1 General Analysis Method

- NCDIS MC is from NEGLIB only (no nuage)
- The cut $20^0 \leq \phi_{12} \leq 160^0$ is applied.
- A 4D correction function $(P_+, P_-, P_{t+}, P_{t-})$ from ncand=34 CCDS is applied to NCDIS.
- A 2D correction function $(M_{\pi\pi}, \zeta_\rho)$ from ncand=34 CCDS is applied to NCDIS.
- A renormalization factor of 1.022 is applied to NCDIS so that the number of events do not change after application of the correction functions
- A folder is saved with $20^0 \leq \phi_{12}$ cut applied for CCDIS normalization.
- NCDIS is normalized on ϕ_{12} with: $\zeta_\rho \geq 0.075$.
- $Coh\rho^0$ is normalized on a ζ_ρ plot (range 0.0-0.1) in the Rho Mass range $(0.6 \leq M_{\pi\pi} \leq 1.0)$
- OBG is normalized by number of events with mass: $0.47 \leq M_{\pi\pi} \leq 0.530$
- The χ^2 calculation (including CCDIS, NCDIS, OBG and $Coh\rho$) is then iterated until convergence.
- Coherent ϕ^0 has been added at a normalization of 200 events (0.05 factor)

Coh$\boldsymbol{\rho^0}$ Analysis (P+,P$-$ $>$ **0.5**)

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2 Zeroth Norms

Table1 shows the generated, MC-Z-weighted number of events to pass basic cuts for the sake of Zeroth norm calculations. < See notes 2/15/11 >

The cuts include:

1) Fid |x,y-5|≤130 ; 5<zvs<405
2) Pfermi cut
3) W^2 cut (DIS only)

	Gen Number	Zroth Norm
CCDIS	4,477,786.5	1,440,000
NCDIS	2,358,388.1	437,760
Coh$\boldsymbol{\pi^0}$	156,611.6	4,925
Coh$\boldsymbol{\pi^+}$	29,596.0	10,000
Coh$\boldsymbol{\rho^0}$	25,235.8	1,000
QE	126,414.7	32,000
CohPhi0	4,075.9	204

Table 1: Generated Number of MC Events

3 Baby Ntuple Reduction

Cut Name	Raw	MC-Z-Weight
All Events	1843856.0	1719047.4
W^2 >1.96	1757271.0	1639114.9
Pfermi<1.0	1741929.0	1624875.6
zmin<zvr<405	1721363.0	1617165.0
No Muon	274784.0	258398.5
# of Tracks	82043.0	76551.3

Table 2: Baby Ntuple Reduction for **CCDIS**

Cut Name	Raw	MC-Z-Weight
All Events	2284335.0	2136933.2
W^2 >1.96	2278349.0	2131031.5
Pfermi<1.0	2259398.0	2113269.0
zmin<zvr<405	2138682.0	2012505.8
No Muon	2063056.0	1941480.8
# of Tracks	756128.0	708934.8

Table 3: Baby Ntuple Reduction for **NCDIS (neglib)**

Cut Name	Raw
All Events	12451135.0
zmin<zvr<405	12451135.0
No Muon	8761231.0
# of Tracks	956271.0

Table 4: Baby Ntuple Reduction for **Data**

Cut Name	Raw
All Events	16777216.0
At least 1 v0	1783028.0
zvr<zmin	1127859.0
ncand≤4	662049.0

Table 5: Baby Ntuple Reduction for **OBG**

4 General Information

4.1 Summary Cut Table

Cut Name	CohRho	NC	CC	OBG	Other	Total	Data
1) Raw Events	557.2	43515.3	40387.8	154958.5	44097.8	283516.7	956271.0
2) OBGfid,Trig+CohGenTh	557.2	43515.3	40387.8	26178.3	44097.8	154736.5	956271.0
3) Pfermi & W2	557.2	43515.3	40387.8	26178.3	41610.1	152248.8	956271.0
4) FocP	557.2	43515.3	40387.8	23225.9	41610.1	149296.4	846077.0
5) Fid. Vol. -X	533.7	40939.7	37706.1	22408.3	39828.3	141416.0	598657.0
6) Fid. Vol. -Y	512.0	38126.5	33559.4	21764.7	38302.4	132264.9	382118.0
7) Fid. Vol. -Z	512.0	38126.5	33559.4	14753.7	38302.3	125253.8	382118.0
8) No Ph2Mu	487.4	38126.5	33559.4	6248.7	2977.7	81399.6	382118.0
9) ncand=2	442.9	38126.5	13545.7	4095.8	1492.8	57703.7	258628.0
10) tnchgd=2	430.0	32580.5	11582.9	4095.8	1379.3	50068.6	187970.0
11) +/- Tracks (V0)	423.9	26342.3	9026.4	4093.7	1323.7	41210.0	138269.0
12) Epipi>2.0	422.0	19349.9	5113.7	2261.0	839.6	27986.3	42973.0
13) P+,P->0.5	403.6	15757.9	4414.8	1707.5	646.0	22929.7	34861.0
14) Tube/Veto Cut	403.6	15757.9	4414.8	1707.5	646.0	22929.7	34861.0
15) Theta12<2.62 rad	403.4	15611.0	4381.6	1688.7	641.2	22725.8	26555.0
16) Upstream Hanger cut	400.7	14701.1	4157.2	1688.7	631.9	21579.6	23812.0
17) nsecond<4	395.6	14264.1	3976.1	1688.7	624.8	20949.4	22361.0
18) Fid. Vol. Hanger cut	369.7	12544.1	3427.1	1688.7	587.1	18616.7	19094.0
19) No Hangers fromPVert	365.4	11218.1	3086.2	1688.7	582.6	16941.0	17596.0
20) Pz>0 for pions	365.3	11203.5	3080.8	1688.3	582.5	16920.4	17406.0
21) Thprimord<0.4	353.5	8887.7	2230.3	1402.7	526.6	13400.8	14213.0
22) Nunh*fracunh<200	353.4	8884.6	2229.2	1402.7	526.3	13396.3	13985.0
23) Pt+wrt (-) > 0.05	352.6	8745.7	2208.6	550.5	307.8	12165.2	13129.0
24) Mee > 0.10	352.3	8672.3	2201.4	421.3	274.0	11921.4	12898.0
25) PneutAsym>0.5	348.5	6113.5	1378.4	330.0	272.3	8442.7	8946.0
26) PpiAsym>-0.8	329.2	5927.4	1343.5	324.4	259.6	8184.1	8365.0
27) 20<Phi12<160deg	272.2	4606.6	776.8	229.1	103.5	5988.2	6038.0
28) LH38>0.5 (OFF)	272.2	4606.6	776.8	229.1	103.5	5988.2	6038.0
29) P+,P->1.0	249.5	3025.1	578.9	173.0	82.9	4109.3	4319.0

Table 6: Summary Cut Table

4.2 Cohρ^0 Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	25790.0	23515.6	931.8	557.2
2) OBGfid,Trig+CohGenTh	25790.0	23515.6	931.8	557.2
3) Pfermi & W2	25790.0	23515.6	931.8	557.2
4) FocP	25790.0	23515.6	931.8	557.2
5) Fid. Vol. -X	24698.0	22519.8	892.4	533.7
6) Fid. Vol. -Y	23699.0	21608.0	856.2	512.0
7) Fid. Vol. -Z	23699.0	21608.0	856.2	512.0
8) No Ph2Mu	22561.0	20567.4	815.0	487.4
9) ncand=2	20419.0	18692.3	740.7	442.9
10) tnchgd=2	19812.0	18148.3	719.1	430.0
11) +/- Tracks (V0)	19536.0	17889.3	708.9	423.9
12) Epipi>2.0	19453.0	17809.3	705.7	422.0
13) P+,P->0.5	18605.0	17030.9	674.9	403.6
14) Tube/Veto Cut	18605.0	17030.9	674.9	403.6
15) Theta12<2.62 rad	18594.0	17021.1	674.5	403.4
16) Upstream Hanger cut	18477.0	16908.3	670.0	400.7
17) nsecond<4	18211.0	16694.9	661.6	395.6
18) Fid. Vol. Hanger cut	16964.0	15599.6	618.2	369.7
19) No Hangers fromPVert	16765.0	15418.2	611.0	365.4
20) Pz>0 for pions	16764.0	15417.2	610.9	365.3
21) Thprimord<0.4	16174.0	14916.5	591.1	353.5
22) Nunh*fracunh<200	16171.0	14914.3	591.0	353.4
23) Pt+wrt (-) > 0.05	16134.0	14879.6	589.6	352.6
24) Mee > 0.10	16123.0	14869.1	589.2	352.3
25) PneutAsym>0.5	15936.0	14704.1	582.7	348.5
26) PpiAsym>-0.8	15057.0	13891.4	550.5	329.2
27) 20<Phi12<160deg	12447.0	11486.7	455.2	272.2
28) LH38>0.5 (OFF)	12447.0	11486.7	455.2	272.2
29) P+,P->1.0	11412.0	10531.2	417.3	249.5

Table 7: Cut Table Cohρ^0

4.3 NCDIS Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	756128.0	693660.1	128755.5	43515.3
2) OBGfid,Trig+CohGenTh	756128.0	693660.1	128755.5	43515.3
3) Pfermi & W2	756128.0	693660.1	128755.5	43515.3
4) FocP	756128.0	693660.1	128755.5	43515.3
5) Fid. Vol. -X	716533.0	656919.6	121935.8	40939.7
6) Fid. Vol. -Y	675006.0	618515.9	114807.4	38126.5
7) Fid. Vol. -Z	675006.0	618515.9	114807.4	38126.5
8) No Ph2Mu	675006.0	618515.9	114807.4	38126.5
9) ncand=2	257783.0	237735.6	44127.9	38126.5
10) tnchgd=2	220494.0	202986.7	37677.9	32580.5
11) +/- Tracks (V0)	178245.0	164232.3	30484.4	26342.3
12) Epipi>2.0	128328.0	117970.5	21897.4	19349.9
13) P+,P->0.5	102086.0	93852.9	17420.7	15757.9
14) Tube/Veto Cut	102086.0	93852.9	17420.7	15757.9
15) Theta12<2.62 rad	101218.0	93055.6	17272.7	15611.0
16) Upstream Hanger cut	95436.0	87725.6	16283.4	14701.1
17) nsecond<4	92271.0	85222.2	15818.7	14264.1
18) Fid. Vol. Hanger cut	81130.0	75125.2	13944.6	12544.1
19) No Hangers fromPVert	72709.0	67255.9	12483.9	11218.1
20) Pz>0 for pions	72602.0	67152.3	12464.6	11203.5
21) Thprimord<0.4	56964.0	53411.2	9914.1	8887.7
22) Nunh*fracunh<200	56939.0	53392.6	9910.6	8884.6
23) Pt+wrt (-) > 0.05	56052.0	52577.7	9759.3	8745.7
24) Mee > 0.10	55591.0	52146.0	9679.2	8672.3
25) PneutAsym>0.5	39703.0	36852.8	6840.5	6113.5
26) PpiAsym>-0.8	38147.0	35395.8	6570.1	5927.4
27) 20<Phi12<160deg	29615.0	27491.7	5102.9	4606.6
28) LH38>0.5 (OFF)	29615.0	27491.7	5102.9	4606.6
29) P+,P->1.0	18499.0	17124.3	3178.6	3025.1

Table 8: Cut Table NCDIS

4.4 CCDIS Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	141725.0	127243.1	40919.8	40387.8
2) OBGfid,Trig+CohGenTh	141725.0	127243.1	40919.8	40387.8
3) Pfermi & W2	141725.0	127243.1	40919.8	40387.8
4) FocP	141725.0	127243.1	40919.8	40387.8
5) Fid. Vol. -X	132260.0	118794.2	38202.7	37706.1
6) Fid. Vol. -Y	117578.0	105729.7	34001.4	33559.4
7) Fid. Vol. -Z	117578.0	105729.7	34001.4	33559.4
8) No Ph2Mu	117578.0	105729.7	34001.4	33559.4
9) ncand=2	46635.0	42676.1	13724.1	13545.7
10) tnchgd=2	40101.0	36492.5	11735.5	11582.9
11) +/- Tracks (V0)	31025.0	28438.0	9145.3	9026.4
12) Epipi>2.0	17917.0	16111.0	5181.1	5113.7
13) P+,P->0.5	15436.0	13908.7	4472.9	4414.8
14) Tube/Veto Cut	15436.0	13908.7	4472.9	4414.8
15) Theta12<2.62 rad	15323.0	13804.3	4439.3	4381.6
16) Upstream Hanger cut	14560.0	13097.5	4212.0	4157.2
17) nsecond<4	13862.0	12527.1	4028.5	3976.1
18) Fid. Vol. Hanger cut	11941.0	10796.9	3472.2	3427.1
19) No Hangers fromPVert	10771.0	9722.9	3126.8	3086.2
20) Pz>0 for pions	10754.0	9706.2	3121.4	3080.8
21) Thprimord<0.4	7632.0	7026.7	2259.7	2230.3
22) Nunh*fracunh<200	7627.0	7023.2	2258.6	2229.2
23) Pt+wrt (-) > 0.05	7550.0	6958.1	2237.7	2208.6
24) Mee > 0.10	7527.0	6935.6	2230.4	2201.4
25) PneutAsym>0.5	4803.0	4342.9	1396.6	1378.4
26) PpiAsym>-0.8	4668.0	4232.8	1361.2	1343.5
27) 20<Phi12<160deg	2703.0	2447.1	787.0	776.8
28) LH38>0.5 (OFF)	2703.0	2447.1	787.0	776.8
29) P+,P->1.0	2023.0	1823.9	586.5	578.9

Table 9: Cut Table CCDIS

4.5 OBG Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	662049.0	662049.0	662049.0	154958.5
2) OBGfid,Trig+CohGenTh	111845.0	111845.0	111845.0	26178.3
3) Pfermi & W2	111845.0	111845.0	111845.0	26178.3
4) FocP	99231.0	99231.0	99231.0	23225.9
5) Fid. Vol. -X	95738.0	95738.0	95738.0	22408.3
6) Fid. Vol. -Y	92988.0	92988.0	92988.0	21764.7
7) Fid. Vol. -Z	63034.0	63034.0	63034.0	14753.7
8) No Ph2Mu	26697.0	26697.0	26697.0	6248.7
9) ncand=2	17499.0	17499.0	17499.0	4095.8
10) tnchgd=2	17499.0	17499.0	17499.0	4095.8
11) +/- Tracks (V0)	17490.0	17490.0	17490.0	4093.7
12) Epipi>2.0	9660.0	9660.0	9660.0	2261.0
13) P+,P->0.5	7295.0	7295.0	7295.0	1707.5
14) Tube/Veto Cut	7295.0	7295.0	7295.0	1707.5
15) Theta12<2.62 rad	7215.0	7215.0	7215.0	1688.7
16) Upstream Hanger cut	7215.0	7215.0	7215.0	1688.7
17) nsecond<4	7215.0	7215.0	7215.0	1688.7
18) Fid. Vol. Hanger cut	7215.0	7215.0	7215.0	1688.7
19) No Hangers fromPVert	7215.0	7215.0	7215.0	1688.7
20) Pz>0 for pions	7213.0	7213.0	7213.0	1688.3
21) Thprimord<0.4	5993.0	5993.0	5993.0	1402.7
22) Nunh*fracunh<200	5993.0	5993.0	5993.0	1402.7
23) Pt+wrt (-) > 0.05	2352.0	2352.0	2352.0	550.5
24) Mee > 0.10	1800.0	1800.0	1800.0	421.3
25) PneutAsym>0.5	1410.0	1410.0	1410.0	330.0
26) PpiAsym>-0.8	1386.0	1386.0	1386.0	324.4
27) 20<Phi12<160deg	979.0	979.0	979.0	229.1
28) LH38>0.5 (OFF)	979.0	979.0	979.0	229.1
29) P+,P->1.0	739.0	739.0	739.0	173.0

Table 10: Cut Table OBG

4.6 QE Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	129561.0	116903.9	29592.5	29592.5
2) OBGfid,Trig+CohGenTh	129561.0	116903.9	29592.5	29592.5
3) Pfermi & W2	128836.0	116251.6	29427.3	29427.3
4) FocP	128836.0	116251.6	29427.3	29427.3
5) Fid. Vol. -X	123323.0	111231.6	28156.6	28156.6
6) Fid. Vol. -Y	118713.0	107057.1	27099.9	27099.9
7) Fid. Vol. -Z	118713.0	107057.1	27099.9	27099.9
8) No Ph2Mu	1722.0	1541.5	390.2	390.2
9) ncand=2	527.0	487.7	123.5	123.5
10) tnchgd=2	508.0	470.0	119.0	119.0
11) +/- Tracks (V0)	484.0	449.8	113.9	113.9
12) Epipi>2.0	405.0	374.3	94.7	94.7
13) P+,P->0.5	357.0	328.4	83.1	83.1
14) Tube/Veto Cut	357.0	328.4	83.1	83.1
15) Theta12<2.62 rad	353.0	324.5	82.1	82.1
16) Upstream Hanger cut	353.0	324.5	82.1	82.1
17) nsecond<4	353.0	324.5	82.1	82.1
18) Fid. Vol. Hanger cut	346.0	317.8	80.4	80.4
19) No Hangers fromPVert	346.0	317.8	80.4	80.4
20) Pz>0 for pions	346.0	317.8	80.4	80.4
21) Thprimord<0.4	343.0	316.1	80.0	80.0
22) Nunh*fracunh<200	343.0	316.1	80.0	80.0
23) Pt+wrt (-) > 0.05	343.0	316.1	80.0	80.0
24) Mee > 0.10	343.0	316.1	80.0	80.0
25) PneutAsym>0.5	343.0	316.1	80.0	80.0
26) PpiAsym>-0.8	295.0	277.0	70.1	70.1
27) 20<Phi12<160deg	19.0	18.4	4.7	4.7
28) LH38>0.5 (OFF)	19.0	18.4	4.7	4.7
29) P+,P->1.0	7.0	6.9	1.7	1.7

Table 11: Cut Table QE

4.7 Cohπ^+ Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	30945.0	28076.5	9486.6	9486.6
2) OBGfid,Trig+CohGenTh	30945.0	28076.5	9486.6	9486.6
3) Pfermi & W2	30945.0	28076.5	9486.6	9486.6
4) FocP	30945.0	28076.5	9486.6	9486.6
5) Fid. Vol. -X	29688.0	26921.2	9096.3	9096.3
6) Fid. Vol. -Y	28524.0	25870.8	8741.3	8741.3
7) Fid. Vol. -Z	28524.0	25870.8	8741.3	8741.3
8) No Ph2Mu	472.0	428.4	144.7	144.7
9) ncand=2	324.0	299.5	101.2	101.2
10) tnchgd=2	316.0	291.8	98.6	98.6
11) +/- Tracks (V0)	307.0	284.3	96.1	96.1
12) Epipi>2.0	247.0	226.1	76.4	76.4
13) P+,P->0.5	196.0	180.2	60.9	60.9
14) Tube/Veto Cut	196.0	180.2	60.9	60.9
15) Theta12<2.62 rad	195.0	179.2	60.6	60.6
16) Upstream Hanger cut	195.0	179.2	60.6	60.6
17) nsecond<4	193.0	177.9	60.1	60.1
18) Fid. Vol. Hanger cut	188.0	173.1	58.5	58.5
19) No Hangers fromPVert	187.0	172.1	58.1	58.1
20) Pz>0 for pions	187.0	172.1	58.1	58.1
21) Thprimord<0.4	185.0	170.1	57.5	57.5
22) Nunh*fracunh<200	185.0	170.1	57.5	57.5
23) Pt+wrt (-) > 0.05	185.0	170.1	57.5	57.5
24) Mee > 0.10	184.0	169.1	57.1	57.1
25) PneutAsym>0.5	182.0	167.1	56.5	56.5
26) PpiAsym>-0.8	174.0	159.7	54.0	54.0
27) 20<Phi12<160deg	89.0	82.1	27.7	27.7
28) LH38>0.5 (OFF)	89.0	82.1	27.7	27.7
29) P+,P->1.0	72.0	65.8	22.2	22.2

Table 12: Cut Table Cohπ^+

4.8 Cohπ^0 Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	49972.0	43406.6	1385.8	1365.0
2) OBGfid,Trig+CohGenTh	49972.0	43406.6	1385.8	1365.0
3) Pfermi & W2	49972.0	43406.6	1385.8	1365.0
4) FocP	49972.0	43406.6	1385.8	1365.0
5) Fid. Vol. -X	47459.0	41193.0	1315.1	1295.4
6) Fid. Vol. -Y	44979.0	39070.9	1247.4	1228.7
7) Fid. Vol. -Z	44972.0	39069.8	1247.3	1228.6
8) No Ph2Mu	44972.0	39069.8	1247.3	1228.6
9) ncand=2	32665.0	28498.5	909.8	896.2
10) tnchgd=2	30025.0	26184.4	836.0	823.4
11) +/- Tracks (V0)	29719.0	25924.0	827.7	815.2
12) Epipi>2.0	18087.0	15664.5	500.1	492.6
13) P+,P->0.5	12379.0	10740.0	342.9	337.7
14) Tube/Veto Cut	12379.0	10740.0	342.9	337.7
15) Theta12<2.62 rad	12319.0	10683.7	341.1	336.0
16) Upstream Hanger cut	11999.0	10420.2	332.7	327.7
17) nsecond<4	11765.0	10249.4	327.2	322.3
18) Fid. Vol. Hanger cut	10786.0	9437.1	301.3	296.8
19) No Hangers fromPVert	10702.0	9362.9	298.9	294.4
20) Pz>0 for pions	10702.0	9362.9	298.9	294.4
21) Thprimord<0.4	8737.0	7786.8	248.6	244.9
22) Nunh*fracunh<200	8724.0	7778.1	248.3	244.6
23) Pt+wrt (-) > 0.05	1017.0	916.9	29.3	28.8
24) Mee > 0.10	56.0	51.1	1.6	1.6
25) PneutAsym>0.5	29.0	27.3	0.9	0.9
26) PpiAsym>-0.8	28.0	26.3	0.8	0.8
27) 20<Phi12<160deg	14.0	12.7	0.4	0.4
28) LH38>0.5 (OFF)	14.0	12.7	0.4	0.4
29) P+,P->1.0	10.0	9.6	0.3	0.3

Table 13: Cut Table Cohπ^0

4.9 CohPhi0 Cut Table

Cut	Raw	Z-weight	Norm0	Final
1) Raw Events	4171.0	3799.7	3799.7	190.0
2) OBGfid,Trig+CohGenTh	4171.0	3799.7	3799.7	190.0
3) Pfermi & W2	4171.0	3799.7	3799.7	190.0
4) FocP	4171.0	3799.7	3799.7	190.0
5) Fid. Vol. -X	4008.0	3651.3	3651.3	182.6
6) Fid. Vol. -Y	3836.0	3494.5	3494.5	174.7
7) Fid. Vol. -Z	3836.0	3494.5	3494.5	174.7
8) No Ph2Mu	3446.0	3131.0	3131.0	156.5
9) ncand=2	3041.0	2764.3	2764.3	138.2
10) tnchgd=2	2866.0	2603.6	2603.6	130.2
11) +/- Tracks (V0)	2830.0	2570.8	2570.8	128.5
12) Epipi>2.0	2826.0	2567.0	2567.0	128.4
13) P+,P->0.5	2814.0	2555.4	2555.4	127.8
14) Tube/Veto Cut	2814.0	2555.4	2555.4	127.8
15) Theta12<2.62 rad	2813.0	2554.5	2554.5	127.7
16) Upstream Hanger cut	2800.0	2542.1	2542.1	127.1
17) nsecond<4	2763.0	2518.0	2518.0	125.9
18) Fid. Vol. Hanger cut	2583.0	2363.7	2363.7	118.2
19) No Hangers fromPVert	2558.0	2340.0	2340.0	117.0
20) Pz>0 for pions	2557.0	2339.1	2339.1	117.0
21) Thprimord<0.4	2442.0	2242.5	2242.5	112.1
22) Nunh*fracunh<200	2442.0	2242.5	2242.5	112.1
23) Pt+wrt (-) > 0.05	2393.0	2196.7	2196.7	109.8
24) Mee > 0.10	2259.0	2073.2	2073.2	103.7
25) PneutAsym>0.5	2249.0	2065.1	2065.1	103.3
26) PpiAsym>-0.8	2247.0	2063.1	2063.1	103.2
27) 20<Phi12<160deg	1147.0	1056.5	1056.5	52.8
28) LH38>0.5 (OFF)	1147.0	1056.5	1056.5	52.8
29) P+,P->1.0	1144.0	1053.8	1053.8	52.7

Table 14: Cut Table CohPhi

5 Normalizations

5.1 Background Normalization

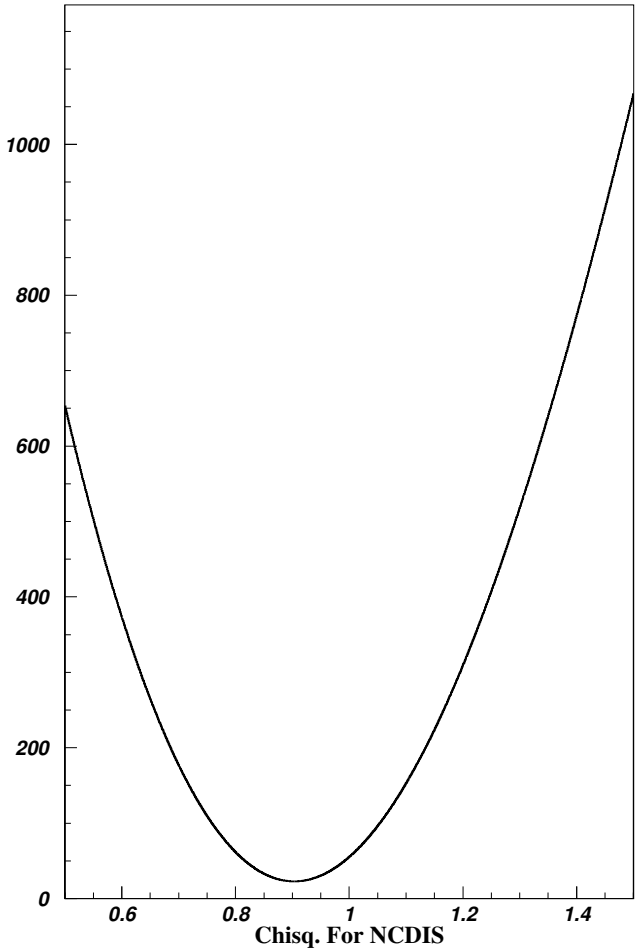

Figure 1: 1σ χ^2 plot for NCDIS

χ^2 Min 22.835 Number of bins used: 18 One σ: 1.126		
	NCDIS	
Norm at Min χ^2	0.903	
-1 σ	0.886	(1.9%)
$+1$ σ	0.920	(1.9%)

Table 15: χ^2 for NCDIS on plot:ϕ_{12} ($\boldsymbol{\zeta_{\pi\pi} > 0.075}$), $\boldsymbol{P_{\pm} \geq 0.5}$

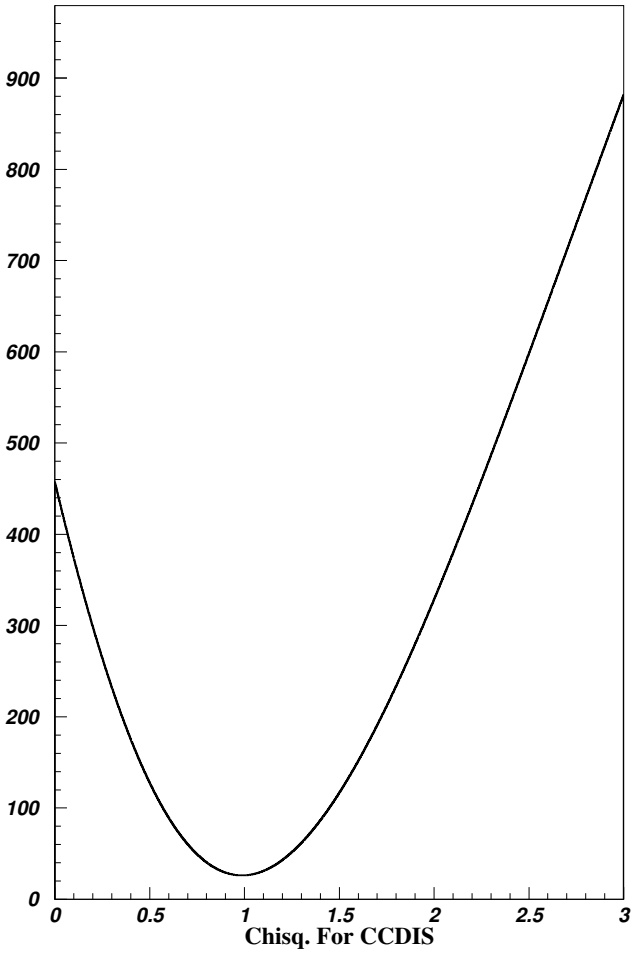

Figure 2: 1σ χ^2 plot for CCDIS

χ^2 Min 26.207 Number of bins used: 32 One σ: 0.905		
	CCDIS	
Norm at Min χ^2	0.987	
-1 σ	0.940	(4.8%)
$+1$ σ	1.035	(4.9%)

Table 16: χ^2 for CCDIS on plot:ϕ_{12}, $P_{\pm} \geq 0.5$

	OBG	
Norm at Min χ^2	0.234060	
-1 σ	0.225325	(3.7%)
$+1$ σ	0.242795	(3.7%)
Number of OBG used 718		

Table 17: Normalization for OBG by number of events within Kaon mass range

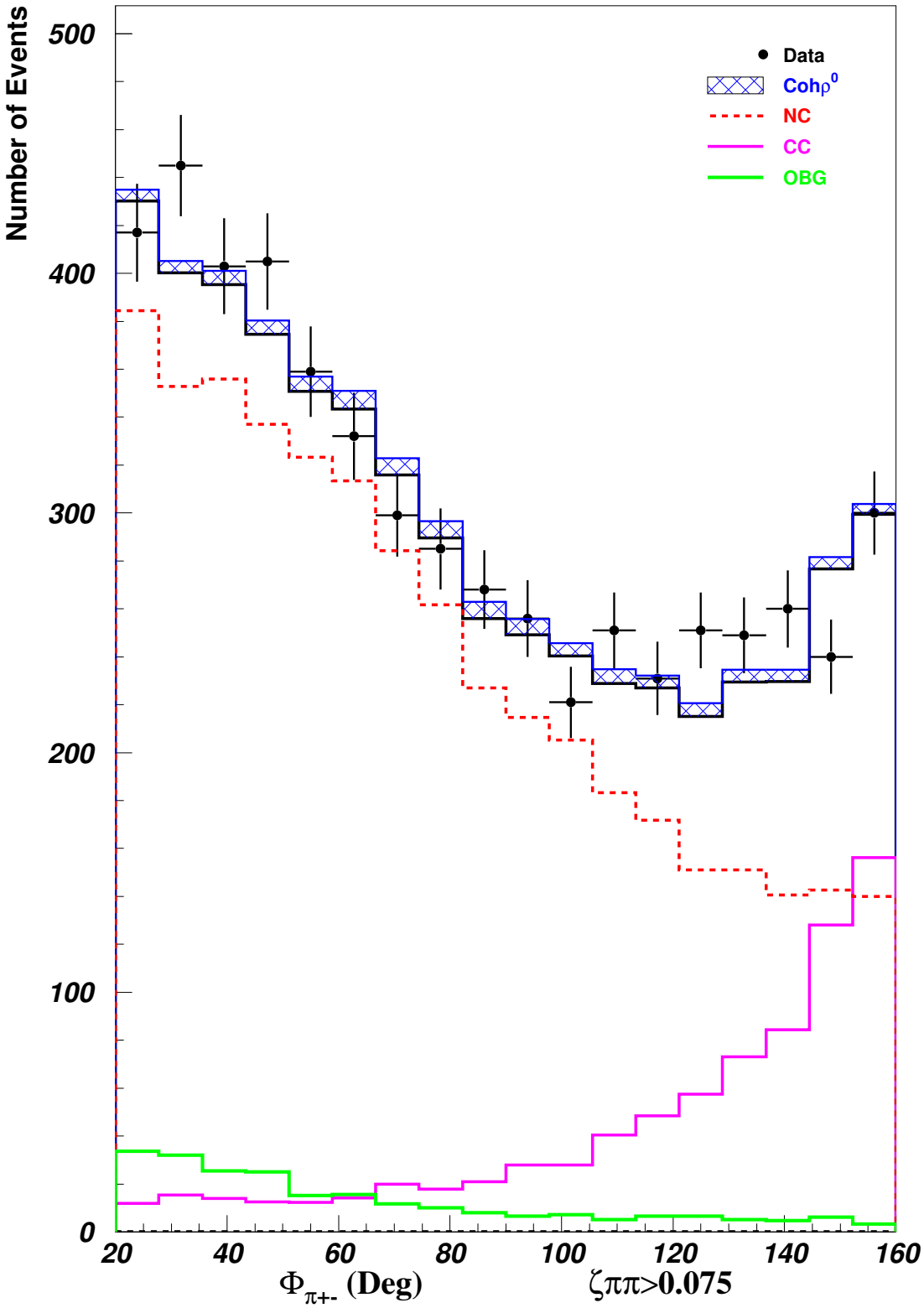

Figure 3: Plot used for NCDIS χ^2 normalization

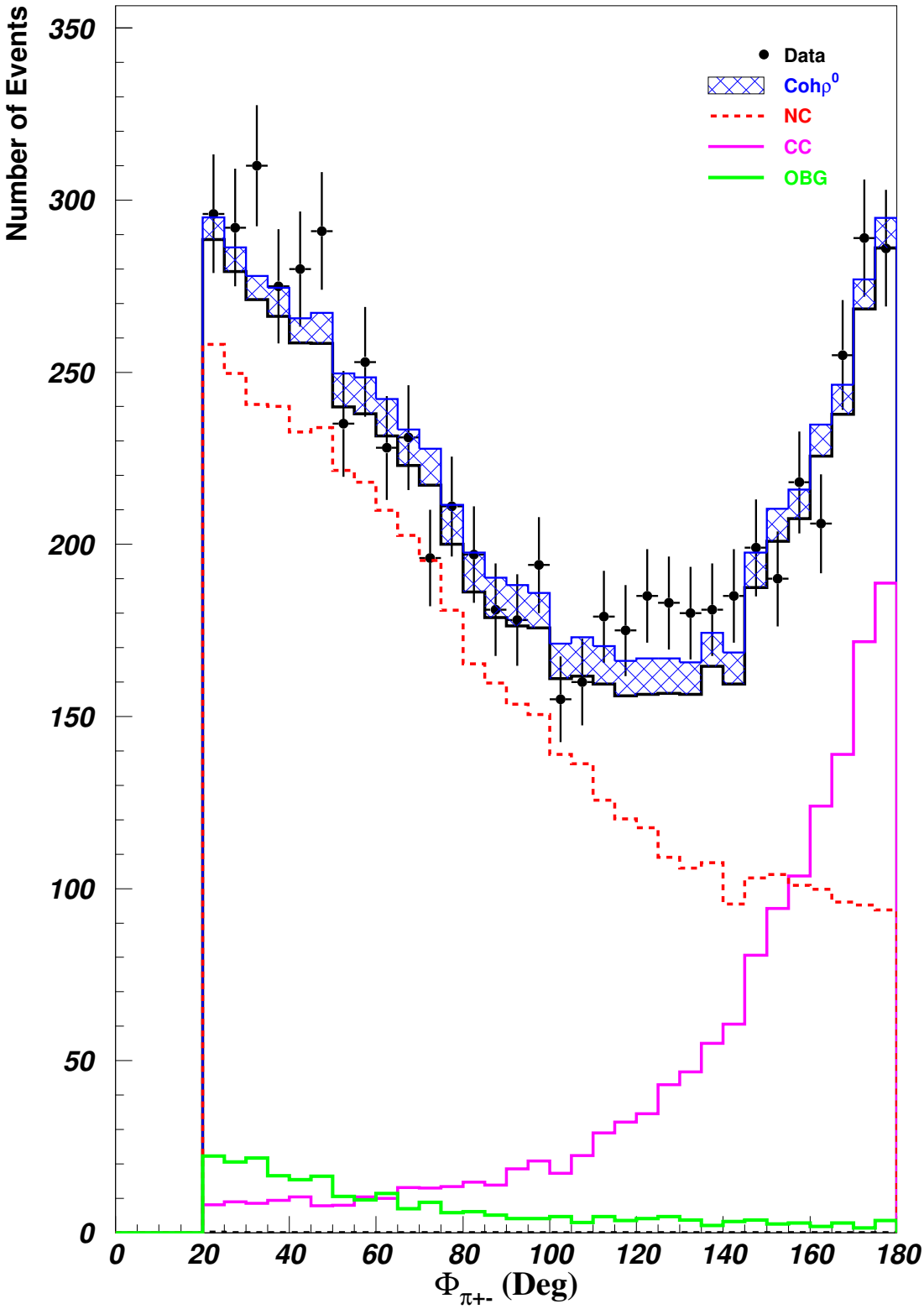

Figure 4: Plot used for CCDIS χ^2 normalization

5.2 Cohρ^0 Normalization

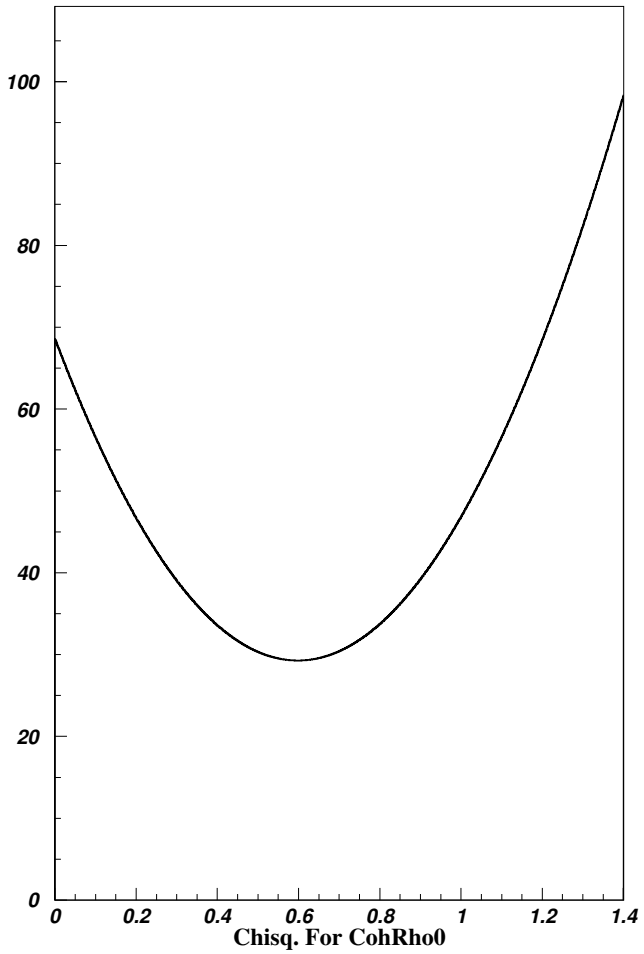

Figure 5: χ^2 plot for Coh$\boldsymbol{\rho^0}$

χ^2 Min 29.274 Number of bins used: 20 One σ: 1.210		
	Coh$\boldsymbol{\rho^0}$	
Norm at Min χ^2	0.598	
-1 σ	0.493	(17.6%)
$+1$ σ	0.703	(17.6%)

Table 18: χ^2 for Coh$\boldsymbol{\rho^0}$ on plot:$\boldsymbol{\zeta_{\pi\pi}}$(0-0.1) In $\boldsymbol{\rho}$ Mass, $\boldsymbol{P_{\pm} \geq 0.5}$

