Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Contribution ID: **3123** Type: **Invited Speaker / Conférencier(ère) invité(e)**

(I) Probing the hadronic Universe with high-energy neutrino observations: present and future

Wednesday 8 June 2022 10:45 (30 minutes)

We have investigated the origin of high-energy cosmic rays since discovering these particles in 1912. Over more than one hundred years, our knowledge of cosmic rays has been improved immensely. However, as magnetic fields deflect the trajectories of cosmic rays, their sources remain elusive. Neutral particles generated from the interactions of cosmic rays, such as gamma rays and neutrinos, can be used to identify the sources as they preserve the directional information. Among these neutral particles, neutrino observations provide unique information as, unlike gamma rays, neutrinos are generated only by hadronic interactions. Also, as weakly interacting particles, neutrinos can probe obscure environments hidden from electromagnetic observations and travel much longer distances than gamma rays, allowing us to explore a larger part of the Universe. The detection of a diffuse neutrino flux by the IceCube neutrino observatory and the recent multi-messenger observations triggered by IceCube in the direction of the blazar TXS 0506+056 show the potential of this approach. High-energy neutrino observations also can be used to study the properties of neutrino interactions up to the PeV energy range. I will overview what we have learned from high-energy neutrino measurements by the IceCube Observatory and what we expect to learn in the future with the next-generation neutrino observatories, such as P-ONE, the future neutrino telescope that will be deployed within the Ocean Networks Canada (ONC) infrastructure in the Pacific.

Author: PARK, Nahee

Co-authors: DANNINGER, Matthias (Simon Fraser University (CA)); KRAUSS, Carsten (University of Alberta); MOORE, Roger; YANEZ GARZA, Juan Pablo; CLARK, Ken (Queen's University); PIRENNE, Benoit (University of Victoria)

Presenter: PARK, Nahee

Session Classification: W1-1 Neutrino Experiments (PPD) | Expériences de neutrinos (PPD)

Track Classification: Technical Sessions / Sessions techniques: Particle Physics / Physique des particules (PPD)