Massachusetts Institute of Technology

Department of Physics

Course: 8.701 – Introduction to Nuclear and Particle Physics
Term: Fall 2020
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Discussion Problems

from recitation on **October 20th, 2020**

Problem 1: Tau Decay

The liftetime of the muon can be calculated to

$$\tau = \frac{1}{\Gamma} = \left(\frac{M_W}{m_\mu g_w}\right)^4 \frac{12\hbar(8\pi)^3}{m_\mu c^2}$$

Use this equation to calculate the lifetime of the tau and compare with the experimental values. Discuss the result.

Problem 2: Kaon Decay

Calculate the ratio of the decay rates $K^- \to e^- + \bar{\nu_e}$ and $K^- \to \mu^- + \bar{\nu_\mu}$. Compare the observed branching ratios.

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