

# CohJ/ $\psi$ Analysis (**OS- $\mu$ +X**)(**Coil**)(**34-track**)

Chris Kullenberg

February 27, 2017

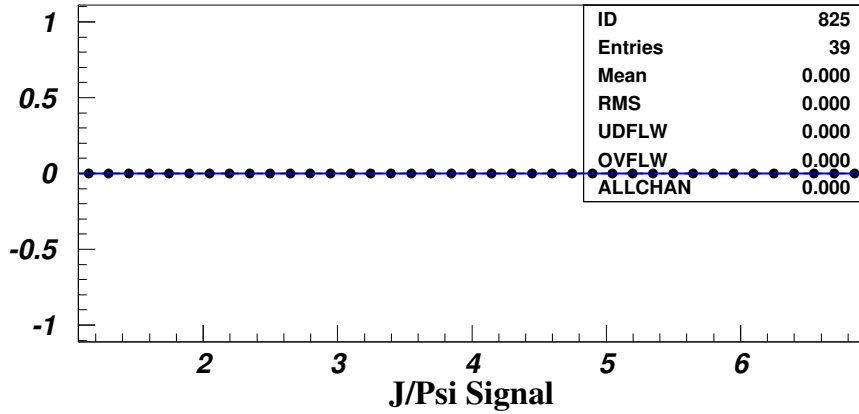
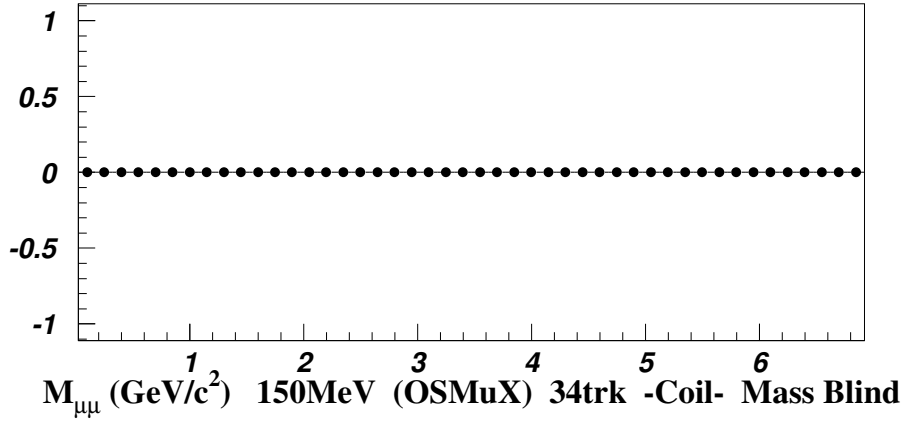
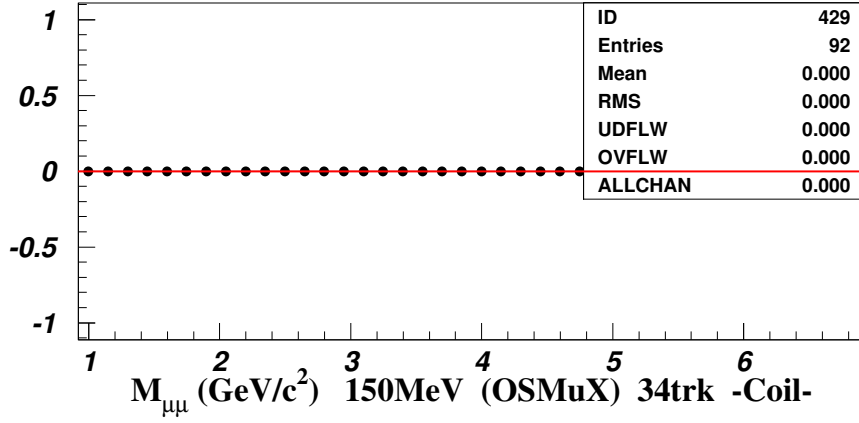
# 1 Zeroth Norms

	Gen Number	Zroth Norm
CCDIS	4116629.0	1440000.0
NCDIS	2451852.2	547200.0
JPsi	337363.3	29.6
CohPi+	824186.4	10000.0
CohRho+	147680.4	7380.1
aNuMu CC	384881.8	36000.0
QE	418257.5	32000.0
CohPi0	179844.8	5000.0
Nue CC	396271.9	21600.0
aNue CC	193616.5	2160.0
aNuMu NC	189598.9	13680.0
CohRho0	25235.8	1000.0
Res	934139.8	50400.0
CohPhi0	4075.9	200.0

Table 1: Generated Number of MC Events

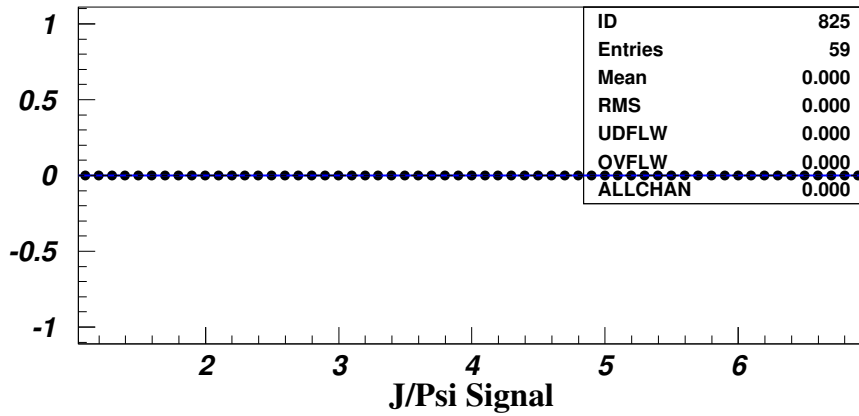
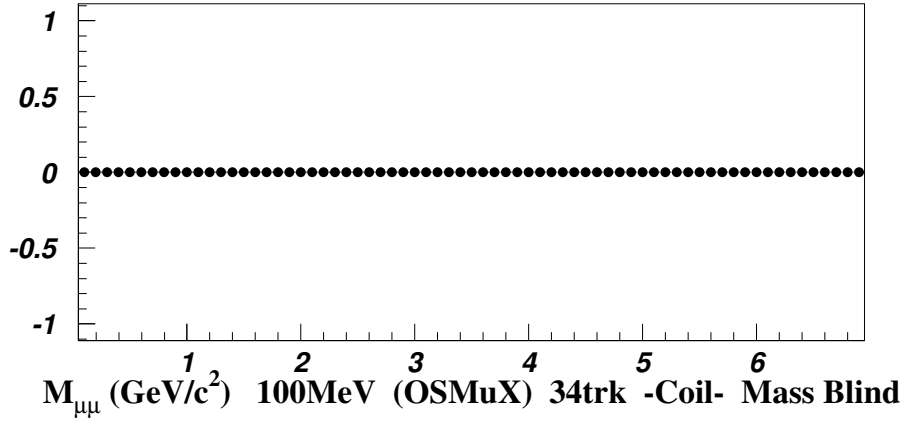
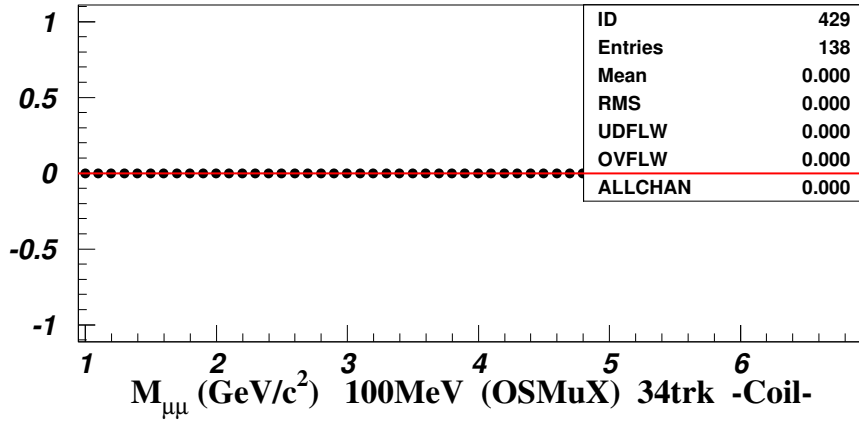
## Extra Normalizations:

- \* Coh $\pi^+$ : 0.985 (From 2V0 analysis)
- \* Coh $\pi^0$ : 0.985 (From 2V0 analysis)
- \* Coh $\rho^+$ : 0.669 (From CohRho0 measurment)
- \* Coh $\rho^0$ : 0.669 (From CohRho0 measurment)
- \* OBG: 0.22 (from CohRho0 analysis)



Signal range	2.72-3.47
Number of signal	<b>0.00</b>
Background	0.00
Statistical error	0.00
Significance	<b>-nan</b>
Signal range	2.87-3.32
Number of signal	<b>0.00</b>
Background	0.00
Statistical error	0.00
Significance	<b>-nan</b>
Signal range	3.02-3.17
Number of signal	<b>0.00</b>
Background	0.00
Statistical error	0.00
Significance	<b>-nan</b>

Figure 1: 150MeV Data Fit. Signal MC set to calculations in 2nd range. (./figs/data-fit-150mev.pdf)(sigcalc-150mev.tex)



Signal range	2.75-3.45
Number of signal	<b>0.00</b>
Background	0.00
Statistical error	0.00
Significance	<b>-nan</b>
Signal range	2.85-3.35
Number of signal	<b>0.00</b>
Background	0.00
Statistical error	0.00
Significance	<b>-nan</b>
Signal range	2.95-3.25
Number of signal	<b>0.00</b>
Background	0.00
Statistical error	0.00
Significance	<b>-nan</b>

Figure 2: 100MeV Data Fit. Signal MC set to calculations in 2nd range. (./figs/data-fit-100mev.pdf)(sigcalc-150mev.tex)

## 2 MC $\chi^2$ Fit

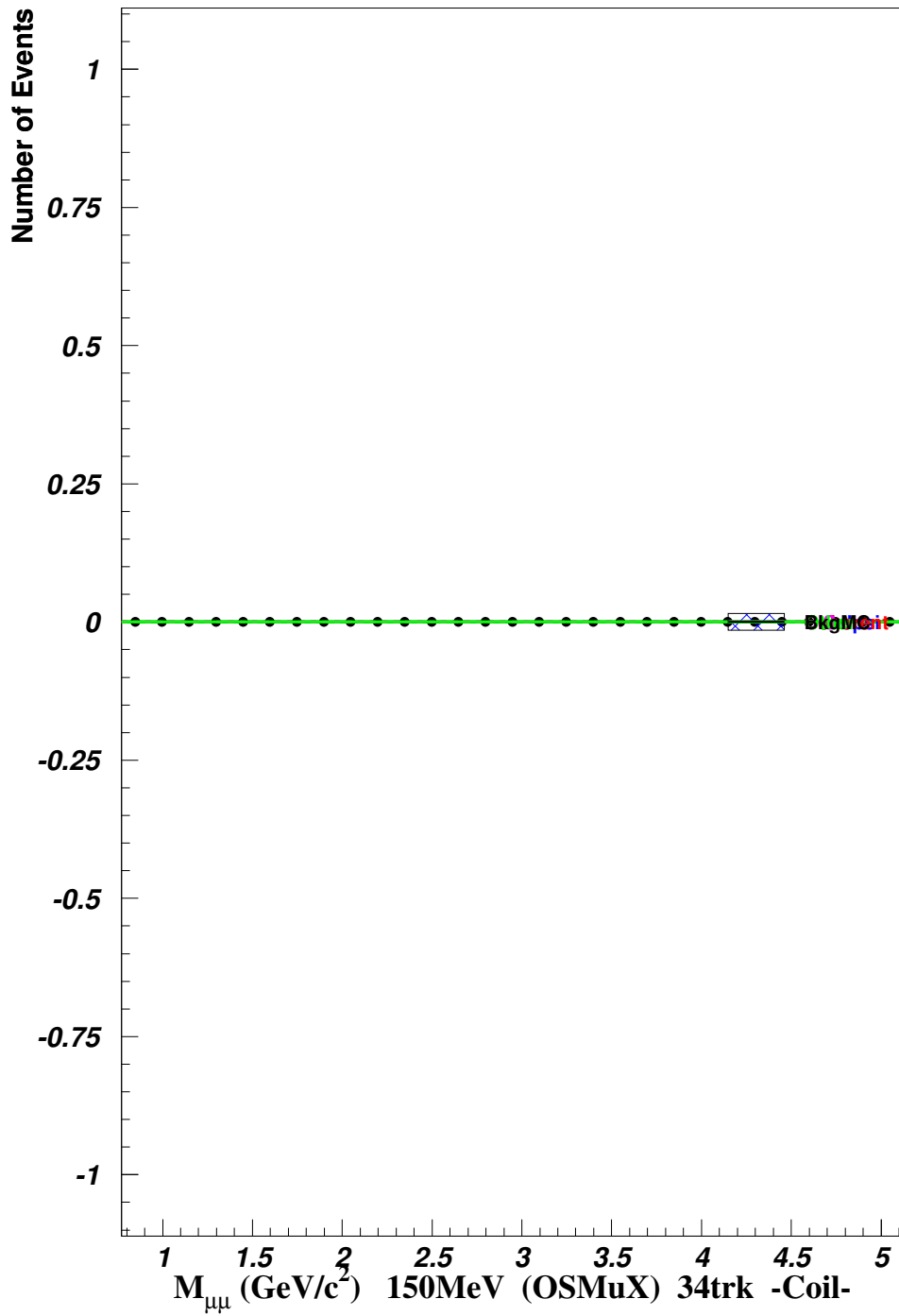


Figure 3: (./figs/mass-0.9to5-150mev.pdf)

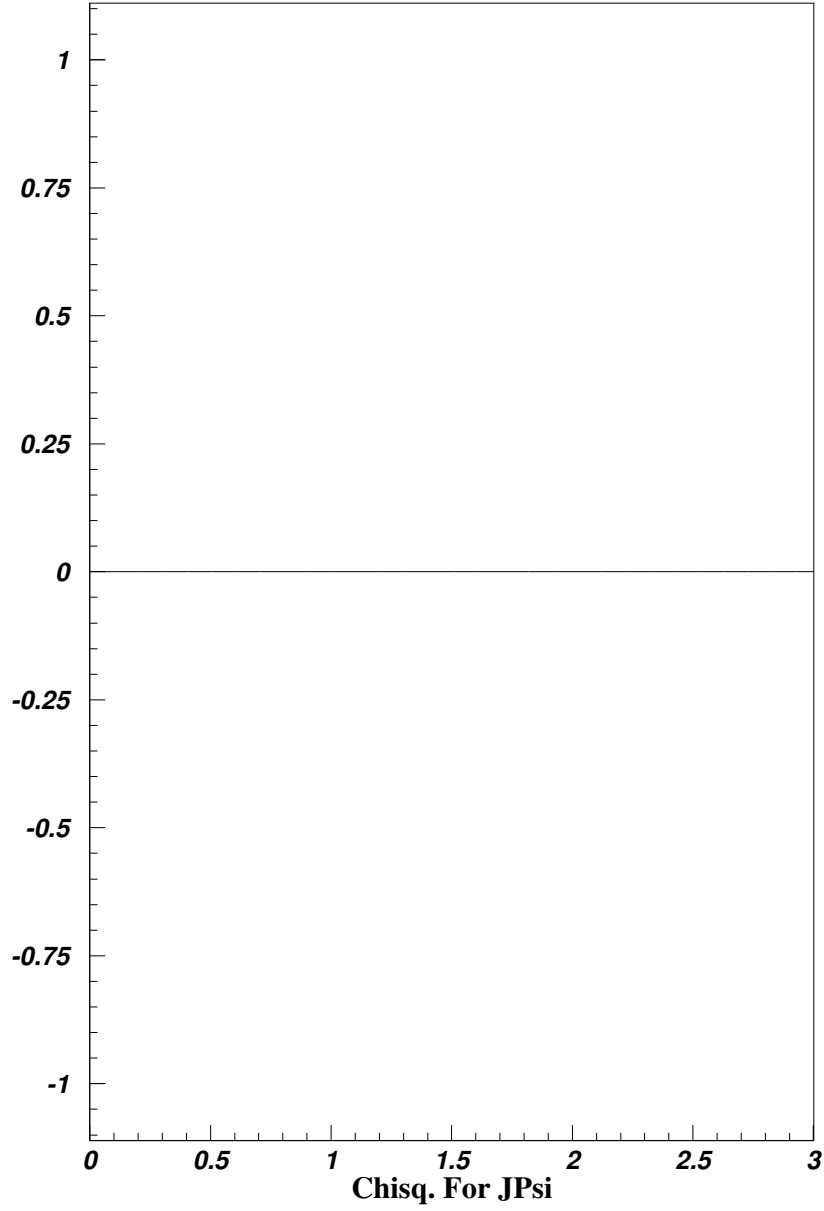


Figure 4: (chisq-jpsi.pdf)

$\chi^2$ Min 0.000		
Number of bins used: 0.		
One $\sigma$ : -nan		
Norm at Min $\chi^2$	JPsi	
-1 $\sigma$	0.000	
+1 $\sigma$	*****	( -inf%)
	*****	( -inf%)

Table 2:  $\chi^2$  for JPsi on plot: 'Mmumu'

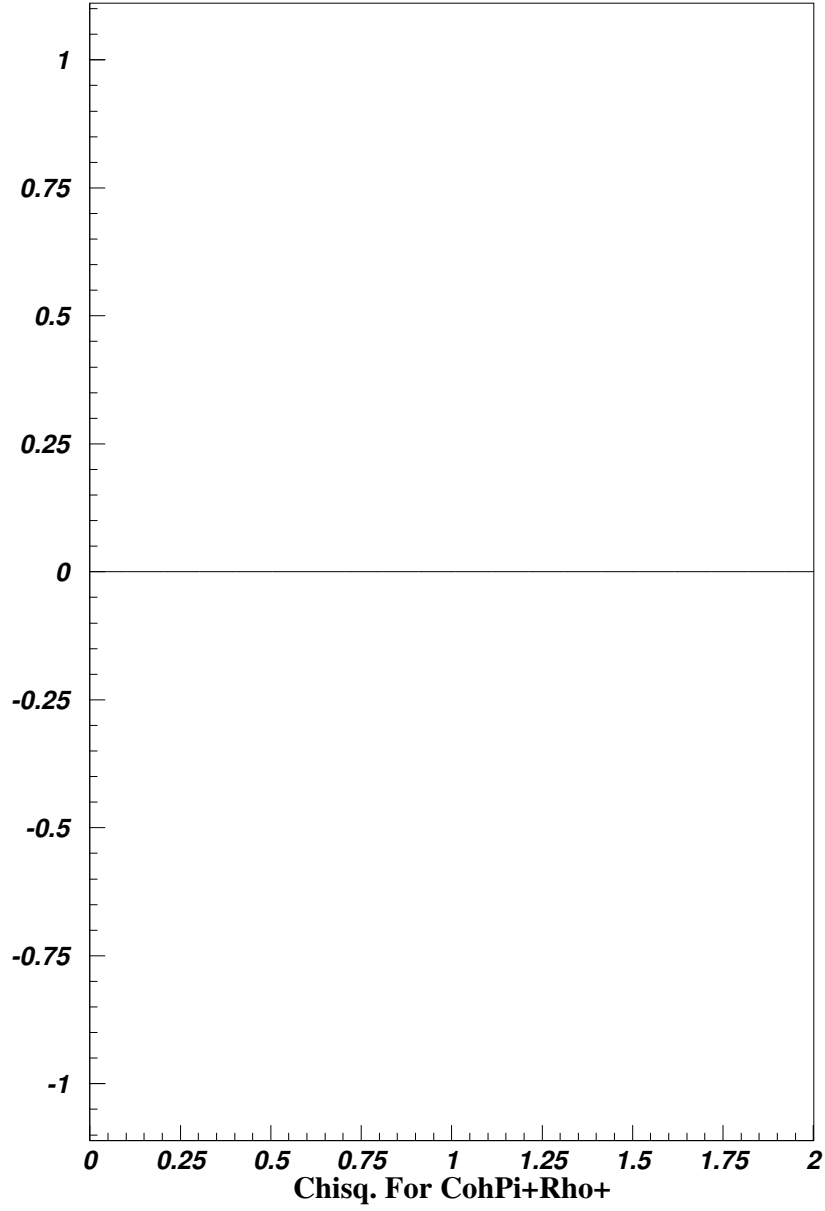


Figure 5: (chisq-cohpi.pdf)

$\chi^2$ Min 0.000 Number of bins used: 0. One $\sigma$ : -nan		
Norm at Min $\chi^2$	CohPi+Rho+	
-1 $\sigma$	0.000 *****	( -inf%)
+1 $\sigma$	*****	( -inf%)

Table 3:  $\chi^2$  for CohPi+Rho+ on plot: 'Mmumu'

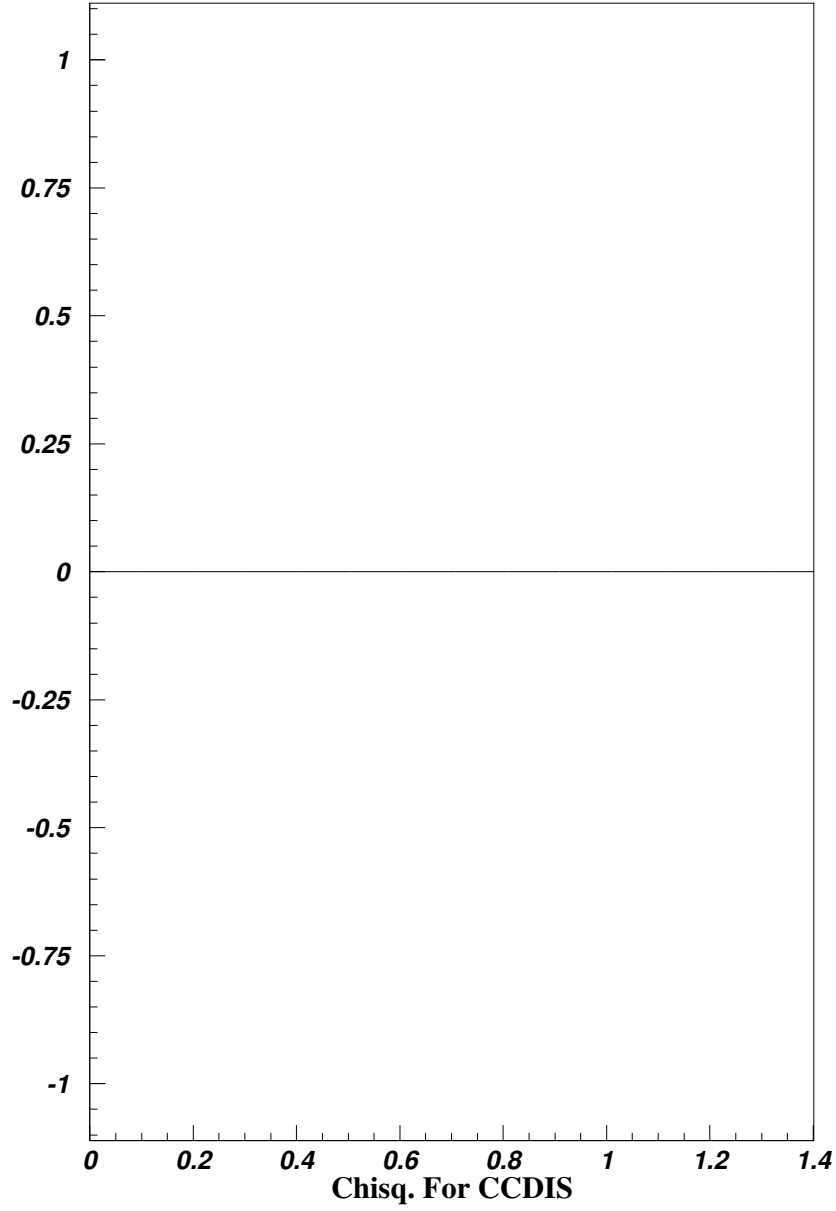


Figure 6: (chisq-ccdiss.pdf)

$\chi^2$ Min 0.000		
Number of bins used: 0.		
One $\sigma$ : -nan		
Norm at Min $\chi^2$	CCDIS	
-1 $\sigma$	0.000	
+1 $\sigma$	*****	( -inf%)
	*****	( -inf%)

Table 4:  $\chi^2$  for CCDIS on plot: 'Mmumu'



### 3 Summary Cut Tables

Cut Name	CCDIS	Coh $\pi^+$	Coh $\rho^+$	Coh $J/\psi$	Other	Total	Data
1) Raw Events	0.0	0.0	0.0	0.0	0.0	0.0	10516.0
2) OBGfid,Trig+CohGenTh	0.0	0.0	0.0	0.0	0.0	0.0	10516.0
3) Pfermi & W2	0.0	0.0	0.0	0.0	0.0	0.0	10516.0
4) Fid. Vol. -X	0.0	0.0	0.0	0.0	0.0	0.0	9867.0
5) Fid. Vol. -Y	0.0	0.0	0.0	0.0	0.0	0.0	9508.0
6) Fid. Vol. -Z (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	9508.0
7) At Least 1 Mu	0.0	0.0	0.0	0.0	0.0	0.0	9508.0
8) ncand=2,3,4	0.0	0.0	0.0	0.0	0.0	0.0	9508.0
9) tchgd=2	0.0	0.0	0.0	0.0	0.0	0.0	9508.0
10) +/- Tracks (V0)	0.0	0.0	0.0	0.0	0.0	0.0	7083.0
11) Tube/Veto Cut	0.0	0.0	0.0	0.0	0.0	0.0	7083.0
12) 2 Muons (1mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13) PmuAsymj0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14) Theta<2.62 rad	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15) Pt+wrt- >0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16) Mee > 2.0 (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17) Upstream Hanger cut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18) nsecond<4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19) Fid. Vol. Hanger cut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20) No Hangers fromPVert	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21) Pz>0 for tracks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22) Thprimord<0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23) Nunh*fracunh<200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24) Emumu>2GeV	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25) P+,P->0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26) P+,P->1.0 (2.5mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27) Emumu>5GeV (8mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28) Phi12>90deg (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29) Pmumu>10GeV (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 5: Summary Cut Table (**all events**)

Cut Name	CCDIS	Coh $\pi^+$	Coh $\rho^+$	Coh $J/\psi$	Other	Total	Data
1) Raw Events	0.0	0.0	0.0	0.0	0.0	0.0	9021.0
2) OBGfid,Trig+CohGenTh	0.0	0.0	0.0	0.0	0.0	0.0	9021.0
3) Pfermi & W2	0.0	0.0	0.0	0.0	0.0	0.0	9021.0
4) Fid. Vol. -X	0.0	0.0	0.0	0.0	0.0	0.0	8457.0
5) Fid. Vol. -Y	0.0	0.0	0.0	0.0	0.0	0.0	8140.0
6) Fid. Vol. -Z (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	8140.0
7) At Least 1 Mu	0.0	0.0	0.0	0.0	0.0	0.0	8140.0
8) ncand=2,3,4	0.0	0.0	0.0	0.0	0.0	0.0	8140.0
9) tchgd=2	0.0	0.0	0.0	0.0	0.0	0.0	8140.0
10) +/- Tracks (V0)	0.0	0.0	0.0	0.0	0.0	0.0	6030.0
11) Tube/Veto Cut	0.0	0.0	0.0	0.0	0.0	0.0	6030.0
12) 2 Muons (1mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13) PmuAsymj0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14) Theta<2.62 rad	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15) Pt+wrt- >0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16) Mee > 2.0 (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17) Upstream Hanger cut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18) nsecond<4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19) Fid. Vol. Hanger cut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20) No Hangers fromPVert	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21) Pz>0 for tracks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22) Thprimord<0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23) Nunh*fracunh<200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24) Emumu>2GeV	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25) P+,P->0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26) P+,P->1.0 (2.5mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27) Emumu>5GeV (8mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28) Phi12>90deg (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29) Pmumu>10GeV (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 6: Summary Cut Table (**mass blind**)

Cut Name	CCDIS	Coh $\pi^+$	Coh $\rho^+$	Coh $J/\psi$	Other	Total	Data
1) Raw Events	0.0	0.0	0.0	0.0	0.0	0.0	1495.0
2) OBGfid,Trig+CohGenTh	0.0	0.0	0.0	0.0	0.0	0.0	1495.0
3) Pfermi & W2	0.0	0.0	0.0	0.0	0.0	0.0	1495.0
4) Fid. Vol. -X	0.0	0.0	0.0	0.0	0.0	0.0	1410.0
5) Fid. Vol. -Y	0.0	0.0	0.0	0.0	0.0	0.0	1368.0
6) Fid. Vol. -Z (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	1368.0
7) At Least 1 Mu	0.0	0.0	0.0	0.0	0.0	0.0	1368.0
8) ncand=2,3,4	0.0	0.0	0.0	0.0	0.0	0.0	1368.0
9) tchgd=2	0.0	0.0	0.0	0.0	0.0	0.0	1368.0
10) +/- Tracks (V0)	0.0	0.0	0.0	0.0	0.0	0.0	1053.0
11) Tube/Veto Cut	0.0	0.0	0.0	0.0	0.0	0.0	1053.0
12) 2 Muons (1mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13) PmuAsymj0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14) Theta<2.62 rad	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15) Pt+wrt- >0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16) Mee > 2.0 (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17) Upstream Hanger cut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18) nsecond<4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19) Fid. Vol. Hanger cut	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20) No Hangers fromPVert	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21) Pz>0 for tracks	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22) Thprimord<0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23) Nunh*fracunh<200	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24) Emumu>2GeV	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25) P+,P->0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26) P+,P->1.0 (2.5mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27) Emumu>5GeV (8mux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28) Phi12>90deg (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29) Pmumu>10GeV (OFF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 7: Summary Cut Table (**mass sig.**)

## 4 Plots

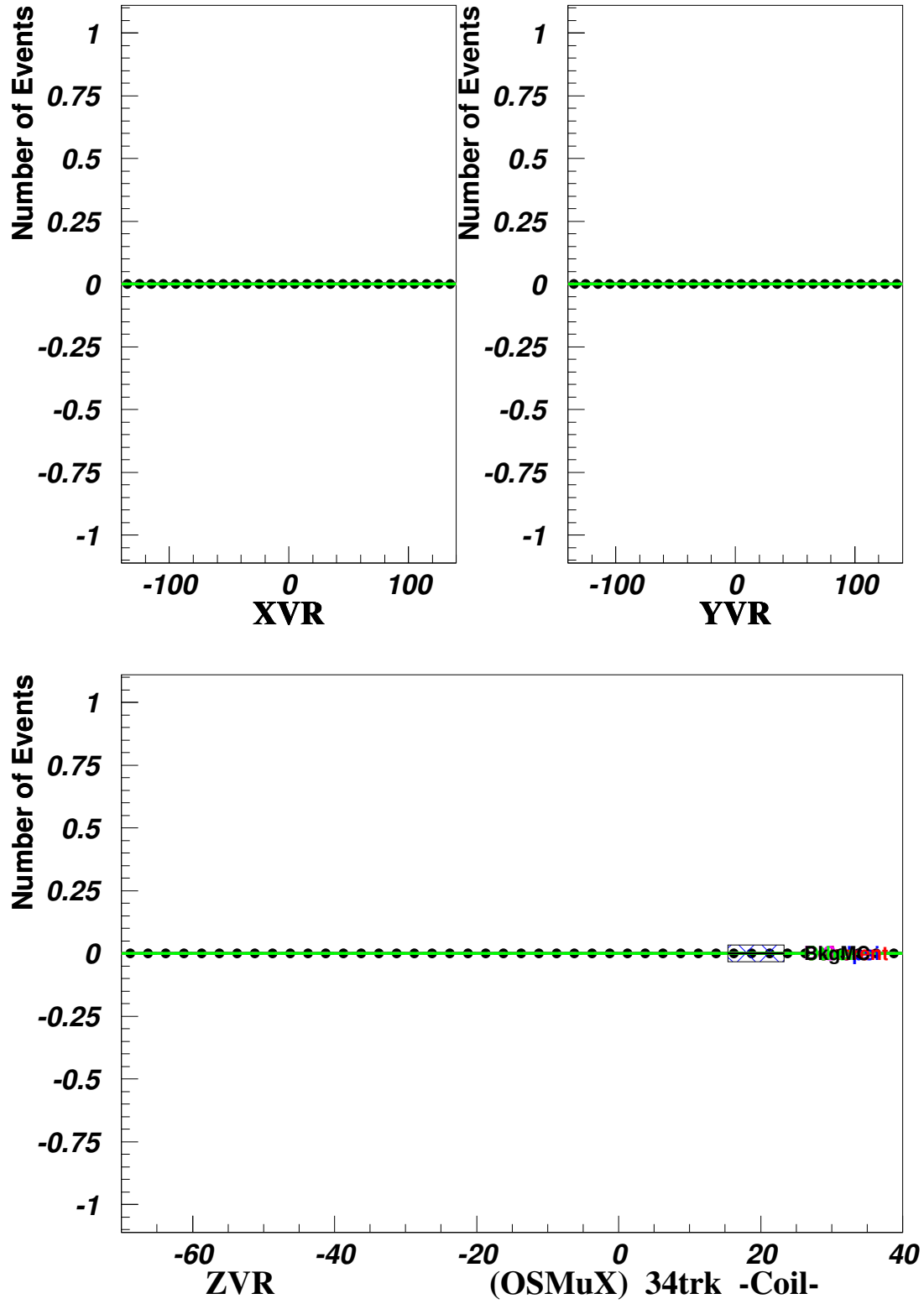


Figure 7: (./figs/vertex.pdf)

