

UCLA Department of Physics & Astronomy

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Superconductivity in Layered Nickelates

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Unconventional superconductivity in proximity to various strongly correlated electronic phases has been a recurring theme in materials as diverse as heavy fermion compounds, cuprates, pnictides, and twisted bilayer graphene. Here we will introduce a new and growing family of layered nickelate superconductors. The initial discovery of superconductivity in infinite-layer nickelates was motivated by looking for an electronic analog of the cuprates. Notable aspects are a doping-dependent superconducting dome, strong magnetic fluctuations, and a landscape of unusual normal state properties from which superconductivity emerges. The subsequent discovery of superconductivity in bulk $\text{La}_3\text{Ni}_2\text{O}_7$ under high pressure is quite intriguing, in that the d-electron configuration is a priori quite different. Recently, we have used epitaxial strain in $(\text{La},\text{Pr})_3\text{Ni}_2\text{O}_7$ thin films to stabilize superconductivity at ambient pressure, which is promising to extend their experimental study and development.