Stripy order in buckled honeycomb lattice antiferromagnet Ba_2NiTeO_6

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*Ba NiTeO is a rare experimental realization of a buckled honeycomb lattice antiferromagnet. The nearest-neighbor and next-nearest-neighbor interactions in the honeycomb lattice are comparative due to the buckled geometry, leading to magnetic frustration. A magnetic transition is observed at 8.6 K in the susceptibility and heat capacity measurements [1]. The frustration parameter /T is 18.6, where is Weiss temperature and is the magnetic transition temperature. In order to investigate the low temperature state we performed neutron scattering experiments. In the diffraction profile magnetic Bragg peaks are observed at < , and the propagation vector is identified as (0, 1/2,1). Combination of the representation analysis and Rietveld refinement reveals that a collinear stripy structure [2] is realized [3]. Our calculation suggests that the stabilization of the stripy structure instead of spiral structure is ascribed to the competition between magnetic frustration and easy-axis type anisotropy. In the inelastic neutron spectrum at 2 K a magnetic excitation with an energy gap of 2 meV is observed. Spin-wave calculation based on two-dimensional frustrated honeycomb lattice antiferromagnet having easy-axis anisotropy reproduces the experimental data. The obtained parameters are consistent with Weiss temperature estimated from the bulk magnetic susceptibility measurement. [1] K. Kasatani et al.JPS 2014 autumn meeting (2014) 7aPS-133. [2] J. G. Rau et al., PRL **112**, 077204(2014). [3]. S. Asai et al. PRB **93**, 024412 (2016).*