CHAPTER FIFTEEN

The Gyroscopic Foundations of Electron Tunneling

Before the reader proceeds any further it is strongly suggested that chapters 15.1 through 15.6 be accessed from the following link:

http://www.columbia.edu/itc/chemistry/photochem/chapter15.html

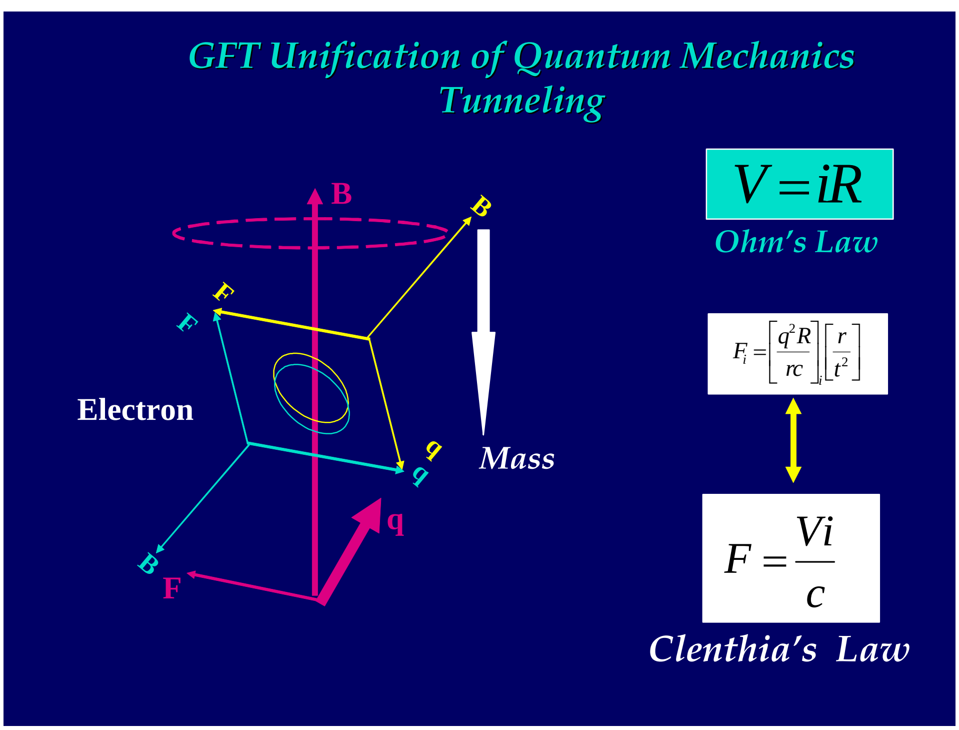
Tunneling is a phenomenon where a current flows through a conductor even though that current is energetically prohibited from doing so. It somehow flows "under" the potential barrier it encounters, which should, theoretically, impede its flow. This barrier is usually exists as a thin insulator. We are told that the electron is able to achieve this feat and violate the law of conservation of energy due to the probabilistic allowances of quantum mechanics. The GFT must and will, at all times, obey all conservation laws. Therefore, contrary to the allowances of quantum mechanical theory, the GFT now provides a much more simple, reasonable, and classical explanation of this phenomenon in full accordance with all the laws of conservation.

Chapter Fourteen established that superconductivity is due to the lost of kinetic energy by the down quark component of the electron and, through Norma's law, the resulting lost of both its applied magnetic B field and conductor resistance. ***Tunneling is no more than an attenuated version of superconductivity where the use of a thin layer insulator performs the equivalent function as liquid helium in causing a lose of kinetic energy.*** **When the electron engages the thin layer insulator, the current of its down quark component is impeded and thus the B field of the electron is also diminished. We need simply refer once again to equation (14.9), Norma's law, where $B = \frac{R}{r^2}$. If r is constant as B decreases then R decreases. If we wish to maintain a constant current then via Ohm's Law V is directly proportional to R. If R decrease so too does V thus accounting for the tunneling below the potential energy barrier.**

We may also view tunneling in the broader context of inertia. In Chapter Ten Clenthia's law was derived and found it to be the unifying equation of inertial interactions. Even though Clenthia's law has been applied to situations involving mass it is still, at its most basic and fundamental nature, an equation descriptive of electromagnetic phenomena. ***This then dictates that any application of Ohm's Law, must obligatorily involve an application of Clenthia's law.*** **These two laws are neither mutually exclusive nor independent. As in the case of gravitational mass and inertial mass, the application of Ohm's Law and l Clenthia's law must occur both simultaneously, sychronisticly, and complimentary.**

