THE CHINESE UNIVERSITY OF HONG KONG

**Department of Physics**

*COLLOQUIUM*

# Chiral Orbital Superfluidity in Dynamical Optical Lattices

*by*

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*Date:* *November 5, 2021 (Friday)*
*Time:* *4:00 - 5:00 p.m.*
*Join ZOOM Meeting:* *https://cuhk.zoom.us/j/95862339617*

ALL INTERESTED ARE WELCOME
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## Abstract

Orbital is a fascinating degree of freedom independent of charge and spin. In condensed matter physics, it is traditionally known---through its coupling to the latter two---for playing an important role in superconductivity, magnetism and other quantum phenomena. The advanced spatiotemporal control of cold atoms provides new opportunities to explore orbital physics in physical conditions beyond what natural materials usually offer, complementary to studies in condensed matter. Higher orbital bands, dynamically realized with optical lattices, are found able to not only simulate outstanding well-known problems but also bring conceptually different phenomena that seem to have no prior analogue. In this talk, I will report on theoretical and experimental progress in orbital optical lattices, and highlight unique phases of matter emerging from the interplay of novel spatial lattice geometry and emerging orbital symmetries in such artificial quantum systems. Great examples include chiral atomic Bose-Einstein condensates with topological excitations and center-of-mass p+ip-wave fermionic pairing across odd-even parity orbital bands.

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