



Principle That Limits Size of a Quantum System

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Principle That Limits Size of a Quantum System

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Abstract

From the fundamentals it is discussed in a theory that universe is a huge quantum system. Human consciousness is also working on principles of quantum mechanics.

The whole universe must be represented in a single quantum state. All the events of this universe are part of that quantum state. A quantum computation is triggered by events in this universe. A single computation is an event associated to whole quantum state of Universe. Thus, universe is a combination of series of closed quantum systems. When two quantum systems are interconnected, the new system must follow a transformation principle

“The amount of information processed by any quantum system when it is coupled with another quantum system will be reduced with the ratio of threshold times of both the systems”

If the processing of information reaches to the capacity of the universe, the system attains consciousness. At this limit, no materialistic quantum system exists. Thus, it is impossible for any AI machine or humanoid to get consciousness even with high degree of intelligence.

Keywords: Universe, consciousness, quantum system, threshold time, decoherence

1 Introduction

Qubit or quantum bit is a basic unit of quantum information which is encoded in quantum states [1]. Quantum computation manipulates and processes information in to logical operations in the form of algorithms. Quantum information processing follows quantum techniques [2] just like and different from binary system for ordinary computers. The state of a qubit contains all of its information. This state is frequently expressed as a vector on the 'Bloch sphere'. Quantum computation will be done by quantum circuits which are based on the "qubit". It is somewhat analogous to the bit in classical computation. 1 and 0 are bits in a binary system. The same 1 and 0 are considered to be quantum states, or they can be in a superposition of the 1 and 0 states since a quantum system and superposition principle is applicable. However, when qubits are measured, the result of the measurement is always either a 0 or a 1; Any quantum computation algorithm can be represented as a network of logic gates. Mathematically quantum mechanics explains that n no of quantum bits interpret 2^n quantum states [3]. In general, n qubits are represented by a superposition state vector in 2^n dimensional Hilbert space. According to quantum mechanics, a perfect isolated quantum state must maintain a perfect coherence but, it is impossible to run the entire system with perfect isolation. If it is not perfectly isolated, during a measurement, coherence is shared with the environment and information will be lost with time; this process is called quantum decoherence [4].

Mathematically it is very important aspect of quantum computation. Decoherence is applicable to all quantum systems whether it is brain or a computer. Brain has been described as a quantum processor and the decoherence has been explained in that process [5]. All quantum systems must be associated with decoherence. A quantum computer is also a quantum system. Mathematically decoherence described as [4] - Quantum computer comprises of qubits which are the quantum analogue for classical bits. The state of a qubit at a time instance is given by the state vector. Qubit can take a state $|\Psi\rangle$ which is neither 0 nor 1, rather a superposition of both states.

$$|\Psi\rangle = \frac{(|0\rangle + |1\rangle)}{\sqrt{2}}$$

is an example of such state that has 50% probability of being $|1\rangle$ and 50% probability of being $|0\rangle$

Besides state vector, state of a qubit can be described with another entity known as density operator or density matrix which is defined by

$$\rho = \sum_i P_i |\Psi_i\rangle\langle\Psi_i|$$

where $|\Psi_i\rangle$ is one of the number of states of the quantum system and P_i is the probability of that state. Although this alternate description is mathematically equivalent to state vector formulation, it provides convenient means of describing the(dynamic) evolution of a quantum system, especially systems with noise. During quantum computation, qubit states evolve with time as governed by Schrodinger equation. The evolution is a unitary transformation. It describes the evolution of quantum system with in a time period. There will be corresponding unitary matrix for Hamiltonian. In gate-based quantum computing regime, different gate operation is defined by different unitary matrices.

At present, there are a number of different physical devices to realize quantum computers e.g., Ion trap, superconducting qubit, Silicon-based, Nuclear Magnetic Resonance (NMR) based etc. quantum computers.

