

## Quantum Physics for Burning Questions

### 1. Introduction

How does reality work? How do we fit into the cosmos? Why are there both a subconscious and a conscious mind? How is free will reconciled with the laws of physics on the Planck scale? What is light? Our ultimate goal here is discovering what is and what is not ultimately possible in physics. Historically, this has led to burning questions. Despite the uncertainty principle, how well can science at its most fundamental level of quantum physics answer them? Well perhaps, if our brains interpret the empirical record correctly.

The bad news is, *physics cannot be divorced from what brains do*. The good news is, our conscious brains are part of the quantum reality, so we do fit in—somehow. More bad news (to some): *physics at large can no longer ignore biology*. The corresponding good news: it no longer needs to because *molecular biology is now on the quantum scale*. Discovering whatever innate distortions our brains bring to physics is as important as physics itself. Of course, artificial equipment eliminates some distortion by providing additional information for our brains to process via associative learning. Another step in the right direction would be to unite quantum mechanics with brain functions, including its conscious ones. (For empirical proof that consciousness is one of the things the universe does and to provide a sense of its definition herein, open and close your eyes and experience how your visual consciousness simply comes and goes.) Due to recent discoveries, we can show herein that the brain's overall operating system is at the level of quantum mechanics. Also provided herein is a roadmap toward understanding how the conscious mind works at the Planck level.

Other impediments to our goal are that the two cornerstones of modern physics, namely, quantum mechanics and relativity, are not yet reconciled in our collective brains. Also, our understanding of consciousness is not yet reconciled with quantum mechanics and relativity. It would be best if somewhere in our quest, the brain's associative learning could eliminate the paradoxes and incredulities of modern physics and make sense of them, or at the very least, show why the limitations of the human brain and its artificial equipment never will. After all, with all things being equal, a physics that makes sense is better than one that does not. In our quest of the goal, then, the method must be to apply the lessons of current technology that were not available to the founding fathers of quantum mechanics, relativity, and the science of consciousness, leading us toward a unified physics that makes sense. Specifically, lessons from molecular biology, engineering, and computer science will be applied herein to our goal. To this end, the statement

*1) charges, [a.k.a. the quanta of discrete matter] 2) move 3) in a coordinated way 4) that evolved 5) brains and 6) the conscious brain*

will be shown to be all-encompassing.

## 2. What the founding fathers of quantum mechanics did not know that bears on our goal

Embryonic self-governing assembly, a.k.a. embryogenesis, proves that proteins are autonomous computational motors within a sea of thermally agitated liquid water. Please remember that brains result solely from embryogenesis! Proteins are also information-processing machines; otherwise they would not be able to “move” the *atomic* raw materials from the maternal bloodstream to the proper places within the fetus “in a coordinated way.” We now know that protein behavior is the result of the atomic process of DNA mutation. From the atomic point of view of DNA and its proteins, natural selection is conducted by the environment, which is also atomic and subject to the laws of physics, such as quantum mechanics and relativity. From conception to death, the unique set of proteins and the atomic systems they manage within an individual can be considered the molecular-self (Schoenfelder, 2007).

It could be said that the most complicated process in the known universe is the protein self-governing assembly of the human body and its brain and the conscious experience that follows throughout adulthood. For the founding fathers, a mechanism for how neurological consciousness was linked to quantum mechanics was an insurmountable problem. This was largely due to the old idea that neurons were simply switches and “that the brain’s operations are primarily digital” (von Neumann, 2000, p. xxi). It is now understandable that proteins not only assemble the brain in the womb but also regulate it throughout adulthood. This is important for two reasons. *A protein-regulated brain is a quantum-regulated brain and protein regulation directly links mutation to brain functions like consciousness.* Three recent discoveries have shown that proteins also manage the adult brain not just its embryogenesis. One is that adult glia brain cells, specifically astrocytes, regulate synaptic gaps of neurons within the adult brain with their brand of proteins (Fields, 2004). Second, “a primary role for the [protein] NMDA receptors...[is] driving Ca<sup>2+</sup> action potential generation (D’Angelo, 1997).” Third, “NMDAR [protein] complexes...underpin Hebbian plasticity (Husi, 2001, p. 260).” Hebbian plasticity is adult neuron growth that requires protein behavior. This means that from embryo to grave brains have one and only one operating system and proteins manage it. This is in stark contrast to the older notion that neurology per se is the seat of intelligence. Toward our goal, this is new and profound. Protein operated brains are “atomic brains” that are activated by quantum mechanisms. This bears on the conscious brain’s role in the Copenhagen interpretation, not to mention how we fit in with the quantum cosmos in general.

