A first look of new MC samples for $h \to \mu^+\mu^-$ analysis

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Introduction

- In ILD, a MC production campaign has been started using ILCSoft v02-00.

- This talk is a simple report of first look of these samples for $h \rightarrow \mu^+ \mu^-$ analysis.
  - I am a newcomer of ILCSoft v02-00, also report some problems when I worked for this.

Quick Summary of MC Samples

|	New	DBD
ILCSoft version	v02-00	v01-16
Detector model	ILD_l5(s5)_01_v02	ILD_o1_v05
Overlaid background	$\gamma\gamma \rightarrow$ hadrons <1.2> e^+e^- seeable pairs	$\gamma\gamma \rightarrow$ hadrons <1.7>
E_{CM}	only 500 GeV now	250 GeV, 500 GeV

To be honest, only checked l5 option.

First Problem

- In default, SatoruJetFinder never works!
  - This processor contains Fortran code.
  - At some point (v01-19-05 -> v01-19-06?), cernlib is excluded from ILCSoft. The cernlib is used for Fortran code.
    - This will also affect for other code using Fortran. (BCalTagEfficiency, EventShapes_Fortran)
  - With experts help, now I can use SatoruJetFinder.

Second Problem

- Performance of IsolatedLeptonTagger is too funny.
  - Reconstruction efficiency (correctly reconstruct one mu+ and one mu-) is greater than 90% in DBD, but is less than 5% in new samples!
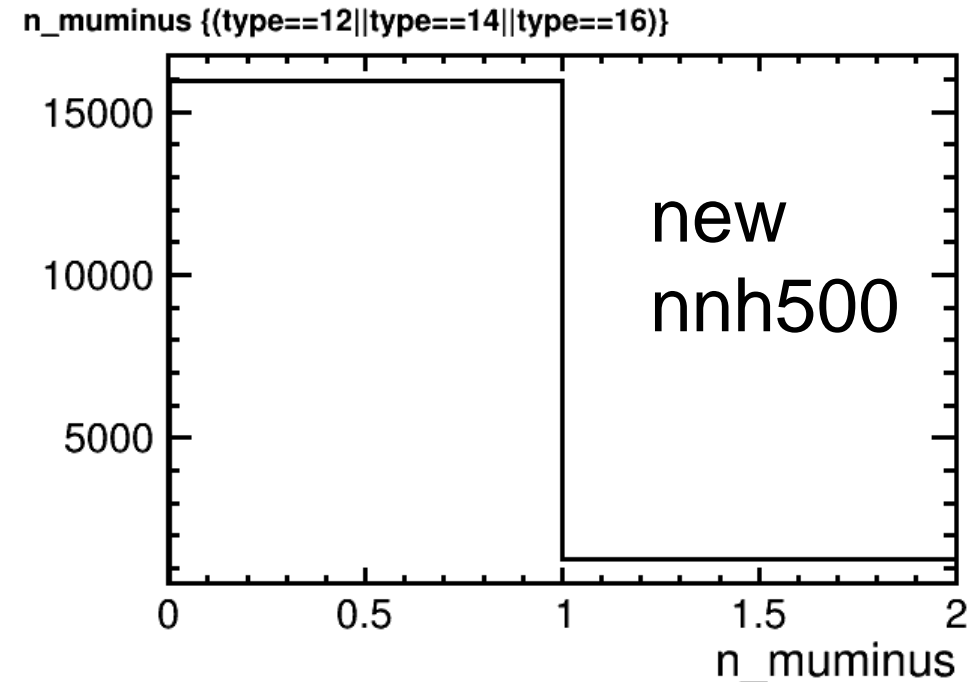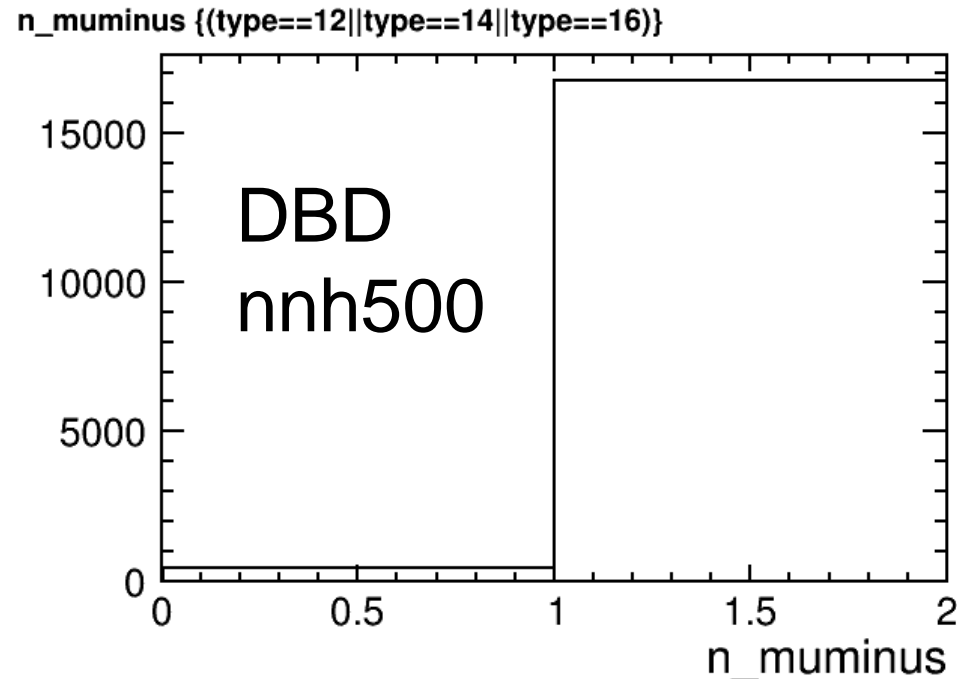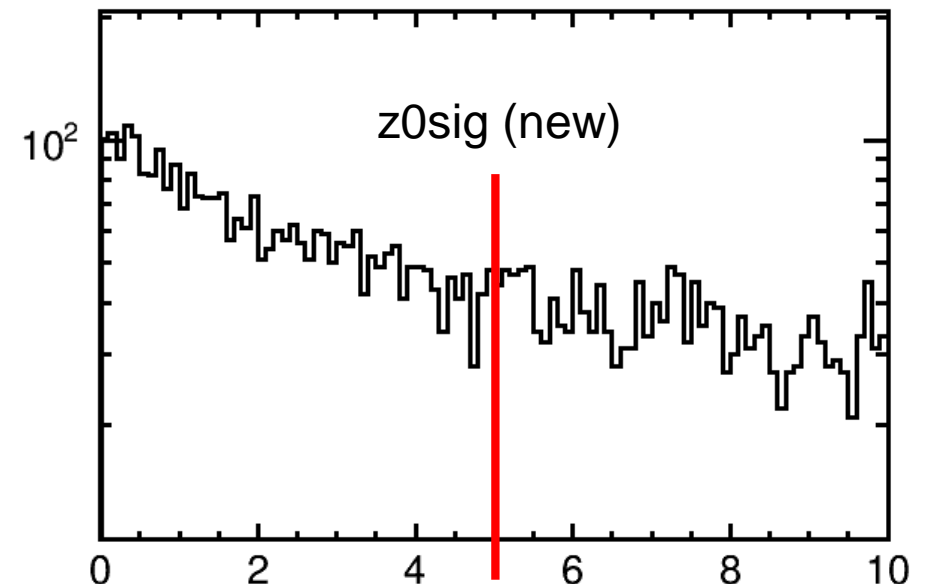
Possible Reason

