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Phenomena and properties in pressurized high-Tc superconducting oxides

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Phenomena and properties in pressurized high-Tc superconducting oxides

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The exploration of emerging phenomena and physics in high-temperature (T_c) superconducting materials from metal oxides has been a frontier topic in condensed matter physics. Particularly, the development of various experimental techniques has opened new opportunities to unravel key issues in this field. Given the nature of strong electron correlation and diverse degrees of freedom inherent in high- T_c superconducting materials, the application of pressure frequently unveils new insights. In this talk, I will report novel phenomena observed from our high-pressure investigations on high- T_c superconducting oxides. These include the pressure-induced crossover from two-dimensional to three-dimensional superconducting states [1] and quantum phase transitions [2] in bismuth-based cuprate superconductors; the pressure-induced superconducting-insulating phase transition in $Ba_{1-x}K_xBiO_3$ bismuthates [3]; and signatures of a Lifshitz transition in pressurized electron-doped cuprate [4].

- These works were in collaboration with GD Gu, CT Lin, SL Li, Q Wu, XJ Zhou, T Xiang.

References :

- [1] J Guo and L Sun et al, Nature Physics 16. 295 (2020).
- [2] YZ Zhou and L Sun et al, Nature Physics 18, 406 (2022).
- [3] JY Han and L Sun et al, Phys. Rev. B 111, L020509 (2025).
- [4] JY Zhao and L Sun et al, arXiv 2025

Field of Condensed Matter

Superconductivity

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