CHAPTER ELEVEN

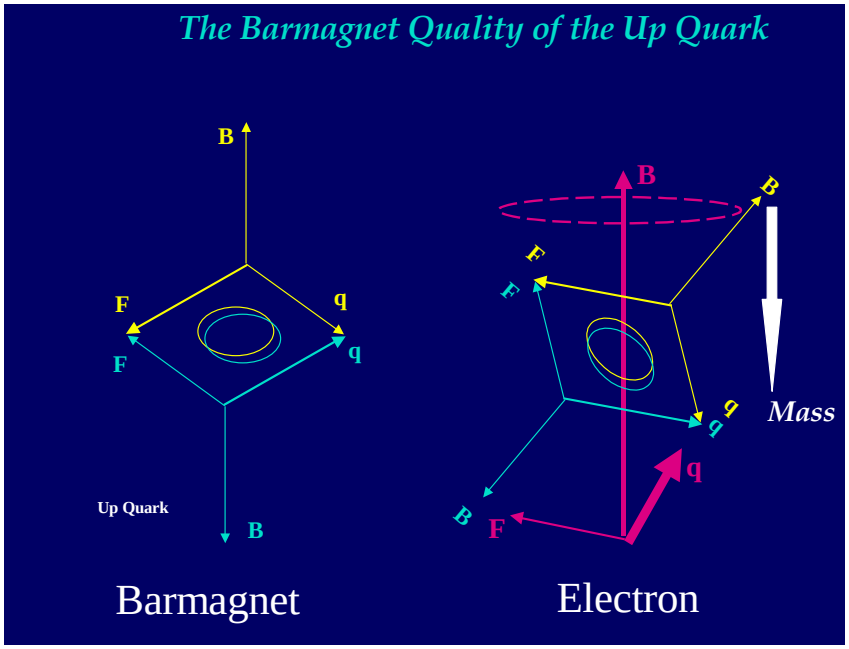
The Magnetic Energy Foundation of Inertia: Ida's Law

Before the reader precedes any further it is strongly suggested that chapters 15.1 through 15.6 be accessed from the appendix or from the following site:

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

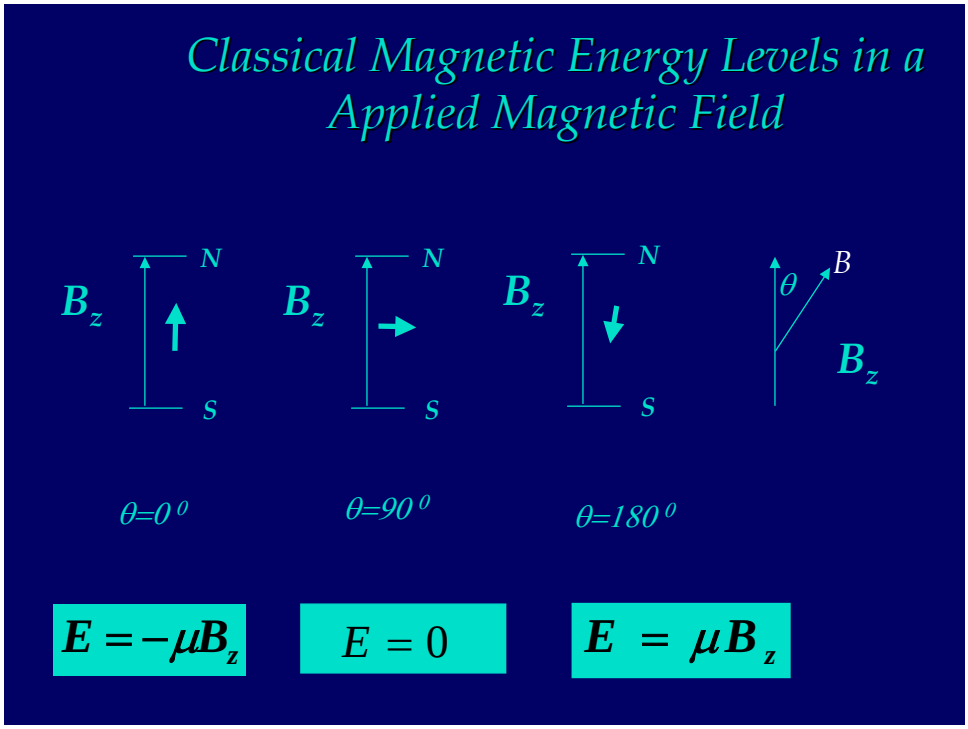
These chapters are from the book entitled Modern Molecular Photochemistry by Nicolas J. Turro. They are highly recommended. In terms of clarity, conciseness, and simplicity it is unrivaled in its discussion of spin and angular momentum. Many of the following concepts presented on spin, angular momentum, and vectors were taken from these chapters. It is highly recommended that the reader become familiar with the content in these chapters. When discussing a particular concept on spin, angular momentum, or vectors, an attempt will be made to reference or link the reader to a pertinent chapter on the subject.

