

A Proposal of Universal Simultaneity in Time

*– Absolute Time as a Ubiquitous and Constant Force of the
Natural Universe –*

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1 Abstract

Using new definitions of Absolute Time and the interaction of energy and matter, we gain an understanding of how Time is the force that drives interactions simultaneously throughout the universe. By re-examining the implications of the universal speed limit of light and its propagation through space, we find space's extremely high fidelity storage capacity as a cosmological illusion of the past. We review systems and analyses that utilize absolute time intervals or curved space-time as not based on Time but the processes that are resultant of Time. We apply these definitions to create tools for understanding Time as a force, such as simultaneity and the thermodynamic arrow of Time. We determine an Absolute Universal Time unit, which incorporates both a periodic rate of change and Time's irreversibility. We use this unit to represent a synchronizable non-periodic quantity with any location in and beyond the observable universe. Therefore, we find that our universe is a cellular structure in which only past information from one section can reach the far ends of its structure and which the forward march in Time from each point in space is relativistically separated permanently from others, preventing the instantaneous interaction of information and thermodynamic entropy. We formulate two tools for determining Time as a force of nature and how to measure Time the universe as a variant of the energy density of light information building up in the void of space. Thus, providing an alternative view of time from Classical Theories all the way through modern Big Bang Cosmology.

2 Introduction

The subject of Time in physics has undergone radical revolutions in the last century, from being an immutable fact of reality to being a dimensional component of space itself. It was long understood that relative perspectives from different observers would lead to different measurements in speed and distance as any event occurred. Einstein's special Relativity declared that, unlike regular Relativity, there is a universal speed limit to the speed at which light travels. Through his special Relativity, absolute Time is broken, and the effects of Time dilation are a scientifically proven and calculable feat of the theory of special Relativity^[1]. In his work, absolute Time is no longer synchronized between two or more observers.

In another very successful theory, Quantum mechanics, the use of Newtonian Time, where Time is absolute, is used. In treating Time as absolute, Quantum mechanics allows the measurement of precise intervals of Time to measure observations. However, quantum mechanics does not measure Time as a force but periodic occurrences that repeat without interruption or limited interference. For example, Oscillations of an atom or crystals in electronics, or more simply, watches that are synchronized with the position of the sun to an individual's location on Earth^[2]. In utilizing these periodic events, Time can be given a numerical basis that allows maths and science equations the parameter "change in time" symbolized as "dt" and " ΔT ". When a measurement of any phenomena is made, such as velocity, it is stated as "going a distance per number of something oscillating". When a driver drives at 30 miles per hour, we are saying that the car is presently moving where it would complete a distance of 30 miles per 1/24 an earth's rotation (1 hour).

In the modern age, both Relativity and Quantum Mechanics have greatly succeeded in describing the world and universe around us. However, with

each theory, Time is a metaphor for change and, as a phenomenon, is not defined in itself as a force. The scope of this paper on simultaneity is to address the issue of Time, not as oscillations of natural phenomena nor as a dimension of space. This paper is going to challenge those findings as we will observe that a universe that has a speed limit must have an absolute or global time, or many of our observations would be different, and a universal speed limit would not be possible. We will use the tools of modern cosmology, mathematics, and thermodynamics to lay a foundation for understanding what the present moment and the passage of Time is and what it isn't.

This paper is organized as follows: Section (3.1) will discuss in detail past and current cosmological observations and the statement of the thesis regarding the definitions and outcome of a universal simultaneous time. Section (3.2) will break down the Quantum Mechanical and metrological views of using time intervals in science both for instrumentation and mathematical derivations of natural laws. Section (3.3) presents a view of these new definitions of Time in the special relativistic framework. Here, we reconcile a system that allows observers to not experience absolute Time to still exist in an absolute time framework. Section (4), we propose a new model and diagram for determining the current age and Time of the universe as a derivation of scattered photon energy levels, and we set up a diagrammatic view of the action of simultaneity in an information and matter transition diagram. Section (5) is our summary and conclusion of findings.

