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Spin polarization in quantum point contact structures ANH NGO, SERGIO ULLOA, Department of Physics and Astronomy, Ohio University — One of the important goals in the field of spintronics is to produce spin-polarized currents in semiconductors [1]. The Rashba spin-orbit interaction is useful in this regard, because its strength is controllable by applying an electric field. In this work we study ballistic transport through semiconductor quantum point contact systems under different confinement geometries and applied fields. In particular, we investigate how the lateral spin-orbit coupling, as induced by the lateral confinement potential, plays a non-trivial role on the spin polarization of the current, even in the absence of magnetic field. We find that high spin polarization can be obtained by controlling the asymmetric shape of the confinement potential, and contrast our results with previous work in the literature [2]. This behavior suggests a novel scheme to implement spin-filters without external magnetic fields, and we present its dependence on structural parameters.
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[2] M. Eto, et al., Spin polarization at semiconductor point contacts in absence of magnetic field, J. Phys. Soc. Jpn. 74, 1934 (2005).

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