

Spectroscopy of the Andreev Bound States in a Carbon Nanotube

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ABSTRACT:

Carbon Nanotubes are not intrinsically superconducting, but when they are connected to superconducting leads they can carry a supercurrent. This supercurrent is carried by the Andreev Bound States (ABS) which provide a universal description of the Josephson effect in coherent quantum nanostructures (molecules, nanowires, normal or magnetic layer...) connected to superconductors. We have performed the first tunnel spectroscopy of individually resolved ABS in a nanotube-superconductor device. We analyze the spectrum using a double quantum dot model which reveals notably the spin structure of these levels. Furthermore this device constitutes a new type of SQUID magnetometer.