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# Template for writing LHCb papers

The LHCb collaboration<sup>†</sup>

## Abstract

Guidelines for the preparation of LHCb documents are given. This is a “living” document that should reflect our current practice. It is expected that these guidelines are implemented for papers before they go into the first collaboration wide review. Please contact the Editorial Board chair if you have suggestions for modifications. This is the title page for journal publications (PAPER). For a CONF note or ANA note, switch to the appropriate template by uncommenting the corresponding line in the file `main.tex`.

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/ Nucl. Phys. B

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# 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.

It is expected that these guidelines are implemented for papers already before they go into the first collaboration wide review.

This template also contains the guidelines for how publications and conference reports should be written. The symbols defined in `lhcb-symbols-def.tex` are compatible with LHCb guidelines.

The front page should be adjusted according to what is written. Default versions are available for papers, conference reports and analysis notes. Just comment out what you require in the `main.tex` file.

This directory contains a file called `Makefile`. Typing `make` will apply all Latex and Bibtex commands in the correct order to produce a pdf file of the document. The default Latex compiler is `pdflatex`, which requires figures to be in pdf format. To change to plain Latex, edit line 9 of `Makefile`. Typing `make clean` will remove all temporary files generated by `(pdf)latex`.

There is also a PRL template, which is called `main-prl.tex`. You need to have REVTeX 4.1 installed [2] to compile this. Typing `make prl` produces a PRL-style PDF file. Note that this version is not meant for LHCb-wide circulation, nor for submission to the arXiv. It is just available to have a look-and-feel of the final PRL version. Typing `make count` will count the words in the main body.

## 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, modelled and aluminium. Words ending on -ise or -isation (polarise, hadronisation) can be written with -ize or -ization ending. The punctuation normally follows the closing quote mark of quoted text, rather than being included before the closing quote. Footnotes come after punctuation. Papers 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. “Systematics” are “systematic uncertainties”, “L0” is “hardware trigger”, “penguin” diagrams are best introduced with an expression like “electroweak loop (penguin) diagrams”.

4. Avoid using quantities that are internal jargon and/or are impossible to reproduce without the full simulation: instead of ‘It is required that  $\chi_{\text{vtx}}^2 < 3$ ’, say ‘A good quality vertex is required’; instead of ‘It is required that  $\chi_{\text{IP}}^2 > 16$ ’, say ‘The track is inconsistent with originating from a PV’; instead of ‘A DLL greater than 20 is required’ say ‘Tracks are required to be identified as kaons’.
5. Latex should be used for typesetting. Line numbering should be switched on for drafts that are circulated for comments.
6. The abstract should be concise, and not include citations or numbered equations, and should give the key results from the paper.
7. Apart from descriptions of the detector, the trigger and the simulation, the text should not be cut-and-pasted from other sources that have previously been published.
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 is measured”, rather than “we measure 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 acknowledgements. 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.
11. A sentence should not start with a variable, a particle or an acronym. A title or caption should not start with an article.
12. Incorrect punctuation around conjunctive adverbs and the use of dangling modifiers are the two most common mistakes of English grammar in LHCb draft papers. If in doubt, read the wikipedia articles on conjunctive adverb and dangling modifier.

### 3 Layout

1. Unnecessary blank space should be avoided, between paragraphs or around figures and tables.
2. Figure and table captions should be concise and use a somewhat smaller typeface than the main text, to help distinguish them. This is achieved by inserting `\small` at the beginning of the caption. (NB with the latest version of the file `preamble.tex` this is automatic) 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 processes.<sup>1,2</sup>
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. If one or more equations are referenced, all equations should be numbered using parentheses as shown in Eq. 1,

$$V_{us}V_{ub}^* + V_{cs}V_{cb}^* + V_{ts}V_{tb}^* = 0 . \quad (1)$$

7. Displayed results like

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

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 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 paragraph.
10. Sub-sectioning should not be excessive: sections with more than three levels of index (1.1.1) should be avoided.
11. Acronyms 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.” The abbreviated words should not be capitalised if it is not naturally written with capitals, *e.g.* quantum chromodynamics (QCD), impact parameter (IP), boosted decision tree (BDT). Avoid acronyms if they are used three times or less. A sentence should never start with an acronym and its better to avoid it as the last word of a sentence as well.

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<sup>1</sup>If 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.

<sup>2</sup>The standard footnote reads: “The inclusion of charge-conjugate processes is implied throughout.” This may need to be modified, for example with “except in the discussion of asymmetries.”

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.

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

## 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 capitalised.
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,  $\text{GeV}/c^2$ . The unit should be separated from the value with a thin space (“\,”), and they should not be broken over two lines. Correct spacing is automatic when using predefined units inside math mode: `\$3.0\text{gev}\$`  $\rightarrow 3.0 \text{ GeV}$ . Spacing goes wrong when using predefined units outside math mode AND forcing extra space: `3.0\,\,\text{gev}`  $\rightarrow 3.0 \text{ GeV}$  or worse: `3.0~\text{gev}`  $\rightarrow 3.0 \text{ GeV}$ .
5. If factors of  $c$  are kept, they should be used both for masses and momenta, *e.g.*  $p = 5.2 \text{ GeV}/c$  (or  $\text{GeV}c^{-1}$ ),  $m = 3.1 \text{ GeV}/c^2$  (or  $\text{GeV}c^{-2}$ ). 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  $c = 1$ .
6. The % sign should not be separated from the number that precedes it: 5%, not 5 %. A thin space is also acceptable: 5%, but should be applied consistently throughout the paper.
7. Ranges should be formatted consistently. The recommendend form is to use a dash with no spacing around it: 7–8 GeV, obtained as `7--8\text{gev}`.
8. 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),  $B_s^0 \rightarrow J/\psi \phi$ ,  $\bar{B}_s^0$ , (note the long bar, obtained with `\overline{\text{line}}`, in contrast to the discouraged short `\bar{\text{B}}` resulting in  $\bar{B}$ ),  $K_s^0$  (note the uppercase roman type “S”). This is most easily achieved by using the predefined symbols described in Appendix C. Unless there is a good reason not to, the charge of a particle should be specified if there is any possible ambiguity ( $m(K^+K^-)$  instead of  $m(KK)$ , which could refer to neutral kaons).

9. Decay chains can be written in several ways, depending on the complexity and the number of times it occurs. Unless there is a good reason not to, usage of a particular type should be consistent within the paper. Examples are:  $D_s^+ \rightarrow \phi\pi^+$ , with  $\phi \rightarrow K^+K^-$ ;  $D_s^+ \rightarrow \phi\pi^+$  ( $\phi \rightarrow K^+K^-$ );  $D_s^+ \rightarrow \phi(\rightarrow K^+K^-)\pi^+$ ; or  $D_s^+ \rightarrow [K^+K^-]_\phi\pi^+$ .
10. Variables are usually italic:  $V$  is a voltage (variable), while 1 V is a volt (unit). Also in combined expressions:  $Q$ -value,  $z$ -scale,  $R$ -parity *etc.*
11. Subscripts and superscripts 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):  $p_T$ ,  $\Delta m_s$ ,  $t_{\text{rec}}$ .
12. Standard function names are in roman type: *e.g.* cos, sin and exp.
13. Figure, Section, Equation, Chapter and Reference should be abbreviated as Fig., Sect. (or alternatively Sec.), 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. Equations may be referred to either with (“Eq. (1)”) or without (“Eq. 1”) parentheses, but it should be consistent within the paper.
14. 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, but not excessively; other more esoteric abbreviations should be avoided.
15. Units, material and particle names are usually lower case if spelled out, but often capitalised if abbreviated: amps (A), gauss (G), lead (Pb), silicon (Si), kaon ( $K$ ), but proton ( $p$ ).
16. 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”). The word ‘unity’ can be useful to express the special meaning of the number one in expressions such as: “The BDT output takes values between zero and unity”.
17. Numbers larger than 9999 have a comma (or a small space, but not both) 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.
18. We apply the rounding rules of the PDG [3]. The basic rule states that if the three highest order digits of the uncertainty lie between 100 and 354, we round to two significant digits. If they lie between 355 and 949, we round to one significant digit. Finally, if they lie between 950 and 999, we round up and keep two significant digits. In all cases, the central value is given with a precision that matches that of the uncertainty. So, for example, the result  $0.827 \pm 0.119$  should be written as  $0.83 \pm 0.12$ ,  $0.827 \pm 0.367$  should turn into  $0.8 \pm 0.4$ , and  $14.674 \pm 0.964$  becomes  $14.7 \pm 1.0$ . When writing numbers with uncertainty components from different sources, *i.e.* statistical and systematic uncertainties, the rule applies to the uncertainty with the best precision, so  $0.827 \pm 0.367$  (stat)  $\pm 0.179$  (syst) goes to  $0.83 \pm 0.37$  (stat)  $\pm 0.18$  (syst) and  $8.943 \pm 0.123$  (stat)  $\pm 0.995$  (syst) goes to  $8.94 \pm 0.12$  (stat)  $\pm 1.00$  (syst).

