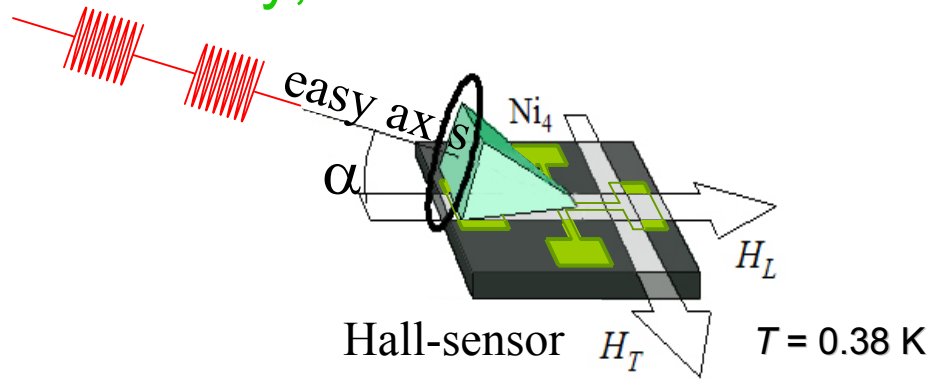
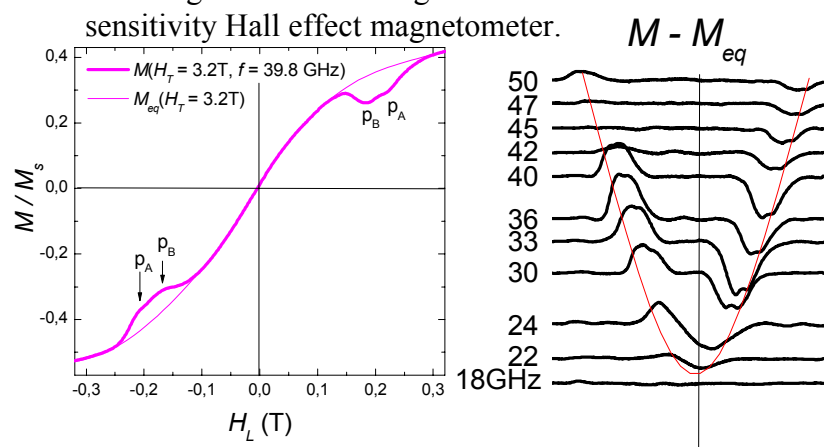
Acquisition of a High Frequency Measurement System for Magnetic Nanostructure Research and Student Training

Andrew D. Kent, New York University, DMR-0315609

This award has enabled the acquisition of a state-of-the-art high frequency (.05 to 50 GHz) measurement system to study nanomagnets. A recent highlight of this research has been a spectroscopic study of quantum tunneling of the magnetization--a quantum mechanical effect that leads to reversal of the magnetization. Such process are of great importance in understanding the fundamental limits to magnetic data storage as well as the possibilities of using nanomagnets in quantum computing.



Pulsed microwave radiation is applied to ensemble of nanomagnts while the magnetization is measured with a high sensitivity Hall effect magnetometer.



Measurements of the magnetization versus applied field in the presence of microwave radiation. Magnetic transitions induced by the microwaves are observed as peaks and dips in the magnetization. The position of these peaks is used to determine the energy level structure of the nanomagnets.

Preprint at: cond-mat/0405331 and to appear in Physical Review Letters 2004

Additional information available at:
http://www.physics.nyu.edu/kentlab/

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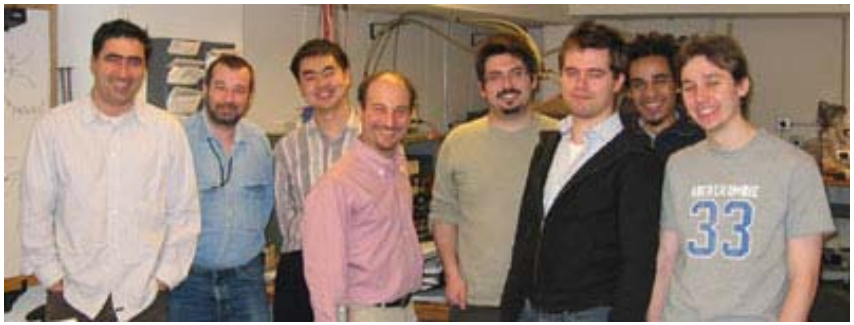

Kent group at NYU. Pictured above (left-right): Enrique del Barco, Mark Oftiserov, Wenyu Chen, Andrew Kent, Barbaros Ozyilmaz, Jan Larsen, Jean-Marc Beaujour and Mariano Zimmler

- **Education** This instrumentation has been critical to the research projects of:

  Post-docs: Enrique del Barco, Jean-Marc Beaujour

  Graduate Students: Wenyu Chen, Jan Larsen and Barbaros Ozyilmaz (accepted post-doc position, starting 2005).

  Undergraduates: Mariano Zimmler (beginning graduate study at Harvard, Fall 2004), Stuart Kirschner, Brian Hayes and Lorraine Robinson

  High School Student: Yuriy Kagan, Intel Science Research (beginning at Columbia, Fall 2004)

- **Societal Impact**

  Research of fundamental importance and critical to future magnetic information storage technology.