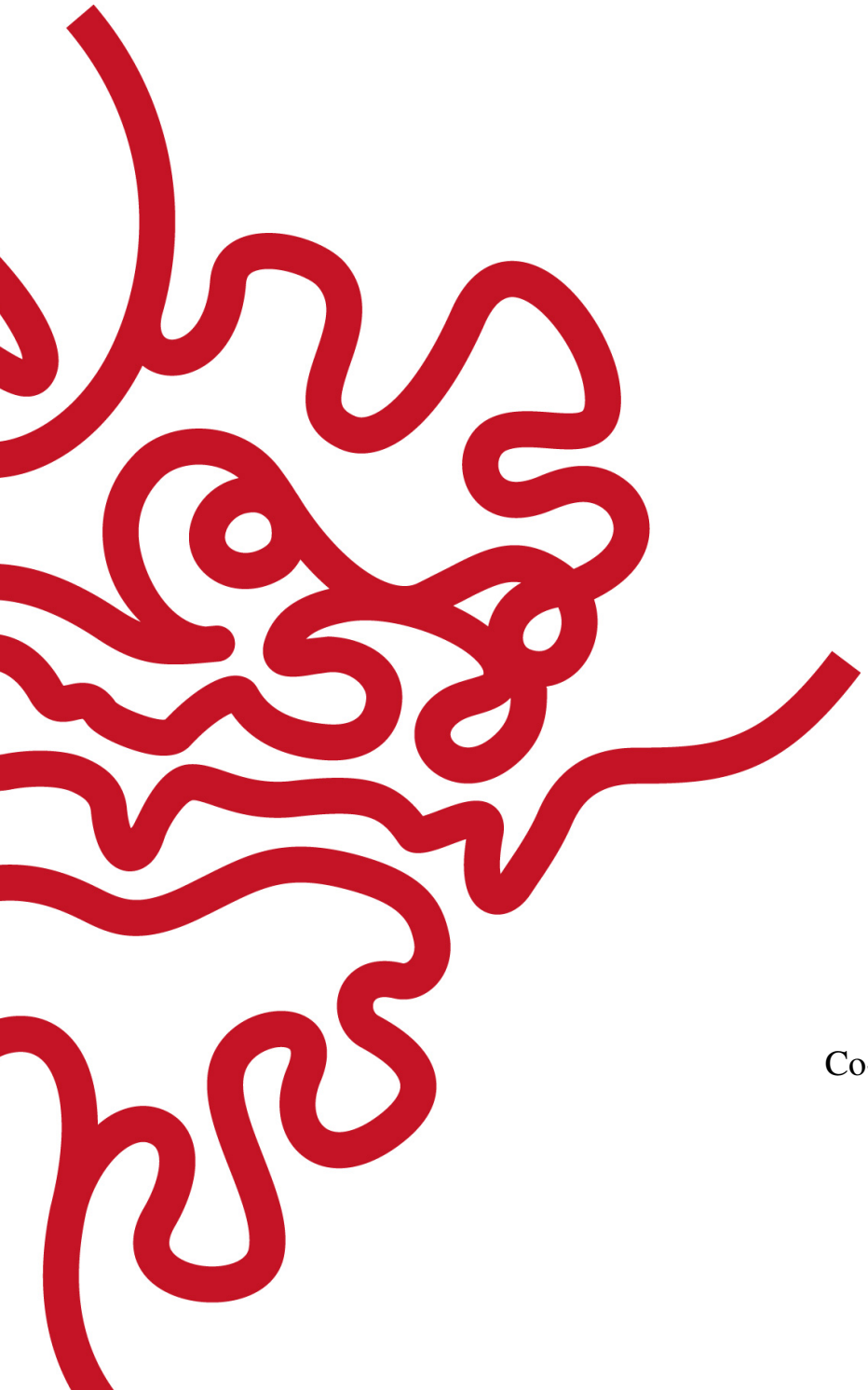
OKINAWA INSTITUTE OF SCIENCE AND TECHNOLOGY
GRADUATE UNIVERSITY

Thesis submitted for the degree

Doctor of Philosophy

LaTeX Thesis Template



by

Jeremie Gillet

Supervisor: **S. Upervisor**
Co-Supervisor: **C. O'Supervisor**

March 2018

Declaration of Original and Sole Authorship

Please insert the Declaration here. The template is made available by the Graduate School in the thesis submission form.

Abstract

The abstract should fit within a page.

Acknowledgments

Please refer to https://www.oist.jp/education/policies-regulations/gs-policies#toc5 for specifications.

List of Abbreviations

Please refer to `https://www.oist.jp/education/policies-regulations/gs-policies#toc5` for specifications.

Here is an example.

PPT	positive partial transpose
SRPT	Schrödinger-Robertson partial transpose

Glossary

Please refer to https://www.oist.jp/education/policies-regulations/gs-policies#toc5 for specifications.

