

Differential single-top-quark cross section in t channel at 13 TeV

by Matthias Komm, Université catholique de Louvain, Belgium

UCL
Université
catholique
de Louvain

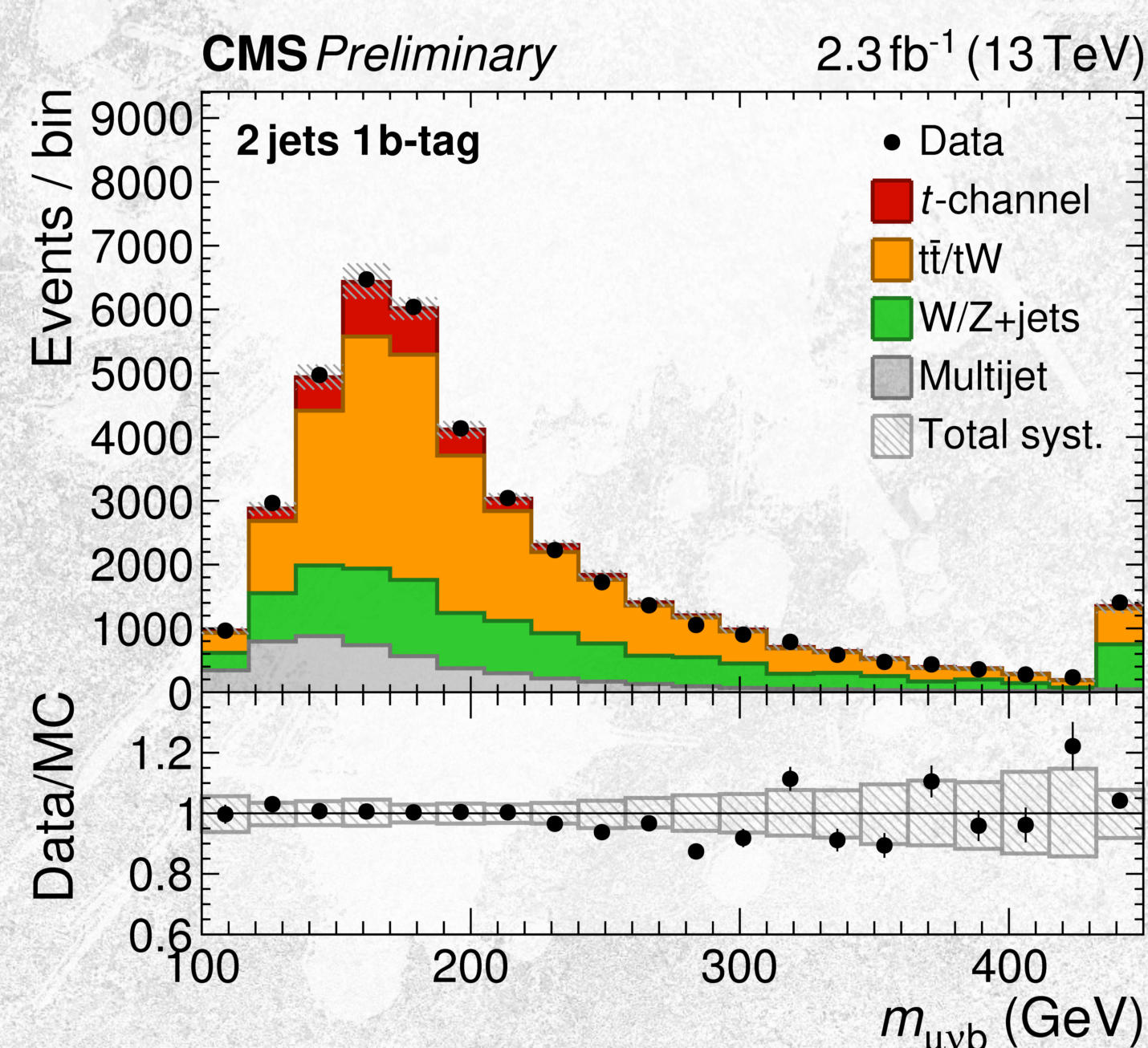
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based on CMS-TOP-PAS-16-004

Event selection

- 1 isolated muon ($p_T > 22$ GeV, $|\eta| < 2.4$)
- 2 or 3 jets ($p_T > 40$ GeV, $|\eta| < 4.7$) with 1 or 2 b-tags
- reject multijet events ($m_T(W) > 50$ GeV)

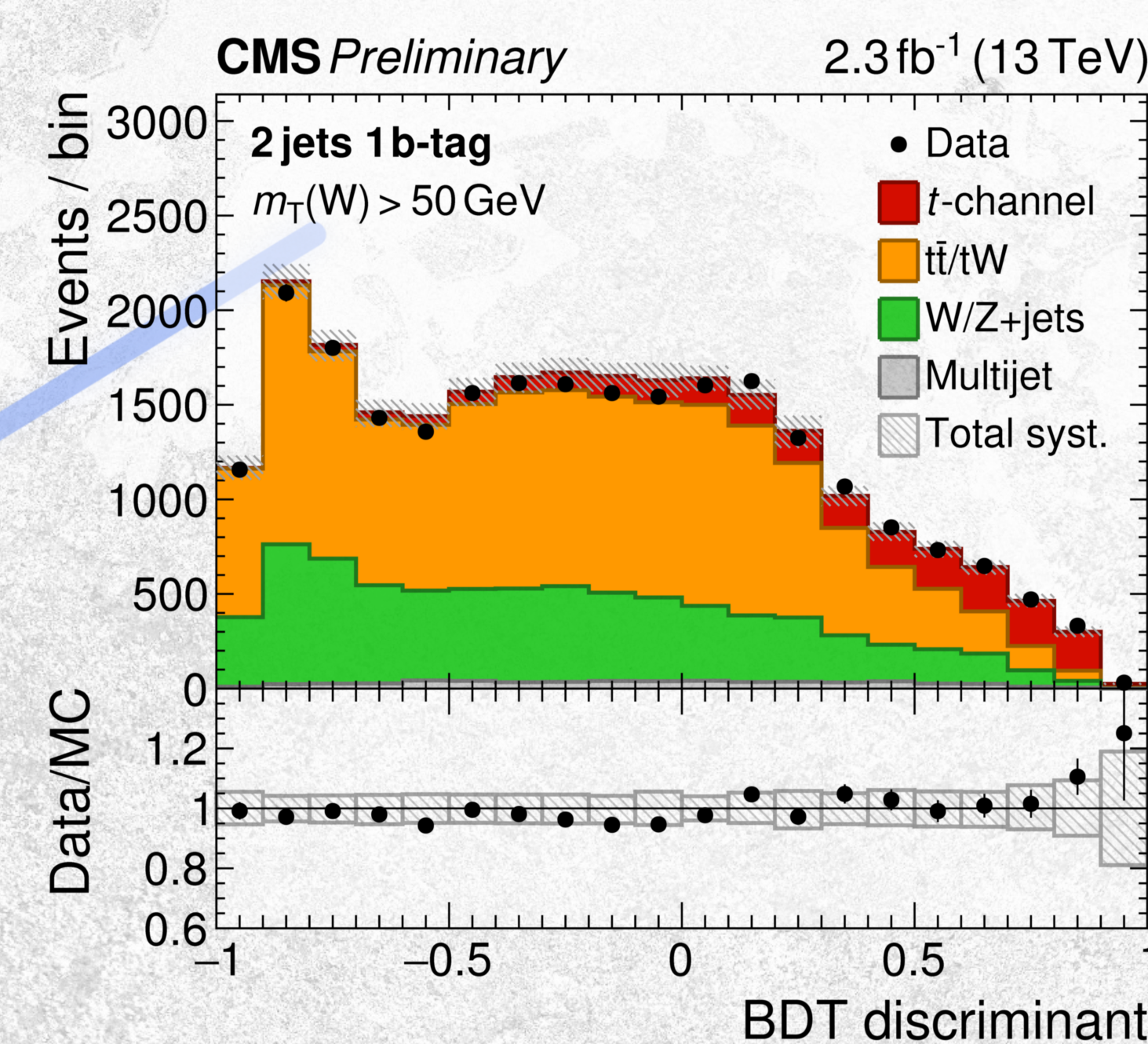


Top quark candidate
by solving neutrino p_z
using

$$m_W^2 = \left[\begin{pmatrix} E_\mu \\ \vec{p}_\mu \end{pmatrix} + \begin{pmatrix} E_\nu \\ \vec{p}_\nu \end{pmatrix} \right]^2$$

