Pileup reweighting in 2018

Jonas Rübenach
EXO Meeting
August 28, 2020

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

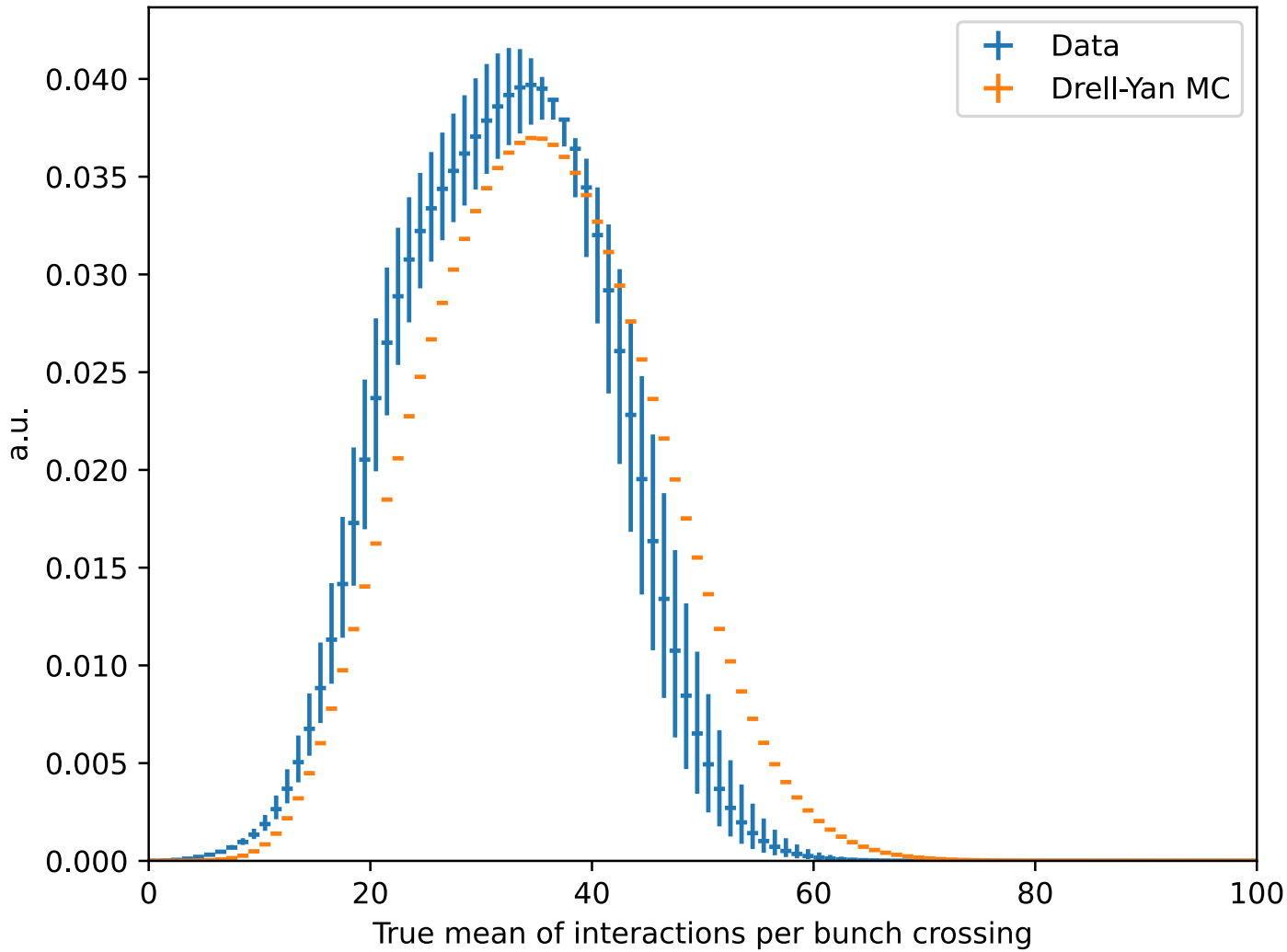
Pileup reweighting

- No pileup reweighting applied until now
  - Not expected to really improve data/mc agreement
- Needed nonetheless, also due to its uncertainties

