Template for LHCb Analysis notes

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Abstract

Guidelines for the preparation of LHCb publications are given. This is a “living” document, that should reflect our current practice. Please contact the Editorial Board chair if you have suggestions for any additions (or if you disagree strongly with any of the current recommendations).
1 Introduction

This is the template for typesetting LHCb notes and journal papers. It should be used for any document in LHCb [1] that is to be publicly available. The format should be used for uploading to preprint servers and only afterwards should specific typesetting required for journals or conference proceedings be applied. The main \LaTeX{} file contains several options as described in the \LaTeX{} comment lines.

This template also contain the guidelines for how publications and conference reports should be written. Through the symbols defined in \texttt{lhcb-symbols-def.tex} it should be easy to follow the majority of requirements set out here.

2 General principles

The main goal is for a paper to be clear. It should be as brief as possible, without sacrificing clarity. For all public documents, special consideration should be given to the fact that the reader will be less familiar with LHCb than the author.

Here follow a list of general principles that should be adhered to:

1. Choices that are made concerning layout and typography should be consistently applied throughout the document.

2. Standard English should be used (British rather than American) for LHCb notes and preprints. Examples: colour, flavour, centre, metre and aluminium. The punctuation normally follows the closing quote mark of quoted text, rather than being included before the closing quote. When in doubt, consult a dictionary. Papers which are to be submitted to an American journal can be written in American English instead. Under no circumstance should the two be mixed.

3. Use of jargon should be avoided where possible. “PID” is “particle identification”, “Systematics” are “systematic uncertainties”, etc. Data are plural.

4. \LaTeX{} should be used for typesetting. Line numbering should be switched on for drafts that are circulated for comments.

5. The authorship for Conference Reports should be “The LHCb Collaboration”, with a footnote giving the name(s) of the contact author(s), but without the full list of collaboration names. For journal publications the full author list should be included. It is provided by the Membership Committee and will contain the authors eligible on the date of the first circulation of the paper to the collaboration.

6. The abstract should be concise, and not include citations or numbered equations, and should give the key results from the paper.

7. Text in the document should not be cut-and-pasted from other sources that have previously been published. This also applies to the description of the detector and trigger in papers.
8. References should usually be made only to publicly accessible documents. References to LHCb conference reports and public notes should be avoided in journal publications, instead including the relevant material in the paper itself.

9. The use of tenses should be consistent. It is recommended to mainly stay in the present tense, for the abstract, the description of the analysis, etc; the past tense is then used where necessary, for example when describing the data taking conditions.

10. It is recommended to use the passive rather than active voice: “the mass was measured”, rather than “we measured the mass”. Limited use of the active voice is acceptable, in situations where re-writing in the passive form would be cumbersome, such as for the acknowledgments. Some leeway is permitted to accommodate different author’s styles, but “we” should not appear excessively, in the abstract or the first lines of introduction or conclusion.

3 Layout

1. Unnecessary blank space should be avoided, between paragraphs or around figures and tables.

2. Figure and table captions should use a somewhat smaller typeface than the main text, to help distinguish them, and should be concise. Figure captions go below the figure, table captions go above the table.

3. Captions and footnotes should be punctuated correctly, like normal text. The use of too many footnotes should be avoided: typically they are used for giving commercial details of companies, or standard items like coordinate system definition or the implicit inclusion of charge-conjugate states. In papers submitted to APS journals, e.g. PRL, PRD, footnotes should be completely avoided as they are mixed together with the references.

4. Tables should be formatted in a simple fashion, without excessive use of horizontal and vertical lines. See Table 1 for an example.

5. Figures and tables should normally be placed so that they appear on the same page as their first reference, but at the top or bottom of the page; if this is not possible, they should come as soon as possible afterwards. They must all be referred to from the text.

6. Equations should be numbered using parentheses as shown in Eq. 1

\[ V_{us} V_{ub}^* + V_{cs} V_{cb}^* + V_{ts} V_{tb}^* = 0 \]  

1If placed at the end of a sentence, the footnote symbol normally follows the punctuation; if placed in the middle of an equation, take care to avoid any possible confusion with an index.
Table 1: Background-to-signal ratio estimated in a $\pm 50\text{MeV}/c^2$ mass window for the prompt and long-lived backgrounds, and the minimum bias rate.