Here is an example:

Dipole Blockade	Phenomenon in which the simultaneous excitation of two atoms is inhibited by their dipolar interaction.
Cavity Induced Transparency	Phenomenon in which a cavity containing two atoms excited with light at a frequency halfway between the atomic frequencies contains the number of photons an empty cavity would contain.

Nomenclature

Please refer to `https://www.oist.jp/education/policies-regulations/gs-policies#toc5` for specifications.

Here is an example:

c	Speed of light ($2.997\ 924\ 58 \times 10^{8}$ ms^{-1})
$\hbar$	Planck constant ($1.054\ 572\ 66 \times 10^{-34}$ Js)
k_B	Boltzmann constant ($1.380\ 658 \times 10^{-23}$ JK^{-1})
Z_0	Impedance of free space ($376.730\ 313\ 461\ \Omega$)
μ_0	Permeability of free-space ($4\pi \times 10^{-7}$ Hm^{-1})

If desired, an optional and short dedication may be included here.

List of Publications

- J. Gillet, T. Bastin, and G. Agarwal. Multipartite entanglement criterion from uncertainty relations. *Physical Review A—Atomic, Molecular, and Optical Physics*, 78(5):052317, 2008. URL https://journals.aps.org/pra/abstract/10.1103/PhysRevA.78.052317

  Please identify your contribution for each publication.

- J. Gillet, G. Agarwal, and T. Bastin. Tunable entanglement, antibunching, and saturation effects in dipole blockade. *Physical Review A—Atomic, Molecular, and Optical Physics*, 81(1):013837, 2010. URL https://journals.aps.org/pra/abstract/10.1103/PhysRevA.81.013837

  Please identify your contribution for each publication.

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Introduction

This is the introduction. You might want to leave it unnumbered, as it is now. If you want to number it, treat it like any other chapter.

Chapter 1

Guidelines on the preparation of theses

Please refer to `https://www.oist.jp/education/policies-regulations/gs-policies#toc5` for specifications.

Many of the formatting requirements such as page size, fonts, etc are built-in into this template. Do not modify them.

For the bibliography, we recommend using BibTeX or BibLaTeX and through the file `Preamble/Thesis_bibliography.bib`. Citing one reference can be done like so: [5] and multiple references in one go like so [1, 4, 6].

Chapter 2

How to use the templates

This is a practical guide into how to use this template, by explaining the role of the different folders, and an option of `\documentclass{oist_thesis}`, which accepts either `temporary` or `final`.

2.1 Folders

The main folder contains three folders detailed here:

- **Images.** This folder should contain all the images that you will use in your thesis. It can contain subfolders, for example one for each chapter. To include an image from the main text, use something like `\includegraphics{subfolder/image.jpg}` without worrying about the `Images` path.
- **MainText.** This folder contains a series of LaTeX files that form the main text: introduction, chapters, conclusion, appendices and published articles. The introduction and conclusion as they are now are not numbered, which creates a few difficulties with the headers of the thesis. Those are solved by including the commands `\unnumberedchapter{}` and `\numberedchapter` before including the files in `Thesis.tex`. If you want the introduction and conclusion to be numbered, include them as regular chapters.
- **Preamble.** This folder contains a series of LaTeX files with the pages that will appear before the main text. Please write (or copy and paste) your own text in those files and delete the dummy text when appropriate. The files are:
  - `abbreviations.tex` — List of abbreviations. If the list goes over one page, create another table.

- `abstract.tex` — Abstract. Follow directions in the file.
- `acknowledgments.tex` — Acknowledgments. Follow directions in the file.
- `declaration.tex` — Declaration of Original and Sole Authorship. Insert the text from the template made available by the Graduate School in the thesis submission form.
- `dedication.tex` — Dedication (optional). Should only be a very few lines.
- `glossary.tex` — Glossary (optional). If the list goes over one page, create another table.
- `nomenclature.tex` — Nomenclature (optional). If the list goes over one page, create another table.
- `physics_bibstyle.bst` — Bibliography style file modified by Jeremie Gillet in 2011 to suit his thesis. Might be suitable for physics. If you want to use another custom bibliography style, include the file in this folder.
- `Thesis_bibliography.bib` — BibTeX file containing your bibliography.
- `Thesis_publications.bib` — BibTeX file containing the list of your own publications (only for thesis by publication).

2.2 `Thesis.tex`

This is the main file, the only one that needs to be compiled to build the thesis. Compile once with LaTeX, once with BibTeX and finally twice with LaTeX to get all the references right. At the top of this file, you can see `\documentclass[temporary]{oist_thesis}`. When you submit a temporary version to the graduate school, do not modify it. When you submit a final version, use `\documentclass[final]{oist_thesis}` instead.

Let's go through each section and comment them briefly. The last section will emphasize the differences between options `\documentclass[temporary]{oist_thesis}` and `\documentclass[final]{oist_thesis}`.

