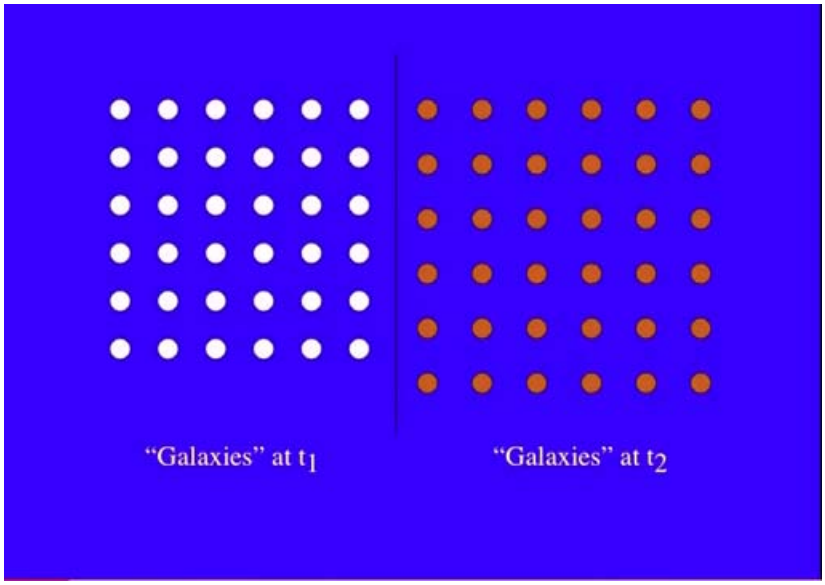
Response to Dr. Laurence Krauss

of the University of Arizona

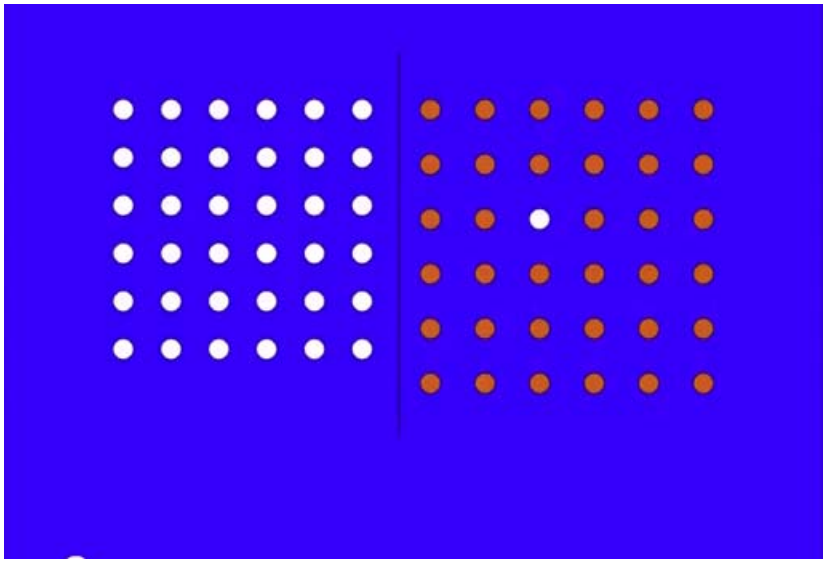
By Robert Sungenis, Ph.D.

http://www.youtube.com/watch?v=7ImvlS8PLIo

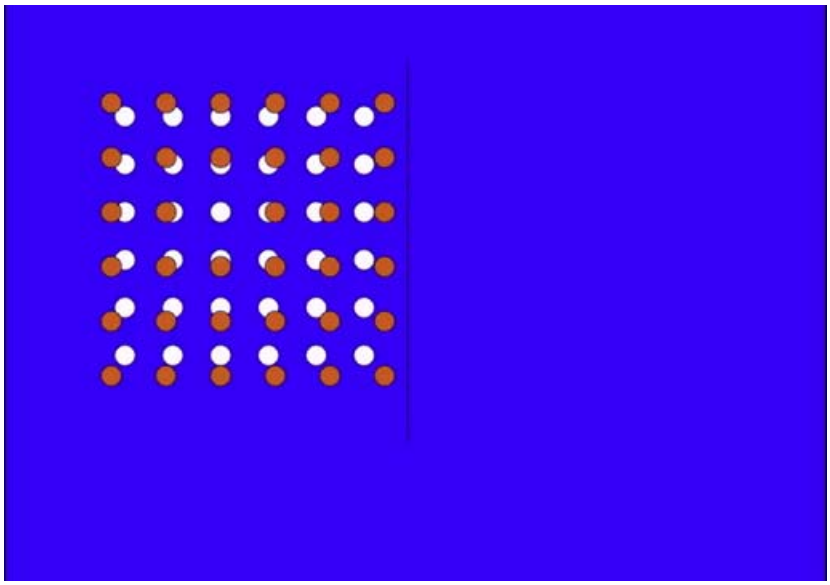
Krauss: “All other galaxies are moving away from us, on average….Now, what does this tell you? It obviously tells you we are the center of the universe. And, in fact, it does, and my wife reminds me of that on a daily basis. It really means the universe is expanding uniformly in all directions.”



“Then pick a galaxy to live on”:

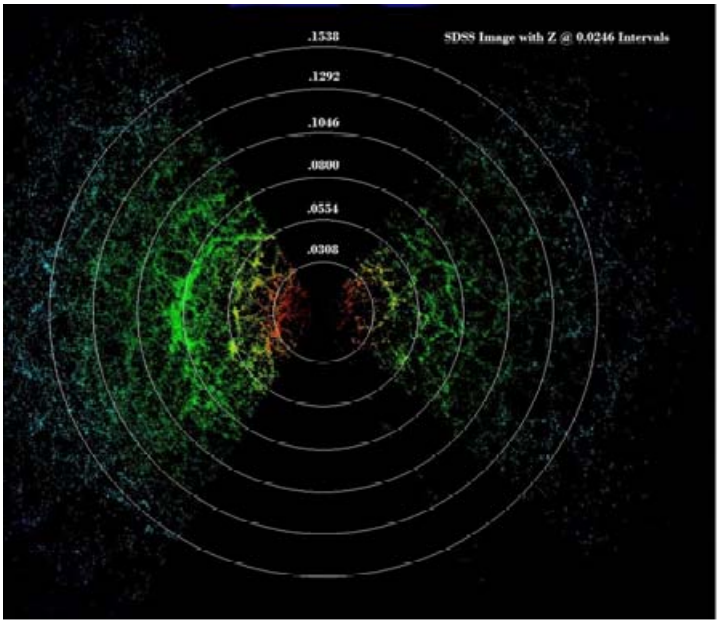


“What would you see? Superimpose the expanding galaxy on the beginning galaxy”:



“So, depending on your mood at the time, every place is the center of the universe, or no place is the center of the universe. It doesn’t matter. The universe is expanding.”

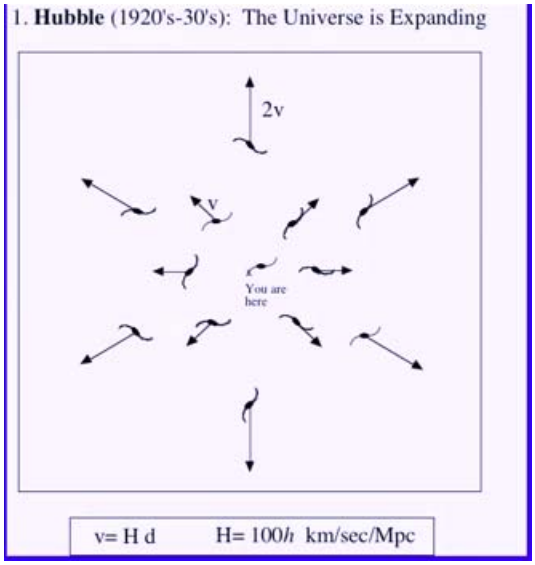
R. Sungenis: First, Krauss doesn’t know the universe is expanding, since there are about three or four other scientifically viable explanations to redshift that do not depend on expansion. Krauss needs the universe to expand because he insists on using Einstein’s general relativity to explain the universe. One of the best geocentric explanations is that the redshift is caused by the centrifugal force on light in a rotating and yet non-expanding universe. Second, it is not true that in an expanding universe one would see himself in the center in any location he stood. The reasons are twofold: one, because the Sloan Digital Sky Survey shows there are concentric circles or periodicities of galaxies with specific redshift values in the range of z = 0.0246 and these values only show up when viewed from Earth. In any other place the circles would disappear, and that means that no other place can be the center of galaxy distribution. (See SDSS image left). Two, as recent as 2008, it was discovered that Lorentzian- and Hubble- related mathematics disqualifies Krauss’ “center in every place” alternative. Yukio Tomazawa of the Michigan Center for Theoretical Physics demonstrated that the attempt to escape a center “there is no cosmic microwave



background (CMB) dipole even in the presence of a peculiar velocity. In other words, the observation of a CMB dipole excludes such an interpretation of the coordinates for the Friedman universe" ("The CMB dipole and existence of a center for expansion of the universe," Yukio Tomazawa, University of Michigan, February 2, 2008, p. 2, see Galileo Was Wrong, p. 65, fn 218).

Krauss: "You are all stardust. You couldn't be here today if stars hadn't exploded…because the elements…carbon, nitrogen, oxygen, iron, all the things that matter for evolution weren't created at the beginning of time, they were created in the nuclear furnaces of stars, and the only way they could get into your body is if the stars were kind enough to explode. So forget Jesus. The stars died so you could be here today."

R. Sungenis: Even though Krauss tries to pass this comment off as one of his many attempts at comic relief, in the real world it is typical of the agenda Krauss and his like-minded colleagues have when the approach science. They are avowed atheists and they make a concerted effort to remove God, and in this case Jesus, from people's minds. Science is their religion and the stars are their gods.



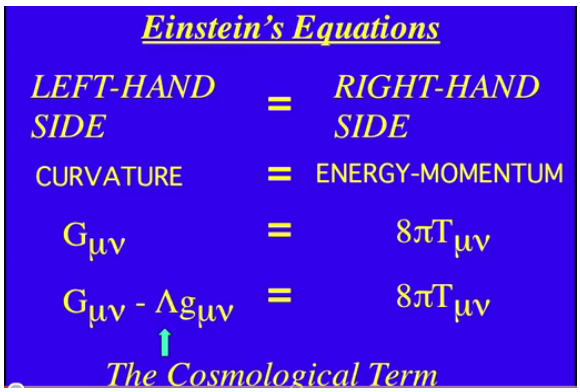
This observation caused Hubble to conclude: "…Such a condition would imply that we occupy a unique position in the universe, analogous, in a sense, to the ancient conception of a central Earth.…This hypothesis cannot be disproved, but it is unwelcome and would only be accepted as a last resort in order to save the phenomena. Therefore we disregard this possibility…the unwelcome position of a favored location must be avoided at all costs… such a favored position is intolerable…. Therefore, in order to restore homogeneity, and to escape the horror of a unique position…must be compensated by spatial curvature. There seems to be no other escape" (The Observational Approach to Cosmology, 1937, pp. 50, 51, 58-59.)