<table>
<thead>
<tr>
<th>Channel</th>
<th>$B_{pr}/S$</th>
<th>$B_{LL}/S$</th>
<th>MB rate</th>
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<tbody>
<tr>
<td>$B^0 \rightarrow J/\psi \phi$</td>
<td>$1.6 \pm 0.6$</td>
<td>$0.51 \pm 0.08$</td>
<td>$\sim 0.3 \text{ Hz}$</td>
</tr>
<tr>
<td>$B^0 \rightarrow J/\psi K^{*0}$</td>
<td>$5.2 \pm 0.3$</td>
<td>$1.53 \pm 0.08$</td>
<td>$\sim 8.1 \text{ Hz}$</td>
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<tr>
<td>$B^+ \rightarrow J/\psi K^{*+}$</td>
<td>$1.6 \pm 0.2$</td>
<td>$0.29 \pm 0.06$</td>
<td>$\sim 1.4 \text{ Hz}$</td>
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</tbody>
</table>

7. Displayed results like

$$
\mathcal{B}(B^0_s \rightarrow \mu^+\mu^-) < 1.5 \times 10^{-8} \text{ at 95\% CL}
$$

should in general not be numbered.

8. Numbered equations should be avoided in captions and footnotes.

9. Displayed equations are part of the normal grammar of the text. This means that there should not be a colon before the equation, and the equation should end in full stop or comma if required when reading aloud. The line after the equation should only be indented if it starts a new section.

10. Sub-sectioning should not be excessive: sections with more than three levels of index (1.1.1) should be avoided.

11. It is generally preferable to itemize a list using numbers rather than bullets.

12. Abbreviations should be defined the first time they are used, e.g. “Monte Carlo (MC) events containing a doubly Cabibbo-suppressed (DCS) decay have been generated.” Try to avoid excessive use of abbreviations. The definition of the abbreviation should always be on the same line as the last word of what it abbreviates.

4 Typography

The use of the \LaTeX typesetting symbols defined in the file lhcb-symbols-def.tex and detailed in the appendices of this document is strongly encouraged as it will make it much easier to follow the recommendation set out below.

1. LHCb is typeset with a normal (roman) lowercase b.

2. Titles are in bold face, and usually only the first word is capitalized.

3. Mathematical symbols and particle names should also be typeset in bold when appearing in titles.
4. Units are in roman type, except for constants such as $c$ or $h$ that are italic: GeV, GeV/c$^2$. The unit should be separated from the value with a space, and they should not be broken over two lines. It is recommended to keep the factors of $c$ for masses and momenta, e.g. $m = 3.1 \text{ GeV}/c^2$. However, if they are dropped this should be done consistently throughout, and a note should be added at the first instance to indicate that units are taken with $c = 1$.

5. Italic is preferred for particle names (although roman is acceptable, if applied consistently throughout). Particle Data Group conventions should generally be followed: $B^0$ (no need for a “$d$” subscript), $B_s^0 \rightarrow J/\psi \phi$, $B_s^0$, $K^0_s$ (note the uppercase roman type “S”).

6. Variables are usually italic: $V$ is a voltage (variable), while 1 V is a volt (unit).

7. Subscripts are roman type when they refer to a word (such as T for transverse) and italic when they refer to a variable (such as $t$ for time): $p_T$, $\Delta m_s$, $t_{\text{rec}}$.

8. Standard function names are in roman type: e.g. cos, sin and exp.

9. Figure, Section, Equation, Chapter and Reference should be abbreviated as Fig., Sect., Eq., Chap. and Ref. respectively, when they refer to a particular (numbered) item, except when they start a sentence. Table and Appendix are not abbreviated. The plural form of abbreviation keeps the point after the s, e.g. Figs. 1 and 2.

10. Common abbreviations derived from Latin such as “for example” (e.g.), “in other words” (i.e.), “and so forth” (etc.), “and others” (et al.), “versus” (vs.) can be used, with the typography shown; other more esoteric abbreviations should be avoided.

