

Quantum criticality in a paradigm Luttinger liquid: T-dependent ARPES of the Quasi-1D metal $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$

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$\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$ is a quasi-one-dimensional metal having highly anisotropic electronic properties [1]. Previous studies of this material by angle-resolved photoemission spectroscopy (ARPES) [2-4] have shown various signatures of the Luttinger liquid (LL) model [5], including a power-law like density of state (DOS) near Fermi energy E_F . The power-law DOS has also been observed in scanning tunneling spectroscopy, however with a different anomalous exponent α value [6].

I am going to present our most recently work, where we carefully studied the temperature dependence of $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$ over a wide T range of 15-300 K using ARPES. We have found that α shows a strong T-dependent renormalization such that the values found in tunneling and previous ARPES are quantitatively consistent, and that this renormalization is the result of marginal interactions among charge neutral modes present explicitly because of the two-band nature of $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$ [7]. The angle resolved spectra are also analyzed and show T scaling over a wide T range. To understand the slight deviation from perfect T scaling at low T, we compare experiment data to simulations with consideration of finite resolutions. Since low energy ARPES is generally a surface sensitive technique, we compared our results from SRC using low photon energy to those from Spring-8 using high photon energy, which confirms the LL behaviors we have measured in $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$ is of real bulk [8].

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