Smuon Pair Physical Result under CEPCSW 25.3.6 at CEPC@240GeV

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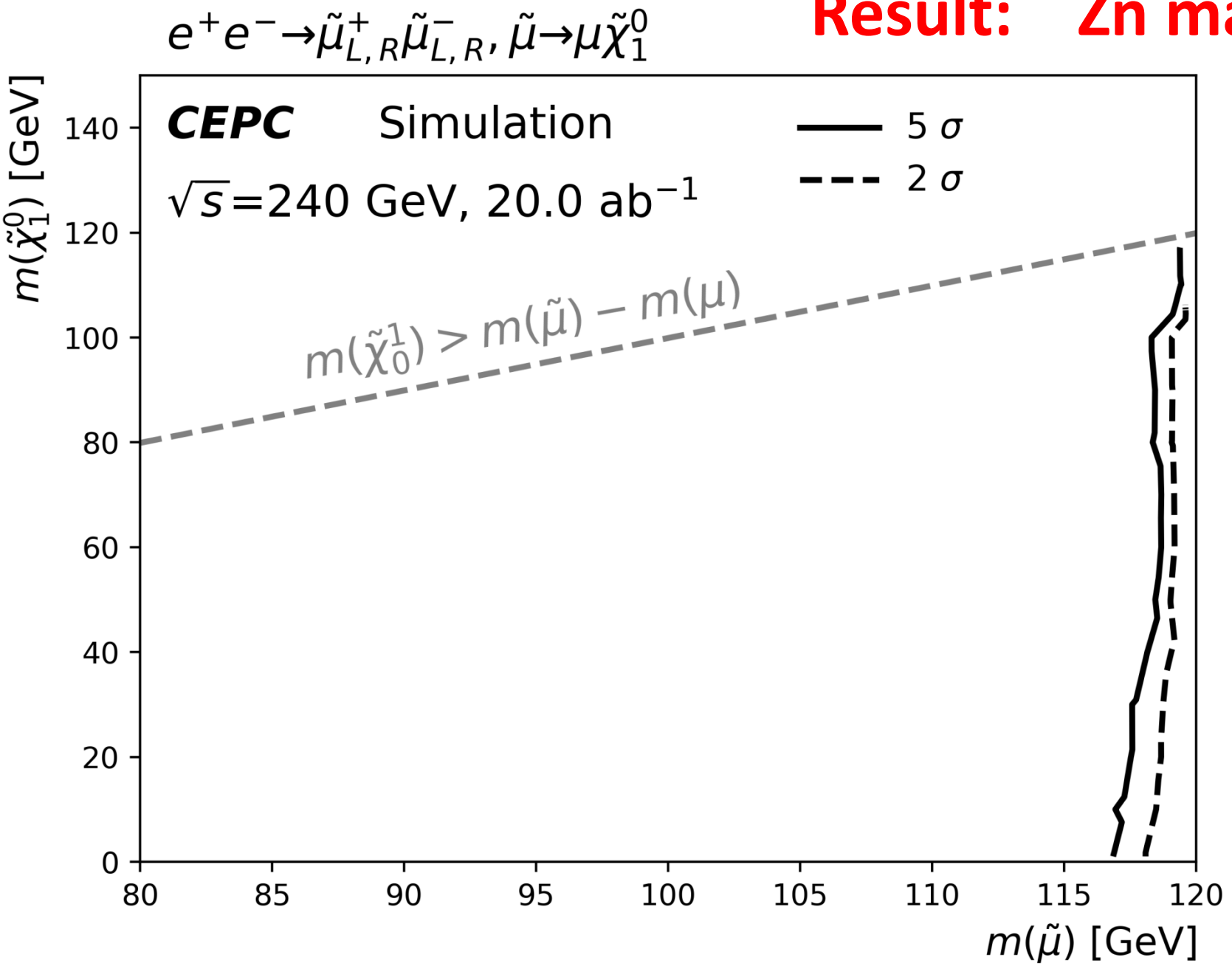
Smu pair BKG Truth Filter

