It is the author's experience that to this day; many Ph.D. physicists believe that the negative results of the Michelson-Morley experiment prove that the speed of Electromagnetic Radiation is an absolute constant. It is straightforward to prove that the negative results of the M.M. experiment are derivable from the Galilean Transform that in turn is derivable from the 1st postulate of S.R. and the vectorial additivity of electromagnetic radiation, where the vectorial additivity of E.R. is substituted for the 2nd postulate of S.R. The situation is abbreviated below.

1st Postulate
Vectorial Additivity of E.R. $\Longrightarrow$ G.T. $\Longrightarrow$ ~M.M.

Also

1st Postlate
2nd Postulate $\Longrightarrow$ L.T. $\Longrightarrow$ ~M.M.

As far as the negative results of the M.M. experiment are concerned one can use either set of postulates. The physics used in the text is in accord with the first set of postulates, however it is not necessary to assume the physical validity of the first set as it is mathematically rigorously proved in the text that: If the 1st Postulate is self consistent, then the Vectorial Additivity of Electromagnetic Radiation and only the Vectorial Additivity are derivable from the 1st Postulate. Schematically:

1st Postulate $\Longrightarrow$ Vectorial Additivity of E.R. $\Longrightarrow$ 2nd Postulate is false and

1st Postulate $\Longrightarrow$ Vectorial Additivity of E.R. $\Longrightarrow$ G.T. $\Longrightarrow$ ~M.M.

A proof of the self-consistency of the 1st Postulate is either based on axioms or postulates.
1. A proof based on axioms is unacceptable as axioms do not represent physical reality and testable physical reality is not a consequence of axioms that do not represent physical reality.
2. A proof based on postulates is unacceptable as the postulates themselves must be proved to be self-inconsistent and consistent with one another...
There is no known experimental evidence in disagreement with postulate 1.
There is known experimental evidence in disagreement with postulate 2.

Physics today is based on six grand ideas summed up in the six sets of equations called:
A. Newton's Laws and Universal Gravitation.
B. Maxwell's Equations.
C. Einstein's Special and General Relativity Theories.
D. Schrodinger's Equation.

During the past 100 years there have been many criticisms made of the foundation postulates and consequent physical ideas of physics. However, no thoroughgoing alternative postulates and alternative consequent physical ideas have been advanced to replace them.

What follows, is a short history of the foundations of physics followed by criticisms and resolutions of the foundations of physics. In order to answer the criticisms, it was necessary to create new foundation postulates and a new atom to replace the quantum mechanical atom. The new foundations, the mathematical model for the new atom and the consequences of the new atom are to be found in the text.

With the publication of "Principia" in 1687, Newton effectively founded classical and gravitational dynamics. In the following decades, attempts to apply the gravitational equation to electrostatic and magnetostatic phenomena met with failure due to the attractive and repulsive nature of the phenomena as well as to the fact that electrostatic and magnetostatic forces are orders of magnitude larger than the gravitational forces acting between the components of a given experimental setup.
In the same time period there was even an attempt by biologists to explain the development of embryos as a result of gravitational attraction between the various parts of a developing embryo. The attempt was given up due to the inability of biologists to explain how so many different life forms could arise as a result of one gravitational force equation. A partial solution to the problem was not achieved for another ~250 years.

In the latter half of the 18th century the concept of plus and minus charge and north pole and south pole were created to explain the magnitude and direction of the force acting on charges and magnets.

In the early 1800's, liquids and solids were envisioned as consisting of continuous, charge neutral matter, and $\underset{\sim}{f} = m\underset{\sim}{a}$ was generalized for continuous matter resulting in the Navier-Stokes equations from which equations for the bulk moduli (speed of sound, compressibility etc.) were derived. These equations are taught to this day in spite of the fact that liquids and solids are not composed of continuous matter.
New Equations to replace the Navier-Stokes equations and new derivations for the bulk moduli based on the atomicity of matter and the new atom are developed in chapter 4 of the text.

Further experimental work on moving charges and moving magnets established the relationship between moving charges and magnets on electric currents and electric currents on charges and magnets, which led to the concept of the electromagnetic field. This work was unified in the equations of James Clerk Maxwell and published in final form in 1873.
One of the basic assumptions that Maxwell made was that electromagnetic radiation was a disturbance of the ether, a hypothesized mass less substance pervading all of space. The existence of the ether was experimentally proven false by Michelson and Morley in 1887 and threw physicists into a quandary that was seemingly resolved by Albert Einstein. Before Einstein, the Lorentz Transform was an interesting

mathematical object as when applied to Maxwell's Equations, it left the equations form invariant. Einstein working within the concept of no ether (He is quoted as saying that when he wrote his 1905 paper, he did not know of the work of Michelson and Morley) created a derivation of the Lorentz Transform that was based on two physically testable postulates.

