

#### 4.4. Template Fit continued

I 752: event number → number of events

I 753: Due to the background level is not ignorable, → As the background levels can not be ignored,

I 754 -755: Rewrite as: "Therefore, in order to extract clean antiproton signals, the template fit method is used in this analysis"

\* You have to explain more what this "template fit method" does and most specifically the 2D fit that you do; what do you fit to the data? why? etc...

I 759: are used as the same as the one → are the same with the ones used

I 760: antiproton → the antiproton

#### Low Rigidity Range

I 763 -764: most backgrounds are electrons and interaction secondary particles like pions. → the dominant background sources are electrons and secondary particles produced at interactions like pions.

I 766: decrease, → decreases

I 767:

- increase, → increases,
- TRDLikelihood → TRD Likelihood (\* PLEASE correct all the instances of this word; I will not indicate it any more from now on)
- afterward — afterwards

I 768: temple → template

I 771: TOF → the TOF

I 772: cuts and selections → all the cuts and selections are applied,

I 774:

- ISS → the ISS
- the → a

I 775: data → data sample

I 776:

- TOF → the TOF
- TRDLikelihood. → the TRD Likelihood.

I 777: secondaries → secondaries samples

I 778: respectively. → for each sample respectively.

I 779 -780:

- selected dedicatedly → should fulfill additional selection requirements
- selections → these additional selections

I 781:

- the table of 4.4 → table 4.4
- with fixed → using a fixed

I 782 and 783: \* You have to define/explain all the new symbols you use here like  $\beta_{\text{low}}$ ,  $m_p$ ,  $\Lambda_{\text{low}}$ . Why do you call here the estimator "TRDLogLikelihood"? So far you did not use the "Log" in the name. Try to be consistent with what you write.

I 783:

- are → define

- the lower edge is —> their lower edge values are

I 786: \* What do you mean by “representative result”?

I 787: dependent lower edges are—> dependence of  $\beta_{\text{low}}$  and  $\Lambda_{\text{low}}$  at the lower edge of the template fit range is

Figure 4.4:

- The rigidity-dependent lower edge of template fit range —> The rigidity dependence of  $\beta_{\text{low}}$  (a) and  $\Lambda_{\text{low}}$  (b) at the lower edge of the template fit range for 90% signal efficiency.

\* You should have already defined in the text what is  $\beta_{\text{low}}$  (a) and  $\Lambda_{\text{low}}$  of course....

- \* Do not use fullstops after a). , b). etc (\* PLEASE correct all the instances of this; I will not indicate it any more from now on)

Table 4.4: \* You have to define/explain in the text what all these cuts mean, right? And write more things in your captions! For example: List of selections for templates —> List of selections for the formation of all the templates used in the template fit in the low rigidity range.

I 788:

- \* Specify which are these “two projections” you’re talking about. These are the projections of the 2D template fit axes for TOF beta and the TRD Likelihood, right? Explain better in the text.

- in —> in the rigidity range of

Figure 4.5:

- in 3.64 to 4.02 GV in low rigidity range —> in the low rigidity range of 3.64 to 4.02 GV.

- the value is subtracted by the  $1/\beta$  —> the value of  $1/\beta$  is subtracted from  $1/\beta_{\text{TOF}}$

- around —> equal to around zero.

- \* Explain what the “assumption of antiproton mass” means.

- \* Use the same symbols in the text and in your Figures for the different quantities e.g.  $1/\beta_{\text{TOF}}$  and  $1/\text{TOFBeta}$  are used for the same thing; this is not correct.

- \* I think instead of “Counts” on the y-axis is better to use “Events”. Cross check with Henning.

- \* It is not good practice to use a black line for the fit. Moreover this line doesn't look like a fit line. It is a histogram. Please check again ALL your plots with template fits.

I 790: antiproton numbers —> number of antiproton events (or the number of antiprotons)

I 791:

- antiproton number —> number of antiproton events as a function of the rigidity (or the number of antiprotons as a function of the rigidity)

-  $\chi^2$  —>  $\chi^2$  (\* PLEASE correct all the instances of this; I will not indicate it any more from now on)

- The  $\chi^2/\text{dof}$  of the correspondent template fit is —> The corresponding  $\chi^2/\text{dof}$  values of the template fits are

Figure 4.6:

- antiproton numbers —> number of antiproton events (or the number of antiprotons)

\* Change accordingly the y-axis label of the plot

- fit —> fits

- low —> the low

Figure 4.7:

- template fit —> the template fits

- low —> the low

\* You have to give more explanations for all the Figures/results that you give in the text and the Figure captions. For example are your fits good or bad? what about the error bars (uncertainties) of your points? etc

### Intermediate Rigidity Range

I 794: In the intermediate rigidity range, —> In the intermediate rigidity range (3.0 to 19.5 GV),

I 800: is ignorable. —> can be ignored.

