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# I Introduction

Already when I started writing my bachelor thesis [1], I tweaked a lot the original L<sup>A</sup>T<sub>E</sub>X template (which itself was slightly updated since then [2]) provided for students at MFF CUNI — Faculty of Mathematics and Physics, Charles University in Prague.

Some design choices originated already during this stage, particularly the significant use of theorem-like and remark-like environments with highly interlinked structure of the text.

I picked up right where I left off when I started writing my master thesis [•], and I have been refining the template ever since. Improved understanding of the coding backbone behind L<sup>A</sup>T<sub>E</sub>X and its package ecosystem enabled me to customize it even further to my liking, and add even more “bells and whistles”.

**Remark 1 (Template Purpose).** While primarily targeting theses, T<sub>E</sub>Xtured can be used for other document types as well. ┘

To make it user-friendly, I have restructured the preamble into several files, each of which is responsible for a specific aspect of the document. This way, the user can (and is encouraged to) easily find the relevant part of the code and modify it.

Numerous comments and explanations are provided throughout the code to further aid the user in understanding the template without always having to consult the documentation of packages (which is recommended for more advanced changes).

**Remark 2 (How to Setup).** To setup T<sub>E</sub>Xtured template for your document, you can clone the repository on GitHub [4]. Then, you can start modifying the files to suit your needs.

**Note.** In reality, it is slightly more involved, see [jdujava/TeXtured #5](#).

Also make sure to check the README.md file for more detailed instructions, particularly on various software dependencies. **TODO: Good to quickly describe main points also here.** ┘

**Remark 3 (MFF CUNI Template Compatibility).** T<sub>E</sub>Xtured can be used out of the box for theses at the Faculty of Mathematics and Physics, Charles University in Prague. Just be sure to include all *front matter pages* and fill out necessary data:

- Title Page with the faculty logo (among other things),
- Declaration,
- Dedication (optional),
- Information Page including the abstract.

Layout of these front matter pages is adapted and modified from the original MFF CUNI template [2]. However, always make sure it is compliant with the faculty guidelines, otherwise please raise an issue on GitHub [4]. ┘

# Quick Summary

In [Chapter N](#) we exhibit an example of a *front matter* chapter.

In [Chapter 1](#) we present design *Principles* to which `TeX`tured adheres.

In [Chapter 2](#) we describe various implemented *features*, design choices, and `LaTeX` packages helping with the task of realizing goals sketched in [Chapter 1](#).

In [Chapter 3](#) we give tips and tricks on how to fully utilize and even extend capabilities of `TeX`tured.

In [Appendix A](#) we show an example of an Appendix chapter.

**Note** (WIP Disclaimer). Both [Chapter 2<sup>→p.2</sup>](#) and [Chapter 3<sup>→p.8</sup>](#) are as of now Work-in-Progress. There is a lot of stuff yet to be exhibited and explained. All the colored TODO-like environments are to be resolved in the final version of this document.

# Notation & Conventions

**Example N.1** (Usage of Mathematical Fonts). To make the text more readable and beautiful, we can use different types of mathematical fonts for different types of objects (striving to be at least somewhat consistent):

- **Bold** often for tensorial object (abstract index).
- **Serif** for groups, certain spaces, or some operations/maps.
- **Fraktur** for algebras (and densities).
- *Calligraphic* (available are only capital letters, and  $\ell$ , also different  $g$ ).
- **Double-Struck** for fields like  $\mathbb{R}$ , spaces like  $S^n$  and  $\mathbb{C}P^n$ .
- **Typewriter** for code functions, or other special objects. ┘

**Remark N.2.** This chapter is numbered (or perhaps more precisely “lettered”). This means that it appears in Table of Contents with its letter **N**, which also prefixes all numbering of environments in this chapter.

