

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Anomalous spin-resolved point-contact transmission of holes due to cubic Rashba spin-orbit coupling STEFANO CHESI, University of Basel, GABRIELE GIULIANI, LEONID ROKHINSON, Purdue University, LOREN PFERIFFER, KEN WEST, Princeton University — We present experimental and theoretical evidence for the crossing at finite wave vector of the two lowest one-dimensional spin-split subbands in quantum point contacts fabricated from two-dimensional hole gases with strong spin-orbit interaction. We derive the existence of such crossing point from a two-dimensional spin-orbit interaction with a cubic momentum dependence, appropriate for asymmetric quantum wells. This phenomenon provides an explanation for the anomalous sign of the spin polarization filtered by the point contact, as observed in magnetic focusing experiments. Anticrossing in the one-dimensional spin subbands is introduced by a magnetic field parallel to the channel or an asymmetric potential transverse to it. Controlling the magnitude of the spin-splitting affords a novel mechanism for inverting the sign of the spin polarization.

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Date submitted: 19 Nov 2010

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