Qubit Cosmology

by

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Abstract

Understanding the fabric and mechanism of the universe as an information processing procedure is one way of approaching the mystery of reality. And there should be ingredients of information for such a description. But if we are going to start from the origin of the universe, those ingredients should be found at the beginning. What is assumed, in this paper, to be found at the beginning of the universe is an outward-inward vanishing of a point. And those are taken to be the primordial bits of information that can be used to build the universe. If those bits work quantum-mechanically, then we shall call them qubits, or maybe *prime-bits.* Otherwise, we will see.

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By *qubit cosmology* we mean description of the origin of the universe and its fabrics and workings in terms of *qubit mechanics.* And by *qubit mechanics* we mean a certain mechanics that composes the structure of the universe. We may call such a mechanics by a name of *primordial mechanics.* We are not sure whether we already have such a mechanics, but there is a candidate which we call quantum mechanics. It is probably the only candidate currently.

The term qubit is partly derived from quantum mechanics, but what we really mean by *qubit* in this paper is an ingredient of information that directly derives its existence from whatever is the cause of the universe. If quantum mechanics is really at the foundation beyond which no other mechanics exists, then our use of the term qubit will be understandable. But, if that is not the case, then what we mean by qubit doesn't necessarily imply a bit that works quantum-mechanically.

So what we are going to do in this paper isn't only theorize about qubit cosmology but also observe whether quantum mechanics is really primordial. If we find at last that our use of the term 'qubit' really coincides with the idea of a quantum-mechanical bit, then we shall probably be successful not only on our attempt on qubit cosmology but also on the question of quantum mechanics as a primordial mechanics of the universe. In that case, we may even propose to change the name of quantum mechanics to the more appropriate one: primordial mechanics. But if our prospective theory's mechanism, very unfortunately, doesn't coincide with quantum

mechanics, then that should imply one of the following: (1) quantum mechanics is not primordial mechanics (2) our theory is wrong.

Now let's begin describing the origin of the world in qubit mechanics. But before we do that, first we have to originate the qubits as ingredients of the world. And to do that, we have to also originate the world itself.

So where do we get the world from? To answer this question, we should ask another question: *What would be there if there was nothing at all?* The most straightforward answer to this question is: *There would be nothingness if there was nothing at all.* So why is there something rather than nothing? It must be because of nothingness, if we are to stick to our answer to the previous question. So again where does the world come from? It must be from nothingness. And where does nothingness come from? It doesn't have to come from anything at all; that is why we are taking it as our foundation for any existence whatsoever. But, at conceptual level, we can say it can be derived from the question: What would be there if there was nothing at all?

We are preparing the ground for the rise of qubits and their mechanics, and our next question is: *How is it possible for the world to come from nothingness?* To answer this question we have to be able to talk about nothingness. But, surely, if *something* is to be spoken of, it cannot be nothingness, right? We are not sure about that, but, in any case, we are going to have a principle that should give us guidance when we talk about nothingness, lest we go astray. And, with the help of that principle, we should be able to talk about nothingness without corrupting its essence. That is, whatever we say about nothingness, shouldn't give us *something* rather than nothing. Because of this, let this principle be called the *principle of conservation of nothingness.*

But we need a world—a *real* world. And that, we suppose, is something rather than nothing. So how should we be able to see the real world coming from nothingness without violating our principle? So probably what we are going to get is *something* which in its entirety is nothing. We get the world out of "compromise"! So let this be our second principle: *The universe in its entirety must amount to nothing.*

So now let's say something about nothingness. What we say should give us a starting point to break the code of the very existence of the universe. It is a forbidding concept, but we have to say something about it if we are to continue. We have a conservation principle that will keep us from going astray, and that means we can be a little bit more relaxed to say something about it. So let's say something, something like: *nothingness has neither inside nor outside.*

Very good. We will see if what we have said is well said. Now we have 'neither inside nor outside', and that is what we are going to take as our foundation for any structure to come. And from it we should be able to

derive the real world, but of course, without corrupting the essence of nothingness. And the world to come from it should be able to be represented by qubits.