On the other hand, Introduction  $\rightarrow$  p.iii and Quick Summary  $\rightarrow$  p.iv are unnumbered (or “unlettered”) in this sense. ┘

# 1 Design Principles

It is not like I stated the *Principles* at the beginning and then tried to follow them. They emerged more naturally. So the causal structure is more like

made some design choices and implemented certain features  $\rightsquigarrow$  recognized at first subconscious overarching principles.

Anyway, here they are.

**Definition 1.1** (Design Principles). The main design *Principles* are:

- **Elegance** — Aim for a classy, typographically elegant layout.
- **Structure** — Create a smart, easy-to-reference, and skimmable structure.
- **Clarity** — Eliminate distractions and strive for clear explanations.

**Remark 1.2** (Common Goal, Alternative Definition via Antiprinciples). There is also an alternative point of view. The common goal of Design Principles is to minimize the following *Antiprinciples*:

- We should be concise, and that means fewer pages, the better. Long blocks of text without noticeable space between paragraphs are preferred (the reader should go on a walk to have some breathing spacetime).
- Avoid creating distinct anchor points for important concepts, since an attentive reader should be able to extract them from blocks of text.
- Do not waste time referencing earlier discussions and reflecting on them from the current context and point of view, as the reader is anyway making such connections all the time. ┘

Each of these principles is somehow reflected in the design choices and features included (or omitted) in TeXtured, see Chapter 2<sup>→p.2</sup> for more details.

**Remark 1.3** (Disclaimer). The following is at places highly opinionated, and not applicable to all scenarios and use-cases. I tried to describe my reasons for specific design choices, with which you can certainly disagree. I hope that at least it can provoke more people (*especially you!*) to contemplate about document creation, ideally resulting in production of documents with overall better quality. ┘

# 2 Features of **TEXtured**

**Note** (WIP Disclaimer). This chapter is Work-in-Progress.

**Todo.** When referencing to a package, link to its documentation/CTAN page.

First two sections are about typography of the document, next are more about its contents and structure.

## 2.1 Page Layout and Style

### Page Dimensions, Printing Layout

`geometry` package — set up the page layout (supported single/double-sided printing). Apply `\flushbottom` — try to make text body on all pages have the same height.

### Headers, Footers

`fancyhdr` package — headers and footers — consistent style also for initial page of a chapter (not totally different style with numbering in the bottom center ...).

### Heading Style

Pretty chapter heading style — big calligraphic number/letter behind the title.

## 2.2 Sane Typographical Defaults

Now we will concern ourselves with more intricate and detailed typography (more at level of sentences, words, and even letters).

### Paragraphs, Captions

No paragraph indentation, proper space between paragraphs — `parskip`. Caption styling — `hang`, `\footnotesize` font, bold serif label (like other environments).

### Font and Related Stuff

Nothing special here. The default choice are Latin Modern fonts — classic really. Quotation — `csquotes`.

### Micro-Typography

Enable micro-typographic extensions with package `microtype`, most prominently character protrusion and font expansion.

Following quote from `microtype` documentation nicely explains what it is about:

Micro-typography is the art of enhancing the appearance and readability of a document while exhibiting a minimum degree of visual obtrusion. It is concerned with what happens between or at the margins of characters, words or lines. Whereas the macro-typographical aspects of a document (i.e., its layout) are clearly visible even to the untrained eye, micro-typographical refinements should ideally not even be recognizable. That is, you may think that a document looks beautiful, but you might not be able to tell exactly why: good micro-typographic practice tries to reduce all potential irritations that might disturb a reader.

## 2.3 Document Structure

Implemented mostly via `tcolorbox` package (and `thmtools`).

### Theorem/Remark-like Environments

- clear structure, enables high level of interlinking
- include title if possible — rough idea after first look, quicker navigation/finding
- non-intrusive indicators for the end of non-boxed environments
- shared numbering, together with tables, figures, equations, ... — linear increase of reference number, easier to find
- easy to skim through, get quickly an idea, and know what to expect
- not only for physics/math texts, can be used to highlight key ideas
- no emphasis for the whole body of definitions ... we have box for that ...