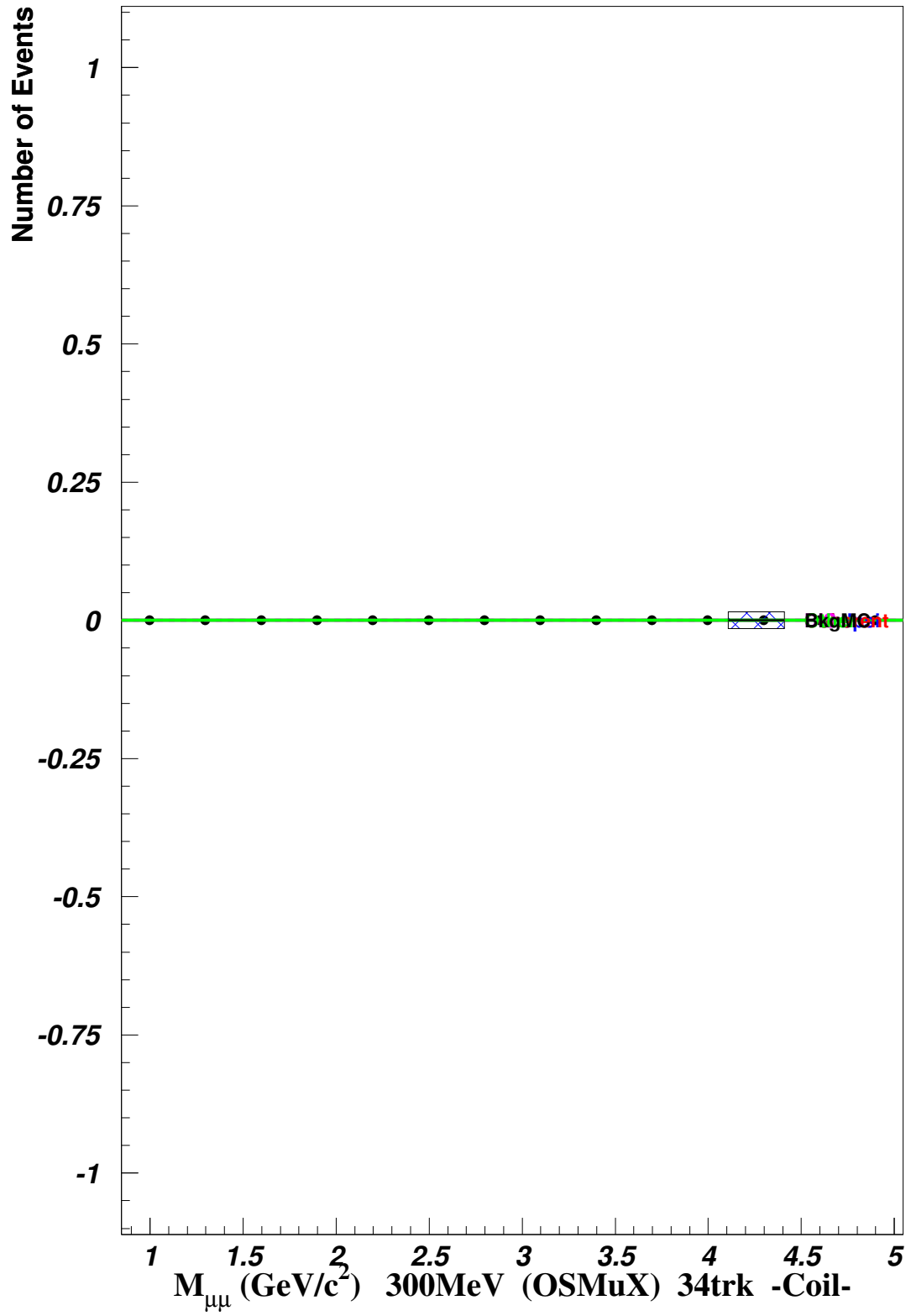


Figure 8: (./figs/mass-0.9to5-300mev.pdf)

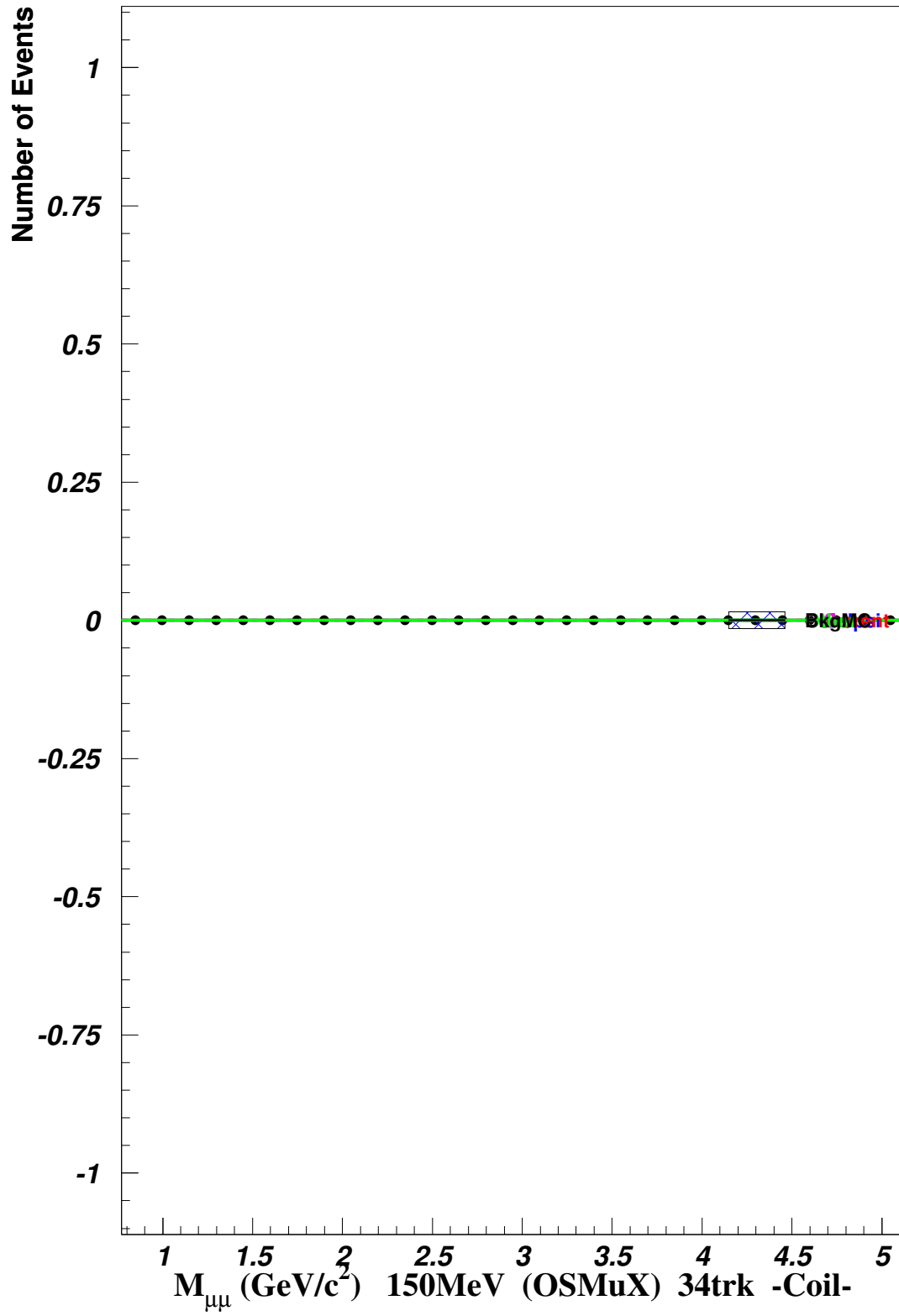


Figure 9: (./figs/mass-0.9to5-150mev.pdf)

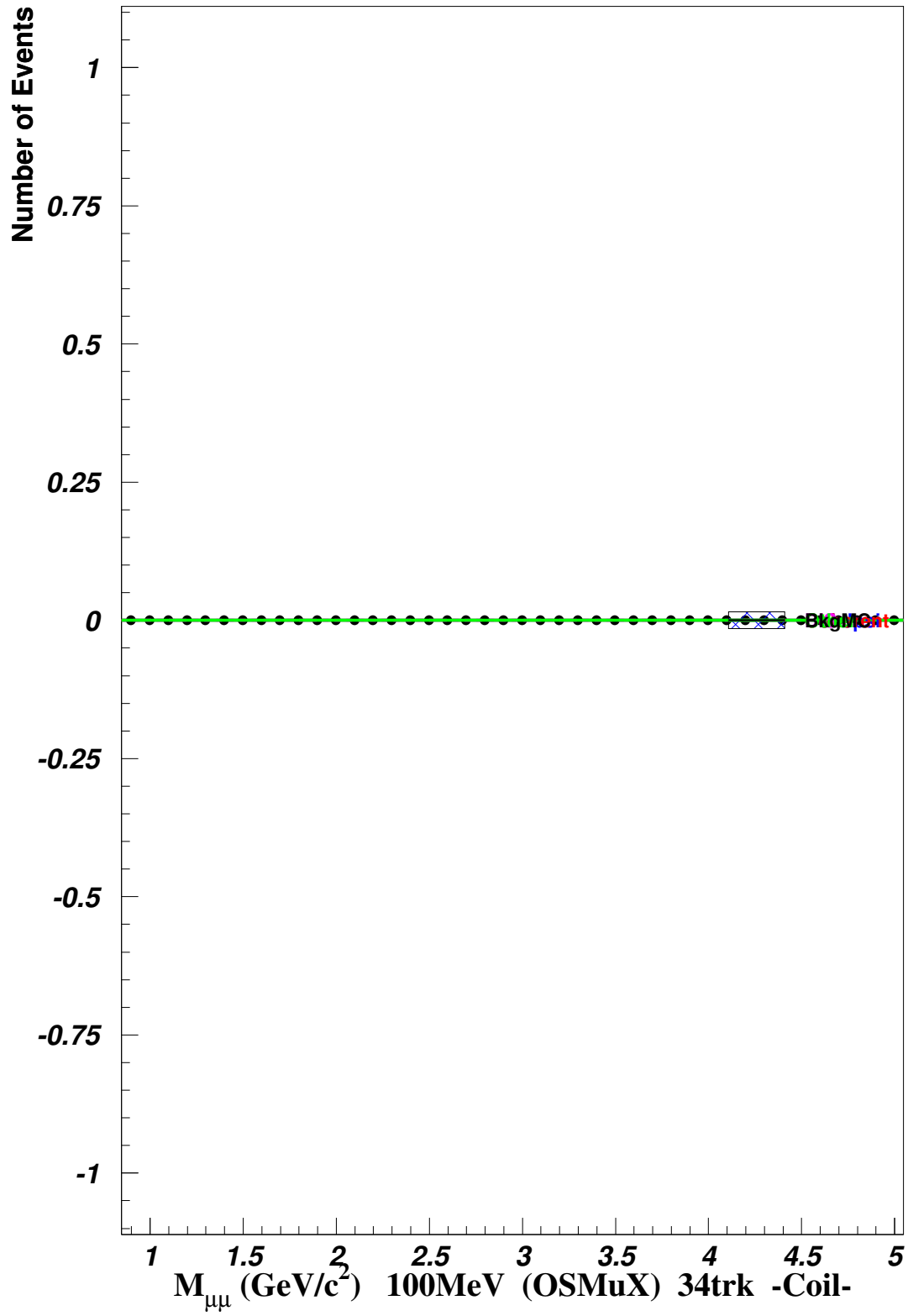


Figure 10: (./figs/mass-0.9to5-100mev.pdf)

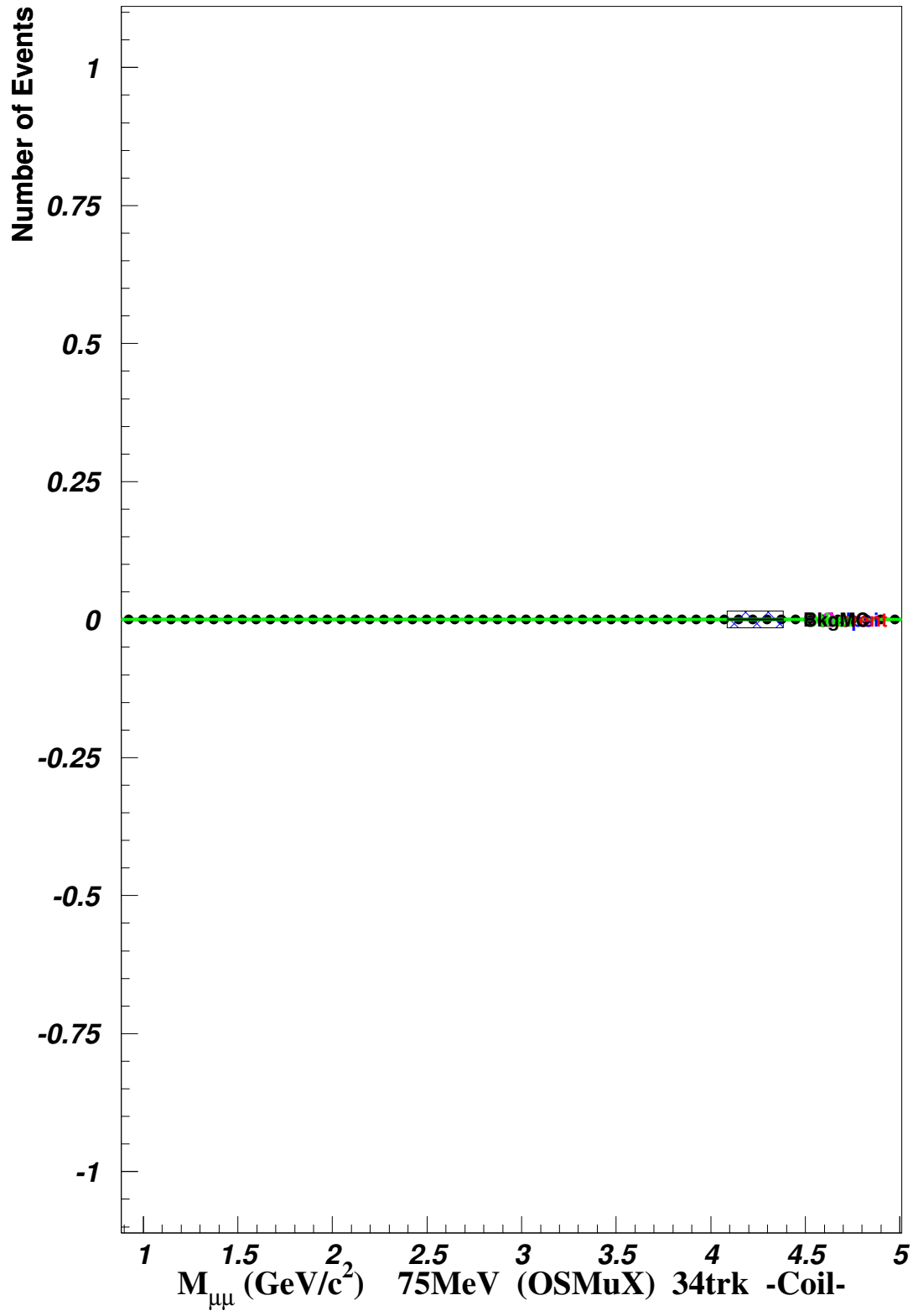


Figure 11: (./figs/mass-0.9to5-75mev.pdf)



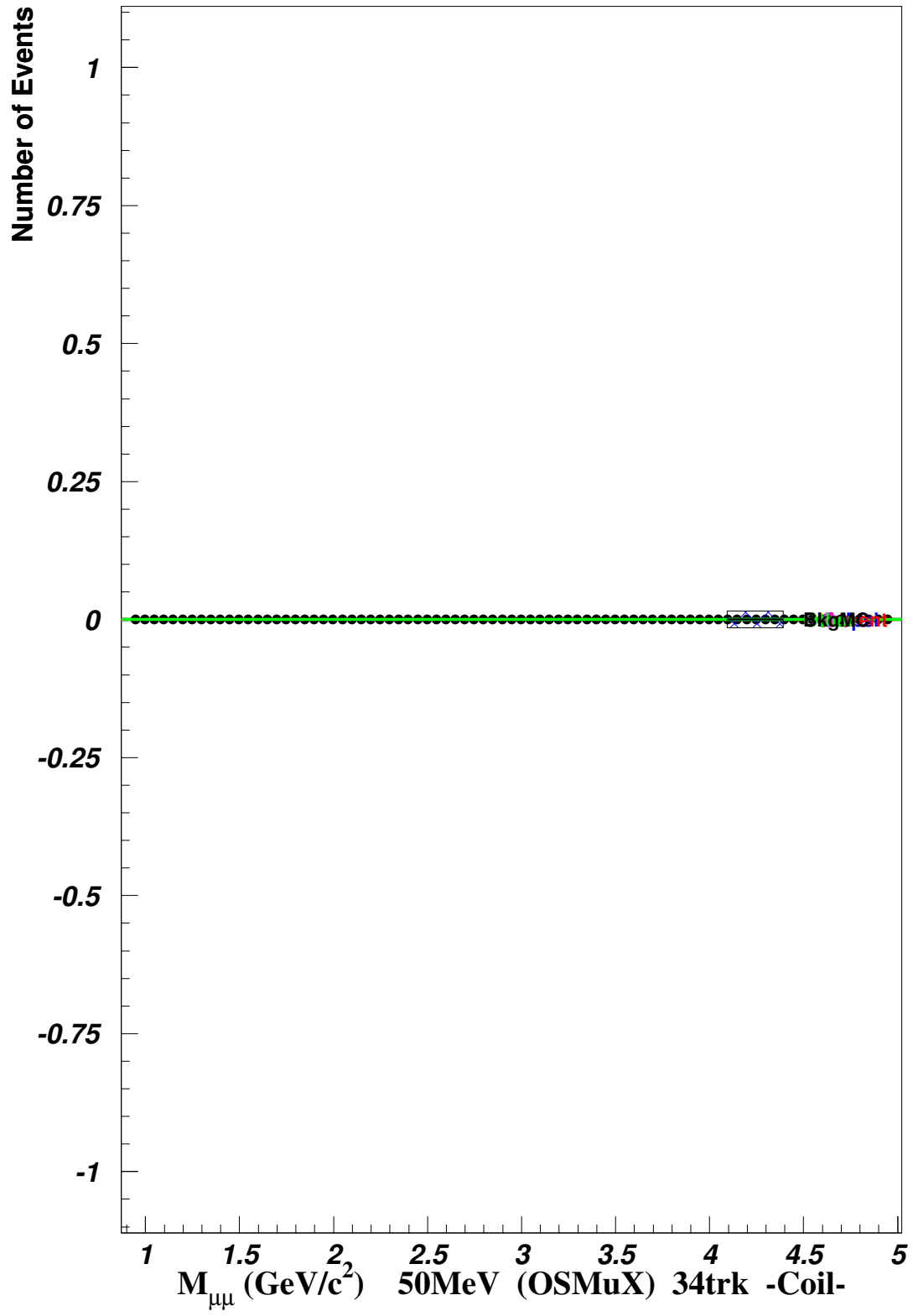


Figure 12: (./figs/mass-0.9to5-50mev.pdf)

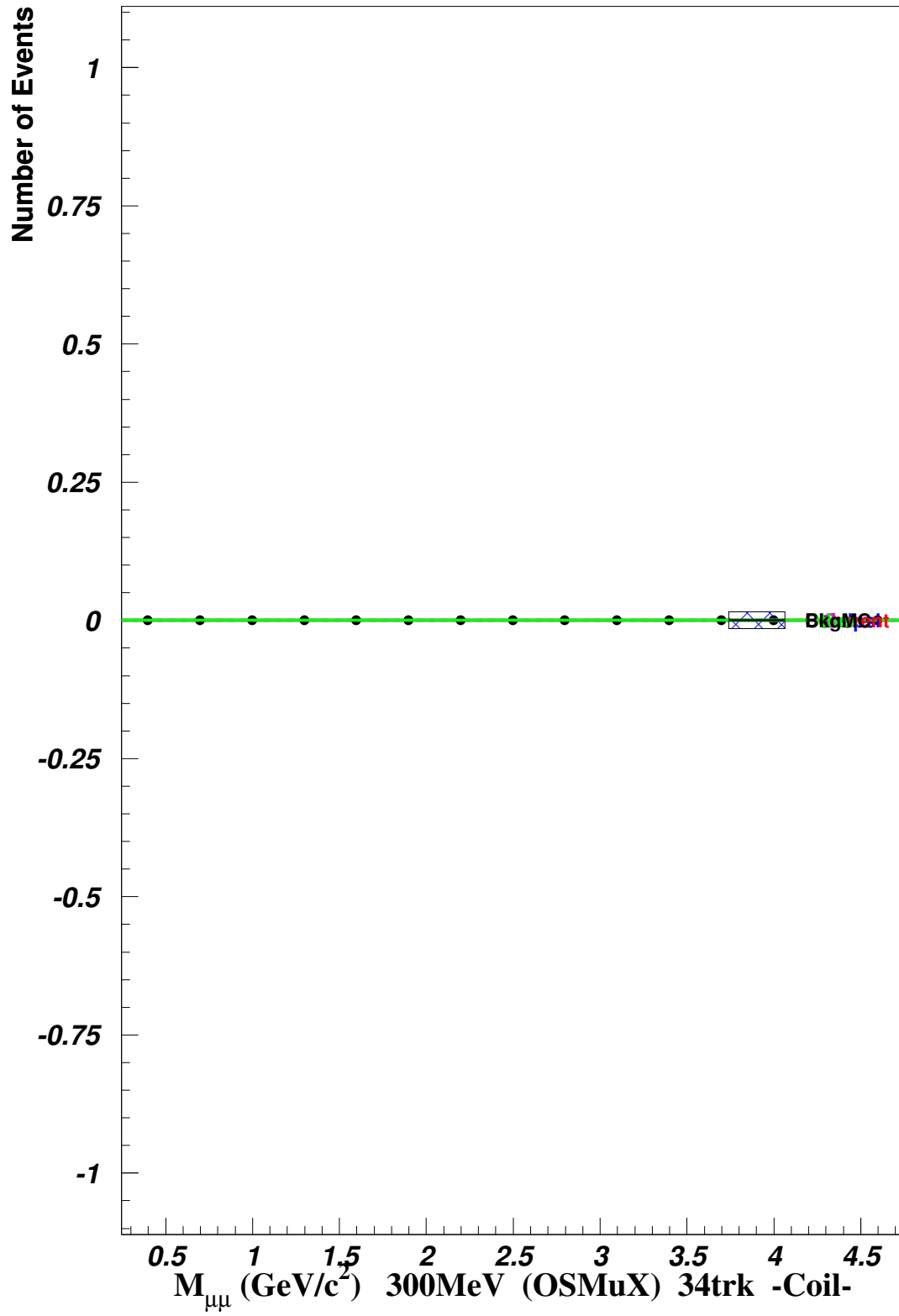


Figure 13: (./figs/mass-0to5-300mev.pdf)

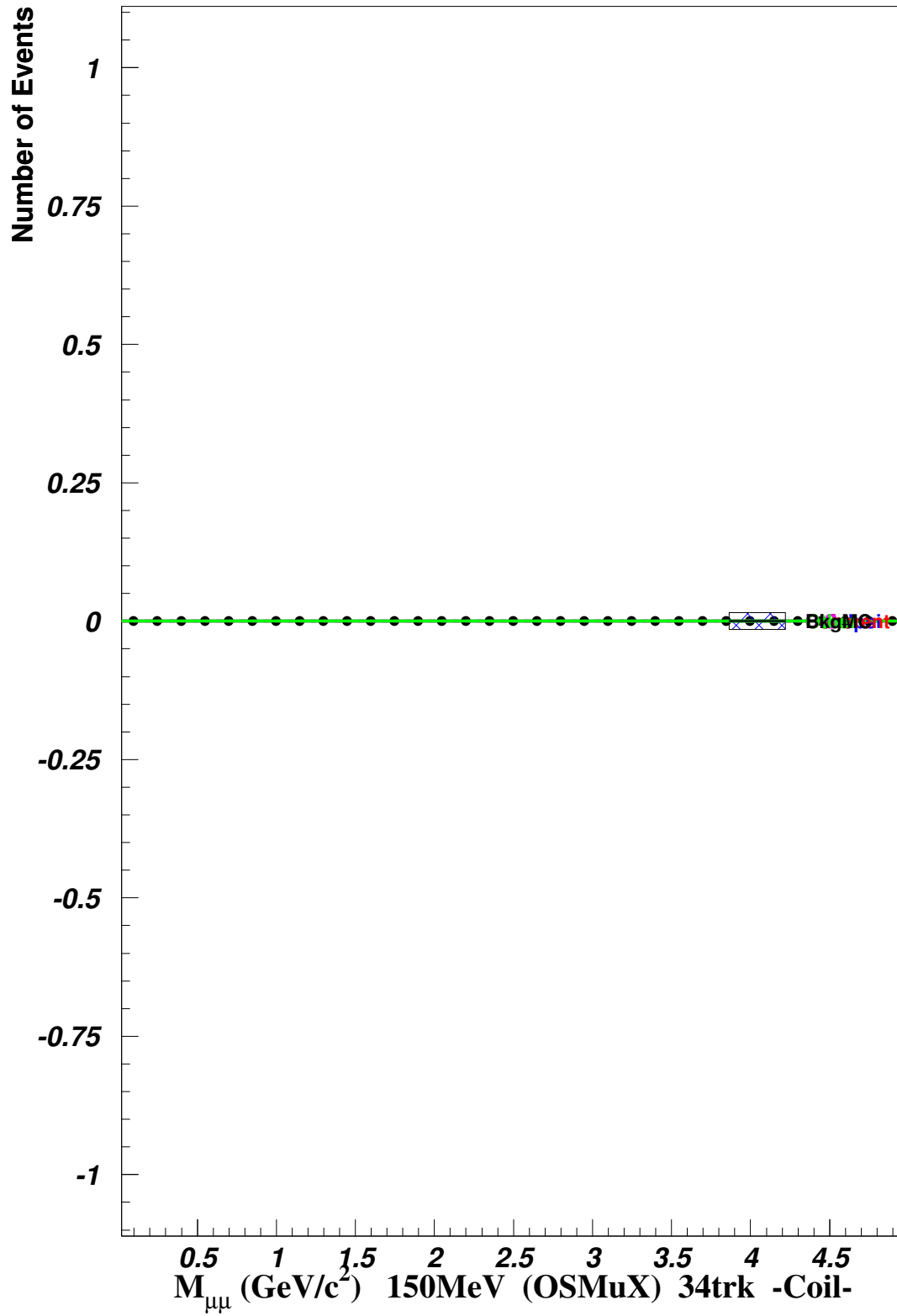


Figure 14: (./figs/mass-0to5-150mev.pdf)

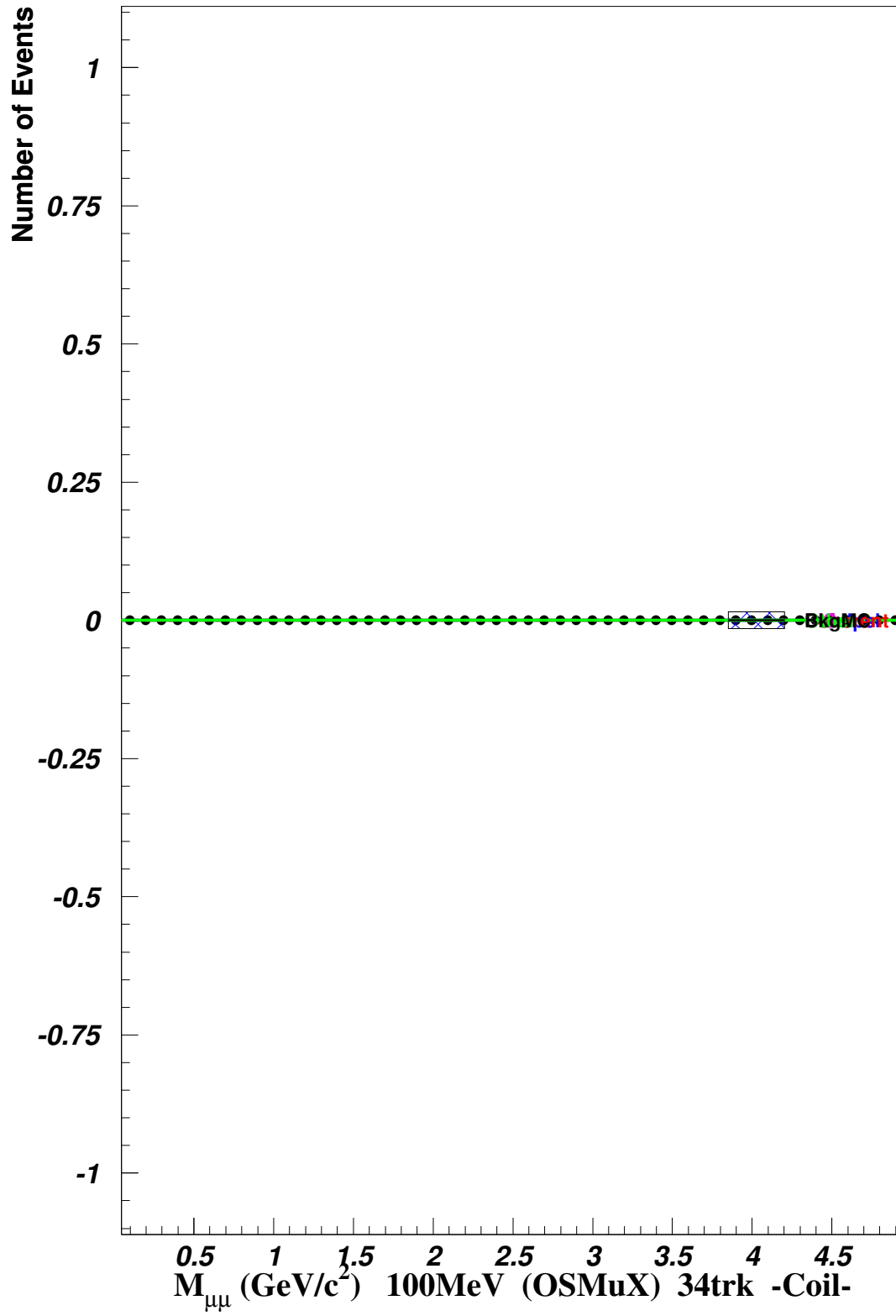


Figure 15: (./figs/mass-0to5-100mev.pdf)

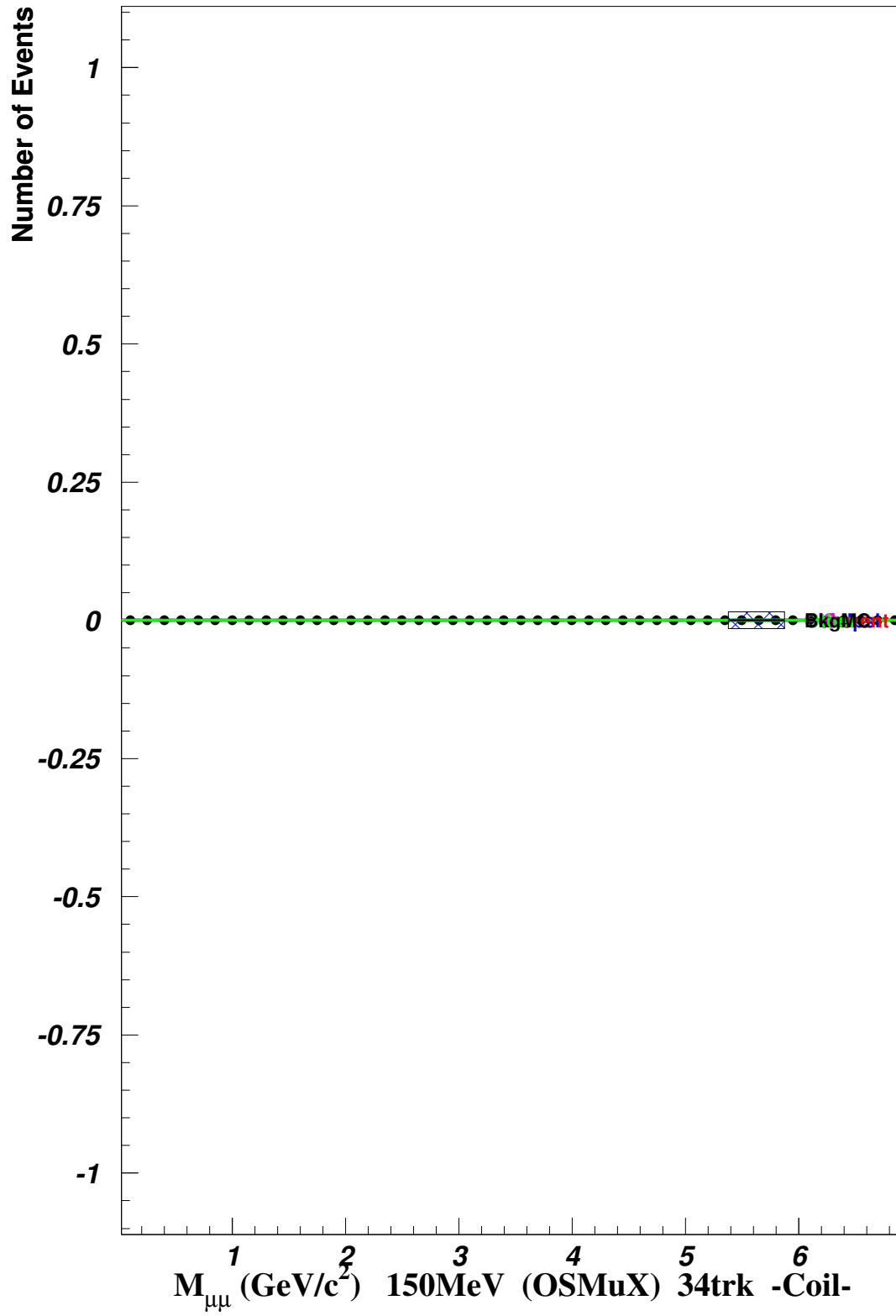


Figure 16: (./figs/mass-0to7-150mev.pdf)