11. Units, material and particle names are usually lower case if spelled out, but often capitalized if abbreviated: amps (A), gauss (G), lead (Pb), silicon (Si), kaon ($K$), proton ($p$).

12. The prefix for 1000 (k, e.g. kV) should not be confused with that used in computing (K, which strictly speaking denotes $2^{10}$, e.g. KB).

13. Counting numbers are usually written in words if they start a sentence, or if they have a value of ten or below in descriptive text (i.e. not including figure numbers such as “Fig. 4”, or values followed by a unit such as “4 cm”).

14. Numbers larger than 9999 have a comma (or a small space) between the multiples of thousand: e.g. 10,000 or 12,345,678. The decimal point is indicated with a point rather than a comma: e.g. 3.141.

15. Hyphenation should be used where necessary to avoid ambiguity, but not excessively. For example: “big-toothed fish”, but “big white fish”. Cross-section is hyphenated.
16. Minus signs should be in a proper font (−1), not just hyphens (-1); this applies to figure labels as well as the body of the text.

17. Inverted commas (around a title, for example) should be a matching set of left- and right-handed pairs: “Title”. The use of these should be avoided where possible.

18. Single symbols are preferred for variables in equations, e.g. $B$ rather than BF for a branching fraction.

19. Parentheses are not usually required around a value and its uncertainty, before the unit, unless there is possible ambiguity: so $\Delta m_s = 20 \pm 2\text{ps}^{-1}$ does not need parentheses, whereas $f_d = (40 \pm 4)\%$ does. The unit should not need to be repeated in expressions like $1.2 < E < 2.4\text{GeV}$.

20. The same number of decimal places should be given for all values in any one expression (e.g. $5.20 < m_B < 5.34\text{GeV}/c^2$).

21. Apostrophes are best avoided for abbreviations: if the abbreviated term is capitalized or otherwise easily identified then the plural can simply add an s, otherwise it is best to rephrase: e.g. HPDs, $\pi^0$s, pions, rather than HPD’s, $\pi^0$’s, $\pi$s.

5 Figures

A standard LHCb style file for use in production of figures in ROOT is in the Erasmus package RootTools/LHCbStyle or directly in SVN at svn+ssh://svn.cern.ch/reps/lhcb/Erasmus/trunk/RootTools/LHCbStyle. It is not mandatory to use this style, but it makes it easier to follow the recommendations below.

In Fig. [1] is shown an example of how to include an eps or pdf figure with the \includegraphics command (eps figures will not work with pdflatex).

1. Figures should be legible at the size they will appear in the publication, with suitable line width. Their axes should be labelled, and have suitable units (e.g. avoid a mass plot with labels in MeV/$c^2$ if the region of interest covers a few GeV/$c^2$ and all the numbers then run together). Spurious background shading and boxes around text should be avoided.

2. Colour may be used in figures, but the distinction between differently coloured areas or lines should be clear also when the document is printed in black and white, for example by suitable use of shading or differently dashed lines. As a minimum, colours that print in clearly different shades of grey should be used, with a corresponding description: e.g. “red (dark) and yellow (light) shaded areas”.

3. Figures with more than one part should have the parts labelled (a), (b) etc., with a corresponding description in the caption; alternatively they should be clearly referred to by their position, e.g. Fig. 1 (left).
Figure 1: \( A_{FB} \) in \( B^0 \to K^{*0} \mu^+\mu^- \) as a function of \( q^2 \). The theory predictions are from Ref. [2].

4. All figures containing LHCb data should have LHCb written on them, preferably in the upper right corner. For preliminary results, that should be replaced by “LHCb preliminary”.

6 References

References should be made using Bib\TeX\ [3]. A special style LHCb.bst has been created to achieve a uniform style. Independent of the journal the paper is submitted to, the preprint should be created using this style. Where arXiv numbers exist, these should be added even for published articles. In the PDF file, hyperlinks will be created to both the arXiv and the published version.

1. Citations are marked using square brackets, and the corresponding references should be typeset using Bib\TeX\ and the official LHCb Bib\TeX\ style. An example is in Ref. [4].

