Multi-spatial-mode memory in warm atomic vapors

Radoslaw Chrapkiewicz

University of Warsaw

The most common source of single photons is based on generation of heralded photons in the spontaneous parametric down-conversion. The drawback of this process is that the time of the arrival of a photon cannot be control and once as a photons appears it has to be used immediately. The alternative process - the collective Raman scattering can overcome this problem by storing the state of a photon in the atomic excitation. Once the photon is stored in the memory it can be released on demand. Here we show that such memory has ability to store information about photons number and their spatial profile. We implemented the memory in warm Rubidium 87 vapour. By proper optimization of decoherence processes we can store and retrieve a few spatial modes for single microseconds whereas the fundamental mode can be retrieved up to a few tens of microseconds.