MG5 report

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Outline

- ☐ Gridpacks generation
- ☐ Comparison plots
- ☐ Change Range
- ☐ Draw with NanoAOD

Gridpacks generation

- Setup and Environment:
  - 2 MG version used: MG2.9.18 and MG3.5.2
  - scram_arch: slc7_amd64_gcc10
  - CMSSW version: CMSSW_12_4_8

```
llchen@nd-0:~$lsb_release -a
LSB Version:    :core-4.1-amd64:core-4.1-noarch
Distributor ID: CentOS
Description:    CentOS Linux release 7.9.2009 (Core)
Release:        7.9.2009
Codename:       Core
```

- Preparation of the cards
  - XXX_proc_card.dat (declares the process to be generated)
  - XXX_run_card.dat (define how generator run, generate the process, specific kinematic cut values)
  - XXX_madspin_card.dat (instructs MadSpin on how to decay specific particles)

https://gitlab.cern.ch/lianglia/lo_mlm_dy_jetbin/tree/master/DY1JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8/cards

https://gitlab.cern.ch/lianglia/lo_mlm_dy_jetbin/tree/master/DY2JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8/cards

https://gitlab.cern.ch/lianglia/lo_mlm_dy_jetbin/tree/master/DY3JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8/cards

https://gitlab.cern.ch/lianglia/lo_mlm_dy_jetbin/tree/master/DY4JetsToLL_M-50_TuneCP5_13TeV-madgraphMLM-pythia8/cards

Gridpacks generation

- Process cards:

1-Jet

```
import model sm-ckm_no_b_mass
# Define multiparticle labels
define l+ = e+ mu+ ta+
define l- = e- mu- ta-
# Specify process(es) to run
generate p p > l+ l- j / h @0

# Output processes to MadEvent directory
output DY1Jets_madgraph_5f_LO -nojpeg
```

2-Jet

```
import model sm-ckm_no_b_mass
# Define multiparticle labels
define l+ = e+ mu+ ta+
define l- = e- mu- ta-
# Specify process(es) to run
generate p p > l+ l- j j / h @0
# Output processes to MadEvent directory
output DY2Jets_madgraph_5f_LO -nojpeg
```

3-Jet

```
import model sm-ckm_no_b_mass
# Define multiparticle labels
define l+ = e+ mu+ ta+
define l- = e- mu- ta-
# Specify process(es) to run
generate p p > l+ l- j j j / h @0
# Output processes to MadEvent directory
output DY3Jets_madgraph_5f_LO -nojpeg
```

4-Jet

```
import model sm-ckm_no_b_mass
# Define multiparticle labels
define l+ = e+ mu+ ta+
define l- = e- mu- ta-
# Specify process(es) to run
generate p p > l+ l- j j j j / h @0
# Output processes to MadEvent directory
output DY4Jets_madgraph_5f_LO -nojpeg
```

Gridpacks generation

- Command lines used:
- ./gridpack_generation.sh DY1Jets_madgraph_5f_LO cards/LO_MLM_DY_Jetbin/DY1JetsToLL
- ./gridpack_generation.sh DY2Jets_madgraph_5f_LO cards/LO_MLM_DY_Jetbin/DY2JetsToLL
- ./gridpack_generation.sh DY3Jets_madgraph_5f_LO cards/LO_MLM_DY_Jetbin/DY3JetsToLL
- ./gridpack_generation.sh DY4Jets_madgraph_5f_LO cards/LO_MLM_DY_Jetbin/DY4JetsToLL

Only 4 tarball files generated: 1-Jet/2-Jet samples from MGv2/v3

```
genproductions-mg2/bin/MadGraph5_aMCatNLO/DY1Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz
genproductions-mg2/bin/MadGraph5_aMCatNLO/DY2Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz
genproductions-mg3/bin/MadGraph5_aMCatNLO/DY1Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz
genproductions-mg3/bin/MadGraph5_aMCatNLO/DY2Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz
```

