The Quantum Tathagata

Forward

Parenthetical and italicized text are mine.

I submit the following for your consideration in your modern understanding of the knowledge that Shakyamuni Buddha was trying to convey some almost 3000 years ago to a largely illiterate people as well as all caste up to the intellectual (*Brahman*) caste of India.

My constant goal is to make the history and scholarship of Buddhism and its founder's teachings as easy to understand as this modern era of Mappo can transmit. With the access to our great scholars in both Buddhist lineage as well as those academically trained, this wealth of information can be overwhelming. It is my task to reduce the noise or extraneous pursuits of politicized agendas to deliver a paired back but no simplified, straightforward teaching without distraction. The sciences today, from physics and cosmology to psychology and neurology, provide a glut of observable truths that apply directly to our Buddhist practices and rhetoric. I provide here a direct transcription of video talks from the Internet with interruptions of personal insight regarding Buddhist teachings and practice, as a guide to interrelate our practice with the provided text.

Sifu, Bodhisattva Sylvain Chamberlain

Love and respect,

NaMuMyoHoRenGeKyo

Transcript Annotated

Scientists have confirmed that the distance between you and a galaxy 13 billion light-years away is by the laws of quantum physics exactly zero. Not approximately zero, not metaphorically zero. Zero. That galaxy NGC 1300, a barred spiral hanging in the constellation Aerodanis is, according to peer-reviewed quantum mechanics, occupying the same fundamental point in reality as the hand you are looking at right now. And the most unsettling part, that's not a theory. That's the experiment.

In 1964, physicist **John Stewart Bell** at **CERN** published what would become the most tested theorem in the history of science. Bell's theorem, later confirmed through **Alain Aspect**'s landmark 1982 experiment at the institute in Paris and sealed beyond all reasonable scientific doubt by the loophole-free bell tests run simultaneously at Delft University **NIST** and the University of Vienna in 2015 proved

something that **Einstein** called spooky action at a distance and spent 20 years trying to disprove. He failed.

What Aspect, Henson and Giustina and their teams proved published in Physical Review Letters and Nature was not a philosophical suggestion. It was a measured, repeatable, peer-reviewed experimental result that violated every classical assumption about space and distance that physics had built over 300 years. The result, particles that have interacted are not separated by distance in any meaningful physical sense. What happens to one instantly, not fast, not at the speed of light instantly, affects the other, regardless of how far apart they are. But that's just particles, right? tiny invisible things in a laboratory. Here's why it isn't.

By the end of this video, you are going to understand three things that most physics graduates never connect into a single coherent picture.

1. First, you are going to understand exactly what Bell's theorem proved in plain language without losing a single atom of its strangeness. And you are going to understand why the result means that the distance between any two points in the universe is not a physical fact. It is a perceptual event.
2. Second, you are going to understand what the holographic principle developed by theoretical physicist **Juan Maldacena** at Harvard and later formalized by **Leonard Susskind** at Stanford says about where information in the universe actually lives and it is not where you think. It is not even in the space between things. It is on a surface, a boundary. And that boundary might be everywhere simultaneously.
3. Third, and this is the part that changes the question of who you are and where you exist. You are going to understand what happens when you apply both of those findings to the object doing the observing to the consciousness inside the system to you.

The last part of this video is the part people rewind. Stay with me because what we're about to do is not explain the universe. We are going to dissolve the distance between you and it.

Put your hand in front of your face. Look at it. Not as a hand. Look at it as what it physically is. Look at the gap between your fingers and your eyes. That gap feels real. It feels like empty space. It feels like distance. maybe 30 centimeters of air and light and nothing much. Now consider what that gap is actually made of. The air between your hand and your eyes is not empty. It is a seething of approximately 2.7* 10^ to the 19th power molecules per cubic cm. Each of those molecules is made of atoms.

Each of those atoms is made of a nucleus surrounded by an electron cloud. And here is the thing your physics teacher probably didn't say out loud. That electron cloud is not a solid thing in a location. It is a ***probability distribution***.

