

Basic principles of STM/S and applications to condensed matter physics

Fabrizio Bobba (1,2)

(1) Physics Department “E.R. Caianiello”, University of Salerno, Italy (2) CNR-SPIN, Fisciano, Italy

The scanning tunneling microscope (STM) is commonly known as the most powerful tool for imaging and manipulation of individual atoms. Moreover, when operated in spectroscopy mode (STS), it allows to access the electronic density of states of superconducting, conducting and semiconducting materials with atomic resolution. For the aforementioned reasons, the STM/S is the cornerstones of nanoscience and nanotechnology.

In this lecture, I will introduce the working principles of STM/S, discussing the phenomenon of quantum-tunneling and presenting the technical principles to establish and control a quantum tunneling current between a conducting atomically sharp probe and sample surface. Special attention will be devoted to exploring some examples of STM application in condensed matter physics by STM, with a focus on superconductivity.

Fabrizio Bobba, fbobba@unisa.it