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Tabletop soft x-ray magnetic circular dichroism measurements using circularly polarized high harmonic sources T FAN, R KNUT, C HERNNDEZ GARCA, D HICKSTEIN, D ZUSIN, C GENTRY, F DOLLAR, C MANCUSO, C HOGLE, J ELLIS, K DORNEY, JILA - University of Colorado, D LEGUT, Charles University, K CARVA, P OPPENEER, Department of Physics - Uppsalla University, O SHPYRKO, E FULLERTON, University of California at San Diego, O KFIR, O COHEN, Physics Department - Technion, D MILOSEVIC, University of Sarajevo, A BECKER, A JARON BECKER, T POPMINTCHEV, M MURNANE, H KAPTEYN, P GRYCHTOL, JILA - University of Colorado — X-ray magnetic circular dichroism (XMCD) allows for the extraction of the orbital and spin contributions to the magnetization and its interaction with phononic and electronic degrees of freedom on fs time and nm length scales, with element-specificity. However, to date, circular soft x-ray beams were restricted to large-scale x-ray facilities. These facilities have great advantages of high peak and average powers, but have limited access and temporal resolution. In this work, we present the first direct tabletop approach for generating bright circularly polarized light exceeding 160 eV. This makes it possible to implement XMCD on the tabletop for the first time, allowing to probe not only the 3d ferromagnets, but also the 4f rare earth materials with element-specificity. We demonstrate the stability, circularity and brightness of our high harmonic source by extracting the magneto-optical coefficients near the N edge of Gd (145 eV), as well as at the M edges of Fe (52eV), for an out-of-plane magnetized Gd/Fe multilayer sample thus enabling ultrafast studies of magnetization dynamics.

Patrik Grychtol
JILA - University of Colorado

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