Poster-1-9

Superconducting and normal state properties of the kagome system $Ta_2V_{3.1}Si_{0.9}$ probed by muon spin rotation

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Recently, the Kagome lattice has been extensively explored as a model system to host several diverse quantum phases, from frustrated magnetism to unconventional superconductivity [1-3]. $Ta_2V_{3.1}Si_{0.9}$ is a newly identified Kagome superconductor with a T_c of 7.5 K, a record high for Kagome metals at ambient pressure [4]. Here we conducted comprehensive μSR measurements on the superconducting and normal state properties of $Ta_2V_{3.1}Si_{0.9}$ [5], to reveal bulk superconductivity with an extremely low superfluid density, which is comparable to cuprates and currently the lowest T_C/λ^{-2} ratio of all the Kagome superconductors [3]. In addition, below T_c, μSR reveals two nodeless gaps, which are robust against hydrostatic pressure up to 1.8 GPa, and an anomalous paramagnetic shift in response to an external magnetic field. In the normal state, we find a sizeable increase in the zero-field muon spin depolarization rate below 170 K. This shows similarities with other Kagome-lattice superconductors, suggesting a potential state of time-reversal symmetry breaking [6,7], and requires further study to determine its origin. This combination of results classifies $Ta_2V_{3.1}Si_{0.9}$ as possessing both an unconventional superconducting and normal state.

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