> *(This is the Trichiliocosm or 3000 Realms of influence you hear me talk about repeatedly)*

a smear of potential positions that only collapses into a specific location *(Moment)* when something interacts with it. The solid feeling gap between your hand and your face is almost entirely made of probability. Now extend that logic outward. The distance between your body and the chair you're sitting on, same thing. Probability constrained by quantum fields creating the sensation of resistance, the sensation of surface, the sensation of here and there. Now extend it further.

The distance between the Earth and the Moon, 384,000 km of what we call space.

What is that space? It is not empty. It is the quantum vacuum. A roiling field of virtual particles blinking in and out of existence governed entirely by quantum field theory carrying no classical notion of fixed measurable absolute distance. Physicists have a name for this. They call it the non-locality of space. And non-locality does not mean hard to measure. It means that space as a property that separates things in an absolute and classical sense does not fundamentally exist. The universe does not have a fixed external ruler sitting somewhere outside it measuring the gaps between things.

Distance is a relationship between systems and relationships in quantum mechanics are not fixed by location (or Moments!). They are fixed by interaction.

(What we can identify as Karma)

Which means the relevant question is not how far away is that galaxy. The relevant question is have any of the particles in your body ever interacted directly or through an unbroken chain of interactions with particles that were once part of that galaxy? And the answer because of how the universe began because of the big bang singularity from which every particle in existence emerged in a single quantum event is yes. Every particle in your body shares a quantum history with every other particle in the universe. Which means the question how far away is that galaxy might be at the deepest physical level the wrong question entirely. So what is the right question and what do the experiments actually show?

(Even though I have shown many times that the universe is a recycling instantiation of potential, using Dr. Penrose's CCC, the Conformal Cycling Cosmos, as valid observation, the relationship not only continues to hold, but is actually far more profound.)

In 1935, **Albert Einstein, Boris Podolski, and Nathan Rosen** published a paper that was intended to be a death blow to quantum mechanics. The **EPR** paper, as it became known, identified what they considered a fatal flaw in the theory. If quantum mechanics was correct, it would require what Einstein called spooky action at a distance. The idea that measuring one particle could instantaneously affect another particle far away with no signal passing between them. Einstein considered this impossible. He believed in what physicists call local realism. The idea that physical reality is local, meaning things are only affected by their immediate surroundings, and real, meaning particles have definite properties whether or not they are being measured. If quantum mechanics violated local realism, Einstein argued, it must be incomplete. So for nearly three decades, the

debate sat unresolved, a philosophical disagreement between the giants of physics with no experimental tool sharp enough to cut through it.

Then in 1964, **John Bell** published a deceptively simple paper in the journal Physics *Physique Physika*. Bell showed that if Einstein's local realism was correct, if particles had hidden predetermined properties, then the correlations between measurements of entangled particles would obey certain mathematical limits. He called these limits bell inequalities. And he showed that if quantum mechanics was correct, those correlations would violate the inequalities, exceed them by a measurable testable margin. Bell had done something extraordinary. He had turned a philosophical disagreement into an experiment. Common sense and Einstein predicted that the Bell inequalities would hold. that when scientists measured the spin of two entangled particles, particles that had once interacted and then been sent in opposite directions, the correlations between their measurements would stay within the boundaries Bell had calculated. The intuitive picture is easy to grasp.

Imagine you have a pair of gloves. You put them in two separate boxes without looking. You send one box to London and keep one in New York. When you open the New York box and find a left glove, you instantly know the London box contains a right glove. But nothing mysterious happened. The gloves had their handedness all along. You just didn't know it. Einstein believed particles were like gloves. They had hidden properties, hidden variables that determined the outcome of measurements before anyone looked. The correlation between measurements was just revealing pre-existing information, not creating a mysterious connection across space. This was the local realist prediction. Bell's inequalities would hold. The universe would turn out to be classical at its core. Space would mean something.

