郭应焕（1937.10—），男，陕西岐山人，中国科学院高能物理研究所高级知识分子，（国际）卢鹤绂格物研究所研究员；研究方向：理论物理，核物理与应用，基础数学及应用。E-mail: guoyh-mail@qq.com
郭振华，（1947.8—），男，陕西岐山人，宝鸡文理学院物理与信息技术系，中国陕西，教授，研究方向：原子物理与科学史，基础数学、基础物理及应用研究，E-mail:guozhh2670@163.com;

Unmatter – A New Form of Matter

Dr. Florentin Smarandache
University of New Mexico
200 College Road
Gallup, NM 87301, USA.
E-mail: smarand@unm.edu

Abstract.

Besides *matter* and *antimatter* there must exist an intermediate form of matter, called *unmatter* (as a new form of matter) in accordance with the neutrosophy theory that between an entity <A> and its opposite <AntiA> there exist intermediate entities <NeutA>.

Unmatter is neither matter nor antimatter, but something in between. An atom of unmatter is formed either by (1): electrons, protons, and antineutrons, or by (2): antielectrons, antiprotons, and neutrons.

In a physics lab it will be possible to test the production of unmatter.

The existence of unmatter in the universe has a similar chance to that of the antimatter, and its production also difficult for present technologies.

As shown, experiments registered unmatter: a new kind of matter whose atoms include both nucleons and anti-nucleons, while their life span was very short, no more than 10^{-20} sec. Stable states of unmatter can be built on quarks and anti-quarks: applying the unmatter principle here it is obtained a quantum chromodynamics formula that gives many combinations of unmatter built on quarks and anti-quarks.

In the last time, before the apparition of my articles defining "matter, antimatter, and unmatter" [1, 2], and Dr. S. Chubb's pertinent comment [3] on unmatter, new development has been made to the unmatter topic in the sense that experiments verifying unmatter have been found.

This article is an improved version of an old manuscript [5] and a combination of results from the papers [7, 8, 24-35].

1. A New Possible Form of Matter, Unmatter – Formed by Particles and Anti-Particles

1.1. Introduction.

According to the neutrosophy theory in philosophy [see 4], between an entity <A> and its opposite <AntiA> there exist intermediate entities <NeutA> which are neither <A> nor <AntiA>.

Thus, between "matter" and "antimatter" there must exist something which is neither matter nor antimatter, let's call it UNMATTER.

In neutrosophy, <NonA> is what is not <A>, i.e. <NonA> = <AntiA>χ<NeutA>. Then, in physics, NONMATTER is what is not matter, i.e. nonmatter means antimatter together with unmatter.

1.2. Classification.

A) **Matter** is made out of electrons, protons, and neutrons.

Each matter atom has electrons, protons, and neutrons, except the atom of ordinary hydrogen which has no neutron.

The number of electrons is equal to the number of protons, and thus the matter atom is neutral.

B) Oppositely, the **antimatter** is made out of antielectrons, antiprotons, and antineutrons.

Each antimatter atom has antielectrons (positrons), antiprotons, and antineutrons, except the antiatom of ordinary hydrogen which has no antineutron.

The number of antielectrons is equal to the number of antiprotons, and thus the antimatter atom is neutral.

C) **Unmatter** means neither matter nor antimatter, but in between, an entity which has common parts from both of them.

Etymologically "un-matter" comes from [ME < OE, akin to Gr. *an-*, *a-*, Latin *in-*, and to the negative elements in *no*, *not*, *nor*] and [ME *matière* < OFr < Latin *materia*] matter [see 6], signifying no/without/off the matter.

There are two types of unmatter atoms, that we call unatoms:

u1) the first type is derived from matter; and a such unmatter atom is formed by electrons, protons, and antineutrons;

u2) the second type is derived from antimatter, and a such unmatter atom is formed by antielectrons, antiprotons, and neutrons.

One unmatter type is oppositely charged with respect to the other, so when they meet they annihilate.
The unmatter nucleus, called **unnucleus**, is formed either by protons and antineutrons in the first type, or by antiprotons and neutrons in the second type.

The charge of unmatter should be neutral, as that of matter or antimatter.
The charge of un-isotopes will also be neutral, as that of isotopes and anti-isotopes.
But, if we are interested in a negative or positive charge of un-matter, we can consider an un-ion. For example an anion is negative, then its corresponding unmatter of type 1 will also be negative. While taking a cation, which is positive, its corresponding unmatter of type 1 will also be positive.

Sure, it might be the question of how much *stable* the unmatter is, as J. Murphy pointed out in a private e-mail. But Dirac also theoretically supposed the existence of antimatter in 1928which resulted from Dirac's mathematical equation, and finally the antimatter was discovered/produced in large accelerators in 1996 when it was created the first atom of antihydrogen which lasted for 37 nanoseconds only.

