Physics & Astronomy Colloquium

Presents

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Thursday, September 9, 2021
4:10 pm, Webster Room 17

"Ultrafast Dynamics of Quasiparticle Formation in Structurally Tunable Materials"

Localization of electronic states as a result of electron-phonon coupling plays a critical role in determining the properties of a wide range of materials: polaron formation has a profound impact on charge transport properties of electronic materials, and formation of self-trapped excitons, or exciton-polarons, dramatically changes optical properties and energy transport mechanisms. I will present time-resolved studies of the dynamics of electronic localization, including the formation and evolution of self-trapped excitons, polarons, and solitons. The experiments are carried out in quasi-one-dimensional materials in which the strength of the electron-phonon coupling that drives the dynamics can be systematically tuned by varying the material composition. The studies use a combination of ultrafast time-resolved techniques that are sensitive to the electronic, vibrational, and structural dynamics that accompany self-trapping, including femtosecond optical spectroscopy in the vibrationally impulsive limit, time-resolved terahertz spectroscopy, and time-resolved X-ray spectroscopy.

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