

Modification of A. Einstein's $E = mc^2$

Book Proposal
Status Manuscript complete (PAGES 260)
Author AJAY SHARMA
Mobile 0091 98160 04244
Mail: Post Box 107 GPO SHIMLA 171001 India

Part I

1.0 General

This book unequivocally justifies the modification of THE MOST FAMOUS equation of the last hundred years, $\Delta E = \Delta mc^2$ to $\Delta E = Ac^2\Delta M$. We find $\Delta E = Ac^2\Delta M$ is the general equation and $\Delta E = \Delta mc^2$ is its special case (if $A = 1$, then it is $\Delta E = \Delta mc^2$). $\Delta E = \Delta mc^2$ is applicable in numerous processes in which inter-conversion of mass and energy take place (from chemical reactions to astrophysical and cosmological reactions), but it has not been justified [experimentally in numerous cases](#).

$\Delta E = \Delta mc^2$ was derived by Einstein in his paper, [*Annalen der Physik* 18 639-641 (1905)] available at http://www.fourmilab.ch/etexts/einstein/E_mc2/www/

In some enigmatic cases e.g. in Gamma Ray Bursts $\Delta E = \Delta mc^2$ cannot explain the gigantic amount of energy emitted. $\Delta E = \Delta mc^2$ cannot explain how the mass of the universe 10^{55} kg was created and the Big Bang took place. In many cases (from chemical reactions to astrophysical and cosmological reactions) $\Delta E = \Delta mc^2$ is not experimentally justified but regarded as established. Thus $\Delta E = Ac^2\Delta M$ is suggested.

Scientific approval to this book (MOEE): This book is based upon 7 papers of the author published/accepted in peer review international journals and proceedings of international conferences (publications from Canada, USA, Russia, Greece, India, Bulgaria). **Thus it has scientific consent/approval, as it ONLY comes from peer reviews publications in international journals and conferences. It is the established norm in science.** Some articles are under consideration for publication from the book.

2.0 Reasons for modification.

There are two types of logical reasons for the modification of this equation.

(A) **Theoretical reasons;** Einstein's Sep. 1905 derivation has serious mathematical limitations. In this derivation firstly Einstein derived light energy – mass interconversion equation $\Delta L = \Delta mc^2$, then from it Einstein speculated $\Delta E = \Delta mc^2$ without proof.

Einstein's derivation involves FOUR variables e.g. I magnitude of light energy, number of waves emitted, angle ϕ at which light energy is emitted and velocity v . But Einstein simply took handpicked values of parameters to obtain $\Delta L = \Delta mc^2$. If values of parameters are taken in general or scientific way then LAW of CONSERVATION of MATTER is violated.

- i. **Einstein's derivation contradicts** LAW OF CONSERVATION OF MATTER, as it implies that when light energy is emitted the mass of body must increase. Thus there are two simultaneous phenomena ----- when body emits light energy then its mass also increases.

In simple words when a body of 10gm emits light energy then its mass becomes 12gm, say.
So mass and energy are being emitted out of NOTHING.

Experimental reasons. $\Delta E = \Delta mc^2$ is applicable to all cases which involve inter-conversion of mass and energy. There are numerous cases in which $\Delta E = \Delta mc^2$ is applicable e.g nuclear reactions, chemical reactions, astrophysical reactions, cosmological reactions, Big Bang, formation of mass of universe before Big Bang etc.

To date, $\Delta E = \Delta mc^2$ is only studied in the case of nuclear reaction and no others. Until it is specially justified in all cases it must NOT be regarded as universally true. It is significant in the sense when new and new phenomena are being discovered. For example in heavenly phenomena, Gamma Ray Bursts (the most energetic events after Big Bang) then the energy emitted is 10^{47} J. Thus from $\Delta E = \Delta mc^2$, the mass annihilated must be,

$$\Delta m = \Delta E / c^2 = 10^{47} / 9 \times 10^{16} = 1.11 \times 10^{30} \text{ kg}$$

which is not true compared to the mass of the Sun, as there can never be such a huge mass. The value of Δm cannot be estimated. Just for simplicity (for understanding the value of A) let us assume that mass annihilated is 10^{-16} kg. The value of A can be assessed as,

$$A = \Delta E / c^2 \Delta m = 10^{45} \text{ J} / 9 \times 10^{16} \times 10^{-16} = 1.11 \times 10^{44}$$

Thus under these estimates i.e. equation $\Delta E = Ac^2 \Delta m$ becomes,

$$\Delta E = Ac^2 \Delta m = 1.11 \times 10^{44} c^2 \Delta m$$

Thus for a small mass, a large amount of energy is emitted.