We notice that Hubble tries to counter the geocentric evidence by injecting "spatial curvature" into the universe. Why? Because, as Krauss tried to say above, spatial curvature would allow one to say that he was expanding on a big ball which would then make it

appear as if every point could be considered a center. This attempt at injecting spatial curvature as the solution against geocentrism was clever but it could not explain the concentric circles of galaxies around the earth, as noted above. It also cannot explain the distribution of gamma ray bursts, X-ray bursts, quasars or BL Lacertae.

In the video, Krauss claims that Hubble's 1929 expansion rate "had to be off by a factor of ten" simply because it would only allow the universe to be 1.5 billion years old, but paleontology said the Earth was 4.5 billion years old, so Hubble's expansion rate had to be modified to fit evolution, "otherwise the universe would come into existence before the earth." This is a good example of how modern science fudges the data when it is forced to do so to save its theory. Hubble based his figures on observation. Krauss is basing his on the theory of evolution.

Krauss then shows the following charts of Einstein's theory of general relativity:

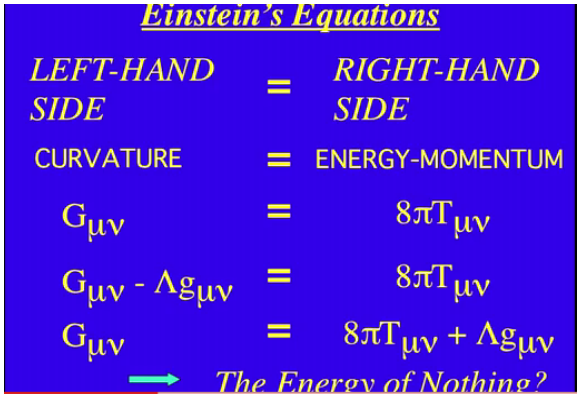


Krauss gives a history of Einstein's general relativity formula as applied to the cosmos. In Einstein's theory, gravity causes space to curve in on itself.[1] The result of gravity's pull on space is the tensor $G_{\mu\nu}$ on the left side of the equation. This will cause the universe to contract since gravity causes all mass to congeal together. The $T_{\mu\nu}$ is the stress or energy-momentum tensor which causes the gravity. The 8π was added by determining what factor was necessary in order to make Einstein's equation equal to Newton's equation. This is why General Relativists, such as Misner, Thorne and Wheeler, can say: "The field equation [$G = 8\pi T$] even contains within itself the equations of motion ("Force = mass x acceleration") for the matter whose stress-energy generates the curvature."

But Einstein had a big problem. If there was nothing to retard the curvature, the universe would eventually curve into itself and disappear. So Einstein invented a counterforce to make the universe expand instead of contract. This is represented by the Lambda ($\Lambda g_{\mu\nu}$) on the left side of the equation. Einstein, of course, could give any value he wanted for Lambda in order to make his theory work. Later he decided not to use it, since he figured the universe would somehow expand on its own, which was later dubbed the Big Bang.

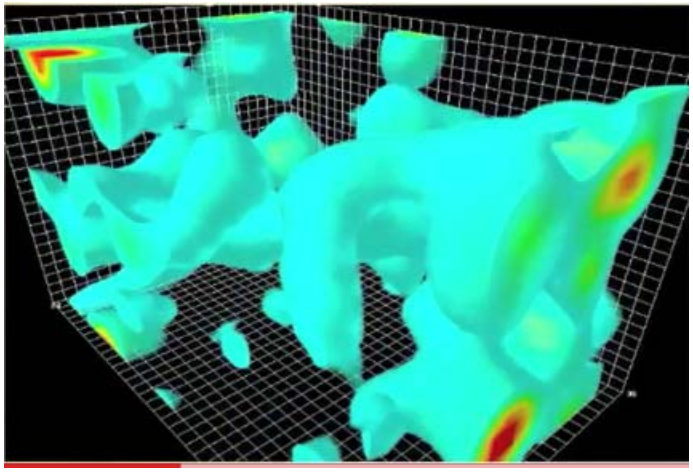
[1] This in itself is a dubious idea, since neither Einstein nor anyone else has explained what space is curving against or even what space is in order to have existence so that it can curve. According to Einstein, space is a total vacuum, so what is curving? Moreover, in order to know it is "curved" one has to have a straight edge with which to contrast it, but Einstein gave us none. But we will address the point for the sake of argument.

Krauss then suggests that, because of the development of Quantum Mechanics, Einstein's Lambda figure is needful, but on the other side of the tensor equation.



Here Krauss puts Lambda on the other side of Einstein's equation (and in doing do he must change it from a minus to a plus) and says it is "energy." He also says "it is "nothing, but in physics nothing isn't nothing anymore. It weighs something." We need to understand here that Krauss is being equivocal about the meaning of "nothing" in order to set the audience up for his next hypothesis. He doesn't mean that nothing exists (an oxymoron) but only that we can see it, feel it, taste it, touch it, or hear it, so to us it is "nothing" but in reality it is something very real, and so real that it takes up about 99.99999% of the universe.

Krauss elaborates on this idea and says that this "nothing" has substance because its minute particles pop in and out of existence in so fast a time that you can't see them, and thus it looks like nothing is there. Because of these "quantum fluctuations" in and out of our universe they are called "virtual" particles. He admits this may sound like philosophy or religion, "like counting the number of angels on the head of a pin."



As an example of how these "virtual" particles interact with our universe, Krauss the above animation shows the "empty space" of a proton (not the quarks, but the empty space between the quarks), is filled with these virtual particles and take up about 90% of the volume of the proton (represented by the green area). (NB: Krauss will later tell us that

since the virtual particles in this proton can "pop in and out of existence" so can anything, and thus the universe can come from nothing).

Why does Krauss insist that these minute particles are "virtual" and "pop in and out of existence"? The reason is that he needs this virtual matter to support his cosmology. Krauss' cosmology is based on General Relativity (since Einstein's theories have dominated physics for the last 100 years and it is presently locked into his paradigm). General Relativity believes the universe is expanding based on its interpretation of the red shift it sees in galaxies. But in order to have the universe expanding at the rate they need it to expand (and the rate they need it to expand is based on how long they need the universe to have existed to make enough room for the billions of years needed for evolution of species to take place) they need a lot more matter in the universe than they presently find, to the tune of needing 96% more matter than they see in stars and galaxies. Since Einstein's tensor equation ($G_{\mu\nu} = 8\pi T_{\mu\nu}$) is merely a more sophisticated form of Newton's basic force law (F = ma), Einstein's formula cannot escape the "m" (mass) requirement of Newton's formula if it believes the "a" (acceleration) is occurring as the universe presently expands and thus accelerates outwards. But the big problem for the Big Bang is that their most sophisticated instruments have not been able to detect any of this needed matter (including Krauss' "Germanium" detector he speaks about in the lecture).[2] So the next best thing is for them to say the matter "is there and not there" at "virtually" the same time.

[NB: this is where Krauss and his colleagues also invent the "parallel universe" idea, since if the "virtual" particles are such that they "pop in and out of existence," then they must be in another place we can't see (i.e., in another universe or two or three or ad infinitum) while they are not with us].

In the end, the concept of "virtual" particles popping in and out of existence as the source for the needed matter to make the Big Bang/Evolution model work is merely a desperate, last-ditch effort to save face for modern man. It's like the street corner magician playing Three-Card Monty with you – now you see it now you don't.

Here I'm going to quote from my book Galileo Was Wrong (pages 241-253) to show you the history and development of the "virtual" particle theory so that you can see how the whole thing was pieced together as needed.

What science has found since the time of Einstein is a virtual sea of particles, both in the micro-levels and macro-levels of the cosmos, many of which are suitable candidates for the "ponderable" ether that Einstein dismissed because of his philosophical and scientific presuppositions. As noted above, the primary presupposition of which Einstein and all Copernican scientists were guilty is that they left no room to explain the interferometer

[2] Krauss claims that germanium at slightly above -273 K can detect DM when a particle of DM hits it, since it will cause heat. He never explains how he knows it is DM that is hitting the germanium or even what DM is. Or he says that they will discover the DM when the Hadron collider breaks apart the proton and "creates" the DM. It's a "race" he says.

experiments by means of a motionless Earth. Had they done so, it would have shown that something physical was there, even though they could not see, touch, hear, smell or taste it. That this kind of presupposition would lead to either a misinterpretation of the evidence, or even a downright denial of it, was brought out quite clearly in Einstein's interpretation of **Carl Anderson's** experiment in 1932. Anderson (1905-1991) was an American physicist who, with Victor Francis Hess of Austria, won the Nobel Prize for physics in 1936 for his discovery of the positron, the first known particle of "antimatter." In 1927, Anderson had begun studying X-ray photoelectrons (electrons ejected from atoms by interaction with high-energy photons). In 1930 he began research on gamma rays and cosmic rays. While studying photographs of cosmic rays in cloud-chambers, Anderson discovered a number of tracks whose orientation indicated they were caused by positively charged particles, but particles too small to be protons. In 1932 he announced that the particles were "positrons," particles with the same mass as electrons but positively charged. Paul Dirac had predicted their existence in 1928. Anderson's claim was controversial until it was verified the next year by the British physicist Patrick M. S. Blackett.

Prior to Anderson, the electron was discovered in 1897 by J. J. Thomson; the proton in 1911 by Rutherford, Wein, et al., and the neutron in 1932 by James Chadwick. In 1937, Anderson would also discover the short-lived meson. Later came the discovery, although much of it theoretical, of about two hundred more nuclear particles, but most, like the meson, were unstable. The implications of Anderson's work, however, went far beyond the finding of just another subatomic particle. His discovery was another crossroads for science, perhaps equal to the 1887 Michelson-Morley experiment. As in 1887, everything depended on the *interpretation* given to the experiment. The wrong interpretation, which is inevitably based on the wrong presuppositions, would put all of science on the wrong track, and it could be decades, even centuries, before it would get back on the right track. As in the Michelson-Morley experiment, if science bases its interpretation on an unproven presupposition (*e.g.*, that the Earth is moving at 30 km/sec), then every subsequent experiment, whether on the micro- or macro-level, will be adversely affected, which has been the case with physics for quite a long time.