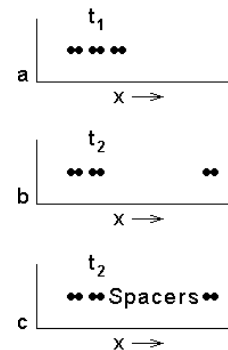


Fig. 12. Three protein CAMs in time in water spacers  
With permission (Schoenfelder, 2007)

The founding fathers also did not know that protein behaviors are powered by thermal vibration and/or the likes of ATP. As Fig. 12 illustrates that they “move in a coordinated way” by pushing and/or pulling other atomic systems (mostly H<sub>2</sub>O and other proteins) in front and/or behind them. (CAM stands for Computational Atomic Motor.) If this motorized protein mechanism is impeded, biology will be in a “frozen” state of death or suspended animation with no possibility of experiencing time because information-processing metabolism is impossible. See Fig. 11. As we shall see later, this is significant because entangled events only seem instantaneous when atoms in proteins and equipment do not move. (Schoenfelder, 2007)

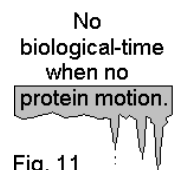


Fig. 11  
With permission (Schoenfelder, 2007)

Also remember the sensorium is made of proteins. Thus proteins are at the forefront as the observer. This further relates to measurement in the Copenhagen interpretation sense and decoherence in the quantum sense. As with proteins, the behavior of all atomic systems depends on their arrangement. Like proteins, *all atomic systems* can be considered autonomous as they “move in a coordinated way.”

### 3. Burning questions answered via the molecular-self, and thus, quantum mechanics

Since the beginning of recorded history, *Homo sapiens sapiens* has asked many poignant questions. This section will answer some of those questions based on what we have talked about. The ease demonstrates the universal utility of atomic biology since not that long ago these burning questions were impossible to answer. Furthermore, this gets the easy questions out of the way, so as not to complicate more difficult ones.

*What is life, and more specifically what are we?* Life is a unique arrangement of the elements of the periodic table—both in general, and more specifically in animals, humans, RNA, DNA, and proteins. Each protein is gene-expressed from amino acids based on an RNA template from a master DNA molecule. See Fig. 1. Liquid water is key because it provides a medium that the above molecules can *freely* move within. During animal embryogenesis and adulthood molecules are arranged within enumerable small membrane “bags” within enumerable bigger bags. Bags keep water in and isolate groups of specific proteins from each other and the external environment. Specific biological functions depend on which mix of proteins are within. All the molecules of an animal are a molecular-self because they are literally what make that creature a living individual, provided its proteins are *free* to function (Schoenfelder, 2007).

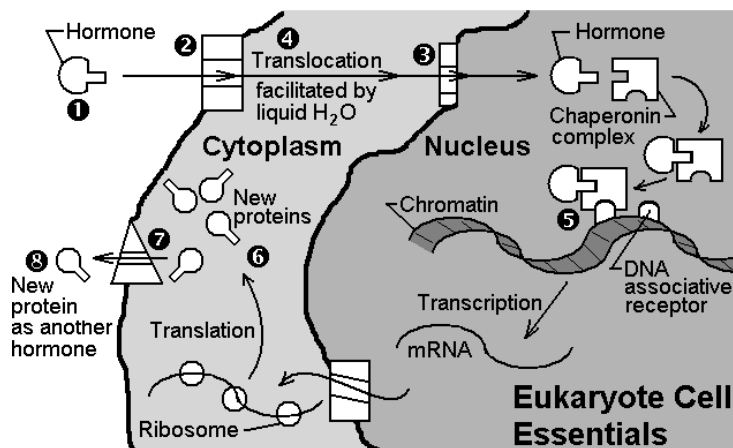


Fig. 1. Examples of relevant cellular dynamics  
With permission (Schoenfelder, 2007)

*What causes death?* In general, death occurs when proteins are disrupted from their life-sustaining functions. Disruptions at the necessary protein level include: cancer, aged telomeres, poisons, and broken membranes. The latter is what spears, bullets, and protons do, as in the case of radiation sickness.

