Institute of Applied Physics
Friedrich-Schiller-Universität Jena

Extreme ultraviolet lensless imaging

Description:

Optical imaging has a longstanding history that is inextricably linked to the utilization of lenses. While telescopes enabled the discovery of far distant galaxies, microscopes employ lenses to magnify microscale objects. Lens-based imaging appears as a natural choice; after all the human eye uses a lens to process our visual surrounding. However, recently the interest in lensless technologies has been growing drastically. Ever since the pioneering works of Ernst Abbe in the eve of the 19th century it is well known that the resolution of classical microscopes is proportional to the wavelength of the light used. A nearby conclusion is to investigate microscopy methods using shorter and shorter wavelengths. However, since the fabrication of lenses beneath the visible region of the electromagnetic spectrum is complex and costly, lens-based technologies appear as the most feasible route towards short wavelength microscopy. Lensless imaging technologies currently undergo a revolution, which is driven by both the ever-increasing computational power of modern computer architectures and the rapidly increasing coherent flux from laboratory-scale EUV and x-ray radiation sources. Our research aims at developing lensless microscopy techniques for EUV and x-ray imaging applications. The goals range from multispectral and ultimately chemical sensitivity to high-resolution microscopy. In particular, this is typically implies modern optimization algorithms that convert diffraction data into images of a specimen at hand.

Taks:

The goal of this project is the improvement of the performance of an existing EUV microscope. Depending on the qualifications of the applicant, the following tasks can be assigned:

- Lensless imaging algorithm design
- Simulation of EUV Optics.
- Optimization of hardware components of an EUV microscope.
- Hardware control of a tomographic imaging system.

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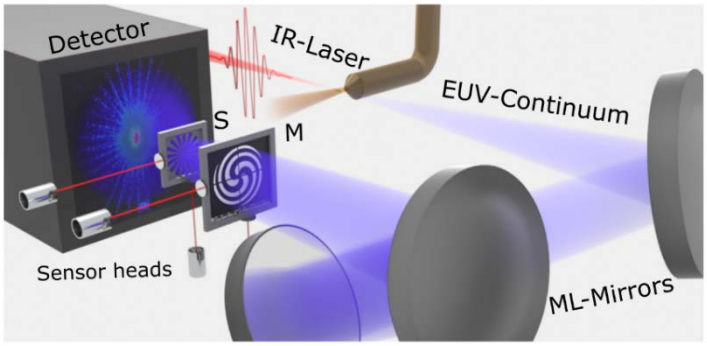

Literatur:

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