

Tuning the cuts for Jpsi

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Methods

- Jpsi mass window (2.6, 3.5) GeV
 - 3 rapidity bins – (0,0.9), (0.9,1.5) , (1.5, 2.1)
 - $\text{EffSig} = n\text{Sig_cut} / n\text{Sig_nocut}$
 - $\text{RejBkg} = 1 - n\text{BG_cut} / n\text{BG_nocut}$
 - S/BG –Calculated in $\pm 2\sigma$ peak window
 - num in the $\pm 2\sigma$ (signal) && out4sigma sideband(background)
-

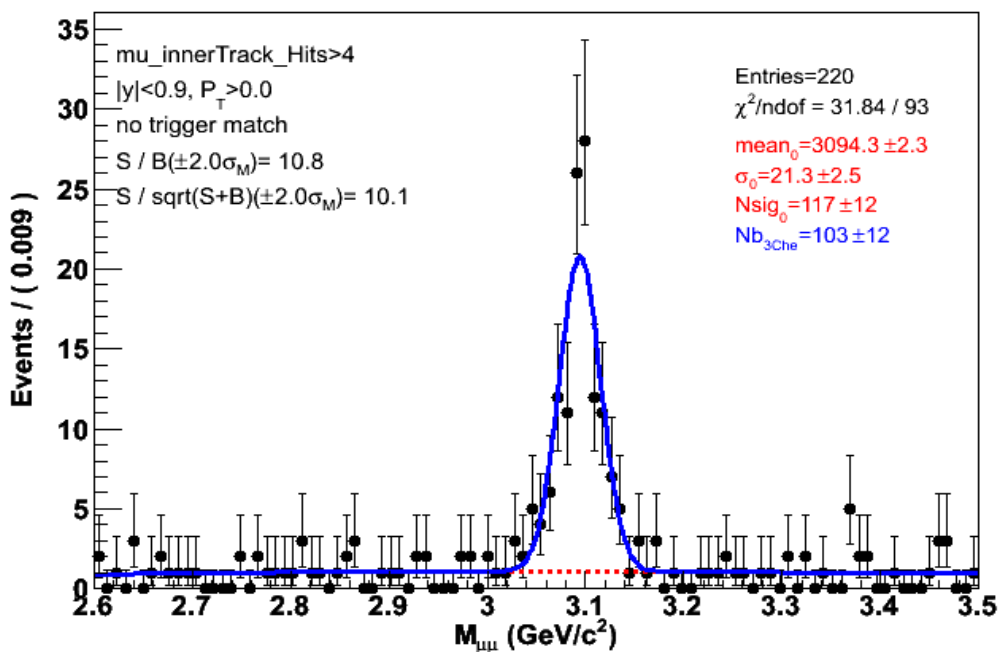
Run on data

/castor/cern.ch/cms/store/caf/user/tdahms/HeavyIons/Onia/Data2010/v4/Skims/Prompt/150256-150619/

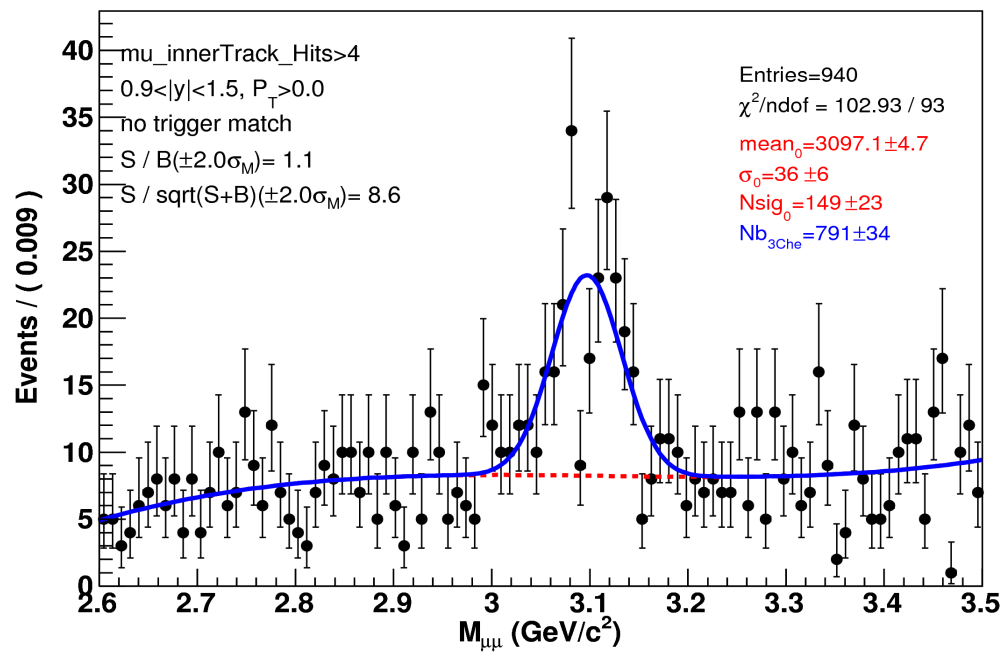
/castor/cern.ch/cms/store/caf/user/tdahms/HeavyIons/Onia/Data2010/v4/Skims/Prompt/150844-153368/

Mass distribution in 3 rapidity bins

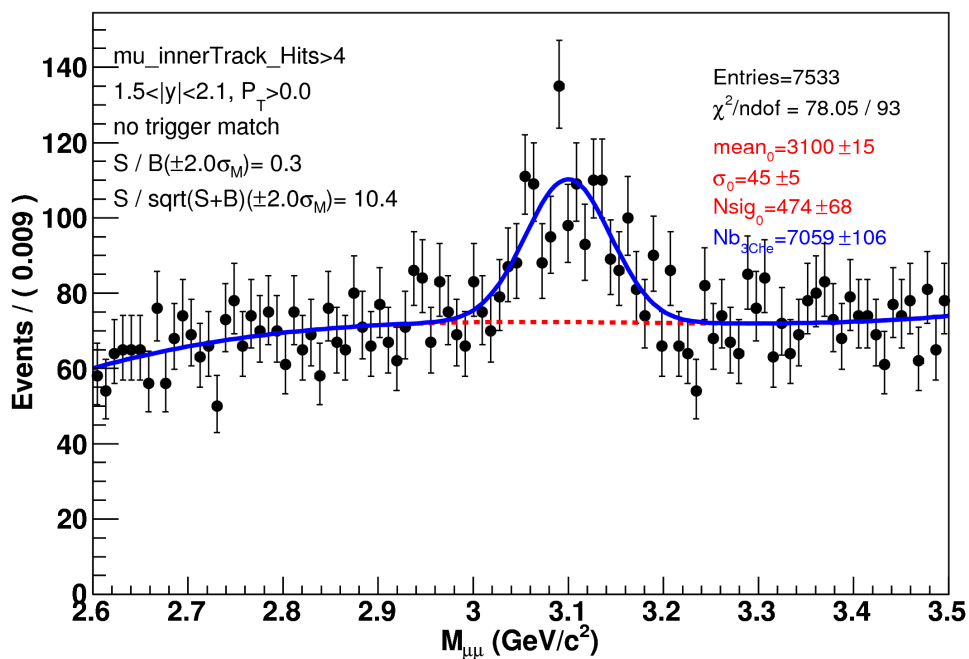
Gaussian & Chebychev



Gaussian & Chebychev

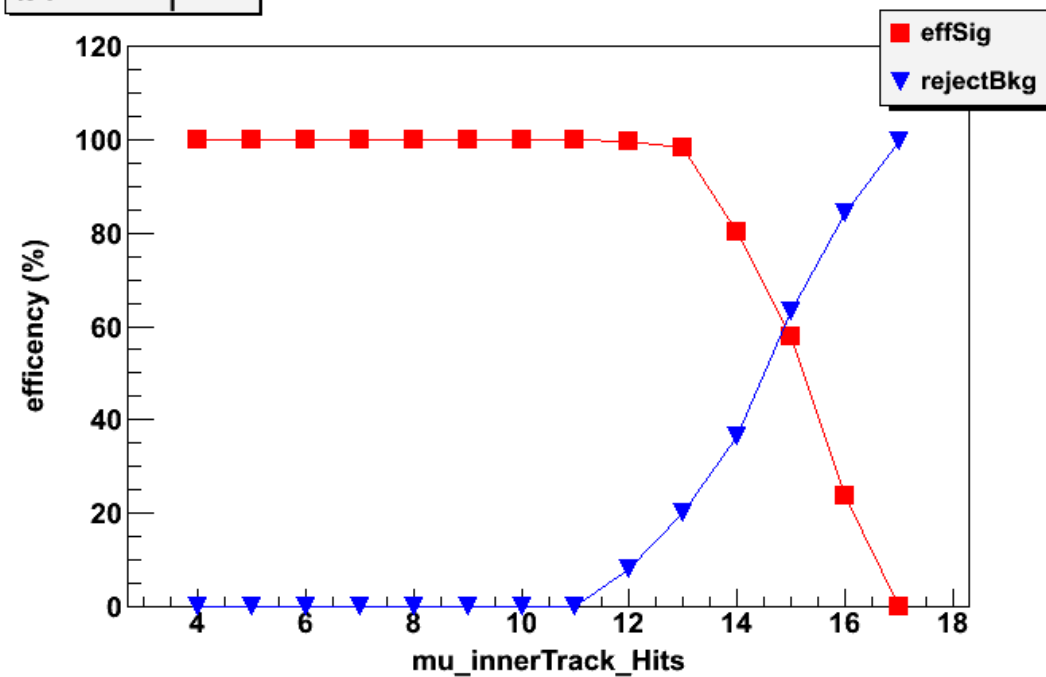


Gaussian & Chebychev

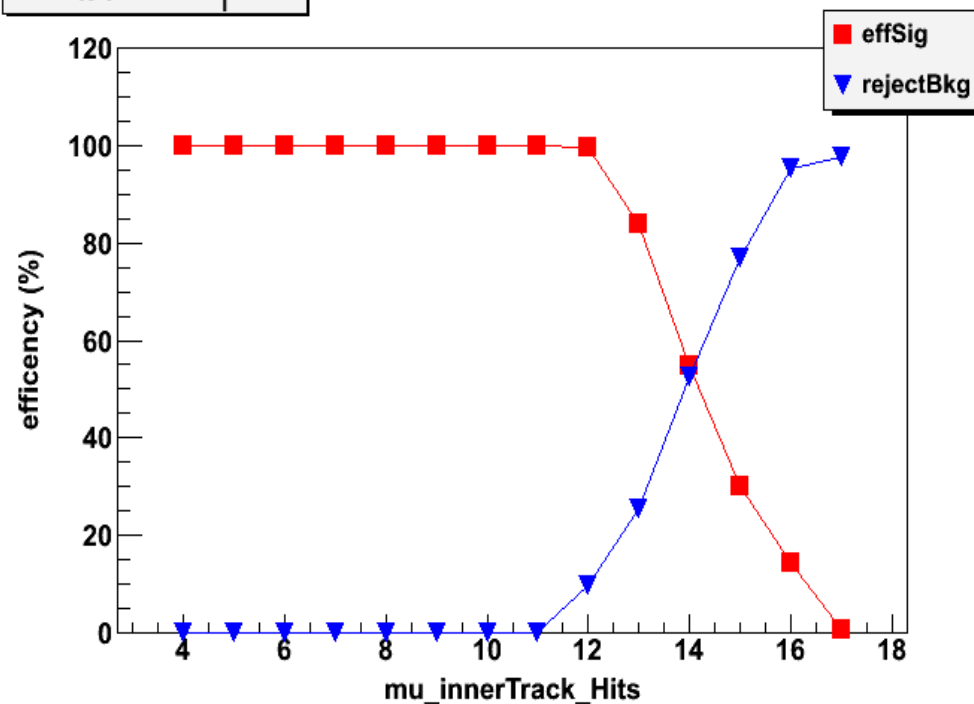


mu_innerTrack_Hits

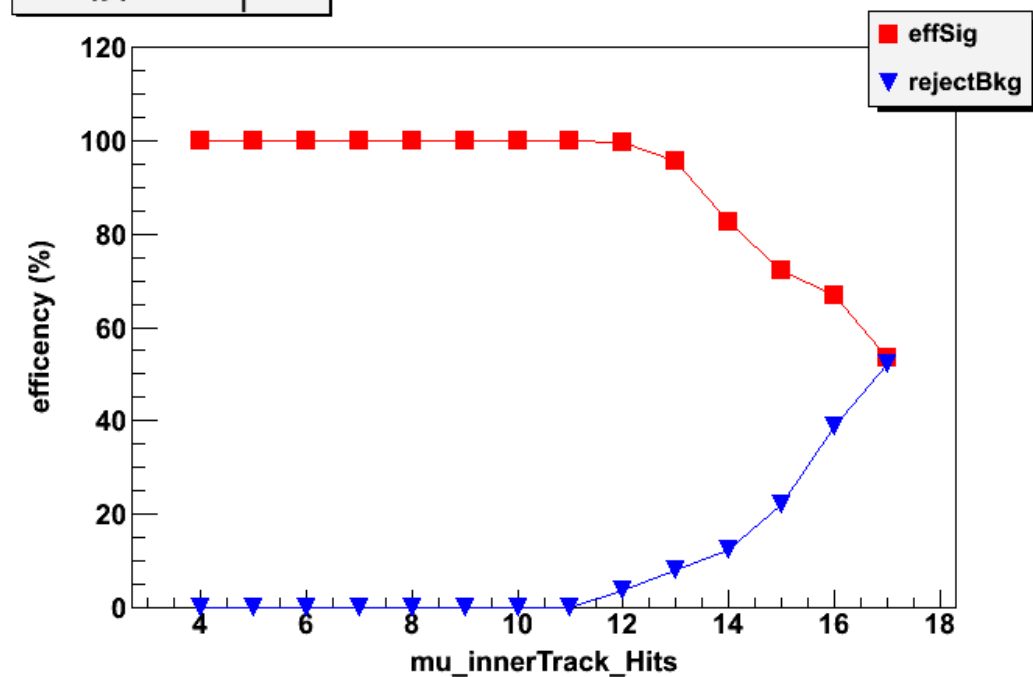
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



mu_innerTrack_Hits

$|y| < 0.9$

Cut value	4	5	6	7	8	9	10
Effi sig%	100	100	100	100	100	100	100
RejBkg%	0	0	0	0	0	0	0
Cut value	11	12	13	14	15	16	17
Effi sig%	100	99.4	98.2	80.08	57.9	23.6	3.076e-6
RejBkg%	0	7.9	19.9	36.2	63.1	84.07	99.7

