PART 4
METHODOLOGY FOR THIS MATHEMATICAL PHYSICS RESEARCH WORK, HOW NOT TO, PERSONAL OVERVIEW

These Reports Cover Material as Follows:

Chapter 4.1 Methodology

This report covers the objectives and scope that were set for this project's research work. What were the project objectives or what results were expected? How would these these objectives be reached? What were the general guideline assumptions needed for the work? What basic starting input data would be the permitted? What mathematical approach was to be taken and those not to be taken? The actual detailed procedures are listed. What constraints or criteria would be placed upon any candidate descriptive equations that might be discovered for the target measured subatomic physical properties? Overall in the Methodology report, the vast bulk of the discussions focus upon how the research work of this project would be and in fact was done.

Chapter 4.2 How Not To Approach This Work

This report focuses on what others have done in relation to mathematical investigations of the nature of the subatomic particles. This topic is long, immensely long, and covers at least 30 years of endeavors in particle, high energy, and hypothetical physics. What others have done in these sub realms of the broader science of physics covers tens-of-thousands of papers, tens-of-millions of research hours, and billions of dollars. Essentially none of these efforts have any relevance to the mathematical physics research efforts of this overall work. Therefore only very limited references were made in Methodology to what others have done in these realms. This was intentional to keep that report focused on what would be done in this overall work.

Never-the-less to be fair some discussion is needed in this overall work as to what others have done. This is particularly true since such discussions are absolutely required in the formal published papers of others in academia the field of physics. In fact such discussions are the first item of business. From these a logical flow is made to the entire rest of the body of such papers. Readers from the academic realms automatically look for such discussions upon starting the body of work here or any other similar work. Further they tend to become extremely disoriented, confused, and frustrated when they cannot an item required as a part of their habitual way of thinking and doing things. This report was created to soften the impact of this "missing" item.

This report gives a brief overview of what other have done in the field of hypothetical or calculational particle physics. Again essentially none of this prior work was relevant to the research conducted here. What others have done is NOT examined for specific concepts, calculational procedures, or resultant answers which could have been and were not used as trail heads for the current work here. Instead this prior work is examined for broad generalities to determine various methodologies and calculational practices. These procedures are highlighted as being something which was NOT done in this work. Essentially every thing which others have done is contrasted with what was done in this work, and is not be used to supplement or support the work here.

The main objective here is NOT to negate what others in academic particle physics have found useful for the last 30 years. The intention of this report is to show a different way of viewing and "doing" calculational particle physics which has either been overlooked or forgotten. Specifically what is found repeatedly in this report, is that when the required trappings of the hypothesis-first methodology are throw off, then great intellectual freedom and creativity can arise. This is the emphasis and message here and is the hope for what the reader carries away from this report.

Chapter 4.3 Personal Overview Of Project

This report presents a brief narrative of the progress of the project from a historical and personal perspective. This summarizes the several phases of the project and the various challenges encountered

with each phase. Generally there was the initial research phase of the project with its inherent challenge of playing a guessing game with the universe. After this, concurrent with further research, there was the attempts at publishing phase of the project which brought the severe rejection and repression of this material by the closed ranks of the academic physics community.

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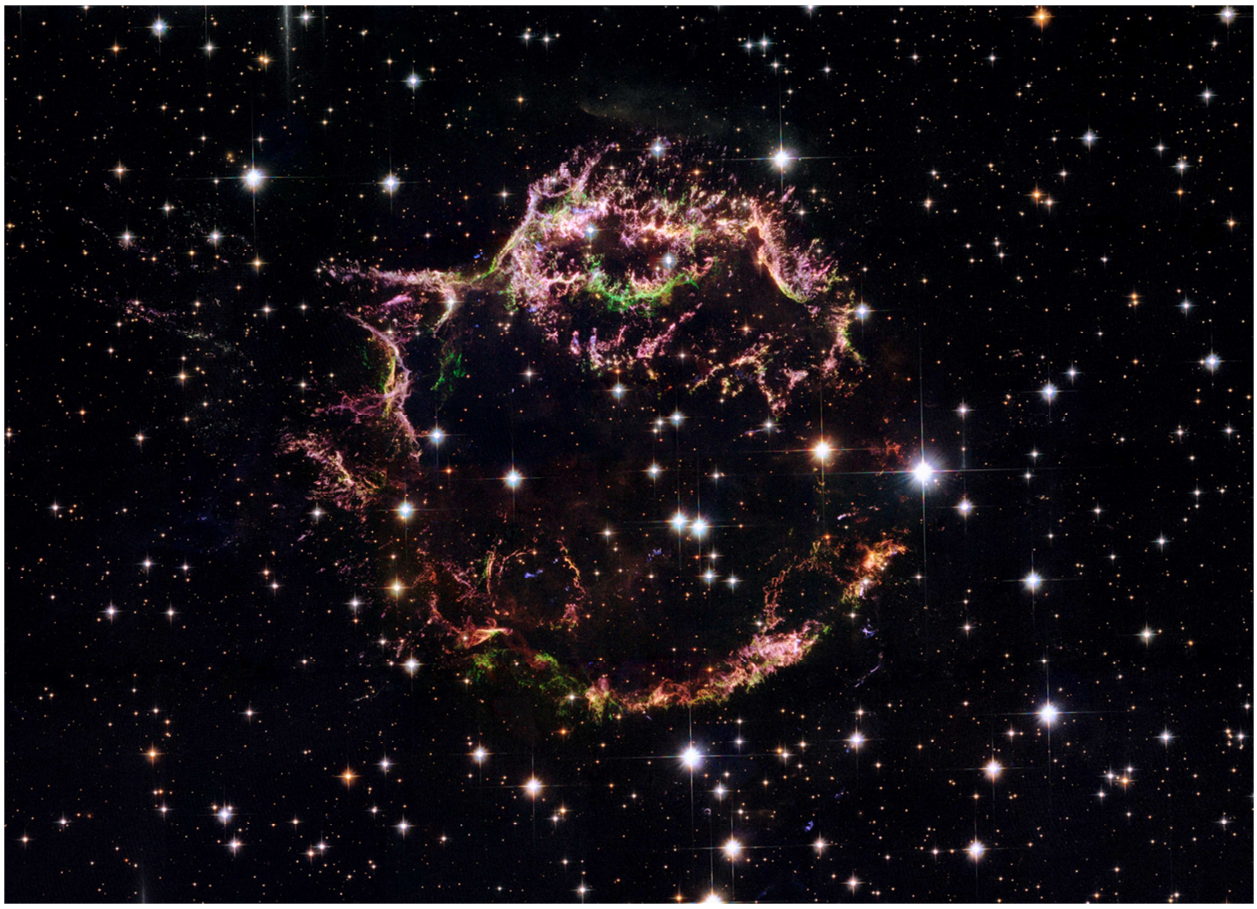
PART 1 List Of Figures



CHAPTER 4.1 RESEARCH WORK OBJECTIVES, METHODOLOGY, GUIDELINES, & CRITERIA FOR RESULTS

1 Introduction

This report covers the objectives and scope that were set for this project's research work. What were the project objectives or what results were expected? How would these these objectives be reached? What were the general guideline assumptions needed for the work? What basic starting input data would be the permitted? What mathematical approach was to be taken and those not to be taken? The actual detailed procedures are listed. What constraints or criteria would be placed upon any candidate descriptive equations that might be discovered for the target measured subatomic physical properties? Overall in this Methodology report, the vast bulk of the discussions focus upon how the research work of this project would be and in fact was done.

Also discussed is why the deductive hypothesis-first methodology that is required by the hypothetical particle physicists was not used in this work.

1.1 General Objectives Of The Work And The Findings

The objectives of the mathematical research work reported in this overall book were as follows.

First correlations were to be developed for the masses of the three known leptons; the electron, the muon, and the tau, m_e, m_μ, & m_τ. These correlations were to be turned into actual descriptive equations with the use of scaling or correlation constants with measurement units. The final equations would be partitioned into two major factors. One factor was a "pure" or sterile mathematical-geometric-calculus factor with meta or generic place holder measurement units in the arbitrarily sized world of blackboard mathematics. The other factor was a general, and maybe individual scaling factors, to embed the mathematical forms into the consensus world of humans. These scaling factors were composed of well measured physical property constants which were considered to be a-priori or independent to the particle waveforms.

As part of this first effort the mathematics which describes the elementary charge of the leptons, e, was incidentally uncovered. What was found was how mass and charge are just two different mathematical descriptions of the same "objects" or waveforms. Vector mathematics in rectilinear coordinates is needed to describe what could be called the encapsulated electromagnetic force or the entrapped energy of the particle as charge in coulombs. Regular or scalar mathematics in polar coordinates is needed to describe what could be called the stabilized gravitational force or the contained energy of the particle as mass in kilograms. Since these two mathematical descriptions are just two different conceptual views of the same objects, as expected many features were found in common between the two descriptions.

Second, after having seen the patterns set by the mass equation descriptions for the three leptons, an equation was discovered for the key defining photon constant. This is of course the Planck constant which is the measured value for the fixed (ML)(L/T) for all the photons regardless of their wave lengths. A clear side-by-side set of mathematical patterns were found for both of these elementary electromagnetic particle classes, the leptons and the photons. As was found, to go from the leptons to the photons or vice versa only requires very minor modifications in their mathematical forms. What also was seen was how these minor changes result in their many gross physical property differences.

Third, after having seen the many common mathematical features between the leptons and the photons, the Ternary Force Interaction (TFI) constant was explored. This constant describes how the three basic forces gravitational, electrical, and magnetic interact as they assemble to form the basic electromagnetic waveforms. This constant appears to underlie these encapsulated or stabilized electromagnetic forms, the leptons and the photons, and has many common mathematical features and even identical multiplying factors with the mathematics of these particles.

The fourth objective of this work was to defend it from detractors who wished to criticize these equations describing physical properties of the particles because of the use of measurement units. This lead to the numerical values of key mathematical-geometric-calculus factors in the equations for the charge and masses of the leptons were demonstrated to be measurement system independent, for any SI analogous based absolute set of scale systems. Likewise the mathematical-geometric factor in the equation for the photon constant was proven to be measurement system independent for any set of absolute scale systems. That is whether these scale systems are SI analogous or for those with totally random or independent underlying relative scales for length L, time T, mass M, and charge Q.

Finally after doing the research, writing up this work (multiple times), attempting to publish it (again multiple times), defending it from some very vicious detractors, a break was needed. After recovering, the possibility of matching the ± 2/3 and ± 1/3 charge of the quarks with the fixed curvature of certain vector curves in 4 dimensional space was investigated. This possibility was hinted at by the work done which linked the ± 1 charge of the leptons to the fixed invariant curvature of certain vector curves in 3 dimensional space.

1.2 Scope of Overall Work and These Reports

Aside from including the objectives just stated, the scope of this mathematical research work has been expanded in this report to include several broader related and peripheral topics. These includes two primary areas of focus.

First what can be called speculative ideas are included concerning some of the implications of the equations which were found. These are called speculative since the ideas presented in these additional discussions are not supported by mathematics to any decimal places. There are two areas of speculative discussions. First the equations which were found are mined for additional implications concerning the leptons and photons. That is those obvious implications which were not already reported with these equations in their respective reports. Second grander implications of these equations are addressed concerning the potential development of a Periodic Table of the Elements of Physics (PTEP). These grander implications also include ideas as to how to approach discovering equations describing the quark masses.

The second area of peripheral focus covers in depth discussions and analysis of measurement units and systems. These analyses were a necessary part of the fourth objective. They set a broad foundation and background for the narrower focused discussions which resulted in the demonstrations of the universality, measurement system independence, of the mathematical-geometric factors found within the various physical property equations for the lepton and photon reports.

2 What Have Other Done?

Reading samplings of the past and current formal publications, journal articles, concerning particle physics, a seriously disturbing state of affairs is found. For approximately 30 years now particle and hypothetical physicists have been attempting to mathematically describe the masses of the elementary particles; the three neutrinos, the three known leptons, and the six quarks. They, tens-of-thousands of hypotheticians, have spent untold tens-of-millions of research hours, billions of dollars, written tens or even hundreds-of-thousands of papers. All this intense effort has been for naught. Nothing concrete what-so-ever has been produced, just so many marks on paper. There still is no agreed upon means, or even a close to being agreed upon means, of mathematically describing this most basic property of the elementary particles, mass. The tax payers of the wealthy countries of the world supporting this research have nothing to show for their money. It was obvious that should an attempt be made to explain this unsolved riddle of mass that the approach used here needed to be totally different.

A thorough discussion of what academics have done in attempting to explain the masses of the elementary particles is given in the Chapter 4.2 How Not To Approach This Work. Without going into

any of the details here, some broad characterizations of this body of academic hypothetical physics work as a whole can still be made which are instructive for the purposes here. Also some general conclusions can be drawn as to what should not be done, seeing what so many others have already tried in vain for 30 years.

Stated ever so briefly, the research work in hypothetical particle physics for the last 30 years has fallen into three major schools of thought; Super String-Membrane, Super Symmetry, and Super Gravity. By consensus, or even by fiat, within these realms of the academic hypothetical physics sub community all research endeavors and all papers published about these endeavors must begin by expounding a hypothesis. There are many flaws in this approach. These are discussed at length in the Chapter 4.2, How Not To Approach This Work.

Summing up these many problems into several short sentences is difficult. Probably the single most detrimental impediment to the efforts of all these otherwise highly capable scientists for the last 30 years is a false premise. This premise is the concept that humans in their superiority, or arrogance, can fabricate a hypothesis and impose it on the data and of course upon the particles that the data represents. In short, the methodology of the big three hypothesis-first schools of thought is to first assume an answer, "The Answer". Instead of being called hypothetical particle physics this branch of academic endeavors might be called assumptive particle physics. Then secondly this methodology sets about proving, or attempting to prove by deduction, that the particular mathematical model being expounded is "The One". In terms of simplistic buzz words, the methodology of the hypothesis-first schools of thought is; start with the unknowns (assume things) and work towards the knowns (the data). Of course for 30 years now none of the proposed solutions have ever connected with the data in a scientifically acceptable fashion. The end result of such methodology has been to ignore the data and particles when they don't agree and publish the mathematics anyhow. In short this particular hypothesis-first methodology has shown itself not only to be inefficient, but also to be utterly ineffective.

The flaw which has held back this particular method of doing science becomes obvious. The data, not the human, should speak and be allowed to display itself. After all the data is the only way that the particles or waveforms have of speaking to humans. The humans should listen and observe, not the other way around.

This is not to bad mouth or detract from all the fine highly capable physicists in the experimental branch of subatomic physics related to these hypothetical black board thought only efforts. These "hands on" people have done some incredible work and gotten very little credit for their efforts. They keep refining their equipment and experiments. They have meticulously analyzed the results of their experiments and have found tiny-tiny-tiny patterns in these results. More new "particles" or waveforms have been predicted and then found. All to compile a bigger and bigger Standard Model.

Here then is first and foremost where this mathematical research work differs from what others in academia have done. The approach here prohibits the use of a hypothesis as its trail head. There are many other ways in which this research work is different and many of the other trappings of the hypothesis-first approach which were not used and even were prohibited. These are also listed in the Chapter 4.2, How Not To Approach This Work. To summarize, in general this work takes a totally new course and is utterly different from all the approaches used by the hypothesis-first or assumptive schools of thought. Essentially all the trappings, requirements, procedures, etc forced by this particular 30 year old methodology are thrown off.

Although this gives great freedom, this does not necessarily mean freedom to do whatever suits someone's fancy. Several requirements, restrictions, and criteria must be imposed upon this work to keep it focused and to keep its results valid and acceptable. As it turns out, these restrictions and criteria are even more restrictive than the requirements of the hypothesis-first or assumptive schools of thought.

For the second and third objectives of this mathematical research work a clear wide open field is found. The measured value of the photon (ML)(L/T), the Planck constant, has been available for over

100 years. After having measured this constant, physicists appear to have never concerned themselves with how this numerical value arises. In the near term, literature for at least the last 30 years has no discussions, not one article out of tens of thousands, concerning the mathematical origins of this constant.

Even more wide open is the Ternary Force Interaction constant. Physics has never even recognized the existence of this hidden constant which appears to underlie the structures of both the lepton and photon classes of elementary electromagnetic waveforms. This is obviously because physics has not yet come to any consensus as to the existence of any wave form structures for any of the elementary particles, let alone agreed upon the mathematical-geometric nature of such structures.

3 Actual Research Methodology -- How Was This Research Work Going To Be Done?

At this point decisions had been made as to what was going to be done, and how not to do it. Then a decision was needed of just how this work would be done. A Data-First correlative approach was to be used. This research would start with the knowns and work towards the unknowns. The knowns are the physical property data of the particles. The unknowns are the mathematical-geometric structures of the fixed waveforms, the particles, which were assumed to exist and are hoped to be found. Here modeling techniques were to be used, systems analysis, and other such tools, which are well understood and used thruout engineering, mathematics, and all the other sciences except for conceptual particle physics.

The data, the masses of the three leptons (electron, muon, and tau), was to be correlated. The data was to be correlated BLINDLY, with NO PRECONVEIVED IMPOSITIONS. Any correlation developed would turn out however it turned out.

For example the following were not to be used as starting points: Ampere's Law, Coulomb's Law, Faraday's Law, Coulomb wave equations, Maxwell's equations, Schrodinger equations, Hamiltonian formulations, the Heisenberg Uncertainty Principle, Lorentz transformations, nor any other such formulations which inherently assume or pre-impose a given model. Likewise this work would not specifically resort to the concepts and mathematics of Newtonian mechanics, Lagrangian mechanics, quantum mechanics, et cetera, at least not intentionally as starting models. In short, this work would proceed in a manner directly counter to the usual modeling methodologies which use deductive logic. What would be required of this work, to the best extent possible, was a wide open clear mind field, free from habitual intellectual and conceptual clutter.

In fact upon examining the various laws, equations, formulations, principles found throughout physics, as exemplified by those listed above, an amazing discovery becomes obvious. These and the other various mechanically oriented procedures can not be used in this work. All of these mathematical mechanisms and procedures require forms, structures, or systems, either known or assumed, before the mathematics can even begin. These models are no good what-so-ever if there are no given structures to model. In the case of the subatomic particles and waveforms, there are not any known physical forms or structures. So physics is and has been faced with two mutually exclusive choices.

1 Assume specific structural forms for the fermions and bosons. This choice has lead to the three big hypothesis-first assumptive schools of particle physics Super String-Membrane, Super Symmetry, and Super Gravity the results of which, or lack thereof, have already been mentioned.
2 Do not assume any forms, structures, or systems. Further any such assumptions must be prohibited for this branch of methodology to work or for its procedures to be successful. While the assumption can be made that the various particles, fermions and bosons, do have structures, the assuming of any specific forms must be prohibited. This choice of course leads to the data-first approach which was followed in this research and possibly to other techniques not yet tried.

For whatever the freedom and creativity that was opened by the data-first correlative approach, there was however a series of constraints to be put upon any trial or test equations. See Section 7 below. This was so that any equations which might be discovered would form a meaningful series or pattern and most importantly would have physical significance.

With the exception of the one personal preference of requiring a conceptual simplicity, all the remainder of the criteria for any proposed equations made from the correlations are actually just common sense. These are the same criteria required of any scientific or mathematical physical representation of consensus reality. So while the mathematical-geometric creativity here was still unfettered, its results needed to conform to some common sense about the real physical world.

A final or scoping aspect of the methodology of this research was that of restricting all work to the very limited scope as is seen in Section 4 below. All the initial mathematical research work were to stay strictly focused on searching for a correlation for the masses of the observed leptons. Speculations as to the existence of other here-to-fore unobserved particles; about the masses of other known particles, such as those of the neutrinos or quarks; collision product scattering angles; relativity; and other such off topic matters were to be strictly prohibited. The existence or lack thereof of other particles, known or unknown, was to be completely irrelevant. The age of the universe, what occurred during its first few instants of existence, the origins of the matter composition of the universe as is now found, etc. were all likewise to be completely irrelevant. Finally grandiose discussions concerning nebulous religious-like guiding metaphysics such as a Grand Unified Hypotheses of Everything were to be utterly avoided.

