$\beta^* \frac{dL}{dz}$ Simulation: Update

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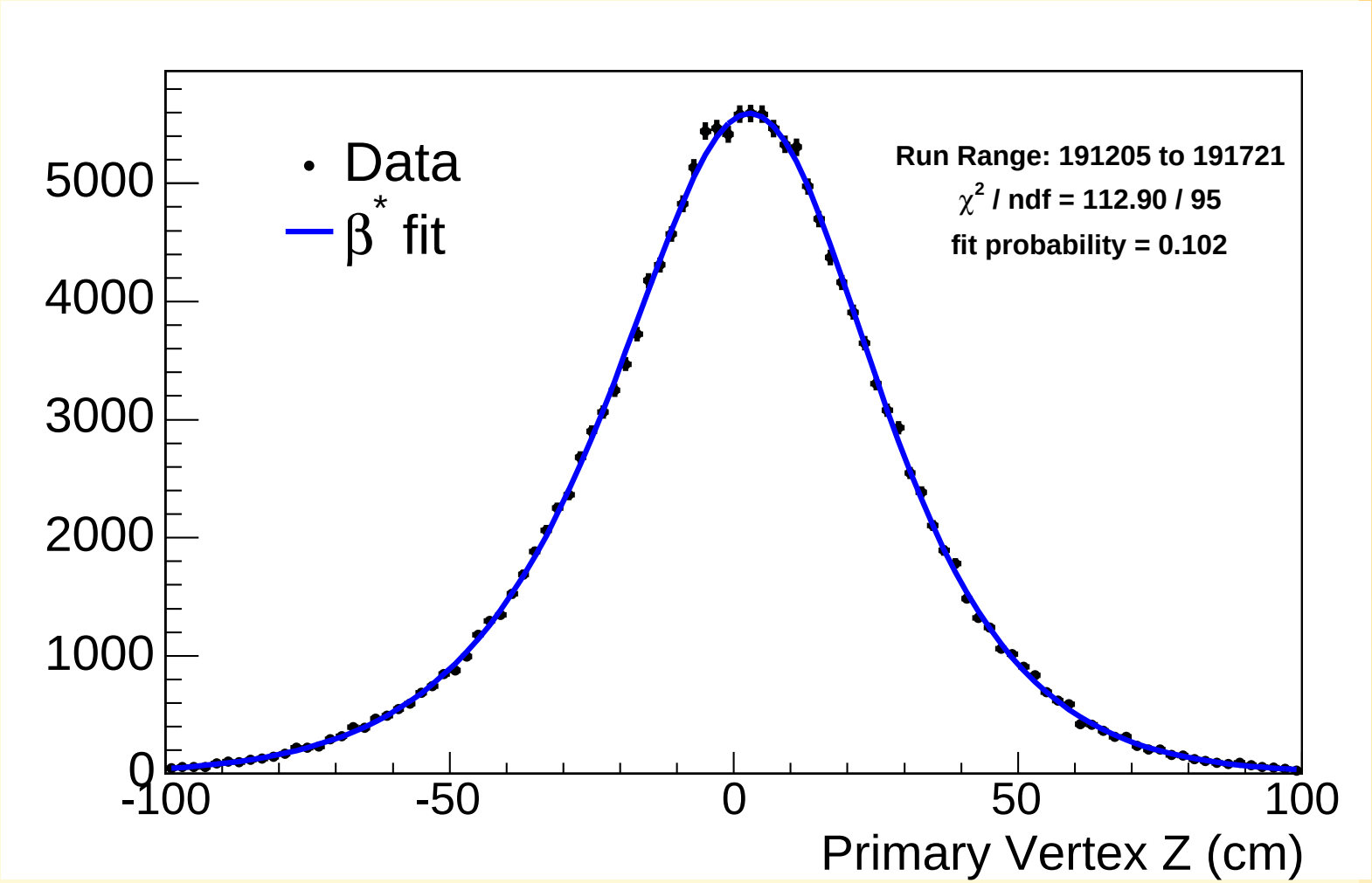
Introduction

- The simulation of the primary vertex z coordinate for Gen6 MC is based upon the $\beta^* \frac{dL}{dz}$ function:

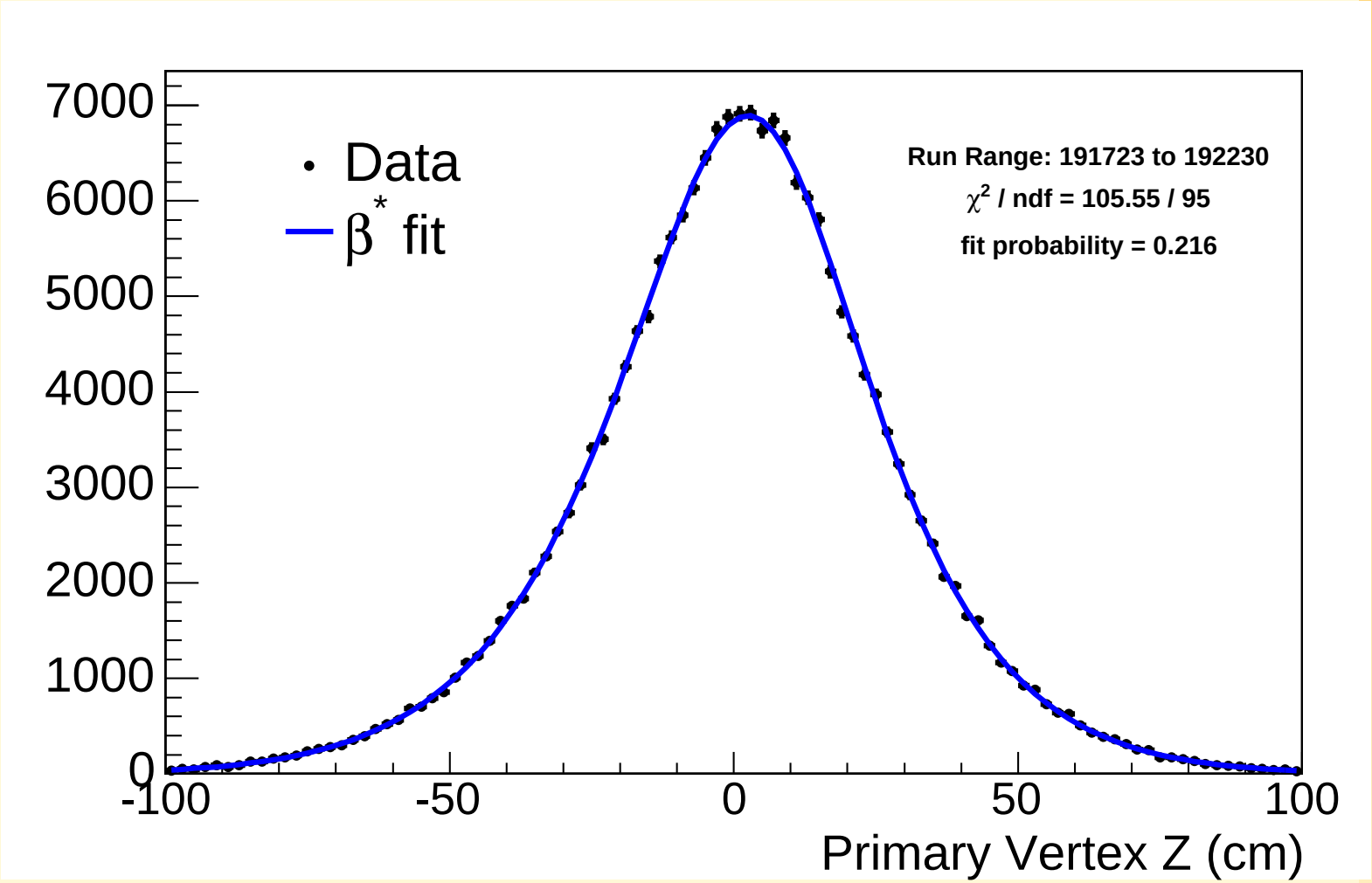
$$\frac{dL}{dz} \propto \frac{e^{\frac{-(z-z_0)^2}{2\sigma_z^2}}}{1+\frac{(z-z_{min})^2}{\beta^{*2}}}$$

- The original implementation covered all runs through the August 2004 shutdown, and is documented in note 7521.
- This update covers runs from January through March (the last run is 195383).
- Newer runs will use the same parameters as run 195383.

