List of things this talk will discuss:

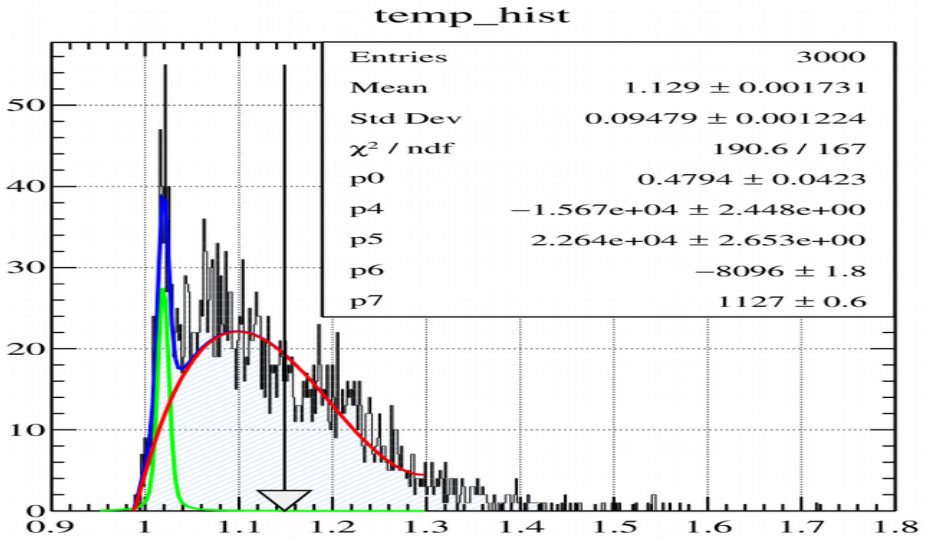
- Testing the ‘cusp’ effect seen in the background histogram for the K+K- invariant mass
    - Sigma = 0.005
    - Sigma = 0.01
    - Sigma = 0.02
    - Sigma = 0.03
- Qvalue Study using a relativistic Breit-Wigner convoluted with a Gaussian
- Thoughts on the results of these studies

Testing the ‘cusp’ effect:

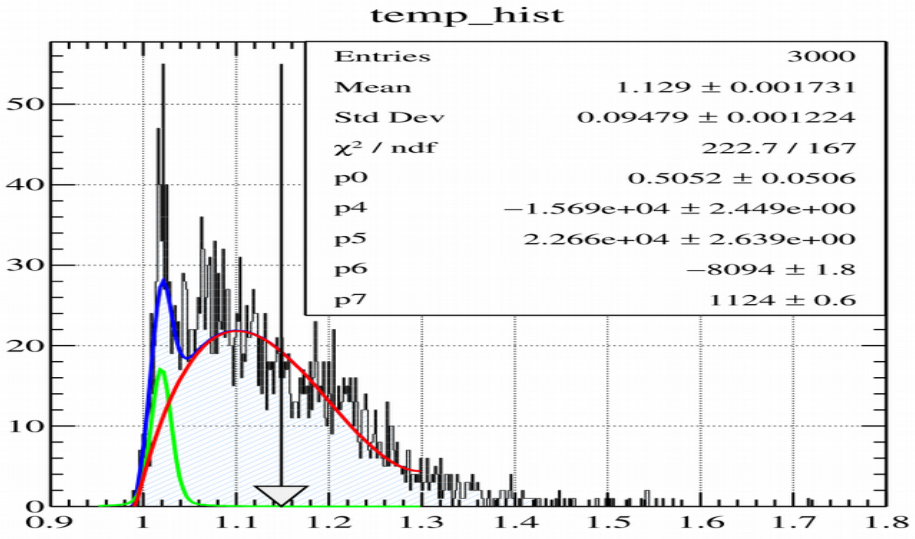
- Background function: 3rd degree Chebyshev polynomial
- Signal function: Voigtian (Non Relativistic Breit-Wigner convoluted with a Gaussian)
  - Mass and width parameter of the Breit-Wigner are fixed
  - The resolution of the Gaussian is fixed to study its effect on the background cusp
  - The 5 free parameters come from: the amplitude of the Voigtian plus 4 parameters of the background

