

DAAD-STDF Meeting

10 May 2023

Run parameters:

- No. of events: 30k
- Colliding particles: p, p

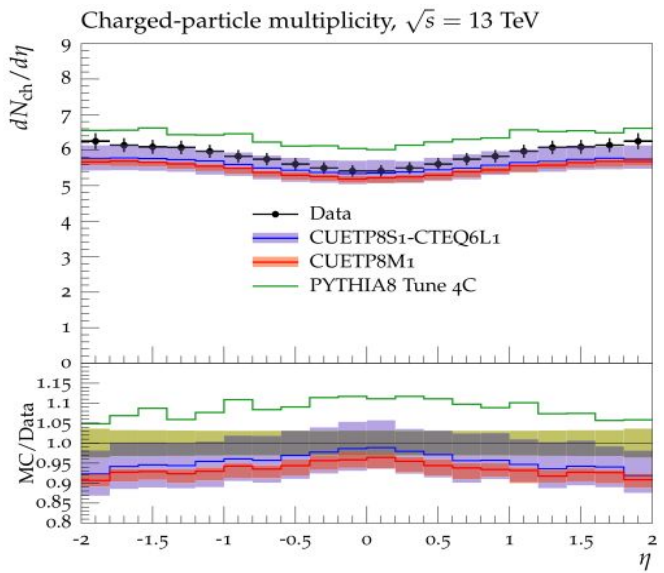
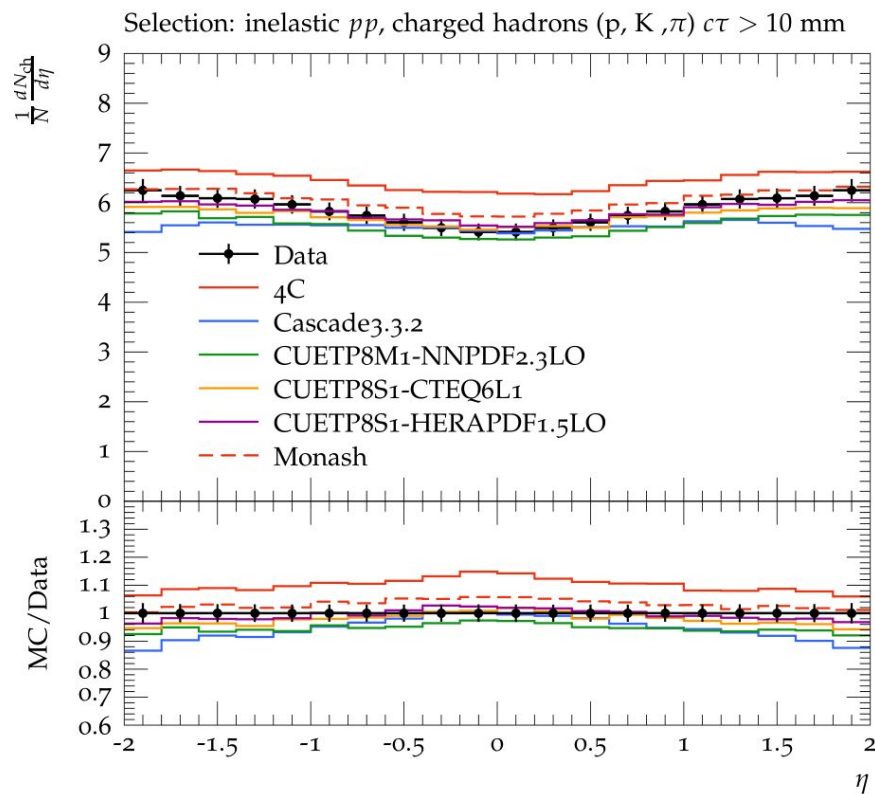
Cascade parameters:

- Version: 3.3.2 (TMDlib: 2.2.08)
- Input file: **steer_pp (old)**

Pythia8 parameters:

- Version: 8309
- Process: **SoftQCD:ineleastic**
- Tunes:
 - Monash tune [[P. Skands, S. Carrazza and J. Rojo, Eur.Phys.J. C74 \(2014\) 8, 3024 \[arXiv:1404.5630 \[hep-ph\]\]](#)]
 - CUETP8S1 [[CMS Collaboration, CMS PAS GEN-14-001, arXiv:1512.00815](#)]
 - CUETP8M1 [[CMS Collaboration, CMS PAS GEN-14-001, arXiv:1512.00815](#)]

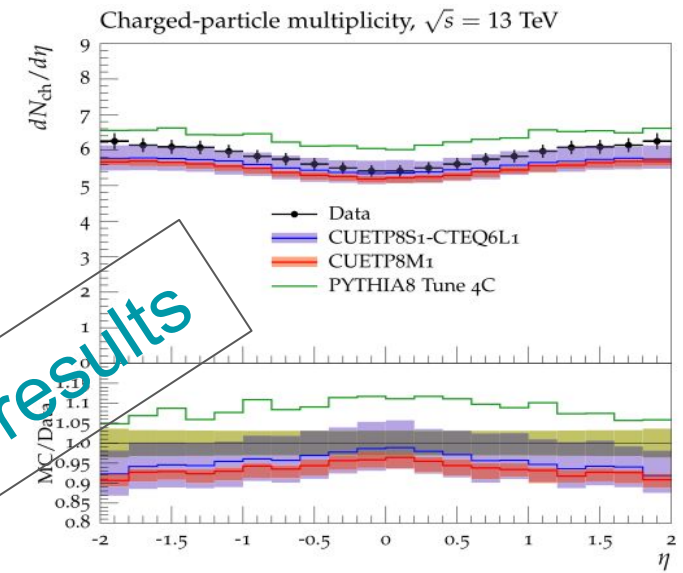
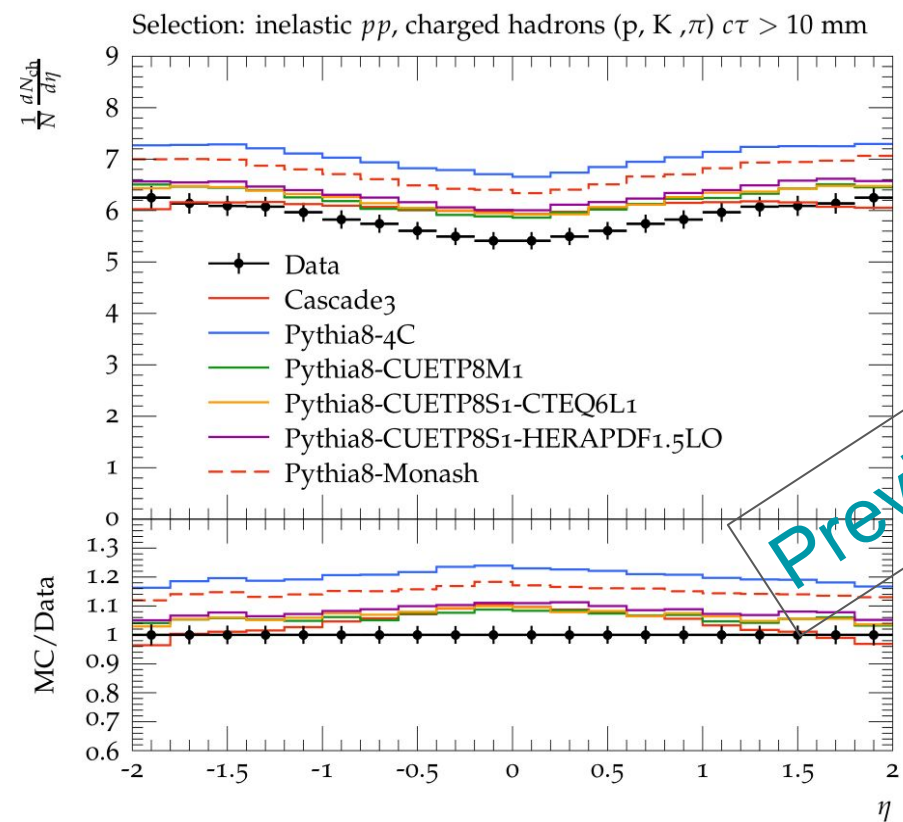
Results: CMS_2015_I1384119 (arXiv:1507.05915 [hep-ex])



[arXiv:1507.05915](https://arxiv.org/abs/1507.05915)

Pseudorapidity distribution of charged hadrons in the region $|\eta| < 2$ in inelastic pp collisions at 13 TeV measured using Cascade3 and different tunes of Pythia8. The results are compared to CMS data at 13 TeV.