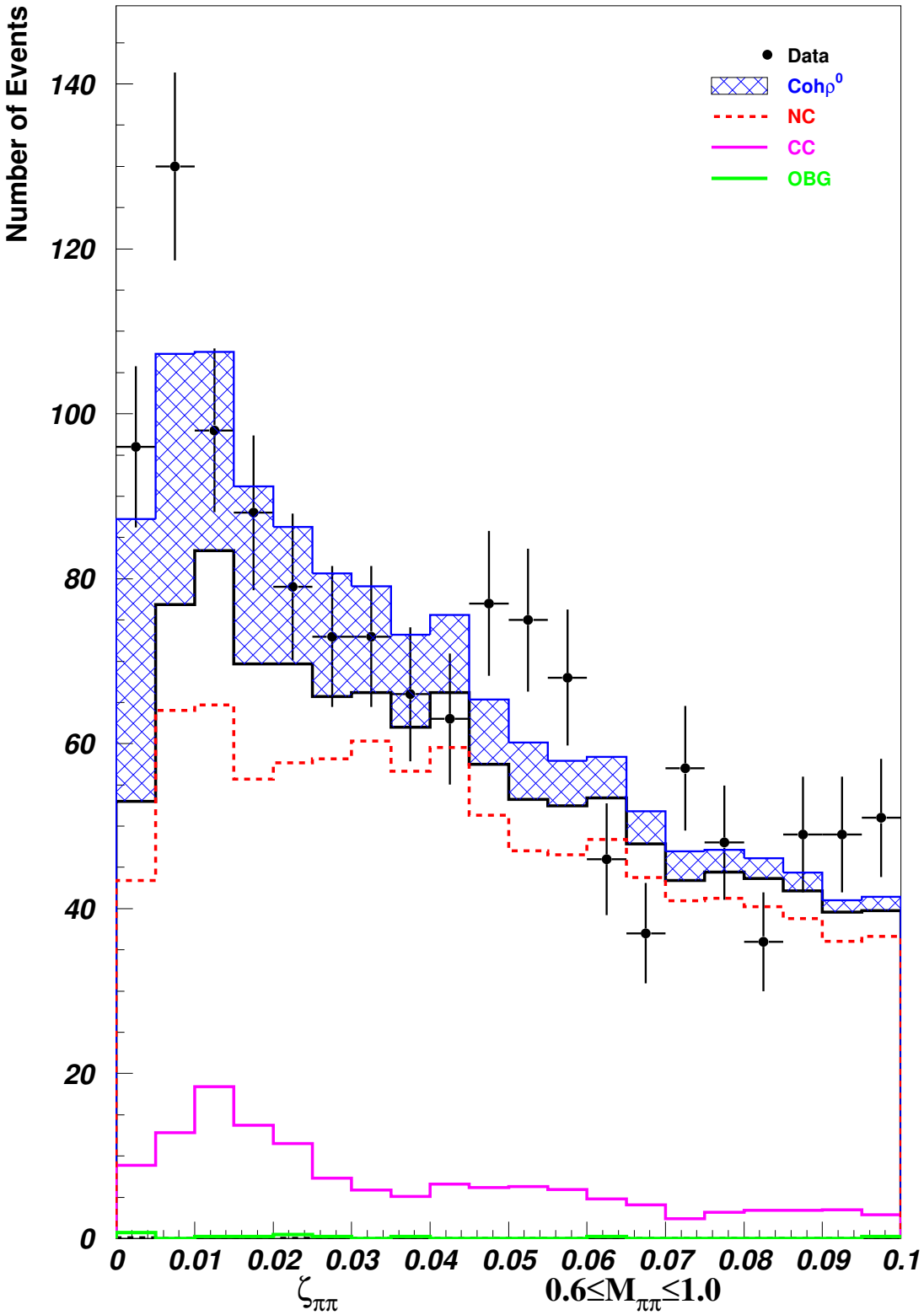

Figure 6: Plot used for Cohρ^0 χ^2 normalization

6 Systematic Variations

NCDIS Stat Var				nbins:	20
BKG Variation	$Coh\rho$ Norm	$+1\sigma$	-1σ	χ^2	σ
$+1\sigma$	0.562	+ 0.106(18.86%)	- 0.105(18.68%)	29.744	1.220
Central	0.598	+ 0.105(17.56%)	- 0.105(17.56%)	29.274	1.210
-1σ	0.633	+ 0.105(16.59%)	- 0.104(16.43%)	28.969	1.204
Effect:	0.598	+ 0.035(5.85%)	- 0.036(6.02%)		

Table 19: Systematic variations in background NCDIS with $P_{\pm} \geq 0.5$

CCDIS Stat Var				nbins:	20
BKG Variation	$Coh\rho$ Norm	$+1\sigma$	-1σ	χ^2	σ
$+1\sigma$	0.585	+ 0.105(17.95%)	- 0.105(17.95%)	29.410	1.213
Central	0.598	+ 0.105(17.56%)	- 0.105(17.56%)	29.274	1.210
-1σ	0.611	+ 0.104(17.02%)	- 0.105(17.18%)	29.149	1.207
Effect:	0.598	+ 0.013(2.17%)	- 0.013(2.17%)		

Table 20: Systematic variations in background CCDIS with $P_{\pm} \geq 0.5$

OBG Stat Var				nbins:	20
BKG Variation	$Coh\rho$ Norm	$+1\sigma$	-1σ	χ^2	σ
$+1\sigma$	0.598	+ 0.104(17.39%)	- 0.105(17.56%)	29.278	1.210
Central	0.598	+ 0.105(17.56%)	- 0.105(17.56%)	29.274	1.210
-1σ	0.598	+ 0.105(17.56%)	- 0.104(17.39%)	29.270	1.210
Effect:	0.598	+ 0.000(0.00%)	- 0.000(0.00%)		

Table 21: Systematic variations in background OBG with $P_{\pm} \geq 0.5$

7 MC Shape Plots

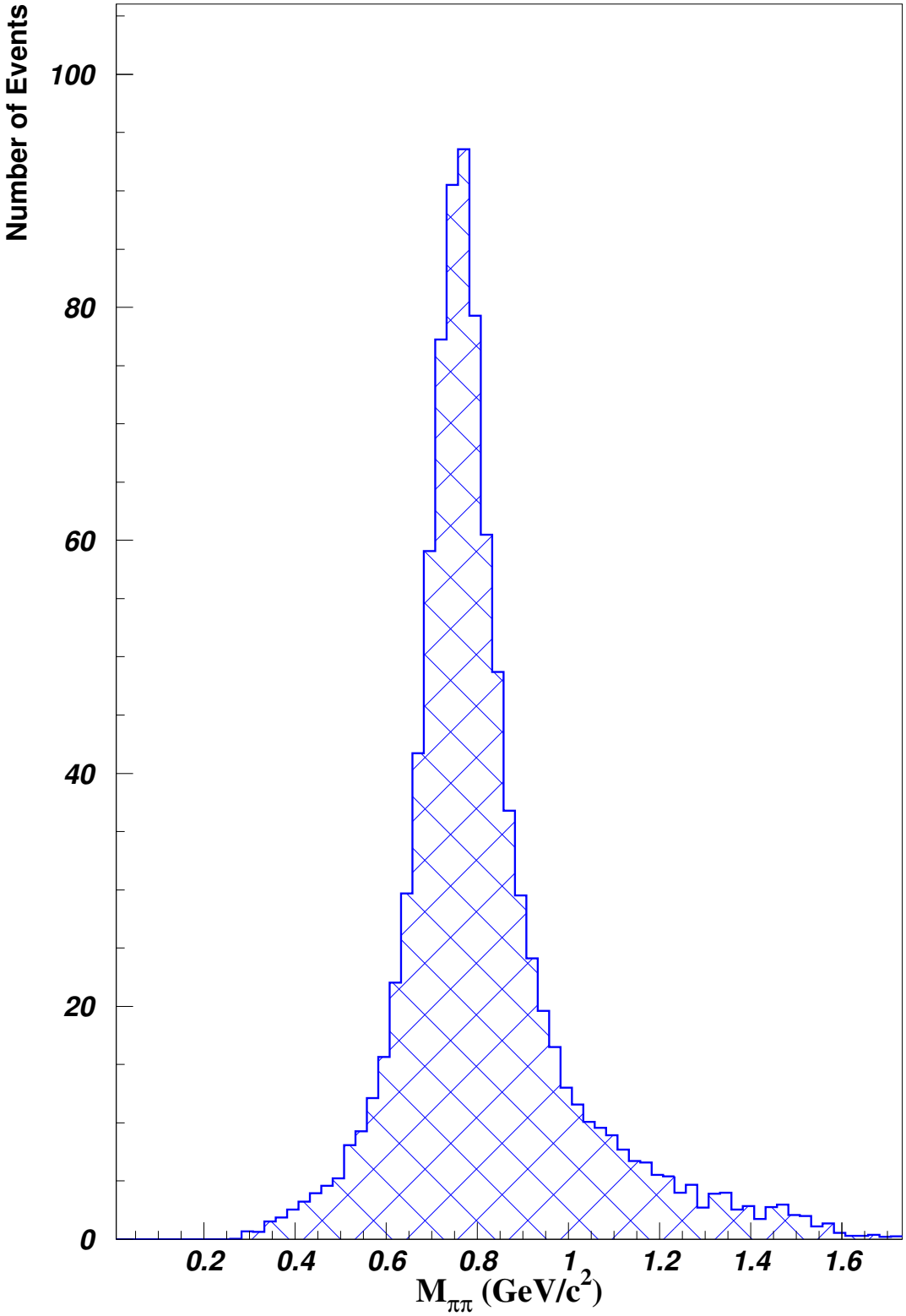

Figure 7: $M_{\pi\pi}$ For Full Cohρ^0 MC (25MeV)

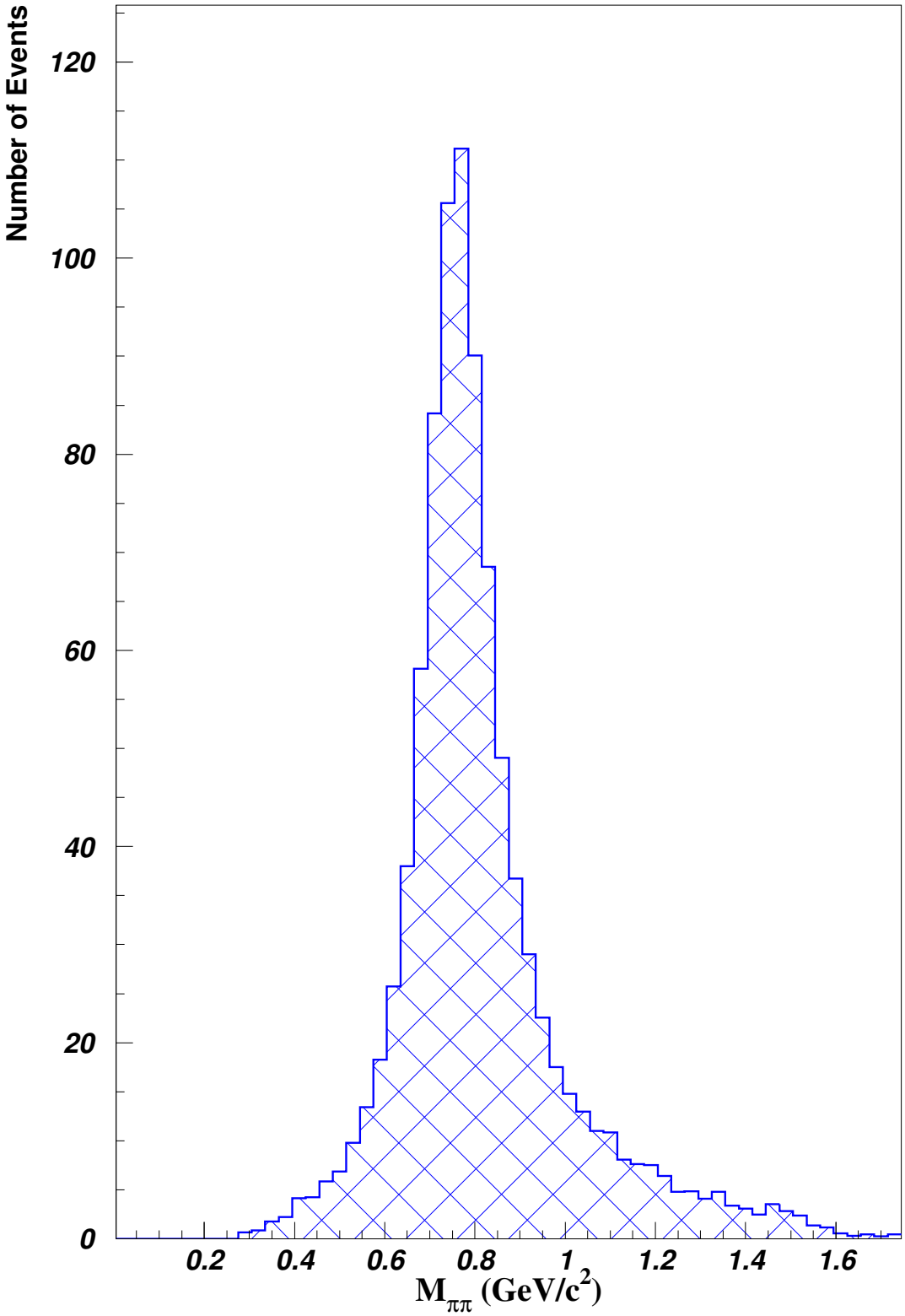

Figure 8: $M_{\pi\pi}$ For Full Cohρ^0 MC (30MeV)

