

Does matter attract or repel antimatter?

Abstract: It is quite clear that the heteronymous charged particles and charged material bodies are attracted to each other and the homonymous charged are repelled. So the positively charged protons repel the other protons, while the negatively charged electrons are also repelled between each other. However, protons and electrons, because they have heteronymous charges are attracted. The same happens to the positively or negatively charged material bodies. Something similar is also happened with the charged particles and bodies of the antimatter. But when we have neutral particles, such as neutrons and atoms, or uncharged bodies of matter or antimatter, this state is reversed by neutrons to attract the other neutrons, –strong nuclear force–, atoms to attract other atoms, and the material bodies to be attracted between them, –gravitation–. The above properties of the charged particles and bodies and the reversal of these properties to neutral particles and uncharged bodies lead us to a new rule that “neutral particles and uncharged bodies of matter are attracted to one another but they are repelled by neutral particles and uncharged bodies of antimatter”.

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The interactions between particles and bodies, of matter and antimatter can be classified into two major categories: The first category includes the interactions of charged par-

ticles and charged bodies and the second one includes the interactions of the neutral particles and uncharged bodies.

Concerning the first category, i.e. the interactions of charged particles and charged bodies of matter and antimatter, we can distinguish the following three cases:

First case: Charged particles or charged bodies of matter. This case concerns our Universe, or any other Universes, if of course we accept that there are other Universes apart from our own Universe.

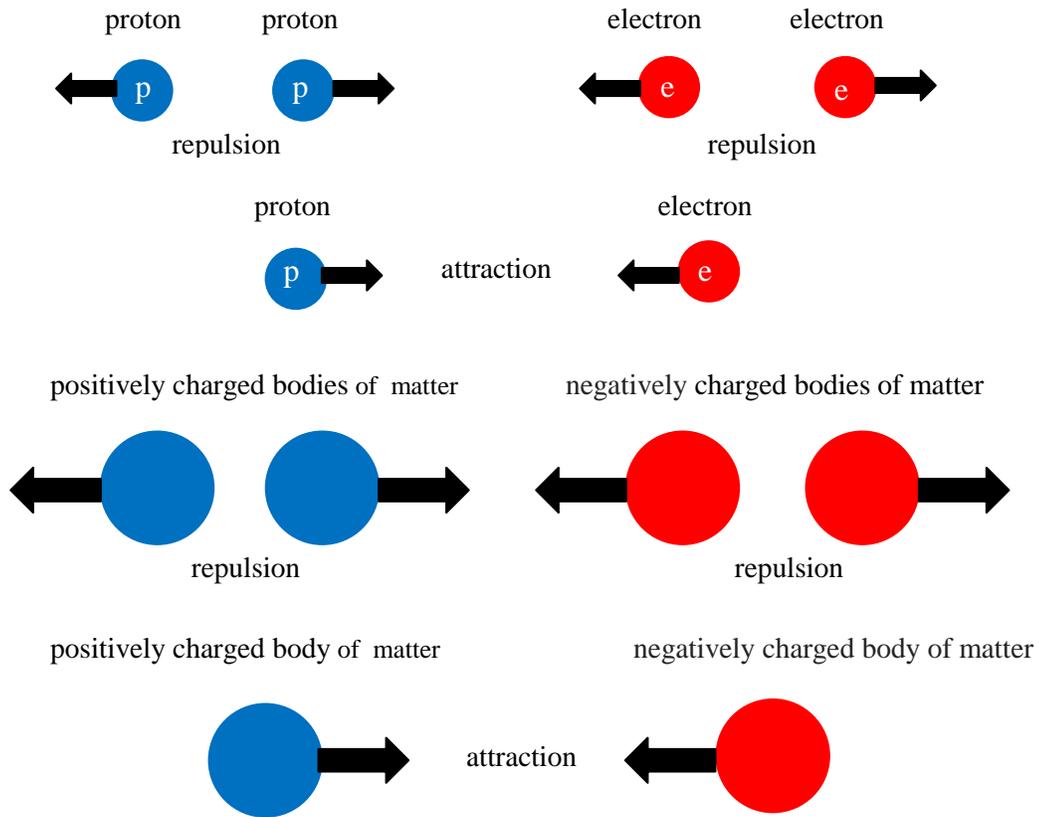


Figure 1. The interactions between the charged particles and charged bodies of matter

If we take two protons¹ (p), will notice that is created repulsion between them which, according to the law of the Coulomb, it is:

¹ With dark blue, red or gray colors, characterize the particles and bodies of matter and with light same colors characterize the particles and the bodies of the antimatter

$$F_p = K \frac{p^2}{r^2} \quad (\text{repulsion})$$

Where: F_p the repulsing force developed between the two protons, K is the electrostatic constant, p the positive² charge of the proton and r the distance between the two protons.

