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A comparative study of laser-induced demagnetization dynamics in Fe, Co, and Ni MAITHREYI GOPALAKRISHNAN, CHRISTIAN GENTRY, DMITRIY ZUSIN, PATRIK GRYCHTOL, RONNY KNUT, JILA, University of Colorado Boulder, JUSTIN SHAW, HANS NEMBACH, Electromagnetics Division, NIST, Boulder, STEFAN MATHIAS, Department of Physics, Georg-August-Universitat Gottingen, MARTIN AESCHLIMANN, Department of Physics, University of Kaiserslautern, PETER OPPENEER, Departement of Physics and Astronomy, Uppsala University, CLAUS SCHNEIDER, Peter Grunberg Institut, Forschungszentrum Julich, HENRY KAPTEYN, MARGARET MURNANE, JILA, University of Colorado Boulder — Even twenty years after the discovery of ultrafast demagnetization of ferromagnetic materials induced by a femtosecond laser pulse there is still an ongoing debate about the mechanisms that drive the process. Surprisingly, a comprehensive study that compares demagnetization dynamics in different materials on equal footing is lacking. Yet, the scientific community would greatly benefit from such study. We fill this gap by performing a systematic comparison of ultrafast demagnetization behavior in Iron, Cobalt and Nickel, the simplest itinerant ferromagnets, under a wide range of pump fluences. In this experiment, we utilize a tabletop broadband extreme ultraviolet source to probe magnetization dynamics at the $M_{2,3}$ absorption edges of these three elements using the transverse magneto-optical Kerr effect. The obtained data can be used to inform theory and, thereby, assist in resolving the remaining questions about the micro- and macroscopic mechanisms behind ultrafast laser-induced magnetization dynamics in materials.

Maithreyi Gopalakrishnan
JILA, University of Colorado at Boulder

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