In Chapter Eleven the GFT established a mathematical basis for the origin of inertial mass through Clenthia's Law where $F = \frac{Vi}{c}$. We identified the potential, *V*, in Clenthia's law as the inertial potential. As a potential it must obviously possess some form of energy. We now ask, what is this energy and from whence does it originate? To answer these questions let's once again examine the GFT model of the electron.



As we have previously established, 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 a GFT down quark component of the electron, the GFT up quark component precesses. (For a more in depth analysis of this interaction see Turro's Chapter 15.5.) Turro states the following: "According to classical physics, when a bar magnet is placed in a magnetic field B_0, the torque acting on the magnetic moment of the bar magnet is proportional to the product of the magnitude of the magnetic moment, μ, of the bar magnet, the magnitude of the magnetic field, B_z, and the angle θ between the vectors describing the moments." In the analysis of charged particle spin it is useful to follow the magnetic moment because it coincides with the angular momentum vector. (For more on the magnetic moments see Turro's Chapter 15.4) 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

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



If the GFT up quark component of the electron functions as a bar magnet and the GFT down quark component is the source of a coupling magnetic field analogous to the magnetic field B_z, then the up quark component must also assume the magnetic energy given by

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

We may now state that the energy inherent in the inertial potential is the magnetic energy assumed by the GFT up quark component of the electron as it precesses within the magnetic field supplied by the electron's GFT down quark component. This is defined mathematically as

$$V_{inertial} = \frac{E_{magnetic}}{q} = \frac{-\mu B_z \cos\theta}{q}$$

It is this magnetic energy that constitutes the fundamental nature of inertia or the intrinsic quality of mass to resist gravitational attraction. This is Ida's Law.

To demonstrate why this is so let's accelerate the electron along the q vector of the electron causing an increase in the magnitude of this q vector and an increase in the B field of the GFT down quark component. This creates an increase in the torque acting on the bar magnet like up quark, which increases the normal force acting on the up quark, which is manifest as gravitational attraction. This increase in torque also causes an increase in the angle θ . At θ =0^o the magnetic energy is at its maximum. At θ 90^o the magnetic energy is at its minimum. An increase in the angle θ means a decrease in the magnetic energy, which implies a concomitant decrease in the torque exerted on the up quark component which results in a decrease tendency of the up quark to be pulled by the normal force of gravity. This is the essence of inertia.

The GFT therefore asserts that all mass, both gravitational and inertial, issues forth from an electromagnetic interaction in general, and from the magnetic field specifically.

Recall from Turro's Chapter 15.5. the various energy levels the precessing up quark component of the electron may assume. Depending upon the orientation of the applied magnetic field of the down quark component of the electron, the up quark component is allowed to assume certain specific orientations. We focus our attention on the state of mass when theta assumes 0, 90, and 180 degrees. At 0 degrees the up quark component of the electron is aligned parallel to the B field of the down quark component. Here, presumably the up quark will have its most minimal gravitational mass and its maximum tendency to precess or alternatively, to be attracted by an attracting body such as the earth. As theta increases its gravitational mass increases until it reaches a maximum at ninety degrees. At this juncture the maximum gravitational mass attainable by that particular particle has been reached. Note however, that this also denotes its minimum tendency to precess or alternatively, to be attracted by an attracting body such as the earth. *In short, at 90 degrees a particle will attain a maximum mass whereupon it will then cease to be affected by the gravitational force field.* (See Turro's Chapter 15.5. page2).

If we proceed past 90 degrees we would then initiate the formation of a tangible inertial matter, the reverse of the common Newtonian gravitational matter. Here, this inertial matter exists at its maximum mass. Proceeding pass this point creates a decrease in the tangible inertial matter mass until it reaches a minimum at 180 degrees whereupon a reverse electron is formed or antimatter. At 270 degrees the antimatter reaches a maximum whereupon inertial antimatter is formed. At 360/ 0 degrees the inertial antimatter reaches a minimum whereupon the electron is

formed once again. Alternatively, we may view this shifting of matter types as a reversal of polarities of the gravitational and inertial potential. From zero to 90 degrees we may view the attractive gravitational potential as negative and the inertial potential as positive. A progression to each subsequent quadrant causes a reversal in their polarities. Note we may also correlate inertial mass with spin. We allow $m, \varpi, and\ q$ to represent gravitational mass, inertial mass, and charge respectively. The subsequent polarity of each of these entities would be as follows:

Quadrant I	$m, \varpi, and\ q$
Quadrant II	$\varpi, m, and\ q^{-}$
Quadrant III	$m^{-}, \varpi^{-}, and\ q^{-}$
Quadrant IV	$\varpi^{-}, m^{-}, and\ q$

We may therefore state, gravitational mass and inertial mass interact as polar equivalents. Just as charge has polarity so too does mass. This is Karen's Law.

The Four Families of Tangible Matter