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Ultra-fast Measurements of Optically Induced Lattice Dynamics in LuMnO₃ Using Aluminum K-alpha X-Ray Diffraction.¹ J. WORK-MAN, H.J. LEE, J. ROBERTS, Q. MCCULLOCH, A.J. TAYLOR, D.J. FUNK, Los Alamos National Laboratory, J.S. WARK, Clarendon Laboratory, University of Oxford — An experiment to study the structural dynamics at the ultra-fast time scale in optically-pumped samples is presented. Measurements of lattice dynamics in LuMnO₃ are presented and compared to calculations using dynamical diffraction theory modified for hexagonal crystal structure. Ultra-fast x-ray emission is used to measure Bragg peak shifts using diffraction and compared to calculations. Results are presented for optical pump energy densities of 8 and 20-mJ/cm². The experiment uses ~150 mJ of a 100fs Ti:Sapphire laser to excite K-alpha x-ray emission in an aluminum wire with ~1-2% split off for the material pump. The x-ray emission is relayed using a spherical Quartz crystal to the sample target. Plans for experiments using Cu K-alpha emission to probe Fe samples will also be described.

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