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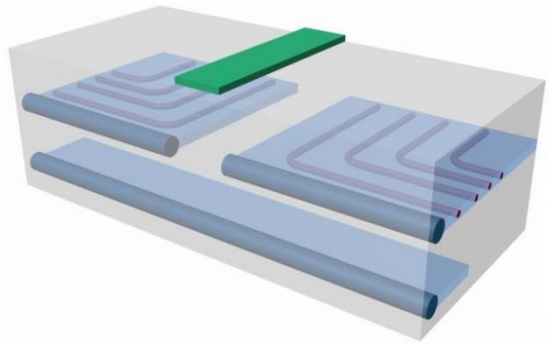
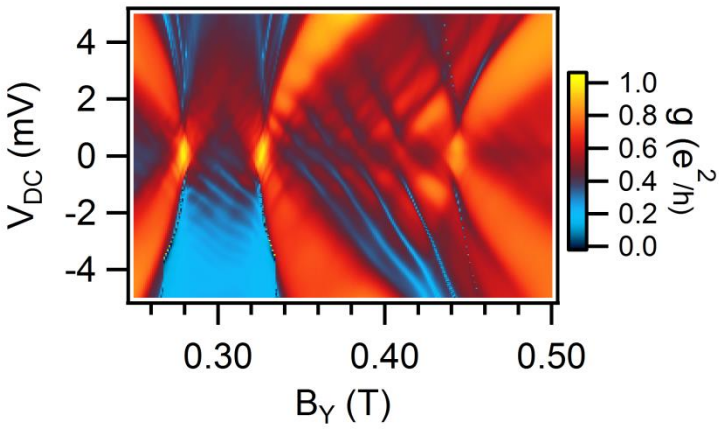
Master Project: "Edge mode velocities from tunneling spectroscopy"

Energy and momentum conserving tunneling spectroscopy is a very powerful tool for studying strongly interacting systems. This technique was used to show spin-charge separation, charge fractionalization and to study Luttinger-liquids in 1D nanowires. Recently, we have developed a techique in our group to study the integer quantum Hall edge states. Up to now the velocities of these edge states were determined from time-resolved measurements, high-frequency ac transport or interferometry experiments. The goal of this project is to utilize the new spectroscopy technique to obtain the velocities of the edge states. In contrast to previous works, this new method allows us for the first time to determine the velocity of edge modes simultaneously along with the whole lifecycle of the edge states from formation to depopulation at large magnetic fields. This work will also include a comparison to theoretical predictions.





Left: schematic of the device structure. Dark blue represents the 1D wires, quantum Hall edge states are depicted in purple. Local top gate (green) controls the electron density and can be used to tune the system into the tunneling configuration regime. Right: Tunneling conductance as a function of magnetic field (horizontal axis) and bias voltage (vertical axis).

To apply, please send an email to Dominik Zumbühl (dominik.zumbuhl@unibas.ch) or Taras Patlatiuk (taras.patlatiuk@unibas.ch).

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