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Robustness of Majorana modes in multiband topological superconductors SHUSA DENG, Dartmouth College, GERARDO ORTIZ, University of Indiana, Bloomington, LORENZA VIOLA, Dartmouth College — We investigate the robustness of Majorana modes in a multiband topological superconductor model belonging to symmetry class DIII, against various perturbations. In the three dimensional case, we find that in topological phases where an even number of Kramer pairs of Majorana modes exist on each boundary, these modes may become gapped under a boundary perturbation, despite time-reversal invariance being preserved. Conversely, in two dimensions, the gapless Majorana modes may remain gapless in the presence of certain time-reversal breaking fields or impurities. However, upon changing the strength of an applied longitudinal Zeeman field, a transformation from helical Majorana modes to chiral Majorana modes may be induced, accompanied by a quantum phase transition in the bulk.

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