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# Quantum critical spin-liquid behavior in $S = 1/2$ quasikagome lattice $CeRh_{1-x}Pd_xSn$ investigated using muon spin relaxation

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We present the results of muon spin relaxation ($\mu$SR) on the Ce-based quasikagome lattice $CeRh_{1-x}Pd_xSn$ ($x$ = 0.1 to 0.5). Our zero-field (ZF) $\mu$SR results reveal the absence of both static long-range magnetic order and spin freezing down to 0.05 K in the single crystal sample of $x = 0.1$. The weak temperature-dependent plateaus of the dynamic spin fluctuations below 0.2 K in ZF-$\mu$SR together with its longitudinal-field (LF) dependence between 0 and 3 kG indicate the presence of dynamic spin fluctuations persisting even at $T$ = 0.05 K without static magnetic order. On the other hand, the magnetic specific heat divided by temperature $C_{4f}/T$ increases as -log $T$ on cooling below 0.9 K, passes through a broad maximum at 0.13 K and slightly decreases on further cooling. The ac-susceptibility ($\chi_{ac}$) also exhibits a frequency independent broad peak at 0.16 K, which is prominent with an applied field $H$ along the $c$-direction. We, therefore, argue that such behavior for $x = 0.1$ (namely, a plateau in the spin relaxation rate ($\lambda$) below 0.2 K and a linear $T$-dependence in $C_{4f}$ below 0.13 K) can be attributed to a metallic spin-liquid (SL) ground state near the quantum critical point (QCP) in the frustrated Kondo lattice. The LF-$\mu$SR study suggests that the out of kagome plane spin fluctuations are responsible for the SL behavior. The ZF-$\mu$SR results for the $x = 0.2$ polycrystalline sample exhibits similar behavior to that of $x = 0.1$. A saturation of $\lambda$ below 0.2 K suggests a spin-fluctuating SL ground state down to 0.05 K. The ZF-$\mu$SR results for the $x = 0.5$ sample are interpreted as a long-range antiferromagnetic (AFM) ground state below $T_N$ = 0.8 K, in which the AFM interaction of the enlarged moments probably overcomes the frustration effect.

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