- 178 19. When rounding numbers, it should be avoided to pad with zeroes at the end. So  
179  $51237 \pm 4561$  should be rounded as  $(5.12 \pm 0.46) \times 10^4$  and not  $51200 \pm 4600$ .
- 180 20. When rounding numbers in a table, some variation of the rounding rules above may  
181 be required to achieve uniformity.
- 182 21. Hyphenation should be used where necessary to avoid ambiguity, but not excessively.  
183 For example: “big-toothed fish” (to indicate that big refers to the teeth, not to  
184 the fish), but “big white fish”. A compound modifier often requires hyphenation  
185 (*CP*-violating observables, *b*-hadron decays, final-state radiation, second-order poly-  
186 nomial), even if the same combination in an adjective-noun combination does not  
187 (direct *CP* violation, heavy *b* hadrons, charmless final state). Adverb-adjective  
188 combinations are not hyphenated if the adverb ends with ‘ly’: oppositely charged  
189 pions, kinematically similar decay. Cross-section, cross-check, and two-dimensional  
190 are hyphenated. Semileptonic, pseudorapidity, pseudoexperiment, multivariate,  
191 multidimensional, reweighted, preselection, nonresonant, nonzero, nonparametric,  
192 nonrelativistic, misreconstructed and misidentified are single words and should not  
193 be hyphenated.
- 194 22. Minus signs should be in a proper font ( $-$ ), not just hyphens ( $-$ ); this applies to  
195 figure labels as well as the body of the text. In Latex, use math mode (between  
196  $\$$ ’s) or make a dash (“--”). In ROOT, use `#font[122]{-}` to get a normal-sized  
197 minus sign.
- 198 23. Inverted commas (around a title, for example) should be a matching set of left- and  
199 right-handed pairs: “Title”. The use of these should be avoided where possible.
- 200 24. Single symbols are preferred for variables in equations, *e.g.*  $\mathcal{B}$  rather than BF for a  
201 branching fraction.
- 202 25. Parentheses are not usually required around a value and its uncertainty, before  
203 the unit, unless there is possible ambiguity: so  $\Delta m_s = 20 \pm 2 \text{ ps}^{-1}$  does not need  
204 parentheses, whereas  $f_d = (40 \pm 4)\%$  or  $x = (1.7 \pm 0.3) \times 10^{-6}$  does. The unit does  
205 not need to be repeated in expressions like  $1.2 < E < 2.4 \text{ GeV}$ .
- 206 26. The same number of decimal places should be given for all values in any one  
207 expression (*e.g.*  $5.20 < m_B < 5.34 \text{ GeV}/c^2$ ).
- 208 27. Apostrophes are best avoided for abbreviations: if the abbreviated term is capitalised  
209 or otherwise easily identified then the plural can simply add an s, otherwise it is  
210 best to rephrase: *e.g.* HPDs,  $\pi^0$ s, pions, rather than HPD’s,  $\pi^0$ ’s,  $\pi$ s.
- 211 28. Particle labels, decay descriptors and mathematical functions are not nouns, and  
212 need often to be followed by a noun. Thus “background from  $B^0 \rightarrow \pi^+\pi^-$  decays”  
213 instead of “background from  $B^0 \rightarrow \pi^+\pi^-$ ”, and “the width of the Gaussian function”  
214 instead of “the width of the Gaussian”.
- 215 29. In equations with multidimensional integrations or differentiations, the differential  
216 terms should be separated by a thin space. Thus  $\int f(x, y) dx dy$  instead  $\int f(x, y) dx dy$   
217 and  $\frac{d^2\Gamma}{dx dQ^2}$  instead of  $\frac{d^2\Gamma}{dx dQ^2}$ . The d’s are allowed in either roman or italic font, but  
218 should be consistent throughout the paper.



## 5 Detector and simulation

The paragraph below can be used for the detector description. Modifications may be required in specific papers to fit within page limits, to enhance particular detector elements or to introduce acronyms used later in the text. For journals where strict word counts are applied (for example, PRL), and space is at a premium, it may be sufficient to write, as a minimum: “The LHCb detector is a single-arm forward spectrometer covering the pseudorapidity range  $2 < \eta < 5$ , described in detail in Refs. [1, 4]”. A slightly longer version could specify the most relevant sub-detectors, *e.g.* “The LHCb detector [1, 4] is a single-arm forward spectrometer covering the pseudorapidity range  $2 < \eta < 5$ , designed for the study of particles containing *b* or *c* quarks. The detector elements that are particularly relevant to this analysis are: a silicon-strip vertex detector surrounding the *pp* interaction region that allows *c*- and *b*-hadrons to be identified from their characteristically long flight distance; a tracking system that provides a measurement of momentum, *p*, of charged particles; and two ring-imaging Cherenkov detectors that are able to discriminate between different species of charged hadrons.”

In the following paragraph, references to the individual detector performance papers are marked with a \* and should only be included if the analysis relies on numbers or methods described in the specific papers. Otherwise, a reference to the overall detector performance paper~\cite{LHCb-DP-2014-002} will suffice. Note also that the text defines the acronyms for primary vertex, PV, and impact parameter, IP. Remove either of those in case it is not used later on.

The LHCb detector [1, 4] is a single-arm forward spectrometer covering the pseudorapidity range  $2 < \eta < 5$ , designed for the study of particles containing *b* or *c* quarks. The detector includes a high-precision tracking system consisting of a silicon-strip vertex detector surrounding the *pp* interaction region [5]\*, a large-area silicon-strip detector located upstream of a dipole magnet with a bending power of about 4 Tm, and three stations of silicon-strip detectors and straw drift tubes [6]\* placed downstream of the magnet. The tracking system provides a measurement of momentum, *p*, of charged particles with a relative uncertainty that varies from 0.5% at low momentum to 1.0% at 200 GeV/*c*. The minimum distance of a track to a primary vertex (PV), the impact parameter (IP), is measured with a resolution of  $(15 + 29/p_T) \mu\text{m}$ , where  $p_T$  is the component of the momentum transverse to the beam, in GeV/*c*. Different types of charged hadrons are distinguished using information from two ring-imaging Cherenkov detectors [7]\*. Photons, electrons and hadrons are identified by a calorimeter system consisting of scintillating-pad and preshower detectors, an electromagnetic calorimeter and a hadronic calorimeter. Muons are identified by a system composed of alternating layers of iron and multiwire proportional chambers [8]\*. The online event selection is performed by a trigger [9]\*, which consists of a hardware stage, based on information from the calorimeter and muon systems, followed by a software stage, which applies a full event reconstruction.

A more detailed description of the ‘full event reconstruction’ could be:

- The trigger [9]\* consists of a hardware stage, based on information from the calorimeter and muon systems, followed by a software stage, in which all charged particles with  $p_T > 500$  (300) MeV are reconstructed for 2011 (2012) data. For triggers that

require neutral particles, energy deposits in the electromagnetic calorimeter are analysed to reconstruct  $\pi^0$  and  $\gamma$  candidates.

The trigger description has to be specific for the analysis in question. In general, you should not attempt to describe the full trigger system. Below are a few variations that inspiration can be taken from. First from a hadronic analysis, and second from an analysis with muons in the final state. In case you have to look up specifics of a certain trigger, a detailed description of the trigger conditions for Run 1 is available in Ref. [10]. **Never cite this note in a PAPER or CONF-note.**

- At the hardware trigger stage, events are required to have a muon with high  $p_T$  or a hadron, photon or electron with high transverse energy in the calorimeters. For hadrons, the transverse energy threshold is 3.5 GeV. The software trigger requires a two-, three- or four-track secondary vertex with a significant displacement from the primary  $pp$  interaction vertices. At least one charged particle must have a transverse momentum  $p_T > 1.7$  GeV/ $c$  and be inconsistent with originating from a PV. A multivariate algorithm [11] is used for the identification of secondary vertices consistent with the decay of a  $b$  hadron.
- The  $B^0 \rightarrow K^{*0} \mu^+ \mu^-$  signal candidates are first required to pass the hardware trigger, which selects events containing at least one muon with transverse momentum  $p_T > 1.48$  GeV/ $c$  in the 7 TeV data or  $p_T > 1.76$  GeV/ $c$  in the 8 TeV data. In the subsequent software trigger, at least one of the final-state particles is required to have  $p_T > 1.7$  GeV/ $c$  in the 7 TeV data or  $p_T > 1.6$  GeV/ $c$  in the 8 TeV data, unless the particle is identified as a muon in which case  $p_T > 1.0$  GeV/ $c$  is required. The final-state particles that satisfy these transverse momentum criteria are also required to have an impact parameter larger than 100  $\mu\text{m}$  with respect to all PVs in the event. Finally, the tracks of two or more of the final-state particles are required to form a vertex that is significantly displaced from the PVs.”

An example to describe the use of both TOS and TIS events:

- In the offline selection, trigger signals are associated with reconstructed particles. Selection requirements can therefore be made on the trigger selection itself and on whether the decision was due to the signal candidate, other particles produced in the  $pp$  collision, or a combination of both.

A good example of a description of long and downstream  $K_s^0$  is given in Ref. [12]:

- Decays of  $K_s^0 \rightarrow \pi^+ \pi^-$  are reconstructed in two different categories: the first involving  $K_s^0$  mesons that decay early enough for the daughter pions to be reconstructed in the vertex detector; and the second containing  $K_s^0$  that decay later such that track segments of the pions cannot be formed in the vertex detector. These categories are referred to as *long* and *downstream*, respectively. The long category has better mass, momentum and vertex resolution than the downstream category.

The description of our software stack for simulation is often causing trouble. The following paragraph can act as inspiration but with variations according to the level of detail required and if mentioning of *e.g.* PHOTOS is required.

- In the simulation,  $pp$  collisions are generated using PYTHIA [13] (In case only PYTHIA 6 is used, remove `*Sjostrand:2007gs` from this citation; if only PYTHIA 8 is used, then reverse the order of the papers in the citation.) with a specific LHCb configuration [14]. Decays of hadronic particles are described by EVTGEN [15], in which final-state radiation is generated using PHOTOS [16]. The interaction of the generated particles with the detector, and its response, are implemented using the GEANT4 toolkit [17] as described in Ref. [18].