Carl Anderson's experiment was another example of such an occasion. In his discovery of the positron, Anderson found that when gamma radiation of no less than 1.022 million electron volts (MeV) was discharged in any point of space, an electron and positron emerged from that point.[3] He also found the converse, that is, when an electron collides with a positron, the two particles disappear, as it were, and produce two gamma-ray quanta which disperse in opposite directions, but with a combined energy of 1.022 MeV. As one set of authors describe his discovery:

> On August 2, 1932, Anderson obtained a stunningly clear photo-graph that shocked both men. Despite Millikan's protestations, a particle had indeed shot up like a Roman candle from the floor of the chamber, slipped through the plate, and fallen off to the left. From the size of the track, the degree of the curvature, and the amount of momentum lost, the particle's mass was obviously near to that of an electron. But the track curved the wrong way. The particle was positive. Neither electron, proton, or neutron, the track came from something that had never been discovered before. It was, in fact, a "hole," although Anderson did not realize it for a while. Anderson called the new particle a "positive electron," but positron was the

[3] 1.022 MeV equals 3.9×10^{-19} calories.

> name that stuck. Positrons were the new type of matter – antimatter – Dirac had been forced to predict by his theory. (The equation, he said later, had been smarter than he was.)"[4]

After the excitement of the discovery, of course, comes the interpretation. Often there is a vast gulf that separates the two. A viable interpretation of Anderson's discovery is that space is composed of a lattice of very stable electron-positron pairs which, when the proper quanta of radiation are administered, will either temporarily deform the lattice or jolt the electrons and positrons out of alignment and release them into the view of our bubble chambers. But there is one caveat for modern science: this particular interpretation contradicts both Einstein's theory of Relativity, which was well in vogue by 1932, and the Quantum Mechanical model of the atom known as the Standard Model. Since science almost invariably depends on the reigning paradigm to interpret new evidence (especially paradigms as strong as Relativity and Quantum Mechanics), a suitable counter-interpretation had to be created – one eliminating the possibility that space contained a material substance.

There were two men bold enough to apply this interpretation, Albert Einstein (to save Relativity) and Werner Heisenberg (to save Quantum Mechanics). Relativity theory holds that there is a physical relationship between energy and matter, as well as necessitating that space is a vacuum containing no "ponderable" ether. Thus Einstein had no choice but to conclude that the appearance and disappearance of the electron-positron pair was an example, as he called it, "of the creation and annihilation of matter." Moreover, with the ability to create and destroy electrons and positrons, the formula $E = mc^2$ now had its first "proof." Not only was there a mathematical relationship between matter and energy, but now there could be a relationship wherein energy could become mass, and mass could become energy. This became the standard interpretation of not only electrons and positrons, but of all subatomic particles that met their antimatter counterpart. Although this was pure speculation, these new interpretations did not seem to bother its authors. Let's revisit one of our earlier authors, Jonathan Katz, as he explains the electron-positron "creation" in regard to gamma-ray bursts:

> Einstein's equation $E = mc^2$ gives the amount of energy E that can be obtained if a mass m is completely turned into energy. This relation can be turned around: if two gamma rays with total energy E collide, they may produce a mass m. However, this is only possible if particles whose masses are m or less can be *created* (visible light cannot turn into matter because there are no particles with small enough masses). The least massive known particles are electrons (negatively charged) and positrons (positively charged), each with a mass corresponding to 0.511 MeV of energy. Because electric charge is never created or destroyed, electrons and positrons can only be *created* in pairs, one of each, with zero total charge. Two gamma rays, each of energy 0.511 MeV or more, colliding head-on, can therefore *produce* an electron-positron pair. If the collision is not head-on, then the necessary energy is greater. If the gamma rays have more energy than the minimum required, the extra appears as kinetic energy of the *newborn* matter – the electron and positron are *born* in motion.[5]

As one can sense from reading Katz's description, the science establishment has given this explanation so often, and believed it for so many years, they have not the slightest doubt or

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[4] Robert Crease and Charles Mann, "Uncertainty and Complimentarity," *World Treasury of Physics, Astronomy and Mathematics*, ed., T. Ferris, 1991, p. 78.

[5] Jonathan Katz, *The Biggest Bangs*, p. 46, emphasis added.

embarrassment in saying that matter is created out of thin air. As if hypnotized, they entertain no other possibilities. This is a perfect example of how the evidence from experiment will invariably be interpreted by the scientific paradigm reigning at the time, in this case, the theories of Relativity and the Quantum Model of the atom.[6] As **Paul Dirac** said in his 1933 Nobel Prize speech:

> To get an interpretation of some modern experimental results one must suppose that particles can be created and annihilated. Thus if a particle is observed to come out from another particle, one can no longer be sure that the latter is composite. The former may have been created. The distinction between elementary particles and composite particles now becomes a matter of convenience. This reason alone is sufficient to compel one to give up the attractive philosophical idea that all matter is made up of one kind, or perhaps two kinds, of bricks.[7]

Actually, Dirac was being critical of the "creation" interpretation, but interpretations of this variety are still very popular today. Often, the more bizarre the theory, the better it sells to the media and the public at large. Various physicists have made a cottage industry out of such speculations. Stephen Hawking, for example, theorizes that in order to have higher than zero temperatures in black holes (a requirement to keep them stable), there must exist "virtual particles." According to Hawking, these are particles that "pop in and out of the vacuum of space spontaneously." Interestingly enough, Hawking holds that these "virtual particles" are mostly electron-positron pairs, and perhaps some proton-antiproton pairs. He writes:

> Quantum mechanics implies that the whole of space is filled with pairs of "virtual" particles and antiparticles that are constantly materializing in pairs, separating, and then coming together again and annihilating each other. These particles are called virtual because, unlike "real" particles, they cannot be observed directly with a particle detector. Their indirect effects can nonetheless be measured, and their existence has been confirmed by a small shift (the "Lamb shift") they produce in the spectrum of light from excited hydrogen atoms.[8]

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[6] Besides the ignoring of the First Law of Thermodynamics, a rather glaring anomaly in the "creation/annihilation" theory is that the resulting electron and positron both have angular momentums equal to $\hbar/2$ (h = Planck's constant). But this would necessarily mean that the electron or positron, respectively, would have 16 times (or 1,600%) more energy than the gamma photon that supposedly "created" it. Modern physics simply ignores the problem and refers to it as an "inherent property" of the process.

[7] *World Treasury of Physics, Astronomy and Mathematics*, ed., T. Ferris, 1991, pp. 80-81.

[8] *Black Holes and Baby Universes*, pp. 107-108.

He explains their origin in another paragraph:

> When the universe was a single point, like the North Pole, it contained nothing. Yet there are now at least ten-to-the-eightieth particles in the part of the universe we can observe. Where did all these particles come from? The answer is that relativity and quantum mechanics allow matter to be created out of energy in the form of particle/antiparticle pairs. And where did the energy come from to create this matter? The answer is that it was borrowed from the gravitational energy of the universe.[9]

Again, the more logical and less mystifying interpretation is that the electron-positron pairs are not created through force but were already present, and the radiation of the "black hole" is enough to jar them loose (that is, if black holes actually exist). This solution, of course, would be the death knell of the Big Bang theory, as well as Relativity and Quantum Mechanics.

There is quite an intriguing story behind the "creation/annihilation" interpretation of Anderson's positron discovery. As noted, physicist Paul Dirac had predicted the discovery of the positron in 1928. In fact, his famous equation predicted that the entire universe is made up of electron-positron pairs (we will call them electropons, henceforth).[10] The most unique aspect of Dirac's analysis was that his equation required two sets of electropon pairs, positive pairs and negative pairs.[11] It was known as Dirac's "sea." For the Relativists who followed Einstein, Dirac's model, although everyone knew it was very workable, merely raised the stakes in the ongoing "ether-war," whose shots were first fired over forty years prior in the Michelson-Morley experiment (1887). In fact, in the same year that Dirac came out with his equation and through it predicted the positron's existence, Michelson was doing his final interferometer experiment to detect the ether that Dayton Miller had found four years earlier. Dirac's equation would be one more proof that Einstein incorrectly interpreted Michelson-Morley, the very experiment that hung Relativity in the balance.

This smell of ether was a stench in the nostrils of Relativists, but the budding science of Quantum Mechanics didn't much like the odor either. **Werner Heisenberg** did everything but hire an assassin to foil Dirac's work. He once referred to Dirac's work as "learned trash which no one can take seriously."[12] Heisenberg got into the act because the stakes were raised high when Carl Anderson experimentally verified Dirac's 1928 prediction of the positron just four years later (1932). Something had to be done, and done quickly, to destroy Dirac's ether-based universe. For six years Heisenberg and his colleagues tried to

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[9] *Black Holes and Baby Universes*, p. 97. In another place Hawking says that black holes "would be able to create electron-positron pairs and particles of zero mass" (*ibid*., p. 109). We notice, however, that Hawking doesn't tell us from where the gravitational energy originates if, according the General Relativity theory he is employing, there was no matter to warp space-time.

[10] Paul A. M. Dirac*, Proceedings of the Royal Society A*, 117, 610 (1928a); 118, 351 (1928b). P. A. M. Dirac, *Scientific American*, May 1963, p. 86. The equation took the form: $\sum_\beta [\sum_\mu (\gamma_\mu)_{\alpha\beta} \theta/\theta x^\mu + mc/\hbar \theta_{\alpha\beta}]\psi_\beta = 0$.

[11] This is because the energy-momentum-mass relation of $E^2 = c^2p^2 + m^2c^4$ requires both a positive and negative energy, such that $\pm E = (c^2p^2 + m^2c^4)^{½}$. Some hypothesize that the 2.7° Kelvin radiation is the interface between the negative and positive energy.

[12] Werner Heisenberg, Letter to Wolfgang Pauli, February 8, 1934.

find an error in Dirac's equation, but to no avail. Finally, they decided to create their own fudge factor. Although Dirac's equation required the negative energy electropon pairs to be raised to positive energy pairs, Heisenberg circumvented this process by claiming that the positive energy pairs were merely "created" and had no origin from negative energy. Similarly, as Dirac's equation required the positive energy pairs to go back intermittently to the negative energy state, Heisenberg reinterpreted this to mean that the positive pairs were "annihilated." If there was any inadvertent crossover between the negative and positive, Heisenberg's quantum mechanics coined the words "vacuum fluctuation" or "Zero-Point fluctuation" to take care of that problem. Thus we have the dubious origin of the "creation/annihilation" interpretation of Carl Anderson's 1932 experiment and a case in which the politics and intrigue of the science establishment is revealed.

The significance of the electropon phenomenon is noted in how it reflects on the essence of the Big Bang theory, and the inevitable problems it creates. The standard theory is told to the popular enthusiast in the science magazine, *Discover*:

> Whenever a normal particle and an antiparticle meet, they annihilate each other, converting all their mass into energy in a pyrotechnic demonstration of Einstein's famous law, $E = mc^2$. And therein lies the source of one of the greatest dilemmas of science. Physicists believe that by the time the universe was just 10^{-33} of a second old…the temperature had dropped from unimaginably hot to a mere 18 million billion billion degrees. That was cool enough for the first particles of matter and antimatter to condense from pure energy. But to balance the cosmic energy books – and to avoid violating the most fundamental laws of physics – matter and antimatter should have been created in exactly equal amounts. And then they should have promptly wiped each other out. Yet here we are. Somehow a bit of matter managed to survive.[13]

The article proceeds to report that the scientists working on this problem have no clue how to solve it. One team of scientists, although admitting that this theory is "extremely speculative" and has "no experimental evidence" to support it, proposes that the universe started with neutrinos that turned into electrons, positrons, protons and antiprotons, but finds that this solution "would have yielded more protons and antiprotons, leading to a fateful imbalance between matter and antimatter at the dawn of time," to which his partner offers the consolation: "In the end there is irrefutable evidence that we are here."[14] Thank God for that.

