

DOI: <https://doi.org/10.24297/jap.v20i.9356>**Asymmetry of the Matter-Anti Matter Ratio in the Universe and Violation of $E=mc^2$: Sayed's Theory for Matter-Antimatter Chirality and its Correlations**

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Abstract

Unity of the laws is a function in divinity of the **Creator – Allah**. The postulation of the Big Bang that the universe began by symmetrical matter to anti-matter (M/AM) ratio leads to non-matter universe. This article went deeply and simply through the asymmetry and imbalance of (M/AM) ratio at the beginning of the universe and in the time being. A simple derived formula (**Sayed's Matter-Antimatter ratio**) quantified the Anti-matter percentage to be $\frac{1}{4}$ (-25%), while it was $\frac{3}{4}$ (-75%) for matter at the early universe. This ratio is almost equivalent $-\pi$. It may be concluded that the asymmetry of (M/AM) is due to violation of $E=mc^2$. Comparison of the published and a derived antineutrino/neutrino mass ratio was found to be correlated by Sayed's factor (SF); about $30\sqrt{\pi e}$. The entropy of black hole is inversely correlated with antimatter percentage and $(-3/4\pi)$. The proton/electron and antineutrino/neutrino mass ratios correlated with their acceleration were also expressed. Based on our current and previous published findings; the ratios of dark energy/dark matter = Hydrogen/Helium = Matter/antimatter $\approx \pi$.

Keywords: Matter-antimatter asymmetry/Sayed (M/AM) formula/Black hole entropy/Violation of $E=mc^2$

Introduction

The author of this article published an article/letter to the editor entitled "Is this true that ^{210}Po is fissioned by antineutrino", as an observation during his work for Ph.D. theses in Germany (1,2). Another article (3) of the author merged the classic mechanics, special relativity and quantum field deduced a violation of the $E=mc^2$ and predicted that there is a faster than the light speed by 12.5%. This is in addition to other unique publications including dark energy- dark matter ratio (4-10). The Noble prize in physics of this year 2022 is for quantum **entanglement**; the phenomenon that **violating speed of light** of the special relativity and Bell's inequality. It was derided by Prof. Einstein; "a Spooky action at a distance".

This article introduces a new imagination of physics for clarifying of the universe matter-antimatter asymmetry problem and correlating the black hole entropy with antimatter using innovative formula.

I. Review of some matter- antimatter publications

- Violation of special relativity was theoretically and experimentally observed as given by:
 - Noble prize in physics 2022 for quantum entanglement experiments.
 - Sayed's acceleration equation shows violation of light speed of the special relativity (3).
 - A recent article produced hot plasma photons faster than light speed; >30% more (11).
 - A hypothesis: the speed of the photon can exceed 300 000 km/sec (12).
 - In the cosmic inflation (10^{-34} – 10^{-32} second), the space itself expanded faster than the speed of light.
- At a specific era from the Big Bang (BB), the universe began with almost 50:50 of matter to antimatter ratio. This is impossible, because this ratio leads to vanish of the already exist universe due to annihilation process of matter by antimatter (13,14).
- The images of the JWST indicate that the BB theory needs revision as mentioned in some reports.
- In a billion imbalance of electrons and positrons comes from the fact that the baryon to photon ratio is about 1 per billion, and before annihilation there would have been roughly the same numbers of photons as leptons in equilibrium (none of this is exact, there were other leptons, and other charged particles, but those were the dominant ones). Roughly there is 1 baryon per about 10^9 photons. That can be deduced from thermodynamic equilibrium in cosmological evolution, and the abundance of light elements from the Big Bang nucleosynthesis (BBN) (15,16).
- The scientific foundation for antimatter began with Paul Dirac. In 1928, Dirac wrote that the relativistic equivalent to the Schrödinger wave equation of the electron predicted antielectrons. In 1932, Carl D. Anderson discovered the antielectron, which he named the positron (for "positive electron"). Dirac shared the 1933 Nobel Prize in Physics with Erwin Schrödinger "for the discovery of new productive forms of atomic theory." Anderson received the 1936 Nobel Prize in Physics for the discovery of the positron (17).



