Weekly report

FANGYI GUO

Upgrade HGTD analysis

Keep connecting with HProspect and HGTD group convenors

- Study the VBF-ggF discrimination in HGTD condition [HGTD report at 7.15]
- Try the 2-step BDT(attached slides)
- Answer the questions from convenors

Schwartzman, Ariel G. [sch@slac.stanford.edu]

To: Stephane Jezequel; Fangyi Guo

Cc: Marianna Testa; Christian Ohm

30 July 2019 04:25

▪ Flag for follow up. Start by 30 July 2019. Due by 06 August 2019.

Dear Fangyi and Stephane,

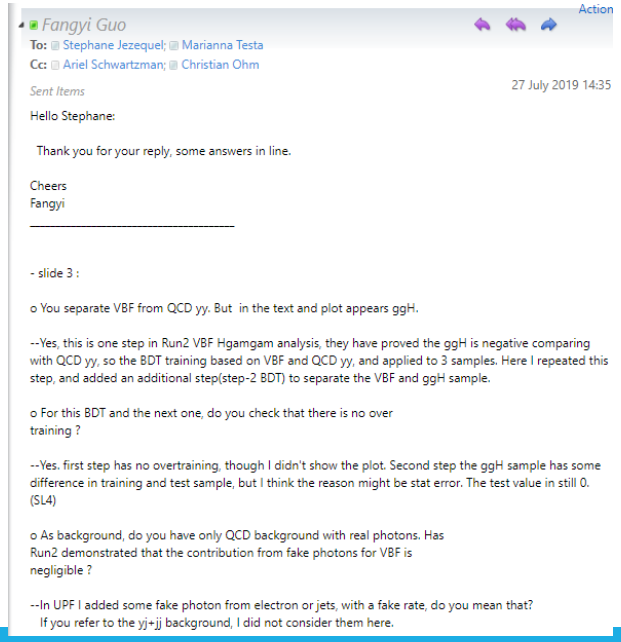
Thank you very much for following up with these studies and apologies for my late response as I was traveling for the last week and a half.

In slides 9 and 10, the left and middle plots look identical to me. Is this expected?

Could you make these plots in linear y-scale?

In agreement with Ben's studies, the dominant background contribution is central forward. So, the limit to HGTD performance will be given by removing this contribution. It would be good to have an estimate on the sensitivity improvement for this, as well as for removing 50% of this background. Or, if it is not too difficult, make a plot of sensitivity as a function of the efficiency to suppress the CF pileup background. This plot could give us a target to reach to be able to achieve a significantly enough improvement.

Thanks,
Ariel



Fangyi Guo

Action

To: Stephane Jezequel; Marianna Testa

Cc: Ariel Schwartzman; Christian Ohm

Sent Items

27 July 2019 14:35

Hello Stephane:

Thank you for your reply, some answers in line.

Cheers
Fangyi

- slide 3 :

o You separate VBF from QCD yy. But in the text and plot appears ggH.

--Yes, this is one step in Run2 VBF Hgamgam analysis, they have proved the ggH is negative comparing with QCD yy, so the BDT training based on VBF and QCD yy, and applied to 3 samples. Here I repeated this step, and added an additional step(step-2 BDT) to separate the VBF and ggH sample.

o For this BDT and the next one, do you check that there is no over training ?

--Yes. first step has no overtraining, though I didn't show the plot. Second step the ggH sample has some difference in training and test sample, but I think the reason might be stat error. The test value in still 0. (SL4)

o As background, do you have only QCD background with real photons. Has Run2 demonstrated that the contribution from fake photons for VBF is negligible ?

--In UPF I added some fake photon from electron or jets, with a fake rate, do you mean that? If you refer to the yj+jj background, I did not consider them here.

Higgs CP

Information from DAOD:

(mc16_13TeV.345041.PowhegPythia8EvtGen_NNPDF30_AZNLOCTEQ6L1_VBFH125_gamgam.deriv.DAOD_HIGG1D1.e5720_s3126_r9364_p3665)

- Get truth particles and truth event information:

```
const xAOD::TruthParticleContainer *truthParticles = truthHandler()->getTruthParticles();
const xAOD::TruthEventContainer *truthEvents = 0;
if(!event()->retrieve(truthEvents,"TruthEvents")) HG::fatal("can not access TruthEvents");
```

- Incoming and outgoing parton:

  TruthParticle::status() 21 = incoming particles
  22 = intermediate particles (Higgs here)
  23 = outgoing particles Ref: status code

  problem: (1) incoming particles has gluon
  TruthEvent::pdfInfo::pdgId1&pdgId2 has correct quark ID
  (2) all events have 3 outgoing particles
  Can calculate the weight, but is this still VBF?