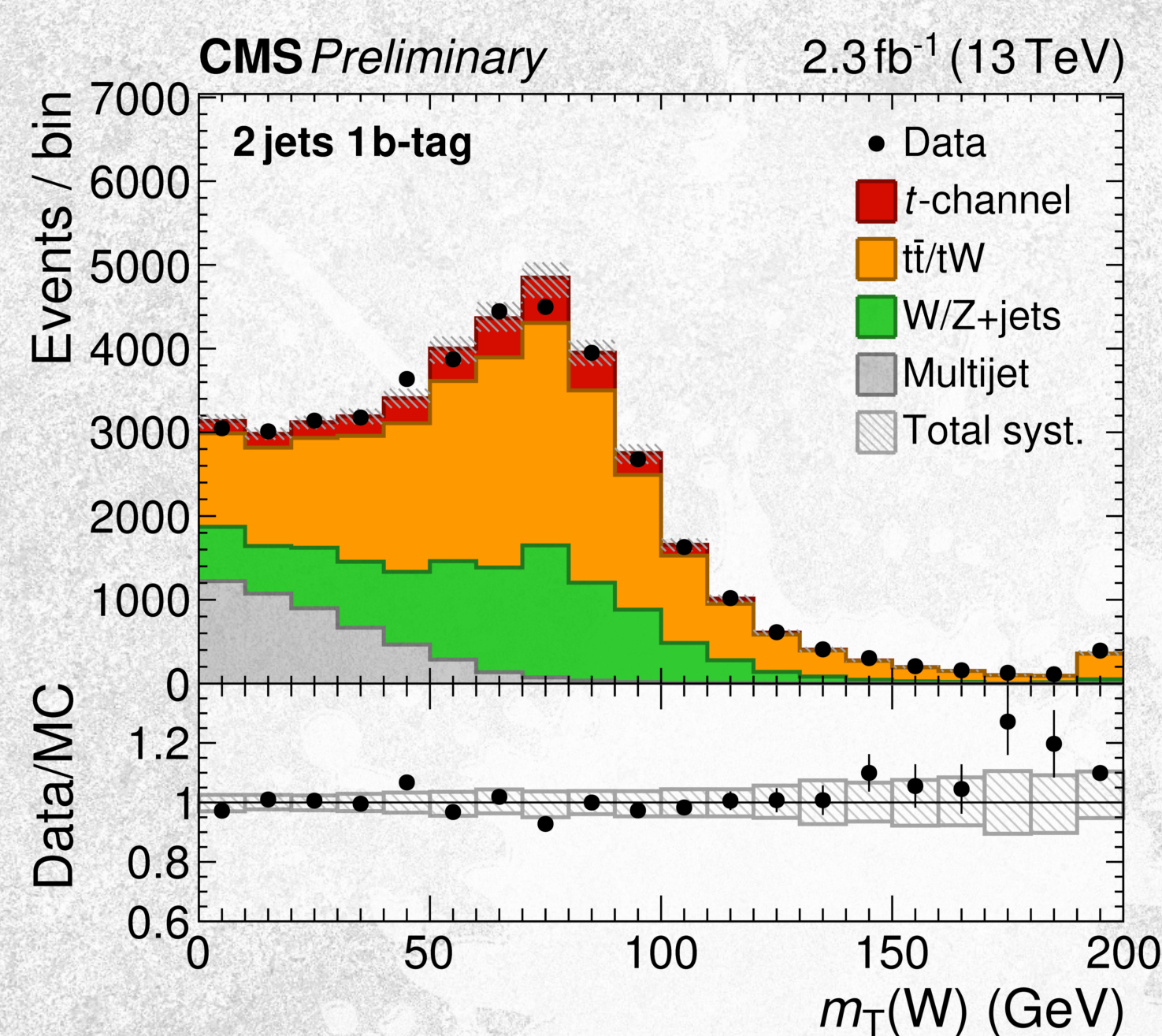
Boosted Decision Tree

- trained to reject W+jets & $t\bar{t}$ backgrounds
- 5 input observables: $|\eta(j')|$, $m_{\mu\nu b}$, $m_T(W)$, $\Delta R(b, j')$, $|\Delta\eta(b, \mu)|$



