

# Charge density waves and electron phonon coupling in $(\text{La}_{1.6-x}\text{Nd}_{0.4})\text{Sr}_x\text{CuO}_4$ studied by using RIXS

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## Abstract

The superconductivity in cuprates is created by doping holes or electrons into a Mott Insulator. An anomalous suppression of superconductivity has been observed in  $(\text{La}_{1.6-x}\text{Nd}_{0.4})\text{Sr}_x\text{CuO}_4$  with  $x = 1/8$ . Here we present results of O  $K$ -edge and Cu  $L$ -edge resonant inelastic X-ray scattering (RIXS) to reveal charge density waves (CDW) and electron-phonon coupling (EPC) in  $(\text{La}_{1.6-x}\text{Nd}_{0.4})\text{Sr}_x\text{CuO}_4$ . From elastic scattering, we observed that CDW exist at temperatures below 140 K. With an energy resolution of 18 meV at O  $K$ -edge, we observed three excitations derived from the electron-phonon coupling corresponding to O vibrations associated with La/Sr, apical, and half breathing modes, respectively. Further paramagnon dispersion using Cu  $L$ -edge RIXS, shows negligible T dependence across CDW temperature. The effect of electron phonon-coupling and spin locking on CDW will be discussed.

**Keywords – RIXS, Superconductivity, Cuprates, CDW.**