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SCHRÖDINGER

# COLLOQUIUM

SERIES

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## PROF. JOHN BUSH MIT Cambridge Hydrodynamic quantum analogs: droplets walking on the impossible pilot wave

In 2005, Yves Couder and Emmanuel Fort discovered that droplets walking on a vibrating fluid bath exhibit several features previously thought to be exclusive to the microscopic, quantum realm. These walking droplets propel themselves by virtue of a resonant interaction with their own wave field, and so represent the first macroscopic realization of a pilot-wave system of the form proposed for microscopic quantum

dynamics by Louis de Broglie in the 1920s. New experimental and theoretical results allow us to rationalize the emergence of quantum-like behavior in this hydrodynamic pilot-wave system in a number of settings, and explore its potential and limitations as a quantum analog. A new, trajectory-based description of quantum particles, informed by the hydrodynamic system, is proposed and explored.

