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The False Force- Gravity

Since Sir Isaac Newton's discovery of gravity in 1670, the scientific community has acknowledged gravity as a fundamental force within nature. According to Quantum Mechanics, each of the now four fundamental forces is caused by a miniscule subatomic particle. The four fundamental forces described by Quantum Mechanics are: gravity, the weak force, the electromagnetic force and the strong force. This belief is now held as common knowledge within the modern science community. However, there are several major flaws with the theory of gravity.

The first major flaw is that a subatomic particle has not been attributed to gravity. Unlike the other fundamental forces, gravity lacks a subatomic particle, the graviton. The next major flaw in the theory of gravity is the presence of dark energy. Since dark energy supposedly drives the expansion of the universe, how is it possible for both gravity and dark energy to exist jointly? The theoretical force of dark energy was hypothesized to justify the expansion of the universe, based on the idea that gravity is too weak to counteract dark energy. However, this explanation of dark energy is unsatisfying as dark energy must comprise of about 68% of the universe for it to be true. The true explanation of both gravity and dark energy cannot be made by blindly labeling them off as forces. Though scientists know it is true that massive objects attract, these same scientists should also take into consideration that the universe is expanding, rather than contracting. Though we humans may observe an effect known as gravity, gravity is not a force, contrary to the common belief and principle. Einstein too challenged the basics of gravity in his theory of General Relativity. Einstein believed that gravity may be caused due to the curvature of space time. While this is a step in the right direction, Einstein's idea is also objectionable. The curvature of space-time may explain the phenomena known as gravity, but it also leaves dark energy unknown. Therefore, presented is a unique hypothesis on gravity. According to String Theory, each dimension results from the folding and packaging of the previous dimension. If this idea stands true, each dimension is a different pathway for particles to travel through. According to the formula KE =1/2mv^2, the kinetic energy of an object is proportional to its mass. Since similar objects contain the same kinetic energy, the more massive objects move at a slower velocity through space. By applying String Theory to this, we can observe that more massive objects move more slowly than less massive objects through the fourth dimension, time. This may explain why time occurs more slowly in areas of high gravity. In areas of high gravity, the total mass is very high and the object therefore moves through the dimension of time more slowly. Our hypothesis is that as objects move through time, slow-moving objects cause faster-moving objects to slow down to its own speed. This is a result of the electromagnetic force. Since the electromagnetic force has an infinite radius, it is able to cause slight interactions between nearby objects, thereby reducing the speed of the faster-moving object. This idea can be related to the concept of polarizability. If an object has more mass, this means it has more moles of particles, thereby increasing its ability to be polarized. These slight, instantaneous polar charges attract nearby objects and cause them to slow down. Due to the weakness of these slight interactions, the effect known as gravity is therefore 10^36 times weaker than the force of electromagnetism. The effect known as gravity cannot exist without the passage of time, and interactions from the electromagnetic force. Through the use of theoretical, analytical, and observational evidence, we will provide ideas to prove our argument that gravity is not a fundamental force.

Through the use of **observational** evidence, it can be deduced that gravity is not a fundamental force. First of all, one of the major points of analytical evidence is the formula for the theoretical gravitational force of attraction experienced by two objects. The formula is F=Gmm/r^2, where F stands for the gravitational force, r is the radius, or distance between the two objects mentioned, and the two m's are the masses, in kilograms, respective masses for which the gravitational force is being calculated. The formula suggests that the force that we experience as gravity is directly related to a dimension outside the dimension we reside in. We live in a dimension with three spatial dimensions, length, depth, and width. The fact that the distance between two objects is squared instead of cubed suggests that the observed attraction due to gravity is related to a dimension with two spatial dimensions instead of three. This also explains the weak interactions of gravity. Gravity has to diffuse from dimensions outside of our own. It does not originate from subatomic particles that reside in three spatial dimensions, unlike the three fundamental forces, so the graviton is not responsible for gravity.

There are many other points that can be observed that show that gravity is not a fundamental force. A primary point is that a graviton has never been observed. The graviton is supposed to be responsible for gravity if it is to be a fundamental force, according to Quantum Theory. Despite having sophisticated equipment like the Large Hadron Collider, no direct observations have been made of the graviton, which means that it must not exist. The theory of general relativity also proves that gravity is not one of the fundamental forces. The theory of general relativity, created by Albert Einstein, proposes that gravity is the caused by the warping of the fabric of space-time by large masses. Classical physics states, as perpetuated by Isaac

Newton, that objects in motion will tend to stay in motion unless acted upon by an outside force. This means that objects in space should travel in a straight line unless acted upon an outside force. One may then say that, “does that not mean that since gravity causes objects to deviate from their straight pathways, gravity is a force and a fundamental force?” However, general relativity accounts for this phenomenon in order to maintain the assertion that gravity is not a force. When under the influence of distorted space time warped by objects of astounding mass, the natural progression of objects is not a straight line, but rather a geodesic curve, according to general relativity. In places where the fabric of space-time is warped, objects follow geodesic and spherical paths, meaning that two separate objects that would not have collided in regular space-time would be able to intersect at a point, explaining how gravity can apparently disobey Newton’s first law without being a force. Additionally, general relativity suggests the existence of gravitational waves, which have been observed. Astronomers have observed the effect of gravitational waves, caused by events like asymmetric supernovae and binary star systems, in the orbits of stars. Certain stars and planets have been observed to move due to effects that can be attributed to gravitational waves attributed to nearby events. In addition equipment, such as Weber bars, have been used and detected traces of what seem like gravitational waves. The existence of gravitational waves suggest that gravity is not a force because they are caused by the acceleration of objects and are actually ripples in the fabric of space-time. They show the relationship of gravity and space-time, instead of gravity and subatomic particles. It can also be observed that gravity exerts only attractive properties and not repulsive properties by simply looking at objects all around the universe. This is unlike other fundamental forces. This suggests that gravity is not caused by subatomic particles because gravity is only capable of attracting objects.

The effect of gravity of large distances is also more significant in the universe on the macroscopic scale, showing that the presence of large masses seem to be responsible for gravity, despite distance. The distortion of space-time can be felt at extremely macroscopic distances. Gravity also seems to apply to only extremely massive objects. These massive objects are made up of many atoms with many subatomic particles. Gravity is not a fundamental force, but rather, according to this observation, gravity is an effect of the polarizability of large masses. Large masses have copious amounts of protons, neutrons, electrons, and smaller particles, which can be manipulated and become synchronous with the particle of other massive objects. When in the right phase, masses can become attracted to each other, observed as gravity, because the masses and their particles are polarized and become attracted towards each other. This is why that on the microscopic scale, gravity is so weak and much weaker compared to the fundamental forces. On the microscopic scale, objects do not have enough mass and particles to actually exert and experience significant attractions. They are not polarizable enough.

On the other hand, the fact that all objects fall with the same acceleration in a vacuum shows that gravity is not a force. It is common knowledge that objects do not fall at the same rate on Earth because of air resistance and an object’s shape, which can slow the acceleration due to gravity. However, it has been proposed and observed in numerous labs worldwide that objects do fall at the same acceleration in the absence of air resistance in a vacuum. Now, according to Newton’s second law, the force exerted on an object is proportional to the object’s mass and acceleration. In other words, F=ma. So objects in the Earth’s gravitational field experience the same acceleration, but do not seem to show signs of be under the influence of the same force. Objects, no matter how massive they are, should fall at the same acceleration as long as they are at the same height and are not subject to air resistance. Objects do not experience the same force as they fall due to gravity. This suggests that gravity is not actually a force, but actually something similar to a curvature in space-time, as a result of macroscopic weak electromagnetic forces.. Objects follow the same natural spherical path under the space-time that is warped by the Earth. The metaphorical slope of the warped space-time is responsible for the attraction caused by gravity, and guarantees that objects fall into the Earth at the same rate. This is because the metaphorical slope is what causes objects to follow a spherical path, and the metaphorical slope is experienced to be the same for all objects at the same distance from the Earth. The observed force due to gravity is not observed to be the same for all objects, but the observed acceleration is. Gravity is not a force because the force fluctuates depending on a mass. Gravity causes a field where accelerations felt by objects are constant and the same conditions of space-time. The last and most important observational point proving that gravity is not force is the effect gravity has on lights. As observed in space by telescopes, many massive objects in the universe, like galaxies, are able to bend light. Images have been found to be distorted and shifted due to the light of image having been bent by the gravitational field of massive objects. Since forces can only exist on objects with mass, gravity must not be a force. Rather, gravity can merely be an effect of curved space-time, which would be able to bend and affect light rays, as the theory of general relativity states. Much evidence can be simply observed in the universe to prove that gravity is not a force.

Theoretical Evidence (1200 words- Sanum Patel)

Theoretically, there is evidence that suggests the possibility of gravity not being a fundamental force. One key flaw in the theory of gravity is that it’s missing a subatomic particle. Though theorists have hypothesized the existence of the graviton, there is no evidence actually suggesting its presence in the universe. If it is true that gravitons exist, their force within the atom would be so negligible that it would not cause a visible impact. Theorists have explained this to give an explanation for why the graviton has not been discovered, and why it is near impossible to detect the graviton. One reason why theorists could be false is the fact that gravity is able to affect photons. Photons are thought to be the mass-less particles that are the harbingers of the electromagnetic force. Even if these photons had mass, gravity should not be strong enough to cause an attractive force between these particles. A flow of photons, or light, should not observe any gravitational force, due to its high speed and low mass. However, gravity is still observed within light. This would provide evidence suggesting that gravitons exist, and that they also play a significant role within the atom. However, scientists already know this is to be false. While gravitons may exist, it is obvious that they do not play a significant role within the atom. If they were to do so, they must be much larger and much more massive than photons. If they were like this, gravitons would have likely already been observed. If gravitons are as small, and mass-less as theorists hypothesize, they should not be able to cause gravity within light. Therefore, another force must be at work. We propose that the force of attraction between light particles is actually caused by the electromagnetic force itself. As light is spontaneously created by vibrating electrical charge, some of these instantaneous charges attract one another. Though light itself does not have charge, an extremely miniscule part of it is created due to vibrations of electrical charge every instant. Nearby light beams will therefore both have spontaneous, short-lived charges that will both attract and repel nearby light beams. This causes light to curve through space rather than traveling in one straight line.

Another piece of theoretical evidence is the possibility of dark energy. Since 1998, astronomers have used the concept of dark energy to explain the expansion of the universe. While it is true that the universe is expanding, this does not provide evidence that the force of dark energy exists. Though dark energy is said to have the exact opposite ability of gravity, it is improbable that either gravity or dark energy are forces. If the force known as dark energy exists, it should thrive in areas of very low mass. In addition, this force would have to account for nearly 70% of the universe for this to be true. An alternative explanation of dark energy can be explained jointly with the explanation of gravity. Our hypothesis is that as objects are moving through the dimension of time, slow-massive objects slow down fast-light objects to their own speed through slight electromagnetic interactions. This explanation could also be used to explain the expansion of the universe. In the vast emptiness of space, there are few particles, and the empty regions can best be described as a vacuum. The few particles that exist are lightweight, and therefore travel very quickly through space and time. Since surrounding particles are about the same mass, travel at about the same speed, and are far apart, there are not many electromagnetic interactions between these particles. In more massive objects, however, there are many slight positive and slight negative charges due to the constant movement of electrons at a particular instant. Since each of these charges attract every opposite charge in the universe, and repel every similar charge in the universe, these slight electromagnetic forces between two objects would generally result in the path of the less-massive object to be altered. However, since these electromagnetic forces between light particles in the vast emptiness of space are insignificant, these particles are able to travel quickly through time. As a result, particles in space move very quickly through time in comparison to massive objects within space. This would thereby cause the expansion of the universe as time goes on, and would also allow for gravity to occur in areas of high-mass. Therefore, if weak electromagnetic forces were actually responsible for the effect known as gravity, both gravity and dark energy could co-exist, and dark energy would not account for 68 percent of the universe. Since the electromagnetic force has a universal radius, it is possible that slight charges brought on by the quick movement of electrons could cause gravity in a macroscopic scale. Two interactions would be at work: the attractions of positive and negative charges, and the repulsions of similar charges. A balance between both forces would result in an object orbiting around a more massive object. This could explain why a satellite, such as the Moon, orbits far enough away from the Earth so that it collision is improbable, and close enough that Earth's gravitational force would keep the Moon in orbit. However, if the kinetic energy of an object were substantially higher than that of Earth's, the repulsive forces of the electromagnetic force would be overpowered and a collision would occur. This may explain why asteroids collide easily with more massive objects. Due to the large kinetic energy difference between asteroids and planets, it is highly probable that repulsive forces will be overpowered, and a collision will occur. However, with larger objects, such as the Moon, the kinetic energy is closer to that of Earth's and there is far more available mass. More mass means that slight positive and slight negative charges are more probable, thereby increasing the power of the attractive and repulsive forces. Eventually, these two forces are so strong that an object's position remains relatively constant, and collision becomes improbable, causing lighter objects to orbit around more massive ones.

