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Ultrafast conductivity dynamics in epitaxially strained $La_{1-x}Ca_xMnO_3$ thin films[1] JINGDI ZHANG, RICHARD AVERITT, Department of Physics, Boston University, XUELIAN TAN, WENBIN WU, HFNL, University of Science and Technology of China — $La_{1-x}Ca_xMnO_3$ is a prototype colossal magnetoresistance (CMR) material where the conductivity displays a marked sensitivity to an external magnetic field for reasons that are not fully understood. The underlying rich physics is a result of strong coupling of the spin, lattice, orbital, and charge degrees of freedom. Optical spectroscopy provides experimental access to the underlying interactions in the manganites including spin and orbital ordering and the metal-insulator transition. Ultrafast spectroscopy can dynamically probe photo-induced changes that drive phase transitions. In this work we report on time-resolved terahertz spectroscopic studies of epitaxially strained $La_{1-x}Ca_xMnO_3$ thin films. In these films, the strain results in a robust antiferromagnetic insulating phase below 260K. Following 1.5 eV short pulse excitation the THz conductivity reveals a transition to a persistent metallic phase. This response is a result of competition in a dynamic phase fluctuation regime. We will describe, in detail, the observed differences in the conductivity dynamics as a function of lattice strain.

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