The second postulate of Einstein's is that the speed of electromagnetic radiation in vacuum is an absolute constant. i.e. In vacuum the speed of electromagnetic radiation (Light in particular) is independent of the speed of the e.m. radiation source with respect to the measuring apparatus. In effect, what Einstein had done was to substitute the idea of the absolute constancy of the speed of e.m. radiation, for the existence of the ether while maintaining the mathematical form of Maxwell's Equations. This is the only time in the history of physics that one false physical assumption (The existence of the ether) was replaced by another (The speed of e.m. radiation is an absolute constant) preserving intact the mathematical equations of interest.

Any model for the e.m. field that is to replace the Maxwellian model, must explain where and why Maxwell's Equations and the wave model for the $\underset{\sim}{E}$ and $\underset{\sim}{B}$ fields are false and further explain the experimental results currently explained by Maxwell's Equations and the wave model for the $\underset{\sim}{E}$ and $\underset{\sim}{B}$ fields.

At the turn of the 19th century there was an intense interest in elucidating the structure of the atom. It was realized that Maxwell's Equations predicted that a proton-electron pair rotating about their center of mass was unstable and would collapse in $\sim 10^{-9}$ sec. emitting e.m. radiation in the process. It had also been observed that suitably excited atoms and molecules emit e.m. radiation in discrete spectral lines. This observation and the instability of a proton-electron pair, led to the quantum mechanical model for the atom and to Schrodinger's Equation. Any model for the atom that is to replace the quantum mechanical model, must explain where and why the quantum mechanical model for the atom and Schrodinger's Equation are false and further explain the experimental results currently explained by Schrodinger's Equation and the quantum mechanical model for the atom.

Criticisms of the Foundations of Physics

Criticisms and Resolution of Newtonian Physics.

1. The mass m of $\underset{\sim}{f} = m\underset{\sim}{a}$ was envisioned as a point mass. Point masses do not exist. A point mass has an infinite binding energy, is indestructible, has a 0 cross section and (If charge neutral, see below) would penetrate and go through any object of arbitrary thickness. Such a point mass has never been observed.

On the other hand, any particle of finite radius must have a force binding it together and another force keeping it from collapse. The concept of like charge repulsion is currently invoked to explain what keeps a particle from collapse. The aim of the text is to eliminate the concept of charge and to explain all charge effects with in the concept of charge neutral particles. In particular the assumption is made that what

keeps a neutral particle from collapse are contact forces caused by internal
vibrations of the particle mass.

All other charge effects are explained as due to charge neutral masses and are explained on an experiment-by-experiment basis.

The text is written within the concept of Newton's Laws and the Galilean Transform. All atoms and particles considered in the text have a finite radius, are charge neutral and the internal dynamics of these particles is examined using conservation of energy and momentum principles. The replacement for the e.m. field is discussed below.

2. The notation for the position $\underset{\sim}{x}$, velocity $\underset{\sim}{v}$, and acceleration $\underset{\sim}{a}$, of a moving particle as respectively $\underset{\sim}{x}=\underset{\sim}{x}(t)$, $\underset{\sim}{v}=\underset{\sim}{\dot{x}}(\underset{\sim}{x},t)$, $\underset{\sim}{a}=\underset{\sim}{\ddot{x}}(\underset{\sim}{x},\underset{\sim}{\dot{x}},t)$ is used throughout all of mathematical

physics. In particular it is used to derive the advection $(\underset{\sim}{u}\cdot\nabla)\underset{\sim}{u}$ term of the Navier Stokes Equations and the Navier Stokes Equations with the advection term are used to derive the oceanic tidal potential and the mathematical theory of fluid turbulence. It is shown in chapter 12 of the text that using $\underset{\sim}{x}=\underset{\sim}{x}(t)$, is inconsistent with the use of (x,y,z) as coordinate axes. The inconsistency is resolved by letting $\underset{\sim}{h}$ represent the position of a moving point where $\underset{\sim}{h}=\underset{\sim}{x}+\chi(\underset{\sim}{x},t)$. $\underset{\sim}{x}$ is an arbitrary fixed point in inertial frame S i.e. $\underset{\sim}{x}\neq\underset{\sim}{x}(t)$ and χ is a function of $\underset{\sim}{x}$ and t where $\chi(\underset{\sim}{x},0)=0$. Also $\underset{\sim}{\dot{h}}=\underset{\sim}{\dot{\chi}}(\underset{\sim}{x},t)$ and $\underset{\sim}{\ddot{h}}=\underset{\sim}{\ddot{\chi}}(\underset{\sim}{x},t)$. Using this notation, a new theory for the oceanic tides is developed in chapter 11 and a new theory for fluid turbulence is developed in chapter 12.

