DISSERTATION

Awesome Science

ausgeführt am Atominstitut

der Technische Universität Wien
Fakultät für Physik

unter der Anleitung von
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durch

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Matrikelnummer: 9-18-27-15-21-36

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Wien, am 10.02.2020

"The Setesh guard's nose drips."
Teal'c

Abstract

Short and sweet...

Zusammenfassung

Kurz und bündig...

Contents

1. Chapter 1

List of class options:

********** General settings **********

1. ‘a4paper’ or ‘a5paper’
2. ‘11pt’, ‘12pt’(default) or ’10pt’ however font size 10pt is NOT recommended
3. ‘print’: Use ‘print’ for print version with appropriate margins and page layout. Leaving the options field blank will activate Online version.
4. ‘signed’: Use ‘signed’ to add section on titlepage to be signed by the superviser. Works only with the print option!
5. ‘declaration‘: adds a page with an declaration after the titlepage, to be signed by the author Works only with the print option!
6. ‘final‘: option some packages might need for the finalized document
7. ‘place‘: insert place and date on the title page
8. ‘index’: For index at the end of the thesis
9. ‘abstract’: To generate only the title page and abstract page with dissertation title and name for submission somewhere
10. ‘chapter‘: This option enables only the specified chapter and its references Useful for review and corrections.
11. ‘titlepage2‘: This option loads the alternative titlepage titlepage_alternative instead of titlepage_official. This intended to have two designs available and quickly switch between them.

********** Draftmode settings **********

12. ‘draftclassic’: For draft mode without loading any images (same as draft in scrbook) and notes
13. ‘draft’: Special draft mode with line numbers, images, and water mark with timestamp and custom text. Position of the text can also be modified.
14. ‘nolinenumbers‘: disable line numbers in draft mode !!!When toggled auxiliary

files must be deleted.

15. ‘todonotesoff‘: manualy disable todonotes (has to be loaded after draft options) Add notes with follwing commands in the draft mode:

```
\mynote{text} -> green note on the side pointing to the location
\sidenote{text} -> blue note on the side
\needref{text} -> blue note on the side pointing to the location
\urgentnote{text} -> red note on the side pointing to the location
\inlinenote{text} -> orange inline note
\missingfigure[figwidth=length]{text} -> dummy picture
```

    In the index section a list of todonotes is printed. !!!You must not use underscore in the missingfigure argument. !!!Line numbers and todo notes are not really compatible.

16. ’bibdebug’: debug mode for BibLaTeX

    ********** Custom Page Margins **********

17. ‘custommargin‘: Use ‘custommargin’ in options to activate custom page margins, which can be defined in the preamble.tex. Custom margin will override print/online margin setup.

    ********** Choosing the Fonts in Class Options **********

18. ‘times’ : Times font with math support
19. ‘fourier’: Utopia Font with Fourier Math font (Font has to be installed) It’s a free font.
20. ‘customfont’: Use ‘customfont’ option in the document class and load the package in the preamble.tex

    default or leave empty: ‘Latin Modern’ font will be loaded.

    ********** Bibliography settings **********

21. ‘biblatex‘: use the package BibLaTex instead of natbib packages
22. ‘bibsections‘: list references by parts/chapters/sections (settings in header)
23. ‘bibtex‘: use BibTeX as backend for BibLaTeX to sort references from .bib file (by default Biber is used)
24. ‘bibtex8‘: use BibTeX8 (UTF-8 support) as backend for BibLaTeX to sort references from .bib file (by default Biber is used)

    ********** Choosing the Bibliography style **********

25. ‘authoryear’: For author-year citation eg., Krishna (2013)
26. ‘numbered’: (Default Option) For numbered and sorted citation e.g., [1,5,2]
27. ‘custombib’: Define your own bibliography style in the ‘preamble.tex’ file.

    `\RequirePackage}[square, sort, numbers, authoryear]{natbib}`

    . This can be also used to load biblatex instead of natbib

The equation from [1, 2] and [3]

$$\langle n \rangle_{\mathrm{BE}} = \frac{1}{\mathrm{e}^{\beta(\epsilon-\mu)} - 1}, \tag{1.1}$$

was inserted with by using the short-cut cmd + n, which gives a labelled "eqn" environment.

2. Chapter 2

Here some Pgf exemplary plots.