Many analyses depend on boosted decision trees. It is inappropriate to use TMVA as the reference as that is merely an implementation of the BDT algorithm. Rather it is suggested to write

In this paper we use a boosted decision tree (BDT) [19,20] to separate signal from background.

When describing the integrated luminosity of the data set, do not use expressions like “ $1.0\text{ fb}^{-1}$  of data”, but *e.g.* “data corresponding to an integrated luminosity of  $1.0\text{ fb}^{-1}$ ”, or “data obtained from  $3\text{ fb}^{-1}$  of integrated luminosity”.

For analyses where the periodical reversal of the magnetic field is crucial, *e.g.* in measurements of direct  $CP$  violation, the following description can be used as an example phrase: “The polarity of the dipole magnet is reversed periodically throughout data-taking. The configuration with the magnetic field vertically upwards, *MagUp* (downwards, *MagDown*), bends positively (negatively) charged particles in the horizontal plane towards the centre of the LHC.” Only use the *MagUp*, *MagDown* symbols if they are used extensively in tables or figures.

## 6 Figures

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

Figure 1 shows an example of how to include an eps or pdf figure with the `\includegraphics` command (eps figures will not work with `pdflatex`). Note that if the graphics sits in `figs/myfig.pdf`, you can just write `\includegraphics{myfig}` as the `figs` subdirectory is searched automatically and the extension `.pdf` (`.eps`) is automatically added for `pdflatex` (`latex`).

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  $\text{MeV}/c^2$  if the region of interest covers a few  $\text{GeV}/c^2$  and all the numbers then run together). Spurious background shading and boxes around text should be avoided.
2. For the  $y$ -axis, “Entries” or “Candidates” is appropriate in case no background subtraction has been applied. Otherwise “Yield” or “Decays” may be more appropriate. If the unit on the  $y$ -axis corresponds to the yield per bin, indicate so, for example “Entries / (  $5\text{ MeV}/c^2$ )” or “Entries per  $5\text{ MeV}/c^2$ ”.

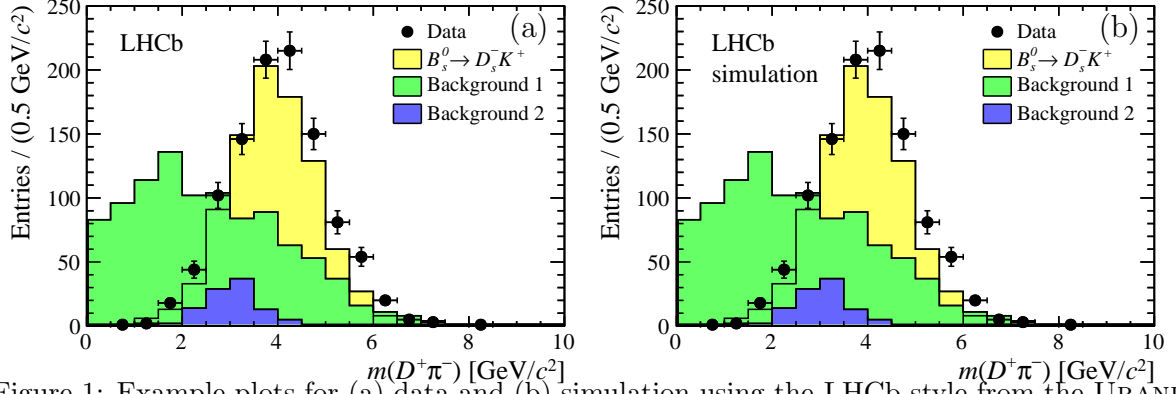


Figure 1: Example plots for (a) data and (b) simulation using the LHCb style from the URANIA package `RootTools/LHCbStyle`. The signal data is shown as points with the signal component as yellow (light shaded), background 1 as green (medium shaded) and background 2 as blue (dark shaded).

3. Fit curves should not obscure the data points, and data points are best (re)drawn over the fit curves.
4. 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 through differently dashed lines. The LHCb style mentioned above implements a colour scheme that works well but individual adjustments might be required.
5. Using different hatching styles helps to distinguished filled areas, also in black and white prints. Hatching styles 3001-3025 should be avoided since they behave unpredictably under zooming and scaling. Good styles for “falling hatched” and “rising hatched” are 3345 and 3354.
6. 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). In the caption, the labels (a), (b) *etc.* should precede their description. When referencing specific sub-figures, use “see Fig. 1(a)” or “see Figs. 2(b)-(e)”.
7. All figures containing LHCb data should have LHCb written on them. For preliminary results, that should be replaced by “LHCb preliminary”. Figures that only have simulated data should display “LHCb simulation”. Figures that do not depend on LHCb-specific software (*e.g.* only on PYTHIA) should not have any label.

## 7 References

References should be made using Bib<sub>T</sub>EX [21]. 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 BibTeX and the official LHCb BibTeX style. An example is in Ref. [13].
2. For references with four or less authors all of the authors' names are listed [22], otherwise the first author is given, followed by *et al.*. The LHCb BibTeX style will take care of this.
3. The order of references should be sequential when reading the document. This is automatic when using BibTeX.
4. The titles of papers should in general be included. To remove them, change `\setboolean{articletitles}{false}` to `true` at the top of this template. Note that the titles in `LHCb-PAPER.bib` are in plain LaTeX, in order to correspond to the actual title on the arXiv record. Some differences in style can thus be noticed with respect to the main text, for example particle names that use capital Greek letters are not slanted in the reference titles ( $\Lambda$  vs  $\Lambda$ ).
5. Whenever possible, use references from the supplied files `main.bib`, `LHCb-PAPER.bib`, `LHCb-CONF.bib`, and `LHCb-DP.bib`. These are kept up-to-date by the EB. If you see a mistake, do not edit these files, but let the EB know. This way, for every update of the paper, you save yourself the work of updating the references. Instead, you can just copy or check in the latest versions of the `.bib` files from the repository.
6. For those references not provided by the EB, the best is to copy the BibTeX entry directly from *Inspire*. Often these need to be edited to get the correct title, author names and formatting. For authors with multiple initials, add a space between them (change `R.G.C.` to `R. G. C.`), otherwise only the first initial will be taken. Also, make sure to eliminate unnecessary capitalisation. Apart from that, the title should be respected as much as possible (*e.g.* do not change particle names to PDG convention nor introduce/remove factors of  $c$ ). Check that both the arXiv and the journal index are clickable and point to the right article.
7. The `mciteplus` [23] package is used to enable multiple references to show up as a single item in the reference list. As an example `\cite{Mohapatra:1979ia,*Pascoli:2007qh}` where the `*` indicates that the reference should be merged with the previous one. The result of this can be seen in Ref. [24]. Be aware that the `mciteplus` package should be included as the very last item before the `\begin{document}` to work correctly.
8. It should be avoided to make references to public notes and conference reports in public documents. Exceptions can be discussed on a case-by-case basis with the review committee for the analysis. In internal reports they are of course welcome and can be referenced as seen in Ref. [25] using the `lhcbreport` category. For conference reports, omit the author field completely in the BibTeX record.
9. To get the typesetting and hyperlinks correct for LHCb reports, the category `lhcbreport` should be used in the BibTeX file. See Refs. [26] for some examples. It can be used for LHCb documents in the series `CONF`, `PAPER`, `PROC`, `THESIS`, `LHCC`, `TDR` and internal LHCb reports. Papers sent for publication, but not published yet,

should be referred with their **arXiv** number, so the **PAPER** category should only be used in the rare case of a forward reference to a paper.

10. Proceedings can be used for references to items such as the LHCb simulation [18], where we do not yet have a published paper.

There is a set of standard references to be used in LHCb that are listed in Appendix A.

## 8 Inclusion of supplementary material

Three types of supplementary material should be distinguished:

- A regular appendix: lengthy equations or long tables are sometimes better put in an appendix in order not to interrupt the main flow of a paper. Appendices will appear in the final paper, on arXiv and on the cds record and should be considered integral part of a paper, and are thus to be reviewed like the rest of the paper. An example of an LHCb paper with an appendix is Ref. [27].
- Supplementary material for cds: plots or tables that would make the paper exceed the page limit or are not appropriate to include in the paper itself, but are desirable to be shown in public should be added to the paper drafts in an appendix, and removed from the paper before submitting to arXiv or the journal. See Appendix D for further instructions. Examples are: comparison plots of the new result with older results, plots that illustrate cross-checks. An example of an LHCb paper with supplementary material for cds is Ref. [28]. Supplementary material for cds cannot be referenced in the paper. Supplementary material should be included in the draft paper to be reviewed by the collaboration.
- Supplementary material for the paper. This is usually called “supplemental material”, which distinguishes it from supplementary material for cds only. Most journals allow to submit files along with the paper that will not be part of the text of the article, but will be stored on the journal server. Examples are plain text files with numerical data corresponding to the plots in the paper. The supplemental material should be cited in the paper by including a reference which should say “See supplemental material at [link] for [give brief description of material].” The journal will insert a specific link for [link]. The arXiv version will usually include the supplemental material as part of the paper and so should not contain the words “at [link]”. Supplemental material should be included in the draft paper to be reviewed by the collaboration. An example of an LHCb paper with supplemental material is Ref. [29]

## Acknowledgements

The text below are the acknowledgements as approved by the collaboration board. Extending the acknowledgements to include individuals from outside the collaboration who have contributed to the analysis should be approved by the EB. The extra acknowledgements are normally placed before the standard acknowledgements, unless it matches better

with the text of the standard acknowledgements to put them elsewhere. They should be included in the draft for the first circulation. Except in exceptional circumstances, to be approved by the EB chair, authors of the paper should not be named in extended acknowledgements.