Every time modern science tries to explain the present universe by relying on a process, the process fails to produce the universe they presently see. This is the perennial problem with the Big Bang theory: every twist and turn concocted to answer the anomalies it invariably confronts, invariably "violates the most fundamental laws of physics." So either the new

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[13] Tim Folger, "Antimatter," *Discover*, August 2004, p. 67-68. *Discover* notes that "Andrei Sakharov was the first to understand that the Big Bang actually created a crisis for physicists: How could they explain the absence of antimatter and the presence of matter in a cosmos where both should have almost instantaneously vanished?" (p. 69).

[14] "Antimatter," *Discover*, August 2004, p. 71.

theories are wrong, or the "fundamental laws of physics" are wrong, or quite likely both are wrong. We can safely say, however, that when a theory is based on the idea that matter and energy are created out of thin air, then Middle Age alchemists and blood-letters are not as odd in comparison. Until men accept the fact that it was all brought into being simultaneously by an *ex nihilo* divine fiat, they will continue to go down the path of no return.

The Anderson discovery was also important for another reason. It revealed that space consists of very dense yet very stable electropon pairings, perhaps in some type of lattice or crystalline structure. Someone in the physics community should have surmised that light traveling through this dense medium would be directly affected. Physics had already been prompted to think in this vein with Einstein's Nobel Prize-winning discovery in 1905 of the photoelectric effect (the process by which a photon of the right frequency releases an electron from metal), as well as Arthur Compton's discovery in 1923 of the process by which a photon gives momentum to an electron, appropriately called the "Compton effect." With the knowledge that light can be affected by, and produce, physical effects when it interacts with atomic particles, then observing consistent interferometer results of 1-4 km/sec over the course of more than 60 years (*i.e.*, 1867-1932) should have suggested to them that light was being physically affected by some kind of substance in space. Unfortunately, as we know all too well, strong but unproven presuppositions (*i.e.*, that the Earth was revolving around the sun at 30 km/sec) prohibited them from making that crucial link.

Another possible reason for modern science's reluctance to accept that electropon pairs already exist and are not "created" is that it would force a wholly different explanation to such formulas as $E = mc^2$, explanations that are not dependent on Lorentz's complex transformation equations or Einstein's canons of tensor calculus. In other words, the alternative explanations would be physical, mechanical, and anti-Relativistic. That is, energy (E) is absorbed into open space resulting in the release of a mass of electrons and positrons (or various other possible particles), which can then be multiplied by the square of the speed of light to calculate the total amount of energy absorbed. In fact, accepting the electropon lattice model, one can arrive at $E = mc^2$ by a simple algebraic proportion.[15]

That an electropon lattice may pervade all of open space and thus constitute the salient part of the "ponderable" ether has been postulated for quite some time. Plasma physics, for example, has demonstrated that electropon pairs play an important role in almost every phenomenon in the cosmos, including stars, neutron-stars, pulsars, quasars and gamma-ray bursters.[16] Based on much physical evidence, several physicists have shown that an

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[15] If the product 300,000 km/sec is caused by the velocity (v) of the wave motion of the electropon lattice, then $v = (E/m)^{½}$ where m equals the mass of the electron or positron (9.1×10^{-31} kg), and E is the binding energy per particle (511,000 eV or 8.2×10^{-14} joules), the equation is: $v = (8.2 \times 10^{-14}$ joules/ 9.1×10^{-31} kg$)^{½} = (9 \times 10^{16}$ m^2/s$^2)^{½} = 3 \times 10^8$ m/s = 300,000 km/s = c, the accepted "speed" of light. Since $c = v$ in $v = (E/m)^{½}$, then $E = mc^2$. (See M. Simhony, *An Invitation to the Natural Physics of Matter, Space, Radiation*, Singapore, New Jersey: World Scientific, 1994, pp. 172-175.)

[16] *Electron-Positron Physics at the Z*, "Series in High Energy Physics, Cosmology and Gravitation," M. G. Green, Royal Holloway and Bedford College, UK, January 1998. Plasma experimenters spend most of their time colliding electrons and positrons at just below luminal speeds producing an array of other strange particles. In fact, different

electropon lattice provides one of the most logical, lucid, and thoroughly physical explanations for nuclear and cosmological phenomena. Despite the unfortunate theoretical detour to which science drove itself after the 1887 Michelson-Morley experiment, there are a few modern scientists who haven't succumbed to the *hocus pocus* of spatial warps, time dilations, and quantum uncertainties. All the mystery and confusion created by Relativity and Quantum Mechanics is suddenly evaporated once one understands the *physical* reasons (as opposed to the merely mathematical or theoretical) why things occur as they do.[17] For example, the origin of inertia could be simply explained, since around every micro and macro object there are billions of electropon pairs, which vibrate at a frequency proportional to the velocity of the object. If the object remains in uniform motion, so does the vibration energy of the electropon pairs. If there is any change in motion, the electropon pairs act accordingly, changing their frequency and energy. The energy required to change the values for the electropon pairs is equivalent to the inertial energy of the object. The same principle could hold for gravity. Any two bodies will disturb the equilibrium of the electropon pairs, and will do so based on their masses and the inverse square of the distance between them. Since the disturbance occurs between the bodies, the force will be felt there, and nowhere else.[18] In fact, because the electropons are in a lattice formation, they function very similar to crystalline structures. In light of this comparison, Robert Laughlin sheds some light as to how such crystalline structures transmit their energy:

> The ability of electrons and holes to move ballistically through the lattice is not obvious at all….The resolution of this problem is that the entanglement is rendered irrelevant by emergence. It turns out to be exactly and universally the case that crystalline insulators have specific collective motions of isolated electrons that look and act as though they were motions of isolated electrons….The important thing is that the particle-like nature of the collective motion is exact and reliable.[19]

As for magnetism, a free moving electron will simply attract the positron end of an electropon pair. Thus, as Maxwell wrote in 1873:

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particles are produced depending on how fast the electrons and positrons collide. Whether these are true particles or merely different bubble-chamber paths of the same particle remains on the debating table.

[17] Among the many contributors, Menahem Simhony has developed one of the most comprehensive explanations of matter, space, and energy. From the results of the 1932 discovery of the positron, Simhony's model is based on the concept of an electron-positron cubical lattice comprising all of open space. Simhony holds that the density of the electron-positron pairs in space is 6×10^{30} cm^3. This is precisely the same value found by another researcher in the field, Allen Rothwarf, although the two scientists worked independently (Allen Rothwarf, "Cosmological Implications of the Electron-Positron Ether," *Physics Essays*, 11, 1998). John Kierein finds a similar density to the electron-positron model, and by it shows that redshift is due to the Compton effect (John Kierein, "Implications of the Compton Effect Interpretation of the Redshift," *IEEE Trans. Plasma Science* 18, 61 (1990). Simhony puts forth physical answers to gravity (p. 129), electromagnetism (p. 92), inertia (pp. 124, 212, 222), momentum (p. 162), the wave-particle duality (p. 163), the speed of light and superluminal speeds (p. 209), redshift (pp. 223, 249, 252), why atoms do not collapse (p. 193), evidence against the Big Bang and expanding universe (pp. 241, 245-247, 254), black holes (p. 244), etc. Simhony, however, misinterprets the Michelson-Morley experiment, and therefore fails to equate the electron-positron pairs as a constituent part of the ether detected by the interferometer experiments (See M. Simhony, *An Invitation to the Natural Physics of Matter, Space, Radiation*, 1994).

[18] Coulomb's law says the attractive force between the electron and positron is 42 orders (10^{42}) higher than the gravitational force, so these are very stable pairings.

[19] Robert B. Laughlin, *A Different Universe*, p. 66.

> From the hypothesis that electric action is not a direct action between bodies at a distance, but is exerted by means of the medium between the bodies, we have deduced that this medium must be in a state of stress.[20]

At the least, there are viable, physical, solutions at our disposal. Unfortunately, most physicists still think that the particles appearing in electropon collisions are created out of thin air, rather than being released from it, since opting for the latter would mean that space is substantive and that science has to go back to the drawing board.

In line with these insights is the discovery in 1911 by **Ernest Rutherford** when he bombarded very thin sheets of gold with alpha particles. He found that, even though alpha particles are 8,000 times larger than the electron, and the metal foil was 400-atoms-thick, nevertheless, most of the particles penetrated the foil with little problem. Only a few, perhaps 1 in 1,000, were scattered, some deflected 90 degrees, others 180 degrees. A viable interpretation of this phenomenon is that the alpha particles move through the atom as if it were almost completely empty. The few alpha particles that were deflected had done so because they hit the nucleus of the atom, which means that most of the mass and electric charge of the atom are concentrated at that central point. As it turns out, only a quadrillionth of the atom has mass. The rest is "empty space," whatever one conceives that to be.

Naturally, Rutherford's results bring up some intriguing questions that are not often given the proper spotlight. If only 0.000,000,000,01% of the typical atom is occupied by particles, what constitutes the other 99.999,999,999,99%? For lack of a better term, modern science calls it "empty space," but what is empty space? We are back to our philosophical question introduced at the beginning of this chapter: Can "nothing" exist? It will do no good for the Relativist to appeal to General Relativity, for the fact remains that Rutherford's alpha particles did not go through a time warp or a spatial curvature but through the "absolute" space between the nucleus and the swirling electrons of the atom.

Since the time of Rutherford, science has penetrated even farther into the atom. By the time we get down to quarks and leptons (the theoretical components of protons and neutrons), we are at dimensions of 10^{-18} centimeters in length, as opposed to 10^{-12} cm for

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[20] James Clerk Maxwell, *A Treatise on Electricity and Magnetism*, 142, 670, 1873. Maxwell also said: "There can be no doubt that the interplanetary and interstellar spaces are not empty but are occupied by a material substance or body, which is certainly the largest, and probably the most uniform body of which we have any knowledge."

the atom itself.[21] But we are still left with the "empty space." Could this "empty space" be filled with particles even smaller than a length of 10^{-18} cm? Perhaps the electropon pairings constitute much of open space, but even then it looks like we need some help in packing the rest of the space with something even smaller.