**Remark 2.1.** There are also helper environments for TODO-like notes. By default, there are `Todo`, `Note`, `Suggestion`, and `Question` environments, but you can easily create your own. ┘

**Note.** No “code listing” setup yet. PRs welcome.

### References, Links

Custom reference/link/citation styles.

- I like distinguished references/links/citations
- always use `\Cref` from `cleveref` package
- frames are useful, but not that pretty (they can obscure punctuation ...), and the PDF viewer must support them
- just color is sometimes alright, but less ideal when printing



- sometimes good to have an idea where they point (mainly when printed, no ability to click) — include page number
- there is slight inconvenience due to small flexibility around line breaks (would be nice to have proper workaround, like link breaking or something like that)

## Table of Contents, Index

Clear Table of Contents.

- subsections included (in a compact style), but not numbered...
- don't frame references in the Contents, just keep it clean and simple
- include everything important

Proper Index (ToC in PDF viewer).

- very handy for navigating longer documents
- include also other important pages other than just initial pages of main chapters: Contents, Introduction, References, ...
- I use Zathura as my PDF viewer, where Index is just one Tab away ...

## 2.4 Bibliography/References

Clear Bibliography/References, via `biblatex` package.

### Bibliography Style

Entries in **TODO: somehow reference References:**

- have clean consistent style based on `ext-numeric-verb`
- support (new) `github` field
- have DOI/arXiv/URL/GitHub links on the new line
- include “backlinks”

**Remark 2.2** (Bibliography Data). Make sure to gather all the relevant data you need for every reference. If you later decide you want to reduce the amount of presented information, `biblatex` can help you with that. For example, it is possible to automatically

- remove `url` field if `doi` field is present,
- ignore unwanted fields (`pages`, `number`, `volume`, `series`, `location`, ...). ┘

### Citation Style

Include `[` and `]` characters around citation number inside the link (and wrap in `tcolorbox` ...), for example [\[4\]](#).

## 2.5 PDF/A Compliance

Proper metadata setup (via `hyperref` and `\DocumentMetadata`).

**Remark 2.3** (Document Data). Various data about the work should be entered in `preamble/data.tex` file. When the relevant entries contain L<sup>A</sup>T<sub>E</sub>X commands (for example to obtain specific formatting of the title), it is necessary to provide “plaintext” variations, so that `hyperref` can properly setup PDF metadata. ┘

Next we will describe various common violations of PDF/A standard, and how to fix them.

### Glyph to Unicode Map

**Todo.** Link to guide on how to find the name of a glyph, and how to provide *glyph to Unicode* mapping.

### PDF /Interpolation Key

Some PDFs can have enabled the `/Interpolation` key, for example Inkscape generated PDFs with blur parts. However, PDF/A requires it to be disabled.

## 2.6 Code Organization

- broke the code into multiple files by its function
- use `aux_dir` to minimize clutter
- no big, hard to navigate, preamble files
- try to follow “one sentence per line” rule — improves diffs for versioning systems like `git` — tools like `latexindent` can help

**Note.** My config for `latexindent` mostly works, but some corner cases can surface. Will share someday.

**Remark 2.4** (Custom User Macros). Enter your own macros in the `preamble/user/` directory, which is reserved precisely for this purpose. Then, if you would like to update to a newer version of T<sub>E</sub>Xtured, you will be having easier time — less mixing of your code with the template code will result in fewer conflicts you must resolve manually. ┘

### Math Macros

- frequently define macros for notation used more than once — easier switch to different `...`, since now we have syntactically differentiated, otherwise there could be conflicts between different brackets and so on — better automation of fine-tuning (spacing, different versions `...`)

- `\ensuremath` for easier use outside math mode
- better extendable arrows with `tikz`

