

## Fusion Using Heating Effect of Current and Electrostatic Shielding Along With Laser Action

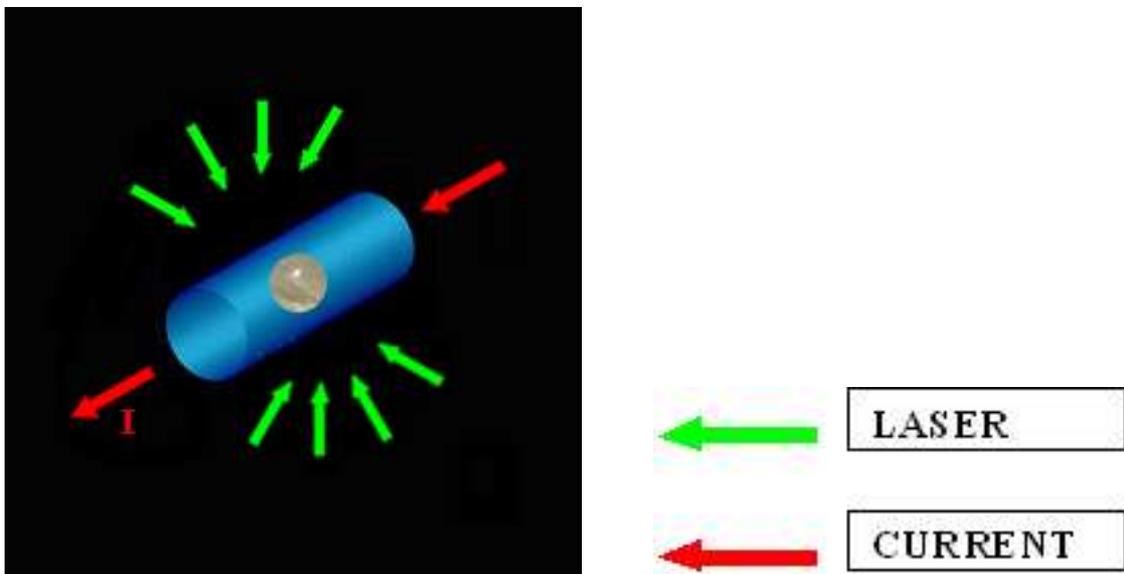
R.Rajakarthik

*Kongu Engineering College, Perundurai, India*

### Abstract

This paper focuses on a idea of reaching break even by increasing the value of reaction time by electro static shielding in a microscopic level with ionized lead atoms by laser and by supplying additional energy, using spontaneous conversion of super conductors carrying high current, enclosing the pellet into conductors by laser action, there by using heating effect of current as an additional energy.

### Description of the Process



The fuel pellet is embedded inside a lead rod. The lead is cooled below  $T_c$  (critical temperature) to convert it into superconductor. High current is passed through the superconductor (lead). No heating is produced due to zero resistance. The pellet is struck with laser. The lead gets heated up and loses its super conductivity and becomes ordinary conductor obeying ohm's law. Current passing through it further increases the temperature.

The resistance increases to a high value in a short time and high heat is evolved due heating effect of current. This energy is supplied as an additional energy to energy supplied by laser action. After lasing the lead vaporizes and form super hot plasma of lead. This super hot plasma of lead formed by laser action emits X-rays that would cause implosion of fuel pellet.

### Derivation of Value of Voltage (V) for Fusion

The temperature of  $10^8$  K is achieved by relating heat equation ( $H = MC (\theta_1 - \theta_2)$  and  $H = (V^2/R)T$ ) let us consider time  $T = 10^{-9}$ s,  $M$  = mass of the laser affected region,  $C$  = specific heat capacity,  $V$ =voltage across the superconductor,  $R$ =resistance. Here  $\theta_1 - \theta_2 = 10^8$  K. the resistance varies from  $R_0$  to  $R$  -> resistance of lead reached  $10^{-9}$  s after laser action.

