aN3LO PDFs for Run3 & YR5

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WG1 ggF: Current Tasks

Run 3 Update (Now)

Goal: Update ggF Cross Section for Run 3

Timeline: End of Summer 2024

Location: https://github.com/bmistlbe/InclusiveHXSUpdate (currently template)

N^3LO QCD HTL Dulat, Lazopoulos, Mistlberger 18

NNLO QCD Quark Mass Corrections Czakon et al. 21, 23

Mixed QCD-EW Corrections Becchetti et al 20

PDF Uncertainties

Yellow Report 5 (Next)

Goal: Update ggF Cross Section for Run 3 & HL-LHC + Boosted Higgs + …

Timeline: General Assembly 2025

Location: https://scipost.org/SciPostPhysCommunityRep (currently empty)

Room for other topics of exp/th interest — please propose them!

Parameter Choices

Most parameters fixed: (thanks to Karlberg, Mistlberger, Malcles, Di Nardo)

https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHWG136TeVxsec

Each group asked if they can produce full or reduced scan

Each group asked if $m_H != 125$ BSM scan is possible

Additional parameters/choices:

Central Scale set to $\mu_0 = \frac{m_H}{2}$

Requested 7-point scale variation

No omissions/ambiguities yet identified in above settings

1. iHixs2 Run 3 Parameter Update

Old: $\delta\sigma_{PP\to H+X} = \delta(\mathrm{PDF}+\alpha_s) + \delta(\mathrm{theory}) = \left[\delta(\mathrm{PDF}+\alpha_s)\right] + \left[\delta(\mathrm{scale}) + \delta(\mathrm{EWK}) + \delta(t,b,c) + \delta(1/m_t) + \delta(\mathrm{PDF}-\mathrm{TH})\right]$

New: $\delta\sigma_{PP\to H+X} = \delta(\mathrm{PDF}+\alpha_s) + \delta(\mathrm{theory}) + \delta(\mathrm{PDF}-\mathrm{TH}) = \left[\delta(\mathrm{PDF}+\alpha_s)\right] + \left[\delta(\mathrm{scale}) + \delta(\mathrm{EWK}) + \delta(t,b,c) + \delta(1/m_t)\right] + \left[\delta(\mathrm{PDF}-\mathrm{TH})\right]$

Running iHixs2 with recommended parameters:

$\sqrt{s}$ [TeV]	M_H [GeV]	σ [pb]	δ(theory)	δ(scale)	δ(EWK)	δ(t, b, c)	$\delta(1/m_t)$	$\delta(\mathrm{PDF}+\alpha_s)$	δ(PDF)	$\delta(\alpha_s)$	δ(PDF − TH)
13.6	120.00	56.03	$^{+3.16}_{-5.42}\%$	$^{+0.31}_{-2.57}\%$	$\pm1.00\%$	$\pm0.85\%$	$\pm1.00\%$	$^{+2.67}_{-2.27}\%$	$^{+1.65}_{+1.65}\%$	$^{+2.11}_{-1.56}\%$	$\pm1.21\%$
13.6	122.00	54.40	$^{+3.14}_{-5.37}\%$	$^{+0.30}_{-2.53}\%$	$\pm1.00\%$	$\pm0.84\%$	$\pm1.00\%$	$^{+2.67}_{-2.26}\%$	$^{+1.65}_{+1.65}\%$	$^{+2.10}_{-1.55}\%$	$\pm1.20\%$
13.6	124.00	52.87	$^{+3.12}_{-5.33}\%$	$^{+0.29}_{-2.50}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.67}_{-2.26}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.55}\%$	$\pm1.18\%$
13.6	124.60	52.43	$^{+3.11}_{-5.32}\%$	$^{+0.28}_{-2.49}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.67}_{-2.26}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	124.80	52.28	$^{+3.11}_{-5.32}\%$	$^{+0.28}_{-2.49}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.67}_{-2.26}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	125.00	52.13	$^{+3.11}_{-5.31}\%$	$^{+0.28}_{-2.48}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.67}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	125.09	52.07	$^{+3.11}_{-5.31}\%$	$^{+0.28}_{-2.48}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.67}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	125.20	51.99	$^{+3.11}_{-5.31}\%$	$^{+0.28}_{-2.48}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.67}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	125.30	51.92	$^{+3.10}_{-5.30}\%$	$^{+0.28}_{-2.48}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.66}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	125.38	51.86	$^{+3.10}_{-5.30}\%$	$^{+0.28}_{-2.48}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm1.00\%$	$^{+2.66}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.18\%$
13.6	125.60	51.70	$^{+3.10}_{-5.30}\%$	$^{+0.28}_{-2.47}\%$	$\pm1.00\%$	$\pm0.82\%$	$\pm1.00\%$	$^{+2.66}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.17\%$
13.6	126.00	51.41	$^{+3.10}_{-5.29}\%$	$^{+0.27}_{-2.47}\%$	$\pm1.00\%$	$\pm0.82\%$	$\pm1.00\%$	$^{+2.66}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.10}_{-1.54}\%$	$\pm1.17\%$
13.6	128.00	50.00	$^{+3.07}_{-5.24}\%$	$^{+0.26}_{-2.43}\%$	$\pm1.00\%$	$\pm0.81\%$	$\pm1.00\%$	$^{+2.66}_{-2.25}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.09}_{-1.54}\%$	$\pm1.16\%$
13.6	130.00	48.65	$^{+3.05}_{-5.19}\%$	$^{+0.25}_{-2.39}\%$	$\pm1.00\%$	$\pm0.80\%$	$\pm1.00\%$	$^{+2.66}_{-2.24}\%$	$^{+1.64}_{+1.64}\%$	$^{+2.09}_{-1.53}\%$	$\pm1.15\%$

Note: Numbers here do not include (t,b,c) or (EWK) update

c.f. previous extrapolated numbers: (differences: PDF4LHC 15 → 21)

2	ggF (N3LO QCD + NLO EW)							
3	MH	XS	Uncertainty					
4		Interpolation	Theory			PDF+ α s	PDF	α s
5	[GeV]	[pb]	pos [%]	neg [%]	Gauss [%]	[%]	[%]	[%]
6	120.00	5.611E+01	+4.7	--6.9	±4.0	±3.2	±1.9	±2.6
24	125.00	5.223E+01	+4.6	--6.7	±3.9	±3.2	±1.9	±2.6
25	125.09	5.217E+01	+4.6	--6.7	±3.9	±3.2	±1.9	±2.6
26	125.10	5.216E+01	+4.6	--6.7	±3.9	±3.2	±1.9	±2.6
43	130.00	4.875E+01	+4.5	--6.6	±3.8	±3.2	±1.8	±2.6

2. Estimate for PDF-TH & aN³LO PDFs

numbers for $\sqrt{s} = 13.6\,\mathrm{TeV}$ & $M_\mathrm{H} = 125.09\,\mathrm{GeV}$

baseline: $$\delta(\text{PDF-TH}) = \pm\frac{1}{2}\left|\sigma^{(2),\text{ EFT, NNLO}}_{PP\to H+X} - \sigma^{(2),\text{ EFT, NLO}}_{PP\to H+X}\right|$$

PDF4LHC21 — no NLO set available

⇒ switch to PDF4LHC15 *just* for δ(PDF-TH) estimate

↪ PDF4LHC15 $\pm 1.18\,\%$

Robust w.r.t. PDF var.

