# statistical Significance for nnL peak

The following method is used to calculate the statistical significance for E12_17_003 Experiment

1. The region around the peak is selected and the selected region is chopped by using the graphical cut. The chopped portion is printed in a separate canvas and no of events in the region is recorded by integrating the whole chopped region. This includes the background events.

Lets denote these events ( signal + BG) = N1

2. For the 1$^{st}$ peak, the region above the background and for the second peak, region above the QF line is selected by graphical cut method and chopped. The chopped region is again printed in a different canvas and the no of events are recorded by using the integral method.
Note: This events contains signal only
Lets denote these events(signal only) = N2

The statistical significance = total signal /sqrt( signal +BG) = N2/sqrt(N1)

## For the first peak

**Mean = -0.19 MeV and sigma = 0.81 MeV**

1. band width = 1sigma = -1.0 to + 0.62 MeV
N1 = 12.9527 and N2 = 6.3
Statistical Significance = 6.3/sqrt(12.9527) ~ 1.75

2. band width = 2sigma = -1.81 to + 1.43 MeV
N1 = 22.87 and N2 = 9.47954
Statistical Significance = 9.47954/sqrt(22.87) ~ 1.98

3. band width = 3sigma = -2.62 to + 2.24 MeV
N1 = 30.7697 and N2 = 10.8973
Statistical Significance = 10.8973/sqrt(30.7697) ~ 1.96