Criticisms and Resolution of Maxwell's Equations.

1. Maxwell considered that light and all e.m. radiation consists of E and B wave fields radiating out from charged particles. In particular, light on passing through a spectral grating forms a series of light lines and dark spaces. If light is a wave, then one can derive Bragg's law. If light is not a wave, then one cannot derive Bragg's law.

In order to measure the wave length of light, one uses a spectral grating i.e. a smooth piece of plain glass thinly coated with Al upon which parallel lines a distance d apart are scratched with a diamond tipped needle using a ruling engine. Assuming light is a self-interfering wave, one can derive Bragg's law: $\lambda=d\sin\theta$ for the 1st order spectrum where λ is the wavelength, d as above and θ is the angle through which light is diffracted. If one now makes a second grating with parallel lines a distance D apart using the same diamond tipped needle as above and shines the same monochromatic light source on both gratings, and now assuming Bragg's law is correct: $\lambda=d\sin\theta=D\sin\phi$ where angle $\theta\neq\phi$. However experimentally $\theta=\phi$ and therefore Bragg's Law is experimentally false. This proves that e.m. radiation is not a wave and that the most important equation of quantum mechanics $E=nh\nu$, is physically false and does not represent physical reality.

A small mass photon dynamics to replace Maxwell's Electrodynamics is developed in the text. The model for e.m. radiation is of small mass photons and the interaction properties of small mass photons with liquids, solids and gasses including the interaction with a spectroscopic grid is derived in the text. How small mass photons are created from solid mass atoms, is derived in chapter 6 of the text.

1. Einstein based his derivation of the Lorentz Transform on the 1st and 2nd postulates of Special Relativity. It is rigorously proved in chapter 1 that the two postulates are inconsistent with one another and that therefore at most, only one of the postulates is physically correct. However both postulates must be physically correct in order to derive $E=mc^2$. Therefore $E \neq mc^2$. A new model is therefore necessary to explain the energy source of nuclear weapons and nuclear reactors and to explain the energy source of stars and our sun. This is done respectively in chapters 10 and 11.

2. In order to prove that the two postulates are inconsistent with one another it is proved that:
a. If the 1st postulate is true, then the speed of light is vectorially additive and therefore the 2nd postulate (The speed of light is an absolute constant) is false.
b. If the 2nd postulate is true, then the 1st postulate is false.
c. It is a consequence of a and b that the 1st and 2nd postulates are inconsistent with one another.

3. Further it is proved using just the 1st postulate:
a. The transform between inertial frames S and S' is the Galilean Transform.
b. The negative results of the Michelson-Morley experiment are derivable from the Galilean Transform.
c. In so far as the 2nd postulate is false, and that one of the basic assumptions of both Maxwell's Equations and Einstein's Special Relativity Theory is that the 2nd postulate is true, then both Maxwell's Equations and Einstein's Special Relativity Theory are physically false.

Criticisms and Resolution of Einstein's General Relativity Theory.
1. Mass is introduced into the equations of General Relativity Theory (GRT) via the incorrect expression $E=mc^2$ and therefore General Relativity Theory is false and does not represent physical reality.
2. The equivalence principle is in general not true.
Consider the example of a man in a closed elevator in free fall in an externally caused gravitational field. The equivalence principle states that no experiment exists from which the man can determine whether he is in free fall or whether he is far removed from and not accelerating due to external gravitational sources.
All gravitational fields from a given individual source (e.g. the earth) have a divergence and that divergence will cause a compressive force f_1 and contraction Δx_1 on two m_1 masses held together by a hooks law spring oriented at right angles to a line drawn between the center of mass of the $2m_1$'s and the center of mass M_e of a spherical external gravitational source (e.g. the earth).
3. General Relativity Theory envisions that the presence of mass warps or curves the space around it. This is to attribute something (The curvature of space) to nothing (Empty Space). A physically false principle.

