SFB1242

SFB 1242 Nichtgleichgewichtsdynamik kondensierter Materie in der Zeitdomäne

UNIVERSITÄT DUISBURG ESSEN

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Optical control of multiplet states in 4f metals

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Rare-earth 4f metals play a key role in materials allowing all-optical switching of magnetization, and their large spin-orbit coupling can result in strong magneto-crystalline anisotropy (MCA) - a property highly relevant for the formation of stable magnetic domains.

The talk will provide an overview on optically controlled 4f electronic excitations, their signatures in X-ray spectroscopy and possible impact on ultrafast magnetization dynamics. In time-resolved X-ray absorption (XAS) and resonant inelastic X-ray scattering (RIXS) experiments at EuXFEL, FLASH and FemtoSlicing we studied ultrafast changes in the 4f electronic state of different 4f-metals. For Tb metal, we show that 5d-4f inelastic electron-electron scattering leads to selective excitation out of the 4f groundstate multiplet, involving a change of the total angular momentum J. As a consequence, the MCA and thus the coupling of the 4f spins to their environment is manipulated on fs-timescales. From the distinct behavior of fluence dependent magnetization dynamics in Dy metal, we conclude that an altered 4f-electronic state directly impacts magnetization dynamics.

Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.

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