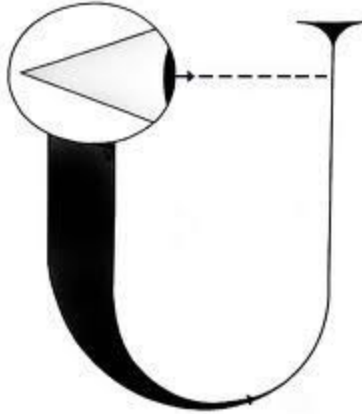
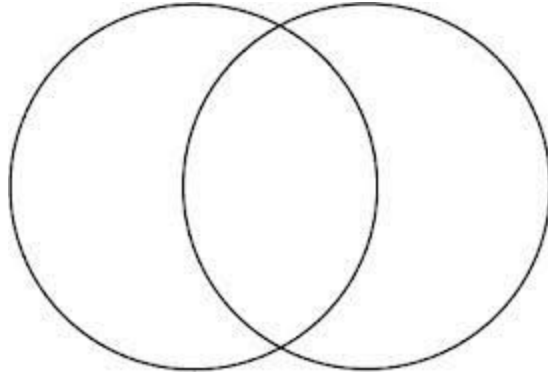


Why the Old Physicalism Paradigm is False and Science only has Validity in a New One-World-per-Observer Paradigm



Universal Observer

The basic problem with modern physics, specifically with the way quantum theory is interpreted by almost all physicists, is the problem of assuming that multiple observers exist in the same observable world. This assumption is a paradigm about the nature of the world, which is flawed in the sense of logical inconsistencies inherent within the paradigm. The only way to resolve the logical inconsistencies of this conventional paradigm, as Amanda Geffer realized in her book *Trespassing on Einstein's Lawn*, is to adopt a new paradigm. The *one-world-per-observer paradigm* inherent in the holographic principle is this new paradigm. The basic idea of this new paradigm is that every observer has its own world defined on its own holographic screen. The observer's holographic screen can only arise as an event horizon in the observer's accelerated frame of reference, and so that screen is inherently observer-dependent. The observer's screen is where all the fundamental qubits of information are encoded for everything the observer can observe in its own holographic world. In the sense of thermodynamics, the qubits of information encoded on the observer's holographic screen are the fundamental dynamical degrees of freedom for everything the observer can observe in its own holographic world. There is only a false impression that multiple observers exist in the same observable world due to information sharing among overlapping holographic screens. This state of information sharing can only arise from consistency relations between the way entangled qubits of information are encoded on differing but overlapping holographic screens. These consistency relations are the essence of the entanglement problem that characterizes the mathematical structure of a holographic world.



Information Sharing Among Overlapping Bounding Surfaces of Space Create the Appearance of Multiple Observers Sharing a Consensual Reality

The problem with the old paradigm of assuming multiple observers exist in the same observable world are the paradoxes of quantum theory made apparent by the Schrodinger cat paradox or the Wigner friend paradox. Physicists would like to assume that they are each an independent observer that can independently make measurements in the same observable world, but that is the false assumption that leads to all the paradoxes of quantum theory. Each physicist falsely assumes they can each independently observe the same observable world. The problem is quantum theory tells us that whatever the *thing* is that is being measured in any experiment only exists in an unobserved state of potentiality until the measurement or observation of that *thing* occurs. Quantum theory tells us the quantum state of the measuring apparatus is entangled with the *thing* being measured, and so the total system of the *thing* being measured and measuring apparatus also only exists in an unobserved state of potentiality until the measurement occurs. All the atoms and molecules inside the body and the brain of the physicist that performs the experiment are also entangled with the *thing* being measured and the measuring apparatus, and so the total system of the *thing* being measured, the measuring apparatus, and the body and the brain of the experimentalist performing the experiment are all entangled, which means the quantum state of all this stuff only exists in an unobserved state of potentiality until the measurement occurs. Who is actually making the observation? Who is the observer?

The old conventional paradigm of modern physics can never answer this question. There is no place for an observer in this paradigm, which is why most scientists who work in neuroscience and artificial intelligence want to convince us that consciousness is an illusion. These scientists are all physicalists who believe in the physicalism paradigm that only the observable physical world has its own inherent physical reality. They do not acknowledge any other reality. The problem of the physicalism paradigm is that there is no place for the consciousness of the observer in physical reality, and so they deny the existence of consciousness. As far as they're concerned, the observer doesn't really exist because consciousness doesn't really exist. This is the inevitable conclusion they have to come to when they falsely assume that only an observable physical world really exists, and that multiple observers appearing to exist within that world is

only an illusion. In order to continue to believe in their physicalism paradigm, they have to come to the conclusion that the apparent existence of conscious observers is an illusion. In one sense, they are right. Conscious observers do not really exist inside an observable physical world.

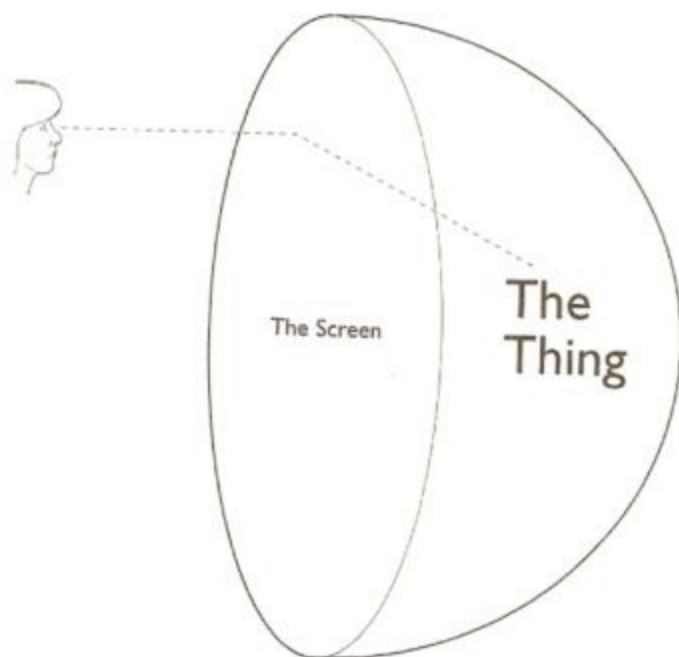
This conclusion that consciousness is an illusion is very odd since each of us as the observer of our own world knows that we exist as the observer of that world. Each of us is aware of our own existence in terms of our own observing consciousness. In the sense of solipsism, the only thing that we can know with absolute certainty is that we exist, and we know that because each of us has the sense of our own existence as we observe our own observable world. Each of us has the sense of being present for our own observable world, and that sense of being present, often called *I Am*, verifies our own existence as the observer of that world. At the most fundamental level possible, it is the existence of our own consciousness that we are each aware of with our own sense of being present to observe our own observable world, and yet all the scientists that buy into the logically inconsistent physicalism paradigm want to convince us that the apparent existence of our consciousness is an illusion. They are so emotionally invested in the physicalism paradigm that has no place for the existence of consciousness that they would rather deny the existence of consciousness than abandon this old discredited paradigm.

