PAUL SCHERRER INSTITUT

PSI facilities newsletter

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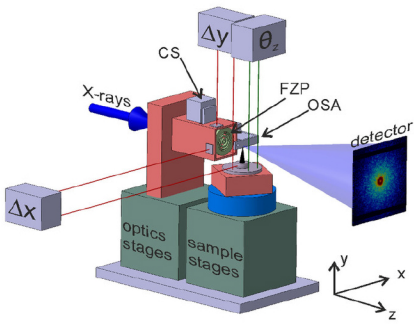
Swiss Light Source - Research highlights

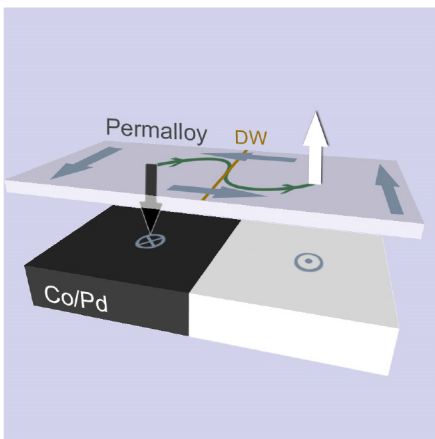
Nanotomography at cryogenic temperatures



M. Holler et al, Scientific Reports 4, 3857 (2014);
DOI: 10.1038/srep03857

Ptychographic multi-keV X-ray computed tomography (PXCT) has been demonstrated down to an isotropic 3D resolultion of 16 nm in a multi-micron sized test object. This was achieved in a prototype tomography instrument, that was measuring at room temperature and atmospheric pressure. This prototype was and is in regular user operation at the cSAXS beamline at SLS. However, measuring at room temperature was limiting high-resolution PXCT to radiation insensitive samples. The OMNY (tOMography Nano crYo) instrument was successfully commissioned at the cSAXS beamline in June and is now available. A radiation sensitive biological structure was measured at a temperature of 92 K with a 3D resolution of 28 nm. The instrument is additionally equipped with a cryogenic sample transfer system that allows cryogenically fixed specimens to be transferred and measured in OMNY. For further information or in case of interest please contact the beam line staff.

Nanoscale switch for vortex polarization mediated by Bloch core formation in magnetic hybrid systems



P. Wohlhüter et al., Nature Communications 6, Article number: 7836,Published 4 Aug 2015;
DOI: 10.1038/ncomms8836

Vortices are fundamental magnetic topological structures characterized by a curling magnetization around a highly stable nanometric core. The control of the polarization of this core and its gyration is key to the utilization of vortices in technological applications. So far polarization control has been achieved in single-material structures using magnetic fields, spin-polarized currents or spin waves. Here we demonstrate local control of the vortex core orientation in hybrid structures where the vortex in an in-plane Permalloy film coexists with out-of-plane maze domains in a Co/Pd multilayer. The vortex core reverses its polarization on crossing a maze domain boundary. This reversal is mediated by a pair of magnetic singularities, known as Bloch points, and leads to the transient formation of a three-dimensional magnetization structure: a Bloch core. The interaction between vortex and domain wall thus acts as a nanoscale switch for the vortex core polarization.