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CENTRO INTERDISCIPLINARE MATERIALI E INTERFACCE NANOSTRUTTURATI

Wednesday, 24th February 2010

10.30

Aula Caldirola

Dipartimento di Fisica

Università degli Studi di Milano

MAGNETORESISTANCE AND SPINTRONIC DEVICES

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Magnetoresistance (MR) is the change of electrical resistance in a material occurring upon the application of a magnetic field.¹ Since the first observation of MR in Fe by William Thomson in 1856, different MR phenomena has been discovered, sometimes understood, and exploited in the recent years. In particular, the engineering of thin films and multilayers opened the way for the realization of devices showing large MR effects like to so-called giant-MR (GMR)² and tunnel-MR (TMR),³ which opened the way for the realization of innovative spin-based electronic devices for applications in magnetic field sensing (high density hard disks) and non-volatile memory devices (magnetic RAM, MRAM). In this talk, I will present the basic principles of MR phenomena focusing on the exploitation of MR effects in spintronic devices. Results of MR measurements in magnetite (Fe_3O_4) films deposited by chemical vapour deposition will be presented, together with a correlation between MR and the atomic-scale properties of Fe_3O_4 as investigated by Mössbauer spectroscopy.⁴ I will present our efforts in the development of a full in situ atomic layer/chemical vapour-deposition system for the synthesis of magnetic tunnel junctions for memory applications, an activity performed in the framework of the SPAM³ project.⁵

¹ Mathias Getzlaff "Fundamentals of Magnetism", Springer-Verlag Berlin Heidelberg 2008.

² http://www.nobelprize.org/nobel_prizes/physics/laureates/2007

³ C. Chappert, A. Fert, and F. N. Van Dau, Nature 6, 813 (2007).

⁴ R Mantovan, A. Lamperti, M. Georgieva, G. Tallarida, and M. Fanciulli, J. Phys. D: Appl. Phys. 43, 065002 (2010).

⁵ <http://www.mdm.infm.it/SPAM3>

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