YR4: the way forward

LHCHXSWG

status after 10th general meeting

The SC is always trying to improve your working conditions...

Next General Meeting

The 11th Workshop of the LHC Higgs Cross Section Working Group

13-15 January 2016
CERN
Europe/Zurich timezone

Search

General Assembly Meeting of LHC Higgs Cross Section Working Group

- Overview
- LHCHXSWG TWiki page
- Subscribing to the HXSWG mailing list
- Agenda
- Registration
- Participant List
- Entrance to CERN
- Videoconference Rooms

The LHC Higgs cross-section working group (HXSWG) was created in January 2010. The aim of this group was to produce agreements on cross sections, branching ratios and pseudo-observables relevant to SM and MSSM Higgs boson(s). In spring 2012, the group was restructured and new subgroups were added with the goal of discussing Higgs property/measurement and BSM extensions. Three CERN Reports have been completed, "Inclusive Observables" (CERN-2011- 002), "Differential Distributions" (CERN-2012-002), and "Higgs Properties" (CERN-2013-004). These achievements facilitated the comparison and combination of Higgs results at LHC since the beginning of the LHC physics program me. After 5 years of activities, our group has been reorganized in 2014 in order to prepare the future run at higher energy. The group is organized in three working groups: (1) cross-sections & branching ratios, (2) Higgs properties and (3) beyond the Standard Model. Each of these groups involve some task-force subgroups.

In this 11th general assembly meeting, we shall review the progresses made in the various groups for the Higgs physics in LHC RUN-2 and beyond.

Starts 13 Jan 2016 09:00
Ends 15 Jan 2016 17:00
Europe/Zurich

CERN
Main Auditorium

Anastasiou, Charalampos
de Florian, Daniel
Grojean, Christophe
Maltoni, Fabio
Mariotti, Chiara
Nikitenko, Alexandre
Savard, Pierre
Schumacher, Markus

Registration for this event is now open
Deadline: **6 Jan 2016**

Register now

book the dates (and your room at the CERN hostel)

Timeline for CERN Report 4 (YR4)

- An outline by July 31, 2015 (before your vacation!)
- A first draft by Nov. 15, 2015
- CERN Report 4 should be finished by Jan. 31, 2016

SVN depository will be prepared
and instructions sent around

Guide of good conduct

- stick to the timeline

- November 15 there should be a first draft, and people can work on the content until the closing date (January 31), but without adding new stuff (unless something miraculous goes on)

- only the arguments, plots, numbers etc discussed and agreed by the group/sub-group will go inside the YR4 (at least 1 month of "contingency" to give the people the time to react, think, etc …)

- last minutes numbers, plots etc… do not get into the YR4

CERN–2016–xxx
31 January 2016

Draft version o.0

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE

CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Handbook of LHC Higgs cross sections:
4. Unravelling the nature of the Higgs sector

Report of the LHC Higgs Cross Section Working Group

Editors: C. Anastasiou
D. de Florian
C. Grojean
F. Maltoni
C. Mariotti
A. Nikitenko
M. Schumacher
R. Tanaka

GENEVA
2016

Conveners

WG1: Higgs XS& BR B. Mellado, P. Musella, M. Grazzini, R. Harlander

WG2: Higgs properties M. Dührssen, A. David, A. Falkowski, G. Isidori

WG3: BSM Higgs N. Rompotis, M. Pelliccioni, I. Low, M. Mühlleitner

ISBN XXX
ISSN XXX

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This Report should be cited as:
LHC Higgs Cross Section Working Group, C. Anastasiou, D. de Florian, C. Grojean, F. Maltoni, C. Mariotti, A. Nikitenko, M. Schumacher, R. Tanaka (Eds.), *Handbook of LHC Higgs Cross Sections: 4. Unraveling the nature of the Higgs sector*, CERN-2016-XXX (CERN, Geneva, 2016).

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Abstract

This Report summarises the results of the activities in the period 2014–2015 of the LHC Higgs Cross Section Working Group. The main goal of the working group was to present the state of the art of Higgs Physics at the LHC, integrating all new results that have appeared in the last few years. This report follows the first working group report *Handbook of LHC Higgs Cross Sections: 1. Inclusive Observables* (CERN-2011-002) and the second working group report *Handbook of LHC Higgs Cross Sections: 2. Differential Distributions* (CERN-2012-002). *Handbook of LHC Higgs Cross Sections: 3. Higgs properties* (CERN-2013-004). *BlaBla...*

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[1] B. Mellado, P. Musella, M. Grazzini, R. Harlander (eds.); plus Authors
[2] M. Dührssen, A. David, A. Falkowski, G. Isidori (eds.); plus Authors
[3] N. Rompotis, M. Pelliccioni, I. Low, M. Mühlleitner (eds.); plus Authors

