God and modern physics:
Facts about the beginning and design of the universe
A basic overview

The Magis Center of Reason and Faith: There has never been a better time to affirm the close relationship between science, philosophy, reason and faith.

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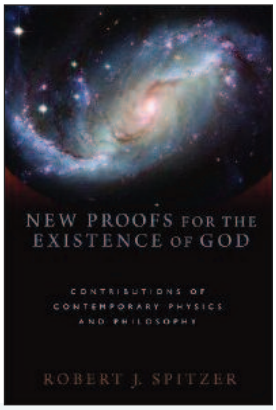
"Magis" (pronounced "màh-jis") means "more," representing a call to do more to open the eyes of reason to faith. We take our mission directly from this call. By combining new discoveries in astrophysics and philosophy, we can present powerful scientific evidence that the universe was created by a higher power – evidence capable of withstanding rigorous intellectual scrutiny.

God and modern physics

Facts about the beginning and design of the universe

By Fr. Robert Spitzer, S.J., PhD.



Fr. Spitzer's Book

The Magis Center of Reason and Faith is a private, non-profit organization dedicated to explaining the consistency between science and spirituality in contemporary physics. In the past ten years, implications of transcendence in physics, philosophy of mathematics, and metaphysics have become more pronounced. Indeed, no other decade in history has revealed more or better evidence for God. So what is this evidence?

In astrophysics, several major discoveries pointing to a beginning and creation of the universe have been made. Three discoveries are very significant here:

> **1) The likelihood that our universe is inflationary (expanding) and will continue to expand forever.**
>
> **2) The strong implication that inflationary universes have a beginning of time. This is critical, because anything with a beginning requires a cause for its beginning. Otherwise matter would have to come into being out of nothing, which defies logic.**
>
> **3) The extremely high improbability that our universe would be able to sustain any form of life without extraordinarily complex fine-tuning.**

As you will see from this fact sheet, if you put all this evidence together, it strongly leads to the conclusion that the universe was created by a trans-universal (supernatural) power. The evidence also indicates that this trans-universal power is highly intelligent. Fred Hoyle, one of the world's most prominent astrophysists and an ardent atheist, completely changed his mind when he examined some of this evidence. According to Hoyle:

> *Would you not say to yourself,* **"Some super-calculating intellect must have designed the properties of the carbon atom, otherwise the chance of my finding such an atom through the blind forces of nature would be utterly miniscule?"** *Of course you would... A common sense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question.*
>
> (Fred Hoyle. "The Universe: Past and Present Reflections." Engineering and Science, November, 1981.)

While this information is readily available to those who know where to look, very few people are aware of these breakthroughs in our ability to understand Creation scientifically. The Magis Center is working on a wide range of initiatives designed to deliver this information to the public, from documentaries to academic curricula and new media. This fact sheet provides a brief overview of the argument for a Creator combining physics and basic logic.

Information in this fact sheet is taken from the book, *New Proofs for the Existence of God: Contributions of Contemporary Physics and Philosophy* (Eerdmans, 2010) by Fr. Robert Spitzer, S.J., Ph.D. All quotations cited in this fact sheet are referenced in that book. The podcasts referred to in this fact sheet may be found and downloaded free of charge through the Magis Center website, www.magisreasonfaith.org.

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Can science show God created the universe?

Scientific theories and conclusions are subject to modification because of the possibility of new discoveries. Nevertheless, certain theories and conclusions are considered well-grounded and highly probable because they rest on multiple, distinct, bases of evidence which mutually corroborate one another. There are three mutually corroborative bases of evidence that indicate the existence of a superintellectual creator (God) from the vantage point of modern physics:

- **Evidence of a beginning of the universe from the law of entropy;**
- **Evidence of a beginning of the universe (or any multiverse in which it might be situated) from the vantage point of space-time geometry; and**
- **Evidence of supernatural design from our low-entropy universe and the anthropic values of cosmological constants.**

When all three are seen in their mutually corroborative relationship, the conclusion of Balor Institute Scholar in Residence Bruce Gordon is quite reasonable: **"When the logical and metaphysical necessity of an efficient cause, the demonstrable absence of a material one, and the proof that there was an absolute beginning to any universe or multiverse are all conjoined with the fact that our universe exists and its conditions are fine-tuned immeasurably beyond the capacity of any mindless process, the scientific evidence points inexorably toward transcendent intelligent agency as the most plausible, if not the only reasonable explanation."**

The Big Bang

The explosion of matter from a state of very high density and temperature and the expansion of space-time from a singularity, marking the origin of the universe.

