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Relation: $E = M C^2$ New Mass Energy Relation**

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Universal Medium Exploration of Einstein's Mass Energy Relation: $E = M C^2$ New Mass Energy Relation

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Abstract

Universal Medium; This thesis is about the Universe, which is a branch of Physics. It is a known fact that, we receive heat and light from sun and there are billions of stars in our galaxy which are emitting the same along with other radiations. In the universe there are billions of galaxies in which all the stars are emitting and the remaining [heavenly bodies] are receiving the radiations. The space between the heavenly bodies was considered as vacuum.

In 20 th century it was found that (i) Though vacuum does not transmit sound , it will transmit heat , light and other wavelengths of the electromagnetic spectrum , known as Physical Vacuum and (ii) The physical vacuum possess energy (heat energy) known as Zero Point Energy and was found to be all pervasive and mandatory for all that exists in the universe . In the book titled 'Numeric Biography of Prophet Muhammad'[Peace be upon Him], the not worthy quote of Mrs. S. S. Banu, an Educationist and Awardee that "Universe possess heat", bears testimony to my research. Further the discovery and existence of heat in the entire universe motivated to think of the universal medium. Mass Energy Relation

The in depth study on heat and light radiations and their comparison proves that, heat is everything and light is fancy or optional. On the contrary, all the scientists from Aristotle till date have considered light and its velocity.

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Even Einstein in his mass energy relation $e = m c^2$, had considered the velocity of light, even though it is independent of mass energy, reaction and medium. And the Einstein's constant 'c', no longer remained a constant, as it was found to be decreased over a period of 300 years. The importance and the existence of heat in the entire universe and the variation of velocity of light, makes one to think of the velocity of heat radiations (Radiance), which is a constant. It is evident that the mass and energy are proportional to each other and the constant of Proportionality, should be a factor of the reaction (fusion) and the medium (in which the reaction is taking place). The constant is assumed as the velocity of Radiance 'r' as it justifies the dependence. Consequently, the mass and energy relation may be accepted as

$$E = m r^2$$

Since the heat of the medium is from the Infra Red Radiations, the medium may be called as 'Radiance'. And its velocity may be denoted as 'r'

Similarly the other equations which comprises of the velocity of light may be reconsidered and replace the velocity of Radiance in place of velocity of Light wherever necessary.

Key Words: Mass Energy Relation; Physical Vacuum; Zero Point Energy.

1. Introduction

The teaching of Physics for three long decades and the constant reference of articles, journals and publications of self as well as other authors left many questions unanswered. Many books were referred particularly on Universe, Fusion reaction, Vacuum, heat, light etc., And found that the merits of heat surpasses the merits of light.

Hendrik Casimir of Dutch (1948), Dr. Hal Puthoff of Texas (1990) and M.J.Spaarnay of Holland provided the latest knowledge about zero point energy and its applications. It was proved that zero point energy exists even in vacuum (bare or classical) and the Vacuum was come to be called as physical vacuum. Since the zero point energy is all pervasive, it is concluded that a medium of heat exists in the Universe, which may be called as 'Radiance'.

A critical study of the Einstein's Theory of Relativity (1905) was carried out along with the constancy of the velocity of light authored by my contemporary Mathematician Alan Montgomery of Canada and Physicist Lambert Dolphin of California, USA during Sept – Oct 1993, and found that the velocity no longer remains a constant. The mass energy relation $e = m c^2$ was found to be independent of the medium. The importance and the existence of heat in the entire universe and the variation of **velocity of light, makes one to** think of the velocity of heat radiations (Radiance).

2. Materials and Methods

In ancient times, the study of heavenly bodies and their properties was called 'PHYSIS'

(FU – SIS), which is the abbreviation of ‘NATURE ‘ or Natural Philosophy . In 4th BCE , Aristotle named these studies as ‘ PHYSICS ’, which deals with Mass , Energy and their relationship . The insertion of ‘ C ’, might have caused the Scientists from Aristotle to Einstein to concentrate on light and its Velocity , neglecting the basic element heat , even though both are received by the earth since existence . In fact the merits of heat surpasses merits of light .

