



千葉大学

ハドロン宇宙国際研究センター

International Center for Hadron Astrophysics

# ICEHAP Online Seminar

**Date** Oct. 27 Tuesday 14 : 00~16 : 00

**Location** Online via Zoom (The meeting url will be informed by mail.)

**By** Dr. Christian Glaser (Uppsala University)

**Title**

『Radio detection of ultra-high energy neutrinos』

## Abstract

High energy neutrino astronomy is a powerful tool to study the high-energy universe. Neutrinos can escape dense source environments and point back to their sources with sub-degree accuracy. In particular, multi-messenger analyses that combine neutrino detection with electromagnetic (e.g. gamma ray) and gravitational-wave observations bear huge potential to probe the sources of neutrinos and cosmic rays. The detection of neutrinos is challenging because of their small flux and cross-section, and requires the instrumentation of huge volumes. Ultra-high energy neutrinos ( $E > 1e16$  eV) can be efficiently measured using the radio technique, and the cold (ant-)arctic ice is an optimal target material.

Before discussing the radio detection of neutrinos, I will briefly present the radio detection of cosmic rays, highlighting what we can learn from this mature field for neutrino detection. Then, I will report on the pilot neutrino detectors (ARA and ARIANNA) installed on the Ross ice shelf and at the South Pole, and the plans for the RNO-G detector in Greenland with deployment starting in 2021. I will discuss how neutrinos can be measured with a radio detector and how their properties can be reconstructed from the short radio flash. I will present plans for a large-scale radio neutrino detector as part of the IceCube-Gen2 project and discuss its prospects.

I will also present NuRadioMC, a new MC code for the simulation of neutrino interactions and their radio emission. The code allows for an unprecedented level of detail, for example the simulation of radio emission from secondary leptons.