

Materials Science and Technology Division

"Turning a Nickelate Fermi Surface into a Cupratelike One through Heterostructuring"

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Abstract

Using the local density approximation and its combination with dynamical mean-field theory, we show that electronic correlations induce a single-sheet, cupratelike Fermi surface for hole-doped 1/1 LaNiO₃/LaAlO₃ heterostructures, even though both *eg* orbitals contribute to it. The Ni 3d_{3z²-1} orbital plays the role of the axial Cu 4s-like orbital in the cuprates. These two results indicate that “orbital engineering” by means of heterostructuring should be possible. As we also find strong antiferromagnetic correlations, the low-energy electronic and spin excitations in nickelate heterostructures resemble those of high-temperature cuprate superconductors.

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