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Project: Higgs Boson Decay



ATLAS

EXPERIMENT

Verify the Standard Model and go beyond

But also search for physics beyond the standard model

Quarks

| | | |
|-----|-----|-----|
| u | c | t |
| d | s | b |

Forces

| | |
|-----|----------|
| Z | γ |
| W | g |

| | | |
|---------|-----------|------------|
| e | μ | τ |
| ν_e | ν_μ | ν_τ |

Leptons

Specific assemblies of quarks form hadrons. Protons, Neutrons, pions

Gravitational force
Electromagnetic force
Strong interacting force
Weak interacting force

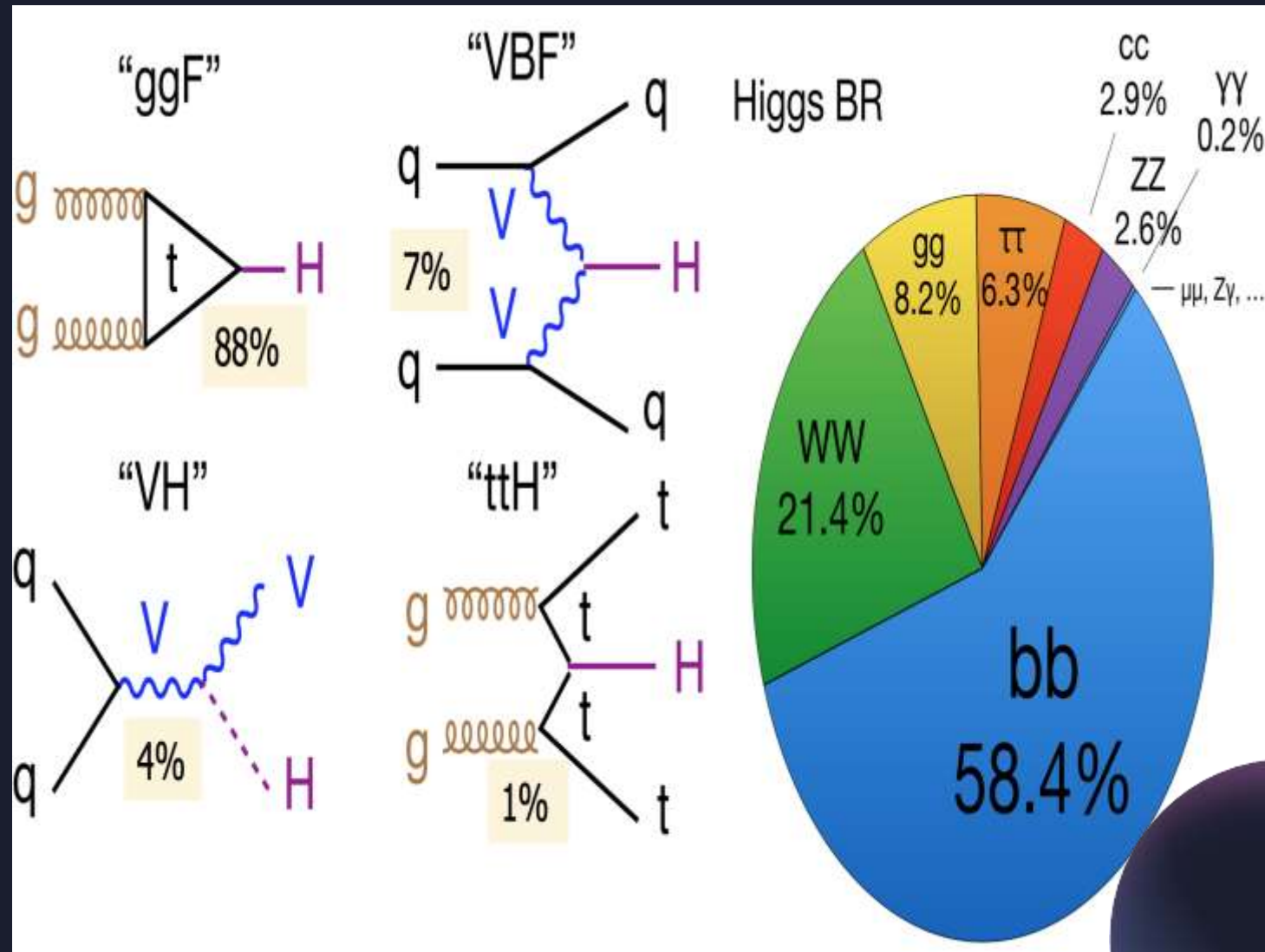
For every particle...

Particle Accelerators

Machines that accelerate then collide protons to obtain and read new particles from detectors.

The detectors would then read the collision and classify each events momenta, energy and paths.

Higgs Decays

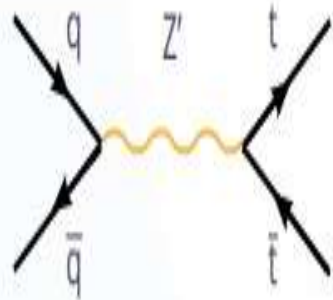


Higgs Boson is elementary particle that gives mass.

