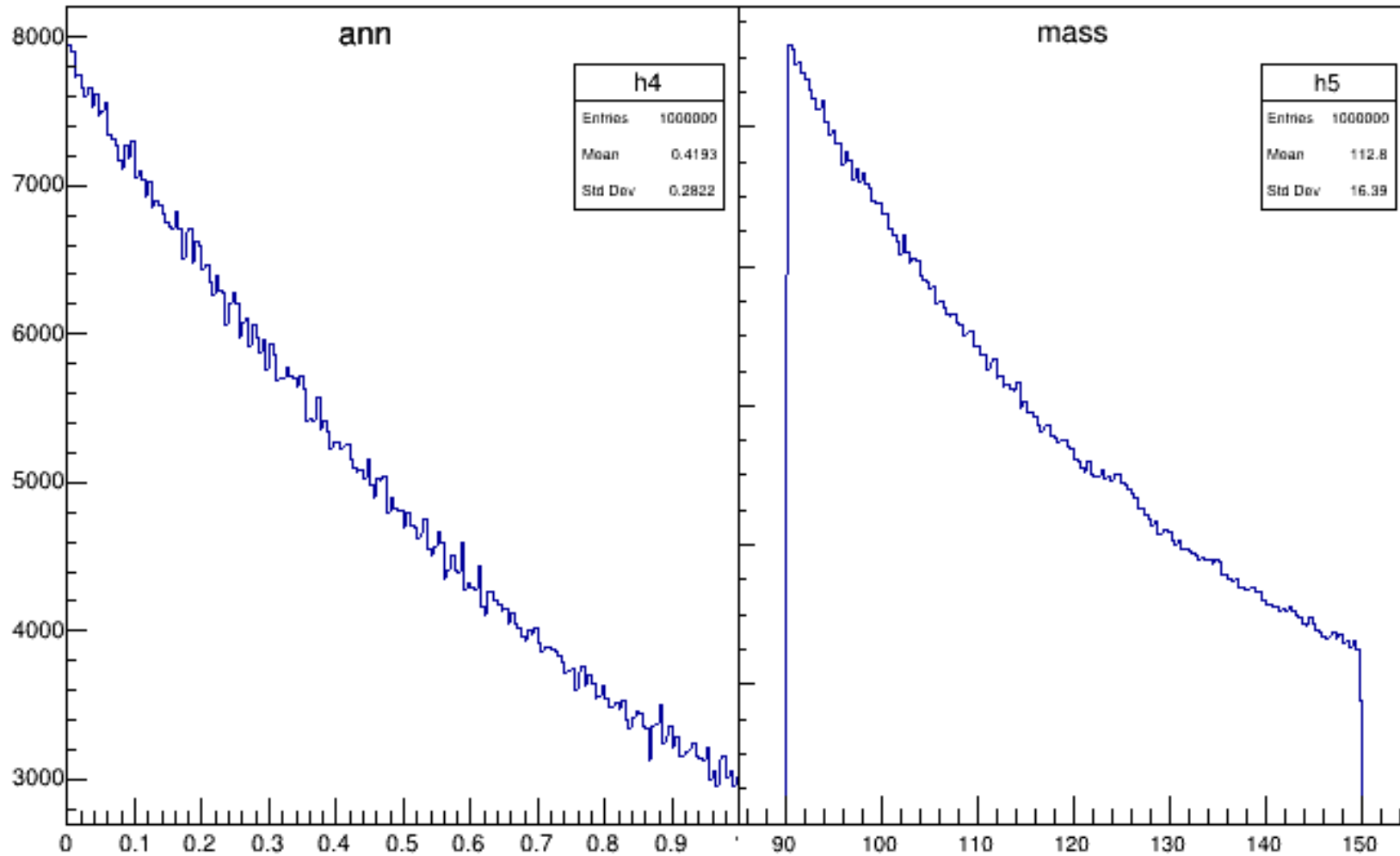


Group 1 Report

Group Member:

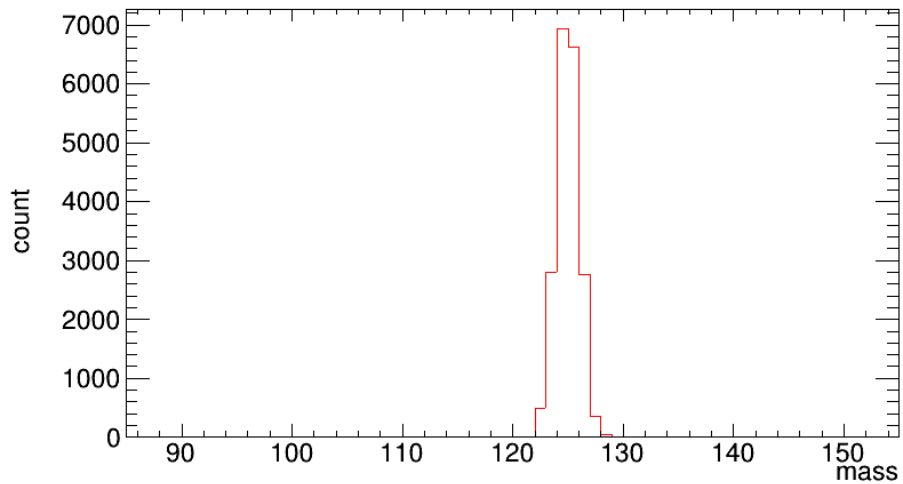
Chen Xiaohao, Chen Yongqing, Huang Xiaotao, Li Jialin, Li Tianqi, Li Qiaohong, Liu Jinfeng, Lu Tan, Qian Zhen, Wang Tianting, Wang Zhen, Xian Shu, Yang Jishun.