↪ MSHT20 $\pm 1.43\,\%$

↪ CT18 $\pm 1.03\,\%$

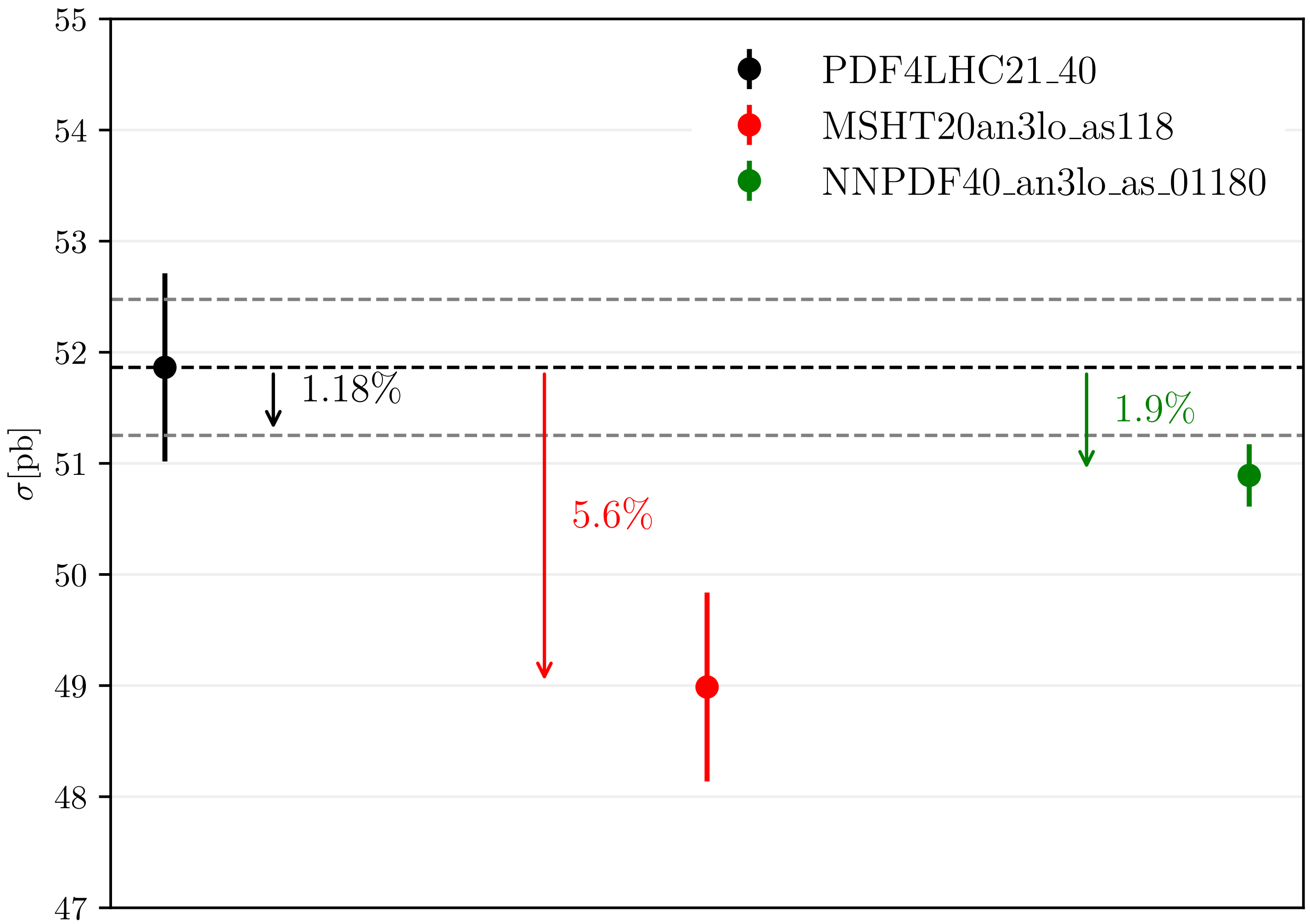
↪ NNPDF3.1 $\pm 0.92\,\%$

↪ NNPDF4 $\pm 0.18\,\%$

2. Estimate for PDF-TH & aN³LO PDFs

numbers for $\sqrt{s} = 13.6\,\text{TeV}$ & $M_H = 125.09\,\text{GeV}$

alternative: $$\delta(\text{PDF} - \text{TH}) = |\,\sigma^{(3),\text{EFT,aN3LO}}_{PP\to H+X} - \sigma^{(3),\text{EFT,NNLO}}_{PP\to H+X}\,|$$



