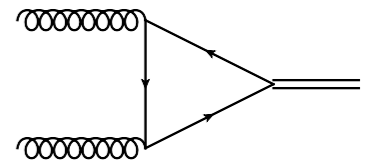


GGF AT 13.6 TEV

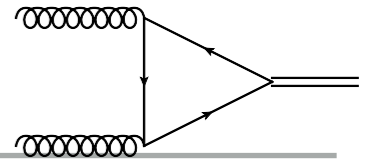
BERNHARD MISTLBERGER

SLAC



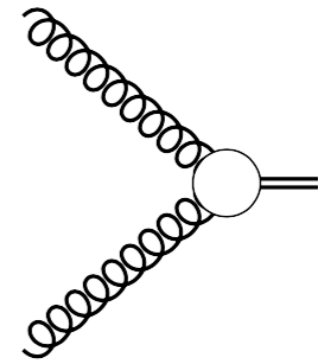
CURRENT SUB-WORKING GROUP CONVENERS

- ▶ Haider Abidi syed.haider.abidi@cern.ch
- ▶ Jonathon Mark Langford jonathon.langford@cern.ch
- ▶ Stephen Jones stephen.jones@durham.ac.uk
- ▶ Bernhard Mistlberger bernhard.mistlberger@cern.ch

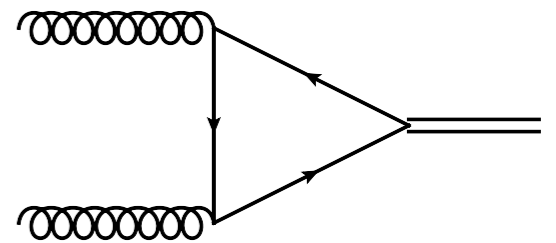


THE GLUON FUSION CROSS SECTION IN YR4

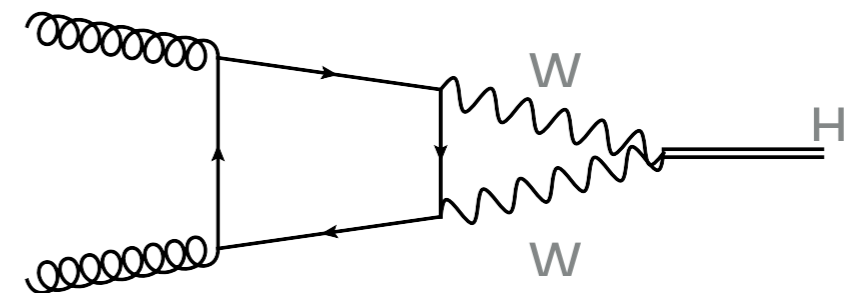
- ▶ N3LO QCD corrections in the limit $m_t \rightarrow \infty$