I. The standard Big Bang model

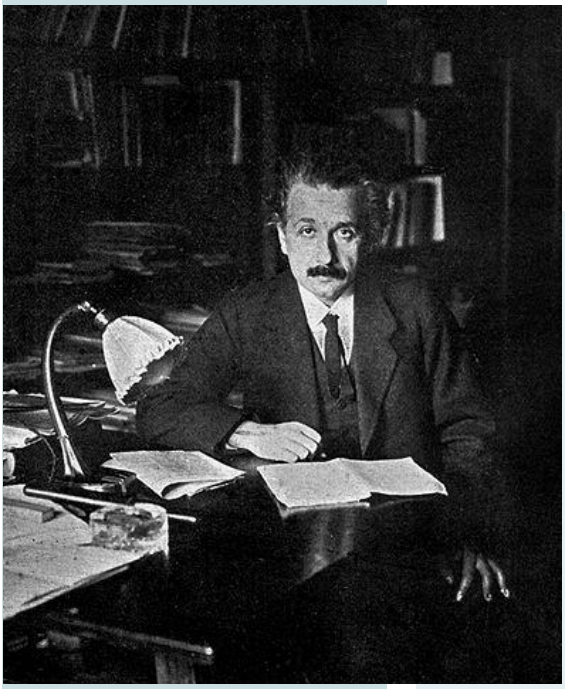
The SBBM assumes that the Big Bang could be the beginning of the universe. This assumption has not been proven, but there is no evidence against it. If it is true, then the universe is 13.7 billion years old (the age of the Big Bang). The universe is limited in mass-energy: 4.6% of the universe is visible matter (emits and absorbs light/electromagnetic radiation); 23% is dark matter (does not emit and absorb light/electromagnetic radiation, but has gravitational effects); and 72.4% is dark energy (a field which causes repulsion). With respect to visible matter there is 10^{53} kg of mass, which is approximately 10^{80} baryons (protons and neutrons). This is configured in about 10^{22} stars in 10^{11} galaxies. **Thus the Big Bang Model shows the universe to have finite parameters, which is different from previous assumptions which held the universe to be infinite in time and mass.**

This mass energy is united through a dynamic space-time field. Space is not an empty vacuum (as Newton and others conceived it), but rather a dynamic field (which may be likened to a sheet of elastic) which has properties, conditions, and constants. It is dimensional and orientable; its geometry is compressed and reconfigured through the density of mass-energy in it; it can warp and vibrate, and it can affect the mass energy in it. For this reason, the universe can be likened to a balloon which has paint on its elastic surface.

At the Big Bang, the balloon had a very tiny radius, and as it continues to expand, the matter on it (e.g. the paint molecules) move away from one another. Note that space-time itself (e.g. the elastic of the balloon) is expanding and this causes the clusters of matter to move away from one another. There is no true center, because everything is a "center" and nothing is at "the center." It is highly likely that the universe will continue to expand like this forever because of the abundance of dark energy causing repulsion within it.

*See **New Proofs** Chapter One, Section 1; and Podcast I*

II. The Big Bang model: A well-corroborated theory



Ground-breaking physicist Albert Einstein (pictured in his office at the University of Berlin in 1920) said Georges Lemaitre's theory was "The most beautiful and satisfactory explanation of creation to which I have ever listened."

Fr. Georges Lemaitre

The Standard Big Bang Theory was first formulated by a Belgian priest, Fr. Georges Lemaitre, to answer questions about radial velocity of extra galactic nebulae (with respect to Einstein's General Theory of Relativity). At first glance, Einstein discounted this theory because he believed the universe to be in a steady state. He initially told Lemaitre, "your calculus is correct, but your physics is abominable." After subsequent confirmations, Einstein changed his mind, saying, "This is the most beautiful and satisfactory explanation of creation to which I have ever listened."