*Where did we come from?* We are atomic stardust that over the last 4 billion years or so evolved via mutation and natural selection. Recent DNA evidence shows our genus first evolved in Africa about 100,000 years ago.

*How is free will reconciled with the laws of physics?* From the perspective of the molecular-self, once proteins are considered self-governing they each individually have a unique will because they initiate a unique behavior. Otherwise, embryogenesis would be impossible. Of course, for a whole molecular-self to be free, its proteins must be too. In the case of human cells, death results

when proteins are not free to do their collective will. Freezing is an example. Just as proteins must follow the laws of physics, people also are bound by its rules, despite some occasional fantasy. Thus, genes pay the consequence of a willful molecular-self. (Schoenfelder, 2007)

*What is consciousness?* Not so easy. See the next section. As a reminder of why this is integral to physics, in the Copenhagen interpretation consciousness has been considered a mechanism of reality. Relating to this, Einstein said, “I like to think that the moon is there even if I am not looking at it.” If this is what one of physics’ brightest minds had to say on the subject, we surely must have an understanding of consciousness before we can have a complete physics.

#### **4. A roadmap to understanding the conscious brain**

This section is a roadmap of questions whose answers must be part of any comprehensive explanation of conscious experience. Of course, all scientific answers must be based in the molecular-self and the atomic brain, as discussed. Although they are answered in my unpublished manuscript, for the sake of brevity only the first and last are answered herein. (Schoenfelder, unpublished—see [www.mindorigins.com](http://www.mindorigins.com))

*How does the brain function at the level of quantum mechanics?* See section 2, 2<sup>nd</sup> paragraph.

*Why is the subconscious mind a quarter of a second faster than the conscious mind?*

*Why does time seem to go faster when we age?*

*Why does the conscious mind not experience time while under sedation?*

*What mechanism during sleep requires the brain rendered unconscious?*

*How do drugs alter consciousness?*

*What are the functions of the conscious brain that helps perpetuate its DNA?*

*How is homeostasis linked to feeling pain and pleasure?*

*What is pain? How did it evolve step by mutational step?*

*What are the lessons of blindsight?*

*How does the conscious mind interface with the subconscious mind and vice versa?*

*What is there about the molecular-self that requires its brain to be both subconscious conscious?*

***Why is the subconscious not conscious?***

***What potential qualities did the primordial eukaryote cell have that morphed into qualia?***

*Why and how are qualia (colors, tones, tastes, feelings) manifested and blended from a molecular-self’s proteins points of view?*

*How is protein behavior linked to the “hard problem” of qualia formation and binding?*

*Are not microtubules a byproduct of protein behavior and therefore subordinate?*

*How does entanglement bear on the binding problem?*

*How will artificial intelligence become conscious?*

***Does a protein-based mechanism of associative learning bear on consciousness?***

*Which is ultimately in control, the subconscious or conscious mind?*

*Is free will within the subconscious mind, conscious mind, or both?* Both! A free molecular-self is at their center because it created the atomic brain in the womb. Thus, the conscious mind is not always in control, as Freud pointed out. See section 3, last paragraph.

## 5. Eliminating what is not physics and how it affects our goal

According to Webster, physics is “the science that deals with matter, energy, motion, and force.” Since Science is based on empirical measurement, it follows that if a concept is not measurable it is not physics. In a sense, this section is an exercise in hair splitting since mathematical concepts and word concepts are both the language of physics, but not the physics per se. Here we will deal with what is not possible in physics because some basic “concepts” are immeasurable, and thus unscientific and not descriptive of how the universe works in general. Once these unscientific concepts are banished from our thoughts, this section gives examples of how this helps scientifically answer some burning questions.

Webster says nothing is “not anything.” This includes not anything empirical and measurable. Clearly by definition the concept of “nothingness” is not physics. However, the empirical evidence of vacuum polarization is physics, rather than “space” being evidence of nothingness. This is at the heart of physics as is the big bang issue. The burning question of “*How is matter made from nothing?*” is, scientifically simply a bad question. The only scientific answer is that “matter can neither be created nor destroyed”; matter and thus the universe has always existed. Matter, a.k.a. “charge” without “movement” is without energy and time. The burning question of whether the universe will end is also a scientifically invalid question. Here too the only scientific answer we can provide is that time and “energy can neither be created nor destroyed.” They have always and will always exist. Big bangs are part of a cycle. This is not to say that time is infinite. We can only state that all movement will not stop because that would be an immeasurable condition. Likewise, the concept of infinity is not scientific because it also is not empirical and measurable.