Hook's Law Spring
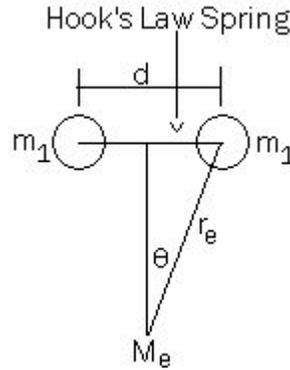
Where $f_1 = m_1 M_e \dfrac{G}{r_e^2} \sin\theta = m_1 M_e \dfrac{dG}{2 r_e^3}$

4. Observationally, the perihelion shift of Mercury is 42 seconds of arc per century where $\dfrac{42''}{\text{Cent}} = 1.17 \cdot 10^{-4} \dfrac{\text{deg}}{\text{yr}} = 2.04 \cdot 10^{-6} \dfrac{\text{Rad}}{\text{yr}}$. At observation, the positions of the Sun, Mercury and the Earth are as in the diagram below.
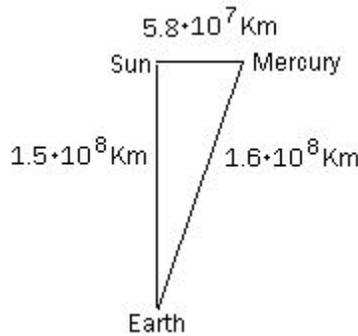
a. The diameter of Mercury is 4880Km and $(1.6 \cdot 10^8)(2.04 \cdot 10^{-6}) = 330$Km. i.e. during the course of 1 year, at most, the difference between the observed position and the theoretic position of the perihelion of Mercury is 330Km where 330<<4880Km= diameter of mercury.

Mercury is difficult to observe and is always observed with in 10° of the horizon, either just before sunrise or just after sunset. Thus the light from Mercury is subject to atmospheric aberration and Mercury's position is subject to atmospheric aberration. The quoted perihelion shift of Mercury at 42 seconds of arc per century is open to question.

b. Never the less, Einstein did derive the quoted perihelion shift. How did he do it? It was noted before Einstein that if the gravitational force were $f = \dfrac{K}{r^2} + \dfrac{A}{r^4}$ and if A were chosen correctly, one could derive the perihelion shift of Mercury. With the theory of GRT, Einstein was able to derive $f \doteq \dfrac{K}{r^2} + \dfrac{A}{r^4}$ and further by using a modified mass for the mass of the sun and of Mercury, Einstein was able to derive a value for A such that he could derive the perihelion shift of Mercury.

c. The sun rotates about an axis at 7.25$^\mathbf{o}$ to the ecliptic in ~25days at the solar
equator. John Wheeler, using the gravitational law, $f=\dfrac{K}{r^2}$, derived the perihelion shift
of Mercury by computing the dimensions and mass of the sun's equatorial bulge
necessary to cause Mercury's perihelion shift by Newtonian Gravitational attraction
between the bulge and Mercury and assuming the required bulge is a result of the
sun's rotation about its axis.

5. The Deflection of Starlight by the Sun

GRT predicts that light from a star on a line from the earth to the sun at grazing
incidence to the sun will be deflected 1.75 arc seconds. Although there is significant
scatter in the experimental evidence, (Anomalies in the History of Relativity, Ian McCausland,
Journal of Scientific Exploration, Vol. 13, No. 2, pp. 271– 290, 1999), the
experimental evidence was accepted as supporting GRT. The small mass photon
model for light predicts a gravitation caused deflection of 0.875 arc seconds.
Refraction effects due to the sun's and earth's atmosphere have not been taken into
account and it is hypothesized that the experimentally determined deflection and the
scatter of the data is caused by a combination of Newtonian Gravity and refraction.

The Quantum Atom and Schrodinger's Equation

As proved below, Schrodinger's Equation (SE) creates a mathematical model for
an atom that physically does not exist and therefore Schrodinger's Equation does not
represent physical reality.

1. SE was originally created to derive the wavelengths of light emitted by excited
hydrogen: Four lines in the optical and many lines in the ultra violet. Hydrogen is
placed in a sealed glass tube and electrically excited until it gives off a red glow. The
red light is passed through a spectral grating and 4 lines red, yellow, green, blue
appear. However to generate the yellow, green and blue lines, the glass through
which the red glow passes must be doped with the atoms Li, K, Ca. Without the
doped atoms, only the red line appears. The origin of the UV lines is white dwarf
stars. Consequently, SE creates a mathematical model for an atom that physically
does not exist and therefore (SE) does not represent physical reality.

