Neutrino beam simulation

For each decay, in flight the neutrino energy in the target defines a cone and is weighted by the probability. It is hit as a line at a distance L.

\[ P = \frac{1}{4\pi} \frac{L}{(1 - \beta^2 \cos^2 \theta) \sqrt{1 - \beta^2}} \]

Two-body decay case

Reference values for flux comparison

Effect of the positive particle focusing on the flux

Improved neutrino beam

\[ \pi, K p \rightarrow 0 \] production at the target exit. Weighted by the probability to emit a neutrino in the far detector acceptance.

Neutrino beam tuning

Parameter scan performed around the reference configuration to optimize CP sensitivity of the energy spectrum.

Sensitivity to CP-Violation

Improved beam neutrino flux considered

Neutrino energy reconstructed from final state events.

\( \nu_e \) background treated with kinematical analysis.

Integrated potential: 5.5x10^{20} m/kton

Running mode: 25%/75% sharing neutrino and antineutrino

Systematic errors:
- Signals normalizations: 5%/50%
- Horn polarity: 5%
- NC, CC background: 5%
- Matter density 4%

Related Contributions: S. di Luise, "LAGUNA-LBNO: a very Long Baseline Neutrino Oscillation experiment". Session: Neutrinos