
Analysis Report

Jiarong Yuan

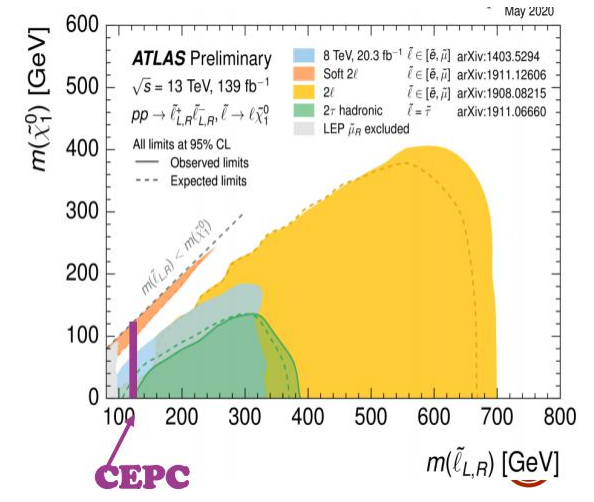
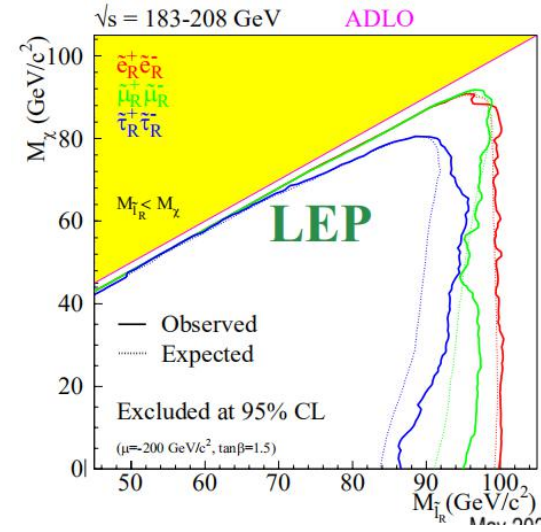
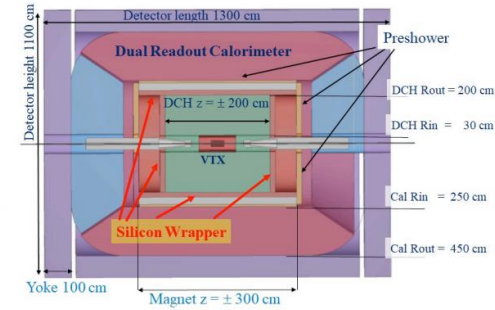
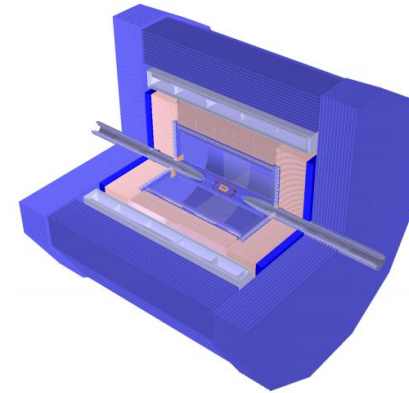
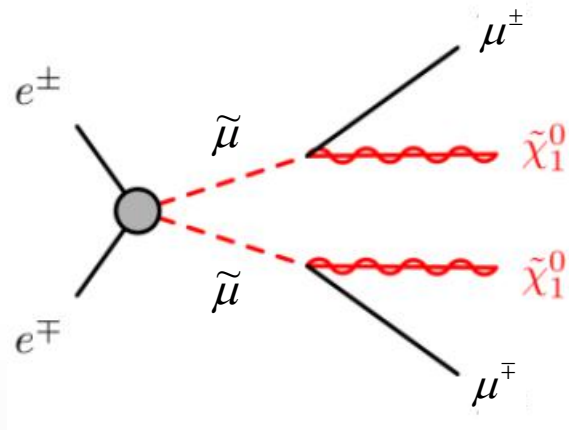
2020/8/14

Smuon

Circular Electron Positron Collider(CPEC):
 ECM=240GeV.
 simulation:Mokka
 reconstruction:Marlin

lepton collider: small background
 no trigger

smuon can explain mu g-2 excess.



Smuon

Signal samples are produced. $\sqrt{s} = 240\text{GeV}$

$m_{s\mu} - m_{LSP}$	$m_{s\mu} - m_{LSP}$	$m_{s\mu} - m_{LSP}$	$m_{s\mu} - m_{LSP}$	$m_{s\mu} - m_{LSP}$	$m_{s\mu} - m_{LSP}$
80_1	90_1	100_1	110_1	115_1	119_1
80_10	90_10	100_10	110_10	115_10	119_10
80_20	90_20	100_20	110_20	115_20	119_20
80_30	90_30	100_30	110_30	115_30	119_30
80_40	90_40	100_40	110_40	115_40	119_40
80_50	90_50	100_50	110_50	115_50	119_50
80_60	90_60	100_60	110_60	115_60	119_60
80_70	90_70	100_70	110_70	115_70	119_70
80_75	90_80	100_80	110_80	115_80	119_80
80_78	90_85	100_90	110_90	115_90	119_90
80_79	90_88	100_95	110_100	115_100	119_100
	90_89	100_98	110_105	115_110	119_110
		100_99	110_108	115_113	119_115
			110_109	115_114	119_117
					119_118

unit: GeV

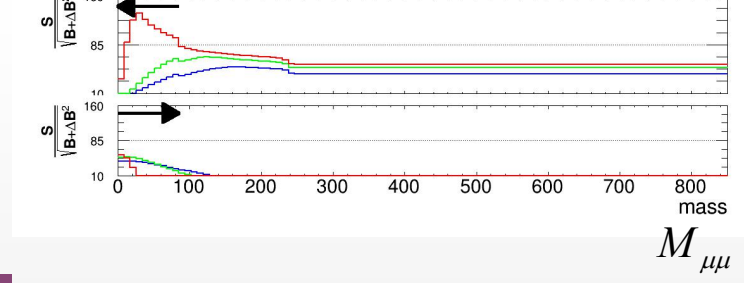
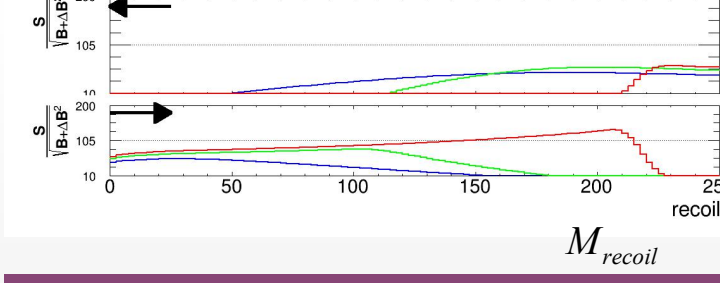
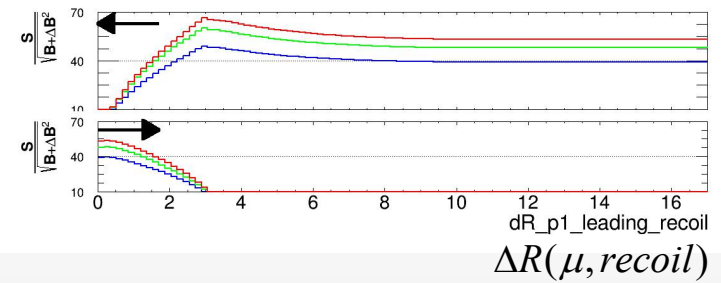
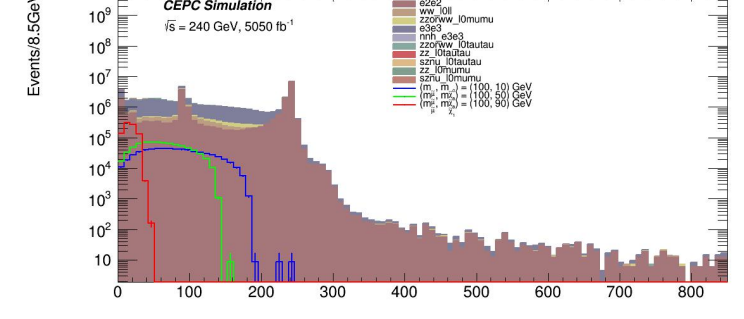
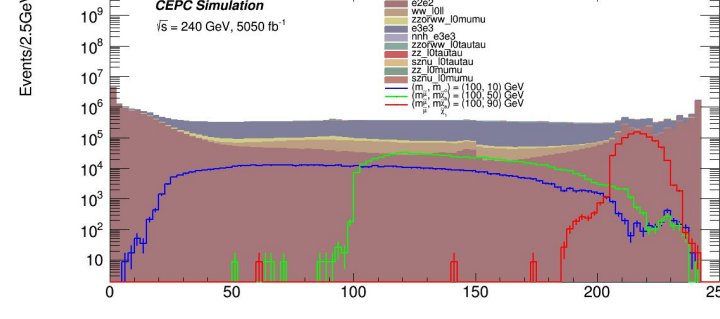
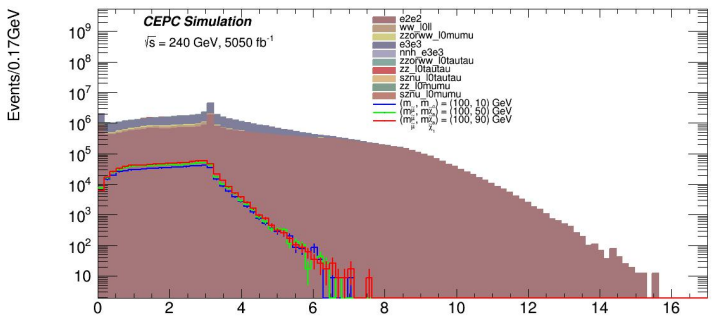
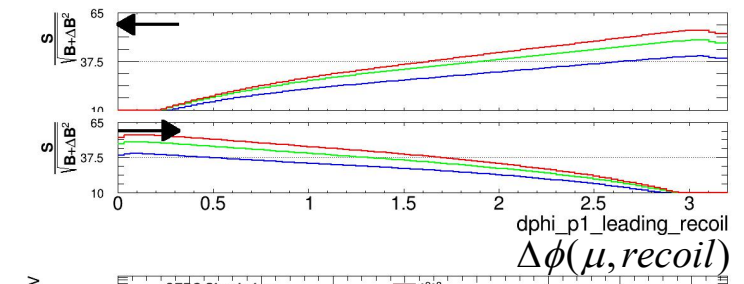
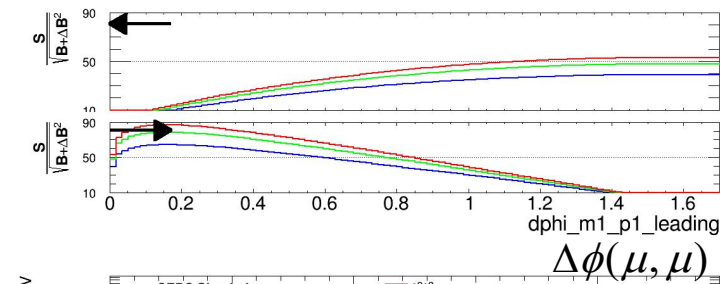
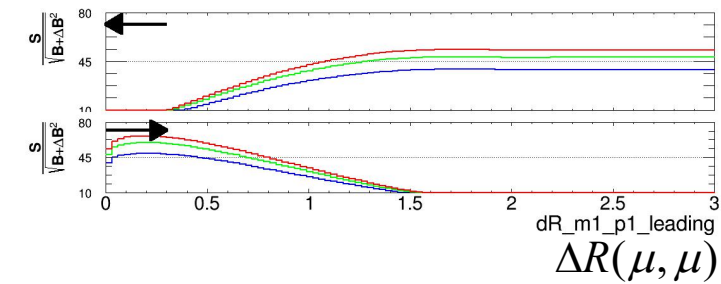
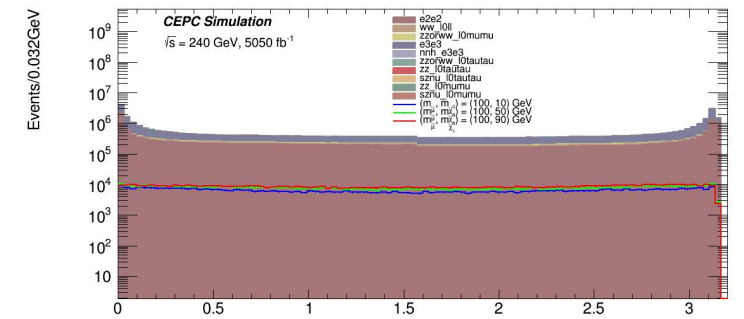
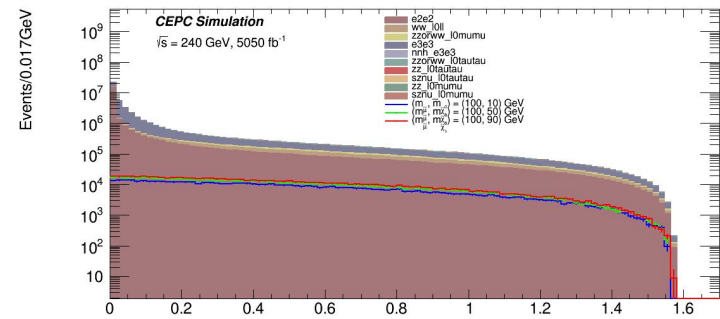
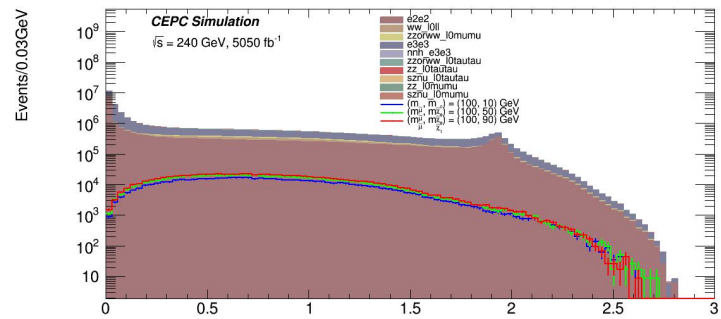
100, 000 Events at each mass point

background: processes with final state mumu or tautau, from Huajie.

