

Fundamental Forces

The forces in the SM are carried by again (bosonic) particles.

Note that the gravitational force is not included in the SM, one of the most important flaws of SM. If we rank the four known forces in nature:

Force	Strength	Mediator
Strong	10	Gluon, g ← Perturbation does not work!
EM	10^{-2}	Photon, γ
Weak	10^{-13}	<u>Intermediate Vector Bosons</u> , $W^{\pm}, Z^0$ Gauge
Gravitational	10^{-42}	Graviton ← No quantum theory available (superstring theory working on it)

* The particles with electric charge (other than neutrinos, gluons, Z^0) interact with EM force

* All particles in SM other than photon and gluons interact with weak force

* All quarks interact with strong force

Since photons carry no charge they do not interact directly with each other.

However, both gluons (carrying color-anticolor) and gauge bosons (carrying weak charge) interact with one another!

[More on these, when revisit this subject in the 'Popular Part' of the Course]