Chapter 31

RELATIVISTIC DYNAMICS: MASS, MOMENTUM, ENERGY & FORCE

In Section 10 of his Special Theory, Einstein theoretically applied his relativistic kinematic concepts to the mass of an electron. He imagined and described a new type of electromagnetic mass for the electron, the magnitude of which varied depending upon its relative velocity. This ad hoc *theory, which is now called Relativistic Mass, was the basis for his other relativistic concepts of dynamics and mechanics: Relativistic Momentum, Relativistic Force, and Relativistic Energy. Relativistic Mass also became the mass for Einstein's September 1905 mass-energy paper ($E = mc^2$). However, none of these* ad hoc *concepts and theories has any empirical validity. They are all meaningless.*

A. Einstein's electromagnetic concept of relativistic mass.

Einstein's Lorentz transformations succeeded in making his absolutely constant velocity of light at *c* mathematically invariant (or covariant) in all inertial reference frames, but only at the price of making classical mechanics no longer invariant in such frames when transformed by Lorentz transformations. "What had been gained on one side had been lost on the other." (D'Abro, 1950, p. 156) Einstein's only way out of this theoretical dilemma, and to retain mathematical consistency for his Special Theory, was "to assume [*ad hoc*] that the classical laws [of mechanics] were incorrect."[1] (*Id*.)

> "Accordingly," states D'Abro, "the problem confronting Einstein was to formulate new laws of mechanics which would be invariant under the Lorentz-Einstein transformations, and which at the same time would tend to coincide with the classical mechanical laws when low velocities were considered. This last restriction stemmed from the fact that for low velocities the classical laws of mechanics were known to be very approximately correct." (*Id*.)

"Einstein obtained the revised mechanical laws" by conjecturing that the magnitudes of most physical phenomena (including length and time intervals) were

[1] The real reason for this dilemma was that Einstein's impossible concept of the absolutely constant velocity of light at *c* relative to everything was empirically invalid, as were his Lorentz transformations. (see Chapters 21 and 27) Classical mechanics, though not completely theoretically correct, was not the real culprit.

dependent upon relative velocity.[2] (*Id*) Einstein continued his attempt to change all of the classical laws of mechanics in Section 10 of his Special Theory with his *ad hoc* velocity dependent concept of Relativistic Mass. If Einstein could convince his readers that mass was not really an invariant quantity, but rather varied and increased with relative velocity, then mathematically every other relativistic concept of mechanics and dynamics (which mathematically depended upon mass), including momentum, force, acceleration and even energy, would automatically follow with algebraic precision.[3]

"In classical physics inertial mass m_i is an inherent characteristic property of a particle and…is independent of the particle's motion." (Jammer, 2000, p. 41) In contrast, Einstein's theoretical concept of Relativistic Mass m_r, as described in Section 10 of his 1905 Special Theory, was a velocity-dependent mass which depends on the relative velocity of the moving reference frame as measured by Einstein's relativistic kinematics from one inertial reference frame to another. Jammer described Relativistic Mass by "the equation $m_r = m_0/(1 - u^2/c^2)^{-½}$," where m_0 represents the proper mass of a particle at rest in relatively moving reference frame k, u is the velocity of the particle as measured from the relatively stationary reference frame K, and *c* is the velocity of light. [4] (*Id*.)

In Section 10 of his Special Theory, entitled the 'Dynamics of the Slowly Accelerated Electron,' Einstein conducted another thought experiment. He imagined "an

[2] This conjecture was completely *ad hoc*, and like Einstein's many other *ad hoc* conjectures, it never should have been made.

[3] Where did Einstein get the *ad hoc* idea that the magnitude of physical phenomena might be dependent upon relative velocity? Possibly from Lorentz's transformation equations in his April 1904 treatise which asserted that the constant velocity of light at *c* in Michelson's experiments was somehow dependent upon the velocity of the Earth relative to the Sun and the ether. However, we now know that this assertion was incorrect, because we now know the real reasons for Michelson's paradoxical null results, which have nothing to do with any relative velocity dependent phenomena. (see Chapter 16) Possibly Einstein got such *ad hoc* idea from Kaufmann's 1901 – 1902 experiments which asserted that electromagnetic mass varied depending upon the velocity of an electron.

[4] This equation appeared in Lorentz's April 1904 treatise. (Jammer, 2000, p. 42) Such equation for Relativistic Mass may also be written as: $m = m_0 / \sqrt{1 - v^2/c^2}$. (see Feynman, 1963, p. 15-1)

electrically charged particle…an 'electron'…in motion in an electromagnetic field…" (Einstein, 1905d [Dover, 1952, p. 61]) Einstein stated that he was seeking the law of motion of the slowly accelerated electron.[5] (*Id*.)

At this point, we must ask the following questions. Why did Einstein choose an electron in an electromagnetic field for the subject of his discussion of Relativistic Mass, whereas before in his Special Theory he had usually referred to a ponderable body in empty space?[6] The apparent answer is because the mass which Einstein was going to imagine and describe in Section 10 was the highly theoretical 'electromagnetic mass' of an electron moving in an electromagnetic field. In other words, such 'mass' was actually an electromagnetic resistance or inertia masquerading as a material mass (see Chapter 17), rather than the ponderable (weighable) inertial mass of a ponderable (weighable) material body. As Abraham acknowledged in 1902:

> "the inertia of the electron originates in the electromagnetic field."
>
> "the mass of the electron is of purely electromagnetic nature." (see Jammer, 1961, p. 151)

In this regard, Miller pointed out that in the original German version of his Special Theory, Einstein used the symbol 'μ' for 'm' "even though in the German language scientific literature this symbol was usually reserved for the electromagnetic mass." (Miller, p. 308) This fact, as well as Einstein's abrupt switch from a rigid body in space to an electron in an electromagnetic field, and his later references to 'longitudinal

[5] Why was Einstein so interested in keeping the electron slowly accelerated? Probably so that when he conjectured that the motion and mass of the electron should also apply to ponderable material objects, the speed of such electron would appear to be within the normal range of speeds for material terrestrial objects. This might make such *ad hoc* conjecture appear to be more credible.

[6] The word 'ponderable' means: 'that can be weighed.' (Webster's Dictionary, p. 1049) Almost everything in Einstein's Special Theory before Section 10 dealt with a rigid or solid body as an irreducible entity. But in § 10 Einstein switched "to the notion of a *point* electron moving according to the kinematics derived in Part I of the relativity paper." (Miller, p. 305)

mass' and 'transverse mass,' which are only applicable to an electromagnetic mass, strongly implies to the author that throughout almost all of Section 10 Einstein was only discussing an 'electromagnetic mass' (an electromagnetic resistance), rather than the inertial mass of ponderable matter. In fact, Einstein twice acknowledged that the author's interpretation is correct. In the middle of Section 10, Einstein conjectured that the longitudinal mass and the transverse mass "are also valid for ponderable material points" (Einstein, 1905d [Dover, 1952, p. 63]), and toward the end of Section 10, he conjectured that the kinetic energy of the electron's mass must also apply to "ponderable masses as well." (*Id*., p. 64)

Why did Einstein decide to use and analyze an electromagnetic mass (a resistance) rather than the ponderable mass of a weighable body? Because Kaufmann's 1901 – 1902 experimental data suggested that electromagnetic mass varied depending upon the velocity of the electron; whereas, there was absolutely no empirical evidence that the ponderable mass of a rigid body ever varied because of its velocity. Thus, an analysis of the ponderable mass of a rigid body would not have furthered Einstein's relativistic agenda.

In Section 10, Einstein began his thought experiment by imagining that the electron was at rest in moving inertial reference system k. He conjectured that the slightly accelerated motion of the electron in system k was described by three equations, and that "m [is] the mass of the electron, as long as its motion is slow."[7] (Einstein, 1905d [Dover, 1952, p. 61]) Thereafter, Einstein applied the Lorentz transformations and the transformations which he found in Section 6, and transformed the equations for the

[7] This statement means that at low speeds, the mass of the electron was substantially the same as the non-velocity dependent classical mass m.

electron's motion in k to the stationary reference system K. He then asserted that a 'pondermotive force' was acting on the electron and was accelerating the electron in accordance with the equation F = ma. [8] (*Id*., p. 62)

But wait a minute. In Section 6 of his Special Theory, Einstein had denied that there was an 'electromotive force' that acts on a point charge moving in an electromagnetic field.[9] Instead he asserted that the force acting upon the electron was nothing more than the 'electric force.' (see Chapter 30A) Why is this case any different? Why is it not the 'electric force' of the electromagnetic field which is acting on the electric charged particle (the electron)?[10] Einstein probably mischaracterized such force as 'pondermotive' so that he could later conjecture that the electromagnetic mass of the electron also applied to ponderable masses. A 'pondermotive' force means a 'weight moving force' such as Newton's force in F = ma. Somewhat later in Section 10, Einstein acknowledged that he needed the definition of force that he had chosen in order to derive his equations for longitudinal mass and transverse mass, because: "with a different definition of force and acceleration we should naturally obtain <u>other values</u> for the masses."[11] (Einstein, 1905d [Dover, 1952, p. 63])

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[8] The phrase, 'as long as its motion is slow,' also implied to Miller "that, as a result of the <u>relativity of simultaneity</u>, we can expect certain changes to occur in the mathematical formulation of this law"… m = F/a. (Miller, p. 308)

[9] According to the electron theory: "Conductors of electricity, for example silver or copper metal, contain electrons which are free to move through the metal under the influence of electrical forces. Electrons are the fundamental entities of electric charge. When they move, they constitute an electric current. Should the electron, in its motion, be in the vicinity of a magnetic field, a force should be exerted on the electron in a direction opposed to its motion. This type of force is referred to as electromagnetic inertia of the electron." (Goldberg, p. 134)

