

The Nuclear Emulsion Technology and the Analysis of the OPERA Experiment Data

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OPERA is an experiment that aims at detecting the appearance of tau-neutrinos in an almost pure muon-neutrinos beam through oscillation. The CC tau-neutrino interaction is identified through the detection of the tau lepton decay topology in the so-called Emulsion Cloud Chambers (ECC), passive lead sheets constituting the target mass interleaved with nuclear emulsion films providing the high spatial resolution. We mainly report here on the analysis of the emulsion films data.

This analysis is performed in two main steps: locating the neutrino interaction and searching for a secondary vertex topology of which kinematics is compatible with that of tau decay. We first describe the system developed and currently used for the location of the neutrino interactions and summarize the status of the analysis. We introduce the method used to search for decay vertex topologies. We then explain how the ECC technology is further used to perform kinematic measurements and particle identification that complements the information provided by the electronic detector. Finally, we show some special events, including charm decay candidates, observed during the physics run.

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