There does not exist an unmatter atom of ordinary hydrogen, neither an unnucleus of ordinary hydrogen since the ordinary hydrogen has no neutron. Yet, two isotopes of the hydrogen, *deuterium* (^{2}H) which has one neutron, and artificially made *tritium* (^{3}H) which has two neutrons have corresponding unmatter atoms of both types, *un-deuterium* and *un-tritium* respectively. The isotopes of an element X differ in the number of neutrons, thus their nuclear mass is different, but their nuclear charges are the same.

For all other matter atom X, there is corresponding an antimatter atom and two unmatter atoms
The unmatter atoms are also neutral for the same reason that either the number of electrons is equal to the number of protons in the first type, or the number of antielectrons is equal to the number of antiprotons in the second type.
If antimatter exists then a higher probability would be for the unmatter to exist, and reciprocally.
Unmatter atoms of the same type stick together form an **unmatter molecule** (we call it **unmolecule**), and so on. Similarly one has two types of unmatter molecules.

The *isotopes* of an atom or element X have the same atomic number (same number of protons in the nucleus) but different atomic masses because the different number of neutrons.
Therefore, similarly the **un-isotopes of type 1** of X will be formed by electrons, protons, and antineutrons, while the **un-isotopes of type 2** of X will be formed by antielectrons, antiprotons, and neutrons.

An *ion* is an atom (or group of atoms) X which has last one or more electrons [and as a consequence carries a negative charge, called *anion*], or has gained one or more electrons [and as a consequence carries a positive charge, called *cation*].
Similarly to isotopes, the **un-ion of type 1** (also called **un-anion 1** or **un-cation 1** if resulted from a negatively or respectively positive charge ion) of X will be formed by electrons, protons, and antineutrons, while the **un-ion of type 2** of X (also called **un-anion 2** or **un-cation 2** if resulted from a negatively or respectively positive charge ion) will be formed by antielectrons, antiprotons, and neutrons.
The ion and the un-ion of type 1 have the same charges, while the ion and un-ion of type 2 have opposite charges.

D) **Nonmatter** means what is not matter, therefore nonmatter actually comprises antimatter and unmatter. Similarly one defines a nonnucleus.

1.3. Unmatter propulsion.

We think (as a prediction or supposition) it could be possible at using unmatter as fuel for space rockets or for weapons platforms because, in a similar way as antimatter is presupposed to do [see 2-3], its mass converted into energy will be fuel for propulsion.
It seems to be a little easier to build unmatter than antimatter because we need say antielectrons and antiprotons only (no need for antineutrons), but the resulting energy might be less than in matter-antimatter collision.

We can collide unmatter 1 with unmatter 2, or unmatter 1 with antimatter, or unmatter 2 with matter.
When two, three, or four of them (unmatter 1, unmatter 2, matter, antimatter) collide together, they annihilate and turn into energy which can materialize at high energy into new particles and antiparticles.

1.4. Existence of unmatter.

The existence of unmatter in the universe has a similar chance to that of the antimatter, and its production also difficult for present technologies. At CERN it will be possible to test the production of unmatter.
If antimatter exists then a higher probability would be for the unmatter to exist, and reciprocally.

The 1998 Alpha Magnetic Spectrometer (AMS) flown on the International Space Station orbiting the Earth would be able to detect, besides cosmic antimatter, unmatter if any.

1.5. Experiments.
Besides colliding electrons, or protons, would be interesting in colliding neutrons.
Also, colliding a neutron with an antineutron in accelerators.

We think it might be easier to produce in an experiment an unmatter atom of deuterium (we can call it un-deuterium of type 1). The deuterium, which is an isotope of the ordinary hydrogen, has an electron, a proton, and a neutron. The idea would be to convert/transform in a deuterium atom the neutron into an antineutron, then study the properties of the resulting un-deuterium 1.
Or, similarly for un-deuterium 2, to convert/transform in a deuterium atom the electron into an antielectron, and the proton into an antiproton (we can call it un-deuterium of type 2).

Or maybe choose another chemical element for which any of the previous conversions/transformations might be possible.

