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ELECTROMAGNETIC MIRROR NUCLEAR REACTION CONTROLER

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***Abstract*— a particle can be trapped inside such a mirror field (electric and magnetic field) and its velocity, acceleration and all other type of kinematic movement can be controlled.**

Introduction

It will be a type of mirror in which particles having a magnetic or electric or both fields will be reflected back with almost negligible loss of energy. A particle can be trapped inside such a mirror field and its velocity, acceleration and all other type of kinematic movement can be controlled (using varying electric and magnetic field) Main principle behind such mirror will be electromagnetism. Electromagnetism explains why when a charged particle is placed in magnetic field experience a force and also the amount of force experience or distortion in magnetic or electric field around that particle. This will help us to control the magnitude of electric field or magnetic field to control the particles kinematics.

QUESTION IS WHY WE NEED TO CONTROL THE KINEMATICS OF A PARTICLE?

Considering a situation of nuclear fusion reaction where the reaction doesn't occur because of repulsion between charged particle. By controlling the movement of such type of particles, we can bring the particle enough closer so that the nuclear force overcomes the electromagnetic force and the nuclear reaction might be possible. Although the strength of magnetic field to control the particles in such type of reaction will be very high but the energy consumed to produce such field will be nothing in comparison to the energy which will be produce in case of nuclear fusion reaction.

Electronic Configuration

Electron in its non excited state is motionless that is it does not alters its position with time. Considering the space inside the atom (which is not empty but filled with space matter), it exerts a buoyant force on the electron. It is one of the factors which determine the electronic configuration. The other factors are attraction from the nucleus of the atom because of which electron are revolving around the nucleus and repulsion between electron in a shell and between electron in inner and outer shell. Shells are different energy levels which are assumed to be present in an atom. Electrons are distributed in various shells according to atomic structures. An atom has two type of shell. Electron shells are regions where the electrons are configured in an atom (when the electron is in its non excited state) and transitory shells are possible regions where the electron can jump from their electron shells when being excited.

generation of electric and magnetic field

Electron has a standing electric and magnetic field at right angle to each other which doesn't alters with the motion, presence of charge and position of electron in shell of atom. This is the reason why an electron acts like a small bar magnet with a negative charge. In an atom electric field will be directed towards the nucleus and the magnetic field will horizontal to the nucleus. When the charged particles will be aligned in a single way in a material, a magnetic field will be produced in the material.

electric field controller

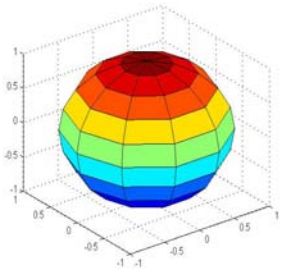
Using electric field controller particles speed and acceleration can be controlled. Electric field sensor is a type of sensor which calculates the strength of electric field. Suppose a particle having a charge Q is confined in a space where electric field sensor are existing . Electric field sensor will have a very small test charge suppose q (Q>>q). Force experienced by the charge will be

$F = \frac{qQ}{4\pi\varepsilon_0 r^2}$ (coulombs' law)

So the electric field intensity will be

$E = \frac{Q}{4\pi\varepsilon_0 r^2}$

So the electric field intensity of the charged particle will be inversely proportional to the distance between the charged particle and the sensor. Since the charge particle is accelerating its displacement with respect to the sensor is also changing. From this it can inferred that, when particle will approach the sensor its field intensity will increase and vice-versa.



Suppose six sensors are present in the co-ordinate system as (0, 0, 0), (0,0,1), (1,0,0), (-1,0,0), (01,0), (0,-1,0), (0,0,1), (0,0,-1). These six sensors will try to concentrate the particle present inside the sphere at the center of the virtual sphere. A detailed explanation has been illustrated in table 1 about the effect of electric field on charged particle.

Magnetic Field Controller

Magnetic field will give a specific direction to the particles.

Due to electric field the particles will accumulate at the center of the virtual sphere.

