Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Update 29 July 2020

- Follow up from previous meeting (19 February 2020*)
  1. Check detector and hadron level decorrelation angle plots
  2. Produce control plots (data plotted together with Ariadne) for the multi-D measurements
  3. Show correlation matrixes (without and with systematics)
  4. Calculate systematics according previous ZEUS analyses
  5. For the final results, plot the Ariadne curve as a histogram (not line)
- Using a wider eta cut; before |eta|<1, now -1.5 < eta < 1.8
- Systematics uncertainties
- Results
- Conclusion and path forward
- Theory prediction from Feng Yuan

*https://indico.desy.de/indico/event/25491/

** The format of the presentation (pptx) is designed towards a website. Some of the functions might not work in pdf format.

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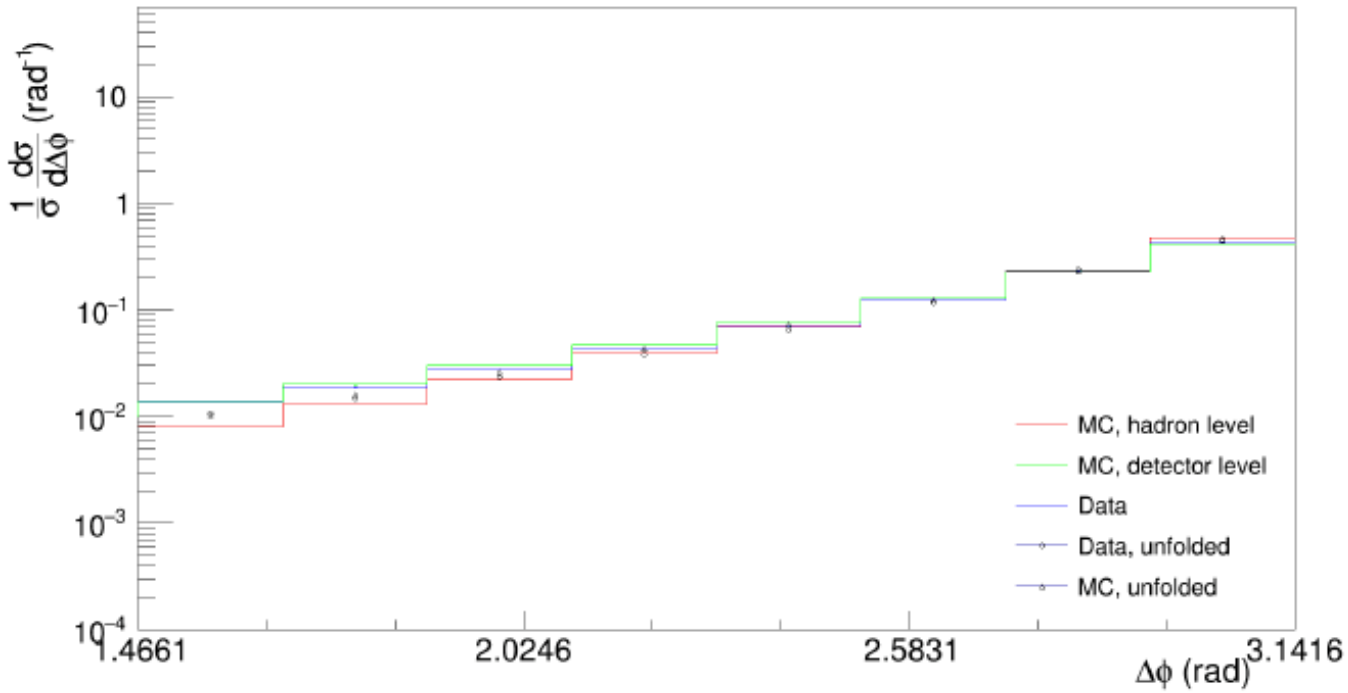
Check detector and hadron level Δϕ

For the **preliminary results** (statistical uncertainty only), we used a MC sample with diffraction off and Empz > 35



$$\chi^2_{A,Data}/N_{df} = 2.6$$

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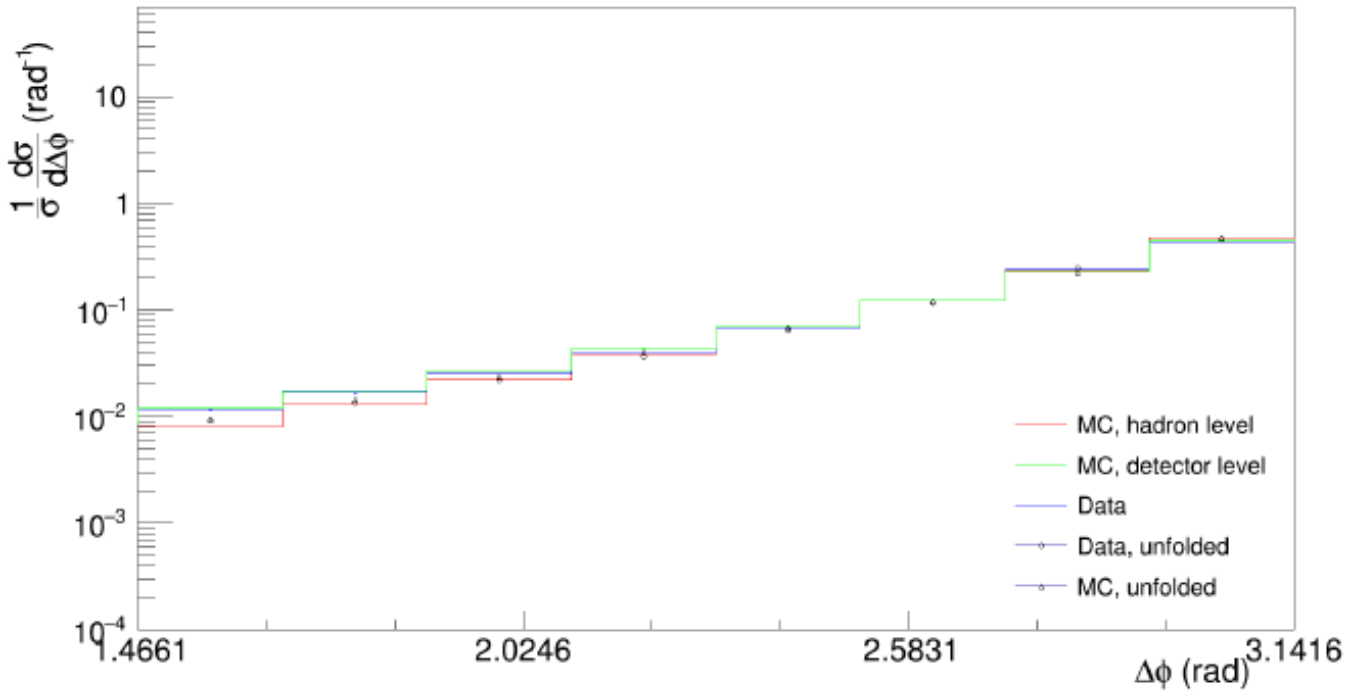
Check detector and hadron level Δϕ

After preliminary we used the correct MC sample with diffraction on and Empz > 45 which improves the data/MC control plots

*Using same eta cut as preliminary result



$$\chi^2_{A,Data}/N_{df} = 9.8$$

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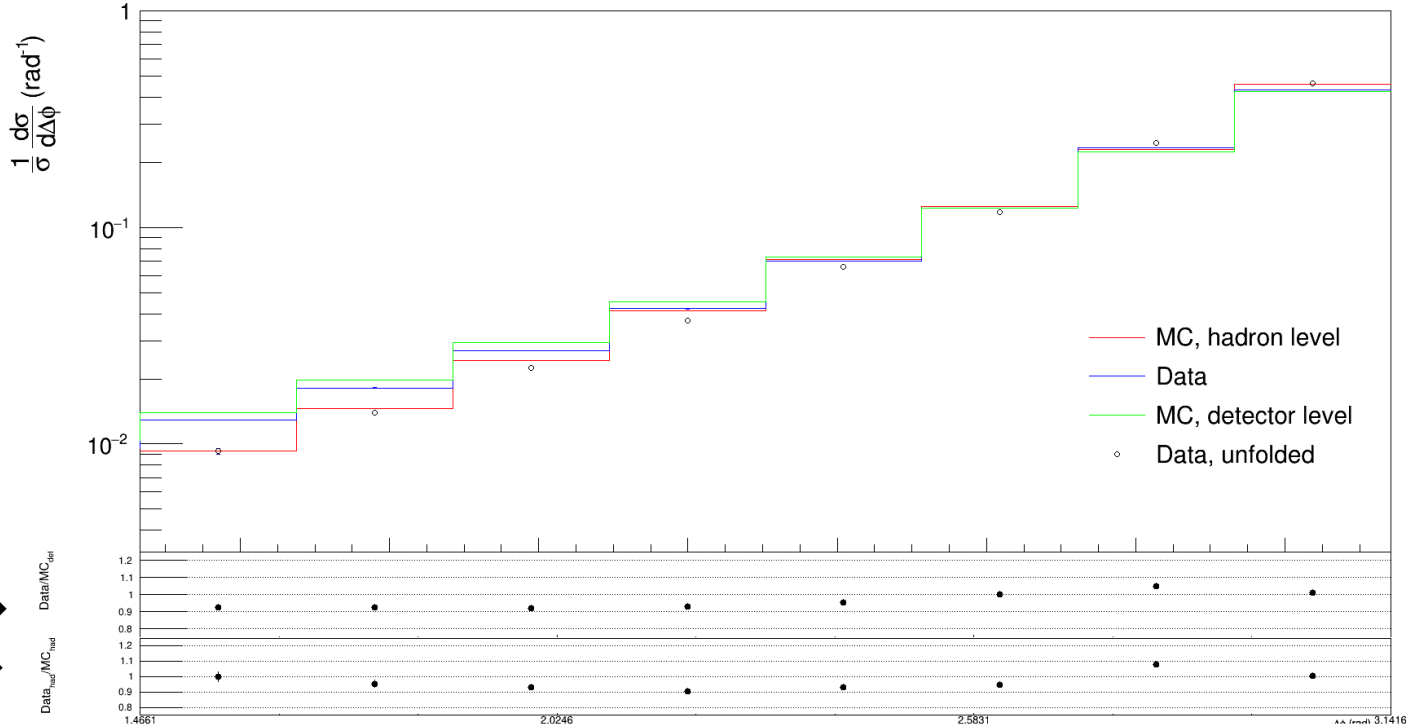
Check detector and hadron level Δϕ

Using wider eta cut, correct MC sample with diffraction on and Empz > 45; the data and MC comparisons for both hadron and detector level are similar and the agreement is less than 10% as before



