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Quantum confinement of correlated e_g^1 electrons in rare earth nickelate heterostructures JIAN LIU[1], Department of Physics, University of Arkansas, M. VAN VEENENDAAL, Argonne National Lab, S. OKAMOTO, Oak Ridge National Lab, M. KAREEV, B. GRAY, Department of Physics, University of Arkansas, P. RYAN, J.W. FREELAND, Argonne National Lab, J. CHAKHALIAN, Department of Physics, University of Arkansas — Complex oxide heterostrutures have emerged as a new playground for controlling the mutually coupled charge, spin, orbital and lattice degrees of freedom, and a promising route to stabilize unusual phases not existing in the bulk. In particular, quantum well structures have recently attracted attention due to the potential in creating novel two-dimensional systems with confined correlated electrons. To this end, we have studied the e_g^1 system based on the $3d^7$ low-spin state in perovskite rare earth nickelates which are artificially confined by wide-gap dielectrics $LaAlO_3$. The combination of transport measurements and dynamical-mean-field calculations indicate that, a Mott-type metal-insulator transition can be induced by confinement via dimensionality-control. X-ray absorption spectroscopy reveals that the electronic modification in proximity to the confining interfaces is caused by modulated covalency, which is in good agreement with cluster calculations. J.C. was supported by DOD-ARO under the Contract No. 0402-17291 and NSF Contract No. DMR-0747808.

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