Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Critical Ionization Velocity Exploration and Diagnostics in Magnetized Rotating Plasmas[1] N. J. ESCHBACH, K. N. FROST[2], J. N. STEFANCIK, C. A. ROMERO-TALAMAS, University of Maryland, Baltimore County — The Adjustable Long Pulse High-Field Apparatus (ALPHA), a Bitter-type electromagnet with a 15-cm bore capable of delivering up to 10-T for more than 10 seconds, is being constructed at the Dusty Plasma Laboratory at UMBC. Experiments designed to explore and surpass the Critical Ionization Velocity (CIV) limit in E x B rotating hydrogen plasmas, previously identified both theoretically and experimentally by other groups, are planned with ALPHA. To carry out such experiments, a mirror coil design for ALPHAs Bitter-plates will be implemented. The mirror field will have about 4.5-T at midplane for steady state operation, and higher in pulsed mode. A mirror ratio slightly above 1 is estimated to be sufficient for confining plasmas that will yield measurable spectroscopic intensities to obtain rotation velocities through Doppler shifts. Optical access at midplane will be challenging since the magnet consists of a single continuous coil. Thus, to capture Doppler-shifted spectra, thin periscopes are designed to fit between the cylindrical vacuum vessel and the magnet. A mirror coil design, optical access system, and different electrode and insulator configurations will be presented.

[1]Work supported by the Air Force Office of Scientific Research, Grant No. FA9550-19-1-0071. Undergraduate students supported by the Maryland Space Grant Consortium.
[2]Visiting from Capital Technology University

Nathan Eschbach
University of Maryland, Baltimore County

Date submitted: 03 Jul 2019 Electronic form version 1.4