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Title:Electrically active magnetic excitations in antiferromagnets

Authors:Krivoruchko, V.N. (1)

Author affiliation:(1) O.O. Galkin Donetsk Inst. for Phys. & Technol., Donetsk, Ukraine

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Abstract:Operating magnetic resonance by an electric field is a highly nontrivial concept, but is the most demanding function in the future of spin-electronics. Recent observations in a variety of multiferroic materials, named 'collective electrically active magnetic excitations' and frequently referred to as 'electromagnons,' reveal a possibility of implementing such a function. Experimental advances in terahertz spectroscopy of electromagnons in multiferroics, as well as related theoretical models, are reviewed. Earlier theoretical works, where the existence of electric-dipole-active magnetic excitations in antiferro- and ferrimagnets with collinear spin structure has been predicted, are also discussed. Multi-sublattice magnets with electrically active magnetic excitations at room temperature provide a direct opportunity to transform one type of excitation into another in a terahertz time-domain. This is of crucial importance for magnon-based spintronics, since only short-wavelength exchange magnons allow signal processing at nanoscale distances.

Number of references:97

Inspec controlled terms:antiferromagnetic materials - ferrimagnetic materials - gadolinium compounds - magnetic resonance - magnons - multiferroics - reviews - spin systems - terahertz wave spectra - terbium compounds

Uncontrolled terms:review - perovskite manganites - signal processing - short-wavelength exchange magnons - terahertz time-domain spectroscopy - multisublattice magnets - collinear spin structure - ferrimagnets - electric-dipole-active magnetic excitation - electromagnons - multiferroic materials - spin-electronics - magnetic resonance - antiferromagnets - collective electrically-active magnetic excitation - temperature 293 K to 298 K - TbMnO<sub>3</sub> - GdMnO<sub>3</sub>

Inspec classification codes:A7580 Magnetomechanical and magnetoelectric effects, magnetostriction - A7530D Spin waves in magnetically ordered materials - A7870G Microwave and radiofrequency interactions with condensed matter - A7550G Ferrimagnetics - A7650 Ferromagnetic, antiferromagnetic, and ferrimagnetic resonances; spin wave resonance - A7550E Antiferromagnetics - A0130R Reviews and tutorial papers; resource letters

Numerical data indexing:temperature 2.93E+02 2.98E+02 K

Chemical indexing:TbMnO<sub>3</sub>/ss O<sub>3</sub>/ss Mn/ss Tb/ss O/ss;GdMnO<sub>3</sub>/ss O<sub>3</sub>/ss Gd/ss Mn/ss O/ss

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