Muon-spin rotation measurements of the penetration depth of the Mo_3Sb_7 superconductor

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The analysis of the magnetic field penetration depth λ in the single crystals of superconductor Mo_3Sb_7 ($T_c \approx 2.1$ K) was carried out based on the transverse field muon-spin-rotation measurements. The calculated absolute values of λ, the Ginzburg-Landau parameter κ, the first H_{c1} and the second H_{c2} critical fields at $T = 0$ are $\lambda(0) = 720(25)$ nm, $\kappa(0) = 55(4)$, $\mu_0 H_{c1}(0) = 1{:}8(1)$ mT, and $\mu_0 H_{c2}(0) = 1{:}9(2)$ T. The zero temperature value of the superconducting energy gap $\Delta(0)$ was estimated at 0.35(1) meV corresponding to the ratio $2\Delta(0)/k_B T_c = 3{:}83(10)$. At low temperatures the $\lambda^{-2}(T)$ dependence saturates and becomes constant below $T \approx 0.3T_c$, in agreement to what would be expected for $s-$wave BCS superconductors. At temperature of 20 mK the μSR spectra were collected for several magnetic field values in range $0 < B/B_{c2} \leq 0.1$. This led to the depolarization rates in mixed superconducting state, which reveal the constant $\lambda(B)$ behavior, in variance to what is found for several non-conventional superconductors.