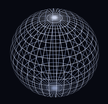
# The Colonization of Quantum Realms

In Edwin A. Abbott's novella, Flatland: A Romance of Many Dimensions, the narrator, A Square, who lives in a two-dimensional world, experiences a three-dimensional sphere passing through his flat 2D world as magically growing and shrinking circles. A Square believes the sphere is a circle playing tricks on him as A Square cannot comprehend depth and, therefore, cannot conceive of a three-dimensional object.

Similarly, we, in our 5% understanding of the universe, cannot comprehend freedom and, therefore, cannot conceive of concepts like justice, difference, revolution, love, and faith beyond the framing of binaries placed within hierarchies. We can only realize freedoms so much as our beliefs allow, beliefs that materialize as individual bodies with determinate properties that entangle with a system that can co-opt any attempts to expand beyond our 5% universe into capital.

So how then can we expand beyond the 5%?



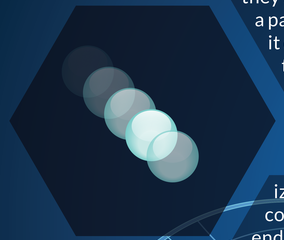
The ability of an object, such as a sub-atomic particle or even an atom, to be in more than one quantum state at the same time is called quantum superposition, a fundamental principle of quantum mechanics. For example, an unobserved object could technically be in two places at the same time. This is a consequence of the wave-like character of micro particles. On the quantum scale, particles may be partly described in terms not only of particles but also of waves (wave-particle duality), which expresses the inability of classical (i.e., 5%) concepts of "particle" or "wave" to fully describe the behavior of quantum-scale objects.

## The queer realities of quantum particles

Let's start by adventuring into the quantum world of subatomic particles. In this extraordinary micro universe, known in our 5% reality as quantum physics, particles, such protons, neutrons, and electrons, which bundle together into atoms—the stuff you and I and the entire visible universe are made of—behave in radically different ways than the ways we behave in the macro world. In this queer reality, ***particles hover in a state of uncertainty,*** seemingly being partly here and partly there, occupying all known positions simultaneously. The ***orientation devices*** we use to ground ourselves in our 5% universe—namely binaries, hierarchies, and capital—fall away. There is no such grounding in this world where particles exist in several states and several realities at the same time, spinning in multiple angular rotations at once.

And the incredible thing about all of this is that it is happening inside of us as we speak; all of this fantastic queering and disrupting of time and space is happening RIGHT NOW in the subatomic particles that make up our bodies and all the observable matter in the universe. So how does all this radical queering wash away into a system that converges into a single reality, this 5% rendering of our macro world?

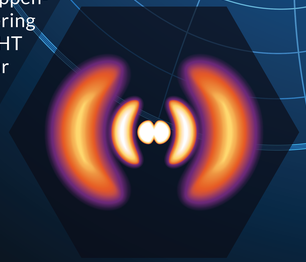
In addition to binaries, hierarchies, and capital, the nonnegotiable law of linear time that fixes us in our 5% universe does not exist in the micro world where an event in the future can cause a particle to decide what form it takes in its past. For example, a photon will change its form into either a wave or a particle through the first event depending on what the second event is before it even encounters it. Therefore, it seems time can move backwards or the particle is able to pull the future into its past or there is no such thing as time.



## An insatiable desire to observe and measure

The uncertainty principle in quantum physics states that the more precisely the position of a particle is determined, the less precisely its momentum can be known, and vice versa. Essentially, we cannot measure the position and the momentum of a particle at the same time. In their unobserved state, particles exist as a fuzzy jumble of possibilities. However, once they are measured, the ***act of measurement*** forces a particle to relinquish all of the possible places it could have been and select one fixed location where we find it. And when a particle is forced to choose a position, we lose its momentum.

Our singular, 5% reality is realized and sustained by our constant measuring. Our endless acts of measurement place everything and everyone, every event, every phenomenon within a binary-bound, hierarchical spectrum that washes away the possibilities of us and our world existing in multiple states and multiple realities at the same time. Our incessant drive to observe and measure forces us into a position, an orientation, an identity, a behavior, a way of being. And when we are forced to choose a position, we lose our momentum; and without momentum we can never expand beyond our 5% universe.



In quantum physics, unitarity is a restriction on the allowed evolution of quantum systems, which ensures that the probabilities of all possible outcomes of any event always adds up to one. The principle of locality states that an object is only directly influenced by its immediate surroundings. For an action at one point to have an influence at another point, something in the space between those points must mediate the action. Both locality and unitarity are considered necessary components of quantum field theory and both these deeply rooted pillars are implemented and imposed as constraints to maintain consistency and preserve the norm.

