Search for Extra Scalars Produced in Association with a Z boson at the ILC

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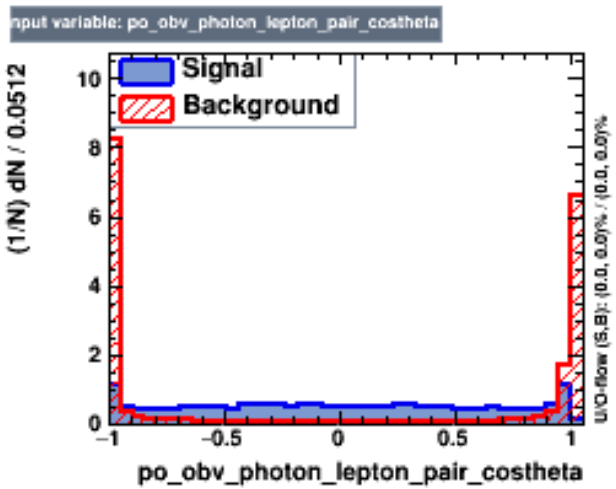
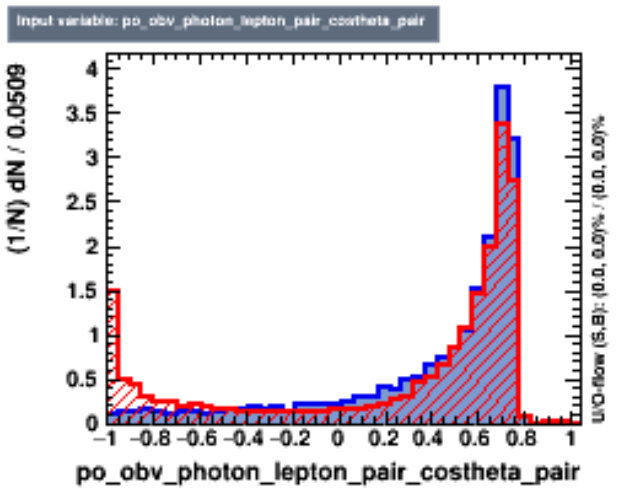
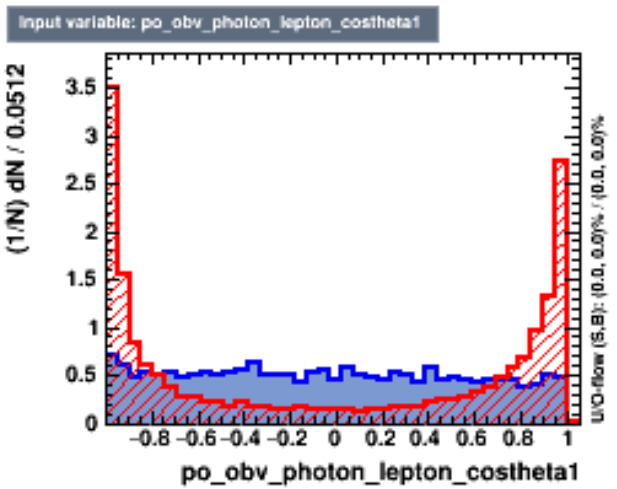
BDTG

