

Is this good enough?



LPCC workshop on

(Public) Fast Simulators for LHC
11-12 June 2012, CERN

Introduction
Sezen Sekmen (CERN)

Motivation

The workshop aims to bring together the developers of the existing and upcoming fast simulation tools, the experts from experiments, and the current and potential users in order to thoroughly discuss the current situation of the fast simulation tools and seek ways to improve them.

We would like to proceed towards realizing [Les Houches Recommendation for the Presentation of LHC Results, 2b](#).

Searches for New Physics: Les Houches Recommendations for the Presentation of LHC Results

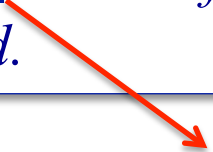
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C. Balazs, A. Barr, P. Bechtle, G. Belanger, A. Belyaev, K. Benslama,
M. Campanelli, K. Cranmer, A. De Roeck, M.J. Dolan, T. Eifert, J.R. Ellis,
M. Felcini, B. Fuks, D. Guadagnoli, J.F. Gunion, S. Heinemeyer,
J. Hewett, A. Ismail, M. Kadastik, M. Kraemer, J. Lykken, F. Mahmoudi,
S.P. Martin, T. Rizzo, T. Robens, M. Tytgat, A. Weiler

“We present a set of recommendations for the presentation of LHC results on searches for new physics, which are aimed at providing a more efficient flow of scientific information between the experimental collaborations and the rest of the high energy physics community, and at facilitating the interpretation of the results in a wide class of models. Implementing these recommendations would aid the full exploitation of the physics potential of the LHC.”

arXiv:1203.2489, Eur.Phys.J. C72 (2012) 1976

Recommendations on detector modeling

Recommendation 2b: *The community should take responsibility for providing, validating and maintaining a simplified simulation code for public use, reproducing the basic response of the LHC detectors. The validation and tuning of this tool should be based on comparisons with actual performance plots, and/or other inputs, made available by the experiments along the lines of Recommendation 2a. Limits of validity should be investigated and clearly documented.*



Recommendation 2a: *Provide histograms or functional forms of efficiency maps wherever possible in the auxiliary information, along with precise definitions of the efficiencies, and preferably provide them in standard electronic forms that can easily be interfaced with simulation or analysis software.*

Why are public FastSim tools necessary?

- LHC is producing many results. Every physicist naturally wishes to, and should have a right to, contribute to understanding these results. The community should share the work.
- There are so many theories waiting to be tested. Fast simulators are useful for making first rough interpretations quickly and guiding the way to detailed interpretation.
- Many new physics models have multiple parameters. We need “fast” tools to explore these.
- Currently it is not possible to unfold most new physics results.
- New search methods and variables are being proposed, and simple tools are needed to test their feasibility.

Public fast simulation frameworks

In alphabetical order

- **ATOM:** C. Bauer, M. Papucci, C. Vermilion, T. Volansky, A. Weiler
- **Delphes:** S. Owyn, X. Rouby, V. Lemaitre, P. Demin, J. de Favereau
<https://server06.fynu.ucl.ac.be/projects/delphes/wiki/WikiStart>
- **MadAnalysis5:** E. Conte, B. Fuks, G. Serret
<http://madanalysis.irmp.ucl.ac.be/>
- **PGS:** J. Conway
<http://physics.ucdavis.edu/~conway/research/software/pgs/pgs4-general.htm>
- **Turbosim:** B. Knuteson

What do we try to achieve?

- Various fast simulation frameworks exist, and are used by the community. We will learn about these tools and understand their limitations better rather than using them blindly.
- Public tools cannot achieve the precision of the collaboration tools, but there are some topologies in which they work well, while there are others in which they do not. We will look for ways to improve performance in necessary situations.
- The workshop consists mainly of discussion sessions dedicated to specific subjects which address ways to improve fast simulators.
- These discussions intend to be a starting point for communication between experiments and the rest of the community regarding sharing of the information necessary to validate public fast simulators.

Discussion sessions

1. I/O formats, run performance and analysis tools

11/06/12, 16:30 – 18:00; Chairs: B. Fuks, E. Conte

- Are there limitations due to run performance and how can they be improved?
- How can we avoid working with large input files? Can the fast simulators get the input from MCDB?
- Can the output content be easily configured by the users?
- Can we provide user-friendly analysis tools?

2. Object implementation, object performance

12/06/12, 09:30 – 11:00; Chairs: J. de Favereau, P. Demin

- Are the various detectors sufficiently well-defined?
- How can we refine the implementations of various objects?
- Can we build a systematic way to incorporate the efficiencies provided by experiments?

Discussion sessions

3. Implementation of difficult topologies

12/06/12, 11:30 – 13:00; Chair: C. Vermilion

- What are the difficult topologies of high physics interest?
- What are the shortcomings of the current tools when it comes to difficult topologies, and how can we improve these?

4. Validation

12/06/12, 14:30 – 16:00; Chairs: S. Kraml, S. Sekmen

- What information do we need from the experiments in order to validate FastSim tools properly?
- How can we systematize validation?
- Are there ways to automate validation?

Workshop output

3. Public fast simulators for the LHC twiki:

<https://twiki.cern.ch/twiki/bin/view/Main/PublicFastSimforLHC>

Intended as a common gateway to information about public FastSim for the LHC.

A results document?

Depending on the course of the workshop discussions, we could consider writing a short results document?

Let's have a fruitful workshop!

Your ideas and contribution are very welcome.

Thanks!