

Ultrafast dynamics in complex solids manipulated and observed with “ultra-broadband” ultrafast pulses, from the THz to the hard x-rays.

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In this talk, I will discuss some of our recent progress in the study of complex materials with various ultrafast techniques. I will discuss the direct measurement of coherent phonon-polaritons in LiTaO_3 with femtosecond x-rays, where the mechanical component of electromagnetic radiation is measured with phase sensitivity in the time domain. I will also discuss our recent studies of the light-induced insulator-to metal transition in the CMR manganite $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$, where different coherent excitations at ultra-high frequencies are found to dominate the melting of charge and orbital order.