Abstract Submitted for the MAR17 Meeting of The American Physical Society

Thin of Film Topological Insulator-Semiconductor Heterostructures¹ MAHMOUD M. ASMAR, DANIEL E. SHEEHY, ILYA VEKHTER, Department of Physics and Astronomy, Louisiana State University — We consider a thin film topological insulator deposited on a substrate or sandwiched between two semiconductors. Motivated by recent work [1] showing that the properties of the interface states in a bulk topological insulator-semiconductor heterostructures depend on the residual symmetries of the interface potential, we analyze the spectral and transport properties of the thin film structures. We show that the reduced symmetry of the interface is reflected in the nature of the hybridization of the topological states at the opposite sides of the film. Consequently, the energy spectrum as well as the spin and charge properties of the hybridized states critically depend on the specific choice of the materials and the surface preparation. Our results have important implications for the systems utilizing hybrids of topological insulating thin films and semiconductors [2-3]. [1] M. M. Asmar, D. E. Sheehy and I. Vekhter. Unpublished. [2] A. A. Burkov and L. Balents. Phys. Rev. Lett 107, 127205 (2011). [3] G.Y. Cho and J. E. Moore. Phys Rev B 84, 165101 (2011). [4] A. A. Zyuzin, M. D. Hook, and A. A. Burkov. Phys. Rev. B 83, 245428 (2011).

¹This research was supported by NSF via grants DMR-1410741 and DMR-1151717.

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Date submitted: 10 Nov 2016

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