Evidence for Cross-Dimensional Time Travel

A Temporal Mechanics Approach

This paper investigates temporal mechanics, three-dimensional time, Tired Light Theory, Gravitational Lensing, Superfluidity, Wormholes, and Time Travel

Reagan Turedi

Michigan State University

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Background

Our understanding of time has stood still since the era of Einstein and Schrödinger. These two individuals established the groundwork for much of what will be discussed in this paper. Einstein showed that time was relative to the observer, while Schrödinger showed that reality was relative to the observed. Here, we will introduce a third perspective.

Format of the Paper

To help the reader better understand the point, and purpose of the following research, it is necessary to explain the framework of the paper at the beginning. This is to avoid unnecessary confusion.

This paper is separated by four main sections.

The first section will detail the fundamentals of the topic. We will uncover what a temporally oriented universe means, mathematically, along with the relevant definitions and explanations of the topic.

The second section will provide an application of the idea to modern physics. The first application in this section will be related to Kepler's Second Law. Kepler's Second Law is an unchangeable, observable physical phenomenon which remains completely unaffected by the observer. The mechanics behind the law cannot change due to modifications by the observer. The second application is a revisitation of an older, "debunked" theory that serves to prove that most of modern physics may need to change in order to accommodate this research. The main purpose of the second section is to show that it is applicable to current, and former physics.

The third section will provide an insight into current (self) research that heavily suggests the reality of temporal orientation. The results of this experiment directly refute the possibility of spatial orientation by current mathematical methods.

The fourth section will highlight future applications, and areas of interest (or suspicion). This section will serve to show that some of the biggest unanswered questions in physics may be unanswerable with current methods. However, a temporal orientation may provide an answer. This section will also reveal a terrifying physical possibility.

Fallacies and Mathematical Errors

For this argument to work, we must steer clear of any logical fallacies or mathematical errors. We must not disregard our physical experience of three-dimensional space to accommodate this new idea, rather this new idea should accommodate our pre-existing knowledge, and directly fit into modern physical equations, or supplement them.

We must not conclude any of the following:

Simply because there is no current reasonable scientific explanation of a phenomenon, does not mean that a radical idea, such as this, is the correct answer.

Simply because the idea works, it does not conclude that the idea is a reality, or the best possible explanation.

For this idea to be concrete, it must follow one simple rule:

The idea is void of any fallacies and mathematical errors, and justifies multiple physical phenomenon with clear certainty. Furthermore, the idea solidifies present day understanding, and does not alter known realities.

To provide an example, we know that after dropping a bowling ball and a door key off of a tall building, they will fall at the same speed. This idea cannot alter that reality, or similar realities.

In regards to the mathematical errors, we must adhere to the following:

Current mathematical models are well-established. This idea cannot alter current mathematical models, rather the idea must fit into them. We must not contradict known mathematical realities.

Introduction [1]

Before we dive into the mathematics, we must first initialize a frame of reference, and a set of conditions that are unchangeable. These will be the foundation of the argument. Time is three-dimensional, with each of the three axes representing the **period** (T_1), the **present** (T_2), and the negative **passage** (T_3) of time. The extension of a triangular plane from the origin will be defined as **linear time**. **Mass** will be defined as a transition down, shifting from a faster passage of time, to a slower passage of time (or vice versa) while uniformly moving forward in linear time, in a direction towards where the displacement in relative passage of time can converge to zero. In simpler terms, mass is the negative volume of time. For a period, present, and passage each with quantity t, **mass** will be t^3.

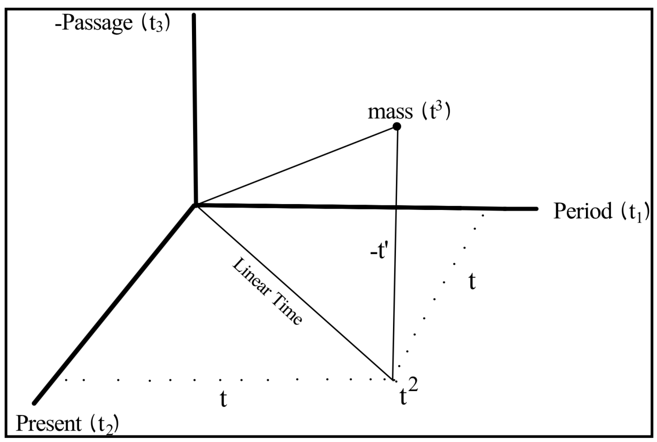

Figure 1

Furthermore, from temporal mechanics, we will also define the following:[2]

$$|-t'| \propto 1/s$$

$$|S| \propto^* t^2,\ \propto^* = \text{Lorentz Invariant}$$

$$-t'' \propto 1/s : \text{Reference frame of object falling toward massive body}$$

$$t'' \propto 1/s : \text{Reference frame of massive body with object falling towards it}$$

$$-t' \propto 1/t^2 : \text{Reference frame of massive body with object falling towards it}$$

$$t' \propto 1/t^2 : \text{Reference frame of object falling toward massive body}$$

$$\mathbf{N} = \text{Volume interactions relative to linear time}$$

$$\mathbf{n} = \text{Interactions relative to linear time}$$

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[1] gavinwince. “The Dark Side of Time.” *YouTube*, YouTube, 10 July 2013, https://www.youtube.com/watch?v=oy47OQxUBvw&feature=emb_imp_woyt.

[2] Jarvis, Stephen (1995-2021). Temporal Mechanics ISBN: 978-0-6488302-9-0.

And the foundation equations for mass:

$$-nt' \times t^2 = m$$
$$-nt' = m/t^2$$

The purpose of **n** being in the equation is similar to the purpose of density being in the equation of $m = dv$. Mass of an object in 3-D space is the volume of the object, multiplied by the amount of interactions between the particles that occupy that object (density). If an object is very dense, more of those particles are interacting, they are closer together. If an object is less dense, then the particles interact less. Since **n** is the amount of interactions relative to linear time, $m = nv$, and $v = t' \times t^2$.

In a temporally oriented universe, space also exists. Therefore, we must define space in terms of some kinematic equation of motion, since motion is in the context of three-dimensions in a spatially oriented universe.

We will use

$$a = \frac{\Delta v}{\Delta t} = \frac{d^2x}{dt^2} = \frac{\text{change in space}}{\text{change in time}} = \frac{\text{spatial units}}{\text{temporal units}^2} = \frac{S}{t^2}$$

From the previous definitions,

$$a = \frac{S}{t^2} = \frac{t''}{t'}$$

And thus,

$$S = \frac{t''}{t'}t^2$$

To be clear, the previous derivation and the previous definitions are simply setting up the framework of a temporally oriented universe. Their purpose is similar to the purpose of the x-y-z plane. On a standard x-y-z plane, mass would have been $x \times y \times z$, but mass in terms of **Figure 1** is $t_1 \times t_2 \times t_3$. Since passage is a negative value, this is why we claim that mass is the negative volume of time. [3]

To further simplify this, we will use the following metric as the definition of 3-D space

$$[t, -x, -y, -z]$$

And this as the metric of 3-D time

$$[-S, t_1, -t_2, -t_3]$$

In the absolute purest form, we are changing "space-time" to "time-space".

