0.1 General comments

- Almost all plots in the text made larger, as requested by Dave.

- A number of typos highlighted by Dave and Cristina have been fixed, but are not explicitly listed here.

0.2 Chapter 1

Page 2, Line 391 - "the candidate conducted" to "I conducted".

Page 2, Line 405 - "The fermions are spin-half particles comprising the quarks and leptons, which make up the vast majority of everyday matter." to "The fermions are spin-half particles comprising the quarks and 405 leptons, of which everyday matter is composed." for obvious reasons.

Page 3, footnote 1 - Corrected to note that the charged weak bosons couple only to left-handed fermions while the neutral bosons couple to both left and right.

Page 5, Eq 1.2 - noted that ϕ represents a physical field.

Page 13, Line 1.19 - Changed an error in the equations about the diagonal CKM elements and unitarity.

Page 14, Figure 1.3 - added more detail to the CKM constraints plot, as per Dave's request.

Page 16, Figure 1.4 - Caption now defines n_b, the number of b quarks in the hadron.

Page 19, Line 760 - section reference fixed.

Page 21, Line 760 - "LHCb machine" to "LHCb detector".

0.3 Chapter 2

Page 24, Figure 2.1 - lower text removed from plot, relevant part of plot made larger.

Page 25, Table 2.1 - wrong units for instantaneous luminosity corrected.

Page 34, Line 1017 - defined X_0 here where it's mentioned first, instead of later as before, and gone into further detail on description.

Page 38, Line 1077 - removed X_0 definition.

Page 39, Line 1105 - defined gas electron multiplier.

0.4   Chapter 3

Page 52, Line 1131 - Removed some repetitious text on the momentum ranges of the radiators.

Page 53, Line 1345 - added some detail on the clarity coefficient, although I can't seem to find much additional information on it.

Page 53, Line 1359 - "$pp \rightarrow pp\mu^+\mu^-$ decays" to "$pp \rightarrow pp\mu^+\mu^-$ production".

Page 53, Line 1362 - cm^3 corrected to m^3.

Page 54, Line 1368 - Provided some more information on the Cherenkov photons as requested by Cristina.

Page 55, Line 1404 - "8192 square of area" to "8192 square sub-detectors of area".

Page 56, Line 1423 - As requested by Cristina, added some information on the detected photoelectron yields.

Page 61, Line 1587 - As requested, expanded on the ${}_s\mathcal{P}lots$ technique.

Page 62 - Throughout this section, selection information has been collated in tables to improve clarity and removed from the main text.

Page 70 - Stripping selections of $\Lambda_c^+ \rightarrow phh'$ calibration modes described in tables to improve clarity.

Page 75, Figure 3.12 - As requested by Dave, have expanded on the resonant structure of the decays in the caption. Prospect of getting a better diagram was raised but I'm not too familiar with vector graphics packages.

Page 76, Fig 3.14 - Defined WM as wrong mass in caption.

Page 77, Line 1879 - Added reference to the CROP algorithm used in selection training.

Page 80, Figure 3.18 - Figures made larger so captions are more legible at Dave's request. Want to make the text larger, but need to remake the dataset first.

Page 84, Line 1931 - Rewrote this paragraph to be clearer as per Cristina's request.

Page 94, Fig 3.27 - Caption mistakenly referred to a black curve which isn't there, have corrected this.

0.5 Chapter 4

Page 96, Line 2121 - Cristina requested that I expand on the exchange diagrams, but we cover them earlier in the theory review so I have added a reference to the relevant section here.

Page 98, Line 2174 - Cristina asked for some clarification as to the different gen-level cuts. This was because some simulation using one cut had been previously generated by another analysis and was suitable for reuse, so I've added a footnote here explaining that.

Page 98, Line 2183 - As mentioned in the viva, the EVTGEN code here is a little esoteric, I've detailed the simulation's resonant components in text instead of in the code fragment. Cristina also suggested a table here but I feel the information is brief enough to function as text.

Page 100, Line 2230 - Added a footnote with a very brief description of what the Kullback-Liebler distance is.

Page 100, Line 2234 - As requested by Cristina, expanded on the DIRA quantity and why we use it to suppress combinatorics and secondaries.

Page 103, Line 2282 - Rewrote this paragraph to be clearer.

Page 109, Line 2370 - Have referenced the section in which we test the BDT response, as requested by Cristina.

Page 111, Line 2434 - Have explicitly given the BDT cut used in the analysis, as requested by Cristina.

Page 114, Line 2471 - Have commented on the spectra of the prompt and the SL, as requested by Cristina.

Page 128, Line 2622 - Cristina requested that I clarify our position on the small reflection tails entering the signal region, which we deal with by narrowing the window.

Page 128, Line 2635 - Have changed the wording here to be more accurate - instead of claiming the candidates are uniformly distributed, I make the weaker claim that they do not peak sharply.

0.6 Chapter 5

Page 138, Line 2738 - Have defined what we consider to be "reconstructible" as per Cristina's requests.

Page 145, Line 2894 - Have clarified that when the p-values of the flat line fits are below 0.05 we attempt local efficiency re-weighting and find them compatible with the phase-space averaged approach.

Page 145, Line 2905 - have clarified the meaning of the generator-level efficiencies taken from the logfiles and those calculated from our smaller samples.

Page 151, Line 2996 - Cristina asked this paragraph to be explained more thoroughly - it all is in subsequent sections so I've added references to those.

Page 161, Line 3218 - Have rewritten as per Cristina's suggestions to improve clarity.

Page 174, Section 5.2.4 - Have made general changes to this section to reflect the prompt/secondary discrimination as "future work" and not something which will go in the thesis. Cristina also asked for a reference to the Bukin function, but there isn't one I can find, in either a note or published paper.

Page 177, Figure 5.17 - Added a plot as discussed in the viva showing some example Bukin functions.

0.7 Chapter 6

Page 183, Line 3465 - Have expanded on Wilks' theorem and how systematics would be incorporated to the significance extraction.

Page 189, Line 3528 - As requested in the viva have commented on the discrepancy and our belief it is caused by the secondary contamination in the prompt analysis.

0.8 Appendix A

Page 196, Line 3643 - Rewrote to be clearer, as per Cristina's suggestions.

Section A.1.7 - Cristina remarks that we "don't learn much" from the examples. I personally disagree, as I think it is valuable to observe that the very low and high values of κ correspond to effects in the efficiency space that are visible - respectively the development of visible statistical fluctuation in low κ and the poor resolution of structure for high κ. I'll go with what you decide.

0.9 Appendix B

General - Cristina has remarked that by keeping the efficiency bias below the individual efficiency bin uncertainties we are hiding it behind uncertainties. While this is true, I've added a note that by ensuring the bias is smaller than the uncertainty the effect will be largely mitigated given we take the ratios of efficiencies, both of which will be very slightly biased downwards. I'm continuing with others at LHCb to find a correct estimator for this re-weighting procedure but we haven't arrived at anything which works as of yet.

0.10 References

Reference 109 corrected as requested by Dave.