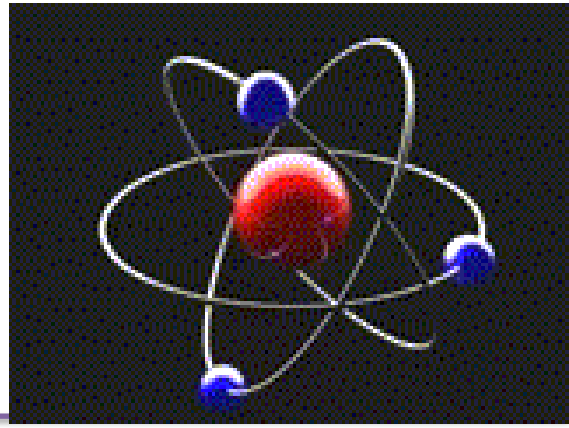
Inspire – 2012



Presented on 25-01-2012

Joy of Learning Electrical and Electronics

By

M.Senthil Kumaran

Knowledge is collection of Dead facts and information - Knowing is the melting of the mind into the Unknown. Knowledge is someone else Knowing, Knowing is your Knowledge

"All that can be counted doesn't count ,
All that Counts cannot be counted"
--Albert Einstein

Matter is Everything and Everything is Matter

It is neutral by nature

It is Everywhere

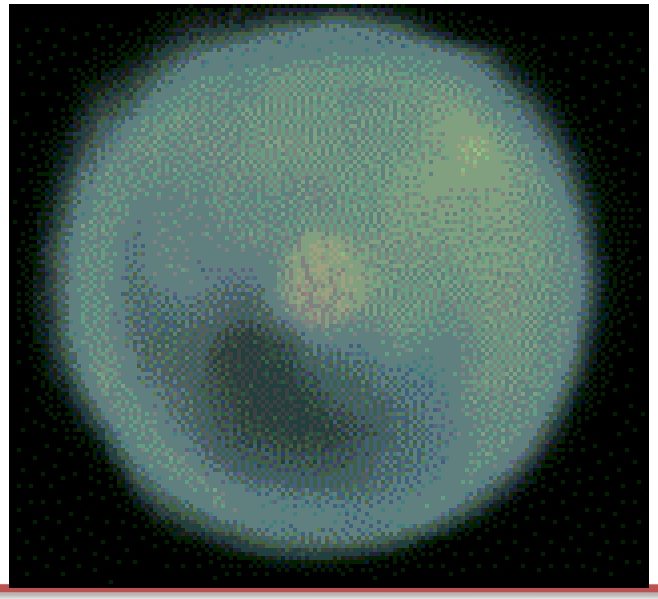
Charge is the unbalance that we create within the property of matter

How to create it ?

By removing an electron

or

by adding an electron



Charge ..

Can we see charge.

