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Ultrafast magnetization dynamics in GdFeCo

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Nanostructures of GdFeCo have been fabricated using lithography and lift-off techniques. Their magnetic properties were revealed using the Photoemission Electron Microscope (PEEM) available at the SIM beamline. Employing fs-optical excitation, we have been able to manipulate the magnetization of the nanostructures on very short time scales. By performing these experiments we have found experimental evidence for a novel mechanism of magnetization reversal in a ferrimagnet, which is triggered by a heat pulse only. In general, magnetization reversal is driven by a quantity that can be represented by a vector such as an external magnetic field or an applied current while in our experiment the reversal happens only by heating the system on the time scale of the exchange interaction of the two sublattices. We have further investigated the structures by performing Time Resolved X-ray Magnetic Circular Dichroism (TR-XMCD) and observed that the magnetization reversal occurs on a time scale faster than our resolution limit of 50 ps. We will report and discuss our latest results, obtained in both static and time resolved modes and the mechanism of the magnetization reversal will be described.

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Ultrafast magnetization dynamics

Primary author: Dr EL MOUSSAOUI, Souliman (Paul Scherrer Institut)

Co-authors: Prof. ITOH, Akiyoshi (Nihon University); Dr KIMEL, Alexey (Radboud University Nijmegen); Dr KIRILYUK, Andrei (Radboud University Nijmegen); Dr TSUKAMOTO, Arata (Nihon University); Dr MENGOTTI, Elena (Paul Scherrer Institut); NOLTING, Frithjof (Paul Scherrer Institut); Dr HEYDERMAN, Laura (Paul Scherrer Institut); Dr LE GUYADER, Loïc (Paul Scherrer Institut); RASING, Theo (Radboud University Nijmegen)

Presenter: Dr EL MOUSSAOUI, Souliman (Paul Scherrer Institut)

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