2. In order to measure the wave length of light, one uses a spectral grating i.e. a
smooth piece of plain glass thinly coated with Al upon which parallel lines a distance
d apart are scratched with a diamond tipped needle on a ruling engine. Assuming
light is a self-interfering wave, one can derive Bragg's law: $\lambda=d\sin\theta$ where λ is the
wavelength, d as above and θ is the angle through which light is diffracted. If one
now makes a second grating with parallel lines a distance D apart using the same
diamond tipped needle as above and shines the same monochromatic light source
on both gratings, and now assuming Bragg's law is correct: $\lambda=d\sin\theta=D\sin\phi$ where
angle $\theta\neq\phi$. However experimentally $\theta=\phi$ and therefore Bragg's Law is experimentally
false. This proves that e.m. radiation is not a wave and that the most important

equation of quantum mechanics E=nhν, is physically false and does not represent physical reality.

The model for e.m. radiation developed in the text is that of small mass photons and the interaction properties of small mass photons with liquids, solids and gasses including the interaction with a spectroscopic grid.

3. In order to solve SE for the energy states of any atom, a spurious mathematical technique was developed. By using ANY twice differentiable function $F=F(\underset{\sim}{x},t)$ in $\underset{\sim}{x}$ and t, the given interaction Hamiltonian H, and Schrodinger's Equation, one can create an infinite set of orthonormal functions $\phi_n(\underset{\sim}{x},t)$ n=1,2,... such that by expressing Ψ in terms of the orthonormal series, $\Psi = \sum_{n=1}^{\infty} a_n \phi_n$ one can solve SE for Ψ, (i.e. for the a_n) such that Ψ is a solution of Schrodinger's Equation and Ψ converges in the mean to F. Thus any twice differentiable function F can be shown to be a solution of Schrodinger's Equation modulo convergence in the mean. Therefore, in general, using convergence in the mean to create solutions to differential equations is a spurious mathematical technique. I myself created the "kit" for tritium, using parabolic coordinates.

As far as I know, how to determine the orthonormal series for a given H and F using Schrodinger's Equation was first presented by its originator at Bletchley Park, England on December 28, 1942.

4. Ψ (The unknown in SE) is a complex number. Complex numbers have no units can not be physically measured and do not represent physical reality. The absolute value squared $|\Psi|^2$ is given a physical interpretation as a probability e.g. of finding an electron at distance r at time t from the nucleus to which it is bound. However, one is now deriving physical reality i.e. $|\Psi|^2$ from non-physical reality i.e. Ψ. That is absolute nonsense.

The Relation Between Mathematics and Experimental Physics

Let P_i i=1,2,...,n represent the n postulates upon which all of current physics is based and let $P \equiv U\, P_i$. Among these are the basic postulates upon which Newton's Laws and the Law of Universal Gravitation, Maxwell's Equations, Special and General Relativity, Schrödinger's Equations, Quantum Electrodynamics and String Theory are based.

In order to represent physical reality the postulates and the consequences of the postulates are required to be physically testable and experimentally true. That is, it is required in principle to design and perform an experiment to test the physical validity of each postulate and the consequences of each postulate. To remove observer bias, each experiment should in principle be able to be completely automated and

the numerical results of each experiment typed on a piece of paper by a computer controlled typewriter all without human interference.

Each experiment should be repeatable. That is the distribution of typewritten answers after N trials should be the same distribution after a second run of N trials as $N \rightarrow \infty$. The requirement of repeatability is necessary as one cannot construct a fundamental theory on the basis of a postulational system one of whose postulates P_k is experimentally observed to be true once and never observed to be true again without giving a physical reason as to why P_k was observed only once. The physical reason as to why P_k was experimentally observed to be true once and never observed to be true again should then be reduced to $p_1...p_m$ postulates all of which are repeat ably testable.

The Postulates P_i i=1,2,...,n are required to be consistent with one another as well as to represent physical reality: $P_i \neq \sim P_j$ and the consequences of the ith postulate, represented by $C_{i,k}$, k=1,2,...q , must be consistent with the consequences of the jth postulate, represented by $C_{j,v}$, v=1,2,...r: $C_{i,k} \neq \sim C_{j,v}$. To allow $C_{i,k} = \sim C_{j,v}$ violates the requirement that the postulates and the consequences of the postulates are physically testable and experimentally true. The Postulates P_i might be functions of time, that is $P_i = P_i(t)$ in which case it is required that $P_i(t) \neq \sim P_j(t)$ and that $C_{i,k}(t) \neq \sim C_{j,v}(t)$. Unfortunately it turns out that the currently accepted P_i are not consistent with one another. In chapter 1 it is rigorously proved from the 1st postulate of Special Relativity that the 2nd postulate of Special relativity is false. That is, assuming the 1st postulate and the consequences of the 1st postulate are experimentally true, it is rigorously proved that the 2nd postulate is physically false.