Likewise, mathematically the specific properties of concern of the leptons were to be dependent upon the leptons alone and upon the three a-priori force constants. The wealth of undisputable additional experimental data and the well established properties of other particles were prohibited from entering the mathematics of any equations to be found for the lepton physical properties. This prohibition stems in part from some of the general guideline and assumptions in Section 7 below.

4 Step-By-Step Procedures

Since this work was a Data-First effort, then one of the first logical starting actions was to plot the data. See Figures 1.1 & 1.2 following. The three points seen are the masses of the three known leptons; m_e, m_μ, & m_τ.

Data point 1- electron mass	m_e	9.109,389,7 x 10^{-31} kg
Data point 2 - muon mass	m_μ	1.883,532,7 x 10^{-28} kg
Data point 3 - tau mass	m_τ	3.167,88 x 10^{-27} kg

An important note here is that the relative or common measurement units of mass, kg, from the SI system of scales is part of the data. These units provide valuable imformation and also need to be explained.

In Figures 2.1 & 2.2 as possible secondary constraints, input, or useful information the ratios of the lepton masses have been plotted.

Ratio 1 muon mass / electron mass	206.768,26 kg / kg
Ratio 2 tau mass / muon mass	16.818,8 kg / kg

At this point, before proceeding any further, a strong reminder is needed of the objective of this work. This was to ultimately find mathematical-geometric equation descriptions for the masses of the three known leptons. This was NOT to find such descriptions for the sums or products of, differences or quotients (ratios) between, binary groupings of these three data points of physical properties. This distinction between modeling several quantities and modeling the ratios between several quantities

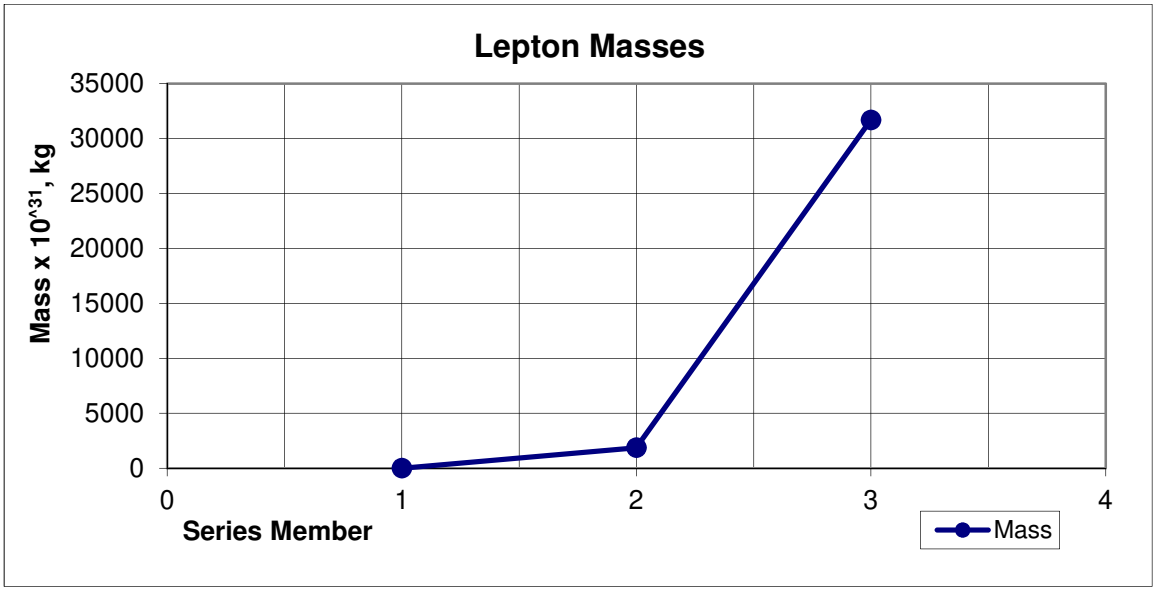
should be abundantly obvious anyhow. These are clearly two different conceptual operations with two different objectives. Further there is absolutely no guarantee that the model of several ratios can ever lead backwards to a model of the individual quantities from which the ratios came.

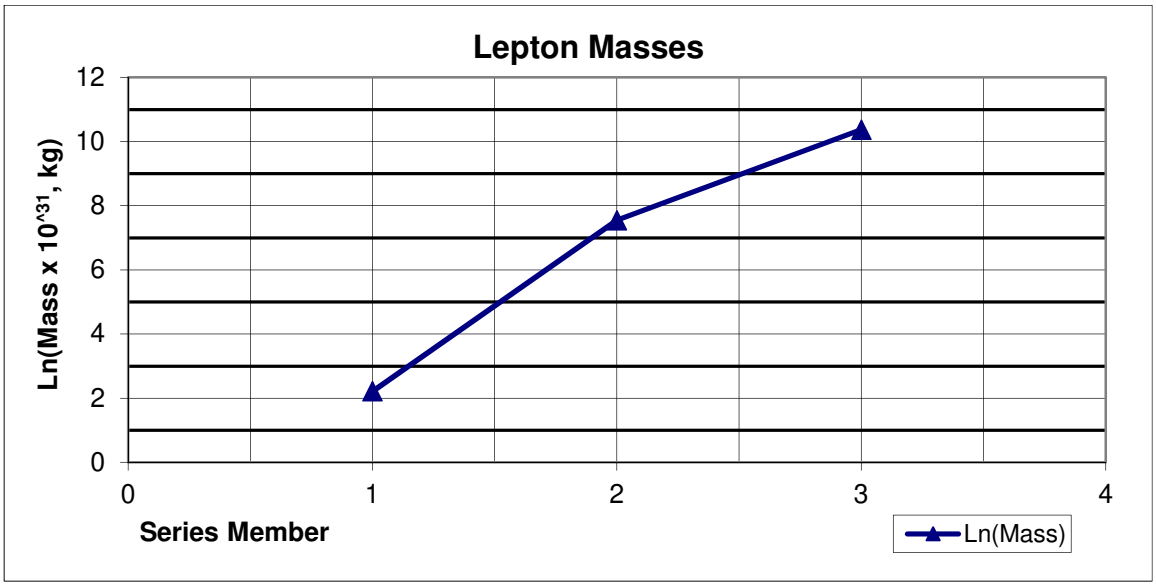
Additionally ratioing the 3 mass data points for the sole purpose of canceling out their measurement units simply throws away part of the data, the units. Such ratioing also reduces the available data pool from 3 points to 2 points. Finally attempting to correlate the 2 remaining ratios of the masses is sort of silly. Even a 1st grader can draw a line between 2 points, if the teacher holds the ruler.

The research here was to start with this data, these three points, and follow wherever they lead. These three mass points were to be the only guides. Hopefully some coherent picture would develop. Not only would this research start with these three objectives of concern, the known leptons, it would stick with it and stay focused on them exclusively. Later this work would be expanded to include the photons. But nowhere would this work be allowed to get caught up in grandiose speculations about the ultimate nature of the universe. If the work was done correctly, then the correlation might have implications for other arenas of physics and science, but these would only be known afterward.

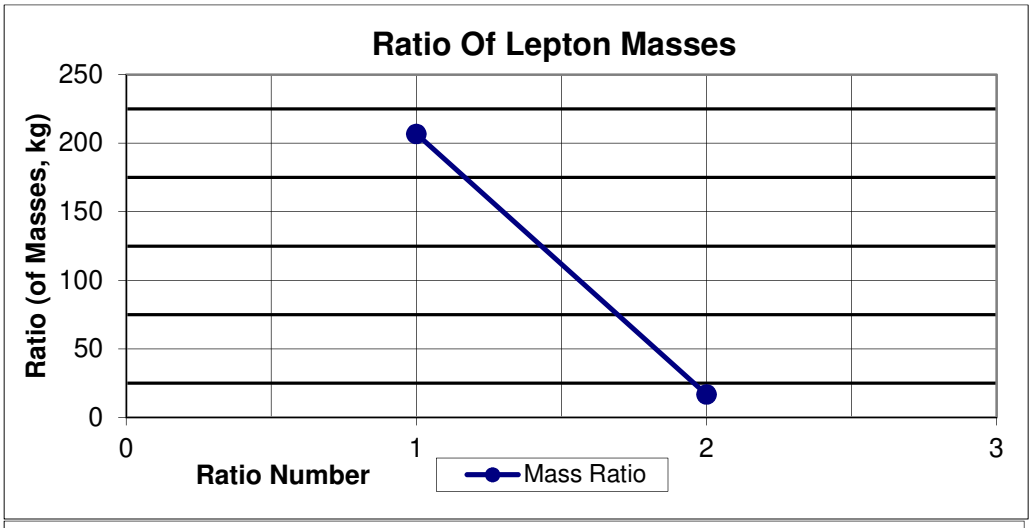
As is rapidly seen fitting these curves of the three lepton masses, Figures 1.1 & 1.2, was not going to be simple. There appears to be a minimum of at least two different competing underlying curves or factors that are needed. An expansive factor (or term) to force the shape of the curve upwards is needed and some competing factor (or term) to dampen this expansive effort and to eventually terminate it. This is confirmed by the decaying mass ratios of Figures 2.1 & 2.2. Just by plotting the data what is easily seen is that not only is the mass of the leptons changing as progress is made thru the series, the rate at which it is changing is itself also changing. As is already seen some nonlinearity is required; either higher order polynomials or the solutions to some second order differential equation.

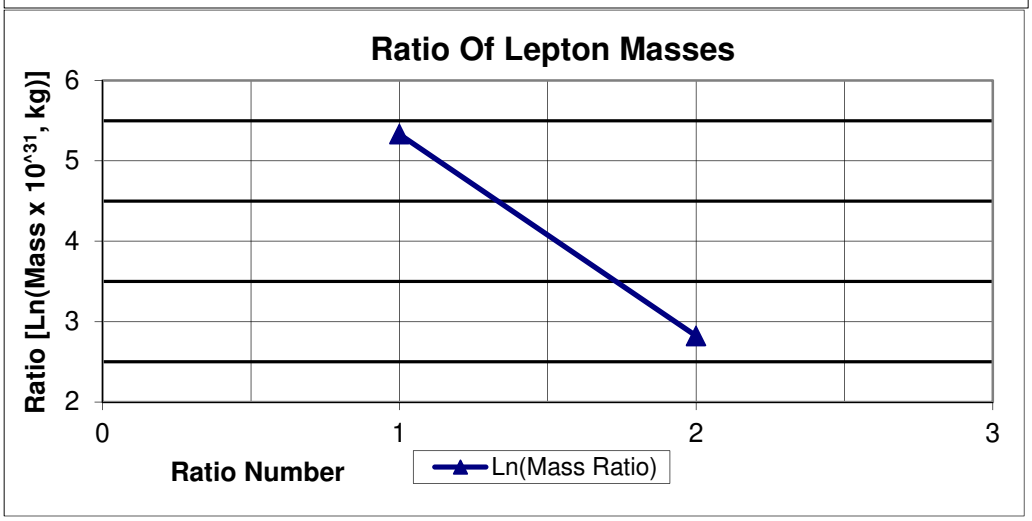
FIGURES 1.1& 1.2





FIGURES 2.1 & 2.2





Having taken this first effort of looking at the starting data, the path has looped back again to the original question, just how is progress to be made? The time honored Edisonian Method was to be used, i.e. brute force trial and error. This trial and error effort was to be no holds barred. All ideas were fair game and to be checked out. Starting out, simple correlative checks were to be made, multiplying two or three basic mathematical forms together. By varying the parameters in these beginning forms, the products of the factors would show if they began to form the shape of the curve that is desired. Once these elementary forms were worked to the point of absurdity, forms with more and more complexity were to be introduced. When stuck the path or procedure was to return to the data over and over again. What mathematical forms, that hadn't already been tried, make this curve shape? As already seen just by merely plotting the data, there were a plethora of ideas available as to what starting mathematical forms to try next.

To sum up the actual experimental or research work, it would consist of a never ending repetition of two steps. Conceptualize an idea for a mathematical form, or series of forms, to try as candidate solutions to match the data curve. Test or check out this idea by having a computer crunch the numbers. Screen the form or idea as broadly as possible by varying the numerical constants in this test form in simple steps. An an example of a candidate form,

$$\text{Mass of lepton (n)} = k\int_0^{\infty} e^{-ar^p} e^{+br^q} L_n(+br^q)dr$$

During the course of one computer run each constant would be varied one at a time, while holding the others at some base value. For example the following permutations could be tested.

a = 1, 2, 3, 4, 5, 6
b = 0.5, 1, 1.5, 2, ... up to = a's value
p = 1, 2, 3, 4
q = 0.5, 1, 1.5, ... up to = p's value
n = 0, 2, & 4 as guesses for the three lepton members, and n = 6 just to see what happens next
k = a scaling constant to be determined

Just reviewing the results of this one computer run should prompt ideas as to what to try next to shape or flex the curve. As long as ideas continue to arise the research can proceed in this manner; idea, test; idea, test; idea, test...

A key of great importance here is the word "idea". This was the applicable word. Nowhere was the claim made, or even the pretense, that these candidate ideas were anything other than that. There was to be no deception or aggrandizing these ideas by thinking that the test form of the moment constituted a hypothesis concerning the leptons structures. At this point in the actual research work, speculation as to the meaning of any candidate series of solutions was a waste of time and mental effort.

After everything was learned from a trial mathematical form there was a final way to terminate the exhaustive checking of it. The parameters or constants could be forced one at a time so that the form calculated to the objective quantities. If any of the constants, for example q above, was required to be an irrational number for which there was not a ready explanation, and for which there probably never would be, then the form was out. The general form might be modified by adding more factors or terms, substituting variables for constants, or other such guesses if the form was appealing, but as it stood the form was gone.

Part of the data is its accuracy. The electron and muon masses have been agreed upon to 7 digits following the decimal point in scientific notation, and the tau to 5 digits. While trying to fit the curve of

the data, and if it was found that a proposed general mathematical form only matched the data to 3 decimal places, forget it and move on. If the data was matched to 4 decimals, then the trial form might deserve some brief attention. Five decimals of accuracy, might deserve a stop and analysis to see how the form could be refined to squeeze out another decimal. When 6 decimals were reached, then decision time had come. If more and more accuracy was added to the calculations, such as by taking finer and finer steps in any integrals, did the flexing and sharpening of the proposed solution equations home in on the target data? Or did it become obvious that the proposed solutions were going to numerically undershoot or overshoot the targets? The important thing here was not to grasp the trial idea too tightly. If the idea was not right, then it must be let go. Otherwise if the proposed trial mathematical form was still viable, what was needed to continue to come up ideas for ways to modify or refine it.

Letting loose of a proposed series of solution equations when 7 decimals of accuracy had been reached was extremely difficult, but the necessity did arise. What was particularly difficult with proposed solutions which came very close to the target data, to 6 or 7 decimals, but which were obviously not going to work out, was that usually all variations and modifications of the general form of the equations being used had been exhausted. The entire form must be thrown out. This means the path went all the way back to the beginning, and started all over with nothing. This was incredibly frustrating after devoting several years of effort to investigating a particularly promising trial mathematical form. In these cases an attempt could have been made to fake it and say that the proposed series of equations was the solution or the correct mathematics describing the target particle masses, but this would again have been humans trying to force their will upon the particles. If honesty was maintained, then these very close but not quite right solutions would be seen rapidly for what they were. This is, that they were ultimately going to be nothing better than force fits and did not actually reveal the particles' true nature to anyone or to greater science.

The concept of not assuming or getting locked into any specific mathematical form was of paramount importance, was another unique feature of this work, and ultimately was the reason for the project’s success. Repeating, imposing any mathematics upon the leptons, based on someone's current ideas, including the author's, of how they are supposed to be, was prohibited. Such ideas obviously would have been be limited to a person's specific educational backgrounds, research interests, et cetera. The advantage of the “all forms were allowed" approach was, that any equations so developed would be free of bias, prejudice, or force fitting into any preconceived hypothetical mold or presupposed mathematical form.Ultimately such equations would stand the best chance of accurately reflecting the true nature of the leptons. They would also stand the best chance of connecting back to any appropriate or applicable hypothesis or possibly later generating a new hypothetical framework for the lepton masses.

To sum up the path or approach here, the data was the starting point. A correlation was to be developed that exactly matched the shape of the curve formed by the three data points. This was to be a trial and error process of testing trial mathematical forms and filling in constants in these forms. Then once satisfied, this correlation or the set of proposed solutions would be turned into actual equations by developing correlation or scaling constants. These constants would scale from the arbitrary sized world of blackboard math-geometry to the size of the real consensus world of physics. Then finally if another step was desired, the body of material which had been developed could be examined to see if and how it fits in with other known models of the waveforms, particles, or the likes. The advantage of this whole procedure was that any model or framework which was ultimately developed or discovered was guaranteed to be linked to the data, and further the exact mathematical path of that linkage would already be known.

5 Physical And Numerical Assumptions

Having decided what research was going to occur and how it was going to be done, a decision was needed about what materials were going to be used in the work. Specifically what physical phenomena and their measured values were to be permitted as the starting data?

First were the stated target objectives, the masses of the three known leptons, m_e, m_μ, & m_τ.

Data point 1- electron mass m_e 9.109,389,7 x 10^{-31} kg
Data point 2 - muon mass m_μ 1.883,532,7 x 10^{-28} kg
Data point 3 - tau mass m_τ 3.167,88 x 10^{-27} kg

This was it, these three data points. This all the information that was available and permitted. these were the only permitted physical property inputs, except for the few additional universal constants listed immediately below. Otherwise all other physical property data was prohibited.

Later in this research two more objectives (one already incidentally discovered) were added that are related to the particles or energy waveforms and that were well known in physics;

The elementary charge e 1.602,177,33 x 10^{-19} C
The Planck constant *h* 6.626,075,5 x 10^{-34} kgm^2/s

Underlying this photon constant of (ML)(L/T) another independent and accepted constant was needed;

The fine structure constant, 1 / (2α) 6.851,799,475 x 10^{+01}(ML^2/T absolute)

Lastly in the investigation of the pure or free space forces a final objective was added, which here-to-fore physics had not even recognized as being a basic essential constant.

The Universal Ternary Force Interaction constant, $(G/\varepsilon_o)^{0.5}/\mu_0$
2.184,555,091 x 10^{+06} (C/kg relative)$(L/T \text{ absolute})^2$

Just as important as the target objectives, was the data that was to be used to get to these objectives. The measured values of some phenomena were needed as a starting basis or some a-priori data from which scaling factors could be developed. These were the values of the three measured universal force constants;

Universal gravitational constant G 6.672,59 x 10^{-11} $m/kg(m/s)^2$
Universal electrical constant, ε_o 8.854,187,817 x 10^{-12} $C^2/(kgm)(s/m)^2$
Universal magnetic constant μ_o 1.256,637,061 x 10^{-06} $(kgm)/C^2$

The units shown above as associated with the fine structure constant are rigorously derived in step-by-step detail in the Chapter 3.4, Analyses of Measurement Systems I, Section 5.2. Physicists habitually list this constant as being unitless or not having measurement units in tables in reference handbooks, textbooks, and everywhere else. As is clearly shown in Analyses of Measurement Systems I, Section 5.2 such listings and usages of this constant are incorrect, misunderstandings, or else are just the sloppy shorthand abuse of absolute physics scales.

All data, calculations, and written presentations were to be kept in the basic elementary units of the SI set of relative scales for distance-length (m), duration-time (s), mass (kg), and charge (C) to the exclusion of all other forms. The compositing of units, groupings, or otherwise confusing terminology such as Newtons, Joules, Watts was not to be done. Nor was the mathematics here to be complicated

with higher order composite entities such as electron volts, eV. The enclosed-encapsulated static quantity of charge, the coulomb, was specifically used and the dynamic quantity of amperes was avoided. The reasoning for these various choices is discussed thruout Chapter 3.3, Measurement Units & Scales. Also where possible the two quantities understood, or at least used as measuring sticks by humans, distance (m) and time (s), were grouped as ratios raised to some power. While this may occasionally appear as an excessive use of this manner of grouping of these two units, as is seen in Chapter 1.4, Ternary Force Interaction Constant, Section 2.2, there are good reasons for this practice.

