ICEHAP Online Seminar

Date   June 09 Tuesday 15:00～17:00

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

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Title

『**Study of neutrinos at the high energy frontier with FASERν at the LHC**』

Abstract

Since their discovery, neutrinos have been detected from a variety of sources. Each time a new neutrino source was utilised, or a new energy regime was explored, neutrinos surprised us by showing their characteristic features. Despite the continuous efforts, we are still missing data about their behaviour in the TeV energy scale, as well as conclusive tests of lepton universality in neutrino scattering. Embracing the discussions on recently identified flavour anomalies, which hint at lepton universality violation, the study of high-energy neutrino interactions involving heavy leptons and heavy quarks may be a powerful and complementary tool to search for new physics effects.

To meet these scientific demands, FASER neutrino group is going to study neutrinos at the uncharted energy range around 1 TeV, by employing the "collider neutrinos" from the LHC for the first time. The high neutrino beam involves all neutrino flavors, it is very much complementary to the other sources, enabling the study of heavy flavor production channels, such as tau, charm and beauty. To exploit this feature, the FASERν detector with a target mass of 1.2 tonnes will be built with the emulsion tracker technique. FASERν has been approved by CERN in December 2019, and is going to take data during the forthcoming Run 3 of LHC operation (2021-2024), which would yield >20,000 neutrino interactions in the detector. In relation to IceCube, 14 TeV proton collisions correspond to 100 PeV proton interactions in fixed target mode. Therefore, FASERν would provide a basic data for the understanding of the prompt neutrinos at the PeV energy scale.

Establishing neutrino studies with the LHC would pave the way to develop neutrino experiments along with the progress of ultimate collider machines, opening a new field of neutrino researches. In this seminar, I will report the overview of the FASERν project, results from 2018 pilot run, and prospects for the physics runs.