- In order to produce a matter-antimatter asymmetry in the early universe, a particle physics model has to satisfy the following Sakharov Conditions: 1- Baryon number cannot be a conserved quantity. 2- Charge and Charge-Parity (CP) symmetries must be violated. 3- There must be processes that fall out of thermal equilibrium. (The Standard Model does not satisfy conditions 2& 3.) (18).
- One of the mutual transformation of matter and anti-matter; proton-antiproton transformation is shown in Fig.1 (19).

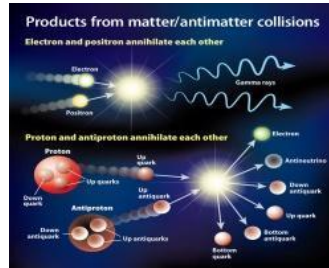


Fig.1: The products from matter/antimatter collisions

- The big bang theory ladder of events as a function in time is given (18).

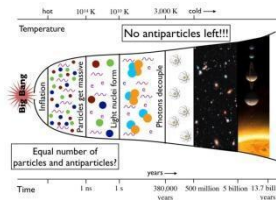


Fig. 2: The universe from the beginning till now

- Antimatter is all around us – for example bananas emit antimatter. This is because they contain a particular type of potassium (called potassium-40) which undergoes radioactive decay releasing a positron every 75 minutes. But this positron is very quickly annihilated by a passing electron (20).
- Anti-matter examples in the life components can be given as follow (17).

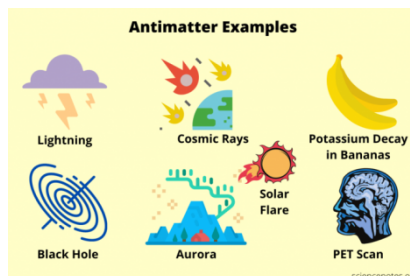


Fig.3: The Anti-matter examples in different sources

- The humans have created antimatter particles using ultra-high-speed collisions at huge particle accelerators such as the Large Hadron Collider (LHC), which is located outside Geneva and operated by CERN (the European Organization for Nuclear Research). Several experiments at CERN create antihydrogen, the antimatter twin of the element hydrogen (21).
- A new research found that neutron-proton mutual transformation accompanied with emission of Photon/gamma ray (22). Physicist measured something new in the radioactive decay of neutrons.
- CERN: discovery sheds light on the great mystery of why the universe has less ‘antimatter’ than matter (23).
- Physicists were so greatly puzzled back in 2018, when the head of the Alpha Magnetic Spectrometer (AMS) experiment mounted on the exterior of the International Space Station announced that the instrument might have detected two antihelium nuclei (24).
- A clue to what happened to all the antimatter comes from the fact that the ‘afterglow’ of the Big Bang (the cosmic background radiation) contains about 10 billion photons for every particle of matter in today’s Universe. This tells us that, in the Big Bang, there were 10 billion and one particles of matter for every 10 billion of antimatter, and after an orgy of annihilation there were 10 billion photons for every particle of matter (25).

II. Derivation of Sayed's matter/antimatter ratio formula

II.a. Approach and Track one

Based on the duality characteristic of the matter; wave property of particles, the following equations of Planck and Einstein are given as (3):

$$E = mc^2 \quad (1)$$

This formula was recently deduced and validated by the author of this article.

$$E = hv = hc/\lambda \quad (2)$$

By equating these two equations for electron and proton, one gets

$$hc/\lambda = mc^2 \quad (3)$$

$$h/\lambda = mc \quad (4)$$

$$m_p = h/\lambda_p c \quad (5)$$

$$m_e = h/\lambda_e c \quad (6)$$

By dividing m_p by m_e of equations 5 and 6, it produces

$$m_p/m_e = (h/\lambda_p c_p)/(h/\lambda_e c_e) \quad (7)$$

$$m_p/m_e = \lambda_e c_e/\lambda_p c_p \quad (8)$$

It should be mentioned that the mass (m_p/m_e) ratio equals to 1836.15. It is the rest mass of the proton (a baryon found in atoms) divided by that of the electron (a lepton found in atoms) (26). The wavelength as given by de Broglie (27) for both electron and proton can be calculated as:

$$\lambda_e = h/p = h/m_e v_e \quad (9)$$

$$\lambda_p = h/p = h/m_p v_p \quad (10)$$

Using mass of electron 9.11×10^{-31} kg, proton of 1.6726×10^{-27} kg and the planck constant 6.63×10^{-34} Js and speed of electron and proton equal to Einstein's light speed ; 3×10^8 m/s, one found (28):

$$\lambda_e = 2.426 \times 10^{-12} \quad (11)$$

$$\lambda_p = 1.321 \times 10^{-15} \quad (12)$$

By substituting λ_e and λ_p values in equation 8, supposing that during the early time of the big bang the speed of proton was half the Einstein's light speed and considering Sayed's mass-energy equivalence; $E = 1/8 mc^2$, which predicted a faster than speed of light by 12.5% (3), one gets.

