



HELIOS Training Day – 25th February

Zoom: <https://desy.zoom.us/j/85641148095>

Meeting ID: 856 4114 8095

Passcode: 483049

9:00: Grant Writing in a Nutshell – SB Science Management

This introductory course is based on grant proposals for Horizon Europe, but the principals presented here can also be applied elsewhere. The course addresses the general principals of proposal writing, the do's and dont's and give background information on the application process, funders and reviewers of the proposals.

10:30: Coffee break

11:00: Velocity map imaging of atomic and molecular dynamics – Marc Vrakking, MBI Berlin

In this hands-on lecture, you will experience working with software that can be used to retrieve the 3D velocity distribution from a measured 2D velocity map imaging measurement. We will work in particular with a method that is based on a decomposition of the photoelectron angular distribution into Legendre polynomials, which directly allows to extract some of the observables of interest such as the angle-integrated velocity/kinetic energy distribution and the velocity/kinetic energy-dependent anisotropy parameter from the measurement.

12:30: Lunch break

14:00: Ultrafast Vacuum Nanoelectronics – Donnie Keathley, MIT, Cambridge

With the aid of modern nanofabrication tools, vacuum electronics are experiencing a comeback. With the ability to create few-nanometer radii of curvature and free-space gaps for ballistic electron transport from metallic structures, it is now possible to develop vacuum electronics that operate with unprecedentedly low voltages and powers (few-volt biases and micro-watt powers) at incredibly high speeds (terahertz to petahertz frequencies). The physics of field emission and ballistic electron transport are relatively insensitive to power and ionizing radiation, making these devices attractive for operation in harsh environments (e.g. space, or nuclear reactors). Furthermore, due to ultrafast, attosecond to femtosecond timescales of the electron tunneling and ballistic transport, it is possible for these devices to operate electronically when driven by optical fields.

In this tutorial I will discuss recent advances in vacuum nanoelectronics and their applications. I will overview basic concepts such as: nanofabrication techniques, electron emission regimes and operation when driven by both static and optical fields, and device design and modelling. Particular attention will be paid to optically-driven operation for petahertz-scale electronics. I will conclude by touching on open questions and future directions of interest.

15:30: Closing remarks – Francesca Calegari

16:00: Finish