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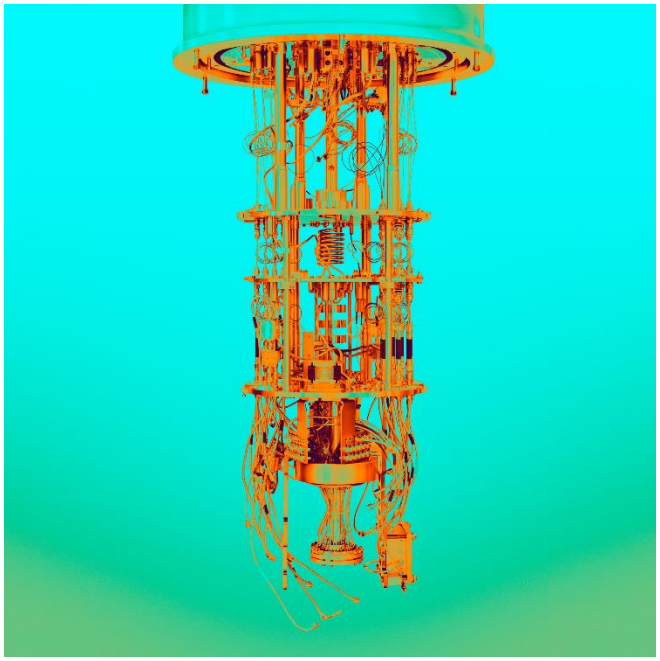
QUANTUM COMPUTING

Quantum Computing can spur technology development and it can be the future of the computing world which aids in making new medicines, problem-solving and storing data far greater than supercomputers. These Computers which are based on qubits unlike conventional computing following 0's and 1's does quantum computations and pass high-level encryptions with help of subatomic particles like electrons or photons. They are likely to expand their growth in a few years. Scientists claim that it can do the work more efficiently and is 100 trillion times faster in solving a problem than any computer. The first Quantum computer (fig: 1.1.) is owned by IBM in 2016 and following that lane, other tech giants are establishing their quantum computers.



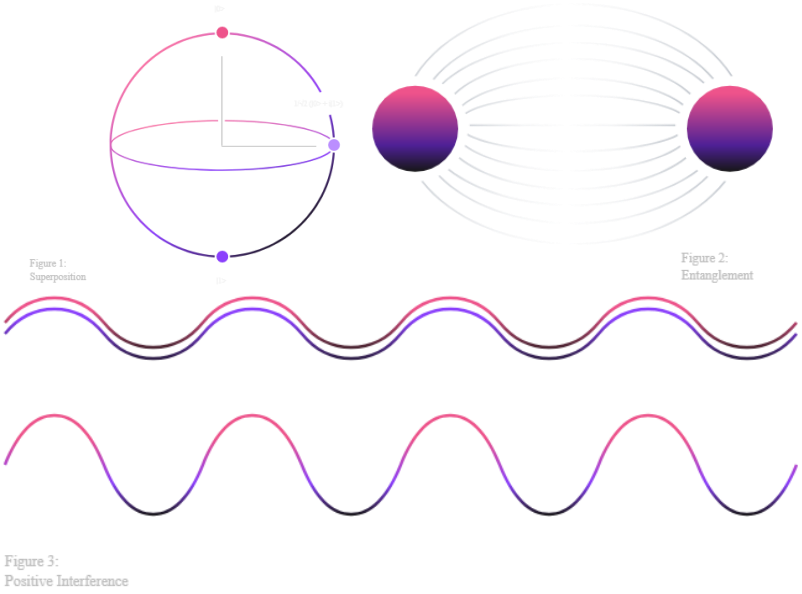
(Fig: 1. 1. Quantum Computing)

The Quantum computers are kept in deep space and under super cold temperatures to isolate the qubits when in a controlled quantum state. The Quantum Computer works basically on three mechanical properties they are superposition, entanglement and interference. These properties help in manipulating the qubit state. Refer fig (1.2).

1. **Superposition:**
   It is the combination of two states. The analogy where various mixed combinations give different outputs.

2. **Entanglement:**
   The entangled systems behave as a whole to make a single system that can't be explained in the means of normal terms by using classical logic.
3. **Interference:**
   In the phase phenomenon, the quantum states undergo the interference method where when two waves are in phase they are amplified and when they are out they cancel with each other.

To increase the computational power we have to increase the number of qubits that reside in the quantum computer and are to be improved in a 2Dimensional manner. While maintaining the error rate to minimum the computational power can be increased by performing sequential operations.



(Fig: 1. 2. Mechanical properties)

These machines can also be used for optimization as they can perform huge computational problems. Though they are in the beginning phase it might take some more years to get people to understand the full potential of the quantum computer. Many Researchers, Business companies and Universities that are working on this have less skilled manpower and a shortage of main components. Once they fulfill their objective, this will bring in a new tide in the technical aspects of the world and will be the answer for many unknown scientific and mathematical mysteries.

Reference:

https://www.ibm.com/quantum-computing/learn/what-is-quantum-computing/,
https://www.zdnet.com/article/eight-leading-quantum-computing-companies-in-2020/.