Original Data

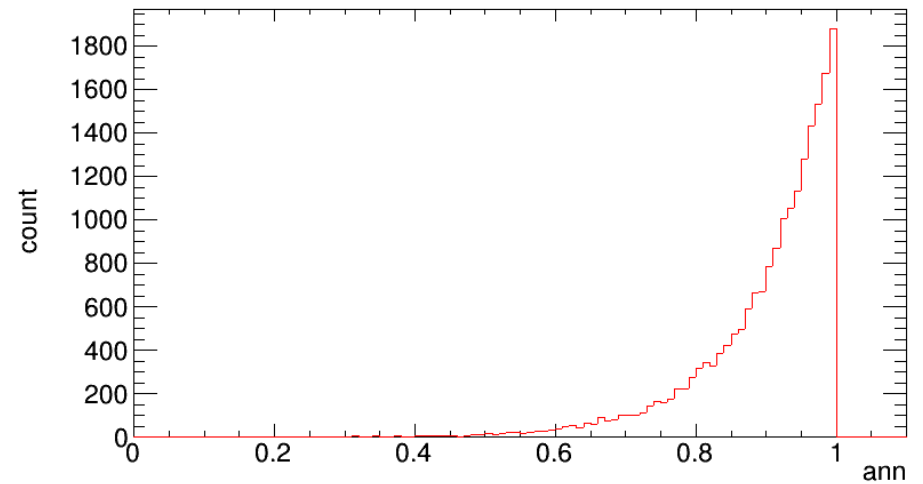


MC Simulation

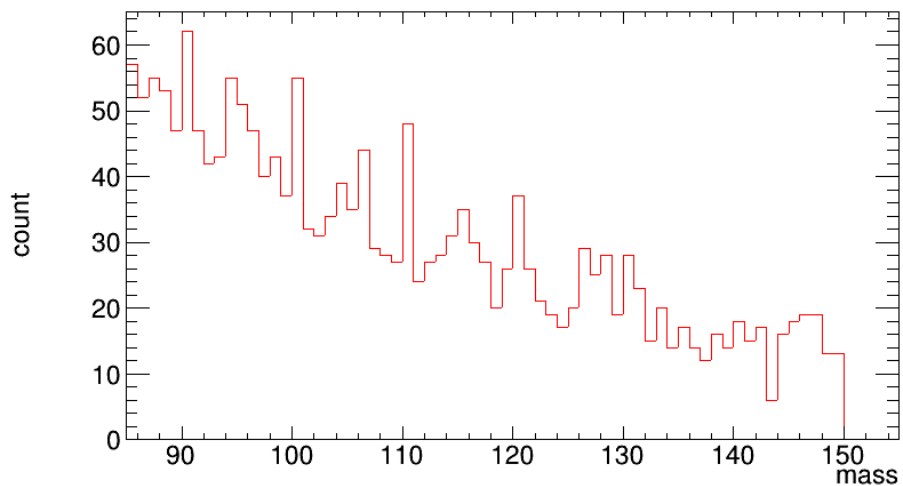
signal_mass



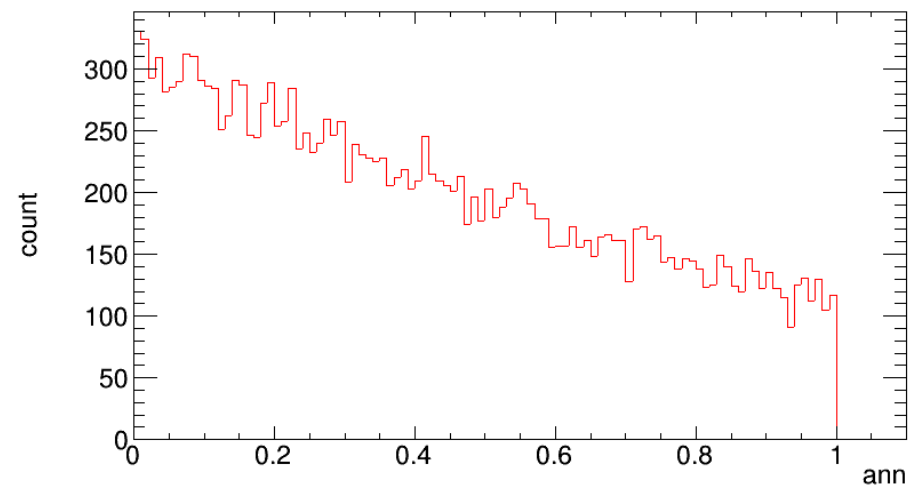
signal_ann



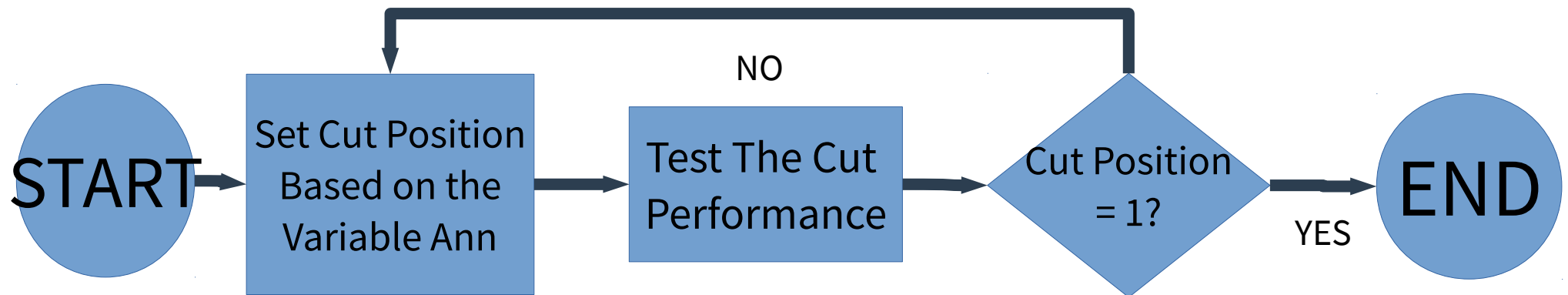
background_mass



background_ann

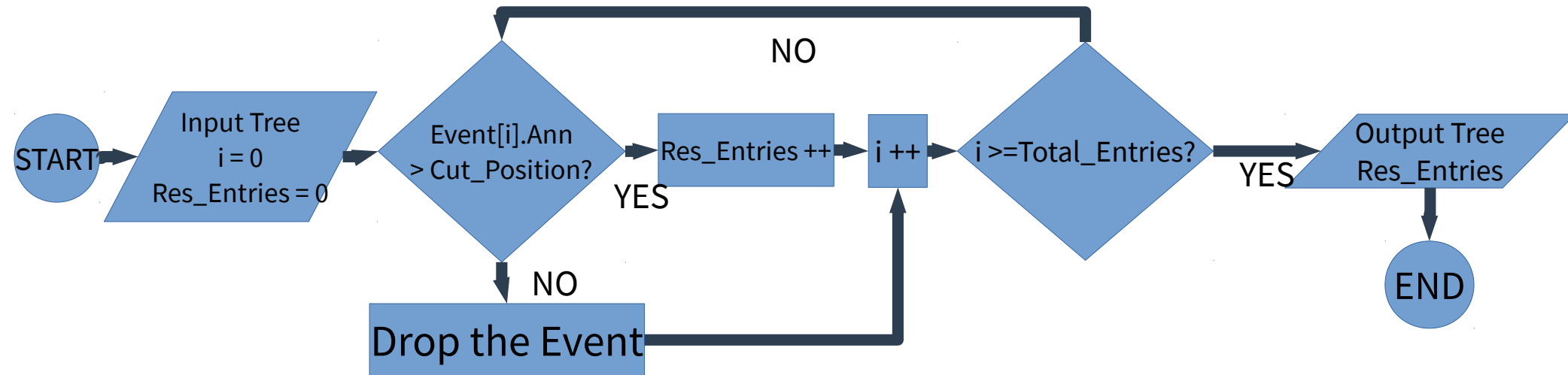


Our Program



The basic routine

How To Test the Cut Performance



Traverse through the input tree to perform the cut and get the output tree and the efficiency

Output Tree ==> Fit and other analysis

How To Get the Efficiency

Traverse the MC Signal Tree

$\text{Efficiency} = \text{Remain_Entries} / \text{Total_Entries};$

or

$\text{TH1D}::\text{Fill}(\text{ann}) \Rightarrow \text{TH1D}::\text{Integral}(\text{Cut_Position}, 1) / \text{Total_Entries};$