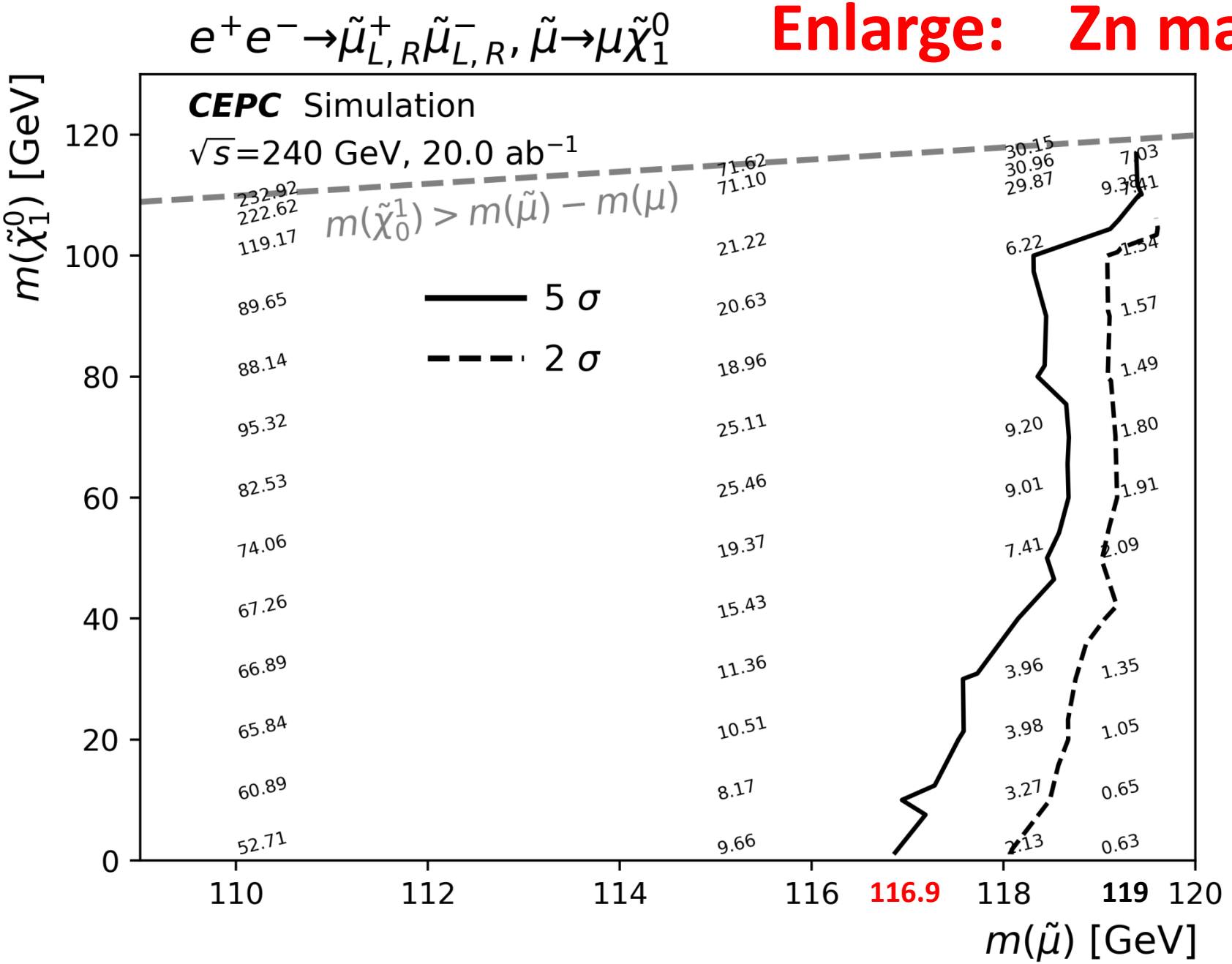
SR-highDeltaM	SR-midDeltaM	SR-lowDeltaM
	== 2 muons(OS, both energy > 0.5 GeV)	
Eμ > 32 GeV	3GeV < Eμ < 56 GeV	----------
ΔR(μ, recoil) < 3.25	1.2 < ΔR(μ, recoil) < 3.15	1.2 < ΔR(μ, recoil) < 3.15
Mμμ < 74 GeV	Mμμ < 88 GeV	----------
Mrecoil > 32 GeV	----------	Mrecoil > 210 GeV

