NMR STUDY OF TWO TRANSITIONS IN TRIANGULAR-LATTICE ANTIFERROMAGNET $CsV(MoO_4)_2$

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We carried out ^{133}Cs NMR measurements on triangular lattice magnet $CsV(MoO_4)_2$ single crystals. $CsV(MoO_4)_2$ belongs to the trigonal space group $P\bar{3}m1$ at room temperature, where V^{3+} ions (S=1) form a regular triangular lattice in the basal plane with Cs atoms located between them.[1] The heat capacity measurement revealed two phase transitions around 24 K and 29 K, the former related to an antiferromagnetic ordering and the latter unknown. The ^{133}Cs (I = 7/2, γ= 5.5844 MHz/T) spectrum at 40 K showed a set of simple seven lines due to its electric quadrupole moment. The seven lines started to shift to lower frequencies below 29 K, at which low temperature XRD measurements also revealed an anomaly. Upon further cooling, each electric quadrupole line split into three pairs below 24 K, which is associated to the AFM ordering at the same temperature. The ^{133}Cs spin-lattice relaxation time (T_1) showed significant change around 24 K but no apparent features around 29 K. The NMR results indicate that $CsV(MoO_4)_2$ goes through a structural phase transition at 29 K and an AFM transition at 24 K. The splitting of the NMR spectrum suggests the 120 degree ordered phase below 24 K.[3] We discuss the possible origin of the structural phase transition considering the orbital degree of freedom of V^{3+}.[4]

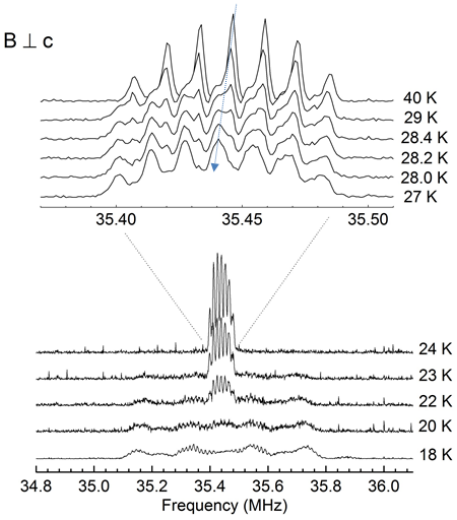

Figure 1. ^{133}Cs NMR spectra for B ⊥ c at 6.36 T showing two transitions around 29 K and 24 K.

[1] K. H. Lii, *et al*., J. Solid State Chem. **80**, 144 (1989).
[2] H. D. Zhou, *et al*., unpublished
[3] L. E. Svistov, *et al*., JETP Letters, **81**, 102 (2005).
[4] T. M. McQueen, *et al*., Phys. Rev. Lett. **101**, 166402 (2008).

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