

LHCHXSWG

13th general meeting -- concluding remarks
CERN, July 2017

on behalf of the Steering Committee

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At a FCC meeting in January, MLM explained that synergy is
when one person is bringing the meat/vegetables and another one the fire
Without each other, the meal would have been rather tasteless



Yes, the HXSWG can organize BBQ!
(many thanks to Marco)



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And we know that it takes 2 to tango
(any help, even moral one, is important)

The show must go on!

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WGI

ggF 503-1-001 - C
VBF 503-1-001 - C
Off shell 503-1-001 - C
Coffee break 503-1-001 - C
VH 503-1-001 - C
ttH 503-1-001 - C

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WG2

1 EFTs/POs and STXS/fdXS

2 Well-defined interpretation schemes (benchmarks)

3 Extension to Electroweak data

3 documents

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WG3

* XS for neutral Higgs:

- Extend to 5TeV using the EFT approach.

Done: https://twiki.cern.ch/twiki/bin/view/LHCPhysics/CERNYellowReportPageBSMA13TeV#gluon_gluon_Fusion_Process it uses the EFT of <https://arxiv.org/pdf/1605.05761.pdf>

* MSSM:

- Update all the numbers following the update in the mH calculation in MSSM.

- Provide Benchmark Points for the new low mass mH scenario, and for MSSM-EFT.

- Study the Higgs pT @ NLO.

* NMSSM:

- Provide Benchmark Points for existing ATLAS/CMS channels -> there are many WPs but theorists don't know what ATLAS/CMS need.

Agreed to iterate with theoreticians just before publication to get online feedback.

* bbH:

- New XS to replace Santander matching.

- Can we have differential distributions comparisons? Can you compare the Powheg/MG5_aMCatNLO/sherpa?

- Aim to do similar study for cH (3FS LO UFO model exists but not NLO).

* Charged:

- Please provide a model for interpreting the S channel and the pair production mechanisms.

Rachid et al will work on models for charged higgs pair production.

Flavourful model provides numbers for the S channel.

* Extended:

- Check whether there is interesting physics case for 3HDM, LRS, CPV, SM+Triplet model -> have numbers (XS/BR) for that one.

CPV is already being studied by Maggie et al.

- Benchmarks and XS for searching the H5 states in GM with low masses below 200GeV; Simulation for loop-induced H+ -> W+ gamma with fermiophobic H+ in GM.

- Interface the theory constraints, like perturbativity, unitarity etc for singlet into ScannerS (this is mainly to check the validity of the phase points where width of H become pretty large).

- 2HDM + Singlet (real/complex) in the twiki (Maggie - <https://arxiv.org/abs/1612.01309>/Stefania - <https://arxiv.org/pdf/1312.4992.pdf>) - have BRs in the twiki -> compare the BRs and ATLAS/CMS use it.

- Flavourful model for cH LO 3FS in the UFO -> can be used for the correct XS/distributions.

* Exotic:

- h-> M W, M Z (where M is a meson): comparison of the XS obtained using the QCD factorization approach (ArXiv:1609.06310) and those recommended in the YR4 -> want to have final recommendations for those BRs (since there is a new different paper).

- More feasibility studies for Higgs rare decays beyond gamma+J/Psi, gamma+phi, gamma+Upsilon; Feasibility studies for h-> Zf + MET development of benchmarks predicting this type of signatures -> will prepare few slides to advertise new signatures.

- Study of feasible Higgs decays involving 1 or more displaced vertices; What is the best way to present Higgs displaced searches to allow a simple recast by theorists? -> LLP effort working on that too (will have white paper).

- Adding convener from LHCb.

* General:

- Iterate exp-the just before publication to get online feedback.

- Identify missing signatures motivated by various models that are not covered by ATLAS/CMS in three steps: 30fb-1 (up to 2016), 100 fb-1 (up to 2017), 300 fb-1 (end of run2).

- Prioritize the various Benchmark Points from all the models/scenarios per channel in order to synchronise the ATLAS/CMS interpretation results.

- Improve mass predictions further.

- Good Benchmark:

1. Fulfill our searches constraints.

2. Fulfill our measurements (Higgs but also pure SM searches) constraints.

3. Fulfill theory constraints, like rho etc.

4. Feasible for our publications, so ideally (if we don't discover anything) we would like to have a benchmark that fulfill 1-3 and that we can exclude some points with 30 fb-1, more points with 100 fb-1 and more with 300 fb-1.

We plan to have papers now, then at the end of run2 and then with 300 fb-1 -> I believe the best will be to have the same benchmark and to show the progress in exclusion with time.

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together are preparing the analyses
that will be fully carried on at HL-LHC
(differential distributions, ttH, HH...)

The forthcoming challenges...



When we have been excellent, the biggest difficulty is to remain excellent

A few things will change...

- ▶ No plan for YR5 (at least for the next couple of years)
- ▶ Interest on more specific notes HXSWG recommendations
 - Can start as Internal notes
 - Official Reports
 - can be cited by exp. collaborations
 - can be submitted to the arXiv
 - reviewed by WG members & SC
 - practical details on twiki page
- ▶ Encourage discussions within WG/SubWG/XG
 - vidyo meetings
 - on-site meetings (limited support available)
 - keep twiki updated (roadmap and timeline for notes)

Mark your calendar...

"Workshop on the physics of HL-LHC, and perspectives at HE-LHC"

Kickoff meeting October 30-November 1

Next General Meeting after Moriond 2018 (March 26-27 Monday/Tuesday)

Have a safe trip back home!

Enjoy the summer

(while reading the good book on the beach)