Matter, Antimatter, and Unmatter

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Abstract.
Besides matter and antimatter there must exist 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. At CERN 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.

1. Introduction.
This article is an improved version of an old manuscript [5]. 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>∪<NeutA>. Then, in physics, NONMATTER is what is not matter, i.e. nonmatter means antimatter together with unmatter.

2. Classification.
A) Matter is made out of electrons, protons, and neutrons. Each matter atom has electrons, protons, and neutrons, except the atom of 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 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. There does not exist an unmatter atom of hydrogen, neither an unnucleus of hydrogen since the hydrogen has no proton. 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.

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

3. **Unmatter propulsion.**

We think it could be possible at using unmatter as fuel for space rockets or for weapons platforms because, similarly to the antimatter [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)

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.

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.

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

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 $+2/3 \cdot 1.606 \cdot 10^{-19}$ C) and two Down quarks (each with the charge of $-1/3 \cdot 1.606 \cdot 10^{-19}$ C), while an antineutron has one anti Up quark (with the charge of $-2/3 \cdot 1.606 \cdot 10^{-19}$ C) and two anti Down quarks (each with the charge of $+1/3 \cdot 1.606 \cdot 10^{-19}$ 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.

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.

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?

References:
http://livefromcern.web.cern.ch/livefromcern/antimatter/history/AM-history00.html.