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Circularly polarized high harmonic generation for element-selective probing of magnetic materials on a tabletop PATRICK GRYCHTOL, EMRAH TURGUT, DMITRIY ZUSIN, DIMITAR POPMINTCHEV, TENIO POPMINTCHEV, HENRY KAPTEYN, MARGARET MURNANE, JILA, University of Colorado, Boulder, CO 80309, RONNY KNUT, HANS NEMBACH, JUSTIN SHAW, Electromagnetics Division, National Institute of Standards and Technology, Boulder, CO 80305, OFER KFIR, AVNER FLEISCHER, OREN COHEN, Physics Department and Solid State Institute, Technion - Israel Institute of Technology, Haifa 32000 — Ultrafast short wavelength sources based on high harmonic upconversion of femtosecond lasers are unique in their ability to simultaneously probe the magnetically-sensitive M absorption edges of the 3d ferromagnets Fe, Co and Ni. This novel capability to capture the fastest spin dynamics in materials has uncovered a wealth of new fundamental understanding about spin scattering and transport on few-femtosecond timescales. However, to date these investigations have used linearly polarized higher harmonics, since it has not been possible to generate circularly polarized harmonics with sufficient flux for scientific applications. In this contribution, we present a simple setup that enables the efficient generation of circularly polarized harmonics, and demonstrates that they are bright enough for studies of magnetic materials. The fundamental and second harmonic of a Ti:sapphire laser are focused into a gas filled waveguide under good phase matching conditions, with opposite chirality circular polarizations. Thus, circularly-polarized harmonics are produced that are then used to perform magnetic circular dichroism studies in the extreme ultraviolet photon energy range.

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