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Chiral Magnons in Multiferroic Ni3TeO6

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The search for novel materials exhibiting non-trivial properties is the main task of solid state research. Ranging from high temperature superconductivity over quantum computers, novel batteries to spintronics and multifunctional materials, this field spans a wide range of disciplines and material types. One specific field of interest within magnetism is multiferroicity where especially materials experiencing strong couplings are promising.

One such material is the multiferroic Ni_3TeO_6 which undergoes a hysteresis-free first order spin-flop transition from an antiferromagnetic collinear order to an incommensurate helical structure at 8.6 T along c, sporting one of the larges magnetoelectric responses measured. This transition is controllable through both magnetic and electric field. The ordering vector jumps from (0, 0, 1.5) to (0, 0, 1.5$\pm\delta$) with $\delta \sim 0.18$. This position is mirrored in the minima of the low field spin-wave gap and in magnetic field the gaps move linearly but in opposite directions, with a cross over around the known phase transition field of 8.6 T. We hypothesize that these magnons condense at the phase transition establishing the high field ground state and have opposite chirality. Due the crystal symmetry (R3) the three distinct magnetic Ni ions are allowed to move along c relative to each other coupling the lattice, electric and magnetic degrees of freedom. In this talk I will present our resent polarized inelastic results.

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