There were two reasons for choosing the three universal force constants as the starting or a-priori data. One reason was practical. From the practical aspect, these three constants along with the elementary charge, $e_{measured}$ = 1.602,177,33 x 10^{-19} ± 4.9 x 10^{-26} C, are the four bases for the four interlocked absolute physics Squigs scales. These scales and their conversions to the equivalent SI relative metric scales are needed.

These Squigs scales are the absolute or "natural" physics scales appropriate to this sub-sub-atomic scale of distance and time. They are based upon the measurement units put forth by George Johnstone Stoney in 1874. Except the Squigs scales have had his assumed 2 or 3 dimensional π constants removed. These scales are defined as follows.

Table 2 Definition Of Absolute Physics Measurement Units

		Input -- Exponents				Derived -- Exponents				1 Squigs or Absolute Unit	
Quantity	Symbol	of Unit Combinations				of Force Constants				= n Common or Relative Units	
		L	T	M	Q	G	ε_o	μ_o	e	n	reciprocal
Length	l_{Sgs}	**1**				**0.5**	**0.5**	**1**	**1**	4.893753 x 10^{-36}	2.043422 x 10^{+35}
Time	t_{Sgs}		**1**			**0.5**	**1**	**1.5**	**1**	1.632380 x 10^{-44}	6.126024 x 10^{+43}
Mass	m_{Sgs}			**1**		**-0.5**	**-0.5**		**1**	6.591572 x 10^{-09}	1.517089 x 10^{+08}
Charge	q_{Sgs}				**1**				**1**	1.602177 x 10^{-19}	6.241506 x 10^{+18}

Absolute distance = Squigs distance, $l_{Sgs} = G^{0.5}\ \varepsilon_o^{0.5}\ \mu_o^{1}\ e^{1}$ = 4.893,753 x 10^{-36} relative meters
Absolute time = Squigs time, $t_{Sgs} = G^{0.5}\ \varepsilon_o^{1}\ \mu_o^{1.5}\ e^{1}$ = 1.632,380 x 10^{-44} relative seconds
Absolute mass = Squigs mass, $m_{Sgs} = G^{-0.5}\ \varepsilon_o^{-0.5}\ \mu_o^{0}\ e^{1}$ = 6.591,572 x 10^{-09} relative kilograms
Absolute charge = Squigs charge, $c_{Sgs} = G^{0}\ \varepsilon_o^{0}\ \mu_o^{0}\ e^{1}$ = 1.602,177 x 10^{-19} relative Coulombs

These conversions ultimately were used to scale or bridge from the world of pure mathematical equations and geometry to the scale of the consensus world of physics and humans. Again the development and use of these absolute physics scales are thoroughly discussed in the Part 3 reports on analyses of measurement systems and their bases.

A brief note on nomenclature is needed. First there are the usual SI notations for the relative units of distance-length, duration-time, mass, and charge, (m, s, kg, C) and the Squigs absolute physics units of l_{Sgs}, t_{Sgs}, m_{Sgs}, c_{Sgs}. Additionally the notations L, T, M, Q are used to indicate generic, meta, or universal place holders for absolute or relative units.

The other reason for using G, ε_o, and μ_o as a-priori was philosophical. The three forces, applicable to the leptons and photons, were assumed to be a-priori to all else. This assumption was made because of an underlying assumption which was based upon the observed physical properties of the leptons and other particles. That was, the basic particles only know of or only experience the basic forces applicable to them, or else they only sense entrapped-encapsulated quantized forms of these forces. For the elementary electromagnetic particles or waveforms these are mass as contained-stabilized gravitational force and charge as contained-stabilized electromagnetic force. Similarly the neutrinos only appear to know of or experience the gravitational force or mass. For the quarks in addition to gravity and

electromagnetism, they appear to also experience or sense the color forces or their own encapsulated-stabilized version white.

An assertion could be made that the basic particles, the leptons in this case, do not know of and could care less about the human imposed conceptual measuring sticks of distance (meters) and time (seconds). Any equations describing properties of the basic particles, waveforms, would the form of mathematical bridges or semantic translations from the particle sense to the human sense; i.e. mass per radial meter, charge squared per radial meter, color or White cubed per radial meter. These quantities then would need to be multiplied by the value of the absolute meter as derived from G, ε_o, and μ_o.

Aside from these three assumed a-priories of G, ε_o, and μ_o, all the remaining measured basic or elementary physical properties usually found tabulated in reference books were felt to be derivables. Obviously the target physical properties (e, m_e, m_μ m_τ, h, α) were felt to be derivable. In a way this is intuitively obvious, that the properties associated with particles or stabilized energy waveforms are somehow more complex in their nature than the properties associated with the free space forces. Logically only the three a-priori force constants would be used, if possible, to create the necessary scaling factors. The elementary charge e is somewhat problematic in this logic. While it is the basis of one of the absolute physics scales and is used as if it were a-priori to develop scaling constants, at the same time it is also a mathematically-geometrically derivable quantity. Similarly α is a mathematically-geometrically derivable quantity but is needed as if it too were a-priori. As seen care needed to be exercised in the order of mathematical derivations so as not to create circular references or circular derivations.

Stated differently the six basic forces; the unary set gravity, the binary set electro-magnetism, and the ternary set blue-green-red were assumed to not depend on the particles for their values, but the particles definitely require these forces for their geometric structures. That is; gravity does not require an electron, but an electron depends on gravity for its existence. One immediate implication of this logic is seen in the discussion of the accuracy of the equation describing the charge of the leptons, Chapter 1.1, Section 4.1.

While this logic served its purpose in developing the equations describing the properties of the particles, ultimately as is seen in Chapter 4.1, Ternary Force Interaction Constant, Section 2.1, this one way dependency assumption is not correct. As shown in that report, there is a total mutual two way dependency street between the forces and the particles. The particle and the forces both depend on each other for their existence. After all, the particles are viewed here as quantized or stabilized forces. Even if a pretense is made about conceptualizing some broad sweeping statement about the universe, which should be avoided and even should be prohibited, the end view of the particles and forces ultimately is a dualistic chicken and egg argument, a which comes first koan.

6 General Guidelines And Universal Framework Assumptions

So far decisions had been made of what research was going to occur, how it was going to be done, and what were the working materials or numerical data. Next some sign posts were needed which would point out how the research effort was going or at least what had covered. This is because the current analytical approach had gone off on a new trail, away from hypothetical physics. Care needed to be taken at all times, awareness of where the current path of reasoning lead, what were the implications of the current mathematical procedures, etc. Some landmarks were needed which could always be seen thru the trees. These indicate if any progress was being made and also what success was. On the negative side there needed to be some indicators as to when it is getting dark in the woods, when there was still a river to cross, or when the edge of a cliff was in the path ahead. These should indicate when to "fold, walk away, or run" from a particular approach or even from the whole project.

Before listing these sign posts though, some confidence building ideas needed be developed. These can take the form of some assumptions, beliefs, or frameworks which bolster the idea that this project

could even be done. A good start would be by examining the world and seeing what is found and then using a little inductive logic from there as a trail head. The composite structural nature of the large universal and galactic objects is obvious. That of the smallest objects of practical use, the atoms and molecular, is now know. The neutrinos, leptons, and quarks likewise can be inferred to have some form of structure or compositeness.

Additional simple independent logic says that the leptons, the subjects of these investigations, must have definitive energy structures, and these structures must be distinct. If the opposite assumption is made, that the leptons are mathematical points with no content, form, or spatial dimensions, then how can these three supposedly identical, formless, and spatially dimensionless mathematical points have three distinct masses. Following this logic to the extreme, a prediction can be made that particle physicists will never find an ultimate unity or unifying force but rather that there is always be an infinite regression of composite form. That is, as long as there is a proven multiplicity of forms at whatever the size scale.

In addition to the spatial logic, from a temporal view the same conclusion can be reached.
Premise; everything in the physical world is impermanent, always has been, and always will be.
Conclusion; everything, including the "elementary" particles, must be a composite. That is; all things including the elementary particles must have a form or structure. Otherwise they could never come into existence, change, decay, or be destroyed.
Secondary conclusion; If everything in the physical universe has a form or structure, then at a small enough scale there can never be a physical embodiment of the mental concept of unity, nor of uniformity; neither in time nor space.

The basic assumptions used for this work were;
1 All objects in the consensus physical world have a form or structure. This includes the elementary particles and waveforms which are the objects of discussion of physics.

1.1 There are no formless particles nor any particles that are mathematical points.

1.2 These structures are responsible for the many observed and measured properties of the particles.

1.3 These structures or forms are not random, but have some underlying order or patterns of existence.

2 The form or structure of the basic simplistic objects of the physical universe, subatomic particles, can be described by appropriate mathematical-geometric equations.

2.1 Further these wave structures or "objects" can be described via mathematical-geometric equations not just in general, but precisely, to as many decimals as necessary.

2.2 The inherent nature of such equations is that they must be particle centric. That is, the equations may only refer to the waveforms of concern, their intrinsic nature, and may not refer to the background, machine parameters, reaction products, scattering matrixes, etc.

2.3 Further, the mathematics of an individual member within a class of particles may not have variables dependent upon or entangled with the mathematics of the other members from within that class.

3 Different physical properties must be described by different mathematics. That is; for every distinct measured physical property of a particle, there must be a corresponding distinct mathematical-geometric feature of its structure to hold or embody that property.

3.1 For examples; particles with mass must have at least one mathematical-geometric feature. Particles with mass and charge have at least two such descriptions, and those with all three of mass, charge, and color must have at least three distinct structural features.

4 Different classes of subatomic particles have inherently different forms or structures. To accurately model or reflect these different structures any mathematical descriptions of them, such as equations,

must have corresponding intrinsic differences. That is, there must be unique mathematical features to map unique physical, particle, or wave form structures.

4.1 Likewise, all members of the same subatomic particle class have similar structures and are best described by mathematics having similar features, and probably have several identical mathematical features.

These four assumptions were needed before even starting. These set a necessary context or framework for the work. There needed to be the hope that the concepts behind these statements are in fact the correct descriptions the nature of the physical universe in general and the subatomic particles in particular. But whether they are true or false, it is the reliance on them which permited this search to even be conducted for mathematical representations of some of the physical properties of the elementary particles.

These assumptions are powerful and cut both ways. First assuming no form (mathematical points), then later accepting that there must be a form, but not knowing what these structures are for the particles, is what has stopped the deductive approach of hypothesis-first or assumptive physics in its tracks for 30 years. In the case of this work, since a correlative approach had been chosen, it was Assumption 2 that allowed and even encouraged the research to progress. Not knowing forms for the particles in no way prohibits a person from attempting to correlate their masses. In this case, Assumption 2 actually can be used in reverse. If a good mathematical correlation that precisely models the masses of the three member of this system is developed, then the correlation itself will point out the correct geometry of the objects being modeled.

These assumptions also lay out some specific instructions. For example by Assumption 3, the mathematical equations describing the mass densities of the elementary particles (the neutrinos, leptons, and quarks) would be logically expected to have some distinguishing or different features for each species. Likewise the descriptions for gravitons, photons, and gluons would be expected to have different distinguishing mathematical features. The mathematics for the mass densities of the binary composites, the mesons, and of the ternary composites, the baryons, would logically have additional complications, such as terms, factors, or some such features which would make them distinguishable from the elementary particles. By Assumption 4, the mathematics describing encapsulated or stabilized electromagnetism, coulomb of charge, would be expected to be different from the mathematics describing encapsulated gravitational energy, kilogram of mass. Likewise the mathematical descriptions for features of the static particle structures the fermions, such as their mass, would be expected to be different from descriptions of features for the dynamic or moving particles structures the bosons, such as their (ML)(L/T).

Finally, if this search for descriptive equations for some of the physical properties of the subatomic particles was successful, then there may be some desire to extend what has been done upwards toward a hypothetical basis. If this is done then some guidelines concerning any such hypothesis would be needed. While there probably needs to be many such criteria, this step is a long way off yet. So just a few of the obvious criteria for such hypotheses are listed.

Guideline 1. The hypothesis must explain why it applies to the particular topic concerning subatomic particle properties.
Guideline 2. The hypothesis must explain how it applies, specifically, not just in general.
Guideline 3. The hypothesis must flow directly from any equations which may have been discovered.
Guideline 4. The hypothesis must down select to these equations and only these equations. Or this could be used in reverse, the equations must point towards a particular hypothesis that may have been chosen and only that hypothesis.

7 Criteria For Equations

The hypothesis-first deductive straight jacket was thrown off. The correlative approach was declared to be no holds barred. No preconceived impositions were to be placed upon this work. This does not mean that someone could do whatever they pleased. The correlative approach to developing equations actually carried severe restrictions upon what could and could not be done. Specifically the restrictions of the following 15 criteria must be met. Any equations developed were required to have the following properties.

The resulting equations must:

1 Be simple conceptually-pictorially. The math can be as messy as necessary.

2 Be explainable. Every part of the equations, factors in this case, must be identified as having some plausible origin which relates them to already well understood and accepted analogous mathematical-physical phenomena.

3 Calculate their objective quantities to many decimals of accuracy, preferably matching that of their measurement.

4 Set or form obvious patterns. These patterns must be interlinked across all the members of a specific class of particles and also possibly between different classes of waveforms.

5 These patterns must terminate. Once a pattern has been established, then the mathematics must show why and how the pattern, sequence, or series terminates.

6 Include all applicable data, exclude other possibilities. Once a pattern has been set, then it must include all the observed phenomena of a particular category and only those phenomena. If the mathematics predicts more than the known or discovered data, then the mathematics must also show why the additional data has not been found and how it might be found or else why it will never be observed.

7 In general, be such that their inherent nature is particle centric. That is, the equations may only refer to the waveforms of concern, their intrinsic nature, and may not refer to the background, machine parameters, reaction products, scattering matrixes, etc. Further, the mathematical equations describing an individual member within the lepton class of particles must not have variables dependent upon the mathematics of the other members from within that class.

8 Be bounded. That is, the equations must not go to infinity at any point in the domain of their independent variables, particularly paying attention to the values of zero and infinity of the independent variables. Over the whole domain of their independent variables the equations must converge to quantifiable values, and these individual values must sum to the value of their objective quantities.

9 Result in real number quantities. The values of these equations must sum to match measured data with real numerical values. If the equations make any forays into the complex plane, then their values there must neutralize to zero.

10 Apply to the consensus world. The measured data represents consensus world information. Any equations must ultimately apply to the consensus world, and must not be left in terms of probabilities, inertias, momentums, other non-physical, mathematical, or conceptual spaces. Further, the mathematical equations describing a specific physical property of a particle must result in a value quantifiable on some measurement scale and must not be forced to be unitless ratios nor involved other such mathematical trickery which results in meaningless sterile numbers.

11 Have variables or parameters, as described in the next section 8. While this criterion can initially seem silly, the example of a "mathematical-scientific" hypothetical model in Appendix 2, Time and Space, Section 9, shows why this needs to be explicitly stated.

12 Have a definable correlation constant or scaling factor, as described in the next section 8. This scale factor converts the mathematical-geometric values from the arbitrary size of universal meta-units to either the relative or absolute size scales, as appropriate, of the target measured data.

The resulting equations must not:
13 Contain any arbitrary constants, physically limiting (or limited) constants, speculative constants, as described in the next section 8.
14 Contain circular references.
15 Either predict or invoke the use of anomalies at odds with known science or physical common sense. Requiring 9, 10, or 26 spatial dimensions to describe sub constituents of the consensus world is prohibited.

Secondary but not rigidly binding criteria are:
16 Resorting to the use of probability should be avoided if possible.
17 Invoking the use of imaginary numbers should be avoided if possible.
18 Continuous mathematics is to be preferred over discrete, disjointed, or otherwise discontinuous forms.
19 The development of differential equations should be avoided if possible. This is for the simple reason that such equations cannot be used to make straight forwards calculations.

These criteria were necessary signposts and guides. They could be used to point out when something stupid was being attempted, ie something which was not explainable. For example, before concocting a long and crazy proposed equations, there always needed to be an awareness that these solutions ultimately must be explained to others and what their parts represent. Likewise, if a nice series of equations were found which matched the target data but they contained a weird constant, again there always should be an awareness that ultimately this constant either needed to be resolved into simple explainable numerical subfactors or else it needed to be scrapped.

Only the first criterion has been stipulated as something new applying to this work. All the rest are just common sense and honesty required of the equations of any mathematical, engineering, or scientific project which describes real world physical phenomena. This first criterion can be stated as an assumption; any geometrical descriptions discovered for the leptons must be explainable verbally and pictorially to a sixth grade science class. Otherwise the proposed descriptions are not the correct descriptions of some of the basic elemental particles of nature. Instead they are merely intellectual projections and wheel spinning. In short, K.I.S.S., keep it simple, stupid.

Criterion 2 of assigning a plausible origin or demonstrating a probable meaning for any equations developed and for each term and factor within them, is intentionally only loosely restrictive. The official meaning of any equations found or for their parts can only be assigned by the consensus of the greater scientific community once the equations have been mathematically validated and accepted.

Some persons might feel that criterion 2, requiring the assigning of meaning, and the prohibition of speculative constants in criterion 13 are at odds with each other or could produce an incompatible situation. This is not so. What criterion 2 requires is that once equations have been discovered or developed, then plausible meaning must be assigned to the parts of these equations. This plausibility means that analogies to accepted mathematical structures that represent known physical phenomena must be used. For example references can be made to radial and angular equations or to initial and boundary conditions.

What the speculative prohibition of criterion 13 excludes is; starting with a hypothesis and attempting to impose or build one of its key variables into any equations which are yet to be discovered. The intention here is to assign meaning to factors within the equations by making analogies to obvious well understood or at least well accepted phenomena and not by making references to speculative phenomena. While these assignments themselves could be considered hypothetical or theoretical, their

references would have to be quite concrete. In short the parts of any equation developed, including its constants and variables, must be at least as "concrete" as the measured data which is being explained. Otherwise the equations would be self defeating and serve no purpose.

Some persons might object to part of criterion 11 further discussed in Section 9 below, which requires that a phenomena be understood by humans, as being a conceptual or philosophical assumption. Again, this is not so. For the equations to be useful to humans, then this is a practical and necessary criterion.

8 Criteria For Numbers, Constants, Variables, And Parameters

Numerical quantities and parameters, whether constants or variables, are required to have the following properties:

Numerical quantities which refer to physical properties must:

1 Be real numbers

2 Have some definite quantifiable value, ie cannot be infinity (countable or otherwise).

Parameters, whether Constants or Variables must:

1 Be identifiable with physical phenomena understood by humans, such as time and space, or combinations thereof such as velocity or acceleration.

2 Be amenable to mathematical manipulations. At a minimum any constants must be scalable or be able to be raised to powers. Any variables, or step sums and differences of any discrete analogs, should be usable in integrals and derivatives. Variables should be usable in any equations as the arguments of exponentials, trigonometric transcendentals, et cetera.

3 Correlation constants and scaling factors must be based on known and well measured a-priori physical constants. Additionally if the target value has absolute units, then this scaling factor must have absolute units. Otherwise if the target value has relative units, then this correlation constant must contain a conversion factor to relative from absolute units.

Parameters, whether Constants or Variables, must not be:

1 Arbitrary; such as meaningless integers e.g. the biblical number 49; nor unexplainable irrational numbers e.g. the golden mean just because it is a nice archaic weird number. This prohibition specifically excludes any undefinable or otherwise arbitrary correlation constant.

2 Physically limiting; such as constants which refer to machine parameters or anything else which is physically limited or less general in scope than the measured data being explained.

3 Essential references to other established physical phenomenon or other particles which are obviously more complex in nature than the basic or elementary particles that are being examined.

4 Speculative; such as constants or variables which refer to a hypothetical, theoretical, or otherwise unproven phenomenon. An example would be assigning an essential constant in an equation to represent an interaction constant from a speculative mathematical reaction mechanism. For example referring to a speculative quasi mathematical-physical see-saw mechanism would be prohibited.

