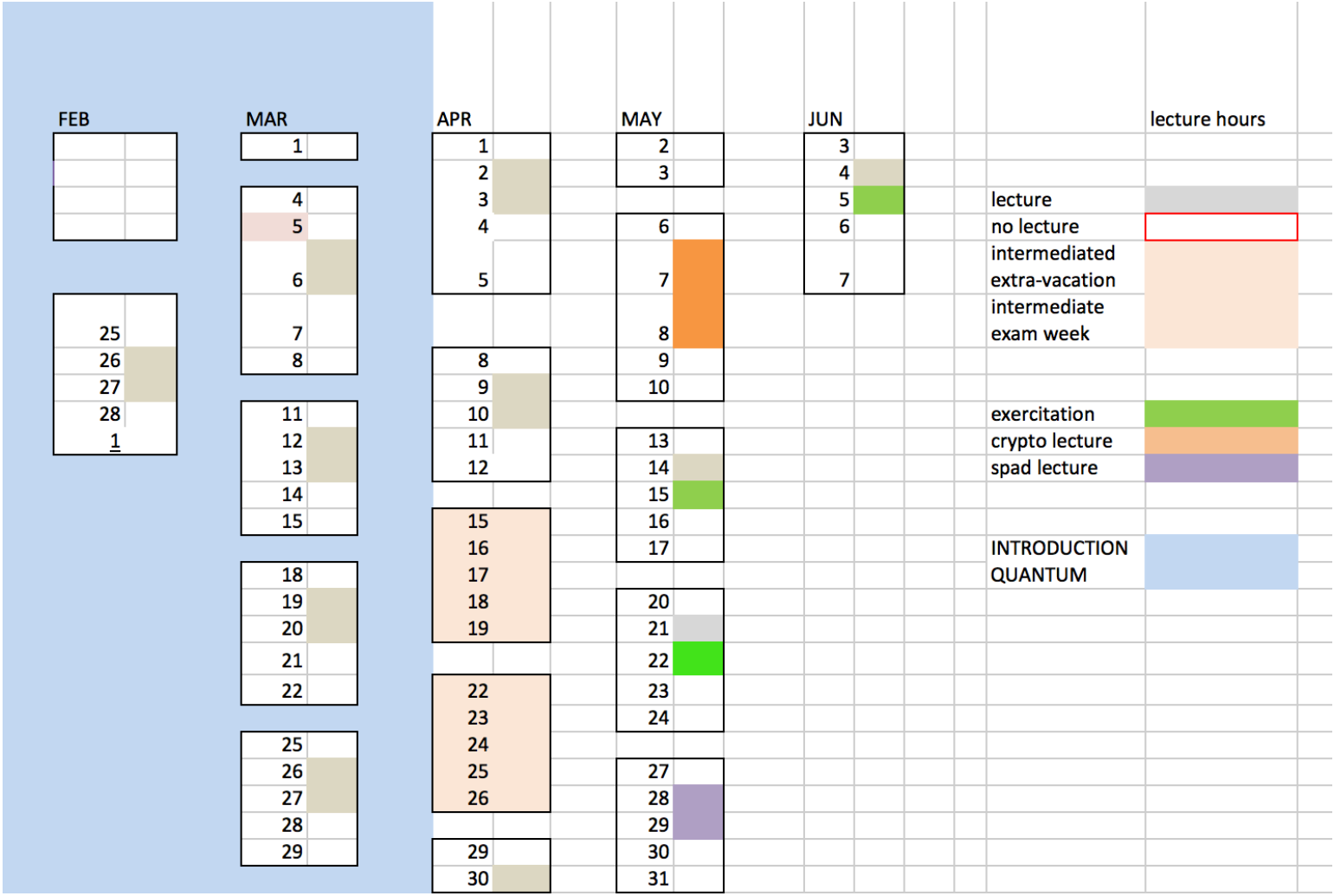
Quantum Communications Calendar



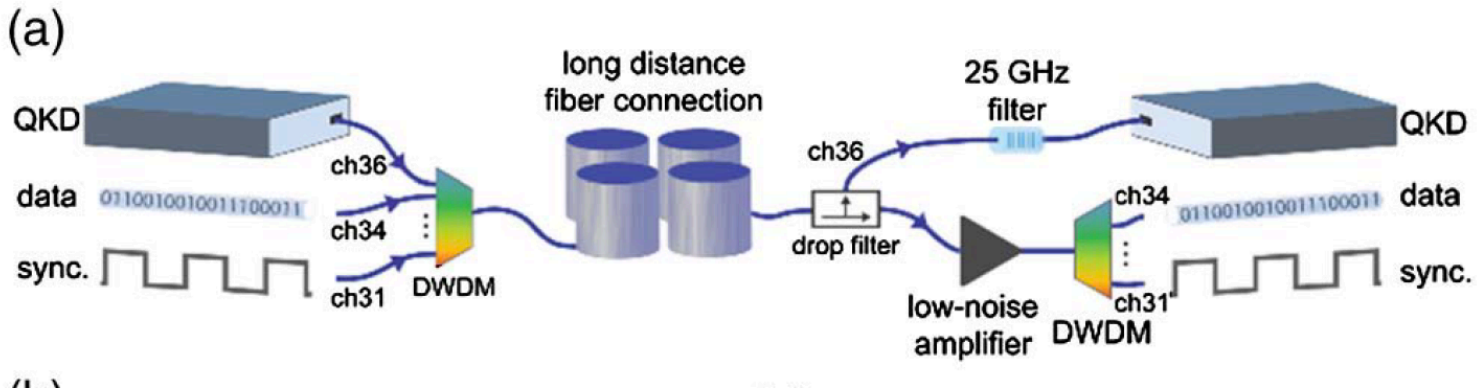
QUANTUM COMMUNICATIONS

Quantum communication is the transmission of signals by quantum bit (or qubit) instead of bit. The possibility of using photons as a qubit opened concrete possibilities for the unconditioned secure transmission of string of bits (quantum key distribution , QKD) . The course aims to provide the basis for quantum information through an introduction that includes information thermodynamics, information theory and quantum theory. The Course further details the QKD protocols and also focuses on some applications and some technological aspects of the subject.

EXAM PROGRAMME

Introduction to Quantum Mechanics.

Elements of quantum mechanics: states and operators. Poisson parenthesis. Schrodinger representation. Heisenberg representation. The wave and the matrix quantum mechanic. The symbolic quantum mechanics. The density operator.
The Harmonic oscillator in different representations. The creation and annihilation operator.
The Fock state, the coherent state and the quantum representation of the light. The physics of the single photon.



Quantum Cryptography

Introduction to cryptography. The Bennet-Brassard protocol for the quantum key distribution (QKD). The Block sphere and the Poincaré sphere. QKD experiments and systems. Evolution of the BB-84 protocol.

Quantum technology

QKD systems in free-space and in optical fiber. The Single-photon avalanche diode (SPAD). Single photon sources and attenuated sources. The polarization stabilization issues and technology. Retracing paths an birefringence compensation. Mirrors and quantum operators.

REQUIREMENTS

Students are expected to have a basic knowledge of algebra and differential calculus.

The examination will be only written by means open questions and exercises on the subject matter delivering during the lectures.