Define Electric field

1

Define Voltage
(potential difference)

2

Right hand rule for finding the direction of the force on charged particles moving in a magnetic field.

3

Orders of Magnitude

4

Beta Decay

5

Hadron

6

Baryons

7

Mesons

8

Fermions

9

Bosons

10

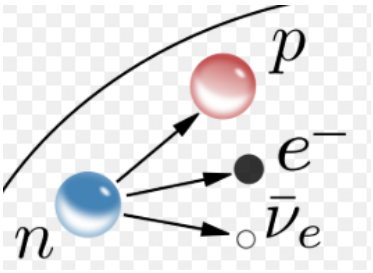
$V = W / Q$
Work done per coulomb of charge.

A region where a charged particle experiences a force.

$1x10^3$ is 3 orders of magnitude smaller than $2.4x10^6$

First finger = Direction of magnetic **f**ield (N to S)
Middle finger = direction of electron current.
Thumb = direction of the force on the particle.

Composite particle consisting of quarks.



This was the first evidence for the neutrino

Hadrons consisting of quark – anti-quark pairs

Hadrons consisting of 3 quarks

These are the force mediating particles. Photons (electromagnetic force), W and Z bosons (weak nuclear force), gluons (strong nuclear force) & Higgs boson.

These are the matter particles. Consisting of quarks (Six types: up, down, charm, strange, top, bottom) and leptons (electron, muon and tau, together with their neutrinos).

$E = mc^2$

11

Nuclear fusion reactors

12

Irradiance

13

Point source of light

14

Photoelectric effect

15

Threshold frequency

16

Work function

17

$E_k = hf - hf_0$

18

Interference

19

Coherent waves

20

Require charged particles at very high temperature (plasma) which have to be contained by magnetic fields.

In nuclear fission and fusion reactions mass is lost. This lost mass is converted into energy

A source of light coming from a single point and giving off light in all directions e.g. small light bulb or a distant star.

$I = k/d^2$ for a point source.

$I_1 d_1^2 = I_2 d_2^2$

Power per unit area

$I = P / A$

Minimum frequency of a photon required for photoemission.

This is evidence for the particle model of light. Photons of a sufficient energy can eject electrons from the surface of a material (photoemission).

Electron kinetic energy = energy of photon - work function

Minimum energy of photon required for photoemission.

Waves that have the same frequency and constant phase difference

This is evidence for the wave model of light

Constructive Interference

21

Destructive interference

22

Diffraction grating formula
$m\lambda = d \sin \theta$

23

Bohr model of the atom - Ground state

24

Bohr model of the atom – Ionisation level

25

Emission spectrum

26

Absorption spectrum

27

Fraunhofer lines

28

Absolute Refractive Index

29

Snell's Law

30

Occurs when 2 waves with a phase difference of an integer multiple of $\frac{1}{2}$ wavelengths meet and combine.
Path difference = $(m+1/2)\,\lambda$

Occurs when 2 waves with a phase difference of an integer multiple of wavelengths meet and combine.
Path difference = $m\,\lambda$

The lowest energy level an electron can be in. This corresponds to the level closest to the nucleus.

m = order of maximum
λ = wavelength of source
d = distance between slits
Θ = angle from the central (zero order) maximum

Range of frequencies emitted when electrons fall to lower energy levels. Each element has a unique emission spectrum.

The energy level an electron is in when it has zero potential energy and can escape from the atom.

Absorption lines in the spectrum of sunlight. These give evidence for the composition of the sun's outer atmosphere

Range of frequencies absorbed when electrons rise to higher energy levels. Each element has a unique absorption spectrum.

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2}$$

$$n = \frac{\sin\theta_1}{\sin\theta_2}$$

The ratio of the speed of light in a vacuum to the speed of light in a medium.

Refractive index and frequency relationship

31

Critical Angle

32

Total internal reflection

33

Relationship between refractive index and critical angle

34

Electric field patterns for single point charges.

35

Electric field patterns for pairs of point charges.

36

Electric field pattern between two charged parallel plates.

37

38

39

40

The angle of incidence when the angle of refraction is equal to 90 degrees.

Refractive index of a medium increases as the frequency of incident radiation increases.

$$\sin\theta_c = \frac{1}{n}$$

This occurs whenever the angle of incidence is greater than the critical angle.