What's Wrong with Physics

Conventional physics has the whole thing ass-backwards. The number one mistake that conventional physics makes is to falsely assume that there is an objective physical reality of the world out there that we can perceive. This idea contradicts the very notion of quantum theory, which is the foundation for all of modern theoretical physics. In quantum theory, the quantum state is not an observable state. The quantum state is a state of potentiality that expresses the possibility of observation. The quantum state is formulated as a superposition or a sum over all possible observable states. An observation only occurs when a choice is made and one of these possible observable states is actually observed. The other way the quantum state can be formulated is as a sum over all possible paths. Again, a choice must be made wherever a path is actually followed. In quantum theory, this choice goes by various names, such as a quantum state reduction or the collapse of the wave function. The nature of this choice about what we can observe in the world or which path we can follow through the world is at the heart of what's called the measurement problem of quantum theory.

The bottom line is that there is no objective physical reality of the world out there that we can perceive. With every observation of the world, we have to make a choice about what we'll observe in the world or which path we'll follow through the world. The quantum state of the world only expresses all possibilities about what we can observe in the world, which is always formulated as a superposition of all possible observable states. That's what makes the quantum state a state of potentiality.

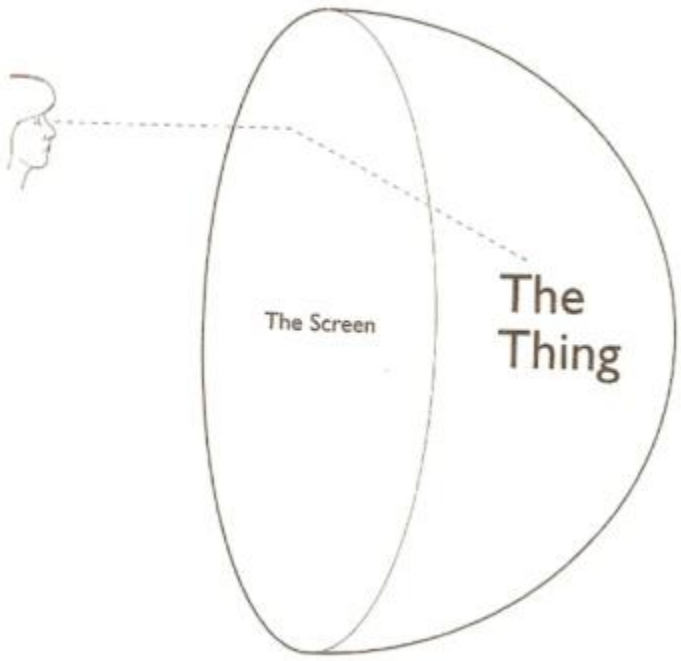
In the language of quantum theory, the quantum state is inherently entangled due to this superposition of all possible observable states. Quantum entanglement expresses this potentiality of observation. Quantum entanglement tells us that there is no such thing as local realism. This is not just a theoretical idea, but has been confirmed by direct observation of the world, and for which the Nobel prize was recently awarded. When the quantum state of two distinct things that can be observed in the world becomes quantum entangled, observation of the first thing determines the nature with which the second thing can be observed, even if those two things appear to have become separated by a large distance. This is simply a consequence of observation reducing the entangled quantum state, which is a superposition of all possible observable states, to an actual observable state. Reduce the quantum state of one thing and you also reduce the quantum state of the other thing. Quantum entanglement tells us that there is no objective physical reality of the world out there that we can perceive in the sense of local realism. Things do not actually exist out there with their own local properties. Quantum entanglement tells us that the observation of anything is inherently connected to the observation of everything else that we can perceive in the world.

For an example of this kind of mistaken thinking about the world as a objective physical reality, watch this recent World Science Festival video about Gravitational Rainbows:

Beyond Einstein: Gravitational Rainbows

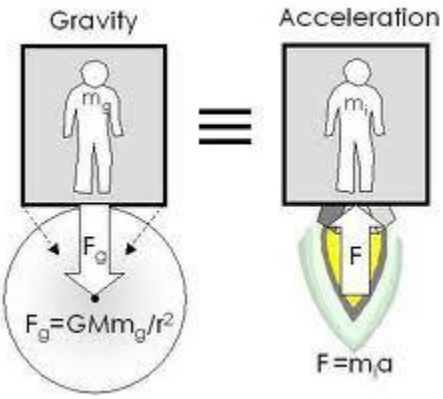
Conventional physics with its mistaken idea that there is an objective physical reality of the world out there that we can perceive also mistakenly assumes that a world of matter, energy, space and time exists. Conventional physics, like all other branches of science, mistakenly assumes that in that perceivable world the emotionally animated form of a person comes into existence and that within that personal form personal consciousness emerges. This idea is just flat-out wrong. It is logically impossible that the consciousness that perceives the world can arise within the world that it perceives.

In some sense, the consciousness of the observer must be outside the world that it perceives, just like the consciousness of an observer that watches a movie that is being displayed on a computer screen is outside the computer screen. Everything that the observer can perceive in the movie is a form of information that can be reduced to bits of information encoded on the computer screen. Those forms are projected like images from the computer screen to the observer's point of view outside the screen and are animated in the flow of energy that flows through the computer. Everything the observer can perceive is an object of perception that is being displayed on the computer screen. John Wheeler called this idea about the nature of perception "*It from bit*".



The Observer, the Screen and the Object of Perception

Neither theoretical physics nor neuroscience nor any other branch of science can explain the nature of the observer's perceiving consciousness. In relativity theory, the observer is simply understood to be a point of view that defines its own frame of reference. That point of view can be understood as the origin of a coordinate system. When the observer's coordinate system moves with accelerated motion relative to the coordinate systems of other observers, the accelerating observer is understood to be in an accelerated frame of reference. The importance of an accelerated frame of reference has to do with the nature of gravity. In relativity theory, the principle of equivalence tells us that the observer's perception of the effects of gravity are equivalent to the observer's own accelerated motion. An accelerating observer observes the same effects of gravity as observed by an observer that stands on the surface of the earth.



Principle of Equivalence

In relativity theory, the effects of gravity are understood to arise from the dynamical curvature of the observer's own space-time geometry. The only reason the observer's space-time geometry is curved is due to the observer's own accelerated motion in its accelerated frame of reference. Every accelerating observer observes the effects of gravity in its own accelerated frame of reference due to the dynamical curvature of its own space-time geometry that only occurs due to its own accelerated motion.

The reason the observer's accelerated motion is so important is because it explains the nature of the holographic principle of quantum gravity. The holographic principle is the most fundamental scientific concept known to man, as it not only explains the nature of all the elementary particles that appear to exist in the world in the sense of quantum theory, atomic theory, and the fundamental electromagnetic and nuclear forces, but it also explains the nature of the dynamical curvature of the space-time geometry of the world in the sense of relativity theory and the gravitational force.

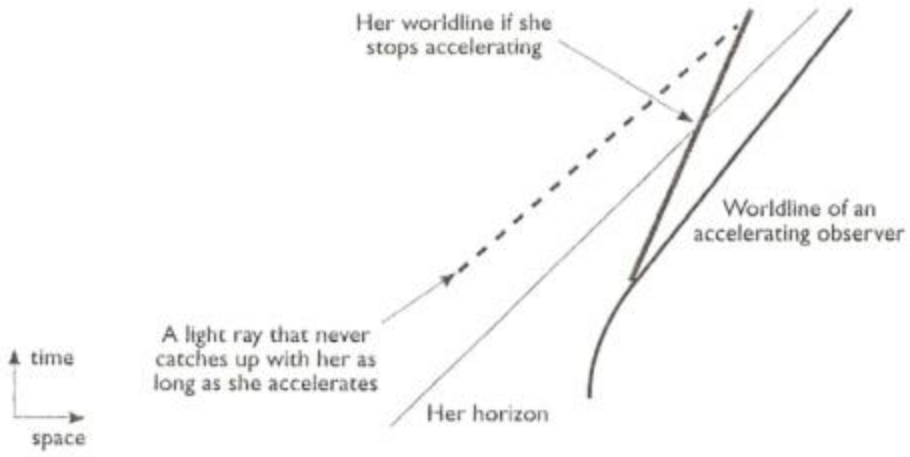
The thing to be clear about the holographic principle is that we have to begin with the assumption that an observer exists. The holographic principle cannot explain the nature

of the observer or its perceiving consciousness, only that the observer exists at a point of view. This is the number one assumption of the holographic principle. We have to assume that an observer exists at a point of view, which can be understood as the central point of view or origin of its own space-time geometry. The second thing we have to assume is that the observer undergoes some kind of accelerated motion in its own accelerated frame of reference, which gives rise to the dynamical curvature of its own space-time geometry and explains the perceived effects of gravity.

Again, to be clear about things, we're not explaining the nature of the observer except as the perceiving consciousness that exists at a point of view at the center of its own space-time geometry. We're not explaining where the observer or its consciousness comes from. We're also not explaining where the energy of the observer's own accelerated motion comes from. We have to begin with the assumption that an observer exists at a point of view at the center of its own coordinate system, which defines its own space-time geometry, and the assumption that the observer undergoes some kind of accelerated motion that gives rise to the dynamical curvature of its own space-time geometry, which explains the perceived effects of gravity. We are not explaining where the perceiving consciousness of the observer comes from or where the energy of the observer's own accelerated motion in its accelerated frame of reference comes from.

The next step in terms of understanding the holographic principle is the idea that the observer's own accelerated motion gives rise to its own event horizon. The reason the observer's event horizon is so important is because its event horizon becomes its holographic screen, which defines its own holographic world. The observer is the perceiving consciousness that exists at the central point of view of its own holographic world. The observer's holographic world is always constructed on a holographic screen that surrounds the observer's central point of view and displays all the images of its own holographic world, just like a computer screen displays all the animated images of a virtual reality movie that are projected to the point of view of an observer. The observer's holographic screen arises as its event horizon due to its own accelerated motion.

The observer's event horizon is a two dimensional bounding surface of space that limits its observations of things in three dimensional space due to the limitation of the speed of light as the maximal rate with which information can be transmitted in three dimensional space. Nothing is observable to the accelerating observer beyond the limits of its own event horizon. As long as the observer continues its accelerated motion, no light signal that originates from the other side of its event horizon can ever reach the observer due to the limitation of the speed of light. The observer can only be understood as the perceiving consciousness that is present at a point of view that follows an accelerating worldline through its own space-time geometry.



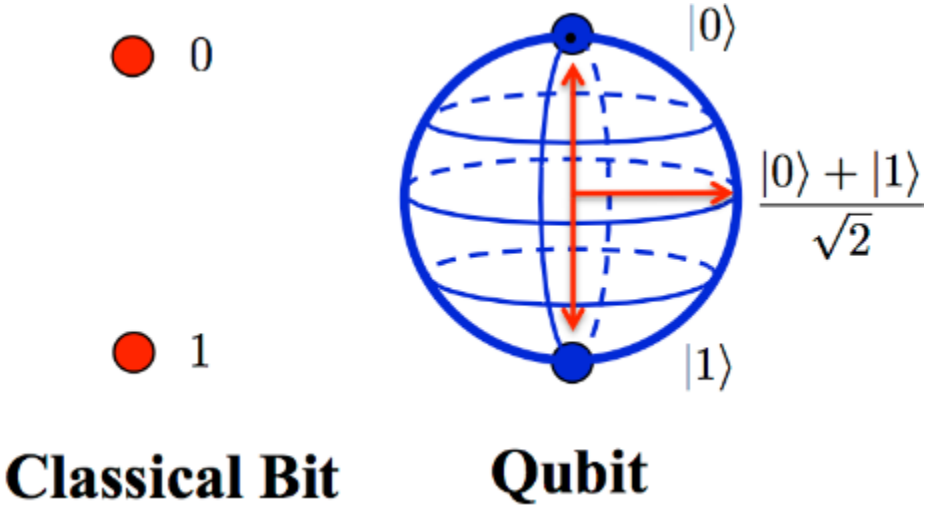
Accelerating Observer's Event Horizon

The big question is how is information encoded on the observer's event horizon? The answer is that information is encoded in terms of quantized bits of information called qubits. A qubit is understood to be mathematically represented in terms of a matrix, like a Pauli spin matrix that represents a spin variable that can only be observed in either a spin up or spin down state. The spin variable encodes measurable information in a binary code of 1's and 0's like a computer switch that is either on or off. This measurable information arises from the eigenvalues of the matrix. In quantum theory, the Pauli spin matrix is formulated in terms of an SU(2) matrix, which also gives a mathematical representation of rotational symmetry of the surface of a sphere. The eigenvalues of the matrix, which are the nature of the measurable information encoded by the matrix, are entangled due to quantum entanglement, which is a mathematical reflection of this rotational invariance. At the level of qubits, quantum entanglement is only reflecting that information is being encoded on the surface of a sphere in a rotationally invariant way.

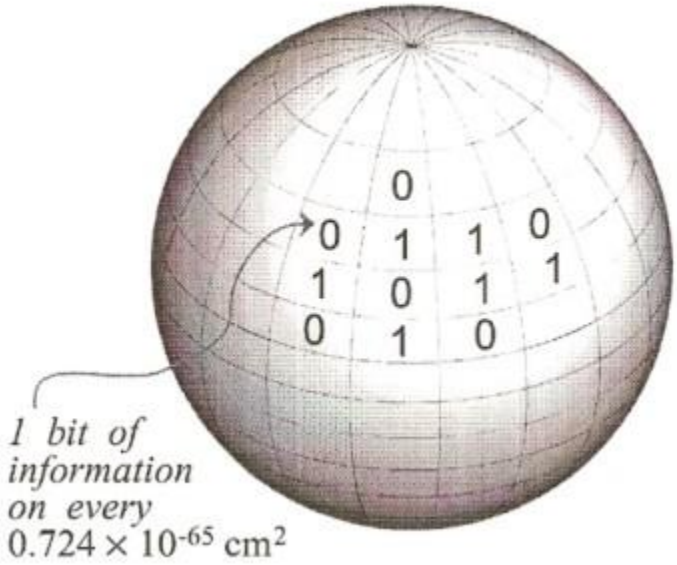
This way of encoding quantized bits of information on the surface of a sphere is called a matrix model. The next big question is where does the surface of the sphere come from? The answer the holographic principle gives is that the surface of the sphere arises as an observer's event horizon due to the observer's own accelerated motion.