Lemaitre's model – dubbed somewhat sarcastically by Fred Hoyle as "the Big Bang" – was confirmed by Hubbell's red shifts; Penzias' and Wilson's discovery of a 2.7 degree kelvin virtually uniformly distributed radiation; observations from the COBE satellite; MAP satellite; and other observations. It was subsequently adjusted to account for a brief period of inflation and a possible period of quantum cosmology. Virtually all contemporary physicists accept this theory.

*See **New Proofs** Chapter One, Section 1; and Podcast I and II*

III. What is the significance of a beginning?

First we must ask, "What is the meaning of a beginning of the universe?"

"Beginning" means that the universe came into existence. This means that prior to that beginning point, it did not exist – it was literally nothing. Now if we take "nothing" literally, then we should not import any reality into nothingness. Nothing is not a vacuum (which has dimensionality), nothing is not space, nothing is not a void – it is only nothing.

We may now proceed to the first principle of metaphysics, namely, "from nothing, only nothing comes." This means that prior to the beginning; the universe could not have caused itself to exist, because it was nothing. So, how could the universe have come into existence if it was nothing? The only answer can be that something real caused the universe to be, and that reality must be other than the universe. This "other reality" must be beyond the universe and, it must be capable of causing the universe (as a whole) to come into existence. This reality is frequently called "Creator" or "God." Thus, "beginning of the universe" implies a "Creator" or "God."

See **New Proofs** *Chapter One, Section V, and Podcast IV*

Was there a beginning?

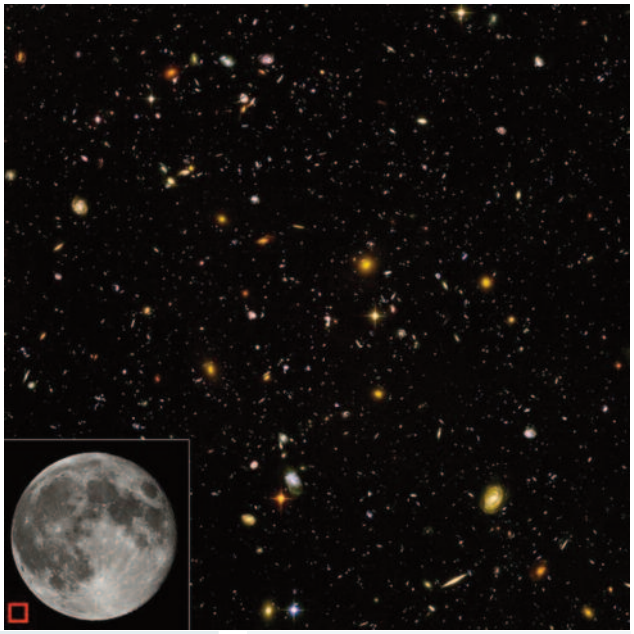
The above implications of creation have incited some physicists to suggest that the Big Bang was not the beginning of the universe, and they have proposed some speculative models for a pre-big-bang period which might be infinite in duration.

Are these models of infinite time consistent with the current evidence of physics? During the last twenty years considerable evidence has been discovered showing the high likelihood of a beginning of every pre-big-bang period (of every expanding universe model). This evidence is discussed in Sections IV and V.

It means that it is highly likely that our universe (and any multiverse in which it might be situated) would have a beginning and by implication, would have been created by something beyond the universe. We will now examine this evidence in two parts:

- **Evidence of a beginning from the Law of Entropy (Section V)**
- **Evidence of a beginning from space-time geometry (Section VI)**

*See **New Proofs**, Chapter One*



This high-resolution image of the Hubble ultra deep field shows a diverse range of galaxies, each consisting of billions of stars. The equivalent area of sky that the picture occupies is shown in the lower left corner. The smallest, reddest galaxies, about 100, are some of the most distant galaxies to have been imaged by an optical telescope, existing at the time shortly after the Big Bang.

IV. Three pre-Big Bang models

Since the Big Bang has not been proven to be the beginning of the universe, some physicists have postulated some models of a pre-Big-Bang era with the potential for infinite duration (which could avert the need for a beginning and a creation). Three well-known models are:

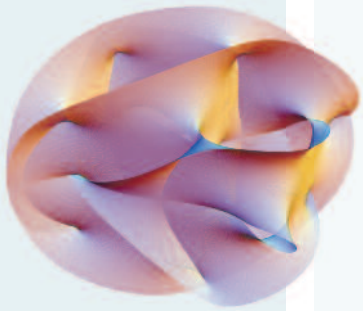


Illustration of a Calabi-Yau manifold. In superstring theory, the extra dimensions of spacetime are sometimes conjectured to take this form.