Smu pair Rec. 终选

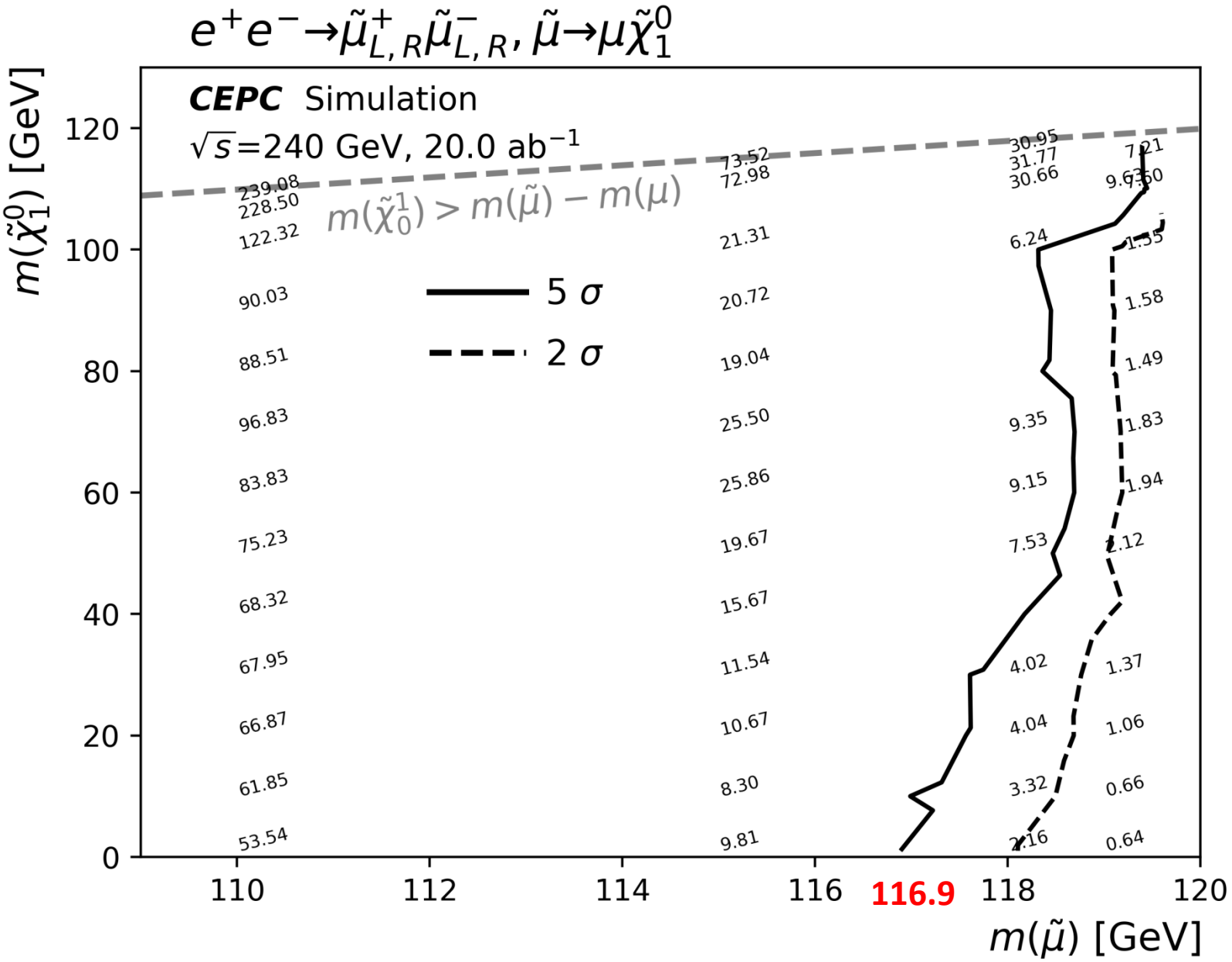
SR-highDeltaM	SR-midDeltaM	SR-lowDeltaM
	== 2 muons(OS, both energy > 0.5 GeV)	
Eμ > 40 GeV	9GeV < Eμ < 48 GeV	---------
ΔR(μ, recoil) < 2.9	1.5 < ΔR(μ, recoil) < 2.8	1.5 < ΔR(μ, recoil) < 2.8
Mμμ < 60 GeV	Mμμ < 80 GeV	----------
Mrecoil > 60 GeV	----------	Mrecoil > 220 GeV

