T2K oscillation analysis aims to extract oscillation probability from a rate of event in the Super-K detector.

Need to modelize neutrino flux and interaction.

\[
N_{\nu_\beta}^{FD}(E_\nu) = \Phi_{\nu_\beta}^{FD}(E_\nu) \times \sigma_{\nu_\beta}^{FD}(E_\nu) \times \varepsilon_{FD}(E_\nu) \times P_{\nu_\alpha \to \nu_\beta}(E_\nu)
\]

Cross-section | Osc. Probability
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Flux | Det. Efficiency

> Need to evaluate this

1) Build simulated data at ND280 and SK with alternative models.

2) Fit at ND280 with nominal model.

3) Propagate at SK and fit SK simulated data.

4) Compare the result with a fit to the nominal MC.
We can quantify this effect by comparing 1D oscillation parameters likelihood curves. The biases being too large, defined a procedure based on the results of the study to have an additional uncertainty.

- Additional parameter being able to absorb shape effects.
- Smearing of the oscillation parameters likelihood.

This additional uncertainty impacts mainly the disappearance parameters $\theta_{23}$ $\Delta m^2_{32}$.

We get bias for all the alternative models and oscillation parameters.

We can define if biases are acceptable.