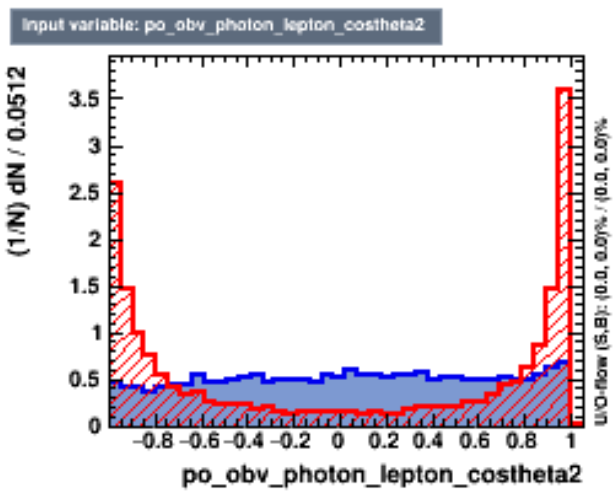
BDTG observables—training for 2f

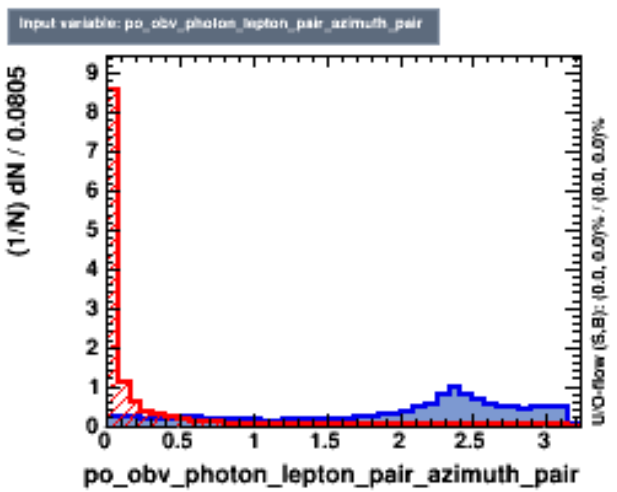
use observables in the effective center of mass reference frame

