Topological insulating phases in oxide multilayers using perovskites and rutiles\textsuperscript{1} VICTOR PARDO, University Santiago de Compostela, JOSE L. LADO, Iberian Nanotechnology Laboratory, DANIEL BALDOMIR, University Santiago de Compostela — Ab initio calculations combined with tight-binding modelling have been performed\textsuperscript{2} in 5d-electron-based perovskite multilayers in the large spin-orbit coupling limit. The topological properties of the systems (SrTiO\textsubscript{3})\textsubscript{7}/(SrIrO\textsubscript{3})\textsubscript{2} and isoelectronic (K\textsubscript{2}TaO\textsubscript{3})\textsubscript{7}/(K\textsubscript{2}PtO\textsubscript{3})\textsubscript{2} grown along the (111) direction have been analyzed as a function of on-site Coulomb repulsion $U$, parity asymmetry and uniaxial strain. The former is found to be a topological semimetal and the latter is a topological insulator describable as the high-$U$ limit of the other one. This high-$U$ phase can be driven to a trivial insulating phase by a perpendicular external electric field. In the talk, we will describe how to proceed in a similar way with rutile-based multilayered structures, where a 4d/5d electron dioxide with rutile structure, sandwiched by a band insulator like TiO\textsubscript{2} or SnO\textsubscript{2} can lead to topologically non-trivial properties if band filling and strain are tuned. We discuss also the possibility of obtaining similar topological states using isoelectronic fluorides. The electronic structure and properties of free-standing thin films will be also briefly discussed.

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