[10] Again, this is what Abraham acknowledged in 1902: "the inertia of the electron originates in the electromagnetic field." "The mass of the electron is of purely electromagnetic nature." (Jammer, 1961, p. 151)

[11] Einstein needed to obtain the same or similar values for longitudinal and transverse mass for his Special Theory, as was previously obtained by Kaufmann, Abraham and Lorentz, in order not to appear too *ad hoc*. Einstein appears to contradict himself two paragraphs later when (instead of a pondermotive force) he

Remember that the concepts of longitudinal mass and transverse mass were invented by Abraham in 1903 in order to describe Kaufmann's 1901 – 1902 experiments with the electromagnetic mass of electrons and the data which he collected and published in 1902. (see Chapter 17) At the end of his April 1904 treatise, Lorentz also referred to the "electromagnetic masses" of electrons which Kaufmann and Abraham had found, and Lorentz asserted that the values which he himself had found (based on his April 1904 theories) for the same masses agreed with Kaufmann's measurements "nearly as well as with those of Abraham." (see Lorentz, 1904c [Dover, 1952, pp. 30 – 34])

Einstein asserted in § 10 that he took "the ordinary point of view" in his inquiry "as to the 'longitudinal' and the 'transverse' mass of the moving electron."[12] (Einstein, 1905d [Dover, 1952, p. 62]) Einstein's equations for these 'apparent' masses were:[13]

$$\text{Longitudinal mass} = \frac{m}{(\sqrt{1 - v^2/c^2})^3}$$

$$\text{Transverse mass} = \frac{m}{1 - v^2/c^2} \quad (\textit{Id.}, \text{p. } 63)$$

In order to derive these equations, Einstein called his 'pondermotive force' simply 'the force acting upon the electron,'[14] he maintained the equation F = ma, and he decided "that the accelerations are to be measured in the stationary system K."[15] (*Id.*)

According to Einstein's concepts of longitudinal mass and transverse mass, as the

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described the motion of the electron "under the action of an electrostatic force" and "the energy withdrawn from the electrostatic field" by the motion of the electron. (Einstein, 1905d [Dover, 1952, p. 63])

[12] The 'ordinary point of view' "was Abraham's in which the electron's mass was a two-component quantity that depended upon the orientation of the external forces and was totally electromagnetic in origin." (Miller, p. 309)

[13] In order to remain consistent with the rest of his Special Theory, the m in each equation should have been m_0, the proper rest mass in system k.

[14] According to Einstein, this force "followed from the relativity of electromagnetic fields." (Miller, p. 309) This concept was, of course, *ad hoc*. Einstein considered the force he used as equivalent to Lorentz's force law, and he referred to Lorentz's derivation of it as a major achievement. (Miller, pp. 309 – 310) For a description of Lorentz's electromagnetic force law see Resnick, 1968, p. 120.

[15] The accelerations of the electron in the moving system k needed to be measured in the stationary reference system K in order to obtain the Relativistic Mass, because if measured in system k the mass would only be the proper rest mass m_0.

relative velocity v of system k increases so does the mass of the electron (as measured in K), and when v approaches *c* the mass m_r of the electron in k (as measured in K) increases toward infinity.[16] (see Chart 31.1 and Figure 31.2) As will be seen on Chart 31.1A and Figure 31.2, Einstein's values for longitudinal mass match Lorentz's April 1904 values exactly,[17] but they differ dramatically from Abraham's values. Remember from Chapter 17 that Abraham had determined that Kaufmann's 'longitudinal mass' was meaningless and immeasurable. So why did Einstein derive a formula for Longitudinal Mass and thus imply that it did have meaning and was measurable? Most likely because he did not know about Abraham's conjecture and was merely mimicking the theories of Kaufmann, Abraham and Lorentz without much scrutiny or original thought. On the other hand, Einstein's values for transverse mass differ dramatically from both Abraham's and Lorentz's values. (see Chart 31.1B)

Miller believed that Einstein's variations with respect to Lorentz's magnitudes for transverse mass required an explanation, and that the question why Einstein did not provide one in his Special Theory was a mystery. (Miller, p. 312) However, there is very little mystery for the author. Any such explanation by Einstein might have signaled that he had read Lorentz's April 1904 treatise and that he had 'borrowed' many of its concepts, especially the Lorentz transformation equations, which he claimed to have derived from his two fundamental postulates.

Shortly thereafter, Einstein conjectured that these results for the increase in (electromagnetic) mass of the electron are also valid for ponderable matter. (Einstein,

[16] Since momentum becomes m_0v, the momentum of the particle likewise theoretically increases toward infinity in Einstein's Special Theory.
[17] This is further evidence for our conclusions in Chapter 27 that Einstein had read Lorentz's April 1904 treatise well before he published his Special Theory, and that he copied many of Lorentz's concepts in his Special Theory.

1905d [Dover, 1952, p. 63) In Einstein's own words:

> "We remark that these results as to the mass are also valid for ponderable material points, because a ponderable material point can be made into an electron (in our sense of the word) by the addition of an electric charge, no matter how small."[18] (*Id*.)

On the contrary, as we previously explained, all that Einstein was dealing with were the resistances provided by the electromagnetic field to the motion of an electron through it, which when using the formula F = ma mathematically results in increases in mass m. These electromagnetic resistances had been mischaracterized by everyone during the latter part of the 19th century as 'apparent' masses in order to remain consistent with Euler's incorrect formula F = ma for the determination of the masses. This incorrect characterization was perfect for Einstein's theory of Relativistic Mass, because such electromagnetic 'apparent' masses (re-characterized as ponderable masses) would vary with velocity in his Special Theory.[19] (Chapter 17) This is the major reason why Einstein wanted to maintain the equation F = ma.

But, if there were no real increases in the mass of an electron due to such electromagnetic resistances, how could Einstein's concept of a variable mass for the electron depending upon relative velocity be extended to (and be empirically valid for) the mass of ponderable matter? It could not. In light of the above discussion, we must ask the question: Does Einstein's Relativistic Mass even exist?

[18] This conversion of a material point into an electron was, of course, nothing more than Einstein's imagination of hyperbole at work. Einstein's 'sense of the word' electron was, of course, fantasy.
[19] As the author explained in Chapter 17, Euler's formula (F = ma) should have been modified to F = (m – R)a, or the equivalent, in order to account for the environmental resistances to motion (R), to show the correct force, mass and acceleration, and to prevent such resistances R from being mathematically characterized as increases in mass.

B. Does Einstein's Relativistic Mass Exist?

In early 1906, German scientist, Max Planck, showed that with a different definition of force (vis. the rate of change of momentum) Einstein's equations (from which he derived transverse mass) could be written in a different form. From this different form for Einstein's equations, Planck also derived a different equation for transverse mass:[20]

$$m_r = m_r Y_u = m_0(1 - u^2/c^2)^{-½}$$

(Jammer, 2000, pp. 43 – 44)

During the period 1909 – 1912, in order to demonstrate that the relativistic formulas for mass and momentum could be derived from mechanics principles, as well as electromagnetic principles, American mathematical physicist Richard Tolman (1881 - 1948) invented a series of relativistic thought experiments wherein identical bodies collided. (Jammer, 1961, pp. 161 – 162) He applied the mechanics principles of conservation of mass and momentum, and Einstein's relativistic addition theorem of velocities to such thought experiments, and derived the same equation for transverse mass as Planck did.[21] (Jammer, 2000, p. 46)

There is little doubt that Planck's derivations, Tolman's method of derivation, and Jammer's derivations are mathematically correct and internally consistent with Einstein's theories and formulas. The only real questions are: Do any of these relativistic

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[20] In his 2000 book, entitled *Mass*, Jammer then rewrote Planck's scalar equation as a vector equation, redefined "force as the (time) rate of change of momentum," and derived the relativistic formula for momentum: $p = m_0 Y_u U$. (Jammer, 2000, p. 44) The symbol "Y_u stands for $(1 - u^2/c^2)^{-½}$." (*Id*., p. 53)

[21] Tolman's method for deriving Relativistic Mass has generally been adopted by the scientific community. (Jammer, 2000, p. 46) In order to demonstrate the internal consistency of Einstein's relativistic mass concept, Jammer (in his 2000 book) also mathematically demonstrated that "the equation $m = m_0 Y_u$ is a direct consequence of the Lorentz transformation." (*Id*., pp. 49 – 50)

derivations, equations and computations mean anything? Does Einstein's mathematical Relativistic Mass have any relevance to reality? Does Relativistic Momentum derived from Relativistic Mass have any empirical meaning? Is there any empirical evidence that ponderable inertial mass is velocity-dependent?

First of all, we must remember that Einstein was not just asserting that mass was velocity dependent, but rather he was asserting that it was relative velocity dependent. One must then ask the question: What does relative velocity have to do with anything? Every co-moving body in the Cosmos has a relative velocity with respect to every other co-moving body. But very few of such relative velocities have any relevant meaning.

According to Einstein's Special Theory, the measurement of the magnitude of the mass of a body depends upon the relative motion of the observer "with respect to the body of reference chosen in the particular case."[22] (Einstein, *Relativity*, p. 60) This means that the measured mass of a body will depend upon which body of reference is chosen and which observer is doing the measuring with respect to the relative motion in the particular case. In other words, according to Einstein, the same ponderable inertial mass of a material body can vary from m_0 to a magnitude approaching infinity in each reference frame depending upon who is doing the measuring.