$\text{TTree}::\text{GetEntries}(\text{"ann} > \text{Cut_Position} \text{"}) / \text{Total_Entries}$

.....

How To Get the Power

Traverse the MC Background Tree

$\text{Power} = 1 - \text{Remain_Entries} / \text{Total_Entries};$

or

$\text{TH1D}::\text{Fill}(\text{ann}) \Rightarrow \text{TH1D}::\text{Integral}(0, \text{Cut_Position}) / \text{Total_Entries};$

$\text{Ttree}::\text{GetEntries}(\text{"ann} < \text{Cut_Position} \text{"}) / \text{Total_Entries}$

.....

How To Fit the Histogram

Traverse the Data Tree

TH1D::Fill(mass) =====>

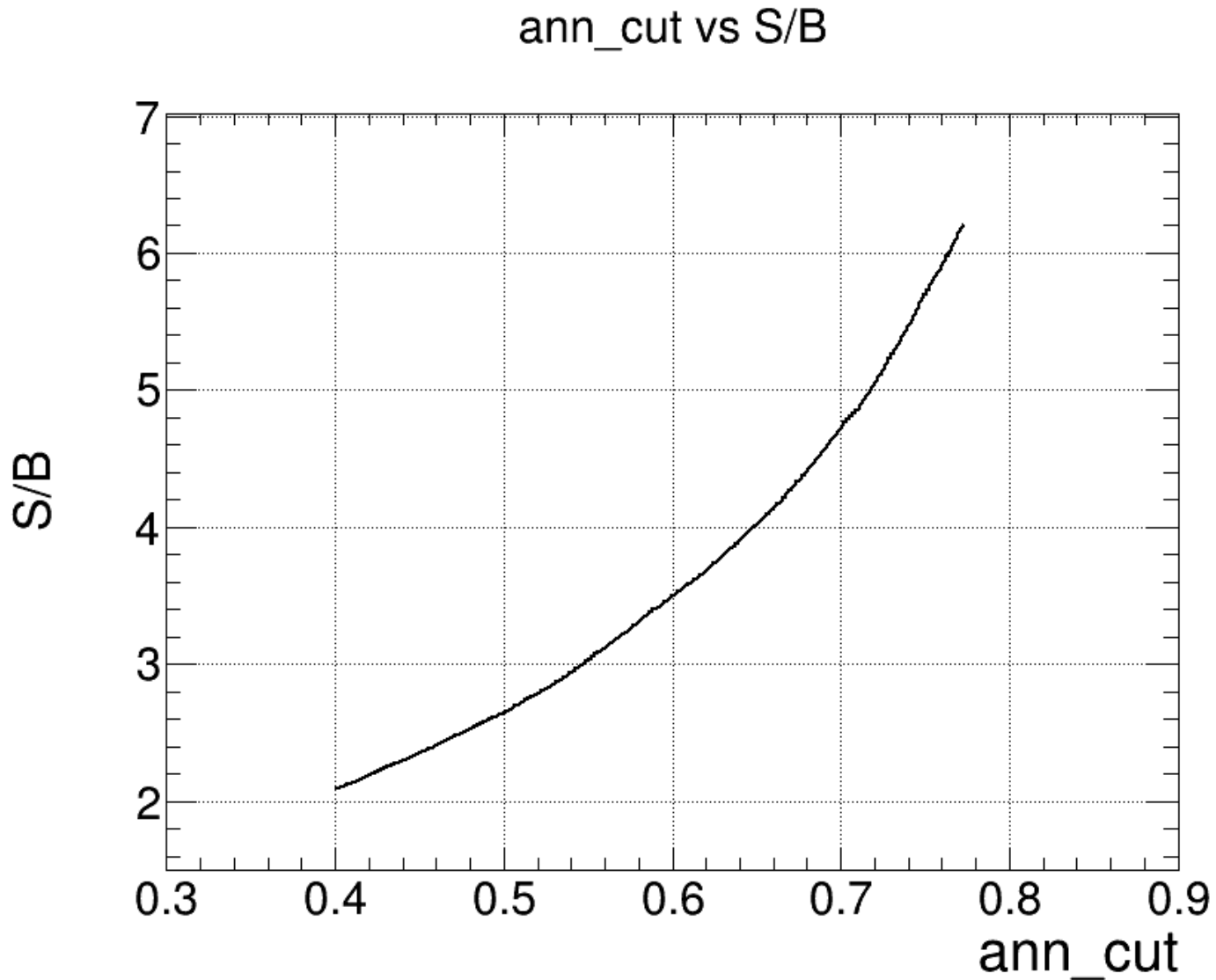
TF1 function = gauss + exponential ==> TH1D::Fit("function")

