



SFB1242

Nichtgleichgewichtsdynamik kondensierter
Materie in der Zeitdomäne

UNIVERSITÄT
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ESSEN

Open-Minded

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Campus Duisburg**

Femtomagnetism: Laser-induced ultrafast demagnetization and all-optical spin switching

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Nearly twenty years ago, Beaurepaire and colleagues reported a ground-breaking experiment that a single femtosecond laser pulse could demagnetize a nickel thin film within 1 ps, very surprising from traditional point of view. This motivated intensive investigations around the world. In this talk I will first review latest developments in the field, and discuss exchange splitting quenching and demagnetization mechanisms beyond current models in fcc Ni and hcp Gd. If time allows, I will present the time- and momentum-resolved demagnetization. Then I will show how a simple model can simulate all-optical spin reversal with different light helicities through the optical spin-orbit torque. Both helicity-dependent and helicity-independent switchings are found. Spin switching occurs only if the effective spin angular momentum of each constituent in an alloy exceeds a critical value of 0.8 hbar. The resultant magnetic field (65 T) is so big that it will significantly reduce high current in spintronics.

- [1] G. P. Zhang, Y. H. Bai, and T. F. George, J. Phys.: Condens. Matter **28** 236004, (2016).
- [2] G. P. Zhang, T. Latta, Z. Babyak, Y. H. Bai and T. F. George, Modern Physics Letters B **30**, 1630005 (2016),
- [3] G. P. Zhang, Y. H. Bai and Thomas F. George, EPL **115** 57003 (2016).

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

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