0.1 Unit 03 - Forces

0.1.1 September 20, 2021

1 **Definition** (Force)
Any interaction between any two objects.

2 **Definition** (Fundamental Forces)
Fundamental forces:

- Gravitational force - by far the weakest force.
- Electromagnetic force - the fundamental force that dictates 98% of forces you experience on an everyday basis. Holds together molecules. Ex. rub a balloon on your head.
  - People are mostly made up of empty space.
  - Why do you feel the desk? Photon-photon interactions.
- Strong Nuclear Force - since atoms are all charged positively in the nucleus and should theoretically repel each other, they still stick together because of strong nuclear force.
  - Strongest force. Only works over small distances.
  - Making these using $E = mc^2$ then it can easily turn into a nuclear reaction.
  - To make a nuclear fusion reaction, two atoms must collide with large amounts of energy.
- Weak Nuclear Force - underlies radioactivity and decay
  - The effective range of the weak force is limited to subatomic distances, and is less than the diameter of a proton.

Newton's Three Forces

- An object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force. Aka inertia - laziness.
- $\sum F = ma$
- Newton's third law states that when two bodies interact, they apply forces to one another that are equal in magnitude and opposite in direction.