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Coherent spin and lattice dynamics studied with femtosecond x-ray diffraction

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Abstract
Femtosecond x-ray diffraction is a technique that combines the atomic-scale resolution of short-wavelength diffraction with sufficient time resolution to see some of the fastest vibrational and even electronic dynamics in solid state systems with long-range order. This lecture will discuss the capabilities and limits of such techniques as applied at current large-scale x-ray sources. Particular attention will be given to coherent dynamics of both the lattice and of the spin subsystems. We will discuss these ideas in relation to two recent examples of such experiments, one showing a time-resolved structural phase transition and another showing a coherent rotation of spins connected with a coherent electromagnon.