



Seminar

Opportunities in bosonic quantum simulators subject to particle non-conserving processes

Prof. Carlos Navarrete-Benlloch

Wilczek Quantum Center, School of Physics and Astronomy, Shanghai Jiao Tong University



Time: 10: 00 am, Nov. 19, 2019 (Tuesday)

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Venue: Room W563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

We explore the physics of the extended Bose-Hubbard model under the action of down-conversion-type Hamiltonians which break particle-number conservation, but keep interesting Z_2 or $U(1)$ symmetries. The bare model presents a variety of phases ranging from superfluid to insulating. We show that the introduction of down-conversion terms potentially adds more phases, e.g., predicting Ising-type spontaneous symmetry breaking or supersolid-like behavior. As a side-product, we provide an example of a single-mode Hamiltonian that presents a continuous quantum phase transition, a result that challenges the common intuition that only infinite-size systems present such behavior. Our model is in the same universality class as the Dicke, Lipkin-Meshkov-Glick, and quantum Rabi models. We explore the possibility of implementing our ideas in modern platforms such as superconducting circuits or optical lattices.

About the speaker

Carlos Navarrete-Benlloch studied Theoretical Physics at the University of Valencia, where he got his PhD in Quantum Optics in 2011, for work developed partially at the Max-Planck Institute for Quantum Optics (Germany), the Massachusetts Institute of Technology (USA), and Swinburne University (Australia). In 2012 he joined Ignacio Cirac's theory division at the Max-Planck Institute for Quantum Optics, until 2016, when he became Group Leader at Florian Marquardt's theory division at the Max-Planck Institute for the Science of Light (Germany). Since April 2019 he is an Associate Professor at the Wilczek Quantum Center of Shanghai Jiao Tong University. His research lies at the interface between quantum optics, phase transitions, and quantum information. For more information, visit www.carlosnb.com.