Procedure

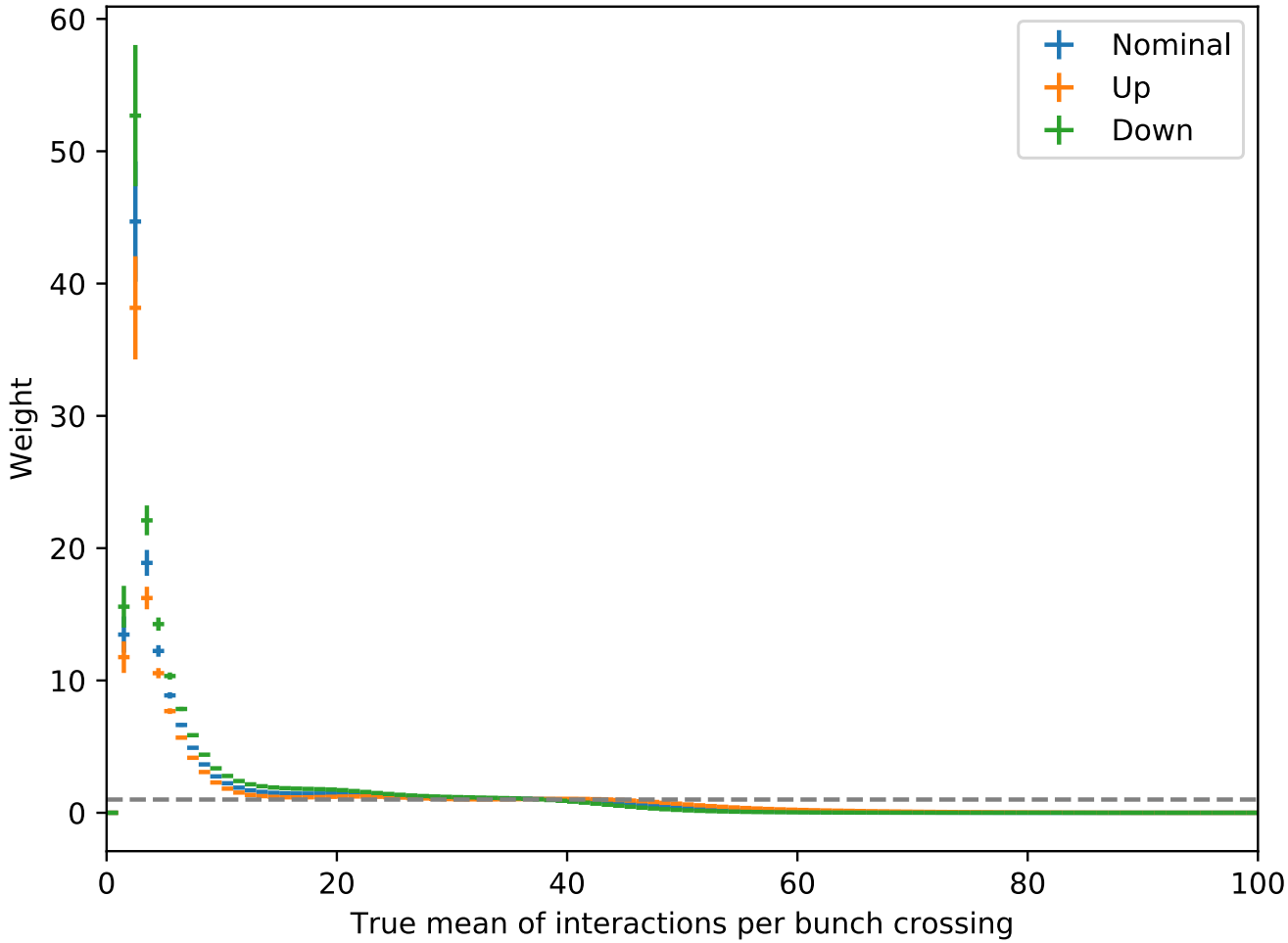
1. Get pileup distribution from data using pileupCalc.py
2. Get it from MC histogramming Pileup_nTrueInt on per-dataset basis
3. Weight is ratio of data/mc histograms, both normalized
4. Error derived from varying σ_{inel} (parameter of the data hist) by 4.6%

