The spin lattice relaxation of ^{8}Li in simple metals

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In simple elemental metals, we often find that implanted $^8Li^+$ ions undergo a thermally activated site change below room temperature, with significant occupation of a metastable site at low temperature. The two sites generally differ in their hyperfine couplings to the host conduction band. In this paper, we present evidence of the site change from spin lattice relaxation measurements. At high magnetic field, the relaxation is Korringa-like, and we develop a detailed model of its temperature dependence through the transition. This model works best for Ag, Au and Al and less well for Nb. In contrast at low field (below about 0.01 Tesla), another mode of relaxation becomes dominant, likely due to the dynamic host nuclear spins. In this regime, in Au at 8 Gauss applied field, we find a pronounced T_1 minimum at the site change temperature and discuss its origin.

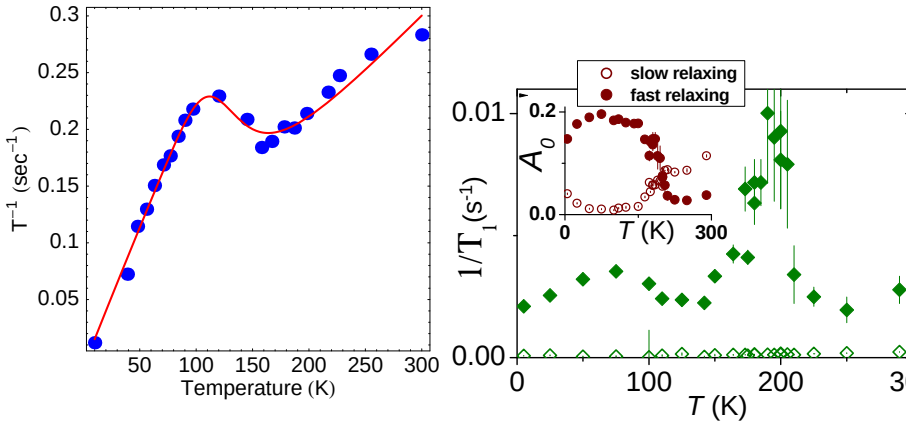

Fig. 1: Left: The temperature dependent spin lattice relaxation in Ag at 3 Tesla and Right: The rate in Au at 8 Gauss which exhibits a two component relaxation.