The irony is that modern physics is pointing to a new paradigm that resolves all the paradoxes and logical inconsistencies of the old physicalism paradigm. In the last 25 years, modern physics has discovered the holographic principle of quantum gravity, which resolves all the paradoxes. Quantum gravity with its holographic principle implies a new paradigm, which can be called the *one-world-per-observer* paradigm, that totally resolves all paradoxes and inconsistencies. This tells us that the consciousness of the observer does indeed exist, but that consciousness isn't really in the observable physical world that the observer observes. The consciousness of the observer is only a presence of consciousness at the central point of view of its own holographic world. This paradigm turns the nature of illusion totally around. The consciousness of the observer isn't the illusion that the physicalists would like us to falsely believe. The observable physical world is the holographic illusion.

The holographic principle fundamentally says that everything the observer can observe in its own observable holographic world can be reduced to qubits of information encoded on its own holographic screen, which is an event horizon that arises in the observer's accelerated frame of reference. To return for a moment to the measurement paradox inherent in quantum theory with the old conventional physicalism paradigm, the body and the brain of the experimentalist that performs the experiment can also be reduced to qubits of information encoded on the observer's holographic screen. The observer itself can only be understood as a presence of consciousness at the center of its own holographic world. This is the new paradigm we have to accept with the holographic principle. Everything observable in a holographic world is reducible to information and energy, but the consciousness of the observer observing that world is not. Consciousness has its own independent existence. The holographic principle tells us that the true nature of existence is precisely the other way around from what the old physicalism paradigm told us. The apparent

existence of a holographic world that is reducible to information encoded on the observer's holographic screen and the flow of energy animating that world is dependent on the existence of the observer's consciousness that has its own independent existence.

The natural way to understand how information is encoded on the observer's event horizon is with non-commutative geometry, which explains how space-time geometry is quantized. Every quantized position coordinate on the observer's event horizon is smeared out into an area element like a pixel that encodes a qubit of information. These qubits of information are the fundamental dynamical degrees of freedom for everything the observer can observe in its holographic world, which is the nature of entropy. The nature of energy is the thermal energy inherent in each qubit of information, which fundamentally arises in the observer's accelerated frame of reference as the Unruh temperature of the observer's event horizon. That energy is inherent in the observer's acceleration. Everything the observer can observe in its own holographic world is a holographic illusion in the sense that all those observable things can be reduced to qubits of information encoded on the observer's event horizon. Observable things are forms of information projected like images from the observer's holographic screen to its central point of view and animated in the flow of energy inherent in the observer's accelerated frame of reference. The whole explanation is observer-dependent, which tells us that only the observer itself is fundamental to the explanation. This tells us that only the observer itself can have its own independent existence, which fundamentally is the existence of consciousness.



The Observer, the Screen and the Thing

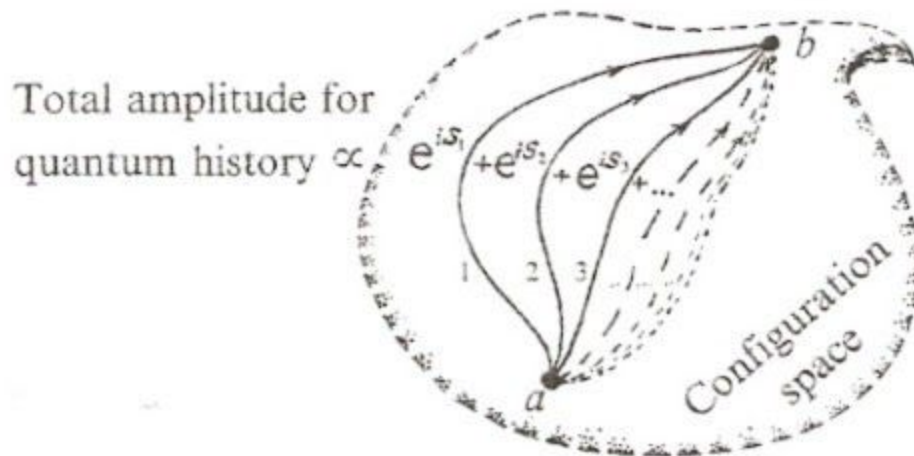
The constancy of the speed of light for all observers, independent of their state of motion, is an essential aspect of a holographic universe. This is the basic reason an event horizon arises for an accelerating observer. When quantized bits of information, called qubits, are encoded on the observer's event horizon, which is the case for all versions of quantum gravity, like M-theory or non-commutative geometry, the horizon acts as a holographic screen that defines the observer's holographic world. The speed of light can be understood as the maximal rate of information transfer in three dimensional space, which is like the maximal rate of information transfer in a computer. This fact is woven into Einstein's theory of relativity in terms of understanding how the 3+1 dimensional space-time geometry of the world is similar to a Euclidean geometry, where there is a generalized version of the Pythagorean theorem. Unlike a Euclidean geometry, this 3+1 dimensional space-time geometry can become curved, which explains the nature of gravity, but there is still a version of the Pythagorean theorem that allows for measurement of distance in the geometry. Gravity has no natural length scale with which to measure distance, which gives gravity or space-time geometry a property called conformal symmetry. When gravity is quantized, conformal symmetry implies the inevitability of holography due to the encoding of qubits on a holographic screen. Basically, the $1/R^2$ force law for gravity implies holography whenever gravity waves are quantized into gravitons and each graviton is reduced to a qubit of information encoded on the observer's event horizon that acts as its holographic screen.

The basic postulate of relativity theory is the principle of equivalence, which says the observer is understood as a point of view, which is the point of origin of a coordinate system that defines the observer's frame of reference. That point of view always arises in relation to an event horizon whenever the observer is in accelerated motion or in an accelerated frame of reference. The observer's accelerated point of view and its holographic screen, understood as an event horizon that encodes qubits of information, always arise together. Since the observer's holographic screen encodes all the qubits of information for everything the observer can observe in its holographic world, which includes the observer's body and brain, the observer's point of view can only be understood as a focal point of pure consciousness. There is no other logical explanation. This also fits in perfectly with what enlightened beings like Nisargadatta Maharaj have to say about the nature of the world from their own direct experience.

Einstein's theory of relativity, where the force of gravity is understood to arise as the curvature of space-time geometry, is really only built on the constancy of the speed of light, which implies a space-time geometry with a Pythagorean theorem to measure distances, and the lack of a natural length scale, which implies the conformal symmetry of gravity. When gravity is quantized, these two facts imply holography. The only natural way to generate holography is with an accelerating observer, which is understood as a point of view or focal point of pure consciousness, and the observer's event horizon that acts as a holographic screen that encodes all the qubits of information for all the observable things the observer can observe in its holographic world.

The measurement of distance along some path through a space-time geometry with utilization of a generalized Pythagorean theorem, even when that space-time geometry is curved, is called

proper-time, which is fundamental to the formulation of relativity theory. It turns out there is a deep connection between relativity theory and the quantum theory of point particles in terms of measuring distance along some path through space-time geometry. The most general way to formulate quantum theory is in terms of a sum over all possible paths. The quantum state of potentiality allows for all possible outcomes, not just the classical outcome. The way quantum theory expresses this potentiality is in terms of a quantum state that can always be formulated as a sum over all possible paths in some information configuration space.



