

Linear Coherent Response in trARPES Reveals Electron-Phonon Coupling in Fe-based Superconductors

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The interactions leading to the emergence of superconductivity in Fe-based materials remain a subject of debate. Electronic correlations have been suggested to enhance the electron-phonon coupling (EPC) in these materials, but direct experimental verification is lacking. Here, we study the linear response of coherent phonon modes to optical excitation in two Fe-based superconductors using time- and angle-resolved photoemission spectroscopy (trARPES): (1) We combine trARPES with time-resolved x-ray diffraction on thin-film FeSe to quantify the EPC strength purely from experiment and reveal a strong enhancement of the EPC strength due to correlation effects. (2) Our preliminary trARPES work on K-doped BaFe₂As₂ reveals a rich coherent excitation spectrum with at least four bosonic modes that exhibit a non-trivial dependence on temperature and excitation density.