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Low temperature penetration depth of κ-$(ET)_2Cu[N(CN)_2]Br$
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Several experimental results have suggested that the quasi-2D organic metal κ-$(ET)_2Cu[N(CN)_2]Br$ is host to some form of unconventional superconductivity. The presence of gap nodes in the superconducting order parameter should be detectable through power law behavior in the penetration depth at low temperature. The most accurate measurements of the temperature dependent penetration depth to date show a fractional power law, $\lambda \propto T^{1.5}$. However, these measurements were not performed at sufficiently low temperatures to determine whether this was due to the combination of gap nodes and the effects of impurity scattering, or due to an intrinsic form of exotic pair excitation. Using a radio frequency (rf) tunnel diode technique in a dilution fridge we have extended these measurements to T $\sim$ 75 mK ($\sim$0.006 T_c). Special care has been taken to eliminate heating effects at these temperatures due to the presence of the small applied rf field. Data at the lowest temperature are more consistent with a nodal state in the presence of impurities.

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