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 the LHCb institutes. We acknowledge support from CERN and from the national agencies: CAPES, CNPq, FAPERJ and FINEP (Brazil); NSFC (China); CNRS/IN2P3 (France); BMBF, DFG and MPG (Germany); INFN (Italy); FOM and NWO (The Netherlands); MNiSW and NCN (Poland); MEN/IFA (Romania); MinES and FANO (Russia); MinECo (Spain); SNSF and SER (Switzerland); NASU (Ukraine); STFC (United Kingdom); NSF (USA). We acknowledge the computing resources that are provided by CERN, IN2P3 (France), KIT and DESY (Germany), INFN (Italy), SURF (The Netherlands), PIC (Spain), GridPP (United Kingdom), RRCKI and Yandex LLC (Russia), CSCS (Switzerland), IFIN-HH (Romania), CBPF (Brazil), PL-GRID (Poland) and OSC (USA). We are indebted to the communities behind the multiple open source software packages on which we depend. Individual groups or members have received support from AvH Foundation (Germany), EPLANET, Marie Skłodowska-Curie Actions and ERC (European Union), Conseil Général de Haute-Savoie, Labex ENIGMASS and OCEVU, Région Auvergne (France), RFBR and Yandex LLC (Russia), GVA, XuntaGal and GENCAT (Spain), Herchel Smith Fund, The Royal Society, Royal Commission for the Exhibition of 1851 and the Leverhulme Trust (United Kingdom).

## Appendices

### A Standard References

Below is a list of common references, as well as a list of all LHCb publications. As they are already in prepared bib files, they can be used as simply as `\cite{Alves:2008zz}` to get the LHCb detector paper. The references are defined in the files `main.bib`, `LHCb-PAPER.bib`, `LHCb-CONF.bib`, `LHCb-DP.bib` `LHCb-TDR.bib` files, with obvious contents. Each of these have their LHCb-ZZZ-20XX-0YY number as their cite code. If you believe there is a problem with the formatting or content of one of the entries, then get in contact with the Editorial Board rather than just editing it in your local file, since you are likely to need the latest version just before submitting the article.

Description	cite code	Reference
LHCb detector	Alves:2008zz	[1]
LHCb simulation	LHCb-PROC-2011-006	[18]
PDG 2014	PDG2014	[3]
HFAG	HFAG	[30]
PYTHIA	Sjostrand:2006za, *Sjostrand:2007gs	[13]
LHCb PYTHIA tuning	LHCb-PROC-2010-056	[14]
GEANT4	Allison:2006ve, *Agostinelli:2002hh	[17]
EVTGEN	Lange:2001uf	[15]
PHOTOS	Golonka:2005pn	[16]
DIRAC	Tsaregorodtsev:2010zz, *BelleDIRACAmazon	[31]
Crystal Ball function <sup>3</sup>	Skwarnicki:1986xj	[32]
Wilks' theorem	Wilks:1938dza	[33]
BDT	Breiman	[19]
BDT training	AdaBoost	[20]
HLT2 topo	BBDT	[11]
DecayTreeFitter	Hulsbergen:2005pu	[34]
<i>sPlot</i>	Pivk:2004ty	[35]
Punzi's optimization	Punzi:2003bu	[36]
$f_s/f_d$	fsfd	[37]

<sup>3</sup>A valid alternative for most papers where the normalisation is not critical is to use the expression "Gaussian function with a low-mass power-law tail" or "Gaussian function with power-law tails". In that case, no citation is needed



LHCb-DP number	Title
LHCb-DP-2016-001 [38]	TESLA project
LHCb-DP-2014-002 [4]	LHCb detector performance
LHCb-DP-2014-001 [5]	Performance of the LHCb Vertex Locator
LHCb-DP-2013-004 [39]	Performance of the LHCb calorimeters
LHCb-DP-2013-003 [6]	Performance of the LHCb Outer Tracker
LHCb-DP-2013-002 [40]	Measurement of the track reconstruction efficiency at LHCb
LHCb-DP-2013-001 [41]	Performance of the muon identification at LHCb
LHCb-DP-2012-005 [42]	Radiation damage in the LHCb Vertex Locator
LHCb-DP-2012-004 [9]	The LHCb trigger and its performance in 2011
LHCb-DP-2012-003 [7]	Performance of the LHCb RICH detector at the LHC
LHCb-DP-2012-002 [8]	Performance of the LHCb muon system
LHCb-DP-2012-001 [43]	Radiation hardness of the LHCb Outer Tracker
LHCb-DP-2011-002 [44]	Simulation of machine induced background ...
LHCb-DP-2011-001 [45]	Performance of the LHCb muon system with cosmic rays
LHCb-DP-2010-001 [46]	First spatial alignment of the LHCb VELO ...

LHCb-TDR number	Title
LHCb-TDR-016 [47]	Trigger and online upgrade
LHCb-TDR-015 [48]	Tracker upgrade
LHCb-TDR-014 [49]	PID upgrade
LHCb-TDR-013 [50]	VELO upgrade
LHCb-TDR-012 [51]	Framework TDR for the upgrade
LHCb-TDR-011 [52]	Computing
LHCb-TDR-010 [53]	Trigger
LHCb-TDR-009 [54]	Reoptimized detector
LHCb-TDR-008 [55]	Inner Tracker
LHCb-TDR-007 [56]	Online, DAQ, ECS
LHCb-TDR-006 [57]	Outer Tracker
LHCb-TDR-005 [58]	VELO
LHCb-TDR-004 [59]	Muon system
LHCb-TDR-003 [60]	RICH
LHCb-TDR-002 [61]	Calorimeters
LHCb-TDR-001 [62]	Magnet

Table 3: LHCb-PAPERS (which have their identifier as their cite code). Note that LHCb-PAPER-2011-039 does not exist.

	LHCb-PAPER-2016-029 [63]
LHCb-PAPER-2016-028 [64]	LHCb-PAPER-2016-027 [65]
LHCb-PAPER-2016-026 [66]	LHCb-PAPER-2016-025 [67]
LHCb-PAPER-2016-024 [68]	LHCb-PAPER-2016-023 [69]
LHCb-PAPER-2016-022 [70]	LHCb-PAPER-2016-021 [71]
LHCb-PAPER-2016-020 [72]	LHCb-PAPER-2016-019 [73]
LHCb-PAPER-2016-018 [74]	LHCb-PAPER-2016-017 [75]
LHCb-PAPER-2016-016 [76]	LHCb-PAPER-2016-015 [77]
LHCb-PAPER-2016-014 [78]	LHCb-PAPER-2016-013 [79]

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LHCb-PAPER-2016-012 [80]	LHCb-PAPER-2016-011 [81]
LHCb-PAPER-2016-010 [82]	LHCb-PAPER-2016-009 [83]
LHCb-PAPER-2016-008 [84]	LHCb-PAPER-2016-007 [85]
LHCb-PAPER-2016-006 [86]	LHCb-PAPER-2016-005 [87]
LHCb-PAPER-2016-004 [88]	LHCb-PAPER-2016-003 [89]
LHCb-PAPER-2016-002 [90]	LHCb-PAPER-2016-001 [91]
LHCb-PAPER-2015-060 [92]	LHCb-PAPER-2015-059 [93]
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LHCb-PAPER-2012-002 [343]	LHCb-PAPER-2012-001 [344]
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LHCb-PAPER-2011-045 [345]	LHCb-PAPER-2011-044 [346]
LHCb-PAPER-2011-043 [347]	LHCb-PAPER-2011-042 [348]
LHCb-PAPER-2011-041 [349]	LHCb-PAPER-2011-040 [350]

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LHCb-PAPER-2011-036 [353]	LHCb-PAPER-2011-035 [354]
LHCb-PAPER-2011-034 [355]	LHCb-PAPER-2011-033 [356]
LHCb-PAPER-2011-032 [357]	LHCb-PAPER-2011-031 [358]
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LHCb-PAPER-2011-024 [365]	LHCb-PAPER-2011-023 [366]
LHCb-PAPER-2011-023 [367]	LHCb-PAPER-2011-021 [368]
LHCb-PAPER-2011-020 [369]	LHCb-PAPER-2011-019 [370]
LHCb-PAPER-2011-018 [371]	LHCb-PAPER-2011-017 [372]
LHCb-PAPER-2011-016 [373]	LHCb-PAPER-2011-015 [374]
LHCb-PAPER-2011-014 [375]	LHCb-PAPER-2011-013 [376]
LHCb-PAPER-2011-012 [377]	LHCb-PAPER-2011-011 [378]
LHCb-PAPER-2011-010 [379]	LHCb-PAPER-2011-009 [380]
LHCb-PAPER-2011-008 [381]	LHCb-PAPER-2011-007 [382]
LHCb-PAPER-2011-006 [383]	LHCb-PAPER-2011-005 [384]
LHCb-PAPER-2011-004 [385]	LHCb-PAPER-2011-003 [386]
LHCb-PAPER-2011-002 [387]	LHCb-PAPER-2011-001 [388]
LHCb-PAPER-2010-002 [389]	LHCb-PAPER-2010-001 [390]

486

Table 4: LHCb-CONFs (which have their identifier as their cite code). Note that LHCb-CONF-2011-032 does not exist.