2. For references with four or less authors all of the authors’ names are listed [5], otherwise the first author is given, followed by \textit{et al.}. the LHCb Bib\TeX\ style will take care of this.

3. The order of references should be sequential when reading the document.

4. The titles of papers should in general be included. To remove them, change \texttt{\setboolean{articletitles}{false}} to \texttt{true} at the top of this template.

5. The obtain the correct bibliographic information, the best option is to copy the Bib\TeX\ entry directly from Spires or Inspire. Some manual editing of the paper titles might be required to achieve correct L\LaTeX\ formatting.
6. The mciteplus [6] package is used in order to enable multiple references to show up as a single item in the reference list. As an example \cite{Aaij:2011rj,*Pascoli:2007qh} where the * indicates that the reference should be merged with the previous one. The result of this can be seen in Ref. [7]. Be aware that the mciteplus package should be included as the very last item before the \begin{document} to work correctly.

Acknowledgments

We express our gratitude to our colleagues in the CERN accelerator departments for the excellent performance of the LHC. We thank the technical and administrative staff at CERN and at the LHCb institutes, and acknowledge support from the National Agencies: CAPES, CNPq, FAPERJ and FINEP (Brazil); CERN; NSFC (China); CNRS/IN2P3 (France); BMBF, DFG, HGF and MPG (Germany); SFI (Ireland); INFN (Italy); FOM and NWO (Netherlands); SCRR (Poland); ANCS (Romania); MinES of Russia and Rosatom (Russia); MICINN, XuntaGal and GENCAT (Spain); SNSF and SER (Switzerland); NAS Ukraine (Ukraine); STFC (United Kingdom); NSF (USA). We also acknowledge the support received from the ERC under FP7 and the Region Auvergne.

References


Appendix

A Standard symbols

As explained in Sect. 4 this appendix contains standard typesetting of symbols, particle names, units etc. in LHCb documents.

In the file lhcb-symbols-def.tex, which is included, a very large number of symbols are defined. While they can lead to quicker typing, the main reason is to ensure a uniform notation within a document and indeed between different LHCb documents. If a symbol like $\mathcal{CP}$ to typeset $CP$ violation is available for a unit, particle name, process or whatever, it should be used. If you do not agree with the notation you should lobby to get the definition in lhcb-symbols-def.tex changed rather than just ignoring it.

All the main particles have been given symbols. The $B$ mesons are thus named $B^+$, $B^0$, $B^0_s$, and $B^+_c$. There is no need to go into math mode to use particle names, thus saving the typing of many $ signs. By default particle names are typeset in slanted type to agree with the PDG preference. To get roman particle names you can just change \setboolean{uprightparticles}{false} to true at the top of this template.

There is a large number of units typeset that ensures the correct use of fonts, capitals and spacing. As an example we have $m_{B^0} = 5366.3 \pm 0.6 \text{MeV}/c^2$. Note that $\mu m$ is typeset with an upright $\mu$, even if the particle names have slanted greek letters.

A set of useful symbols are defined for working groups. More of these symbols can be included later. As an example in the Rare Decay group we have several different analyses looking for a measurement of $C_7^{(\text{eff})}$ and $\mathcal{O}_7'$.

B List of all symbols

B.1 Experiments

\begin{tabular}{llll}
\texttt{lhc} & LHC & \texttt{ux85} & UX85 & \texttt{cern} & CERN \\
\texttt{lhc} & LHC & \texttt{atlas} & ATLAS & \texttt{cms} & CMS \\
\texttt{babar} & BABAR & \texttt{belle} & BELLE & \texttt{aleph} & ALEPH \\
\texttt{delphi} & DELPHI & \texttt{opal} & OPAL & \texttt{lthree} & L3 \\
\texttt{lep} & LEP & \texttt{cdf} & CDF & \texttt{dzero} & D0 \\
\texttt{sl} & SLD & \texttt{cleo} & CLEO & \texttt{uaone} & UA1 \\
\texttt{uatwo} & UA2 & \texttt{tevatron} & TEVATRON
\end{tabular}
B.1.1 LHCb sub-detectors and sub-systems

