LHC H XS WG
7th general meeting
12-13 June 2014, CERN

Introduction
Outline

• A bit of history
• The group as of today
• How did we organized this meeting
A bit of history

• In 2008 Giampiero Passarino had the idea of the group for the first time, underlying the urgency, since a discovery could come sooner than expected!

• In August 2009 we met at the cafeteria of B40 (Passarino, Mariotti, Murray, Nisati, Qian and Stoeckli)

• In Torino, in November 2009 (the exact day LHC delivered the very first pp interaction!) the group was formed and the program was discussed.

• Jan 2010 the experiments formally recognize it.
Workshops

• April 2011: first official general workshop of the group in Freiburg: the subgroups presented already many results that will then go to the YR1

• Followed by few others:

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Date</th>
<th>Home page</th>
<th>Agenda</th>
<th>Minutes</th>
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<tr>
<td>The 6th Workshop at CERN 2012</td>
<td>May 24-25, 2012</td>
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<td>The 5th Workshop at LAL 2011</td>
<td>Nov. 21-22, 2011</td>
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<td>The 4th Workshop at BNL 2011</td>
<td>May 4-6, 2011</td>
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<td>The 3rd Workshop at Bari 2010</td>
<td>Nov. 4-5, 2010</td>
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<tr>
<td>The 2nd Workshop at CERN 2010</td>
<td>Jul. 5-6, 2010</td>
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<td>Minutes</td>
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<tr>
<td>Inauguration Workshop in Freiburg 2010</td>
<td>Apr. 12-13, 2010</td>
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<td>Minutes</td>
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• Plus many more sub-groups meetings
The results

• The Yellow Report 1 (CERN-2011-002) 17-Feb-2011: 
  Handbook of LHC Higgs cross sections:
  1. Inclusive variables
  
  720 citation, 64 authors

• The Yellow Report 2 (CERN-2012-002) 12-Jan-2012 
  Handbook of LHC Higgs cross sections:
  2. Differential distributions
  
  341 citation, 141 authors

• The Yellow Report 3 (CERN-2013-004) 29 July 2013 
  Handbook of LHC Higgs cross sections:
  3. Higgs Properties
  
  139 citations, 157 authors
# The structure up to this spring

## Overall Contacts

<table>
<thead>
<tr>
<th>ATLAS</th>
<th>CMS</th>
<th>THEORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reisaburo Tanaka (LAL)</td>
<td>Chiara Mariotti (Torino)</td>
<td>Sven Heinemeyer (IFCA)</td>
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<td></td>
<td>Giampiero Passarino (Torino)</td>
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## Subgroup Contacts and Link for Subgroup Wiki

- We are organized in 11 subgroups, with 1-2 experimental contacts from each ATLAS and CMS and 2-4 theoretical contacts for each subgroup.

<table>
<thead>
<tr>
<th>Group</th>
<th>Higgs decay</th>
<th>ATLAS</th>
<th>CMS</th>
<th>THEORY</th>
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</thead>
<tbody>
<tr>
<td>1. ggF</td>
<td>yy, WW, ZZ</td>
<td>Biagio di Micco (Roma Tre)</td>
<td>Giovanni Petrucciani (CERN)</td>
<td>Daniel de Florian (Buenos Aires)</td>
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<td>Kirill Melnikov (Johns Hopkins)</td>
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<td>Frank Petriello (Northwestern)</td>
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<tr>
<td>2. VBF</td>
<td>tt, yy, WW, ZZ</td>
<td>Daniela Rebuzzi (Pavia)</td>
<td>Pietro Govoni (CERN)</td>
<td>Ansgar Denner (Würzburg)</td>
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<td>Carlo Oleari (Milano-Bicocca)</td>
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<td>3. WH/ZH</td>
<td>bb</td>
<td>Jason Nielsen (UCSC)</td>
<td>Andrea Rizzi (Pisa)</td>
<td>Stefan Dittrich (Freiburg)</td>
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<td>Giancarlo Ferrera (Milano)</td>
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<tr>
<td>4. ttH</td>
<td>bb</td>
<td>Aurelio Juste (Barcelona) Peter Onyisi (Texas)</td>
<td>Chira Neu (Virginia) Andrea Rizzi (Pisa)</td>
<td>Laura Reina (Florida) Michael Spira (PSI)</td>
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<tr>
<td>5. HH</td>
<td>all</td>
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<td></td>
<td>Charged</td>
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<tr>
<td>8. Heavy Higgs and BSM</td>
<td>Neutral &amp; Charged</td>
<td>Sara Digio (Melbourne) Kriszlan Peters (CERN)</td>
<td>Mario Pellecchio (Torino/CERN) Mario Kadamuk (INCRT Estonia)</td>
<td>Margarete Muehlleitner (Karlsruhe) Heather Logan (Carleton)</td>
</tr>
<tr>
<td>9. Branching ratios</td>
<td></td>
<td>Daniela Rebuzzi (Pavia)</td>
<td>Ivica Puljak (Split)</td>
<td>Sven Heinemeyer (IFCA) Alexander Mück (Aachen)</td>
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<tr>
<td>10. Jets</td>
<td></td>
<td>Bruce Mellado (Whitewatersend)</td>
<td>Daniele Del Re (Roma 1)</td>
<td>Gavin Salam (CERN) Frank Tackmann (DESY)</td>
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<td>11. NLO MC</td>
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<td></td>
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<td>Stefano Frixione (CERN) Frank Krauss (Durham) Fabio Maltoni (Louvain)</td>
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<td>12. PDF</td>
<td></td>
<td>Joey Huston (Michigan State)</td>
<td></td>
<td>Stefano Forte (Milano) Robert Thorne (UCL)</td>
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</tbody>
</table>
THANKS!

