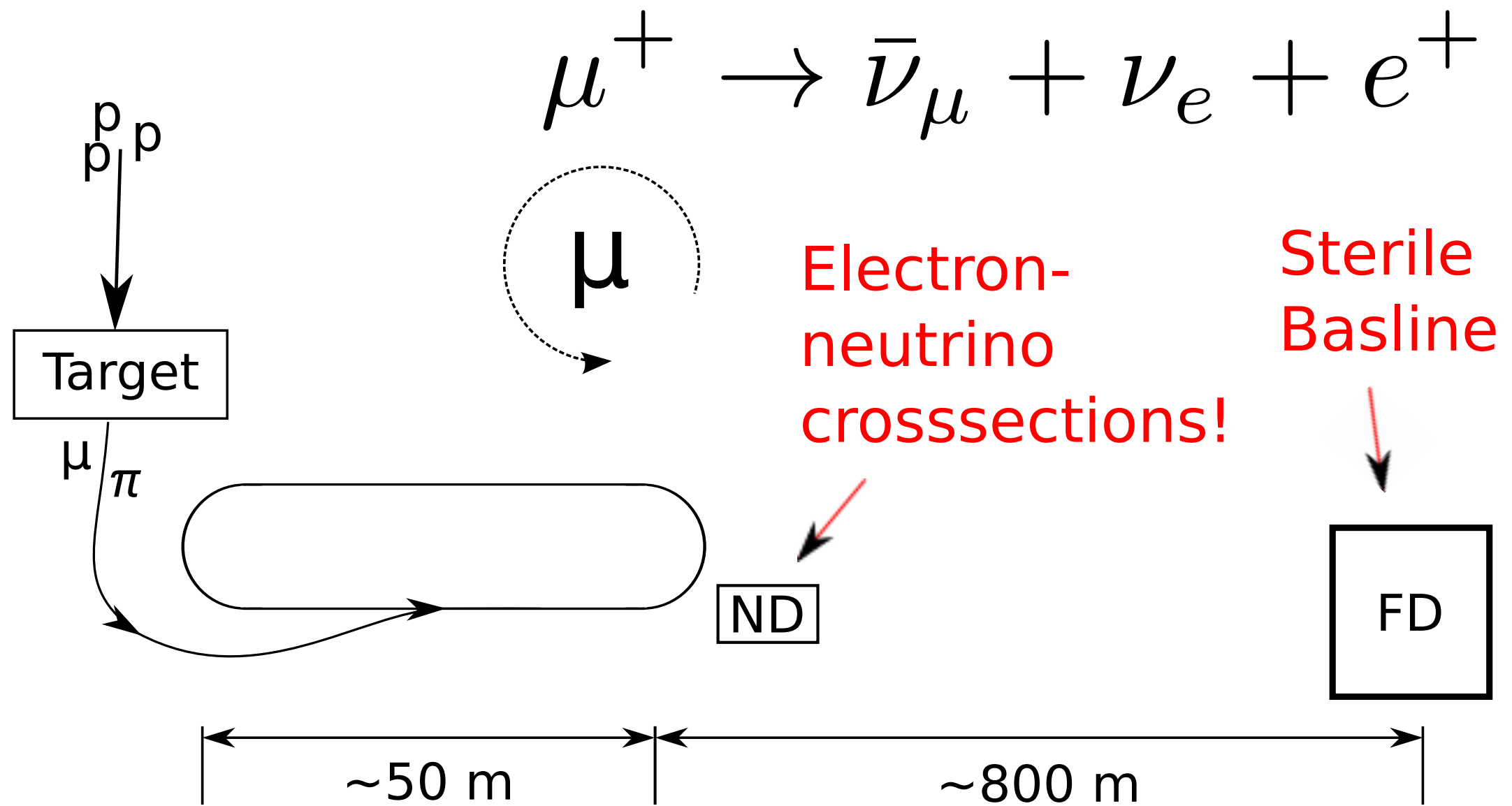


Oscillation Physics

Reach

Chris Tunnell and John Cobb
Oxford



.....

Appearance-only (though disappearance good too!)