The accelerating observer's event horizon becomes its holographic screen when it encodes qubits of information. A qubit is a quantized bit of information mathematically represented by a matrix. A matrix is a two dimensional array of numbers that must be encoded on a two dimensional surface of space, which always arises as the observer's event horizon. A qubit is like a spin variable defined in quantum theory that can only be observed to point up or down. Unlike a classical bit of information that can only take on the values of 1 or 0, a qubit has the property of quantum entanglement that represents

rotational symmetry on the surface of a sphere. In quantum gravity, the smallest possible event horizon is a Planck-size event horizon that encodes a single qubit of information. Larger event horizons encode more information, but always in terms of an integral number of qubits, which is how information is quantized in quantum gravity.



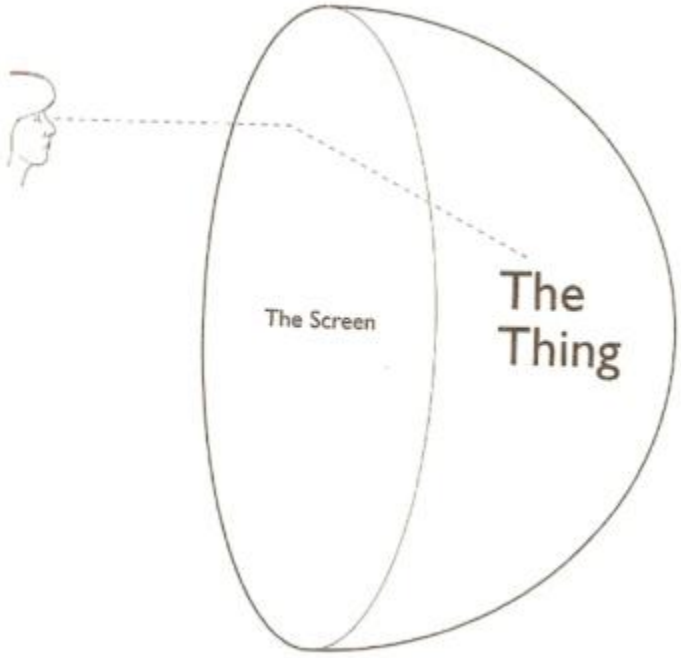
Qubit of Information Encoded on a Planck-size Event Horizon



Holographic Principle

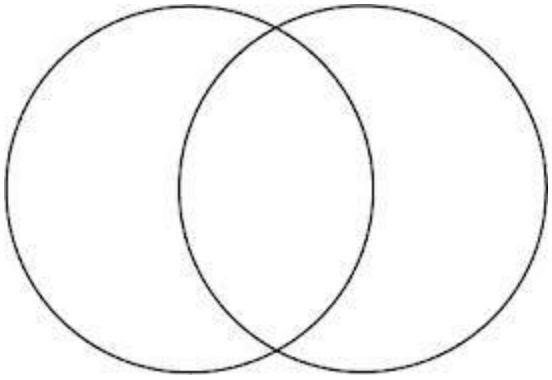
Every observable thing that an observer can perceive in its own holographic world is a form of information defined on its own holographic screen in terms of qubits of information encoded on its own holographic screen. Those perceivable forms are all reducible to qubits of information encoded on the observer's own holographic screen.

The forms are projected like images to the observer's own point of view at the center of its own holographic world and are animated in the flow of energy through that world.



The Observer and its Holographic Screen

How do we explain a consensual reality shared by many observers? The answer is information sharing, just like the information sharing that occurs in a computer network of connected computer screens. Each observer perceives its own holographic world from the central point of view of that world as the images of that world are displayed on its own holographic screen, but when the respective holographic screens of different observers overlap like a Venn diagram, they can share information.



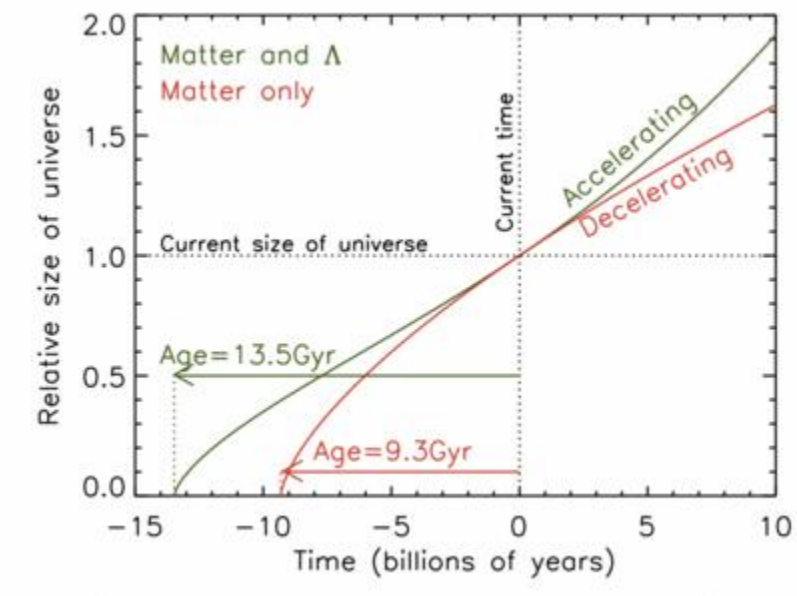
Information Sharing Among Overlapping Holographic Screens

The holographic principle resolves all the measurement paradoxes of quantum theory, like the Schrodinger cat and the Wigner friend paradoxes, because every observer observes events in its own holographic world as defined by the way qubits of information are encoded on its own holographic screen, which is how the quantum state of that world is formulated. Different observers observe events in their own holographic world from the central point of view of that world. The quantum state of every observer's world is defined by the way qubits of information are encoded on its own holographic screen that arises as its own event horizon due to its own accelerated motion. At most, there can be information sharing between observers when their respective holographic screens overlap like a Venn diagram. The holographic principle also resolves the measurement paradoxes of quantum entanglement and spooky action at a distance since all the qubits of information that are encoded on the observer's own holographic screen are inherently entangled until an observation of its own holographic world is made. That observation is never a local phenomena, but rather a global phenomena that disentangles the quantum state of the observer's entire holographic world. The simultaneous observation of different objects that appear to be separated in space in that world requires the disentanglement of the quantum state of that entire world.

The AdS/CFT correspondence is an example of a holographic world that's created in anti-de Sitter space with a negative cosmological constant, which gives rise to the accelerated contraction of space. Anti-de Sitter space has a conformal boundary, and information can be encoded on that boundary in terms of an SU(N) conformal field theory. In the large N limit, the information encoded on the conformal boundary of anti-de Sitter space is equivalent to gravity in anti-de Sitter space. The way this works is that the information encoded on the 10-dimensional conformal boundary of anti-de Sitter space by a supersymmetric SU(N) conformal field theory in the large N limit is equivalent to 11-dimensional supergravity in anti-de Sitter space. When we understand the extra dimensions are being compactified, 11-dimensional supergravity explains all the laws of physics in terms of Einstein's field equations for the space-time metric, which is the nature of the gravitational field, along with Maxwell's equations for the electromagnetic field and the Yang-Mills equations for the nuclear fields. The matter fields, as described by Dirac's equation for the electron and quark fields, naturally arise from supersymmetry. In other words, the laws of physics in 11-dimensional anti-de Sitter space are equivalent to the information encoded by a supersymmetric SU(N) conformal field theory defined on the 10-dimensional conformal boundary of anti-de Sitter space.

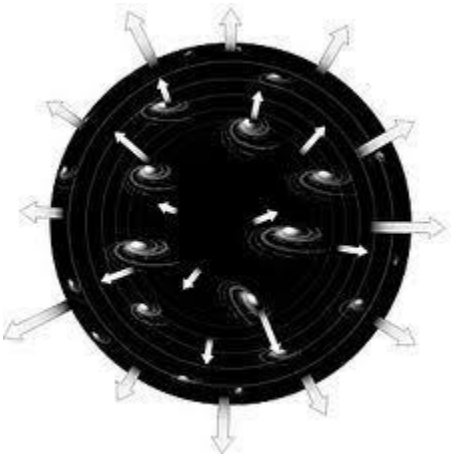
The problem with the AdS/CFT correspondence is that we do not live in anti-de Sitter space. We live in an exponentially expanding universe as characterized by de Sitter space and the accelerated expansion of space. This is confirmed by direct observation. When we look out at distant galaxies, the farther away the galaxy, the faster the galaxy appears to accelerate away from us. The limits of our observations are defined by a

cosmic horizon at which point galaxies appear to move away from us at the speed of light. The Nobel prize was awarded for this discovery of observational cosmology.



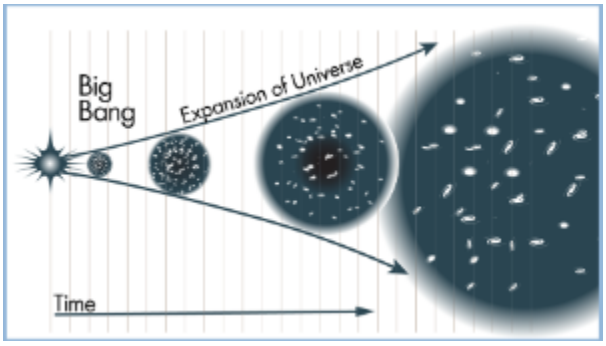
Accelerating Universe

Every accelerating observer observes events in its own holographic world in terms of qubits of information encoded on its own holographic screen that arises as its own event horizon due to its own accelerated motion. The ultimate size of the event horizon that defines the observer's holographic world is called a cosmic horizon. The idea of a cosmic horizon is related to the idea of dark energy and the accelerated expansion of space. In relativity theory, dark energy is called a cosmological constant that gives rise to the accelerated expansion of space that always expands relative to an observer's central point of view. The observer's cosmic horizon is called a de Sitter horizon.



Accelerated Expansion of Space

An observer in de Sitter space observes its own holographic world due to qubits of information encoded on its own de Sitter cosmic horizon that arises from dark energy and the accelerated expansion of space, which in relativity theory is understood as a positive cosmological constant. In relativity theory, the accelerated expansion of space always expands relative to the central point of view of an observer. At the observer's cosmic horizon, space appears to expand away from the observer at the speed of light, and so nothing is observable to the observer beyond the limits of its cosmic horizon.



Accelerated Expansion of the Universe

When the observer's cosmic horizon encodes information for its own holographic world, its horizon becomes its holographic screen. Everything observable to the observer in its own holographic world is reducible to information encoded on its holographic screen. Everything observable in the observer's holographic world is like a holographic image projected from its screen to its point of view at the center of its own holographic world.

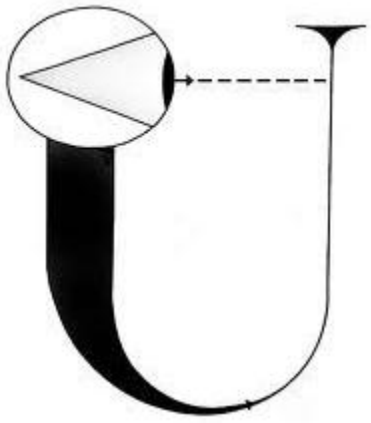
The idea of qubits of information being the fundamental underlying basis for quantum theory has recently received a great deal of attention, including the award of a Nobel prize for experiments in quantum entanglement. The big question these experiments have not answered is exactly where is this information encoded? The holographic principle answers this question in terms of the surface of an event horizon that arises due to an observer's own accelerated motion. In terms of an observer's cosmic horizon that arises due to the expression of dark energy, that accelerated motion is understood in terms of the accelerated expansion of space. Even without the expression of dark energy, any accelerating observer will have its observations of events in space limited by an event horizon. In the generic case, this event horizon is called a Rindler horizon.

Physicists like Leonard Susskind accept that the de Sitter cosmic horizon is the nature of the observer's holographic screen that defines its holographic world when qubits of information are encoded on its horizon. The stumbling block in terms of formulating this idea in theoretical physics is that there is no analogue of the AdS/CFT correspondence that generalizes to de Sitter space. The basic problem comes down to the nature of the observer. In de Sitter space, the observer is always at the central point of view of its

own de Sitter cosmic horizon. The observer's holographic world is only constructed and defined when its cosmic horizon encodes qubits of information for everything the observer can observe in its holographic world and becomes its holographic screen.

An accelerating observer always observes events in its own space-time geometry in terms of the curvature of that space-time geometry. The curvature of that space-time geometry is the nature of the gravitational field as formulated by Einstein's field equations for the space-time metric. The situation in de Sitter space is very similar, except the curvature of that space-time geometry is being generated by the accelerated expansion of space. The expression of dark energy in terms of the accelerated expansion of space, like any other expression of mass or energy, is a generator of gravity in terms of the curvature of that space-time geometry. Dark energy generates gravity. The odd thing about this process is that the expression of dark energy is always counterbalanced by the expression of gravity. The negative potential energy of gravity always exactly cancels out the positive dark energy. The negative potential energy of gravitational attraction exactly cancels out the repulsive effect of positive dark energy, and so the total energy of this process exactly adds up to zero. This is actually confirmed by observations of the universe. A universe with a total energy of zero is asymptotically flat, which is confirmed by direct observations of the universe.

