Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Universality of low-energy Rashba scattering JOEL HUTCHINSON, JOSEPH MACIEJKO, University of Alberta — In two-dimensional (2D) crystals with broken inversion symmetry, the spin degeneracy of the electronic band structure may be lifted by Rashba spin-orbit coupling. The resulting spin-split dispersion is responsible for the spin Hall effect and can also be observed in ultra-cold atoms. This spin-split dispersion is described in terms of two distinct helicity bands, but below a threshold energy, electrons are confined to one of these. At the bottom of this lower band, the density of states is enhanced to form a van Hove singularity. This is the relevant regime for a dilute spin-orbit coupled 2D electron gas, which has been shown to host a variety of exotic phases in the presence of electron-electron interactions. In this limit, electron scattering from a hard disk potential has been shown to exhibit an unusual one-dimensional characteristic in its S matrix and scattering cross-section. In this talk we show that this behaviour is universal for Rashba scattering off of any circular, finite range potential. This is relevant both for impurity scattering in the noninteracting limit as well as for short-range two-particle scattering in the interacting problem. A generic solution of the T matrix is computed, which enforces the one-dimensional character of the scattering physics.

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Date submitted: 31 Oct 2016 Electronic form version 1.4