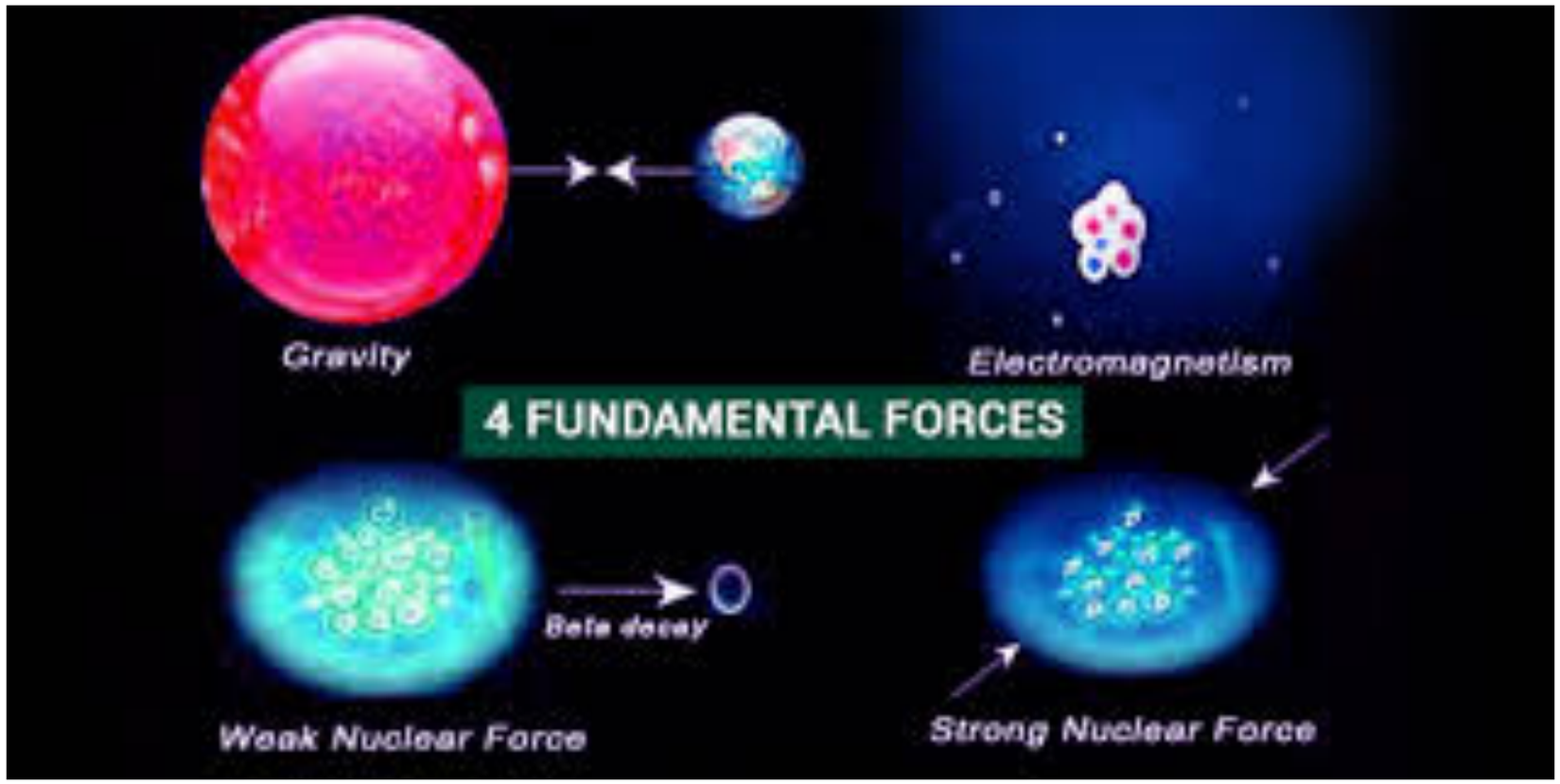
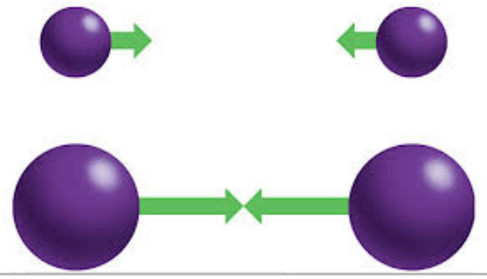
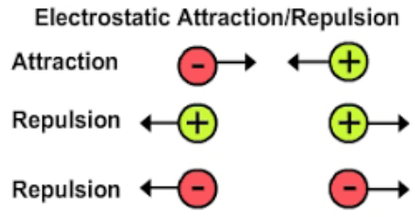
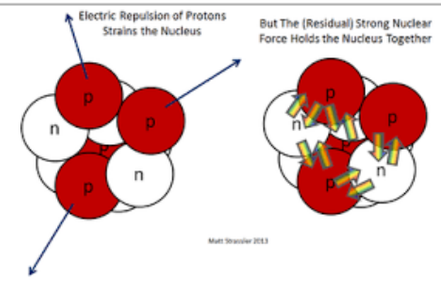
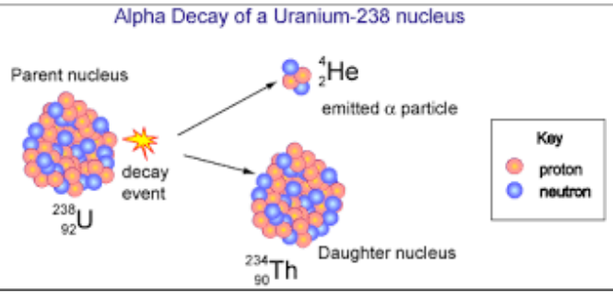
Four Fundamental Forces and Nuclear Decay



