First Presentation
BS Final Year Project

Optical Properties of Gain Incorporating Photonic Resonators

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Idea of work

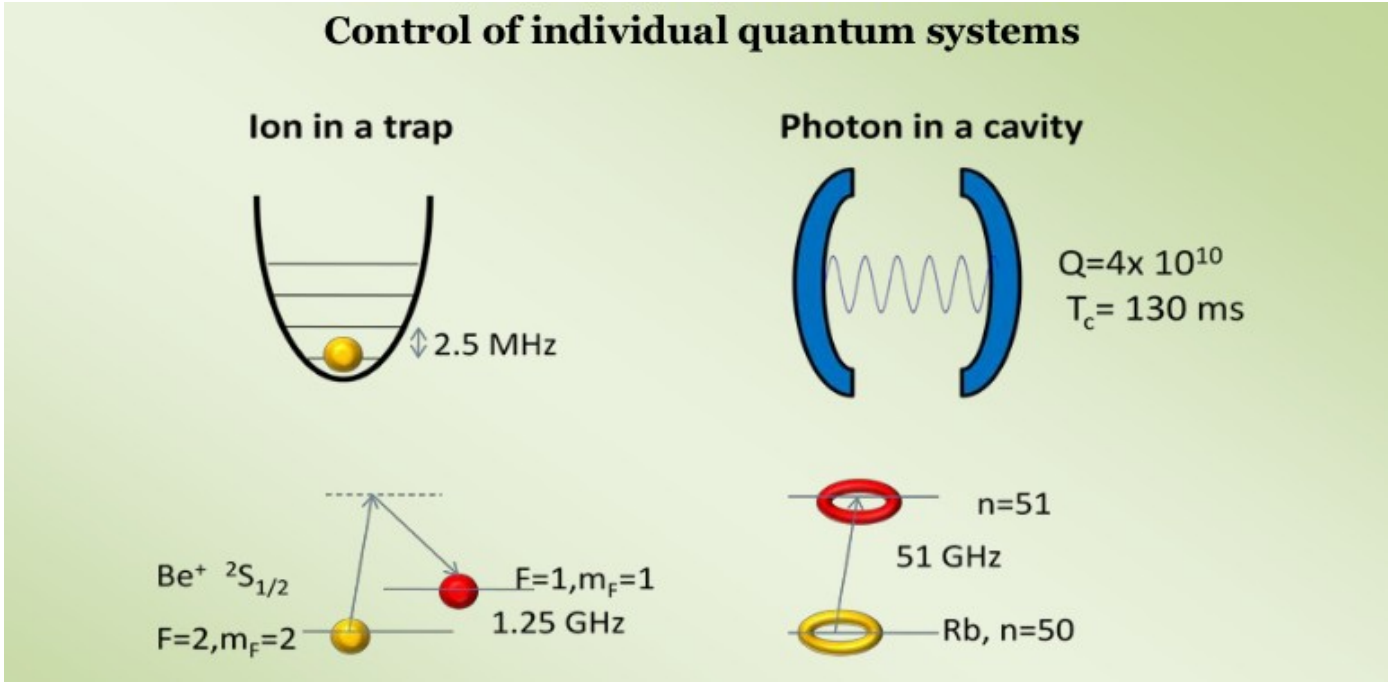
- This theoretical research aims to explore distinctions between optical response of photonic resonators with or without gain based on finding of single gain incorporating resonator

- Furthermore, this study aims to extend this research to multiple interacting resonators

Motivation

- Usually optical resonators are lossy (intrinsic loss, scattering, coupling loss, etc.)
- Resonators with gain may be used to overcome those losses.
- Resonators with gain may have a great number of Application in Photonics and it as a fresh field of study.

Motivation



The Nobel Prize in Physics 2012 was awarded jointly to Serge Haroche and David J. Wineland "for ground-breaking experimental methods that enable measuring and manipulation o=f individual quantum systems."

Plan of work

- Study physics of passive optical resonators and Investigate and comprehend the underlying physics of gain incorporating photonic resonators.
- Examine how the spectra of resonators with gain is modified. (reproduce results)
- Extend these ideas to arrays of coherently interacting resonators and determine the effects of optical coupling.
- Evaluate the feasibility of experimental implementation of these findings.
- Finalize the results of my FYP.

Expected Outcomes

- It is anticipated that resonant optical features of active resonators as well as the underlying physics will be distinct from passive resonators.

- Resonators with gain may enable control over resonator-wave guide coupling regimes and photon storage time in resonators.

Time Frame of Project (semester wise)

Semester 7	Semester 8
Literature review and text book thoroughly to get the grasp on technical background	Research work and reproducing the results using different parameters
Learning different tools for modeling and reproducing the different calculation and data i-e Mathematica, Octave, python	Thesis writing and result compilation
Overall 50 to 60% work complete	Comparing the results and completing the work