2019 Ph H1 Q13

Section: Particles and Waves

Topic: The Standard Model

Brief summary of the question

Decide which of the given statements about the Standard Model are correct: I. Every particle has an antiparticle II. Alpha decay is evidence for the existence of the neutrino III. The W-boson is associated with the strong nuclear force

Worked solution

– Statement I: Correct. In the Standard Model, each particle has a corresponding antiparticle with the same mass but opposite charge (or other quantum numbers).

– Statement II: Incorrect. Alpha decay does not involve neutrinos; neutrinos were proposed to explain missing energy in beta decay.

– Statement III: Incorrect. The W-boson mediates the weak nuclear force, not the strong nuclear force.

Final answer

A — I only.

Revision tips

Antiparticles: identical mass, opposite charge; examples include positron (antielectron) and antiproton.
Neutrinos are linked to beta decay, not alpha decay.
W and Z bosons mediate the weak force; gluons mediate the

strong force.