Abstract Submitted
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Frustrated Vortices[1] V. ROSE, H. IBACH, Forschungszentrum Jülich (ISG3), Germany, V. METLUSHKO, University of Illinois, Chicago, S.-H. CHUNG, K. BUCHANAN, M. GRIMSDITCH, V. NOVOSAD, A. HOFFMANN, S.D. BADER, Argonne National Laboratory (MSD and CNM) — Patterning soft magnetic materials into ring structures can give rise to a vortex state of the magnetization. When two rings interact strongly, i.e., through direct contact, the vortex states should have opposite chiralities. Thus, for three interacting rings there is an obvious frustration between the magnetic states. We have fabricated isolated and contiguous arrays of permalloy rings, with diameters of 1–4 μm, widths of 0.2–1.8 μm, and thickness of 15 nm. Their field dependent magnetization was investigated with magnetic force microscopy and magneto-optical Kerr effect measurements, accompanied by micromagnetic simulations. Generally, in isolated rings the magnetization reverses via nucleation and annihilation of a vortex state. However, in the case of three interconnected rings the magnetization reversal depends on the direction of the applied field. With the field along the midpoints of two of the rings the magnetization changes gradually, while for the field tangential to the connection between two of the rings vortices develop with opposite chiralities and the third ring remains in an onion state.

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Axel Hoffmann
Argonne National Laboratory

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