

Results physicist event scan at MSU  
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April 5, 2005

Scanned at the end of 2004 were a number of simulated muon and electron neutrino events in an off-axis beam with the momentum spectrum expected at 800 km. The following documents the results of this scan. The scan sheets are available if an independent evaluation is desired.

Items recorded during the scan procedure:

1. Locate the primary vertex position in two views
2. Count the number of EM showers that are likely associated with the primary vertex
3. Count and number the primary vertex tracks
4. Any primary vertex track that “develops” into a shower is an **EM shower track**.
  - a) The shower must clearly start on the track in all views.
  - b) The **EM shower start** is defined as the first occurrence of 3 sequential hits with an Ionization  $> 1.5$ .
5. For an **EM shower track** measure the distance between primary vertex and the track’s **EM shower start**.
6. Measure the number of hits with Ionization  $< 1.5$  between primary vertex and the **EM shower start**.

Electron event ID: 

- 1) **EM shower starts**  $> 1.5$  cm from the primary vertex
- 2) At least 2 hits with Ionization  $< 1.5$  before **EM shower starts**
- 3) No more than 3 EM showers in an event.

Scan of 50 electron neutrino CC interactions.

- \* 8 events fail electron ID-1
- \* 1 event passes electron ID-1 and ID-2 but fails ID-3
- \* Remaining events (41) pass ID-1, ID-2 and ID-3.

Scan of 265 neutrino NC events

Out of these events, 35 had an energy deposition similar to that of the signal events.

- \* 9 events had an **EM shower track**
- \* In 7 of these events the tracks failed electron ID-1
- \* The 2 remaining events failed ID-3

Bottom line: 82  $\pm$  6% electron CC efficiency, and upper limit (non-rigorous) on NC background events of  $\sim 2$  events, or 5% of the NC background. At this level the NC background is about a factor of two below the electron neutrino beam contamination.