isolated lepton tagging
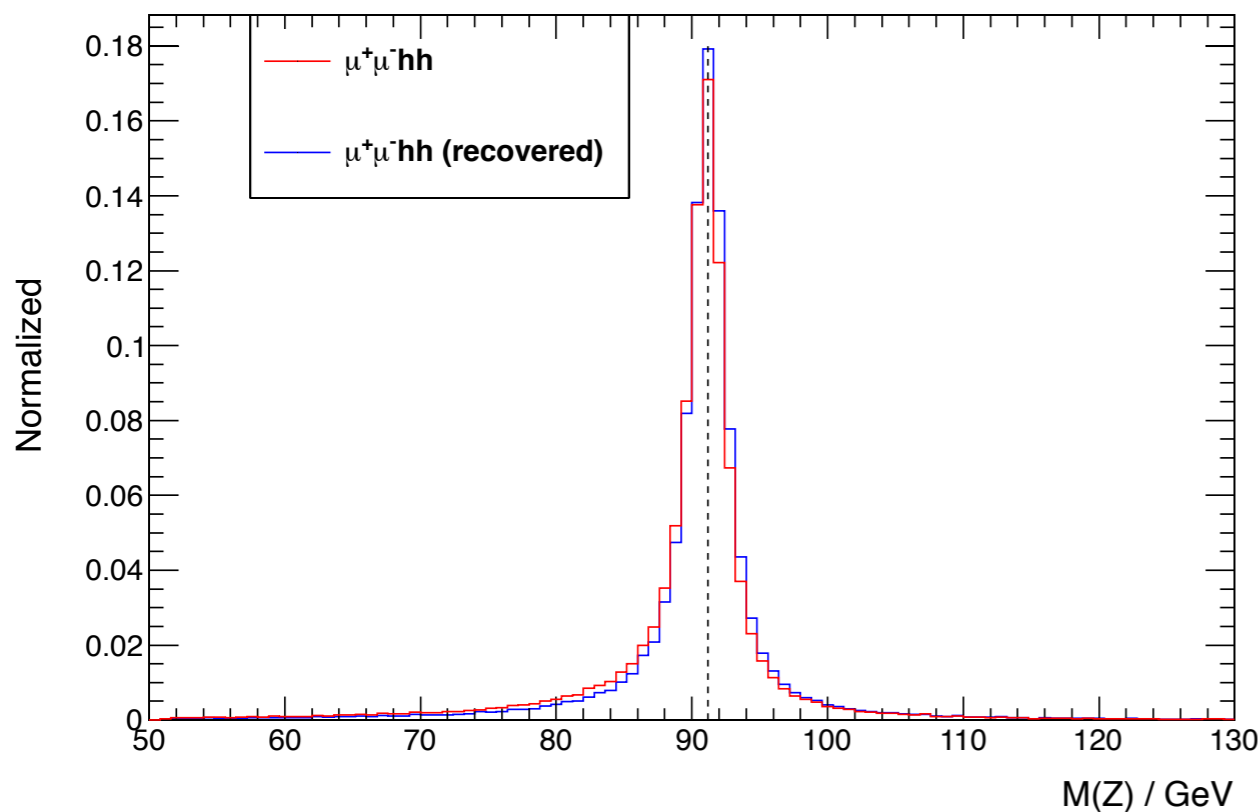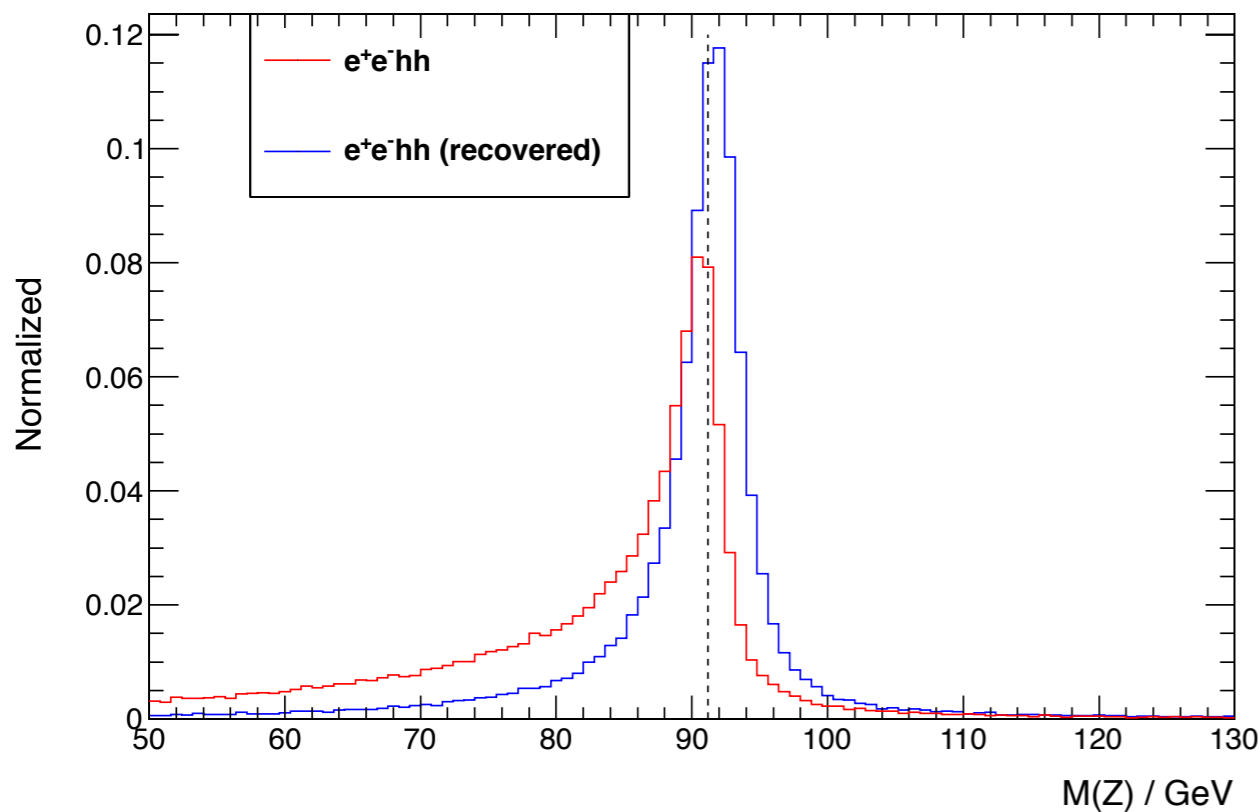
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Nov. 1@ Asian Physics and Software Meeting