Quantum State as the Sum Over All Possible Paths

The laws of physics only enter into the quantum state as an action principle, which determines quantum probability. Quantum probability is determined by the quantum wavefunction, which in turn is determined by an action principle. All the laws of physics can be expressed as an action principle. Action is like a measure of distance along some path between two points in some information configuration space. The most likely outcome in terms of quantum probability is the path of least action, which is like the shortest possible distance between those two points in the information configuration space. That's why events seem to obey classical laws of physics, but there is an important caveat. The path of least action only arises from the quantum state when things are chosen from the quantum state of potentiality in an unbiased or random way. If there is bias in the way choices are made, then the laws of physics lose their classical predictability. In the sense of throwing dice, if the dice are loaded, the game is rigged and all bets are off.

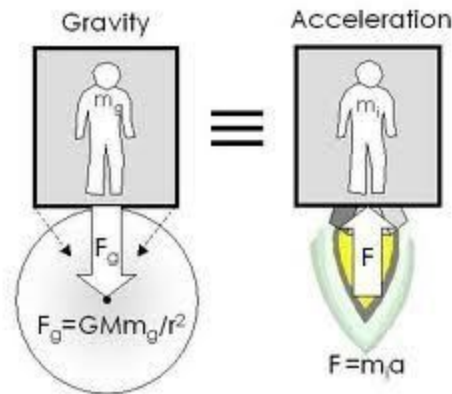
This choice that chooses something from the quantum state of potentiality is called the collapse of the wavefunction or a quantum state reduction. Quantum theory tells us every measurement of something is a choice in the sense of collapsing the quantum wavefunction or reducing the quantum state. The quantum state of potentiality includes all possible outcomes. To actually measure some specific outcome, a choice must be made. Quantum theory says the choices are made randomly, but why can't choices be made in a biased way? Who would make that choice? The obvious answer is that the observer of the actual outcome of the measurement is making that

choice. In the sense of perceiving consciousness, the observer is choosing what to observe in its own observable world. That world only exists in an unobserved state of potentiality until it is observed by the observer and appears to come into an actual state of existence. This raises an even bigger question. What is the true nature of the observer?

In the sense of relativity theory, the observer is nothing more than a point of view at the origin of its own coordinate system. That's what a frame of reference means in relativity theory. From the point of view of other observers, the observer is following a world-line through their space-time geometry, but from the observer's own point of view, the observer is at the center of its own space-time geometry. Quantum theory is telling us with the concept that the measurement of something can only arise as the quantum state of potentiality is reduced to an actual observable state that every point on the observer's world-line is a decision point about what to observe in its world and which path to follow through that world. Only the observer can make that choice. The big question is about the true nature of the observer's consciousness in relation to whatever the observer happens to observe in its world. This question explodes when that observable world is understood to be a holographic world. A holographic world is no more real than images projected from a holographic screen. Who is really observing those projected images? Can an image observe itself? The holographic principle gives the only logically possible answer, which is that the observer is nothing more than a pure point of perceiving consciousness that arises in relation to its own holographic screen. This answer is apparent when we try to unify quantum theory with relativity theory and quantize gravity, which leads us to the holographic principle.

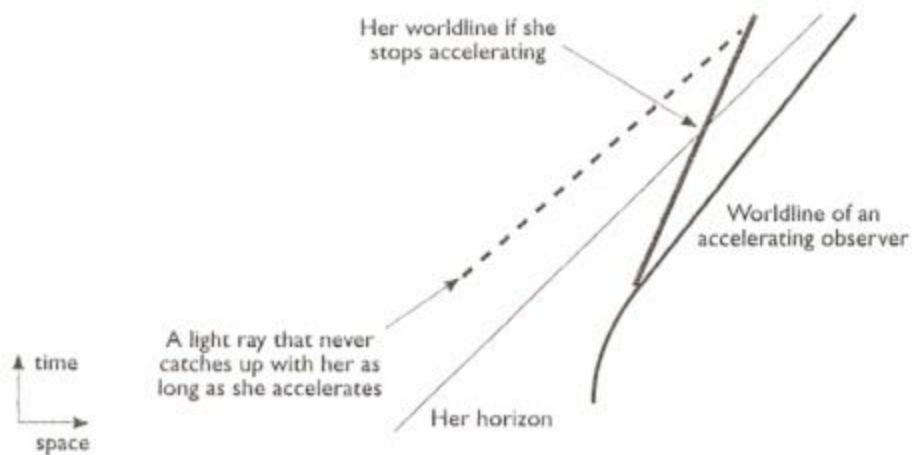
The deep connection of quantum theory to relativity theory is that particle action can always be formulated in terms of proper-time, which measures distance along some path in a curved space-time geometry. The quantum field theory formulation of particle physics utilizes this connection to relativity theory, but can only be formulated in flat space-time geometry, which is called Minkowski space. By its very nature, all of particle physics as formulated by quantum field theory must assume that space-time geometry is flat, but then there is no force of gravity since gravity is nothing more than the curvature of space-time geometry. The basic problem with trying to quantize gravity the same way particle physics is quantized with quantum field theory is that the quantum particle of that field theory must follow a path through a space-time geometry. For quantum gravity, that particle would be called the graviton. Quantizing gravity in this way would mean the graviton would follow a path through space-time geometry, but in the sense of quantum field theory, that is only possible if space-time geometry is flat. The problem is the graviton as the quantum particle of the field theory is supposed to give a representation of the curvature of space-time geometry, which is the nature of gravity, but the graviton itself has to follow a path through space-time geometry. There is a deep contradiction in this way of formulating how gravity is quantized. The only solution that has been found for how to resolve this logical contradiction is the holographic principle. Only the holographic principle allows for a logically consistent formulation of quantum gravity, but the price we have to pay for this logical consistency is a new way of understanding the nature of consciousness.

In relativity theory, an accelerated frame of reference is equivalent to the exertion of a force, which is known as the principle of equivalence. Any force, like the force of gravity, is equivalent to an observer's acceleration, like an observer in a rocket-ship that accelerates through space. There is no way to distinguish the effect of an acceleration from the exertion of a force.



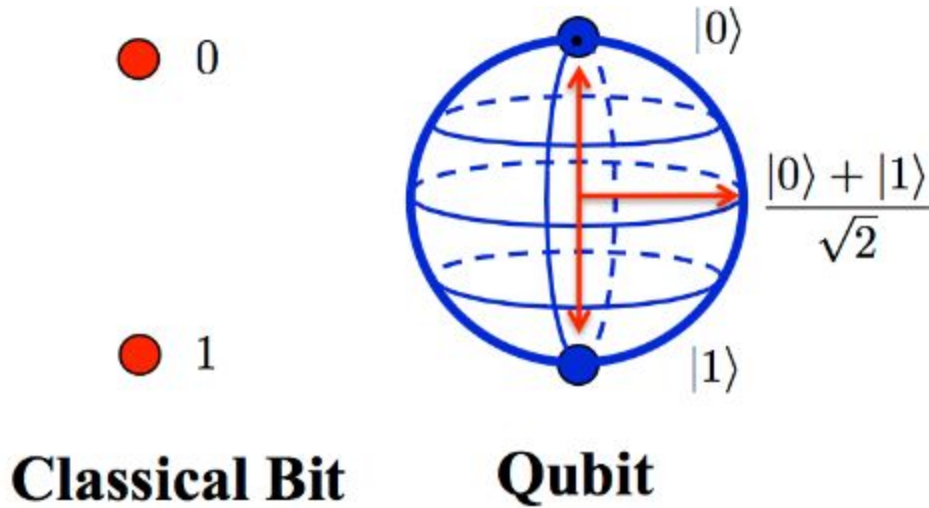
Principle of Equivalence

The fundamental nature of the universe is quantized bits of information, called qubits, which are encoded on a holographic screen. That's what makes the universe a holographic universe. The holographic screen in turn is an event horizon that arises in an observer's accelerated frame of reference. The accelerating observer's event horizon is a bounding surface of space that limits the observer's observation of things in space due to the constancy of the speed of light for all observers, independent of their individual state of motion. The observer's event horizon is as far out in space as the observer can observe things in space. Every observer in an accelerated frame of reference has an event horizon that limits the observer's observation of things in space.

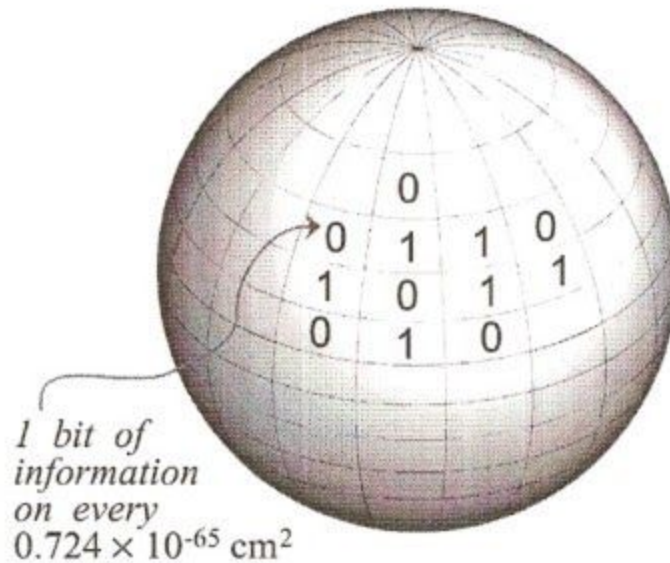


Accelerating Observer's Event Horizon

The easiest way to understand how qubits of information are encoded on the observer's event horizon, which turns the horizon into a holographic screen, is with non-commutative geometry, which explains how space-time geometry is quantized. Each quantized position coordinate on the observer's event horizon is smeared out into an area element like a pixel that encodes a quantized bit of information or qubit. In quantum gravity, the pixel size is called the Planck area.



Qubit as the Information Encoded on a Planck Size Event Horizon

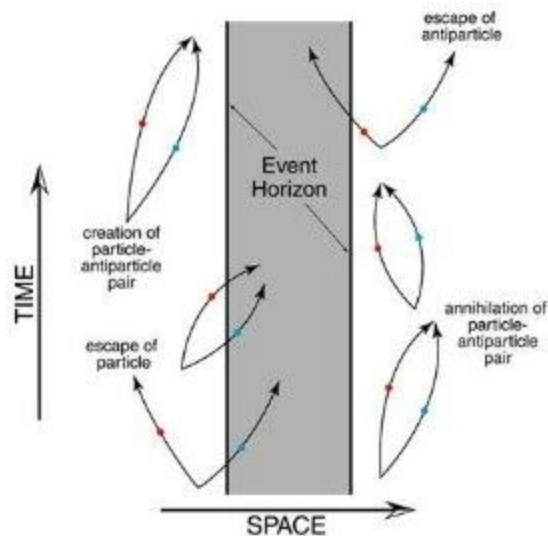


Holographic Principle

This gives the observer's event horizon an entropy as $S=kn$, where n is the number of qubits encoded on the event horizon, which is proportional to the surface area A of the horizon as $n=A/4\ell^2$, where $\ell^2=\hbar G/c^3$ is the Planck area. Each Planck area on the horizon acts like a pixel

that encodes a qubit of information. Non-commutative geometry fundamentally explains how the qubits are encoded on a holographic screen in terms of quantizing position coordinates on the screen, which smears out each quantized position coordinate into an area element like a pixel that encodes a qubit of information. This value for entropy of the observer's event horizon given in terms of the number of qubits encoded on the horizon is called the holographic principle.

The holographic principle says that every accelerating observer has its own holographic world defined on its own holographic screen that arises as an event horizon in the observer's accelerated frame of reference. The observer's holographic screen is where all the qubits of information for everything observable in the observer's world are encoded. Things don't really exist in three dimensional space. Everything observable in three dimensional space is a holographic illusion that arises as a holographic form of information for that thing is projected like an image from the observer's holographic screen, which is a two dimensional bounding surface of space, to the observer's central point of view in space, which always arises in relation to that holographic screen. The observation of things appearing in three dimensional space is a holographic illusion that results from holographic projection. This even applies to elementary particles, like photons and electrons. All the fundamental qubits of information for an elementary particle are encoded on the observer's holographic screen. The observer's observation of an elementary particle, like anything else it can observe in its holographic world, is only the observation of a form of information projected like an image from the observer's holographic screen to its central point of view. Everything observable arises through holographic projection.



Hawking Radiation

The energy that flows through the observer's holographic world also arises in the observer's accelerated frame of reference. This energy is given in terms of the Unruh temperature as $E=kT$, which is proportional to the observer's acceleration, a , as $kT=\hbar a/2\pi c$. The Unruh temperature arises as the temperature of thermal radiation the accelerating observer observes emitted from its

event horizon. This thermal radiation arises from separation of virtual particle-antiparticle pairs at the event horizon as observed by the observer in its accelerated frame of reference.

Thermal radiation appears to be radiated away from the accelerating observer's event horizon, which is called Hawking radiation, but is only observed by the accelerating observer. Hawking radiation is confusing since it mixes up concepts of the holographic principle with the quantum field theory formulation of point particles. In quantum field theory, uncertainty in energy allows virtual particle-antiparticle pairs to become created within the vacuum state for a short period of time. The virtual pairs are created out of nothing and then normally annihilate back into nothing, but from the point of view of an accelerated observer, something weird appears to happen. The accelerated observer's observations of things in space are limited by its event horizon. At the observer's event horizon, the virtual particle-antiparticle pairs can appear to separate. One member of the pair can disappear behind the event horizon while the other member of the pair can appear to be radiated away from the event horizon toward the observer. The observer observes this radiated particle as a particle of thermal radiation, which gives its event horizon an apparent temperature. The observer's event horizon is acting as a holographic screen that encodes qubits of information for all the point particles that can appear in the observer's world through holographic projection, but the separation of virtual particle-antiparticle pairs at that event horizon gives the observer's event horizon an apparent temperature that's proportional to the observer's acceleration. In quantum field theory, the virtual particle-antiparticle pairs are entangled. This implies the entropy of the observer's event horizon is an entanglement entropy. This is consistent with the holographic principle as understood with non-commutative geometry since all the qubits of information encoded on the observer's event horizon are also entangled.

