Journal of Advanced Research in Applied Physics and Applications
Volume 8, Issue 1 - 2025, Pg. No. 1-4
Peer Reviewed Journal

Review Article

On the coupled particle accelerator theoretical experiment

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How to cite this article:
Sikoka J. On the coupled particle accelerator theoretical experiment. J Adv Res Appl Phy Appl 2025; 8(1): 1-4.

Date of Submission: 2025-02-12

Date of Acceptance: 2023-04-29

A B S T R A C T

Particle accelerators are machines that are capable of accelerating particles at very high velocities before colliding the particles with each other or a target. Particle accelerators are useful in that they help the physicist understand the nature of some of the particles in the universe. In this article I use the concept of an elastic collision occurring between an electron and an object to try and theoretically design an experiment were the electron accelerated in the particle accelerator can, hypothetically increase in energy during its period with in these particle accelerators. I use the concept of a couple accelerator, as well as electromagnetic fields, conducting plates and mathematical predictions to try and detail the theoretical experiment. The conclusions drawn from this theoretical experiment are from mathematical predictions.

Keywords: Particle physics, Particle accelerator, Law of conservation of momentum, Law of conservation of energy.

1. Introduction

Concept of how to push the limits of a particle accelerator will be explored in the text to follow. The laws of mechanics state that in an elastic collision, the rate at which an electron is deflected is as well related to the energy of the deflecting object. In the theoretical experiment discussed here in, I try to implement the concept of deflecting particles which are accelerating in the particle accelerator, that the speed of the accelerated particle is now increased by n.[1] In this theoretical experiment, I use the concept of two accelerators connected to each other at a point of intersections. The concept of the second accelerator is more modified and is where the collision happens. The first accelerator, designated as first because it's where the accelerated particle departs. The first accelerator consisting of all the components of a particle accelerator. Namely, the cathode and anode producing a field of n volts in an evacuated (or near) vessel. The first accelerator is modified at the point of intersection of the two accelerators. In as much as the point where the accelerated particle is to strike, initially, this point is tilted that the particle accelerating towards the point is deflected at an angle of 135 degrees when it collides with this point, that the collision is elastic. This is possible by running a small current through a conducting plate where the accelerated particle is initially supposed to strike.[2] That when the particle hits the plate, it's deflected at an angle of 135 degrees. It's then deflected at an angle of 45 degrees after striking a second conducting plate with a current running through it before being acted upon by an anode field pulling the electron towards the point that the electron is to strike and striking this point, which is between the anode and the deflecting plate. What are the consequences of the particle being deflected and acted upon by a positive field? I try to predict these consequences mathematically.[3] Particle accelerators are devices that speed up the particles that make up all matter in the universe and collide them together or into a target. This allows scientists to study those particles and the forces that shape them. Specifically, particle accelerators speed up charged particles.[4,5] Particle accelerators can be linear (straight) or circular in shape and have many different sizes. They can be tens of kilometers long or fit in a small room, but all accelerators feature four principal components.[6,7] Particle accelerators are highly complex machines that take the smallest components of matter, charged particles, and boost them to velocities very close to the speed of light. Beams of these particles can be collided, and in the collisions strange new particles emerge. By analyzing the resulting new particles, we can learn more about the structure of the universe itself.

Particle colliders tend to be very big, at 27 km in circumference the Large Hadron Collider is the largest machine ever built. However, smaller accelerators can be produced which have applications closer to home such as in archaeology, zoology and medicine.[9, 10, 11]

2. Coupled particle accelerator

The consequences of the field in the evacuated vessel can be represented as

$$\partial F = \frac{F}{\frac{1}{4}}$$

This represents the anode and cathode to be connected by the induced voltage between the two, that they're both part of the same circuit. The voltage in the evacuated vessel is (by the point of view from in the evacuated vessel) at

$$\frac{1}{4}\partial F = F$$

Were this field is further individualized in-order to represent the path that the particle takes as it's accelerated, which is mathematically represented as:

$$\frac{1}{4}\partial F - \frac{1}{4}\partial F\frac{1}{2} + \frac{1}{4}\partial F\frac{1}{2}$$

The particle follows a constant path after being accelerated. This by taking the evacuated system to be closed, or at least, the processes happening in them, are of constant nature of physical laws. It can be said that the particle can also be deflected when the field flowing through the conducting plate is as close to the below integration as possible, which is represented as:

$$0 = \int_a^b f(x)dx$$

Representing the surface of the plate to have no potential difference that the approaching particle is initially attracted to the plate.

3. Estimation of deflecting the accelerated particle

The accelerated particle is then deflected when:

$$E \cdot \theta = d_p^{\mu v_1}$$

Were E is the energy of the current flowing through the conducting plate, θ is the angle that the plate is to deflect the approaching particle at, and $d_p^{\mu v_1}$ is the point at which the particle is deflected; which is represented to be a tensor field. It should then be assumed that below $d_p^{\mu v_1}$ the particle is not deflected, but as the law of conservation of momentum would have it, there being a relation with the law of conservation of energy, the approaching particle could as well, rather ionize the conducting plate whilst the conducting plate emits a number of particle(s), that the amount of energy in the conducting plate does not stay at a certain threshold. The two laws mentioned in the previous statement assume a transfer of energy between the accelerated particle and the conducting plate. In as much as the accelerated particle colliding with the conducting plate, a transfer of energy between the two happens, were if the energy of the accelerated particle is great enough, it's momentum could overcome the resistance of the conducting plate.

4. Energy and the deflected particle

It then follows from the law of conservation of momentum and that of energy, that increasing the energy of the particles with in the conducting plate, whilst keeping this energy below a certain threshold frequency, this could increase the resistance of the plate from absorbing a high momentum particle, as shown in the above tensor equation, increasing the angle between the particle and the plate, could as very well increase the resistive index of the conducting plate. As the particle doesn't transfer it's full momentum to the conducting plate. $d_p^{\mu v_1}$ Depends on the momentum and energy of the accelerated particle. The energy and momentum of the particle after it's deflection at 135 degrees are then placed at xm, xE; were the two represent unknown variables of the energy and momentum. Were by the law of conservation of energy, the conducting plate should have transferred some of it's energy to the particle, while the particle lost some of it's energy to the conducting plate.

Were x_m, x_E depends on the particle's ability to resist change in the direction of it's motion before the collision and the amount of energy transferred to it after the collision. The energy and momentum of the particle as it approaches the plate that's to deflect it at an angle of 45 degrees is then represented as x_m, x_E. Were the same equation:

$$E \cdot \theta = d_p^{\mu v_1}$$

Is used in-order to find $d_p^{\mu v_1}$ at this point in the experiment. It's possible to increase E by increasing the surface of the conducting plate, and running a greater amount of current through it, then if it had a much smaller surface. It should be noted that the electromagnetic forces produced by running a current through the conducting plates are isolated, they're closed from the cathode and anode fields from a secondary emitter.

The field produced by each of the conducting plates can then be represented in curl notation, taking in to account that the magnitude of the curl is related to the potential difference between the cathode and anode of the source generating the current, were as, the resistance to the electro- magnetic field is near zero due to the vessel being evacuated. It's then represented as

$$E_p - R$$

When the particle is being acted upon by a positive field force. E_p Is the energy of the particle, R is the resistance to the particle in the positive field force.

5. Conclusion

The positive field force should only be able to exert a force capable of accelerating the particle even faster when the force of the positive field force is able to overcome the momentum of the particle.

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