

# Energy Part 1:

The universe is composed of matter

- elements, atoms, molecules, and compounds

Energy is the capacity to do work or supply heat

- SI Unit for Energy = Joules

- Potential e. (position) = stored → could do something.

- Kinetic e. (motion) = ↑ temp, then motion of molecules ↑

$$\Delta E = E_f - E_i$$

ex. Think about dropping a ball. High e. when held up high. Lower e. once dropped. (Ball = system)

- gave up energy.

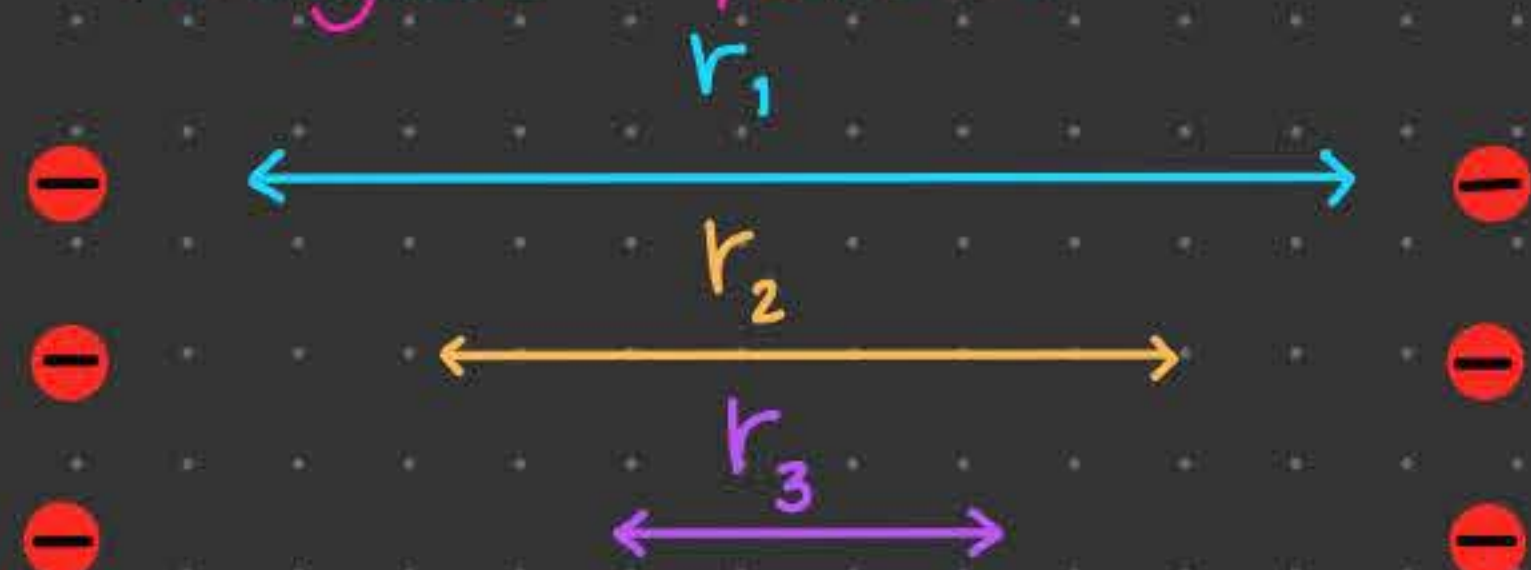
\* negative  $\Delta$ , spontaneous

\* systems cannot spontaneously gain energy, needs source

**ENERGY PERSPECTIVE**  
energy that results from interactions between charged particles.  
Tendency of Universe towards lowest energy.

