Chapter 21 :- Electric Charge

- Electrically neutral :- contains equal amounts of The Two Kinds of charges : Positive & negal
- charged :- It has an imbalance charge (net charge)
- Charges with the same electrical signs repel
- charges with opposite electrical signs attract each other

- Types of materials :-

1- Conductors : charge can more freely : Ex metals
2- insulators : charge can't more freely : Ex, Plastic, glass
3- Semiconductors : intermediate between 1 and 2 Ex : silicon & germanium
4- superconductors : perfect conductors

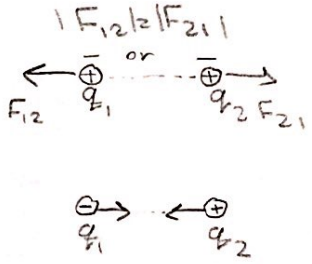
Coulumb's law :-

$$\vec{F} = \frac{K q_1 q_2}{r^2} \hat{r}$$

- K is a constant $= \frac{1}{4\pi\varepsilon_0} = 9\times10^9$ in air & vaccum
- r distance between q_1 and q_2
- $[K] = \frac{N.m^2}{C^2}$

$\vec{F}$ can be

- Repulsion :- same signs (+,+) or (−,−)
- Attraction :- opposite signs (+,−)



Note 2 charged spheres connected with a wire. Then the wire is removed Then the after charges are equal, If The two spheres are identical

Alaa Eltaimi

Gravitational force : (always attraction)

$\vec{F} = G \frac{m_1 m_2}{r^2} \hat{r}$ G is the gravitational Ro constant

Equilibriam point :-

- is when the net electrostatic force force on the charge = 0
- The point is always closer to the smallest charge

Proprieties of charges

↳ charge is conserved :- ($q_{before} = q_{after}$)

↳ Quantization of charge :- $q = ne$

$n = \pm 1, \pm 2, \pm 3, \ldots$

$e = 1.6 \times 10^{-19} C$

$m_e = 9.11 \times 10^{-31}$ kg

Note :-
a charge or a conductor is grounded means that

$q = 0$

Alaa Hawi