Pileup distribution



Pileup weight

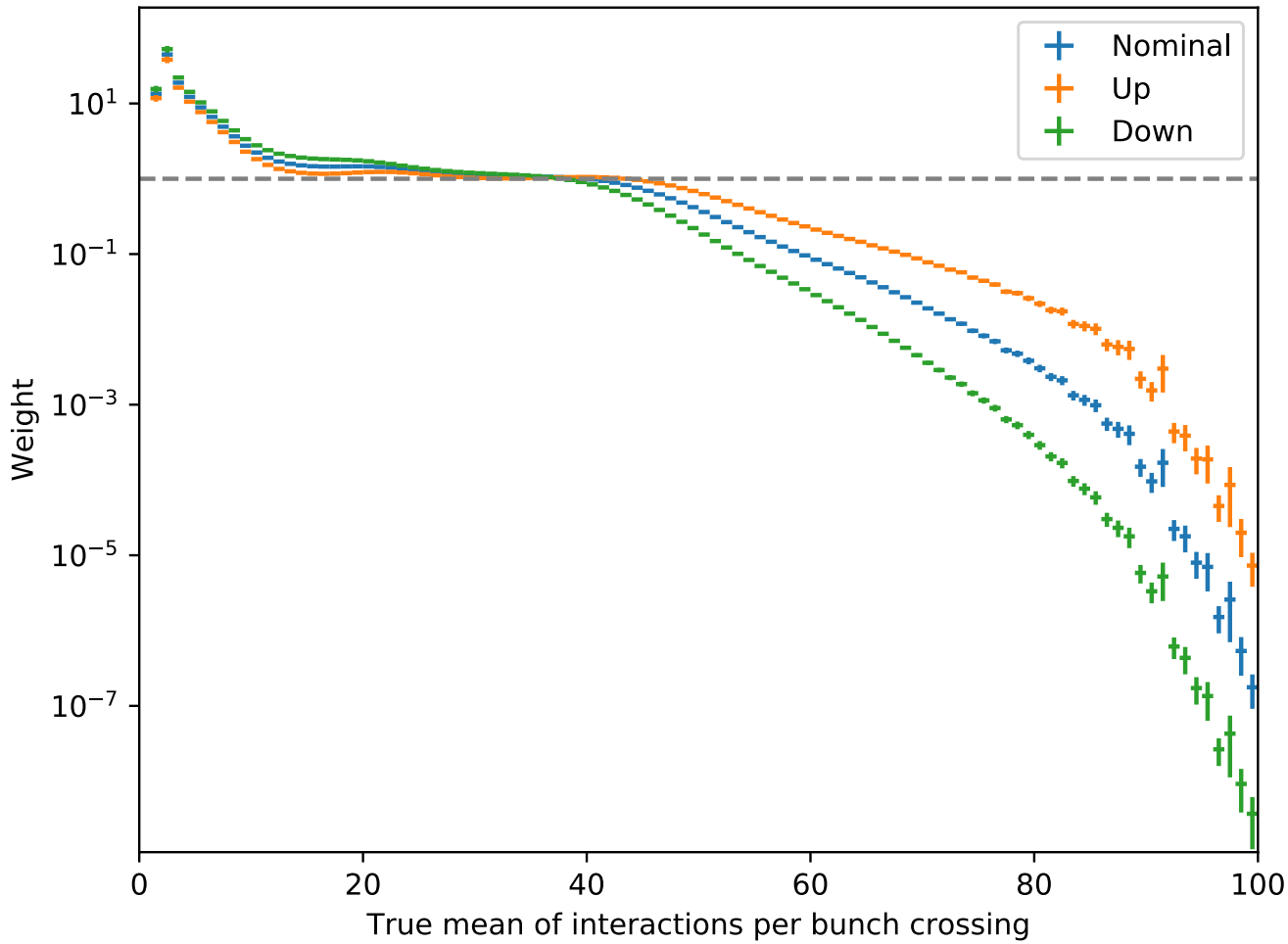
Using the distribution from Drell-Yan, with stat. uncertainty



Large weights (factor 50) around low pileup.

