## Phenomenology 2021 Symposium



Contribution ID: 1472

Type: Neutrinos

## Detecting and studying high-energy neutrinos with FASERnu at the LHC

Wednesday 26 May 2021 18:30 (15 minutes)

 $FASER\nu$  at the LHC is designed to directly detect collider neutrinos for the first time and study their cross sections at TeV energies, where no such measurements currently exist. The detector will be located 480 m downstream of the ATLAS interaction point. With FASERnu, the three-flavor neutrino cross-sections will be measured in the currently unexplored energy range between 360 GeV and 5 TeV. In particular, tau-neutrino and electron-neutrino cross sections will be measured at the highest energy ever. From the other perspective, FASERnu can measure forward neutrino production, and provide novel constraints on forward particle production.

In 2018 we performed a pilot run with the aims of measuring particle fluxes at the proposed detector location and of possibly detecting neutrino interactions for the first time at the LHC. We installed a 30-kg lead/tungsten emulsion detector and collected data of 12.2 fb<sup>-1</sup>. The analysis of this data has yielded several neutrino interaction candidates, excluding the no-signal hypothesis at the  $2\sigma$  level.

During Run-3 of the LHC starting from 2022, we will deploy an emulsion detector with a target mass of 1.1 tons, coupled with the FASER magnetic spectrometer. This would yield roughly 2,000  $\nu_e$ , 7,000  $\nu_{\mu}$ , and 30  $\nu_{\tau}$  interacting in the detector. Here we present the status and plan of FASER $\nu$ , as well as the neutrino detection in the 2018 data.

## Summary

Author:ARIGA, Tomoko (Kyushu University (JP))Presenter:ARIGA, Tomoko (Kyushu University (JP))Session Classification:Neutrino III