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Quantifying Electron-Phonon Coupling in FeSe by Tracking Coherent Phonons P.S. KIRCHMANN, SLAC National Accelerator Lab, USA, S. GERBER, Paul Scherrer Institut, Switzerland, S.-L. YANG, H. SOIFER, D. ZHU, J.A. SOBOTA, S. REBEC, J.J. LEE, T. JIA, B MORITZ, C. JIA, Y. LI, D. LEUENBERGER, SLAC National Accelerator Lab, USA, Y. ZHANG, Peking University, China, H. JANG, J.-S. LEE, S. SONG, J.M. GLOWNIA, S. NELSON, SLAC National Accelerator Lab, USA, K.W. KIM, Chungbuk National University, Korea, Y.-D. CHUANG, Lawrence Berkeley National Lab, USA, R.G. MOORE, T.P. DEVEREAUX, W.-S. LEE, Z.-X. SHEN, SLAC National Accelerator Lab, USA — The superconductor FeSe is a good prototype for studying how correlation effects impact the electron-phonon coupling. Here, we present a new time-domain method to quantify the electron-phonon coupling strength: An optical femtosecond pump pulse excites a coherent A1g phonon; time-resolved x-ray diffraction tracks the coherent lattice motion while ultrafast photoemission monitors the related changes of the electronic bands. We combine the oscillatory responses from both experiments in a high-precision coherent lock-in measurement of the electron-phonon coupling strength. Comparison with theory reveals a strong enhancement of the coupling strength in FeSe due to correlation effects.

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