Detector level→
Hadron level →

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Selection Cuts

True MC→

Data:
040506e ~**189** pb^{-1}, 0607p ~**143** pb^{-1}

MC:
ari_incl_nc_DIS_lowQ2_040506e
ari_incl_nc_DIS_lowQ2_0607p

Phase Space:
$10 < Q^2 < 350\ GeV^2$
$y_{el} < 0.7$ && $y_{jb} > 0.04$

Cleaning cuts:
-40 < Zvtx/cm < 40
45 GeV < $E - p_z$ < 65 GeV (both Cal and Zufo)
Cal_pt / sqrt(Cal_et) < 2.5

Electron cuts:
10 GeV < Energy (Siecorr)
140^o < Theta < 180^o
Electron position sqrt($x^2 + y^2$) > 20.0
Sienin[0] > 0.1*(Siein[0] +Sienin[0]) (energy in cone)
Chimney cut
Siprob[0], the lepton with highest prob (> 0.9)

Triggers:
SPP02 (Tltw[2] & (1 << 1)) for 0405e
SPP09 (Tltw[2] & (1 << 8)) for 06e and 0607p

Jet selection:
$E_T > 2.5$ GeV && $P_T < 30$
-1.5 < eta < 1.8
Using “Kt_etjet_b[0]” (massive), the leading jet only

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Selection Cuts True MC

←Back

~~**Data:**~~
~~040506e ~189 pb^{-1}, 0607p ~143 pb^{-1}~~

MC:
ari_incl_nc_DIS_lowQ2_040506e
ari_incl_nc_DIS_lowQ2_0607p

Phase Space:
$10 < Q^2 < 350$ GeV^2
~~$y_{el} < 0.7$ && $y_{jb} > 0.04$~~ $0.04 < y < 0.95$

Cleaning cuts:
~~$-40 < Zvtx/cm < 40$~~
~~45 GeV $< E - p_z < 65$ GeV (both Cal and Zufo)~~
~~Cal_pt / sqrt(Cal_et) < 2.5~~

Electron cuts:
10 GeV < ~~Siecorr~~ Mc_pfsl[3]
$140^o <$ ~~Theta~~ Mc_(pfsl)Theta$< 180^o$
~~Electron position sqrt($x^2 + y^2$) > 20.0~~
~~Sienin[0] > 0.1*(Siein[0] +Sienin[0]) *(energy in cone)~~
~~Chimney cut~~
~~Siprob[0], the lepton with highest prob (>0.9).~~

Triggers:
~~SPP02 (Tltw[2] & (1 << 1)) for 0405e~~
~~SPP09 (Tltw[2] & (1 << 8)) for 06e and 0607p~~

Jet selection:
$E_T > 2.5$ GeV && $P_T < 30$
-1.5 < eta < 1.8
Using “MCHMJets” (massive), the leading jet only

* Use all the true MC variables and remove all the detector dependences

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Event 0-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

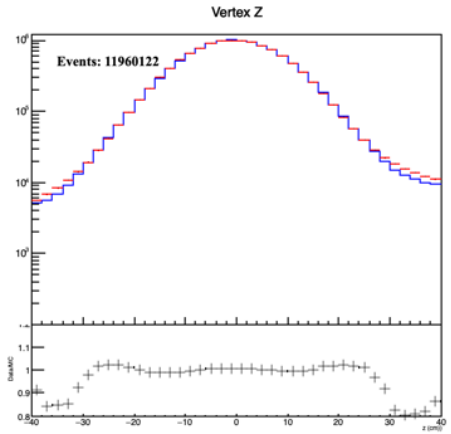
Jet multiplicity:

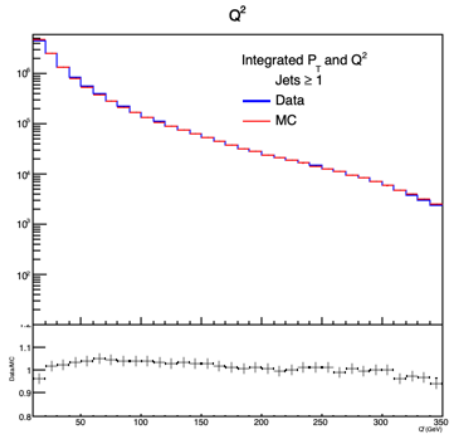
jets > 1

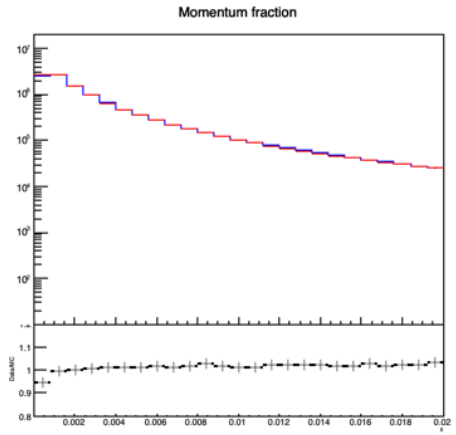
jets > 2

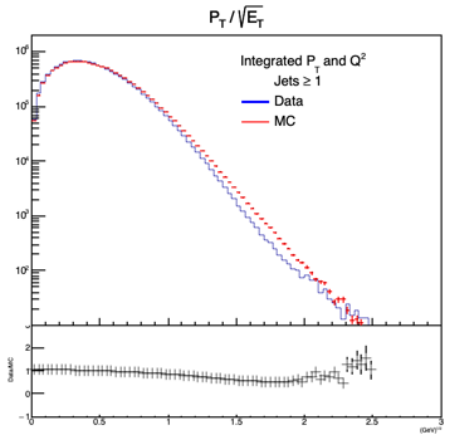
jets > 3

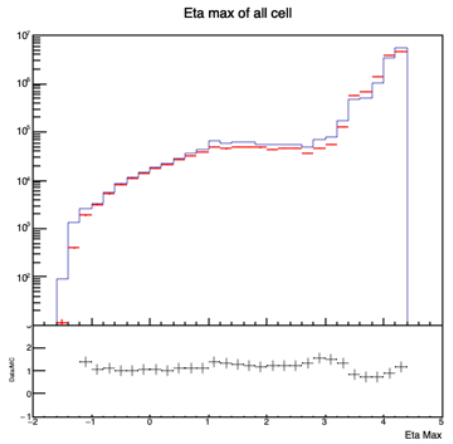
jets > 4

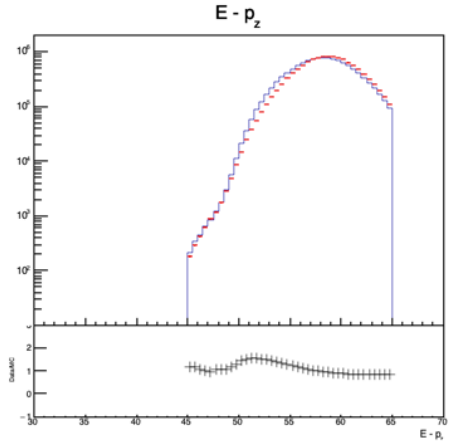












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Lepton 0_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

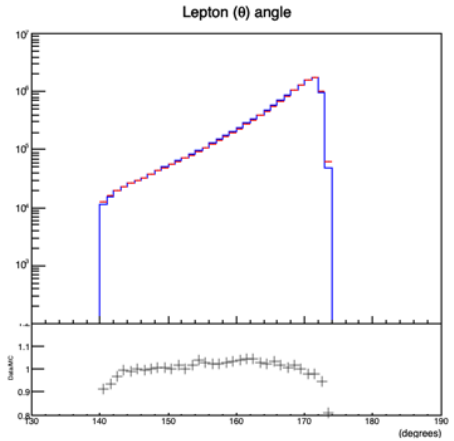
Jet multiplicity:

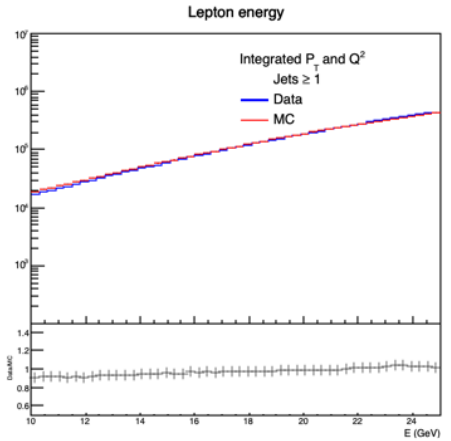
jets > 1

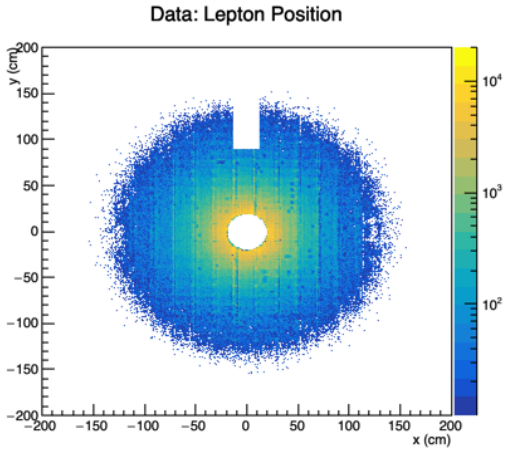
jets > 2

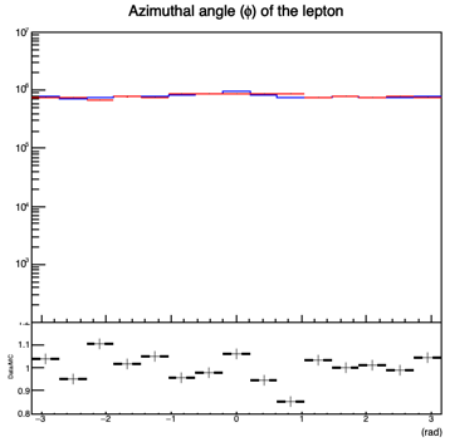
jets > 3

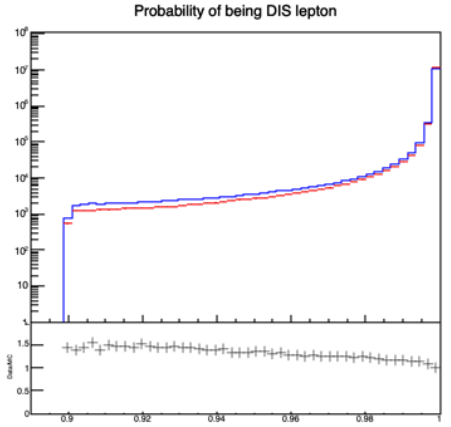
jets > 4

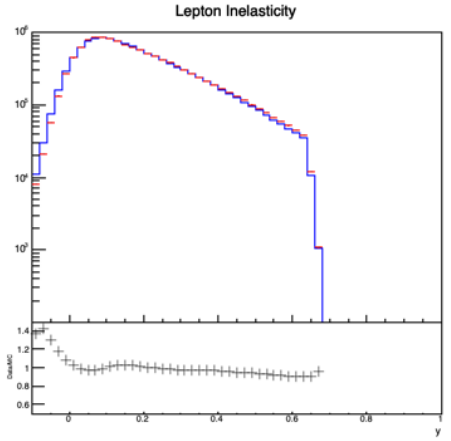












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Jet 0_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