3 Cosmological Time

3.1 Historical Perspective

The most prevalent and long-term use of observation in Physics has come from the observation of the skies. Dating before written history, the oration myths of the gods of the heavens told by the people of the world gave way to navigation and forecasting seasonal change by memorizing the generalized shapes in the sky. These creative stories of the constellations have given humanity a continuous platform of cosmology that has evolved into modern physics. We will examine two historical photos as a reference to this concept. In Figure 1, we have the medieval cosmological view where the Earth is the center of the universe and solar system. In Figure 2, we have an artist rendition popularly used by many leading physicists and scientists in speeches and presentations that includes a view of the universe with the solar system, galaxies, and a border depicting the cosmological horizon. Both pieces of art come from different millennia of human history and both formed the basis of understanding modern physics of their Time; many good observations made both. Like the ancient variant we propose here, both are incorrect figures in describing what our observations tell of our universe, especially its order and current shape. Starting with the profound similarity that places the Earth near the center of either diagram. Where even current observations of the cosmological horizon would place the Earth very near the center of the universe and/or Big Bang. An observation no modern astrophysicist would dare openly state, but do not have a clear reconciliation for this fact either. We clearly need a new way of thinking about Time as a force to reconcile with these observations.

Fig. 1: Ancient Model of The Universe
Source: [Ptolomeic Solar System]

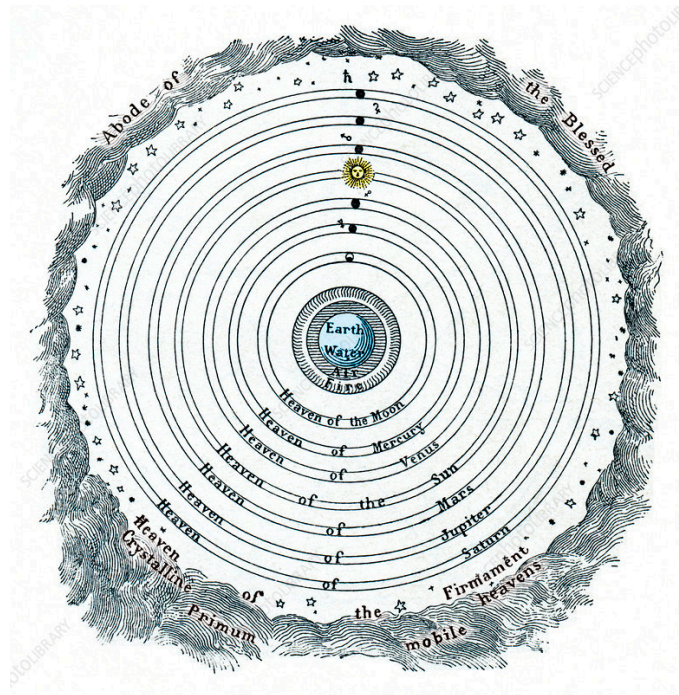


Fig. 2: Modern Artist Rendition of The Universe



Source: [Universe Illustration by Pablo Carlos Budassi]

When we gaze into the cosmos either with our eyes or with the latest telescopes, what we see is not what is far away. We are receiving via photons merely information about the past arriving into our present location. Distance in space can be viewed merely as an information storage medium, and light is the bits/data being stored. The question of absolute simultaneity is not whether there is a universal time at every location in the universe but whether there exists a universal time flow regardless of observer speed and time-coordinate change. We can then imagine an ideal situation somewhere across the universe that has matter and an earth like our own with an intelligent species. As that intelligent species views outward in our direction and only sees the past Earth as it was. In our universe, there may be infinitely many of these simultaneous boxes or frames, each looking out into the universe simultaneously, seeing only the information that still exists in the present of material from long ago.

