

Abstract Submitted
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Fractional vortices and composite domain walls in flat nanomagnets¹ OLEG TCHERNYSHYOV, GIA-WEI CHERN, Johns Hopkins University — We provide a simple explanation of complex magnetic patterns observed in ferromagnetic nanostructures. To this end we identify elementary topological defects in the field of magnetization: ordinary vortices in the bulk and vortices with *fractional* winding numbers ($\pm 1/2$) confined to the edge [1]. Domain walls found in experiments and numerical simulations in strips and rings are composite objects containing two or more of the elementary defects. Allowed compositions of a domain wall in a strip or ring are constrained by simple selection rules of topological origin: (i) An edge contains an odd number of edge defects. (ii) The net winding number of all edge and bulk defects is zero. The walls observed most frequently in experiments and simulations contain a halfvortex and an antihalfvortex (transverse walls in thin and narrow strips) or two antihalfvortices and a vortex (vortex walls in thicker and wider strips).

References

[1] O. Tchernyshyov and G.-W. Chern, Phys. Rev. Lett. **95**, 197204 (2005).

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