- ▶ NLO effects due to top, bottom and charm mass

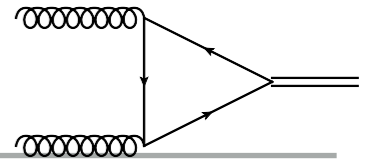


- ▶ LO factorized EWK corrections



- ▶ PDF4LHC15

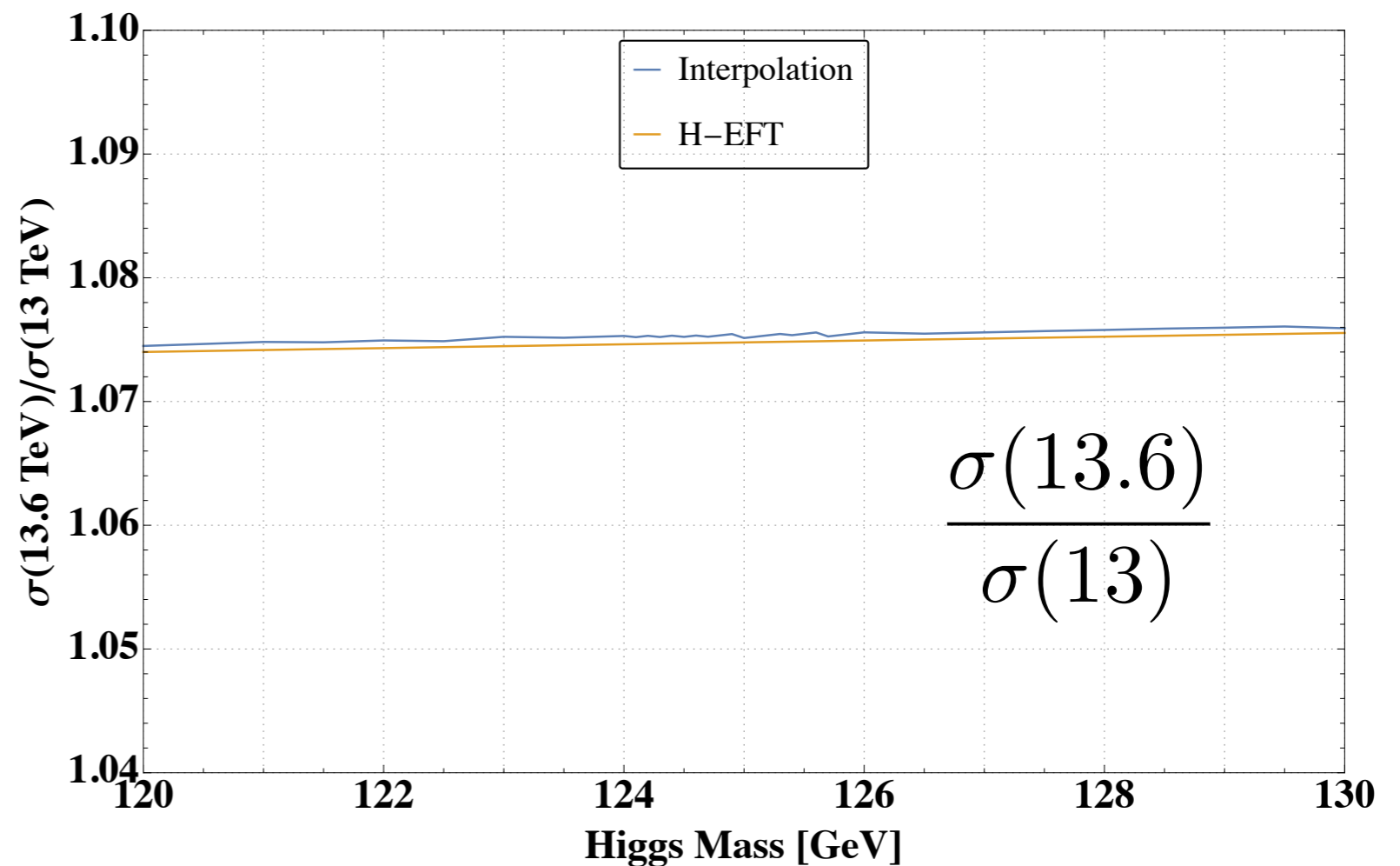
- ▶ 2 different schemes to compute the inclusive cross section