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B.2 Particles

B.2.1 Leptons

| electron | e          | en | e−         | ep | e+ |
| epm      | e±         | epem | e+e−     | ee | e−e− |
| mmu      | μ          | mup | μ+         | mun | μ− |
| mumu     | μ+μ−       | mtau | τ         | taup | τ+ |
| tauμ     | τ−         | tauμ | τ+τ−     | ellμ | ℓ− |
| ellp     | ℓ+         | elll | ℓ⁺ℓ−     | neu | ν |
| neub     | ν          | nueneub | νν̄      | neue | νe |
| neumb     | νe         | neunueub | νeνē | neum | νμ |
| neutb     | νμ         | neutneumb | νμνμ̄ | neut | ντ |
| neutl     | ντ         | neutneult | ντντ̄ | neul | νℓ |
| neult     | νℓ         | neulneult | νℓνℓ̄ |

B.2.2 Gauge bosons and scalars

| g | γ        | H | H0 | Hp | H+ |
| Hm | H−        | Hpm | H± | W | W |
| Wp | W+        | Wm | W− | Wpm | W± |
| Z | Z0       |    |    |    |    |

B.2.3 Quarks

| quark | q          | quarkbar | q̄   | qqbar | q̄q |
| uquark | u          | uquarkbar | ū  | uubar | ūu |
| dquark | d          | dquarkbar | d̄  | ddbar | d̄d |
| squark | s          | squarkbar | s̄  | sssbar | s̄s |
| cquark | c          | cquarkbar | c̄  | ccbar | c̄c |
| bquark | b          | bquarkbar | b̄  | bbbbar | b̄b |
| tquark | t          | tquarkbar | t̄  | ttbar | t̄t |
### B.2.4 Light mesons

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<td>chiczero</td>
<td>$\chi_{c0}$</td>
<td>chicone</td>
<td>$\chi_{c1}$</td>
</tr>
<tr>
<td>chictwo</td>
<td>$\chi_{c2}$</td>
<td>OneS</td>
<td>$\Upsilon(1S)$</td>
<td>TwoS</td>
<td>$\Upsilon(2S)$</td>
</tr>
<tr>
<td>ThreeS</td>
<td>$\Upsilon(3S)$</td>
<td>FourS</td>
<td>$\Upsilon(4S)$</td>
<td>FiveS</td>
<td>$\Upsilon(5S)$</td>
</tr>
<tr>
<td>chic</td>
<td>$\chi_c$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B.2.7 Baryons

- Proton \( p \)
- Antiproton \( \bar{p} \)
- Neutron \( n \)
- Antineutron \( \bar{n} \)
- Delta \( \Delta \)
- Antidelta \( \bar{\Delta} \)
- Xi \( \Xi \)
- Antixi \( \bar{\Xi} \)
- Lambda \( \Lambda \)
- Antilambda \( \bar{\Lambda} \)
- Sigma \( \Sigma \)
- Antisigma \( \bar{\Sigma} \)
- Omega \( \Omega \)
- Antomega \( \bar{\Omega} \)
- Lambda b \( \Lambda_b \)
- Antilambda b \( \bar{\Lambda}_b \)
- Lambda c \( \Lambda_c \)
- Antilambda c \( \bar{\Lambda}_c \)

B.3 Physics symbols

B.3.1 Decays

- BF \( B \)
- BR \( B_{\text{vis}} \)
- BR \( B \)

\[ \text{decay}[2] \text{ decay}\{a\} \{b\ c\} a \rightarrow bc \]

\[ \text{ra} \rightarrow \text{to} \rightarrow \]

B.3.2 Lifetimes

- \( \tau_{B^0} \)
- \( \tau_B \)
- \( \tau_{B^+} \)
- \( \tau_{D^+} \)
- \( \tau_{D^0} \)
- \( \tau_L \)
- \( \tau_H \)

B.3.3 Masses

- \( m_{B^0} \)
- \( m_{B^+} \)
- \( m_{B^0} \)

\[ m_{\Lambda_c} \]

\[ m_{\Lambda_b} \]