The big puzzle we have to confront is about the nature of the observer. The observer is best understood as arising at the central point of view of its own holographic world that is defined in terms of information encoded on its own cosmic horizon that arises due to dark energy and the accelerated expansion of space. The big question is: Where does the observer come from? The answer John Wheeler proposed is that the observer and its holographic world are a self-excited circuit. John Wheeler proposed this idea of the observer and its world as a self-excited circuit when he tried to scientifically understand the nature of an observer and the world that it perceives in terms of information.



Universal Observer as a Self-Excited Circuit

There is actually a great deal of merit in this idea of the observer and the world that it perceives as a self-excited circuit since perception always occurs in a subject-object relation. The observer is the subject and whatever it perceives in its world is an object of perception. In terms of the holographic principle, the observer always arises at the central point of view of its own holographic world, and whatever it perceives in that world is a form of information that can be reduced to qubits of information encoded on its own holographic screen. The observer's holographic screen is an event horizon that arises due to the observer's own accelerated motion, which in the case of the expression of dark energy is the accelerated expansion of space. The observer's event horizon becomes its holographic screen when its horizon encodes information.

Wheeler understood this process is similar to what an observer observes on a computer screen. The computer screen encodes bits of information on pixels, which is encoded in a binary code of 1's and 0's. Whatever the observer observes is a form of information that can be reduced to bits of information encoded on the computer screen. These forms of information are projected like images from the screen to the observer's point of view outside the screen and are animated in the flow of energy that flows through the computer. Everything the observer observes is a projected form of information animated in the flow of energy. Wheeler called this idea "It from bit".

The idea of the observer's holographic screen as similar to a computer screen is the essential nature of the holographic principle. Information is encoded on the observer's holographic screen in terms of qubits of information. The big question was how this information encoding occurs when the holographic screen is a de Sitter comic horizon.

Tom Banks discovered such an explanation, which was initially called matrix theory, and later on was called holographic space-time. Banks and Susskind are colleagues, and collaborated on the initial paper on matrix theory before the AdS/CFT correspondence was discovered. Their respective interests then diverged as Banks became focused on de Sitter space while Susskind focused his attention only on anti-de Sitter space. Banks assumed the observer's holographic screen is ultimately defined on a de Sitter cosmic horizon. This is inherently an observer-centric and observer-dependent formulation of the holographic principle since the observer is at the central point of view of its own holographic world that is defined on its own de Sitter cosmic horizon.

The nature of an event horizon only requires the idea of an observer that undergoes accelerated motion and the invariance of the speed of light, which is the maximal rate of information transmission in three dimensional space, and is also the maximal rate of information transmission in a computer network. A light ray that originates on the other side of the observer's event horizon can never reach the accelerating observer as long as the observer continues to undergo its accelerated motion. The holographic principle

is built on this idea of accelerated motion, whether that accelerated motion arises from the observer's own accelerated motion or the accelerated expansion of space.

The basic idea of the holographic principle is that the observer's event horizon, whether a de Sitter cosmic horizon or a Rindler event horizon or some combination of the two, becomes its holographic screen when qubits of information are encoded on its horizon. The most general way to formulate the holographic principle is in terms of a matrix model, which is how Tom Banks has formulated the holographic principle. Unlike the AdS/CFT correspondence that only applies in anti-de Sitter space, the idea of a matrix model can also be formulated in de Sitter space.

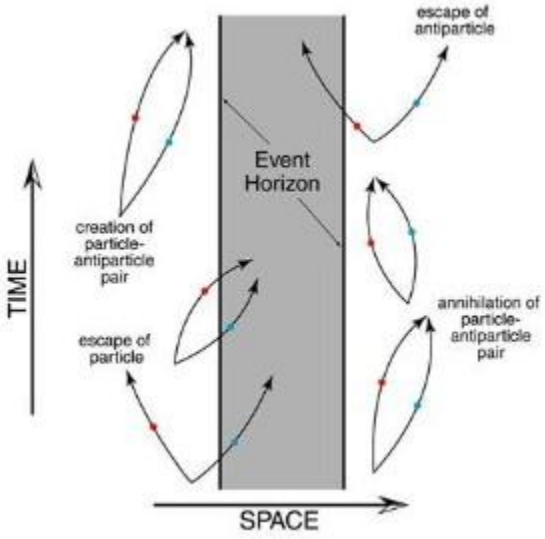
The upshot is that an observer's event horizon can become its holographic screen when qubits of information are encoded on its horizon, which is mathematically formulated in terms of a matrix model. The way the holographic works is that each qubit of information is encoded on a Planck size area element defined on the surface of the horizon, like bits of information encoded on the pixels of a computer screen. The number of qubits of information encoded on the horizon is given in terms of the surface area, A, of the horizon as $n=A/4\ell^2$, where the Planck area, $\ell^2=\hbar G/c^3$, is given in terms of Planck's constant, the gravitational constant and the speed of light. Since a qubit of information is the smallest amount of measurable information that can be measured, this explains why a Planck-size event horizon, which encodes a single qubit of information, is the smallest possible event horizon. Larger event horizons encode more qubits of information.

The idea Tom Banks had about formulating the holographic principle in de Sitter space in terms of a matrix model, where the observer is at the central point of view of its own holographic world that is defined in terms of qubits of information encoded on its own holographic screen that arises as its cosmic horizon, is a natural extension of the idea that Ted Jacobson had about the thermodynamics of space-time. Jacobson considered an accelerating observer and its Rindler horizon. Jacobson assumed that the observer's world was defined in terms of qubits of information encoded on the observer's Rindler horizon. In terms of thermodynamics, this way of encoding qubits on the observer's horizon is the nature of holographic entropy. The qubits are the fundamental dynamical degrees of freedom for the observer's world. In terms of qubits as the fundamental basis for quantum theory, a qubit is the nature of entropic information. Holographic entropy is simply given in terms of the number of qubits encoded on the observer's event horizon as $S=kn$. Jacobson needed one more piece of the puzzle, which is the amount of thermal energy carried by each dynamical degree of freedom at thermal equilibrium.

Thermodynamics tells us that at thermal equilibrium, each dynamical degree of freedom carries the same amount of thermal energy, which is given in terms of temperature as $E=kT$. In a holographic world, these dynamical degrees of freedom are qubits of information encoded on the observer's event horizon. Jacobson was able to specify this

thermal energy in terms of the Unruh temperature of the Rindler horizon, which is simply given in terms of the observer's acceleration, a, as $kT=\hbar a/2\pi c$.

The Unruh temperature is given in terms of the thermal energy of the thermal radiation carried away from the observer's event horizon, $E=kT$, as observed by the accelerating observer. This emitted thermal radiation is also called Hawking radiation. The Unruh temperature is calculated in quantum field theory in terms of the separation of virtual particle-antiparticle pairs at the event horizon as observed by the accelerating observer. Virtual particle-antiparticle pairs are created out of nothing due to quantum uncertainty in energy, and normally annihilate back into nothing in a short period of time, but at the event horizon they can appear to separate from the point of view of the accelerating observer, which gives the event horizon an apparent temperature due to the apparent emission of thermal radiation from the horizon that carries heat to the observer.



Hawking Radiation

With these values for the holographic entropy and the Unruh temperature of the event horizon, Jacobson was then able to use the laws of thermodynamics, which says that $\Delta E=T\Delta S=kT\Delta n$, to derive Einstein's field equations. Since holographic entropy, $S=kn$, is given in terms of the number of qubits encoded on the surface area of the event horizon as $n=A/4\ell^2$, this simply says that at thermal equilibrium, as the event horizon changes in surface area, the amount of thermal energy inherent in the observer's holographic world also changes since there is a change in the number of qubits of information encoded on the event horizon. At thermal equilibrium, each qubit carries the same amount of thermal energy given in terms of the observer's own acceleration as $E=kT=\hbar a/2\pi c$.

This simple relationship allowed Jacobson to derive Einstein's field equations for the space-time metric from the laws of thermodynamics. As the surface area of the

observer's event horizon changes, there is a corresponding change in the amount of thermal energy inherent in the observer's holographic world, which corresponds to a change in the dynamical curvature of the space-time geometry of that holographic world as is specified by Einstein's field equations for the space-time metric.

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

Einstein's Field Equations for the Space-time Metric

Einstein's field equations for the space-time metric are not really fundamental, but are more like a thermodynamic equation of state that describes gravitational events in the observer's holographic world when things are near thermal equilibrium. Once we have Einstein's field equations, we can then deduce all the field equations for the standard model of particle physics using the usual unification mechanisms of supersymmetry and extra compactified dimensions of space. At the level of field theory, the final result of unification looks like 11-dimensional supergravity, just as it does in the AdS/CFT correspondence. All the quantum fields that correspond to particle physics arise from Einstein's field equations as extra components of the space-time metric due to supersymmetry and extra compactified dimensions of space. Just like Einstein's field equations, none of these quantum fields are really fundamental, but instead only have the limited validity of thermodynamic equations of state that describe events in the observer's holographic world when things are near thermal equilibrium.

This explanation clears up one of the big puzzles of quantum field theory. We can use quantum field theory to calculate the Unruh temperature of an event horizon because we are assuming thermal equilibrium, and quantum field theory as a thermodynamic equation of state is valid for small quantum fluctuations around thermal equilibrium. On the other hand, we cannot use quantum field theory to calculate the cosmological constant, which is often mistakenly equated with vacuum energy. The idea of vacuum energy as arising from large quantum fluctuations of a quantum field is invalid since that idea implies that things are not at thermal equilibrium. The cosmological constant, as the dark energy that gives rise to the accelerated expansion of space, is not at thermal equilibrium, and so quantum field theory is not a valid way to calculate it.

In some sense, the cosmological constant is a boundary condition, since it sets the distance to the observer's cosmic horizon, which is the ultimate boundary of its own holographic world. That holographic world is defined by the way qubits of information are encoded on the observer's cosmic horizon. The radius, R, of the observer's cosmic horizon is given in terms of the cosmological constant, Λ, as $(R/\ell)^2=3/\Lambda$. Before we can

construct a holographic world, we have to assume a value for the cosmological constant for that world. We can't use the laws of physics to calculate the cosmological constant of that world since the laws of physics, like the laws of gravity, electromagnetism and the nuclear forces, only emerge in that world as thermodynamic equations of state when things are near thermal equilibrium and only are valid at thermal equilibrium. We have to assume a value for the cosmological constant before we can construct that holographic world, and only then do the laws of physics emerge in that world as thermodynamic equations of state when things are near thermal equilibrium.

This problem is related to all modern theories of the big bang event. In inflationary cosmology, it's assumed that the cosmological constant must transition from a higher to a lower value early in the history of the universe. The dark energy of the cosmological constant is what puts the *bang* in the big bang event. The laws of physics not only are unable to explain the value of the cosmological constant, but also can't explain how the cosmological constant transitions from a higher to a lower value. The cosmological constant is a boundary condition that sets the distance to the observer's cosmic horizon, and its value must be set before the observer's holographic world can be constructed.

Before an observer's holographic world can be constructed, we have to assume two things. We have to assume that an observer exists at the central point of view of its own holographic world. We also have to assume that the observer undergoes some kind of accelerated motion, whether that of an observer accelerating through space-time or the accelerated expansion of space, which defines the observer's accelerated frame of reference that gives rise to its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon. Science has no explanation for where the observer comes from or where the energy of the observer's accelerated motion comes from. There is no scientific explanation for where the perceiving consciousness of the observer comes from or where the energy of the observer's accelerated motion comes from. There is no scientific explanation for what sets the value for dark energy and the cosmological constant. These things have to be assumed before the observer's holographic world can be constructed and the laws of physics can emerge in that world.

The holographic principle is telling us that every observer observes events in its own holographic world from the central point of view of that world. Although those events appear to occur in three dimensional space and to be governed by the laws of physics as formulated in three dimensional space, in reality, the information for all those events is reducible to qubits of information encoded on the observer's own event horizon, which is the two dimensional bounding surface of that space. The observer's event horizon arises due to its own accelerated motion and becomes its holographic screen when its horizon encodes qubits of information. Everything the observer can observe in its own holographic world is a form of information that's reducible to qubits of information encoded on its own holographic screen. Those forms of information are projected like

images from the observer's screen to its own point of view at the center of its own holographic world. Even the flow of energy that animates the images can be understood in terms of the energy of the observer's own accelerated motion.

In the sense of the subject-object relation of perception, the observer is the subject and its object of perception is a form of information that is reducible to qubits of information encoded on its holographic screen. Perception only occurs as that form of information is projected like an image from the observer's screen to its central point of view. The observer not only perceives the form of things, but also the flow energy that animates things. There is only an illusion that the form of a person that appears in the observer's world is able to perceive things in that world. The form of a person is only the central form of information that appears in the observer's world, like the form of an avatar that appears in a computer-generated virtual reality world. In reality, there is no person, only the projected and animated images of a holographic virtual reality world that only appears to exist due to the observer's own accelerated motion.

This illusion that the form of a person that appears in the observer's world is able to make local observations of things in that world is why the concept of local realism is not a valid concept. Observation is never really local in nature, but rather is global in nature as an observer makes observations of things in its own holographic world. The observer can only be understood as the central point of view of that world, and the observable form of all things are forms of information projected like images from the observer's own holographic screen to its central point of view. Perception is holographic projection.