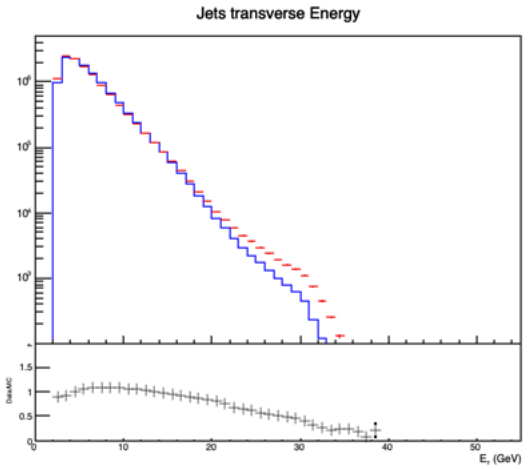
Jet multiplicity:

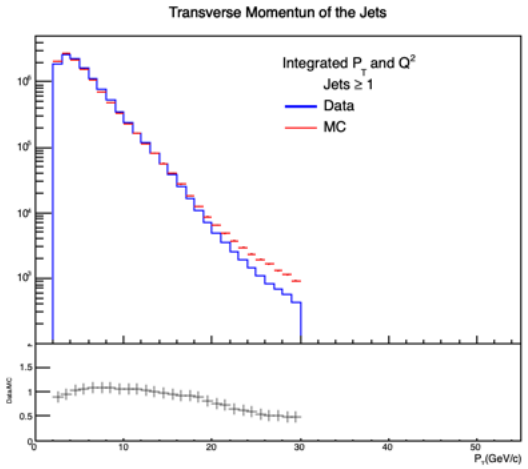
jets > 1

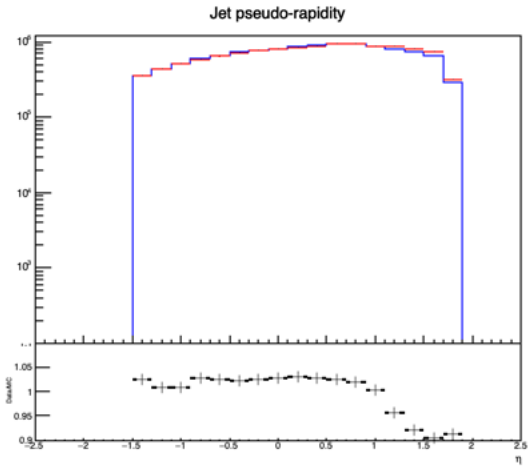
jets > 2

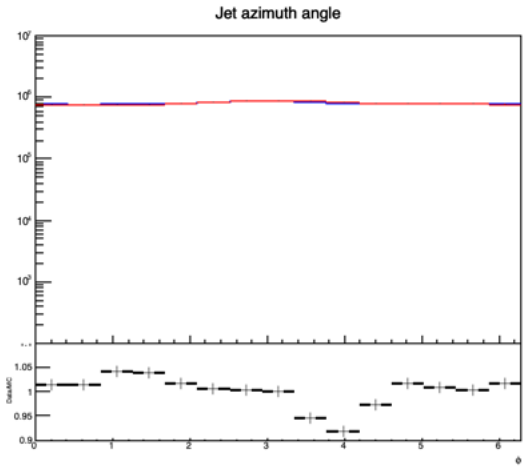
jets > 3

jets > 4









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dPhi 0_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1

jets > 2

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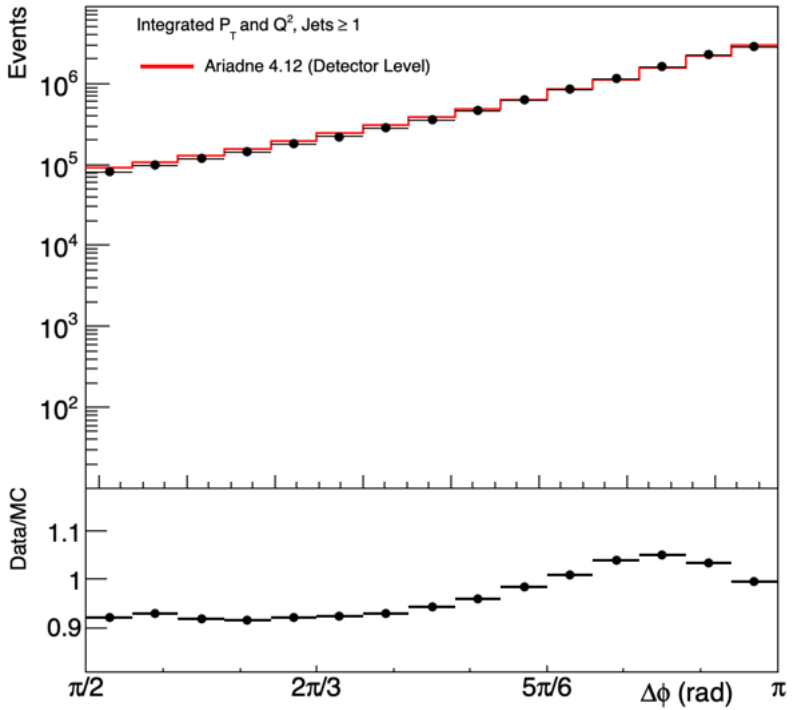
jets > 4



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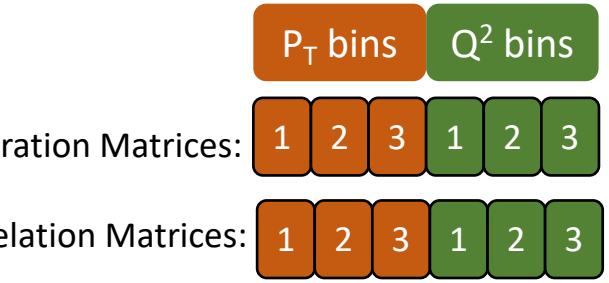
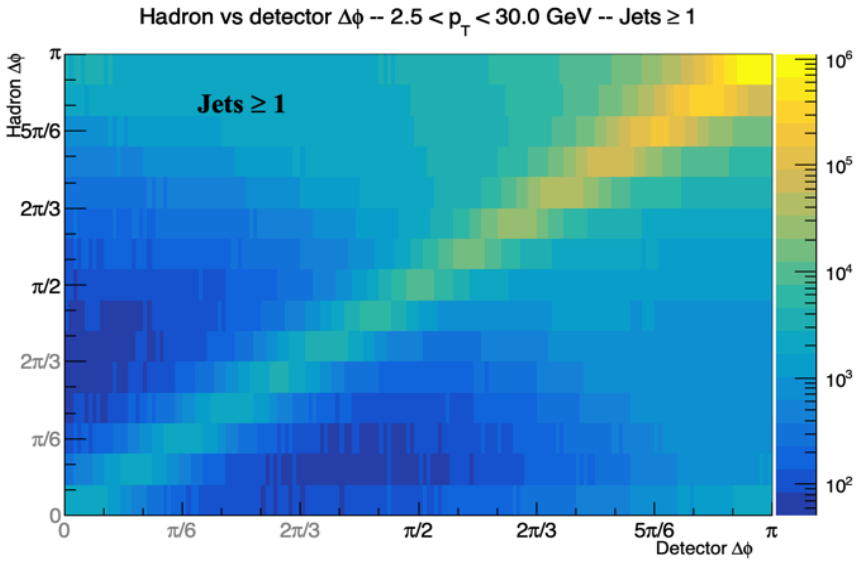
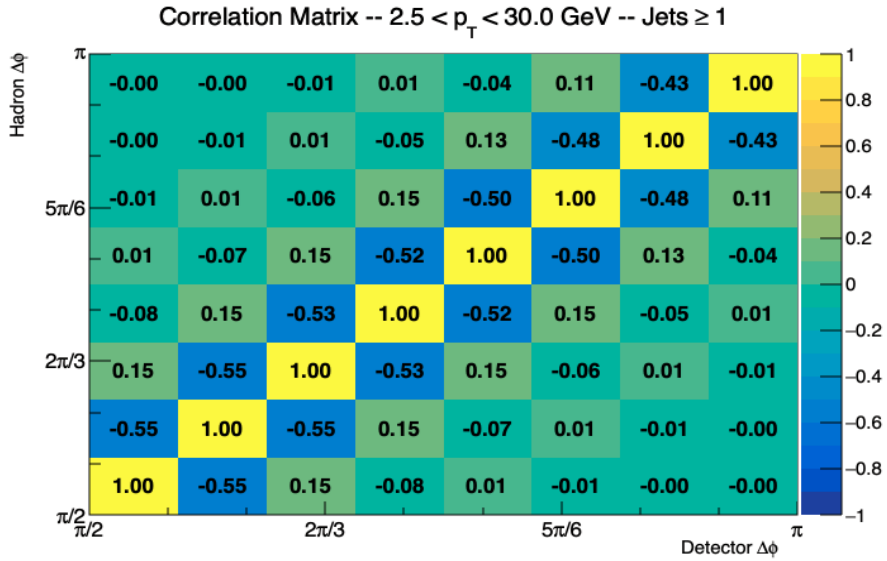
Unfolding

- Unfolding in 1-D was performed with default parameters of the TUnfold package.
- Previous studies to optimize unfolding parameters did not show any improvement.
- The binning is π/16, eight bins for all the p_T, Q^2 and jet multiplicity bins.
- Unfolding is done individually for each bin combination studied.
- No reweighting of the MC is needed. Previous studies did not show any improvement.







Details at: https://indico.desy.de/indico/event/24498/contribution/3/material/slides/0.pdf (9-12 pages)

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Systematics

1. Lepton Energy ±2% → Q^2 ±4%
2. Jet energy scale
3. Selection cuts
4. Lepto – Ariadne difference
5. Breit Frame

*TUnfold calculates systematics by propagating variations of migration matrix M (differences between the central one and those we plug in for systematics). We input into TUnfold the bin migration matrix for each systematics.