In 1982, **Alain Aspect** and his team at the Institute Optique Graduate School in Orse France performed the first truly decisive bell test. Using pairs of photons, particles of light entangled at the quantum level, they measured the polarization of each photon after separating them by distances large enough that no classical signal could have passed between them in the time available. The results violated Bell's inequalities clearly decisively by a margin that ruled out any reasonable possibility of experimental error. The glove analogy was wrong. The particles did not have hidden-handedness. They did not carry predetermined properties through space like luggage on a conveyor belt. The correlations between their measurements were stronger than any classical local explanation could account for. Something was connecting them in a way that did not depend on the distance between them. But Aspect's experiment, brilliant as it was, still had what physicists call loopholes, technical gaps in the experimental design that a committed skeptic could use to argue the result away. The detection loophole, the locality loophole, the freedom of choice loophole. So the experiments kept coming better, tighter, more precisely controlled and the result never changed.

In 2015, three separate teams, Hensen...et, al at Delft University in the Netherlands, **Marissa Giustina** at the *Austrian Academy of Sciences* in Vienna and **Krister Shalm** at *NIST in Boulder, Colorado*, simultaneously published loophole-free bell tests in *Nature* and *Physical Review Letters*. All three closed all significant loopholes simultaneously. All three got the same result. Bell's inequalities were violated. local

realism was dead. The universe is not locally real. Either things do not have definite properties before they are measured, or the properties of things in one location are affected by measurements performed at distant locations without any signal passing between them.

> *(This is fascinating as a discussion surrounding the Nidana and the Engine of Life. Imagine, as you continue to read, the quantum fluctuations vibrating throughout the Quiescent Energy of the Bulk spawning quanta of energy to form quarks, leptons, Higgs, all in discrete units and to amass them into fields of potential and amalgams to Form yet again into endless expressions of the varied potential frequencies of the living cosmos.)*

One or both of those statements must be true. The experiments leave no other room. And either way, the classical concept of distance as an absolute physical separator is undermined at its foundation. Here's where it gets strange in a way that most science communicators shy away from because it requires saying something that sounds impossible but is in fact the direct logical consequence of the experimental results.

If two particles can be correlated in ways that cannot be explained by their spatial separation. If the distance between them is physically irrelevant to the information they share, then distance is not the fundamental organizing principle of reality that we thought it was. Distance in classical physics is the reason information cannot travel faster than light. Distance is the reason cause precedes effect. Distance is the you are here and the Andromeda galaxy is there. Distance is the entire architecture of the universe as we experience it.

But entanglement does not care about distance, not in the slightest. A pair of entangled particles separated by 1 meter behaves identically to a pair separated by one light-year. The distance between them is in the language of quantum mechanics not part of the equation. This is what physicists mean when they use the word non-local. Not that things are far away and connected anyway, but that the connection operates outside the framework of spatial separation entirely.

The connection is prior to space. It is not mediated by space. It is in the most literal sense indifferent to space.

> *(It is Tathagata in that it is fundamental and integral to the self-identifying expression of potential. There is only one "reason" to "be". To be is to know what it is to "Be". The observation is built in, requisite, inherent.)*

And now consider this. Every particle in the observable universe emerged from the same initial quantum state at the moment of the big bang. Every particle in your body in the galaxy NGC 1300 in the cosmic microwave background radiation filling the universe at 2.725 Kelvin. All of it condensed from a single unified quantum event. Which means by the logic of entanglement, the quantum correlations connecting every particle in existence to every other particle in existence have never been broken. They have been diluted by decoherence, the process by which quantum systems lose their quantum properties through interaction with the environment. But they have not been erased. They are still there, buried beneath the

noise of classical physics in every atom of everything. Your hand and the galaxy NGC 1300 are in the quantum sense part of the same system. and the distance between them according to the deepest experiments physics has ever run is a property of the way you observe the system not a property of the system itself. Now we need to go somewhere that physics journals rarely go but that the physics itself demands because if distance is a property of observation rather than an absolute feature of reality then the entity doing the observing becomes physically significant in a way that mainstream science is deeply uncomfortable with.

