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Dynamics and stability of confined interfacial droplets STUART THOMSON, MATTHEW DUREY, MILES COUCHMAN, RUBEN ROSALES, JOHN BUSH, Massachusetts Institute of Technology — Millimetric droplets may bounce on the surface of a vibrating liquid bath or "walk" by means of self-propulsion through a resonant interaction with their own wave field. The propulsive wave force exerted by the bath is balanced by the droplet's inertia and dissipation in the form of drag. In this talk we present the results of a combined experimental and theoretical study in which we consider the dynamics and stability of droplets confined to an annular ring. Single droplets are observed to destabilize to a pulsating walking state and then to a random-walk like instability as the vibrational acceleration of the bath is increased. When multiple droplets are brought into close proximity, they may bind together to form one-dimensional lattices which exhibit several features characteristic of driven dissipative oscillator systems including periodic oscillations and a striking solitary wave-like instability. Our experimental system provides a highly tunable apparatus to study dynamical systems driven far from equilbrium at the macroscale.

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