PHYSICAL MATHEMATICS SEMINAR

A Macroscopic Wave-Particle System in a Harmonic Potential Well: A Double Quantization

MATTHIEU LABOUSSE

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(Paris, FRANCE)

ABSTRACT:

A millimetric droplet may bounce indefinitely on a vertically vibrating fluid bath; moreover, above a critical vibrational acceleration, the bouncing state is destabilized and gives way to a walking state in which the drop is propelled forward by its own guiding wave field. This macroscopic wave-particle association exhibits fascinating quantum-like behaviours that are strongly experimentally supported, *e.g.* diffraction, double slits, Landau levels, tunnel effect, Zeeman splitting, cavities…A new step has been taken in the understanding of this system by applying a harmonic potential to a ferrofluidic drop. Depending of the interaction with its past field, a transition from classical to quantized behaviours is observed and is provided by a strongly non-linear dynamics. We here report the experimental and simulation results of this dual system. A double quantization of energy and angular momentum is observed, with selection rules surprisingly similar to the 2D quantum harmonic potential. Finally, a brief overview of the theoretical approach will be presented to simply rationalize these statistical attractors.

TUESDAY, MARCH 12, 2013
2:30 PM
Building 56, Room 180

Reception following in Building 2, Room 290
(Math Dept. Common Room)

http://math.mit.edu/pms

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