Goals for the Aug.2km meeting

March 31/April1, 2004 2km meeting

Updated on April 2

1) General goals:

i) Clarify the importance and requirements for the 2km detector.

ii) Do the initial design for the detector (including non-WC options….).

iii) Clarify the time-scale (especially the construction time scale) and the cost.

2) Key items:

a) Far-near ratio problem

b) Prediction of the ν_μ spectrum for the μ- disappearance

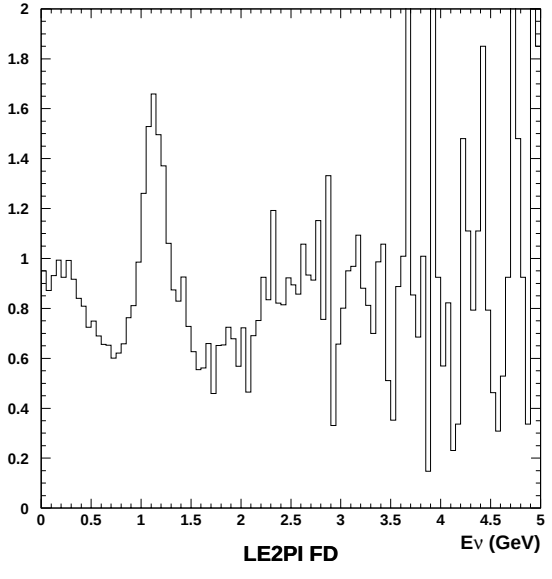
c) prediction of the background for the electron appearance

Ways of getting results for the key items

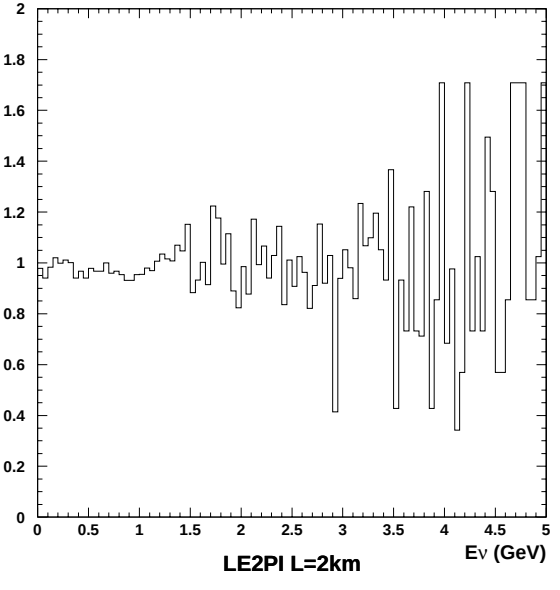
2-a) Far-near ratio problem:

The strategy can be to get the far-near ratio between 280m and 2km detectors. The agreement between the beam simulation and the data gives the estimate of the systematic errors. Then the systematic errors of the far-near ratio between 2km and SK can be estimated. (Original proposal by Y.Suzuki).

2km/280m



SK/2km



2-b) Prediction of the nm spectrum for the m- disappearance:

First we need to review the relation between the systematic error sources and the effects on the $\sin^2 2\theta$ and Δm^2 measurements. Then we should demonstrate that the systematic errors can be controlled within the accuracy we need for getting the expected accuracy of the parameter determination.

The most important sources could be:

2-b-1) Fiducial volume of the 2km detector.

We need idea to prove that we understand the fiducial volume within the accuracy we need. (Probably MC study is not enough, but MC study may tell 8 inch PMTs are better than 20inch PMTs.)

2-b-2) Ring-counting.

We need to demonstrate that the single-ring selection efficiencies and background contaminations are similar between the 2km and SK detectors.
We have to have good strategy to prove the ring-counting efficiency. One serious possibility is a light source that simulates the Cherenkov rings. This possibility should be seriously studied.

2-b-3) Particle-ID, energy calibration etc

Similar to 2-b-2), but maybe easier?

2-b-4) Non-quasielastic contamination and the relation between $E\nu$ and $E\mu$ for these events:

Of course, the basic idea is the fine-grained scintillator detector.

However, due to the limited time and man power, we may not be able to carry out detailed work before the Aug. T2K meeting. However, in the longer term, groups of people should work on this issue.

2-c) prediction of the background for the electron appearance:

We should demonstrate that the background rates are very similar between 2km and SK based on MC. (Or we should demonstrate that the 2km background rate is lower than SK and the 2km detector can predict the SK background rate.)

We should be able to prove that the estimated background number of events at SK by the 2km detector is right. For example, if most of the CC ν_μ events are rejected in relatively early stages of the background reduction, the validity of the cuts can be proven by comparing the SK and 2km distributions used for the cuts…. (We need these studies.)

Maybe MC studies will tell that the detector with 8inch PMTs is much better than that with 20inch PMTs.

Also, we need more inputs from the K2K experience.