$$H = M C (\theta_1 - \theta_2)$$

$$H = \left( \frac{V^2}{r} \right) T$$

$$\text{So } M C (\theta_1 - \theta_2) = \left( \frac{V^2}{r} \right) T$$

It is integrated from  $R_0$  to  $R$ . then

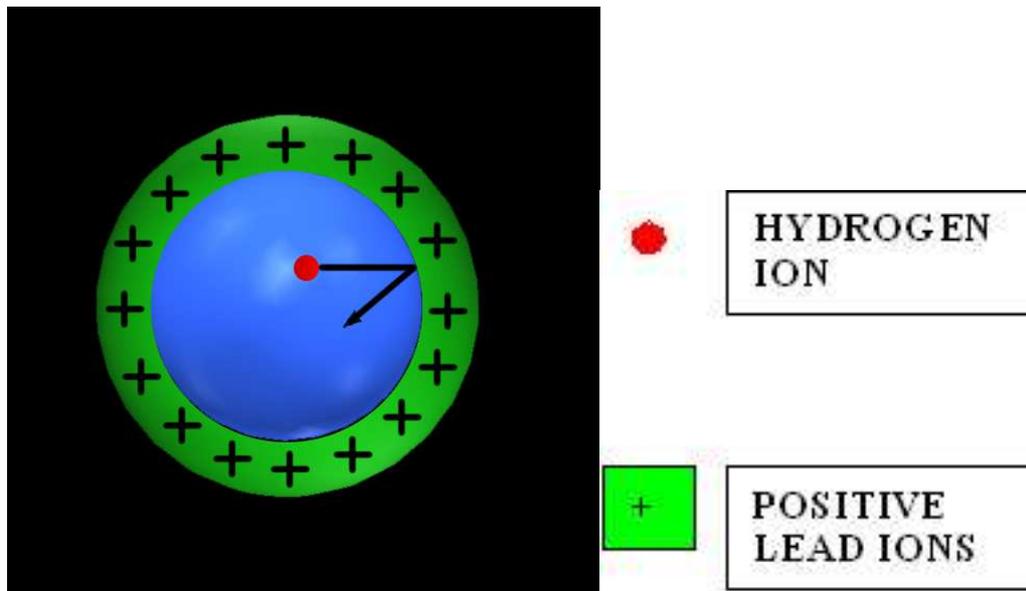
$$MC10^8 = \int_{R_0}^R \left( \frac{V^2}{r} \right) 10^{-9} dr$$

$$MC10^8 = V^2 [\log(r)]_{R_0}^R 10^{-9}$$

$$MC10^8 = V^2 [\log(R) - \log(R_0)] 10^{-9}$$

Where  $[\log(R) - \log(R_0)]$  is a constant positive value and  $M, C$  are constant. Thus by this equation the voltage required for achieving  $10^8$  K is found.

### Electrostatic Shielding By Lead Ions



The pellet enclosed in lead rod is bombarded with laser, as an initial process the lead reaches high temperature and becomes high positive ions which encloses the plasma of D-T. The ions of lead form a hollow sphere of positive ions. When a Gaussian surface inside is considered the electric field inside the sphere is zero. When a hydrogen ion is considered inside the sphere, it experience no field, but when it moves outwards and touches the wall of the sphere, it experience repulsive force due to repulsion by lead ions and experiences electrostatic collision with the ions and is reflected back inside the sphere there by increasing the value of  $t$ .

### Objective of the Paper

The fusion could be achieved by controlling the voltage  $V$  found by the equation derived above. This method would help in ignition of the fusion reaction by inertial confinement method. This method could also bring in fusion higher element other than hydrogen, since the voltage required for fusing a particular element could be found from the

above equation by knowing its specific heat capacity and the temperature needed for the nucleus to move across the columbic barrier.

### **Conclusion**

This process brings in fusion temperature and implosion by X-rays as seen in Z – pinch fusion. In this method energy loss would be less than the direct drive process since most of the electric energy will be converted to heat energy which is supplied for the formation of super heated plasma of lead and heating of fuel pellet. This process could also increase the fusing time to some extent by electrostatic shielding provided by positive lead ions. So this process may bring in ignition of fusion reaction.

### **Acknowledgments**

I would like to thank Dr R.Balasubramanian and Mrs. Nivathini Mathan who had helped me in my carrier in physics.

### **References**

- David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics.
- Arthur Beiser, Concepts of Morden Physics.

**Contact ID** : rajakarthikr@gmail.com