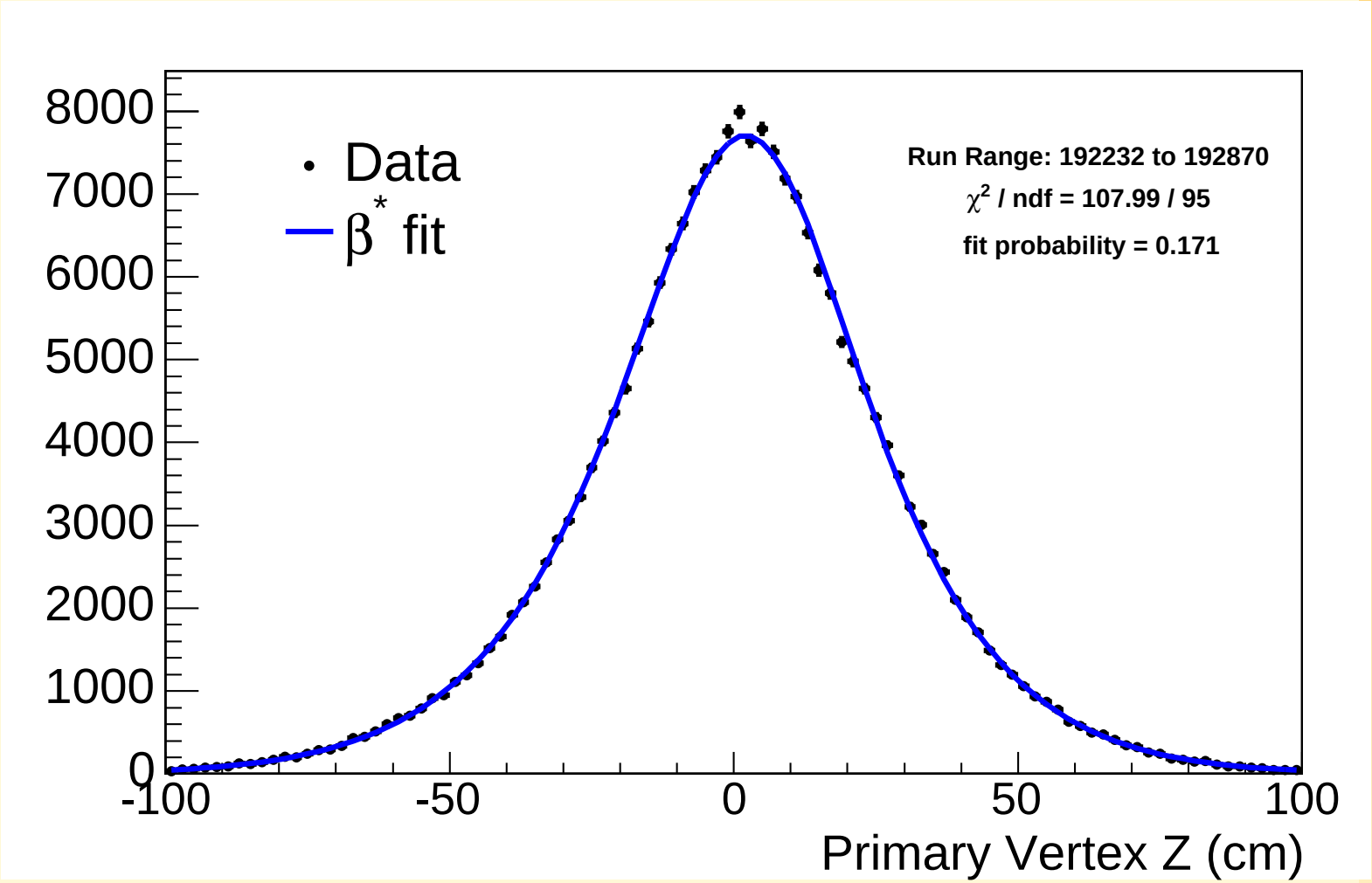
PV Z fits 1


Data
β* fit
Run Range: 191205 to 191721
χ² / ndf = 112.90 / 95
fit probability = 0.102
5000
4000
3000
2000
1000
0
-100
-50
0
50
100
Primary Vertex Z (cm)

