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Tunneling spectroscopy of the Andreev Bound States in a Carbon Nanotube[1] JEAN-DAMIEN PILLET, CEA-Saclay, CHARIS QUAY, CRISTINA BENA, LPS Orsay, ALFREDO LEVY YEYATI, Universidad Autónoma de Madrid, PHILIPPE JOYEZ, CEA-Saclay — Carbon nanotubes are not intrinsically superconducting but they can carry a supercurrent when connected to superconducting electrodes. This supercurrent is mainly transmitted by discrete entangled (electron-hole) states confined to the nanotube, called Andreev Bound States. These states are a key concept in mesoscopic superconductivity as they provide a universal description of Josephson-like effects in quantum-coherent nanostructures (e.g. molecules, nanowires, magnetic or normal metallic layers) connected to superconducting leads. We report here the first tunneling spectroscopy of individually resolved ABS, in a nanotube-superconductor device. Analyzing the evolution of the ABS spectrum with a gate voltage, we show that the ABS arise from the discrete electronic levels of the molecule and that they reveal detailed information about the energies of these levels, their relative spin orientation and the coupling to the leads.

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