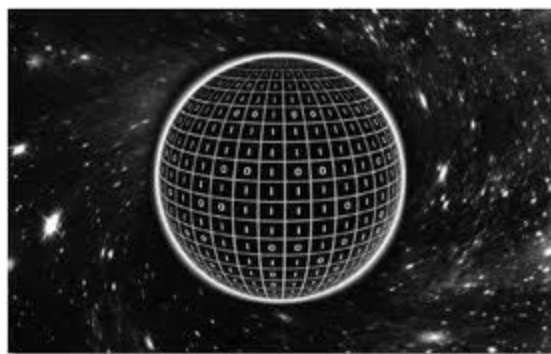
The idea of quantum entanglement is inherent in the holographic principle as understood with non-commutative geometry. All the quantized bits of information or qubit encoded on an event horizon that acts as a holographic screen are inherently entangled, which is understood in terms of matrices. Quantum entanglement allows qubits to be defined in a rotationally invariant way. This is much like the way quantum theory defines spin $\frac{1}{2}$ particles in terms of a 2×2 $SU(2)$ matrix. The $SU(2)$ matrix gives a representation of rotational symmetry on the surface of a sphere, but its two eigenvalues also define spin up and spin down states. These two spin states give a representation of information in a binary code, like a switch that is either on or off. The spin up and spin down states are like vectors that point up or down, but when these spin states are entangled, the vector can point in any direction, and so rotational symmetry is preserved. With the holographic principle, the n qubits of information encoded on a spherically symmetric holographic screen can be defined by the n eigenvalues of an $n \times n$ $SU(2)$ matrix.

This tells us that the n qubits of information encoded on a holographic screen are fundamentally entangled with each other. A holographic world defined by the qubits of information encoded on a holographic screen is fundamentally a world where everything is connected to everything else at the level of quantum entanglement. A holographic world is inherently holistically connected.



Black Hole

The holographic principle is telling us about a peculiar symmetry that's inherent to the nature of gravity. This symmetry is called conformal symmetry, which is the symmetry of objects that appear self-similar when observed at different length scales. Conformal symmetry expresses invariance of the laws of physics as the space-time metric is transformed with a new length scale. The law of gravity as reflected by Einstein's field equations for the space-time metric has no inherent length scale. This gives rise to the gravitational acceleration of a massive body that falls off as $1/R^2$ at a radial distance R from the massive body. The holographic principle was first discovered for black holes, which are defined by an event horizon of radius R . At the event horizon, the acceleration due to gravity is $a=GM/R^2$, where M is the mass of the black hole and R is the radius of its event horizon. A stationary observer hovering outside the event horizon of a black hole must accelerate away from the black hole with an equal but opposite acceleration to maintain its stationary position. The Unruh temperature of the event horizon as observed by the accelerating observer, $kT=\hbar a/2\pi c$, is proportional to the observer's acceleration $a=GM/R^2$. The entropy, $S=kn=kA/4\ell^2$, of the event horizon is proportional to its surface area $A=4\pi R^2$.



$$S_{\text{BH}} = \frac{kA}{4\ell_{\text{P}}^2}$$

Black Hole Entropy

The event horizon of a black hole is a special spherical surface where the escape velocity from that surface is the speed of light. A simple way to calculate the radius of the event horizon using classical concepts is to equate the kinetic energy of a particle of mass m moving away from a mass M with a velocity v , $KE = \frac{1}{2}mv^2$, with the gravitational potential energy of that particle at a distance R from the mass M , $PE = GmM/R$. With escape velocity, the mass m has just enough kinetic energy to overcome the gravitational attraction of the mass M . This determines escape velocity as $v^2 = 2GM/R$. If we equate $v=c$, we find the radius of the event horizon is $R = 2GM/c^2$, which is to say the escape velocity at the event horizon of a black hole is the speed of light.

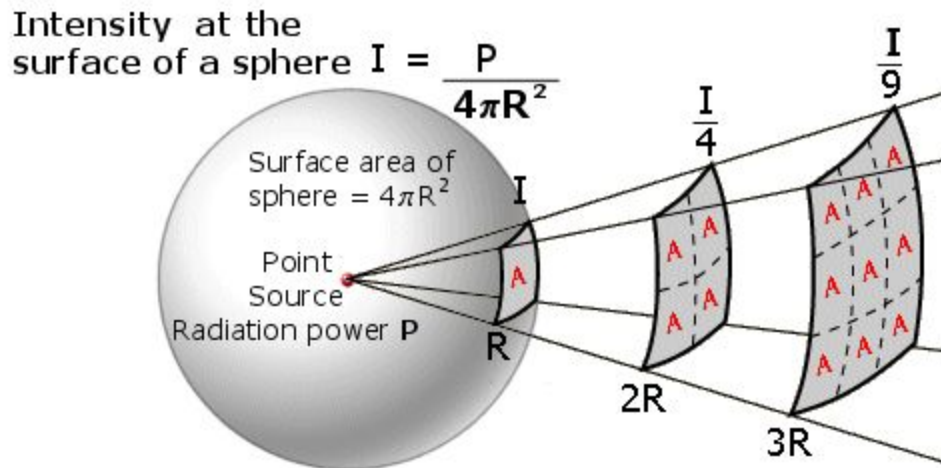
$$R = \frac{2GM}{c^2}$$

Schwarzschild Radius

It's not a coincidence that the entropy of the event horizon behaves like R^2 while the Unruh temperature behaves like $1/R^2$. The total energy of the black hole is given in terms of its mass as $E = Mc^2$. The laws of thermodynamics relate a change in total energy to temperature and a change in entropy as $\Delta E = T\Delta S$. In terms of the holographic principle, the fundamental reason for this relation between energy and entropy is each qubit of information encoded on the observer's holographic screen inherently carries an amount of thermal energy $E = kT$ given in terms of the Unruh temperature. At thermal equilibrium, each qubit carries an equal amount of thermal energy. Each qubit of information is a fundamental dynamical degree of freedom for the observer's holographic world. The equal partition of energy tells us that each dynamical degree of freedom, which is a qubit of information, carries an equal amount of energy $E = kT$ at thermal equilibrium, which defines temperature. As more qubits of information are encoded on the observer's holographic screen, more energy is inherent in that holographic world.

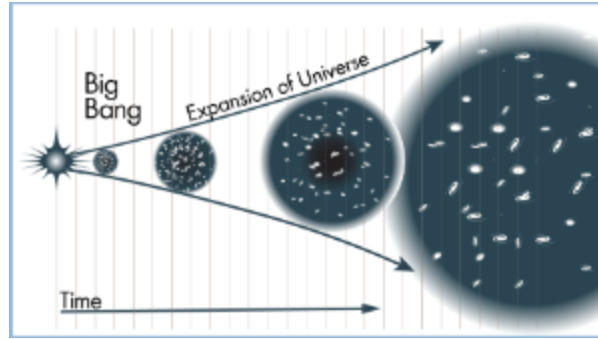
The key idea is the entropy of the event horizon is an area law that behaves like R^2 , while the Unruh temperature of the event horizon is an acceleration that behaves like $1/R^2$, and so these two factors cancel each other out in the thermodynamic relation between energy and entropy, $\Delta E = T\Delta S$. We're assuming three dimensional space where the surface area of a spherical event horizon is proportional to R^2 . There's a simple physical explanation for why the acceleration due to gravity behaves like $1/R^2$. If we imagine the force of gravity is due to the exchange of a force particle called the graviton and that a mass acts like a point source of gravitons constantly emitted in all directions, then the total flux of gravitons that pass through a spherical surface of radius R must be constant, and so the force of gravity falls off as $1/R^2$. The force of gravity between two masses is proportional to the number of gravitons exchanged and falls off as $1/R^2$ since the total flux of gravitons passing through a spherical surface is constant.

