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RESEARCH ARTICLE

EINSTEIN'S SPECULATION E = mc², RELATED EXPERIMENTS, AND EINSTEIN'S CONJECTURE OF UNIFICATION

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ABSTRACT

The formula $E = mc^2$ is actually only a speculation of Einstein because it has never been proven. This formula started from special relativity and has become famous because of the atomic bomb. However, for a single type of energy, Einstein has failed to prove it. Einstein thought that he had proved that the electromagnetic energy is equivalent to mass because he had mistaken that the photons have only electromagnetic energy. However, General Relativity shows that the photons necessarily have the combination of electromagnetic energy and the gravitational energy.Theoretically, the electromagnetic energy is not equivalent to mass because the electromagnetic energy-stress tensor is traceless and thus cannot affect the Rici curvature as a mass does. Moreover, the electromagnetic energy would generate repulsive gravitation, which has been confirmed by experiments, but the mass generates only attractive gravitation. It is due to the existence of such a charge-mass interaction, general relativity also must be extended and Einstein's unification between electromagnetism and gravitation is necessary. In addition, experimentally a charged capacitor has a reduced weight and a piece of heated-up metal would also have a reduced weight, instead of an increased weight as Einstein predicted. Now, $E = mc^2$ is established as an obstacle.

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INTRODUCTION

The formula $E = mc^2$ is probably the best known formula for the general population. Because of this, it is the only formula in Hawking's popular book, "A Brief History of Time" [1]. (He was wrong since he considers it as generally valid.) However, such a formula has to be questioned because it leads to the belief that the coupling constants of the Einstein equation [2, 3] has a unique sign [4] 1), and in turn this leads to the result that the Einstein equation has no dynamic solution [5, 6]. 2) This result was suspected by Gullstrand [7], the Chairman of the Nobel Committee for Physics. Thus Einstein obtained his Nobel Prize based on his photo-electric effects [8], instead of general relativity as many physicists expected. Nevertheless, in 1993 Christodoulou and Klainerman [9] claimed that they have constructed dynamic solutions for the Einstein equation, and apparently this has convinced the 1993 Nobel Prize Committee to change their mind [10]. However, upon close examination, it is found that they actually have not completed their construction [11].3) The contributions of Christodoulou are just errors [12]. In view of this, the general validity of the formula $E = mc^2$ must be investigated.

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Note that, to have a bounded dynamic solution, it is necessary to modify the Einstein equation [2, 3]

$$G_{\mu\nu} \equiv R_{\mu\nu} - (1/2)g_{\mu\nu}R = - KT_{\mu\nu}\,, \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where $g_{\mu\nu}$ is the space-time metric, $R_{\mu\nu}$ is the Ricci curvature tensor, $T_{\mu\nu}$ is the sum of energy-stress tensors of matter, and K is the coupling constant.4) This is done by adding a gravitational energy-stress tensor with an anti-gravitational coupling [6],

$$G_{\mu\nu} \equiv R_{\mu\nu} - \frac{1}{2} g_{\mu\nu}R = - K[T_{\mu\nu} - t(g)_{\mu\nu}], \quad \ldots\ldots\ldots\ldots (2)$$

where $t(g)_{\mu\nu}$ is the gravitational energy-stress tensor.5) Due to inadequacy in non-linear mathematics, many have failed this.

Historically, eq. (2) was first proposed by Lorentz [13] and one year later it was also proposed by Levi-Civita [14] as $Kt(g)_{ab} = G_{ab} + KT_{ab}$, although they did not prove the necessity of such a modification. However, Einstein [15] objected to eq. (2) on the grounds that his equation (1) implies $t(g)_{\mu\nu} = 0$. Now, Einstein is clearly wrong since his equation is proven invalid for the dynamic case. Thus, eq. (6) should be called the Lorentz-Levi-Einstein equation.

Another clear evidence that eq. (1) has no bounded dynamic solution is, as shown by Hu, Zhang, & Ding [16], that the calculated gravitational radiation depends on the perturbation approach used.

