MadGraph Tutorial

Syntax Tutorial

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Exercise I: Install MadGraph 5!

- https://launchpad.net/madgraph5
  - ➡ use the 2.3_beta version!
- untar it (tar -xzpvf MG5_XXX.tgz)
- launch it ($ ./bin/mg5_amc)

- learn it!
  - ➡ Type tutorial and follow instructions
- install external package
  - ➡ install pythia-pgs
  - ➡ install MadAnalysis

Install

MadGraph5 in Launchpad

Apple annonce OS X ... | Le vaisseau Star Wars... | NCSA to host worksh... | LC13 | WWDC : qu'est-ce qu'... | 2013:groups:tools_lh... | MadGraph5 in Launc...

https://launchpad.net/madgraph5

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The MadGraph Matrix Element Generator version 5

Overview | Code | Bugs | Blueprints | Translations | Answers

Registered 2009-09-15 by Michel Herquet

The version 5 of the MadGraph Matrix Element Generator for the simulation of parton-level events for decay and collision processes at high energy colliders. Allows matrix element generation and event generation for any model that can be written as a Lagrangian, using the output of the FeynRules Feynman rule calculator. Provides output in multiple formats and languages, including Fortran MadEvent, Fortran Standalone matrix elements, C++ matrix elements, and Pythia 8 process libraries.

Note that process generation can also be done directly online at http://madgraph.phys.ucl.ac.be or http://madgraph.hep.uiuc.edu.
If you use MadGraph 5, please cite JHEP 1106(2011)128, arXiv:1106.0522 [hep-ph].

Installation:
MadGraph 5 needs Python version 2.6 or 2.7. The latest stable release is in the trunk, which can be branched using the Bazaar versioning system:
bzr branch lp:madgraph5
or be downloaded as a tar.gz package to the right. This release contains everything needed for process generation in multiple models, as well as event generation through MadEvent, and standalone matrix element evaluation for Fortran or C++ output.
In order to use the process library output for Pythia 8, you need Pythia 8.150 or later installed.

Getting started:
Run bin/mg5 and type "help" to learn how to run MadGraph 5 using the command interface, or run the interactive quick-start tutorial by typing "tutorial".
Or copy the Template, edit the Cards/proc_card_mg5.dat and run bin/newprocess_mg5.

Examples of process generation syntax:
p p > w+ j j
p p > t t~, t > b j j, t~ > b~ l- vl~
e+ e- > z > n2 n2, (n2 > x1+ w-, x1+ > l+ vl n1, w- > l- vl~), n2 > j j n1

To output model files for MadGraph 5 with FeynRules, use version 1.6 or later, and use the WriteUFO command.

Home page | Wiki

Get Involved

- Report a bug
- Ask a question
- Register a blueprint
- Help translate

Downloads

MadGraph5_v1.5.10.tar.gz

MadGraph5_v...eta3.tar.gz

released on 2012-09-29

All downloads

Announcements

aMC@NLO in MadGraph5 on 2012-11-08
On Nov 8th 2012, version 2.0 beta of MadGraph5 has been released. This is a m...

Read all announcements

Project information

Maintainer: Driver:

Series and milestones

View full history

trunk

Find: Next Previous Highlight all Match case

Where to find help?

- Ask us!
- Use the command "help" / "help XXX"
  - ➡ "help" tell you the next command that you need to do.
- Launchpad:
  - ➡ https://answers.launchpad.net/madgraph5
  - ➡ FAQ: https://answers.launchpad.net/madgraph5/+faqs

What are those cards?

- Read the Cards and identify what they do
  - ➡ param_card: model parameters
  - ➡ run_card: beam/run parameters and cuts
    - ✦ https://answers.launchpad.net/madgraph5/+faq/2014

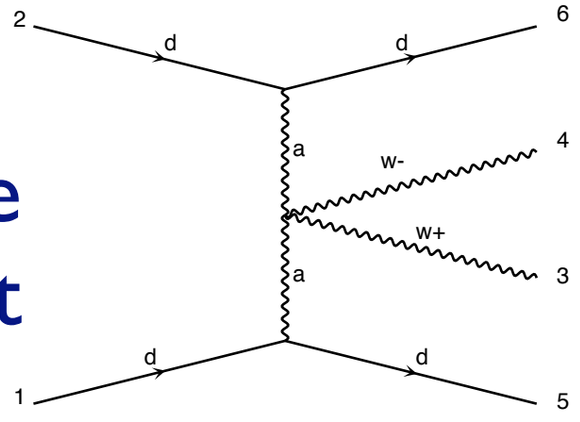
Exercise II: Cards Meaning

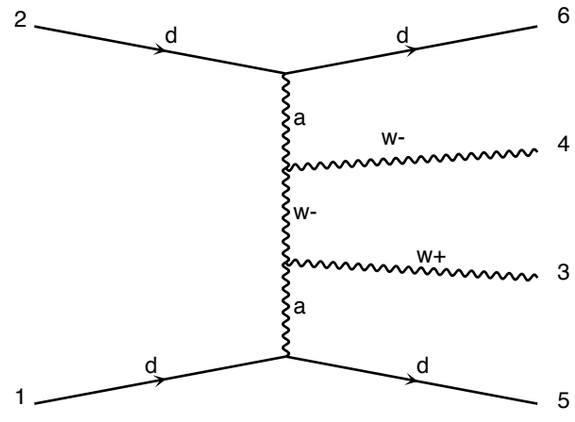
- How do you change
  - ➡ top mass
  - ➡ top width
  - ➡ W mass
  - ➡ beam energy
  - ➡ pt cut on the lepton

Exercise III : Syntax

- What's the meaning of the order QED/QCD
- What's the difference between
  - ➡ p p > t t~
  - ➡ p p > t t~ QED=2
  - ➡ p p > t t~ QED=0
  - ➡ p p > t t~ QCD=0
  - ➡ p p > t t~ QED<=2
  - ➡ p p > t t~ QCD<=2
- Compute the cross-section for each of those and check the diagram

- Generate VBF process
- check that you have the diagram that you want





Exercise IV: Syntax

- Generate the cross-section and the distribution (invariant mass) for
  - p p > e+ e-
  - p p > z, z > e+ e-
  - p p > e+ e- $ z
  - p p > e+ e- / z

Hint :To plot automatically distributions:
mg5> install MadAnalysis

- Use the invariant mass distribution to determine the meaning of each syntax.

Exercise V: Automation/Width

- Compute the cross-section for the top pair production for 3 different mass points.
  - ➡ Do NOT use the interactive interface
    - ✦ hint: you can edit the param_card/run_card via the "set" command [After the launch]
    - ✦ hint: All command [including answer to question] can be put in a file. (run ./bin/mg5 PATH_TO_FILE)

  - ➡ Remember to change the value of the width
    - ✦ "set width 6 Auto" works

Examples

File:

```
import model EWDim6
generate p p > z z
ouput TUTO_DIM6
launch
  set nevents 5000
  set MZ 100
```

How to Run: `./bin/mg5_amc PATH`

Exercise VI: Decay Chain

- Generate p p > t t~ h, fully decayed (fully leptonic decay for the top)
  - ➡ Using the decay-chain formalism
  - ➡ Using MadSpin
- Compare cross-section
  - ➡ which one is the correct one?
  - ➡ Why are they different?
- Compare the shape.