B.3.4 EW theory, groups

- SU(3) \( \text{grpsuthree} \)
- SU(2) \( \text{grpsutw} \)
- U(1) \( \text{grpuone} \)

\[ \sin^2 \theta_W \]
\[ \cos^2 \theta_W \]
\[ \sin \theta_W \]
\[ \cos \theta_W \]
\[ \sin^2 \theta_W^{\text{eff}} \]
\[ \cos^2 \theta_W^{\text{eff}} \]
\[ g_A \]
\[ g_\text{order} \]
\[ g_\text{ordalsq} \]
\[ g_\text{ordalcb} \]

B.3.5 QCD parameters

- \( \alpha_s \)
- \( \text{MSb} \)
- \( \overline{\text{MS}} \)
- \( \Lambda_{\text{QCD}} \)
- \( \text{Lqcd} \)

\[ q^2 \]
B.3.6 CKM, CP violation

\[ \begin{align*}
\text{\textbackslash eps} & \quad \varepsilon \\
\text{\textbackslash epsK} & \quad \varepsilon_K \\
\text{\textbackslash epsB} & \quad \varepsilon_B \\
\text{\textbackslash CP} & \quad \varepsilon' \\
\text{\textbackslash CP} & \quad \varepsilon'_K \\
\text{\textbackslash CP} & \quad \varepsilon'_B \\
\text{\textbackslash Vud} & \quad |V_{ud}| \\
\text{\textbackslash Vus} & \quad |V_{us}| \\
\text{\textbackslash Vub} & \quad |V_{ub}| \\
\text{\textbackslash Vcd} & \quad |V_{cd}| \\
\text{\textbackslash Vtd} & \quad |V_{td}| \\
\text{\textbackslash Vcs} & \quad |V_{cs}| \\
\text{\textbackslash Vts} & \quad |V_{ts}| \\
\text{\textbackslash Vcb} & \quad |V_{cb}| \\
\text{\textbackslash Vtb} & \quad |V_{tb}| \\
\end{align*} \]

B.3.7 Oscillations

\[ \begin{align*}
\text{\textbackslash dm} & \quad \Delta m \\
\text{\textbackslash dms} & \quad \Delta m_s \\
\text{\textbackslash dmd} & \quad \Delta m_d \\
\text{\textbackslash DG} & \quad \Delta \Gamma \\
\text{\textbackslash DGs} & \quad \Delta \Gamma_s \\
\text{\textbackslash DGd} & \quad \Delta \Gamma_d \\
\text{\textbackslash Gs} & \quad \Gamma_s \\
\text{\textbackslash Gd} & \quad \Gamma_d \\
\text{\textbackslash dmq} & \quad \Delta m_q \\
\text{\textbackslash Delm} & \quad \Delta m_{\text{mix}} \\
\text{\textbackslash Amix} & \quad A_{\text{mix}} \\
\text{\textbackslash sinphi} & \quad \sin\phi_d \\
\text{\textbackslash phis} & \quad \phi_s \\
\text{\textbackslash sbetas} & \quad \sigma(\beta_s) \\
\text{\textbackslash stbetas} & \quad \sigma(2\beta_s) \\
\text{\textbackslash sinphis} & \quad \sigma(\phi_s) \\
\end{align*} \]

B.3.8 Tagging

\[ \begin{align*}
\text{\textbackslash edet} & \quad \varepsilon_{\text{det}} \\
\text{\textbackslash etot} & \quad \varepsilon_{\text{rec/det}} \\
\text{\textbackslash etot} & \quad \varepsilon_{\text{tot}} \\
\text{\textbackslash mistag} & \quad \omega \\
\text{\textbackslash tag} & \quad \varepsilon_{\text{tag}} \\
\text{\textbackslash etagcomb} & \quad \varepsilon_{\text{tag}} \\
\text{\textbackslash effeff} & \quad \varepsilon_{\text{eff}} \\
\text{\textbackslash effeffcomb} & \quad \varepsilon_{\text{eff}} \\
\text{\textbackslash effeffD} & \quad \varepsilon_{\text{tag}} D^2 \\
\text{\textbackslash etagprompt} & \quad \varepsilon_{\text{tag}} \\
\text{\textbackslash etagLL} & \quad \varepsilon_{\text{tag}} \\
\end{align*} \]