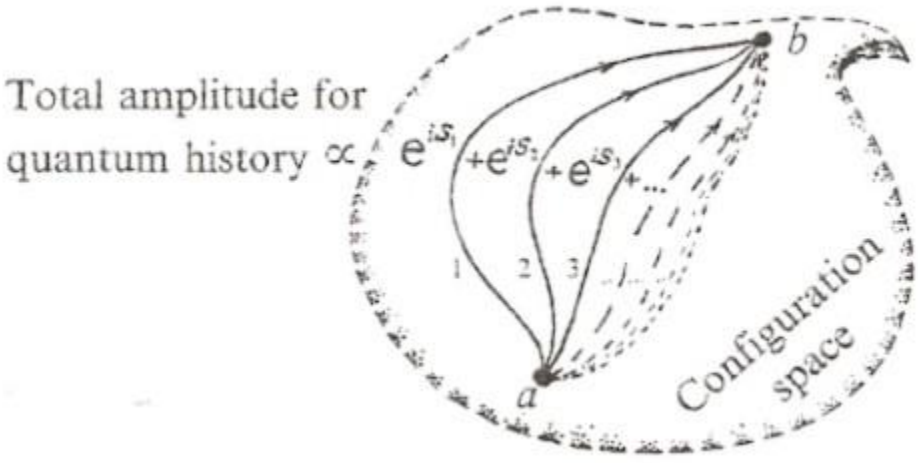
There is only an illusion that the central form of a person that appears in the observer's holographic world is able to perceive things in that world. That illusion is created as the observer emotionally identifies itself with its emotionally animated central personal form. The central form of a person is always emotionally animated relative to all other forms that appear in the observer's holographic world. The observer only emotionally identifies itself with that emotionally animated personal form due to its perception of feelings of emotional self-limitation to that emotionally animated personal form as that personal form is emotionally animated relative to all other forms that appear in its world.

In no significant way is this state of affairs different from an observer's perception of the projected and animated images of a computer-generated virtual reality world that's being displayed on a computer screen. In effect, the observer itself creates its own quantum computer that gives rise to the appearance of its own computer-generated holographic virtual reality world. The quantum computer is created due to the observer's own accelerated motion that gives rise to its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon. The laws of physics for the observer's holographic world are like computational rules that govern the operation

of the quantum computer. Even the energy that flows through the quantum computer can be understood as arising from the energy of the observer's own accelerated motion.

The holographic principle is a way of reformulating quantum theory in terms of the observer. Instead of a wave-function that describes the behavior of point particles in some space-time geometry, the holographic principle reformulates quantum theory in terms of an accelerating observer and its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon. Everything in the observer's holographic world, which not only includes all the point particles of that world, but also the space-time geometry of that world, can be reduced to qubits of information encoded on the screen. Everything is a form of information, and the perception of anything is like an image projected from the screen to the observer's own point of view. Even the perception of the flow of energy, which arises from the observer's own accelerated motion, can be understood in terms of the animation of the images.

In the ordinary quantum theory and quantum field theory of point particles, the quantum state can either be formulated in terms of a wave-function or as a sum over all possible paths. Each path is weighted with a probability factor that depends on the action for that path, $P=\exp(iA/\hbar)$, where the action is given in terms of kinetic and potential energy as an integral along the path, $A=\int dt(KE-PE)$. This probability factor is the essence of the wave-function and specifies wave motion in terms of Euler's formula $\exp(i\theta)=\cos\theta+i\sin\theta$. The wave-function, $\psi(x,t)$, specifies the quantum probability with which a point particle can be measured at position x at time t as the particle follows its trajectory $x=x(t)$. The most likely path in terms of quantum probability, which is the classical path, is the path of least action, which is like the path that measures the shortest possible distance between two points in a curved space-time geometry. In relative theory, the analogue of the action is called the proper-time, and least action maximizes proper-time.



Quantum State as the Sum over all Possible Paths

Quantum theory, whether formulated in terms of the wave-function or as a sum over all possible paths, allows for the expression of potentiality. A path is never determined, but can only be specified in terms of its quantum probability. Classical physics only seems to be deterministic because it only considers the path of least action. At every decision point, there is always a choice to be made about which path to follow. The expression of potentiality is inherent in the choices we make about which path to follow.

The holographic principle totally reverses this process of quantization. Instead of a wave-function, we start with the idea of an accelerating observer and its event horizon, which becomes its holographic screen when qubits of information are encoded on the horizon. The expression of potentiality arises from quantum entanglement, which is a consequence of the way qubits are defined in terms of the eigenvalues of a matrix that in turn is defined on the surface of the event horizon. By their very nature, entangled qubits allow for the expression of potentiality, which is the essential difference between classical and quantum computing. Fundamentally, quantum theory is based upon the mathematical structure of qubits encoded on an accelerating observer's event horizon.

The wave-function is not fundamental, but is a derived concept that arises from the laws of thermodynamics when things are near thermal equilibrium. Einstein's field equations for the gravitational space-time metric, Maxwell's equations for the electromagnetic field, the Yang-Mills equations for the nuclear fields, and Dirac's equation for the electron and quark fields are all examples of wave-functions, but only have the limited validity of thermodynamic equations of state that describe perceivable events in a holographic world when things are near thermal equilibrium.

There's one last point to make about the nature of a holographic world. The problem has to do with time. What gives rise to the perception of time? The perception of three dimensional space has a natural explanation in a holographic world since a holographic screen is a two dimensional bounding surface of space that projects holographic images from the screen to the observer's central point of view, but what gives rise to the perception of time? What animates the images? There is no scientific answer anywhere in theoretical physics that explains where the perception of time comes from.

In relativity theory, the only valid definition of time is the observer's own proper-time, which is the only invariant quantity of relativity theory. Ordinary quantum theory is based on the idea of unitary time evolution of the quantum state, but this cannot generalize to relativity theory since there is no definition of time that all observers will agree upon in a dynamically curved space-time geometry with gravity. There is no valid notion of time translation invariance in a dynamically curved space-time geometry with gravity. Only in flat Minkowski space, where there is no effect of gravity, is there a valid notion of time translation invariance that allows different observers to agree upon the same definition of time. The whole concept of ordinary quantum theory is based upon the idea of unitary

time evolution, but breaks down in a dynamically curved space-time geometry with gravity. This is a big problem since unitary time evolution is the fundamental defining principle of ordinary quantum theory. There's a direct path from the assumption of unitary time evolution to the sum over all possible paths formulation of quantum theory to the Feynman diagram formulation of quantum field theory, which gives rise to the point particle formulation of the standard model of particle physics.

$$|\Psi(t)\rangle = e^{-i\hat{H}t}\,|\Psi(0)\rangle$$

Unitary Time Evolution of the Quantum State

What happens when unitary time evolution breaks down, as it must break down in a dynamically curved space-time geometry with gravity? The answer of course is the holographic principle, which does not assume unitary time evolution. Unitary time evolution is only approximately valid when things are near thermal equilibrium and quantum fields can be defined as thermodynamic equations of state.

The only really valid definition of time is the observer's own proper-time, but how is that proper-time defined? We have the idea that the observer carries a clock with itself. That clock undergoes some kind of periodic motion, like the swinging of a pendulum, or a light clock with a light ray bouncing back and forth between two mirrors. The problem is, how can the observer carry a clock with itself if the observer is only a point of view at the center of its own holographic world? What is actually undergoing periodic motion? The answer of course is the observer's own accelerated motion. The perception of time, in the sense of the observer's own sense of proper-time, arises from the observer's own accelerated motion. It is the observer's own accelerated motion that is energizing and animating all the projected images of the observer's own holographic world.

We have one last important question to answer, which is the original question: Where does the observer come from? There must be a source of the observer. If we think of the observer as the perceiving consciousness present at the central point of view of its own holographic world, then there must be a source of this perceiving consciousness. The really big question is what is the source of the observer's consciousness?

The reason this is a big question is because the perceiving consciousness of the observer cannot arise from something that appears in the holographic world that the

observer perceives, like the central form of a person that appears in that world. The source of consciousness cannot be an object in consciousness. Perception always occurs in a subject-object relation, where the observer is the subject and its object of perception is a form of information that appears in its holographic world. That object of perception cannot be the source of the observer's consciousness. To make that assumption would be to create a paradox of self-reference that would make the whole explanation logically inconsistent. Logical consistency of the explanation demands that the observer's consciousness cannot arise from something that it can observe.

The basic problem is that consciousness cannot be computational in nature as Roger Penrose has pointed out. In a holographic world, everything the observer can observe is a form of information that's reducible to qubits of information encoded on the observer's own holographic screen. All observable forms of information are computational since they can be reduced to qubits of information encoded on the observer's screen, but the observer's consciousness cannot be computational since it is what perceives the forms of information. The forms must be projected like images from the observer's holographic screen to its point of view outside the screen. Since the observer's consciousness exists outside the screen, it cannot be reduced to qubits of information encoded on the screen without creating a logically inconsistent paradox of self-reference. This is the basic idea underlying the Godel incompleteness theorems. An observer that observes forms of information that are being displayed on a computer screen from its point of view outside the screen cannot be reduced to bits of information encoded on the computer screen, and so the observer's consciousness cannot be computational in nature. The forms of information are all computational in nature, but not the observer's consciousness.

If the source of consciousness cannot arise from something that the observer can perceive in a subject-object relation of perception, then where does the observer's consciousness come from? If the source of consciousness cannot arise from an object of perception, then where does the observer's consciousness come from? This is the stumbling block that has prevented all real progress in terms of understanding the holographic principle. This is a stumbling block since we have to begin by assuming the a priori existence of a source for the observer's consciousness before we can discuss how its holographic world appears to come into existence. That source of the observer's consciousness must exist prior to the apparent existence of its holographic world.

This problem arises from how a holographic world is created. A holographic world only appears to come into existence due to an observer's accelerated motion that gives rise to its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon. The observer itself can only be understood as the perceiving consciousness present at the central point of view of its own holographic world that is able to undergo accelerated motion, which gives rise to its event horizon. To make sense of this scenario, we have to begin with the assumption of the existence of a

source for the observer's consciousness. There must be a source of the observer's perceiving consciousness that has an a priori existence that exists prior to the apparent existence of its holographic world. Before the observer's holographic world can appear to come into existence, the source of the observer's consciousness must exist.

This is a stumbling block to any real understanding of the holographic principle because the assumption of the a priori existence of a source of the observer's consciousness smacks of spiritualism, which is exactly what it is. Virtually everybody that works in the scientific field of the holographic principle is a physicalist, and the idea of a spiritual reality that is beyond physical reality is anathema to the physicalists. Lenny Susskind, Tom Banks and Roger Penrose are all physicalists, and they all vehemently deny the existence of a spiritual reality that is beyond physical reality. The big problem that they face is that they also accept that physical reality is constructed as a holographic world.

Once you accept that physical reality is constructed as a holographic world, you're in a real pickle when you try to understand the nature of consciousness. The source of consciousness cannot be an object in consciousness. In the sense of a subject-object relation of perception, the source of the observer's perceiving consciousness cannot be an object of perception that appears in its holographic world, which is understood as a form of information that's reducible to qubits of information encoded on its own holographic screen that arises as an event horizon due to its accelerated motion as a point of consciousness at the center of its own holographic world. Where does that consciousness come from? It's fine to say that the subject-object relation of perception arises as a self-excited circuit, but we still have to explain the source of consciousness.

The physicalists will never really understand the holographic principle because they deny the existence of a spiritual reality beyond physical reality. That spiritual reality is the only possible source of consciousness. There is no other possible explanation for the source of consciousness. All other possible explanations suffer from the logical inconsistency of a paradox of self-reference. If we want to maintain logical consistency, we have to assume the existence of a source of consciousness that is beyond physical reality, which is best called spiritual reality. In the words of Sherlock Holmes, when you've eliminated everything that is impossible, whatever remains must be the truth.

What exactly is this spiritual reality beyond physical reality that is the source of the observer's consciousness? The simple answer is that this spiritual reality is the primordial nature of existence. It is what exists when everything else disappears from existence. The observer's holographic world can only disappear from existence when the observer stops accelerating. When the observer's accelerated motion comes to an end, the observer enters into an ultimate state of free-fall. When the observer enters into an ultimate state of free-fall, the observer no longer has an event horizon that encodes qubits of information and becomes its holographic screen. In an ultimate state

of free-fall, everything in the observer's holographic world disappears from existence from its own point of view, and nothing remains.

The nothingness that remains when the observer's holographic world disappears from existence is called the void. The void is the source of the observer's consciousness, which is a differentiated state of consciousness that arises at the central point of view of its own holographic world. That holographic world only appears to come into existence from the observer's point of view due to the observer's accelerated motion relative to the motionless void. The existence of the void is timeless and unchanging, which is to say it is motionless. The void is unlimited. It has no boundary. The bounding surface of an event horizon can only arise from the point of view of an accelerating observer. The void is also undivided. As the source of the observer's perceiving consciousness, the void can only be understood as undifferentiated consciousness.

In reality, the void cannot be conceptualized except in terms of negation as absolute nothingness, which is unlimited, undivided and unchanging. Only a holographic world that is characterized by limitation, division and change can ever be conceptualized. That conceptualization is the very nature of a holographic world, which is characterized by forms of information and the flow of energy. As absolute nothingness, the void is formless. As absolute nothingness, the void is timeless and motionless. The course of time, like the flow of energy, only appears to exist in an observer's holographic world due to the observer's own accelerated motion relative to the motionless void that gives rise to its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon. In the absolute nothingness of the void, there are no events and nothing ever appears to happen. There is only absolute nothingness.

The void is the primordial, timeless nature of existence. The course of time, like the flow of energy, only appears to exist in an observer's holographic world. Forms of information only appear to exist in an observer's holographic world. The void, as the source of the observer's perceiving consciousness, is the nature of timeless being, which can only be understood as undifferentiated consciousness. The individual consciousness of the observer, present at the central point of view of its own holographic world, is the nature of individual being, which is called *I Am* or the *Self*. As absolute nothingness, the void is the nature of undivided and unlimited timeless being, which is also called *No-self.*

In some mysterious way, the individual consciousness of the observer, present at its own point of view, must separate itself from the undifferentiated consciousness of the void before its holographic world can appear to come into existence. Individual consciousness only refers to the observer's individual point of view. The observer's holographic world only appears to come into existence from its own point of view when the observer begins to undergo accelerated motion relative to the motionless void, which is how its event horizon arises that becomes its holographic screen when qubits

of information are encoded on its horizon. When the observer's accelerated motion comes to an end in an ultimate state of free-fall, its holographic world disappears from existence from its own point of view, and only the void remains. In the sense of a dissolution, the individual consciousness of the observer, present at its own point of view at the center of its own holographic world, dissolves back into the nothingness of the undifferentiated consciousness of the void like a drop of water that dissolves back into the ocean. Individual being dissolves back into its source of pure undivided being. This experience of dissolution is called spiritual enlightenment.