So first let's take the simplest thing we know to start constructing the structure of a state which has neither inside nor outside. That simplest thing would be a point. Let's define a point as a notion that doesn't need a place to stand on. We don't have a space yet, so the idea of a point is a suitable choice, or probably a necessary one, for our purpose. We have said that nothingness has neither inside nor outside; so to give a structure to this state, we think of a point as a representation of that which vanished inward-outwardly both at once so that there is neither inside nor outside.

But we can't just have a single point and say we have nothingness. Singularity is a peculiar entity; it leads to dichotomy of a single nothingness and an undefined realm of nothingness; and again this leads to an idea of nothingness with a single center; and still again this leads to variety of perspectives. But, according to our principle of conservation of nothingness, all these don't seem to be allowed; what we must have is a complete, an absolute nothingness. To have an absolute nothingness our structure must incorporate universality, avoid special centrality, and attain homogeneity. So what we need is not just a single point but infinity of points, not just a single center but infinity of centers, and not variety of perspectives but sameness from the perspective of every one of the infinite points.

But how does such a thing as the real world come from something which is completely devoid of variety? This is the question that takes us to the next level. The comprehension of nothingness needs to take into account infinity all at once. What about the real world? The real world is a step-by-step comprehension. That is the contrast between nothingness and the real world. When we take it all-at-once, it is nothing; when we take it step-by-step, it is the real world. In other words, to get the real world, we have to go through the structure of nothingness step-by-step. What does it mean to go through the structure of nothingness step-by-step? It means to have *time.* So, we can say, the concept of time is what brings forth the real world from nothingness. Let's propose that is all we need to initiate the real world and have a qubit-representation of it.

So first we take a point and call it a zero—a zero at time zero but without location, because we don't have space yet. So the first thing is to see our chosen point's outward vanishing. We should note that if we take both inward and outward vanishings all-at-once, what we get is nothing; but now we are going to take them step-by-step. And that we consider as the first moment of our qubit cosmology, and call it time one (t_1). And here is how we represent it.

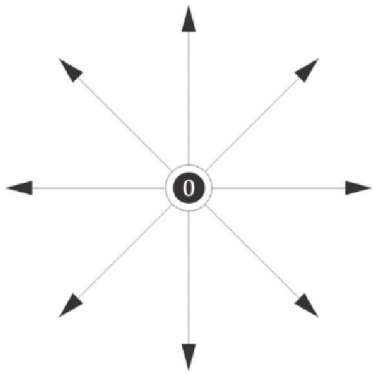

Fig. 01 – *Representation of the first qubit at time one, depicting outward vanishing of a point.*

Our point, represented by zero, is now in a partially vanished state. And next, the outward projected lines that represent outward vanishing of the point must "undergo" an inward vanishing. And that is going to be time two (t_2). At this moment, we witness the birth of several concepts. Because of the need for universality of structure, centrality of infinite points, and homogeneity of occurrences, now when the point vanishes inwardly, all those indefinite "terminals" of the projected lines must undergo what the first point has already done; that is, vanish outwardly. Due to this, the structure takes a certain unit of quantification, a quantum that becomes the basic unit of several concepts and quantities to come. But before we mention them, let's see the field diagram at t_2. First let's do the "placements" for the qubits. We represent the centers of outward vanishings of points by zero, and the center of inward vanishing by one; that makes the point which was a zero at t_1 now one. Here is the placement at t_2.