Event #4 – Example Fits

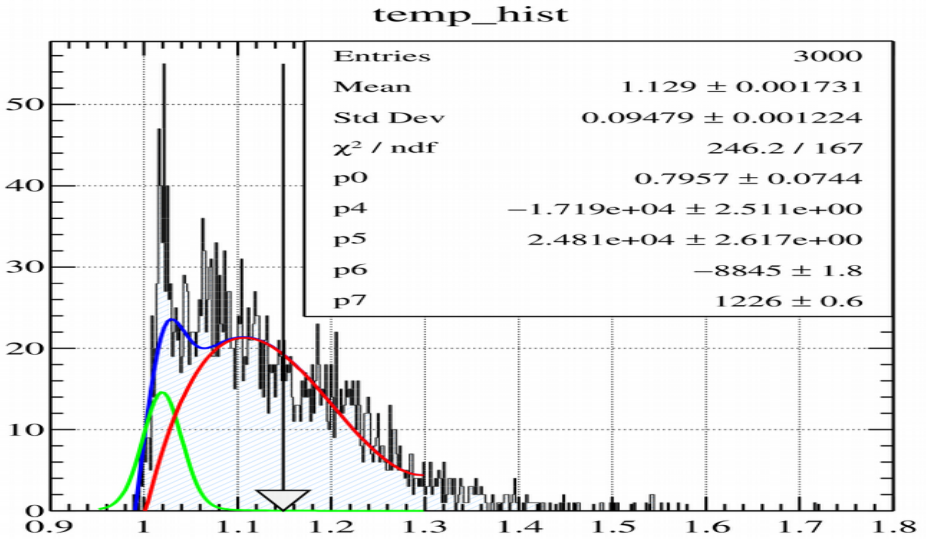
Sigma = 0.005, ChiSq = 1.14



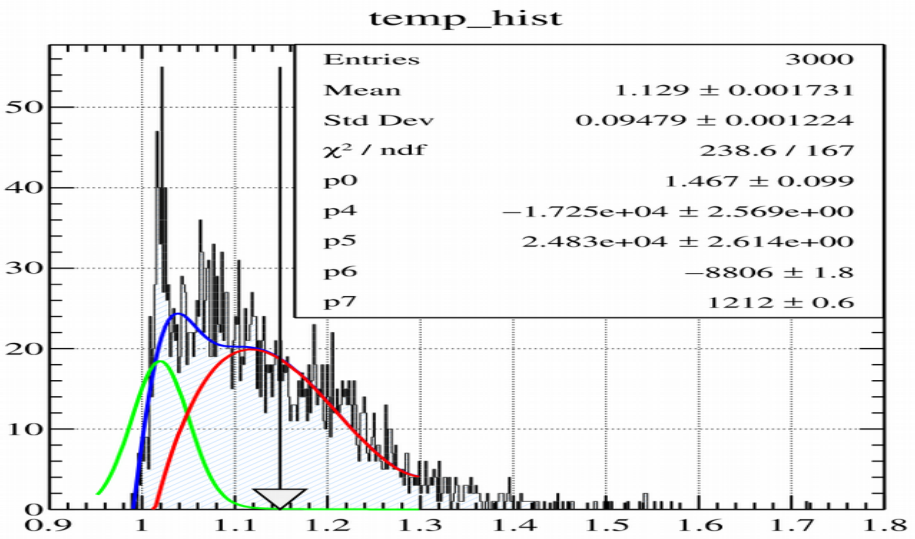
Sigma = 0.01, ChiSq = 1.33



Sigma = 0.02, ChiSq = 1.47

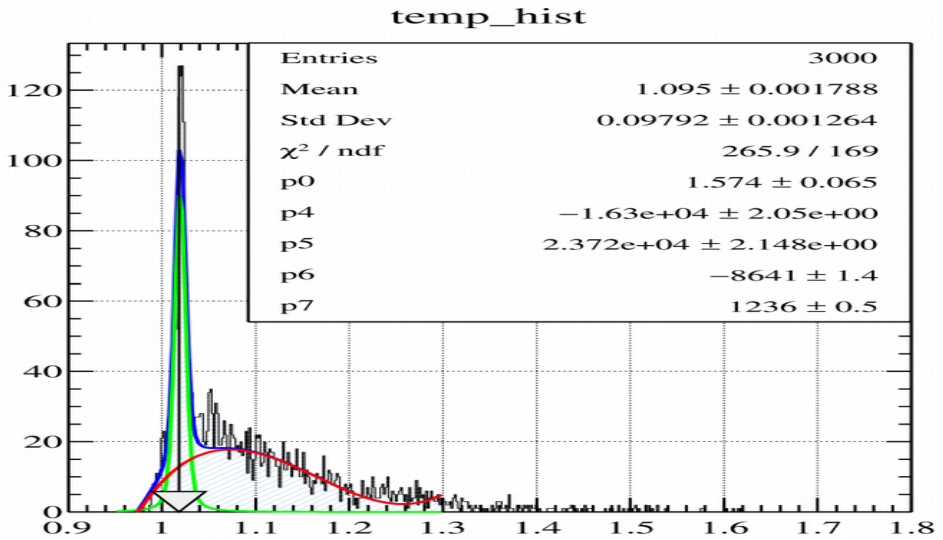


Sigma = 0.03, ChiSq = 1.42

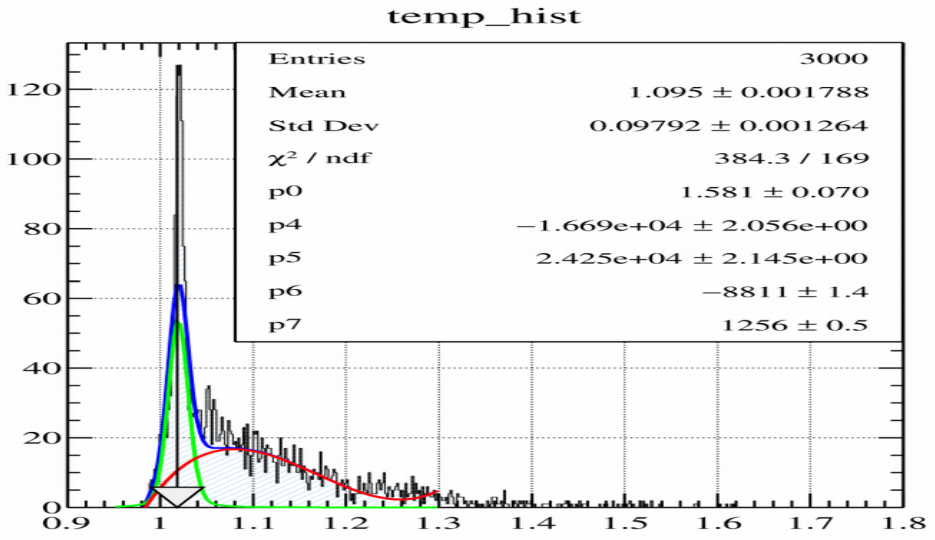


Event #9 – Example Fits

