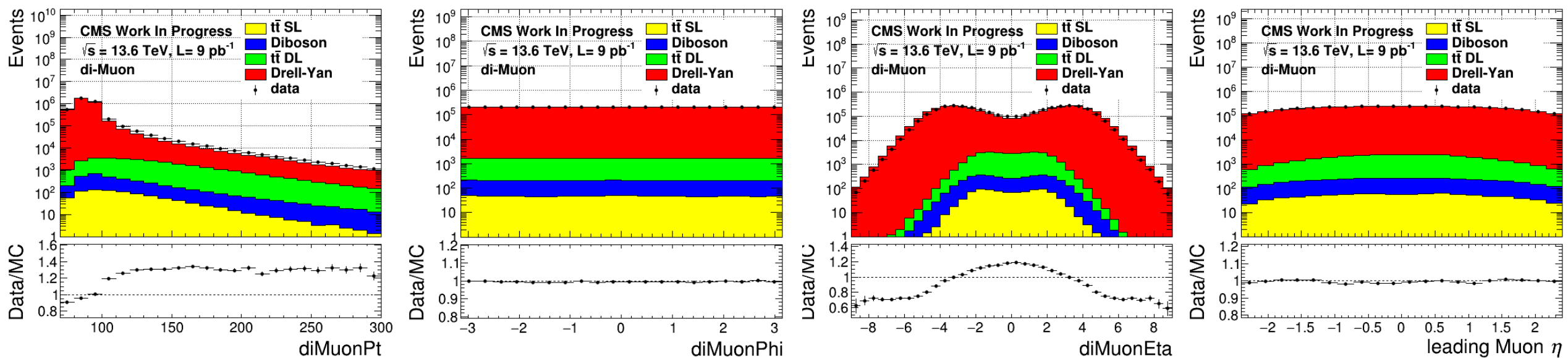


Further $t\bar{t}HH$ data check and next stage plan

Yang Tianyi

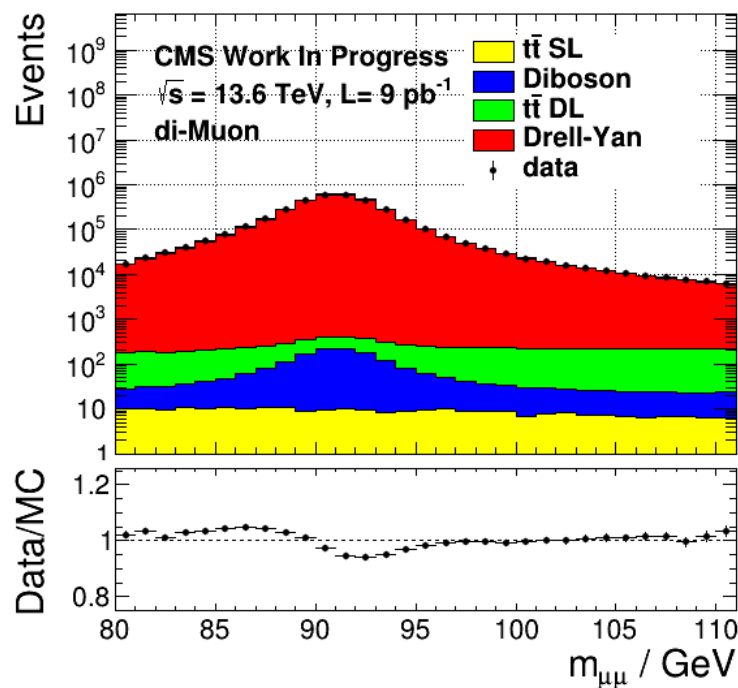
di-Muon properties



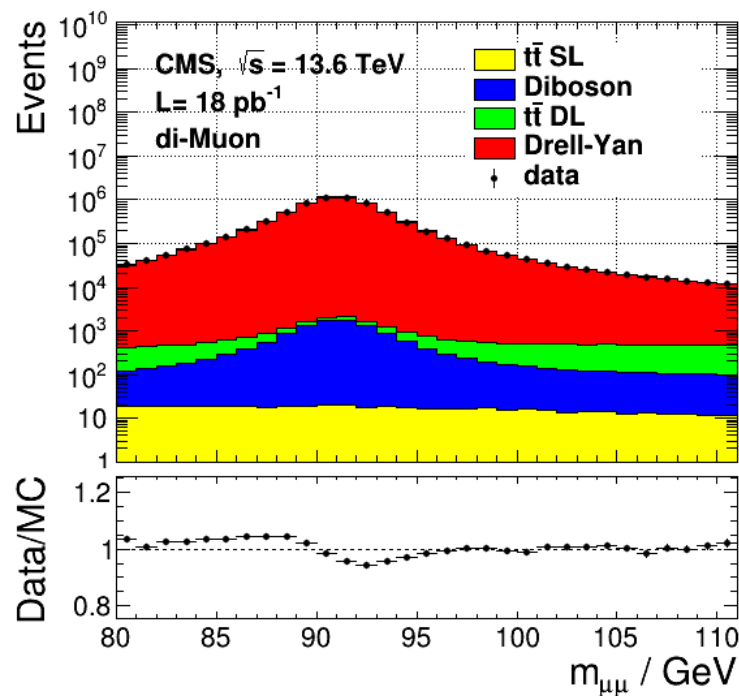
- di-Muon p_T shows the same shift effect as seen in the single Muon.
- ϕ distribution is uniform.
- The shift of p_T cause larger also η distribution more centralized in data, which is not for the single Muon. This would because the two muons has different p_T shift, but why they become more concentrated would need further check.

