

Installation of

MAD
Analysis 5

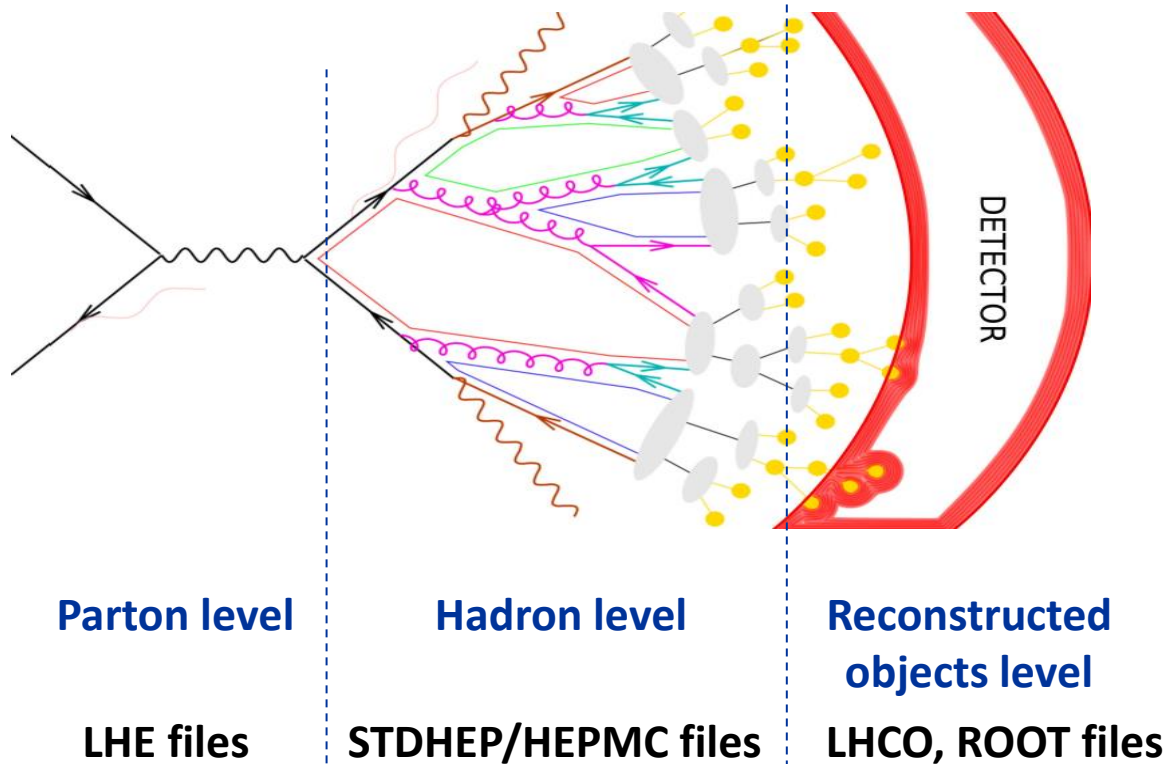
Eric Conte, Benjamin Fuks



2015 MadGraph school on Collider Phenomenology
November 23-27 @ Shanghai

What is MadAnalysis 5?

The primary goal of MadAnalysis 5: analyzing generated & simulated samples



Relevant features of design

- User-friendly
- Flexible
- Efficient
- Easy to maintain

A unique framework : MadAnalysis 5

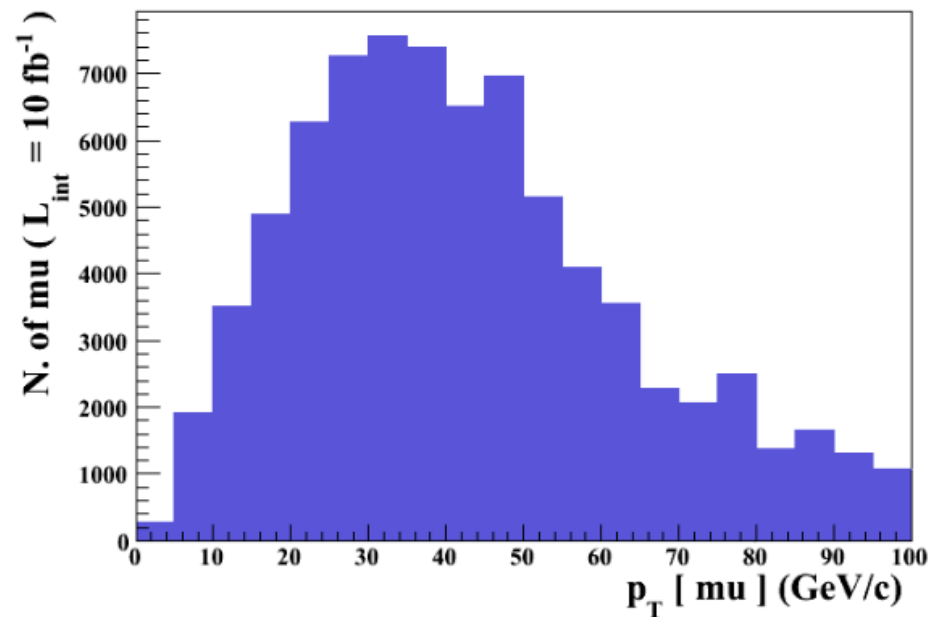
What is MadAnalysis 5?

