HZB Helmholtz Zentrum Berlin

VORTRAGSANKÜNDIGUNG - ANNOUNCEMENT

Investigating magnetic phase transitions and ferroelectric switching dynamics using time-resolved hard X-ray diffraction

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Joint Research Group Ultrafast Dynamics (PS-GUD)

on Thursday 15th February 2024, 10:00 a.m. sharp
location: WCRC 13.10 – 6 (Kino)

Time-resolved hard X-ray diffraction is a method to investigate the transient structural response of materials upon an (external) excitation. We routinely use this tool to study different materials and heterostructures after, for example, the excitation with short laser pulses, electrical field pulse sequences, or static temperature changes. These excitations can for example trigger structural and/or magnetic phase transitions, or induce the reversal of ferroelectric polarisation. The material-specific nature of the X-rays allows for studying buried layers or interfaces in heterostructures.

In this talk I will focus on two recent examples of time-resolved X-ray diffraction experiments performed at the KMC-3 XPP endstation: The dynamics of the laser-induced magnetic phase transition of FeRh thin films has been measured in the low-alpha operation mode of BESSY II and an characteristic timescale for the domain formation of 8 ps is observed. Furthermore, I will explain how the frequency-dependent polarisation of ferroelectric thin film heterostructures, in particular in $Pb(Zr_{0.48}Ti_{0.52})O_3$ thin films grown on Silicon substrates, can be derived from the simultaneously measured transient structural and electrical data of a test device under operating conditions.