As the 2nd postulate i.e. that the speed of electromagnetic radiation is an absolute constant, is a corner stone of most of nineteenth and twentieth century physics, the proof necessitates the rewriting of a majority of mathematical physics which is the subject of this text.

Physics is that part of human experience which can be reduced to repeatable experiments. The experiments are reduced to measurements of physical variables yielding numbers with physical units: gm, sec, cm etc. In principle, any trained observer who performs the experiment arrives at the same distribution of numbers representing the measurement of physical variables, as the number of trials goes to infinity. That is, in its broadest sense, physics is the study of that part of objective reality that can be reduced to repeatable meter readings.

Consider the relationship between pure mathematics and mathematical physics. Let A_i i=1,2,...m, represent the axioms upon which the sum total of mathematics as it is known today can be derived and let $A \equiv UA_i$. The number of axioms is not constant over time as new fields of mathematics are created by mathematicians based on new axioms. The axioms do not represent physical reality, that is the axioms are not physically testable. This is the major difference between the postulates of mathematical physics and the axioms of mathematics.

A problem arises however as the language of physics is the calculus. If calculus is to represent physical reality then its basic axioms must represent physical reality, that is its basic axioms must be repeat ably testable. Unfortunately the calculus has as part of its basic axioms certain primitive terms, point, line, plane etc. which do not objectively exist as physical objects as they do not have physical representations upon which repeatable objective experiments can be performed. Points don't exist, spherical physical representations with radius $r_\varepsilon > 0$ do exist. Lines don't exist, right circular cylindrical representations of radius $r_\varepsilon > 0$ do exist. Planes don't exist, rectangular solid representations of thickness $\Delta z > 0$ do exist. Triangles don't exist, representations made from lines composed of right circular cylinders of radius $r_\varepsilon > 0$ do exist etc. The calculus as used by physicists should therefore be based on the physical representations given above. This criticism is highly non trivial as Newton's Laws are written for point particles: Points with a given mass but no volume. Newton's Laws need to be rewritten so as to be based on point like particles. That is, particles with a continuous, deformable, finite mass in a finite volume where the volume of the particles is determined by experiment. The particles in question are atoms and photons. This work is done in chapter 6, section 4.

The sentential calculus if it is to represent physical reality must also be rewritten so that all primitive terms and postulates represent physical reality and be repeat ably testable. All primitive terms and postulates must be given operational definitions so that they are experimentally measurable using standardized units of measurement. The tautology, "Either it is raining or it is not raining" is replaced by "Either it is raining at point $\underset{\sim}{x}$ at time t or it is not raining at point $\underset{\sim}{x}$ at time t" where, either/or, raining, not raining, point $\underset{\sim}{x}$ and time t are given operational definitions.

The non tautological, operationally defined truth tables used in chapter one, are an example of an operationally defined symbolic logic.

All of the mathematics used by physicists should have no undefined primitive terms. All primitive terms used by mathematical physicists should have physical representations upon which physical measurements can be made and the numbers representing the results of the measurements must have physical units, gm, sec, cm etc. This is not presently the case. The principle unknown of Quantum Theory, the wave function $\Psi(r,t)$, is a complex number. Complex numbers do not represent objective, physical, measurable, reality, and they have no possible physical units to measure them by. There is a mathematical operation, the absolute value of a complex number, which yields a real number to which units can be assigned. However there is no valid physical representation of a mathematical operation which starts with a complex number which does not represent objective physical reality and to which no measurable units can be assigned and ends with a real number which represents physical reality and to which measurable units are assigned.

As it stands, physical reality $|\Psi(r,t)|$ is a mathematical consequence of a ghost with no measurable properties namely $\Psi(r,t)$. Physical reality we are told is a consequence of an object that does not represent physical reality.

Consider an axiomatic system consisting of n axioms. Call it $\{A_n\}$ and let Th_1
(theorem 1) using agreed upon inference rules be derived from $\{A_n\}$. i.e. $\{A_n\}\Rightarrow Th_1$.
Assuming the system is self consistent, $\{\sim A_n\}\not\Rightarrow Th_1$, but $Th_1\neq\sim Th_1$, so $\{\sim A_n\}\Rightarrow\sim Th_1$.
Thus within the confines of non experimentally testable axiomatic systems
one can prove what ever one pleases, Th_1 and $\sim Th_1$. Formally, $\{A_n\}\Rightarrow Th_1$, $\sim Th_1\Leftarrow\{\sim A_n\}$.

