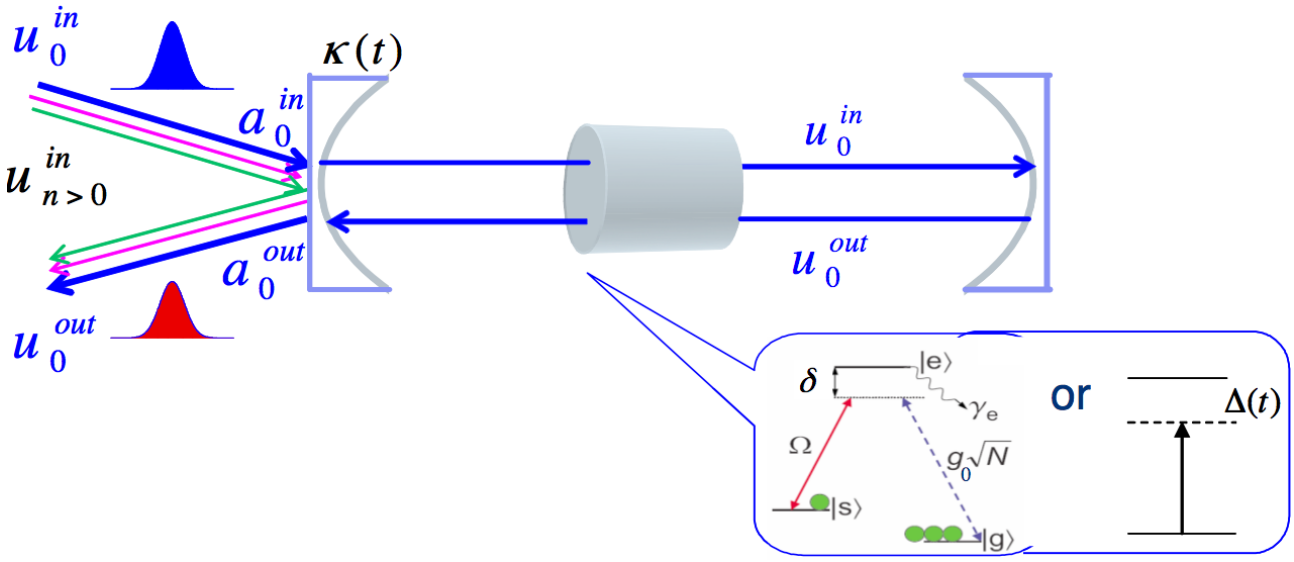
Digital quantum memories: storing Schroedinger's cat

Schroedinger Cat states – which only acquire reality when observed – are the corner-stone of quantum mechanics. SUT researchers Q. He, M. Reid and P. Drummond have published a new proposed architecture for quantum memories, allowing faithful storage of **any** quantum superposition or Schroedinger cat state.

The proposed digital quantum memory, published in the high impact online journal, Optics Express, is a new paradigm in this field. Previous attempts to build quantum memories have used an analog approach, like a tape-recorder. Instead, Qiongyi He and colleagues propose to build quantum memories using a digital approach, like a computer memory.



The research is funded by the ARC Center of Excellence for Quantum-Atom Optics and SUT CAOUS centre. It has both fundamental interest and technological applications. The new concept relies on the integration of a microscopic optical cavity with a long-lived quantum oscillator. The key new approach is a tailored gating pulse.

The proposed architecture is very adaptable to different technologies. These range from ultra-cold atomic gases at micro or nano-Kelvin temperatures through to superconducting circuits and cooled nano-mechanical oscillators, which can approach the quantum domain. This is a joint project with University Pierre et Marie Curie, Paris.

See:

Q. Y. He, M. D. Reid, and P. D. Drummond, *Digital quantum memories with symmetric pulses*

Optics Express, Vol. 17, Issue 12, pp. 9662-9668 (2009).