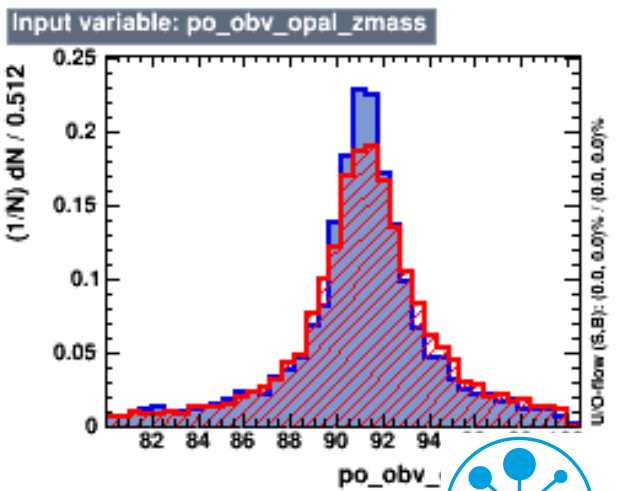




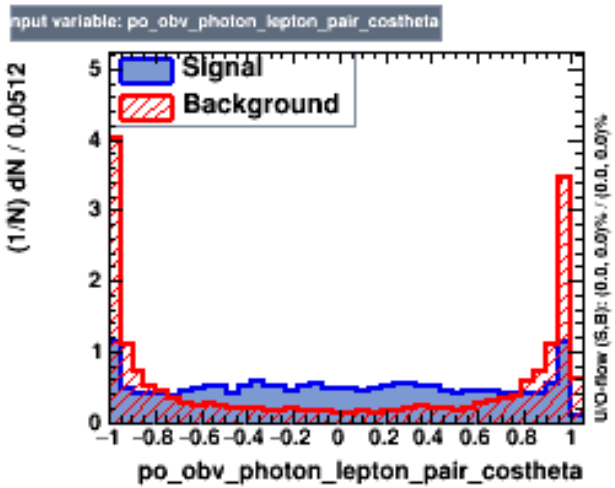


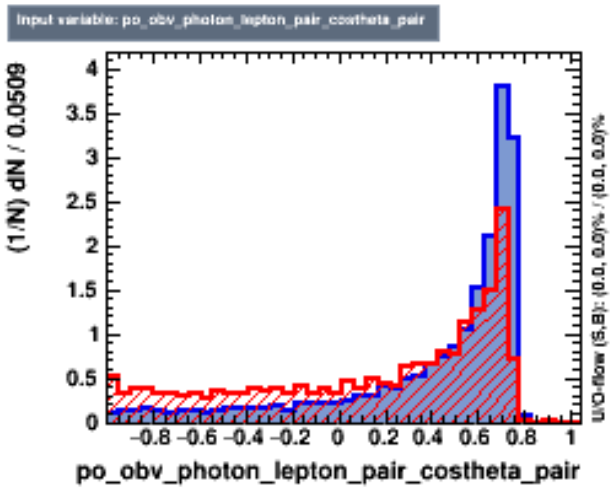


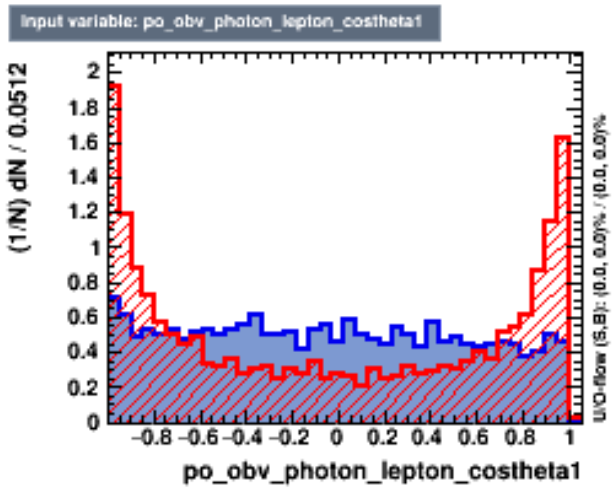


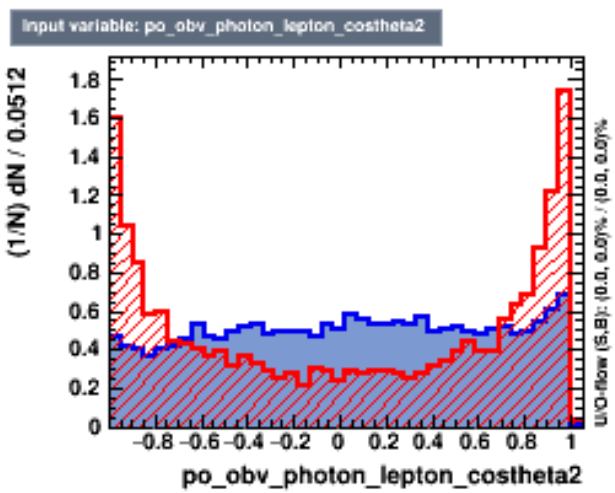