The cosmological horizon shows not only the beginnings of our current universe and its conditions^[3], however, we can make more implications of this horizon. The observable universe sets the storage maximum of past information that can simultaneously be observed by the present at our location or any other location. Like any information storage analogy, we have to consider the issues of interference, extinction, and signal fidelity. For the study of simultaneity in a cosmological view, we will look at all signals as cooperatively interacting or not. The goal is not to suggest that noise does not occur; however, to see it as a natural state of how the information is being stored. Information for this framework is simply the existence of a massless particle of energy in space. There is no distinction between symbolic meaning in information and the Photon itself.

Along with mass-material within space, we find the spectrum of information fidelity. Where there is no mass, we find space to be the highest fidelity storage of light. With mass photons interacting with material are slowly lost to a

process an effect known as extinction^[4]. On the opposite scale of mass, inside of a black hole, information is mostly destroyed and cannot be transferred. Modern Cosmology has many tools and theories describing the interaction of space and mass as gravity and curvature. What is missing from those theories is an analogy of space and light.

Definitions:

Simultaneity - The ubiquitous and constant force in the universe allowing material-heat and energy-information to exchange position and/or form instantaneously, while limiting the magnitude of that exchange as experienced by the maximum speed of light and minimum thermodynamic temperature. .

Space-light - Non-material distance as the highest fidelity storage medium of light. The medium is non-material and composed of fields that couple with light and only degrade in discrete steps as the light travels enormous cosmological distances.

Absolute Time - is a force that provides the continuity of information and thermodynamic interactions concurrently throughout space. An allowable energetic path for information to accumulate as Space-Light through the productive interaction with space coupling with light and mass that limits speed to the speed of light.

Past - The illusion of continuous increase of complex information stored in the present at all locations in the universe. A derivative of distance and energy.

Future - The potential states of energy-information and matter-heat. A derivative of distance and energy.

With these pieces, our aim is to construct a view of the universe where there is an absolute time where simultaneous events can be calculated and that the universe we see is not made to clearly show simultaneity and is more

of a memory storage medium of the past information. Every current location in the universe can only look at the skies as a form of this current information of the past, though each location does, in fact, exist. However, the viewer has and, as we will show, will always bend the perspective of the information being shown in its current state.

3.2 Quantum Cosmological View

One of the fundamental principles of quantum theory is the Heisenberg Uncertainty principle, which generally states that we cannot know the particle's position and momentum or the energy quantity and time coordinate of the particle with unlimited precision^[5]. We ask what holds the Heisenberg uncertainty principle in place. In a universe where a present is instantaneously continuous, we can see where the separation of observing location and momentum is possible at smaller and smaller time intervals. Therefore, we will also add that simultaneity as a parameter in our universe cannot be fully divisible by anything in it, which is confirmed by the calculation of plank \hbar ^[6]. Read another way, there is no pause in the present, no matter temperature of any object in the universe.

We must use our new definition of "time" clearly so that it can be applied to events and measurements. Time is traditionally used as a form of measure that can be observed as rates of change, where the units are: seconds, years, and vibrations of atoms (in atomic clocks). Time as a measurement is the counting of cycles. Each cycle is a unit of comparison to some other event unfolding per cycle called a period. An animal takes years to grow, a human heart beats a certain frequency per minute, and electromagnetic waves come in cycles per second called "hertz". Where years, days, and hours are all in relation to the cycle of Earth transiting its orbit around the sun. The current metrological definition of Time is the duration of 919263170 periods of radiation corresponding to the transition between the two hyperfine levels of the

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ground state of the caesium-133 atom^[7]. Periodicity, by definition, requires repeated patterns, and in the case of atomic vibrations, each period is, in fact, commonly referred to as a time interval. It is important to understand that all Time as a measurement is one dimensional, meaning that Time as a measurement is always an interval. In Mathematical terms, the time interval is a set of Time coordinates on a time axis. If we are to expand our understanding of Time, we have to create a more sophisticated definition than that of periodicity alone, which does not explain nor include the anti-symmetrical or non-reversible nature of Time.

