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What we've learned so far about the stability of plasma confined by a laboratory dipole magnet[1] MICHAEL MAUEL, Columbia University, CTX PHYSICS TEAM, LDX PHYSICS TEAM — During the past decade, new experiments with collisionless plasma confined by magnetic dipoles have been built at Columbia University, MIT, and the University of Tokyo. These have resulted in detailed observations of interchange instability, convective mixing, and high-beta toroidal confinement without magnetic shear. This poster discusses these new results with the aim of understanding linear, nonlinear, and turbulent plasma physics due to interchange dynamics. To date, observations show interchange modes to be fixed-boundary modes with broad structures that are easily measured and understood theoretically. Additionally, for a strong dipole magnet, interchange modes create wave-particle kinetics that are essentially one-dimensional. Hence, observations of linear and nonlinear MHD, fast-particle drift-resonances, transport in magnetospheric and fusion systems, and the effects of strong plasma flows are dominated by low-dimensional dynamics and show good agreement between observation, theory, and numerical simulation.

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