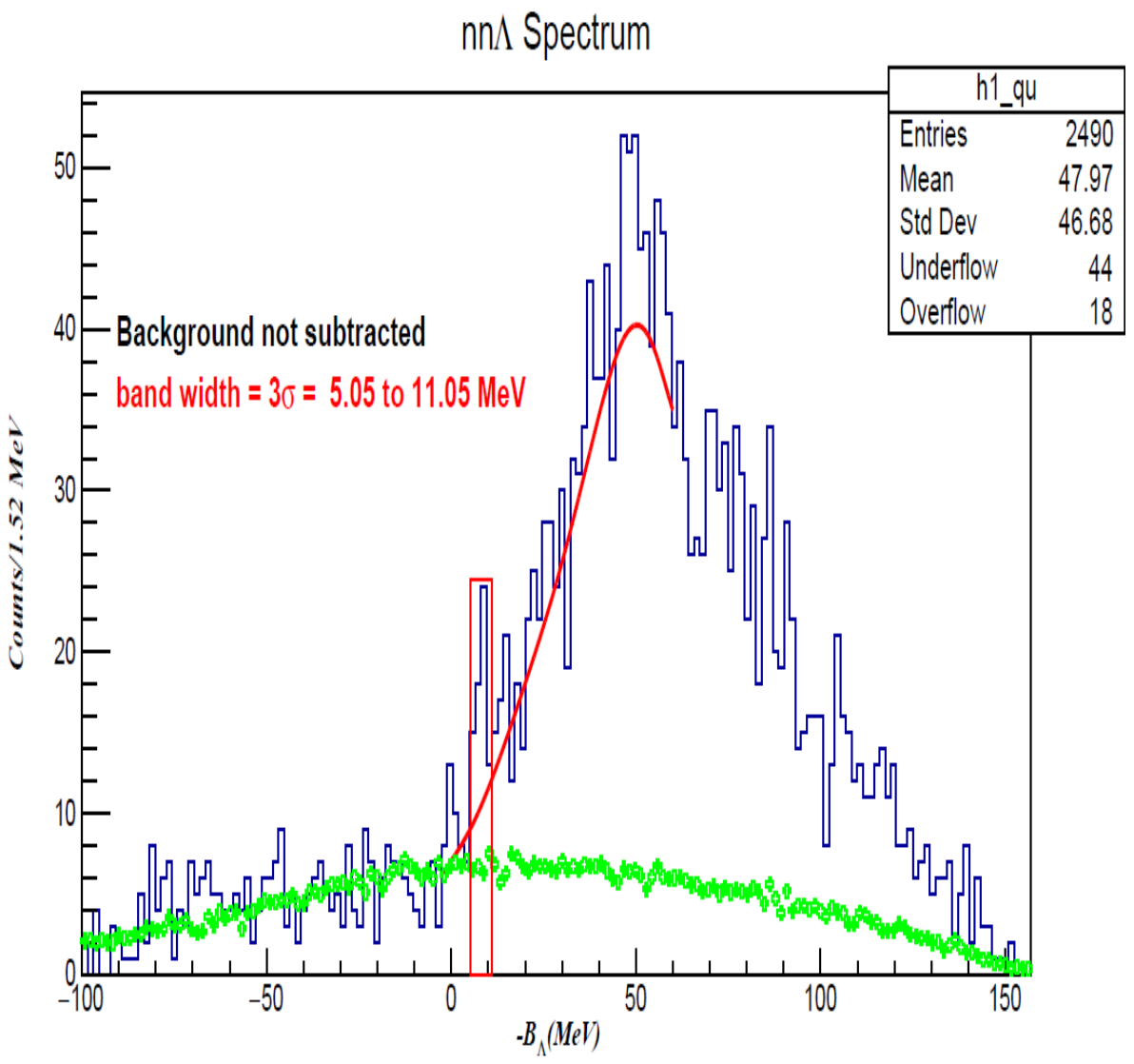
## For the second peak

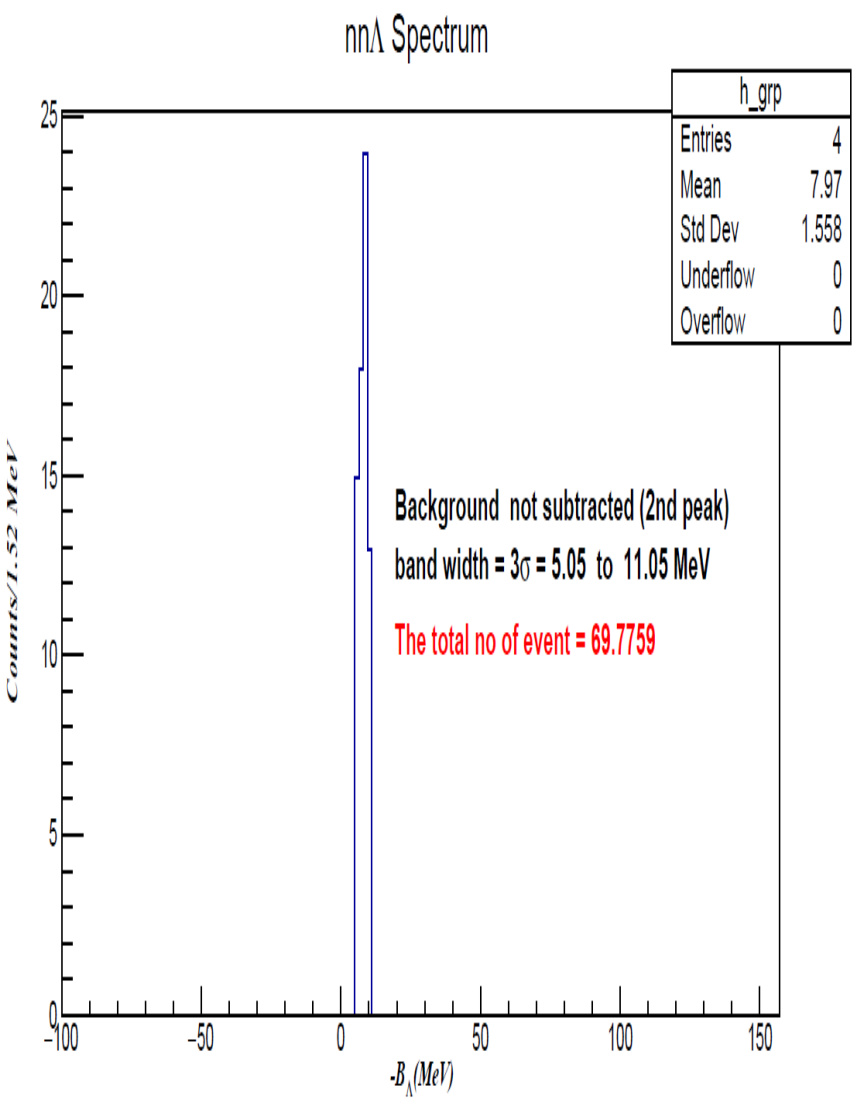
**Mean = 8.05 MeV and sigma = 1.0 MeV**

