[Title] Racetrack memory: From the current-induced domain wall motion to Skyrmion on the track

[abstract]

For the last decade, a broad range of devices based on domain wall (DW) motion has been proposed, including high-density data storage, logic and sensing devices. In order to avoid an insurmountable issue of the magnetic field driven DW motion, the current-induced DW motion gives us synchronous multiple DW displacements, which is a mandatory ingredient to realize DW based devices. Recently, magnetic skyrmions, topologically stable spin configuration based on chiral interactions known as Dzyaloshinskii-Moriya (DM) interactions, make a meteoric rise as a promising candidate for future non-volatile information-processing devices [1].

In this presentation, the current stage of the current-induced DW motion and the scientific obstacles of it is discussed. On the other hand, a radically different approach to manipulate DWs and realize synchronous multiple DWs by applying magnetic field pulses is demonstrated as well [2]. Such these numerous efforts to improve the efficiency of the current-induced DW motion lead to experimentally demonstrate the existence of the DM interaction, which is a theoretically predicted physical quantity [3] and the basis of the skyrmion state. Finally, a quantitative measurement method of the DM energy density, Brillouin (inelastic) light scattering, is introduced [4].

[References]

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