

# Unusual Manifestations of Ferroelectric Order in Multiferroics

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Materials with a coexistence of magnetic and electric order, called multiferroics, are rare because (anti)ferromagnetic and ferroelectric order tend to be mutually exclusive. Magnetic order based on transition-metal exchange interactions requires partially filled 3d orbitals while ferroelectricity of the displacive hybridisation type calls for empty 3d shells. In this sense, any occurrence of magnetoelectric multiferroicity inherently involves unusual realisations of ferroelectric order.

In my talk I will highlight various examples for these "exotic ferroelectrics" and how the unconventional origin of the spontaneous polarization leads to manifestations that may be relevant for future oxide electronics devices. The experiments presented here were conducted by optical second harmonic generation and by piezoresponse force microscopy.