[3] Jarvis, Stephen (1995-2021). Temporal Mechanics ISBN: 978-0-6488302-9-0.

Applications to Modern Physical Equations [4]

We will begin by deriving Kepler's Law in terms of the standard force equation.

$$F = ma = \frac{GMm}{r^2}$$

$$a = \frac{v^2}{r} \qquad \text{consequently} \qquad m\frac{v^2}{r} = \frac{GMm}{r^2}$$

$$v^2 = \frac{GM}{r}$$

$$v = \frac{2\pi r}{T} \text{ (linear velocity of a body undergoing circular motion)}$$

$$\frac{GM}{r} = \frac{4\pi 2r^2}{T^2}$$

$$\frac{GM}{4\pi 2} = \frac{r^3}{T^2} \ \ldots \text{ and thus } r^3 \propto T^2 \text{ (Kepler's 3rd Law)}$$

We can then relate (by means of logic, or a Lorentz Transformation):

$$r^3 \rightarrow t^3 \text{(spatial radius substituted by temporal radius)}$$

$$t^3 \propto T^3 \rightarrow t^3 = m$$

$$m \propto T^2, \sqrt{m} \propto T$$

What we find here is that the square of the period, **T**, is proportional to the square of the mass energy. For a system exhibiting simple harmonic motion, we know that $T = 2\pi\sqrt{\frac{m}{k}}$, or in simpler terms, $T \propto \sqrt{m}$. We have concluded a similar physical expression by switching from a spatially oriented universe to a temporally oriented one. From what may appear to be a single mathematical proof, this derivation and transformation of Kepler's Second Law into the frame of a temporal orientation is intrinsically powerful. This shows that for a mechanic with no influence from the

[4] gavinwince. "The Dark Side of Time." *YouTube*, YouTube, 10 July 2013, https://www.youtube.com/watch?v=oy47OQxUBvw&feature=emb_imp_woyt.

observer (a planet revolving around its star), the laws of a temporally oriented universe fits perfectly.

Reviving an Old Idea: Tired Light Theory

In the 1900s, during the greatest period of growth in the field of physics, among the likes of Albert Einstein , Feynman, and Fermi was a lesser known, and widely hated scientist by the name of Fritz Zwicky. Originally Bulgarian, Zwicky spent most of his career studying astronomy as a Swiss citizen.While examining the Coma galaxy cluster in 1933, Zwicky was the first to coin the term “dark matter”. This idea became a reality. In 1935, Zwicky became one of the first to identify neutron stars, initialized from the hypothesis that supernova was somehow the transition from a typical star into a neutron star. This idea became a reality, backed by his observations. In 1937, Zwicky proposed the idea that galaxies could act as gravitational lenses. This idea became a reality. While most of Zwicky’s ideas started off as pure hypotheses, and through careful observations a known reality, one of his hypotheses never held ground in the realm of modern physics. His *Tired Light Theory* essentially states that the redshift that occurs when astronomers observe distant supernova is not a functionality of the supernova moving away at some velocity (defining the terms necessary for a Hubble Constant), rather he believed that there was somehow a gradual energy loss by the photons as they make their way to the observer. In better terms, “The tired light hypothesis claims that while the light propagates, it must be affected by all matters of the Cosmos.”[5] The main problem of this theory comes stems from the Law of the Conservation of Energy. In simple terms, this states that energy cannot be created or destroyed. The total change in energy of a system can change, but the energy of the universe cannot. Analyzing this mathematically, we see:

$$E^2=p^2c^2+m^2c^4$$

$$E=(p^2c^2+m^2c^4)^{1/2}$$

$$E=pc, \text{ where } m=0 \text{ and } p=\text{momentum}$$

Thus, the momentum of the photon cannot change without violating the Law of the Conservation of Energy. This three-line proof had been consistently used to show that the Tired Light Theory could not be correct, since there was no alternative explanation

[5] Ming-Hui Shao, Na Wang and Zhi-Fu Gao (December 7th 2018). Tired Light Denies the Big Bang, Redefining Standard Model Cosmology, Brian Albert Robson, IntechOpen, DOI: 10.5772/intechopen.81233. Available from: https://www.intechopen.com/chapters/64538

as to how the momentum of the photon would change without changing the energy. The idea is that there is not a single known interaction or event that changes the energy of the photon independent of a change in momentum.

There is well-established proof beyond this violation of the Conservation of Energy that also rules out the Tired Light Theory. These proofs however are naive to the possibility of a temporally oriented universe. We will now use the temporal model to show that gradual energy loss of a photon is possible, without violating any laws of physics.

Using the observation of redshift:

$$1 + z = \frac{\lambda_{obs}}{\lambda_{emit}} \text{ (in terms of wavelength)}$$

$$1 + z = \frac{f_{obs}}{f_{emit}} \text{ (in terms of frequency)}$$

Equivalence principle between linear time and relativistic time, which comes from the 3D time model and continuous fractions relating infinite series of non-inertial frames shows:

$$\frac{\lambda_{obs}}{\lambda_{emit}} = \frac{a}{b} = (N* - I)/(I - U*)$$

$$\frac{f_{obs}}{f_{emit}} = \frac{a}{b} = (N* - I)/(I - U*)$$

N* and **U*** are representative of an infinite series of continuous fractions. With respect to temporal mechanics, this represents the infinite travel of a photon, losing energy as a continuous fractionation. **I** is representative of the identity, which will in our case be a value of 1. The purpose of this previous exercise was to show that redshift can occur in a temporal model. Now that the redshift has been shown to occur temporally, we can apply transition the equations of energy from space-time to time-space:

$$\Delta E = \Delta m c^2$$

$$\Delta E = (m_f - m_i)c^2 = 0$$

$$m_f = m_i, m_f - m_i = 0, m_f/m_i = 1$$

$$\Delta E = [\ (\text{-nt't}^2)_f - (\text{-nt't}^2)\ ]\text{c}^2 = 0$$

$$\Delta E = [[\text{-n}_f \text{ t' t}_f^2 + \text{n}_i \text{t}_i\text{'t}_i^2] = 0$$

Since t' $\propto$ 1/t^2

$$\Delta E = [\text{-t''t}_f^2 + \text{t't}_i^2]\text{c} = 0 \qquad (\text{-n}_f = 1,\ \text{n}_i = 1\ ,\ \text{t'}_f = \text{t''},\ \text{t}_i\text{'} = \text{t'}\ ,\ \text{t''} < \text{t'})$$ [6]

[6] gavinwince. "The Dark Side of Time." *YouTube*, YouTube, 10 July 2013, https://www.youtube.com/watch?v=oy47OQxUBvw&feature=emb_imp_woyt.

The previous derivation shows that the period of time for a traveling photon increases proportionally with distance. This is shown since there is a change in the period of time for a single photon. Since there is a change in time, the passage of time decreases relative to the observed frequency of the traveling photon, and the photon will have appeared to increase in wavelength. This is shown in the final line, where -t'' and t' must maintain a relationship relative to t_f and t_i. The final and initial times are a factor of the passage of time. ΔE=[**-t''**t_f^2+**t'**t_i^2]c = 0 (where -t'' is the passage, and t' is the period) So, the mass of the photon is not changing in order to maintain the conservation of energy; therefore, the passage of time must decrease proportional as the period of time increases. The period of time for a traveling photon increases with distance.

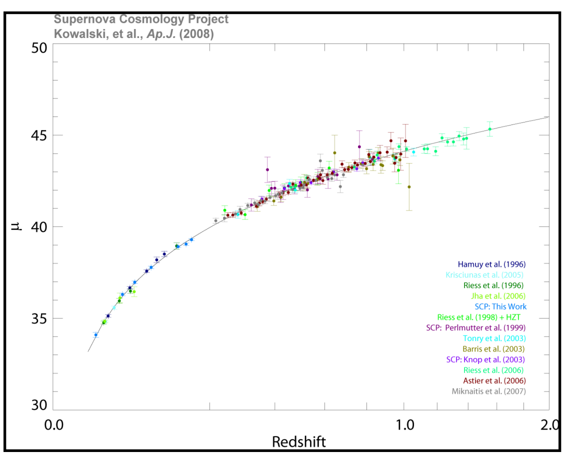
One of the fallbacks of this theory lies in the assumptions made while parameterizing the previous equations. The parameterization cannot be made without justifiably arguing that some constant is equal to some unchangeable value. The parameterization, boiled down to its essence, states that

$E_{photon} \propto e^{t'} = t^2$, where t' and t^2 are members of ΔE.

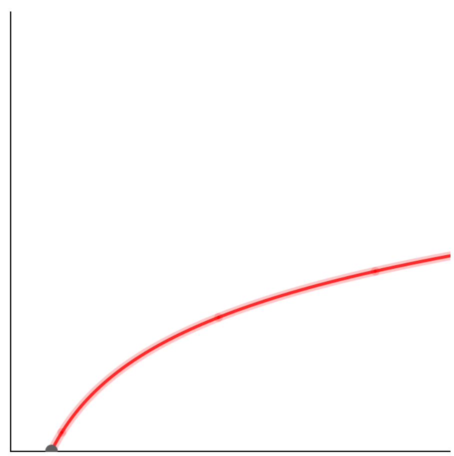
We derive the relationship:

$t' = ln(t^2)$

And thus, we assume there are no constants interfering with this simple parameterization. A plot of this will yield a shape similar to that seen in modern supernova data plots of the Distance Modulus vs. Redshift, and "temporal mechanists" will claim that this is reason enough to suggest that temporal mechanics accounts for the redshift seen in supernova data.



Distance Modulus vs Redshift
Credit: Supernova Cosmology Project

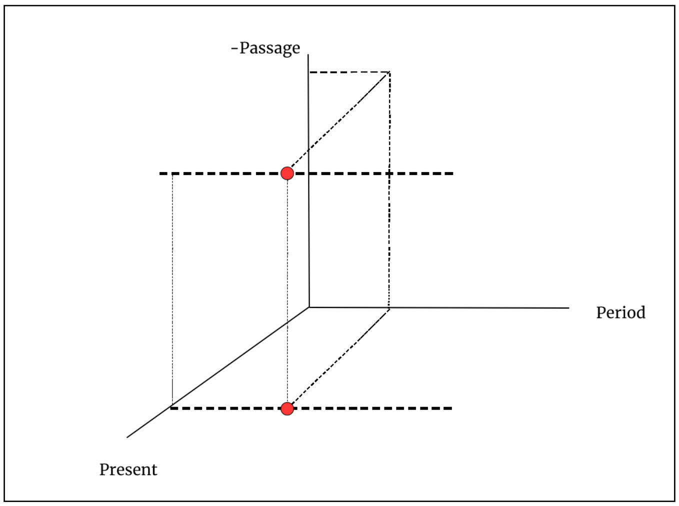


Graph of $t' = ln(t^2)$

Superfluids: Background

Interested in solving this problem, in 2019 I designed a series of experiments with the purpose of finding the constant of this parameterization, since this constant (much like cosmological constants) needs to be identified through observation rather than mathematical deduction.

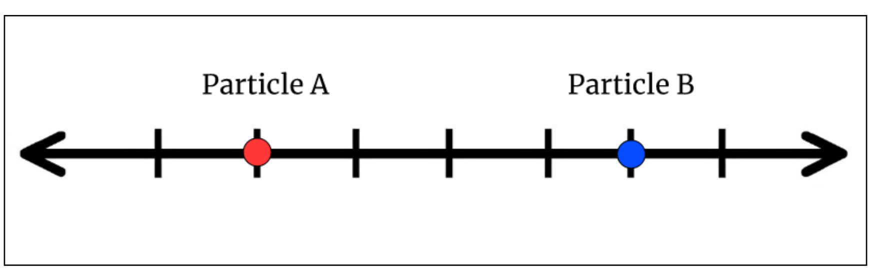
Before we delve into the specifics of the experiment, some information pertaining to quantum mechanics, and a revisitation of our 3-D time frame is needed.



By taking a look at the above graphic, we see that it is physically possible for an object in a temporally oriented universe to occupy the same position on the present axis. In essence, this means that an object can be at two separate locations, at the same time, but will experience some difference in either period, or passage.

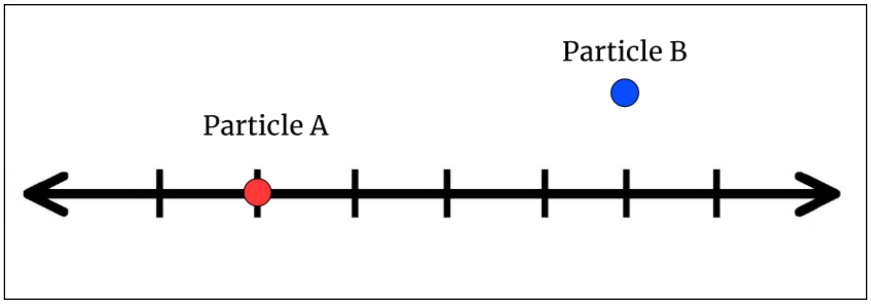
Superfluids: Logic

Allow us to assume a set of three particles (A,B,C). These particles follow these rules:
Particle A can only observe and exist in one dimension
Particle B can only observe and exist in two dimensions
Particles A and B can only observe particles in the frame of their dimension. Particle A, for example, is a one-dimensional particle.



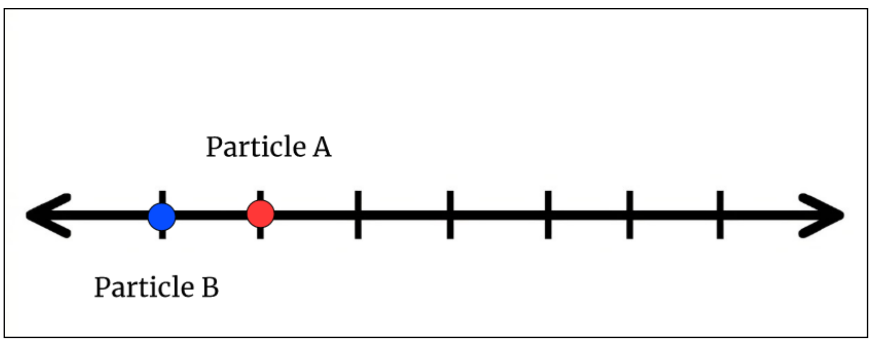
Both particle A and B can observe one another, as both can see one-dimensionally.

Let's modify this slightly:



In this image, particle A can not observe particle B, since its observation capacity ceases to exist in two-dimensions; however, particle B can clearly see particle A as it's observational capacity is still two-dimensional. Particle A would conclude that particle B has vanished.

Let's modify this once more:



Particle B then travelled perpendicular to the x-axis, behind Particle A, and moved down to the same position relative to the horizontal. Both Particle A, and Particle B can observe each other again. For Particle A, Particle B has reappeared out of thin air on the opposite side. Particle A would conclude that Particle B has teleported.

The purpose of this explanation is to lay the framework for the initial purpose of the experiment. In temporal mechanics, it is clearly possible for two particles to occupy the same location in present time, but in order to observe this phenomenon, the conditions of the particles matter. Particles, and atoms, on Earth have their own unique identity, bound by the temperature, pressure, and energy of their environment. In order to observe quantum phenomenon, the conditions surrounding the particle must not interfere with with particle.

In the quantum world, this is referred to a shared “quantum state”. This means that each particle of a system must occupy the same quantum state, and exhibit the same quantum wave function. In layman’s terms, this means that the particles must be indistinguishable from one another. Each particle must lose its identity. This is to provide no other possible explanation for the activity or behavior of these particles other than some undeniable phenomenon. This will make more sense as we continue.

Superfluids: The Experiment (Accidentally Proving Temporal Orientation)[7]
Important Tools Used:

Optical Cavity: A closed, resonating, system arranging mirrors in such a way that a standing wave is formed when measured. Fluctuations of this standing wave are detected per some calibration technique. The optical cavity of this experiment was calibrated to detect singular atoms with an error of ± 1,400 atoms /mL of helium gas

Cryocooler: A refrigeration unit designed to cool an object down to cryogenic temperatures.

Arduino: A physical programmable device used to accept an input signal, and deliver an output.

Temperature probes: Designed to measure the temperature of a system with extreme accuracy $\pm 0.001\ ^{o}$F

Superfluidity is a “state of matter” where liquid has zero viscosity, and its atoms lose individual identity. [8][9] The initial experiment consisted of using a cryocooler to cool down a known quantity of helium atoms (measured through an optical cavity), and once the helium atoms reached the critical temperature of 2.17K (the temperature needed for the helium to turn into a superfluid), the liquid was quickly passed back through the optical cavity and another measurement was made. Each measurement was made without making significant changes to the system, a robotic claw inside the machine was operated outside of the machine and was used to carefully extract the lid and pour the contents through the optical cavity through a narrow hole made at the top of the container. exist in more than one place, but at the same present moment. Superfluidity

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[7] Schmitt, A. (n.d.). *Introduction to superfluidity arxiv:1404.1284v2 [hep-ph] 31 ...* Retrieved December 16, 2021, from https://arxiv.org/pdf/1404.1284.pdf

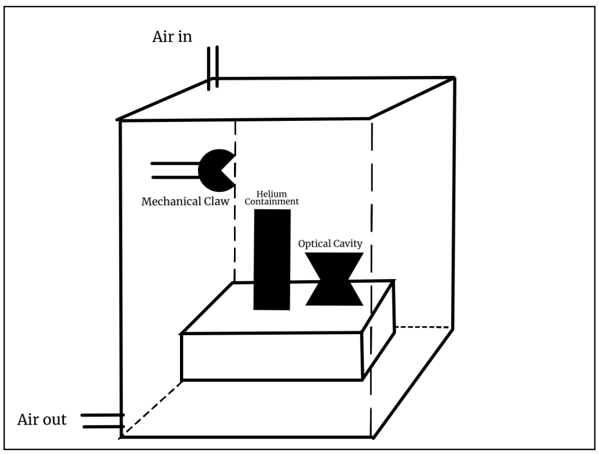
[8] Putterman, Seth J. "Superfluid hydrodynamics." *Amsterdam* 3 (1974).

[9] Vollhardt, Dieter, and Peter Wolfle. *The superfluid phases of helium 3.* Courier Corporation, 2013.

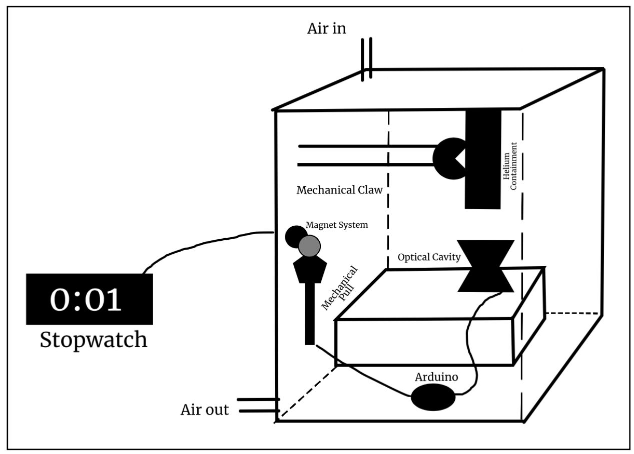
is a “state of matter” where liquid has zero viscosity, and its atoms lose individual identity. [10][11]

The purpose of the experiment was to see whether or not more atoms could be detected in our optical cavity than was previously inside of the container. If 500,000 atoms were placed into the container, but a post-superfluid reading measured 1,000,000, then we could reasonably assume that more atoms somehow existed in this container than we began with. This would justify the argument that a single atom would have to exist in more than one place, but at the same present moment.

Experiment One



Experiment Two



The first experiment proved uneventful, so a second design was enacted. The optical cavity was working as intended, as the expected number of atoms was accurately being measured, within the bounds of expected error. With the addition of an on/off switch I also connected an Arduino. This Arduino device kept a count of how many atoms passed through the optical cavity, and sent immediate feedback to the main circuit telling it to pull the mechanical pull when the count hit 5000, which stopped the stopwatch. So long as the rate at which the helium was passing through the optical cavity remained constant, this could serve to prove our point. If we see extreme time fluctuations between superfluid helium, and regular helium, then this means that more atoms were detected than were placed in.

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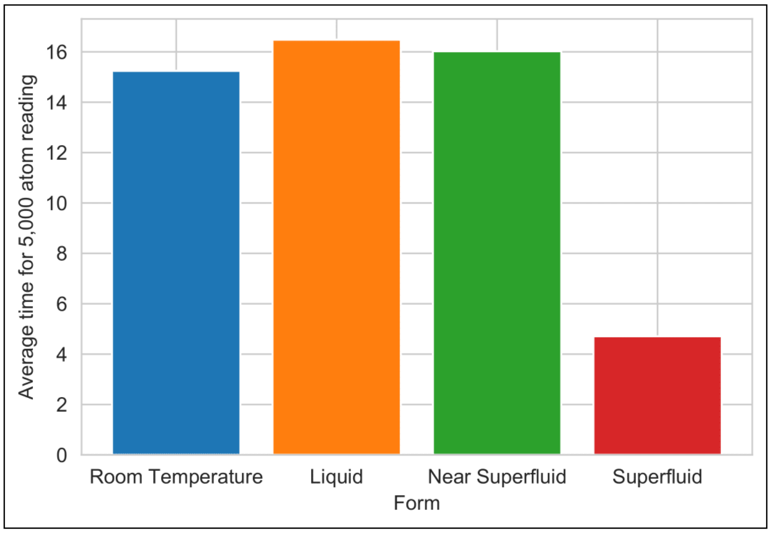
[10] Putterman, Seth J. "Superfluid hydrodynamics." *Amsterdam* 3 (1974).

[11] Vollhardt, Dieter, and Peter Wolfle. *The superfluid phases of helium 3.* Courier Corporation, 2013.

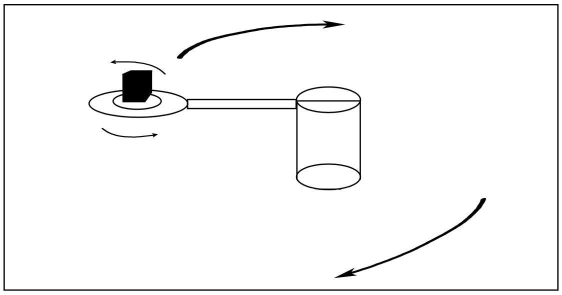
To enact a control, room temperature helium, liquid helium, and near-superfluid helium was also tested. This is a graphical representation of the data.



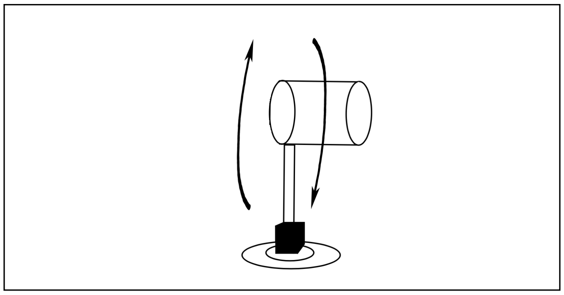
Average time for a 5000 atom reading vs State of Helium

The following method of the experiment is kept under lock-and-key per the advice of my Research Advisor. The specific engineering of the system is kept private so that current publications of this document do not result in plagiarism of the design.

The system was then placed in motion, both horizontally and vertically. The motion was uniform and circular, revolving a specific amount in a specific time. An unspecified technique was used to measure the atoms consistently as the temperature of the system dropped from T=2.18K at the t=0, and T=2.15K at t=100 seconds. Two platforms, equally opposite in angular momentum, were used so that the observer (cavity) experienced no change (in the horizontal run). **One revolution is 28 seconds horizontally, and 22 seconds vertically.**

