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Non-topological nature of the edge current in a chiral p-wave superconductor[1] EDWARD TAYLOR, University of Toronto, WEN HUANG, McMaster University, SAMUEL LEDERER, Stanford University, CATHERINE KALLIN, McMaster University — The edges of time reversal symmetry breaking topological superconductors support chiral Majorana bound states as well as spontaneous charge currents. The Majorana modes are a robust, topological property, but the charge currents are non-topological–and therefore sensitive to microscopic details–even if we neglect Meissner screening. We give insight into the non-topological nature of edge currents in chiral p-wave superconductors using a variety of theoretical techniques, including lattice Bogoliubov-de Gennes equations, the quasiclassical approximation, and the gradient expansion, and describe those special cases where edge currents do have a topological character. While edge currents are not quantized, they are generically large, but can be substantially reduced for a sufficiently anisotropic gap function, a scenario of possible relevance for the putative chiral p-wave superconductor Sr_2RuO_4.

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