

Tuesday December 14th

14h00

Amphithéâtre

Centre de Nanosciences et de Nanotechnologies

10 boulevard Thomas Gobert

91120 Palaiseau

“Quantum hardware for the generation, manipulation and detection of light at the single photon level”

Pr. Val Zwiller

The Royal Institute of Technology, Stockholm – Sweden

We develop single photon sources based on semiconductor quantum dots to generate single photons as well as entangled photon pairs at telecom wavelengths to enable the implementation of long distance quantum communication in optical fibers. Operation at telecom wavelengths also allows us to implement experiments at the single photon level with off-the-shelf components such as modulators. Schemes to manipulate light on-chip, allowing for integration, scalability and higher reliability are also carried out with the aim of operating at telecom frequencies.

Single photon detectors with high detection efficiency, low noise and high time resolution are required to realize quantum communication and quantum sensing experiments. For this purpose, we develop superconducting nanowire single photon detectors, these find a wide range of applications including lidar and quantum microscopy. To allow for complex systems, integrated quantum optics circuits where we combine quantum sources and superconducting detectors are under development.

Finally, we demonstrate single photon transmission over 34 km of deployed optical fibers, paving the way to secure telecommunication links using quantum technologies

