Abstract Submitted
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MHD Equilibrium and Diamagnetism of Rotating Plasmas in Shaped Magnetic Fields[1] WILLIAM C. YOUNG, M.R. CLARY, R.F. ELLIS, A. HASSAM, R. REID, G. SWAN, C.A. ROMERO-TALAMÁS, G. TAYLOR, C. TEODORESCU, University of Maryland, College Park, I. UZUN-KAYMAK, University of Wisconsin, MCX TEAM — A combination of diamagnetic and magnetic pick up loops external to the Maryland Centrifugal Experiment's (MCX) vacuum vessel measure changes in the local radial magnetic field and the averaged axial magnetic field. The measurements result in an axial profile of the rotating plasma's diamagnetism on a millisecond timescale, limited by the L/R time of the vacuum vessel. Additionally, two interferometers provide average density measurements and a multi-chord spectrometer estimates radial rotation and ion temperature profiles. Combining these measurements allows for comparison to MHD equilibrium found by numerically solving for a perturbative solution to the Grad-Shafranov equation including supersonic rotation. This comparison constitutes a test for the efficacy of centrifugal confinement, a central goal of the MCX experiment. Preliminary analysis shows remarkable agreement for the magnitudes and axial profiles of plasma diamagnetism across broad parameter variations. The addition of magnetic measurements inside plasma will also be described.

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