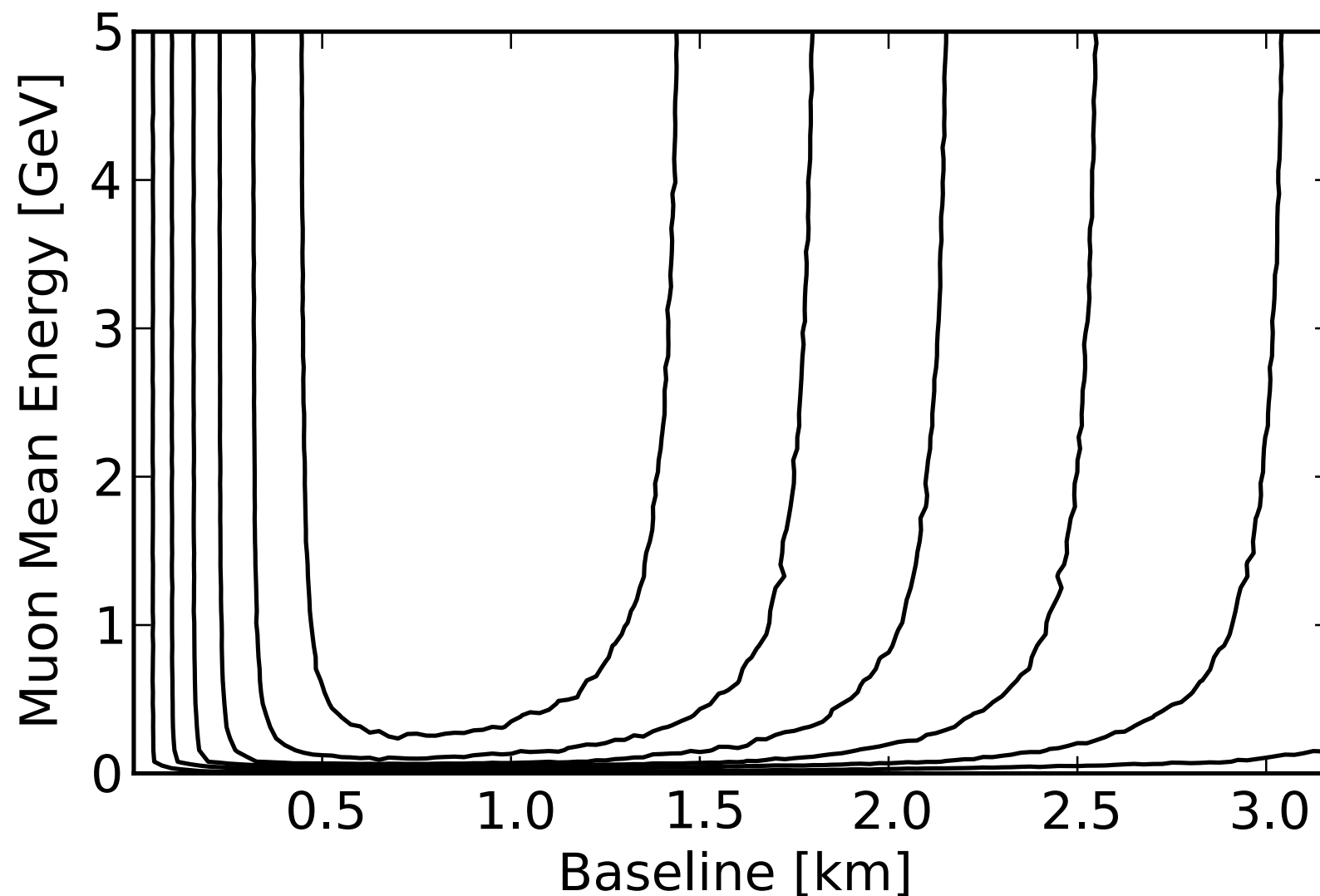
$$Pr[e \rightarrow \mu] = 4|U_{e4}|^2|U_{\mu4}|^2 \sin^2\left(\frac{\Delta m_{41}^2 L}{4E}\right)$$