	LHCb-CONF-2016-005 [391]
LHCb-CONF-2016-004 [392]	LHCb-CONF-2016-003 [393]
LHCb-CONF-2016-002 [394]	LHCb-CONF-2016-001 [395]
LHCb-CONF-2015-005 [396]	
LHCb-CONF-2015-004 [397]	LHCb-CONF-2015-003 [398]
LHCb-CONF-2015-002 [399]	LHCb-CONF-2015-001 [400]
LHCb-CONF-2014-004 [401] <sup>4</sup>	LHCb-CONF-2014-003 [402]
LHCb-CONF-2014-002 [403]	LHCb-CONF-2014-001 [404]
LHCb-CONF-2013-013 [405]	
LHCb-CONF-2013-012 [406]	LHCb-CONF-2013-011 [407]
LHCb-CONF-2013-010 [408]	LHCb-CONF-2013-009 [409]
LHCb-CONF-2013-008 [410]	LHCb-CONF-2013-007 [411]
LHCb-CONF-2013-006 [412]	LHCb-CONF-2013-005 [413]
LHCb-CONF-2013-004 [414]	LHCb-CONF-2013-003 [415]
LHCb-CONF-2013-002 [416]	LHCb-CONF-2013-001 [417]
LHCb-CONF-2012-034 [418]	LHCb-CONF-2012-033 [419]
LHCb-CONF-2012-032 [420]	LHCb-CONF-2012-031 [421]

<sup>4</sup>If you cite the gamma combination, always also cite the latest gamma paper as `\cite{LHCb-PAPER-2013-020,*LHCb-CONF-2014-004}` (unless you cite LHCb-PAPER-2013-020 separately too).

– continued from previous page.

LHCb-CONF-2012-030 [422]	LHCb-CONF-2012-029 [423]
LHCb-CONF-2012-028 [424]	LHCb-CONF-2012-027 [425]
LHCb-CONF-2012-026 [426]	LHCb-CONF-2012-025 [427]
LHCb-CONF-2012-024 [428]	LHCb-CONF-2012-023 [429]
LHCb-CONF-2012-022 [430]	LHCb-CONF-2012-021 [431]
LHCb-CONF-2012-020 [432]	LHCb-CONF-2012-019 [433]
LHCb-CONF-2012-018 [434]	LHCb-CONF-2012-017 [435]
LHCb-CONF-2012-016 [436]	LHCb-CONF-2012-015 [437]
LHCb-CONF-2012-014 [438]	LHCb-CONF-2012-013 [439]
LHCb-CONF-2012-012 [440]	LHCb-CONF-2012-011 [441]
LHCb-CONF-2012-010 [442]	LHCb-CONF-2012-009 [443]
LHCb-CONF-2012-008 [444]	LHCb-CONF-2012-007 [445]
LHCb-CONF-2012-006 [446]	LHCb-CONF-2012-005 [447]
LHCb-CONF-2012-004 [448]	LHCb-CONF-2012-003 [449]
LHCb-CONF-2012-002 [450]	LHCb-CONF-2012-001 [451]
LHCb-CONF-2011-062 [452]	LHCb-CONF-2011-061 [453]
LHCb-CONF-2011-060 [454]	LHCb-CONF-2011-059 [455]
LHCb-CONF-2011-058 [456]	LHCb-CONF-2011-057 [457]
LHCb-CONF-2011-056 [458]	LHCb-CONF-2011-055 [459]
LHCb-CONF-2011-054 [460]	LHCb-CONF-2011-053 [461]
LHCb-CONF-2011-052 [462]	LHCb-CONF-2011-051 [463]
LHCb-CONF-2011-050 [464]	LHCb-CONF-2011-049 [465]
LHCb-CONF-2011-048 [466]	LHCb-CONF-2011-047 [467]
LHCb-CONF-2011-046 [468]	LHCb-CONF-2011-045 [469]
LHCb-CONF-2011-044 [470]	LHCb-CONF-2011-043 [471]
LHCb-CONF-2011-042 [472]	LHCb-CONF-2011-041 [473]
LHCb-CONF-2011-040 [474]	LHCb-CONF-2011-039 [475]
LHCb-CONF-2011-038 [476]	LHCb-CONF-2011-037 [477]
LHCb-CONF-2011-036 [478]	LHCb-CONF-2011-035 [479]
LHCb-CONF-2011-034 [480]	LHCb-CONF-2011-033 [481]
LHCb-CONF-2011-031 [482]	
LHCb-CONF-2011-030 [483]	LHCb-CONF-2011-029 [484]
LHCb-CONF-2011-028 [485]	LHCb-CONF-2011-027 [486]
LHCb-CONF-2011-026 [487]	LHCb-CONF-2011-025 [488]
LHCb-CONF-2011-024 [489]	LHCb-CONF-2011-023 [490]
LHCb-CONF-2011-023 [491]	LHCb-CONF-2011-021 [492]
LHCb-CONF-2011-020 [493]	LHCb-CONF-2011-019 [494]
LHCb-CONF-2011-018 [495]	LHCb-CONF-2011-017 [496]
LHCb-CONF-2011-016 [497]	LHCb-CONF-2011-015 [498]
LHCb-CONF-2011-014 [499]	LHCb-CONF-2011-013 [500]
LHCb-CONF-2011-012 [501]	LHCb-CONF-2011-011 [502]
LHCb-CONF-2011-010 [503]	LHCb-CONF-2011-009 [504]
LHCb-CONF-2011-008 [505]	LHCb-CONF-2011-007 [506]
LHCb-CONF-2011-006 [507]	LHCb-CONF-2011-005 [508]
LHCb-CONF-2011-004 [509]	LHCb-CONF-2011-003 [25]

– continued from previous page.

LHCb-CONF-2011-002 [510]	LHCb-CONF-2011-001 [511]
LHCb-CONF-2010-014 [512]	LHCb-CONF-2010-013 [513]
LHCb-CONF-2010-012 [514]	LHCb-CONF-2010-011 [515]
LHCb-CONF-2010-010 [516]	LHCb-CONF-2010-009 [517]
LHCb-CONF-2010-008 [518]	

487

488 Some LHCb papers quoted together will look like [382–386]. The combination of CMS  
489 and LHCb results on  $B_{(s)}^0 \rightarrow \mu^+ \mu^-$  should be cited like [406].

## 490 B Standard symbols

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

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

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

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

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

## 510 C List of all symbols

### 511 C.1 Experiments

<code>\lhcb</code>	LHCb	<code>\atlas</code>	ATLAS	<code>\cms</code>	CMS
<code>\alice</code>	ALICE	<code>\babar</code>	BaBar	<code>\belle</code>	Belle
<code>\cleo</code>	CLEO	<code>\cdf</code>	CDF	<code>\dzero</code>	D0
512 <code>\aleph</code>	ALEPH	<code>\delphi</code>	DELPHI	<code>\opal</code>	OPAL
<code>\lthree</code>	L3	<code>\sld</code>	SLD	<code>\cern</code>	CERN
<code>\lhc</code>	LHC	<code>\lep</code>	LEP	<code>\tevatron</code>	Tevatron

### 513 C.1.1 LHCb sub-detectors and sub-systems

<code>\velo</code>	VELO	<code>\rich</code>	RICH	<code>\richone</code>	RICH1
<code>\richtwo</code>	RICH2	<code>\ttracker</code>	TT	<code>\intr</code>	IT
<code>\st</code>	ST	<code>\ot</code>	OT	<code>\spd</code>	SPD
<code>\presh</code>	PS	<code>\ecal</code>	ECAL	<code>\hcal</code>	HCAL
514 <code>\MagUp</code>	<i>MagUp</i>	<code>\MagDown</code>	<i>MagDown</i>	<code>\ode</code>	ODE
<code>\daq</code>	DAQ	<code>\tfc</code>	TFC	<code>\ecs</code>	ECS
<code>\lone</code>	L0	<code>\hlt</code>	HLT	<code>\hlton</code>	HLT1
<code>\hltwo</code>	HLT2				

## 515 C.2 Particles

### 516 C.2.1 Leptons

<code>\electron</code>	$e$	<code>\en</code>	$e^-$	<code>\ep</code>	$e^+$
<code>\epm</code>	$e^\pm$	<code>\epem</code>	$e^+e^-$	<code>\muon</code>	$\mu$
<code>\mup</code>	$\mu^+$	<code>\mun</code>	$\mu^-$	<code>\mumu</code>	$\mu^+\mu^-$
<code>\tauon</code>	$\tau$	<code>\taup</code>	$\tau^+$	<code>\taum</code>	$\tau^-$
517 <code>\tautau</code>	$\tau^+\tau^-$	<code>\lepton</code>	$\ell$	<code>\ellm</code>	$\ell^-$
<code>\ellp</code>	$\ell^+$	<code>\ellell</code>	$\ell^+\ell^-$	<code>\neu</code>	$\nu$
<code>\neub</code>	$\bar{\nu}$	<code>\neue</code>	$\nu_e$	<code>\neueb</code>	$\bar{\nu}_e$
<code>\neum</code>	$\nu_\mu$	<code>\neumb</code>	$\bar{\nu}_\mu$	<code>\neut</code>	$\nu_\tau$
<code>\neutb</code>	$\bar{\nu}_\tau$	<code>\neul</code>	$\nu_\ell$	<code>\neulb</code>	$\bar{\nu}_\ell$

### 518 C.2.2 Gauge bosons and scalars

<code>\g</code>	$\gamma$	<code>\H</code>	$H^0$	<code>\Hp</code>	$H^+$
<code>\Hm</code>	$H^-$	<code>\Hpm</code>	$H^\pm$	<code>\W</code>	$W$
519 <code>\Wp</code>	$W^+$	<code>\Wm</code>	$W^-$	<code>\Wpm</code>	$W^\pm$
<code>\Z</code>	$Z$				