In 2019, physicist **Carlo Rovelli** at the center *Le centre Physic Tarik* in Marseilles published a paper in nature reviews physics arguing for what he calls relational quantum mechanics. The idea that quantum states are not absolute properties of systems but are defined only relative to other systems. There is no view from nowhere. There is no outside the universe perspective from which the positions and distances of things can be objectively measured.

Every fact about the universe is a fact relative to some system interacting with some other system. Distance on this view is not a feature of the universe. It is a feature of a relationship and relationships require *relatae*, things that are relating, which ***means you***.

The ***holographic principle*** takes this further developed from Gerard de Hooft's 1993 work and formalized by **Juan Maldacena** 1997 AdS/CFT correspondence a paper that has accumulated over 20,000 academic citations and is considered one of the most important results in theoretical physics in the last 30 years.

The holographic principle states that all the information describing a volume of space is encoded on a two-dimensional boundary surrounding that volume. Read that again because it is stranger than it sounds. The three-dimensional universe you inhabit, the depth, the distance, the space between your hand and the screen you're looking at may be a projection from a two-dimensional surface, like a hologram, like information encoded on a flat surface and rendered into apparent three-dimensionality by the physics of observation, the distance between you and that galaxy. In the holographic description, that distance is not a fundamental quantity.

> *(This is so like the term I introduced to Quantum Buddhism many years ago, from the martial arts in China, Wuji, a conditional 'space' that is both point – non-space – and an encircling boundary. In my big book of Buddhism and my book on Nichiren Doctrine, the chapter Wuji to You and Me, takes this discussion into everyday vernacular while discussing this same insight.)*

It is an ***emergent property***. It is what you get when you project two-dimensional quantum information into three-dimensional **experience**.

> *(Experience, here, is Samsara.)*

And here's where the gut punch lands. If distance is emergent, if it arises from the projection of two-dimensional information into three-dimensional experience, then the thing doing the projecting, the thing converting information into experience, the

thing that looks at a hand 30 cm from a face and perceives distance, that thing is not a passive observer sitting inside a preexisting spatial framework.

That thing is the mechanism by which the spatial framework is constructed. You are not located in space. **You are in the most precise physical sense available to us, one of the processes by which space is being generated.** And every conscious system in the universe, every entity capable of processing quantum information and registering it as experience, is doing the same thing. The universe does not have distance at its core. It has information and information has no address.

In 1994, physicist **Max Tegmark**, then at the *University of California, Berkeley,* later at MIT, began developing what he called the mathematical universe hypothesis. The idea that the universe is not described by mathematics, but is mathematics. That physical existence and mathematical structure are the same thing. That what we call the universe is a self-consistent mathematical object in which observers are substructures, patterns within the pattern. And that distance is simply one of the geometric relationships encoded in the structure.

On Tegmark's view, asking how far away is that galaxy is like asking how far away is the number seven (7) from the number thirteen (13). The question makes sense within a particular mathematical framework. But the framework is not the territory. It is one description among many possible descriptions of the same underlying information. And underneath all the descriptions, underneath the quantum field theory and the holographic principle and the relational quantum mechanics, the universe is a structure of relationships with no preferred location, no preferred distance, no preferred here from which all other theirs are measured. There is only the information and you are in it and so is that galaxy. And the gap between you is exactly as real as the gap between a dream and the mind dreaming it.

