

Abstract Submitted
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Pi-flux as a universal probe of two-dimensional topological insulators¹ VLADIMIR JURICIC, Instituut-Lorentz for Theoretical Physics, Leiden University, The Netherlands, ANDREJ MESAROS, Department of Physics, Boston College, Chestnut Hill, MA 02467, USA, ROBERT-JAN SLAGER, JAN ZAAANEN, Instituut-Lorentz for Theoretical Physics, Leiden University, The Netherlands — We show that the existence of a Kramers pair of zero-energy modes bound to a vortex carrying π -flux is a generic feature of topologically nontrivial phases in the $M - B$ model, describing HgTe quantum wells, and therefore this vortex represents the bulk probe of the band topology [1]. We explicitly find the form of the zero-energy states by analytically solving Dirac equation which contains a momentum-dependent Schrödinger mass, besides the usual Dirac mass term. A particular regularization of the vortex potential yields the modes exponentially localized and regular at the origin that carry nontrivial charge or spin quantum number.

[1] V. Juricic, A. Mesaros, R.-J. Slager, and J. Zaanen, arXiv:1108.3337.

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