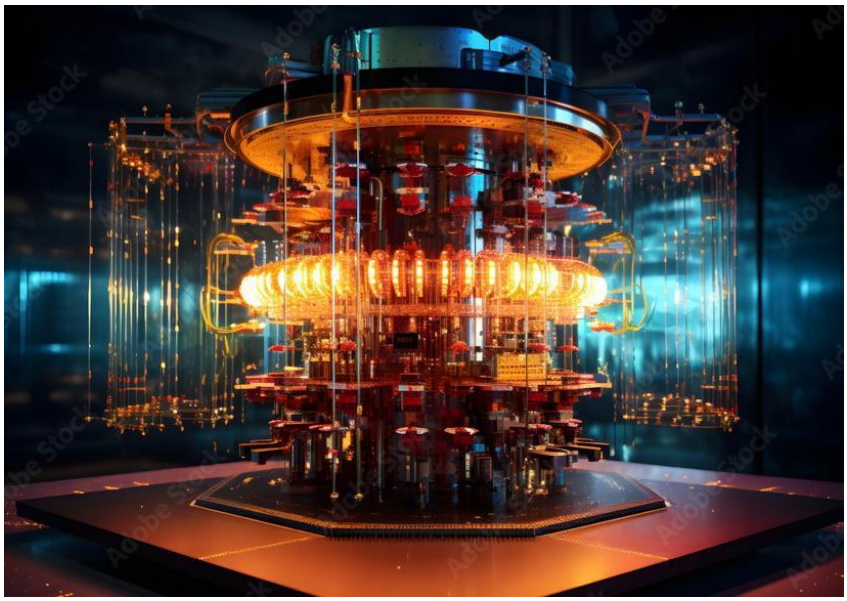
How does quantum computing work?



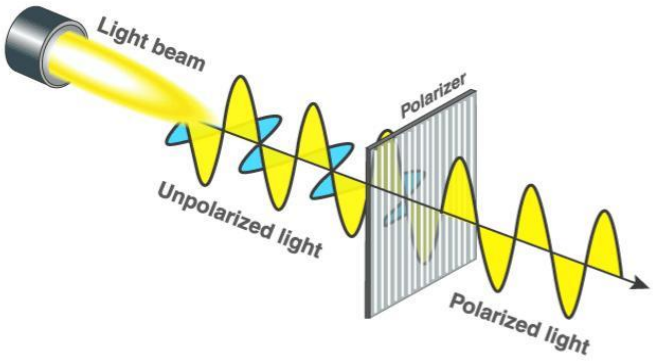
Quantum computing takes advantage of how quantum matter works:

- **Where classical computing uses binary bits 1s and 0s, quantum computing uses particles such as electrons and photons that are given either a charge or polarization to act as a 0, 1 or any of the possible states in between. The ability of these units, called qubits, to be in more than one state at a time is what gives quantum computers much of their processing power.**

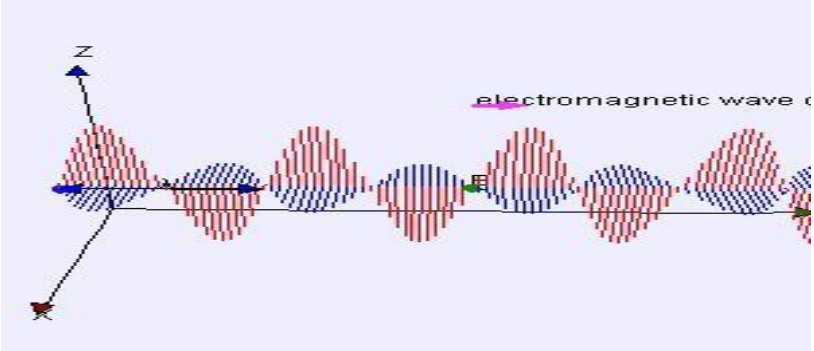
- **Deference of Protons and photons:-** Fun-damentally different particles. Protons are massive, positively charged particles that reside in the nucleus of an atom, while photons are massless, chargeless particles that carry electromagnetic radiation and energy.

- **Electrons and protons:-** charge of an electron and a proton refers to the fundamental property of these subatomic particles that causes them to interact with electromagnetic forces. **Electrons carry a negative charge (-e), while protons carry a positive charge (+e).** The magnitude of these charges is the same, but their signs are opposite, meaning they attract each other.

- **Polarization, property of certain electromagnetic radiations in which the direction and magnitude of the vibrating electric field are related in a specified way. Light waves are transverse: that is, the vibrating electric vector associated with each wave is perpendicular to the direction of propagation.**



- **Oscillation refers to the back-and-forth or repetitive movement of an object or quantity around a central point or equilibrium position.**



- The ability of quantum computers to be in multiple states at once, a concept known as superposition, is what gives them their significant computational power. This means that unlike classical bits, which are either 0 or 1, qubits (quantum bits) can exist in a combination of both states simultaneously. This allows quantum computers to explore a vast number of possibilities concurrently, potentially solving complex problems much faster than classical computers.