The Conflict between E = mc² and the Einstein Equation

An obvious conflict between $E = mc^2$ and the Einstein equation is over-looked. According to eq. (1), we have

$R = KT_{\mu\nu}g^{\mu\nu}$. ……………………………………………. (3)

Since an electromagnetic energy cannot affect the curvature R, an electromagnetic energy cannot be equivalent to a mass. One may object that experimentally a π_0 meson can be decayed into two photons (i. e., $\pi_0 \rightarrow \gamma + \gamma$). However, this means only that the photons consist of more than electromagnetic energy. Since the sum of two electromagnetic energies is still an electromagnetic energy whose energy stress tensor is traceless, it cannot be equivalent to a mass whose energy-stress tensor is not traceless. However, a photon, being a massless particle, actually contains also gravitational energy [17].

The Photonic Energy Includes also Gravitational Energy

Note that the sum of two massless particles with respectively an equal but opposite momentum can generate a rest mass although the energy-momentum tensor of a massless particle is also traceless. Thus, a photon must consist of more than just electromagnetic energy. Fortunately, this is supported by the (modified) Einstein equation [17, 18]. It has been shown that the anti-gravity coupling is necessary for the dynamic case of massive matter [5, 6]. Naturally, one may ask if the anti-gravity coupling is also necessary for the case of an electromagnetic wave as a source. Einstein [19] believed that there is no antigravity coupling for this case. Then, it is found that there is no valid gravitational solution. Thus, Einstein is proven wrong again [17, 18]. However, general relativity is not hopeless. If a photonic energy-stress tensor with an anti-gravitational coupling is added to the source, then one can find valid gravitational solutions, i.e.

$G_{ab} = K[T(E)_{ab} - T(p)_{ab}]$, and
$T_{ab} = - T(g)_{ab} = T(E)_{ab} - T(P)_{ab}$, ………………………… (4)

where $T(E)_{ab}$ and $T(P)_{ab}$ are the energy-stress tensors for the electromagnetic wave and the related photons. Thus, we have that the photonic energy includes the energy from its gravitational wave component. This solves the puzzle that the photonic energy can be equivalent to mass, but the electromagnetic energy-stress tensor is traceless. Moreover, now we have a good reason why in the calculation of QED, a renormalization is necessary. [6)] The existence of the anti-gravity couplings implies that the energy conditions in the space-time singularity theorems of Hawking and Penrose cannot be satisfied. Thus, their theorems are actually irrelevant to physics. Hence, the rectifications related to general relativity can potentially start another revolution in physics. [6)]

Reissner-Nordstrom Metric and the Charge-Mass Interaction

Another major problem of $E = mc^2$ is that gravity is mistakenly considered as the effect of mass only. Therefore, the gravitational effects of the other types of energy are neglected. The Reissner-Nordstrom metric was ignored since 1916. Due to the existence of many intrinsic errors, essentially nothing has been done until 1997 [20]. Now, let us reexamine again the Reissner-Nordstrom metric [21] (with c =1) as follows:

$$ds^2 = \left(1 - \frac{2M}{r} + \frac{q^2}{r^2}\right)dt^2 - \left(1 - \frac{2M}{r} + \frac{q^2}{r^2}\right)^{-1} dr^2 - r^2 d\Omega^2, \quad (5)$$

where q and M are the charge and mass of a particle, and r is the radial distance from the particle center. In metric (5), the gravitational components generated by electricity have not only a very different radial coordinate dependence but also a different sign that makes it a new repulsive gravity in general relativity [22].

However, theorists such as Herrera, Santos, & Skea [23] argued that M in (5) involves the electric energy. Then the metric would imply a charged ball would increase its weight as the charge Q increased. However, this is in disagreement with experiments of Tsipenyuk and Andreev [24], who show that a metal ball would have decreased weight after it has been charged with electrons.[7)] Thus, the repulsive gravitation confirms that the electromagnetic energy is not equivalent to mass. Nevertheless, Herrera et al. [23] are not alone in such an error. For instance, Nobel Laureate 't Hooft even claimed, in disagreement with special relativity, that the electric energy of an electron contributed to the inertial mass of an electron [25]. In the Nobel Speech of Wilczek [26], he also did not know that $m = E/c^2$ must be justified. [8)] On the other hand, if the mass M is the inertial mass of the particle, the weight of a charged metal ball can be reduced [27]. Thus, as Lo [20] expected, experiments of Tsipenyuk and Andreev [24] supports that the charged ball has a reduced weight. This is an experimental direct proof that the electric energy is not equivalent to mass. According to metric (5), the static repulsive force to a particle of mass m at a distance r is approximately mq^2/r^3. For a charged ball, the formula becomes Q^2/R^3, where Q is the charge of the ball and R is the distance from the ball center [27]. The discovery of the repulsive gravitation is important because it would solve why we have never seen a black hole. If gravity is always attractive to mass, simulation convinces Wheeler that a black hole must be formed [28]. However, now we know that gravity is not always attractive to mass. Understandably, the Wheeler School [21] ignored this new physics.