### 520 C.2.3 Quarks

<code>\quark</code>	$q$	<code>\quarkbar</code>	$\bar{q}$	<code>\qqbar</code>	$q\bar{q}$
<code>\uquark</code>	$u$	<code>\uquarkbar</code>	$\bar{u}$	<code>\uubar</code>	$u\bar{u}$
<code>\dquark</code>	$d$	<code>\dquarkbar</code>	$\bar{d}$	<code>\ddbar</code>	$d\bar{d}$
521 <code>\squark</code>	$s$	<code>\squarkbar</code>	$\bar{s}$	<code>\ssbar</code>	$s\bar{s}$
<code>\cquark</code>	$c$	<code>\cquarkbar</code>	$\bar{c}$	<code>\ccbar</code>	$c\bar{c}$
<code>\bquark</code>	$b$	<code>\bquarkbar</code>	$\bar{b}$	<code>\bbbar</code>	$b\bar{b}$
<code>\tquark</code>	$t$	<code>\tquarkbar</code>	$\bar{t}$	<code>\ttbar</code>	$t\bar{t}$



## 522 C.2.4 Light mesons

<code>\hadron</code>	$h$	<code>\pion</code>	$\pi$	<code>\piz</code>	$\pi^0$
<code>\pizs</code>	$\pi^0_s$	<code>\pip</code>	$\pi^+$	<code>\pim</code>	$\pi^-$
<code>\pipm</code>	$\pi^\pm$	<code>\pimp</code>	$\pi^\mp$	<code>\rhomeson</code>	$\rho$
<code>\rhoz</code>	$\rho^0$	<code>\rhop</code>	$\rho^+$	<code>\rhom</code>	$\rho^-$
<code>\rhopm</code>	$\rho^\pm$	<code>\rhomp</code>	$\rho^\mp$	<code>\kaon</code>	$K$
<code>\Kb</code>	$\bar{K}$	<code>\KorKbar</code>	$\bar{K}$	<code>\Kz</code>	$K^0$
523 <code>\Kzb</code>	$\bar{K}^0$	<code>\Kp</code>	$K^+$	<code>\Km</code>	$K^-$
<code>\Kpm</code>	$K^\pm$	<code>\Kmp</code>	$K^\mp$	<code>\KS</code>	$K^0_s$
<code>\KL</code>	$K^0_L$	<code>\Kstarz</code>	$K^{*0}$	<code>\Kstarzb</code>	$\bar{K}^{*0}$
<code>\Kstar</code>	$K^*$	<code>\Kstarb</code>	$\bar{K}^*$	<code>\Kstarp</code>	$K^{*+}$
<code>\Kstarm</code>	$K^{*-}$	<code>\Kstarpm</code>	$K^{*\mp}$	<code>\Kstarmp</code>	$K^{*\mp}$
<code>\etaz</code>	$\eta$	<code>\etapr</code>	$\eta'$	<code>\phiz</code>	$\phi$
<code>\omegaz</code>	$\omega$				

## 524 C.2.5 Heavy mesons

<code>\D</code>	$D$	<code>\Db</code>	$\bar{D}$	<code>\DorDbar</code>	$\bar{D}$
<code>\Dz</code>	$D^0$	<code>\Dzb</code>	$\bar{D}^0$	<code>\Dp</code>	$D^+$
<code>\Dm</code>	$D^-$	<code>\Dpm</code>	$D^\pm$	<code>\Dmp</code>	$D^\mp$
<code>\Dstar</code>	$D^*$	<code>\Dstarb</code>	$\bar{D}^*$	<code>\Dstarz</code>	$D^{*0}$
<code>\Dstarzb</code>	$\bar{D}^{*0}$	<code>\Dstarp</code>	$D^{*+}$	<code>\Dstarm</code>	$D^{*-}$
<code>\Dstarpm</code>	$D^{*\pm}$	<code>\Dstarmp</code>	$D^{*\mp}$	<code>\Ds</code>	$D^+_s$
<code>\Dsp</code>	$D^+_s$	<code>\Dsm</code>	$D^-_s$	<code>\Dspm</code>	$D^\pm_s$
525 <code>\Dsmp</code>	$D^\mp_s$	<code>\Dss</code>	$D^{*+}_s$	<code>\Dssp</code>	$D^{*+}_s$
<code>\Dssm</code>	$D^{*-}_s$	<code>\Dsspm</code>	$D^{*\pm}_s$	<code>\Dssmp</code>	$D^{*\mp}_s$
<code>\B</code>	$B$	<code>\Bbar</code>	$\bar{B}$	<code>\Bb</code>	$\bar{B}$
<code>\BorBbar</code>	$\bar{B}$	<code>\Bz</code>	$B^0$	<code>\Bzb</code>	$\bar{B}^0$
<code>\Bu</code>	$B^+$	<code>\Bub</code>	$B^-$	<code>\Bp</code>	$B^+$
<code>\Bm</code>	$B^-$	<code>\Bpm</code>	$B^\pm$	<code>\Bmp</code>	$B^\mp$
<code>\Bd</code>	$B^0$	<code>\Bs</code>	$B^0_s$	<code>\Bsb</code>	$\bar{B}^0_s$
<code>\Bdb</code>	$\bar{B}^0$	<code>\Bc</code>	$B^+_c$	<code>\Bcp</code>	$B^+_c$
<code>\Bcm</code>	$B^-_c$	<code>\Bcpm</code>	$B^\pm_c$		

## 526 C.2.6 Onia

<code>\jpsi</code>	$J/\psi$	<code>\psitwos</code>	$\psi(2S)$	<code>\psiprpr</code>	$\psi(3770)$
<code>\etac</code>	$\eta_c$	<code>\chiczero</code>	$\chi_{c0}$	<code>\chicone</code>	$\chi_{c1}$
527 <code>\chictwo</code>	$\chi_{c2}$	<code>\OneS</code>	$\Upsilon(1S)$	<code>\TwoS</code>	$\Upsilon(2S)$
<code>\ThreeS</code>	$\Upsilon(3S)$	<code>\FourS</code>	$\Upsilon(4S)$	<code>\FiveS</code>	$\Upsilon(5S)$
<code>\chic</code>	$\chi_c$				

### 528 C.2.7 Baryons

<code>\proton</code>	$p$	<code>\antiproton</code>	$\bar{p}$	<code>\neutron</code>	$n$
<code>\antineutron</code>	$\bar{n}$	<code>\Deltares</code>	$\Delta$	<code>\Deltaresbar</code>	$\bar{\Delta}$
<code>\Xires</code>	$\Xi$	<code>\Xiresbar</code>	$\bar{\Xi}$	<code>\Lz</code>	$\Lambda$
<code>\Lbar</code>	$\bar{\Lambda}$	<code>\LorLbar</code>	$\bar{\Lambda}^{(\overline{\phantom{x}})}$	<code>\Lambdares</code>	$\Lambda$
<code>\Lambdaresbar</code>	$\bar{\Lambda}$	<code>\Sigmares</code>	$\Sigma$	<code>\Sigmaresbar</code>	$\bar{\Sigma}$
<code>\Omegares</code>	$\Omega$	<code>\Omegaresbar</code>	$\bar{\Omega}$	<code>\Lb</code>	$\Lambda_b^0$
529 <code>\Lbbar</code>	$\bar{\Lambda}_b^0$	<code>\Lc</code>	$\Lambda_c^+$	<code>\Lcbar</code>	$\bar{\Lambda}_c^-$
<code>\Xib</code>	$\Xi_b$	<code>\Xibz</code>	$\Xi_b^0$	<code>\Xibm</code>	$\Xi_b^-$
<code>\Xibbar</code>	$\bar{\Xi}_b$	<code>\Xibbarz</code>	$\bar{\Xi}_b^0$	<code>\Xibbarp</code>	$\Xi_b^+$
<code>\Xic</code>	$\Xi_c$	<code>\Xicz</code>	$\Xi_c^0$	<code>\Xicp</code>	$\Xi_c^+$
<code>\Xicbar</code>	$\bar{\Xi}_c$	<code>\Xicbarz</code>	$\bar{\Xi}_c^0$	<code>\Xicbarm</code>	$\Xi_c^-$
<code>\Omegac</code>	$\Omega_c^0$	<code>\Omegacbar</code>	$\bar{\Omega}_c^0$	<code>\Omegab</code>	$\Omega_b^-$
<code>\Omegabbar</code>	$\bar{\Omega}_b^+$				

## 530 C.3 Physics symbols

### 531 C.3.1 Decays

<code>\BF</code>	$\mathcal{B}$	<code>\BRvis</code>	$\mathcal{B}_{\text{vis}}$	<code>\BR</code>	$\mathcal{B}$
532 <code>\decay[2] \decay{a }{b c }</code>	$a \rightarrow bc$	<code>\ra</code>	$\rightarrow$	<code>\to</code>	$\rightarrow$

### 533 C.3.2 Lifetimes

<code>\tauBs</code>	$\tau_{B_s^0}$	<code>\tauBd</code>	$\tau_{B^0}$	<code>\tauBz</code>	$\tau_{B^0}$
534 <code>\tauBu</code>	$\tau_{B^+}$	<code>\tauDp</code>	$\tau_{D^+}$	<code>\tauDz</code>	$\tau_{D^0}$
<code>\tauL</code>	$\tau_L$	<code>\tauH</code>	$\tau_H$		

### 535 C.3.3 Masses

<code>\mBd</code>	$m_{B^0}$	<code>\mBp</code>	$m_{B^+}$	<code>\mBs</code>	$m_{B_s^0}$
536 <code>\mBc</code>	$m_{B_c^+}$	<code>\mLb</code>	$m_{\Lambda_b^0}$		