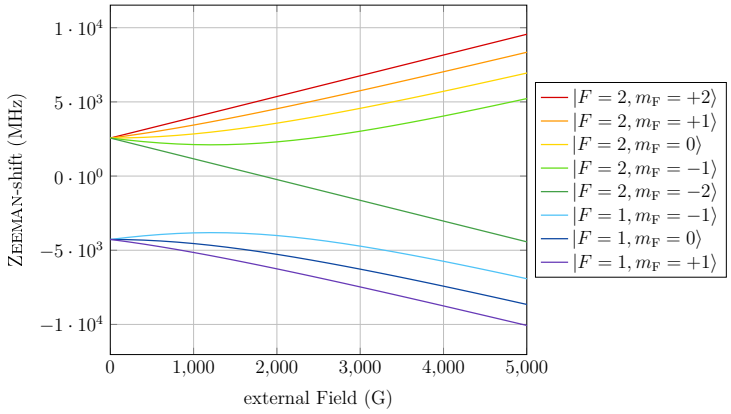

Figure 2.1.: ZEEMAN splitting of the ^{87}Rb ground state $5^2S_{1/2}$.

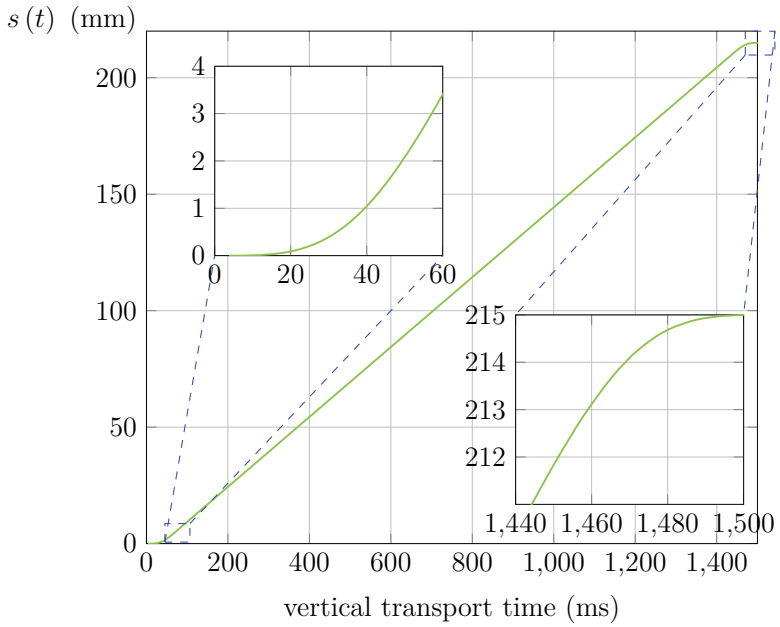

Figure 2.2.: pgf plot with zoom

3. Chapter 3

This chapter contains a few Tikz sketches and diagrams as a inspiration and guide line to create your own Tikz figures.

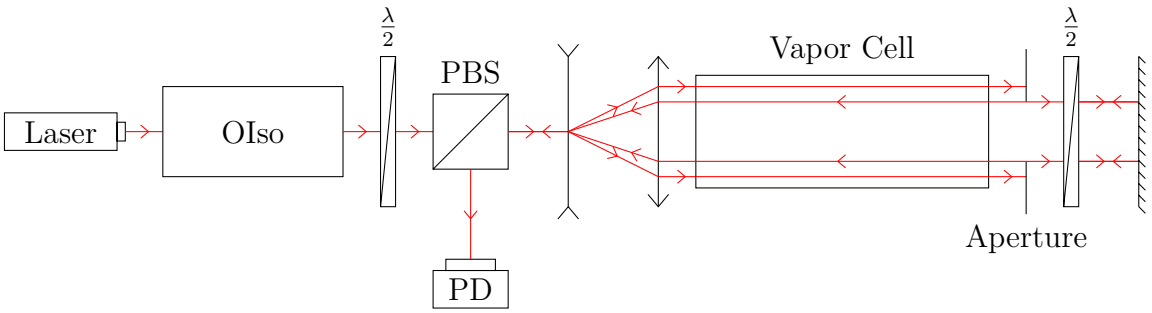

Figure 3.1.: optical setup for a DOPPLER free spectroscopy

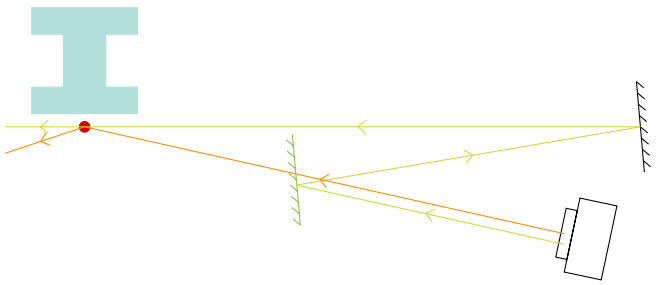

Figure 3.2.: optics sketch 1

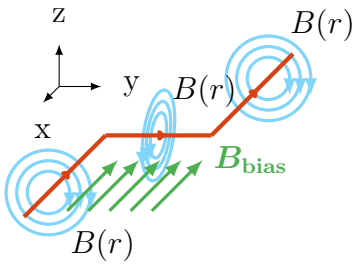

Figure 3.3.: Trapping atoms with wires.

