

## Poster-2-9

**Investigation of charge order fluctuations in  $\text{La}_{1.675}\text{Eu}_{0.2}\text{Sr}_{0.125}\text{CuO}_4$** 

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This study reports direct observation of charge order fluctuations (CF) in the unconventional cuprate superconductor  $\text{La}_{1.675}\text{Eu}_{0.2}\text{Sr}_{0.125}\text{CuO}_4$  (LESCO) through resonant inelastic x-ray scattering (RIXS). Charge order (CO) is closely related to and even competes with superconductivity in cuprates [1], making the excitations stemming from this order, CF, critical for understanding the low-energy physics in this system. Although intensive studies have focused on CO in cuprates [2,3], CF has not been fully investigated due to experimental challenges in isolating the CF signal. "Thanks to the advent of high-resolution RIXS technique [4], we can now resolve the low-energy excitations, including CF and phonons. Indirect studies of CF on several compounds based on phonon anomalies have been carried out in the past few years [5-7], while direct observation of CF is yet to be explored.

This study focusses on lanthanum-based cuprate deep inside the charge order phase. We managed to separate out the CF signal from the low-lying phonons by numerical simulations, which allows for a direct extraction of the information of CF. Our work not only advances the understanding of CF in superconductivity but also introduces a useful numerical technique for isolating CF from low-energy excitations, facilitating future quantum material studies.

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