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A Prototype Electron-Positron Fusion Reactor

Ardeshir Irani

The Dark Energy Research Institute, Downey, USA
Email: artirani@aol.com

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Abstract

In a previous paper [1] we established the possibility of the advantage of using the bombardment of electron-positron beams to produce commercial electrical energy. We consider the design of such a prototype reactor using 100 KJ laser beams to produce electron-positron beams that are sent to the reactor to release the 100 KJ of energy in the form of Xrays, which creates the high temperature and pressure needed to ignite the deuterium-tritium pellets for the fusion reaction.

Keywords

Electron-Positron, Prototype Reactor, Laser Beams

1. Introduction

The apparatus consists of laser beams that deliver total energy of 100 KJ to the lead target. The lead target is encased in a vacuum chamber with a magnetic field (B) within the chamber perpendicular to the laser beam and pointed into the page as shown in **Figure 1**. The laser beams will produce an equal number of electrons and positrons with a maximum energy of 100 KJ that will be sent to the reactor to ignite deuterium-tritium pellets for the fusion reaction to take place. The correct thickness of the lead target will have to be determined experimentally for maximum efficiency of laser beam conversion to electrons and positrons.

2. Procedure

Since the laser beam is made up of photons its interaction with the lead target will produce electron e^- and positron e^+ beams within the vacuum chamber and the two beams will be directed oppositely by the B field. The two beams can then be transported a distance away from the vacuum chamber as in **Figure 1** by B fields within two separate vacuum tubes and brought together to interact inside

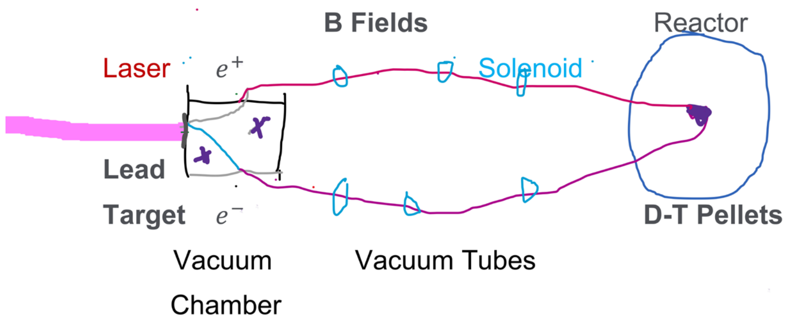

Figure 1. Schematic diagram of different parts leading to an electron-positron fusion reaction.

the reactor where the energy released by the e^- and e^+ explosion can then be used to start the fusion process by igniting deuterium-tritium (D-T) pellets placed at the center of the reactor, thereby generating electricity in the conventional manner where the energy obtained from the fusion reaction is used to heat water, converting it into steam that is then used to convert mechanical energy into electrical energy. This process can be compared to laser Fusion experiments at NIF [2] where multiple laser beams are shot at targets made of deuterium-tritium pellets encased in different materials for implosion, but the implosion of the pellets needed to start the Fusion reaction has become problematic. After the prototype experiment has been carried out then the more powerful multiple laser beams (192) of NIF delivering total energy of 2.15 MJ to the lead target can be brought into play and the experiment carried out without the need of encasing the pellets for pellet implosion. The prototype experiment described can be conducted by combining 9 of the 192 NIF laser beams to deliver 100 KJ of energy to the D-T pellet thereby eliminating the possibility of a catastrophic explosion since we are planning the design of a Fusion Reactor and not a Fusion Bomb.

3. Conclusion

While the laser inertial confinement fusion program has been unsuccessful so far as per NIF reports, the nuclear Fission method is currently engaged in the production of electrical energy. Nuclear reactors are placed far from the city whose energy needs it serves because of the documented radioactive explosion accidents of several nuclear reactors around the world and the problem of storing radioactive waste byproducts. This distancing problem also holds true for hydroelectric power and wind generated power but for different reasons since hydroelectric power would have to be created near a dam while wind generated power would have to be created near a windy open field. The electron-positron Fusion reactor, on the other hand, can be placed within the city limits that it services, and this eliminates the problem of transporting electrical energy over large distances from source to site since Fusion unlike Fission does not have radioactive byproducts.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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