“What is and what is not ultimately possible in physics” should be a physics question and not a philosophical one! It follows that any answers that harbor the concepts of nothingness and infinity are suspect, and even an impediment to reaching our goal. This is a core issue because these concepts are integral to mathematics. For example, a point is nothing, and integrals often go to infinity. However they are *not* integral to computerized computation and its finite methods of coping with large numbers of things and in particular the methods of cellular automata.

From this perspective, there is one possible scientific answer to the mother of all burning questions: “*Is there life after death?*” Since an existing person’s unique molecular-self is finite, the law of probability shows it will continually reoccur in a universe with no end. Of course, a problem with this is that a scientific explanation of consciousness has not been published (yet).

*How did nature beat the odds against creating life?* Within a universe with no beginning it has all the time it needs to accomplish the astronomically improbable events that theory, null field lab, and SETI results suggest.

## 6. Unified local physics

This section offers a very brief description of a unique unified model of how a unified quantum universe is proposed to work locally. I call it framed quantum dynamics, FQD. In it all atomic systems are self-governing, like proteins are in liquid water. (Schoenfelder, 2007)

In this model, atomic systems are modeled as state machines in the Turing machine sense of a mathematical and universal model of computation that, in its original analogy, pushes and pulls a ticker tape in a computational way. (Table-of-instructions, read, and write refer to Turing machines.) This work is not the first to describe atoms and molecules as state machines. However, it is the first to describe atomic systems as *bimodal* state machines, one state for classical computation via atomic charge distribution-logic registers and the other for quantum computation via spin-logic registers. Atoms and molecules are then like nodes that transition between the two modes as in Fig. 15. This transition would be like a bimodal abacus, where one computational mode would be the spin up or down of its beads on the wire and the second mode the location of the beads on wire, where, via the wire, the two modes could interact and transition.

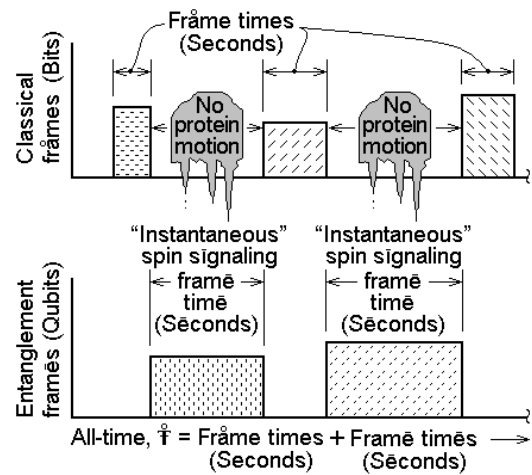


Fig. 15. Time, showing quantum time frames of instantaneous signaling 180° out of phase from classical time frames. With permission (Schoenfelder, 2007)

In Figs. 15, 23 and i, atomic systems are referred to as CAMs—short for computational atomic motors. Referring to Fig. 15, the general idea and lesson from entanglement is that all the atomic systems, a.k.a. CAMs, in the universe (contained in the bars) manage their behavior in two distinct modes and cycle between them as shown. At the top of Fig. 15, each bar in bits is called a frāme (The circle above the a in frāme denotes CAM classical events.) because all the information in the universe is momentarily contained there, like the information in one celluloid frame of a movie. Continuing the movie analogy, the observers in the audience do not notice the time in between frames despite the fact that during that apparent instantaneousness the mechanics of the projector are very busy. The shaded icicles between the classical bars represent the audience’s incomplete awareness of all that is going on. At the bottom of Fig. 15, each bar in qubits is called a framē. (The bar denotes entangled CAM events.) As at the movies, frames are so short in time many of them seem continuous, although they are really individually discrete, as many frāmes are depicted in Fig. 23b. Artificial equipment does not help with framē timē

