

# The role of quantum mechanics in modern technology

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# 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

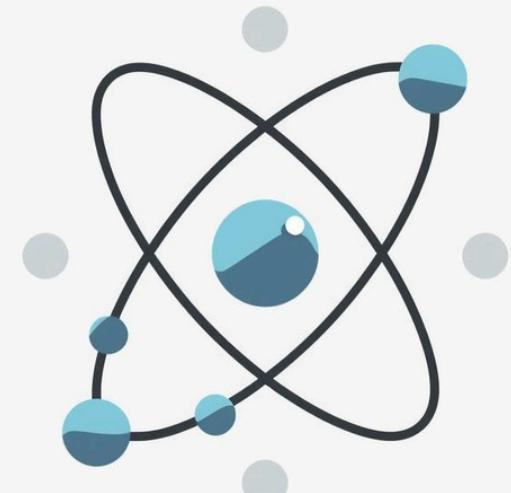
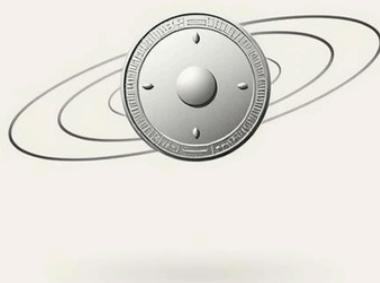
## Qubits Explained

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

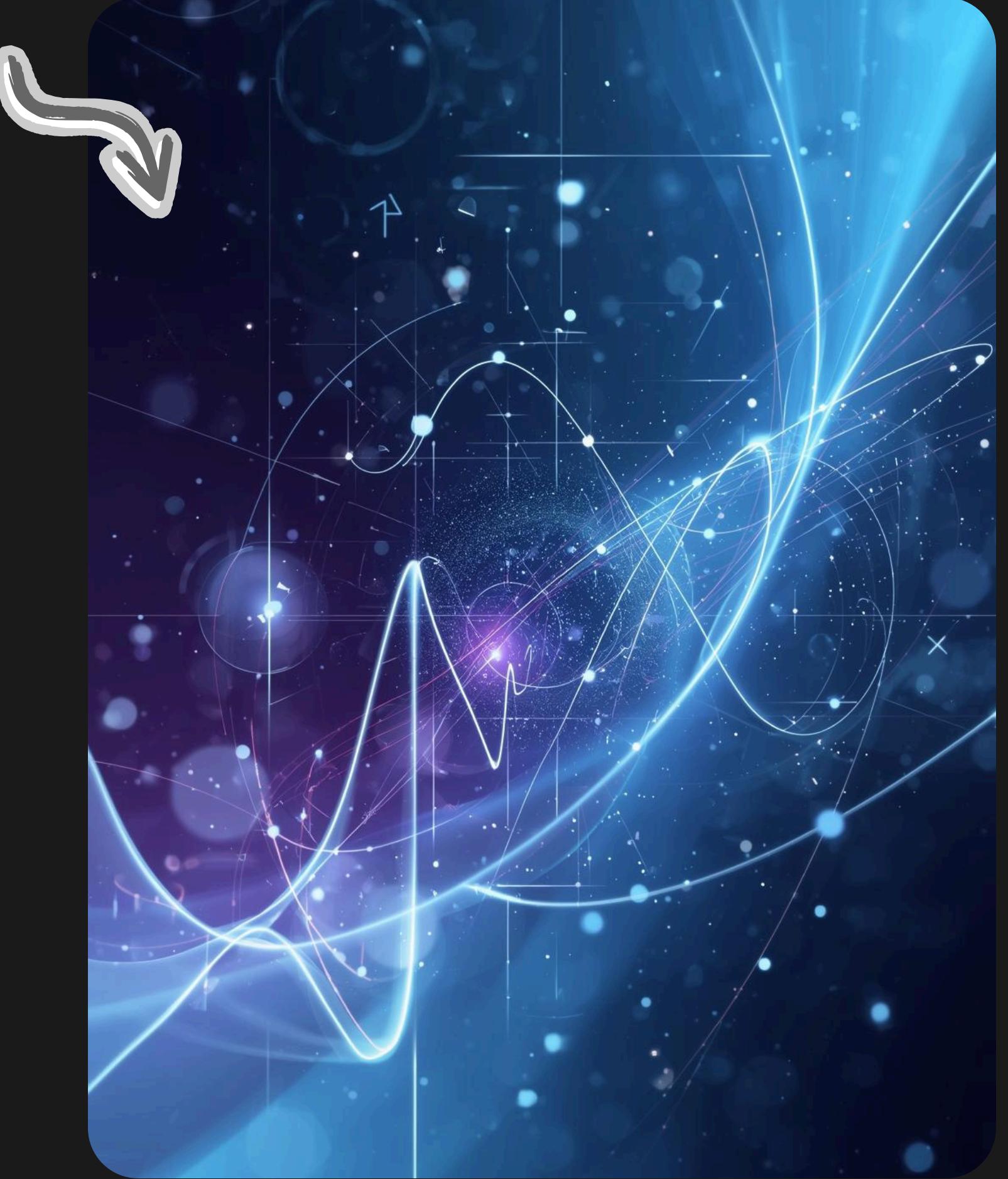


## Superposition

Represents 0 and 1  
simultaneously in qubits

## Qubit

Fundamental unit of  
quantum information  
processing



# THANK YOU

Any question?