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# Daily web log book

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## 2014 04 22

- Ran reweight on 100,000 event pp --> w+zjj --> l+l+l+v1 with SM\_LT012 model data set.
  - ◆ It appears that this process is not currently configured to run on Condor, and it is veeery slow:
    - ◇ First reweight completed at 1:46 (AM) April 20
    - ◇ 31st reweight completed at 0:45 April 23
  - ◆ Files are located in ~/cms/Madgraph/generated\_events/w+zjj\_ewk\_LT\_reweights and in /nfs\_scratch/kdlong/w+zjj\_ewk\_LT\_reweights

## 2014 04 23

- Added Matt's WpZ\_ana.C analysis code to git and pushed to github. Editing formatting and organization on branch "kenneth."
  - ◆ [https://github.com/kdlong/WpZ\\_analysis](https://github.com/kdlong/WpZ_analysis)
  - ◆ See GitHub for log of edits

2014 04 25

- Created a simple text file for easier submission of Madgraph results. I should have done this a long time ago!
  - ◆ Contents of survey\_refine.cmd:
    - ◇ survey
    - ◇ refine 100000
    - ◇ refine 100000
    - ◇ refine 100000
    - ◇ refine 100000
  - ◆ Contents of combine.cmd
    - ◇ combine\_events
    - ◇ store\_events
- Run processes as follows:
  - ◆ Initially edit file Cards/me5\_configuration.txt to:
    - ◇ run\_mode = 1 (cluster mode)
    - ◇ cluster\_type = condor
    - ◇ cluster\_queue = None
  - ◆ Run: nohup ./bin/madevent survey\_refine.cmd > survey\_refine.out &
    - ◇ Note: nohup is roughly equivalent to using C-z then bg (which is equivalent to &, sends processes to background) + disown. This completely detaches the jobs from the shell.
  - ◆ Edit Cards/me5\_configuration.txt to:
    - ◇ run\_mode = 2 (combine\_events script gives error when run on cluster)
    - ◇ Run: nohup ./bin/madevent combine.cmd > combine.out &
- Attempting to create a 100,000 event data set with the process  $pp \rightarrow w+l+l- \text{ QED} = 6, w+ \rightarrow l+ \nu l$ . This allows the inclusion of zg interference and is more realistic.
- Generated 1000 events using generate p p > w+ l- l+ j j QED=6, w+ > l+  $\nu l$  with default settings in the SM. Stored as wpz\_zg\_default\_sm in /nfs\_scratch/kdlong and ~/cms/Madgraph/generated\_events.
  - ◆ I do get quite a few errors during the survey command, of the form: `^[[1;34mWARNING: resubmit job (for the 1 times) ^[[0m * See survey_refine.out of these respective directories for details. This doesn't seem to affect the refine process in this case, the events were still generated without apparent issue. * It seems that the error is related to submission to the condor cluster and not with madgraph. A similar problem is discussed here: * https://answers.launchpad.net/mg5amcnlo/+question/245706 * Ran 100 events with SM pp --> w+zjj process to see if this error is related to the process. I still get errors in the survey process of the same form. It again does not cause issues in the refine process. * Files are stored in nfs_scratch/kdlong/w+zjj_ewk_sm. See survey.out for error.`

```
#LogDay20140426 ----+ 2014 04 26 * I didn't do). * Run as follows: * ./bin/madevent *
import model SM_LT012 * define p g u c s d b u~ c~ s~ d~ b~ * define j = p * define l+ e+
mu+ ta+ * define l- e- mu- ta- * define vl ve vm vt * define vl~ ve~ vm~ vt~ * generate p p >
w+ l- l+ j j QED=6, w+ > l+ vl * output wpz_zg_ewk
#LogDay20140430 ----+ 2014 04 30 ERROR: Failed to set ClusterId=549192 for job
549192.0 (110) ERROR: Failed to queue job. ERROR: Failed to set ClusterId=549293 for job
549293.0 (110) ERROR: Failed to queue job.
#LogDay20140506 ----+ 2014 05 06 * Met with Dan Bradley to discuss the condor errors I
have been consistently seeing, e.g. (#LogDay20140425). As expected, the issue comes from
jobs running on machines that are not "properly configured" for MadGraph. Specifically,
some machines do not have CVMFS. Dan Bradley fixed this by making CVMFS are
requirement for all jobs submitted by CMS users.
```
- It's not clear why Matt had not encountered this issue, but it should now be fixed for everyone.

