MadAnalysis 5 in a nutshell

[Conte, Fuks, Serret (CPC '13); Conte, Fuks (arXiv:1309.7831)]

What is MadAnalysis 5?

- A framework for phenomenological analyses
- Multiple input format: StdHep, HepMC, Lhe, Lhco, Root
- Any level of sophistication: partonic, hadronic, detector, reconstructed
- User friendly, flexible and fast
- Interface to several HEP packages to process events (fastsim, showering, clustering, *etc.)*

➥ Professional analyses in an easy way
➥ No limit on the analysis complexity

Two modules

- A Python command line interface (interactive and soon independent of Root)
- A C++/Root core module, SampleAnalyzer

Normal mode

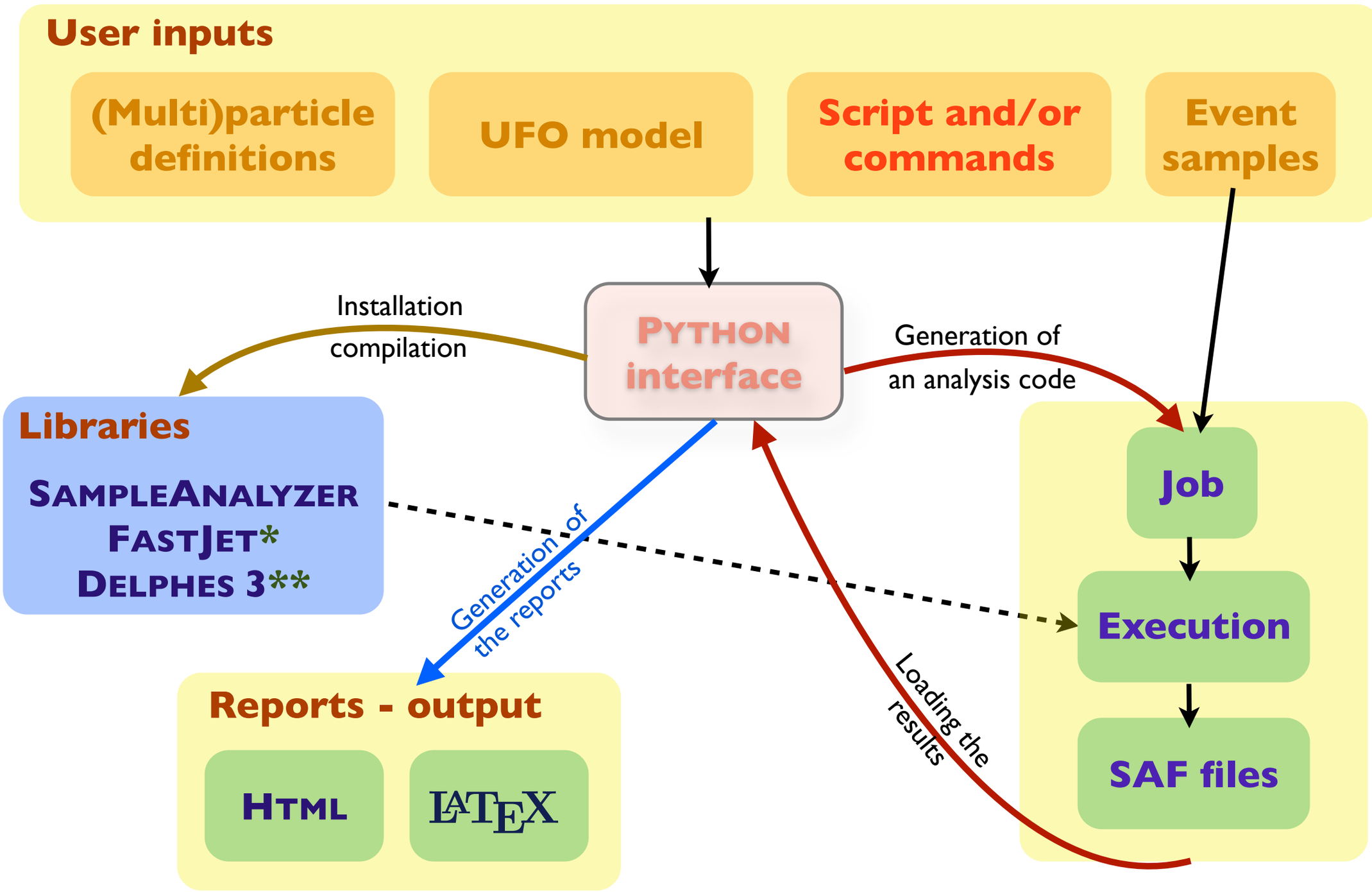
- Intuitive commands typed in the Python interface
- Analysis performed behind the scenes (black box)
- Human readable output: Html and LaTeX