9 Criteria For Measurement Units

The criteria for the use of measurement units in the equations here, or the apparent lack of them, should be consistent with the standard requirements of all scientific equations. Typical mathematical-scientific equations must meet the following requirements;

1 Any variable with measurement units which is used as the argument for a transcendental, such as Exp(), Sin(), Cos(), et cetera, must also have at least one constant premultiplying it inside this

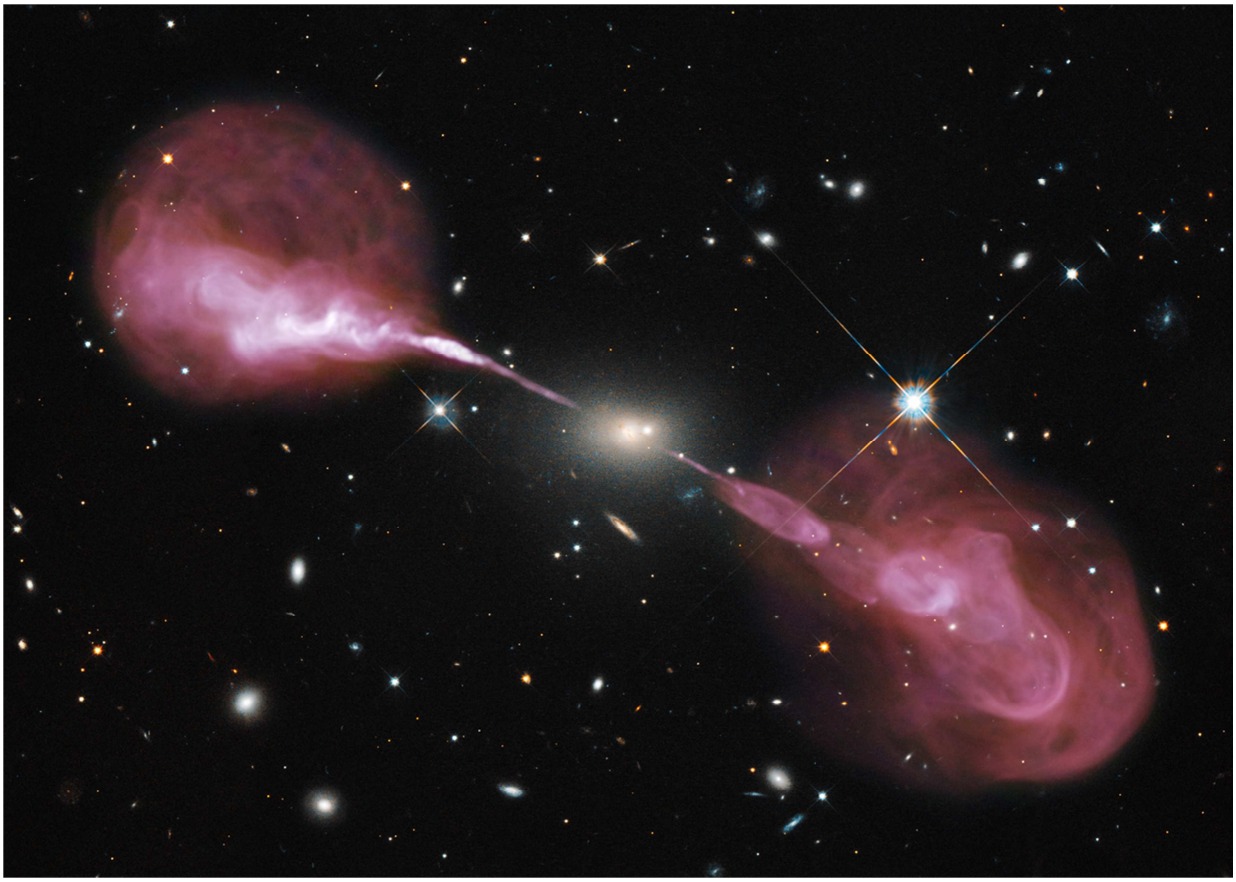
transcendental. This constant is assumed to have measurement units and these units are such that they cancel the units of the primary variable.
2 Similarly to (1) any variable used as the argument of a polynomial must have a constant multiplier for each term of the polynomial where it appears. The units-dimensions of these constant multipliers must vary inversely with the power to which the primary variable is raised.
3 The concepts of (1) and (2) can be extended to include variables-arguments inside differentials and integrals.
4 All terms of any multi-term equation must have the same measurement units. The factors within any multi-factor term must balance so as to produce whatever the measurement units are for the whole equation.
5 Finally any free standing constants with measurement units must balance unitwise across the equal sign. It is only these free standing constants which give any physical meaning or significance to the equations. In this work, such free standing constants are called, scaling factors.

Any constants, variables, or parameters with measurement units, which haven't been canceled out, are probably some form of premultiplying factor. This factor, is typically found external to any exponentials, trigonometrics, et cetera, and is composed of physical constants. Examples are common in equations thruout engineering and science, including physics. A typical one is the $8\pi m/h$, with SI units of (s/m^2), found in the Schrodinger wave equation describing the electron shells of the hydrogen atom. Even simpler is the conversion factor found in all high school physics texts with the generic force equation, $F = kma$ (conversion constant x mass x acceleration). A specific application is G found in the equation, $F = Gm_1m_2/d^2$, where the relative SI measurement units of G are $(m/kg)(m/s)^2$. It is this correlation constant which turns what otherwise would remain a correlation into an actual equation.

When a correlation has been developed for the selected physical property data which meets all the other 14 criteria above, now the necessity of criterion 12 is seen. This is to turn any correlation which might have been discovered into actual final equations. Therefore at least one correlation constant with measurement units can be expected to be necessary. This constant must be developed from some even simpler a-priori measured physical data.

10 Summary

Concluding, in this report the constraints for the entire project were set. This included what results were to be expected, what data was to be permitted, what constraints or criteria the mathematical results must meet, and just how the mathematical descriptions of the target subatomic measured physical properties would be determined.



CHAPTER 4.2 HOW NOT TO APPROACH THIS WORK

1 Introduction

This report focuses on what others have done in relation to mathematical investigations of the nature of the subatomic particles.

In Methodology the overall constraints for the entire project were set. What the project objectives were to be or what results were expected. How these objectives would be reached. What starting data would be the permitted. What constraints or criteria would be placed upon any candidate descriptive equations for the target measured subatomic physical properties. Overall in the Methodology report, the vast bulk of the discussions focused upon how the research work of this project would be or was in fact done.

What was only briefly alluded to in Methodology was what manner of research others have done. This topic is long, immensely long, and covers at least 30 years of endeavors in particle, high energy, and hypothetical physics. What others have done in these sub realms of the broader science of physics covers tens-of-thousands of papers, tens-of-millions of research hours, and billions of dollars. Essentially none of these efforts have any relevance to the mathematical physics research efforts of this overall work. Therefore only very limited references were made in Chapter 4.1, Methodology, to what others have done in these realms. This was intentional to keep that report focused on what would be / was done in this overall work.

Never-the-less to be fair some discussion is needed in this overall work as to what others have done. This is particularly true since such discussions are absolutely required in the formal published papers of others in academia the field of physics. In fact such discussions are the first item of business. From these a logical flow is made to the entire rest of the body of such papers. Readers from the academic realms automatically look for such discussions upon starting the body of work here or any other similar work. Further they tend to become extremely disoriented, confused, and frustrated when they cannot an item required as a part of their habitual way of thinking and doing things. This report was created to soften the impact of this "missing" item.

This report gives a brief overview of what other have done in the field of hypothetical or calculational particle physics. Again essentially none of this prior work was relevant to the research conducted here. What others have done is NOT examined for specific concepts, calculational procedures, or resultant answers which could have been and were not used as trail heads for the current work here. Instead this prior work is examined for broad generalities to determine various methodologies and calculational practices. These procedures are highlighted as being something which is NOT done in this work. Essentially every thing which others have done is contrasted with what was done in this work, and is not be used to supplement or support the work here.

The main objective here is NOT to negate what others in academic particle physics have found useful for the last 30 years. The intention of this report is to show a different way of viewing and "doing" calculational particle physics which has either been overlooked or forgotten. Specifically what is found repeatedly in this report, is that when the required trappings of the hypothesis-first methodology are throw off, then great intellectual freedom and creativity can arise. This is the emphasis and message here and is the hope for what the reader carries away from this report.

2 What Have Other Done?

Having decided in Chapter 4.3 Personal Overview, Sections 2-3, what was to be the intellectual challenge of this research and what were its exact objectives, a decision was needed of how to approach this challenge. Logically then what others have already done needed to be investigated.

Reading samplings of the current literature concerning particle physics and also commentaries by non-physicists such as Peter Woit, "Not Even Wrong", is enough to give anyone pause, some serious

pause. For approximately 30 years now particle and hypothetical physicists have been onto the same search as proposed here. They, tens-of-thousands of hypotheticians, have spent untold tens-of-millions of research hours, billions of dollars, written tens or even hundreds-of-thousands of papers. All for naught. All this intense effort has produced nothing concrete what-so-ever, just so many marks on paper or maybe every few years another exotic "particle" to add to the particle catalogue, the Standard Model. The tax payers of the wealthy countries of the world supporting this "research" have nothing to show for their money. Seeing this either the crazy idea of producing something useful in the field of particle physics needed to be abandoned before it was even started, or else a totally different approach needs to be considered.

So more reading needs to be done to see what approaches have already been tried. The three super kings are found; Super String-Membrane "Theory", Super Symmetry "Theory", and Super Gravity "Theory". While continuing to read, a realization is made that there is something wrong here. These "theories" do not meet the definition of the word theory. The work surrounding them for the last 30 years has never once connected with the consensus physical world by producing a verifiable structural calculation for the masses of any of the particles. None of the multitude of mathematical calculations covered by these schools of thought can be verified to be correct, nor can they even be shown to be wrong (Not Even Wrong). Back to the basics.

For definitive references several definitions and synonyms can be read straight from Webster's New World College Dictonary;

Theory, definition 4; A formulation of apparent relationships or underlying principles of certain observed phenomena which has been verified to some degree: distinguished from hypothesis.
Syn. – Theory implies considerable evidence in support of a formulated general principle explaining the operation of certain phenomena.
Syn. – Hypothesis implies an inadequacy of evidence in support of an explanation that is tentatively inferred.
Hypothesis, definition; An unproven theory, proposition, supposition, etc. tentatively accepted to explain certain facts.
Postulate, definition 2; To assume without proof to be true, real, or necessary.
Syn. – Presume
Presume, definition 2: To take for granted; accept as true, lacking proof to the contrary; suppose
Syn. -- Postulate implies the assumption of something as an underlying factor, often one that is incapable of proof.

These three general formulations of physical reality, Super This, Super That, Super the Next Thing, are de-facto not theories. While there is nothing wrong with these hypotheses or conjectures per se, continuing to aggrandize them by calling them what they are not, theories, needs to be stopped. This is false advertising. Why not drop the pretense and choose other words from Webster's by which to call them; Super String-Membrane Assumptions, Super Symmetry Propositions, and Super Gravity Suppositions? These schools of speculation clearly do not fall into the same category as Newton's Laws or any other definitive proven foundations of physics. To call these three schools of thought theories demeans and abuses the word theory.

An analogy can be made here to the degree of sureness used in legal speak. In a court of law concerning criminal matters the words used are "beyond a shadow of a doubt". In science this would be a law, such as Newton's Laws of Motion or the law of gravity. In a court of law concerning civil matters the words used are "the preponderance of the evidence". In science this would be a theory. In legal matters, if someone has an idea, speculation, or suspicion that their neighbor is doing something illegal,

then it is up to the local district attorney to decide if the matter merits further investigation. Without concrete evidence this matter usually never even goes to court. In science this scenario falls under the heading, "the esteemed professor's latest wild bing idea".

Further upon continuing to read even more disturbing and very ungrounded thinking is found. This is the parents of the three hypothetical or assumptive thought schools; The Theory of Everything and M Theory. These two frameworks or models are totally vacuous, empty, and contain no articulated mental substance. They fall into the same category as the Emperor's New Clothes which contained no physical substance of cloth. These parents of the three speculative physics modeling schools are even more nebulous than the parents of any of the mythological gods that humans have ever created. In comparison, although it was based on religious mythology, even "Intelligent Design" at least contained some mental-conceptual substance. Further, M "Theory", the mother of the string-membrane postulate brood, is found to have been concocted after her children. The father of this whole hypothetical dynasty, The "Theory" of Everything, might more properly be called The Ultimate Mental Masturbation since it proposes the ludicrous idea of a theory to end all theories. Human scientists should know better.

Returning to the objective of this research, this was to use mathematical-geometric calculations to match the precisely measured masses of three known particles to their measured accuracy, if possible. This was not just a mere provable or verifiable one point objective. What was set up to do here was something which ultimately could, if taken far enough, meet the definition of a theory. Clearly the path of the three permitted schools of hypothetical physics thought with their unproven and unprovable results could not be followed. There was no need to continue to read the many years of nitty gritty details of what others proposed and since has failed to meet physical reality. Reading whatever it was that was published according to these hypotheses was no longer of any concern or an efficient use of time. As sad as this scenario is that tens-of-thousands of researchers have been on the wrong roads for many years, this appears to leave many wide open roads for others to follow their own creativity.

3 The Hypothesis-First Approach

Although a decision has been made to avoid regurgitating what was swallowed by the only three permitted schools of thought in academic hypothetical physics (Super String-Membrane, Super Symmetry, and Super Gravity), learning more about the general nature of the mathematical paths which were followed was advisable. While there was no need to get stuck in the nitty gritty details, seeing what physics or mathematical frameworks were assumed was wise. Then decisions could be made about what was appealing and also not appealing about these efforts or where they appear to have gone wrong. Then decisions could be made as to what not to repeat.

Sampling numerous peer reviewed articles in prestigious journals, all sorts of de-facto ineffective or incomplete approaches appear to have been tried. A long detailed list can be made of how many of these past efforts violated what should have been common sense. In fact just such apparent errors helped to formalize what is listed in Chapter 4.1, Methodology, Section 6 as Assumptions 3 and 4.

First though, easily seen is a general overarching way of doing this particular science, cutting across all three of its modeling or thought school. This way of doing things appears to be at the core of their failure to produce anything useful. Currently all the efforts to explain the physical properties of the elementary particles are hypothetical. There appears to be no exception in the wealth of published papers. There appears to be a consensus but unstated rule that a particle physics paper must start with the expounding of a hypothesis and work downwards towards the data. Otherwise a person's work is not published because it would never be reviewed, read, or taken seriously.

Typically a hypothesis or a new slant on an existing hypothesis is proposed. Frequently these hypotheses are only a collection of unstated assumptions and conjectures. Mathematical physicists then work downward by developing equations from the hypothesis. These equations are made specific by the insertion of unique specifying constants into them, such as interaction constants. These constants are

themselves derived or specified in some manner. Typically then, these constants are used as multiplying factors in the equations which have been formulated based upon the original proposition. Then lastly the wealth of particle data is screened for those occurrences which make relatively close matches to the values which have been calculated from the hypothetically based equations. These matches are held up as proving the hypothesis and other similar but un-matching data is explained away as not being applicable due to some complexity not addressed by the hypothesis.

Obviously there are several major inherent difficulties in this approach of starting with a hypothesis and attempting to apply it to the unexplained physical property data of the subatomic particles. Two such difficulties or traps of the hypothesis-first approach are as follows. First, a hypothesis-first researcher must have a hypothesis, and further their hypothesis must somehow be substantively different from and superior to all the other hypothesis. This means that the "researcher" must first extensively study and understand all the other hypothesis available at any given time. Further they must predict where these hypothesis are going next to either intentionally leap frog them or else to intentionally avoid duplication with them. Such study and continuous updating is intensely time consuming and difficult for the academic researcher. It is essentially impossible for someone outside academia.

Since the generation of a hypothesis, or a new slant on an existing hypothesis, involves so much time and energy, the hypothesis itself becomes overwhelmingly important. In fact the publishing of a new hypothesis becomes the academic researcher's life's blood. Publish or perish. This then leads to the second major trap or pitfall which is almost impossible for the hypothesis-first academic researcher to avoid. This is the slippery walled deep pit of projecting the hypothesis down onto the data, imposing it on the data, or in short, force fitting.

The sad part of this chain, hypothesis-first leading to force fitting, is that outcome can easily be seen ahead of time. That is, anyone outside academia can see where this hypothesis-first approach is going to lead. Following the chain of mathematical details to their dire end is not needed. Obviously from the get go, any such an approach automatically imposes the researcher's preferred hypothesis or pet conjecture upon any equations to be developed. Anyone can easily foresee that ultimately these equations will always attempt to cram the data into the researcher's mold or model of how he thinks the world should be. Behind this the second or even the primary underlying foreseeable flaw is found. The particles and the data representing them are not the researcher's private mental creations, but are "objects" from the collective world.

Additionally there is another inherent fatal flaw with the hypothesis-first approach to the mathematics of particle physics which needs to be exposed. Not only are the hypotheses often just a collection of unstated assumptions and conjectures, in fact by the inherent nature of all the mathematics used in physics there has been no other choice. The mathematics which has been used by physics is deductive and starts with a statement of a law, repetition of some famous equation or formulation, or follows some other equally famous mechanical procedure. There are a plethora of examples, such as; Ampere's Law, Coulomb's Law, Faraday's Law, Coulomb wave equations, Maxwell's equations, Schrodinger equations, Hamiltonian formulations, the Heisenberg Uncertainty Principle, Lorentz transformations, Newtonian mechanics, Lagrangian mechanics, quantum mechanics, etc. All of these mathematical mechanisms and procedures require forms, structures, or systems, either known or assumed, before the mathematics can even begin. These models are no good what-so-ever if there are no given structures to model. In the case of the subatomic particles and waveforms, there are not any known physical forms or structures. To begin the deductive mathematical procedures followed by the string-membrane, symmetry, and gravity schools of thought some specific structures, form, or systems must be assumed. Instead of being called hypothetical particle physics this branch of academic endeavors might be called assumptive particle physics.

There are numerous other additional systemic difficulties and traps for an academic attempting to develop and publish a radically new or different model of physical reality. This topic itself could fill an entire book.

Anyone not entrenched in the academic establishment, can avoid these and numerous other traps of the hypothesis-first approach all together. Starting with this general rejection of the hypothesis-first approach a detailed list can be made, Section 8, of the various calculational approaches that at a minimum were not needed, and better yet should be totally avoided all together.

4 Specifically What Have Others Done?

Dropping down from the preceding generalizations about the hypothesis first approach to subatomic physics, a specific detailing or listing is in order of some of the particulars that are found in the trade journals. Here the usual intimidation of non-academic persons needs to be avoided. For those persons who are in academia but who do not have PhD's in hypothetical physics, there is no desire for them to be intimidated either. Specific references are listed here as examples of some of the discussion points. But there is no expectation that any, let alone all, of the readers have read these referenced articles. Likewise there is no expectation that the readers to go out, find, and read these references, let alone understand them. These are listed simply to show that fictitious scenarios are not being created.

There are several major and profound differences between how the work here was done and those mathematical physics endeavors which have been reported in the mainstream physics journals. For these reasons some of what others have done is highlighted and compared with what was done different in this work.

First, the hypothesis-first approach is true for all those approaches to calculating the particle masses which are based in symmetry (supersymmetry), group theory, and matrices. There are a plethora of examples, with [3-9] being typical. As already emphasized, this work did not assume as its starting point that any specific hypothesis nor any particular branch of mathematics, such as set theory or modern algebras, applies to the masses of the particles. The objective of this work was to explain the masses of a class of particles, not to prove, bolster, or support a particular hypothetical model of the particle universe.

Secondly, with very few exceptions, all the hypothetical particle physics research assumes some hypothetical material forms, objects, "things" as absolutely necessary starting points. Examples are extra spatial dimensions, and extra symmetries of some unknown and nebulous specifications. Specifically almost all the current hypothetical work in particle physics whose objective is to explain the masses of the known particles, set out by assuming some hypothetical particles. These are hypothetical particles in that they have never been observed. This second objection to some of what specifically has been done, assuming hypotheticals to explain the known particles, is true for all the work based in supersymmetry [10-14]. Most of these particles such as supersymmetric partners realistically can never be verifiable and the hypothesis never tested. By definition these hypotheses do not constitute theories and further can never become theories.

