

# Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart  
Max-Planck-Institut für Festkörperforschung  
Max-Planck-Institut für Intelligente Systeme

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Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

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## Multiferroics

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### Abstract

In today's electronics ferroelectrics and ferromagnets play a key role and are used in a wide range of applications. The quest for multiferroic materials, where these two phenomena are intimately coupled is of great fundamental and technological importance. The most considered multiferroics are those who combine ferroelectricity and ferromagnetism and in addition reveal strong magnetoelectric coupling, which allows the control of magnetization by electric fields and the control of polarization by magnetic fields. This talk will provide a broad introduction into the basics of multiferroics, of magnetoelectric coupling and of possible applications. Specifically I will focus on different routes to induce multiferroic order in single phase materials, like multiferroicity induced by charge order or spin-driven ferroelectricity. In the latter case the switching of the ferroelectric polarization by external magnetic fields can be experimentally demonstrated. In addition, I will discuss the observation of electromagnons in multiferroics constituting a new fundamental class of excitations.