Contribution ID: **1001** Type: **Poster**

4P63 - Measurements of the Magnetic Rayleigh Taylor Instability in Centimeter-Scale Magnetized Plasma Bubbles*

Thursday 27 June 2019 16:00 (1h 30m)

The PBEX (Plasma Bubble Expansion eXperiment), being conducted on the University of New Mexico's Hel-Cat (Helicon-Cathode) basic plasma science device, utilizes a coaxial plasma gun to launch plasma jets and bubbles (spheromaks) into lower density magnetized plasmas. The goal of these experiments is to study the dynamics of magnetic relaxation processes in the presence of background plasma. Gun-produced plasma bubbles, which exist on cm spatial scales and tens of microsecond time scales, exhibit much more complicated dynamics when injected into background plasma, as compared to vacuum. These dynamics include a double shock structure at the bubble leading edge, magnetic reconnection upon bubble detachment from the gun, trailing edge turbulence, and finger-like structures that have been identified as Magneto-Rayleigh-Taylor (MRT) instability. The relatively large spatial and time scales of this experiment provide an opportunity to investigate MRT physics in a regime much different than typical high-energy-density cases. Here we report on studies of the MRT with varying background magnetic field, gas fill, and background plasma using fast imaging and magnetic and Langmuir probes.

*Work supported by the U.S. Army Research Office, award W911NF1510480

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Session Classification: Poster - Charged Particle Beams and Accelerators and High Energy Density Plasmas and Applications

Track Classification: 4.6 Fast Z Pinches