

### THEORY

1. The first part of the theory discusses the basic principles of quantum mechanics, including the wave-particle duality and the uncertainty principle. It also covers the Schrödinger equation and the concept of wave functions.

2. The second part of the theory discusses the applications of quantum mechanics, such as the quantum tunneling effect and the quantum Hall effect. It also covers the quantum entanglement and the quantum teleportation.

3. The third part of the theory discusses the quantum computing and the quantum cryptography. It also covers the quantum communication and the quantum networks.

| Topic                | Sub-topic             | Key Concepts  |
|----------------------|-----------------------|---|
| Quantum Mechanics    | Wave-particle duality | De Broglie wavelength, Compton effect                       |
|                      | Uncertainty principle | Heisenberg uncertainty principle, Compton wavelength        |
|                      | Schrödinger equation  | Wave function, Probability density                          |
|                      | Quantum tunneling     | Barrier penetration, Tunneling current                      |
| Quantum Applications | Quantum Hall effect   | Integer quantum Hall effect, Fractional quantum Hall effect |
|                      | Quantum entanglement  | EPR paradox, Bell's inequality                              |
|                      | Quantum teleportation | Entangled state, Classical communication                    |
|                      | Quantum computing     | Qubit, Quantum gate, Quantum circuit                        |

### EXPERIMENT

