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Probing momentum-resolved electronic structure of buried artificial graphenelike Mott crystal NdNiO3 [111] with soft x-ray angle-resolved photoemission ARIAN ARAB, WEIBING YANG, RAVINI CHANDRASENA, Department of Physics, Temple University, Phialdelphia, PA, USA, SRIMANTA MIDDEY, Department of Physics, University of Arkansas, Fayetteville, AR, USA, VLADIMIR STROKOV, Swiss Light Source, Paul Scherrer Institute, Villigen, Switzerland, KRISTJAN HAULE, JAK CHAKHALIAN, Department of Physics and Astronomy, Rutgers University, Piscataway, NJ, USA, ALEXANDER GRAY, Department of Physics, Temple University, Phialdelphia, PA, USA — Transition metal oxides (TMO) exhibit a wide variety of potentially advantageous strongly-correlated electronic phenomena such as metal-insulator transitions, high-Tc superconductivity, half-metallicity, etc. Until now, however, most of the work has been focused on synthesizing and investigating systems that are grown along the [001] pseudocubic direction. Here we utilize soft x-ray angle-resolved photoemission spectroscopy to investigate the momentum-resolved valence-band electronic structure of artificial graphenelike Mott crystal NdNiO3 grown along the [111] direction. Our measurements reveal broken six-fold symmetry of the Ni 3d eg states hosted on a buckled honeycomb lattice. This engineered electronic structure is unique to the ultrathin (2 u.c.) quazi-2D crystal, and cannot be realized either in the bulk or in the thin-film Nickelate grown along the conventional [001] direction. Our findings open the door for engineering novel polarized Mott-electronic ground states in rare-earth Nickelates, as well as other strongly-correlated transition-metal oxides.

Arian Arab
Department of Physics, Temple University, Phialdelphia, Pennsylvania, USA

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