Even further these and most of the other hypothetical schools of quietly assume behind the scenes that Bigger is Better. Invisible, unproven, unprovable yet always more massive particles are the godfather particles from which the mere lessor known real world particle spring forth or sprang forth six zillion years ago. Imaginary angel-like super-something particles guide and direct the lives of mere mortal particles.

This work did not assume any such entities but instead stuck strictly with known physical data as its starting point. Again, the objective of the work here was to explain some of the observed properties of long accepted and undisputable particles or waveforms, the leptons and photons. Why spent a lot of effort calculating the properties for energy waveforms or entities which are not even known to exist, and for which humans may never be able to show their existence or lack there of. Further not only did this

work not assume any hypothetical entities, such assumptions were prohibited. That is any proposed trial equations for this work were prohibited from containing any variables or constants which refer to unknown, arbitrary, or hypothetical quantities; such as unobserved forces, or speculative particles. Visiting some articles in formal particle physics journals, many gross examples are found of just the opposite. For example, some variants of super symmetric hypotheses can require up to 120 user adjustable constants to explain the 20 something known particles of the Standard Model. Such schemes cannot be called simplification, nor even explanations. To explain 20 something data points with 120+ parameters amounts to de-facto mathematical gross over constraint of any system, in physics or whatever the arena.

To continue this point, as a practical matter, consider that this work initially had only three basic starting points or reference data that are the objectives of the investigative research efforts; the masses of the electron, muon, and tau. Technically given one starting point, say the mass of the electron, then only two inter-relationships needed to be discovered to arrive at the other two masses. The assumption of a mere one single hypothetical or freely adjustable constant in an equation would throw serious doubt on the validity of the whole mathematical procedure of how to get from one mass to the next. Assuming two unknown entities would have completely self defeated the entire purpose of this work. Two arbitrary constants embedded or hidden in equations somewhere would be no better than two supposedly arbitrary starting data points. In short, as a matter of technical necessity unobserved, unspecifiable, and unprovable physical phenomena or mathematical quantities, variables or constants, representing such phenomena were out. If incidentally, after the fact, additional particles were predicted, so be it.

5 Objectionable Excessive Starting Basis And Excessively Broad Scopes

Over time the string-membrane school of thought for modeling the subatomic particles has started by assuming various mathematical excesses such as; 9, 10, 11, or 26 spatial dimensions. Such hypotheses-first approaches then must immediately find some way to discard, hide, negate, or otherwise nullify the excess quantity. This work was much more straightforward and did not hypothesize an excess, such as 11.65 dimensions. Finding some way to eliminate or hide all but three was not necessary in this work.

As a general note, assuming excesses is not a very efficient way to proceed. The first impulse of even a beginning modeler would be to throw out such models and find ones which more closely match the target system as their ways to start. To model a system, or object, then a person needs to model it. This is a tautology. The more precise the desired predictive power of the model, then the more precise the model must match the system. For precision work, such as is required in physics, then the mathematical model must exactly match or mirror the objective system; no excesses and no deficiencies.

Similarly and frequently the symmetry thought school of calculational physics uses 3 X 3 matrices to predict the three lepton masses, or two sets of 3 X 3 matrices for the two families of quarks. Then immediately the six off diagonal elements are rationalized away or discarded [3-5,7-9,13,16,18]. There is another assumption here that a specific sized matrix chosen by the investigator, or derivations from one, correctly reflects the number of subatomic particles under investigation. This assumption cuts both ways. It can predict an excess which somehow must be downsized to the real world number and it also automatically locks in the maximum number of particles of the particular type being studied. Since the assumed starting matrix size cannot be expanded, should another extremely short lived particle of the species of concern be found, the entire hypothesis would need to be scraped. This creates a heavy disincentive against ever looking for such a short lived species member with the newer equipment and instruments available. This work did not lock in with any mathematical starting assumptions that there are only three leptons.

Aside from the hypothetical starting point and approach, or lack of it in the case of this work, there were major differences between the scope of this work and that of most current particle research. For example, many researchers mix calculations and discussions of mixing angles in the same work with

investigations of particle masses [6,8,13-19]. Referring to Chapter 4.1, Methodology, Section 6, Assumption 4 of this work, this assumption excludes the combining of calculations of different physical properties, observations, or measurements into the same mathematical framework. A more limited scope, only masses and not mixing angles was the targets of the calculations of this work. Additionally after the fact, this work shows that only with a prior knowledge of a space-time structure of the particles, either discovered or assumed, will mixing angles probably ever make any sense.

Many researchers mix the study of the lepton masses in with that of the quark masses [4,6,13,15-21]. This broad scope assumes that the masses of the two classes have some definable relation and further such assumptions usually forcibly intertwines the mathematics of these classes of particles. Frequently the objective of such work is to use the masses of one or both of these two classes as a means to indulge in the latest hot topic, predicting the masses of the neutrinos [4,6,8,13,15-16,18-20,22-24]. Again referring to Chapter 4.1, Methodology, Section 6, now Assumption 3, this assumption excludes the dabbling in the masses of several classes of particles simultaneously. That is, with the same form of mathematical equations. Under the principle of keep it simple, the work here focused exclusively on the masses of the leptons. The masses of the leptons were to be explained, for the leptons themselves, and not for some greater ulterior motive.

6 Objectionable Calculational Nuts And Bolts

As to the nuts and bolts of the calculations themselves, there are still more major differences between this work and that of most the research reported in the major journals. Calculations based in symmetry, group theory, and matrices [3-5,7-9,13,16,18] tend to yield many mathematical terms, often dozens, but none specifically tied to any structural properties. A person can ask, what physical property holds or embodies each of the many mathematical terms? This plethora of excessive mathematical terms again runs counter to good modeling practices. In a good mathematical model of a system or of a structure, each term and factor has a tit-for-tat physical feature that it is representing. What is found in many of the particle models reported in the journals is, there are many meaningless or excessive mathematical features which have no physical significance. In contrast this work required that every mathematical factor or term of any proposed description had a plausible explanation assigning it to some observable physical structural feature of the particle or at a minimum to some mathematical feature of the discovered geometric model. This is the number 2 criterion for this work, listed in Chapter 4.1, Methodology, Section 7.

Finally some academic researchers did use creative, non-hypothetical, correlative or numerical based approaches to the particle masses [18-19]. Some even used exponential or logarithmic based calculations as are found in this work [4, 16-17,25]. Unfortunately all these researchers stopped short with only weak correlations for the lepton masses [15, 26-27]. The results of such correlations were often only good to one decimal place. The work here was only considered complete and its objective accomplished when the calculations matched the masses of the particles, or other physical property, to that of their measured decimal accuracy! That is, if this was at all possible given potential computer calculational limitations. This is criterion 3 listed in Chapter 4.1, Methodology, Section 7.

7 One Final Blind Alley

There is one very valid way to derive numerical values for the parameters of physical systems, which again unfortunately was not usable here in this work and which of necessity was discarded.

The usual procedure used by scientists and engineers for approaching problems is deductive. In the case of explaining the measured physical properties for a system, the known physical organizing principles for the system are the starting basis. Whether these principles, or the forces that they represent, are mechanical, chemical, biological, electrical, or whatever doesn't matter. From these starting basis descriptive equations, almost always differential equations for dynamic systems, are

developed. Finally, concerted effort is made to solve or resolve these differential equations in terms of simpler non-differential equations. This is good and well, but was totally inapplicable here. While the photons are known to have a wave like structural nature of a cylindrical helix, experimental physics has not yet shown there to be any intrinsic structure for the leptons. Without a structure or system to be described, no differential equations could be developed. In short, so far experimental physics has given no starting point. There was no path, nor any means of proceeding in this endeavor by the usual deductive route. Whatever the approach or methodology to be used in this work, obviously it could not be that of presenting a formal derivation or proof. While this may be sad and is incredible frustrating to the academic hypothetical physicists who always look for this form of a presentation, clearly this was not possible here.

Further, to avoid assuming an answer or the making of yet another attempt at imposing a hypothesis upon physical reality, starting out by assuming some structural nature for the leptons was not an option here. This is the reasoning for the liberating statement in Section 8 following, listed as number 4. Likewise to avoid an attempt at an end run run around this prohibition, freeing statement 10 was specifically itemized. This prevents the backing into or forcing a structure of some professor's liking upon any particle system, by first making assumptions about the structural nature of the universe in which the particles find themselves. An indirect or two step procedure for imposing a structure on the lepton particles is even worse than just making up the answer with which someone wants to start. For this reason this work was not allowed to start with the universe or some esteemed hypothesis about the universe. Again, in short without an experimentally shown structure or system to be described, the usual engineering mathematical procedures could not be followed.

As one final reference to what others have done, is the issue of assuming a structure that is the entire basis or working methodology of the string-membrane school of thought. This particular hypothesis-first school starts with the grand overall hypothesis that the subatomic particles, particularly the fermions, are actually composed of some forms of standing wave of energy to be discovered by the researcher. This is all well and good and probably not to be disputed. This work lead to the same conclusion, but this was the result of this work, its conclusion, not its starting point.

Simply stated, where is someone to go with this wonderful vibrating energy form idea as a starting point? Nowhere except in circles, as history can attest. There can be tens of thousands of vibrational energy waveforms to check out. Further if someone permits themselves to assume some bizarre number of spatial dimensions, as the academics of this thought school have, then the calculational mathematics are enough to drive a person insane. Thousands of very brilliant, well meaning, and well paid conceptual particle physicists have come up empty handed after several decades of such work. There were other contributing issues to this failure, such as their self prohibition on ever using measurement units to connect to the real physical world. But going into these issues here was not necessary. What was needed was to stick with the conclusion that assuming a structure is a poor road to follow. You can't get there from here.

8 What Is Not In This Work And Writings

When conceptualizing about the realm of subatomic physics the intellectual tool of mathematics is heavily used. Again this is no different from most other engineering and scientific endeavors. There was a key difference here though. In other engineering and scientific endeavors the real physical world sets boundaries upon what can or cannot be done, and there are usually well defined constraints of time and money. In the realm of the waveforms for particle or subatomic physics this all important guidance of the consensus physical world can be lost. Then there is no feedback to indicate when various mental conceptualizations and calculational mathematics have gotten out of hand. The investigative efforts here could have been be seriously over constrained or else under constrained. Without the usual physical feedback, some conceptual guideline for the efforts here needed to be set.

In Chapter 4.1 Methodology, Section 6, a few general guidelines and confidence builders are discussed. Also some very specific and rigorously exacting requirements are laid out there. These criteria were to be placed on any proposed equations. This report has shown some of the major pitfalls of hypothesis-first and what others have done or failed to accomplish starting from this platform. All that is needed below is a detailed listing or reminder of those conceptual starting bases and intellectual procedures which were NOT necessary for this work.

There are three conceptual frameworks or arenas where some clarification is needed; physics frameworks, mathematical frameworks, and more general modeling frameworks.

In the calculations as were done here, in the field of *physics*, there was NO need to make references to, invoke, make assumptions of, nor uses of the following:

1 There was NO need to use hypothetical or otherwise speculative physics.
Specifically, there was NO need for the reader or researcher to know any of the three main branches of hypothetical physics; super string-membrane assumptions, super symmetry propositions, and super gravity suppositions. The advantages of this non-hypothetical approach are numerous, with some of the simplifications for this work being;

1.1 There was NO need to explain why any proposed model of the particle universe is better than all the others, nor why it is a necessary modification from others.

1.2 There was NO need to prove, bolster, nor support any particular model of the particle universe.

1.3 There was NO need to explain away why and where a model is in contradiction to the known facts of the consensus world.

1.4 There was NO need to impose a model down onto the data; ie to try to force fit the data into a preconceived framework.

1.5 There was NO need to try to justify the existence of the data according to a hypothesis. The data exists under its own right to exist.

1.6 There was NO need to explain away data which does not fit at all into particular framework, or which is close but yet clearly does not match the predictions of a particular calculational speculation.

1.7 There was NO need to generate specifying constants to fill a particular framework.

2 There was NO need to use hypothetical, speculative, or mythical particles, forces, or other such metaphysical entities. Specifically;

2.1 There was NO need to use fantasized "angle like" symmetric or supersymmetric partner particles which guide the affairs of mere mortal particles.

2.2 There was NO need to create a whole zoo of virtual particles; various _ino particles, various s_ particles, particles that are; heavy (fat), light (skinny), sterile (oops), active (not sleepy); pseudos, doublets, triplets, leptoquarks, leptophobic (what a shame), or even some that are massless when found in trees. Note, none of these speculative creatures of such typical zoos has yet been trapped.

2.3 There was NO need to ascribe high energy activated intermediaries of a reaction as being a new or distinct elementary particle or basic force, (ie the weak "forces")

2.4 There was NO need to use, invoke, nor speculate about some god-like unifying concept or force.

2.5 There was NO need to use speculative quasi mathematical-physical objects such as strings, membranes, or other such conceptual n-dimensional exterior surfaces or interior solids.

3 There was NO need to use reaction mechanisms.

3.1 There was NO need to use nor to refer to any reaction mechanisms.

3.2 There was NO need to use hypothetical, speculative, mythical, or other such metaphysical, quasi mathematical-physical reaction mechanisms, such as the Seesaw Mechanism.

In short, the objective here was to explain the particles as they are. There was NO need to get into some speculation of how they came about to be.

4 There was NO need to assume an a-priori structural nature or lack thereof of the particles or forces. While the particles may be assumed to have a structural nature, just what this structural nature was cannot be assumed. Specifically;

4.1 There was NO need to invoke any physical property nature not already known or measured by science. But likewise the known physical properties such as the helical spiral nature of the photons, the electromagnetic bosons, must be used and explained. Additionally there was NO need to prohibit any physical property nature of the particles which may be definitively proven later.

4.2 There was NO need to assume the dimensionlessness, descriptionlessness, featurelessness, formlessness, indefinite longevity, identicalness, indivisibility, mathematical BB-ness or dot-ness, permanence, sterileness, structurelessness, etc. of any class or species of particle.

4.3 There was NO need to assume, initially, the number of physical dimensions (spatial or temporal), the number of parameters, variables, or measurement units involved with a particular class of particle.

4.4 There was NO need to assume the mathematical internal versus external nature of the particles and forces. That is, there was NO need to assume any particle species could be mathematically represented by interiors (lines/curves, areas, volumes, n-volume) or necessarily by surfaces (endpoints, perimeters, shells, n-surfaces), etc. Specifically there was NO need to assume any geometric nature for any particle which was not already proven by science. Initially there was NO need to assume that any particle is circular, spherical, 2 or 3d lemniscate shaped, electron p-shell shaped, or has any other such shape.

4.5 There was NO need to assume the mathematical diffuse versus concentrated nature of the particles and forces. That is, there was NO need to assume any species could be mathematically represented by dispersed models nor necessarily by dense or point like models.

4.6 There was NO need to assume high energy implies short half life, or vice versa that short half life implies high energy.

5 There was NO need to use trade jargon, buzz words, name dropping, secretive insider fudge factors. Such as;

5.1 There was NO need to use references to the Yukawa coupling, Yang-Mills "theory", Higgs doublet, littlest Higgs, pseudo Goldstone bosons, Dirac and Majorana particles, seesaw mechanism, Peccei-Quinn, Cabibbo-Kobayashi-Maskawa, Pontecorvo-Maki-Nakagawa-Sakata, MSSM, SUSY, Wess-Zumino, Chern-Simons, Super-Kamiokande, Koide, etc.

6 There was NO need to make assertions of the conservation of any particular particle species.

6.1 There was NO need to assert arbitrary conservation rules, which then some particle species and reactions "violate". Particles and reactions of particles do what they do. They are not bound by human models or rules that they did not vote on.

7 There was NO need to assert the number of members or species in a particular class of particles, nor the total number of classes of particles.

7.1 Of course these numbers of members or species must be equal to or greater than the known observed number of members within a particular class of particles. That is, there was NO need to assume the non-existence of other particles of a particular class. Should other elementary or basic particles be definitively proven to exist later, then this Data-First work would stand in-tact unaffected.

7.2 Likewise the number of classes of particles must be equal to or greater than the known observed number of classes.

7.3 There was NO need to assume the low energy regimes have been exhaustively studied for different species of particles. In fact the opposite assumption was needed. The historical facts are that the low energy regimes were only selectively screened, and the instrumentation used then was much more limited in its screening capability than the current machinery.

8 While observed results of experiments are assumed to be valid, there was NO need to assume these observed results to be all inclusive, or even representative of any more than a small presentation of the nature of the particles.

8.1 That is, the experiments could by their inherent nature be highly biased in their results. For example, donut shaped "objects" flying around a collider loop could always line up on the flight line "chocolate icing side forwards" and rarely collide with each other in a side-to-side manner, and would rarely produce reactions in violation of some asserted rules.

8.2 The experiments could by their inherent nature only reveal a limited, distorted, or otherwise unrepresentative view of the nature of the properties of the particles. For example, donut shaped "objects" traveling near the speed of light in a collider experiment could be shown to be flat in nature when in fact they are 3 dimensional.

9 There was NO need to enter into discussions of relativity, of the particles in general or of the mathematical findings concerning the particles.

10 There was NO need to enter into discussions, overt or implied, of the nature of the physical universe, background, etc. within which the particles exist.

10.1 There was NO need to make references to the exterior background in the mathematics. That is the mathematics here was "particle centric".

10.2 There was NO need to assume or use bizarre versions or concepts of the physical world; such as having 26 spatial dimensions, being non-Euclidian, being discontinuous or otherwise discrete, etc.

10.3 There was NO need to use hypothetical, speculative, mythical, or other such metaphysical models of the universe and particles. For example, There was NO need to assume nor use extra symmetries of some unknown and nebulous specifications. Other examples, There was NO need to refer to nor use such things as worm holes, parallel universes, etc.

10.4 There was NO need to use references to how the universe began to explain what is found now. The assumption of some pre-existing uniform or preexisting unified state has no relevance to this work. That is, the mathematical descriptions of the particles was present tense, independent of the past and likewise independent of the future.

In calculations as were done here, in the field of *mathematics*, there was NO need to make references to, invoke, make assumptions of, nor uses of the following:

1 Theoretical, advanced, or graduate level mathematics.

2 Obscure mathematics and geometries.

2.1 There was NO need to use mathematics that is counter intuitive to common sense or grade school numerics.

2.2 There was NO need to use mathematical definitional trickery; such as proving that 1 + 1 = 3, for large values of 1.

2.3 There was NO need to use bizarre geometries; such as non-Euclidian.

3 Formal (or informal) proofs, or derivations.

4 Statistics, probabilities.

5 Matrices.

5.1 There was No need to assume 3 X 3 matrices which then automatically lock in that there are only 3 members or species within a particular class of particles.

5.2 There was NO need to assume 3 X 3 matrices, and then have to explain away the 6 off diagonal elements.

5.3 There was NO need to explain the dozens or even hundreds of terms which are produced when matrices are multiplied together, solved, determinates calculated, etc. The particles have only a few distinct physical properties to which such terms plausibly could be assigned.

6 Set theories, group theories, modern or abstract algebras.
7 Complex numbers.
8 Discrete or otherwise discontinuous mathematics. Such as
8.1 Might arise from chaos theory or such models of the background or universe.
8.2 Might arise from set theories or such models of the background or universe.
8.3 This is to say, the mathematical nature of space and time in the region of the particle were assumed to be continuous.
9 Topology
10 Perturbation analyses, or other such indirect studies of the nature of the particles (objects) of concern.

