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Modelling the Berezinskii-Kosterlitz-Thouless Transition in the NiGa_2S_4

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In the two-dimensional superfluidity, the proliferation of the vortices and the anti-vortices results in a new class of phase transition, Berezinskii-Kosterlitz-Thouless (BKT) transition. This class of the phase transitions is also anticipated in the two-dimensional magnetic systems. However, its existence in the real magnetic systems still remains mysterious. Here we propose a phenomenological model to illustrate that the novel spin-freezing transition recently uncovered in the NMR experiment on the NiGa_2S_4 compound is the BKT-type. The novel spin-freezing state observed in the NiGa_2S_4 possesses the power-law decayed spin correlation.