

Joint efforts on Higgs Cross Sections ATLAS – CMS - Theory

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LHC Higgs Group

ATLAS and CMS Higgs communities wish to create a working group for discussion of Higgs cross sections.

- The aim is to produce agreements on cross sections, branching ratios and pseudo-observables relevant to SM and MSSM Higgs.
- Recommendation on input parameters and errors (α_s , PDF uncertainty, scale uncertainty, top/bottom masses, etc.).
- Recommendation on how the cross sections of background processes, luminosity errors and any common b-tag uncertainties etc. should be handled.
- Agreement on these issues will facilitate comparison and combination of results. This will require the active collaboration of the leading theorists developing the tools.
- We therefore propose setting up a common group between ATLAS, CMS and theoretical community, to discuss and recommend on these issues, producing numbers that both experiments can use.
- In close collaboration with SM XS task force and Statistics forum.

Joint effort on Higgs cross section

Mandates

- 2-year mandate for contacts.
- Group should continue until one or both experiments feel it is no longer required.
- The contact will report progress to the each Higgs working group.

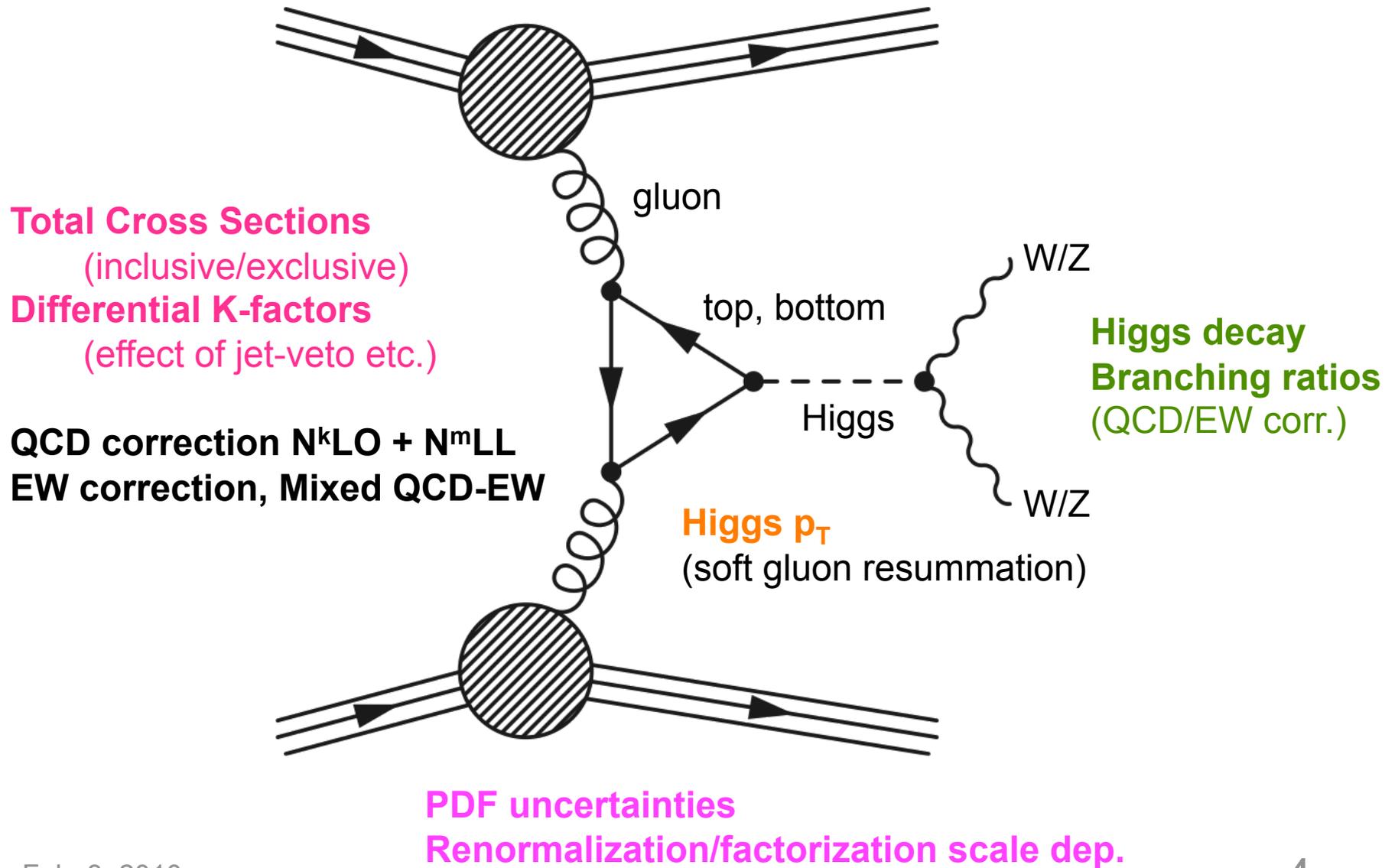
Precautions

- The group is open to everyone who wish to contribute, but this is not a forum for general interest in Higgs physics. Mailing list should be kept short.
- Unreleased data results from the collaborations will not be shown or discussed in this group.

Meeting

- 3-4 times per year.
 - 1st meeting at Freiburg in April. When/Where for the 2nd and 3rd ?
- Meeting agenda open in InDico and announce in mailing list.
- Report and write minutes to the collaboration.

ggF, VBF, WH/ZH, ttH, MSSM Higgs



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Cross Section Tools (non-exhaustive)

ggF

HIGLU (NLO)
FEHiPro (NNLO)
HNNLO (NNLO)

VBF

VV2H (NLO)
VBFNLO (NLO)
HAWK (NLO)

WH/ZH

V2HV (NLO)

ttH

HQQ (NLO)

