Essay

This is an example of the War of the Worldviews in action! As I researched the baryon number problem, I found that many brilliant, evolutionary scientists indicated that this problem has basically been solved. It is a fairly technical, theoretical subject, so I had to learn many new terms and ideas. I became somewhat discouraged and almost gave up. But after more research, I found that it is not solved. Since these scientists are committed to naturalism, they have to cover up the many problems in their naturalistic, anti-Biblical models in order to still hold to their underlying belief. They are willing to use fudge factors, theoretically violate scientific laws, and discard the Standard Model of particle physics before admitting that naturalism is causing major problems in their models. Despite much experimentation, the baryon number problem is still a major problem for the big bang! God's Word is true!

A+

Antimatter and the Big Bang

By Paul W. Lamicela

March 2006

Paul, you demonstrated a great deal of diligence in researching and writing this report. You took up the challenge on your own and worked on it faithfully until it was completed. Your enthusiasm filtered down to the rest of the family — even your seven yearold sister began talking about anti-matter. Keep up the good work!

Outline

Thesis: The fact that we find almost no antimatter in the universe presents an enormous problem to the big bang hypothesis of cosmology, but is consistent with the biblical model.

Introduction

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Introduction

Science fiction, modern physics, cosmology—what do you think of when you think of antimatter? It may be a surprise to you that antimatter has a big part to play in the big bang—as big a part as matter does! In the big bang model, matter and antimatter were produced in equal parts in the beginning. Today, however, we find almost no antimatter in the universe. Furthermore, when matter and antimatter come together, they annihilate, producing pure energy. So why should there even be a universe filled with matter? There should be nothing but radiation.

The fact that we find almost no antimatter in the universe presents an enormous problem to the big bang hypothesis of cosmology, but is consistent with the biblical model.

I. What is antimatter?

A particle of antimatter has the same mass as its mirror matter particle, but it has the opposite electrical charge or other electromagnetic properties such as magnetic moment. (Encarta Encyclopedia defines magnetic moment as "an electromagnetic property that determines the force that acts on a particle as it moves through a magnetic field.") For example, an electron has a negative charge while a positron, its antimatter counterpart, has the same mass but a positive electrical charge and opposite magnetic moment. Neutrons are electrically neutral, as the name suggests, therefore their antiparticle counterpart, antineutrons, have only a different magnetic moment.

Whenever matter is created from pure energy (a process that is explained by Einstein's theory of relativity and has been proven experimentally), an equal amount of antimatter is produced. This is called *quantum pair production*. When matter and antimatter come together they annihilate and form a burst of energy in the form of gamma rays or very short-lived particles.

Antimatter is very scarce in the universe—and even scarcer on earth. Basically the only antimatter particles that exist on earth are those formed in particle accelerators by physicists.

Paul Dirac first predicted the existence of the positron (the opposite of an electron) in 1928. It was discovered in 1932. Since then, a whole range of antiparticles have been discovered by particle physicists in large particle accelerators. In 1995, the first antiatoms were artificially made—physicists in CERN laboratory in Switzerland joined positrons and antiprotons to make atoms of antihydrogen.

Positrons (antielectrons) are used in PET scans. PET (Positron Emission Tomography) scans are used to analyze and diagnose various brain disorders. They are also used in brain research. A positron-emitting substance is put into the brain; the positrons come together with electrons, and produce photons. This activity is tracked by a computer and then studied.

II. What does antimatter have to do with the big bang?

According to the big bang, the universe started out billions of years ago in a *singularity*. A singularity is an infinitely hot and dense point. This point supposedly contained not only all the energy (there was no matter as of yet) but space as well. Now, a singularity is a thermodynamic "dead end." Because it is a very stable situation, it is not a good way to start a universe. But somehow, the primordial singularity found enough energy to start expanding. It expanded incredibly rapidly, (some ideas are 10^{50} in the first 10^{-32} second) then slowed down and began to cool. Matter began to form—hydrogen, helium, and a few other light elements—and since it was forming from energy, antimatter appeared in equal quantities (the Law of Conservation of Baryon Number). So there was an equal amount of antimatter and matter in the beginning. This original matter is supposedly responsible for virtually all the matter in the universe today. The helium and hydrogen formed stars and galaxies, which in turn formed the heavier elements. Then, these elements turn into dust. Somehow, some of these clouds of dust collapsed, stuck together, and formed planets. On the planet we call "Earth," chemicals just happened to form life—which is scientifically impossible. Then over millions of years, living organisms somehow turned into people (another impossibility). This whole process, from the big bang to the present, is supposed to have taken approximately ten to twenty billion years.

