

ARPES as microscopy: tracking correlated and topological quasiparticle energetics with spatial resolution in SmB6

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The Kondo lattice compound SmB6 has drawn widespread attention in recent years as the first insulator to feature both strong electronic correlations and topological quantum order, potentially enabling a host of new phenomenologies as the chemical potential is tuned. However, the investigation of electronic band structure versus chemical potential is notoriously challenging in Kondo systems and constitutes a fundamental knowledge gap for this class of many-body state. I will present an angle-resolved photoemission spectromicroscopy (micro-ARPES) study of SmB6 alloys, in which single-sample inhomogeneity is mapped to construct the analogue of a doping series. The doping dependence of the bulk bands is found to reflect strong electronic interactions with a surprisingly large effective Hubbard U parameter of ~ 1.5 eV, which may be a key factor in profound charge localization phenomena associated with disorder and strain in the material. Furthermore, the Fermi momentum of the surface states is observed to closely track with the outer contour of the topological symmetry inversion in momentum space as the bulk energies are varied. These observations affirm the topological classification of the surface states and provide key insight into the doping dependence of Kondo-like systems.