Guidelines for Bachelor Theses

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1 Formal aspects

- Before you officially submit your thesis, run it by me.
- You may use the TTK logo for your thesis if you follow these instructions. You get the official logo from me.
- Your LaTeX file must compile with standard installations of `latex` or `pdflatex`. If you really feel the need to include non-standard style files, include them in the tar-ball with the LaTeX sources of your thesis.
- After you have submitted your thesis, send a tar-ball of the sources, as well as a PDF of your thesis to me.

2 Orthographical and grammatical comments

- Every sentence needs a verb, a noun, and an object.
- Decide whether you use British or US spelling. Do not mix the two.
- Hyphenation in English is different from German, but follows some rather simple rules. See here: `https://en.oxforddictionaries.com/punctuation/hyphen`. Most importantly, remember:
  - Hyphens are rare. Examples: bottom quark, Standard Model, etc.
  - Compound adjectives almost always need a hyphen. Examples: heavy-flavor symmetry, well-known facts, etc.

- Relative clauses are not separated by a comma (most of the time). In other words: there is no comma before "that" or "which" in general. There are exceptions though, check yourself.

3 General remarks

- Put your work into context.
- Write only things that you can defend/explain.
- Write the thesis in such a way that it would have been useful for you to have it three months ago.
- Clearly state the sources that you have used for each part of your thesis.

3.1 Equations

- Equations require a "=" sign:

$$a^2 + b^2 = c^2\,, \tag{1}$$

$$E = mc^2\,, \tag{2}$$

$$i\hbar\partial_t\psi(\vec{x},t) = -\frac{\hbar^2\nabla^2}{2m}\psi(\vec{x},t)\,. \tag{3}$$

- Be generous with equation numbers (i.e., use `equation` rather than `equation*`), but avoid numbering each equation in a single block of equations, unless it makes sense.
- Equations must be treated as part of a sentence, i.e. they include punctuation.
- Refer to equations in the text as "Eq. (1)", "Eqs. (1), (2)", and "Eqs. (1)–(3)".

3.2 Plots

- Plots should all be in the same style, if possible (axis label font, plot label font, line styles, etc.). Use as few different aspect ratios as possible, and recall that the golden ratio supposedly is the visually most pleasing one; also recall that 16:9 is *not* the golden ratio (except for the media industry).

- All plots should contain all the relevant information, i.e., they should be self-explanatory for an expert without reading the details in the figure caption.

- Each plot should be included in the LaTeX sources as a separate PDF file, i.e. do not combine two or more plots into the same external PDF file. This also holds for Feynman diagrams (do not generate them on the fly). I recommend to use `FeynGame`[1] [1].

- If possible, the plots should be readable also in b/w format, i.e. use different line styles.

- The thickness of the lines, tick marks, etc. should be visible also on an average-quality projector.

3.3 Citations and reference list

References are important. Prepare them thoroughly to show the appropriate appreciation for other people's work.

- `inSpire` is a useful tool to *draft* the list of references. But you *always* have to edit the list manually afterwards, making sure that the spelling of the title and authors agrees with what is actually on the paper (umlaute, accents, order of authors, etc.)

- I recommend to use `bibtex` style `utphys`.

- Citation in the main text:

  - Use the reference number and put it in square brackets. Example: "The Higgs boson was discovered in 2012 [2, 3]".
  - If the reference is part of the sentence, precede it by "Ref." or "Refs.". For example: "These terms can be found in Ref. [4]."

3.4 Acknowledgments

(Note the spelling; in BE, it is "acknowledgements".) Acknowledgments are neither a comedy contest, nor a place for insider enigmas. Be polite and objective.

[1] `https://web.physik.rwth-aachen.de/user/harlander/software/feyngame`

References

[1] R. V. Harlander, S. Y. Klein, and M. Lipp, *FeynGame*, *Comput. Phys. Commun.* **256** (2020) 107465, arXiv:2003.00896 [physics.ed-ph].

[2] ATLAS, G. Aad *et al.*, *Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC*, *Phys. Lett. B* **716** (2012) 1–29, arXiv:1207.7214 [hep-ex].

[3] CMS, S. Chatrchyan *et al.*, *Observation of a New Boson at a Mass of 125 GeV with the CMS Experiment at the LHC*, *Phys. Lett. B* **716** (2012) 30–61, arXiv:1207.7235 [hep-ex].

[4] R. V. Harlander and T. Neumann, *Probing the nature of the Higgs-gluon coupling*, *Phys. Rev. D* **88** (2013) 074015, arXiv:1308.2225 [hep-ph].