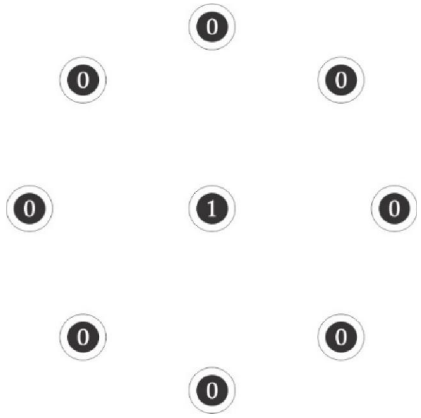

Fig. 02 – *The placements of qubits at time two as a point, which "underwent" outward vanishing at time one, now undergoes inward vanishing.*

And now let's have the overall communication of the points that gives us the spectrum of the *qubit-universe* at t_2. Here it is.

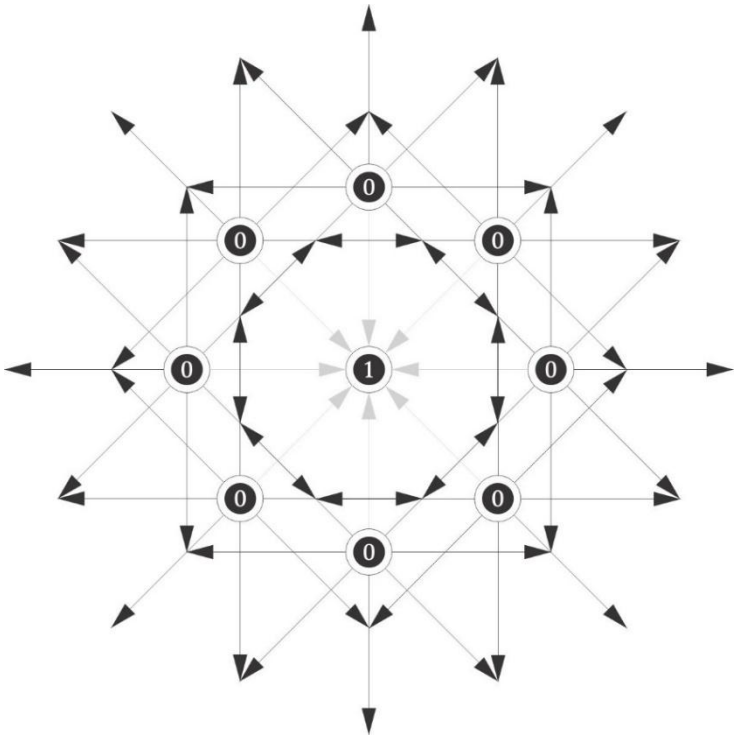

Fig. 03 – *The Spectrum of qubits at time two, representing outward-inward vanishing points.*

So what are the real-worldly concepts that we get starting from t_2? We get quantification, entanglement, space, and energy. What was completely undefined at t_0 gets partially defined at t_1. And now at t_2, because of the first instance of two-way determinacy, we get the first instance of quantifiable relationships. This gives us the mechanism of point-to-point communication which results in *entanglement* of qubits. As the indeterminate outward-inward vanishing state of nothingness which we initiated at an arbitrary point goes further by a mere repetition of the same mechanism, it will get into a configuration of more and more complex structure and further extension; and that will give us *space*. And also the step-by-step view of outward-inward vanishings of points gives us the primordial dynamics of the universe; and what we call *energy* is nothing but the concept behind that same dynamics.

We also expect other real-worldly concepts to come into existence *chronologically.* But now let's continue and arrive at t_3. First we do placements for our qubits at and then we will have them with all their communication lines. Here is the placement at t_3.

