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Large quasiparticle thermal Hall conductivity in the superconductor $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$ ¹ JOSEPH CHECKELSKY, LU LI, Princeton University, G.F. CHEN, J.L. LUO, N.L. WANG, Inst. of Physics, Beijing, China, N.P. ONG, Princeton University — We have measured the thermal conductivity κ_{xx} and thermal Hall conductivity κ_{xy} in single-crystal $\text{Ba}_{1-x}\text{K}_x\text{Fe}_2\text{As}_2$. Below the superconducting transition temperature T_c (~ 30 K), we observe a large peak in the weak-field κ_{xy} . A corresponding peak in the zero-field thermal conductivity κ_{xx} is also observed. Together, these imply the existence of a large population of hole-like quasiparticles below T_c . In magnetic fields H approaching 35 T, the peaks in κ_{xx} are strongly suppressed. A fit of the κ_{xx} vs. H curves shows that the data are consistent with the scattering of long-lived quasiparticles by vortices. Using these fits, we have extracted estimates of the quasiparticle mean-free-path, and separated the zero-field electronic and phononic terms κ_e and κ_{ph} , respectively. We discuss the origin of the large quasiparticle population in terms a strongly anisotropic gap parameter or a gap with nodes.

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Joseph Checkelsky
Princeton University

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