How does the chosen body of reference know that it has been chosen by an observer, and by which observer? According to Einstein, every body in the Cosmos has an infinite number of different mass values depending upon which infinite observer is doing the measuring? If the observer doing the choosing of the body of reference

[22] As we learned in Chapter 28, the only reason that motion effects such measurement is because of Einstein's 1905 methods of hand and eye measurements of coordinates, where it is physically impossible to measure the front end and the rear end of a moving rod, simultaneously. (see Resnick, 1992), pp. 480 – 481) This is not a very good reason to change all of mechanics and much of physics, especially in the 21st century when such hand and eye measurements are completely obsolete.

changes his mind and chooses a different body of reference, will the magnitude of the body's mass that is being measured instantaneously change to a different magnitude of mass? How does the mass of just one co-moving body (i.e. the chosen body of reference) increase the mass of just one other co-moving body to the exclusion of all of the others? By what process does this selective increase of mass occur, and how does it occur at a distance? Does Einstein's Relativistic Mass concept have any real or physical meaning with respect to anything? The answer is no.

Secondly, one must ask the question: What relevance does electromagnetic mass, which is nothing more than an electromagnetic resistance or inertia, have to do with the material mass of ponderable bodies? Einstein's attempts to turn an electromagnetic resistance and its related experiments (by Kaufmann and others) into the ponderable mass of a material body may have fooled those who wanted to be fooled, but they do not fool the author. Of course, the relative velocity of an electromagnetic resistance has nothing to do with a ponderable mass.[23] For this reason alone, Einstein's contrived *ad hoc* concept of Relativistic Mass has no empirical validity.

Thirdly, D'Abro described Einstein's concept of Relativistic Mass, and its above described problems, in the following manner:

> "According to Einstein, the electron increases in mass only in so far as it is in relative motion with respect to the observer. Were the observer to be attached to the flying electron no increase in mass would exist; it would be the electron left behind which would now appear to have suffered the increase. Thus mass follows distance, duration and electromagnetic field in being a relative having no definite magnitude of itself and being essentially dependent on the conditions of observation." (D'Abro, 1950, p. 160)

[23] Even if there was a ponderable mass that was dependent upon relative velocity this would have violated the mechanical co-variance of Galileo's principle of relativity, which Einstein claimed he was attempting to reconcile with the constant velocity of light at *c*. (see Chapters 19 and 24) Unless, of course, if we applied Einstein's empirically invalid kinematic measurements to the situation.

Does any of this description make any empirical sense? Of course not.

Goldberg also made the following insightful comments about Einstein's illusionary concept of Relativistic Mass:

> "We must consider the measurement of mass within the special theory of relativity from two different perspectives, one in which the mass is at rest with respect to us, and one in which the mass is moving at a high rate of speed relative to us."[24] (Goldberg, p. 143)

> "In the Einstein theory…the increase in mass had nothing to do with a specific theory of the electron. In fact it derived only from the measurements of lengths and times and was a kinematic result."[25] (*Id*., p. 141)

> "Does the mass of objects moving with respect to the observer who is measuring actually increase? Within the theory of relativity this question has no meaning. We might coin a phrase: 'Actually is as actually measures.'"[26] (*Id*., p. 147)

> "For as with all other parameters that are treated within the theory of relativity, the change in mass says nothing essential about the body itself, but results as an artifact of the way distances and times are measured for the same events by different inertial observers."[27] (*Id*.)

In other words, the mathematical illusions which result from the Lorentz transformations and Einstein's other bizarre kinematic methods of measuring the magnitudes of physical phenomena (i.e. mass) do not actually change such physical magnitudes. The observer (measurer) who is moving away from the object or the physical phenomenon to be measured only mathematically perceives a different

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[24] But why must we do this? Mass is not a telephone pole which we perceive to have a different height if it is next to us and if it is one hundred yards away. In the case of the telephone pole, our speed does not change our perspective and perception of its height; only distance does. Why is mass any different?

[25] Even Born and Resnick admitted that Einstein's concept of Length Contraction did not result in a physical shortening of a rigid rod. Such shortening was only an illusion of coordinate measurement when relative motion between the measurer and the object to be measured was involved. Illusions of shortening, etc., have no place in physics. (see Chapters 26 and 28)

[26] These ludicrous comments have no meaning with respect to our telephone pole analogy. The telephone pole does not physically change in height just because we perceive it to by our eye measurements. Such measurements of an illusion cannot change reality. We might coin another phrase: "Actuality is as actuality measures reality, not an illusion."

[27] This same type of artifact (i.e. an illusion) results from our eye measurements of a telephone pole at two different distances, but it is a meaningless artifact. Einstein's ridiculous methods of measuring illusions cannot change physical reality.

magnitude because of the unrealistic and unscientific way that Einstein requires distances and times to be measured in his Special Theory.

Based on the above, one might ask: Why did Einstein require such obviously distorted measurements for his Special Theory,[28] and why must we continue to utilize them especially if we know that they are deformations of reality?[29] It becomes obvious that if Einstein had not invented his radical, bizarre and empirically invalid methods of measuring (described in Chapters 25 through 29), and had not applied them to mass, then there never would have been a concept or artifact of Relativistic Mass.[30]

For many years after 1905, relativists (and especially particle physicists) defended Einstein's concept of Relativistic Mass on the ground that it was important "when dealing with atomic and subatomic particles." (see Jammer, 2000, p. 54) Feynman attempted to explain such importance, vis. that Relativistic Mass provides the inertia in a particle accelerator which allows particle physicists to interpret both the magnitude of the mass and the magnitude of the velocity of the accelerated particle. Based on Relativistic Mass, Feynman conjectured that when a force constantly acts on the mass of a body, the body keeps picking up momentum rather than speed. This Relativistic Momentum continually increases because the Relativistic Mass is increasing. However, as the mass approaches velocity *c* there is practically no change of velocity, but Relativistic Momentum continues to increase toward infinity. (Feynman, 1963, p. 15-9) In Feynman's own words:

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[28] We already know the answer to this question. Einstein needed such distortions in order to construct his Special Theory, to make his bizarre relativistic concepts appear mathematically plausible, and above all to remain mathematically consistent with his impossible absolutely constant velocity of light at *c* relative to everything. (see Chapters 21 – 29)

[29] We must continue to use such distorted measurements only if we desire to continue to apply Einstein's empirically invalid and meaningless Special Theory to physics.

[30] These conclusions also equally apply to Einstein's other distorted measurements of length, time intervals, addition of velocities, etc., etc.

> "Whenever a force produces very little change in the velocity of a body, we say that the body has a great deal of inertia, and that is exactly what our formula for relativistic mass says—it says that the inertia is very great when v is nearly as great as *c*.[31]
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> "As an example of this effect, to deflect the high speed electrons in the synchrotron…, we need a magnetic field that is 2000 times stronger than would be expected on the basis of Newton's laws. In other words, the mass of the electrons in the synchrotron is 2000 times as great as their normal mass…[T]hat m_i should be 2000 times m_0 means that…v differs from *c* by one part in 8,000,000…[32]
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> "Whenever electrons are going that fast their masses are enormous, but their speed cannot exceed the speed of light."[33] (*Id*.)

The increase of a particle's or a body's rest mass with velocity, or with relative velocity, has never been empirically demonstrated on a macro level: at speeds that are small compared to *c* this conjecture is not even theoretically detectible. (see Sobel, p. 206) In a modern particle accelerator, a particle is interpreted in accordance with Special Relativity to have "a speed of more than 99.99999999 percent of the speed of light." (*Id*., p. 252, F.N. 6) However, without Special Relativity a particle can have no interpretation of its velocity or its mass, whatsoever. Since we have already demonstrated that every concept of Special Relativity is *ad hoc*, an illusion, and empirically meaningless, why should we have any faith at all in such relativistic interpretations on any level: micro or macro?

Let us pause for a moment from discussing all of these theories, equations, experiments and their relativistic interpretations, in order to determine what we are really

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[31] What really causes this great increase in inertia? In a high-energy particle accelerator it is most likely the resistance of the electromagnetic field acting on the accelerated charged particles, i.e. electrons. In other words, it is nothing more than an electromagnetic mass (an electromagnetic resistance). (see Chapter 17)

[32] Feynman assumed that he was dealing with the electron's inertial mass m_i; but he was most likely only dealing with the electron's electromagnetic mass (or resistance). Remember Abraham's acknowledgement: "the mass of the electron is of purely electromagnetic nature." (Jammer, 1961, p. 151)

[33] All of these *ad hoc* interpretations by Feynman are, of course, based solely upon Einstein's Special Theory and his concept of Relativistic Mass, which we have just demonstrated is a mathematical illusion, a resistance, and does not physically exist as a material mass.

talking about and what we are really attempting to demonstrate. Dingle asked: "What do we mean when we speak of the mass of an electron?" (Dingle, 1972, p. 141) He answered:

> "We certainly do not put an electron in a balance-pan and compare it with weights in the other pan. We could not do so because not only can we not capture an electron but also we do not know what it is. A hundred years ago the word denoted a rather vaguely conceived unit of electricity of unknown character. By the end of the nineteenth century it seemed to have been definitely revealed as a particle of negative electricity with measurable properties of the kind familiar in ordinary matter, but thirty years later it was found to possess undeniably wave-like characteristics. The idea then arose that it was a sort of mist of electricity, and Eddington probably gave it the most candid description as 'something unknown doing we don't know what'. We are no wiser today; nevertheless, we speak of the mass of an electron as though it were equivalent to the mass of a lump of lead." (*Id*., pp. 141 – 142)

Dingle then asked the question: "What, then, can we mean when we say that special relativity receives confirmation from the verification of its prediction that the mass of a body increases with its velocity?" (*Id*., p. 142)

> "What we confirm by the experiments (i.e. by the observations and our inferences from them) is that the whole complex of conceptions that yields the highly metaphorical 'mass' and 'velocity' hangs together if we include special relativity (or Lorentz's theory) as a part of it."[34] (*Id*.)