# Energy Part 2:

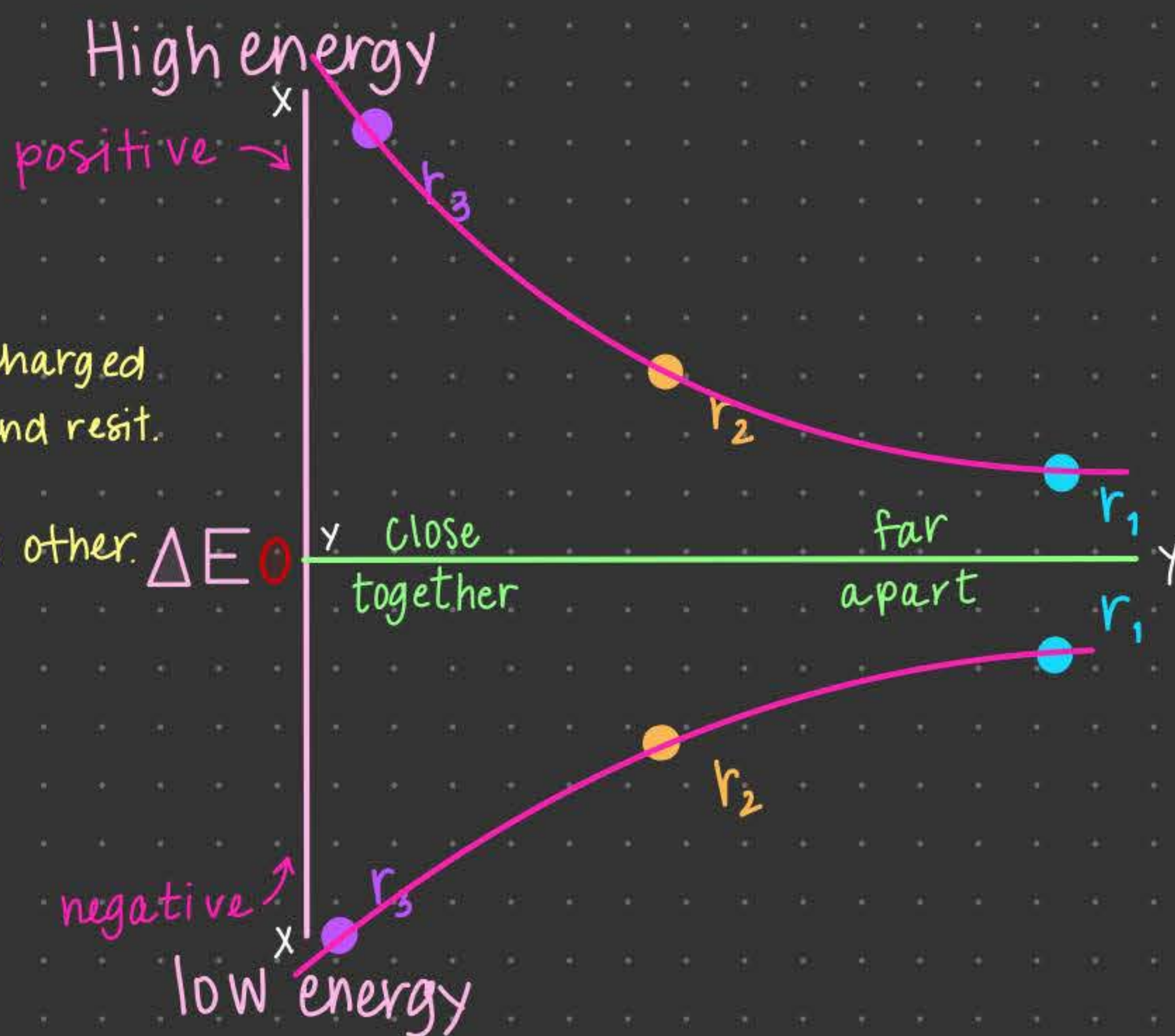
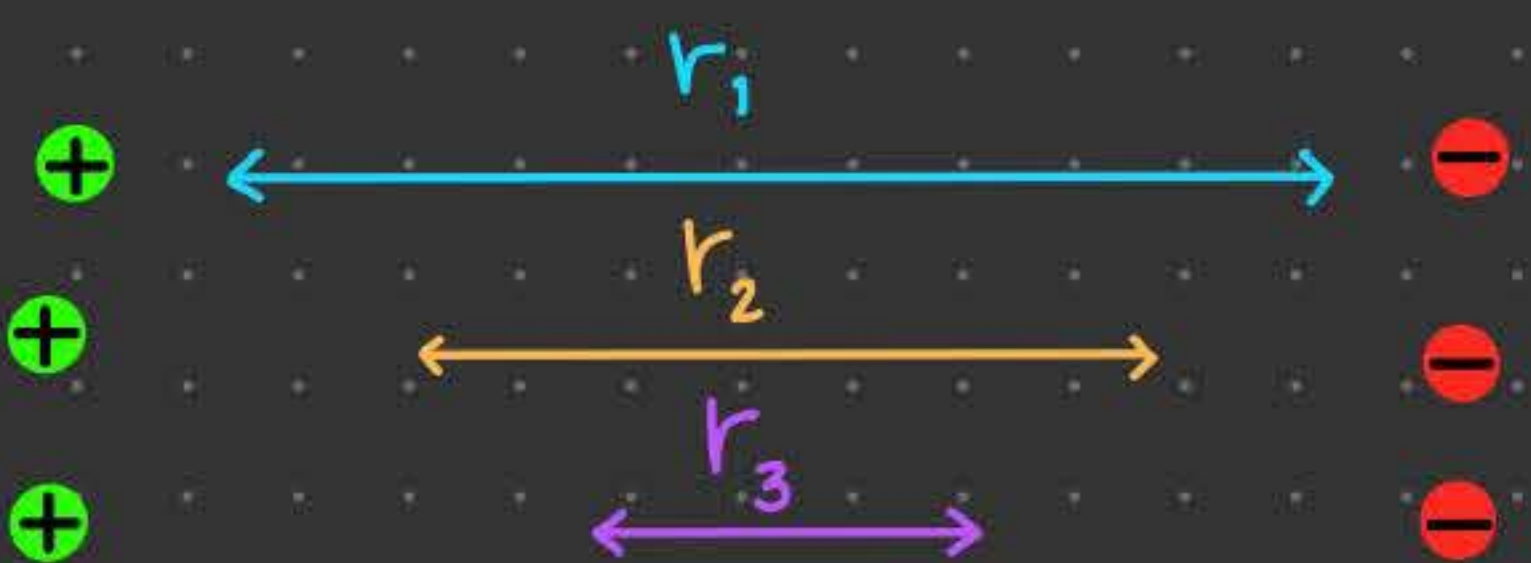
→ magnet experiment:



The energy in the system increases as like charged molecules get closer together. Naturally, they repel and resist. Nature moves to low energy ( $r_1$  not  $r_3$ ).

Like charged particles want to be close to each other.  $\Delta E$  The energy system decreases as  $r$  decreases. Here nature pulls opposites together making

$r_3$  the lower energy state over  $r_1$ .



# Coulomb's Law:

constant

Force

$$F = k \frac{q_1 q_2}{\epsilon r^2}$$

charges

As the numerator increases so does the force.

As the distance decreases so does force.

Distance

Dielectric constant

(shielding factor: liquid, paper, spin?)

Energy →

$$E = \alpha \frac{q_1 q_2}{\epsilon r}$$

repulsive: particles have same charge.  
attractive: particles have opposite charges.