NASA has launched The Swift Gamma-Ray Burst Mission to study Gamma Ray Bursts which will cost NASA more than \$250 millions. The data from this project will definitely increasingly support $\Delta E = Ac^2 \Delta M$, like the data from other satellites.

Part II : Details FIVE Chapters

Chapter I (pages 46)

Physics and Physicists

This chapter deals with development of physics i.e. how theories are created and destroyed? To familiarize the average reader with the conditions under which the legends, Galileo, Newton and Aristotle worked, are discussed. Why European science and American science is at the top is also discussed.

The significant aspect of the chapter is that Buridan (1300-1358) has given his explanation to the motion of bodies in the Buridan Impetus Law. Galileo's Law of Inertia and Newton's First law of motion are nothing but Buridan's Impetus Law, with slightly different words. Furthermore, Galileo gave the Law of Inertia on the basis of rhetorical experiments and Newton had simply published this as Newton's First Law of motion after the death of Galileo, in his immortal contribution, *the Principia*.

Then it is stressed that laws of motion of bodies must be explained using two separate assertions i.e. one for realistic systems and the other for ideal systems. For ideal systems (Buridan's Impetus Law and Galileo's Law of Inertia or Newton's First Law Motion), Newton's $F = ma$ provides mathematical equation. Similarly it is stressed that there must be a separate equation of force primarily for realistic systems.

Also it has been discussed on the basis of book (1674) published by Robert Hooke and letters (famous 1679) to Newton that complete concept of law of gravitation including inverse square law was given by Robert Hooke. Newton quoted the concepts in mathematical form in *the Principia*, Hooke claimed credit but Newton denied.

Chapter 2 (pages 67)

Mathematical and conceptual inconsistencies in $\Delta L = \Delta mc^2$ and hence $\Delta E = \Delta mc^2$

This is the main chapter which highlights the contradictory results of Einstein's derivation, interestingly these limitations are unnoticed yet. In 29 Sep. 1905 paper Einstein firstly suggested light energy mass equation $\Delta L = \Delta mc^2$ i.e. when body emits light energy then its mass decreases. Then from $\Delta L = \Delta mc^2$ Einstein speculated $\Delta E = \Delta mc^2$ without any mathematical proof.

Contradictory results.

Einstein's derivation also predicts that when body emits light energy then its mass must increase i.e. energy is being emitted then its mass increases. It is violation of law of conservation of matter, as matter is being created out of NOTHING.

The main reason for contradictory results is that Einstein's derivation involves four variables i.e. magnitude of light energy, angle ϕ , number of waves and velocity v . To derived $\Delta L = \Delta mc^2$ Einstein simply took handpicked values of variables (not general values) which is not scientific.

Examples. If the values of parameters are considered in general then following equations are possible in the same derivation.

$$\Delta m = m_b - m_a = L / c^2 ; m_b - m_a = 0.4L/vc + L / c^2 ; m_b - m_a = 0 ; m_b - m_a = 0.4L/vc + L / c^2$$

Out of these just first equation gives correct results. The second and third equation contradicts law of conservation of matter. The fourth equation is self contradictory to first equation.

In this chapter it is justified that many scientist have contributed towards development of $\Delta E = \Delta mc^2$ and Italian Olinto De Pretto has suggested the same in 1903-04 before Galileo. Thus Einstein simply derived an existing equation in 1905. It is true but unnoticed yet.

Chapter 3 (pages 35)

$E_{\text{rest}} = M_{\text{rest}}c^2$ cannot be obtained from Relativistic Kinetic Energy.

This chapter mainly deals with three aspects.

(i) Firstly the derivation of relativistic form of kinetic energy $K = (M_{\text{motion}} - M_{\text{rest}}) c^2$ is under the severe constraints. It is derived under some conditions from originating equation, $dW = dK = Fdx \cos\theta$ (W , work, K is kinetic energy, F is force θ is angle between F and S). The conditions of derivations are e.g . body moves , the body is displaced in direction of force, the angle between force and displacement must not be 90 , more strangely the velocity must be simultaneously constant as well as variable. The equation which leads to such a basic law must not have such constraints.

