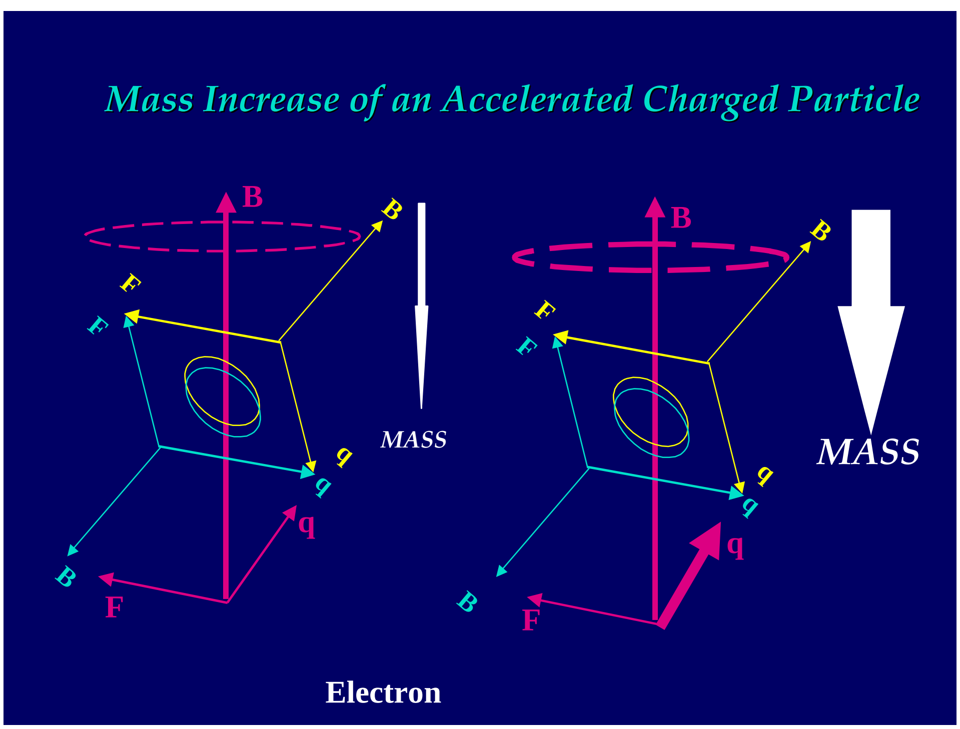
CHAPTER TWELVE

Mass Dilation of an Accelerated Charged Particle

Mass Dilation

The experimental evidence is irrefutable. An accelerating electron will gain both inertial and gravitational mass. Given the GFT model of the electron this phenomenon of mass dilation may be easily explained. Acceleration of a charge increases the magnitude of its q vector. An increase in its q vector must also be accompanied by an increase in its B and F vectors. Suppose we accelerate the GFT model of the electron along the q vector. This causes an accompanying increase in the B and F vectors. The enhanced B field interacts with the magnetic dipole of the up quark causing this component of the electron to precess at a faster rate. A greater precession rate entails an increase of the torque acting on the up quark component. An increasing torque entails an increased normal force. This normal force is manifest as inertial mass. Acceleration of an electron, or any charged particle, creates an increase its gravitational mass as manifest by an enhanced B field in addition to an increase in its inertial mass as manifest by the increased normal force component of the torque exerted on the up quark component of the electron.