The known Universe mainly comprises of matter in the form of heavenly bodies in which Nuclear reactions takes place in some and the rest are receiving the energy produced by them [1] . It has billions (10^{11}) of galaxies of different sizes which are moving away from each other confirming the expansion of the Universe [2] (Georges Lemaitre 1894 – 1966) . Each galaxy has billions (10^{11}) of stars and some are even bigger than the nearest star – sun. Fusion reactions takes place in the core of the sun releasing enormous amount of energy in the form of mainly heat and light radiations [3] , which is received by the earth . It receives more than 1kw/sq m of heat at sea level. In fact earth receive more than half as heat and remaining as light (etc) , which is absorbed and re-radiated as heat making heat as the major element received by the earth.

In 1800 CE William Herschel discovered heat rays [4] and rightfully called them as calorific rays and James Prescott Joule (1818 – 89) discovered heat as a form of energy [5] . At the end of 19th Century, these rays came to be called as ‘Infra Red ‘or IR. Later Electromagnetic waves were discovered and found that heat and light are received by the earth in the form of Electromagnetic waves. The range of all possible frequencies of electromagnetic radiations is known as Electromagnetic Spectrum [6].

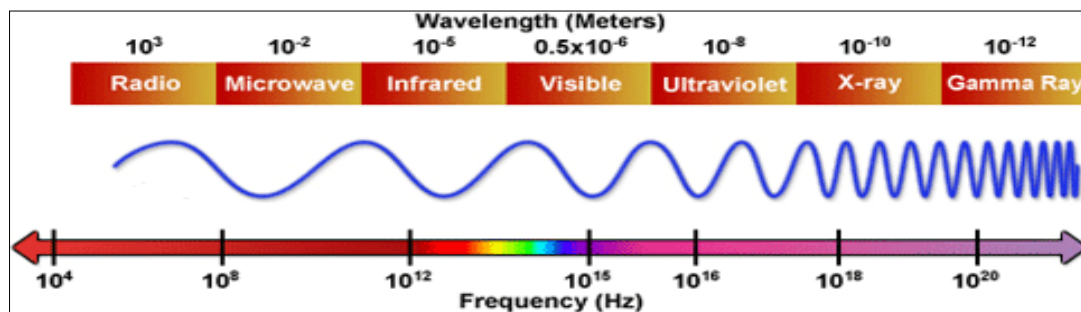


Figure1:

It consists of Radio Waves, Micro Waves, Infra Red , Visible , Ultraviolet and Gamma Radiations having frequencies from 10^0 to 10^{20} Hz . All the radiations have the same velocity of 3, 00,000 km / sec in vacuum. The lowest frequency till visible light 10^{14} Hz are received by the earth whereas the harmful higher frequencies are absorbed by the ozone layer of the earth.

The characteristics of IR are warmth , scalar , low frequency , high wave length and night vision (using IR cameras) whereas light are visibility , vector , high frequency , low wavelength , instant and moves in straight lines as discovered by Al Hazan from Iraq (965 – 1040) - The father of Modern Optics [7] . Later experiments of diffraction proved that light travels Almost in straight lines. The main characteristics of IR is that, it spreads and covers the entire surroundings irrespective of the obstacles and is sustainable whereas light is neither

sustainable nor covers the surroundings.

The reactions similar to the nuclear reactions of the sun are taking place in different stars of our galaxy ' Milky Way ', our cluster of Galaxies ' Local Group ', our super clusters ' Virgo ', different clusters , different super clusters and in general the Universe , producing the same electromagnetic radiations . It is found that, a medium exists between the clusters known as Intra Cluster Medium or ICM, which consists of heated gas having temperatures of the order of 7.9 kev. The Galaxies move with a maximum velocity of 1000 km / sec and our Galaxy is moving with a velocity of 600 km / sec towards the 'Great Attractor'. In other words, a medium of heat exists in the Universe.