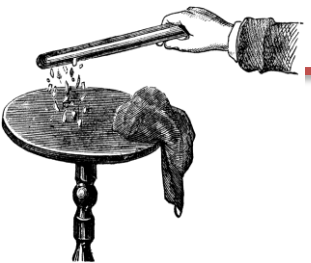
NO

It Can Only be Felt

Because Charge is not a Physical Entity

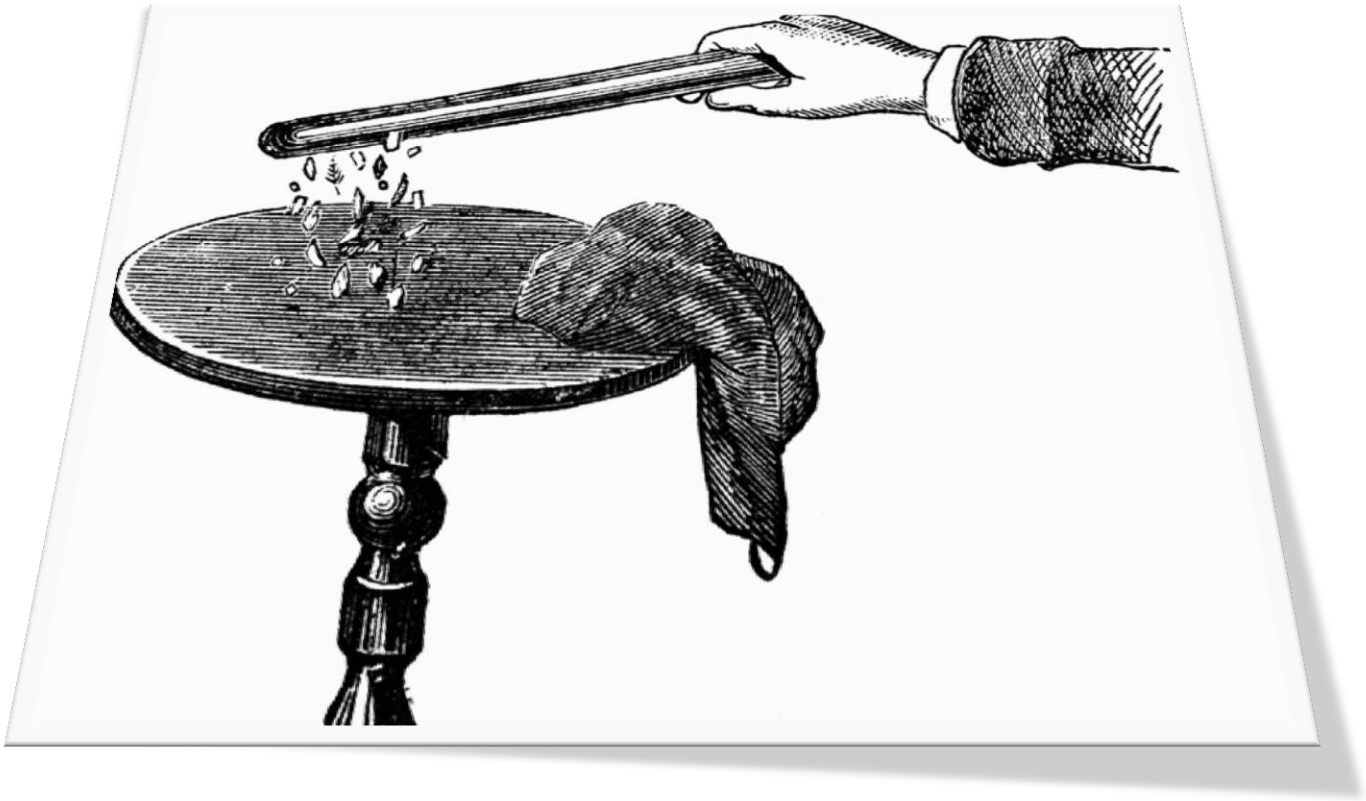
Its only the property of the Entity

Electric charge is a property of matter that causes it to experience a force when near other electrically charged matter.