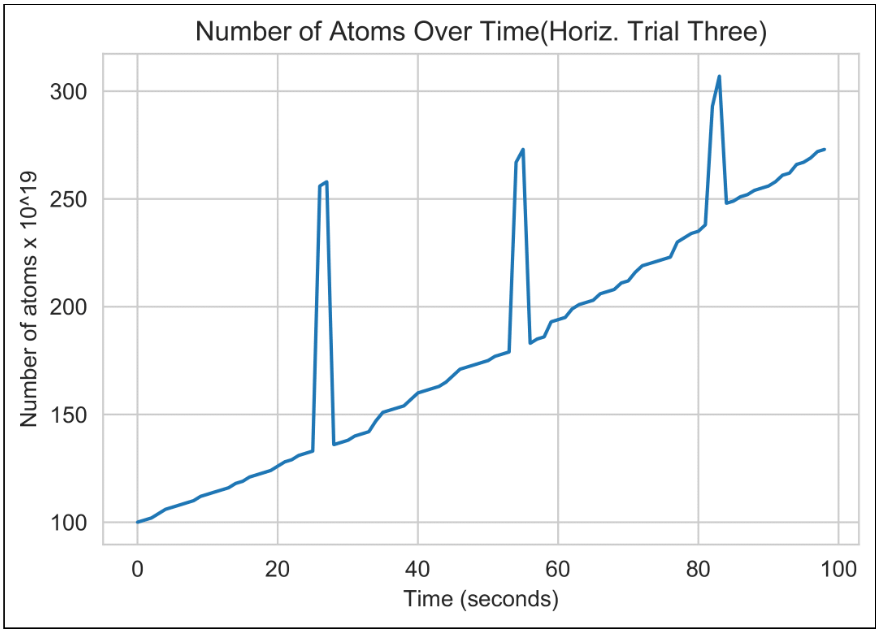


Horizontal Motion

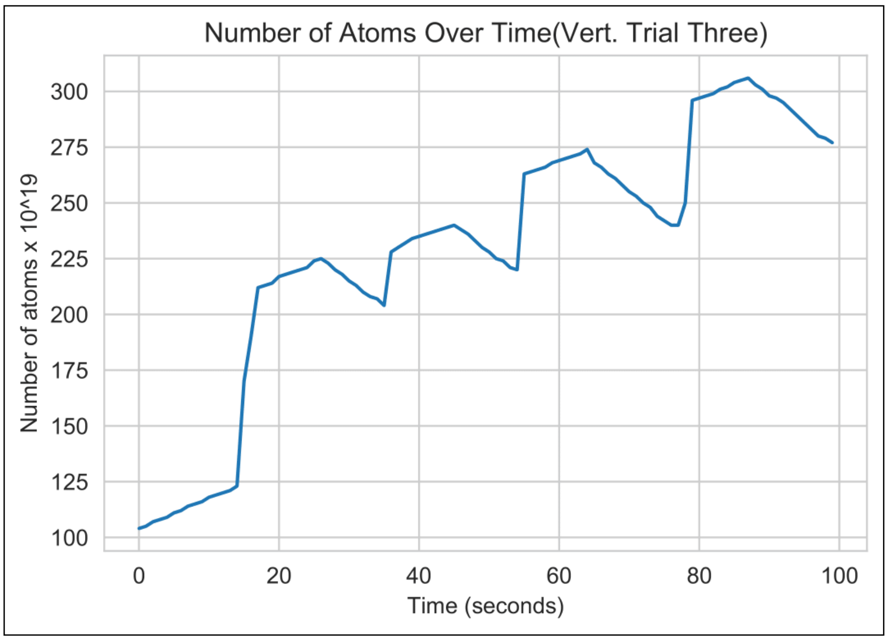


Vertical Motion

The following is a graphical representation of the data of the most accurate trial, which was trial three of the 14th run.



Atoms Over Time (Horizontal)



Atoms Over Time (Vertical)

These results, being quite remarkable, must be explained. What we see present in the graph is (disregarding the peaks), a consistent trend upward in the quantity of atoms present in a container of helium being cooled to a temperature at or below 2.17K. We also see a series of peaks. The typical explanation for this anomaly is a systemic error, or some fault in the hardware or software of the experiment. Careful inspection and multiple adjustments yielded the same data on the output. Vertical motion was employed after the results from horizontal motion to see if the same type of data appeared. After all possible user-error explanations were voided, we have truly accurate data of the number of atoms being read by an *unspecified* optical cavity.

The only plausible explanation of these results returns us to **Figure 1**

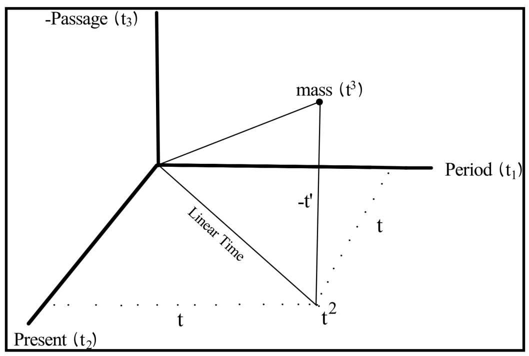


Figure 1, again.

If space is temporally oriented, then at some present time, the experienced period and passage of time for any singular helium atom may differ. This would allot more helium atoms to occupy the spatial dimension of our temporal universe $[-S, t_1, -t_2, -t_3]$, similar to as if you allot more particles to the **y** and **z** positions at a time **t** in a spatially oriented universe. The peaks of the horizontal data occur 28 seconds apart, equal to the amount of time it takes the device to make one full revolution. The peaks of the vertical data occur 22 seconds apart, equal to the amount of time it takes the device to make one full revolution.

The data suggests that when the device came back into its original position, where a portion of the helium atoms became superfluid, somehow a remnant of those atoms stayed at that location, and the device picked them up again on subsequent revolutions. The helium atoms left a mark in time, at a specified location. The helium atoms occupied a singular spatial dimension, respective to the time it was there.

The constant of parameterization was identified vaguely by running a Monte Carlo algorithm to find the parameters that best fit the equation. The below graph is the output of the Monte Carlo approximation.

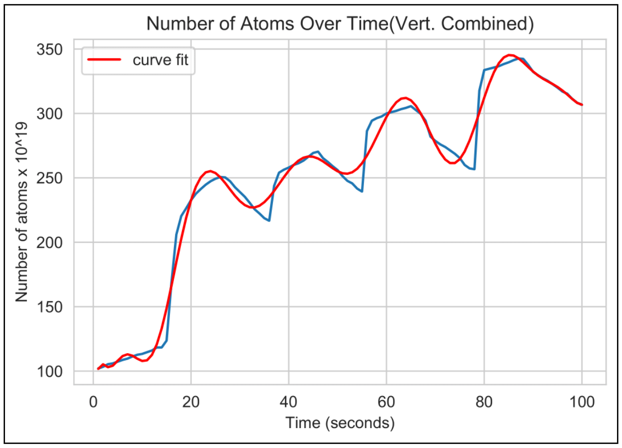
An example code snippet is listed below for scrutiny.

```
n_steps=100
step_size=0.05
B_m=[25.3674607]
C_m=[-0.1977439]

for i in range(n_steps):
    y_init_model=curve_fit_function(x, popt[0], B_m[-1], C_m[-1], popt[3])
    a=random.uniform(-1,1)
    b=random.uniform(-1,1)
    B_m1=B_m[-1]+(a*step_size)
    C_m1=C_m[-1]+(b*step_size)
    y_model=curve_fit_function(x, popt[0], B_m1, C_m1, popt[3])
    chi_squared=calculate_error(AverageSystemInMotionVertical,y_model, sigma)
    chi_squared2=calculate_error(AverageSystemInMotionVertical,y_init_model, sigma)
    p=np.exp(-1*chi_squared)/np.exp(-1*(chi_squared2))
    r=random.uniform(0,1)

    if r<p:
        B_m.append(B_m1)
        C_m.append(C_m1)
        chi_squared=chi_squared2
print(B_m[-1], C_m[-1])
```

With the initial guesses being found through the curve_fit from the scipy library. The optimal parameters found were B: 25.78 and C: -0.1. The parameter of interest is parameter C, since this corresponds to the variance we see in the form of peaks. The significance of the parameter, again, is important for the previous section. With this being so close to one (accounting for systematic error), previous approximations of the constant being insignificant hold true. Here is a graph of the fitted curve.