III. How is antimatter a problem for the big bang?

The big bang has many problems, but in this paper I am discussing just one of them. This one problem, however, is enough to render the whole big bang notion impossible. If it is not solved, there should be no matter in the universe—just a lot of radiation.

As I mentioned earlier, when matter and antimatter come together, they annihilate and form energy. According to the big bang, all the matter in the universe formed from energy. But this would produce an equal amount of antimatter. So just as easily as the matter/antimatter came into existence it could come back together and very soon, there would only be radiation. But the big bang cosmologists believe that that original matter is what formed the stars which formed the planets—which eventually formed everything we see today! So now we have a dilemma—if the big bang is true, I shouldn't be here typing this. Of course, big-bangers have some ideas that could possibly solve this antimatter problem. But how good are they?

IV. What about the attempts to solve the antimatter problem?

As I mentioned earlier, attempts have been made to solve this problem. I will be going through the three main ones and showing that the problem has not

actually been solved. Now, even if this problem did get solved, it would *not* prove that the big bang is correct. The whole model is full of problems, from start to finish.

Keep in mind that these cosmologists have already assumed that the big bang is true. This belief is expressed when they make statements such as "the fact that we are here proves that matter won over antimatter," or the following:

> "The fact that there are about one billion photons in the CBR today for each proton left in the universe tells us that for every particle of matter that survived to the present era, around one billion particles and antiparticles in the early universe must have died trying!" (Krauss, 26)

The fact that we are here proves we got here, but it does *not* prove that matter won some quantum battle, because the whole big bang notion could be false—and it is. In fact, many scientists are now rejecting the big bang hypothesis because it falls far short of being a good scientific theory (see www.cosmologystatement.org).

A. Could the antimatter have separated from matter soon after the big bang and now be in distant regions of space?

There is no evidence that there is much antimatter out in space, or that other galaxies are made of antimatter. Some localized amounts of antimatter exist, but these are from localized events, not the big bang. For instance, there is some evidence for a "fountain" of antimatter near the center of our galaxy. However, big bangers themselves say that this is from some "violent cosmic processes" or perhaps a massive black hole; it is not primordial. Cosmic rays contain light antiparticles, but these are usually a result of particles smashing into each other, releasing energy which produces particle-antiparticle pairs. As one evolutionary physicist said, "they are not necessarily primordial." (Fraser, 198)

Our galaxy appears to be made only of matter (except in local matter-antimatter events, such as in the center of our galaxy, mentioned above). If there were antimatter regions in our galaxy, we should see evidence of matter-antimatter annihilations occurring at the places where the matter regions and antimatter regions come together. However, we see no evidence of this.

A problem with having whole antimatter regions of the *universe* is that we should see evidence of matter-antimatter annihilations that occurred where the matter regions and antimatter regions come together in the CMBR (Cosmic Microwave Background Radiation) and the gamma ray background. However, we do not see evidence of this. In fact, the background is weaker than it should be if there really were large-scale annihilations fifteen billion years ago.

Another problem with the "separate regions" idea is the questions of why and how the matter and antimatter separated. Dr. Steven Hawking wrote, "It seems implausible that some galaxies should be matter and some antimatter" (Hawking, 101). Why and how would matter and antimatter have separated? This idea seems rather far-fetched.

One proposal is that perhaps matter and antimatter separated as soon as they were created, before they could have annihilated. However, what we see in the CMBR goes against this view. Matter and antimatter had to have been together in an early big bang universe. (Fraser, 201)

B. What about Charge Parity violation?

Charge Parity violation is often hailed as the "answer to the antimatter problem." But does it solve the problem?
It was once thought that three symmetries were obeyed in nature—Charge (C), Parity (P), and Time (T). Symmetry C means that a particle and antiparticle (opposite charge) behave the same way. However, this was shown to be false. Symmetry P means that a particle behaves just like its mirror image—the mirror image of a particle spinning in a left-handed direction is one spinning in a right-handed direction. In 1956, Tsung-Dao Lee and Chen Ning Yang predicted that this idea was false, and they were proven correct the same year by Chien-Shiung Wu. Symmetry T means that particles behave the same way if it is going forward in time as it would if it were going backward in time. This is not true either.