Run2023C and Run2023D

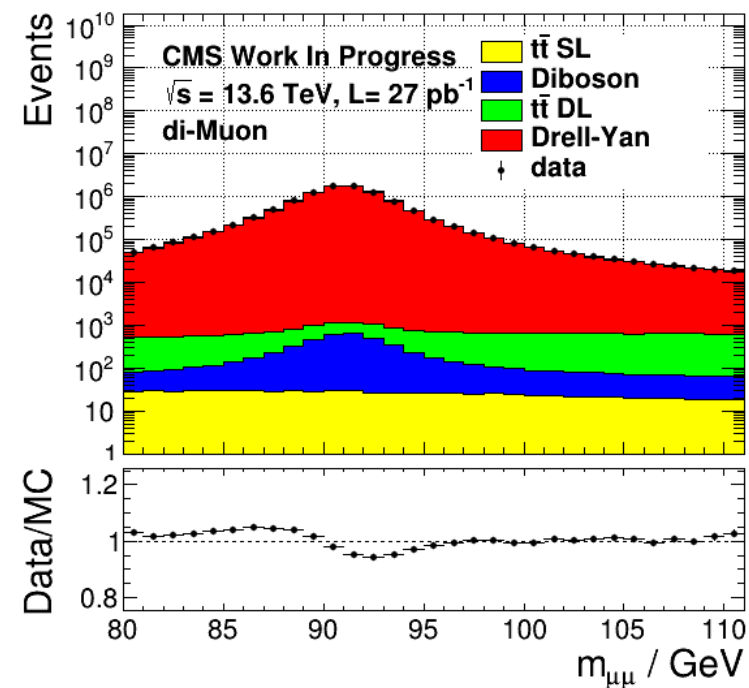
Run2023D



Run2023C



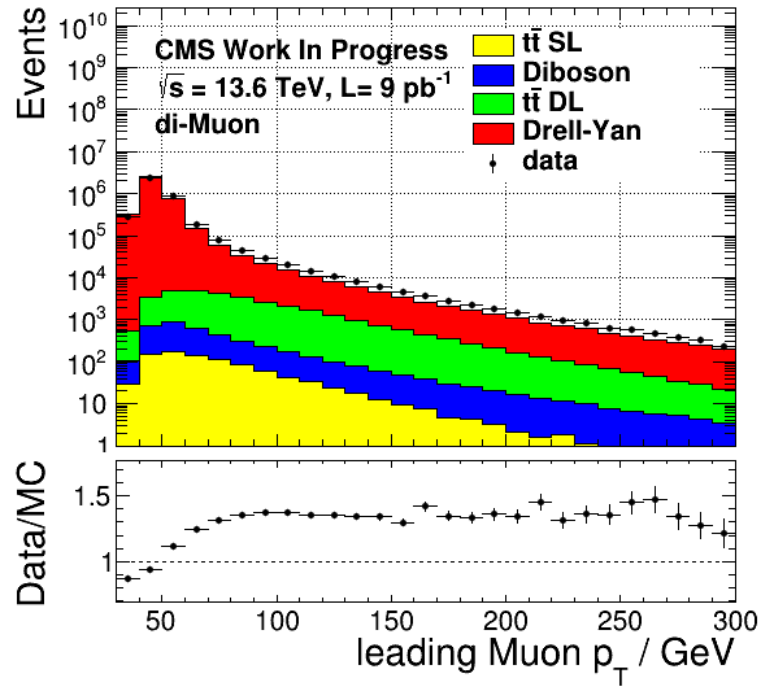
Run2023C+D



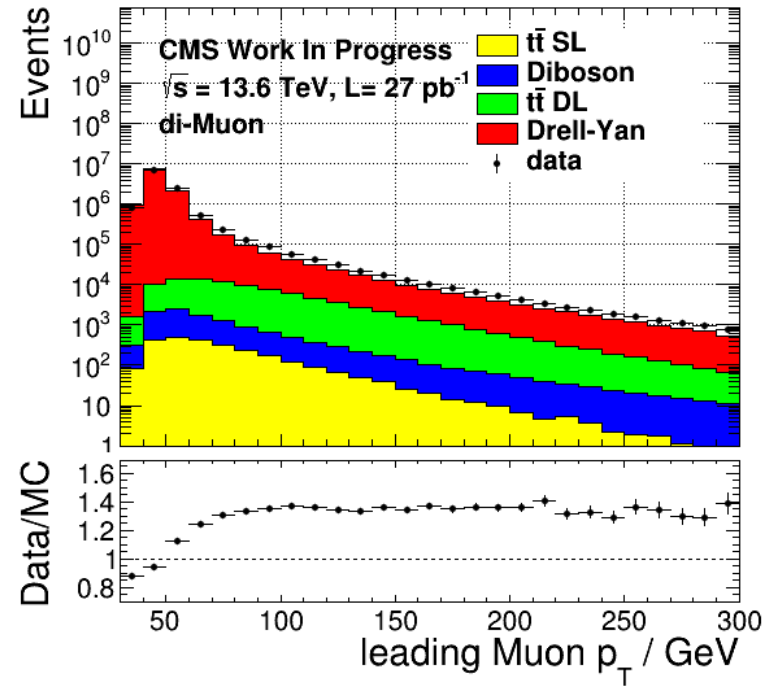
- The Run2023C era has the same issue of invariant mass shift.
- The $t\bar{t}$ contribution seems to be different.

