Session summary: hard QCD theory.

G. Somogyi on behalf of the session chairs (P. Starovoitov, G. Somogyi, S. Schumann)

A non-exhaustive list of topics.

Hard QCD.

6 sessions (2 shared with PDF and MPI), 38 talks, 24 theory talks

Wide range of theory topics

- **Higgs: production, also with jets, $t\bar{t}$**
- **top: production, A_{FB}, m_t**
- **jets: substructure, multijet production**
- **higher orders: NLO, NNLO**
- **resummation: SCET**
- **tools: 1-loop generators, ME + PS, NLO + PS**

An incomplete summary, please have a look at the individual talks. Apologies to speakers.

Tools: NLO.

NLO in good shape: several automated tools available

- **GoSam** ($H + 2, 3j$, $Ht\bar{t}j$) — **E. Mirabella**
- **HELAC-NLO** ($t\bar{t}t\bar{t}$, $b\bar{b}b\bar{b}$) — **G. Bevilacqua**
- **NJet** ($pp \to 4, 5j$) — **V. Yundin**
- **OpenLoops** ($ll\nu\nu + 0, 1j$) — **F. Cascioli**
- **Sherpa** ($W + 5j$) — **F. Siegert**

But it is always worthwhile to search for improvememts

- **Nagy-Soper subtraction** — **T. Robens**
- **numerical loop integration with subtraction and contour deformation** — **S. Weinzierl**