Or

RooDataHist ==> RooFit

.....

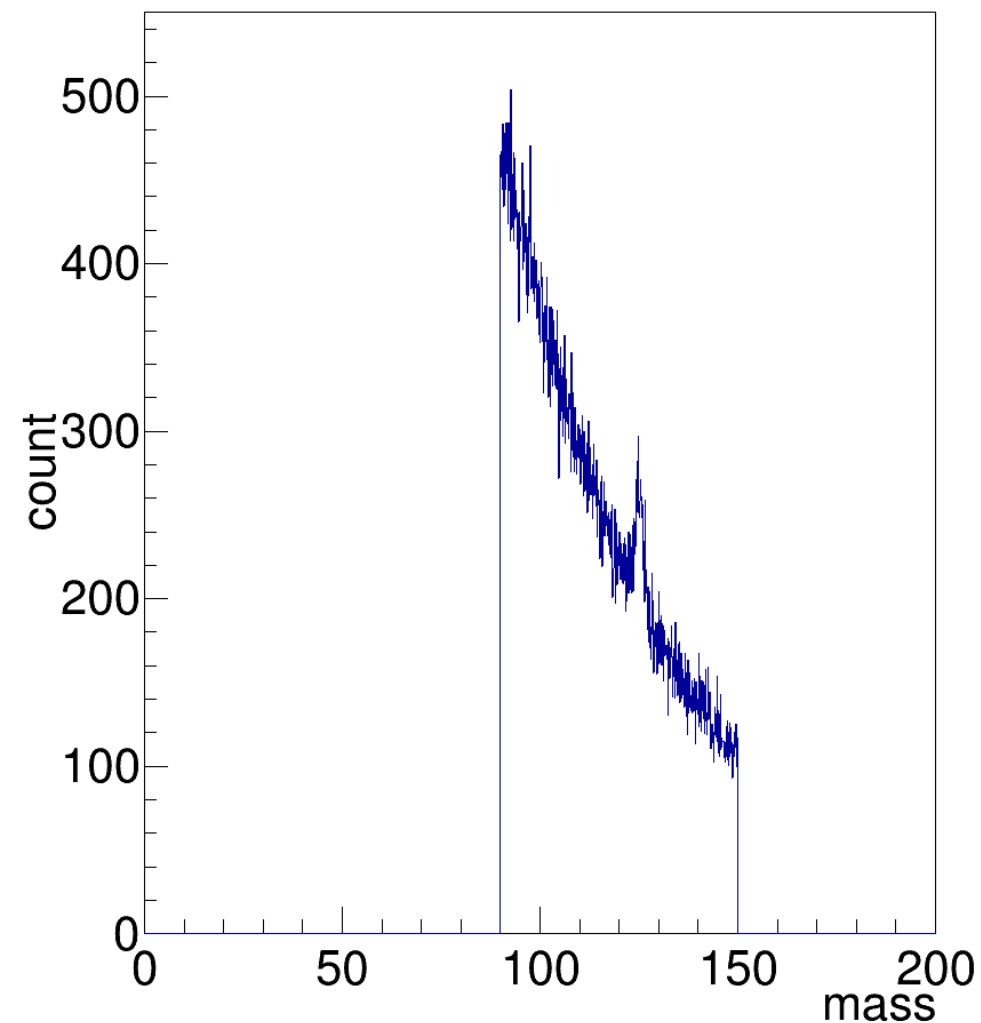
How To Find the Cut



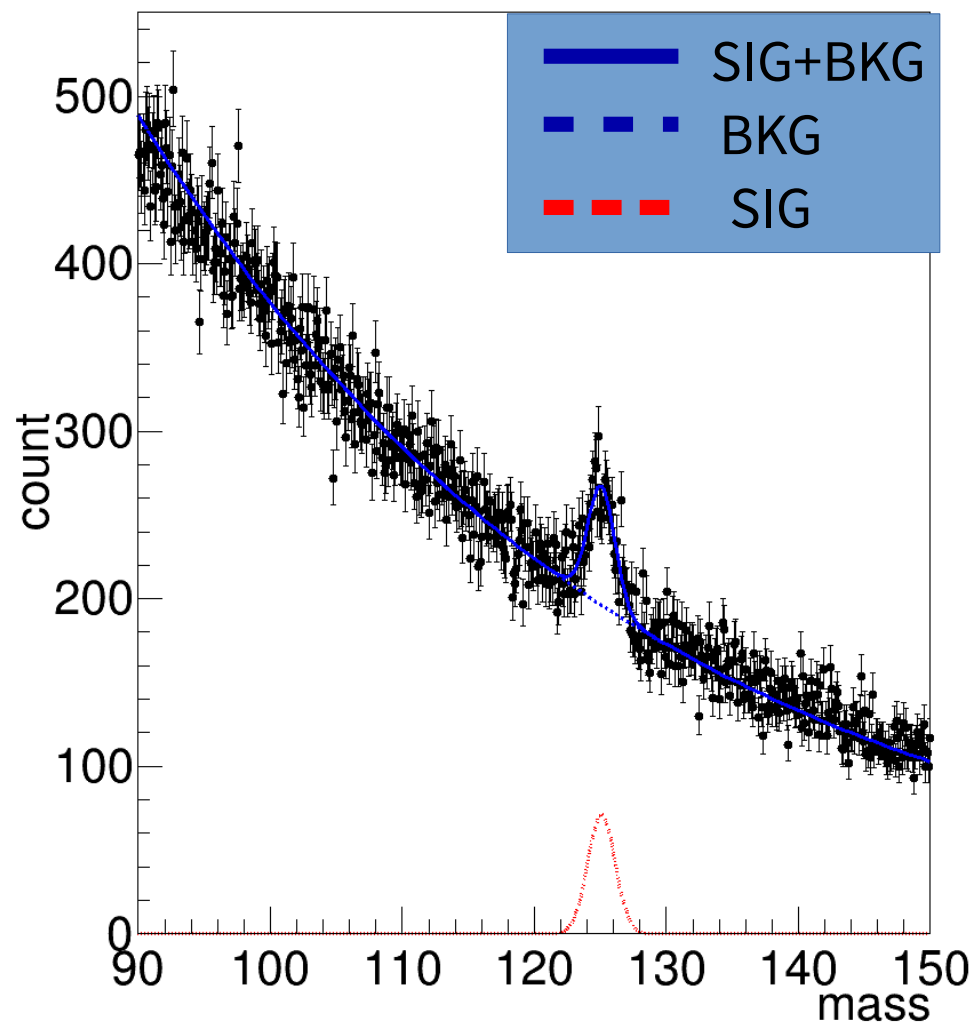
Result 1

90% Efficiency

Invariant mass



