

## # Higgs Boson (God particle)

- Higgs field is a field that give mass to elementary particle when particle interact with it.
- The particle associated with Higgs field is called Higgs Boson. Higgs Boson is an elementary particle produced by quantum excitation of Higgs field.
- It is named after physicist Peter Higgs.
- When particle interact with Higgs field & attract Higgs Boson it will cluster around the particle in varying number.
- The more particle attract Higgs Boson, more will be its mass.
- This is called God particle because it was very much difficult to detect the particle. It took almost 50 years & billion dollar particle accelerator to do it. This nickname was used by icon leader Lederman for 1st time.

## # Gravitational waves → They are ripples in space time which is caused by some of the most violent & energetic process in universe.

- \* These process may include massive accelerating objects such as ~~two~~ neutron or black hole orbiting each other.
- \* This process would disrupt space-time in such a way that 'waves' of spacetime would propagate in all direction away from the source.
- \* These wave travel at speed of light carrying info about their origin.
- \* In 1916 AD, Albert Einstein suggested about existence of these wave in general theory of relativity.
- \* Later in 2015, LIGO [Laser Interferometer Gravitational] was produced by a pair of colliding black hole. (36 & 29 times larger than sun) about



1.3 billion light year away. this proved Einstein prediction

- # Nanotechnology → It is the study of manipulating matter in an atomic and molecular scale.
- It involve control of matter from 1-100 nm
  - It has potential to create many new material and device with vast range of application such as in medicine, electronics and energy production.
  - Nanoparticles used in field of food science and food microbiology.

Imp

# Seismology → Seismology is the scientific study of earthquake and seismic wave that move through and around the earth or through other planet like bodies.

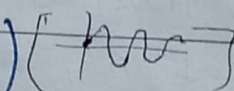
[A]\* Seismic wave → They are elastic wave which can propagate in solid or fluid material. its types are.

(1) Body wave → they are those wave which travel through interior material: its type are:

(a) P-wave (primary/pressure) → they are longitudinal wave which involve in compression and rarefaction in direction of prog. propagation.

→ it is fastest kind of seismic wave

→ it can travel through solid and liquid.

(b) S-wave (shear/secondary) 

→ it is second wave we feel on earthquake

→ It is slower than p-wave

→ It can travel through solid.

→ It move rock particle up and down direction perpendicular to direction of propagation.



## [B]. Surface wave.

→ It travel along surface or interfaces of matter

→ they are Result of s & p-wave interacting with surface of earth.

→ its types are:

### (a) Love wave (Named after A.E.H Love)

→ It is formed by horizontally polarized s-wave interacting with surface.

→ It only exist if there change in elastic properties with depth in solid medium.

### (b) Rayleigh wave. (Named after lord Rayleigh)

→ It have both compressional and shear motions.

→ It Results from interaction of p-wave and vertically polarised s-wave with surface.

→ It can exist in any solid medium

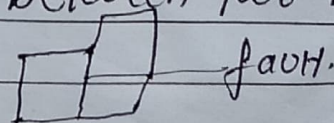
→ It rolls along the ground just like a wave rolls across a lake or ocean.

→ It move the the ground up and down and side to side in same direction.

→ Most of the shaking felt from an earthquake due to Rayleigh wave.

## # origin of Earthquake

→ fault is zone of fracture between two block of rock in



→ This fault can be natural or created by volcanic eruption, bomb blasts, etc.

→ when rock undergoing sudden slide along ground a fault.



After a while Rock break and energy  
Release.

classmate

Date

Page

This sudden release of energy cause the seismic wave that make the ground shake.

The rock continue to move until they get struck again. the spot of origination of seismic wave called hypocenter or focus.

The place right above focus called epicenter.

### Gorkha Earthquake - 2015 (2072)

\* Magnitude - 7.8

\* Epicenter → Gorkha district at Barpak

\* Time - 11:56 on 25 April 2015

or 12 Baisakh 2075.

\* Hypocenter → 8.2 km deep

\* Aftershock → 12 May 2015 at 12:50 (7.3)