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Vector Boson Scattering: Analysis Details

* Set DENYWEBVIEW = TWikiGuest

Introduction

Links Of Important Analysis Steps

LPC standart PAT and NTuples link

- Inujj group twiki page
- Common PATtuple
- Common Ntuple
- UseFull Commands

The full list of products can be found in the following pages:

- RECO collections
- AOD collections

Validated Version of CMSSW : [here](#)

DataSet Naming Convention : [here](#)

Analysis Details

LHE File Details

MadGraph aMCatNLO production page on twiki : [link](#)

Install MadGraph

1. First Install LHAPDF:

```
wget https://www.hepforge.org/archive/lhapdf/LHAPDF-6.1.5.tar.gz
tar xf LHAPDF-6.1.5.tar.gz
cd LHAPDF-6.1.5
./configure --prefix=$PWD/..
make -j20
make install
```

2. Download MadGraph:

```
wget https://launchpad.net/mg5amcnlo/2.0/2.2.0/+download/MG5_aMC_v2.2.3.tar.gz
tar xf MG5_aMC_v2.2.3.tar.gz
cd MG5_aMC_v2_2_3
```

3. Interface LHAPDF with MadGraph

```
cd MG5_aMC_v2_2_3/input
```

Edit file mg5_configuration.txt

lhpdf = <path_to_lhpdf-config> (something like /gridgroup/cms/brochet/HTT/SL6/LHAPDF-6.1.5/lhpdf-config)

4. Important Things To keep in Mind

1. Note while submitting the jobs in many terminal from LXPLUS that every pc should be different.
2. Also remember to change the seed everytime you run. Because if the seed is same then it will g

How To Generate LHE File using aMC@NLO

1. Download it from MadGraph5_aMC@NLO web page [here](#)
2. Just Extract the package and start working
3. But Before working we should also install following packages:
 1. ExRootAnalysis : It converts various output in the root format (to install it download the package from [here](#) and then extract it and go inside the folder and do make)
 2. MadAnalysis : It draws automatically some histograms which is linked to the event generation
 3. pythia-pgs : This package contains Pythia and PGS. Pythia is able to shower and hadronize the events while PGS is a fast detector simulation
 4. Delphes : This package allows faster detector simulation in place of PGS.
4. To install above packages use the following
 1. Go to the Madgraph directory
 2. ./bin/mg5
 3. install PackageName

and follow the tutorial [here](#) or mail by Ilya [here](#).

```
./bin/mg5_aMC
generate p p > W+ W- j j [QCD=0]
output filename
exit
```

After generating output directory we should exit and edit the param_card and only then launch, otherwise if we first generate the lhe then it may have wrong parameters.

Edit run_card.dat (set parameters according to need)

1. 1. = ebeam1
6500 = ebeam2
- 20.0 = ht2min # sum of the transverse momenta of two leading hadrons
- etc.

```
./bin/mg5_aMC
launch filename -i
launch
quit
quit
```

Now the Events $p p \rightarrow W^+ W^- j j$ generated but till now W's is not decayed.
So, now use MadSpin (inside aMC@NLO) to decay them.

A good reference for MadSpin is on this link [link](#).

The technical information is on slide 17

```
./MadSpin/madspin
import filename/Event/run_01/events.lhe.gz
decay W+ > l+ vl
decay w- > j j
launch
```

To propagate the polarization from before decay lhe file to after decay polarization see the link

Some MadGraph Tutorials

1. Madgraph School 2013 Beijing: link [link](#)
2. Madgraph Lecture : link [link](#)
3. http://www.phys.ufl.edu/~matchev/StandardModel/mg5_tutorial.pdf or mg5_tutorial.pdf
4. Tasi Lecture: Tutorial_TASI2013.pdf
5. McCodes: link

Read LHE file

To read lhe file we need a header file of LHEF.h, and it can be found here

```
source /cvmfs/cms.cern.ch/cmsset_default.csh
scram list CMSSW_7_4
setenv SCRAM_ARCH slc6_amd64_gcc491
cmsrel CMSSW_7_4_0_pre2
cd CMSSW_7_4_0_pre2/src
cmsenv
scramv1 b
git clone https://github.com/ram1123/LHEAnalyzer.git
c++ -o anaPhantom `root-config --glibs --cflags` anaPhantom.cpp
./anaPhantom <InputFile.lhe> <OutPutFile.root>
```

Now we will get tree with 6 branches corresponding to each particle in final state. So, first we run code Analyze_LHE.C (before running change the name of input root file name) and then to get the comparison plot run CompareAdvanced.C macro.

Few Angular Variables to Plot

1. Variables to plot: theta_v, Theta*, sqrt(S_{vv}) ; Ref: [here](#) or [here2](#)

Full Detector Simulation

Generation and Simulation Details: <https://twiki.cern.ch/twiki/bin/view/CMSPublic/WorkBookGenIntro>

GEN-SIM

<https://mail.google.com/mail/u/0/#starred/1442377b6b1374c7>

```
source /cvmfs/cms.cern.ch/cmsset_default.csh
scram list CMSSW_7_4
setenv SCRAM_ARCH slc6_amd64_gcc491
cmsrel CMSSW_7_4_0_pre2
cd CMSSW_7_4_0_pre2/src
cmsenv
```

```
scramv1 b
cmsDriver.py gensim -s GEN,SIM --conditions MCRUN2_71_V0::All --eventcontent RAWSIM --datatier GE
scramv1 b
cmsRun gensim_GEN_SIM.py
```

GEN-SIM Analysis

```
cmsrel CMSSW_7_3_2_patch4
cd CMSSW_7_3_2_patch4/src/
cmsenv
scramv1 b -j 10
mkdir GEN-SIM
cd GEN-SIM/
mkedanlzs GenSimAnalyzer
cd GenSimAnalyzer
scramv1 b -j 10
```

RAW-SIM

RAW-SIM Analysis

AOD-SIM

AOD-SIM Analysis

Mini-AOD

1. Twiki : Mini-AOD Analysis Documentation
2. email : link

Few CRAB3 Links

- Crab3 Tutorial
- Crab3 Configuration File

Some General Analysis Related Links

1. Compute Uncertainty from pdf : link
2. Merge EDM Files : link

Generation Details

Published Dataset Details

Sample	Parent Dataset	Events in Parent	Submitter	Type of Dataset	
ppTowLwLqq_WlepWHad_aMCatNLO_13TeV	LHE file	100k	Ramkrishna	GEN-SIM	/qqToqqWIWI/rasharma-C

qqToqqWW_LL_MGv1_DECAYPkg					

#ReviewStatus

Review status

<!-- Add your review status in this table structure with 2 columns delineated by three vertical bars -->

Reviewer/Editor and Date (copy from screen)	Comments
-- RamKrishnaSharma - 18 Sep 2014	created page

<!-- In the following line, be sure to put a blank space AFTER your name; otherwise the Summary doesn't come out right. -->

Responsible: -- RamKrishnaSharma

This topic: CMSPublic > VectorBosonScattering

Topic revision: r40 - 2015-07-16 - RamKrishnaSharma



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