

## Quantum optics and quantum information with twin photon

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### Resumo

In the non-linear process called parametric down-conversion, it is possible to perform frequency conversion in the optical domain. For instance, when one laser beam shines a non-linear crystal, some of its photons are converted into two new photons with frequencies that are different from the frequency of the incident laser. This process is also called "spontaneous" parametric down-conversion, because it is based in spontaneous emission. The pair of photons obtained, are produced basically in the same instant of time, then they are called twin photons. Moreover, besides simultaneity, they also share a non-factorable quantum state. This property makes these photons a very special tool, because they are in an entangled state for some degrees of freedom and they can be prepared in an entangled state for other ones. In this talk, I will discuss the motivation of Quantum Computation and Quantum Communication, present the concept of Quantum Entanglement, and discuss the application of photoic entanglement for the understanding of the Foundations of Quantum Mechanics and the research in Quantum Information.