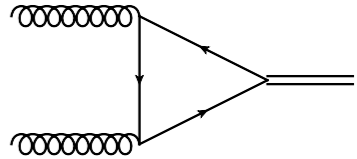


INTERPOLATING NUMBERS TO 13.6 TEV

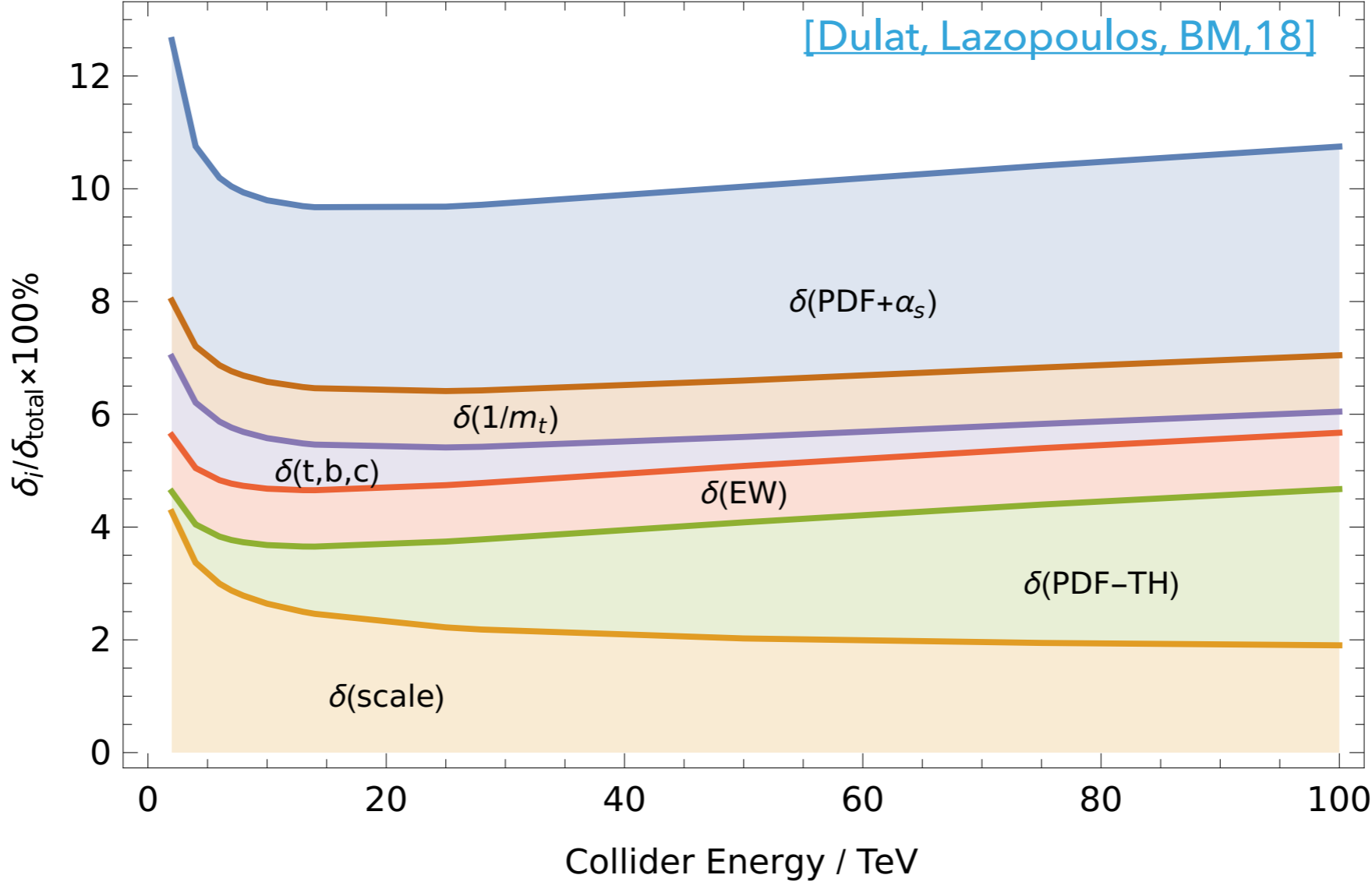
$$\sigma(E) = a * E + b = 0.4\sigma(13) + 0.6\sigma(14)$$

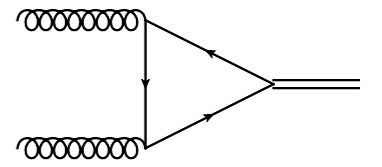
- ▶ Interpolation works well.
- ▶ Uncertainties are extremely similar between 13 TeV and 14 TeV - also interpolate those.
- ▶ **However:**
We are planing many updates - wait for it!