$0.9 < |y| < 1.5$

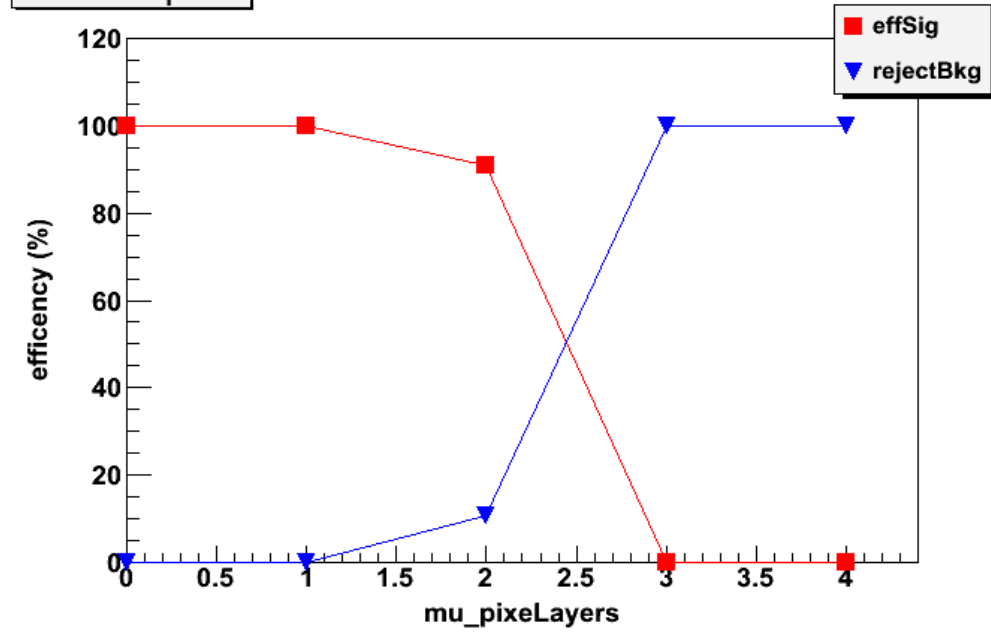
Cut value	4	5	6	7	8	9	10
Effi sig%	100	100	100	100	100	100	100
RejBkg%	0	0	0	0	0	0	0
Cut value	11	12	13	14	15	16	17
Effi sig%	100	99.7	83.9	54.6	30.06	14.	0.6
RejBkg%	0	9.7	25.2	52.3	76.8	95.2	97.5

$1.5 < |y| < 2.1$

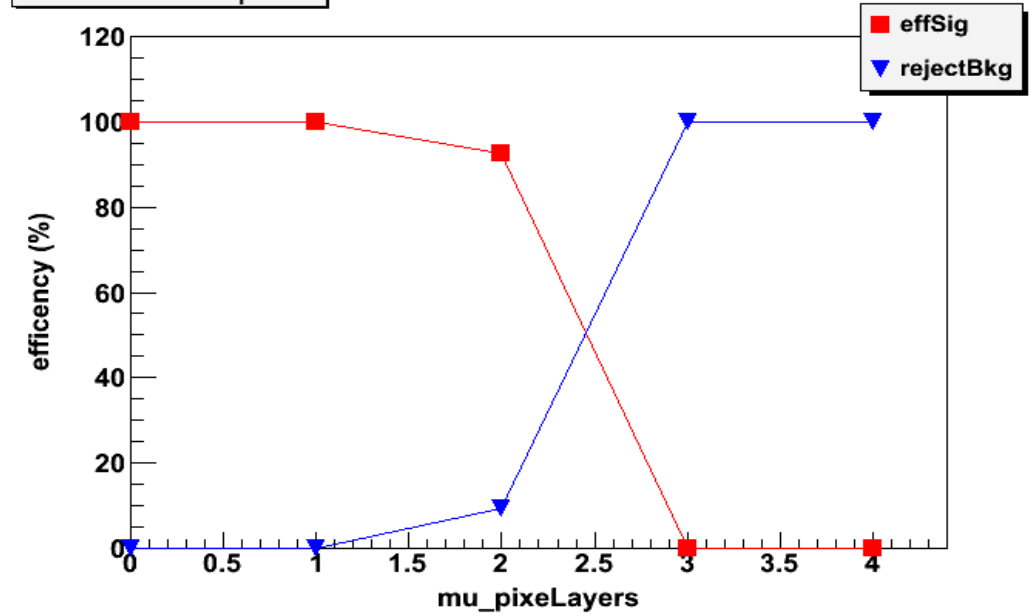
Cut value	4	5	6	7	8	9	10
Effi sig%	100	100	100	100	100	100	100
RejBkg%	0	0	0	0	0	0	0
Cut value	11	12	13	14	15	16	17
Effi sig%	100	99.6	95.7	82.6	72.3	66.8	53.3
RejBkg%	0	3.5	7.9	12.2	21.9	38.7	52.2

mu_pixelLayers

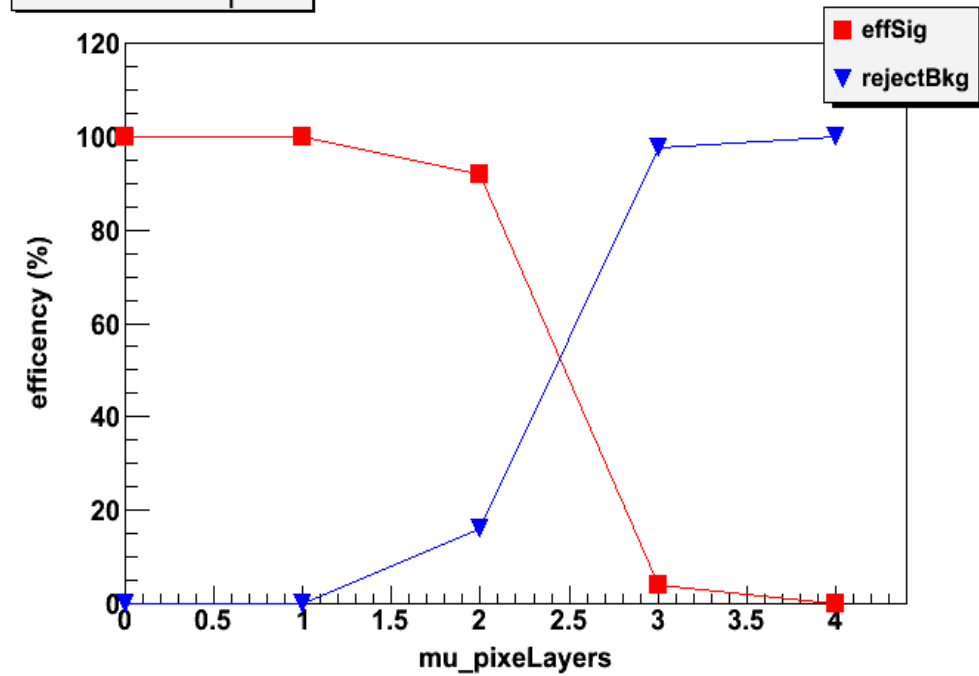
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



mu_pixelLayers

$|y| < 0.9$

Cut value	0	1	2	3	4
Effi sig%	100	100	91.0312	0	0
RejBkg	0	0	10.6912	100	100

$0.9 < |y| < 1.5$

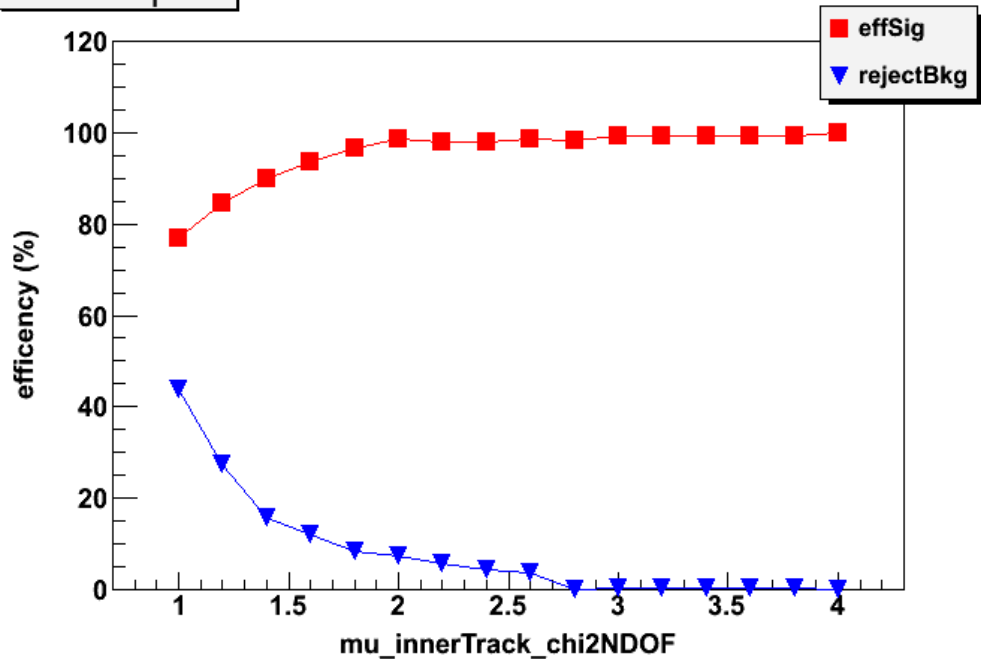
Cut value	0	1	2	3	4
Effi sig%	100	100	92.6348	0	0
RejBkg	0	0	9.17649	100	100

$1.5 < |y| < 2.1$

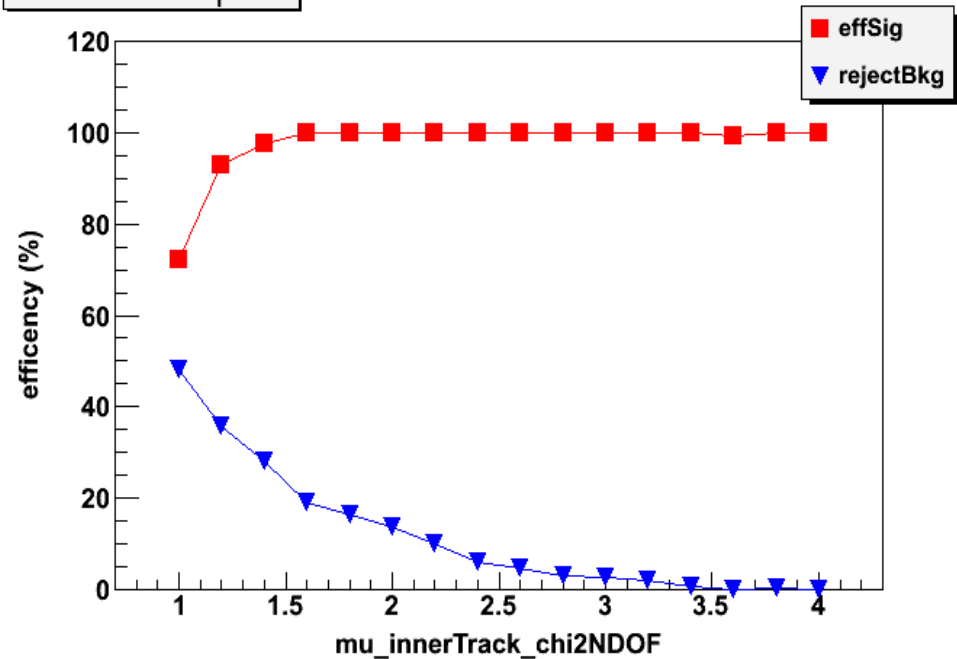
Cut value	0	1	2	3	4
Effi sig%	100	100	92.0996	4.11977	0
RejBkg	0	0	15.9727	97.7623	100

mu_innerTrack_chi2NDOF

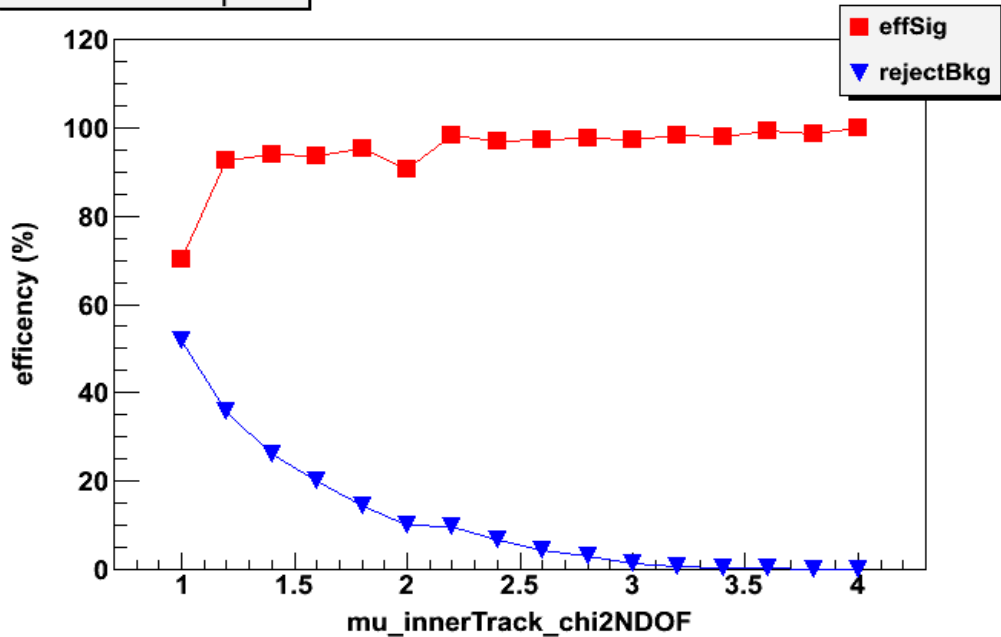
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



mu_innerTrack_chi2NDOF

$|y| < 0.9$

Cut value	1	1.2	1.4	1.6	1.8	2	2.2	2.4
Effi sig%	76.9	84.7	89.8	93.6	96.5	98.7	98.04	97.8
RejBkg	43.6	27.5	15.6	12.07	8.4	7.2	5.7	4.4
Cut value	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Effi sig%	98.5	98.2	99.2	99.2	99.2	99.2	99.2	100
RejBkg	3.7	0.079	0.33	0.33	0.33	0.33	0.33	0

$0.9 < |y| < 1.5$

Cut value	1	1.2	1.4	1.6	1.8	2	2.2	2.4
Effi sig%	72.2	92.8	97.6	100	100	100	100	100
RejBkg	48.0	35.6	27.9	19.1	16.4	13.7	9.8	6.04
Cut value	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Effi sig%	100	100	100	100	100	99.4	100	100
RejBkg	4.7	2.8	2.5	1.8	0.5	0	0.34	0

$1.5 < |y| < 2.1$

Cut value	1	1.2	1.4	1.6	1.8	2	2.2	2.4
Effi sig%	72.2	92.8	97.6	100	100	100	100	100
RejBkg	48.0	35.6	27.9	19.1	16.4	13.7	9.8	6.04
Cut value	2.6	2.8	3	3.2	3.4	3.6	3.8	4
Effi sig%	100	100	100	100	100	99.4	100	100
RejBkg	4.7	2.8	2.5	1.8	0.5	0	0.34	0