Error bars: $\delta(\text{PDF})$

Proposal: stick with baseline using PDF4LHC15, report numbers for aN³LO set(s)?

Summary

14:00	→ 14:10	ggF Overview		10m
14:15	→ 14:35	MSHT (Thomas Cridge)	Speaker: Thomas Cridge (DESY)	20m
14:50	→ 15:10	NNPDF (Giacomo Magni)	Speaker: Giacomo Magni (Nikhef, VU Amsterdam)	20m
15:25	→ 15:45	ABM (Sasha Zenaiev)		20m
16:00	→ 16:15	Break		15m
16:15	→ 16:35	CT (Marco Guzzi)	Speaker: Marco Guzzi (Kennesaw State University)	20m
16:50	→ 17:05	Splitting Functions (Sven-Olaf Moch)	Speakers: Giulio Falcioni, Sven-Olaf Moch, Sven-Olaf Moch	15m
17:10	→ 17:25	Splitting Functions (Tongzhi Yang)	Speakers: Thomas Kurt Gehrmann (University of Zurich (CH)), Tongzhi Yang	15m
17:40	→ 18:00	Summary & Discussion		20m

Goals of Meeting:

1) Decide path to producing a contribution (text and/or plots) to be presented alongside the Run 3 recommendations regarding PDF-TH uncertainties

2) Brainstorm/kick-off YR5 activities surrounding the latest PDFs

Finally: Please join the new* ggF mailing list for future meetings/updates:

lhc-higgs-ggf@cern.ch (via http://cern.ch/egroups)

Backup

Warning: The following slides are from from GA 2023 and are partially outdated

Inclusion of NNLO m_t

iHixs:

$$\begin{aligned}\hat{\sigma}_{ij} &= \mathrm{R}_{\mathrm{LO}} C^2 \left[\sigma_{ij}^{\mathrm{LO,\ EFT}} + \sigma_{ij}^{\mathrm{NLO,\ EFT}} + \sigma_{ij}^{\mathrm{NNLO,\ EFT}} + \sigma_{ij}^{\mathrm{N^3LO,\ EFT}}\right] \\ &+ \delta\sigma_{ij}^{\mathrm{LO,\ (t,b,c)}} + \delta\sigma_{ij}^{\mathrm{NLO,\ (t,b,c)}} + \delta\sigma_{ij}^{\mathrm{NNLO,\ (t)}} + \mathrm{R}_{\mathrm{LO}} C^2\, \delta\sigma_{ij}^{\mathrm{Res}}\,.\end{aligned}$$

- start with iHixs prediction and systematically incorporate new results
- exact top mass at NNLO   Czakon, Harlander, Klappert, Niggetiedt 21

$$\delta\sigma_{ij}^{\mathrm{NNLO,\ (t)}} = \boxed{\sigma_{ij}^{\mathrm{NNLO,\,approx.}}} - \left[C_{\mathrm{QCD}}^2 \mathrm{R}_{\mathrm{LO}} \sigma_{ij}^{\mathrm{EFT}}\right]_{\alpha_S^4} \quad \text{for} \quad (ij) \in \{(gg),(gq)\}$$

iHixs gives access to each part:

↪ substitution $\sigma_{ij}^{\mathrm{NNLO,\,approx}} \to \sigma_{ij}^{\mathrm{NNLO,\,exact}}$ straightforward

(computation of "exact" already as a difference to EFT ⇝ compatibility checks)