Example of basic features:

- Reading of signal and background event files
- Production of histograms for different distributions.
- Definition of various selection cuts on the input samples.
- Results of the analysis summed up by a S/B-like ratio table.
- Dumping results in a smart report (PDF, DVI or HTML)

Dataset	Integral	Entries / events	Mean	RMS	Underflow	Overflow
defaultset	82747	0.752	42.8177	21.36	0.0	1.296

Statistics table

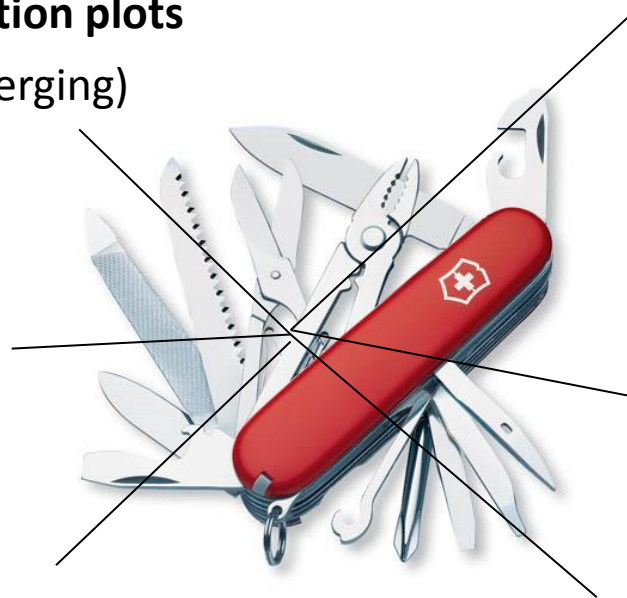


What is MadAnalysis 5?

But MadAnalysis 5 can do other things for you:

- Producing special plots such as **ME/PS merging validation plots** (see talk devoted to merging)

- **Writing** the events in another data format.



