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Neutrino physics in the CERN project SND@LHC

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At the beginning of 2021, the project of the SND@LHC experiment was adopted by CERN - this is a compact experiment designed to study all three neutrino flavors and search for weakly interacting particles at the LHC in the pseudorapidity range of $7.2 < \eta < 8.6$, inaccessible to other experiments at the LHC. The detector is capable of detecting particles of light dark matter scattered by target atoms in the range of parameters that are additional to those already performed in experiments. The SND@LHC detector is a neutrino detector located 480 m from the ATLAS detector in the unused service tunnel TI18 that links the LHC to the Super Proton Synchrotron (SPS). The SND@LHC build at TI18 was done in 2021, during Long Shutdown 2, in order to collect 150 fb^{-1} of data for 2022-24. From April 2022, data collection began. Research in the SND@LHC project is based on the analysis of data from emulsion blocks consisting of emulsion layers with tungsten plates (800 kg) between them. At the same time, the SciFi detector subsystem predicts the location of neutrino interactions in the emulsion target, providing a time stamp for events reconstructed in the emulsion, and performs calorimetric measurements of electromagnetic showers. Thus, the design and characteristics of the SND@LHC hybrid neutrino detector, whose main elements are emulsions and SciFi (the muon detector also works), are of great interest for studying neutrinos of all three flavors.

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