

# Ground-state phases of frustrated bilayer quantum Heisenberg antiferromagnets

*Wednesday, 5 December 2018 11:25 (20 minutes)*

We consider the quantum antiferromagnetic Heisenberg model on the square-lattice and honeycomb-lattice bilayers in the absence of an external magnetic field. We use a variational approach to construct the ground-state phase diagrams of such model on different bilayers. For simplicity, we choose two one-parameter variational wave functions, which can describe states of model in two regions with different relationships between lattice parameters. We calculate variational energies and compare them. This allows us to find borders between different states, where one of the variational energies is minimal. Finally, we construct ground-state phase diagrams in different coordinates. At the end of this study we compare our findings with the earlier results obtained by more sophisticated approaches [1, 2]. We observe good agreement with these results. This studies were performed together with O. Derzhko, J. Richter and O. Götze.

[1] H. Zhang et al., Phys. Rev. B 93, 235150 (2016);

[2] J. Stapmanns et al., Phys. Rev. Lett. 121, 127201 (2018).

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**Session Classification:** Condensed Matter Physics

**Track Classification:** Condensed Matter Physics