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Droplets Walking in a 2D Coulomb Potential LUCAS TAMBASCO, MIT, ANAND OZA, Courant Institute, New York University, JOHN BUSH, MIT
— We present the results of a theoretical investigation of a droplet walking on a vibrating fluid bath subject to a central two-dimensional Coulomb force. Using the Hydrogen Atom as motivation, we introduce an attractive Coulombic term to the integro-differential trajectory equation developed by Oza et al. (JFM, 2014), and analyze the behavior of the droplet's motion. Linear stability analysis of circular trajectories indicates that stable orbits have quantized radii and can only be achieved for a specific range of vibrational forcing acceleration. In unstable regions, numerical simulations of trajectories show that droplets can either collapse into the center or escape the influence of the Coulomb force. We discuss the value of this Coulombic system as a Hydrodynamic Quantum Analog, and explore its extension to 3 dimensions.

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