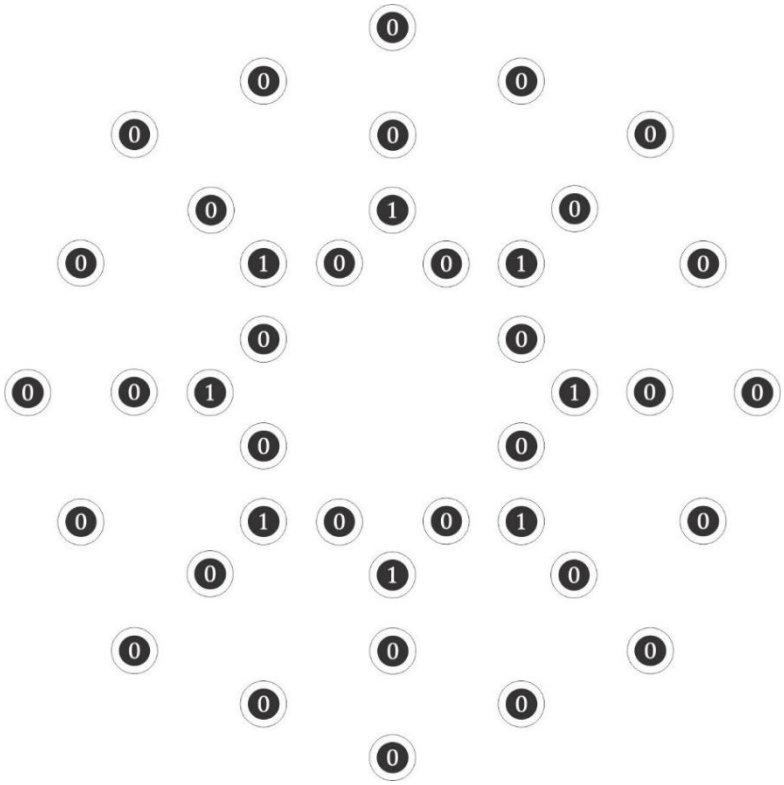

Fig. 04 - *The placements of qubits at time three*.

We should observe, among other things, how the zeros and the ones change positions, like they were in *superposition.*

Here is the communication diagram at t_3.

