COST Action MP1302 Nanospectroscopy

Training School on Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), and Scanning Near-field Optical Microscopy (SNOM)

Rome, Italy, September 24-26, 2014

School Program 1st day, section microscopy STM

Morning 8:30 to 12:30

Antonio Cricenti

Historical introduction of the Scanning Tunneling Microscopy (STM)

Stefano Colonna

Theory of scanning tunneling microscopy and principle of operation of the microscope

- Tunnel effect
- Bardeen perturbative approach
- Model of Tersoff -Hamann
- STS spectroscopy
- Principle of operation of the instrument

Fabio Ronci

Description of the instrumentation and method of operation

- Description of the instrument
i) Tip
ii) Scanning System
iii) methods for vibration isolation

- Method of measurement
i) imaging : height and constant current
ii) spectroscopy measurements
iii) measures of local dynamic

- Meas : air, liquid , ultra high vacuum

Paola Gori

Simulation of STM images from first principles

- Electronic structure of surfaces using density functional theory
- Simulated STM Images : approach of Tersoff -Hamann
- Simulation of STS spectra
- More advanced approaches for electronic structure calculations and STM images

Afternoon 14:30 to 18:30

1) Description of the experimental apparatus
2) Description of tips preparation
3) Preparation of a clean surface of a semiconductor
4) Capture images and STS
5) Post-processing data

School Program 2nd day, section microscopy AFM

Morning 8:30 to 12:30

Marco Girasole

Introduction to atomic force microscopy (AFM): theoretical principles & operating configurations
- Description of the instrument
i) Tip
ii) Scanning System
iii) methods for vibration isolation

Simone Dinarelli

The curves of force in the study of biological samples

Gianni Longo

AFM cantilevers as tools to characterize biological specimens

Ernesto Placidi

The AFM microscopy in materials science

Afternoon 14:30 to 18:30

1) Description of experimental apparatus
2) Description of tips preparation
3) Preparation of sample
4) Capture images and force curves
5) Post-processing data

School Program 3rd day, section microscopy SNOM

Morning 8:30 to 12:30

Antonio Cricenti

Historical introduction of near-field optical microscopy (SNOM)
- Description of the instrument
i) Tip
ii) Scanning System
iii) methods for vibration isolation

Mario D'Acunto

SNOM: theoretical principles and operating configurations

Antonio Cricenti

The SNOM fluorescence microscopy, reflectivity and photoconductivity
The SNOM microscopy coupled to a source of infrared light

Afternoon 14:30 to 18:30

1) Description of experimental apparatus
2) Description of optical fiber tips preparation
3) Detection of the optical signal
4) Capture images
5) Post-processing data