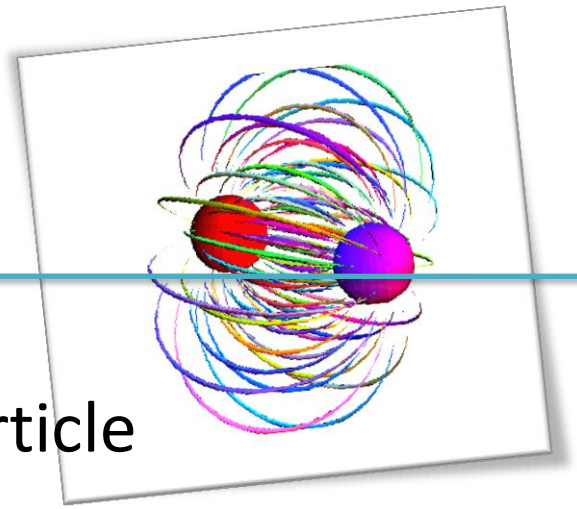
Lets Experiment

Let us Play Engineering – Lets Charge



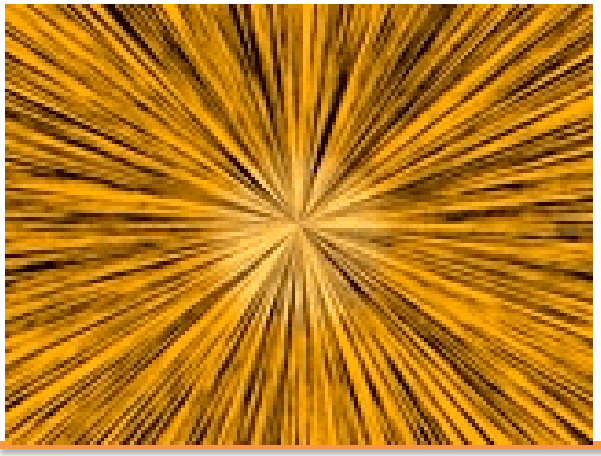
E1 - Wool

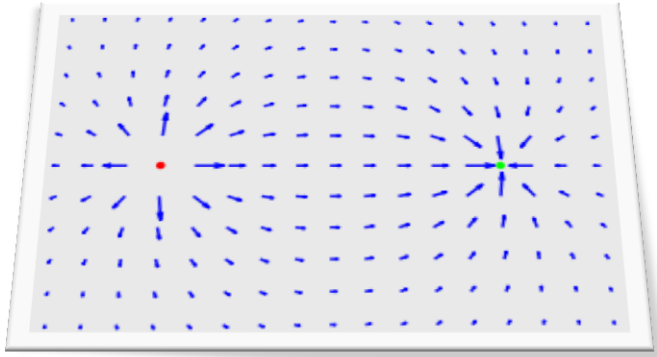
What's an Electric Field



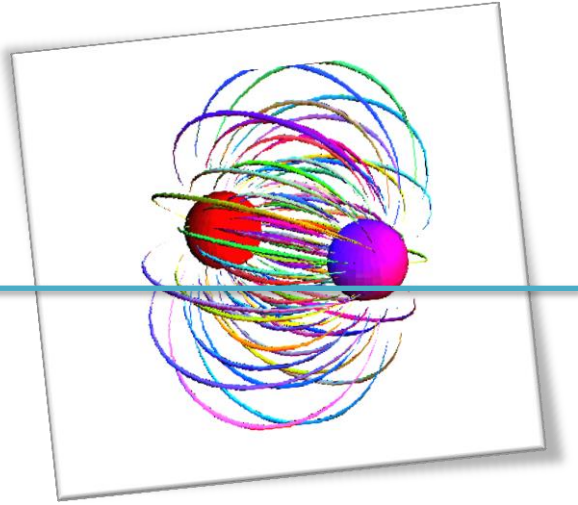
A field of force surrounding a charged particle

The change in the region around a charged matter that makes other charges matters attract or repel it is called an Electric Field.





Force – { Attractive / Repulsive }



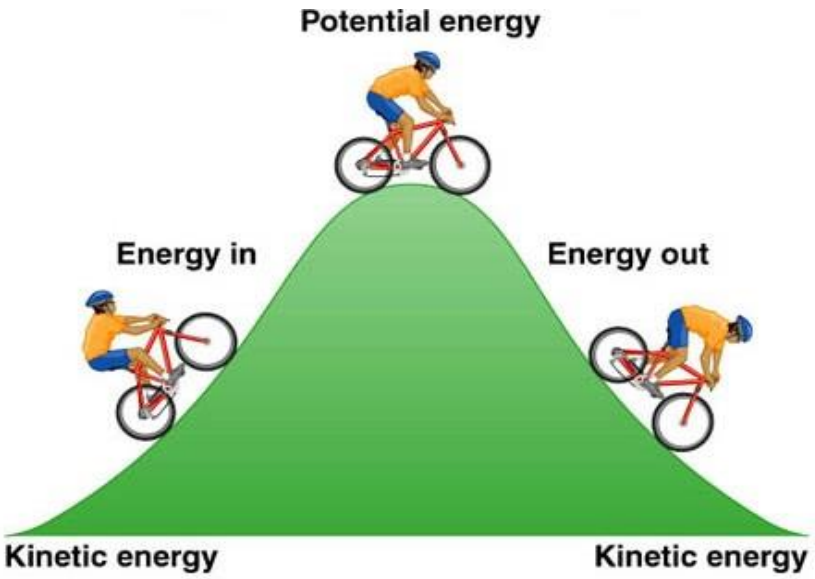
Attractive

Repulsive

What is Voltage? → [Potential]

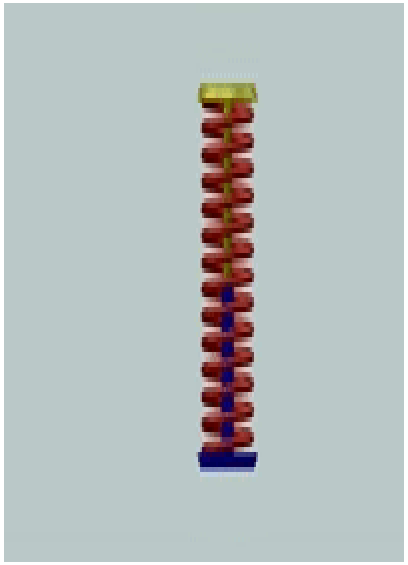
Potential Energy is gained by moving against gravity….

For experiencing Kinetic Energy Potential energy is essential

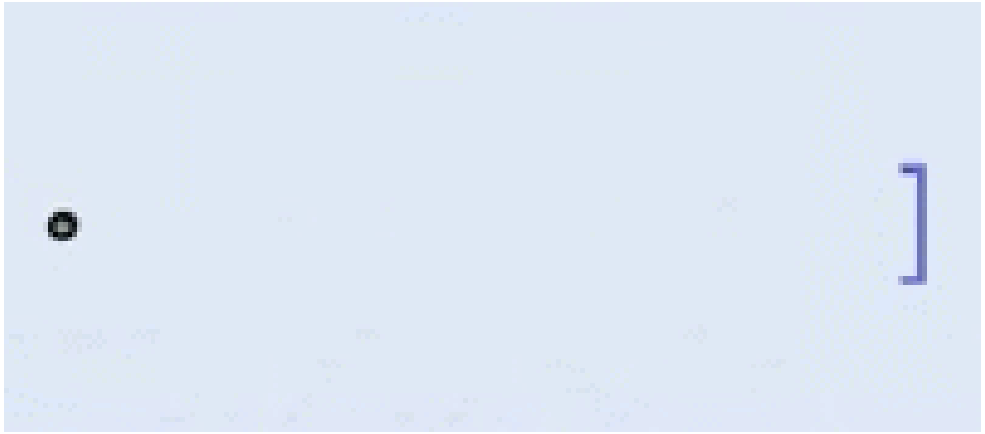


What is Voltage? → [Potential]

Voltage is the energy gained by a charged particle when it moves against the Electric field