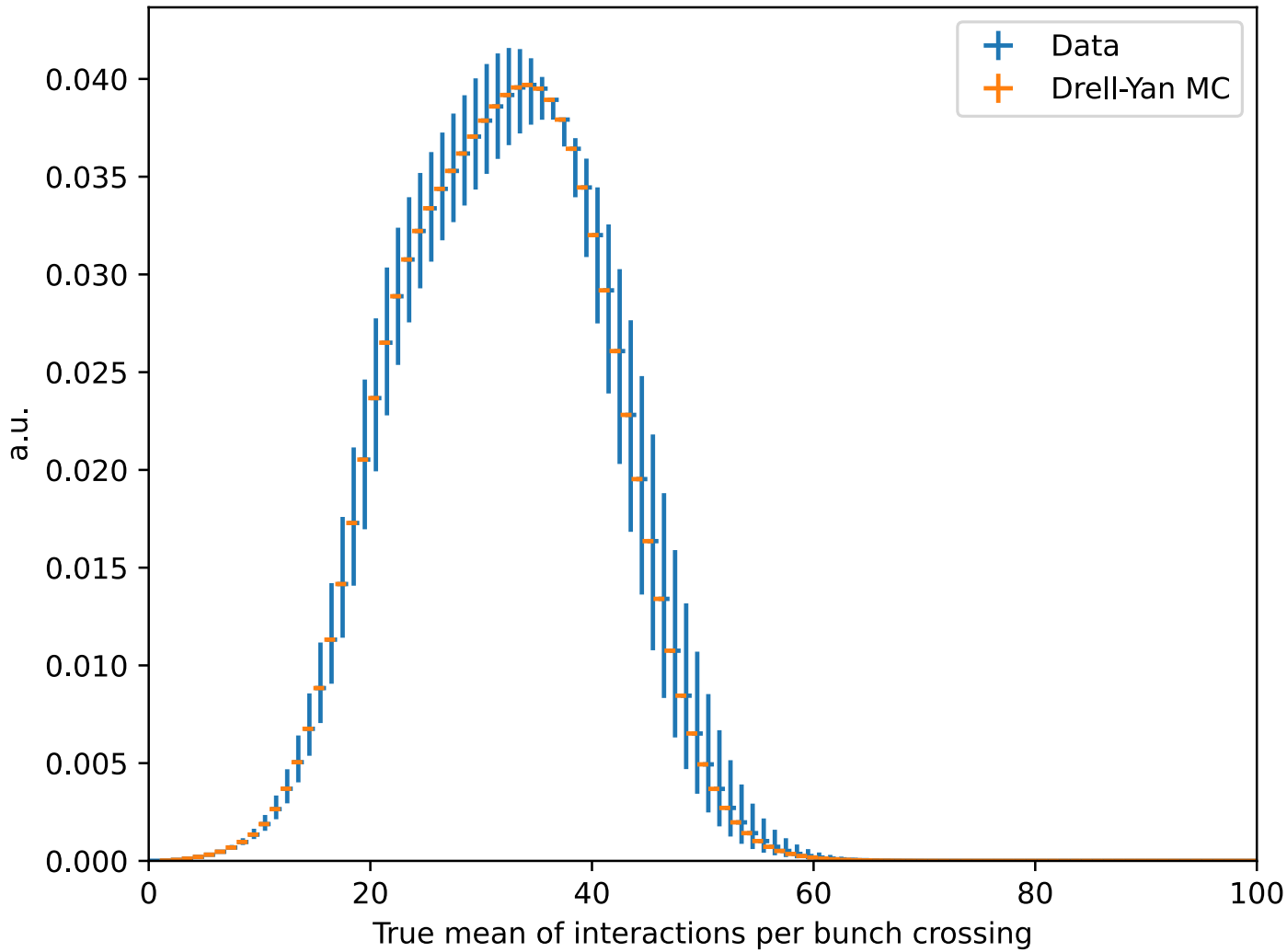
Pileup weight

Using the distribution from Drell-Yan, with