The Charge-Mass Interaction and the Necessity of Extending General Relativity

To show the static repulsive effect, one needs to consider only g_{tt} in metric (5). According to Einstein [2, 3],

$$\frac{d^2x^\mu}{ds^2} + \Gamma^\mu{}_{\alpha\beta}\frac{dx^\mu}{ds}\frac{dx^\nu}{ds} = 0,$$

where $\quad \Gamma^\mu{}_{\alpha\beta} = (\partial_\alpha g_{\nu\beta} + \partial_\beta g_{\nu\alpha} - \partial_\nu g_{\alpha\beta})g^{\mu\nu}/2$ …….. (6)

and $ds^2 = g_{\mu\nu}dx^\mu dx^\nu$. Note that the gauge affects only the second order approximation of $g_{t\,t}$ [29]. Let us consider only the static case. For a particle *P* with mass m at **r**, the force on *P* is

$$-m\frac{M}{r^2}+m\frac{q^2}{r^3} \quad \text{………………………………………….. (7)}$$

in the first order approximation because $g^{rr} \cong -1$. Thus, the second term is a repulsive force. If the particles are at rest, then the force acting on the charged particle Q has the same magnitude

$$(m\frac{M}{r^2}-m\frac{q^2}{r^3})\hat{r} \quad \text{………………………………………...}$$
(8)

Where $\hat{r}$ is a unit vector(8)

because the action and reaction forces are equal and in the opposite directions. However, for the motion of the charged particle with mass M, if one calculates the metric according to the particle P of mass m, only the first term is obtained. Then, it is necessary to have a repulsive force with the coupling q^2 to the charged particle Q in a gravitational field generated by masses. Thus, force (8) to particle Q is beyond the current theoretical framework of gravitation + electromagnetism. As predicted by Lo, Goldstein, & Napier [30], general relativity leads to a realization of its inadequacy. The charge-mass repulsive force for two point-like particles of respectively mass m and charge q with a distance r is $\boldsymbol{mq^2/r^3}$. Thus such a repulsive force would become weak faster than gravity at long distance. Moreover, this force is independent of the charge sign. Such characteristics would make the repulsive effects verifiable [31, 32] because a concentration of electrons would increase such repulsion. The repulsive force in metric (5) comes from the electric energy [22]. An immediate question would be whether such a charge-mass repulsive force $\boldsymbol{mq^2/r^3}$ is subjected to electromagnetic screening. It is conjectured that this force, being independent of a charge sign, would not be subjected to such a screening although it should be according to general relativity. Physically, this force can also be considered as a result of q^2 interacting with a field created by the mass m. Thus such a field is independent of electromagnetism and is beyond general relativity, and the need of unification is established.

Extension of Einstein's Theory and the Five-Dimensional Relativity

The coupling with q^2 leads to a five-dimensional space of Lo et al. [30] because such a coupling does not exist in a four-dimensional theory. Moreover, such a coupling also does not exist in the five-dimensional theory of Kaluza [33]. Now let us give a brief introduction of the five-dimensional relativity. The five dimensional geodesic of a particle is

$$\frac{d}{ds}\left(g_{ik}\frac{dx^k}{ds}\right)=\frac{1}{2}\frac{\partial g_{kl}}{\partial x^i}\frac{dx^k}{ds}\frac{dx^l}{ds}+\left(\frac{\partial g_{5k}}{\partial x^i}-\frac{\partial g_{5i}}{\partial x^k}\right)\frac{dx^5}{ds}\frac{dx^k}{ds}-\Gamma_{i,55}\frac{dx^5}{ds}\frac{dx^5}{ds}-g_{i5}\frac{d^2x^5}{ds^2}, \quad \text{………………………… (9b)}$$