normalized to 5050 fb^{-1}

Smuon

green, red, blue lines are signal processes with different Δm .



no cut plot

scan the combination of cuts

SR1: (100,10),(100,20)

SR2: (100,50),(100,60)

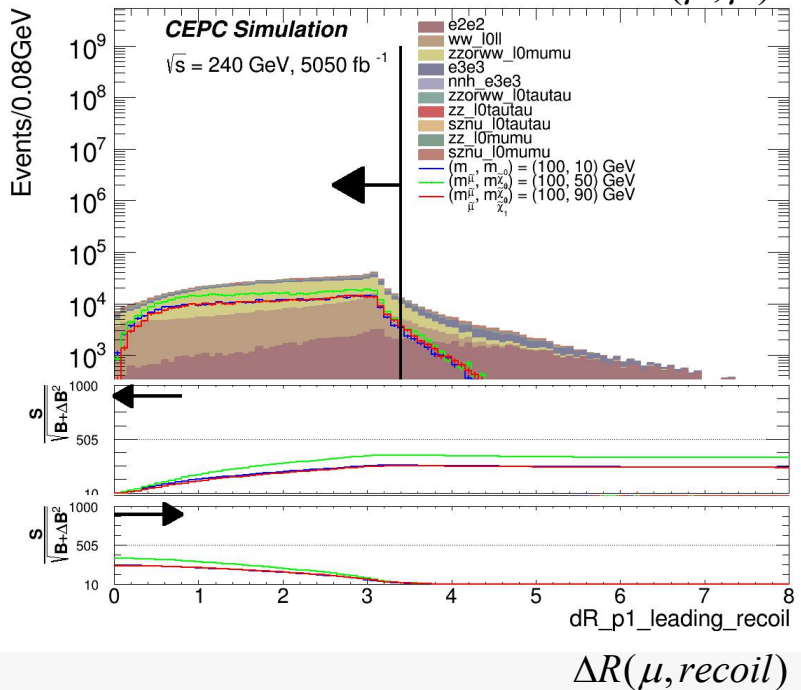
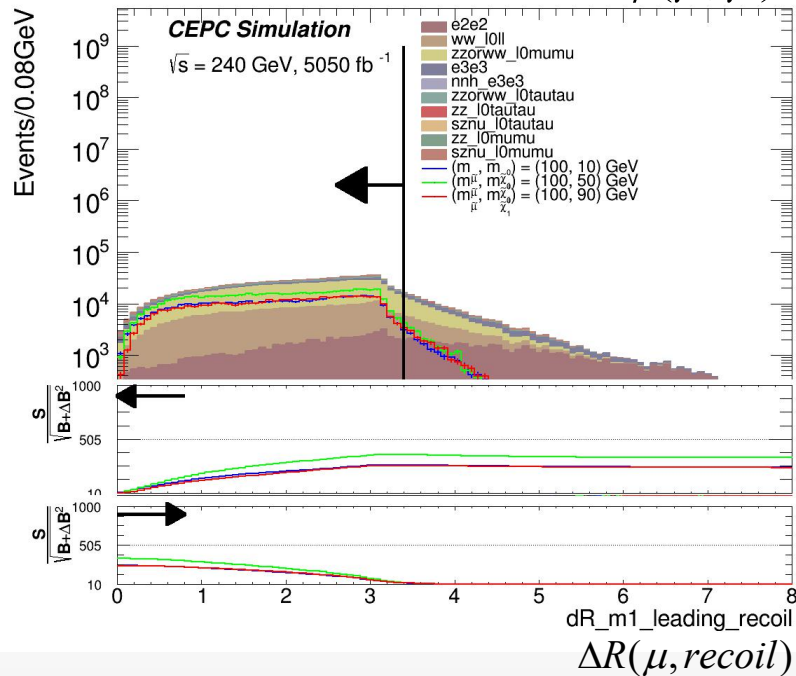
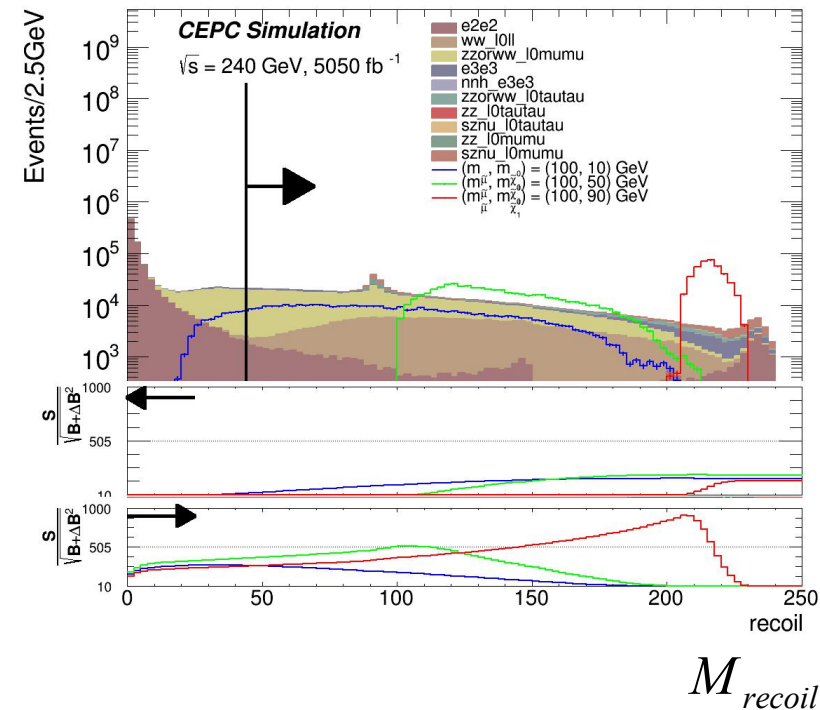
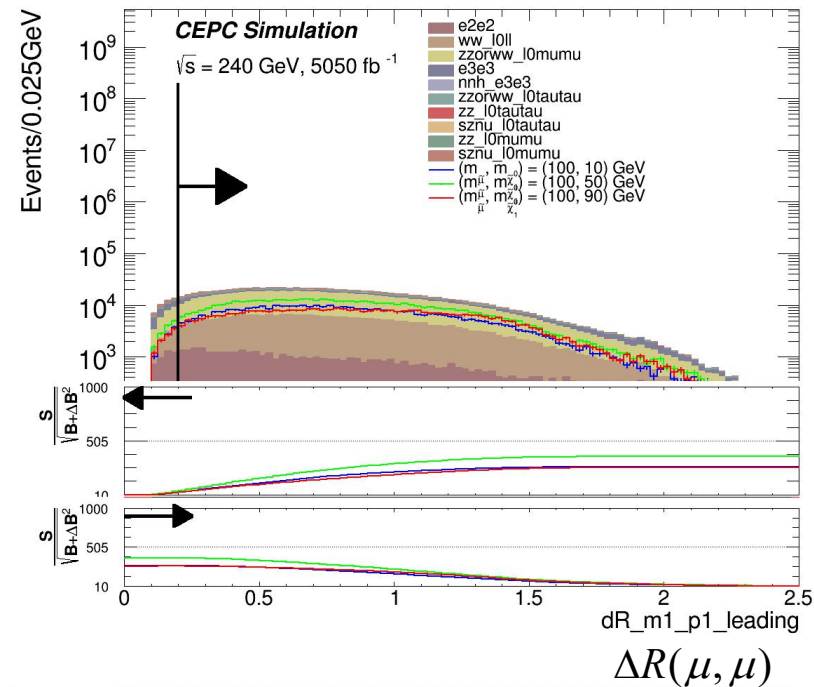
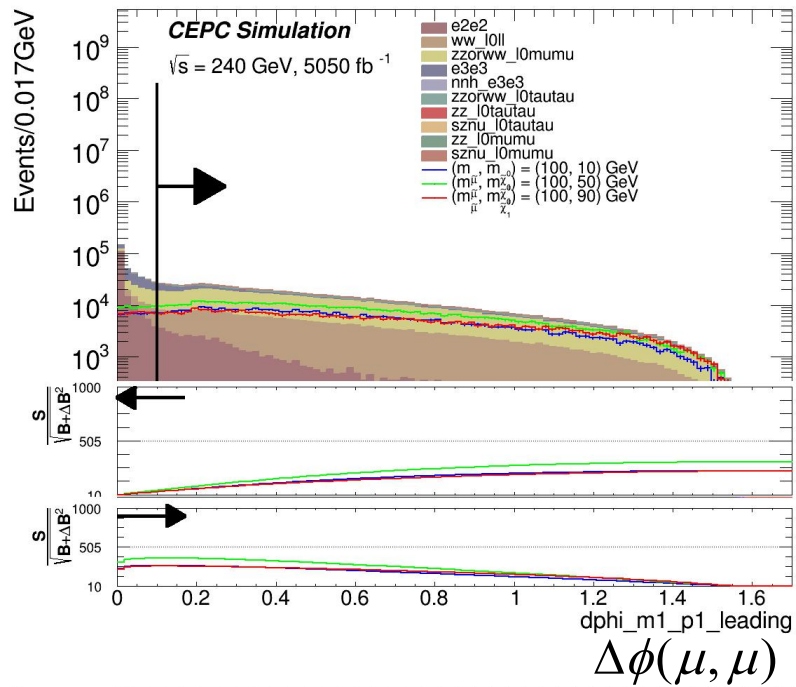
SR3: (100,80),(100,90)

SR1	SR2	SR3
2 OS muon		
$\Delta R(\mu, recoil) < 3.4$		
$0.2 < \Delta R(\mu, \mu)$		$0.3 < \Delta R(\mu, \mu)$
$\Delta\phi(\mu, \mu) > 0.1$	$\Delta\phi(\mu, \mu) > 0.15$	$\Delta\phi(\mu, \mu) > 0.25$
$M_{recoil} > 44\text{GeV}$	$M_{recoil} > 112\text{GeV}$	$M_{recoil} > 180$

