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Physics Department
Condensed Matter

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"Hysteresis Loops of Ferromagnetic-Antiferromagnetic (AFM) Systems after Imprinting Inhomogeneous Magnetization states in the AFM"

The shape of magnetic hysteresis loops is usually ascribed to internal material parameters (crystalline anisotropies, grain size, etc.), thus magnetic properties typically remain fixed after sample preparation. However, tailoring the loop shape by using post-deposition external parameters is appealing from a technological point of view. In this talk the possibility of engineering hysteresis loops in ferromagnetic-antiferromagnetic (F-AF) systems by imprinting different magnetization states in the AF during the cooling procedure will be presented. Two types of systems have been studied by cooling them from above the blocking temperature of the AF in *unsaturated* states (i.e., using zero or rather small fields): F-AF continuous bilayers with out-of-plane anisotropy and F-AF circular dots with in-plane anisotropy. In the first case dual-loops are obtained, where the magnetization amplitude and the loop shift of each of the two sub-loops composing the dual-loop can be independently tailored, allowing the whole loop to be tuned from a symmetric double-shifted to a single-shifted hysteresis loop. This originates from the imprint of F domains of opposite magnetization into the AF [1]. In the second case, a new type of asymmetric hysteresis loop is found. This asymmetry is characterized by the appearance of curved, reversible, central sections in the hysteresis loops, with tunable non-zero remanent magnetization [2]. This is ascribed to the imprint of displaced magnetic vortices in the AF during the cooling process, which pin the vortex core of the F away from the dot center.

Friday, May 5, 2006
11:00am, Room 432 Phy/Geo