

SEMINAR: Frequency bin quantum information processing with integrated photonics

MASSIMO BORGHI

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10:00 to 11:00

Seminar Room

Light-based quantum technologies utilize photons as fundamental carriers of information, taking advantage of their long coherence times, fast propagation speeds and ease of manipulation. Well-explored degrees of freedom for encoding quantum information include polarization, orbital angular momentum, path, and time of arrival. Less investigated is frequency-bin encoding, in which quantum information is encoded in discrete frequency (energy) bands. This approach has great potential because it inherently supports high-dimensional entanglement, is compatible with existing fiber-optic infrastructure, and allows for easy manipulation of the quantum states using standard telecommunication fiber components. Frequency-bin entangled states can be efficiently generated in integrated photonics by exploiting spontaneous parametric processes in microring resonators. In this talk, we will explore our latest works in quantum information processing with frequency bin and resonators, from the generation of non-classical states to their applications, including our recent demonstrations of frequency bin entanglement based quantum key distribution and Gaussian boson sampling.

Hosted by: Prof. Dr. Valerio Pruneri