

Short description of advanced module for FS-STM

The module is intended to familiarize students with the low temperature scanning tunneling microscope (STM) coupled with a femtosecond (FS) laser system. The STM system is operated under ultra-high vacuum (UHV) conditions and attached to a bath cryostat, which is also cooled by Liquid Helium, enabling a temperature in the STM down to 5 K. The pressure inside the shielding of the STM is as low as 10^{-10} mbar due to the cryopump effect of the cryostat. The FS laser beam is focused by an optical system to hit the sample surface with pulses of 70 Femtosecond (FWHM) and a wavelength of 400 nm. With this setup, it is possible to atomically resolve molecules adsorbed on the surface, while the laser system enables to follow reactions on a femtosecond timescale by variation of the delay time between two pulses. The aim of this module is to teach students, who have a keen interest in experimental surface science. Small groups of 2-3 students will be given guidance to operate a STM and FS laser system, encompassing practical aspects of its handling. Along with a general introduction to STM, UHV and FS Lasers, the module will introduce students to the basic STM and FS laser instrumentation, such as: UHV generation, probe and sample preparation, vibration isolation concepts, basic laser alignment, and coupling of laser system with STM etc. Students will also get insights into laboratory teamwork and troubleshooting skills necessary for success in the laboratory.

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