

Canadian Association of Physicists

Association canadienne des physiciens et physiciens

Contribution ID: 3080

Type: Invited Speaker / Conférencier(ère) invité(e)

(I) The cyclotron based high-yield ultracold neutron source and neutron electric dipole moment experiment

Tuesday 7 June 2022 13:55 (25 minutes)

The neutron itself is an ideal laboratory for studying various beyond-the-standard-model theories. Precise measurements of the neutron lifetime can shed light on light element abundances in the universe, searches for electric dipole moments (EDMs) could reveal mechanisms that created the apparent matter-antimatter asymmetry in the universe. The key to these studies are long observation times of the neutron and high neutron densities in experiments. The first is achieved by using very slow, ultracold neutrons (UCN) that can be studied and manipulated for hundreds of seconds, the latter is achieved by superthermal sources of ultracold neutrons.

At TRIUMF the TUCAN collaboration is combining a cyclotron-driven spallation neutron source with a liquiddeuterium moderator and superfluid-helium converter cooled down to around 1 K by a high-power helium-3 cryostat. The UCN are extracted near-horizontally into vacuum guides and transported to a room-temperature EDM experiment. A state-of-the-art magnetically shielded room and self-shielded coils provide a stable magnetic field environment essential for a precise measurement.

The presentation will introduce the key principles of source and experiment and provide a status update.

Author: Dr PICKER, Rüdiger (TRIUMF)

Presenter: Dr PICKER, Rüdiger (TRIUMF)

Session Classification: T3-3 New Directions in Accelerator-Based Experiments: Future Experiments at TRIUMF and Brookhaven (PPD) | Nouvelles voies fondées sur des accélérateurs: expériences futures à TRIUMF et Brookhaven (PPD)

Track Classification: Symposia Day (Tues. June 7) / Journée de symposiums (mardi, le 7 juin): Symposia Day (PPD) - New Directions in Accelerator-Based Experiments