Cu-NMR study on dimer-chain complex quantum spin system $Cu_3Mo_2O_9$

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The low dimensional quantum spin system $Cu_3Mo_2O_9$ possesses two spin degrees of freedom, the antiferromagnetic chain denoted as Cu(1), and dimer-like site denoted as Cu(2) and Cu(3), which are crystallographically slightly inequivalent. These two spin degrees of freedom are interacting with one another, and are expected to bring a novel spin state at low temperatures. So far, it has been reported by T. H. that this system shows a Néel order at $T_{\rm N}$ =7.9 K, with a slightly canted spin structure.[1] We have performed Cu-NMR study on a single crystal under a wide range of the magnetic field up to 16T. In the ordered state, the signal peak of the dimer-like site shows an anomalous splitting at high fields above $H_{\rm c}(4.2K) \simeq 8$T, where a slight magnetization jump of $0.01\mu_{\rm B}$ was observed, indicating an existence of the field-induced phase transition. A prominent hysteresis in spectra depending on the field-sweeping direction was observed at the vicinity of $H_{\rm c}$, suggesting that the phase transition is of the first order and is involved in a spin-charge or spin-lattice coupling.

[1]T. Hamasaki *et al.*, Phys. Rev. **B77** 134419 (2007).