## Inkscape Integration

- automatic export after changing the `svg` (need to enable `--shell-escape` for pdfT<sub>E</sub>X or LuaT<sub>E</sub>X, done via `.latexmkrc`)
- watermark via `ps` injection

**Remark 2.5** (Watermark String). Edit the watermark text in the shell script `figures/Inkscape/inkscape-export-to-latex` to your liking. ┘

**Todo.** Make it easier to change the watermark text. Or extract it somehow automatically from the PDF document?

- automatic fix of `/Interpolation` key problem

## 2.7 GitHub Actions

Describe implemented Github Actions:

- Automatic `latexmk` build of the latest PDF version.
- PDF/A verification via `veraPDF`.
- Deploy to `gh-pages` branch. One can furthermore enable (in repo settings) GitHub Pages for `gh-pages` branch, which will automatically upload latest PDF to `https://username.github.io/reponame/thesis.pdf`. This enables convenient sharing of your (even continuously evolving) work without needing to commit the PDF (resulting in large repository size) or compiling the PDF on the receiving side.

**Remark 2.6** (Private Repositories). Even for private repositories such link is publicly accessible. This is why GitHub Pages setup is not done automatically for you. If you want to share the work more “privately”, there are other solutions, for example GitHub Action which uploads PDF to Google Drive, and sharing via a private link. ┘

## 2.8 Non-Features

These features were deemed unnecessary, or even counterproductive, and thus were not implemented/not customized. This does not mean that it is hard or not compatible to use them with T<sub>E</sub>Xtured.

### Footnotes

- they break the flow of reading, can be distracting

- either it is important and you want it there — no need to use footnotes, or it is not so important (maybe just a reminder/remark), but then there are in my opinion better ways to handle such situation
  - grayed out/smaller text, sidenotes are better alternative, if the page layout enables them
  - it is not bad to remind reader of something in the main text...

### **List of Figures, List of ...**

Don't really see the point, but one is free to include it.

### **Index, Glossary**

- since the text is primarily intended for electronic use, finding usage of certain terms is easy
- text should be ideally structured in such a way, that finding definitions of important terms is straightforward — interlinking/referencing in proper places to indicate where the notion to be used was defined/discussed

# 3 Tips & Tricks

**Note** (WIP Disclaimer). This chapter is Work-in-Progress.

In this chapter we will see how to utilize and extend capabilities of  $\text{T}\text{E}\text{X}$ tured. Also, there will be sprinkled miscellaneous tips on how to improve the quality of your document.

**Suggestion** (TODO). It would be nice to differentiate between built-in  $\text{L}\text{A}\text{T}\text{E}\text{X}$  commands and commands defined by  $\text{T}\text{E}\text{X}$ tured.

## 3.1 Structure

- numbered and “lettered” chapters

**Todo.** Describe `\chapternotnumbered`, and “lettered” chapters in front matter.

- Use nicely named subsections — easier to navigate (also better ToC and Index)

**Todo.** Describe `\texorpdfstring`. If you want, you can even use UTF-8 math characters (superscripts/subscripts, emulate math fonts).

- Utilize remark/definition environments to make the document more structured and easier to read. Important concepts will stick out more and will be remembered better.

**Todo.** Describe creating of new environments, `\qedhere`, ...

- Try to motivate every definition/theorem with “normal” text, do not let the document degenerate just into a listing of definitions/theorems/proofs/...
- Use references to other remarks/definitions/sections to make the document more interconnected, which can help the reader to look at a bigger picture, recollect necessary information to proceed further, or to understand the context better.