- Every quantum state can be represented as a sum of two or more other distinct states. A single qubit can be forced into a superposition of the two states denoted by the addition of the state vectors. An entangled pair is a single quantum system in a superposition of equally possible states. The entangled state contains no information about the individual particles, only that they are in opposite states.
- If the state of one is changed, the state of the other is instantly adjusted to be consistent with quantum mechanical rules.
- If a measurement is made on one, the other will automatically collapse.
- Quantum decoherence is the loss of superposition, because of the spontaneous interaction between a quantum system and its environment.
- Decoherence can be viewed as the loss of information from a system into the environment

Within the decoherence time, superposition principle and entanglement will be applicable simultaneously.

Now the questions are-

1. Fundamentally the quantum interpretation is right? Really there exist loss of information in between coherence and decoherence due to measurement? Is it possible for partial loss of information from a coherence system to the environment?
2. whether superposition and entanglement are sufficient for quantum computation network? Or any other underlying principle is there?

For first question, it is clear that all quantum notations are descriptions of quantum state in any notation either in vector notation or in matrix notation or in Dirac notation.

The entities are state vectors and all these are observables involved in observation or a measurement. All the points of our 4D space of General relativity or N dimensional Hilbert space or even 3D space are quantum states describing position of a point in a purest quantum state. Purest quantum state in this universe is a single film of the universe as per film theory [5] along with new theory of consciousness [5]. In a film, only position will exist. Time will not flow in that. When it changes in to next film then time plays a role in that. If there is no flow of time, the wavefunction will not exist. So, mathematically the states which we are using are all mixed states only. Superposition of two or more such states only will describe other observables. All the events in this universe are happening due to film change or transferring one state to another interpreted by mixed states.

Specifically, it states that whole universe contains this position vectors in each purest state and observed as other observables like velocity or momentum etc. in mixed states. Each such purest state contains whole universe as quantum of space time in the form of space (with position operator). In the next film all mathematical terms will be interpreted in to function with Hamiltonian operator for clear cut description of observables defined by physics. This will be converted to an eigen state. It is also a mathematical conversion which describes the eigen value and a probability indicator to find one state out of all at the time of measurement.

This is actual mathematical interpretation of quantum state which involves observables and their probability to be an eigen state. But is it not separate from universe? whole universe will contain one state at one moment of time or before the involvement of flow of time and after transforming one film to another (it is the formation of space time screen with gravity as curvature). All the events and computations are happening on that screen. The afore said state is part of that universal state. *So, universe or environment is not separate while describing quantum states. All the quantum systems are interconnected in that system if we consider it*

as a whole.

There will be no loss of information also since there is no separation. For me the concept 'quantum information loss' during process has no meaning.

Coherence will exist fully in superposition and entanglement. There will not be any loss. But '*thresh hold time*' plays a role in that in all quantum systems which are part of big system. The quantum states in between a quantum system and another quantum system are neglected in this process. This is considered as loss of information.

Based on this point,

We get another question that why are we getting this question? Because, while working on consciousness and its relation to information processing [5], we found that the universe is a huge quantum system and the laws governing this quantum system must govern the laws of any quantum system. Thus, we reviewed complete quantum system of this universe and found that there is some relation between threshold time with entanglement and superposition to process the information and the quantity of information in the quantum states depends on the threshold time and length or size of the network.

Let us discuss the factors involved in quantum processing.

2 Discussion

All quantum systems follow same principles from universe to simple logic gate. All the models follow that off i.e., 0 position of system and 1 is on position in other words 0 is ground state and 1 is excited state. All other states are in between 0 and 1 and measurement will be in one eigen state in between.