The Higgs can be formed by multiple processes

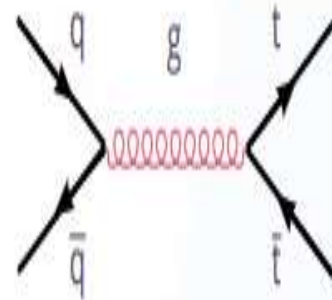
Also, the Higgs has multiple decay possibilities. Ex.(H \rightarrow WW)

Signal and background

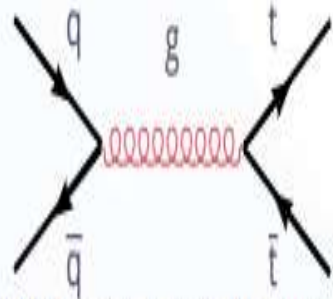


Z' production is the **signal**...

Search for new Z' boson

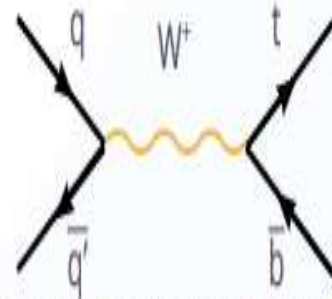


... and SM $t\bar{t}$ production is a **background**.



SM $t\bar{t}$ production is the **signal**...

Measurement of Standard Model $t\bar{t}$ production

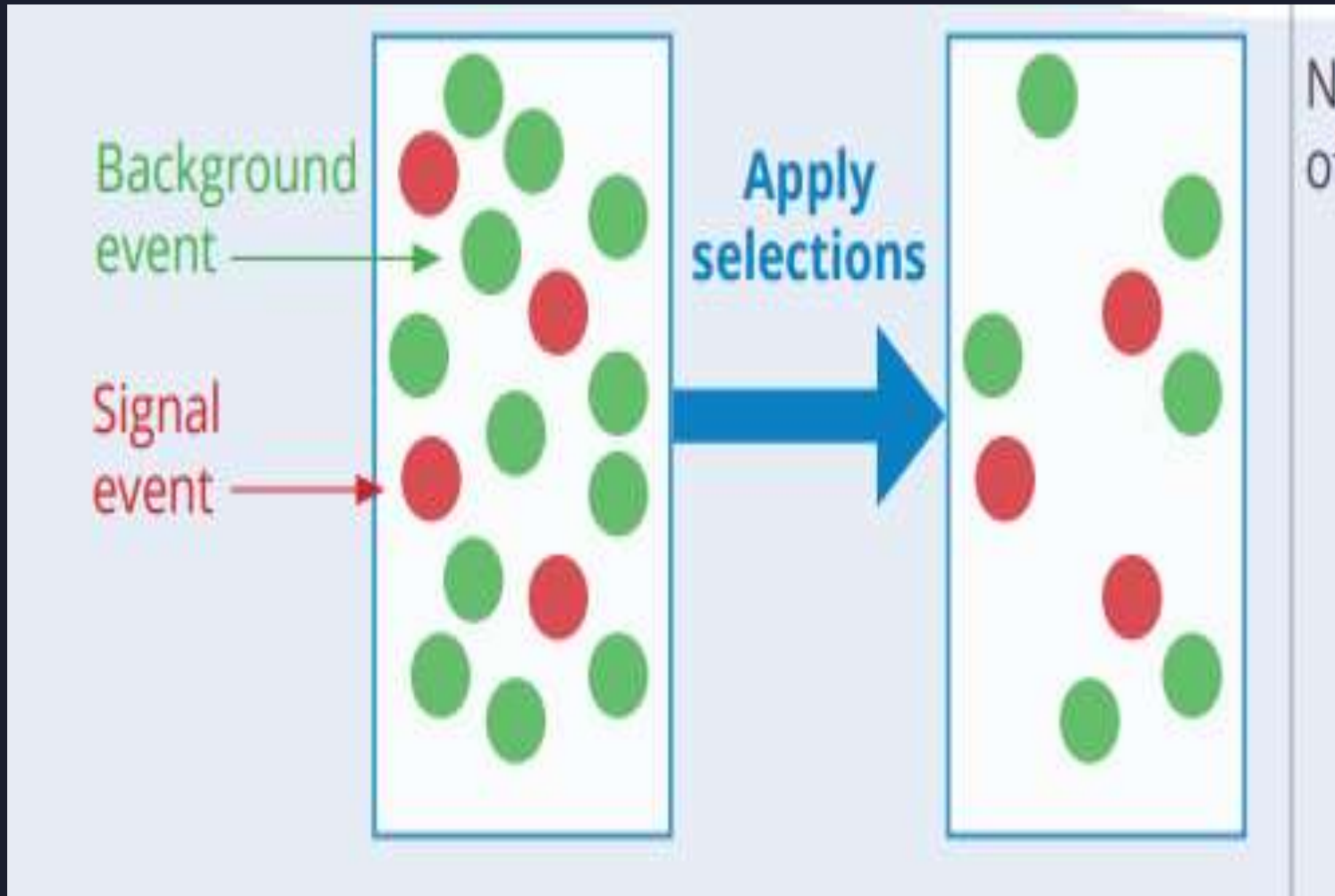


... and SM single top production is a **background**.

A Signal is a desired event detected.

Background is another event in the same detector that is not desired.

Selection Criteria



Selection criteria is essentially having the correct signal/background ratio to obtain desired event. That is what a cut is.



Questions