

Abstract Submitted
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Putting a spin on speckle: the twisted way magnets remember

TRIEU MAI, University of California, Santa Cruz — Major hysteresis loops in magnetic systems have generally been thought to be symmetric under reversal of the two axes. We show why this is incorrect, and how the asymmetry provides an explanation for recent x-ray speckle experiments on thin films that show a nontrivial microscopic difference between the zero field states produced by starting from large positive and large negative fields, and generalizations thereof. This unexpected result is due to the dynamics of vector spins; scalar models such as the Ising model are inadequate for this purpose, even if the anisotropy is high. We compare data from magnetic thin film speckle experiments with our numerical model, and find good agreement for many features. In certain regions of parameter space of the model, we find an unusual ‘mixed phase’ of magnetic domains. We also present results on nanomagnetic pillar arrays, where a similar symmetry violation and multicycles for minor hysteresis loops are seen.

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