UNIVERSITA' DEGLI STUDI DI PAVIA

DOTTORATO DI RICERCA IN FISICA

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Quantum information on a photonic chip

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Abstract: Integrated photonics circuits have a strong potential to perform quantum information processing. Indeed, the ability to manipulate quantum states of light by integrated devices may open new perspectives both for fundamental tests of quantum mechanics and for novel technological applications. By exploiting waveguides fabricated by femtosecond laser pulses, integrated circuits with three dimensional geometry can be designed to carry out several quantum information processing tasks. We will address the implementation of quantum walks on a chip. Finally we will discuss the perspectives of optical quantum simulation: the implementation of the boson sampling to demonstrate the computational capability of quantum systems in the so-called quantum supremacy regime.