FEHiPro

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FEHiP

- NNLO Monte-Carlo for Higgs production via gluon fusion (CA, Melnikov, Petriello, no decays 2004, diphoton decay 2005)

- First fully differential calculation at NNLO.

- We have learnt a lot on how to optimize since then.

- Included the decay to leptons via W's or Z's (CA,Disserori,Stoeckli, 2007)

- Phenomenology analysis for the Tevatron search and an opportunity for comparisons with newer/different HNNLO (CA, Dissertori,Grazzini,Stoeckli, Webber, 2009)

- Theory developments other than NNLO QCD.

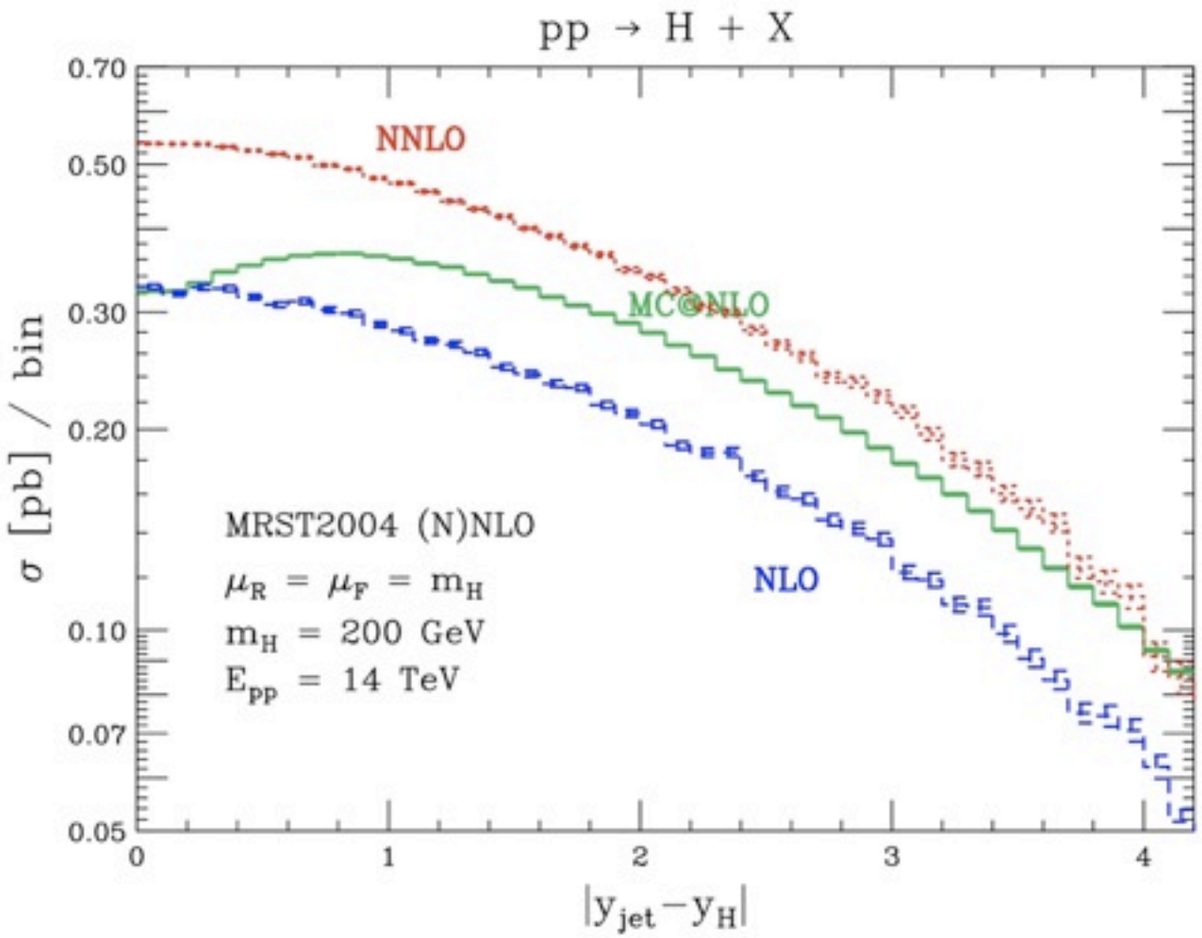
Histograms *Stoeckli*

- Automated (unreadable by humans) slicing and reparameterization of phase space for canceling IR divergences.