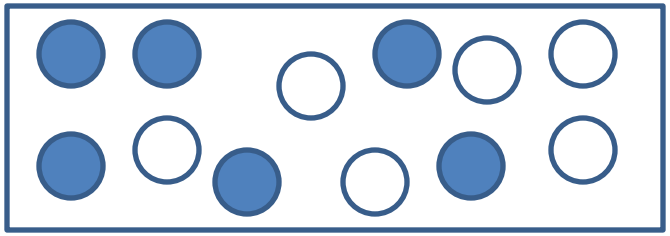


Mechanical Equivalent



Electrical Equivalent

Recap and look deep.. Into the definitions



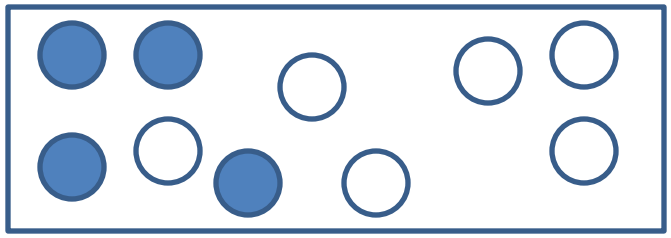
Neutral Material

Fundamental Units

Mr. Electron

Mr. Proton

= -



Positively Charged Material

Net Charge = (Np – Ne)* Charge of fundamental unit
= (6 - 4) * Charge of fundamental unit
= 2 * Charge of fundamental unit

$1C = 6.24*10^{18} * e$

What is the charge of a fundamental Unit

Experiments Prove

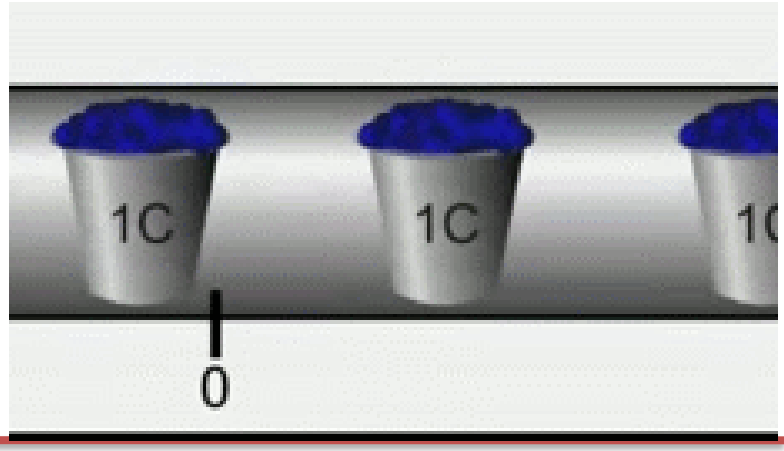
Charge of fundamental unit = $1.602 * 10^{-19}$ [Coulomb]

[or] That much of unbalance

Then 6240000000000000000 of Electrons contains a charge of 1Coulomb

Current here after is this bucket of charge [1Coulomb] passing a surface in unit time = 1 Ampere

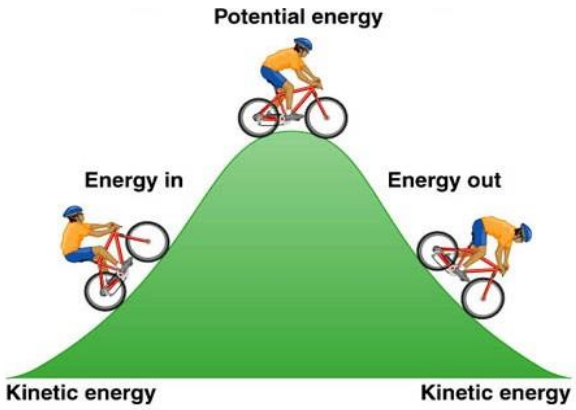
1Amp =1C/1s

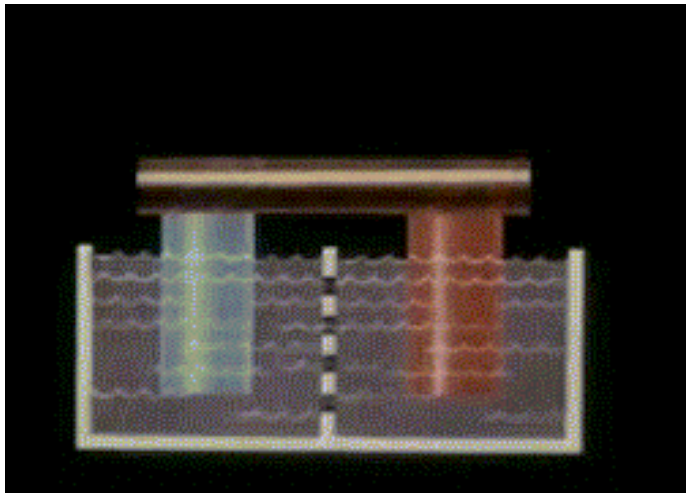


Current? → [Kinetic]

Potential energy flows as kinetic energy when a path is established.