stat. uncertainty



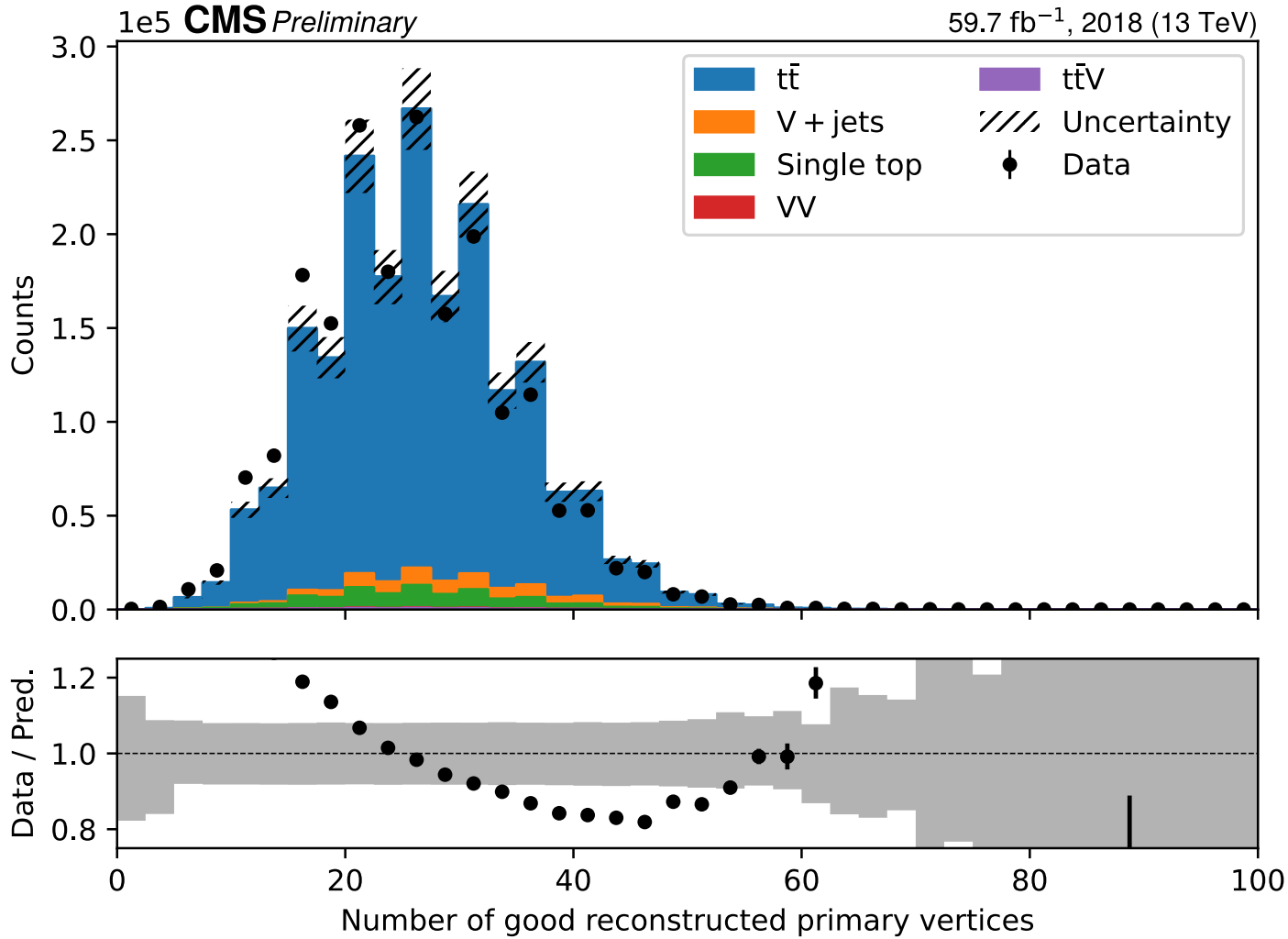
Small weights for high pileup.