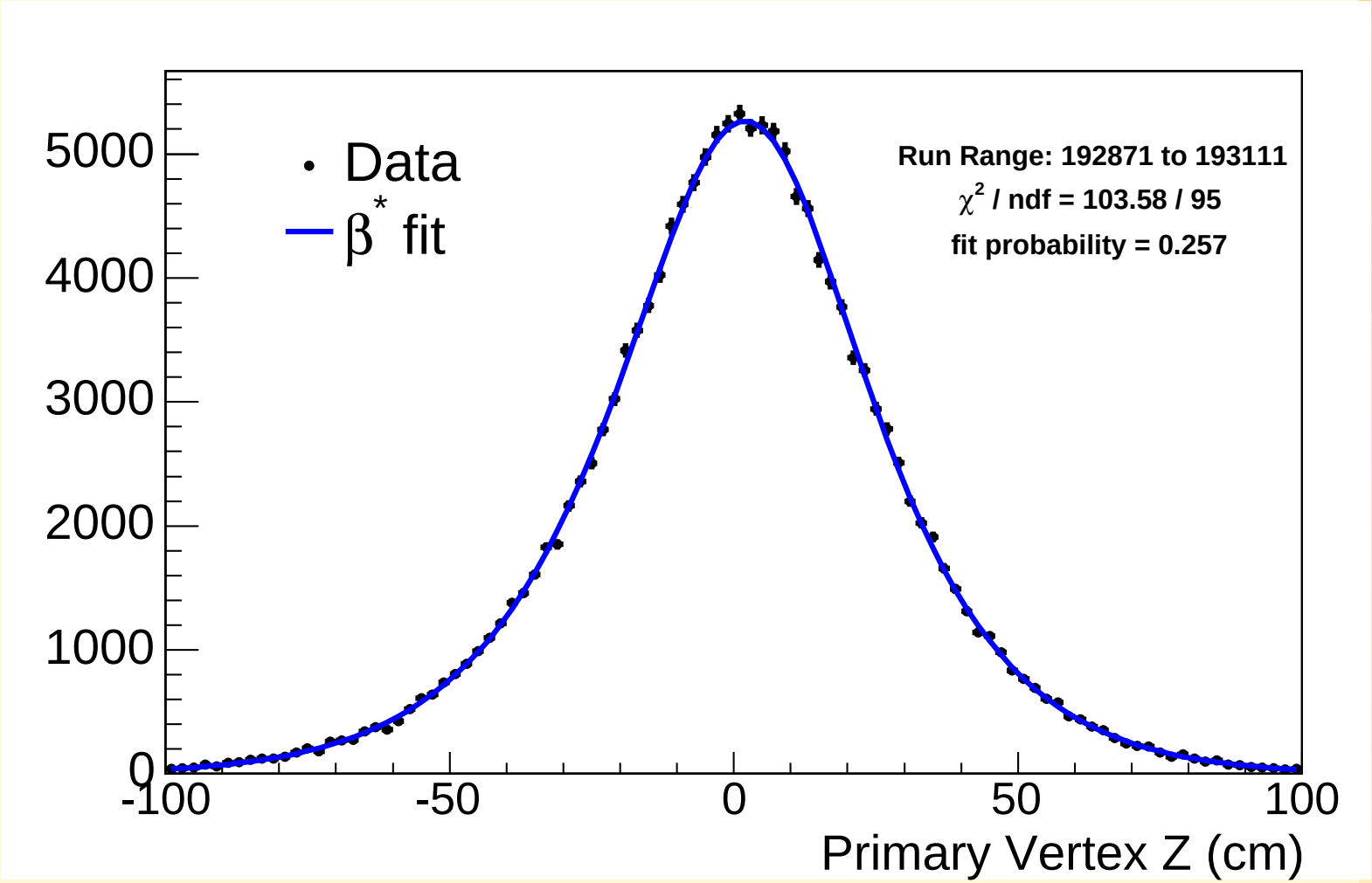
PV Z fits 2


7000
6000
5000
4000
3000
2000
1000
0
-100
-50
0
50
100
Primary Vertex Z (cm)
Data
β* fit
Run Range: 191723 to 192230
χ² / ndf = 105.55 / 95
fit probability = 0.216

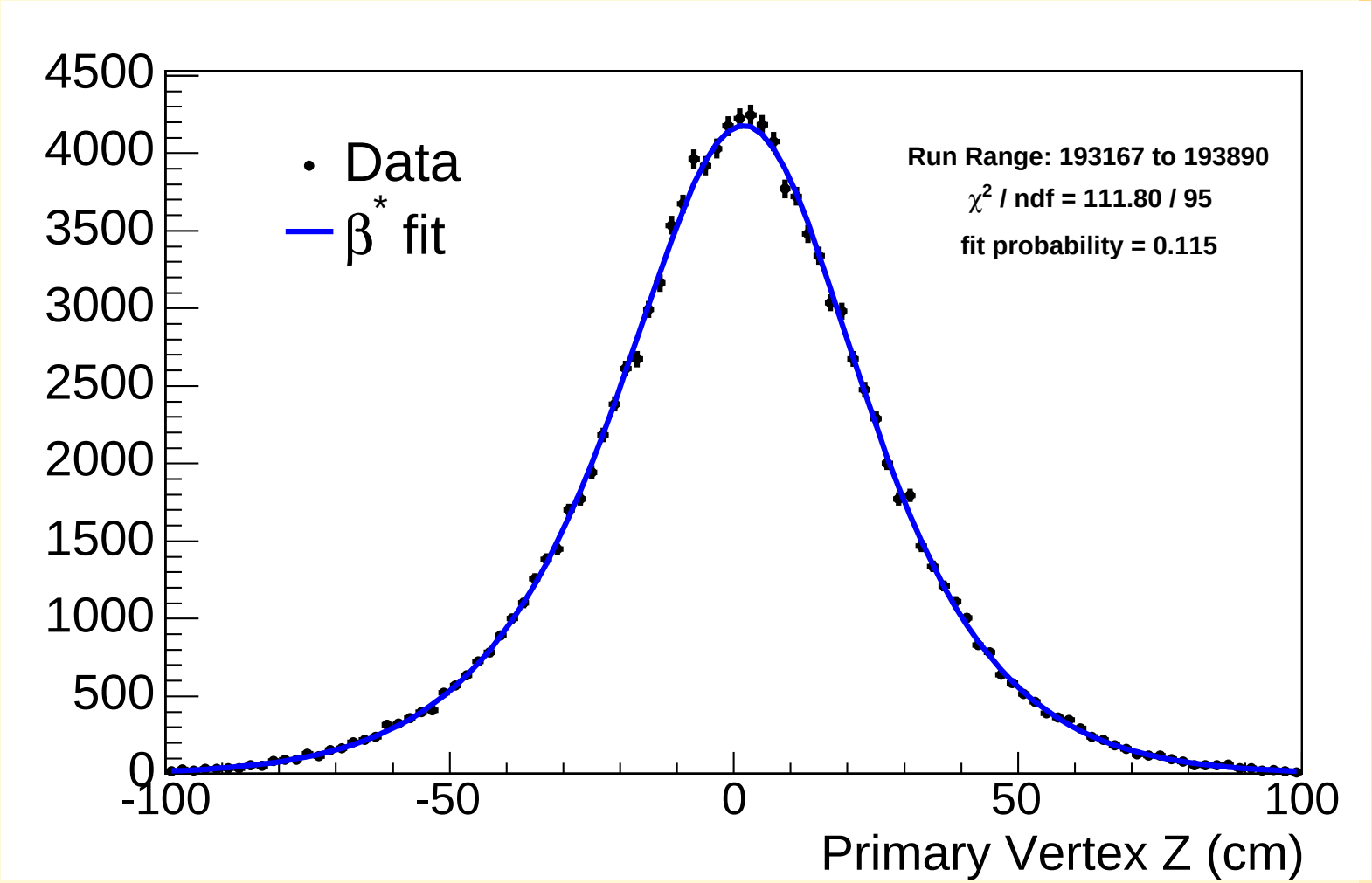
PV Z fits 3


8000
7000
6000
5000
4000
3000
2000
1000
0
-100
-50
0
50
100
Primary Vertex Z (cm)
Data
β* fit
Run Range: 192232 to 192870
χ² / ndf = 107.99 / 95
fit probability = 0.171