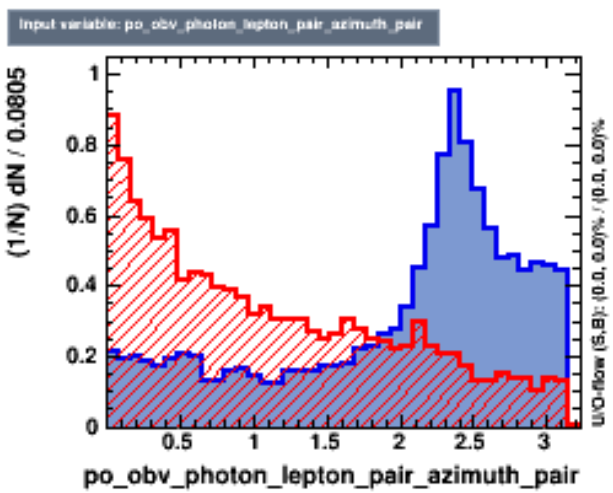
BDTG observables—training for 4f

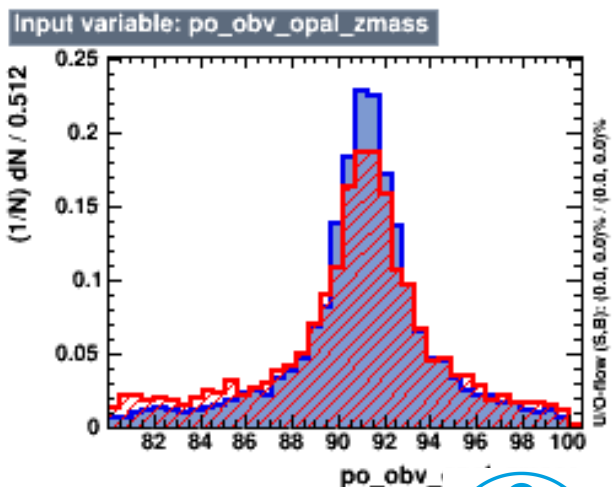






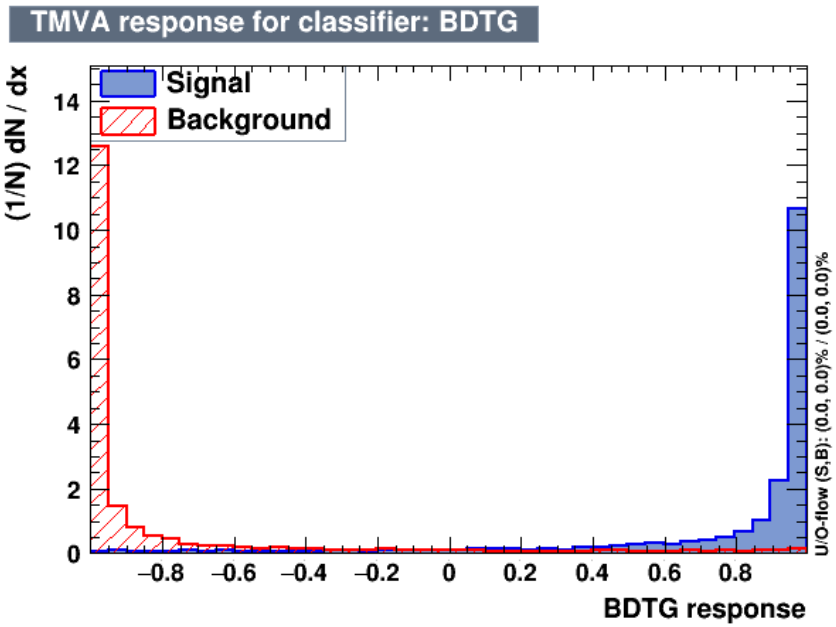




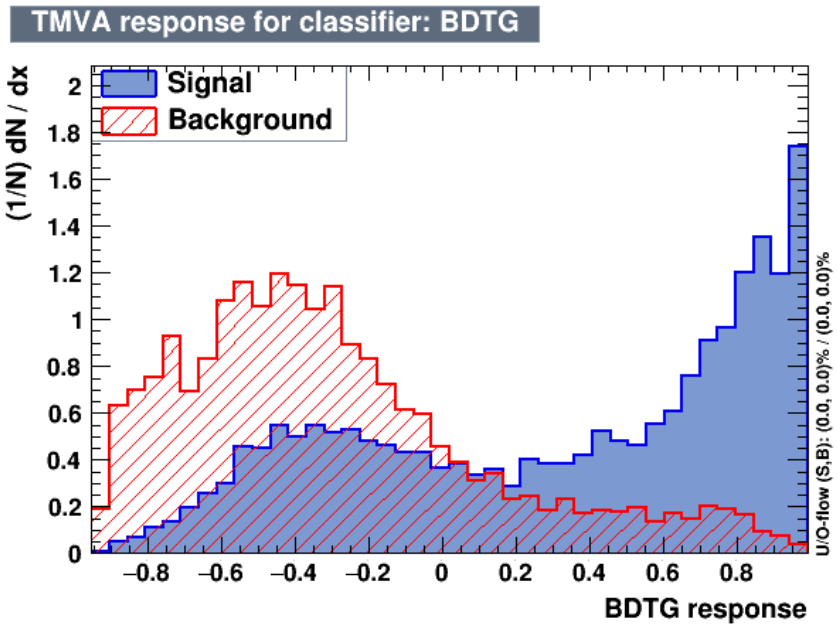


BDTG output for 2f/4f

(2f)

