

## MATERIALS SCIENCE COLLOQUIUM

SPEAKER: Dr. Ilya Krivorotov  
Cornell University

TITLE: Dynamics of Nanomagnets Driven by Spin-Polarized Current

DATE: Thursday, July 7, 2005

TIME: 11:00 a.m.

PLACE: Building 212, Room A157

HOST: Axel Hoffmann

Refreshments will be served at 10:45 a.m.

### Abstract:

Spin-polarized electrons traversing a ferromagnet can transfer spin angular momentum to the local magnetization, thereby inducing magnetization reversal or exciting persistent magnetization dynamics. To understand the mechanism of this recently discovered effect, we make time-resolved measurements of spin-transfer-driven excitations in nanoscale ferromagnetic dots. We find that spin-polarized current can generate coherent magnetic excitations with dephasing times significantly exceeding those of the field-driven modes observed in ferromagnetic resonance experiments. In the switching regime, magnetization reversal induced by spin-polarized current is accomplished via a process of precession, and the switching time is determined by competition between transfer of angular momentum and magnetic energy dissipation. Measurements of magnetic relaxation in the presence of spin-polarized current show that the relaxation is strongly current-dependent. Our observations provide tests of spin transfer theories and demonstrate feasibility of technological applications of spin transfer in the areas of high frequency communications and non-volatile electronics.