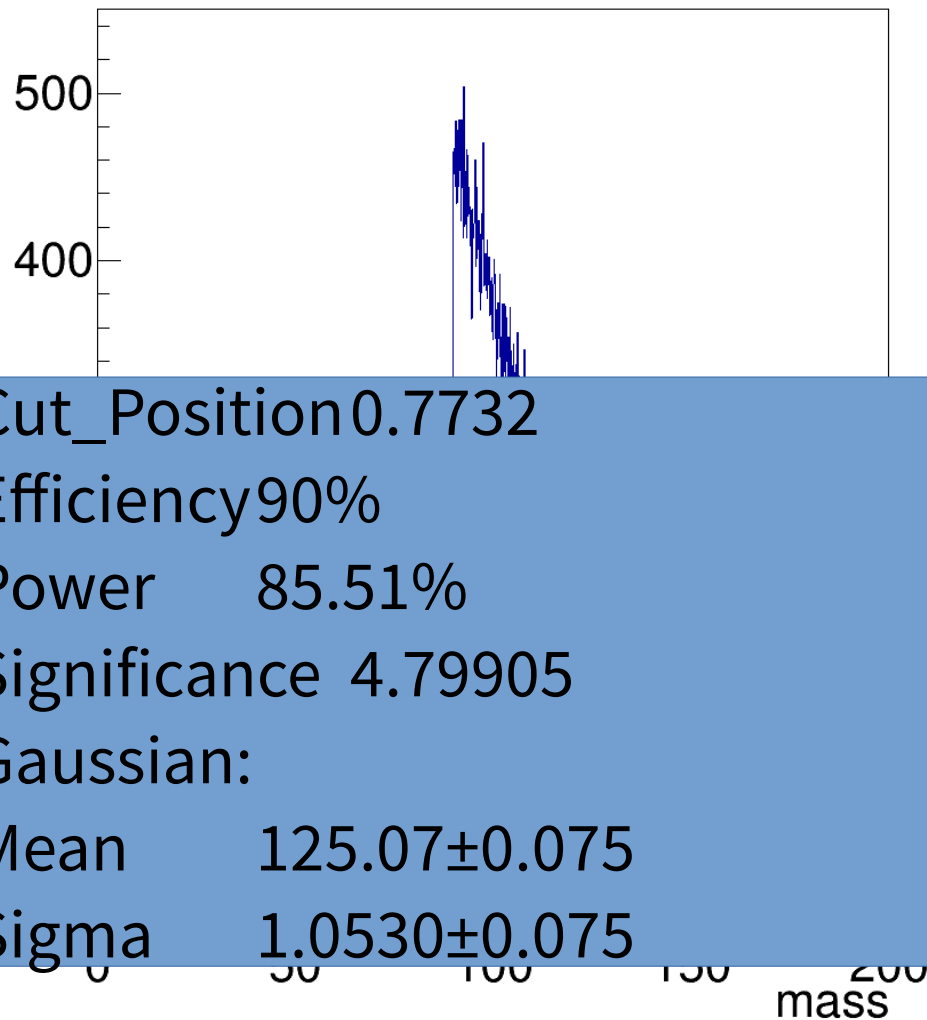
Invariant mass



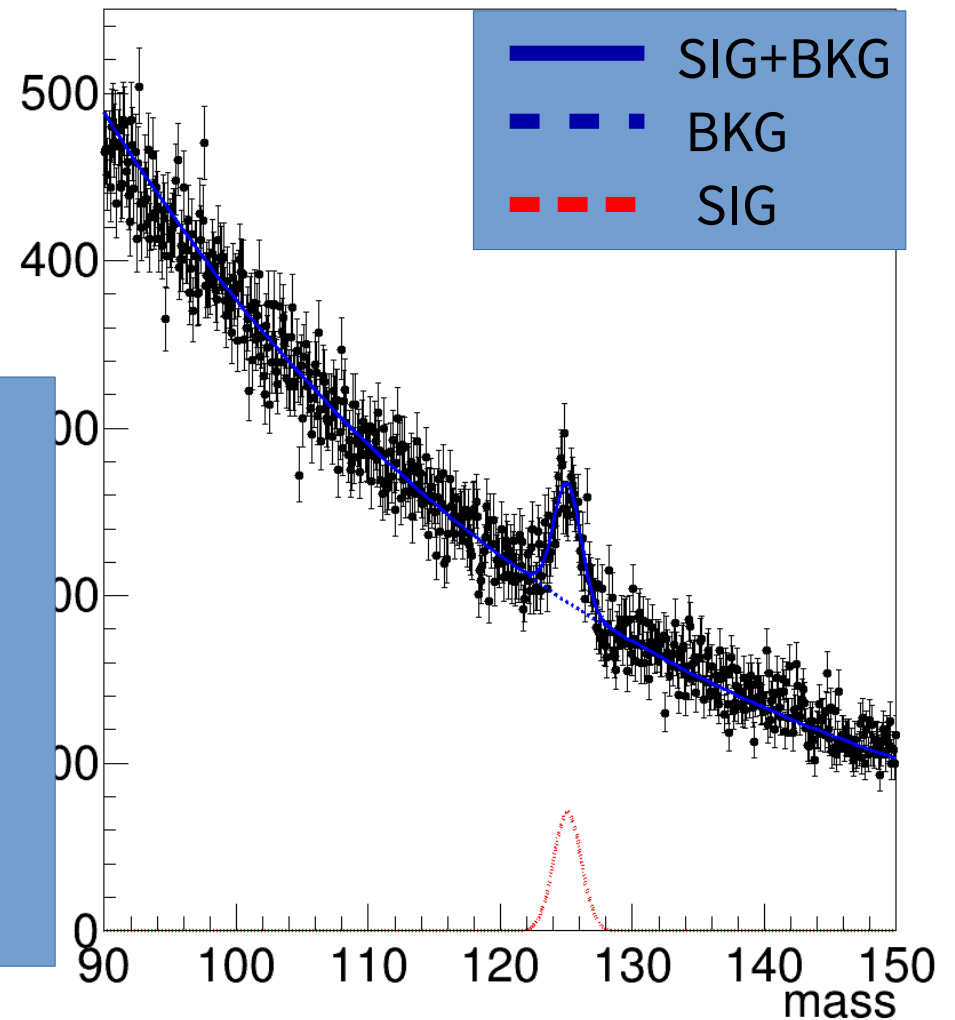
Result 1

90% Efficiency

Invariant mass

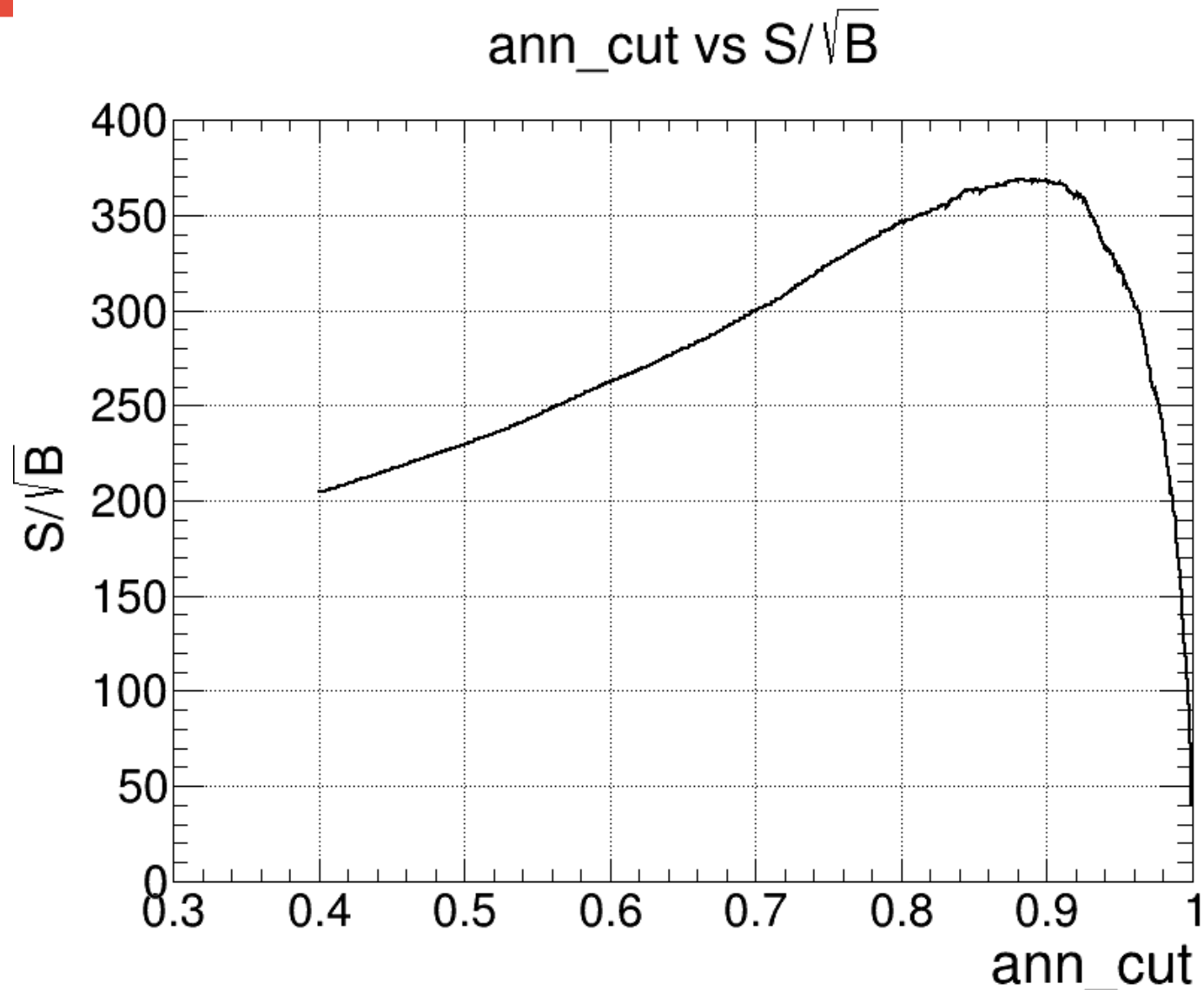


Invariant mass



Animation

