Quantum criticality in single crystalline YFe$_2$Al$_{10}$ determined from zero-field and longitudinal-field muon spin relaxation$^1$ KEVIN HUANG, CHENG TAN, JIAN ZHANG, ZHAOFENG DING, Department of Physics, Fudan University, DOUGLAS MACLAUGHLIN, Department of Physics, UC Riverside, OSCAR BERNAL, Department of Physics, CSU Los Angeles, PEICHUN HO, Department of Physics, CSU Fresno, LIUSUO WU, MEIGAN ARONSON, Department of Physics, Stony Brook University, LEI SHU, Department of Physics, Fudan University — Muon spin relaxation ($\mu$SR) measurements were performed on single crystalline YFe$_2$Al$_{10}$ down to 19 mK and in magnetic fields up to $\sim$100 Oe. Zero-field-$\mu$SR measurements showed no evidence of magnetic order down to 19 mK, consistent with previous measurements. However, we also find that the depolarization rate $\Lambda$ is temperature independent above 1 K but increases in an exponential behavior for $T < 1$ K. Longitudinal-field $\mu$SR measurements also reveals a time-field scaling where $G(t, H) = G(t/H^\gamma)$, with $\gamma = 0.67$. This is further confirmed from the magnetic field dependence of $\Lambda$, which finds $\Lambda(H) \propto H^{0.67}$ at 19 mK. This is further evidence that single crystalline YFe$_2$Al$_{10}$ is in close proximity to a ferromagnetic quantum critical point.

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