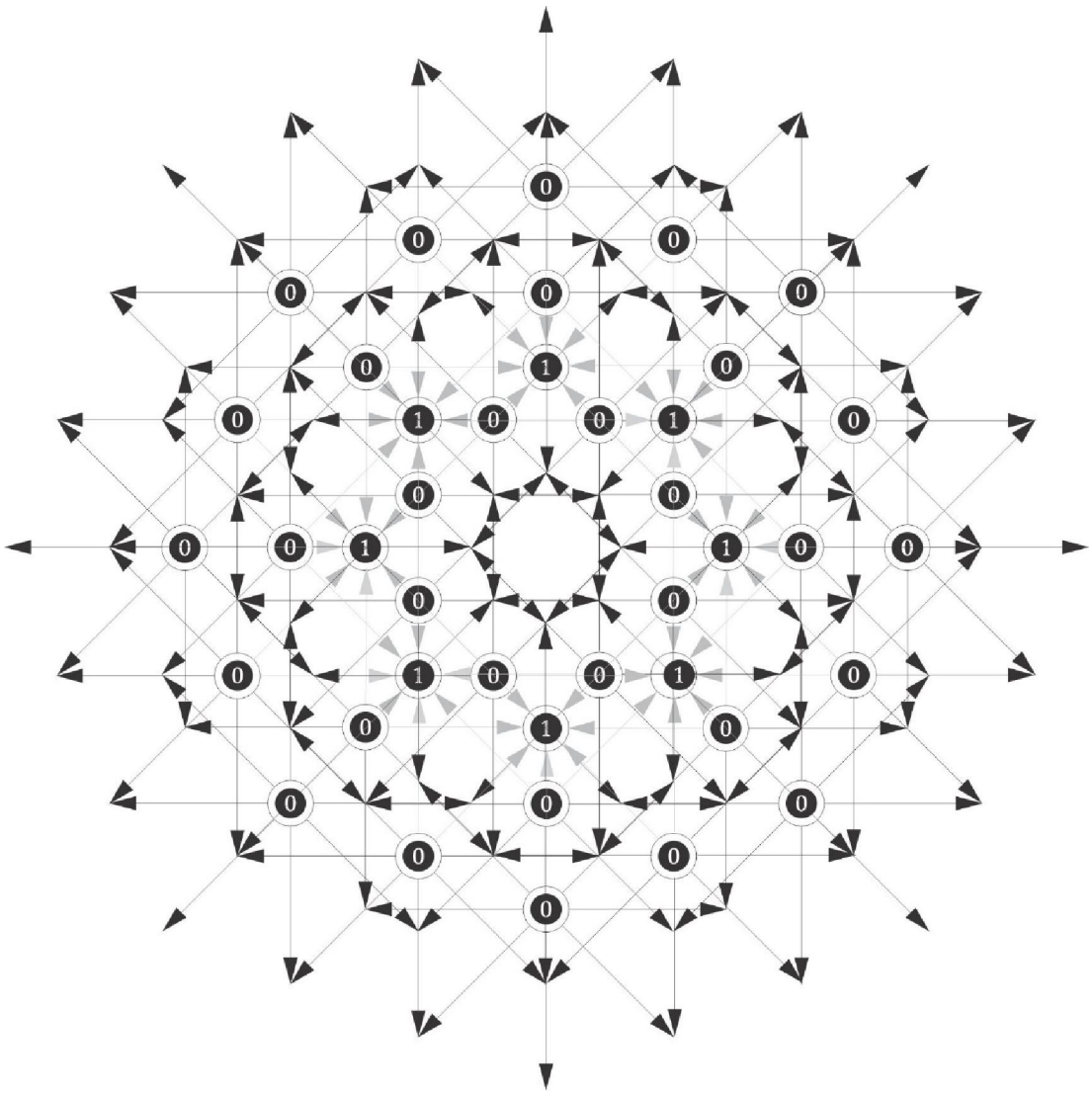

Fig. 05 - *The Spectrum of qubits at time three; the qubit-universe is getting bigger and bigger from one set of events to the other.*

We are talking about time as a set of occurrences or events. One time is one set of events. One set of events is not equal to the next set of events, as we may observe from the diagrams. As time goes on, the number of qubits, the complexity and measure of their entanglements, the expanse of space, and the amount of 'expansive-energy' increase by a certain rate of increment which we may venture to put into equation if we like. So all these together give us a universe that is getting bigger and bigger from time to time (of course, in the meantime, we don't forget the principle of conservation of nothingness that tells us: when taken all-at-once, which means *out of time,* everything we are enumerating must amount to nothing rather than something).

We shall now continue and have the placements of qubits at t_4. Here it is.

