

Abstract Submitted
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Ginzburg-Landau theory for the conical cycloid state in multiferroics: Applications to CoCr_2O_4 ¹ CHUANWEI ZHANG, Department of Physics and Astronomy, Washington State University at Pullman, SUMANTA TEWARI, Department of Physics and Astronomy, Clemson University, JOHN TONER, Department of Physics and Institute of Theoretical Science, University of Oregon at Eugene, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland at College Park — We show that the cycloidal magnetic order of a multiferroic can arise in the absence of spin and lattice anisotropies, e.g., in a cubic material, and this explains the occurrence of such a state in CoCr_2O_4 . We discuss the case when this order coexists with ferromagnetism in a so-called “conical cycloid” state and show that a direct transition to this state from the ferromagnet is necessarily first order. On quite general grounds, the reversal of the direction of the uniform magnetization in this state can lead to the reversal of the electric polarization as well without the need to invoke “toroidal moment” as the order parameter.

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