Ground State and Magnetic Excitations of S=1/2 Kagome Antiferromagnets

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Kagome lattice antiferromagnet (KAFM) is well known as one of the geometrically frustrated system. For $S = 1/2$ system, when we approach the ground state of KAFM using the dimer model, we can expect two kinds of quantum spin state. One is the resonating valence bond (RVB) state and the other is the valence-bond solid (VBS) state. Since both ground states are non-magnetic, we need to distinguish between the two by measuring the magnetic excitation using the inelastic neutron scattering method.
$A_2Cu_3SnF_{12}$ (A = Cs and Rb) is the first experimental realization of S=1/2 KAFM whose single crystals are available. For A=Rb, the ground state is non-magnetic with finite excitation gap[1]. For A=Cs, the system undergoes antiferromagnetic phase transition at $T_N = 20$ K[2]. In order to investigate their ground states and magnetic excitations, we have performed inelastic neutron scattering experiments. For A=Rb, two singlet-to-triplet gaps are clearly observed at Brillouin zone center $\mathbf{Q} = (0, 2, 0)$[3]. We will also show the recent results for A=Cs case.

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