- **An infinitely bouncing universe**
- **An eternally inflating multiverse; and**
- **An eternal universe in higher dimensional space (superstring theory).**

There is substantial evidence to indicate the need for a beginning in each of these three hypothetical pre-Big-Bang models (as well as other possible pre-Big Bang models). This evidence for a beginning of the universe (or any multiverse in which it may be situated) will be given in two parts: three pieces of evidence from the law of entropy (Section V) and three pieces of evidence from space-time geometry (Section VI).

*See **New Proofs** Chapter One, Section III; and Podcast IV*

V. Evidence for a beginning from the law of entropy

Example of entropy: Pool balls move from a racked state to a scattered, disorganized state when struck, but not vice versa.

There are three mutually corroborating pieces of evidence of a beginning of bouncing universes (assuming both three-dimensional and higher-dimensional space) that come from the law of entropy. We will first describe the law of entropy and then examine each of the three pieces of evidence.

Definition of the law of entropy

Isolated energetic systems move from states of organized complexity to disorganized states; they do not move from disorganized states to organized complex ones (because the probability of disorganized states is far greater than that of organized complex ones). For this reason, isolated energetic systems run down. Examples: billiard balls move from a racked state to a scattered, disorganized state when struck, but not vice versa; a cup of coffee moves from hot state to cool state, but not vice versa; gas moves out of an uncorked bottle but does not flow back into it, etc… Inasmuch as the universe is an isolated system, it too will run down (increase in entropy).

*See **New Proofs** Chapter One, Section IV.A; and Podcast V*

First indication of finite bouncing from law of entropy ratio of starlight to CMB radiation.

Bouncing universe

A theorized model of the formation of the known universe derived from the cyclic model or "oscillatory universe" interpretation where the first cosmological event was the result of the collapse of a previous universe

There are two kinds of electromagnetic energy in the universe: starlight (organized complex spectrum), and cosmic microwave background radiation (diffuse, homogeneous radiation). Every hypothetical bounce of the universe would convert all starlight into cosmic microwave background (CMB) radiation. Therefore, if the universe bounced a million times, then the CMB radiation would be a million times greater than starlight. Similarly, if the universe bounced a billion times, then the CMB radiation would be a billion times greater than starlight. If the universe bounced an infinite number of times, then all electromagnetic radiation would be CMB radiation, and there would be no starlight. **This is not the case in our universe where CMB radiation is only one hundred times greater than starlight indicating an upper limit of one hundred bounces, if, indeed, the universe bounced at all.**

*See **New Proofs** Chapter One, Section IV.B; and Podcast V*

Second indication of finite bouncing from law of entropy – Tolman's limit

Every bounce produces increased radiation in the universe; this increased radiation produces increased outward pressure. This increased outward pressure, in turn, produces longer and larger cycles (bounces). Therefore, if one goes back in time from today's finitely large and finitely long cycle, then one will reach an infinitely short cycle with an infinitely small radius (a beginning) in the finite past. This would constitute a beginning of bouncing, and a beginning of the universe.

*See **New Proofs** Chapter One, Section IV.B; and Podcast VI*

Third indication of finite bouncing from law of entropy – low entropy of our Big Bang.

If the universe were to collapse, there would be a tremendous increase in entropy (as independently calculated by Roger Penrose, Willy Fischler, and Thomas Banks). Therefore, if the universe had oscillated an infinite number of times prior to our Big Bang, entropy should have been at its highest possible level at the Big Bang. In point of fact, the entropy of the universe at the Big Bang was very low, indicating that it did not oscillate an infinite number of times. Indeed it does not seem likely that the universe bounced at all because the odds against our universe having its low entropy at the Big Bang (as calculated by Roger Penrose) is already $10^{10^{123}}$ to one (which is exceedingly, exceedingly improbable); and if there were a previous bounce, the entropy of the universe at the previous bounce would have been much lower (meaning that the odds against its occurrence would have been higher – if that can be imagined).

*See **New Proofs** Chapter One, Section IV.B; and Podcast VI)*

The above three pieces of evidence show the exceedingly high improbability of an infinitely bouncing universe (including those conceived to occur in higher dimensional space). It is reasonable to conclude from this that if the universe bounced at all, it did not bounce an infinite number of times, and therefore, had a beginning.