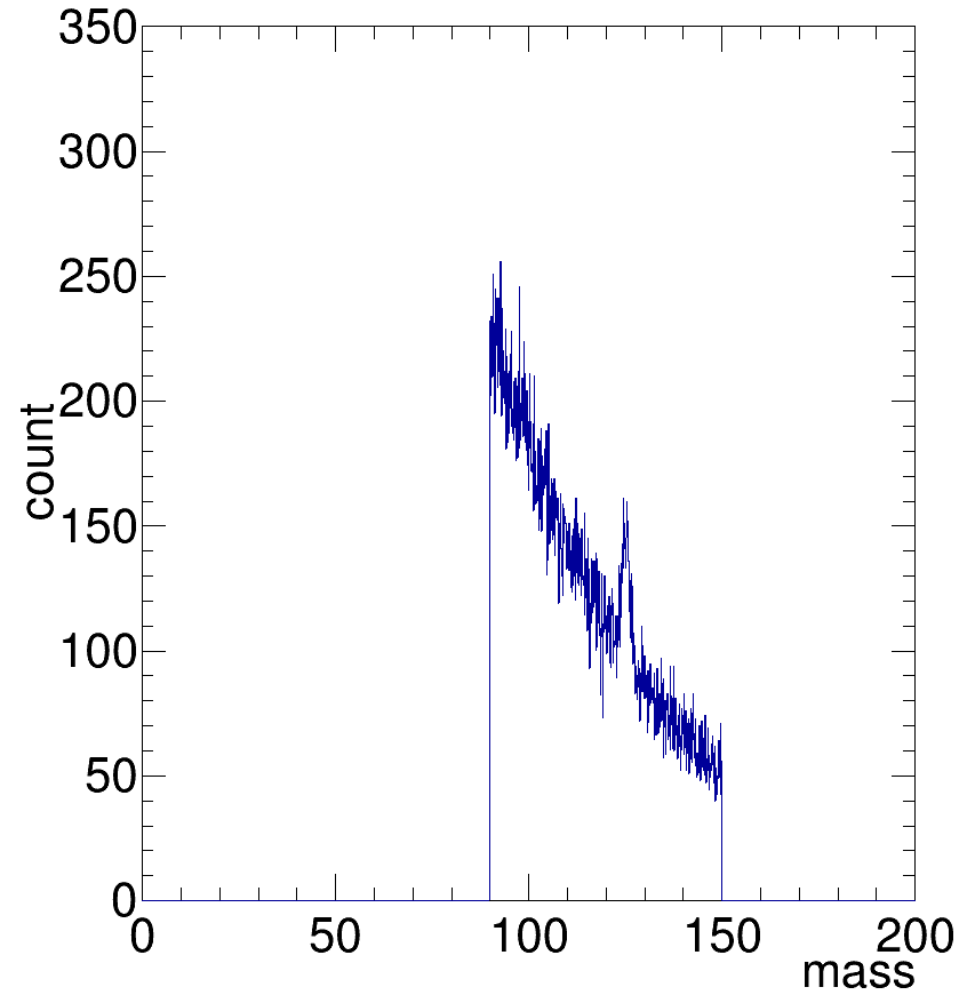
How To Find the Cut



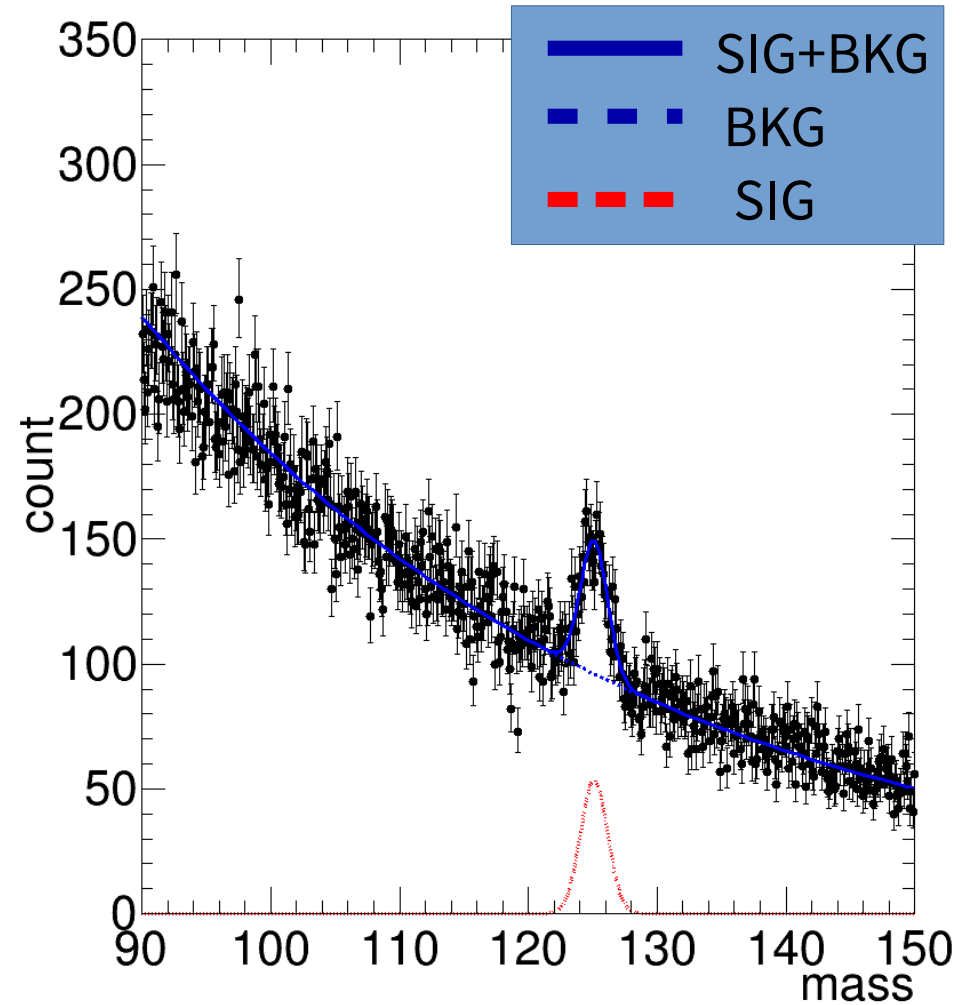
Result 2

Best Significance

Invariant mass



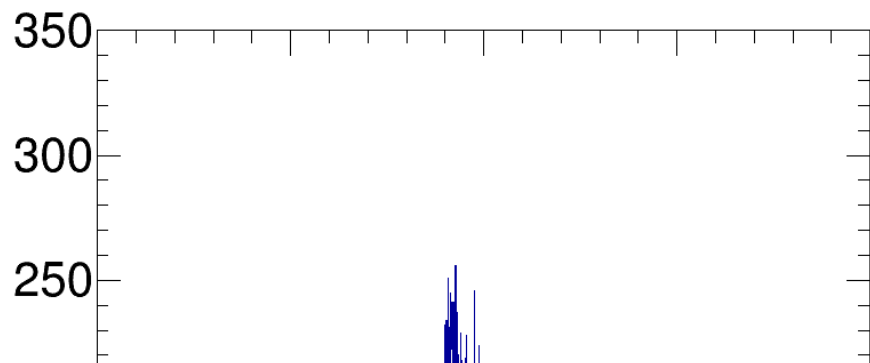
Invariant mass



