[WE-A10] Particle Astrophysics / *Astrophysique des particles*

(PPD)

WEDNESDAY, JUNE 16
MERCREDI, 16 JUIN
10h00 - 12h00

[Room/Salle : Victoria] ***Chair: W. Trischuk, U.Toronto***

WE-A10-1 10h00

KEVIN GRAHAM, Queen's University

Recent Results from the Sudbury Neutrino Observatory

From measurements of the flux of 8B solar neutrinos, the Sudbury Neutrino Observatory has now made significant contributions to solar and neutrino physics from both the initial 'pure D_2O' and second 'salt' phases. A summary of results to date will be provided along with some details of the experimental procedures utilized. A description of detector calibration and systematic uncertainty evaluations for the salt phase will be given including energy, reconstruction, and background evaluations and with some emphasis placed on the differences between neutron response in the first and second phases of data taking. The impact of SNO results will be will be discussed with particular focus placed on the impact of the flux results on neutrino parameters. A brief account of the current phase of operation and future expectations will conclude the session.

WE-A10-2 10h30

KENNETH J. RAGAN, McGill University

STACEE Continues — VERITAS Lives!

We will discuss the current status of the STACEE and VERITAS ground-based gamma-ray astrophysics projects. Both are based on the proven Atmospheric Cherenkov Technique (ACT) in which high-energy gamma-rays are detected by observation of the Cherenkov light produced by their cascades in the upper atmosphere. STACEE samples the resulting Cherenkov wavefront using the large mirrors of a solar research facility, in principle allowing lower thresholds than hitherto obtained from first-generation ACT instruments. STACEE is complete and operating and results will be presented from the data taken to date. VERITAS is an array of 4 imaging telescopes, each of which creates an image of the Cherenkov shower in a pixelated camera. It is now under construction in Arizona and scheduled for completion in early 2006. We will present the current status of the detector and its foreseen capabilities, as well as data from the prototype which has been recently commissioned.

11h00 Coffee Break / Pause café

WE-A10-3 **11h15**

Wavelength Shifter in the Heavy Water of the Sudbury Neutrino Observatory, **Etienne Rollin**, *Carleton University* — In order to have access to the lower energy part of the Boron-8 solar neutrino energy spectrum, a proposal has been made to add wavelength shifter molecules (WLS) to the heavy water of the Sudbury Neutrino Observatory (SNO). WLS should increase the number of photons detected per event while keeping the external backgrounds at a low level. This has the potential to lower the energy threshold cut currently used by the SNO collaboration. Montecarlo studies show that using a Carbostyril-124 solution at a concentration of 1 ppm, one can lower the energy threshold from 5.5 to 3.5 MeV. The physics implications of such a reduction will be discussed.

WE-A10-4 **11h30**

SNO, SNEWS, and the Next Galactic Supernova, **Clarence J. Virtue**, *Laurentian University, for the SNO Collaboration* — A type II supernova releases 99% of its energy in the form of neutrinos over a brief timescale of tens of seconds. These neutrinos escape from the proto-neutron star following core collapse and are an excellent window into the dynamics of the supernova process itself, whose detailed understanding is seen as one of the remaining “grand challenges” of computational physics. The Sudbury Neutrino Observatory (SNO) is one of several detectors worldwide capable of observing galactic supernovae, through the detection of hundreds to thousands of neutrino interaction events. Current models of the supernova process have robust and distinguishing features in their neutrino energy, flavour and luminosity spectra. SNO’s capabilities to extract neutrino energy and flavour distributions are therefore important tools in providing experimental constraints to supernovae theory. A tantalizing aspect of supernova neutrino detection is that the neutrinos precede, by up to 10 hours, the visible eruption of the mantle of the star. This potentially allows for an alert to be issued before the supernova is otherwise detectable. Though galactic supernovae are rare events, occurring approximately every 10-50 years, a false announcement from a neutrino detector would be very disruptive to the observing programs of astronomical instruments around the world. However, a prompt announcement following on the real-time observation of a supernova neutrino signal would also be a unique opportunity for the astronomical community to observe a near-by supernova with modern instruments from the earliest possible moment. In order to ensure a prompt and positive alert several neutrino detectors have formed the Supernova Early Warning System (SNEWS). This presentation will outline the potential of SNO for supernova physics and the techniques in place to maximize this scientific opportunity by providing a reliable and timely alert to the astronomical community through SNEWS.

WE-A10-5 **11h45**

Possible Tests of Universal Gravitation at Short Distances, **Peter Watson**, *Carleton University* — A number of recent theories have suggested that the inverse-square law may be modified at short distances. Current experimental limits show that it is valid down to at least 150μ: but there are effectively no limits below 10μ. We show that it is possible to obtain a very weak limit for shorter distances, and suggest that it may be possible to use a “quantum pendulum” to go below 1μ.

12h00 **Session Ends / Fin de la session**