Silent Starter

https://www.ocr.org.uk/Images/171726-specification-accredited-a-level-gce-physics-a-h556.pdf

2 The specification overview

2a. Overview of A Level in Physics A (H556)

Learners must complete all components (01, 02, 03 and 04) to be awarded the OCR A Level in Physics A.

Content Overview	Assessment Overview	
Content is split into six teaching modules: • Module 1 – Development of practical skills in physics • Module 2 – Foundations of physics • Module 3 – Forces and motion • Module 4 – Electrons, waves and photons • Module 5 – Newtonian world and astrophysics • Module 6 – Particles and medical physics Component 01 assesses content from modules 1, 2, 3 and 5. Component 02 assesses content from modules 1, 2, 4 and 6. Component 03 assesses content from all modules (1 to 6).	Modelling physics (01) 100 marks 2 hours 15 minutes written paper	**37%** of total A level
	Exploring physics (02) 100 marks 2 hours 15 minutes written paper	**37%** of total A level
	Unified physics (03) 70 marks 1 hour 30 minutes written paper	**26%** of total A level
	Practical Endorsement in physics (04) (non exam assessment)	Reported separately (see Section 5g)

Learning objectives:

Describe the standard model

Explain the structure of particles

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1 July 2025

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Describe the standard model

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https://www.youtube.com/watch?v=XYcw8nV_GTs

Learning objectives

- Describe the standard model
- Explain the structure of particles

Key words:

Quark

Lepton

Hadron

Baryon

Proton

Neutron

Electron

Learning objectives:
Describe the standard model
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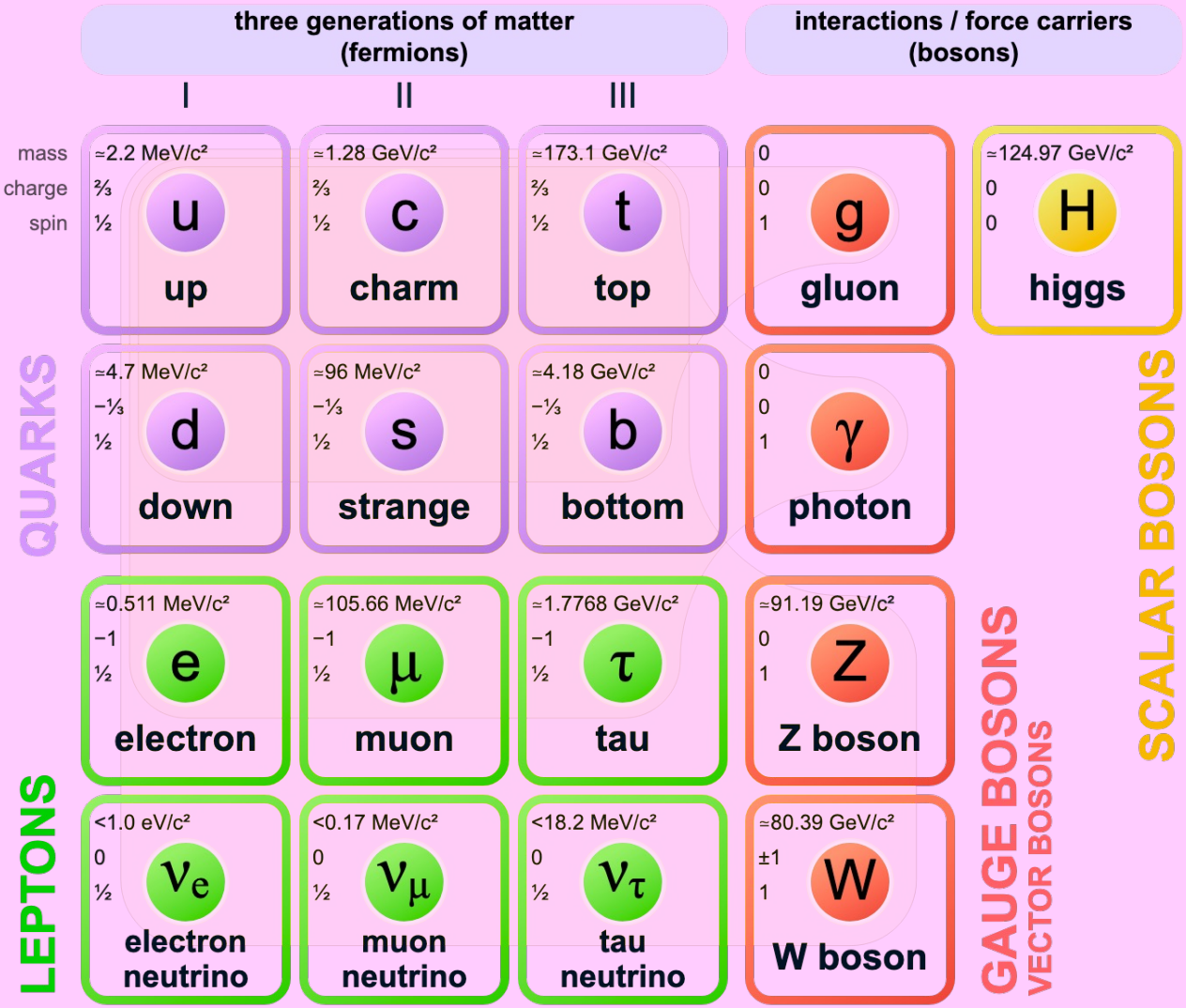
Explanation

