Effect of Quantum Fluctuation on Two-Dimensional Spatially Anisotropic Heisenberg Antiferromagnet with Integer Spin

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Abstract: In the present paper, we calculate the Gaussian correction to the critical value $J_{\perp}^c$ caused by quantum spin fluctuation in a two-dimensional spatially anisotropic Heisenberg antiferromagnet with integer spin S. Previously, some authors computed this quantity by the mean-field theory based on the Schwinger boson representation of spin operators. However, for S=1, their result is much less than the one derived by numerical calculations. By taking the effect of quantum spin fluctuation into consideration, we are able to produce a greatly improved result.

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