## 2014 05 15

- Matt has been investigating the differences between the CMS recommended card (which does not converge for Z-gamma interference processes) and the default Madgraph card. It appears that the convergence errors are linked to  $dR_{ll} = 0$  (separation between leptons) and  $pt_l = 0$  (minimum pt for leptons). Using  $dR_{ll} = 0.001$  and  $pt_l = 5$  does converge. The current `run_card.dat`, modified from Matt's, is attached.
  - ◆ `run_card_14_5_15.dat`: Current `run_card.dat` for full simulations at 13 TeV as of May 15, 2014
- Currently running zg interference process including b quarks and new physics with this `run_card.dat`, located in `/nfs_scatch/kdlong/wpz_zg_ewk_all_aqgc_FT1`
- I now understand the solution to the "Failed to set ClusterId =549293 for job 549293.0 (110)", "Failed to queue job." problem, referenced, e.g. on 2014 04 30. The solution is embarrassingly simple: The `run_card.dat` file has the code path directory hardcoded in. The errors arise when I try to copy another `run_card.dat` and use it!
- Investigating running reweight feature on condor cluster. Running 31 reweights took ~2 days (see 2014 04 22).
  - ◆ Parallelizing the reweight process is addressed here: <https://answers.launchpad.net/mg5amcnlo/+question/244512>, but the solution is unclear.
  - ◆ Matt suggest splitting the 100,000 event data file into 100 pieces and reweighting the full sequence of events separately. This would be easy to implement, and is likely the best option, though it does come with a fair amount of inconvenience, such as file transfers and the large amount of files which would be produced.
  - ◆ I have submitted a question to the authors asking for more information about how they suggest to do this.
- Registered for Fermilab computing account. Will attend a hadron calorimeter upgrade discussion/class tomorrow: <https://indico.cern.ch/event/314999/>

## 2014 05 16

- Attended HATS class on hadron calorimeter upgrade at Fermilab
- Recieved an answer from the Madgraph authors. They suggest that Matt's prescription is easiest, but also suggest how one would parallelize code.
  - ◆ <https://answers.launchpad.net/mg5amcnlo/+question/248730>
- 100,000 event zg interference process from yesterday appears to have successfully run survey/refine.

## 2014 05 19

- The 100,000 event zg interference process only created 660 events after the `combine_events` stage. Not sure why this is, apparently I did not run enough refines. Trying again.
- Discussed reorganizing the `WpZ_ana.C` code with Matt.
  - ◆ He agrees that a large reorganization of the code is a good idea and worth the effort.
  - ◆ Looking into creating a make file to run independently from root. Getting errors from Shared Object files. Possible more of a hassel than I realize.
  - ◆ See GitHub for for log of edits.

## 2014 05 20

- 100,000 event zg interference process ran and combined successfully. Located in /nfs\_scratch/kdlong/wpz\_zg\_ewk\_all\_aqgc\_FT1 and ~/cms/Madgraph/generated\_events/wpz\_zg\_ewk\_all\_aqgc\_FT1
- Successfully compiled, linked, and ran the WpZ\_ana.C file from a make file. The path of the libExRootAnalysis.so file has to be given to LD\_LIBRARY\_PATH so it can be found at run time.
  - ◆ Added LD\_LIBRARY\_PATH= \$LD\_LIBRARY\_PATH:~/WpZ\_ana/lib to .bashrc file.