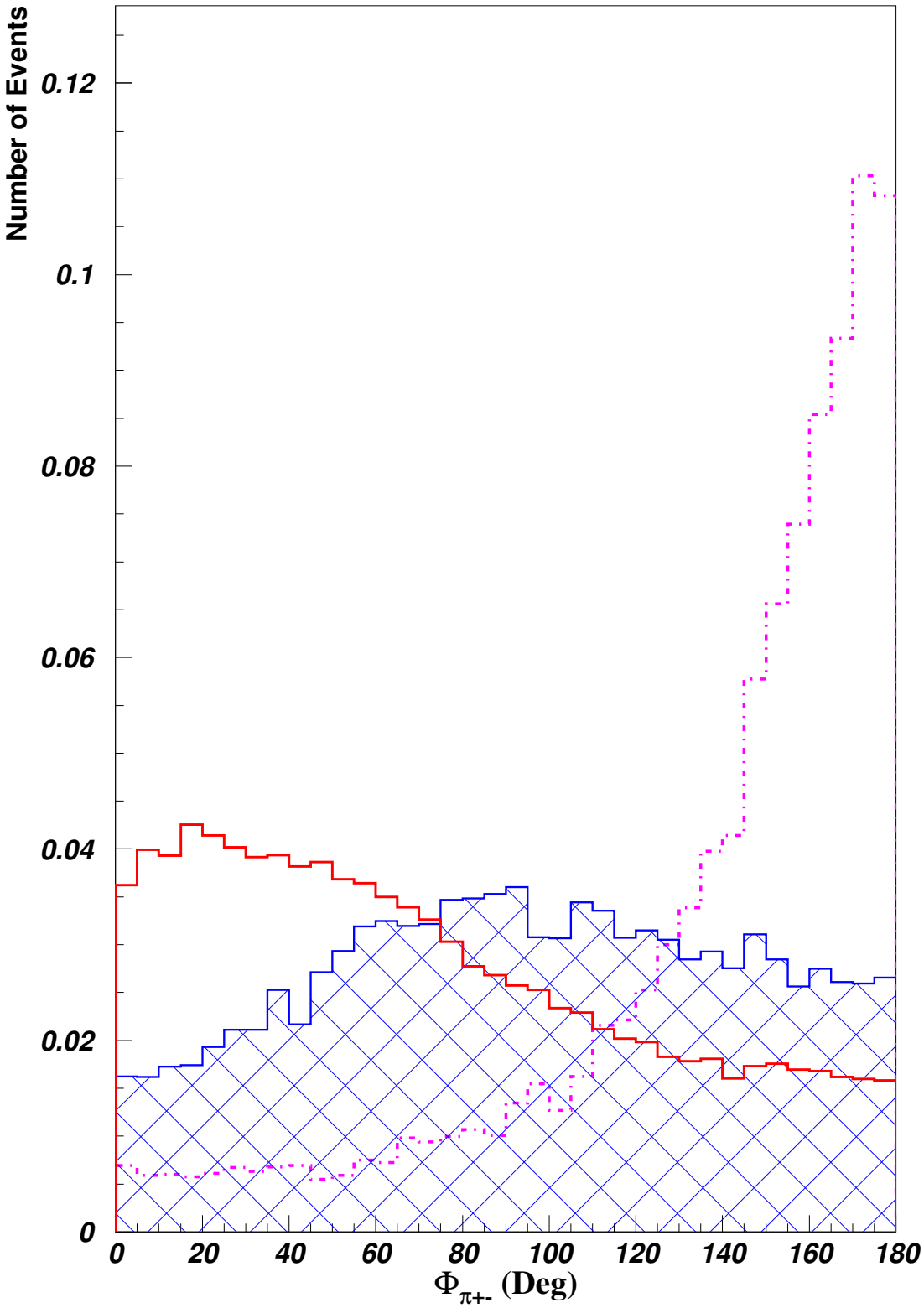

Figure 9: ϕ_{12} MC Shape Comparison

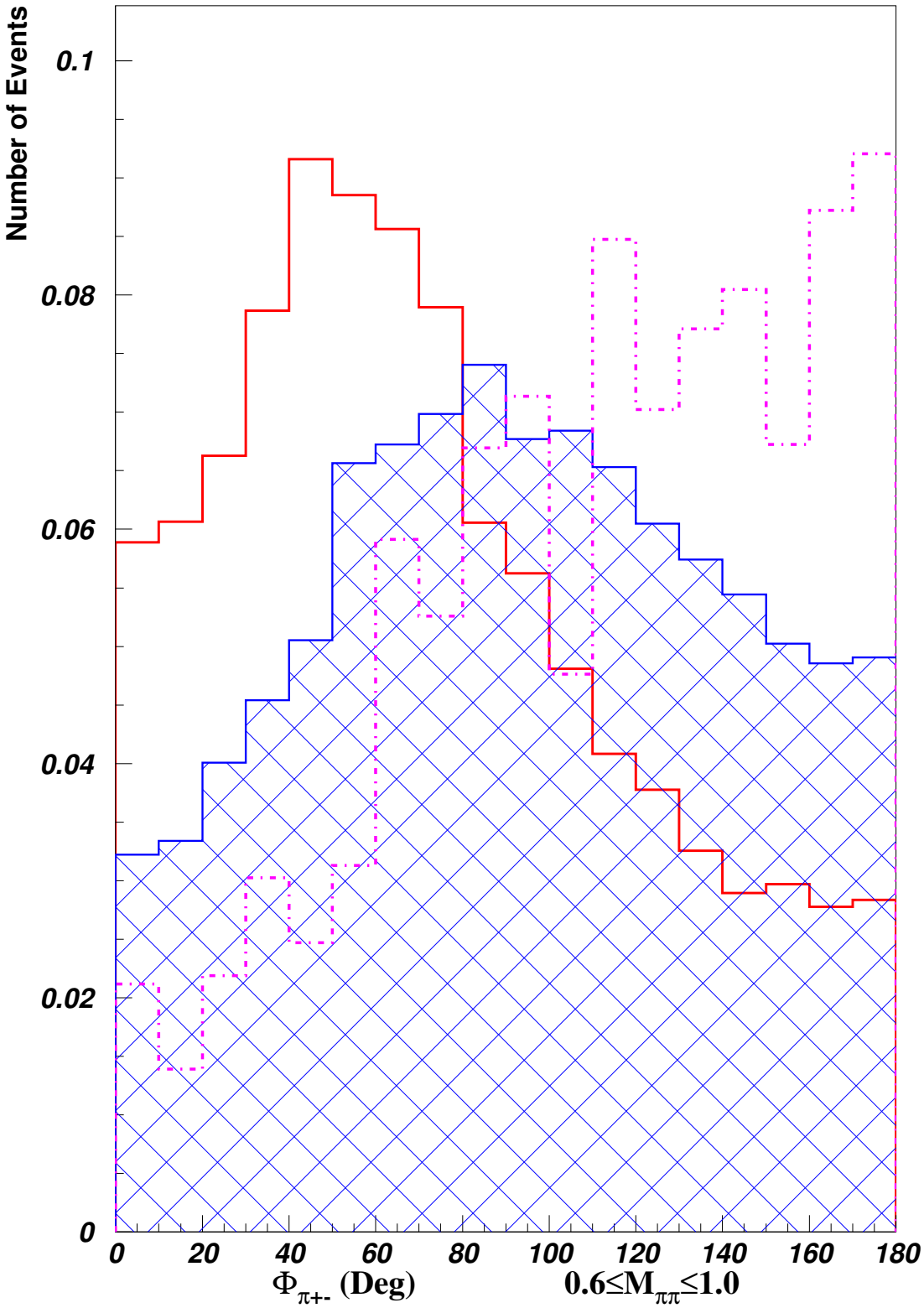

Figure 10: ϕ_{12} in Rho Mass Range MC Shape Comparison

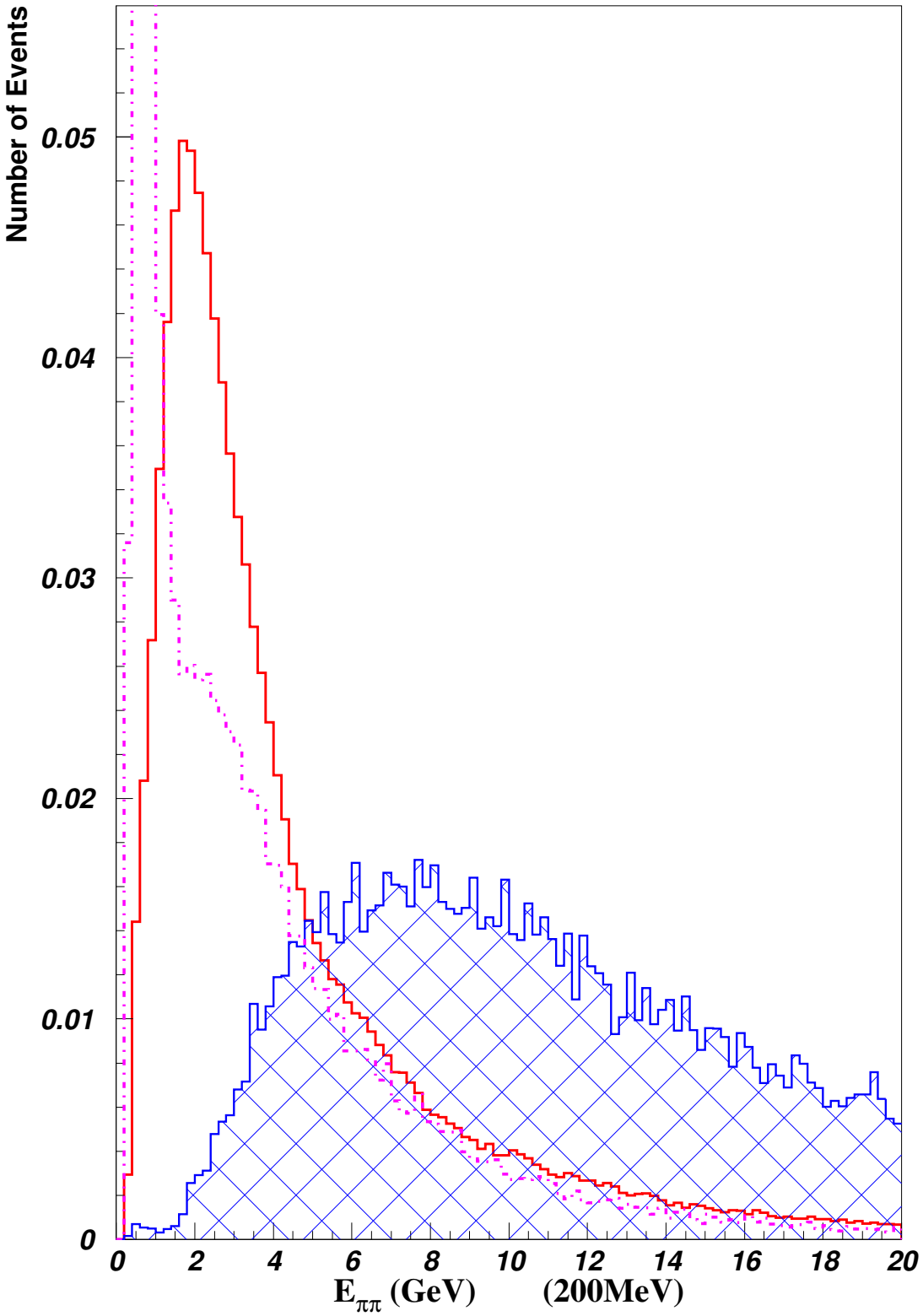

Figure 11: $E_{\pi\pi}$ MC Shape Comparison

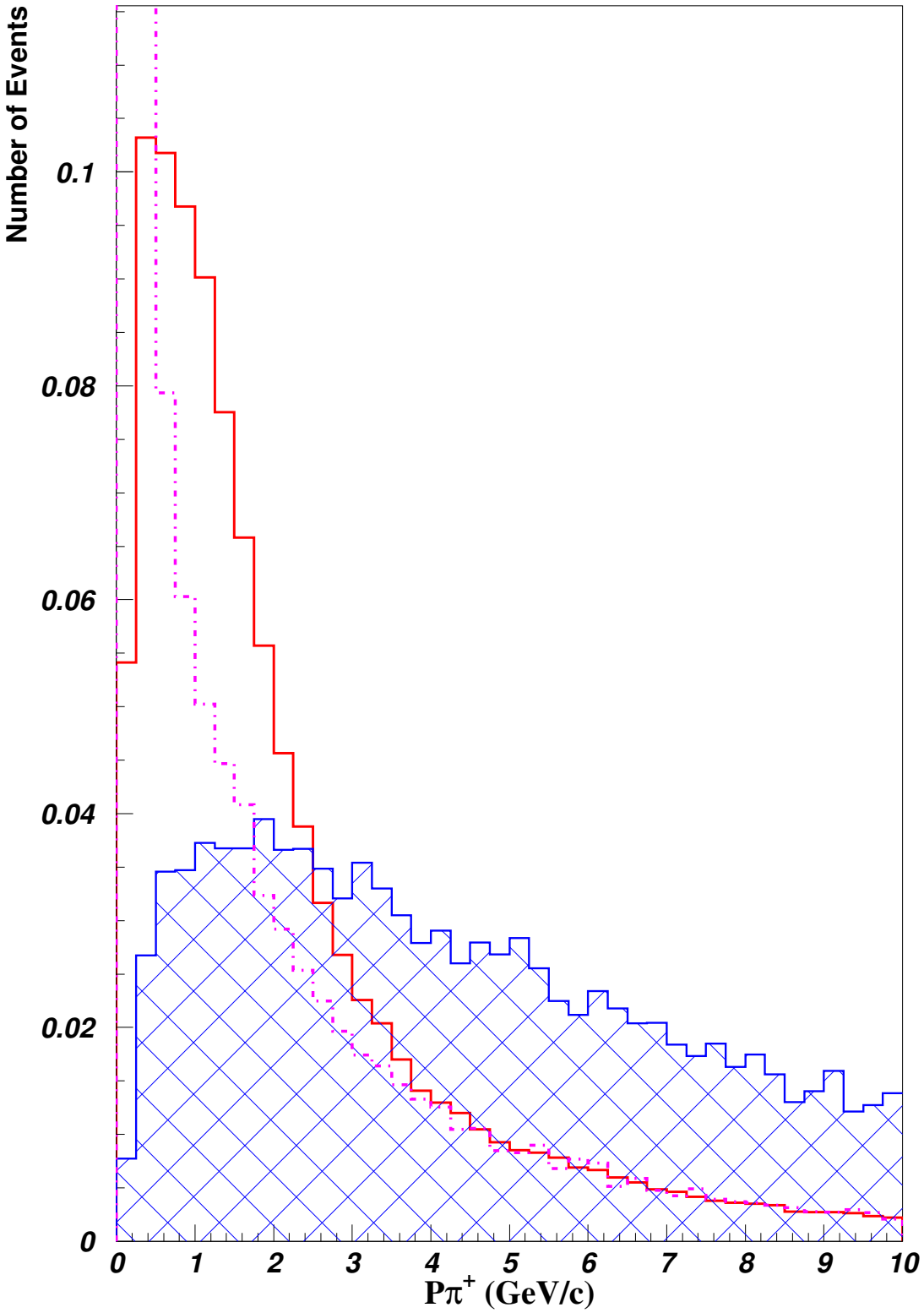

Figure 12: π^+ MC Shape Comparison

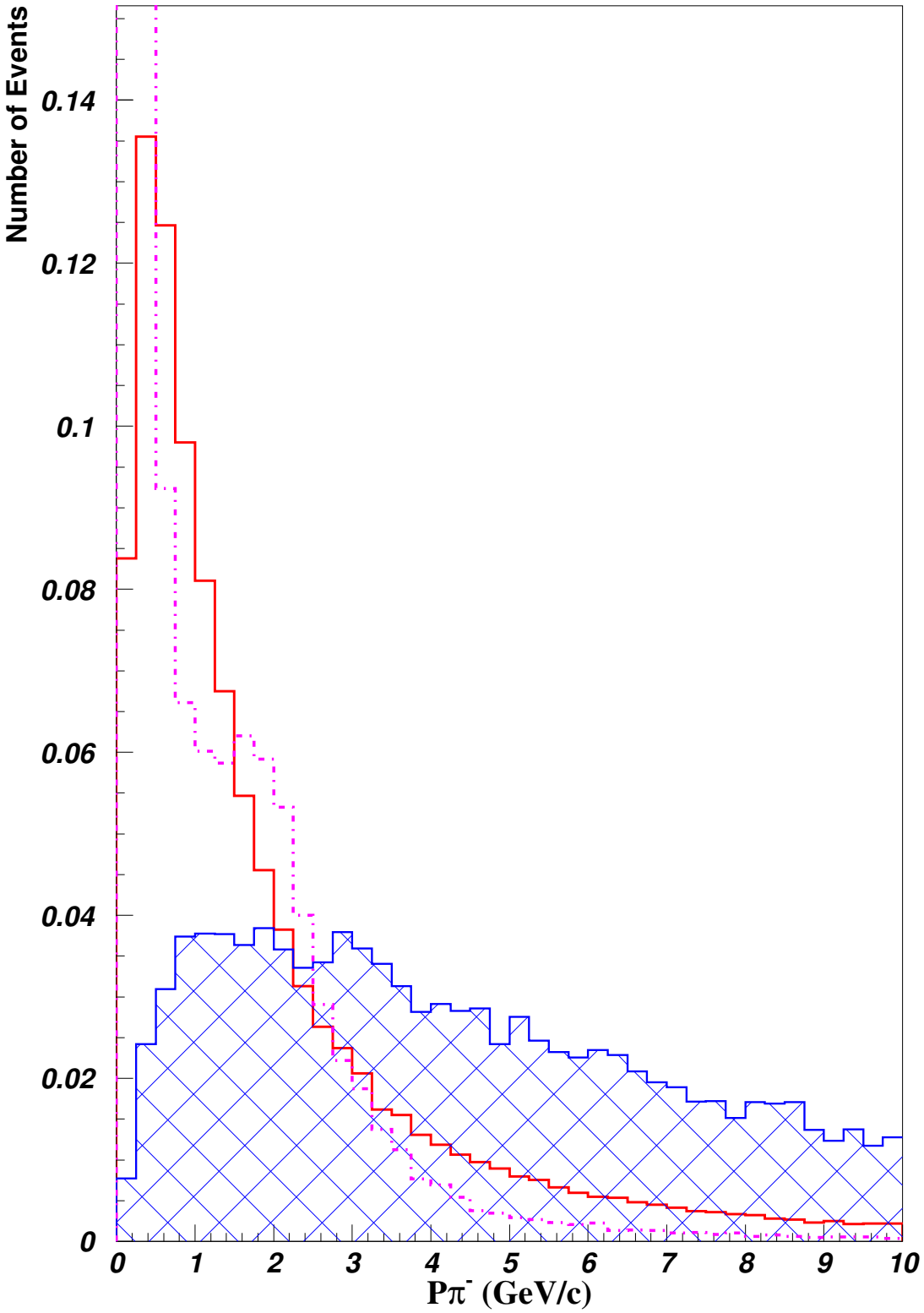

Figure 13: π^- MC Shape Comparison

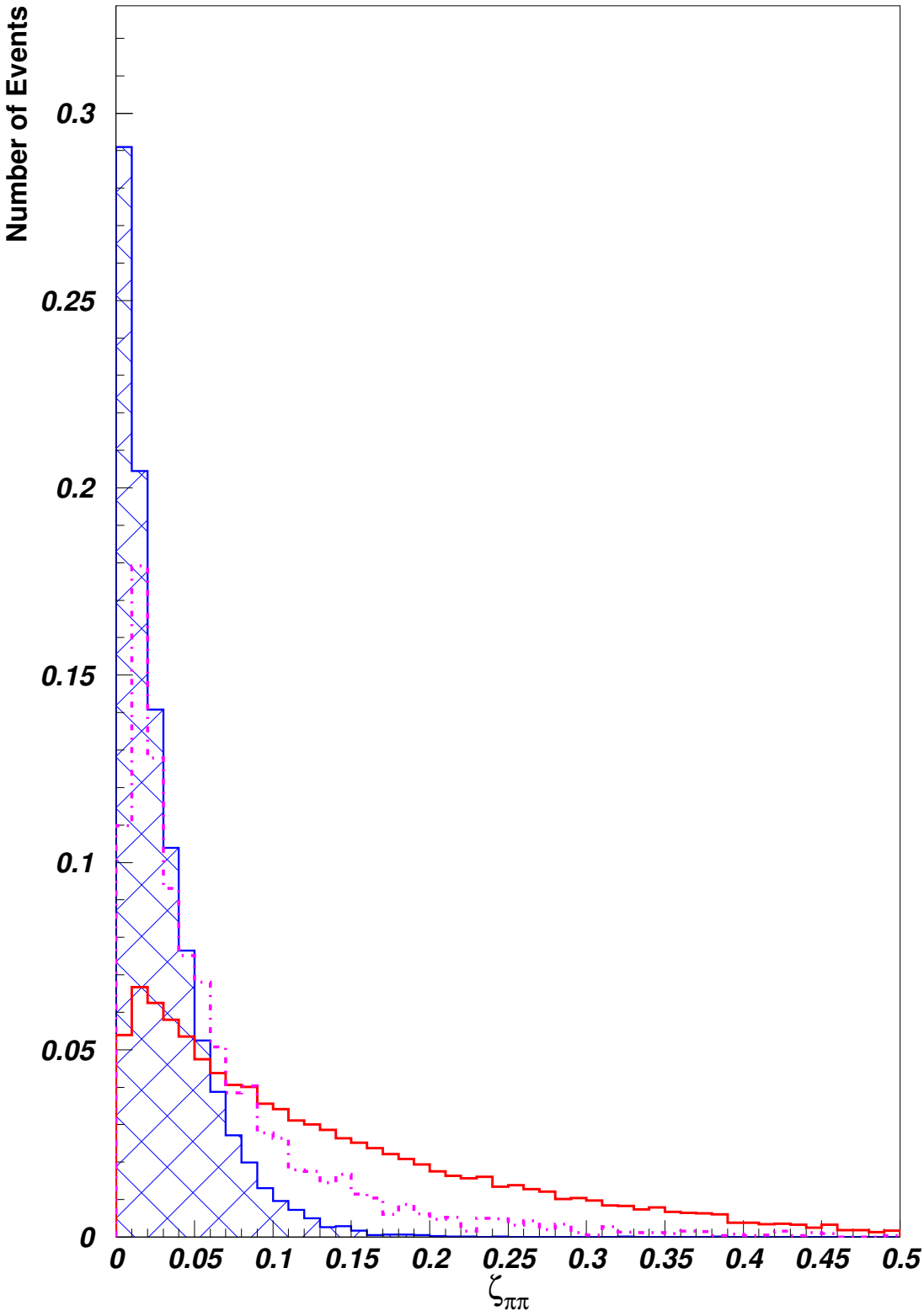

Figure 14: $\zeta_{\pi\pi}$ MC Shape Comparison

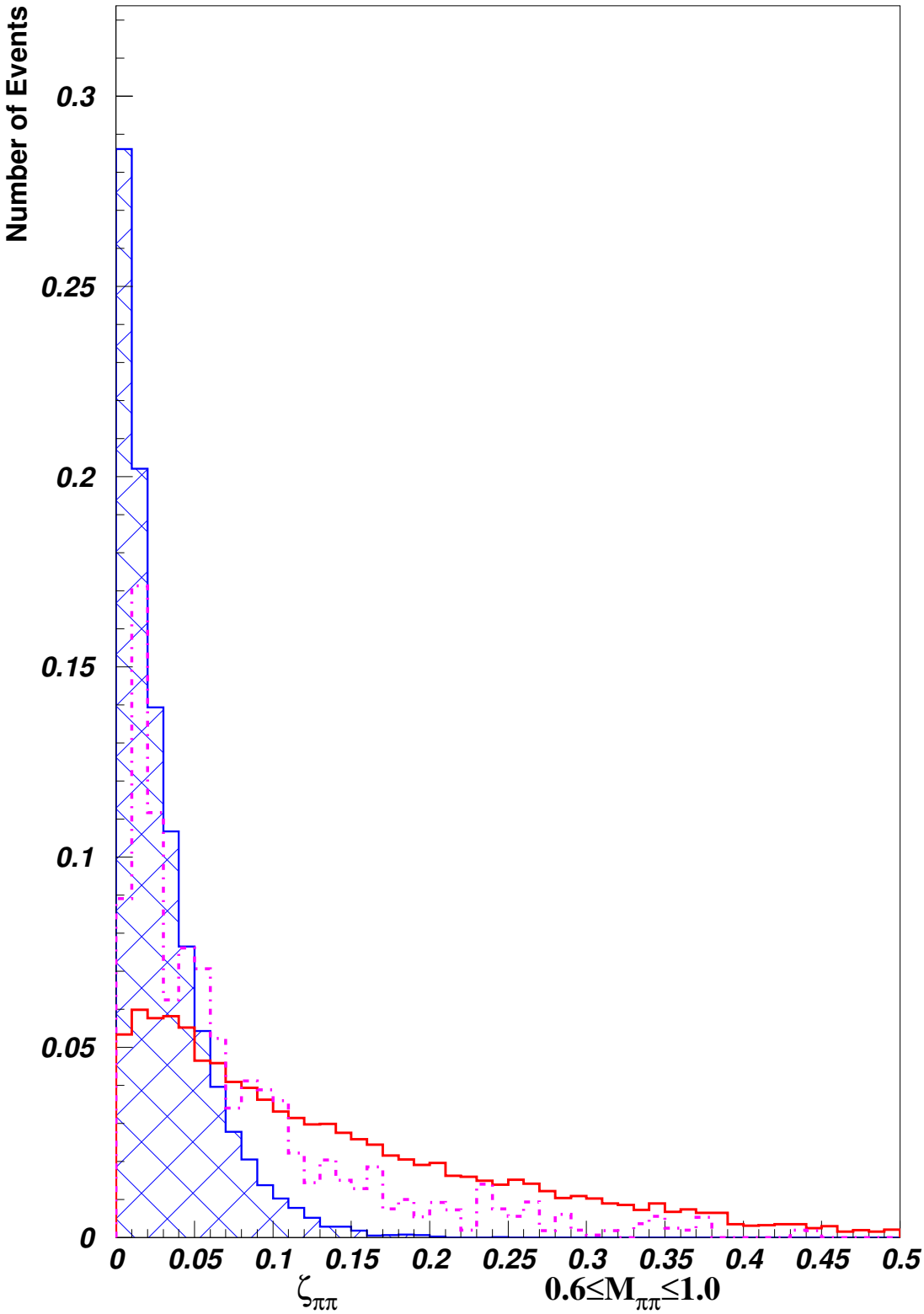

Figure 15: $\zeta_{\pi\pi}$ in Rho Mass Range MC Shape Comparison

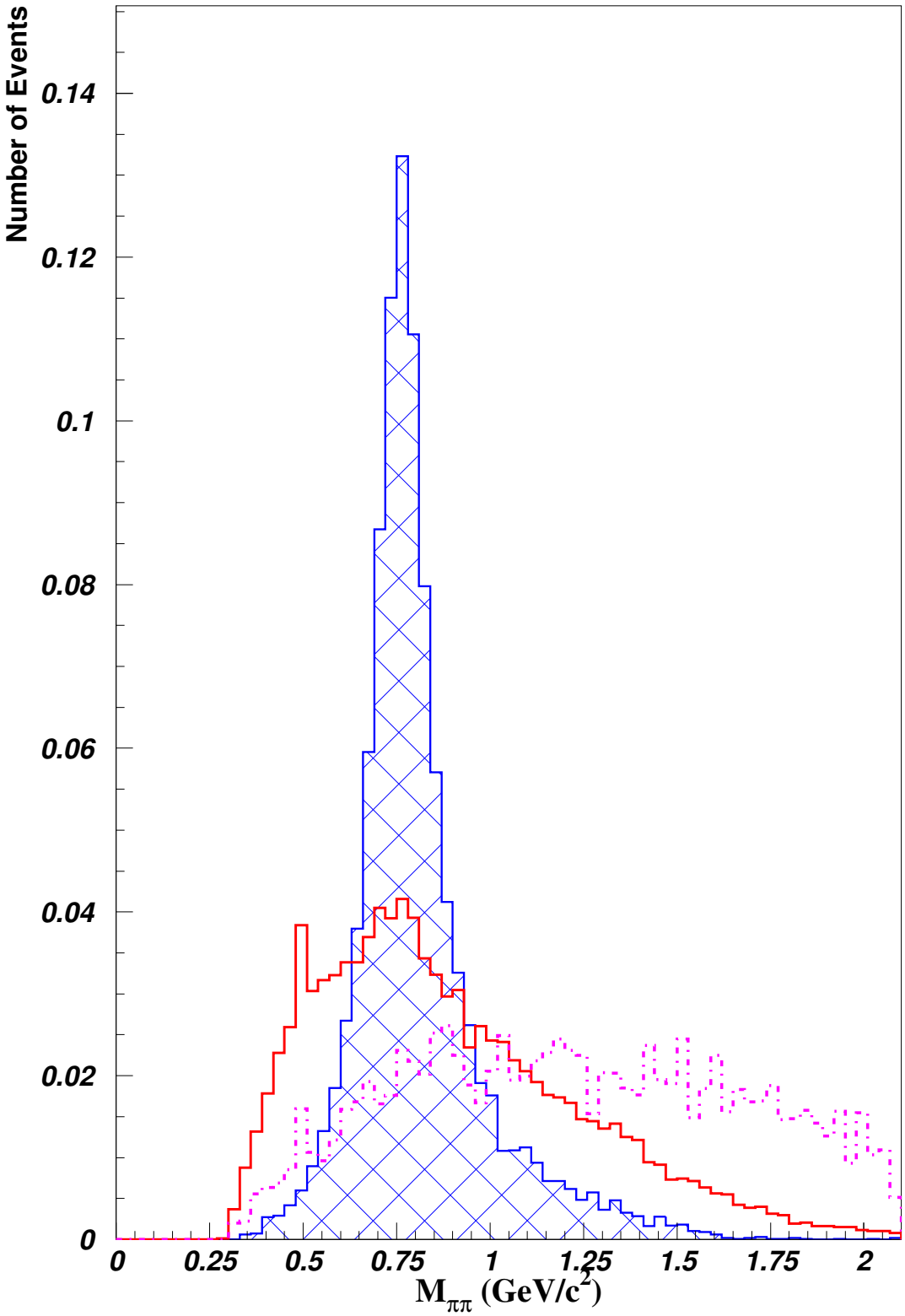

Figure 16: $M_{\pi\pi}$ MC Shape Comparison

8 Plots

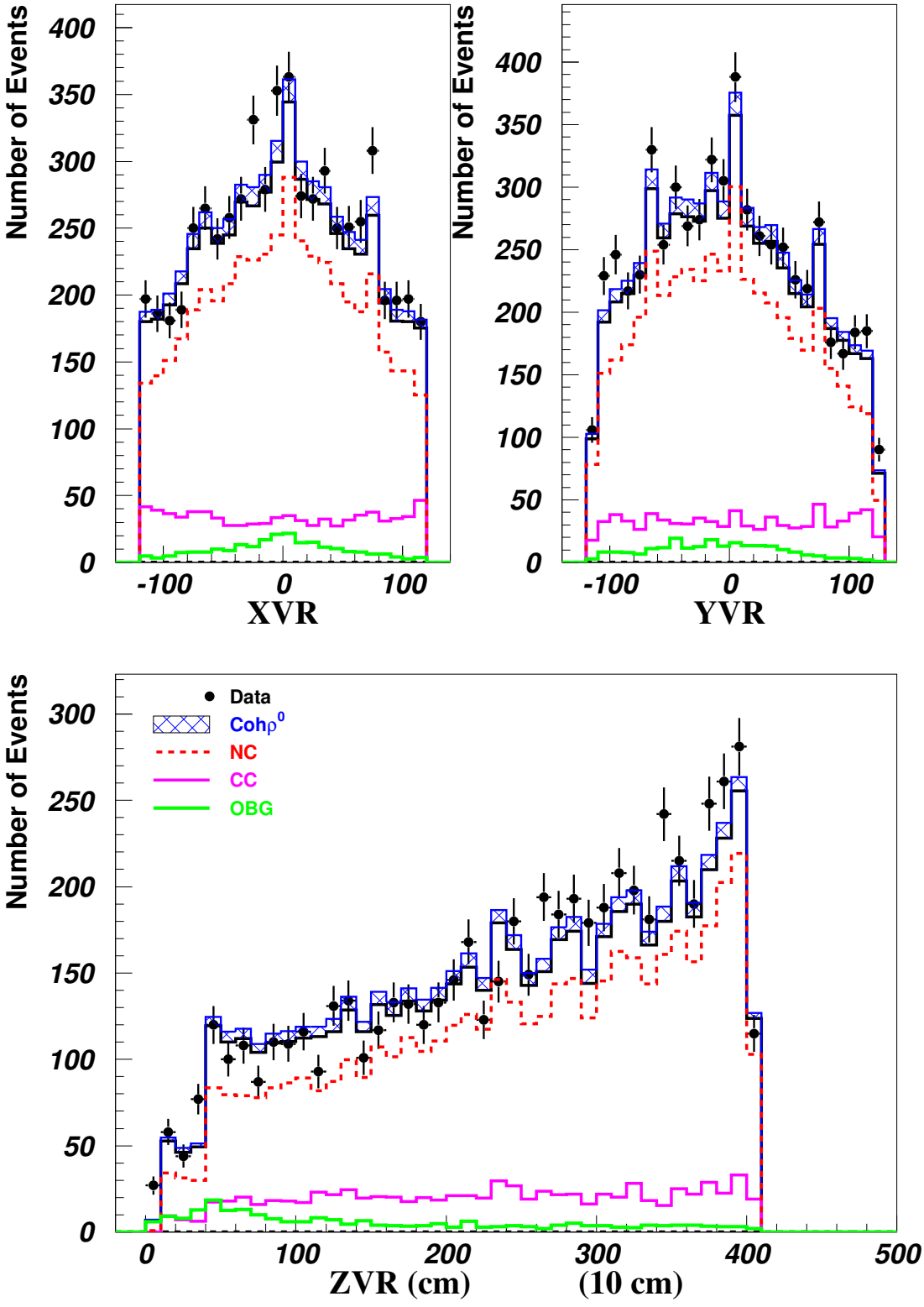

Figure 17: Vertex Position

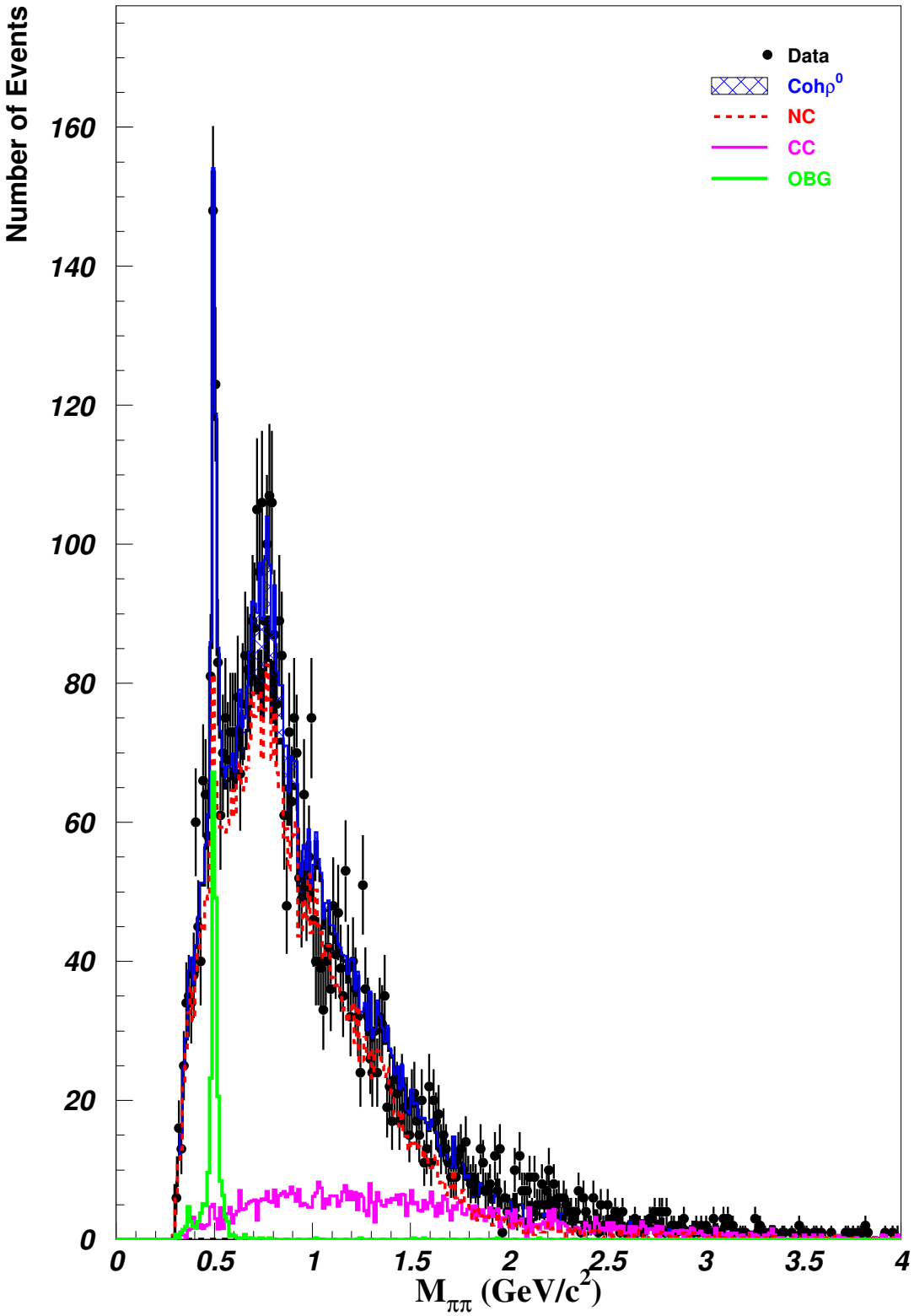

Figure 18: $M_{\pi\pi}$ 12.5MeV

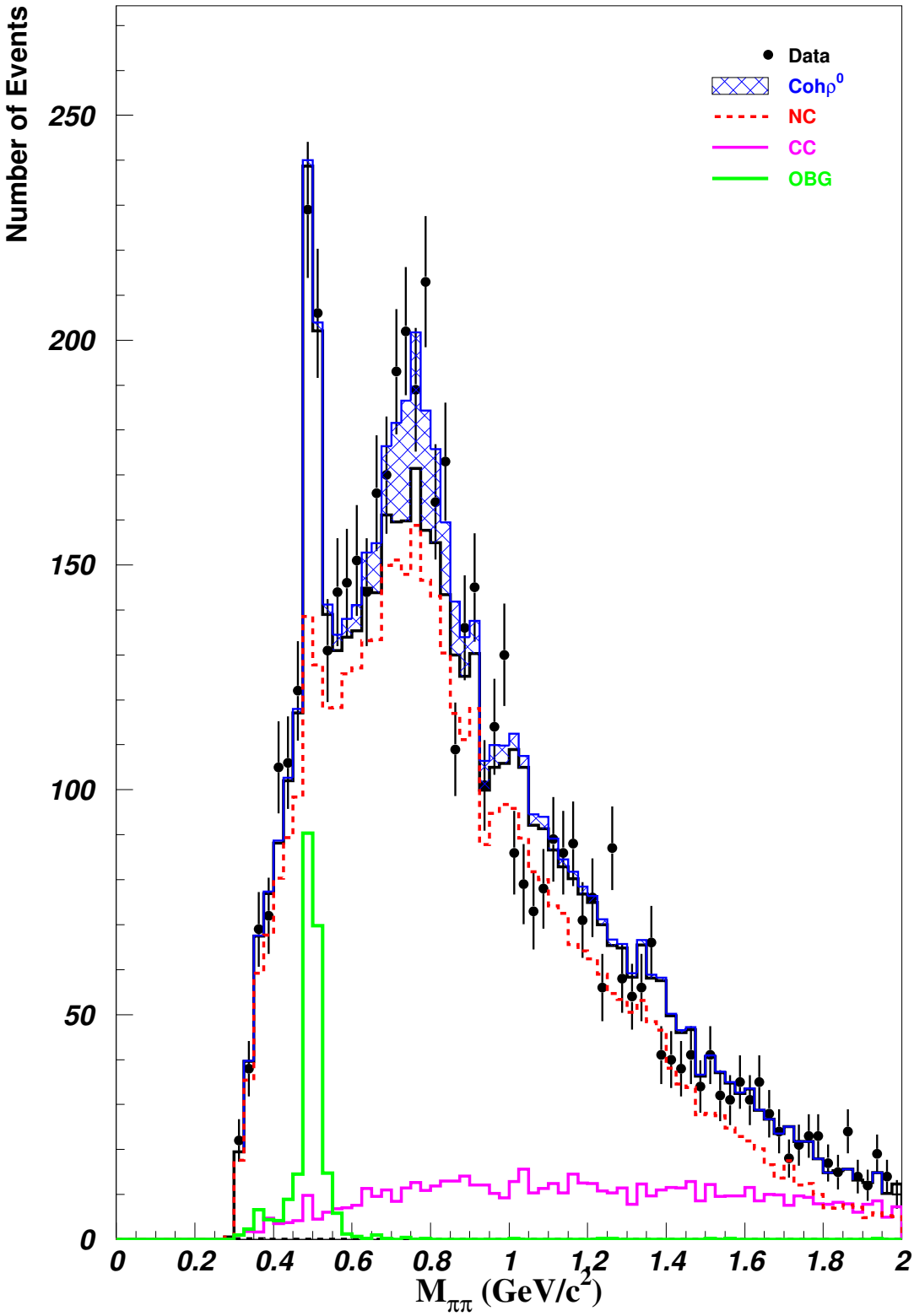

Figure 19: $M_{\pi\pi}$ 25MeV

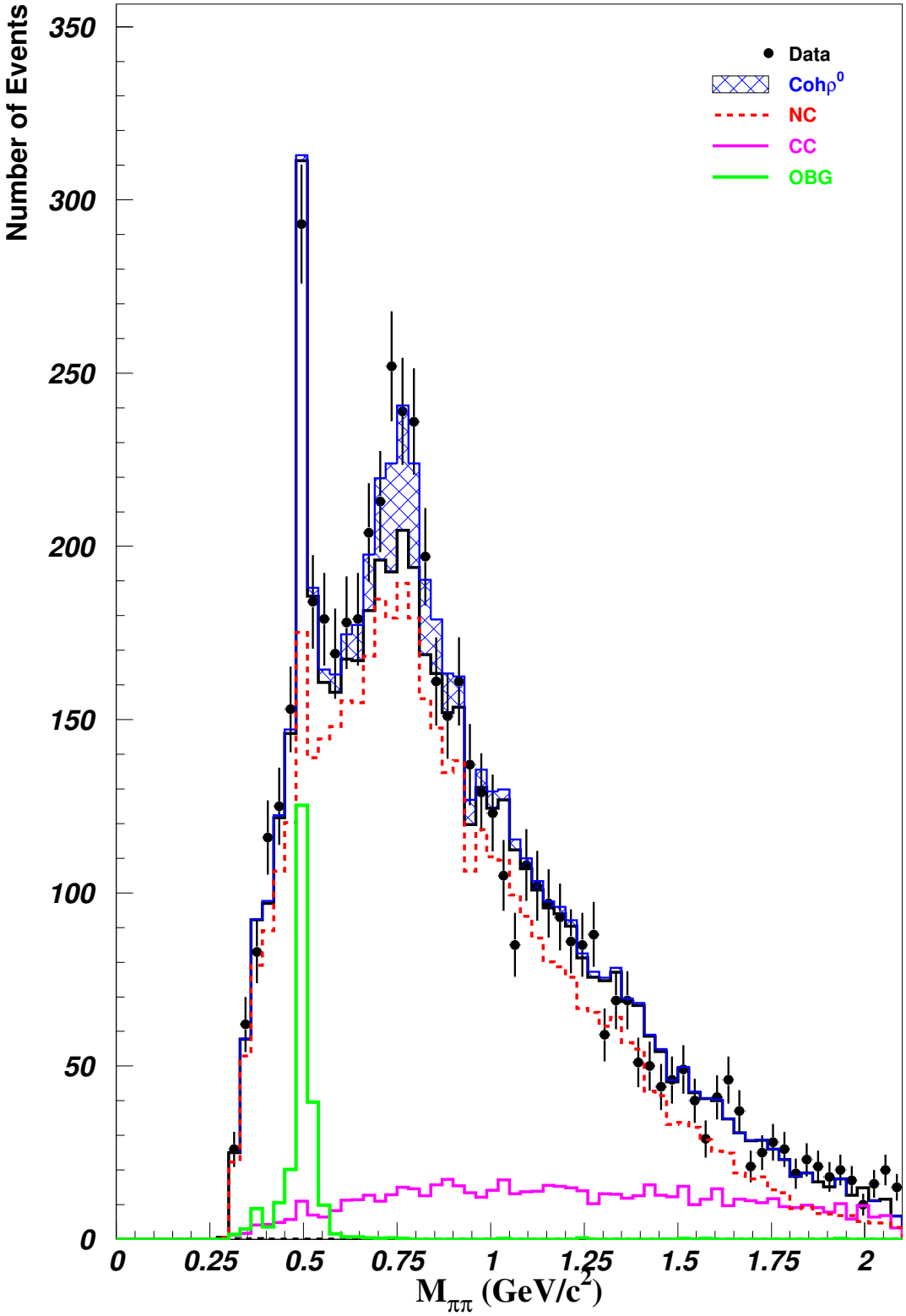

Figure 20: $M_{\pi\pi}$ 30MeV

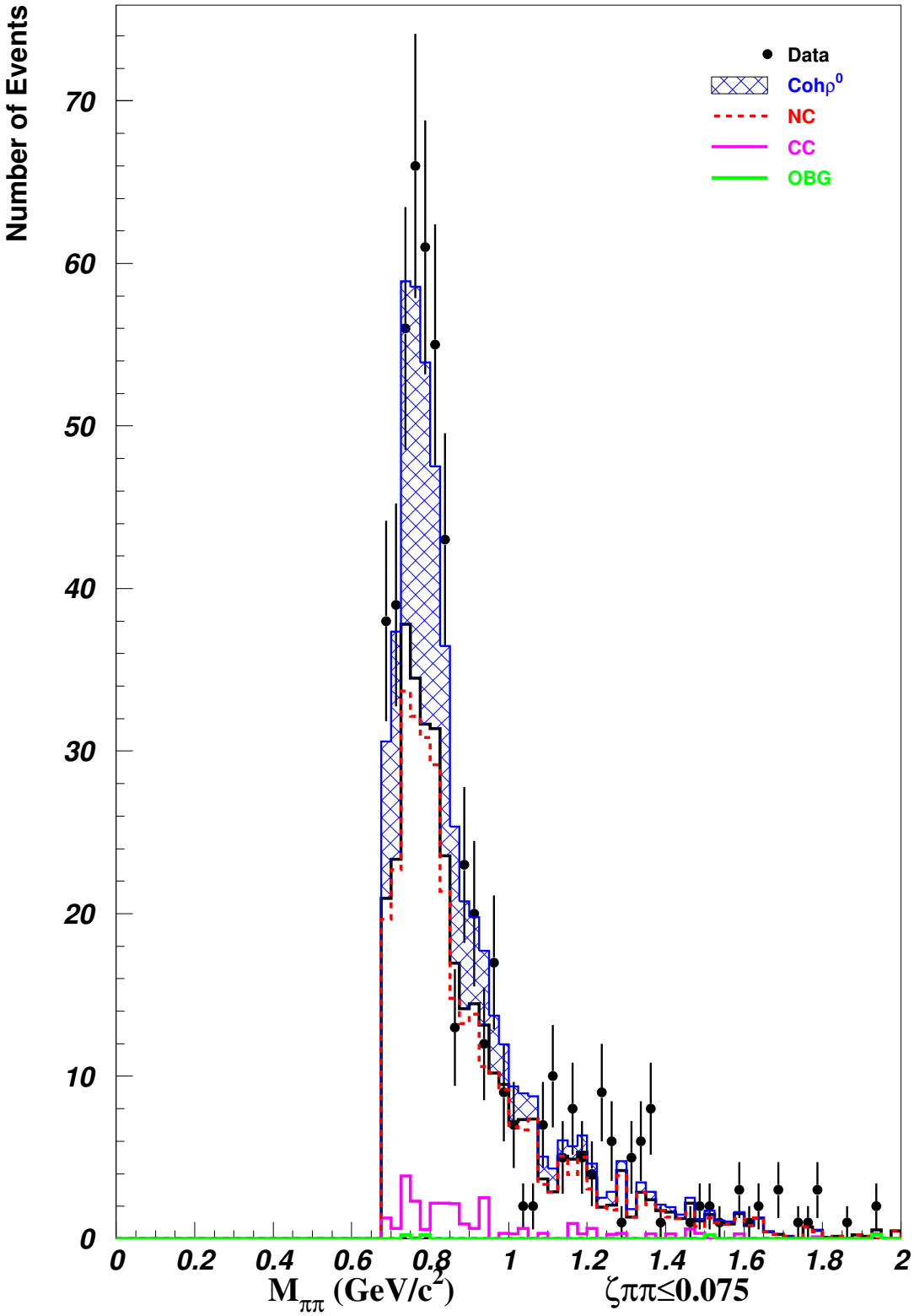

Figure 21: $M_{\pi\pi}$ 25MeV (Signal Region)

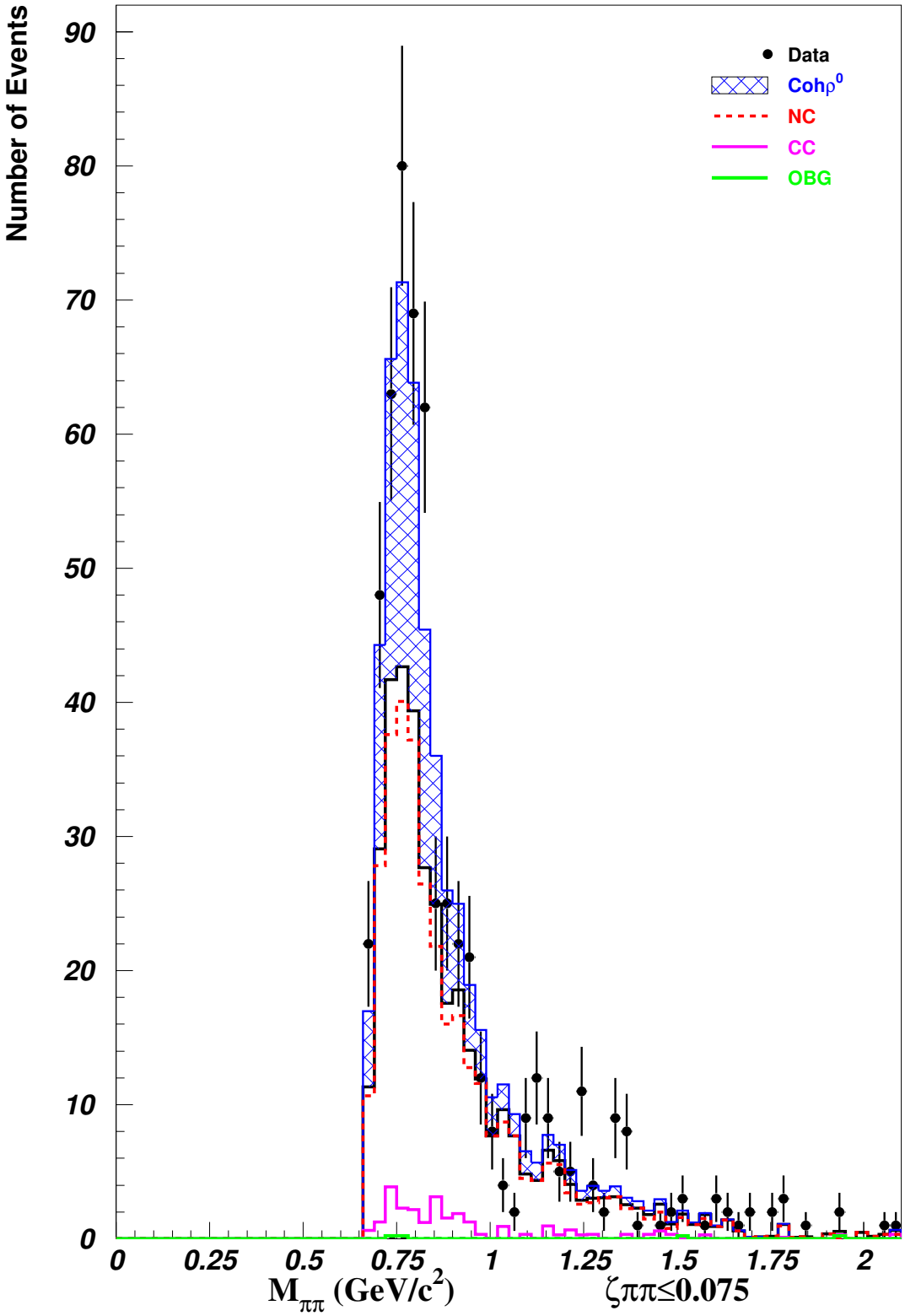

Figure 22: $M_{\pi\pi}$ 30MeV (Signal Region)

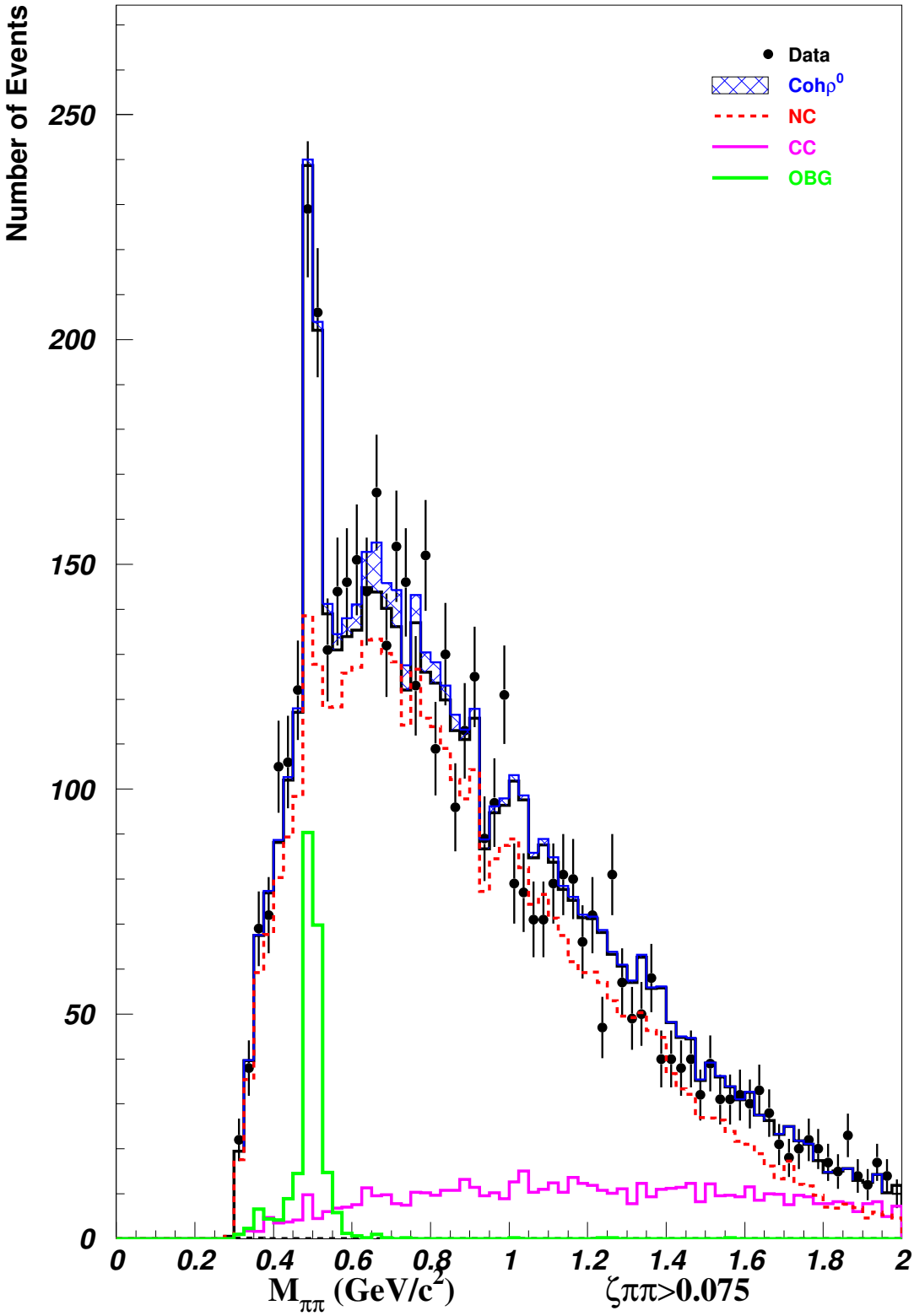

Figure 23: $M_{\pi\pi}$ 25MeV (Background Region)

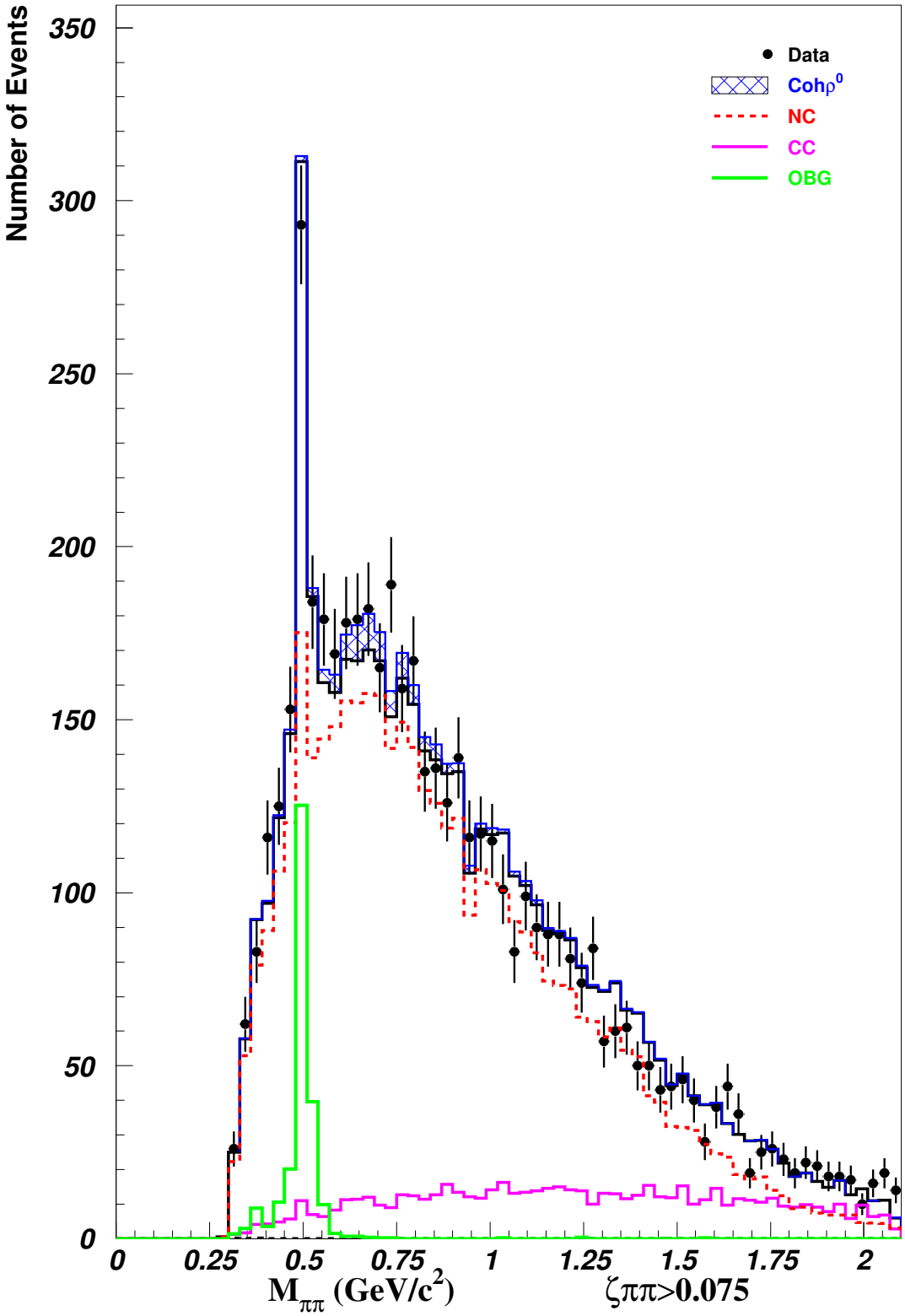

Figure 24: $M_{\pi\pi}$ 30MeV (Background Region)

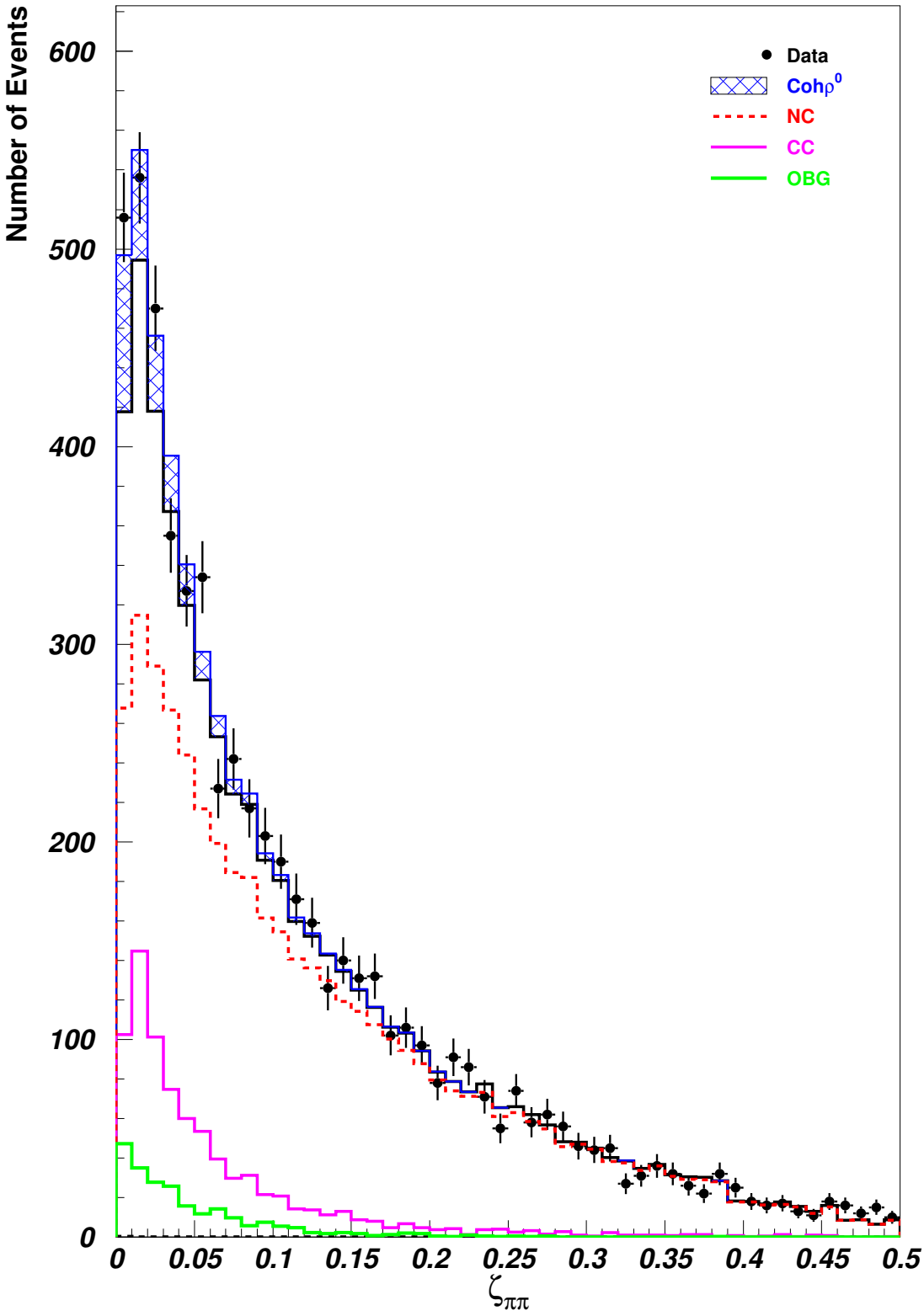

Figure 25: $\zeta_{\pi\pi}$

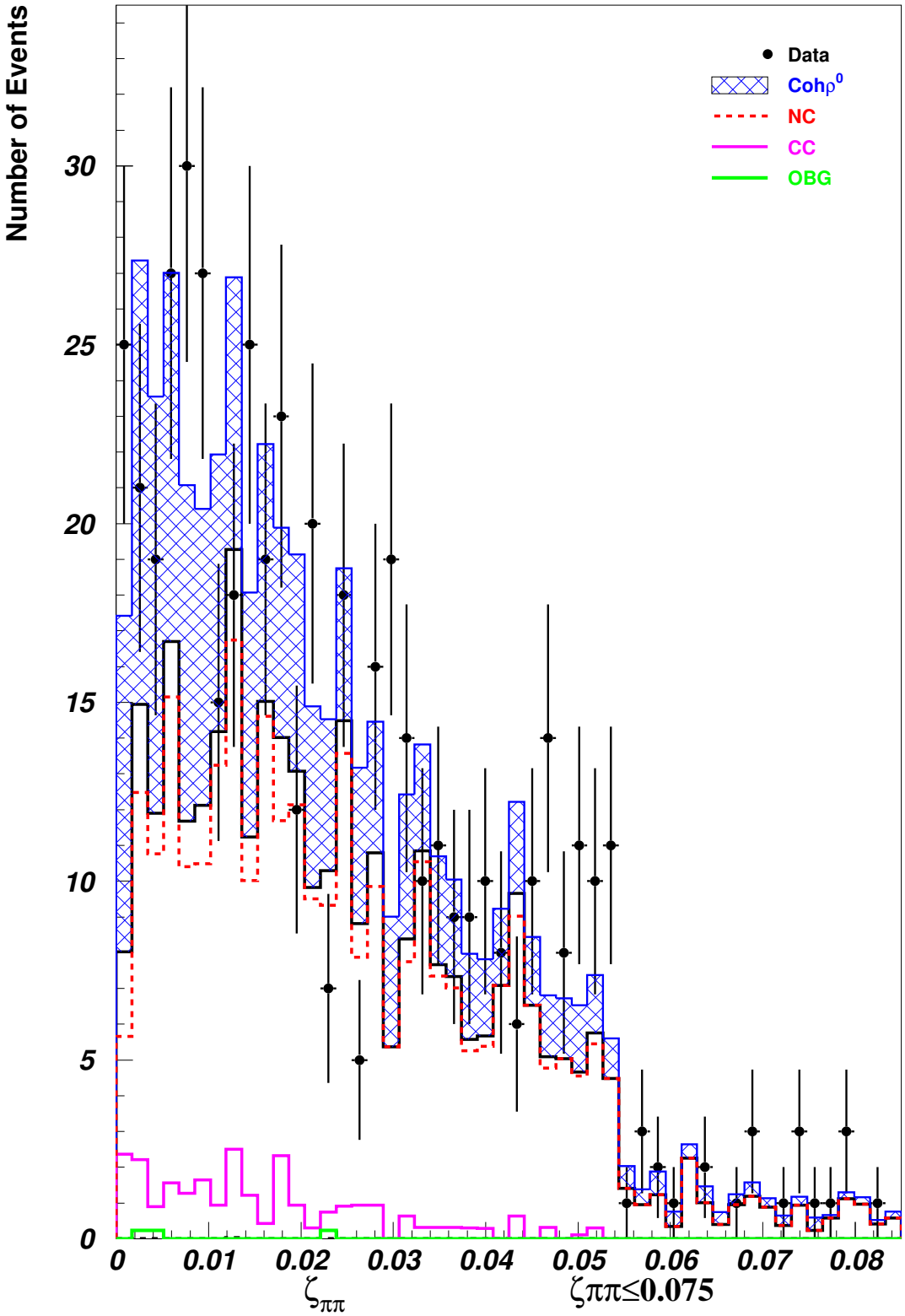

Figure 26: $\zeta_{\pi\pi}$ (Signal Region)

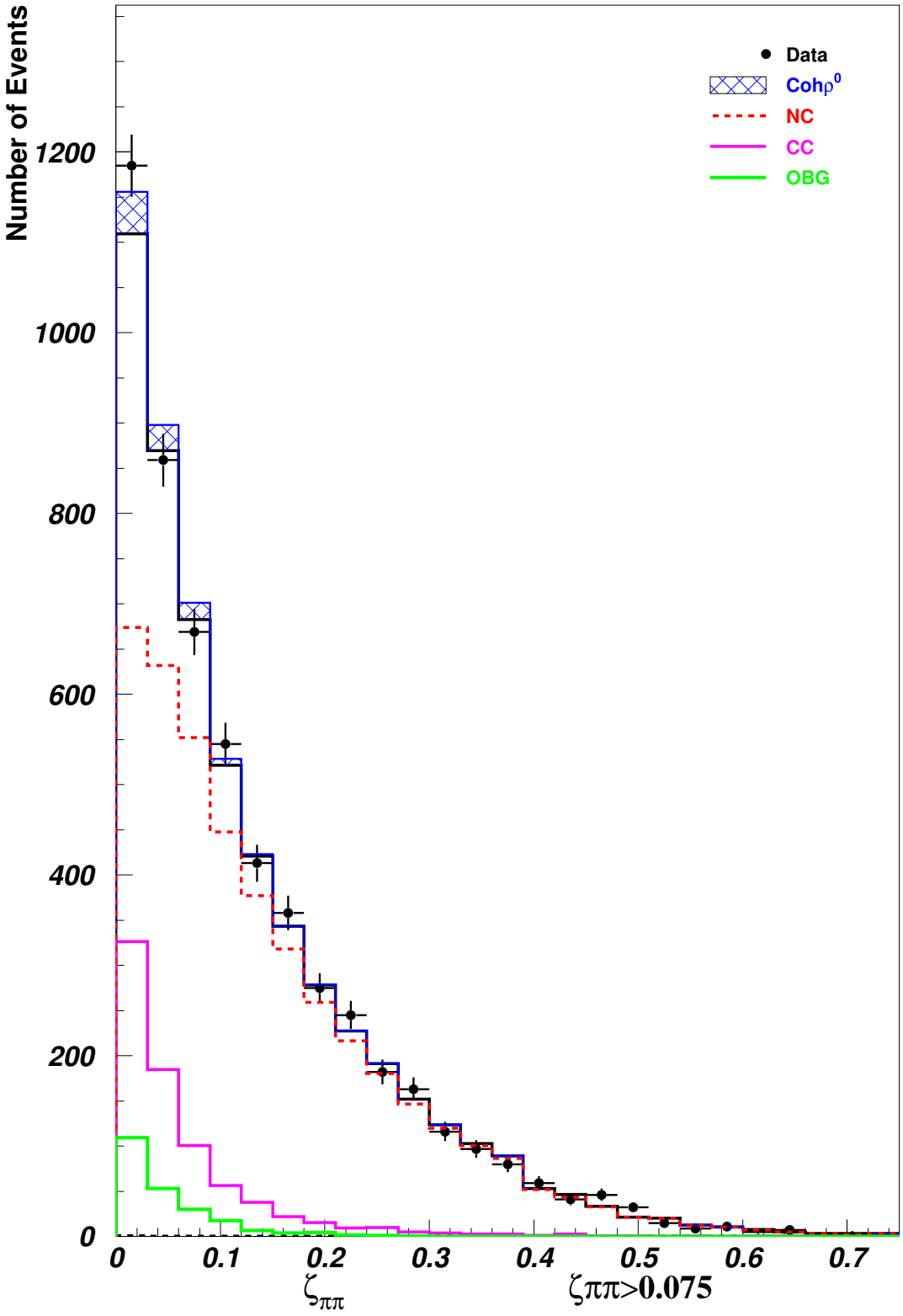

Figure 27: $\zeta_{\pi\pi}$ (Background Region)