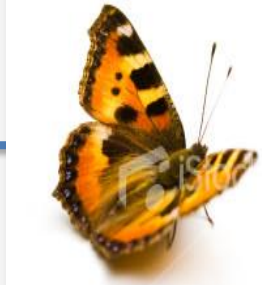
Voltage flows as current in a closed circuit



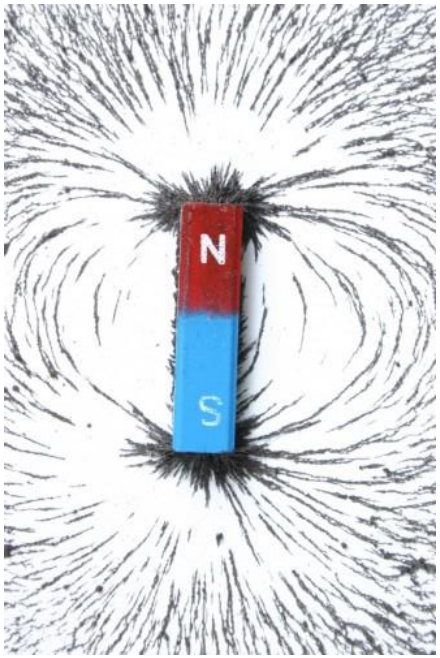


Technically Current is the rate of change of Charge (ie) the amount of charge that passes a surface in unit time. **I = dQ/dt.**

Bar Magnet - Electro Magnet



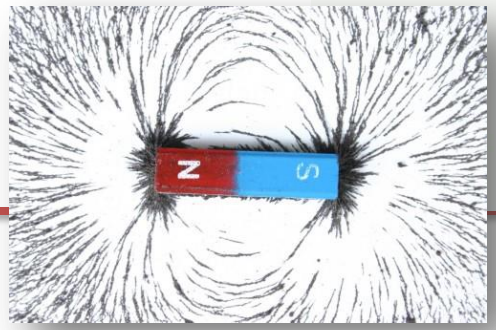
Field around a current Carrying Conductor