Expert mode

- C++/Root programming within the SampleAnalyzer framework

MadAnalysis 5: normal running

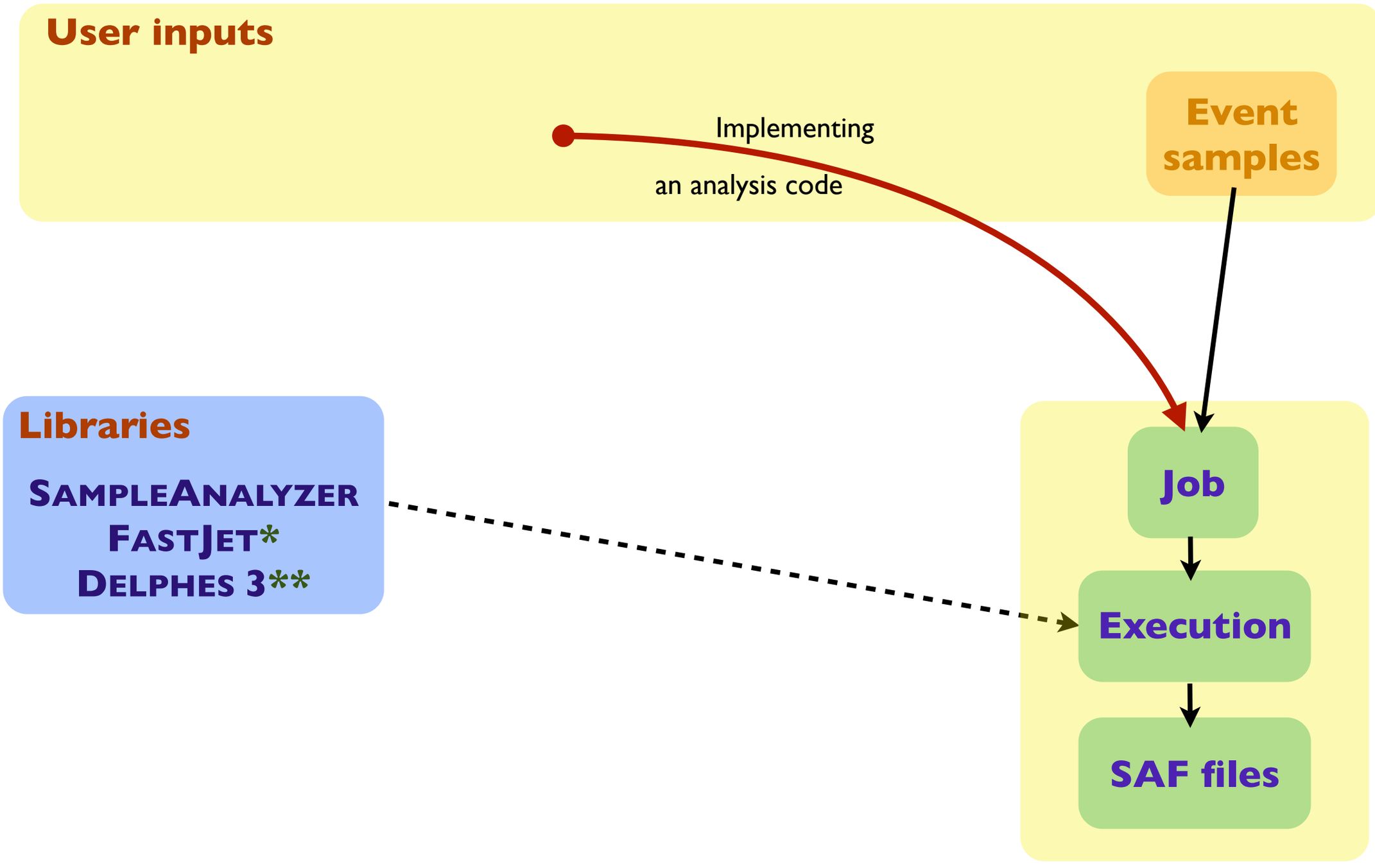
[Conte, Fuks, Serret (CPC '13); Conte, Fuks (arXiv:1309.7831)]