Pileup distribution after reweighting



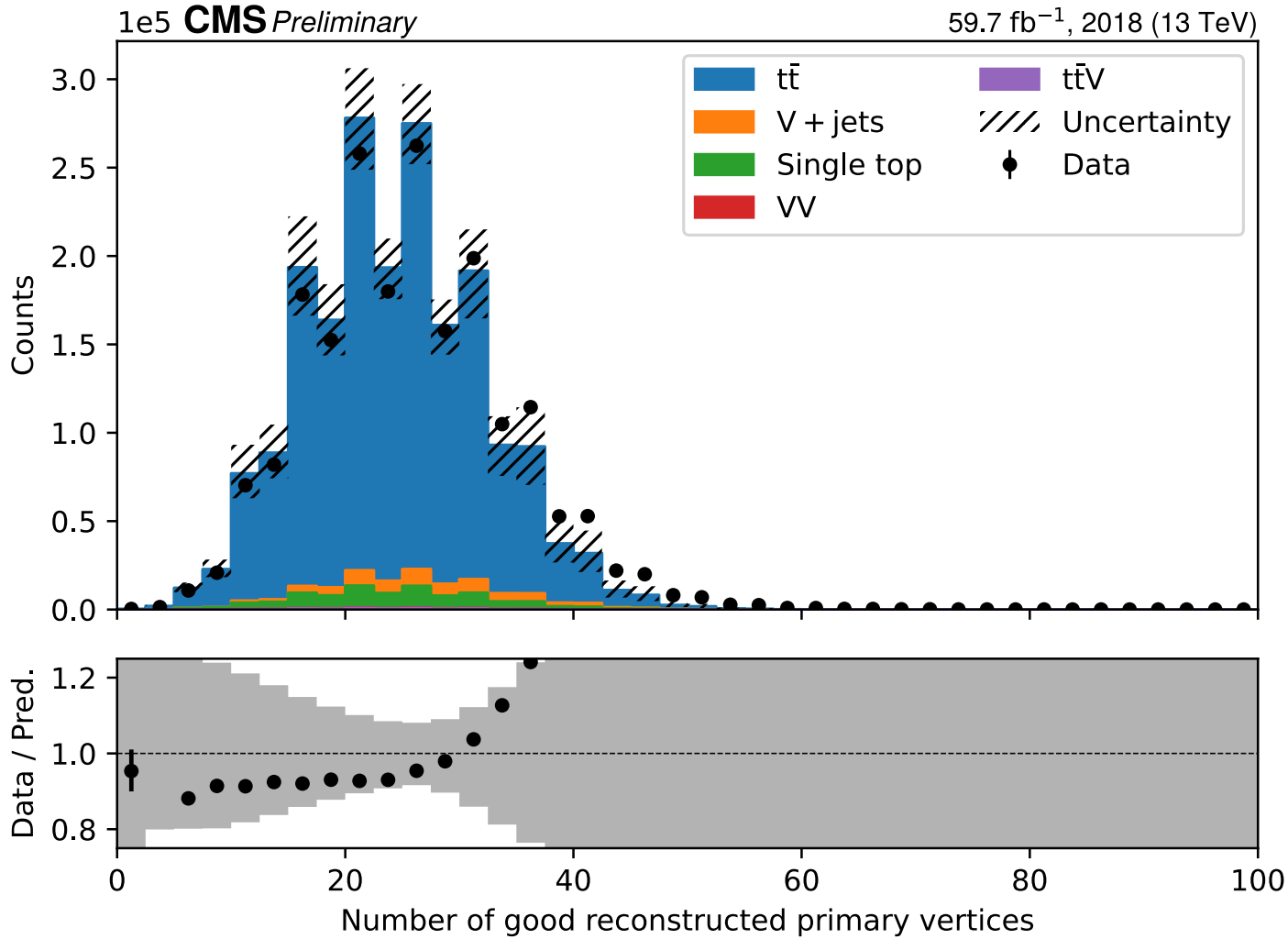
Number of primary vertices

No pileup reweighting, after MET cut



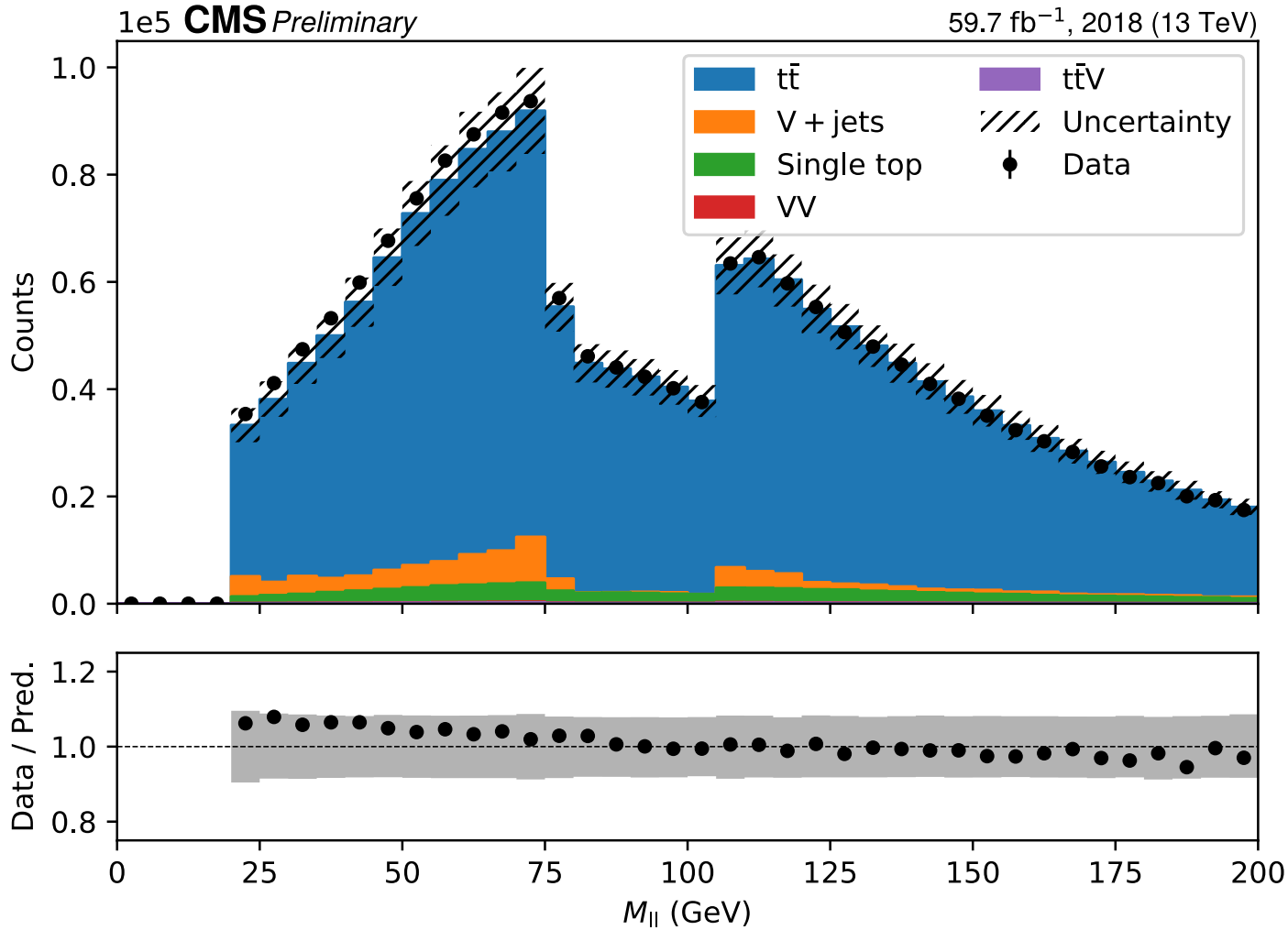