Furthermore, the supernova of very massive stars could provide evidence for our hypothesis. Some stars release a burst of energy, a gamma-ray burst, upon supernova. Though several hypotheses have been constructed to explain why a gamma ray burst may result from a supernova, no concrete theory has been made. We propose that as a star stops using nuclear fusion for a source of energy, attractive forces between atoms becomes significant. Due to their very close proximity to one another, and relative abundance, slight positive and negative charges between these atoms cause an attraction. Similar to London dispersion forces, the repulsive forces exerted by similar charges would be negligible due to the distance between similar charges being greater than the distance between opposite charges. These interactions result in atoms clumping together, resulting in the vibration of their electrical charges into high-energy beam of lights. Leftover nuclear energy within the star transforms light into its greatest-energy wave, the gamma wave. During supernova, a large quantity of gamma rays are emitted, resulting in the phenomena known as a gamma ray burst. Our last piece of theoretical evidence involves the Plank scale. The Plank scale takes into account the weakness of gravity in comparison to the three fundamental forces. For this reason, the Plank scale is designed at certain conditions such that gravity is no longer negligible. Therefore, at this very small distance, the subatomic particles that give rise to gravity should be significant. Though the Plank scale was designed such that each of the “four” fundamental forces would be significant at the conditions described by the scale, gravity has not been observed. Theorists have explained that though gravity may exert a significant force on this scale, its affect is difficult to measure. Though theorists may be correct, their idea is most likely flawed. Once a black hole is formed, it is thought to take on an area in space-time, within the Plank scale. Black holes take in energy on the basis of entropy. Since the entropy of the universe is always increasing, black holes must favor disorder in some way or form, as the formation of black holes occurs naturally within the universe. If the black hole is within the Plank scale, gravity should play an equally important role in the unification of the four forces. However, by unifying the four forces into a single force, order results. Since black holes favor disorder, not order, the unification of the four forces into a single force would not be favored. Due to the universe’s tendency towards disorder, the unification of the four forces would not be favored, even at the Plank scale. It is rather more probable that the force known as gravity is brought on by the electromagnetic force, due to the high concentration of mass and charge in a black hole.

From an **analytical** standpoint, there was ways in which gravity has been to proven to not be one of the fundamental forces of the universe. Many that have doubts that gravity is a fundamental force turn to the explanation that gravity is instead, an emergent force, or more accurately, an entropic force, a statistical force that results from a system's tendency to increase its own entropy rather than relying on the more common notion that gravity is a result of microscopic forces. An example of this new concept in the real world would be if someone threw a ball into the air. This ball would follow the path of a parabolic trajectory. Convention states that the ball would follow a determined path that is dictated by either Newton's law of gravity or Einstein's general relativity. But this entropic theory states that the ball can follow any trajectory, picking one out at random, but if one were to calculate all the possibilities the ball could take, one would find that the overwhelming majority of the choices the ball could take happen to match up, or is very similar to the "gravitational" parabolic trajectory, and can therefore be also thought of as entropic driven. This theory began around the 1970s along with the study of black hole thermodynamics. Along with scientific conjectures and experimentations, the developments in string theory have given indications in this direction as well. In 1997 Juan Maldacena proposed something called the AdS/CFT correspondence, a duality between a gauge theory (gauge meaning that it is comprised of a system that's number of parameters may vary independently) that is defined on a four dimensional boundary (a boundary with three space dimensions and one time dimension), and a five dimensional area (which is comprised of four space dimensions and one time dimension), it was a connection between a dimension of string in which gravity exists, and a dimension in quantum field theory in which gravity does not. This correspondence as stated before, leads to a duality between theories that contain gravity and those that do not. This therefore provides evidence for the fact that gravity can emerge from a microscopic description that does not know about its existence, which can therefore prove that gravity “emerges” from a source and is not a fundamental force.