Although these three separate symmetries were proven false, the combination of the C and P symmetries still seemed to hold true. That is, if one would swap a particle with its antiparticle *and* change its direction of spin, it would behave the same way as it did before the changes. However, in 1964 J. W. Cronin and Val Fitch showed experimentally that this, too, did not hold true in K mesons. This is called CP Violation. Big bangers hypothesized that perhaps this very slight difference between matter and antimatter could account for why there is only matter today. Consider this quote from Britannica:

"The distinction between matter and antimatter may have profound implications for cosmology. One of the unsolved theoretical questions in physics is why the universe is made chiefly of matter. With a series of debatable but plausible assumptions, it can be demonstrated that the observed matter-antimatter ratio may have been produced by the occurrence of CP violation in the first seconds after the "big bang," the violent explosion that is thought to have resulted in the formation of the universe." (Britannica, CP violation)

The evolutionist physicists did more experiments with K mesons, and then built two "B Factories"—particle accelerators used to produce B mesons—in order to further investigate CP violation. These B Factories were completed in 1999. Around 2002, the factories began to yield results: sure enough, B and anti-B mesons demonstrated CP violation as well. So there's the answer to the antimatter problem—CP violating effects caused some of the antimatter to decay faster than matter, the rest annihilated with matter, and the leftover matter is what we see today. Bingo! Well, there is one thing I left out. We now know from the B meson research that the amount of CP violation seen is less than what is needed to solve the antimatter problem—by several orders of magnitude! CP violation

alone is not enough to account for the missing antimatter! Consider the following quotes:

"The accuracy of the CP violation measurements coming from BaBar and Belle has established the magnitude of the effect beyond doubt. However, this knowledge shows that the degree of CP violation now confirmed is not enough on its own to account for the matter-antimatter imbalance in the universe." (SLAC, Press Release)

"There is, however, one glaring problem with the outcome [of the B factory research]. Although CP violation is still thought to be a key ingredient in the explanation of the matter-antimatter asymmetry in the universe, the amount of CP violation in the Standard Model is insufficient to account for all of it. And not just by a factor of two or three but by several orders of magnitude. There must be additional sources of CP violation that have simply not been seen in our experiments." (PhysicsWeb, Natures flawed mirror)

C. What about Grand Unified Theories?

Many scientists suggest combining CP violation with a Grand Unified Theory in order to solve the antimatter problem. But how well does this idea work?

Grand Unified Theories (GUTs) attempt to explain three of the four fundamental forces (the strong nuclear force, the weak nuclear force, and the electromagnetic force; gravity is excluded) as being different aspects of a single force under extremely high energies (called the grand unification energy). In the future, many physicists would like to come up with a unification theory including gravity (sometimes called a Theory of Everything). GUT has not yet been proven to be true, and it has some difficulties. In Dr. Steven Hawking's words:

"This title [grand unified theory] is rather an exaggeration: the resultant theories are not all that grand, nor are they fully unified, as they do not include gravity. Nor are they really complete theories, because they contain a number of parameters whose values cannot be predicted from the theory but have to be chosen to fit in with the experiment. Nevertheless, they may be a step toward a complete, fully unified theory." (Hawking, 96)

GUTs predict not only that the forces are the same at the grand unification energy, but also that certain matter particles (e.g. quarks and electrons) are basically the same at these energies as well. GUTs allow particle decays that violate a scientific law known as the Law of Conservation of Baryon Number. GUTs allow antiquarks to turn into electrons, electrons into antiquarks, etc. Right after the big bang, unification energy would have been reached. Therefore, an antiquark could have turned into an electron, etc., and the universe could have ended up having more matter than antimatter. Because of CP violation, matter could have gained the upper hand. Problem solved! Well, not quite. Maybe the problem is solved within a GUT framework, but remember that GUTs themselves have not been proven.

