

Discussion of the YR2 Draft

... a long way to go !

Chiara, Giampiero, Reisaburo & Stefan

Contents

- 1 General guidelines**
- 2 Comments to specific sections**

Most important: the deadline

Nov 30, 2011

↪ after that no more results can be included, no changes are possible

A quote from <http://www.thefreedictionary.com/deadline> about

“deadline”:

“1. A time limit, as for payment of a debt or completion of an assignment.”

“2. A boundary line in a prison that prisoners can cross only at the risk of being shot.”

General guidelines

The aim

is to produce a **coherent document** in a as much as possible uniform style.

The only way

to achieve this if **WE ALL** respect the following guidelines as closely as possible.

This means

that in many places still **a lot of work** still has to be invested!

↪ common style in figures, diagrams, tables & text

Author lists

- include all people that actively contributed to the report
 - ↳ discard inactive members, even conveners (e.g. \$%@ @#)
- dump the authors into a footnote as in YR1
 - ↳ also for authors of subsections (e.g. Section 5 on ggF)

Tables

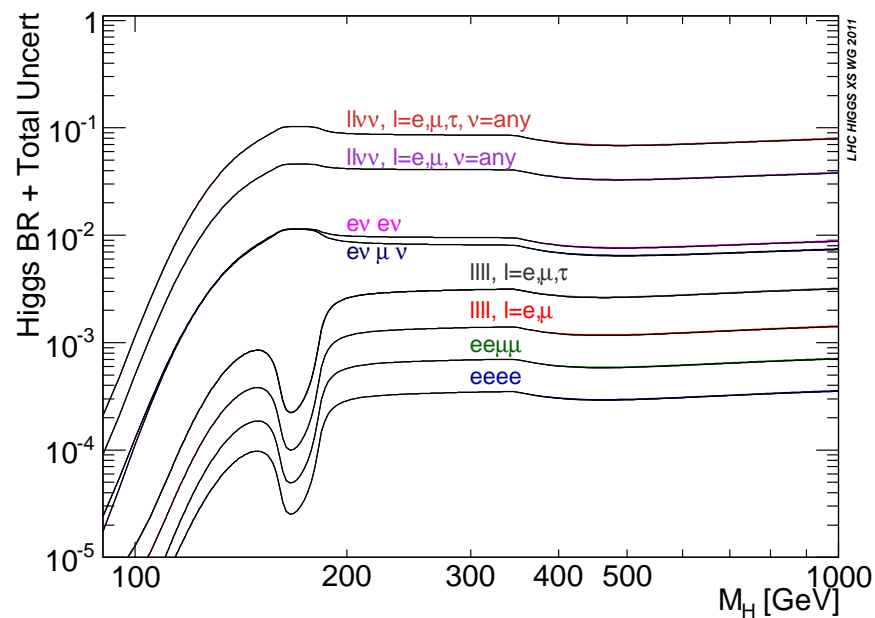
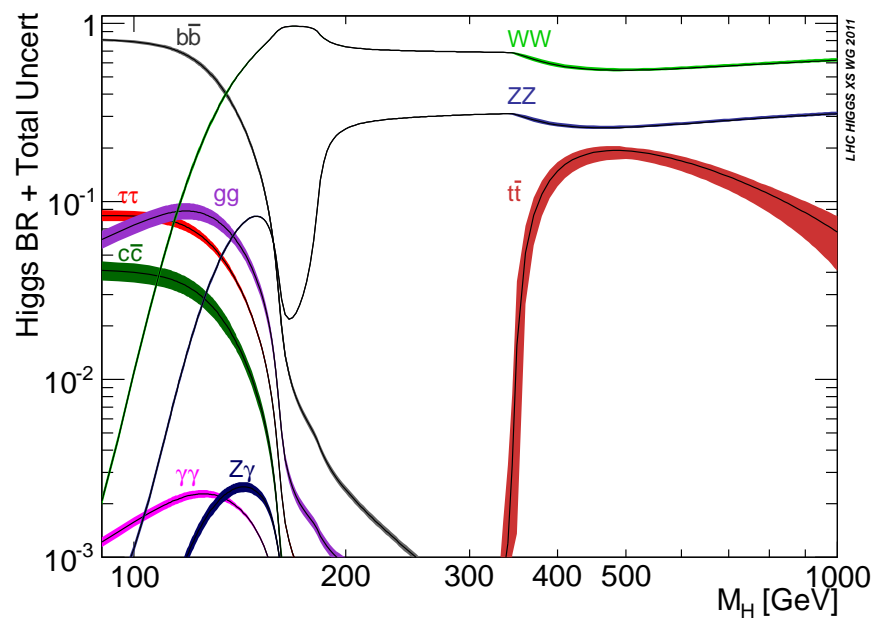
- **Integration errors:**
please give central values and errors with reasonable accuracy!
Proposal: give 4 digits with integration error for the last digit:
 $0.xxxx(y)$ – if $y = 0$ omit it.
- **Scale, PDF + α_s errors:** please give errors in %, not in absolute terms,
give errors in two digits: $\pm x.y\%$,
if errors are asymmetric, give two columns: $+x.y\%$, $-v.w\%$
- Give **one column with the final theory error**, resulting from addition in quadrature.
- **Vertical/horizontal lines**
→ please follow YR1 style (=minimal set of horizontal, no vertical lines)
- **Avoid breaking the text with too many tables!**
→ Put long tables at the end of your section or in the appendix.
- **Caption** above table.

