Nanomagnetism and Spintronics

Visiting professor: Adjunct Professor (Docent) Sayani Majumdar (Aalto University School of Science, Finland)

Course description:

The short course on Nanomagnetism and spintronics will be divided in 5 lectures. They are listed below:

- Basic magnetism + Nanomagnetism (2 lectures)
- Spintronics (1 lecture)
- Organic + multiferroic spintronics (2 lectures)

In the first two lectures the basic concepts of magnetism and nanomagnetism will be discussed. There will be some exercises associated with the lecture materials and by solving those exercises, the students will get better insights of the theoretical issues. There will be one lecture on the theory and development of the field of spintronics and some path-breaking experiments will be discussed. Finally two lectures will cover the topic of organic and multiferroic based spintronics, the two major branches of the emerging branch of spin-based electronic components and the students will be asked to write an essay based on their perception on the future research directions in these fields.

Syllabus of the lecture subjects (enlisted):

1. Basic Magnetism
2. Nano Magnetism:
   - Nanoparticles, clusters and molecular magnets
   - Magnetic thin films and multilayers
3. Spintronics:
   - Giant magnetoresiatance (GMR) - Two current model
   - Spin polarized injection
   - Spin transport and relaxation
   - Spin detection
   - Spintronic materials
4. Organic Spintronics:
   - Advantages of organics
   - Organic based spin-valves and magnetic tunnel junctions
   - Spin polarized tunneling or hopping transport
   - Hybrid inorganic-organic interface
   - Challenges and future research directions
5. Multiferroic Spintronics:
   - Advantages of multiferroics
   - Four resistance states instead of two
   - Energy efficiency
   - Multiferroic tunnel junctions: Ferroelectricity down to nanoscale

Projekt „Rozwój interdyscyplinarnych studiów doktoranckich na Politechnice Gdańskiej w zakresie nowoczesnych technologii" jest współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego.

TERMINY ZAJĘĆ			
Data	**Dzień tyg.**	**Godz.**	**Sala**
2015-03-23	Pon	15-18	2/07 Centrum Nanotechnologii
2015-03-24	Wt	15-18	2/07 Centrum Nanotechnologii
2015-03-25	Śr	15-18	2/07 Centrum Nanotechnologii
2015-03-26	Cz	15-18	2/07 Centrum Nanotechnologii
2015-03-27	Pt	9-12	2/07 Centrum Nanotechnologii

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