1.6. Neutrons and antineutrons.
Hadrons consist of baryons and mesons and interact via strong force.
Protons, neutrons, and many other hadrons are composed from quarks, which are a class of fermions that possess a fractional electric charge. For each type of quark there exists a corresponding antiquark. Quarks are characterized by properties such as *flavor* (up, down, charm, strange, top, or bottom) and *color* (red, blue, or green).
A neutron is made up of quarks, while an antineutron is made up of antiquarks.
A neutron [see 1] has one Up quark (with the charge of +2/3 A1.606 A10^{-19} C) and two Down quarks (each with the charge of -1/3 A1.606 A10^{-19} C), while an antineutron has one anti Up quark (with the charge of -2/3 A1.606 A10^{-19} C) and two anti Down quarks (each with the charge of +1/3 A1.606 A10^{-19} C).
An antineutron has also a neutral charge, through it is opposite to a neutron, and they annihilate each other when meeting.
Both, the neutron and the antineutron, are neither attracted to nor repelling from charges particles.

1.7. Characteristics of unmatter.
Unmatter should look identical to antimatter and matter, also the gravitation should similarly act on all three of them. Unmatter may have, analogously to antimatter, utility in medicine and may be stored in vacuum in traps which have the required configuration of electric and magnetic fields for several months.

1.8. Open Questions:
8.a) Can a matter atom and an unmatter atom of first type stick together to form a molecule?
8.b) Can an antimatter atom and an unmatter atom of second type stick together to form a molecule?
8.c) There might be not only a *You* and an *anti-You*, but some versions of an *un-You* in between You and anti-You. There might exist un-planets, un-stars, un-galaxies?
There might be, besides our universe, an anti-universe, and more un-universes?
8.d) Could this unmatter explain why we see such an imbalance between matter and antimatter in our corner of the universe? (Jeff Farinacci)
8.e) If matter is thought to create gravity, is there any way that antimatter or unmatter can create antigravity or ungravity? (Mike Shafer from Cornell University)
I assume that since the magnetic field or the gravitons generate gravitation for the matter, then for antimatter and unmatter the corresponding magnetic fields or gravitons would look different since the charges of subatomic particles are different...
I wonder how would the universal law of attraction be for antimmater and unmatter?

2. Verifying Unmatter by Experiments, More Types of Unmatter, and A Quantum Chromodynamics Formula

2.1. Definition of Unmatter.
In short, unmatter is formed by matter and antimatter that bind together [7, 8].
The building blocks (most elementary particles known today) are 6 quarks and 6 leptons; their 12 antiparticles also exist.
Then *unmatter* will be formed by at least a building block and at least an antibuilding block which can bind together.

2.2. Exotic Atom.

If in an atom we substitute one or more particles by other particles of the same charge (constituents) we obtain an exotic atom whose particles are held together due to the electric charge. For example, we can substitute in an ordinary atom one or more electrons by other negative particles (say π^-, anti-Rho meson, D^-, D_s^-, muon, tau, Ω^-, Δ^-, etc., generally clusters of quarks and antiquarks whose total charge is negative), or the positively charged nucleus replaced by other positive particle (say clusters of quarks and antiquarks whose total charge is positive, etc.).

2.3. Unmatter Atom.

It is possible to define the unmatter in a more general way, using the exotic atom.

The classical unmatter atoms were formed by particles like (a) electrons, protons, and antineutrons, or (b) antielectrons, antiprotons, and neutrons.

In a more general definition, an unmatter atom is a system of particles as above, or such that one or more particles are replaces by other particles of the same charge.

Other categories would be (c) a matter atom with where one or more (but not all) of the electrons and/or protons are replaced by antimatter particles of the same corresponding charges, and (d) an antimatter atom such that one or more (but not all) of the antielectrons and/or antiprotons are replaced by matter particles of the same corresponding charges.

In a more composed system we can substitute a particle by an unmatter particle and form an unmatter atom.

Of course, not all of these combinations are stable, semi-stable, or quasi-stable, especially when their time to bind together might be longer than their lifespan.

2.4. Examples of Unmatter.

During 1970-1975 numerous pure experimental verifications were obtained proving that "atom-like" systems built on nucleons (protons and neutrons) and anti-nucleons (anti-protons and anti-neutrons) are real. Such "atoms", where nucleon and anti-nucleon are moving at the opposite sides of the same orbit around the common centre of mass, are very unstable, their life span is no more than 10^{-20} sec. Then nucleon and anti-nucleon annihilate into gamma-quanta and more light particles (*pions*) which can not be connected with one another, see [12,13,14]. The experiments were done in mainly Brookhaven National Laboratory (USA) and, partially, CERN (Switzerland), where "proton---anti-proton" and "anti-proton --- neutron" atoms were observed, called them $\overline{p}p$ and $\overline{p}n$ respectively, see Fig. 1 and Fig. 2.

