

LHC-EW WG: Jets and EW bosons

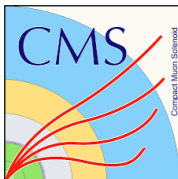
Jet substructure mini workshop

Oct. 19, 2020

Co-Conveners:



Eram Rizvi and Benjamin Nachman



Vieri Candelise, Mikko Voutilainen, Hannes Jung



Stephen Farry and Will Barter



James Mulligan and Nima Zardoshti

ALICE

THEORY

Marek Schoenherr

Briefly, information about the group



We meet on Mondays at 4:30 PM CERN



<https://indico.cern.ch/category/3290/>



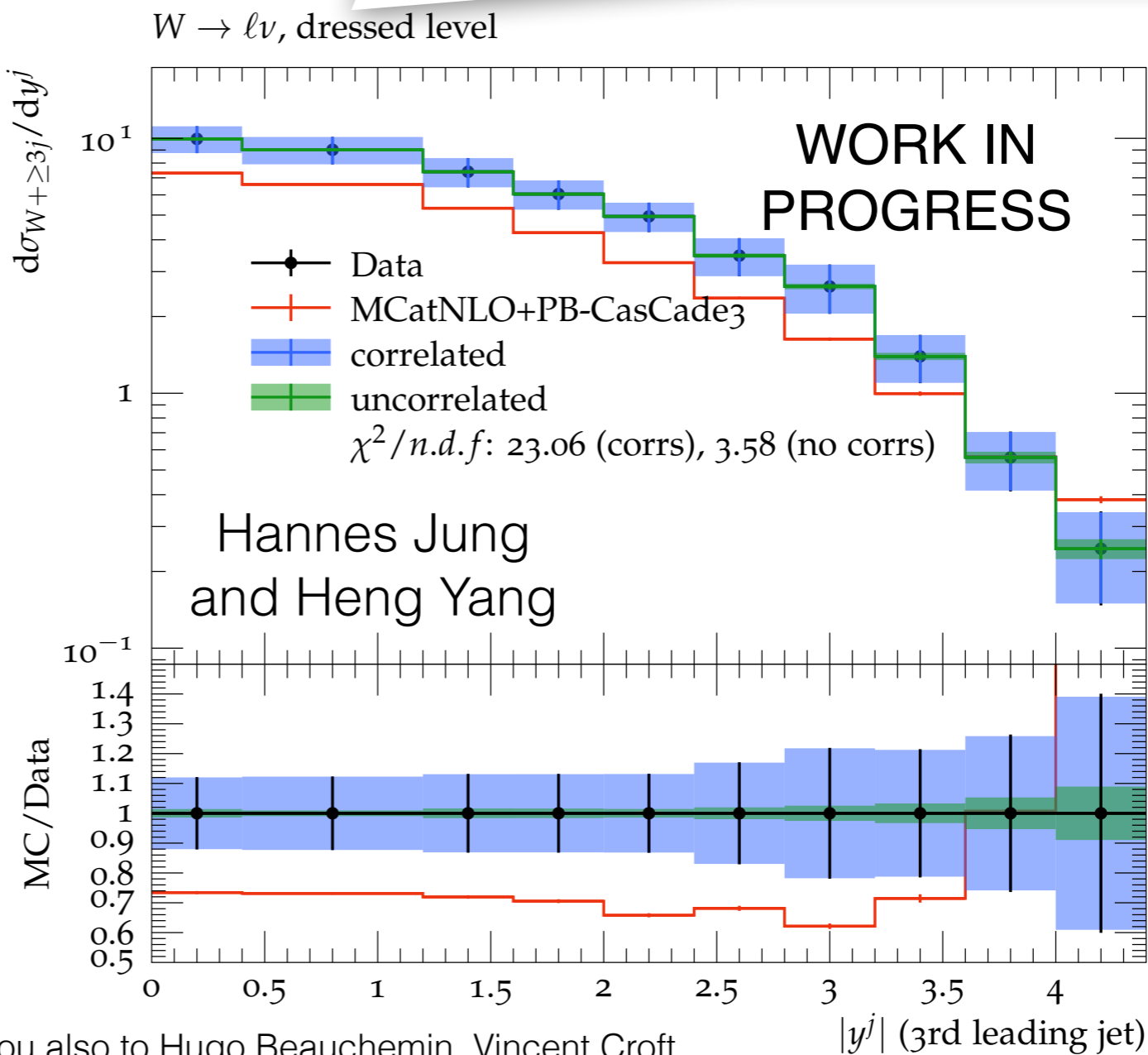
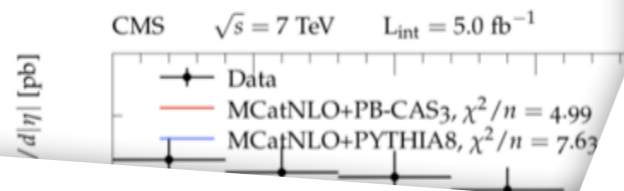
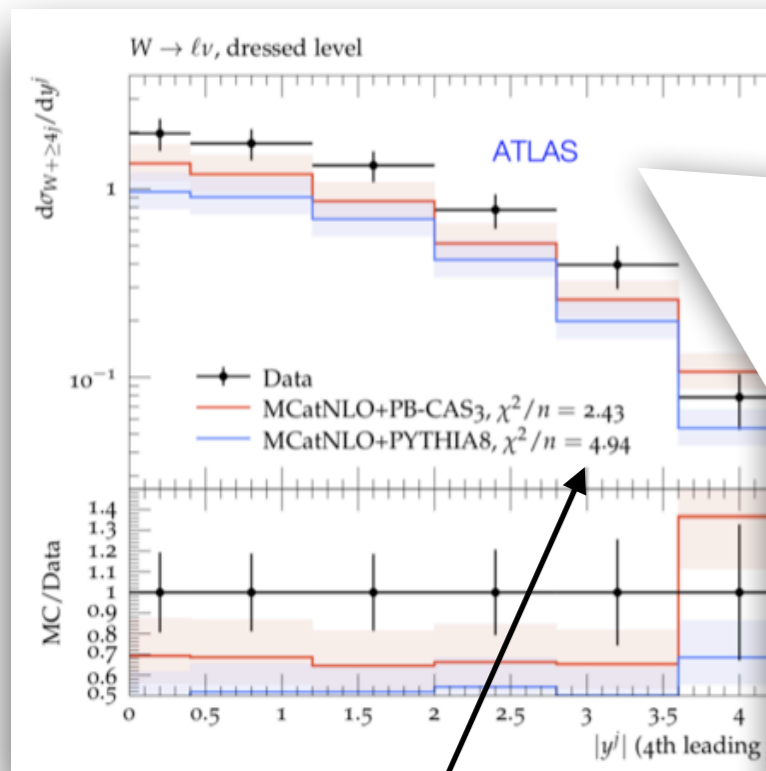
<https://twiki.cern.ch/twiki/bin/view/LHCPhysics/EWWG2>

