

Phase diagrams of spin-3/2 Blume-Capel model on rectangular lattice under longitudinal magnetic field

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The spin-3/2 Blume-Capel model on a rectangular lattice

$$H = - \sum_{i=1}^L \sum_{j=1}^L \left[\Gamma^z S_{i,j}^z + D(S_{i,j}^z)^2 + K^F S_{i,j}^z S_{i+1,j}^z + K^A S_{i,j}^z S_{i,j+1}^z \right]$$

with the ferromagnetic bilinear short-range interaction ($K^F = 1 + x$, $x \in [-1, 1]$) in one direction and the anti-ferromagnetic one ($K^A = -1 + x$) in the perpendicular direction under a longitudinal magnetic field Γ^z and in the presence of a single-ion anisotropy D is investigated within the mean field approximation. The phase diagrams in the (x , temperature) plane are constructed for different values of the longitudinal magnetic field and the single-ion anisotropy.