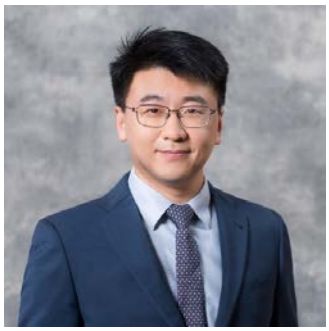
THE CHINESE UNIVERSITY OF HONG KONG

Department of Physics

COLLOQUIUM

‘Unconventional’ Superconductivity in Infinite-Layer Nickelates

by



Professor Danfeng Denver LI (李丹楓教授)
Department of Physics
City University of Hong Kong

Date: November 25, 2022 (Friday)
Time: 4:00 - 5:00 p.m.
Place: L2, Science Centre, CUHK

ALL INTERESTED ARE WELCOME
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Abstract

Developing new techniques to design and discover novel superconductors, especially those with unusual symmetries of superconducting order parameters and/or exotic pairing mechanisms, opens new doors to future applications in quantum devices. The recent discovery of superconductivity in infinite-layer nickelates has engendered reviving interest in the study of a cuprate-analog system [1]. Notably, superconducting nickelates display signatures of intriguing similarities and distinctions to the cuprates in their phase diagrams, proximity to strongly correlated electronic phases [2], antiferromagnetic interactions [3], superconducting anisotropy [4], etc. Partially owing to the non-trivial challenges in materials synthesis and their thin-film nature, experimental demonstration of the intrinsic properties of this materials family has still been limited [5,6]. In this talk, I will introduce this new family of superconductors synthesized by a soft-chemistry approach and highlight the key aspects of their electronic and magnetic structure. I will also present our latest developments in synthetic approaches to the materials system and probing of their distinct features, in a broader context of the unusual role that rare-earth elements and chemical environment play. Finally, I will suggest how new applications of kinetic-based synthetic approaches in oxide heterostructures provide a broad opportunity to create novel quantum systems in previously inaccessible ways.

[1] D. Li *et al.*, *Nature* **572**, 624 (2019).
[2] D. Li *et al.*, *Physical Review Letters* **125**, 27001 (2020).
[3] H. Lu *et al.*, *Science* **373**, 213 (2021).
[4] B. Y. Wang et al., *Nature Physics* **17**, 473 (2021).
[5] K. Lee *et al.*, *APL Materials* **8**, 041107 (2020).
[6] K. Lee *et al.*, *arXiv:*2203.02580 (2022).

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