Using Oil Drops as a Model for Quantum Mechanics

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It was previously thought that the bizarre phenomena (e.g. quantum superposition and entanglement) observed at the quantum level were specific to only a scale of about 10-9meters or less(1). But recently, a macroscale analog for quanta has been discovered(5). If a dish filled with oil is vibrated by a speaker at specific frequencies, it is possible to create a tiny droplet which bounces up and down on the oil surface like a trampoline. As it bounces, it creates and interacts with a wave on the oil bath, much like quantum waves postulated by De Broglie(7.) interact with actual quanta. The potential to describe quantum phenomena and build quantum-based technology via these oil droplets was explored in this research. I present an analog to the Bohr model for the hydrogen atom, an analog to quantum degeneracy pressure, and an analog quantum computing device, capable of converting qubits to bits(3.). I do this via experimental and theoretical means, continuing work presented throughout the 2000s, and discuss the underlying mathematics relating to any fluid dynamic system.

Awards Won: