

Possibility of travelling through wormholes in space time philosophy essay



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Wormhole is a tunnel connecting two different points in space time. It is also known as Einstein-Rosen bridge (1935). The objective of this study is to investigate is it possible to travel through the wormholes.

1 Introduction

Wormhole(named by John Wheeler, physicist, 1955) is the hypothetical “ tunnel” connecting two different points in spacetime in such a way that a trip through the wormhole could take much less time. The spacetime tunnel is also known as Einstein-Rosen bridge (Einstein and Nathan Rosen, 1935)

Wormholes can be found in earth, but is a billion-trillion-trillionths of a centimeter across Hawking(2010), so it cannot be seen by human’s naked eye.

Travelling through wormhole or time machine can make human life to be more simple and interesting. The purpose of this study is to investigate the method that lead to building a time machine and travelling wormholes.

2 Literature Review

2.1 Definition

Wormhole is a hypothetical “ tunnel” which connects two different points in such a way that a trip through the wormhole could take much less time than a journey between the same starting and ending points in normal space in space time. Wormholes can allow matter, energy, and information to travel to a distant point without passing through the space between the two points effectively circumventing the light speed barrier that prevents it travels faster than light through normal space. Wormholes are actually the natural

part of the fabric of space-time or the quantum foam. These natural wormholes are very small and short lived which the light cannot even pass through them. They are a popular feature of science fiction as they allow interstellar travel within human timescales.

2. 2 History

The mathematician Riemann (1845), who is the first formulated higher-dimensional geometry and also the one who first discusses wormholes. Riemann cuts (Riemann's Wormholes) are connections between spaces (multiply connected spaces) with zero length.

Then, Einstein and his collaborator Rosen (Einstein-Rosen bridges , 1935) describe the relativistic of black holes requires wormholes at their center which seem to connect the center of a black hole with a mirror universe on the " other side" of space time. However, due to the center of a black hole singularity, wormhole could not be traversed as the point of infinite space time curvature where the gravity would also be infinite and all matter would be crushed to its most fundamental constituents. In additional, to travel through the wormhole would require motion faster than the speed of light which is a physical impossibility.

2. 3 How is wormholes form

Wormholes are considered possible based on (Einstein's theory of relativity, 1916), who states that, any mass curves space time. To understand this curvature, think about two people holding a bed sheet up and stretching that sheet tightly. If one person is to place a baseball on the bed sheet, the weight of the baseball would roll to the middle of the sheet and causes the

sheet to curve at that point similar if a marble were placed on the edge of the same bed sheet, it would travel toward the baseball because of the curve.

In this example, space is depicted as a two-dimensional plane rather than the four dimensions which actually make up space time. Imagine that the sheet is folded over and leaving a space between the top and bottom. If a mass is placed on the top side will form a curvature. If an equal mass is placed on the bottom part of the sheet at a point that corresponds with the location of the baseball on the top, the second mass would eventually meet with the baseball. This is similar to how wormholes might form.

In space, masses that place pressure on different parts of the universe could eventually come together to form a tunnel which is a wormhole. We could travel from Earth to another galaxy and return back relatively quickly within a lifetime.

3 Finding and Discussion

3.1 Wormholes exist in our earth

According to Stephen Hawking(physicist and cosmologist), everyone knows that all physical object has three dimensions, they are length, width and height. But, there is another type of length that is length in time. Everything has length in time including space. Travelling in time means travelling through this fourth dimension. By imagine of doing a car travel, drove in a straight line and travelling in one dimension, then turn right or left and this is already adding the second dimension. After that, by driving up or down is actually adding the third dimension, height. So, this is the three dimensions.

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The fourth dimension is by travelling in time. There is a concept of making the time machine to travel through the fourth dimension.

Nothing is flat or solid. If by looking closely at anything, holes and wrinkles can be found. It is a very basic principle even applies to time. Even something as smooth as a pool ball has tiny crevices, wrinkles, and voids. Same as the fourth dimension, there are tiny crevices, wrinkles and voids in time. Down at the smallest of scales, smaller even than molecules or atoms, this is so called quantum foam. This is where wormholes exist. Tiny tunnels through space and time constantly form, disappear, and reform within this quantum world. They actually link two separate places and two different times. These real-life time tunnels are just a billion-trillion-trillionths of a centimeter across. It is too small for human to pass through. Some scientists think that is possible to capture the wormholes and enlarge it by using enough power and advanced technology.

Wormholes will happened just like sound system but only radiation instead of sound. Sound enters the microphone. It's transmitted along the wires, made louder by the amplifier, and comes out at the speakers.

3. 2 The leading of making time machine

According to Albert Einstein, He realized that there should be places where time slows down, and others where time speeds up. The proof is in the space. One of the example is GPS, Global Positioning System. The heavier the object, the more it drags on time.

A super-massive black hole is a time machine. It is a heaviest object in the galaxy. It won't destroy itself in a flash of feedback. But it's pretty
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dangerous. It's a long way away and it doesn't even take us very far into the future. Fortunately there is another way to travel in time. And this represents our last and best hope of building a real time machine.