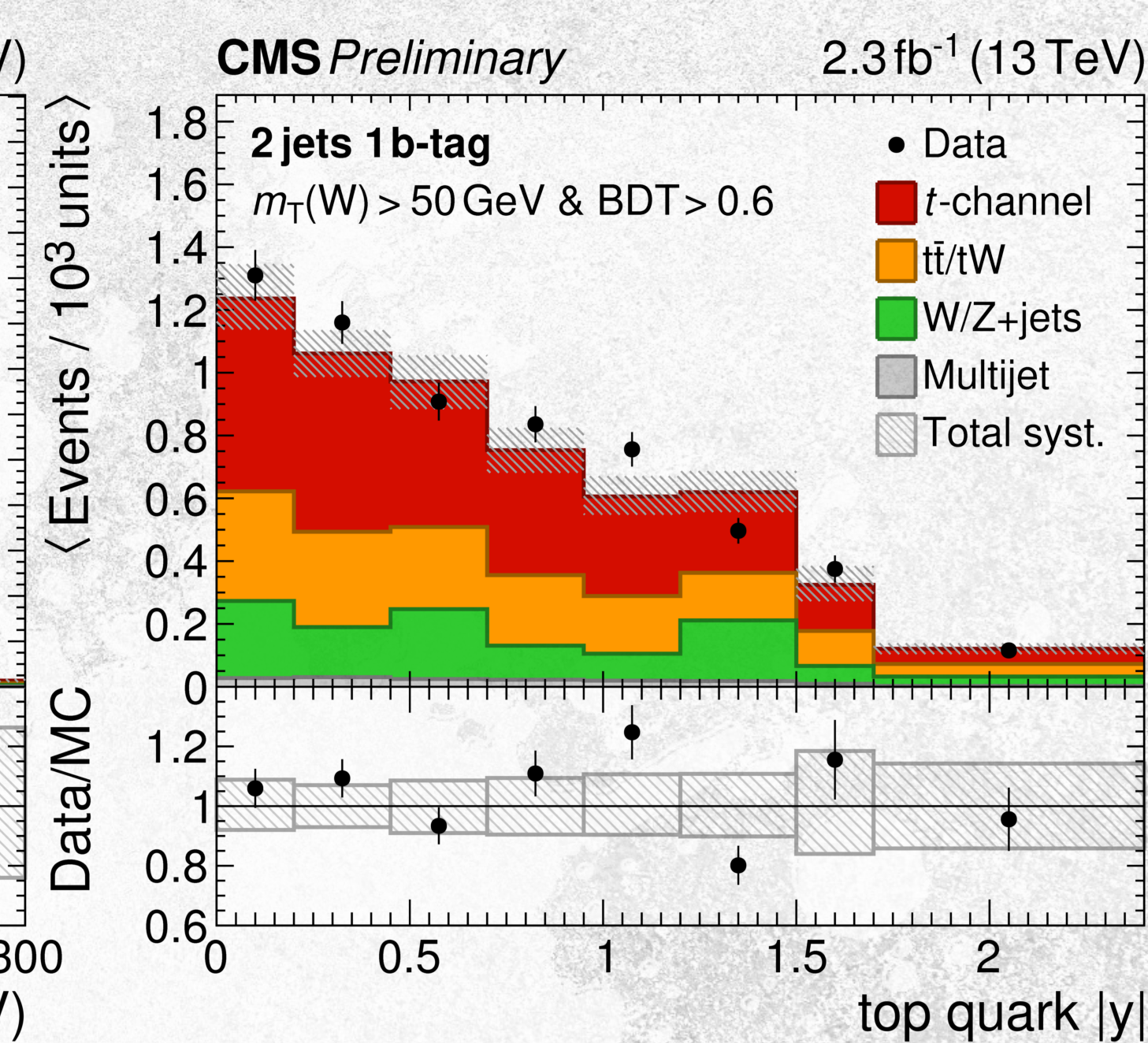