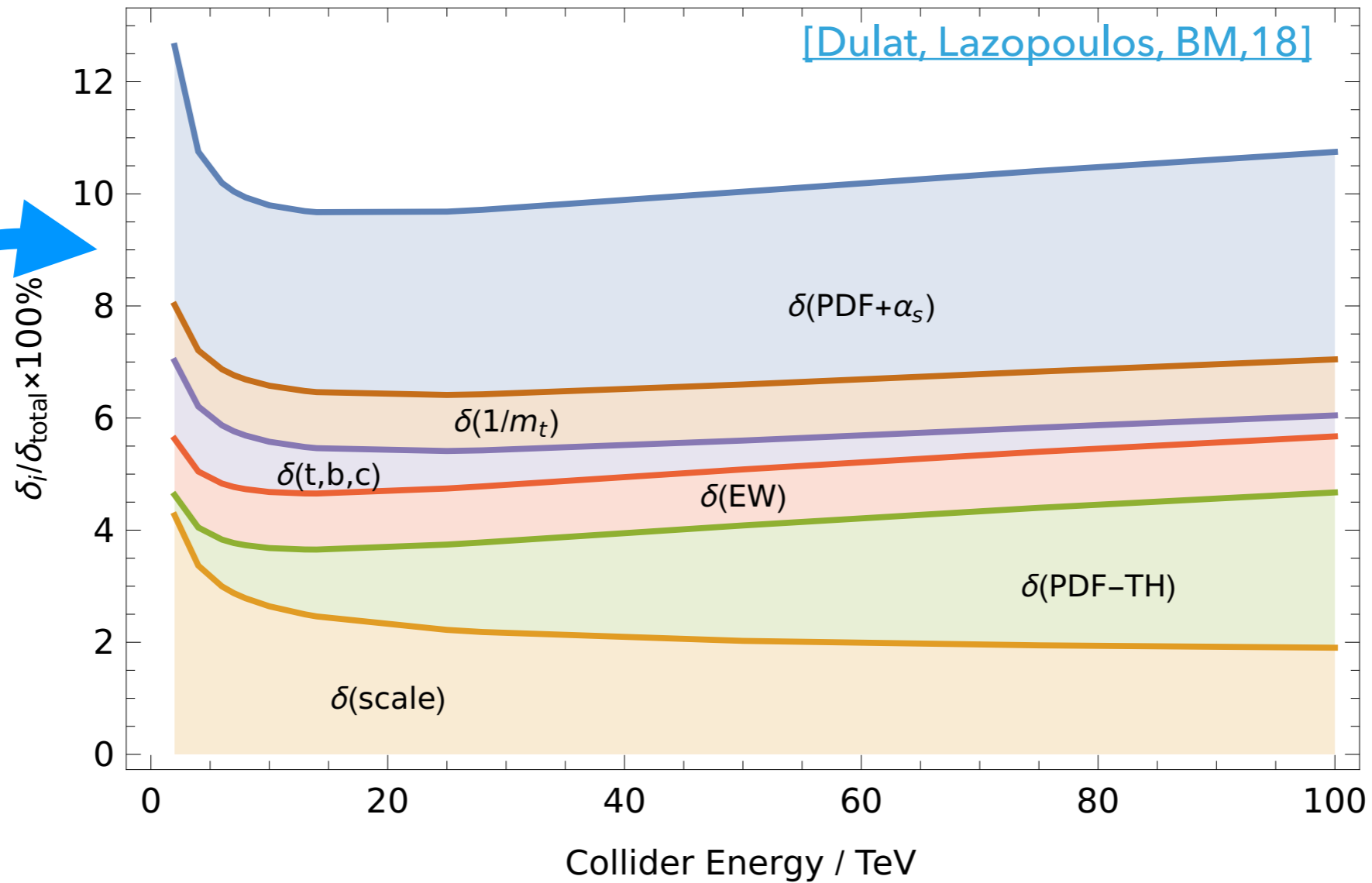
UNCERTAINTY BUDGET



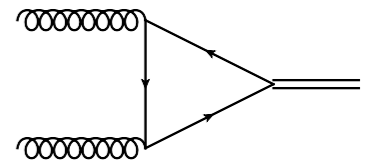