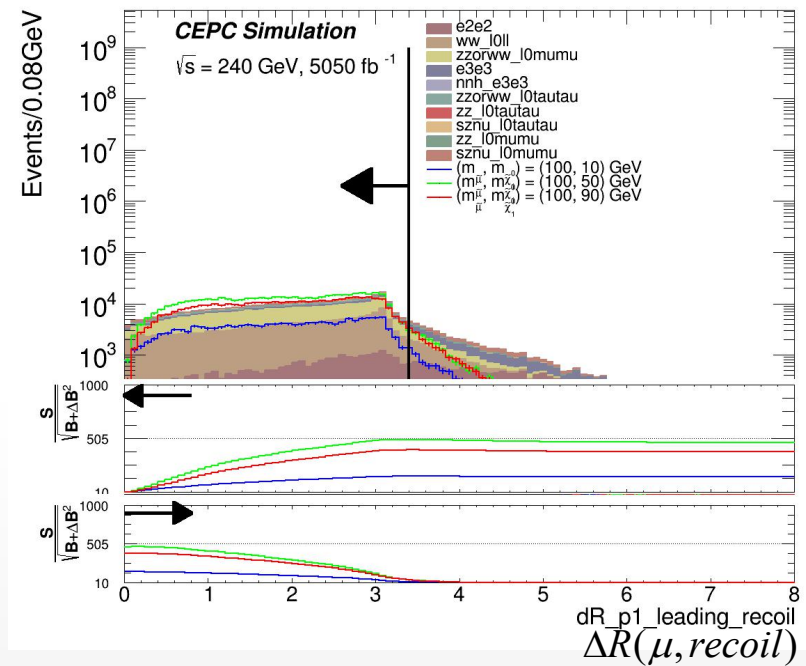
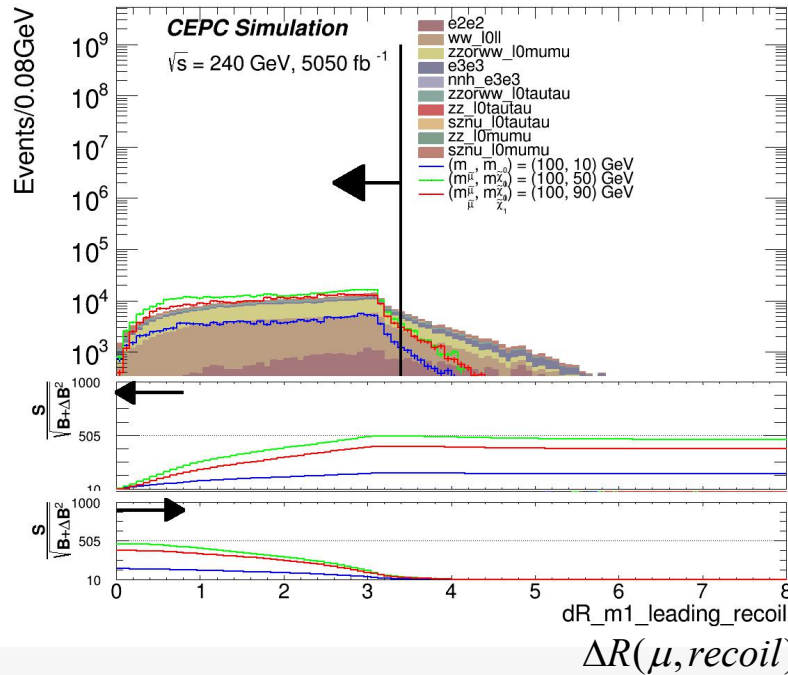
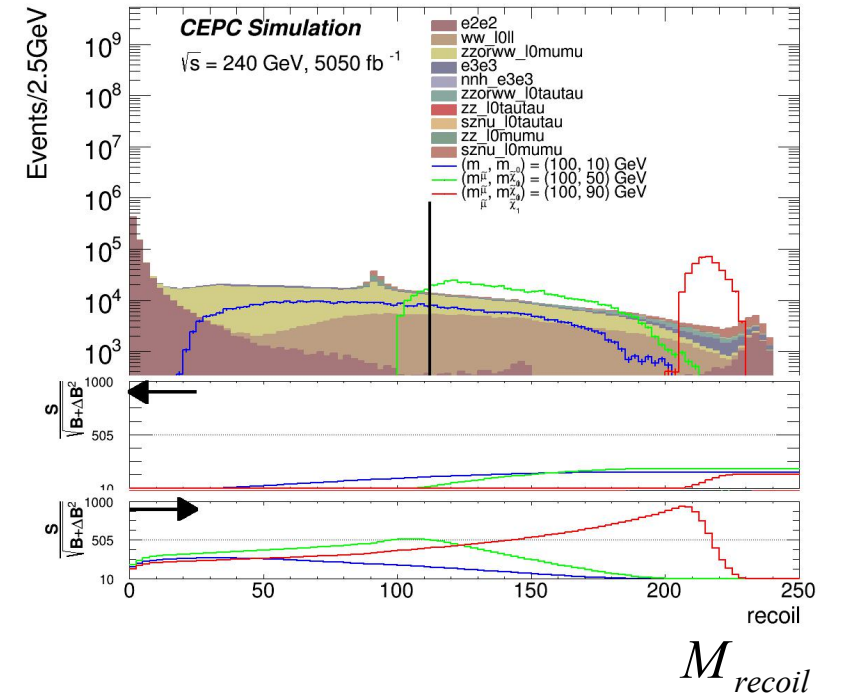
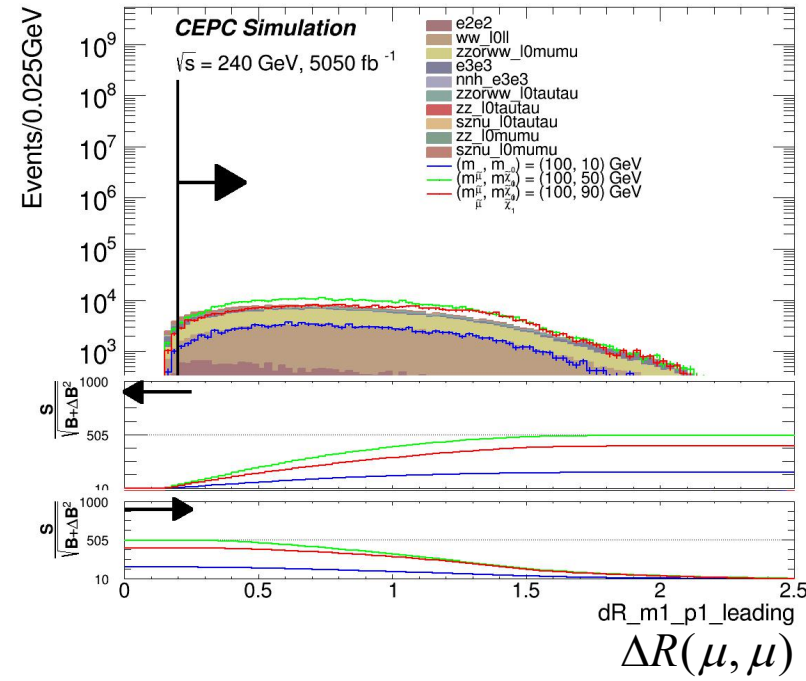
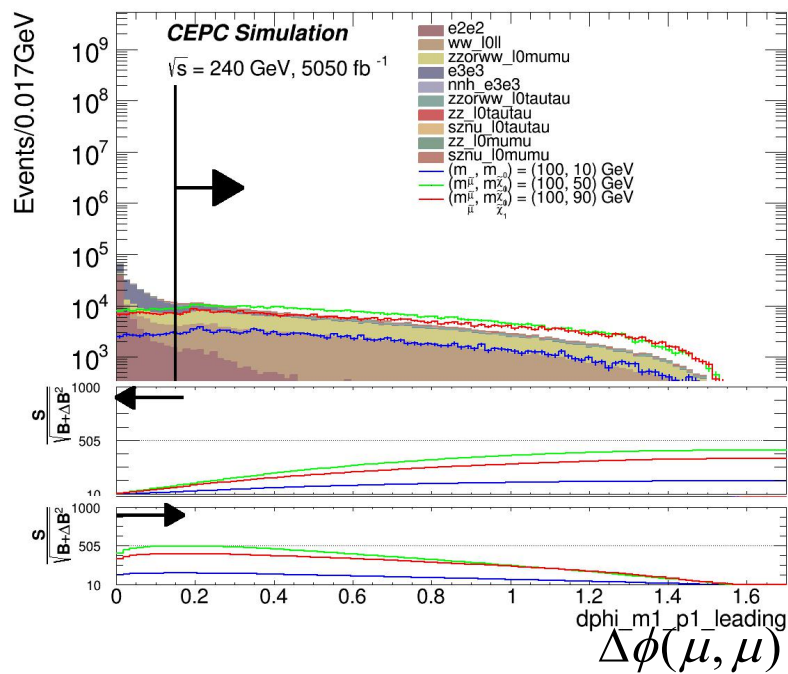
	(100,10)	(100,50)	(100,90)	e3e3	nnh_e3e3	zzorww_l0tautau	zz_l0tautau	sznu_l0tautau	zzorww_l0mumu	zz_l0mumu	ww_l0ll	sznu_l0mumu	e2e2	total background
Raw Events	864534.75	864534.75	864534.75	22068000.00	15503.60	745871.00	46460.10	102544.00	1084820.00	91737.10	1984180.00	218891.00	25087300.00	51445300.00
2 OS muon	566351.00	682116.00	500416.00	588112.00	444.49	22223.30	1332.24	3073.65	906777.00	49231.60	312610.00	103079.00	17766300.00	19753200.00
$\Delta R(\mu, recoil) < 3.4$	529982.00	638848.00	462922.00	418340.00	411.78	19306.00	1112.22	2596.65	811616.00	39957.50	270683.00	82101.60	8102820.00	9748950.00
$0.2 < \Delta R(\mu, \mu)$	501842.00	604355.00	437861.00	183919.00	362.94	17497.60	965.89	2240.45	753791.00	28828.70	253747.00	56873.20	2211380.00	3509610.00
$\Delta\phi(\mu, \mu) > 0.1$	457225.00	550367.00	396442.00	89626.60	323.56	15690.70	857.98	1954.46	676709.00	25847.60	226253.00	51003.20	1687820.00	2776090.00
$M_{recoil} > 44\text{GeV}$	406151.00+-1873.81	550367.00+-2181.27	396442.00+-1851.28	65552.70+-385.611	323.41+-7.08094	15673.00+-107.754	857.46+-21.2448	1954.46+-44.9212	498547.00+-729.69	25817.10+-189.026	224164.00+-478.873	50894.20+-239.003	52518.60+-565.403	936301.00+-1156.14
efficiency	46.98%	63.66%	45.86%	0.30%	2.09%	2.10%	1.85%	1.91%	45.96%	28.14%	11.30%	23.25%	0.21%	1.82%

	(100,10)	(100,50)	(100,90)	e3e3	nnh_e3e3	zzorww_l0tautau	zz_l0tautau	sznu_l0tautau	zzorww_l0mumu	zz_l0mumu	ww_l0ll	sznu_l0mumu	e2e2	total background
Raw Events	864534.75	864534.75	864534.75	22068000.00	15503.60	745871.00	46460.10	102544.00	1084820.00	91737.10	1984180.00	218891.00	25087300.00	51445300.00
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$\Delta R(\mu, recoil) < 3.4$	529982.00	638848.00	462922.00	418340.00	411.78	19306.00	1112.22	2596.65	811616.00	39957.50	270683.00	82101.60	8102820.00	9748950.00
$0.2 < \Delta R(\mu, \mu)$	501842.00	604355.00	437861.00	183919.00	362.94	17497.60	965.89	2240.45	753791.00	28828.70	253747.00	56873.20	2211380.00	3509610.00
$\Delta\phi(\mu, \mu) > 0.15$	433426.00	521795.00	375859.00	72375.90	304.18	14735.80	800.08	1843.99	635619.00	24293.40	212543.00	47928.00	1520430.00	2530870.00
$M_{recoil} > 112\text{GeV}$	144769.00+-1118.72	467176.00+-2009.66	375859.00+-1802.58	22415.70+-225.491	300.46+-6.82512	13959.40+-101.693	792.19+-20.4202	1834.69+-43.5231	136066.00+-43.5231	4798.33+-381.207	124562.00+-81.4916	25061.40+-356.968	21955.80+-167.013	351746.00+-710.261
efficiency	16.75%	54.04%	43.48%	0.10%	1.94%	1.87%	1.71%	1.79%	12.54%	5.23%	6.28%	11.45%	0.09%	0.68%