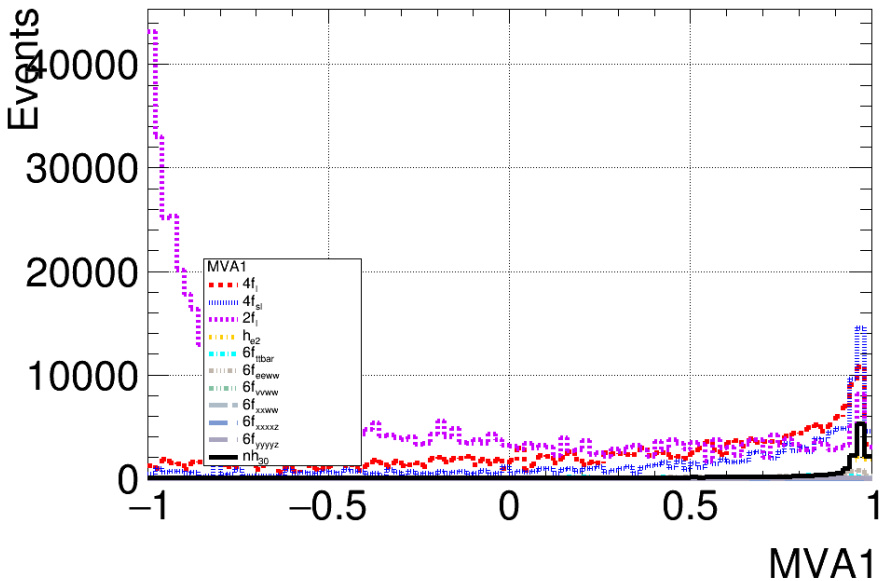


(4f)

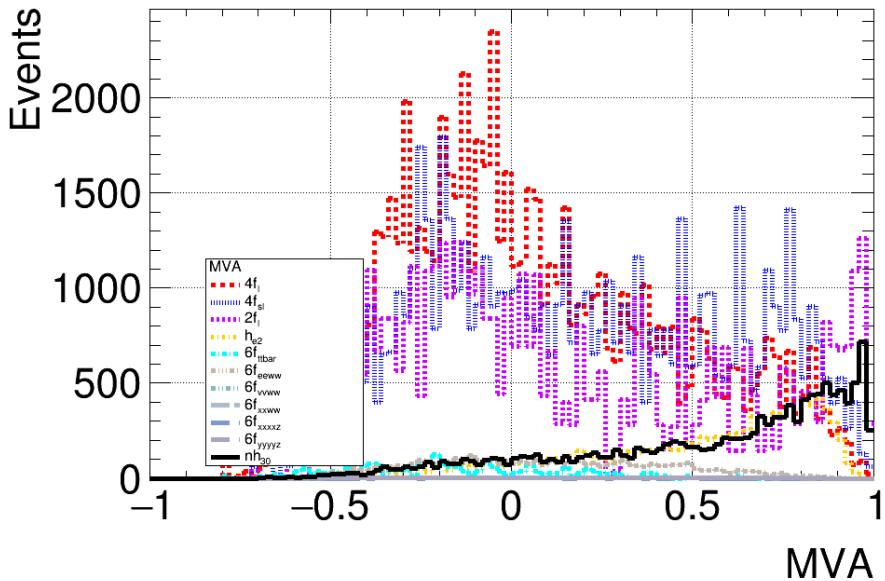


BDTG output for all backgrounds

(before BDTG(2f) cuts)



(before BDTG(4f) cuts)