Figures

- Please prepare **plots for the most important results**, e.g. for cross sections in the specific channels.
- Please prepare **plots using the prescriptions+template** provided on the wiki page: <https://twiki.cern.ch/twiki/bin/view/LHCPhysics/CERNYellowReport>
- **Do not use too bright colours** / keep black&white printing in mind
→ See Section 13 in Graphics Guidelines on the IOP site: <http://authors.iop.org/atom/usermgmt.nsf/AuthorServices>
- **Caption below figure!**
- Don't forget the **“LHC-Higgs XS” logo** as used in the plots of the BR section. Please all extend this logo with “2011” (and make sure that it will not be 2012!).

This can be done in ROOT by calling like `LHCHIGGS_LABEL(0.98,0.18)`.
Package `lhchiggsstyle-v1.zip` has been updated, please download again from TWiki, and check the example `LHCHiggsExample.eps`.
- **The figure width should be half of the full width:**
`\includegraphics[width=0.48\textwidth]{abc.eps}`

Examples: (from the BR group)

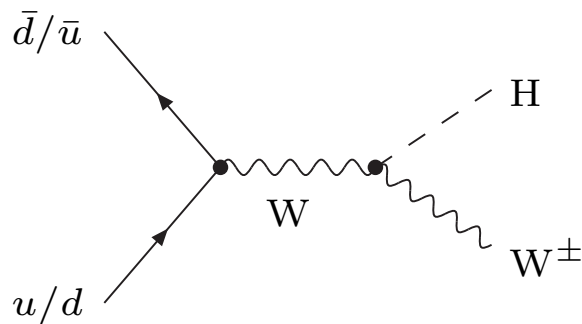


The logo may also be a bit larger. ;-)

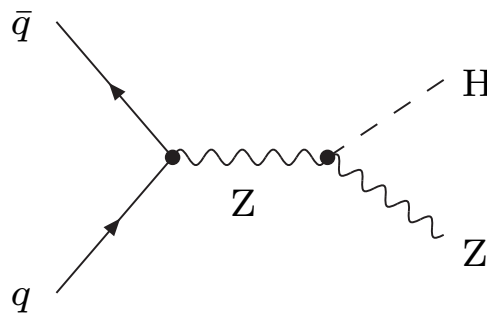
Feynman graphs

- use `axodraw`.
- indicate vertices with thick points
→ `\Vertex` command !
- use latex shorthands `\Pe`, etc., for particle names
→ see file `heppenames2.sty`
- rescale the Feynman graphs to a size similar to the one used in YR1.
→ put figure within `{\unitlength .6pt \scriptsize \SetScale{.6} ... }` or similar.

