$Z->e^+e^-$
Higgs->Invisible

10/05/2018

Maoqiang Jing

• Sample

✓Signal sample:

- /cefs/tmp_storage/moxin/rec_samples/e1e1h_invi/rec/

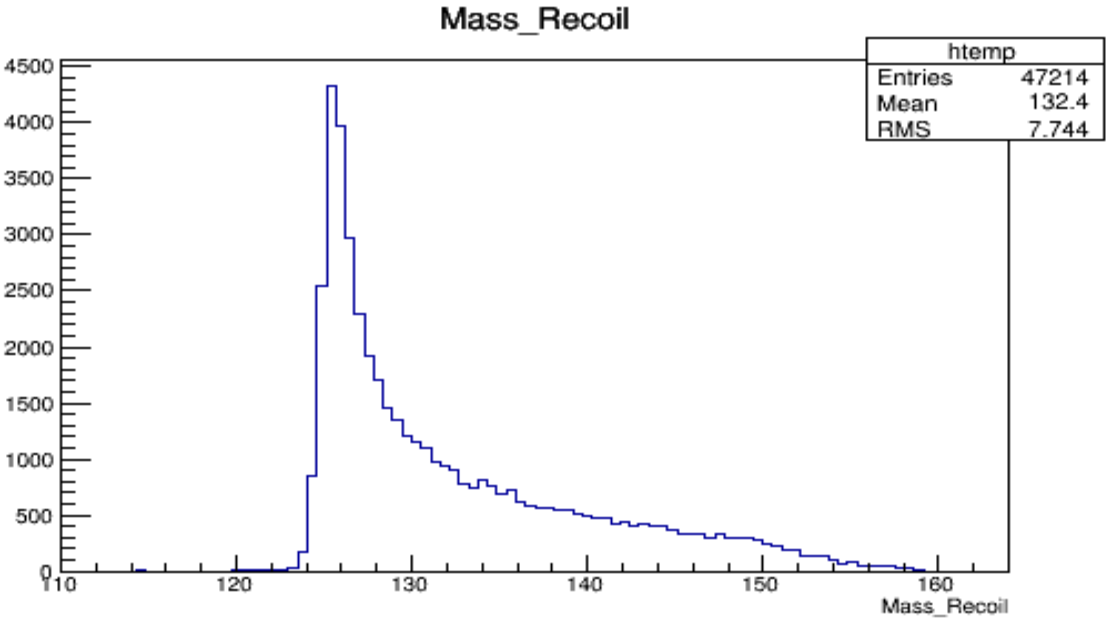
✓Background sample:

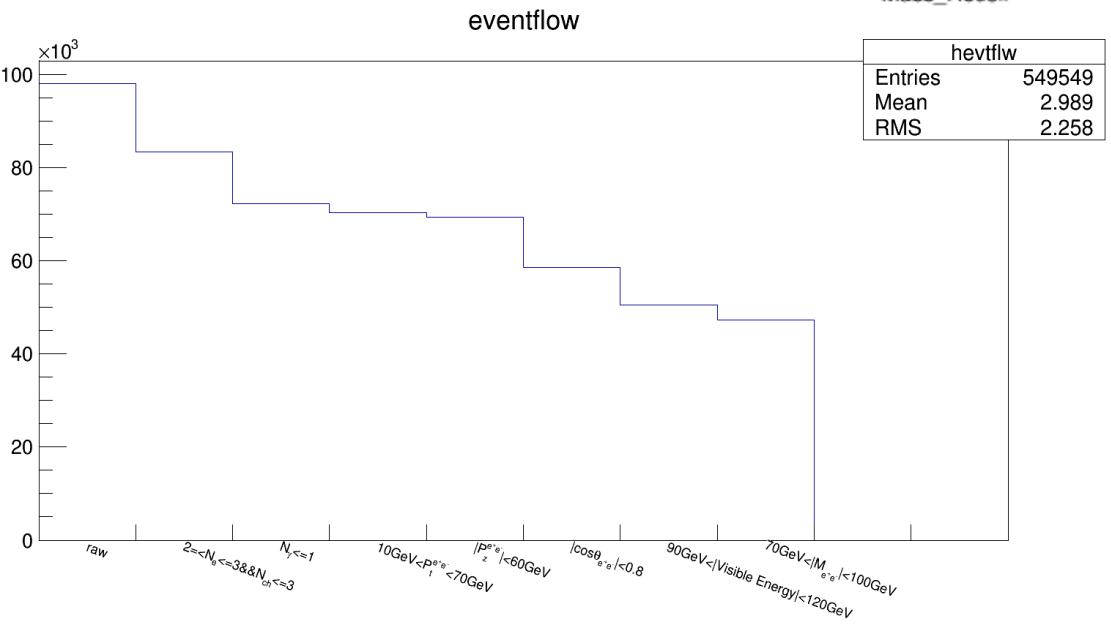
- /cefs/data/RecData/CEPC250/CEPC_v1/2fermions/bhabha/*slcio
- /cefs/data/RecData/CEPC250/CEPC_v1/2fermions/E250.Pe3e3.e0.p0.whizard195/
- /cefs/data/RecData/CEPC250/CEPC_v1/4fermions/E250.Psze_l.e0.p0.whizard195/mu/
- /cefs/data/RecData/CEPC250/CEPC_v1/4fermions/E250.Psze_l.e0.p0.whizard195/nu/
- /cefs/data/RecData/CEPC250/CEPC_v1/4fermions/E250.Psze_l.e0.p0.whizard195/tau/
- /cefs/data/RecData/CEPC250/CEPC_v1/4fermions/E250.Pszeorsw_l.e0.p0.whizard195/
- /cefs/data/RecData/CEPC250/CEPC_v1/4fermions/E250.Pzz_l.e0.p0.whizard195/taumu/

