Temperature and Density Measurements in Low Density, Magnetized Plasmas Using a Multipass Thomson Scattering Cavity

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We present experiments to study the temperature and density in low density, magnetized plasmas in UCLA's Large Plasma Device (density ~10^{12} cm^{-3}, temperature ~5 eV) using a single-shot multipass Thomson scattering cavity with small scattering parameter alpha (non-collective regime). We frequency double the Phoenix laser (1064 nm, 10 J, 5 ns) to a 532 nm probe beam and send the beam ~20 times through the target point in an image-relayed cavity, with the resulting mulitpassed beam yielding an effective probing energy of ~100 J over ~100 ns. The data will be compared to Langmuir probe measurements to characterize the ambient plasma and the setup will be used in future experiments to characterize exploding plasmas relevant to astrophysical collisionless shocks.