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STM on LiFeAs - Momentum Resolved Superconducting Gap Structure, Electron-Boson Interactions and Charge Susceptibilities in a Prototypical Iron-Based Superconductor A.W. ROST, Univ. of St Andrews, M.P. ALLAN, Cornell Univ., T.-M. CHUANG, Institute of Physics, Academia Sinica, Taipei, F. MASSEE, K. LEE, M. FISCHER, Y. XIE, Cornell Univ., K. KIHOU, C.-H. LEE, A. IYO, H. EISAKI, AIST, Tsukuba, A.P. MACKENZIE, Univ. of St Andrews, E.-A. KIM, Cornell Univ., D.J. SCALAPINO, Univ. of California, Santa Barbara, J.C. DAVIS, Cornell Univ. — Tunneling spectroscopy on strong coupling superconductors has been one of the key experiments confirming the phonon-mediated mechanism of superconductivity. In the last two decades it has become possible using STM to access this information in real space with atomic resolution. One of the most important aspects of these developments is the ability to extract momentum space resolved information from Fourier-Transform STM measurements. Here we will demonstrate using our recent data on LiFeAs how this technique allows access to a range of fundamental properties of the electronic excitation spectrum. In particular I will show that it is now in principle possible to access momentum space resolved information not only on the superconducting gap structure but also on quantities such as electron-boson interactions and geometric information on 'nesting' vectors giving rise to peaks in the charge susceptibility. The resulting 'fingerprint' of the mechanism driving superconductivity goes well beyond the information obtained in traditional tunneling experiments and has the potential of being a key experimental tool in the study of the mechanism of unconventional superconductors.

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