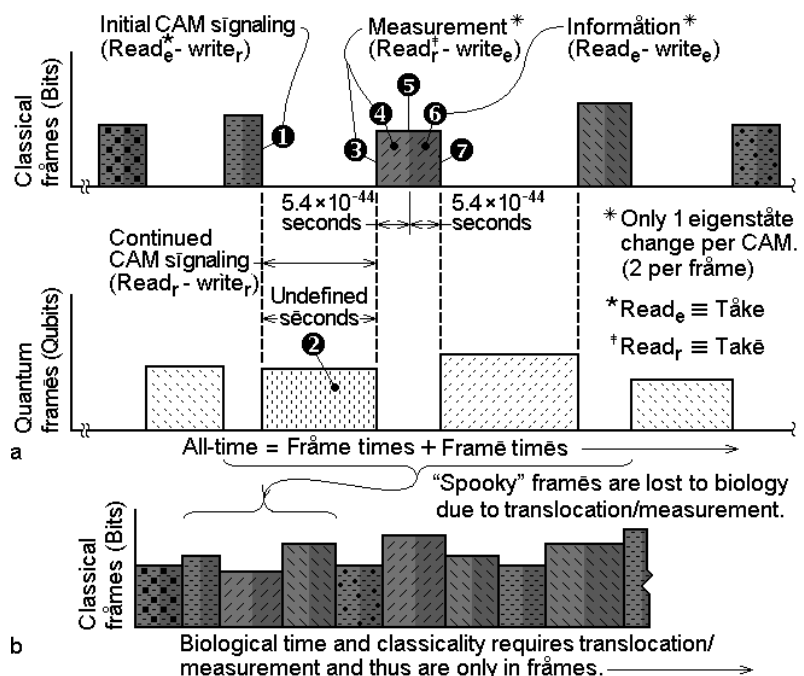


Fig. 23. a. The universe alternates between frames of classical computation and frames of quantum computation in hidden time. b. The instantaneous “spooky” hidden time frames are lost to classical biology due to measurement in the Copenhagen interpretation sense. With permission (Schoenfelder, 2007)

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because it too relies on changes in charge distributions, like electron “orbit” changes. In FQD, frames are in Planck seconds as shown and frames in an undefined unit of time measurement.

Referring to ④ at the top of Fig. 23a, all CAMs conduct classical computation based on their individual tables-of-instructions *and local environment of electrostatic charge distributions* of other CAMs. They then move in a coordinated way accordingly *by changing only one physical discrete quantum state each*, putting them at ⑤. (By the way, the movie analogy becomes inappropriate here. Not all CAM computation happens in hidden time, so the projector is not doing all the work. The classical computation that happens in the next phase ⑥ is equivalent to the celluloid of the film itself changing to show a new image.) During ⑥ all the CAMs in the universe again compute, based on their new local electrostatic environment, and move accordingly *by changing only one physical discrete quantum state each*, putting them at ⑦, which is a similar situation as ①.

Here at step ②, I suggest that nature has integral functions for spin, quantum computation, and positronium. Because each CAM is a tiny classical computer, its capacity is very limited and thus capable of running amok if it does not cooperate with others that are not local. Communicating with non-local CAMs is fulfilled by what we call EMR, electromagnetic radiation. However, all events *must* be local. This brings us to the positronium dipoles of vacuum polarization, a.k.a. the Dirac sea and/or Wheeler foam, shown in Fig. i. In FQD, positronium has three functions. One is to separate CAMs like water does proteins. In this way, both positronium and water molecules are “spacers”. Another is to facilitate CAM movement in a vacuum and third is to facilitate EMR, both by providing a “medium” that CAMs and EMR can transmit through by coded excitations of the dipoles.

At ① and ⑦ CAMs transition to their networked mode ②, where they conduct quantum computation via their spin-logic registers. Since only spins change state, proteins do not move, hence “hidden time,” like between movie frames where much goes on behind the seen. Now the computing power of all the networked CAMs of the universe is available in deciding how to cooperatively next move in a coordinated way, rather than running amok if totally “free”. In this “hidden time” mode, CAMs signal each other via their coded excitations of the positronium. (Remember all events must be local.) Once all the CAMs signal they are done, each CAM is ready for its next classical move that starts at ⑤ based on its updated table-of-instructions, and the cycle starts anew at ④. (Although Pavel Kurakin’s paper *Hidden variables and hidden time in quantum*

Like Dirac’s sea and Wheeler’s foam, a biologically invisible sea of electron-positron dipoles functions as passive “spacers” that comprise vacua and a medium for a regulated motorization of atomic systems.

