

Abstract Submitted  
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**Long range anisotropic RKKY interaction in a disordered two-dimensional electron gas with Rashba and Dresselhaus spin-orbit coupling**<sup>1</sup> STEFANO CHESI, DANIEL LOSS, University of Basel — We study the RKKY exchange interaction between localized magnetic moments in a disordered two-dimensional electron gas with Rashba and Dresselhaus spin-orbit coupling. The disorder-averaged magnetic interaction, due to its oscillatory character, is exponentially suppressed at a distance larger than the mean free path. However, the interaction is still long-ranged and decays in magnitude with the same power-law of the clean case, as revealed by a calculation of its variance. While an isotropic form of the Heisenberg type is valid at distance smaller than the spin-orbit length, the interaction becomes strongly anisotropic at larger distance. We study in detail the crossover to the asymptotic regime, realized when the impurities are a few spin-orbit lengths apart and the variance of the exchange energy is independent of the orientations of the two localized moments. Our results apply to nuclear moments embedded in III-V two-dimensional heterostructures or magnetic impurities deposited on metals or metal alloys, where the surface states display a sizable Rashba spin-orbit coupling.

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