Today, next week, and the week after:
Jet substructure mini-workshop!

Before that, we will start with a brief recap of the LHC EW working group general meeting from two weeks ago.

Benchmark Comparisons

We discussed benchmark comparisons. Two points of discussion came up: *what about “unfold/refold” when binning is different? Where do intrinsic k_T studies belong?*

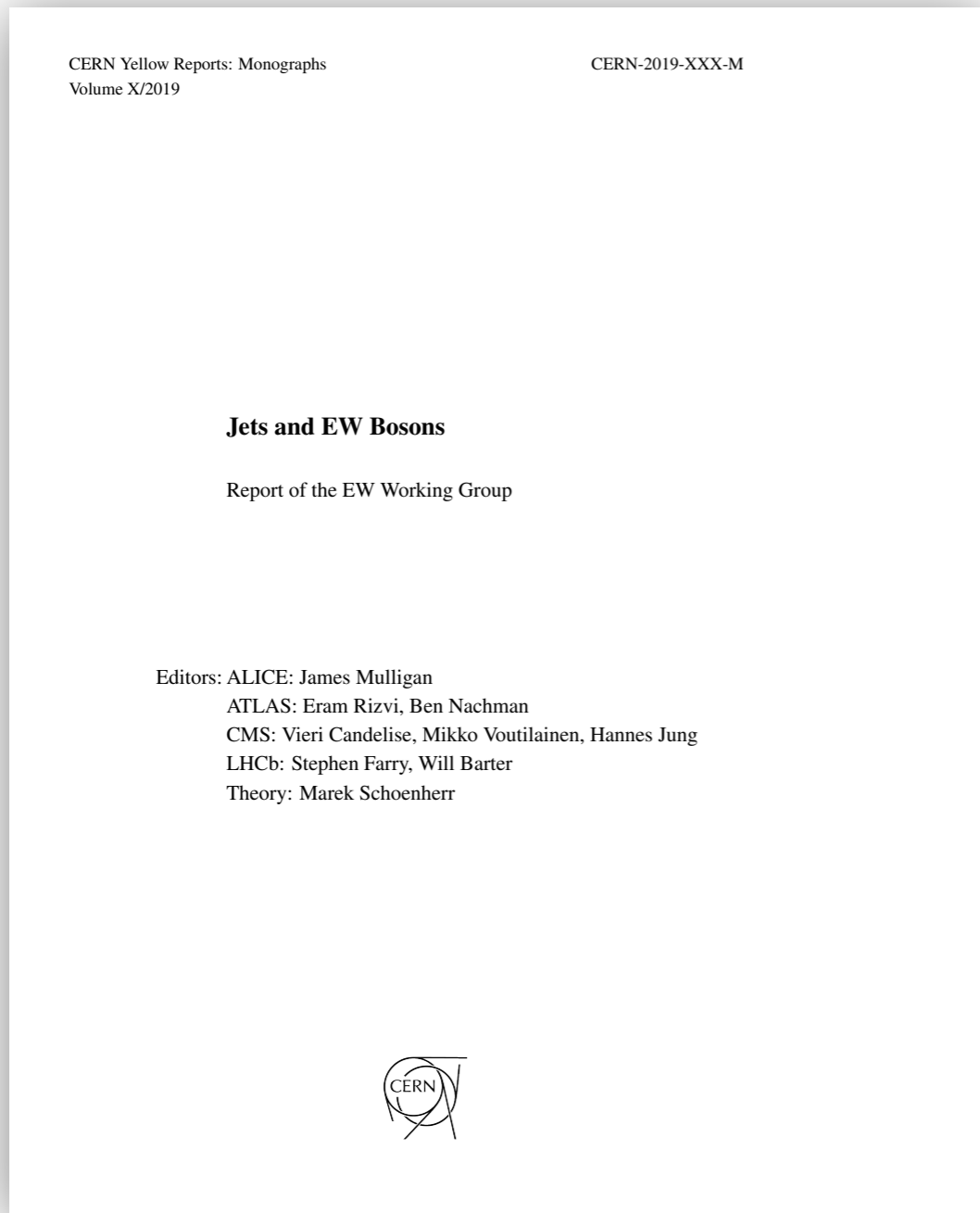


Thank you also to Hugo Beauchemin, Vincent Croft, Alec Drobac (Tufts) for last minute plots!

Not yet full covariance matrix, but have **the information and setting that up.**

Consistency between experiments.

Yellow Report Status



The report itself has basic structure, but work is ongoing. The conveners wanted to know our timeline - this is something we should discuss in an upcoming meeting.

<https://gitlab.cern.ch/lhcewkwg/lhcewkwg-vjets/yellowreport>

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...and now on to the main event!

LHC-EW WG: Jets and EW bosons
Jet substructure mini workshop

Precision Jet Substructure

*A unique setting for
studying the strong
force at high energy!*



(1) (Beyond the) Standard model parameters

α_s (including running), m_{top} , EFTs, Higgs self coupling, ...

(2) Unique tests of fundamental physics, including unique probes of high energy / collective behavior of the strong force.

interference & entanglement, dead cone, ...