- **Selection criteria**

✓$2=<(N_{e+}+N_{e-})<=3$, $N_{charged}<=3$
✓$N_{gamma}<=3$
✓$10GeV<P_t^{e+e-}<70GeV$
✓$|P_z^{e+e-}|<60GeV$
✓$|\cos\theta_{e+e-}|<0.8$
✓$70GeV<M_{e+e-}<100GeV$
✓$90<Energy\ Visible<120$

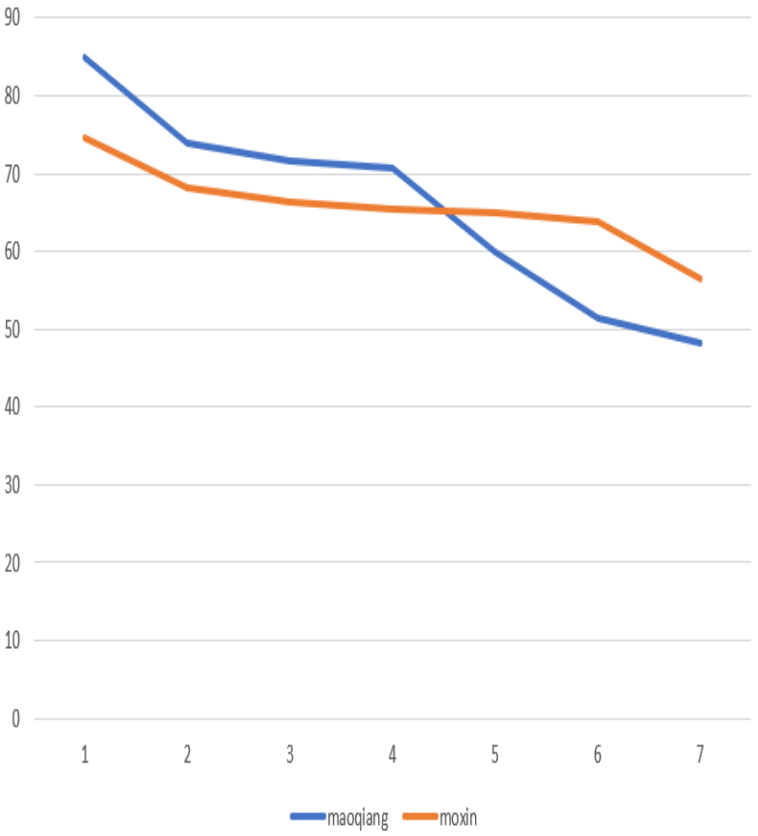
• Recoil mass and cut flow(Signal_e1e1h)





Cut	Efficiency
$2=<(N_{e+}+N_{e-})<=3$, $N_{charged}<=3$	83307/98044=85.0%
$N_{gamma}<=1$	72311/98044=73.8%
$10GeV<P_t^{e+e-}<70GeV$	70277/98044=71.7%
$\|P_z^{e+e-}\|<60GeV$	69302/98044=70.7%
$\|\cos\theta_{e+e-}\|<0.8$	58611/98044=59.8%
$70GeV<M_{e+e-}<100GeV$	50483/98044=51.5%
90GeV<Energy Visible<120GeV	47214/98044=48.2%

