

MidTerm #2: More Fun Facts

Speed of Light: $c = 1$

Planks constant: $\frac{h}{2\pi} = 1$

$$\alpha = 10^{-2}$$

$$\alpha_W \equiv 0.5\alpha$$

$$\alpha_G \equiv G_N m_p^2 = 10^{-39}$$

$$\text{GeV}^{-1} = 10^{-15} \text{m}$$

$$\text{GeV} = 10^{-27} \text{kg}$$

$$\text{GeV}^{-1} = 6 \cdot 10^{-25} \text{ s}$$

$$r_{\text{nucleus}} \sim 10^{-15} \text{ meters.}$$

The mass of the electron is $\sim 10^{-3} \text{ GeV}$

The mass of the muon is $\sim 10^{-1} \text{ GeV}$

The mass of the tauon is $\sim 1 \text{ GeV}$

The mass of the bottom quark is $\sim 5 \text{ GeV}$

The mass of the top quark is $\sim 175 \text{ GeV}$

The mass of the W-boson \sim mass Z-boson $\sim 100 \text{ GeV}$

$$1 \text{ TeV} = 1000 \text{ GeV}$$

$$\text{Cross section: } \sigma \sim \frac{1}{E_1 E_2} |M|^2 d\Pi_{LIPS}$$

$$\text{Decay rate: } \Gamma \sim \frac{1}{E} |M|^2 d\Pi_{LIPS}$$

$$\text{Life-time: } \tau = \frac{1}{\Gamma}$$

$$\text{Branching Ratios: } \text{Br}(X \rightarrow YY) = \frac{\Gamma(X \rightarrow YY)}{\sum_f \Gamma(X \rightarrow ff)}$$

$$\mathcal{L}_{\text{scalar}} = \frac{1}{2} (\partial_\mu \phi) (\partial^\mu \phi) + \frac{m^2}{2} \phi^2$$

$$\mathcal{L}_{\text{spin}1/2} = \bar{\psi} (i\gamma_\mu \partial^\mu - m) \psi$$

$$\mathcal{L}_{\text{spin}1} = F_{\mu\nu} F^{\mu\nu} \text{ where } F_{\mu\nu} = \partial_\mu A_\nu - \partial_\nu A_\mu$$

$$\text{sagitta: } \frac{\Delta p_T}{p_T} = \frac{\Delta s}{s}$$

$$\Delta s \sim \text{constant} (\sim 10 \mu\text{m})$$

$$\text{Uniform Circular Motion: } r_c = \frac{p_T}{qB}$$

