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Elementary Excitations in Quantum Sine-Gordon Spin System $KCuGaF_6$

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Thermodynamic properties and elementary excitations in $S = 1/2$ one-dimensional Heisenberg antiferromagnet $KCuGaF_6$ were investigated by magnetic susceptibility, specific heat and ESR measurements. Due to the Dzyaloshinskii-Moriya interaction with alternating D-vectors and/or the staggered g-tensor, the staggered magnetic field is induced when subjected to external magnetic field. Specific heat in magnetic field clearly shows the formation of excitation gap, which is attributed to the staggered magnetic field. The specific heat data was analyzed on the basis of the quantum sine-Gordon (SG) model. We observed many ESR modes including one soliton and three breather excitations characteristic of the quantum SG model. Details of the present study are shown in Ref. [1].

[1] R. Morisaki, T. Ono, H. Tanaka and H. Nojiri: arXiv:cond-mat/0703671.