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Perspectives of Quantum Light: from Quantum Computer to Future Quantum Communications

The main objective of quantum information consists of understanding the quantum nature of information and learning how to process it by using physical systems operating under the laws of quantum mechanics. In this perspective, completely new schemes of information transfer and processing, enabling new forms of communication and enhancing the computation and simulation power, are currently developed, with a beneficial impact in the design of new scientific strategies.

Among the different platforms quantum photonics represents an excellent experimental test bench for various concepts introduced within the framework of quantum information theory. However the realization of interferometric optical schemes of increasing complexity requires the introduction of integrated waveguide technology to achieve the desired scalability, stability and miniaturization of the devices.

In this talk, after a brief introduction on the fundamental concepts of quantum information, I will present the main results obtained by our group with the use of integrated quantum circuits.

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