



Summary of the first workshop on LHC recasting

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LPTHE / UPMC

**Ist MADANALYSIS 5 workshop on LHC recasting
@ High I, Gangwon Province, Korea**

August 20 - 28, 2017



Aim of the workshop

◆ The LHC legacy

- ❖ It is crucial to be able to reinterpret the LHC results in any theoretical context
- ❖ **Reproducibility** is the ability of an entire experiment to be reproduced, (possibly by an independent theoretical study)

◆ Goal of this workshop: being part of this big adventure

- ❖ Learning about Monte Carlo simulations
- ❖ Learning about detectors
- ❖ Learning about the difficulties in the reimplementation of new physics analyses
- ❖ Learning about physics (in the Standard Model and beyond)
- ❖ **Performing (initiating) a actual reinterpretation work (validation included)**

MADANALYSIS 5

[Conte, BF, Serret (CPC '13); Conte, Dumont, BF, Wymant (EPJC '14)]

◆ What is MADANALYSIS 5?

- ❖ A (user-friendly and flexible) framework for **phenomenological analyses**
- ❖ **Any level of sophistication**: partonic, hadronic, detector, reconstructed
- ❖ **Several input** format: STDHEP, HEPMC, LHE, LHCO, ROOT (from DELPHES)
- ❖ **Interfaced** to other HEP packages (detector simulation, jet clustering, ...)

◆ Normal pythonic mode

- ❖ Intuitive commands typed in a **PYTHON** interface
- ❖ Analysis performed **behind the scenes** (a C++ black box)
- ❖ **Human readable output**: HTML and $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

◆ Expert mode

- ❖ **C++ programming** within the SAMPLEANALYZER framework (the MA5 core)
- ❖ Active development along the 'LHC recasting' line
- ❖ **Can be used for the reimplementaion of any cut-and-count LHC analysis**

The workshop project

◆ Reimplementation of 9 recent LHC analysis in the MADANALYSIS 5 framework

Analysis 1	CMS-EXO-16-012	Mono-Higgs
Analysis 2	CMS-EXO-16-022	Long lived particles
Analysis 3	CMS-SUS-16-041	SUSY (multilepton+jets)
Analysis 4	CMS-EXO-16-052	2l+MET
Analysis 5	ATLAS-EXOT-2016-15	VLQ
Analysis 6	ATLAS-EXOT-2016-25	monoHiggs (Higgs in bbar)
Analysis 7	ATLAS-EXOT-2016-32	Monophoton
Analysis 8	ATL-PHYS-PROC-2016-117	ttZ/ttW
Analysis 9	CMS-SUS-17-001	stop searches

- ❖ Translation of an experimental paper in C++
- ❖ Design of the detector simulation card
- ❖ Validation of the reimplementation
- ❖ Learning of some physics

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**A lot of hard work
has been injected in
the project**

Hard work from all groups



A gorgeous location



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Even the weather was nice!



And great Korean food!



SUSY

Extra-dims

Compositeness

GUT

???

And great Korean food!



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One workshop to rule them all out!

Status of all analyses

- ◆ All groups have worked very hard
 - ♣ **I am impressed!!**
 - ♣ Many analysis reimplementations are well advanced
 - ♣ Validation is sometimes also advanced

WOW!

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Many thanks to all participants!

[Application for being a tutor the next time]

Continuation of the work

◆ The workshop is not over

- ❖ 15.09: meeting for the organizers and tutors for a status update
- ❖ **02.10: analysis codes are due for check-up** (even if not validated)
- ❖ 16.10: meeting for the organizers and tutors for a status update
- ❖ **31.10: validated analysis codes are due** (merging with the PAD)
- ❖ 17.11: validation notes are due

◆ The next steps

- ❖ **Early December: one-day workshop in Seoul** (student presentations)
- ❖ Mid-December: submission of the proceedings (follow-up projects?)

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Please keep up with deadlines

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 - ❖ **Pyungwon**: the Standard Model and Beyond
 - ❖ **Giacomo & Nicolas**: compositeness
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 - ❖ **Taejeong**: top physics
 - ❖ **Hwi-Dong**: object reconstruction

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**Please be on board for
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Main person in charge of the practical details: **Eunbi Jang**,
The rest of the team: **Sunmi Wee, Jieun Jeong, Brad Kwon**

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