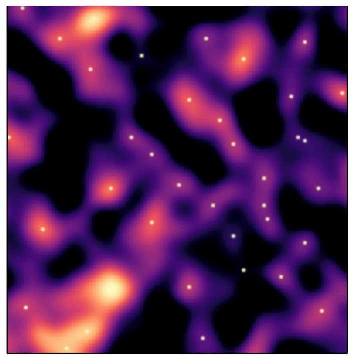
Atoms over Time (Vertical) with Curve Fit

Into the Ether: Future Applications

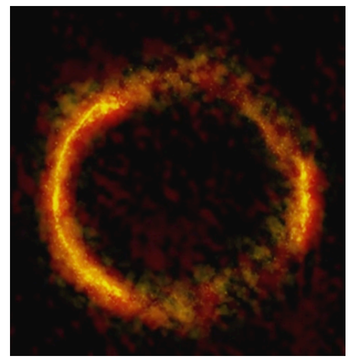
Gravitational Lensing

Proof not only exists on our planet, but in stars and planets hundreds of thousands to millions of AU away. Gravitational lensing is a physical phenomenon where the sheer gravity of supermassive bodies (like a galaxy cluster) can bend light from various sources (supernovae, quasars, etc.). This phenomenon can occur in three different forms. These are seen below.

Strong Lensing
Credit: NASA



Weak Lensing
Credit: CosmoStat



Micro Lensing
Credit: ESO.org

Strong lensing is a form of gravitational lensing where extremely vivid distortions of the observed light is seen. This is typically referred to as an "Einstein ring". Weak lensing is a form of gravitational lensing where the distortions of light are insignificant to observers, but can be detected through rigorous computation. Weak lensing is a weak form of gravitational lensing, as the name suggests. Micro lensing is a form of gravitational lensings where the distortions are nearly invisible, but fluctuations in observed light from the emitting object can be detected by rigorous computation. [12] [13]

The issue with the current theory of gravitational lensing stems from its inability to explain light-interactions with dark matter. Should dark matter outweigh visible matter in a ratio of six-to-one, gravitational lensing should also occur stronger in dark matter "pools", where opposite to the largest mass conglomeration in a distant cluster of galaxies. This phenomenon is not observed, and as seen in the photo above titled

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[12] Schneider, Peter; Ehlers, Jürgen; Falco, Emilio E. (1992). Gravitational Lenses. Springer-Verlag Berlin Heidelberg New York Press. ISBN 978-3-540-97070-5.

[13] Wald, Robert M. *General relativity*. University of Chicago press, 2010.

"Strong Lensing", we see that these effects are nearly uniform for extremely massive systems. An example of this is the "same supernova" being seen three separate times.[14]

Another major issue stems from the total volume of light (we can casually refer to this as luminosity) that is received by the observer. Should the same supernova be seen three times, it would only make physical sense for the total volume of light of one observation to be roughly one-third of the expected volume of light. This, however, is not the case. We see that each observation of the supernova is seen at its total luminosity. This is not physically possible.[15][16]

Applying the principles of temporal mechanics, and Tired Light Theory, we can easily see the mechanics. Particles of light, photons, are not mindlessly bent around the center-of-mass for these objects, rather they are distorted in their momentum. This would suggest that the time that these photons reach the observer differ based on their planned trajectory. The photons are warped in time, not in space, and reach the observer at different periods. This would mean, mathematically, that since mass is related to the rate of change of time by the equation $-nt' \times t^2 = m$, proportional to the period squared, that light interacting with this object in linear time (and thus interacting with the object : +n = number of interactions in linear time relative to previous passage), we can see that the larger the mass, the larger the difference between t' and t^2. This indicates that the time that the photons reach an observer will be different, but the change in energy (ΔE=[-t''t_f^2+t't_i^2]c = 0) must always be set to a constant of zero. ΔE is applicable for each observation of the supernova, and it not specific to only the total change of the system. The energy, in units of total light volume, does not change per observation with this theory; however, in a spatially oriented universe, it must.

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[14] Tomaswick, Andy. "Astronomers Saw the Same Supernova Three Times Thanks to Gravitational Lensing. and in Twenty Years They Think They'll See It One More Time." *Universe Today*, 21 June 2021, https://www.universetoday.com/151581/astronomers-saw-the-same-supernova-three-times-thanks-to-gravitational-lensing-and-in-twenty-years-they-think-theyll-see-it-one-more-time/.

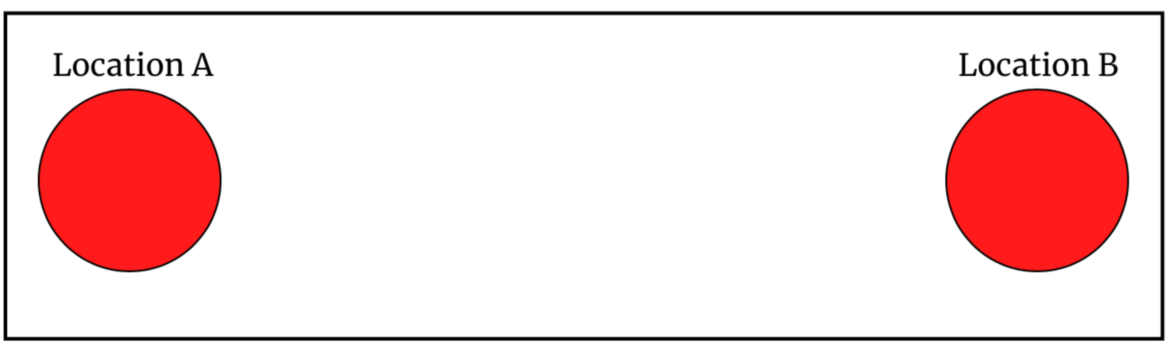
[15] Yang, Jinyi, et al. "Far-infrared Properties of the Bright, Gravitationally Lensed Quasar J0439+ 1634 at z= 6.5." *The Astrophysical Journal* 880.2 (2019): 153.

[16] Davies, Frederick B., et al. "Constraining the Gravitational Lensing of $ z\gtrsim6 $ Quasars from their Proximity Zones." *arXiv preprint arXiv:2007.15657* (2020).

Wormholes

Quantum entanglement, in its most rudimentary definition, is a phenomenon where one particle, in a group of two or more, share dependent information about the other particle(s). One particle harbors valuable and irreplaceable information (spin, energy, etc.) about the other particle(s). In even simpler terms, two entangled particles are like twins. If you have one twin, you know the mother of the other twin, the hair color, their genetic makeup, etc. even if the twins are in two separate locations! The “spooky” part of this is the fact that these two particles do not have to share spatial proximity. Even spookier, if the properties of one particle is changed, the other is immediately known. This translates to a transmission of information that occurs faster than the universal speed limit, or speed of light.[17][18]