3-Jet/4-Jet samples are still reporting errors

Gridpacks generation

- Here are cross sections about 4 samples:
  - DY1Jets_madgraph_5f_LO_mg2: 9.162e+02 +- 1.363e+01 pb
  - DY1Jets_madgraph_5f_LO_mg3: 8.624e+02 +- 1.338e+01 pb
  - DY2Jets_madgraph_5f_LO_mg2: 3.096e+02 +- 7.166e+00 pb
  - DY2Jets_madgraph_5f_LO_mg3: 3.074e+02 +- 7.175e+00 pb

Comparison plots

- ./genval-run -g /home/storage0/users/llchen/mystorage2/servicework/genproductions-mg2/bin/MadGraph5_aMCatNLO/DY1Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz -f ../LO_MLM_DY_Jetbin/DY1JetsToLL/Configuration/GenProduction/python/HIG-RunIIFall18wmLHEGS-00350-fragment.py -n 10000 -j 1 -d DY1Jets_madgraph_5f_LO_mg2 -q cmsconnect -m madgraph -b 13000 -a Z
- ./genval-run -g /home/storage0/users/llchen/mystorage2/servicework/genproductions-mg3/bin/MadGraph5_aMCatNLO/DY1Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz -f ../LO_MLM_DY_Jetbin/DY1JetsToLL/Configuration/GenProduction/python/HIG-RunIIFall18wmLHEGS-00350-fragment.py -n 10000 -j 1 -d DY1Jets_madgraph_5f_LO_mg3 -q cmsconnect -m madgraph -b 13000 -a Z

- ./genval-run -g /home/storage0/users/llchen/mystorage2/servicework/genproductions-mg2/bin/MadGraph5_aMCatNLO/DY2Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz -f ../LO_MLM_DY_Jetbin/DY2JetsToLL/Configuration/GenProduction/python/HIG-RunIIFall18wmLHEGS-00392-fragment.py -n 10000 -j 1 -d DY2Jets_madgraph_5f_LO_mg2 -q cmsconnect -m madgraph -b 13000 -a Z
- ./genval-run -g /home/storage0/users/llchen/mystorage2/servicework/genproductions-mg3/bin/MadGraph5_aMCatNLO/DY2Jets_madgraph_5f_LO_slc7_amd64_gcc10_CMSSW_12_4_8_tarball.tar.xz -f ../LO_MLM_DY_Jetbin/DY2JetsToLL/Configuration/GenProduction/python/HIG-RunIIFall18wmLHEGS-00392-fragment.py -n 10000 -j 1 -d DY2Jets_madgraph_5f_LO_mg3 -q cmsconnect -m madgraph -b 13000 -a Z

https://gitlab.cern.ch/jixiao/genValidation

Comparison plots

- export PYTHONPATH=/usr/local/lib/python3.10/site-packages:$PYTHONPATH

- singularity exec -B $PWD:$PWD --env LD_LIBRARY_PATH=/usr/local/lib:$LD_LIBRARY_PATH docker://hepstore/rivet python -c "import yoda; print('YODA imported successfully')"

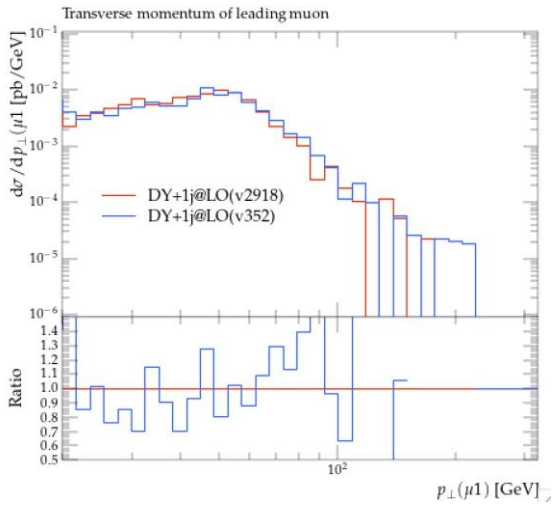
- singularity exec -B $PWD:$PWD --env LD_LIBRARY_PATH=/usr/local/lib:$LD_LIBRARY_PATH docker://hepstore/rivet rivet-mkhtml --no-errs /home/storage0/users/llchen/genValidation/DY1Jets_madgraph_5f_LO_mg2/rivet_result.yoda:Title="DY+1j@LO(v2918)" /home/storage0/users/llchen/genValidation/DY1Jets_madgraph_5f_LO_mg3/rivet_result.yoda:Title="DY+1j@LO(v352)" --output=output_DY1Jets_LO_Jun15_test