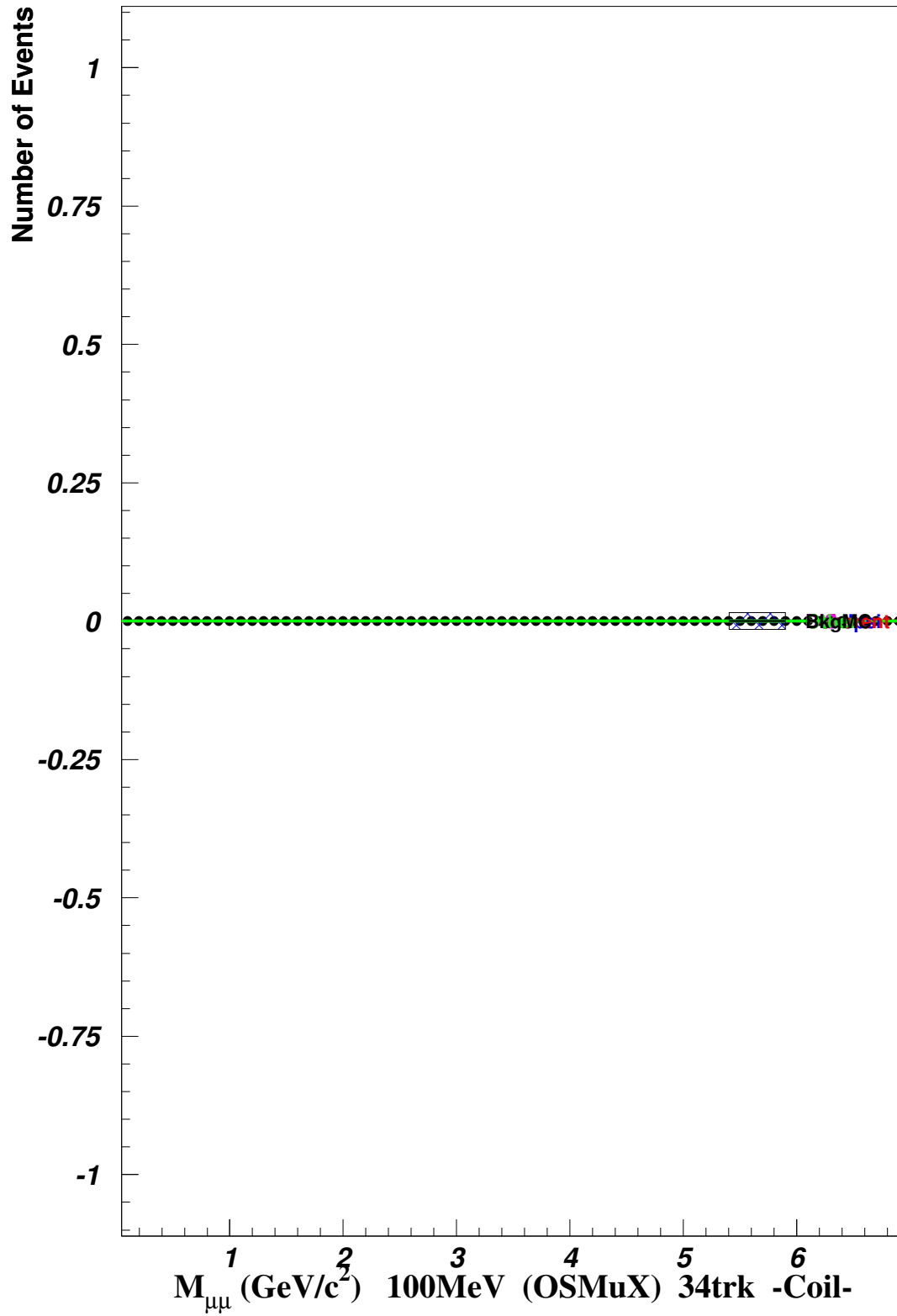


Figure 17: (./figs/mass-0to7-100mev.pdf)

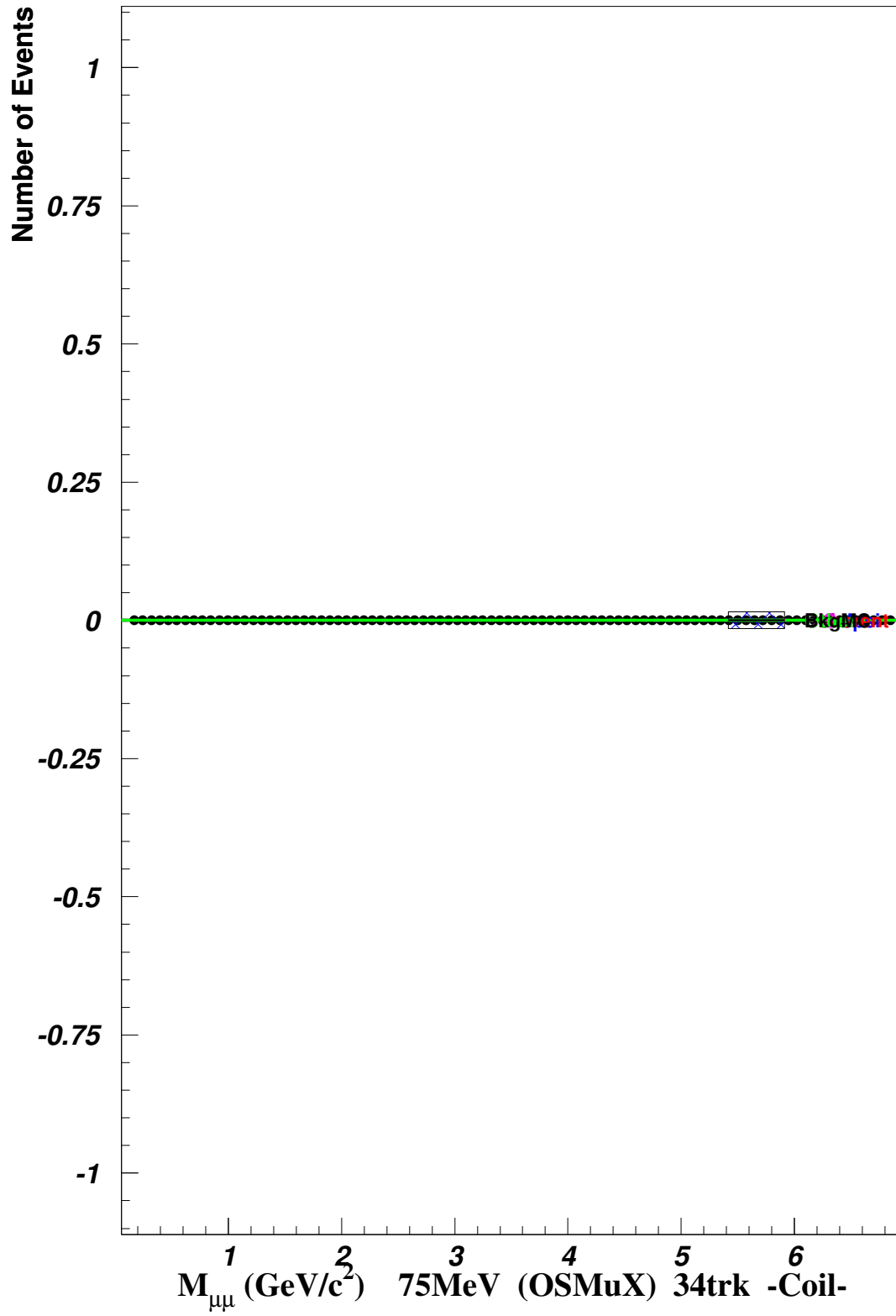


Figure 18: (./figs/mass-0to7-75mev.pdf)

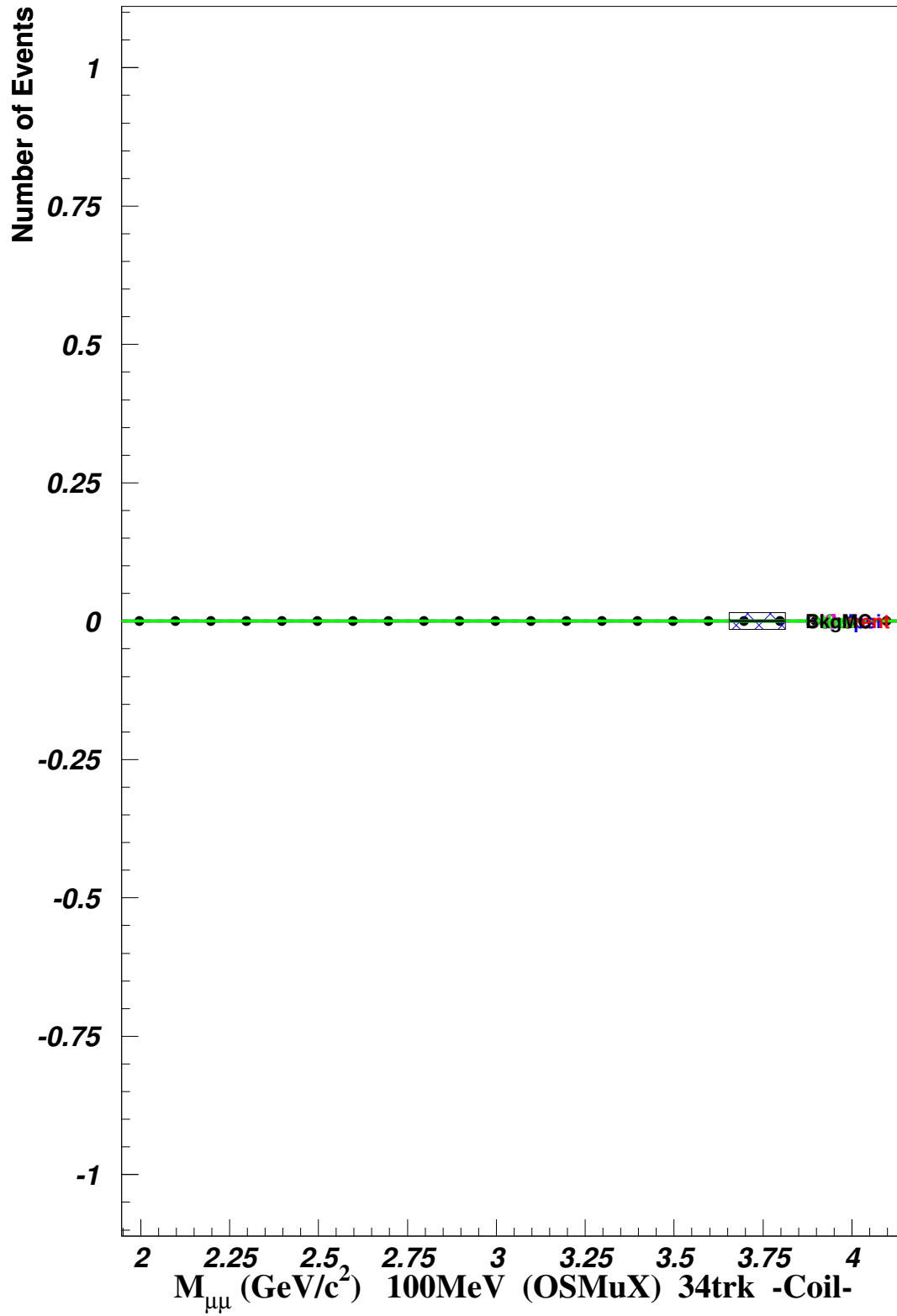


Figure 19: (./figs/mass-2to4-100mev.pdf)



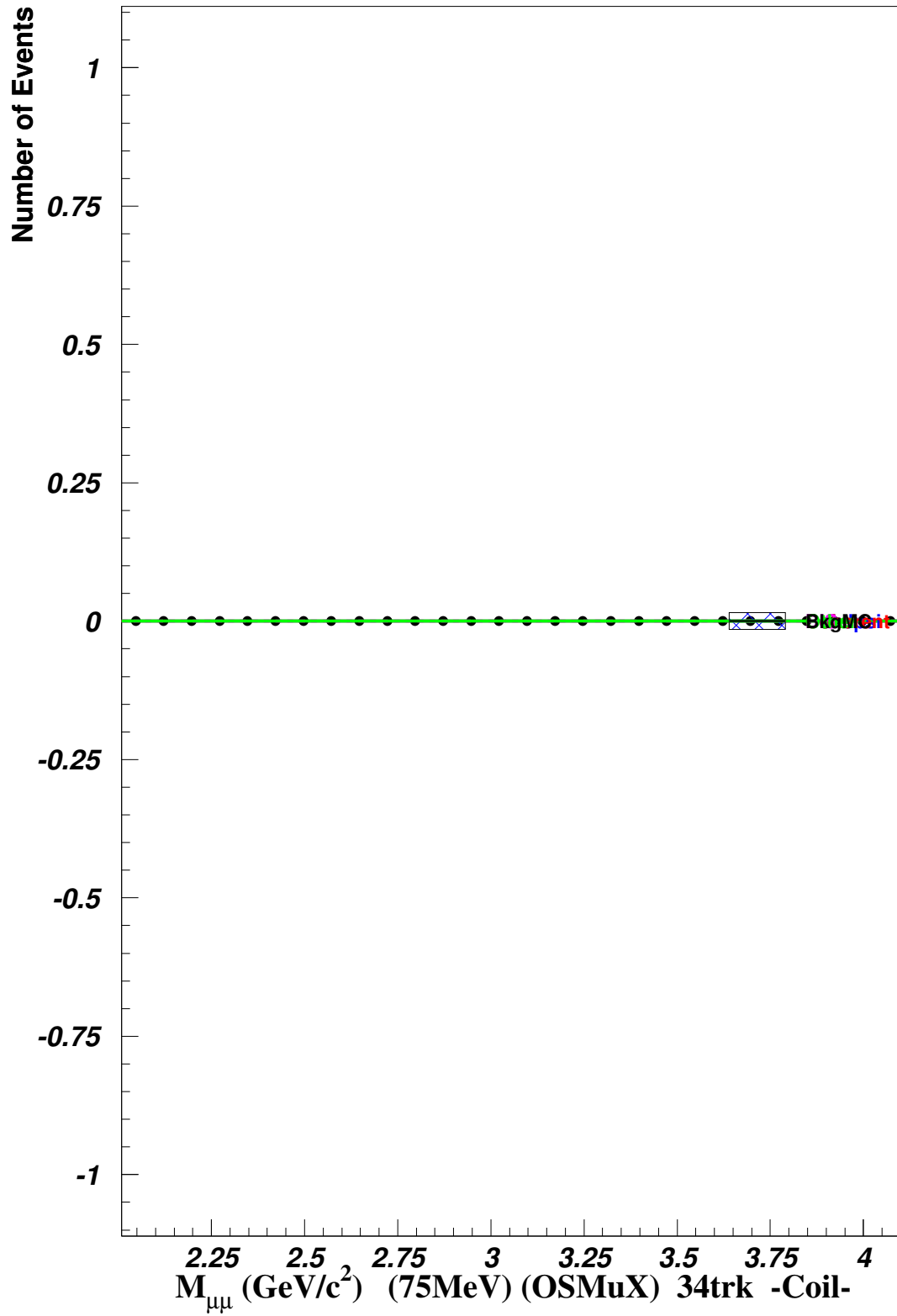


Figure 20: (./figs/mass-2to4-75mev.pdf)

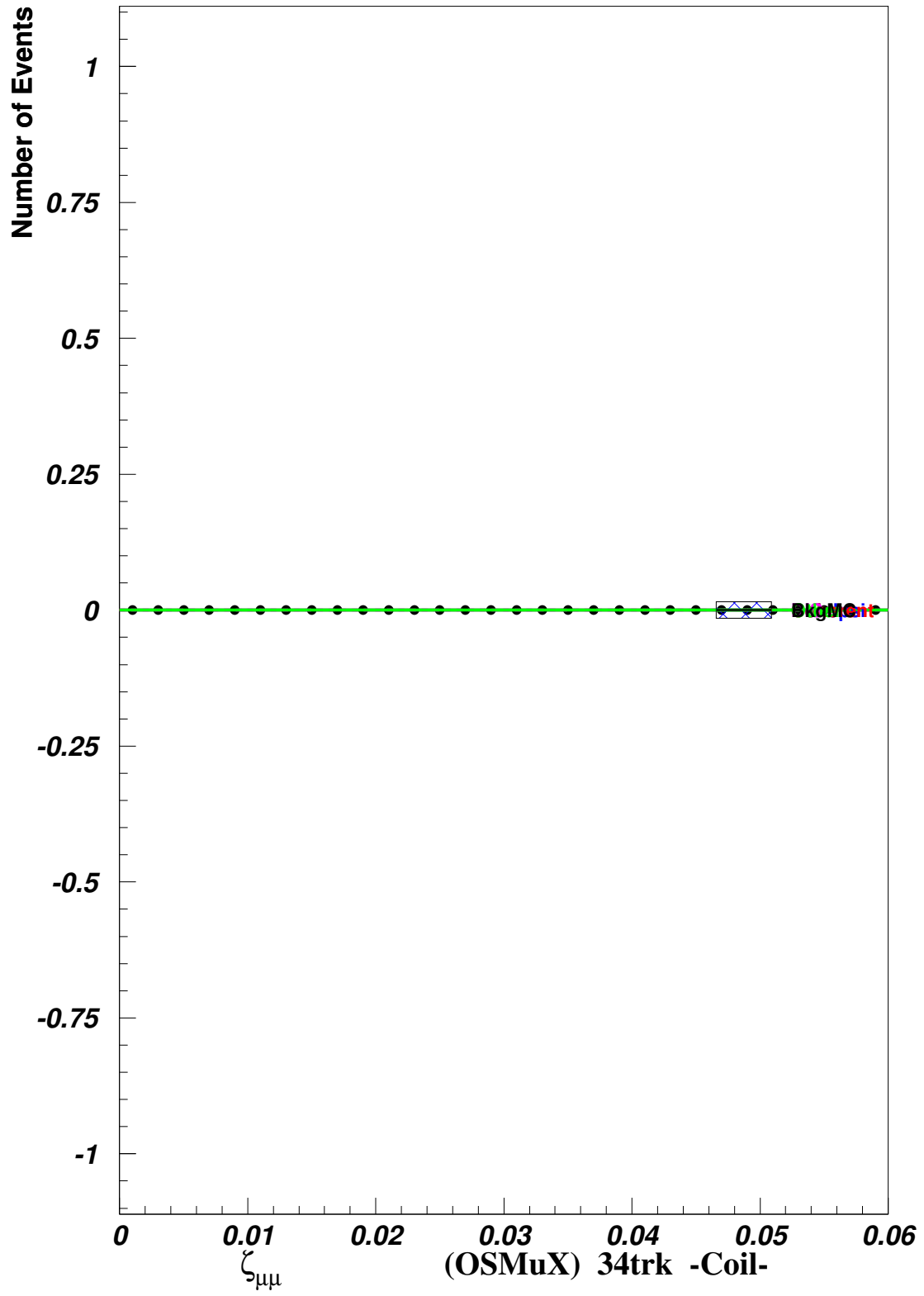


Figure 21: (./figs/zetamumu.pdf)

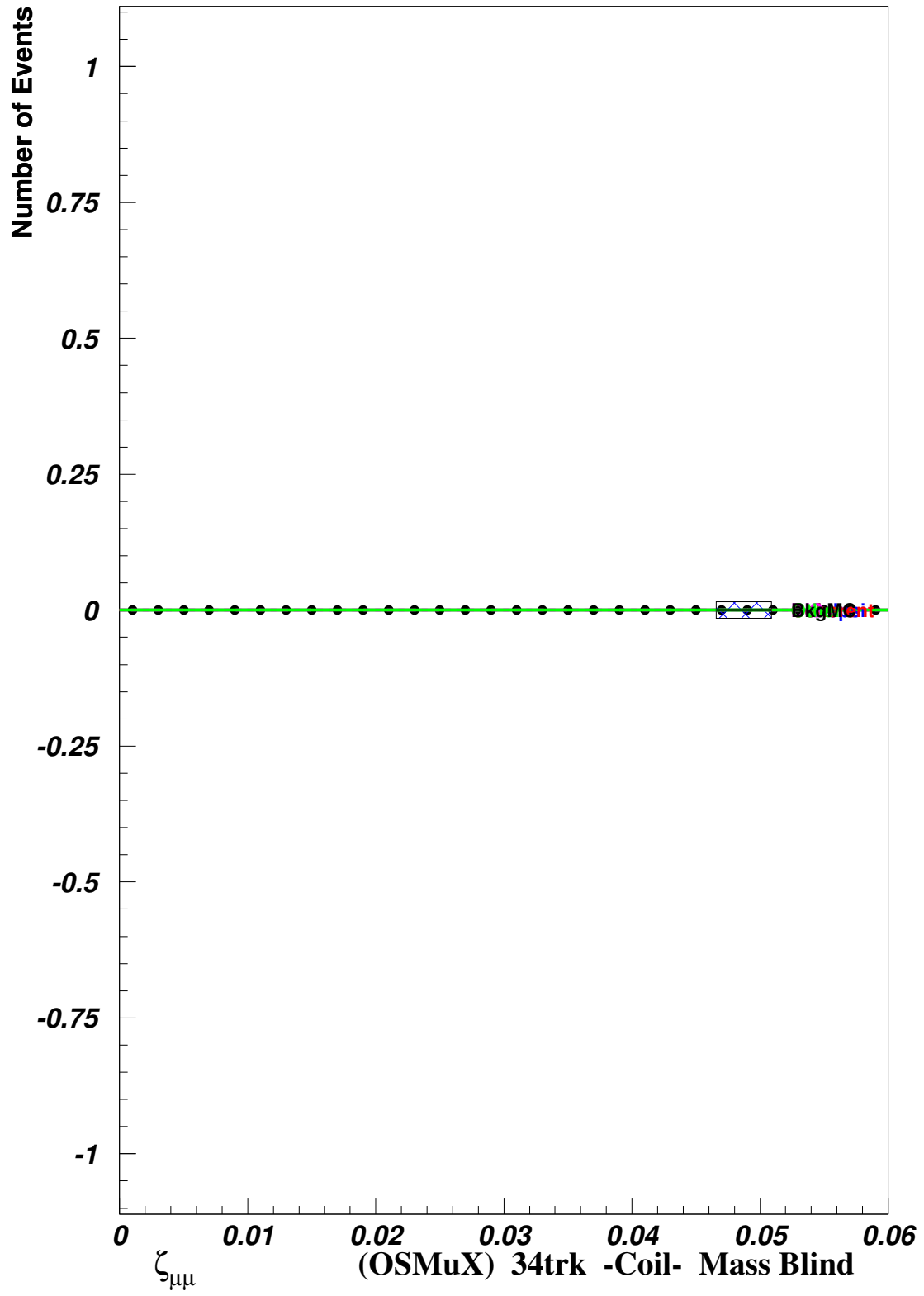


Figure 22: (./figs/zetamumu-mb.pdf)

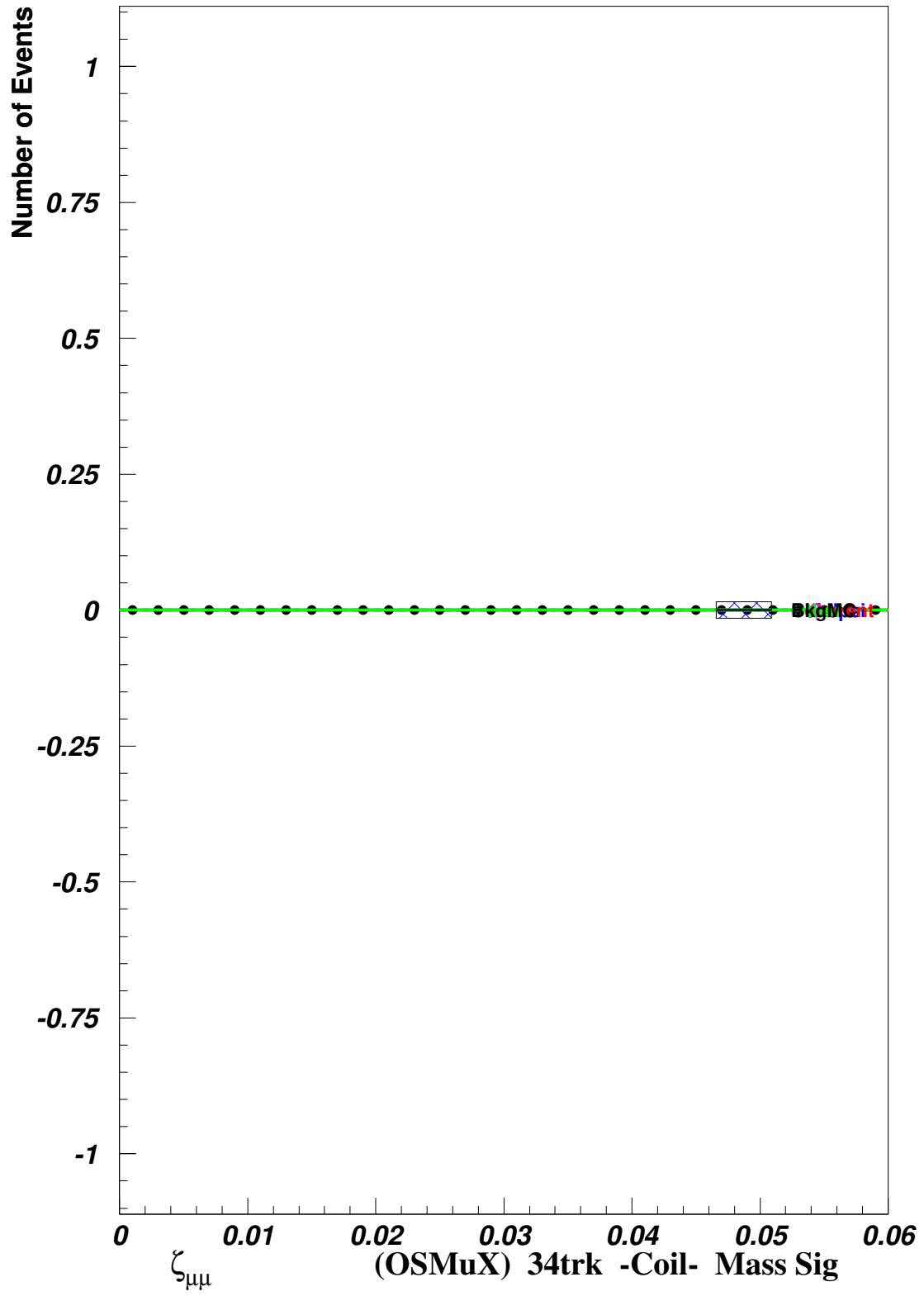


Figure 23: (./figs/zetamumu-msig.pdf)

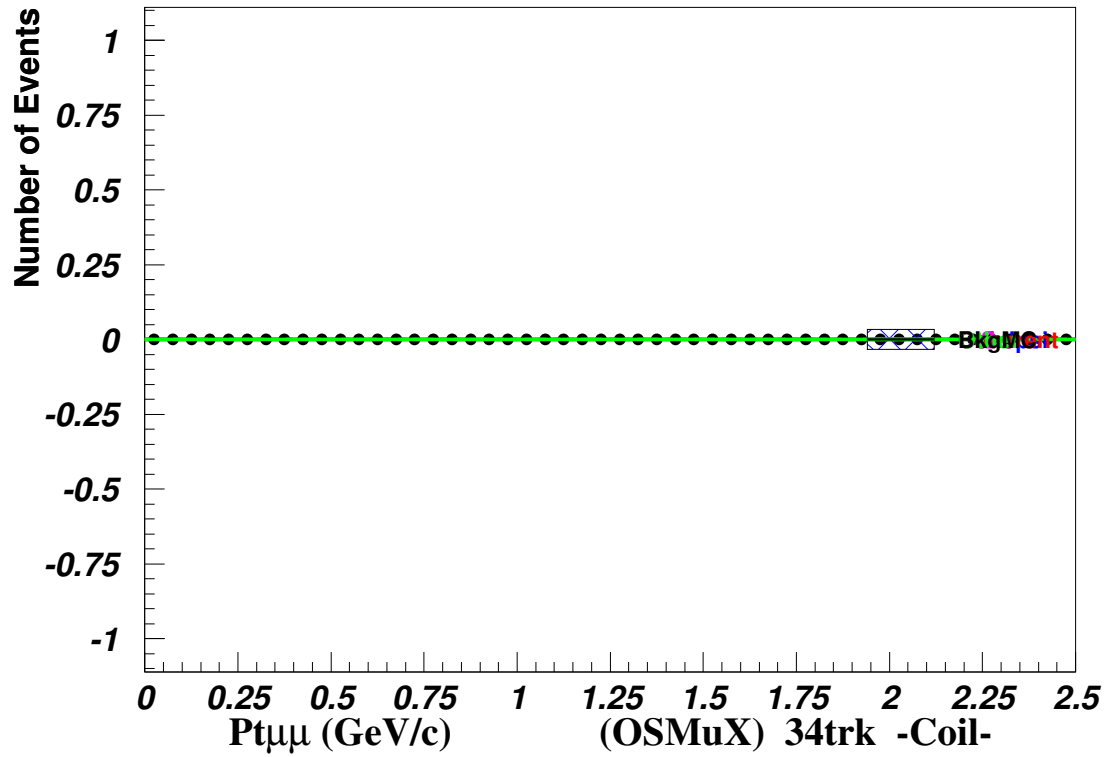
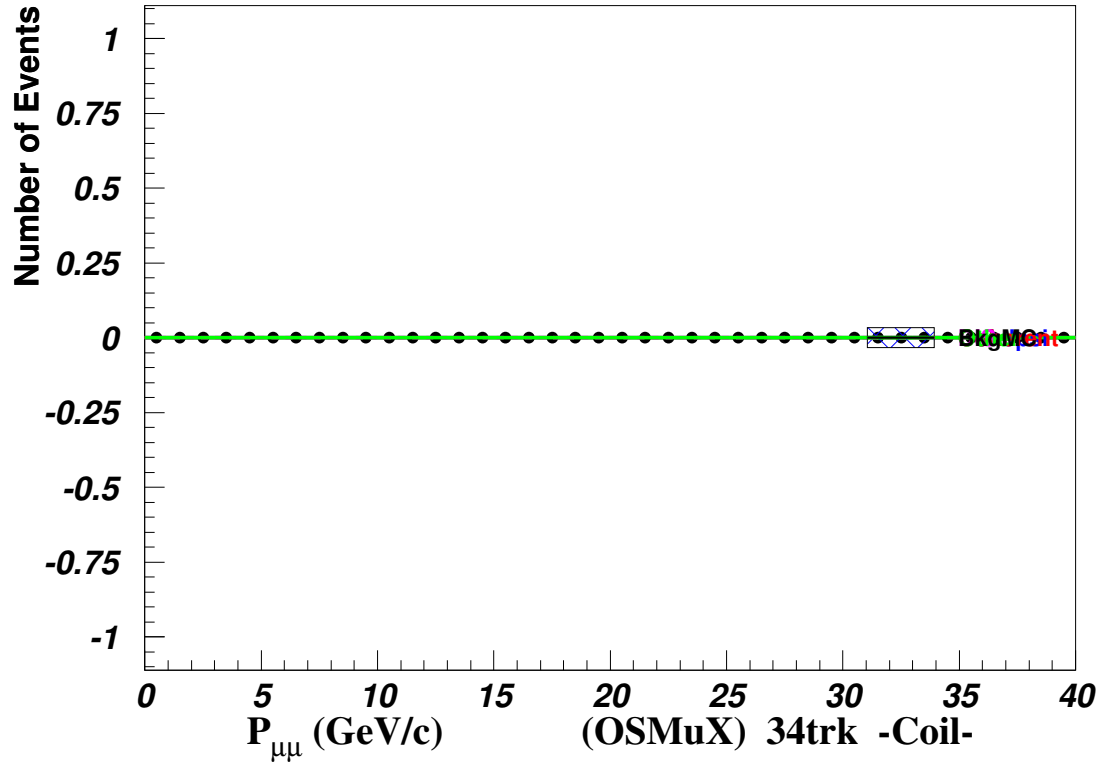