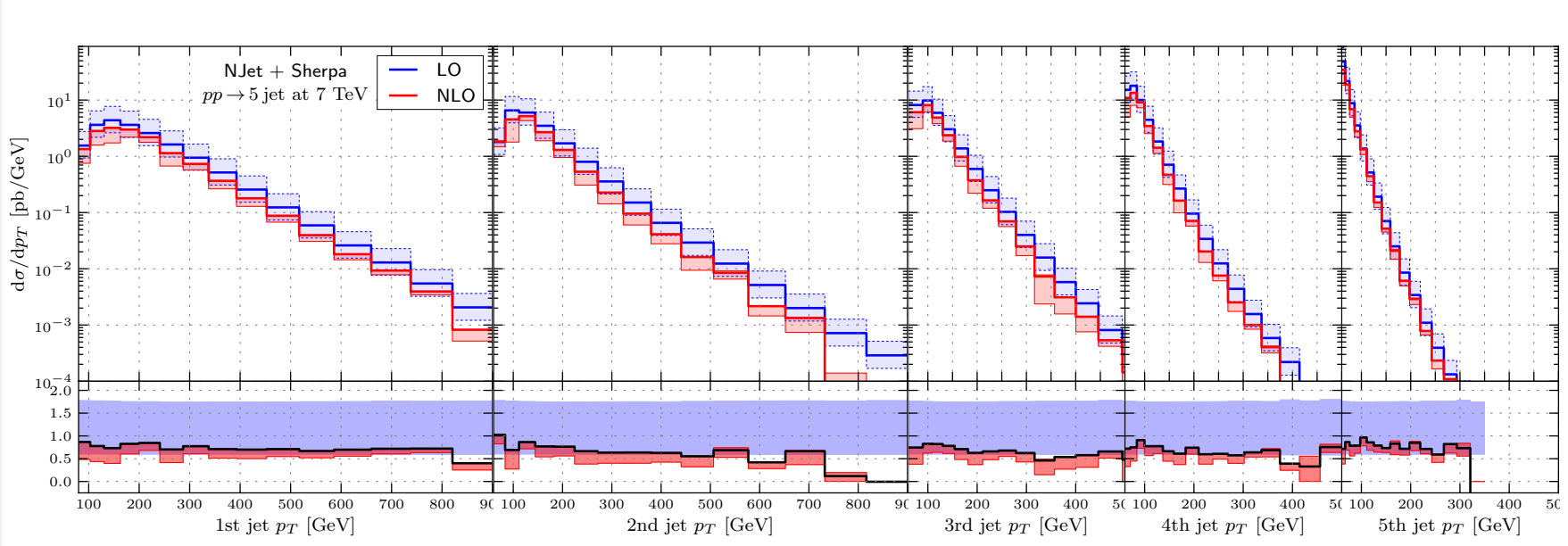
Dedicated calculations remain important

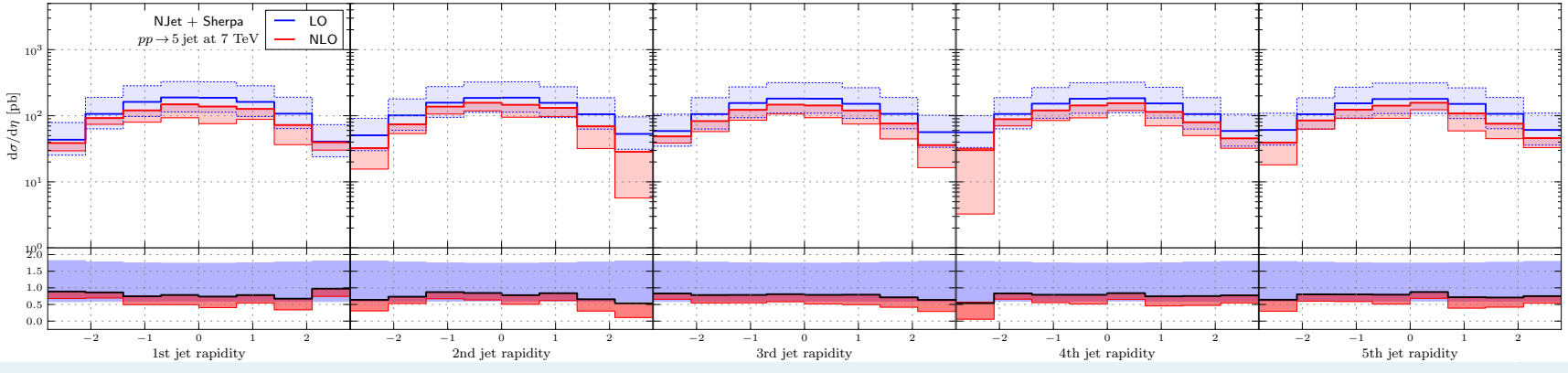
- **EW NLO corrections to single inclusive and dijet production** — **A. Huss**

plenary talks by T. Gehrmann
S. Weinzierl

The NLO complexity fronteer.

First results for $pp \to 5$ jets using NJet + Sherpa [from V. Yundin's talk]





Tools: PS Monte Carlo.

PS Monte Carlos are taking advantage of advances in fixed order technology

Several tools exist to match (N)NLO and PS corrections

- **(a)MC@NLO** ($t\bar{t}H$ **w. spin corr.,** t**-ch. single** t **w. off-shell and non-resonant contr.)** — **M. Zaro**
- **POWHEG/MINLO** (H **production to NNLO + PS accuracy)** — **E. Re**
- **PowHel** ($t\bar{t}H$, $t\bar{t}b\bar{b}$) — **M. V. Garzelli**

Starting to see the inclusion of EW NLO corrections also

- **EW and QCD corrections to Drell-Yan in POWHEG** — **F. Piccinini**

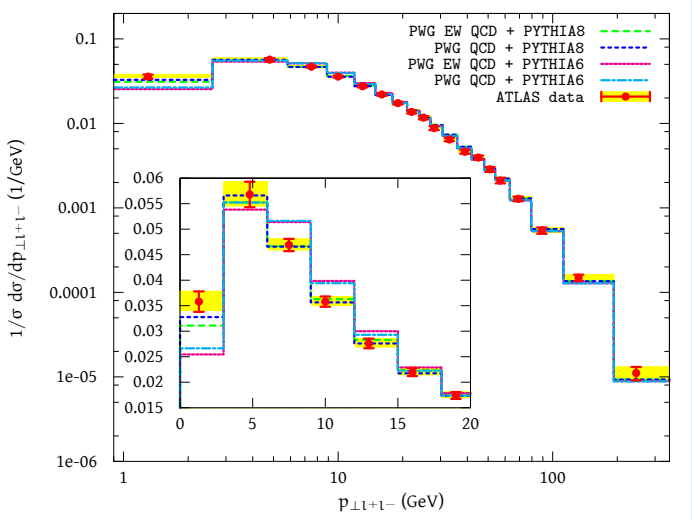
Your favorite shower Monte Carlos come with impressive matching and merging capabilities built in