Because Special Relativity is an integral part of that complex of conceptions, such a 'confirmation' "proves nothing at all. It is like claiming, as a proof that a man always speaks the truth, the fact that he says he does." (*Id*.) In effect, such confirmation is circular.

It becomes obvious that the mass of an electron, its increase with velocity, and even the velocity itself are merely speculations, metaphors and interpretations of experiments based largely upon relativistic equations for mass, momentum, force and

[34] This 'complex of conceptions' is none other than what we currently call 'quantum mechanics,' 'particle physics,' 'quantum field theory,' and 'superstring theory.' (see Chapters 34 and 35)

energy and upon Einstein's other relativistic concepts. What else would one expect for a result, other than a 'self confirmation' of Special Relativity?

Let us now do a little theorizing, speculating and interpreting of our own. All of the above theories and experiments that deal with electrons being accelerated in an electromagnetic field and which result in an 'apparent' increase of mass with velocity, sounds a great deal like the electromagnetic mass theories and experiments that occurred just before Einstein wrote his Special Theory in 1905. (Chapter 17) But, again, it later turned out that the apparent electromagnetic mass was only the resistance of the electromagnetic field acting upon the electron moving through it. This resistance had been interpreted as a mass so that the equation F = ma could remain valid. However, it was really just a form of 'electromagnetic inertia' masquerading as a mass, and Euler's equation F = ma should have been modified to F = (m – R)a, or the equivalent, in order to correctly account for the resistance (R).

Now, factor in Feynman's analogy of a force which "produces very little change in the velocity of a body; we say that the body has a great deal of inertia." If the 'apparent Relativistic Mass' in such high-energy particle experiments is instead re-interpreted as an electromagnetic resistance (or inertia as J. J. Thompson called it), then all of such high-energy particle experiments which supposedly confirm Relativistic Dynamics (the Relativistic Mass of a particle, its relativistic velocity and its relativistic energy) would instead confirm the meaningless new interpretation. The modified classical formula F = (m – R)a would also describe this new interpretation.

Some relativists still defend Relativistic Mass on heuristic or aesthetic grounds, i.e. "it paints a picture of nature that is beautiful in its simplicity." (Jammer, 2000, p. 55)

However, others outright "reject the legitimacy of m_r" and find it "objectionable that the mass of a particle decreases or increases for no physical reason," or find it "unreasonable…that the mass of a particle…should depend on purely geometrical details such as the spatial direction of the force…" (*Id*., pp. 53 – 54) Some even "reject m_r, on the grounds that it gives the impression that the effects of relativity are due to 'something happening' to the particle, whereas they are of course due to the properties of space-time."[35] (*Id*., pp. 54, 55) Still others find it 'misleading' and 'not necessary' at all. (*Id*., p. 54)

Jammer concluded that "the general trend, especially in the literature on elementary particle physics, is toward the elimination of m_r" entirely.[36] (Jammer, 2000, p. 55) The "most vigorous campaign ever waged against the concept of relativistic mass" began in 1989 when prominent Russian particle physicist Lev Okun emphatically declared that:

> "in the modern language of relativity there is only one mass, the Newtonian mass m, which does not vary with velocity," and "there is only one mass in physics which does not depend on the reference frame."[37] (*Id*., p. 51)

Relativistic Mass cannot exist for many other reasons. For example, it depends upon Einstein's Lorentz transformations, which we have demonstrated to be *ad hoc* and empirically meaningless in Chapter 27. It also depends upon all of Einstein's fundamental postulates and his relativistic concepts of kinematics, all of which we have demonstrated to be *ad hoc* and empirically meaningless. (see Chapters 21 through 29) In

[35] This statement is, of course, a direct admission that Relativistic Mass does not empirically exist. In Chapter 33 we will demonstrate that Minkowski's *ad hoc* Spacetime geometry is also empirically invalid and empirically meaningless. Therefore, Jammer's conjectures that Spacetime has properties are also meaningless.
[36] On the other hand, some textbooks still cling to the concept of Relativistic Mass. (Jammer, 2000, p. 55)
[37] If Relativistic Mass does not exist, then how do particle physicists determine the mass and the velocity of an accelerated particle? What happens to the remaining concepts of Relativistic Dynamics (momentum, force and energy) which are dependent upon Relativistic Mass? We shall soon answer these questions.

addition, remember the *ad hoc* reason why we began this discussion of Relativistic Mass: Einstein needed to arbitrarily characterize all of the phenomena involved with classical mechanics, including length, time, velocity and mass, so that they could be considered to be relative velocity dependent in order that they would be consistent with his impossible second postulate concerning the absolutely constant velocity of light at *c* and with the Lorentz transformations.

If Relativistic Mass does not exist, is not empirically valid, and the only remaining mass is classical inertial mass, this is yet another huge inconsistency and contradiction to Einstein's entire Special Theory. *Inter alia*, the natural law of mass would, therefore, not be mathematically covariant with respect to Lorentz transformations. Remember Einstein's edict described in Chapter 27:

> "General laws of nature are co-variant with respect to Lorentz transformations…This is a definite mathematical condition that the theory of relativity demands of a natural law…
>
> "If a general law of nature were to be found which did not satisfy this condition, then at least one of the two fundamental assumptions of the theory would have been disproved." (Einstein, *Relativity*, p. 48)

Well, we have now found yet another law of nature which does not satisfy Einstein's requirement of co-variance. That natural law is mass.

If mass is not mathematically covariant, then neither are the other concepts of Relativistic Dynamics: Relativistic Momentum, Relativistic Force, Relativistic Energy, Relativistic Acceleration, and $E_0 = m_0c^2$, which also depend upon Relativistic Mass and relative velocity. Thus, the *ad hoc* and artificial concepts of Relativistic Dynamics and Relativistic Mechanics become things of the past. Ultimately, Einstein's entire relativistic house of cards collapses completely.

C. Relativistic Momentum. A Most Revealing Section!

In Newtonian mechanics, the law of force F was sometimes described by the rate of change of momentum, F = d(mv)/dt, where mass m was the constant inertial mass. (Feynman, 1963, p. 15-8) Newton's first law of motion together with his third law implied the conservation of linear momentum mv. This conservation law may be described as follows: "In the absence of external forces, the momentum of any system is conserved in all interactions." (Goldberg, p. 58) In other words, "the sum of the momenta mv for two or more interacting bodies [i.e. in a perfectly elastic collision] is a constant," zero. (French, p. 6) These Newtonian laws of mechanics worked with great precision for well over 200 years.

However, after 1905, Einstein and his relativistic followers decided that when theoretically viewed from two different inertial reference frames and measured by his relativistic kinematics, the magnitude of momentum was not conserved in both reference frames and that this violated Einstein's principle of relativity.[38] Resnick demonstrated how this non-conservation of momentum was contrived. In a thought experiment, Resnick showed that when two identical billiard balls (each with the same inertial mass and velocity) collide in a perfectly elastic collision, that momentum is conserved for the observer situated in the same inertial system S as the collision, which observer makes proper physical measurements of such collision.[39] (see Figure 31.3A) Resnick then Lorentz transformed the initial and final velocities of such collision to a distant inertial reference system S' using Einstein's relativistic composition of velocity transformations.

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[38] The fiction that observer S' makes hand and eye coordinate measurements of the momentum of a collision in another frame of reference S is, of course, an absurdity.

[39] This is exactly the way that momentum is empirically demonstrated to be conserved in a theoretically perfectly elastic collision anywhere on Earth.

(see Chapter 29) This Lorentz transformation procedure, of course, mathematically changed and distorted all of the relevant magnitudes of the collision which was performed in system S so that momentum of such collision would not appear to be conserved for the observer in S'. (see Figure 31.3B) Thereafter, Resnick decided that the observer in S' "will conclude [from the distorted collision viewed in S'] that momentum is not conserved," and that this violated Einstein's principle of relativity.[40] (Resnick, 1992, p. 482)

For this reason, Resnick stated that "if we are to retain the conservation of momentum as a general law consistent with Einstein's first postulate, we must find a new definition of momentum."[41] (*Id*.) According to Resnick, this new definition must result: 1) in a conservation law where "if momentum is conserved according to an observer in one inertial frame, then [when Lorentz transformed] it is conserved according to observers in all inertial frames," and 2) "at low speeds, the definition must reduce to p = mv, which we know works perfectly well in the non-relativistic case."[42] (*Id*.)

Not surprisingly, this new relativistic definition or formula for momentum turned out to be $p = mv = m_0v/\sqrt{1 - v^2/c^2}$. (see Feynman, 1963, p. 15-8) "Momentum is still given by mv," but (stated Feynman) the new mass m in such formula for Relativistic

[40] Obviously, a much more precise method of determining whether momentum is conserved in two different reference frames is to conduct the same collision experiment in each frame and properly measure the relevant magnitudes within each frame.
[41] Why should we want the conservation of momentum to be consistent with Einstein's first postulate when we demonstrated in Chapter 24 that it was *ad hoc* and empirically invalid? It should be enough that such conservation of momentum is consistent with Galileo's Relativity and with the Galilean transformation equations.
[42] In other words, we empirically know perfectly well from 200 years of experience on Earth that p = mv always works the same way, and that momentum is always conserved in a theoretically perfectly elastic collision (absent external forces).

