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Bouncing droplets in quantized orbits MATTHIEU LABOUSSE, Langevin Institute, ESPCI ParisTech, STÉPHANE PERRARD, Laboratoire Matière et Systèmes Complexes, UMR 7057 of CNRS and Paris Diderot University, MARC MISKIN, James Franck Institute, University of Chicago, EMMANUEL FORT, Langevin Institute, ESPCI ParisTech, YVES COUDER, Laboratoire Matière et Systèmes Complexes, UMR 7057 of CNRS and Paris Diderot University, JOHN BUSH, Mathematics Department, MIT — A drop of silicon oil on a vibrating bath can surprisingly bounce without coalescing. Slightly below the Faraday threshold, each impact creates a slowly decreasing stationary wave. Driven by the whole past field, a small increment of momentum is given to the droplet at each rebound that leads to a walking regime. This macroscopic wave particle system exhibits fascinating quantum-like behaviour that is strongly experimentally supported by diffraction interference, double slits, Landau levels, tunnel effect, Zeeman effect, cavities. A new step has been taken in the understanding of this system by applying an external potential to a double-structured ferrofluidic drop. Depending of the magnitude of its past field, i.e. the memory of the system, a shift from classical to statistically-quantized behaviours arises. First, we will report the experimental observations of this dual system in the light of the previous experiments. Then, a brief overview of a theoretical approach will be presented to simply rationalize these quantized behaviours.

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