THE CHINESE UNIVERSITY OF HONG KONG

Department of Physics

COLLOQUIUM

Dynamics And Topology in Quantum and Classical Many-Body Systems with Multipolar Symmetry

by



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Date: October 3, 2025 (Friday)
Time: 4:00 - 5:00 p.m.
Place: L2, Science Centre, CUHK

(Light refreshments will be served at SCNB 1/F lobby from 3:30 to 3:50 p.m.)

ALL INTERESTED ARE WELCOME

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Abstract

Symmetries govern the laws that in turn govern the behavior of physical systems. All known natural laws possess some form of charge symmetry leading to the total charge conservation, which is what makes the motion of an individual particle of a given charge possible. In a synthetic world of artificial matter, on the other hand, a new kind of symmetry and conservation laws can emerge such as the dipole symmetry and dipole conservation, for instance. Under the dipole conservation, single-particle motion is forbidden but a pair of particles of opposite charges forming a dipole can move freely. In this talk, I introduce several physical models that embody the dipole conservation in addition to the charge conservation and discuss their physical properties. Examples are drawn from diffusion of classical particles, strongly interacting bosons, and topological models in one and two dimensions. I conclude with a general remark on recent efforts in the theoretical community to expand the notion of symmetry to those of noninvertible symmetry.

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