Hawking (2010) said that there's a cosmic limit of speed that is speed of light. But travelling by a speed near to the speed of light will bring you to the future. For example, the science-fiction transportation system. Imagine a track which goes right round the earth, a track for superfast train. Use this imaginary train to get as close as possible to the speed of light and see how it becomes a time machine. On board are passengers with a one-way ticket to the future. The train begins to accelerate, faster and faster. Soon, it's circling the Earth over and over again. To reach the speed of light and cycling around the earth consider very fast and is 7 times per second. However, no matter how much power the train has, it can never quite reach the speed of light, since the laws of physics forbid it. Instead, let's say the speed gets close, Time starts flowing slowly on board relative to the rest of the world, just like near the black hole. Everything on the train is in slow motion. Imagine that the train left the station on January 1, 2050. It circles Earth over and over again for 100 years before finally coming to a halt on New Year's Day, 2150. The passengers will have only lived one week because time is slowed down that much inside the train. When they got out they'd find a very different world from the one they'd left. In one week they'd have travelled 100 years into the future. Of course, building a train that could reach such a speed is quite impossible. But we have built something very like the train at the world's largest particle accelerator at CERN in Geneva, Switzerland.

Deep underground, in a circular tunnel 16 miles long, is a stream of trillions of tiny particles. When the power is turned on, they accelerate from zero to 60,000mph in a fraction of a second. Increase the power and the particles go faster and faster, until they're whizzing around the tunnel 11,000 times a second, which is almost the speed of light. But just like the train, they never quite reach that ultimate speed. They can only get to 99.99 per cent of the limit. When that happens, they are starting to travel in time. This because of some extremely short-lived particles, called pi-mesons. Ordinarily, they disintegrate after just 25 billionths of a second. But when they are accelerated near to light speed they last 30 times longer.

3.3 Warp drive engine

Two physicists (Cleaver, G. B and Obousy, R) from Baylor University (Waco, Texas) have outlined an engine on how to travel faster than light which is also called warp drive could be created that would bend but not break the laws of physics. The warp engine is based on a design by Alcubierre (1994), known as Alcubierre drive which involves the fabric expansion of space behind a ship into a bubble and shrinking space-time in front of the ship. The ship would rest in between the expanding and shrinking space-time, essentially surfing down the side of the bubble.

In addition, the tricky part is that the space itself would move underneath the stationary spacecraft but the ship would not actually move. The beam of light that far from the ship would left behind but the beam of light next to the ship would zoom away.

This means that the ship would arrive at its destination faster than a beam of light by traveling the same distance. However, without violating Einstein's relativity (Einstein, A. 1916) which says that it would take an infinite amount of energy to accelerate an object with mass to the speed of light, since the ship itself actually is not moving.

3. 4 11th dimension

Moreover, Cleaver and Obousy who are the other coauthor have manipulate the 11th dimension which is a special theoretical construct of m-theory (the offspring of string theory) to create the bubble and the ship would surf down.

The bubble of dark energy could be created if the 11th dimension could be shrunk behind the ship. Hence, the same dark energy would cause the universe to speed up as time goes on. Thus, by expanding the 11th dimension in front of the ship would eventually cause it to decrease although two separate steps are required.

At the end, how is the 11th dimension would be expanded and shrunk is still unknown. All the scientists still work hard for this. If there are extra dimensions and we could manipulate them, that would open up all sorts of exciting possibilities(Tufts University theoretical physicist Lawrence Ford).

3. 5 Overcoming a wormhole's instability with negative energy

The main problem by using wormholes to travel in space or time is that they are inherently unstable. It would create fluctuations that cause the structure to collapse in upon itself when a particle enters a wormhole. There are theories (Thorne, 1994) describe that a wormhole could be held open by <https://assignbuster.com/possibility-of-travelling-through-wormholes-in-space-time-philosophy-essay/>

some form of negative energy which represents a case where the energy density in space is actually negative.

Therefore, sufficient quantity of negative energy might continue to hold the wormhole open while objects pass through it. This would be an absolute necessity to allow a wormhole to become a time portal. However, scientists lack a real understanding on how to get enough negative energy together, and most scientists think it is an impossible task.

3. 6 Relativity of dark energy and negative energy

In some models which are highly contrived, it may be possible to relate dark energy and negative energy because both of it exhibit a form of repulsive gravity even though dark energy is a positive energy. However, the good news is that our universe appears to have dark energy in abundance, but it is looks like the dark energy is distributed throughout the universe.

There is no guarantee that stable wormholes can occur although String theory (Veneziano, 1970) can provide potential sources of negative energy. Therefore, to find any way to store negative energy and use it to sustain a wormhole's stability is far beyond current technology or maybe it is an impossible task.

4 Conclusion

Wormhole is a hypothetical " tunnel" which allows everything to pass through without passing through the space between starting point and ending point. The wormholes may formed by allowing human to travel from Earth to another galaxy and return back relatively quickly within a lifetime.

To travel through the wormhole, it must be travel faster than light. A Warp Drive Engine is outlined and based on a design by Alcubierre (1994), on how to travel faster than light. To overcome wormhole's instability, it required negative energy but there is no guarantee that a stable wormholes can be occur even though String theory can provide potential sources of negative energy. According to Hawking (2010), wormhole is exists in the earth and it is possible to travel through .

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