(ii) Secondly Einstein wrote equation $K = (M_{\text{motion}} - M_{\text{rest}}) c^2$ in arbitrary way and then derived Rest Mass Energy $E_{\text{rest}} = M_{\text{rest}}c^2$ from it under the condition when first equation is zero and other equations are non-existent. It is something like getting output without input. Einstein wrote the above equation as

$$E_{\text{motion}} = K + M_{\text{rest}}c^2 = \text{Relativistic energy}$$

The value of Relativistic Energy when body is at rest. Then Einstein arbitrarily wrote Relativistic energy ($v=0$) = E_{rest} But relativistic energy cannot be written as E_{rest} when $v=0$, as under this condition relativistic energy (when $v \sim c$) is not defined at all.

(iii) Further $E_{\text{rest}} = M_{\text{rest}}c^2$ has been represented as mass annihilated to energy or energy materialized to mass. It is not correct. Here M_{rest} is rest mass, E_{rest} is rest energy, these are absolute values of mass and energy and not the mass annihilated to energy or energy materialized to mass. Like this other equation such as, $KE = M_{\text{rest}}v^2 / 2$,

$PE = M_{\text{rest}}gh$ etc. can also be interpreted as mass annihilated to energy like $E_{\text{rest}} = M_{\text{rest}}c^2$. There is no special privilege that M_{rest} in $E_{\text{rest}} = M_{\text{rest}}c^2$ only regarded as mass annihilated to energy and not in other case i.e. $KE = M_{\text{rest}}v^2/2$, $PE = M_{\text{rest}}gh$ etc. In $F = M_{\text{rest}}a$, M_{rest} is also rest mass as in $E_{\text{rest}} = M_{\text{rest}}c^2$.

Chapter 4 (pages 60)

Derivation and applications of the generalized form of mass-energy equation, $\Delta E = Ac^2 \Delta M$

In this chapter $\Delta E = Ac^2 \Delta M$ has been mathematically justified and extensively proved that it is consistent with centuries old concepts of Physics. Here A is called conversion factor and depends upon the inherent characteristic conditions of the reaction. It is consistent with various coefficients and constants of proportionality, more than one dozen examples have been quoted. If $A=1$ then $\Delta E = Ac^2 \Delta M$ then it becomes $\Delta E = \Delta mc^2$. $\Delta E = \Delta mc^2$ is applicable in numerous processes in which inter-conversion of mass and energy takes place, but it has not been justified experimentally. However it is regarded as correct which is unscientific.

Applications of $\Delta E = Ac^2 \Delta M$

Mass-energy interconversion equation is applicable to numerous reactions e.g. light energy, heat energy, chemical energy, nuclear energy, magnetic energy, electrical energy, sound energy, energy emitted in form of invisible radiations energy emitted in cosmological and astrophysical reactions etc. It is not specifically confirmed in many reactions hence it must not be regarded as true. All the processes can be explained with values $A=1$, $A>1$ and $A<1$.

(a) The Primordial Theory of Universe. The basic motivation for this is how mass of universe 10^{55} kg was formed, then condensed to a point and Big Bang took place. It is assumed that universe started its life from empty space with zeroans i.e. particles of zero mass moving with infinitely large velocities. In due course of time zeroans converted into 'the Primordial Pulse of Energy' having energy 10^{44} J, then according to $\Delta E = Ac^2 \Delta M$ this energy is changed into mass 10^{55} kg,

(b) Manifestation of gravitation. The gravitation is other form of mass. It can be explained on the basis of equations.

$\Delta E = Ac^2 \Delta m$ and Gravitational energy (U_g) = Energy emitted in annihilation of mass ($Ac^2 \Delta m$) / k

(c) Big Bang, how and why? Black Holes, Gamma Ray Bursts, Dark Matter, Quasars Annihilation of antimatter in hadron epoch etc. etc.

These can be explained on the basis of $\Delta E = Ac^2 \Delta m$ with value of A less or more than one. The value of A is consistent with centuries old method of proportionality and existing constants and coefficients.

Chapter 5 (pages 51)

All in one: Questions & Answers

in this way even a person who is not expert in the subject can understand the concepts. Also it is In this chapter total 54 questions have been taken from four chapters and answered. The reason useful in popularizing the physics/science. Two questions from each chapter are mentioned.

Questions from Chapter 1

Q. Did Newton copy Galileo's Law of Inertia and re-christened it as Newton's First law of motion?

In the Principia Newton hinted that First law of motion was used by Galileo, even then known as after Newton's name by the scientific community. This question is explained logically and scientifically.

