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Anomalous superfluid response in the layered heavy fermion compound Ce_2PdIn_8 near a magnetic quantum critical point KENICHIRO HASHIMOTO, YUTA MIZUKAMI, RYO KATSUMATA, MINORU YAMASHITA, HIROAKI IKEDA, TAKASADA SHIBAUCHI, YUJI MATSUDA, Department of Physics, Kyoto University, DANIEL GNIDA, DARIUSZ KACZOROWSKI, Institute of Low Temperature and Structure Research, Polish Academy of Sciences, ANTONY CARRINGTON, H. H. Wills Physics Laboratory, University of Bristol — The recently discovered layered heavy fermion superconductor Ce_2PdIn_8 (T_c = 0.7 K) has attracted a great interest because of the appearance of unconventional superconductivity near a quantum critical point. Here we report high-precision measurements of magnetic penetration depth λ down to 60 mK ($\sim 0.1T/T_c$) by using a tunnel diode oscillator operating at $\sim$13 MHz. A strong power-law temperature dependence of λ demonstrates low-energy excitations of quasiparticles, which is consistent with recent thermal conductivity measurements indicative of nodal superconductivity. The observed $T^{1.5}$ behavior at low temperatures, which is commonly seen in superconductors with line nodes near a magnetic quantum critical point such as $CeCoIn_5$ or organics, can be attributed to the enhancement of effective mass towards zero temperature due to quantum magnetic fluctuations even in the superconducting state.

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