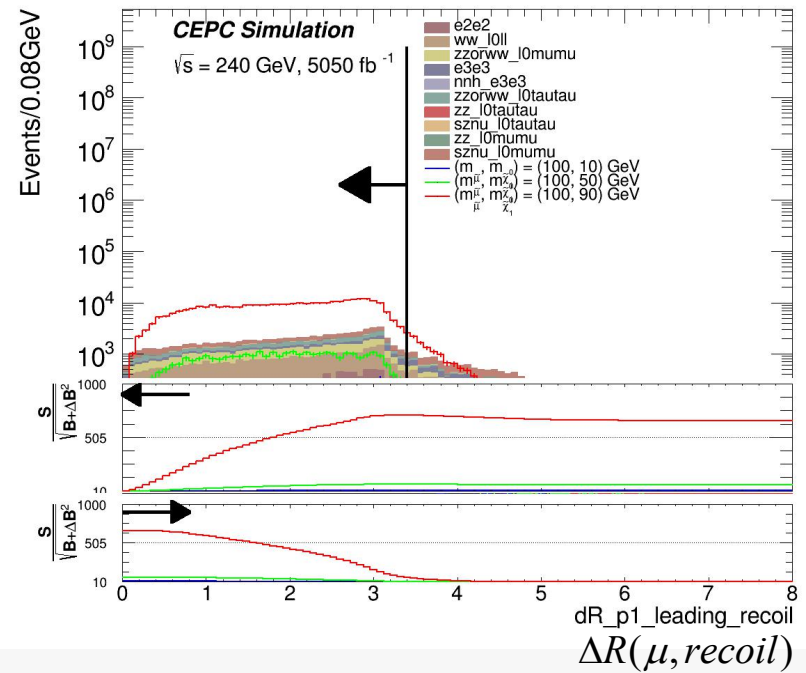
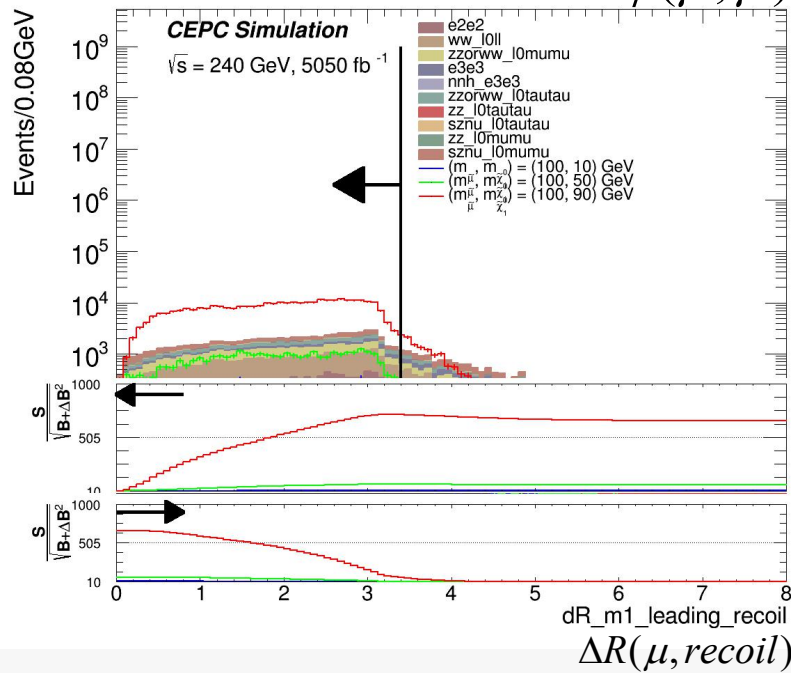
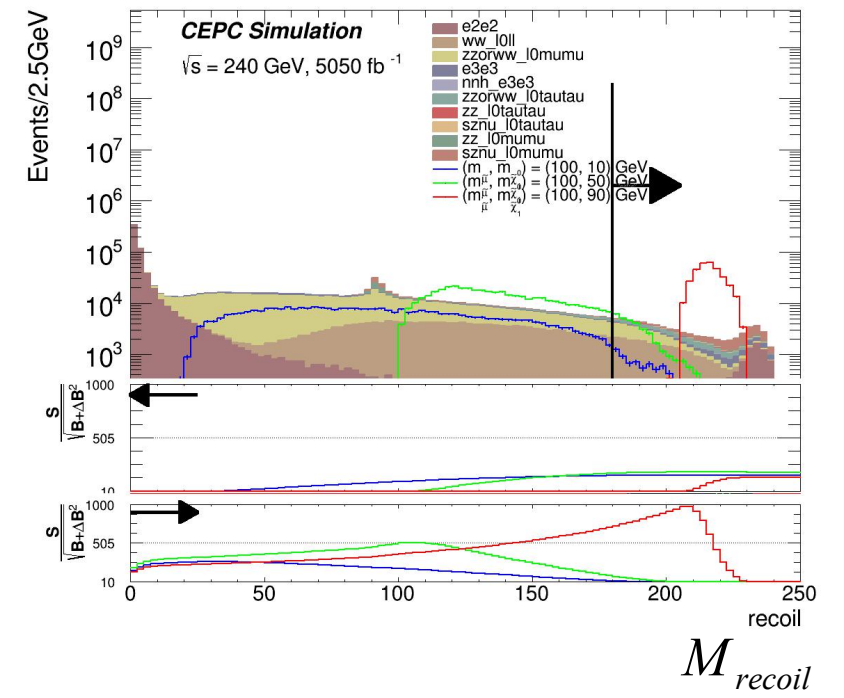
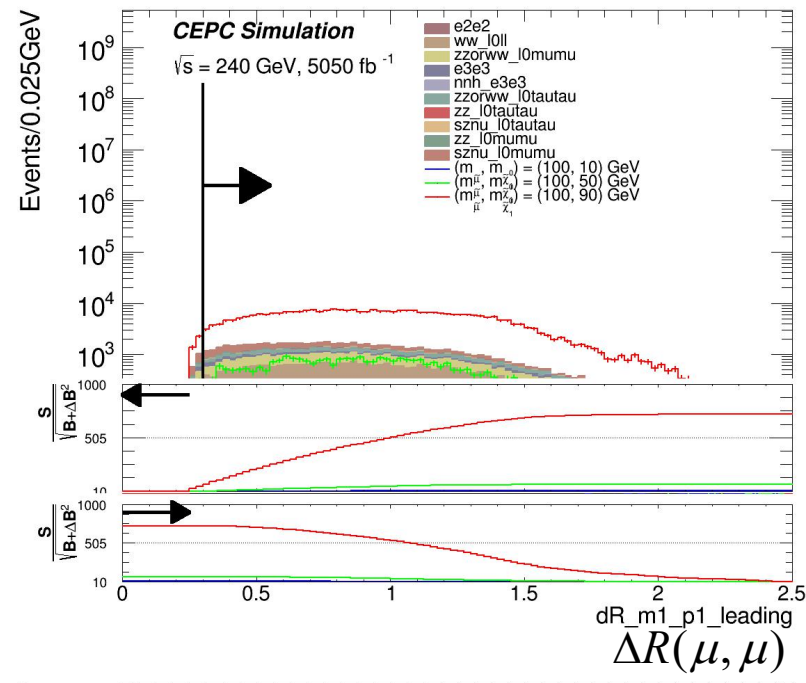
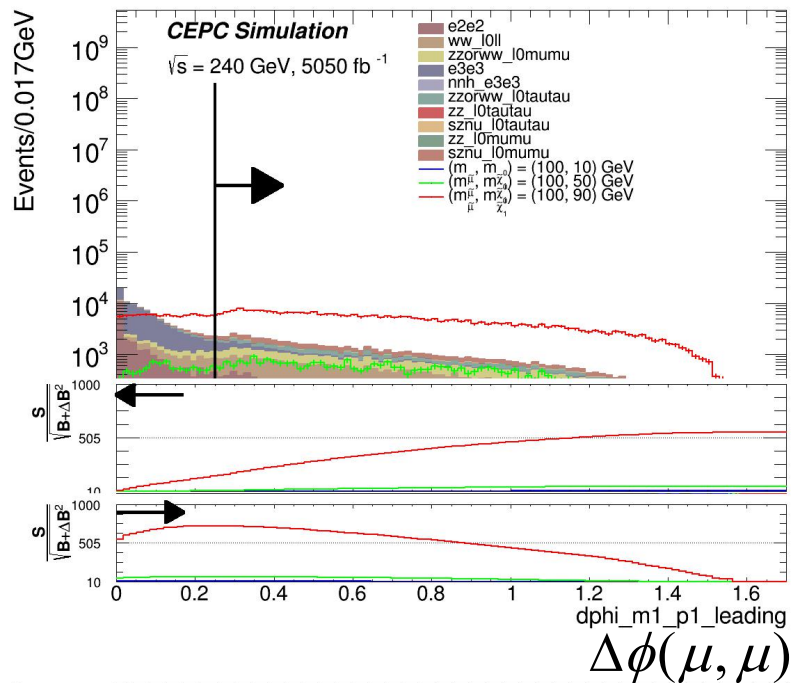
Selection	(100,10)	(100,50)	(100,90)	e3e3	nnh_e3e3	zzorww_l0tautau	zz_l0tautau	sznu_l0tautau	zzorww_l0mumu	zz_l0mumu	ww_l0ll	sznu_l0mumu	e2e2	total background
Raw Events	864534.75	864534.75	864534.75	22068000.00	15503.60	745871.00	46460.10	102544.00	1084820.00	91737.10	1984180.00	218891.00	25087300.00	51445300.00
2 OS muon	566351.00	682116.00	500416.00	588112.00	444.49	22223.30	1332.24	3073.65	906777.00	49231.60	312610.00	103079.00	17766300.00	19753200.00
$\Delta R(\mu, recoil) < 3.4$	529982.00	638848.00	462922.00	418340.00	411.78	19306.00	1112.22	2596.65	811616.00	39957.50	270683.00	82101.60	8102820.00	9748950.00
$0.3 < \Delta R(\mu, \mu)$	470962.00	567285.00	411537.00	161565.00	331.31	16261.20	874.30	2060.80	699786.00	26053.80	236081.00	49791.20	1953840.00	3146640.00
$\Delta\phi(\mu, \mu) > 0.25$	374743.00	450794.00	326418.00	50100.80	247.75	12444.40	678.49	1553.86	533894.00	20109.50	178926.00	38685.70	1183510.00	2020150.00
$M_{recoil} > 180\text{GeV}$	6993.81+- 245.889	32168.00+- 527.345	326418.00+- 1679.85	4686.39+- 103.103	133.18+- 4.54392	5965.89+- 66.4808	423.20+- 14.9252	1139.84+- 34.3052	14515.20+- 124.508	1433.82+- 44.5467	20294.30+- 144.087	12681.50+- 118.805	9617.46+- 241.953	70890.80+- 356.895
efficiency	0.81%	3.72%	37.76%	0.02%	0.86%	0.80%	0.91%	1.11%	1.34%	1.56%	1.02%	5.79%	0.04%	0.14%



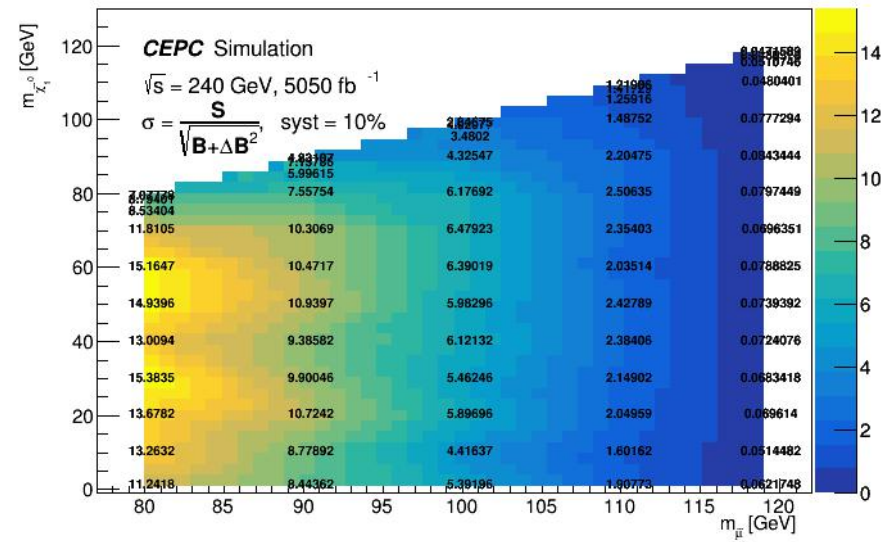
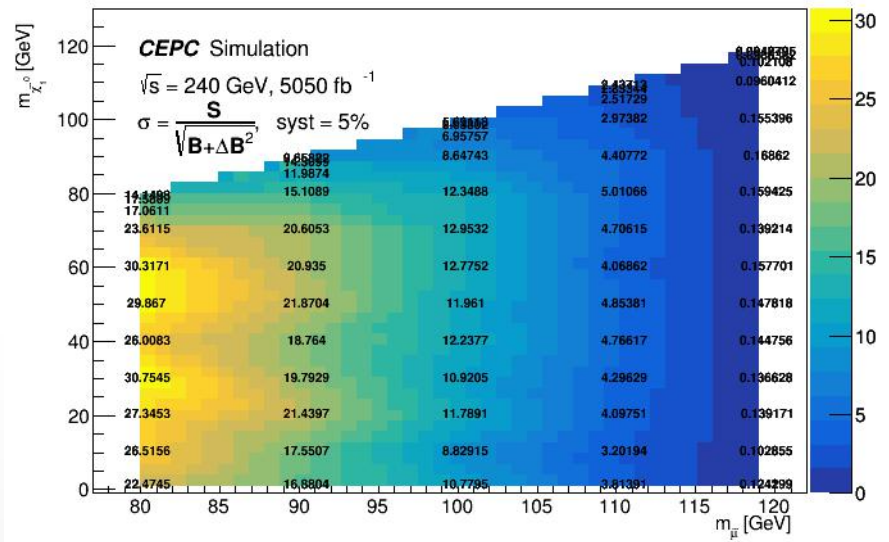
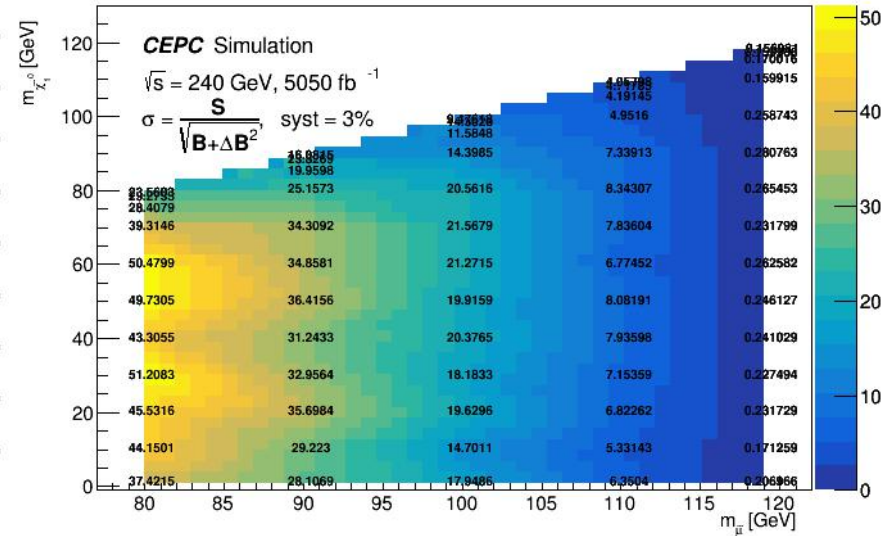
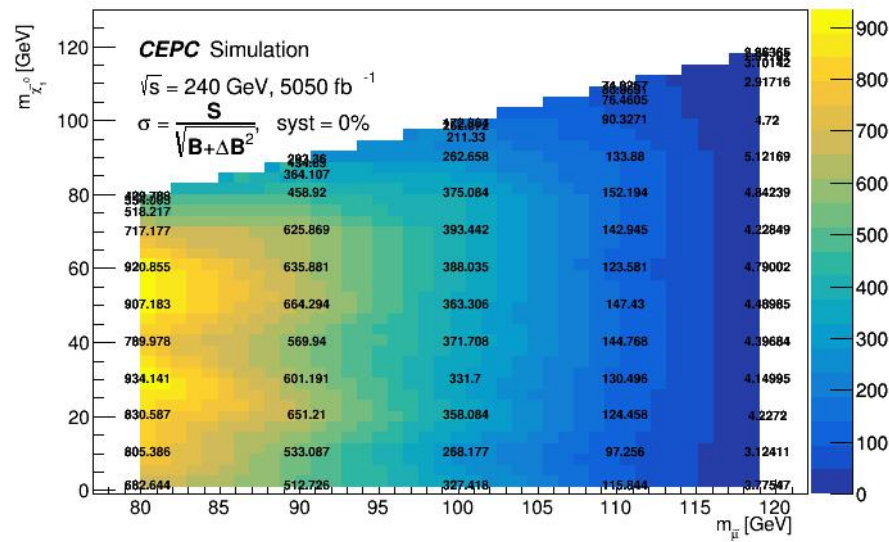
N-1 plot SR1