(3) Direct searches for new particles

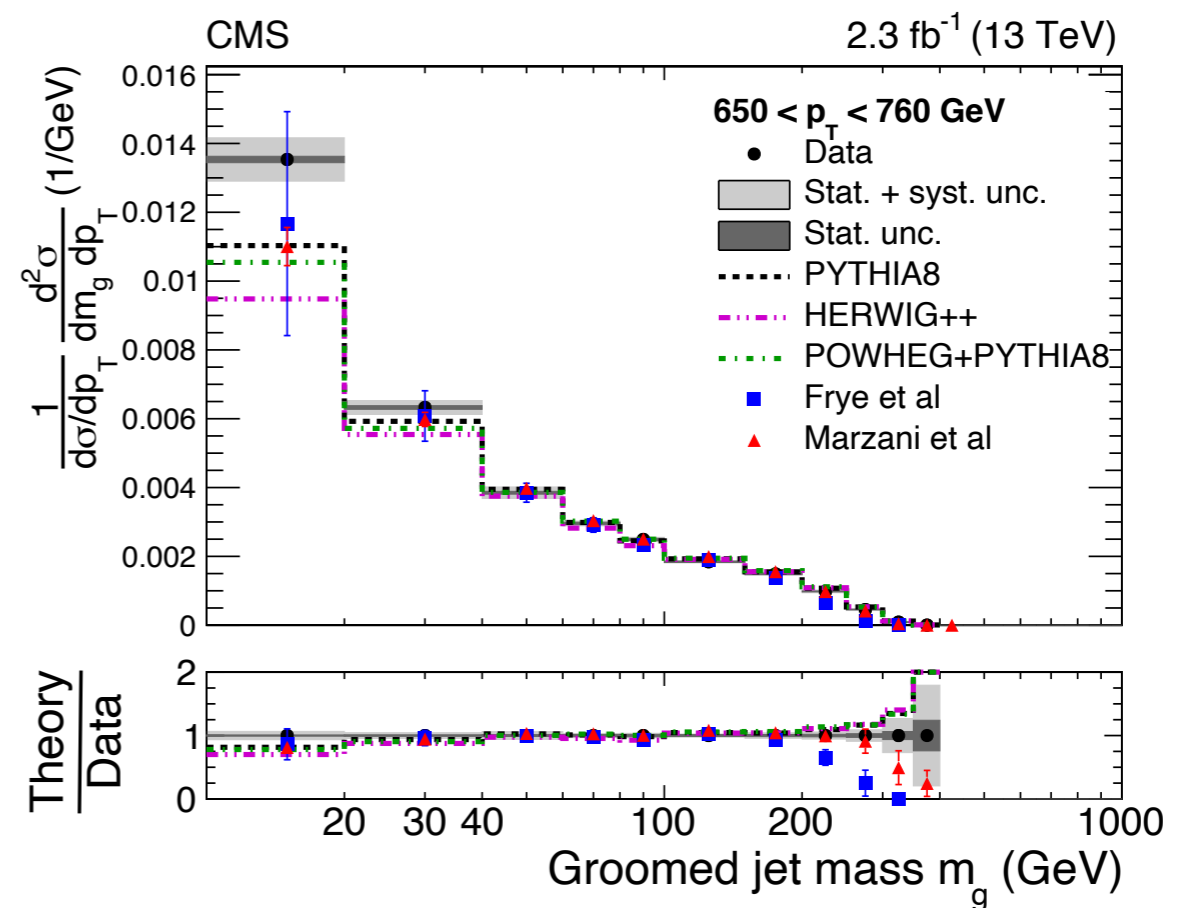
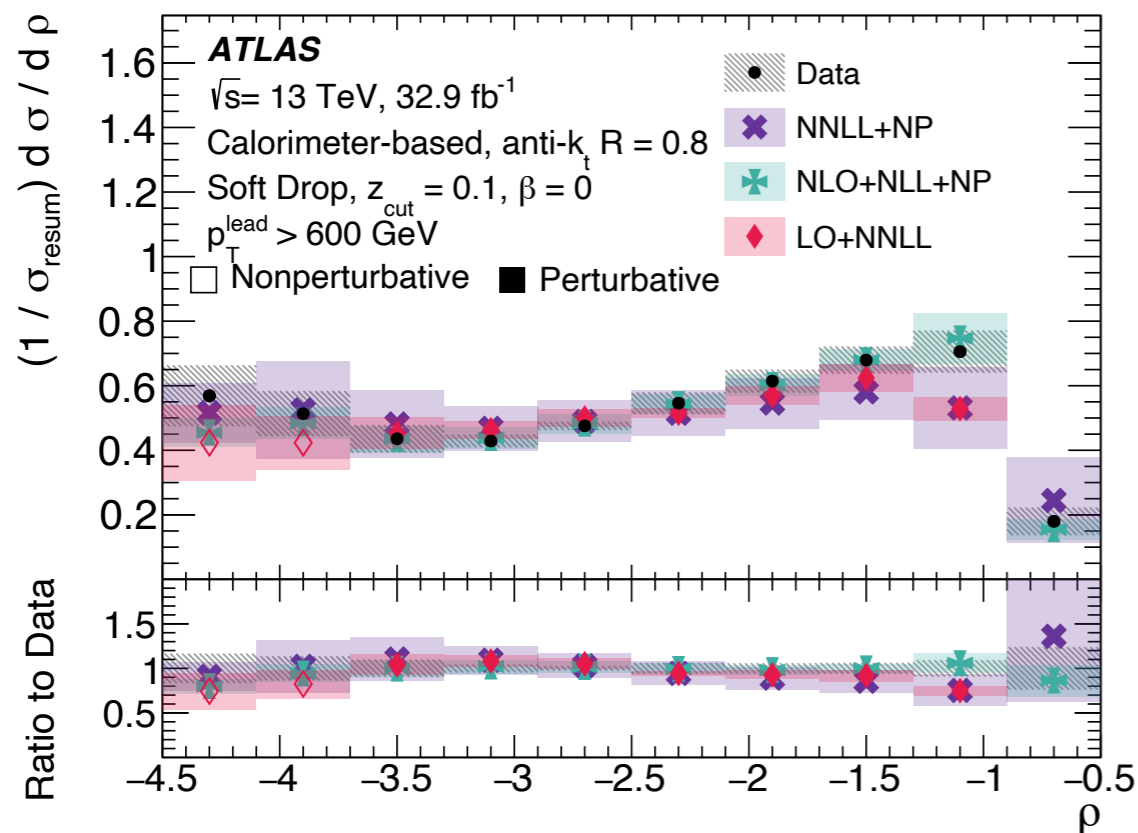
Final states with boosted bosons, top quarks, ...

