Lecture 36

OK left off discussing how 2-state mixing describes atmospheric νs

Turns out that two flavour ν oscillations also explains the solar ν oscillations very well. (More complicated b/c of matter effects that we are not going to talk about)

$\Delta m^2 \sim 10^{-4} eV^2$

This means we have another Δm^2 that explains how ν_es disappear, with a large mixing angle. Can I do an experiment to test that ?

If, $\Delta m^2 \sim 10^{-4} eV^2$, for a 1 GeV ν, oscillation length is 10^4 km.

Idea to do an experiment with reactor νs. $E_\nu \sim 5MeV \Rightarrow$ baselines of 100 km.

Describe Kamland.

Confirms the picture that you get out of the solar νs.

Picture that we have constructed is pretty simple

Atmospheric Oscillations:

$$\Delta m^2 \sim 10^{-3} eV^2$$

$$\nu_\mu \longleftrightarrow \nu_\tau$$

Large Mixing Angle

Solar Oscillations:

$$\Delta m^2 \sim 10^{-4} eV^2$$

$$\nu_e \longleftrightarrow \nu_\mu, \nu_\tau$$

Large Mixing Angle

We know we have three νs, these results are all with 2 state toy. How do we make this into a coherent picture. Why doesn't this work so well, even though we have 3 νs?