MINOS Search for Active Neutrino Disappearance

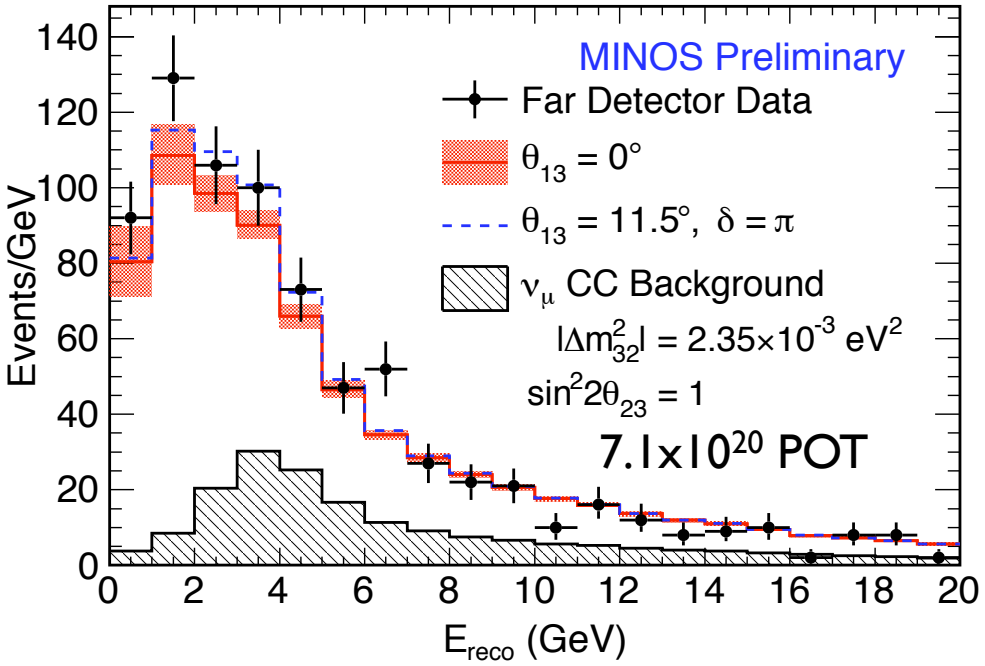
- Transitions of active neutrino flavors to sterile neutrinos would result in a deficit of neutral current events observed at the MINOS Far Detector.

- Observed MINOS neutral current spectrum is shown on the right, along with spectra predicted from the Near Detector for oscillations among three active neutrinos with and without ν_e appearance (set at the MINOS 90% CL limit).

- Agreement between the observed and predicted neutral-current spectra is quantified using the statistic *R*, tabulated on the right for different ranges of E_{reco}.

$$R = \frac{N_{\mathrm{Data}} - \sum B_{\mathrm{CC}}}{S_{\mathrm{NC}}}$$

- Fraction of disappearing ν_μ that may convert to sterile neutrinos is limited to < 0.22 at 90% CL without ν_e appearance (< 0.40 at 90% CL with ν_e appearance).



E_{reco} (GeV)	N_{Data}	S_{NC}	$B^{\nu_\mu}_{CC}$	$B^{\nu_\tau}_{CC}$	$B^{\nu_e}_{CC}$
0 – 3	327	248.4	32.7	3.3	3.1 (21.8)
3 – 120	475	269.6	159.1	9.5	31.2 (54.4)
0 – 3	$R = 1.16 \pm 0.07 \pm 0.08 - 0.08(\nu_e)$				
3 – 120	$R = 1.02 \pm 0.08 \pm 0.06 - 0.08(\nu_e)$				
0 – 120	$R = 1.09 \pm 0.06 \pm 0.05 - 0.08(\nu_e)$				

$$f_s = \frac{P_{\nu_\mu \to \nu_s}}{1 - P_{\nu_\mu \to \nu_\mu}} < 0.22\,(0.40)\ \text{at}\ 90\%\,\text{CL}$$