YCCSA Seminar Series
Spring 2020

An interdisciplinary seminar series hosted by the York Cross-disciplinary Centre for Systems Analysis aimed at researchers from all disciplines

Multiscale Modelling of Magnetic Materials

Professor Roy Chantrell

Department of Physics, University of York

Friday, 14 February 2020
CSE/102&103, Computer Science, 13:30

Abstract:
Magnetic materials are central to today's technology, important examples being in magnetic information storage and permanent magnets for hybrid and all-electric vehicles in addition to generators for wind turbines. Emerging applications include spin electronics: a potential technology for replacing conventional electronics as this runs into physical limitations, and numerous applications in the field of biomagnetism. All of these somewhat disparate examples have in common the design of materials and devices at the nanoscale, which requires modelling support beyond the conventional continuum models which are currently extensively used. The York computational magnetism group has been at the forefront of the development of multiscale model approaches linking electronic structure calculations to atomistic models and beyond to continuum models. I will start with an overview of some of the major areas of application in which we are working before describing the multiscaling approach, using as an example the binary alloy FePt which is the probable storage medium for future hard disc drives, (which are likely to be the basis of cloud storage for the foreseeable future). Finally I will describe the use of magnetic nanoparticles as agents for magnetic nanoparticle hyperthermia (MNH), which is an established procedure for cancer treatment. The underlying physics of MNH is not fully understood, and our initial investigations show the need for significantly improved understanding of the interaction between the magnetic particles themselves and the biological environment in which they function.

The seminar includes a refreshment break to fuel interdisciplinary discussion
Ron Cooke Hub is on Heslington East Campus – accessible by free bus services Nos. 66 and UB1 running at frequent intervals from Heslington West.