Another uncanny feature in this micro universe is nonlocality or what Albert Einstein dismissively called, "spooky actions at a distance." Nonlocality describes the apparent ability of objects to instantaneously know about each other's state, even when separated by large distances (potentially even billions of light years), which violates Einstein's principle of locality as well as his assertion that nothing in the universe can travel faster than the speed of light. Nonlocality occurs with quantum entanglement, a phenomenon that happens when particles become permanently correlated, or dependent on each other's states and properties, to the extent that they effectively lose their individuality and, in many ways, behave as a single entity.

The measurement problem in quantum mechanics is the problem of how (or whether) wave function collapse occurs. The inability to observe this process directly has given rise to different interpretations of quantum physics. The Copenhagen interpretation is the oldest and probably still the most widely held interpretation of quantum mechanics. Most generally it posits something in the act of observation which results in the collapse of the wave function. It is important to note that measurement does not mean only a process in which an actual observer takes part but rather any interaction between classical and quantum objects regardless of any "observer".

Quantum superpositions can never actually be observed. All we can see are the consequences of their existence after individual waves of a superposition interfere with each other. Thus, we can never actually observe a particle in its indeterminate state or being in two places at once, only the resulting consequences. Physical reality is not determined until the act of measurement takes place and solidifies the situation into one state or another. This leads to an ultimate question of whether the properties of the universe are "natural," locking together into a sensible pattern, or whether the universe is extremely unnatural, a peculiar permutation among countless other possibilities, observed for no other reason than that its special conditions allow life to arise. A natural universe is, in principle, a knowable one. But if the universe is unnatural and fine-tuned for life, it stands to reason that a vast and diverse multiverse of universes must exist beyond our reach. This multiverse renders our universe impossible to fully understand on its own terms.

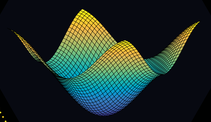
## Quantum particles in resistance

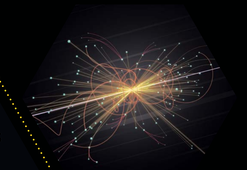
Instead of reaching to expand beyond the 5% and understanding how such acts of measurement prohibit movement, we have opted to wield this powerful act of measurement in continual attempts to colonize the quantum realms by ***forcing it to conform to the rules of our 5% universe.*** In our effort to master the ability to ***manipulate micro particles at the macro level,*** we relinquish the possibilities to exist amongst the micro dimensions.

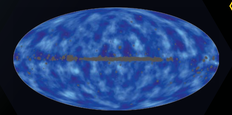
But all is not lost! Quantum particles are excellent at resisting assimilation. Every time we observe a particle, it ***decoheres,*** meaning its probability wave collapses and we lose its ***queer properties,*** such as quantum superposition (the ability to be in multiple places and states simultaneously), and the particle settles into its fixed, observed state under classical physics. Essentially, any attempt to measure or obtain ***knowledge of quantum superpositions*** using the instruments of our 5% world destroys the extraordinary abilities we wish to co-opt.

If we are to look to quantum realms as examples on how to expand beyond our 5% universe, it seems we must learn how to evade observation and measurement, to resist being knowable. It is significant to note that on a cosmic level, 95% of the universe, which consists of dark matter and dark energy, is also unknowable and unobservable. Both, on a macrocosmic scale and the microscopic, point to possible ways of being beyond knowing, beyond beliefs, and toward an infinite number of degrees of freedom.

Quantum cryptography is the science of exploiting quantum mechanical properties to perform cryptographic tasks. For example, it is impossible to copy data encoded in a quantum state because the very act of reading data encoded in a quantum state changes the state. This is used to detect eavesdropping in quantum key distribution. Many national governments and military agencies are funding quantum computing research to develop quantum computers for civilian, business, trade, environmental and national security purposes, such as cryptanalysis, which is used to breach cryptographic security systems.







Quantum decoherence has been used to understand the collapse of the wave function in quantum mechanics. Decoherence does not generate actual wave function collapse. It only provides an explanation for the observation of wave function collapse, as the quantum nature of the system "leaks" into the environment. When a quantum system is not perfectly isolated, but in contact with its surroundings, components of the wave function decouple from a quantum coherent system and acquire phases from their immediate surroundings. Quantum decoherence provides an explanation for the transition of the system to a mixture of states that seem to correspond to those states observers perceive.