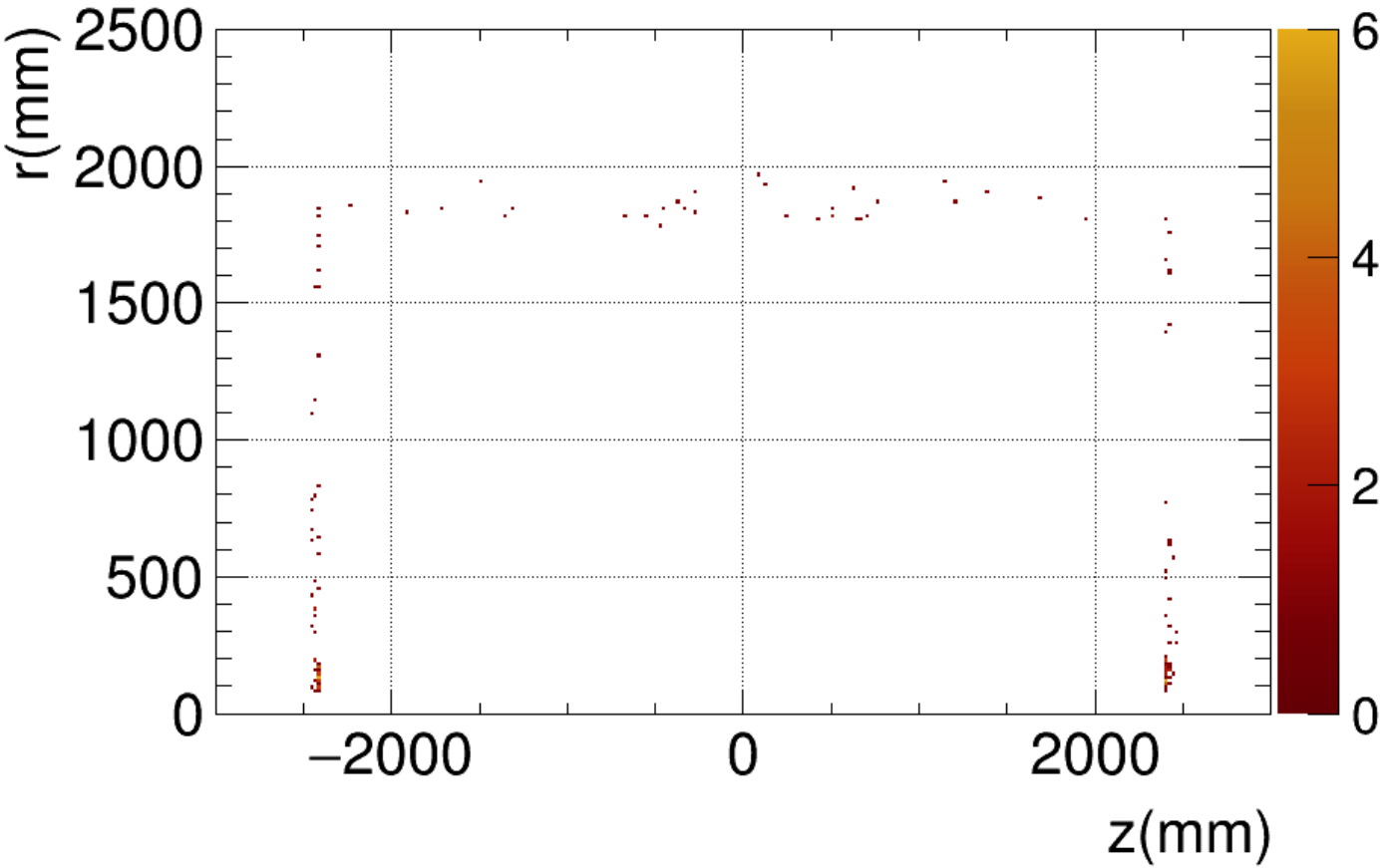
BDTG summary

- training BDTG for 2f and 4f with observables in the effective center of mass reference frame, respectively,
- the significance can be a little better than use observables in the lab/effective frame and training for all backgrounds.

