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**Geometry and heterointerface engineered phases of nickelates**[1]

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Deterministic control over the spatial arrangement atoms in a crystal is the backbone of its properties that, along with the interactions, defines its ground state. Following this notion, several theoretical proposals exist to utilize a few unit cells of a correlated oxide heterostructured along the pseudo-cubic (111) direction. This geometrically engineered motif relies on the presence of correlated carriers placed on a buckled honeycomb (i.e., graphene-like) lattice, or dice lattices for bilayers and trilayers of $ABO_3$ perovskites. The guiding principle is to use strong electronic correlations combined with quantum confinement and symmetry-breaking interfaces to enable access to new electronic band structures that may activate novel or latent quantum phases. In this talk, the current status of research in this field will be reviewed. The experimental challenges in realization and characterization of such heterostructures will be exemplified by rare earth nickelates heterostructures. Several promising examples of such geometrically engineered artificial Mott materials will be discussed.

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