CO-OP Undergraduate STUDENT - Experiment

SuperCDMS Experiment
Summer Term May-August 2021

The SuperCDMS Collaboration has pioneered the use of low temperature phonon-mediated detectors to detect the rare scattering of WIMPs on nuclei and distinguish them from backgrounds. With this powerful technology, operating deep underground in the Soudan mine in Minnesota, CDMS II has provided the most sensitive WIMP search in the world, and this technology has the greatest discovery potential because it has achieved nearly background free performance. The upcoming SuperCDMS SNOLAB project is currently installing a new experimental apparatus in SNOLAB since 2019. The SuperCDMS SNOLAB experiment will improve the present sensitivity for dark matter WIMPs by two orders of magnitude. In the meantime, a cryogenic test facility (CUTE) is currently taking data underground at SNOLAB, in the vicinity of the SuperCDMS allocated space, testing SuperCDMS prototype detectors. The SNOLAB group is/will be supporting both CUTE and SuperCDMS installation, commissioning and science phases.

The student will be actively involved in the data acquisition, simulations and analysis of the CUTE test facility. She/he will play a leading role in understanding and mitigating the environmental backgrounds in CUTE and SuperCDMS. Protection against backgrounds is one of the key issues for the direct dark matter detection experiments. Estimation of the background from radioactive processes becomes a crucial task to inform the final shielding design of the forthcoming test facility and the background budget for the experiment. One of the main tools for background studies is the use of extensive simulation work. This can help with studying background suppression or rejection strategies, and investigation of requirements on the depth, the amount of active/passive shielding, the purity of materials, the veto efficiency, etc. for a given experiment. The SuperCDMS/CUTE group at SNOLAB actively contribute to the efforts to understand and limit the background via MonteCarlo simulations with GEANT4 to estimate radioactive background event rates from the main shielding scheme and via an intensive material and screening assay program. The student will help expanding the ongoing effort in the GEANT4 simulations in terms of neutron and gamma background to any material surrounding the detectors to better understand and estimate the radioactive background budget of the experimental apparatus. Simulation results will be then compared to the first science data.

The student will be joining the activities at the underground laboratory during payload change of the CUTE tower, working in the cleanroom and with SuperCDMS prototype detectors whenever needed and the access to site is granted.
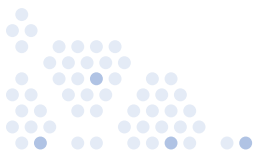
Criteria

Education:

Applications from any undergraduate levels are accepted.
Must be 18 years or older, registered in post-secondary studies at an accredited institution or apprenticeship program, recent graduate (having graduated in the last 3-6 months) or individual returning to full-time or part-time studies in the next academic term.

Experience:

Expertise in data analysis, statistics and modern programming languages is required, ideally in the frame of C++, ROOT and Python. Experience working in a cleanroom laboratory is an advantage.

Salary Range:

Salary will be determined by education and qualifications. These positions are subject to availability of funding. To meet operational needs, shift work may be required.

To Apply:

Applications must be submitted to silvia.scorza@snolab.ca. Interested students should include a cover letter and resume.
For more details on this specific project, please contact Dr. Silvia Scorza vie email silvia.scorza@snolab.ca
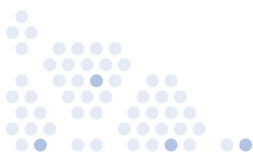
Closing Date

Deadline to Apply: January 15 to February 1

The posting will remain open until the position is filled, but review of applications will commence on January 15th, 2021.

SNOLAB is committed to equity in employment and encourage applications from all qualified applicants, including women, Indigenous persons, members of visible minorities and persons with disabilities. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents.

Posting Date: January 15, 2021