The GFT Derivation of Einstein's Equation of Relativistic Mass

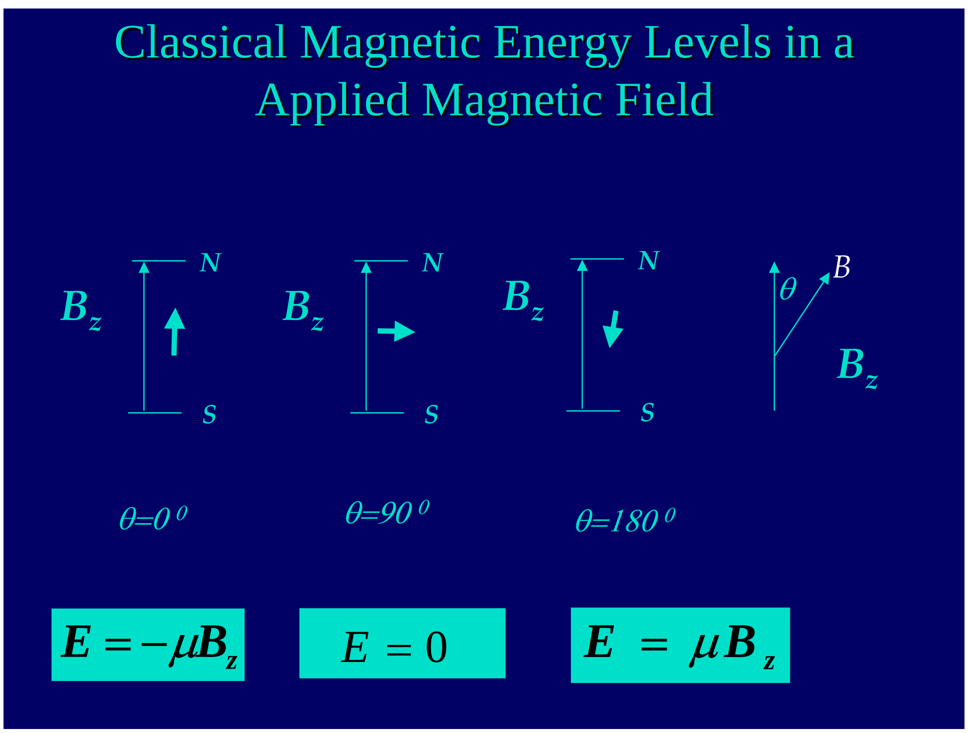
Einstein's theory of Special Relativity derives the relativistic inertial mass of an accelerated particle as

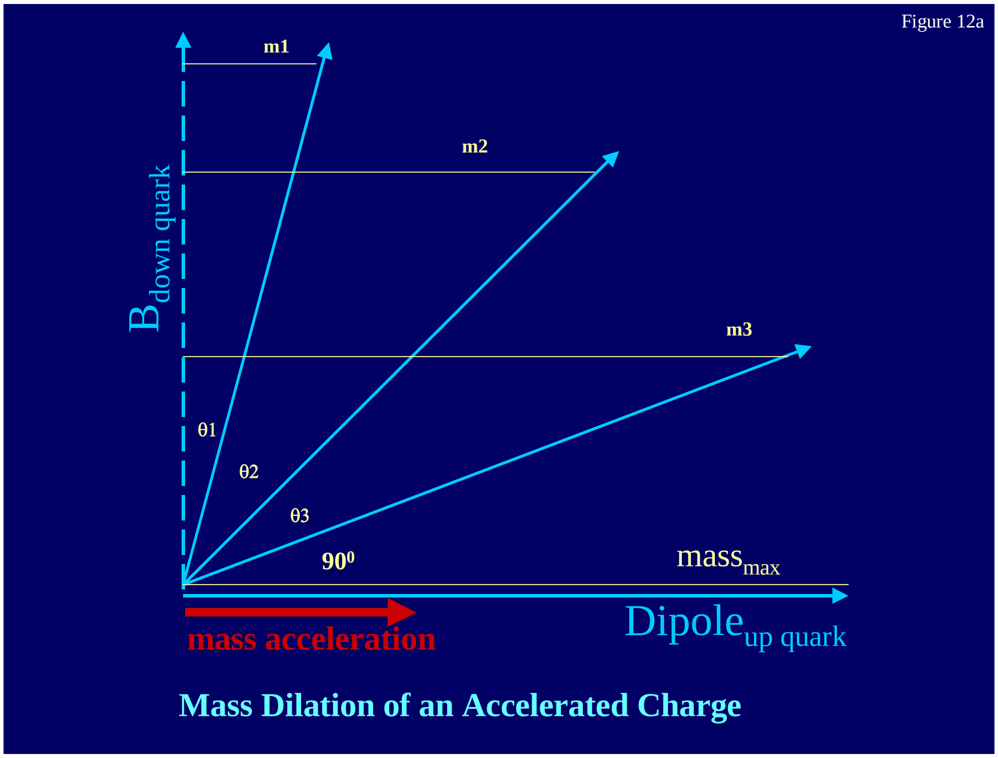
$$m_{accelarated} = \frac{m_{rest}}{\left(1 - \frac{v^2}{c^2}\right)^{\frac{1}{2}}}$$