Cuts applied for S/BG

$\text{mu_innerTrackHits} > 11$

$\text{mu_pixeLayers} > 0$

$\text{mu_innerTrack_chi2NDOF} < 3.4$

$\text{mu_dxy} < 0.1 \text{ cm}$

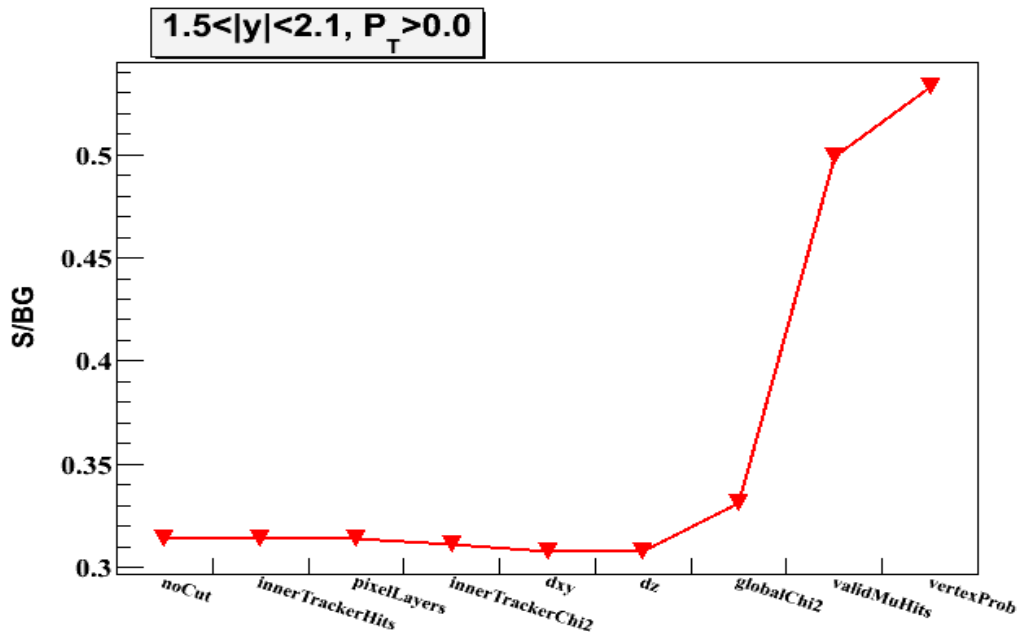
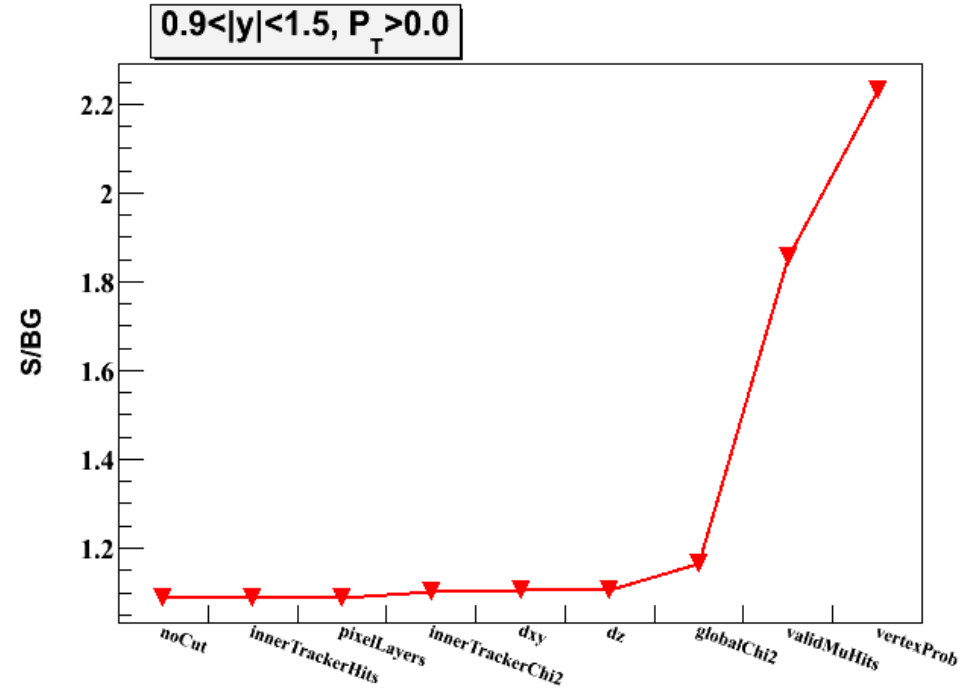
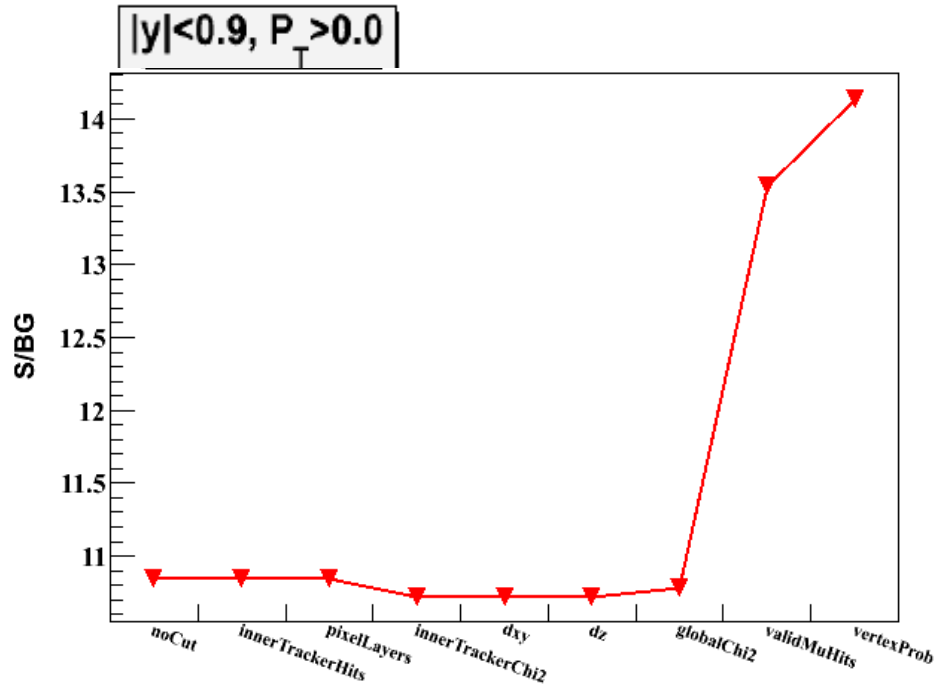
$\text{mu_dz} < 1. \text{ cm}$

$\text{mu_globalTrack_chi2NDOF} < 12$

$\text{mu_validMuHits} > 0$

$\text{vProb} > 0.001$

S/BG



$\text{mu_innerTrackHits} > 11$

$\text{mu_pixelLayers} > 0$

$\text{mu_innerTrack_chi2NDOF} < 3.4$

$\text{mu_dxy} < 0.1 \text{ cm}$

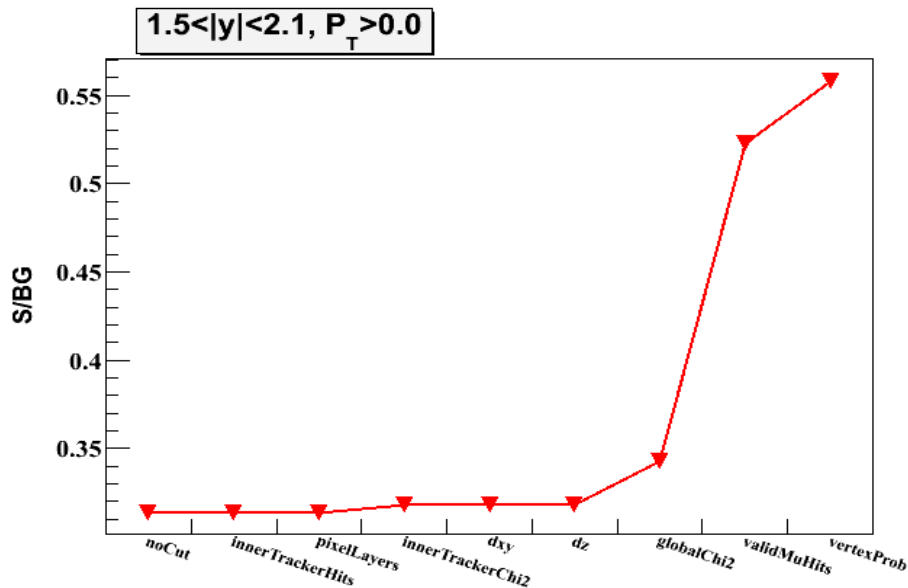
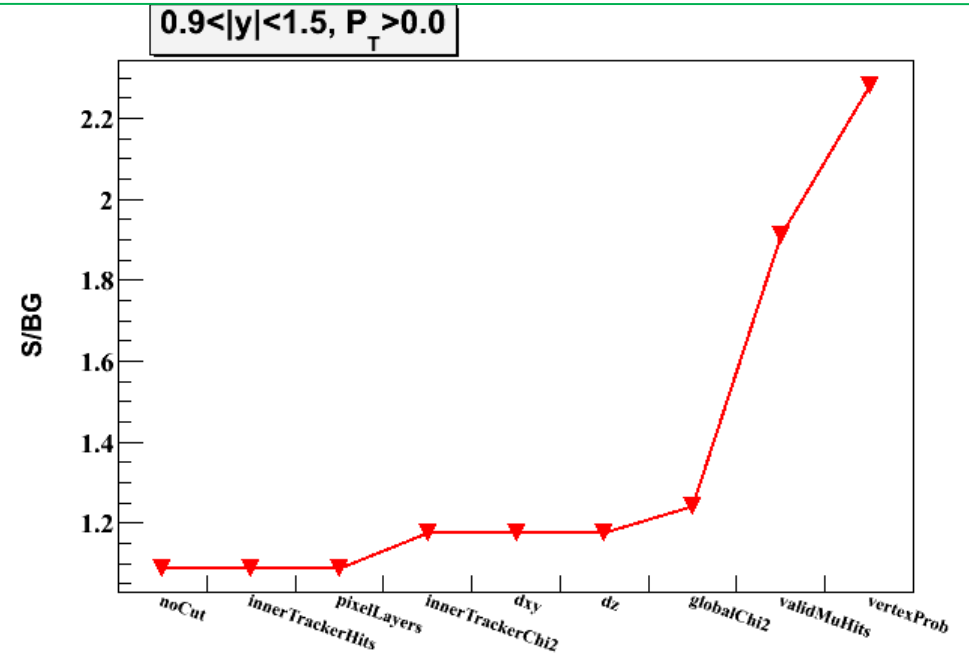
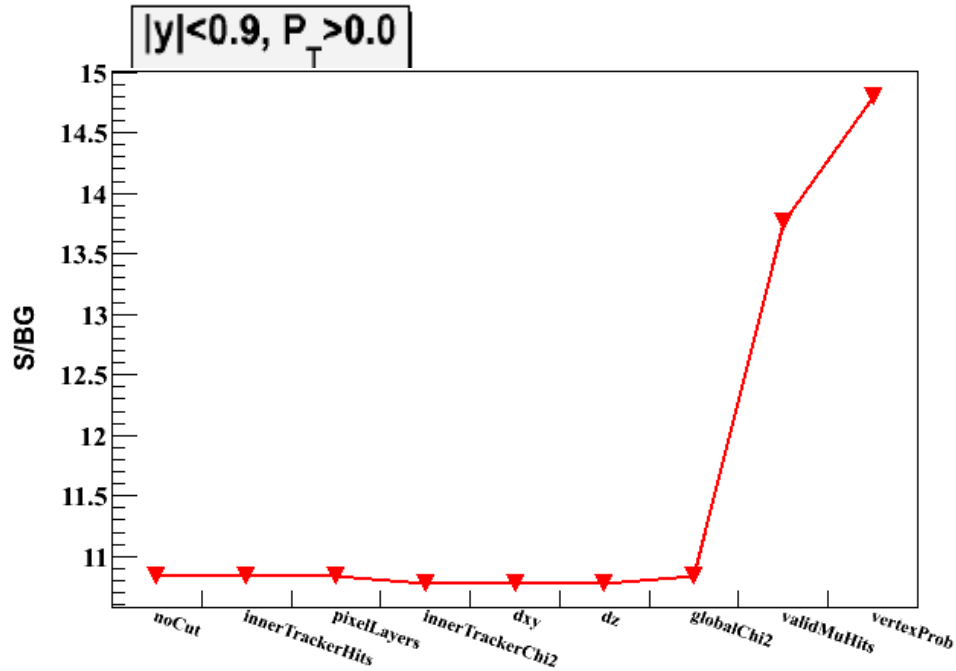
$\text{mu_dz} < 1. \text{ cm}$

$\text{mu_globalTrack_chi2NDOF} < 12$

$\text{mu_validMuHits} > 0$

$\text{vProb} > 0.001$

S/BG



$\text{mu_innerTrackHits} > 11$

$\text{mu_pixelLayers} > 0$

$\text{mu_innerTrack_chi2NDOF} < 2.6$

$\text{mu_dxy} < 1 \text{ cm}$

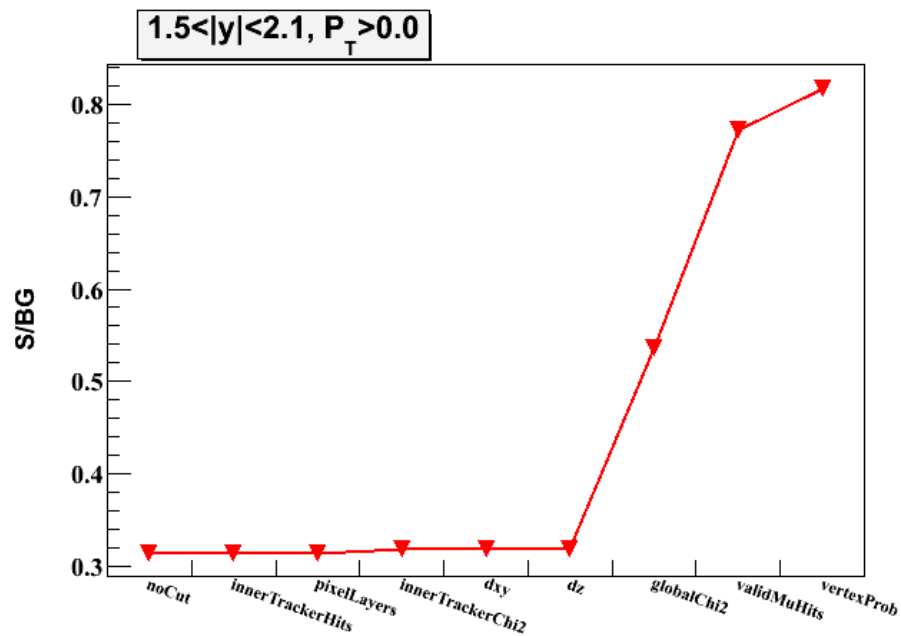
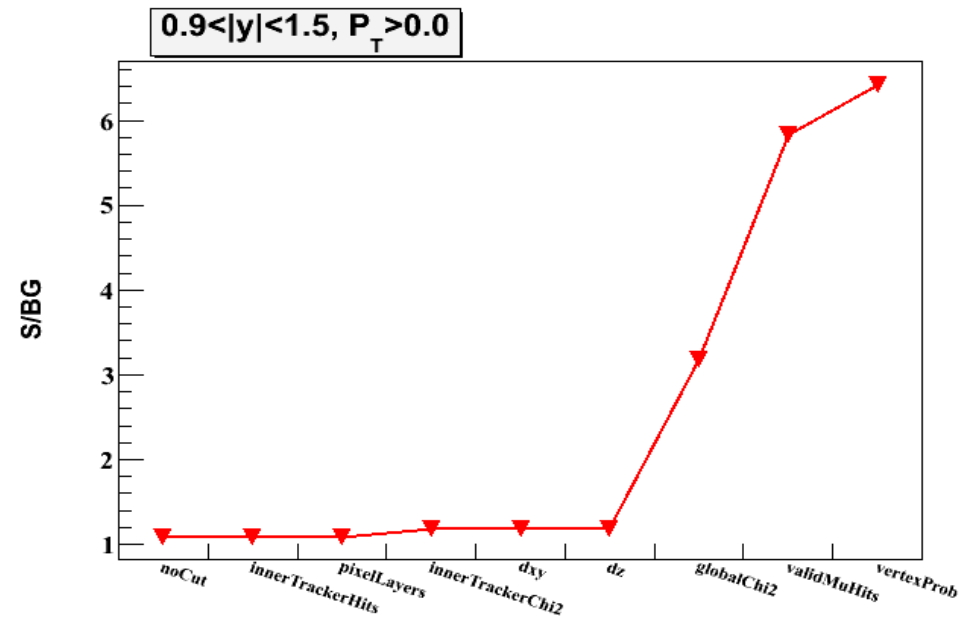
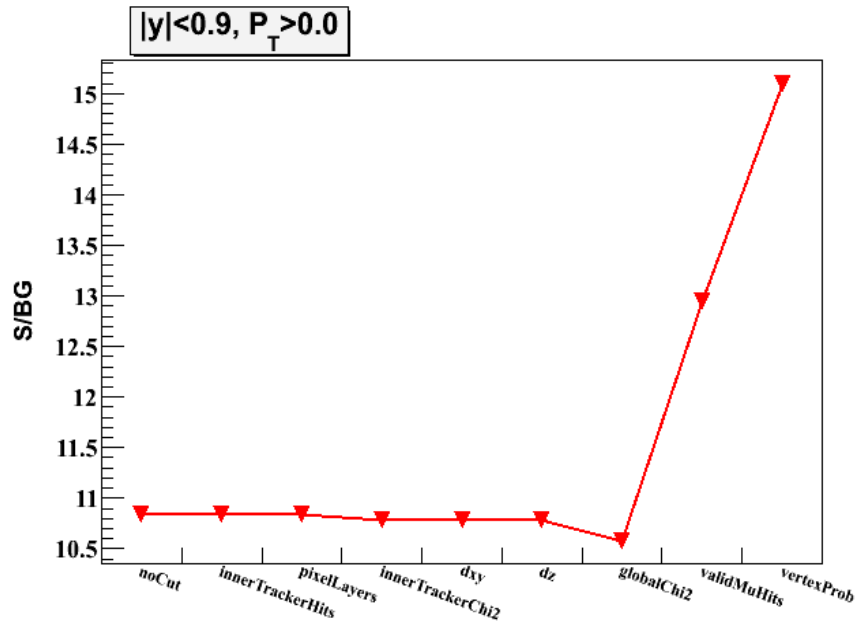
$\text{mu_dz} < 1. \text{ cm}$

