9.7 cm

Properties of the periodic AFM/nonmagnetic multilayers in external magnetic field

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In this presentation we study the influence of the external magnetic field on the equilibrium structure and magnon spectra of the superlattices consisting of alternating antiferromagnetic and nonmagnetic layers. A good example of such a structure is given by MnTe/ZnTe multilayers grown by MBE. Due to misfit strains preferable orientation of the magnetic moments is parallel to the film plane. Propagation of the magnetic perturbation is caused by strong magnetoelastic coupling between longitudinal oscillations of AFM vectors and transverse acoustic phonon mode which propagates perpendicular to the film plane. Transverse magnetic oscillations are locked inside the AFM layers.
According to our calculations, application of the magnetic field perpendicular to the film plane does not change equilibrium in-plane orientation of the magnetic moments but results in a quadratic field dependence of the gap in longitudinal magnon frequency which may be in principle experimentally detected.
In-plane orientation of the magnetic field may result in spin-flop transition. The value of spin-flop field depends upon the elastic stiffness of the neighboring nonmagnetic layer. Arbitrary in-plane orientation causes deflection of AFM moments from $\langle 10 \rangle$ easy spin-axis directions but does not affect noticeably the spectrum of longitudinal magnons.

13.4 cm

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