As per theory of consciousness, universe is a huge quantum system and the information processing follows following rules:

1. Film is a quantum state and information will process while change of film [5][6]. If we say one film is 0 and another is 1, the observation will be superposition of states in between 0 and 1.
2. The processing speed of this information has been calculated as 144 qubits/sec by considering that the duration of film change is Planck time [5][6]. Thus, films will be changed in one second. Each film is a state. Thus, $1.85488837 \times 10^{43}$ states will process in one second. This quantum system will be in coherent state for few seconds. It was calculated by considering formation of a quantum of 4-Dimensional space time. This is the coherent time and it was calculated as per the physical (gravitational binding energy) properties of 4D space time whose curvature is gravity. After this time decoherence will start. Thus, speed of processing and decoherence give the information in coherence.
3. Here it is to be noted that the film changes of the universe due to a processor like brain [5][6] is a connecting mechanism of consciousness [5][7]. 144 qubits/sec is related to processing speed of information

only. But the information between two consecutive films, mechanism of consciousness is to be considered. Thus 144 qubits of the universe are equal to one qubit of mechanism of consciousness (refer fig4 of chapter14) [5]. and the threshold time is $5.13818773 \times 10^{-8}$ sec [5][8]. This threshold time is same for both universe and brain. Two stage system of universe (one film to one film) and the brain (change of quantum states in brain during change of one film of the universe. (ref.fig-4 of chapter14) [5] .

Within this time only entanglement and superposition occur. Thus, entanglement and superposition must dependent on threshold time. Let us see the explanation.

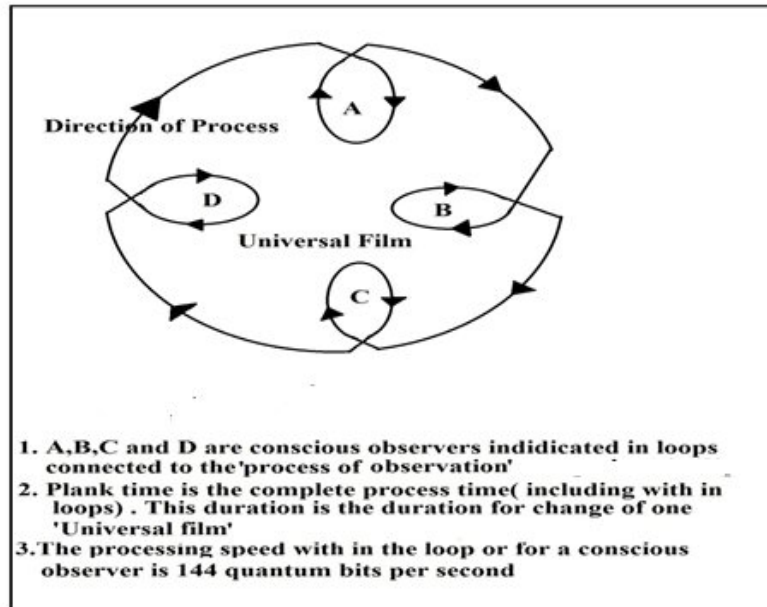


Fig-1 Showing the relation between Universal Film and Conscious observer

Fig.1(chapter13) [5][6] Shows that is a film and A, B, C&D are loops. This theory of consciousness says that the overall circuit including loops circulates the information in the same time that the circulation with in each loop. This mechanism has been explained in Fig.2(chapter14) [5][7] .

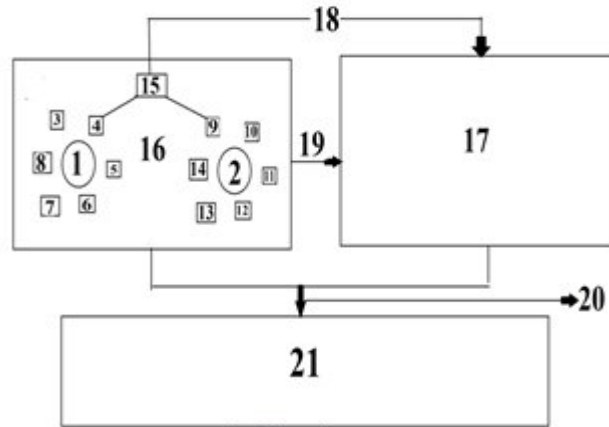


Fig-1
Diagram showing
Mechanism of consciousness

- 1 & 2 are separate conscious observers
- 3 to 8 are Quantum states associated to observer 1
- 9 to 14 are quantum states associated to observer 2
- 15-Super positioned state of one state from observer with one state of observer 2 for example super positioned state of 4&9
- 16. Film containing observer 1&2
- 17-change in film 16 as a part of this mechanism
- 18-Process of mechanism that is to be completed for film change from 16 to 17(It is the process of super position of 1042 quantum states of one observer with one quantum state of another observer
- 19-Process of mechanism of film change from 16 to 17. It is a consequential and simultaneous process of 18
- 20. Process indicating Superposition of films 16 & 17
- 21. Final result –the reality