$$\frac{d}{ds}\left(g_{5k}\frac{dx^k}{ds}+\frac{1}{2}g_{55}\frac{dx^5}{ds}\right)=\Gamma_{k,55}\frac{dx^5}{ds}\frac{dx^k}{ds}-\frac{1}{2}g_{55}\frac{d^2x^5}{ds^2}+\frac{1}{2}\frac{\partial g_{kl}}{\partial x^5}\frac{dx^l}{ds}\frac{dx^k}{ds}, \quad \text{………………………… (9b)}$$

where $ds^2=g_{\mu\nu}dx^\mu dx^\nu$,μ, ν = 0, 1, 2, 3, 5 ($d\tau^2=g_{kl}dx^k dx^l$; k, l = 0, 1, 2, 3).

If instead of ds, $d\tau$ is used in (9), for a particle with charge q and mass M, the Lorentz force suggests

$$\frac{q}{Mc^2}\left(\frac{\partial A_i}{\partial x^k}-\frac{\partial A_k}{\partial x^i}\right)=\left(\frac{\partial g_{i5}}{\partial x^k}-\frac{\partial g_{k5}}{\partial x^i}\right)\frac{dx^5}{d\tau} \quad \text{…………….. (10a)}$$

Thus,

$$\frac{dx^5}{d\tau}=\frac{q}{Mc^2}\frac{1}{K}, \quad K\left(\frac{\partial A_i}{\partial x^k}-\frac{\partial A_k}{\partial x^i}\right)=\left(\frac{\partial g_{i5}}{\partial x^k}-\frac{\partial g_{k5}}{\partial x^i}\right) \text{ and}$$

$$\frac{d^2x^5}{d\tau^2}=0 \quad \text{………………………………………………. (10b)}$$

where K is a constant. It thus follows that (9) is reduced to

$$\frac{d}{d\tau}\left(g_{ik}\frac{dx^k}{d\tau}\right)=\frac{1}{2}\frac{\partial g_{kl}}{\partial x^i}\frac{dx^k}{d\tau}\frac{dx^l}{d\tau}+\left(\frac{\partial A_k}{\partial x^i}-\frac{\partial A_i}{\partial x^k}\right)\frac{q}{Mc^2}\frac{dx^k}{d\tau}-\Gamma_{i,55}\left(\frac{q}{Mc^2}\right)^2\frac{1}{K^2}, \quad \text{………………………………………………. (11b)}$$

$$\frac{d}{d\tau}\left(g_{5k}\frac{dx^k}{d\tau}+\frac{1}{2}g_{55}\frac{q}{KMc^2}\right)=\Gamma_{k,55}\frac{q}{KMc^2}\frac{dx^k}{d\tau}+\frac{1}{2}\frac{\partial g_{kl}}{\partial x^5}\frac{dx^l}{d\tau}\frac{dx^k}{d\tau}. \quad \text{………………………………………………. (11b)}$$

However, our position is that the physical meaning of the fifth dimension is not yet very clear [30], except some physical meaning is given in the equation, $dx^5/d\tau = q/Mc^2K$ where M and q are respectively the mass and charge of a test particle. We denote the fifth axis as the w-axis (w stands for "wunderbar", in memorial of Kaluza), and thus the coordinates are (t, w, x, y, z). Our approach is to find out the full physical meaning of the w-axis as our understanding gets deeper. For a static case, we have the forces on the charged particle Q in the ρ -direction

$$-\frac{mM}{\rho^2}\approx\frac{Mc^2}{2}\frac{\partial g_{tt}}{\partial\rho}\frac{dct}{d\tau}\frac{dct}{d\tau}g^{\rho\rho} \text{ ,and}$$
$$\frac{mq^2}{\rho^3}\approx-\Gamma_{\rho,55}\frac{1}{K^2}\frac{q^2}{Mc^2}g^{\rho\rho} \quad \text{……………………. (12b)}$$

and

$$\Gamma_{k,55}\frac{q}{KMc^2}\frac{dx^k}{d\tau}=0, \quad \text{where}$$
$$\Gamma_{k,55}\equiv\frac{\partial g_{k5}}{\partial x^5}-\frac{1}{2}\frac{\partial g_{55}}{\partial x^k}=-\frac{1}{2}\frac{\partial g_{55}}{\partial x^k} \quad \text{…………………….. (12b)}$$

in the (-r)-direction. The meaning of (12b) is the energy momentum conservation. Thus,

$$g_{tt}=1-\frac{2m}{\rho c^2} \text{ ,and } g_{55}=\frac{mMc^2}{\rho^2}K^2+\text{constant。} \quad \text{………… (13)}$$