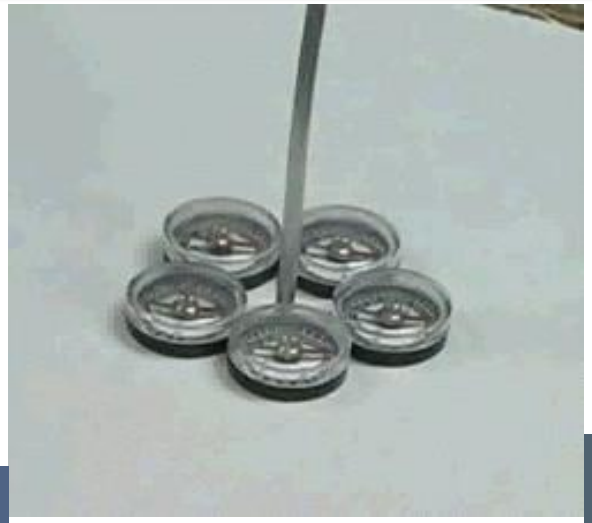
Force due to Magnetic Fields

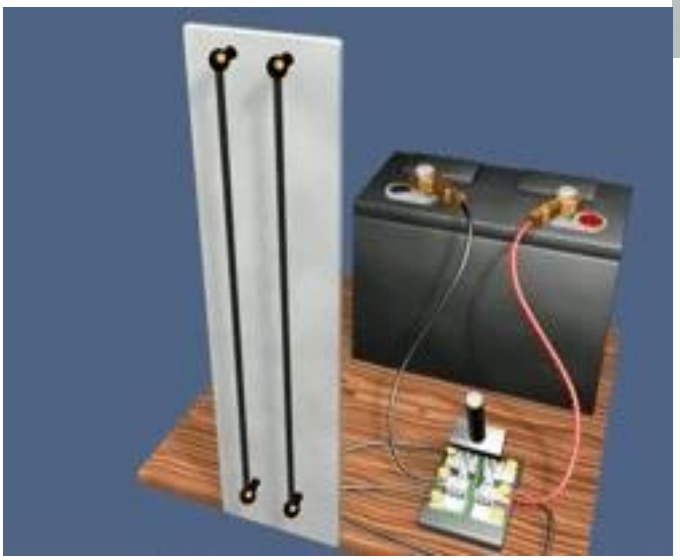
Fleming's Left Hand Rule

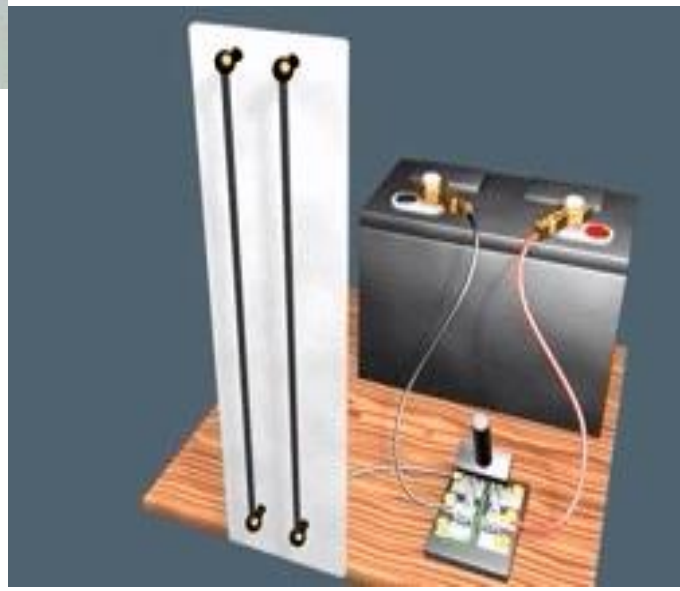
The direction of the **field**, the **current** and the **force** experienced are all perpendicular to each other



