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Antivortex-core switching as write process in random access memories ANDRE DREWS, TORU MATSUYAMA, LARS BOCKLAGE, MARKUS BOLTE, GUIDO MEIER, Institute of Applied Physics and Microstructure Research Center, University of Hamburg, Germany, BENJAMIN KRUEGER, STELLAN BOHLENS, Institute of Theoretical Physics, University of Hamburg, Germany — Magnetic vortices observed in ferromagnetic thin films have received a great deal of interest in recent years. The topological counterpart of a vortex, the antivortex, has not been investigated as intensively so far. Like vortices, magnetic antivortices gyrate when excited by alternating fields or spin-polarized currents. When excited by alternating currents and fields simultaneously, the superposition of the forces leads to an enhancement or suppression of the gyration amplitude, depending on the orientation of the in-plane magnetization, i.e., the c-value of the antivortex, and the antivortex-core polarization p. Thus the c-p-dependent amplitude variation of antivortex core gyration can lead to antivortex-core switching and thus to write binary data. Reading out of the data can be done by detecting the amplitude of gyration, e.g. by inductive loops. A logical zero (one) is represented by a small (large) gyration amplitude, i.e., suppression (enhancement) of the gyration. Due to the c-p-dependence of the excitation amplitude, an ensuing toggle switching is impossible. This technique allows bringing the antivortex into a distinct binary state without the need of a reading process before writing the bits.

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