In 17thCentury, Vacuum or Classical Vacuum was defined as a totally empty volume of space or just nothingness or in general space which is devoid of matter. As science has learned more about the properties of space, the properties of vacuum has taken a considerable leap forward. In 20th century, it was found that although the vacuum will not transmit sound, it will transmit heat, light and all other wavelengths of Electromagnetic Spectrum, came to be known as ' Physical Vacuum '. For instance , if the container which is void of solid , liquid and gas is insulated so that no heat can get in or out and then cooled to Absolute Zero (-273.15°C or -459.67°F) , it was found that , vacuum still has energy known as 'Zero Point Energy ' or ZPE . It is of the order of 10^{98} to 10^{100} ergs /cc. The mysterious nature of physical vacuum is revealed by Quantum Electro Dynamics - It is not an empty nothing but contains randomly fluctuating electromagnetic fields with an infinite zero point energy [8]. The zero point energy is found to be universal and all pervasive.

The zero point energy forms a cloud of natural particles surrounding a proton or electron. If the electron is penetrated deeply into the cloud, then its negative charge was found to be increased. Even the absorption and emission of these virtual particles caused the electron's ' Jitter Motion' in vacuum at absolute zero known as 'Zitterbewegung' [9]. This bears testimony with the existence of zero point energy.

In 1948, Hendrik Casimir – the Dutch scientist , found that , if two large metal plates are brought closer but not touching , then the longer wavelength of zero point energy act on the plates causing the plates to move towards each other .

This phenomenon is known as ' Casimir Effect ' . It is confirmed nine years later by M.J. Sparnaay of Holland. Similarly if the distance between the boats is less than the distance between two wave crests (or one wavelength), the boats are forced towards each other. This Casimir Effect is directly proportional to the area of the plates and is inversely proportional to the fourth power of the distance between them – [10]. The Casimir Effect too bears testimony with the reality of zero point energy.

According to Dr. Hal Puthoff (1990) from Texas , an electron orbiting round a proton radiates energy and as it loses energy , it should spiral in to the atomic nucleus , which did not happen , as the electron gains energy from zero point energy . It was like a child on a swing; just as the swing started to slow down, it was given another push to keep it going. The power lost by electron and the power gained from the zero point energy were found to be same. Consequently without the zero point energy, every atom in the universe would undergo

instantaneous collapse [11]. In other words, the zero point energy is maintaining all atomic structures in the entire universe.

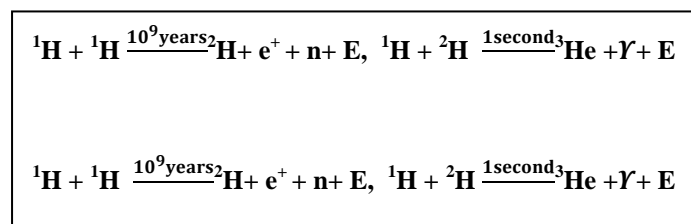
It is evident that, vacuum no longer exists but with the Zero Point Energy or Heat or Infra Red called Physical vacuum. IR exists on earth, between the galaxies, super cluster and in general the entire universe and forms a MEDIUM. In the absences of IR, even the atomic structure would have collapsed. Since the creation of Adam and Eve [12] , it was known that there are five basic elements of life which are – air , water , fire , earth and metal . In other words, fire or heat or IR is mandatory for surviving. In General IR is mandatory for the living and non living in the universe. Even Newton would not have born to watch the apple falling from the tree.

In fact we had knowingly forgotten (for which the scientist's are famous) the IR and all the scientists from dark ages till date gave prominence to the light and its velocity. In practice we followed the adage `Survive on one and praise the other`. The name IR does not justify its significance as the Red in it , is a part of the light . Actually it is named as `one earlier to the other`. At this juncture, I would suggest that IR may be renamed in terms of heat radiations or radiant heat or in short `RADIANCE`.

