

Ultrafast Electron Diffuse Scattering: Mapping Momentum Dependent Electron-Phonon Coupling and Nonequilibrium Phonon Dynamics in 2D Materials

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The nature of the couplings within and between lattice and charge degrees of freedom is central to condensed matter and materials physics. These interactions are determining to phenomena as diverse as superconductivity, charge density waves and carrier mobility in semiconductors and metals. Despite their fundamental role, detailed momentum-dependent information on the strength of electron-phonon and phonon-phonon coupling across the entire Brillouin zone has proved elusive. This talk will describe a new technique, ultrafast electron diffuse scattering (UEDS), that provides such information. Specific applications of UEDS to 2D materials will be presented.