Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Pump-probe measurement of short and long-range exchange interactions in a rare-earth magnet using resonant x-ray diffraction MATTHEW LANGNER, SUJOY ROY, YI-DE CHUANG, Lawrence Berkeley National Lab, ROLF VERSTEEG, University of Groningen, YI ZHU, MARCUS HERTLEIN, THORNTON GLOVER, Lawrence Berkeley National Lab, KARINE DUMESNIL, Nancy Universite, ROBERT SCHOENLEIN, Lawrence Berkeley National Lab — The combined effects of spin-orbit interactions, magnetostriction, and long-range exchange coupling lead to a wide variety of magnetic phases in the rare earth magnets. In dysprosium, core level spins develop a spiral phase as a result of competition between short and long-range RKKY exchange interactions mediated by the conducting electrons. We use time-resolved resonant x-ray diffraction to directly probe the spiral order parameter of the core level magnetism in response to optical pumping of the conduction electrons that mediate the exchange interaction. The dynamics of the diffraction intensity and spiral turn angle occur on different time scales, and through free-energy analysis, we associate these dynamics with changes in the short and long-range exchange coupling.

Matthew Langner
Lawrence Berkeley National Lab

Date submitted: 15 Nov 2013 Electronic form version 1.4