Inclusion of NNLO m_t

Predictions from Czakon, Harlander, Klappert, Niggetiedt 21 + Tom Schellenberger, Felix Eschment

channel	$\sigma^{\text{NNLO}}_{\text{HEFT}}$ [pb] $\mathcal{O}(\alpha_s^2)$	$+\,\mathcal{O}(\alpha_s^3)$	$+\,\mathcal{O}(\alpha_s^4)$	$\left(\sigma^{\text{NNLO}}_{\text{exact}} - \sigma^{\text{NNLO}}_{\text{HEFT}}\right)$ [pb] $\mathcal{O}(\alpha_s^3)$	$\mathcal{O}(\alpha_s^4)$
$\sqrt{s} = 13.6\,\text{TeV}$					
gg	$+17.114$	$+20.750(5)$	$+9.216(23)$	$+0.0238$	$+0.2644(6)$
qg		$+1.613(2)$	$+0.916(6)$	-0.4034	$-0.0004(47)$
qq		$+0.026(1)$	$+0.109(1)$	$+0.0335$	$-0.0551(1)$
total	$+17.114$	$+22.389(6)$	$+10.241(23)$	-0.3461	$+0.2090(47)$

1. predictions employ the pole mass scheme
   - $\leftrightarrow$ default so far: $\overline{\text{MS}}$ scheme
   - $\hookrightarrow$ numerical impact? need to include as uncertainty?
2. predictions $\forall \sqrt{s}$ (7, 8, 13, 13.6, 14 TeV)
   - $\leftrightarrow$ single Higgs mass $M_{\text{H}}^{\text{ref}} \equiv 125.09\,\text{GeV}$
   - $\hookrightarrow$ how to extrapolate? what are the uncertainties?

Inclusion of NNLO m_t

m_t scheme dependence (pole v.s. $\overline{\text{MS}}$) [%]

M_H [GeV]	7 TeV	8 TeV	13 TeV	13.6 TeV	14 TeV
120	0.168	0.164	0.128	0.115	0.115
122	0.165	0.159	0.164	0.165	0.166
124	0.159	0.155	0.154	0.150	0.148
124.60	0.157	0.155	0.147	0.143	0.142
124.80	0.157	0.155	0.145	0.142	0.141
125	0.156	0.154	0.143	0.141	0.140
125.09	0.156	0.154	0.143	0.140	0.139
125.20	0.155	0.152	0.142	0.139	0.139
125.30	0.155	0.151	0.133	0.132	0.128
125.38	0.155	0.151	0.133	0.132	0.128
125.60	0.154	0.151	0.133	0.132	0.127
126	0.154	0.150	0.132	0.130	0.130
128	0.147	0.142	0.127	0.125	0.121
130	0.139	0.137	0.123	0.121	0.119

- scheme dependence $\sim 0.15\,\%$
  - $\leftrightarrow$ c.f. $\delta(1/m_t) = 1\,\%$ (negligible before)
  - $\hookrightarrow$ matters now: new uncertainty

- new default: pole mass scheme in iHixs2

Inclusion of NNLO m_t

M_H extrapolation

- use M_H dependence of HTL to extrapolate

M_H [GeV]	13.6 TeV	13.6 TeV
120	0.984	1.038
122	0.985	1.037
124	0.985	1.036
124.60	0.985	1.035
124.80	0.985	1.035
125	0.984	1.035
125.09	0.984	1.035
125.20	0.984	1.035
125.30	0.984	1.035
125.38	0.984	1.035
125.60	0.984	1.035
126	0.984	1.034
128	0.984	1.033
130	0.984	1.032

$$\frac{\delta\sigma^{\text{exact}}(M_H)\big|_{\mathcal{O}(\alpha_s^3)}}{\delta\sigma^{\text{HTL}}(M_H)\big|_{\mathcal{O}(\alpha_s^3)}} \qquad \frac{\delta\sigma^{\text{approx.}}(M_H)\big|_{\mathcal{O}(\alpha_s^4)}}{\delta\sigma^{\text{HTL}}(M_H)\big|_{\mathcal{O}(\alpha_s^4)}}$$

