MODULATED PHASES, PHASE DIAGRAMS AND THE LIFSHITZ POINT IN MnP FROM THE MEAN FIELD THEORY

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9.7 cm

MnP is the only magnet for which the multicritical Lifshitz point (LP) was found and several critical exponents determined. The axial next-nearest-neighbor Heisenberg (ANNNH) model with the orthorhombic anisotropy was applied to describe its magnetic phases and phase transitions occurring when the magnetic field H is applied along the lattice vectors **a**, **b**, and **c**. Its solution was obtained using analytical methods of Nagamiya theory augmented with numerical minimization of the energy with respect to the wave vector q of magnetic modulated structures (heli, fan, cone). The results include:
a) The dependence $q(H)$ and magnetization curves for all modulated phases. Predicted properties of the cone phase are yet to be experimentally tested.
b) Magnetic phase diagrams for three directions of the applied field ($H \parallel \mathbf{c}$, $H \parallel \mathbf{b}$ and $H \parallel \mathbf{a}$). The characteristics and T, H coordinates of there occurring special points (Lifshitz points, triple point, critical end point, and terminations of critical lines) remain in accordance with the experiment.
c) The effective values of some critical exponents (ϕ, β_k, β_m) for the LP. Results provide explanation, alternative with respect to RG theory, of their experimental values.

13.4 cm

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