

FROM SNO TO SNOLAB AND CONNECTION TO THE LHC

A. Bellerive*

Carleton University

The Sudbury Neutrino Observatory (SNO) has conclusively shown that solar neutrinos oscillate on their way from the core of the Sun to the Earth. This groundbreaking observation was made during the first two phases of the experiment. The third phase of SNO used 40 proportional counters to enable a systematically independent check of the previous SNO measurements. The counters were filled mainly with ^3He and were used to measure the number of neutrons from solar neutral current neutrino interactions with high accuracy. SNO has developed several methods to tell neutron events apart from alpha background events. This ability is crucial for the analysis of the third phase data. The most recent results from this analysis will be presented. The physics reach and goal of a combined three-phase solar analysis by SNO will also be reviewed. The remainder of the talk will be a quick overview of the physics topics coupled with the detector technologies that SNOLAB will be challenged with in the future. The new SNOLAB facility will provide infrastructure for exciting new measurements in particle astrophysics which can only be carried out in a deep ultra-low radioactivity conditions. The 2 km of over burden at the site provides 6010 meter of water equivalent of shielding from cosmic rays and offers a uniquely low background environment for the next generation of experiments exploring the frontiers of particle physics in the study of low energy solar neutrinos, neutrinoless double beta decay, dark matter, and neutrinos from Supernova explosions. Connection between SNOLAB and the Large Hadron Collider (LHC) at CERN will be highlighted together with discovery potential and complementarities between astro-particle and collider physics experiments.

*E-mail: alainb@physics.carleton.ca