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Binary memory switching in zigzag-edge graphene nanostrips[1]
DANIEL GUNLYCKE, Naval Research Laboratory, DENIS A. ARESHKIN, George Washington University, JOHN W. MINTMIRE, JUNWEN LI, Oklahoma State University, CARTER T. WHITE, Naval Research Laboratory — Owing to a peculiar boundary condition, the ground state of any hydrogen-terminated zigzag-edge graphene nanostrip is predicted to exhibit spin-polarized edge states. We capture this physics in a model which has a Hamiltonian that consists of tight-binding terms and terms describing the potential from a spin-dependent scalar field. The model is solved in the presence of a ballistic current passing through the nanostrip. Studying the grand canonical potential for the system, it is shown that the spin-polarized state collapses above a certain bias. Below that threshold there is a bi-stable regime which could be exploited in a possible memory device. The memory could be both set and cleared through the bias and be read by measuring the current through the device.

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