In the case we have two electrons (e) there will again develop the same repulsion:

$$F_e = K \frac{e^2}{r^2} \quad (\text{repulsion})$$

Where we have again: F_e the repulsing force developed between the two electrons, K the electrostatic constant, $e = p$ the negative³ charge of the electron that is equal but opposite the proton's charge and r the distance between the two electrons.

Then if we take a proton and an electron the same force is developed between them but it will be an attractive force, since the charges of the proton and the electron are opposite charges, namely:

$$F_{pe} = K \frac{p \cdot e}{r^2} \quad (\text{attraction})$$

Where we have again: F_{pe} the attraction force developed between the proton and the electron, K the electrostatic constant, $p = e$ the charges of the proton and the electron and r the distance between them.

For two charged bodies at a distance r with charges q_1 and q_2 will be:

$$F_{q_1q_2} = K \frac{q_1q_2}{r^2}$$

Where the force $F_{q_1q_2}$ will be attractive or repulsive force, depending on whether the charges q_1 and q_2 of the two bodies are heteronymous or homonymous.

The above interactions are clearly noted in Figure 1 of the previous page.

Second case: Charged particles of antimatter or charged antimatter bodies. This case applies to the Antiuniverse or to any other Antiuniverses or to large antimatter concentra-

² All particles and bodies of positive charge of matter are characterized by a blue dark color. The particles and bodies of the antimatter bearing a positive charge are characterized by a blue but light color.

³ The particles and bodies of matter that carry a negative charge are characterized by a red dark color. The negative charge particles and bodies of antimatter are characterized by a red but light color

tions if, of course, we accept that there are Antiuniverses or similar large antimaterial concentrations.

For the interactions of charged particles and antimaterial bodies there are analogous phenomena such as for particles and bodies of matter, namely:

The antiprotons⁴ will repel their antiprotons, the antielectrons⁵ will repel their own antielectrons, the antiprotons will attract the antielectrons and the antimatter bodies will be attracted or repelled with each other depending on whether their charges are heteronymous or homonymous, as shown in figure 2 below.

