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Abstract for an Invited Paper
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Designing topologicality using oxides[1]

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In this talk we will describe a series of ab intio calculations carried out on different oxide-based systems and their nanostructures that show emerging non-trivial topological properties or nodal Fermi surfaces. We will show that various well-known oxide structures with the appropriate filling host Dirac points at the Fermi level that could eventually respond to spin-orbit coupling. In particular, we will focus on the results obtained in rutile multilayers[1], perovskite bilayers[2] grown along the polar (111) direction and corundum-based multilayers[3]. Topologically non-trivial phases occur in various limits of spin-orbit coupling strength and on-site Coulomb repulsion, using different fillings of the d-shell for various 3d and 5d elements in the active layers. The different systems will be discussed and compared to try to understand the key ingredients that lead to non-trivial topological properties in oxides and how these can be enhanced or tuned.

[1] V. Pardo, W.E. Pickett, Phys. Rev. Lett. 102, 166803 (2010).
[2] J.L. Lado, V. Pardo, D. Baldomir, Phys. Rev. B 88, 155119 (2013).
[3] J.F. Afonso, V. Pardo, arxiv/1507.08813 (2015).

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