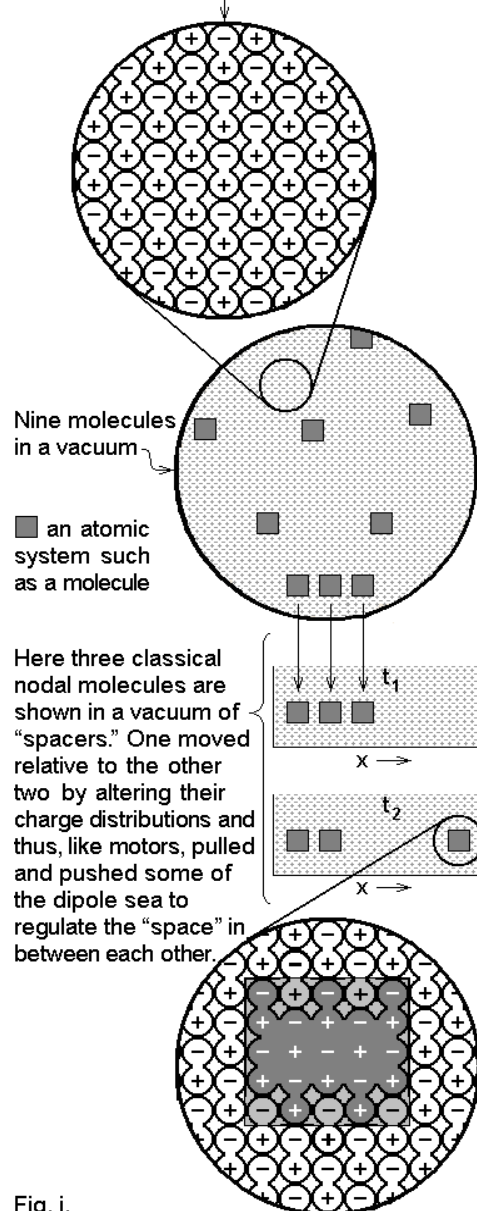


Fig. i.

*theory* does not develop frāmēs, his description of signaling in hidden time and double slit experiments is a must read. As Kurakin says, “The *whole Universe* makes the choice (Kurakin, 2004, p.7)!” In his work he also shows hidden time, as a hidden variable, does not violate Bell’s theorem.)

Referring to Figs. i and 12, CAMs during frāmēs can push and pull positronium and thus “move in a coordinated way” in a vacuum as well as proteins in water, step by frāmē step.

## 7. Discussion

Framed quantum dynamics is functionally like the interactive graphics of a video game with multiple players where pixels change states in two dimensions based entirely on computations via a human-made tables-of-instructions. From the point of view of the players, the pictures created on the screen become reality. The game’s software architecture that networks all the nodal players via their computers, and always keeps things “realistic” by following its central table-of-instructions, is like FQD’s entanglement mode 1 of quantum computation of non-classicality that occurs in hidden time. The game players are like the nodal computers of each atomic system within FQD’s classical modes ④ and ⑥ that *freely initiate* how the pixels ultimately change as they “move in a coordinated way.” In this way, we can use video game technology to model FQD.

Aside from being consistent with the empirical record and linking some loose ends like vacuum polarization and the wave particle duality, FQD is simpler than the present multitude of models. For example, there is only one finite universe with only three spatial dimensions. Its main addition is that the CAMs of whole universe conduct quantum computation in hidden time. FQD’s quantum computation in hidden time is the “hidden variable” that accounts for the paradoxes and incredulities of modern physics—and is better than “spooky” instantaneousness because the latter simply does not make sense. In FQD all time is based on one simple concept, namely atomic systems’ changing states. In other words, classical time results from charge distribution state changes and hidden time results from spin state changes. Time is simple—no state change no time of any kind. We can begin to see how and why our molecular-selves are oblivious to hidden time and why our atomic brains only register classical time because they depend on protein movement. Here the binding of conscious time and Libet’s half-second delay must lurk.

Relative to our goal, FQD helps us to begin to answer the “how questions” that include:

*How are quantum mechanics and relativity one mechanism? More broadly, how does the universe manage gravity, inertia, biology, chaos, and entropy via one system?* From the viewpoint of autonomous atomic systems all of these phenomena require that 1) charges 2) move 3) in a coordinated way within their local Planck-scale environment. Regarding chaos and entropy remember the video game analogy above; pixels can be made to look chaotic and entropic based on the games tables-of-instructions. FQD simply suggests the networked and non-networked tables-of-instructions within all atomic systems manage all motion as they *locally* pull and push themselves and spacers around in a coordinated way. FQD is mostly congruent with QED and QFT, but simpler.