**Todo.** Describe `\Cref`, `\Nref`.

**Todo.** Show using `\autocite{TODO}` in the text `[•]`. Helps to not forget to add the citation later.

## 3.2 Typography

- use `~` to enter non-breakable space, or also after dot in initials/after titles (otherwise one gets bigger space than is proper), for example `M.Sc.~Name Surname`

- proper usage of hyphens/dashes — learn when to use hyphen - (-), when en-dash – (--), and when em-dash — (---)
- use *emphasis* for the names of new and important concepts
- for quotation marks use `\enquote` from `csquotes` package
- sometimes using gray text instead of parentheses may result in a cleaner look, for example instead of “(pseudo-)Riemannian” just gray out “pseudo-” like “pseudo-Riemannian”
- choose capitalization style of titles, and stick with it — I choose “titlecase”

### 3.3 Mathematics

Learn stuff in `amsmath` and `mathtools` packages. Then it is possible to write stuff like this:

$$\iota: (\mathbb{S}^1, \mathbb{R}_{\geq 0}, \mathbb{S}^{d-1}) \longrightarrow \text{AdS}/\mathbb{Z} \quad \begin{cases} \mathbf{x}^{-1} = \sqrt{\ell^2 + r^2} \cos(t/\ell), \\ \mathbf{x}^0 = \sqrt{\ell^2 + r^2} \sin(t/\ell), \\ \mathbf{x}^i = r\bar{\mathbf{x}}^i \quad \text{for } i = 1, \dots, d \end{cases}$$

$$(t, r, \bar{\mathbf{x}}) \longmapsto \mathbf{x} = \iota(t, r, \bar{\mathbf{x}}) \equiv$$

**Todo.** Maybe show diagrams with `TikZ` package.

**Todo.** Describe `\DeclareDocumentCommand`, ...

### 3.4 L<sup>A</sup>T<sub>E</sub>X Coding

**Todo.** Describe how to create custom macros with `\NewDocumentCommand`, `\RenewDocumentCommand`, `\NewCommandCopy`, ...

**Question.** Difference between “macro” and “function” in L<sup>A</sup>T<sub>E</sub>X? Which nomenclature is appropriate?

**Remark 3.1** (Macro Space Handling). Using macro inside text in the form `\foo` can swallow the following whitespace. When this is not the desired behavior, call the macro like `\foo{}`. In this way an empty argument is passed to the macro, leaving the following whitespace intact. ┘

**Todo.** Describe `\makeatletter` and `\makeatother`.

**Todo.** Describe `\ensuremath`.

**Todo.** Describe `\includeonlysmart`.

**Note.** Be careful about implicit end of line spaces in function definitions, sometimes necessary to use `%` after last command on the line. **TODO: Describe this in more detail.**

**Todo.** Describe WIP mode (particularly with Lua $\TeX$ ).

**Note.** Some comments in source code refer to files from  $\TeX$ Live installation on Arch Linux. On other distributions or operating systems the paths might be different.