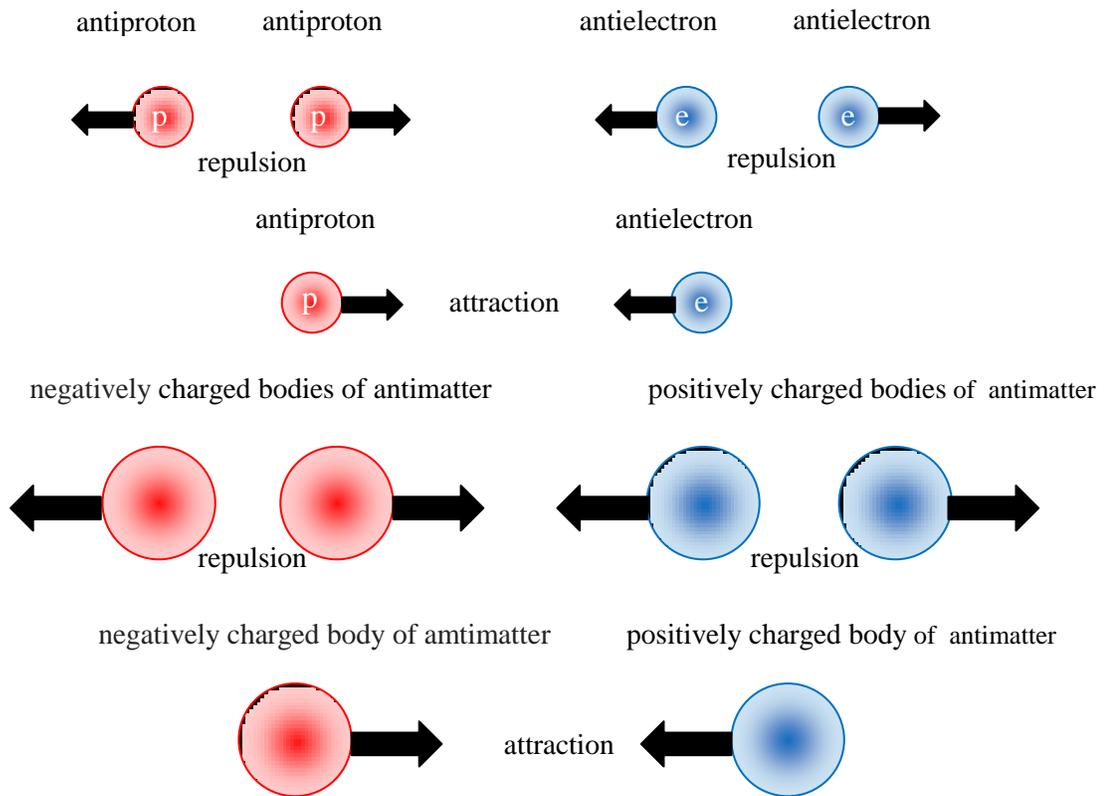


Figure 2. The interactions between charged particles and charged bodies of the antimatter.

Third case: Charged particles or charged bodies of matter and antimatter. This case concerns the initial phases of the creation where matter was mixed with antimatter.

⁴ With the prefix “anti” characterize the elements of the antimatter.

⁵ Quantum Mechanics, for the antielectron, also uses the name positron, but in this work, for the sake of symmetry we will keep the name antielectron.

In the initial phases, where the matter was still mixed with the antimatter, it was natural and normal to have a mixture of the interactions of the first and second cases, as we have described them and as shown in Figures 1 and 2. Of course these interactions are supplemented by the interactions between charged particles or charged bodies of matter and antimatter as shown in the following supplementary figure 3.