Any particle that contains quarks is a hadron.

A lepton is a fundamental particle



Learning objectives:

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Explanation

The Nucleus

The nucleus consists of protons and neutrons, which are collectively known as nucleons.

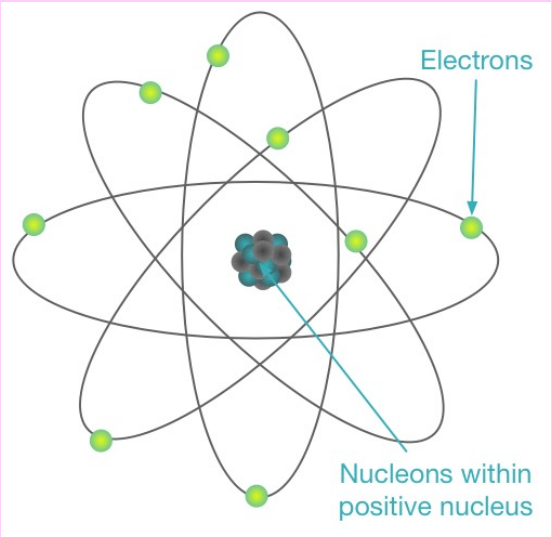
The following notation represents the nucleus of the atom:

Mass Number or
Nucleon Number

$$^{A}_{Z}X$$

Element
Symbol

Proton Number or
Atomic Number



Learning objectives:

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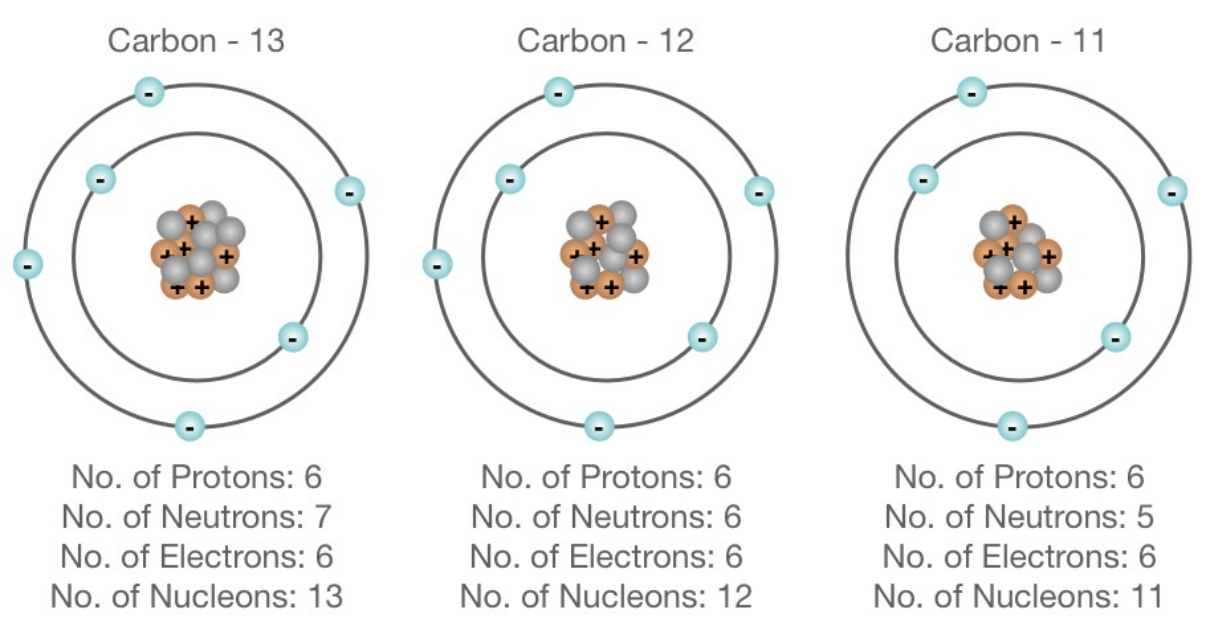
Explanation

Isotopes

An isotope is any of two or more forms of a chemical element. They have the same number of protons in the nucleus, but have different numbers of neutrons.



Learning objectives:

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Explanation

Constituents of the Atom

Proton

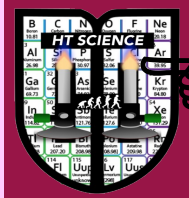
	Relative	SI Unit
Mass	1	1.673×10^{-27} kg
Charge	1	1.6×10^{-19} C

Neutron

	Relative	SI Unit
Mass	1	1.675×10^{-27} kg
Charge	0	0

Electron

	Relative	SI Unit
Mass	0.0005	9.11×10^{-31} kg
Charge	-1	-1.6×10^{-19} C



Learning objectives:

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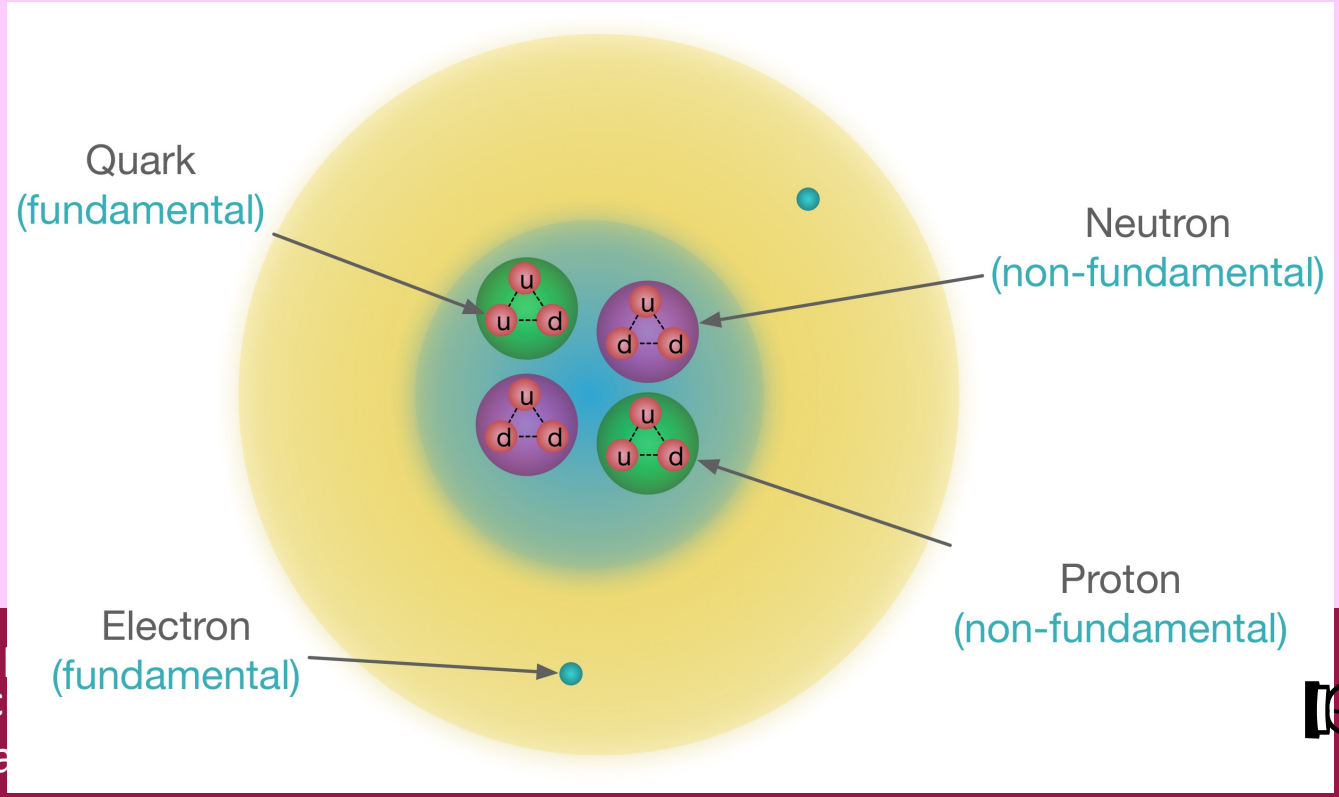
Explanation

Fundamental Particles

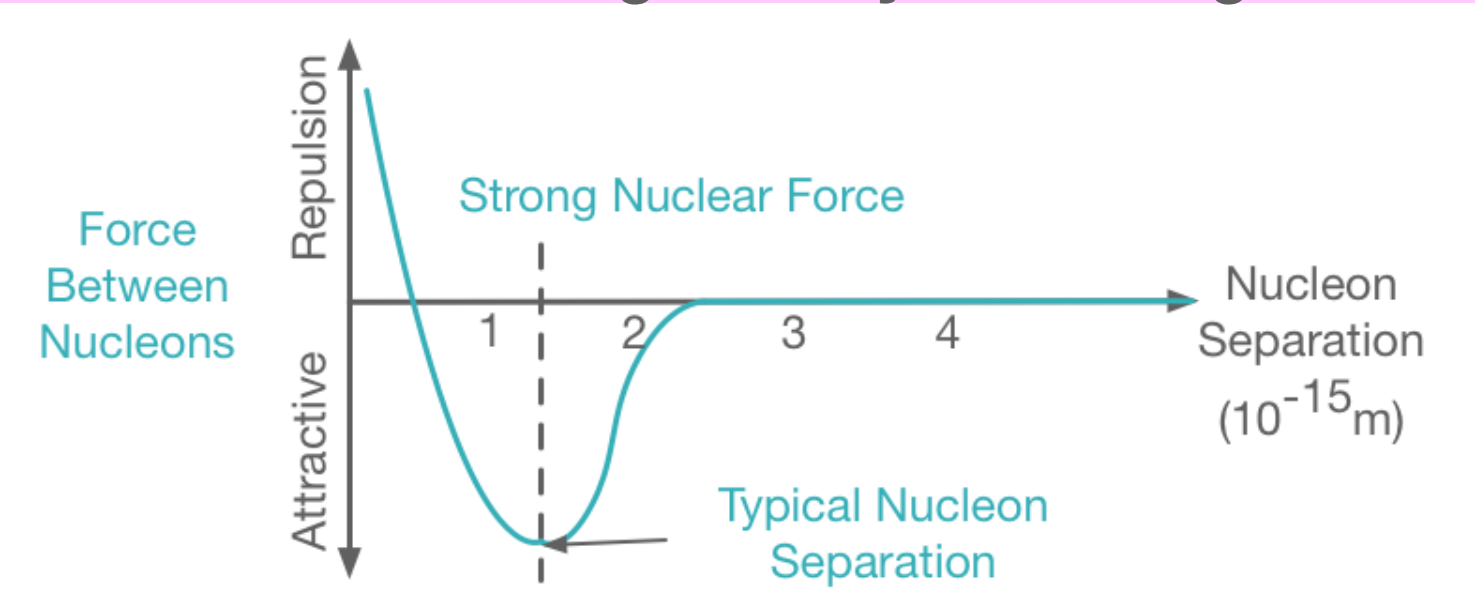
Fundamental (elementary) particles are those which are not composed of other particles. The atom consists of fundamental and non-fundamental particles