Summarizing prohibited mathematical *modeling* approaches referenced in earlier sections, in the calculations as were done here, there was NO need to:

1 Initially, there was NO need to assume any particular branch of mathematics as the valid model or approach. For example;
1.1 There was NO need to assume that matrices, set theory, group theory, modern or abstract algebras, …. are necessary or are the correct mathematical forms to model the particles.
1.2 Just as there was NO need to assume or use hypothetical or speculative physical-mechanical mechanisms, there was NO need to use hypothetical or speculative mathematical mechanisms, ie the Seesaw Mechanism.
2 Initially, there was NO need to assume any specific number of mathematical dimensions (spatial or temporal), any specific number of parameters, variables, units, etc to be the correct mathematical model of a particular class of particle.
2.1 There was NO need to start by assuming excesses such as; 9, 10, 11, or 26 spatial dimensions or a 3 X 3 matrix to explain the three known leptons.
2.2 There was NO need to immediately find some way to discard, hide, negate, or otherwise nullify the excess quantity.
3 There was NO need to assume that functions or other mathematical expressions represented by infinite sums can be arbitrarily terminated after a certain number of steps; such as after the linear or quadratic terms.
4 There was NO need to assume that open ended series or sequences can be arbitrarily terminated after a certain number of steps; such as only examining the first three members or the first three even members of a polynomial series.
5 There was NO need to assume that mathematical expressions which go to infinity as their arguments go to either zero or infinity can be somehow ignored, nullified, or explained away because real world physical phenomena require that they be explained away. Such expressions cannot be used to represent finite physical phenomena.
6 There was NO need to assume that a person can mix the mathematics of different classes of particles.
6.1 There was NO need to assume that the mathematics of the different classes of particles, the neutrinos, leptons, and quarks are related, let alone intermingled.
6.2 In fact the opposite assumption was needed. Different classes of particles, such as leptons and photons, were assumed to necessarily be described by different mathematical forms.
7 There was NO need to assume that a person can mix the mathematics of different physical properties or observations in the same calculations. For example;
7.1 There was NO need to assume that calculations of the masses of particles are in any way related to calculations of the reaction product diverging angles.
7.2 Further, just as with the masses of different classes of particles, the different physical properties necessarily were assumed to need to be described by different mathematical forms.

8 There was NO need to use secretive insider fudge factors, constants, variables, etc. For example;

8.1 There was NO need to use the Yukawa coupling, freely adjustable or user adjustable constants, arbitrarily definable or user definable constants, etc.

8.2 In fact the opposite assumption was needed. The use of such undefined mathematical material in the equations was prohibited. In short unobserved, unspecified, and unproveable quantities, variables or constants, were out.

9 There was NO need to make calculations for ulterior motives; ie pretend to calculate the masses of one class of particles primarily for the unstated reason of dabbling with or speculating on the masses of one of the other classes of particles.

As discussed, virtually anything that had to do with the typical hypothesis-first, at all costs, approach to explaining subatomic particle properties was rejected or thrown out. The nay-sayers, detractors, might then try to claim that there is the freedom to do anything, that there were no restrictions. "How can valid science be done this way"? They are wrong. This strawman objection is false. Actually it is the speculative thought schools of physics which have had no restrictions, which have run wild, consumed money, resources, and in general have done as they have pleased for the last 30 years.

There are many other ways to do science in general and the calculation of particle physics properties in particular, besides that of hypothesis first. Why don't mathematical particle physicists see this? First obviously, because they don't want to. This is because conceptual particle physics is heavily invested in the intellectual projection making business, hypothesizing. This particular arena of academic science is so heavily tied to the modality of spinning tales about the nature of the common physical world that it is incapable of operating any other way. To admit the existence of other approaches is heresy and gets you banned, your career terminated. Other valid approaches to science, including mathematical physics, do exist and most of these do have very severe sets of restrictions. This is seen in Chapter 4.1, Methodology, Sections 6, 7, 8, and 9.

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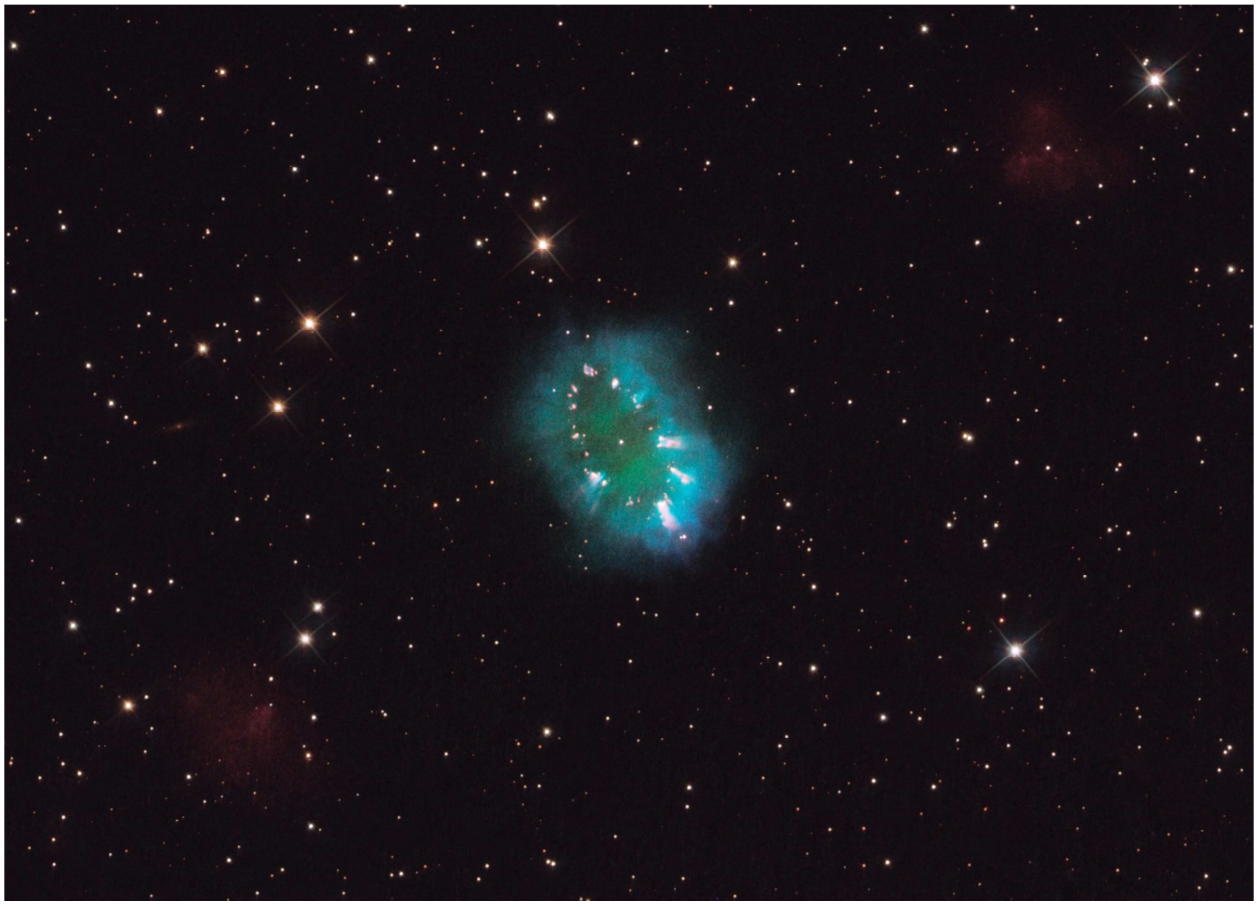

CHAPTER 4.3 PERSONAL OVERVIEW OF PROJECT

1 Introduction

This report is somewhat unique as part of a collected series of reports of a scientific work. From conception to completion this overall project took 22+ years. To give the reader some sense of what occurred during this time, this report recounts some of the major events of the project from a personal and chronological perspective.

This project was started and carried out as a private personal intellectual puzzle, not intended for public consumption. There was little documentation as to what was done when. Much of the exact timeline as to when various pieces of the mathematical equations were discovered was reconstructed after significant time lapse. Many dates are referred to only by months, and these could be ± 1 month off. Even so, the reader can see that the final equations presented in the primary reports in Part 1 were developed one step at a time. These equations describing various physical properties of the elementary electromagnetic waveforms (particles), the leptons and the photons, are complicated and lengthy. Never-the-less as can be expected for the results of any major scientific investigation, each factor had to be added and constant finalized one at a time. This report gives some sense of the necessary steps that had to occur.

Likewise since this project was a private personal project, this report is written from a personal perspective. Since all the mathematical research, almost all of the report writing, and the outside correspondence was an isolated solo effort, the word "I" is used extensively, although not exclusively, in this report. This is unlike the royal "we" used in the reports of most scientific work.

Additionally, failures, particularly in the publishing process, are not usually reported as a part of an overall project. Here these are mentioned because the publishing rejections in this case showed a clear pattern of intentional suppression of the findings of this research project. This is because the findings here did not support any of the big guns in the field nor any of the multitude of subatomic particle hypotheses which have been in vogue for the last 30 years. Worse yet, the mathematical research investigations done here did not support the assumptions nor follow the only methodology that has been permitted within academia for doing mathematical particle physics research. All of the academic scientific research arenas, not just hypothetical and particle physics, would do well to note and seriously consider what went wrong here.

Finally acknowledgments and recognition of persons who encouraged a researcher-author-publisher are usually made personally by name. Here though, there is still some significant chance that there could be negative professional repercussions for some of the persons who gave positive support to this project and its publication efforts. Therefore their names are being withheld until this work receives greater recognition from the scientific community.

2 Deciding The General Nature Of Project

What if we were to set out on a personal challenge, an intellectual puzzle? What if something substantial is what is desired? Suppose a long term challenge was wanted, something more than just the usual time filling distractions or entertainments, such as crossword puzzles.

Specifically what is it that we want to do, and what resources are available to do it? A fixed puzzle is desired, a puzzle where the puzzle pieces, the elements of the task are not going to change with a decree of the latest hotheaded religious dictator or upstart political party. Maybe complex social, political, and religious entanglements can be avoided by picking a puzzle whose solution lies in the scientific arena. Hopefully here, the elements of the periodic chart remain the same, two plus two is always equal to four, the law of gravity is fully enforced, and the state legislature cannot change the value of pi nor the age of the earth. There are some hindrances to such an endeavor though. There is no laboratory available where hands-on research can be done nor shop space for equipment development nor a staff of subordinates.

Also as might be imagined, that just like social endeavors, projects such as scientific research and development may take tens of years to being to fruition and usually also require vast sums of money. History shows that all the great scientific inventors, such as Edison, had staffs and patrons.

Clarifying the initial idea here, we want a personal puzzle which can be done by an individual. A puzzle is desired which can be solved with intellectual efforts as the prime requirement and that only needs a minimal amount of physical hardware. Taking an inventory, the same tools are found as available to everyone else with some technical, scientific, and engineering expertise; a hand calculator, a computer with in latest speed and memory capabilities, and access to university libraries. All technical people have the same organizational skills and analytical abilities that would listed on a generic resume. Even if there isn't any hardware, machinery, or instruments available to produce new data, the knowledge of how to organize information that may already be available leaves many avenues open for exploration. The knowledge of how to model processes and systems is an available tool. If a reminder is needed on how to solve a particular mathematical system or how to find the numerical answer to a particular problem, mathematics and engineering texts are available. Being able to plan work, set criteria and objectives are necessary essential skills. Again a mathematical-scientific puzzle seems to be the challenge. History has shown that some of the greatest breakthroughs in basic scientific knowledge were thought out and developed by unknown nobodies. For example, a mere lowly patent clerk sitting in a corner by himself developed the idea of $E = MC^2$, and further was rejected by the recognized big guns of physics at the time, at least for a while.

Some further criteria are needed for this puzzle. There must be a solution to the puzzle, or more correctly potentially a solution but one which is not yet known. A challenge where the answers are already known is not actually a challenge. This is not a real puzzle, if a person can just go study a textbook and learn how others already got to the answer. That would just be crossword puzzles again and besides people can get paid to do that at work. At the same time a nebulous situation is not desirable, where there may or may not be an answer. There needs to be a definitive undisputable target objective or objectives. Once these targets are chosen, then the puzzle became how does a person get there?

Several such questions need to be asked. What does it mean or would it mean to solve the puzzle? How is success to be measured? The answer to this question becomes a key criterion for any proposed solution that might be developed or discovered. The objective data must be matched to the required number of measured decimal places, if at all possible given potential computer calculational limitations. What is to be the starting point on the journey towards the target objective? What are acceptable starting data, formulas, system models, etc? Is there a means to verify that the path which has been followed from the bases or premises to the objective is a valid path? There is a need for some rules, criteria, guidelines, etc before starting the puzzle. Such rules were discussed in Chapter 4.1, Methodology, Sections 6-9.

3 Specific Objective(s) Of The Project

Having decided upon the general nature of the challenge, a specific puzzle needs to be chosen.

One of the major challenges to basic science 20-30 years ago was the production of a plethora of subatomic particles. Then Murry Gell-Mann and independently George Zweig introduced the quarks as subconstituents of the hundreds of hadrons. This proposal did an excellent job of bringing order to the hadrons. The dozens of mesons were organized as binary composites of quarks and the hundreds of baryons as ternary composites of quarks. This leaves the 3 neutrinos, 3 leptons (electron, muon, and tau), and 6 quarks for a total of 12 fermions, supposedly elementary particles. If the 12 anti-particles are thrown in; the various bosonic waveforms covering the photons, the 8 gluons, and several other oddball energy forms such as the 3 "weak force" particles which were rationalized later, pretty soon the "basic" particles have ballooned back up to a zoo of supposedly elementary forms as the bases of the physical

universe. This was not a very satisfactory state of affairs. Maybe something could done here as the focus of an intellectual challenge.

Additionally a catalogue or encyclopedia of the known or verified "elementary" particles doesn't actually reveal anything. Why do these particles exist as "stable" physical forms but other elementary forms do not? Why or how are they different from each other, inherently? They obviously have different masses; some have charge; some have color, whatever that is; but how do these physical properties arise?

The hypothetical particle physicists were already postulating a plethora of various mathematical descriptions to answer these questions when this project was conceived. Being only one person without the combined power of extremely high paid university teams and high speed computers, what chance did a nothing and nobody stand of developing an answer, any answer. That was, before academia had the answers to these puzzles all wrapped up in a nice package with in a pretty pink bow tie? This didn't matter. Maybe something could be learned and later compared with whatever academia put together. Maybe these investigations would better help in understanding whatever academia found, when they found it. This surely would only be a few short years considering the massive amount of personnel they had to throw at this specific scientific arena.

Down selecting the objective of this project to the masses of the leptons was easy. Simple process of elimination gave these as the only choice. The masses of the simpler neutrinos, which respond only to gravity, had not been established at all. Still today only upper limits have been proposed for several of them. The quarks are problematic in several ways. First, there are more quarks to explain than leptons and the quarks appear to have two major and distinct subcategories. Further the masses of some of the quarks have not been measured to a high degree of accuracy. Such accuracy would be necessary to distinguish between slightly different and competing candidate mathematical equation forms. The quark masses which have decent accuracy of measurement due to having large masses on the other hand represent only a very limited number of observed collider events. Caution or suspicion needed to be exercised. Searches might be made for equations based upon values, which although apparently accurate, might not ultimately represent what science currently thinks they do. The quarks like the leptons respond to and/or contain stabilized gravitational energy (have mass) and encapsulated electromagnetic energy (have charge). But additionally the quarks have the added complexity of containing and/or responding to color energy. This could be expected to add additional complexity to any descriptive mathematics. The charge and masses of the leptons have been measured to many decimals of accuracy and these particles only have the complexity of two parameters, mass and charge. Basically by default the objective of this project became to find or develop equations describing the masses of the three known leptons; electron, muon, and tau.

Considering the other physical properties of the elementary particles there is not sufficient information with which to work. The value of the (ML)(L/T) of the photons has long been well measured, over 100 years, but this only provides a single data point. Further this measured value applies to an infinite number of distinct photons, a continuous spectrum of photon wave lengths. How can a person do anything with that? In comparison the masses of the three known leptons provide three data points for which the development of a mathematical correlation can be attempted. The elementary charge of the electron family is likewise problematic. If the quarks are not considered, then again there is only a single data point with no way to get a handle on it. If the fractional charges of the quarks are considered, then any mathematical considerations would be spread over different classes of particles.

The initial objective of this project 22+ years ago was to attempt to find a mathematical description for the masses of the three known leptons. This objective remained the focus of the project for about 12 1/2 years. Then having found organized mathematical equations explaining the lepton masses, why not go on to look at the photons? What similarities could be found relating the (ML)(L/T) of the photon waveforms to the equations discovered for the leptons' energy waveforms? Finally how come, why do

these two basic energy waveforms have similar mathematical descriptions? An investigation appeared in order to see if these is some form of interaction amongst the three basic forces (gravitational, electrical, and magnetic) which underlies the energy wave patterns for the photons and leptons.

Finally after 22+ years of project work; research, write-ups, publishing efforts, putting down detractors… a break was needed. After recovering, the possibility of matching the ± 2/3 and ± 1/3 charge of the quarks with the fixed curvature of certain vector curves in 4 dimensional space was investigated. Why not round out the research by considering the last physical property information of the elementary particles which was definitive enough to investigate?

4 The Overall Project

This overall project involved many aspects which made its research unique and unfortunately also made it quite grueling.

First was the decision to throw off the straight jacket of academic hypothetical physics. This decision broke the mold of the deductive hypothesis-first way of proceeding. Great freedom as to the choice of a methodology was obtained. Unfortunately with this great freedom also came the overwhelming realm of unlimited ideas, a great forest with no trail maps. Just how was a person supposed to proceed, in which direction did the objectives lie, what cliffs had to be circumnavigated, were there any devas to point the way, and on and on. There were certainly was not any comfort or popsicle trucks to be found in this forest of ideas.

This project had no thesis advisor. There was no god-father figure, thesis advisor-dictator, saying; "This is the way the world is composed. Produce me a paper further imprinting my ideas in the minds of the particle physics community, and I'll make sure you get your PhD." This again actually opened great space for intellectual freedom and creativity. On the negative side, the solo aspect of the project was highly stressful, depressing, and devastating at times. For a vast majority of the efforts focusing on the leptons, there was never anyone with whom to discuss the project, to bounce ideas off, to bolster enthusiasm, or for just good old fashion comfort.

Most of the project was like running thru a great forest of numbers and wondering when there would be a break in the trees. Like the Laurel Highlands Trail, where you can literally pass the mile markers one after another with no break in sight. Like many high mountain trail runs, you finally break out into the bald and scramble to the mountain peak. The views are wonderful, but you turn around and there is no-one with whom to share the beauty or the accomplishment and effort that were necessary to get there. Putting the last factors, constants, and decimals in the lepton and photon equations repeated this scenario over and over. There was no-one there who could care, much less celebrate.

All of the efforts of this project involved self taught methods and procedures. Everything that was done in discovering mathematical-geometric descriptions for some of the physical properties of the leptons, the photons, and the three basic forces was developed on-the-spot as a means of proceeding as the project progressed. For example, just how were the Fraunhofer Diffraction mathematics, once they had been proposed, supposed to be used? The idea of calculating an, or several, overall Fraunhofer Diffraction constants was invented. Then the idea of using this information as initial or boundary conditions was conceived. Neither of these ideas, and many more like them, had any guarantee of being meaningful, useful, beneficial in any way, let alone in succeeding. Nothing that was done had scripts in textbooks. And finally defending this work from detractors likewise required making up a sound defense without any outside guidance.

This project had an incredibly maddening aspect of being all or nothing. The first phase of the project was like being pregnant for 12 1/2 years. Until the last decimal place was ground out, there was never any guarantee that anything had been accomplished, other than abusing one's self mentally. Particularly for the first 8 years of investigative effort, until the double exponential form was discovered, there were repeated intense bouts of questioning one's sanity. Why would a person spend all available

free time, day after day, season after season, year after year and focus such intense effort with nothing to show? This time could have been used relaxing, socializing, watching spectator sports of no lasting value, vegging out with mind numbing TV shows, or in many other ways.

Combining all four of these aspects of playing a solo guessing game with the universe has few physical equivalences in the modern world. Now humans tend to cluster in great masses in cities. Few people understand a great solo venture into the void. A physical analogy would be from a real mountain trail run which occurred in an isolated wilderness. Imagine yourself, solo on the trackless balds of a high mountain ridgeline pass. The last rock cairn has faded away in the fog behind you with an indefinite distance before the next one might appear. Meanwhile the sun is coming in horizontally between the peaks. There is another 15 miles back to the trail head, including skirting around a cliff line. Further you are in minimal summer clothing which is rain soaked and the air temperatures will plummet with nightfall. A rational person may be thinking why was this trip started with only one small flashlight with dubious batteries. The view from above the clouds has been beautiful, but this is really insane.

