Status of $Z(->\mu^+\mu^-)H(->qq\nu\nu)$ analysis

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Data Samples

Signal samples:

-- /besfs/groups/higgs/data/SimReco/wo_BS/CEPC_v4/higgs/smart_final_states/E240.Pllh_zz.e0.p0.whizard195/

Backgrounds :

-- mainly under /cefs/data/DstData/CEPC240

-- some of channels are from CEPC_v1's , such as 2fermion bg. (leptons)

Other higgs decays (as backgrounds)

Not yet.

Event Selection - I.

Pre-selection Stage

-- Using lepton isolation

-- $N(\mu^+) \geqq 1$, $N(\mu^-) \geqq 1$ ($10\ \mathrm{GeV} < E(\mu) < 100\ \mathrm{GeV}$)

-- di-muon pair from Z boson is selected from the invariant mass

-- N(jet) = 2 , with FastJet (avoid LCFIplus this time)

-- No ISR(FSR) treatment.

Event Selection - II.

Event Selection Stage

As written in the Yuqian Wei's thesis

-- Missing Mass > Mass(di-jets)

-- 80 GeV < Mass(di-muon) < 100 GeV

-- 120 GeV < Recoil Mass(di-muon) < 160 GeV

-- N(pfo objects) > 15

-- Pt(all of visible) > 10 GeV

-- Minimum angle between muon and > 0.3 rad

-- Missing Mass > 60 GeV && Mass(di-jets) < 45 GeV

Di-muon Invariant Mass

From the reference

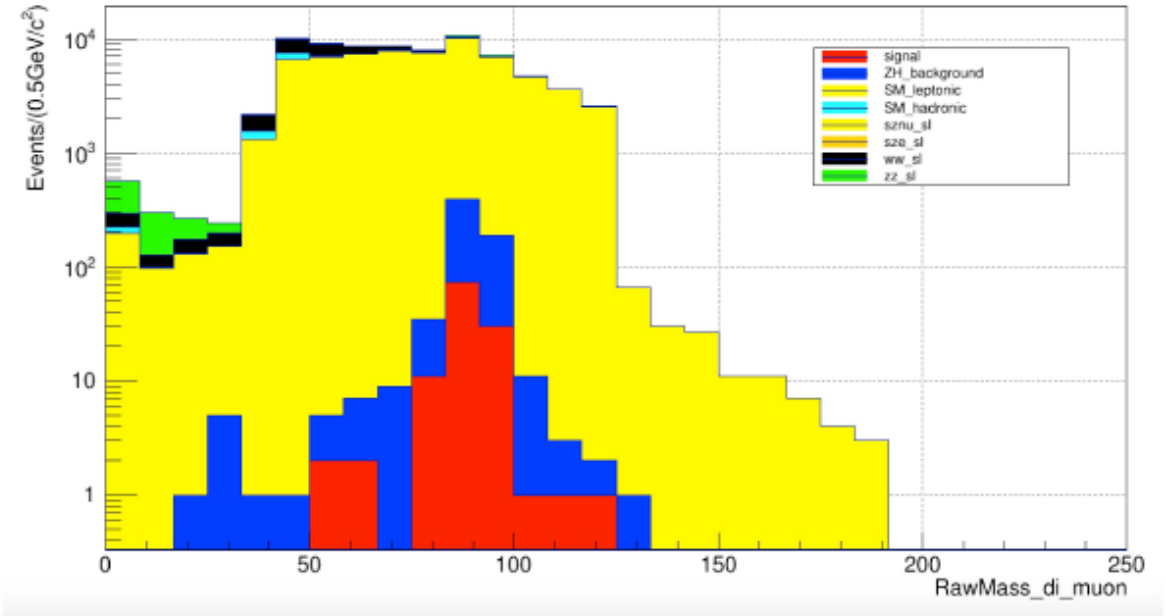
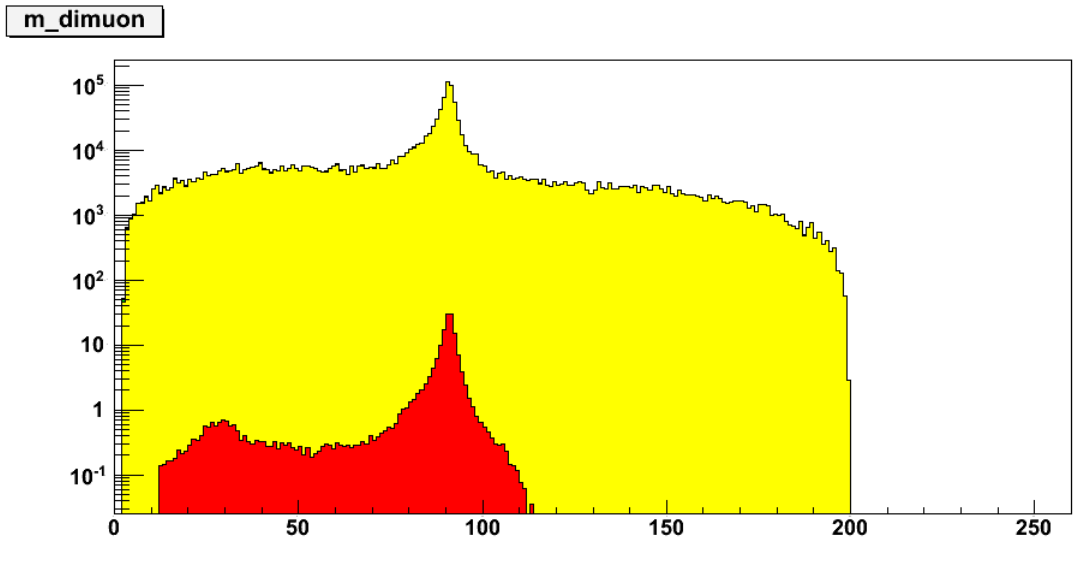


