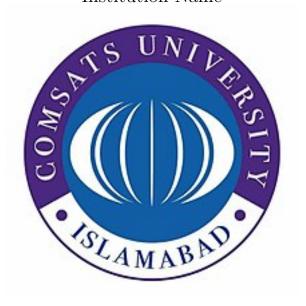
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Abstract

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Dedication

To mum and dad

Declaration

I, AHMAD BILAL CIIT/FA15-BPH-019/ISB, hereby declare that this project neither as a whole nor as a part there of has been copied out from any source. It is further declared that I have developed this thesis and the accompanied report entirely on the basis of my personal efforts made under the sincere guidance of my supervisors. No portion of the work presented in this report has been submitted in support of any other degree of qualification of this or any other University or Institute of learning, if found I shall stand responsible.

Signature of Student:			
Signature of Student.	Ahmad Bilal, Ph.D. CIIT/FA15-BPH-019/ISB		
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Acknowledgements

I want to thank...

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Introduction

1.1 Resonators

Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

1.1.1 Explaination

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision binary floating-point arithmetic and some concepts from numerical analysis. Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

1.2 Optical Resonators

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1.2.1 Different Geometeries

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1.3 Fabry-Perot Resonators

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1.3.1 Explaination

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1.4 Ring Resonators

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision binary floating-point arithmetic and some concepts from numerical analysis.

1.4.1 All-Pass

1.4.2 Add drop

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision binary floating-point arithmetic and some concepts from numerical analysis.

1.4.3 Coupled Ring

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References

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Area of Study

2.1 The Fabry-Perot Interferometer

Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

2.1.1 Theory of Fabry-Perot interferometer

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2.2 Gain incorporation in Resonators

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision

2.2.1 Beer's Law

binary floating-point arithmetic and some concepts from numerical analysis. Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

2.2.2 Beer's law study as gain

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2.3 Gain medium

Coupled Resonators with Gain

3.1 Coupled resontaor with Gain medium

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3.1.1 Gain element

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3.2 Calculation/Equations

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3.2.1 For single

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3.2.2 For coupled

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3.2.3 For triple

3.3 Coupling Regimes

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Electromagnetically Induced Transparecy

4.1 EIT in Atoms

Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

4.1.1 Two level Atoms

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision binary floating-point arithmetic and some concepts from numerical analysis. Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

4.2 EIT in ring resonators

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4.3 EIT in Coupled resonators(CRIT)

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision binary floating-point arithmetic and some concepts from numerical analysis. Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

4.4 CRIT with gain

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4.5 Results

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Electromagnetically Induced Absorbption

5.1 EIA concepts

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5.1.1 EIA in atoms

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5.1.2 EIA Quantum phenomena

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5.2 EIA in resonators

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5.2.1 Coupled resontors induced Absorption

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5.3 CRIA with gain

To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are. This section gives an overview of arbitrary-precision binary floating-point arithmetic and some concepts from numerical analysis. To perform more advanced calculations, it is important to have some understanding of how mpmath works internally and what the possible sources of error are.

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Conclusion

Most of the time, using mpmath is simply a matter of setting the desired precision and entering a formula. For verification purposes, a quite (but not always!) reliable technique is to calculate the same thing a second time at a higher precision and verifying that the results agree.

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Appendix A

Abrevations

EIT Electromagnetically Induced Transparency

EIA Electromagnetically Induced Absorption

CRIT Coupled Resonator Induced Transparency

CRIA Coupled Resonator Induced Absorption

FSR Free Spectral Range

MRR Micro Ring Resonator

MZI Mach Zehnder Interferometer

FWHM Full width at half maximum

CMT Coupled Mode Theory