

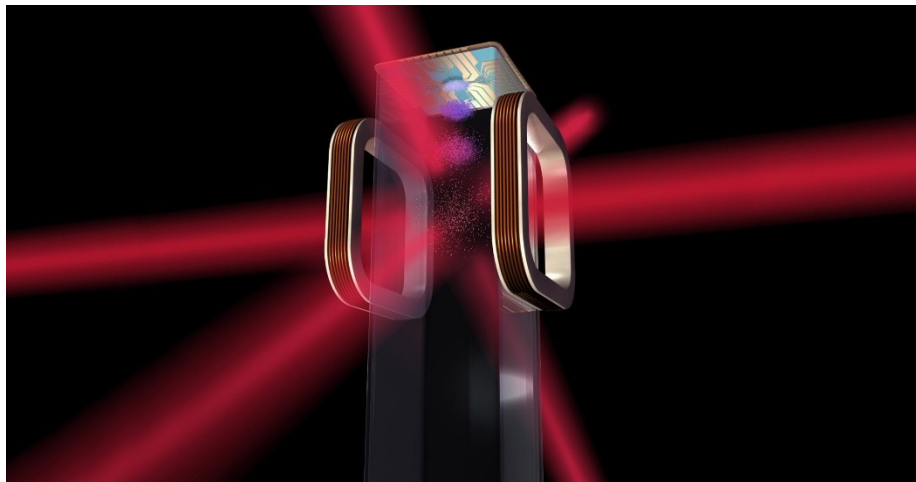
Master / Bachelor Thesis

Joint lab Integrated Quantum Sensors – Dr. M. Gündoğan, Dr. M. Krutzik

Atomic quantum memories for space-based quantum communication applications

Quantum memories (QMs) are devices that store quantum states of incoming light and release them on-demand at a later time. They are highly crucial elements in many applications in quantum information science, such quantum communications and computation.

As part of our recent line of research in the Joint Lab Integrated Quantum Sensors Group, we re exploring different ideas for deploying QMs in space-based scenarios. Our initial calculations reveal that storage time of around a second is required for certain applications. In this context we are building a QM experiment based on cold atomic ensembles. We aim to store input light pulses in the long-lived hyperfine ground states of laser-cooled Rb atoms.



Schematic of a laser-cooled atomic ensemble experiment. The student will work with a similar system in our labs (photo from NASA).

The Master thesis is expected to consist of building a laser system for high resolution resonant spectroscopy and to use the laser system to perform the first light storage experiments. Background in optics, spectroscopy, atomic physics and/or quantum information would be helpful.

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