Introduction to quantum mechanics and some applications

Thursday 8 May 2025 - Thursday 26 June 2025

Scientific Programme

Course 1: May 8, 2025 - Historical introduction to quantum mechanics.

Course 2: May 15, 2025 - Quantum states for quantum computation, the qubit, single qubit quantum gates. The Bloch sphere.

Course 3: May 22, 2025 - Entanglement, two qubits, Bell's inequalities, Bell states and Bell state measurements. Maybe: quantum teleportation.

Seminar 1: Single and two qubit exercises. Quantum gates, Bell states.

Course 4: June 5, 2025 - Quantum communications. The no-cloning theorem.
The BB84 protocol. (The E91 protocol. - if time allows)

Course 5: June 12, 2025 - Introduction to quantum optics. Single photon states. The beam splitter.

Course 6: June 19, 2025 - The HOM effect. The Mach-Zehnder interferometer.
Maybe Coherent states, squeezed vacuum.

Course 7: June 26, 2025 final session - Q&A/discussions/exercises