Motion of charged particle in transverse magnetic field is a circle of radius r and is given by

$$r = \frac{mv}{Bq}$$

Force on charged particle in a magnetic field is given by

$F = q\ v\ B\sin\theta$

A detailed explanation has been illustrated in table 1about the effect of magnetic field on charged particle.

Table 1 : Effect of electric and magnetic field on charged particle

S.No.	Kinematics	Effect on electric field	Effect on magnetic field
1.	When charged particle is at rest.	The force on positively charged particle acts in the direction of motion.	No force act.
2.	When the charged particle is moving along the direction of field.	The positively charged particle is accelerated along the direction of electric field and negatively charged particle is retarded along the direction of electric filed.	No force acts.
3.	When the charged particle is moving perpendicular to the field.	Force acts on the charged particle which is perpendicular to the initial direction of motion of motion of charged particle.	Maximum force (B q v) acts on the charged particle which is perpendicular to B vector and v vector.
4.	Path of moving charged particle in a perpendicular field.	Parabolic path.	Circular path.
5.	Path of the charged particle while moving at an angle Θ with the direction of field.	Parabolic path.	Helical path.
6.	Momentum of the charged particle moving in a perpendicular field.	Momentum of the particle changes in magnitude as well as direction.	Momentum of the particle do not changes in magnitude but the direction changes continuously.
7.	Kinetic energy of the charged particle in a perpendicular field.	Kinetic energy of the particle changes.	Kinetic energy of the particle remains constant.

Nuclear Fusion Reaction

Nuclear fusion reaction is a type of reaction in which two atomic nuclei colloids to form a new atomic nucleus and subsequently releasing very large amount of energy. It is the process which powers the stars. During this process matter is not conserved because some of the masses of fusion nuclei are converted in photons. Fusion of two nucleus having masses less than iron releases high amount of energy while fusion of two electron having masses more than iron absorbs energy. Energy

released in most nuclear reactions is much larger than in chemical reactions, because the binding energy that holds a nucleus together is far greater than the energy that holds electrons to a nucleus.

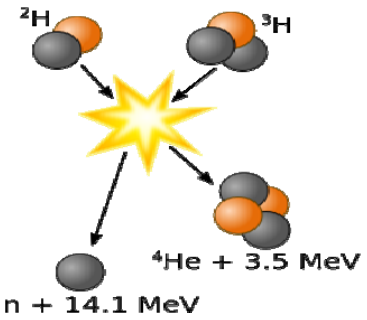


Figure 1 Nuclear fusion reaction

It takes considerable energy to force nuclei to fuse, even those of the lightest element, hydrogen. This is because all nuclei have a positive charge due to their protons, and as like charges repel, nuclei strongly resist being put close together. Accelerated to high speeds, they can overcome this electrostatic repulsion and be forced close enough for the attractive nuclear force to be sufficiently strong to achieve fusion. The fusion of lighter nuclei, which creates a heavier nucleus and often a free neutron or proton, generally releases more energy than it takes to force the nuclei together; this is an exothermic process that can produce self-sustaining reactions.

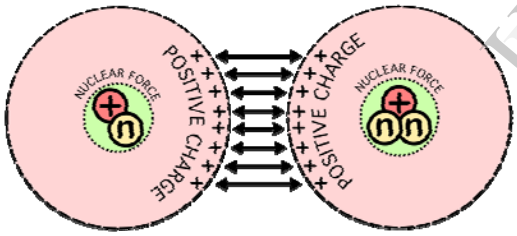


Figure 2 : Strong electrostatic force between nucleus

A substantial energy barrier of electrostatic forces must be overcome before fusion can occur. At large distances two naked nuclei repel one another because of the repulsive electrostatic force between their positively charged protons. If two nuclei can be brought close enough together, however, the electrostatic repulsion can be overcome by the attractive nuclear force, which is stronger at close distances.

This is where the electromagnetic mirror plays its role.

VIII. Advantages

1. This type of mirror can effectively control the kinematics of particle. Using strong and also calculate amount of field strength we can harness the energy of nuclear fusion.
2. Nuclear fusion energy is a clean and green source of energy causing almost no environmental issues.

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