CARDAMOM PLANTERS' ASSOCIATION COLLEGE
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Basics of Quantum Mechanics

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Basics of Quantum Mechanics
- Why Quantum Physics? -

- Classical mechanics (Newton's mechanics) and Maxwell's equations (electromagnetics theory) can explain macroscopic phenomena such as motion of billiard balls or rockets.
- Quantum mechanics is used to explain microscopic phenomena such as photon-atom scattering and flow of the electrons in a semiconductor.
- Quantum mechanics is a collection of postulates based on a huge number of experimental observations.
- The differences between the classical and quantum mechanics can be understood by examining both
  - The classical point of view
  - The quantum point of view

Basics of Quantum Mechanics
- Classical Point of View -

- In Newtonian mechanics, the laws are written in terms of particle trajectories.
- A particle is an indivisible mass point object that has a variety of properties that can be measured, which we call observables. The observables specify the state of the particle (position and momentum).
- A system is a collection of particles, which interact among themselves via internal forces, and can also interact with the outside world via external forces. The state of a system is a collection of the states of the particles that comprise the system.
- All properties of a particle can be known to infinite precision.

Basics of Quantum Mechanics
- Quantum Point of View -

- Quantum particles can act as both particles and waves
  □ WAVE - PARTICLE DUALITY
- Quantum state is a conglomeration of several possible outcomes of measurement of physical properties □ Quantum mechanics uses the language of probability theory (random chance).
- An observer cannot observe a microscopic system without altering some of its properties. Neither one can predict how the state of the system will change.
- Quantization of energy is yet another property of "microscopic" particles.

THANK YOU