There are still a few loose ends that need to be tied together regarding the holographic principle. Just as the undifferentiated consciousness of the void is the source of the individual perceiving consciousness of the observer present at the central point of view of its own holographic world, the void is also the source of the energy that underlies the observer's accelerated motion that gives rise to its event horizon, and the source of the information encoded on the observer's event horizon that becomes its holographic screen. The void as the source of all these things helps clear up the mystery of the normal flow of thermal energy through the observer's holographic world, which is closely related to the mystery of the cosmological constant and the big bang.

The best theory we have of the big bang is called inflationary cosmology, which assumes that early in the history of the universe the cosmological constant transitions from a higher to a lower value. The value of the cosmological constant sets the size of the observer's holographic world in terms of the radius of its cosmic horizon due to the accelerated expansion of space. The cosmic horizon defines the limits of the observer's own observable world since nothing is observable beyond the limits of its horizon. The larger the value of the cosmological constant, Λ, the smaller the radius, R, of the observer's cosmic horizon, as $(R/\ell)^2=3/\Lambda$. Current observation indicates the value of Λ is about 10^{-122}, which corresponds to a radius of the observer's cosmic horizon of about 40 billion light years. In terms of thermal energy, the smaller the radius of the observer's cosmic horizon, the higher its Unruh temperature, as $kT=\hbar c/2\pi R$.

Early In the history of the big bang, the cosmological constant took on a very high value corresponding to a small radius of the observer's cosmic horizon and a high Unruh temperature. Inflationary cosmology assumes that the cosmological constant transitions from a higher to a lower value, which increases the radius to the observer's cosmic horizon and lowers its Unruh temperature. By this mechanism, the observer's holographic world appears to increase in size. Simultaneously, this allows heat to flow from hotter to colder objects as the Unruh temperature decreases, which explains the normal flow of thermal energy through the observer's holographic world. The normal flow of thermal energy is literally directed in the direction of the accelerated expansion of space as the cosmological constant transitions to a lower value and the observer's holographic world increases in size and cools in temperature.

This expansion also allows entropy to increase as the observer's cosmic horizon increases in radius and surface area, which allows more qubits of information to be encoded on the horizon. This increase in entropy as heat flows in a thermal gradient is the nature of the second law of thermodynamics, which says that forms of information tend to become more disordered due to the randomizing effects of the flow of thermal energy as heat flows from hotter to colder objects. The disorganizing effects of thermal disorder are always counterbalanced by the organizing effects of coherent organization as forms hold together, but eventually thermal disorganization wins out and forms fall apart. The flow of heat in a thermal gradient also explains the nature of time's arrow as things tend to become more thermally disordered. Time's arrow is literally directed in the direction of the accelerated expansion of space and the expansion of the observer's holographic world. When the cosmological constant transitions to its final value of zero, the radius of the observer's cosmic horizon increases to infinity and its Unruh temperature cools to absolute zero. When the flow of heat ultimately comes to an end, the course of time also comes to an end, which is called the *heat death* of the universe.

Normal Flow of Thermal Energy through the Observer's Holographic World

There is a big puzzle in this scenario that does not have a scientific explanation. How exactly is the value of the cosmological constant set and what allows for its transition to a lower value? In terms of the holographic principle, there is no scientific answer. In some sense, the value of the cosmological constant is a boundary condition that sets the conditions for the construction of a holographic world. Inflationary cosmology is based on quantum field theory, but quantum field theory cannot explain the nature of the cosmological constant since all quantum field theories only arise in a holographic world as thermodynamic equations of state that only describe events in that world when things are near thermal equilibrium. We have to assume a value for the cosmological constant before we can even construct that holographic world and discuss the laws of physics in that world as formulated in terms of field theories.

In the same way, there is no scientific explanation in terms of the holographic principle for why the cosmological constant transitions to a lower value. Each transition of the cosmological constant would in effect create a new big bang event, which occurs when the universe is far away from thermal equilibrium, and unlike the Unruh temperature, which assumes thermal equilibrium, cannot be calculated in quantum field theory, which is only valid for small fluctuations around thermal equilibrium. Theoretical physics can never explain the value of the cosmological constant or why it transitions to a lower value in terms of the holographic principle since we have to assume a value for the cosmological constant before we can construct a holographic world. In the sense of a boundary condition, the cosmological constant is what sets the radius of the observer's cosmic horizon, which is the bounding surface of space that sets the limits of the observer's own observable holographic world.

Just as the undifferentiated consciousness of the void in some mysterious way is the source of the individual consciousness of the observer at the central point of view of its own holographic world, the void is also the source of the dark energy that's inherent in the cosmological constant, which must take on a non-zero value before the observer's holographic world can even appear to come into existence. The dark energy of the cosmological constant is ultimately what energizes the observer's own holographic world and puts the *bang* in the big bang event. The dark energy of the cosmological constant is also what gives rise to the observer's cosmic horizon that becomes its holographic screen when qubits of information are encoded on the horizon. The void is also the source of this information encoding. In some mysterious way, the whole thing begins as the undifferentiated consciousness of the void differentiates itself into the individual consciousness of the observer at the central point of view of its own holographic world, expresses the dark energy that underlies the accelerated expansion of space that places the observer in an accelerated frame of reference and gives rise to the observer's cosmic horizon, and encodes qubits of information on the observer's cosmic horizon that becomes its holographic screen. It all has to begin with the void. The void is the source of the whole thing. The void is the nature of the spiritual reality that is beyond the physical reality of an observer's holographic world. There is no scientific explanation for the creation of the whole thing other than to call it God's will.

Ultimately, the individual consciousness of the observer must return to its primordial state of undifferentiated consciousness. Individual being must reunite itself with pure undivided being. Individual consciousness, present at the central point of view of its own holographic world, must dissolve back into its source of undifferentiated consciousness like a drop of water that dissolves into the ocean. This dissolution always occurs in an ultimate state of free-fall as the accelerated motion of the observer's own point of view relative to the motionless void comes to an end. In that dissolution, the course of time and the flow of energy come to an end. In that dissolution, the observer's holographic

world disappears from existence from its own point of view and nothing remains. That nothingness is the nature of timeless being, which is the primordial nature of existence.

Nothingness

Why isn't string theory a fundamental description of reality? The answer is string theory is computational, and can only apply to the computational construction of a holographic world. String theory, like field theory, only applies at the level of a holographic world. String theory is closely related to field theory, which is seen in a 10-dimensional supersymmetric SU(N) gauge theory generating string theory in the large N limit, and in the low energy limit of string theory being 11-dimensional supergravity. This connection explains why string theory is holographic. String theory, like field theory, only gives the computational rules that govern events in a holographic world. That computation arises from qubits of information encoded on a holographic screen, which arises as an observer's event horizon due to its own accelerated motion. When that acceleration comes to an end in an ultimate state of free-fall, all computation also comes to an end, and only the void remains. String theory, like field theory, cannot apply in the ultimate reality of the void that is beyond the computational virtual reality of a holographic world. The simple answer is that computation does not apply to the void. The void as the source of a computational holographic virtual reality world is beyond computation.

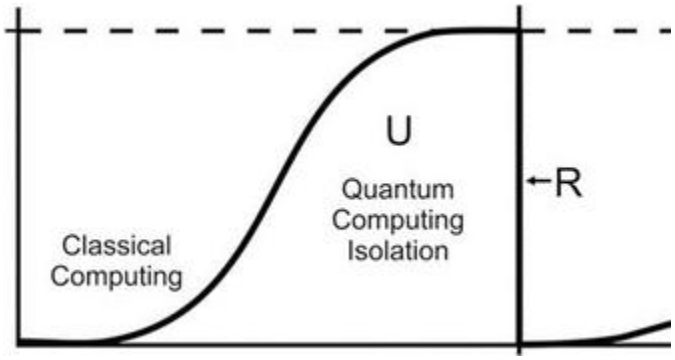
The physicalists deny the existence of this spiritual reality that is beyond computation. They only accept the physical reality of the world, but once you accept that the physical reality of the world is constructed as a holographic world, you're in a real pickle when you try to understand the nature of consciousness. The irony of course is that it's your own consciousness that understands things that's trying to understand its own nature.

A good example of a physicalist is Roger Penrose. Based on the Godel incompleteness theorems, Penrose understands that consciousness cannot be computational in nature. The nature of consciousness must be beyond computation. This is easily seen with the holographic principle, which describes the nature of a holographic world in terms of

quantum computing. Everything the observer can observe in its own holographic world is a form of information that can be reduced to qubits of information encoded on its own holographic screen, which arises as an event horizon due to its own accelerated motion. Those forms are projected like images from the observer's screen to its own point of view outside the screen. The consciousness of the observer exists at a point of view outside the screen and cannot be computational in nature since it cannot be reduced to qubits of information encoded on the screen.

In spite of Penrose's understanding that consciousness must be beyond computation, Penrose is not willing to give up his physicalist mindset. Penrose is desperately searching for a physical explanation for consciousness, even though he acknowledges that this explanation cannot be computational in nature. Penrose has settled on the idea of objective reduction as the non-computational nature of consciousness. Penrose hypothesizes that there are complex structures in the brain that generate consciousness when they undergo a non-computational reduction of their quantum state. The idea of the reduction of the quantum state is based on the idea that the quantum state is highly entangled in nature due to quantum entanglement, which is best understood in terms of the entanglement of qubits of information encoded on a holographic screen. The quantum state can be formulated in terms of a superposition or sum over all possible observable states. When an actual observation occurs, the sum over all possible observable states, which is a state potentiality, is reduced to an actual observable state.

Unitary time evolution tells us that the quantum state becomes increasingly entangled as it evolves between the initial and final states. In terms of qubits of information encoded on a bounding surface of space, like the conformal boundary of anti-de Sitter space or an observer's cosmic horizon in de Sitter space, the quantum state becomes increasingly entangled as it evolves in time and the qubits become increasingly entangled. The complexity of the quantum state only measures this degree of quantum entanglement of qubits, which become increasingly entangled over time from the initial disentangled state, which is a state of observation.



Unitary Time Evolution versus Reduction of the Quantum State

In the process of observation, the entangled quantum state of all possible observable states is disentangled, and only a single observable state is actually observed. Imagine a menu of possibilities from which you have to make an order. What actually shows up on your plate is what you ordered. Potentiality is inherent in having a choice about what to order. The quantum state can also be formulated in terms of a sum over all possible paths, and potentiality is inherent in the choice you make about which path to follow. When you follow a particular path, you make particular observations of whatever you observe as you follow that particular path. In this way, the entangled quantum state of potentiality is reduced to an actual observable state.

Each initial or final state in the sum over all possible paths of the quantum state is an observational event that disentangles the quantum state in the sense of a quantum state reduction, which is the nature of an observation. Roger Penrose has argued that observation must disentangle the quantum state through quantum state reduction.

In terms of the holographic principle, the initial state in the sum over all possible paths could be a state of thermal equilibrium, and yet the qubits will become increasingly entangled over time as the quantum state evolves from this initial disentangled state. Thermal equilibrium is best understood in terms of the equal partition of energy, which tells us that at thermal equilibrium, all the dynamical degrees of freedom for the system of interest carry the same amount of thermal energy given in terms of temperature as $E=kT$. For a holographic world, those dynamical degrees of freedom are qubits of information encoded on a bounding surface of space that arises as an observer's event horizon. If a total of n qubits encode information in a binary code, the maximal classical thermal entropy is given as $S=kn$, and there are a total of 2^n independent classical states, but at the quantum level, there are vastly more possible quantum states since the qubits can become entangled. Classical states are understood as eigenstates, while an entangled quantum state is a superposition of eigenstates. The classical states of qubits are the n eigenvalues of an n x n SU(2) matrix. The entanglement of qubits only represents rotational invariance on the surface of a 2-sphere. Thermal equilibrium only reflects that all the qubits carry the same amount of thermal energy given in terms of temperature. The initial state could be a state of thermal equilibrium, and yet the quantum state will evolve in time in terms of complexity from that initial disentangled state due to an increase in the degree of entanglement of all the qubits. The complexity of the quantum state only measures this degree of quantum entanglement of the qubits, which increases between observational events that disentangle the quantum state. That evolution of the quantum state continues until the next observational event, which is the final state in the sum over all possible paths that disentangles the quantum state.

Quantum state reduction requires disentanglement of the entangled quantum state, which leads to an observation of an actual observable state. Penrose hypothesizes that this process occurs in the brain and generates consciousness as the quantum state of

complex brain structures are reduced by a non-computational mechanism, like the fractal nature of Penrose tiling. Non-computational only means the process cannot be programmed on a computer. Reducing the quantum state by such a non-computational mechanism would allow consciousness to be physical but non-computational in nature.

The reason Penrose tiling cannot be programmed on a computer is because with each tiling, a decision must be made about where to place the tile, and that decision making is an aspect of consciousness, just like the decision about which path to follow. Penrose tiling cannot be programmed on a computer because each decision about where to place the next tile requires seeing the whole geometry, and no computer algorithm can see the whole nature of the geometry. Only consciousness can see the whole geometry.

Penrose tiling is indeed a non-computational mechanism, but only explains the nature of consciousness at the level of circular reasoning. We have to assume an aspect of consciousness, which is decision making, to explain the nature of consciousness. We have to use our consciousness to explain the nature of our consciousness. What kind of an explanation is that? All attempts to explain the nature of consciousness in physical but non-computational terms are fraught with the same problem. We have to assume some aspect of consciousness before we can explain the nature of consciousness.

It appears there is no possible way to explain the nature of consciousness in physical terms unless we begin with the assumption that consciousness exists. There is no way of avoiding the *a priori* existence of consciousness. In terms of the holographic principle, we have to assume the existence of consciousness in terms of the observer and its accelerated motion before we can explain how an observer's holographic world appears to come into existence. Consciousness must exist prior to the apparent existence of an observer's holographic world. Once we understand the nature of physical reality in terms of an observer's holographic world, there is no way of avoiding the conclusion that consciousness must exist prior to the appearance of that holographic world.

Penrose's idea about consciousness being physical but non-computational in nature is an interesting idea, but this is not what enlightened beings tell us about the ultimate reality of consciousness, which is spiritual in nature. The reason Penrose is pushing this idea is because he is a physicalist and denies the existence of a spiritual reality beyond physical reality. The reason Penrose is a physicalist is because he only has the experience of physical reality. That's where all his concepts come from.

The business of philosophy, like theoretical physics, is about the conceptualization of reality. Philosophers, like theoretical physicists, conceptualize reality in terms of their ideas about reality. The problem is these concepts are based on their observations of the physical world, and the holographic principle tells us that the physical world is a holographic world that is constructed through quantum computing. The physical world is

just like a computer-generated holographic virtual reality world that is being displayed on a computer screen. Everything observable in the physical world is a form of information that is reducible to qubits of information encoded on the screen, and these forms are projected like images from the screen to the point of view of the observer outside the screen. Even the flow of energy that animates the forms is perceived as the projected images are animated in the flow of energy. This construction of physical reality as a holographic world is due to quantum computing that occurs due to the observer's own accelerated motion that gives rise to its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon, which in effect creates the observer's own quantum computer. Even the flow of energy through the quantum computer arises from the observer's own accelerated motion.

The problem with both philosophy and theoretical physics is that the conceptualization of reality based on the observer's observations of the physical reality of a holographic world is fraught with logical contradictions. The number one logical contradiction is a paradox of self-reference that arises when the observer emotionally identifies itself with the emotionally animated form of a person that appears in its holographic world. The person is only the central form of information that appears in that world, like the form of an avatar that appears in a virtual reality world displayed on a computer screen. Emotional self-identification of the observer with the form of a person only occurs due to its perception of emotional feelings of self-limitation to that personal form as that form is emotionally animated relative to all other forms that appear in its holographic world. This conceptualization of reality, based on the observer's observations of the physical reality of a holographic world, is doomed to fail due to these inherent logical contradictions.

In the Allegory of the Cave, Plato conceptualized the nature of reality not on the basis of any observations of the physical reality of the world, but based on the direct experience of the ultimate reality of consciousness. Plato described the physical reality of the world as a holographic world in terms of images displayed on the wall of the Cave, which Plato described as shadows cast on the wall of the Cave, just like the projected images of a virtual reality world displayed on a computer screen. The wall of Plato's Cave is a holographic screen that arises as an observer's event horizon due to the observer's own accelerated motion, which becomes its holographic screen when qubits of information are encoded on its horizon. Plato described prisoners who observe the projected images of that holographic world, which are the shadows cast on the wall of the Cave. The prisoner is an observer. The observer becomes a prisoner when it emotionally identifies itself with the central form of information of a person that appears in its own holographic world. This emotional self-identification occurs as the observer perceives emotional feelings of self-limitation to the form of the person as that personal form is emotionally animated relative to all other forms that appear in its holographic world.

Plato also described the observer freeing itself from its emotional bondage of personal self-identification and ascending to the source of light that projects the images.

Plato based this conceptualization of reality not on any observations of the physical reality of a holographic world, but on the direct experience of the ultimate reality of consciousness. The direct experience of the ultimate reality of consciousness is called spiritual enlightenment. Plato was able to conceptualize reality in this way because he underwent a process that led to spiritual enlightenment. When one becomes spiritually enlightened, one's individual consciousness, present as the observer at the central point of view of the holographic world one perceives, dissolves back into its source of undifferentiated consciousness like a drop of water that dissolves back into the ocean.

This undifferentiated source of consciousness is called the void. The void is the primordial nature of existence. The void is what exists when everything else disappears from existence. A holographic world can disappear from existence because that world is only created due to an observer's own accelerated motion that gives rise to its event horizon that becomes its holographic screen when qubits of information are encoded on its horizon. Everything the observer can perceive is a form of information displayed on its own holographic screen. Those forms are projected like images from its screen to its own point of view at the center of its own holographic world. Even the flow of energy that animates the images arises from the observer's own accelerated motion. When that acceleration comes to an end in an ultimate state of free-fall, the observer no longer has an event horizon or a holographic screen, and so its holographic world disappears from existence from its own point of view. All the projected images of that world disappear from existence. Even the flow of energy that animates the images comes to an end. Even the individual consciousness of the observer, present at the central point of view of its own holographic world, dissolves back into its source of pure undifferentiated consciousness, like a drop of water that dissolves back into the ocean. All that remains in this state of dissolution is the timeless, undivided and unlimited existence of the void.

This ultimate state of dissolution always occurs in an ultimate state of free-fall, when the observer's own accelerated motion relative to the motionless void comes to an end. In an ultimate state of free-fall, one no longer has a holographic screen that displays images of one's own holographic world, and so that holographic world disappears from existence from one's own point of view. Only the void remains. In this ultimate state of dissolution, one's consciousness ascends to a higher level, and one sees the nature of one's own holographic world like a virtual reality movie being displayed on a computer screen as all the images of the movie are projected from the screen to one's own point of view and are animated in the flow of energy. This experience of the ascension of consciousness can be called depersonalization, since once one sees things in this way, one can no longer emotionally identify oneself with the central form of a person that appears in one's own holographic world. One can only know oneself to be a presence of consciousness at the central point of view of the holographic world that one perceives. Ultimately, one can only know the true nature of one's timeless existence as the void.

Nothingness

When one becomes spiritually enlightened, one not only sees one's own world from the ascended level of consciousness of the observer, like a movie that one is watching, but one also sees the nature of oneself as the observer at the central point of view of that holographic world. One sees how the accelerated motion of the observer relative to the motionless void is energizing and animating all the images of that world, like the images of movie. One also sees how the light of consciousness, emanating from the central point of view of the observer, is illuminating all the projected images of that world, like the light of a movie projector. One sees all of this from the perspective of the silence, stillness, emptiness and darkness of the void.

One sees how one's individual consciousness that is present at the central point of view of the holographic world one perceives, which is called *I Am* or the *Self*, is differentiated from the undifferentiated consciousness of the void, which is called *No-self*. One sees that ultimately, when one's individual consciousness dissolves back into its source of

pure undifferentiated consciousness, the true nature of the *Self* is *No-self*. In an ultimate state of dissolution, there no longer is an experience of self and other. *All is One*.

The experience of self and other is only possible in a holographic world when the observer emotionally identifies itself with the central form of a person that appears in that world. This experience of self and other always occurs in a subject-object relation of perception, and only the observer can have that experience in its own holographic world when it emotionally identifies itself with the form of a person that appears in that world.

The vast majority of philosophers have absolutely no idea what Plato is describing in the Allegory of the Cave because Plato based his conceptualization of reality on the direct experience of the ultimate reality of consciousness, while almost all other philosophers can only develop their concepts based on their perception of a holographic virtual reality world, and that perception is fraught with logical contradictions about the nature of consciousness. The number one logical contradiction is a paradox of self-reference that arises with the assumption that consciousness is personal in nature that directly leads to personal self-identification. This is why Plato is almost universally misunderstood.

Everyone who is not spiritually enlightened and who attempts to conceptualize reality only based on their observations of the physical reality of a holographic world is at a great disadvantage due to the logical contradictions that inevitably arise from that conceptualization. The number one logical contradiction is the paradox of self-reference that is created when the observer emotionally identifies itself with the form of a person that appears as the central form of information in its own holographic world, which is always emotionally animated relative to all other forms and leads to emotional feelings of self-limitation to that personal form. Plato did not have this disadvantage because of spiritual enlightenment, and was therefore able to conceptualize things based on the direct experience of the ultimate reality of consciousness.

This disadvantage one has of conceptualizing reality only based on the observations of the physical reality of a holographic world is best demonstrated by all the concepts that arise in philosophy and theoretical physics when one is not spiritually enlightened. When one is not spiritually enlightened, one typically takes the position of a physicalist, and one denies the existence of a spiritual reality beyond physical reality.

Only enlightened being have the experience of a spiritual reality beyond physical reality. When Plato conceptualized the Allegory of the Cave, this was based on the direct experience of the ultimate reality of consciousness. Plato was only describing what was being directly experienced, which is the ultimate reality of consciousness. There is no other way to describe this ultimate reality except in spiritual terms.

How exactly does quantum state reduction work at a spiritual level? How is the entangled quantum state disentangled? This question is closely related to the qualia

problem. All of our physical theories about the nature of the world, including the holographic principle, are formulated in terms of quantities. In quantum field theory, we speak about the frequency or the wavelength of a photon, which is a quantum of electromagnetic radiation. With the holographic principle, we speak about qubits of information encoded on an observer's holographic screen. The holographic principle is more fundamental than quantum field theory because the qubits of information encoded on an observer's holographic screen are more fundamental in terms of the dynamical degrees of freedom that underlie all the events that can be perceived in the observer's holographic world than a photon of quantized electromagnetic radiation that appears in the observer's holographic world.

The problem is that these physical descriptions of the observer's holographic world are given in terms of quantities, like the wavelength of a photon or a qubit of information, but that is not how we perceive the world. The qualia problem is pointing out that we do not perceive quantities, like the wavelength of a photon, but qualities, like the color of light. The wavelength of a photon is a quantity, but when we perceive light, we perceive a quality, like the color red. There is no possible way in which any of our physical theories can make this transition from a quantity to a quality.

What is the solution to the qualia problem? The answer comes back to the problem of quantum state reduction. The quantum state is always an entangled state. At the level of quantum field theory, all the photons that appear in an observer's holographic world are entangled. At the level of the holographic principle, all the qubits of information encoded on an observer's holographic screen are entangled. At the level of qubits, quantum entanglement simply reflects that the qubits are defined in terms of the eigenvalues of a matrix that is defined on an observer's event horizon. Quantum entanglement simply reflects that the qubits are defined in a rotationally invariant way on the surface of the observer's event horizon.

When the observer makes an observation of its holographic world, the entangled quantum state for that world is disentangled. In terms of ordinary quantum theory, the entangled sum over all possible observable states is reduced to an actual observable state or the entangled sum over all possible paths is reduced to an actual path. In terms of qubits of information encoded on an observer's holographic screen, the entangled qubits are disentangled whenever an observation is made. Physical theories can never explain how observation occurs through disentanglement of the quantum state because by their very nature, all physical theories are computational in nature and can only describe quantities, not qualities. There is no possible way that a physical theory based on computation can ever change a quantity into a quality. There is no possible solution for the qualia problem in any of our physical theories about the physical world.

What is the solution for the qualia problem? The answer we have to accept is a spiritual solution, which is inherently a non-physical solution. The answer is inherent in the Allegory of the Cave when Plato described ascending to the source of the light. The light is what is projecting the shadows on the wall of the cave. What exactly is this light in spiritual terms? The answer is the light Plato refers to is the light of consciousness, which is spiritual in nature. The source of the light is the void, which is also spiritual in nature. The light of consciousness emanates from the observer's own point of view at the center of its own holographic world. The light of consciousness is what illuminates that world and allows for the projection of all images of that world from the observer's holographic screen to its central point of view as an observation of that world is made. The key aspect of the light of consciousness is that it must be focused, as in the focus of attention, whenever an observer makes an observation of its holographic world. Focusing the light of consciousness is like focusing the light of a movie projector. The light of consciousness allows for the projection of all the images of a holographic world.

In terms of the holographic principle, the light of consciousness is what disentangles the quantum state of the observer's holographic world as the observer makes an observation of that world. The nature of observation is holographic projection, which occurs as the observer perceives the form of things that appear in its own holographic world. Those forms are projected like images from the observer's holographic screen to its central point of view, and in the process of that holographic projection, the entangled quantum state of that world is disentangled. Since this holographic projection can only occur as the observer illuminates that world and focuses its own light of consciousness on that world, the process of disentangling the quantum state and observing that world is inherently a spiritual process that requires the light of consciousness.

At the level of decision making, as in the decision about which path to follow, focusing the light of consciousness is what allows a decision to be made, which also allows the quantum state to be disentangled. In that decision making process, the quantum state is disentangled as actual forms are perceived. At the level of an entangled quantum state, the forms of information are entangled and can only be characterized in terms of the numerical quantities of the entangled qubits of information encoded on an observer's holographic screen. When the quantum state is disentangled and actual forms are perceived, those perceived forms are characterized by qualities. The perception of the qualities of forms requires focusing the light of consciousness, which allows a decision to be made as the quantum state is disentangled and actual forms are perceived.

This is the solution to the qualia problem. Although the quantum state of the observer's holographic world is formulated in terms of quantities, specifically in terms of qubits of information encoded on the observer's holographic screen, the observer's observation of that world is always in terms of qualities, and those qualities are inherent in the way the light of consciousness must be focused in order to disentangle the quantum state

and allow for the perception of forms in terms of their qualities. This is inherently a spiritual solution to the qualia problem.

