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Engineering Rashba interactions at perovskite interfaces GURU KHALSA, NIST, BYOUNGHAK LEE, Texas State University, NICOLE BENEDEK, The University of Texas at Austin, MARK STILES, NIST, ALLAN MACDONALD, The University of Texas at Austin — The broken inversion symmetry at surfaces and interfaces allows new spin-orbit interactions (Rashba interactions). Rashba interactions originate from changes in electronic structure due to displacements of the electron density and changes to metal-oxygen-metal bond angles [1]. While bond angle changes are not expected to be important in conventional semiconductor heterostructures, they may dominate in perovskites – this difference is due to the increased ionic nature of the perovskite crystal. The possibility to control metal-oxygen-metal bond angles at perovskite interfaces or, in a more tunable way, with an electric field or other external perturbation provides a new strategy for engineering perovskite heterostructures with large Rashba interactions. In this talk, we describe our calculations designed to guide the tailoring of Rashba interactions in perovskite heterostructures. We focus on (001) perovskite interfaces/surfaces, and discuss the role of structural distortions and manipulation of octahedral coordination. These calculations highlight the challenges in creating a large tunable Rashba interaction.

[1] Guru Khalsa, Byounghak Lee, and Allan H. MacDonald, Phys. Rev. B 88, 041302(R) (2013).

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