

Incoherent and collective Thomson scattering for the determination of electron and ion properties in low-temperature plasma

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In this lecture an introduction on incoherent Thomson scattering (TS) as well as Collective Thomson scattering (CTS) will be given. Incoherent Thomson scattering is the most accurate method for measuring the electron properties, because the method is direct and non-intrusive. This is also valid for CTS, in this report based on the fundamental mode of a seeded Nd:YAG laser, a system being developed for the high density, low-temperature plasma of the linear plasma generator Magnum-PSI. The small Debye length of dense low temperature plasma enables application of this method at relatively short laser wavelength. The combination of this CTS system and existing incoherent TS system will enable determination of electron density and temperature as well as ion temperature and plasma velocity of the near surface plasma. In this lecture, the theoretical background and experimental challenges of the work will be described along with some practical examples that demonstrate the capabilities of such systems.