## 2014 05 21

[http://w3.iihe.ac.be/~bclerbau/ExRootAnalysys\\_Note\\_Draft.pdf](http://w3.iihe.ac.be/~bclerbau/ExRootAnalysys_Note_Draft.pdf)

#LogDay20140618

## 2014 06 18

- Attended HATS class at Fermilab on Jet substructure
  - ◆ <https://indico.cern.ch/event/315003/>

## 2014 06 19

- Attended second day of HATS class at Fermilab on Jet substructure
- Spoke with Matt about physics details of project
  - ◆ Important Note: values in param card are in units of  $1/M^4$ , with M in units of GeV. Thus a mass scale of 1 TeV gives param =  $1 \times 10^{-12}$

## 2014 06 20

- Day off in Chicago

## 2014 06 23

- Working on root script for reading histograms from .root file created by WpZ\_ana program that compares plots from a specified weight 'number' (it's number in reweight\_card.dat with the SM plot
  - ◆ modified LHEWeights.cpp file to indentify the SM weight as set param = 0.0 and append \_SM for this histogram

## 2014 06 30

- The reweighting for 10000 events /nfs\_scratch/kdlong/wpz\_zg\_ewk\_all\_LT012 seems to have run successfully.
  - ◆ Madgraph actually includes a (perl) script for combining N .lhe.gz files, merge.pl in PROCESS\_DIRECTORY/bin/internal

- ◆ run as `./merge.pl file1.lhe.gz file2.lhe.gz ... fileN.lhe.gz combinedfile.lhe.gz banner.txt` where `banner.txt` is an empty file
- ◆ Obviously running 1000 command line arguments isn't feasible. Wrote `setup_merge.py` to create a simple shell script for combining N files of the form `unweighted_events_XXX.lhe.gz`
- ◆ Tested by combining the 100 `.lhe.gz` files from this reweighting
- Finished reworking code to add the following plots:
  - ◆ `pt` and `eta` for each (3) leptons in an event, ordered by highest `pt`
  - ◆ `pt_ll` and `m_ll` for each combination of lepton particle anti-particle in an event. For events with 3 same flavor leptons, these are ordered by the distance of `m_ll` from the Z mass.
- Began 100,000 event processes in `/nfs_scratch/kdlong/wpz_zg_ewk_all_LT012` using `run_card.dat` with `mll = 12`.

Command "reweight" interrupted with error: `AttributeError : 'Banner' object has no attribute 'lhe_version'`  
 Please report this bug on <https://bugs.launchpad.net/madgraph5> More information is found in `'/nfs_scratch/kdlong/w+zjj_all_LT102_update/run_01_tag_2_debu g.log'`. Please attach this file to your report.

#LogDay20140917

## 2014 09 17

I've got to do a better job maintaining this.

- Sorting through parton level processes generated in MadGraph
- Define "signal" by total QCD + QED generated events - QCD only
- In Madgraph:
  - ◆ `QED = 6 QCD = 0` is "signal", but does not include QED/QCD interference. Instead use `QED = 4 QCD = 2` as background and subtract from `QED = 6`
  - ◆ Note that the order of QCD or QED is the maximum number of vertices allowed. Lower is also allowed, see "examples/format" at <http://madgraph.hep.uiuc.edu/>

## 2014 09 18

- Trying to figure out a recipe to convert my LHE files to EDM files in CMSSW and then use the CMSSW integration to do hadronization and detector simulation.
- I have Devin's recipe, but he did his generation in pythia in the same step as his hadronization
- I also have Matt's old steps, which I believe worked at the time (In March?!)
- Recommendations for generation can be found through the SMP twiki
- <https://cms-pdmv.cern.ch/mcm/campaigns?page=0&shown=63> gives info on the current Monte Carlo campaigns
- [https://cms-pdmv.cern.ch/mcm/chained\\_requests?contains=EXO-Fall13-00131&page=0&shown=15](https://cms-pdmv.cern.ch/mcm/chained_requests?contains=EXO-Fall13-00131&page=0&shown=15) is a Drell Yan Z production + jets which should be a similar process.

## 2014 09 19

- Generated 1,000,000 event samples for `QED = 6` and `QCD = 4 QED = 2` `pp > w+ l+ l- jj > l+ l- vl l+`
- Attempts at following the recipes I find online have been pretty frustrating. I haven't found anything yet that gives a specific example of taking in a `.lhe` file and converting it to EDM. My procedure keeps failing in the hadronization step with error:
  - ◆ [2] Calling event method for module `BetafuncEvtVtxGenerator /'VtxSmeared'`
  - ◆ Exception Message:

- ◆ Principal::getByLabel: Found zero products matching all criteria
- ◆ Looking for type: edm::HepMCProduct
- ◆ Looking for module label: generator
- ◆ Looking for productInstanceName:

## 2014 09 22

- CMSSW integration continues to frustrate
- Working on making plot of signal = (QED6) - (QED4 QCD2). Can make the histogram subtraction work in CINT but am having trouble getting it to work in my plotting script.