(4) General-purpose Monte Carlo generator development and tuning
higher-order corrections, empower other measurements / searches, ...

Thinking towards a combined future



One challenge with existing measurements is that the observables and/or binning is different so direct comparisons are not possible.

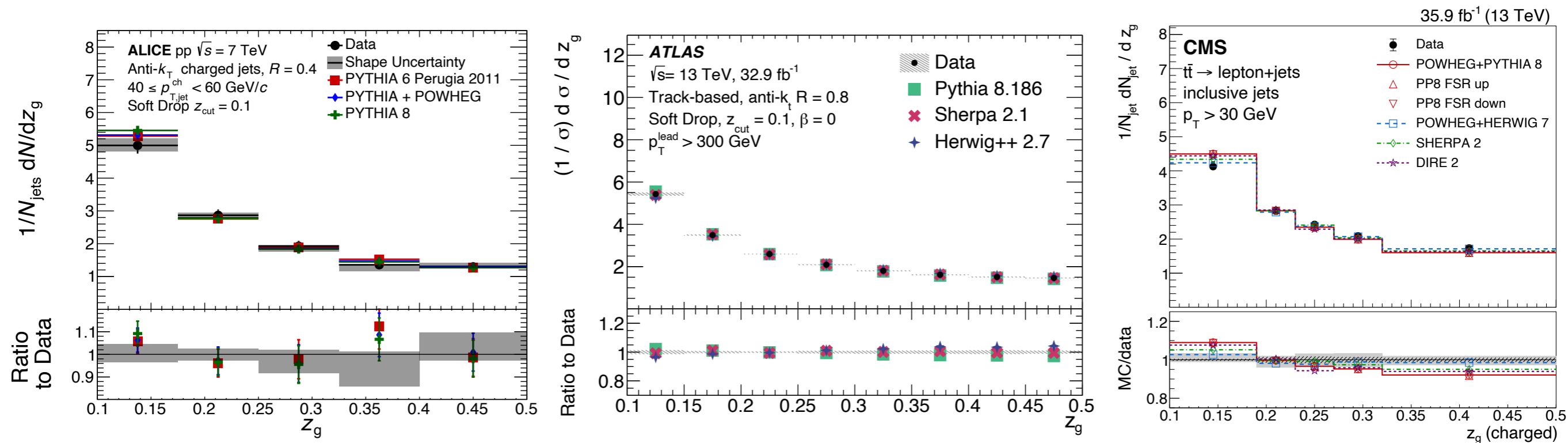


Many of our measurements are not stats limited, so a combination may not be useful, but a comparison would be a very useful exercise with the potential to improve individual measurements in the future.