- **Herwig++** — **S. Plätzer**
- **Pythia 8** — **S. Prestel**
- **Sherpa** — **F. Siegert**

plenary talks by J. Andersen
L. Lönnblad

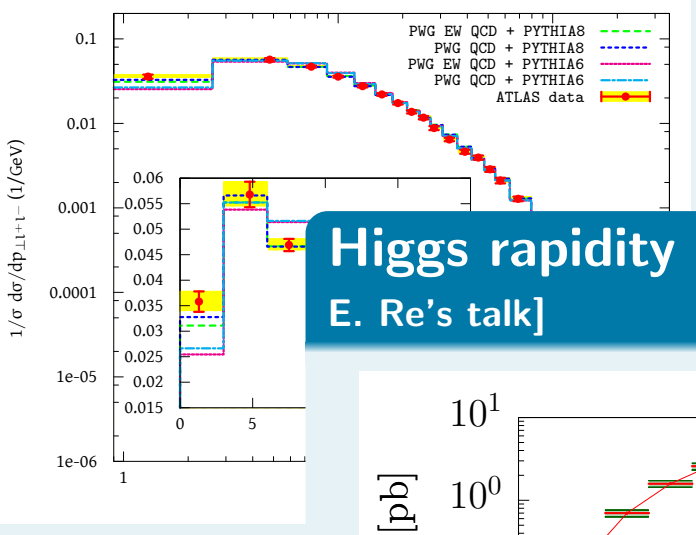
PS Monte Carlos in action.

EW+QCD NLO for DY in POWHEG [from F. Piccinini's talk]

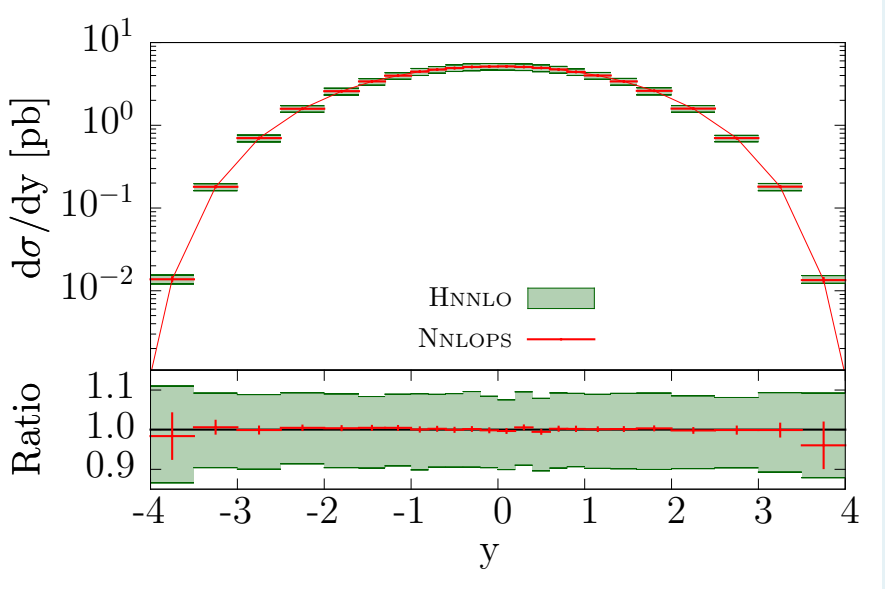


PS Monte Carlos in action.