Explanation

Strong Force

The nucleus is held together by the strong force.



- **Highly attractive between two protons within 1-2 femtometres**
- **Repulsive between two protons at smaller separations (cannot overlap)**
- **It is extremely short range and has no effect outside of the nucleus**

Learning objectives:

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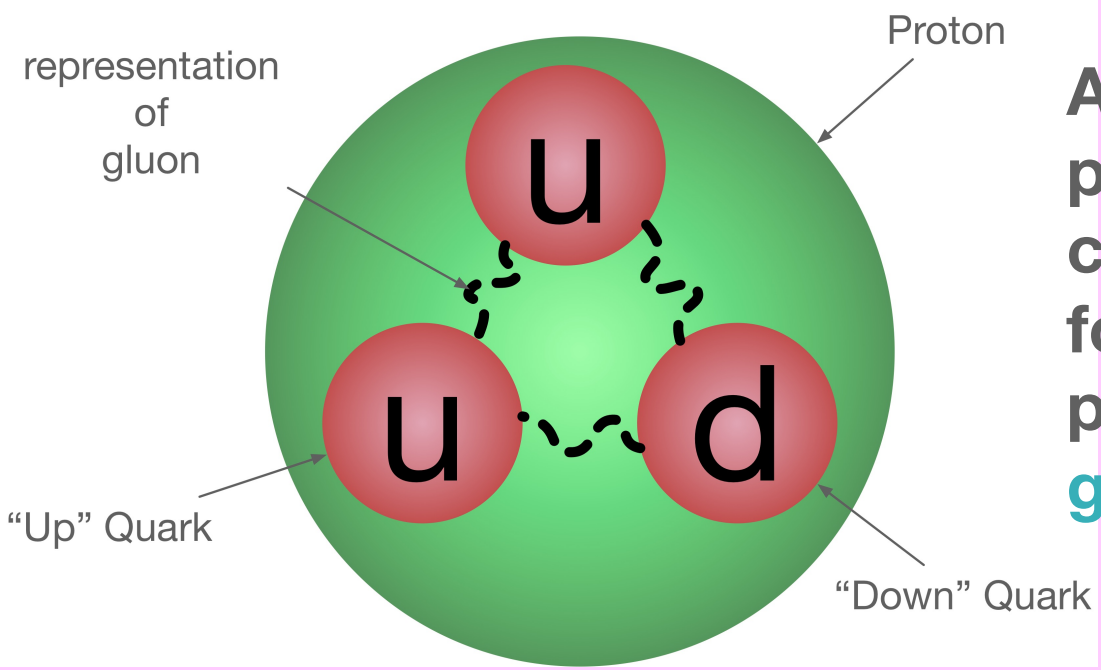
Exchange Particles

It is thought that exchange particles, called gluons, are responsible for the Strong Force. They act between the quarks in a neutron or proton.