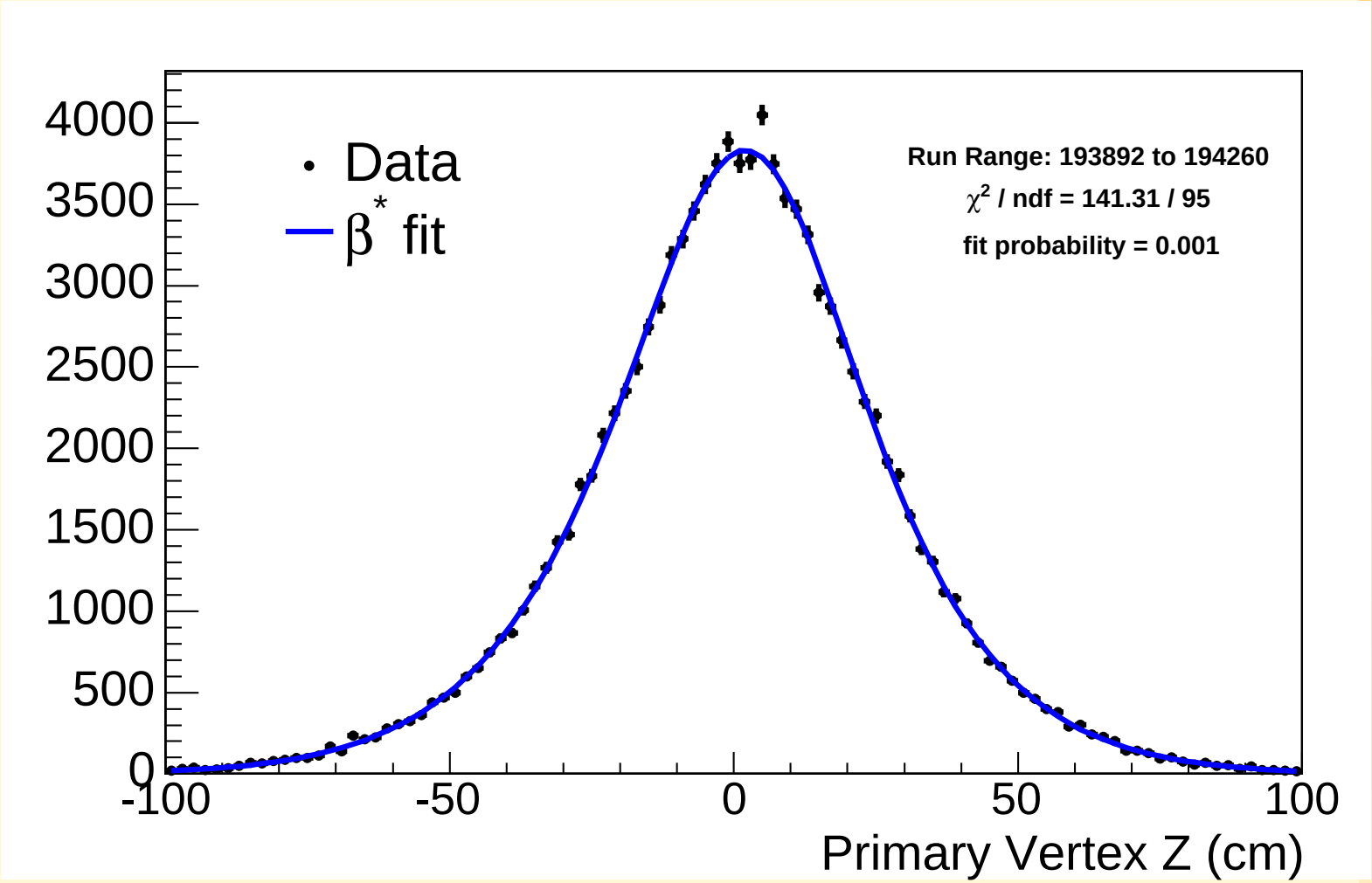
PV Z fits 4


Data
β* fit
Run Range: 192871 to 193111
χ² / ndf = 103.58 / 95
fit probability = 0.257
5000
4000
3000
2000
1000
0
-100
-50
0
50
100
Primary Vertex Z (cm)

