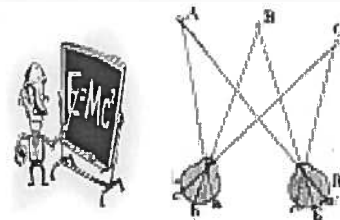




WEEKLY CALENDAR



Department of Physics and Astronomy
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Baton Rouge, Louisiana 70803-4001

April 30, 2007

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<http://www.phys.lsu.edu>

GENERAL SEMINAR

"Topological Hysteresis in Superconductors and Ferromagnets"

3:40PM / Thursday, 3 May 2007 / Room 109

[Refreshments served at 3:15 PM in Room 229 Nicholson]

Host: Dr. Philip Adams

Ruslan Prozorov, Ph.D.

Ames Laboratory, Iowa State University

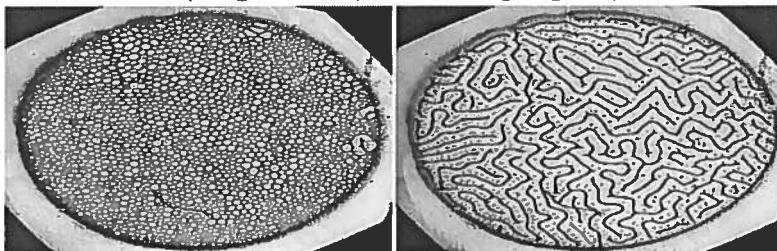
It is commonly believed that magnetic hysteresis is caused by the imperfections and defects of the crystal structure resulting in pinning of magnetic flux in superconductors or domain walls in ferromagnets. The alternative cause of pinning is shape- and surface- related energy barriers (e.g., geometric and Bean-Livingston) that result in spatially nonuniform free energy and corresponding metastable states of the system.

In this talk I will describe a different type of magnetic hysteresis that is only observed in clean, pinning-free samples. Most importantly, this hysteresis cannot be annealed or removed by any "material improvement", so it is an equilibrium property. I call this topological hysteresis to indicate that the difference in the topologies of the intermediate state in type-I superconductors or ferromagnetic domains in soft ferromagnets can lead to a measurable hysteretic response of magnetization. I will discuss the failure of the textbook (Landau) treatment of the intermediate state as well as topological time-reversal symmetry breaking that lead to some very unusual magnetic structures.

The general conclusions of my talk can be relevant for various fields of physics, chemistry, mathematics and cosmology where pattern formations in complex nonlinear systems take place.

(The presentation will be illustrated by images and movies of direct magneto-optical visualizations of the magnetic structures.)

different flux topologies in a superconducting single crystal Pb disc



Material Science and Engineering Seminar

"Where Superconductivity Meets Magnetism"

3:40PM / Wednesday, 2 May 2007 / Room 109

Host: Dr. John Ditusa

Zachary Fisk, Ph.D.

University of California-Irvine

We know where to look for heavy Fermion superconductors, but we still have no good idea why they are there. Some history of the search for new superconductors is discussed in the context of the magnetic/non-magnetic boundary, as well as what we have and have not been learning from this.

Reminder:

Faculty meeting Tuesday, May 1, 2007 at 3:15 p.m. in Room 109 Nicholson.