Poster-2-6

Magnetic and magnetoelectric properties of $LiFePO_4$

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The ability to control magnetic and electric properties is attractive for tailoring materials for devices, data storage and sensor technology. In magnetoelectric materials, these two degrees of freedom are closely linked and this makes them particularly interesting [1]. Here we revisit one such system, $LiFePO_4$, which has been known since the 60s and is now a well-known battery material [2]. Early on, it turned out that $LiFePO_4$ is also a complex antiferromagnetic and magnetoelectric system [3,4]. By combining electric polarization measurements and neutron diffraction under pulsed magnetic fields as well as mean-field calculations we identify the spin-flop phase above 31 T and observe the corresponding change in the magnetoelectric tensor symmetry [5,6]. However, the persistence of off-diagonal magnetoelectric tensor elements above the critical field suggests a lowering of the magnetic point group symmetry and hence a more complex magnetic structure in the high-field phase. Moreover, our mean-field calculations show that the system is less frustrated than first anticipated. The results demonstrate the effectiveness of combining pulsed-field neutron diffraction and electric polarization measurements to elucidate the magnetic structures and symmetries at the highest attainable field strengths.

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