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$\mu$SR Study of Non-Magnetic Non-Centrosymmetric Superconductor LaRhSi$_3$
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— We report on results of $\mu$SR experiments in a transverse field geometry of the non-centrosymmetric non-magnetic superconductor LaRhSi$_3$. LaRhSi$_3$ crystallizes in the BaNiSn$_3$-type tetragonal structure (space group I4mm) and it has a critical temperature $T_c$ of 2.2 K. LaRhSi$_3$ is a type II superconductor which in magnetic fields presents an unusually sharp specific heat transition suggesting first order transitions. Under a field 250 G, LaRhSi$_3$ has a relatively low $H_{c2}$ in respect to its $H_{c1}$ of 90 G and a Pauli limit of 3.3 T. Surprisingly, at a field of 150 G we find the onset of depolarization of the muons to occur at a temperature which is a factor of 4 higher than the $T_c$ obtained from transport measurements.

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