In 2009, a man named Eric Verlinde performed an experiment that proves that gravity relies on entropic forces. The premise of the experiment is that since gravity does not exist at a microscopic level and only appears when you put things from the microscopic scale together and shows that gravity is explained as an entropic force that is caused by a change in the amount of information associated with the positions of bodies of matter. In this experiment, Verlinde makes the extensive use of the holographic principle for the foundation of his premise, the holographic principle being of quantum gravity and string theories that states that the description of space can be thought of as encoded on a boundary to a region. Verlinde works with an experiment that has the assumption that the person has a holographic screen, one that shows all the information inside of it as encoded bits on its surface and asks (in his experiment) how the encoded bits with energy or matter that is being held just outside of it. Verlinde plans to prove this by showing how Newton derived his universal gravitational equations. He starts with the difference in entropy between a mass “M” and a spherical holographic screen with entropy “S”. The information that is on the holographic screen would describe the emergent space inside of the spherical screen, which would be shown as equivalent to the mass “M” at the sphere’s center. The attractive force between the two, which most people would commonly call gravity, would be interpreted as Verlinde describes it, an entropic force due to the difference in informational densities between the two regions. Verlinde goes even further by attempting to re-derive Newton’s second law. He does this by showing that acceleration is related to an entropy gradient and states that inertia is a consequence of the fact that a particle at rest will stay in rest because there are no entropy gradients. By showing this it allows Verlinde to identify Newton's potential, the negative of the entropy gradient, which is the acceleration a particle feels that keeps track of entropy depletion per bit. What more, the entropic potential is shown to follow the Poisson equation which is basically a description of the distribution of matter about a system. Verlinde then concludes that, if the informational density and temperature on a holographic screen are chosen correctly, then the laws of will not follow this theory, thus showing that gravity is an emergent force, and not a fundamental one.

Another experiment is being done by physicist Joel Fajans on the topic of antimatter. Antimatter is material that is composed of antiparticles, particles that have the same mass as a regular particle but has the opposite charge and spin. The basis of the experiment is set on the question, and that is, if the atoms that make up ordinary matter falls downwards due to gravity, would atoms that make up antimatter fall similarly? There has already been some observational evidence that shows that anti-matter (produced by positron decay) does not actually observe gravity similarly to matter. If this is true, it would show a major flaw in the theory that gravity is a fundamental force of the universe, because if it cannot affect all objects in a constant fashion, it cannot be considered a fundamental force. Our hypothesis may explain why anti-matter does not observe gravity in the same fashion as normal matter. If weak electromagnetic attractions and repulsions caused gravity, anti-matter would observe gravity differently since anti-matter is of opposite charges Fajans teams up with the CERNS's international ALPHA experiment group to prove this. They attempt to prove this theory by creating anti-hydrogen atoms by uniting single antiprotons with single positrons, and holding them together in a strong magnetic trap. And when the magnet is turned off, the anti-atoms will collide with the atoms and annihilate them, pinpointing where they are. And knowing the precise location and velocity when the magnet is turned off, the only thing they have to measure is the time it takes for it to fall to the wall of the apparatus. The ALPHA's apparatus's magnetic field does not turn off instantly, and while it is turning off, collisions occur over the wall that depends on the anti-atom's energy. In addition, particles that hit the wall later have a lower amount of energy, showing that gravity's influence is more apparent on them. Only twenty three out of four-hundred and thirty four that escaped the magnetic field had been turned off. Though the signs are still vague, this is a step towards showing that antimatter has a different reaction to gravity than matter, proving that gravity is not a fundamental force. Through the tests of time gravity has carried on being a part of the fundamental forces family (if at best, being the black sheep), but as time continues to pass a new light is shown on this "force."

Conclusion (500 words- Alex Hwang and Matthew Hoang)

This paper shows through observational, theoretical, and analytical evidence that gravity is not a force. It provides a unique way to view the concept of gravity and to explain its effects in our dimension, and other dimensions. It may serve as a basis for further development of the explanation of gravity. As is commonly known, not all hypotheses are correct, and people may choose to verify and debate over which ideas should be more accurate in describing the universe. By providing a new, creative, and unique view on the existence of gravity, new ideas and hypotheses can be developed while old existing theories can be modified. New experiments can be carried out, building off of each other's success and failures. This paper encourages the growth of developing a comprehensive understanding of gravity. This paper drives readers to critically analyze the laws of physics and their applications to gravity. New theories and hypotheses can be developed to better describe phenomena such as black holes, gravitational waves, dark energy, entropy, antimatter, and the characteristics of what we observe as gravity. The theories of general relativity and quantum mechanics, the two great pillars of physics, do not completely agree on concepts such as gravity and also fail to completely describe things such as antimatter and dark energy. Perhaps that since dark energy is thought to be driven by the statistical presence of subatomic particles in the vacuum of space, gravity and dark energy is merely two sides to the same coin. Like other fundamental forces, it may be that gravity is the attraction to a certain mechanism, and that dark energy is the repulsion attributed to the same mechanism. One drives the creation of meaning to the universe, while the other contributes to the expansion of the breadth of the universe. From the entropic theories to the studies of string and antimatter, scientists are peeling back the curtains to show the mechanisms that power this unusual force. And maybe even one day, scientists may be able to unite all the fundamental force into a universal theory not by incorporating gravity, but by excluding it altogether.

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