So here is the question that the physics leaves open and I want you to sit with this, not answer it. Just let it breathe. If distance is something you generate through observation, and if the universe is a structure of information with no absolute spatial framework, then when you look at a star and feel the vertigo of distance, the awe of something impossibly far away, what exactly is it that you are feeling? **Are you perceiving the universe or are you constructing it?**

> ***(This is our foundational perception for awakening, our construct of Enlightenment. In every sense, the construction of the universe that you experience is constructed by you, and therefore, your personal universe. Your universe is Samsara through the very mechanism of your experience. Your experience is guided by your karma, your tendencies and the myriad conditions you have constructed around them. This is Duhkha, this is the process you need to escape in order to 'experience' Buddha. Buddha is the personal process of eschewing the Samsara and instead, using your Buddha consciousness to 'experience' the process of being in your universe to the WUJI of TATHAGATA, or the unfettered construct of a universe observing tendencies but outside of them. A construct of complete cosmic perception without ownership or 'position'. A space-less, timeless, observer of the whole of the process.)***

Let's return to the three promises I made at the start. I promised you would understand what Bell's theorem actually proved. And here is the clean version.

Bell's theorem proved that if you accept quantum mechanics, which every technology you own depends on, then either particles don't have definite properties before they're measured, or measuring one particle can affect another particle anywhere in the universe without any signal crossing the space between them. Local realism is experimentally ruled out. The universe is non-local. Distance is not the fundamental mechanism connecting and separating things. I promised you would understand the holographic principle.

Here it is. Theoretical physics has produced a framework backed by **Maldacena's** AdS/CFT correspondence and 30 years of subsequent research in which the three-dimensional spatial universe is a projection of two-dimensional quantum information. Distance, depth, and the spatial framework you navigate every day are emergent properties. They arise from information. They are not the bedrock. They are what the bedrock looks like when you project it into experience. And I promised you the third thing, the part that changes the question of who you are.

Here it is. If distance is emergent from observation and if you are a quantum information processing system embedded in a non-locally connected universe that emerged from a single quantum event then the boundary between you and the universe is not a physical boundary. It is a computational one.

You are not a thing looking at the universe from a fixed location inside it. You are a process a pattern of information that the universe is using to observe itself from one particular angle.

> *(This "Particular Angle is Samsara, and to extend one's angle to the entirety of the cosmos's infinite angles is the process of becoming Tathagata or in this system that is 'you', Buddhahood.)*

And the galaxy 13 billion light-years away is the universe observing itself from another angle. Both angles, same information, different projections, zero distance in the only sense that physics can ultimately defend. *(Tathagata)*

Now, and I want you to notice that I am not going to let you feel resolved because the physics doesn't allow it. Here is what this opens up. We have been talking about distance as an illusion. But distance is not the only spatial property that quantum mechanics puts under pressure. There's another property, one that is even more central to your experience of reality, even more deeply assumed, even more violently disrupted by the experiments that we haven't touched yet.

Time. Because the same bell tests that demolished local realism, the same experimental framework that proved entangled particles don't care about distance have recently been extended into what physicists call delayed choice entanglement experiments. Experiments in which the choice of how to measure a particle is made after the particle has already been detected. experiments that suggest in the language of the papers published in Physical Review Letters and Science that the measurement doesn't just ignore distance. It ignores the sequence of events in time. The past, it turns out, might be as plastic as the space between things. And that

leads to something even stranger. Because if time is also an emergent property, if the sequence of events is also a feature of observation rather than an absolute feature of reality, then the question of when you exist becomes just as destabilized as the question of where you exist.

And that is the next video.

The experiment that proved the past can be changed by decisions made in the future. The peer-reviewed physics of retro-causality. The reason some of the most careful physicists alive are quietly beginning to say that time, like distance, like space might be something the universe is doing, not something the universe is in. We post one proof every week. And that one is going to be the hardest to sit with. If you've made it this far, if you watched a video about the distance between you and a galaxy, and you're still here, then you already know something about yourself. You're the kind of person who doesn't look away from the strange parts. This channel is built for people like that. We don't do comfort. We do evidence. We take peer-reviewed physics and we follow it all the way past the comfortable stopping point into the place where the experiment stops feeling like it's about particles and starts feeling like it's about you.