Building a framework for a Absolute Time requires evidence of non-periodicity. There is no greater source of this evidence than the continual filling of the universe with information. The Photon may be the perfect carrier evidence of Absolute Time. A photon can represent raw information and does not experience entropic or thermodynamical decay as it travels through space. Some distortions can occur as the Photon travels, and annihilation is possible as it interacts with other photons and matter. However, a photon that does not interact and travels through the void of space is nearly perfectly preserved. The Photon also travels at a maximum speed that the universe allows, giving us the greatest clue that the Photon and Absolute Time as a force are intrinsically related. Photons from the Cosmological Horizon and distant galaxies have traveled to us for an estimated 13.8 or more billion years at the speed of light^[8]. However, this void of space is not void of thermodynamic temperature and emits black body radiation. Several theories exist about what this background radiation is from, most popularly as evidence of the Big Bang, a theory of the universe's beginning. However, for a universe with a global constant time and a global constant speed, a beginning and ending may be unlikely.

For a Absolute Time, we need to build a framework that accounts for the accumulation of information, as well as the periodic nature of matter-energy.

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We know that photons cannot contribute to the temperature of the space they transit. However, this void of space is not void of thermodynamic temperature and emits black body radiation. The radiation that is present has been named the Cosmic Background Radiation, which includes the Cosmic Microwave Radiation and has been found to have a minimum temperature of $2.7\text{K}^{[9]}$. Several theories exist answering what this background radiation is from, most popularly as evidence of the Big Bang or the universe's beginning. However, we propose an alternative by stating that space itself may provide heat from the coupling of electromagnetic fields to the passage of photons, allowing the thermodynamic components of the Cosmic Background Temperature to be a property of space-light coupling as a derivative of Time as a force. As Absolute Time allows movement in the positive direction, this coupling energy will be observable by all points simultaneously in the universe at the present moment and continuing into the future (as observable information storage). This is a simultaneous universe set in Space-Light. Space-light is the amount of energy space will contribute to light until space reaches its energy contribution end. Therefore, the Photon itself does not decay, but the cost of its travel through space is finite.

3.3 Relativistic Simultaneity Reconciliation

In theory Special Relativity, the concept of simultaneity is not absolute. Simultaneity only arises within an inertial frame between objects and continues to require relative adjustments. Inside General Relativity, there is a concept developed called a "stationary system". The stationary system is the rest inertial frame that another object or event is being compared to. Special Relativity utilizes the speed of light to help calculate "proper time" from different reference frames based on their speed. There are no absolute present or simultaneous moments that occur within Special Relativity. In the framework

of Special Relativity, calculations can be used to find the proper Time and size of an event or object as they are Lorentz invariant^[1].

We will define Absolute Time and experienced Time as a distinction from Special Relativity. Experienced Time is the frame of the observer or event, and it is the local Time of any inertial frame of reference. Absolute Time is the magnitude of the difference between the time force and rate of change that accounts for the experience time. Absolute Time can never be negative or zero. To achieve synchronicity between relativistic observers, knowledge of each speed and the speed of light is required. Both of these definitions leave issues with our understanding of Time. Why, under quantum and Newtonian mechanics, can we just assume Time, yet why does Relativity show that the altering of space through curvature also alters the perceptions of Time? In modern experiments and technologies, adjustments are made for the relativistic factors of time-variance. However, the relativistic view of Time takes on the notion that the observer experiences Time. Here, we will draw another important distinction with a new specification where a universal absolute time starts with the concept of a global present called simultaneity. Outside of all reference frames and observers throughout the universe, there is an universal Absolute time from which matter and fields interact with each other at least a non-zero minimum rate. This present simultaneity is immutable. For instance, relativistically, a photon experiences no time while traveling at the speed of light. However, the Photon is created and annihilated by some natural process for a finite duration of global Time. Therefore, the "time" experienced by an observer is not a true time but an inability for the cycles being experienced to occur because of the limitations of the speed of light. Anything travelling at the speed of light cannot be an observer. Here the global simultaneity of time holds true. That time does not have to be observed to be continuing forward.