The Ether of Quantum Mechanics and String Theory

Ever since the dawn of quantum mechanics (a theory to which Einstein was bitterly opposed because any assignment of ponderable substance to space would explicitly contradict General Relativity), most of today's physical theorists hold that inner and outer space hold a dizzying array of particles and/or fields. One scientist, Josef Tsau, believes that the universe is bathed in a primary ether particle, the neutrino. Tsau has a lot on his side, since the existence of neutrinos has been verified many times. Although they have mass, neutrinos are extremely small entities. They can apparently travel through the empty space of the atom and do so at the speed of light. Having no charge, they can only affect other masses by their high kinetic energy. Fifty trillion of them are said to pass through our human body every second. Tsau has developed a whole science of physics based on how the neutrino interacts with atomic particles, explaining everything from gravity to how light travels to how planets revolve around the sun.[22]

Even smaller particles are discussed by other scientists. Different names are given to these entities (*e.g.*, gravitons, maximons, machions, etherons, axions, newtonites, higgsionos, fermions, bosons, zero-point energy field, material vacuum, cosmic false vacuum). Popular String theorist, Brian Greene, speaks of them as "modern echoes…of a space-filling ether." He writes:

> We then encounter subsequent discoveries that transformed the question once again by redefining the meaning of "empty," envisioning that space is unavoidably suffused with what are called quantum fields and possibly a diffuse uniform energy called a cosmological constant – modern echoes of the old and discredited notion of a space-filling ether.[23]

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[21] Some accelerators have produced evidence of "pentaquarks," a collection of five different quarks, but the same evidence leads to the theory that there may be a dozen or more species of pentaquarks (J. R. Minkel, "The Power of Five," *New Scientist*, July 3, 2004, p. 32).

[22] Josef Tsau, *Discovery of Aether and its Science*, 2005. It is Tsau's belief that a neutrino wind generated by the sun pushes the planets in their orbital paths, thereby answering the mysterious phenomenon of inertia. He writes: "The high energy neutrino particles produced by the dense-matter object of the Sun affected by its rapid rotation and the strong force fields created by the rotation may form a constant spiral neutrino-particle wind that provides a directional pushing effect only, which may cause the outer layer of the Sun to rotate and is utilized by all planets to stay in orbit. If a planet is orbiting in the right direction, such a spiral wind at equilibrium would constantly give it a push in both its orbiting and anti-gravity directions to keep it in orbit" (p. 22).

[23] Brian Greene, *The Fabric of the Cosmos*, 2004, Preface, p. x. Brian Greene has also written the popular book, *The Elegant Universe*.

It has been known in modern science for quite some time that there exists a world permeating all of space that consists, perhaps, of the smallest functional dimensions known to man. As one author puts it:

> Classically, a vacuum is simply the absence of matter. In quantum mechanics, however, the [Heisenberg] uncertainty principle leads us to view the vacuum as a very complex system. A particle-antiparticle pair can pop into existence in empty space, provided that the two annihilate each other in a time so short that the violation of energy conservation implicit in this process cannot be detected. The vacuum, then, is more like a pan of popcorn than a featureless, empty sea. Particle-antiparticle pairs pop into existence here and there, but disappear quickly.[24]

Nobel laureate Robert Laughlin shows us a little more of the history behind this discovery:

> The existence and properties of antimatter are profoundly important clues to the nature of the universe….The simplest solution – and the one that turned out to be experimentally correct – was to describe space as a system of many particles similar to an ordinary rock. This is not a precisely correct statement, since Paul Dirac formulated the relativistic theory of the electron…but in hindsight it is clear that they are exactly the same idea….This…has the fascinating implication that real light involves motion of something occupying the vacuum of space….The properties of empty space relevant to our lives show all the signs of being emergent phenomena characteristic of a phase of matter.[25]

As we see, there is a whole other realm of particle-antiparticle pairs besides those of electropons. Quantum mechanics can only measure the effects of the particles. It does not know what the particles are, nor can it accurately predict what these particles will do in every case (as opposed to being able to predict what atoms will do). As noted above, quantum scientists refer to them as particles that "pop in and out of existence."[26] The only thing they know for sure about them is that the First Law of Thermodynamics cannot be violated, and thus, in one zepto-second the particle is here, and in the next it must be gone, but to where no one knows.

Most of this strange, unseen world comes in what science knows as "Planck" dimensions, named after the physicist **Max Planck** due to his formulation of the quantum $\hbar$, the smallest unit of energy.

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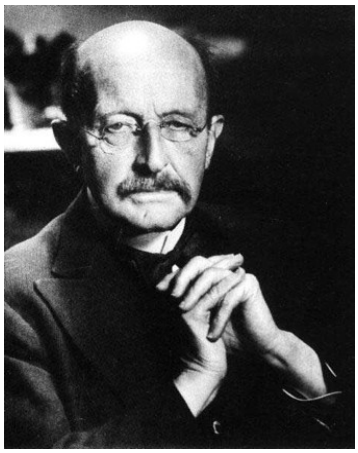
[24] James Trefil, "The Accidental Universe," *Science Digest*, June 1984, p. 100.

[25] Robert B. Laughlin, *A Different Universe*, pp. 103-105.

[26] As one popular magazine put it: "…according to quantum mechanics, empty space is not empty. Rather, the vacuum is filled with fields and particles that constantly pop in and out of existence. The problem is that when physicists estimate how much energy is contained within those fields and particles, they come up with a number…that is insanely large, 10^{120} times greater than what we observe" (*Discover*, October 2005, p. 56).



It is in this world that lengths come as small as 10^{-33} cm; mass as ethereal as 10^{-5} grams; and time as short as 10^{-44} seconds. Comparing the Planck length to the size of an atom (10^{-13} cm) or an electron (10^{-20} cm), a Planck particle (which we call "plancktons," henceforth) is 100,000,000,000,000,000,000 times smaller than the former and 1,000,000,000,000 times smaller than the latter. You can visualize its smallness by this analogy: if a drop of water were the size of Earth, an atom would be the size of a basketball, and a planckton would be about the size of the electrons in the basketball.[27]

How does modern science know plancktons exist? The logic of quantum physics leads them there. As Stephen Hawking puts it:

> [T]he uncertainty principle means that even "empty" space is filled with pairs of virtual particles and antiparticles…(unlike real particles, they cannot be observed directly with a particle detector)….If it weren't – if "empty" space were really completely empty – that would mean that all the fields, such as the gravitational and electromagnetic fields, would have to be exactly zero. However, the value of a field and its rate of change with time are like position and velocity of a particle: the uncertainty principle implies that the more accurately one knows one of these quantities, the less accurately one can know the other. So if a field in empty space were fixed at exactly zero, then it would have both a precise value (zero) and a precise rate of change (also zero), in violation of that principle. Thus there must be a certain minimum amount of uncertainty, or quantum fluctuations, in the value of the field.[28]

As we noted earlier, these particles are said to be continually "popping in and out" of space. In fact, as modern science interprets the appearance and disappearance of electropon pairs to be an example of the creation and annihilation of matter, they make a similar interpretation in explaining why plancktons appear and disappear in 10^{-44} seconds. To explain their appearance some physicists have gone to the extreme of saying that these

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[27] The Planck length is derived from the formula $\sqrt{(G\hbar/c^3)}$, where G is the gravitational constant, $\hbar$ is Planck's constant of angular momentum, and c is the speed of light. This may be the fundamental length that would prohibit further division on an actual, not potential, basis. For further study, see V. L. Ginzburg, *Key Problems of Physics and Astronomy*, Moscow, Mir Publishers, 1976.

[28] Hawking, *A Briefer History of Time*, pp. 122-123.

particles come from other universes or dimensions, visiting us for very brief "Planck" periods.[29] In that sense also they are understood as "virtual" particles, not real particles.

In 1957, Princeton professor **John Wheeler** was the first to describe this phenomenon as "space-time foam" – a universe of virtual particles appearing and disappearing in Planck time through blackholes.[30] Ironically, Wheeler was also quoted as saying that blackholes were "the greatest crisis ever faced by physics."[31] Stephen Hawking supports Wheeler's theory, stating that, on extremely small scales in the Planck dimensions, space is alive with "turbid random activity and gargantuan masses," while "wormholes" provide passage to other universes.[32] Others, such as Ian Redmount and Wai-Mo Suen speak of "quantum space-time foam" or "Lorentizian space-time foam,"[33] as does S. J. Prokhovnik.[34] F. Selleri understands the CMB as the fundamental reference frame, pointing out that any object that travels through it is affected by radiation pressure.[35] Jean-Pierre Vigier refers to it as a "non-empty vacuum" and outlines the phenomenon of superluminal interactions in an "underlying deterministic substructure."[36] Vigier points to the experiments by Alain Aspect, which confirm the results.[37]

Many theorists appeal to ultra small particles to explain the phenomenon of gravity, which has hitherto defied the efforts of modern science to uncover its physical mechanism. In trying to explain gravity as a process of interacting particles, the "empty space" of the

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[29] MIT physicist, Alan Guth, and Russian physicist, Andrei Linde.

[30] John A. Wheeler and C. M. Patton, "Is Physics Legislated by Cosmology?" *The Encyclopedia of Ignorance*, editors: Ronald Duncan and Miranda Weston-Smith, *Pocket Books*, 1978, pp. 19-35.

[31] "Those Baffling Black Holes," *Time*, Sept. 4, 1978. In another venue, Wheeler commented: "To me, the formation of a naked singularity is equivalent to jumping across the Gulf of Mexico. I would be willing to bet a million dollars that it can't be done. But I can't prove that it can't be done" (*Computer Defies Einstein's Theory*, by John Wilford, New York Times, March 10, 1991).

[32] *Black Holes and Baby Universes and Other Essays*, Bantam, 1994; *A Briefer History of Time*, pp. 104-123.

[33] *Physical Review D*, 3rd series, vol. 47, No. 6, March 1993; I. Redmount and W.-M. Suen, "Is Quantum Spacetime Foam Unstable?" *Rapid Communication, Physical Review D*, 47, 2163 (1993); "De Broglie Waves on Dirac Ether," *Lettere Al Nuovo Cimento*, vol. 29, No. 14, Dec. 1980; W.-M. Suen, "Minkowski Spacetime is Unstable in Semi-Classical Gravity," *Physical Review Letters*, 62, 2217 (1989).

[34] S. J. Prokhovnik, "Light in Einstein's Universe," Dordrecht, Reidel, 1985; "A Cosmological Basis for Bell's View on Quantum and Relativistic Physics," in *Bell's Theorem and the Foundation of Modern Physics*, eds., A. Van der Merwe, F. Selleri and G. Tarozzi, Singapore, New Jersey, World Scientific, 1990, pp. 508-514.

[35] F. Selleri, "Space-time Transformations in Ether Theories," *Z. Naturforsch*, 46a, 1990, pp. 419-425.