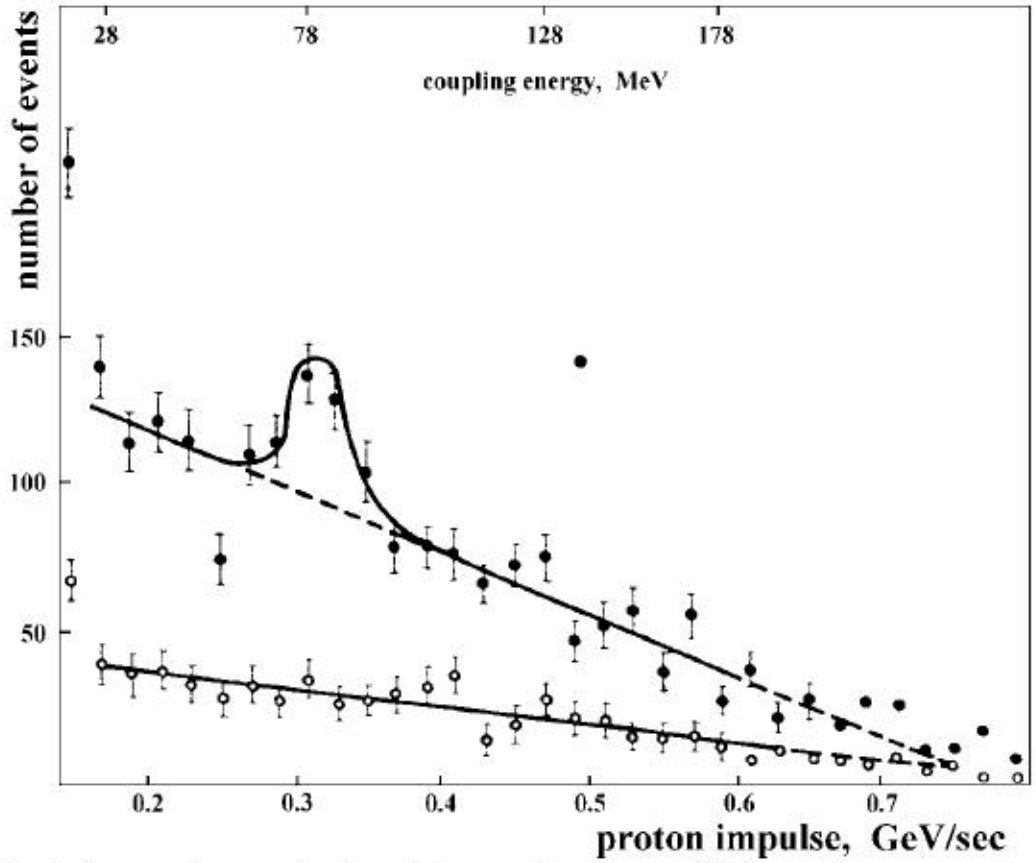

Fig. 1: Spectra of proton impulses in the reaction $\overline{p} + d \rightarrow (\overline{p}n) + p$. The upper arc --- annihilation of $\overline{p}n$ into even

number of pions, the lower arc --- its annihilation into odd number of pions. The observed maximum points out that there is a connected system $\bar{p}n$. Abscissa axis represents the proton impulse in GeV/sec (and the connection energy of the system $\bar{p}n$). Ordinate axis --- the number of events. Cited from \cite{fsm6}.