Number of primary vertices

With pileup reweighting, after MET cut



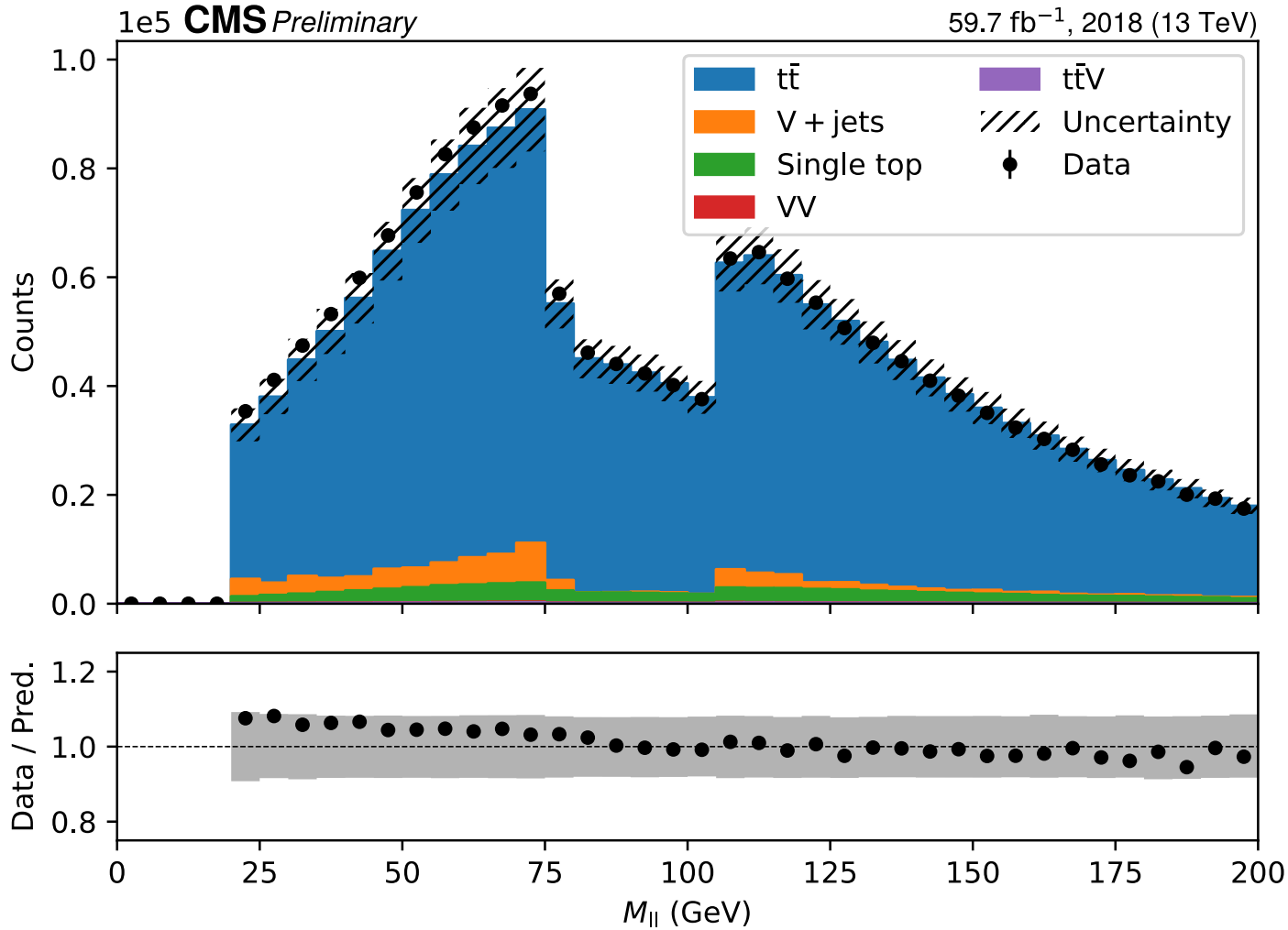
Invariant mass of the lepton pair

No pileup reweighting, after MET cut