- very stable ratio ↔ use extrapolation

$$\frac{\delta\sigma^{\text{HTL}}(M_H)\big|_{\mathcal{O}(\alpha_s^4)}}{\delta\sigma^{\text{HTL}}(M_H^{\text{ref}})\big|_{\mathcal{O}(\alpha_s^4)}} \times \delta\sigma^{\text{exact}}(M_H^{\text{ref}})\big|_{\mathcal{O}(\alpha_s^4)}$$

↪ uncertainty: conservative 100%

$\lesssim 0.03\,\%$

$$\delta^{\text{extrap}}(M_H) = \left|1 - \frac{\delta\sigma^{\text{HTL}}(M_H)|_{\mathcal{O}(\alpha_s^4)}}{\delta\sigma^{\text{HTL}}(M_H^{\text{ref}})|_{\mathcal{O}(\alpha_s^4)}}\right|$$

Inclusion of NNLO m_t

Final impact from NNLO m_t

$\sqrt{s}$ [TeV]	M_H [GeV]	σ [pb]	δ(scale)	δ(EWK)	δ(t, b, c)	$\delta^{\Sigma}(m_t)$	δ(theory)
13.6	120.00	55.90	$^{+0.56}_{-3.32}\%$	$\pm1.00\%$	$\pm0.85\%$	$\pm0.15\%$	$^{+2.56}_{-1.32}\%$
13.6	122.00	54.31	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.84\%$	$\pm0.19\%$	$^{+2.59}_{-1.28}\%$
13.6	124.00	52.79	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.16\%$	$^{+2.55}_{-1.32}\%$
13.6	124.60	52.35	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.15\%$	$^{+2.53}_{-1.33}\%$
13.6	124.80	52.20	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.14\%$	$^{+2.53}_{-1.33}\%$
13.6	125.00	52.06	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.14\%$	$^{+2.53}_{-1.34}\%$
13.6	125.09	51.99	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.14\%$	$^{+2.52}_{-1.34}\%$
13.6	125.20	51.91	$^{+0.56}_{-3.31}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.14\%$	$^{+2.52}_{-1.34}\%$
13.6	125.30	51.84	$^{+0.56}_{-3.30}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.13\%$	$^{+2.52}_{-1.34}\%$
13.6	125.38	51.78	$^{+0.56}_{-3.30}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.13\%$	$^{+2.52}_{-1.34}\%$
13.6	125.60	51.62	$^{+0.55}_{-3.30}\%$	$\pm1.00\%$	$\pm0.83\%$	$\pm0.14\%$	$^{+2.52}_{-1.34}\%$
13.6	126.00	51.33	$^{+0.55}_{-3.30}\%$	$\pm1.00\%$	$\pm0.82\%$	$\pm0.14\%$	$^{+2.51}_{-1.34}\%$
13.6	128.00	49.94	$^{+0.55}_{-3.29}\%$	$\pm1.00\%$	$\pm0.81\%$	$\pm0.14\%$	$^{+2.51}_{-1.33}\%$
13.6	130.00	48.60	$^{+0.55}_{-3.28}\%$	$\pm1.00\%$	$\pm0.80\%$	$\pm0.15\%$	$^{+2.51}_{-1.33}\%$

- linearly add uncertainties from (m_t scheme dependence) + (extrapolation)
  - $\leftrightarrow$ dominant piece: scheme dependence
  - $\hookrightarrow$ net effect: previous $1\,\%$ reduced to $\sim 0.15\,\%$
- full set of numbers in "table_comp.pdf" (attachment on indico)