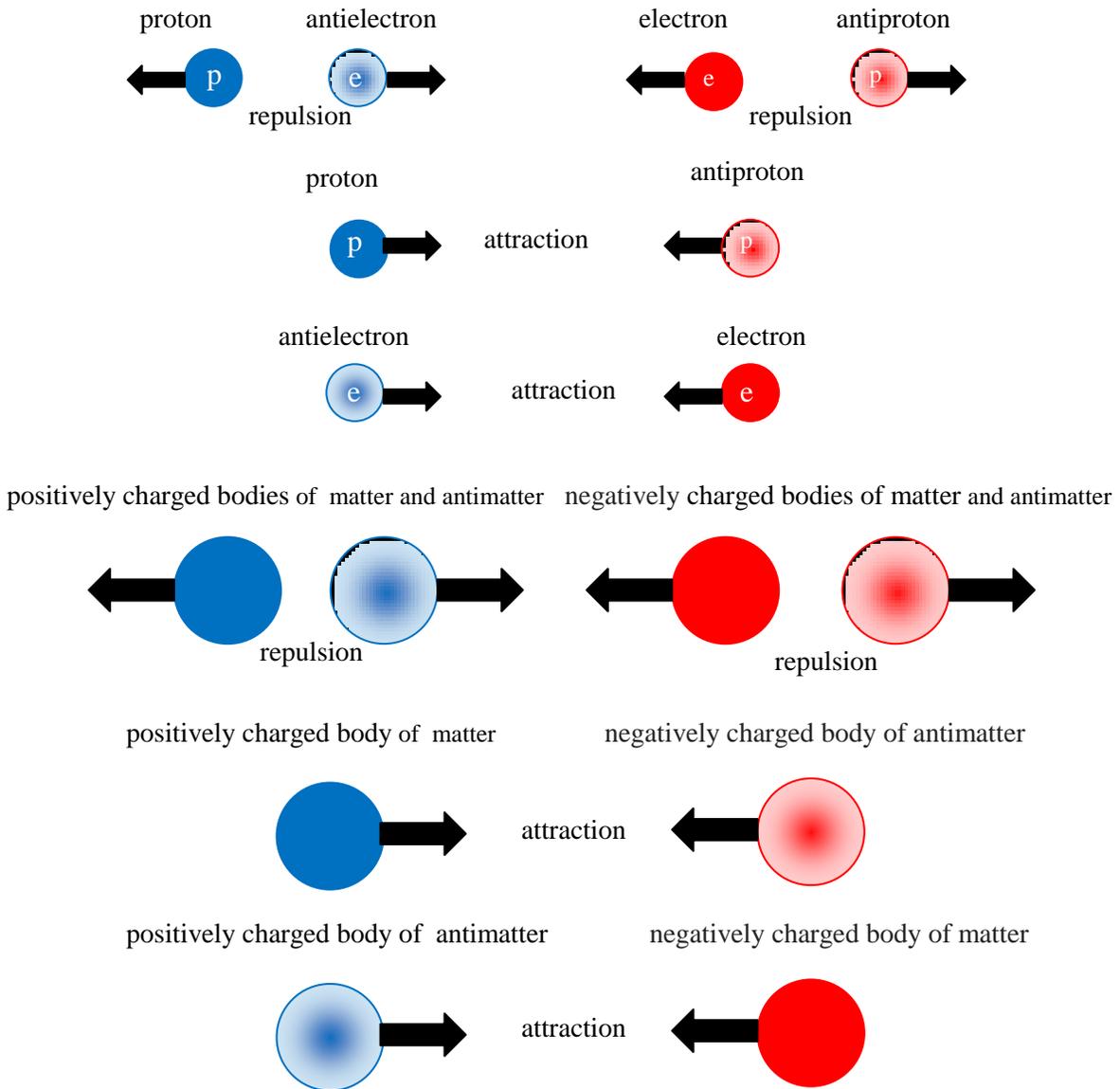


Figure 3. The interactions between charged particles and bodies of matter and antimatter.

If we look carefully at the above three cases and the corresponding figures 1, 2 and 3, we will observe that regardless of whether we have to deal with particles or bodies of matter –gravitation–, or antimatter, the interactions between them follow the general rule:

"The homonymous charges are repelled and the heteronymous are attracted"

This rule will call the ***"charges rule"***. We must, however, note and keep it in mind that this rule concerns exclusively charged particles and bodies of matter and antimatter, since, as will see for neutral particles, or uncharged bodies this rule is reversed.

These relate to the first category, namely to the interactions of charged particles and charged bodies of matter and antimatter. But what about the interactions of the *second category* that is the neutral particles, such as neutrons, atoms and the uncharged bodies of matter and antimatter?

For neutral particles and uncharged bodies of matter, we know that neutrons are attracted, –strong nuclear force–, atoms attract other atoms, and matter is attracted from matter. The same happens with antimatter. We will notice a reversion of the above mentioned rule of charges, which leads us to a new rule, the ***"rule of the uncharged bodies"***, of matter and antimatter, which tells us that:

"The homonymous uncharged bodies are attracted and the heteronymous are repelled"

i.e. matter and matter are attracted, antimatter attracts antimatter, while matter and antimatter are repelled

The attraction of neutral particles and uncharged bodies generally follows the Newton's law of the Universal gravitation⁶, namely:

$$F = G \frac{m_1 * m_2}{r^2}$$

Where we have: F the attraction gravitational force developed between the two particles or bodies, G the gravitational constant, m_1 and m_2 the masses of the two particles or bodies and r the distance between them.

What will observe is that the forces developed by the interactions between the neutral particles, or the uncharged bodies are much weaker force, -about 10^{-36} times- by the elec-

⁶ Except of the attraction of neutrons, which is due to the strong nuclear force and follows different rules I will deal with, in my next work.

