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Acoustic Pulses in Iron Observed by Femtosecond X-ray Diffraction TOM HENIGHAN, PULSE, SLAC, STEFANO BONETTI, PATRICK GRANITZKA, SIMES, SLAC, DILING ZHU, LCLS, SLAC, STUART PARKIN, IBM, MARIANO TRIGO, DAVID REIS, PULSE, SLAC, HERMAN DURR, SIMES, SLAC — Interest in improving the performance of memory storage devices has fueled recent discoveries in novel mechanisms for manipulating magnetic spins on ultrafast timescales, including magnetoacoustics. Direct measurement of ionic motion could allow one to observe the coupling between the magnetic spins and lattice dynamics in a crystal. In this talk, I will discuss recent results on time-resolved acoustics observed by time-resolved diffuse X-ray scattering in a 25 nm thick alpha-iron crystal of high quality. Acoustic pulses are generated using a femtosecond optical laser which provides an impulsive strain in the crystal. The ensuing phonon dynamics are resolved by scattering of femtosecond X-ray pulses provided by the Linac Coherent Light Source. In particular, we observe terahertz oscillations in the Fourier components of the acoustic pulses imaged by the detector.

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