

Magnetic domain walls in cylindrical nanowires – Towards 3D storage media?

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The motion of magnetic domain walls along 1D systems has been an active field of research in the past 15 years. Beyond fundamental interest, an applied background is the search for low-power storage and computing schemes. Another prospect, yet even more challenging, is the concept of a three-dimensional data storage device proposed by IBM ten years ago, the race-track memory. Such a device would be based on dense arrays of cylindrical nanowires, where bits are coded in the form of magnetic domain walls along each wire.

So far mostly theory and simulations have addressed magnetic domain walls in cylindrical nanowires. Through an overview of these predictions, I will show that the expected physics is drastically different from the one encountered in the more traditional geometry of flat strips investigated so far. I will then present a selection of our results concerning synthesis, magnetic microscopy, analytical and micromagnetic modeling.