

# Crystal fields induced compensation temperatures in a decorated square lattice

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## Abstract

A two-sublattice decorated Blume-Capel ferrimagnet has been investigated using the mean field theory. Interesting behaviors of long-range order are obtained depending on particular magnitudes of magnetocrystalline anisotropies for both sublattices sites. Distinguishable features have been discovered in two-dimensional decorated lattice consisting of spin-5/2 and decorating spin-7/2 ions on the bonds. It is found the present system shows two ferrimagnetic compensation temperatures. However, one compensation temperature for different or fixed values of decorated magnetic anisotropies with the values of  $J_1=-0.5$  ,  $J_2=-1.0$  , or with  $J_1=-1.0$  ,  $J_2=-0.5$ , has been induced, respectively. The magnetization behavior in the  $(M, DB/IJ_2I)$  space has not already been considered showing the crystalline anisotropy dependence of total magnetization remanences. Besides, the variations of net magnetizations versus the decorated crystal fields, i.e., in the  $(M, DA/IJ_2I)$  space, have been done, with  $J_1=-0.5$ ,  $J_2=-1.0$  , for various values of  $T=2.0, 2.5, 3.0$  , respectively.

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