Momentum is Einstein's velocity dependant Relativistic Mass, $m_{0.}$[43] (*Id*.) "There will still be conservation of momentum in the same way as before, but the quantity that is being conserved is not the old mv, but instead the quantity [in the above equation for Relativistic Momentum] which has the modified mass." (*Id*.)

At the end of his article on Relativistic Momentum, Resnick further insulted our intelligence. He claimed that the above relativistic formula for momentum was in exact agreement with experimental data collected from high energy linear accelerators, which when plotted showed a curve where the assumed momenta of electrons is a function of their assumed velocity.[44] (see Figure 31.3C) In the process, however, Resnick forgot to inform us that the assumptions of momentum and velocity for such electrons which resulted in such curve had been determined solely by interpretations based on and consistent with the concepts of Special Relativity. Therefore, all that such curve really attempted to confirm was that certain concepts of Special Relativity (i.e. the Relativistic Addition of Velocities and Time Dilation) were consistent with and mathematically confirmed another concept of Special Relativity (i.e. Relativistic Momentum and its associated velocities). In effect, that Special Relativity confirmed itself.

How stupid do the relativists think we are? Resnick took a perfectly valid terrestrial collision experiment which conserved momentum, and then Lorentz transformed it to another distant reference frame which, of course, changed all of its magnitudes and distorted such collision so that momentum would no longer appear to be

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[43] On the other hand, if the new mass is relative velocity dependent Relativistic Mass m_0, then it follows: 1) that Relativistic Momentum must also be relative velocity dependent, and 2) that Relativistic Momentum must be empirically invalid and meaningless, because we know from the prior sections A and B of this chapter that *ad hoc* Relativistic Mass is empirically invalid, an illusion, and a myth.

[44] The applicable relativistic curve should have been the one shown as Figure 16.3B, not the one which Resnick displayed on Figure 31.3C, because it was a result of division (not multiplication) and the Lorentz transformations.

conserved when viewed by S'. (Figures 31.3A & 31.3B) He then decided to scrap the perfectly correct Newtonian law of momentum mv and replace it with an *ad hoc* relativistic law for momentum. When the distorted collision experiment in S' was then mathematically compared with such relativistic law of momentum, they were of course consistent for any inertial reference system moving at any relative velocity v. Then Feynman explained and validated this very obvious mathematical subterfuge.

Are the relativists now so arrogant as to believe that no one else on the planet has a brain; that no one else can see through their artificial and transparent mathematical deceptions? After all, the relativists artificially caused observer S' to falsely believe that momentum had not been conserved during the collision in system S, by intentionally sending observer S' distorted magnitudes for such collision by means of Lorentz transformations. What result other than relativistic consistency should any such relativist expect?[45]

It turns out that Relativistic Momentum is not an isolated example of this obvious subterfuge. On the contrary, all Lorentz transformed physical phenomena from one reference frame to another also result in substantially similar transparent mathematical deceptions. Therefore, all of the dozens upon dozens of distorted relativistic concepts and distorted mathematical consequences that result from these Lorentz transformation processes are completely *ad hoc*, artificial and meaningless. Is this science? Of course not; it is pseudo science.

[45] Relativistic Momentum cannot exist for many other reasons. For example, it depends upon Einstein's two fundamental postulates and his kinematic method of measuring, which we have demonstrated to be artificial, illogical and empirically invalid in Chapters 21 and 29. It depends upon the validity and existence of 'electromagnetic mass,' which we have demonstrated in Chapter 17 to be only an 'apparent mass' and in reality only an electromagnetic resistance or inertia. It also depends upon the existence of Relativistic Mass, which we have just demonstrated earlier in this chapter to be a myth. Above all, it depends upon Einstein's Lorentz transformations, which we have demonstrated to be *ad hoc* and meaningless in Chapter 27.

In one of his lectures, Feynman attempted to demonstrate that Einstein's equations for mass and momentum were valid and correct. Feynman stated that the Newtonian law of force "is the rate of change of momentum, or F = d(mv)/dt," where mv is momentum. (Feynman, 1963, p. 15-9) "In Newtonian mechanics [momentum] is proportional to the speed…[and it increases until the body] goes faster than light."[46] (*Id.*) But this is not really true on Earth. Feynman has forgotten the R (resistance) which we added to Euler's equation F = ma, to get the more correct equation F = m(a – R).[47] Remember that in Chapter 17, the electromagnetic mass m of a naturally accelerated charged particle (i.e. an electron) appeared to mathematically increase dramatically, depending upon its assumed acceleration (a) or velocity (v), when the path of such electron was theoretically deflected by a strong magnetic field, R. However, this greater mathematical mass m turned out to be just a greater electromagnetic resistance, R.

In a modern synchrotron, if we theoretically accelerate a particle with a tremendous electric current we should increase the charge of the particle to many times the charge of a natural electron in order to greatly increase its velocity. If the path of this highly charged particle is then deflected by a magnetic field which is 2,000 times stronger than normal, this super strong magnetic field should apply 2,000 times the normal electromagnetic resistance to the velocity of the particle.

If we analyze this scenario with the unmodified Newtonian equation for force, this much greater electromagnetic resistance R must be accounted for somewhere, and the only logical place is an increase in the particle's mass m. On the other hand, if this scenario is analyzed with the properly modified Newtonian equation for force, F = d(m[v

[46] This might be theoretically possible in empty space far from large gravitating bodies.
[47] Resistance comes in many forms, including: friction, colliding with air particles, the force of gravity, and electromagnetic resistance.

– R])/d/t, then the very great electromagnetic resistance can be accounted for by the R and the lesser velocity v, and the mass m of the particle will remain constant.[48]

Feynman also stated that Einstein's relativistic law of momentum is

$$p = mv = \frac{m_0 v}{\sqrt{1 - v^2/c^2}},$$

"where the 'rest mass' m_0 represents the mass of a body that is not moving" and *m* is "the mass of a body [which] increases with velocity." (*Id*., pp. 15-1 and 15-9) Feynman then went on to conjecture:

> "In relativity, the body keeps picking up, not speed, but momentum, which can continually increase <u>because the mass is increasing</u>. After a while there is practically no acceleration in the sense of a change of velocity, but the momentum continues to increase." (Feynman, 1963, p. 15-9)
>
> "But when *v* is almost equal to *c*, the square-root expression approaches zero, and the momentum therefore goes toward infinity." (*Id*.)
>
> "[At this point] the mass of the electrons in the synchrotron is 2000 times as great as their normal mass, and is as great as that of a proton! That means that…the electrons are getting pretty close to the speed of light." (*Id*.)
>
> "When the electrons are going that fast their <u>masses are enormous</u>, but their speed cannot exceed the speed of light." (*Id*.)

The problem with this scenario is that Feynman has again forgotten the resistance R. In the synchrotron, if we accelerate a particle with a tremendous electric current in order to increase its velocity, we should increase the charge of the particle to many times the charge of a natural electron. If this very highly charged particle is then deflected by a magnetic field which is 2000 times stronger than normal, it should apply 2000 times the normal electromagnetic resistance R to the velocity of the particle.

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[48] Nowhere, in any literature, can the author find any mention that any definition of 'inertial mass' has included within it any <u>additional</u> resistance of any kind. Of course, we are not talking about the concept of 'electromagnetic mass,' which in reality is nothing more than an electromagnetic resistance R masquerading as a material inertial mass m. (see Chapter 17)

If we analyze this scenario with Einstein's unmodified equation for momentum, this much greater electromagnetic resistance R must be accounted for somewhere, and the only logical place is an increase in the mass *m* of the particle. On the other hand, if this scenario is analyzed with Einstein's properly modified equation for momentum

$$p = m(v-R) = \frac{m_0(v-R)}{\sqrt{1-(v\text{-}R)^2/c^2}}$$

then the very great electromagnetic resistance can be accounted for by the R and the lesser velocity v, and the mass *m* of the particle will remain constant. Including the R in the above middle equation solves the empirical problem. Therefore, there is no reason for Einstein's relativistic equations for mass or momentum.

The primary reason that the author is writing this treatise is so that his readers will ultimately realize that all of Einstein's Special Theory of Relativity, all of its bizarre relativistic concepts and its distorted mathematical consequences, are nothing more than a huge collection of transparent mathematical deceptions and their *ad hoc* results. In other words, Einstein's Special Theory in its entirety was simply a monumental and malignant mathematical hoax, cleverly and diabolically conceived for only one primary meaningless purpose: to mathematically attempt to demonstrate that Einstein's impossible absolutely constant velocity of light at *c* relative to all inertial reference frames moving linearly at v should be considered to be a general law of nature. (see Chapter 21) These distortions, subterfuges, and deceptions which have distorted most of physics, along with Einstein's entire *ad hoc* Special Theory, must now be discarded.