## 2014 09 23

- Successfully made QED = 6 QCD = 0 and [QED6 - (QED4 QCD2)] "signal" comparison plot.
- Presented at meeting and met with Matt
- Matt points out that the errors in my CMSSW generation appear to be from the first (LHE->EDM) step not working correctly
- Met with Robert (undergraduate student working with Matt) and passed on my version of the WpZ\_ana code. Noticed a few updates that should be made:
  - ◆ Make a simpler command line argument interface to accept a root and lhe file at run time
  - ◆ Create a simple technique for making unweighted plots (no lhe file)
  - ◆ Make LHEWeights function compatible with weights that set multiple Lagrangian parameters.
- A few other points from talking with Robert not related to analysis code:
  - ◆ Update condor reweight code with a simple user interface so that it can be passed to Robert
  - ◆ Matt, Robert, and I should be doing a better job making sure we are on the same page with our MadGraph release and run/configuration cards.
- Wrote script to allow commonly edited parameters to be changed from default cards while keeping run\_card parameters that we don't usually change untouched. Also takes care of setting run\_mode in me5\_configuration.txt so that survey/refine is done via condor but combine/store is not.
  - ◆ Script is located at /nfs\_scratch/kdlong/Default\_MadGraph\_Run. Invoked as ./run\_madevent <path\_to\_run> <num\_events> <COM energy in TeV >
  - ◆ Tested on Tyler's username successfully. Hopefully will work out of the box for Matt and Robert.

## 2014 09 24

- Emailed Matt and Robert about madevent script implementation
- Successfully updated code to run with no LHE file
- Trying to fix LHEWeights to cooperate with multiple parameters set. Getting the same mysterious errors with file reading hanging up for no apparent reason as at the beginning of the summer.

## 2015 01 06

- New Years resolution: keep my log book updated!
- Researching jet matching
- Found the LHE file from the official Monte Carlo campaign for W+/-Z + jets > 3lv from the SUSY group. Currently located in ~/SUSY\_WZ

- ◆ For future reference:
- ◆ The Monte Carlo campaign through which the sample was created is here:  
[https://cms-pdmv.cern.ch/mcm/requests?dataset\\_name=WZJetsTo3LNu\\_Tune4C\\_13TeV-madgraph-t](https://cms-pdmv.cern.ch/mcm/requests?dataset_name=WZJetsTo3LNu_Tune4C_13TeV-madgraph-t)
  - ◇ I found this by:
  - ◇ searching for dataset=/\*WZ\*/ on <https://cmsweb.cern.ch/das/> to find the name of the data set
  - ◇ Go to <https://cms-pdmv.cern.ch/mcm/>
  - ◇ Click on "Request" at the top
  - ◇ Click on "Output dataset" in blue, above the lists of campaigns, but below the topmost menus
  - ◇ In the search box which appears, search for  
"/WZJetsTo3LNu\_Tune4C\_13TeV-madgraph-tauola/Fall13pLHE-START62\_V1-v1/GEN"
  - ◇ This should give one hit, "SUS-Fall13pLHE-00008." Click on  
"WZJetsTo3LNu\_Tune4C\_13TeV-madgraph-tauola" under "DataSet Name"
- ◆ There should be a list of various stages of the Monte Carlo generation. To get the LHE file, look at the pLHE step. On the line that begins with "SUSFall13pLHE00008", click the small check mark under the "Actions" heading. Hovering your mouse over it should give the text "get test command"
- ◆ This is the command to convert a private LHE file to a CMS EDM file. From the command, the input file is lhe:12632. This indicates that the LHE has been uploaded to the EOS storage system (<https://cern.service-now.com/service-portal/article.do?n=KB0001998>), which is where we can find it!
  - ◇ ssh to lxplus
  - ◇ Use "eos ls store/lhe/12632" to list the contents of this directory. It should contain the file WZJetsTo3LNu\_500k\_events\_q15\_noclus.lhe.xz
  - ◇ Copy from eos with the "cmsStage" script:  
cmsStage /store/lhe/12632/WZJetsTo3LNu\_500k\_events\_q15\_noclus.lhe.xz .
  - ◇ This file is zipped with xz. You can unzip it with: unxz WZJetsTo3LNu\_500k\_events\_q15\_noclus.lhe.xz
  - ◇ Ta da! You can always scp it back to the login machines.