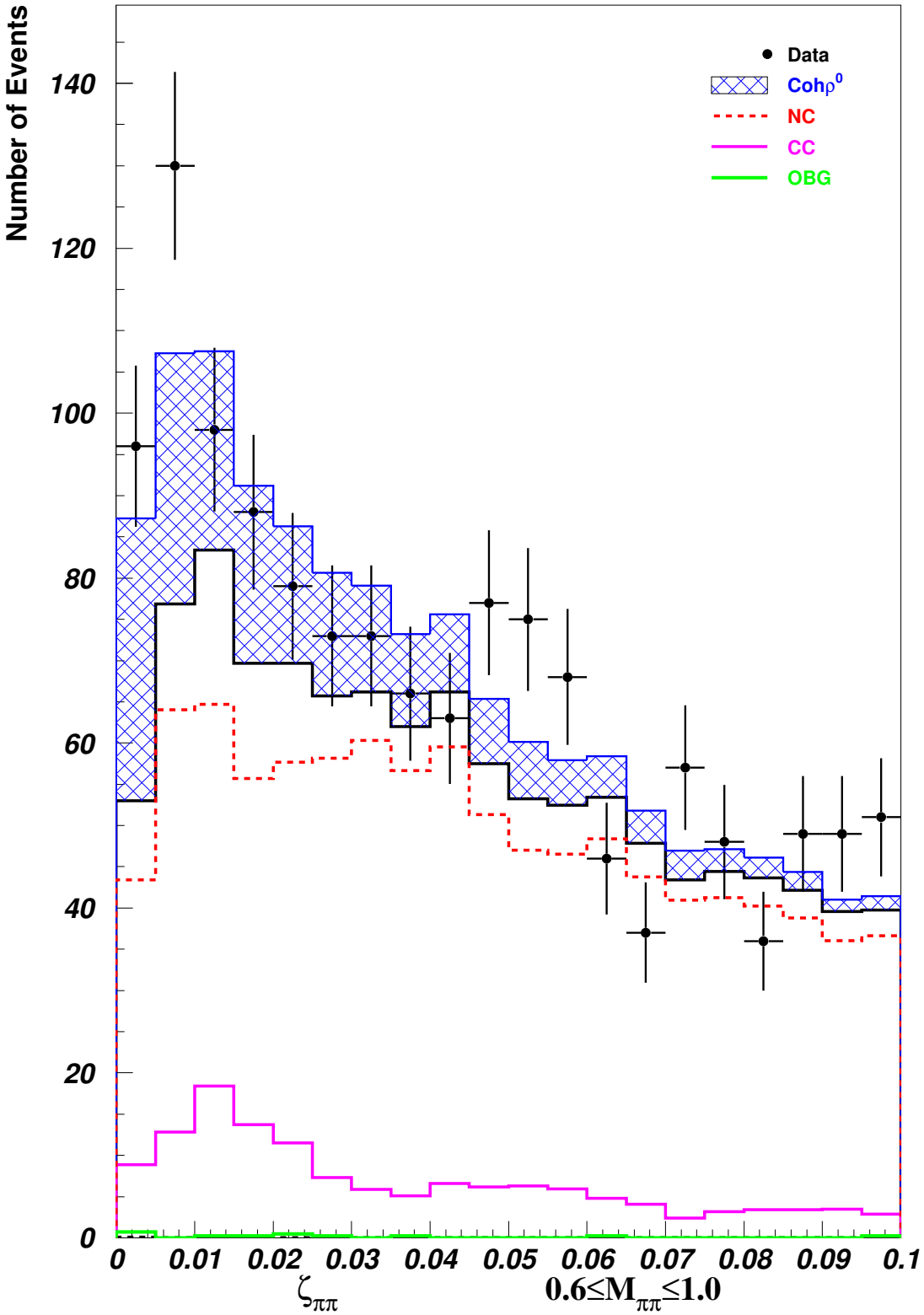

Figure 28: $\zeta_{\pi\pi}$ (Used for χ^2)

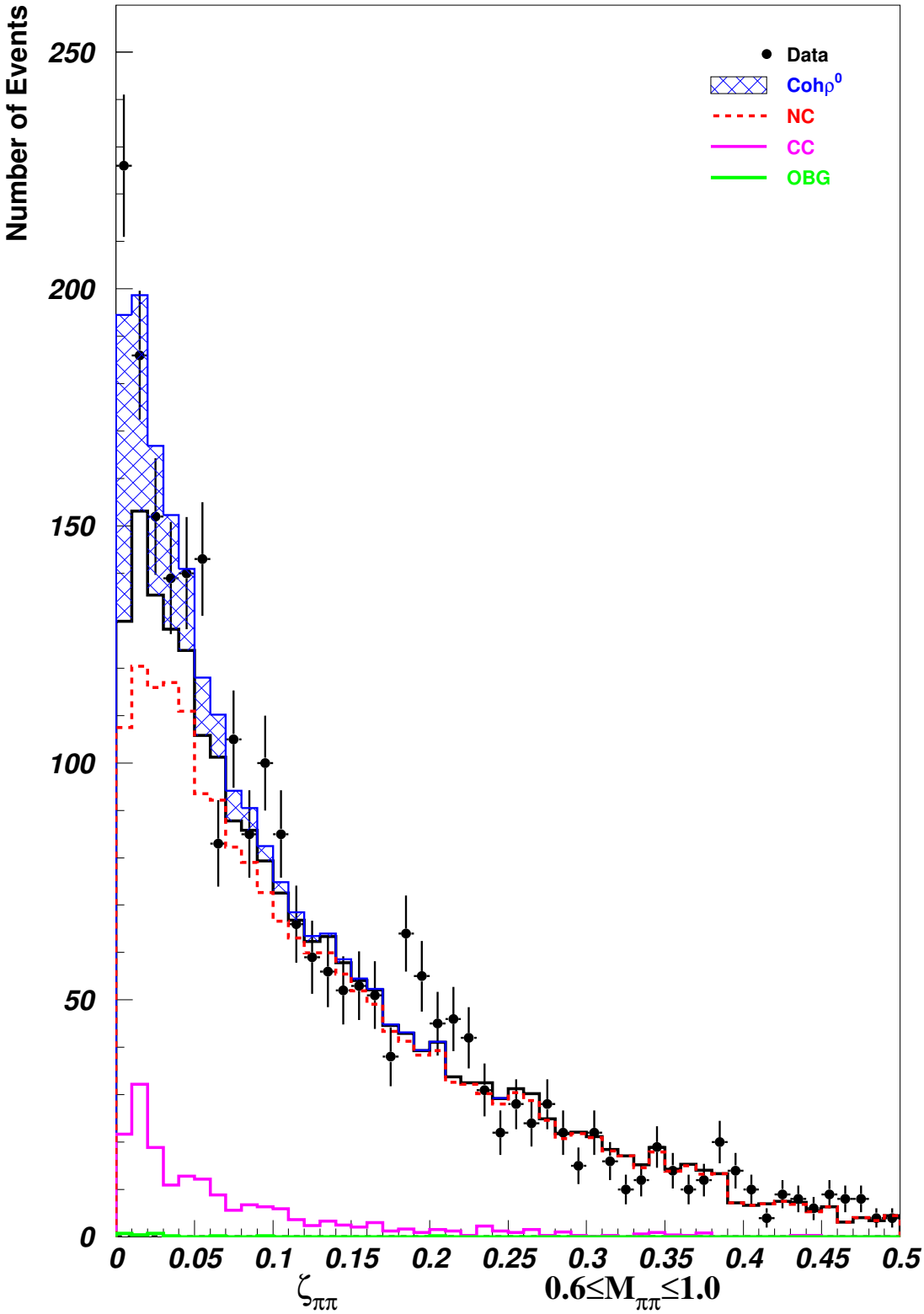

Figure 29: $\zeta_{\pi\pi}$ (Rho Mass Region)

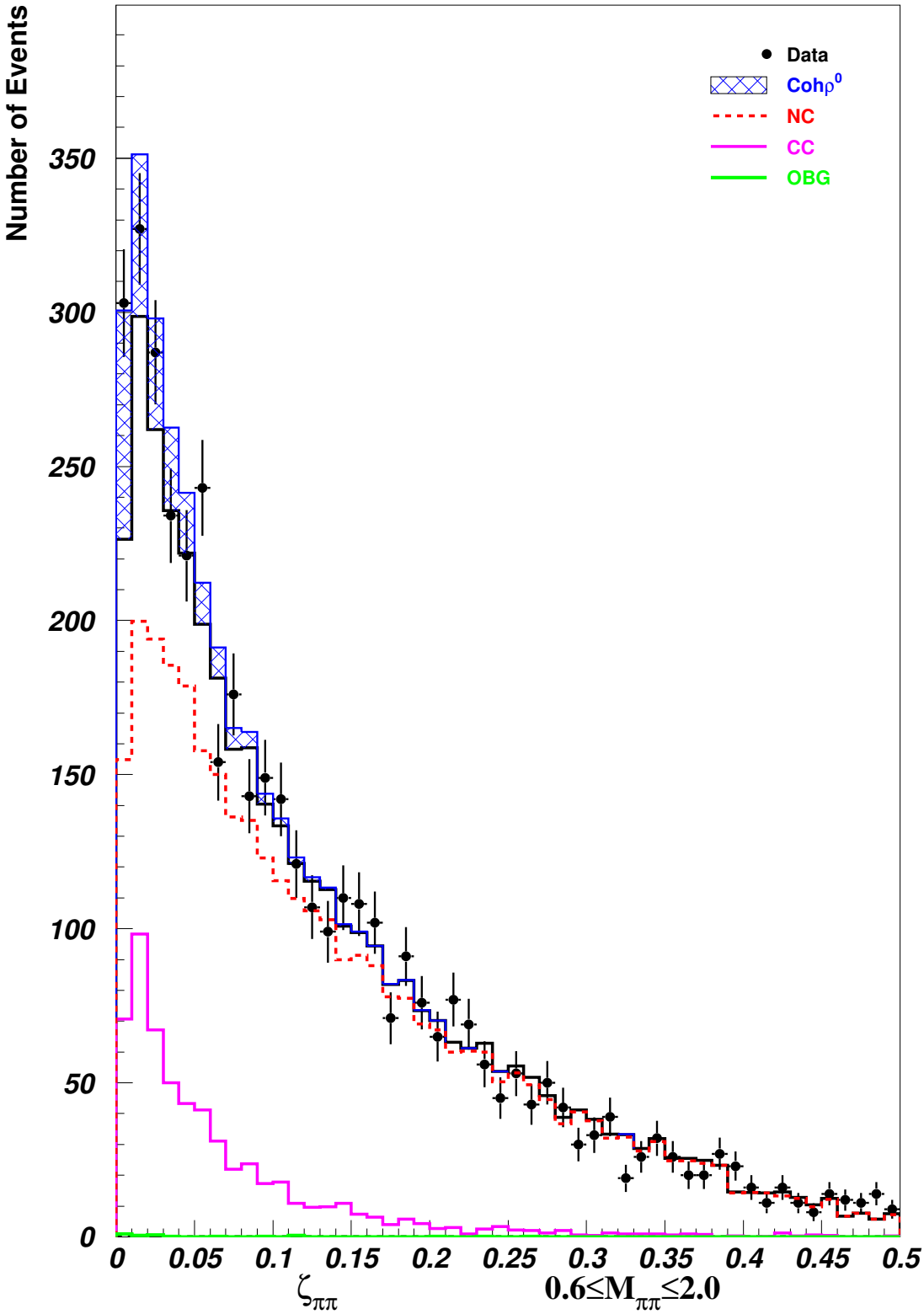

Figure 30: $\zeta_{\pi\pi}$ (Rho+Tail Mass Region)

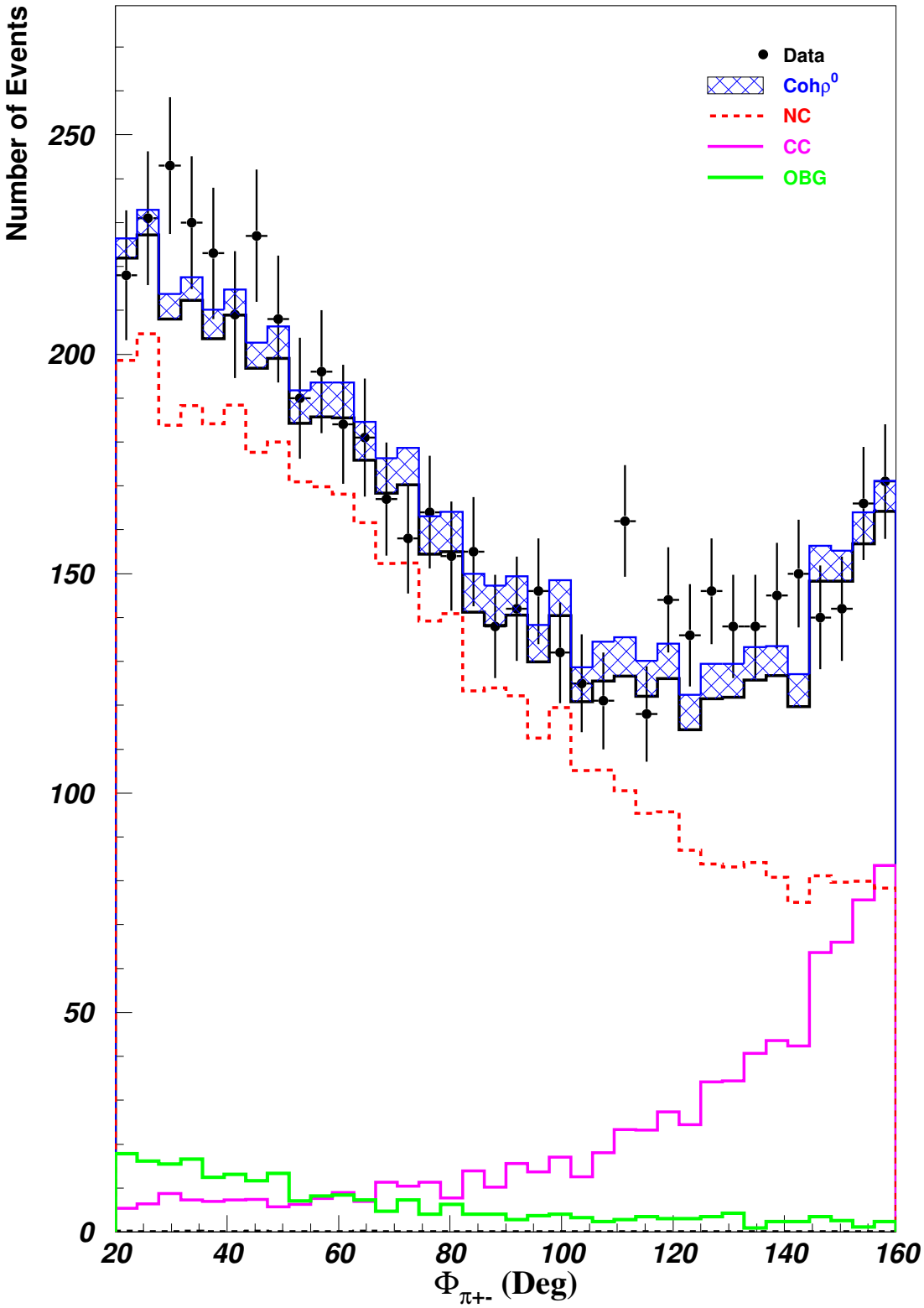

Figure 31: ϕ_{12}

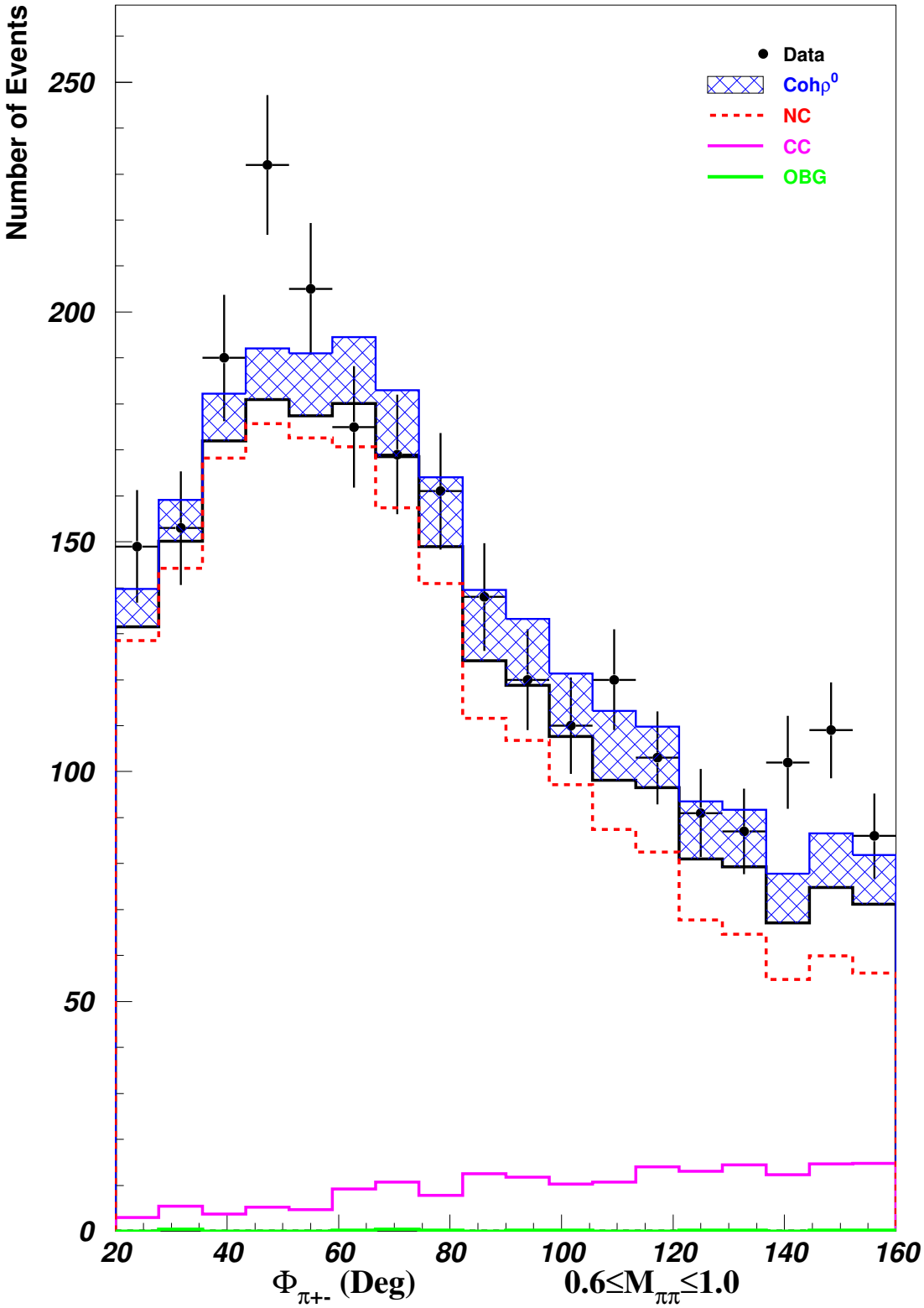

Figure 32: ϕ_{12} (In Rho Mass range)

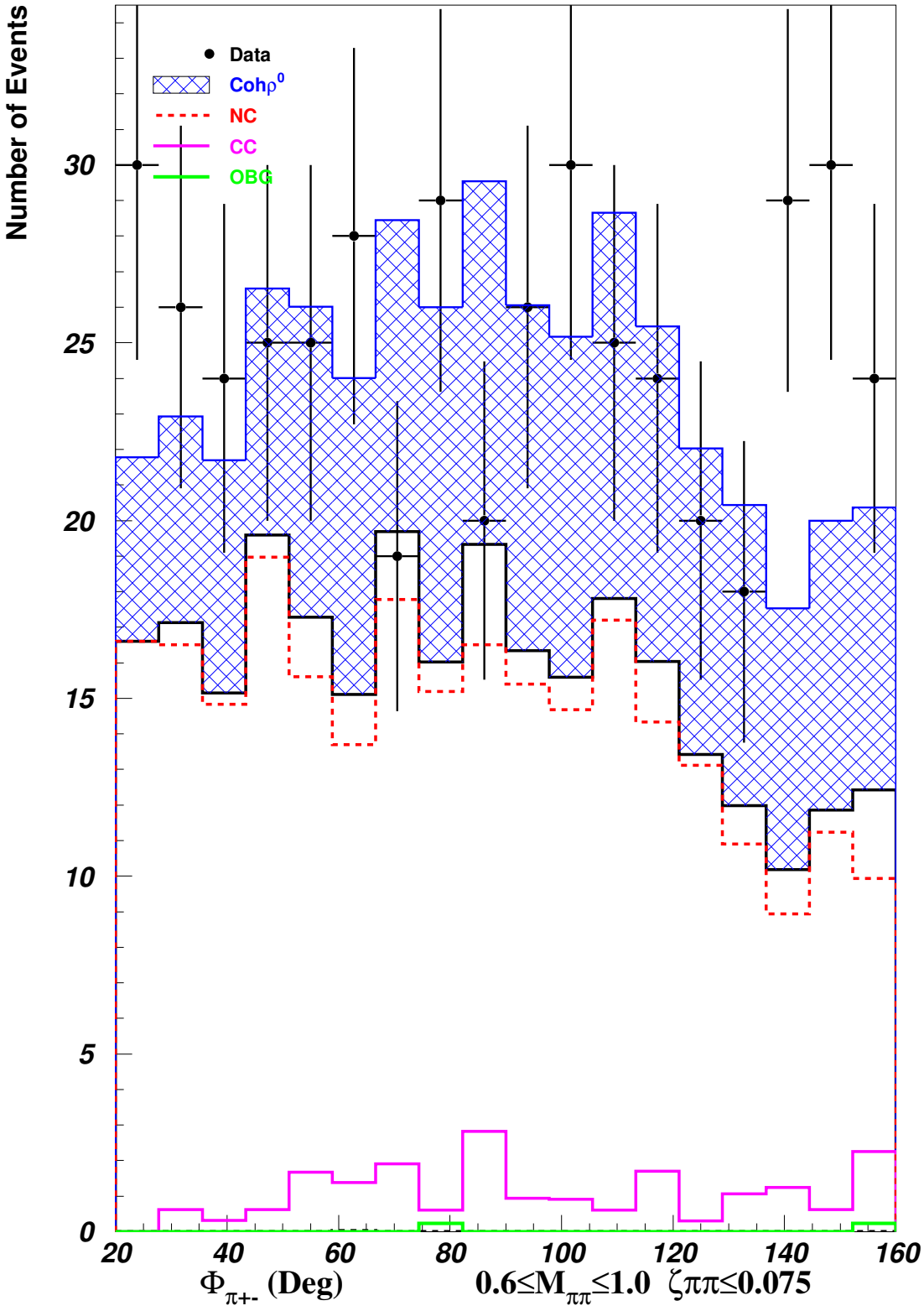

Figure 33: ϕ_{12} (Signal Region in Rho Mass)

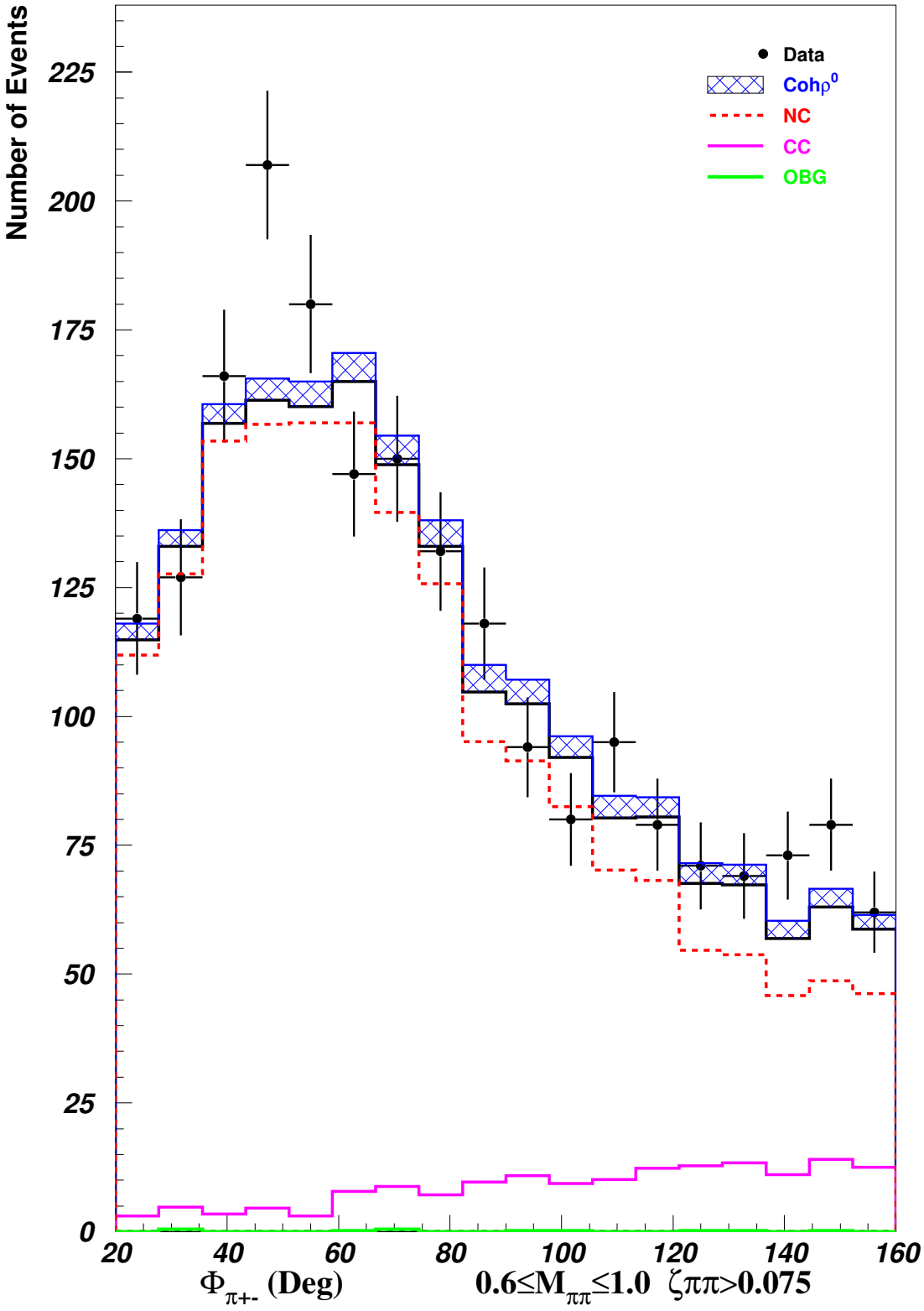

Figure 34: ϕ_{12} (Background Region in Rho Mass)

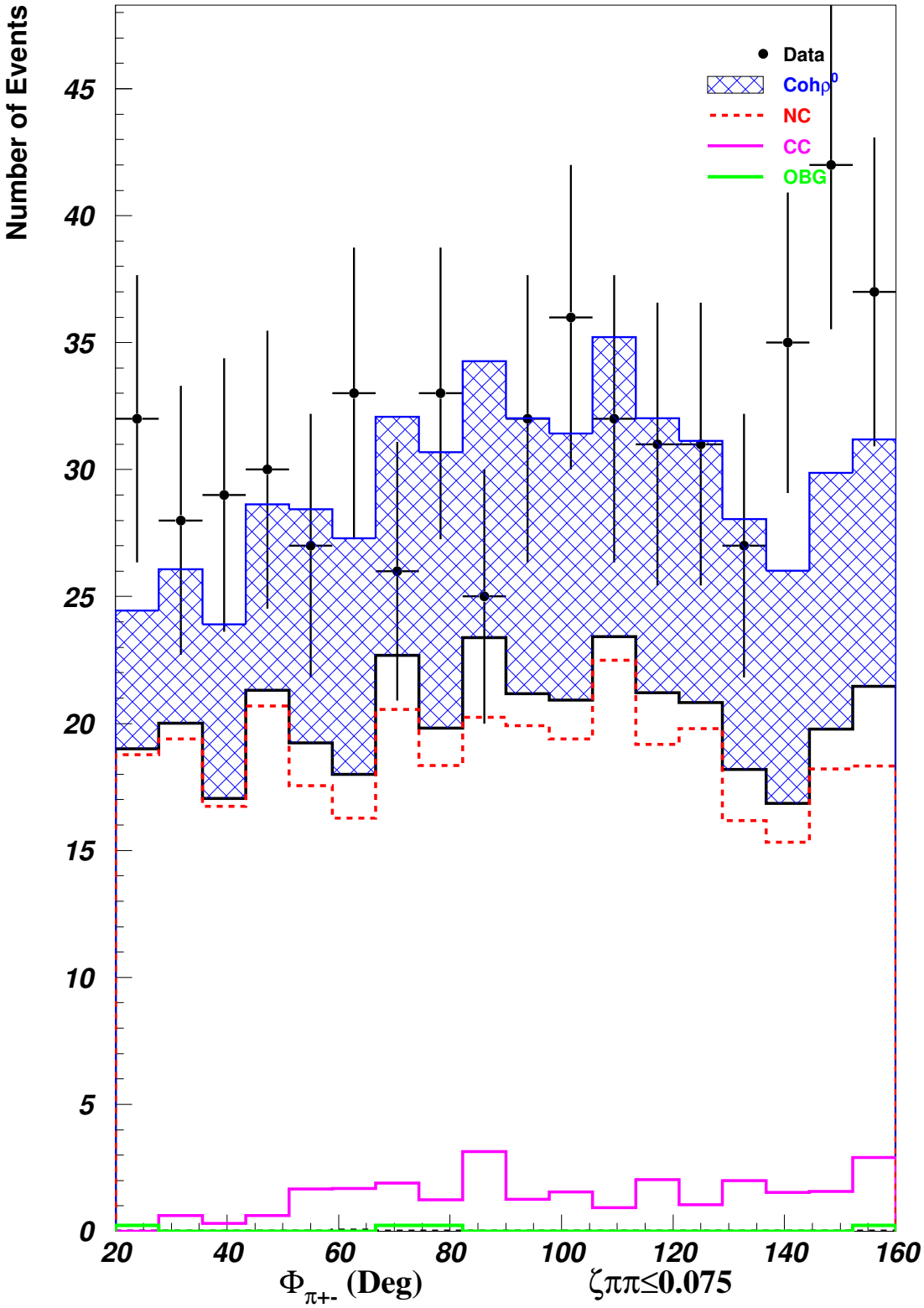

Figure 35: ϕ_{12} (Signal Region)

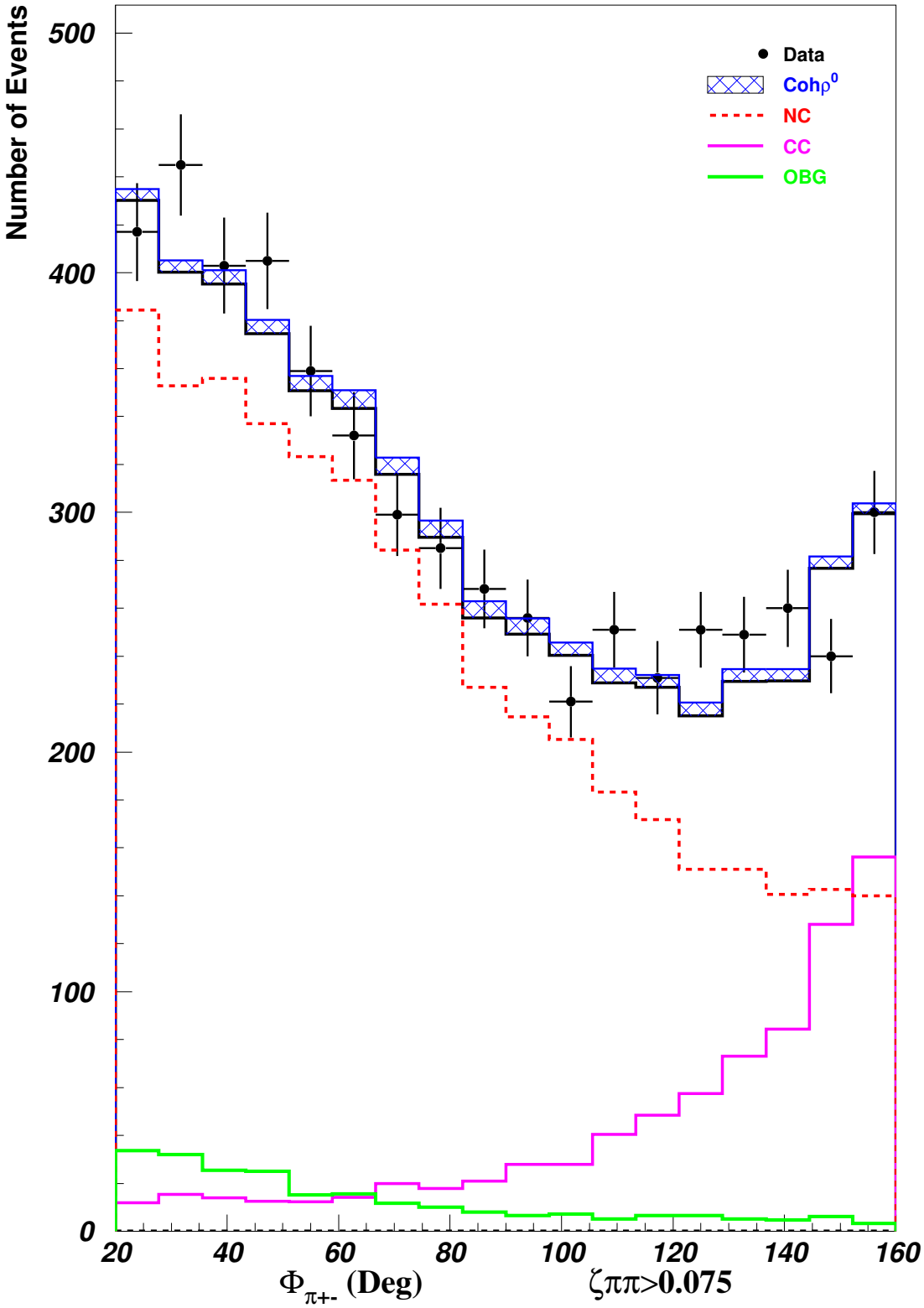

Figure 36: ϕ_{12} (Background Region)

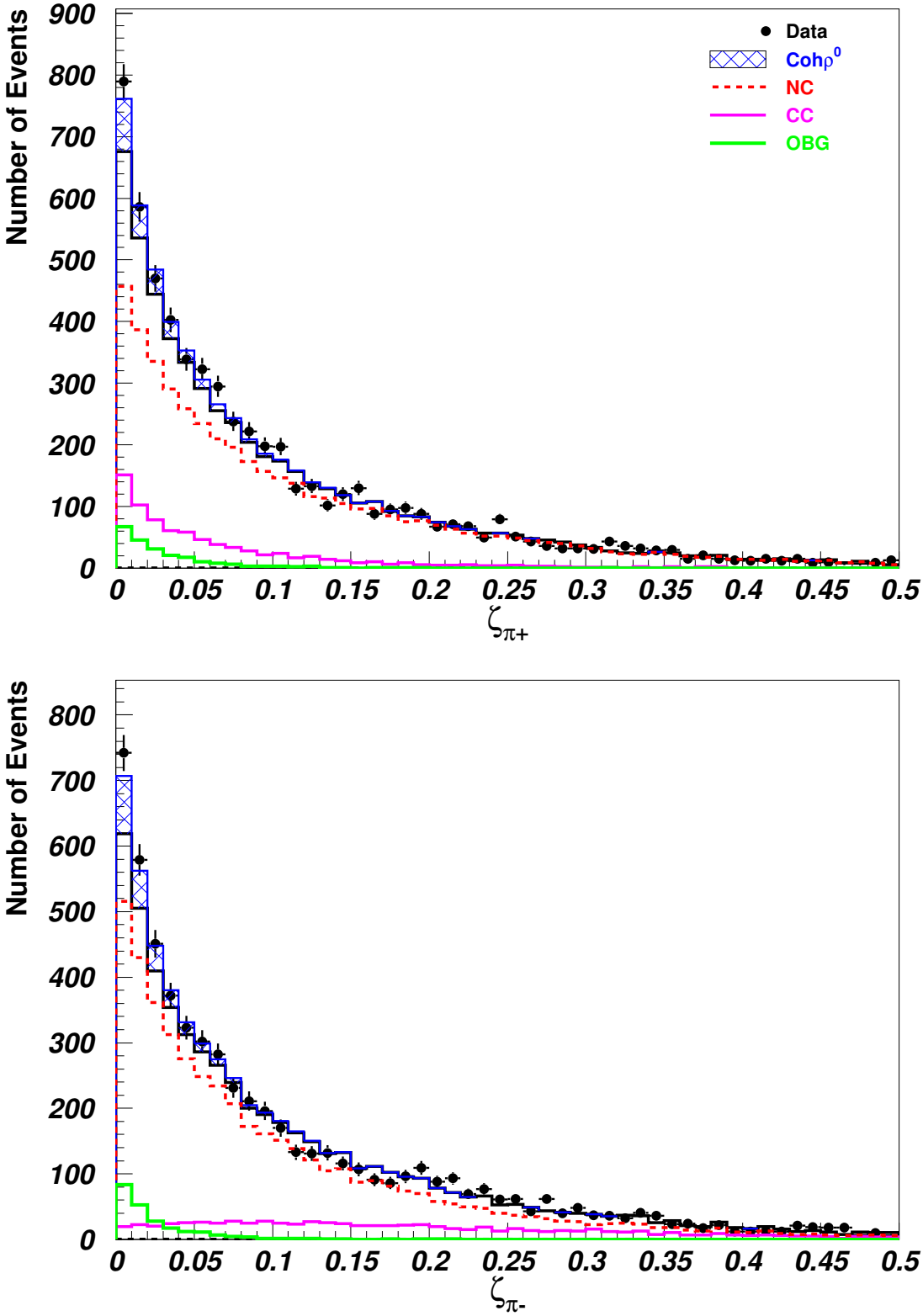

Figure 37: $\zeta_{\pi+}$ and $\zeta_{\pi-}$

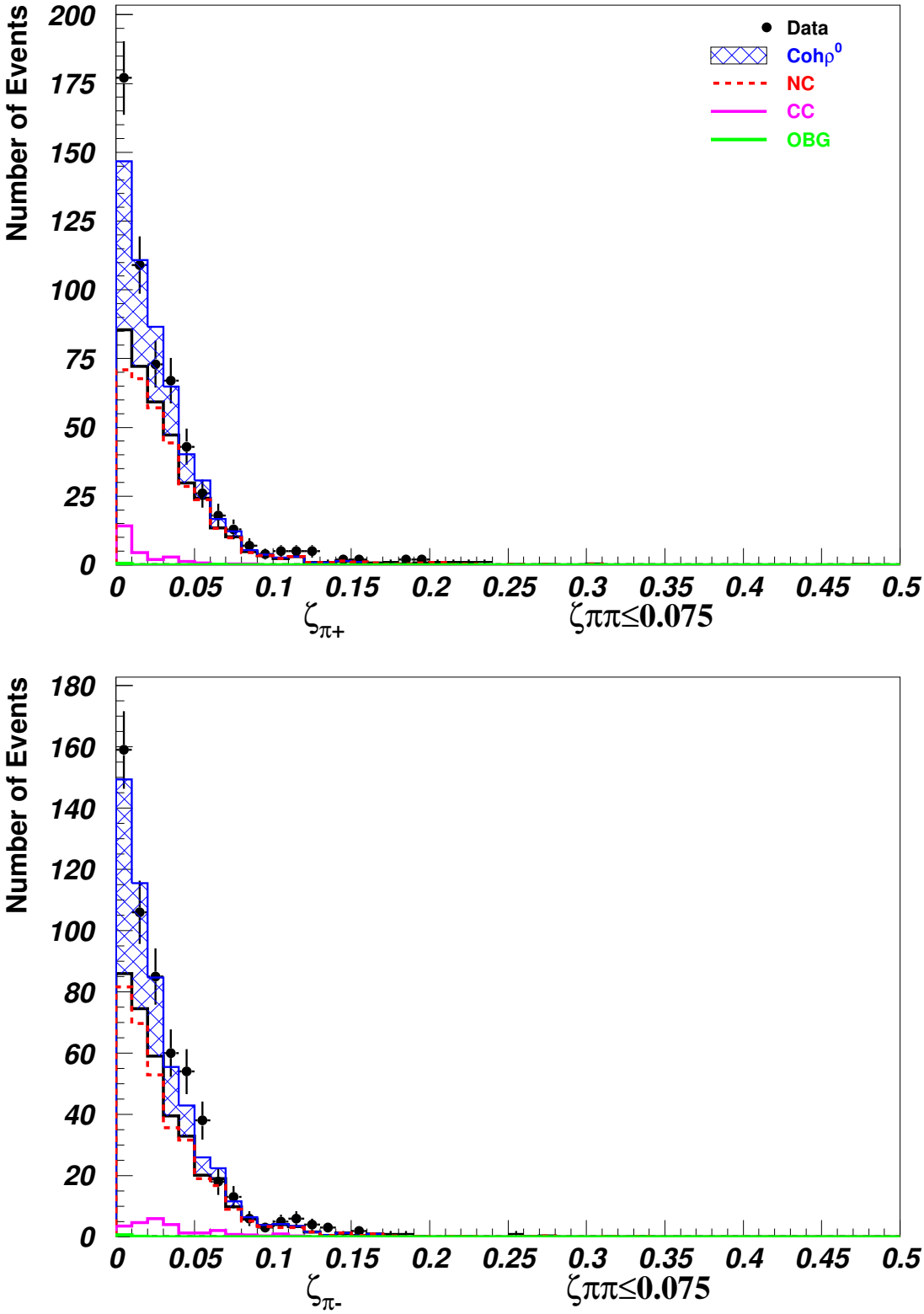

Figure 38: ζ_{π^+} and ζ_{π^-} (Signal Region)