In other words, g_{55} is a repulsive potential. Because g_{55} depends on M, it is a function of local property and thus is difficult to calculate. This is different from the metric element g_{tt} that depends on a distant source of mass m. On the other hand, because g_{55} is independent of q, this force would penetrate electromagnetic screening. From the above, it is also possible that a charge-mass repulsive potential would exist for a metric based on the mass M of the charged particle Q. However, because P is neutral, there is no charge-mass repulsion force (from $\Gamma_{k,\,55}$) on P. Thus, general relativity must be extended to accommodate the charge-mass interaction, and a five-dimensional relativity is a natural candidate. According Lo et al. [30], the charge-mass interaction would penetrate a charged capacitor. On the other hand, from current four-dimensional theory we would not get repulsive force acting on a test particle outside a capacitor. Since the electromagnetic field outside a capacitor would cancel out, there would be no charge-mass interaction outside the capacitor. To verify the five-dimensional theory, one can simply test the repulsive force on a charged capacitor. This repulsive force has been experimentally confirmed [31, 34].[9)] In fact, such a force is confirmed as relating to repulsive gravitation after Liu measured the weight changes of curled up commercial capacitors [34].

Weight Reduction of Heated-up Metals and Current-mass Interaction

To explain $E = mc^2$, Einstein [35] claimed, “an increase of E in the amount of energy must be accompanied by an increase of E/c^2 in the mass.” He also claimed, “I can easily supply energy to the mass-for instance, if I heat it by ten degree. So why not measure the mass increase, or weight increase, connected with this change? The trouble here is that in the mass increase the enormous factor c^2 occurs in the denominator of the fraction. In such a case the increase is too small to be measured directly; even with the most sensitive balance.” However, experimentally from six kinds of metals, it has been shown that a piece of heated-up metal actually reduces it weight [36]. [10)] Thus, Einstein’s claims on mass-energy equivalence are incorrect. Nevertheless, both Princeton and Harvard did not see these problems as inconsistent with experiments. While the electric energy leads to a repulsive force from a charge to a mass, the magnetic energy would lead to an attractive force from a current toward a mass [28]. Also, since a charged capacitor has reduced weight, in a normal situation, the charge-mass repulsive force should be cancelled by other forms of the current-mass force as Galileo, Newton and Einstein implicitly assumed. Thus, the existence of the current-mass attractive force would solve why a charged capacitor exhibits the charge-mass repulsive force since a charged capacitor has no additional electric charges. The existence of such a current-mass attractive force has been verified by Martin Tajmar and Clovis de Matos [37]. It is found that a spinning ring of superconducting material increases its weight much more than expected. However, according to quantum theory, spinning super-conductors should produce a weak magnetic field. Thus, they are measuring also the interaction between an electric current and the earth. The current-mass interaction would generate a force which is perpendicular to the current. Moreover, the charge-current interaction could be identified as the cause for the anomaly of flybys. One may ask what the formula for the current-mass force is. However, unlike the static charge-mass repulsive force, this general force would be beyond general relativity since a current-mass interaction would involve the acceleration of a charge that would generate electromagnetic radiation. Then, the electromagnetic radiation reaction force and the variable of the fifth dimension must be considered [30]. Thus, we are not yet ready to derive this force. Nevertheless, we may assume that, for a charged capacitor, the resulting force is the interaction of net macroscopic charges with the mass. Then one can identify the repulsive force from a charged capacitor with the repulsive force from metric (5). From eq. (8), we obtain the repulsive force is $\boldsymbol{mq^2/r^3}$ between a particle with charge q and another particle of mass m separated by a distance of r **.** Thus, as the distance r increases, the factor $1/r^3$ would imply that the repulsive force from a capacitor would diminished faster than $1/r^2$. Thus, a capacitor lifter [31] would hover at a limited height on earth. The factor q^2 would implies that the repulsive force from a capacitor is proportional to the square of the potential difference V of a charged capacitor since the charge Q of a capacitor with capacity C is Q = VC. This is also supported by data [34].[11)]