As a consequence of all these findings, it is evident that `We are living in the medium of Radiance, which is Universal and all Pervasive`.

2.1 Einstein's Mass Energy Relation

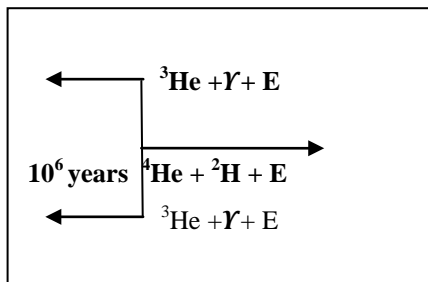
Nuclear fusion reaction takes place in the Sun, which is defined as the Process where light nuclei fuse together to form a heavy nucleus. In 1927, it was found that sun was made from about 73% Hydrogen and 27% Helium. About half of the Hydrogen reserve is used up since 4.54 billion years (inception of Solar System) and the remaining will sustain for another 4.54 billion years. The temperature of the core of the Sun (20 million degree Kelvin) is sufficient to strip the electron off the Hydrogen atoms making them to float. As the mass and temperature of the Sun is less comparatively with the other stars, a Proton-Proton chain reaction takes place (Carbon Nitrogen Oxygen cycle for massive stars).



Two mass 1 isotopes of Hydrogen undergoes a simultaneous fusion and Beta decay to produce a positron, a neutrino and a mass 2 isotope of Hydrogen (Deuterium). The deuterium reacts with another mass 1 isotopes of Hydrogen to produce He 3 and a gamma ray.

The He3 isotope provided in separate implementations of steps 1 and 2 fuses to form a He 4 nucleus plus two protons with enormous amount of energy in every reaction. There are so many Hydrogen atoms in the core of a star that , at any one instant many are undergoing different reactions (of which one is considered) . The energy

produced in the core is radiated into the radiation zone and is further transmitted outwards into convection zone of the sun. The heat and light that we receive today is the energy created by fusion about a million years ago this is the time it takes for photons and then convection to transport energy through the solar interiors to the photosphere. Once sunlight emerges from the electro sphere, it takes only about 8.3 minutes to reach the earth. Every second, the sun converts 500 million metric tons of Hydrogen to Helium. Due to fusion 5 million metric tons of excess material is converted into energy in each second. This means that every year $1, 57,680 \times 10^9$ metric tons are converted into energy.



The mass of Helium nucleus was found to be shorter by 0.0302 mass units (Mass defect) than that of 4 Hydrogen atoms. According to Albert Einstein, this shortage of mass is converted to energy and proposed the Theory of Relativity in 1905, which states that mass and energy are inter-convertible.

$$E = m c^2$$

Where e is energy, m is mass and c is velocity of light in vacuum.

It is to be observed here that:

- The velocity of light no longer remains constant.

The constancy of velocity of light is already challenged by many scientists and found that it has decreased over a period of 300 years, which is published in Galilean Electro Dynamics [13]. Even during the lifetime of Einstein it was found to vary with respect to the observer (relative motion). Consequently it is concluded that energy is proportional to mass but with a different constant.

- The velocity of light is independent of mass and energy
- The velocity of light or light cannot be a factor to the reaction, as it will not differ in illumination or darkness (illogical).
- The reaction is independent of the medium.

Many reactions depend on the medium for instance, different media have different velocities etc, .The velocity of light is said to be maximum in vacuum and decreases in all other media. Even this reaction will depend on the medium.

2.2 Derivation of New Mass Energy Relation

Nuclear fusion reactions can be conducted on the surface of earth and is taking place in the core of the sun. Due to the temperature of 1.5 crore degree centigrade in the core of the sun, the Hydrogen atoms collide each other at great speeds and overcome the repulsive force between them(as both are positively charged). To overcome the repulsive force, work has to be done to accelerate the Hydrogen atoms. The definition of work is already defined in terms of energy where energy is defined as the capacity of doing work. In other words energy and work are identical.