$\text{mu_globalTrack_chi2NDOF} < 12$

$\text{mu_validMuHits} > 0$

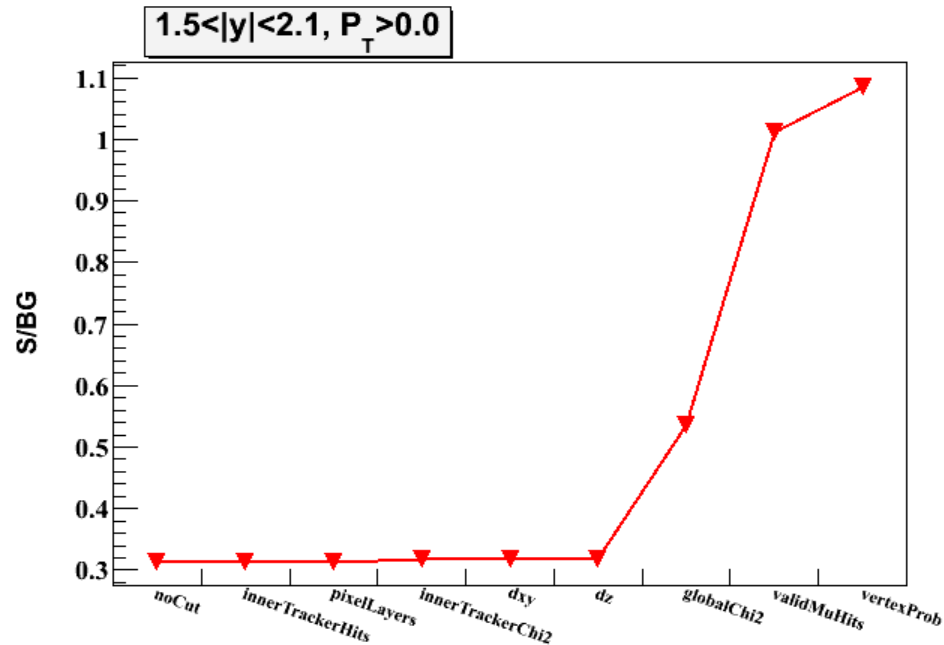
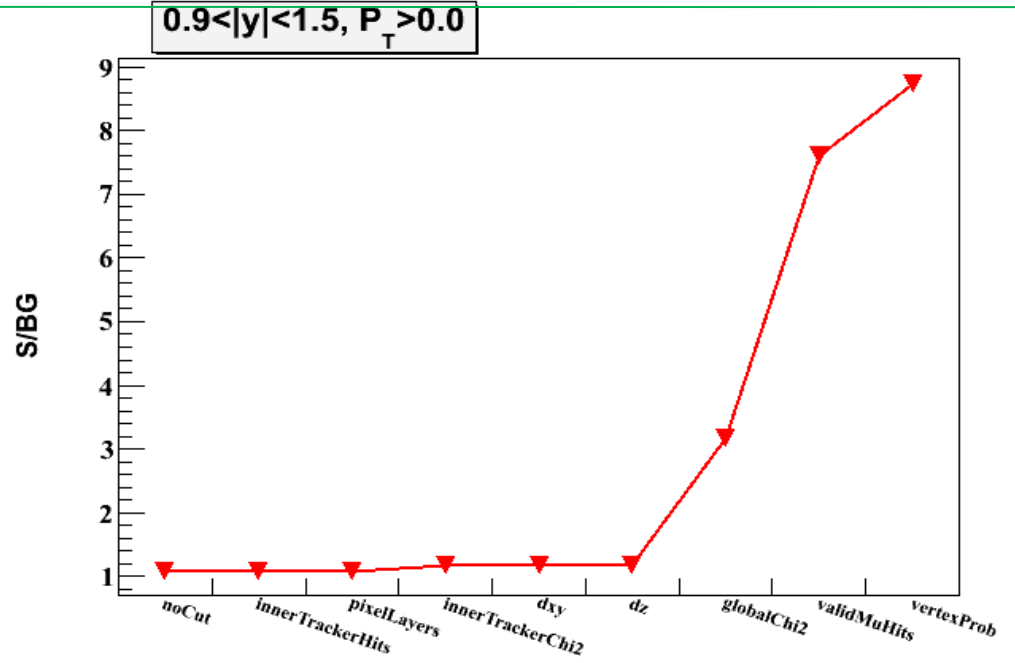
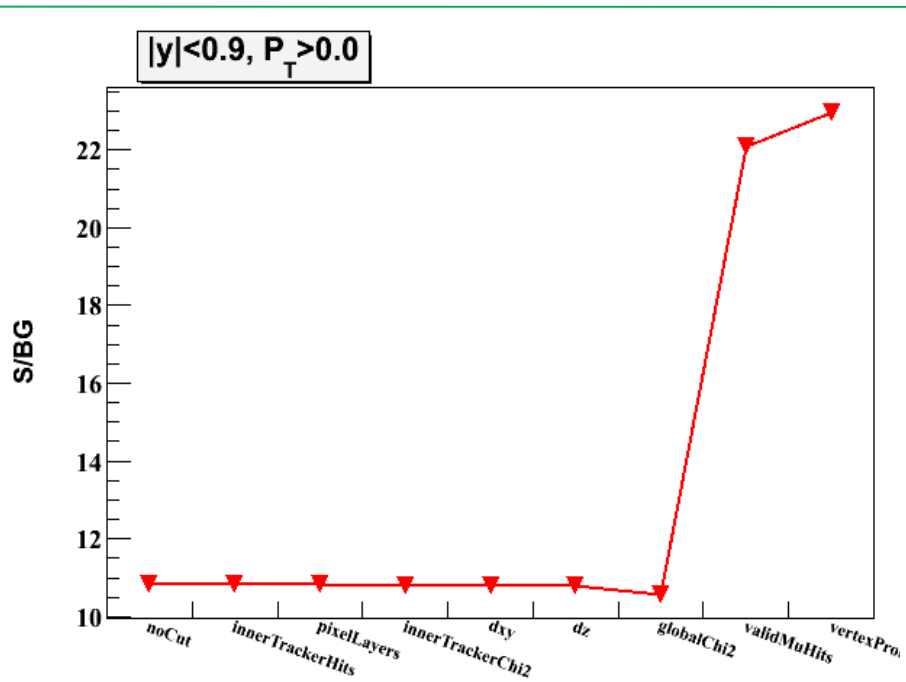
$\text{vProb} > 0.001$

S/BG



- $\mu_{\text{innerTrackHits}} > 11$
- $\mu_{\text{pixelLayers}} > 0$
- $\mu_{\text{innerTrack_chi2NDOF}} < 2.6$
- $\mu_{\text{dxy}} < 1 \text{ cm}$
- $\mu_{\text{globalTrack_chi2NDOF}} < 1$
- $\mu_{\text{dz}} < 1. \text{ cm}$
- $\mu_{\text{validMuHits}} > 0$
- $v\text{Prob} > 0.001$

S/BG



$\mu_{\text{innerTrackHits}} > 11$

$\mu_{\text{pixelLayers}} > 0$

$\mu_{\text{innerTrack_chi2NDOF}} < 2.6$

$\mu_{\text{dxy}} < 1 \text{ cm}$

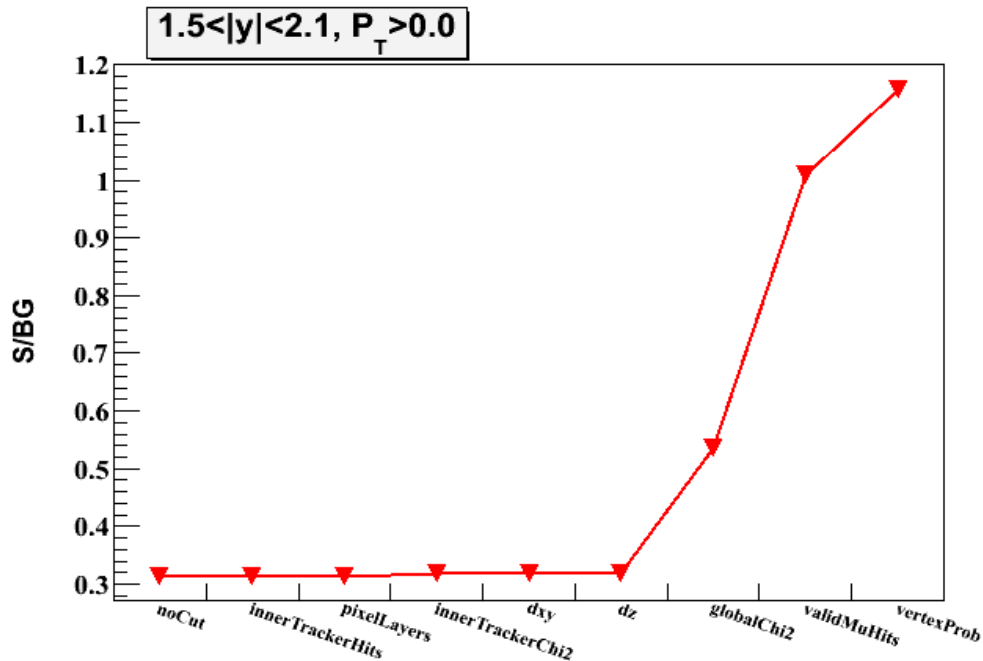
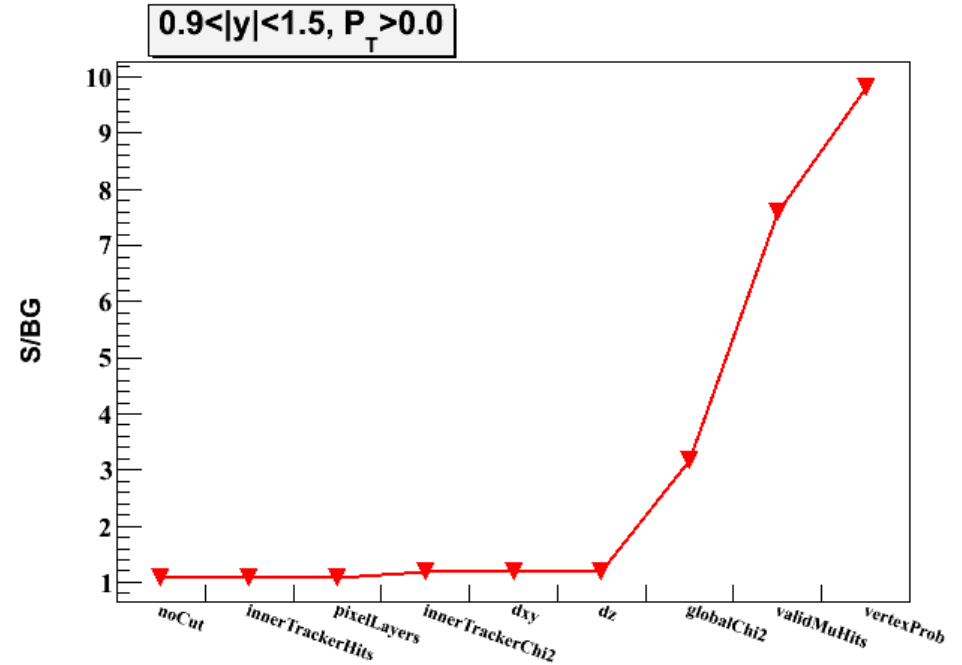
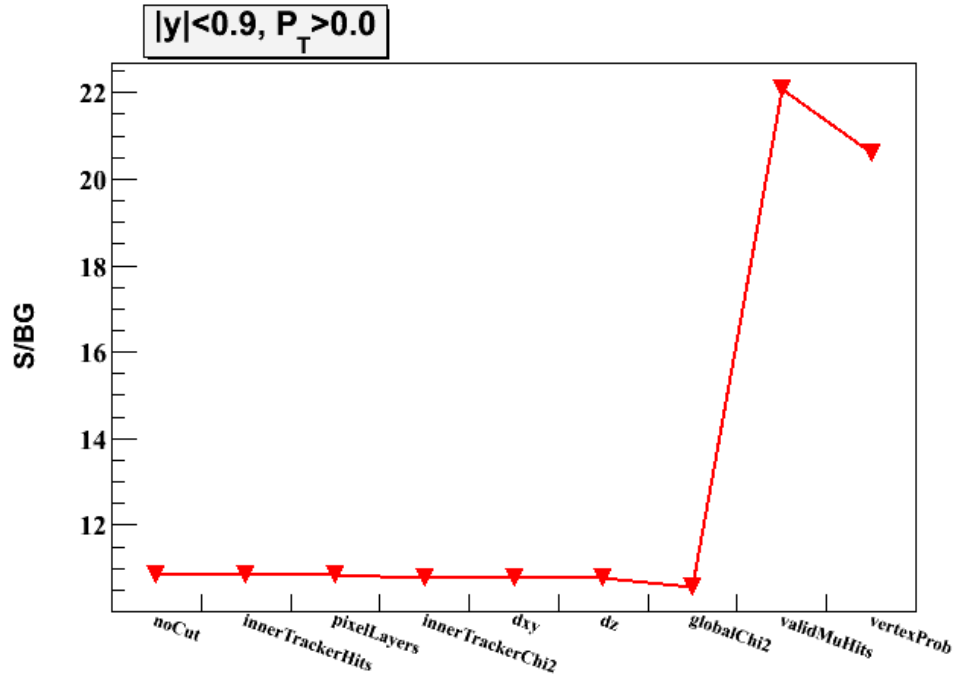
$\mu_{\text{globalTrack_chi2NDOF}} < 1$

