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Rashba scattering in the dilute limit JOEL HUTCHINSON, JOSEPH MACIEJKO, University of Alberta — In two-dimensional (2D) noncentrosymmetric crystals, 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 has desirable applications to spintronics. 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 exhibits 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 talk we investigate scattering of Rashba electrons off a circular potential barrier in this dilute limit, which is relevant both for impurity scattering in the noninteracting limit as well as for short-range two-particle scattering in the interacting problem. The S matrix and scattering cross section are determined, and it is found that scattering becomes effectively one-dimensional at the band bottom.

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