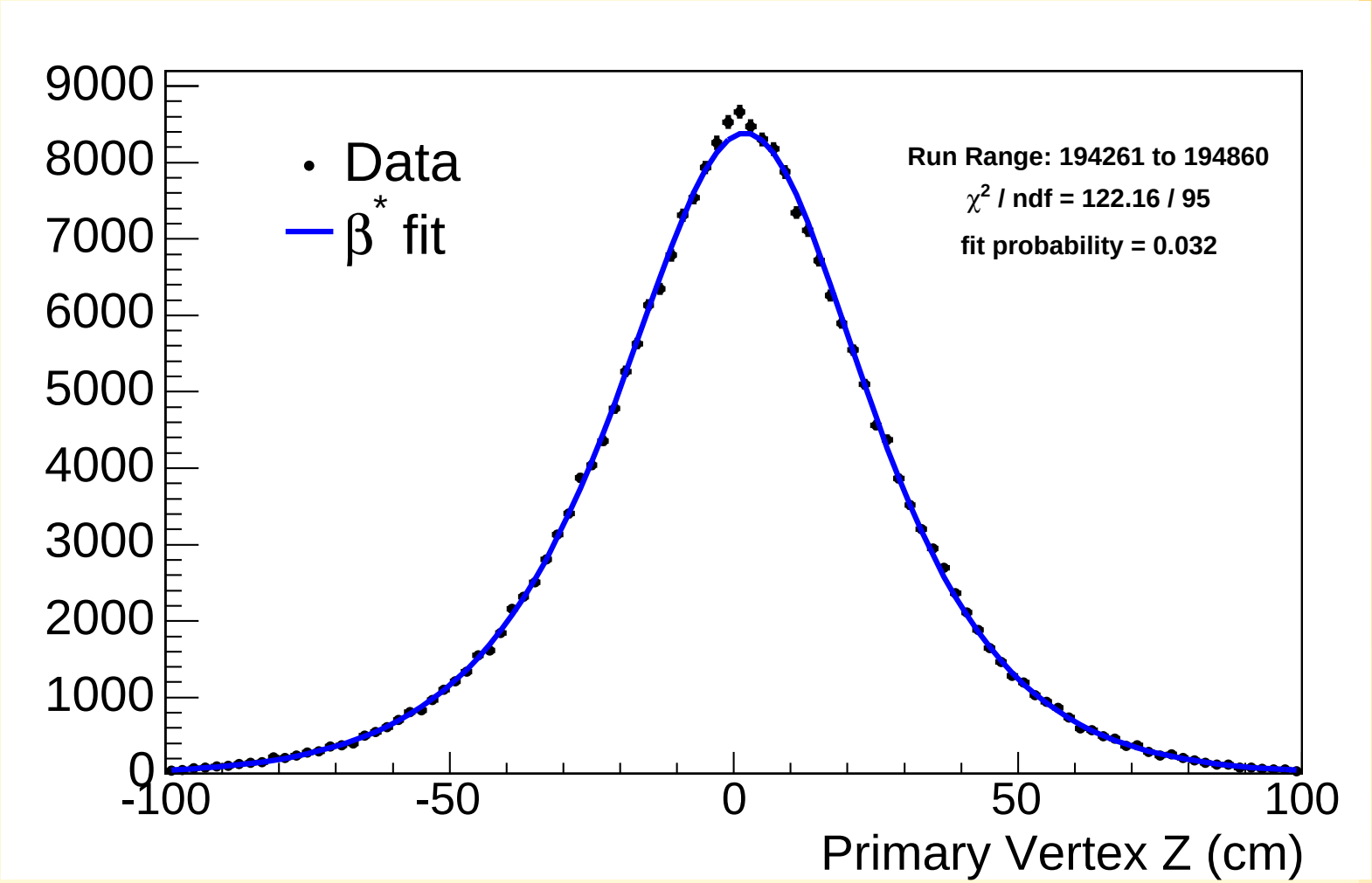
PV Z fits 5


4500
4000
3500
3000
2500
2000
1500
1000
500
0
-100
-50
0
50
100
Primary Vertex Z (cm)
Data
β* fit
Run Range: 193167 to 193890
χ2 / ndf = 111.80 / 95
fit probability = 0.115