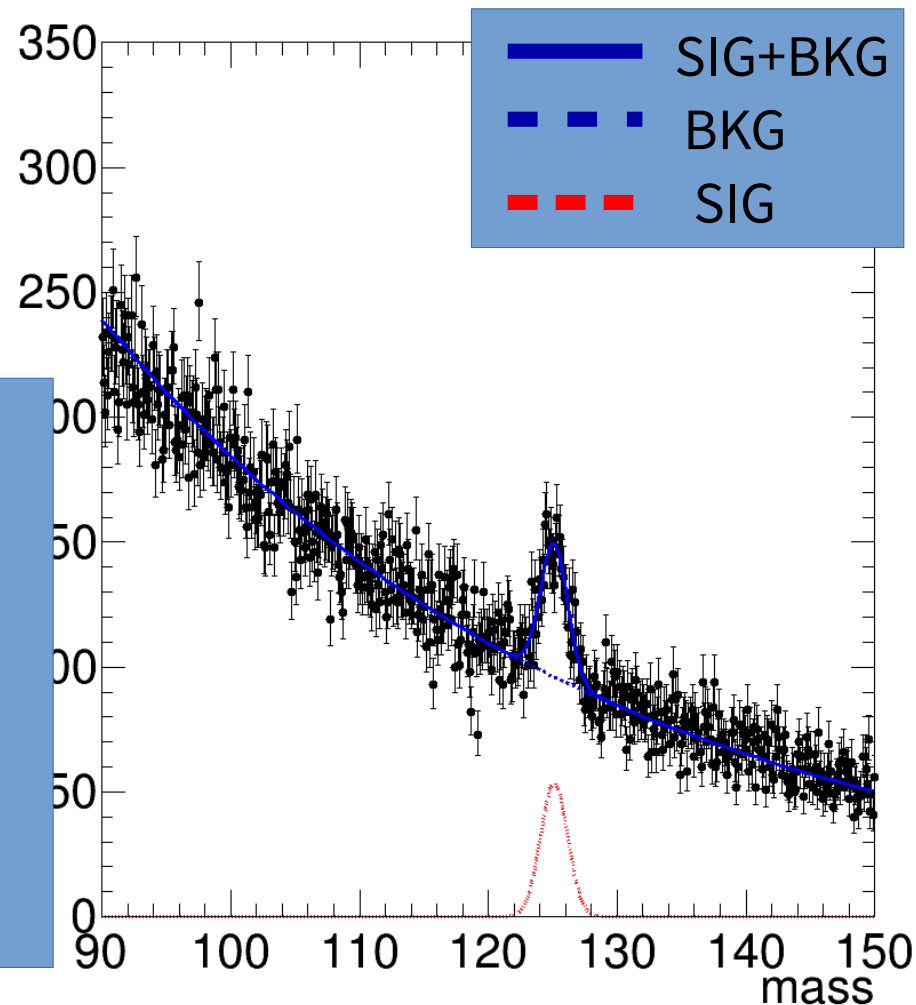
Result 2

Best Significance

Invariant mass



Invariant mass



Cut_Position 0.8824

Power 92.905%

Significance 5.23639

Gaussian

Mean 125.096 ± 0.072

Sigma 1.05489 ± 0.067

mass

Thank You Very Much!

Cheers For the Friendship and Cooperation of Group 1
Appreciate To the Patient Instruct From Every Teacher and the
Great Effort of the ISTEP 2019 Committee