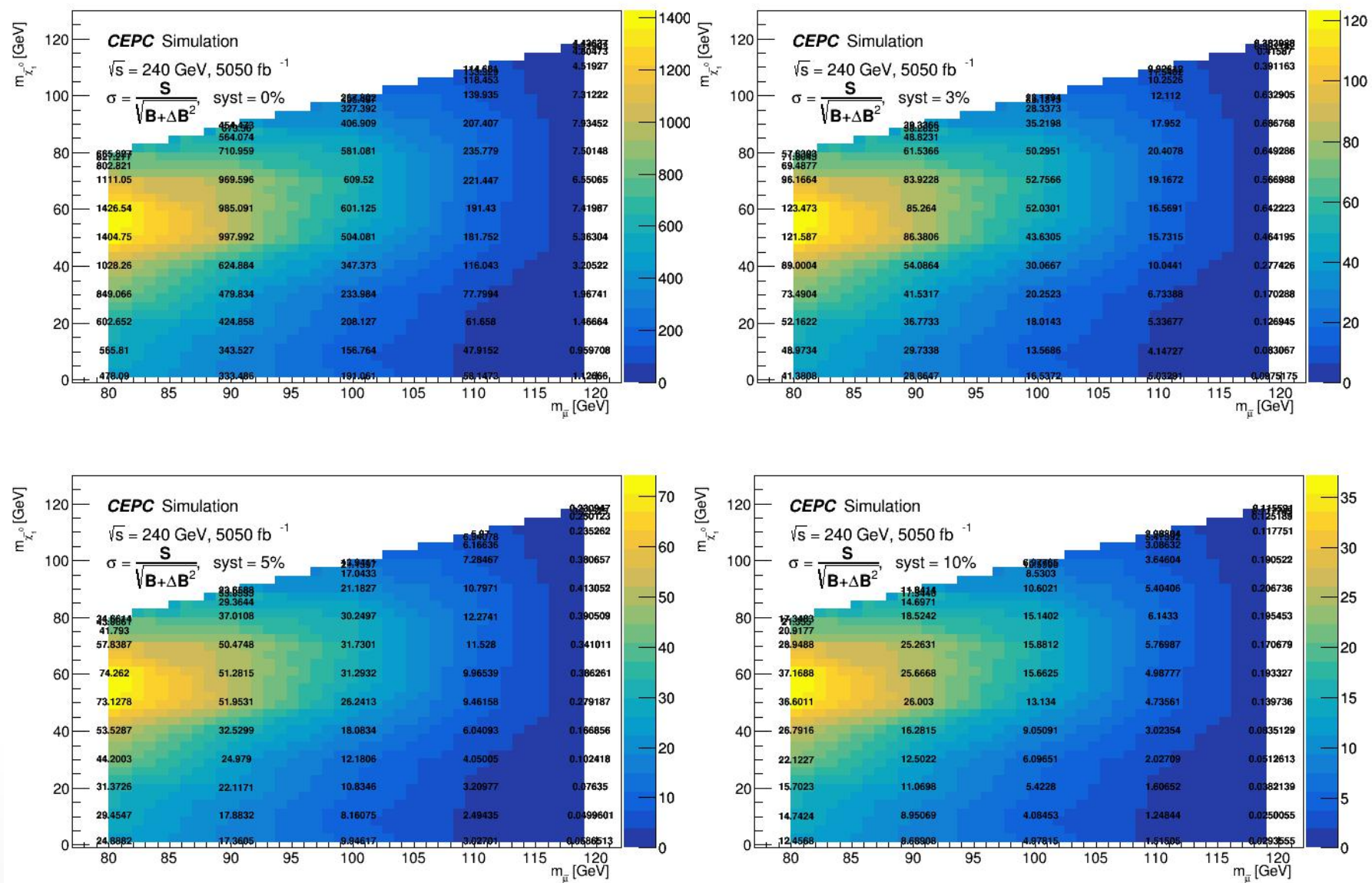
N-1 plot SR2

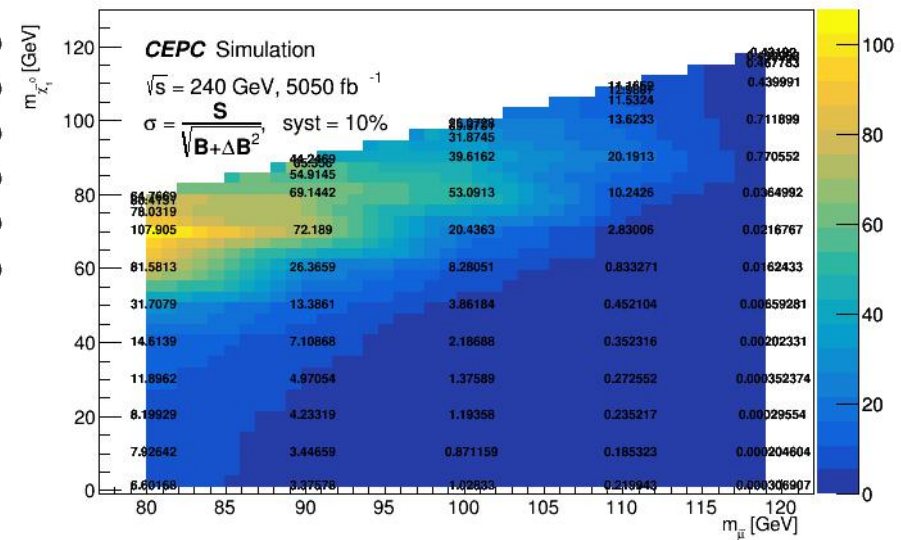
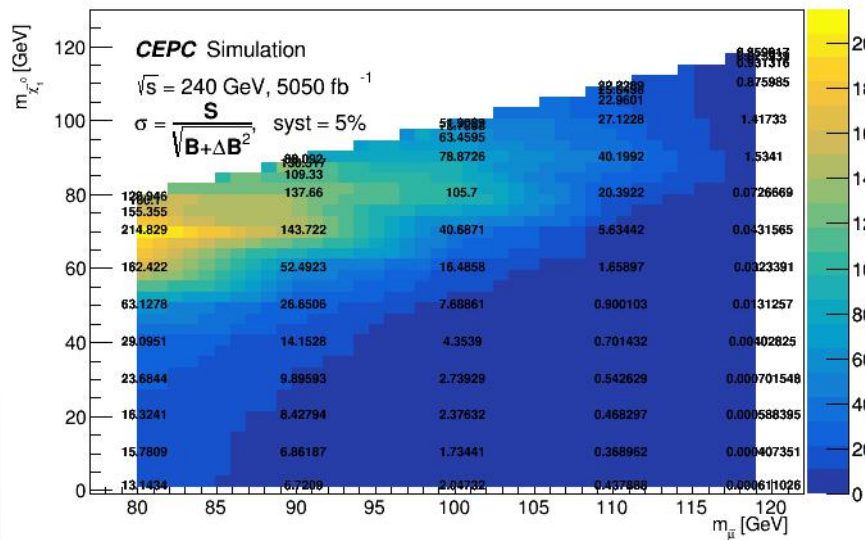
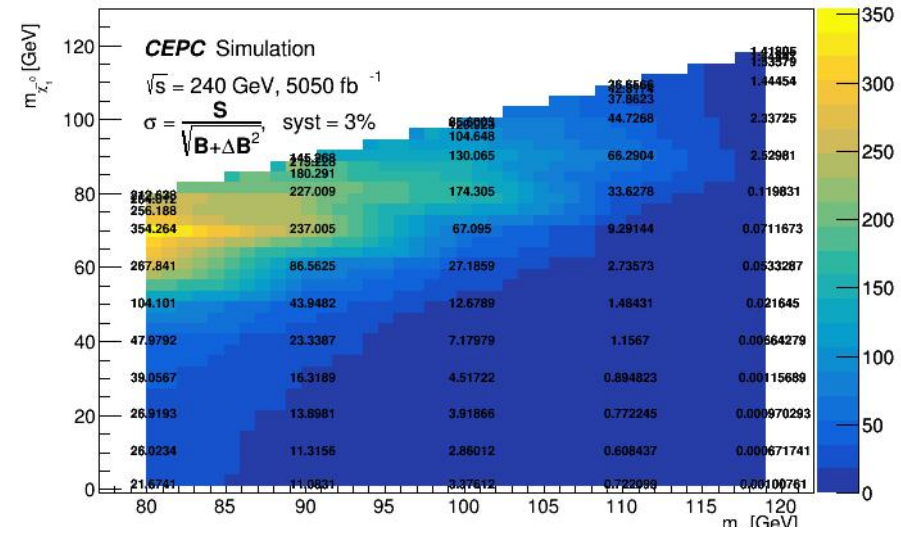
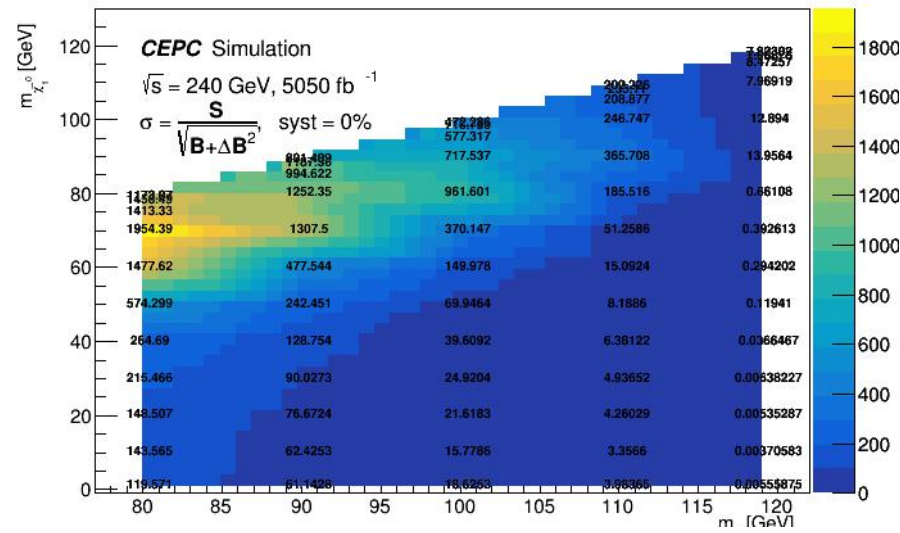


