

MAR16-2015-020236

Abstract for an Invited Paper  
for the MAR16 Meeting of  
the American Physical Society

### **Rise of Racetrack Memory! Domain Wall Spin-Orbitronics**

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Memory-storage devices based on the current controlled motion of a series of domain walls (DWs) in magnetic racetracks promise performance and reliability beyond that of conventional magnetic disk drives and solid state storage devices (1). Racetracks that are formed from atomically thin, perpendicularly magnetized nano-wires, interfaced with adjacent metal layers with high spin-orbit coupling, give rise to domain walls that exhibit a chiral Néel structure (2). These DWs can be moved very efficiently with current via chiral spin-orbit torques (2,3). Record-breaking current-induced DW speeds exceeding 1,000 m/sec are found in synthetic antiferromagnetic structures (3) in which the net magnetization of the DWs is tuned to almost zero, making them “invisible”. Based on these recent discoveries, Racetrack Memory devices have the potential to operate on picosecond timescales and at densities more than 100 times greater than other memory technologies. (1) S.S.P. Parkin et al., *Science* 320, 5873 (2008); S.S.P. Parkin and S.-H. Yang, *Nat. Nano.* 10, 195 (2015). (2) K.-S. Ryu et al., *Nat. Nano.* 8, 527 (2013). (3) S.-H. Yang, K.-S. Ryu and S.S.P. Parkin, *Nat. Nano.* 10, 221 (2015). (4) S.S.P. Parkin, *Phys. Rev. Lett.* 67, 3598 (1991).