NEUTRINO EXERCISES (TALLER DE ALTAS ENERGIAS 2013)

•Compute the appearance and disappearance neutrino oscillation formulae for the case of 2 neutrinos.

• T2K has measured the following number of events in the far detector:
  • $N\nu_\mu = 58$ events
  • $N\nu_e = 28$ events, of which 4.64 +- 0.53 are backgrounds from different sources.
  •The expected number of $N\nu_\mu$ es = 205 +-17.

The oscillation formulas, for $\delta_{CP} = 0$, the oscillations are given by:
  • $P(\nu_\mu \rightarrow \nu_\mu) = 1 - \sin^2 (2\,\theta_{23}) \sin^2 (1.37\,\Delta m^2\,L\,/E)$
  • $P(\nu_\mu \rightarrow \nu_e) = \sin^2 (2\,\theta_{13})\,\sin^2 (2\,\theta_{23}) \sin^2 (1.37\,\Delta m^2\,L\,/E)$

What is the value of $\sin^2 (2\,\theta_{13})$ given by T2K ?

Pay attention to the fact that the neutrino energy spectrum is not monochromatic.