Magnetic properties of six-legs spin-S (S=½, 1) Ising nanotube under the effect of an external field

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Over the last few years, magnetic nanoparticles (nanotubes and nanowires) have attracted the interest of experimental and theoretical researches owing to their quantum importance, surface boundary effects and their promising technological applications such as drug delivery, biomedicine, magnetic resonance (MRI), permanent magnets, long-lasting memories and recording media. In this work, we study a single-walled hexagonal spin-S (S=½ or 1) Ising nanotube on the basis of the effective-field theory (EFT) with correlations and the differential operator technique (DOT). In the six-leg spin nanotube, each spin is connected to its nearest-neighbors through exchange couplings both along the chains (J // ) and adjacent chains (J ⊥ ). Exact expressions for of magnetization, initial susceptibility, critical temperature are obtained as well as the ground phase diagram that is established for different exchange couplings. Some interesting phenomena are revealed, especially for opposite exchange interactions, magnetization plateaus and frustration are found.

Recent Publications:


Biography

Mohamed El Hafidi is Professor of Quantum Physics and Magnetism at Hassan University II of Casablanca (Morocco) since 1985. He prepared a part of his PhD at the High Magnetic Field Laboratory (Grenoble, France) and he stayed as a visiting professor at a visiting professor at Joseph Fourier University of Grenoble. He currently supervises research on topological structures and low dimensionality magnetic systems.

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