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Nodal superconducting state in clean single crystals of FeSe S. KASAHARA, T. MIKAMI, Y. MIZUKAMI, Y. KAWAMOTO, S. KURATA, D. WATANABE, T. SHIBAUCHI, Y. MATSUDA, Department of Physics, Kyoto Univ., A.E. BÖHMER , T. WOLF, C. MEINGAST, H. V. LÖHNEYSEN, IFP, Karlsruher Institut für Technologie — Among iron-based superconductors, the binary "11" family offers the possibility to investigate systems consisting of just the iron arsenic/selenium layers without the intermediate layers which are present in the "111", "122" and "1111" families. This simplest iron based superconductor may therefore yield vital information about the origin of superconductivity in the iron pnictides/chalcogenides. Here we measured the penetration depth and thermal conductivity in very clean single crystals of FeSe [1] with RRR > 200. Presence of line nodes is evident by the quasi T-linear dependence of the penetration depth. Moreover, a large residual thermal conductivity, which is much larger than that expected for d-wave symmetry, suggests that nodes are accidental and nearly vanishing. The field dependence of thermal conductivity suggests a possible field induced phase transition in the superconducting state.
[1] A.E. Böhmer et al., Phys. Rev. B **87**, 180505(R) (2013).

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