NTNU NTNU NANO ENABLING TECHNOLOGY QuSpin

Two Student Projects:

Real-World Simulations of Antiferromagnetic Nanostructures

We are looking for two motivated sudents with completed bachelor's degree in physics, nanotechnology, electronic engineering and/or material science. The candidates should be experienced in Python programming, GPU-accelerated computing, and numerical solution of nonlinear diffrantial equations.

Our aim is to develop a code to solve equations-of-motion (EoM) goverend on dynamics of spins in antiferromagnetic materials. The EoM in this case are nonlinear difrential equations, called Landau-Lifshitz-Gilbert equatins. In the first part of this project, we consider spin dynamics at zero temperature in the presence of external perturbations such as magnetic field and current. You can find examples of these equations in the following papers from my group:

1. Phys. Rev. B **99**, 054423 (2019)
2. Phys. Rev. B **97**, 020402(R) (2018)
3. Phys. Rev. B **96**, 140411(R) (2017)

The project has two goals:

a. Create an open-source code to solve the spin dynamics in antiferromagnetic materials.
b. Collaboration with our experimentalist colleagues in University of Mainz, Germany to reproduce their experimental results using the code.

The project has two parts (in total 700 work hours). The first part of the project is estimated to require 350 work hours split between two students (175 hours per student). The project will be supported by the *NTNU Nano's Enhanced Impact Fund* and will be performed in the Center for Quantum Spintronics (QuSpin) at the Department of Physics.

The remuneration will be paid by the NTNU Nano after submitting a report on the first part of the project. Students who are involved in the first part are in the priority for the second part of the project.

For more information, please contact researcher *Alireza Qaiumzadeh* alireza.qaiumzadeh@ntnu.no (Realfagbygget E5-147)

Please send your CV and a summary of your experience by 15 October 2020.