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Dimensionality-strain phase diagram of strontium iridates superlattices BONGJAE KIM, PEITAO LIU, CESARE FRANCHINI, University of Vienna — Using *ab initio* approach, we study the electronic and magnetic behavior of strontium iridates as a function of dimensionality and epitaxial strain by employing a $(SrIrO_3)_m/(SrTiO_3)$ superlattice structure. We quantitatively evaluate the dimensional and strain-dependent change of the interaction parameters U and J using the constraint random phase approximation and construct a comprehensive phase diagram describing the evolution of the electronic and magnetic ground state upon strain and dimensionality. We find that compressive strain and increasing the dimensionality perturb the insulating relativistic Mott $J_{eff} = 1/2$ state, a characteristic of the $m = 1$ system, and induce two distinct types of insulator-to-metal transition (IMT) that can be explained from the entanglement of U and the bandwidth of the Ir-t_{2g} manifold. The IMTs are associated with distinctive changes of the spin ordering manifested by spin-flop transitions, correlated with the modulation of the interlayer exchange interaction, and with a complete quenching of any spin-ordered state in the $m \to \infty$ limit. The fundamental origin of these electronic and magnetic transitions will be discussed and compared with the corresponding situation in the Ruddlesden-Popper series.

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