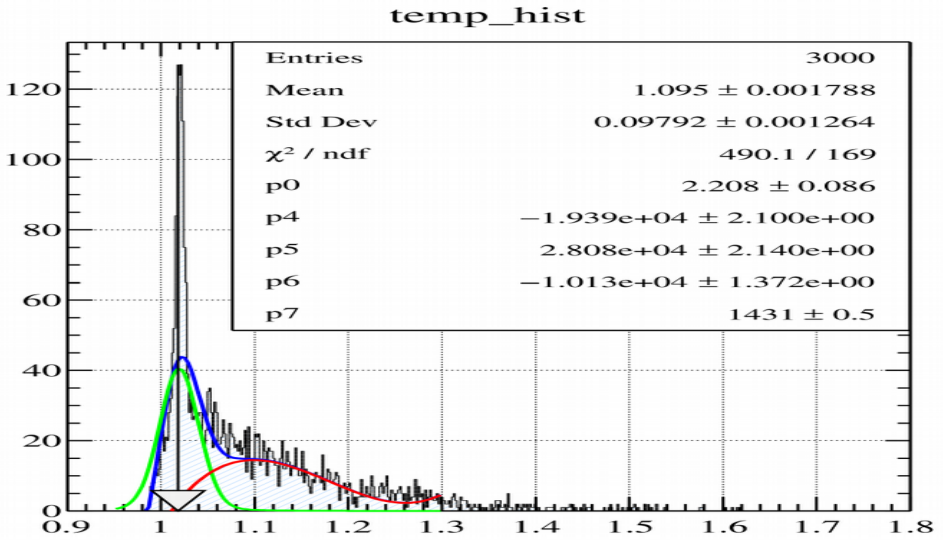
Sigma = 0.005, ChiSq = 1.57



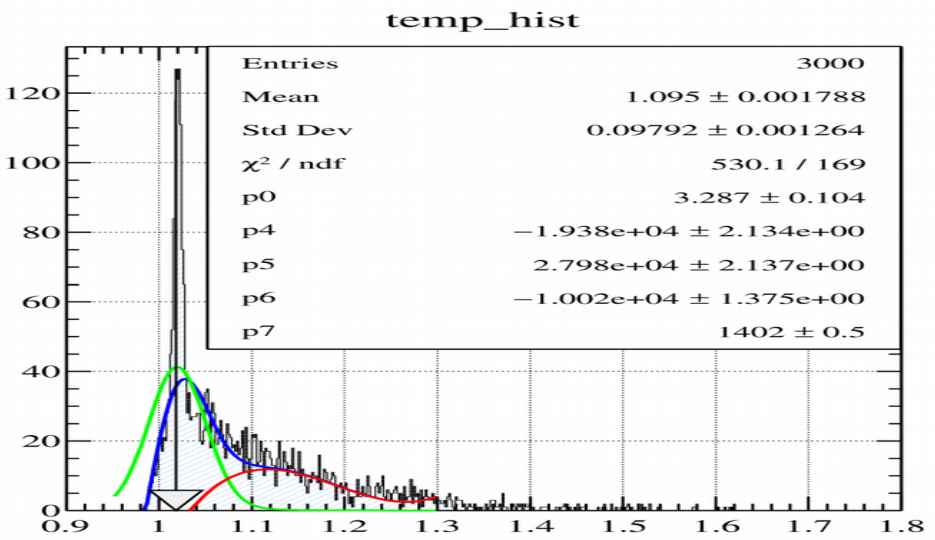
Sigma = 0.01, ChiSq = 2.27



Sigma = 0.02, ChiSq = 2.90

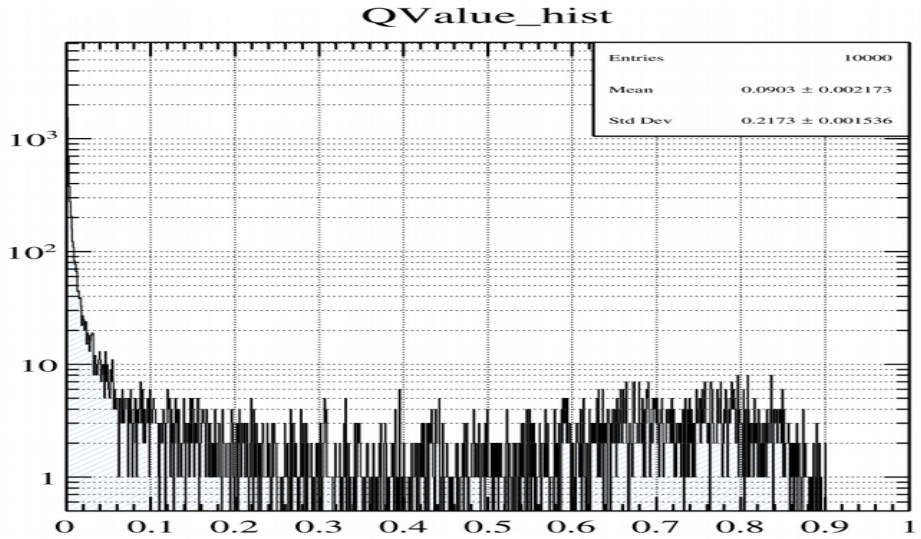


Sigma = 0.03, ChiSq = 3.13

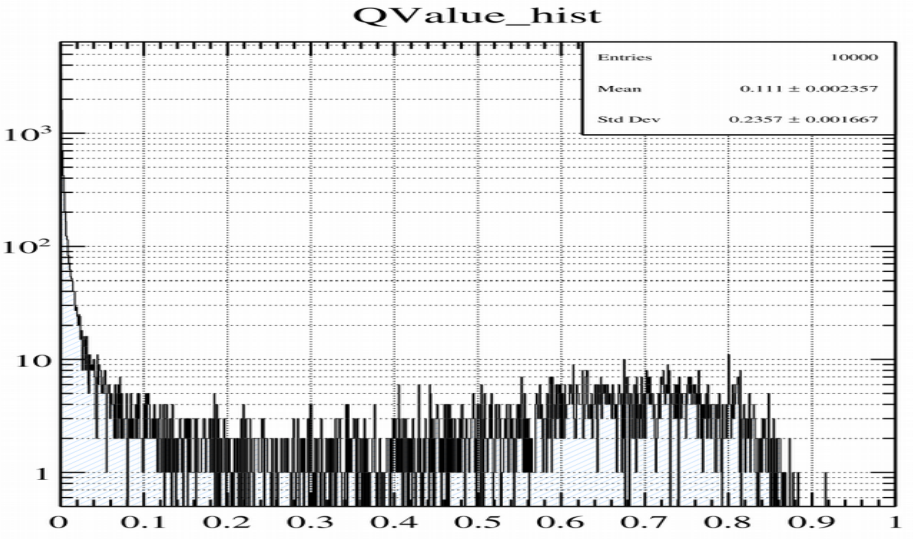


QValues

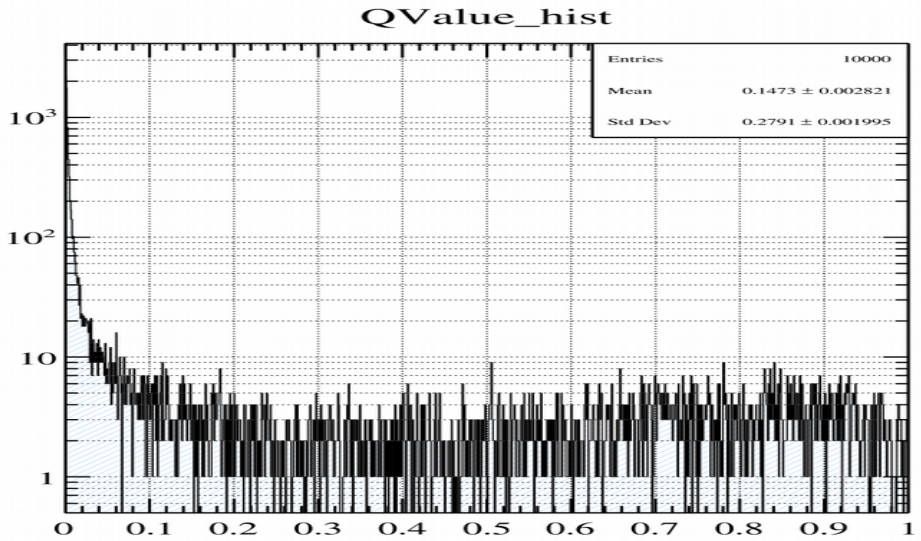
Sigma = 0.005



