

Quantized charge transport in chiral Majorana edge modes

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Majorana fermions can be realized as quasiparticles in topological superconductors, with potential applications in topological quantum computing. After an introduction to topological superconductivity, its potential and its challenges, I will focus on lattices of magnetic adatoms deposited on the surface of s-wave superconductors, so-called Shiba lattices, which have been proposed as a new platform for topological superconductivity. These systems possess the great advantage that they are accessible via scanning-probe techniques and thus enable the local manipulation and detection of Majorana modes. Using a nonequilibrium Greens function technique we demonstrate that the topological Majorana edge modes of nanoscopic Shiba islands display universal electronic and transport properties. Most remarkably, these Majorana modes possess a quantized charge conductance that is proportional to the topological Chern number, C , and carry a supercurrent whose chirality reflects the sign of C . These results establish nanoscopic Shiba islands as promising components in future topology-based devices.