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Exact solutions for Ising models with triplet interactions and external field

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Ising model on honeycomb, decorated honeycomb and diced lattices, and other planar lattices with single decoration on each bond, is solved exactly in the presence of pair and triplet interactions with additional external magnetic field acting on specific sites. Field induced transition is observed when triplet interactions are present. Reentrance phenomenon is found in the decorated triangular lattice. With particular value of the magnetic field, exact critical temperature is obtained also when the field acts on all lattice sites.

Primary author: Prof. URUMOV, Viktor

Presenter: Prof. URUMOV, Viktor

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