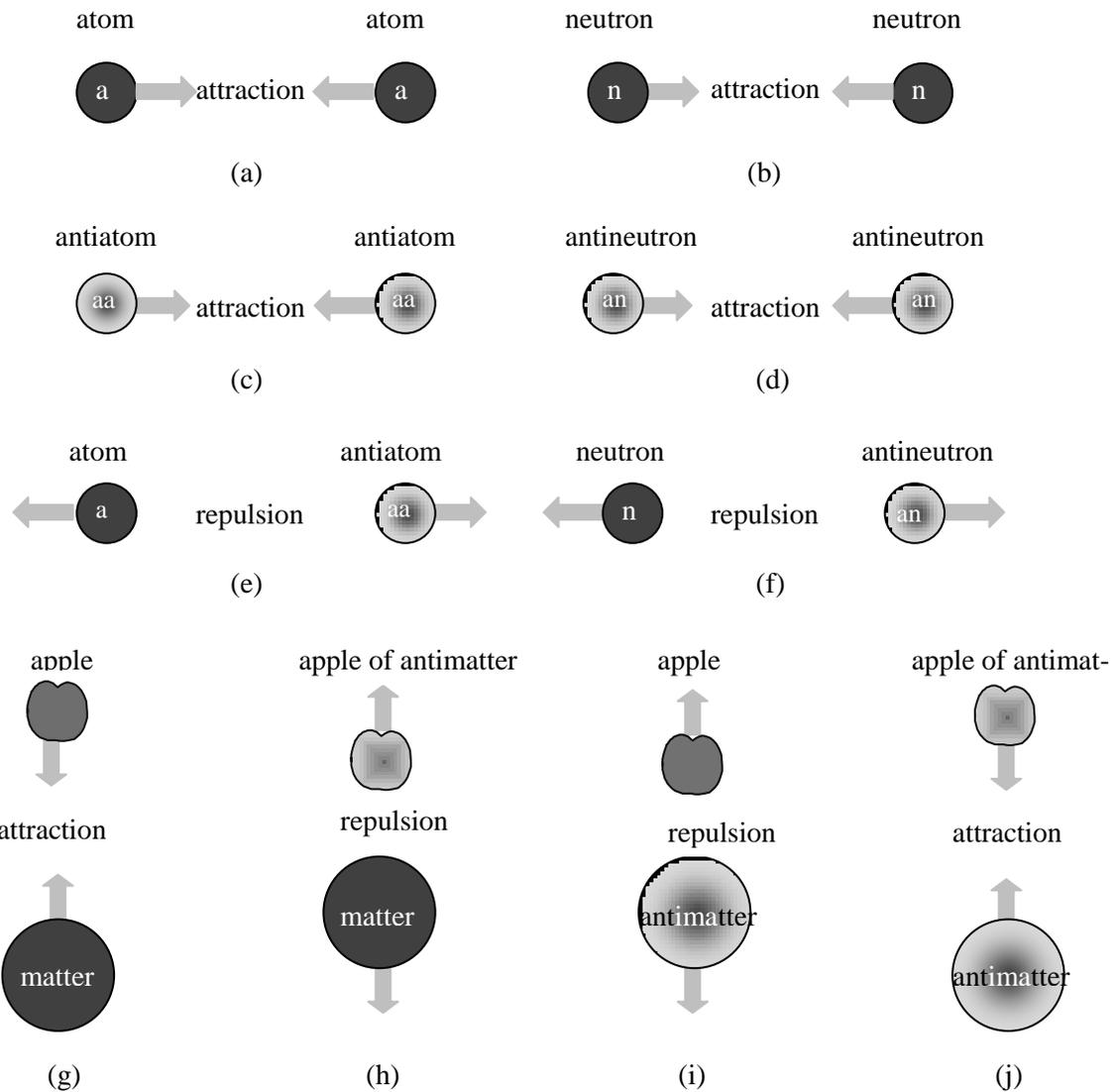


Figure 4. The interactions between neutral particles, or uncharged bodies of matter and antimatter.

tromagnetic forces, F_p , F_e , etc., of the charged particles and bodies, whether they are material elements, or antimaterial elements, or elements of matter and antimatter. Anyway, we have to do with very weak interactions, rather subtle interactions, that if we do not have large concentrations of matter or antimatter, they are not even detected. It is a very big mistake that many physicists believe that matter interacts violently with antimatter.

There is exactly the opposite. The interactions between matter and antimatter, for uncharged bodies, are very mild and rather subtle. That's why when a man of antimatter comes near you -something that is not so possible happen to you- and he wants to greet you, do not be afraid, give him your hand without a fear and greet him normally, you will not suffer anything.