[36] J. P. Vigier, "Causal Superluminal Interpretation of the Einstein-Podolsky-Rosen Paradox," and "New non-zero photon mass interpretation of Sagnac effect as direct experimental justification of the Langevin paradox," *Physics Letters A*, 234, 1997, pp. 75-85; *Physics Letters A* 175, 1993, p. 269.

[37] *Physical Review Letters*, vol. 49, No. 2, July 12, 1982.

cosmos is said to be filled with particles going by such names as "gravitons," "machions," "messenger particles," or "force-carrier particles." Included among these particles are electropon pairs, which are said to have a time-scale existence of 10^{-21} seconds. Another explanation, going by the name of String Theory, holds that, rather than space being filled with point particles, it consists of one-dimensional "strings" that are 10^{-33} cm in length. The particles we are detecting are merely oscillations of the strings. This theory requires the existence of 10 or more dimensions to make everything fit, which are given various exotic names such as "Calabi-Yau manifolds."[38]

Other discoveries have also added to the mystery. In 1948 Hendrik Casimir discovered that two mirrors facing each other in a perfect vacuum have a mysterious force acting upon them that draws them together, which is appropriately called "the Casimir effect."[39] This is a force that seems to appear out of nowhere, since in a vacuum there would be no obvious forces or material substances carrying them, yet a force it was. Current science tries to explain the appearance of this force as a "vacuum fluctuation" wherein the aforementioned "virtual particles" do their magic, but this is merely theoretical phraseology for something they really don't understand. One interesting theory held by the editor of the *Astrophysical Journal*, Bernard Haisch, is that the Casimir effect shows the existence of a "zero-point field" and is the scientific fulfillment of the opening verses of Genesis 1:3, "Let there be light."[40]

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[38] Brian Greene, *The Fabric of the Cosmos: Space, Time and the Texture of Reality*, New York: Alfred A. Knopf, 2004, p. 369.

[39] Hendrik B. G. Casimir, Proc. Kon. Ned. Akad. Wetensch. B51, 793, 1948; S. Lamoreaux, *Physical Review Letters*, 78, 5, 1996; M. Bordag, U. Mohideen and V. M. Mostepanenko, "New developments in the Casimir effect," *Phys. Rep.* 353 1, 2001; H. B. Chan, et al., "Nonlinear micromechanical Casimir oscillator," *Physical Review Letters* 87, 211801, 2001; F. Chen and U. Mohideen, "Demonstration of the lateral Casimir force," *Physical Review Letters* 88, 101801, 2002; C. Genet, A. Lambrecht and S. Reynaud, "Temperature dependence of the Casimir force between metallic mirrors," *Physical Review* A 62 012110, 2000; K. Lamoreaux, "Demonstration of the Casimir force in the 0.6 to 6 micrometer range," *Physical Review Letters* 78 5, 1997; K. A. Milton, *The Casimir Effect: Physical Manifestations of Zero-point Energy*, World Scientific, Singapore, 2001. The Casimir Effect also causes one to wonder whether the Gravitational constant *G* in Newton's force equation [$F = Gm_1m_2/r^2$] is, indeed, caused by gravity or some other force, since its value was determined in 1798 based on the attraction of metallic spheres in close proximity to one another. Stephen Mooney holds that the Cavendish Torsion Balance measures electrostatic attraction, not gravitational attraction. He points out that when Cavendish conducted the test, he found perplexing the fact that the attraction between the two spheres increased when he heated the larger of the two. Mooney believes the reason is that Cavendish was measuring the radiation density at the Earth's surface (which is not a constant value), not gravitational attraction (Stephen Mooney, "From the Cause of Gravity to the Revolution of Science," *Apeiron*, vol. 6, no. 1-2, pp. 138-141, 1999). Science is not agreed on the value of G in any case. Most disagree on its value after only three decimal places, and some disagree even after one decimal.

[40] Bernard Haisch, scientific editor of *The Astrophysical Journal* and editor-in-chief of the *Journal of Scientific Exploration*, has postulated that the Casimir Effect is due to the exclusion of the zero-point field from the gap between the plates, which was worthy enough to be published by *Physical Review*, (B. Haisch, A. Rueda, and H.E. Puthoff, Physical Review A, 49, 678, 1994. In an article in *Science and Spirit Magazine* titled "Brilliant Disguise: Light, Matter and the Zero-Point Field," Haisch coincides his findings with Genesis 1:3's "Let there be light." Haisch holds that the zero-point energy field results when, due to the Heisenberg Uncertainty Principle which says that there will be continual random movement in electromagnetic waves, if all the energy in those random movements are added up, it will produce the "background sea of light whose total energy is enormous: the zero-point field. The 'zero-point' refers to the fact that even though this energy is huge, it is the lowest possible energy state." Other articles include: "BEYOND $E=mc^2$: A First Glimpse of a Post-modern Physics in Which Mass, Inertia and Gravity Arise from Underlying Electromagnetic Processes," B. Haisch, A. Rueda and H. E. Puthoff, *The Sciences*, November/December, Vol. 34, No. 6, pp. 26-31, 1994; B. Haisch, A. Rueda and H. E. Putoff, "Inertia as a Zero Point Field Lorentz Force," *Physical Review* A, Vol. 49, No. 2, 1994; B Haisch and A. Rueda, "Electromagnetic Zero-Point

Although Haisch's exuberance may be somewhat misplaced, it is obvious that he knows *something* is there, and it is far smaller than the dimensions we see on the atomic level. Accordingly, other physicists recognize that it is high-time Einstein's theories about gravity be replaced.[41] All these discoveries spell a certain doom for the theories of Einstein because, try as they may, no one has been able to bridge the huge gap between Relativity and the Quantum world in which these particles are created and catalogued. In fact, Roger Penrose, who has coined the word "twistors" for his particles of choice, has stated that the concept of "space-time" may be eliminated from the basis of physical theory altogether.[42] Abhay Ashtekar holds that at the Planck scale the concept of space-time is replaced by a network of what he calls "loops and knots" of energy. This theory is being further developed by Carlo Rovelli and Lee Smolin.[43]

The seeming inevitable position to which science is being led is that there is a world of activity occurring at Planck dimensions that underlies everything that happens in the universe. Obtaining the right understanding of this Planck universe will ultimately set aside both Relativity and Quantum Mechanics. Even staunch Relativists admit this eventuality. As Alan Kostelecký writes in *Scientific American*: "The observable effects of Planck-scale Relativity violations are likely to lie in the range of 10^{-34} to 10^{-17}."[44] Kostelecký more or less admits that, even though the ultimate theory of nature lies in these tiny dimensions, current science is at a loss to investigate them:

> Whatever the eventual form of the ultimate theory, quantum physics and gravity are expected to become inextricably intertwined at a fundamental length scale of about 10^{-35} meters, which is called the Planck length, after the 19th century German physicist Max Planck. The Planck length is far too small to be within the direct reach of either conventional microscopes or less conventional ones such as high-energy particle colliders (which probe "merely" down to about 10^{-19} meter).[45]

Field as Active Energy Source in the Intergalactic Medium," presented at 35th Jet Propulsion Conference, June 1999. "Vacuum Zero-Point Field Pressure Instability in Astrophysical Plasmas and the Formation of Cosmic Voids," A. Rueda, B. Haisch and D. C. Cole, *Astrophysical Journal*, 445, 7, 1995; Puthoff, H.E., "Gravity as a Zero Point Fluctuation Force", *Physical Review* A, Vol. 39, No. 5, 1989; R. Matthews, "Inertia: Does Empty Space Put Up the Resistance?" *Science*, Vol. 263, 1994.

[41] H. Yilmaz, "Towards a Field Theory of Gravitation," *Il Nuovo Cimento*, Vol. 107B, no. 8, 1991; I. Peterson, "A New Gravity? Challenging Einstein's General Theory of Relativity," *Science News*, Vol. 146, 1994; J. P. Siepmann, "The Laws of Space and Observation," *Journal of Theoretics*, Vol. 1, No. 1, 1999.

[42] Roger Penrose, *The Road to Reality: A Complete Guide to the Laws of the Universe*, New York, Alfred Knoph, 2005, pp. 968-1002.

[43] Lee Smolin, "Atoms of Space and Time," *Scientific American*, Sept. 2004; A. Ashtekar, V. Husain, J. Samuel, C. Rovelli, L. Smolin: "2+1 quantum gravity as a toy model for the 3+1 theory," *Classical and Quantum Gravity* 6, L185, 1989; C. Rovelli: "Loop space representation In: New perspectives in canonical gravity," A. Ashtekar Bibliopolis, Naples 1988; C. Rovelli and L. Smolin: "Knot theory and quantum gravity," *Physical Review Letters* 61, 1155, 1988; C. Rovelli, L. Smolin: "Loop space representation for quantum general relativity," *Nuclear Physics* B331, 80, 1990; A. Ashtekar, C. Rovelli, L. Smolin: "Gravitons and loops," *Physical Review* D44, 1740, 1991; A. Ashtekar, C. Rovelli: "Connections, loops and quantum general relativity," *Classical and Quantum Gravity* 9, 3, 1992; J. Iwasaki, C. Rovelli: "Gravitons from loops: non-perturbative loop-space quantum gravity contains the graviton-physics approximation," *Classical and Quantum Gravity* 11, 1653, 1994; H. Morales-Tecotl and C. Rovelli: "Loop space representation of quantum fermions and gravity," *Nuclear Physics* B 451, 325, 1995; C. Rovelli and L. Smolin: "Spin Networks and Quantum Gravity," *Physical Review* D 53, 5743, 1995; gr-qc/9505006. Lee Smolin argues that space is proportional to the area of its boundary in Planck units establishes a fundamental limitation on the nature of physical systems, called the "Bekenstein" bound. The power of this principle lies in its universality—any viable theory of quantum gravity must explain why it holds ("Three Roads to Quantum Gravity," Basic Books, 2001).

[44] Alan Kostelecký, "The Search for Relativity Violations, " *Scientific American*, September 2004, p. 96.

The magazine itself adds:

> In quantum physics, short distance and short times correspond to high momenta and high energies. Thus, at sufficiently high energy – the so-called Planck energy – a particle should "see" the graininess of spacetime. That violates relativity, which depends on spacetime being smooth down to the tiniest size scales.[46]

> It predicts the same doom, however, for Quantum Mechanics itself:

> Still, something is rotten in the state of quantumland, too. As Einstein was among the first to realize, quantum mechanics, too, is incomplete. It offers no reason for why individual physical events happen, provides no way to get at objects' intrinsic properties and has no compelling conceptual foundations.[47]

In Quantum Land, virtual particles can do just about anything the theorist desires they do, including traveling faster than the speed of light or escaping from a black hole. There is one catch, though. The math of Quantum Mechanics maintains that, if they travel faster than the speed of light, they better "pop out of existence" prior to any violation of the Heisenberg Uncertainty Principle, otherwise, they cannot exist.