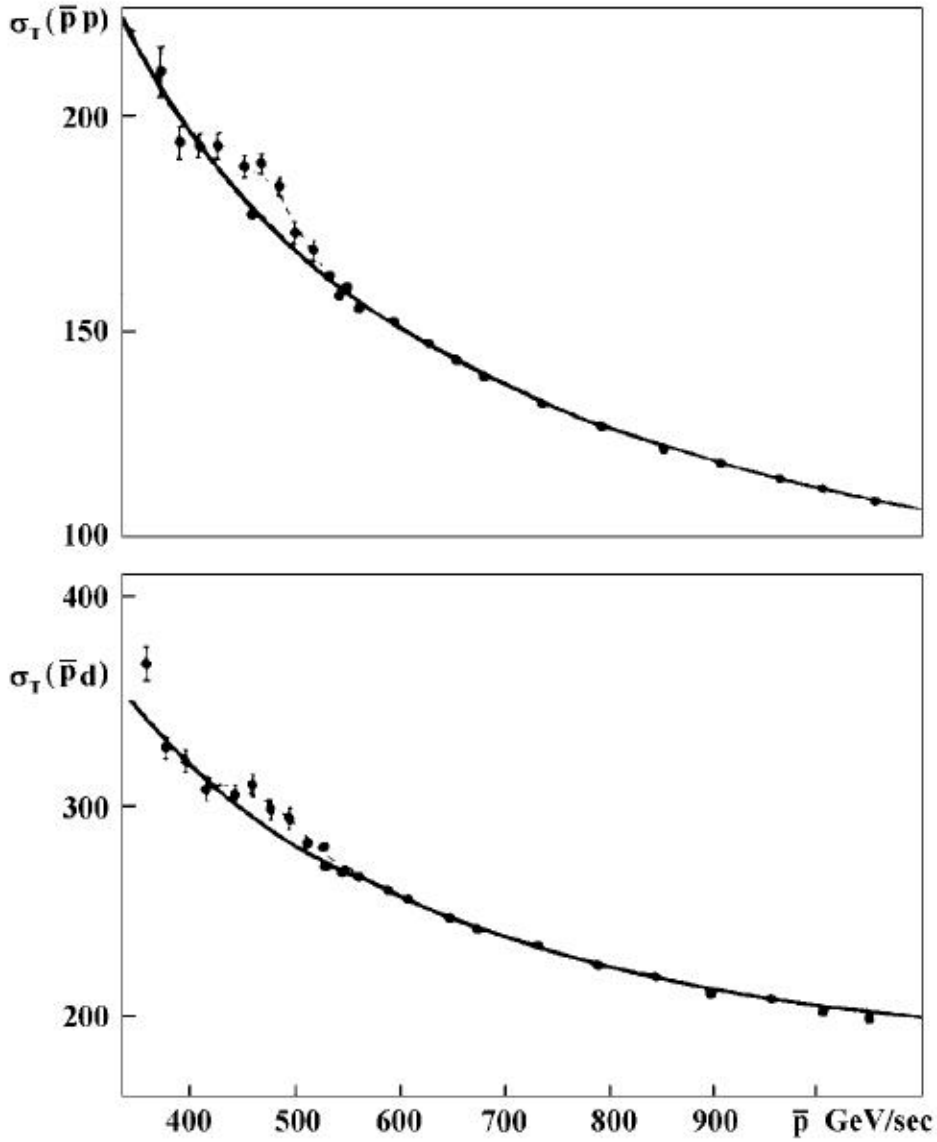

Fig. 2: Probability σ of interaction between $\bar{p}$, p and *deutrons* d (cited from [13]). The presence of maximum stands out the existence of the resonance state of "nucleon --- anti-nucleon".

After the experiments were done, the life span of such "atoms" was calculated in theoretical way in Chapiro's works [15, 16, 17]. His main idea was that nuclear forces, acting between nucleon and anti-nucleon, can keep them far way from each other, hindering their annihilation. For instance, a proton and anti-proton are located at the opposite sides in the same orbit and they are moved around the orbit centre. If the diameter of their orbit is much more than the diameter of "annihilation area", they can be kept out of annihilation (see Fig. 3). But because the orbit, according to Quantum Mechanics, is an actual cloud spreading far around the average radius, at any radius between the proton and the anti-proton there is a probability that they can meet one another at the annihilation distance. Therefore nucleon---anti-nucleon system annihilates in any case, this system is unstable by definition having life span no more than 10^{-20} sec.

