LECTURES ON MAGNETISM by Luigi Paolasini

Lectures will be given in the ESRF Auditorium from 14:00 to 15:00.

Lecture 1: “Why spins spin” 14 JANUARY 2014
- Historical view.
- Classical and quantum mechanics.
- Self-rotating electron model.
- Spin algebra and coupling of two spins.

Lecture 2: “Lonely atoms” 28 JANUARY 2014
- Fine structure and spin-orbit interaction.
- Hund’s rules.
- Magnetic susceptibility: diamagnetism and paramagnetism.
- Rare Earth ions and L-S coupling.

Lecture 3: “Local perturbations” 11 FEBRUARY 2014
- Crystal field and orbital quenching.
- Jahn-Teller effect.
- Magnetic resonance techniques.
- Electron spin resonance, Mössbauer and muon-spin relaxation.

Lecture 4: “Magnetic interactions” 11 MARCH 2014
- Dipole and exchange magnetic interactions.
- Direct and indirect exchange interactions.
- Anisotropic exchange interactions.
- Interplay between orbital and magnetic order.

Lecture 5: “Magnetic structures” 25 MARCH 2014
- Mean-field magnetization and Curie-Weiss models.
- Ferromagnetic and Antiferromagnetic order
- Collinear and non-collinear magnetic structures.
- Magnetic domains.

Lecture 6: “The dark side of magnetism: magnetic metals” 8 APRIL 2014
- Free electron gas model.
- Magnetism in metals.
- Itinerant exchange interactions.

Lecture 7: “Magnetic excitations” 22 APRIL 2014
- Phase transitions and the Landau mean-field theory.
- Heisenberg and Ising models.
- Magnetic excitations in magnetic itinerant systems.

Lecture 8: “Competing interactions” 6 MAY 2014
- Frustrated magnetism.
- Low dimensional magnetism
- Confined magnetic systems

Lecture 9: “X-ray magnetic scattering” 27 MAY 2014
- X-rays-photon interactions.
- Non-resonant magnetic x-ray scattering.
- Resonant magnetic scattering.

Lecture 10: “Other x-ray techniques for magnetism” 17 JUNE 2014
- Resonant inelastic magnetic x-ray scattering.
- Magneto-optical spectroscopy.
- Conclusions and possible extensions of the program.

THE LECTURE NOTES COULD BE FOUND IN: http://www.esrf.eu/events/Seminars
PARTICIPANTS WHO HAVE NO BADGES ALLOWING ENTRANCE TO THE ILL-ESRF SITE ARE REQUESTED TO CONTACT Eva Jahn tel +33 (0)4 76 89 26 19.