Result: Zn map




$e^+e^- \to \tilde{\mu}^+_{L,R}\tilde{\mu}^-_{L,R}, \tilde{\mu} \to \mu\tilde{\chi}^0_1$
Enlarge: Zn map
CEPC Simulation
$\sqrt{s}$=240 GeV, 20.0 ab^{-1}
$m(\tilde{\chi}^1_0) > m(\tilde{\mu}) - m(\mu)$
5 σ
2 σ
$m(\tilde{\chi}^0_1)$ [GeV]
$m(\tilde{\mu})$ [GeV]
0
20
40
60
80
100
120
110
112
114
116
116.9
118
119
120
232.92
222.62
119.17
89.65
88.14
95.32
82.53
74.06
67.26
66.89
65.84
60.89
52.71
71.62
71.10
21.22
20.63
18.96
25.11
25.46
19.37
15.43
11.36
10.51
8.17
9.66
30.15
30.96
29.87
6.22
9.20
9.01
7.41
3.96
3.98
3.27
2.13
7.03
9.38
1.54
1.57
1.49
1.80
1.91
2.09
1.35
1.05
0.65
0.63

BKG statistics double : Zn map



Improving: Emu Binning

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 1, delta_M: 117GeV: Max= 70.9037GeV, Min= 49.0878GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 3, delta_M: 115GeV: Max= 70.8629GeV, Min= 49.0596GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 5, delta_M: 113GeV: Max= 70.7814GeV, Min= 49.0032GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 8, delta_M: 110GeV: Max= 70.5828GeV, Min= 48.8657GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 10, delta_M: 108GeV: Max= 70.3995GeV, Min= 48.7388GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 13, delta_M: 105GeV: Max= 70.0481GeV, Min= 48.4955GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 15, delta_M: 103GeV: Max= 69.7629GeV, Min= 48.2981GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 18, delta_M: 100GeV: Max= 69.2588GeV, Min= 47.949GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 20, delta_M: 98GeV: Max= 68.8717GeV, Min= 47.6811GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 23, delta_M: 95GeV: Max= 68.2148GeV, Min= 47.2263GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 25, delta_M: 93GeV: Max= 67.7259GeV, Min= 46.8878GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 28, delta_M: 90GeV: Max= 66.9162GeV, Min= 46.3272GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 30, delta_M: 88GeV: Max= 66.3254GeV, Min= 45.9182GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 33, delta_M: 85GeV: Max= 65.363GeV, Min= 45.2519GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 35, delta_M: 83GeV: Max= 64.6704GeV, Min= 44.7724GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 38, delta_M: 80GeV: Max= 63.5551GeV, Min= 44.0003GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 40, delta_M: 78GeV: Max= 62.7607GeV, Min= 43.4503GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 45, delta_M: 73GeV: Max= 60.5963GeV, Min= 41.9519GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 48, delta_M: 70GeV: Max= 59.1755GeV, Min= 40.9682GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 50, delta_M: 68GeV: Max= 58.1774GeV, Min= 40.2772GeV