Isolated lepton selection (llHH)

(Etot = Eecal + Ehcal)

electron ID	muon ID
Eecal/Etot > 0.9	Eyoke > 1.2
0.5 < Etot/P < 1.3	Etot/P < 0.3
from primary vertex	from primary vertex
P > 12.2 + 0.87Econe	P > 12.6 + 4.62Econe

isolation

BS and FSR recovery adapted from ZFinder

efficiency of two isolated lepton selection
(much better for DBD)

Eff (%)	eeHH	μμHH	bbbb	evbbqq	μvbbqq
DBD	85.7	88.4	0.028	1.44	0.1
LoI	81.9	85.4	0.43	2.71	1.94

main contamination:

- For electron: charged pion (in exchange with nuclei in ECAL —> neutral pion —> two photons —> very like electron); electron from b-jets (larger IP).

- For muon: high momentum charged pion (escape from HCAL and reach the Yoke); muon from b-jets (larger IP).
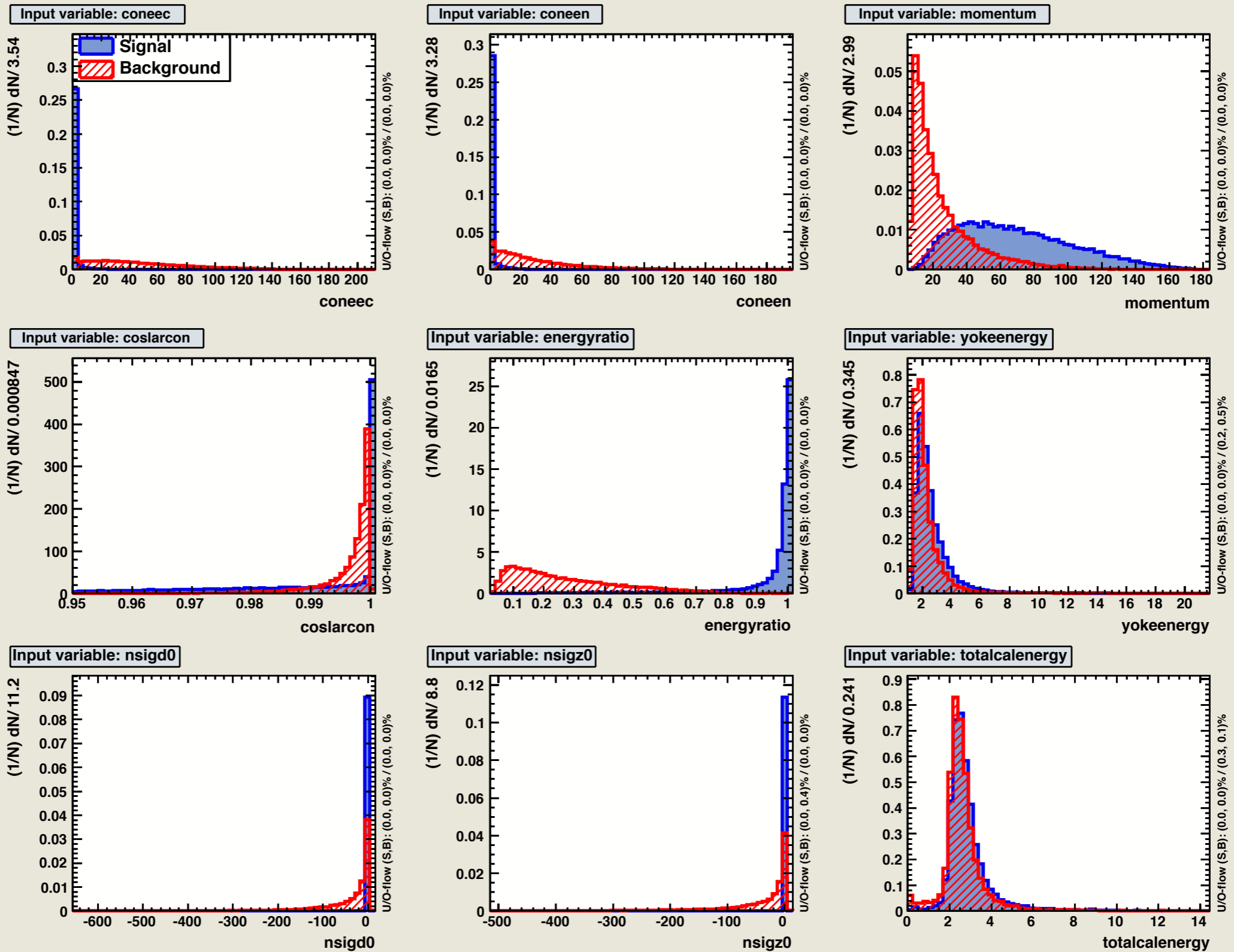
idea for further suppression:

- utilize d0, z0, cone energy, momentum, Eecal/Ehcal more effectively —> MVA

- introduce a larger cone to magnify the jet effluence —> E(lep)/E(jet) and angle between them (similar with in LAL algorithm, but no need to do jet clustering)
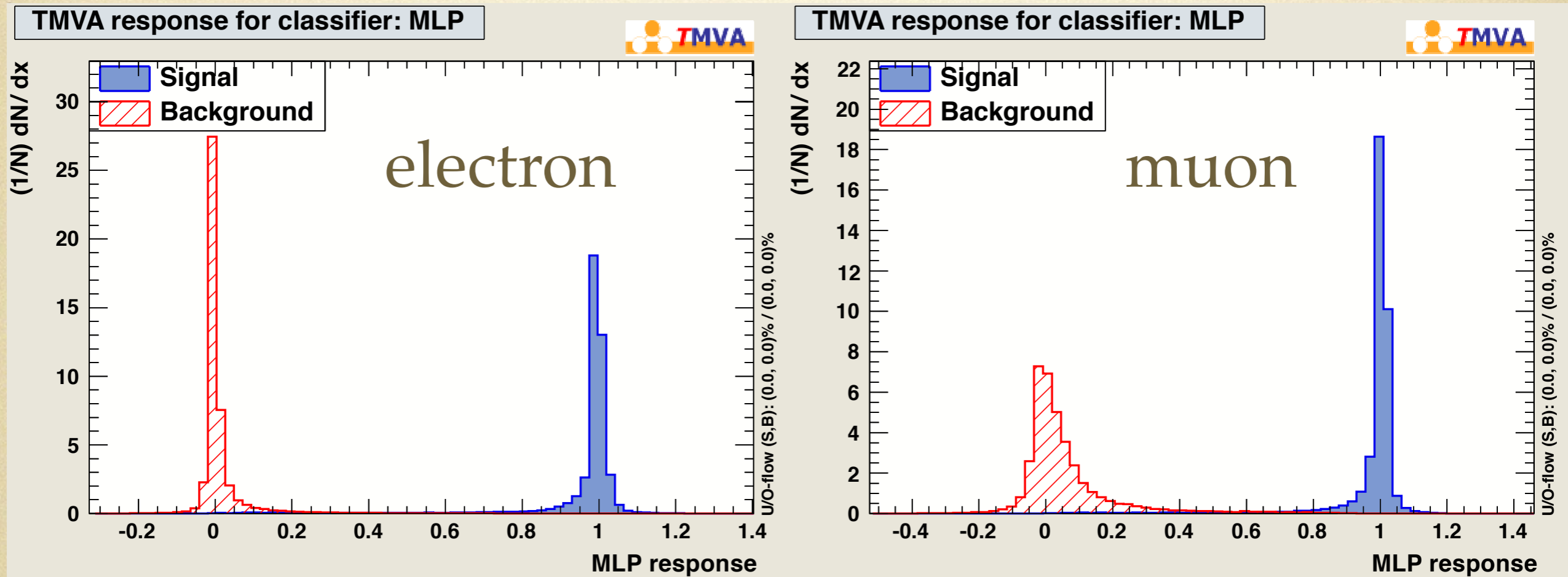
cos=0.98, 95
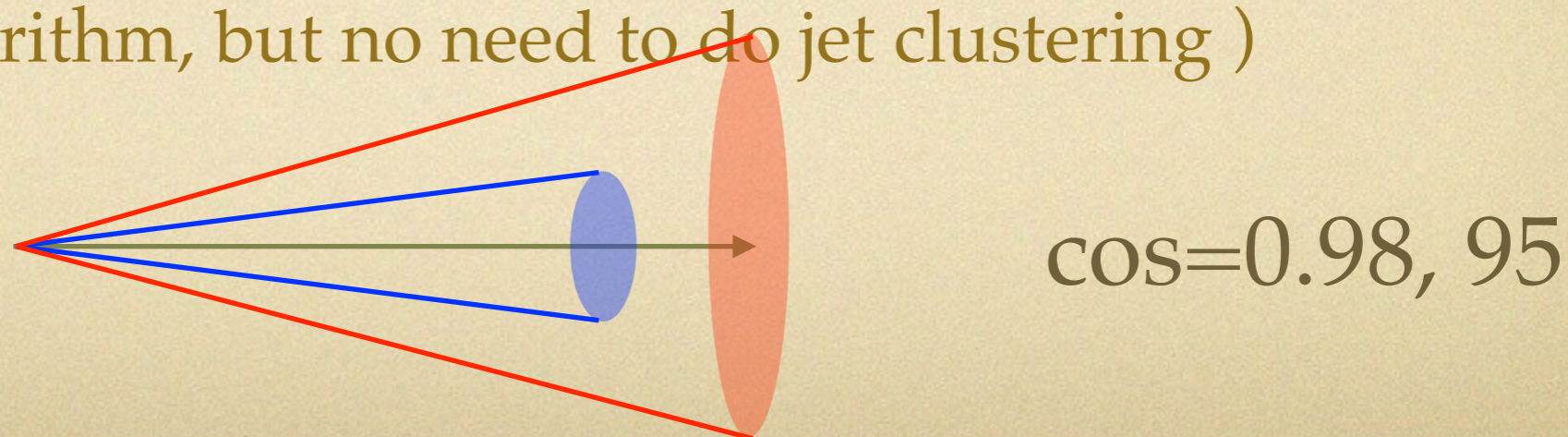
input variables: electron
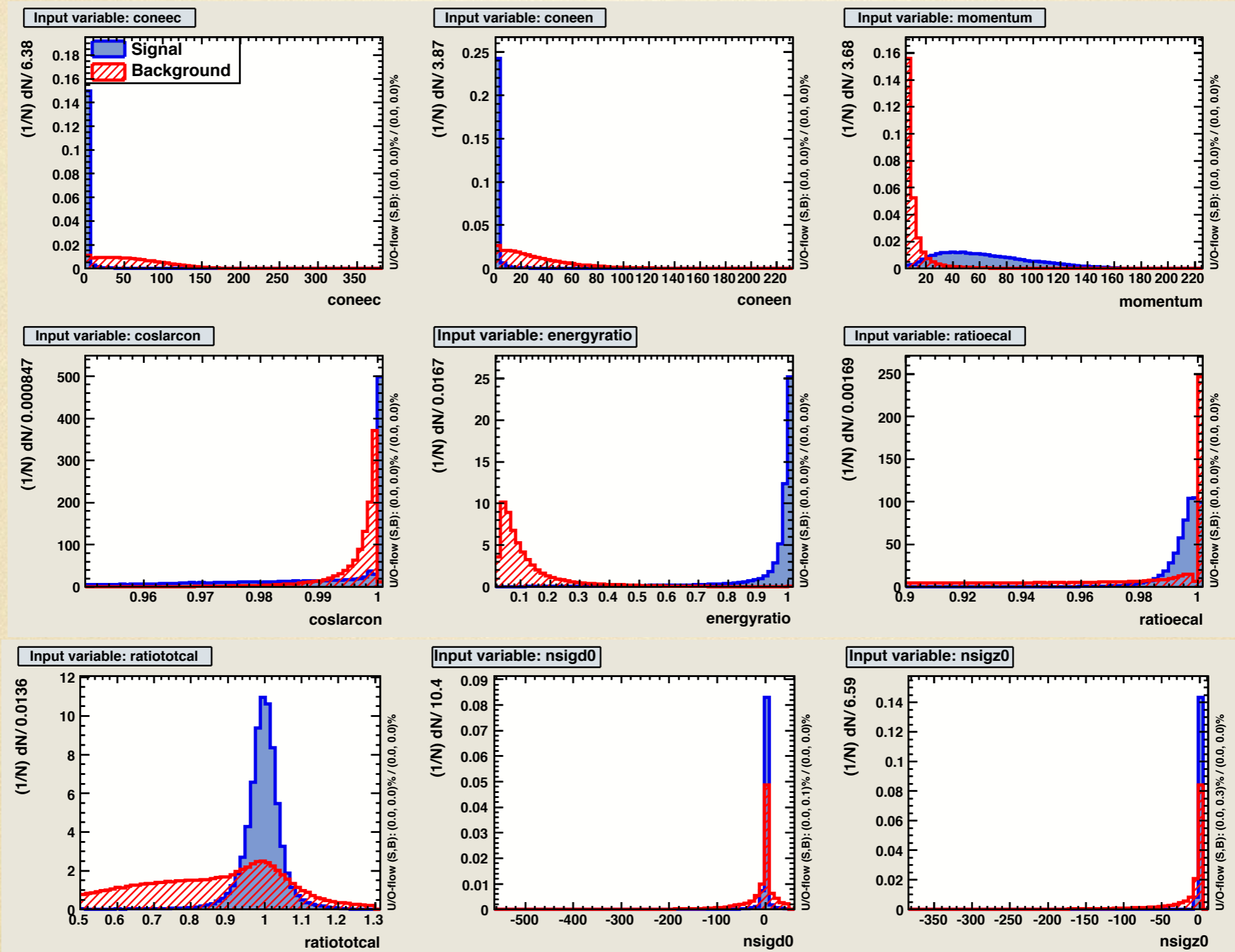
input variables: muon

neural-net output (tagging)

lepton tagging is associated to the selected lepton collection, can be optimized in final selection

Available Processors

kekcc:~tianjp/analysis/PostDBD/IsolatedLeptonTagging

- for one isolated lepton selection: trained using lvbbqq and bbbb samples. use IsolatedLeptonTaggingProcessor

- for isolated lepton pair (from Z) selection: trained using llHH and bbbb samples. use ZHHll4JLeptonSelectionProcessor

performance is a factor 3~4 better for one lepton selection, ~one order better for lepton pair. see detail in Claude's analysis (next wednesday)