

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Bi-directional magnetic domain wall shift register D.E. READ, L. O'BRIEN, H.T. ZENG, E.R. LEWIS, D. PETIT, R.P. COWBURN, Imperial College — Data storage devices based on magnetic domain walls (DWs) propagating through ferromagnetic nanowires have attracted a great deal of attention in recent years [1,2]. Here we experimentally demonstrate a shift register based on an open-ended chain of ferromagnetic NOT gates. When used in combination with a globally applied magnetic field such devices can support bi-directional data flow [3]. We have demonstrated data writing, propagation, and readout in individually addressable NiFe nanowires 90 nm wide and 10 nm thick. Up to eight data bits are electrically input to the device, stored for extended periods without power supplied to the device, and then output using either a first in first out or a last in first out mode of operation. Compared to traditional electronic transistor-based circuits, the inherent bi-directionality afforded by these DW logic gates offers a range of devices that are reversible and not limited to only one mode of operation. [1] S. S. Parkin, US Patent 6,834,005 (2004) [2] D. A. Allwold, et al., Science 309 (5741), 1688 (2005) [3] L. O'Brien, et al. accepted for publication in APL (2009)

Dan Read
Imperial College

Date submitted: 20 Nov 2009

Electronic form version 1.4