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Using Logic and Occam's Razor to Deduce the Origin and Future of the Universe

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Abstract

The origin and future of this universe is a question that we may not ever be able to answer conclusively. Although there are many theories floating about. This paper takes a more grounded approach by going back to the basics, looking around at what we know and using a combination of logic and Occam's Razor to deduce the origin and future of the universe.

This paper theorizes that this universe started off as a black hole in another universe and that the law of conservation of energy can be broken. It will also speculate on a possible mechanism for black holes to undergo a 'Big Bang' as well as a possible process for energy can be created out of nothing involving black holes and Hawking Radiation.

***Keywords:** Universe; Occam's razor; Big-bang*

Introduction

The origin and future of the universe has and always will be the topic of debate and one that we may never be able to conclusively settle. Consequently, many theories have been made regarding this problem, ranging from plausible to wildly speculative. This paper will attempt to take a more straightforward, grounded approach to answer this question by going back to basics, looking at what we already know and using a combination of logic and Occam's Razor to deduce the origin and future of the universe [1].

Logic and deduction have been used many times in science to successfully postulate mechanisms and outcomes to various problems. One example will be the Wolfgang Pauli, who postulated the existence of an undetected particle we now know as the neutrino in response to the problem of beta decay not seeming to conserve energy, momentum and angular momentum.

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This type of 'cold' rationale and thinking out of the box is very useful, especially when one tries to answer a seemingly open-ended question like the one in the title of this paper.

Methods

This paper will attempt to use logic, rationale and Occam's razor to deduce the origin and future of the universe. There will, of course, be assumptions and speculation, but they will also be grounded and reasonable enough to make this paper logically compelling.

The first assumption of this paper is that the universe was not created by a God or 'magic' of any kind. We need to assume, for the purpose of this argument, that the creation of the universe can be explained fully by the laws of science.

In addition to that, this paper will not accept 'arguments' that cannot explain themselves fully. For example, some theories postulate that the energy and matter in the universe have 'always existed' or that the universe 'just happened'. Superficially, these statements seem to bring some sort of closure to the argument-but in reality, they totally avoid answering the question at hand.

The third assumption of this paper is a logical consequence of the first two-which would be that there had to be a universe before this one and that there will also be a universe after. In short, there exists a 'cycle of universes' in the grand scheme of things. This stems from the fact that this universe exists and that we know that this universe had a start-what we call The Big Bang. This universe would, therefore, have had to come from somewhere as we already precluded the explanations of magic and 'it just happened'. Although one could postulate many things, the most straightforward explanation of where this 'somewhere' it would be a 'universe' that existed before ours. Continuing that logic, our universe should, therefore, be able to 'birth' another universe to continue the 'cycle of universes'.

Evidence pertaining to the start of our universe points to what we know as 'The Big Bang', an explosion that tossed untold amounts of energy out into the emptiness of space. To distill it to its essence, however, The Big Bang was essentially an extremely concentrated mass of energy that somehow 'detonated' to form the universe. In addition, this extremely concentrated mass of energy is widely agreed to have originated from a singular point, or what we would refer to as a singularity.

If our universe is able to 'birth' other universes, could the 'seeds' of those future universes exist in our current universe right now? Looking around our universe, we see one class of objects that could fit the description of a singularity that universes are thought to originate from. These objects are black holes. Able to concentrate a universe's worth of energy in a singularity, a black hole is a perfect candidate for the start of a universe. In comparison to other speculative theoretical options, Occam's Razor would suggest that black holes are indeed the precursors to universes as we know for a fact that they exist.

The next question would then be: what triggered The Big Bang? How does one 'detonate' a black hole? Looking at what we know about black holes and science, we can assume that black holes probably don't explode in their parent universe. One will

be hard pressed to explain a plausible mechanism for that without breaking hundreds of scientific laws. A simpler path of logic to go down would be for a black hole to vomit its contents in one big belch somewhere else.

This proposed mechanism is somewhat similar to how white holes are postulated to work. White holes are theoretical 'objects' in space that are linked to black holes through a wormhole. They spew out whatever matter their partner black hole absorbs. However, a key difference here is that wormholes and white holes are supposed to be 'continual' linkages that constantly spew out matter and energy. This property does not align with the Big Bang, which was one big explosion.

Building on the concept of white holes, what we need is a trigger for a black hole to undergo a process that results in the black hole releasing its contents in one big explosion in a separate location. Since the black hole that supposedly formed our universe contained all the energy in our universe, let's ask ourselves what a black hole could do when it reaches that mind-boggling mass. Could the gravitational forces of a black hole that large be able to 'tear' a hole through space-time and discard its contents in one large explosion? Think about it -we always portray space-time and gravity as a piece of fabric with a ball in the middle. Even though said 'cloth' could very strong, any fabric placed in that position will tear if a heavy-enough ball is used.

So, let's recap - the idea presented so far is that our universe started off as a black hole somewhere in another universe. That black hole ate and ate, got large enough and 'broke' the fabric of space-time, discharging its contents in a separate location in one big explosion in an event that we know as The Big Bang.

