

Cross-relaxation of ^8Li in copper

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It is well-known that the “cross relaxation” method (also called “level-crossing resonance” or “avoided level-crossing”) is a powerful technique that can be used to provide detailed structural and site information on impurities in materials. In this paper, we report on the development of the cross-relaxation technique at the ^8Li β -detected nuclear magnetic resonance (β -NMR) facility located in TRIUMF in Vancouver, Canada. The measurements were carried out on a Cu single crystal in which relaxation rate of the ^8Li polarization was monitored as a function of the applied longitudinal magnetic field. The occurrence of cross-relaxation, at a particular magnetic field, between the ^8Li and the surrounding ^{63}Cu and ^{65}Cu nuclei is evident as a resonant enhancement of the relaxation rate at the level crossing field. We discuss inferences about the site and structure of ^8Li in Cu from this data. Typical cross-relaxation spectrum is shown in Fig.1.

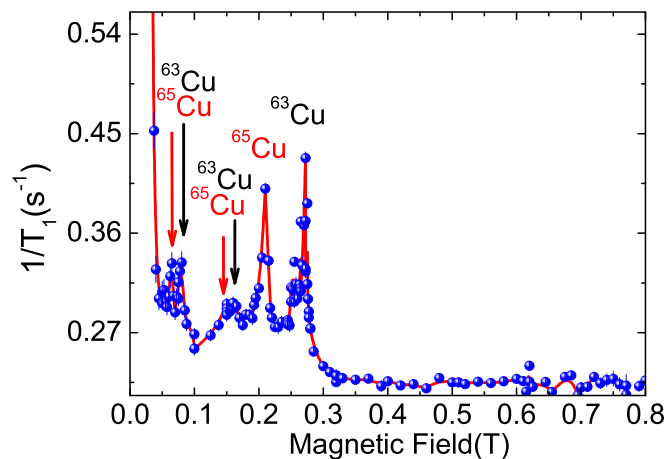


Fig. 1: Cross-relaxation spectrum showing the field dependence of ^8Li spin-lattice relaxation rate $1/T_1$ in a $\langle 100 \rangle$ Cu single crystal at 200 K.