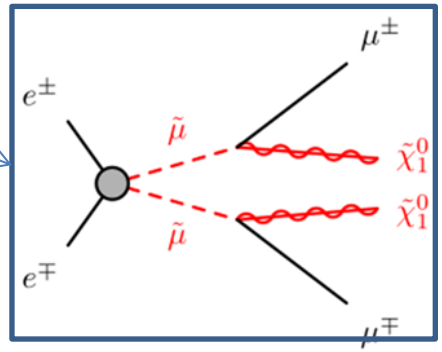
Ecm: 240GeV, Msmu: 118GeV , Mlsp: 55, delta_M: 63GeV: Max= 55.5038GeV, Min= 38.4262GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 58, delta_M: 60GeV: Max= 53.7774GeV, Min= 37.231GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 60, delta_M: 58GeV: Max= 52.5756GeV, Min= 36.399GeV

Ecm: 240GeV, Msmu: 118GeV , Mlsp: 63, delta_M: 55GeV: Max= 50.6964GeV, Min= 35.098GeV

H区 （dM>60 GeV）				M区（10<dM<60）				L(dM <10)
2muon (OS, Both energy>0.5)								
1	2	3	4	5	6	7	8	9
40<Emu1<50 40<Emu2<50	40<Emu1<50 Emu2>50	Emu1>50 40<Emu2<50	Emu1>50 Emu2>50	9<Emu1<25 9<Emu2<25	9<Emu1<25 25<Emu2<48	25<Emu1<48 9<Emu2<25	25<Emu1<48 25<Emu2<48	-----
dR(mu1,2, recoil)<2.9				1.2<dR(mu1,2, recoil)<2.8				
Mmum < 60				Mmumu < 80				------
Mrecoil > 40				----------				Mrecoil> 220



SM BKG

Process	X-section (fb)	Sample Tag	20ab^{-1}预期数量 (k events)	Filter输入数量（ k events ）	Weight
ττ	4374.94	e3e3	87498.8	4910	17.82
ννH,H → anything	3.07	nnh_X	61.4	61.4	1.0
ZZorWW → ττνν	211.18	zzorww_l0tautau	4223.6	963.917	4.38
ZZ → ττνν	9.61	zz_l0tautau	192.2	184	1.0446
ννZ, Z → ττ	14.57	sznu_l0tautau	291.4	291.4	1.0
ZZorWW → μμνν	221.10	zzorww_l0mumu	4422	756.97	5.842
ZZ→ μμνν	19.38	zz_l0mumu	387.6	363.4	1.0666
WW → ℓℓνν	403.66	ww_l0ll	8073.2	919.898	8.7762
ννZ,Z → μμ	43.43	sznu_l0mumu	868.6	758.891	1.14456
μμ	4967.58	e2e2	99351.6	11817.197	8.407

Smu pair signal generation info.

Msmu (GeV)	X-section (fb)	20ab^{-1}预期事例数
80	316.2 +- 0.5064	6324k
90	286.1 +- 0.6814	5722k
100	253.6 +- 0.7284	5072k
110	219.0 +- 0.8025	4380k
115	23.61 +- 1.741e-02	472.2k
118	6.088 +- 4.489e-03	121.76k
119	2.166 +- 1.597e-03	43.32k
119.2	1.552 +- 1.144e-03	31.04k
119.4	1.009 +- 7.441e-04	20.18k
119.5	0.7682 +- 5.664e-04	15.364k
119.7	0.3575 +- 2.636e-04	7.15k

