this presentation we discuss the development of an OTS diagnostic for the Orion laser system at AWE, UK. A 3ω probe beam will be used and the light scattered by the volume of plasma under study will be collected using a reflective telescope system. Light from the ion and electron features can be split into two spectrometers, one covering the narrow bandwidth of the acoustic waves with high resolution and a second spectrometer to cover the broader wavelength range of the plasma waves. Time resolved data can then be obtained by relaying the spectrally resolved signal onto an optical streak camera.

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