UNCERTAINTY BUDGET

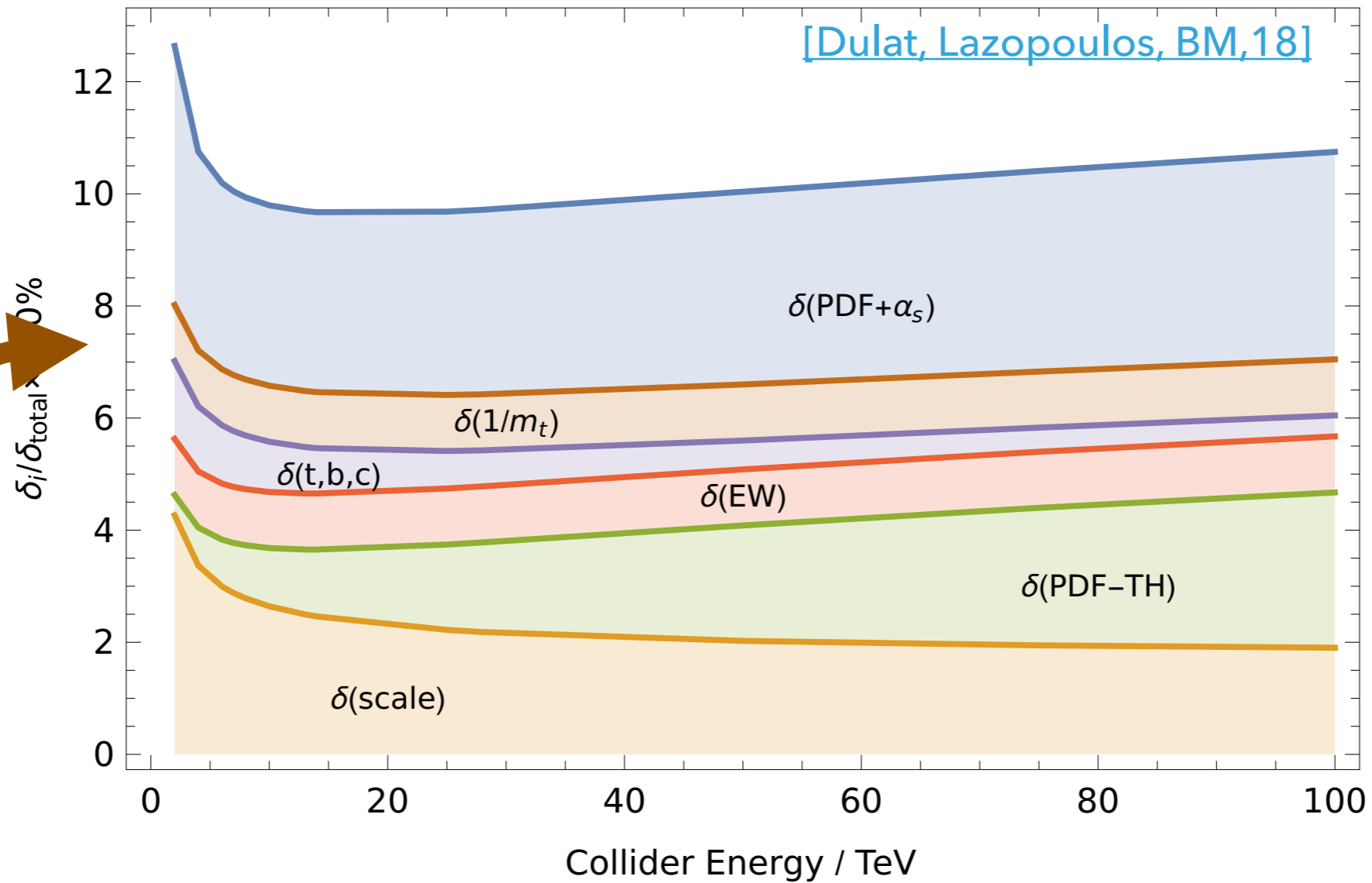
[Dulat, Lazopoulos, BM, 18]



