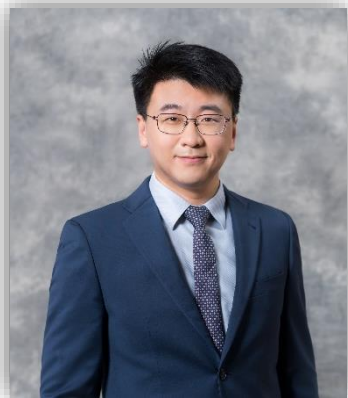


Superconductivity in Thin-film Infinite-layer Nickelates



21 November 2024

Prof. Danfeng LI
City University of Hong Kong
Venue: N23-4018
Time: 15:00 - 16:00
Hosted by: Prof. Haifeng LI

Abstract

The recent discovery of superconductivity in infinite-layer nickelates has engendered reviving interest in the study of a cuprate-analog system. Notably, superconducting nickelates display signatures of intriguing similarities and distinctions to the cuprates in their phase diagrams, proximity to strongly correlated electronic phases, antiferromagnetic interactions, superconducting anisotropy, 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. In this talk, I will introduce this new family of superconductors synthesized by a soft-chemistry approach and highlight the critical aspects of their electronic and magnetic structure. I will also present our latest work on novel 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 nickelate systems in previously inaccessible ways.

Biography

Prof. Danfeng LI is an Associated Professor in the Department of Physics and currently serves as Associate Dean for Research and Postgraduate Education in the College of Science at City University of Hong Kong (CityUHK). Prof. Li has received several prestigious awards and recognitions, including the AAPPS-APCTP Chen-Ning Yang Award in 2023, The Oxide Electronics Prize for Excellence in Research in 2024, the MIT Technology Review 35 Innovators Under 35 (China) in 2021, and the Stanford's List of World's Top 2% Scientists in 2023 and 2024. Prof. Li obtained his B.Eng. from Zhejiang University and M.Phil. from The Hong Kong Polytechnic University (advisor: Prof. Ji-yan Dai). Shortly after earning his Ph.D. (2016) in the Department of Quantum Matter Physics at University of Geneva (advisor: Prof. Jean-Marc Triscone), he joined Stanford University as a Swiss National Science Foundation postdoctoral fellow, working with Prof. Harold Hwang. He joined CityUHK as an Assistant Professor in November 2020.

Prof. Li's main research interests span across condensed-matter physics and materials science, focusing on atomic-scale fabrication of oxide heterostructures and nanomembranes, kinetic based synthesis of unconventional quantum materials, low-dimensional superconductivity, oxide interfaces for emergent states, etc. In 2019, a team led by Prof. Li and Prof. Hwang discovered the first nickelate superconductor, which had been a target of continuous materials search for over three decades. This discovery has opened a new research area, which now marks nickelates as the new family of high-temperature.