



CONDENSED MATTER THEORY SEMINAR

Multiferroics: magneto-electric coupling through phonons

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Abstract:

Multiferroic systems exhibit the interplay between magnetic and electric moments, that is the coupling between electronic degrees of freedom: intrinsic spin and charge density distribution/polarization. One common scenario for magnetoelectric coupling is based upon noncollinear spin textures, but multiferroicity has been also linked to magnetoelastic deformations in collinear spin models, that produce in turn dielectric polarizations. Motivated by different experiments where the coupling between magnetic moments, elastic distortions and electric dipoles has been observed, we propose an effective model in which the magnetoelectric coupling is mediated by lattice distortions. A bosonization analysis predicts the profile for the electric dipoles which is confirmed numerically by DMRG. We also analyze the effect of an external electric field E when the magnetic system is in a gapped (plateau) phase and show that the magnetization can be reversed by means of reversing E .