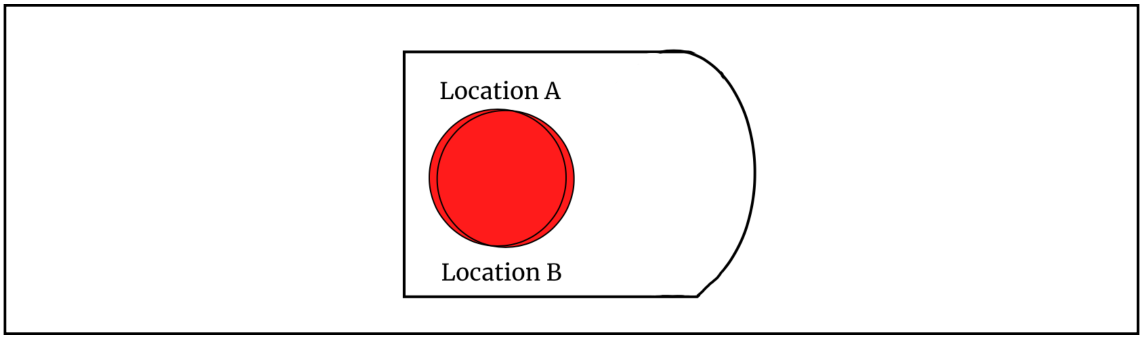
Wormholes, in its simplest definition, is a hypothesized passage through spacetime. In essence, it translocates whatever enters the wormhole to a distant location in space. It’s a rip in spacetime, allowing immediate transition from one location in space, to another. To give the age old example, consider two points (red dots below) in a sheet of paper(rectangle below), separated by some distance between them.



[17] Griffiths, David J., and Darrell F. Schroeter. *Introduction to quantum mechanics.* Cambridge University Press, 2018

[18] Schrödinger E (1936). "Probability relations between separated systems". *Mathematical Proceedings of the Cambridge Philosophical Society.* **32** (3): 446–452.

If we now fold this paper, the two circles lay on top of one another. This is a crude representation of the two locations in space, with the fold representing a fold in space-time.



To create the wormhole, all we need to do is push right through the center of the two red dots, successfully creating a translocation pathway to two uniquely separated points by whatever object enters through the pathway. This is how a wormhole works.

Similar to how black holes were a unique hypothesis before their actual discovery, wormholes are treated similarly in physics. The main difference between black hole and wormhole theory is that wormholes are suspected not to exist due to their instability. It is thought that the void created in spacetime would become too volatile to exist, no equilibrium would be met, and the “rip” though the two locations could never occur. Despite this, new research sheds some interesting light on the topic. [19]

Researchers recently discovered that these wormholes actually can exist mathematically, but one with caveat. With the application of the Eddington-Finklestein metric, Pascal Koiran found a mathematical proof of their existence. The difference between the Schwarzschild metric and the Eddington-Finklestein metric is the interpretation of the time variable. All other aspects of these daunting metrics are irrelevant to this discussion (thankfully!). In the Eddington-Finklestein metric, time is replaced in the form $t' = t \pm (r^* - r)$, $u = t - r^*$. Again, the specifics are of little importance. The point is that the time variable has been changed in order to accommodate the theory of wormholes. The Schwarzschild metric brings the trajectory of the object entering the pathway of the wormhole “beyond the end of time.”, whereas

[19] Eiroa, Ernesto F., and Claudio Simeone. "Cylindrical thin-shell wormholes." *Physical Review D* 70.4 (2004): 044008.

the Eddington-Finklestein metric brings the object entering the pathway of the wormhole “up to the end of time”. [20][21]

With our definition of a temporally oriented universe, this of course would not be a “rip” in space, rather a “rip” in time. An object, consisting of a value equal to the negative volume of time (mass), would be translocated to a different location in time. Returning to quantum entanglement, the biggest unanswered question still remains:

Let’s assume you have two high-tech boxes that you can store two entangled particles in. Box A contains one particle (Particle A), Box B contains one particle (Particle B). If Box A is sent through a wormhole, with our new definition that wormholes are a translocation in time, would we not be changing the quantum parameters associated with Particle B? [22] [23] [24]

We can express this mathematically by returning to our definitions:

$t'' \propto 1/s$: Reference frame of massive body with object falling towards it

$-t' \propto 1/t^2$: Reference frame of massive body with object falling towards it

We can use what we know and understand from temporal mechanics to explore the possibility of engaging the Eddington-Finklestein metric with these new definitions.

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[20] Koiran, Pascal. (2021). Infall time in the Eddington-Finkelstein metric, with application to Einstein-Rosen bridges. International Journal of Modern Physics D. 10.1142/S0218271821501066.

[21] Lobo, Francisco SN. "Phantom energy traversable wormholes." *Physical Review D* 71.8 (2005): 084011.

[22] Morris, Michael S., and Kip S. Thorne. "Wormholes in spacetime and their use for interstellar travel: A tool for teaching general relativity." *American Journal of Physics* 56.5 (1988): 395-412.

[23] Arntzenius, Frank, and Tim Maudlin. "Time travel and modern physics." *Royal Institute of Philosophy Supplements* 50 (2002): 169-200.

[24]

Gott, J. Richard. *Time travel in Einstein's universe: the physical possibilities of travel through time.* Houghton Mifflin Harcourt, 2002.

A simple check is to re-parameterize the equation in terms of t, and approximate things so that the constants and rates are insignificant.
If we apply these equations to the Eddington-Finklestein metric

$$ds^2 = -\left(1 - \frac{2GM}{r}\right)dt'^{\,2} \pm \frac{4GM}{r}dt'dr + \left(1 + \frac{2GM}{r}\right)dr^2 + r^2 d\Omega^2 = (dt'^{\,2} + dr^2 + r^2 d\Omega^2) + \frac{2GM}{r}(dt' \pm dr)^2$$

Solving this equation in terms of t appreciating insignificant constants, and derivatives, we find the appropriate proportionality below:

$$-t' \propto 2GM \times dr^{-3}$$

With 2GM being a constant,

$$-t' \propto dr^{-3}$$

And thus, with r being spatially related to our temporal model as r = t (space = time)

$$-t' \propto dt^{-3}$$

And now

$$-t'' \propto dt'^{-3}$$

If $t'' \propto 1/s$

$$1/s \propto dt'^{-3}$$

And finally,

$$s \propto dt'^{3}$$

We recover that space is proportional to time cubed. **For every singular point in space, there exist three changing time components.** Wormholes, should they exist, in fact prove by default the fundamental argument of the paper.

Concluding Thoughts

Through a hefty evaluation of temporal mechanics, and a justified interest in exploring this physical phenomenon through careful experimentation, there is a significant argument for the exploration of three-dimensional time in the context of modern physics. Not only can this hypothesis be applied to current physical realities, it can revive previously debunked ideas, and provide a spark to the engine driving some of the biggest unanswered questions. Is time three dimensional? This paper certainly alludes to that fact; however, it cannot be proven unless further evaluation of the topic is conducted. Perhaps one day we will unlock this mystery, and I can again find myself writing this paper as a visitor from a different period in time.

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