

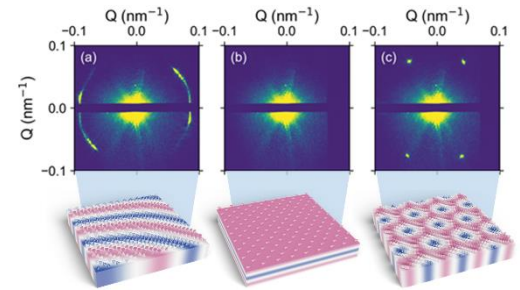


Exotic Magnetism in Rare Earth Materials: Magnetometry, neutron scattering, and muon spin relaxation data analysis

Undergraduate Summer Research Project

Are you interested in exploring the world of magnetism in condensed matter physics? I am seeking a motivated undergraduate student to work on a summer research project focused on investigating exotic magnetism, particularly unexplained high-temperature magnetism in R_2PdSi_3 materials.

Magnetism exists in all of the materials that surround us in our everyday lives; as part of the electromagnetic force, it forms an integral part of all matter at the nanoscale level. However, in certain special solid systems, where the atoms making up the materials have unpaired electronic spins, magnetism can take on a more significant role which can be felt on the macroscopic scale. Depending on the crystal structure of these materials, spins can arrange themselves into a wide variety of long range magnetic structures including ferromagnetism (spins aligned parallel to each other, e.g. fridge magnets), antiferromagnetism (spins aligned anti-parallel), and more exotic structures such as magnetic helices, and magnetic skyrmions (shown to the right).



Understanding of the origin and behavior of these various spin structures is quite important, as they have numerous potential applications, such as in data storage devices (hard disc drives, magnetic tape storage, potential domain wall / skyrmion racetrack memory), and novel computational schemes. To investigate these spin structures, physicists often use techniques such as neutron scattering, magnetometry, and muon spin relaxation μ SR to gain information about the microscopic arrangement and dynamics of spins within a material. One particularly interesting class of materials is the R_2PdSi_3 materials, where numerous exotic magnetic states have been reported (including magnetic skyrmions), and more appear waiting to be discovered.

In this project, the student will assist in data analysis & interpretation of scattering, magnetometry, and μ SR data previously collected on R_2PdSi_3 materials to investigate previously unreported high temperature magnetic phases that appear in these materials. This work will include simulation of potential magnetic structures, along with calculating their expected signatures in the measured data using software packages such as MuESR.

This research project will be supervised by Dr. Murray Wilson.

Qualifications: Students applying for this project should be familiar with undergraduate electromagnetism, and have experience in computer coding. Computational work in this project will primarily make use of python scripting, but coding experience generally easily crosses over between languages.

Application Deadline: May 3rd

Please apply by filling out this [Application Form](#).

Should you wish more information about this position, please contact me at murray.wilson@mun.ca