Max-Planck-Institut für
Struktur und Dynamik der Materie
Max Planck Institute for the Structure and Dynamics of Matter

IMPRS ULTRAFAST IMAGING & STRUCTURAL DYNAMICS

IMPRS UFAST Call for PhD applications 2020/2021

Structural dynamics of multiferroics
G. Mercurio

Title of PhD Project	**Structural dynamics of multiferroics**
Type	Experimental
Supervisor(s)	Dr. Giuseppe Mercurio
Affiliation(s):	European XFEL
Number of positions:	1
Abstract:	Multiferroic materials, with the promise to reduce the energy per memory bit down to 1 aJ, represent an appealing alternative to metal-oxide-semiconductor technology. An example of multiferroic material is one that exhibits both spontaneous ferroelectric polarization and magnetization. To advance the search of efficient multiferroics, a fundamental understanding of the relation between atomic structure and functional properties as well as controlling the dynamics of multiferroics switching is essential. The time-resolved X-ray Standing Wave (tr-XSW) technique can play a crucial role in correlating time-dependent atomic positions with multiferroic properties by measuring atomic positions with picometer spatial and femtosecond temporal resolution. The goal of this PhD project is to establish tr-XSW as a tool to probe the structural dynamics of multiferroics in optical pump – X-ray probe experiments. The PhD student will perform XSW experiments at synchrotron light sources to characterize sample atomic positions in the ground state, as well as second harmonic generation (all-optical laboratory experiments) to probe the dynamics of ferroelectric polarization. The PhD student will contribute to the commissioning of tr-XSW setup at the Spectroscopy and Coherent Scattering Instrument of the European XFEL and to the performance of the first tr-XSW experiments on a prototypical ferroelectric thin film.
Contact person for scientific questions about the project:	Giuseppe Mercurio: giuseppe.mercurio@xfel.eu

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