

University of Regina
Department of Physics

STUDENT JOB PROGRAM

Fall 2009 job posting

Student job title: Electromagnetic Calorimeter Construction (Particle Physics)

Name of project: Calorimeter Matrix Construction using Lead Sheets and Scintillating Fibers for the GlueX Project at Jefferson Lab

Overview:

One of the main scientific questions that remain unanswered in subatomic physics is the nature and behavior of the “glue” which holds the quarks together. The puzzling feature of this quark-gluon interaction is that quarks are never found free, a phenomenon known as confinement. Since gluons carry color charge, they cause the formation of chromoelectric flux tubes, which may yield unusual objects such as glueballs or hybrids. In certain models the latter can be produced with quantum numbers not allowed in the simple quark model providing a powerful signature for hybrid meson spectroscopy. The GlueX experiment will provide for the detailed spectroscopy necessary to map out the light quark hybrid meson spectrum, which is essential for an understanding of the confinement mechanism.

The GlueX experiment is a new experiment stationed in Hall D, which will be constructed as part of the 12 GeV upgrade project of JLab.

Duties:

Our Group at Regina has assumed responsibility for one of the largest sub-systems (the electromagnetic barrel calorimeter - BCAL). Our team consists of two professors, one research scientist, one postdoctoral assistant, and three graduate students. Our efforts have been divided among R&D on the design and construction of prototype electromagnetic/spaghetti calorimeter modules, and cutting edge R&D with the commercial sector towards the development of large-area Silicon Photomultiplier Arrays.

We are now looking for up to five (5) undergraduate students to work on the Construction of the 49 modules of the BCAL matrix, which will consist of alternating layers of thin lead sheets and scintillating optical fibers, bonded together with optical epoxy. Engineering methods must be applied in all construction phases ensuring finished products that adhere to engineering specifications and pass quality assurance (QA) protocols.

Skills learned during this work experience:

- Construction techniques, materials handling, electro-pneumatic apparatus
- Precision measurements and leveling.
- Introduction to principles of light transportation in optical fibers.
- Exposure to advanced particle physics instrumentation techniques.
- Usage of NIM and CAMAC electronics and data-acquisition systems.

Qualifications:

- Curiosity in and fun at physics with engineering skill set.
- Undergraduate level physics/engineering and mathematics.
- Organizational skills and systematic approach to measurement and reporting.
- Work ethic.

Shift work required: Yes; punctuality is required, as the work must proceed on a planned time frame in order to mesh with other parallel construction tasks.

Period of Work: September 2009 - April 2010 minimally, 12- or 16-month internship desired

Salary is commensurate with academic progress and previous relevant work experience, and ranges from \$ 2000 to \$ 2500 per month. We will pay return airfare or equivalent for out-of-province students.

The application must include a covering letter, a resume, and a transcript of all post-secondary grades. Applications must clearly indicate the number of academic terms completed (i.e. terms, semesters, or quarters) and the number of work terms completed (or the equivalent). Only students with an accumulated average grade of 75% or higher (or the equivalent GPA or letter grade) will be considered for a position.

This job is available to eligible students from any accredited post secondary institution in Canada. To be eligible, the student must be a Canadian Citizen or a Permanent Resident. Foreign students may apply, provided they have temporary resident status, where required, and are eligible to obtain a work permit.

We wish to thank all applicants for their interest, and regret that only those being considered will be contacted.

For more information, please visit our web sites at <http://www.phys.uregina.ca/research/gluex/> and <http://www.gluex.org/>