- Designing a sophisticated analysis in the **expert mode**

- Applying a **jet-clustering algorithm** to your hadronic events

- Applying a **fast-simulation detector (Delphes)** to your hadronic events

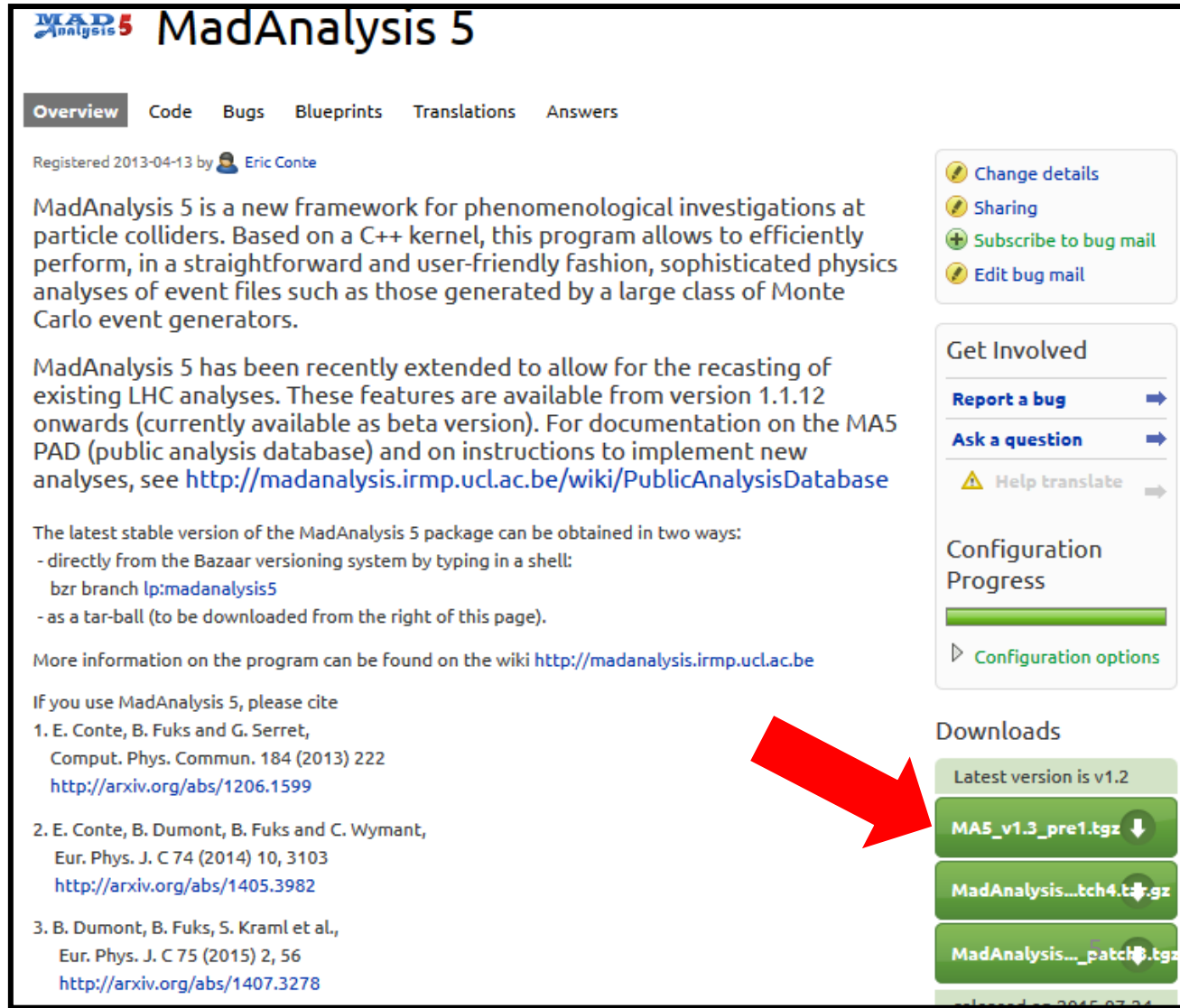
- **Recasting an existed analysis** and **computing a limit** to a BSM signal

How to download MadAnalysis 5?

- Not possible (now) from MadGraph_aMC @NLO (**only MadAnalysis 4 is available**)
- The package can be download from the **Launchpad** framework:
<https://launchpad.net/madanalysis5>


Release suggested for the school :

v1.3_pre1



MAD Analysis 5 MadAnalysis 5

Overview Code Bugs Blueprints Translations Answers

Registered 2013-04-13 by  Eric Conte

MadAnalysis 5 is a new framework for phenomenological investigations at particle colliders. Based on a C++ kernel, this program allows to efficiently perform, in a straightforward and user-friendly fashion, sophisticated physics analyses of event files such as those generated by a large class of Monte Carlo event generators.

MadAnalysis 5 has been recently extended to allow for the recasting of existing LHC analyses. These features are available from version 1.1.12 onwards (currently available as beta version). For documentation on the MA5 PAD (public analysis database) and on instructions to implement new analyses, see <http://madanalysis.irmp.ucl.ac.be/wiki/PublicAnalysisDatabase>

The latest stable version of the MadAnalysis 5 package can be obtained in two ways:

- directly from the Bazaar versioning system by typing in a shell:
`bzr branch lp:madanalysis5`
- as a tar-ball (to be downloaded from the right of this page).

More information on the program can be found on the wiki <http://madanalysis.irmp.ucl.ac.be>

If you use MadAnalysis 5, please cite

1. E. Conte, B. Fuks and G. Serret,
Comput. Phys. Commun. 184 (2013) 222
<http://arxiv.org/abs/1206.1599>
2. E. Conte, B. Dumont, B. Fuks and C. Wymant,
Eur. Phys. J. C 74 (2014) 10, 3103
<http://arxiv.org/abs/1405.3982>
3. B. Dumont, B. Fuks, S. Kraml et al.,
Eur. Phys. J. C 75 (2015) 2, 56
<http://arxiv.org/abs/1407.3278>

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Configuration Progress

Configuration options

Downloads

- Latest version is v1.2
- MA5_v1.3_pre1.tgz ↓
- MadAnalysis...tch4.tgz ↓
- MadAnalysis...patch.tgz ↓

Dependencies

Mandatory	Optional
PYTHON 2.6 or a more recent version (but not the 3.X series)	ZLIB
GNU GCC compiler	LATEX / PDFLATEX
ROOT 5.27 or a more recent version	FASTJET
NUMPY module for Python	DELPHES