** Using “Prompt Photon” JHEP01(2018)032 and “Inc-Jets in NC-DIS” Phys Lett. B Volume 691, Issue 3, 2010; as guideline for systematics

***Statistical errors of Ariadne model are negligible.

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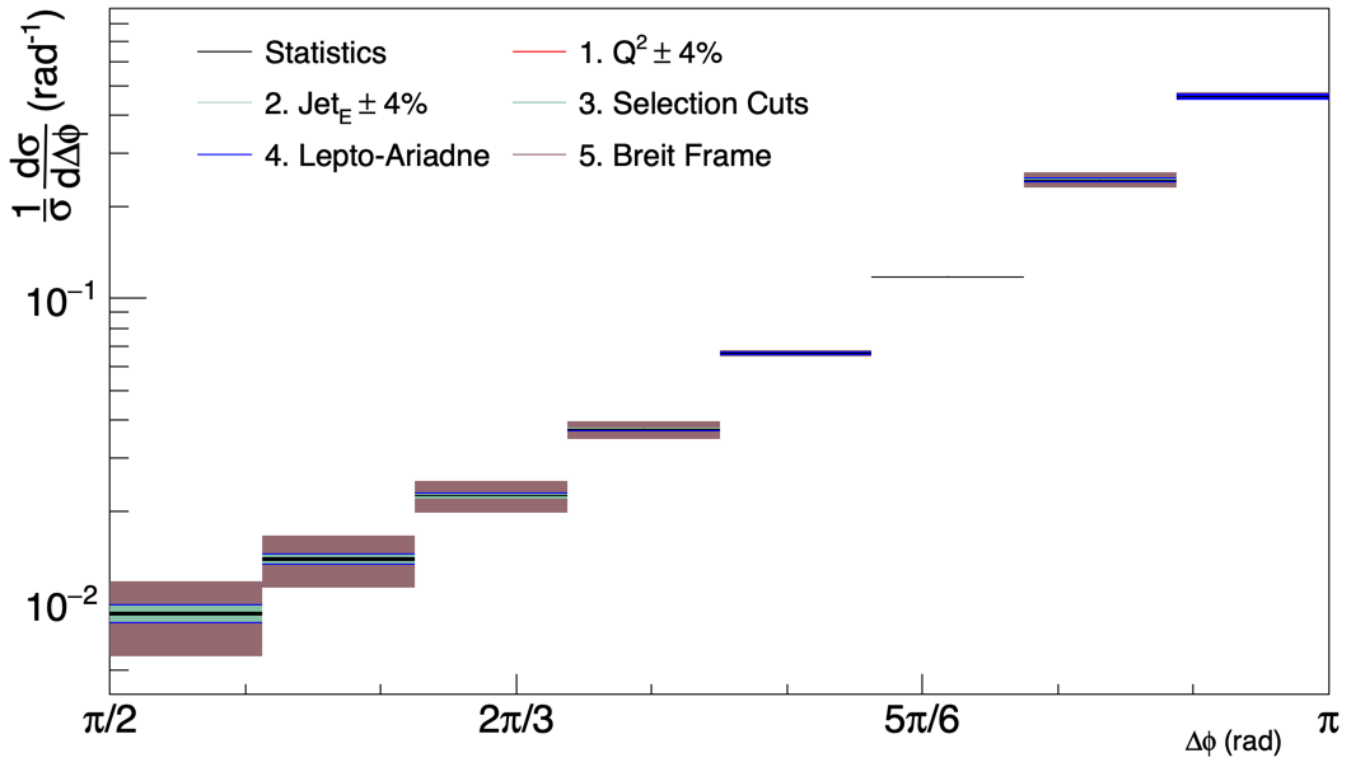
Total systematics

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

All systematics and statistical uncertainties are added in quadrature



*The error size represent the quadrature sum on each label systematics plus the previous numbered systematic

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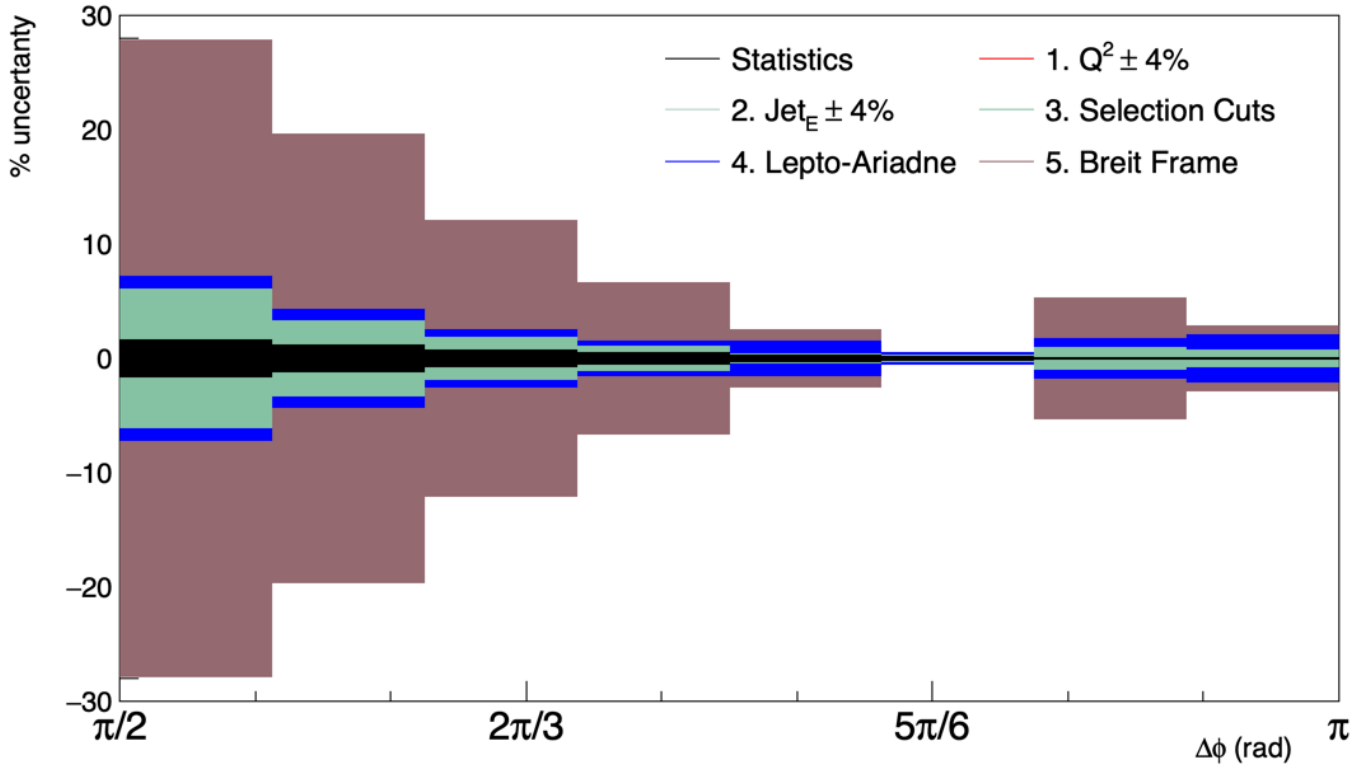
Systematics %

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

All systematics and statistical uncertainties are added in quadrature



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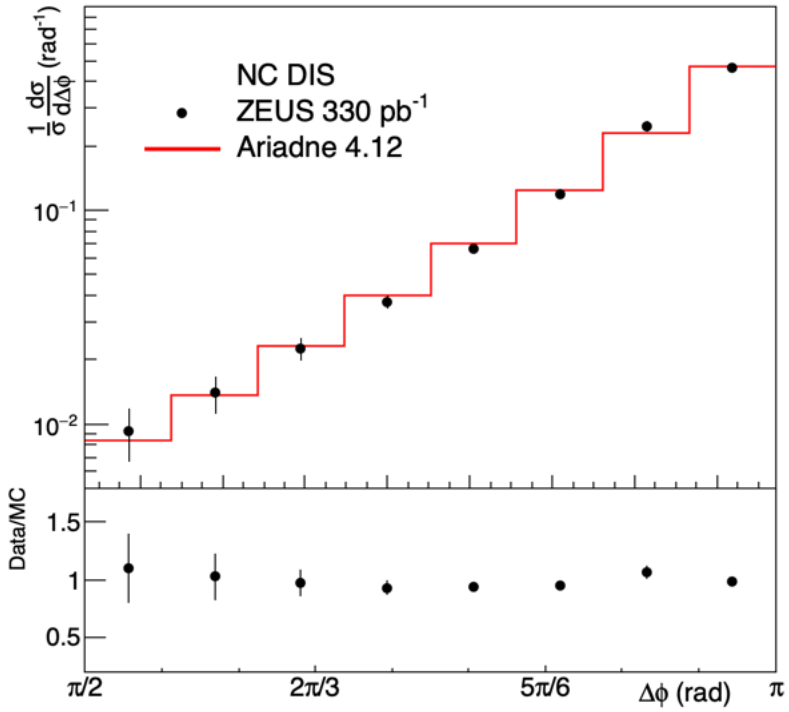
Cross Section integrated

