OCR B Physics A Level

6.2.2 - Particle Types

Flashcards

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What are antiparticles?

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What are antiparticles?

Particles that have the same mass and rest energy but opposite charges and conservation numbers to their matter counterpart.

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What category of particles does a proton fit into?

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What category of particles does a proton fit into?

A proton is a hadron.

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What category of particles does an electron fit into?

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What category of particles does an electron fit into?

An electrons is a lepton.

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What is the antiparticle of an electron?

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What is the antiparticle of an electron?

A positron.

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What type of interactions do leptons experience?

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What type of interactions do leptons experience?

Weak nuclear interactions.

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What are hadrons made up of?

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What are hadrons made up of?

Quarks

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What is always conserved in particle interactions?

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What is always conserved in particle interactions?

- Charge
- Lepton number (by type)
- Baryon number
- Energy/Mass
- Momentum

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What is the mass-energy equivalence?

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What is the mass-energy equivalence?

The mass-energy equivalence is the concept that mass and energy are interchangeable.

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State Einstein's mass-energy equation.

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State Einstein's mass-energy equation.

$$E = mc^2$$

Where E is energy, m is the mass and c is the speed of light in a vacuum.

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What is pair production?

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What is pair production?

Pair production is where a photon is converted into an equal amount of matter and antimatter.

This can only occur when the photon has an energy greater than the total rest energy of a particle and its antiparticle, any excess energy is converted into the kinetic energy of the particles.

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What is annihilation?

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What is annihilation?

Annihilation occurs when a particle and its equivalent antiparticle collide, as a result their masses are converted into energy which is released in the form of two photons travelling in opposite directions.

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Why must two photons of energy be released in annihilation?

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Why must two photons of energy be released in annihilation?

To conserve momentum.

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What piece of apparatus can be used to observe particle annihilation and pair production?

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What piece of apparatus can be used to observe particle annihilation and pair production?

A cloud chamber.

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What is a cloud chamber?

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What is a cloud chamber?

A chamber filled with vapour which condenses when molecules are ionised by other particles. This leaves tracks which can be observed.

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What are the two types of quarks that make up protons and neutrons?

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What are the two types of quarks that make up protons and neutrons?

1. Up
2. Down

Alongside with their anti-quark counterparts.

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What is the charge of an up quark?

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What is the charge of an up quark?

$$\frac{+2e}{3}$$

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What is the charge of a down quark?

CC BY NC ND

What is the charge of a down quark?

$$\frac{-1e}{3}$$

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What is the quark composition of a proton?

CC BY NC ND

What is the quark composition of a proton?

uud

CC BY NC ND

What is the quark composition of a neutron?

CC BY NC ND

What is the quark composition of a neutron?

udd

CC BY NC ND