Photoemission spectromicroscopy: correlating local chemistry and electronic structure in quantum materials

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Angle-resolved photoemission spectroscopy (ARPES) is a surface sensitive probe of electronic band structure in crystalline solids, and electronic structure can be strongly influenced by local chemistry/composition. Examples where composition strongly affects electronic structure includes doping-controlled superconductors and topological materials where the presentation of the characteristic surface state depends on the surface termination. Surface chemistry can be measured sequentially with ARPES in the same probing volume using x-ray photoelectron spectroscopy (XPS), and micro/nanofocusing of the photon beam has enabled these techniques to tackle systems with mesoscale inhomogeneity. I will discuss my group's work correlating local surface chemistry with surface electronic structure, using high-temperature superconductors and Weyl semimetals as examples.

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