

Bright days ahead - Soft X-ray scanning microscopy at 4th generation lightsources

Simone Finizio

Paul Scherrer Institute, Swiss Light Source

Diffraction limited synchrotron (DLSR), or 4th generation, light sources are a novel design promising an increase in the coherent photon flux of several orders of magnitude compared to the current 3rd generation storage ring design. These improvements are revolutionizing synchrotron-based experiments, and several light sources around the world are currently undergoing, or planning an upgrade to a DLSR.

For scanning transmission X-ray microscopy (STXM), the increase in coherent photon flux will allow us to routinely perform high-resolution imaging, as it will tackle all the issues occurring for high-resolution X-ray optics. In addition, the combined increase in coherent photon flux, in the available (GPU) computational power, and in the performances of 2D soft X-ray detectors will also enable for the routine performing of high-resolution soft X-ray ptychographic imaging.

In this presentation, I will show the current status of the commissioning of a new combined STXM and soft X-ray ptychography endstation at the SoftiMAX beamline of the MaxIV DLSR, and the first results in the ptychographic imaging of the magneto-electric coupling between ferroelectric domains and spin cycloid in freestanding BiFeO₃ thin films, which fully exploit the sub-5nm spatial resolutions achievable with the technique.

Bio

Simone Finizio studied physics engineering (BSc) at the TU of Milan, Italy, where he obtained his first experience in spintronics during his bachelor thesis. He received a MSC in nuclear engineering from the TU Milan in 2011 with a master thesis on first-wall materials for the divertor of Tokamak plasma confinement systems. In 2015 he got his PhD in Physics at the U Mainz/Germany in the group of Mathias Kläui where his thesis was on multiferroic materials, with focus on X-ray microscopy investigation using photoemission electron microscopy. From 2016-2019 he was a postdoc within the MagicSky EU Horizon 2020 project in the Microspectroscopy group of the Paul Scherrer Institut (Switzerland), focused on the investigation of magnetic skyrmions with time-resolved scanning transmission X-ray microscopy (STXM). Since 2019 he is a beamline scientist at the PolLux STXM beamline of the Swiss Light Source at the Paul Scherrer Institute (Switzerland), and received his tenure in August 2023. His research is focused on time-resolved X-ray microscopy of spintronic systems and he has published more than 120 papers so far. This year he is on sabbatical spending time at BESSY II (HZB) in Berlin and at the MaxIV lightsources due to the SLS 2.0 upgrade shutdown.