B.3.9 Key decay channels

\[ \begin{align*}
\text{\textbackslash BdToKstmm} & \quad B^0 \to K^{*0}\mu^+\mu^- \\
\text{\textbackslash BdbToKstmm} & \quad \bar{B}^0 \to \bar{K}^{*0}\mu^+\mu^- \\
\text{\textbackslash BsToJPsiPhi} & \quad B_s^0 \to J/\psi \phi \\
\text{\textbackslash BTohh} & \quad B \to h^+h^- \\
\text{\textbackslash BdTopipi} & \quad B^0 \to \pi^+\pi^- \\
\text{\textbackslash BsToKK} & \quad B_s^0 \to K^+K^- \\
\text{\textbackslash BsTopiK} & \quad B_s^0 \to \pi^+K^- \\
\end{align*} \]

B.3.10 Rare decays

\[ \begin{align*}
\text{\textbackslash BdBKstee} & \quad B^0 \to K^{*0}e^+e^- \\
\text{\textbackslash bsl1} & \quad b \to s\ell^+\ell^- \\
\text{\textbackslash AFBl} & \quad A_{\text{FB}} \\
\text{\textbackslash Btoh} & \quad B \to h^+h^- \\
\text{\textbackslash BsToK} & \quad B_s^0 \to \mu^+\mu^- \\
\text{\textbackslash ctl} & \quad \cos\theta_t \\
\text{\textbackslash ctk} & \quad \cos\theta_K \\
\end{align*} \]
B.3.11 Wilson coefficients and operators

\[ C^9, C_{\text{eff}}^9, C_{\text{peff}}^9, O_2, O_7, O_{\text{eff}}^7 \]

B.3.12 Charm

\[ x', y', y_{\text{CP}}, \Gamma, \pi, \kappa, \pi, K^+ \]

B.3.13 QM

\[ \langle a| \psi | b \rangle, \langle a| b \rangle \]

B.4 Units

B.4.1 Energy and momentum

\[ \text{TeV}, \text{GeV}, \text{MeV}, \text{GeV/c}, \text{GeV/c}^2 \]

B.4.2 Distance and area

\[ \text{km}, \text{m}, \text{cm}, \text{mm}, \text{mum}, \text{fm}, \text{m}, \text{mm}, \text{mum}, \text{fm}, \text{mbarn}, \text{nb}, \text{pb}, \text{fb} \]

B.4.3 Time

\[ \text{s}, \text{ms}, \text{ms}, \text{ms}, \text{ns}, \text{ps}, \text{fs}, \text{mhz}, \text{khz}, \text{hz}, \text{invps}, \text{yr} \]

B.4.4 Temperature

\[ ^{\circ}\text{C}, \text{K} \]
B.4.5 Material lengths, radiation

\( X_{rad} \quad X_0 \quad \text{NIL} \quad \lambda_{int} \quad \text{mip} \quad \text{MIP} \)

\( \text{neutron eq} \quad n_{eq} \quad \text{neq mcm} \quad n_{eq/cm^2} \quad \text{kRad} \quad \text{kRad} \)

\( \text{M Rad} \quad \text{MRad} \quad \text{ci} \quad \text{Ci} \quad \text{mci} \quad \text{mCi} \)

B.4.6 Uncertainties

\( \text{sx} \quad \sigma_x \quad \text{sy} \quad \sigma_y \quad \text{sz} \quad \sigma_z \)

\( \text{stat} \quad (\text{stat}) \quad \text{syst} \quad (\text{syst}) \)

B.4.7 Maths

\( \text{order} \quad \mathcal{O} \quad \text{chisq} \quad \chi^2 \quad \text{deriv} \quad d \)

\( \text{gsim} \quad \gtrsim \quad \text{lsim} \quad \lesssim \quad \text{mean}[1] \quad \text{mean}\{x\} \quad \langle x \rangle \)

\( \text{abs}[1] \quad \text{abs}\{x\} \quad \|x\| \quad \text{Real} \quad \text{Re} \quad \text{Imag} \quad \text{Im} \)

\( \text{PDF} \quad \text{PDF} \)