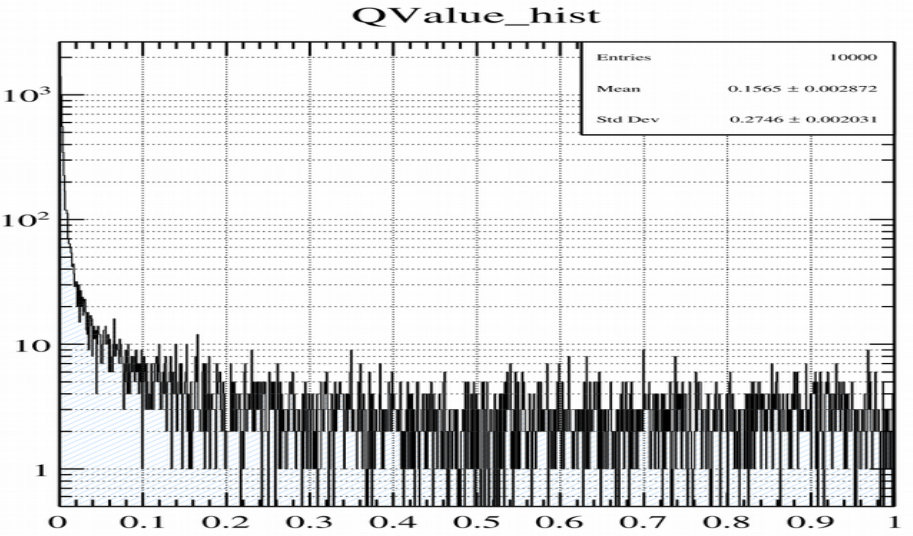
Sigma = 0.01



Sigma = 0.02

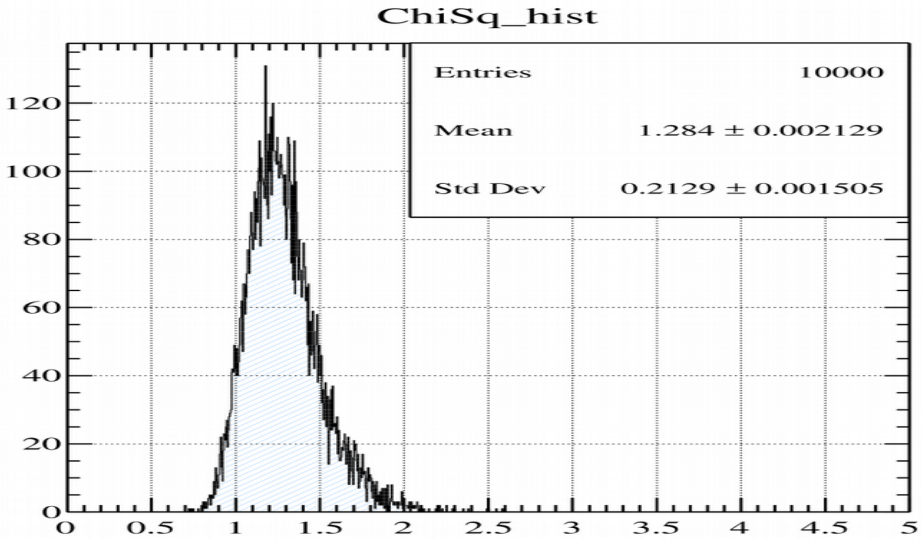


Sigma = 0.03

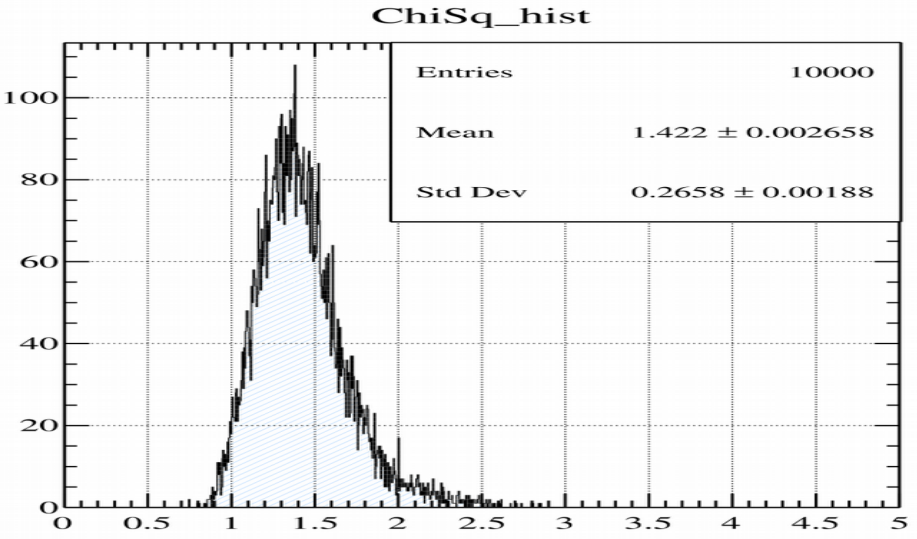


Chi^2/NDF

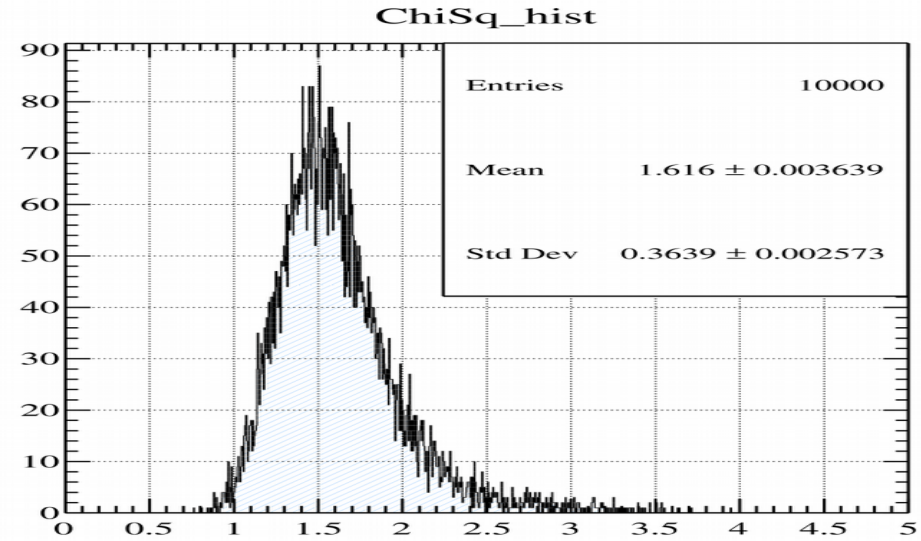
Sigma = 0.005



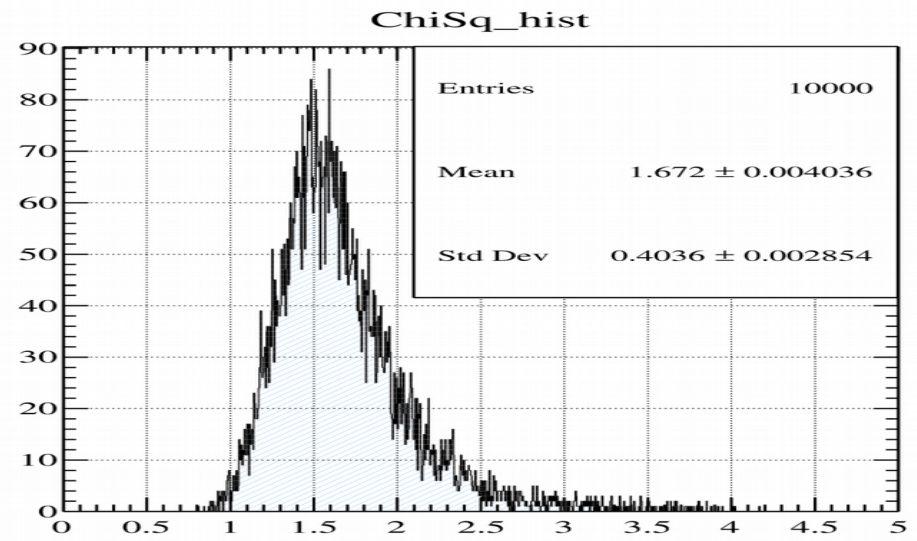
Sigma = 0.01



Sigma = 0.02

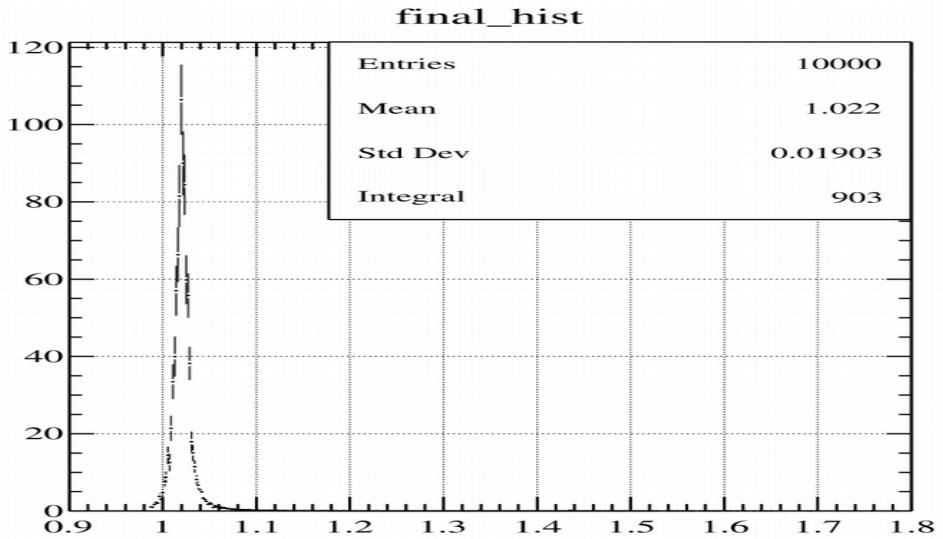


