Engineering quantum frequency states of light with AlGaAs chips

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Date and time: **Friday May 7th, at 15:15**

Link: <https://epfl.zoom.us/j/89778378177>

Abstract: Optical quantum technologies have so far largely relied on two-dimensional degrees of freedom of photons (such as polarization), but in order to exploit deeper the advantages of quantum physics the focus is currently shifting towards high-dimensional degrees of freedom (such as frequency). In this talk, I will present our recent results using III-V semiconductor waveguides to produce frequency-entangled photons at room temperature and telecom wavelength. I will show how we can engineer the wavefunction and exchange statistics of the generated photons so as to simulate the behavior of fermions and anyons, i.e. particles displaying a fractional statistics intermediate between bosons and fermions, that play a central role e.g. in the quantum Hall effect. In addition, hybrid frequency-polarization entangled states can be generated with the same source. These results open perspectives for simulating condensed matter problems with tailored photons on a chip-integrated platform.

Florent Baboux is assistant professor at University of Paris in the “Quantum Materials and Phenomena” laboratory. He completed his PhD in 2013 working on spin excitations in semiconductor nanostructures with F. Perez. He then did a postdoc on cavity polaritons and their applications to quantum simulation in the group of J. Bloch. Since 2016 he is working with his MPQ team colleagues S. Ducci and M. Amanti in the field of integrated quantum photonics, focusing in particular on semiconductor sources of entangled photons for quantum information.