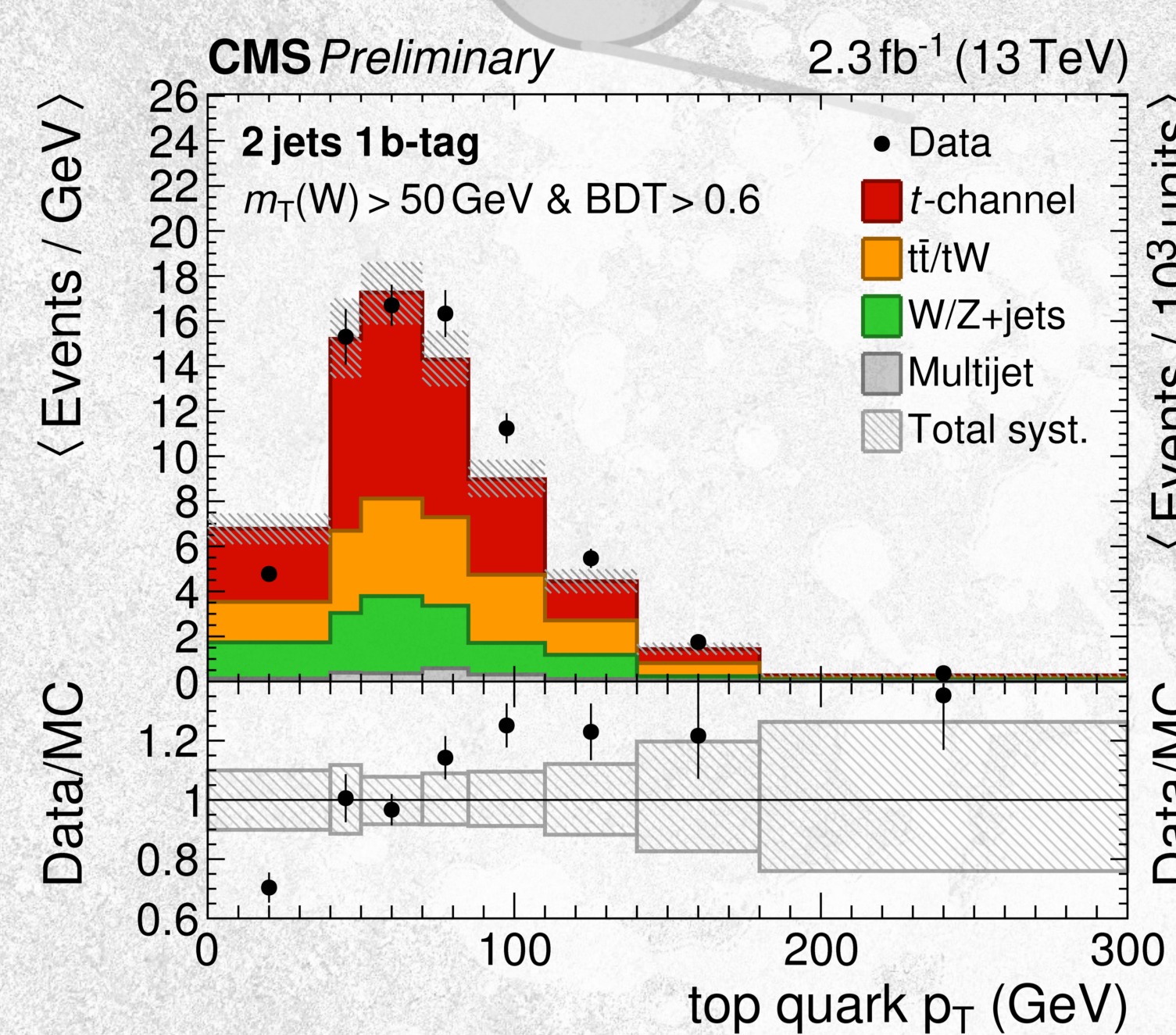
Signal extraction