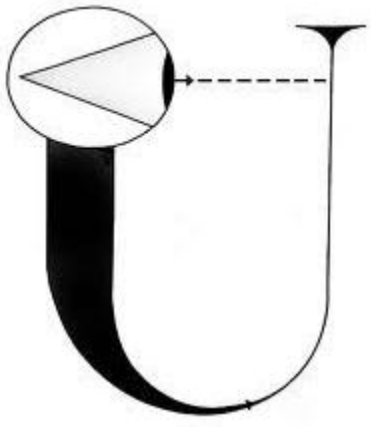
How can we be certain that this is the correct solution? The answer is spiritual enlightenment, which is the direct experience of the ultimate reality of consciousness. When one becomes spiritually enlightened, one sees that the observer, which is present at the central point of view of its own holographic world, is animating that world through its own accelerated motion, just like the animated images of a movie. One sees that the observer's accelerated motion is what gives rise to its holographic screen that displays all the images of its holographic world, just like the images of a movie displayed on a screen. One sees that the light of consciousness that emanates from the observer's central point of view is illuminating that world and projecting all the images of that world from the observer's holographic screen to its central point of view, like the light of a movie projector. One sees this from the silence, emptiness and darkness of the void.

All Seeing Eye

Perception always occurs in a subject-object relation. The true nature of the subject is the observer at the central point of view of its own holographic world, which is called the *Self* or *I Am*, and the nature of all the objects of perception that the observer can perceive in its own holographic world are forms of information that appear in that holographic world. The forms are like images that are projected from the observer’s own holographic screen to its central point of view and are animated in the flow of energy that arises from its own accelerated motion, which also gives rise to its holographic screen as its event horizon. The holographic principle tells us that the forms are all reducible to qubits of information encoded on the observer’s own holographic screen.

The thing to be clear about is that the true nature of your *Self* is nothing more than the perceiving consciousness present at the central point of view of your own holographic world. You create your own world when your *Self* undergoes accelerated motion, which is how your own holographic screen arises as an event horizon. At the level of perceiving your own holographic world, you are that presence of consciousness at the central point of view of that world. Perception always occurs in a subject-object relation. The true nature of the subject is your *Self*, which is the presence of consciousness at the central point of view of your own holographic world. The nature of all the objects you perceive are forms of information encoded on your own holographic screen. Those forms are all reducible to qubits of information encoded on your own holographic screen and are projected like images from your own screen to your own point of view. Those forms are animated in the flow of energy that arises from your own accelerated motion.

Understanding the animation of the images only requires understanding the accelerated motion of the observer. Not only does the flow of energy through its own holographic world arise from the accelerated motion of the observer, but so too does the course of time through that world, which is perceived in terms of the animation of the forms. More difficult to understand is the projection of the forms. Understanding the projection of the forms requires another concept about the nature of consciousness, which is the idea of the light of consciousness. You are not only a point of perceiving consciousness at the center of your own holographic world that perceives the images of that world, but you are also the source of the light of consciousness that illuminates that world and projects all the images of that world from your own holographic screen to your own point of view. The light of consciousness is what illuminates the observer's own holographic world as it emanates from the observer's own point of view and is what projects all the images of its own holographic world from its holographic screen back to its own point of view.



Universal Observer

If what you really are at the level of perceiving your own holographic world is a presence of perceiving consciousness at the central point of view of that world, then why do you have the impression of being a person in that world? The answer is called delusion. Each observer has its own personal form, which is the central form of information that appears in its own holographic world. The observer's personal form is called a body and is always emotionally animated relative to all other forms that appear in that world.

Delusion is created due to the way the observer's personal form is emotionally animated relative to all other forms that appear in its holographic world. As the observer perceives the flow of emotional energy that animates the form of its body relative to all other forms that appear in its holographic world, the observer feels emotionally self-limited to the form of its body due to its perception of feelings of emotional self-limitation to its body.

The observer's personal form is only the central form of information that appears in its own holographic world, but due to perceived feelings of emotional self-limitation to the form of its body, the observer mistakenly identifies itself with its body. The observer's mistaken self-identification with its body is purely an emotional self-identification due to perceived feelings of emotional self-limitation to its body. The expression of emotions that emotionally animates its body is inherently self-limiting in nature and leads the observer to emotionally identify itself with its body. In reality, the observer's body is only a form of information that appears in the world it perceives. In reality, the observer is only a presence of consciousness at the central point of view of that holographic world.

The problem of the personal self-identification of the observer with its body, which is the problem of delusion, is compounded due to the self-defensive nature of emotions. The easiest way to understand the self-defensive nature of emotions is with the ideas of Darwinian evolution, natural selection, and the survival of the fittest body. Darwinian evolution is not just about genetic evolution, but is also about emotional evolution. Not only does the genetic information encoded within the body evolve, but the emotions expressed by the body also evolve. Natural selection in turn then selects those bodies for survival that are best able to survive, which is called the survival of the fittest body.

Body survival not only depends on generic evolution, but also on the evolution of emotions. This is an inevitable consequence of living in a body-eat-body world. At the most primitive level of body survival, the body must eat other bodies in order to survive while it also avoids being eaten by other bodies. Body survival is an energetic process that requires the expression of emotions. Body survival is really nothing more than the coherent self-replication of the form of the body in a recognizable way while the body is emotionally animated. The body must coherently hold together as a recognizable form of information over a sequence of observable events in order to appear to survive.

The only way the body can appear to coherently hold together as a recognizable form of information over a sequence of observable events as the body is emotionally animated is if the body adds organizing potential energy to its form. The addition of organizing potential energy to the body is called eating, which is necessary for body survival. This fact has a simple thermodynamic explanation. Work must be performed within the body in order to maintain the coherent organization of the body while the body is emotionally animated, and the energy that allows this work to be performed requires the addition of organizing potential energy to the body. If this organizing potential energy is not added to the body, the random flow of thermal energy through the body will disorganize the body and the form of the body will eventually fall apart and its form will no longer be coherently self-replicated in recognizable way. The thermal disorganization of the body must be counterbalanced by the coherent organization of the body, which requires the addition of organizing potential energy to the form of the body if the body is to survive.

Bodies only survive because they eat other bodies. That's the only place they can find the organizing potential energy they need in order to survive. The addition of organizing potential energy to the body is emotionally expressed as the desire to eat another body. At the same time, if the body is to survive, the body also needs to avoid being eaten by another body, which is emotionally expressed as the fear of being eaten by another body. This unfortunate state of affairs is an inevitable energetic consequence of living in a body-eat-body world, where bodies must eat each other in order to survive.

Natural selection has selected those bodies for survival that are best able to eat other bodies while they also avoid being eaten by other bodies. At the most primitive level of body survival, that's what the survival of the fittest body is all about. There is an inherent emotional conflict in the expression of these survival emotions. The expression of the desire to eat another body is a movement toward another body, while the expression of the fear of being eaten by another body is a movement away from another body. There is no way to resolve this emotional conflict at the level of the motion of bodies.

The emotional expression of fear and desire are always driven by the pleasure-pain principle. Whatever promotes body survival, like eating, feels good and gives pleasure, while whatever threatens body survival, like being eaten, feels bad and gives pain. The survival of the fittest body is always driven by the pleasure-pain principle, as whatever promotes body survival and gives pleasure is pursued while whatever threatens body survival and gives pain is avoided. That pursuit of pleasure and avoidance of pain are ultimately what the emotional expressions of fear and desire are all about.

The human life-form is a social animal, and not only expresses the primitive emotions of fear and desire, but also expresses social emotions, like emotional attachments. The immature body of a child is not able to fend for its own survival, but must emotionally attach itself to the body of its mother or caregiver in order to survive. The expression of

the social emotions of emotional attachments are just as necessary for body survival as are the expression of the primitive emotions of fear and desire.

The thing to be crystal clear about is that all the primitive emotional expressions of fear and desire are self-defensive in nature as they defend the survival of the body. Even the expression of social emotions, like emotional attachments, are self-defensive in nature as they defend the survival of the body. The body only appears to survive in the world as the coherently organized form of the body is self-replicated in form in a recognizable way over a sequence of observable events while the body is emotionally animated.

The big question you have to ask yourself is: Who exactly is recognizing the form of the body as its own form as the body is self-replicated in form in a recognizable way over a sequence of observable events while the body is emotionally animated? The answer of course is the observer, but the observer is not its body. The observer is a presence of perceiving consciousness at the central point of view of its own holographic world. The observer's body is only the central form of information that appears in that world. The observer only mistakenly or emotionally identifies itself with the form of its body due to its perception of emotional feelings of self-limitation to the form of its body as its body is emotionally animated relative to all other forms that appear in its own holographic world.

This is the basic problem of delusion. The observer emotionally identifies itself with the form of its body due to its perception of emotional feelings of self-limitation to its body as its body is emotionally animated relative to all other forms. Those emotional expressions are all self-defensive in nature as they defend the survival of the body. Once the observer emotionally identifies itself with its body, it then feels compelled to defend the survival of its body as though its existence depends on it. This creates a vicious cycle that leads to the expression of more self-defensive emotions, which perpetuates the observer's emotional self-identification with its body. The observer's false assumption that its existence depends on the survival of its body is the primary false belief that underlies the nature of delusion. The observer's delusion is this false belief that the observer believes about itself that its existence depends on the survival of its body. The very act of self-recognition and emotional self-identification with a body is delusional.

To be clear about things, consciousness does not evolve. *Consciousness is*, which is often stated as *I Am*. Consciousness is the ultimate nature of existence, which is the nature of your own being. The ultimate nature of your own existence is *timeless being*, which does not evolve in time. That *timeless being* is the ultimate nature of your being. At the level of perceiving your own holographic world, you can only know your *Self* to be a presence of perceiving consciousness at the central point of view of that world. The only true thing you can ever know about your *Self* is your own sense of being present as you perceive that world. Whatever you perceive in that world constantly changes over time, but your own sense of being present as the perceiver of that world is always the

same sense of being and does not change. As the perceiver of your own world, you always exist in an *eternal now*, which is a reflection of your own *timeless being*.

On the other hand, delusion does evolve. Your delusion that you are a person that appears in the holographic world that you perceive evolves in the sense of Darwinian evolution, natural selection and the survival of the fittest body. That evolution is how the expression of your self-defensive emotions evolve that make you feel emotionally self-limited to the form of your body as your body is emotionally animated, which leads you to emotionally identify yourself with the form of your body. When you suffer from delusion, you come under the sway of the conditioning of Darwinian evolution, which makes you feel that your own existence depends on the survival of your body.

When you come under the sway of Darwinian evolution, you're being conditioned by Darwinian evolution. That conditioning takes the form of self-concerned thoughts. Your self-concerned thoughts are emotionally constructed in your mind as a body-based personal self-image is emotionally related to the image of some other thing that appears in the world you perceive. Those emotional expressions are all self-defensive in nature in the sense that they defend the survival of your own body as though your existence depends on it. This is the inevitable result of emotionally identifying yourself with your body. You've been conditioned to think these self-concerned thoughts about yourself.

Delusion evolves because the self-concerned thoughts you think about yourself evolve. This conditioning has evolved over millions of life-times. In reality, you are a presence of perceiving consciousness at the central point of view of the world you perceive, and your thoughts are only emotionally animated forms of information that appear in that world. Your self-concerned thoughts are like the self-referential narration of a movie by the central character of the movie. Your self-concerned thoughts are personal in nature because you're emotionally identifying yourself with the personal form of the central character of the movie. Your self-concerned thoughts are all about whatever personal troubles the central character finds itself to have in the movie and how the central character can get out of those troubles. Your self-concerned thoughts are delusional because you are not a person. You are not the central character of the movie that you're watching. In reality, you are a presence of perceiving consciousness that is watching the movie from your own point of view as the animated images of the movie are displayed on a movie screen and are projected to your own point of view outside the screen.

The problem of the mentally constructed and emotionally energized body-based personal self-concept or ego is only created when the expression of self-defensive emotions are exaggerated, amplified, distorted and perpetuated in a nearly continuous inner running monologue of self-concerned thoughts emotionally constructed in the mind. Self-concerned thoughts are self-referential in nature, as they refer to survival of the body, and are like the self-referential narration of a movie by the central character of

the movie. Whatever personal troubles the central character finds itself to have in the movie, the self-referential narration of the movie by the central character is all about how the central character can get out of that trouble. That's the nature of self-concerned thoughts. Self-concerned thoughts have been conditioned over millions of life-times by Darwinian evolution and natural selection, which is all about defending the survival of the body. The bodies that survive in the sense of the self-replication of their forms and the sexual reproduction of their forms are the bodies that are best able to defend the survival of their forms through the expression of self-defensive emotions. That's what the survival of the fittest body and the expression of fear and desire are all about. Body survival is really nothing more than the coherent self-replication of the emotionally animated form of the body in a recognizable way over a sequence of observable events.

The ego has evolved over millions of life-times because the ego is a way of ensuring the survival of the body. The self-referential construction of the ego in the mind is always emotionally energized, as a body-based self-concept or self-image is emotionally related to the concept or image of some other thing. The other thing is in emotional relationship with the body. Since the purpose of the ego is to defend the survival of the body, these emotional expressions are self-defensive in nature. Unlike a self-defensive emotion that naturally occurs in the moment, these self-concerned thoughts are nearly continuous in nature, and create an inner running monologue in the back of your mind. They're often referred to as automatic thoughts that you may only be vaguely aware of. They are not unconscious, but you may only have a dim conscious awareness of them.

A key aspect of delusion is personal bias. As you express self-defensive emotions and emotionally identify yourself with your personal form, you're being conditioned by Darwinian evolution to express self-defensive emotions that defend the survival of your body as though your existence depends on it. That false belief that you believe about yourself that your existence depends on the survival of your body is the nature of your personal bias. That personal bias is expressed with the expression of personally biased emotions that defend the survival of your body as though your existence depends on it.

The expression of that personal bias arises from personal bias in the focus of your attention. As you focus your attention on the life your character appears to live in the world you perceive in a personally biased way, you express personally biased emotions that animate the life of your character. You've been conditioned by Darwinian evolution to express your emotions in that personally biased way because you're defending the survival of your body as though your existence depends on it. That false belief you believe about yourself, which is inherent in every self-concerned thought you think about yourself, is the nature of your personal bias in the focus of your attention.