D. Relativistic Kinetic Energy

The concept of energy was developed during the 19th century. During the early

1800s, heat (a form of energy also known as thermal energy) was considered to be "a material substance, a fluid called *caloric*." (Goldberg, p. 63) After this inauspicious false start, great progress ensued. However, it was not until the end of the 19th century that "the concept of energy, which is nothing more than the ability to do work," became fully developed and generalized.[49] (*Id*., p. 414)

The concept of the 'conservation of energy' was developed in parallel with the concept of energy. It states that "in any isolated system, the total energy remains constant." Whereas, energy may be converted from one form to another, when all processes are accounted for there are no net gains or losses.[50] (*Id*.) In other words,

> "At any time, the energy of the system is given by the kinetic energy of motion, [any electromagnetic energy], the various forms of potential energy that might be found in the system [such as gravitational energy], and the heat being generated as a result of the interaction of the various parts."[51] (Goldberg, p. 414)

In classical physics, kinetic energy, $K = \frac{1}{2}mv^2$, was defined as the energy of motion of a body, where m was the body's inertial mass.[52] (Miller, p. 313) Resnick defined the classical kinetic energy of a particle in motion as "the work done by an external force in increasing the speed of the particle from zero to some value of u." (Resnick, 1968, p. 120) It is axiomatic that the work done by a body's motion is equal to the change in its kinetic energy. Therefore, "should the work be zero whatever kinetic

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[49] 'Work' W is generally defined in physics as "the product of the force [acting] on an object and the distance the object moves in the direction of the force." (Goldberg, p. 405)

[50] "Rather than losses or additions, there are only conversions between potential, chemical, mechanical, electrical, magnetic, light, sound and heat energies." (Goldberg, p. 64)

[51] The final breakthrough for the concept of energy conservation took place in the late 19th century when it was ultimately realized that heat "was a manifestation of the…interactions of the atoms and molecules that make up all matter" (Goldberg, p. 64), and included friction and air resistance which were all part of the isolated system. (*Id*., p. 414)

[52] Goldberg describes how the formula for kinetic energy K was arrived at and how this concept was developed. (Goldberg, pp. 400 – 413)

energy the body has would be unchanged."[53] (Goldberg, p. 402)

With this brief background in place, let us now return to Einstein. In the second half of § 10 of his Special Theory, Einstein deduced "the kinetic energy of the electron" from his *ad hoc* equations and rationalizations concerning Relativistic Mass. (Einstein, 1905d [Dover, 1952, p. 63]) In Einstein's own words:

> "If an electron moves from rest…under the action of an electrostatic force…as the electron is to be slowly accelerated…the energy withdrawn from the electrostatic field must be put down as equal to the energy of motion W of the electron…we therefore obtain $W = mc^2[1/\sqrt{1 - v^2/c^2} - 1]$."[54] (*Id*.)
>
> "Thus, when $v = c$, W becomes infinite. Velocities greater than that of light have—as in our previous results—no possibility of existence."[55] (*Id*., pp. 63 – 64)

If the energy withdrawn from the electrostatic field by the electron's motion through it results in Einstein's above equation for velocity dependent relativistic kinetic energy, then the mass m in such equation must be an 'electromagnetic mass.' In other words, it must be the resistance of the electrostatic field (medium) to the motion of the electron through it, or an 'electromagnetic inertia.' In effect, the mass m in the above equation must be Einstein's relative velocity dependent Relativistic Mass.[56] (see Miller, p. 313)

The author asserts the following: When energy creates a force which is applied to do work, i.e. to accelerate the mass m of a body to velocity v, the energy applied is

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[53] In a theoretically perfectly elastic collision, "the net effect is that the kinetic energy after the collision is the same as before the collision." (Goldberg, p. 404)

[54] One might ask: Why did Einstein use the symbol W for the kinetic energy of the electron, instead of the correct symbol K for kinetic energy? W is the symbol for work! The author's only response is: Why did Einstein do anything that he did?

[55] Miller points out that: "One of Lorentz's…assumptions [in his April 1904 thesis] was that the velocity of material bodies could not exceed *c*…" (Miller, p. 313) This is yet another example of Einstein copying concepts from Lorentz's April 1904 mathematical thesis. Nevertheless, Einstein's equations for kinetic energy do not prove his *ad hoc* relativistic conjecture concerning a maximum velocity.

[56] For this reason alone the above equation for kinetic energy cannot be empirically valid.

conserved in the greater kinetic energy of motion and momentum mv of the mass of the more rapidly moving body which has the potential to do more work than before. But this process does not change or increase the body's mass (the number of atoms which constitute the material body or their weight). (see Chapter 32)

It is not difficult to see in Einstein's above equation for kinetic energy the origin of the equation: $E = mc^2$. It follows from the above discussion that any assertion of a relationship between mass and energy in Einstein's September 1905e paper was really that rest energy E_0 equals electromagnetic mass m_0 (a resistance) times c^2. Rather than being a revolutionary empirical assertion of equivalence, $E_0 = m_0c^2$ was merely an *ad hoc*, empirically invalid and meaningless relativistic conjecture by Einstein. (Chapter 32)

Immediately thereafter, "from his theory for the motion of an electron in an electromagnetic field" (Miller, p. 313), and from his derivation of Relativistic Mass, Einstein conjectured that: "This expression for the kinetic energy must also, by virtue of the argument stated above, apply to ponderable masses as well."[57] (Einstein, 1905d [Dover, 1952, p. 64]) Any empirical skeptic would immediately scream: WHY?

Einstein then further conjectured the existence of three resulting 'properties' of the motion of the electron:

> First: "It is possible by our theory to determine the velocity of the electron from the ratio of the magnetic power of deflexion A_m to the electric power of deflexion A_e, for any velocity, by applying the law $A_m/A_e = v/c$."[58] (*Id*.)

This so-called property of determining the velocity of a deflected electron in a magnetic

[57] Miller stated that this "bold conjecture, provided a basis for the previous one (that the mass of all bodies behaves like the electron's mass)." (Miller, p. 313) The author has had great difficulty in finding such a basis, other than circular reasoning. It is true that both circular *ad hoc* conjectures acknowledge that Relativistic Mass was really nothing more than an electromagnetic mass, an electromagnetic resistance, and they both were mutually supportive. But circular reasoning is never a valid basis for anything.

[58] Einstein then conjectured what theoretically occurs in a modern particle accelerator: "This relationship may be tested experimentally, since the velocity of the electron can be directly measured, e.g. by means of rapidly oscillating electric and magnetic fields." (Einstein, 1905d [Dover, 1952, p. 64])

field based on a deflection ratio was merely a mathematical description of what theoretically occurred in Kaufmann's 1901 – 1902 electron deflection experiments.[59] (see Goldberg, p. 134) Kaufmann's method of measuring the magnetic deflections of electrons (greatly refined and improved) is now the primary method that particle physicists use to interpret the velocities and masses of electrons and other particles in their particle accelerators.

However, we must now ask the questions: How valid is such relativistic method for determining the interpreted tremendous velocities of magnetic deflected masses of atomic particles in particle accelerators, if such masses are really only electromagnetic resistances and electromagnetic inertia masquerading as a ponderable mass; and if Einstein's relativistic formula was derived in such an *ad hoc* and artificial manner? Could it be that particle physicists are only theoretically accelerating and virtually deflecting electromagnetic resistances and electromagnetic inertia, and that the resulting photographed 'tracks' (interpreted as new particles and their interactions) are really meaningless? Could it be that such interpreted velocities are also only theoretical, virtual and meaningless? (see Chapters 34 and 35)

The details for Einstein's second conjectured 'property' of the electron's motion (the relationship between the potential difference between the momentum traversed by the electron and its acquired velocity v) "were the same as the ones that led to" his relativistic equation for kinetic energy.[60] (Miller, p. 314; see Einstein, 1905d [Dover, 1952, p. 64]) Einstein's third conjectured 'property' predicted "that an electron injected

[59] In Kaufmann's deflection experiments the very similar ratio was "the charge of the electron to its mass as a function of the electron's speed…," and it was "found that the ratio decreased as the speed of the electrons increased." (Goldberg, p. 134)

[60] This conjecture also has similar implications for particle physics and other mathematical theories.

normally into a constant magnetic field executed circular motion with a radius that was a function of its velocity."[61] (Miller, p. 314; Einstein, 1905d [Dover, 1952, p. 64]) Einstein ended § 10 of his Special Theory with his final mathematical conjecture: "These [last] three relationships are a complete expression for the laws according to which, by the theory here advanced, the electron must move."[62] (*Id*., pp. 64 – 65)

Miller concluded that the last three conjectures (or relationships) followed from Einstein's Relativity of Simultaneity (Miller, p. 314), which we have demonstrated is empirically invalid. (see Chapters 25, 26 and 28) Miller was also baffled by them because: 1) "the ratio A_m/A_e [v/*c*] seemed to be indigenous to any theory based on Lorentz's force equation;" and 2) Einstein's last two conjectures directly contradicted "Kaufmann's (1901 – 1903) experiments on injecting electrons normally into parallel electric and magnetic fields." (*Id*.) It becomes apparent that all of Einstein's conjectures in § 10 are probably just that: meaningless conjectures.

By analogy to his discussion of momentum (described in Section C of this chapter and as illustrated by the collisions in Figures 31.3A and 31.3B), Resnick attempted to show why "special relativity gives us a different approach to kinetic energy." (Resnick, 1992, p. 483) Resnick asserted that:

> "if we use the classical expression $\frac{1}{2}mv^2$, the collision [which conserved kinetic energy in the S frame] does not conserve kinetic energy in the S' frame…this situation violates the relativity of kinetic energy if we are to preserve the law of conservation of energy and the relativity postulate." (*Id*.)

