

Study of Neutrino Mixing by using accelerator neutrino beams.

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【Outline of survey】

In order to reveal neutrino mixing phenomena and to measure the mass square difference of neutrinos, we conduct the accelerator neutrino beam experiments: SciBooNE and T2K.

In SciBooNE, the Fermilab neutrino beam is used to measure the neutrino interaction cross sections in low energy. In SciBooNE, we concentrate to understand the inelastic reactions which are serious backgrounds in the neutrino oscillation signals in T2K. We also measure the anti-neutrino cross section around 1GeV.

In T2K, we use the high power and high quality neutrino beam from J-PARC and the Super-Kamiokande neutrino detector to study neutrino mixing. In T2K, the near neutrino detector installed in J-PARC plays a crucial role to understand the property of the neutrino beam and neutrino interactions. In T2K, we conduct the precise measurements of neutrino oscillation parameters and the high-sensitive search for the rare process $\nu_{\mu} \rightarrow \nu_e$ to determine θ_{13} .

【Expected results】

1. World-best precision measurements of neutrino cross-sections around 1 GeV.
2. Precise measurements of neutrino oscillation parameters: θ_{23} and Δm_{23}^2
3. Most-sensitive search for the unknown neutrino oscillation channel $\nu_{\mu} \rightarrow \nu_e$ and the determination of θ_{13} .
4. For a future neutrino CP violation experiment, compile of necessary information of neutrino and anti-neutrino cross sections and the neutrino beam properties.

【References by the principal investigator】

- "Measurement of neutrino oscillation by the K2K experiment", M.H.Ahn, A.K.Ichikawa, T.Nakaya, M.Yokoyama et al., Phys. Rev. D74, 072003 (2006)
- "Improved Search for $\nu_{\mu} \rightarrow \nu_e$ Oscillation in a Long-Baseline Accelerator Experiment", S.Yamamoto, T.Nakaya et al., Phys. Rev. Lett 96, 181801 (2006)
- "The JHF-Kamioka neutrino project", Y.Itow, T.Nakaya et al., hep-ex/0106019

【Term of project】 FY2008—2012

【Budget allocation】

64,100,000 yen (direct cost)

【Homepage address】

<http://www-he.scphys.kyoto-u.ac.jp/Neutrino/>
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