## Scanning tunneling microscopy and spectroscopy: An introduction

## tutorial

May 22<sup>nd</sup>, 2019 | 4:00 pm Lecture Hall MPI | B.1.11

## Abstract

Scanning tunneling microscopy is an advanced surface science technique which can effectively be used for imaging surfaces with atomic resolution. Its working principle is quantum tunneling between a sharp tip and a sample through a vacuum gap. Because the tunneling current depends on the overlap between the electronic wavefunctions of the sample and the tip, the STM technique can provide detailed information also on electronic and magnetic properties of surfaces.

In this tutorial, I will start by providing an overview of the experimental set-up, describing how it is possible to establish tunneling contact with a mechanical stability below 1 pm. Subsequently, I will analyze which parameters determine the tunneling current. I will then discuss how the local density of states is encoded into the tunneling current and discuss how it is possible, by spectroscopic techniques, to effectively disentangle this information as a function of energy and space. Finally, I will discuss how the use of spin-polarized tunneling allows to visualize complex magnetic structures down to the atomic scale.

## Speaker

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