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Backscattering Between Helical Edge States via Dynamic Nuclear Polarization ADRIAN DEL MAESTRO, University of Vermont, TIMO HYART, BERND ROSENOW, Institute for Theoretical Physics, University of Leipzig — We describe how the non-equilibrium spin polarization of one dimensional helical edge states at the boundary of a two dimensional topological insulator can dynamically induce a polarization of nuclei via the hyperfine interaction. When combined with a spatially inhomogeneous Rashba coupling, the resulting steady state polarization of the nuclei produces backscattering between the topologically protected edge states leading to a reduction in the conductance which persists to zero temperature. We study these effects in both short and long edges, uncovering deviations from Ohmic transport at finite temperature and a current noise spectrum which may hold the fingerprints for experimental verification of the backscattering mechanism.

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