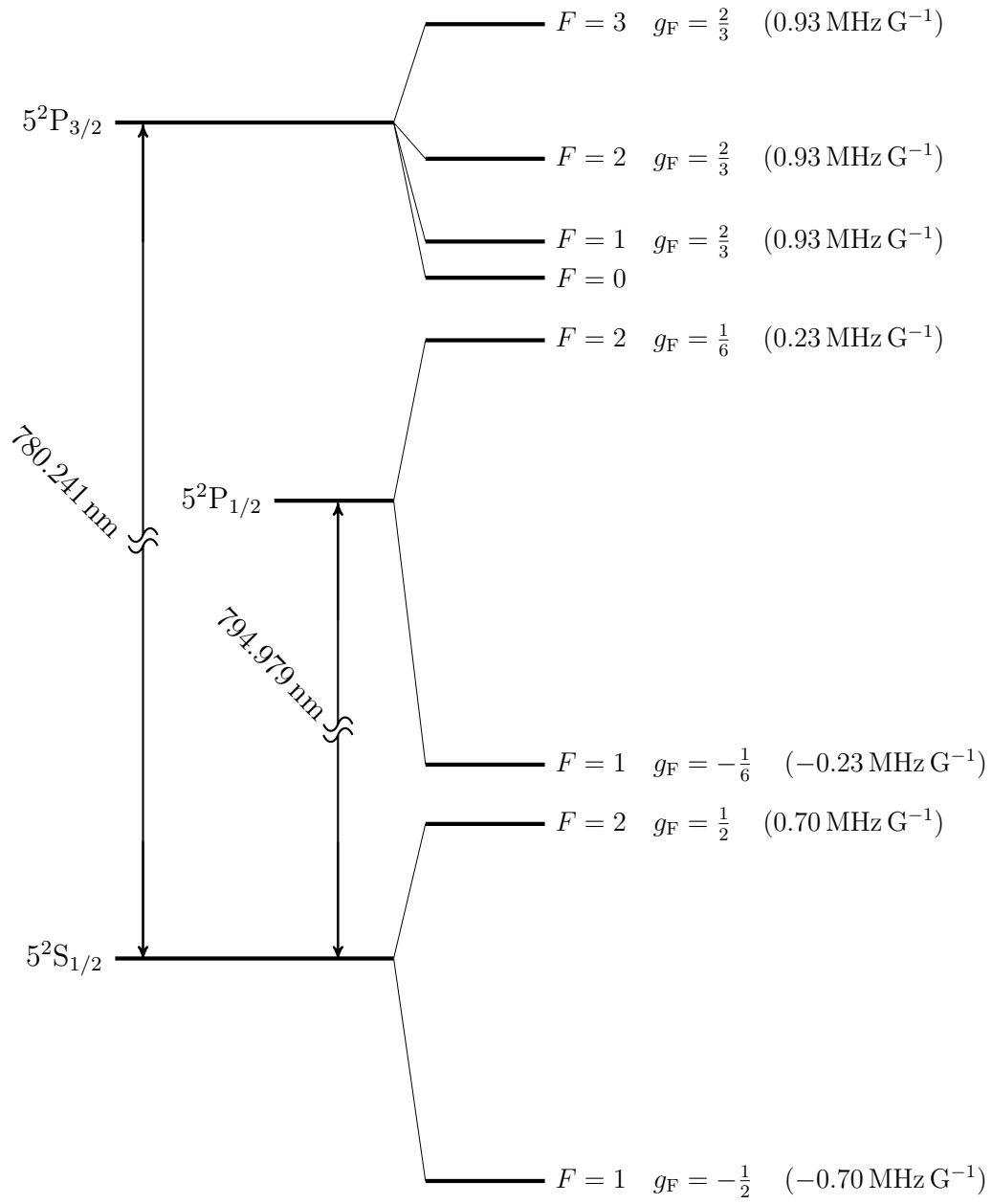

Figure 3.4.: ^{87}Rb hyperfine structure of the D1 and D2 line

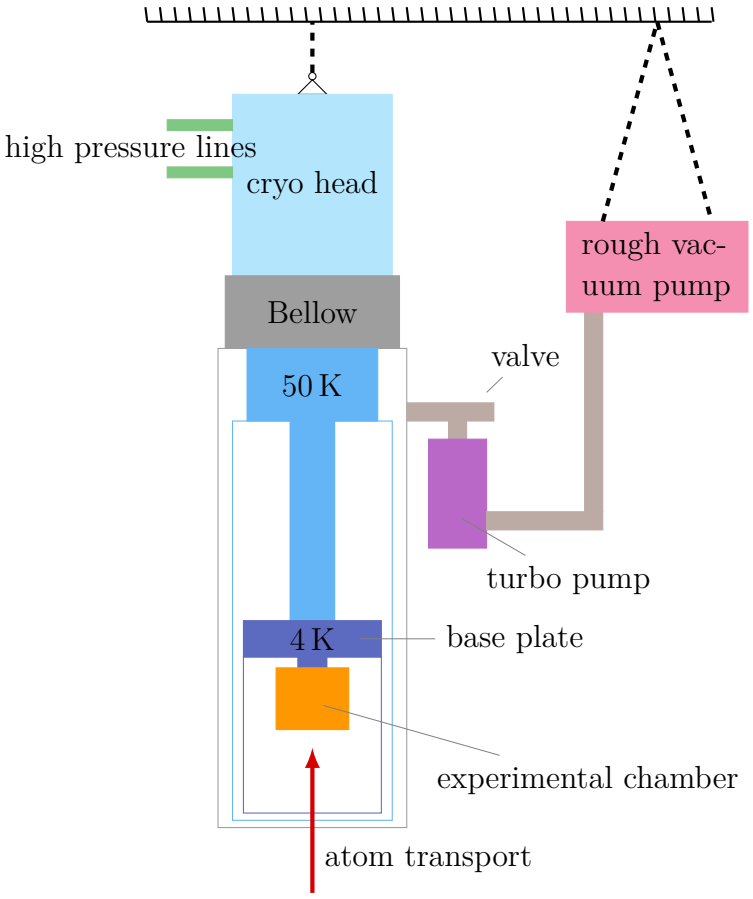

Figure 3.5.: Overview sketch of the cryogenic setup

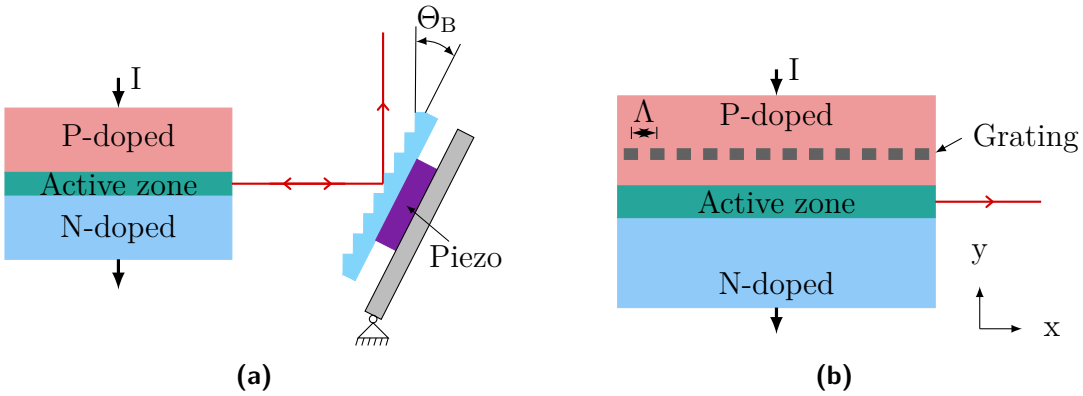

Figure 3.6.: semiconductor laser types: (a) ECDL; (b) DFB.

Appendix

A. Appendix A

A.1. Source Code

Here is some source code added with the lstlisting package. With

```
$£\vdots£$
```

you can insert vertical dots to truncate code.

```
/*+++++++++++++++++++++++++++++++++++++++
+                 Awesome source code                 +
+                    TU Wien 2018                     +
+                   Thomas Weigner                    +
+              weigner.thomas@gmail.com               +
+                       main.cpp                       +
+                       vers  3.4.1                    +
+++++++++++++++++++++++++++++++++++++++*/

#include <header.h>
//---main program
int  main(){
//---declare stuff and initialize  things
⋮
//------generating polynom for vertical transport
Poly polArray[5];            //Creating a polynom object array with the default constructor
double vMax = 2.0;           //maximal velocity
⋮
```

A.2. Matlab2Tikz

Matlab to Tikz a is a very power full script to translate a Matlab figure into Tikz and Pgf code. After creating a file containing the code with this Matlab script one can do

fine adjustments directly in the code. If you are not already using it you should go and check it out.

List of Figures

List of Tables

Acknowledgements

Thanks to ...

References

[1] Albert Einstein. “Quantentheorie des einatomigen idealen Gases (zweite Abhandlung)”. In: *Sitzungsberichte der Preussischen Akademie der Wissenschaften* 1 (1924), pp. 261–267.

[2] Albert Einstein. “Quantentheorie des einatomigen idealen Gases (erste Abhandlung)”. In: *Sitzungsberichte der Preussischen Akademie der Wissenschaften* 2 (1925), pp. 245–257.

[3] Louis V. de Broglie. “The wave nature of the electron”. In: *Nobel lectures, Physics 1922-1941* (1929), pp. 244–256.