Thinking towards a combined future



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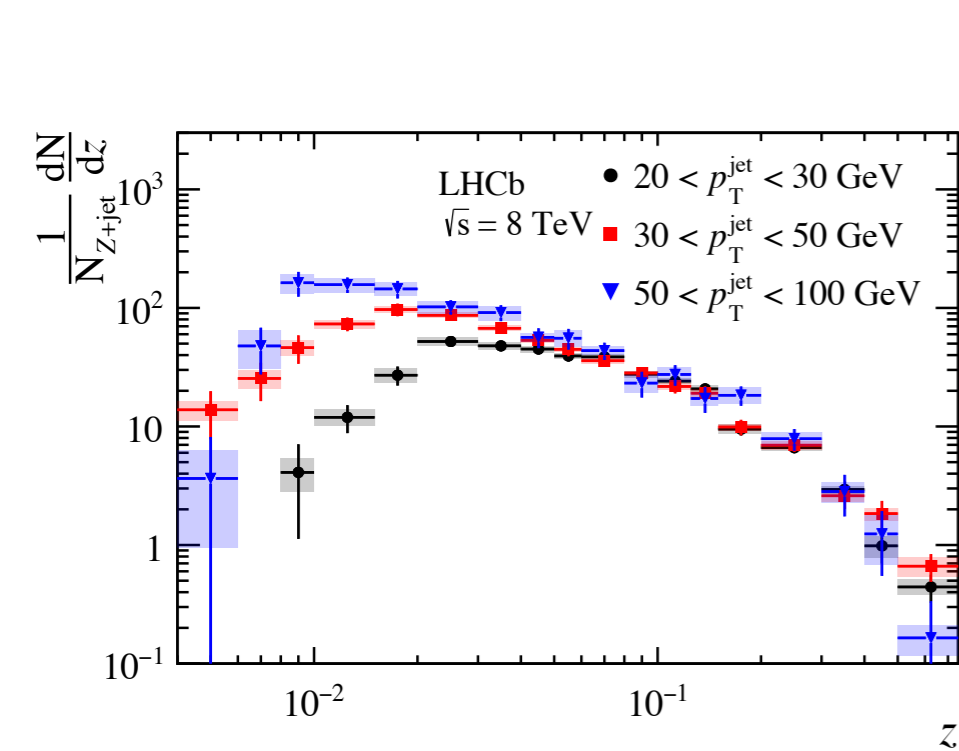
**Momentum fraction of
 “hardest splitting” inside jet**

Many of our measurements are not stats limited, so a combination may not be useful, but a comparison would be a very useful exercise with the potential to improve individual measurements in the future.

