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Tunable All Electric Spin Polarizer Using A Quantum Point Contact With Two Pairs of In-Plane Side Gates[1] NIKHIL BHANDARI, JAMES CHARLES, MAITREYA DUTTA, School of Electronics and Computing Systems, University of Cincinnati, Cincinnati, Ohio, PARTHA DAS, Physics of Nanodevices, Zernike Institute for Advanced Materials, University of Groningen, Groningen, The Netherlands,, MARC CAHAY, School of Electronics and Computing Systems, University of Cincinnati, Cincinnati, Ohio, RICHARD NEWROCK, Physics Department, University of Cincinnati, Cincinnati, Ohio, STEVEN HERBERT, Department of Physics, Xavier University, Cincinnati, Ohio — We report the first experimental investigation of a device consisting of a quantum point contact (QPC) with four gates – two in-plane side gates in series. The first set of gates (nearest the source contact) is asymmetrically biased to create spin polarization in the channel of the QPC. A symmetric bias is then applied on the second set of side gates (nearest the drain) and varied to tune the location of a conductance anomaly near 0.5 (x$2e^2$/h). The experimental results compare well with simulations of the four-gate QPC devices using a Non-Equilibrium Green's Function formalism. The device is shown to be a tunable all-electric spin polarizer. The range of common-mode bias on the first set of gates over which maximum spin polarization can be achieved is much broader for the four-gate structure compared with the case of a QPC with a single pair of in-plane side gates.

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