- But, particle momenta are fully reconstructed, and observable definition multi-valued, and 'factorized'.

- CUBA and PVEGAS support the integration of multi-valued functions.

- In one run, we obtain all distributions!

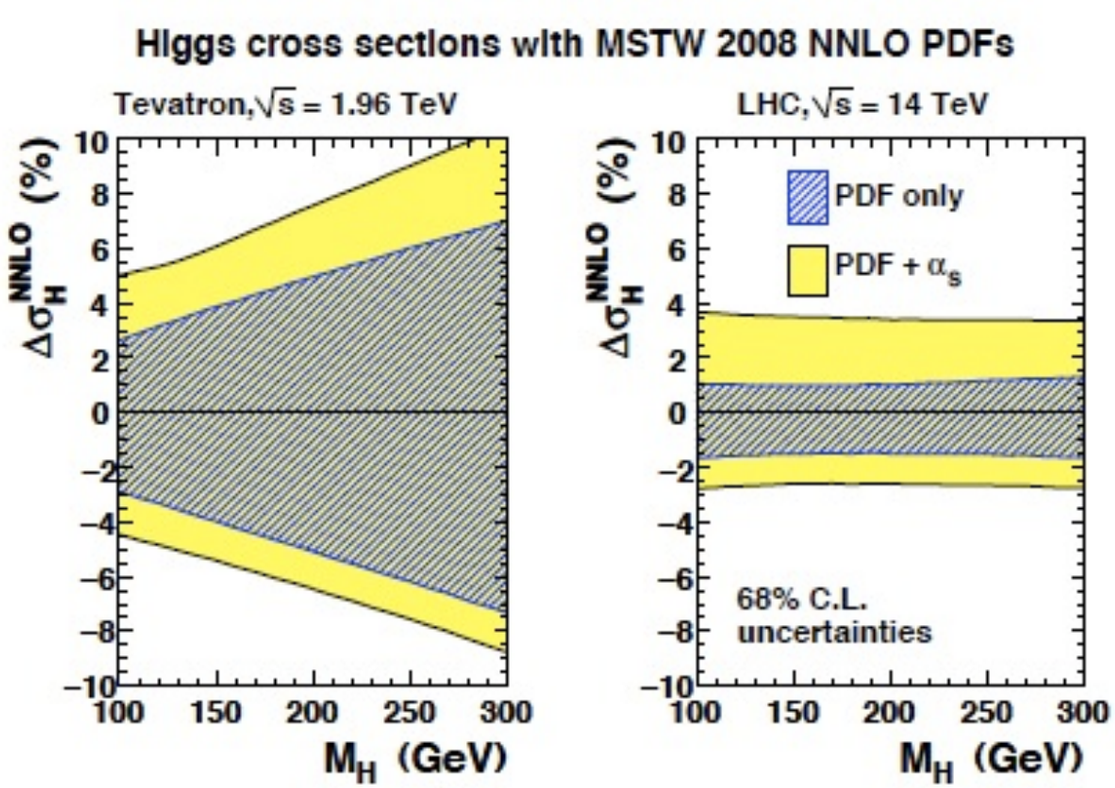


PDF uncertainties

- PDFs have improved and they now come with quantified uncertainties.

- Simultaneous evaluation of all pdf-eigenvectors for MSTW08 pdfs *(NNLO sets with data constraining directly high-x gluons)*

- Evaluation in FEHiP of the combined "pdf +alphas" uncertainty.