VI. Evidence of a beginning of all expanding pre-Big Bang models from space-time geometry

There are three pieces of evidence from space-time geometry that require a beginning of the universe (or multiverse) under certain assumptions. It will be helpful to start with a description of the space-time field. Recall that space-time is like a field with known properties, conditions, and constants. It is dimensional and orientable; its geometry is compressed and reconfigured through the density of mass-energy in it; it can warp and vibrate; and it can affect the mass energy in it. These characteristics enable physicists to demonstrate the necessity of a beginning under certain assumptions. All postulated models of a pre-big-bang era fall under these assumptions, and so the following three mutually corroborating pieces of evidence ground the high probability of a beginning of our universe (or multiverse in which it might be situated).

Alexander Vilenkin is Professor of Physics and Director of the Institute of Cosmology at Tufts University. A theoretical physicist who has been working in the field of cosmology for 25 years, Vilenkin has written more than 150 papers. His work in cosmic strings has been pivotal.

The 1993 Borde-Vilenkin Proof

Arvin Borde and Alexander Vilenkin gave a proof in 1993 that every inflationary universe meeting five assumptions would have to have a singularity (a beginning of the universe/multiverse in a finite proper time). In 1997 they discovered a possible exception to one of their assumptions (concerning weak energy conditions) which was very, very unlikely within our universe. Physicists (including Alan Guth) did not consider this exception to be very important, meaning that the proof still shows the likelihood of a beginning of time in our universe (or a multiverse in which it might be situated).

*See **New Proofs** Chapter One, Section IV.D; Podcast VII*

Alan Guth's 1999 analysis of expanding pre-big-bang models

Guth concluded his study as follows: "In my own opinion, it looks like eternally inflating models necessarily have a beginning. I believe this for two reasons. The first is the fact that, as hard as physicists have worked to try to construct an alternative, so far all the models that we construct have a beginning; they are eternal into the future, but not into the past. The second reason is that the technical assumption questioned in the 1997 Borde-Vilenkin paper does not seem important enough to me to change the conclusion."

*See **New Proofs** Chapter One, Section IV.D; Podcast VII*

Alan Harvey Guth is a theoretical physicist and cosmologist. Guth has researched elementary particle theory (and how particle theory is applicable to the early universe). Currently serving as Victor Weisskopf Professor of Physics at the Massachusetts Institute of Technology, he is the originator of the inflationary universe theory.

The 2003 Borde-Vilenkin-Guth Theorem (the BVG Theorem)

Borde, Vilenkin, and Guth joined together to formulate an elegant and applicable demonstration of a beginning of expanding universes in a famous article in *Physical Review Letters*. Alexander Vilenkin explained it as follows:

> *Suppose, for example, that [a] space traveler has just zoomed by the earth at the speed of 100,000 kilometers per second and is now headed toward a distant galaxy, about a billion light years away. That galaxy is moving away from us at a speed of 20,000 kilometers per second, so when the space traveler catches up with it, the observers there will see him moving at 80,000 kilometers per second.*
>
> *If the velocity of the space traveler relative to the spectators gets smaller and smaller into the future, then it follows that his velocity should get larger and larger as we follow his history into the past. In the limit, his velocity should get arbitrarily close to the speed of light.*

This point constitutes a boundary to past time in any expanding universe or multiverse. This boundary to past time could indicate an absolute beginning of the universe or a pre-Big Bang era with a completely different physics. If the latter, then the pre-Big Bang period would also have to have had a boundary to its past time (because it would be expanding). Eventually, one will reach an absolute beginning when there are no more pre-pre-Big Bang eras. What does this mean? **It means that there must be an absolute beginning of any expanding universe or multiverse** (even if it has multiple pre-Big Bang eras).

