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Dramatic effect of curvature on DW velocity in chiral domain walls CHIRAG GARG, Max Planck Institute for Microstructure Physics, Halle, SEE-HUN YANG, TIMOTHY PHUNG, AAKASH PUSHP, IBM Almaden Research Ctr, STUART S.P. PARKIN, Max Planck Institute for Microstructure Physics, Halle, MAGNETOELECTRONICS GROUP, IBM ALMADEN TEAM — The use of current pulses to manipulate domain walls (DWs) in nanowires is one of the most exciting developments in spintronics over the past decade, promising a range of novel devices. However, even after more than 10 years of work on current induced DW motion it has not been realized that the curvature of the nanowire can affect the speed of chiral DWs. Here we show that simply changing the sign of the curvature of a nanowire, dramatically changes the speed of Néel DWs in perpendicularly magnetized nanowires, by up to a factor of 10. We find that, DWs have an increased or decreased velocity in wires of a given curvature, independent of the DW chirality and the sign of the current induced torques. The fundamental origin of this effect is due to a current induced tilting of the DW that breaks the symmetry of the DW's motion with respect to the curvature of the wire. Whilst the strong dependence of the DW velocity on the nanowire's curvature may offer added device functionalities, we find that in synthetic antiferromagnetic nanowires, the influence of the curvature on the DW's velocity can be completely removed.

Chirag Garg
IBM Almaden Research Ctr

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