SPIN-WAVES IN MAGNETS WITH IMPURITIES: LANDAU-LIFSHITZ EQUATION APPROACH

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9.7 cm

Using the Landau-Lifshitz equation the interaction of long-wavelength excitations with magnetic defects in ferro- and antiferromagnets is studied. The defects are supposed to produce random inhomogeneous magnetic field and may have different geometry, e.g. be point, line or plane imperfections. The static random magnetic structure caused by this field is determined together with equations for the spin waves. The Dyson equation for a magnon self-energy is derived and its solution for different scales of inhomogeneities is analysed. The magnon frequency shift and damping are found as well as the lineshape of ferromagnetic resonance. It is shown that the width of the uniform resonance has an essentially nonlinear dependence on the impurity concentration, the effect missed by the usual first Born approximation theory. The impurities in an antiferromagnet are also considered using the same approach.

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