EW+QCD NLO for DY in POWHEG [from F. Piccinini's talk]

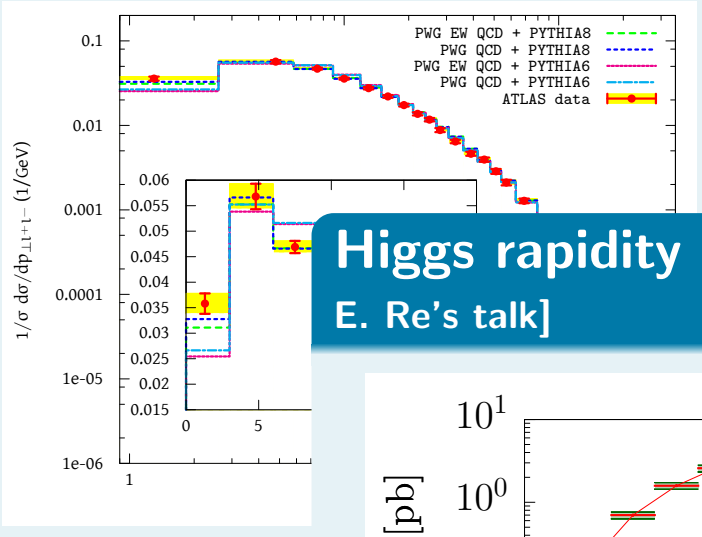


Higgs rapidity at NNLO + PS [from E. Re's talk]



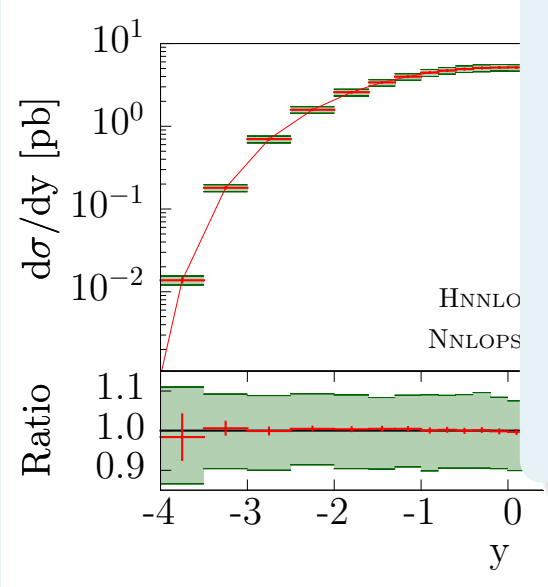
PS Monte Carlos in action.

EW+QCD NLO for DY in POWHEG [from F. Piccinini's talk]

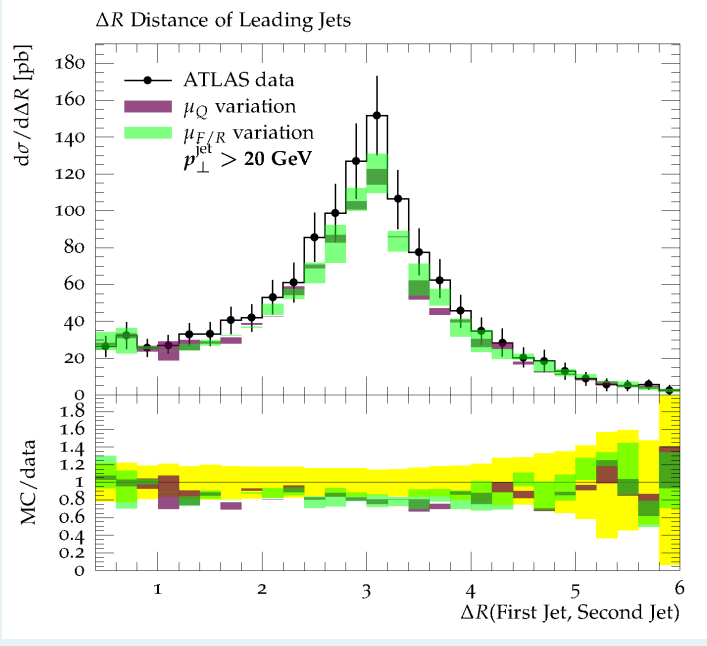


Higgs rapidity at NNL

E. Re's talk]



$W + 0, 1, 2j$ samples matched with UNLOPS [from S. Prestel's talk]



The precision frontier: (N)NNLO.

