

$$\begin{aligned}
|\psi(L,T)\rangle = & e^{-i\phi_1} \left(e^{i\Delta\phi_{12}} - 1 \right) \cos\theta \sin\theta \, |\nu_e\rangle \\
& - e^{-i\phi_1} \left(e^{i\Delta\phi_{12}} \cos^2\theta + \sin^2\theta \right) |\nu_\mu\rangle
\end{aligned}$$

$$\Delta\phi_{12} = \phi_1 - \phi_2 \approx \frac{m_1^2 - m_2^2}{2p} L$$