The VLENF Parameterization

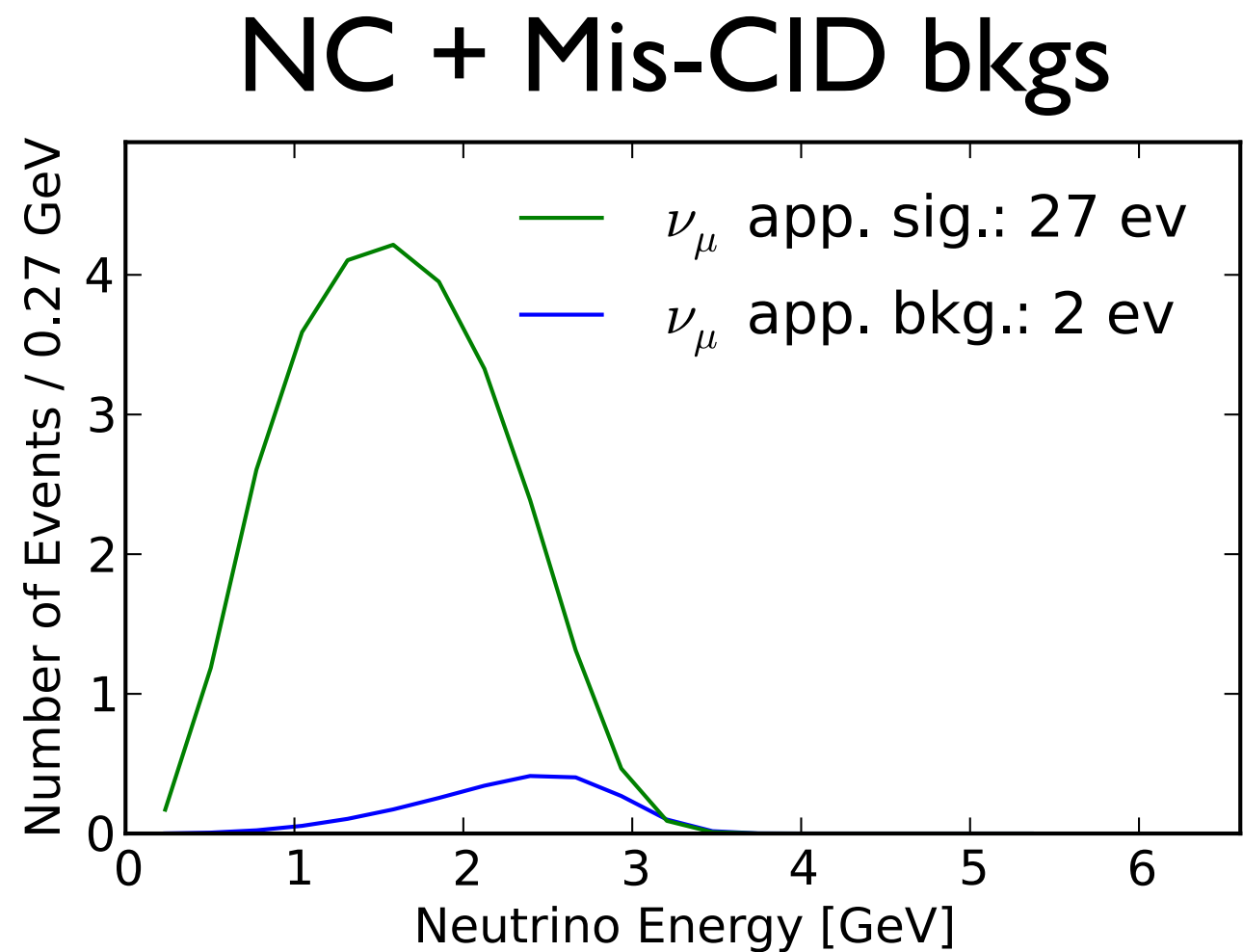
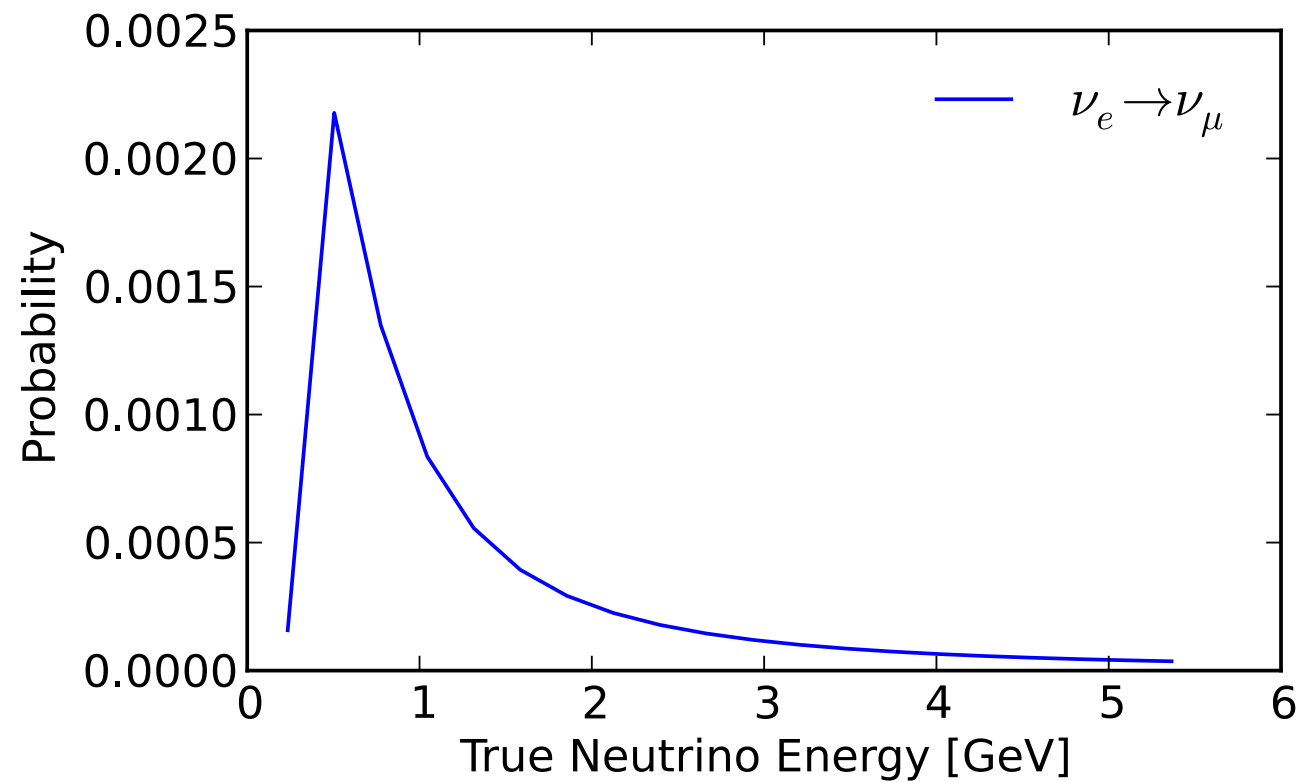
Target Mass:	1 kt
Muon Energy:	2 GeV
Number of Muons:	2.00E+17
Baseline:	800 m
<hr/>	
Detector efficiency	(90 +/- 2)%
NC Background Probability	1e-4 +/- 20%
Charge Mis-ID	1e-5 +/- 20%
<hr/>	
Length of accelerator straight:	50 m
Twiss parameters in straight	$\alpha=0, \beta=25\text{m}$
Energy spread	20%
Gaussian emittance	15 mm

