Penetration depth and point-contact spectroscopy studies of exotic superconductivity in noncentrosymmetric half-Heusler YPtBi

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Strong asymmetric spin-orbit coupling in a noncentrosymmetric superconductor allows mixing of even and odd parity of the pairing interactions. Such an exotic pairing interaction has been suggested in some Pt-based noncentrosymmetric superconductors such as CePt$_3$Si and Li$_2$Pt$_3$B. More recently, we reported superconductivity below 0.8 K in YPtBi, a half-Heusler compound that lacks inversion symmetry. Here we present our studies of the superconducting energy gap in YPtBi using soft point contact spectroscopy and superconducting penetration depth measurements via tunnel diode resonator technique. We will compare the morphology of our d$I$/d$V$ energy gap spectra to previous theoretical and experimental results for triplet $sp$-wave materials, and review our analysis of London penetration depth and compare to various possible superconducting energy gap symmetries.