The Inverse Square Law



The speed of light is also the speed that a graviton travels through space since the graviton is a massless particle, like the photon. The idea of the holographic principle is to encode qubits of information for gravitons on the surface of an event horizon that acts as a holographic screen. In order to keep the flux of gravitons through the surface constant, independent of the radius of the surface, the number of pixels on the surface, each of which encodes a qubit of information, must be proportional to the surface area. The holographic principle reflects the total flux of gravitons through a spherical surface is constant when the gravitons are emitted from a point source at the center of that surface, which implies the $1/R^2$ force law, and that each graviton can be reduced to a qubit of information encoded on the special surface of an event horizon, which implies the area law for entropy. Entropy is the total number, $n=A/4\ell^2$, of qubits encoded on the event horizon needed to characterize all the gravitons. The acceleration due to gravity enters into the Unruh temperature as a way to insure that the laws of thermodynamics are satisfied.

The holographic principle gives a perfectly good explanation for how the observer's world is created in terms of the observer's accelerated frame of reference. Everything the observer can observe in its world arises through holographic projection, as a form of information is projected like an image from the observer's holographic screen to its central point of view. The observer's holographic screen always arises as an event horizon in its own accelerated frame of reference. That event horizon acts as a holographic screen in the sense of encoding qubits of information, which are the fundamental dynamical degrees of freedom of its holographic world. Everything perceivable in its holographic world is a form of information constructed out of qubits encoded on the observer's holographic screen. Even the flow of energy that animates those forms of information is inherent in the observer's own accelerated frame of reference in the sense of thermodynamics and the Unruh temperature of its event horizon.



Expansion of Space

The idea of creation of the universe in a big bang is based on the idea of the expansion of space. As is well known, the expansion of space implies a cosmic horizon that limits the observations of the observer at the central point of view of that bounding surface of space. The holographic principle tells us the observer's cosmic horizon defines its world whenever space expands. Inherent in the big bang is the idea the observer's world increases in size as space expands. This implies the observer's cosmic horizon increases in radius as the observer's world increases in size. As the observer's cosmic horizon increases in radius, its Unruh temperature cools, which explains the normal flow of heat in the observer's world as heat flows from hotter to colder objects. This also explains the second law of thermodynamics which says entropy tends to increase as heat flows in a thermal gradient. As the observer's cosmic horizon increases in radius, its Unruh temperature cools, but its surface area increases, which implies the entropy of the observer's world increases even as its world cools, since more qubits of information are encoded on the observer's cosmic horizon.



Normal Flow of Energy Through the Observer's Perceivable World

Everything perceivable arises through holographic projection. Even the 3+1 dimensional space-time geometry of the world arises through holographic projection. Just like all other

perceivable things, space-time geometry can be reduced to qubits of information encoded on a holographic screen, and the perception of space-time geometry is no more real than forms of information projected like images from the screen to the observer's central point of view. The space-time geometry the observer observes in its world has no independent existence. If the observer doesn't observe it, that space-time geometry doesn't really exist. Everything the observer observes in its world, including the space-time geometry of that world, is dependent on the observer's observation of it before it can appear to come into existence. If the observer does not observe it, it does not exist, except in the sense of an unobserved state of potentiality. That's what quantum theory tells us. The observation of space-time geometry, just like anything else the observer can observe, is only an illusion of existence in the sense of holographic projection.

Most physicists cannot accept this state of affairs since space-time geometry, like everything else that can be perceived in the world, appears to obey computational rules. The space-time geometry of the observer's world appears to obey the computational rules inherent in Einstein's field equations for the space-time metric. How can something that's not really real and doesn't really exist obey computational rules? The simple answer is, that's the inherent nature of a holographic world. The holographic appearance of that world is constructed out of the qubits of information encoded on a holographic screen, and that holographic construction process obeys computational rules, like the rules that govern the operation of a computer. The computational rules that govern the holographic appearance of the 3+1 dimensional space-time geometry of the observer's world aren't even exact. These rules arise as thermodynamic equations of state and are only an approximation with a limited range of validity in the sense of thermodynamics, which only gives an approximate thermal average description of the observer's world.

When the observer observes a particle located at some position in space and the motion of that particle through space over the course of time, the observer is really only observing a form of information projected like an image from its own holographic screen to its own point of view and animated over a sequence of holographic projections, just like the animation of the projected images of a movie from a computer screen to an observer. The reason we can say this with confidence is because all of particle physics can be formulated in terms of quantum field theory, and we can deduce all of quantum field theory from the holographic principle.

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} = 8\pi GT_{\mu\nu} - \Lambda g_{\mu\nu}$$

Einstein's Field Equations for the Space-time Metric

To begin with, we can deduce Einstein's field equations for the space-time metric, which is the nature of gravity, from the holographic principle. Einstein's field equations are thermodynamic equations of state that arise from the laws of thermodynamics that relate energy to entropy and

temperature, $\Delta E = T \Delta S$. Ted Jacobson has shown how this derivation goes forward in terms of the area law for the entropy, $S = kn = kA/4\ell^2$, of an event horizon and the Unruh temperature of that event horizon, $kT = \hbar a/2\pi c$, as observed by the accelerating observer in its accelerated frame of reference. As heat flows across a bounding surface of space, the total energy of that bounded region of space must change, which implies a change in the entropy of that bounded region of space. The holographic principle then tells us the area of the bounding surface must change, which implies a change in the geometry of the bounded region. Jacobson showed this change in the geometry of the bounded region is described by Einstein's field equations for the space-time metric. Einstein's field equations only have the validity of a thermodynamic equation of state. Once we have Einstein's field equations, all quantum fields of the standard model of particle physics can then be deduced as extra components of the space-time metric with the usual unification mechanisms of extra compactified dimensions of space and super-symmetry. The whole quantum field theory formulation of particle physics and the relativistic space-time geometry formulation of gravity can therefore be deduced from the holographic principle.

All we really need to explain the quantum field theory formulation of particle physics and the relativistic space-time geometry formulation of gravity is an observer in an accelerated frame of reference, which gives rise to an event horizon. Apply non-commutative geometry to that event horizon as a way to quantize position coordinates on the horizon, and we have an explanation for how to generate all the qubits of information that describe everything in a holographic world. This not only includes all the so-called elementary particles of that world that underlie the electromagnetic, strong and weak nuclear forces, but also the space-time geometry of that world that underlies the effect of gravity. Everything observable in that world is a projected form of information animated in the flow of energy. In the sense of holographic projection, the forms are projected like images from a holographic screen to the observer's central point of view that arises in space relative to the screen and are animated in the flow of energy, like the animated frames of a movie. The Unruh temperature of the observer's event horizon also gives us a thermodynamic explanation for how energy flows through that holographic world. The Unruh temperature feeds back into the point particle formulation of quantum theory since it arises from the apparent separation of virtual particle-antiparticle pairs at the event horizon as observed by the observer in its accelerated frame of reference. The only thing that really seems to be fundamental to the explanation is the observer itself. The holographic principle is telling us that only the observer itself has its own independent existence, which fundamentally is the existence of consciousness.