- Treatment in z-direction has been changed.
  - In DBD, everything happened in (0,0,0). But in new, the z-direction is smeared up to ~200 μm.

abs(pfo_z0sig) {(type==12||type==14||type==16)&&pfo_chrg!=0&&abs(pfo_pid_mc)==13}
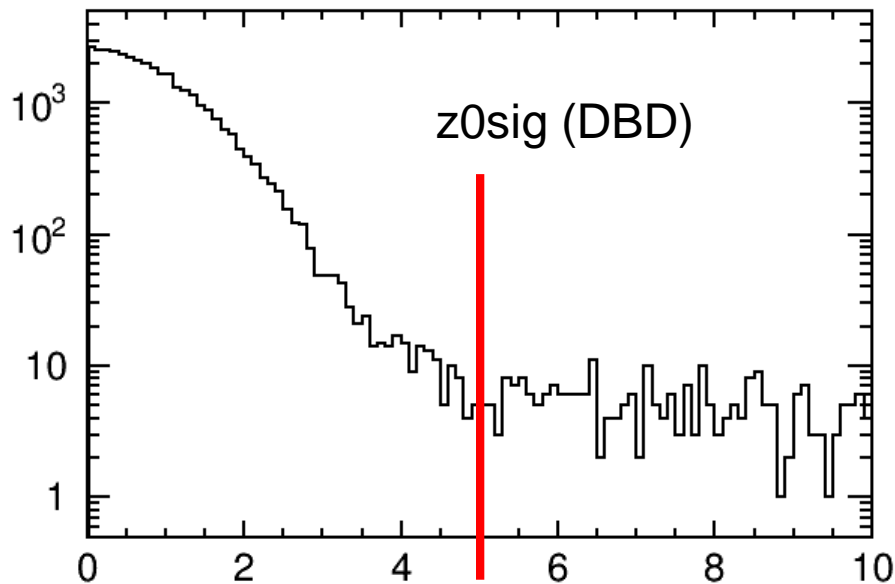
z0sig (DBD)
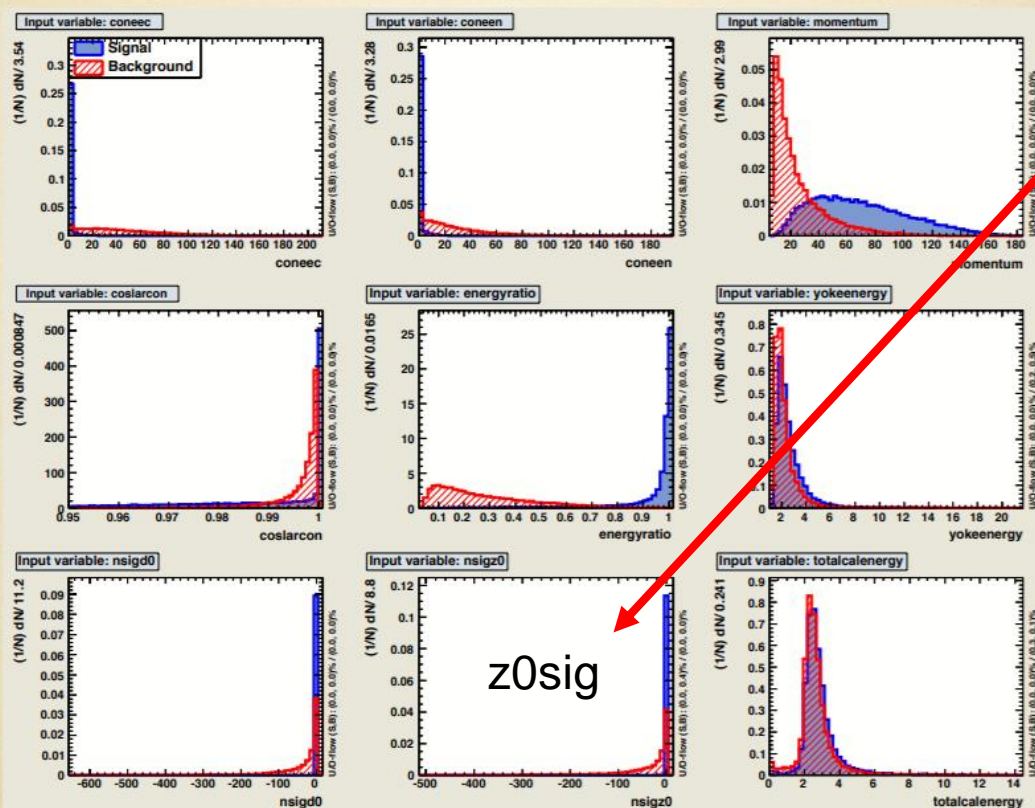
abs(pfo_z0sig) {(type==12||type==14||type==16)&&pfo_chrg!=0&&abs(pfo_pid_mc)==13}

z0sig (new)

MVA in IsolatedLeptonTagger

z0sig is the one of the input to MVA in IsolatedLeptonTagger

z0-related variables are changed significantly

need to re-train or use simple cut analysis

Third Problem

- I found 2 strange MCParticle muons (genstat == 2) with the energy greater than 500 GeV.
  - ID = 108161, Event = 19926
  - ID = 108163, Event = 6914
- Common thing
  - Higgs decays to two muons, the simstat of one muon is "c", and another is "I".
  - These two muons go to PDG94.
  - PDG94 produces two muons, and one muon from PDG94 has too high energy. (3300 GeV, 92300 GeV)

Summary

- Reported couple of things I have found
  - Fortran/cernlib
  - IsolatedLeptonTagger: new z-direction treatment
  - Some strange things in new samples
- I want to check more, but currently we have DESY-storage problem. Sometimes files cannot read or take too long time.