Q. Should Newton be completely credited to the discovery of Law of Gravitation? It is justified that Robert Hooke (1635 - 1703) contemporary and countryman of Newton must be given some credit.

Questions from Chapter 2

Q. What are limitations of Einstein's $\Delta L = \Delta mc^2$ (and hence $\Delta E = \Delta mc^2$) which a layman can understand?

Einstein's derivation ALSO implies that if a body of mass 10gm emits energy, then its mass must become 12 gm. It is clear contradiction.

Q. What is the main reasons of limitations in Einstein's derivation of $\Delta L = \Delta mc^2$ and $\Delta E = \Delta mc^2$. Einstein's derivation involves 4 variables, but Einstein taken just took handpicked values of the variables. If all values are

taken then contradictions results.

Questions from Chapter 3

Q. How did Einstein derive $E_{\text{rest}} = M_{\text{rest}} c^2$ from $KE_{\text{rel}} = c^2 (M_{\text{motion}} - M_{\text{rest}})$?

Einstein derived it under the condition when the first equation is zero. Thus the final equation is non-zero ($E_{\text{rest}} = M_{\text{rest}} c^2$).

Q. What are conditions for derivation of $KE_{\text{rel}} = c^2 (M_{\text{motion}} - M_{\text{rest}})$?

It is already explained in the brief in Part I.

Questions from Chapter 4

Q. Is $\Delta E = \Delta mc^2$ is applicable in chemical, volcanic , cosmological , astrophysical reactions and creation of mass before Big Bang. $\Delta E = \Delta c^2 \Delta m$? Yes, it is applicable but not confirmed yet. It is regarded as true which is unscientific.

Q. What are other advantages of the $\Delta E = \Delta c^2 \Delta m$?

It does not have mathematical limitations. It is a general equation and $\Delta E = \Delta mc^2$ is its special case. It explains those phenomena which are not explained by $\Delta E = \Delta mc^2$. The Primordial Theory of universe is based upon it.

Publications by the Author:

(Regarding generalization of Einstein's $E=mc^2$ to $DE = \Delta c^2 \Delta m$)

- [1] Sharma, A .To be published in *Physics Essays*, Vol. 17 No. 2 in June 2004 issue
- [2] Sharma A. Book of Abstracts GR17, the 17th International Conference on General Relativity and Gravitation, Ireland July 2004
- [4] Sharma, A Proceedings of International Conference on Number, Time, Relativity United Physical Society of Russian Federation, Moscow , pp.81-82 August 2004
- [3]. Sharma, A. Proceedings of International Conference on Computational Methods in Sciences and Engineering 2003 World Scientific Co. Singapore, 585-586 (2003)
- [5] Sharma, A *Acta Ciencia Indica* Vol. XXIV P No .4 pp 153-158 (1998).
- [6] Sharma, A. *Journal of Theoretics* Vol 5-6 Oct/ Nov 2004
- [7] Sharma , A. Accepted for publication in *Academic Open Internet Journal* in Oct 2004.

References

- [1] Sharma, A .To be published in *Physics Essays*, Vol. 17 No. 2 in June 2004 issue
- [2]. Sharma, A. *Proceedings of International Conference on Computational Methods in Sciences and Engineering* 2003 World Scientific Co. Singapore, 585-586 (2003)
- [3] Sharma, A *Proceedings of International Conference on Number, Time, Relativity* United Physical Society of Russian Federation, Moscow , pp.81-82 August 2004
- [4] Sharma, A Book of Abstracts of 17th International conference on General Relativity and Gravitation (International Society on General Relativity and Gravitation) Dublin pp.156 July 2004
- [5] Sharma, A *Acta Ciencia Indica* Vol. XXIV P No .4 pp 153-158 (1998).
- [6] Sharma, A. *Journal of Theoretics* Vol 5-6 Oct/ Nov 2004
- [7] Sharma , A. Accepted for publication in *Academic Open Internet Journal* in Oct 2004.
- [8] Sharma, A. *Acta Ciencia Indica* Vol. XXV P. No 4 181 (1999)

Comments and suggestions are requested regarding the publication of the book outlined above

Mobile 0091 98160 04244 ,

Email physicsajay@lycos.co.uk, physicsajay@yahoo.com, physicsajay@rediffmail.com

Mail: Post Box 107 GPO SHIMLA 171001 India