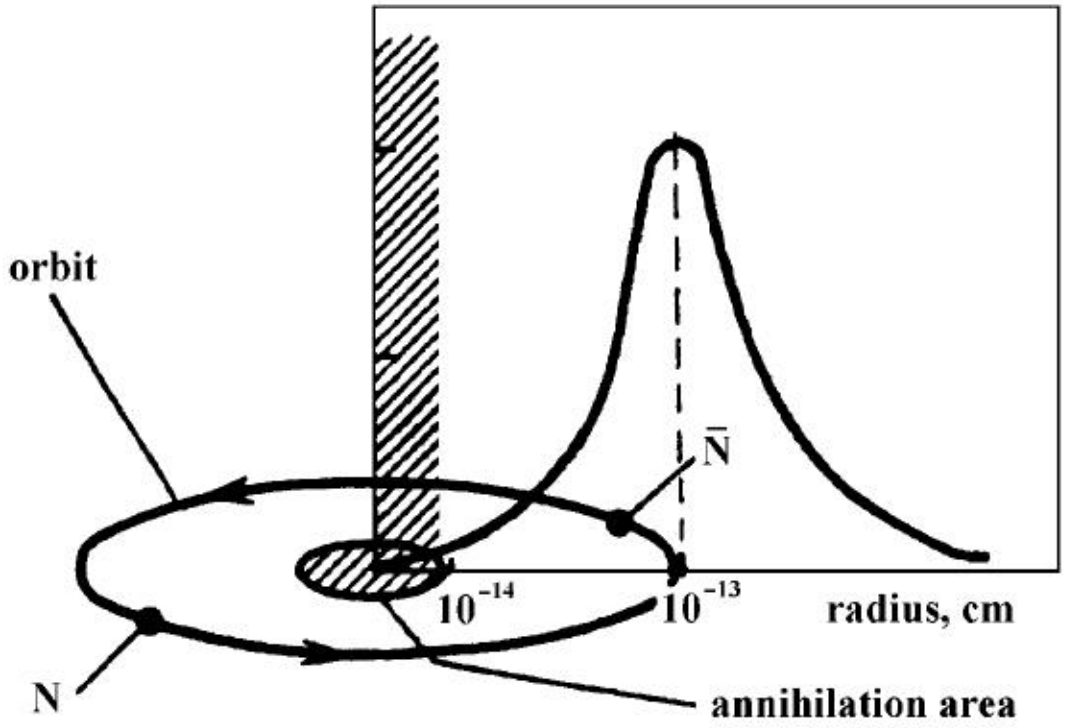

Fig. 3: Annihilation area and the probability arc in "nucleon --- anti-nucleon" system (cited from [17]).

Unfortunately, the researchers limited the research to the consideration of $\bar{p}p$ and $\bar{p}n$ nuclei only. The reason was that they, in the absence of a theory, considered $\bar{p}p$ and $\bar{p}n$ "atoms" as only a rare exception, which gives no classes of matter.

The unmatter does exists, for example some messons and antimessons, through for a trifling of a second lifetime, so the pions are unmatter [which have the composition u^d and ud^ , where by u^ we mean anti-up quark, d = down quark, and analogously u = up quark and d^ = anti-down quark, while by ^ means anti], the kaon K^+ (us^), K^- (u^s), Phi (ss^), D^+ (cd^), D^0(cu^), D_s^+ (cs^), J/Psi (cc^), B^- (bu^), B^0 (db^), B_s^0 (sb^), Upsilon (bb^) [where c = charm quark, s = strange quark, b = bottom quark], etc. are unmatter too.

Also, the pentaquark Theta-plus (Θ^+), of charge $^+1$, uudds^ (i.e. two quarks up, two quarks down, and one anti-strange quark), at a mass of 1.54 geV and a narrow width of 22 MeV, is unmatter, observed in 2003 at the Jefferson Lab in Newport News, Virginia, in the experiments that involved multi-GeV photons impacting a deuterium target. Similar pentaquark evidence was obtained by Takashi Nakano of Osaka University in 2002, by researchers at the ELSA accelerator in Bonn in 1997-1998, and by researchers at ITEP in Moscow in 1986.
Besides Theta-plus, evidence has been found in one experiment [10] for other pentaquarks, Ξ_5^{--}(ddssu^) and Ξ_5^+(uussd^).
D. S. Carman [11] has reviewed the positive and null evidence for these pentaquarks and their existence is still under investigation.

In order for the paper to be self-contained let's recall that the *pionium* is formed by a π^+ and π^- mesons, the *positronium* is formed by an antielectron (positron) and an electron in a semi-stable arrangement, the *protonium* is formed by a proton and an antiproton also semi-stable, the *antiprotonic helium* is formed by an antiproton and electron together with the helium nucleus (semi-stable), and *muonium* is formed by a positive muon and an electron.
Also, the *mesonic atom* is an ordinary atom with one or more of its electrons replaced by negative mesons.
The *strange matter* is a ultra-dense matter formed by a big number of strange quarks bounded together with an electron atmosphere (this strange matter is hypothetical).

From the exotic atom, the pionium, positronium, protonium, antiprotonic helium, and muonium are unmatter.
The mesonic atom is unmatter if the electron(s) are replaced by negatively-charged antimessons.
Also we can define a mesonic antiatom as an ordinary antiatomic nucleous with one or more of its antielectrons replaced by positively-charged mesons. Hence, this mesonic antiatom is unmatter if the antielectron(s) are replaced by positively-charged messons.

The strange matter can be unmatter if these exists at least an antiquark together with so many quarks in the nucleous. Also, we can define the strange antimatter as formed by a large number of antiquarks bound together with an antielectron around them. Similarly, the strange antimatter can be unmatter if there exists at least one quark together with so many antiquarks in its nucleous.

The bosons and antibosons help in the decay of unmatter. There are 13+1 (Higgs boson) known bosons and 14 antibosons in present.

2.5.1. Quantum Chromodynamics Formula.
In order to save the colorless combinations prevailed in the Theory of Quantum Chromodynamics (QCD) of quarks and antiquarks in their combinations when binding, we devise the following formula:

$$\mathbf{Q - A = \pm M3} \quad (1)$$

where $M3$ means multiple of three,
i.e. $\pm M3 = \{3 \cdot k \mid k \epsilon Z\} = \{\ldots, -12, -9, -6, -3, 0, 3, 6, 9, 12, \ldots\}$,
and Q = number of quarks, A = number of antiquarks.
But (1) is equivalent to:

$$\mathbf{Q \equiv A \pmod 3} \quad (2)$$

(Q is congruent to A modulo 3).