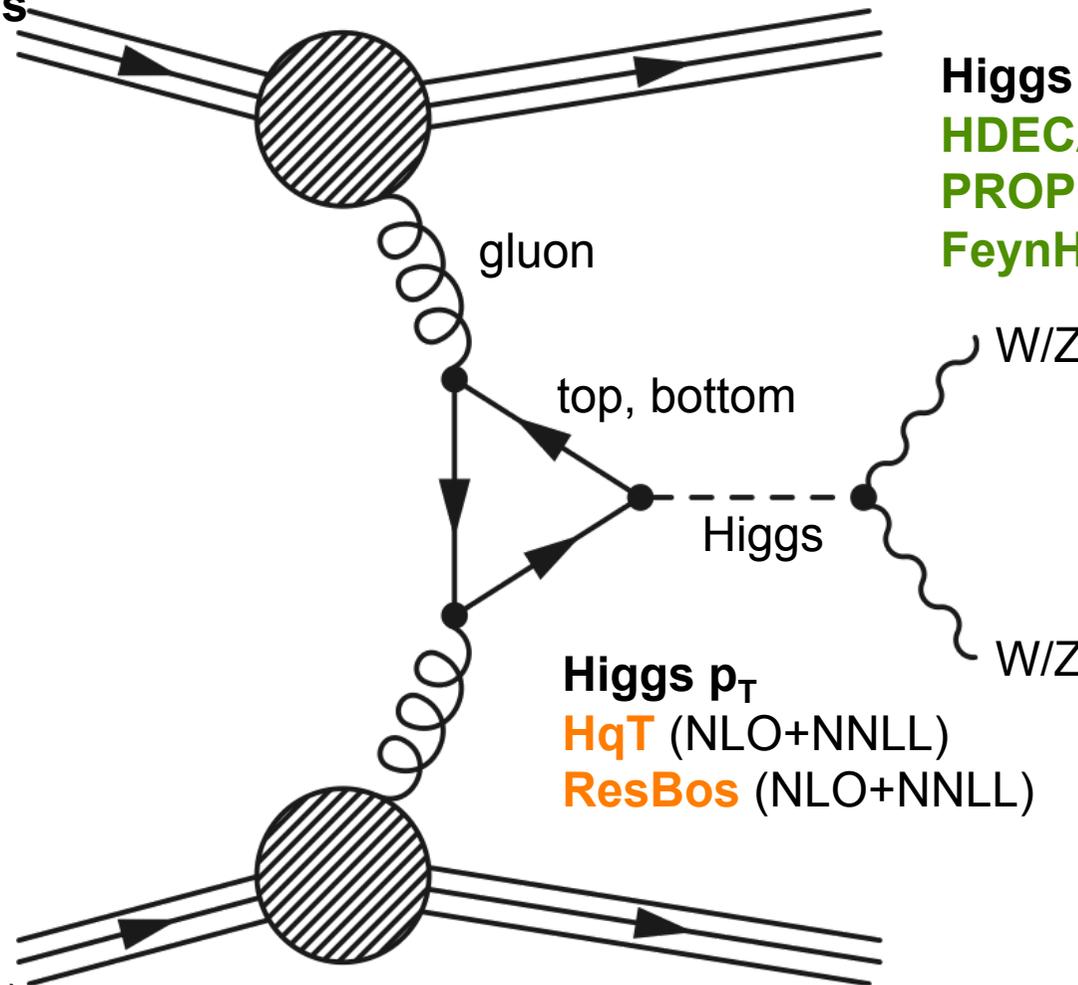
bbH

bbH@NNLO (NNLO)

PDF: **MSTW, CTEQ, NNPDF**

Higgs Decay

HDECAY (NLO)
PROPHECY4f (NLO)
FeynHiggs



+ private codes.

Experiment Contacts

ATLAS

Overall	Reisaburo Tanaka (LAL)
1. ggF	Jianming Qian (Michigan)
2. VBF	Daniela Rebutti (Pavia)
3. WH/ZH	Giacinto Piacquadio (CERN)
4. ttH	Simon Dean (UCL)
5. MSSM neutral	
	Markus Warsinsky (Freiburg)
6. MSSM charged	
	Martin Flechl (Uppsala)
7. PDF	Joey Huston (Michigan State)
8. BRs	Daniela Rebutti (Pavia)
9. NLO MC	Jaehoon Yu (Texas)
10. Pseudo-observable	
	*

CMS

Chiara Mariotti (Torino)
Fabian Stoeckli (CERN)
Christian Hackstein (Karlsruhe)
Jim Olsen (Princeton)
Chris Neu (Virginia)
Monica Vazquez Acosta (IC)
Sami Lehti (Helsinki)
Kajari Mazumdar (Mumbai)
Ivica Puljak (Split)
*
Martin Grunewald (Dublin)

* to be appointed.

Experiment Contacts

Ex-officio

	ATLAS	CMS
Higgs conveners	Ketevi Assamagan (BNL) Bill Murray (RAL)	Andrey Korytov (Florida) Vivek Sharma (UCSD)
