Characterization of Sensitive Magnetic Field Sensors for Cold Strontium Experiments
Experimental project (Internship, min duration 2 months)

The narrow intercombination line of strontium is highly sensitive to the magnetic field. In order to cancel stray magnetic field in cold atomic experiments, an active compensation system has been implemented [1]. In this system the magnetic field is controlled to a level below one milligauss, using a digital PID controller. An important component of this system is a network of eight three-axis magnetic field sensors.

The aim of this project is to characterize a new set of sensors that will replace the current ones. These sensors measure each component of the magnetic field through magnetoresistive effect. Due to resistance imbalance in different arms of the Wheatstone bridge, an offset reading is obtained under zero magnetic field conditions. The student will be required to measure and compensate this large offset values by adding suitable values of shunt resistance to each Wheatstone bridge.

This new set of sensors has to be calibrated before it may be used in the experimental setup. The student will also perform measurements of the sensor sensitivity in all three axes, and conclude on the noise characteristics of the sensors. From the characterization of the sensors, a set of eight sensors will be identified to replace the current sensors.

A basic understanding of magnetism and electronics is required for this project.

[1] K. Pandey, C.C. Kwong, M.S. Pramod and D. Wilkowski, Linear and nonlinear magneto-optical rotation on the narrow strontium intercombination line, Phys. Rev. A **93**, 053428 (2016)