In the end, those who depend on "virtual" particles with word pictures such as "space-time foam" or "non-empty vacuum" have admitted, however, that the whole system of "virtual" particles is doomed from the start. Redmount and Suen have shown that if plancktons are left in the "pop in and pop out" category it creates numerous anomalies in the structure of the quantum field, including but not limited to "wormholes" on an intolerable scale.[48] This leads one to posit that the plancktons should be understood as real particles, the underlying substance of the Genesis firmament itself.

End

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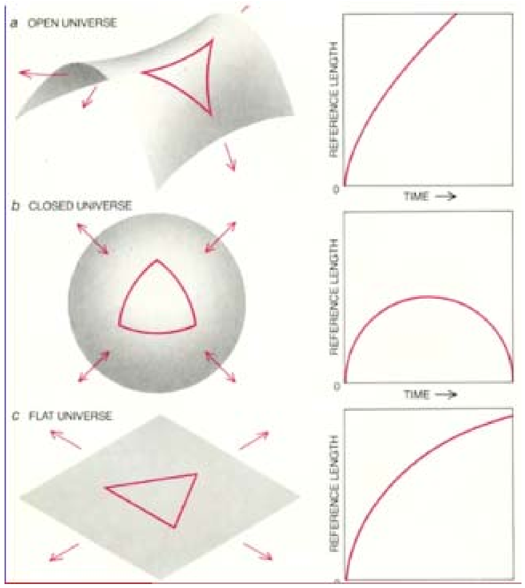
[45] *Ibid*.

[46] Graham P. Collins, staff writer, *Scientific American*, Sept. 2004, p. 99. NB: We are not here supporting the concept of "space-time," but merely using the same terminology of modern science as they discover the contradictions and anomalies in their own theories.

[47] George Musser, "Was Einstein Right," *Scientific American*, September 2004, p. 89.

[48] I. Redmount and W.-M. Suen, "Is Quantum Spacetime Foam Unstable?" *Rapid Communication, Physical Review D*, 47, 2163, 1993.

Krauss: Types of universes:



Krauss: Since GTR says space is curved, then the universe can be one of three different geometries: Open, Closed or Flat. A Closed universe will expand, stop and collapse. An Open universe will expand forever. A Flat universe will expand, slow down, but never stop.

Krauss says: If we “weigh” the universe we can tell what kind of the three we have.

The energy of empty space, however, turned out to be 10^{120} more than all the observable material in the universe. They had to have zero as an answer, however, in order to make everything balance out, since we could not live in a universe with 10^{120} energy. But they didn’t know how to get zero.

Vacuum Energy =

1,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,
000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,
000,000,000,000,000,000,000,000,000

x ***Energy of All Matter in the Universe***

THE WORST PREDICTION IN ALL OF PHYSICS!!

Their answer is apparently Dark Matter and Dark Energy, for they will make the balance. But it is only theoretical, since they have never found either DM or DE.

Krauss said that, working backwards from how much they know General Relativity Theory (GRT) pulls mass, they use GRT to weigh the universe. The “weighing” process takes place

as follows. For example, they believe that a galaxy will produce many images of galaxies because of gravitational lensing (see below), that is, they believe galaxies pull light around them and magnify the image or produce many images (like looking through a faceted piece of glass). In order to calculate how much galaxy mass would be needed to see what we see, GRT “weighs” the mass and finds that it needs a huge amount, thus DM and DE are created by GRT.

Example of gravitational lensing:

The blue objects are supposed to be the result of gravitational lensing.

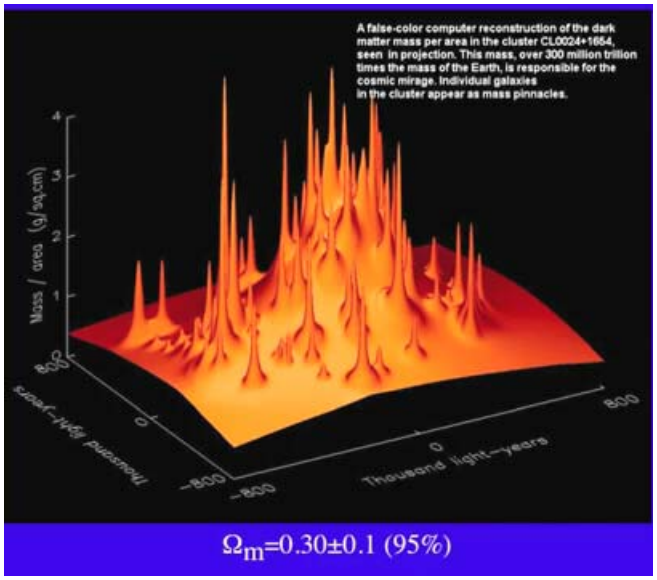


Chart showing the galaxies at the needles, but most mass is between the needles.

Krauss says Ω_m (Omega) is Dark Matter plus normal matter divided by what you need to make a flat universe. Krauss needs a “flat” universe because, as noted above, of the three

universes (Open, Closed or Flat) only the flat universe has zero energy, that is, where the negative energy of gravity balances out the positive energy of matter. But the above W_m value (which is what our universe contains of DM and normal matter) gives only 30% of what is needed to make a flat universe.

Why does Krauss want a universe with a total energy of zero? Because, he says, only a universe with zero energy could come from nothing (or zero). They need certain values to make the Big Bang work so they insist upon them and tweak the numbers until they get what they want. In order to give credence to the Big Bang they must show that something can come from nothing. But this is a shell game. As noted earlier, it is not really nothing. It is very high energy substance that acts in unpredictable ways (like exploding into a Big Bang and producing our universe), or it could act very differently at another time and produce a completely different universe or perhaps one very similar to ours.

But all this talk of "parallel universes" and "quantum fluctuations" and "virtual particles that pop in and out of existence" has one overriding agenda behind it. Krauss told us what that agenda is:

> **"The laws of physics allow the universe to begin from nothing. You don't need a deity. You have nothing, zero total energy, and quantum fluctuations can produce a universe."**

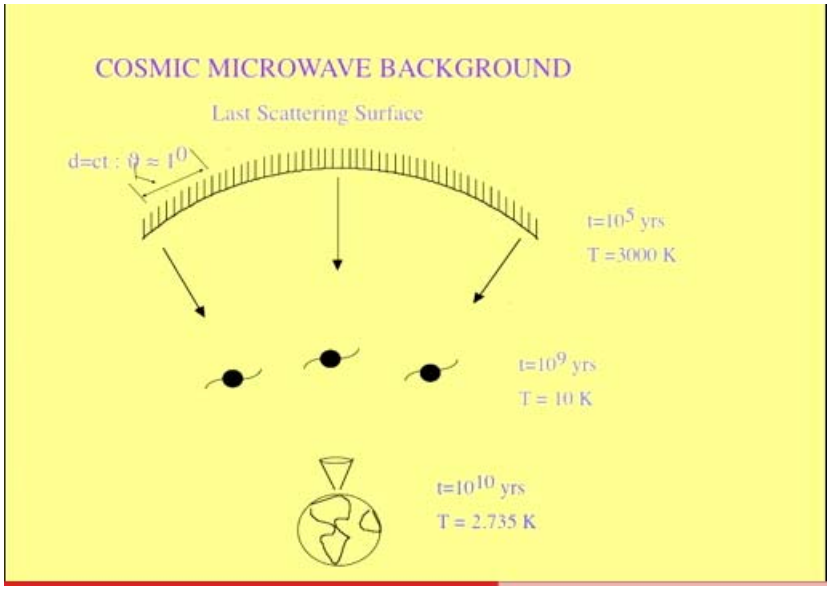
But lo and behold, Krauss says they ran into a big problem, since the "observers" did not find the energy at the very beginning of the Big Bang to be zero (although Krauss doesn't explain what these "observers" were observing). So, like a good scientist, did they abandon the theory of the Big Bang and start over again? No, the merely tried another means to get to zero energy. This one required them to measure the "curvature" or "energy-momentum" (from $G_{\mu\nu} = 8\pi T_{\mu\nu}$) by hand. In order to do so they needed a large triangle (since one can circumscribe a triangle in a circle)

Krauss arrives at his "triangle" by the following reasoning: if the universe is 13.78 billion years old, we should be able to look out and see the beginning of the big bang (looking backwards into time, as it were).

-but we can't see all the way to the Big Bang because there is a wall. At the Big Bang, the temperature was hot enough (3000K) to break apart Hydrogen atoms to produce protons and electrons, which is a "charged plasma" and such is opaque to radiation. So we cannot see past this part since the universe is opaque at this point.

-but the light that bounces off the surface of the opaque wall is reradiated back to earth. It is at 3K, not 3000K, so the protons have captured the electrons and made space transparent instead of opaque, and thus we can see it from earth. Moreover, the radiation should be coming to us from all directions since the wall surrounds us like a sphere.

-if one takes an arc of 1 degree on the wall of the CMB (where it is opaque), this represents 100k light years in distance. This surface (of 1 degree = 100K light years) existed when the universe was only 100,00 years old.

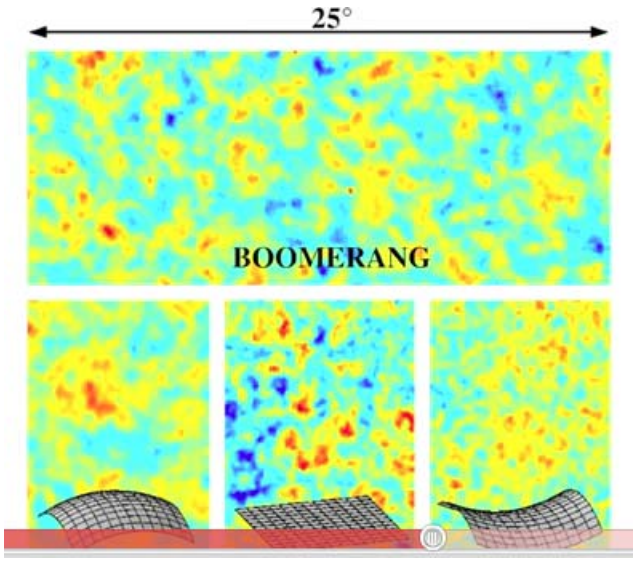


Krauss continues: Since Einstein said no information can be transferred faster than light, this means that nothing that happened on one side of the CMB could affect anything on the other side of the CMB. Thus, big lumps of matter "don't know they are matter because gravity could not go across them." Thus, very large lumps won't collapse.

Krauss says the biggest lumps that would collapse are those that are 100K miles or less in size. Since 100K miles equals one degree for the base of the "triangle," and the distance to the "wall" gives us the two other sides of the isosceles triangle (and since light rays travel in straight lines in the "transparent" part, then the sides of the triangle are straight), Krauss has his "triangle" to measure the curvature or energy-momentum of Einstein's universe.