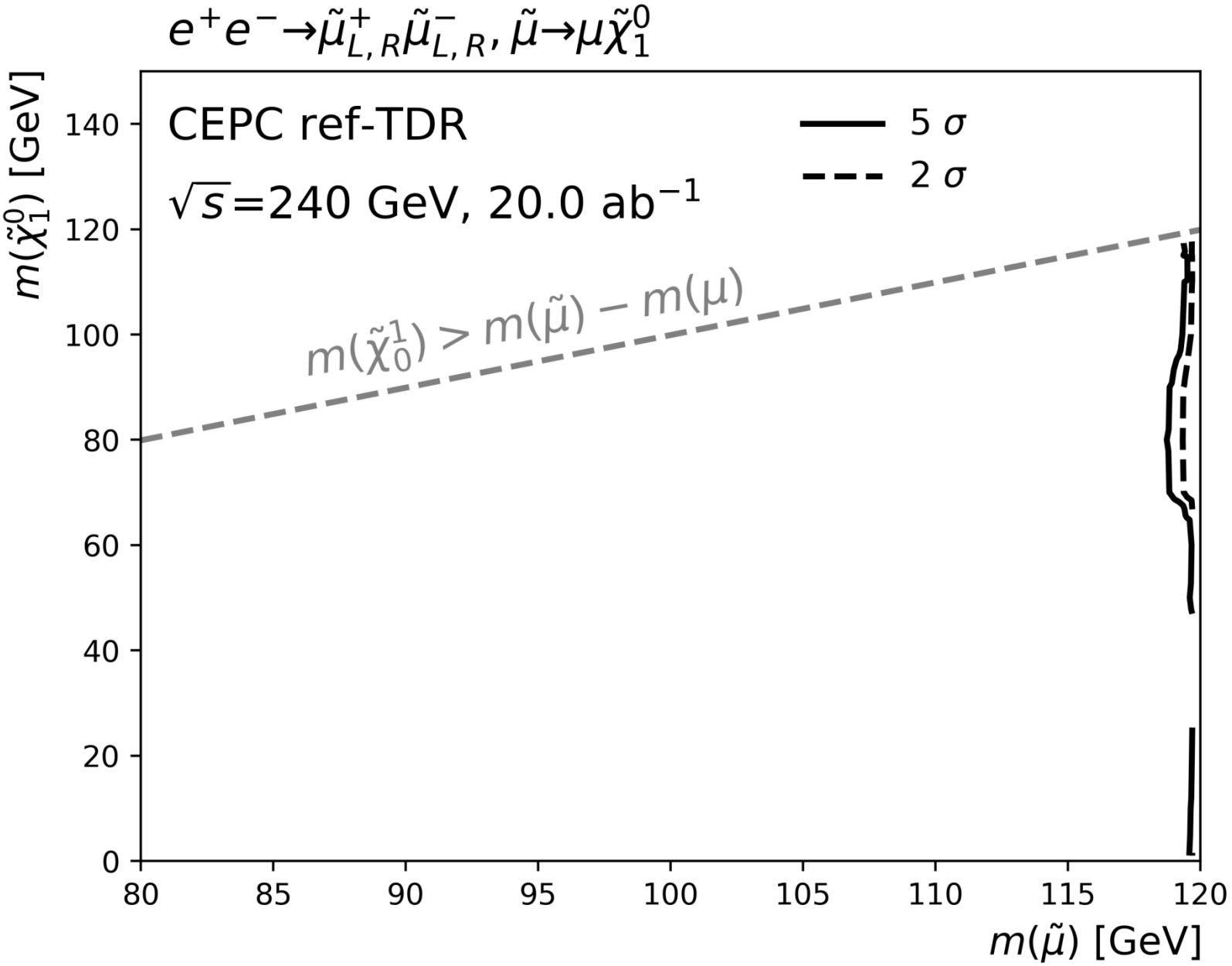
新增了5个新的质量

/publicfs/atlas/atlasnew/SUSY/users/luf/DirectSmuon/hepmc_240GeV_MG5_aMC_v2_9_21/smusmu_nodecay_119*