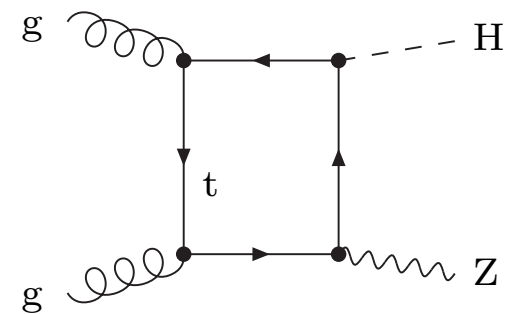
Example:



(a)



(b)



(c)

Text

- use latex shorthands `\Pe`, etc., for particle names
→ see file `heppenames2.sty`
- use latex shorthands `\MH`, etc., for particle masses (and other parameters)
→ see file `lhchiggs.sty`
- Please put numbers appearing in the text consistently in math mode like $\$1\%\$$.
Write ranges like $\$1\{-\}2\%\$$ with `\{-\}`.
- introduce text abbreviations such as LO, EW, PDF, etc., in a self-contained way in each section.
↪ Do not use `\def` or `\renewcommand`,
but instead `\newcommand` or `\providecommand`
- use latex shorthands for units: `\UGeV`, etc.
→ see file `cernunits.sty`
- use natural units, i.e. $c = 1$ so that $GeV/c^2 \rightarrow GeV$ etc.
- define intervals via $a < b < c$, not via $a \leq b \leq c$
- use latex font `\sc` for program names

References/labelling

- use latex shorthands for referencing: `\Ref`, `\Refs`, `\Bref`, `\Brefs`, etc.
→ see file `cernall.sty`
- use latex shorthands for table/figure labels:
`\Figure`, `\Figures`, `\Table`, `\Section`, `\Eq`, etc.
→ see file `cernall.sty`

Comments to specific sections

Preliminary comment:

The specific comments refer to “revision 3768” of YR2 (last Friday, Nov 18)

↪ see http://wwwth.mppmu.mpg.de/members/dittmair/YRHXS2_revision3768.pdf

Some comments may already be outdated (hopefully!).

Section 2: Branching Ratios

Section in good shape

Contents:

- fix author list
- Table 1 + text in Sect. 2.1.2: eliminate redundant input !
↳ refer to App. of YR1
- (3): stress asymmetric errors?
- Table 4, 1st line of $H \rightarrow t\bar{t}$: two numbers in errors interchanged ??
- Tabs. 5–24: shorten and put full set on wiki page ?
- Table 8: How is $H \rightarrow t\bar{t}$ calculated below $t\bar{t}$ threshold ?
- Sect. 2.2: **results missing**
- Sect. 2.2.1: make last sentence clearer

Section 2: Branching Ratios (continued)

Technicalities:

- use particle-mass shorthands such as $\backslash MH$, $\backslash MZ$, etc.
- use $\backslash GF$ for Fermi constant
- TU \rightarrow THU as in YR1
- I.342/360: “dominate the error” \rightarrow “serve as error estimate” ?
- Sect. 2.2: cross references missing

Section 3: PDFs

Section in good shape

Contents:

- (9): better write $\sigma(\dots)^2$ instead of $\sigma^2(\dots)$?
- Table 25: bigger font to improve readability ?
- Figs. 13–16: **scale up figures !**
- new recipe for PDF+ α_s errors at NNLO ?

Technicalities:

- use particle-mass shorthands such as $\backslash MH$, $\backslash MZ$, etc.
- use particle shorthands such as $\backslash PH$, $\backslash Pg$, etc.
- (8) does not fit into one line
- I.528: “LHC xsec” → correct name !
- I.546: “averages move two classes” – what does that mean ?

Section 4: NLO Parton Shower

Contents:

- Figs. 17–20, 22, 26: scale up figures
- Sect. 4.2.2 completely missing
- Sect. 4.3.3 complete the TODO part

Technicalities:

- use standards for refs. to “Fig.”, “Ref.”, “Tables”, “Eq.”, etc.
- **particle and mass symbols are a mess !** → use predefined shorthands
 $p \rightarrow p, g \rightarrow g, m_H/m_h \rightarrow M_H$ – **also in plots !**
- use `\alphas`
- M for invariant masses instead of m ?!
- l.644: sentence is somehow corrupt
- unify notation for R^s, R^f, R_s, R_f
- Sect. 4.2.3: cross references missing
- l.779: reference to non-existing Fig. 4.3.2

Section 5: gluon fusion

Contents:

- common introduction to all subsection to avoid many repetitions
- l.1473: replace “elsewhere in this report” by explicit reference !
- l.1564: point out whether $\mu = \mu_F = \mu_R$

Technicalities:

- put authors of subsections into footnote as for sections
- use \backslash alphas
- $p_T \rightarrow p_T$
- **particle and mass symbols are a mess !** → use predefined shorthands
 $W \rightarrow W, g \rightarrow g, m_t/M_t \rightarrow m_t, m_H/M_H \rightarrow M_H$ – **also in plots !**
- l.1052+: $\Delta(t + b, exact) \rightarrow \Delta(t + b, exact)$, etc.
- use standards for refs. to “Fig.”, “Ref.”, “Tables”, “Eq.”, etc.
- (23) and (38) do not fit into one line
- l.1206+: $\mu_f, \mu_r \rightarrow \mu_F, \mu_R$
- Sect. 5.3: replace Σ by σ for a cross section ?!
- l.1379,1423: “ \ll ” → \lll
- l.1511,1517: make $+5\% - 3\%$ and $\pm 1 - 2\%$ clearer

Section 6: VBF

Contents:

- Sect. 6.1.1: Why are initial-state b's and s -channels
- Sect. 6.1.2, 2nd par.: mention that decays in VBFNLO are LO, not NLO ?!
- Sect. 6.1.3: initial b's included in POWHEG → incompatible with HAWK above !
- (47): CKM effects should be irrelevant, again compatibility ?!
- (52): give ref. for numbers
- Tabs. 29+31: **disagreement in “w/ EW corr” !**
↳ clarify issue or omit questionable results !
- Sect. 6.3.1: include α_s uncertainty in PDF
- Sect. 6.3.2: mention PDF insensitivity of δ_{EW}
- Tabs. 30+32 and Sect. 6.3.3: “NLO” → “NLO QCD”
- Fig. 44 and Tab. 33: is it “NLO QCD” ? VBFNLO in Fig. 44 ?

Technicalities: → looks good !

- l.1731,1788: missing refs.
- Figs. 38–43: make legends in plots bigger for better readability

Section 7: WH/ZH

Contents:

- HAWK reference for WH/ZH still missing
- Tab. 34: statement on PDF or better PDF $_{+\alpha_s}$ uncertainties
- PDF $(+\alpha_s)$ uncertainties for distributions ?

Technicalities:

↪ removed already by our vacuum cleaner

Section 8: ttH

Contents:

- I.2040: “very important” → at best “desirable”
- **Where are the results ???**
↪ we hope there will be any ...
- most likely there won't be results for ttbb @ 7 TeV !
I.2120: results @ 14 TeV can be found in Ref.[215] as well
- **please clean the author list !**
new uncertainty principle ? $\Delta(\#authors) \times \Delta(\#results) > \hbar/2$

Technicalities:

- use standards for refs. to “Ref.”, etc.
- use `\alphas`
- use particle shorthands such as `\PH`, `\Pg`, etc.

Section 9: $\gamma\gamma$

Completely missing ! → 5* disaster

↪ no contribution at all if not coming before Nov 30 !



Section 10: WW decay mode

Contents:

- author list ?
- Sects. 10.1+10.2: **still missing**
- l.2183: complete “.....”
- **More results ???**

Technicalities: → a true disaster !

- use standards for refs. to “Fig.”, “Ref.”, “Tables”, “Eq.”, etc.
- use predefined shorthands for particle and mass symbols
 $W \rightarrow W$, $g \rightarrow g$, $m_t/M_t \rightarrow m_t$, $m_H/M_H \rightarrow M_H$ – **also in plots !**
- “pdf” → “PDF”
- l.2168: sentence corrupt
- caption above tables please !
- M for invariant masses instead of m ?!

Section 11: ZZ decay mode

Contents:

- fix author list
- l.2278+: complete and update
- Tab. 40: font too small → split table, maybe shift to App. ?
- set $c \rightarrow 1$ everywhere ! → Figs. 49,50,54-57,59-62
- (65)-(68): physical units missing
- Fig. 61: correct “ $q\bar{q}/gg \rightarrow \dots \rightarrow m_{2e2\mu}$ ” (and improve style)
- Sect. 11.4.5: “Summary” missing

Section 11: ZZ decay mode (continued)

Technicalities:

- use predefined shorthands for particle and mass symbols
 $Z \rightarrow \mathbb{Z}, H \rightarrow \mathbb{H}, t \rightarrow \mathbb{t}, b \rightarrow \mathbb{b}, M_{Z_1} \rightarrow \mathbb{M}_{Z_1}, m_H/M_H \rightarrow \mathbb{M}_H$
also in plots and table !
- unify notation for leptons $l, \ell \rightarrow \mathbb{L}$
- Fig. 56: conform notation for m_{LL} in plot legend
- Tab. 41+42: clean style in caption and table (and elsewhere)
- $p_T \rightarrow \mathbb{p}_T$
- M for invariant masses instead of m ?!
- Figs. 51+52: switch off background colour
- use standards for refs. to “Fig.”, “Ref.”, “Tables”, etc.

