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The Occurrence of Anomalous Conductance Plateaus and Spin Textures in Quantum Point Contacts[1] J. WAN, M. CAHAY, Department of ECE, University of Cincinnati, P. DEBRAY, R. NEWROCK, Department of Physics, University of Cincinnati — Recently, we used a NEGF formalism [1] to provide a theoretical explanation for the experimentally observed $0.5G_0$ ($G_0=2e^2/h$) plateau in the conductance of side-gated quantum point contacts (QPCs) in the presence of lateral spin-orbit coupling (LSOC) [2]. We showed that the $0.5G_0$ plateau appears in the QPCs without any external magnetic field as a result of three ingredients: an asymmetric lateral confinement, a LSOC, and a strong electron-electron (e-e) interaction. In this report, we present the results of simulations for a wide range of QPC dimensions and biasing parameters showing that the same physics predicts the appearance of other anomalous plateaus at non-integer values of G_0, including the well-known $0.7G_0$ anomaly. These features are related to a plethora of spin textures in the QPC that depend sensitively on material, device, biasing parameters, temperature, and the strength of the e-e interaction. [1] J. Wan, M. Cahay, P. Debray, and R.S. Newrock, Phys. Rev. B 80, 155440 (2009). [2] P. Debray, S.M. Rahman, J. Wan, R.S. Newrock, M. Cahay, A.T. Ngo, S.E. Ulloa, S.T. Herbert, M. Muhammad, and M. Johnson, Nature Nanotech. 4, 759 (2009).

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J. Wan
Department of ECE, University of Cincinnati

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