The overall project had several other aspects worth noting. This project was approached mostly as an experimentalist, a trial and errorist, and not as a hypothetician. No concern was given to why a particular mathematical form worked. The answer was “Because that is what works”. On the other hand, much thought was given to the form of the mathematical-geometric expressions and to plausible explanations for them. This was because the generation of plausible explanations of the nature or meaning of the mathematical equations was a criterion required from the first inception of the project.

This work was finished on two personal computers each having dual Pentium Pro 200 processors, with net processor speeds approximately equivalent to that of machines with a single 385 mHz processor. The primary tools used for the necessary trial and error searches were spreadsheets with behind-the-scenes custom developed integration macros.

5 Project Phase One

This mathematical physics project was begun on July 4, 1991. The initial investigative research efforts proceeded 2-6 hours a night, after a regular 8 hour day job, and on weekends almost non-stop for 12 1/2 years. The final form of the lepton mass density equations were finished in December 2002. This initial phase of the overall project presented in these reports can briefly be summarized or broken down as follows:

First year of the project was wasted attempting to correlate the masses of the electron, and the up and down particles. This attempt to make a correlation across particle classes was obviously a mistake and showed that some of the guidelines and rules for the project were not well thought out yet.

Five more years were spent with wild searches of intellectual fancy 4-6 hours a night, and in-head while running on trails on the weekends. While this was "fun" it produced nothing useful because the efforts were essentially random, not focused.

Then on Saturday 23th of August 1997 I "DNF'ed" a second time at the Leadville Trail 100, a formal timed high altitude mountain trail run. Monday morning two day later while lying in bed, feeling depressed and utterly worthless, I turned to my hand calculator, which of course was lying at the head of the bed. Within less than 2 minutes I had found the correct mathematical form for the elementary charge of the electron. The wrong explanation for this mathematical form was conceived and would not be corrected for another 4 years. Never-the-less, this coincidental discovery did show that mathematical descriptions could be found for the elementary properties of the particles and that explanations for such discoveries were possible.

By the late 1990's it became obvious that brute force intellect alone would not be able to find an answer to the puzzle of the lepton masses with its only three pieces. During the summer of 1999

hypnosis sessions were begun with myself as the subject to bring focus and some visual clarity to the geometric appearances which would be necessary.

One afternoon in August 1999 while running on the Windsor Trail about thirty five minutes out of the Santa Fe New Mexico ski basin, the idea of trying a double exponential curve was formulated. This form was to use a positive exponential factor to force a mathematical curve simulating the plotted masses up and a more powerful negative exponential factor to close off and terminate the mass density accumulating under the curve. In less than 2 hours after returning home, and in less than 1 hour of time on the computer, a simple spreadsheet was developed and a several decimal place match was made with the lepton masses using the Laguerre orthogonal polynomials to step thru the series.

The initial form of the equations found that night, or in the next few days, were

$$\text{Mass of lepton (n)} = \text{k x meters x} \int_0^\infty e^{-6r^2} e^{+br^1} L_n^d(br^1) dr$$

where

$k = (2\pi^2)^2$
meters = $e\mu_o(G\varepsilon_o)^{1/2} = 4.893,752,96 \times 10^{-36}$
b = a fixed constant 12.482,717,78
n = 0, for the electron; 2, two for the muon; and 4, four for the tau
d = 0 for all cases, that is all particles only had one shell

The problem with these first forms was the value of b = 12.482,717,78 was a meaningless unexplainable irrational number. Additionally $k = (2\pi^2)^2$ also appeared highly dubious. Having matched the target objectives to several decimals letting loose of fixating on these forms was extremely difficult, particularly when there were no better ideas with which to replace them. Another 3 1/2 years would be needed and the addition of initial conditions, multiple shells, angular equations, and the deletion of k to upgrade this semi correct start.

Even with the addition of these many complications the form still remained with $e^{+br^p} = e^{+br^{1.0095}}$ for b to have any meaningful sense. Ultimately this expansive exponential in r needed to be seen as an entirely different form, as a new distinct implicit variable in r(t). This would not occur until the late summer of 2002 as discussed below.

Between June 2000 and December 2001 a series of seven hypnosis sessions were conducted again, this time with Jolanta Pyra as the subject to visualize the geometric forms of the leptons. For her, since she was an actress, these sessions involved her actively taking part, in her mind, in various movie-like scenes. These internal movies included all the major sensory faculties of visual, auditory, and kinesthetic feelings. These sessions helped reveal utterly critical and very specific mathematical-physics information. Some of this information was so oddball it could not have been guessed at in 1000 years.

For example during our first "hypnosis" or interactive investigative session the following information was obtained. Three unequivocal images or interactions occurred:

First seen was a Bavarian person with his trademark hat and leather walking shorts, named Fraunz. This person, depicted as an arrogant little twit, swore he had written a book on the topic that we were investigating, but of course wouldn't tell me/us what its title was. He made a nuisance of himself and burned his name in my memory. Maybe I should go visit a library, hint, hint.

Second seen was a large circular aperture big enough to climb through. This aperture was depicted as something which might be found in a very large mechanical camera. This was clearly stated as being

an aperture, not a cave, orifice, valve, or other opening. Of course true to her style, no fear, Jolanta proceeded to climb through this aperture to see what was on the other side. There she found the third scene.

Third, there were three gargantuan objects, crystals, which nashed together. These supposedly represented the answer as to what terminated a particular mathematical series that was then under consideration. I had to ask Jolanta not to stick her arm between their anvil like points.

The existence of Fraunhofer diffraction and the form of its mathematics were discovered in optics texts between several weeks to a month after this first session. Once a library was visited, the card catalogue lead not to Fraunz but instead to Fraunhofer.

Of course Fraunhofer diffraction is the mathematical description of a particular form of diffraction which results from light shining thru variously shaped apertures, particularly circular ones. Bessel functions, $J_n(x)$, are embedded as part of the formula of the Fraunhofer diffraction mathematics for circular apertures, $\mathrm{FHDif}[F(r)] = \left[\frac{2J_1[F(r)]}{F(r)}\right]^2$. Of course F(r) is usually stated in terms of several constants (k, a, and w) in classical optics texts. The infinite series solution formula for the Bessel functions is $J_n(x) = \sum_{k=0}^{\infty}(-1)^k \left(\frac{x}{2}\right)^{(2k+n)} / (k!\,(n+k)!)$. The three gargantuan objects were then understood to be the one numerator and two denominators in this infinite series solution. This numerator $(\frac{x}{2})^{(2k+n)}$ and the two denominators k! and (n+k)! are all individually driven to infinity, gargantuan size, as the summation is driven to a high number of steps of k.

It needs to be noted that in 20:20 hindsight, these scenes and interactions which lead to the Fraunhofer diffraction information clearly had nothing to do with the specific questions for investigation which had been asked for that first session. At that time, how this information fitted into the overall mathematics of the project was not known or even if it did, but its uncanny accuracy could not be denied. This lead to Fraunhofer diffraction mathematics was probably the most critical and also the most far out off the beaten track of the whole project. Of course as already mentioned, I then had to figure out what to do with this information.

After this as an initial start, I no longer tried to direct this actress running wild in her own internal movie sets. For our next six sessions I merely played questioner and recorder. Many exact geometric visualizations occurred during these last sessions. Such geometric visualizations were trivial for Jolanta, as she also was an incredible artist, as well as an actress. These additional sessions resulted in the following information critical to the project.

1 The double exponential curve form of the radial equations was reconfirmed. I was already using the mathematical form containing two exponentials as just discussed above. These were visualized as two distinct spiral curves, as would be seen in radial-angular plots.

2 The necessity of a polynomial series as a multiplier was reconfirmed. These were visualized as several different squiggles.

3 The slinky torus appearance of the electron and some other more complicated appearances for the other leptons were first seen.

4 The general appearance of the angular equations was specifically seen. These were described as sine like waves, but with flattened humps. The form which was to be found was clearly stated as having neither smooth rounded curves, like sine or cosine curves, nor shape saw tooth like points.

These last two items either resulted from our last session together, or were reinforced there. The next day they were forcefully and not so politely reinforced, burned into my mind, as I put Jolanta on a jet plane for the last time never to see her again. Our work together was done, as was our relationship.

Several months after the last of the hypnosis sessions with Jolanta, leafing thru an old college calculus text revealed valuable information. The slinky like appearance, Item 3 above, of a cylindrical spiral was illustrated and its vector mathematics was discussed. How this mathematics could be generalized to produce the vector mathematics for the toroidal donut appearance of the electron was obvious.

Finally the information concerning the angular equations was confirmed a year later when the use of trigonometric curves embedded as the arguments within other trigonometrics became necessary. These mathematical forms, sin[a cos(bθ)] and sin[a sin(bθ)], when plotted or as might be viewed on an oscilloscope, have round sine or cosine like shapes, but with flattened humps.

Meditation practices during the late summer of 2002 on the mountain just off the Peak-To-Peak Highway near Ward Colorado lead to a dream where the necessary square root form of the distance function was made obvious. This is when the expansive exponential with $e^{+br^p} = e^{+br^{1.0095}}$ was realized as $e^{[1+br^2]^{1/2}}$. This quantity in braces was recognized as an example of the two dimensional rectilinear distance function $ds = [1+ (dy/dx)^2]^{1/2}$. In another final dream late that fall the exact choice of the numerical constants in this distance function became evident.

Summarizing the first 12 1/2 years of research of this overall project, brute force number crunching was mixed with times of conceptualization. Ultimately of the work done or energy-time expended, 99.99% was brute force and 0.01% was inspiration. Inversely of the results achieved, 99% was from inspiration-intuition and 1% was from focused number crunching to check ideas and concepts.

6 Project Phase Two

The second phase of the project initially began with writing a report of the work done and results found for the lepton masses and charge. After rapid and brutal rejection by those in control of the academic physics publishing processes, the next elementary physics challenge was turned to. This challenge was that of completing the picture of both the Fermion (lepton) and Boson (photon) classes of the elementary electromagnetic particles.

This second phase of the overall project, consisted of attempting to find a mathematical-geometric explanation for the fine structure constant in the form, $1 / (2\alpha) = 6.851{,}799{,}475 \times 10^{+1}$ (ML^2/T absolute). Approximately 1 1/2 years were needed to find the final mathematical form of this and the equation describing the Planck constant, *h*. The key mathematical difference between the photon's (ML)(L/T) and the lepton's mass was formulated as an idea to try while trail running behind Red Rock Lake in Brainard Lake Recreation Area near Ward Colorado. This idea was that of using the form $\frac{\pi t^1}{k_2}$ for the photons versus that of $\frac{2\pi t^2}{k_1}$ for the leptons as the argument in the radial distance function. Ultimately the mathematical research work concerning both classes of elementary electromagnetic particle, the leptons and photons, was concluded in about 14 years.

7 Project Phase Three

The third phase of the project was a mix of efforts compared to the streamlined focused efforts of the first two phases.

The first area of endeavors during this third phase of the overall project fell under the general heading of publication. There were five major attempts, generally during 2003-2004, to either publish in formal journals or to present at conferences the findings of the first two phases. After mostly callous indifference by publishers, forum organizers, and members of the hypothetical particle physics establishment, all efforts at publishing this work in the accepted manner were dropped. Instead a private book of this material was written in 2004-2005, published in 2006 and given a small distribution. As a

result of this effort a co-worker helped rewrite the lepton report from its initial awkward format in word processor language into the equally rudimentary, but scientifically required, Revtex-Latex format. The photon report was also transcribed into the Revtex-Latex language. With this coworker's help, another round of several publishing attempts was begun. These turned out to be equally futile and even more self abusive than the first series. Initial pathetic childish excuses made up at the keyboard by a particular journal editor as a means to brush off this work and the credentials of this coworker, eventually turned into condescending derogatory insinuations concerning my worthiness as a scientist or technical person. These efforts at writing and repeatedly rewriting reports of this work took up to maybe 50% of the time of the last 8 years of this project. These efforts to please the hypothetical physicists in academia and their publishing guardians took their toll physically, emotionally, and dampened any enthusiasm for continuing the project.

A second area of effort in this third phase was in further mathematical physics research. To further bolster the soundness of the previous findings concerning the particles and to complete the picture of electromagnetism at the subatomic physics scale the third research phase of the project was begun. These investigations were centered on the three basic forces; gravitational, electrical, and magnetic and the inter relationships amongst them. The mathematical research of this third phase of the project was spread over approximately the 4 years following the completion of the photon findings.

About the first three years of these mathematical efforts were spent on a very appealing, intellectually mesmerizing, but unfruitful path of searching for binary relationships between gravity and electricity and between gravity and magnetism. Not only was this path unfruitful, upon 20:20 hindsight it was always doomed because any such binary relationship would have yielded a measurement system dependent not a universal mathematical-geometric constant. Once this error became obvious only about a year was needed to develop the mathematical explanation behind the Ternary Force Interaction Constant. See Chapter 1.4.

During this third mathematical research period a shot of intuition was again needed to boost the intellect. In early August 2009 a one hour consultation was made with a professional psychic, who had incidentally bailed out of hypothetical physics in disgust. Also repeating the discovery pattern of 1997, the third weekend in August of 2009 brought the annual event of the Leadville Trail 100 footrace. Again, an attempt to get to the finish line resulted in a spectacular failure. Two weeks of feeling utterly worthless and taking console in mathematical pursuits resulted in early September 2009 in the final form of the explanation for the Ternary Force Interaction constant.

The third area of endeavors during this last phase of the overall project was that of defending this entire body of work from the utterly vicious attacks made by various detractors. These persons were intent upon bolstering and upholding the academic hypothesis-first method of doing particle physics research by soundly abusing anyone who's work took a different course or that in any way appeared threatening to the established academic order. The work defending the results of this project had the very clear dates of beginning on 19 November 2008. This defense was finalized on 19 February 2012 with an iron clad proof of the soundness of the use of units with the numerics.

Besides research investigations into the physical properties of the leptons, the photons, and the Ternary Force Interaction constant, this last intense effort of the overall project involved the analyses of measurement systems. The objective of this last effort was to show that the mathematical-geometric constants discovered in the work with the lepton masses and charge were numerically measurement system independent. Stated in other words, the units attached to these constants are universal, generic, or meta units and these constants can be imported into the relative and absolute measurement systems of any intellectual beings.

8 Project Phase Four Add-on

After some lapse the project was picked up again sometime before August 2016. The objective this time was to investigated the possibility of matching the ± 2/3 and ± 1/3 charge of the quarks with the fixed curvature of certain vector curves in 4 dimensional space. This possibility was hinted at by the work done which linked the ± 1 charge of the leptons to the fixed invariant curvature of certain vector curves in 3 dimensional space.

Additionally this possibility was hinted at during the last session with Jolanta Pyra 16 years earlier. In addition to the Items 3 and 4 mentioned above concerning Jolanta Pyra's visualization input to the project, there was one other scene which occurred as the last scenario of our last session together in December 2001. In this scenario Jolanta was "flown" thru space in a scene similar to that in the final parts of "2001: A Space Odyssey", directed and produced by Stanley Kubrick. In this scenario Jolanta would be stopped in space, all the stars would be visible and everything appeared natural. Then she would be accelerated to some high speed. The stars and her surrounding environment would become a blur, streaks, again very similar to the final scenes of "2001: A Space Odyssey". Then she would be slowed to a stop and again everything appeared as expected. This scenario was repeated three times just so "she", really meaning me, would remember it. I knew this information was of importance, but had no use for it or did not know how it fit into the overall project. That is, until 16 years later in January 2017. Then I realized that what she had been shown was symbolic for a "particle" or vector curve traveling in the 4th dimension.

The biggest obstacle to overcome in this Phase Four add-on was not conceptual, but was the lack of mathematical knowledge of a routine for calculating the vector curvature of curves in 4 dimensional space. Without a correct mathematical procedure nothing could be accomplished. Finally in April 2019 a connection was made with Professor Jeanne Nielsen Clelland at the University of Colorado Boulder, an expert in the field of differential geometries. After a meeting with her in early May 2019 she rapidly developed the necessary formulas out of her love for the topic of 4 dimensional space. After that I applied these formulas towards my objective and filled them in with the necessary numerics. As expected, very rapidly the desired answer fell out. Again the project was brought to a close.

9 Why Publish In This Manner?

Why publish the results of over 20 1/2 years of intense mathematical physics research in the manner of a private book?

Additionally this body of work gives mathematical explanations for five of the most basic physical properties here-to-fore listed as de-facto unexplained assumptions in essentially all scientific reference books. The findings of this work should merit the attention of and numerous open public discussions by the entire scientific community. So why has this public recognition not occurred?

The short answer is because bringing the mathematical-geometric findings of this research to the people of the world in any other way has been impossible. The arrogancy and callousness of most of those persons controlling the formal academic physics publishing processes have been insurmountable roadblocks. Seven major times attempts were made to work within the system, and to publish this work in one of the several current standard forums available for doing so. There are formal peer reviewed journals, forums-conferences, "public" repositories, etc. On several of the attempts, stone walls were run into. These were the high walled concrete towers where the academic hypothetical physicists have shut themselves in and all others out. The silence of their replies was deafening. On a few other attempts this work was demeaned, belittled, and ridiculed by journal editors based on what were clearly pathetic excuses which had been fabricated at the keyboard just for the sole purpose of rejecting it. Other scenarios where this work was ignored or brushed off would be enough to make any level headed person either get seriously angry or else despair, except that many of these scenarios were also so comical as to be laughable.

The idea of something new, the correlative data-first approach of this work appears to have been instantly viewed as a threat to the established order of the academic hypothetical physics community. This work was to be suppressed at all costs. Such repression of these scientific findings was simple to accomplish. First this work was not allowed to be published in any reputable "public" journal because of the lack of pre-seeded peer reviewers. Second this work could not be uploaded to "open" repositories, such as ARXIV, because there were no insider buddies to be endorsers. Thirdly is work could not be presented at the gatherings of scientific organizations, those which supposedly championed the underdog such as the Society for Scientific Exploration, because there were no sponsors from within the establishment. Peer reviewers, endorsers, sponsors, the scenarios were all the same. There was a uniform refusal to permit this work to be presented to the public. That is with any form of a stamp of approval by the academic physics community. There is overwhelming evidence, the exact wording of numerous email correspondences, to document this repression of the scientific findings of this work by representatives of the scientific community itself. Without going into a full tirade here, this is all that needs to be said about this matter.

The need to publish the results of this work in this manner of a private unapproved report has been seriously frustrating and distressing. This work is well defined, is easy to verify and simple to follow (no secretive insider trade jargon or buzz words), has definitive results, references the particles themselves only (does not refer to the background of whatever age or how many dimensions), and has many other such strong points. The necessity that there must be pre-seeded reviewers, endorsers, or sponsors from within The Chosen Few in order for this work to be published or otherwise brought to the attention of the general scientific public is not only highly unfair and unjust, this attitude is flat out detrimental to the advancement of science itself.

The one saving grace of this whole project, which mitigates this entire ugly scenario of this work not being approved by The Establishment for publishing, is that there has been no necessity of publishing it. This entire body of work from its inception had no time table, no do or die, no publish or perish. There was never any PhD thesis hanging in the balance, determining whether someone continued in pre-graduate servant-like servitude and poverty or obtained post-graduate freedom and income.

Returning all the way to the beginning, this project was started as a personal intellectual puzzle. If something judged worth bringing to the scientific community's attention was found, so be it. But there was never any necessity of producing a result, let alone of publishing one. The hypothetical physics establishment and other detractors of this work have had no tools or leverage for forcing compliance or obedience into The Mold. The sad part of this whole scenario was that there was no need for them to have any such tools. This work and its results were never in any way intended to be a threat to the reputations, careers, or egos of the hypothetical particle physicists. The findings of this mathematical research are what they are, sterile and innocent. These results appear to have been instantly viewed as threatening, by many of those persons controlling the academic physics publishing processes. Now the only choices the academic hypothetical and particle physicists have are; whether to like or dislike what has been found. The suppression of this mathematical scientific work is over.

