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Anisotropic Energy-Gaps of Iron-based Superconductivity from Intra-band Quasiparticle Interference in LiFeAs, Part I

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— Cooper pairing in the iron-based high-$T_c$ superconductors is thought to occur due to the projection of the antiferromagnetic interactions between neighboring iron atoms onto the complex momentum-space electronic structure. It is thus pivotal to have an exact measurement of the electronic structure in these materials. In this talk, I will introduce intra-band Bogoliubov quasiparticle scattering interference (QPI) to iron-based superconductor studies. We report a precise determination of the low energy band structure of LiFeAs using QPI. We observe three hole-like bands, in qualitative agreement with dHvA and ARPES studies (“$\gamma$, $\alpha_2$ & $\alpha_1$”). The quantitative determination of the bandstructure is the foundation that we later use to measure the superconducting gap structure with QPI.

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