

# NuFact15 : XVII International Workshop on Neutrino Factories and Future Neutrino Facilities



Contribution ID: 157

Type: Poster

## Revisiting T2KK and T2KO physics potential and $\nu_\mu$ - anti- $\nu_\mu$ beam ratio

In this presentation, we revisit the sensitivity studies of a Tokai-to-Kamioka-and-Korea (T2KK) and Tokai-to-Kamioka-and-Oki (T2KO) proposals where a 100 kton detector is placed in Korea ( $L = 1000$  km) and Oki island ( $L = 653$  km) in Japan, respectively, in addition to the Super-Kamiokande (SK) for determination of the neutrino mass hierarchy and leptonic CP phase ( $\delta_{CP}$ ).

We systematically study the  $\nu_\mu$  and anti- $\nu_\mu$  focusing beam ratio with dedicated estimation of backgrounds for the  $\nu_e$  appearance and  $\nu_\mu$  disappearance signals, especially improving treatment of the neutral current (NC)  $\pi^0$  backgrounds.

Using a  $\nu_\mu$  : anti- $\nu_\mu$  beam ratio between 3 : 2 and 2.5 : 2.5, the mass hierarchy determination with  $\Delta\chi^2 = 10-30$  by the T2KK and 3-20 by the T2KO experiment are expected for  $5 \times 10^{21}$  POT when  $\sin^2(\theta_{23}) = 0.5$ .

The CP phase is measured with the uncertainty of 20 deg. – 50 deg. by the T2KK and T2KO using the  $\nu_\mu$  : anti- $\nu_\mu$  focusing beam ratio between 3.5 : 1.5 and 1.5 : 3.5.

These findings indicate that the T2KK and T2KO experiments can improve their sensitivity to both the mass hierarchy determination and leptonic CP phase measurement simultaneously, using  $\nu_\mu$  and anti- $\nu_\mu$  focusing beams with 3 : 2 - 2.5 : 2.5 beam ratio.

**Primary author:** Dr TAKAESU, Yoshitaro (University of Tokyo)

**Co-authors:** Prof. HAGIWARA, Kaoru (KEK); Prof. OKAMURA, Naotoshi (International University of Health and Welfare); Prof. KO, Pyungwon (KIAS)

**Presenter:** Dr TAKAESU, Yoshitaro (University of Tokyo)

**Track Classification:** Working group 1: Neutrino Oscillation Physics