A spherical Couette experiment to observe linear MHD instabilities at medium Reynolds numbers

ELLIOT KAPLAN, BENJAMIN GOHL, THOMAS GUNDSUM, MARTIN SEILMAYER, FRANK STEFANI, Helmholtz Zentrum Dresden Rossendorf — Turbulent spherical Couette flows in a strong axial magnetic field (Re ∈ (10^4, 10^6), Ha ∈ (0, 3000)) have given rise to a nonaxisymmetric instability that resembled the long sought-after, nonlinear, Magnetorotational Instability [Sisan (2004)]. Subsequent theoretical and numerical investigations have likened the observed instability to linear instabilities in either the Shercliff layer or the return flow [Hollerbach (2009), Gissinger (2011)]. These investigations also turned up a stability region in Re/Ha space between these (MHD) instabilities and the (HD) jet instability. Presented here are designs and plans for a spherical Couette experiment—presently under construction in Rossendorf—that aims to measure these instabilities in the space betwixt the simulations and the turbulent experiments (Re ∈ (10^3, 10^4), Ha ∈ (0, 160)).