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Latest results from the OPERA experiment

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The OPERA experiment is designed to search for $\nu_\mu \rightarrow \nu_\tau$ oscillations in appearance mode through the direct observation of the τ lepton in ν_τ Charged Current interactions. The ν_τ CC interaction is identified through the detection of the τ lepton decay topology in the so called Emulsion Cloud Chamber (ECC), passive lead plates constituting the target mass interleaved with nuclear emulsion films providing the high spatial resolution. Electronic detectors complement the ECCs.

The experiment recorded data for five years, since 2008, with the CNGS, a quasi-pure ν_μ beam from CERN to the Gran Sasso laboratory LNGS in Italy, collecting 1.8×10^{20} protons on target. The running of the detector and the data collection from the emulsions films by means of fast automatic optical microscopes will be described, together with the special procedures used to locate the interactions vertices and to detect short decay topologies. Methods for background reduction, especially a new analysis to improve the charge sign measurement, will also be discussed.

The latest results on oscillations with the increased statistics, including the fourth tau neutrino candidate event, will be presented.

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