The irradiated ball has the extra electrons compared to a normal ball [24]. A spinning ring of superconducting material has the electric currents that are attractive to the earth [37]. This also explains a predicted phenomenon, which is also reported by Liu [34] that it takes time for a capacitor to recover its weight after being discharged [36]. This was observed by Liu because his rolled-up capacitors keep heat better. A discharged capacitor needs time to dissipate the heat generated by discharging, and the motion of its charges would accordingly recover to normal. In other words, the weight reduction experiments of a charged capacitor are also the pioneer for the weight reduction experiments of heated-up metals. There are three factors that determine the weight of matter. They are; 1) the mass of the matter; 2) the charge-mass repulsive force; and 3) the attractive current-mass force. For a piece of a heated-up metal, the current-mass attractive force is reduced, but the charge-mass repulsive force would increase. The net result is a reduction of weight [36] instead of increased weight as Einstein predicted [35]. Thus, according to experiments, Lo [20] is correct, but Einstein [35] was wrong.

CONCLUSION AND DISCUSSION

Einstein's error started with his failure to see that the mass and electromagnetic energy are intrinsically different [22]. He overlooked that his field equation is in conflict with $E = mc^2$. Since he had proposed successfully but inadequately that the photons would consist of only electromagnetic energy [2], Einstein had mistaken the equivalence of mass and photonic energy as a proof for the equivalence of mass and electromagnetic energy. Thus, he overlooked that the photons actually include the gravitational wave energy, and missed the need of the anti-gravity coupling in general relativity. Consequently, Einstein did not know that the existence of photons is a necessary consequence of general relativity. This error leads to the spacetime singularity theorems of Hawking and Penrose. However, it is proven that for the binary pulsars, the coupling constants must have different signs [5, 6]. Thus, their energy conditions are actually invalid because of the necessity of the anti-gravity coupling. These theorems are the starting points for the notion of black holes and the assumption of an expanding universe. Now, one must find new justifications for these theories. The formula $E = mc^2$ leads to negligence of the gravity generated by non-massive energy-stress tensor. Thus, the 1916 Reissner-Nordstrom metric was not investigated until 1997 [20], and the charge-mass repulsive force was discovered. This force was inadvertently verified by Tsipenyuk & Andreev [24], and this proves the non-equivalence between mass and electromagnetic energy [22]. This force shows that the theoretical framework of general relativity must be extended by unifying electromagnetism and gravitation. Moreover, this force also shows that gravitation is not always attractive. In current theory, the charge-mass repulsive force would be subjected to electromagnetic screening. Physically, because such a force is proportional to the charge square, it is unnatural that such a neutral force could be screened. From the viewpoint of the five-dimensional theory, however, the charge-mass repulsive force would be understood as that the charge interacts with a new field created by a mass. Therefore, the repulsive force would not be subjected to such screening. It thus follows that such a force is a perfect test for the existence of a five-dimensional space. Moreover, this can be verified by simply weighing a capacitor before and after being charged [31, 32]. Some experimental consequences are that a charged capacitor would fall slower than a stone [38] and there are capacitor lifters [31].

Since the existence of the charge-mass repulsive force is established, the unification of gravitation and electromagnetism is necessary. From the weight reductions of charged capacitors we conclude: 1) The electromagnetic energy is not equivalent to mass. 2) However, Einstein's conjecture of unification is established. Moreover, the Einstein equation remains to be rectified and completed in at least two aspects: a) The exact form of the gravitational energy-stress tensor; and b) The radiation reaction force [12]. Due to the radiation reaction force, general relativity is not just a theory of geometry. The weight reductions of a charged metal ball [24], a charged capacitor [11)] and a piece of heated-up metal confirm the existence of a charge-mass interaction,[12)] and thus $E = mc^2$ is not generally valid although there are supporting cases. However, the American Physical Society did not know these experiments and thus also their consequences because they pay little attention beyond what are familiar with [32, 34]. Einstein failed to show such a unification because: 1) He failed to see that it is necessary to create new interactions in a unification; 2) He rejected repulsive gravitation due to the invalid belief that $E = mc^2$ was unconditional. Hence, Einstein is the biggest winner from the rectification of his theories. [13)] Einstein and his followers failed his unification because of over confidence on $E = mc^2$, but ignored experiments.[14)] A common problem of physicists is inadequacy in pure mathematics, especially the non-linear mathematics.[15)] The charge-mass interaction shows that the gravitational picture provided by Newton and Einstein is too simple. The Wheeler School rejected the repulsive charge-mass interaction because it shows the basic assumption of black holes, the always attractiveness of gravitation is proven invalid. Moreover, Einstein's unification would open new areas in physics [31, 34].

