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Department of Physics
COLLOQUIUM

Quantum Simulation With Atoms and Lights for Scientific Discovery

by



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ALL INTERESTED ARE WELCOME

Abstract

Over the past few years, we have witnessed an ever-increasing demand for leveraging quantum technologies for scientific discovery. A quantum simulator – specialized quantum apparatus for emulating exotic quantum phenomena – is one of such viable use cases. In this talk, I will discuss how unique quantum simulation with ultracold atoms have been performed directly based on the Hamiltonian engineering. In particular, one of the most interesting directions in quantum simulations with ultracold atoms is the expansion of our capability to investigate topological matter. Using sophisticated atom-light couplings in an atomic system, it is within our experimental reach to realize several iconic lattice models with non-trivial band topology allowing to monitor non-equilibrium topological dynamics and even realize non-Hermitian topological phases with dissipation. Here I will discuss ongoing efforts at HKUST to explore such topological matter made of atoms and lights, and conclude with my view of the broad prospects of synthetic matter made of cold atoms.