Section 12: MSSM neutral

in surprisingly good shape !

Contents:

- finalize author list
- mention “neutral” in title
- l.2562: **part still missing**
- Sect. 12.2.2: point out that section deals with SM (not MSSM) for illustration
- Figs. 63+64: indicate that “matched” means “Santander matched” ?
- set $c \rightarrow 1$ everywhere ! \rightarrow Figs. 69
- Sect. 12.3.4.3: merge and make clearer 2nd+3rd paragraph ?!
- Fig. 70: small vertex blobs and larger indication of counterterm insertions !
- Sect. 12.3.4.5: several missing cross references
- after (81): explicit parametrization of *off-shell* Higgs ?!
- p.142: drop footnote, because M.W. is author himself ?!
- Sect. 12.3.6: **part still missing**



Section 12: MSSM neutral (continued)

Technicalities:

- use predefined shorthands for particle and mass symbols
 $H \rightarrow \text{H}, t \rightarrow \text{t}, b \rightarrow \text{b}, m_H \rightarrow M_H, m_A \rightarrow M_A, m_t \rightarrow m_{\text{t}}, A_t \rightarrow A_{\text{t}}, \text{etc.}$
also in plots !
- $m_h^{\max} \rightarrow m_{\text{h}}^{\max}, p_T \rightarrow p_{\text{T}}, \mu_R \rightarrow \mu_{\text{R}}$
- l.2537: which “program”
- “pdf” \rightarrow “PDF”
- l.2651,2653: refs. missing
- l.2694: change style of $\widehat{m}_{\text{t}}, \widehat{m}_{\text{b}}$
- M for invariant masses instead of m ?!
- l.2951,2970,2992: missing cross refs.
- l.2934: make “see below” clearer
- use `\alphas`
- Tabs. 45-48: caption above table

Section 13: MSSM charged

Contents:

- I.3037: perform “CHECK”
- Sect. 13.1.2: update and remove “xxxxxxxxxxxxx...” (appearing twice)
- (89): I -function not defined
- I.3059: complete “TODO”
- Figs. 77,80-82: physical units missing !
scale plots up for better readability
- Sect. 13.2: **still missing**

Technicalities:

- $m_h^{\max} \rightarrow m_h^{\max}$
- “pdf” \rightarrow “PDF”

Section 14: SM4

Contents:

- take over last changes from paper draft
- put long tables into App. ?

Technicalities:

↪ removed already by our vacuum cleaner

Section 15: Higgs lineshape

Contents:

- I.3484: “It is worth nothing ...” ;-)
- (124),(125)-(128): better write $\Gamma_{H \rightarrow f}(s)$, $\sigma_{ij \rightarrow H}(s)$, etc. ?
- (134): include old ref. here ?!
- I.3529: why necessarily Eq.(132) ant not fixed-width BW ?
- (147): $\int dQ^2 / (2\pi)$ missing ?
- (149),(150): really important ? omit ?
- Tab. 61: define ξ
- Tab. 64 and I.3606: δ is not “ratio”, but “relative deviation”
- generally: include also some low values of $M_H \sim 100-200$ GeV ?

Section 15: Higgs lineshape (continued)

Technicalities:

- l.3339: move footnote mark to title
- replace final state f by F to avoid confusion (f = fermion elsewhere) ?
- l.3400: line too long
- l.3413: “ \ll ” \rightarrow \lll
- (113): make superscripts h, v uppercase ?
- Tabs. 59-70: reduce vertical spaces to standard table format
- l.3572: “sqrt”
- use predefined shorthands for particle and mass symbols
 $H \rightarrow \text{H}$
- l.3637: rename δ ?
- Figs.: rescale plots to accommodate 2 plots per page
- Figs. 85+86: shift “GeV” from “Higgs virtuality” to “200” (since $[\mu_{\text{H}}] = \text{GeV}$)
- Fig. 87: $OS \rightarrow \text{OS}$ in plot (right axis)
- Fig. 91: replace gluino-like lines by straight lines ?

If we all make a common effort ...



... there still could be a happy end !