# Time-Universe Relationship

Yash Keyur Thaker, Manas Manoj Wagh

**Abstract-** As we know from the theory of relativity by Albert Einstein, time depends on one's frame of reference and how time's a major force leading the material world and the cosmos. Time shows its influence on all the matter in the universe as said by the theory of relativity. A low gravitational field, time will move faster in comparison to an object in a high gravitational field where time will move slower. The paper explains that how time holds the universe and the working of space-time continuum and how time influences different objects in the cosmos.

**Index Terms**: Space-time continuum, gravity, energy, matter, entropy, universe, relativity

## 1. Introduction

Due to this relativity, we need to synchronize our clocks in order for the time to match. Time plays an important role in our daily lives as well as international affairs. In this scenario it is at utmost necessity that we understand time's influence.

If one was to completely forget about time, that is losing the understanding of any kind of temporal quantities. Like days hours seconds etc. Then it is obvious that the ability to function is hampered and that psychologically it is built in human instincts to always consider time, that is, time has an indirect effect on psychological state of a human.

Speaking about physical state, Theory of Relativity explains well how matter has an impact on spacetime and vice versa. It seems we have a relation, yet an undefined one. Time has always been undefined. We haven't found a compelling definition for time, and that helps into increasing the ambiguity of this topic. Yet according to thermodynamics, there seems to be a connection between entropy and time.

A lateral forward flow of time ensures an ever increase in entropy, according to the current laws of physics. If it was for entropy to reduce, that would mean the flow of time inversing and hence breaking

spacetime continuum. But if there was no work at all in this universe, the increase in entropy will stagnate hence stagnating the flow of time. Therefore, we can derive time by

its relation with entropy and thus matter. After all this universe is a machine with various components working in sync.

2.1 The cosmos holds one of the most beautiful objects which are deeply bonded with time and gravity. All the matter in this universe has deep relations with time and gravity time and gravity are one of the most important factors which lead the universe. Blackholes, wormholes etc. are all affected by the time gravity phenomena.

2.2 Time and gravity have a well-established relation by theory of relativity we know the matter has the ability to bend space-time and the bending of spacetime is also a phenomenon of gravity thus time and gravity are proportional to each other. As we know that the space time is curved and it can be warped by time, energy and gravity so therefore all these factors have their effects on the matter present around the universe.

2.3 So, what if there is infinite gravity? A blackhole is an example. Because of so much amount of gravity the space time continuum will break entirely at the center of a black hole which will slowdown time so much that will stop entirely.

2.4 So, what about a time tunnel? The wormholes are Einstein's predictions of theory of relativity. The worm-holes are created due to large amount of concentrated matter supported by influence of gravity there is a large amount of energy in a certain manner which will bend spacetime to create a tunnel around. The Cosmos will never stop until this phenomenon is alive

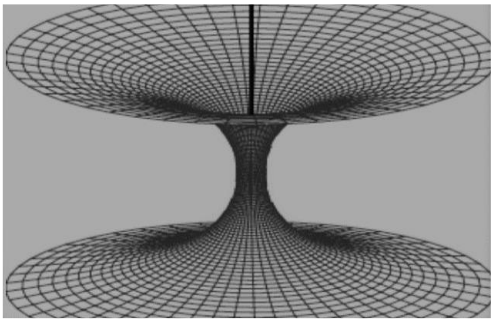


**Figure: 3.2**

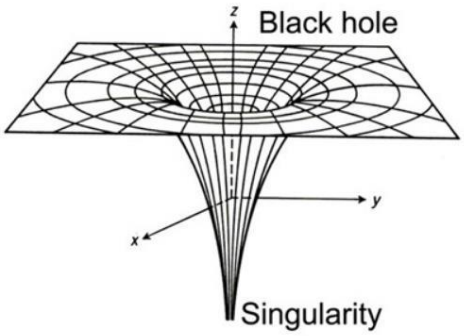
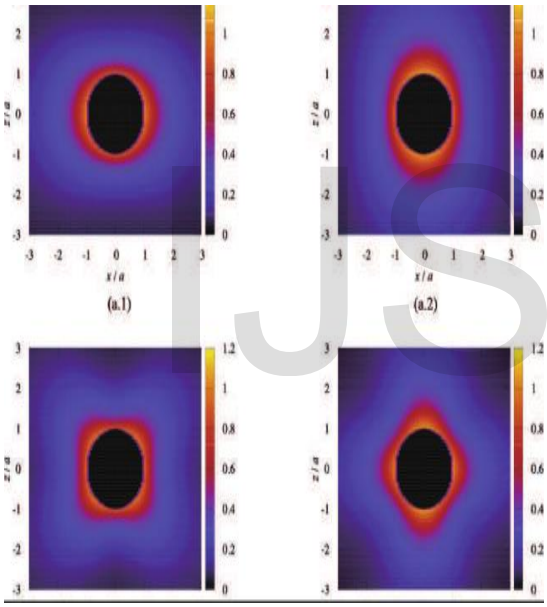
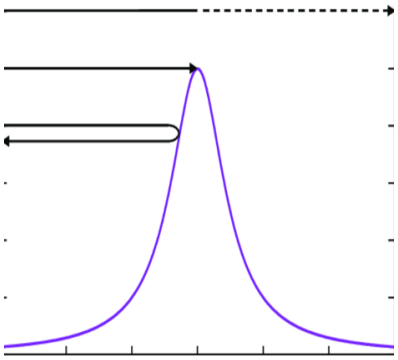



**Figure: 3.3**



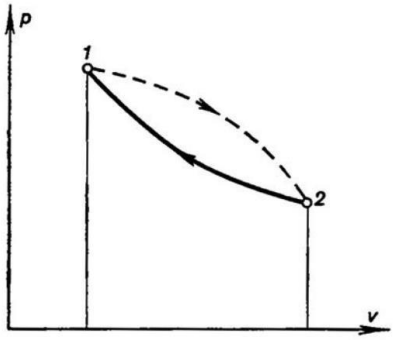

Contour map of the dust density n(r, θ)/na. The rectangle coordinates (x, z) are defined as (4.30) and hence the wormhole throat corresponds to the circle x 2 + z 2 = a 2. No real spacetime exists in the black region of x 2 + z 2 < a 2. We set u r 0 = −0.1 and C(θ) = 0, and illustrate four cases, (f θ 0 , k) = (−0.02, 2), (0.02, 2), (−0.02, 4) and (0.02, 4), in (a.1), (a.2), (b.1), and (b2), respectively.



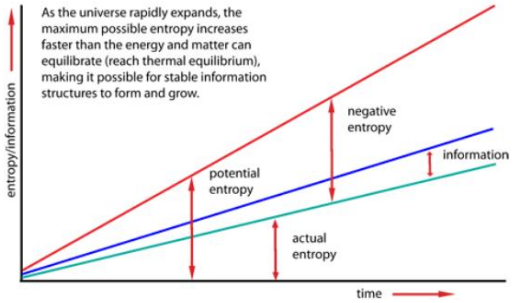
Effective potential of photons in the Ellis wormhole spacetime. The maximum point at r = 0, which indicates the throat of the wormhole, corresponds to the unstable circular orbits. The region for by r < 0 is the other side of the spacetime and we use a dashed line for the trajectory in this region.

## 3. TIME AND THERMODYNAMICS

3.1 According to the Laws of Thermodynamics, an ever increase in entropy would ensure a lateral forward flow of time. A decrease in entropy will lead to the inversing of the flow of time, and hence breakage in the spacetime continuum. Though decrease in entropy could be one method to travel to the past, yet not a possible one. But if there would be no mechanical work, the increase in entropy will become stagnate hence stagnating the flow of time.




Entropy changes are estimated through this for finite variant at constant T. ΔG=ΔH−TΔ




## 4. Time's influence on objects in motion

4.1 The spacetime fabric is curved due to the presence of massive objects and energy exerted by them on the fabric. The more the fabric is curved the more time moves slower as momentum bends the spacetime.

4.2 According to special relativity the faster an object moves the slower that first object experiences time. Consider two frames of reference. If they move together, there is no measured time dilation between them - they each experience time the same. In fact, they are in the same frame of reference. If they move at different speeds, then there is a measured time dilation between them - the one moving faster experience time slower. In this case, they are in different frames of reference.

4.3 Motion requires a certain amount of energy so this energy is equivalent to the work done by that object the more work done by an object is equal to more energy used by that object.



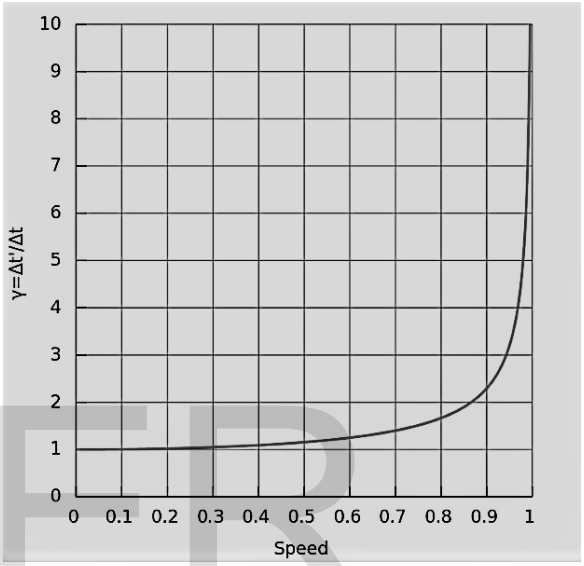
## 5. A Complete relationship

5.1 Since time and motion are related to each other then it must be that the work done and time are inversely proportional, that means more work done by an object is equal to the time passing slower for that object.

5.2 Now work and energy are equivalent and time and work are inversely proportional, so it must be that energy used and time are also inversely proportional using of energy also means transfer of energy and transfer of energy is directly proportional to entropy.

5.3 Motion means change in position over change in time so that means motion and space are related. Hence energy and space are related so if there is a larger concentration of energy in a single point of space then space time fabric will bend hence momentum bends space-time fabric.

5.4 Force is a required amount to do work and hence work and energy are proportional. There should also be a well-established relationship of force and time. As stated by the $F = ma$




5.6 Mass is equivalent to energy because of

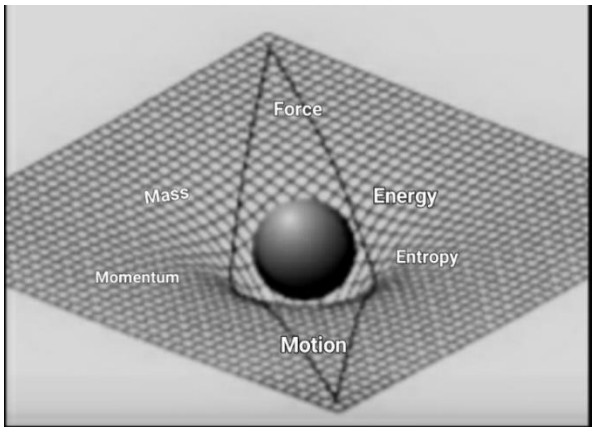
$E = mc^2$ so, since large concentration of energy bends spacetime mass should also bend spacetime

So, this bending of spacetime by mass is called gravity.

5.7 Light has also a well-established relation with time as energy and light are directly proportional (As stated by the $e = mc^2$)
We know the photons which are the particles of light travel at the speed of light which is C. They do so because their mass is equal to zero. So, an object with mass more than zero will not be able to faster than or equal to the speed of light.

The more the mass of an object is, the slower it will move as compared to object with a lesser mass provided that equal amount of energy is supplied to

that object. Thus, $m \propto \frac{1}{v^2}$, that is, mass is inversely proportional to velocity.




## CONCLUSION

Time is a undefined force of the nature which influences all the matter in the universe time's origins are said to have of the big bang yet not proved time is also the most important factor which leads the material world as well as the Space-time. Yet both are different concepts.



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