Only the observer itself can have its own independent existence, but we'd like to go further and understand the true nature of that existence. The observer itself can only be understood as a presence of consciousness that's present at the center of its own holographic world, but where does that presence of consciousness come from? This is where the void comes into the story. The void is the true nature of potentiality. The void can also be called the ultimate nature of existence or the ground of being, which is the potentiality for things to come into existence. As the ground of being, the void is the ultimate nature of reality. In-and-of-itself, the void only exists in the

sense of absolute nothingness, but that nothingness is the potentiality for things to come into existence. The void is the potentiality to create all the energy and information inherent in a holographic world. The void is the ultimate nature of reality, and the holographic world it creates is a lesser form of reality, like a virtual reality. That virtual reality comes into existence because of the creation of the information and energy that underlies all observable things. These things not only include what physicists call elementary particles, but also the space-time geometry those observable things appear to exist within. Even the space-time geometry of a holographic world is observable, and in some sense is just another observable thing that can be reduced to information and energy. The space-time geometry of a holographic world is reducible to the qubits of information encoded on a holographic screen and the flow of energy through that holographic world just like everything else observable in that holographic world.

The way this creation process goes forward is in terms of the energy inherent in the observer's accelerated frame of reference. The observer's acceleration is where the energy comes from that animates the observer's holographic world. The void is the potentiality to create the energy inherent in the observer's accelerated frame of reference. The easiest way to understand how the void creates this energy is in terms of the expansion of space, which is the nature of dark energy. The expansion of space always gives rise to an event horizon with the observer at the central point of view of that bounding surface of space. The easiest way to understand how the void creates information is in terms of non-commutative geometry, which is a way to encode qubits of information on the observer's event horizon that turns into its holographic screen.

The void is the potentiality to create all the energy and information inherent in a holographic world, but where does the consciousness of the observer come from? The simplest answer is the consciousness of the observer also comes from the void. The void is the potentiality to give rise to the consciousness of the observer. The void is also consciousness, but it is a more fundamental kind of consciousness than the observer's consciousness. The consciousness of the observer is an individual or divided kind of consciousness, while the void is undivided consciousness. The void is the potentiality for the observer's consciousness to come into existence in the sense that the individual consciousness of the observer must be divided from the undivided consciousness of the void before the observer's holographic world can appear to come into existence and be observed by the observer. The observation of that world is always limited by an event horizon that acts as a holographic screen.

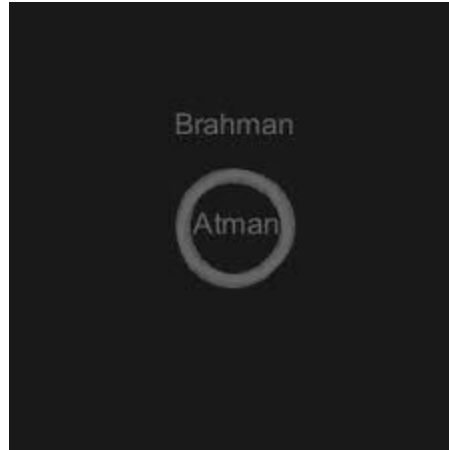
The consciousness of the observer is not only divided, but it is also limited, while the consciousness of the void is unlimited and undivided. Only the observer's consciousness can observe things in its own holographic world. Each such observation of something by the observer is the observation of a form of information projected like an image from the observer's holographic screen to its central point of view. The consciousness of the void observes nothing because it has no holographic screen. The observer's holographic screen is always a limitation of consciousness that can only arise in the observer's accelerated frame of reference as an observation limiting event horizon. Only an observer can observe things in its own holographic

world. This only becomes possible when the divided consciousness of the observer is limited by a holographic screen. The unlimited and undivided consciousness of the void observes nothing, and yet the void is the potentiality to create a holographic world and give rise to the consciousness of the observer that observes that holographic world from the central point of view of that world. This creation process can only appear to happen within the void if the consciousness of the observer is divided from the undivided consciousness of the void and that point of consciousness then enters into an accelerated frame of reference that gives rise to the limitation of a holographic screen that defines the observer's holographic world.

The key concept of the *one-world-per-observer* paradigm inherent in the holographic principle is that the observer's holographic world can only be created within the void through the construction of a holographic screen as the observer enters into an accelerated frame of reference, but before that creation can occur, the consciousness of the observer must be divided from the undivided consciousness of the void. The only reason the observer is unaware of the void is because the observer's attention is totally focused on itself and its world. The process of the observer shifting the focus of its attention away from itself and its world, and back onto its source, is called awakening, as in awakening from a dream.

This relationship of the void to the observer is like the relationship of a dreamer to its dream. The unlimited and undivided consciousness of the void, which observes nothing, is the source of the limited and divided consciousness of the observer that observes its own holographic world. That holographic world is the dream, and the void is the dreamer. The consciousness of the observer is a divided fragment of the undivided consciousness of the void. The fragmented consciousness of the observer must be separated from the unfragmented consciousness of the void for that holographic world to appear to come into existence and be observed by the observer. The fragmented consciousness of the observer is always connected to its source in that this state of separation can come to an end at any moment and the divided consciousness of the observer can return to and reunite itself with the undivided consciousness of the void.

This state of reunion can be understood as an ultimate state of free fall in which the observer's holographic world disappears from existence. The observer has no holographic screen in an ultimate state of free fall since it has no event horizon that limits its observations. Ironically, when there is no limitation of consciousness, there is also nothing to observe, and there is no separation. The void is this unlimited and undivided primordial state of consciousness, which is a state of pure potentiality. When that potentiality is expressed, an observable holographic world appears to come into existence and the consciousness of the observer becomes divided from the undivided consciousness of the void so that the observer can observe its own world. When that potentiality is not expressed, only the unlimited and undivided consciousness of the void exists. In that ultimate state of existence, nothing is observed. The void is that absolute nothingness, which in the sense of potentiality, is the true nature of what I am, you are, and everything is.



Atman-Brahman

How is the observer's ultimate state of free fall even possible? The answer is the observer must be present to observe its own observable holographic world. Being present for its world means the observer must focus its attention on that world. If the observer withdraws its attention away from that world and is not present to observe that world, that world remains in an unobserved state of potentiality. Both the form of all things in that world and the flow of energy through that world remain in an unobserved state of potentiality. Without the expression of that energy, the observer no longer is in an accelerated frame of reference, but instead enters into an ultimate state of free fall. In this ultimate state of free fall, the observer no longer observes a holographic world. The observer's holographic world disappears from existence from the observer's own point of view. In the language of nonduality, this ultimate state of free fall is described as falling into the void. In this ultimate state of free fall, the observer's individual existence, which is its own divided sense of being present or *I-Am-ness*, dissolves back into the undivided being of the void like a drop of water dissolves back into the ocean. This oceanic experience is the nature of the observer realizing the truth of what it really is, which is the truth of its own being.

