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Measuring electron-phonon coupling with Scanning Tunneling Microscopy

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Electron-boson interactions are ubiquitous in systems ranging from simple metals to novel materials such as graphene, high-temperature superconductors and topological insulators. Of particular interest is the coupling between electrons and phonons. In general, electron-phonon coupling gives rise to quasiparticles of decreased mobility and increased effective mass. Nearly all information about electron-phonon coupling is contained in the Eliashberg function ($\alpha^2F(\omega; k, E)$)of the material. In this talk I discuss the various methods by which the effects of electron-phonon coupling can be measured by scanning tunneling microscopy. I will present STM data on a variety of systems ranging from metals to topological insulators and discuss the signatures of electron-phonon interactions in different types of STM data. In particular I discuss how high resolution measurements allow us to measure the dispersion and obtain the real part of the self-energy, which can in principle be inverted to obtain the Eliashberg function.