The next question to tackle would then be how this proposed 'cycle of universes' all started. It can also be pointed out that if the proposed cycle above goes on for some time, assuming that a black hole would need to reach a certain amount of mass to breach the fabric of space-time, that subsequent cycles after the first won't produce another universe as any black hole in that first universe probably won't be able to re-capture all of that universe's contents and become large enough to rip a hole through space-time again.

To answer both questions of causality and continuity, this paper proposes we break a rule. The simplest, most logical explanation for the existence of energy would be that there is a mechanism for the cosmos to create energy out of nothing. This violates what we probably consider the most sacred law of the physics-the law of conservation of energy. Note, however, that this law only exists because we have yet to find a process that breaks it. As ridiculous as it sounds, one can argue that our very existence, the existence of energy demands that the law of conservation of energy be broken.

So how do we go about breaking the law of conservation of energy? It would be illogical to assume the creation of energy and matter to be a one-off occurrence, which would imply divine intervention of some kind. Energy creation, should it exist, would most likely be a recurring, continual process that is probably going on in our universe right now. One may also reason that this process is probably slow and would occur only under specific circumstances that are not found anywhere near the earth as we would have already observed it if that were so.

For possible mechanisms that break the law of conservation of energy, let's look again to black holes as they seem to be the origin of universe and the extreme conditions around and inside them might be what breaks the laws of physics we know. In addition, let's also look to a known phenomenon in quantum mechanics that most closely resembles 'energy creation' in any sense of the phrase. This will be the existence of virtual particles as a consequence of the uncertainty principle. This leads us to a postulated phenomenon that is almost as interesting as a black hole itself-Hawking Radiation.

There are a few descriptions of how Hawking Radiation works, and this paper is going with the explanation that states that Hawking Radiation occurs when a pair of virtual particles, one with 'positive' energy and one with 'negative' energy is formed near the event horizon of a black hole, with one of the particles escaping and the other falling into the black hole. In order to preserve total energy, the particle with 'negative' energy would fall into the black hole, lowering its mass, while the 'positive' particle escapes and adds mass to the universe [1].

However, let's ask ourselves whether the 'negative' particle that falls in actually lowers the black hole's mass by interacting with the 'positive' energy matter inside? Although this may seem intuitively correct, this comes as a consequence of us assuming that the singularity in a black hole will behave somewhat like the ordinary 'positive' energy matter it has absorbed, at least at the most basic level.

Instead of losing mass, this paper proposes that a black hole that absorbs a 'negative' particle actually gains mass. The singularity of a black hole is unique, in that all the black hole has absorbed is 'compressed' into a singular point. Although we don't exactly know what goes on at the singularity, this paper postulates that whatever that has fallen into a black hole would be changed may be changed so much that it cannot be considered as normal 'positive' energy matter anymore. A 'negative' energy particle that falls in thus may not lower a black hole's mass as it gets absorbed into the singularity, but may instead, add to it, providing the cosmos with a means to create energy out of nothing. It has often been said that the known laws of physics break down at the singularity. Maybe this is truer than we expected.

Results

If a black hole is able to gain mass from nothing via the process postulated above, it would give an explanation as to the existence of matter as well as a mechanism for black holes to eventually gain enough mass to tear through the fabric of space-time and start a new Big Bang. Maybe at the very start of all universes, a pair of 'virtual' micro black holes materialized by sheer chance, possibly combined together and grew larger via Hawking Radiation, eventually becoming massive enough to tear a hole through space-time to start the very first universe.

Summary

To summarize, this paper, using logic and Occam's Razor, postulates two base arguments, that:

- Since our universe was inferred to start from the explosion of a singularity, that singularity would logically have needed to come from somewhere. Looking around, we see that black holes closely fit the description of the Big Bang's singularity and have the potential to accumulate a universe's worth of mass

- The simplest explanation for the existence of energy would be that the universe is able to create energy out of nothing

Discussion

To solve these statements, it is proposed that:

- Black holes are quite likely the start of universes as they resemble the beginnings of the implied singularity that started our universe

- When a black hole grows large enough, its gravitational field is able to tear through the fabric of space time and divulge all its contents in one big explosion to form a new universe

- A black hole could gain mass via Hawking Radiation as the 'negative' energy particles that fall into it add to its mass instead of subtracting from it as previously thought. This is based on the idea that a singularity may be fundamentally different from the matter it absorbs and would thus be able to gain mass, even from 'negative' particles

- The very start of all universes could be the creation, through sheer chance, of a pair of virtual black holes that became real and started gaining mass via the mechanism described above

Conclusion

Although one can rightfully argue that the proposals made in this paper are utterly ridiculous, it is also possible to agree that the base arguments made here are seemingly logical to a fault. A good middle ground here would be to take the proposals with a pinch of salt, as they are, after all, general postulations made in response to the base arguments, and the actual mechanisms, if they do exist at all, may deviate significantly from what was initially proposed here. However, one should keep the base arguments in mind, especially when dealing with black holes.

In closing, this paper would like to encourage physicists to view our universe through different perspectives, think out of the box and not be held down, even by laws that have proven to be unbreakable.

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