Run2023C and Run2023D

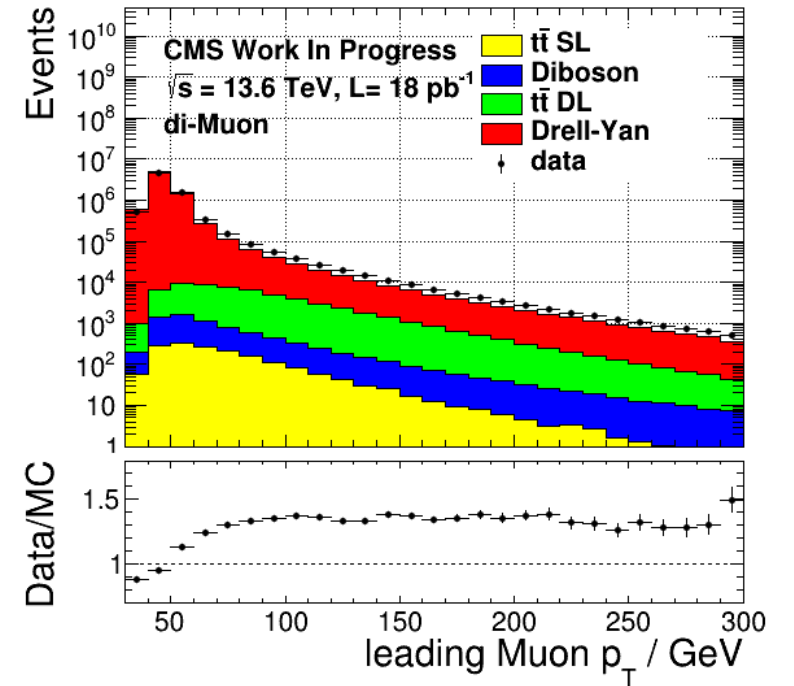
Run2023D



Run2023C



Run2023C+D



- The Run2023C has the same p_T shift.

Trying on gridpack

```
INFO: Generating events
INFO: Idle: 0, Running: 4, Completed: 20 [ current time: 18h25 ]
INFO: Idle: 0, Running: 3, Completed: 21 [ 0.11s ]
INFO: Idle: 0, Running: 2, Completed: 22 [ 0.13s ]
INFO: Idle: 0, Running: 1, Completed: 23 [ 0.22s ]
INFO: Idle: 0, Running: 0, Completed: 24 [ 0.32s ]
sum of cpu time of last step: 0 second
INFO: Doing reweight
At line 397 of file reweight_xsec_events.f
Fortran runtime error: End of file

Error termination. Backtrace:
#0 0x7f6e6404418c in list_formatted_read_scalar
    at ../../libgfortran/io/list_read.c:2180
#1 0x420407 in ???
```

The following switches determine which programs are run:

```
/=====\  
1. Type of perturbative computation      ESC[1m      orderESC[0m = ESC[32mNLOESC[0m  
2. No MC@N[N]LO matching / event generation ESC[1mfixed_orderESC[0m = ESC[32mOFFESC[0m  
3. Shower the generated events          ESC[1m      showerESC[0m = ESC[32mOFFESC[0m  
4. Decay onshell particles              ESC[1m      madspinESC[0m = ESC[31mOFFESC[0m  
5. Add weights to events for new hypp.   ESC[1m      reweightESC[0m = ESC[31mOFFESC[0m  
6. Run MadAnalysis5 on the events generated ESC[1mmadanalysisESC[0m = ESC[01mNot Avail.ESC[0m  
\=====/  
Either type the switch number (1 to 6) to change its setting,  
Set any switch explicitly (e.g. type 'order=L0' at the prompt)  
Type 'help' for the list of all valid option  
Type '0', 'auto', 'done' or just press enter when you are done.  
>stty: 'standard input': Inappropriate ioctl for device  
INFO: will run in mode: noshower
```

- I am trying the master branch generator pack <https://github.com/cms-sw/genproductions>.
- Not need CMSREL environment. Trying the running on lxplus EOS filesystem.
- Testing the central production card 13p6TeV/ggh012j_5f_NLO_FXFX_60. Meet some issue in the production step, need further check. Then we can have our private ttHH production for Run3.
- Also, I found the gridpack generation turning off the Pythia showering. In the 2020 MC [tutorial](#), the Parton shower need to be done after Nano production? Would need to check the procedure.

Discussion with French group

- The French group comes back to contact, and we would have a further discussion on this **Thursday 4pm** CERN time.
- Proposed discussion with the French group:
 - MC samples production: including the Run3 signal processes, ttbb and tt4b backgrounds. We would need ttHH sample with **inclusive decay** mode.
 - Normalization and scaling: for the common sample shared in our study, we may have NNLO XS values, reducible background scaling values, lepton ID scaling values shared.

GEM EPR

- Task: uploading to GEM database the QC info.
- I have finished External frame, Internal frame, Foil, Chips QC records XML preparation. Stefano and Luigi seems to be satisfied with the style. (Sorry our communication is using skype, that no emails c.c. to everyone in the group).
- This is a short and simple task guiding me to the GEM. Later on we may have chance joining more interesting study.
- This **Wednesday 2 pm** CERN time, I will have a presentation on the work done. Later today when I send the email to Stefano and Luigi, I will c.c. to people in our group.