

**JOINT INSTITUTE FOR MOLECULAR AND NANOSCALE INNOVATION (IMNI) AND
DIVISION OF ENGINEERING – ELECTRICAL SCIENCES SEMINAR****Magnetic QCA: From Devices to Circuits to
Architectures (and back!)****Prof. Michael Niemier**

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Email: mniemier@nd.edu<http://www.cse.nd.edu/~mniemier/>**Thursday, October 2, 2008****Barus & Holley, Room 190****12:00pm****Abstract**

At present, numerous research efforts are seeking a new logic device to either replace or augment CMOS technology to continue the performance scaling trends of the past 40 years. In this talk, I'll examine how a magnetic implementation of the Quantum-dot Cellular Automata device architecture (MQCA) might help in this regard. I will discuss extensions of existing experimental work – where wires and gates have been demonstrated in isolation at room temperature -- and consider the milestones on the critical path to a computationally interesting system that must ultimately be addressed in order for MQCA to be a viable alternative to CMOS. In addition, I will illustrate how device design, design techniques to facilitate more complex circuit structures, and system-level architectures are best considered simultaneously. Particular emphasis will be placed on the energy efficiency of said structures.

Michael T. Niemier is an assistant professor at the University of Notre Dame. He obtained his Ph.D. from Notre Dame in 2004. He was a faculty member at the Georgia Institute of Technology before returning to Notre Dame. His research interests include designing, facilitating, and evaluating architectures for emerging technologies with an emphasis on magnetic logic based on the QCA device architecture. He is also interested in mechanisms for heterogeneous technology integration.