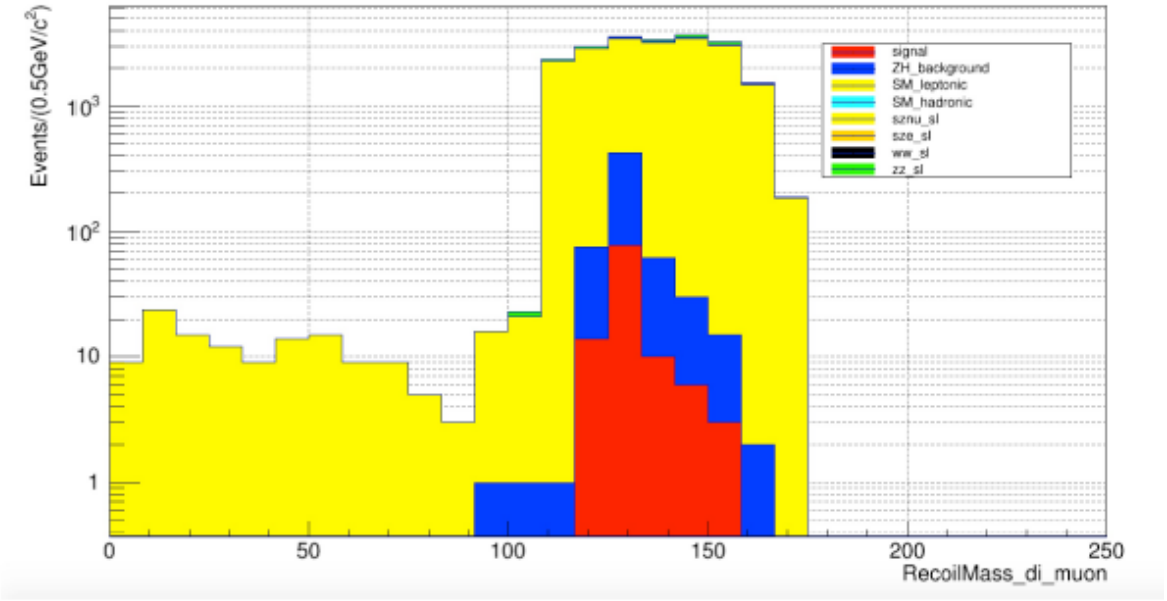
图 4.4 正负缪子不变质量

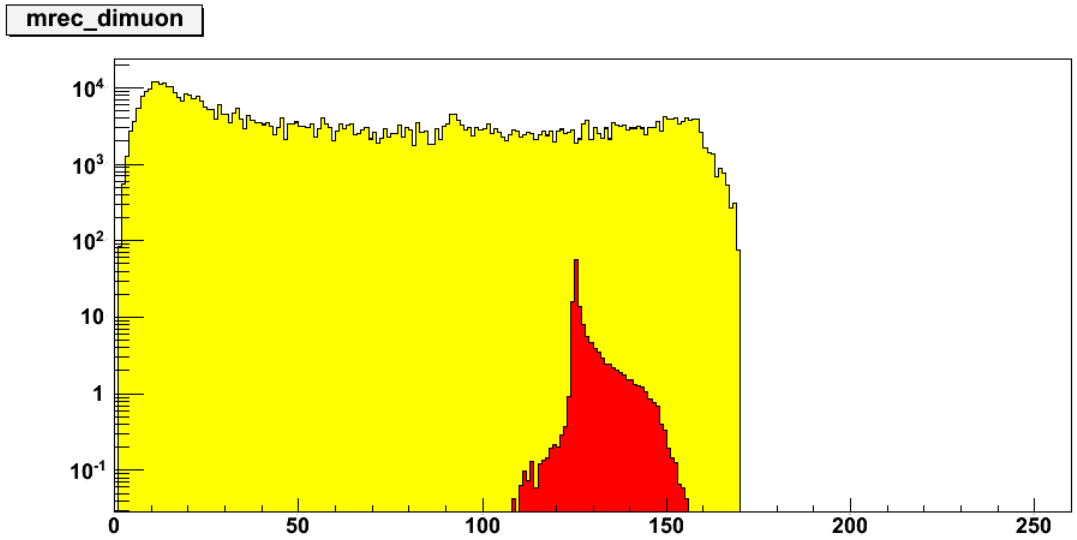
This work



Blue color (other Higgs channels) contribution is not included in this analysis.

