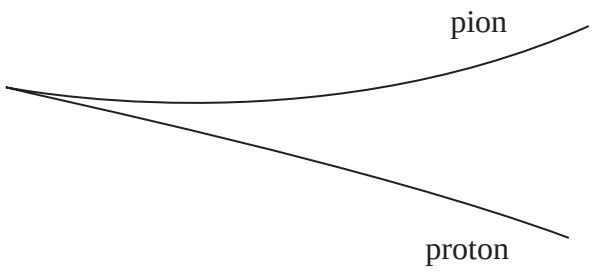
15 A delta particle decays into a proton and a pion.

(a) The diagram shows tracks in a particle detector formed when the delta particle decays.



(i) State why it can be concluded from the diagram that the delta particle is neutral.

(1)

(ii) Deduce the charge on the pion.

(2)

(iii) Complete the particle equation for the decay of the delta (Δ^0) particle.

(1)

$\Delta^0 \rightarrow$

(iv) State why the delta particle must be classified as a baryon based on the evidence of its decay.

(1)

(v) Explain how the momentum of the proton compares with the momentum of the pion.

(3)

(b) The mass of the delta particle is 1232 MeV/c^2.

(i) Calculate the mass of the delta particle in kg.

(3)

Mass = ... kg

(ii) The mass of the proton is 939 MeV/c^2 and the mass of the pion is 139 MeV/c^2.

Explain why the sum of the masses of the two particles after the decay is not equal to the mass of the delta particle.

(3)

(Total for Question 15 = 14 marks)