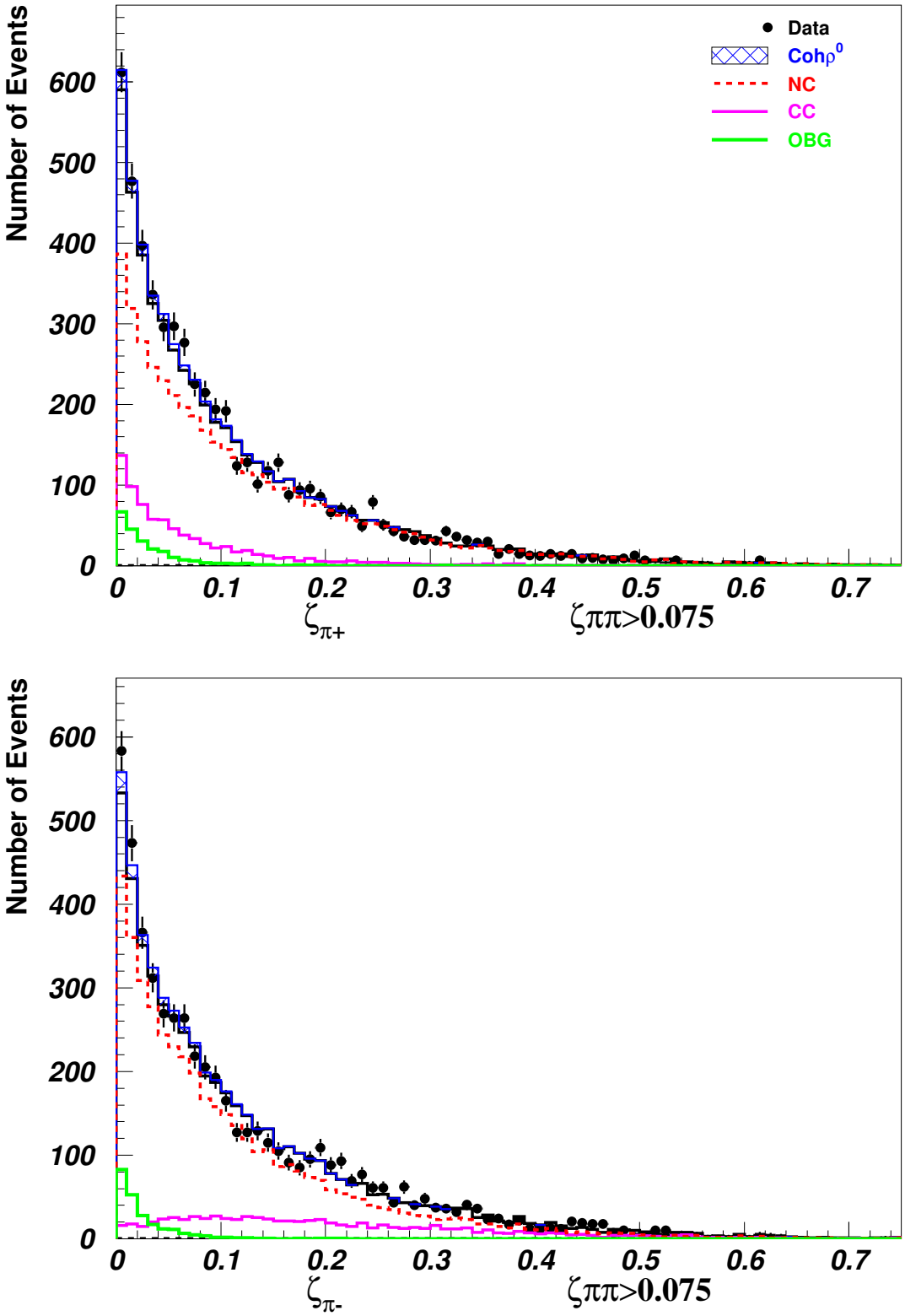

Figure 39: $\zeta_{\pi+}$ and $\zeta_{\pi-}$ (Background Region)

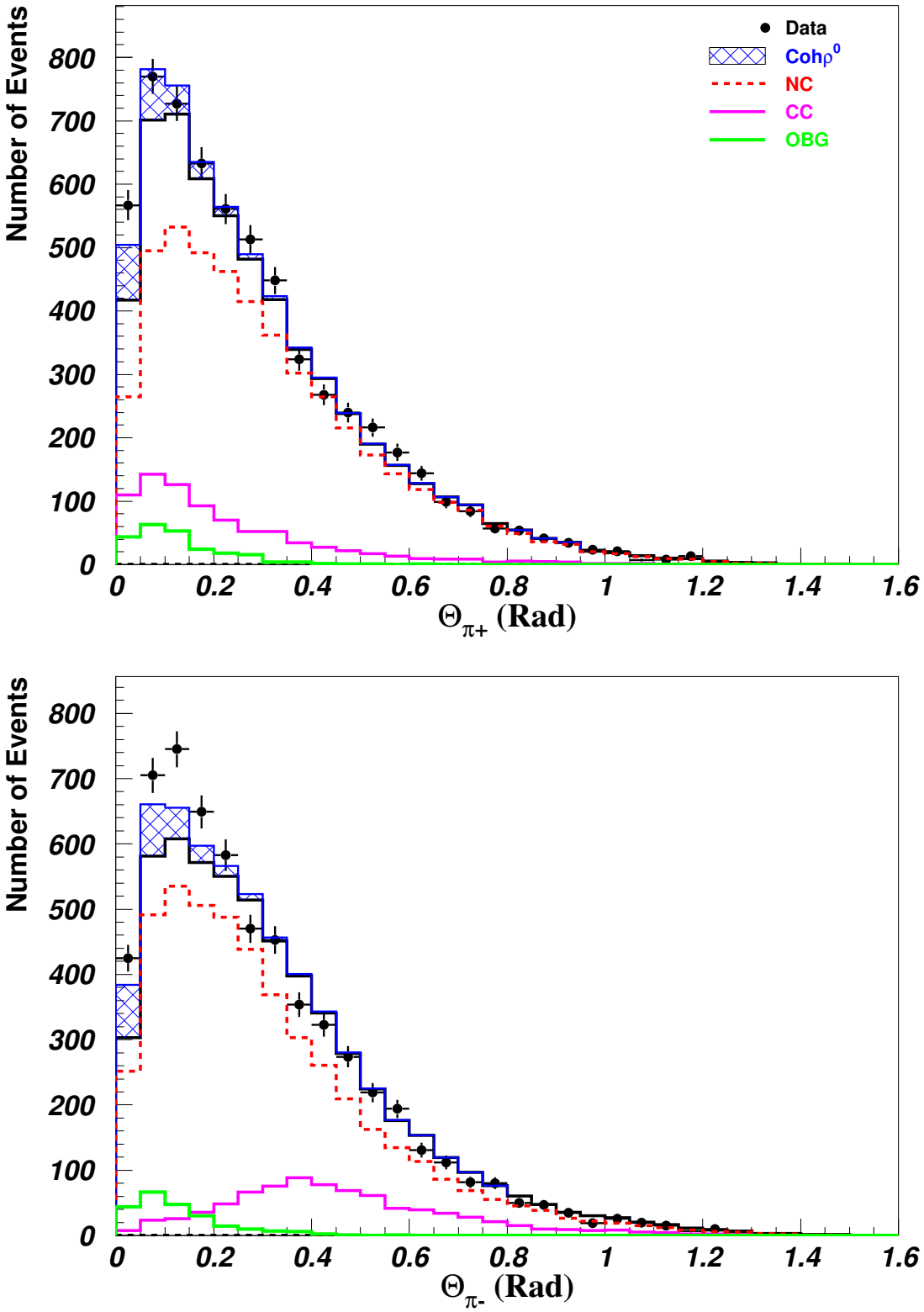

Figure 40: $\theta_{\pi+}$ and $\theta_{\pi-}$

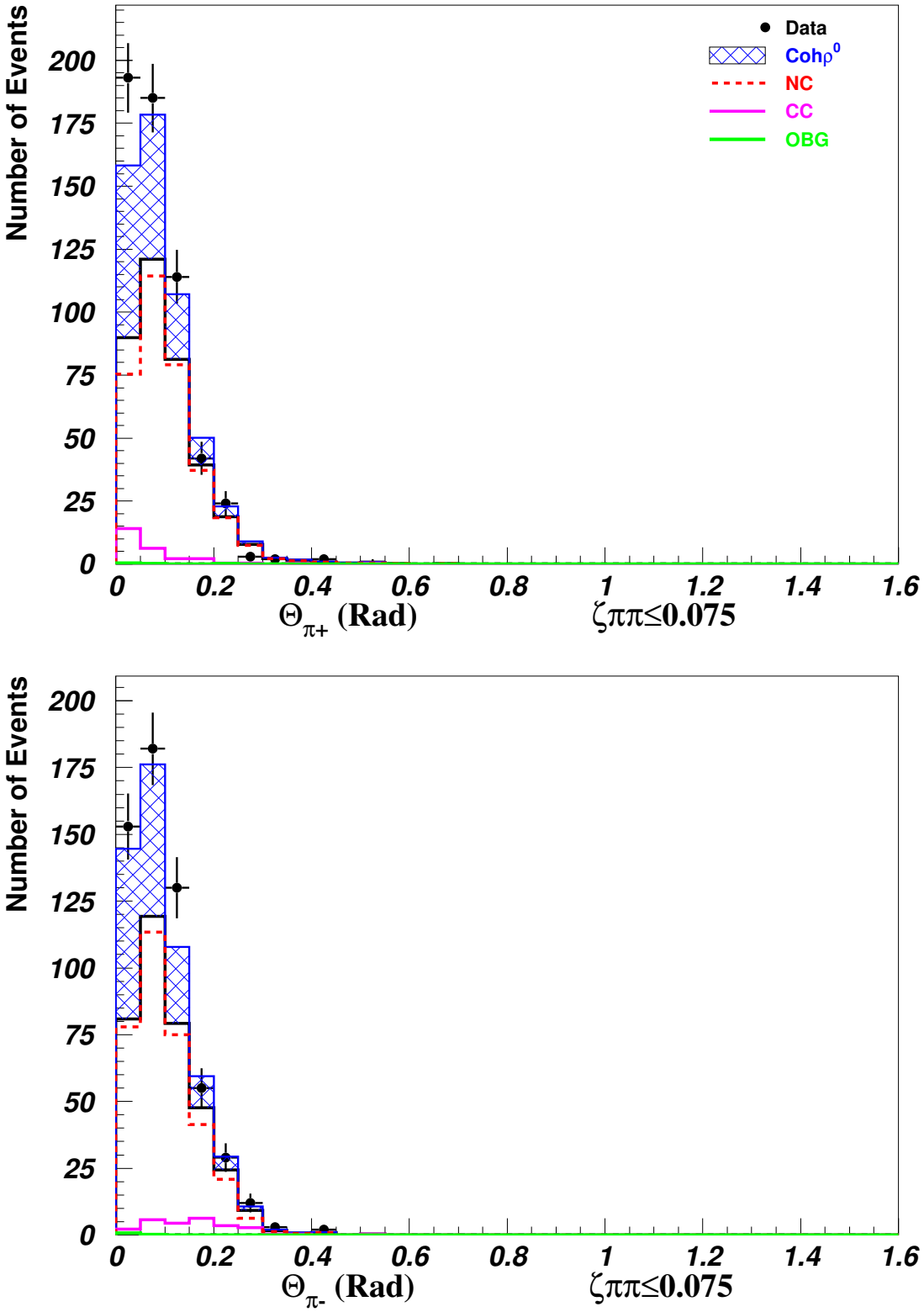

Figure 41: θ_{π^+} and θ_{π^-} (Signal Region)

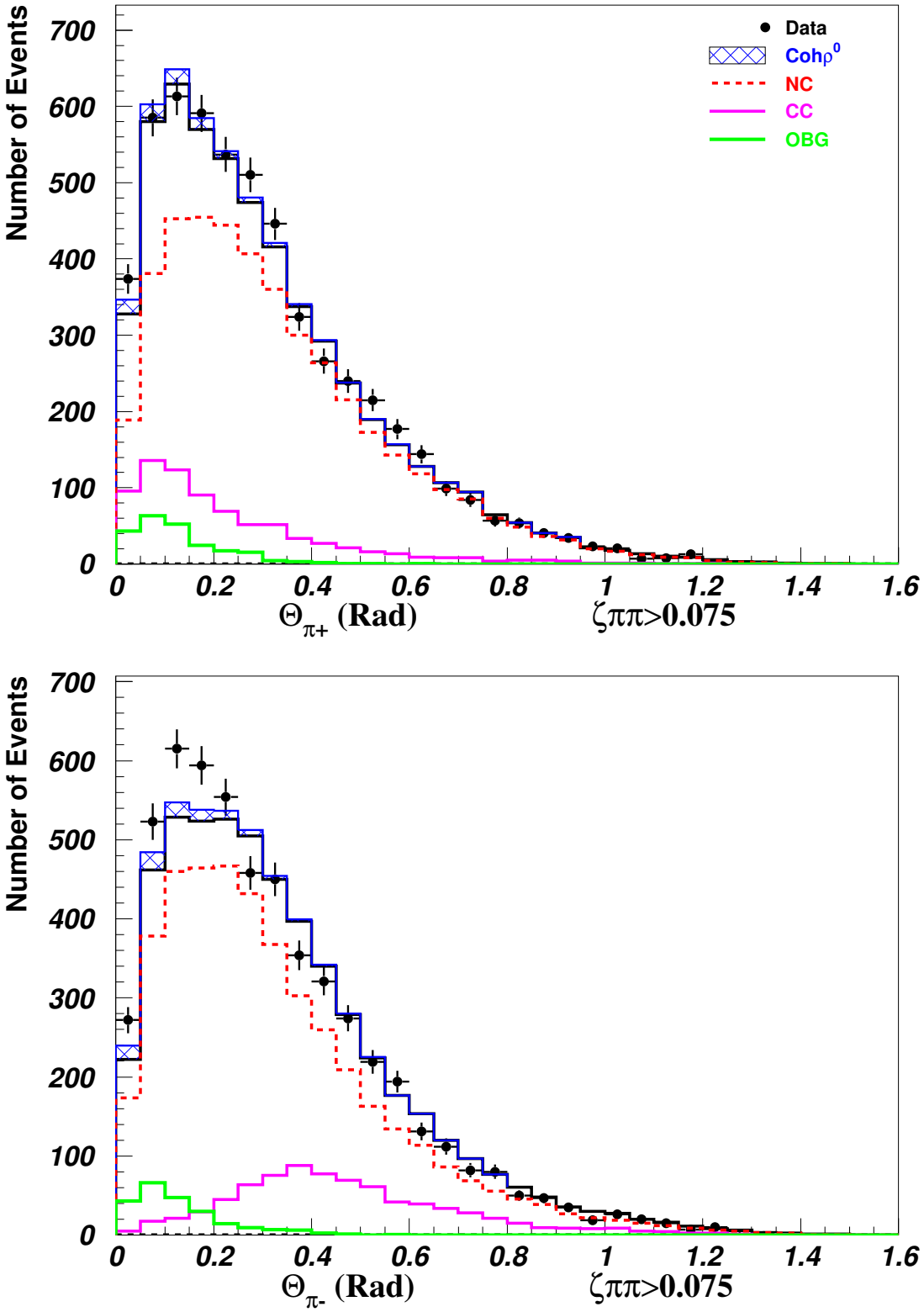

Figure 42: θ_{π^+} and θ_{π^-} (Background Region)

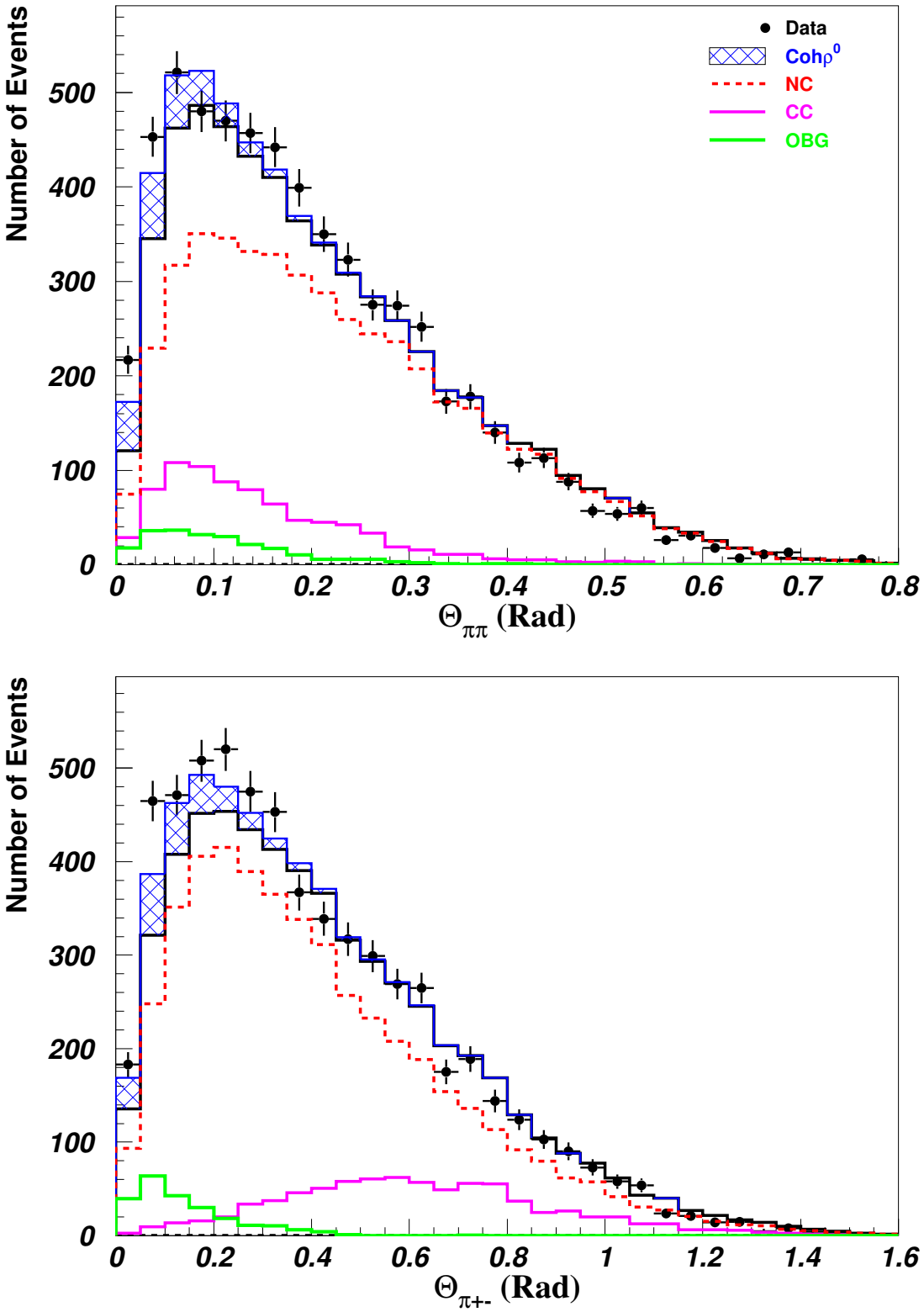

Figure 43: $\theta_{\pi\pi}$

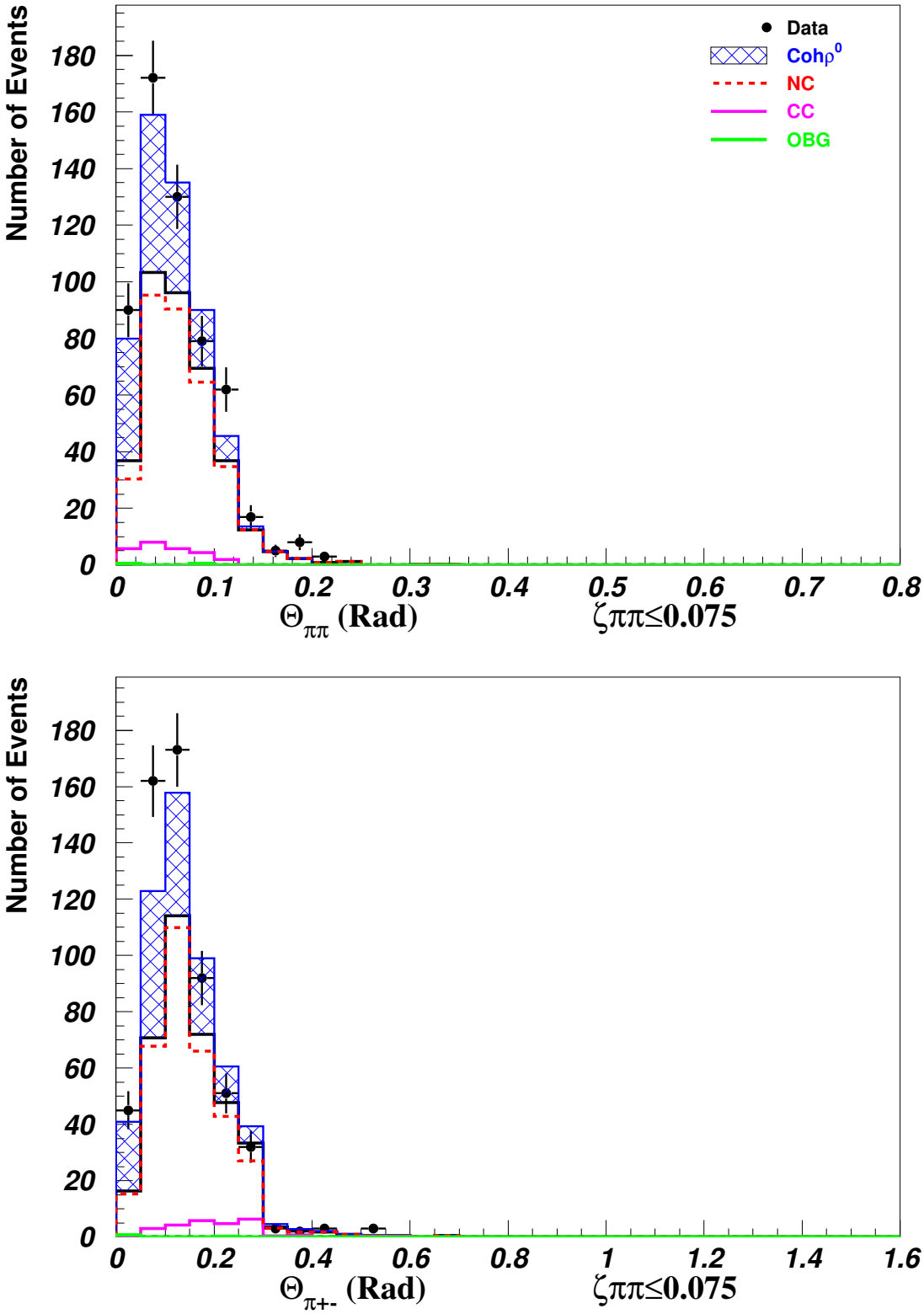

Figure 44: $\theta_{\pi\pi}$ and θ_{12} (Signal Region)

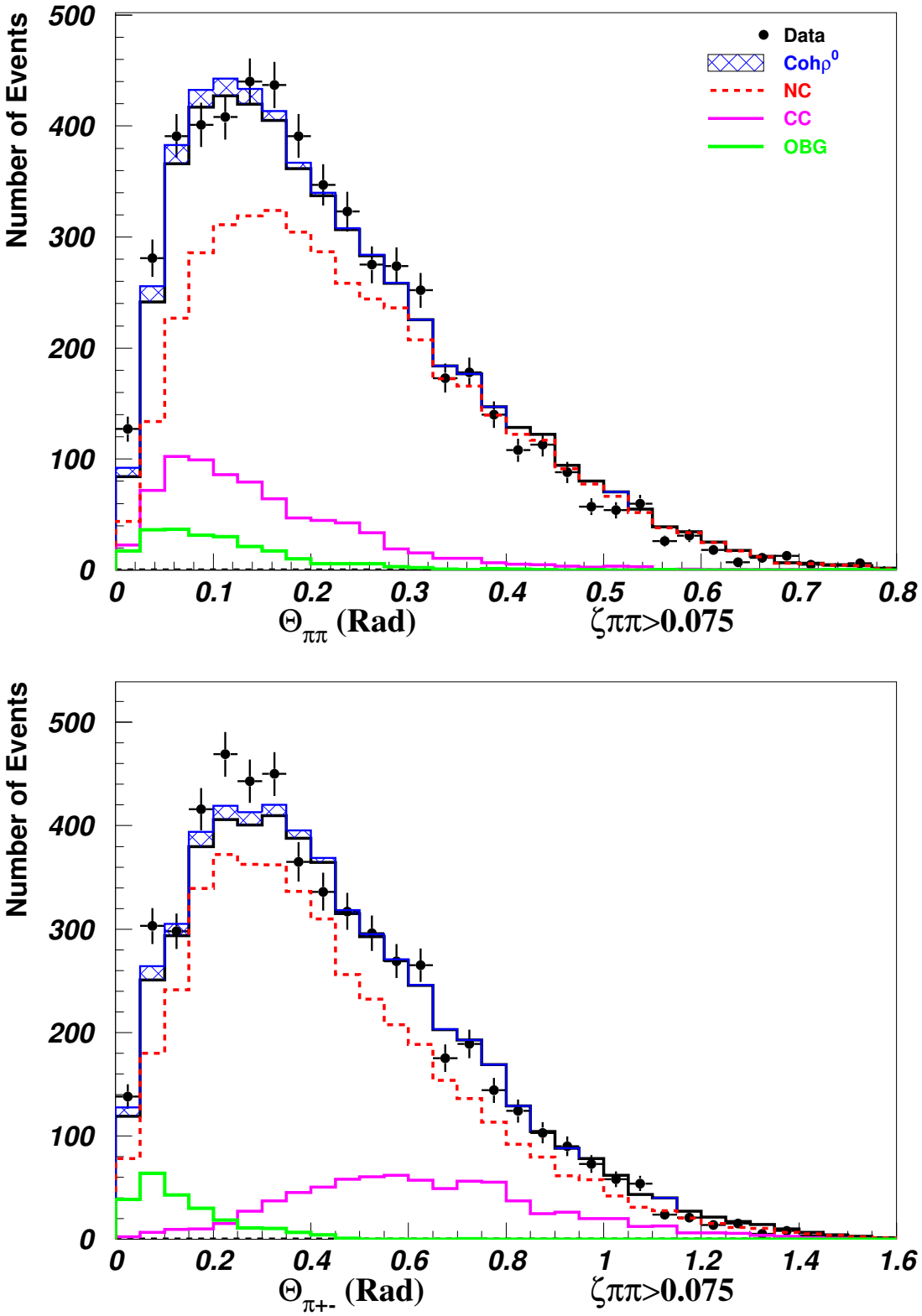

Figure 45: $\boldsymbol{\theta_{\pi\pi}}$ and $\boldsymbol{\theta_{12}}$ (Background Region)

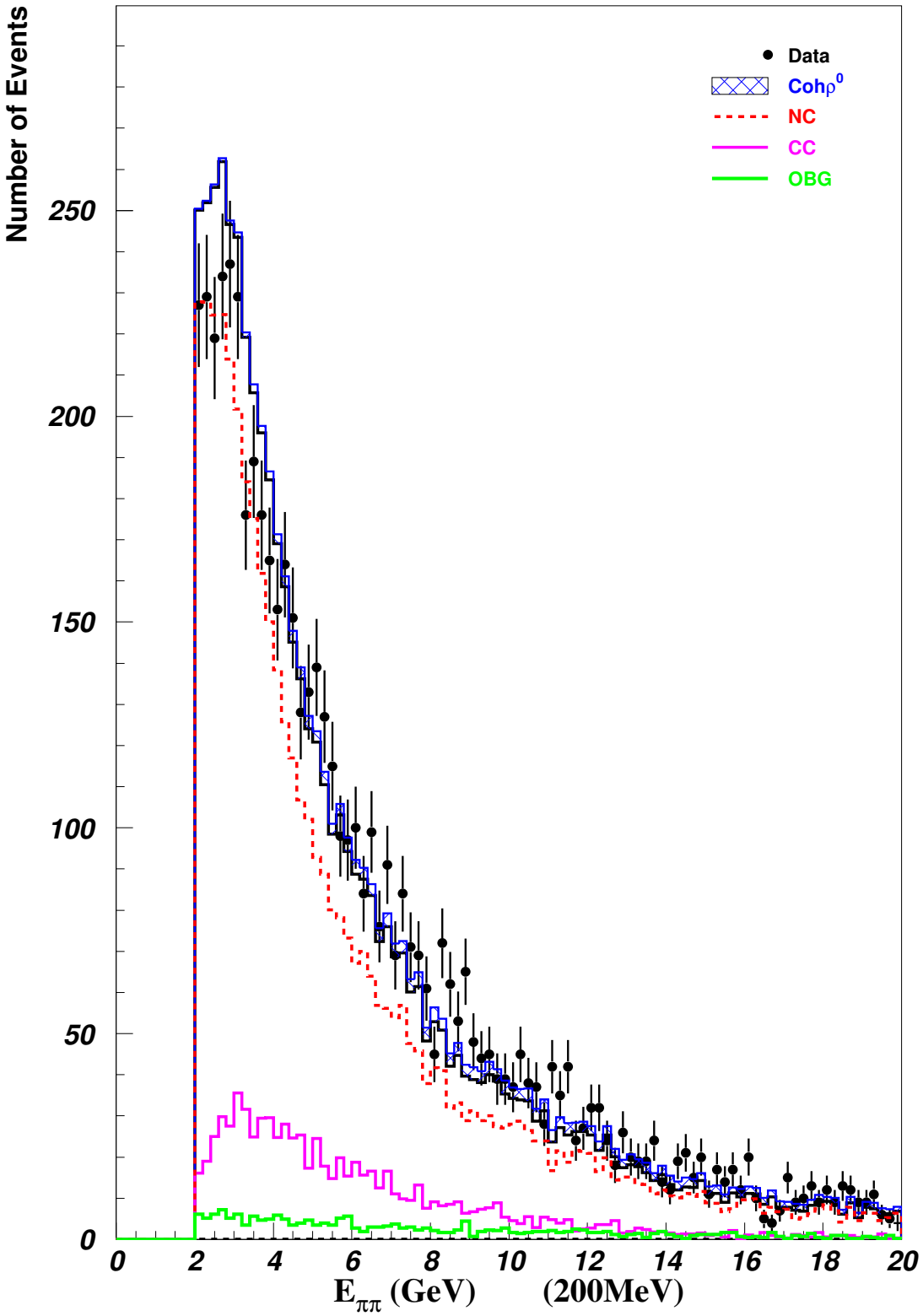

Figure 46: $E_{\pi\pi}$

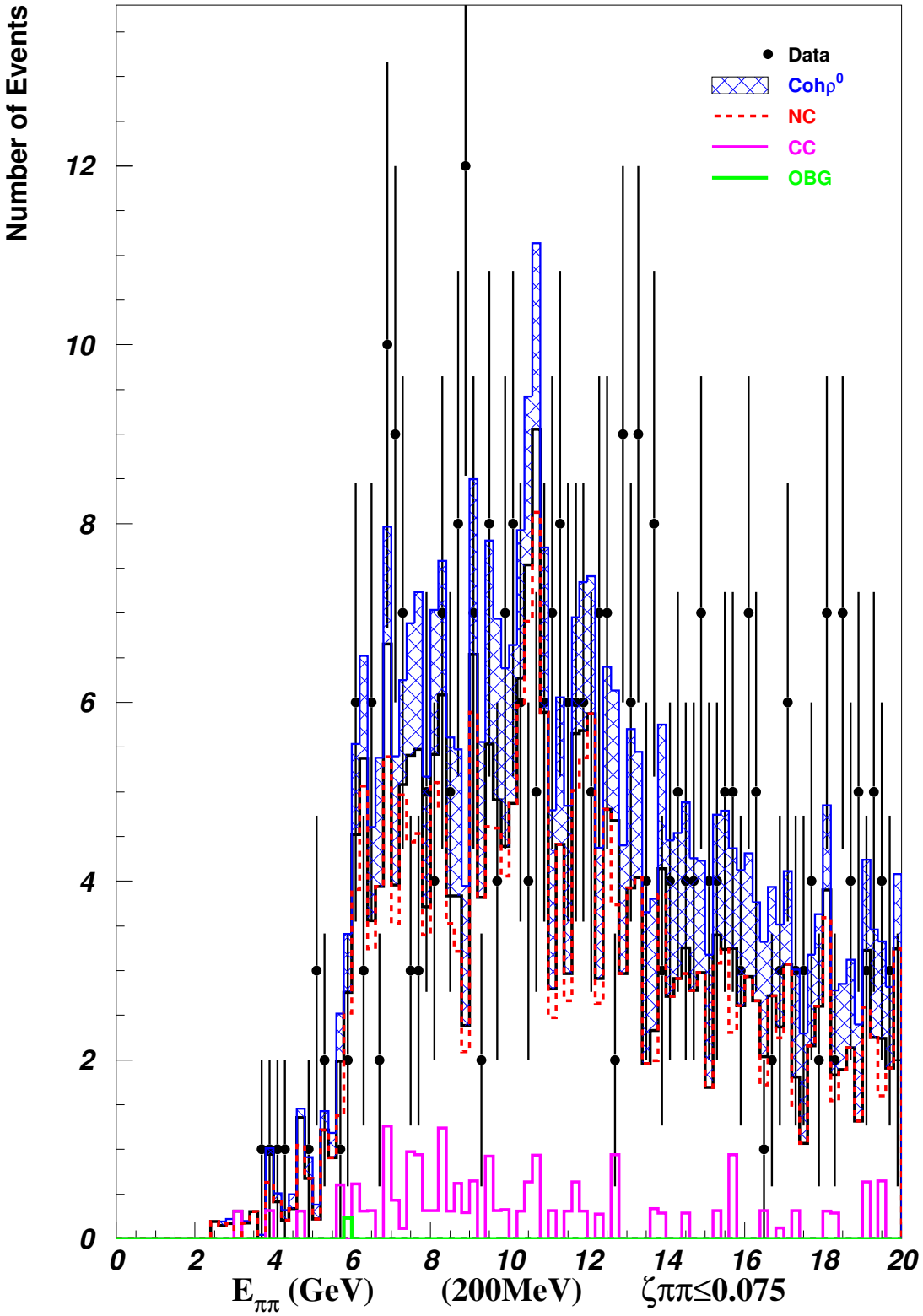

Figure 47: $E_{\pi\pi}$ (Signal Region)

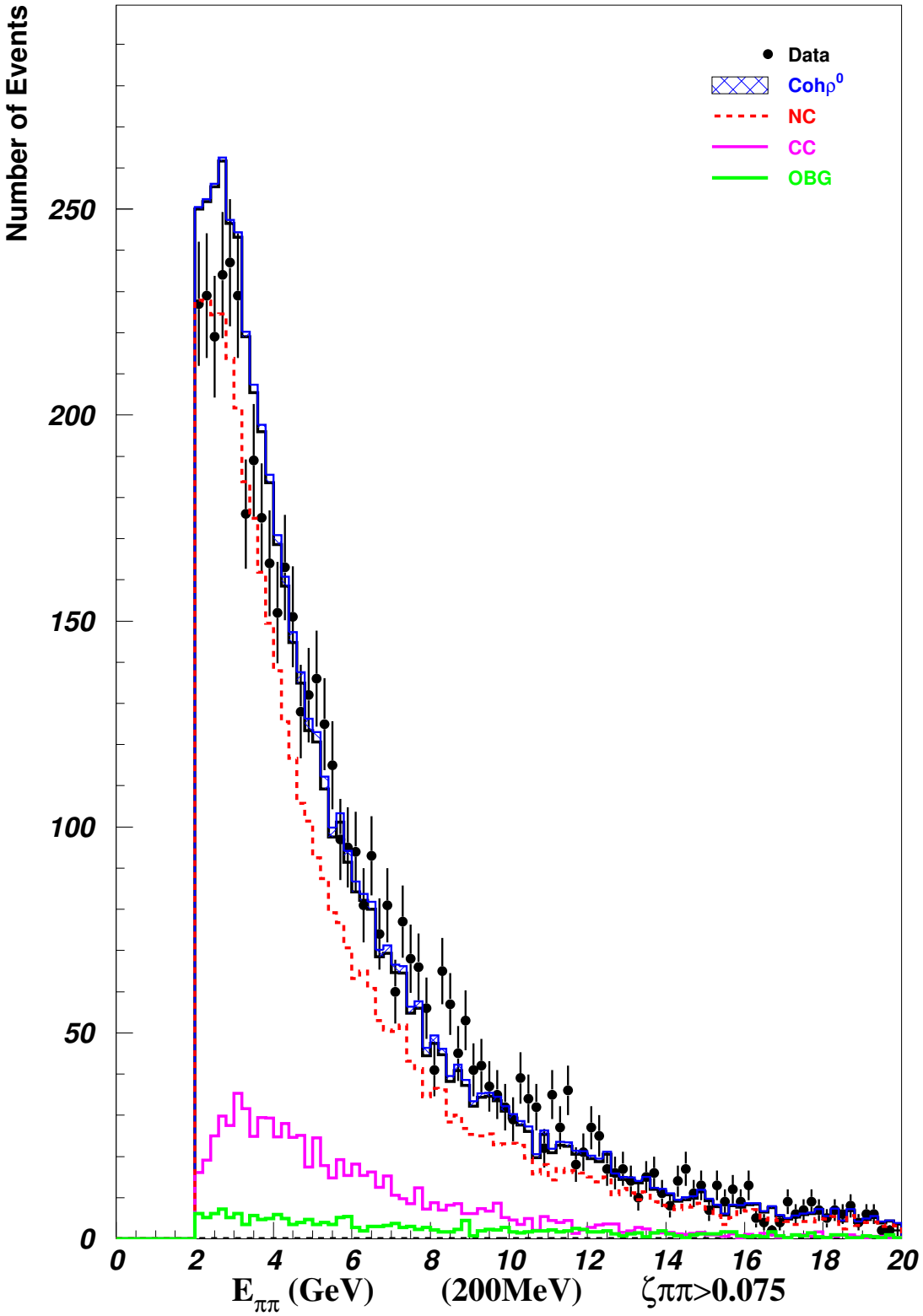

Figure 48: $E_{\pi\pi}$ (Background Region)

