素粒子物理学 宿題 6

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Survival Probability

$$P(\nu_\mu \to \nu_\mu) = 1 - \sin^2 2\theta \sin^2 \frac{\Delta m^2}{4E} t$$

と $L = ct$ から $\Delta m^2 t/4E$ を Si 単位系に治すと

$$\begin{aligned}
\frac{\Delta m^2}{4E} t &= \frac{\Delta (mc^2)^2}{4E\hbar} \frac{L}{c} \\
&= \frac{1}{4\hbar c} \frac{\Delta (mc^2)^2 L}{E} \\
&= \frac{1}{4 \times 197\ (\mathrm{MeV\,fm})} \frac{1}{10^6 \times 10^{-15}} \frac{\Delta (mc^2)^2 L\ (\mathrm{eV\,km})}{E\ (\mathrm{GeV})} \frac{1^2 \times 10^3}{10^9} \\
&= \frac{10^3}{4 \times 197} \frac{\Delta (mc^2)^2 L\ (\mathrm{eV\,km})}{E\ (\mathrm{GeV})} \\
&= 1.27 \frac{\Delta (mc^2)^2 L\ (\mathrm{eV\,km})}{E\ (\mathrm{GeV})}
\end{aligned}$$