*How is the twin paradox accomplished?* Time dilation occurs in a clock that is moving fast because its atomic system mostly moves spacers (positronium) for linear motion leaving few “left over” for clock motion. Consider proteins within twins, one fixed and one traveling near the speed of light. There would be few eigenstate changes available for intracellular translocation, resulting in a partial state of suspended animation. Thus, the stationary twin would age more.

*How is EMR manifested without paradox?* In FQD, EMR is neither waves nor particles. EMR is a virtual effect, not the cause but rather the result of atomic systems as they *move* themselves in a *coordinated* way. This virtual effect is due to coded spin-signaling as nodes network during hidden time’s quantum computation via the *local* “excitations” of positronium. Currently, every time CAMs alter the record another particle is proposed, rather than an upgrade to a tables-of-instructions. FQD is simpler, with no waves that collapse into photons that make choices, and without duality.

*How do things have a top speed?* In FQD the fastest an atomic system that harbors information can move is one Planck length per Planck time, which is  $c$ . The Michelson-Morley experiment was null because what we call light appears instantaneous and thus is measured the same in all directions.

*How are multiple universes made?* In FQD there is just one. The mathematical utility of multiple universes may be due to the finality of the frāmēs where the universe’s computational decisions are complete and it, in effect, stops and starts, thus the need for multiple stops and starts within math models where decisions occur. See Figs. 15 and 23.

*How is wave collapse accomplished over the entire universe and what triggers it?* This incredulity is eliminated since there is no wave to collapse. In FQD, EMR does not initiate anything but instead all initiation is via the autonomy of atomic systems.

*How do the ten or more spatial dimensions manifest only three within one conscious experience?* In FQD there is only three spatial dimensions. Most likely the fourth spatial dimension of general relativity resulted from hidden time and nature’s use of quantum computation inadvertently being incorporated within Riemannian geometry and tensors.

*How does the uncertainty principle describe how the universe works or instead our limited understanding of it?* FQD and Planck units show the latter. FQD also shows that quantum computation in hidden time exacerbates the problem because it increases the level of complexity of initial conditions. A cluster of  $10^{29}$  frāmē cycles is required for them to be interpreted with minimal uncertainty as a green photon. See Figs. 15 and 23.

*How does this situation improve?* Computer modeling—via cellular automata, finite element analysis, video game technology, etc—will help because it is suited to detail and it is how the universe works.

*Does the universe “play dice”?* No because it is precise and computational—embryogenesis is proof.

*Where does the mind-body duality reside?* Once atoms and proteins are modeled like Turing machines, then their tables-of-instructions are mind and their means to move are body. Thus, embryogenesis is mindful, the atomic brain has body, and the physical universe is not stupid.

*Is there a God* (In the sense of an invisible governance of the whole universe that allows us some free will.)? Well, from the scientific point of view of FQD, an invisible governance of the whole universe is entanglement's hidden time networking of quantum computation as described by mode ②. The free will of the molecular-self is within mode ⑥. See Figs. 15 and 23.

## 8. Summary and conclusions

The simple statement *1) Charges 2) move 3) in a coordinated way 4) that evolved 5) brains and 6) the conscious brain* has been shown all encompassing. Most importantly “in a coordinated way” is shown central to *all physics*—including atomic conscious brains via the roadmap—when atomic systems are modeled as bimodal Turing machines. FQD has the potential to be a unified model of everything, because its core feature of tables-of-instructions is so versatile. Also, FQD is simpler than other theories. There is only one universe with three dimensions and no need of wave collapse. There are no “fields” within nothingness because all is the local actions of atomic system within positronium as a finite numbers of quanta on the Planck scale. Moreover, FQD has the potential to continue to unify the entire empirical record via computer modeling, because both FQD and computers are based on tables-of-instructions, as is budding technology of video games.

Although in its infancy, the extraordinary powers of quantum computation are now facts. This bears heavily on our goal. One hundred years ago radio was in its infancy. Relative to quantum computation one hundred years from now, asking the right questions today would be like asking Marconi (1874-1937) if analog cell phones are better than digital ones.

Perhaps, FQD puts this in a more complete perspective, which suggests that the computational power of the whole universe is potentially within our reach. Our molecular-selves just need a molecular technology to interface with it. Then and only then will the human brain be able to frame the ultimate questions.

The good news is there is an enormous technological potential in quantum computation that may make even the great revolution from Marconi's era seem humble. The bad news is that it is likely too soon to reach our goal within our lifetime. But, *how long could we live?* Ah! Another burning question for next time.

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