- shape template for multijet background from data with inverted muon isolation
- multiple fits in bins of $p_T^{\text{top}} / |y^{\text{top}}|$ using $m_T(W)$ below 50 GeV & BDT otherwise

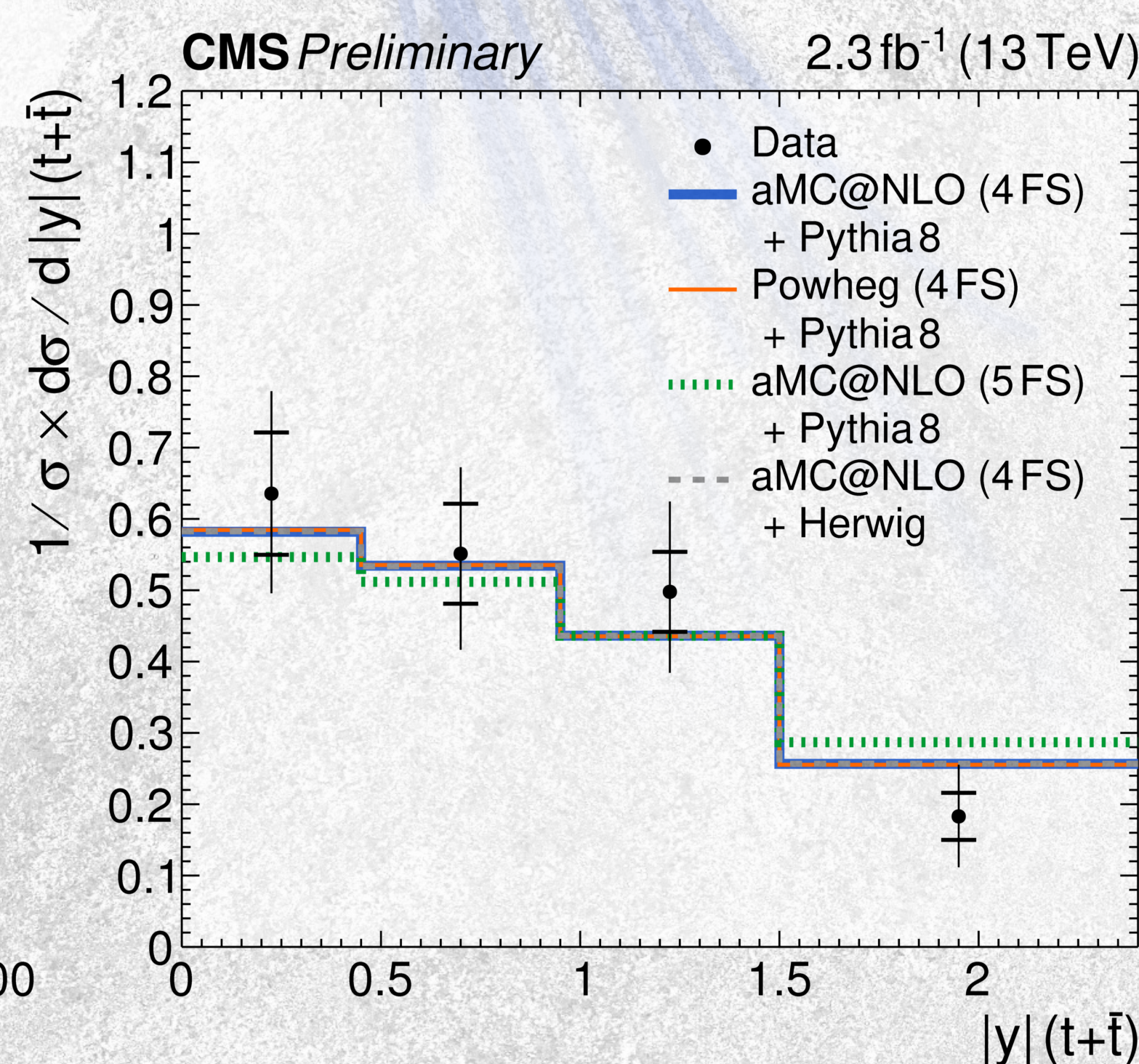
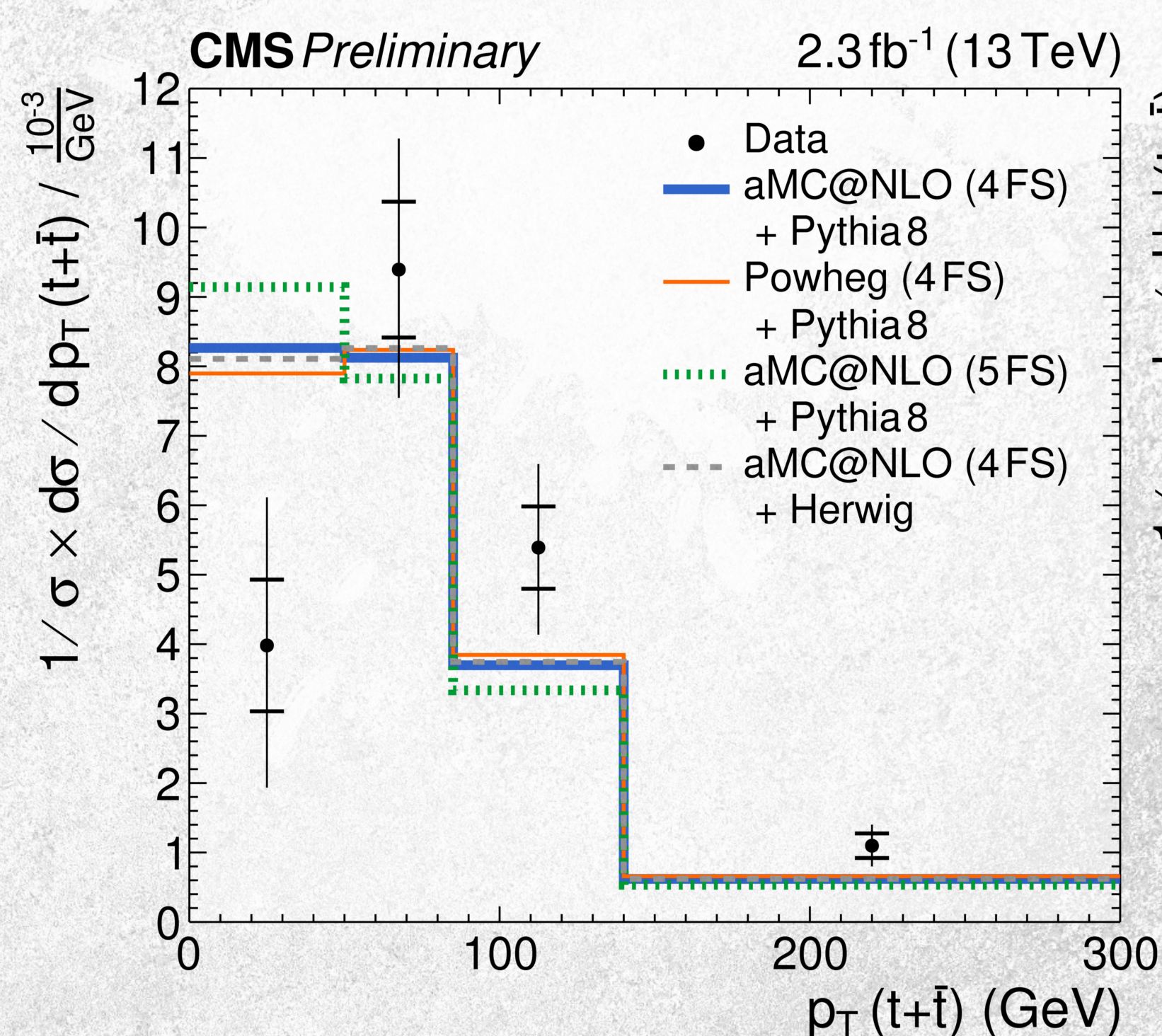


Unfolding

- TUnfold package & regularized for minimal global correlation
- parton-level top quark defined after QCD/QED radiation



Measured cross sections



Largest uncertainties:

- statistics (10-25%)
- Q_F / Q_R scale (10-15%)
- top quark mass (10-20%)
- jet energy calib. (10-15%)

Data described by predictions within large uncertainties. No significant deviations observed.

more info

