

Friday July 12<sup>th</sup> 2019 - 10h 00

Amphitheater of C2N

## Pushing photon-photon and spin-photon interactions to the single photon level

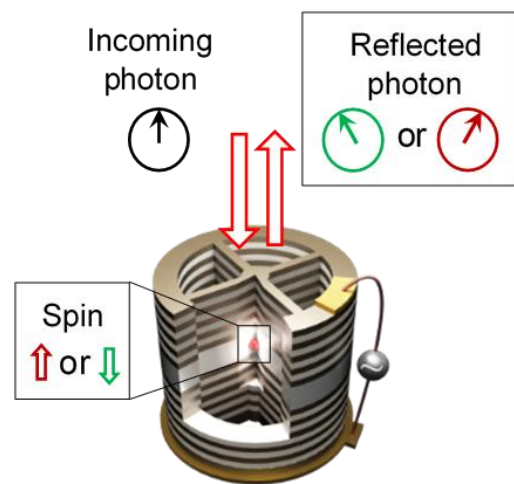
**Loïc Lanco**

*(Department of Photonics – C2N/Université de Paris)*

How can we make individual photons interact with each other, or with a single stationary quantum bit? I will show that efficient light-matter interfaces can be developed to address these challenges, using semiconductor quantum dots in optimized microcavity structures. This led to a number of achievements in the last decade, including:

- The engineering of an effective photon-photon interaction, using an optical nonlinearity at the single-photon limit.
- The demonstration of an efficient spin-photon interaction, using the spin of a confined semiconductor hole as a stationary quantum bit.

The current efforts for realizing deterministic quantum gates and fundamental quantum experiments, based on a new generation of spin-based devices, will also be discussed.



*Principle of a spin-photon interface: the polarization of reflected photons is macroscopically rotated clockwise or counter-clockwise, depending on the embedded spin state*



**Loïc Lanco** was hired in 2007 as an Associate Professor at University Paris Diderot, after a PhD in Laboratory « Quantum Materials and Phenomena » (MPQ), and a one year post-doc at the Laboratory for Photonics and Nanostructures (LPN, now C2N). His research activity focuses on light-matter interfacing at the single-photon level, using semiconductor quantum dot / cavity structures. He was nominated at the Institut Universitaire de France in 2019. He headed the Physics BSc in Paris Diderot from 2014 to 2018.

**External visitors should be register beforehand in the following [link](#)**