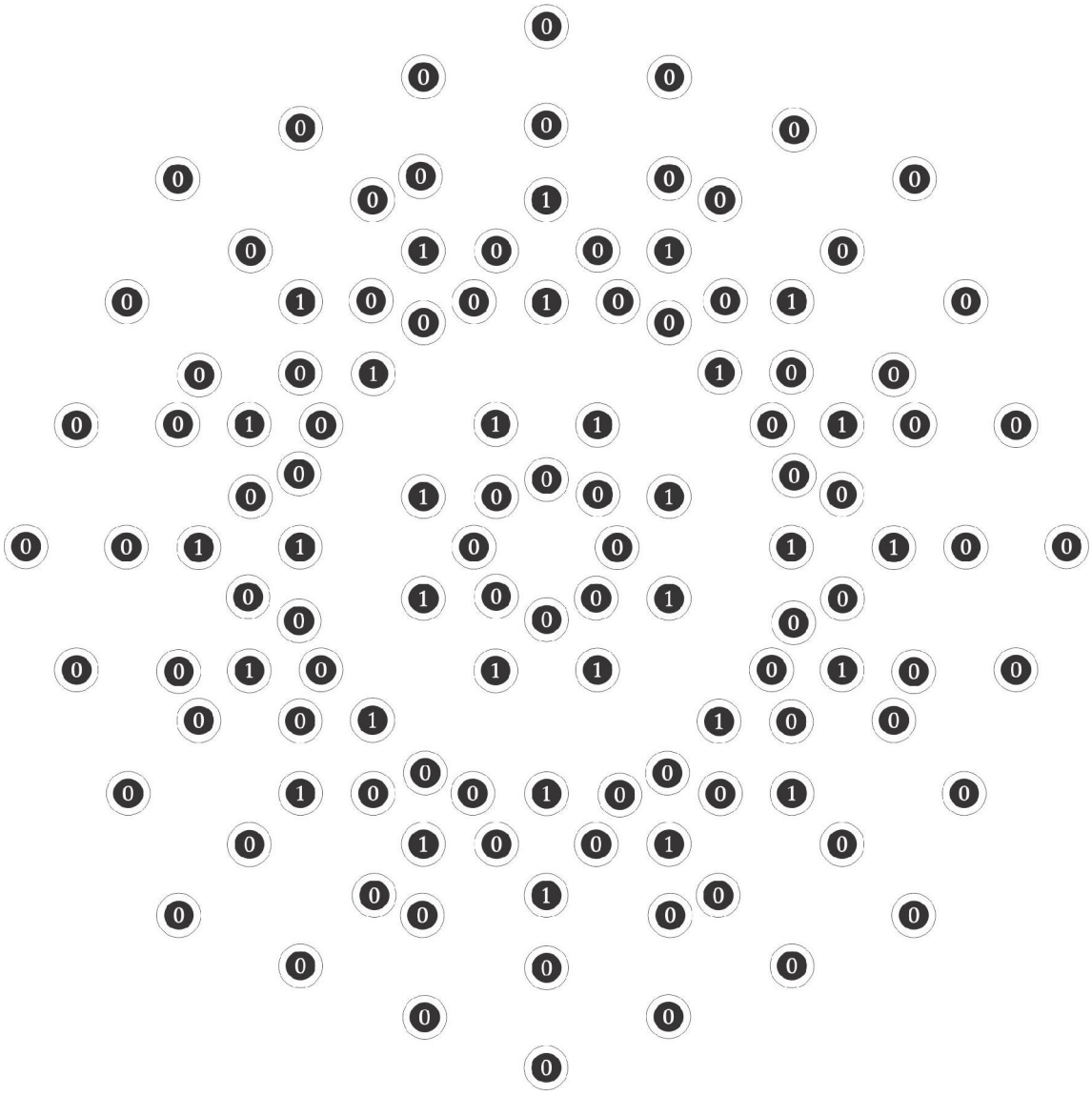

Fig. 06 – Placements of qubits at time four

Here, for various reasons, we are not going to continue building the diagrams, but we expect a higher level of complexity as time keeps going. And that, we hope, gives us the real world with all its *ups and downs.* We may also remark that a certain computer simulation of this mechanism should give us the *portrait of the universe whether as a young or an old spirit* at any t_n.

In any case, we have initiated it, and hope for the best. But, in the meantime, what should we do next? Should we speak about our observation and reflection of the primordial mechanics and evaluate whether it is the same thing as quantum mechanics? Should we speak about formation of matter if it isn't too soon? Should we speak about…?

We might not be sure about what we should say next, but there really is an important point we have overlooked so far. Previously, we have argued that our structure should look homogenous from every point's perspective because of conservation of nothingness. But what do we get now? The points in the diagrams don't seem to give us homogeneous look; what went wrong? Nothing went wrong, all we need to do is take every point as a center and accept the consequence. One such consequence would be the existence of "hidden" parts of the universe, because any center could now be a boundary at the horizon for another center, as if all that is surrounding it were not there. Incidentally, we seem to be proposing a solution to the famous problem of dark matter. But shouldn't we first discuss how matter is formed in our qubit universe? Maybe true, but to do that we should first let the qubit structure evolve until a certain t_n and see where the progress and complexity of it lead to. Let's take this as a better idea.