Figure 24: (./figs/p-pt-mumu.pdf)

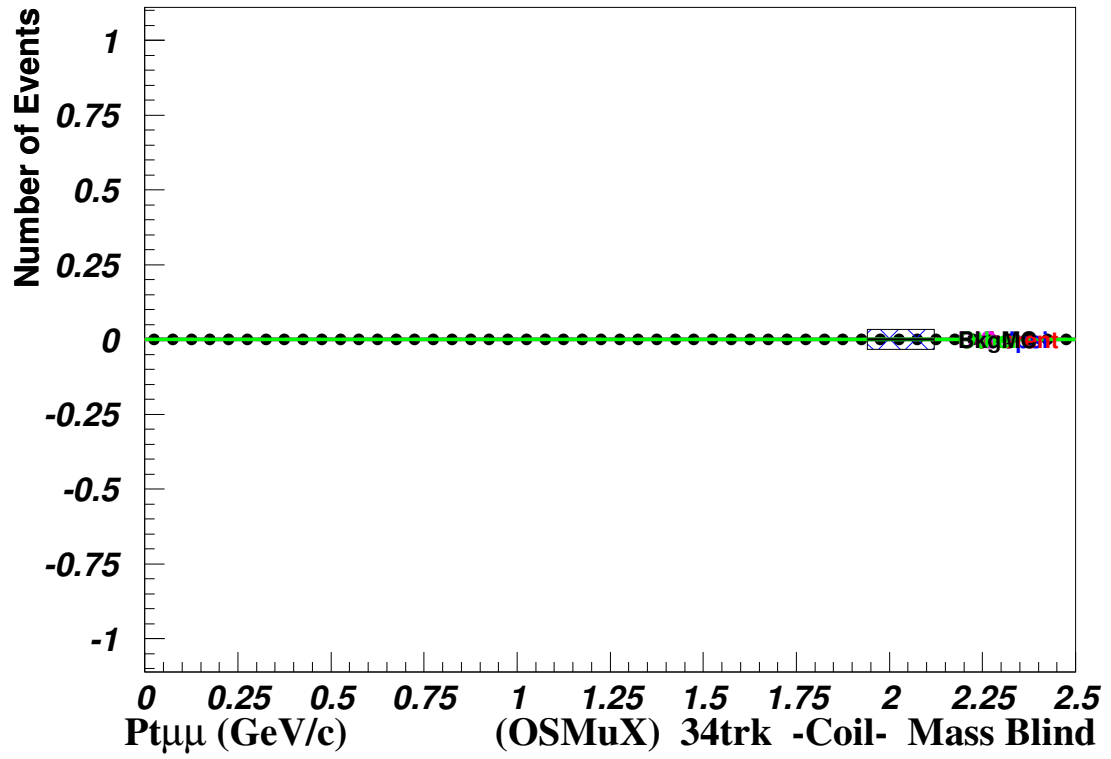
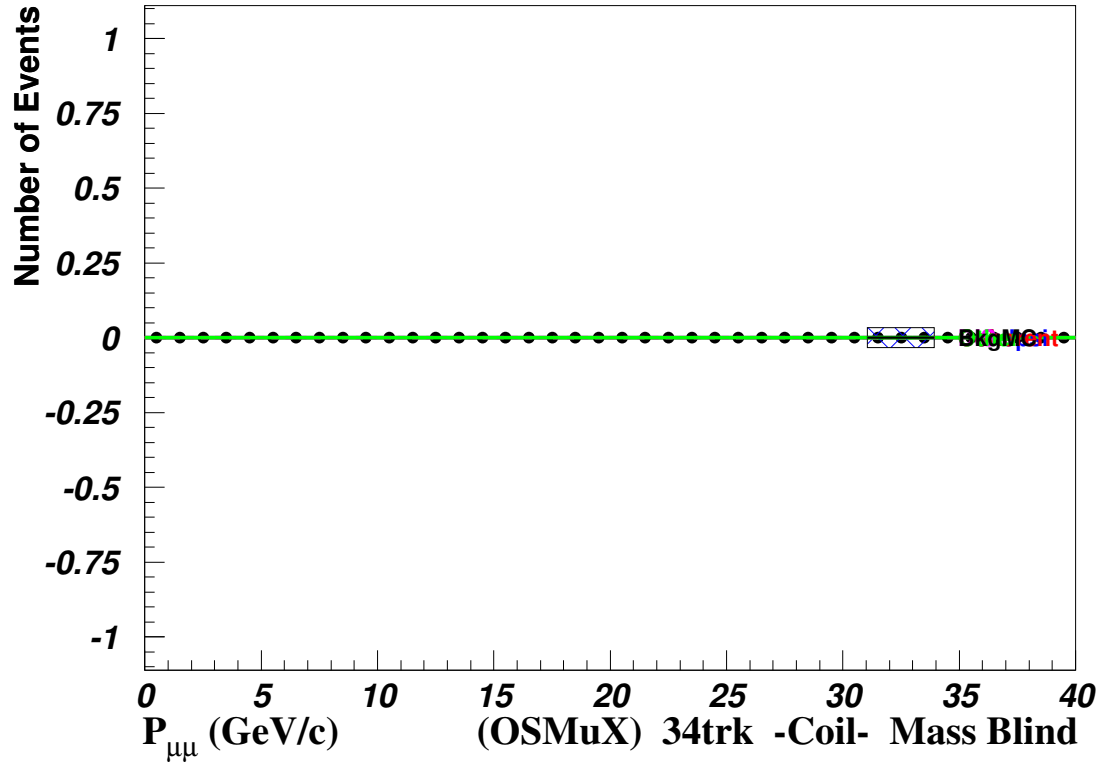


Figure 25: (./figs/p-pt-mumu-mb.pdf)

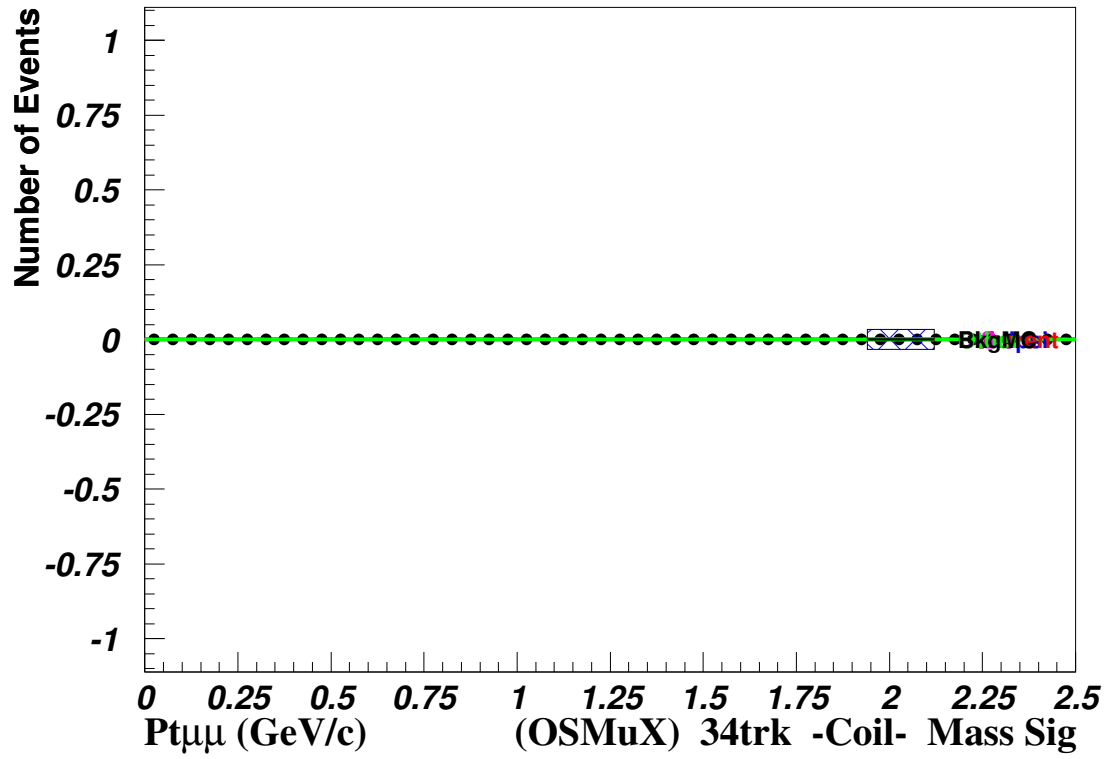
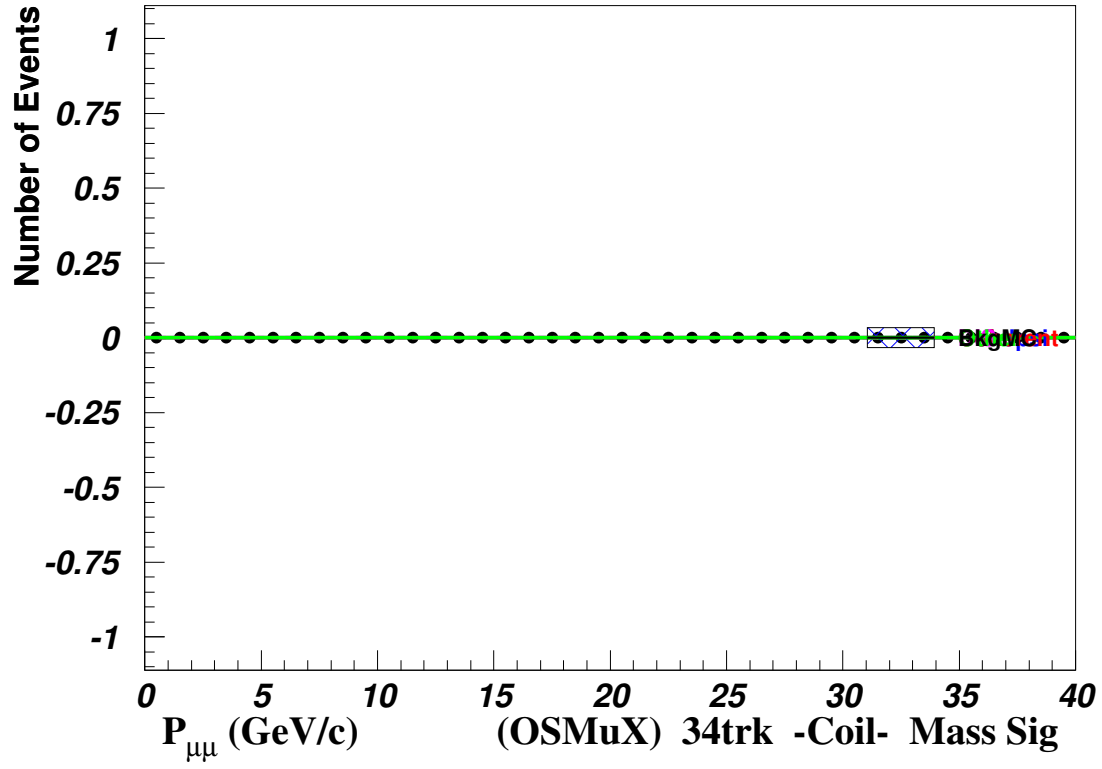


Figure 26: (./figs/p-pt-mumu-msig.pdf)

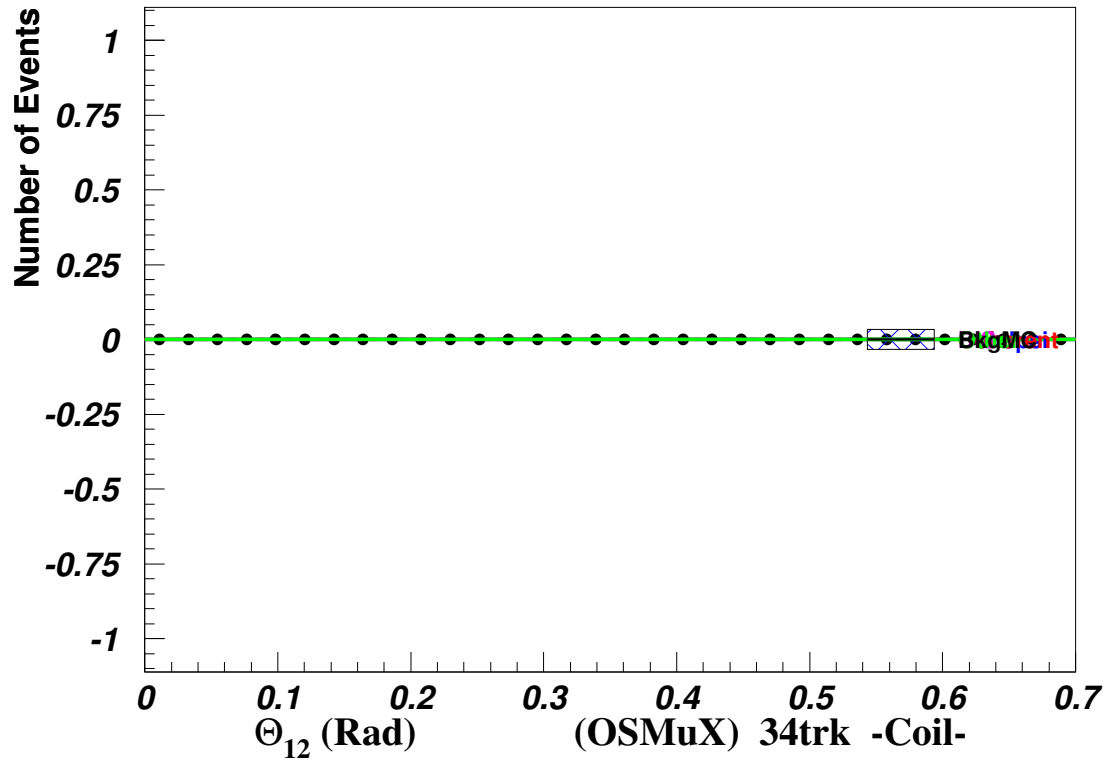
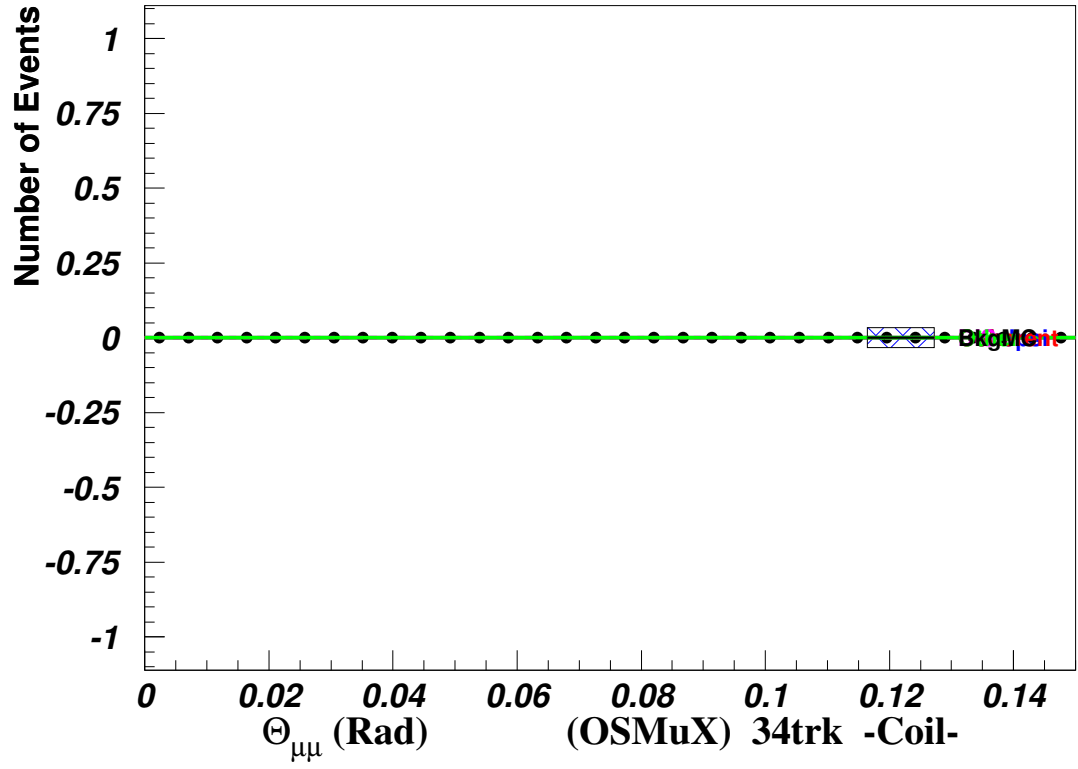


Figure 27: (./figs/thetamumu-theta12.pdf)



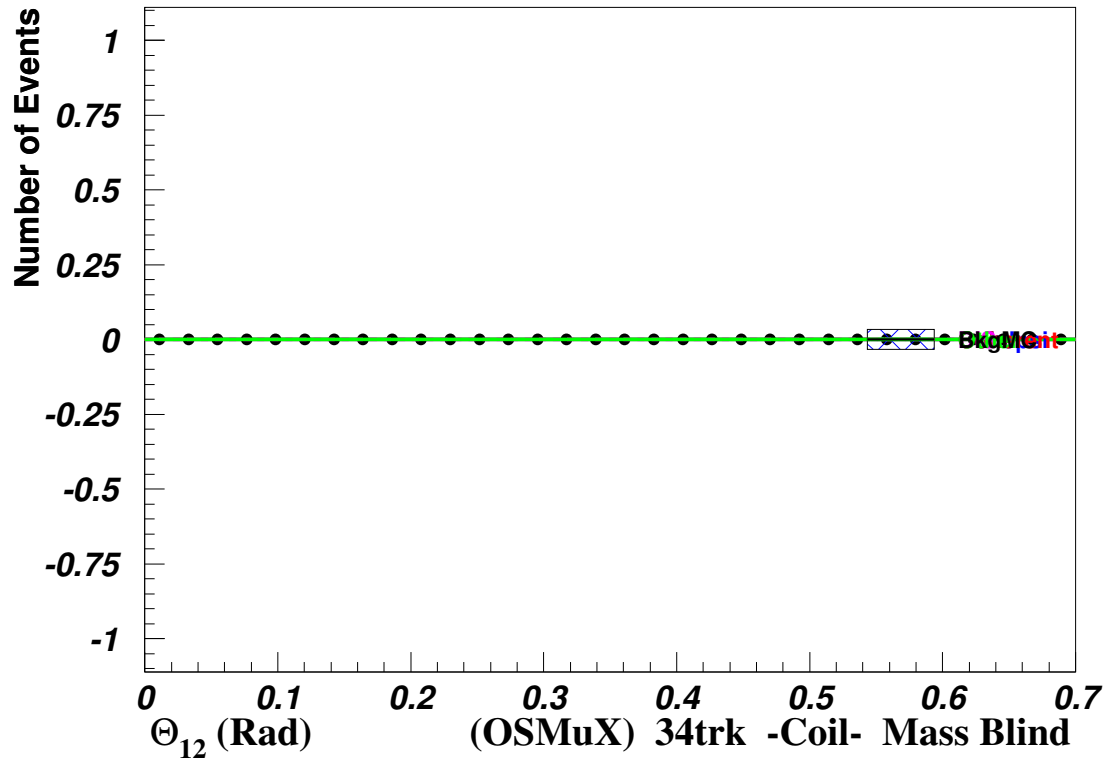
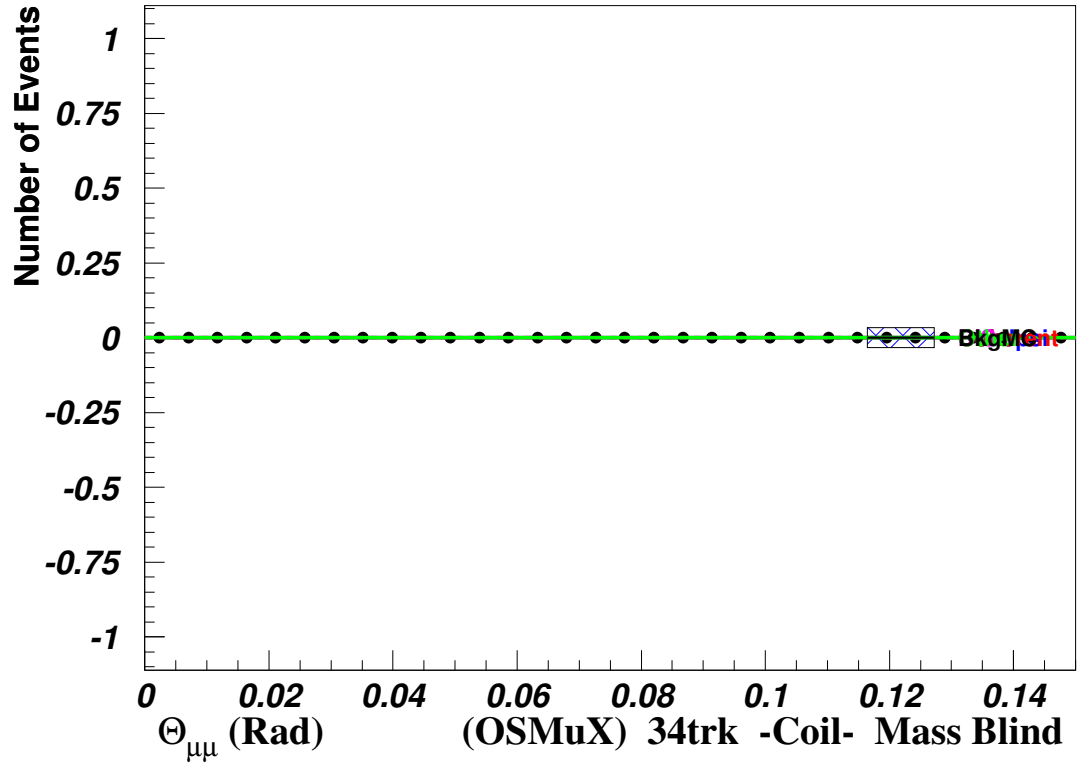


Figure 28: (./figs/thetamumu-theta12-mb.pdf)

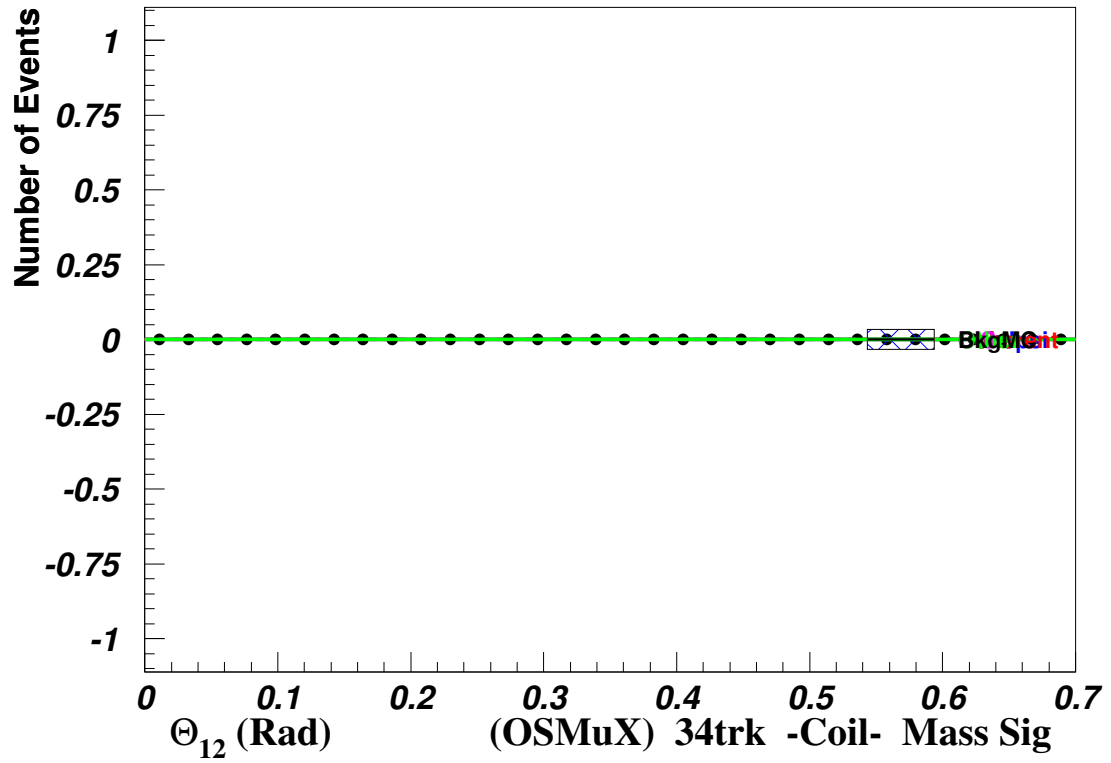
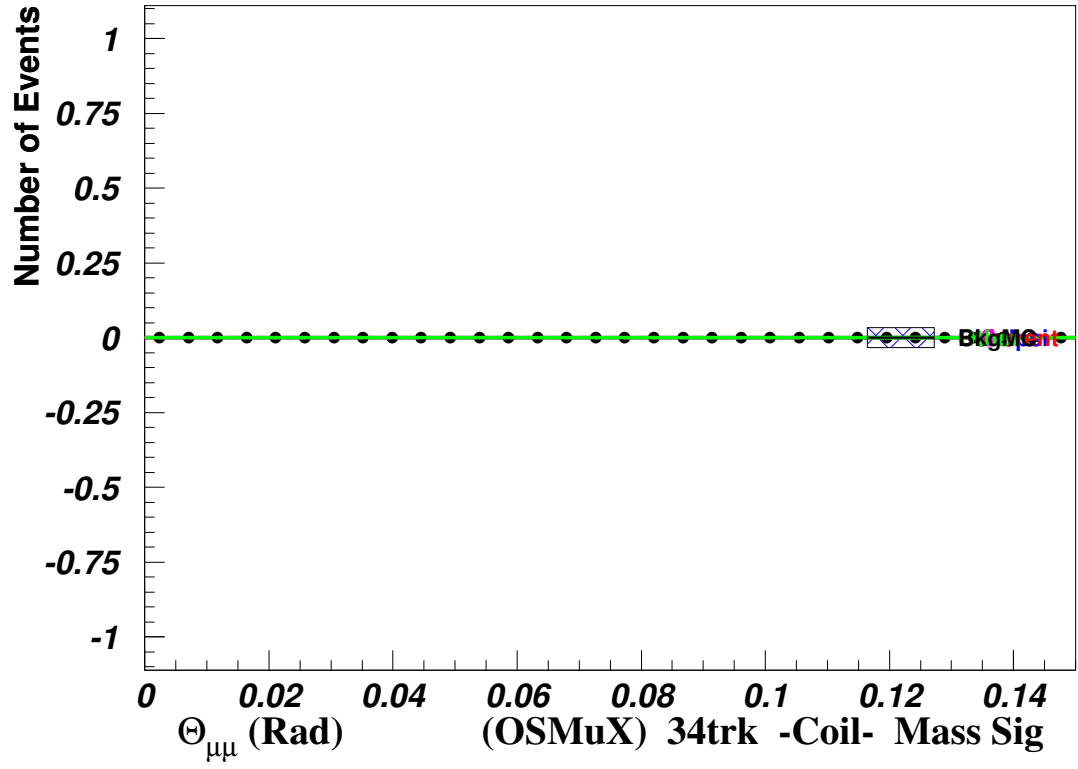


Figure 29: (./figs/thetamumu-theta12-msig.pdf)

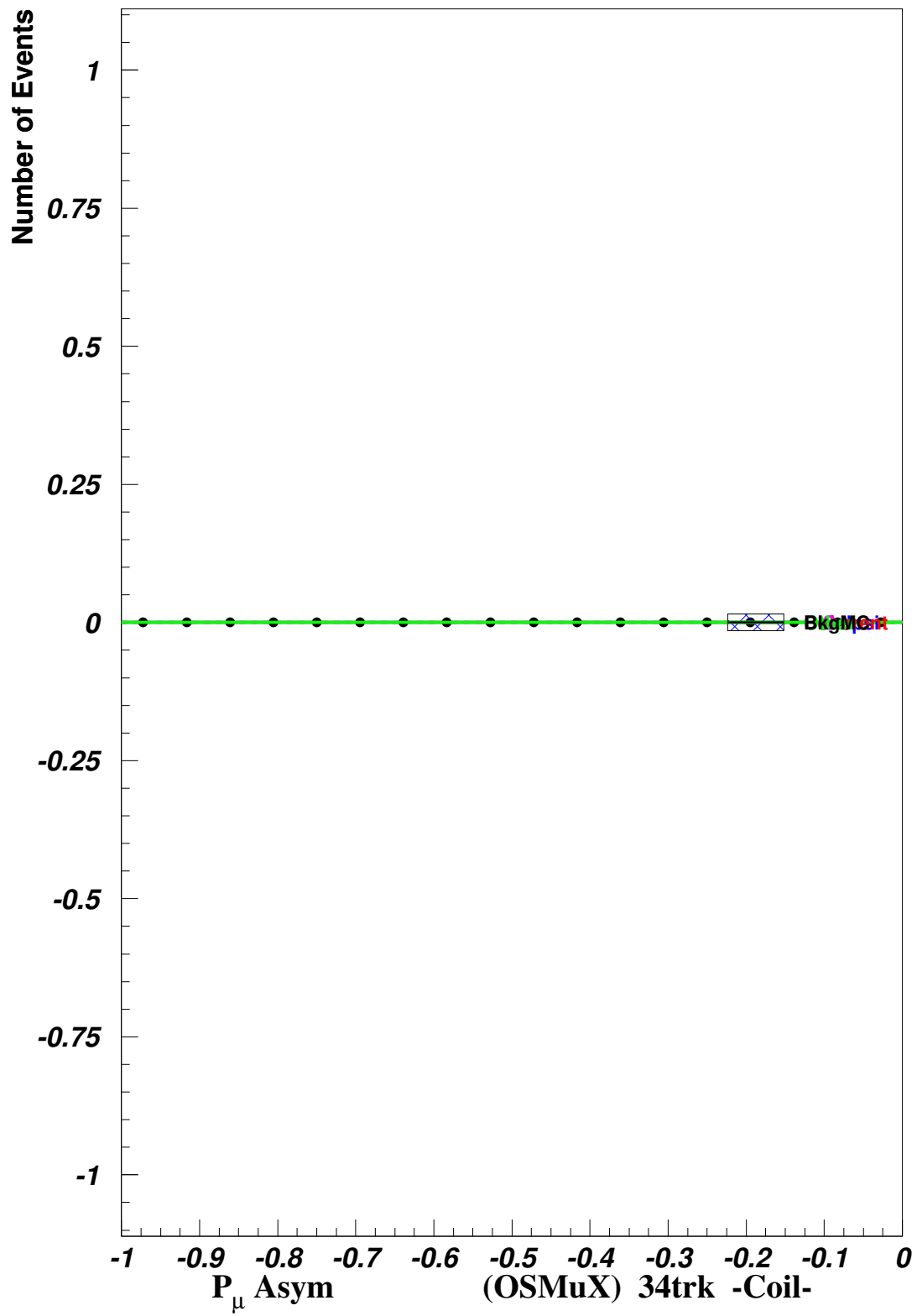


Figure 30: (./figs/pasym.pdf)