This is possible by the action of the signal between the loops (conscious observers)

with infinite speed. It is nothing but entanglement. At the same time, it depends on the processor attached to the loop and film. If we say that it is brain, the threshold time has been calculated as $5.13818773 \times 10^{-8}$ sec [5][8]. It is calculated based on the system defined by physics that says the matter is formed by space time whose curvature is gravity. Means, with in this threshold time, 144 qubits will be processed in the universal system are considered as 1 qubit of information for consciousness with in the brain.

Quantum computation of brain is being operated by 1 quantum bit only. One qubit of information contains 144 qubits of universal system and will be processed in one second. For brain, this information will be in coherence with in a threshold time of $5.13818773 \times 10^{-8}$ sec.

All other quantum systems in this universe are part of it and must be

compared with it since all the quantum systems are part of one qubit of information with which the quantum system of brain is getting consciousness.

Present quantum computing is based on the term 'qubit' and they defined it as a two-stage quantum system. one with 0 and another with 1. In between their superposition states.

Depending upon the methodology and material used for these two stages, researchers are conducting research with various quantum systems.

They defined the qubit same for all systems which are independent of threshold time. They thought that the threshold time depends on material used for storage of quantum bits.

But for the universal system the qubit and threshold time of system are interconnected [5].

So, if we consider every quantum computer system or loop(network) of these quantum computer systems is a part of quantum system of brain that contains consciousness. (Brain with bio computing material is the processor) as explained above, the information which is processing through these loops of system and the threshold time (provided that is a quantum system means, follow superposition, entanglement and full coherence) are inherently connected. The information of any system is a part of qubit of information of the conscious brain.

So, why should we keep different units of measurement for different systems? All the measurement of information (qubits) defined for all systems can be interpreted in terms of Universal qubit.

Any how a qubit can be interpreted by two stage quantum system. One is 0 and other is 1 and superposition will be in between these two stages. When we want to compare with universal system, two state system is between two films of the universe. Let us consider that 1 qubit of information will be processed in brain with in a threshold time is $5.13818773 \times 10^{-8}$ sec as explained by mechanism of consciousness. This is considered as 1 qubit since the brain like processor processes this huge quantum information of universe to get consciousness. In this, all quantum mechanical properties such as superposition, entanglement and coherence will be maintained. Starting of this system is considered as 0 and after completion of formation it will be 1. The same has been taken for firing of neuron from zero state to firing state i.e., 1. It is nothing but action potential or stimulus of neural transmission in all calculations of consciousness. But this information will be different from another quantum computer system dependent on material depending on its thresholding capacity. Thus, the qubit quantity varies with system to system. If all these systems are to be connect in processing, then the problem will come. So, we have to make the quantity universal

Let us calculate,

Universe is a huge quantum system with brain as processor.

For any system information is same since it is a part of universal quantum system. Only the processing speed and number of qubits per second changes.

Let us suppose

N_x is no of qubits for an individual system.

T_x is threshold time of that system

T_U is threshold time of Universal system

N_U is no of qubits for Universal system.

