



# COLLOQUE DE PHYSIQUE

Lundi 28 février 2022, 12h30  
École de Physique, Auditoire Stueckelberg

## «Quantum network technology – the second life of rare-earth crystals»

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Starting with the demonstration of lasing more than 50 years ago, the special properties of rare-earth ion doped crystals and glasses have given rise to the development of solid-state lasers and amplifiers, which are crucial for the functioning of today's world-wide Internet. As a fascinating generalization of their use in optical communication infrastructure, it became clear during the past decade that, when cooled to cryogenic temperatures of a few Kelvin, rare-earth crystals also promise the creation of technology for quantum communication networks.

I will discuss recent advances towards the development of key ingredients of such networks: the creation of single photons using individual rare-earth ions coupled to nano-photonic cavities, as well as the reversible storage of quantum states of light in large ensembles of rare-earth ions. This work is not only interesting from a fundamental point of view, but furthermore paves the path towards a quantum repeater, which will ultimately enable quantum communications over arbitrary distances.