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Nota di contenuto	Introduction -- Quantum memory of orbital angular momentum and its' superposition -- Quantum memory single photon's high-dimensional state -- Two-dimensional orbital angular momentum entanglement storage -- Raman quantum memory of high-dimensional entanglement -- Raman quantum memory polarized entanglement -- Conclusion and Outlook.
Sommario/riassunto	This thesis presents an experimental study of quantum memory based on cold atomic ensembles and discusses photonic entanglement. It mainly focuses on experimental research on storing orbital angular momentum, and introduces readers to methods for storing a single photon carried by an image or an entanglement of spatial modes. The thesis also discusses the storage of photonic entanglement using the Raman scheme as a step toward implementing high-bandwidth

quantum memory. The storage of photonic entanglement is central to achieving long-distance quantum communication based on quantum repeaters and scalable linear optical quantum computation. Addressing this key issue, the findings presented in the thesis are very promising with regard to future high-speed and high-capacity quantum communications.