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Quantum Computing

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Today Quantum Computing is central in the advance engineering. This is because there is more demand for faster and more effective computer to treat huge amount of information in a very short amount of time. From engineering point of view this means that we must go in to the atomic level in the constructing computer. This is in fact what Quantum Computing is about. For this one should have good understanding about electrons dynamic behavior. This in turn demands a good understanding of the quantum. Quantum that we teach student now is limited by uncertainty and paradox. First it is not transparent. One may not be interested in transparency and only be interested in the result of the calculation. Even if one is directed to the result, we should say that the calculation is often complicated and confronted with ambiguity. We must say that we can never separate transparency from the other aspects of the calculation. It is through the transparency that we can find the best way of the calculation. Here we come to the *Confined Quantum Field Theory*. In confined Quantum Field Theory we have no uncertainty and paradox. Each quantum object like electrons are represented by a well defined bounded and connected manifold with well defined size. This size is a function of the quantum objects energy. Therefore we often refer to the energy as the size. Quantum objects with higher energy have smaller size. More in the confined quantum field theory quantum objects have well defined position. Well defined size and position is the transparency we receive from the Confined Quantum Field Theory.

Dynamic of the electron

Let's briefly describe the dynamic of an electron in the quantum computer. An electron can be in a three states in the quantum computer. It can be in a bounded state in an atom or molecule, it can be in a transitory state and it can move in a stabile state or pre-superconducting state. Concerning bounded state there is not much difference in the Confined Quantum Field Theory compared with the standard quantum. The only difference is that state functions have a cut-off and do not go to infinity. One can accept solution to the Schrödinger but on a bounded domain. The difference is mainly on the transitory and stable or pre-superconducting state as we call it in the Confined Quantum Field Theory. Transitory state is a state that the electron moves around and has a size or energy that do not match with the potentials around to be captured. In this state the electron frequently exchanges energy with the bulk until it finds energy or size and position to be in a bounded state or pre-superconducting state. Pre-superconducting state is a state which specifically recognized by Confined Quantum Field Theory in that an electron moves in a periodic potential and the size of the electron is a multiple of the periodicity. In hardware engineering avoiding impurity and defect is especially important just

because they destroy the periodicity. We all are aware that computers works always better in a lower temperature. It is just because the temperature disturbs the potential periodicity. Since in the quantum computing we deal with single atom or molecule, if this atom or molecule is disturbs by high energy radiation can be a problem for the computing. Disturbance due to the high energy radiation like cosmic radiation is more difficult to prevent. For this one need a thick jacket of lead which is not practical for small mobile computer. One possible solution is to construct several parallel computing lines. The probability that two lines disturbs in a same way by a high energy radiation at the same time is almost zero.