Master thesis

Line junctions in two-dimensional electron gas systems

We invite applications from motivated students in physics or nanoscale science to join a project focused on realizing and characterizing line junctions in an AlGaAs/GaAs two-dimensional electron gas (2DEG).

A line junction is a narrow potential barrier that separates two electron reservoirs while still allowing controlled tunnelling between them. Line junctions are analogues of conventional tunnel junctions but formed directly in a 2DEG. In principle, they can be a fundamental element in quantum transport experiments and provide a platform for developing new quantum-device concepts.

In this exciting and fundamental project, you will explore the possibility of forming line junctions in a 2DEG. Your role will involve fabricating the nano devices and performing cryogenic measurements to achieve this goal.

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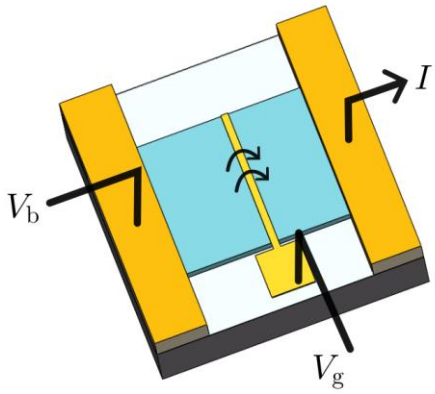

Figure 1: Electrons tunnelling through the potential barrier formed by the line junction which separates the two sides of the 2DEG.

References:

Aditi Mitra and S. M. Girvin, Phys. Rev. B **64**, 041309 (2001).

Eun-Ah Kim and Eduardo Fradkin Phys. Rev. B **67**, 045317 (2003).