B.5 Kinematics

B.5.1 Energy, Momenta

\( E_{beam} \quad E_{\text{BEAM}} \quad \text{sqs} \quad \sqrt{s} \quad \text{ptot} \quad p \)

\( p_T \quad \text{pt} \quad E_T \quad \text{et} \quad \text{dpp} \quad \text{dp/p} \)

\( \text{dedx} \quad dE/dx \)

B.5.2 PID

\( \text{dllkpi} \quad \text{DLL}_{K\pi} \quad \text{dllppi} \quad \text{DLL}_{p\pi} \quad \text{dllepi} \quad \text{DLL}_{e\pi} \)

\( \text{dllmupi} \quad \text{DLL}_{\mu\pi} \)

B.5.3 Geometry

\( \text{mphi} \quad \phi \quad \text{mtheta} \quad \theta \quad \text{ctheta} \quad \cos \theta \)

\( \text{stheta} \quad \sin \theta \quad \text{ttheta} \quad \tan \theta \quad \text{degrees} \quad ^\circ \)

\( \text{krad} \quad \text{krad} \quad \text{mrad} \quad \text{mrad} \quad \text{rad} \quad \text{rad} \)

B.5.4 Accelerator

\( \beta^* \quad \text{lum} \quad \mathcal{L} \quad \text{intlum}[1] \quad \text{intlum}\{2 \text{ fb}^{-1}\} \quad \int \mathcal{L} = 2 \text{ fb}^{-1} \)
B.6 Software

B.6.1 Programs

\evtgen EvtGen \pythia PYTHIA \fluka FLUKA
\tosca TOSCA \ansys ANSYS \spice SPICE
\garfield GARFIELD \geant GEANT4 \hepmc HEPMC
\gauss GAUSS \gaudi GAUDI \boole BOOLE
\brunel BRUNEL \davinci DA VINCI \erasmus ERASMUS
\moore MOORE \ganga GAN\nA \dirac DIRAC
\root ROOT \roo\nfit ROOFIT \pyroot PYROOT

B.6.2 Languages

\cpp C++ \python PYTHON \ruby RUBY
\fortran FORTRAN \svn SVN

B.6.3 Data processing

\kbytes kbytes \kbsps kbits/s \kbits kbits
\kbsps kbits/s \mbps Mbytes/s \mbytes Mbytes
\mbps Mbyte/s \mbsps Mbytes/s \gbps Gbytes/s
\gbytes Gbytes \gbps Gbytes/s \tbytes Tbytes
\tbpy Tbytes/yr \ dst DST

B.7 Detector related

B.7.1 Detector technologies

\nonn n^+\text{-on-}n \ponn p^+\text{-on-}n \nonp n^+\text{-on-}p
\cvd CVD \mwpc MWPC \gem GEM

B.7.2 Detector components, electronics

\tell1 TELL1 \ukl1 UKL1 \beetle Beetle
\otis OTIS \croc CROC \carioca CARIOCA
\dialog DIAL\nOG \sync SYNC \cardiac CARDIAC
\gol GOL \vc\nse1 VCSE1 \ttc TTC
\ttcrx TTCrx \hp\n HPD \pmt PMT
\specs SPECS \elmb ELMB \fpga FPGA
\plc PLC \rasnik RASNIK \elmb ELMB
\can CAN \lvds LVDS \ntc NTC
\adc ADC \led LED \ccd CCD
\hv HV \lv LV \pvss PVSS
\cmos CMOS \fifo FIFO \ccpc CCPC
B.7.3 Chemical symbols

\texttt{cfourften} \texttt{C_4F_{10}} \quad \texttt{cffour} \texttt{CF}_4 \quad \texttt{cotwo} \texttt{CO}_2 \\
\texttt{csixffouteen} \texttt{C_6F_{14}} \quad \texttt{mgftwo} \texttt{MgF}_2 \quad \texttt{siotwo} \texttt{SiO}_2 \\

B.8 Special Text

\texttt{eg} \texttt{e.g.} \quad \texttt{ie} \texttt{i.e.} \quad \texttt{etal} \texttt{et al.} \\
\texttt{etc} \texttt{etc.} \quad \texttt{cf} \texttt{cf.} \quad \texttt{ffp} \texttt{ff.}