Thèse LIDyL

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Amphitéâtre Claude Bloch – CEA Saclay bât 771 Orme des Merisiers

« Single shot lensless Imaging with coherence and wavefront characterization of harmonic and FEL sources»

Lensless imaging techniques have broadened imaging applications to coherent sources in the short wavelength XUV domain, where optical systems to create an image are still not readily available. Furthermore, high harmonic generation sources (HHG) and free electron lasers (FEL) provide the advantage of offering short temporal resolutions (atto 10^{-18}s - femto 10^{-15}s), opening the way towards ultrafast time resolved nanoscale imaging. Single shot imaging techniques are then highly important to exploit the shortest temporal resolution that can be reached with XUV sources. The diffraction pattern depends on the object transmittance but also on the source spatial coherence and wavefront. Single shot characterization of those properties thus leads to an improvement of the resolution of the object reconstruction.

The results that we will present are divided in two parts; the first is focused on the characterization of the sources and the second on the development of new multidimensional imaging techniques. We will present a new method for single shot characterization of the spatial coherence that does not require the simultaneous characterization of the intensity distribution. Additionally, two multidimensional imaging techniques developed during the thesis will be introduced. We will discuss the extension of imaging using a broadband source towards spectrally resolved single shot imaging and attosecond applications. Finally, we will present a new tri-dimensional imaging technique that is single shot, easy to implement and lowers drastically the X-ray dose received by the sample.

Vous êtes tous cordialement conviés au pot qui suivra