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Evidence for fully-gapped superconductivity in heavy-fermion $CeCu_2Si_2$ Y. KASAHARA, D. TERAZAWA, T. YAMASHITA, T. ONISHI, Y. TOKIWA, T. TERASHIMA, Y. MATSUDA, Kyoto Univ., T. TAKENAKA, Y. MIZUKAMI, T. SHIBAUCHI, Univ. of Tokyo, J. WILCOX, C. PUTZKE, A. CARRINGTON, Univ. of Bristol, S. KITTAKA, T. SAKAKIBARA, ISSP, Univ. of Tokyo, H. S. JEEVAN, S. SEIRO, C. GEIBEL, Max Planck Institute, Y. HAGA, JAEA — The discovery of superconductivity in heavy-fermion $CeCu_2Si_2$ in 1979 has opened a new playground for unconventional superconductivity in strongly-correlated systems. However, even in this archetypal heavy-fermion superconductor, the symmetry and the structure of the superconducting gap, which are intimately related to the paring mechanism, are still elusive. Here, to investigate the low-energy quasiparticle excitations in the superconducting state of $CeCu_2Si_2$ ($T_c = 0.6$ K), we performed specific heat, thermal conductivity, and penetration depth measurements down to 60 mK. We found that specific heat and penetration depth exhibit exponential T-dependence at low T. Moreover, thermal conductivity has no residual T-linear term and shows little H-dependence. These behavior are in marked contrast to nodal superconductors. From the data taken with different experimental configurations, the detailed superconducting gap structure will be discussed.

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