$$m_p/m_e = (2.426 \times 10^{-12} / 1.321 \times 10^{-15}) \times (1/8 \times 3 \times 10^8) / (0.5 \times 3 \times 10^8) \quad (13)$$

$$m_p/m_e = 459.121877 \quad (14)$$

$$(m_p/m_e)_{ca} / (m_p/m_e)_{ex} = 459.121877 / 1836.15 = 0.25 = 25\% = 1/4 \quad (15)$$

Based on the calculated (ca) and measured (ex); the ratio 1836.15 is the rest mass of Baryon (p) and lepton (e) in the atom, and taking into consideration the mutual transformation of proton (p) and neutron (n) (free neutron is ~15 minutes average half life time), inverse β -decay process and photons (2 gamma quanta) due to $\beta^+\beta^-$ annihilation (3,29,30), it can be predicted that the antimatter was $1/4$ in the early universe and not -50% as proposed by the Big Bang.

II.b. Approach and Track two:

Using the fact that proton (2 up quark and one down quark) can be transformed to β^+ and neutral pion (π^0 with mean life time of 8.5×10^{-17} sec.) travelling at $0.7c$ decays into pair of photons (2γ), when they don't, it's because one or more of those photons converted implicitly to an electron/positron pair (31), the abovementioned equation 8 and Sayed's formula; $E = 1/8 mc^2$, it can be deduced the following:

$$m_p/m_e = 1836.48 \times 1/8 = 1836.15 \times 1/4 \times 1/2 \quad (16)$$

By dividing the value given in equation 16, by 1836.15 and canceling the term $1/2$ as it represents the 2 photon/or electron-positron pair, one gets also the value $1/4$ (25%) which represents the anti-matter (e.g. β^+) percentage.

This means that the matter was ~75%, while the antimatter was ~25% in the early universe. This ratio is almost equals to π as expressed in the next equation:

(M/AM) Ratio = (3/4) / (1/4) = 75/25 $\approx \pi$
(17)

It may be proposed and deduced that this ratio is due to *violation of Einstein light speed*. The (M/AM) is called **Sayed's matter –antimatter ratio**; see table 1..

Table 1: The predicted ratio of the matter and anti-matter at the early beginning of the universe

Item	Big Bang (11,14) Early universe	Sayed's Prediction	Ratio of matter/ antimatter
Matter	50% (50 +1)	(75%) = 3/4	$\sim \pi$
Anti-matter	50%	(25 %) = 1/4	

The predicted ratio (1/4) is matched with the laws and basic principles of nature (the **creator**) The maximum force value $(1/4)c^4/G$ is observer-invariant. While, Force values $> (1/4)c^4/G$ cannot be produced. In nature, no force in any muscle, machine or system can exceed this value. There is a maximum power, or energy change per time, in nature: $P \leq (1/4)c^5/G$. No power of any lamp, engine or explosion can exceed this value. The maximum rate of mass change in nature: $dm /dt \leq (1/4)c^3/G$. The factor **1/4** has no deeper meaning: it is just the value that leads to the correct form of the field equations of general relativity (32).

There are over a billion photons for every proton or neutron, and about 70% as many neutrinos-and-antineutrinos as photons (33). The current ratio of baryons to photons in the universe is about 1 per 10^9 (13,34). **This asymmetry might also be due to violation of $E=mc^2$**

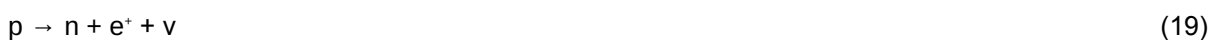
The de-Broglie wavelength value of a photon is twice the electron wavelength ($\lambda_{\text{photon}} = 2 \lambda_e$) for speed of the electron equals $(c/100)$ (35).

