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Silicon photonics: Generation of entangled photon pairs

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Integrated quantum photonics has already proven its suitability for high-performance photon-pair source realizations and basic quantum state simulation. Among all physical technological platforms (lithium niobate, KTP, III/V semiconductors), silicon photonics stands as a promising avenue for developing cost-effective quantum circuits, with the potential for on-chip signal processing. Thanks to the possibility of integrating electronics and photonics in a full monolithic fashion. Notably, integrated ring cavities already enable producing entangled photons, thanks to enhanced third-order nonlinear processes. In this talk, we report the generation of entangled photon pairs in micro-ring cavity based on silicon-on-insulator structure (SOI), in energy-time format, which is widely suited for the fiber based quantum key distribution (QKD) because of its robustness against polarization mode dispersion and disturbance. Furthermore, since this on-chip quantum entangled photons pair source is fully compatible with telecom components, it offers a path toward quantum photonic circuits for the next QKD real-world system.

Biography

Labonté Laurent studied in the University of Limoges (France) where he received a Master's degree in "Optical and High Frequency Telecommunication" (University of Limoges, France). He obtained the PhD degree in Physics in 2005 on both experimental and numerical study of microstructured fiber for non-linear optics and astronomy. From 2005 to 2006, he was an Assistant Professor. In 2006, he joined the group "Quantum Information with Light & Matter" of the Laboratory of Condensed Matter Physics (LPMC), as an Associate Professor of the University of Nice Sophia Antipolis. His research activities focus on generating, distributing and manipulating quantum information at telecom wavelength.

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