From magnetic resonance to magnonics: reprogrammable spin wave flow in nanostructured magnets

In this lecture we first outline the equation of motion of correlated spins, discuss the resonant behavior of the magnetic susceptibility, and introduce the concept of an effective magnetic field. We then discuss the anisotropic dispersion relations for spin waves (magnons) in thin films in the long-wavelength limit and explain the reconfigurable artificial crystal, i.e., the paradigm of magnonics. This magnetic device allows one to tailor and reprogram spin-wave dispersion relations on demand.

For the first part we follow the book “Magnetic oscillations and waves” by A.G. Gurevich and G.A. Melkov, CRC Press, 1996.

The second part is contained in the review “Review and prospects of magnonic crystals and devices with reprogrammable band structure", M. Krawczyk and D. Grundler, J. Phys.: Cond. Matter 26, 123202 (2014).

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