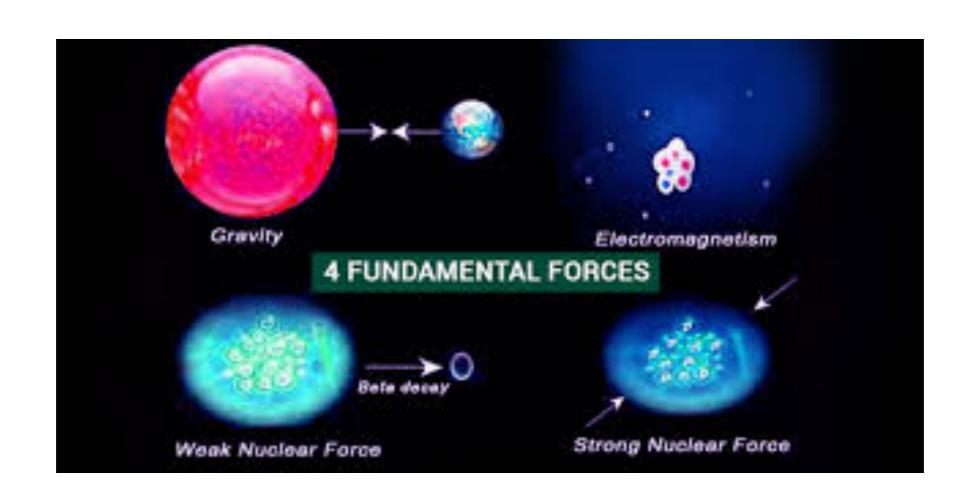
# Four Fundamental Forces and Nuclear Decay



#### Four Fundamental Forces

Force	Affects	Visual	Relative Strength
Gravity	Mass (attraction only)		10-40
Electrostatic	Attraction or repulsion of + and - particles	Electrostatic Attraction/Repulsion  Attraction  Repulsion  Repulsion  Repulsion	1
Strong nuclear	Only protons or neutrons (attraction only, very short range)	Electric Repulsion of Protons Strains the Nucleus  But The (Residual) Strong Nuclear Force Holds the Nucleus Together	100
Weak nuclear	Nuclear decay	Alpha Decay of a Uranium-238 nucleus  Parent nucleus  Parent nucleus  4He emitted α particle proton neutron  Daughter nucleus	<b>10</b> -10

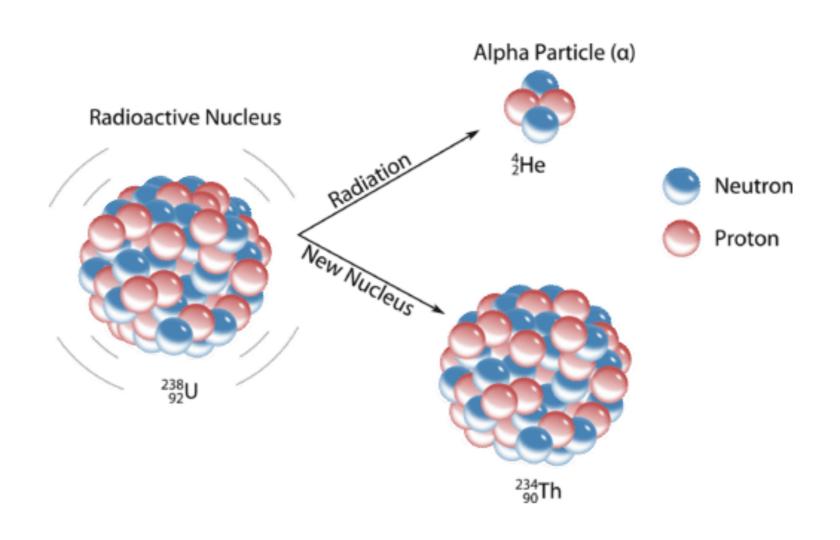
#### **Nuclear Decay**

What keeps protons in the nucleus from flying away from each other?

The stability of a nucleus is dependent on the strong nuclear force being sufficient to overcome all the proton-proton repulsions.

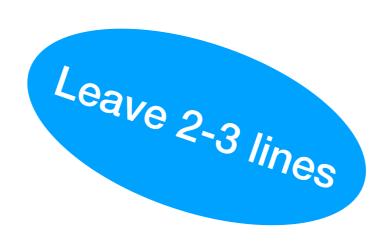
When elements contain too many protons, additional neutrons are needed to have a "stable" nuclei.

## The nucleus decays to become more stable. (drawing not necessary)

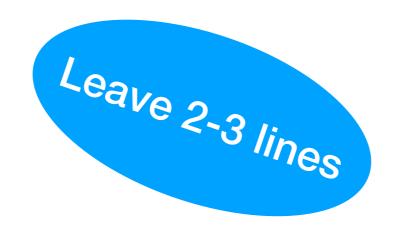


#### Types of Nuclear Decay

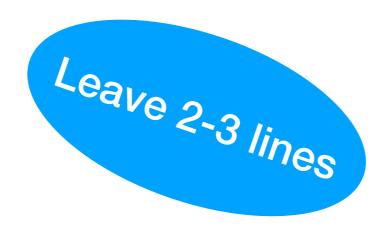
#### 1. Alpha decay



#### 2. Beta decay



#### 3. Gamma radiation



### **Penetrating Power**

- 1. Alpha particles: stopped by paper
- 2. Beta particles: stopped by 1-2 mm Al
- 3. Gamma radiation: stopped by 8-10 cm lead or many meters of concrete

Penetrating power of different types of radiation