Sigma = 0.03

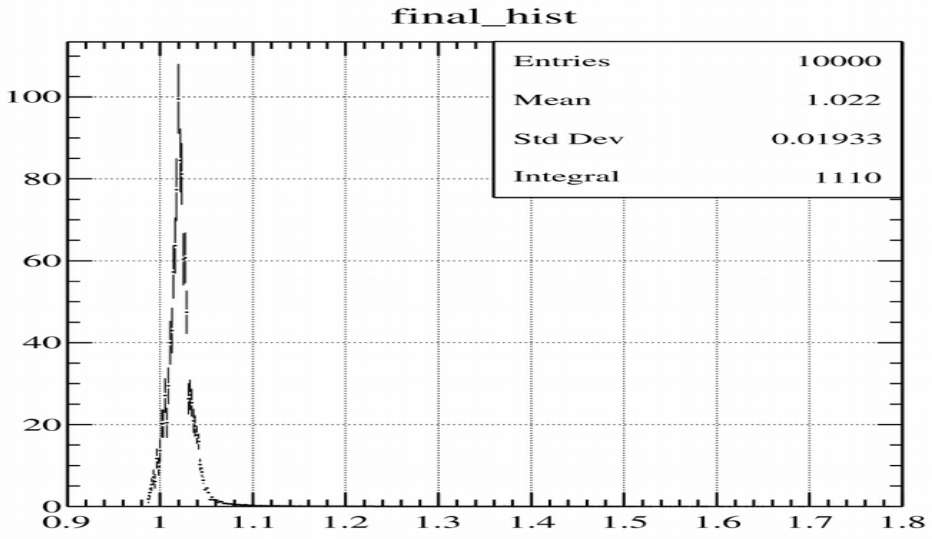


Signal Events

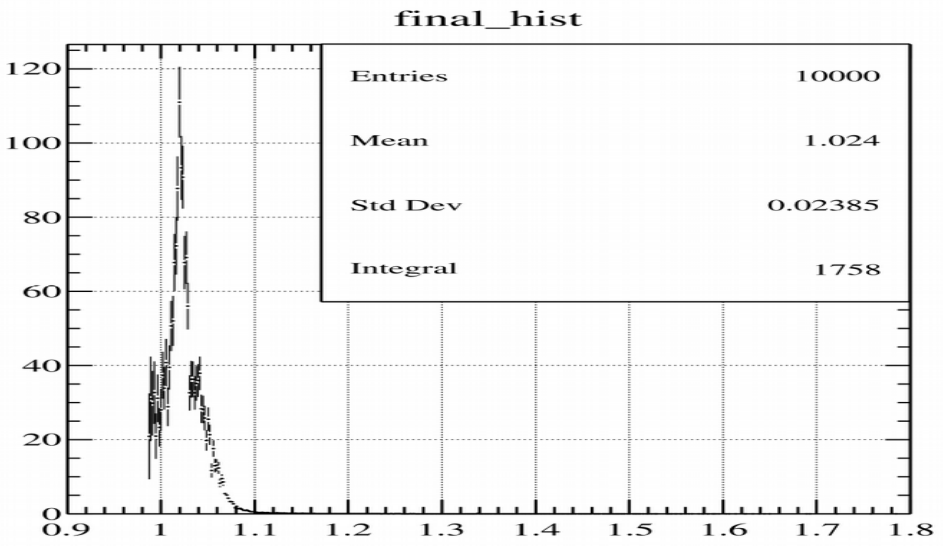
Sigma = 0.005



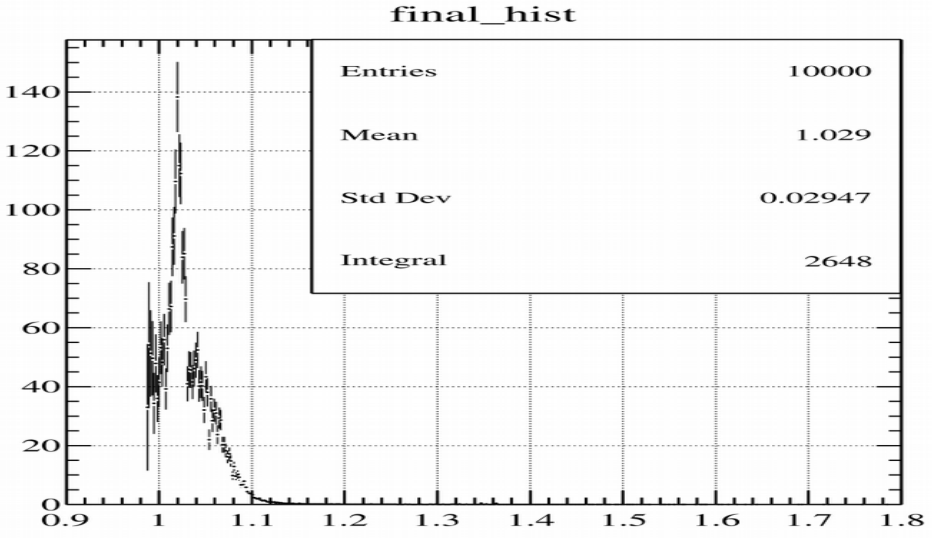
Sigma = 0.01



Sigma = 0.02

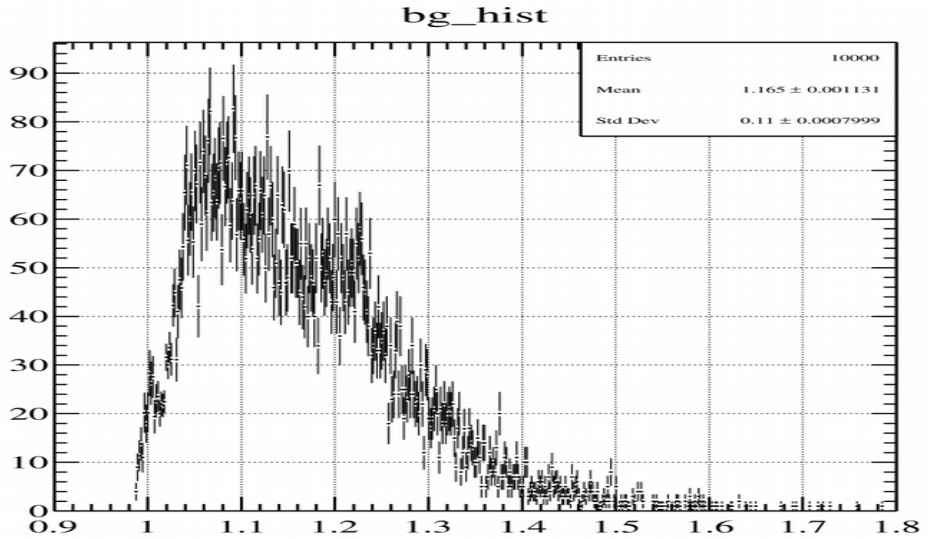


Sigma = 0.03

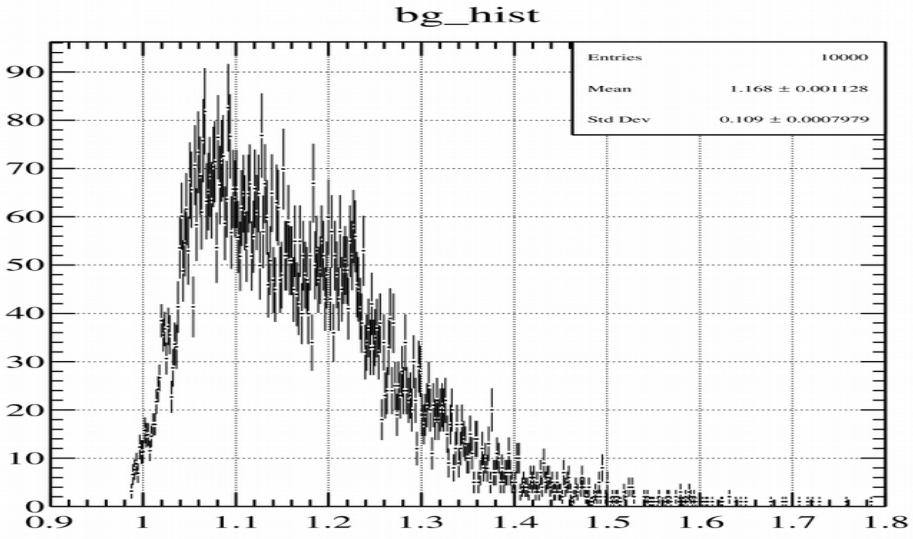


Background Events

