DOTTORATO DI RICERCA IN FISICA

CORSO DI SEMINARI DI STRUTTURA DELLA MATERIA

A.A. 2007/2008

Si informano gli studenti del Dottorato di Ricerca in Fisica, e altri interessati, che

Venerdì 13 Giugno 2008, alle ore 16, in Aula Dottorato, il

Dr. Roberto Mantovan

Laboratorio Nazionale MDM (CNR-INFM)

terrà un seminario dal titolo:

SPINTRONICS: AN OPTION FOR FUTURE DATA STORAGE

Sommario:

There is large interest in developing novel concepts for non-volatile memory devices. The emerging field of spin-based electronics is characterized by the use of the electron spin and it is one of the most likely candidates for the new generation of electronic devices. Among the most competitive solutions for replacing and/or integrating the currently used memory options, the magnetoresistive random access memory (MRAM) is the most promising. The bit storage element in a MRAM is the magnetic tunnel junction (MTJ), consisting of two ferromagnetic layers acting as electrodes separated by a tunnel barrier.
In a MTJ, the storage element is constituted by the soft electrode magnetization. The read-out process is possible through the reading of two distinct perpendicular-to-plane resistances in the MTJ stack, depending on the relative orientation of the electrodes magnetization (tunnel magnetoresistance effect - TMR).

In the seminar the basic principles of the MTJ operation and the TMR effect will be outlined, giving a short overview of the currently pursued strategies for producing highly performing MTJ devices for non-volatile memory applications. The search for a "perfect" tunnel barrier and the need of fully spin-polarized ferromagnetic electrodes is demanding and some of the recent advances will be presented. Our research efforts towards the use of atomic layer- and chemical vapour-deposition methods for fabricating MTJs will be reported. Particular attention will be given to the synthesis and the structural, magnetic and magneto-transport characterization of magnetite (Fe_3O_4), a ferrimagnet showing exciting properties such as half metallicity. Some recent results obtained at the MDM Laboratory related to the characterization of ferromagnetic layers/oxide interfaces at the atomic scale, mainly by means of Mössbauer spectroscopy, will be presented.

Il Titolare del corso
Prof. A. Rigamonti