$$\phi_\mu(E_\mu, \Theta_\mu) = \underbrace{\phi^0_\mu(E_\mu, \Theta_\mu)\, P_{\mu\mu}(E_\mu, \Theta_\mu)}$$

$$+ \phi^0_e(E_e, \Theta_e)\, P_{e\mu}(E_e, \Theta_e)$$

$$+ \phi^0_\tau(E_\tau, \Theta_\tau), P_{\tau\mu}(E_\tau, \Theta_\tau)$$

$$N(\tilde{E}_\mu, \tilde{\theta}_\mu) = R(E_\mu, \tilde{E}_\mu)\, R(\theta_\mu, \tilde{\theta}_\mu) \int \frac{d^2\sigma(\nu_\mu N \to \mu^- N')}{dE_{\nu_\mu} d\cos\theta_\mu}(E_{\nu_\mu}, \theta_{\nu_\mu}, E_\mu, \theta_\mu)\, P_{\mu_\mu}(E_{\nu_\mu}, \theta_{\nu_\mu})\, \Phi^0_{\nu_\mu}(E_{\nu_\mu}, \theta_{\nu_\mu})$$

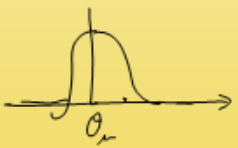
μ

$E_\mu \theta_\mu$

ν_μ

differential cross section

ex: $R(\theta_\mu, \tilde{\theta}_\mu)$



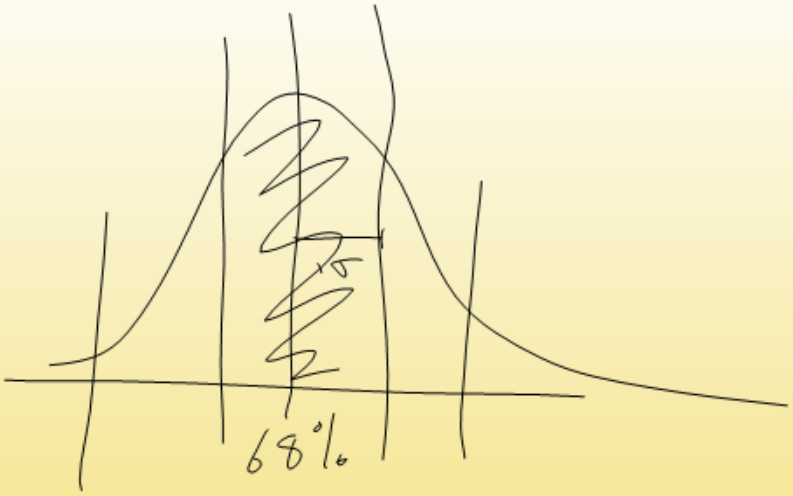
$$\sim e^{-(\theta_\mu - \tilde{\theta}_\mu)^2 / 2\sigma_\theta^2}$$

degrees of freedom =

data points − # parameters

$$\frac{\chi^2}{d.o.f} \sim 1$$

$$\chi^2 = \chi^2(\Delta m^2, \theta_{mixing})$$



90% ~ 1.65σ

95% ~ 2σ

99... ← 3σ

$$1.27\ \Delta m^2 \cdot \frac{L}{E} \sim \frac{\pi}{2}$$

$$1.27 \times 2.5 \times 10^{-3} \quad \frac{L^{(km)}}{E_{(GeV)}} \sim 1.5$$

$$\frac{L}{E} \sim \frac{1.5 \times 10^3}{1.27 \times 2.5} \sim 400$$

~ 500

1 GeV

500 km