Cross Section

P_T bins | Q^2 bins



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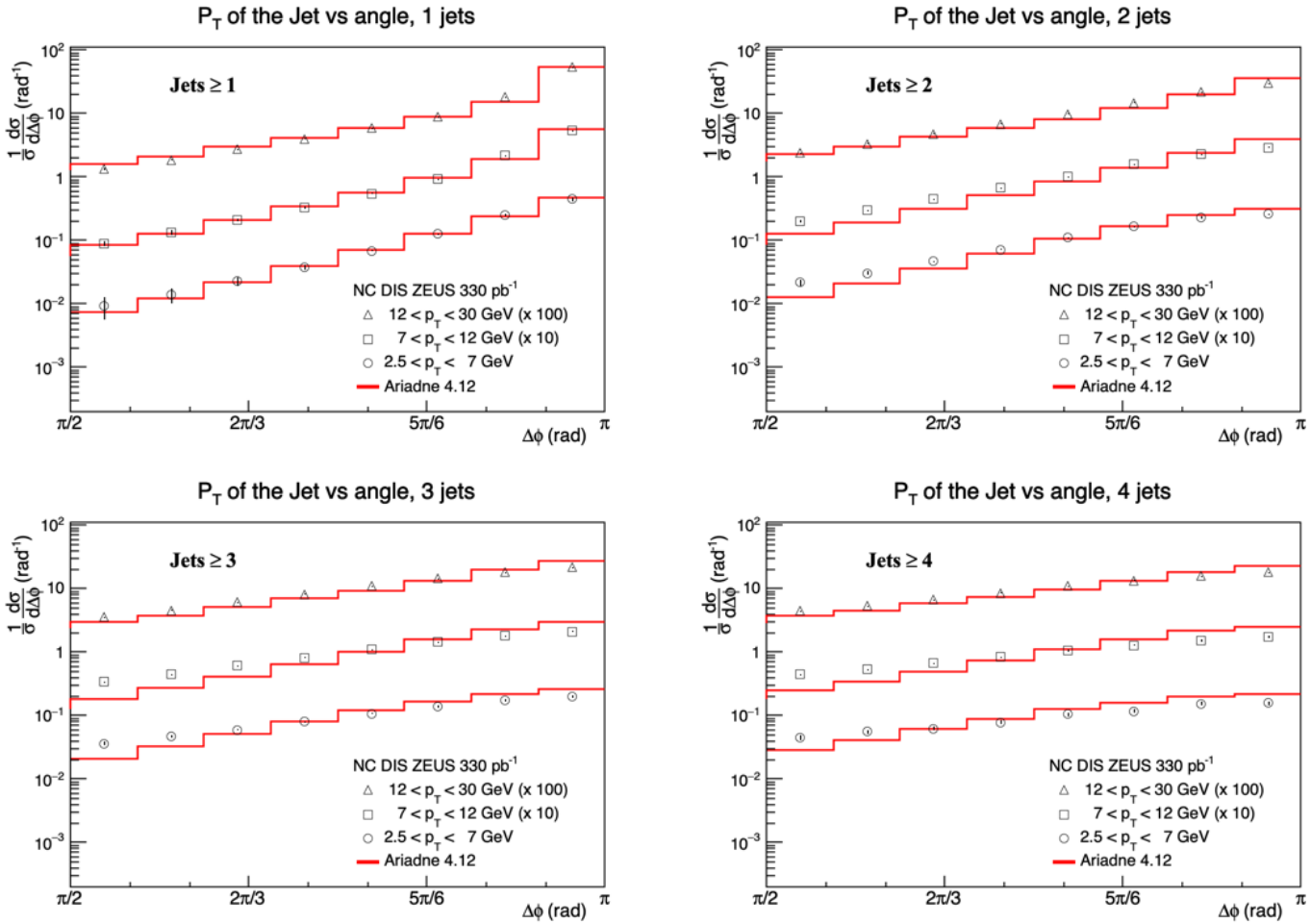
Cross Section in Pt bins

Cross Section

P_T bins | Q^2 bins



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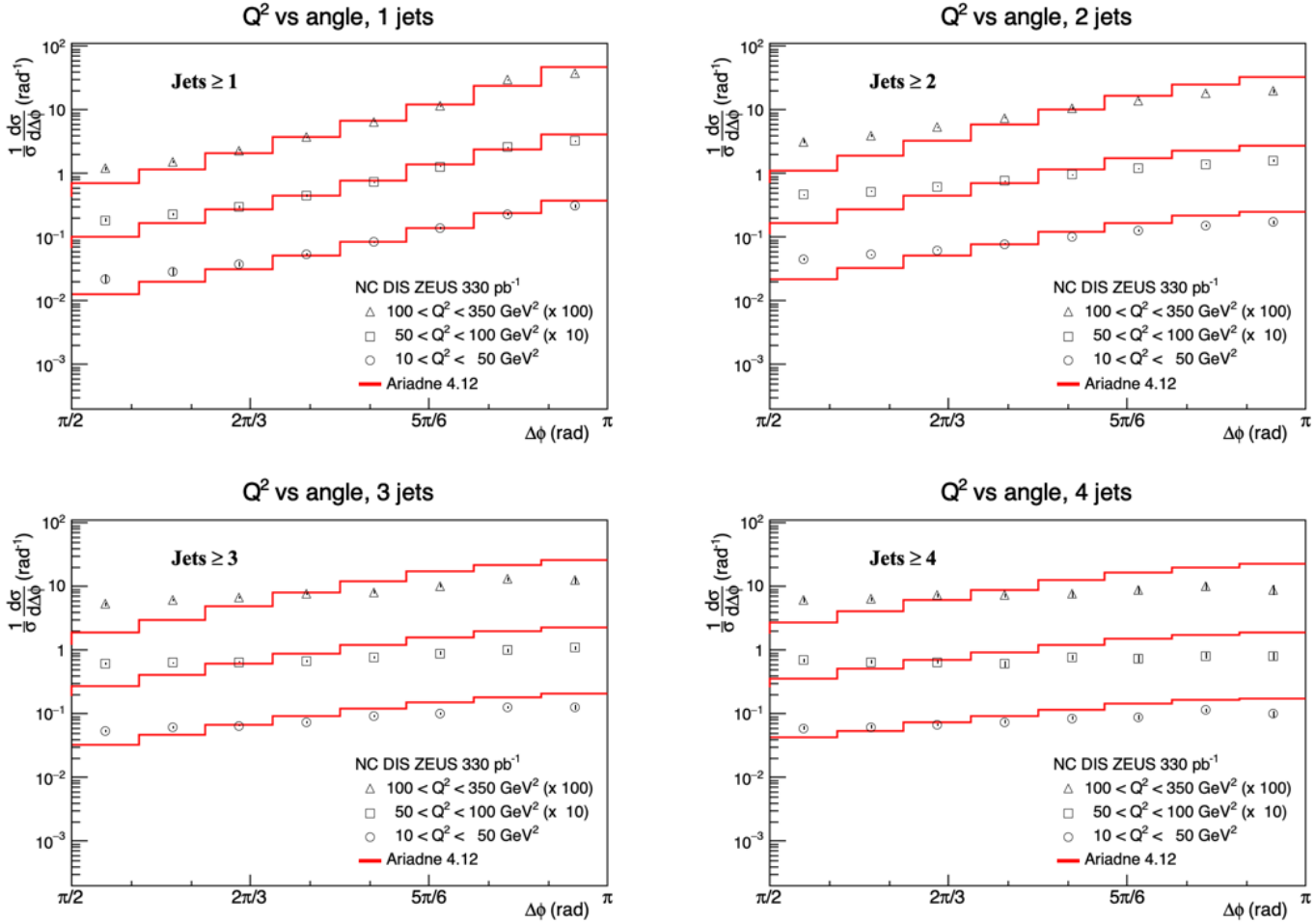
Cross Section in Q2 bins

Cross Section

P_T bins | Q^2 bins



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Conclusions

- Detector and hadron level decorrelation angle measurements show similar results. Using either cuts from preliminary results and newest cuts.
- Comparison of control plots for different p_T, Q^2 and jet multiplicity, showing similar behavior. However the matching degrades for some cases, as statistics reduces for higher p_T, Q^2 and jet multiplicity values.
- Correlation matrices up to 70% in neighboring bins for certain measured values. No major difference in these matrices after adding systematics errors.
- Systematic uncertainties studied seem reasonable, except the Breit frame systematics (still investigating).
- Good matching between all cross-section measurements presented and Ariadne 4.12.
- We are trying to set the website with the same format as this presentation.
- We started to draft a paper with these results.
- Accepted abstract for DNP 2020 in November. Might present the preliminary results only.

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From the theorist

- Feng Yuan et al emailed me at the beginning of the month, that they finished their calculations and they are planning to publish their finding that used our preliminary result.
- We asked him to hold on this figure and he agreed. They are only going to mention our measurements.
- The new measurement will not differ much from the preliminary result.

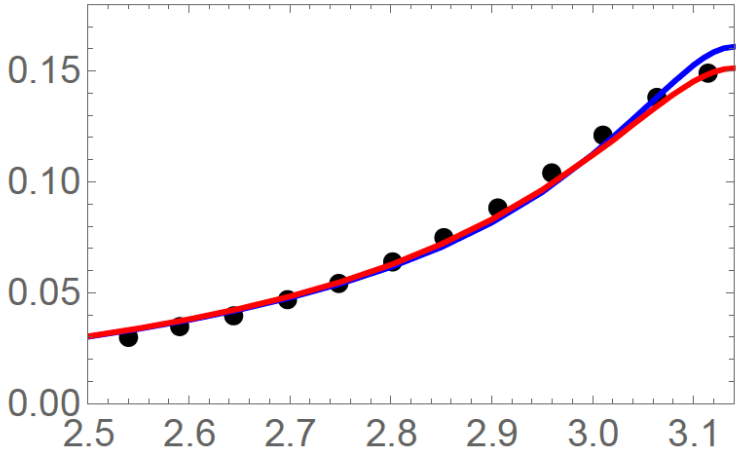

FIG. 5. The azimuthal angular correlation between the final state lepton and jet for the HERA kinematics compared to the experimental result from Ref. [8]. For the theory curves, we have chosen an average jet transverse momentum of 5GeV at mid-rapidity in the Lab frame to evaluate the TMD quark distributions. The blue curve represents the result from the default parameterization of the non-perturbative form factor from Ref. [43, 52], whereas the red curve for an addtional small-x contribution as indicated in Eq. (29).

[8] A. Quintero, EIC 2019 Users Group Annual Meeting, Paris, June 2019; and private communications.

Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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Event Pt 1-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

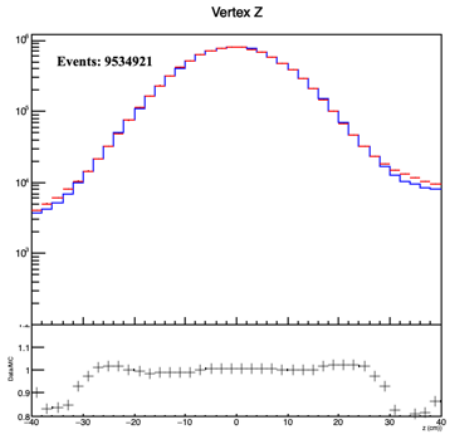
Jet multiplicity:

