

Orbital and dimensionality control of collective electronic instabilities in nickelate superlattices

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Since the discovery of high-temperature superconductivity two decades ago, a large-scale effort has been undertaken to explore and understand the quantum physics of strongly correlated electrons in transition metal oxides. The key tuning parameters of the electron system include the valences state of the transition metals, the occupation of transition metal d-orbitals, and the dimensionality of the electron system. Using the LaNiO_3 - LaAlO_3 system as an example, we will discuss how TMO superlattices offer new perspectives to probe and control these parameters in a systematic way, overcoming many of the limitations of conventional solid-state chemistry.