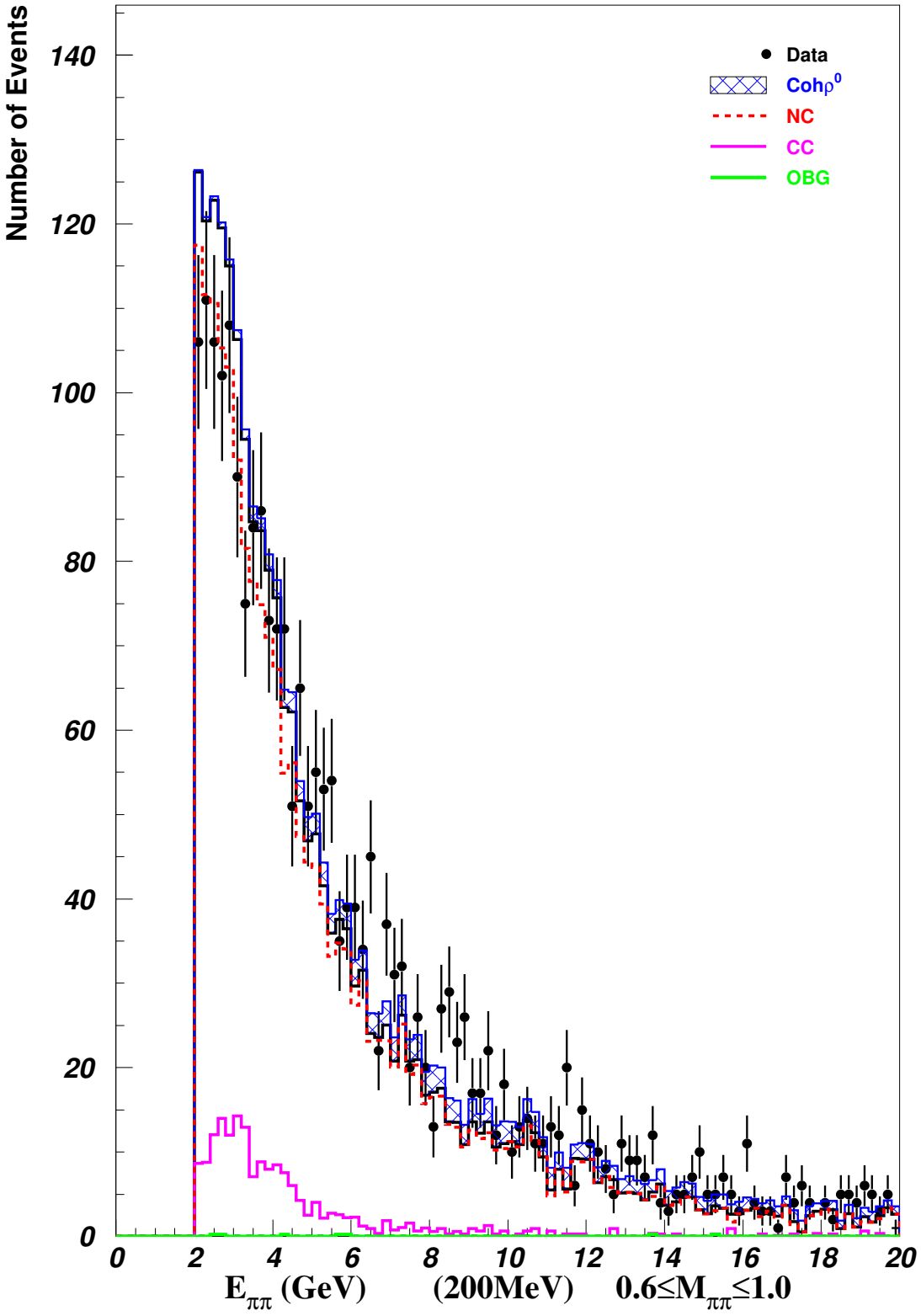

Figure 49: $E_{\pi\pi}$ (ρ Mass Range)

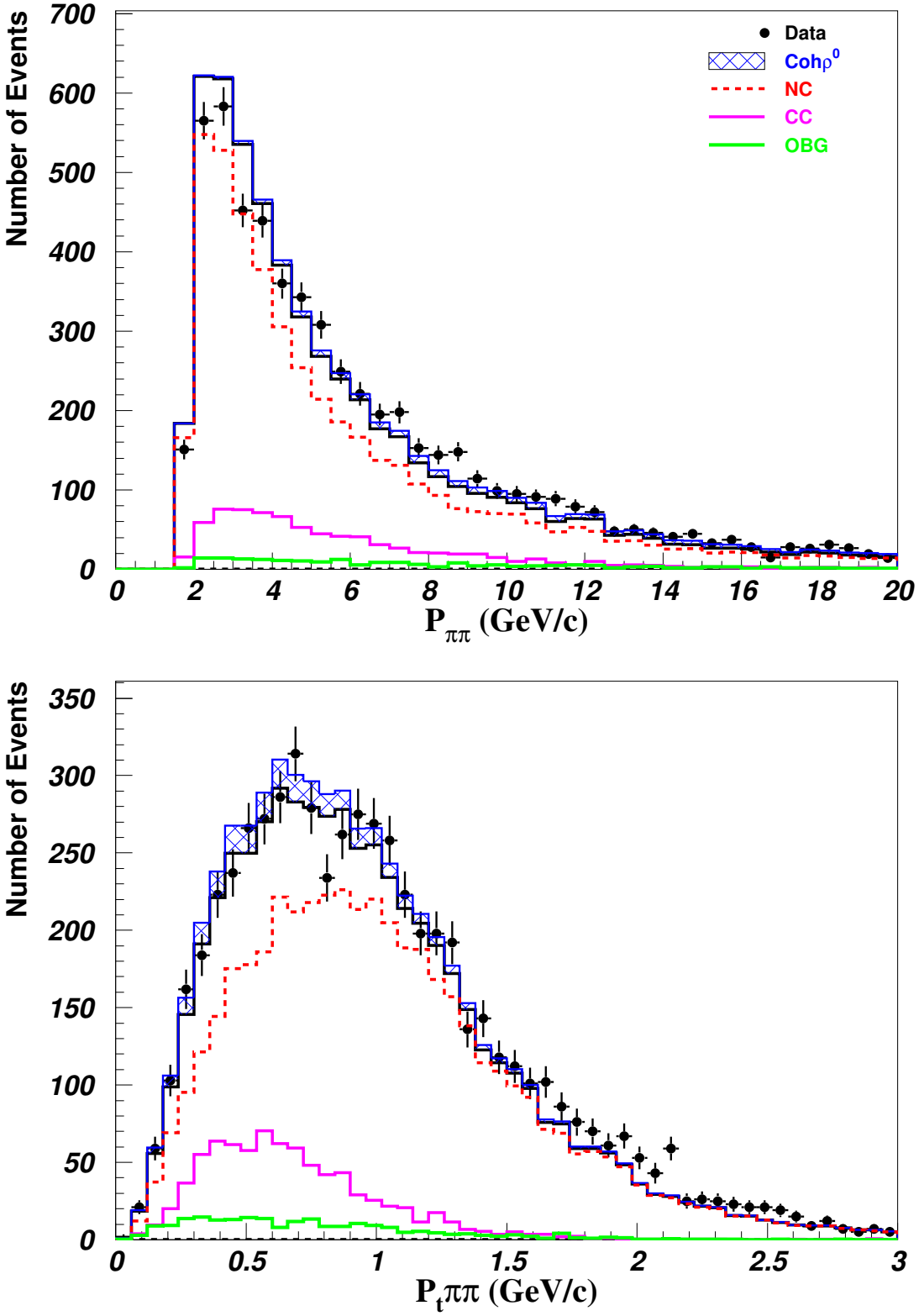

Figure 50: $P_t\pi\pi$

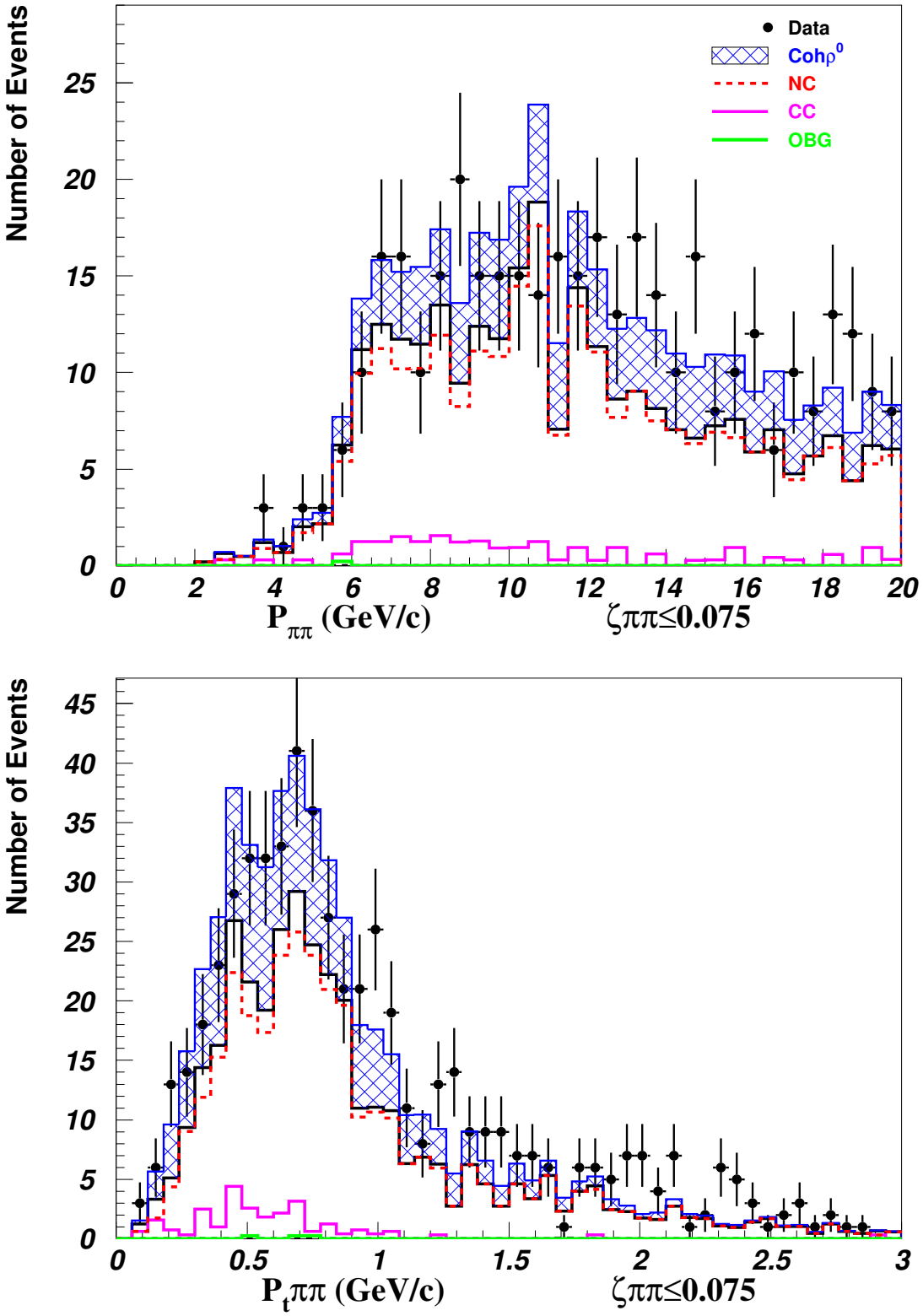

Figure 51: $P_t\pi\pi$ (Signal Region)

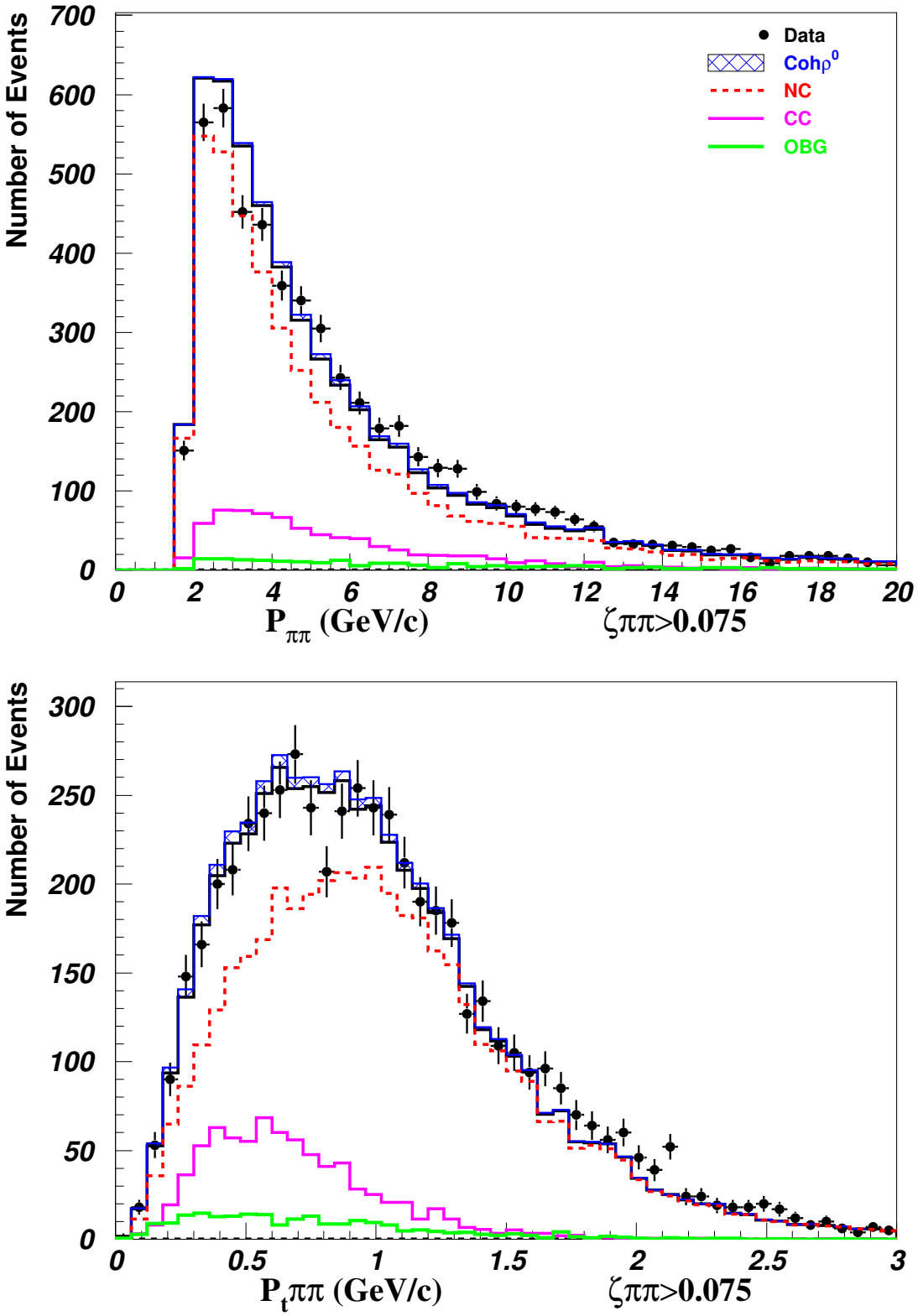

Figure 52: $P_t\pi\pi$ (Background Region)

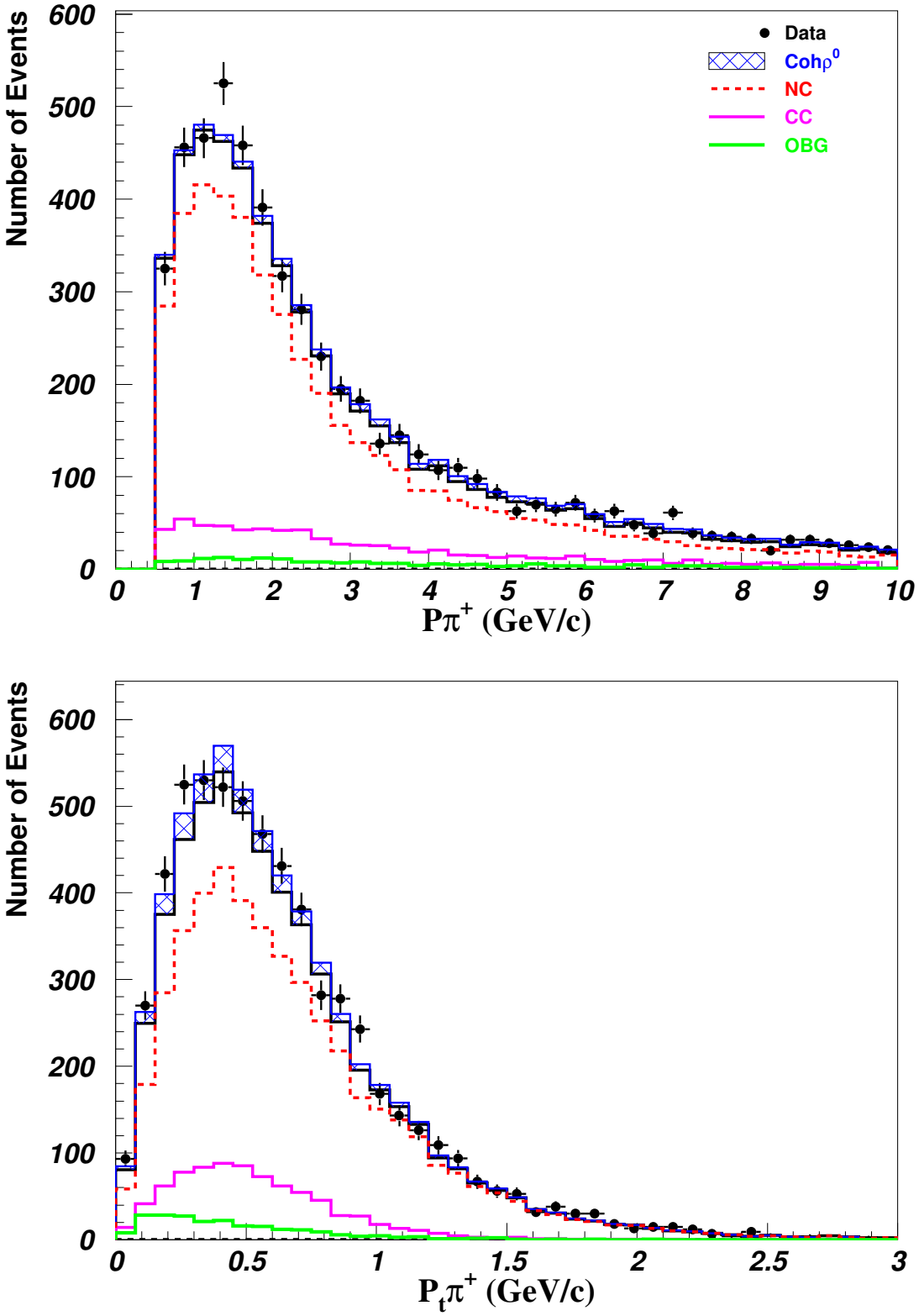

Figure 53: $P_t \pi^+$

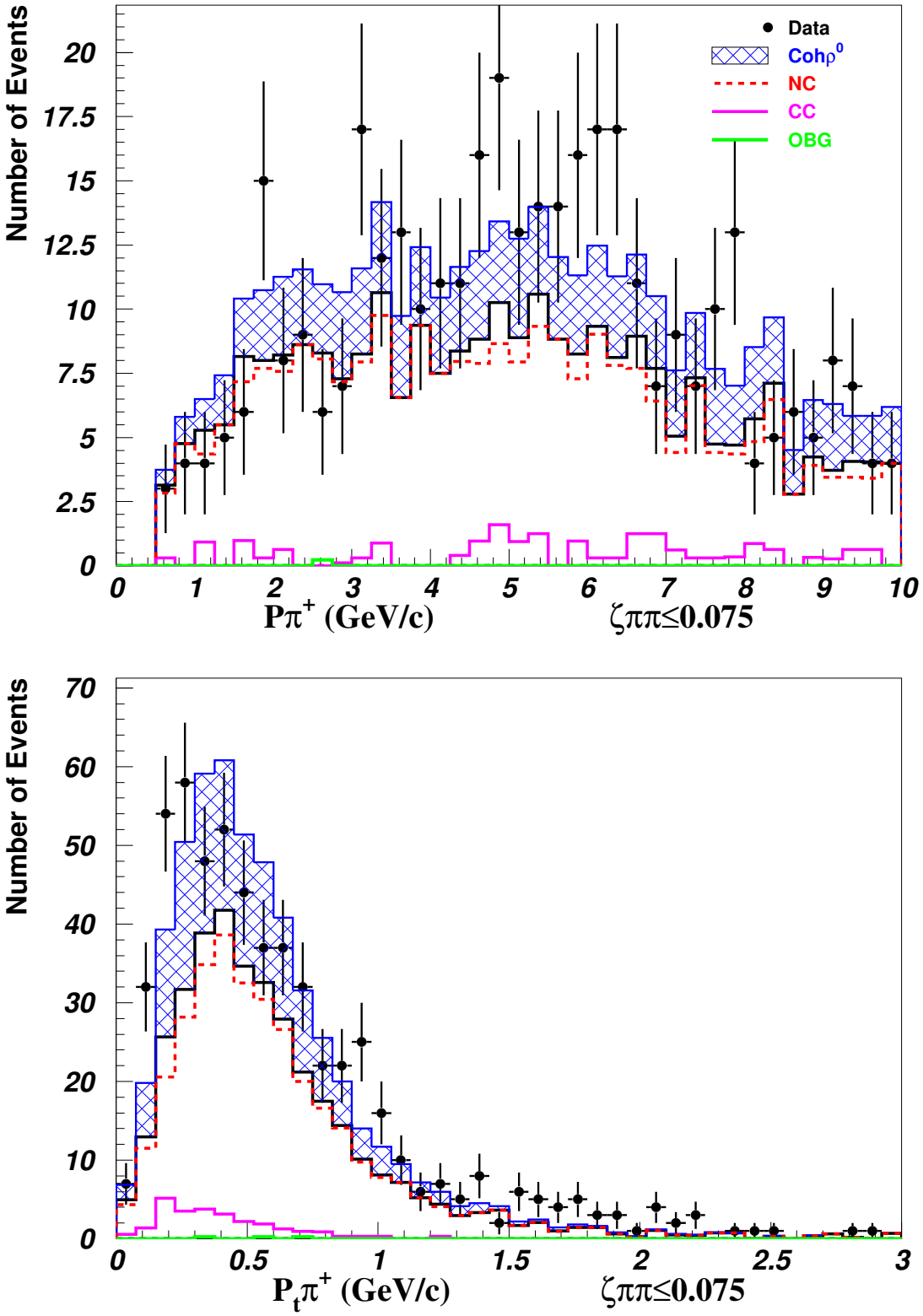

Figure 54: $P_t \pi^+$ (Signal Region)

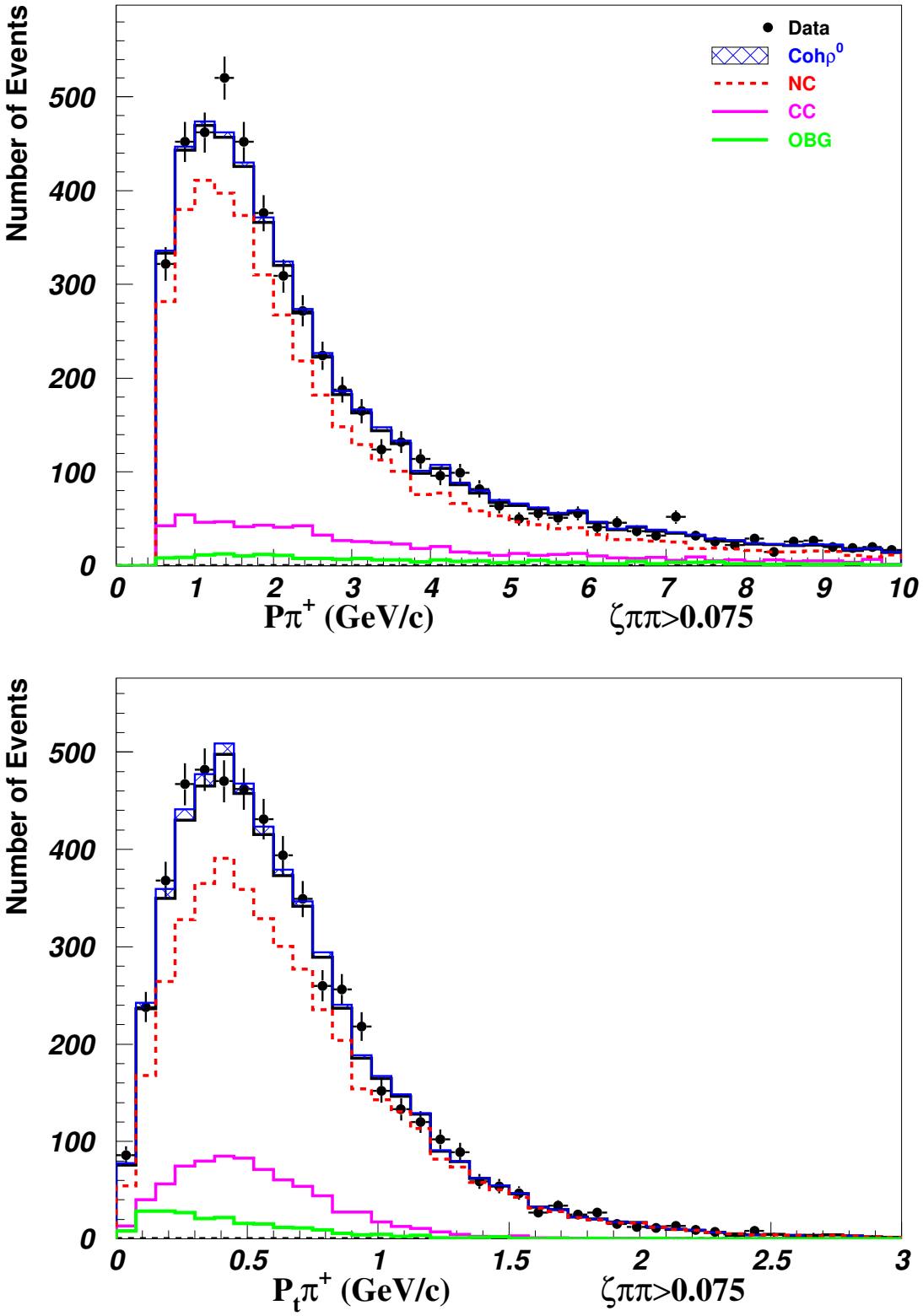

Figure 55: $P_t\pi^+$ (Background Region)

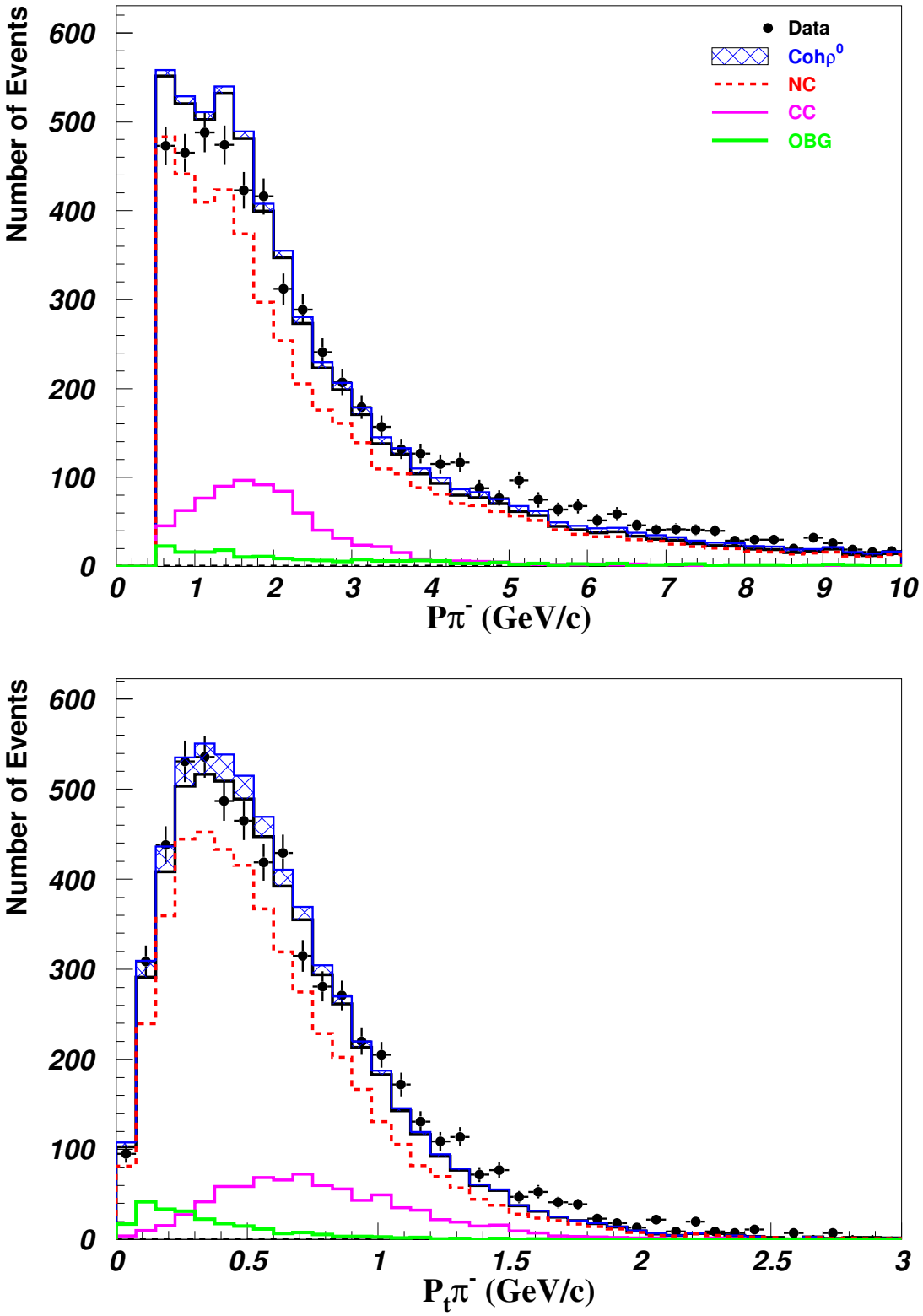

Figure 56: $P_t\pi^-$

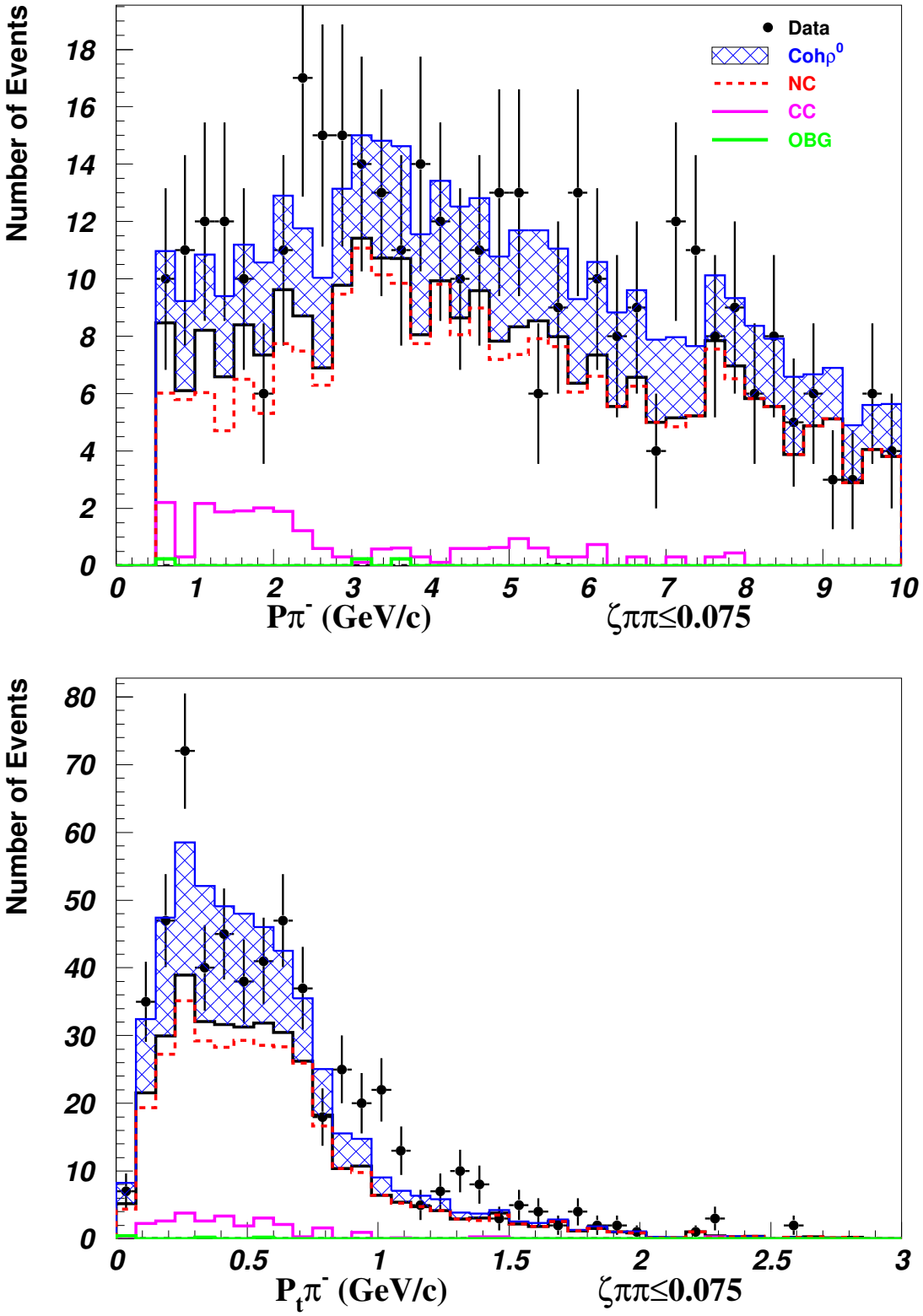

Figure 57: $P_t\pi^-$ (Signal Region)

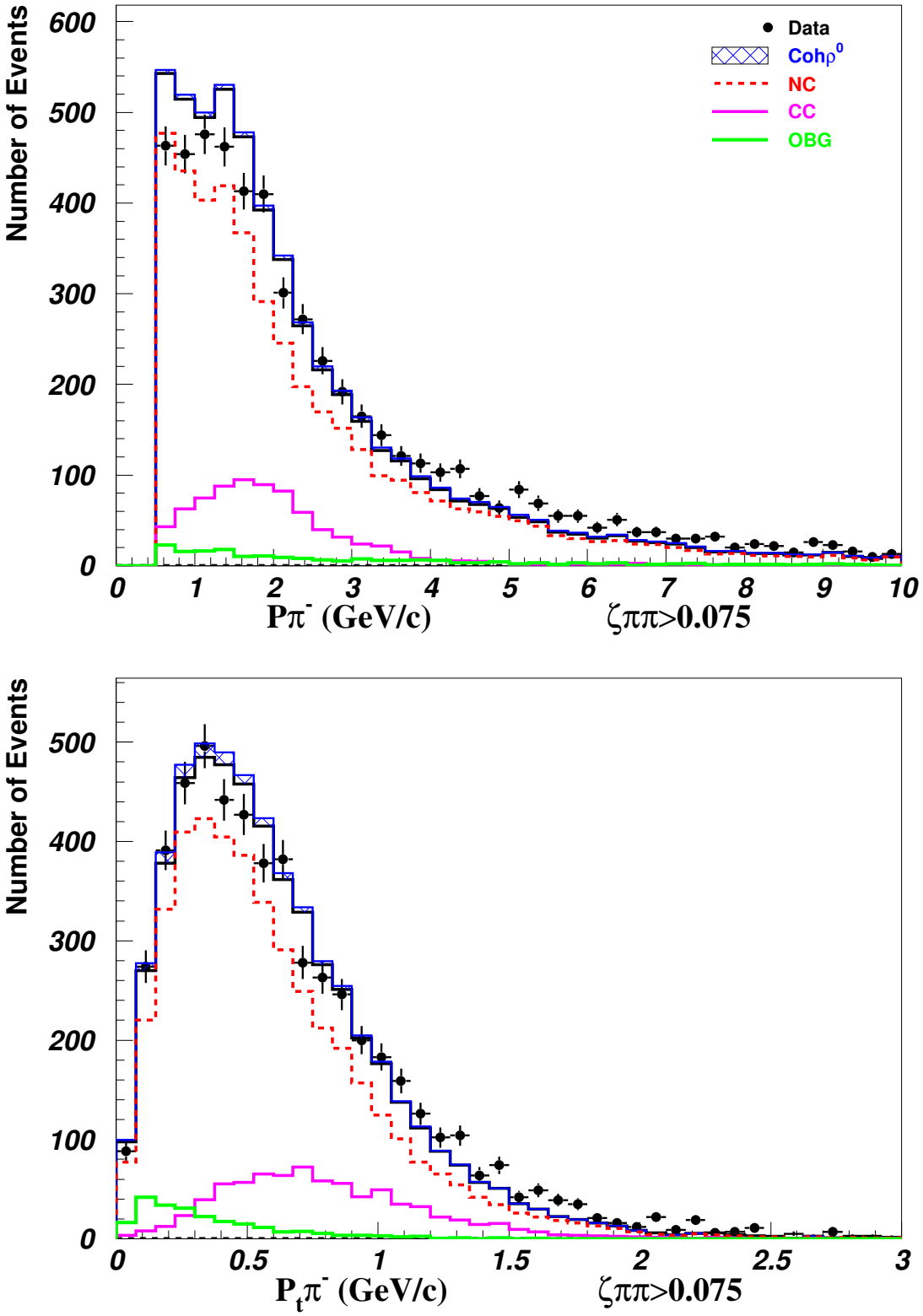

Figure 58: $P_t\pi^-$ (Background Region)

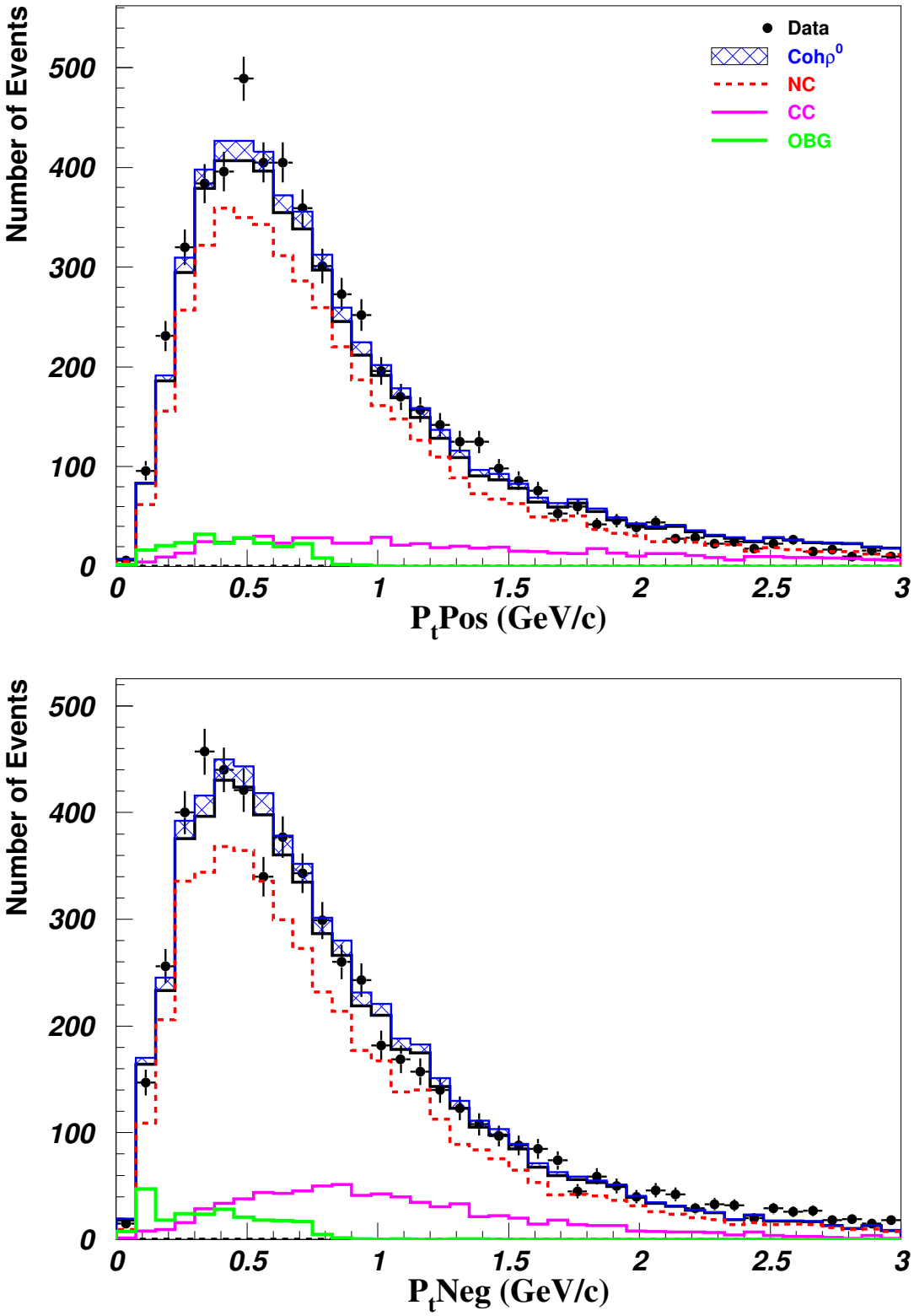

Figure 59: Ptpos and Ptneg

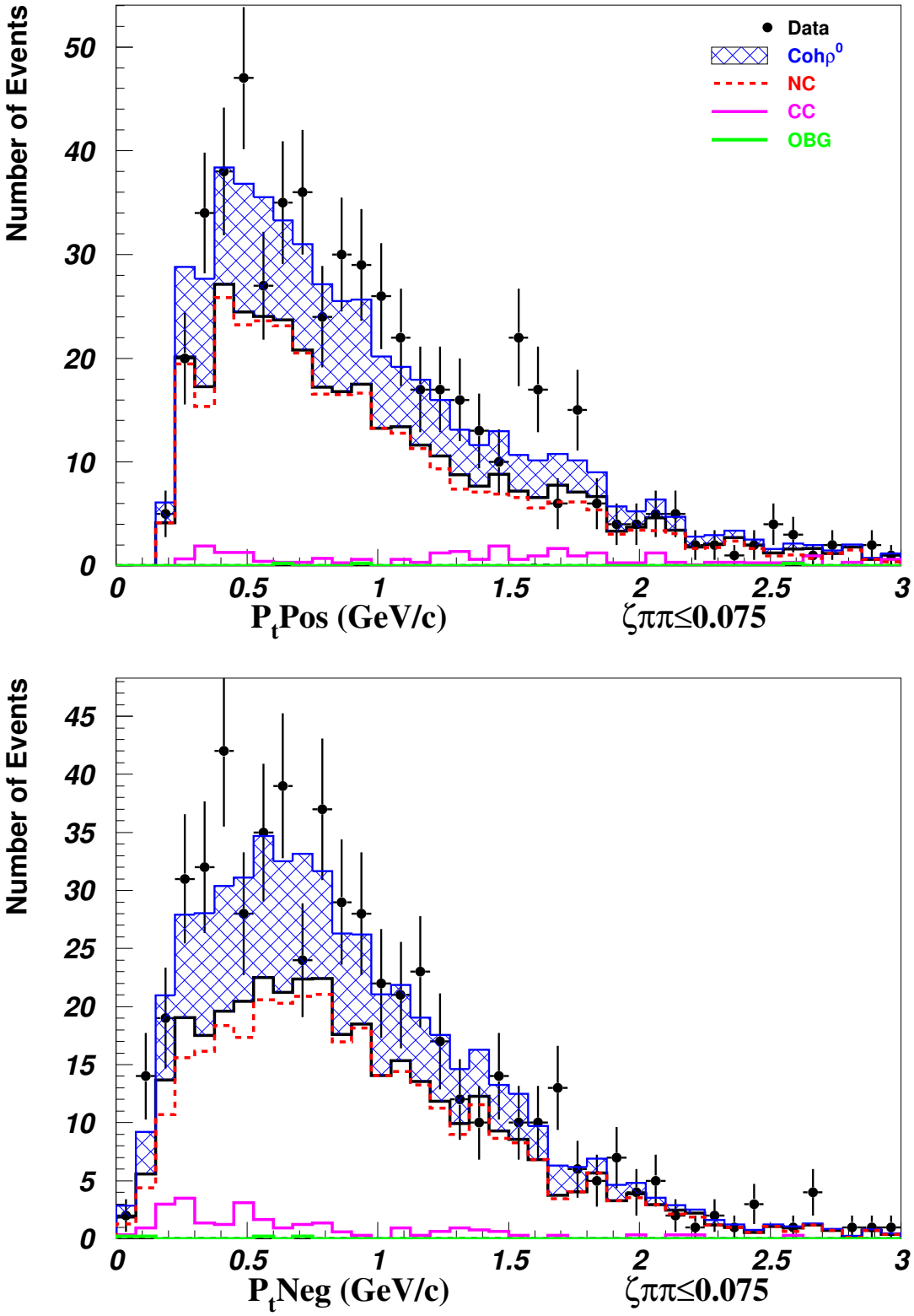

Figure 60: Ptpos and Ptneg (Signal Region)