$\mu_{\text{validMuHits}} > 6$

$\mu_{\text{dz}} < 1. \text{ cm}$

$v\text{Prob} > 0.001$

S/BG



$\mu_{\text{innerTrackHits}} > 11$

$\mu_{\text{pixelLayers}} > 0$

$\mu_{\text{innerTrack_chi2NDOF}} < 2.6$

$\mu_{\text{dxy}} < 1 \text{ cm}$

$\mu_{\text{globalTrack_chi2NDOF}} < 1$

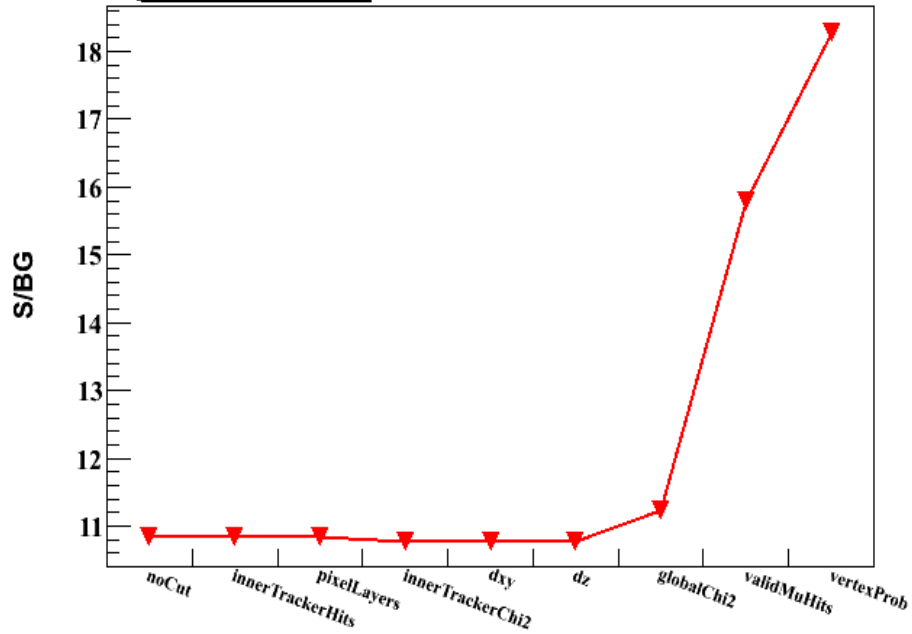
$\mu_{\text{validMuHits}} > 6$

$v\text{Prob} > 0.018$

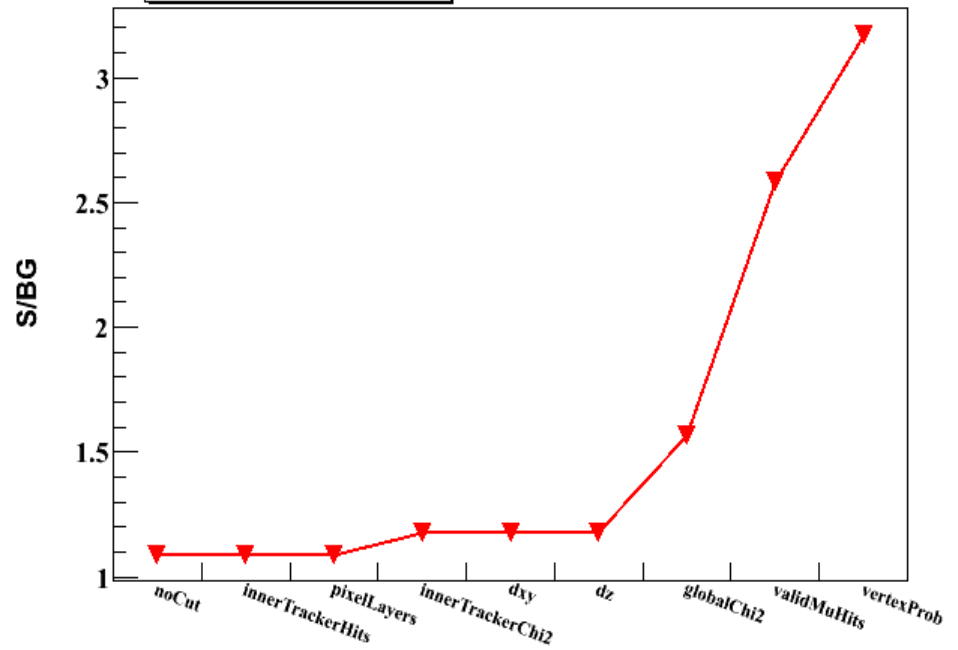
$\mu_{\text{dz}} < 1. \text{ cm}$

S/BG

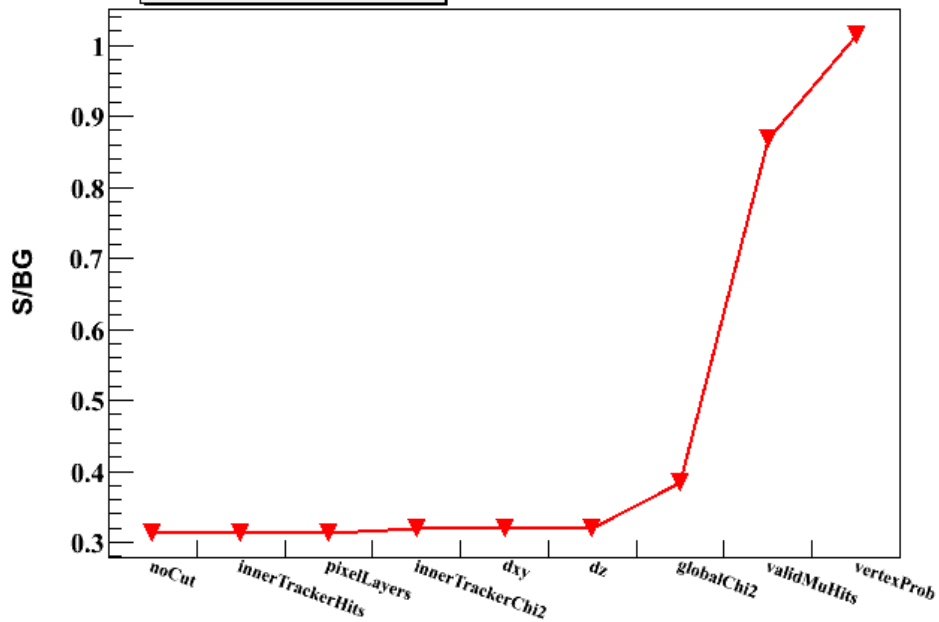
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



$\mu_{\text{innerTrackHits}} > 11$

$\mu_{\text{pixelLayers}} > 0$

$\mu_{\text{innerTrack_chi2NDOF}} < 2.6$

$\mu_{\text{dxy}} < 1 \text{ cm}$

$\mu_{\text{globalTrack_chi2NDOF}} < 2$

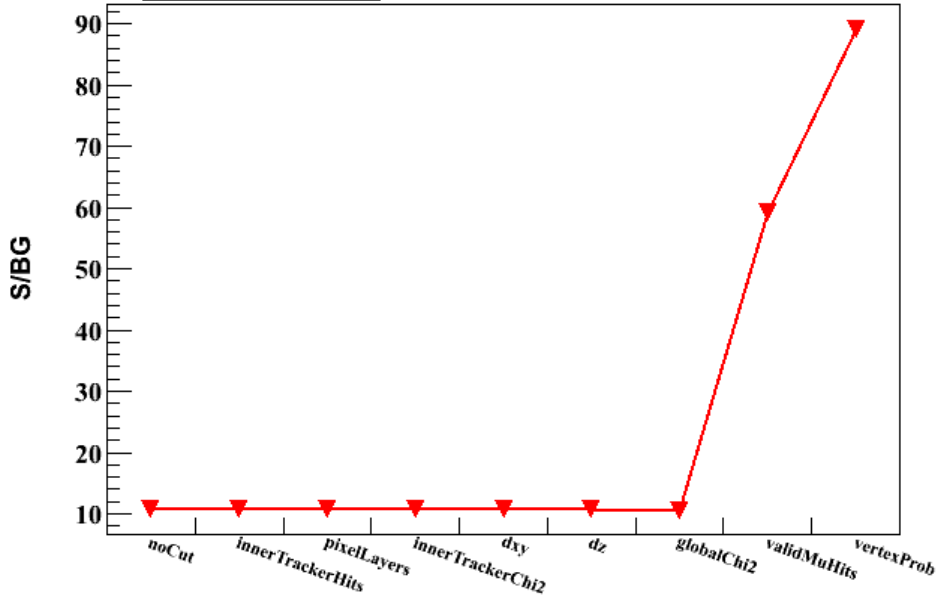
$\mu_{\text{validMuHits}} > 6$

$v\text{Prob} > 0.018$

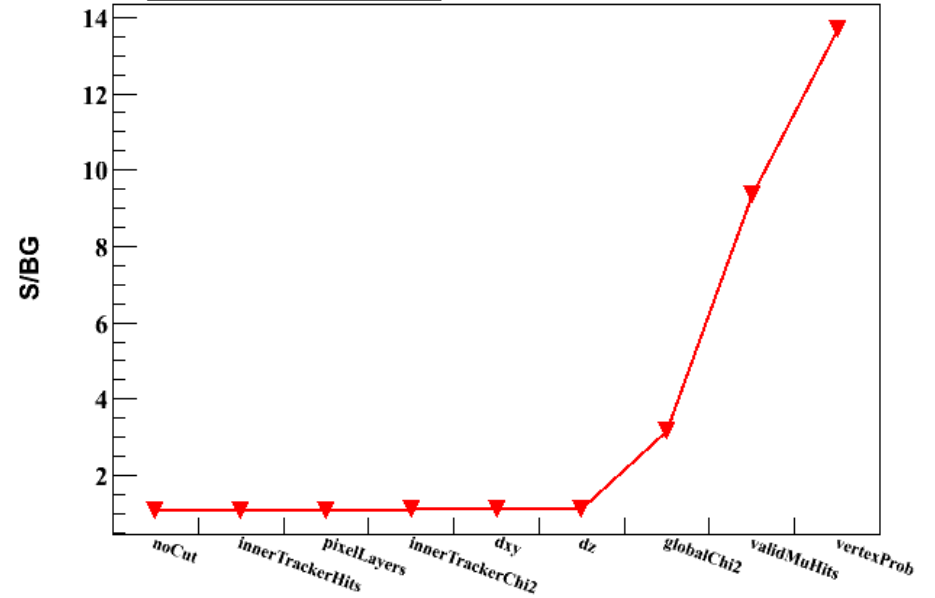
$\mu_{\text{dz}} < 1. \text{ cm}$

S/BG

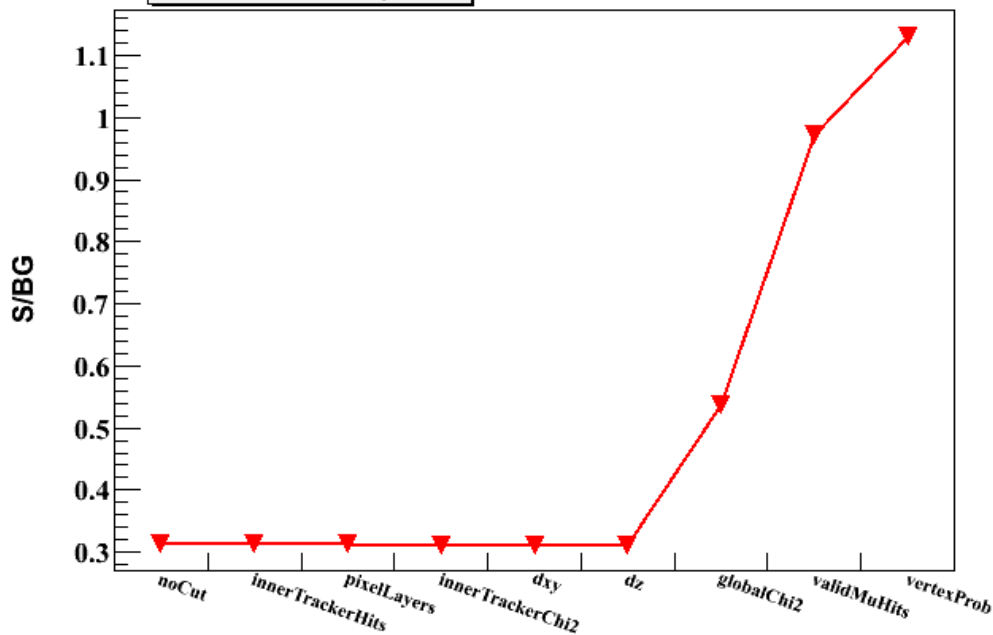
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