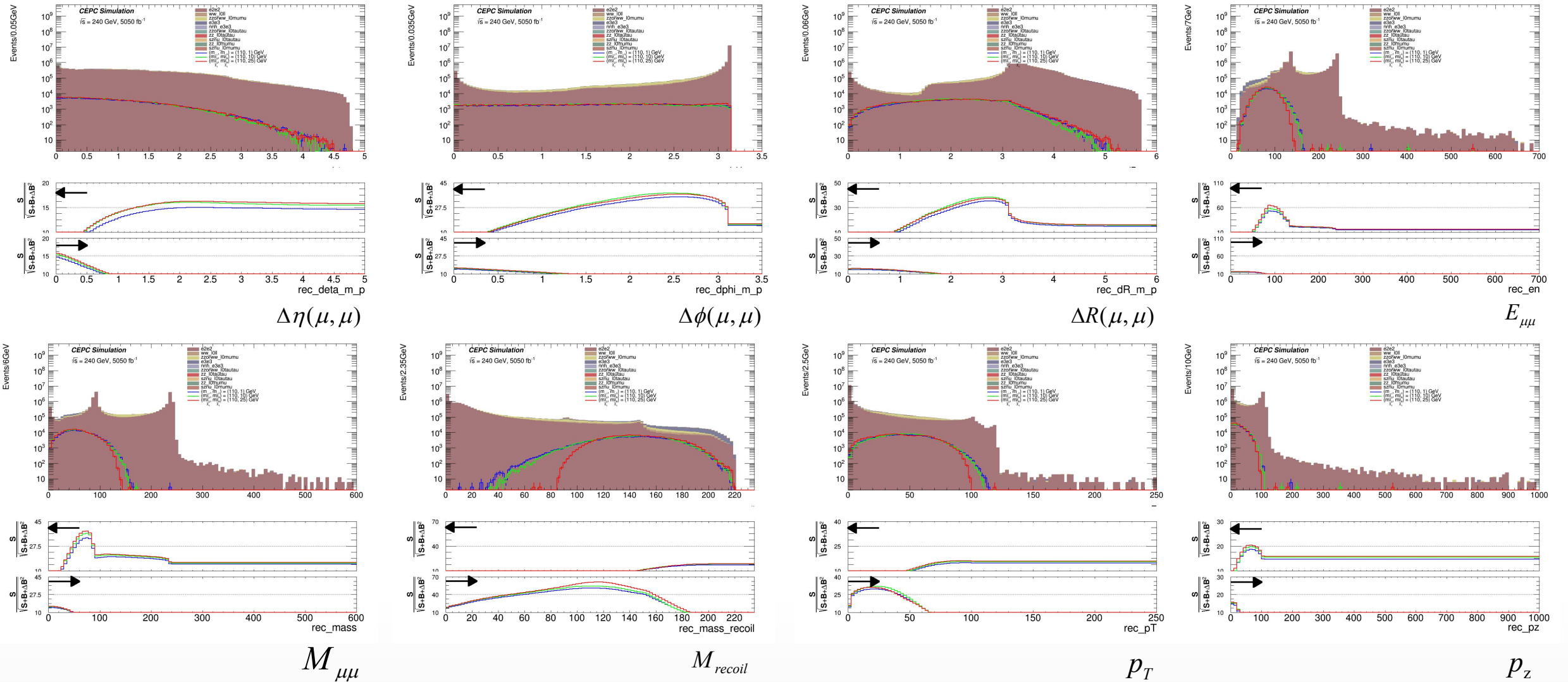
N-1 plot SR3



Smuon







Summary

A sensitivity check for direct smuon in CEPC
The begin of the recon level analysis of C1C1.

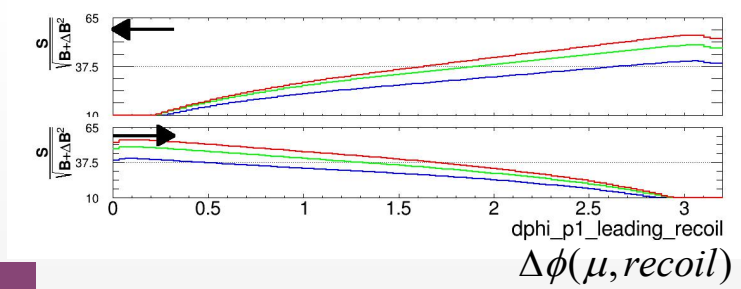
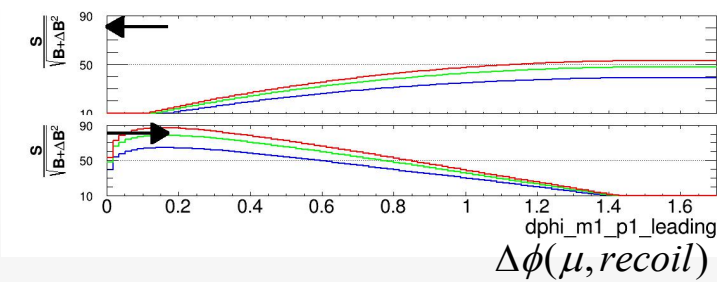
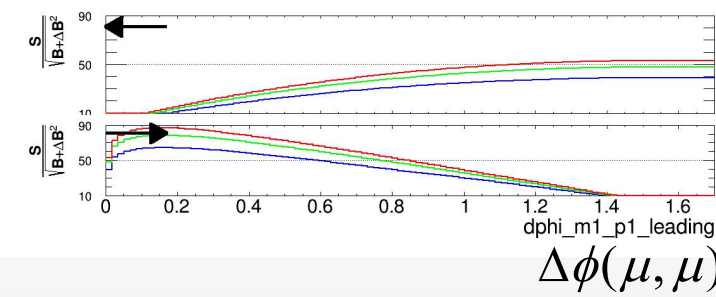
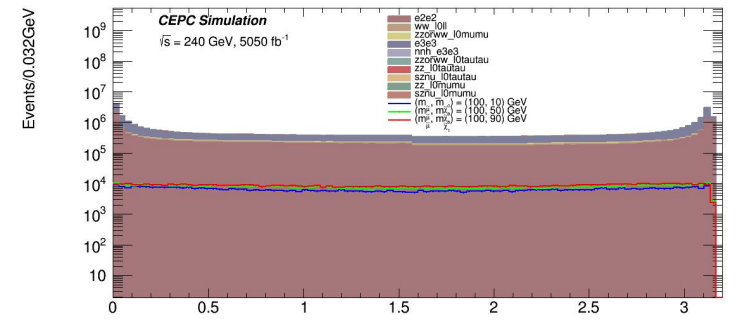
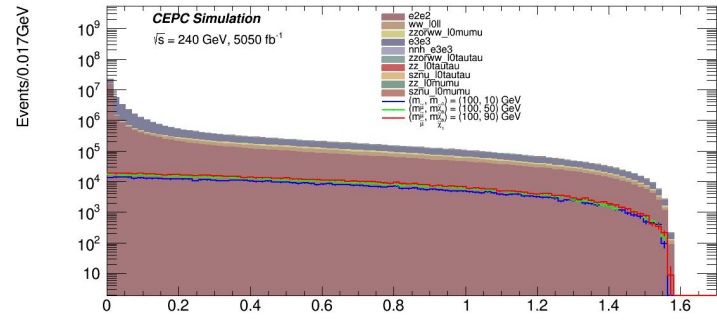
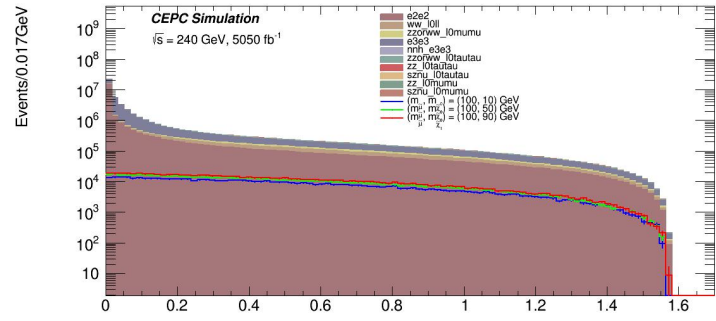
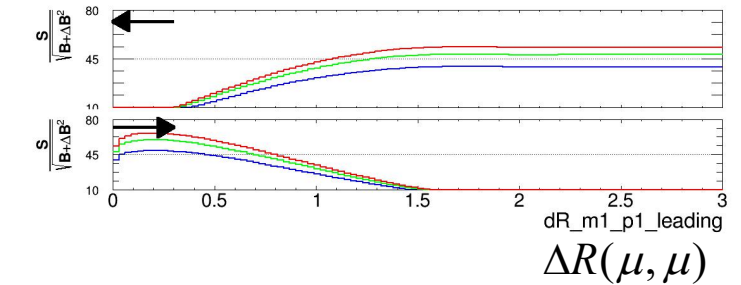
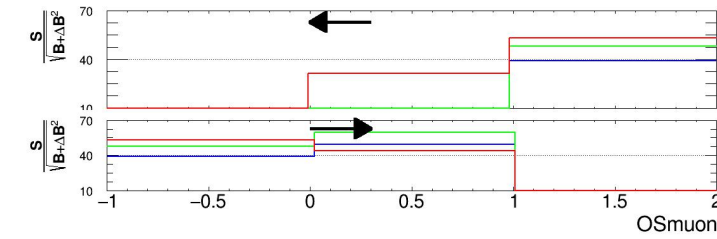
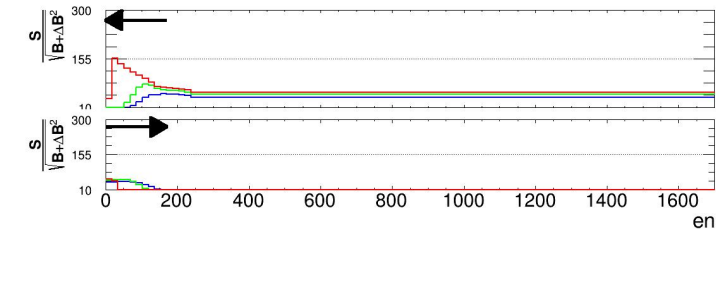
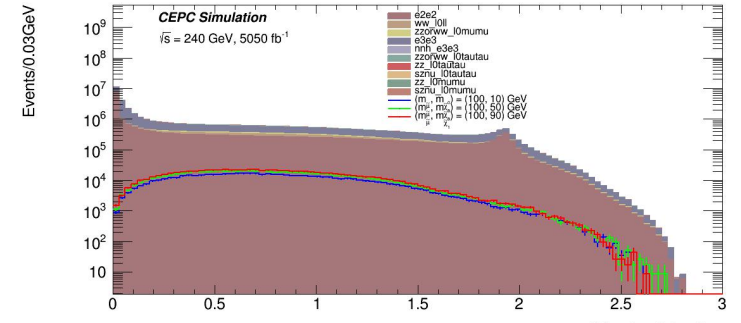
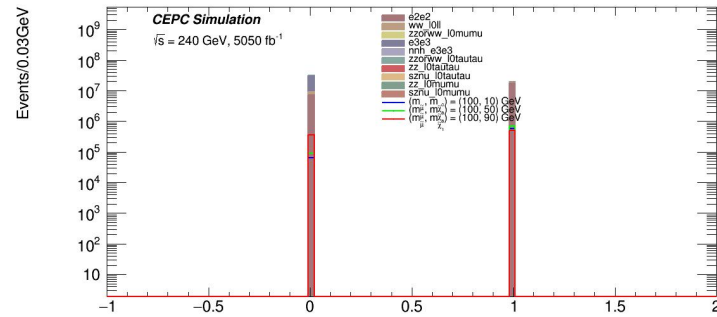
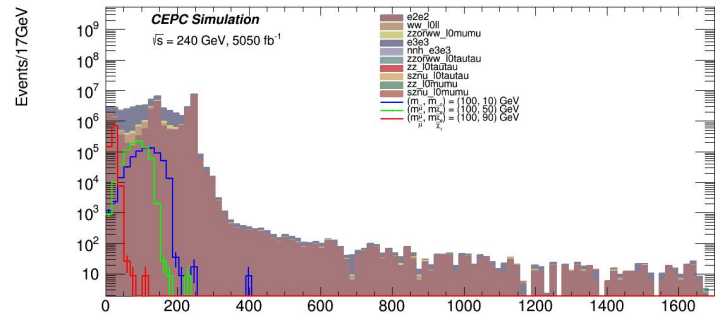
Todo:

Smuon: try orthogonal SR and compare sensitivity.

