The Ultimate Secrets of the Universe

Fundamentals Series

5: Computing a Quantum Universe

A separate *instance* of the elemental program computes the continual spacetime evolution of each coherent particle process in the observable universe. The universal processor runs all these innumerable program instances simultaneously in a manner that computes an observable universe that is both fully relativistic and quantum.

To compute a relativistic universe in which everything continuously travels through the 4 dimensions of spacetime at the speed of light c, the processor just needs to use the same large *fixed number of cycles* to compute each tick of processor time for each particle process. It first uses the cycles necessary to compute the spatial velocity of each process. Then it uses any remaining cycles to compute the *internal evolution of the process* which is its velocity through time.

This processor cycle model that computes a relativistic universe can also automatically compute a quantum universe. Just assume that as separate instances of the elemental program compute each coherent particle process each instance uniquely and randomly *conflates* a small fixed number of spatial velocity and temporal velocity cycles at the particle scale. That is it computes spatial velocity with temporal velocity cycles, and temporal velocity with spatial velocity cycles.

This results in an inherent *uncertainty* of spatial and temporal velocities in all particle processes that manifests as the Heisenberg Uncertainty Principle in which it's inherently impossible to simultaneously measure spatial and temporal velocity related variables with greater than Planck constant resolution. These random conflations are also why particle locations at points in time are inherently uncertain as described by *wave functions*.

And just as the large fixed number of processor cycles per tick of processor time is the source of the value of the speed of light c, so the fixed number of random conflations in each tick of processor time is the source of the value of the Planck constant h. Again, somewhat speculative but it seems to work, so the actual process must be similar.

Since each coherent particle process is computed by a separate instance of the elemental program with its own unique random conflation pattern, this results in a quantum universe in which the dimensionalities of coherent processes are inherently uncertain with respect to each other at the Planck (particle) scale. This accounts for the observed quantum randomness of all particle measurements. So as long as particles don't interact they remain dimensionally uncertain with respect to each other.

However, when particles interact all their particle properties are exactly conserved (with a few rare exceptions). This requires all their particle properties *must have exact values with respect to each other*. Thus, when particles interact their mutually uncertain dimensional properties (such as mass-energy, momentum, spin orientation, etc.) randomly *decohere* to become exact with respect to each other. *Interacting coherent particle processes lose their individual coherences and mutually decohere to form a new coherent process.*

Thus, the interaction of particles results in new *coherent particle processes* computed by *new instances* of the elemental program each with its own new unique random conflation pattern. All constituent particles and their properties in the new coherent particle process will now continue to have exact values with respect to each other prior to any subsequent interactions.

The overall result is a universe that consists of innumerable coherent particle processes, each of whose evolution is being computed by a separate instance of the elemental program with its own unique conflation pattern. Thus, all free particles within each coherent process maintain exact property values with respect to each other, but each separate coherent process is dimensionally uncertain with respect to all others because it's being computed by a separate program instance with its own unique random conflation pattern.

In addition to such free particles, many particles in the universe form semi-permanent bound interactions such as those in atoms and molecules. These exist in states of *partial decoherence*, in which dimensional interrelationships are partially constrained by their bonds but still indeterminate at finer scales. E.g. atomic orbitals in which individual electrons occupy indeterminate locations in harmonic standing waves within the overall semi-classical dimensionality of the atom. Even wave functions have *exact trajectories*. It's only the locations of particles *within their wave functions* that are probabilistic.

The overall result is a universal information structure that incorporates all particles in the universe, their property values including dimensional relationships, and all their aggregate emergent structures. This can be called the *Universal Entanglement Network* (UEN) and is the fundamental *information structure* of the observable universe. Because the UEN implicitly includes all dimensional relationships among particles in their property values everything is effectively computed relative to the implicit dimensionality of the UEN.

Because of the UEN's existing universal information network of particle property relationships, all particle interactions automatically get computed with respect to the overall information structure of the UEN. Thus, the UEN is the universal 'background' with respect to which rotation takes place solving the 'Newton's bucket' problem. And it's also the *original inertial path* with respect to which actual spatial velocity and actual time dilation occur. It's what Planck sought as "the average mass of the universe." It's the aggregate dimensionality of the observable universe and the Cosmic Microwave Background.

The UEN exists only as the *intrinsic information* of all particles and particle properties themselves. All the relationships among particles are *implicit* in the values of the particle properties themselves and not explicitly encoded as separate information structures. This is because the values of all particle properties are the result of their complete interaction histories and thus are interrelated. These information relationships among particle properties are called *entanglements*.

All relationships among particle property values produced by conservation interactions should be called *entanglements*, though physicists tend to apply the term only to certain cases that appear 'paradoxical'. Entanglement is basically very easy to understand. Even the two halves of a chocolate chip cookie are *entangled on their chocolate chips* because the number in one half determines the number in the other half since by conservation they must sum to the number in the original cookie.

Thus, in particle interactions, the values of particle properties are conserved and the totals of each particle property entering and exiting an interaction must be equal. However, two opposite spins in particular, could have any *orientation,* so long as they are opposite, and still be conserved. And there is a general principle that whatever is not forbidden by a physical law will occur with some probability. This also includes the indeterminate trajectories of resulting particles so long as energy and momentum are conserved.

So in the standard *spin entanglement paradox* 2 particles exit a conservation interaction with opposite spin orientations that are indeterminate with respect to the overall UEN orientation including measuring devices. When the spin of one particle is measured its orientation will be random, but when the spin of the other is measured it will always have the opposite orientation. This is because the first measurement decoheres the *entire coherent process of both particles* with that of the UEN including classical measuring devices. A simple non-paradoxical explanation with no 'faster than light' communication and in a computational universe that is inherently non-local.

So when we understand that every particle process is being computed by a separate instance of the elemental program with its own unique random spatial/temporal velocity conflation pattern the quantum world is no longer paradoxical. This is how the computational universe automatically computes its quantum nature.

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