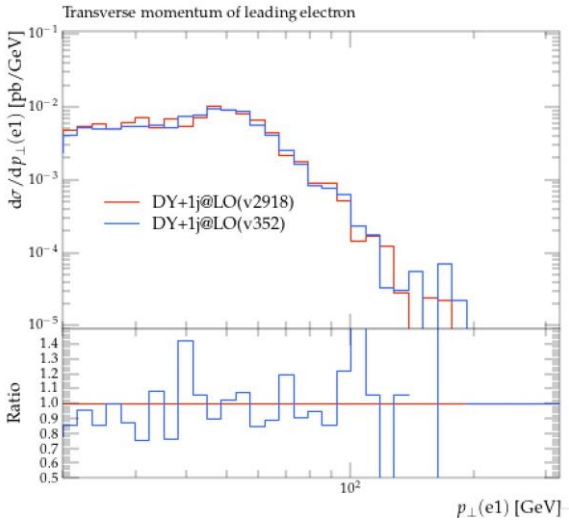
- singularity exec -B $PWD:$PWD --env LD_LIBRARY_PATH=/usr/local/lib:$LD_LIBRARY_PATH docker://hepstore/rivet rivet-mkhtml --no-errs /home/storage0/users/llchen/genValidation/DY2Jets_madgraph_5f_LO_mg2/rivet_result.yoda:Title="DY+2j@LO(v2918)" /home/storage0/users/llchen/genValidation/DY2Jets_madgraph_5f_LO_mg3/rivet_result.yoda:Title="DY+2j@LO(v352)" --output=output_DY2Jets_LO_Jun15_test

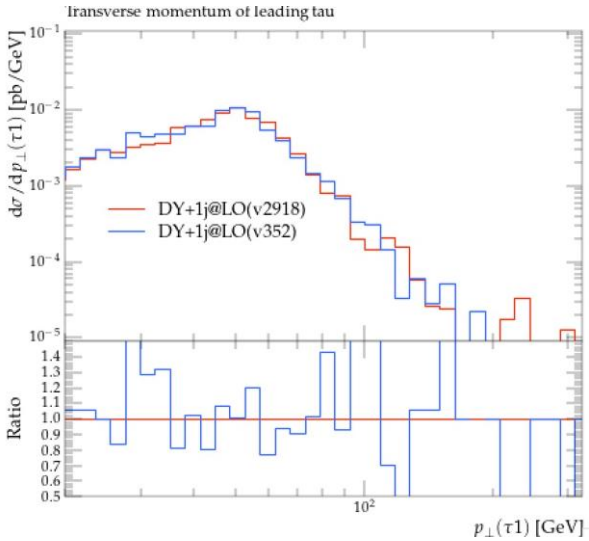
https://gitlab.cern.ch/jixiao/genValidation

