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Theoretical and experimental investigations of the electronic structure configuration during ultrafast demagnetization of Co EMRAH TURGUT, PATRIK GRYCHTOL, DMITRY ZUSIN , HENRY C. KAPTEYN, MARGARET M. MURNANE, Department of Physics and JILA, University of Colorado, Boulder CO, USA, DOMINIK LEGUT , VSB-Technical University of Ostrava, Czech Republic, KAREL CARVA, PETER M. OPPENEER, Physics and Astronomy, Uppsala University, Uppsala, Sweden, STEFAN MATHIAS, MARTIN AESCHLIMANN, University of Kaiserslautern, Kaiserslautern, Germany, CLAUS M. SCHNEIDER, Research Centre Ju?lich, Ju?lich, Germany, JUSTIN SHAW, RONNY KNUT, HANS NEMBACH, THOMAS J. SILVA, Electromagnetics Division, NIST, Boulder CO, USA — We report on theoretical and experimental studies of the electronic structure configuration during the ultrafast demagnetization in Co thin films. After an ultrafast optical laser excitation of a ferromagnetic material, the magnetization of the material decreases rapidly in less than a picosecond. This ultrafast behavior has attracted a significant amount of attention for more than two decades; however, the underlying driving mechanism is still unclear. In this work, we use an extreme ultraviolet, broad-bandwidth, tabletop, ultrafast, and element-selective magnetization probe that employs the transverse magneto-optical Kerr effect to extract the energy- and time-resolved dynamics of the off-diagonal dielectric tensor element that is proportional to the magnetization. We compare our data with theoretical optical predictions based upon *ab-initio* calculations of the electronic structure, with the ultimate goal of determining how the occupation of majority and minority states vs. energy evolves after ultrafast optical pumping.

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