Four Fundamental Forces

Force	Affects	Visual	Relative Strength
Gravity	Mass (attraction only)		10^{-40}
Electrostatic	Attraction or repulsion of + and - particles		1
Strong nuclear	Only protons or neutrons (attraction only, very short range)		100
Weak nuclear	Nuclear decay		10^{-10}

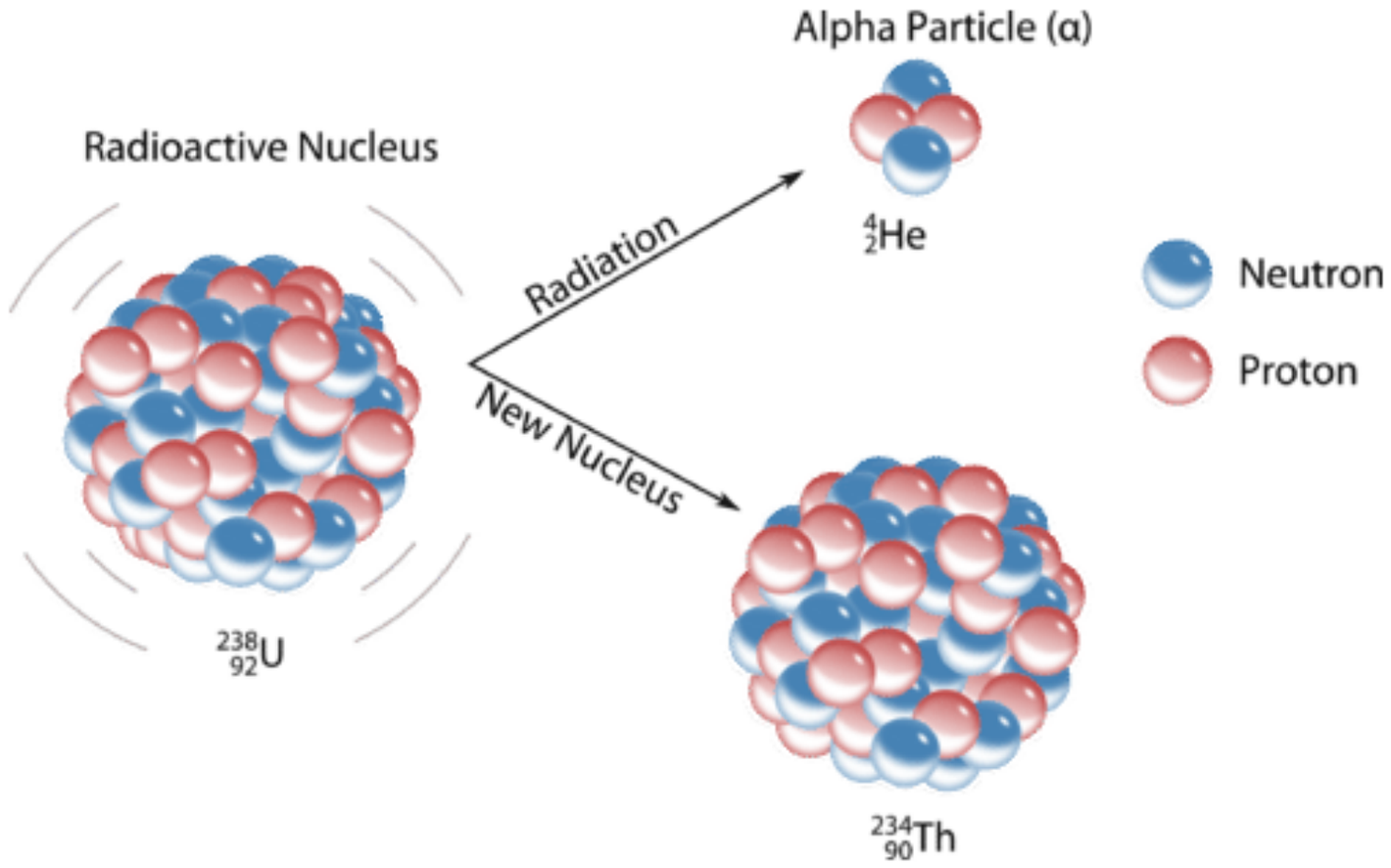
Nuclear Decay

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.