The theory of Relativity shows us that space can couple with matter to bend space itself, providing an emergence of gravity^[1]. Space may, in fact, couple in different ways to matter-energy than previously thought of. Here, we will expand the previous section's notion of Cosmic Background Radiation. Suppose a relativistic particle (traveling at or near the speed of light) does not experience Time nor contribute locally to thermodynamic temperature. In that case, however, the vacuum energy of space may have small induced EMF transitions that may cause an emergence of temperature.

It is known that at the speed of light, a photon "experiences" no time and that any particle of matter cannot go the full speed of light. However, over cosmological distances and at relativistic speeds, light can become distorted in what is called a Doppler or red-shift effect. We, therefore, make the very simple logical conclusion that regardless of velocity, all objects containing mass experience time in the form of information and thermodynamic transfer.

4 Universal Simultaneity and Absolute Time Measured

4.1 The Energy Age of the Universe.

In the previous theories of Time, we ask how long the universe has existed in the form of a time interval. In the Simultaneity of Absolute Time as a force, we ask how much of the universe exists as complex information stored in it. Current observations are determined by the red shifting of the cosmic background radiation within the framework of Big Bang cosmology. It is predominantly accepted that this is why the red-shift exists. However, there are several weaknesses in this conclusion. First, there is a gradient present in the CMB that correlates with material in the universe and not a singular point that allows the distinction of where the Big Bang would have been concentrated in the space that now exists^[10]. Second, we have to reconcile the various cosmological horizons with the fact that it is equidistant in all directions, and if we are not the center of where the Big Bang occurred, light from some regions and directions would have had more Time to arrive at Earth than in others.

Our goal now is to build a framework that provides an explanation for space-light as a derivation of a Global Time Force. As light has traveled from very far distances in the void of space, objects seem to be moving faster and farther than Relativity or other cosmological theories predict. Here, we define Space-light similarly to the emergence of gravity from space curvature. In order for space to be a continuous manifold, there may be an analogy to an elastic nature to the vast voids of space in between massive objects such as galaxies that create a thermodynamic gradient by the elasticity of far space. This distortion has a finite cost on the photons traversing it. However, once

that cost is paid, there is a cosmological distance through as long as the Photon is not interfered with or absorbed, that Photon can travel until ultimately being annihilated by another step or block in that elastic energy. Here, the cost of a photon being timeless is an emergent thermodynamic property of space itself, again referred to as space-light.

Based on our definitions of the past being represented by information that is continuously stored in the present, we don't define Time as a cycle but as the transition matter-energy as luminous information in the void of space. Information as a whole is simply massless energy (photons: packets of emf) which in order to exist must move at the speed of light. A photon cannot be stopped without changing it. The distance "apartness" is the storage medium. Now we ask how much information is stored in the universe proportionately to how much we may have observational capacity to receive.

We define luminous accumulation as an energy density in space. We can most simply use a general accumulation function as inputs + generation – outputs – consumption. We define our inputs and generation components as the total stellar luminosity^[11] over the distance of the radius of the observable universe minus the extinction rate of that luminosity times the inverse of the Hubble parameter (seen below)^[12]. These inputs are the primary natural causes of photon emission in the universe. Current average values and calculations put our Global Present Time at an energy density of $2.87384 \cdot 10^{-15}$ eV/m³. This is the value of past information stored in the present as simultaneously observed by any observer in our universe at the same moment it was calculated. This information/energy density may be the only universal value of Time in the universe as it is not related to common periodic cycles and includes the one-way direction of Time in the form of accumulation and decay.

