

Charge Mediated Nonvolatile Spintronic Logic

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In this presentation a spin logic device called MESO is introduced which uses magneto-electric switching in combination with an efficient spin to charge transduction mechanism. The new family of spin logic devices is based on magneto-electric and spin-orbit effects, is energy efficient and addresses a prior shortcoming of all prior spintronic devices – the slow switching and interconnect speed, while it is also dimensionally scalable. The innovative impact of MESO logic is its realization of charge mediated interconnect at its output, and a voltage signal to the capacitive input of following gate. The proposed MESO devices scale favorably with critical dimensions of the device, showing a cubic scaling of energy/switching ($E_{\text{MESO}} \propto 1/W^3$) and square law scaling of energy with voltage ($E_{\text{MESO}} \propto V^2$). The proposed logic technology is superior in energy-delay product to the leading beyond CMOS options while allowing scalable nanoscale interconnects, and non-volatility.



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He received the B.E.E and the M. Eng. Science, from the University of Melbourne, Australia. He received the Ph.D. in Electrical Engineering from the University of California, Berkeley