

# Re: The Positron and the Trend of Physics Toward Religion

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Nth Complexity wrote:

"I think that there is a moral to this story, namely that it is more important to have beauty in one's equations than to have them fit experiment. If Schroedinger had been more confident of his work, he could have published it some months earlier, and he could have published a more accurate equation. It seems that if one is working from the point of view of getting beauty in one's equations, and if one has really a sound insight, one is on a sure line of progress. If there is not complete agreement between the results of one's work and experiment, one should not allow oneself to be too discouraged, because the discrepancy may well be due to minor features that are not properly taken into account and that will get cleared up with further development of the theory."  
-- Paul Dirac, Scientific American, May 1963.

One often hears Dirac's mantra from the modern crackpot theoretical physicists. Particularly in such fields as string theory, experiment is not even a concern to the clowns. But this disturbing trend has been going on for a long time.

For those of you not familiar with the work of Paul Dirac, a bit of the story will be useful. With the advent of quantum mechanics, it was discovered that electrons sometimes behave as waves. However, the theory of electron waves at that time was not consistent with Einstein's theory of special relativity. Dirac's most famous work was developing a theory of electron waves consistent with relativity. But there was a problem: Dirac's theory implied the existence of particles with the same mass and opposite charge to the electron, which had never been seen. But Dirac stuck to his theory, and a few years later, this particle, called the positron, was discovered.

Unfortunately, some physicists got carried away with Dirac's

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success. It made them willing to construct theories that included all sorts of things that no one had ever seen, just because it made the theory nice. They hoped that in a few years, their new inventions would likewise be detected. But this is usually not the case.

Examples of this kind of thought abound in physics:

The idea of spontaneous symmetry breaking, a part of the modern Standard Model of particle physics, says that the laws of physics are symmetric in ways that the results of particle experiments are not symmetric in. To explain this apparent discrepancy, the direction in which the symmetry is broken is allowed to vary from place to place. It is turned into an asymmetry of the world around us instead of the basic laws of physics. The trouble with this is that if it is true, we ought to see places where the direction changes abruptly from one way to another. These places are called "topological defects," and depending on their shape, they are known as domain walls, cosmic strings, monopoles, and textures. Many theoretical physics papers have been written about them. Yet they do not exist.

The modern theoretical model of electrons and related particles called leptons requires that the particles have no mass. Since they clearly do have mass, an interaction with a particle called the Higgs particle was introduced to cause electrons to have mass. But where is the Higgs particle?

Various theories have attempted to unify all known forces into a single field described by one gauge theory with one group. A gauge theory, BTW, is a very symmetrical and elegant way of describing a field, which of course means that crackpot physicists will want to play with them whether or not what they are doing described the real world. Some of these theories predicted that protons, the very stuff most of the non-imaginary universe is made of, ought to undergo radioactive decay. Physicists assembled huge tanks of ultra-pure water deep underground, and waited in earnest for just a few of the hydrogen atoms to decay. None of them ever did.

The rims of galaxies appear to rotate so fast around the galactic center that the galaxy would tear itself apart according to current gravitational theory. This has led to the well-known postulation of so-called "dark matter."

In addition, observations of the geometry of the universe do

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not agree with theories of nuclear reactions in the early universe on how much stuff there is in the universe. This has led to the idea that most of the matter in the universe is not made of atoms, but is of an undiscovered type of particle that passes directly through us without us even noticing. Worse, neutrinos, which have been observed and are the only things we know of that do pass through ordinary matter well enough to make the cut, have been shown not to fit the bill. The imaginary particles are called "WIMPs."

And even more ... some physicists think that rather than modifying the equations of gravity to account for the observation that the universe is flying apart at greater and greater speeds, it is better to postulate a new, bizzare kind of energy that would be by far the primary ingredient in the universe, if it existed, beating out even the WIMPs several times. You have probably heard of it ... it's called "dark energy."

Supersymmetry, the foundation of crackpot string theory, posits a suggestion that attempts to one-up Dirac by promising for every particle a "superpartner." Superpartners, unlike antimatter have different masses and spins. Not one of them has ever been detected after many more years of looking.

You can practically pick up any theoretical physics paper nowadays to find a detailed description of something new that does not exist. Physicists believe in such things not because there is evidence, but because they want them to be real. It's gotten so bad that it begs a question. What is the difference between the invisible world of religion and the invisible world of modern theoretical crackpot physics? And why is so much taxpayer money wasted on the latter, but none into the former?

Great post! I fully agree (except for the funding of religion). "Beauty" plays too much a role in physicists' thinking. When faced with new facts many of them prefer to cling to the old "beautiful" theory and invent more and more bizarre assumptions rather than critically re-examine the fundamentals of the old theory and come up with new alternative approaches.

We all laugh at 19th century physicists that believed in the aether that cannot be directly observed and yet penetrates everywhere. Look how many non-observable things the physics of the 20th century has produced: virtual particles, ghost fields, "physical" vacuum, quarks, gluons... I am even not talking about strings.

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I don't think that theoretical beauty is equivalent to having a small number of short equations (this seems to be the prevailing view). It is more important, in my opinion, to avoid logical contradictions and to have directly observable counterparts to all ingredients of the theory.

Eugene.