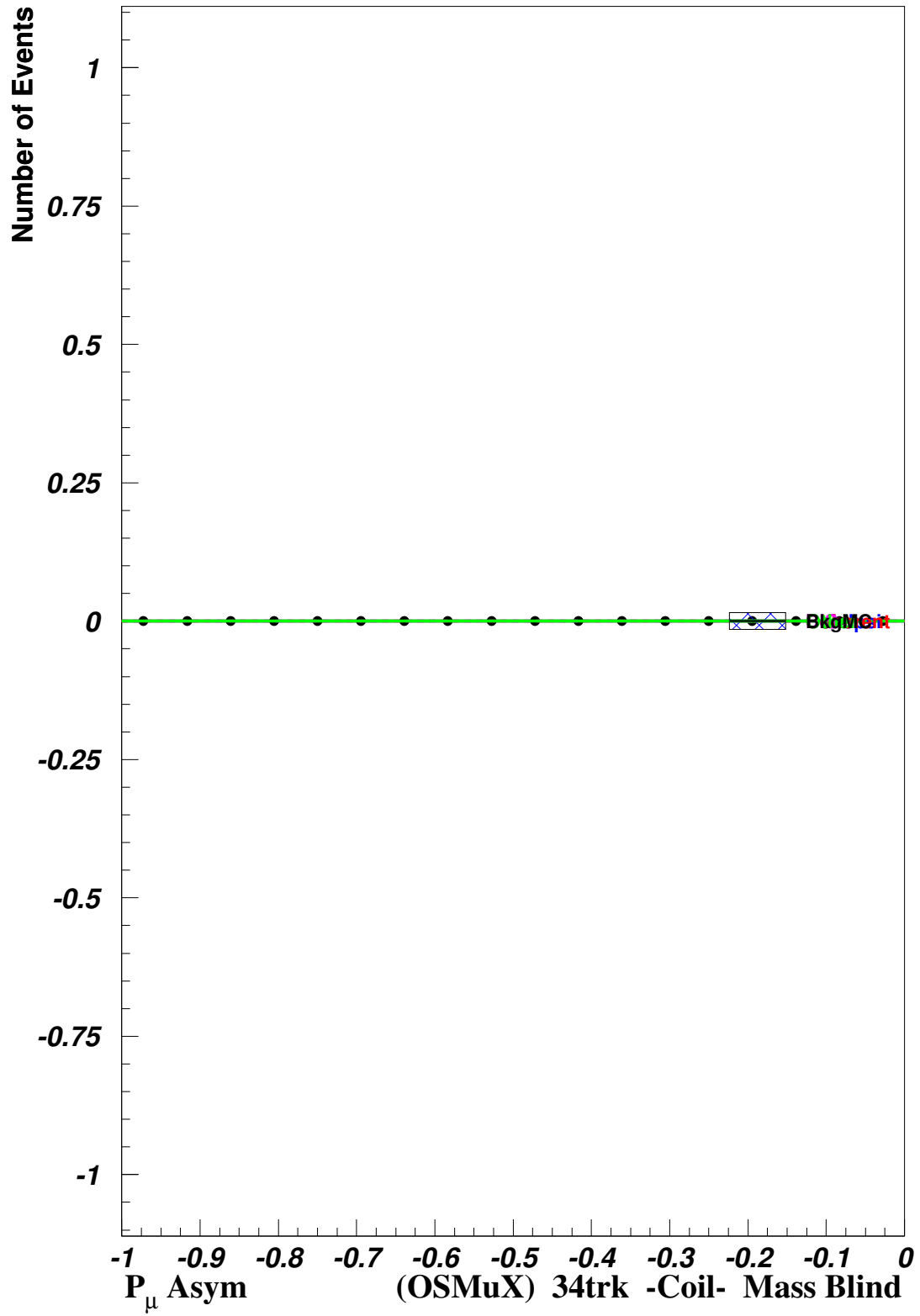


Figure 31: (./figs/pasym-mb.pdf)

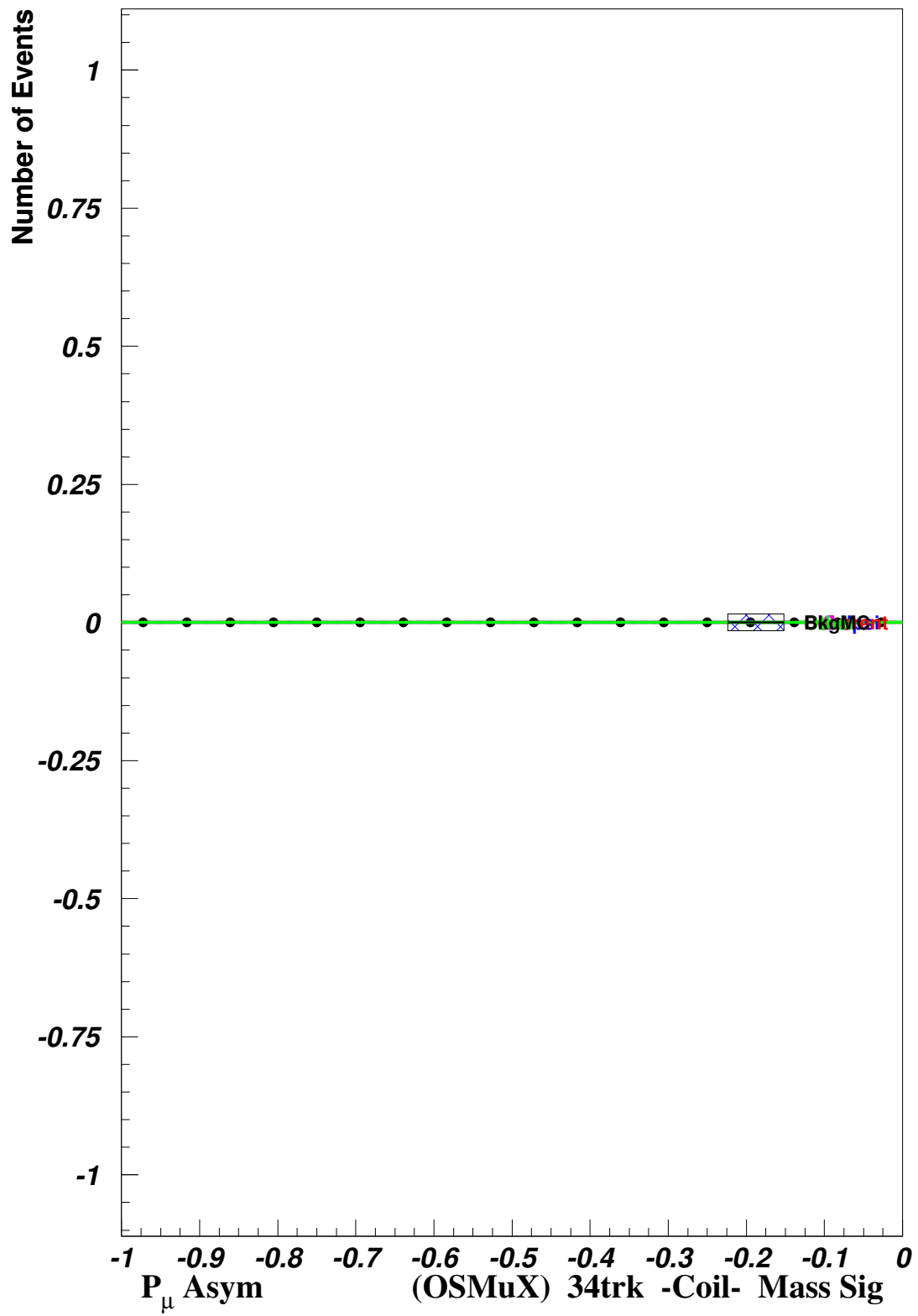


Figure 32: (./figs/pasym-msig.pdf)

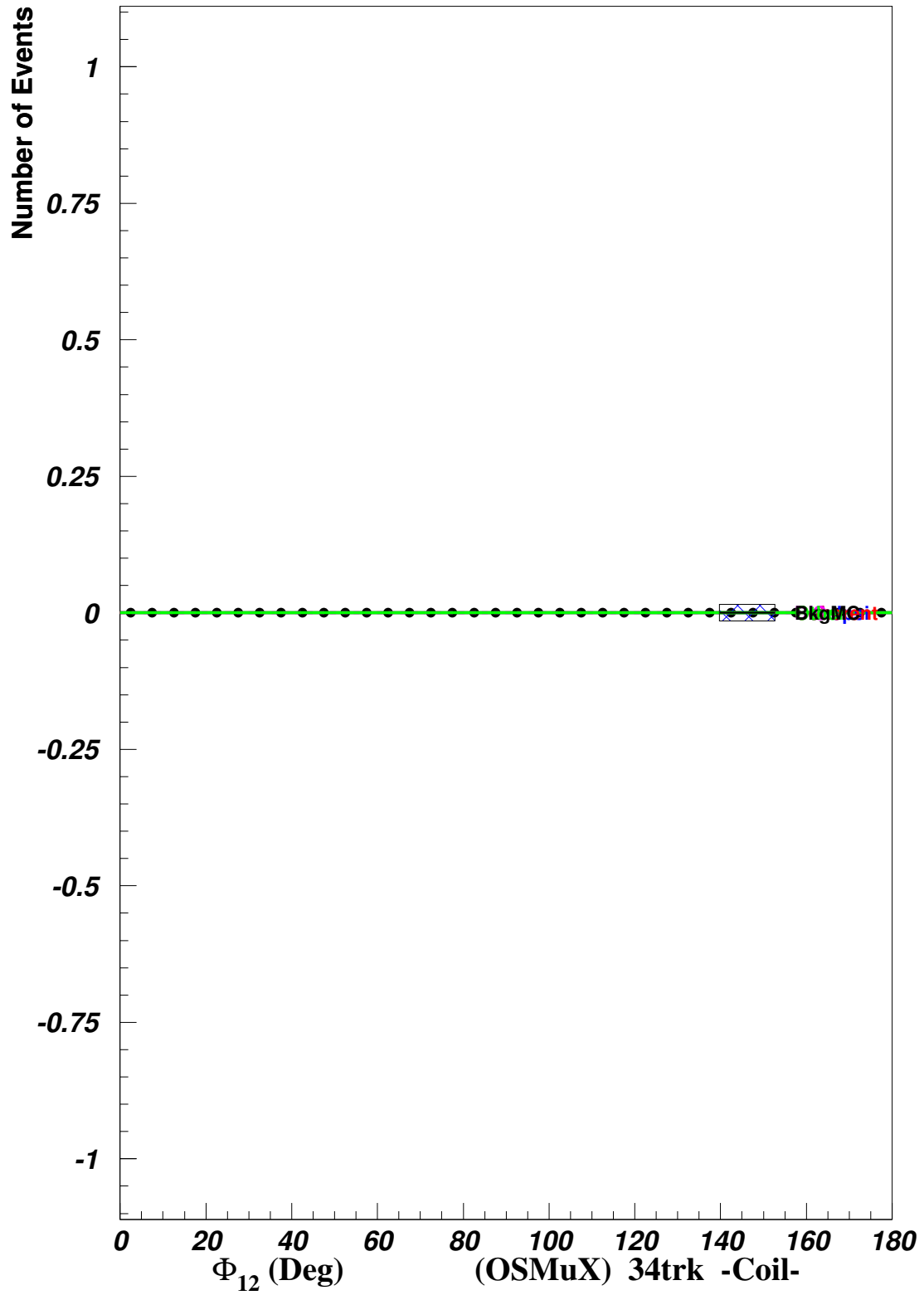


Figure 33: (./figs/phi12.pdf)

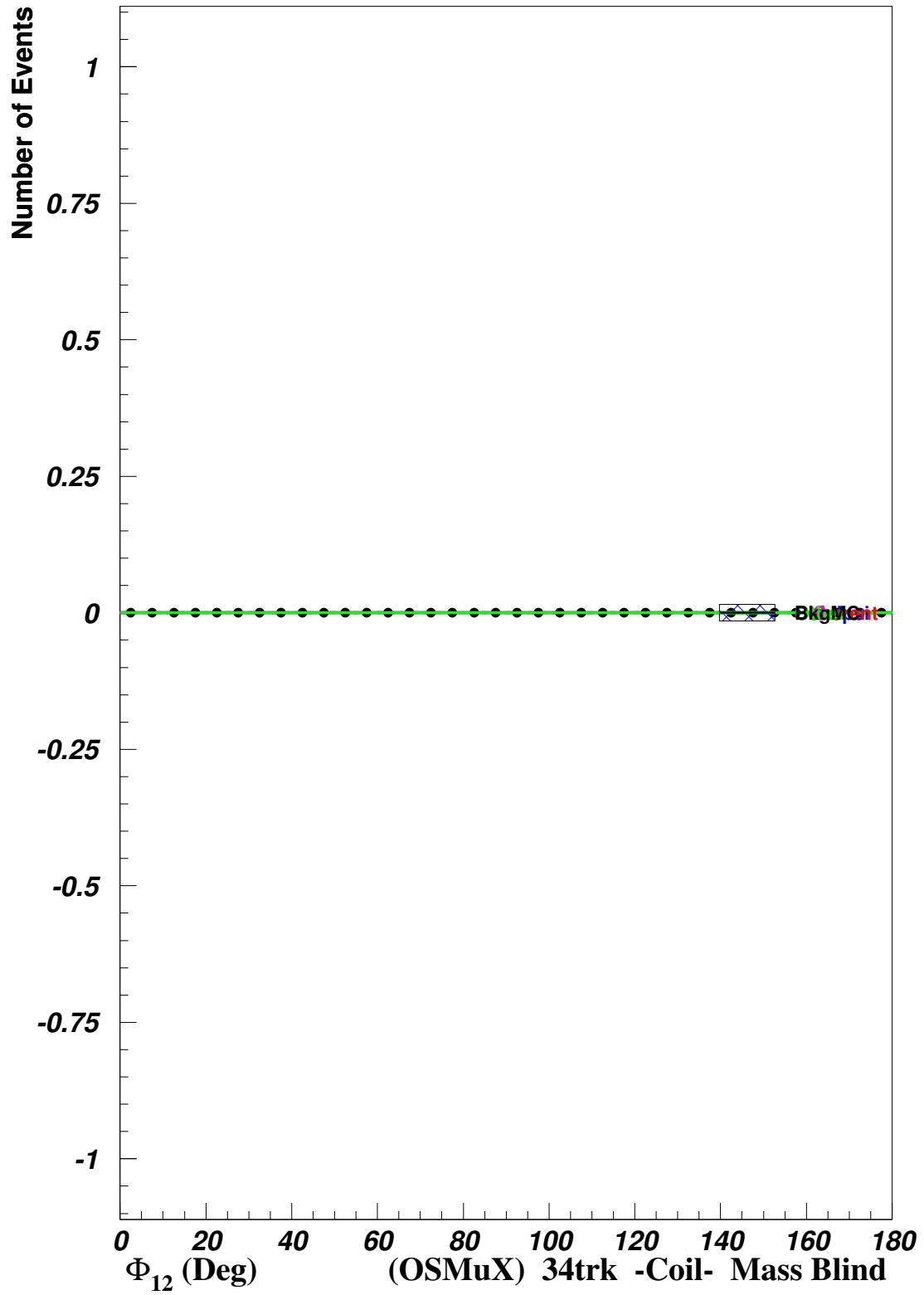


Figure 34: (./figs/phi12-mb.pdf)

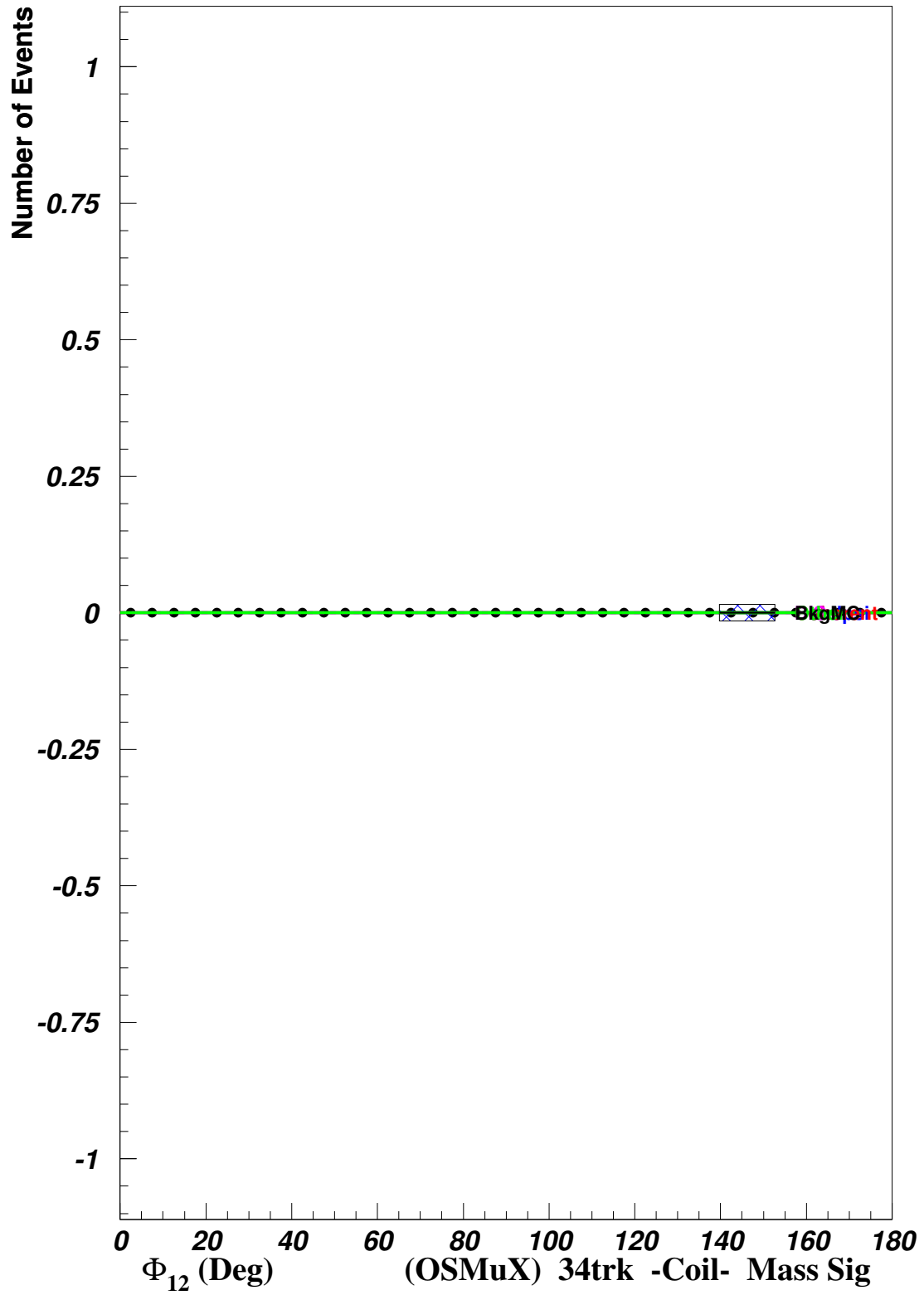


Figure 35: (./figs/phi12-msig.pdf)



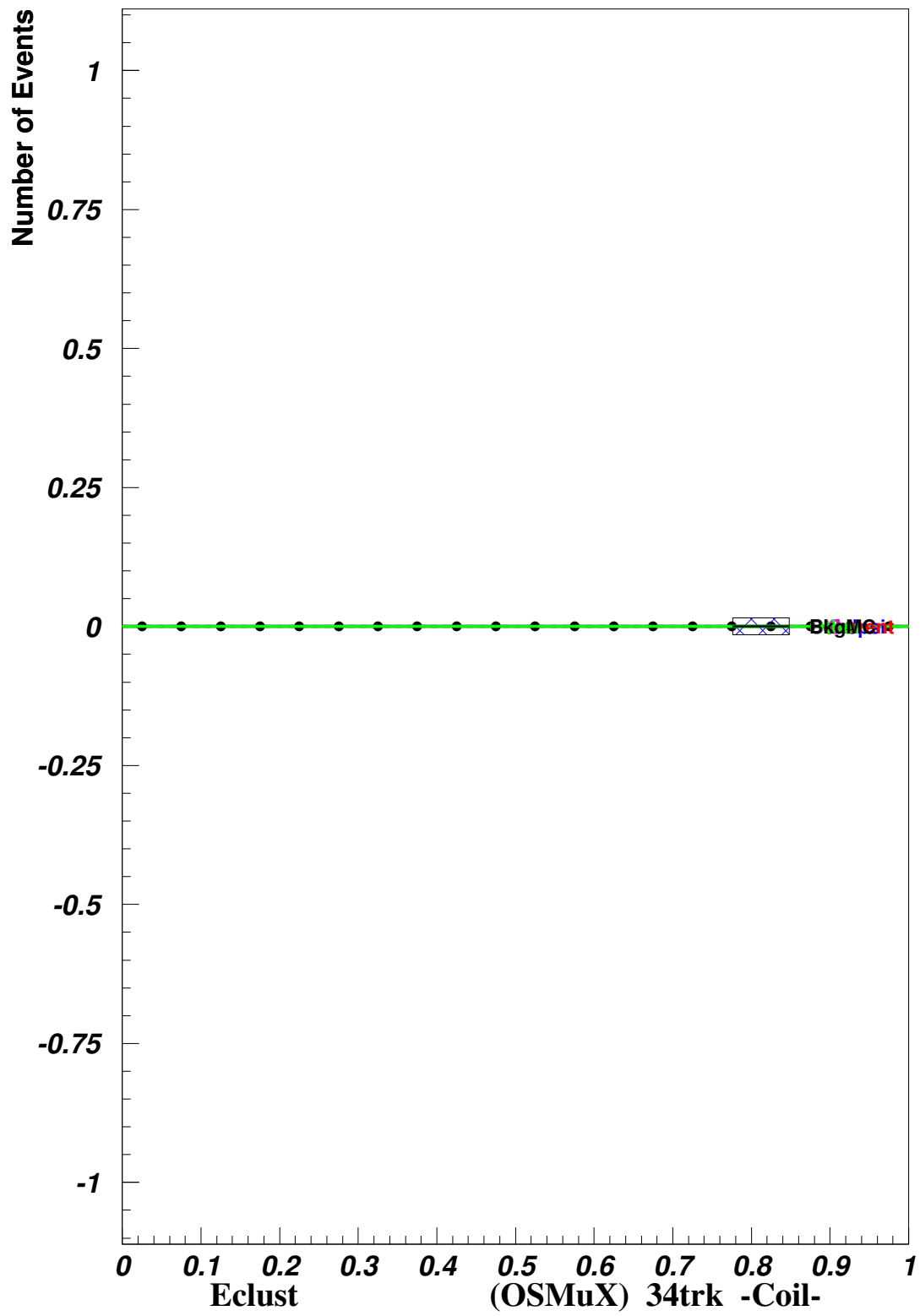


Figure 36: (./figs/eneut.pdf)

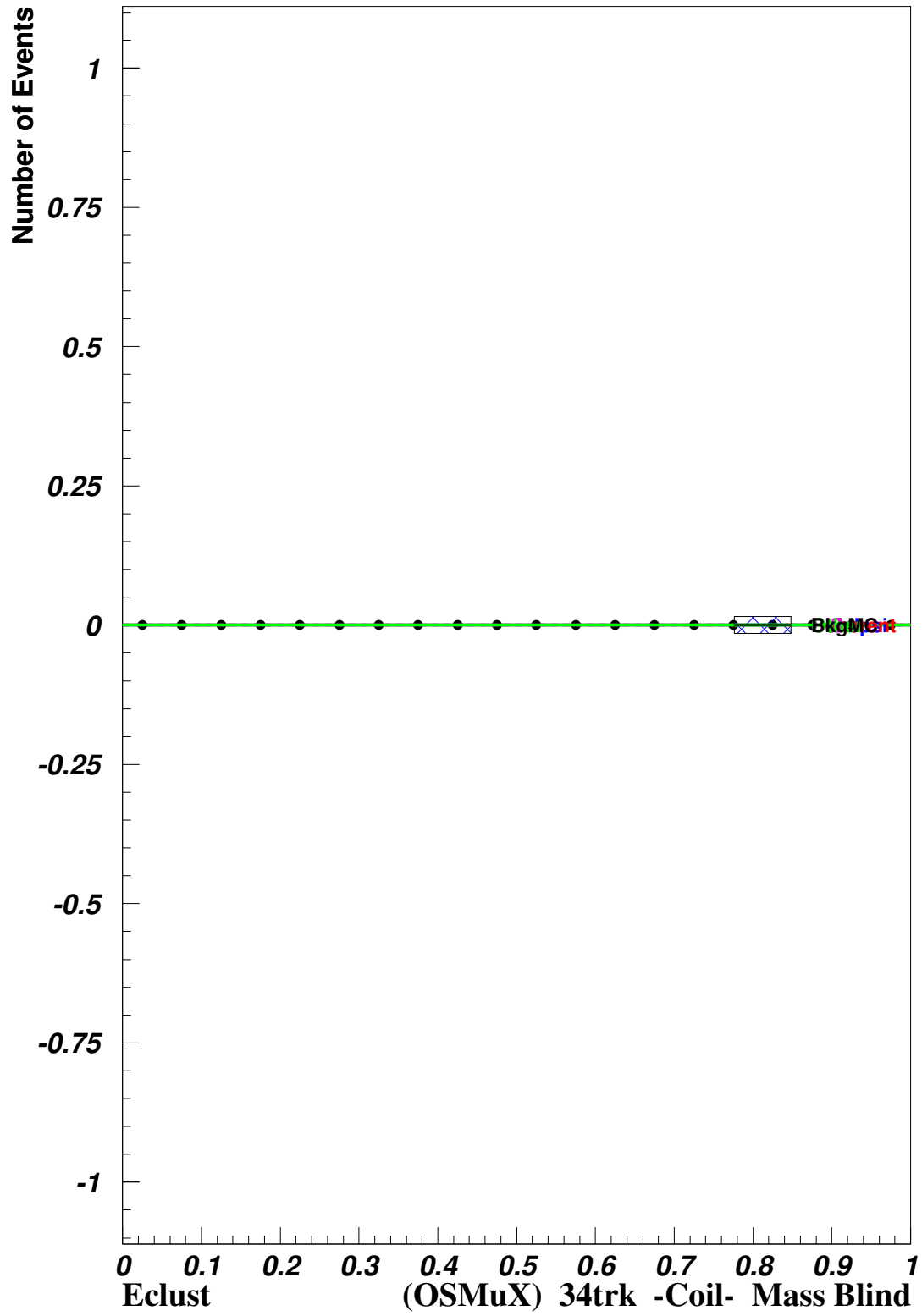


Figure 37: (./figs/eneut-mb.pdf)

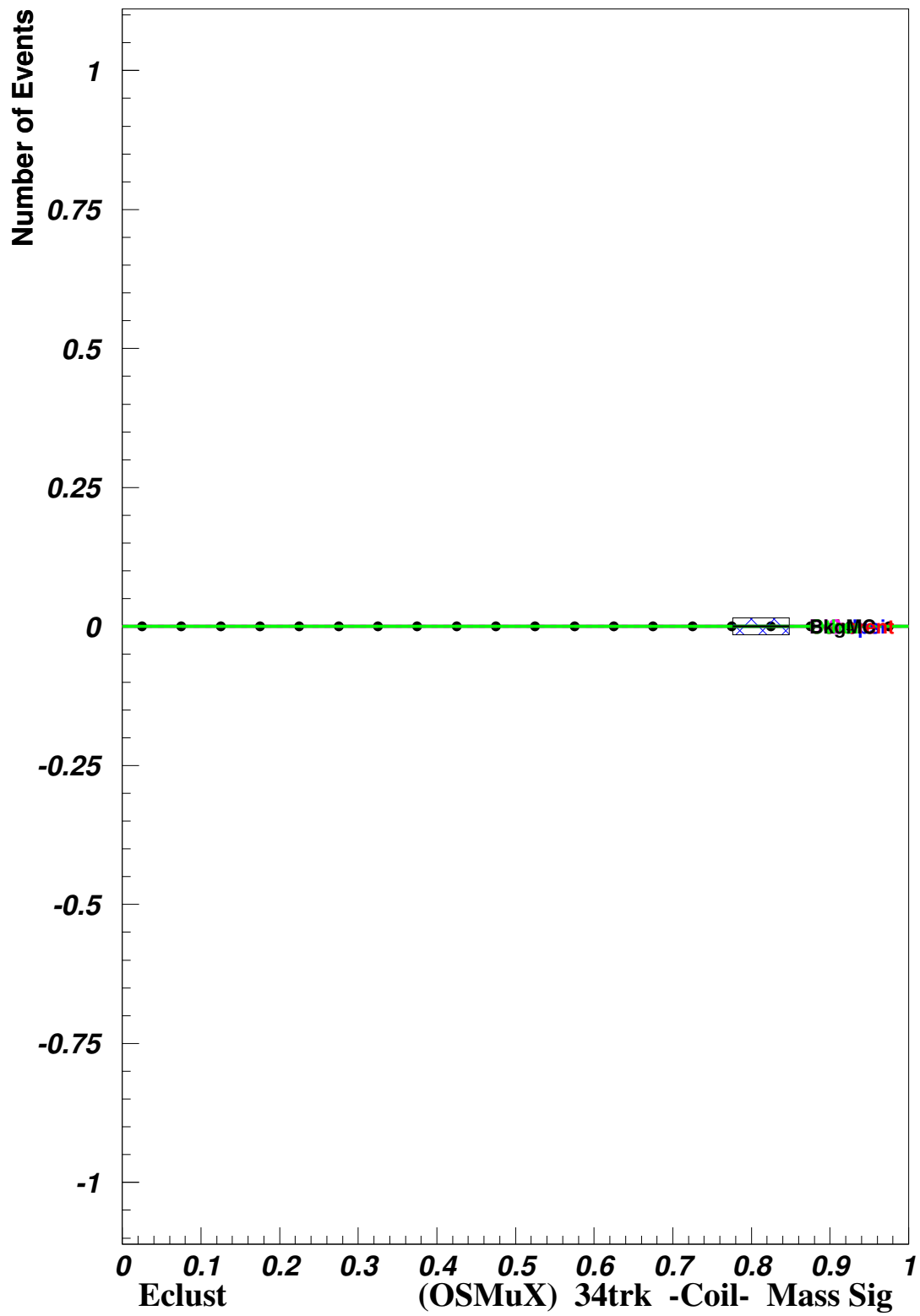


Figure 38: (./figs/eneut-msig.pdf)

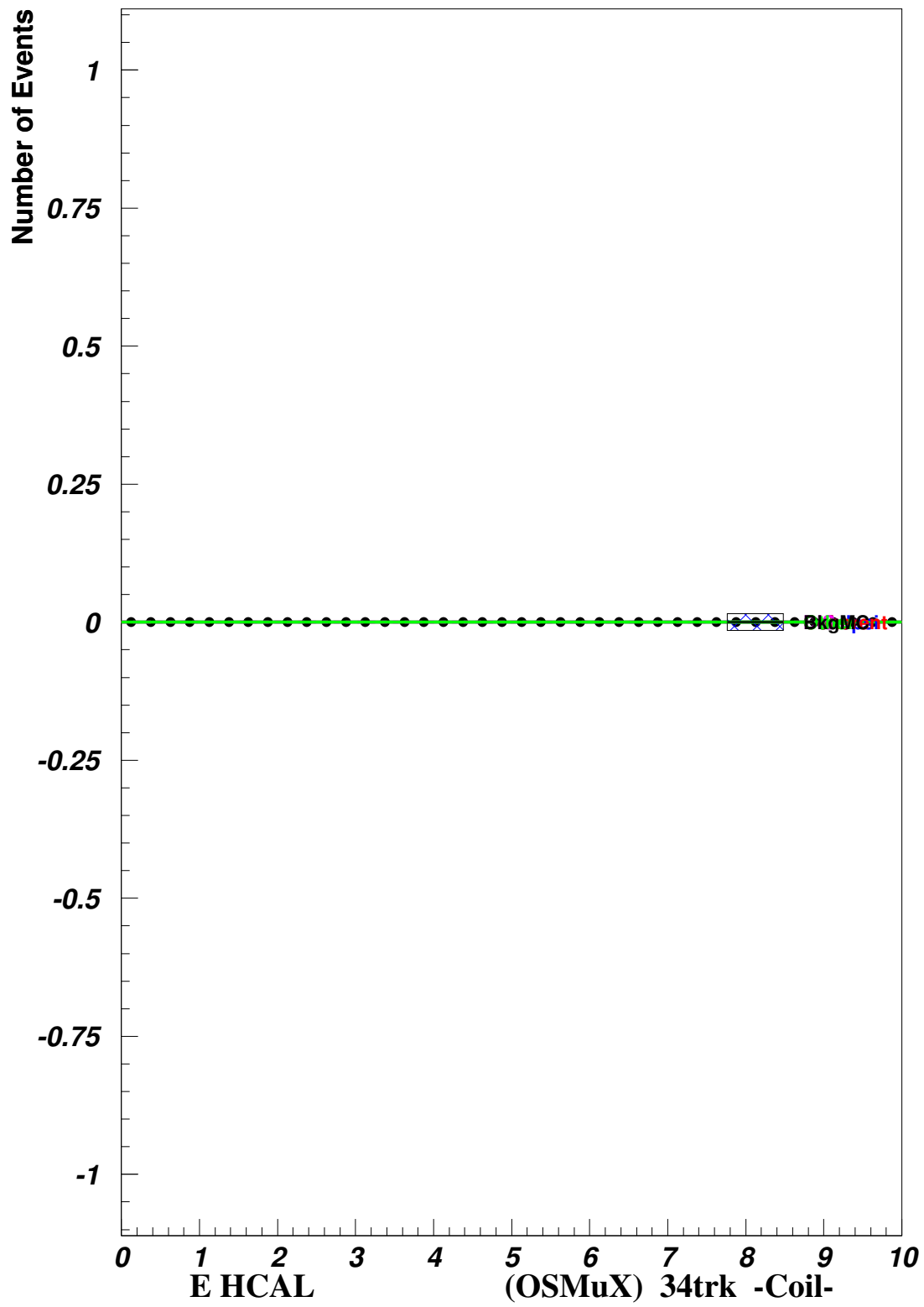


Figure 39: (./figs/ehcal.pdf)