$\text{mu_innerTrackHits} > 11$

$\text{mu_pixelLayers} > 0$

$\text{mu_innerTrack_chi2NDOF} < 2.6$

$\text{mu_dxy} < 1 \text{ cm}$

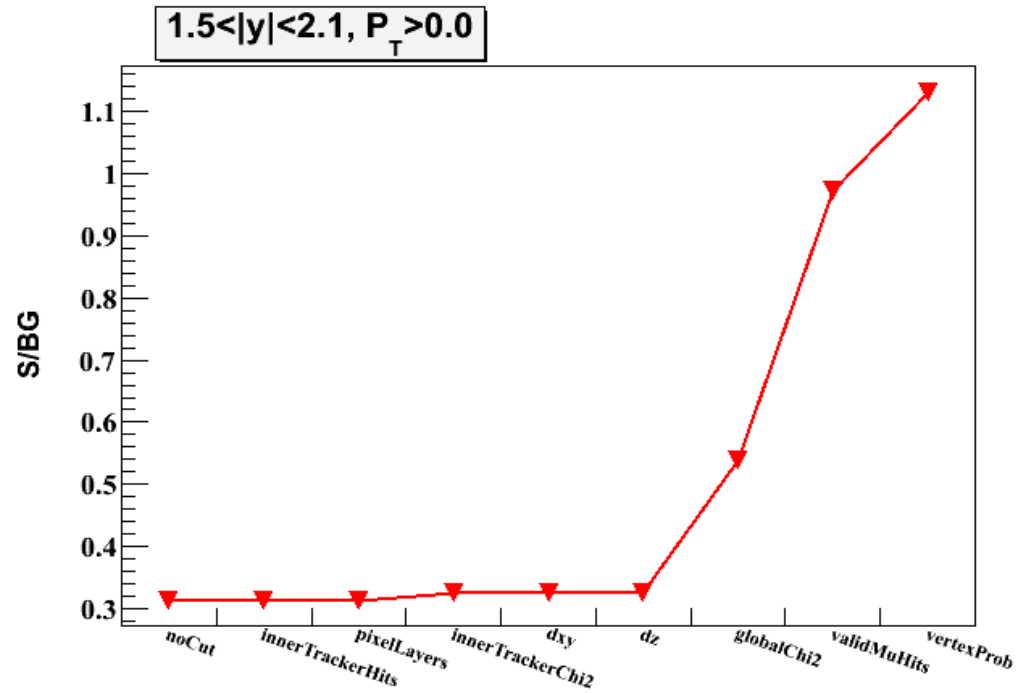
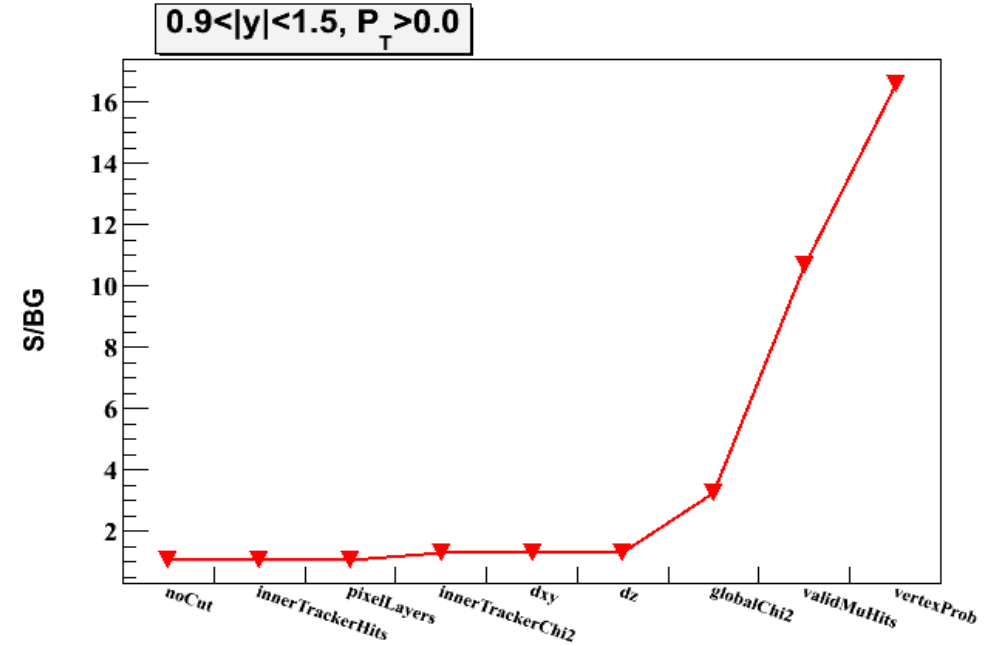
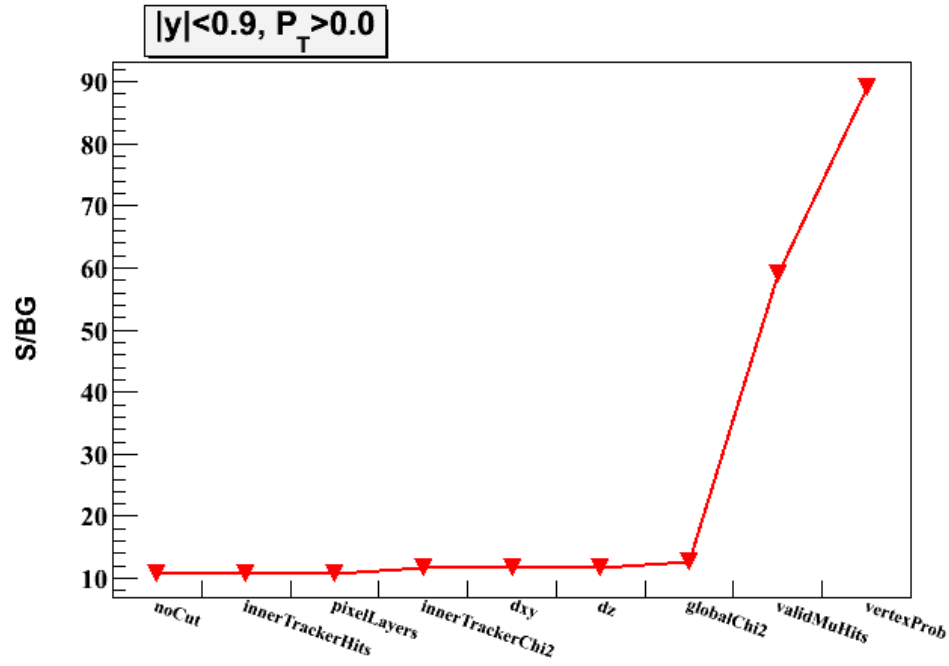
$\text{mu_globalTrack_chi2NDOF} < 1$

$\text{mu_validMuHits} > 8$

$\text{vProb} > 0.018$

$\text{mu_dz} < 1. \text{ cm}$

S/BG



$\text{mu_innerTrackHits} > 11$

$\text{mu_pixelLayers} > 0$

$\text{mu_innerTrack_chi2NDOF} < 2$

$\text{mu_dxy} < 1 \text{ cm}$

$\text{mu_globalTrack_chi2NDOF} < 1$

$\text{mu_validMuHits} > 8$

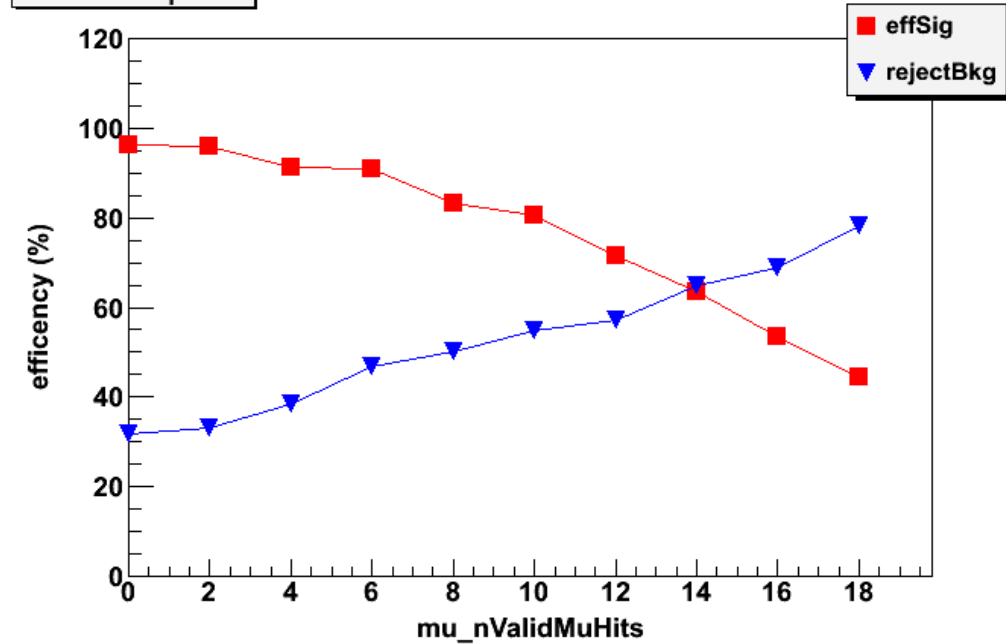
$\text{vProb} > 0.018$

$\text{mu_dz} < 1. \text{ cm}$

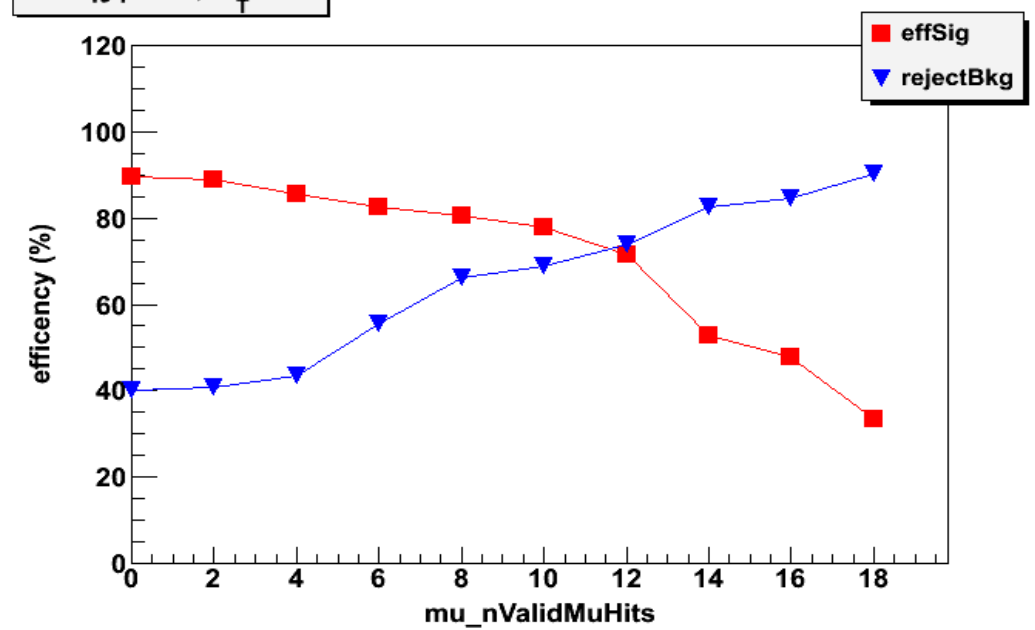
Back up

mu_validMuHits

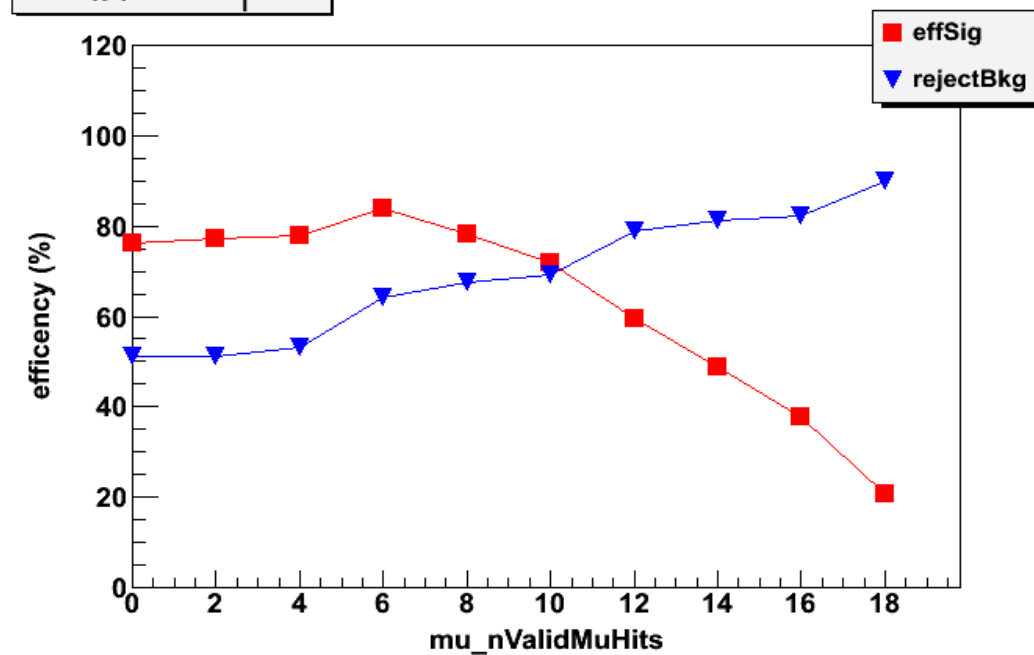
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



mu_validMuHits

$|y| < 0.9$

Cut value	0	2	4	6	8	10	12	14	16	18
Effi sig%	96.2	95.9	91.1	90.7	83.2	80.7	71.6	63.3	53.2	44.3
RejBkg%	31.5	33.1	38.5	46.6	50.1	54.8	57.0	64.8	68.9	78.1

$0.9 < |y| < 1.5$

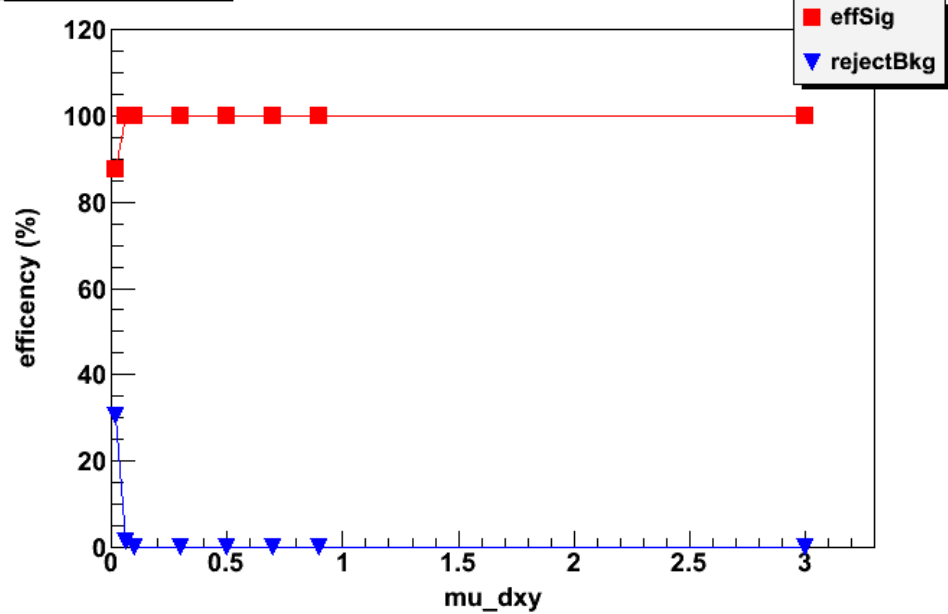
Cut value	0	2	4	6	8	10	12	14	16	18
Effi sig%	89.5	88.8	85.6	82.4	80.4	78.0	71.5	52.8	47.7	33.3
RejBkg%	40.0	40.8	43.6	55.5	66.1	68.9	74.0	82.4	84.7	90.4