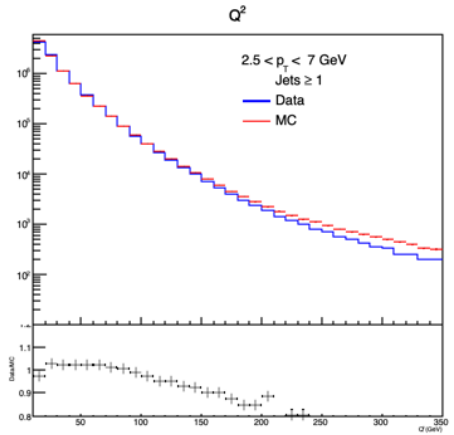
jets > 1

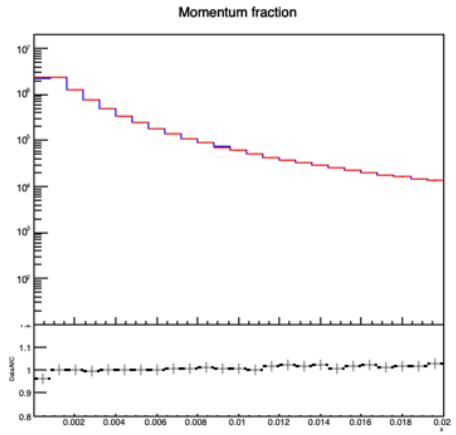
jets > 2

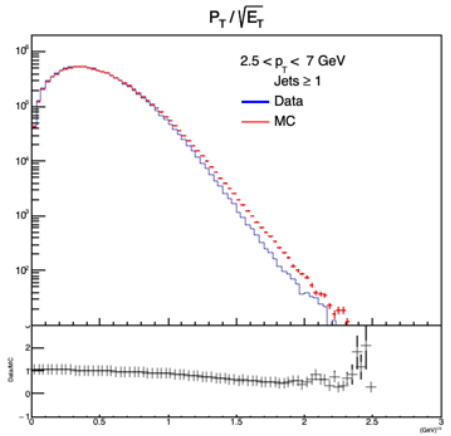
jets > 3

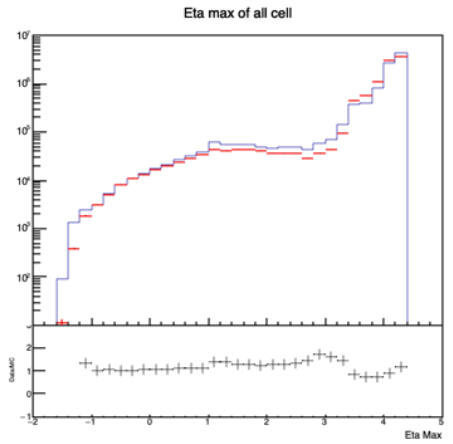
jets > 4

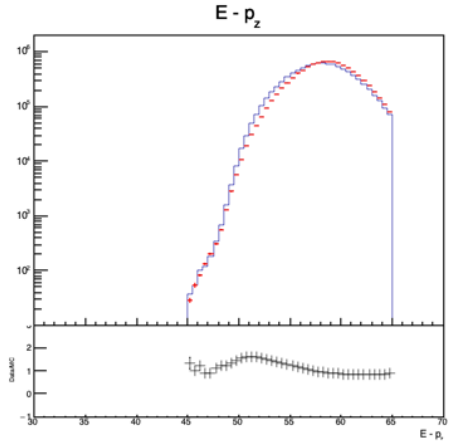












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 1_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

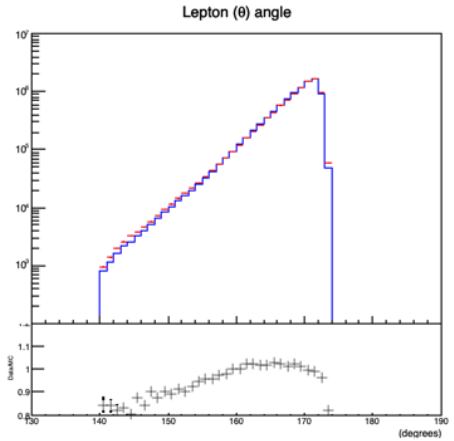
Jet multiplicity:

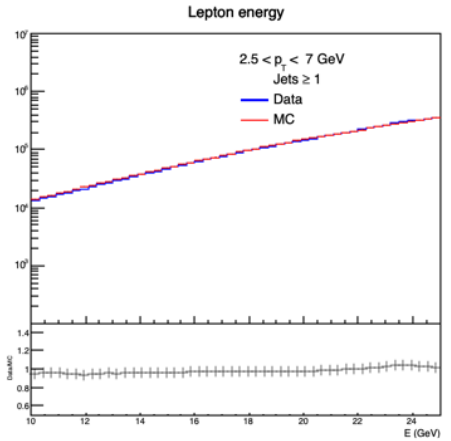
jets > 1

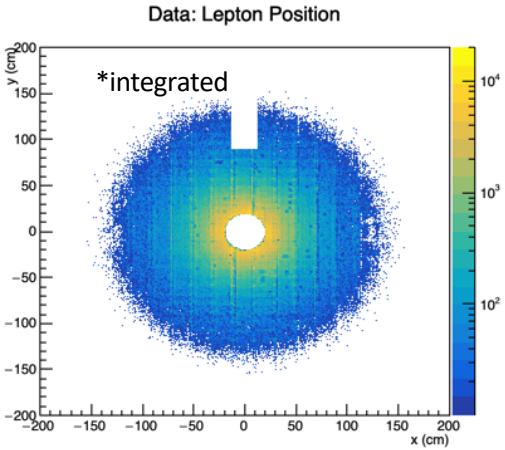
jets > 2

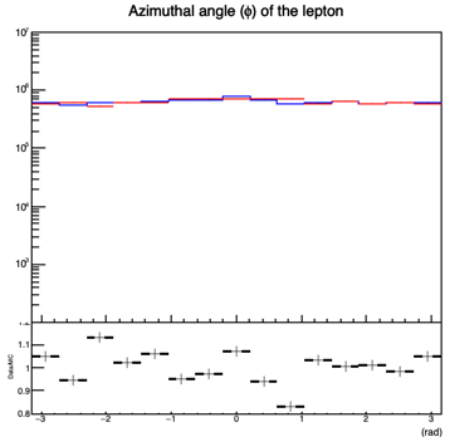
jets > 3

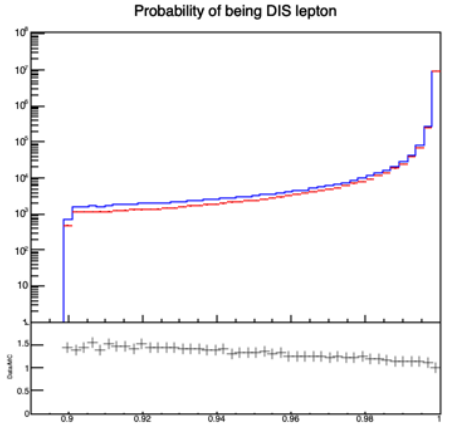
jets > 4

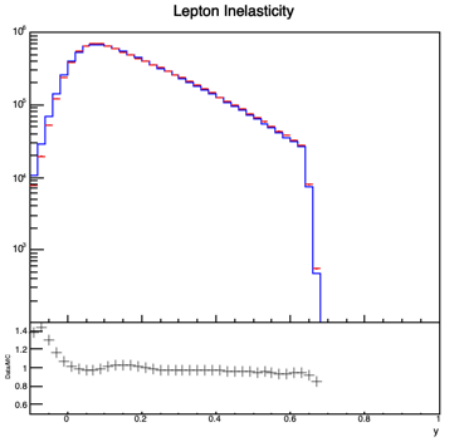












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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Jet Pt 1_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

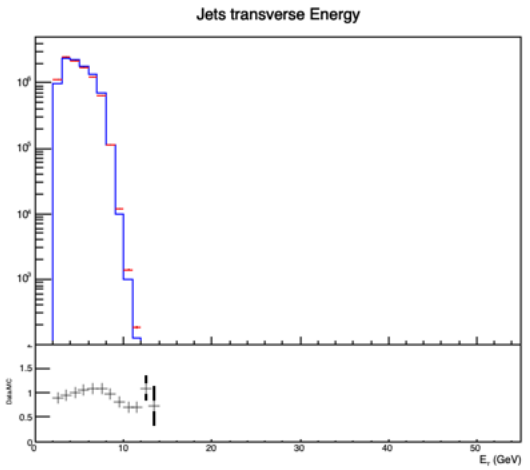
Jet multiplicity:

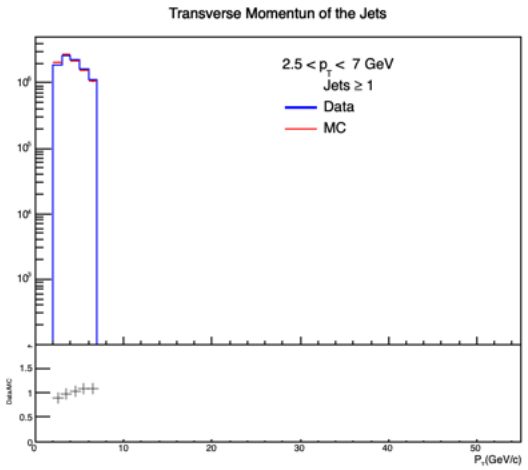
jets > 1

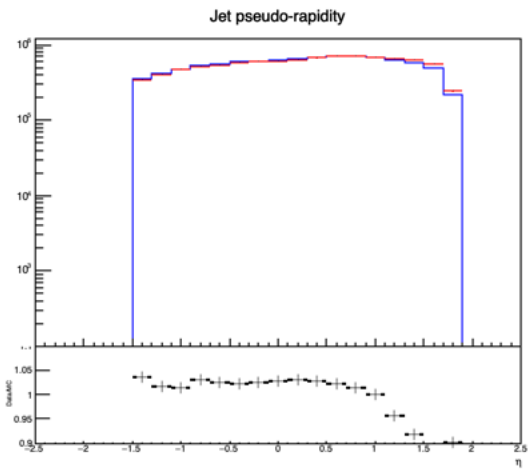
jets > 2

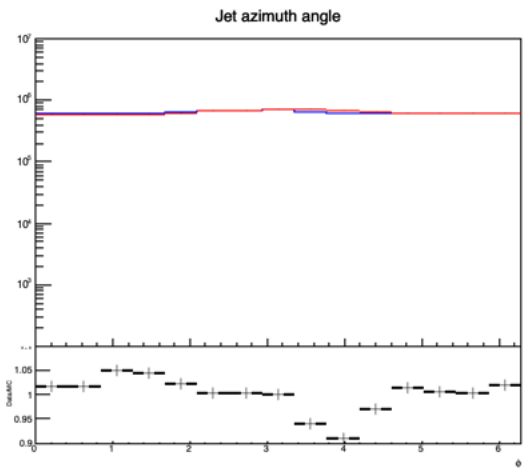
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 1_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