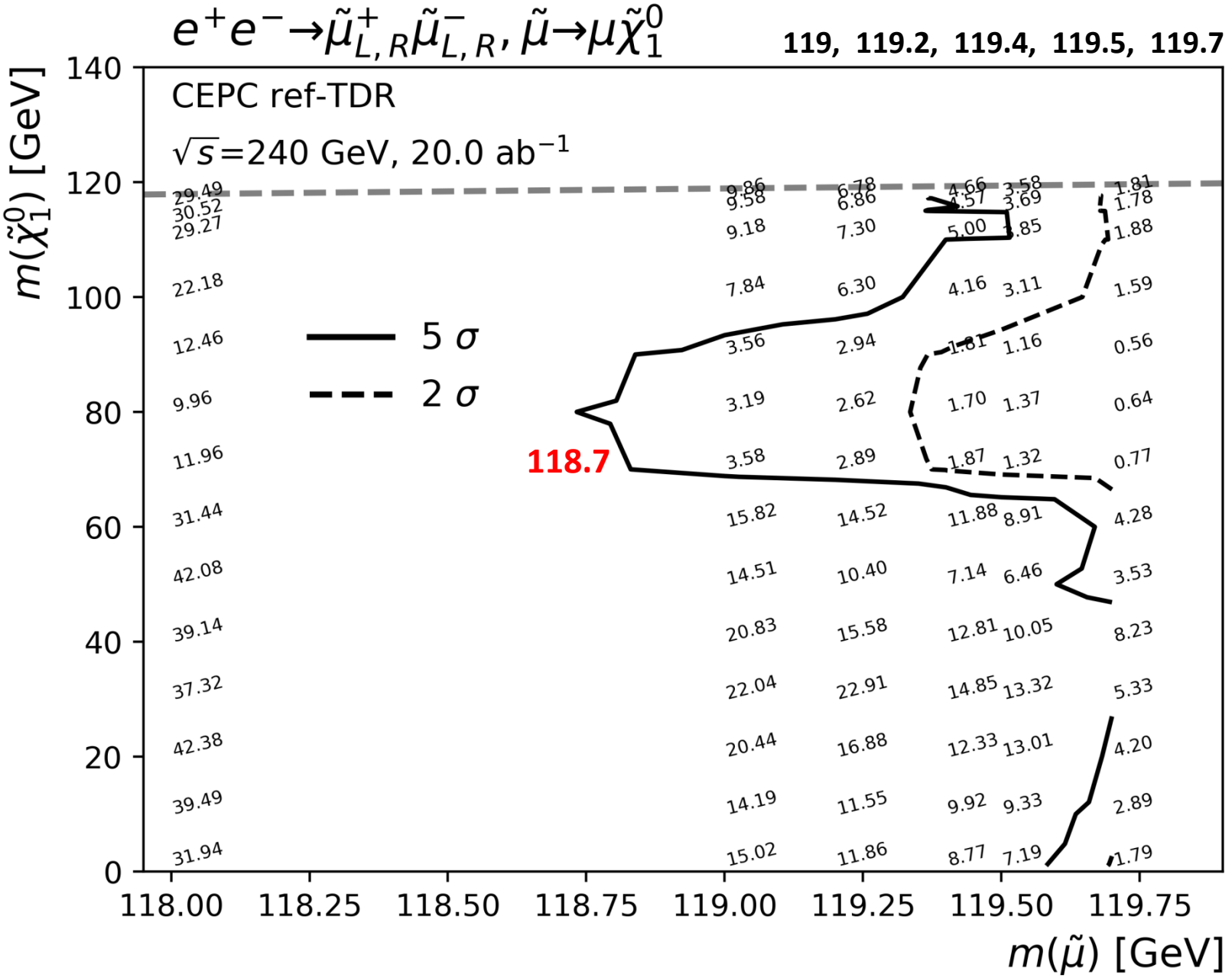
信号事例**Weight = 20 ab^{-1} 预期事例数 / MC sample events Number**