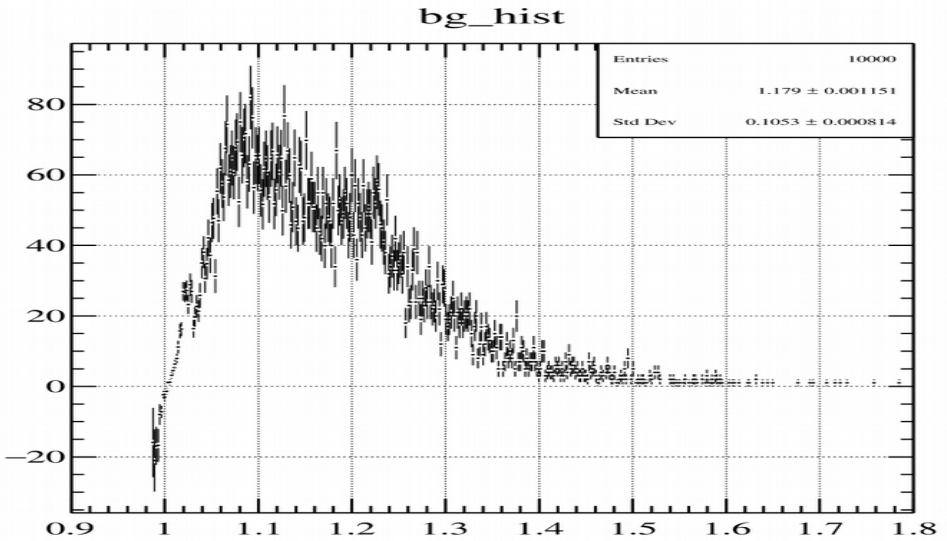
Sigma = 0.005



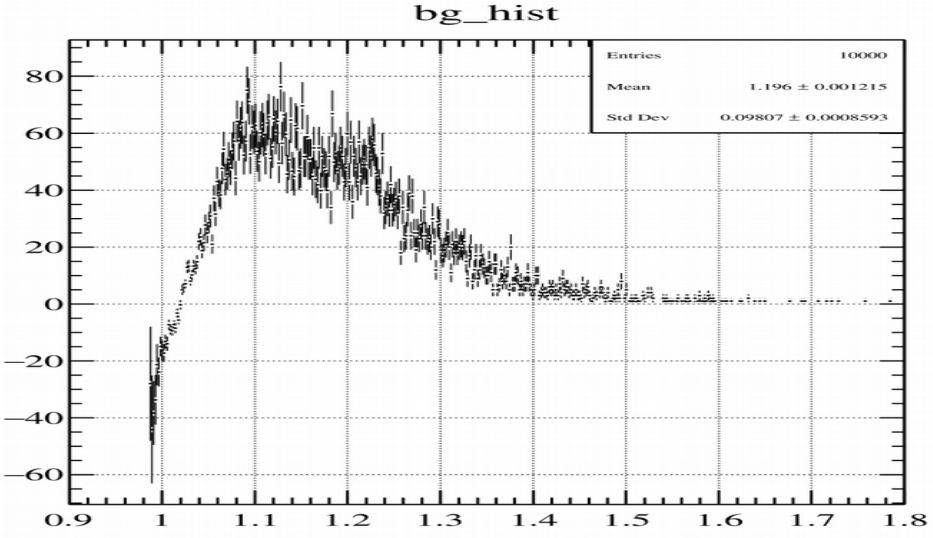
Sigma = 0.01



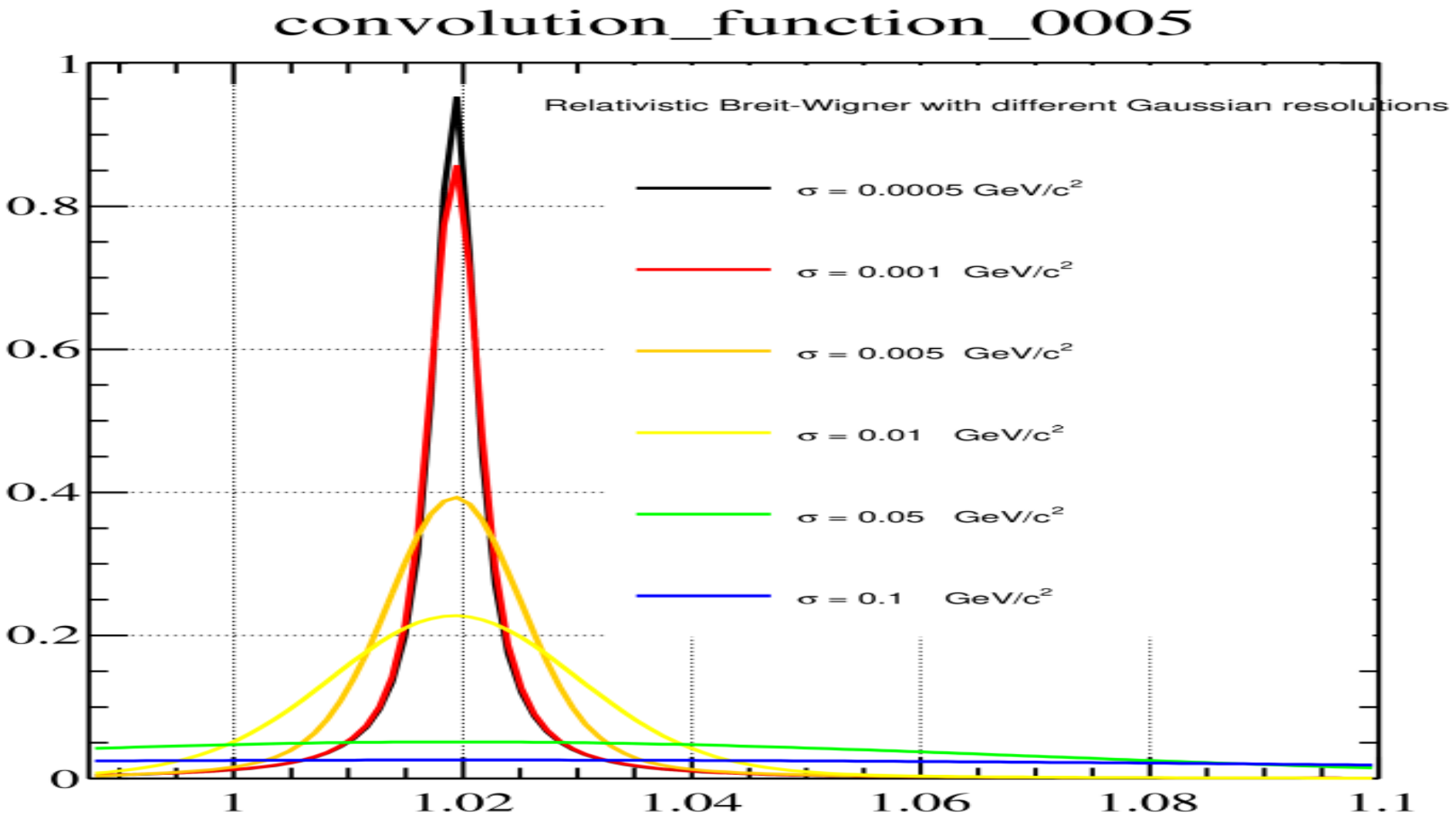
Sigma = 0.02



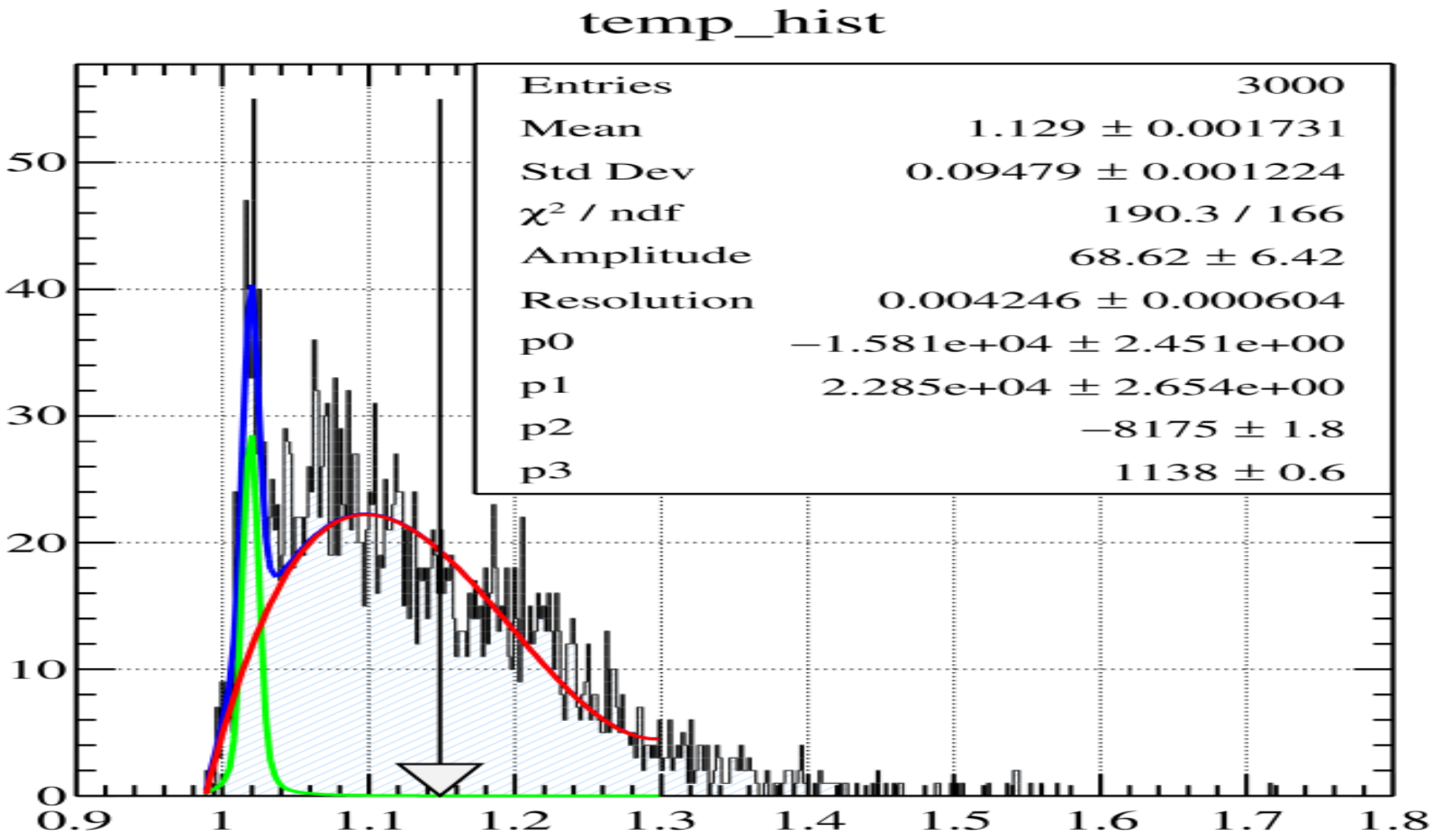
Sigma = 0.03



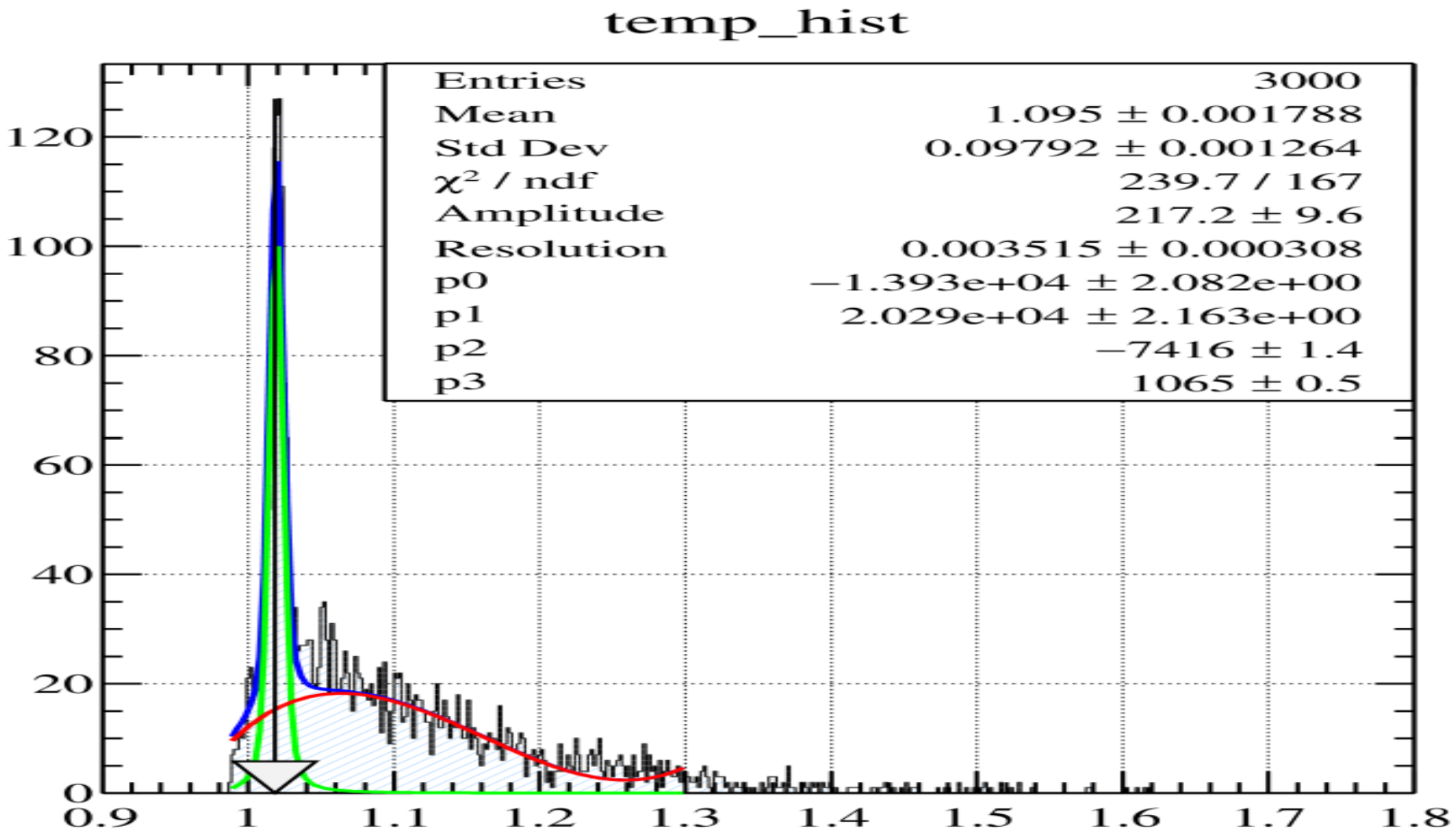
Example Distributions of Relativistic Breit-Wigner convoluted with a Gaussian



