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Streaked Thomson Scattering on Laboratory Plasma Jets[1] JACOB BANASEK, TOM BYVANK, SOPHIA ROCCO, BRUCE KUSSE, DAVID HAMMER, Cornell University — Streaked Thomson scattering measurements have been performed on plasma jets created from a 15 μm thick radial Al or Ti foil load on COBRA, a 1 MA pulsed power machine. The goal was to measure the electron temperatures inside the center of the plasma jet created by the radial foil. The laser used for these measurements had a maximum energy of 10 J at 526.5 nm in a 3 ns duration pulse. Early experiments showed using the full energy significantly heats the 5×10^{18} cm^{-3} jet by inverse bremsstrahlung radiation. Here we used a streak camera to record the scattered spectrum and measure the evolving electron temperature of this laser heated jet. Analysis of the streak camera image showed that the electron temperature of the Al jet was increased from about 25 eV to 80-100 eV within about 2 ns. The Ti jets showed even stronger interaction with the laser, being heated to over 150 eV, and showed some heating even when only 1 J of laser energy was used. Also, the ion-acoustic peaks in the scattered spectrum from the Ti jets were significantly narrower than those from Al jets. Initial results will also be presented with scattered spectra taken at two different times within a single experiment by splitting the probe beam.

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