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Continuous variable (CV) quantum computation over the optical frequency comb

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In order to implement quantum algorithms that allow practical applications, it is known that we need to provide a platform which avoids decoherence - in order to maintain the quantum properties of the system-, achieves scalability- the property to generate a large amount of entangled systems- and where it is possible to perform precisely controlled interactions - in order to implement quantum gates. It have been great improvements in the taming the decoherence and in the implementation of high fidelity quantum gates for qubits platforms such as trapped ions or superconducting devices -like quantum dots- but currently is not clear how those systems would address the scalablity issue.
In this talk, I will present how the quantum frequency comb in the continuous variable regime generated by the optical parametric oscillator (OPO) is a promising candidate for the implementation of a quantum computer. I will explain the process of generation of large scale entangled states and how they can be useful for measurement based quantum computation. I will also present the progress done in this topic at University of Virginia in the group lead by Prof. Oliver Pfister.