ISR

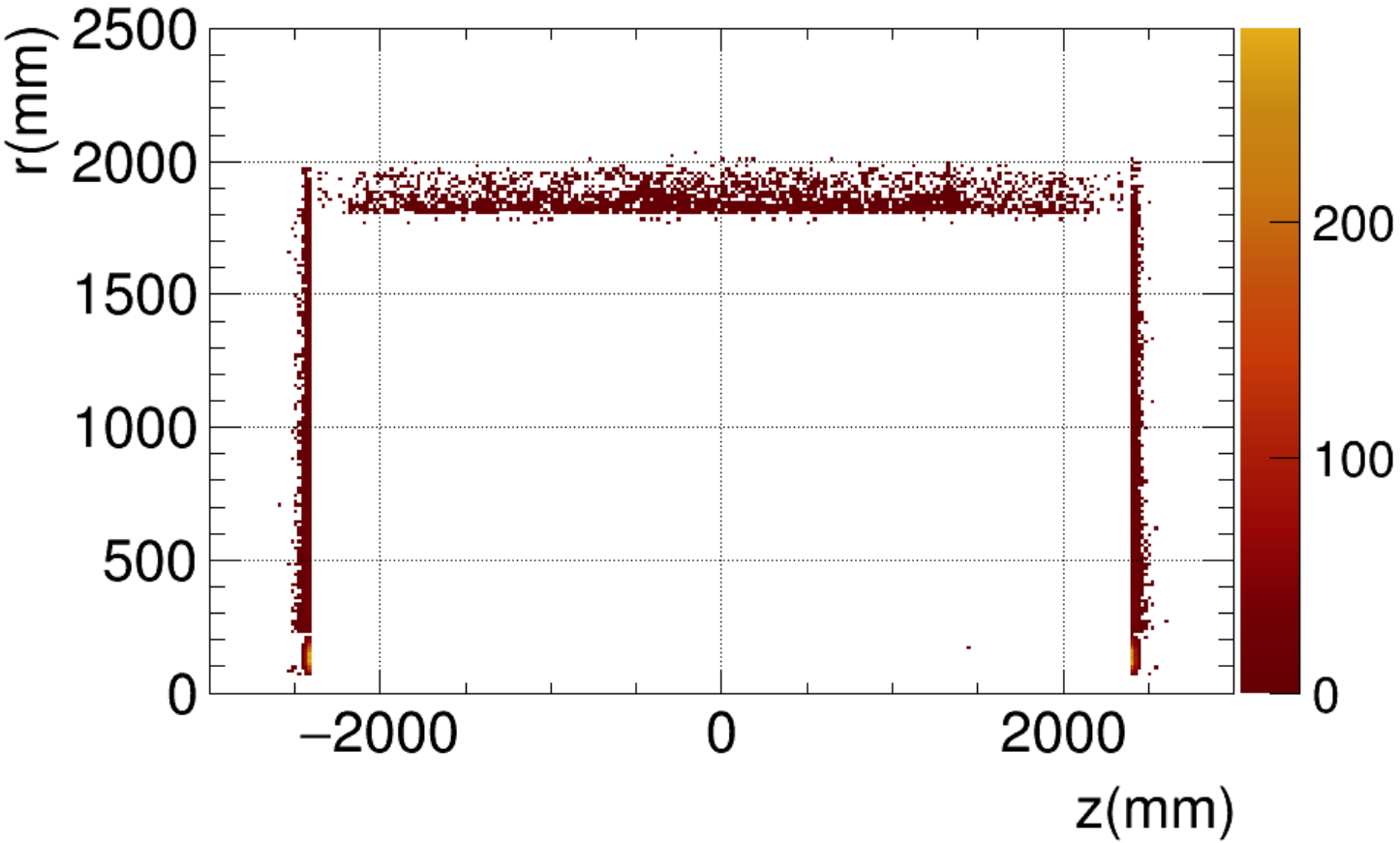
PFO photon energy larger than MC

SM higgs sample : totally 10000 events,
$E_{pfo} - E_{MC} > 5$: 136 events



PFO photon energy larger than MC

2f l : totally 194102 events,
$E_{pfo} - E_{MC} > 5$: 15263 events



ISR

Take 125 GeV higs for example: totally 1000 events:
First, using IsolatedLeptonTagging, then searching the photon within the PFOWoISRLepton cuts: E>10 for 0<cosθ <0.95
E>5 for 0.95<cosθ <0.99
cone angle 0.95, cone energy ratio: 0.95

- MCHS : 63
- MCPS : 86
- MCDS : 74
- PFO : 161, 63 from HS-ISR, 62 from HS-muon, 36 from HS-Higgs