C1C1: cutcount, N-1, sensitivity map.

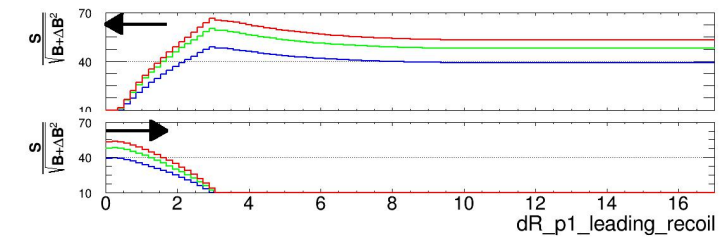
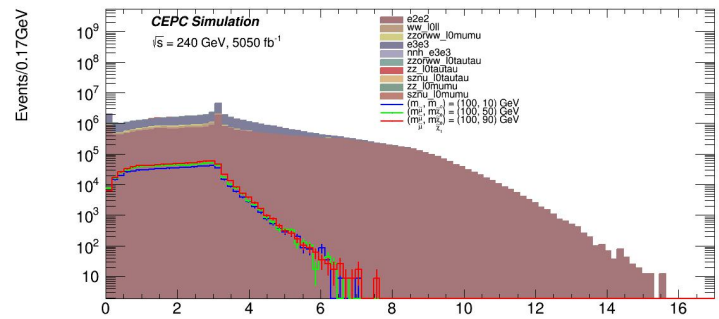
backup

Smuon

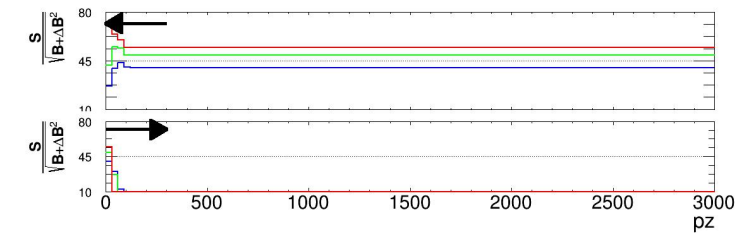
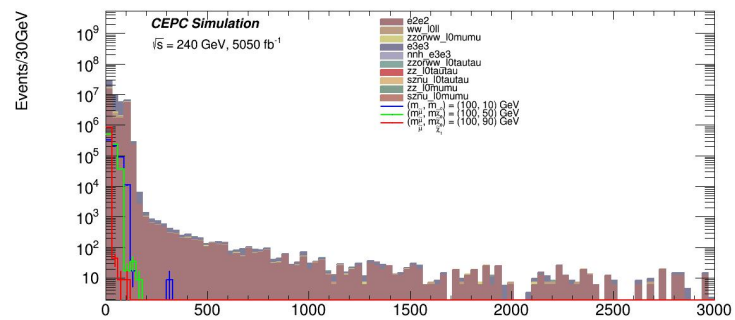


no cut plot

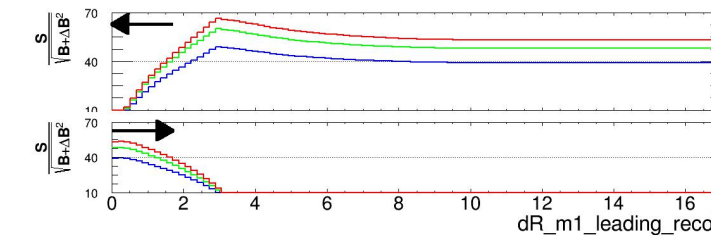
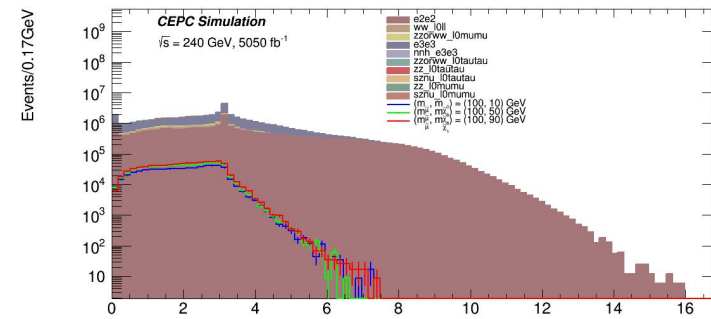
Smuon



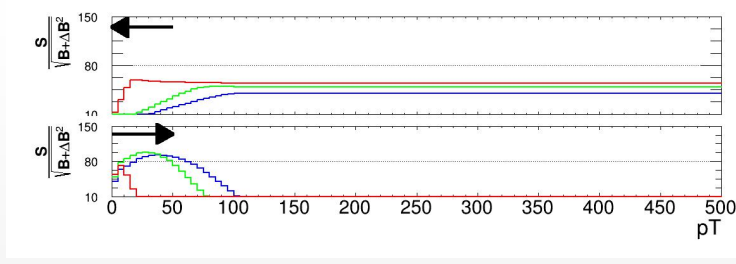
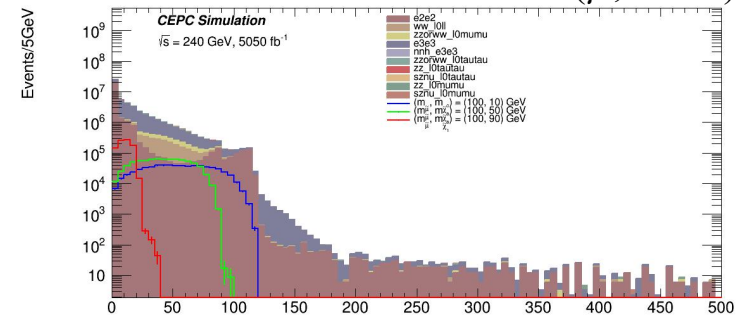
$\Delta R(\mu, recoil)$



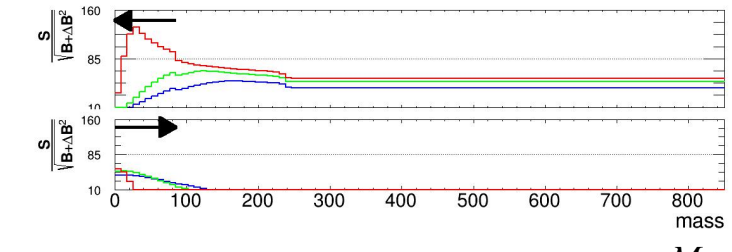
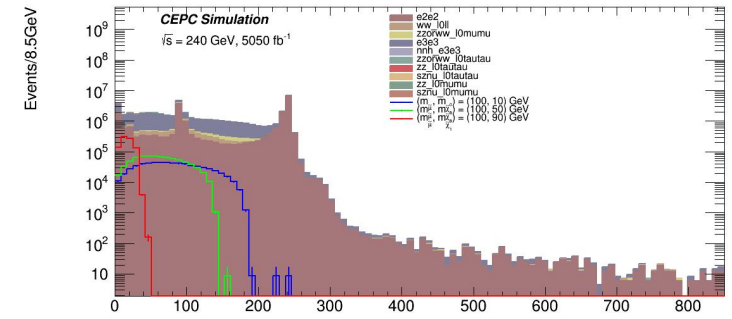
p_z



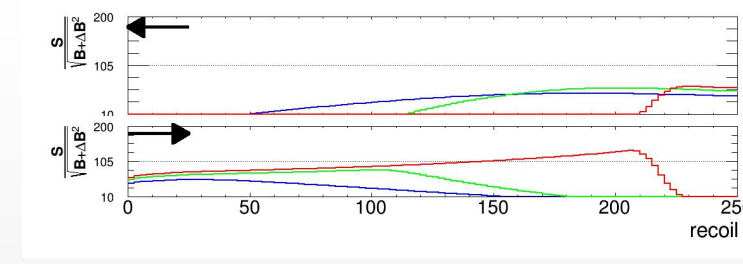
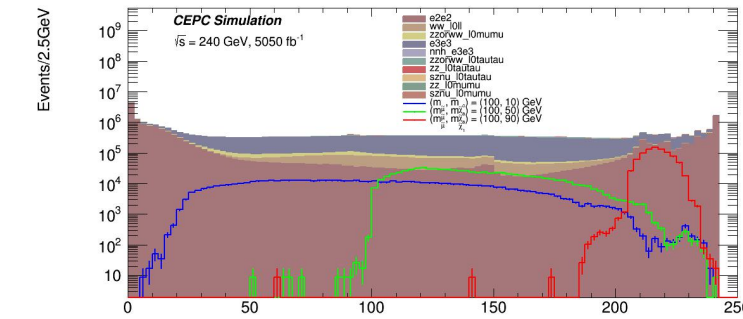
$\Delta R(\mu, recoil)$



p_T



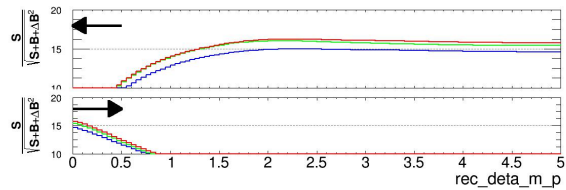
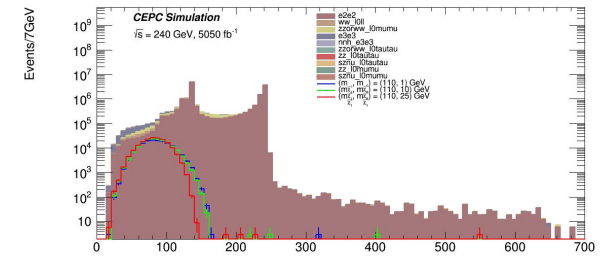
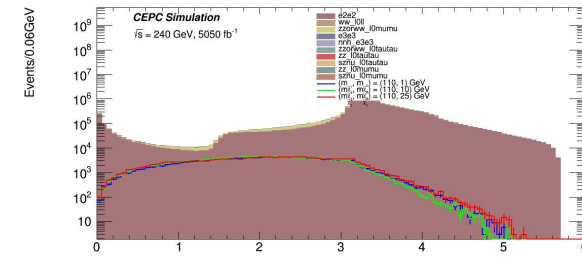
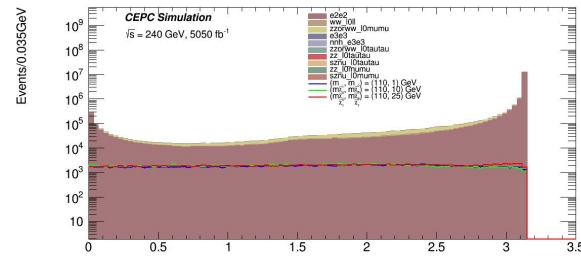
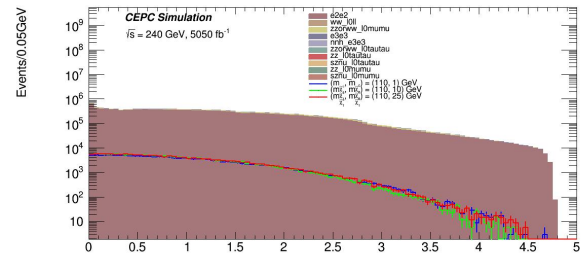
$M_{\mu\mu}$