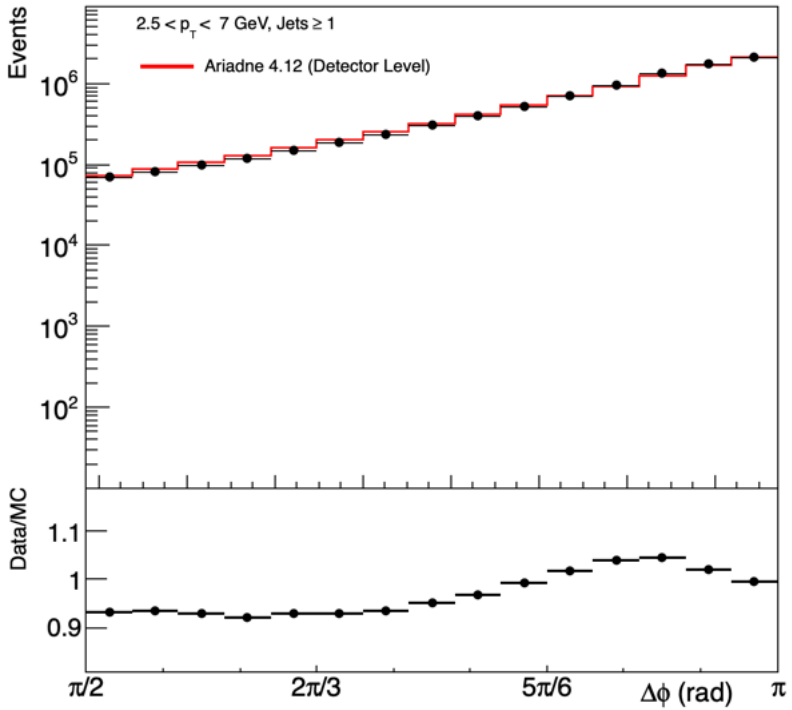
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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Event Pt 2-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

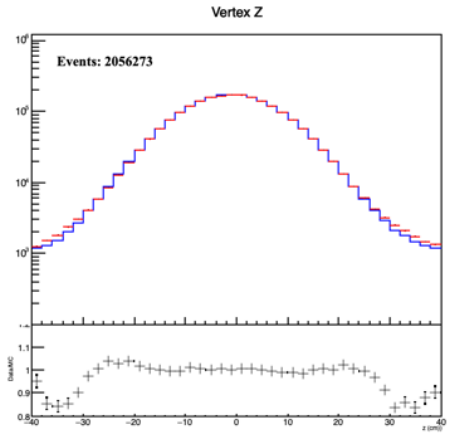
Jet multiplicity:

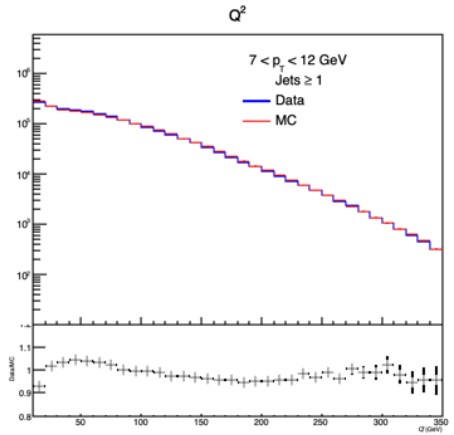
jets > 1

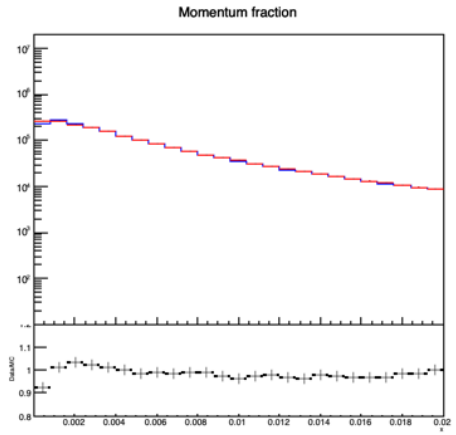
jets > 2

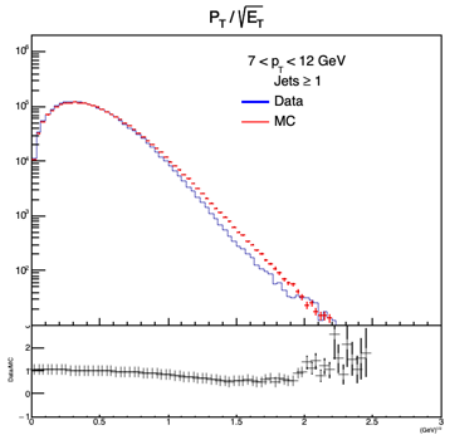
jets > 3

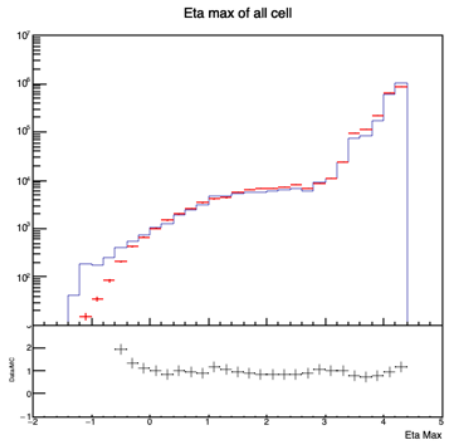
jets > 4

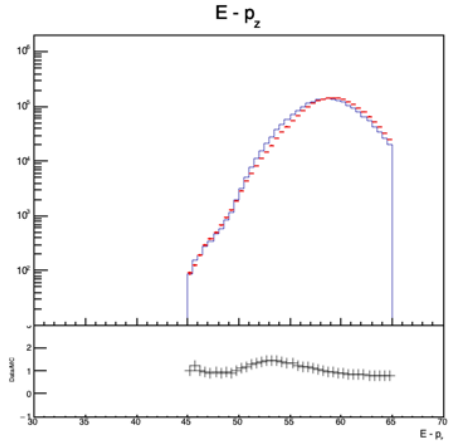












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 2_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

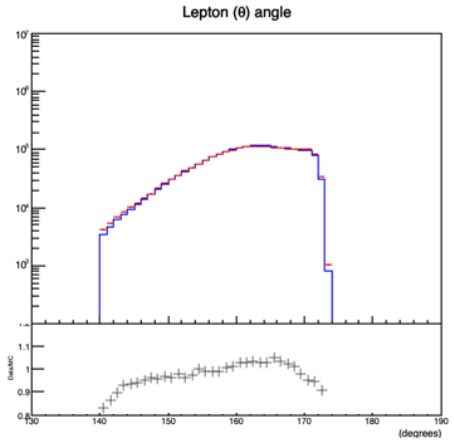
Jet multiplicity:

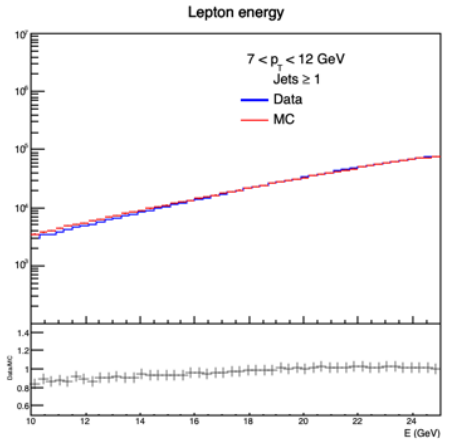
jets > 1

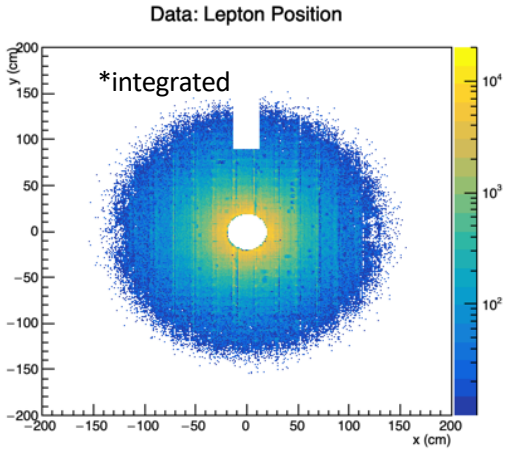
jets > 2

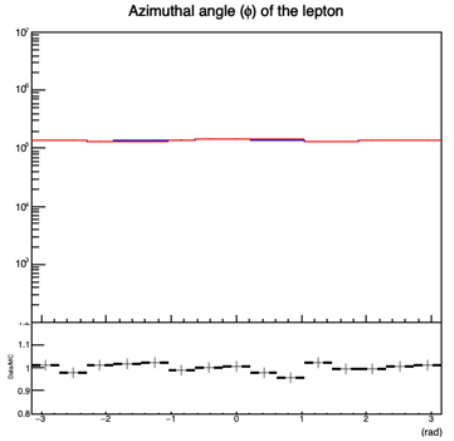
jets > 3

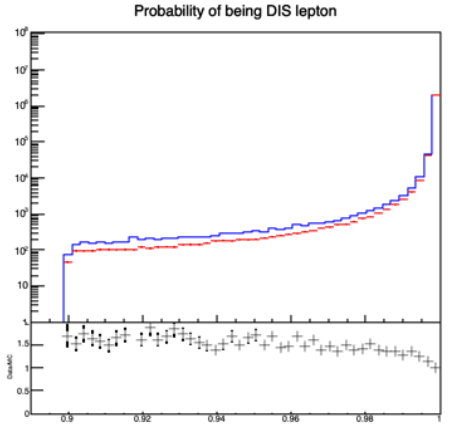
jets > 4

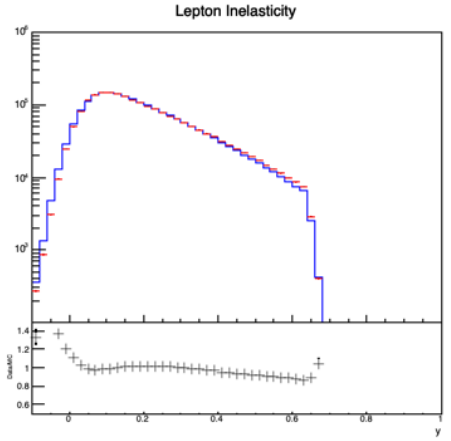












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Pt 2_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

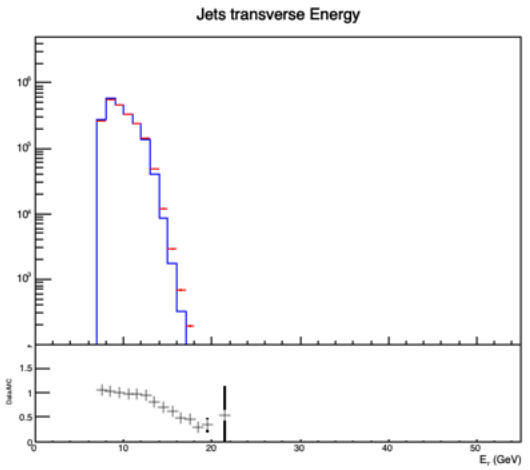
Jet multiplicity:

