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**The Search for Majorana Fermions in Semiconductor Nanowires**

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Majorana Fermions can arise as quasi-particles in specially designed nanoscale, electronic devices. Our approach is to use semiconductor nanowires with strong spin-orbit interaction (InAs or InSb). We induce superconductivity in the nanowires and control the electron density through a nearby gate. Several properties are measured such as the spin-orbit strength (including the dependence on the magnetic field direction), the induced superconducting gap (including magnetic field dependence) and the flow of supercurrents. For the determined experimental values we estimate the temperature scale to be $\sim$2 Kelvin as the transition temperature for the reaching the phase of a topological superconductor. Majorana Fermions should be detectable as special features in the tunneling conductance or in the periodicity of an interferometer setup (SQUID geometry).