Martin, Stirling, Thorne, Watt
arXiv:0905.3531,0901.0002

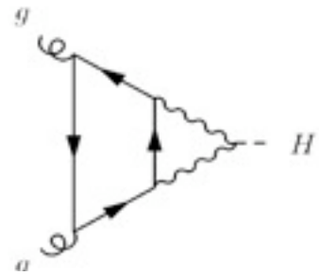
Electroweak effects

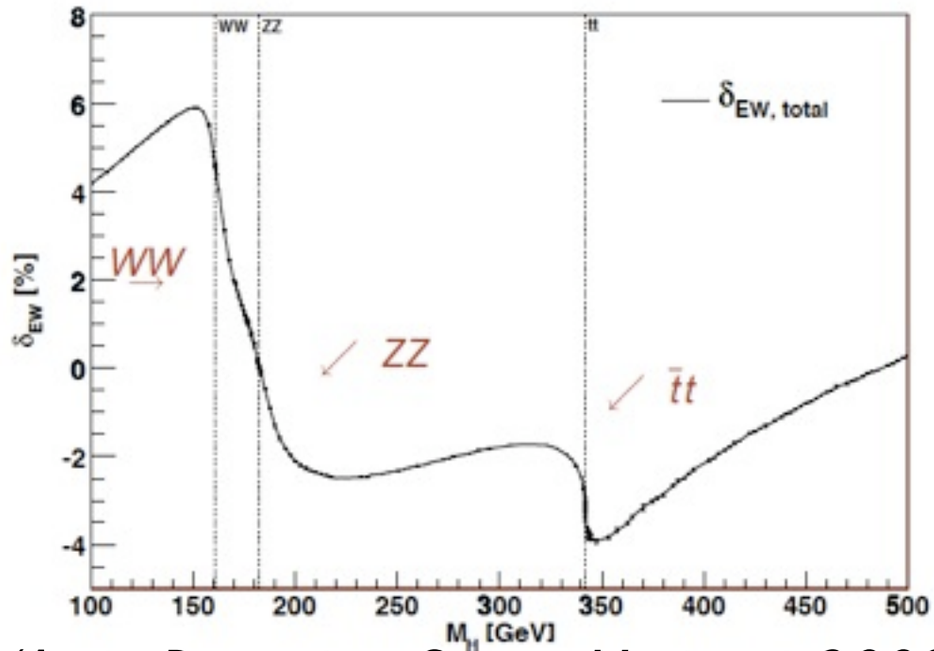
- Two-loop light fermion EWK amplitude *(Aglietti, Bonciani, Degrassi, Vicini, 2004)*