NNLO predictions are now available for some $2 \to 2$ processes

- **$t\bar{t}$ total cross section** — **P. Fiedler**
- **$H + j$ total cross section** — **R. Boughezal**
- **dijet production** — **T. Gehrmann**
- **VH production, diphoton production** — **G. Ferrera**

More to come: towards VV production at NNLO

- **planar two-loop master integrals for VV production at the LHC** — **E. Weihs**

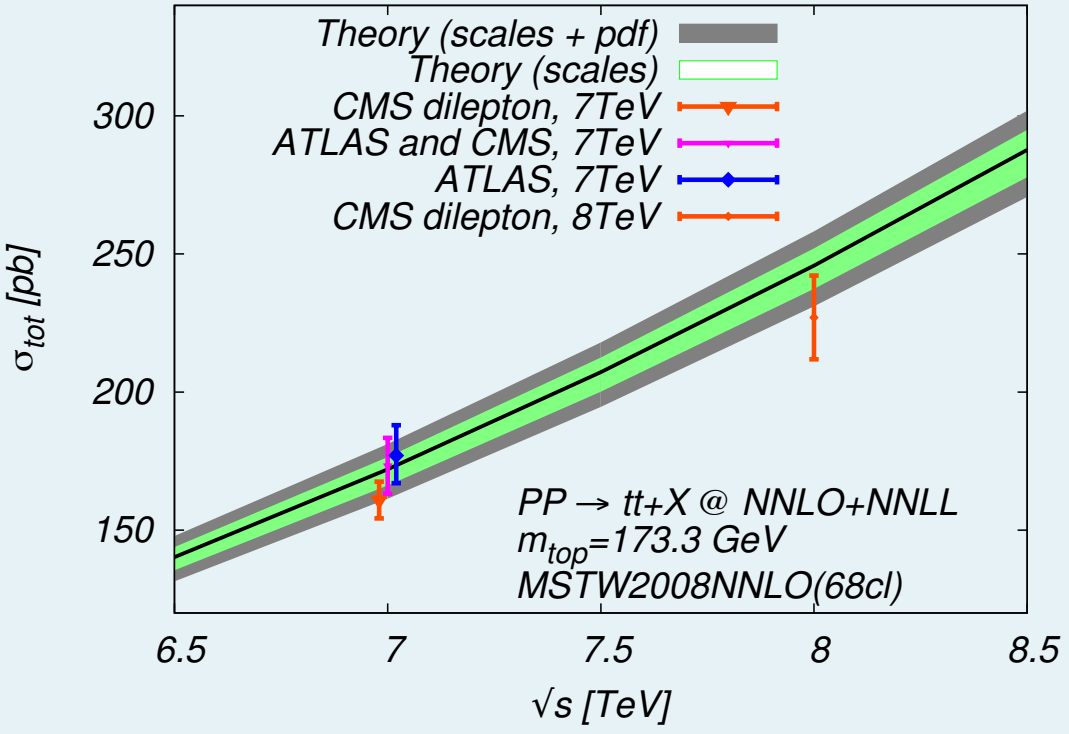
Beyond NNLO

- **$gg \to H$ at approximate N^{3}LO** — **M. Bonvini**

plenary talks by T. Gehrmann
G. Ferrera

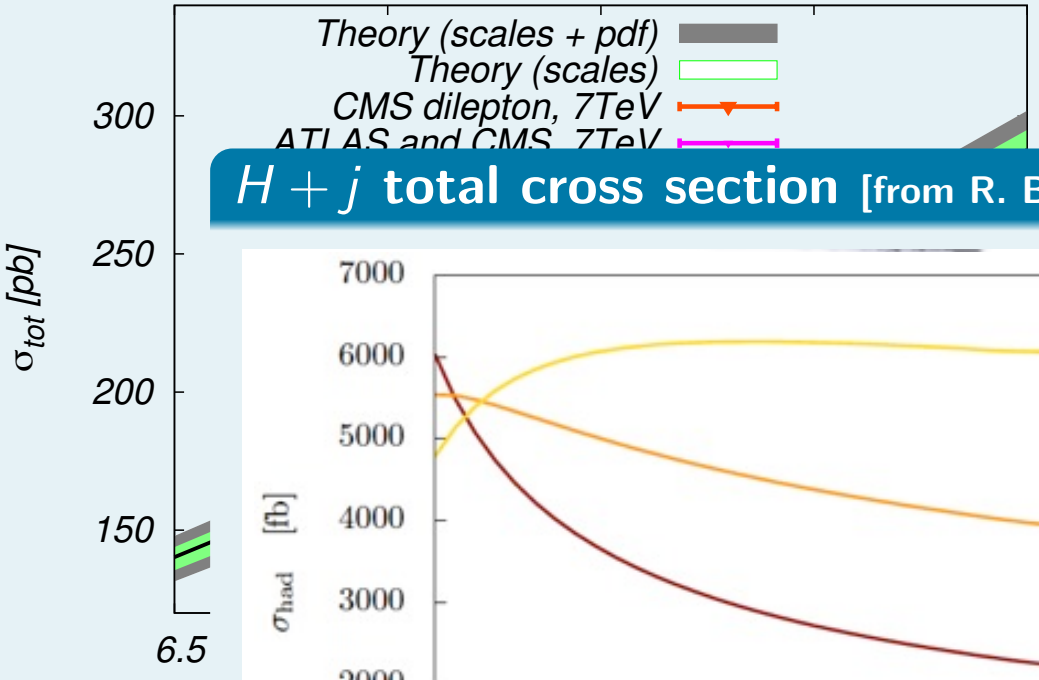
Postcards from the precision frontier.

$t\bar{t}$ total cross section [from P. Fiedler's talk]

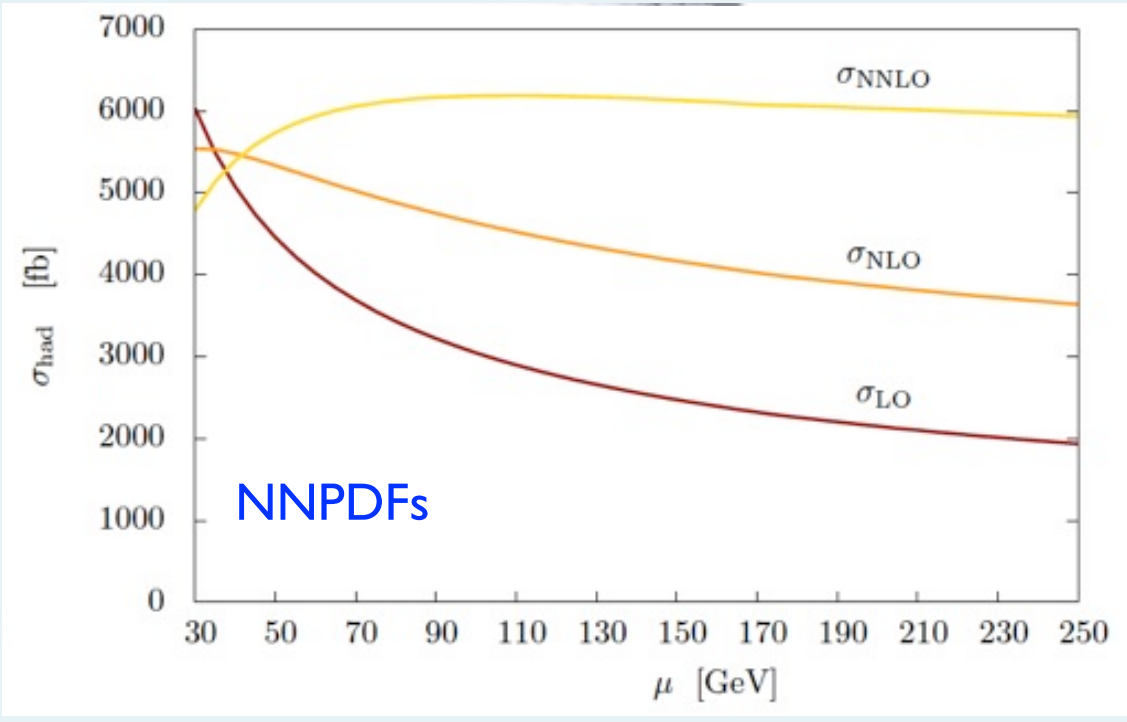


Postcards from the precision frontier.