Why 800 m?

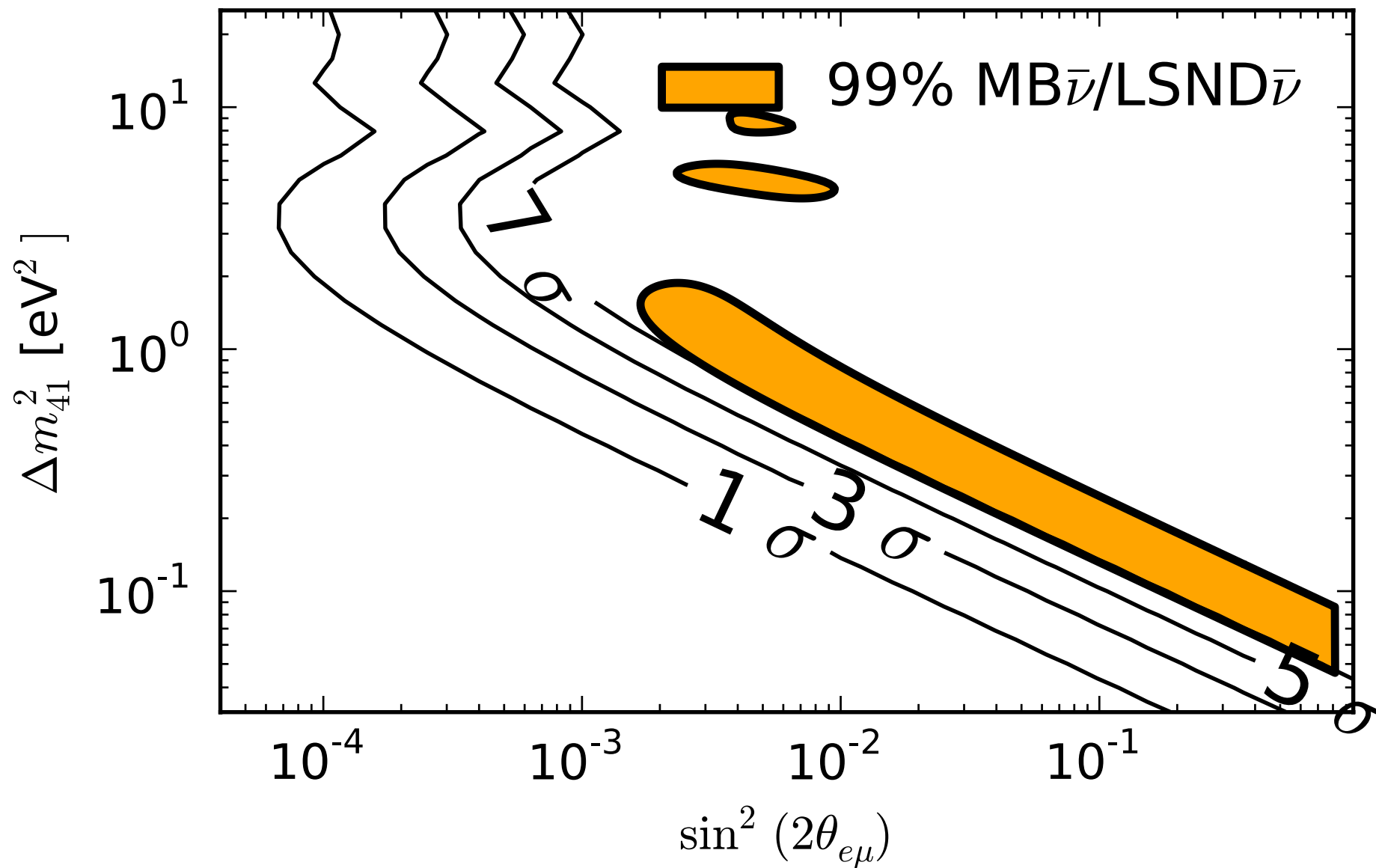
Compare χ^2 between null and LSND effect with appearance



