Abstract Submitted
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The Stability and Dynamics of Bouncing Droplet Rings[1] MILES COUCHMAN, JOHN BUSH, Massachusetts Institute of Technology — Millimetric droplets bouncing on the surface of a vibrating fluid bath may interact through their shared wavefield to form bound states. In this talk, we present the results of a combined experimental and theoretical investigation of the stability of droplet rings. As the bath's vibrational acceleration is increased progressively, droplet rings are observed to destabilize into a variety of dynamical states including steady rotational motion, radial oscillations, azimuthal oscillations, and azimuthally traveling waves. The instability observed is dependent on the ring's initial radius and drop number, and whether the drop's are bouncing in- or out-of-phase relative to their neighbors. As the vibrational acceleration is further increased, more exotic forms emerge including pentagonal and square structures. A linear stability analysis based on the trajectory equation of Couchman *et al.* (JFM, 2019) rationalizes the observed instabilities and provides insight into the dynamics of droplet lattices and other aggregates. Connections with vortex arrays in superfluid helium and Bose Einstein condensates are discussed.

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