

Are there nodes in LaFePO, BaFe₂(AsP)₂, and KFe₂As₂?

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It is a hot and interesting topic that some of Fe-based superconductors have a nodal gap – a hallmark of an unconventional superconducting (SC) state. I will reexamine the experimental evidences for the possible existence of the SC gap nodes in the three most suspected Fe-pnictide SC compounds: LaFePO, BaFe₂(As_{0.67}P_{0.33})₂, and KFe₂As₂. Then I will show that while the T -linear temperature dependence of the penetration depth $\lambda(T)$ of these three compounds indicate extremely clean nodal gap superconductors, the thermal conductivity data $\kappa(H,T)/T$ unambiguously showed that LaFePO and BaFe₂(As_{0.67}P_{0.33})₂, are extremely dirty, while KFe₂As₂ can possibly be clean. This apparently conflicting experimental data casts a serious doubt on the nodal gap possibility on LaFePO and BaFe₂(As_{0.67}P_{0.33})₂.