* [Cacciari, Salam (PLB '06)]
** [de Favareau, Delaere, Demin, Giammanco, Lemaitre, Mertens, Selvaggi (arXiv:1307.6346)]

MadAnalysis 5 for experts

[Conte, Fuks, Serret (CPC '13); Conte, Fuks (arXiv:1309.7831)]



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New features from MadAnalysis 5

✦ Xmas'13 version: v1.1.10 (to be downloaded from launchpad)

✤ Event file conversion: from anything to (homemade simplified) LHE or to LHCO

```
ma5>import samples/tag_1_pythia_events.hep.gz as ttbar
   -> Storing the file 'tag_1_pythia_events.hep.gz' in the dataset 'ttbar'.
ma5>set main.outputfile = ttbar.lhe.gz
```

✤ Simplified fast detector simulation (can be applied during the conversion)

```
ma5>set main.fastsim.package = fastjet
ma5>set main.fast
main.fastsim.algorithm              main.fastsim.bjet_id.misid_cjet   main.fastsim.ptmin
main.fastsim.bjet_id.efficiency     main.fastsim.bjet_id.misid_ljet   main.fastsim.radius
main.fastsim.bjet_id.exclusive      main.fastsim.exclusive_id         main.fastsim.tau_id.efficiency
main.fastsim.bjet_id.matching_dr    main.fastsim.package              main.fastsim.tau_id.misid_ljet
```

★ **b-tagging stuff**

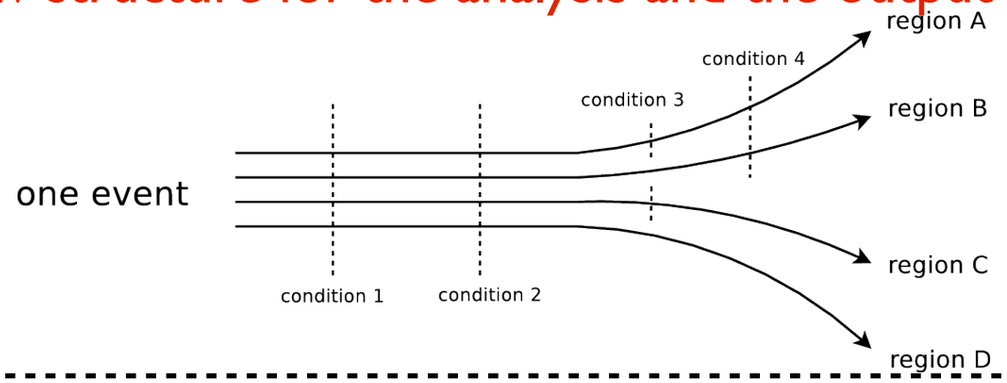
★ **Tau-tagging stuff**

✤ Interface to DELPHES 3 (or to a modified version of it for private usage)

```
ma5>install del
delfes   delphes
```

```
ma5>set main.fastsim.package =
delfes   delphes  fastjet  none
ma5>set main.fastsim.package = delphes
ma5>set main.fas
main.fastsim.detector  main.fastsim.output    main.fastsim.package   main.fastsim.pileup
ma5>set main.fastsim.detector = cms
```

✤ A new structure for the analysis and the output (only in expert mode for the moment)



✤ New observables:

- ★ alpha$_T$
- ★ transverse variables (M_{T2}, M_{T2W}, ...)
- ★ MT_MET

Development and news

The team

✤ E. Conte + B. Fuks + C. Wymant

⋆ Room for anyone interested

Interface to PYTHIA-8 + shower structure

✤ Running parton showering from the shell
✤ Mostly done - to be validated

Interface to HERWIG-6

✤ On its way
✤ HERWIG++ on the to-do list

Improving the simplified fastsim module

✤ Smearing
✤ Non trivial efficiencies

Compatibility with Herwig-generated files

✤ Including FxFx merging checks

Towards a dynamic library

✤ With all analyses, showers, plots, *etc.*, inside
✤ Compatibility with MADGRAPH5_aMC@NLO
✤ Compatibility with ATOM

Uncertainty bands

✤ Automatically accounted for in the plots
✤ New LHE format

Analysis library

✤ Many SUSY analyses of CMS and ATLAS soon public

⋆ Do not hesitate to add items
⋆ BUT remember: we are only three people