

Abstract Submitted  
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**Induction of novel macroscopic properties by local symmetry violations in spin-spiral multiferroics**<sup>1</sup> D. MEIER, UC Berkeley, N. LEO, University Bonn, P. BECKER, L. BOHATY, University of Cologne, R. RAMESH, UC Berkeley, M. FIEBIG, University Bonn — Incommensurate (IC) structures are omnipresent in strongly correlated electron systems as high- $T_C$  superconductors, CMR manganites, as well as multiferroics. In each case they are origin of a pronounced symmetry reduction reflecting the complexity of the underlying microscopic interactions. Macroscopically, this can lead to new phases and possibilities to gain control of the host material. Here we report how the IC nature of a spin-spiral multiferroic induces new physical properties by renormalizing the relevant length scales of the system. Local symmetry violations directly manifest in the macroscopic response of the material and co-determine the multiferroic order giving rise to additional domain states. These usually hidden degrees of freedom become visible when non-homogenous fields are applied and condition for instance the second harmonic generation. Our study shows that incommensurabilities play a vital role in the discussion of the physical properties of multiferroics – they represent a key ingredient for further enhancing the functionality of this class of materials.

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