- ▶ **New:** PDF4LHC21(to come)
Aslo: CT18, MSHT20, NNPDF4.0
- ▶ Comparison studies on the cross section will be necessary!

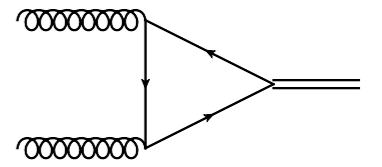


UNCERTAINTY BUDGET

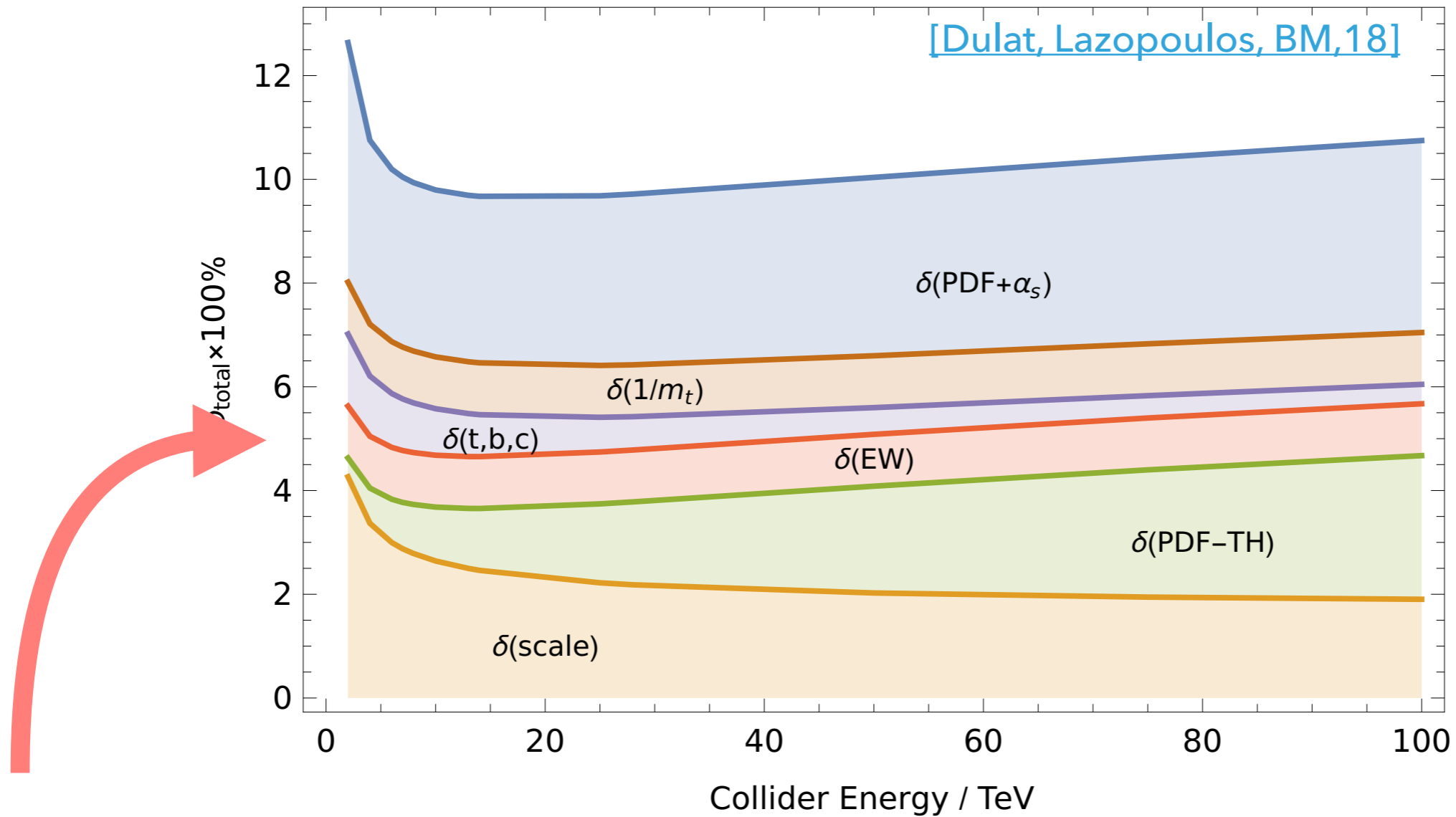


► **New:** Exact top quark mass dependence at NNLO

[Czakon, Harlander, Klappert, Niggetiedt; 2105.04436]

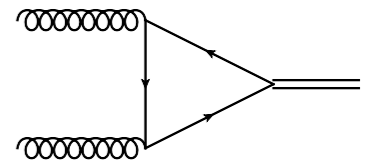


UNCERTAINTY BUDGET



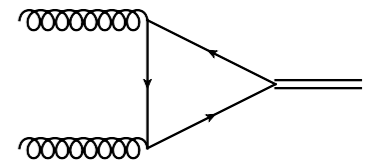