Di-muon Recoil Mass





Particle Flow Object

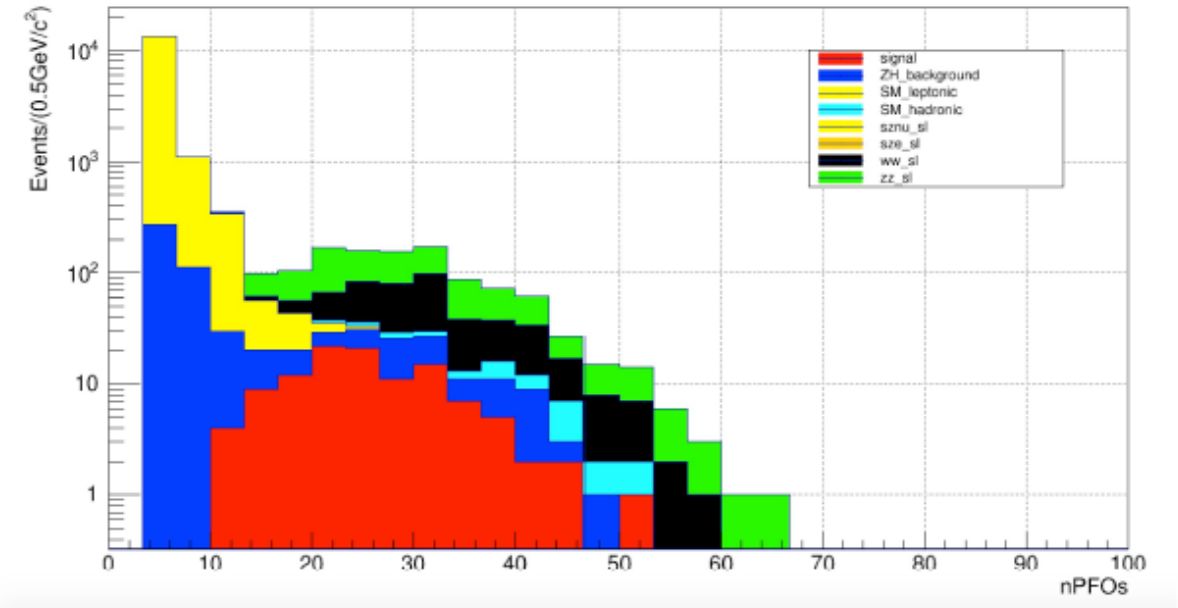
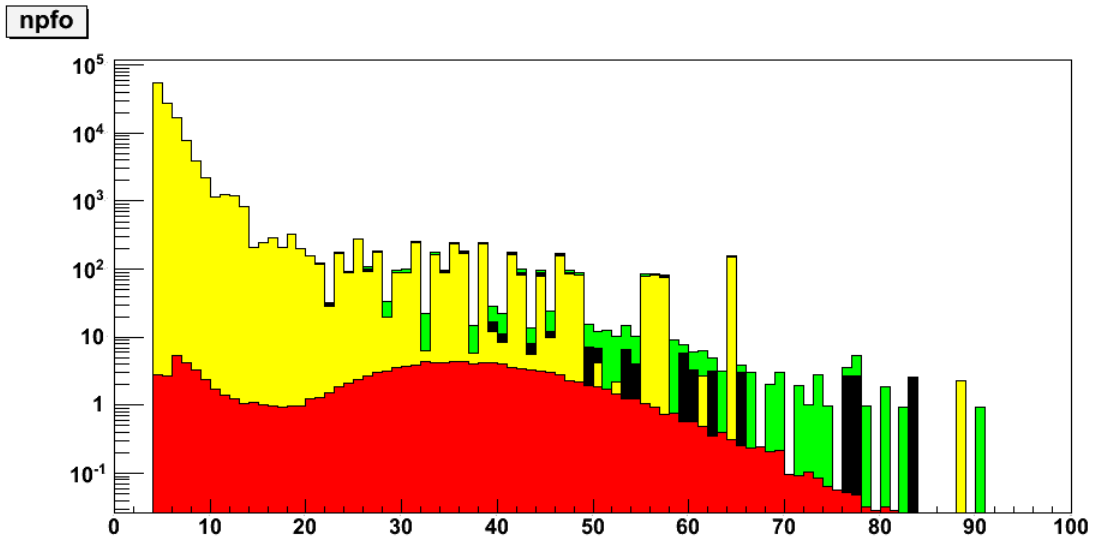


图 4.6 Particle Flow Object（粒子流对象）个数



Min. Angle (muon <-> jet)