To justify this formula we mention that 3 quarks form a colorless combination, and any multiple of three (***M3***) combination of quarks too, i.e. 6, 9, 12, etc. quarks. In a similar way, 3 antiquarks form a colorless combination, and any multiple of three (***M3***) combination of antiquarks too, i.e. 6, 9, 12, etc. antiquarks. Hence, when we have hybrid combinations of quarks and antiquarks, a quark and an antiquark will annihilate their colors and, therefore, what's left should be a multiple of three number of quarks (in the case when the number of quarks is bigger, and the difference in the formula is positive), or a multiple of three number of antiquarks (in the case when the number of antiquarks is bigger, and the difference in the formula is negative).

2.5.2. Whence the **Quantum Chromodynamics Unmatter Formula.**
In order to save the colorless combinations prevailed in the Theory of Quantum Chromodynamics (QCD) of quarks and antiquarks in their combinations when binding, we devise the following formula:

$$\mathbf{Q - A = \pm M3} \quad (3)$$

where $M3$ means multiple of three,
i.e. $\pm M3 = \{3 \cdot k \mid k \epsilon Z\} = \{\ldots, -12, -9, -6, -3, 0, 3, 6, 9, 12, \ldots\}$,
and Q = number of quarks, A = number of antiquarks,
with $Q \geq 1$ and $A \geq 1$.
But (1) is equivalent to:

$$\mathbf{Q \equiv A \pmod 3} \quad (4)$$

(Q is congruent to A modulo 3) and $Q \geq 1$ and $A \geq 1$.

2.6. Quark-Antiquark Combinations.
Let's note by q = quark ϵ {Up, Down, Top, Bottom, Strange, Charm},
and by a = antiquark ϵ {Up^, Down^, Top^, Bottom^, Strange^, Charm^}.
Hence, for combinations of n quarks and antiquarks, $n \geq 2$, prevailing the colorless, we have the following possibilities:
- if n = 2, we have: qa (biquark – for example the mesons and antimessons);
- if n = 3, we have qqq, aaa (triquark – for example the baryons and antibaryons);
- if n = 4, we have qqaa (tetraquark);
- if n = 5, we have qqqqa, aaaaq (pentaquark);
- if n = 6, we have qqqaaa, qqqqqq, aaaaaa (hexaquark);
- if n = 7, we have qqqqqaa, qqaaaaa (septiquark);
- if n = 8, we have qqqqaaaa, qqqqqqaa, qqaaaaaa (octoquark);
- if n = 9, we have qqqqqqqqq, qqqqqqaaa, qqqaaaaaa, aaaaaaaaa (nonaquark);
- if n = 10, we have qqqqqaaaaa, qqqqqqqqaa, qqaaaaaaaa (decaquark);

etc.

2.7. Unmatter Combinations.
From the above general case we extract the unmatter combinations:
- For combinations of 2 we have: qa (unmatter biquark), [mesons and antimesons]; the number of all possible unmatter combinations will be 6·6 = 36, but not all of them will bind together.
It is possible to combine an entity with its mirror opposite and still bound them, such as:
uu^, dd^, ss^, cc^, bb^ which form mesons.
It is possible to combine, unmatter + unmatter = unmatter, as in ud^ + us^ = uud^s^ (of course if they bind together).
- For combinations of 3 (unmatter triquark) we can not form unmatter since the colorless can not hold.
- For combinations of 4 we have: qqaa (unmatter tetraquark);
the number of all possible unmatter combinations will be $6^2 \cdot 6^2 = 1{,}296$, but not all of them will bind together.
- For combinations of 5 we have: qqqqa, or aaaaq (unmatter pentaquarks);
the number of all possible unmatter combinations will be $6^4 \cdot 6 + 6^4 \cdot 6 = 15{,}552$, but not all of them will bind together.
- For combinations of 6 we have: qqqaaa (unmatter hexaquarks);
the number of all possible unmatter combinations will be $6^3 \cdot 6^3 = 46{,}656$, but not all of them will bind together.
- For combinations of 7 we have: qqqqqaa, qqaaaaa (unmatter septiquarks);
the number of all possible unmatter combinations will be $6^5 \cdot 6^2 + 6^2 \cdot 6^5 = 559{,}872$, but not all of them will bind together.
- For combinations of 8 we have: qqqqaaaa, qqqqqqqa, qaaaaaaa (unmatter octoquarks);
the number of all possible unmatter combinations will be $6^4 \cdot 6^4 + 6^7 \cdot 6^1 + 6^1 \cdot 6^7 = 5{,}038{,}848$, but not all of them will bind together.
- For combinations of 9 we have: qqqqqqaaa, qqqaaaaaa (unmatter nonaquarks);
the number of all possible unmatter combinations will be $6^6 \cdot 6^3 + 6^3 \cdot 6^6 = 2 \cdot 6^9 = 20{,}155{,}392$, but not all of them will bind together.
- For combinations of 10 we have: qqqqqqqqaa, qqqqqaaaaa, qqaaaaaaaa (unmatter decaquarks);
the number of all possible unmatter combinations will be $3 \cdot 6^{10} = 181{,}398{,}528$, but not all of them will bind together.
Etc.

