PHYS 1443 – Section 002
Lecture #7

Wednesday, Sept. 24, 2008
Dr. Jaehoon Yu

- Exam Solutions

Announcements

- First term exam result
  - Class average: 61/103
    - Equivalent to 59.1/100
  - Top score: 101/103
  - The better of the first and the third non-comprehensive exams will be used for the final grading
- Grading scheme
  - Homework: 25%
  - Mid-term and final comprehensive exams: 19% each
  - One better non-comprehensive term exam: 12%
  - Lab: 15%
  - Quizzes: 10%
  - Extra credit: 10%
    - Colloquia, special projects, planetarium shows, etc
- There will be a quiz in class Monday, Sept. 29

Physics Department
The University of Texas at Arlington
COLLOQUIUM

The Role of Surfactant Interactions in the Magnetic Properties of Chemically Synthesized Nanoparticles and Nanocomposites

Dr. Dale Huber
Sandia National Laboratory

Wednesday, September 23, 2008 at 4:00 pm in Room 101 SH

Abstract

The interfaces of magnetic nanoparticles are of critical importance to their magnetic properties, altering such important magnetic properties as saturation magnetization, magnetic susceptibility, magnetocrystalline anisotropy, and blocking temperature. While the fundamental behavior of magnetic nanoparticles in vacuum or inert carrier gas has long been understood, there is currently a lack of understanding of the effects that organic surfactants have on these nanoparticles. A highly reactive model system has been chosen to observe and attempt to explain the impact of organic surfactants in magnetic nanoparticles and their composites. This model system is based upon iron nanoparticles synthesized by the thermal decomposition of iron pentacarbonyl in the presence of various surfactants. The resultant nanoparticles are probed in numerous ways to correlate magnetic properties with more fundamental particle properties. The results of these studies will be presented and some possible mechanisms for surfactant alteration of magnetic properties will be discussed. Another way of controlling the properties of magnetic nanoparticles with surfactants is the control of particle size. Particle size is often controlled through controlling surfactant concentration during a reaction, which provides kinetic control of particle size. A novel method of particle size control is to achieve size control through the choice of surfactant, where the surfactant identity alone determines the particle's size. This is a general approach to the synthesis of narrow polydispersity magnetic nanoparticles of a predetermined size. Preliminary data demonstrating size control through surfactant choice will be shown along with a detailed description of the rationale for this approach.

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Refreshments will be served in the Physics Lounge at 3:30 pm