As per our concept explained above

The process of information in one second is same for all systems and is equal to 1 qubit of conscious brain as explained above

$$N_x T_x = N_U T_U$$

We have

$$N_U = \frac{1}{144} \text{ qubits}$$

$$T_U = 5.13818773 \times 10^{-8} \text{ sec}$$

(144 qubits of the universe is equal to 1 qubit of conscious brain. So, one qubit of conscious brain is 1/144 qubits of

Universe since 144 films are changing in one universal system)

Explanation:

For conscious brain, the information in quantum state is 1/144 qubit. And for universe it is 144 such qubits. So finally, the universal system by considering both brain and universe

$$N_x T_x = N_U T_U$$

$\therefore N_x \left(\frac{T_x}{N_U \times T_U} \right) = 1$ (This 1 indicates that the system is constant for all and all systems can be compared with this)

$$N_x \left(\frac{T_x}{N_U \times T_U} \right) = 1$$

Where N_x is no of qubits for an individual system.

T_x is threshold time of that system

T_U is threshold time of universal system.

N_U is no of qubits for universal system

For Universe,

$$N_U = \frac{1}{144} \text{ qubits}$$

$$T_U = 5.13818773 \times 10^{-8} \text{ sec}$$

The same equation can be written as

$$N_x T_x = N_y T_y = N_U T_U$$

Or

$$N_x T_x = N_y T_y = 144 \times 10^{-8}$$

Where N_x is no of qubits for quantum system 'x'.

T_x is threshold time for quantum system 'x'

T_y is threshold time for quantum system 'y'.

N_y is no of qubits for quantum system 'y'

Now, if quantum system 'x' and quantum system 'y' are connected together to make another bigger system, The qubits or threshold time of individual

systems i.e. x and y systems will be changed by a factor

$$N_x \left(\frac{T_x}{N_U \times T_U} \right) \text{ or } T_x \left(\frac{N_x}{N_U \times T_U} \right)$$

Let us consider qubits only for 1,2,3...up to n systems

Total system qubits are

$$N_1 \left(\frac{T_1}{N_U \times T_U} \right) + N_2 \left(\frac{T_2}{N_U \times T_U} \right) + N_3 \left(\frac{T_3}{N_U \times T_U} \right) \dots + N_n \left(\frac{T_n}{N_U \times T_U} \right)$$

Or

$$\sum N_n \left(\frac{T_n}{N_U \times T_U} \right)$$

When $\sum T_n = T_U$ and
 $\sum N_n = N_U$

Then it reaches huge universal quantum system for which the qubit is 1 for which brain is the only processor and the consciousness arises by this process of information. Systems more than this cannot exist.

Here universal quantum system has been considered as 1 qubit. and all other qubits are comparable to this quantity of information for the purpose of calculation as a transformation process from one quantum system to another. Thus, the information of a qubit will change according to quantum system depending upon material for storage, methodology and storage capacity. Any how a qubit can be interpreted by two stage quantum system. One is 0 and the other is 1 and superposition will be in between these two stages. When we want to interact with another quantum system this transformation must be used to universalize the computing system. The same has been taken for firing of neuron from zero state to firing state i.e., 1. It is nothing but action potential or stimulus of neural transmission in all calculations of consciousness

At this stage, the threshold time is not possible for any material than the biogenesis material. since as per the new consciousness theory [5]. There is no meaning for materials without a conscious observer since every material occupies space and space originated by consciousness. Only conscious observers exist all the materials and even space between them is manifestation of consciousness only

This shows that number of qubits of any system (processed information) when it is coupled or connected or interacted with another system will change with the ratio of threshold times of both the systems. It is mandatory to apply this principle in any computation while interconnecting two quantum systems

2 Conclusions

1. Predicted a principle of quantum mechanics-
 “Number of qubits of any system (amount of processed information) when it is coupled with another system will change with the ratio of threshold times of both the systems”.
 This can be verified experimentally. Its verification revolutionizes the advancement of quantum mechanics and quantum computing.
2. Introduced a formula to interconnect all the quantum system irrespective of

their threshold time and to make invariance in transformation of information from one system to another for a universal quantum computation system

Where,

$$N_x \frac{T_x}{U_t}$$

N_x is no of qubits for an individual system. T_x is threshold time of that system. U_t is threshold time of universal film. This formula will be useful to interconnect the quantum processors and the computations applicable for that.

Declarations

‘Not applicable’

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