We know, Work is the product of force and distance.

$W = F \times d$, where F is Repulsive force

Or $E = F \times d$ (As energy and work are identical)

According to Newton's Second law of motion, Force is the product of mass and acceleration [14].

$F = m a$

$\therefore E = m a \times d$ where a is the acceleration given to the Hydrogen atoms.

But $a = \frac{v}{t}$ and $v = \frac{d}{t}$ or $d = v t$, where d is distance travelled and v is the velocity at which the Hydrogen atoms are moving to collide with one another. It is observed here that, the velocity or the acceleration is provided by the temperature of the core of sun. Moreover, for this reaction to happen on the surface of earth, the basic necessity is the existence of Hydrogen atoms for which the zero Point energy is mandatory (Dr Hal Puthoff), otherwise the electron will spiral into the atomic nucleus after radiating energy. This is not happening either on the surface of earth or in the universe. In other words, the zero point energy or the heat radiation or Radiance is maintaining all atomic structures in the universe. It is to be observed here that, it is the radiance and not the light or its velocity as confirmed by Einstein. Consequently r replaces v.

$\therefore a = \frac{r}{t}$ where 'r' is radiance and $d = r t$

Substituting for a and r in $E = m a \times d$,

$$E = m \times \frac{r}{t} \times r t$$

$$E = m r^2$$

$E = m r^2$

It is to be observed here that,

- i. Radiance 'r' is a constant, as it is sustainable and independent of relative motion.
- ii. Radiance 'r' depends on energy and mass as it is providing the sustaining energy to the electrons to orbit round the nucleus.
- iii. The reaction is taking place in the medium of Radiance, which is universal and all pervasive.

The velocity of Radiance finds its own place in the relations and definitions described centuries ago. For instance, the speed is defined as the distance travelled in a second. In the vacuum it is maximum and decreases in all other media, as different media has different Refractive Index or Index of Refraction. Refractive Index is a measure of the change in speed as it passes from one medium (usually air) to other. In case of light,

$$\text{R.I} = \frac{\text{velocity of light in vacuum}}{\text{velocity of light in medium}} \quad \text{or} \quad n = \frac{c}{v}$$

In other words, the velocity in any media is compared with the velocity of light in vacuum. further , the vacuum (bare or classical) is no longer empty but with the zero point energy or Radiance which is sustaining the entire universe including the living beings otherwise the universe itself is unimaginable or nothing . Consequently the velocity in any media has to be compared with the velocity of Radiance and not the velocity of light.

$$\text{R.I} = \frac{\text{velocity of Radiance}}{\text{velocity in medium}} \quad \text{or} \quad n = \frac{r}{v}$$

As the velocity of light is no longer a constant, the electron orbital speed , Planck's Constant , half life of radioactive elements etc , will be affected [15] . Consequently the velocity of light has to be replaced with the velocity of Radiance wherever necessary.

3. Results

1. The existing medium in the Universe is Radiance.
2. The velocity of Radiance is same as that of the velocity of light and is a constant 3, 00,000 km / sec unlike light.
3. The velocity of Radiance replaces the velocity of light wherever necessary.

4. Discussions

It is suggested to discuss a few issues since most of the reactions depend on the medium in which they are conducted. Consequently the equations having the velocity of light have to be reconsidered. For instance , the Planck's constant , electron orbital speed , half life of Radioactive elements and other relations including Einstein's mass energy relation .

5. Conclusion

In view of the facts and figures, the following may be accepted,

- Radiance as the Universal Medium.
- New Mass Energy Relation: $e = m r^2$ and
- Replacement of the velocity of Radiance in place of the velocity of Light, wherever necessary including the thesis on 'Soluble Models' submitted by the author himself earlier in the year 1992 to The International University, California USA.

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