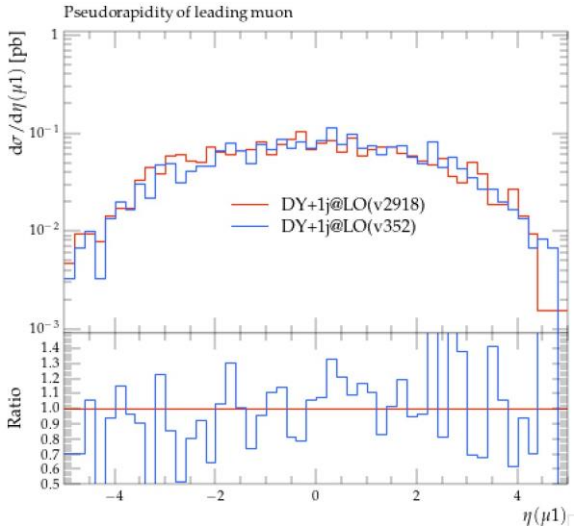
Comparison plots

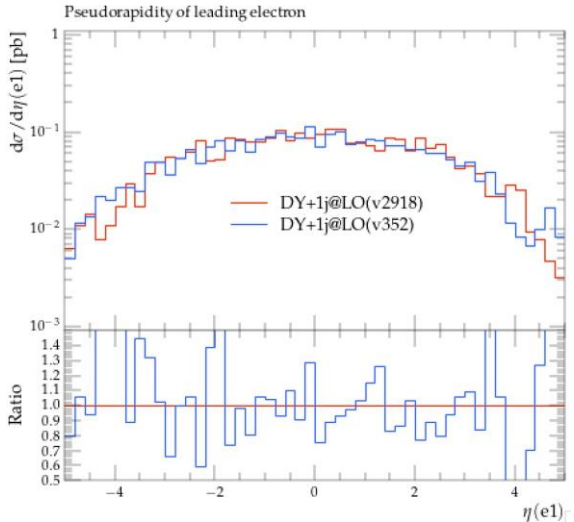
- Here are comparison plots about Lepton pt and eta (1-Jet)

