

A photon-atom interface at telecom wavelengths

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Enabling communication between quantum devices, such as clocks, computers, and simulators has the potential to significantly enhance the capabilities of their applications, such as quantum sensing and computing. The key to achieving this lies in establishing efficient communication channels among these quantum devices even over a long distance, which involves the exchange of qubits encoded in light at telecom wavelengths through optical fibers. In this context, I will present an overview of the new experiment that we are building in Florence, which focuses on interfacing single photons at telecom wavelengths with individual neutral ytterbium atoms trapped in optical tweezers. By leveraging the unique properties of the ytterbium clock state and its telecom transitions, our objective is to interface a long-lived "matter" qubit and resonant light, including atom-resonant heralded single photons or photons forming entangled pairs. I will discuss the first developments, the motivation for exploring this research line and its impact as a crucial foundation for distributing entanglement between light and matter.

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Session Classification: Invited Speakers