Krauss measure it as follows: -in an Open universe Krauss says light rays will diverge as you look back into time, so the distance across the "lump" (the "ruler") will look smaller, perhaps a half degree. In a Closed universe the light rays look bigger as you look back into time so the distance across the lump would be bigger than 1 degree.

So we then measure the lumps and see if they are a half degree, one degree or 1.5 degrees.



-Krauss says the Boomerang took a picture of the opaque wall and found the separation of the lumps was about 1 degree, which matches the bottom-middle picture showing a “flat” universe. Using a computer generated lump picture in which the lump is less than 1 degree produces a “Closed” universe (picture on the bottom-left). If the lumps are larger than one degree we get an “Open” universe (picture on bottom-right).

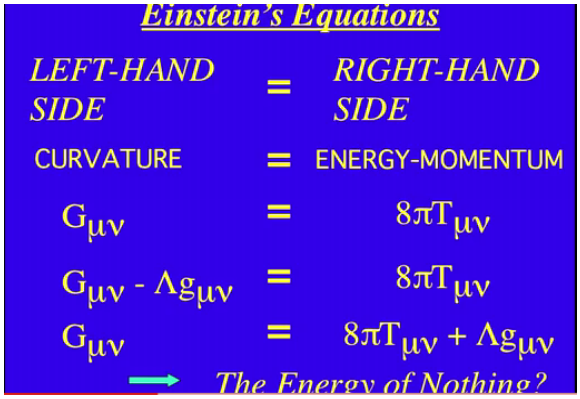
Since a “flat” universe (the middle picture) matches the Boomerang image, and thus Krauss says the universe is flat.

He then reinforces his previous point that, because “the universe is flat, it has zero total energy, and it could have come from nothing.”

Krauss admits that he said earlier that the “flat” universe only has 30% of the mass it needs to function as a flat universe (even if one includes Dark Matter and normal matter). So where is the other 70%?

Answer: You put it in by hand, because you have to have it to make the Big Bang work.

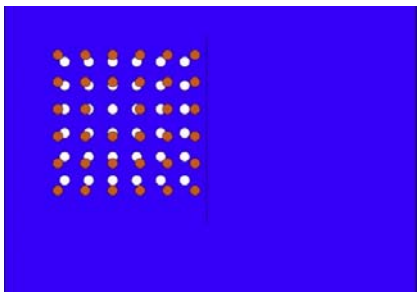
Krauss said they put in “energy” (Dark Energy) between the spaces of the Dark Matter and normal matter. If you do, he says, you are giving it Einstein’s “cosmological constant” in reverse, that is, you are putting Lamda on the other side of the equation. So it is now $G_{\mu\nu} = 8\pi T_{\mu\nu}$ (Dark Matter & Normal Matter) + $\Lambda g_{\mu\nu}$ (Dark Energy). See his chart below.



Krauss admits, however, this would cause the expansion of the universe to accelerate over time.[49] So he needs a way to confirm this acceleration. Krauss says that in 1998 astronomers used supernovas as measuring sticks and found that they were showing an accelerating universe (but he never shows how supernovas can serve as rulers). Krauss then reminds us that if we figure out how much energy is needed to make the universe accelerate according to the chart, it is 70% more than we presently have.

Krauss concludes with: "this completes the **ultimate Copernican principle**. We constitute a 1% bit of pollution in a universe that is 30% Dark Matter and 70% Dark Energy. We are completely irrelevant. Why we are in a universe in which we are so irrelevant is beyond me."

R. Sungenis: This, of course, is absurd, but it just goes to show you that scientists will do anything they can to stop us from being special in the universe. Krauss and company are caught in a dilemma. They see the redshift of light from galaxies increasing as the radius from us increases. They insist on interpreting this as an expansion of galaxies away from us because this will give them the only alternative answer to the fact that the galaxies and their redshift is all equidistant from us. Instead of interpreting the equidistant redshift as a sign that the earth is in the center of it all, they adopt the Friedmann-Walker-Robertson metric of an expanding universe idea and propose that in an expanding universe everywhere seems to be the center and nowhere is the center, since that it what it would produce if it were expanding. See his original pictorial:



[49] Krauss says "eventually the galaxies will move away from us faster than the speed of light. It's allowed in General Relativity."

But in order to have this expansion and "no center" they must have something that causes the expansion, but they don't have anything, so they have to invent Dark Energy to propel the expansion, and that is why Krauss put the Lambda ($\Lambda g_{\mu\nu}$) figure on the right side of the equation (since that represents Dark Energy):

$G_{\mu\nu} = 8\pi T_{\mu\nu}$ (Dark Matter & Normal Matter) + $\Lambda g_{\mu\nu}$ (Dark Energy)

It's all a bunch of hocus pocus, made-to-order cosmology that preserves their world view. But as we saw above, the CMB dipole and the concentric circles of galaxies that arc around our earth simply will not allow their cosmology. The simple explanation is as we say in GWW, from which we quote Timothy Clifton:

There was also a second thesis at work, what we might call the "Einsteinian Principle," that is, the universe obeyed the Special and General Relativistic equations of Albert Einstein. In this model, the universe has been expanding since the proposed Big Bang occurred 13.5 billion years ago. Based on both the Copernican and Einsteinian principles, a grid to measure the universe's expansion was invented by three physicists, which became known as the "Friedmann-Walker-Robertson (FRW) metric,"[50] but the expansion is only possible, as Clifton, *et al*, say,

…if a fraction of r is in the form of a smoothly distributed and gravitationally repulsive exotic substance, often referred to as Dark Energy. The existence of such an unusual substance is unexpected, and requires previously unimagined amounts of fine-tuning in order to reproduce the observations. Nonetheless, dark energy has been incorporated into the standard cosmological model, known as LCDM [NB: "LCDM" is another way of saying $G_{\mu\nu} = 8\pi T_{\mu\nu}$ (Dark Matter & Normal Matter) + $\Lambda g_{\mu\nu}$ (Dark Energy)]

Clifton then shows that the tweaking required to get the Dark Energy model working is wholly unnecessary if one simply rejects the first principle of cosmology, the Copernican principle:

> An alternative to admitting the existence of dark energy is to review the postulates that necessitate its introduction. In particular, it has been proposed that the SNe observations could be accounted for without dark energy if our local environment were emptier than the surrounding Universe, i.e., if we were to live in a void.[51] This explanation for the apparent acceleration does not invoke any exotic substances, extra dimensions, or modifications to gravity – but it does require a rejection of the Copernican Principle. We would be required to live near the center of a spherically

[50] $H^2 = 8\pi G\rho/3 - k/a^2$, where H is the Hubble rate, ρ is the energy density, *k* is the curvature of space. The scale factor can then be determined by observing the luminosity distance of astrophysical objects: $H_O D_L \cong cz + ½(1 - q_O)cz^2$, where *q* is the deceleration rate and subscript O denotes the value of a quantity today (*ibid*).

[51] Here Clifton, *et al*. cite: S. Alexander, T. Biswas and A. Notari at [arXiv:0712.0370]; and H. Alnes, M. Amarzguioui and Ø. Grøn in *Physical Review* D73, 083519 (2006); and J. Garcia-Dellido & T. Jaugboelle in *Journal of Cosmology and Astroparticle Physics* 04, 003 (2008).

> symmetric under-density, on a scale of the same order of magnitude as the observable Universe. Such a situation would have profound consequences for the interpretation of all cosmological observations, and would ultimately mean that we could not infer the properties of the Universe at large from what we observe locally.
>
> Within the standard inflationary cosmological model the probability of large, deep voids occurring is extremely small. However, it can be argued that the center of a large underdensity is the most likely place for observers to find themselves.[52] In this case, finding ourselves in the center of a giant void would violate the Copernican principle, that we are not in a special place…[53]

New Scientist wasted no time in laying out the cosmological and historical implications of this study:

> It was the evolutionary theory of its age. A revolutionary hypothesis that undermined the cherished notion that we humans are somehow special, driving a deep wedge between science and religion. The philosopher Giordano Bruno was burned at the stake for espousing it; Galileo Galilei, the most brilliant scientist of his age, was silenced. But Nicolaus Copernicus's idea that Earth was just one of many planets orbiting the sun – and so occupied no exceptional position in the cosmos – has endured and become a foundation stone of our understanding of the universe. Could it actually be wrong, though? At first glance, that question might seem heretical, or downright silly….And that idea, some cosmologists point out, has not been tested beyond all doubt – yet.

When we add to this the fact that no one has ever found physical evidence of the much needed Dark Energy to make the Copernican/Einsteinian model work, it is clear that current cosmology is merely a desperate attempt to avoid the simplest solution to the data – a geocentric universe. As one commentator put it:

> Astronomers will find it hard to settle that troubling sensation in the pit of their stomachs. The truth is that when it comes to swallowing uncomfortable ideas, dark energy may turn out to be a sugar-coated doughnut compared to a rejection of the Copernican principle."[54]

New Scientist shows why even the sugar-coated phase gives astronomers a queasy feeling in their stomachs:

> This startling possibility can be accommodated by the standard cosmological equations, but only at a price. That price is introducing dark energy – an unseen energy pervading space that overwhelms gravity and drives an accelerating expansion. Dark Energy is problematic. No one really knows what it is. We can make an educated guess, and use quantum theory to estimate how much of it

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[52] Here Clifton, *et al*. cite A. D. Linde, D. A. Linde and A. Mezhlumian in *Physical Letters* B345, 203 (1995).

[53] "Living in a Void: Testing the Copernican Principle with Distant Supernovae," *Physical Review Letters*, 101, 131302 (2008) DOI: 10.1103/PhysRevLett.101.131302.

[54] "Dark Energy and the Bitterest Pill," July 14, 2008 at the Physics arXiv blog.

> there might be, but then we overshoot by an astounding factor of 10^{120}. That is grounds enough, says George Ellis…to take a hard look at our assumptions about the universe and our place in it. "If we analyse the supernova data by assuming the Copernican principle is correct and get out something unphysical, I think we should start questioning the Copernican principle…. Whatever our theoretical predilections, they will in the end have to give way to the observational evidence."
>
> So what would it mean if…the outcome were that the Copernican principle is wrong? It would certainly require a seismic reassessment of what we know about the universe….If the Copernican Principle fails, all that goes that [the Big Bang] goes out the window too….Cosmology would be back at the drawing board. If we are in a void, answering how we came to be in such a privileged spot in the universe would be even trickier.[55]

Actually, it's not really that "tricky." As Robert Caldwell of Dartmouth College said in remarking on the crossroads at which modern cosmology finds itself: "It would be great if there were someone out there who could look back at us and tell us if we're in a void."[56] The truth is, Someone has already told us the Earth was in a privileged spot, many years ago in a book, oddly enough, called *Genesis*, but that is a subject treated in Volume II of this series.

[55] Marcus Chown, "Is the Earth at the Heart of a Giant Cosmic Void?*New Scientist*, Nov. 12, 2008, pp. 32-35.
[56] *Ibid*., p. 33.