- Full two-loop EWK corrections *(Actis, Passarino, Sturm, Uccirati, 2008)*

- One-loop EWK effects for pt>0 *(Keung, Petriello)*

- Mixed QCD- EWK effects *(CA, Boughezal, Petriello)*





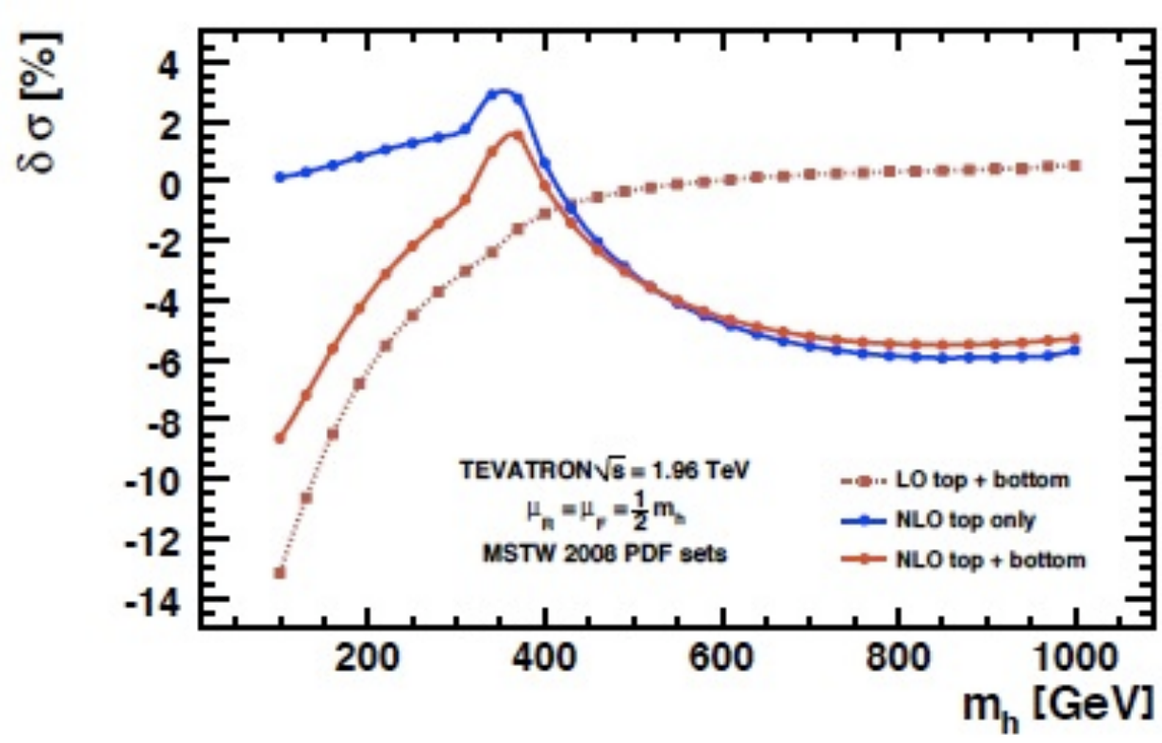
(Actis, Passarino, Sturm, Uccirati, 2008)

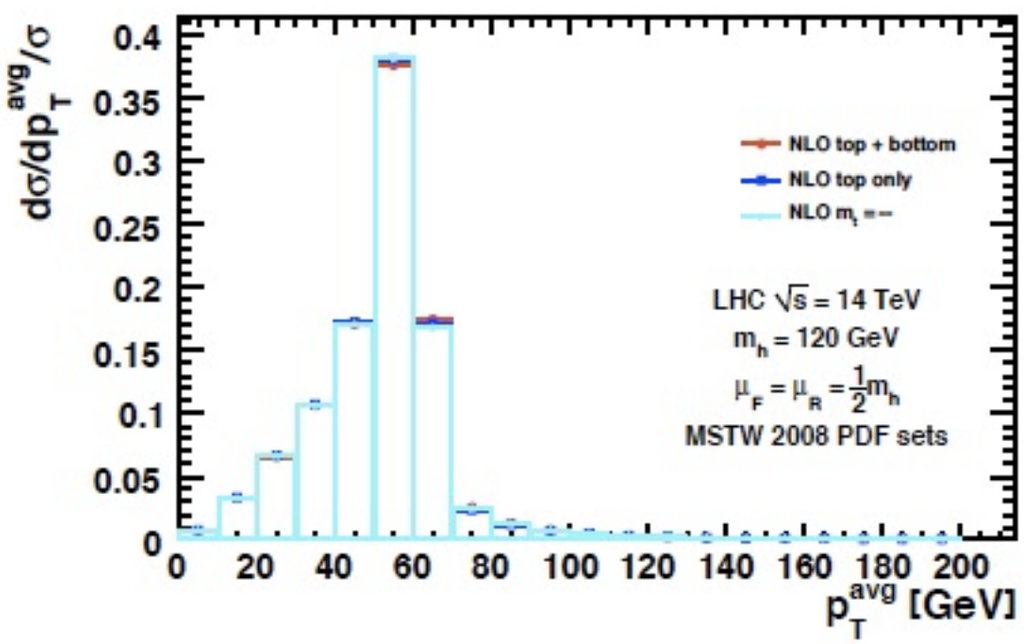
HPRO

CA,Bucherer,Kunszt

- Full QCD calculation at NLO, without using the Heavy Quark approximation

- First fully differential calculation with exact quark mass effects.





More developments

- Finite Higgs width
- Exact treatment of the decays to leptons, including the interference of WW/ZZ diagrams
- Accommodating an arbitrary Wilson coefficient for the Higgs-gluon interaction
- Final testing/ soon to be released