Abstract Submitted
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Asymmetric Orbital-Lattice Interactions in Ultrathin Correlated Oxide Films[1] JAK CHAKHALIAN, Physics Department, University of Arkansas — Epitaxial control of strongly correlated electrons offers opportunities to push beyond the bulk phase diagram and access new ground states. Using resonant x-ray spectroscopies combined with density functional calculations, we report the discovery of an asymmetric biaxial strain-induced 3d-orbital response in ultrathin films of the correlated metal LaNiO3 that are not accessible in the bulk [J. Chakhalian et al., PRL, 107, 116805 (2011)]. Compressive strain results in an orbital polarization due to structural induced changes in the crystal field, but tensile strain shows no orbital response. This is accompanied by a strong change in the oxygen hole states due a systematic change of the charge transfer energy as a function of strain. We suggest that knowledge of this asymmetric orbital-lattice interaction is fundamental to the rational design of quantum materials with exotic correlated phases and enhanced critical temperatures.

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