A gluon is a particle within the category of force-carrier particles called gauge bosons.

Learning objectives:
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Explanation

Four Fundamental Forces

There are four fundamental forces that act within a nucleus. Each is thought to have their own set of exchange particles, which "carry" the force:

Fundamental Force:	Acts On:	Exchange particles (gauge boson):
Strong	Quarks	Gluons
Gravitational	All particles with mass	Gravitons (not yet observed)
Electromagnetic	All particles with charge	Photons
Weak	Leptons	W and Z Bosons

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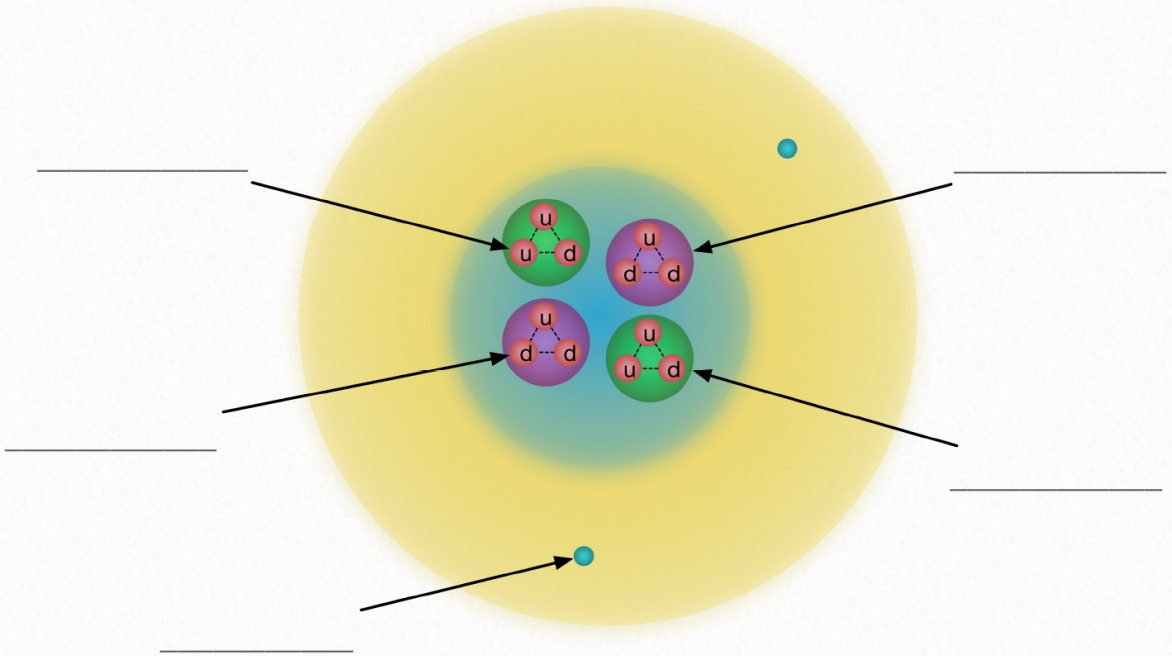
Explanation

Complete the Questions

Particle Physics

1. Label the diagram of the particles within the atom below:



2. State what is meant by a fundamental particle

Learning objectives:

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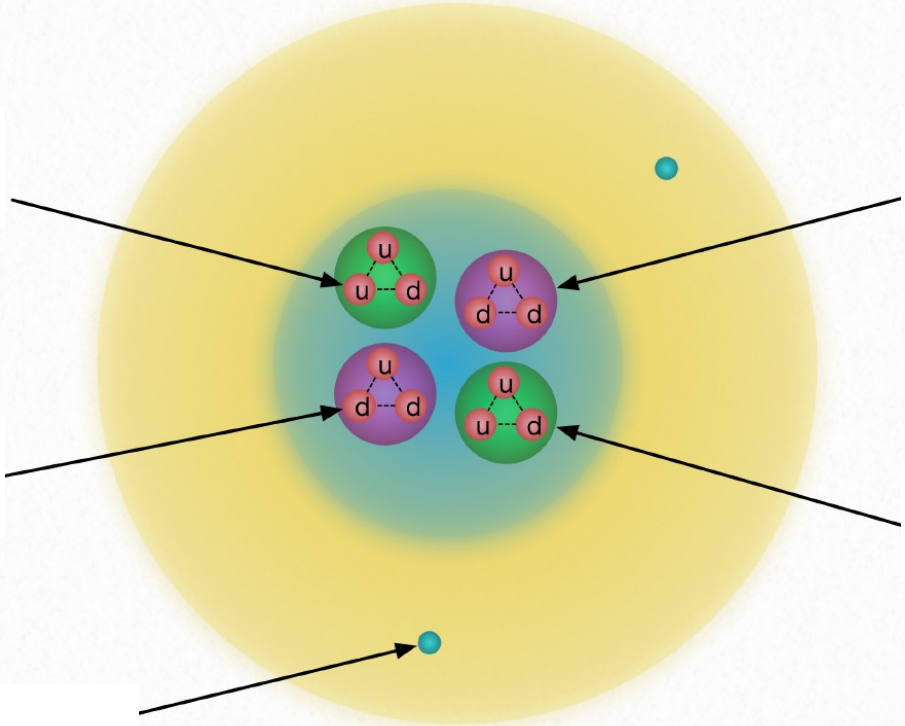
Checking Pro

Particle Physics

1.



2. State what is meant by a fundamental particle

Fundamental (elementary) particles are those which are not composed of other particles.

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Checking Progress

Challenge Task

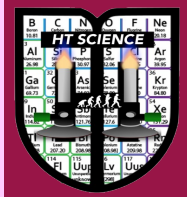
3. The particles within an atom can be divided into fundamental particles and non-fundamental particles.

a) Give two examples fundamental particles:

3. a) Quark, any lepton (e.g. electron)

b) Give two examples of non-fundamental particles:

b) Proton, neutron (any baryon or meson)



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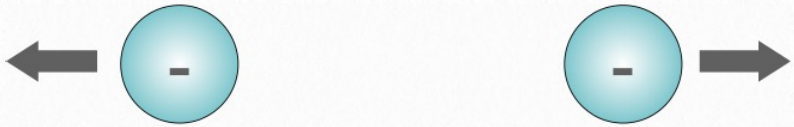
Questions Continued

Particle Physics

4. Name the four fundamental forces.

4. Strong, Weak, Electromagnetic and Gravitational

5. Two electrons approach each other but do not collide. They exert a force on each other and move apart.



a) Which of the four fundamental forces is involved in this process.

5. a) Weak

b) Name the exchange particle that plays a role in this interaction.

b) Photon (Gauge Boson)

6. State the quark composition of:

a) The proton

6. a) uud

b) The neutron

b) udd

7. A π^o particle is classed as a meson. It has a charge of 0 and a baryon number of 0. Using the quark table below, which of the following combinations could correspond to a π^o meson.

A. $s\bar{u}$

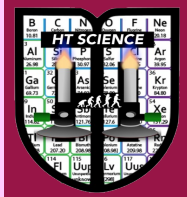
B. udd

C. $d\bar{d}$

D. $u\bar{d}$

7. C

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



Learning objectives:

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End & send Expectations

1. Put the borrowed <u>equipment</u> back.

2. Bin all <u>rubbish</u>.

3. Put your belongings in your <u>bag</u>.

4. <u>Double check</u> 1 to 3 has been done.

5. <u>Stand</u> and <u>stay</u> behind your <u>chair silently</u> .

Learning objectives:

Describe the standard model

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