I wonder if it is possible to make infinitely many combinations of quarks / antiquarks and leptons / antileptons...
Unmatter can combine with matter and/or antimatter and the result may be any of these three.
Some unmatter could be in the strong force, hence part of hadrons.

2.8. Unmatter Charge.
The charge of unmatter may be positive as in the pentaquark Theta-plus, 0 (as in positronium), or negative as in anti-Rho meson (u^d) [M. Jordan].

2.9. Containment.
I think for the containment of antimatter and unmatter it would be possible to use electromagnetic fields (a container whose walls are electromagnetic fields). But its duration is unknown.

2.10. Further Research.
Let's start from neutrosophy [23], which is a generalization of dialectics, i.e. not only the opposites are combined but also the neutralities. Why? Because when an idea is launched, a category of people will accept it, others will reject it, and a third one will ignore it (don't care). But the dynamics between these three categories changes, so somebody accepting it might later reject or ignore it, or an ignorant will accept it or reject it, and so on. Similarly the dynamicity of <A>, <antiA>, <neutA>, where <neutA> means neither <A> nor <antiA>, but in between (neutral).
Neutrosophy considers a kind not of di-alectics but tri-alectics (based on three components: <A>, <antiA>, <neutA>). Hence unmatter is a kind of intermediary between matter and antimatter, i.e. neither one, nor the other.

Upon the model of unmatter we may look at ungravity, unforce, unenergy, etc.
Ungravity would be a mixture between gravity and antigravity (for example attracting and rejecting simultaneously or alternatively; or a magnet which changes the + and - poles frequently).
Unforce. We may consider positive force (in the direction we want), and negative force (repulsive, opposed to the previous). There could be a combination of both positive and negative forces in the same time, or alternating positive and negative, etc.
Unenergy would similarly be a combination between positive and negative energies (as the alternating current (a.c.), which periodically reverses its direction in a circuit and whose frequency, f, is independent of the circuit's constants). Would it be possible to construct an alternating-energy generator?
To conclusion:
According to the Universal Dialectic the unity is manifested in duality and the duality in unity.

"Thus, Unmatter (unity) is experienced as duality (matter vs. antimatter).
Ungravity (unity) as duality (gravity vs antigravity).
Unenergy (unity) as duality (positive energy vs negative energy).
and thus also...
between duality of being (existence) vs nothingness (antiexistence) must be "unexistence" (or pure unity)." (R. Davic)

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化学元素起源与早期恒星演化

陈有恒

（中国管理科学研究院思维科学研究所广东海南分所，广东省湛江市赤坎大通街 48 号，524035）

摘要：太阳系中的化学元素起源于太阳系原始星际氢云团核反应灶中所发生的核聚合反应。核反应灶内以对称核聚变反应为主，生成质量 A=2^{n}的对称核素 $^{2}_{1}H$ 、$^{4}_{2}He$ 、$^{8}_{4}Be$ 、$^{16}_{8}O$ 及 $^{32}_{16}S$ ，当 n≥6 时合成核素 $^{64}_{32}Ge$ 的激发能△E <0，核聚合反应不能自发进行。对于 A≠2^{n}的核素，可由中子 n、质子 $^{1}_{1}H$ 、重氢 $^{2}_{1}H$ 、氦 $^{4}_{2}He$ 和其它轻核素聚合反应而成。伴随着化学元素的合成，太阳系星际氢云团核反应灶也演变成原始的新星、变星等天体。

关键词：化学元素 星际氢云核反应灶 核聚变反应 化学元素丰度 恒星 新星 光度

一、基本理论

天体物理中的大量观测结果发现，银河系和河外星系中的星际氢云团是新恒星不断诞生的起源地，因此构成银河系、太阳系和地球等天体的化学元素，也伴随着银河系、太阳系中原始星际氢云团的核反应而形成。

对于在太阳系原始星际氢云核反应灶内，如果入射粒子的散射截面为б $_{散射}$，最可几速度为υ_T，那么对麦克斯韦