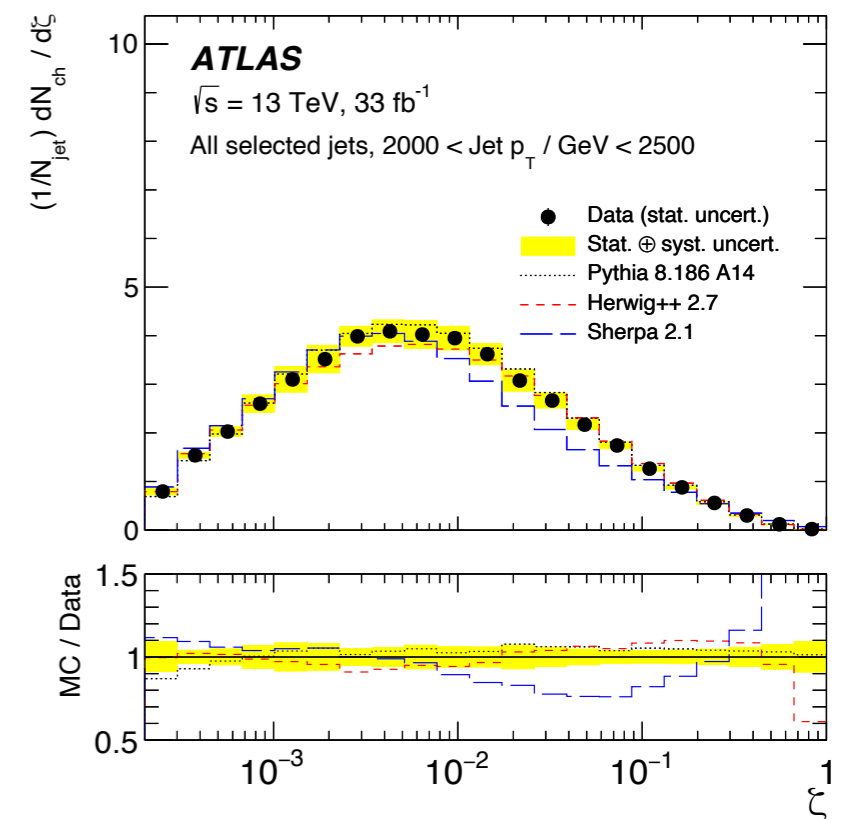
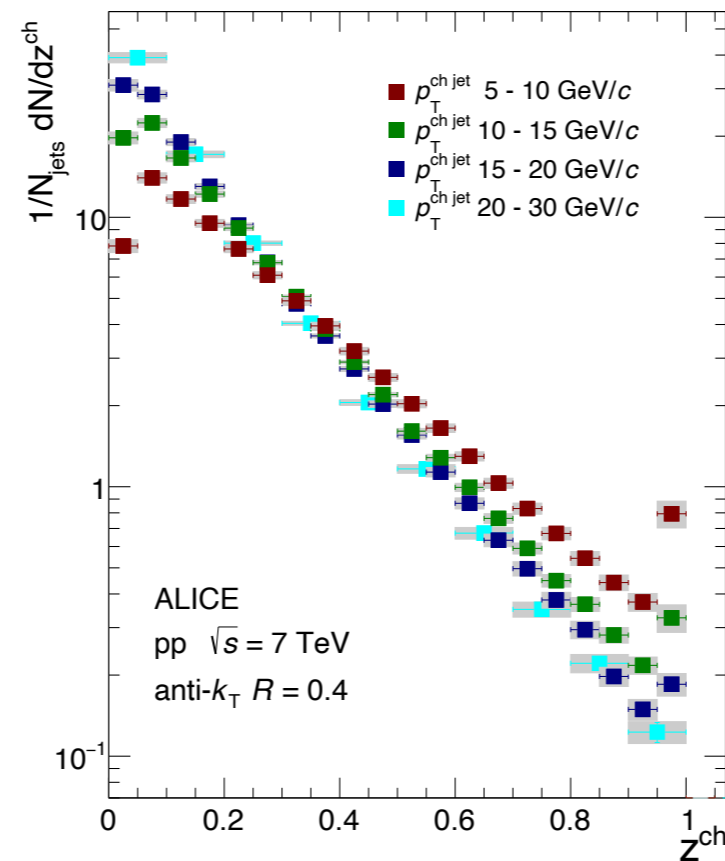
Thinking towards a combined future



One challenge with existing measurements is that the observables and/or binning is different so direct comparisons are not possible.



Momentum fraction of hadrons inside jets



Many of our measurements are not stats limited, so a combination may not be useful, but a comparison would be a very useful exercise with the potential to improve individual measurements in the future.

Now, for the workshop program!



MONDAY, 19 OCTOBER

16:30 → 18:00	Jet substructure: ATLAS, ALICE Conveners: Ben Nachman (Lawrence Berkeley National Lab. (US)), James Mulligan (University of California, Berkeley (US))	
16:30	Introduction Speakers: Ben Nachman (Lawrence Berkeley National Lab. (US)), James Mulligan (University of California, Berkeley (US))	⌚ 10m
16:40	Jet substructure with ATLAS Speaker: Jennifer Kathryn Roloff (Brookhaven National Laboratory (US))	⌚ 30m
17:10	Jet substructure with ALICE Speaker: Nima Zardoshti (CERN)	⌚ 30m

MONDAY, 26 OCTOBER

16:30 → 18:00	Jet substructure: CMS, Theory Conveners: Ben Nachman (Lawrence Berkeley National Lab. (US)), James Mulligan (University of California, Berkeley (US))	
16:30	Introduction	⌚ 10m
16:40	Jet substructure with CMS Speaker: Andreas Hinzmann (Hamburg University (DE))	⌚ 30m
17:10	Jet substructure: Theory Speaker: Kyle Lee (LBNL)	⌚ 30m

MONDAY, 2 NOVEMBER

16:30 → 18:00	Jet substructure: LHCb, Theory Conveners: Ben Nachman (Lawrence Berkeley National Lab. (US)), James Mulligan (University of California, Berkeley (US))	
16:30	Introduction	⌚ 10m
16:40	Jet substructure with LHCb Speaker: Sook Hyun Lee (University of Michigan (US))	⌚ 30m
17:10	Jet substructure: Theory Speaker: Andrew Larkoski (Reed College)	⌚ 30m

Questions?

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