



FIRST INTERNATIONAL NANOTECHNOLOGY CONFERENCE ON COMMUNICATION AND COOPERATION

Abstract

Spintronics for Information Processing
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There is an urgent need to seek for new innovative low power devices for information processing beyond that of scaled CMOS. Alternate logic state variables, such as the use of particle spin in lieu of today's charge based electronics, may offer a possibility of resolving today's most critical bottlenecks – power dissipation and interconnect. Spin-based devices offer a new opportunity for low power, high functional throughput applications. We analyze a couple of new kinds of nano scale spin-based devices and computational architectures using spin waves for information transmission and processing. We will discuss the concepts and their experimental progress to date for spin-based devices. By introducing these novel circuits built on the spin-based devices and spin wave interconnect, we anticipated enhanced logic functionality. It may be possible to implement more logic functions with a smaller number of devices than it has place for today's computing architectures. The performance of the proposed devices is illustrated by numerical modeling based on the experimental data. We explore the possibility to take advantage of some of the features of these new spin-based elements while preserving full compatibility with the conventional architecture and processing of CMOS. We will examine the potential for new low power high functional electronics applications from spin nanostructures to computational paradigms.