

Short Course: Scanning Probe Microscopy (6h)

Prof. Franz J. Giessibl

Instructor: The courses are taught by Franz J. Giessibl, who did his PhD studies with Gerd Binnig, Physics Nobel Laureate of 1986, co-inventor of the scanning tunneling microscope (STM) and inventor of the atomic force microscope (AFM) at the IBM Research Division. After his PhD, he moved to Silicon Valley to work at Park Scientific Instruments (now Park Systems) where he succeeded for the first time to image the silicon 7x7 reconstruction by AFM. Franz J. Giessibl is the inventor of the qPlus sensor, a sensor that enables atomic force microscopy with subatomic spatial resolution and uncompromised simultaneous STM/AFM. He has also contributed to the mathematical foundations of noncontact AFM such as force deconvolution algorithms. He holds a chair in experimental and applied physics at the University of Regensburg in Germany.

Who Should Attend? Undergraduate as well as graduate students, but also senior scientists who are interested in exploring the world of high resolution AFM and combined STM/AFM.

Contents:

1. Basics of scanning tunneling microscopy
2. Basics of atomic force microscopy
3. Special challenges faced by AFM
4. Frequency-Modulation AFM
5. Introduction of the qPlus sensor
6. Selection of key experiments :
 - Subatomic spatial resolution
 - Atomic manipulation and driving forces
 - AFM studies of designed atomic quantum structures
 - Measurement of ultraweak forces

Course Materials: Printed copies of key papers, pdf of slides