



European XFEL Science Seminar

Tuesday, 7th March 2017, 17:00 (Tea/Coffee at 16:45)
Campus Schenefeld, main building (XHQ) room E1.173

Christian Schroer

DESY Photon Science, Hamburg and Department
Physik, Universität Hamburg

Imaging fast processes in matter by hard x-ray microscopy at XFELs

Hard x-ray free-electron lasers (XFELs) have opened up a whole variety of scientific opportunities in areas as diverse as atomic physics, plasma physics, nonlinear optics in the x-ray range, and protein crystallography. We demonstrate the successful time-resolved x-ray imaging of an elastic compression wave in diamond using an XFEL. The temporal evolution of such a shock wave can be monitored quantitatively, yielding detailed information on shock dynamics, such as the shock velocity, the shock front width, and the local compression of the material. It opens a new quantitative perspective on the state of matter in extreme conditions. The imaging scheme can be extended to a large variety of pump-probe experiments. Crucial for x-ray microscopy techniques at XFELs is the possibility to focus the pulses to the 100 nm level and below. Exact metrology and control of the x-ray wavefront is mandatory for quantitative results. We discuss the possibilities of wavefront shaping and shot by shot metrology.

Host: Ulrike Bösenberg