

Abstract Submitted  
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**NEGF Study of the Spontaneous Spin Polarization in a Quantum Point Contact**<sup>1</sup> JUNJUN WAN, MARC CAHAY, RICHARD NEWROCK, PHILIPPE DEBRAY, University of Cincinnati — A non-equilibrium Green function formalism (NEGF) is used to study the conductance of a side-gated quantum point contact (QPC) in the presence of lateral spin-orbit coupling (LSOC) induced by the electric field due to the gradient of the lateral confining potential. A small asymmetry in the confining potential induced by difference of potential between the two side-gates (SGs) leads to an inversion asymmetry in the LSOC which triggers a spontaneous spin polarization in the QPC. In the regime of single-mode transport, the spontaneous spin polarization can reach nearly 100 % when a strong electron-electron (e-e) interaction is taken into account. This leads to the occurrence of a plateau at  $G \approx 0.5(e^2/h)$  in the ballistic conductance without the need of any externally applied magnetic field. Two ingredients are essential for the occurrence of the 0.5 plateau: an asymmetric LSOC and a strong e-e interaction.

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