III. Neutrino- antineutrino mass ratio

The basic nuclear process underlying β^- (negatron) decay is the conversion of neutron (n) to proton (p) with electron anti-neutrino (ν^-) emission (30):



While for β^+ (positron) decay, the conversion of proton into neutron with release of electron neutrino (ν);



Note that while a free neutron decays to proton, the decay of proton to neutron is possible only inside the nucleus, since proton has smaller mass than neutron (30). The following equation can be observed;

$m_p/m_{e^-} = (m_n + m_{e^+} + \nu) / m_{e^-}$ (20)

By substituting their values, one gets:

$m_p/m_e = 1839.529$ (21)

Dividing the calculated (m_p/m_e) value in the eq.21 and the tabulated values 1836.15, one gets almost the unity (1.00184) with 0.18% difference:

Using the published values (36) of the electron antineutrino and neutrino masses; $M_{\nu^-} = 1.6 \times 10^{-36}$ Kg and $m_{\nu} = 1.25 \times 10^{-37}$ kg respectively, one gets their mass ratio as follow:

$m_{\nu^-} / m_{\nu} = 1.6 \times 10^{-36} \text{ Kg} / 1.25 \times 10^{-37} \text{ kg} = 12.8$ (22)

The electron antineutrino and neutrino mass ratio can be used as antimatter/matter ratio indicator taking into consideration the proton/electron mass ratio; 1836.15.

$(m_p/m_e) = 1836.15 = SF (m_{\nu^-} / m_{\nu})$ (23)

This formula can be rewritten as follow;

$(m_p/m_e) = 12.8 SF$ (24)



$$(m_p/m_e) = 12.8 \times (30\sqrt{\pi e}) \tag{25}$$

Where **SF** is called **Sayed's Factor** and equals to; $- 30\sqrt{\pi e}$;

Finally, the antineutrino/neutrino mass ratio as a function in the antimatter/matter ratio can be given as follow;

$$m_{\nu^-} / m_{\nu} = (m_p/m_e) / 30\sqrt{\pi e} = 12.7034 \tag{26}$$

This ratio is called **Sayed's Antineutrino-neutrino mass ratio** and it is almost identical to the published mass values. The results of comparison are given in the following table 2.

Table 2: The Mass Ratio of Antineutrino/neutrino

Item (mass ratio)	Based on Published values (36)	Sayed's mass ratio of antineutrino/neutrino	Published/predicted Ratio	Equivalent
Antineutrino/neutrino	12.8	12.703	1.0076 ±0.76 Unity	$(m_p/m_e) / 30\sqrt{\pi e}$ 1836.15/30√πe

- The (e) is the base logarithm; 2.71828 and π is 3.14159...

The recent observed gamma ray emission with neutron-proton transformation should be considered (22). The 2010 result of an article (MINOS experiment of Fermi lab.) found, as a whole, that the range of mass difference in the neutrinos was about 40% less for antineutrinos, while their new result (2011) shows a 16% only (37). It should be observed that the mass of neutrinos (sum of 3 flavors; tau, muon and electron neutrinos) is $< 2.14 \times 10^{-37}$ kg. The tau neutrino is 17 times heavier than the muon neutrino (38).

IV. Correlation of M/AM ratio and black hole entropy.

The concluded ratio may lead to a confirmation of our theory concerning anatomy of Black hole (BH) and our conclusion that Hawking radiation is nothing (6). As given in our previous correlation between entropy (S) and the event horizon surface area (A_{EH}) (6):

$$S = K A_{EH} \tag{27}$$

Where, K is a constant equal $\{K_B C^3 / \hbar G\}$ representing the Boltzmann, Einstein's light speed, Newton's gravitational constants. By dividing equation 27 and 17, produces

$$(S) / (M/AM) = K (A_{EH}) / \pi \tag{28}$$

$$S = (1 / \pi) \cdot (M/AM) (K A_{EH}) \tag{29}$$

By substituting the value of matter percentage which is equal to (3/4), one gets the correlation between entropy, event horizon surface area and antimatter percentage;

$$S = (3/4\pi) \cdot (1/AM\%) (K A_{EH}) \tag{30}$$

By substituting the value of antimatter percentage; (1/4), one gets the correlation between entropy, event horizon surface area and matter;

$$S = (4/\pi) \cdot (M\%) (K A_{EH}) \tag{31}$$

Another correlation between reverse thermodynamically behavior of antimatter collapse and primordial BH at the beginning of the universe was given by a recent publication (34). Recent article concluded that Baryons are efficiently produced in relativistic collisions around the black holes and soon redistribute to the rest of the universe, generating the observed matter-antimatter asymmetry well before primordial nucleosynthesis. Therefore, in this scenario, there is a common origin of both the dark matter to baryon ratio and the photon to baryon ratio (39).