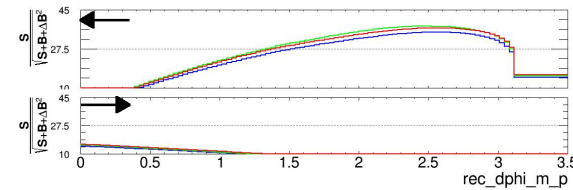
M_{recoil}

no cut plot

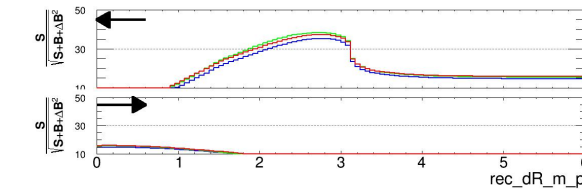
C1C1



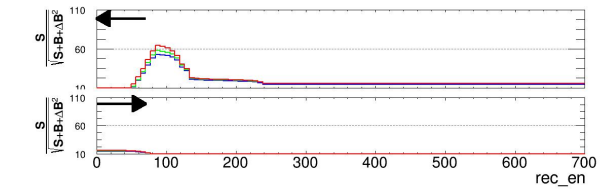
$\Delta\eta(\mu, \mu)$



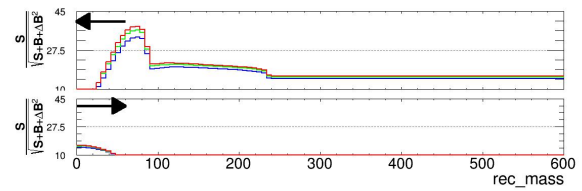
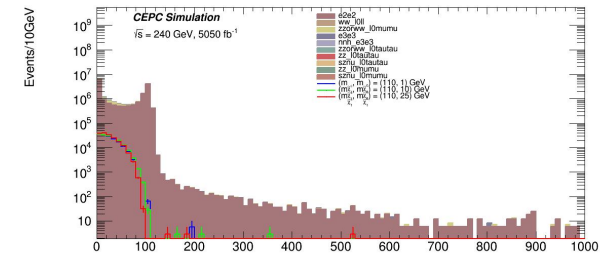
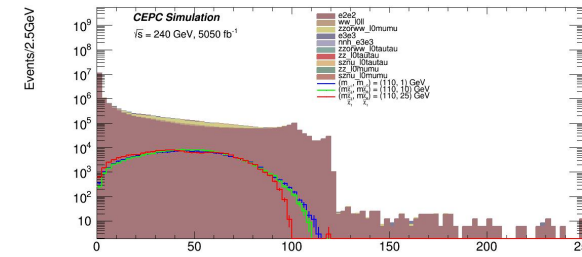
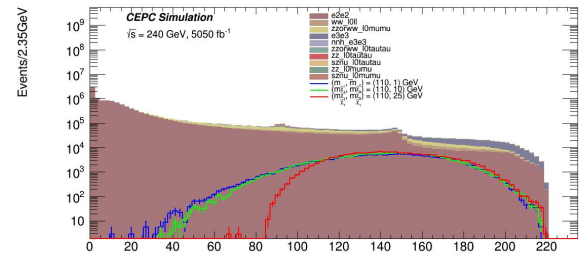
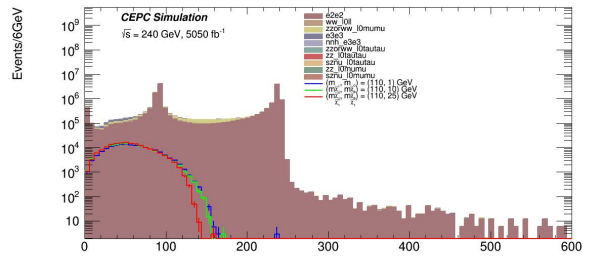
$\Delta\phi(\mu, \mu)$



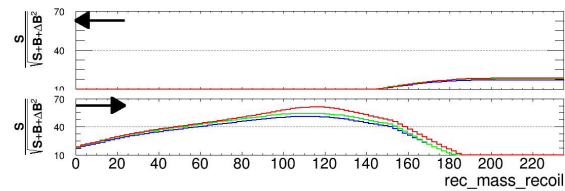
$\Delta R(\mu, \mu)$



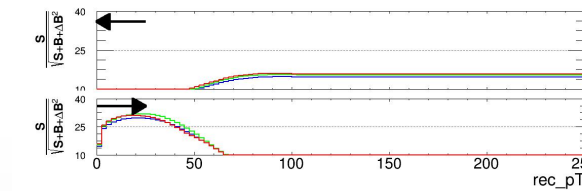
$E_{\mu\mu}$



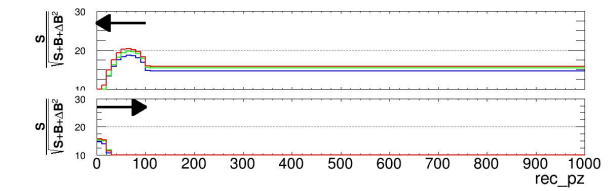
$M_{\mu\mu}$



M_{recoil}



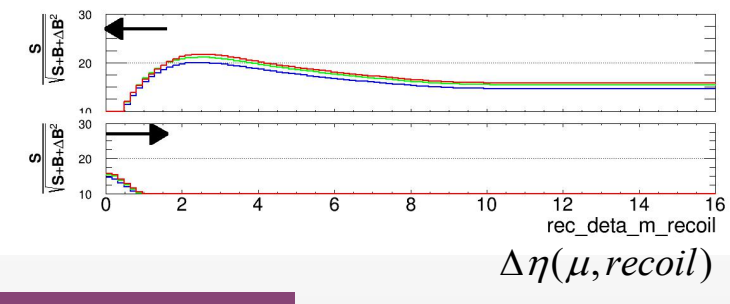
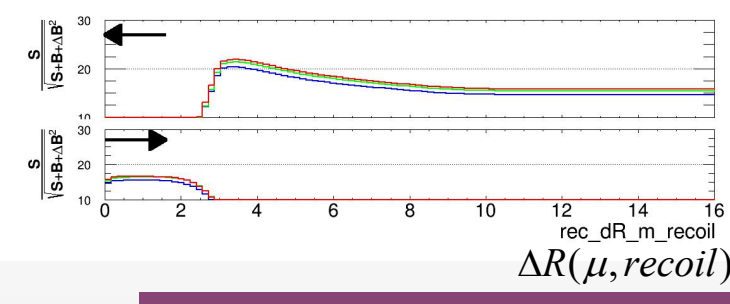
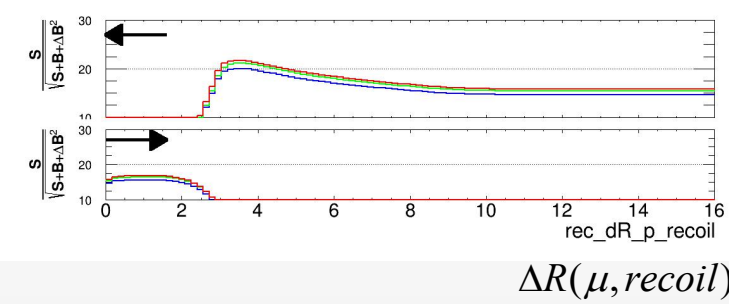
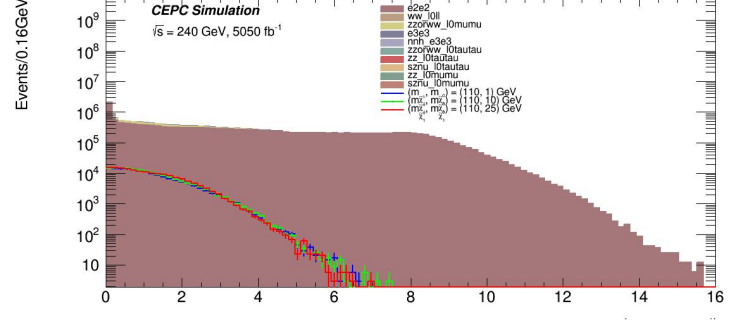
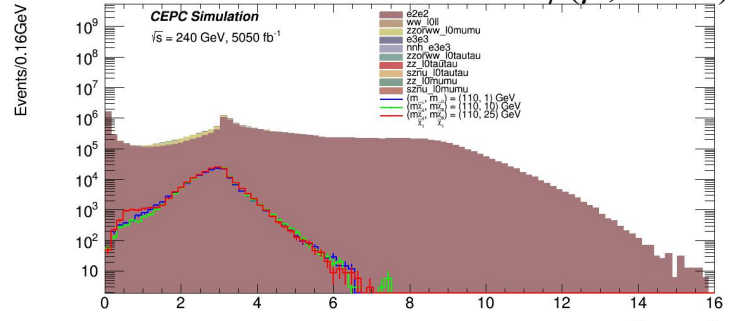
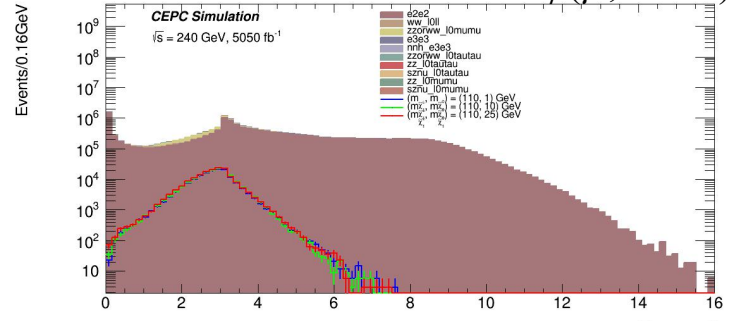
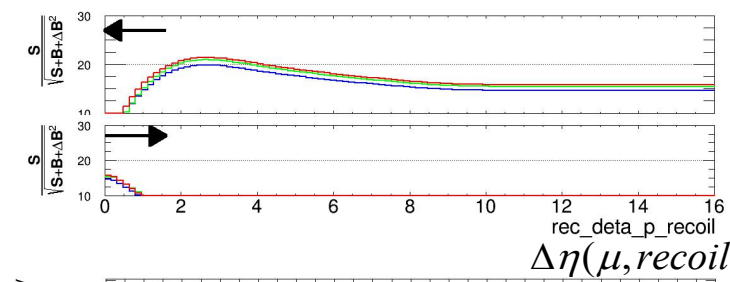
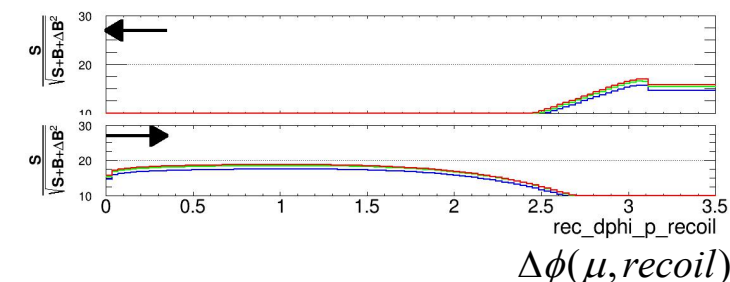
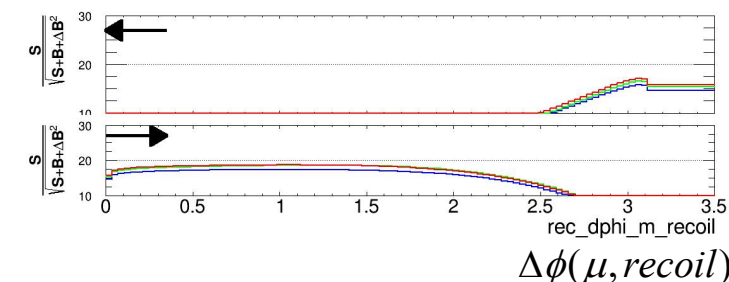
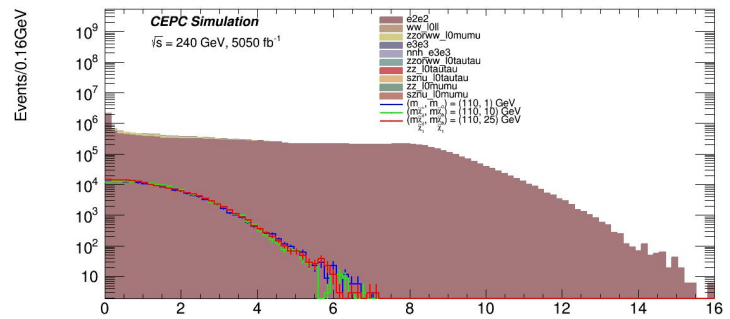
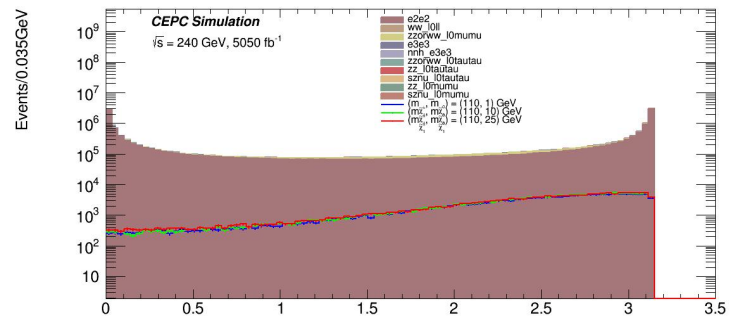
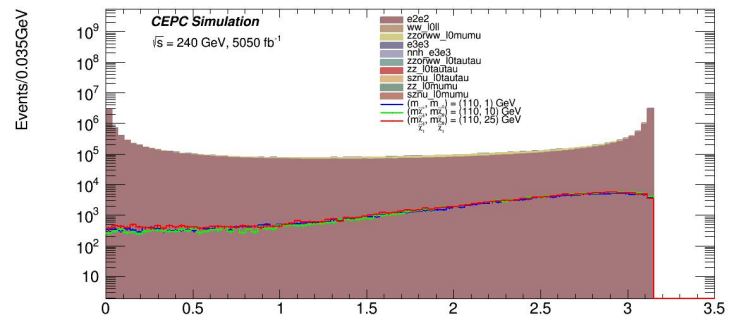
p_T



p_z

2 OS muon

C1C1



2 OS muon