### 537 C.3.4 EW theory, groups

<code>\grpsuthree</code>	$\text{SU}(3)$	<code>\grpsutw</code>	$\text{SU}(2)$	<code>\grpuone</code>	$\text{U}(1)$
<code>\ssqtw</code>	$\sin^2 \theta_W$	<code>\csqtw</code>	$\cos^2 \theta_W$	<code>\stw</code>	$\sin \theta_W$
<code>\ctw</code>	$\cos \theta_W$	<code>\ssqtweff</code>	$\sin^2 \theta_W^{\text{eff}}$	<code>\csqtweff</code>	$\cos^2 \theta_W^{\text{eff}}$
538 <code>\stweff</code>	$\sin \theta_W^{\text{eff}}$	<code>\ctweff</code>	$\cos \theta_W^{\text{eff}}$	<code>\gv</code>	$g_V$
<code>\ga</code>	$g_A$	<code>\order</code>	$\mathcal{O}$	<code>\ordalph</code>	$\mathcal{O}(\alpha)$
<code>\ordalsq</code>	$\mathcal{O}(\alpha^2)$	<code>\ordalcub</code>	$\mathcal{O}(\alpha^3)$		

### 539 C.3.5 QCD parameters

<code>\as</code>	$\alpha_s$	<code>\MSb</code>	$\overline{\text{MS}}$	<code>\lqcd</code>	$\Lambda_{\text{QCD}}$
540 <code>\qsq</code>	$q^2$				

### 541 C.3.6 CKM, CP violation

<code>\eps</code>	$\varepsilon$	<code>\epsK</code>	$\varepsilon_K$	<code>\epsB</code>	$\varepsilon_B$
<code>\epsp</code>	$\varepsilon'_K$	<code>\CP</code>	$CP$	<code>\CPT</code>	$CPT$
<code>\rhobar</code>	$\bar{\rho}$	<code>\etabar</code>	$\bar{\eta}$	<code>\Vud</code>	$V_{ud}$
<code>\Vcd</code>	$V_{cd}$	<code>\Vtd</code>	$V_{td}$	<code>\Vus</code>	$V_{us}$
542 <code>\Vcs</code>	$V_{cs}$	<code>\Vts</code>	$V_{ts}$	<code>\Vub</code>	$V_{ub}$
<code>\Vcb</code>	$V_{cb}$	<code>\Vtb</code>	$V_{tb}$	<code>\Vuds</code>	$V_{ud}^*$
<code>\Vcds</code>	$V_{cd}^*$	<code>\Vtds</code>	$V_{td}^*$	<code>\Vuss</code>	$V_{us}^*$
<code>\Vcss</code>	$V_{cs}^*$	<code>\Vtss</code>	$V_{ts}^*$	<code>\Vubs</code>	$V_{ub}^*$
<code>\Vcbs</code>	$V_{cb}^*$	<code>\Vtbs</code>	$V_{tb}^*$		

### 543 C.3.7 Oscillations

<code>\dm</code>	$\Delta m$	<code>\dms</code>	$\Delta m_s$	<code>\dmd</code>	$\Delta m_d$
<code>\DG</code>	$\Delta \Gamma$	<code>\DGs</code>	$\Delta \Gamma_s$	<code>\DGd</code>	$\Delta \Gamma_d$
<code>\Gs</code>	$\Gamma_s$	<code>\Gd</code>	$\Gamma_d$	<code>\MBq</code>	$M_{B_q}$
<code>\DGq</code>	$\Delta \Gamma_q$	<code>\Gq</code>	$\Gamma_q$	<code>\dmq</code>	$\Delta m_q$
<code>\GL</code>	$\Gamma_L$	<code>\GH</code>	$\Gamma_H$	<code>\DGsGs</code>	$\Delta \Gamma_s / \Gamma_s$
544 <code>\Delm</code>	$\Delta m$	<code>\ACP</code>	$\mathcal{A}^{CP}$	<code>\Adir</code>	$\mathcal{A}^{\text{dir}}$
<code>\Amix</code>	$\mathcal{A}^{\text{mix}}$	<code>\ADelta</code>	$\mathcal{A}^\Delta$	<code>\phid</code>	$\phi_d$
<code>\sinphid</code>	$\sin \phi_d$	<code>\phis</code>	$\phi_s$	<code>\betas</code>	$\beta_s$
<code>\sbetas</code>	$\sigma(\beta_s)$	<code>\stbetas</code>	$\sigma(2\beta_s)$	<code>\stphis</code>	$\sigma(\phi_s)$
<code>\sinphis</code>	$\sin \phi_s$				

### 545 C.3.8 Tagging

<code>\edet</code>	$\varepsilon_{\text{det}}$	<code>\erec</code>	$\varepsilon_{\text{rec/det}}$	<code>\esel</code>	$\varepsilon_{\text{sel/rec}}$
<code>\etrg</code>	$\varepsilon_{\text{trg/sel}}$	<code>\etot</code>	$\varepsilon_{\text{tot}}$	<code>\mistag</code>	$\omega$
546 <code>\wcomb</code>	$\omega^{\text{comb}}$	<code>\etag</code>	$\varepsilon_{\text{tag}}$	<code>\etagcomb</code>	$\varepsilon_{\text{tag}}^{\text{comb}}$
<code>\effeff</code>	$\varepsilon_{\text{eff}}$	<code>\effeffcomb</code>	$\varepsilon_{\text{eff}}^{\text{comb}}$	<code>\efftag</code>	$\varepsilon_{\text{tag}}(1 - 2\omega)^2$
<code>\effD</code>	$\varepsilon_{\text{tag}} D^2$	<code>\etagprompt</code>	$\varepsilon_{\text{tag}}^{\text{Pr}}$	<code>\etagLL</code>	$\varepsilon_{\text{tag}}^{\text{LL}}$

### 547 C.3.9 Key decay channels

<code>\BdToKstmm</code>	$B^0 \rightarrow K^{*0} \mu^+ \mu^-$	<code>\BdbToKstmm</code>	$\bar{B}^0 \rightarrow \bar{K}^{*0} \mu^+ \mu^-$	<code>\BsToJPsiPhi</code>	$B_s^0 \rightarrow J/\psi \phi$
<code>\BdToJPsiKst</code>	$B^0 \rightarrow J/\psi K^{*0}$	<code>\BdbToJPsiKst</code>	$\bar{B}^0 \rightarrow J/\psi \bar{K}^{*0}$	<code>\BsPhiGam</code>	$B_s^0 \rightarrow \phi \gamma$
548 <code>\BdKstGam</code>	$B^0 \rightarrow K^{*0} \gamma$	<code>\BTohh</code>	$B \rightarrow h^+ h'^-$	<code>\BdTopipi</code>	$B^0 \rightarrow \pi^+ \pi^-$
<code>\BdToKpi</code>	$B^0 \rightarrow K^+ \pi^-$	<code>\BsToKK</code>	$B_s^0 \rightarrow K^+ K^-$	<code>\BsTopiK</code>	$B_s^0 \rightarrow \pi^+ K^-$

### 549 C.3.10 Rare decays

<code>\BdKstee</code>	$B^0 \rightarrow K^{*0} e^+ e^-$	<code>\BdbKstee</code>	$\bar{B}^0 \rightarrow \bar{K}^{*0} e^+ e^-$	<code>\bsll</code>	$b \rightarrow s \ell^+ \ell^-$
<code>\AFB</code>	$A_{\text{FB}}$	<code>\FL</code>	$F_L$	<code>\AT#1</code>	$A_{\text{T}}^2$
550 <code>\btosgam</code>	$b \rightarrow s \gamma$	<code>\btodgam</code>	$b \rightarrow d \gamma$	<code>\Bsmm</code>	$B_s^0 \rightarrow \mu^+ \mu^-$
<code>\Bdmm</code>	$B^0 \rightarrow \mu^+ \mu^-$	<code>\ctl</code>	$\cos \theta_\ell$	<code>\ctk</code>	$\cos \theta_K$

### 551 C.3.11 Wilson coefficients and operators

552	<code>\C#1</code>	<code>\C9</code>	$\mathcal{C}_9$	<code>\Cp#1</code>	<code>\Cp7</code>	$\mathcal{C}'_7$	<code>\Ceff#1</code>	<code>\Ceff9</code>	$\mathcal{C}_9^{(\text{eff})}$
	<code>\Cpeff#1</code>	<code>\Cpeff7</code>	$\mathcal{C}'_7^{(\text{eff})}$	<code>\Ope#1</code>	<code>\Ope2</code>	$\mathcal{O}_2$	<code>\Opep#1</code>	<code>\Opep7</code>	$\mathcal{O}'_7$

### 553 C.3.12 Charm

554	<code>\xprime</code>	$x'$	<code>\yprime</code>	$y'$	<code>\ycp</code>	$y_{CP}$
	<code>\agamma</code>	$A_\Gamma$	<code>\dkpicf</code>	$D^0 \rightarrow K^- \pi^+$		

### 555 C.3.13 QM

556	<code>\bra[1]</code>	<code>\bra{a}</code>	$\langle a $	<code>\ket[1]</code>	<code>\ket{b}</code>	$ b\rangle$	<code>\braket[2]</code>	<code>\braket{a}{b}</code>	$\langle a b\rangle$
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## 557 C.4 Units

558	<code>\unit[1]</code>	<code>\unit{kg}</code>	kg
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### 559 C.4.1 Energy and momentum

	<code>\tev</code>	TeV	<code>\gev</code>	GeV	<code>\mev</code>	MeV
	<code>\kev</code>	keV	<code>\ev</code>	eV	<code>\gevc</code>	GeV/c
560	<code>\mevc</code>	MeV/c	<code>\gevcc</code>	GeV/c <sup>2</sup>	<code>\gevgevcccc</code>	GeV <sup>2</sup> /c <sup>4</sup>
	<code>\mevcc</code>	MeV/c <sup>2</sup>				

