MAR11-2010-004929

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Logic Devices Based on Spin Current[1]

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The need to find low power alternatives to digital electronics circuits has led to increasing interest in alternative switching schemes like the magnetic quantum cellular automata that store information in nanomagnets which communicate through their magnetic fields. A recent proposal called all spin logic (ASL) proposes to communicate between nanomagnets using spin currents which are spatially localized and can be conveniently routed. In this talk we present a model for ASL devices that is based on established physics and is benchmarked against available experimental data. We investigate switching energy-delay of ASL devices and provide frameworks that allow simple comparisons with charge based devices like CMOS and can help to determine possible use of ASL in future logic implementation. Expected scaling of switching energy-delay of ASL devices as magnets are downscaled while retaining their stability against thermal fluctuations will be presented.

[1]This work was supported by Nanoelectronics Research Initiative (NRI) and Network for Computational Nanotechnology (NCN).

[2]First author would like to acknowledge his collaborators Angik Sarkar, Srikant Srinivasan and Supriyo Datta.