

## Final results from the OPERA experiment in the CNGS neutrino beam

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The OPERA experiment at the Gran Sasso Laboratory was designed to study  $\nu_{\mu} \rightarrow \nu_{\tau}$  oscillations in appearance mode in the CERN-to-Gran Sasso neutrino beam. We report the final analysis of the full data sample based on looser selection criteria than in previous analyses and multivariate approach. Oscillation parameters have been determined with a reduced statistical uncertainty, and the discovery of tau neutrino appearance is confirmed with an improved significance level. The measurement of  $\nu_{\tau}$  CC cross-section was performed, and the direct observation of the  $\nu_{\tau}$ -lepton number is also reported. Moreover, the search for electron neutrino events has been extended to the full dataset exploiting an improved method for the electron neutrino energy estimation. New limits have been set in the 3+1 neutrino model.

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