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A model for wave-droplet interaction in a confined environment[1]
TRISTAN GILET, University of Liege, FRANCOIS BLANCHETTE, University of California, Merced — A walker is a droplet bouncing on a liquid surface and propelled by the waves that it generates. This macroscopic wave-particle association exhibits behaviors reminiscent of quantum particles. The horizontal trajectory of a single walker becomes chaotic when it is subject to horizontal confinement. Recent experiments (D. Harris et al., Phys. Rev. E 2013) reveal that the statistics of the walker position is shaped by the eigenmodes of the cavity in which it is confined, similarly to a quantum particle in a box. In this talk, we introduce a model of the coupling between a droplet and a confined surface wave. The resulting iterated map captures many features of the walker dynamics under confinement. These features include the time decomposition of the chaotic trajectory in quantized eigenstates, and the droplet statistics being shaped by the wave. It suggests that deterministic wave-particle coupling expressed in its simplest form can account for some quantum-like behaviors.

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