Abstract Submitted
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Neutron scattering study of the dimerized spin 1/2 AFM kagome lattice in $Rb_2Cu_3SnF_{12}$ YANG ZHAO, University of Maryland, College Park / NIST NCNR, K. MATAN, Mahidol University, Thailand, Y. NAMBU, T. J. SATO, Tohoku University, Japan, Y. FUKUMOTO, Tokyo University of Science, Japan, T. ONO, Osaka Prefecture University, Japan, H. TANAKA, Tokyo Institute of Technology, Japan, C. BROHOLM, Johns Hopkins University / NIST NCNR, A. PODLESNYAK, G. EHLERS, SNS — The deformed AFM kagome lattice $Rb_2Cu_3SnF_{12}$ is the first realization of 'pinwheel' valence bond solid (VBS) ground state system [1]. Using inelastic neutron scattering technique, we mapped out the spin excitation spectrum up to 12 meV. The singlet to triplet transition is split by a substantial Dzyaloshinskii-Moriya (DM) interaction, with the energy gap at 2.4 meV ($S_z = \pm 1$) and 6.9 meV ($S_z = 0$), respectively. While both excitations are non-dispersive to within 1.0 meV for wave vectors, q_z, perpendicular to the kagome like plane, the intensity varies differently with q_z for the two modes. This difference can be explained by the different polarization factor for $S_z = \pm 1$ and $S_z = 0$ excitations. Under a magnetic field along the c-axis, the low energy gap persist near 1 meV for the fields between 9 T and 15 T. Our findings emphasize the important role of DM interaction in this material.

[1] K. Matan, T. Ono, Y. Fukumoto, T. J. Sato, J. Yamaura, M. Yano, K. Morita, and H. Tanaka, Nature Physics 10 (2010).

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