Again, the experimental evidence , to date, confirms the validity of this equation. If this equation is indeed true then the GFT is obliged to derive this same equation via the tenants and principles espoused in Chapters Ten and Eleven. As previously established in Chapter Eleven, the up quark component of the electron is a magnetic dipole. Its behavior is identical to that of a bar magnet. When placed within the magnetic field of the GFT down quark component of the electron, the GFT up quark component precesses. When the bar magnet is subjected to such a magnetic field it will assume a certain a magnetic energy. This magnetic energy is given by the equation

$$E_{magnetic} = -\mu B_z \cos\theta$$

where μ is the magnetic dipole moment of the up quark component , and B_z is the magnetic field applied via the down quark component.





Refer to Figure 12a. When μ, the dipole moment, is subjected to B_z then μ will precess about the applied B_z field. As μ precesses it begins to tilt, forming some angle θ to the normal. If we accelerate the down quark perpendicular to the applied magnetic field, B_z increases causing a greater precession of μ which causes an increase in θ.

We initially allow both μ and B_z to be colinear, both being oriented along the y axis. Any type of "mass", at this point, must exist at its minimum. Indeed, such an orientation imposes that there is not and cannot exist any gravitational or inertial mass at this point. We designate this massless entity m_0. We then accelerate m_0 along the x axis for some short finite distance. Since the acceleration of m_0 is perpendicular to the orientation of B_z there is an increase in the strength of B_z, which in turn creates a torque on μ, causing μ to tilt or rotate from B_z at some angle θ. This arrangement creates a triangle whose hypotenuse is formed by μ. Therefore

$$B_z \propto \mu \cos\theta$$

This poses the question as to what then is $\mu \cos\theta$. We once again accelerate m_0 some short distance along the x axis, where once again μ rotates creating a new larger angle θ. We continue this series of acceleration and rotations until μ is rotated 90^0. This is the maximum distance of rotation before the cycle begins anew. If this is the maximum distance of rotation then m_0 has been accelerated to its maximum velocity, which is c, and therefore it has reached its maximum mass.

Therefore the maximum mass is directly proportional to the rotation of μ or to the size of θ. Since $B_z \propto \mu \cos\theta$ then the mass of an accelerated m_0 may be defined as

$$accelerated\ m_0 = mass_{enhanced} \propto \mu \sin\theta \qquad \textbf{(12.1)}$$

Also note that as μ rotates θ increases which causes a decrease in the strength or influence of B_z vis a vis μ until at 90^0 B_z ceases to influence μ.