\* Explain why it can be ignored; you may also use a reference of previous publications that prove that.

I 801: are only —> are only formed for

I 802:

- ISS —> the ISS
- antiproton —> antiproton template

I 805: to get templates and data selections —> that are used for the data and in order to form the templates

I 808: particle —> particles

I 809: in —> the

I 810: \* Explain a bit more what this ECALBDT value is.

Table 4.5:

- List of selections for templates —> \* see previous comment

I 813:

- of 10.1-11 GV —> in the rigidity range of 10.1-11 GV
- signals —> signal

I 814: with electron backgrounds —> from the electron background.

I 815:

- antiproton number—> number of antiproton events (or the number of antiprotons)

Figure 4.8:

- in 10.1 to 11 GV in intermediate —> in the intermediate rigidity range of 10.1 to 11.0 GV.
- \* Add a fullstop at the end of this sentence
- \* Write the number of entries in the parenthesis in the same way in all plots! Compare with with figure 4.5.

Figure 4.9:

- antiproton numbers —> number of antiproton events (or the number of antiprotons) as a function of the rigidity
- intermediate —> the intermediate
- \* Add a fullstop at the end of this sentence (\* PLEASE correct all the instances of this; I will not indicate it any more from now on)

I 815 - 816: Rewrite as: “The corresponding  $\chi^2$  /dof values of the template fits in the intermediate rigidity range are given in Figure 4.10.”

Figure 4.10:

- template fit —> the template fits
- intermediate —> the intermediate

### High Rigidity Range

I 818: confusion —> confused

I 818 -819: Remove “with the rigidity going up”.

I 819: should be —> is

I 821: range. —> ranges.

I 825: ISS —> the ISS

I 826 -827:

- ISS —> the ISS
- 0 < ECALBDT, the charge confused proton is taken from proton MC simulation—> ECALBDT to be larger than zero. Finally, the charge confused proton template is formed by using proton MC simulation samples

I 827: negative rigidity —> events with negative rigidity

I 828: \* You have to explain what this TRDLikelihood\_p/He estimator is.

I 829: template —> the template

I 830: in 175-211 GV —> in the rigidity range of 175 to 211 GV

I 832:

- antiproton — antiprotons
- confusion —> confused
- \* Explain why they can be separated. They have for example different shapes and describe them. Always explain your results!

I 833: antiproton and electron —> antiprotons and electrons

Figure 4.11: - 175 to 211 GV in high rigidity range. —> the high rigidity range of 175 to 211 GV.

- \*Again try to explain more these Figures. You have to comment for example on the tiny contribution of the electrons in Figure 4.11 (a) that it is hardly visible.

I 834: antiproton got —> number of antiprotons obtained

I 835: correspondent —> corresponding

Figure 4.12: \* What fluctuation are you talking about? Explain better. Give for example the Rigidity value or range where this fluctuation is visible....Your explanation is not clear and you need to expand it specially for the case of the different tracker patterns.

Figure 4.13: \* Please correct the caption according to previous comments.

I 836:

- range —> ranges
- is done, —> are performed

I 837: determined —> collected (or selected)

### Time dependent analysis

I 840: every six Bartels Rotations bin. —> time bins with a width equal to the duration of six Bartels Rotations each.

I 842 - 843: Rewrite as: "the rigidity binning is altered in the following way: every two original neighbouring rigidity bins are now merged to form a new bin. In this way, an increase in statistics in each new bin is accomplished."

I 844: time —> the time

I 848: in —> in the rigidity range of

Figure 4.14:

- in ---> in the rigidity range of
- collected —> collected from

I 850:

- from the 23 six —> for the 23 groups containing data of six Bartels Rotations each
- Bartel's —> Bartels

I 851:

- correspondent —> corresponding values of the
- is —> are

Figure 4.15:

- template ---> the template
- in —> in the rigidity range of

Figure 4.16:

- in  $\rightarrow$  in the rigidity range of

\* Again, there are no explanations of your Figures...For example, why the number of antiprotons decreases the last years?  
Are the fits of good quality?

\*Use grid lines inside these figures.