

HL/HE-LHC yellow Report

WG1 SM/Top Activities

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May Topical Meeting

Current Activities

- February / March meetings helped list analysis topics and identify contributors
- Since then we have attempted to bring together interested parties across experimental and theory communities on specific topics
 - To prompt discussions on specific topics
 - Share of experience, tools, MC samples and workload among contributors
 - If you have not received e-mails from us that linked you to other collaborators, let us know!
- Immediate goal is to advance studies as fast as possible
 - Experimental HL-LHC analyses will need collaboration approval and need to keep on schedule
 - Stand-alone HE-LHC studies, that do not need collaboration approval, have looser time-scale but should get in shape soon
 - Theoretical calculations should become available (e.g. tables) soon to be used in experimental analyses
 - Experimental systematics approach should become available soon as well
 - Plan now for inputs needed from experimental groups for pseudo-data interpretations, e.g. distributions and uncertainties for PDF and EFT
- Work in parallel on chapter layout and sections that discuss theoretical tools

Documentation

- TWiki pages: <https://twiki.cern.ch/twiki/bin/view/LHCPhysics/HLHEWG1>
 - List of Contributors per section:
https://twiki.cern.ch/twiki/bin/view/LHCPhysics/HLHEWG1#Draft_Table_of_Contents_of_repor
 - Table with experimental analysis phase spaces:
https://twiki.cern.ch/twiki/bin/view/LHCPhysics/HLHEWG1#Fiducial_Phase_Spaces
 - Input to theorists to start calculations with same phase spaces as in experimental analysis
 - We invite more experimental teams to post more entries

Fiducial Phase Spaces:

Here follows a table with selection cuts applied by different analyses to define the fiducial phase space.

Process	Experiment	Main Contact	Selection requirements
ssWW_{CP}	ATLAS	Claire Lee	2 same-charge leptons $p_T > 25$ GeV; $m_{ll} > 20$ GeV; MET > 40 GeV; 2 jets $p_T > 30$ GeV; $d_{\text{eta}}(\text{jet}, \text{jet}) > 2.4$; $m_{jj} > 500$ GeV; centrality > 0
Tt-gamma	ATLAS		1 photon $p_T > 25$ GeV; 1 (2) lepton $p_T > 25$ GeV; ≥ 4 (2) jets $p_T > 25$ GeV; ≥ 1 bjets; $dR(\text{photon}, \text{jet}) > 0.4$; $dR(\text{photon}, \text{lepton}) > 1.0$; for single(di) lepton channel
s-channel	ATLAS		1 electron or muon $p_T > 30$ GeV, exactly 2 b-tagged jets $\text{abs}(\text{eta}) < 2.5$ and $p_{T, \text{jet}} > 30$ GeV. MET > 35 GeV and $m_T(W) > 30$ GeV
VBS WZ	ATLAS	Corinne Goy	Fully leptonic : 3l with $P_T > 15$ GeV and $\text{abs}(\text{eta}) < 4.0$, one with $P_T > 25$ GeV, SFOC leptons compatible with Z mass (10 GeV), 3rd lepton with $P_T > 20$ GeV and W transverse Mass (3rd lepton + missing ET) > 30 GeV, 2 jets in opp. hemisphere with $P_T > 30$ GeV and $\text{abs}(\text{eta}_{\text{jet}}) < 3.8$, $M_{jj} > 500$ GeV
WWW	ATLAS	Nenad Vranjes	Fully leptonic : 3l with $P_T > 30$ GeV and $\text{abs}(\text{eta}) < 4.0$, $\Phi(\text{PT}_{\text{ll}}, \text{P}_{\text{tmiss}}) > 2.5$, OS leptons compatible with Z mass (15 GeV), at most 1 jet with $P_T > 30$ GeV, and $\text{abs}(\text{eta}) < 2.5$; b-jet veto with $P_T > 30$ GeV, and $\text{abs}(\text{eta}) < 2.5$; Semileptonic : 2l with $P_T > 20$ GeV and $\text{abs}(\text{eta}) < 4.0$, at least two jets $p_T > 30$ GeV, and $\text{abs}(\text{eta}) < 2.5$, dilepton mass > 40 GeV, $\text{P}_{\text{tmiss}} > 80$ GeV, $d_{\text{eta}}(\text{jet}, \text{jet}) < 2.5$, $60 < m_{jj} < 120$ GeV, 3rd lepton veto $P_T > 6$ GeV, and $\text{abs}(\text{eta}) < 2.5$, b-jet veto with $P_T > 30$ GeV, and $\text{abs}(\text{eta}) < 2.5$

Chapter draft

- Skeleton of WG1 chapter draft is already in overleaf
 - Strategy: contributors will provide convenors with LaTeX text and we will integrate it in overleaf
- Target for whole chapter: ~150 pages.
- Page allocation per section is approximate
 - Introduction - 10 pages
 - Theoretical Tools 25 pages
 - MC Generators (5 pages), High Order QCD calculations (5 pages), EW corrections (5 pages), PDF tools (5 pages), EFT tools (5 pages)
 - Electroweak processes - 35 pages
 - Vector boson fusion processes (5 pages), Vector Boson scattering (10 pages), Triboson production (5 pages), Precision EW measurements (10 pages), Forward EW physics (5 pages)
 - Strong Interactions - 26 pages
 - Jets and photons (8 pages), Ultimate Parton Densities (10 pages), Forward and Soft QCD physics (8 pages)
 - Top Physics - 36 pages
 - Top cross section (5 pages), Top properties (10 pages), Top couplings (5 pages) , Top mass (8 pages), FCNC (8 pages)
 - Effective coupling interpretations - 10 pages

Schedule

- Next WG1 topical meetings:
 - 14th May: EW meetings: <https://indico.cern.ch/event/721951/>
- Focus now is on fast progress on analyses
- Preparation for June 18th-20th meeting at CERN:
<https://indico.cern.ch/event/686494/>
- Afterwards, focus will shift on analysis completion and draft write-up
- September 2018: Full Draft Chapters
- December 2018: Submission