**Could be installed automatically
from MadAnalysis 5 console**

Untarring MadAnalysis 5

```
mkdir MA5 ; cd MA5
```

```
mv /.../.../MA5_v1.3_pre1.tgz ./
```

```
tar xvzf MA5_v1.3_pre1.tgz
```

Launching MadAnalysis 5

```
./bin/ma5
```

```
Platform: Linux 2.6.18-348.12.1.el5 [Linux mode]
Reading user settings ...
Checking mandatory packages:
  - python [OK]
  - python library: numpy [OK]
  - g++ [OK]
  - GNU Make [OK]
  - Root [OK]
  - PyRoot libraries [OK]
Checking optional packages:
  - pdflatex [OK]
  - latex [OK]
  - dvi2pdf [OK]
  - zlib [OK]
  - FastJet [OK]
  - Delphes [OK]
  - Delphes-MA5tune [OK]
Checking the MadAnalysis library:
=> MadAnalysis libraries found.
=> MadAnalysis test program works.
*****
MadGraph 5 NOT found:
=> Particle labels from input/particles_name_default.txt
=> 87 particles successfully exported.
=> Multiparticle labels from
madanalysis/input/multiparticles_default.txt
=> Creation of the label 'invisible' (-> missing energy).
=> Creation of the label 'hadronic' (-> jet energy).
=> 8 multiparticles successfully exported.

ma5>_
```


Compilation and other software tricks behind the scene = physicist-friendly

- **Inspection of your system:**
 - Autodetection of the required packages (g++, root, numpy)
 - Autodetection of the optional packages (zlib, delphes, fastjet, ...)
 - Autodetection of MadGraph if it is installed.
- First time you used MadAnalysis:
compilation of the core libraries
- Users could bypass or force a step of the MadAnalysis recipe
→ **configuration file** *madanalysis/inputs/user_configuration.dat*

```
Platform: Linux 2.6.18-348.12.1.el5 [Linux mode]
Reading user settings ...
Checking mandatory packages:
- python [OK]
- python library: numpy [OK]
- g++ [OK]
- GNU Make [OK]
- Root [OK]
- PyRoot libraries [OK]
Checking optional packages:
- pdflatex [OK]
- latex [OK]
- dvipdf [OK]
- zlib [OK]
- FastJet [OK]
- Delphes [OK]
- Delphes-MA5tune [OK]
Checking the MadAnalysis library:
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```

Optional libraries could be installed quickly from the console with the command **install**

Optional libraries could be installed quickly from the console with the command **install**

For the tutorial, you are invited to install Delphes inside your MadAnalysis 5 framework :

```
ma5 > install delphes
```

Advice for ROOT installation



**ROOT is certainly the dependency the most difficult to install.
Its installation requires close attention.**

1. Go to the official ROOT download page: <https://root.cern.ch/downloading-root>
1. Download the sources of the last release of ROOT.
For instance: https://root.cern.ch/download/root_v6.04.10.source.tar.gz
We do not advise you to download RPM package for your OS (Python libraries could be missing).
2. Untaring the sources of ROOT : `tar xvzf <root tarball name>`
3. Type : `./configure --enable-python`
Then: `make`
4. If you are root of your machine, you can (but not mandatory) type :
`sudo make install`

else: once you open a new console, you need to type the following command:
`source <folder where ROOT is installed>/bin/thisROOT.sh`

Advice for ROOT installation



**ROOT is certainly the dependency the most difficult to install.
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5. For identifying the shell you used, type: `echo $SHELL`

6. If the answer is “bash” :

→ once you open a new console, you need to type the following command:

```
source <folder where ROOT is installed>/bin/thisroot.sh
```

If the answer is “tcsh” :

→ once you open a new console, you need to type the following command:

```
source <folder where ROOT is installed>/bin/thisroot.csh
```

7. You are ready now. Just a small test:

- Lancing a Python console: `python`
- Type inside the console: `import ROOT`
- If no error message appears, congratulations: you succeeded.

1. **Downloading the last MadAnalysis 5 release from the launchpad.**
For the tutorial:
https://launchpad.net/madanalysis5/trunk/v1.2/+download/MA5_v1.3_pre1.tgz
2. **Untaring the package in a devoted folder.**
3. **Launching MadAnalysis 5 and noticing the mandatory dependencies that MadAnalysis 5 does not detect.**
4. **If some mandatory dependencies are missing, installing them.**
Be careful with ROOT installation (see slides 10-11).
5. **If you think that everything is installed properly and you got still problem, contacting the experts (Eric CONTE or Benjamin FUKS)**
6. **Installing Delphes with the help of the MadAnalysis 5 console :**
`ma5> install delphes`