

Seminar über Ultrafast Science and Technology

Referent: Dr. Roxana Tarkeshian, Institute of Applied Physics, University of Bern

Titel: Towards plasma-based techniques for high-field FEL e- beam characterization

Ultrashort, ultra-intense X-ray pulses produced by free-electron lasers (FELs) driven by conventional or future plasma-based accelerators are crucial elements in experiments ranging from single-molecule imaging to few femtosecond down to atto-second X-ray science. The longitudinal charge distribution within the electron beam and the peak current are crucial factors for determining the lasing process of the FEL. In order to obtain a short gain-length the electron bunch needs to be compressed to achieve high peak current. A method for characterizing ultra-short high brightness electron beams is proposed that relies on tunnel-ionizing neutral gas through which they propagate. Experiments with conventional and advanced accelerators are proposed and it is shown via simulations and analytic theory that, by measuring the properties of field-induced ions and secondary electrons, single-shot beam charge density can be obtained. This novel concept will aid with the development of state-of-the-art accelerators that power free electron lasers and future colliders that operate at the frontiers of performance. Here 3D particle-in-cell simulation results, experimental setup, potential implementations of this technique for bunch characterisation at LCLS, and transverse characterisation of sub-micrometer beams from the laser-driven wakefield accelerator BELLA will be presented.

Zeit: Donnerstag, 06.04.2017, 11:15 Uhr

Ort: **Hörsaal B116**, Gebäude exakte Wissenschaften, Sidlerstrasse 5, Bern, Schweiz