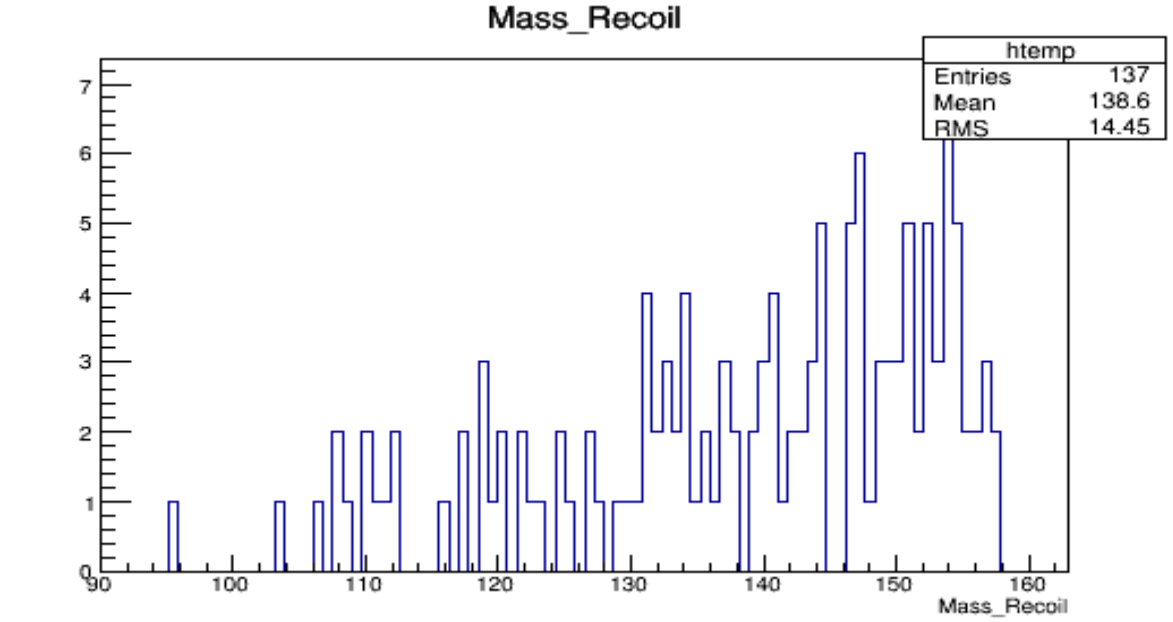
• Moxin's cut flow(Signal_e1e1h)

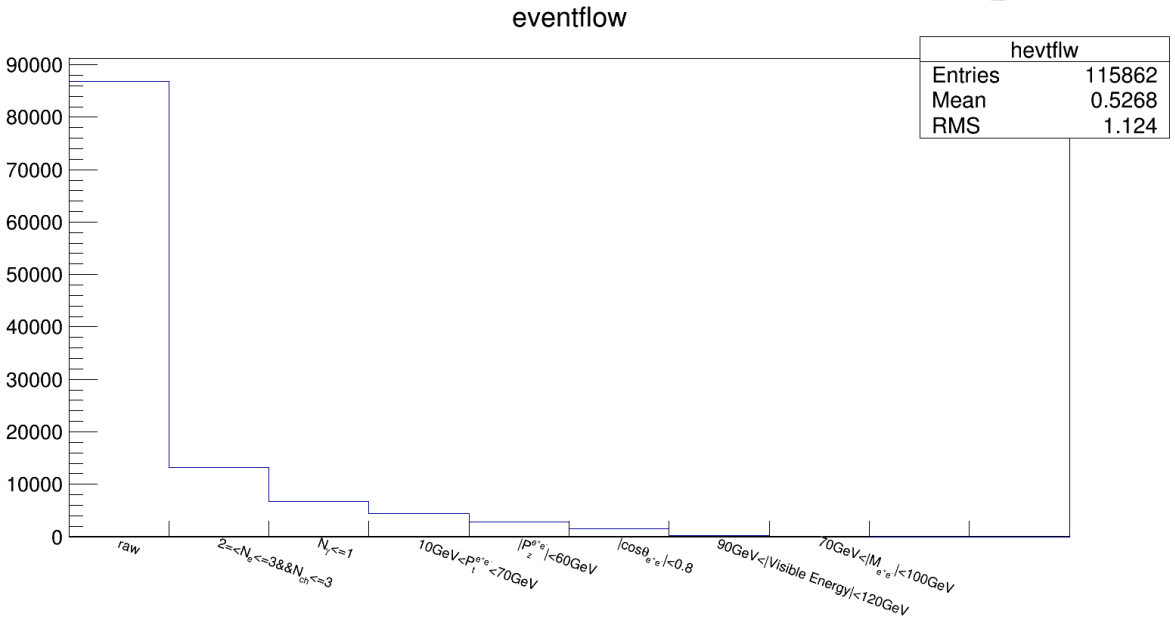


Cut	Efficiency
$2=<(N_{e+}+N_{e-})<=3$, $N_{charged}<=3$	74522/100000=74.5%(85.0%)
$N_{gamma}<=1$	68219/100000=68.2%(73.8%)
$10GeV<P_t^{e+e-}<70GeV$	66394/100000=66.4%(71.7%)
$\|P_z^{e+e-}\|<60GeV$	65428/100000=65.4%(70.7%)
$\|\cos\theta_{e+e-}\|<0.8$	64873/100000=64.9%(59.8%)
$70GeV<M_{e+e-}<100GeV$	63850/100000=63.9%(51.5%)
$90GeV<$Energy Visible$<120GeV$	56368/100000=56.4%(48.2%)