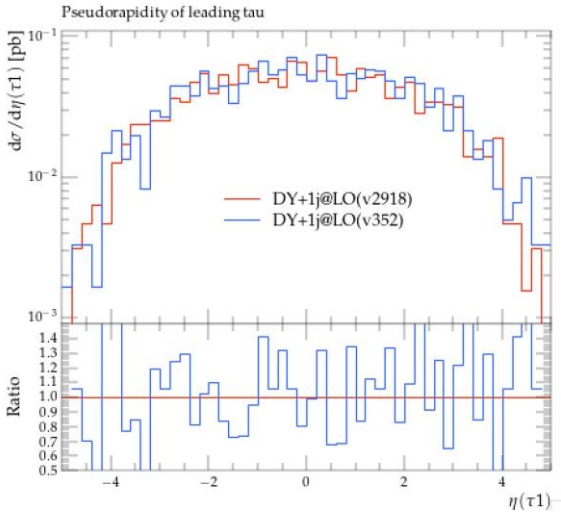






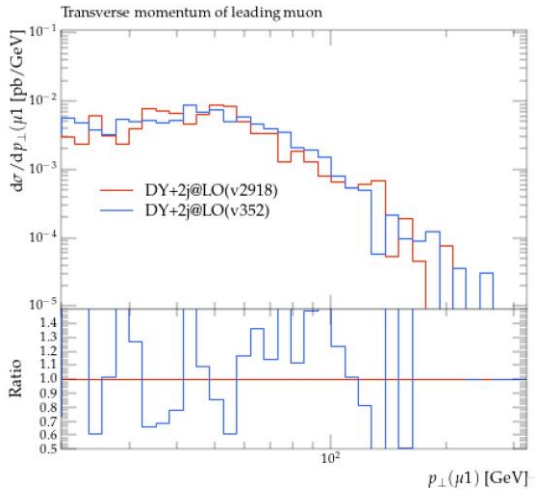


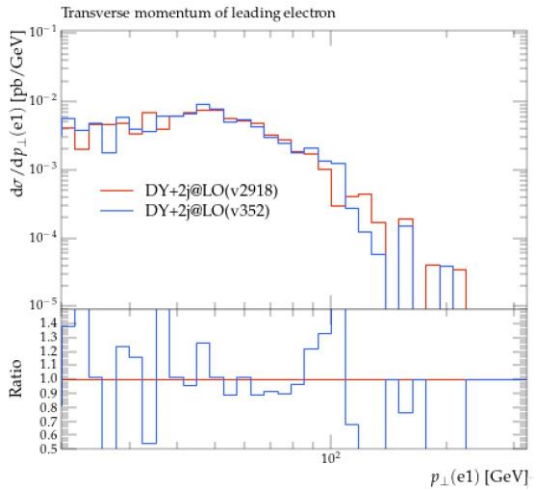


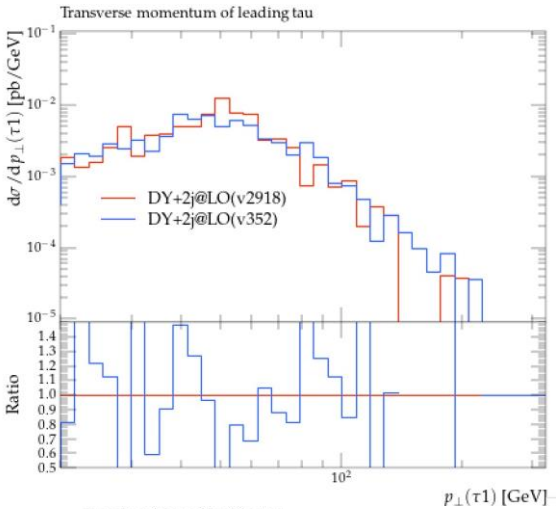


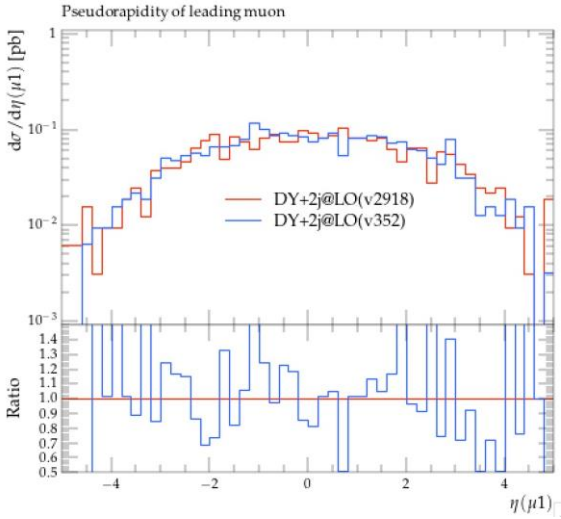
Comparison plots

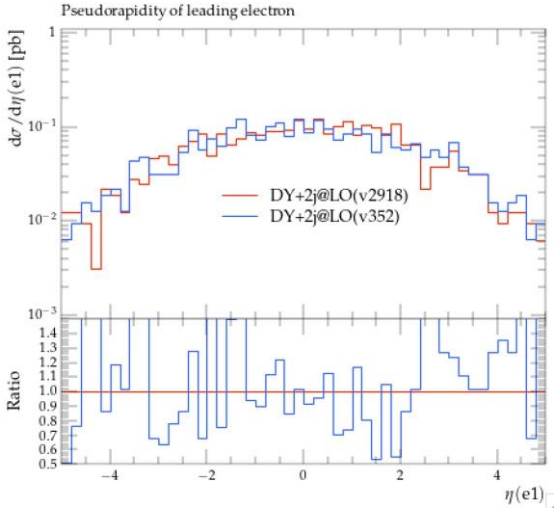
- Here are comparison plots about Lepton pt and eta (2-Jet)

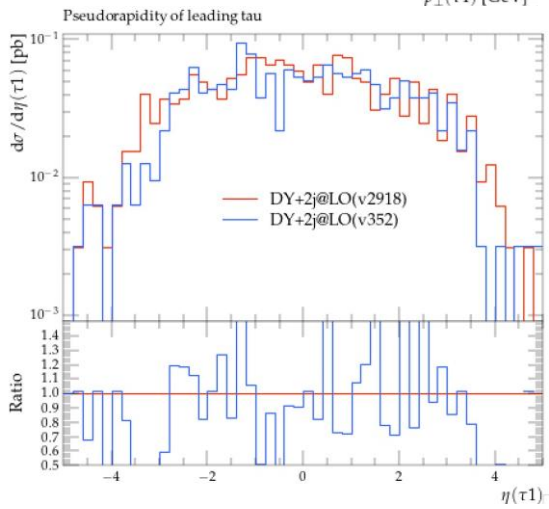












Problems

- 3-Jet/4-Jet report errors
- Selections in rivet command are not found yet