

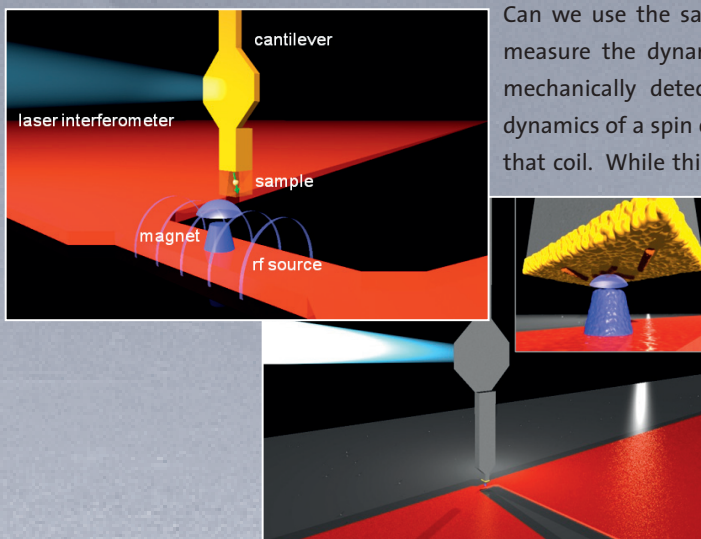
Magnetic Resonance Imaging with Nanomechanics

May 12, 2010, 16:45h, HPV G4

Martino Poggio

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Tea and Coffee at 16:15h



Can we use the same forces that cause two magnets to attract or repel each other to measure the dynamics of single spins? This is the basic question driving research in mechanically detected magnetic resonance. In conventional magnetic resonance, the dynamics of a spin ensemble alter magnetic fields inside a pick-up coil inducing currents in that coil. While this works beautifully for macroscopic samples, the scheme breaks down, as samples approach the nanoscale. Moving to a mechanically-detected technique is one solution to this problem. In such methods, the oscillating force between spins and a small magnet drive a compliant cantilever. The cantilever's mechanical oscillations are then measured using an optical interferometer. I will describe how mechanically detected techniques have been used to do nanoscale magnetic resonance imaging, achieving a billion-fold improvement in the volume sensitivity over inductively-detected methods. Could a "molecular structure microscope", whereby one could image the atomic structure of macromolecules, be around the corner?

24.2.2010

Ferdinand Brennecke
Institute for Quantum Electronics, ETH Zurich, Switzerland

3.3.2010

Neil Weiner
Department of Physics, New York University, USA

10.3.2010

A. Douglas Stone
Department of Applied Physics, Yale University, USA

17.3.2010

Andrea Cavalleri
University of Hamburg, Germany and University of Oxford, UK

24.3.2010

Dave Wark
The Blackett Laboratory, Imperial College London, UK

31.3.2010

John Morton
Materials Dept. & Clarendon Laboratory, Oxford University, UK

7.4.2010

Easter – no Colloquium

14.4.2010

Erwin Frey
Theoretical Physics, LMU München, Germany

21.4.2010

Philip Russel
MPI for the Science of Light, Erlangen, Germany

28.4.2010

Harold Y. Hwang
Department of Applied Physics, University of Tokyo, Japan

5.5.2010

Slava Mukhanov
Theoretical Physics, LMU München, Germany

12.5.2010

Martino Poggio
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26.5.2010

Reinhard Werner
Institut für Mathematische Physik, TU Braunschweig, Germany

2.6.2010

Richard Wielebinski
MPI für Radioastronomie Bonn, Germany