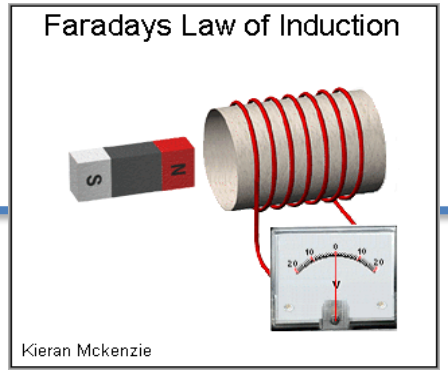
Forces and Magnetic fields



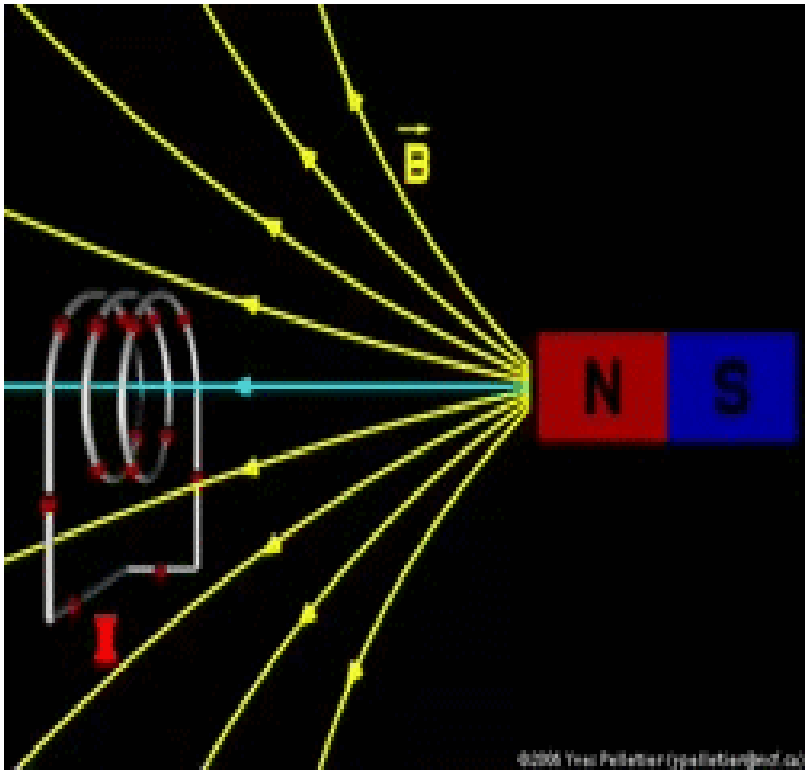


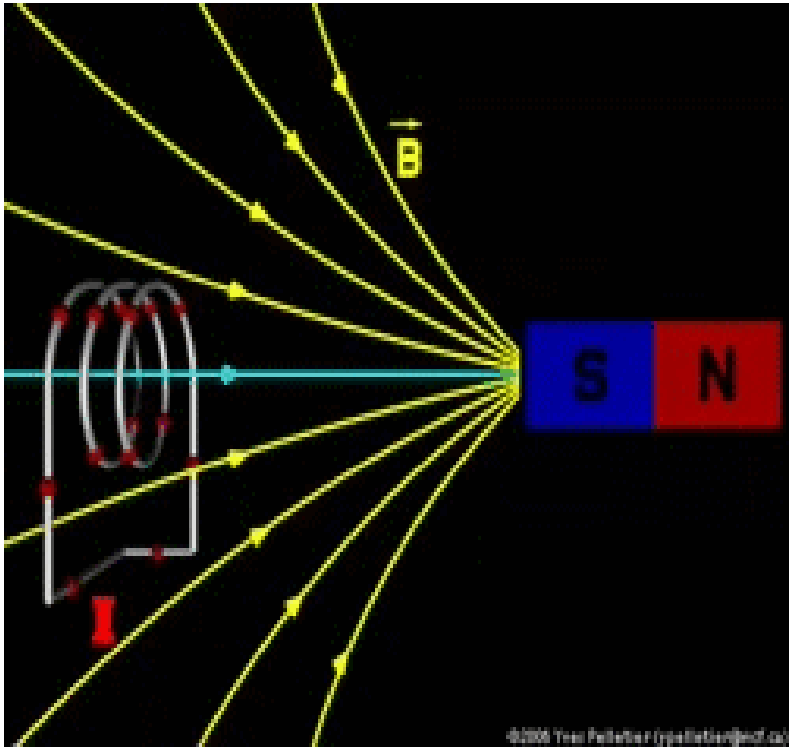


Electro Magnetic Induction



$$V = - d\psi / dt$$

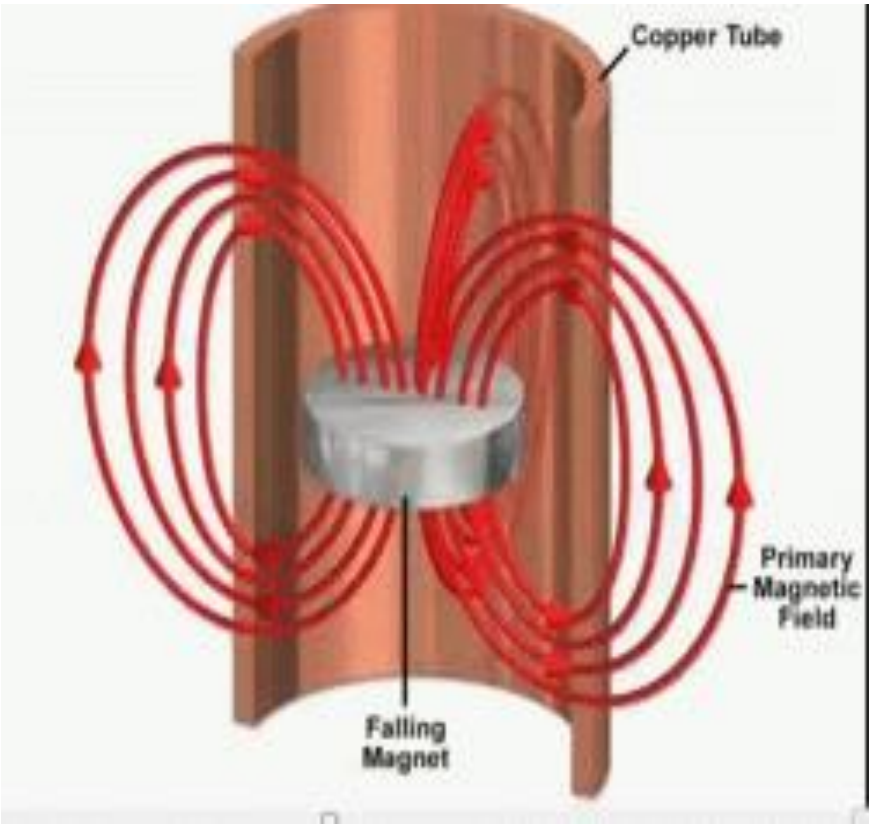




Lenz Law

$V = -d\psi/dt$

Induced Emf Opposes the Cause which Created it.

