

## LETTERS TO PROGRESS IN PHYSICS

## Discovered “Angel Particle”, which is Both Matter and Antimatter, as a New Experimental Proof of Unmatter

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“Angel particle” bearing properties of both particles and anti-particles, which was recently discovered by the Stanford team of experimental physicists, is usually associated with Majorana fermions (predicted in 1937 by Ettore Majorana). In this message we point out that particles bearing properties of both matter and anti-matter were as well predicted without any connexion with particle physics, but on the basis of pure mathematics, namely — neutrosophic logic which is a generalization of fuzzy and intuitionistic fuzzy logics in mathematics.

Recently, a group of experimental physicists conducted by Prof. Shoucheng Zhang, in Stanford University, claimed about discovery of the particles that bear properties of both particles and anti-particles. The press-release [1] was issued on July 20, one day before the official publication [2].

Shoucheng Zhang told [1, 2] that the idea itself rose up from Ettore Majorana who in 1937 suggested that within the class of fermions a particle may exist which bear properties of particle and anti-particle in the same time. Such hypothetic particles are now know as “Majorana fermions”.

In their experiment, the Stanford team used the following experimental setup. Two stacked films — the top film made of superconductor and the bottom film made of magnetic insulator — were stored together in a cooled down vacuum box. And an electrical current was sent through this “sandwich”. Using a magnet mounted over the stackled films, the speed of the electrons in the film was able to be modifying. Varying the magnet’s properties, the experimentalists registered Majorana particles which appeared in pairs in the electron flow but deviated from the electrons (so they were able to be registered separately). The experimentalists referred to the supposed new particle as “Angel particle” (meaning that, as well as angels are neither male nor female, the supposed particle is neither matter nor anti-matter).

Shoucheng Zhang also declared the importance of this discovery because, he thinks, the particles bearing properties of matter and anti-matter in the same time shows a fantastic perspective for computer industry and machinery.

In this background, we should note that particles bearing properties of matter and anti-matter were as well theoretically predicted being non-connected with particle physics, but only on the basis of pure mathematics. This is a series of works [3–8] based on neutrosophic logic (one of the multi-valued modern logics, a part of mathematics) authored by Florentin Smarandache.

So, following the neutrosophic logics, “between an entity  $\langle A \rangle$  and its opposite  $\langle \text{Anti}A \rangle$  there exist intermediate en-

tities  $\langle \text{Neut}A \rangle$  which are neither  $\langle A \rangle$  nor  $\langle \text{Anti}A \rangle$  [...]. Thus, between “matter” and “antimatter” there must exist something which is neither matter nor antimatter, let’s call it UNMATTER” [3]. Expanding this theory, a new type of matter — “unmatter” — was predicted.

Now, this theoretical study based on pure mathematics, elucidates that was discovered by the Stanford team conducted by Shoucheng Zhang. This fact shows that not only particle physics but also pure mathematics can make essential predictions that may change the world of science and techniques.

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### References

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