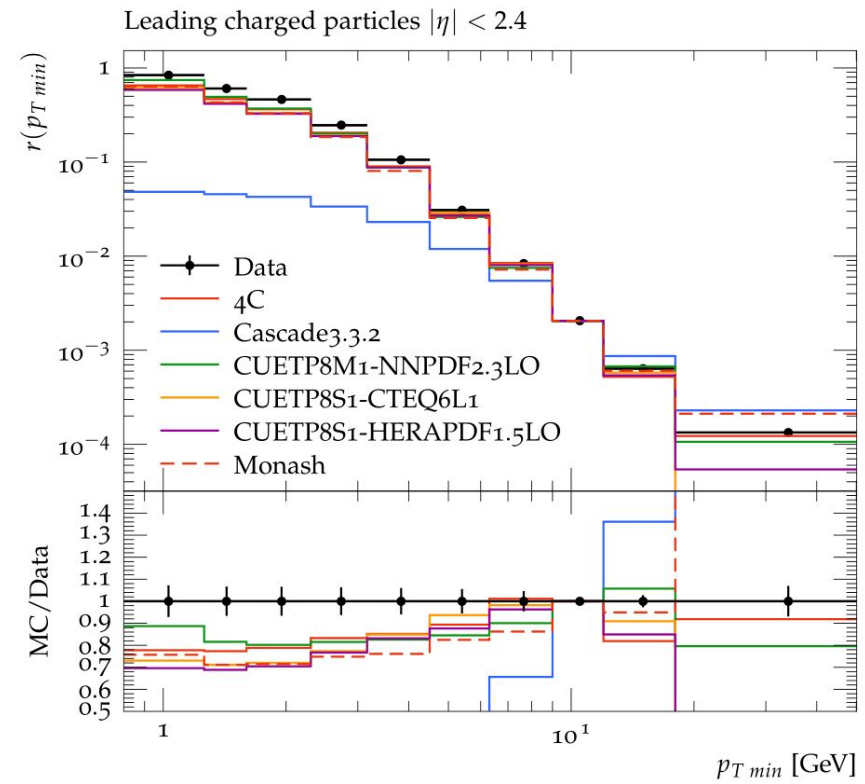
Results: CMS_2015_I1384119 (arXiv:1507.05915 [hep-ex])



