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Angle-resolved specific heat in iron-based superconductors: The case for a nodeless extended s-wave gap

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Abstract

We consider the variation in the field-induced component of the specific heat C (H) with the direction of the applied field in Fe pnictides within quasiclassical Doppler-shift approximation with special emphasis to recent experiments on FeSe0.4 Te0.6. We show that for extended s -wave gap with no nodes, C (H) has cos4 component, where is the angle between H and the direction between hole and electron Fermi surfaces. The maxima of C (H) are at π/4, 3π/4, etc., if the applied field is smaller than H0 ≤1T, and at =0, π/2, etc., if the applied field is larger than H0. The angle dependence of C (H), the positions of the maxima, and the relative magnitude of the oscillating component are consistent with the experiments performed in the field of 9TH0. We show that the observed cos4 variation does not hold if the s -wave gap has accidental nodes along the two electron Fermi surfaces. © 2010 The American Physical Society.

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