

Marcelo Martinelli (IFUSP - USP, Brazil): Building quantum machines with light

We will consider the use of quantum optics in quantum information. Starting from the quantization of the electromagnetic field, we will discuss the manipulation of the field state by photonics and nonlinear optics, and the frontiers between classical and quantum sources.

On the other hand, detection of these quantum states of the field, by measurements of observables of discrete or continuous spectra, trust strongly in the sensitive measurements provided by interferometry and photodetection. We will discuss the techniques to reconstruct the quantum states and perform precise measurements of observables.

Given these sensitive techniques, it is no surprise that their applications range from extreme measurements to possible implementations in quantum information processing. Some examples of these features, ranging from gravitational wave detection to applications of cluster states, will be discussed along the course.

Introductory bibliography:

Quantum Optics, D.F. Walls, Gerard J. Milburn (Springer)

Quantum Optics, Marlan O. Scully and M. Suhail Zubairy (Cambridge)