Inclusion of mixed QCD-EW

iHixs:

$$\hat{\sigma}_{ij} = \mathrm{R_{LO}}C^2\left[\sigma_{ij}^{\mathrm{LO,\,EFT}} + \sigma_{ij}^{\mathrm{NLO,\,EFT}} + \sigma_{ij}^{\mathrm{NNLO,\,EFT}} + \sigma_{ij}^{\mathrm{N^3LO,\,EFT}}\right] + \delta\sigma_{ij}^{\mathrm{LO,\,(t,b,c)}} + \delta\sigma_{ij}^{\mathrm{NLO,\,(t,b,c)}} + \delta\sigma_{ij}^{\mathrm{NNLO,\,(t)}} + \mathrm{R_{LO}}C^2\,\delta\sigma_{ij}^{\mathrm{Res}}\,.$$

- start with iHixs prediction and systematically incorporate new results
- inclusion of EW corrections by Becchetti, Bonciani, Del Duca, Hirschi, Moriello, Schweitzer 20
  iHixs formula based on *factorization hypothesis*:

$$C = C_{\mathrm{QCD}} + \lambda_{\mathrm{EWK}}\left(1 + \frac{\alpha_S}{\pi}C_{1w} + \ldots\right).$$

↪ iHixs uses $C_{1w} = 7/6$ as estimated from the $M_V \to \infty$ limit

↪ full result gives: $C_{1w} = -1.7$ $(\mu_R = M_\mathrm{H}/2)$ $C_{1w} = -2.1$ $(\mu_R = M_\mathrm{H})$

but note: $\delta(\mathrm{EW}) \sim \pm 1\,\%$ ⇝ vary C_{1w} by factor in range $[-3, 6]$

Initial proposal: incorporate new result with an additional correction term (1st step)

$$\delta\sigma_{ij}^{\mathrm{EW}} = \sigma_{ij}^{\mathrm{EW}} - \left[C^2 R_{\mathrm{LO}}\sigma_{ij}^{\mathrm{EFT}}\right]_{\alpha_s^3\alpha^2}$$

and define error estimates on correction factor (beyond light quarks, gg channel, …)

Inclusion of mixed QCD-EW

Impact from naive replacement $C_{1w} \to -1.7$

Becchetti, Bonciani, Del Duca, Hirschi, Moriello, Schweitzer 20

E [TeV]	M_H [GeV]	σ [pb]	$\sigma\|_{C_{1w}\to-1.7}$ [pb]	Δ [%]
7.0	125.09	16.757	16.668	0.530
8.0	125.09	21.326	21.213	0.530
13.0	125.09	48.497	48.240	0.530
13.6	125.09	52.140	51.864	0.529
14.0	125.09	54.611	54.321	0.529

E [TeV]	M_H [GeV]	σ [pb]	$\sigma\|_{C_{1w}\to-1.7}$ [pb]	Δ [%]
13.6	120.00	56.099	55.812	0.512
13.6	122.00	54.494	54.211	0.519
13.6	124.00	52.953	52.675	0.526
13.6	124.60	52.504	52.227	0.528
13.6	124.80	52.355	52.078	0.529
13.6	125.00	52.206	51.930	0.529
13.6	125.09	52.140	51.864	0.529
13.6	125.20	52.059	51.783	0.530
13.6	125.30	51.986	51.710	0.530
13.6	125.38	51.927	51.652	0.530
13.6	125.60	51.766	51.491	0.531
13.6	126.00	51.476	51.202	0.533
13.6	128.00	50.062	49.792	0.539
13.6	130.00	48.706	48.440	0.546

- approx. constant impact ($\sqrt{s}$ & M_H variation) $\sim$ $0.5\,\%$
- well within the $\delta(\mathrm{EWK}) = \pm 1\,\%$ uncertainty estimate
- caveats:
  ↪ only gg channel

Current Proposal (for discussion):

- Stick with baseline using $C_{1w} = 7/6$
- Keep 1% error