Osc. Prob./Event Rates



7 Sigma Rejection so far

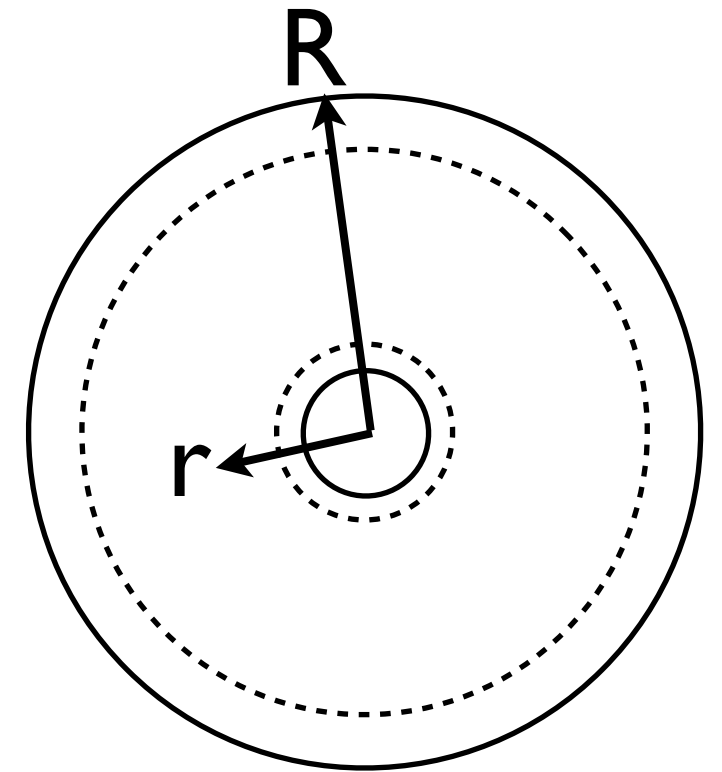


Paper Draft

- Drafted paper on $(3+1)$ sterile neutrino reach
- On arXiv: <http://arxiv.org/abs/1111.6550>
- New version adds history of idea and diagram
- May submit somewhere, may not; thoughts?

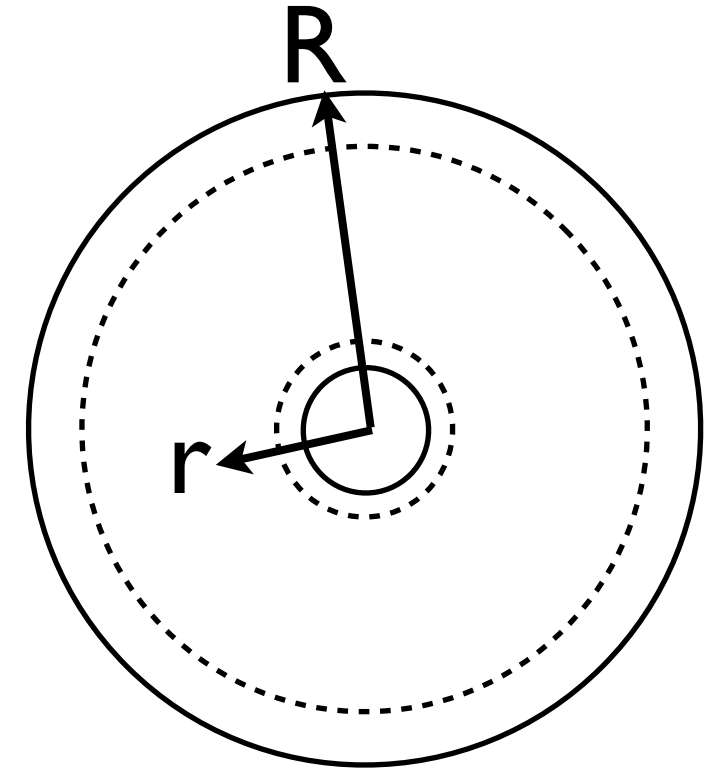
Question 1

- MINOS Fiducial:
 $50 \text{ cm} < r < R - 50 \text{ cm}$
- Alan: "5 meter wide plates for MINOS-like"
- Fiducial efficiency of 66%,
make plates bigger or buy more detector?



Question 2

- Alan: "1 cm thick plates"
- John: "These are atmospheric energies, so few mm"
- Alain: "2 [some unit] is optimal"
- I want to spend a week figuring optimal plate thickness



What next?

- Far detector physics: see if we can get these efficiencies? If not, we still have disappearance measurements.
- Near detector: what do we want to measure and how are we better?
- Accelerator instrumentation?
- A few possibilities....