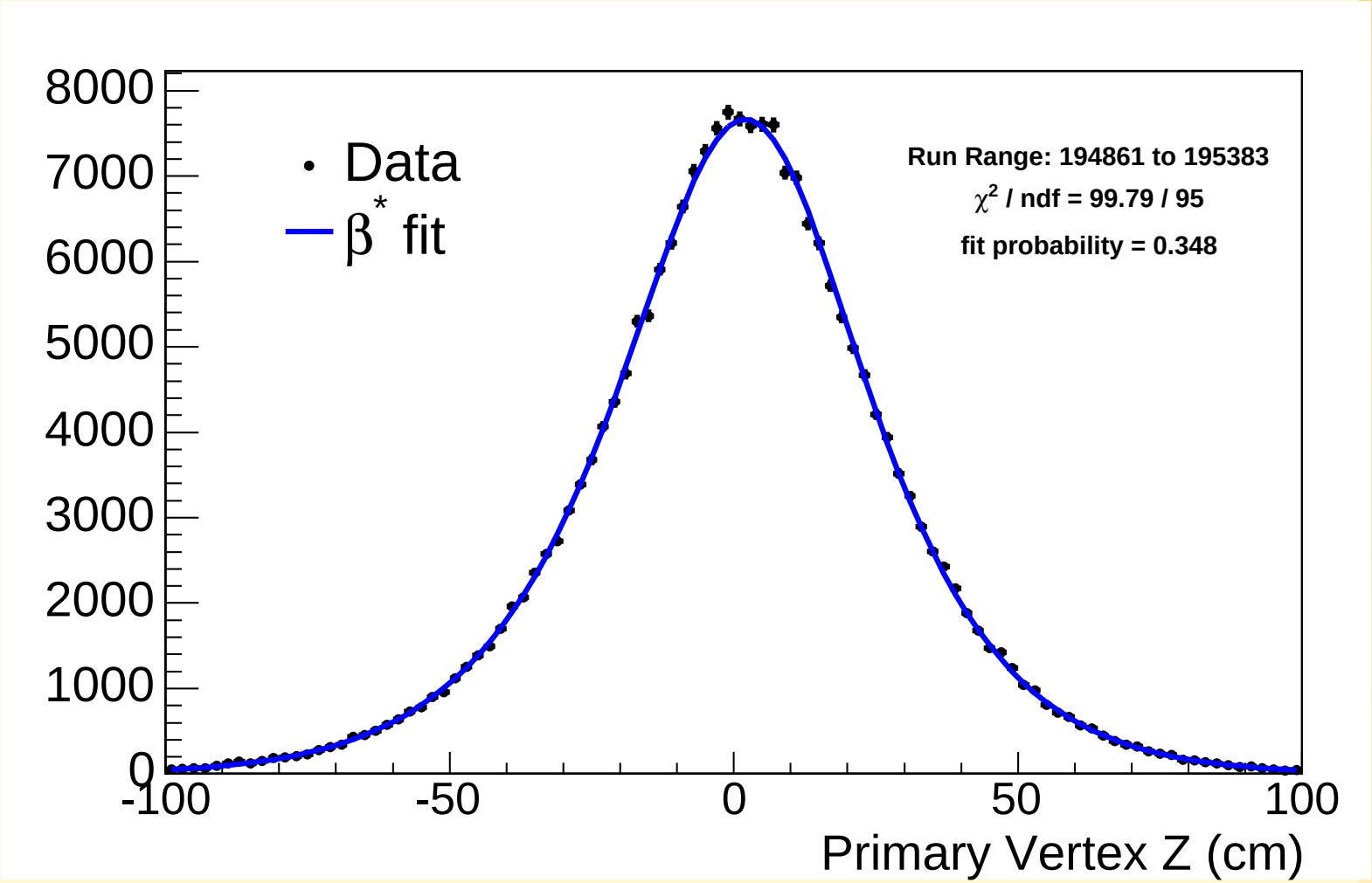
PV Z fits 6


Data
β* fit
Run Range: 193892 to 194260
χ² / ndf = 141.31 / 95
fit probability = 0.001
4000
3500
3000
2500
2000
1500
1000
500
0
-100
-50
0
50
100
Primary Vertex Z (cm)

PV Z fits 7

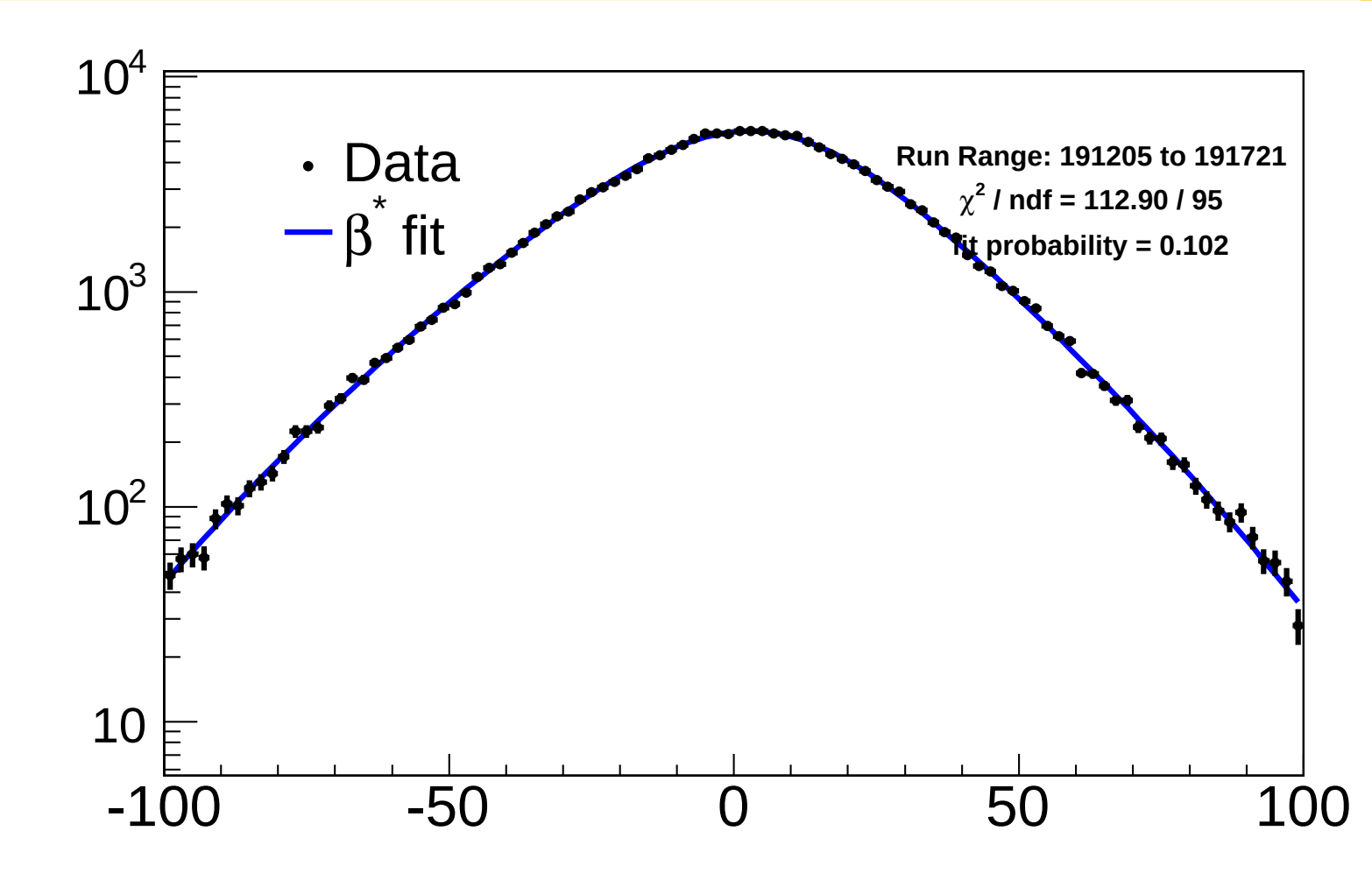

9000
8000
7000
6000
5000
4000
3000
2000
1000
0
-100
-50
0
50
100
Primary Vertex Z (cm)
Data
β* fit
Run Range: 194261 to 194860
χ² / ndf = 122.16 / 95
fit probability = 0.032