► **New:** Mixed QCD / EWK corrections

[Becchetti, Bonciani, DelDuca, Hirschi, Moriello, Schweitzer, 2010.09451]



PLANNED UPDATES

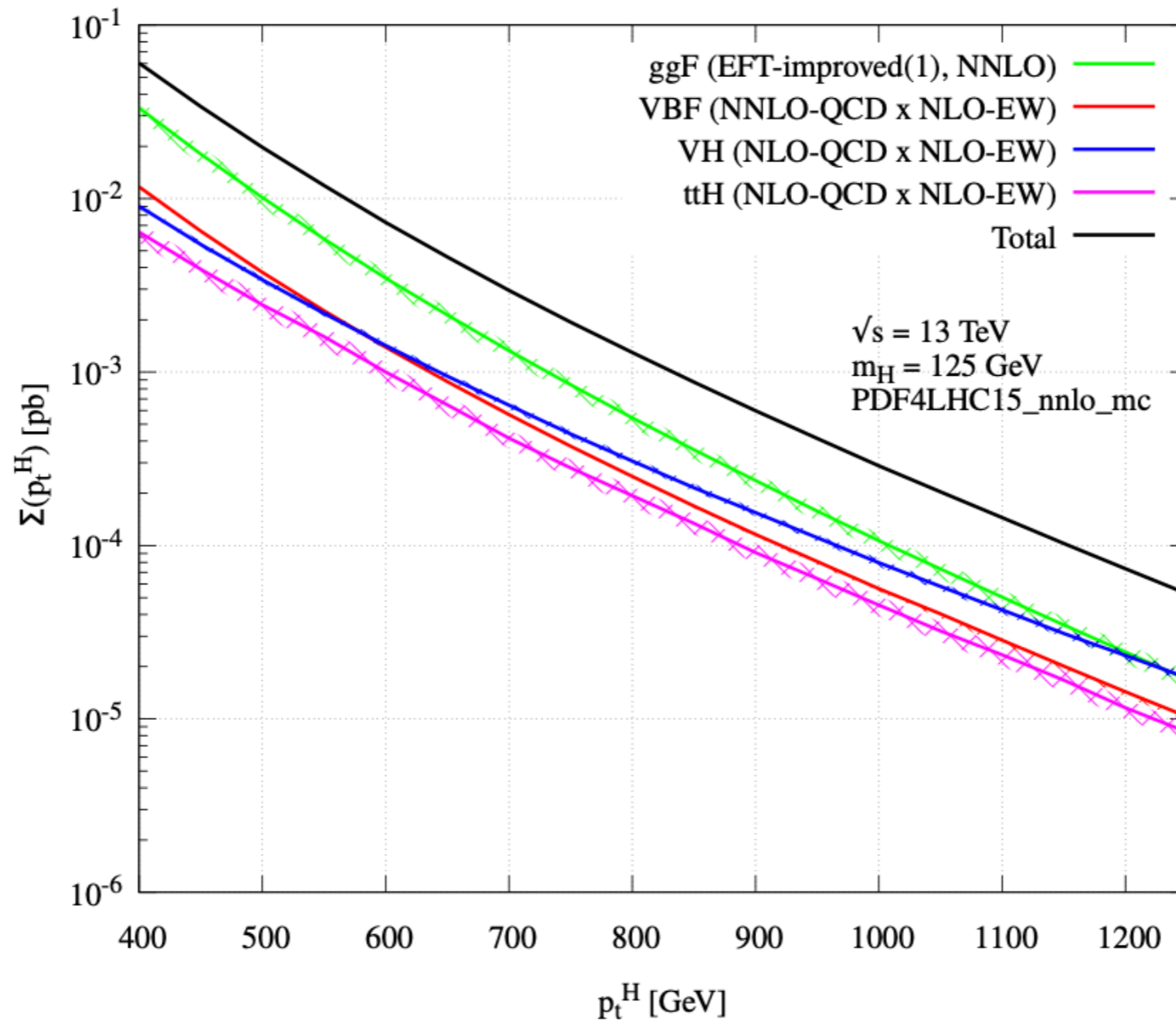
- ▶ Use PDF4LHC21 and study individual new PDF sets.
- ▶ Include exact top quark mass dependence at NNLO
- ▶ Include mixed QCD / electroweak effects due to light quarks
- ▶ Produce predictions for 13.6 TeV on top of previous CoM energies.