$t\bar{t}$ total cross section [from P. Fiedler's talk]

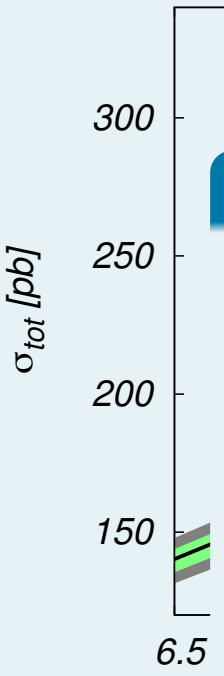


$H + j$ total cross section [from R. Boughezal's talk]

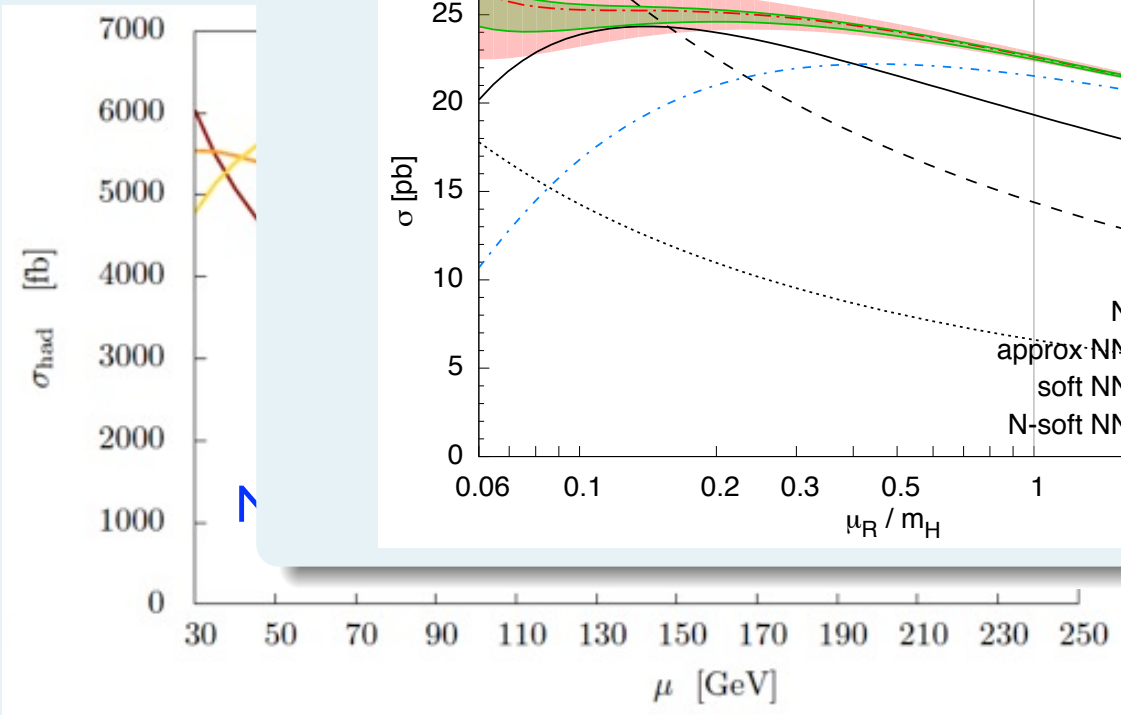


Postcards from the precision frontier.

