International Journal of Scientific Research and Reviews

Charge Oscillator

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http://doi.org/10.37794/IJSRR.2019.8414

ABSTRACT

An Oscillator is used for accelerating charged particles, so that they acquire energy large enough to carry out the nuclear reactions. In fig1.1 the electric field which is applied is directly proportional to the radius of circular motion. By increasing the electric field in proportion, the kinetic energy of the positive ions also increases. A magnetic field is applied plane to the paper and perpendicular to the velocity of positive ion. The motion of the positive ion will be a combination of the circular motion and straight path. A metallic plate is used which applied electric field to the positive ion.In these charged oscillator DC voltage are used. It is suitable for accelerating heavy charged particles such as proton positive ions. It is based on the principal that E is directly proportional to the radius of positive ion.

KEYWORDS: Magnetic field, Charge, Electric field, Proton, Oscillator

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INTRODUCTION

A particle accelerator is a machine that uses electromagnetic fields to propel charged particle to very high speed and energies and to contain them in well defined beams[1]. Particle accelerator are usually complex and expensive machine. The accelerated particle are generally made to collide with other particle. The basic idea of a synchrotron was stated by Oliphant. L.W Alvarez built the first high-energy (32Mev) proton linear accelerator[2]. In 1948, Ginzton, Hansen and Kennedy reported the construction, completed in early 1947, of a 0.9m long, 1.5Mev electron linear accelerator that used a 3.GHz magnetron as a RF power[3]. As early as in 2005 and 2006 there were published advanced consideration on the photon collider at ILC[4]. Editorial series on accelerator science and technology has been recently published in its 50 volume, now within the EU ARIES H2020 project[5,6].

Cyclotron is one of the type of particle accelerator invented by Ernest O. Lawrence in 1929-1930 at the University of California, Berkeley. It accelerate the charged particle outward from the center along a spiral path[7].

LITERATURE REVIEW

In Modern ABC, the author Satish K Gupta discuss about charge oscillator. The charge oscillator made by Lawrence is wonderful device but this device work only on AC voltage. When we applied DC voltage it does not work and it is a main drawback. To overcame this problem I came with new idea and also with new principal. In my charge, oscillator dees are not required.

DISCUSSION

It is based on the principal that when we increase an electric field in a proportion the radius of a positive ion increases. It is suitable for accelerating heavy charged particle. The whole apparatus is placed between the two poles of a strong electromagnet NS as shown in fig 1.1.The apparatus containing a gas at low pressure. The positive ions are produced by the ionization of this gas. Consider a positive ion is produced; the direction of velocity of positive ions is perpendicular to the direction of B. The positive ion will move in a circular path with the force always directed toward the center of circular path. The magnetic force is responsible for the circular motion.

$$F_B = qvBSin\emptyset$$

As this force is the centripetal force

$$qvBSin\emptyset = \frac{mv^2}{r}$$

$$qBSin\emptyset = mw$$

where, $w = \frac{qBSin\emptyset}{m} = \frac{qB}{m}$ $(\emptyset = 90°)$

If q, B and m are constant then w($angular\ velocity$)is also constant. Now we will apply an electric field in a proportion that the radius of positive ion increases. Let us assume a point P_1($Fig\ 1.1$) where magnetic force acts on charged particles, is numerically equal to the force applied by electric field. F_B is magnetic force and F_e is force due to electric field.

$F_B = F_e$

$qvB = qE$

$$\frac{vB}{r} = \frac{E}{r}$$ $(multiply\ both\ side\ by\ r)$.

We get, E=rwB $\left(\frac{v}{r} = w\right)$

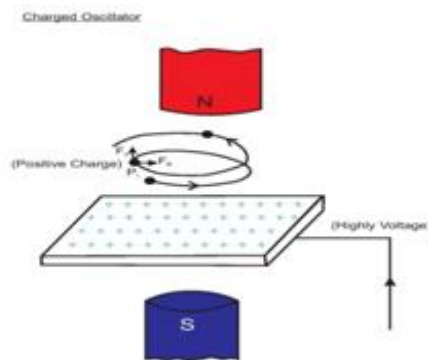Here w is constant and also magnetic field B is constant

Figure 1. 3D Charge Oscillator

$\mathbf{E \propto r}$

The more will be electric field more the radius will be increased. We know that when angular velocity is constant, by increasing radius the velocity also increases. Let the velocity increase be v_0 by applying electric field E_0 at point P_1.

P_1 is a point where F_B is equal to F_e

$F_B = F_e$

$qv_oB = qE_0$

$V_0B = E_O$ ....(1)

To make the point P_2 as point P_1 where magnetic force is equal to electrostatic force.

$$F_B = F_e$$

$$qv_1B = qE_1$$

$$v_1B = E_0 \quad ....(2)$$

Dividing (2) from(1)

$$\frac{v_{1B}}{V_0B} = \frac{E_1}{E_0}$$

$$\frac{E_1}{E_0} = \frac{V_1}{V_0} = Constant$$

By applying electric field in this proportion the kinetic energy of positive ion increases. In fig (1.1) a metallic plate is used which applied electric field to the positive ion. This is a 3D charge oscillator, the positive ion will move in space.

CONCLUSION

When we increase the electric field, the kinetic energy of positive ion increases. The electric field is increased in a proportion. This is a 3D charge oscillator. In this charged oscillator dees are not required. In magnetic resonance accelerator alternating potential difference is applied both the end[7]. In these charged oscillator DC voltage are applied. It is suitable for accelerating heavy charged particles such as proton, positive ions.

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