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Quantum Tunneling and Chaos in Classical Scale Walkers JENNY SU, JOSHUA DIJKSMAN, Duke University, JEREMY WARD, University of North Carolina Chapel Hill, ROBERT BEHRINGER, Duke University — We study the behavior of 'walkers'; small droplets bouncing on a fluid layer vibrated at amplitudes just below the onset of Faraday instability. It was shown recently that despite their macroscopic size, the droplet dynamics are stochastic in nature and reminiscent of the dual particle-wave dynamics in the realm of quantum mechanics (Couder PRL 2006). We use these walkers to study how chaos, which is macroscopically unpredictable, will manifest in a quantum setting. Pecora showed in 2011 that tunneling for particles that have a chaotic ground state is different from tunneling for particles with a regular ground state (PRE 2011). In the experiment we gather data that illustrates the particle trajectory and tunneling behavior as particles transition across the barrier in the double well system with both integrable and chaotic shapes.

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