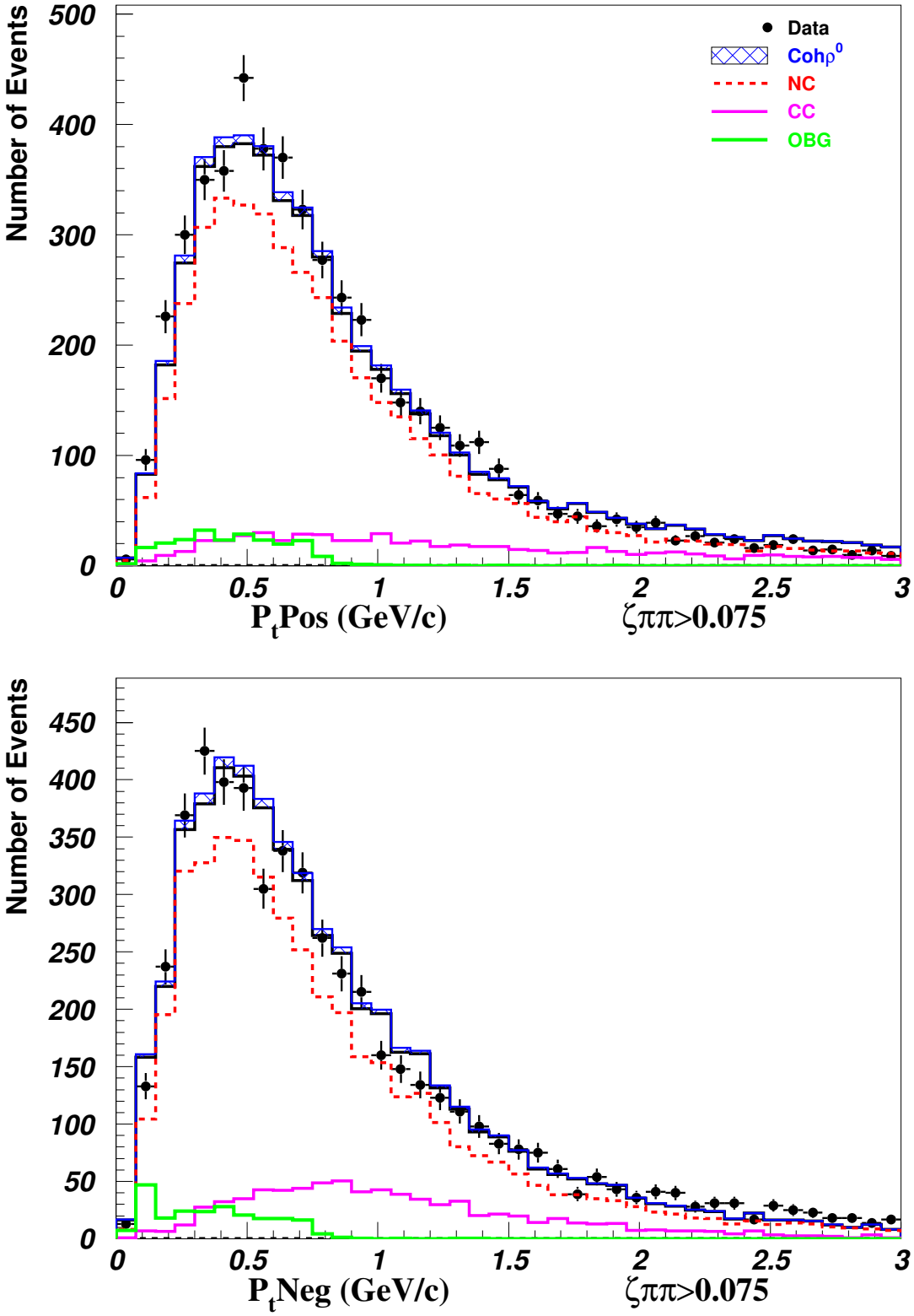

Figure 61: Ptpos and Ptneg (Background Region)

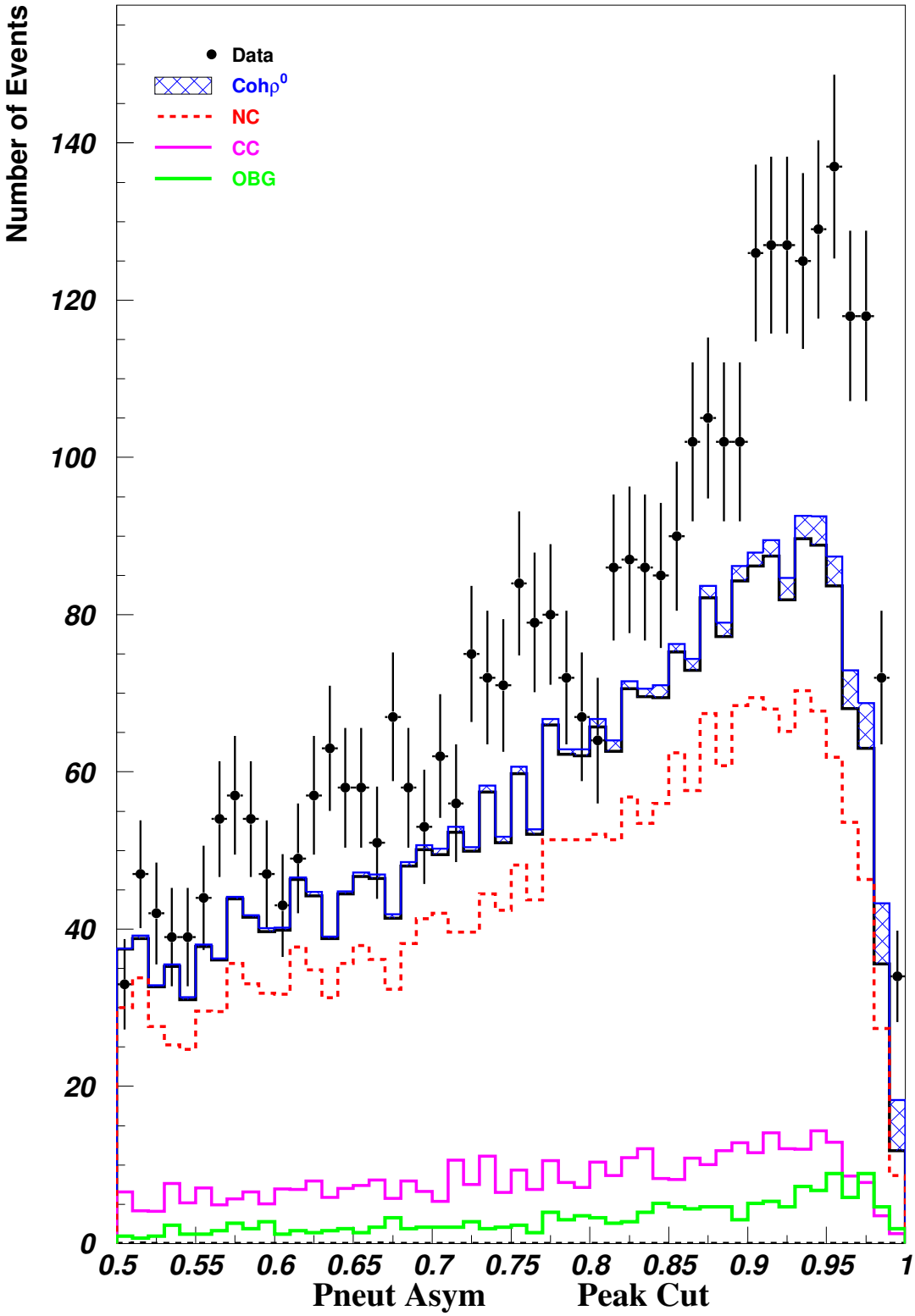

Figure 62: PAN (Neutral Momentum Assymetry)

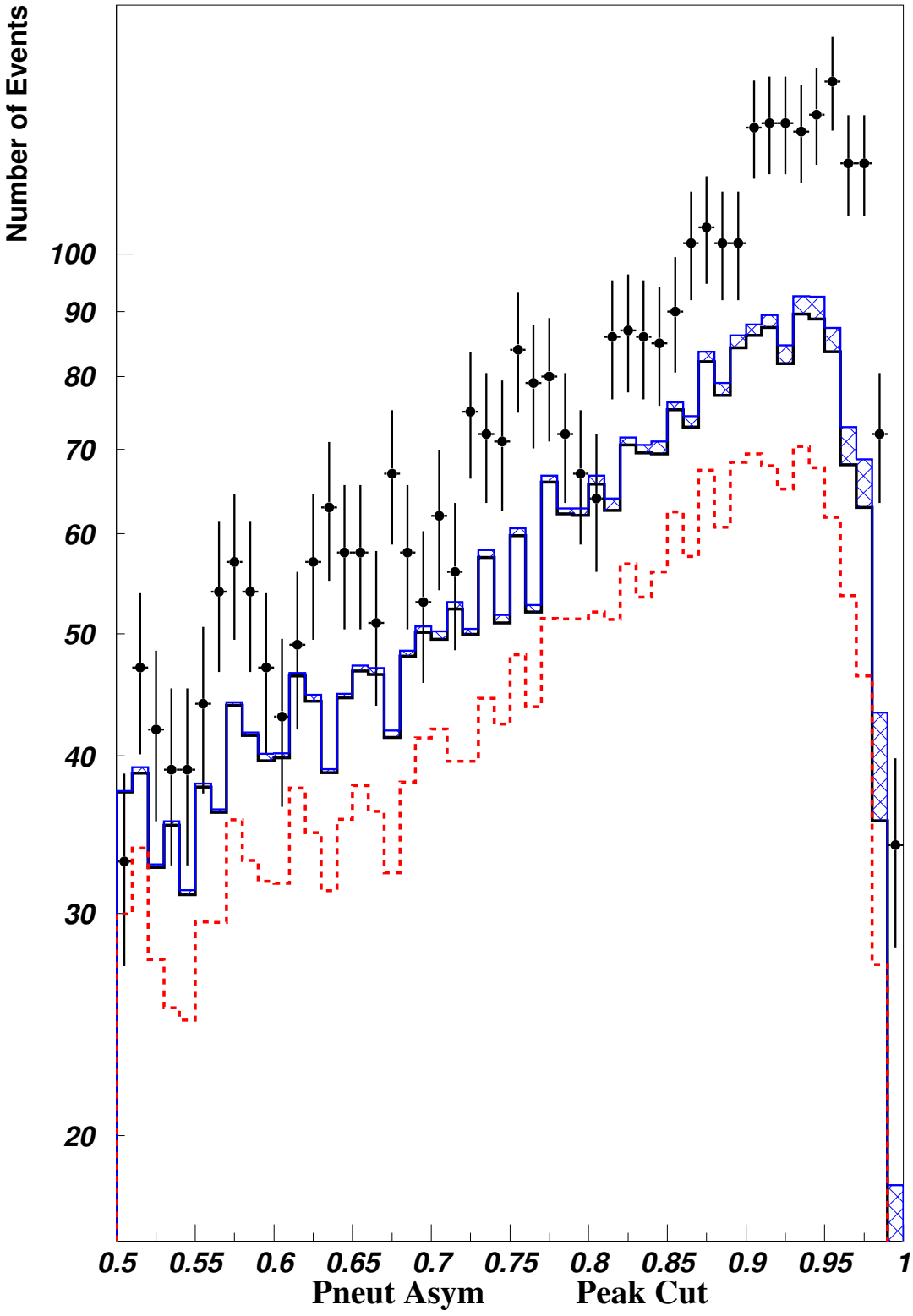

Figure 63: PAN (Neutral Momentum Assymetry (log scale))

9 Extra Plots

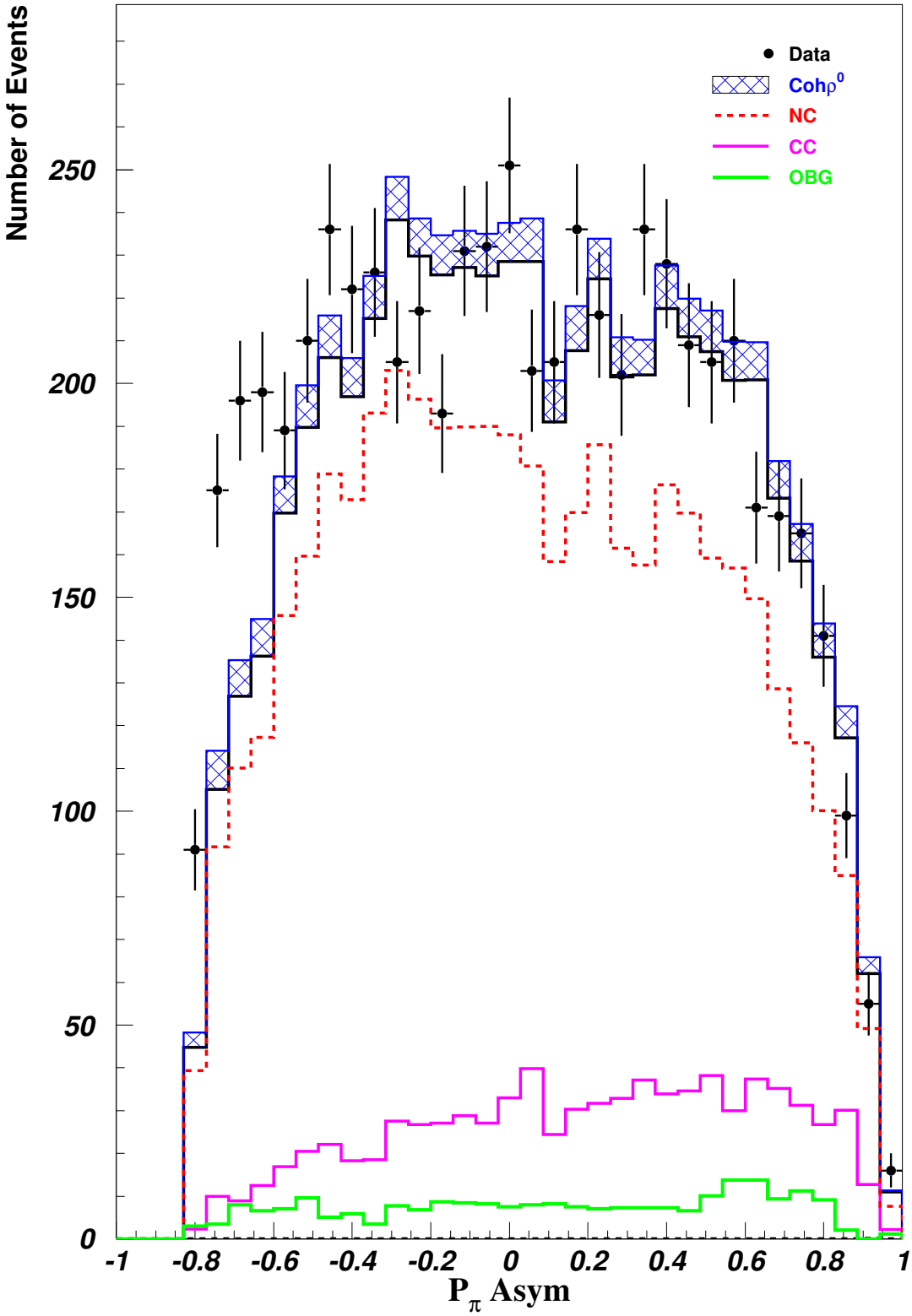

Figure 64: P_π Asymetry

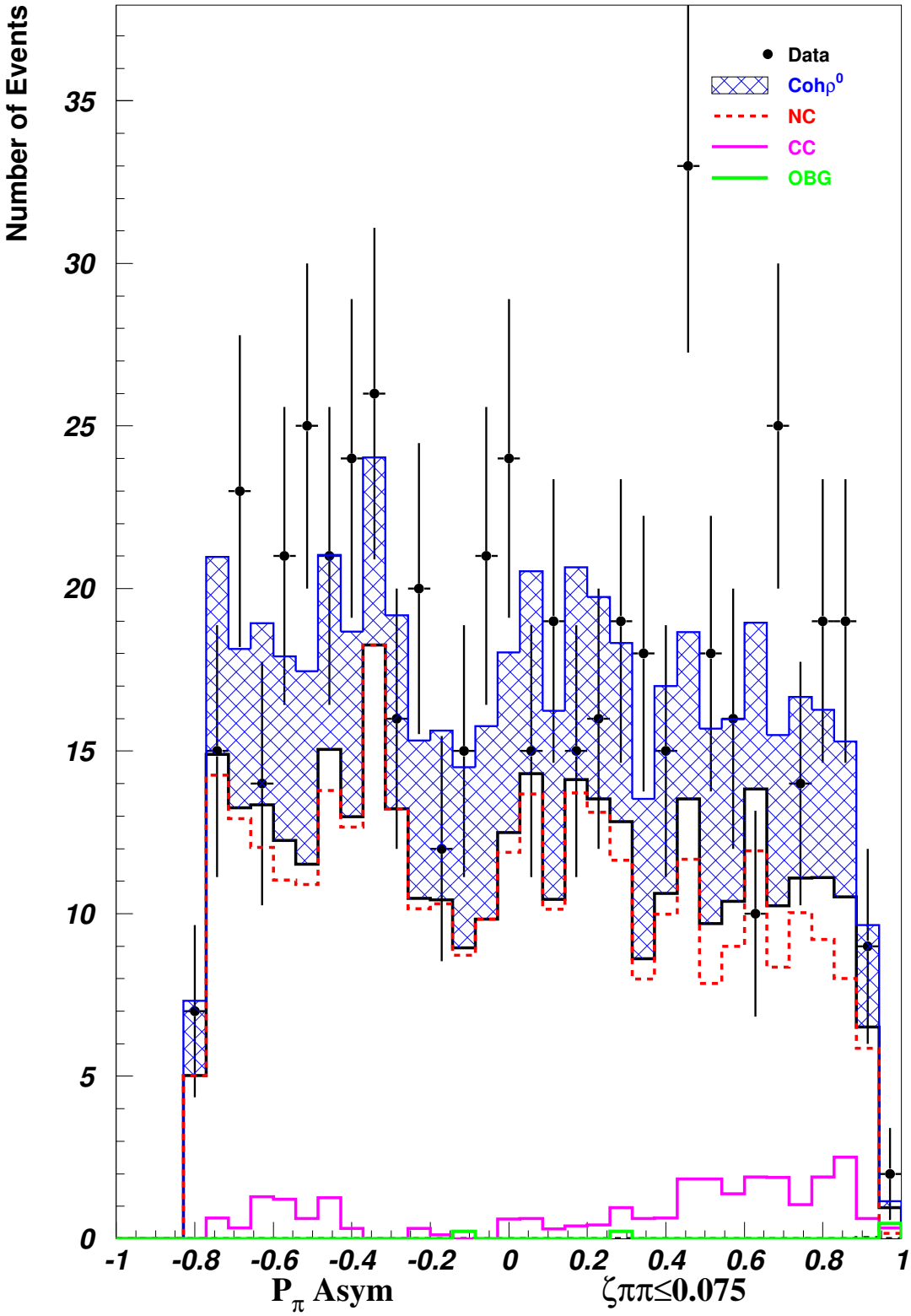

Figure 65: P_π Asymmetry (Signal Region)

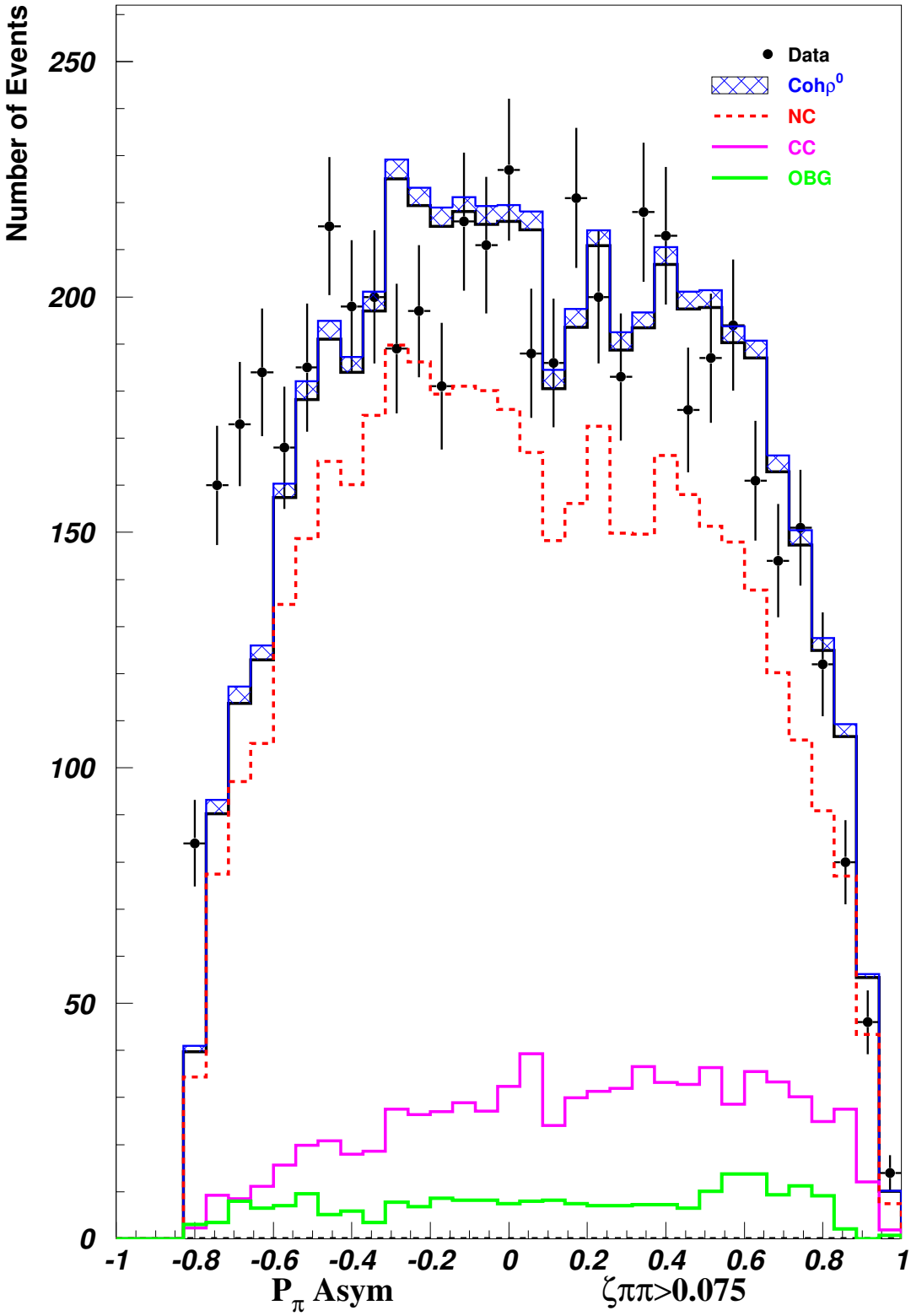

Figure 66: P_π Asymmetry (Background Region)

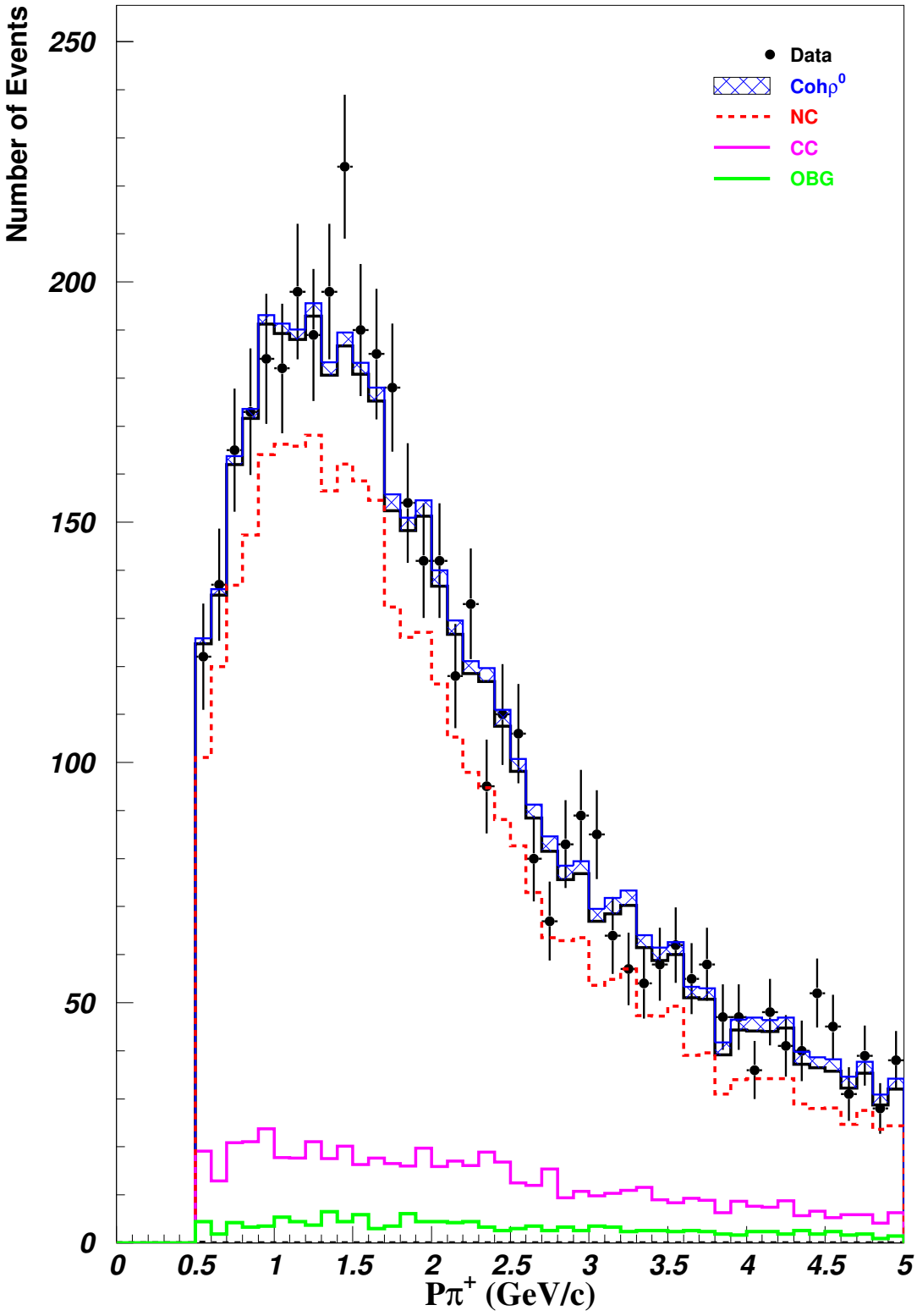
Number of Events
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Pπ+ (GeV/c)
Data
Cohρ0
NC
CC
OBG

Figure 67: P_+

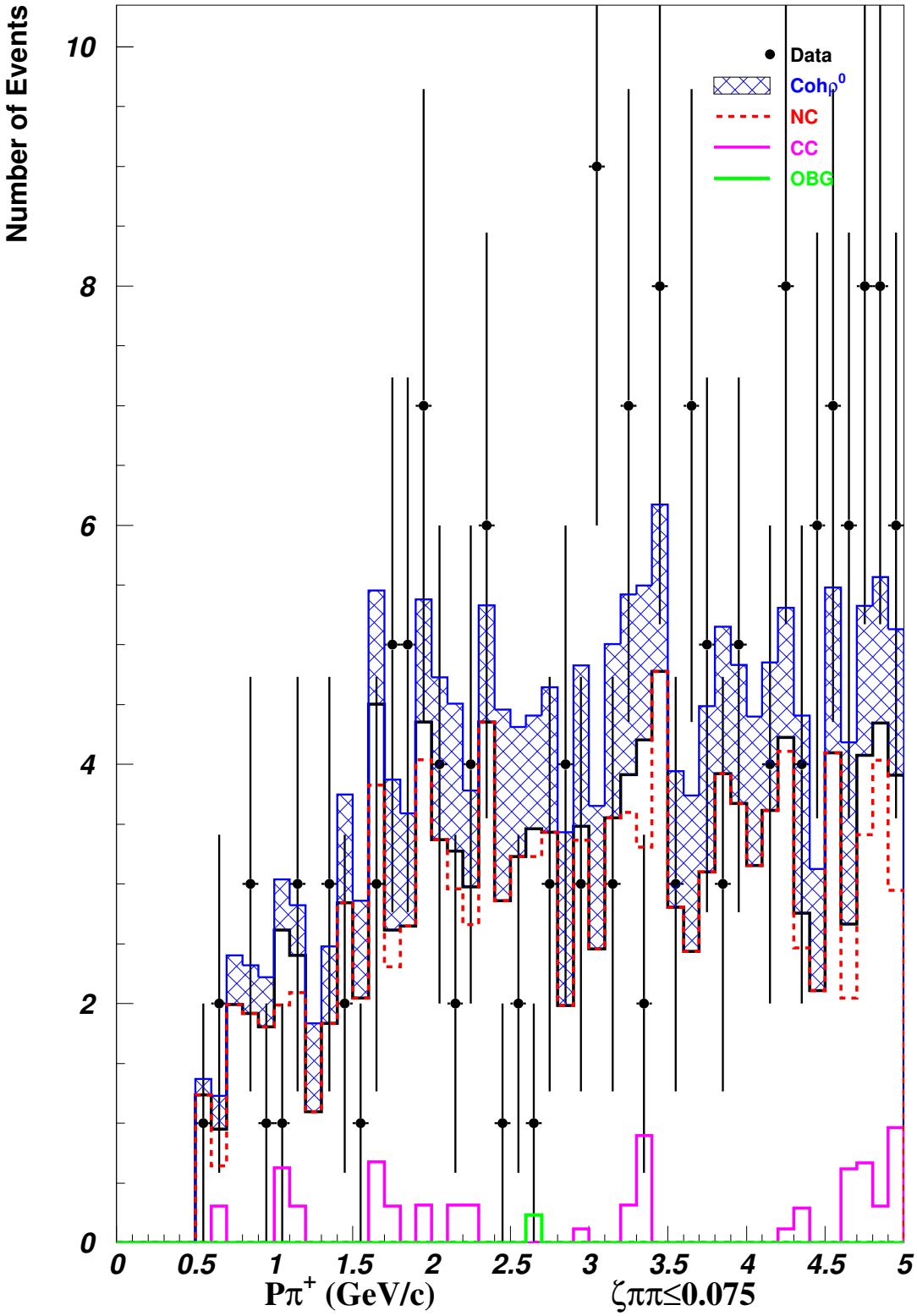

Figure 68: P_+ (Signal Region)

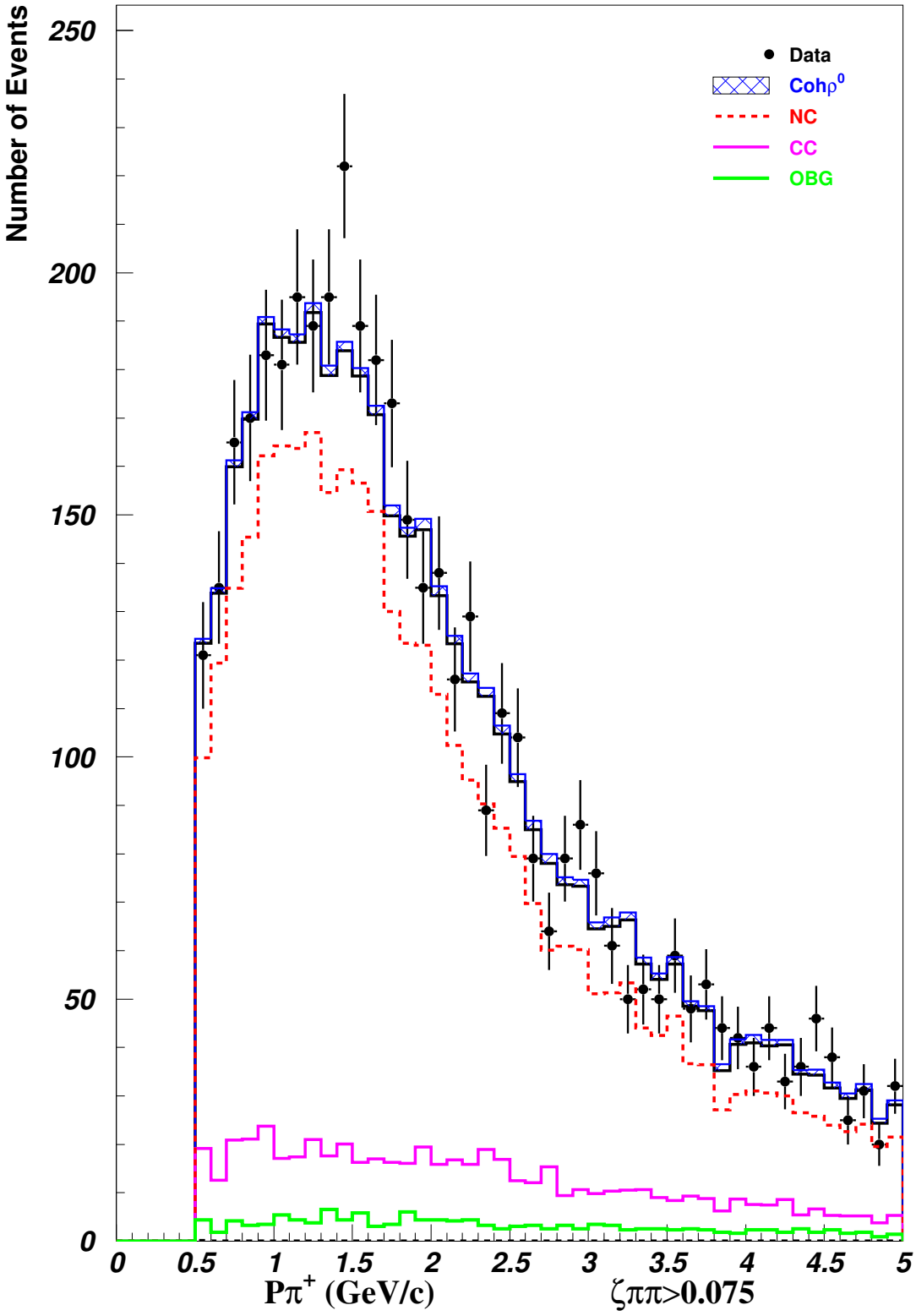

Figure 69: P_+ (Background Region)

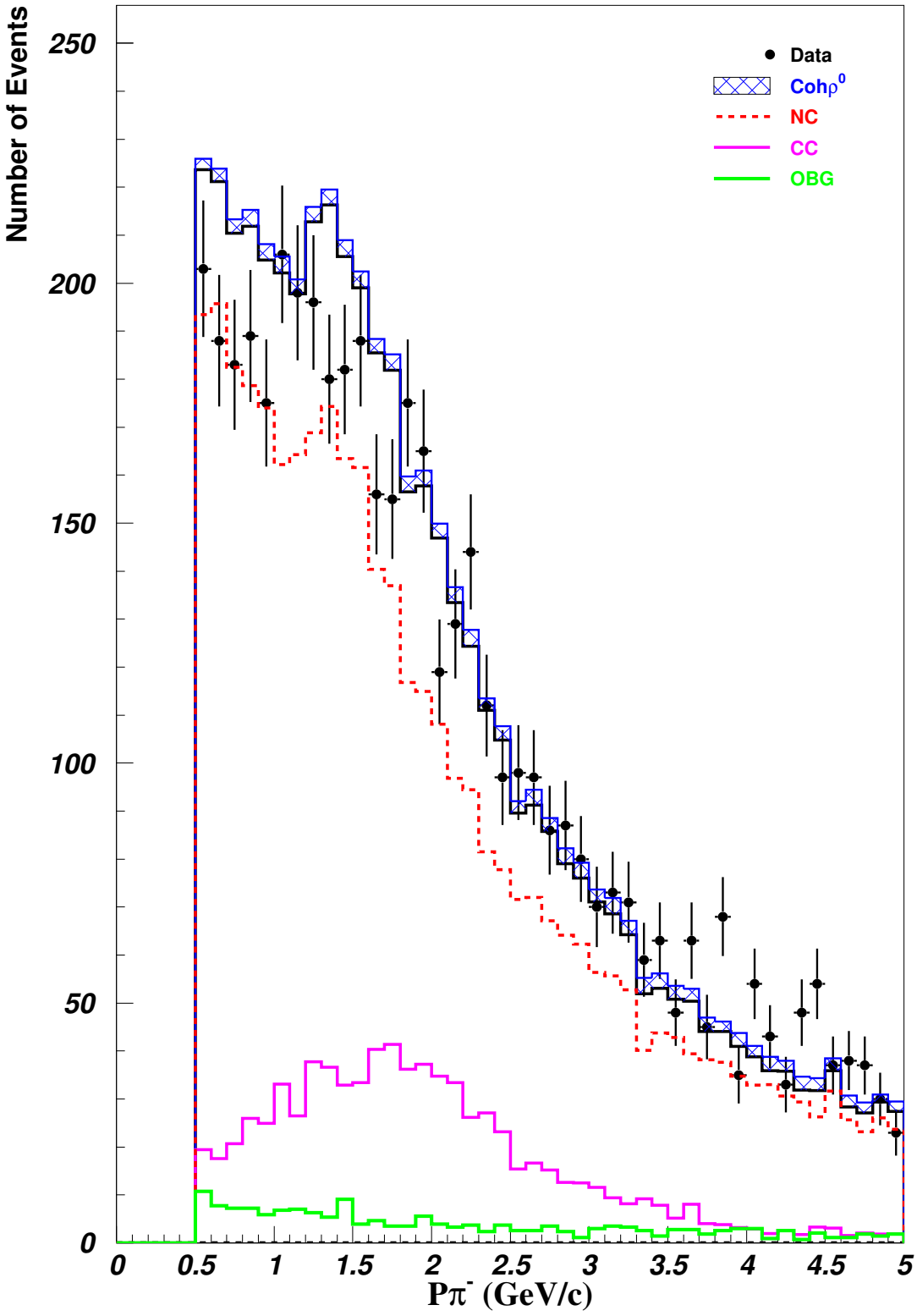
Number of Events
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Pπ⁻ (GeV/c)
Data
Cohρ⁰
NC
CC
OBG