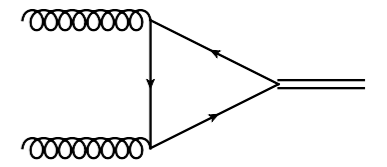


UPDATE OF THE PUBLIC NOTE

<https://arxiv.org/pdf/2005.07762.pdf>

THE HIGGS BOSON PT AT $p_T > 400\text{GeV}$



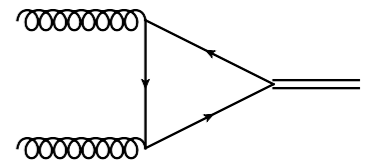


UPDATE OF THE PUBLIC NOTE

<https://arxiv.org/pdf/2005.07762.pdf>

THE HIGGS BOSON PT AT $p_T > 400\text{GeV}$

- ▶ Use PDF4LHC21 and study individual new PDF sets.
- ▶ Extend range of p_T from [400,800] GeV \rightarrow [400,1250] GeV
- ▶ Derive predictions for LHC @ 13.6 TeV
- ▶ Study top quark mass scheme uncertainty at NLO
- ▶ Include mixed QCD / electroweak corrections for ggF
- ▶ Include more guidance for PS and extend to H+JJ
- ▶ Study impact of non-factorizable corrections in VBF
- ▶ ... - **your input here!**



PLANNED UPDATES FOR INCLUSIVE GGF

- ▶ Use PDF4LHC21 and study individual new PDF sets.
- ▶ Include exact top quark mass dependence at NNLO
- ▶ Include mixed QCD / electroweak effects due to light quarks
- ▶ Produce predictions for 13.6 TeV on top of previous CoM energies.

UPDATE OF THE PUBLIC NOTE

<https://arxiv.org/pdf/2005.07762.pdf>

THE HIGGS BOSON p_T AT

$p_T > 400\text{GeV}$