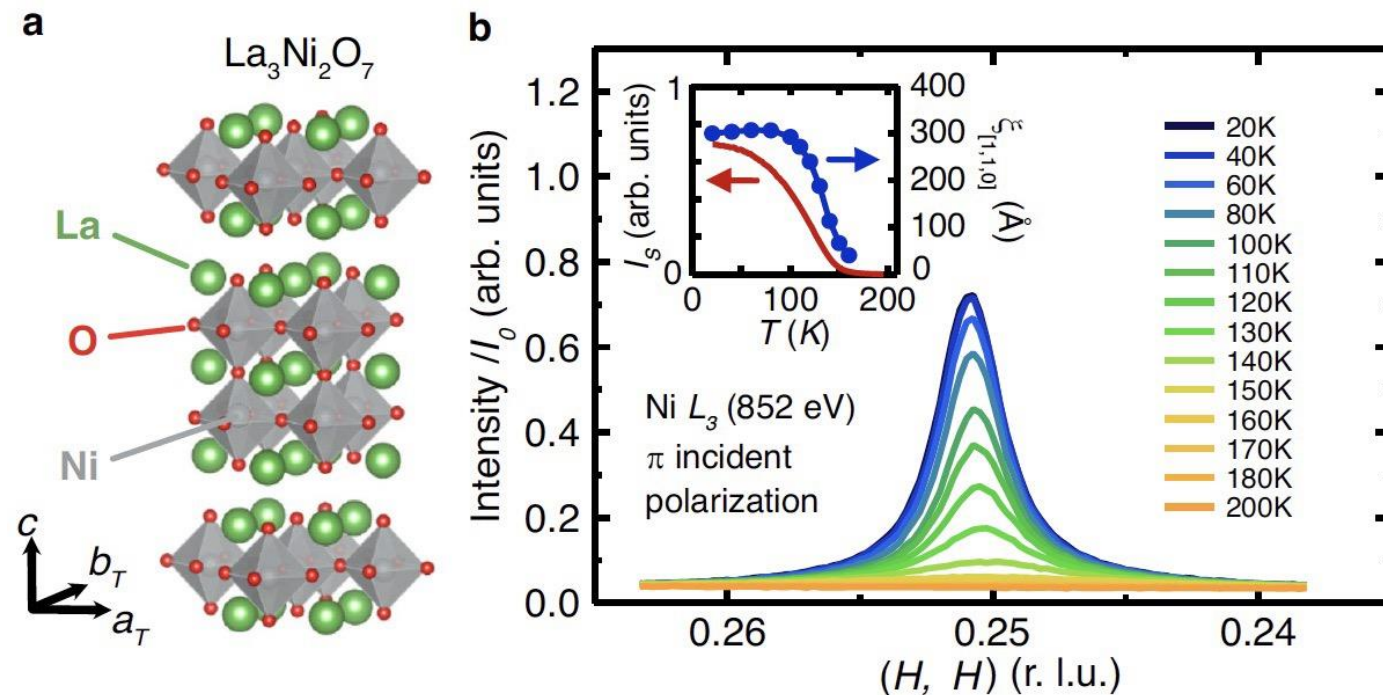


K.M. Shen, A. Singer, D.G. Schlom (Cornell) & D.G. Hawthorn (Waterloo)

Superconductivity is the ability to conduct electricity with zero resistance, but commonly requires ultralow temperatures. The recent finding of superconductivity in $\text{La}_3\text{Ni}_2\text{O}_7$ with a transition temperature above 80 K when under high pressure ignited intense interest in understanding the common ingredients and mechanism that are essential for enabling superconductivity at high temperatures. A spin density wave (SDW) state could be the common denominator of the required pairing interaction.

Here, members of the PARADIM In-House Research Team and collaborators use resonant soft x-ray scattering and polarimetry on thin films of $\text{La}_3\text{Ni}_2\text{O}_7$ (see figure for its crystal structure) to determine the magnetic structure of the SDW. Highly elongated, stripe-shaped domains of charge density were discerned. Analogous features are seen in other high-temperature superconductors, making them the common feature in this rare class of quantum materials.

N.K. Gupta, *et al.* [Nat. Commun. 16, 6560 \(2025\)](#).



Magnetic Resonant Scattering and X-Ray Absorption of $\text{La}_3\text{Ni}_2\text{O}_7$. **a)** The crystal structure of $\text{La}_3\text{Ni}_2\text{O}_7$, with the pseudo tetragonal axes a_T and b_T denoting the in-plane NiO bond directions. **b)** The intensity (scattering + background) for cuts along the $(H, H, 1.86)$ direction through the SDW peak at various temperatures, measured at the Ni L_3 absorption edge with π incident polarization for sample A. Inset: The SDW peak amplitude, (red), and correlation length along the $[1\ 1\ 0]$ direction (blue) as a function of temperature.