In Figure 4 of the previous page we note the combinations of the interactions of neutral particles and uncharged bodies⁷ of matter and antimatter, according to the above mentioned rule of the uncharged bodies.

From these combinations, the combinations of a, b, c, d, g and j, that is the combinations of the attractive interactions between matter and antimatter, either theoretically or experimentally or as undisputed axioms, have already been verified and remain to verify the combinations of e, f, h and i, i.e. the combinations of repulsive interactions generated according to the neutral uncharged bodies rule. In my book "The Real Grand Unification" I give enough data to verify these combinations. In the third book of the trilogy, "The creation of matter and antimatter", where I will describe the rules and the way of creation of matter and antimatter, it seems clear that:

“Matter and antimatter are repelled”

Commenting on the above, I would like to point out that today the majority of physicists and physics accept the opposite⁸, namely that: matter and antimatter are attracted, but they do not suggest any theoretical or experimental proof that confirms this acceptance. They consider de facto the attraction of matter and antimatter; even characterizing as heretics⁹ the scientists who claim that matter and antimatter are repelled.

Initially, the acceptance by science of the view that matter attracts antimatter, was unnoticed. It rather facilitated the whole situation, since it also agreed with the views of the

⁷ With dark gray color we characterize the neutral particles and the uncharged bodies of the matter and with light gray we characterize the neutral particles and the uncharged bodies of the antimatter

⁸ May be affected from the charges rule I have described, but in the case of neutral particles, or uncharged bodies, this rule does not apply.

⁹ While, the case must be the opposite, because those who claim, that matter and antimatter are attracted are also outside the above normal rules that should apply.

Big Bang¹⁰ theory. But over time and newer discoveries, has been found that accepting the idea that matter attracts antimatter helped to answer some questions, but created new unanswered questions, such as: How is the accelerated motion¹¹ of the Galaxies created? How did the matter separated from the antimatter? What happened and where is the antimatter found¹²? How did the Galaxies build? etc, questions very important that have not yet been answered satisfactorily.

On the other hand if we accept the view that matter repels antimatter, a view that lies within the rule of the uncharged bodies of matter and antimatter, we will produce answers, to all the above queries are not answered, namely:

1. In the question, how is the accelerated motion of the Galaxies created? The answer is that: The antimatter is created along with matter. The matter and the antimatter are repelled, resulting in continuous forces of repulsion over the concentrations of matter and the antimatter. These forces applied continuously to the matter and the antimatter concentrations create, in accordance with the laws of mechanically, accelerated movements ($\gamma = F / m$).
2. In the question, how did the matter was separated from the antimatter? The answer is self-evident: The matter was separated from the antimatter due to the repulsion between matter and antimatter.
3. In the question, what happened and where is the antimatter found? The answer is: In the previous question we saw that matter was separated from the antimatter. The matter created the Universe or any other Universes. The antimatter created the Antiuniverse or the Antiuniverses. The Universes and the Antiuniverses are so far apart that we cannot make any provision for a localization or communication with any other Universe or Antiuniverse.

¹⁰ The Big Bang theory is the predominant cosmological theory that explains the creation of our universe.

¹¹ Physicists are trying to explain the accelerated motion of the Galaxies by introducing two new meanings, “Dark matter” and “Dark energy”, but have not yet produced a positive result.

¹² The explanation given by the Big Bang theory, that initially there was a little more matter than the antimatter and so after the self-destruction of matter and antimatter rescued an amount of matter created the Universe, is not a satisfactory explanation.

4. In the question, how did the Galaxies build? The answer is: The mechanism of creating and moving the concentrations of matter and antimatter, with bodies of matter attracted to one another, the bodies of the antimatter also been attracted and the material bodies repelling the bodies of the antimatter, creates conditions formatting concentrations with the characteristics of the Galaxies. But we still need a lot of study until we reach a definite conclusion.

I finish the work with the wish, it not to become some cause for any controversy among the scientists, for who have right? Those who claim that matter attract the antimatter, or those who support the opposite? But, I wish the work to be the motive that will lead scientists to study in-depth of the whole theme and after then, to make their final and definitive conclusions.

P.S

Please do not hesitate to ask me for any question. I will answer all the questions.

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