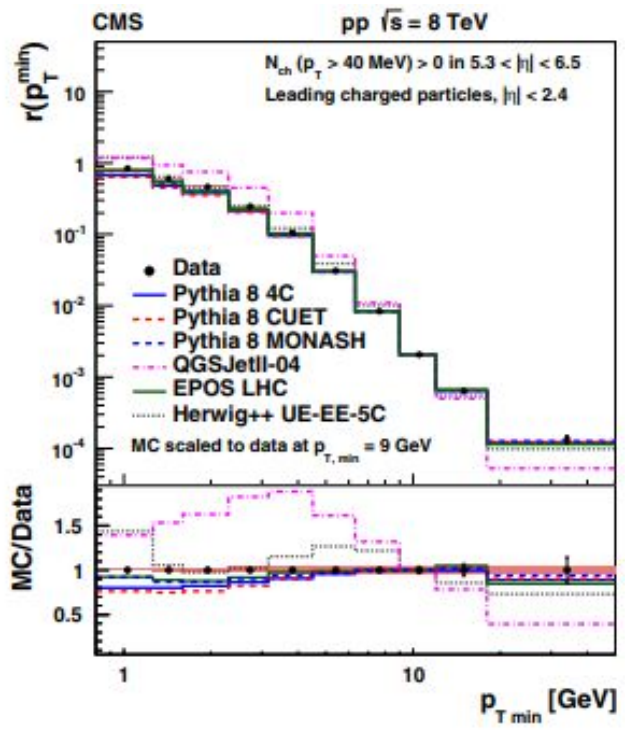
Previous results

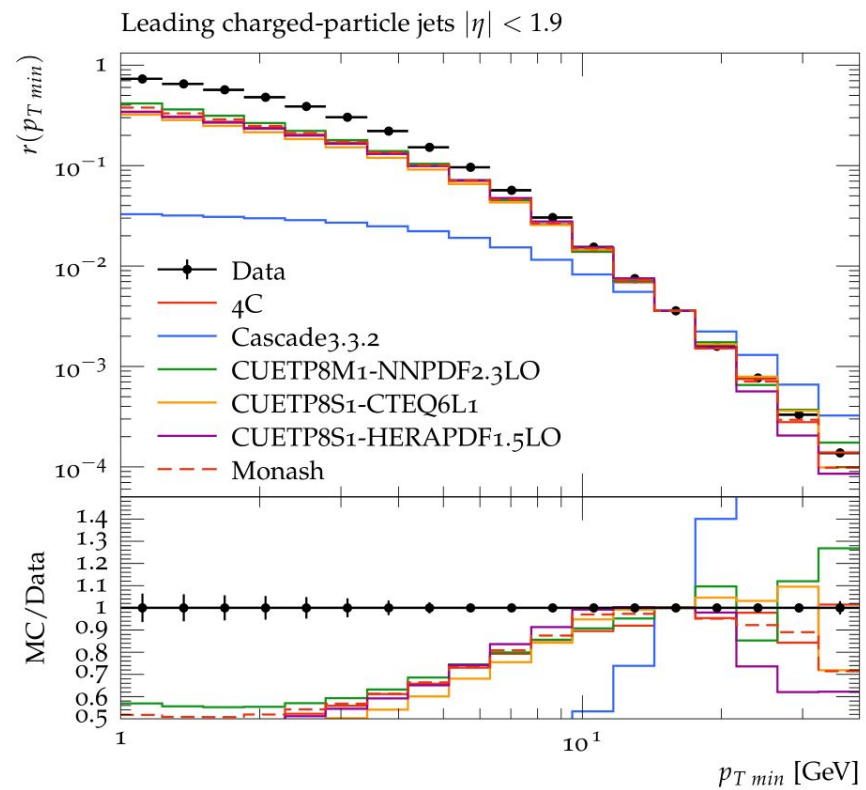
[arXiv:1507.05915](https://arxiv.org/abs/1507.05915)

Pseudorapidity distribution of charged hadrons in the region $|\eta| < 2$ in inelastic pp collisions at 13 TeV measured using Cascade3 and different tunes of Pythia8. The results are compared to CMS data at 13 TeV.

