Abstract Submitted
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Vortex walls in helical magnets[1] FUXIANG LI, Dept. Physics and Astronomy, Texas A&M University, THOMAS NATTERMANN, Inst. Of Theoretical Physics, University of Cologne, D-50937, Cologne, Germany, VALERY POKROVSKY[2], Dept. Physics and Astronomy, Texas A&M University — The structure of domain walls determines to a large extent the properties of magnetic materials, in particular their hardness and switching behavior, it represents an essential ingredient of spintronics. In Bloch and Neel domain walls the magnetization rotates around a fixed axis in a one-dimensional magnetization profile. Surprisingly, domain walls in helical magnets, most relevant in multiferroics and metals, were never studied. We show that domain walls in helical magnets are fundamentally different from Bloch and Neel walls. They are generally two-dimensional patterns formed by a regular lattice of vortex singularities. Only at discrete exceptional orientations, domain walls are free of vortices, but still remain two-dimensional textures. In helical magnets with weak anisotropy the domain wall width and energy only weakly depend on the anisotropy, though domain wall does not exist without it. In conical phases vortices carry Berry phase flux resulting in the anomalous Hall effect. In multiferroics vortices are electrically charged allowing manipulating magnetic domain walls by the electric field. Our theory allows the interpretation of magnetic textures observed in helical magnetic structures.

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