2.2.1 REQUIRED PACKAGES AND CONFIGURATIONS

This section contains the minimum number of packages and definitions to compile the thesis. No line should be removed or modified.

2.2.2 ADD YOUR PACKAGES

Add you packages in this section. In general, try to include as little packages as possible, as some of them can interfere and break each other.

2.2.3 ADD YOUR DEFINITIONS AND COMMANDS

Optionally, add custom definitions in this section. You don't have to keep the examples that come with the template.

2.2.4 PICK YOUR BIBLIOGRAPHY STYLE

Pick the bibliography style the most adapted to your field within the `natbib` package.

2.2.5 TITLE PAGE

Creates the title page. Do not modify.

2.2.6 PREAMBLE PAGES

Structures the style (header) for the preamble pages and builds them. Do not modify, except for deleting the optional preambles you might not want to include.

2.2.7 LIST OF CONTENTS/FIGURES/TABLES

Creates the different lists. Do not modify.

2.2.8 THESIS MAIN TEXT

Structures the style for the main text chapters and builds them.

The command `\numberedchapter` is only relevant for a transition between unnumbered sections and numbered sections, it does not need to be included between each chapter.

2.2.9 OVERFULL LINES

LaTeX should warn you at compile time of overfull lines, with messages along the lines of `Overfull \hbox (14.45969pt too wide) in paragraph at lines 5--151`. You should always address those warnings and fix the issues, usually by adding a `\-` inside a word to indicate that it can be split at that point. To make the issue more obvious, the template will add a thick black line wherever this happens, you might see several in this document.

In general, the final document should compile without any warnings or errors.

2.2.10 BIBLIOGRAPHY

Includes the bibliography.

2.2.11 APPENDICES

Structures the style for the appendices and builds them. The appendices are numbered with letters but are structured like regular chapters.

2.2.12 Differences between temporary version and final version

There is only one difference between `\documentclass[temporary]{oist_thesis}` and `\documentclass[final]{oist_thesis}`: the line spacing is different. This might create small issues, such as page breaking with large tables, images or captions, when compiling the same content.

Chapter 3

Figures, tables and images

3.1 Figures

Refer to figure like this: Figure 3.1 or this (Fig. 3.1). If you want to include a list of figure, you can use a short version of the caption as shown in Figure 3.1.

3.2 Tables

Refer to tables this this: Table 3.1.



Figure 3.1: Short caption (if wanted). Full caption with all the details here.



This secret image won't be numbered and won't appear in the List of Figures because of the *

Table 3.1: Short heading for the List of Tables.

Full caption with all the details here.

Parameter	Value
Δ	0, 150
α	85
ϵ	6
κ	6.8
γ	0.2

This secret table won't be numbered and won't appear in the List of Figures because of the *

Parameter	Value
Δ	0, 1500
α	850
ϵ	60
κ	68
γ	2

Conclusion

This is the conclusion. You might want to leave it unnumbered, as it is now. If you want to number it, treat it like any other chapter.

Reference List

[1] S. Filipp, P. Maurer, P. J. Leek, M. Baur, R. Bianchetti, J. M. Fink, M. Göppl, L. Steffen, J. M. Gambetta, A. Blais, and A. Wallraff. Two-qubit state tomography using a joint dispersive readout. *Phys. Rev. Lett.*, 102:200402, May 2009. doi: 10.1103/PhysRevLett.102.200402. URL http://link.aps.org/doi/10.1103/PhysRevLett.102.200402.

[2] J. Gillet, T. Bastin, and G. Agarwal. Multipartite entanglement criterion from uncertainty relations. *Physical Review A—Atomic, Molecular, and Optical Physics*, 78(5): 052317, 2008. URL https://journals.aps.org/pra/abstract/10.1103/PhysRevA.78.052317.

[3] J. Gillet, G. Agarwal, and T. Bastin. Tunable entanglement, antibunching, and saturation effects in dipole blockade. *Physical Review A—Atomic, Molecular, and Optical Physics*, 81(1):013837, 2010. URL https://journals.aps.org/pra/abstract/10.1103/PhysRevA.81.013837.

[4] H. Kramers. Scattering of light by atoms. *Atti Cong. Intern. Fisica Como*, 2:545–557, 1927.

[5] H. Lee and M. Scully. The physics of eit and lwi in v-type configurations. *Found. Phys.*, 28:585–600, 1998. ISSN 0015-9018. URL http://dx.doi.org/10.1023/A:1018709621908. 10.1023/A:1018709621908.

[6] M. Mücke, E. Figueroa, J. Bochmann, C. Hahn, K. Murr, S. Ritter, C. J. Villas-Boas, and G. Rempe. Electromagnetically induced transparency with single atoms in a cavity. *Nature*, 465(7299):755–758, 06 2010. URL http://dx.doi.org/10.1038/nature09093.

Appendix A

Appendices

Please refer to https://www.oist.jp/education/policies-regulations/gs-policies#toc5 for specifications.