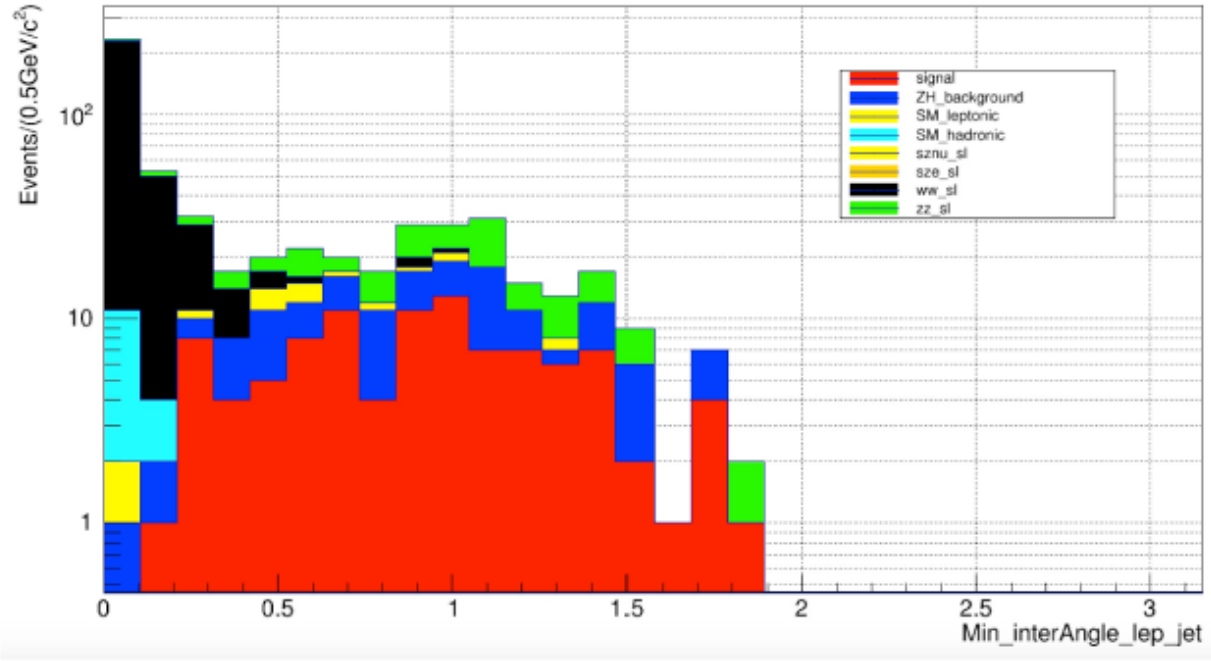
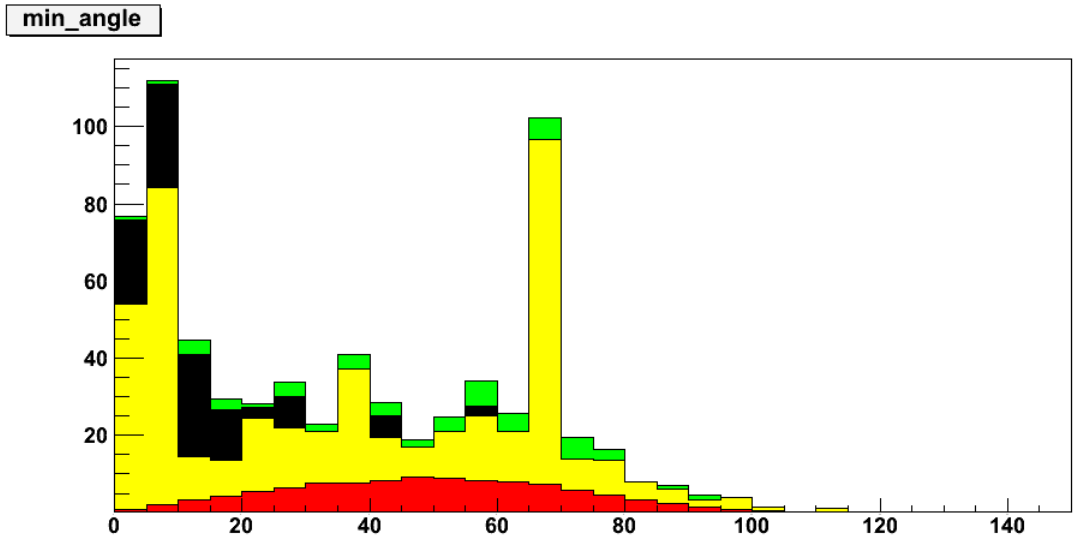


图 4.7 最小喷注-轻子夹角分布



Di-muon Invariant Mass (final)