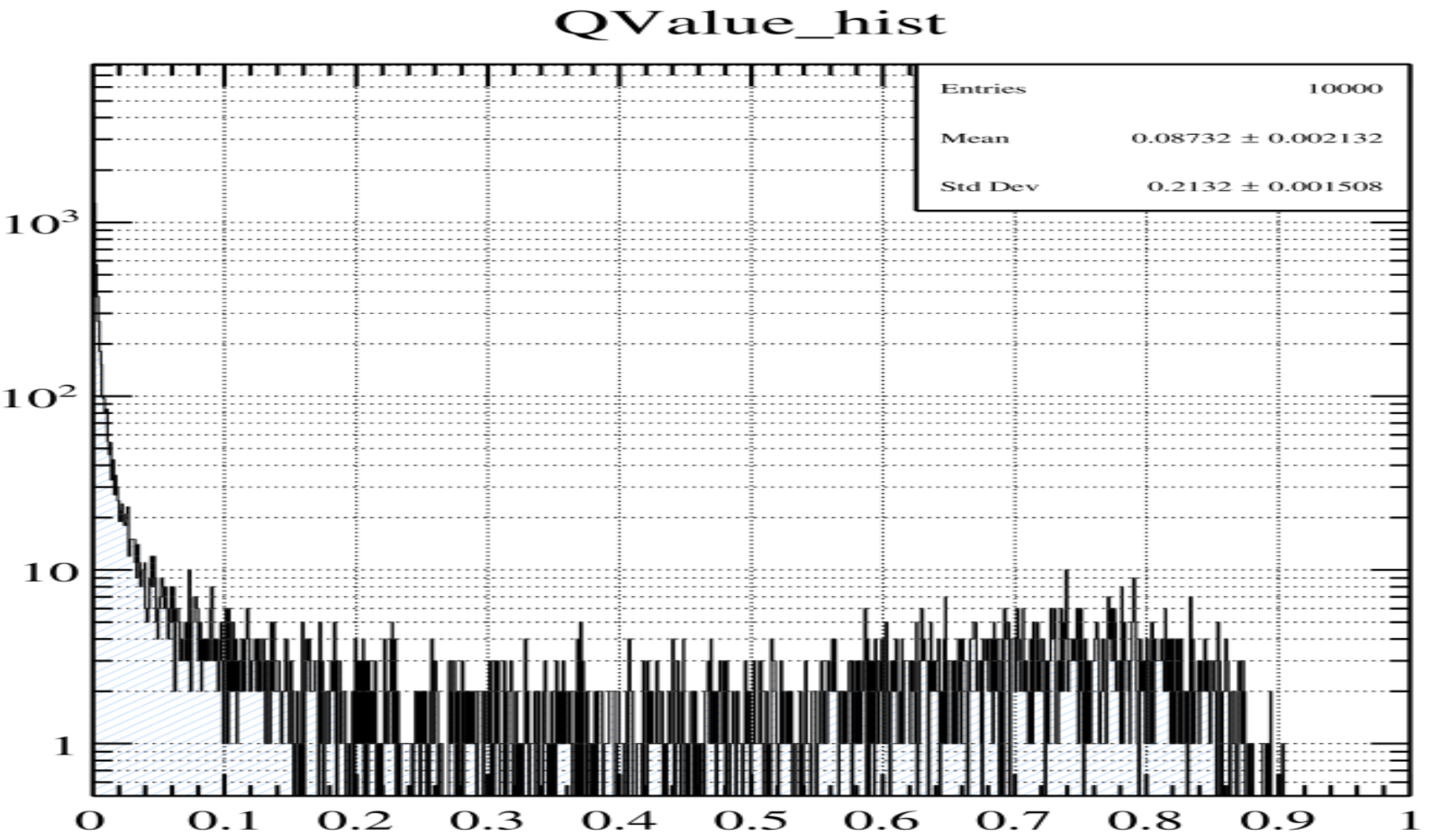
Event #4 – Example Fit, ChiSq = 1.14



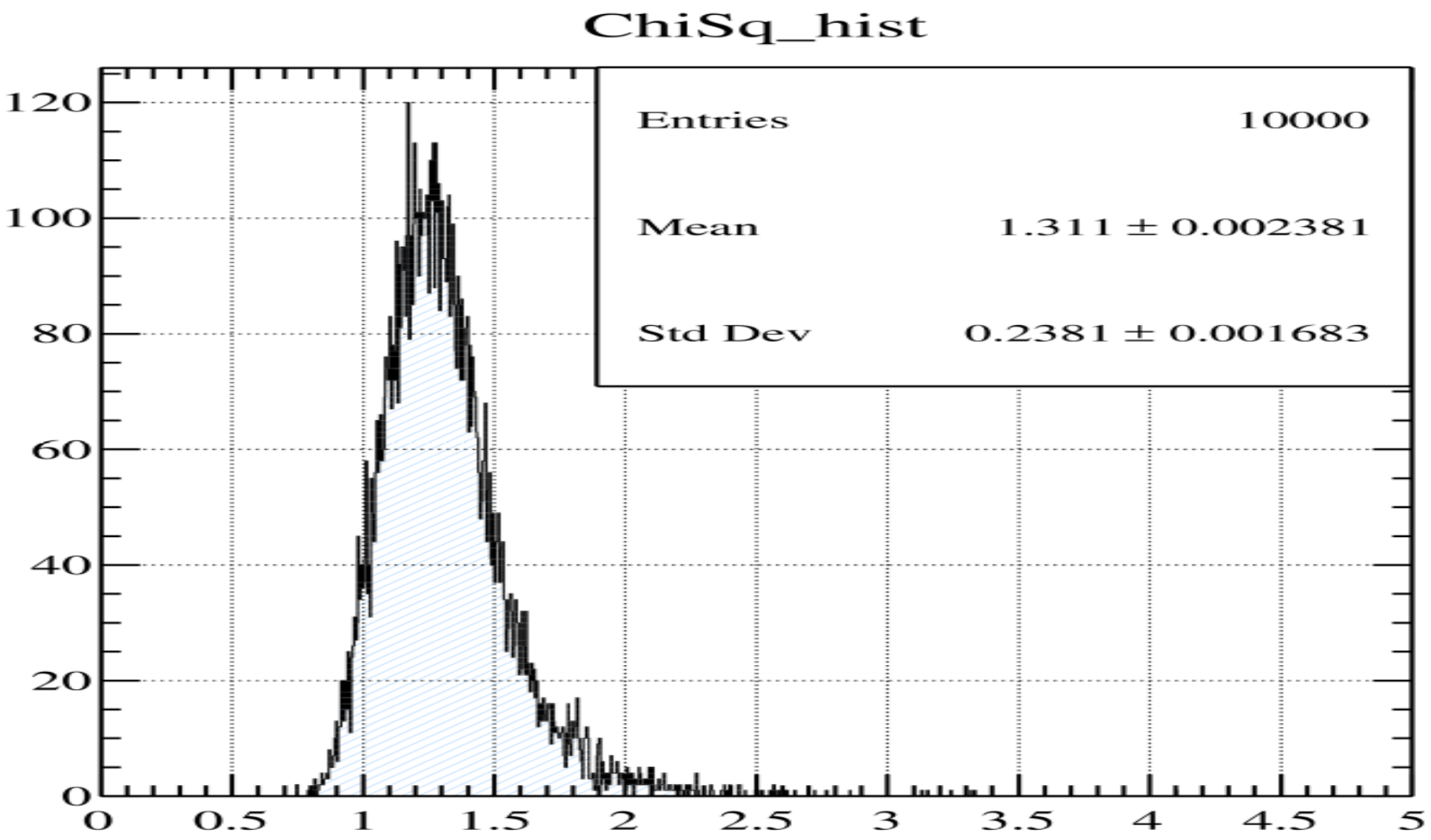
Event #9 – Example Fit, ChiSq = 1.43



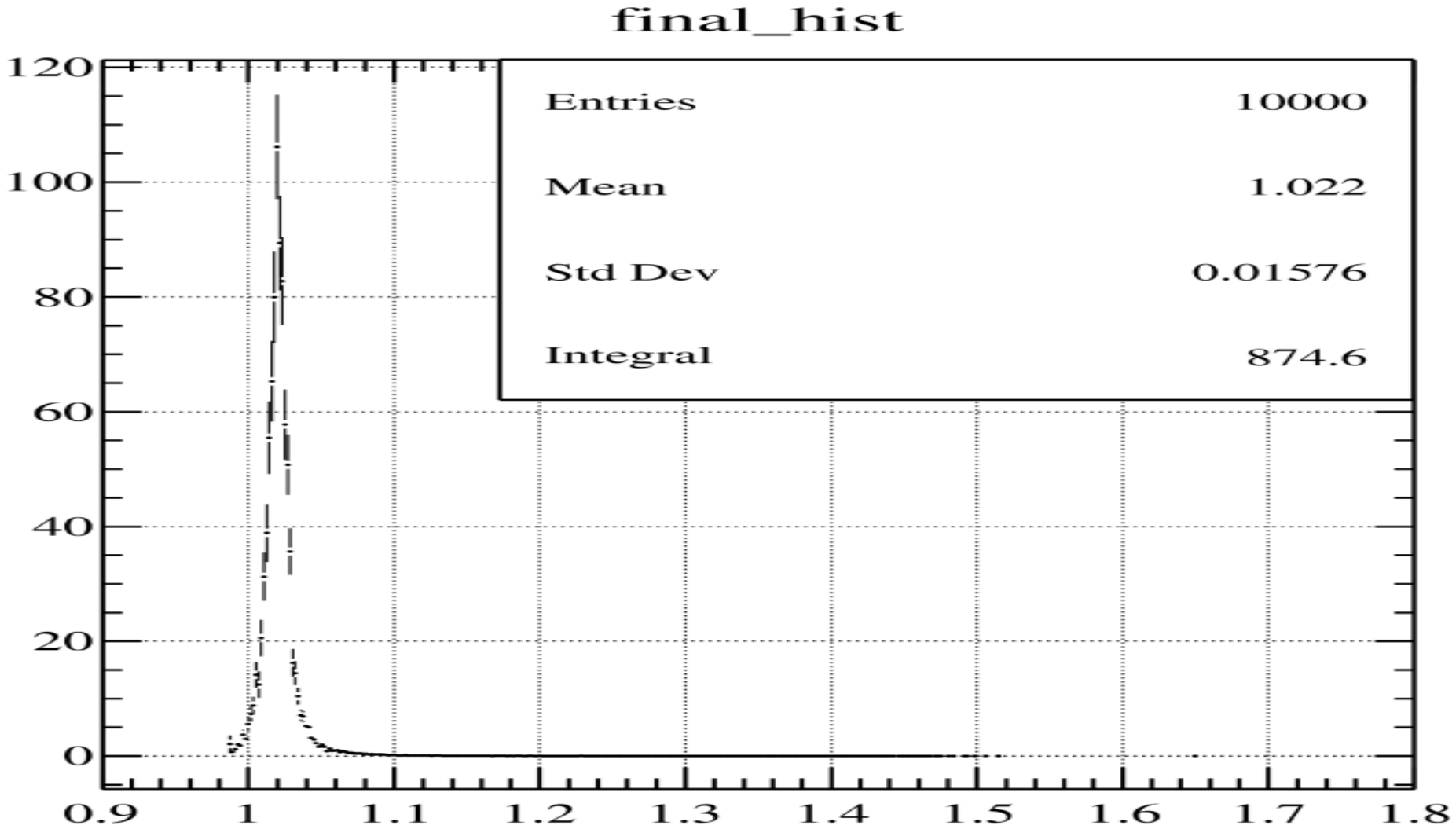
QValue


QValue_hist
Entries 10000
Mean 0.08732 ± 0.002132
Std Dev 0.2132 ± 0.001508
10³
10²
10
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