PV Z fits 8

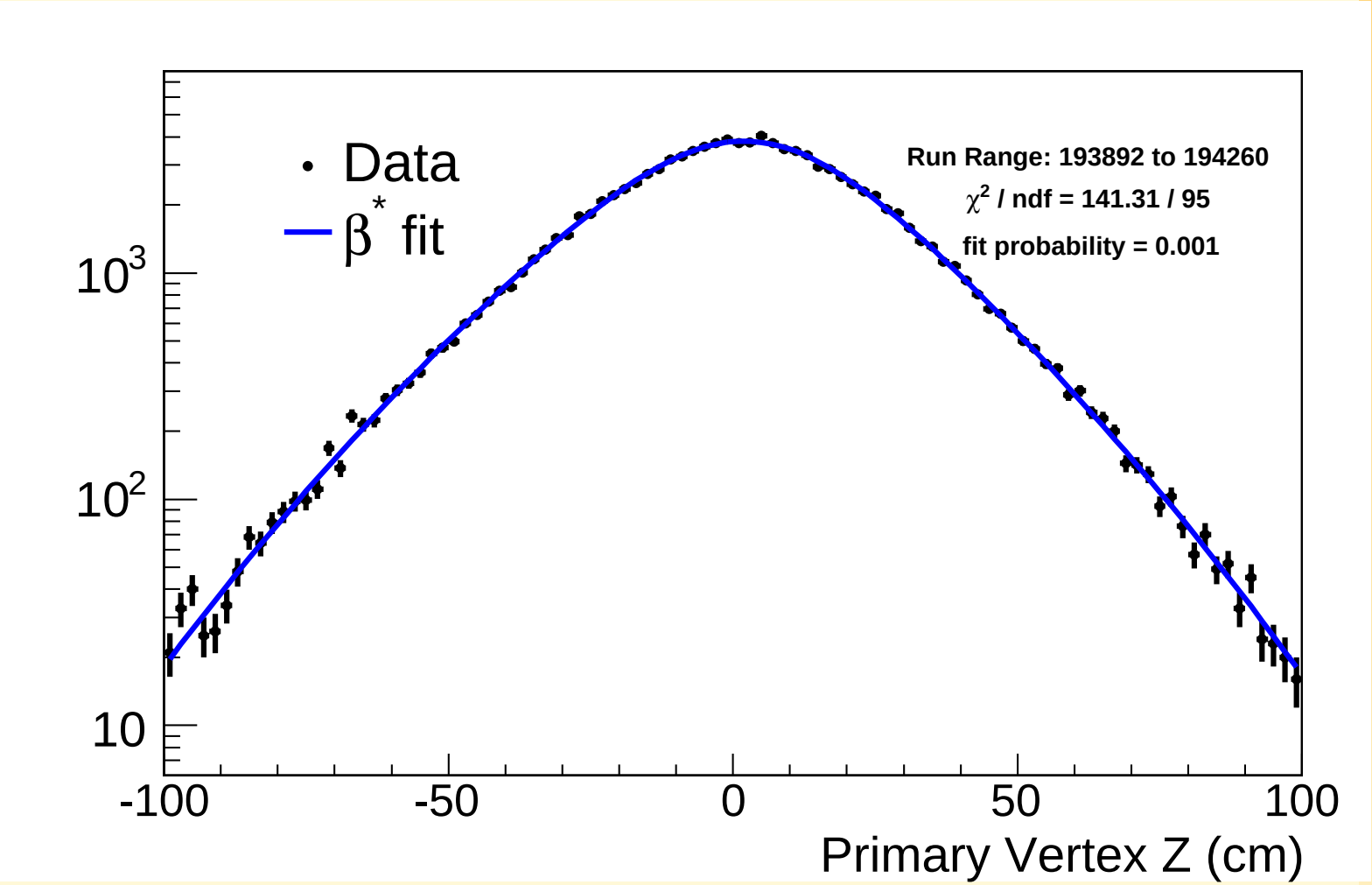

8000
7000
6000
5000
4000
3000
2000
1000
0
-100
-50
0
50
100
Primary Vertex Z (cm)
Data
β* fit
Run Range: 194861 to 195383
χ² / ndf = 99.79 / 95
fit probability = 0.348

Backup

PV Z fits 1b


Data
β* fit
Run Range: 191205 to 191721
χ² / ndf = 112.90 / 95
fit probability = 0.102
10⁴
10³
10²
10
-100
-50
0
50
100

PV Z fits 6b


Data
β* fit
Run Range: 193892 to 194260
χ² / ndf = 141.31 / 95
fit probability = 0.001
10³
10²
10
-100
-50
0
50
100
Primary Vertex Z (cm)