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Disorder-induced topological transitions in multichannel Majorana wires[1] INANC ADAGIDELI, BARIS PEKERTEN, AYKUT TEKER, Sabanci University, MICHAEL WIMMER, Delft University of Technology, OZGUR BOZAT, Sabanci University — In this work, we investigate the effect of disorder on the topological properties of multichannel superconductor nanowires. While the standard expectation is that the spectral gap is closed and opened at transitions changing the topological property of the ground state, we show that the closing and opening of a *transport* gap can also cause topological transitions, even in the presence of (localized) states at both sides of the transition. Such transport gaps, induced by disorder, can thus change the topological index, driving a topologically trivial wire into a nontrivial state. We focus on nanowires exhibiting p-wave superconductivity as well as Rashba semiconductor nanowires in proximity to a conventional superconductor, and obtain analytical formulas for topological transitions in these wires, valid for generic realizations of disorder, generalizing earlier results. Full tight-binding simulations show excellent agreement with our analytical results without any fitting parameters.

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