1 WG1: Higgs XS& BR[1]

1.1 Standard Model Parameters

1.2 PDF recommendations for Higgs

1.3 ggF

1.3.1 Inclusive results at N3LO+

1.3.2 Comparison of tools for pTH, y, pTjets, etc (possible recommendation ?)

1.3.3 Jet Binned cross sections, comparison and recommendation (?)

1.4 VBF and VH

1.4.1 Fully Differential "NNLO" calculation for VBF

1.4.2 H+3jets at NLO+PS

1.4.3 ggF H+3jets at NLO

1.4.4 Fully Differential "NNLO" calculation for VH

1.4.5 NNLOPS for VH (if ready?)

1.4.6 NNLO QCD corrections to differential H→ bb decay

1.4.7 gg→Zh+jet (recommendation and uncertainties)

1.4.8 EW corrections (recommendation)

1.5 ttH

1.5.1 Report on tool comparisons : tt + b jets, tt +jets, tt +H/Z/W, tt+gammas

1.5.2 Review of new TH results and recommendations: 1) pp→ tH + jets at NLO, 2) Off-Shell tth with top leptonic decays, 3) pp→tt +H/Z/W at NLO QCD +EW

1.6 Off-Shell

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1.7 Branching Ratios

1.7.1 SM BR updates for 125 GeV Higgs

1.7.2 Dalitz decays (recommendation)

1.7.3 Update on MSSM BR

1.7.4 Exotic decay evaluation (with WG3)

1.8 Higgs Pair Production

1.8.1 Update on inclusive cross section at NNLO+NNLL ($m_t \to \infty$)

1.8.2 Progress on the inclusion of mt effects and uncertainties

1.8.3 Distributions with comparisons between tools

1.8.4 Benchmarks for BSM studies

1.8.5 Experimental Outlooks/projections

1.9 Fiducial Cross Section (along with WG2)

[1] B. Mellado, P. Musella, M. Grazzini, R. Harlander (eds.); plus Authors

2 WG2: Higgs properties[2]

2.1 EFT

2.1.1 Choice of basis and relation between basis (Higgs Basis, SILH, WARSAW, . . .): unitary gauge, Goldstone+Ghost terms

2.1.2 ROSETTA tool for translation

2.1.3 Tools for event generation in EFT

2.1.4 Towards NLO predictions

2.1.5 Validity of EFT analyses (e.g. comparison with explicit models) ?

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2.2.2 From simplified/template cross sections in production?

2.2.3 implementation in an explicit model?

2.3 Fiducial cross sections?

2.3.1 Fiducial xs vs simplified/template xs?

2.3.2 Model independence of the acceptances in the different bins/regions?

[2] M. Dührssen, A. David, A. Falkowski, G. Isidori (eds.); plus Authors

3 WG3: BSM Higgs[3]

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3.1.1 Higgs Singlet Extension of SM

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3.1.3 CP conservative benchmarks

3.1.4 CP violating 2HDM

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3.2.2 Inclusive cross-sections and uncertainties in benchmark scenarios

3.2.3 Recommendations for MC generation and associated uncertainties

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3.4.3 Prompt decays with MET

3.4.4 Decays with displaced vertices

[3] N. Rompotis, M. Pelliccioni, I. Low, M. Mühlleitner (eds.); plus Authors

CERN Report 4

- SVN (Subversion)
  - Guide

    https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWGHigggsRepository
  - Repository

    https://svnweb.cern.ch/cern/wsvn/lhchiggsxs/

  If your are not familiar with SVN, ask your EXP buddy !
- CERN Report 4 Instruction

  https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWGCERNYellowReport

  LaTeX
  - Please follow the common macros (units, particle names) !

    https://twiki.cern.ch/twiki/pub/LHCPhysics/LHCHXSWGCERNYellowReport/RulesAndInstructions.pdf
  - Please use the ROOT macro for common figure style !
  - Please use BibTeX with Inspire labeling (to avoid double count) !

LHCHXSWG Documentations

- Library https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWGLibrary
- Documentation types
  1. **CERN Report** (*CERN-2015-001*)
     - CERN **Yellow Reports**
  2. **Public Notes, Official Report** (*LHCHXSWG-2015-001*)
     - Interim Recommendation/Report/Proceedings, etc.
     - Can be submitted to arXiv.
     - Citable by the collaborations.
  3. **Internal Notes** (*LHCHXSWG-INT-2015-001*)
     - Work Review/Plan
     - Not ideal for citation by the collaborations.

CERN Document Service

- LHC Higgs XS WG CDS collection
  - https://cds.cern.ch/collection/LHC%20Higgs%20Cross%20Section%20Working%20Group
- CDS instruction
  - https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWGCDSGuide

1. **Submission**: anyone in e-Group lhc-higgs can submit.
2. **Modification**: only who submitted, Steering Committee or WG1/2/3 conveners can modify any record.
3. **Posting Comment**: anyone with CERN full account or CERN Lightweight External account can post the comments.
4. **Approval**: only SC member can push "Extra status" button for Draft or Approved status in LHCHXSWG Official Report category.

SC strongly recommends that you use SVN for co-editing and for the record.

RIP Y. Nambu

1921-2015