

# The role of quantum mechanics in modern technology

**Md. Shahria Sarker Shuvo**

ECE, CSE

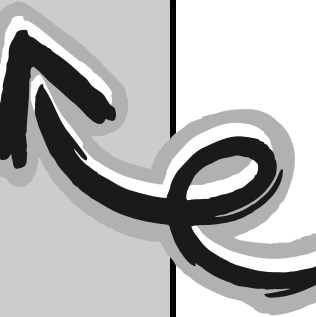
# Wave-Particle Duality: Particles as Both Waves and Particles

## Dual Behavior

Particles like electrons exhibit both wave and particle characteristics, demonstrating their dual nature in various experiments such as the double-slit experiment, highlighting their complexity.

## Quantum Tunneling

This unique duality allows particles to tunnel through barriers, enabling significant applications in technology such as semiconductors, which form the basis of modern electronics.



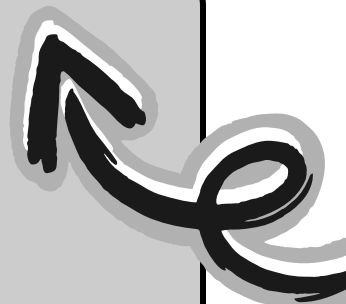
# Quantum Tunneling and Semiconductors.

## **Concept of Quantum Tunneling**

Quantum tunneling allows particles to pass through potential barriers, defying classical physics expectations. This phenomenon occurs at quantum scales where particles behave with wave-like properties.

## **Real-World Applications**

Quantum tunneling is crucial in modern technologies, enabling the function of semiconductors and transistors. This principle underpins the operation of devices like computers and smartphones.



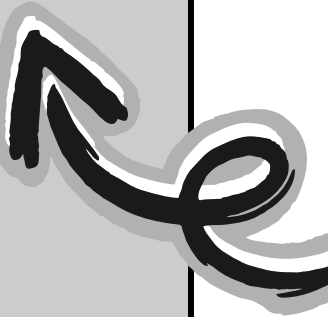
# Quantum Computing: Qubits and Superposition

## **Qubits Explained**

**Qubits are the basic units of quantum information, capable of representing both 0 and 1 simultaneously due to superposition, vastly increasing computational potential.**

## **Advantage of Speed**

**This unique property allows quantum computers to process complex problems much faster than classical computers, offering solutions to challenges previously deemed intractable.**

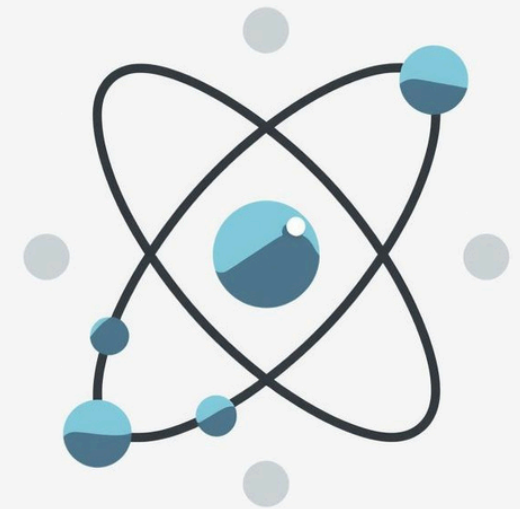


# Quantum Computing: Superposition Explained



## Superposition

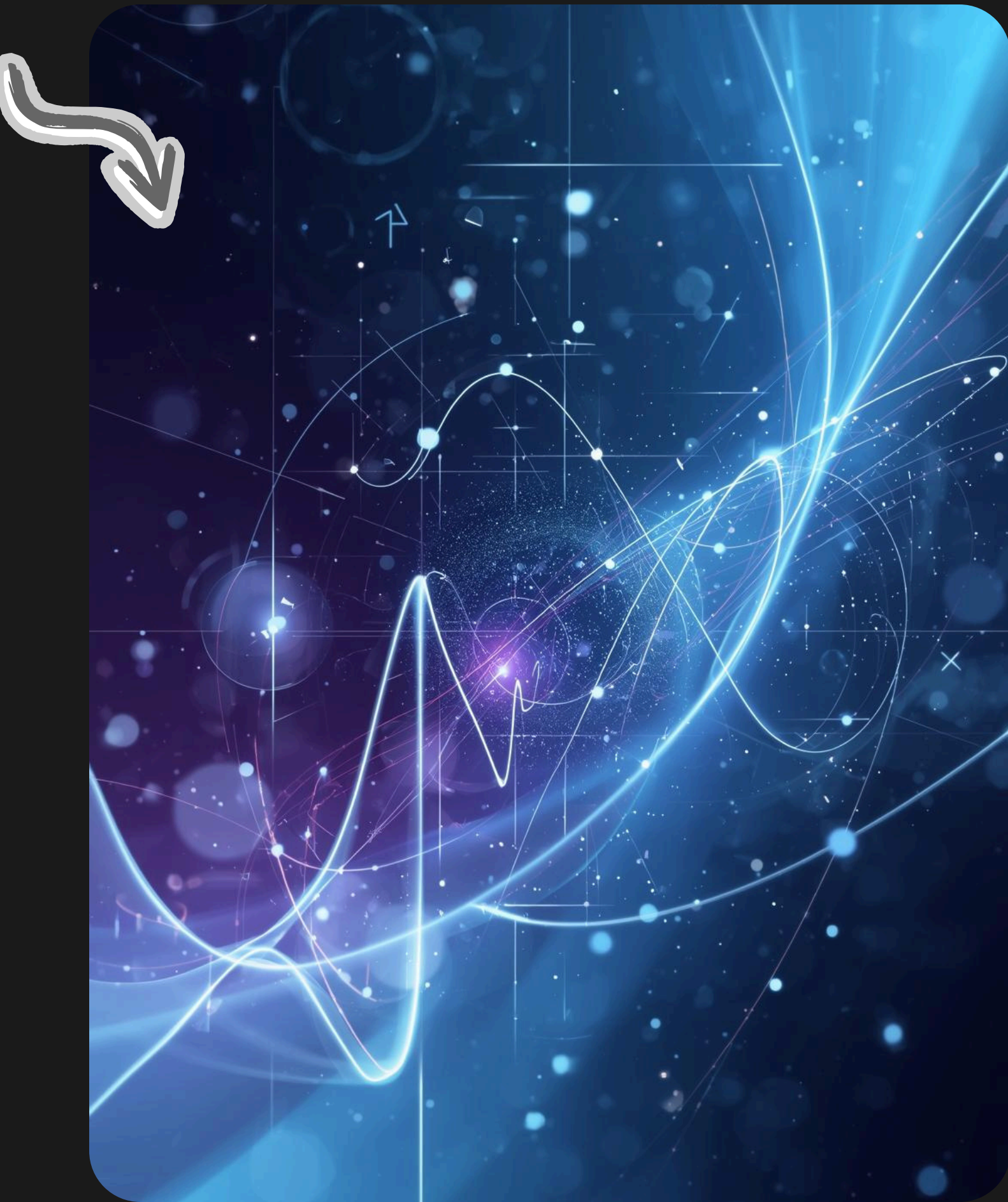
**Represents 0 and 1  
simultaneously in qubits**



## Qubit

**Fundamental unit of  
quantum information  
processing**





# THANK YOU

Any question?