APS March Meeting 2021

View Abstract

CONTROL ID: 3494469

TITLE: Superconductivity and phonon self-energy effects in $Fe_{1+y}Te_{0.6}Se_{0.4}$

Abstract Body: The measurement of superconducting gaps on different Fermi surface pockets is essential for elucidating the pairing mechanism in multi-band superconductors. The inelastic light scattering, or Raman spectroscopy, has been proven to be the best bulk probe to study the Cooper pair breaking excitations. Here, we present polarization-resolved Raman spectroscopic study of the multi-band superconductor Fe1+yTe0.6Se0.4 with Tc=14K. Deep in the superconducting state, we detect a pair-breaking excitation at 45 cm-1 (5.6 meV) in the non-symmetric channel, consistent with twice of the gap energy (3meV) on the hole-like Fermi pocket with dxz/dyz character around Γ point revealed by ARPES [1]. We also analyze the superconductivity induced phonon self-energy effects for the B1g(Fe) phonon and estimate the electron-phonon coupling constant $\lambda\Gamma \approx 0.026$, which is insufficient to explain the superconducting paring in Fe1+yTe0.6Se0.4 [2].

[1] Rinott et al Sci. Adv. 3, e1602372 (2017).
[2] Wu et al Phys. Rev. Research 2, 013373 (2020).

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