Short description of advanced module "Scanning probe techniques: STM and AFM"

The module is intended to familiarize students with the exciting field of scanning probe techniques: scanning tunnelling microscopy (STM) and atomic force microscopy (AFM). The scanning tunnelling microscope, which earned its inventors the 1986 Nobel Prize in Physics, is one of the few tools which allows scientists to actually "see" individual atoms in the real space. Today this high resolution microscopy technique has found its use in a wide range of areas from advanced physics research to applications in nanotechnology. The aim of this module is to teach students, who have a keen interest in experimental surface science, the basic skills necessary to operate this complicated piece of scientific equipment. Small groups of 2-3 students will be given guidance to operate a scanning tunnelling microscope or atomic force microscope, encompassing practical aspects of its handling. Along with a general introduction to STM/AFM, the module will introduce students to the basic STM/AFM instrumentation, such as: ultrahigh vacuum (UHV) generation, probe and sample preparation, probe-positioning devices, handling data acquisition electronics, and vibration isolation concepts. Students will also get insights into laboratory teamwork and trouble-shooting skills necessary for success in the laboratory.