Method of getting efficiency

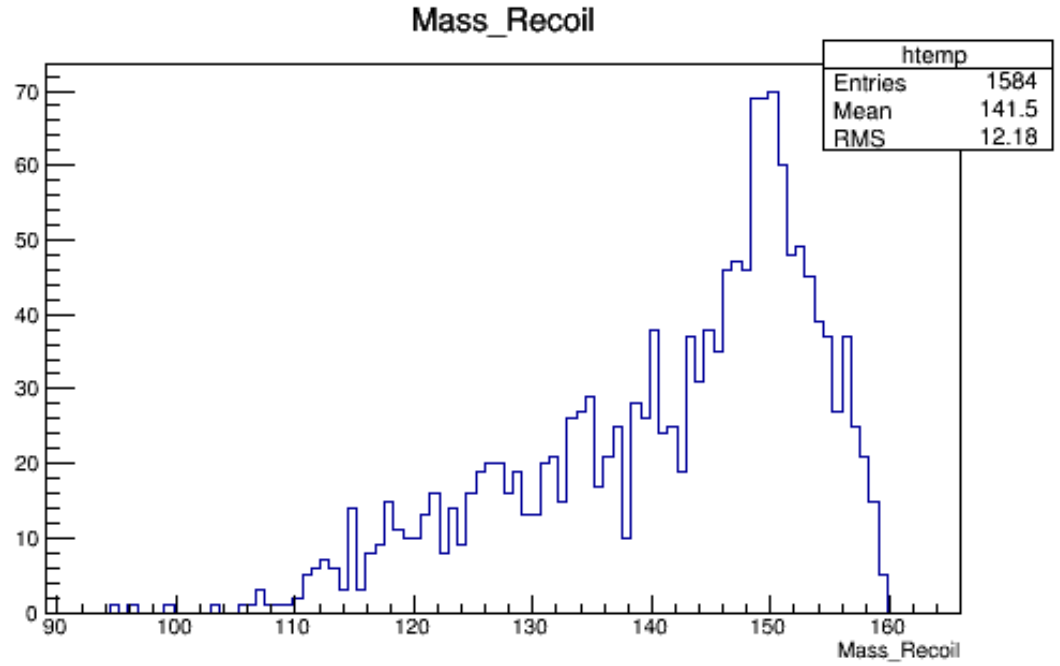
• Recoil mass and cut flow(bhabha)





Cut	Efficiency
$2=<(N_{e+}+N_{e-})<=3$, $N_{charged}<=3$	13193/86903=15.2%(57.4%)
$N_{gamma}<=1$	6646/86903=7.6%(38.8%)
$10GeV<P_t^{e+e-}<70GeV$	4388/86903=5.0%(22.0%)
$\|P_z^{e+e-}\|<60GeV$	2823/86903=3.2%(9.8%)
$\|\cos\theta_{e+e-}\|<0.8$	1491/86903=1.7%(9.6%)
$70GeV<M_{e+e-}<100GeV$	281/86903=0.3%(0.1%)
90GeV<Energy Visible<120GeV	137/86903=0.16%(0.07%)

• Recoil mass and cut flow(e3e3)



Cut	Efficiency
$2=<(N_{e+}+N_{e-})<=3$, $N_{charged}<=3$	26930/1484572=1.8%(2.8%)
$N_{gamma}<=1$	26930/1484572=1.8%(2.6%)
$10GeV<P_t^{e+e-}<70GeV$	16463/1484572=1.1%(1.5%)
$\|P_z^{e+e-}\|<60GeV$	14806/1484572=0.9973%(1.3%)
$\|\cos\theta_{e+e-}\|<0.8$	10409/1484572=0.70%(0.85%)
$70GeV<M_{e+e-}<100GeV$	2517/1484572=0.17%(0.18%)
90GeV<Energy Visible<120GeV	1584/1484572=0.1067%(0.11%)

- **Problems**

✓Methods of calculating efficiencies are different

✓Cut flow of signal sample

Thanks