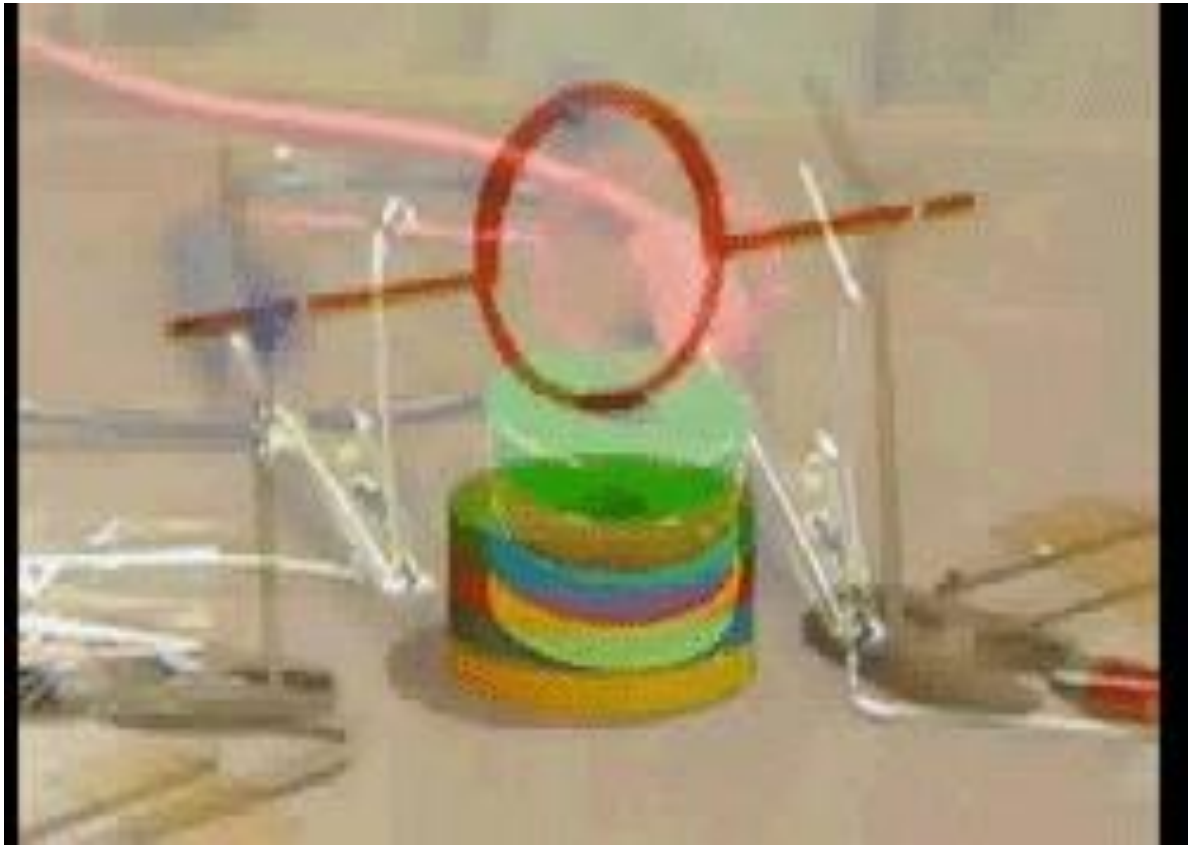


Lenz Law – Eddy current Continued…

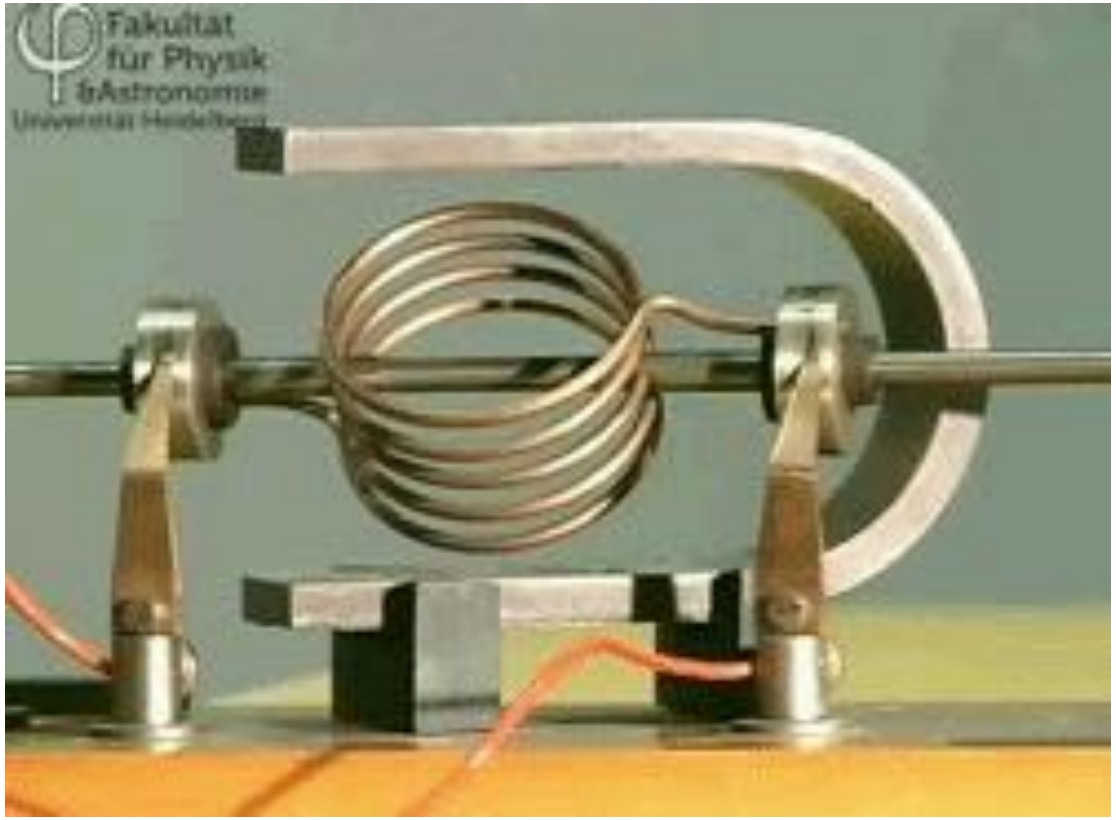
Levitation through
Eddy current induction

E5 – Plate

Electrical Motor [Working Principal]



Electrical Generator [Working Principal]



Great Minds.....

James Clerke Maxwell

Michael Faraday

Ampere

Thank you...

-ZnTill [ ]

Natural ability without education has more often attained to glory and virtue than education without natural ability

---- Ciero