How then is Clenthia's Law manifest? To answer this question let's first explore the genesis and location of the potential energy barrier that the moving electron encounters as it propagates through a typical electric circuit. The GFT states that this potential energy barrier is encountered within the conductor. This barrier is also a function of the resistance R in the conductor. In a general sense, Ohm's law pertains to a quantity of force or energy, i.e. the *EMF*, required to push accelerated electrons through some conductor having some resistance R. Ohm's Law pertains more generally to the characteristics of the voltage originating from a battery or generator, or electrical wall outlet and how it sets about forming a current. Conversely, Clenthia's law concerns itself with the character of the conductor as it responds to the constant force it encounters from the EMF issuing forth from the generator or wall outlet. The juxtaposition of these two approaches hints at the complimentary nature of the two laws. *Within the conductor Clenthia's law establishes that, in the presence of a constant force supplied by an EMF, the flow of electrons will be inversely proportional to the potential energy barrier of the conductor.*

What then are the practical electromagnetic applications of Clenthia's law? If an electrical plug is inserted into an electrical outlet that plug is most likely coated with a minute coating of its own metal oxide. This oxide coating acts as an insulator, forming a potential energy barrier that, theoretically, should impede the flow of electrons. However the electricity flows freely without any interruption. Once we place the plug in the outlet an EMF is instantly applied across the plug and the remainder of the circuit. Electrons are accelerated forming a current. This applied EMF is constant; therefore the force exerted upon these electrons is constant. It is important to note that the force component of the EMF in Ohm's law must be equal to the force component of Clenthia's law. Therefore



$$EMF = V_{Ohm} = \frac{E}{q} = F_{Ohm}\left[\frac{r}{q}\right] = iR$$

$$F_{Clenthiao} = F_{Ohm}$$

It has been demonstrated that through dimensional analysis Crews law, the gyroscopic equivalent of Coulomb's law, can be directly derived from Ohm's law thus demonstrating a mathematical link between the two. The rotational equivalent of Newton's first law states that a freely rotating body will continue to rotate with constant angular velocity as long as no torque acts to change that motion. If Crew's law is the mathematical description of the centripetal force exerted by a "fixed" charge on its orbiting counterpart then there must be some mathematical description of the torque being exerted on an orbiting charge.

Newtonian rotational dynamics has the torque, τ, expressed as

$$\tau = Fr\sin\theta. \qquad \textbf{(15.1)}$$

At 90 degrees

$$\tau = Fr. \qquad \textbf{(15.2)}$$

Therefore the torque per charge would be

$$\frac{\tau}{q} = \frac{Fr}{q} \qquad \textbf{(15.3)}$$

If

$$F = \frac{q^2Rc}{r^2} = Crew's\ Law \qquad \textbf{Corollary IIb.}$$

Then the constant c, must be the tangential velocity, v, of the orbiting charge. Note that the radius vector, r, is perpendicular to the velocity vector, v.

If

$$F = \frac{q^2Rv}{r^2} \qquad \textbf{(15.4)}$$

and

$$v = \frac{r}{t} \qquad \textbf{(15.5)}$$

then

$$F = \frac{q^2R\perp r}{tr^2} \qquad \textbf{(15.6)}$$

At 90 degrees

$$F\perp r = \frac{q^2R\perp r^2}{tr^2} \qquad \textbf{(15.7)}$$

$$\frac{\tau}{q} = \frac{q^2 R \perp r^2}{qtr^2} \quad \textbf{(15.8)}$$

$$\frac{\tau}{q} = iR\left[\frac{qr^2}{qr^2}\right] \quad \textbf{(15.9)}$$

$$V = \frac{\tau}{q} = Madeline's\ Law \quad \textbf{(15.10)}$$

$$\frac{F \perp r}{q} = \frac{F_{Ohm} \perp r}{q} = \frac{F_{Clenthia} \perp r}{q} = iR = V = \ Ohm's\ Law \quad \textbf{(15.11)}$$

It may therefore be stated that in accordance with Keith's law, validated by Clenthia's law, just as mass possesses the intrinsic quality of inertia so too does charge. Ohm's Law may be interpreted as a gyroscopic dynamical description of a torque being applied to an orbiting charge. The gyroscopic equivalent of Ohm's law is Madeline's law where $V = \frac{\tau}{q}$**.**