One thing that GUTs predict is the instability of the proton. The proton's average lifetime has been estimated to be about 10^{31} years. This is far longer

than the amount of time since the alleged big bang (10^{10} years), but if 10^{31} protons could be observed, physicists reasoned, one would expect to see at least one proton decay at the end of one year. So physicists performed experiments to try to find spontaneous proton decay. However, no proton decay has been observed. This is not good news for GUTs. Dr. Keith Wanser, professor of physics at California State University, does not believe GUTs are a good idea:

"Because of this problem [the antimatter problem], elementary particle physicists have proposed Grand Unified Theories, or GUTs, which hypothesize terms in the mathematical equations of the theory which violate Baryon number conservation, in order to produce a dominance of matter over anti-matter as a result of the big bang. Unfortunately, these theories predict that the proton is unstable and will decay, which has led to considerable experimental efforts to detect proton decay. However, such searches have failed to find proton decay and have set lower limits on the proton lifetime of at least 10^{+31} years. The fact that there is no experimental evidence for violation of Baryon number conservation strongly calls into question any big-bang scenario for the origin of matter in the universe." (Wanser)

V. How is antimatter not a problem for the biblical model?

God created matter in the beginning, but He did not create much antimatter. God did not want all the matter to annihilate with antimatter. He designed the universe to function. Astrophysicist Dr. Jason Lisle echoes this:

"This devastating problem for the big bang is actually consistent with biblical creation; it is a design feature. God created the universe to be essentially matter only—and it's a good thing He did. When matter and antimatter come together, they violently destroy each other. If the universe had equal amounts of matter and antimatter (as the big bang requires), life would not be possible." (War of the Worldviews, 75)

The matter we see today is not the product of energy, which would have created an equal amount of antimatter. Ironically, the gamma-ray background does not confirm the idea of massive antimatter-matter annihilations. Consider this quote by Gordon Fraser, an evolutionist physicist:

"From its vantage point [orbiting the earth], GRO [Compton Gamma Ray Observatory] clearly saw these bursts against a faint but uniform gamma-ray backdrop. The bursts are more interesting than the faint backdrop, but physicists saw that this backdrop is feebler than what would have resulted from primordial large-scale matter-antimatter annihilation. Today's gamma-ray background shows no sign of matter-antimatter annihilation processes ever having taken place on a large scale." (Fraser, 199)

Why are most scientists so eager to accept ideas such as the big bang that do not hold up as good scientific models? The answer is the underlying belief that God is to be kept out of the picture. Richard Lewontin admits this:

"It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our a priori adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counter-intuitive... Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door." (Lewontin)

If there is a God, a Creator, then we are all accountable to Him; we must obey Him and follow Him. That idea is uncomfortable to us sinners; therefore people try as hard as they can to believe that God does not exist. However, not believing something does not make it false. This is what the Bible says:

*For this is what the LORD says-- he who created the heavens, he is God; he who fashioned and made the earth, he founded it; **he did not create it to be empty, but formed it to be inhabited**-- he says: "I am the LORD, and there is no other. I have not spoken in secret, from somewhere in a land of darkness; I have not said to Jacob's descendants, 'Seek me in vain.' I, the LORD, speak the truth; I declare what is right.*

"Gather together and come; assemble, you fugitives from the nations. Ignorant are those who carry about idols of wood, who pray to gods that cannot save. Declare what is to be, present it-- let them take counsel together. Who foretold this long ago, who declared it from the distant past? Was it not I, the LORD? And there is no God apart from me, a righteous God and a Savior; there is none but me.

***"Turn to me and be saved**, all you ends of the earth; for I am God, and there is no other. By myself I have sworn, my mouth has uttered in all integrity a word that will not be revoked: Before me every knee will bow; by me every tongue will swear. They will say of me, 'In the LORD alone are righteousness and strength.'" **All who have raged against him will come to him and be put to shame**. (Isaiah 18-24, NIV, emphasis added)*

Conclusion

The fact that we find almost no antimatter in the universe presents an enormous problem to the big bang hypothesis of cosmology. The attempts to solve this problem have fallen short of what is needed to actually account for the missing antimatter. However, the lack of antimatter is consistent with the biblical model.

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