### 561 C.4.2 Distance and area

	<code>\km</code>	km	<code>\m</code>	m	<code>\ma</code>	m <sup>2</sup>
	<code>\cm</code>	cm	<code>\cma</code>	cm <sup>2</sup>	<code>\mm</code>	mm
	<code>\mma</code>	mm <sup>2</sup>	<code>\mum</code>	μm	<code>\muma</code>	μm <sup>2</sup>
562	<code>\nm</code>	nm	<code>\fm</code>	fm	<code>\barn</code>	b
	<code>\mbarn</code>	mb	<code>\mub</code>	μb	<code>\nb</code>	nb
	<code>\invnb</code>	nb <sup>-1</sup>	<code>\pb</code>	pb	<code>\invpb</code>	pb <sup>-1</sup>
	<code>\fb</code>	fb	<code>\invfb</code>	fb <sup>-1</sup>	<code>\ab</code>	ab
	<code>\invab</code>	ab <sup>-1</sup>				

### 563 C.4.3 Time

	<code>\sec</code>	s	<code>\ms</code>	ms	<code>\mus</code>	μs
	<code>\ns</code>	ns	<code>\ps</code>	ps	<code>\fs</code>	fs
564	<code>\mhz</code>	MHz	<code>\khz</code>	kHz	<code>\hz</code>	Hz
	<code>\invps</code>	ps <sup>-1</sup>	<code>\invns</code>	ns <sup>-1</sup>	<code>\yr</code>	yr
	<code>\hr</code>	hr				

### 565 C.4.4 Temperature

566	<code>\degc</code>	°C	<code>\degk</code>	K
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## 567 C.4.5 Material lengths, radiation

	<code>\Xrad</code>	$X_0$		<code>\NIL</code>	$\lambda_{int}$		<code>\mip</code>	MIP
568	<code>\neutroneq</code>	$n_{eq}$		<code>\neqcmcm</code>	$n_{eq}/\text{cm}^2$		<code>\kRad</code>	kRad
	<code>\MRad</code>	MRad		<code>\ci</code>	Ci		<code>\mci</code>	mCi

## 569 C.4.6 Uncertainties

	<code>\sx</code>	$\sigma_x$		<code>\sy</code>	$\sigma_y$		<code>\sz</code>	$\sigma_z$
570	<code>\stat</code>	(stat)		<code>\syst</code>	(syst)			

## 571 C.4.7 Maths

	<code>\order</code>	$\mathcal{O}$		<code>\chisq</code>	$\chi^2$		<code>\chisqndf</code>	$\chi^2/\text{ndf}$
	<code>\chisqip</code>	$\chi_{IP}^2$		<code>\chisqvs</code>	$\chi_{VS}^2$		<code>\chisqvtx</code>	$\chi_{vtx}^2$
	<code>\chisqvtxndf</code>	$\chi_{vtx}^2/\text{ndf}$		<code>\deriv</code>	d		<code>\gsim</code>	$\gtrsim$
572	<code>\lsim</code>	$\lesssim$		<code>\mean[1]</code>	$\langle x \rangle$		<code>\abs[1]</code>	$\ x\ $
	<code>\Real</code>	$\mathcal{R}e$		<code>\Imag</code>	$\mathcal{I}m$		<code>\PDF</code>	PDF
	<code>\sPlot</code>	$sPlot$						

## 573 C.5 Kinematics

### 574 C.5.1 Energy, Momenta

	<code>\Ebeam</code>	$E_{\text{BEAM}}$		<code>\sqs</code>	$\sqrt{s}$		<code>\ptot</code>	$p$
575	<code>\pt</code>	$p_T$		<code>\et</code>	$E_T$		<code>\mt</code>	$M_T$
	<code>\dpp</code>	$\Delta p/p$		<code>\msq</code>	$m^2$		<code>\dedx</code>	$dE/dx$

### 576 C.5.2 PID

	<code>\dllkpi</code>	$DLL_{K\pi}$		<code>\dllppi</code>	$DLL_{p\pi}$		<code>\dllepi</code>	$DLL_{e\pi}$
577	<code>\dllmupi</code>	$DLL_{\mu\pi}$						

### 578 C.5.3 Geometry

	<code>\degrees</code>	$^\circ$		<code>\krad</code>	krad		<code>\mrad</code>	mrad
579	<code>\rad</code>	rad						

### 580 C.5.4 Accelerator

581	<code>\betastar</code>	$\beta^*$		<code>\lum</code>	$\mathcal{L}$		<code>\intlum[1]</code>	$\int \mathcal{L} = 2 \text{ fb}^{-1}$
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## 582 C.6 Software

### 583 C.6.1 Programs

\bcveppy	BCVEGPY	\boole	BOOLE	\brunel	BRUNEL
\davinci	DAVINCI	\dirac	DIRAC	\evtgen	EVTGEN
\fewz	FEWZ	\fluka	FLUKA	\ganga	GANGA
\gaudi	GAUDI	\gauss	GAUSS	\geant	GEANT4
584 \hepmc	HEPMC	\herwig	HERWIG	\moore	MOORE
\neurobayes	NEUROBAYES	\photos	PHOTOS	\powheg	POWHEG
\pythia	PYTHIA	\resbos	RESBOS	\roofit	ROOTFIT
\root	ROOT	\spice	SPICE	\urania	URANIA

### 585 C.6.2 Languages

\cpp	C++	\ruby	RUBY	\fortran	FORTRAN
586 \svn	SVN				

### 587 C.6.3 Data processing

\kbytes	kbytes	\kbsps	kbits/s	\kbits	kbits
\kbsps	kbits/s	\mbps	Mbytes/s	\mbytes	Mbytes
588 \mbps	Mbyte/s	\mbps	Mbytes/s	\gbsps	Gbytes/s
\gbytes	Gbytes	\gbsps	Gbytes/s	\tbytes	Tbytes
\tbpv	Tbytes/yr	\dst	DST		

## 589 C.7 Detector related

### 590 C.7.1 Detector technologies

\nonn	$n^+$ -on- $n$	\ponn	$p^+$ -on- $n$	\nonp	$n^+$ -on- $p$
591 \cvd	CVD	\mwpc	MWPC	\gem	GEM

### 592 C.7.2 Detector components, electronics

\tell1	TELL1	\ukl1	UKL1	\beetle	Beetle
\otis	OTIS	\croc	CROC	\carioca	CARIOCA
\dialog	DIALOG	\sync	SYNC	\cardiac	CARDIAC
\gol	GOL	\vcsl	VCSEL	\ttc	TTC
\ttcrx	TTCrx	\hpd	HPD	\pmt	PMT
593 \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

### 594 C.7.3 Chemical symbols

\cfourften	C <sub>4</sub> F <sub>10</sub>	\cffour	CF <sub>4</sub>	\cotwo	CO <sub>2</sub>
595 \csixffoutteen	C <sub>6</sub> F <sub>14</sub>	\mgftwo	MgF <sub>2</sub>	\siotwo	SiO <sub>2</sub>

596 **C.8 Special Text**

	<code>\eg</code>	<i>e.g.</i>		<code>\ie</code>	<i>i.e.</i>		<code>\etal</code>	<i>et al.</i>
597	<code>\etc</code>	<i>etc.</i>		<code>\cf</code>	<i>cf.</i>		<code>\ffp</code>	<i>ff.</i>
	<code>\vs</code>	<i>vs.</i>						

## D Supplementary material for LHCb-PAPER-20XX-YYY

This appendix contains supplementary material that will posted on the public cds record but will not appear in the paper.

Please leave the above sentence in your draft for first and second circulation and replace what follows by your actual supplementary material. For more information about other types of supplementary material, see Section 8. Plots and tables that follow should be well described, either with captions or with additional explanatory text.

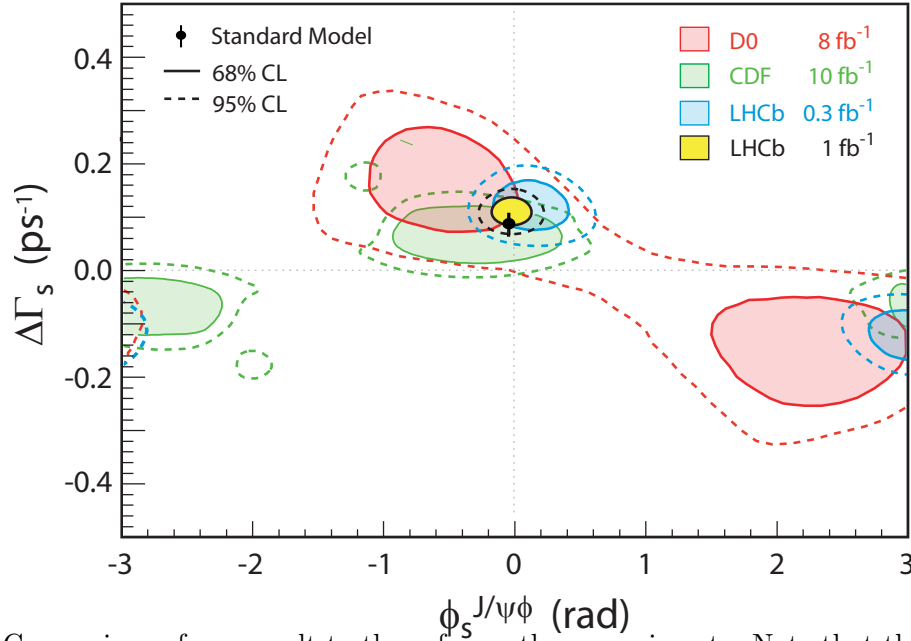


Figure 2: Comparison of our result to those from other experiments. Note that the style of this figure differs slightly from that of Figure 1



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