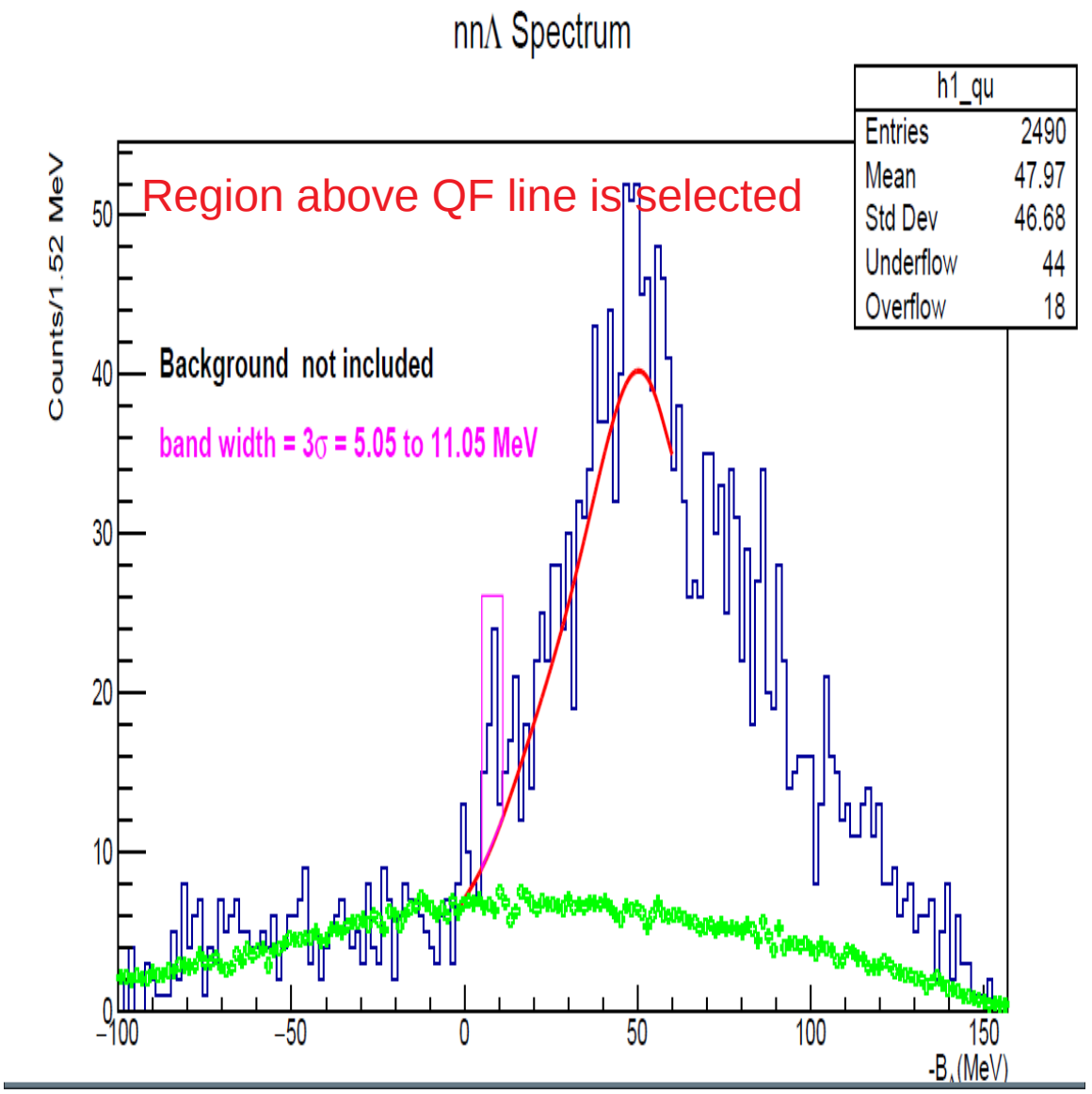
1. band width = 1sigma = 7.05 to 9.05 MeV
N1 = 41.698 and N2 = 21.8998
Statistical Significance = 21.8998/sqrt(41.698 ) ~ 3.39