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End notes

1) The energy conditions of the space-time singularity theorems of Hawking and Penrose can be satisfied only if all the coupling constants have the same sign [4].
2) S. Chandrasekhar is a Nobel Laureate and an expert in general relativity. Since he approved Lo's paper in 1995, after the 1993 Nobel Prize awarded to Hulse & Taylor, Chandrasekhar also objected to the errors of 1993 Nobel committee. Moreover, P. Morrison of MIT had gone to Princeton University to question J. A. Taylor on their justification in calculating the gravitational radiation of the binary pulsars. As expected, Taylor was unable to give a valid justification [39].
3) The Ph. D. degree advisor of D. Christodoulou was J. A. Wheeler, whose mathematics has been known from *Gravitation* [21] as having crucial errors at the undergraduate level [40]. Perlick [41] pointed out that the book of Christodoulou and Klainerman is incomprehensible, and Lo [11, 12] pointed out that their book is wrong. Accordingly, the honors awarded to Christodoulou actually reflected the blind faith toward Einstein and accumulated errors in mathematics and general relativity [12]. For instance, Yum-Tong Siu who does not understand non-linear mathematics, approved to award him a 2011 Shaw Prize. In short, the contributions of Christodoulou to general relativity are just errors.
4) Some journals, in disagreement with the principle of causality [12], accepted unbounded solutions as valid. However, even accepting this, it is still necessary to have a bounded solution to calculate the gravitational radiation.
5) For the dynamic case, the Maxwell-Newton Approximation is actually a linearization of the up-dated modified Einstein equation (3) [42], but is independent of the Einstein equation [5, 6]. However, by assuming the existence of bounded solutions incorrectly, Hod [43] claimed to have a solution for a two-body problem, and Turyshev & Tothy [44] even claimed to have developed a perturbative method for the many-body problem.
6) It has been shown that in addition to gravity the charge-mass interaction is also neglected in QED [34].
7) Einstein and the American Physical Society (APS) did not know this experiment of Tsipenyuk and Andreev [24].
8) Almost all Noble Prize winners make the same mistake. Apparently, nobody checks this formula adequately. Moreover, they did not even attempt to understand the related experiments.
9) The APS does not recognize the well-known experiments of weight reduction of a charged capacitor [31, 34].
10) This is expected since a discharged capacitor has a delayed weight recovery until its heat is dissipated [34]. However, the editors of APS do not know such important experiments of weight reduction of heated-up metals.
11) Thus, the static repulsive charge-mass force from a charged capacitor is confirmed [31, 34]. However, the American Physical Society still has not recognized these well-known experiments in their March and April 2015 meetings.
12) Fan [45] misinterpreted the weight reduction experiments of heated-up metals as a loss of mass

because he does not know the charge-mass interaction. Apparently, his error has misled many to reject his experiments as invalid.

13) Apparently, Einstein did not know that his unification was that close to confirmation. If he had known this, he may not be that willing to go by rejecting the modern medicine to prolong his life [46].
14) The weight reduction experiments [24, 34, 36] were not well-known because editors of APS were dominated by errors of the Wheeler School. In fact, the editors of APS often made errors in general relativity [12, 20, 39, 40, 42].
15) For instance, according to APS Editorial Director, Daniel Kulp, none of the editors of APS has a degree in pure mathematics. In particular, just as Pauli [47, 48], Dr. Eric J. Weinberg, Editor of Physical Review D, did not understand even Einstein's equivalence principle because of his inadequacy in pure mathematics [40].

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