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NA65 (DsTau) experiment: Tau neutrino production study at the CERN SPS

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The production process of tau neutrinos is, up-to-date, largely unknown compared with other neutrino flavors. The NA65 (DsTau) experiment is an approved CERN experiment with the scope to investigate the tau neutrino production using an emulsion cloud chamber (ECC).

The main production process of tau neutrinos is the sequential decay of Ds mesons produced by the reaction of the high-energy protons and nucleons. The tau neutrinos are emitted both when the Ds mesons decay into tau leptons and when the tau leptons decay to other particles. The NA65 experiment aims to measure the differential production cross section of the Ds mesons emerging from the 400 GeV/c proton beam interaction with the metal plates.

The NA65 emulsions are read out in a whole area because the sequential decay cannot be detected by other electronic trackers. We use an automated track-readout system HTS which is two orders of magnitude faster than the one used in the previous neutrino experiment OPERA. It is also a challenge to reconstruct the massive amount of track data, which reaches 5×105 tracks/cm2 at the downstream part of ECC.

In this presentation, we present an overview of the NA65 (DsTau) experiment, the interim results of the 2018 pilot run, and the plans for the 2021 physics run.

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