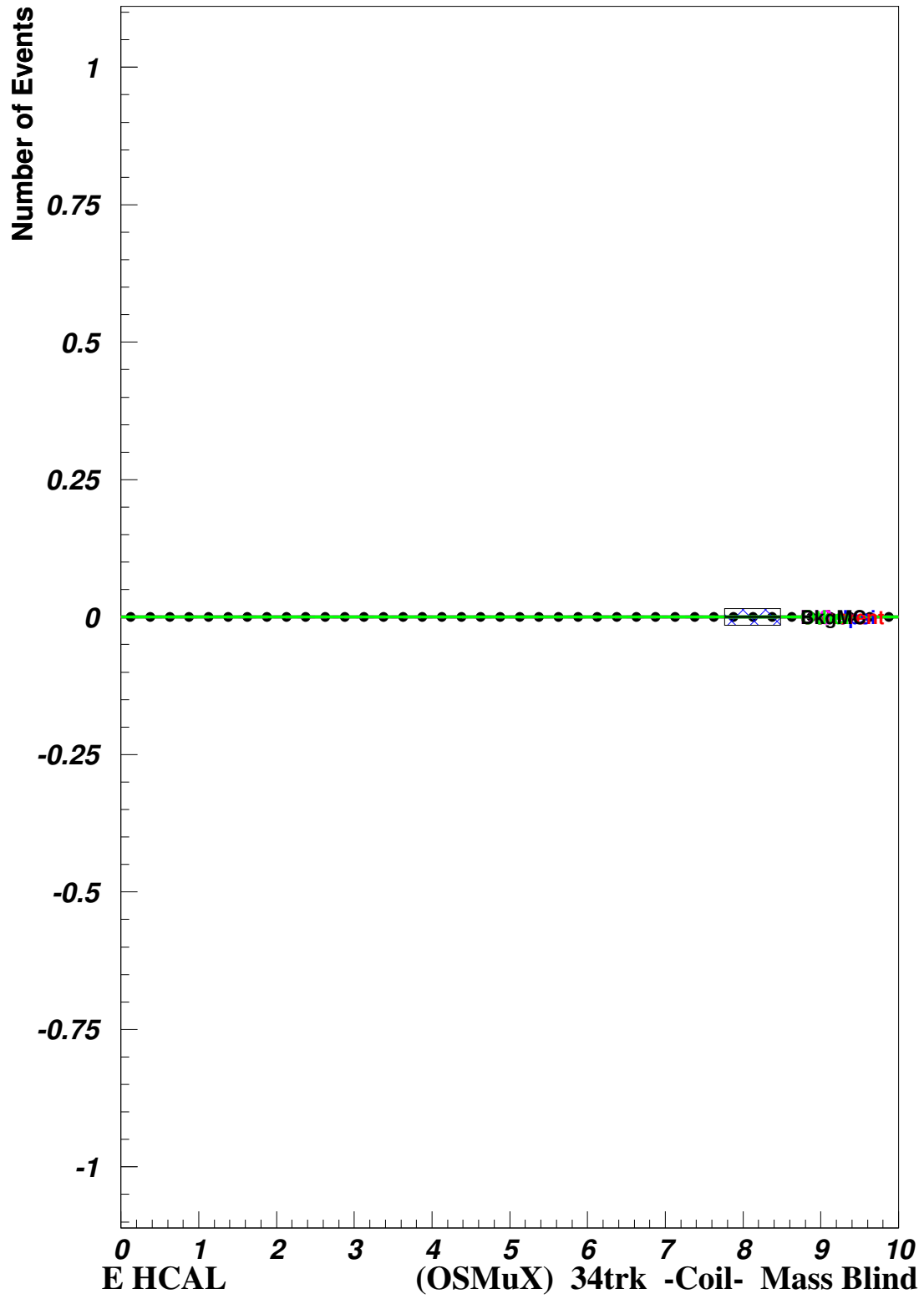


Figure 40: (./figs/ehcal-mb.pdf)

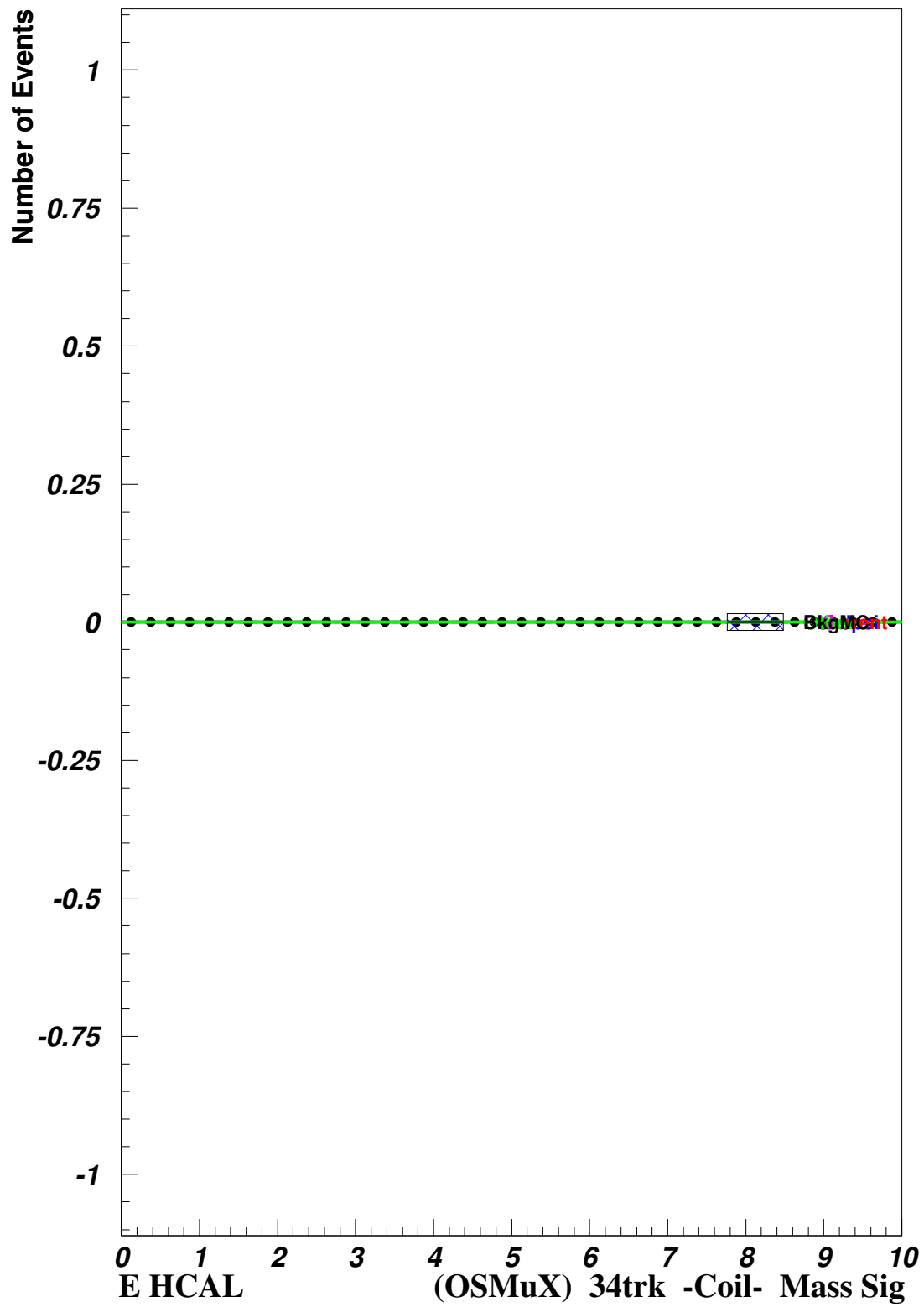


Figure 41: (./figs/ehcal-msig.pdf)

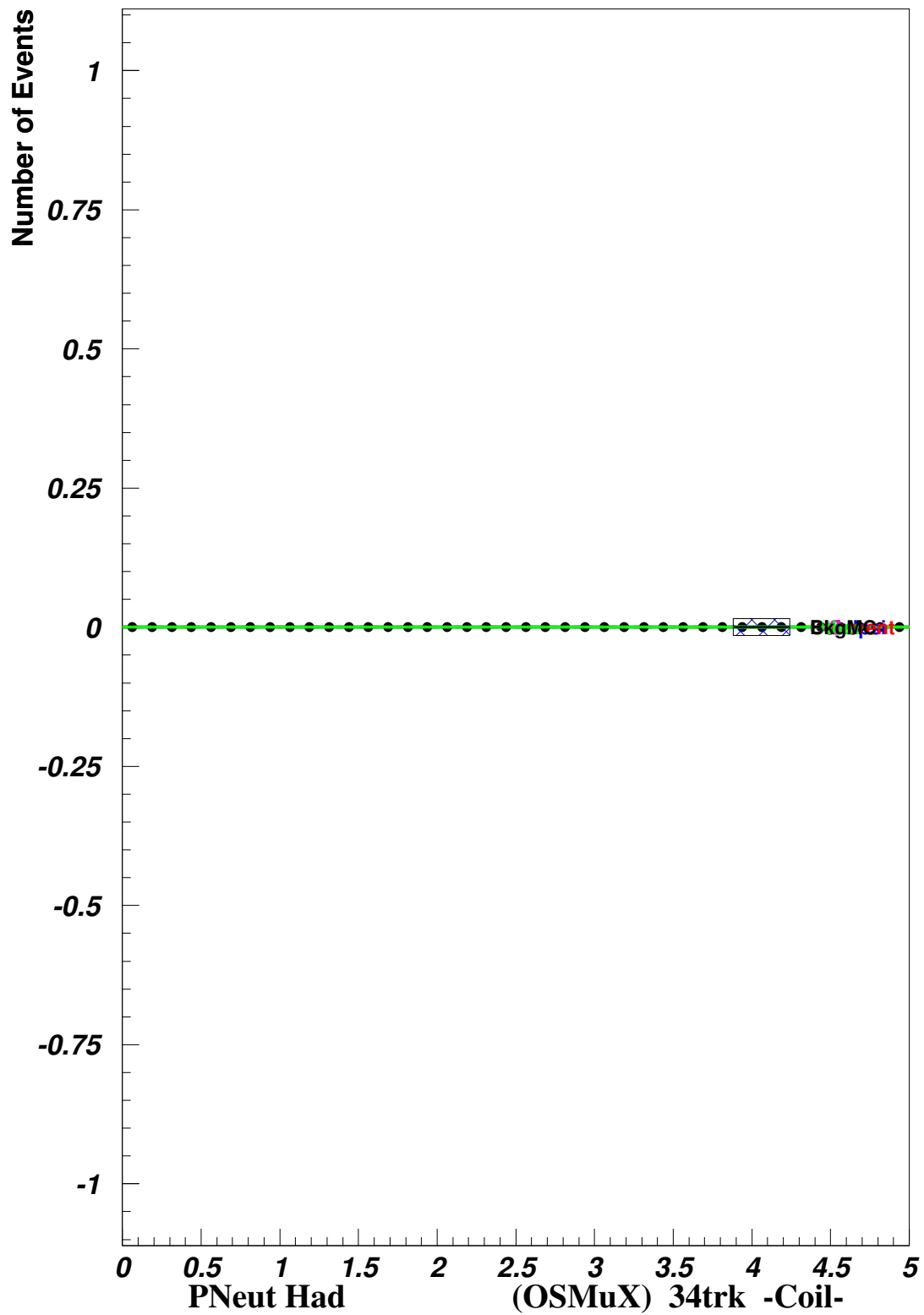


Figure 42: (./figs/pneuth.pdf)

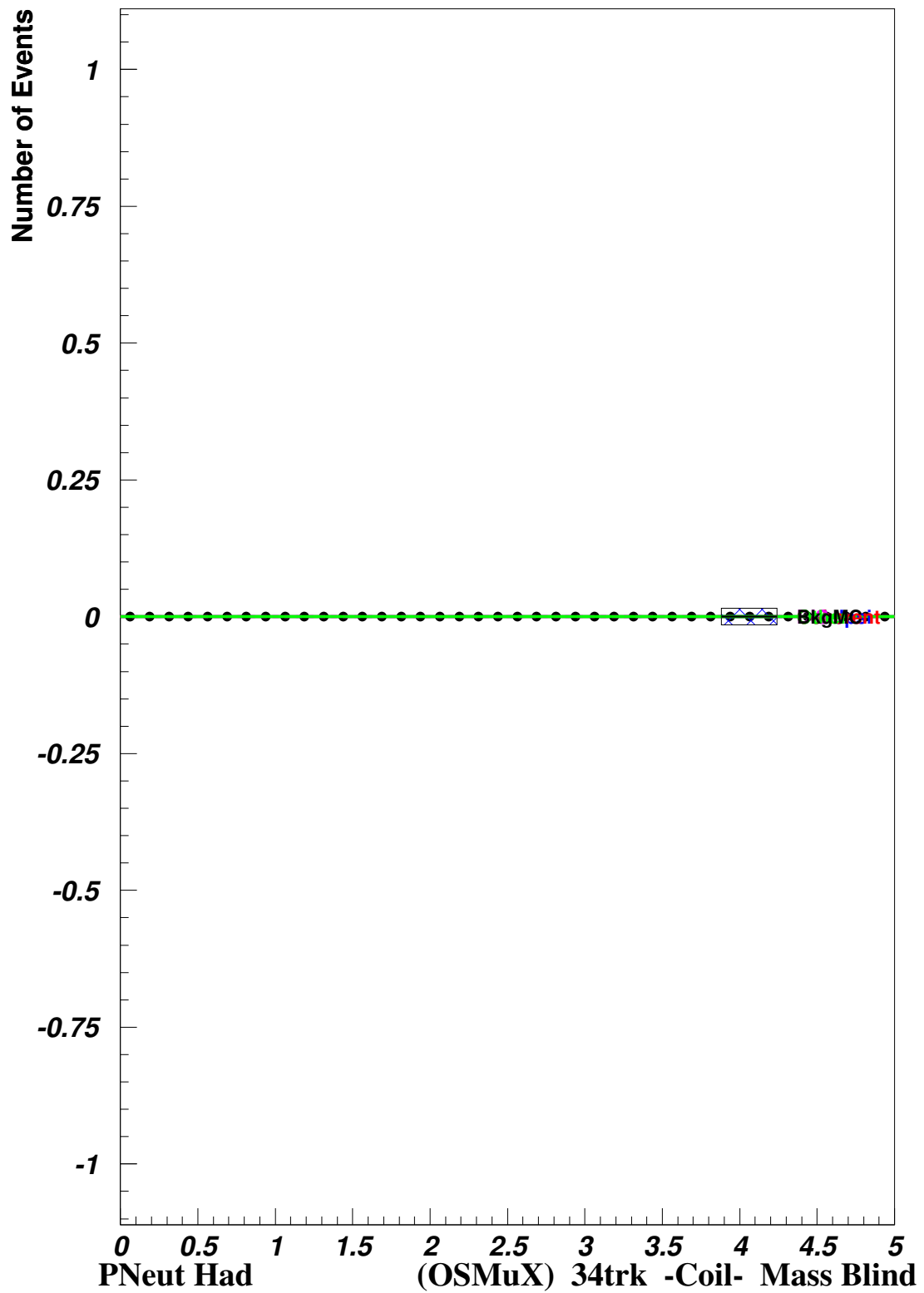


Figure 43: (./figs/pneuth-mb.pdf)



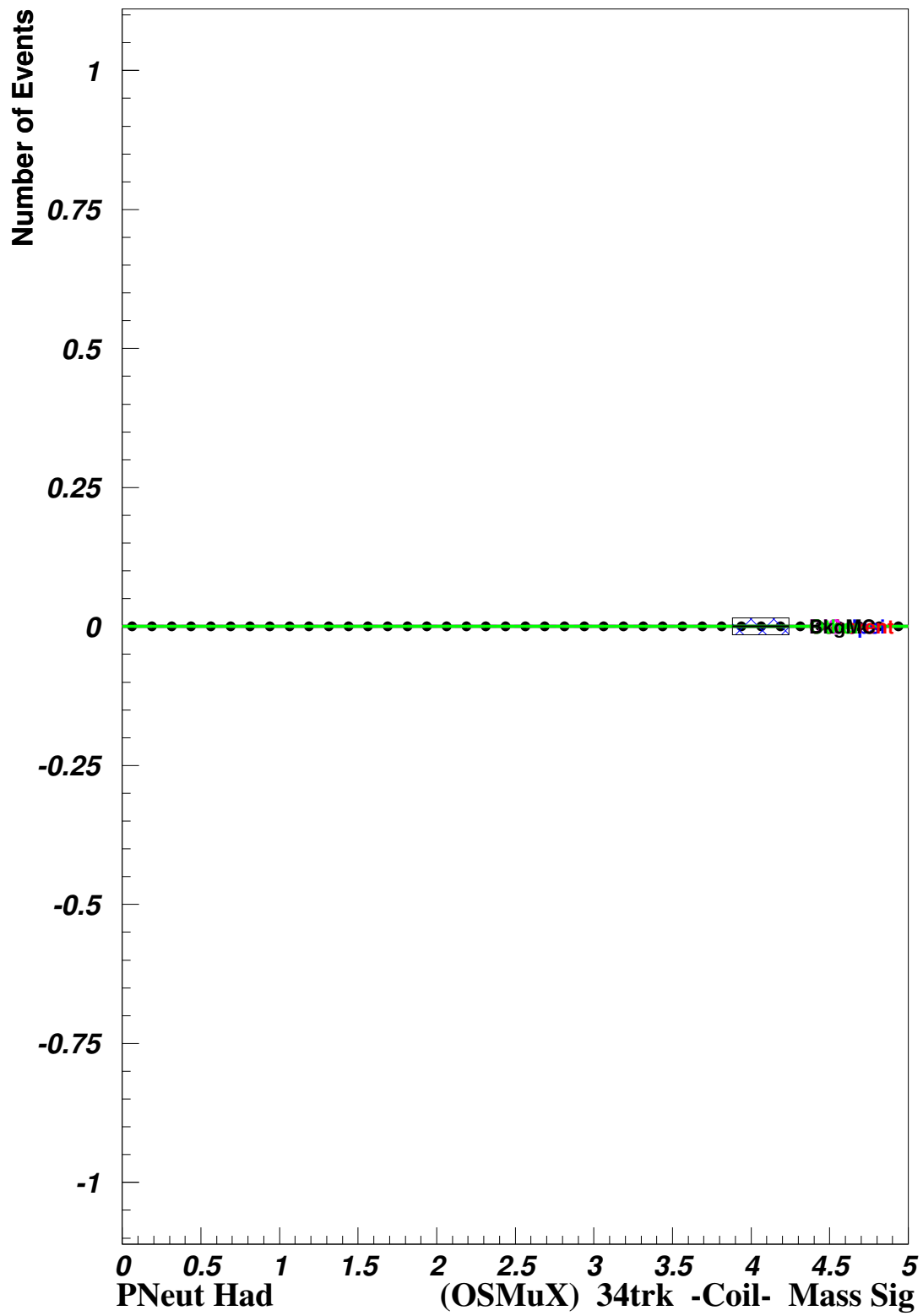


Figure 44: (./figs/pneuth-msig.pdf)

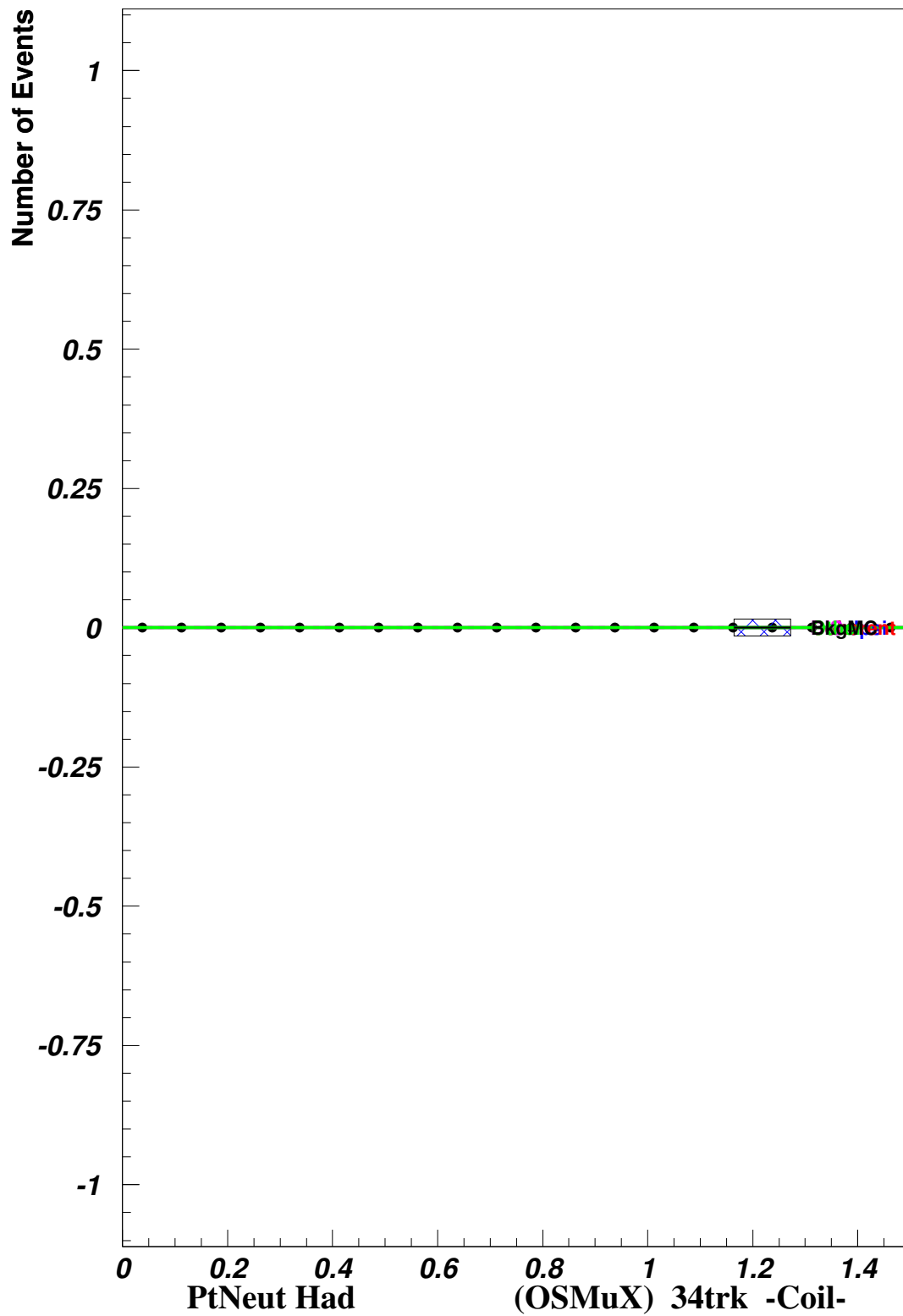


Figure 45: (./figs/ptneuth.pdf)

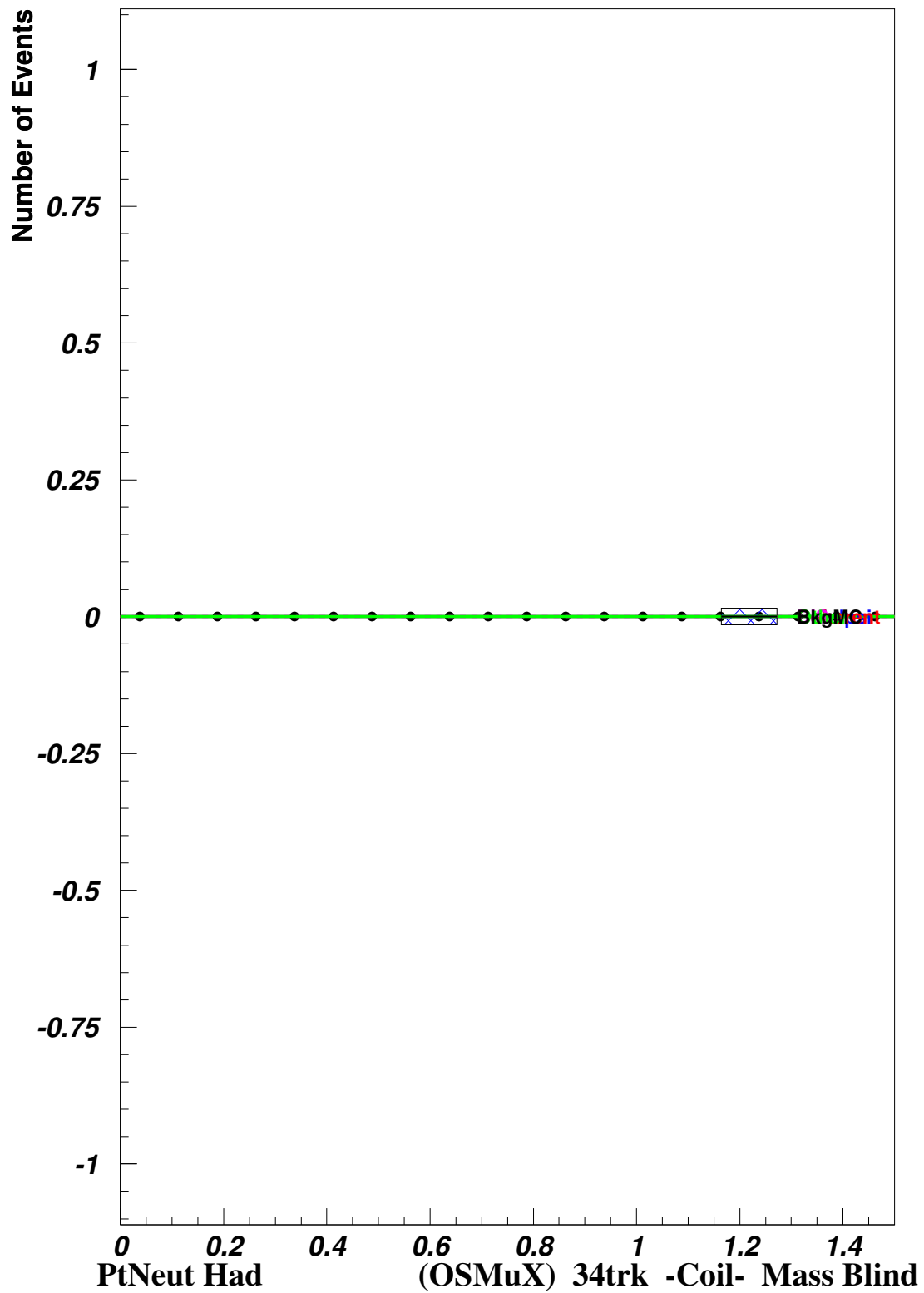


Figure 46: (./figs/ptneuth-mb.pdf)

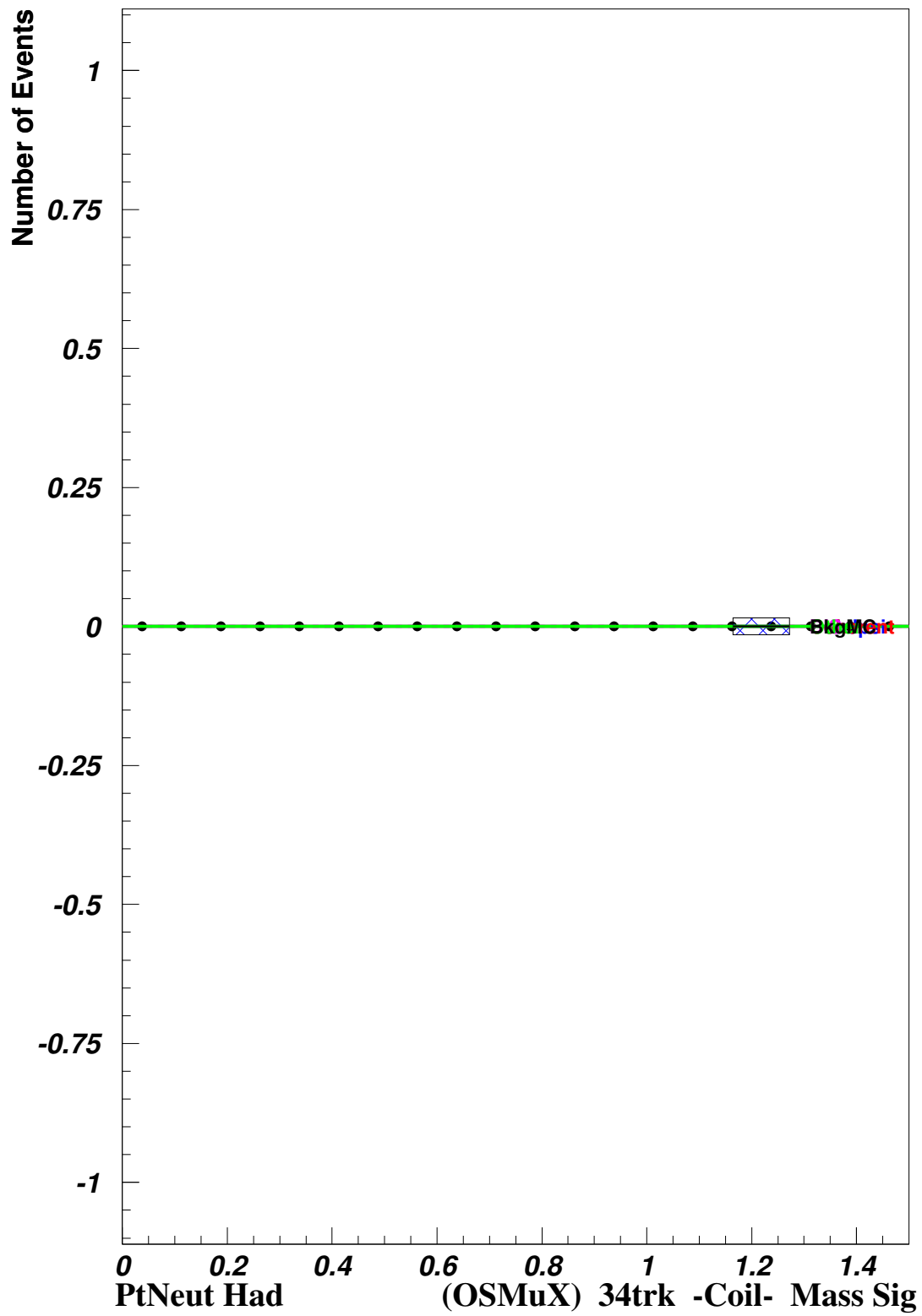


Figure 47: (./figs/ptneuth-msig.pdf)

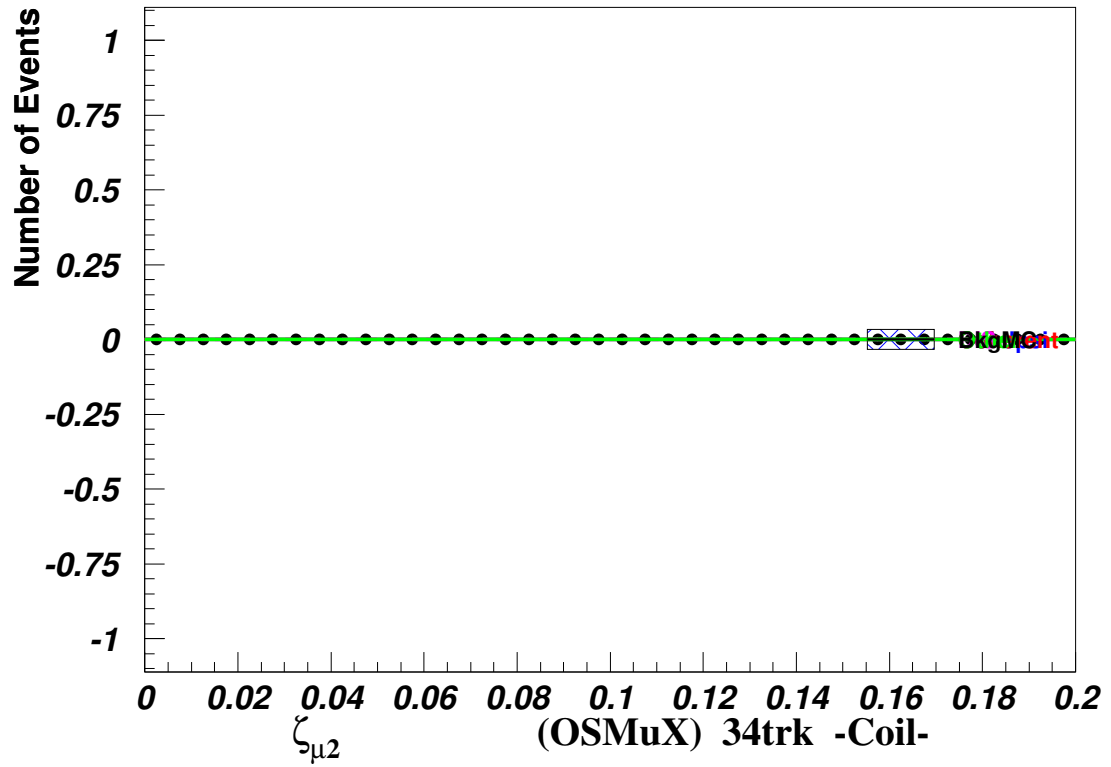
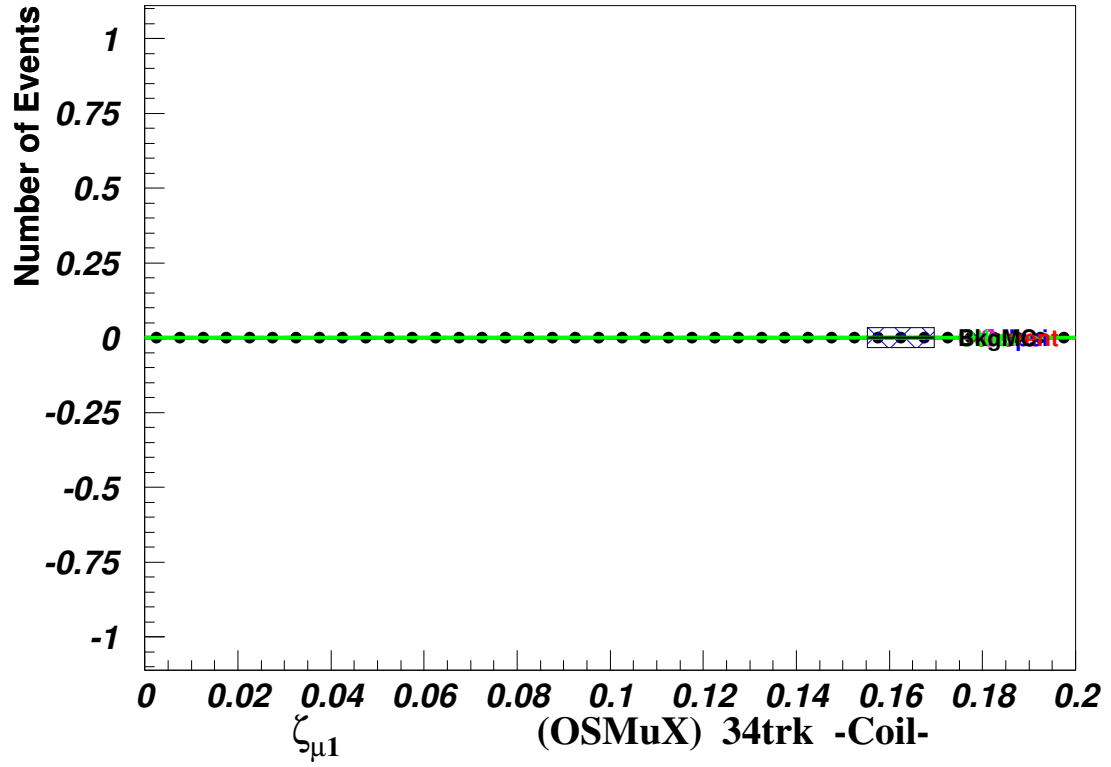


