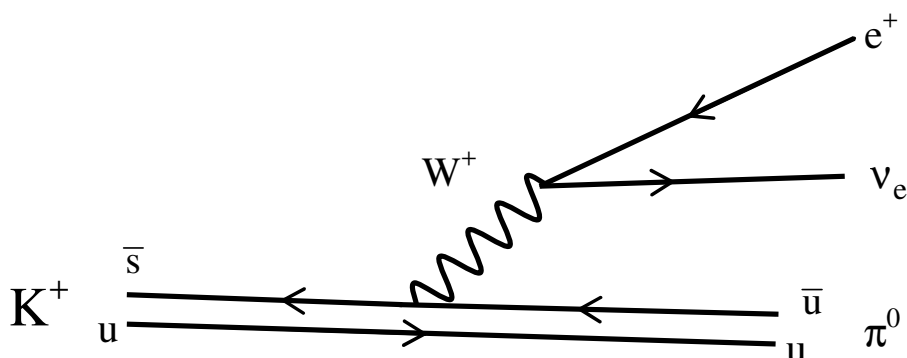


It is not departmental policy to provide complete specimen answers to past examination papers. However, to help you in revision, numerical values and similar information are given below so that you can check your attempts. If you have attempted past questions and wish to discuss the descriptive questions or the details of your calculations, please see me!

Dr Booth

Question 1

c)



- d) Spin $\frac{1}{2}$, isospin 0, charge $-\frac{1}{3}$, $S = -1$.
- e) Hypercharge of strange quark is $-\frac{2}{3}$.
- f) Weak interaction, as strangeness is not conserved.
- g) $\Xi^- = ssd$; $\pi^- = d\bar{u}$.
- h) Muon energy is 258 MeV.

Question 2

b) $\Sigma^+ = uu$; $\Sigma^0 = \frac{1}{\sqrt{2}}(ud+du)$; $\Sigma^- = dd$; spins $\uparrow\uparrow$, $\frac{1}{\sqrt{2}}(\uparrow\downarrow + \downarrow\uparrow)$ or $\downarrow\downarrow$.

$\Lambda = \frac{1}{\sqrt{2}}(ud - du)$; spin $\frac{1}{\sqrt{2}}(\uparrow\downarrow - \downarrow\uparrow)$

- c)i) Electromagnetic – photons involved (all qu. nos. conserved).
- c)ii) Forbidden – τ lepton number not conserved.
- c)iii) Weak – change of strangeness by 1 unit.
- c)iv) Strong – hadrons involved, all qu. nos. conserved.
- c)v) Forbidden – change of strangeness by 2 units.
- c)vi) Forbidden – change of strangeness by 2 units.
- c)vii) Strong – hadrons involved, all qu. nos. conserved.
- c)viii) Weak – involvement of neutrinos (all qu. nos. conserved).

Question 3

c) Maximum pion energy is 2.13 GeV.

Question 4

c) Yes – invariant mass consistent with Λ .

Question 5

c) $F(q) \rightarrow 1$ as $q \rightarrow 0$.