If the aim is to create a system that represents experimentally testable physical
reality, then that system must be based on testable postulates that are tested and
found to be physically true. Using experimentally verified inference rules one derives
theorems that are experimentally verifiable. This is the ideal case which because of
lack of time and money is rarely carried out.
Consider a postulational system consisting of n testable postulates. Call it $\{P_n\}$ and
let th_1 (theorem 1) using experimentally verified inference rules be derived from $\{P_n\}$.
i.e. $\{P_n\}\Rightarrow th_1$. Assuming the system is self consistent, $\{\sim P_n\}\not\Rightarrow th_1$, but $th_1\neq\sim th_1$, so
$\{\sim P_n\}\Rightarrow\sim th_1$.
Thus within the confines of experimentally testable postulational systems one can
prove what ever one pleases, th_1 and $\sim th_1$. Formally, $\{P_n\}\Rightarrow th_1$, $\sim th_1\Leftarrow\{\sim P_n\}$.
However insofar as $\{P_n\}$ and th_1 are experimentally true then $\{\sim P_n\}$ and $\sim th_1$ are
experimentally false. Therefore in so far as the aim is to create a system that
represents experimentally testable physical reality, $\{\sim P_n\}$ and $\sim th_1$ may be disregarded.

The mathematics used in the text is the calculus and mathematical analysis of a real
variable, and is treated as if it were derived from testable postulates.

To sum up:
A central tenant of modern physics is the proposition that the speed of
electromagnetic radiation is an absolute constant. That proposition is the 2nd
postulate of special relativity theory. In chapter 1 of the enclosed text, it is rigorously
proved that:
1. If the 1st postulate of special relativity is true, then the 2nd postulate is false.
2. If the 1st postulate is true then the speed of light is vectorially additive.
3. If the 1st postulate is true then $E\neq mc^2$
This necessitates the creation of a new atom. The aim of the text is to create the
new atom within the context of Newton's Laws rewritten for point like particles.

1. The new atom consists of a neutral, spherical, continuous mass with
experimentally determined mass and radius as given in published periodic tables of
the elements and in agreement with the determination of those quantities in chapter
four of the text.

2. The s.m.a. (Solid mass atom) is held together by a central force whose potential

for two point like masses is $\Phi_{12} = -\dfrac{m_1 m_2}{r}[H\, e^{-(r/r_\varepsilon)^n} + G]$ with n large enough so

that Φ_{12} is effectively a square well at atomic dimensions. In order to derive

Rutherford scattering, H is determined to be: $H \approx 1 \cdot 10^{30}$ ergcm/gm^2 with

($G = (6.67)10^{-8}$ ergcm/gm^2).

3. The s.m.a. is kept from collapse by contact forces generated by internal vibrations resulting in internal pressures that keep the atom from collapse. This is a fundamental postulate that has not been reduced to a more fundamental postulate. With r measured from the center of the atom, the pressure generated by internal

vibrations is $P_C(r) = -\dfrac{1}{3}\displaystyle\int_r^{r_0} \rho(r) U[r]_{rms} \dfrac{dU_{rms}}{dr} dr$.

4. It is assumed that for small enough translational kinetic energies, charge neutral s.m.a.'s undergo elastic collisions with one another. See #5 below

5. The electromagnetic field is considered to be composed of small solid mass photons generated by the collision of two s.m.a. The photons under go elastic collisions with their parent s.m.a.'s increasing in kinetic energy until, in the case of continuous spectra, their mean kinetic energy is the same as the mean kinetic energy
of their parents. For photons emitted by a Tungsten source at 800ºK with speed $(3)10^{10}$ cm/sec (As measured with source and measuring device at rest with

respect to one another) and self binding energy 1ev, $m_{ph} = 10^{-10}$ amu and $r_{ph} = 10^{-31}$ cm. When in the act of creating a small mass photon, the parent atoms do not undergo an elastic collision.

6. As derived in chapter 6, the origin of spectral lines is due to a temperature dependent threshold energy for the creation of photons. Below the threshold energy, no photons are created by 2 colliding atoms. At the threshold energy a spectral line photon is created by 2 colliding atoms. In order to exceed the threshold, 2 colliding atoms must pass through the threshold thereby emitting a spectral line photon when at the threshold. Therefore there are effectively no 2 colliding atoms above
the threshold energy for those atoms emitting a sharp spectral line.
Interference effects are due to reflection of solid mass photons from a spectral grating into bright lines and away from dark lines as discussed in chap.6, sec 6.