V. Correlation of Matter-Antimatter with the Acceleration

By using the second law of Newton to be applied on proton and electron acceleration in certain conditions (3):

$$F = m_e a_e \tag{32}$$

$$F = m_p a_p \tag{33}$$

Dividing equation 32 and 33 considering the same force (F), one gets

$$m_p / m_e = a_e / a_p \tag{34}$$



The same value of 1836.15 must be obtained due to the acceleration is a function in mass. In other words, the proton and electron are accelerated by the same mass ratio 1836.15 (40). The acceleration ratio of proton to electron and proton to alpha based on their masses can be shown in table 3. Taking into consideration and merging the equation 34 and 26, one gets:

$$(a_e/a_p) = (m_p/m_e) SF \quad (35)$$

The antineutrino/ neutrino mass ratio was correlated with acceleration of electron/ proton mass ratio by Sayed's factor ($SF=30\sqrt{\pi e}$) and found to be matched with the expected value with 0.76% discrepancy.

Table 3: Ratio of proton, electron and alpha acceleration based on their masses

Item	Published	Sayed's value	% discrepancy
$a_p/a_e = m_e/m_p$	$1/1836.15 =$ 0.5446×10^{-3}	$1/1836.4875 =$ 0.5445×10^{-3}	0.018%
$(a_e/a_p) = (m_p/m_e) SF$	1836.15	1850.12	0.76%
$a_\alpha/a_p = m_p/m_\alpha$	$\frac{1}{4}$	$\frac{1}{4}$	Almost equivalent to $\sim \sqrt{e/20\pi}$

- Mass of proton $M_p = \frac{1}{4} M_\alpha$ (mass of alpha particle); they are accelerated by their mass ratio. The acceleration ratio of proton/ alpha is equal to 4

From about 2 minutes, conditions are suitable for nucleosynthesis: around 25% ($\frac{1}{4}$) of the protons and all the neutrons (there were about 7 protons for each neutron) fuse into heavier elements, initially deuterium which itself quickly transferred into helium-4 (41).

After about 240 seconds, the universe was a hot plasma consisting mostly of ionized hydrogen ($\frac{3}{4}$) and helium ($\frac{1}{4}$), electrons, photons, neutrinos (and anti-neutrinos), and mysterious particles of dark matter (42). After about three minutes, there were about 2 billion photons and a similar number of neutrinos for each proton and each neutron. But the charge of the universe is believed to be relatively small, so there were almost exactly as many protons as electrons (42).

A recent article suggests a tau mass for which several calculated standard deviations fit within one measured standard deviation. Rest energies for at least two of the three neutrinos would be 3.4 hundredths of one eV. At least two neutrinos of the known three have different masses (43)

Conclusion

It can be concluded based on the abovementioned findings that the Antimatter percentage was $\frac{1}{4}$ at the early beginning of the universe. The ratio of matter/antimatter is almost equal to π . This asymmetry may be due to violation of $E=mc^2$; the speed of light (photons) is higher than the special relativity value. This predication and findings may also clarify the matter-antimatter imbalance debate in the time being. The **Sayed's Antineutrino-neutrino mass ratio** was derived and found to almost be identical to their published mass ratio. The black hole entropy was found to be inversely proportional to antimatter percentage and correlated with the $-\frac{3}{4}\pi$. The acceleration of alpha to proton (a_α/a_p) ratio ($\frac{1}{4}$) is expressed to be about $(\sim\sqrt{e/20\pi})$.

Acknowledgment

Just a glance to the sky, milky-way and the observed universe, Nobody can imagine how Greatness of the Creator. Thanks my generous God – Allah, for your endless support.

Conflict of interest

There is no any conflict of interest with anyone concerning this article.

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Biography



Prof. Sayed is the slave of the Creator – Allah. He was V. President of Egypt nuclear and radiological authority (ENRRA). Currently, He is scientific supervisor and consultant for nuclear affairs. He participated in meetings, conferences, workshops, training in the USA, EU, IAEA, Russia, Asia and Arab states. He recently published many theories in different scientific field; merging classic, relativity and quantum , black hole anatomy and dark matter.