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Anisotropic conductivity caused by spin-orbit interactions DAVID H. BERMAN, MICHAEL E. FLATTÉ, University of Iowa — Free propagation in a two-dimensional electron gas with both Rashba and Dresselhaus spin-orbit coupling shows strong anisotropy depending on the ratio of the coupling strength to the Fermi energy and on the ratio of the strengths of the Rashba and Dresselhaus interactions [1]. This spin-orbit induced anisotropy appears also in the local density of states near impurities. In addition the non-local conductivity, $\sigma_{i,j}(\mathbf{r}, \mathbf{r}')$, computed in the absence of impurities is anisotropic. This is in contrast to the macroscopic conductivity in the presence of impurities which shows no anisotropy when only ladder diagrams are considered [2]. In all these instances, the degree of anisotropy can be controlled by application of electric fields perpendicular to the 2DEG.

[1] D. H. Berman and M. E. Flatté, PRL **105**, 157202 (2010).
[2] O. Chalaev and D.Loss, Phys. Rev. B **71**, 245318 (2005).

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