Figure 48: (./figs/zeta1+2.pdf)

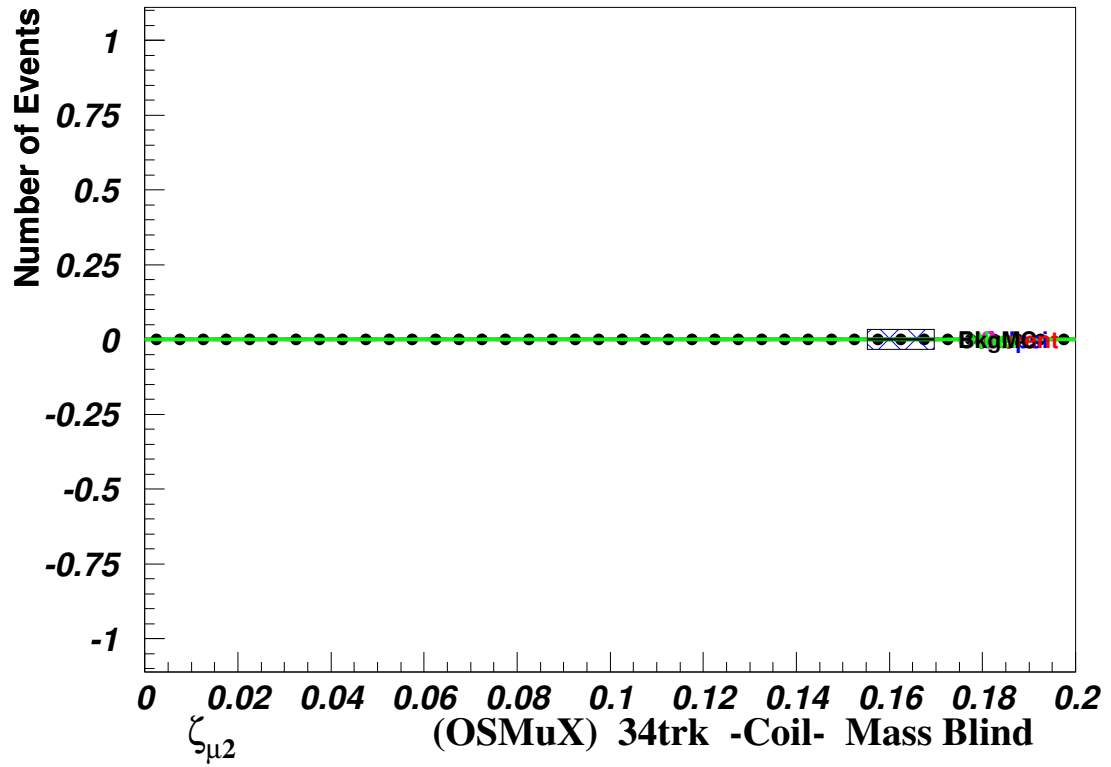
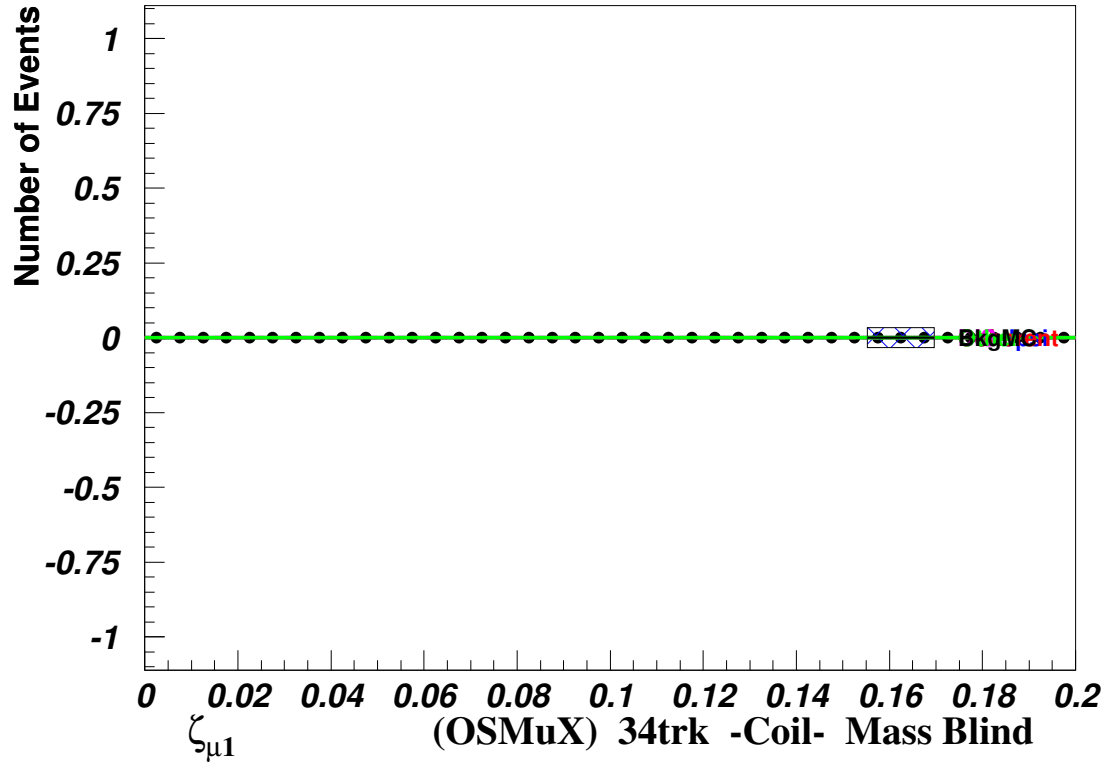


Figure 49: (./figs/zeta1+2-mb.pdf)

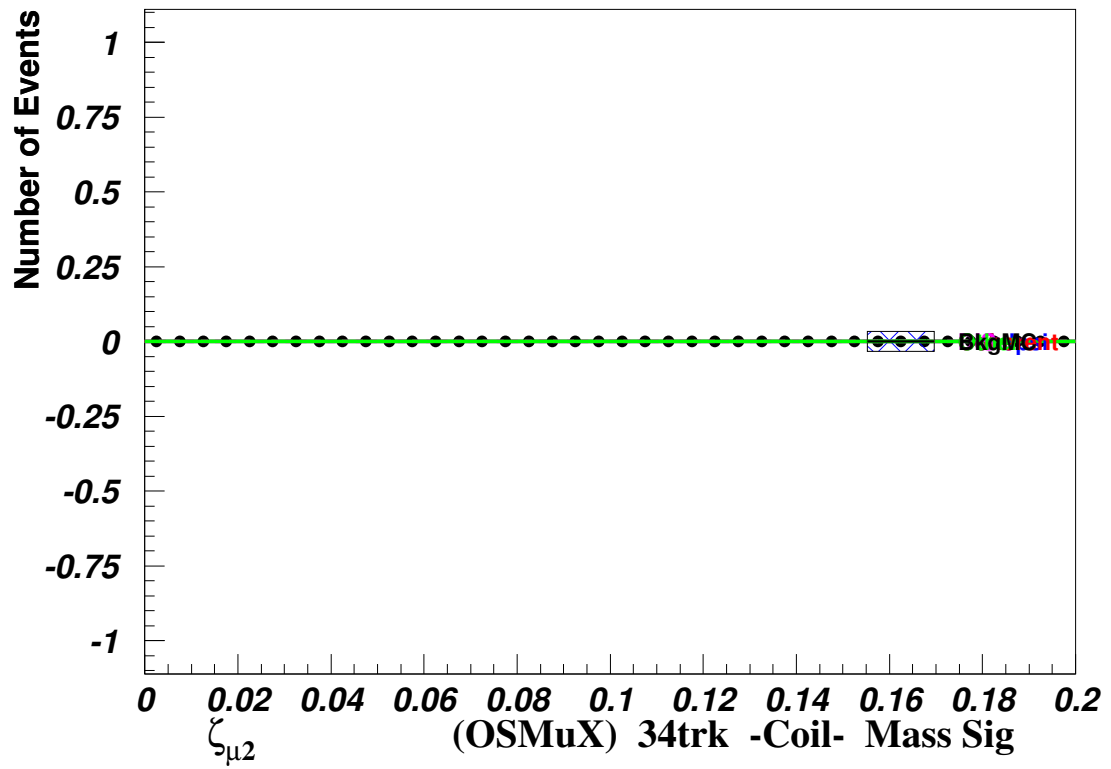
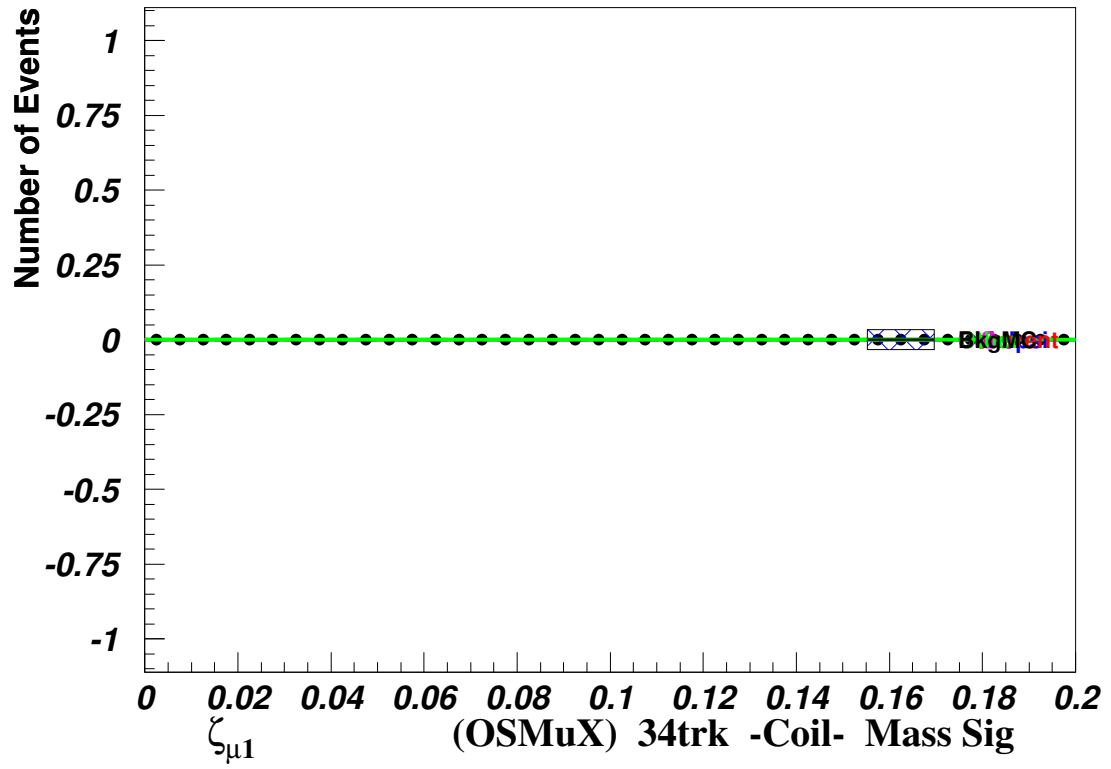


Figure 50: (./figs/zeta1+2-msig.pdf)

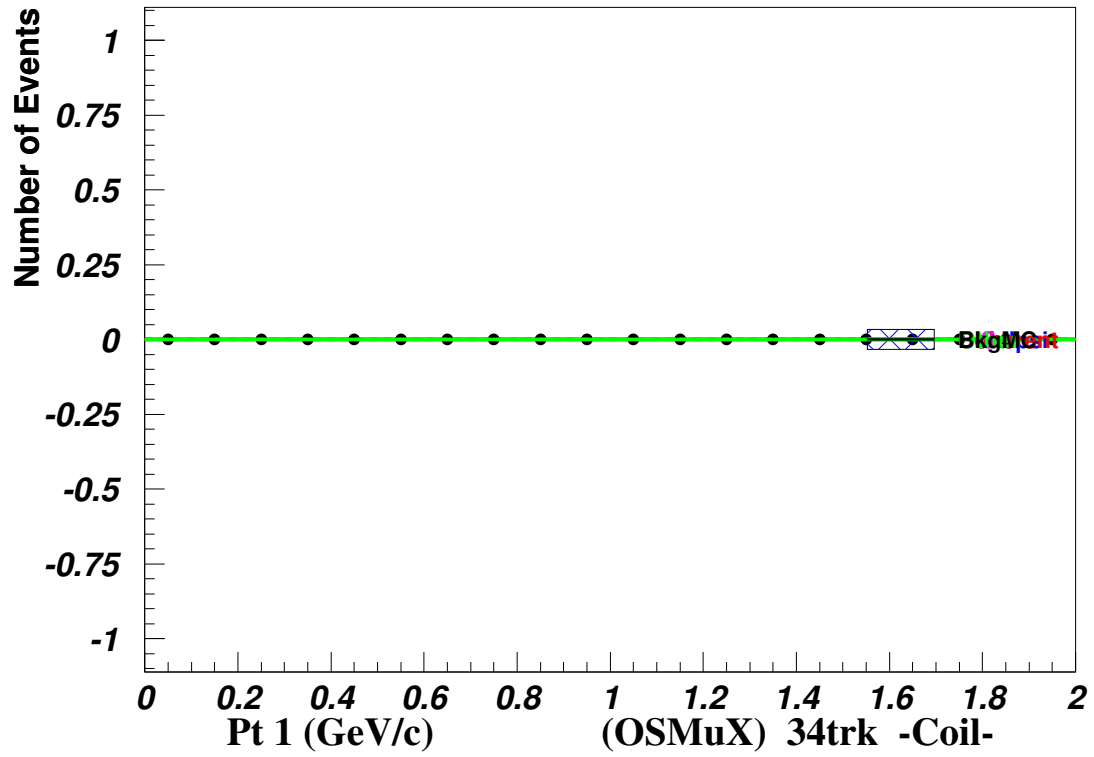
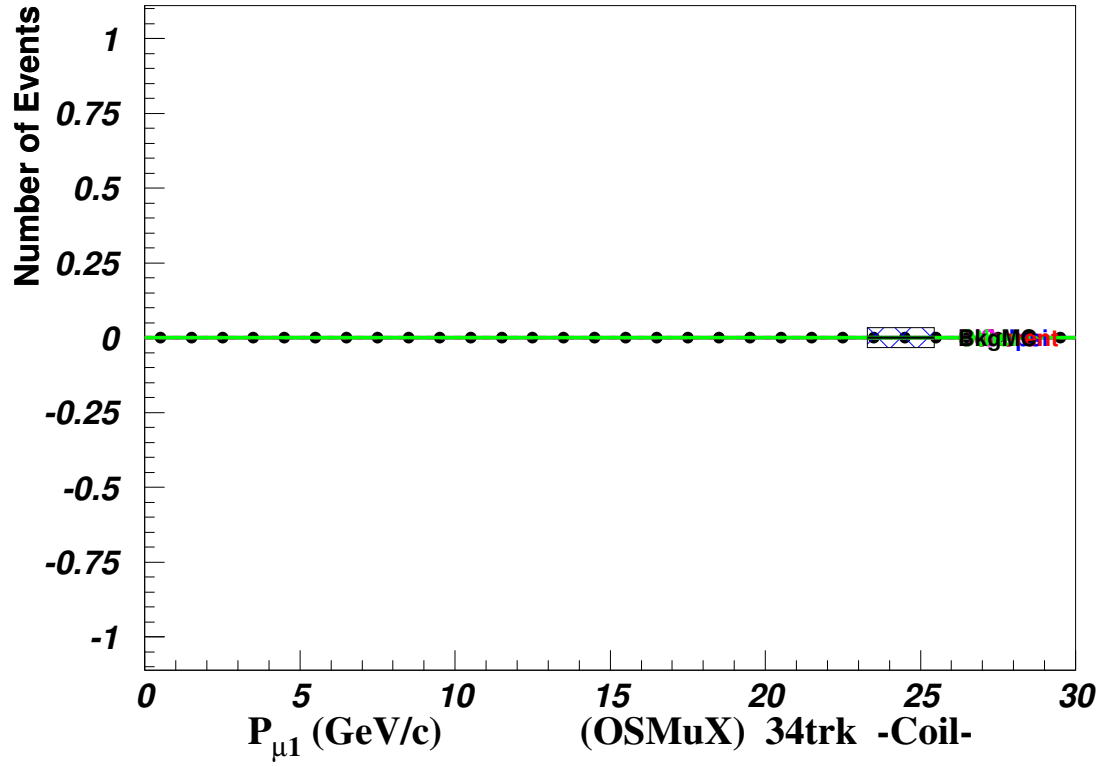


Figure 51: (./figs/p-pt-muneg.pdf)



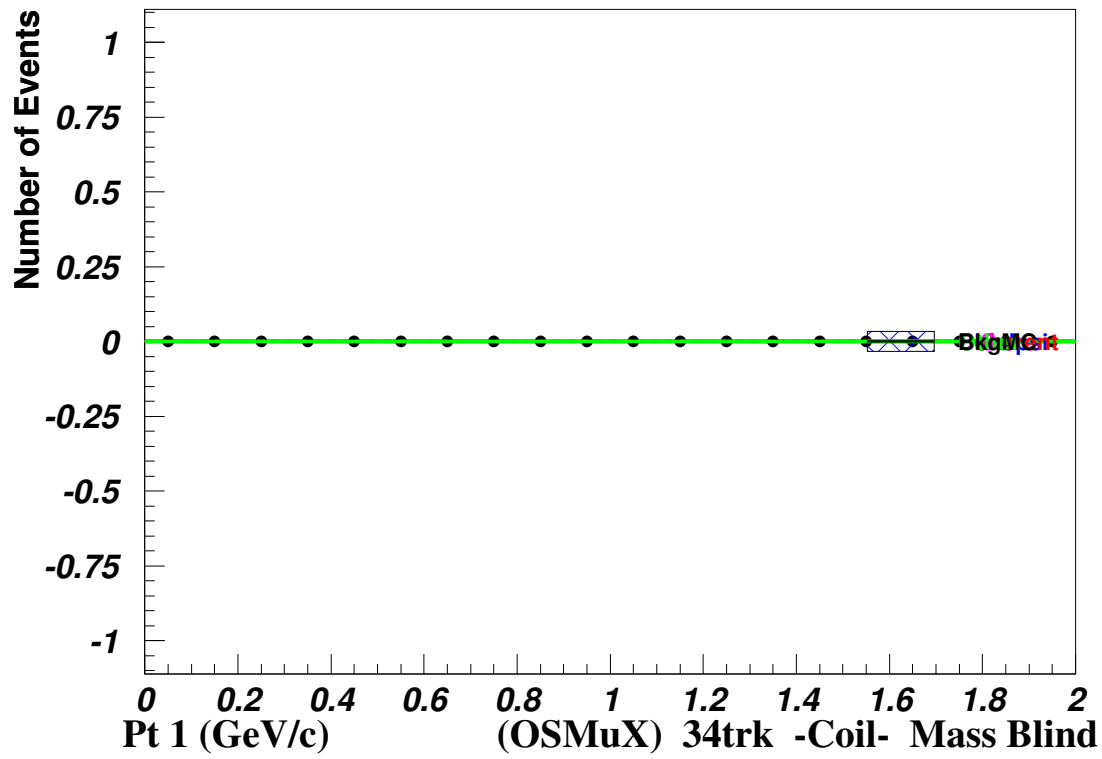
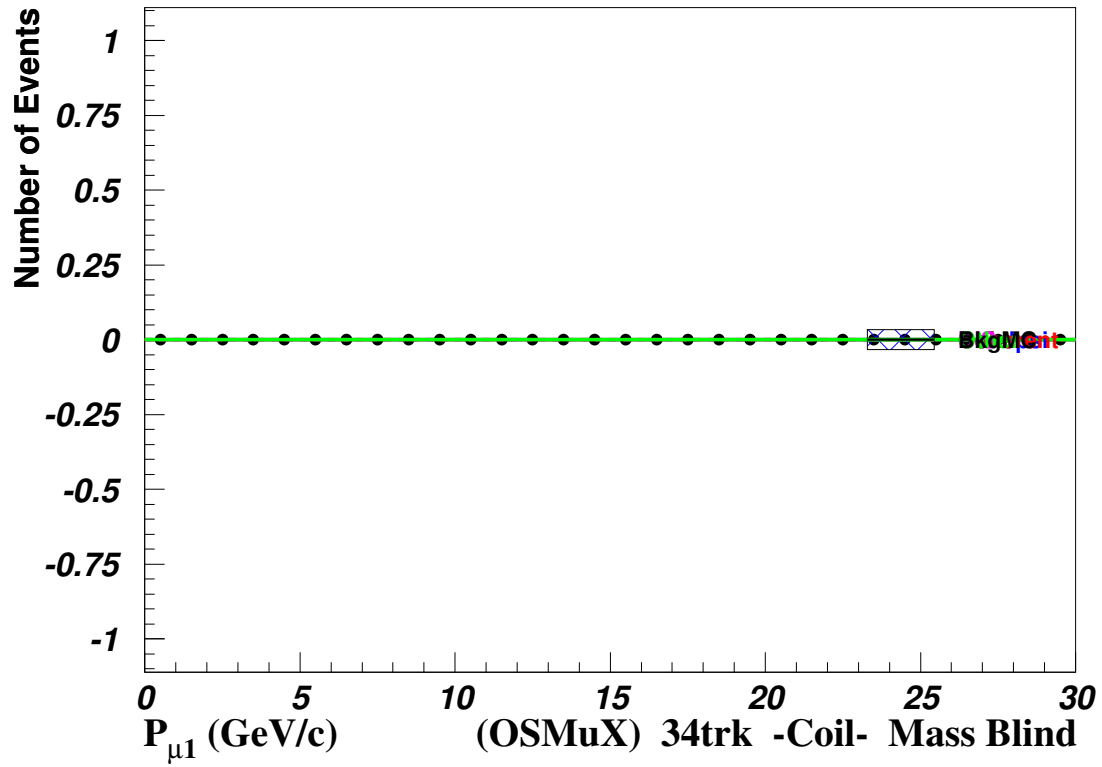


Figure 52: (./figs/p-pt-muneg-mb.pdf)

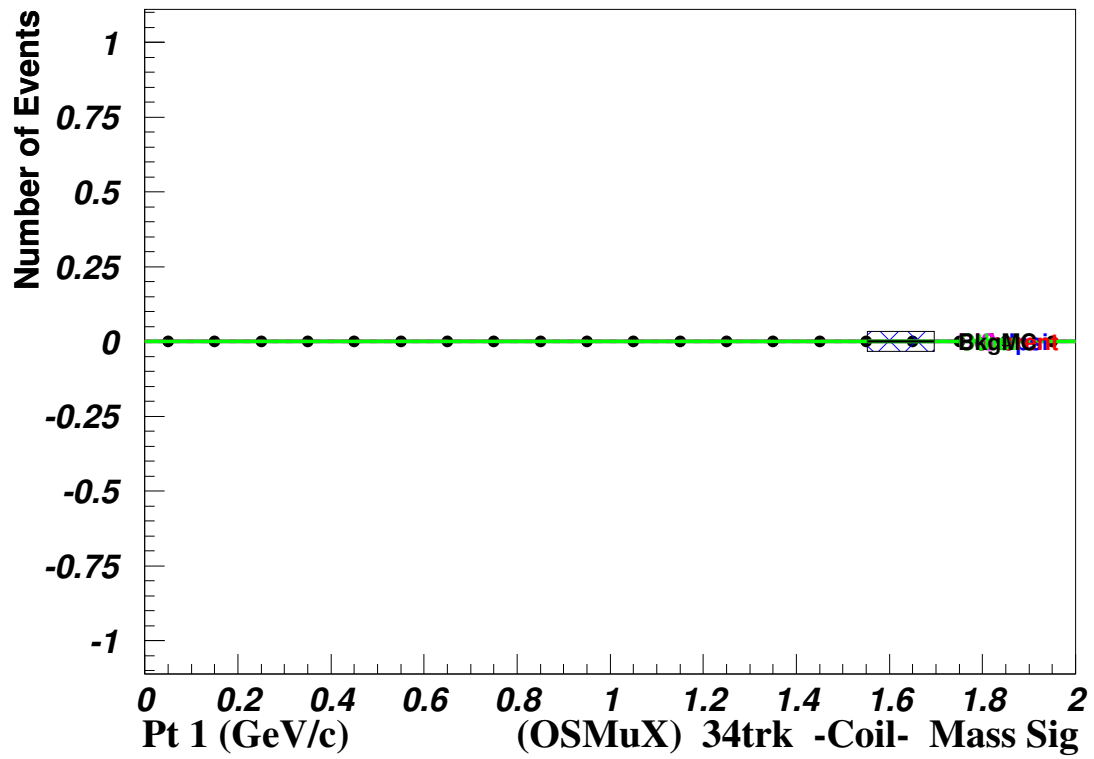
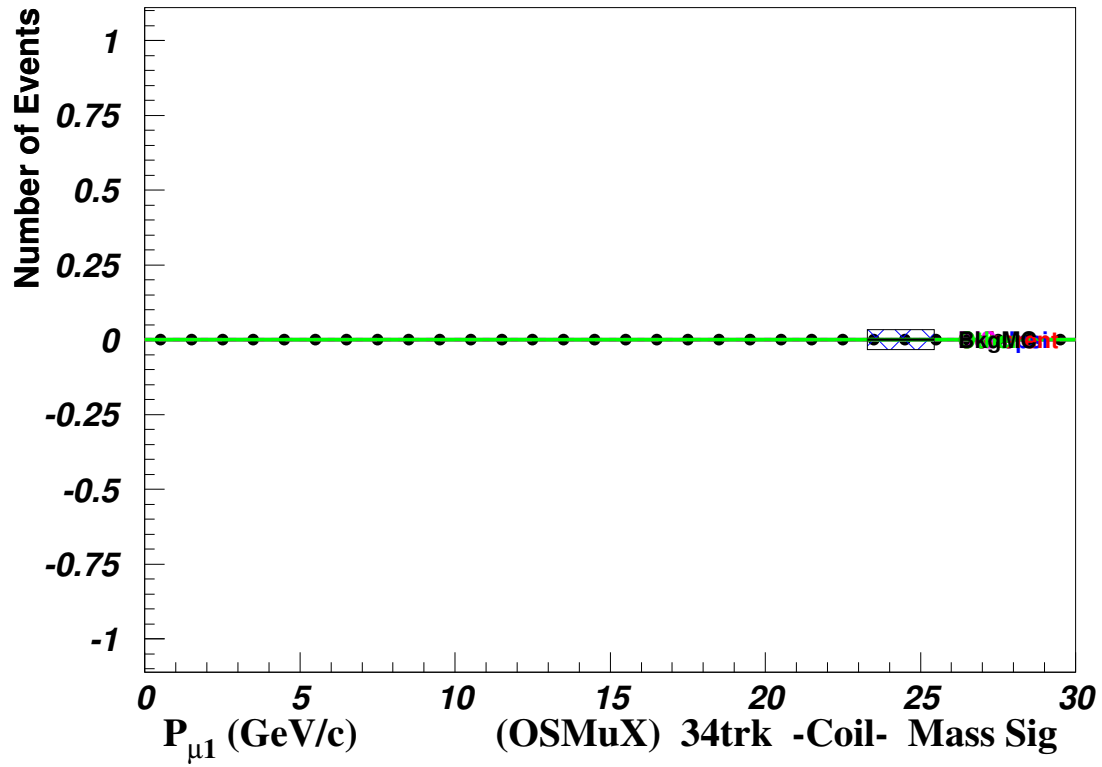


Figure 53: (./figs/p-pt-muneg-msig.pdf)

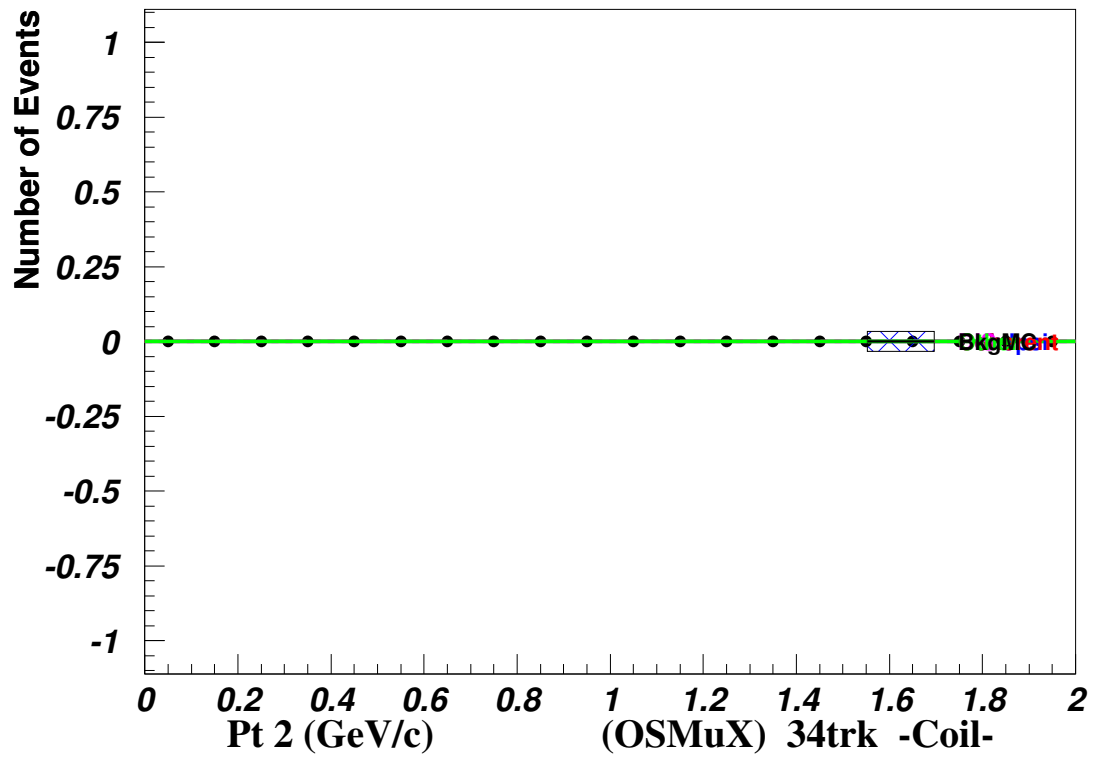
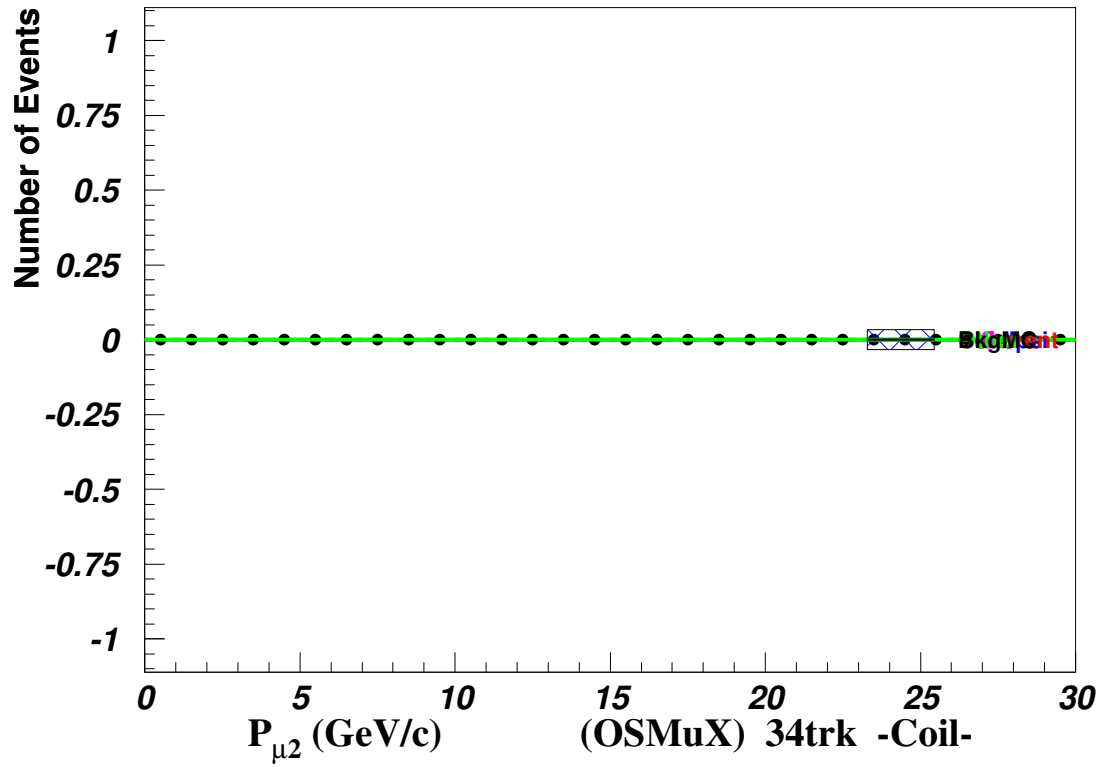