Directly searching the photon within the PandoraPFO

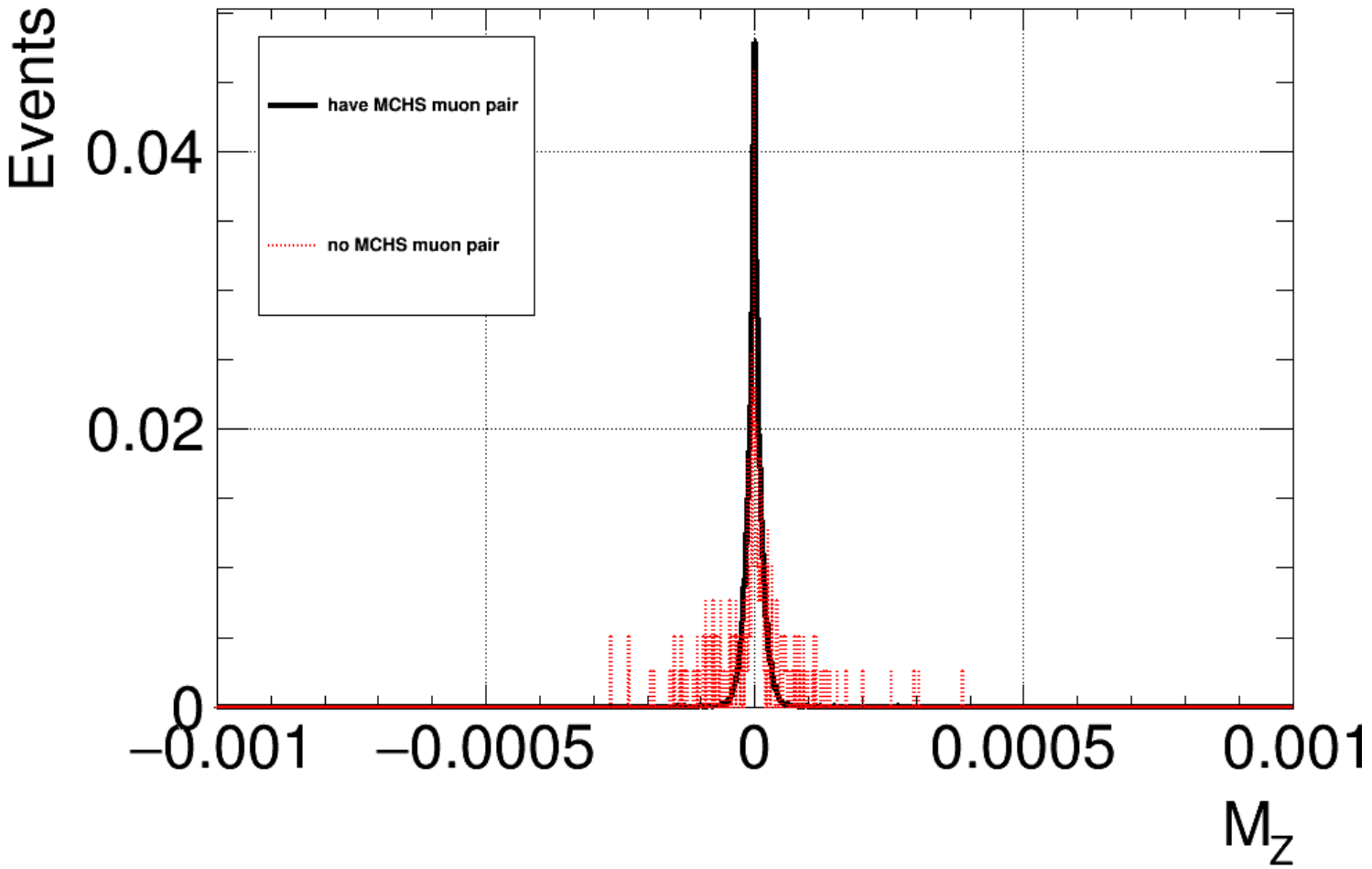
- PFO : 103, 63 from HS-ISR, 18 from HS-muon, 15 from HS-Higgs

IsolatedLeptonTagging: test the new version

Last week, I used IsolatedLeptonTagging in the ILCSoft v02-00-02,
But I found some events that μ was coming from τ decay. So I test the new IsolatedLeptonTagging.

PFO vertex-x

black: $z \to \mu\mu$
red : $z \to \tau\tau \to \mu\mu$



note: xaxis is vextex-x

PFO vertex-x

- : $Z \to \mu\mu$, $Z \to \tau\tau \to \mu\mu$
- 2f : 31597, 129
- 4f : 16756, 11
- nh : 5026, 13