Contribution ID: **392**

Type: **Invited Speaker / Conférencier invité**

Neutrinos at SNOLAB: SNO+ and HALO

Tuesday 17 June 2014 14:15 (30 minutes)

SNOLAB is the facility of choice for the next generation of underground particle astrophysics experiments. The scientific programme of SNOLAB encompasses the search for neutrino-less double beta decay; low energy solar neutrino studies; the neutrino signal from the next galactic supernova; and the quest for the direct observation of dark matter. This talk leaves aside the several SNOLAB experiments focussed on dark matter and describes the elements of SNOLAB's neutrino programme by presenting the physics potential and the status of the SNO+ and HALO experiments. SNO+ is the successor experiment to the Sudbury Neutrino Observatory (SNO) that re-uses much of the SNO infrastructure to create a multi-purpose kilotonne liquid scintillator detector. By replacing SNO's heavy water target with liquid scintillator SNO+ can substantially lower its energy threshold and improve its energy resolution which opens several possibilities to contribute to neutrino physics. The highest scientific priority is placed on the search for neutrino-less double beta decay in Te-130. An unambiguous observation of which would establish the Majorana nature of the neutrino and indirectly constrain the absolute neutrino mass. This phase of SNO+ operation will initially involve the loading of the liquid scintillator 0.3% by weight of natural Tellurium. In other operational phases, without Te loading, SNO+ would be able to measure the low energy part of the solar spectrum; measure the flux of anti-neutrinos associated with the radioactivity in the earth's crust; measure neutrino oscillation parameters by detecting the anti-neutrinos from Ontario's reactors. In all phases of operation SNO+ will be sensitive to a burst of neutrinos from a galactic supernova and by participating in the Supernova Early Warning System (SNEWS), along with HALO, help to ensure that astronomers also derive maximum benefit from such a rare opportunity. Unlike SNO+, the Helium and Lead Observatory (HALO) is dedicated to a single objective, that of recording data from the next galactic supernova. HALO employs 80 tonnes of lead as its neutrino target and Pauli blocking in the lead nucleus makes HALO dominantly sensitive to electron neutrinos in contrast to anti-electron neutrinos, which is the case with both Cerenkov and liquid scintillator based detectors, positioning HALO to make a unique contribution.

Author: VIRTUE, Clarence (Laurentian University)

Presenter: VIRTUE, Clarence (Laurentian University)

Session Classification: (T2-10) Neutrinoless Double Beta Decay - DNP-PPD / Double dégénérescence beta sans neutrino - DPN-PPD

Track Classification: Nuclear Physics / Physique nucléaire (DNP-DPN)