What about mathematical truth? Mathematical truth is inherent in the potentiality of the void to create geometry. As mathematicians have long known, all mathematical truths are geometrical in nature. Great mathematicians have been Platonists in the sense they know they only discover the mathematical truths inherent in the potentiality to create geometry. Geometrical mathematical truth is what underlies the geometric creation of the holographic illusion of a holographic world.

This way of understanding the holographic principle has no logical inconsistencies or paradoxes. It is completely consistent with everything we know about modern physics, and is really the only way modern physics can be understood in a logically consistent way. The other great advantage of this way of understanding the holographic principle is that it's totally consistent with what enlightened beings like Nisargadatta Maharaj tell us about the true nature of reality. Enlightened beings have directly experienced the true nature of reality. They have returned to the ultimate state of existence and come back to the world to tell us what is real and what is illusion.

Anyone who has read this article to its logical conclusion is at least open to the possibility that physicalism is a false paradigm. The question everyone has to ask themselves is why is there so much emotional resistance to this possibility? The resistance against rejecting physicalism as a false paradigm about the nature of the world is not based on logical reasoning, but solely on emotional reactions against this possibility. Where does this emotional resistance come from?

The answer is the ego. The ego or personal self-concept is entirely an emotional creation, as is well accepted in both psychology and neuroscience. The ego is mentally constructed as a personal body-based self-concept is emotionally related to the concept of some other thing. The personal self-concept is a mentally constructed self-image, while the concept of the other thing is a mentally constructed image of the other thing. These mentally constructed images must be emotionally related for the ego to *appear to come into existence*. The ego can only *appear to come into existence*, since these mentally constructed images can only be constructed out of what can be perceived in the world. The question the ego can never answer is about the true nature of the perceiver. What is the true nature of perceiving consciousness that perceives these images?

At a more fundamental level than the mental-emotional construction of the ego, the experience of *self and other* can only arise in a *subject-object relation* as an observer observes some observable thing in its own observable world. The holographic principle is telling us that the true subjective nature of the observer is a focal point of perceiving consciousness at the center of the observer's own holographic world, and that the objective nature of all things in that world are only forms of information encoded on the observer's holographic screen, which only arises as an event horizon in the observer's accelerated frame of reference. Those observable things include the observer's body and all the mental images constructed in the observer's mind. A body-based, emotionally energized, mentally constructed personal self-concept cannot be the true nature of the observer since that self-concept is only another form of information the observer perceives.

There can only be an illusion that the observer is a personal self-concept when the observer feels emotionally self-limited to the emotionally animated form of its body. That emotional feeling of self-limitation is the only thing that can create the illusion that the observer is a person in the world that it perceives. In reality, the observer has its own independent existence as a presence of perceiving consciousness at the central point of view of its own holographic world. That is the only logically consistent way to interpret the holographic principle.

The holographic principle is a hammer. All I'm doing in this article is hammering away at the logical inconsistencies inherent in the conventional physicalist way science is understood. I'm only hammering away at the logical inconsistencies inherent within science when science is understood in the context of a personal self-concept that is assumed to understand science. This of course is logically impossible, since a personal self-concept must itself arise from the logical structure of science to be a scientific thing. The critical thing to realize is that scientific things are all observable things. The holographic principle is telling us that the *Self* in the sense of the observer of the observable things is not itself an observable thing. The *Self* can only be a

presence of consciousness at the center of its own holographic world, which is not an observable thing. Only the *Self* can have its own independent existence, called *I Am*, independent of all the observable things the *Self* observes in its own observable world. The *Self* is aware of its own independent existence with its own sense of being present to observe that observable world.

The observable things are all a part of the holographic world the *Self* is observing, including the person in that world the *Self* mistakenly takes itself to be by emotionally identifying itself with the emotionally animated form of a person. To assume that a person is an observing *Self* is a logical contradiction. That is the logical contradiction in science I'm hammering away at. What surprises me is that more people in science can't see that logical contradiction and don't use the holographic principle to hammer away at it. I guess I really shouldn't be surprised since the ego will believe any logical contradiction it has to believe to defend its own survival and apparent existence. Who wants to realize their apparent existence as a person in the world they perceive, which is their personal self-concept, is only a holographic illusion? The answer is nobody.

People in science who search for a *Theory of Everything* are searching for an answer that has already been discovered. The answer is inherent in the logical implications of the holographic principle. The holographic principle as demonstrated by the AdS/CFT correspondence deduced from M-theory or in matrix models that utilize the geometric mechanism of non-commutative geometry gives a perfectly good scientific answer to the questions scientists are asking. The problem is that scientists ignore the answer because they don't like the answer even though the answer is the only logical possibility. All the other answers they seem to prefer and look for are logically impossible. If they really were good detectives like Sherlock Holmes, they would reject the logically impossible answers and accept the only logically possible answer. When you've ruled out everything that's impossible, whatever remains, no matter how implausible it seems, must be the truth. The true answer only seems implausible to them because they don't like the answer, not because the answer is untrue. The answers they prefer and find more plausible are the logically impossible answers. If they really carried the logical implications of the holographic principle to its logical conclusion, they would discover what in Zen Buddhism, Taoism and Advaita Vedanta is called nonduality.

The concept of nonduality is all about the *Source* of the observable physical world and the *Source* of the observing consciousness that perceives that observable physical world. This is the part of the answer they're ignoring. They're ignoring the *Source*. If they were really serious about discovering a true conceptual answer, they would consider the *Source*. Ironically, no conceptual answer can ever really describe the nature of the *Source* since the *Source* is non-conceptual in nature. That's why in Zen Buddhism, Taoism and Advaita Vedanta no value is given to any possible conceptual answer, but only to the direct experience of the *Source*. One has to go beyond conceptual answers to have that direct experience. Of course, if they really did that, there would be no purpose in their search for a scientific answer. They're trying to answer a question that really can't be answered, at least not at a conceptual or scientific level.

People in science who continue to believe in the physicalism paradigm have taken the blue pill. They're unwilling to confront the unpleasant truth about the nature of their own life. They remain in a blissful state of ignorance and believe whatever they want to believe. They take the blue pill because they can't give up or let go of their emotionally created beliefs. They're emotionally attached to their beliefs. The core belief they can't give up is their belief that they are a physical person in the physical world they perceive. The only thing that props up this false belief is the emotional energy inherent in the mental construction of this belief, which makes it feel real.

To take the red pill is to go beyond beliefs. To go beyond beliefs is to go beyond the expression of emotions that create all beliefs. That emotional energy is what animates the life of a physical person in the physical world one perceives and makes that life feel real. The core belief that one has to give up in order to go beyond belief is the false belief that one is a physical person in the physical world one perceives. To awaken to the truth of what one really is, one has to become willing to believe nothing. One can only realize the truth without belief because *No belief is true*. Believing nothing is a necessary step in the process of doing nothing and becoming nothing, which eventually leads to knowing nothing. One eventually knows the non-conceptual absolute nothingness that is the truth of one's own existence, which is the truth of what one really is.

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