



THE CHINESE UNIVERSITY OF HONG KONG
Department of Physics
SEMINAR

Probing and Tuning the Charge-spin Stripes in Cuprate Superconductors

by

Dr. Qisi WANG (王奇思博士)
Department of Physics
University of Zurich, Switzerland

Date: June 21, 2022 (Tuesday)

Time: 3:30 - 4:30 p.m

Join ZOOM Meeting: <https://bit.ly/3Nllsfb>



ALL INTERESTED ARE WELCOME

Abstract

Charge order has now been established as a common thread in all hole-doped cuprate superconductors. How it influences the normal and superconducting state properties is yet an unsettled question. While static charge order is detrimental to the Cooper pairing, its fluctuations could possibly promote superconductivity. In this talk I will focus on our recent results on the La-based cuprate superconductors. This prototypical system displays charge and spin orders that form an intertwined phase, of which the symmetry and microscopic mechanism remain controversial. Utilizing the enhanced sensitivity of resonant inelastic x-ray scattering (RIXS) to charge susceptibility, we show that charge correlations emerge spontaneously^[1] and develop into long-range order as the electron-phonon coupling is enhanced providing a “lock-in” effect^[2]. We further developed uniaxial strain devices that enable tuning of both the charge and spin orders. Our x-ray and neutron scattering measurements under uniaxial strain provide clear evidence of the “stripe” nature of the spin-charge intertwined order^[3,4], and reveal the critical role of quantum stripe fluctuations in defining the ground state properties^[5].

References

- [1] Q. Wang, M. Horio, K. von Arx et al., Phys. Rev. Lett. 124, 187002 (2020).
- [2] Q. Wang, K. von Arx, M. Horio et al., Sic. Adv. 7, eabg7394 (2021).
- [3] J. Choi, Q. Wang, S. Jöhr et al., Phys. Rev. Lett. 128, 207002 (2022).
- [4] G. Simutis, J. Küspert, Q. Wang et al., arXiv:2204.02304.
- [5] Q. Wang, K. von Arx, D. G. Mazzone et al., Nat. Commun. 13, 1795 (2022).