$t\bar{t}$ total cross section [from P. Fiedler's talk]



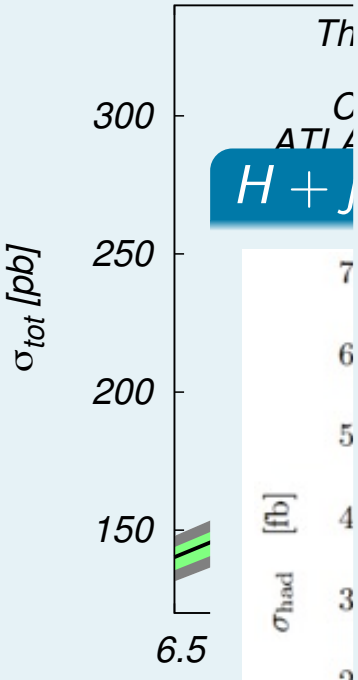
$H + j$ total



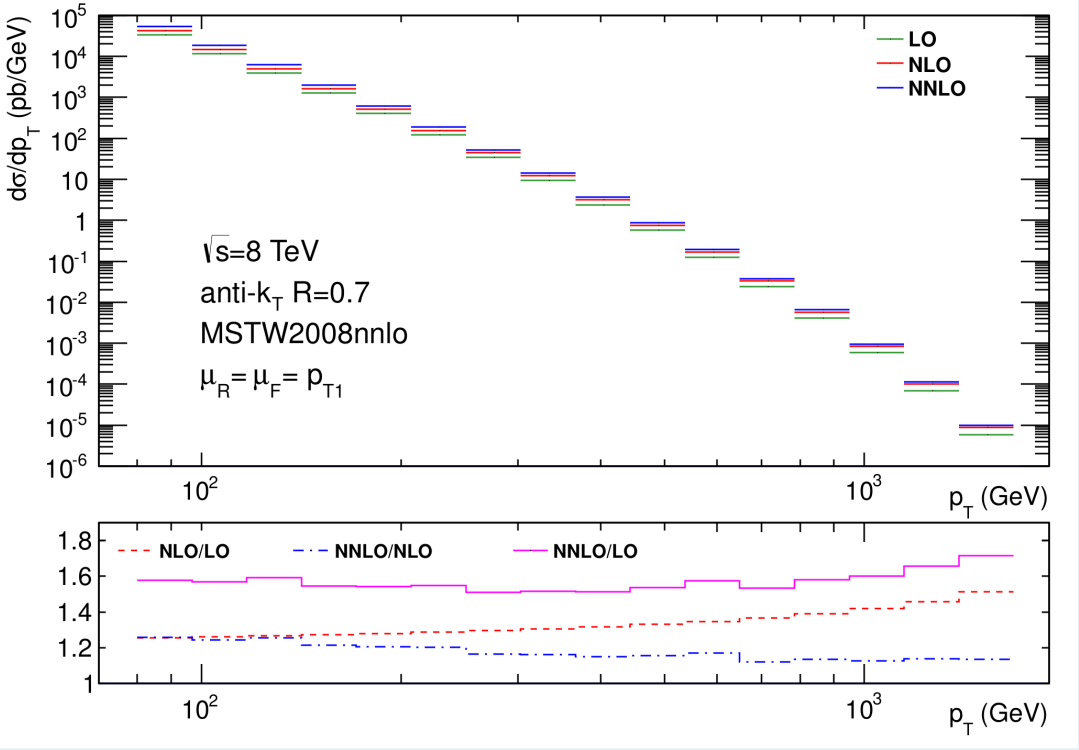
Approx. N^{3}LO prediction for $gg \to H$ [from M. Bonvini's talk]

Postcards from the precision frontier.

$t\bar{t}$ total cross se



NNLO predictions for dijet production [from T. Gehrmann's talk]



Non-tools oriented topics.

Top — plenary talk by S. Alioli

- new observables for measuring the top charge asymmetry at hadron colliders — S. Berge
- a new observable to measure m_t at hadron colliders — A. Irles

Jets, resummation — plenary talk by A. Kulesza

- jet mass and substructure in SCET — F. Tackmann
- QCD calculations for jet substructure, taggers — S. Marzani
- track based observables, track thrust — M. Procura
- two-loop beam functions — M. Stahlhofen
- dijet azimuthal decorrelations in the Regge limit at the LHC — A. V. Shipilova

Conclusions.

- Wide array of topics covered
- Impressive progress on the precision frontier
- Tools are being continuously refined
- Lots of interesting phenomenology