

Ubiquitous generalized ARPES signatures of electron fractionalization in quasi-low-d metals

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Many quasi-low-dimensional (quasi-low-d) metals show ARPES lineshape anomalies that contrast greatly with the spectra of the quasi-2d Fermi liquid reference material TiTe_2 and hint at the electron fractionalization of the Tomonaga-Luttinger (TL) model. But with the exception of quasi-1d $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$, whose ARPES line shapes have most of the features predicted for the TL model, in general these anomalies do not show detailed agreement with the simple model lineshapes. This situation has generated skepticism as to the occurrence of fractionalization in quasi-low-d metals and so motivates the use of generalized spectral signatures of fractionalization abstracted from the TL and other models. These signatures are found in the normal metallic states of quasi-1-d $\text{K}_{0.3}\text{MoO}_3$, and of quasi-2-d systems like $\text{NaMo}_6\text{O}_{17}$ which display hidden one-dimensionality, and arguably also of quasi-2d superconducting cuprates, if the effects of disorder and the intrinsic nature of \mathbf{k} -independent “background” spectral weight are recognized.

Supported at the Synchrotron Radiation Center by the U.S. National Science Foundation (USNSF); at UM by the U.S. Dept. of Energy under Contract No. DE-FG-02-90ER45416 and by the USNSF under Grant No. DMR-9971611.