This demonstration is applicable to just about any model universe or multiverse that could be connected with our universe. It applies also to oscillating universe conjectures where the average Hubble expansion is greater than zero. Exceptions to this theorem are very difficult to formulate and are quite tenuous because they require either a universe with an average Hubble expansion less than or equal to zero (which is difficult to connect to our expanding universe) or a deconstruction of time (which is physically unrealistic). For this reason all attempts to get around the BVG Theorem to date have been unsuccessful. Even if physicists in the future are able

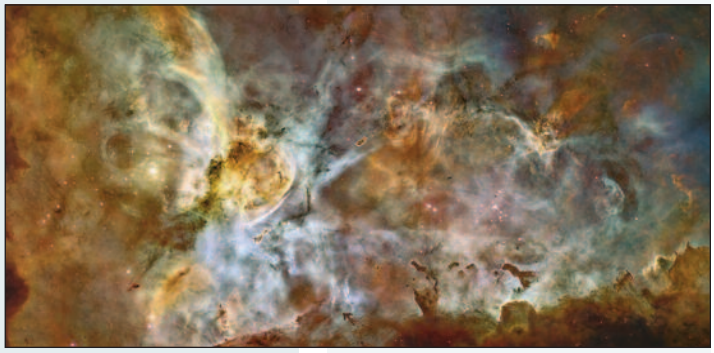
to formulate a hypothetical model which could get around the BVG Theorem, it would not mean that this hypothetical model is true for our universe. It is likely to be only a testimony to human ingenuity. Therefore, it is quite likely that our universe (or any multiverse in which it might be situated) had an absolute beginning. This implies a creation of the universe by a Power transcending our universe.

*See **New Proofs** Chapter One, Sections IV.D – IV.E and Section V; Podcast VIII*

The above three mutually corroborating pieces of evidence (the 1993 Borde-Vilenkin singularity proof; Guth's analysis showing that every constructed expanding cosmology has a beginning; and the 2003 BVG theorem showing that every expanding cosmology has a boundary to past time) show the high probability of a beginning of our universe (or any hypothetical multiverse in which it might be situated) from the vantage point of space-time geometry.

VII. Evidence of supernatural design from our low entropy universe and anthropic values of our cosmological constants

There are several conditions of our universe necessary for the emergence of any complex life form. Many of these conditions are so exceedingly improbable that it is not reasonable to expect that they could have occurred by pure chance (these highly improbable but necessary conditions for life are termed "anthropic coincidences"). For this reason many physicists attribute their occurrence to supernatural design. Some other physicists prefer to believe instead in trillions upon trillions of "other universes" (which are unobserved and likely unobservable) to lower the improbability of these conditions. Therefore, these anthropic coincidences can only be explained by belief – either belief in a superintellect that designed them or belief in trillions upon trillions of unobserved universes. Current multiple universe (multiverse) theories have shaky assumptions and require as much fine-tuning as the conditions they are meant to explain. Therefore, belief in a transcendent superintellect has considerable probative force.



Could deep-space structures such as the Eta Carinae Nebula (above) form in a universe with significantly different physical constants?

*See **New Proofs** Chapter Two, Section III; and Podcast IX*

The high improbability of a pure chance occurrence of our low-entropy universe

A low-entropy universe is necessary for the emergence, development, and complexification of life forms because a high entropy universe would be too run down to allow for such development. Roger Penrose has calculated the exceedingly low probability of a pure chance occurrence of our low-entropy universe as $10^{10^{123}}$ to one. Absent a natural explanation of this phenomenon, one is left with two choices to explain the initial conditions of our universe: either they were selected by a super-intellectual creator or they occurred naturally in one universe amidst trillions upon trillions upon trillions of other unobserved universes. Penrose himself concludes, **"In order to produce a universe resembling the one in which we live, the Creator would have to aim for an absurdly tiny volume of the phase space of possible universes—about $1/10^{10^{123}}$ of the entire volume, for the situation under consideration."**

*See **New Proofs** Chapter Two, Section II; and Podcast X*

The high improbability of five other anthropic conditions (based on cosmological constants)

A cosmological constant is a number that controls the equations of physics; the equations of physics, in turn, describe the laws of nature. Therefore, these numbers control the laws of nature (and whether these laws of nature will be hospitable or hostile to any life form). Some examples of constants are: the speed of light constant (c= 300,000 km per second), Planck's constant ($\hbar$ = 6.6 x 10^{-34} joule seconds), the gravitational attraction constant (G = 6.67 x 10^{-11}), the strong nuclear force constant (g_s = 15), the weak force constant (g_w = 1.43 x 10^{-62}), the mass of the proton (m_p = 1.67 x 10^{-27} kg), rest mass of an electron (m_e = 9.11 x 10^{-31} kg), and charge of an electron proton (e = 1.6 x 10^{-19} coulombs). There are several other constants, but these pertain to the following anthropic coincidences (highly improbable conditions required for life).