MC Gen. conveners	Claire Gwenlan (Oxford) Judith Katzy (DESY)	Fabio Cossutti (Trieste) Fabian Stoeckli (CERN)
SM XS task force	Jon Butterworth (UCL)	Roberto Chierici (Lyon)
Freiburg organizer	Markus Schumacher (Freiburg)	

Theory Contacts

Overall	Giampiero Passarino (Torino)	Stefan Dittmaier (Freiburg)
1. ggF	Frank Petriello (Wisconsin)	Massimiliano Grazzini (Firenze)
2. VBF	Ansgar Denner (PSI)	Carlo Oleari (Milano-Bicocca)
3. WH/ZH	Stefan Dittmaier (Freiburg)	Robert Harlander (Wuppertal)
4. ttH	Michael Spira (PSI)	Laura Reina (Florida)
5. MSSM neutral		
	Georg Weiglein (DESY)	Michael Spira (PSI)
6. MSSM charged		
	Tilman Plehn (Heidelberg)	Michael Kraemer (Aachen)
7. PDF	Stefano Forte (Milano)	Robert Thorne (UCL)
8. BRs	Sven Heinemeyer (IFCA)	Ansgar Denner (PSI)
9. NLO MC	Fabio Maltoni (Louvain)	Paolo Nason (Milano-Bicocca)
10. Pseudo-observable		
	Giampiero Passarino (Torino)	Sven Heinemeyer (IFCA)

Few remarks

- ggF

- MSSM neutral Higgs will study both ggF and bbh.
- SM ggF calculation is handled in group 1.
- Keep close contact between SM ggF and MSSM Neutral.

