

Publication

Anisotropic transport in a two-dimensional electron gas in the presence of spin-orbit coupling

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 119928

Author(s) Schliemann, J; Loss, D

Author(s) at UniBasel [Loss, Daniel](#) ;

Year 2003

Title Anisotropic transport in a two-dimensional electron gas in the presence of spin-orbit coupling

Journal Physical Review B

Volume 68

Number 16

Pages / Article-Number 165311

In a two-dimensional electron gas as realized by a semiconductor quantum well, the presence of spin-orbit coupling of both the Rashba and Dresselhaus type leads to anisotropic dispersion relations and Fermi contours. We study the effect of this anisotropy on the electrical conductivity in the presence of fixed impurity scatterers. The conductivity also shows in general an anisotropy which can be tuned by varying the Rashba coefficient. This effect provides a method of detecting and investigating spin-orbit coupling by measuring spin-unpolarized electrical currents in the diffusive regime. Our approach is based on an exact solution of the two-dimensional Boltzmann equation and provides also a natural framework for investigating other transport effects including the anomalous Hall effect.

Publisher American Institute of Physics

ISSN/ISBN 0163-1829

edoc-URL <http://edoc.unibas.ch/dok/A5254690>

Full Text on edoc No;

Digital Object Identifier DOI 10.1103/PhysRevB.68.165311

ISI-Number WOS:000186571800042

Document type (ISI) Article