# Summary and Outlook

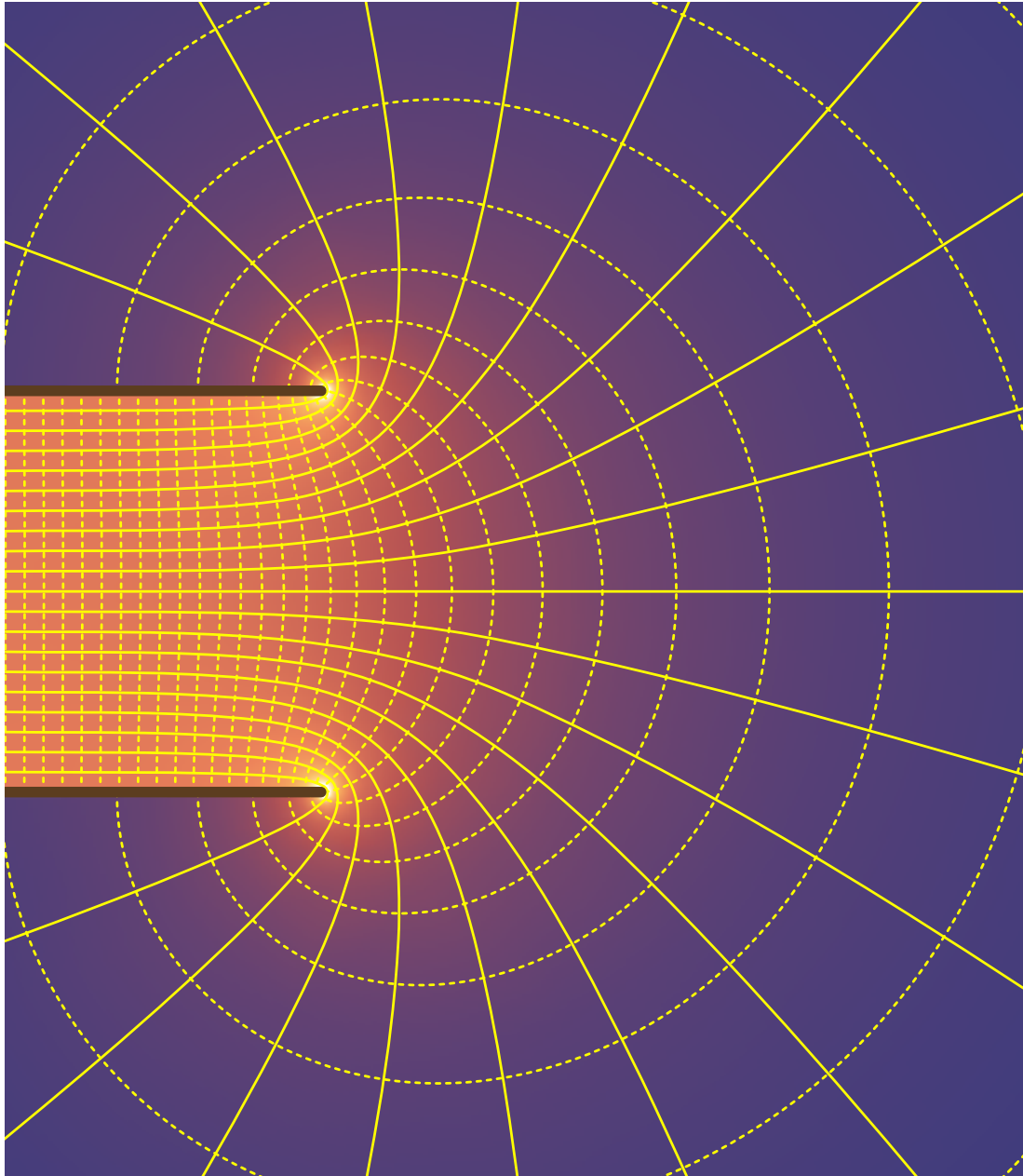
Summary and Outlook.



# Example of Appendix Chapter

## A.1 Appendix Section

**Definition A.1** (Appendix Definition). This is an example definition.



**Figure A.2:** Example of a figure with a corresponding caption: Equipotentials (solid yellow lines) and field lines (dashed yellow lines) near a two-dimensional parallel plate capacitor (solid dark brown lines).

**Remark A.3.** The header reflects that this is an appendix page.

# References

Back-references to the pages where the publication was cited are given by •.

- [1] Jonáš Dujava. Counting operators in Effective Field Theory. Bachelor Thesis. Charles University, **2022**.  
 ARXIV: 2211.05759 [hep-th] GITHUB: jdujava/CountingInEFT  
 URL: https://hdl.handle.net/20.500.11956/175647 iii
- [2] Martin Mareš, Arnošt Komárek, and Michal Kulich. A Template for Typesetting Thesis at MFF UK in LaTeX. **2024**.  
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 URL: https://www.mff.cuni.cz/en/students/student-theses-templates iii
- [•] Author Unknown. TODO. **2024**.  
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- [4] Jonáš Dujava. TeXtured — L<sup>A</sup>T<sub>E</sub>X Template. **2024**.  
 GITHUB: jdujava/TeXtured iii, 4