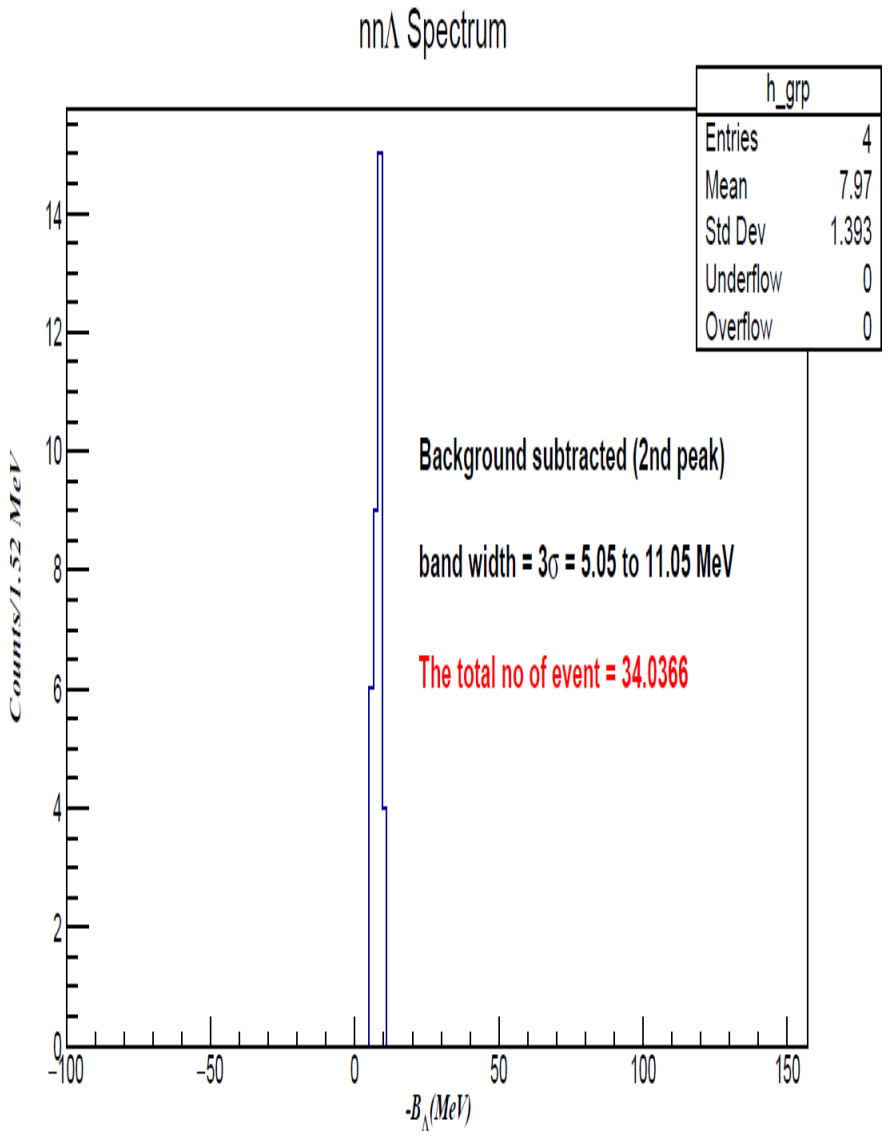
2. band width = 2sigma = 6.05 to 10.05 MeV
N1 = 41.9863 and N2 = 23.0158
Statistical Significance = 23.0158/sqrt(41.9863) ~ 3.55

3. band width = 3sigma = 5.05 to 11.05 MeV
N1 = 69.7759 and N2 = 34.0366
Statistical Significance = 34.0366/sqrt(69.7759) ~ 4.07


nnΛ Spectrum
h1_qu
Entries 2490
Mean 47.97
Std Dev 46.68
Underflow 44
Overflow 18
Background not subtracted
band width = 3σ = 5.05 to 11.05 MeV
Counts/1.52 MeV
-B_Λ(MeV)


nnΛ Spectrum
h_grp
Entries 4
Mean 7.97
Std Dev 1.558
Underflow 0
Overflow 0
Background not subtracted (2nd peak)
band width = 3σ = 5.05 to 11.05 MeV
The total no of event = 69.7759
Counts/1.52 MeV
-B_Λ(MeV)


nnΛ Spectrum
h1_qu
Entries 2490
Mean 47.97
Std Dev 46.68
Underflow 44
Overflow 18
Region above QF line is selected
Background not included
band width = 3σ = 5.05 to 11.05 MeV
Counts/1.52 MeV
-B_Λ(MeV)


nnΛ Spectrum
h_grp
Entries 4
Mean 7.97
Std Dev 1.393
Underflow 0
Overflow 0
Background subtracted (2nd peak)
band width = 3σ = 5.05 to 11.05 MeV
The total no of event = 34.0366
Counts/1.52 MeV
-B_Λ(MeV)