



University of Crete
Department of Physics

Physics Colloquium

Thursday, 17 February 2022 | 17:00 – 18:00, Online with ZOOM

Non-Equilibrium Ultracold Quantum Matter: From Josephson Junctions to Universal Scaling laws

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ABSTRACT

Trapped quantum gases provide an excellent playground for studying macroscopic quantum coherence phenomena and scaling laws in a controlled manner. In this Colloquium I will focus on two specific scenarios in which numerical simulations provide fundamental understanding and critical insight into experiments: Firstly, I will discuss the emergent nonlinear dynamics and dissipation channels across an ultracold atomic Josephson junction, delineating the different dynamical regimes, and directly connecting microscopic features with macroscopic dissipative transport. Secondly, I will discuss controlled cooling quenches which lead to spontaneous emergence of local order, and the stochastic generation of defects during the crossing of a phase transition in both three and two dimensions: these will be characterised both within the framework of the well-known Kibble-Zurek paradigm (for finite-duration quenches), and the universality of late-time phase-ordering kinetics. The connection of ultracold atoms to ‘atomtronic’ quantum sensing devices will also be briefly touched upon in concluding remarks.

ZOOM Link: <https://zoom.us/j/92355471983?pwd=cmJTNVVoVjE1L2VXNnNFaIVqeWRBdz09>