



PHYSICS

COLORADO STATE UNIVERSITY

CSU PHYSICS COLLOQUIUM

A Journey Through Magnetic Memory

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Monday, April 30th at 4:00p.m.
120 Engineering (Hammond Auditorium)

Abstract

Magnetic memory is a key component in the development of magnetic storage nanotechnologies. Magnetic domain memory (MDM) is the ability exhibited by certain ferromagnetic thin films to reproduce the exact same nanoscale magnetic domain pattern after it has been erased by an external magnetic field. I will review the various circumstances under which this unusual phenomenon occurs. We will see how MDM was first observed in rough Co/Pt multilayers as a result of disorder. I will then describe how 100 % MDM can be achieved even in smooth ferromagnetic films, by coupling the film to an antiferromagnetic template through exchange interactions at low temperature (1). I will review the persistence of MDM through field cycling and through warming. Additionally, we will discuss the spatial dependence of MDM, highlighting intriguing oscillatory behaviors revealing magnetic correlations and rotational symmetries at the nanoscopic and microscopic scales.(2) Finally, we will review the dependence of MDM on cooling conditions, revealing how MDM can be fully controlled, turned on and off, by adjusting the magnitude of the cooling field.(3)

(1) K. Chesnel, E.E Fullerton, J.B. Kortright & S. Kevan, PRB 78, 132409 (2008)

(2) K. Chesnel, J. Nelson, S. Kevan & E.E. Fullerton, PRB 83, 054436 (2011)

(3) K. Chesnel, A. Safsten, M. Rytting & E.E Fullerton, Nature Comm, 7, 11648 (2016)