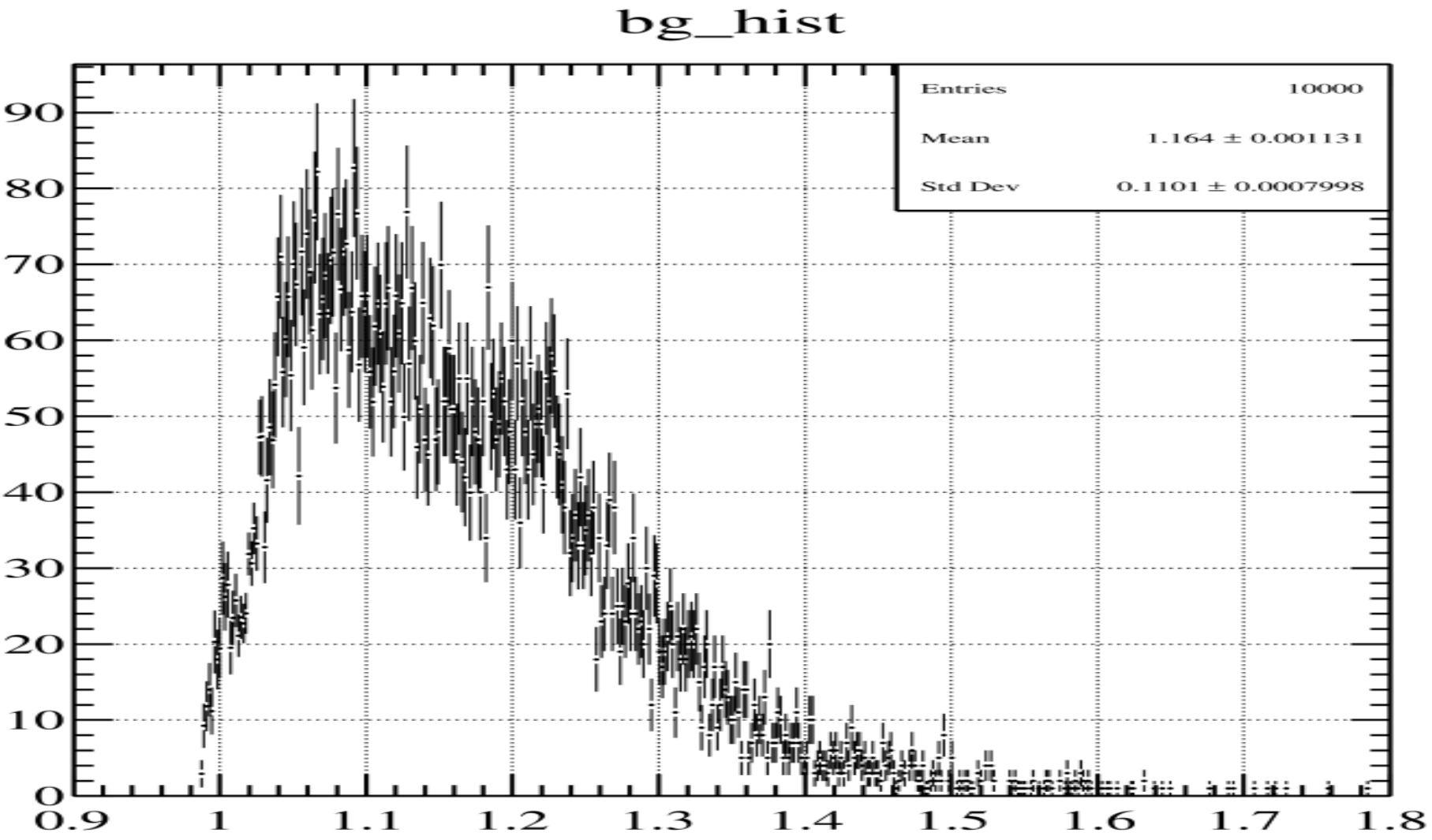
Chi^2/NDF


ChiSq_hist
Entries 10000
Mean 1.311 ± 0.002381
Std Dev 0.2381 ± 0.001683
120
100
80
60
40
20
0
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5

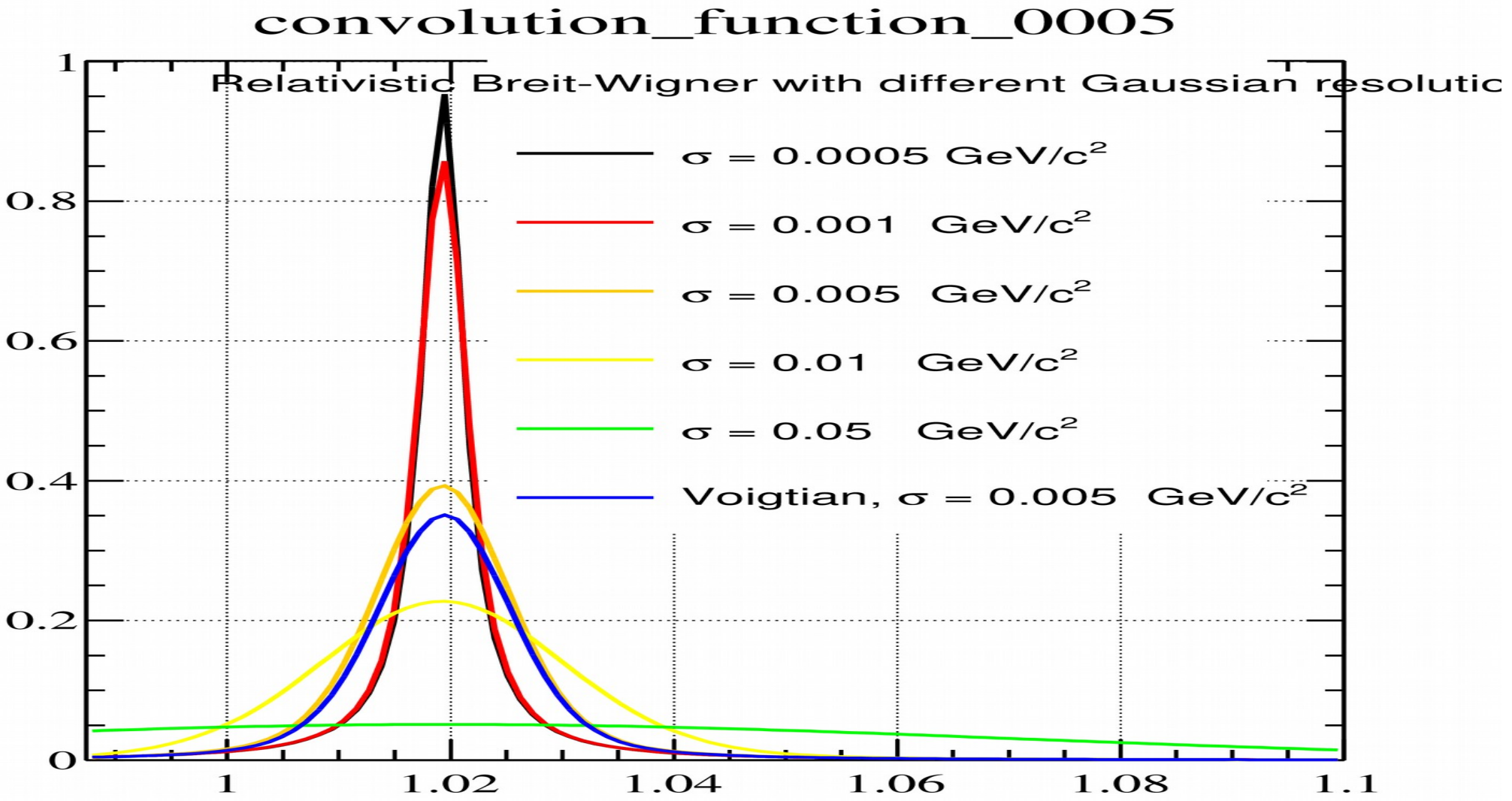
Signal Events



Background Events



Example Distributions of Relativistic Breit-Wigner convoluted with a Gaussian



Thoughts

- As the resolution of the Gaussian is increases, the ‘cusp’ effect starts to go away
- However, this means that the weight which use to be in the background histogram is pushed into the signal histogram (not good)
- Perhaps this is a sign that we really are properly parameterizing the K+K- invariant mass
- Using a relativistic Breit-Wigner as opposed to a non relativistic Breit-Wigner appears to make no difference