Fig. 3: Space-Light Accumulation Energy

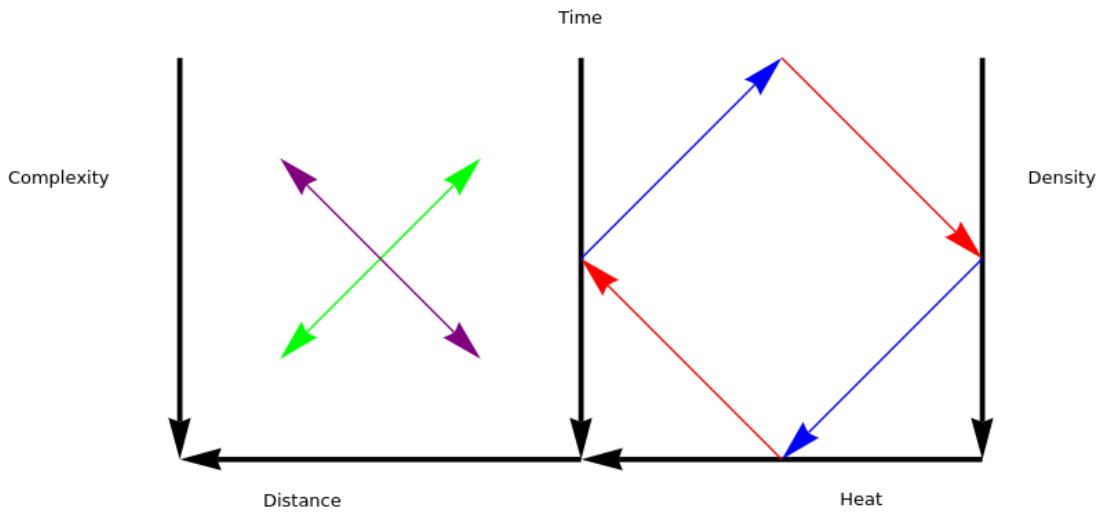
$$L_c = \left(\frac{4}{H_0 3 \pi r^3} \right) (n \sigma A T^4 - V)$$

L_c is the power density of luminosity in the Universe. It is inversely proportional the Hubble Constant H₀ times the average luminosity per star and the numbers of stars n in the volume of the observable universe minus the extinction rate of the average stars light converted from Magnitude to Luminosity (V).

4.2 Simultaneity Space-Light Thermodynamics

When taken into account, Space-Light and thermodynamic forces require a principle of simultaneity throughout the universe in order to keep the universe and the laws of physics continuous and smooth. By dividing each moment as an interaction between Space-Light and matter, we can build the tools to derive features of the universe. Below in Figure 3. the Global Time transition diagram shows the process of information accumulation, dispersion, and the cyclical flows of material in space. Using our definition of Time and Space-Light, we can build a diagram of observable patterns. In the diagram, it is

Fig. 4: Simultaneity Transition Diagram



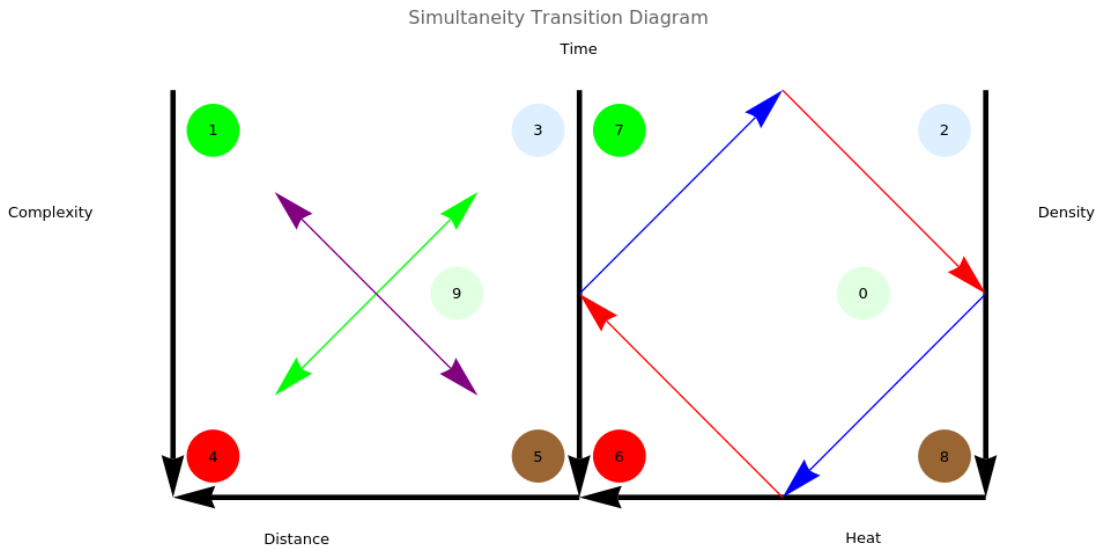
shown that the direction of Time and its magnitude affect the interaction prop-