Resnick also asserted that the classical formula, $K = \frac{1}{2}mv^2$, which allows kinetic energy to increase without limit, implies that velocity likewise may increase without

[61] This mathematical conjecture is a basis for interpreting the curvilinear cloud chamber tracks of assumed atomic particles to mean certain things, including their electric charge.
[62] How can these mathematical relationships have any empirical validity if Einstein's Special Theory (upon which they are based) is completely *ad hoc*, empirically invalid and meaningless?

limit, thereby violating Einstein's second postulate which demands that a material body may not exceed the speed of light at *c*. (*Id*., pp. 483 – 484; also see French, pp. 6 – 7)

> "We must therefore find a way to redefine kinetic energy, so that the kinetic energy of a particle can be increased without limit while its speed remains less than *c*." (Resnick, 1992, p. 484)

The relativistic formula for kinetic energy turns out to be the relative velocity dependent quantity $K = m_0c^2/\sqrt{1 - v^2/c^2} - m_0c^2$, which reduces to $\frac{1}{2}m_0c^2$ when speeds are much lower than c. Resnick stated that such relativistic formula can also be expressed as $K = E - E_0$, where E is the total relativistic energy $E = mc^2/\sqrt{1 - v^2/c^2}$, and rest energy E_0 is $E_0 = m_0c^2$.[63] (*Id*.) Finally, Resnick stated that the new relativistic principle for the conservation of energy was: "In an isolated system of particles [where no external work is done by its environment], the total relativistic energy remains constant." (*Id*.)

At this point, Resnick returned to his collision thought experiment in an attempt to prove his conjecture that classical kinetic energy ($K = \frac{1}{2}mv^2$) in the S frame (Figure 31.3A) was not conserved when Lorentz transformed to the S' frame. First, Resnick used the velocities given in Figure 31.3B for the S' frame, and showed that according to observer S', the kinetic energies before and after the collision (computed according to the classical $K = \frac{1}{2}mv^2$) produce two different quantities for K; thus the collision apparently does not conserve classical kinetic energy in S'. (*Id*., p. 483) Secondly, using the relativistic formula for kinetic energy, $K = m_0c^2/\sqrt{1 - v^2/c^2} - m_0c^2$, Resnick showed that relativistic kinetic energy is conserved in the S' frame of the collision.[64]

Again, as with Relativistic Momentum, the author must ask the question: How

[63] "The rest energy is in effect the total relativistic energy of a particle measured in a frame of reference in which the particle is at rest." (Resnick, 1992, p. 484)

[64] Specifically, Resnick concluded that "because the rest energies of the initial and final particles are equal in this collision [as measured in S'], conservation of total relativistic energy is equivalent to conservation of kinetic energy," due to the fact that no new particles were produced by such collision.

stupid do the relativists think we are? Resnick took a perfectly valid collision experiment which conserved kinetic energy in the S frame using the classical equation $K = ½mv^2$. (Figure 31.3A) He then Lorentz transformed the initial and final velocities of such collision to another distant reference frame S', which of course changed all of its magnitudes and distorted such collision so that kinetic energy would no longer appear to be conserved when viewed by S'. (Figure 31.3B) He then decided to scrap the perfectly correct classical law of kinetic energy, $K = ½mv^2$, and to replace it with an *ad hoc* relativistic formula for kinetic energy. When the distorted collision experiment in S' was then mathematically compared with such relativistic formula for kinetic energy, they were of course consistent for any inertial reference system moving at any relative velocity of v. What a coincidence.[65]

Are the relativists now so blatantly arrogant as to believe that on one else can see through this obvious mathematical subterfuge…this artificial and transparent mathematical deception? After all, Resnick artificially caused observer S' to falsely believe that kinetic energy had not been conserved during the collision in system S by intentionally sending observer S' distorted magnitudes for such collision by means of Lorentz transformations. Should it be a shock to anyone that the transformed and now distorted collision in system S' appeared not to conserve kinetic energy? What result other than relativistic consistency should Resnick expect in S'? Again, this is not science; it is pseudoscience! In fact, Relativistic Energy, like Relativistic Mass and Relativistic

[65] Relativistic Kinetic Energy also cannot exist for many other reasons. For example, it depends upon Einstein's two fundamental postulates and his kinematic method of measuring, which we have demonstrated to be artificial, illogical and empirically invalid in Chapters 21 and 29. It depends upon the validity and existence of 'electromagnetic mass,' which we have demonstrated in Chapter 17 to be only an 'apparent mass' and in reality only an electromagnetic resistance or inertia. It also depends upon the existence of Relativistic Mass, which we have just demonstrated earlier in this chapter to be a myth. Above all, it depends upon Einstein's Lorentz transformations, which we have demonstrated to be *ad hoc* and meaningless in Chapter 27.

Momentum, rises to the status of a monumental and diabolical hoax.

It is patently obvious to any fair-minded person that if the same collision experiment had been conducted separately in accordance with the classical formula $K = \frac{1}{2}mv^2$ in two different reference frames, kinetic energy would have been conserved in each frame. It is only when the Lorentz transformations are misapplied to distort the situation that classical kinetic energy can never be conserved.[66] Again, all of these mathematical subterfuges, deceptions and distortions, along with Einstein's entire *ad hoc* Special Theory, must immediately be discarded onto the scientific trash pile of outlandish myths.

E. Relativistic Force, Relativistic Acceleration, etc.

In Newtonian mechanics, the force F in Newton's second law (F = ma) may also be defined as "the rate of change of momentum, or F = d(mv)/dt." (Feynman, 1963, p. 15-9) Due to the mathematical concepts of Relativistic Mass and Relativistic Momentum, Resnick asserted that "Newton's second law must now be generalized to

$$F = d/dt(p) = d/dt(m_0u/\sqrt{1 - v^2/c^2}).$$"

(Resnick, 1968, p. 119) This new expression of force "is not equivalent to writing F = *m*a…[we do not] simply multiply the acceleration by the relativistic mass."[67] (*Id*., p. 120)

Resnick then conjectured that this new relativistic definition of force correctly describes the motion of high-energy charged particles in a particle accelerator where F is

[66] The same conclusion would apply to inertial mass, classical momentum, length, and every other physical phenomenon which Einstein and his Special Theory have distorted.

[67] The reason for this limitation was Einstein's theory that no material object can reach or surpass the velocity of light, and his relativistic formula for the compilation of two velocities in the same direction which mathematically 'confirms' his theory. (see Chapter 29)

interpreted to be the Lorentz electromagnetic force q(E = u x B). With respect to such Lorentz force equation, E is the electric field, B is the magnetic field, u is the particle velocity (all measured in the same reference frame), and q is the constant invariant electric charge of the particle.[68] (*Id*.) More *ad hoc* relativistic conjectures.

Resnick also derived from the relativistic equation for force a relativistic equation for acceleration that, in general, states that "acceleration a is not parallel to the force in relativity." (Resnick, 1968, p. 124) The two exceptions are: 1) "when F and a are parallel to the velocity u" (the mass is then called 'longitudinal mass'); and 2) "when F and a are perpendicular to the velocity u" (the formula for the mass is then called 'transverse mass'). (*Id*., p. 125) More meaningless bootstrap conjectures.

On the other hand, if the *ad hoc* concepts of Relativistic Mass and Relativistic Momentum are empirically invalid and meaningless, as we have just demonstrated, then so also must be such formula for Relativistic Force which incorporates such invalid and meaningless relativistic concepts. It follows that any formula for Relativistic Acceleration which is produced by such Relativistic Force must also suffer the same fate. Regardless of Einstein's conjectures and his follower's derivations, computations and further conjectures concerning relativistic force and relativistic acceleration, these concepts cannot be valid for all of the reasons set forth in the previous chapters of this treatise and the previous sections on Relativistic Mass, Relativistic Momentum and Relativistic Energy. They are based on the empirically invalid Lorentz transformations (Chapter 27), and the invalid concepts of relative velocity dependent Relativistic Mass,

[68] One might ask: Why is the magnitude of the physical concept of an electric charge not relative velocity dependent within Einstein's Special Theory? What is the reason for this relativistic exception or inconsistency? The answer is probably because Einstein needed an electric charge to be independent of its velocity so that he could confirm Kaufmann's assumption of such independence and use Kaufmann's experimental data to confirm his own relativistic dynamic theories. (see Chapter 31F)

and on all of the other *ad hoc*, artificial, and meaningless concepts that constitute Einstein's Special Theory.

All of Resnick's conjectures contained in this chapter are perfect examples of the way that all relativists attempt to bootstrap their way from one false relativistic concept to another. All of Resnick's mathematics and rationalizations are neat and convincing within the framework of Special Relativity, except for one thing: they are all based on false assumptions, and are all logically and empirically incorrect. [69]

All of the so-called experimental confirmations of Relativistic mass and Relativistic Dynamics only deal with charged theoretical particles (i.e. electrons) in high-energy particle accelerators, and their results are all interpretations based on Einstein's relativistic formulae. (see Zhang, p. 233) One might ask, what relevance do circular relativistic interpretations of the theoretical electromagnetic resistances, energies and inertias of electrons have with respect to the ponderable masses of material bodies? What (if anything) do they really confirm?

By the 1920s, Einstein and his relativistic mathematical physicist followers had become so bold that they began to conjecture all kinds of wild *ad hoc* ideas in order to expand Einstein's Special Theory. For example:

> "Owing to the general validity of the Lorentz-Einstein transformations, it becomes permissible to apply them to all manner of phenomena. In this way it was found that temperature, pressure and many other physical magnitudes turned out to be relatives." (D'Abro, 1950, p. 160)

In other words, all of such phenomena become relative velocity dependent relativistic concepts of physics. This unscientific process cannot be allowed to continue.

[69] We are not just picking on Resnick. His ideas and analyses are typical of all relativists.