$1.5 < |y| < 2.1$

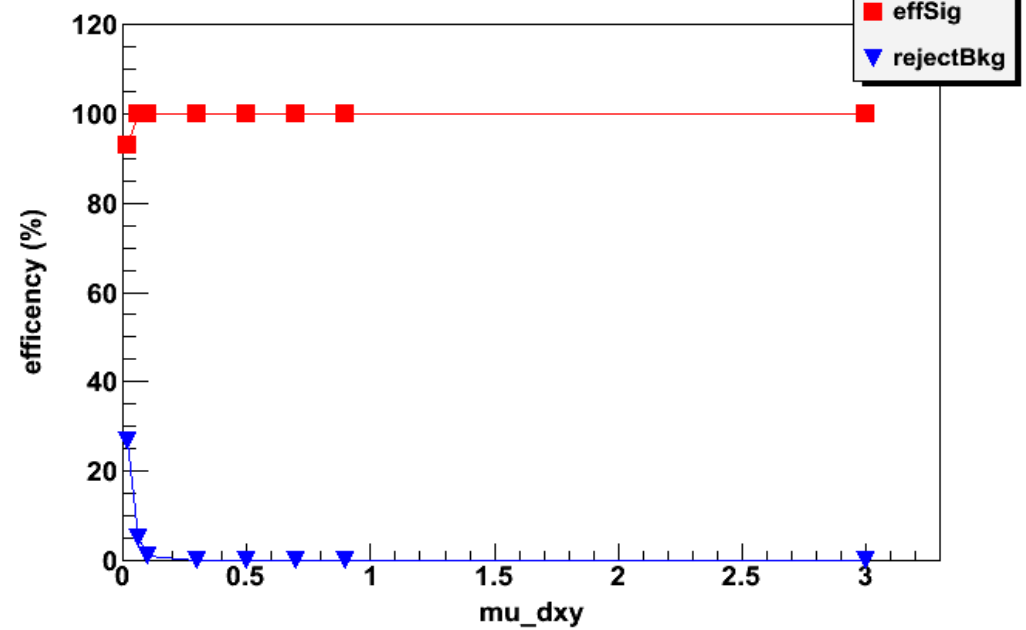
Cut value	0	2	4	6	8	10	12	14	16	18
Effi sig%	76.2	77.1	77.7	84.0	78.1	71.8	59.6	48.8	37.6	20.8
RejBkg%	50.9	51.2	53.1	64.2	67.6	69.2	78.8	81.2	82.1	89.7

mu_dxy

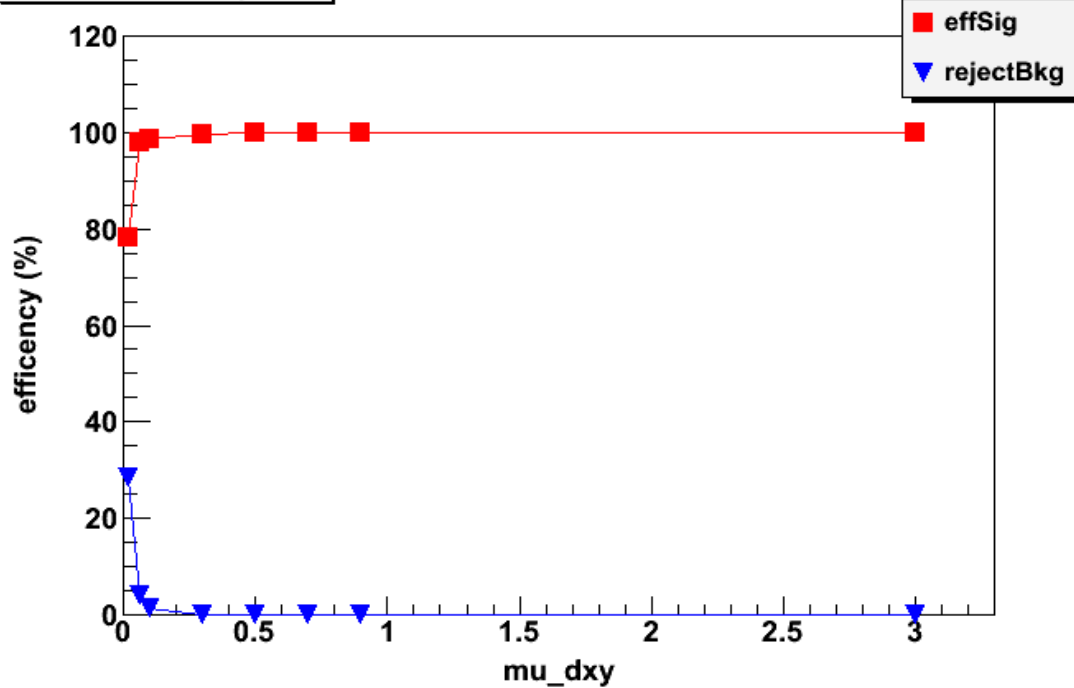
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



mu_dxy

$|y| < 0.9$

Cut value	0.02	0.06	0.1	0.3	0.5	0.7	0.9	3
Effi sig%	87.5	99.9	100	100	100	100	100	100
RejBkg	30.5	1.19	0	0	0	0	0	0

$0.9 < |y| < 1.5$

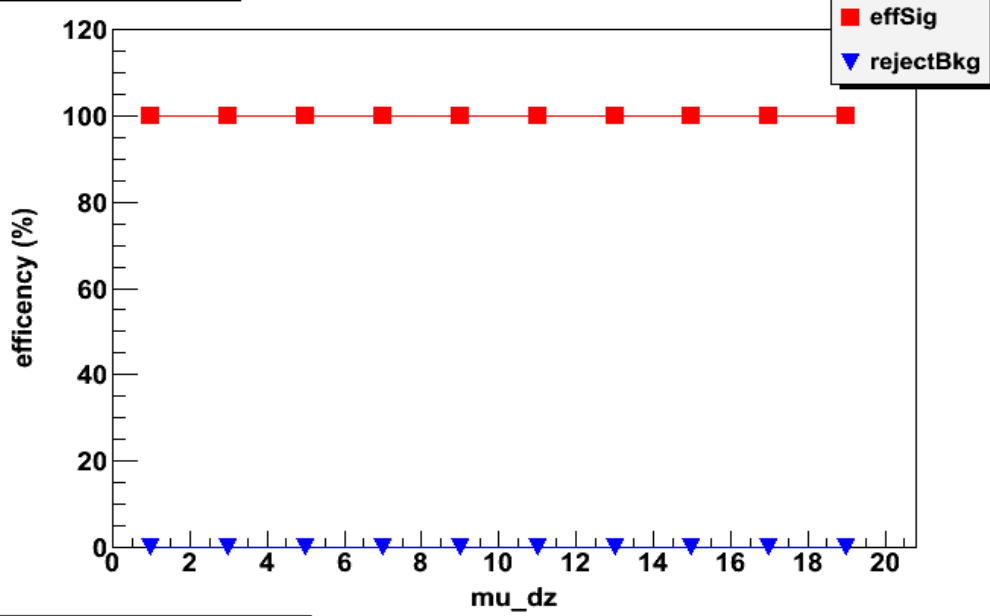
Cut value	0.02	0.06	0.1	0.3	0.5	0.7	0.9	3
Effi sig%	93.02	100	100	100	100	100	100	100
RejBkg	26.8	4.83	1.11	0	0	0	0	0

$1.5 < |y| < 2.1$

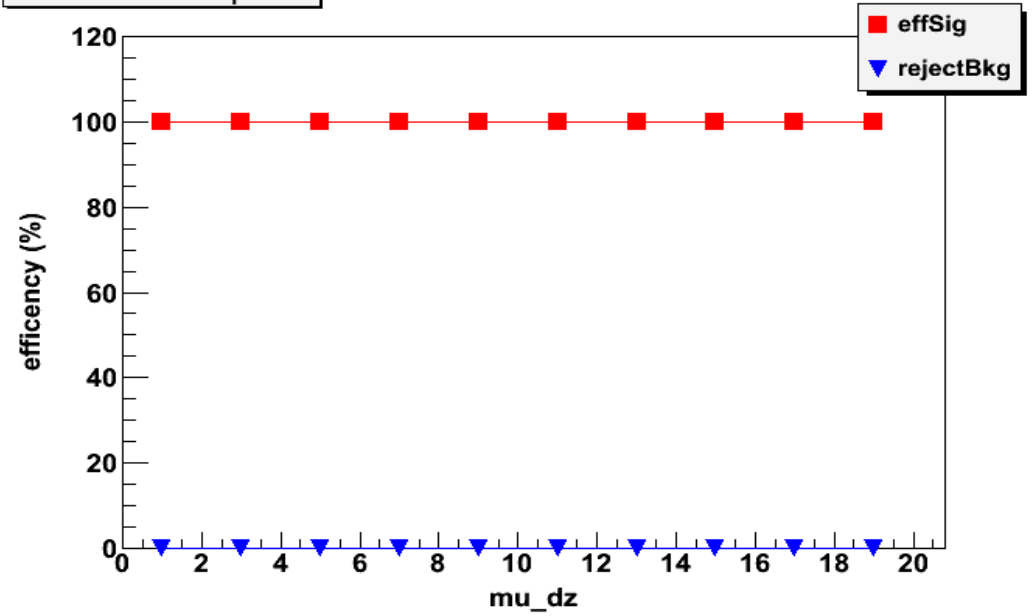
Cut value	0.02	0.06	0.1	0.3	0.5	0.7	0.9	3
Effi sig%	78.3	97.8	98.6	99.6	100	100	100	100
RejBkg	28.4	4.03	1.41	0	0	0	0	0

mu_dz

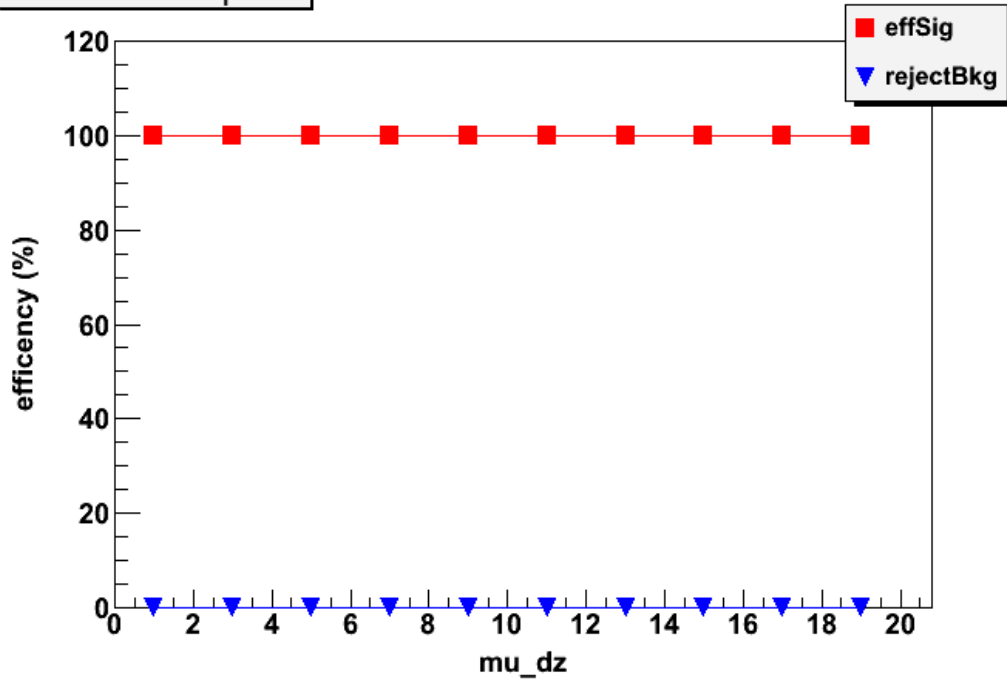
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$

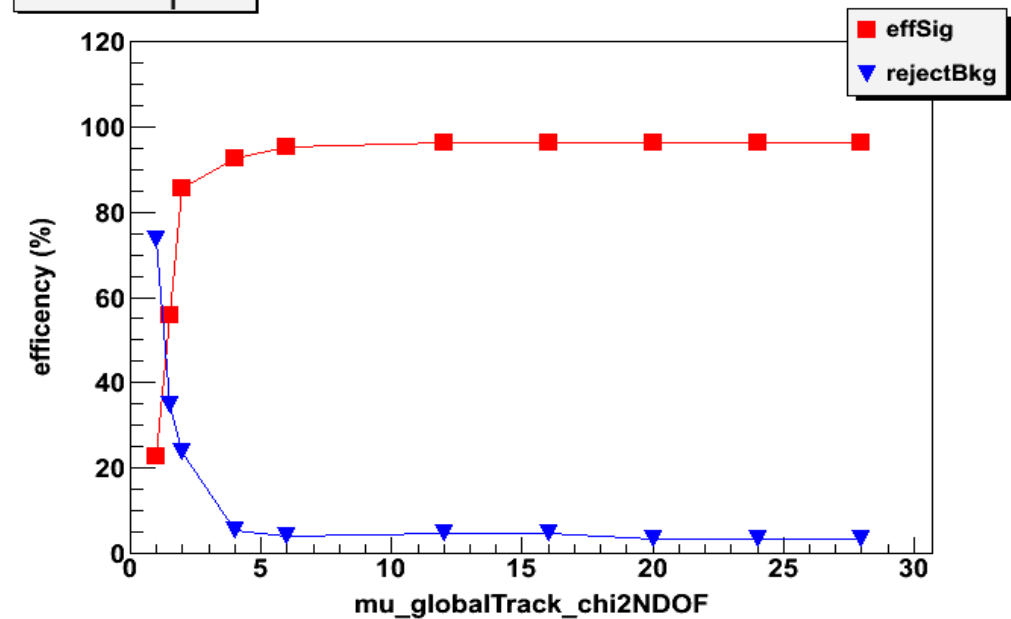


$1.5 < |y| < 2.1, P_T > 0.0$

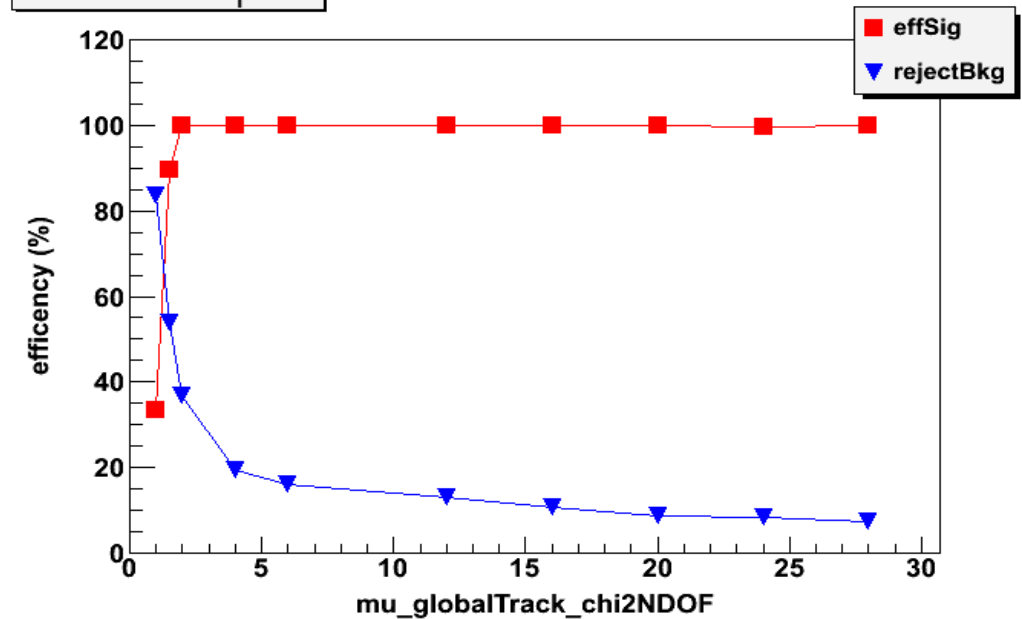


mu_globalTrack_chi2NDOF

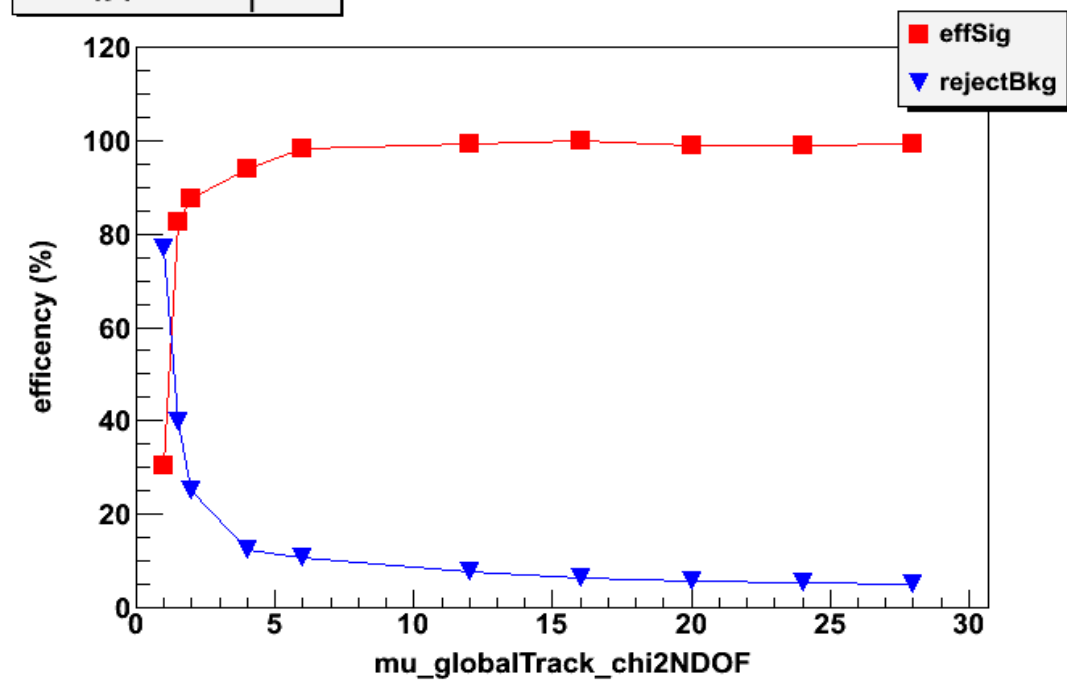
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



mu_globalTrack_chi2NDOF

$|y| < 0.9$

Cut value	1	1.5	2	4	6	12	16	20	24	28
Effi sig%	22.5	55.8	85.6	92.5	95.1	96.3	96.3	96.1	96.1	96.1
RejBkg%	73.4	34.7	23.5	5.14	4.04	4.68	4.68	3.42	3.42	3.42

