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Ultrafast conductivity dynamics in the colossal magnetoresistance La1-xCaxMnO3 thin films

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J. Zhang, Boston University
R. D. Averitt, Boston University
X. Tan, University of Science and Technology of China
W. Wu, University of Science and Technology of China

La1-xCaxMnO3 is a classic colossal magnetoresistance (CMR) material where the conductivity displays a marked sensitivity to an external magnetic field for reasons that are still not fully understood. The underlying rich physics is a result of the strong coupling of spin, lattice, orbital and charge degrees of freedom. Optical spectroscopy provides experimental access to the underlying interactions in the manganites including, as examples, spin and orbital ordering, and the metal-insulator transition. Further, time-resolved optical spectroscopy can dynamically probe photoinduced changes that drive phase transitions. In this work we report on time resolved terahertz spectroscopic studies of strained La1-xCaxMnO3 thin films, where we observe and control electron-spin-lattice relaxation dynamics with 1.5 eV excitation pulses. We will describe, in detail, the observed differences in the conductivity dynamics as a function of lattice strain.

Primary author: ZHANG, Jingdi (Boston University)

Presenter: ZHANG, Jingdi (Boston University)

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