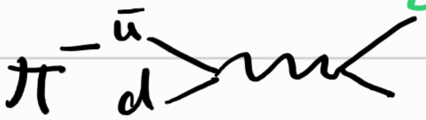
1) a) $\pi^- \to \mu^- +$ $\quad L_\mu = 0 \to 1 + (-1) \Rightarrow + \bar{\nu}_\mu$

$\bar{u} d \to \pi^-$

$L_\mu = 1 \to 0 + 1 + 0$

$L_e = 0 \to 1 + 0 + (-1) \Rightarrow + \nu_\mu + \bar{\nu}_e$



b) $\mu^- \to e^- + \quad +$

data sheet

$\Lambda^0 + p \to K^- + p + p$

$\to$ uds uud s̄u uud uud $\Rightarrow$ quark flavour conservation

⇓

STRONG FORCE

(no free photon γ that could indicate EM instead)

2) a) $\Lambda^0 + p \to K^- + p + p$ = quark composition

common sense

baryon

photon] gluon → colour charge

b) $\pi^+ \to \mu^+ + \nu_\mu$

meson : weak

= boson

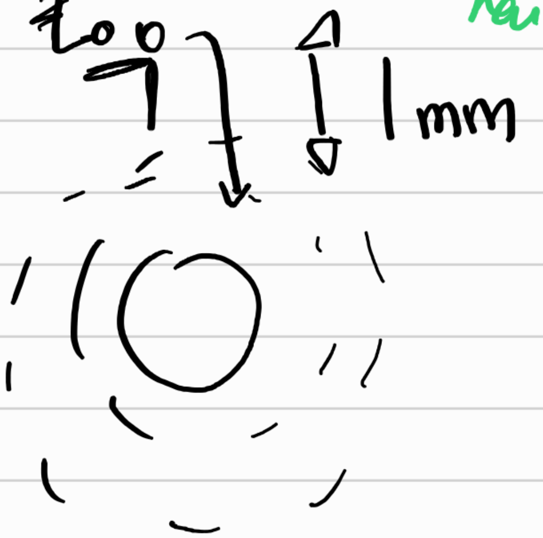
$\pi^+ \to \mu^+ + \nu_\mu$

u d̄ → NO QUARKS $\Rightarrow$ no conservation + KE? quarks [neutrinos]

⇓

WEAK

3) E = 0 $\quad E_{tot} = m_0 c^2 + KE$



?

Grav field

4) (i) $t_{1/2} = \frac{\ln(2)}{\lambda} \Rightarrow \lambda = \frac{\ln(2)}{t_{1/2}}$

$$t_{1/2} = 20.4 \times 60\,s$$

$$\lambda = 5.66 \times 10^{-4}$$

(ii) Decay rate $= N_0 \lambda = 1132593.43$

(iii) n° radioactive nuclei after 8h $= \lambda N_0 e^{-\lambda t} = 5.34 \times 10^{-5}$

$\approx$

which makes sense: way past 20m ½ life

$t = 8 \times 60 \times 60$
$= 28800\,s$

(iv) Activity after 8h $= \dfrac{N_0 \lambda}{2\ln(2)} = 816993.46$

(v) Mean life $= 1/\lambda = 1766.78\,s$
$\simeq 29.4\,min$

5. $M = N_0$ $\quad t = 2.2 \times 10^{-5}\,s$

$\lambda N_0 e^{-\lambda t}$ $\quad t_{1/2} =$

$\lambda = \frac{\ln(2)}{t_{1/2}}$??

6. how many decays are there per gram?

λN?

$\frac{\ln(2)}{t_{1/2}} N$

6

$266 = A$

7)

$5.3 \times 60 = \lambda N_0 e^{-\lambda(t)}$?

2