TRIUMF

Postdoctoral Researcher – Accelerator driven Neutron Sources

BASIC FUNCTION:
The prime focus is to work target materials, power handling, and moderator design of a compact accelerator driven neutron source (CANS). The objective of CANS is to provide high brightness neutron beams of thermal to cold neutron energies for the Canadian/North American neutron scattering research community using an intense proton beam. The main tasks are research towards the choice of target (eg. liquid Li vs. solid Be target material), as well as neutron yield estimates and the optimization of moderator materials and geometry via calculations and simulations. The research associate will gain practical and hands on experience while working within the local ultracold neutron (UCN) facility based at TRIUMF which relies on a spallation target and efficient neutron moderation.

ORGANIZATIONAL RELATIONSHIPS:
This position reports directly to the supervisor at the University of Windsor, the principle investigator of the CANS project and will receive local supervision at TRIUMF via O. Kester and R. Laxdal. The incumbent will have a close working relationship with the TRIUMF UCN group via B. Franke and will be able to participate in UCN beam times and will get familiar with remote handling aspects of neutron production targets. The incumbent interacts on a regular basis with beam physicists, target and ion sources group under A. Gottberg and experts on neutron moderation. All relationships and interactions are characterized by competence and professionalism.

RESPONSIBILITIES:
The CANS approach generates less unwanted radiation reducing the volume of biological shielding required, and the neutrons produced will have much lower energies which reduces the volume of expensive moderator materials to lower the neutron energy.

- The incumbent will have to lay out an optimized target geometry for different target materials. In case of a Li-target, a liquid Li target should be investigated.
- Production yields, power deposition, and radiation fields shall be investigated by the incumbent via FLUKA simulations.
- In a CANS, a moderator a few centimetres thick is enough to decrease the neutron energies to tens of meV. Thus, the target station shall be designed with a compact moderator geometry to allow a much greater fraction of the neutrons to be guided into neutron beamlines.
- For the moderator design the position will require the incumbent to get familiar with the code MCNP, which will be possible by being trained by projects of the UCN group at TRIUMF.
- The incumbent will have the possibility/task to get involved in the work of the UCN group by contributing in remote handling design aspects of the existing UCN facility, as well as by participating in UCN beam times.

KNOWLEDGE AND SKILLS:
The incumbent must have a good knowledge of neutron production and neutron moderation. Experience with proton target interaction would be an asset. The ability to use simulation codes like MCNP for neutron moderation investigation or FLUKA for beam matter interaction is important. Good oral and written communication skills which enable effective teamwork are essential.

MINIMUM QUALIFICATIONS AND YEARS OF EXPERIENCE:
A recent PhD in a physics discipline related to neutron moderation or neutron production with low energy proton beams. Relevant previous experience working or researching at a reactor or other neutron sources is an asset.