## 2015 01 07

- Found the solution to the problem of discontinuities at the  $m_{4l}$  cut when combining two samples formed with high and low  $m_{4l}$  cuts. (See attached)
  - ◆ The problem is neither a physics problem nor a code problem, but actually a usage of the code problem: when the reweighting is done via condor, the lhe file is split and then recombined. This recombining step does not necessarily restore the events to their original order. The application of weights in the WpZ\_analysis program depends on the events in the root file being in the same order as in the lhe file.
  - ◆ The solution is simple: create a new root file from the new weighted lhe file with ExRootAnalysis/ExRootLHEFConverter and use this root file instead.
- Investigated the usage of MatchChecker (<https://cp3.irmp.ucl.ac.be/projects/madgraph/wiki/MatchChecker>) for checking that the differential jet rate plots are smooth, which indicates a reasonable setting of the matching parameter  $xqcut$ .
  - ◆ My impression is that this program may have been superseded by MadAnalysis. Trying to properly configure MadAnalysis and hoping that these plots are then automatically generated.

## 2015 01 08

- The differential jet rate plots are automatically generated if MadAnalysis is installed. Then after



running pythia the plots are created. Ran for wz+jets sample with xqcut = 10, 20, 30. I believe qcut is automatically set in MadGraph to be  $> xqcut$ , something like  $1.2*xqcut$  or  $xqcut + 5$ .

- I need to understand what these plots actually mean.
- Working on pre-exercises for CMSDAS

## 2015 01 09

- Worked on trying to get the recipe for submitting jobs finished before going off to CMSDAS.
- Talked to Bhawna about which pileup settings she used. She had the minbias files moved to the UW cluster so the completion time should be improved for this step.
- Talked to Matt about which pileup setting to use. He recommends AVE\_20\_BX\_25ns i.e. 20 PU and 25 ns bunch crossings, which should be the running conditions in the longer future (~months - year rather than immediately after turn on), so this is appropriate for the longer term studies such as this.
- Worked on pre-exercises for CMSDAS

## 2015 01 12 - 16

At CMS Data Analysis School: <https://indico.cern.ch/event/346968/>

#LogDay20150119

## 2015 01 19

- The jobs which I submitted the week before the CMSDAS all seem to give incorrect results in the pythia step. Out of 500 events, many fail with errors of the type:
  - ◆ 495 Abort from Pythia::next: parton+hadronLevel failed; giving up
  - ◆ 33145 Error in Pythia::check: unmatched particle energy/momentum/mass
- I believe this error can be tracked to the file with weight information, running a file without any event weights does not give such errors.
- It appears that using a newer version of the software fixes the errors. I ran 100 events with CMSSW\_7\_0\_6patch1 without any such errors. Submitted Fall13 step to condor for  $m_{4l} >$  and  $<$  600 100,000 event samples.

## 2015 01 20

- Jobs run through Pythia step successfully when using CMSSW\_7\_0\_6\_patch1 instead of 6\_2\_3 as used in Fall13.
- Ran Madgraph process for W+Z + 2 jets QCD production (100,000 events) with exact same settings as
- Attended UW meeting and Devin's prelim

## 2015 01 21

- Added CMSSW generation code and config files to github
  - ◆ Code now includes proper FarmoutAnalysisJobs call for each step. Using a simple bash script to avoid excessively long names to output files
  - ◆ Will move to a config file style input rather than command line options to simplify input

- Finished all steps for wpz\_all\_m600h\_rwgt data set (inclusive w1+l-jj sample with weights, with  $m_{4l} < 600$  GeV), close to completing wpz\_all\_m600l\_rwgt and wpz\_qcd2jet (no matching)
- 

This topic: Main > KDLogBook

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