

MAR10-2009-002376

Abstract for an Invited Paper
for the MAR10 Meeting of
the American Physical Society

Magnetic and magnetoelectric excitations in multiferroic manganites

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Multiferroics are materials simultaneously showing ferromagnetic and ferroelectric order. Two order parameters are coupled in these materials, which leads to such unusual effects like magnetic switching of electric polarization and dielectric constant. As can be expected already from the first principles, changes in the static properties of multiferroics must be accompanied by dynamic effects like characteristic magnetoelectric excitations. Indeed, such excitations could be recently observed in the spectra and were called electromagnons. Contrary to the conventional magnons, the electromagnons are excited by the electric component of the electromagnetic wave and contribute to the static dielectric permittivity. The suppression of electromagnons in external magnetic fields provides a natural explanation for the magnetoelectric effects in broad frequency range between dc and terahertz.