7. Coulomb charge, that is the energy contained in a "Charged" object, is stored as (Due to) a radial oscillation of the s.m.a. Repulsive and attractive effects are explained on an experiment by experiment basis. See 8 and 9 below.

An electric current is the passage of the radial oscillation and energy contained in the radial oscillation by direct contact of one s.m.a. with its neighbor in say a copper wire.

8. Static electric (Turbo electric) gold foil repulsion is hypothesized to be due to heating of the air between the two gold leaves. At S.T.P. a temperature difference of + 0.02^{o}K between the air on the near side of the leaves and the far side of the leaves suffices to spread the leaves 40°. No air, no repulsion. The heating is due to the radial oscillation of the gold atoms which increases the temperature of the gold leaves by + 0.02^{o}K .
The repulsion experienced by gold leaves connected to a continuous 1000V. D.C. source has a completely different explanation and does not require air between the leaves. See #9.

9. The force experienced by two parallel current carrying wires is derived in chapter 7, section 11.

10.   A derived property of the continuous mass atom is induced explosion. By removing enough of the mass of the s.m.a., the remaining mass will explode into space. This property is derived in chapter 3.

11. $\underset{\sim}{V} \times \underset{\sim}{B}$ Effects. Restricting attention to cyclotrons. In order for a cyclotron to produce a beam, there must be a background gas in the cyclotron with pressure <10^{-4}mmHg. Without the background gas, there is no beam current. Briefly, solid mass photons from the cyclotron magnet are adsorbed by the background atoms. The background atoms explode (See 15 below) and the explosion products push the beam atoms into a spiral path. The details are examined in chapter 8.

12. It is hypothesized that the Van Allen Belts are comprised of neutral, radially oscillating solid mass particles in gravitational orbit about the earth.

13. The energy radiated by stars is hypothesized to come from the gravitational field of the star. A contraction rate of 1m/year is sufficient to account for the energy radiated by the sun during 1year.

14. The equation of state for a solid PV=$\dfrac{2r_{0}NKT}{\overline{R}}$ is derived in chapter four. r_{0} is the mean radius of the atom and $2r_{0}+\overline{R}$(T) is the mean distance between the center of mass of two adjacent atoms. All quantities are experimentally determined. From the equation of state one derives the speed of sound $c^{2}=\dfrac{P}{\rho}=\dfrac{2r_{0}KT}{m\overline{R}}$. m is the mass of the atom. This equation yields sound speed data in excellent agreement with the experimentally determined speed of sound in the transition metals. See table 4.2 .

15. As regards atomic and thermonuclear weapons. It is necessary to give an explanation of the energy liberated by these weapons without resort to the disproven

formula E=mc^2 and to do so without giving enough engineering details so as to enable terrorists to construct such weapons.

As derived in chapter 10 of the text in order to construct and explode an atomic device it is necessary to:

a. Shrink the s.m.a. until it's binding energy is, in the case of an atomic bomb, $\approx$ -200Mev per atom. This cannot be done by cooling the s.m.a. even to 0^+ ^oK. How in principle this is done is discussed in chapter 10 of the text.

b. Induce the s.m.a. to explode by adsorbing a neutral particle of mass m_{ex} and radius<<1$\overset{o}{A}$. As m_{ex} is attracted to the center of the atom, it will exchange potential energy for kinetic energy which will excite the internal mass of the atom by direct contact. As derived in chapter 10, when the excitation energy is greater than the absolute value of the binding energy of the atom, the atom will explode creating more m_{ex}'s and initiating a chain reaction

The general thrust of the research can be gleaned from 1 to 15 above. It is to:
a. Hypothesize a physical model for the new atom.
b. Hypothesize the mathematical nature of the field of that atom.
c. Apply the mathematics to a given physical experiment and solve the mathematics so as to obtain numerical results which can be compared with the numerical results obtained by performing the physical experiment.
d. Compare the numerical results of the mathematics with the numerical results obtained by actually performing the experiment.

Consideration of #15 above will convince one that for political, social and economic reasons, the task of creating the solid mass atom is much more than just an intellectual exercise.

It is the aim of the text therefore to:

1. Replace the current mathematics of mathematical physics with mathematics, (As developed in the text), based on a generalization of the mathematics developed by Isaac Newton in his text "Principia Mathematica" published some 330 years ago.

2. To eliminate the concept of charge. The concept of charge energy in a field is replaced by the energy stored as radial oscillation energy, (radial expansion and contraction) of one neutral continuous mass atom or continuous mass photon.
3. Replace the electromagnetic field with the continuous mass photon.

4. Replace the quantum mechanical atom with the continuous mass atom

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