Figure 70: P_{-}

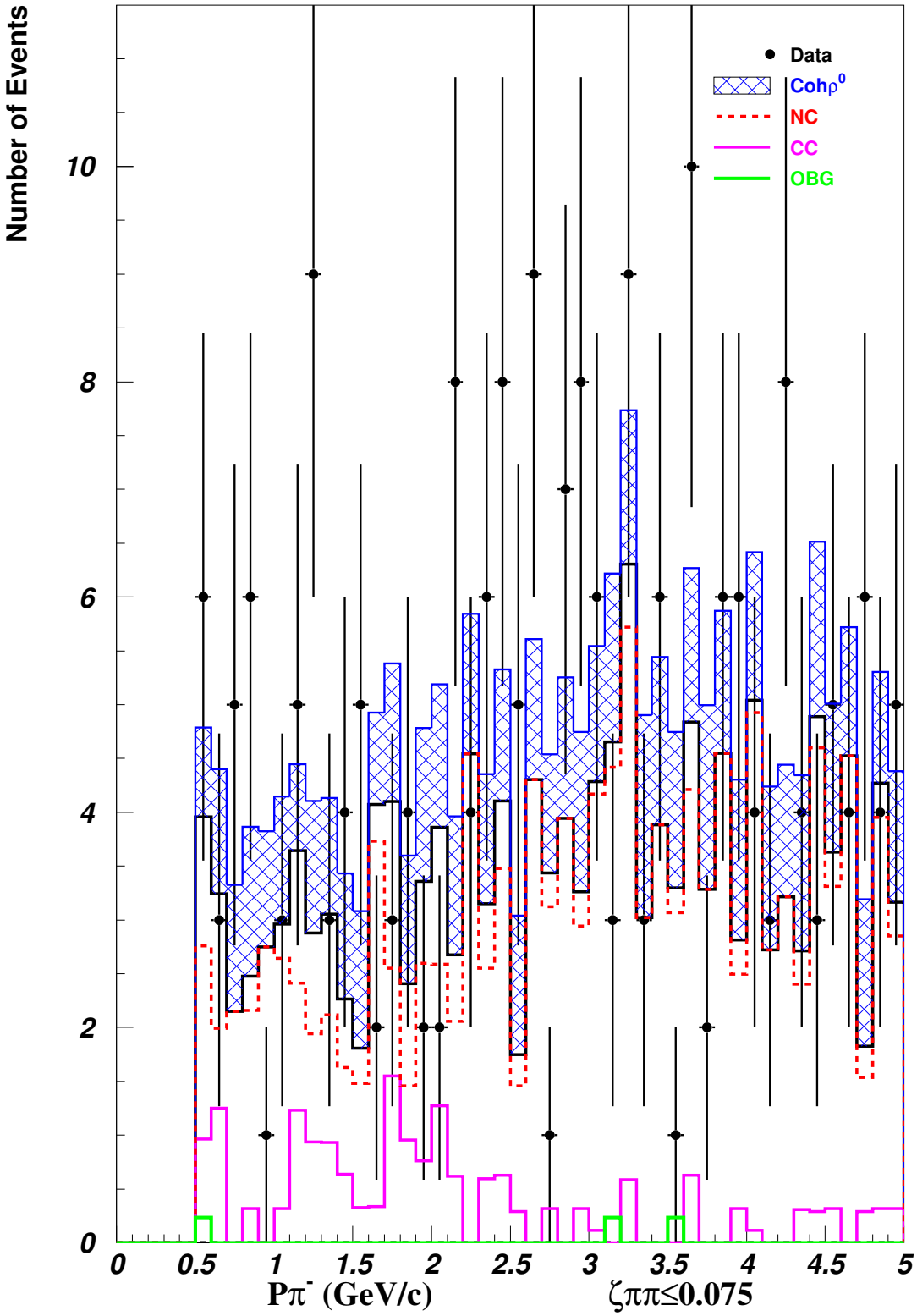

Figure 71: P_{-} (Signal Region)

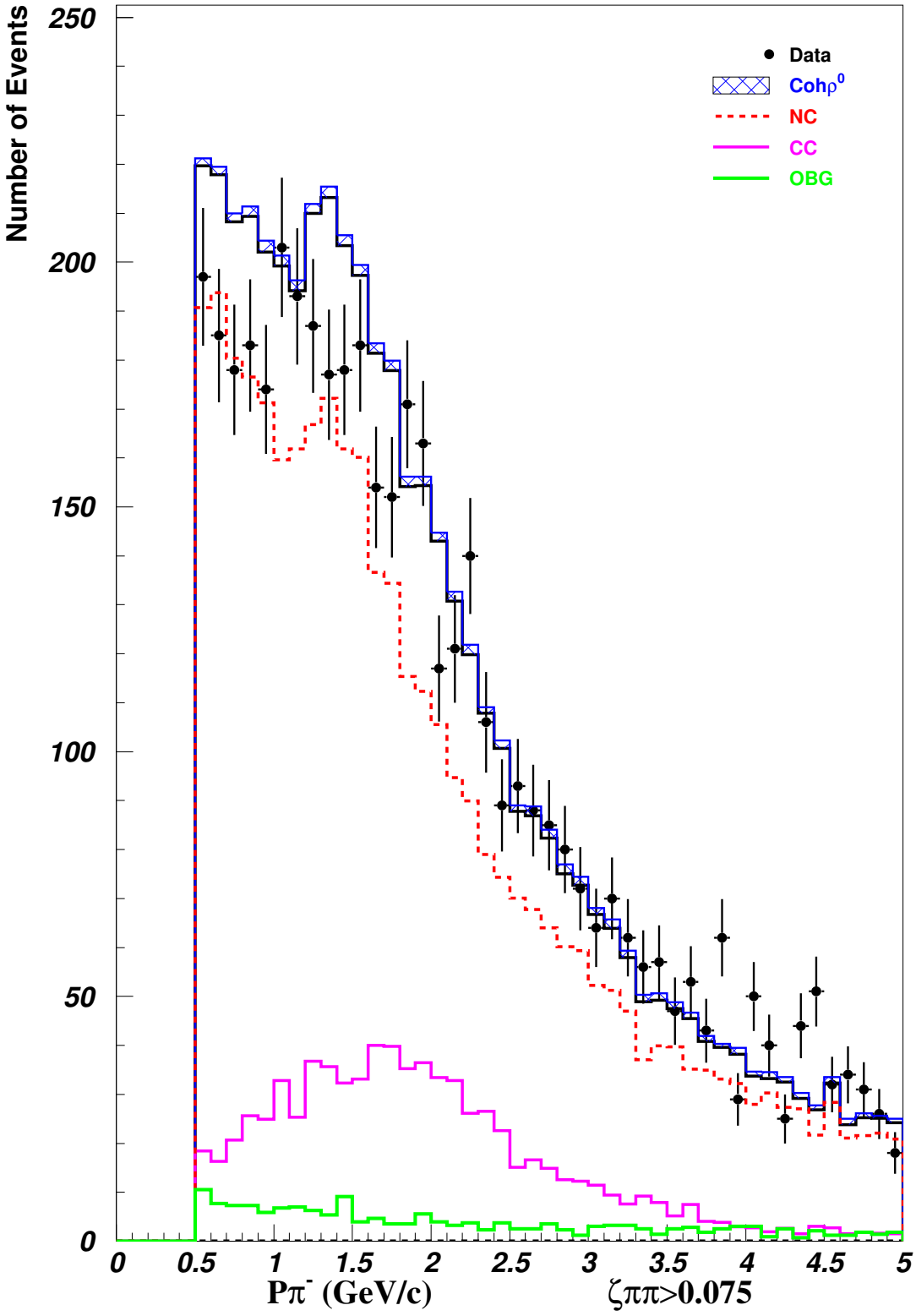

Figure 72: P_{-} (Background Region)

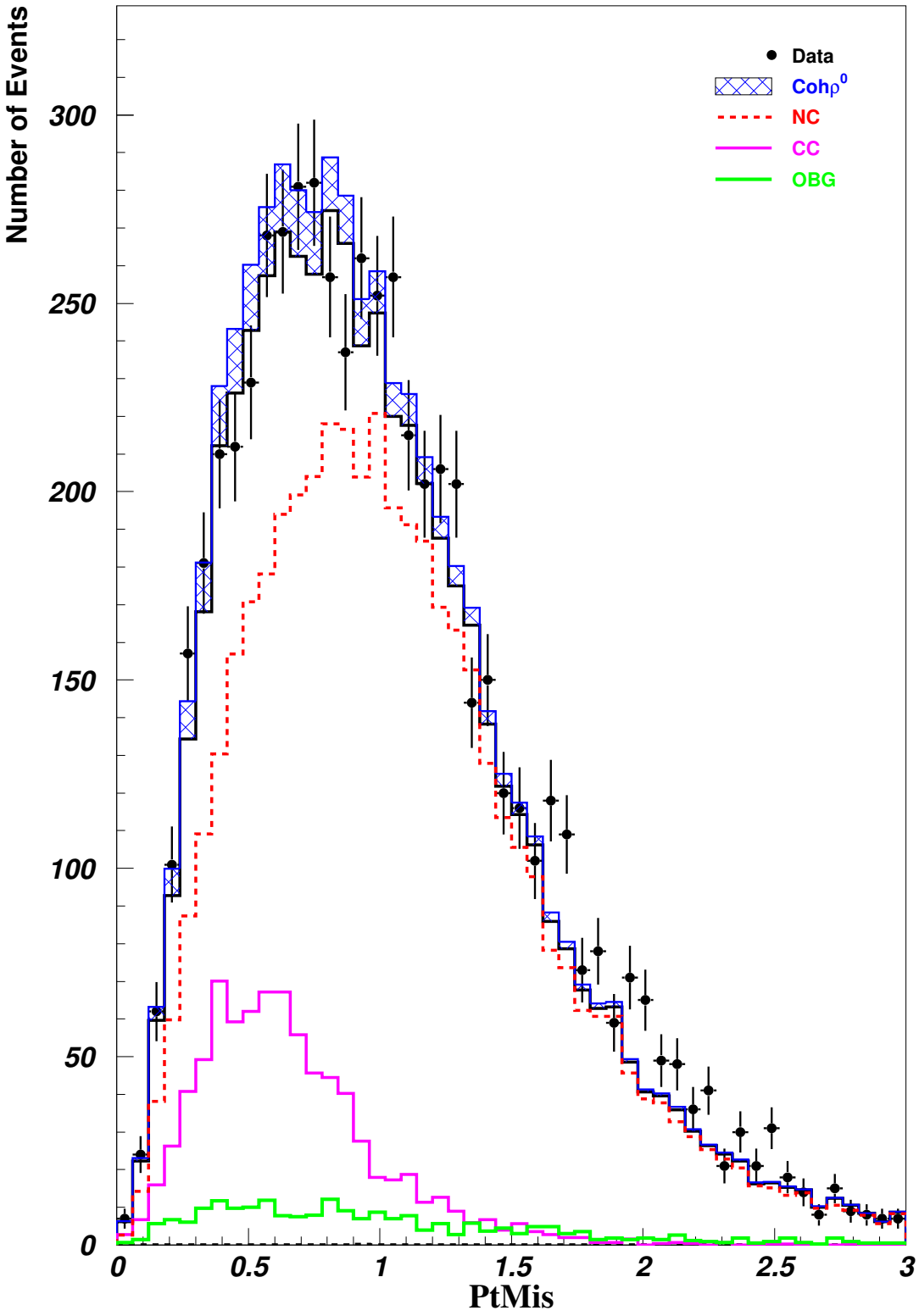

Figure 73: $P_t Mis$

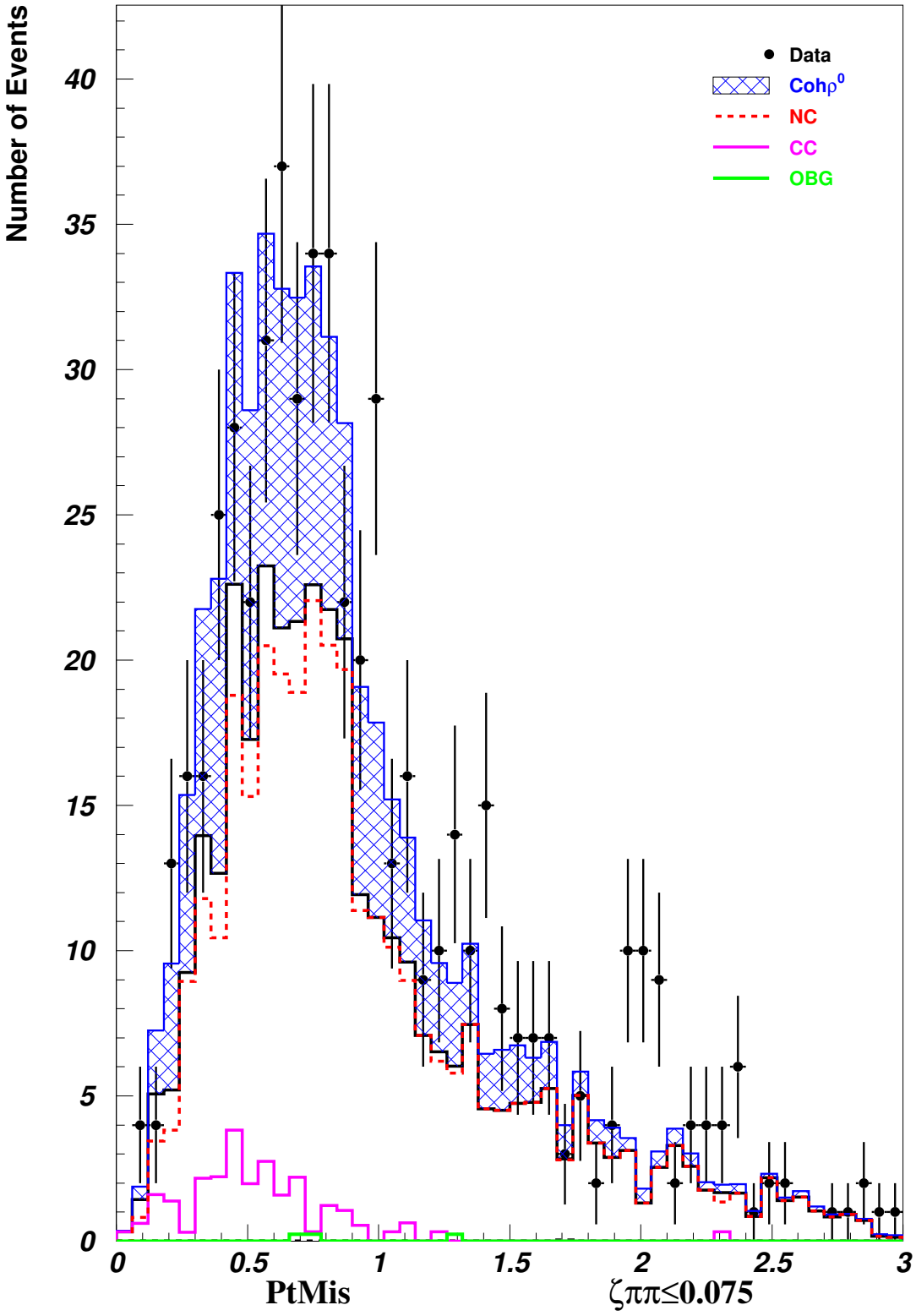

Figure 74: P_tMis (Signal Region)

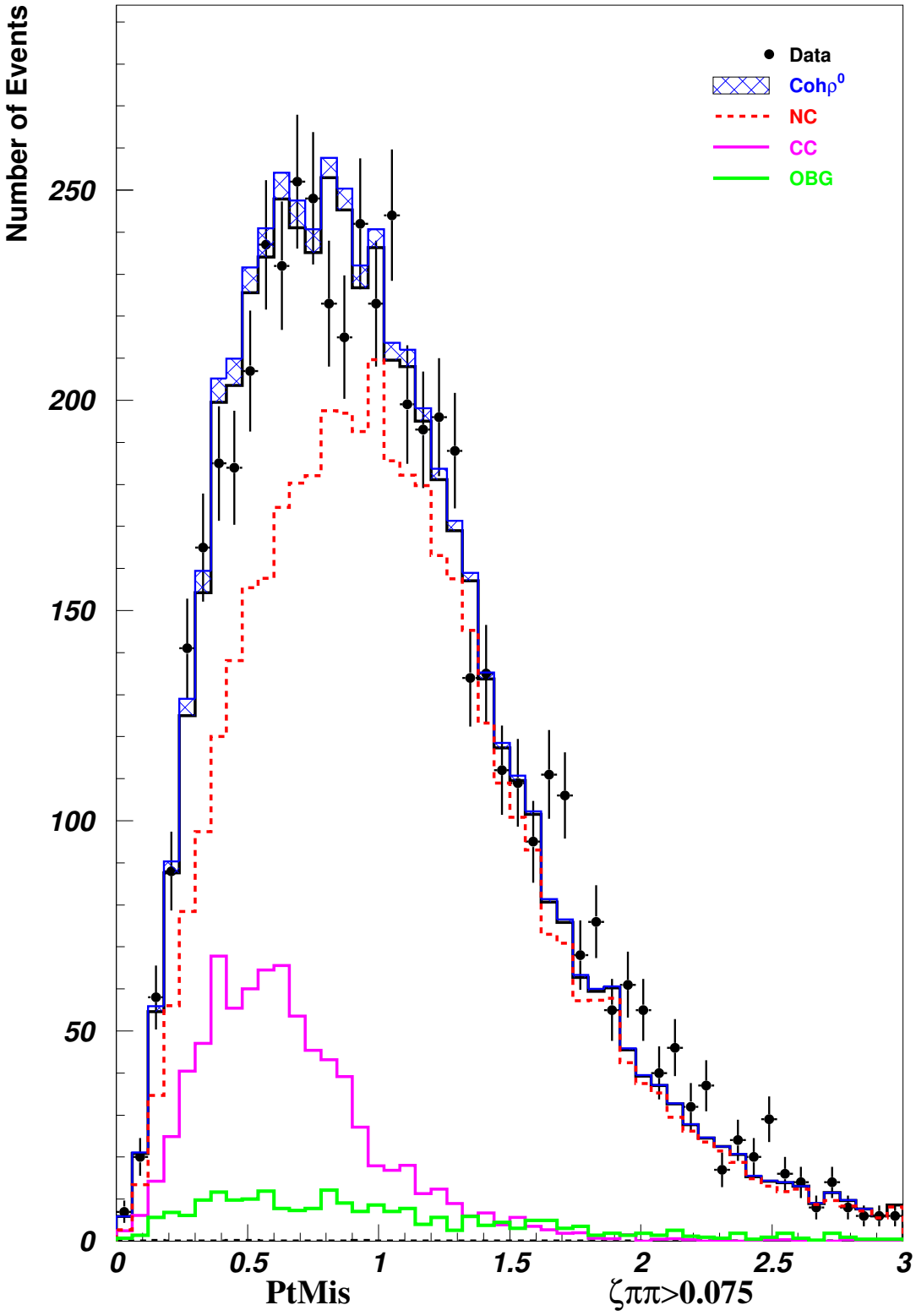

Figure 75: P_tMis (Background Region)

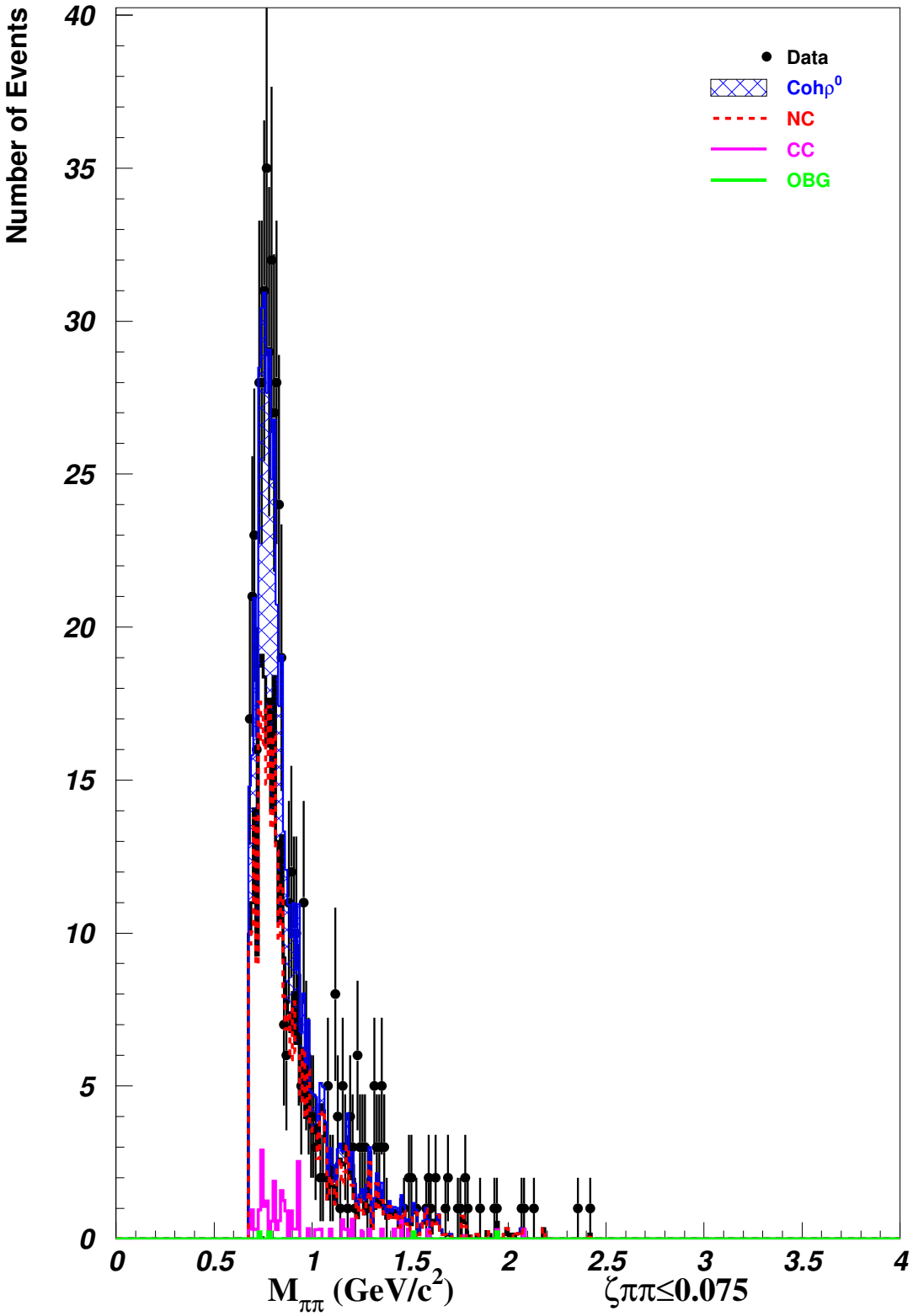

Figure 76: $M_{\pi\pi}$ 12.5MeV
(Signal Region)

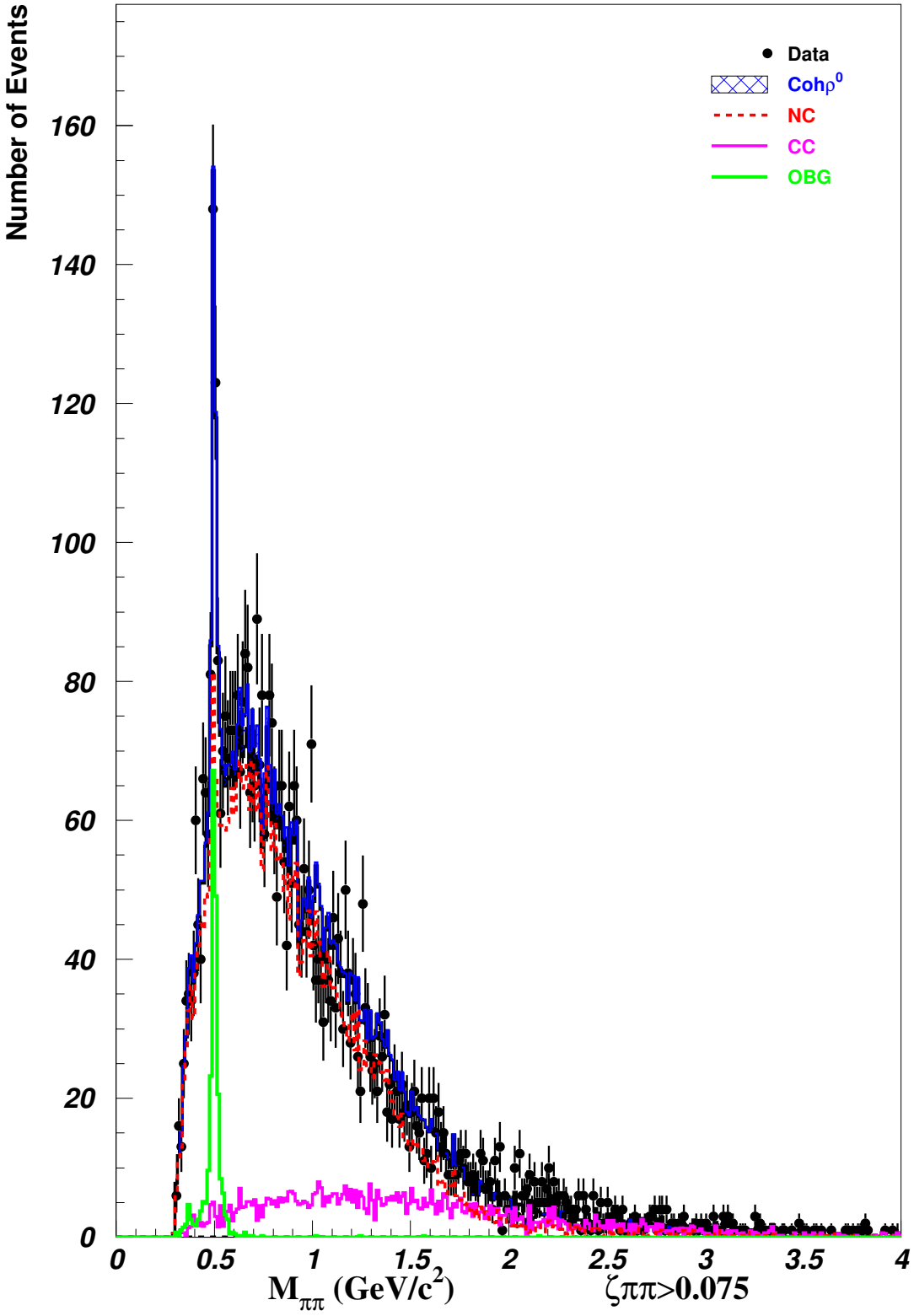

Figure 77: $M_{\pi\pi}$ 12.5MeV
(Background Region)

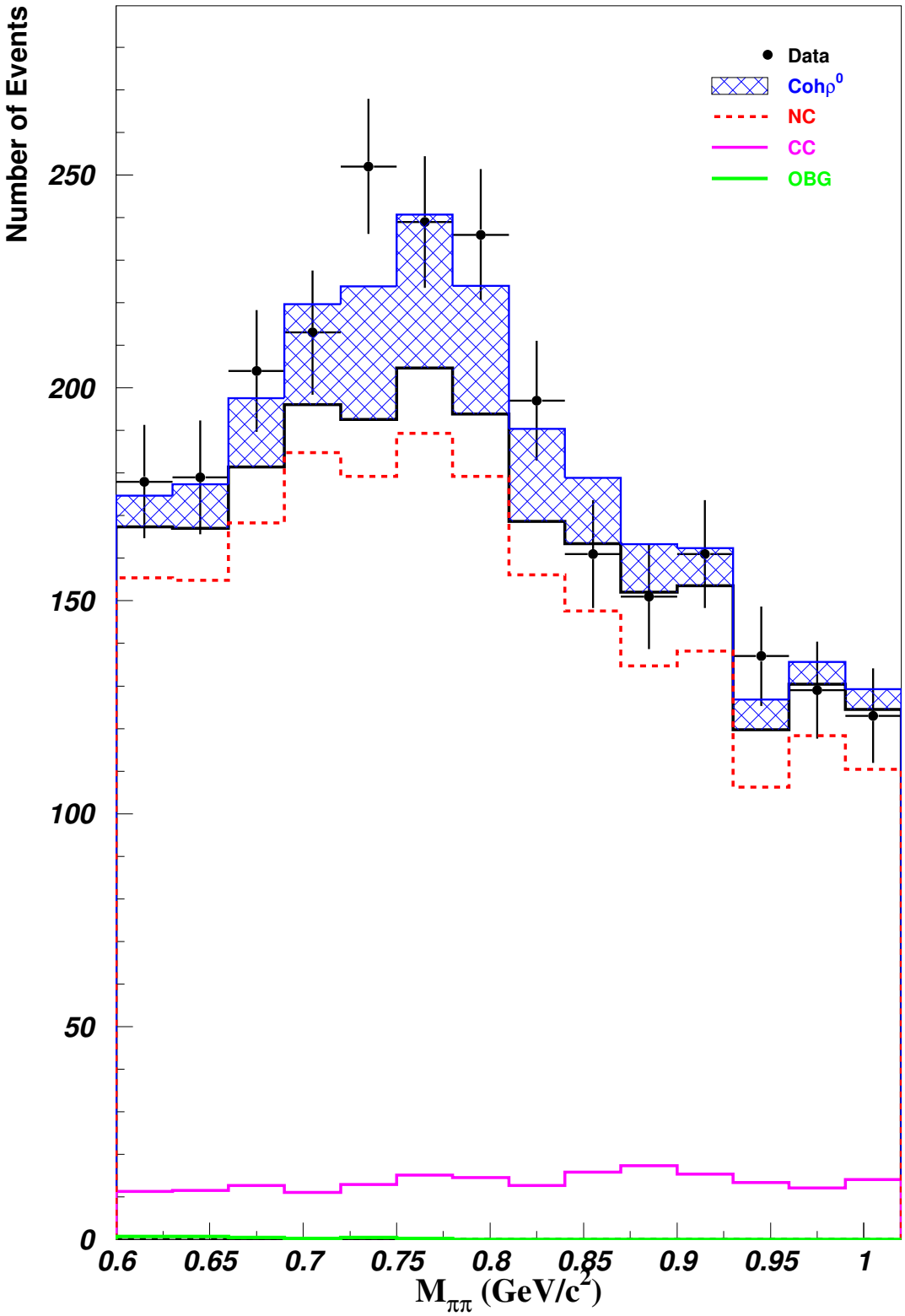

Figure 78: $M_{\pi\pi}$ For χ^2

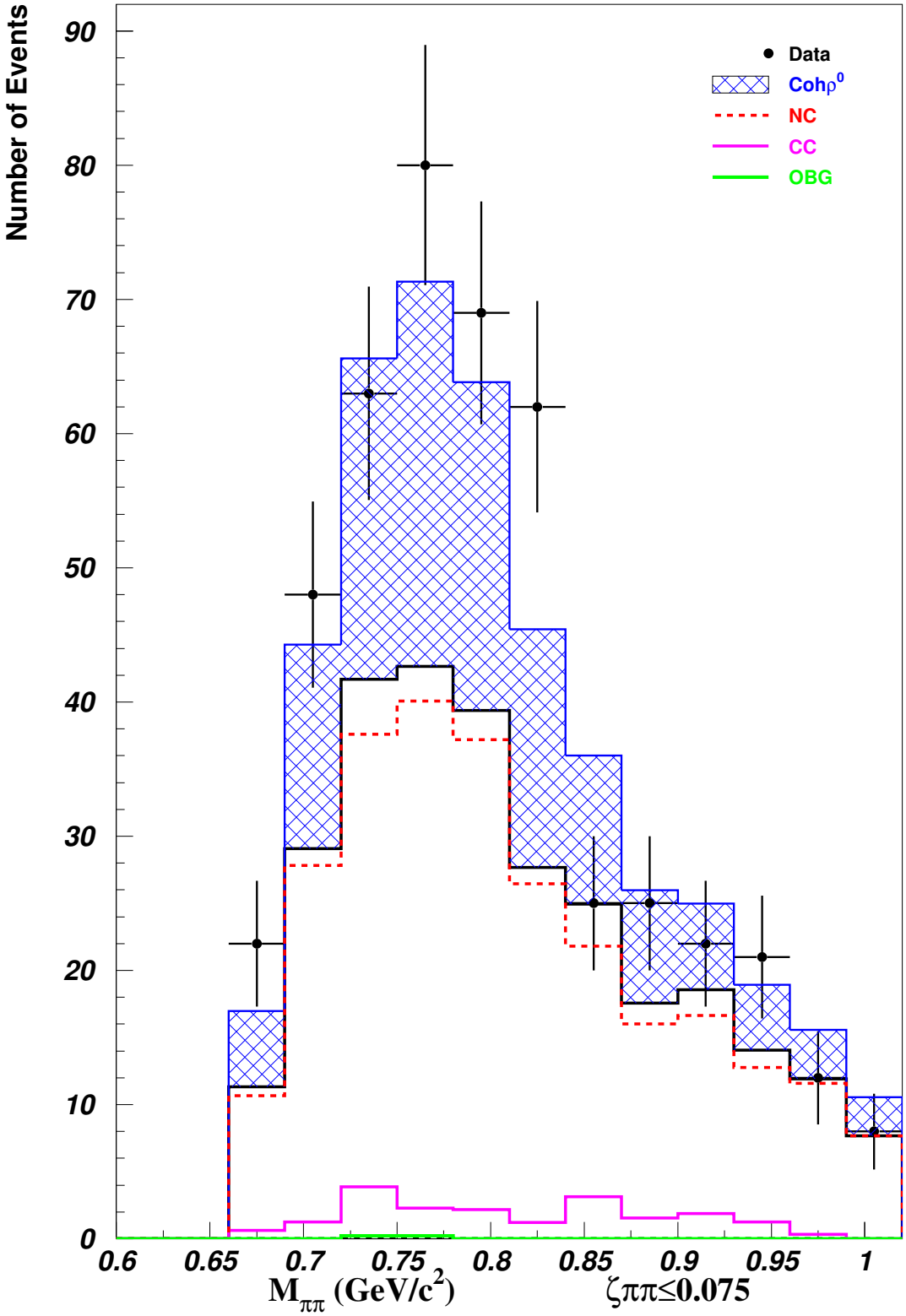

Figure 79: $M_{\pi\pi}$ For χ^2
(Signal Region)

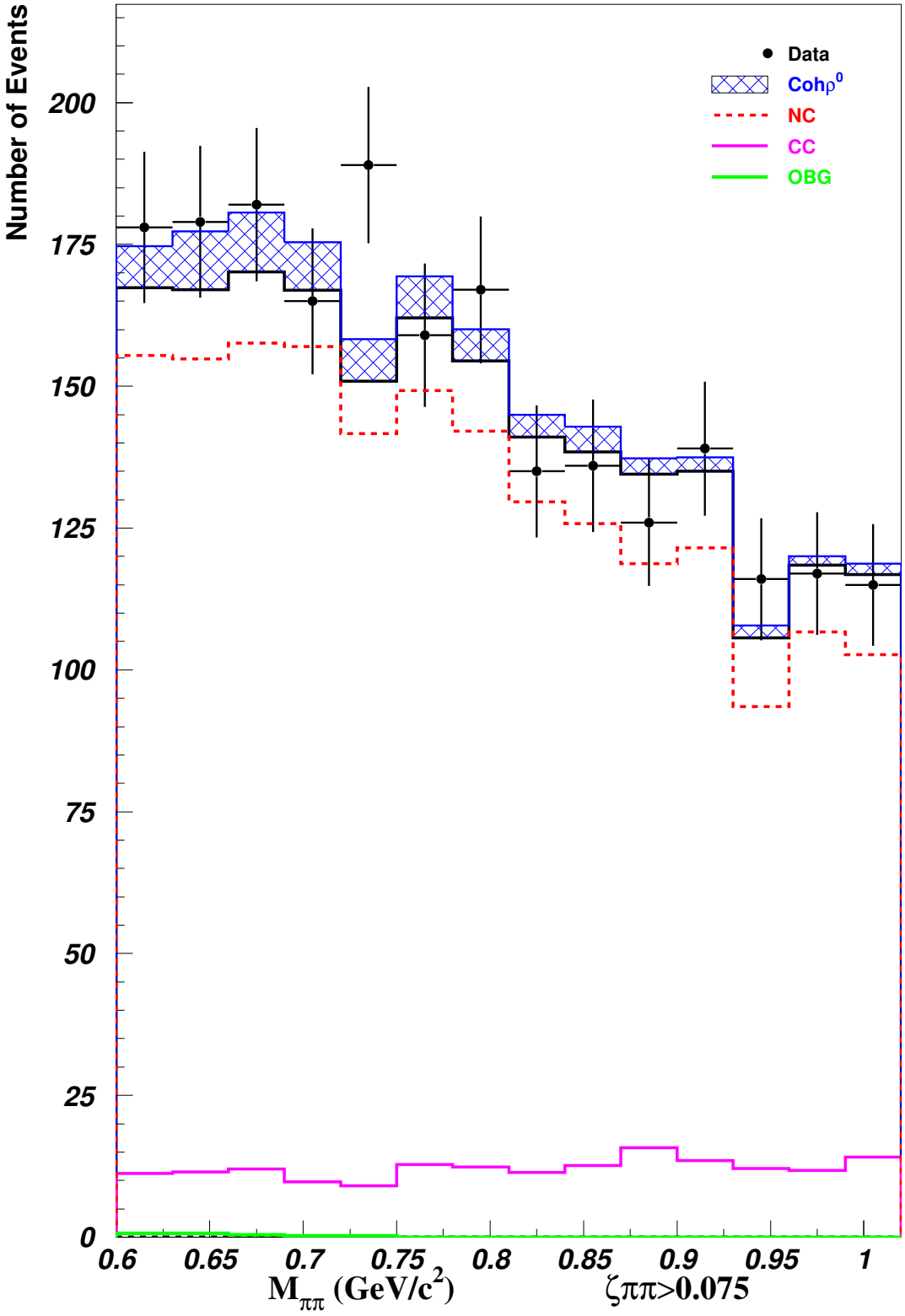

Figure 80: $M_{\pi\pi}$ For χ^2
(Background Region)

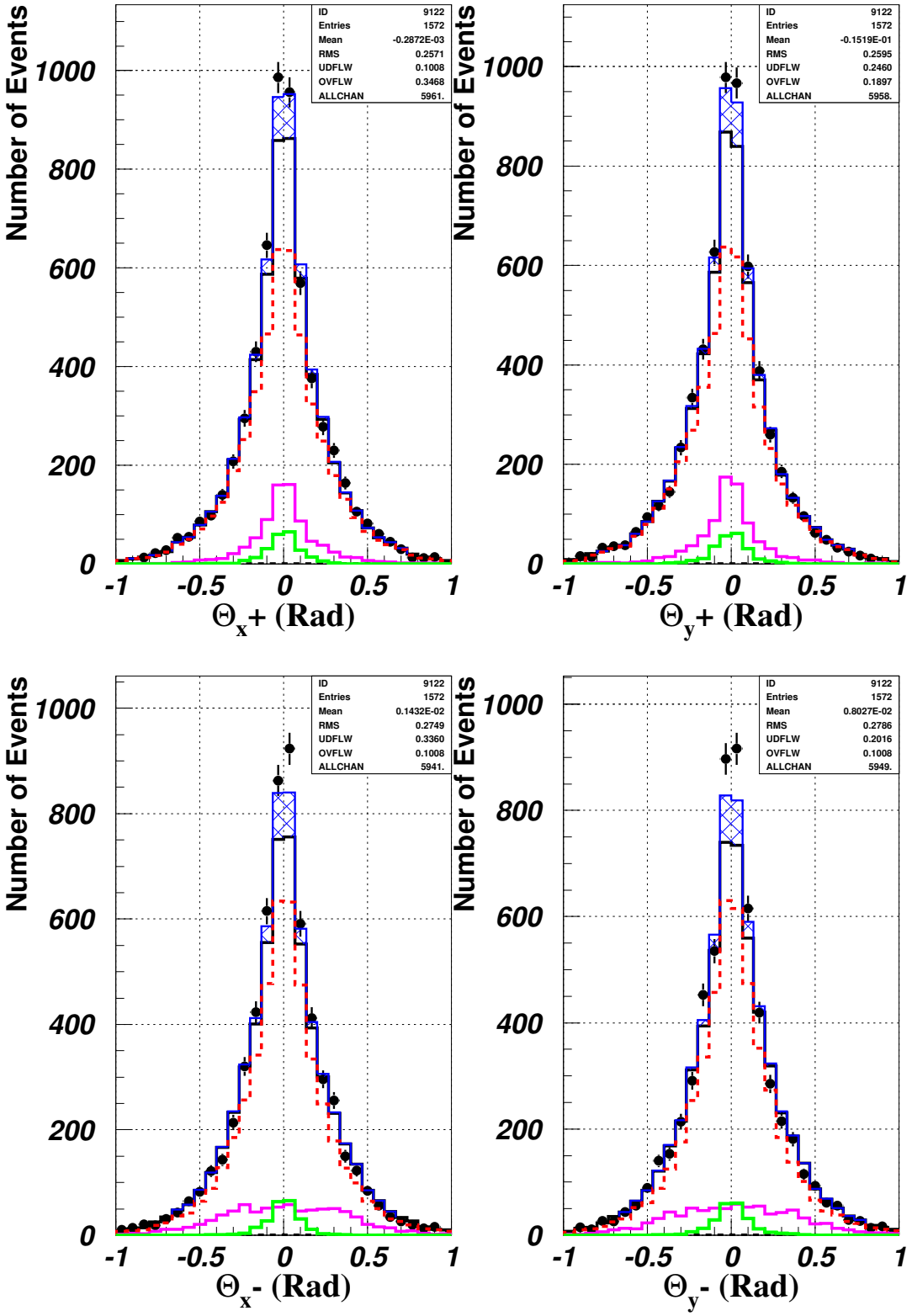

Figure 81: θ_x and θ_y