$0.9 < |y| < 1.5$

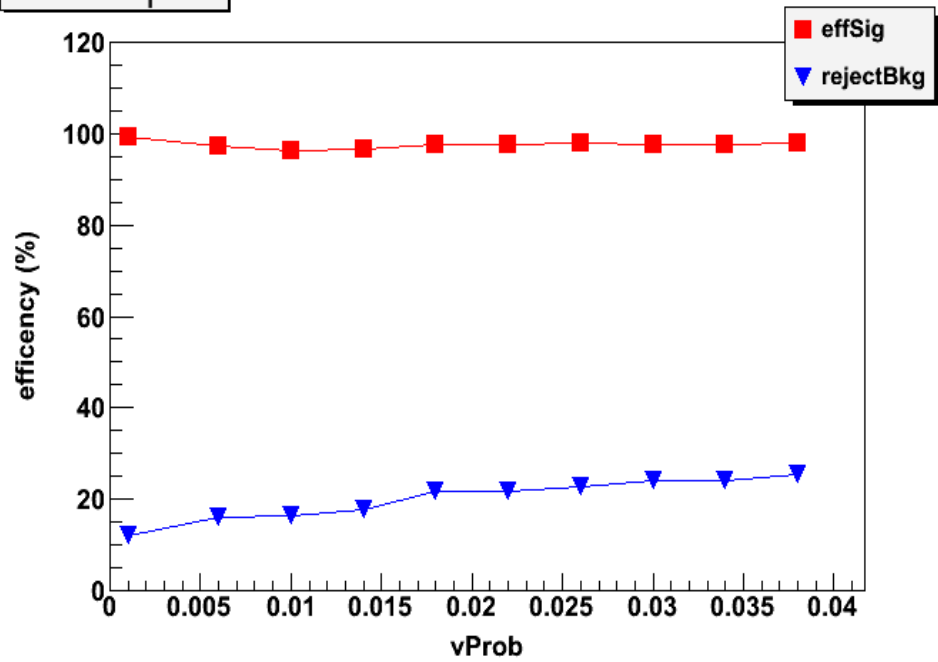
Cut value	1	1.5	2	4	6	12	16	20	24	28
Effi sig%	33.3	89.4	100	100	100	100	100	99.9	99.6	100
RejBkg%	83.7	53.8	36.7	19.4	16.0	13.1	10.5	8.78	8.31	7.35

$1.5 < |y| < 2.1$

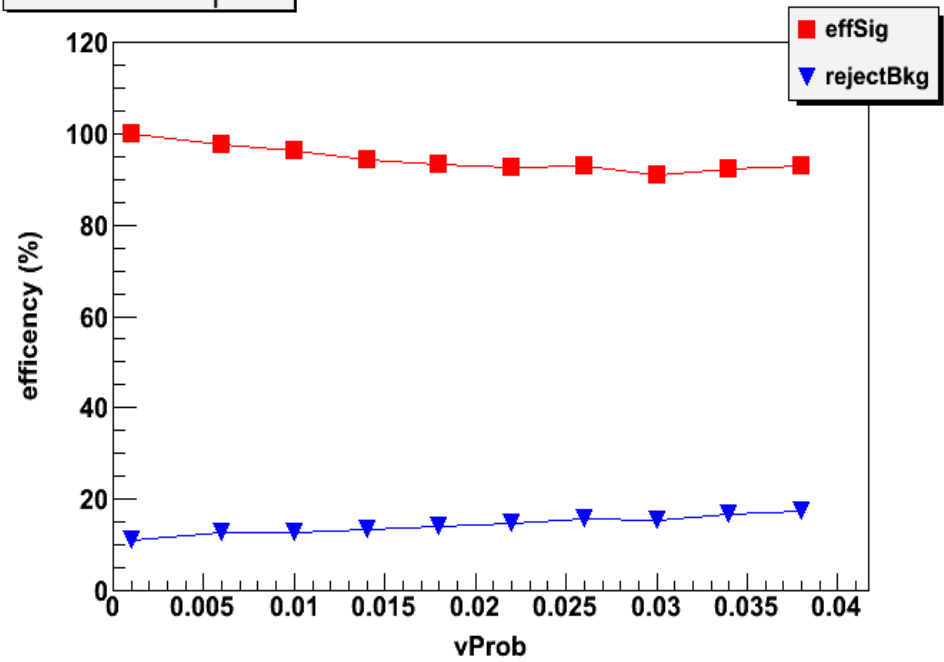
Cut value	1	1.5	2	4	6	12	16	20	24	28
Effi sig%	30.4	82.4	87.6	94.0	98.1	99.2	99.8	99.03	98.8	99.2
RejBkg%	76.9	39.8	25.04	12.22	10.6	7.69	6.43	5.49	5.2	5.08

vProb

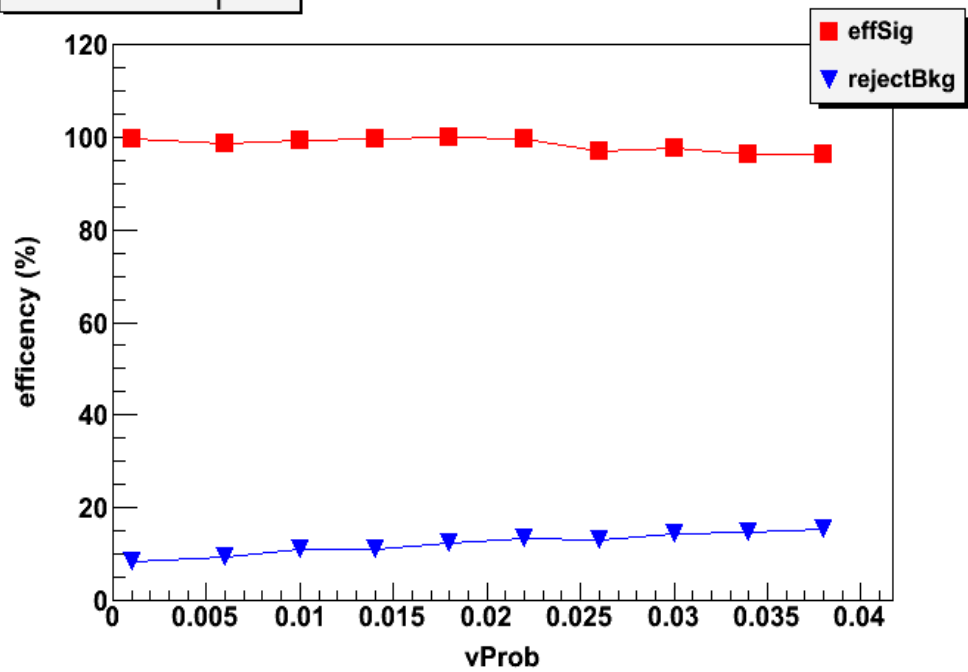
$|y| < 0.9, P_T > 0.0$



$0.9 < |y| < 1.5, P_T > 0.0$



$1.5 < |y| < 2.1, P_T > 0.0$



vProb **$|y| < 0.9$**

Cut value	0.001	0.006	0.01	0.014	0.018	0.022	0.026	0.03	0.034	0.038
Effi sig%	99.1	97.3	96.2	96.6	97.6	97.6	97.8	97.7	97.7	97.8
RejBkg%	11.8.	15.8	16.5	17.7	21.6	21.6	22.8	24.02	24.02	25.2

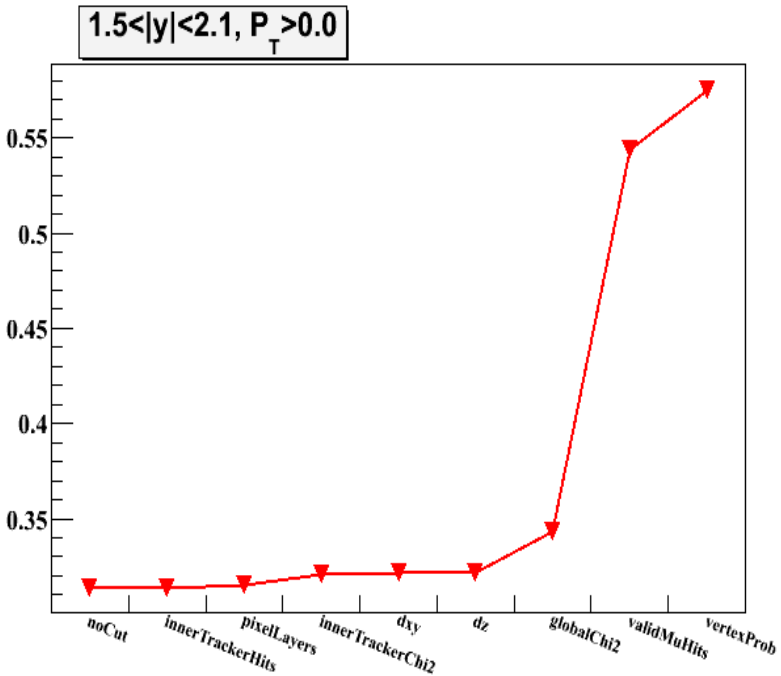
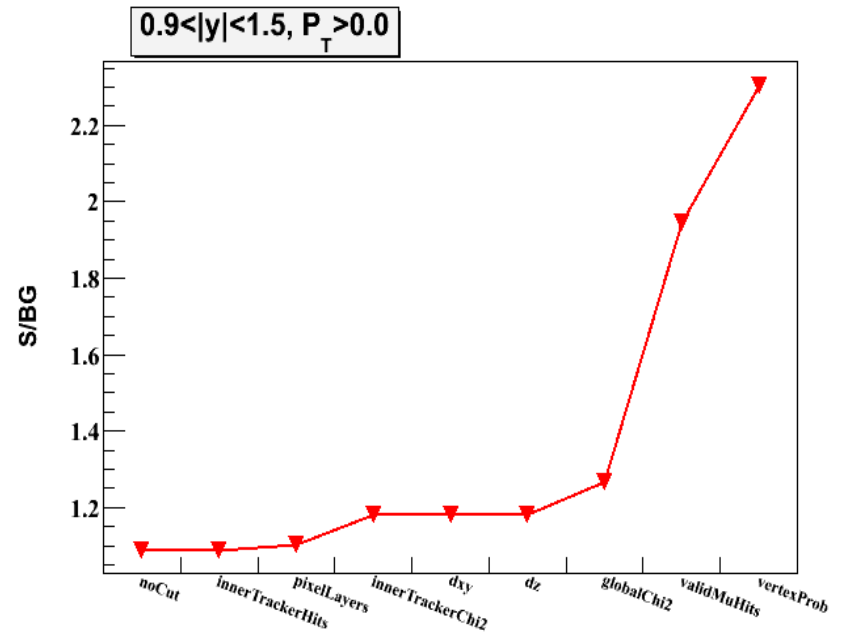
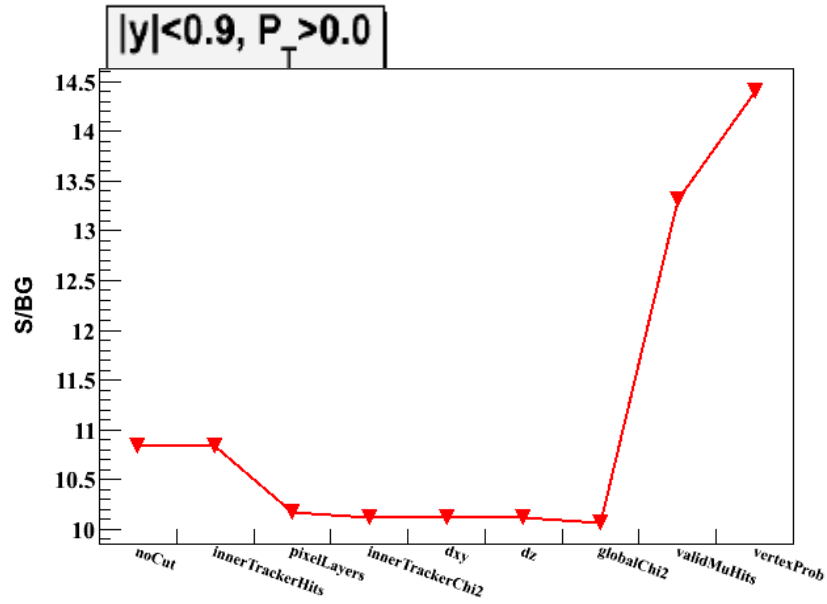
 $0.9 < |y| < 1.5$

Cut value	0.001	0.006	0.01	0.014	0.018	0.022	0.026	0.03	0.034	0.038
Effi sig%	100	97.6	96.3	94.3	93.1	92.5	92.9	90.6	92.1	93.06
RejBkg%	11.0	12.7	12.8	13.4	14.09	14.6	15.7	15.2	16.7	17.4

 $1.5 < |y| < 2.1$

Cut value	0.001	0.006	0.01	0.014	0.018	0.022	0.026	0.03	0.034	0.038
Effi sig%	99.5	98.5	99.4	99.7	100	99.6	97.1	97.6	96.4	96.2
RejBkg%	8.22	9.4	10.8	11.1	12.4	13.3	13.01	14.2	14.5	15.3

S/BG



$\mu_{\text{pixelLayers}} > 2$
 $\mu_{\text{nchi2In}} < 2.6$