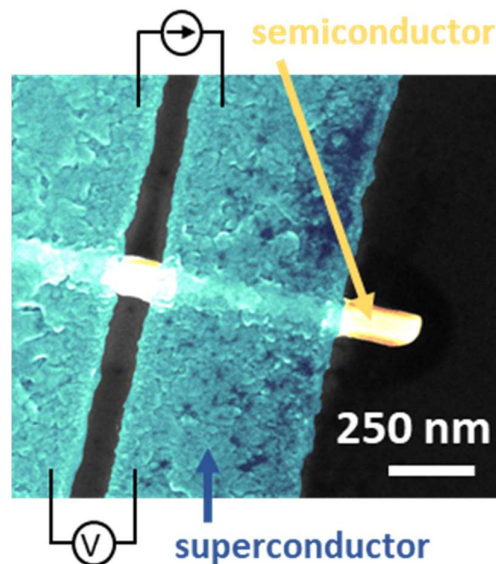


Electrical transport in semiconductor nanowires contacted by superconducting electrodes

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Hybrid semiconductor – superconductor devices have attracted considerable attention due to promising prospects in the fields of quantum computing and quantum transducers. This project will focus on the characterization of the electrical properties of semiconductor – superconductor devices and is part of ongoing research within the Quantum Nano Photonics group. Various samples fabricated at KTH will be measured in a four-point configuration and systematically compared. Experiments in a field effect transistor configuration will be performed to gain insights into the electrical transport mechanisms. Eventually, selected devices will be studied in magnetic fields, at cryogenic temperatures down to the milli-Kelvin range and under photon illumination.

The project work includes hands-on practical work on electrical device characterization using different experimental setups, including measurements at cryogenic temperatures. Depending on student preferences, topics can also include programming tasks related to measurement setup automation or device design.



Hybrid semiconductor nanowire – superconductor device. The scanning electron microscope image shows a nanogap in the nanowire contact electrodes where superconductivity is induced by the proximity effect. A four-point measurement configuration is used for device characterization.