

HL 51 Invited Talk Eroms

Time: Friday 10:15–11:00

Room: HSZ 01

Invited Talk

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Andreev reflection in Nb-InAs structures: Phase-coherence, ballistic transport and edge channels — •JONATHAN EROMS^{1,2} and DIETER WEISS¹ — ¹Institut für Experimentelle und Angewandte Physik, Universität Regensburg, Germany — ²Kavli Institute of Nanoscience, TU Delft, The Netherlands

In this talk we present our experimental work on transport in superconductor-semiconductor structures. Using high-quality contacts, Andreev reflection dominates the transport properties in a range of experimental parameters, including high magnetic fields.

We investigated periodic arrays of Nb filled stripes or antidots in an InAs-based 2DEG. Depending on the geometry and magnetic field, Andreev reflection modifies transport in different ways. At magnetic fields up to a few flux quanta per unit cell, we observe phase-coherent behavior, such as flux-periodic oscillations. At slightly higher fields, the Andreev reflection probability is determined by induced superconductivity in the 2DEG, which is gradually suppressed by an increasing magnetic field. The impact of Andreev reflection on the ballistic motion in antidot lattices is particularly intriguing: the commensurability peaks commonly found in the magnetotransport in those lattices are strongly suppressed. At fields of several Tesla we enter the regime of the quantum Hall effect in the 2DEG, and we find a pronounced increase of the amplitude of $1/B$ -periodic magnetoresistance oscillations. The latter can be traced to an enhanced backscattering of Andreev-reflected edge channels, which contain both electrons and holes .