Contribution ID: **178** Type: **Poster**

Effects of raytracing on neutrino simulations using RadioPropa

Wednesday 14 July 2021 12:48 (12 minutes)

The in-ice radio detection of the radio signals caused by the interaction of high energy neutrinos in vast natural media like polar ice, will be a promising technique to detect neutrinos of energies beyond the ones thus far measured. Because of the large attenuation length in ice for radio O(1km), sparse arrays can be built implying large effective volumes.

The simulations of effective volume calculations and reconstructions of the waveforms highly depend on the ice modelling. Thus far, for simplification, mainly analytically solvable exponential models of the ice are used. This allows for computationally fast raytracing. More elaborate methods, like FDTD (solving Maxwell equations on a full grid) can incorporate all ice properties. In particular, allowing for rays to reflect within the ice due to density discontinuities or allowing rays to travel horizontally through the firn (upper 200 m). However, this method is due to its heavy computing load impractical for large-scale simulations and reconstructions.

RadioPropa is a numerical ray-tracer that was started to accommodate more complex ice models with acceptable speed. It is forked from the cosmic ray propagation code CRPropa. Presented here are waveform simulations and reconstructions (with respectively NuRadioMC and NuRadioReco) using RadioPropa. This contribution shows the effects of a non-exponential ice-model on the radio waveforms and the implications for reconstruction. Also, the implementation of horizontal propagation due to a non-smooth ice-model and its effect on the neutrino waveforms are shown.

other Collaboration

RNO-G

Subcategory

Experimental Methods & Instrumentation

Keywords

raytracing, in-ice radio detection, neutrinos, ice properties

Collaboration

other (fill field below)

Primary authors: Mr OEYEN, Bob (Ghent University); PLAISIER, Ilse (ZEU-ICE (Astroteilchenphysik)); Prof. NELLES, Anna (ECAP, Desy Zeuthen); Prof. GLASER, Christian (Uppsala University); Dr WINCHEN, Tobias (VUB)

Presenter: Mr OEYEN, Bob (Ghent University)

Session Classification: Discussion

Track Classification: Scientific Field: NU | Neutrinos & Muons