每个点全模拟事例数：**20k events**

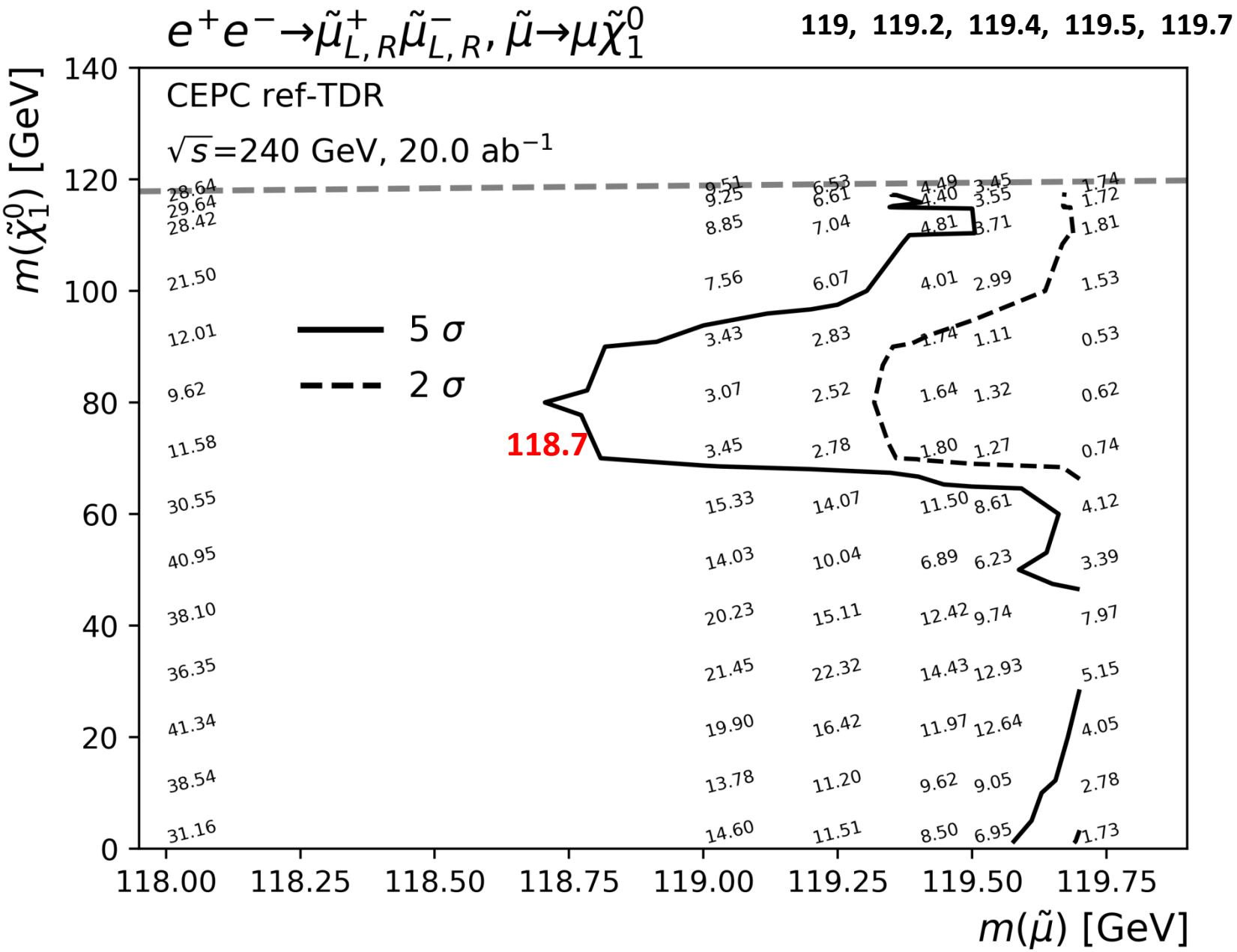
New Result: Zn map



New Result enlarge: Zn map



MUID 98%, 2mu event 96% Eff. : Zn map



Further Emu improving test

Signal M region:

Emu binning cut from 25 to 30, 35 GeV