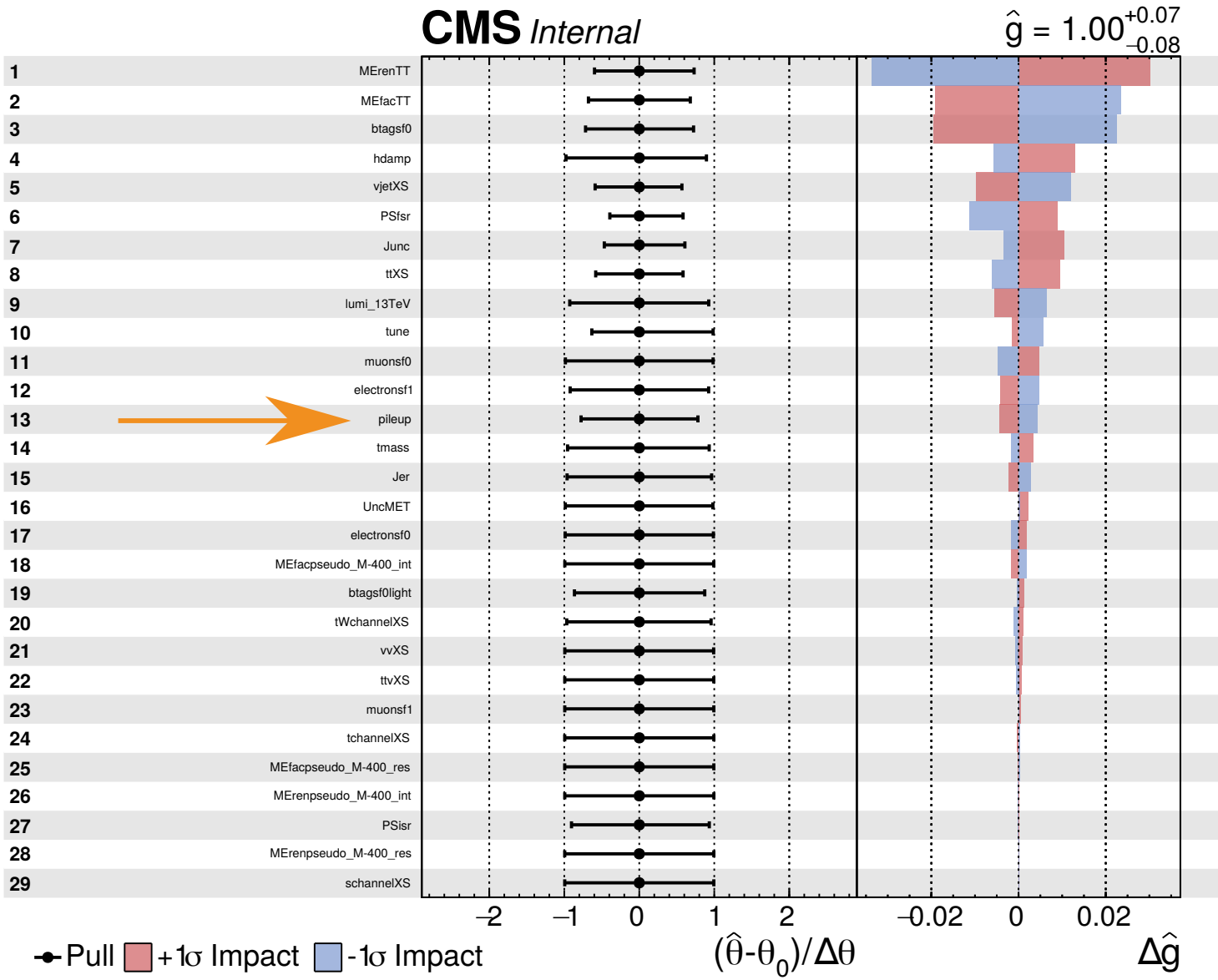
Invariant mass of the lepton pair

With pileup reweighting, after MET cut



Impact of the pileup uncertainty

For pseudoscalar Higgs with $m_A = 400$ GeV



Thank you