

Summer Research Project 2010

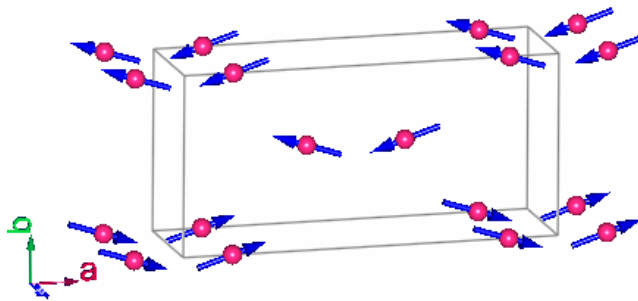
Magnetic structures of Rare-Earth intermetallic compounds

Professor Seán Cadogan

Intermetallic compounds formed between Rare-Earth (R) and Transition-Metal (T) elements are important from both fundamental and applied viewpoints. They allow us to study the interplay between the localized 4f electrons of the R atom and the delocalized 3d electrons of the T atoms. The magnetic structures formed by such compounds are the result of the intrinsic magnetic exchange and crystal-field interactions and in many cases the magnetic structure changes as one cools a sample or applies a magnetic field, due to the competition between these fundamental interactions. From an applied viewpoint, R-T intermetallics are the basis for the world's strongest permanent-magnets and will provide the next generation of refrigeration materials in the not too distant future.

In this project we will investigate a number of magnetic reorientations in R-T compounds. This will involve computer modeling of the crystal-field and exchange interactions and a degree of proficiency in computing would be an advantage. In particular, the student will have the opportunity to modify existing programs and/or write new ones, depending on the nature of the problem being investigated.

There will also be the opportunity to determine actual magnetic structures by analyzing existing neutron diffraction patterns we have previously obtained at the NRU reactor in Chalk River.



Contact: cadogan@physics.umanitoba.ca. 311 Allen Building. Extn 6195