- Higgs NLO MC

- In ATLAS and CMS, a quite good structure already exists, MC Generator working group which is in close contact with multi-purpose Monte Carlo generators like Pythia, Herwig, Sherpa, including issues like underlying event, minimum bias events.
- The right place to ask multi-purpose MCs, Parton Shower MC is therefore, 1) each experiment's MC Generator working group, and 2) LHC wide efforts such as MC4LHC or Les Houches.
- We should avoid duplicating of such efforts, and our new group should concentrate on Higgs cross sections (ex. Differential K-factor) and Higgs specific MC issues.

Actions

- Please start to contact each other among ATLAS, CMS and theory contacts for each subgroup.
 - Define the short-term and long-term milestones.
 - Build automatic calculation machinery (first at 7 TeV).
 - Common input parameters will be discussed later via mailing list.
 - Tools and the first results should be presented at Freiburg meeting.
 - Start discussions on how to define the PDF, scale uncertainties etc.

Outcome of Chamonix: Steve Myers (Feb. 3, 2008)

LHC runs for 18 to 24 months

- at a collision energy of 7 TeV (3.5 TeV per beam),
- to reach integrated luminosity of 1fb^{-1} .

After that, long shut down to reach the LHC design 14 TeV.

Freiburg Workshop

2 day workshop April 12 (Mon.) - 13 (Tue.)

- Arrive in Freiburg Sunday evening.
- Monday from 9:00 or 10:00 to ~19:00
 - Introduction, Working group talk 30 minutes + 30 min discussion
- Tuesday morning -> early afternoon
 - Continue with the working group talks, Summary talk on work to be done.

3 day workshop April 12 (Mon.) - 14 (Wed.)

- Monday afternoon (13:00 -):
 - Introductory talks (1 or 2), Working group talk 20 minutes
 - Tuesday:
 - Parallel sessions: mainly discussion and working.
 - Wednesday morning:
 - Report back on progress and future work plan, Discussion.
- ✓ We may have pedagogical review talk(s) for students and post-docs.
- ✓ We should have a plenty of discussion/working time.

Communication Tools

a) Mailing list

lhc-higgs@cern.ch

<https://groups.cern.ch/group/lhc-higgs/>

- open access to everybody for those who are willing to work in the group.

lhc-higgs-contact@cern.ch

<https://groups.cern.ch/group/lhc-higgs-contact/>

- for discussion among contact persons and for steering.

Subscription method for lhc-higgs@cern.ch

- those who do not have an account at CERN
 - Apply for a CERN Computing Account or CERN External Account at <https://cernaccount.web.cern.ch/cernaccount/>
 - Or send an e-mail to rei.tanaka@cern.ch or chiara.mariotti@cern.ch

Experiment and Theory contact persons have already been added to these two mailing lists. So, don't worry.

Communication Tools

b) Twiki

<https://twiki.cern.ch/twiki/bin/view/LHCPhysics/HiggsTwikiPage>

starting to fill the information.

c) InDico

<http://indico.cern.ch/categoryDisplay.py?categId=2792>

Home > Conferences, Workshops and Events > Workshops > LHC Physics > Higgs > Higgs Cross Section

d) Code Repository

- LCG/GENSER server: <http://lcgapp.cern.ch/project/simu/generator/> ?
 - Pythia/Herwig/MC@NLO/ALPGEN etc. are already integrated.
 - Supported by GENSER term. Link to documents.
- LHC Physics Center at CERN server ?
- Our own SVN ?

Let's start to work together !