Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dynamical spin correlation function in a frustrated two-leg spin-ladder system TAKANORI SUGIMOTO, MICHIYASU MORI, ASRC, Japan Atomic Energy Agency; CREST, Japan Science and Technology Agency, TAKAMI TOHYAMA, YITP, Kyoto University, SADAMICHI MAEKAWA, ASRC, Japan Atomic Energy Agency; CREST, Japan Science and Technology Agency — We numerically study the magnetic excitations in a frustrated two-leg spin-ladder system, in which all magnetic exchange interactions, i.e., the nearest-, next-nearest-neighbor sites in the leg direction, and the nearest-neighbor sites in the rung direction, are antiferromagnetic. This is a minimal model describing a low-dimensional quantum spin compound, $BiCu_2PO_6$. We calculate a dynamical spin correlation function at zero temperature by using the dynamical density-matrix renormalization-group method in possible magnetic phases, columnar dimer and rung singlet. The columnar dimer phase is characterized by multi-spinon excitations, while the rung singlet phase is dominated by a triplon excitation, which is the triplet excitation in the rung direction. Difference between these two types of excitations appears in the spectral weight, in particular, of the bonding and anti-bonding modes in the rung direction. Therefore, we can distinguish one phase from the other by distribution of the spectral weight. In addition, we examine frustration effect on the bonding mode, so-called bound triplon, with a perturbation theory from the strong coupling limit in the rung direction. Our study is expected to be useful to analyze inelastic neutron scattering data for $BiCu_2PO_6$.

Takanori Sugimoto
ASRC, Japan Atomic Energy Agency;
CREST, Japan Science and Technology Agency

Date submitted: 27 Nov 2012 Electronic form version 1.4