Chart 31.1 Longitudinal and Transversal Magnitudes For The Mass Of An Electron

A. Longitudinal Mass

v as % of *c*	Abraham	Lorentz	Einstein
0.1	1.012	1.015	1.01
0.2	1.050	1.063	1.06
0.3	1.192	1.152	1.15
0.4	1.231	1.299	1.29
0.5	1.408	1.540	1.53
0.6	1.697	1.953	1.95
0.7	2.221	2.746	2.74
0.8	3.292	4.630	4.62
0.9	6.717	12.075	12.07
0.95	12.15	32.846	32.84
0.98	35.063	126.899	126.9
0.99	72.816	356.22	356.22
0.999		11,188.73	11,188.73
0.9999		353,579.00	353,579.00
0.99999		11,180,423.00	11,180,423.00
0.999999		353,553,655.00	353,553,655.00

B. Transversal Mass

v as % of *c*	Abraham	Lorentz	Einstein
0.1	1.004	1.005	1.01
0.2	1.016	1.021	1.04
0.3	1.038	1.048	1.09
0.4	1.072	1.091	1.19
0.5	1.120	1.155	1.33
0.6	1.190	1.250	1.56
0.7	1.295	1.400	1.96
0.8	1.467	1.667	2.77
0.9	1.816	2.294	5.26
0.95	2.218	3.203	10.25
0.98	2.808	5.025	
0.99	3.286	7.089	50.25
0.999		22.3664	500.25
0.9999		87.5657	5,000.25
0.99999		223.6136	50,000.25
0.999999		707.2136	500,000.25

Partial Source: Pavlovic, Table 23.1

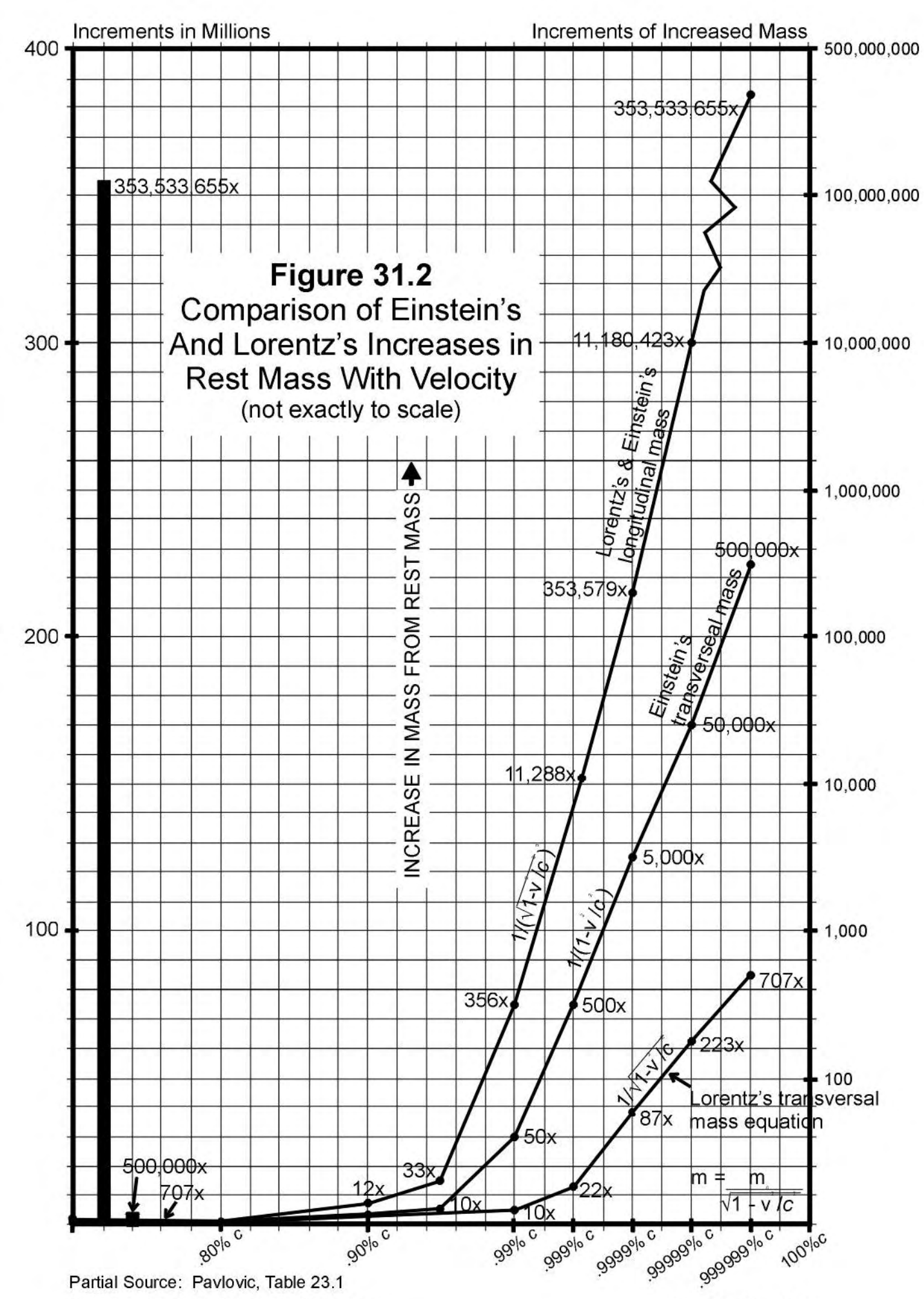
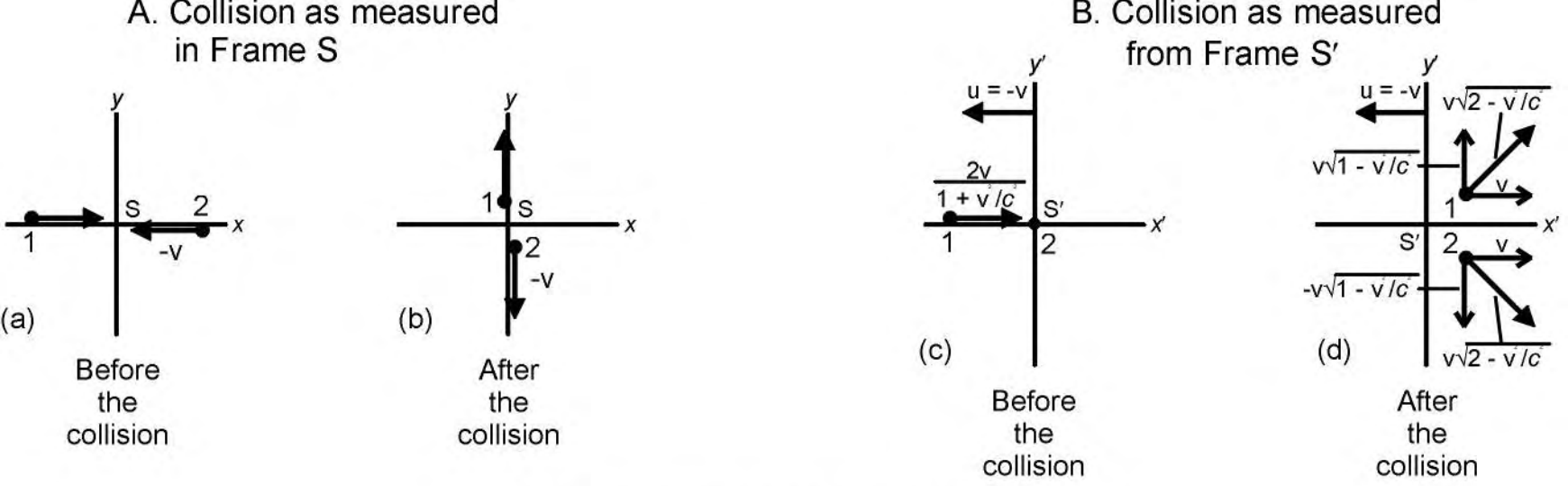


Figure 31.2
Comparison of Einstein's And Lorentz's Increases in Rest Mass With Velocity
(not exactly to scale)

Partial Source: Pavlovic, Table 23.1



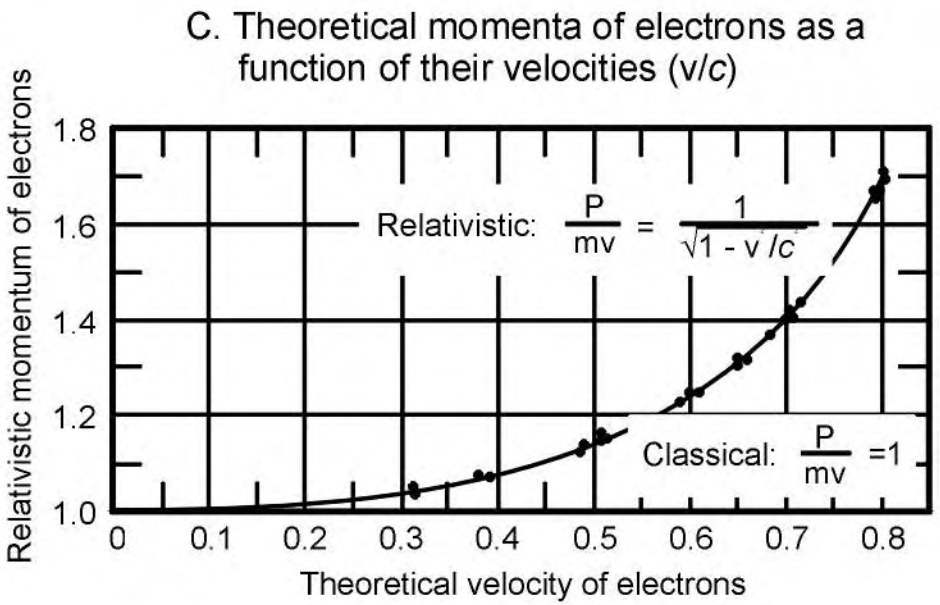


Figure 31.3 Theoretical Momentum And Kinetic Energies Of Collisions And High Speed Electrons

Source: Resnick, 1992, pp. 482 - 483