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Exploring Transition Regions of Collisionality, Criticality, and Magnetization in Laboratory Parallel Shock Experiment DOUGLASS ENDRIZZI, CARY FOREST, RACHEL SASSELLA, University of Wisconsin - Madison, WISCONSIN PLASMA PHYSICS LABORATORY TEAM — A series of parallel shock experiments were performed on the Big Red Ball at the Wisconsin Plasma Physics Lab. An upgraded compact toroid injector produced a supersonic piston (60 - 100 km/s) that collided with a stationary background plasma. Target plasma densities ($0.5 < n_e < 50 \cdot 10^{18}\ m^{-3}$) were adjusted by varying the number of plasma washer guns, with the experiment length (L = 3 m) always much larger than the ion skin depth ($3 < d_i < 30$ cm). The variable magnetic field ($0 - 10$ mT), aligned in the direction of piston propagation, allowed for target plasma betas of $0.1 < \beta < 10$. Together, this amounts to a substantial parameter space in magnetosonic Mach number ($M_{\rm ms} \sim 0.5 - 5$), in collisionality ($\nu_e/\omega_{ce} \sim 0.1 - 5$), and in magnetization ($\rho_i/L \sim 0.1 - 2$). Results and analysis to identify the transitions from subcritical to supercritical, from collisional to collisionless, and from Hall-MHD to MHD, will be presented.

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