erties of matter thermodynamics on the right and information energy on the left. It is also noted that the equations relating mass and energy from special Relativity continue to hold true when Time is the force that converts them into an absolute non-relativistic position. It is also shown that information is nearly perfectly preserved and transferred in the vacuum of space; however, on the other end of the scale, inside a black hole, information is nearly destroyed and cannot be easily transferred.

The goal of this diagram is to understand the transitions of Space-Light and its interaction transitions with matter. There are five lines with both direction and magnitude. The present line in the center shows both the direction of transitions in nature, as well as the handed semi-symmetrical property of Time. The Density line on the right moves downward from low to high. The thermodynamic temperature line moves towards the center from low to high. The storage line moves out from the center and represents low entropy to no entropy. The complexity line moves from top to bottom and represents high complexity going to low complexity. The area on the left denotes the reference frame of something (light) traveling at the speed of light, and the area on the right denotes anything not traveling at the speed of light. Each arrow within either side of the diagram on the left portion of the instantaneous present line represents the information held in a photon in the vacuum of space. Each arrow on the left portion of the instantaneous present line shows the periodic flow of matter-energy. The instantaneous present line distinguishes the state of the interaction between material periodic synchronism on the right and the global information time-line that accumulates in empty space without interactions. The colored lines on the left indicate that information does not interact to change the state of information, though it may make it more complex or cancel out. The colored lines on the right indicate the interactions and changes of state that occur thermodynamically with matter.

4.3 Simultaneity Space-Light Thermodynamics Examples

Fig. 5: Simultaneity Transition Diagram Examples



In the diagram above, we make several examples with the use of colored and numbered points. They are colored to show the handed nature of Time. 1 & 7. Complex information at a far distance has not interacted with heat or density. 2 & 3. Low Density and Low Heat will be able to create or interact with highly complex information but not send it a far distance. 4 & 6 Extremely complex information at extremely far distances does not interact with matter in the same way black holes do not produce as much information. 8 & 5 Highly dense material at cool temperatures produces complex energy interactions at close distances. 9 & 0 Where *intelligent life and other information systems can reside.

5 Conclusion

When we speak of Time, we are usually discussing Time by comparing a velocity, acceleration, change in position, temperature, or energy over a number of periodic occurrences of something else that possesses a consistent pattern. This is not Time but a way of acknowledging a consistent rate of change compared to another unknown rate of change. The rules of change are a product of Time. Time is itself a force that allows the continuous transition(change of location) of information and material states regardless of speed. The universe is moved by Absolute Time simultaneously at every loc-

ation. The size of the universe that we see in the universe is related to the coupling energy space gives to traveling light, which is not infinite. Light speed is not infinite, nor is the distance light can travel.

In a universe with a consistent, simultaneously driven present, the cost of light as information in space, along with its universal speed limit, gives us the picture of a cellular universe with localities that are separated first by the material energy, space and Time, and then the cost of light in space. With this view, we reconcile that even though we see a cosmological horizon in all directions, we are, in fact, not the center of where the Big Bang would have occurred but are reaching, with technological advances, the boundaries of the effective light storage capacity of the vacuum of space. Because, of these effects any observer in a different galactic location as to ours may draw similar observations and only be able to see what looks like that they are in terms of a cosmological horizon near the center of their universe with galaxies and distant objects moving away from them.

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