The Eagle has landed – what now?

Patrick Huber

Center for Neutrino Physics at Virginia Tech

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Scenario

Let's assume nuSTORM makes a 10 sigma discovery

- We have seen $\nu_e \to \nu_\mu$ transitions of order $P \sim 0.003$ (consistent with LSND)
- We assume we deal with $3 + N$ neutrinos
- We further assume that one $\Delta m^2 \simeq 1\,\mathrm{eV}$

This raises the following questions

- Is it sterile neutrinos?
- How many sterile neutrinos?
- Is there CP violation?

First steps

- First thing to do is to look at $\bar{\nu}_e \to \bar{\nu}_\mu$ if, $\bar{P} \neq P$ $\Rightarrow$ CP violation $\Rightarrow N > 1$ with $\Delta m^2 \simeq 1\,\mathrm{eV}$
- Next look at disappearance since

$$P(\nu_e \to \nu_\mu) \leq 4P(\nu_e \to \nu_e)P(\nu_\mu \to \nu_\mu)$$

More tests

- Neutral current disappearance – not so easy since flux is supperpositon of ν_μ and ν_e and hence NC events will measure some linear combinations of

$$\alpha P(\nu_e \to \nu_e) + \beta P(\bar{\nu}_\mu \to \bar{\nu}_\mu)$$

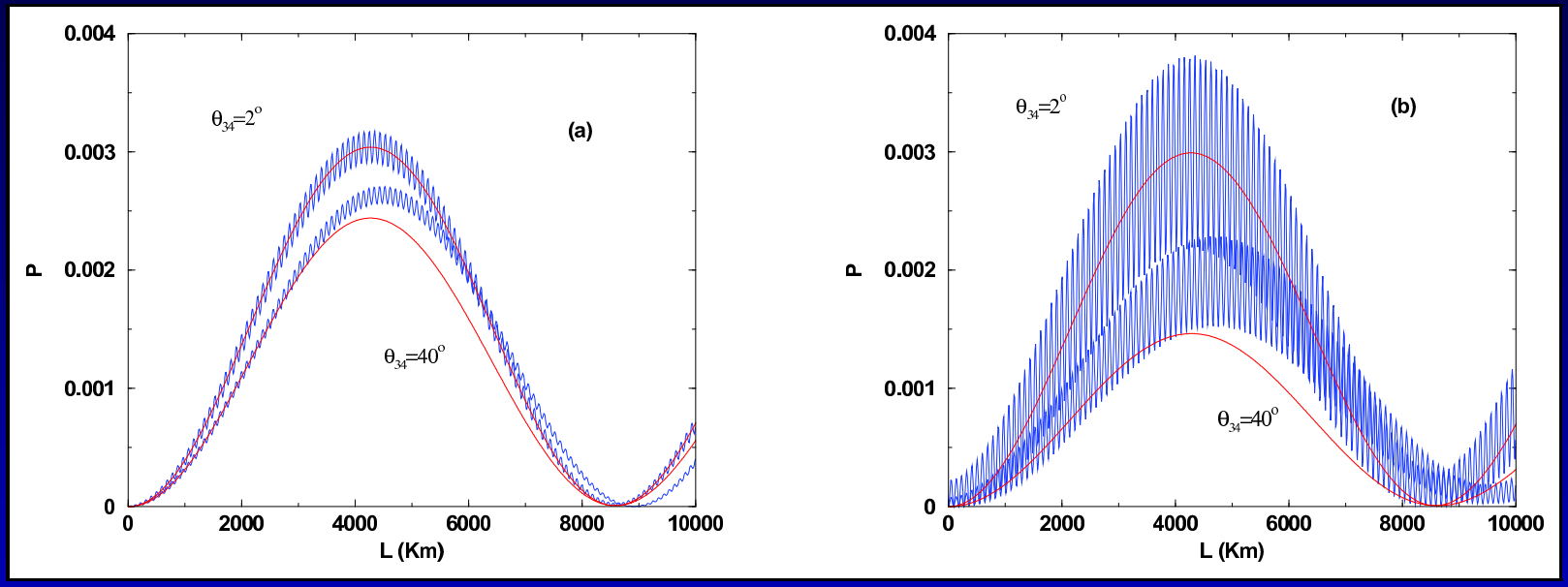
  Would muon polarization help? Since you can modulate α and β in a well defined way.

- $3 + N$ predicts sizeable ν_τ-appearance due to maximal mixing of μ and τ

$$P(\nu_e \to \nu_\tau) \simeq 1/2 P(\nu_e \to \nu_\mu)$$

Impact on long baselines

Since the the atmospheric $\Delta m^2_{31} \ll \Delta m^{4x}$ there will be only averaged sterile oscillations at long baselines.



Donini,Lusignoli,Meloni, hep-ph/0107231

Thus, we expect “shifts” of mixing angles but no additional CP effects