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Time-Resolved Thomson Scattering On Gas-Puff Z-Pinch Plasmas At Pinch Time[1] SOPHIA ROCCO, JACOB BANASEK, WILLIAM POTTER, BRUCE KUSSE, DAVID HAMMER, Cornell University — The conditions and dynamics of neon gas puff z-pinch plasmas at pinch time are studied on COBRA, Cornell's pulsed power generator (current rise time of ˜240ns and approximately 0.9MA peak current). Radial tailoring of the gas puff mass-density profile using a triple-nozzle coaxial valve (two annular gas puffs and a central jet) enables production of both more stable and less stable (in regards to the magneto-Rayleigh Taylor instability) z-pinch implosions. A 526.5nm, 10J Thomson scattering diagnostic laser enables probing of the flow dynamics and plasma conditions of these implosions with both spatial and temporal resolution. The 3ns laser pulse is split in half, one of the beams delayed by up to 10ns relative to the other. This allows observation of streaked spectra for a total consecutive time of 6ns, providing subnanosecond resolution of the evolution of the pinch through stagnation. A gated spectrometer provides spatially-resolved spectra at the same time for comparison. Extreme ultraviolet imaging and laser schlieren imaging at multiple times enable monitoring of the implosion morphology as a function of time.

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