The use of the term rest mass is actually a misnomer. A true rest mass must be devoid of any gravitational or inertial mass. In classical terms rest mass is defined as simply any non accelerated mass , thus a moving particle may exist as a rest mass whereupon being accelerated its mass is enhanced until acceleration ceases whereupon it once more acquires the status of rest mass albeit with a new and greater store of gravitational and inertial mass. For example, to proceed from m_1 to m_2 we accelerate m_1 until it attains the mass of m_2. To proceed from m_2 to m_3 we accelerate m_2 until it attains the mass of m_3 and so on until we attain the ultimate maximum mass at a velocity of c. Note that each mass is followed by a larger mass and thus each mass can be considered as a rest mass prior to its acceleration and transformation into a larger subsequent mass. Every mass is proportional to the $\sin\theta$, therefore we may designate m_1 as a rest mass before being accelerated to m_2, an enhanced relativistic inertial mass. We may now state

$$\frac{m_1}{\sin\theta_1} = \frac{m_{rest}}{\sin\theta_1} = \frac{m_{enhanced}}{\sin\theta 2} = \frac{m_2}{\sin\theta 2}. \qquad \textbf{(12.2)}$$

In the case of the ultimate maximum mass we may write

$$\frac{m_1}{\sin\theta_1} = \frac{m_{rest}}{\sin\theta_1} = \frac{mass_{\max imum}}{\sin\theta} = \frac{mass_{\max imum}}{\sin 90^\circ} = mass_{\max imum} \qquad \textbf{(12.1)}$$

Note however that the maximum mass is none the less an enhanced mass, therefore any enhanced mass may be construed as occupying the sine of 90^0 orientation. If we rotate the enhanced mass to the 90^0 orientation we must also rotate the rest mass a proportional distance. This additional rotation is simply $90^\circ - \sin\theta_2$ where the original orientation of the enhanced mass is $\sin\theta_2$. Therefore

$$\frac{m_{rest}}{\sin\left[\theta_1 + \left(90^\circ - \theta_2\right)\right]} = \frac{mass_{\max imum}}{\sin 90^\circ} = \frac{mass_{enhanced}}{\sin 90^\circ} = mass_{\max imum=} mass_{enhanced} \qquad \textbf{(12.3)}$$

Therefore

$$\frac{m_{rest}}{\sin\theta} = mass_{enhanced} \tag{12.4}$$

Through trigonometric identities

$$\sin\theta = \sqrt{1-\cos^2 x} \tag{12.5}$$

and

$$\cos = \frac{x}{hypotenuese} \tag{12.6}$$

Note that at 90 degrees μ ,c, and the maximum mass are all colinear and all at their maximums, thus the hypotenuses can represent any one of these entities or their products. We therefore allow the hypotenuse to represent c. If m_0 is being accelerated along x then the velocity, v, of m_0 also lies along the x axis and equals x. Given equations (12.5) and (12.6) we may state

$$\sin\theta = \sqrt{1-\cos^2 x} = \sqrt{1-\frac{v^2}{c^2}} \tag{12.7}$$

From equation (12.7) we may therefore derive Einstein's relativistic equation for mass where

$$mass_{enhanced=}\frac{m_{rest}}{\sin\theta} = \frac{m_{rest}}{\sqrt{1-\frac{v^2}{c^2}}} \tag{12.1}$$

QED

The GFT Derivation of Einstein's Relativistic Energy

Just as we derived Einstein's equation for relativistic mass the same principles must also allow us to derive his expression for relativistic energy. At 90^0, μ,c, and the maximum mass are all colinear and at their maximums. If this is true then this must also be true of the momenta and energies dependent upon these entities. Along the hypotenuse the maximum energy for mass would be Einstein's $E = m_0 c^2$ since it is only along the hypotenuse we find maximum mass and maximum velocity. Where the energy along the x axis would be $m_0 v^2$ the energy along the y axis can only be dependent upon some form of momenta absent any gravitational or inertial mass. DeBroglie provides us with such momenta where

$$momentum = p = \frac{h}{\lambda}$$

Given

$$c = \nu\lambda$$

and

$$E = h\nu$$

Then

$$\nu = \frac{c}{\lambda}$$

Therefore, along the y axis

$$E = \frac{hc}{\lambda} = pc$$

Via the Pythagorean Theorem

$$E^2 = \left(m_0 c^2\right)^2 = \left(m_0 v^2\right)^2 + (pc)^2$$

QED