Figure 54: (./figs/p-pt-mupos.pdf)

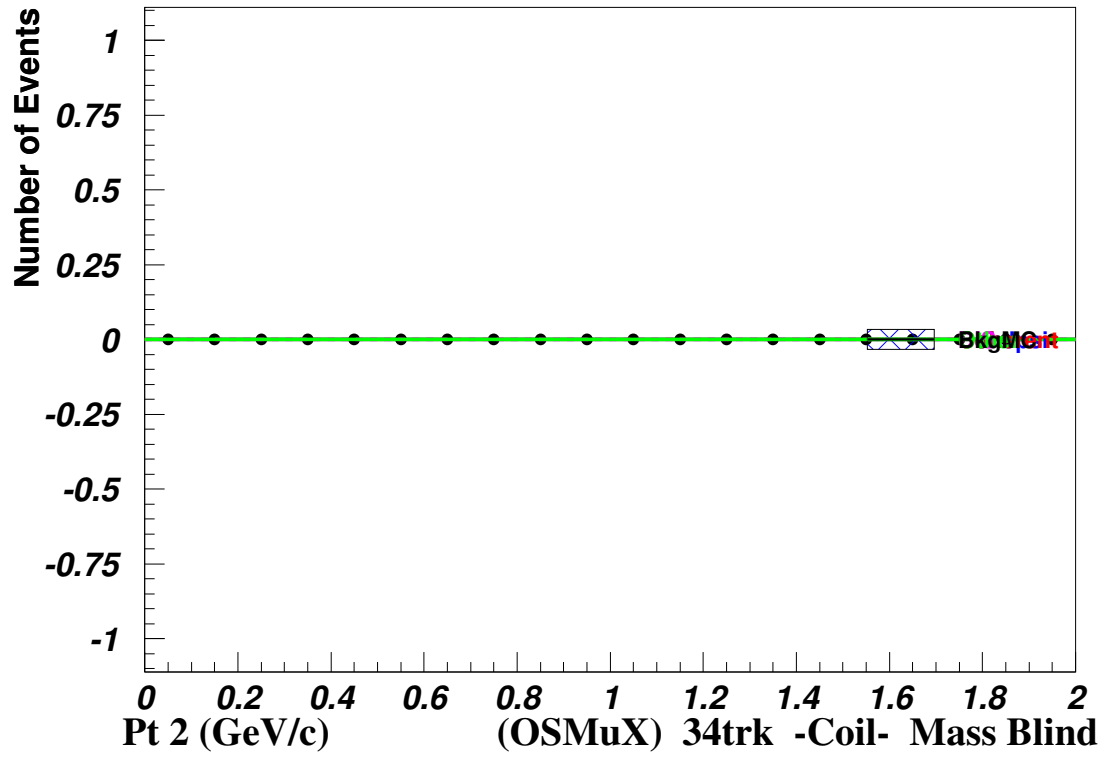
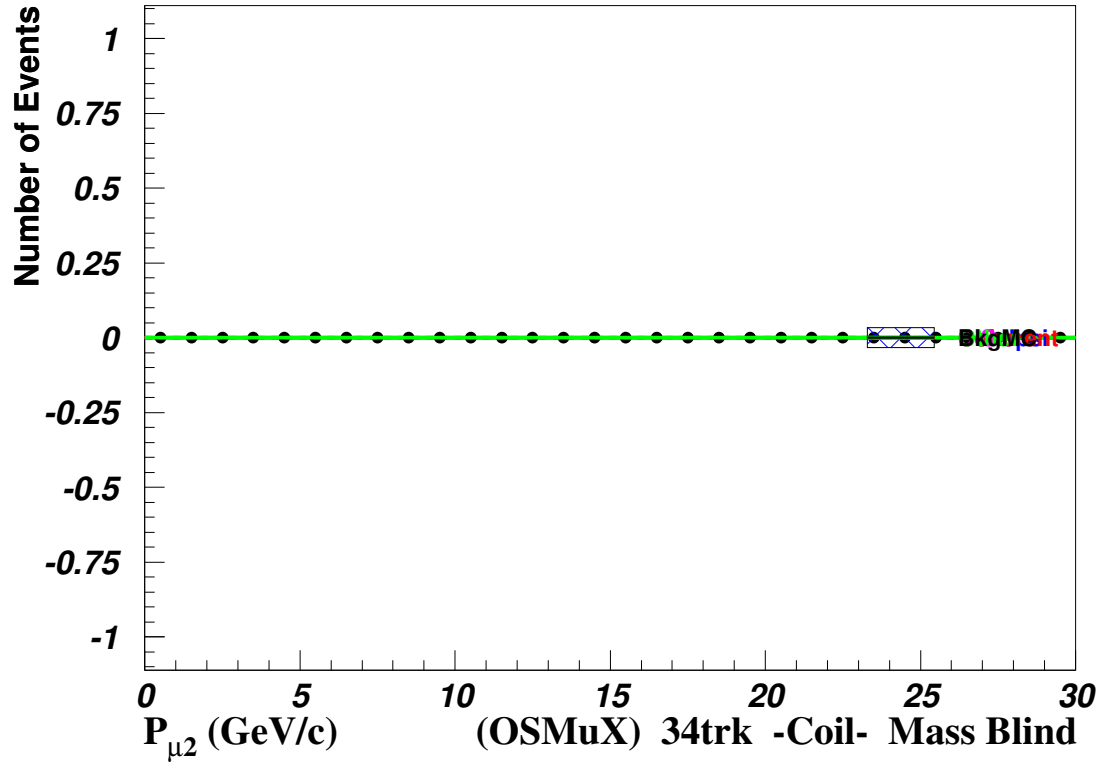


Figure 55: (./figs/p-pt-mupos-mb.pdf)

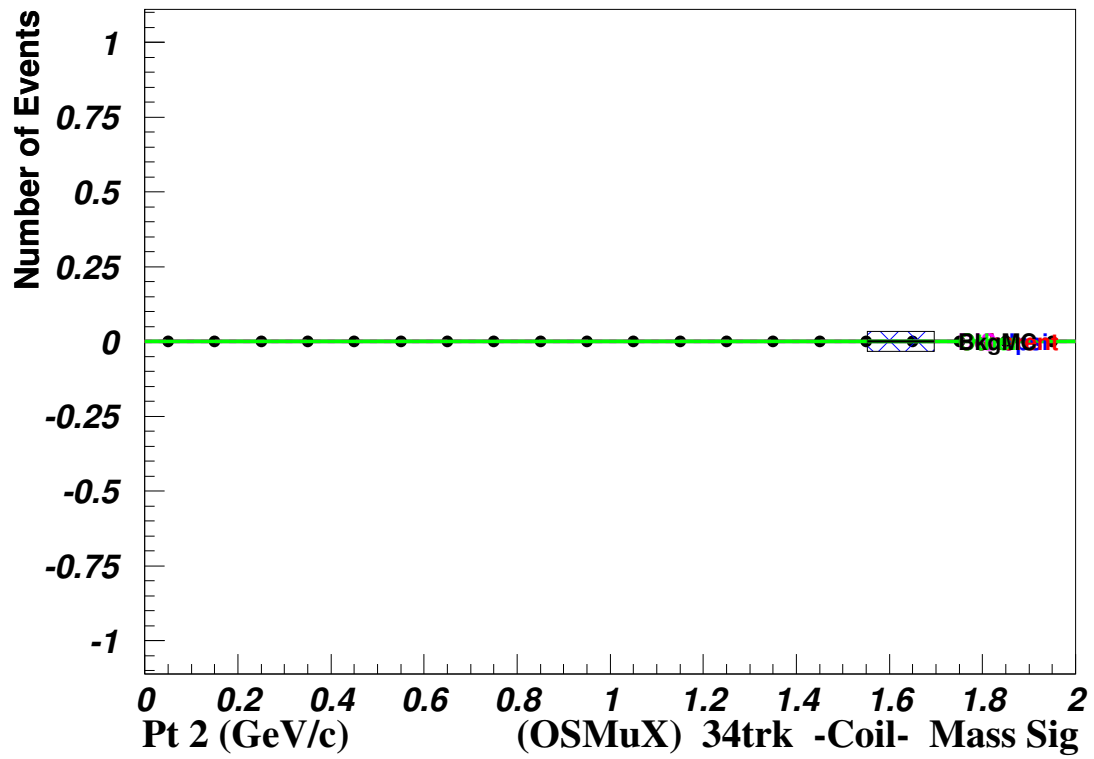
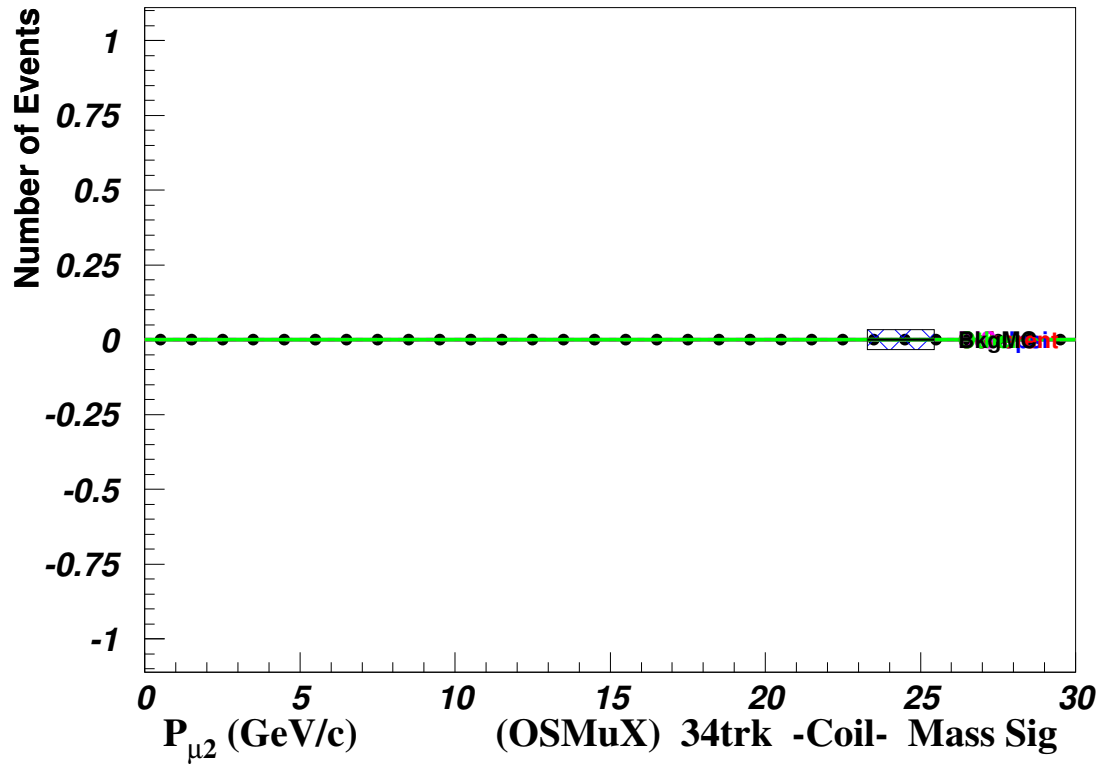


Figure 56: (./figs/p-pt-mupos-msig.pdf)

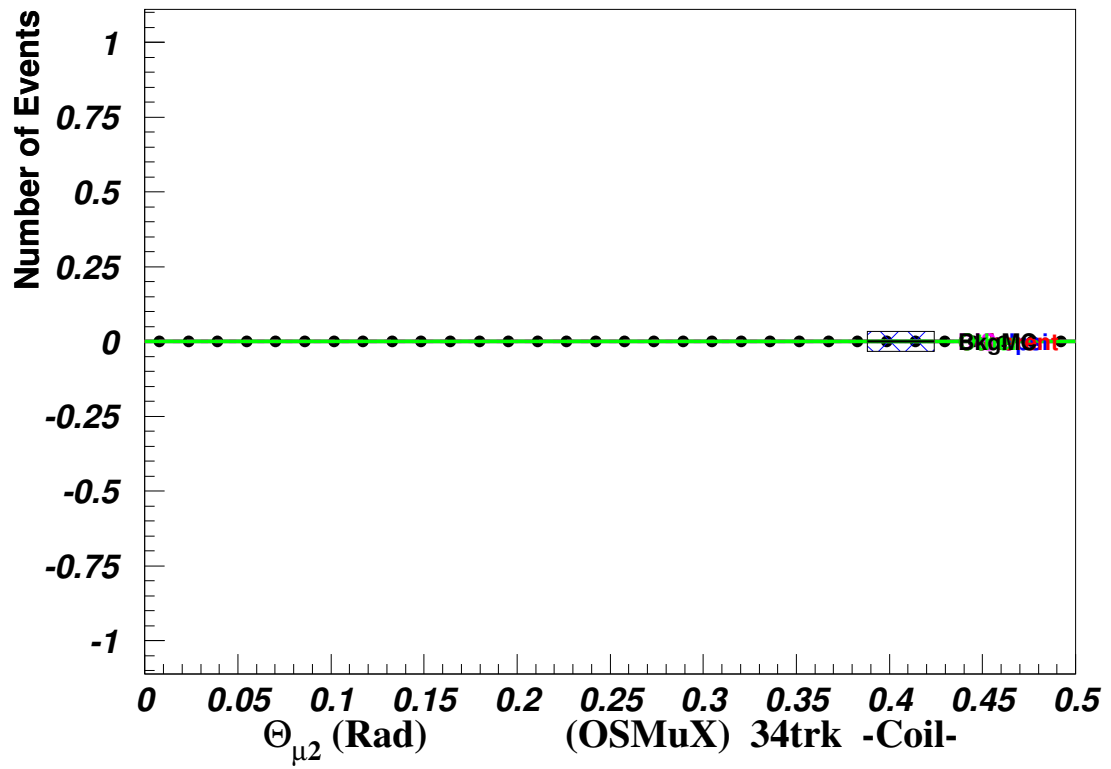
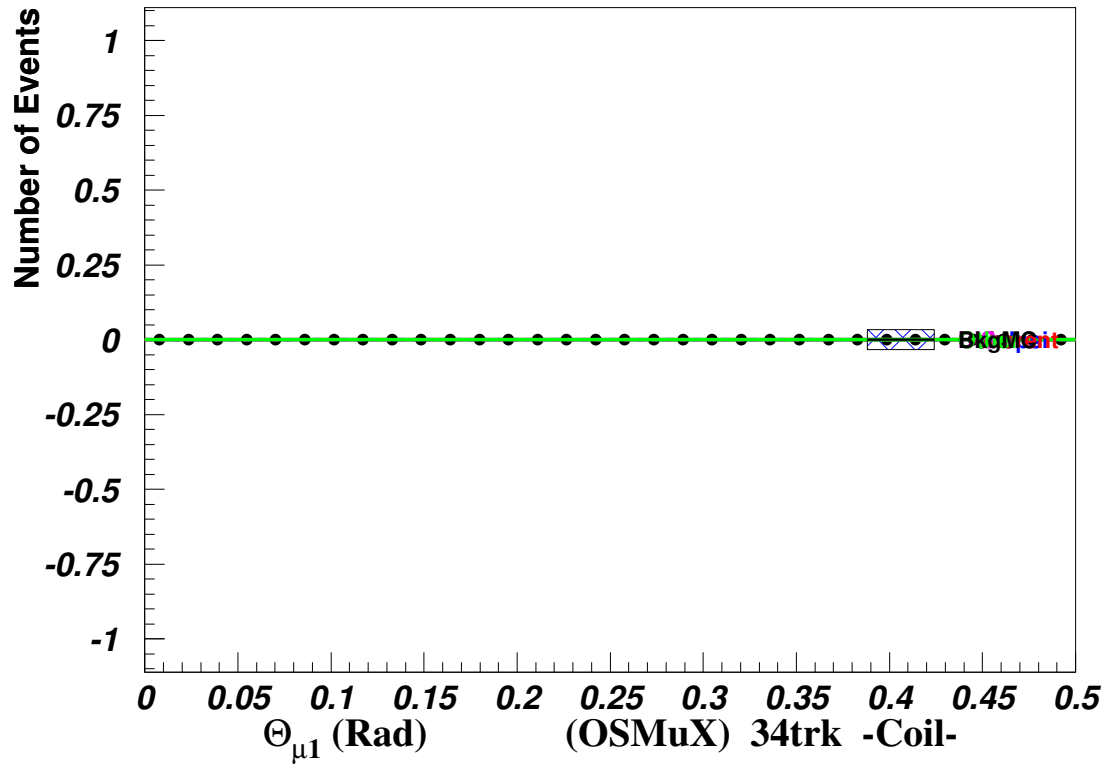


Figure 57: (./figs/theta1+2.pdf)

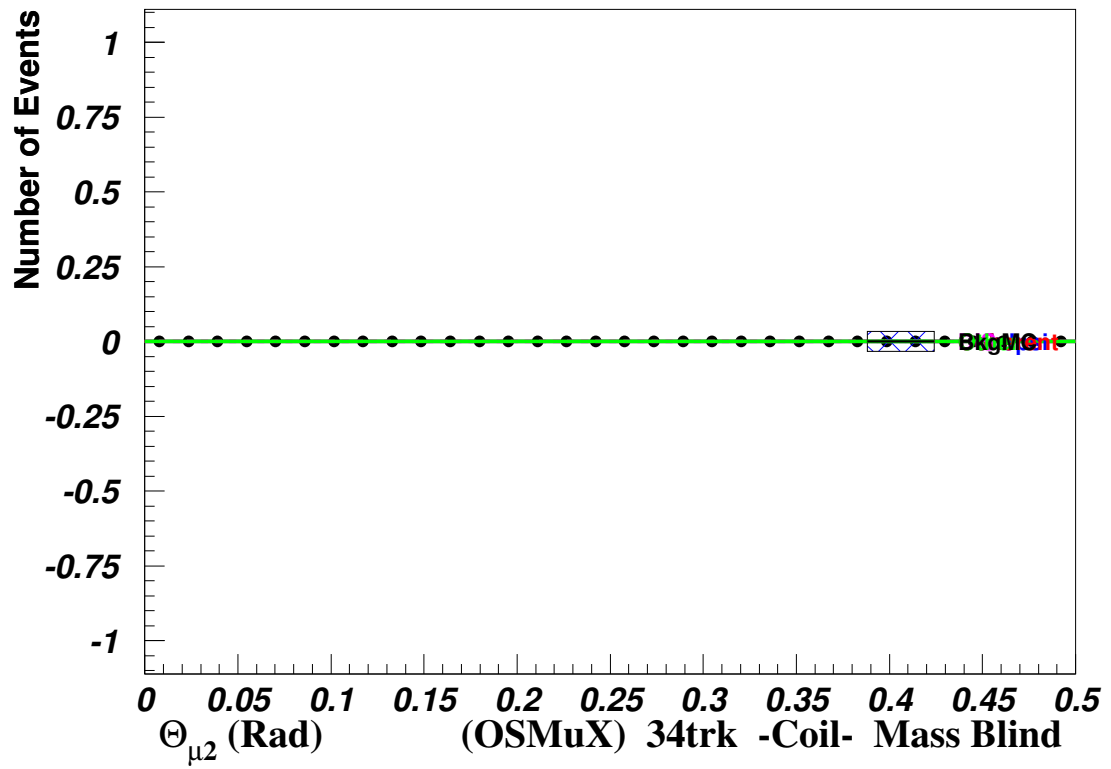
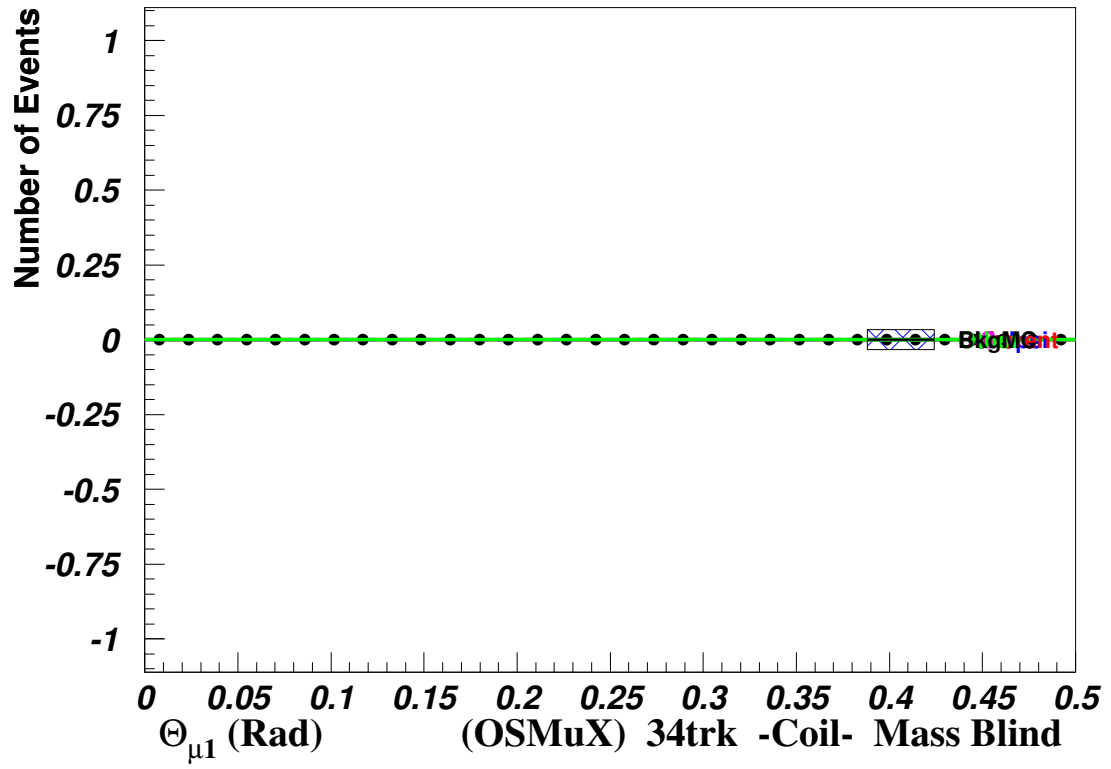


Figure 58: (./figs/theta1+2-mb.pdf)

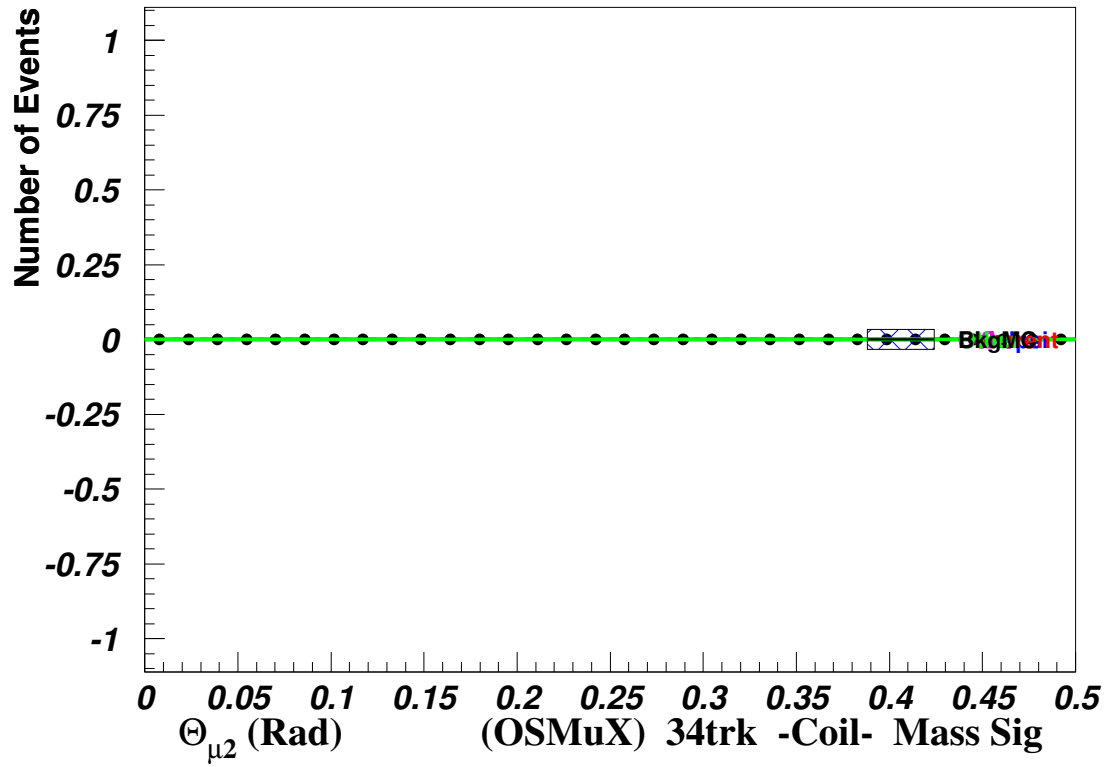
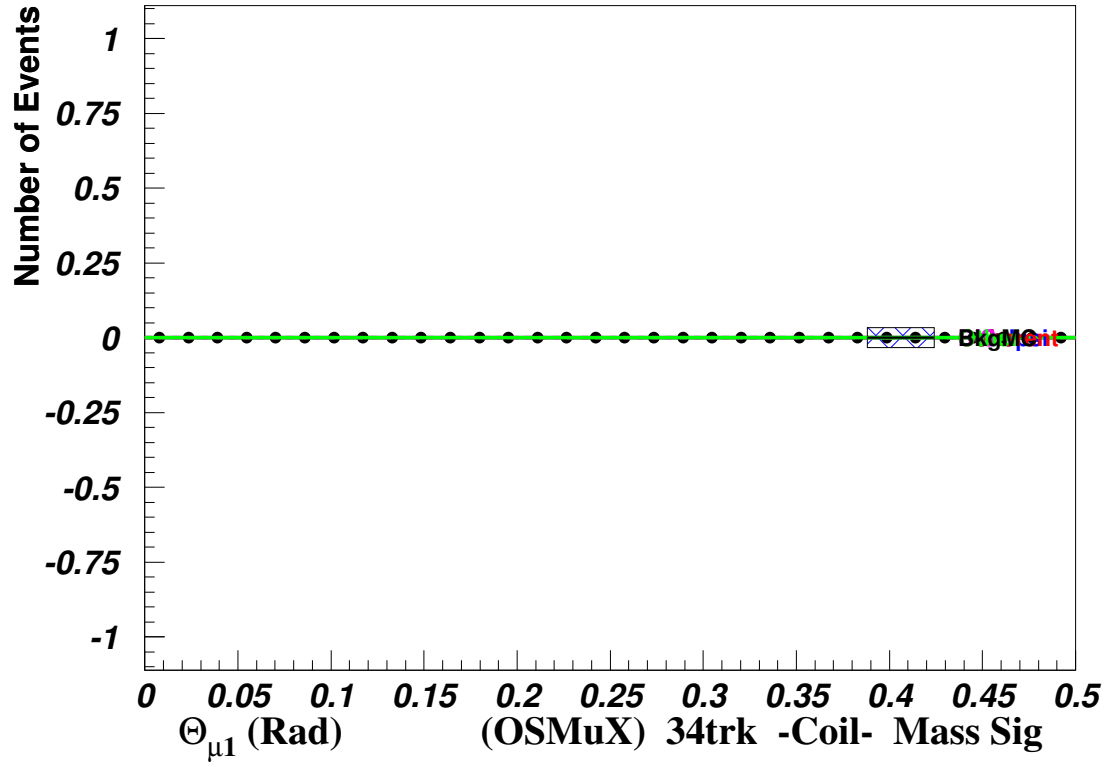


Figure 59: (./figs/theta1+2-msig.pdf)



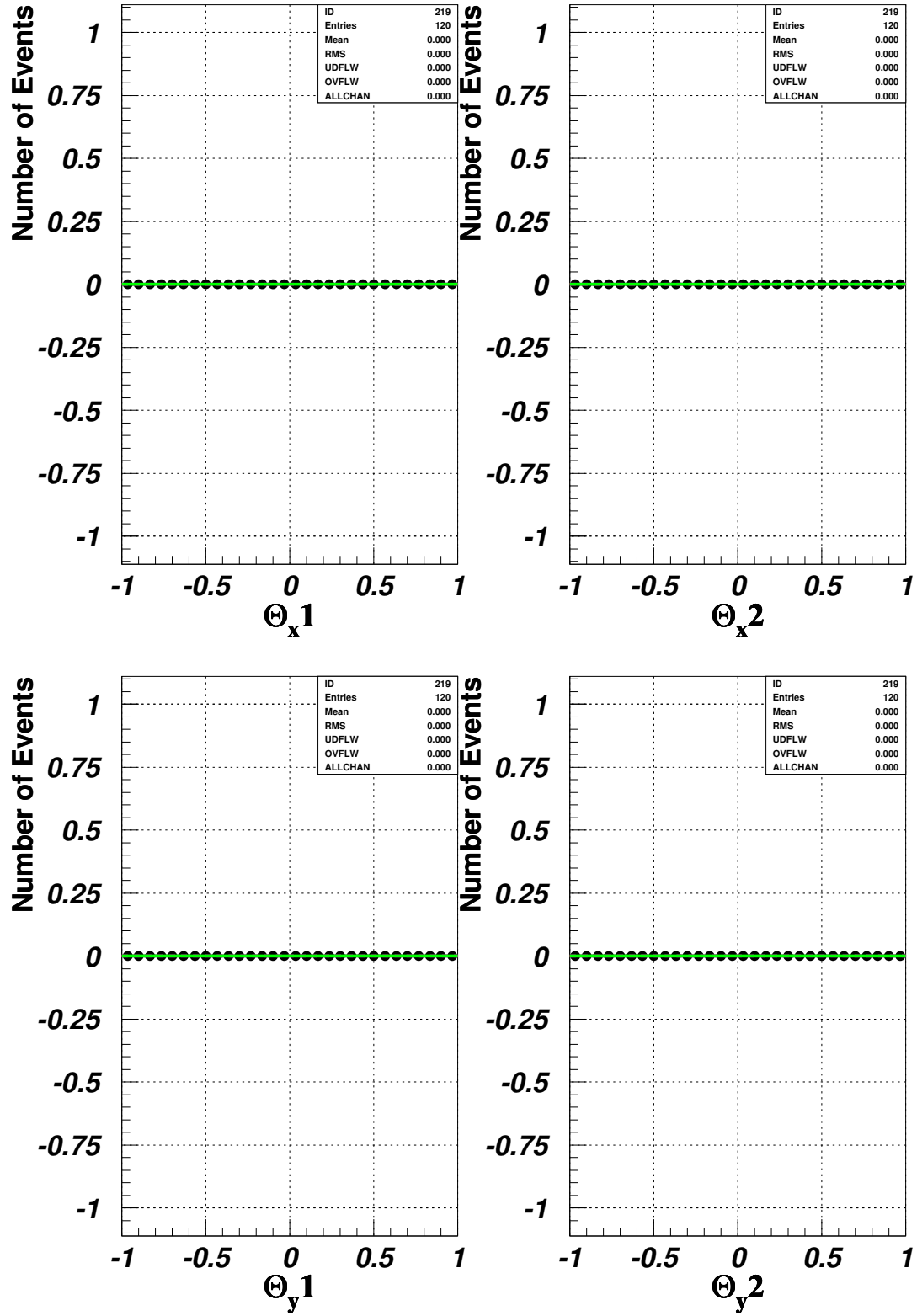


Figure 60: (./figs/thetaxy.pdf)