• To Giampiero Passarino, Stefan Dittmaier and Sven Heinemeier for the huge work done as Overall Contacts.

• We -experimentalists were a big pain sometime... ! A dinner is waiting for you!
Towards today

But about this we will discuss on Friday...

No comments today, a part some from me !!!
The “big” change

• In Nov 2009 the theory community asked the experimental community to appoint the Overall Conveners, and so we did.
• Up to 2014 there were 1 overall contact from Atlas, 1 from CMS and 2 from Theory
• From 2014, given that the group was widening the goals and dimension, we decided to have 2 contact from each experiments and 4 from TH
  -> Steering Committee

• After Easter the TH community organized itself: the existing 3 TH Overall Contacts (appointed by the experiments) invited an international group of theory leaders to form a “Theory Advisory Committee” with the task to select the theory members of the SC. The TAC endorsed the role of the 3 theorists and chose, in addition, a 4th theory member in the SC.
The Steering Committee

- **ATLAS**: Reisaburo Tanaka
  Markus Schumacher
- **CMS**: Chiara Mariotti
  Sasha Nikitenko
- **TH**: Babis Anastasiou
  Daniel De Florian
  Christophe Grojean
  Fabio Maltoni
The Theory Advisory Committee

• Guido Altarelli
• Sally Dawson
• Lance Dixon
• Nigel Glover
• Zoltan Kunszt
• Hitoshi Murayama
• Alex Pomarol
• Gavin Salam
The structure of the Higgs XS WorkingGroup

3 main sub-groups:

- **WG1**: XS and BR for SM Higgs

- **WG2**: Higgs Properties

- **WG3**: BSM
WG1: XS and BR

• Conveners: Bruce Mellado (A), Pasquale Musella (C), Robert Harlander (TH) + 1TH more

• Original subgroups:
  - ggF
  - VBF
  - VH
  - ttH and bbH
  - HH
  - BR
  - PDF
  - Jets
  - MC at NLO

Structure to be discussed during this meeting. Shall we keep it as it is, or do you think an evolution would be beneficial?
WG2: Properties

- Contacts: Michael Duehrssen (A), Andre David (C), TH1, TH2

- structure to be discussed in this meeting
WG3 : BSM

• Contacts: Nikolaos Rompotis (A), Mario Pelliccioni (C), Ian Low (TH), +1TH

• Subgroups:
  – Proposal: MSSM moves here

The rest to be discussed in this meeting
Twiki and more

- [https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWG](https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWG) here you find information on the organization, the XS, BR up to date values, a collection of plots and hopefully all the info you may need!

- Mailing list: [lhc-higgs@cern.ch](mailto:lhc-higgs@cern.ch)
  To register go to: [https://e-groups.cern.ch](https://e-groups.cern.ch)
This workshop

• 3 sessions for each WG – not only a report from the groups, but also individual contributions on updates on the most recent results (contrary to the usual modus operandi).

• A discussion session on the program and structure of the WG and on the overall HXSWG organization etc... on Friday afternoon with a contribution from Sergio Bertolucci (RD of CERN) and the experiment’s managements.

(HXSWG workshops will be help twice per year)
It's a lot of work ...

S. Dittmaier, summary talk at BNL May 2011.... .

... but acting as a team we can make it !

.... and we did it !

So let’s continue.
Social dinner

• In Thoiry: Bergerie de Baizenas.

• Bring 35 euros today to Reisaburo or me.

• We are only 14 with the cars and 58 to go, so we have to be 4.15! in the car

  Let’s meet at the entrance of B40 at 7:00 sharp, to car-pool and leave.

Instructions:
1) from CERN go to Saint Genis, at the first big round-about go left direction Thoiry.
2) Take the first exit "St Genis - Sergy". At the round about go straight towards the mountains, leaving the Holiday Inn on your right.
3) At the end of the road there is a T cross. Turn right, and then immediately (i.e. ~10 meters) left (direction Gex)
4) Take the second road on your left (i.e. ~400 meters after), called Chemin de Baizenas (a panel will indicate the bergerie/restaurant).
5) Continue straight up towards the mountains for about 500 meters.
6) The chalet is on your right.