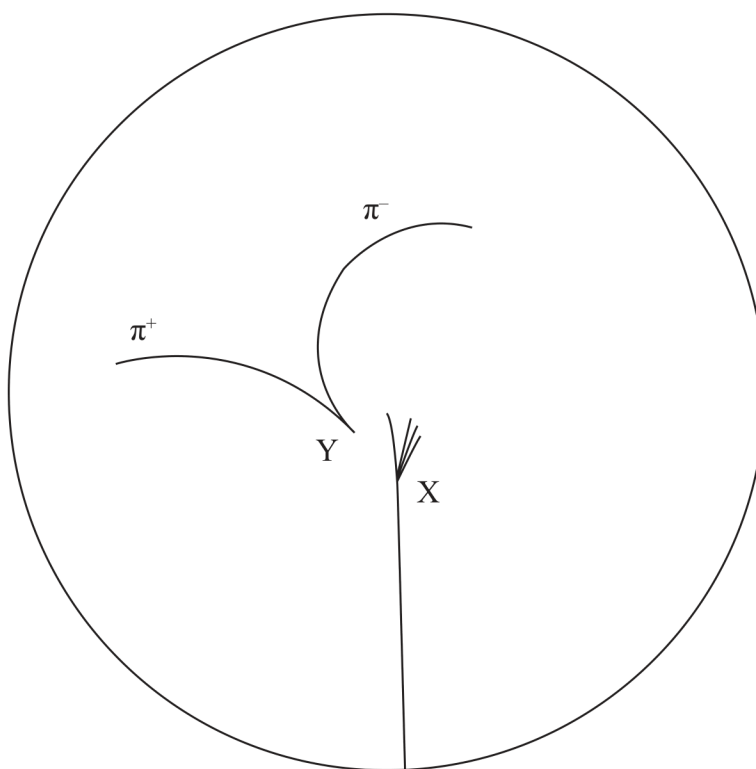


- 14 The diagram shows the paths of particles in a circular particle detector. There is a magnetic field acting at right angles to the plane of the paper. The diagram is drawn to scale. 1 cm on the diagram represents 10 cm in the particle detector.

An antiproton enters the detector and collides with a stationary proton at X. Several particles are produced. One particle is a kaon ( $K^0$ ). The kaon then decays into two pions ( $\pi^+$  and  $\pi^-$ ) at Y.



- (a) Determine the momentum of the negative pion.

magnetic flux density of field in the detector = 7.0 T

(4)

Momentum = .....



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(b) State two ways that the diagram shows the kaon is neutral. (2)

(c) The table shows the charge for the up quark and the down quark as a fraction of the charge on the proton.

Quark	Charge
u	+2/3
d	-1/3

Deduce the quark structure of the antiproton and the negative pion. (2)

Quark structure of the antiproton .....

Quark structure of the negative pion .....

(d) Calculate the mass of a proton in GeV/c<sup>2</sup>. (3)

Mass = ..... GeV/c<sup>2</sup>