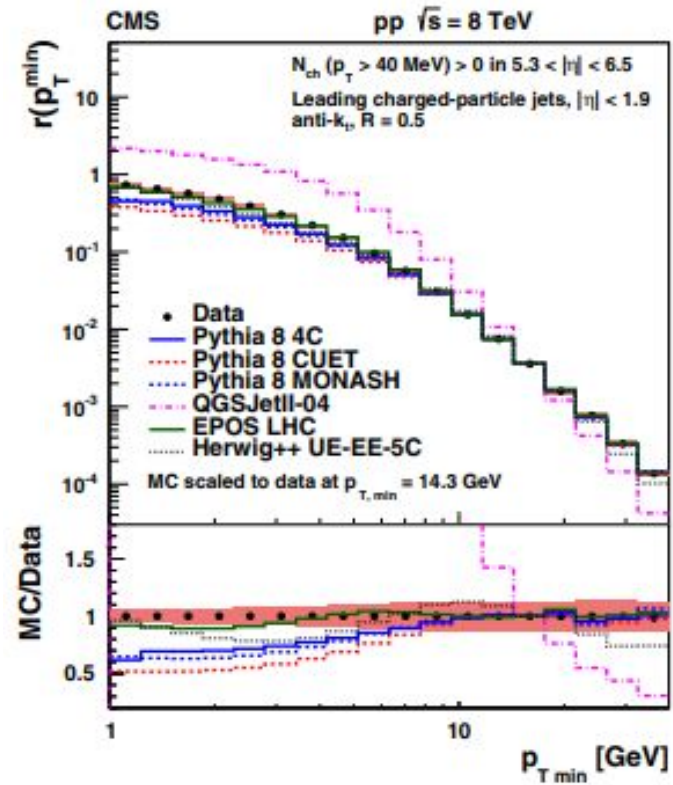


The integrated yield, $r(p_{T\min})$, of events with a leading charged particle within $|\eta| < 2.4$ as a function of $p_{T\min}$ measured using Cascade3 and different tunes of Pythia8. The results are compared to CMS data at 8 TeV.





The integrated yield, $r(p_{T\min})$, of events with a leading charged particle within $|\eta| < 1.9$ as a function of $p_{T\min}$ measured using Cascade3 and different tunes of Pythia8. The results are compared to CMS data at 8 TeV.



Backup

Pythia8 tunes:

1. CUETP8M1

- Constructed using the parameters of the Monash Tune and fitting the below parameters to UE data at $\sqrt{s} = 0.9, 1.96, \text{ and } 7 \text{ TeV}$.

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Table 3 The PYTHIA8 parameters, tuning range, Monash values [29], and best-fit values for CUETP8M1, obtained from fits to the TransMAX and TransMIN charged-particle and p_T^{sum} densities, as defined by the leading charged-particle p_T^{max} at $\sqrt{s} = 0.9, 1.96, \text{ and } 7 \text{ TeV}$. The $\sqrt{s} = 300 \text{ GeV}$ data are excluded from the fit

PYTHIA8 parameter	Tuning range	Monash	CUETP8M1
PDF	–	NNPDF2.3LO	NNPDF2.3LO
MultipartonInteractions:pT0Ref [GeV]	1.0–3.0	2.280	2.402
MultipartonInteractions:ecmPow	0.0–0.4	0.215	0.252
MultipartonInteractions:expPow	–	1.85	1.6 ^a
ColourReconnection:range	–	1.80	1.80 ^b
MultipartonInteractions:ecmRef [GeV]	–	7000	7000 ^b
χ^2/dof	–	–	1.54

^a Fixed at CUETP8S1-CTEQ6L1 value

^b Fixed at Monash Tune value

Ref: [CMS Collaboration, CMS PAS GEN-14-001, arXiv:1512.00815](#)

Pythia8 tunes:

2. CUETP8S1

- Constructed using the parameters of the Tune 4C and fitting the below parameters to UE data at $\sqrt{s} = 0.9, 1.96, \text{ and } 7 \text{ TeV}$.

Table 2 The PYTHIA8 parameters, tuning range, Tune 4C values [28], and best-fit values for CUETP8S1-CTEQ6L1 and CUETP8S1-HERAPDF1.5LO, obtained from fits to the TransMAX and TransMIN charged-particle and p_T^{sum} densities, as defined by the leading charged-particle p_T^{max} at $\sqrt{s} = 0.9, 1.96, \text{ and } 7 \text{ TeV}$. The $\sqrt{s} = 300 \text{ GeV}$ data are excluded from the fit

PYTHIA8 parameter	Tuning range	Tune 4C	CUETP8S1	CUETP8S1
PDF	–	CTEQ6L1	CTEQ6L1	HERAPDF1.5LO
MultipartonInteractions:pT0Ref [GeV]	1.0–3.0	2.085	2.101	2.000
MultipartonInteractions:ecmPow	0.0–0.4	0.19	0.211	0.250
MultipartonInteractions:expPow	0.4–10.0	2.0	1.609	1.691
ColourReconnection:range	0.0–9.0	1.5	3.313	6.096
MultipartonInteractions:ecmRef [GeV]	–	1800	1800 ^a	1800 ^a
χ^2/dof	–	–	0.952	1.13

^a Fixed at Tune 4C value