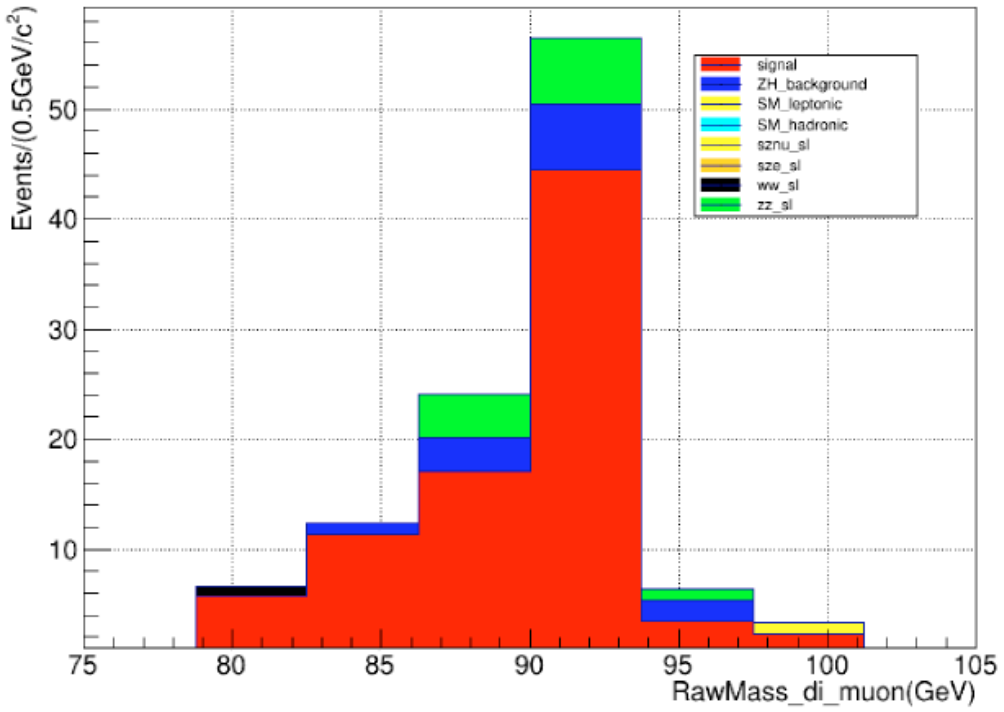
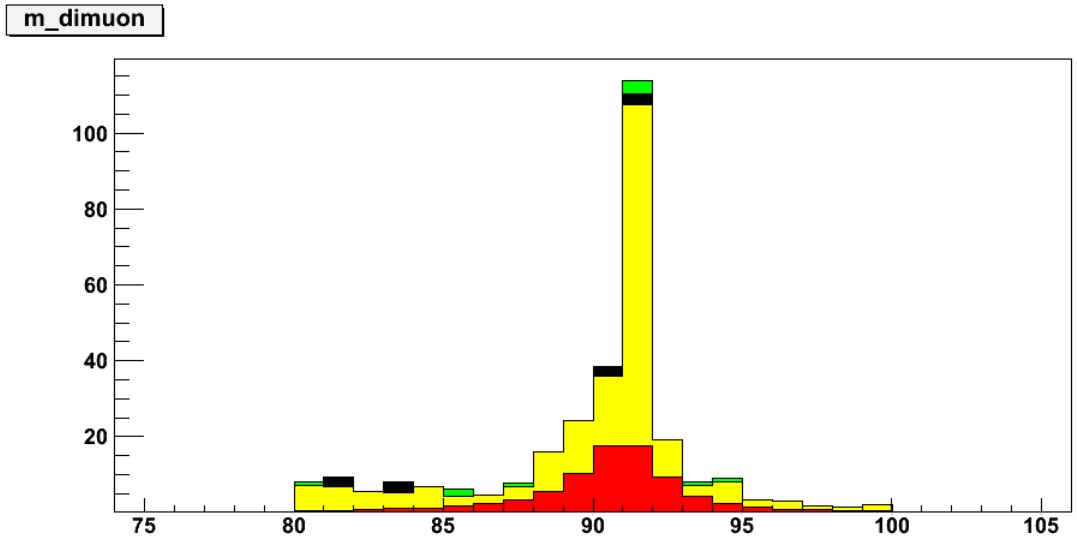


图 4.10 经事例选择后的信号事例和本底事例在正负缪子不变质量谱上的分布



At present, backgrounds are too large and not effective to calculate the S/N

Cut Flow Table

	Signal	SM lep.	SM had.	sznu_sl	sze_sl	ww_sl	zz_sl
Missing mass> M(di-jets)	172	1176081	144	5	0	1683	2436
80 < M(dimuon) < 100	144	601788	0	0	0	174	886
120 < RecM(dimuon) < 160	142	122852	0	0	0	107	363
N(pfo) >15	114	4458	0	0	0	107	361
Pt(total visible) > 15	107	416	0	0	0	107	54
Min angle > 0.3	99	264	0	0	0	26	48
Missing Mass & M(dijets)	82	195	0	0	0	11	9

Comments

- Background contribution should be suppressed more.
- “Isolatedlepton” procedure is different from the reference.
- Need to conder ZH channels as well
- Some points though I did not write each item here, should be updated though (I expect) it does not change the current result much.