Contribution ID: **4** Type: **Oral**

Time-resolved soft X-ray microscopy of magnetic nanostructures at the P04 beamline of PETRA III

Friday 13 June 2014 12:30 (30 minutes)

Oral presentation (~ 20 minutes)

Abstract:

Picosecond magnetization dynamics of small permalloy (Ni80Fe20) elements has been investigated with a new full-field transmission microscope at the soft X-ray beamline P04 of the high brilliance synchrotron radiation source PETRA III.

The soft X-ray microscope generates a flat-top illumination field of 20 μm diameter using a grating condenser. A tilted nanostructured magnetic sample can be excited either by making use of a mobile synchronized femtosecond laser system or by a picosecond electric current pulse via a coplanar waveguide. The transmitted light of the sample plane is directly imaged by a micro zone plate with < 65 nm resolution onto a 2D gateable X-ray detector to select one particular bunch in the storage ring that probes the time evolution of the dynamic information successively via XMCD spectromicroscopy in a pump-probe scheme.

In the experiments it was possible to generate a homogeneously magnetized state in patterned magnetic layers by a strong magnetic Oersted field pulse and directly observe the destruction and recovery of the initial flux-closure vortex domain patterns. On the rising edge of the magnetic field pulse, high velocities of a central vortex core were discovered exceeding 1 km/s.

Primary author: WESSELS, Philipp (The Hamburg Centre for Ultrafast Imaging, Universität Hamburg)

Co-authors: Dr VOGEL, Andreas (Institute for Applied Physics, Universität Hamburg); Mr ABBATI, Gennaro (Institute for X-Optics, Hochschule Koblenz); Dr MEIER, Guido (Institute for Applied Physics); Dr VIEFHAUS, Jens (Deutsches Elektronen-Synchrotron); Mr EWALD, Johannes (Institute for X-Optics, Hochschule Koblenz); Mr OVERBUSCHMANN, Johannes (Center of Advanced European Studies and Research); Dr WIELAND, Marek (Institute for Experimental Physics, Universität Hamburg); Prof. DRESCHER, Markus (The Hamburg Centre for Ultrafast Imaging, Universität Hamburg); Mr BAUMBACH, Stefan (Institute for X-Optics, Hochschule Koblenz); Mr NISIUS, Thomas (Institute for X-Optics, Hochschule Koblenz); Prof. WILHEIN, Thomas (Institute for X-Optics, Hochschule Koblenz)

Presenter: WESSELS, Philipp (The Hamburg Centre for Ultrafast Imaging, Universität Hamburg)

Session Classification: User reports