

Title :

Experimental study of neutrino properties with modern nuclear emulsion technology
— OPERA & J-PARC T60 —

Name :

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Abstract :

The accelerator based neutrino experiment with nuclear emulsion has a long history since late 1970's, for example the Fermilab E531 experiment. Then the CHORUS and DONUT experiments were successfully carried out with the progress of the emulsion analysis technique. Through these experiments, nuclear emulsion has played an important role in the field of neutrino physics.

OPERA is a long baseline neutrino oscillation experiment to search for $\nu_\mu \rightarrow \nu_\tau$ oscillation in appearance mode. OPERA took data from 2008 to 2012 with CNGS neutrino beam, collecting 17.97×10^{19} p.o.t. and its analysis is ongoing. The first ν_τ candidate event was observed in 2010. Then in June 2015 the 5th ν_τ candidate has been reported, achieving the discovery of ν_τ appearance with 5.1 sigma significance. I have worked for OPERA since 2003 when the construction of the largest emulsion detector ever made was started. So I'd like to talk about not only results from OPERA but also the long term hard works.

Then I will introduce a new experimental project to study low energy neutrino-nucleus interactions and to explore the possible existence of sterile neutrinos with modern nuclear emulsion technique at J-PARC. First of all, we have proposed a test experiment, J-PARC T60. Its purpose is to demonstrate the feasibility of emulsion detectors in sub – multi GeV region. Current status and future prospects will be given in the talk.

Reference :

- [1] N. Agafonova et al. (OPERA collaboration), Phys. Rev. Lett. 115,121802(2015).
arXiv:1507.01417
- [2] T. Fukuda et al. (T60 collaboration), the presentation for “Workshop for Neutrino Programs with facilities in Japan” .
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