

A level Physics B

H557/01 Fundamentals of physics

Question Set 30

1 (a) (i) Subatomic particles called π^- mesons are produced with a kinetic energy of 73 MeV.

The rest mass for π^- mesons is 140 MeV.

Show that the relativistic time dilation factor γ for these particles is less than 2.

$$\gamma = \dots\dots\dots$$

[2]

(ii) Show that they are travelling at about $0.75c$

[2]

(b) The mean lifetime of π^- mesons at low speeds is 2.6×10^{-8} s.

Calculate the mean distance the fast mesons will travel before decaying.

$$\text{mean distance} = \dots\dots\dots \text{m} \quad [2]$$

Total Marks for Question Set: 6

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