

Dynamic Pathways in Multidimensional Landscapes



Dynamic Pathways in Multidimensional Landscapes

Contribution ID : 16

Engineering Ultrafast Magnetism

Content :

Controlling magnetic states of matter on ultrashort timescales is crucial to engineering the next-generation magnetic devices combining ultrafast data processing with ultrahigh-density data storage.

Here, we report on femtosecond laser-driven dynamics of multi-sublattice magnetic materials, with both ferromagnetic and antiferromagnetic coupling between sublattices, investigated using element-specific, femtosecond time-resolved XMCD. These measurements [1], fully supported by phenomenological and atomistic spin simulations, provide evidence for a demagnetization time that scales with the elemental magnetic moment and varies with the sign of the exchange interaction. As such, one can control the speed of magnetization processes in multi-sublattices materials, being either switching or demagnetization, by properly choosing the magnitude of the constituent magnetic moments and the sign of the exchange interaction that couples them, as exemplified for the case of a synthetic ferrimagnet.

[1] I. Radu et al., (submitted)

Primary authors : Dr. RADU, Ilie (Helmholtz-Zentrum Berlin)

Co-authors : Dr. STAMM, Christian (Helmholtz-Zentrum Berlin, BESSY II, Germany) ; Prof. FÖHLISCH, Alexander (Helmholtz-Zentrum Berlin, BESSY II, Germany) ; Dr. EVANS, Richard (Physics Department, University of York, United Kingdom) ; Dr. OSTLER, Thomas (Physics Department, University of York, United Kingdom) ; Dr. MENTINK, Johan (Institute for Molecules and Materials, Radboud University Nijmegen, Netherlands) ; Prof. CHANTRELL, Roy (Physics Department, University of York, United Kingdom) ; Dr. TSUKAMOTO, Arata (College of Science and Technology, Nihon University, Japan) ; Prof. ITOH, Akiyoshi (College of Science and Technology, Nihon University, Japan) ; Dr. KIRILYUK, Andrei (Institute for Molecules and Materials, Radboud University Nijmegen, Netherlands) ; Dr. KIMEL, Alexey (Institute for Molecules and Materials, Radboud University Nijmegen, Netherlands) ; Prof. RASING, Theo (Institute for Molecules and Materials, Radboud University Nijmegen, Netherlands) ; Dr. ESCHENLOHR, Andrea (Uni Duisburg-Essen) ; Dr. RADU, Florin (Helmholtz-Zentrum Berlin, BESSY II, Germany) ; Dr. ABRUDAN, Radu (Institut für Experimentalphysik, Ruhr-University Bochum, Germany) ; Dr. VAHAPLAR, Kadir (Institute for Molecules and Materials, Radboud University Nijmegen, Netherlands) ; Dr. KACHEL, Torsten (Helmholtz-Zentrum Berlin, BESSY II, Germany) ; Dr. PONTIUS, Niko (Helmholtz-Zentrum Berlin, BESSY II, Germany) ; Dr. MITZNER, Rolf (Helmholtz-Zentrum Berlin) ; Dr. HOLLDAK, Karsten (Helmholtz-Zentrum Berlin, BESSY

II, Germany)

Presenter : Dr. RADU, Ilie (Helmholtz-Zentrum Berlin)

Session classification : Quantum materials 2

Track classification : --not yet classified--

Type : contributed talk