IMPRS UFAST

MAX-PLANCK-GESELLSCHAFT

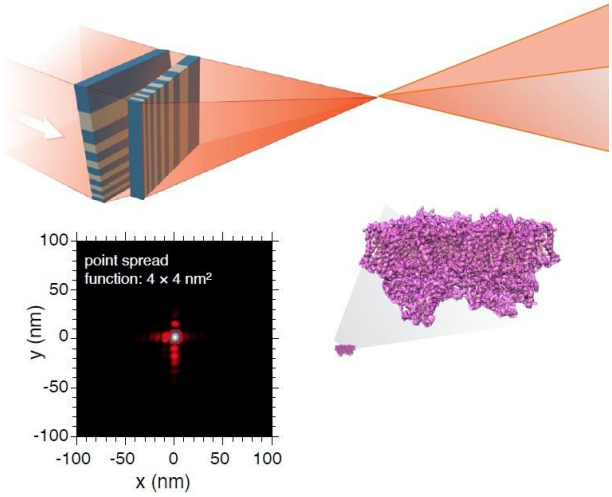
IMPRS UFAST focus course

Fourier optics for X-ray science

Henry Chapman

This course will cover the principles of Fourier Optics, with the goal to examine the opportunities that arise from latest developments in X-ray lenses of high numerical aperture. It will go over the formal connection of a lens to a spatial Fourier transform, and examine how three-dimensional spatial information about an object is transferred in various imaging and diffraction situations, primarily in the first Born approximation. The characterization and influence of aberrations will be discussed. The formulation can describe the method of ptychography and a general "4D-STXM" instrument, including measurement schemes on crystals to atomic resolution, but techniques such as single-particle diffractive imaging are special cases. New algorithms for the rapid retrieval of 3D structural information will be covered, and some recent examples in the use of ultra-bright coherent X-ray sources for structure determination will be discussed.

With this, students will gain an understanding and appreciation of the connections between a diverse range of coherent imaging, diffraction, and crystallography experiments and be on track for taking full advantage of the next generation photon sources.



Bldg. 99 (CFEL); SR O2.068
22nd – 26th February 2027
14:00 h – 16:00 h

Register on Geventis: I-UF FC12
Registration deadline: 15th February 2027

CFEL SCIENCE

DESY.

UH Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

European XFEL

MAX-PLANCK-GESELLSCHAFT