Personal bias is only possible because you always have a choice about what you can perceive in your own world. You make that choice as you focus your attention on things

in your own world. Whatever you focus your attention on is what you perceive. That choice is inherent in the quantum state of that world. At the level of ordinary quantum theory, the quantum state of your own world can be understood as a sum over all possible paths that connect two points in that world, and you always have a choice about which path you will follow. The quantum state is a state of potentiality that only specifies the quantum probability about how likely it is that you will follow any particular path. The classical path, which is called the path of least action, is only the most likely path in the sense of quantum probability, but even the classical path assumes that choices are made in an unbiased way. If personal bias arises in the way the choices are made, then all bets are off and the quantum state loses its classical predictability.

The sum over all possible paths of the quantum state is a superposition of observable states that represents quantum entanglement. At the level of the holographic principle, quantum entanglement represents that all the qubits of information encoded on your own holographic screen are entangled. Again, this entanglement of the qubits is a state of potentiality that specifies how likely it is that you will observe anything in your own holographic world, but that likelihood assumes that you're making your choices without any bias. If you observe things with personal bias, then you're making your choices in a personally biased way. You make your choice about what you will observe in that world as you focus your attention on things that appear in your own holographic world.

Your focus of attention is directly related to the light of consciousness that illuminates your own holographic world and that projects the images of that world from your own holographic screen to your own point of view, like the light of a movie projector. The illuminating effect of the light of consciousness is directed with your focus of attention on things in your own holographic world. This illuminating and projecting effect of the light of consciousness, which is directed with your focus of attention on things, is the solution to a famous problem of perception, which is called the qualia problem.

Both quantum theory and the holographic principle tell us that at the level of the quantum state information is encoded in terms of quantities. A qubit of information is a quantity. The problem is that we do not perceive the world in terms of quantities, but rather in terms of qualities. We do not perceive quantities, like the wavelength of light, but rather qualities, like the color of light. At the level of the quantum state, which is an unobserved state of potentiality, the qubits are all entangled, but when we perceive the form of something in the world, we are disentangling the quantum state and perceiving an actual observable state. The observation of the form of something is only possible because we are disentangling the quantum state as we make our observations of the world, which is always a choice, like the choice about which path to follow.

When we make our choices about what to observe in the world or which path to follow through the world, and thereby disentangle the quantum state, we are directing the light

of consciousness through the focus of our attention. In terms of the holographic principle, information is encoded on a holographic screen in terms of entangled qubits, but when we make our choices and disentangle the quantum state, we're directing the light of consciousness through the focus of our attention. The illuminating effect of the light of consciousness is how images of our own holographic world are projected from our own holographic screen to our own point of view. In the process, we do not perceive quantities, like the qubits encoded on the holographic screen, but rather qualities, which characterize the form of things. The qualities of things are inherent in the images of things that are projected through the illuminating effect of the light of consciousness.

This solution to the qualia problem goes a long way toward explaining the nature of personal self-identification. The problem is personal bias in the observer's focus of attention. The observer's perception of feelings of personal self-limitation to the form of its body is an emotional quality. Just as feelings of pleasure and pain are emotional qualities, the feeling of personal self-limitation to a body is also an emotional quality. That emotional quality arises with personal bias in the observer's focus of attention. The observer's focus of attention is personally biased because the observer is emotionally identifying itself with the emotionally animated form of its body due to its perception of emotional feelings of self-limitation to its body that arise as self-defensive emotions are expressed. That personal bias arises from the false belief the observer believes about itself that its existence depends on the survival of its body, which leads to the expression of more self-defensive emotions, perpetuates the vicious cycle of personal self-identification, and reinforces the observer's false belief that it believes about itself that it is a person that appears in the world it perceives. That false belief is created as personally biased self-concerned thoughts are emotionally constructed in the observer's mind. Personal self-identification is only possible because of personal bias in the observer's focus of attention that leads to the expression of personally biased emotions.

The problem of delusion is created due to personal bias in the observer's focus of attention. Once the observer emotionally identifies itself with the personal form of its body, it then feels compelled to defend the survival of that personal form as though its existence depends on it. The expression of those self-defensive emotions arises from personal bias in the observer's focus of attention. The observer's perception of feelings of personal self-limitation to the form of its body arises from that personal bias as personally biased emotions are expressed, which typically are self-defensive as they defend the survival of the body. Just as feelings of pleasure and pain are emotional qualities, the feeling of personal self-limitation to a body is also an emotional quality.

The personal bias of personal self-identification is the nature of delusion. Delusion evolves in the sense of Darwinian evolution, natural selection and survival of the fittest body because that's how the observer's mind has been conditioned over millions of life-times to think personally biased self-concerned thoughts about itself. The inherent

emotional nature of those self-concerned thoughts is self-defensive in the sense of defending the survival of its body as though the observer's existence depends on it. That false belief the observer believes about itself is the big lie at the heart of delusion.

The true nature of the observer is not its body, but consciousness. Consciousness does not evolve. *Consciousness is*. Consciousness is the nature of being, which ultimately is *timeless being*. Delusion can evolve over millions of life-times, but not consciousness. Consciousness can only be what it really is, which is the ultimate nature of existence.

Consciousness can only realize the true nature of what it really is when delusion comes to an end. Just as delusion can evolve over time, delusion can also come to an end. Delusion can evolve over millions of life-times, but eventually must come to an end. The end of delusion is called spiritual awakening. When consciousness awakens to the true nature of what it really is, delusion comes to an end.

Every observer creates its own virtual reality world, but what appears in that virtual reality world is no more real than the projected and animated images of a movie being displayed on a computer screen. Even the information and energy inherent in that virtual reality world can only arise due to the accelerated motion of the observer. The observer's virtual reality world can only appear to come into existence due to its own accelerated motion. In the end, when that accelerated motion comes to an end, that virtual reality world disappears from existence from the observer's own point of view and only the consciousness of the observer ultimately exists. When everything in your own world disappears from existence from your own point of view, what remains? The answer is nothing. That absolute nothingness is what you ultimately are.

The true nature of what you are is what remains when everything else disappears from existence. That absolute nothingness is the ultimate nature of existence, which is best described as pure undivided and unlimited timeless being. That pure *timeless being* is the source of your own consciousness that arises at the central point of view of your own holographic world. Your holographic world always appears to come into existence and disappears from existence from your own point of view. The source of your own consciousness is not the physical world that you perceive, but that pure *timeless being*.

The direct experience of that *timeless being* is called spiritual enlightenment. Spiritual enlightenment is only possible because you can withdraw the focus of your attention away from the world that you perceive. When you focus your attention on events in that world, that world appears to come into existence, and when you withdraw your attention away from that world, that world disappears from existence from your own point of view.

This subject-object relation of perception gives rise to a state of duality, which is the observer’s experience of self and other. The true nature of the *Self* is the observer, which is a point of illuminating and perceiving consciousness at the center of its own

holographic world. The only true thing the observer can know about its *Self* is *I Am*, which is its own sense of being present as it perceives events in its own holographic world, but this state of duality is characterized by delusion due to the observer's emotional self-identification with the form of its body that appears in its holographic world. The observer's body is only the central form of information that appears in its own holographic world, but when that personal form is emotionally animated relative to all other forms that appears in its world, the observer feels emotionally self-limited to that personal form due to its perception of feelings of emotional self-limitation to its body, which leads the observer of emotionally identify itself with the personal form of its body and gives rise to its dualistic experience of self and other in its own holographic world.

Delusion can only come to an end when the observer's emotional self-identification with the personal form of its body comes to an end. The observer's holographic world only appears to come into existence when the observer focuses its attention on the events of its holographic world. When the observer withdraws its attention away from the events of its holographic world, its holographic world disappears from existence from its own point of view. When the observer withdraws its attention away from the events of its holographic world, it also withdraws its investment of emotional energy in that world that emotionally animates the form of its body within that world relative to all other forms that appear in that world. When the observer withdraws its attention away from the events of its holographic world, it also withdraws the focus of the light of consciousness away from events in that world that illuminates that world and projects all the images of that world from its own holographic screen to its own point of view at the center of that world. When the observer's own holographic world is no longer illuminated or animated, its holographic world disappears from existence from its own point of view.

The disappearance of the observer's own holographic world from its own point of view is always experienced as an ultimate state of free-fall. When the observer withdraws its investment of animating emotional energy in its own holographic world, the observer's own accelerated motion relative to the motionless void comes to an end. The end of that accelerated motion is an ultimate state of free-fall in which the observer no longer has an event horizon that acts as its holographic screen, and therefore no longer perceives events in its own holographic world. In this ultimate state of free-fall, the observer's own holographic world disappears from existence from its own point of view.

What happens to the observer in this ultimate state of free-fall? The answer is called spiritual enlightenment. The observer's individual being, the *I Am*, which is always present as a point of illuminating and perceiving consciousness at the center of its own holographic world, dissolves back into the *One Source* of consciousness like a drop of water that dissolves into the ocean. The individual being of the observer dissolves back into the pure undivided and unlimited timeless being of the void. Not only does the observer's holographic world disappear from existence from its own point of view, but

the course of time also comes to an end. The observer's individual being always exists in the *eternal now* of its holographic world, which is a reflection of its *timeless being*, and that *timeless being* is experienced with the dissolution of spiritual enlightenment as individual consciousness dissolves back into its source of undivided consciousness.

That unlimited and undivided *timeless being* can only be described in terms of negation as absolute nothingness or void. It is described as motionless since it is the source of all animating energy. It is described as darkness since it is the source of the illuminating effect of the light of consciousness. It is not perceivable, but is the source of perception. It is the source of the individual being of the perceiver of its own world, the *I Am*, which is the illuminating and perceiving consciousness at the center of its own world. It is the source of the perceiver's own motion relative to the motionless void. It is the source of all individual consciousness. It is the source of the *Self*. Within the *One Being* of that absolute nothingness, there is no experience of self and other, hence it is called *No-self*.

After the dissolution of spiritual enlightenment, the observer again experiences its own holographic world, but that world is now experienced from the highest perspective of the emptiness, silence, stillness and darkness of the void. From that highest perspective of consciousness, it is seen how the observer's world appears to come into existence due to the observer's own motion relative to the motionless void that animates all the forms of that world, and how that world is illuminated due to the light of consciousness that projects all the images of the forms of that world from the observer's own screen to its own point of view at the center of that world. The forms are animated due to the observer's own motion, like the animated images of a movie displayed on a movie screen, and are projected from the screen to the observer's own point of view, where the images are perceived, due to the illuminating effect of the light of consciousness that emanates from the observer's own point of view, like the light of a movie projector. All of this is seen from the emptiness, silence, stillness and darkness of the void.

Nothingness

Scientific References

Quanta Magazine June 6, 2023 video in which Lenny Susskind proposes a second law of quantum complexity: https://www.youtube.com/watch?v=yLOHdW7dLug
Tom Banks and Willy Fischler (2018): Why the Cosmological Constant is a Boundary Condition. arXiv:1811.00130
Raphael Bousso (2002): The Holographic Principle. arXiv:hep-th/0203101
Amanda Gefter (2014): Trespassing on Einstein's Lawn (Random House)
Amanda Gefter (2012): Cosmic Solipsism. FQXi Essay
Rebecca Goldstein (2005): Incompleteness (W W Norton)
Brian Greene (2000): The Elegant Universe (Vintage Books)
Gerard 't Hooft (2000): The Holographic Principle. arXiv:hep-th/0003004
Ted Jacobson (1995): Thermodynamics of Space-time. arXiv:gr-qc/9504004
J Madore (1999): Non-commutative Geometry for Pedestrians. arXiv:gr-qc/9906059
Juan Maldacena (1997): The Large N Limit of Superconformal Field Theories and Supergravity. arXiv:hep-th/9711200
Roger Penrose (2005): The Road to Reality (Alfred A Knopf)
Roger Penrose (2000): The Large, the Small and the Human Mind (Canto)
Roger Penrose Interview: New Scientist, Nov 14, 2022
Lee Smolin (2001): Three Roads to Quantum Gravity (Basic Books)
Leonard Susskind (2008): The Black Hole War (Little, Brown and Company)
Leonard Susskind (1994): The World as a Hologram. arXiv:hep-th/9409089
A. Zee (2003): Quantum Field Theory in a Nutshell (Princeton University Press)
Anton Zeilinger (1999): Experiment and the Foundations of Quantum Physics. Rev. Mod. Phys. 71, S288.

Additional References

The Bhagavad-Gita (1909): Edwin Arnold trans. (Harvard Classics)
The Complete Works of Chuang Tzu (1968) Burton Watson trans. (Columbia Press)
Plato's Republic (2001) Benjamin Jowett trans. (Agora Publications)
Noam Chomsky on Curt Jaimungal's podcast Theories of Everything (Apr 12, 2022)
Antonio Damasio (1999): The Feeling of What Happens (Harcourt Brace)
N. Gregory Hamilton (1988): Self and Others (Jason Aronson)
Jed McKenna (2002, 2004, 2007): Spiritual Enlightenment Trilogy (Wisefool Press)
Jed McKenna (2013): Jed McKenna's Theory of Everything (Wisefool Press)
Nisargadatta Maharaj (1973): I Am That (Acorn Press)
Osho (1974): The Book of Secrets (St Martin's Griffin)
Paul Reps and Nyogen Senzaki (1957): Zen Flesh, Zen Bones (Tuttle Publishing)
Bernadette Roberts (1993): The Experience of No-Self (State Univ of New York Press)
Eckhart Tolle (1997): The Power of Now (New World Library)
Lao Tsu (1989): Tao Te Ching. Gia-Fu Feng trans. (Vintage Books)