Sir Fred Hoyle was an English astronomer who started his career as an atheist. Later studies convinced him that sheer force of numbers dictates the existence of a Creator. The odds of life emerging otherwise are far too difficult to explain. Hoyle compared the random emergence of even the simplest cell to the likelihood that "a tornado sweeping through a junk-yard might assemble a Boeing 747 from the materials therein." Hoyle also compared the chance of obtaining even a single functioning protein by chance combination of amino acids to a solar system full of blind men solving Rubik's Cube simultaneously.

A. If the gravitational constant (G) or weak force constant (g_w) varied from their values by an exceedingly small fraction (higher or lower) – one part in 10^{50} (.00000000000000000000 00000000000000000000000000001) then either the universe would have suffered a catastrophic collapse or would have exploded throughout its expansion, both of which options would have prevented the emergence and development of any life form. This cannot be reasonably explained by pure chance.

B. If the strong nuclear force constant were higher than its value (15) by only 2%, there would be no hydrogen in the universe (and therefore no nuclear fuel or water – this would have prohibited life). If, on the other hand, the strong nuclear force constant had been 2% lower than its value then no element heavier than hydrogen could have emerged in the universe (helium, carbon, etc). This would have been equally detrimental to the development of life. This anthropic coincidence also seems to lie beyond the boundaries of pure chance.

C. If the gravitational constant, electromagnetism, or the "proton mass relative to the electron mass" varied from their values by only a tiny fraction (higher or lower), then all stars would be either blue giants or red dwarfs. These kinds of stars would not emit the proper kind of heat and light for a long enough period to allow for the emergence, development, and complexification of life forms. Again, these anthropic coincidences are beyond pure chance occurrence.

D. If the weak force constant had been slightly smaller or larger than its value, then supernovae explosions would never have occurred. If these explosions had not occurred, there would be no carbon, iron, or earth-like planets.

E. Fred Hoyle and William Fowler discovered the exceedingly high improbability of oxygen, carbon, he-

lium and beryllium having the precise resonance levels to allow for both carbon abundance and carbon bonding (necessary for life). This anthropic coincidence was so striking that it caused Hoyle to abandon his previous atheism and declare: "A common sense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question."

*For all five anthropic coincidences, refer to **New Proofs** Chapter Two, Section II; and Podcast X*

Conclusion

We began this fact sheet by elucidating the horizons and limits of scientific methodology in its description and explanation of the universe and its limits. Scientific theories and conclusions are subject to modification because of the possibility of new discoveries. Nevertheless, certain theories and conclusions are considered well-grounded and highly probable because they rest on multiple, distinct, bases of evidence which mutually corroborate one another. The evidence for an absolute beginning and extraordinary fine-tuning of the universe is grounded in three distinct bases:

1. **Three pieces of evidence from the law of entropy;**
2. **Three pieces of evidence from space-time geometry; and**
3. **The fine-tuning intrinsic to multiple anthropic coincidences.**

As such, the current physical evidence supports a reasonable likelihood of the creation of our universe by a highly intelligent transcendent power. We invite you to visit our website at www.magisreasonfaith.org to learn more and join the discussion.

A note about our founder

Fr. Robert Spitzer, S.J., PhD., is uniquely qualified to direct this Center. He spent twenty-eight years working with young adults in a college setting. He has taught courses on faith and reason, metaphysics, philosophy of God, and philosophy of science to graduate and undergraduate students at Georgetown University, Gonzaga University, Seattle University, and St. Louis University. He won teaching awards at both Georgetown University and Seattle University. He has published eleven scholarly articles on philosophical arguments for God's existence, indications of creation in Big Bang cosmology, indications of supernatural design in contemporary astrophysics, and the ontological and scientific study of time. His most recent book is titled *New Proofs for the Existence of God: Contributions of Contemporary Physics and Philosophy* (Eerdmans, 2010). He has produced two television series on Finding God through Faith and Reason for EWTN Catholic television and received a Templeton Grant for teaching physics and metaphysics. For more information, please visit our website at www.magisreasonfaith.org.