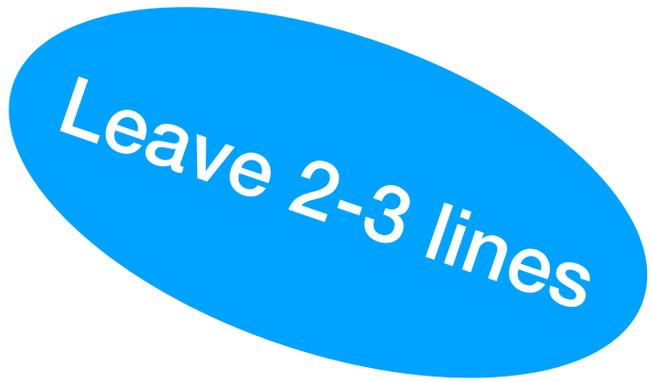
When elements contain too many protons, additional neutrons are needed to have a "stable" nuclei.

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

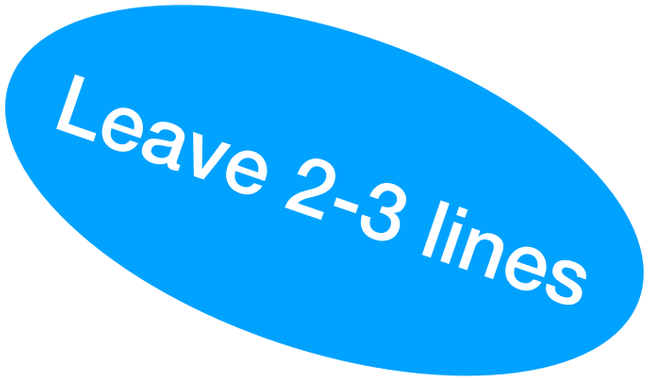


Types of Nuclear Decay

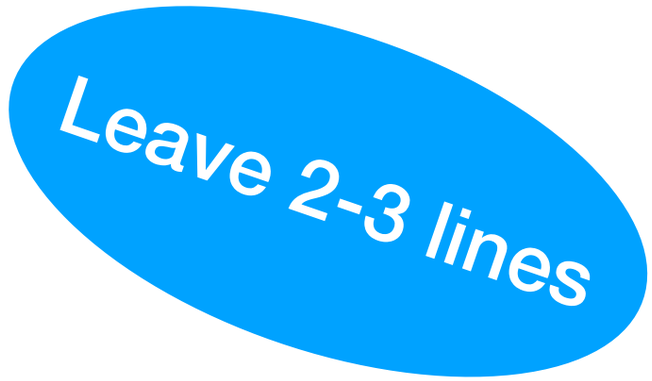
1. Alpha decay



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**