On a more serious note and as a benefit to those other persons who would consider free lancing in the arenas of hypothetical and particle physics, listing the major points of attack on this work is instructive. In all likelihood the specific issues raised here or their analogous counterparts probably apply to most of the other areas of academic research and their corresponding publishing processes. All academic scientific arenas might do well to learn from what went wrong here.

10 The 16 No-Nos

From the view of the established academic hypothetical physics community, this work had 16 major errors or the author had committed heresy against the required-mandated way of doing things for at least the last 30 years. These are as follows.

The first three items listed following were never stated openly but never-the-less showed themselves to always be the first form of "intellectual profiling" or subconscious prejudice used to reject this work. This is that practice which is supposedly prohibited but which is in fact omni present in its use. This is the practice of rejecting a scientific work based upon the perceived personal merit of the researcher, the esteem of their institution, and other totally irrelevant matters rather than upon the merit of the work itself.

1 The name of a prestigious university, in the field of particle physics, was not behind my name. This is to say, only members of The Tribe, The Club, or The In Group are permitted.

2 The work and the formal articles of the proclaimed experts, self proclaimed, in the field were not referenced as a jump off point for this work. Not enhancing one's own stature and spicing up one's own work by riding on the coat tails of the big bosses in the field was a grave threat to the reputations, careers, and egos of such persons. In short doing truly independent research is not necessarily viewed as something meritorious. The accuracy of the results of independent work in reflecting physical reality as it is, or the possible benefits to society of some new research, does not necessarily matter in terms of a work's recognition.

3 Government money, research grants, nor other forms of public sponsorship were not used to do this research or to produce these results. That is, not on penny was received in 20 years, in exchange for what is being offered to the scientific world. Again, this was a big threat to the academic particle physics establishment which has received hundreds of millions of dollars over the last 30 years as an incentive to produce something useful for the tax paying public.

The next five items, 4-8, listed were directly referenced in correspondences as reasons for rejecting this body of work.

4 A PhD in hypothetical or particle physics is automatically required. As just one example, in a polite exchange with a well known physics popularizer, he said that he would not read this work. Nor would he even submit it to some of his subordinate staff members for review, because "without a PhD no-one is capable of making a contribution". This is a direct quote.

5 The results that have been found, the nature of the real physical world was too simple. The mathematical results of this work or the concepts that it uncovers can be demonstrated to 6th grade kids with toy Slinkys. If the nature of the subatomic world could be understood as energy waveforms and mathematically verified by high school students, what grip would the hypothetical physicists hold over the public and the other fields of science? The curtain would have been pulled back on the Wizards of Oz. This conceptual simplicity was directly referenced by the chief editor of a prestigious journal as one of his reasons for not even considering sending this work to peer review.

6 The numerical value of the most basic force that holds this universe together was used in the equations. That is, the universal gravitational constant G was used. Physicists appear to utterly despise this "little weakling" because of their own failures and inability to measure it well. Its poor measurement and an accuracy of only a few decimal places is a rhinoceros in middle of their otherwise pristine laboratories and its mention must be avoided at all costs. Even though this constant is an inherent and necessary part of the equations that were found, academic physicists advised getting rid of it several times.

Laying all these sins and excuses aside, there were two overwhelming reasons that this body of work was not only instantly rejected but was often met with bare open all-out viscous frontal attacks, by some but not all of the academic particle physicists.

7 A hypothesis was not used to start this work. This was perceived as a threat to the entire established order of doing conceptual particle physics for the last several decades. Should the methodology of this body of work, data-first trial and error, become public then the only permitted means of doing mathematical particle physics research, hypothesis-first, would be shaken to its core. The reputations and careers of the thousands, tens-of-thousands of physics graduates whose work has and still involves Super String-Membrane, Super Symmetry, and Super Gravity hypotheses would need to be rethought. The foundations of these big three, the only three, arenas in which so many have received their PhDs would dissolve. The results of thirty years of academic efforts based upon this impractical hypothesis-first methodology would be revealed for the waste of time and often impenetrable muddy thinking that it has been. Specifically, the editor of one journal demanded that each and every one of the hundreds of existing hypotheses concerning the particle masses must be shown to be wrong or at least why they needed to be amended before he would consider reading the submitted manuscript any further. This was even though not one of these hundreds of "grand" hypotheses have ever produced verifiable results to anywhere near the measured number of decimal places.

8 Finally, a connection was made with the real physical world. Measurement units were attached to the constants generated from correlative mathematical-geometric models. These constants could be scaled from the arbitrary size of conceptual math and geometry to the size of the real world and the standard human measurements, or those scale systems of any other inquiring beings. Absolute physics scales, analogous to the Stoney units, were used for this purpose.

This was a novel approach. The big sin, though, was something far more sinister. Because of this universal scalability this work could be verified, could be shown to be wrong, or could be proven to be correct. The big three schools of conceptual particle physics have never been able to make this claim. If Super String-Membrane, Super Symmetry, or Super Gravity could be verified, either could be shown to be wrong or else to be correct, then the need for decades more of endless mathematical research would come to a halt. Specifically this scalability, use of measurement units, and verifiability was the first and foremost point of attack by every academic detractor and editor who wished to kill the publishing process.

Seven other minor sins were as follows:

10 For this work the absolute or "natural" physics Squigs scales (Squigs l, t, m, and q; l_{Sgs}, t_{Sgs}, m_{Sgs}, and q_{Sgs}) are used. These Squigs scales are analogous to the "natural" physics measurement units put forth by George Johnstone Stoney in 1874. Except the Squigs scales have had his assumed 2 or 3 dimensional π constants removed.

What is the big sin here? The big sin is "THE PLANCK" Units were not used. The Planck "natural" units were introduced by Max Planck in 1899 and base off *h* rather than e as with Stoney. For the obvious reason that if the correlating, determining, or matching *h* was one of the objectives of this work, then the Planck Units could not be used in the physical scaling to make actual equations of any correlations which might be found. But this obvious avoiding of any possible circular referencing was blatantly ignored.

Why? Max Karl Ernst Ludwig Planck was, and still is, loved and adored by the particle and theoretical physics communities. Max Planck was a "full" professor of physics at the Friedrich Wilhelms Universität in Berlin in the very powerful newly united German Reich. Whereas George Johnstone

Stoney was "merely" an Irish physicist whose day job was as a civil servent for the Irish government, technically the United Kingdom of Great Britain and Ireland. He did his scientific work in his spare time. That is to say, politics everywhere, even in supposedly pure science and engineering.

11 Parameteric units were used with α rather than leaving it as a sterile and meaningless symbol. Alpha, α, that is $e^2\sqrt{\mu/\varepsilon}$, is a conversion/scaling constant between the absolute Squigs units and the relative SI set of measurement units. When a numerical value from the relative SI set of measurement units is multiplied (scaled) by α it then takes on the absolute set of measurement units, the Stoney or Squigs units in this case.

12 Where geometric coordinates were necesssary, the expansion coordinate system was not used and not the dead end 3 dimensional declination coordinate system.

13 This work totally rejected the hypothetical physics mandate that the number of parameters involved with a quantity or "object" is automatically equivalent to the number of spatial dimensions involved.

14 The measurements of Mass, M, as defined in terms of kilograms and Charge, Q, as defined in terms of Amperes and the derivative Coulombs were rigorously shown to NOT be independent of the SI measurement unit of Length, the meter. The blatantly and overtly stated independence of 7 basis for the SI set of relative measurement units was shown to be false. Further in this work M and Q were used as not being independent.

The author used charge as a thing, a blob, not as a thing plus movement. Movement involves and assumes a path and the human concepts of distance and duration.

The author used basic units; the human concepts of distance-length and duration-time and the quantities understood by the particles mass, charge, color. NO composities or complex blobs of units were used, such as; force, energy, power, action-velocity, etc.

15 In reviewing the results of the correlation for or "derivation" of the Planck Constant new meaning was found for this quantity.

For historical reasons the Planck Constant is typically stated as or to be energy divided by time. This is very true and just essentially states the results of what happens in the measurement of this quantity. The author supplemented this <u>what</u> happens with a deeper understanding of <u>how</u> or <u>why</u> the what happens. The author found this quantity's true mathematical-geometric meaning to be more realistically explained with either of two explanations. One, a mass which arises along a length multiplied by a velocity, (ML)(L/T), a spinning string. Or two the mass which appears over an area per a unit of time, $(ML^2)(1/T)$, a vibrating membrane.

Never-the-less the particle and theoretical physics communities get highly upset if anyone "messes" with anything produced by The Max Planck. It does not matter if this "messing" is improving or adding meaning to something with his name on it.

16 Another key criterion and distinct difference of this work was that of restricting all work to a very limited scope. All the initial mathematical research work was to stay strictly focused on searching for a correlation for the masses of the three observed leptons.

This limited closed approach was NOT liked. The academics like to and wanted to be able to run everywhere with wild interlinked, mixed up, tangled up flights of fancy. This unfettered unsupervised academic approach has translated as unlimited time and unlimited money pouring into their hypothetical physics departments.

11 A Blessing Comes In A Very Bad Package

After 17 years of working on this project and having completed the equations which describe the masses of the leptons, the (ML)(L/T) of the photon, and being well on the way to setting the basis for the ternary force interaction constant, efforts were revived to reach out to the official physicists for some constructive feedback. A novel approach was tried this time of starting correspondence with members of some of the exclusive high IQ societies. This was under the self deception that such persons would be interested in the creative aspect of a scientific work which took a new and different approach.

The first responses received were the usual responses of the general public abasing themselves at the feet of the hypothetical physicists, "I'm not good enough to read particle physics material", or the slightly more graceful, "This is not my field of expertise". Such responses were unbelievable coming from members of the 999 Society and other similar societies. Even more ironic, this work only requires a knowledge of second semester calculus to understand the equations, and even less just to follow the discussions.

Then came the real bad package, a stout defender of the faith. As in, no outsiders are allowed, and he personally would seriously abuse anyone for even thinking about getting in this exclusive club house. This particular respondent was flat out rude, crude, foul, and abusive. As in, he was way beyond demeaning and condescending. Besides playing childish, first grader, games of refusing to use his real name, he resorted to vicious personal attacks as a means to settle technical disagreements. These exchanges were seriously trying, as an attempt was made to maintain some level of professional courtesy and just good business manners. After all the objective here was to learn how academic hypothetical physicists think so that their objections to this work could be better addressed. After noting this individual's primary objection to the preliminary articles concerning the leptons and photons, all correspondence with this high IQ, socially maladapted, person were dropped. As his final "childish" (criminal) prank he destroyed the location on my enploying company's web site where these articles had been posted.

Reviewing this person's objections to the preliminary lepton and photon articles, they were found to be the usual, as already noted in Section 10, Item 8, above. This particular class of physicists appears to have an intense paranoia of measurement units. Their concern about the lack of validity of applying the relative units of the SI set of scales to subatomic phenomena is easy to understand. From this person's emails though, as well as those of a journal editor bent upon defending the faith, much of this community appears to have no awareness of the absolute or natural scales of George Stoney and Max Planck, much less an understanding of the use of such scales. The word "appears" is used here, because while busy heaping abuse upon myself and the lepton and photon articles, these persons never admitted to their own knowledge, or lack thereof, of the absolute physics scale systems, nor made any mention of correct or incorrect application of these absolute scales.

So from my view a blessing had come in this otherwise ugly scenario. These persons forced me to make this work more thorough, broader in scope, and more complete than originally intended. Since this class of physicists' objections to the use of measurement units in equations or with constants appeared to be almost omni-present and perpetual, this objection needed to be addressed head-on. The research for much of the material in Part 3 was begun as a defense of the mathematical findings of this work.

Beginning at the beginning, the nature of numbers and their need for units was investigated. All numbers, except for those used in practice equations by grade school, high school and college students, require the sizing of some measurement system to be of any benefit in describing the real physical world. Pure sterile numbers cannot be applied for any practical or useful purpose. Even "unitless ratios" still stand for or represent some concept of sizing or otherwise they are just meaningless symbols and communicate nothing of any value. Secondly there are several classes of measurement or scale systems with respect to their scope of applicability. There are units with relative scale systems, absolute scale systems, and those which are place holders, generic, or meta units.

On examination, the various relative scientific and engineering scales appear to be complete, comprehensive, or all inclusive, and are self consistent. This self consistency is critical to the work here. Upon further investigation though what is found is that not all of the various scales of some of these scale systems are in fact independent or random. Specifically despite the deceptive proclamations of the editor in a well established physics reference handbook, two of the scales for the SI set of units are in fact dependently linked to at least one of the other units of the scale set. Seeing through these proclaimed falsehoods took yet another act of defiance against yet another authority figure of physics.

Coincidentally or otherwise the two dependent scales of the SI system of units are those two representing the quantities sensed or experienced by the particles, M mass and Q charge. These were linked by definitional fiats to the quantity best understood by humans, L distance, as follows.

Given a specific substance, water; at a precise temperature, 4C; level of deaeration; etc;
then 1 gram mass = 1 centimeter^3 or more generically 1 unit of M = 1 unit of L^3

After a complicated definition involving electrical and magnetic properties, numerous unstated assumptions, calculus integrations, etc, ultimately what is found is 1 Coulomb, $Q = (ML)^{1/2}$.

Both of these interlinkages of the underlying bases of the SI set of scales become critical in showing that the authoritative attacks on this work concerning the use of measurement units with numerical mathematical-geometric constants were false, invalid.

On 20:20 hindsight, remembering one of the first things taught about the metric system in high school chemistry and physics classes is easy. The metric scales were intentionally set up about 200 years ago to make aqueous calculations simple, with 1 gram of water equal to 1 centimeter cubed. All the upgrades made to the original metric system, now the SI set of measurement scales, have never erased this original linkage and only amount to embellishments, fancifications on these original bases.

The nature of several absolute physics scale systems was investigated. This revealed several additional surprises. The system of absolute units used in the lepton and photon articles is analogous to that proposed by George Stoney in 1874. The only difference is the deletion of a few pi constants that Stoney used to embed his units into some assumed spatial geometries. This discovery lead to serious misgivings. Who am I, a nothing and nobody, to say that the "natural" units proposed by Max Planck in 1899 and embraced by all the high powered physicists since are not the correct units needed to describe both the leptons and the photons? Only the knowledge that the equations reported here were the result of open ended discoveries, and had not resulted from trying to cram the particles into pre-approved models or hypotheses kept intact any confidence in what had been done. A great amount of time was spent learning; how to construct absolute physics scale systems, how to correctly use them, the important differences between these totally interlinked absolute measurement systems and the relative scale systems of human size science, etc. Of great importance was the issue of how to import values from relative sized scales into the absolute sized scales and what units these imported values took on once they got there. None of this material is found in any textbooks. Yet more reports were added to Part 3 to document this developmental work.

Finally after making these many discoveries about measurement systems, the analysis necessary to lay out a proof for the measurement system independence of the mathematical-geometric constants found in the lepton and photon articles was relatively simple. The numerical universality of mathematical-geometric constants, with their mixed relative-absolute units used in describing the elementary charge of the leptons and with their masses were proven to be measurement system independent. This is with the stipulation or constraint that whatever set of absolute units were used, as invented by any inquiring species, these need to be based upon relative scale systems which are SI analogous.

So after taking several severe beatings from the detractors of this particle physics work, the blessings in their abuse were found. Not only were their endless squawkings, "what if the length of the meter was different", ill thought out and invalid, now there is a straight forwards simple proof that they spoke before they thoroughly investigated what they were speaking about. These detractors ultimately made this work stronger, more well rounded and complete than it would have been otherwise.

12 Bright Notes And Thanks

Although this work was attacked by many in or associated with the academic hypothetical physics community, not all encounters with academic physicists were negative. Some physicists were kind, helpful, and uplifting. There were several such persons from within the academic particle physics field who treated me with respect and took this work seriously as something which at least merited public discussion. None of these persons every directly approved or blessed this work as being correct, but their treatment of me as a person and encouragement were invaluable. These supportive gestures of the persons from within the field were greatly appreciated. As examples;

Early on after the discovery of the equations leading to the elementary charge e, one experimental physicist sat me at his kitchen table and in a kind and fatherly manner explained how physicists do things. He encouraged me to ditch the use of G and said that measurement units must be done away with. That was, if any particle physicist was going to read this work or take it seriously. Ultimately of course these two points of his advice were incorrect and had to be ignored, but his kind and personal manner were a blessing.

Correspondence with one university physics professor concerning review of the equations for the lepton masses, lead to the following. He wrote that he had had ideas similar to mine 20 years earlier, which had he pursued them probably would have lead to the same periodic chart like equations. Upon mentioning his ideas to others in the field though, they laughed him out-of-town. Never-the-less he encouraged me keep trying to find some way to publish the results of this research.

There were even some journal editors who apparently felt no need to defend the lack of results of the other professionals in the hypothetical calculational business. During the numerous publishing attempts two such uplifting editors were found.

One editor was open, honest, and point blank. He liked and respected this work, but knew up front that due to stated economic constraints of his publisher that he could not send it to peer review. He knew that the physics hypotheticians would never approve this work and his publisher would not let him submit material to peer reviewers unless he was 100% sure that the work would make it thru the process. He was open and forth right about telling me this in our initial correspondence with no cover up excuses. Further then, he encouraged me and hoped that another suitable forum could be found to bring the results of this work to the general scientific public.

The other editor appeared to be excited and encouraged me to rewrite the reports of this work in a manner in keeping with the format of his journal. He did not mind at all that a person may have a lack of standing in the field. He also started educating me as to what had already been done within the vast realm of hypothetical calculational particle physics and as to where he thought these efforts were ultimately going to go. The show stopper was he wanted to restrict my reports, both the individual lepton and photon ones, to a single combined report and to one half the size of what one of these reports was alone. Additionally, this work obviously would run into head-to-head conflict with his own work and that of his followers. Any chances of his ultimately publishing the equations found in this work were nil. The good news in this encounter was that it lead to researching as to just how the researchers in the Super String-Membrane, Super Symmetry, and Super Gravity schools of thought actually proceed with their logic and calculations, what assumptions and data they start with, how they mix different particle classes or equally disparate measured phenomena together, etc. Now there is better preparation, knowing

what the hypothetical physicists would be looking for in this work and what they would not find since this work did not use a hypothesis-first methodology.

Finally there was a well known and respected person from the symmetry school of thought, who found this work on my enploying company's web site. He initiated correspondence with me, not the other way around as had always occurred before with members of academia. He wondered why this material had not been uploaded to ARXIV. So the whole scenario had to be explained to him over again in short form. Further I was not ready to proceed with his help because I was still working on the proof neutralizing the "what if the length of the meter was different" argument.

13 Concluding

This project has been a long journey, like an ultra run. Essentially all of research work was done in the manner of an ultra runner, solo, and every step had to be taken one step at a time by one's self.

There were some really nasty detractors along the way, like rattle snakes or mountain lions. Being a wise runner, their fangs were duly noted. Equally such closed minded persons could be considered aid station race officials who argued that I should not be allowed to continue. Since this was a private personal event, their attempts to disqualify me were ignored.

Counter balancing the negativity, there was a personal crew member for a short and critical period of time. Without her intuitive input the project could not have continued or succeeded. Like an ultra run, there were some cheering spectators and a few personal supporters who would appear every now-and-then for a short while along the way. In this case these persons were coworkers and trail running buddies who read thru the first several attempts at reporting the results of the mathematical-geometric research work. There were even some members of academia who gave me encouragement. These kind people were like innocent back country hikers who offer directions and water when a wacked–out runner stumbles upon them. What began as a study of physics particles became a study of physicists' personalities.

This project had another aspect found in formal ultra runs, 100 milers. There is the external thing to do, with its many details which need to be tended to. There is also the internal landscape. A 100 mile runner goes thru some of the highest highs a human can experience and thru some of the deepest darkest lows imaginable, and they are all self created. Likewise the internal landscape of this project covered the gambit of black depressions, loneliness, and incredible highs, all of them self created. In the end there were only numbers, like a finisher's time on a sweat shirt sleeve. Still it would be nice though if someone else recognized the achievement.