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## Development of a High Intensity Ultra-Cold Neutron Source using Superfluid Helium at TRIUMF

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Ultracold Neutrons (UCN) are extremely slow neutrons with a kinetic energy in the order of 100 neV. As a consequence, UCNs are totally reflected at the surface of certain materials and can be confined in a material bottle. Using this unique property, UCNs are used for various experiments such as neutron electric dipole moment searches, neutron lifetime measurements, gravity experiments, and other.

An advanced high intensity UCN source is being developed at TRIUMF. The UCN source is composed of a combination of a spallation neutron source and a superfluid helium UCN converter. Spallation neutrons are thermalized first by LD<sub>2</sub> or D<sub>2</sub>O moderators. After that they give their kinetic energy to a phonon (single-phonon excitation) or phonons (multi-phonon excitation) in superfluid helium to result in UCNs. A dedicated proton beam line of which beam power is 20 kW was built at Meson hall1, TRIUMF. In order to avoid up-scattering of UCN, superfluid helium UCN converter kept cold around 1 K. Cryogenics is a key of our source. Design of the UCN source will be discussed.

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