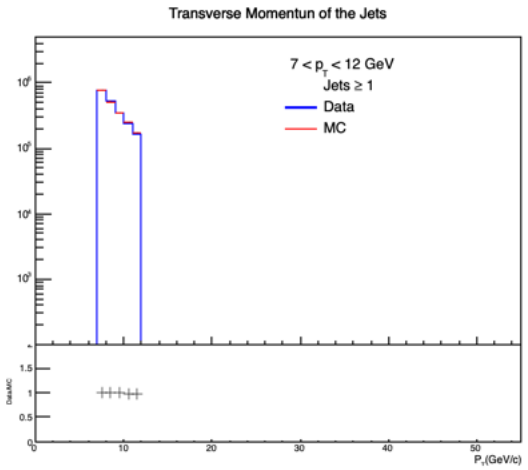
jets > 1

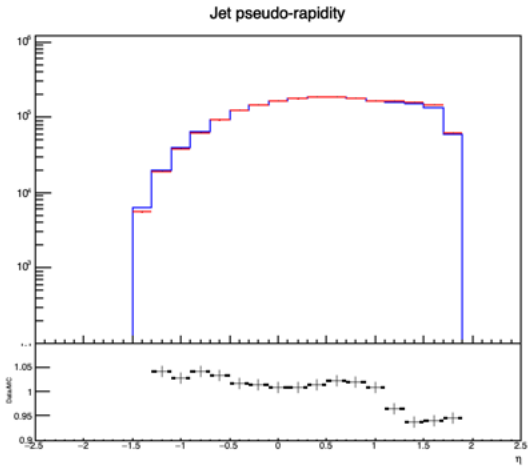
jets > 2

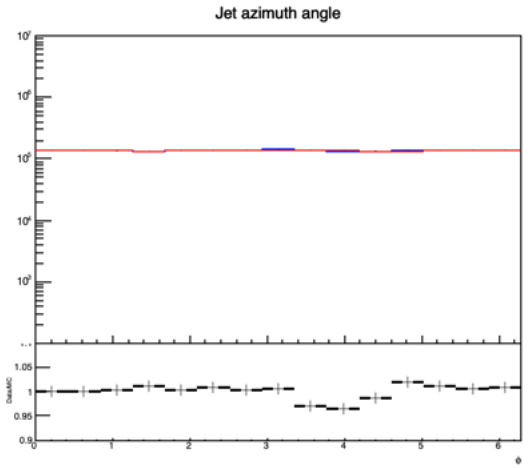
jets > 3

jets > 4









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dPhi Pt 2_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

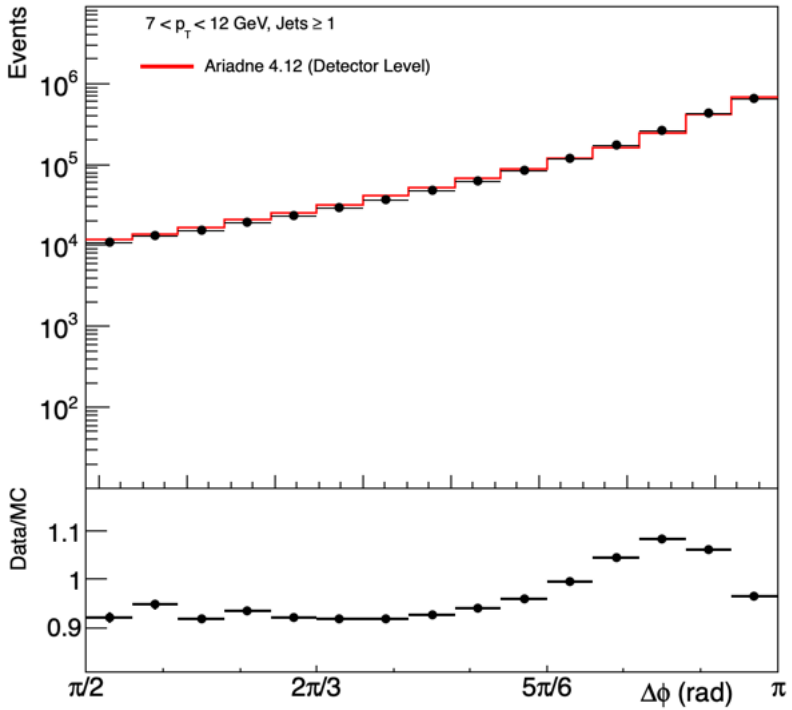
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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Event Pt 3-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

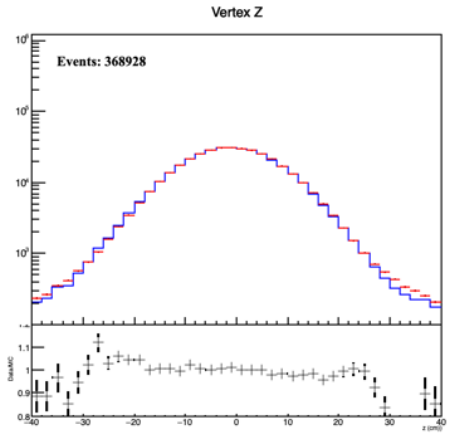
Jet multiplicity:

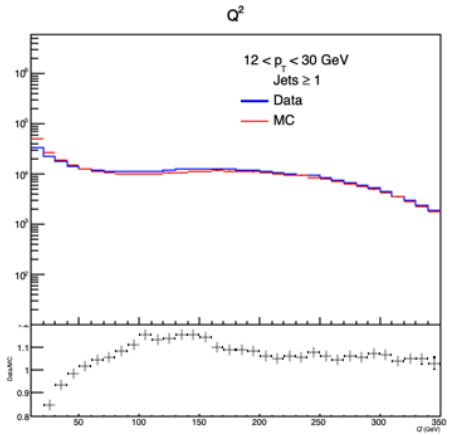
jets > 1

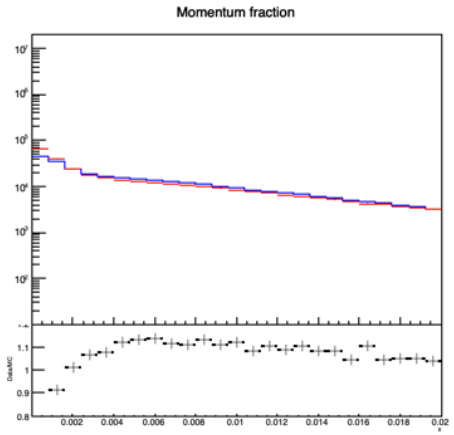
jets > 2

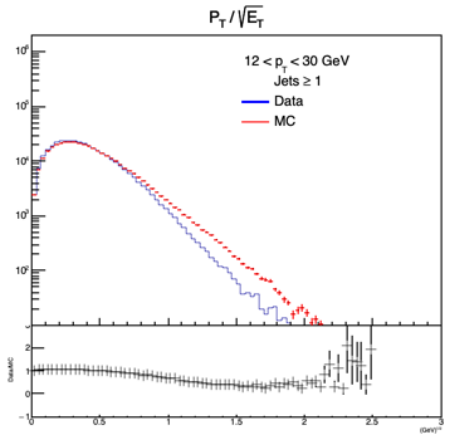
jets > 3

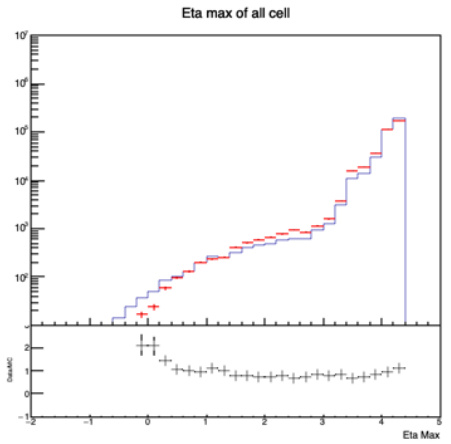
jets > 4

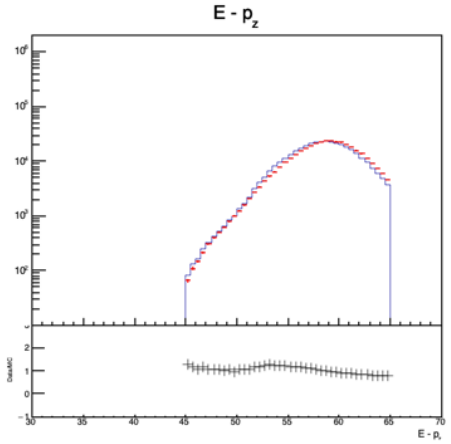












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Lepton Pt 3_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

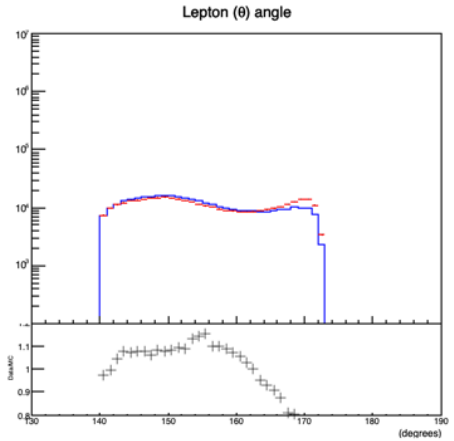
Jet multiplicity:

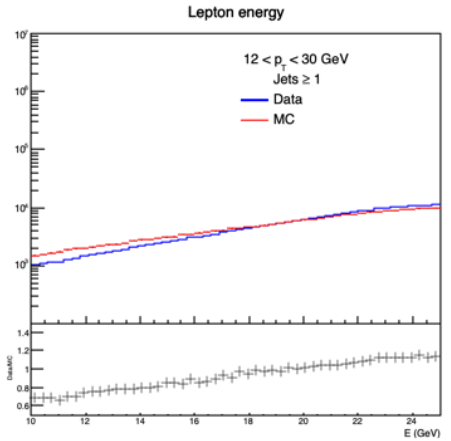
jets > 1

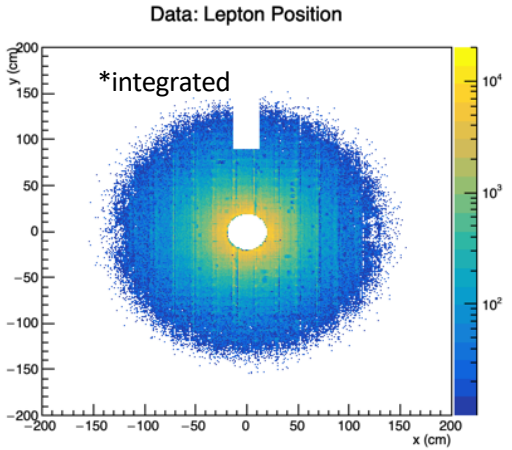
jets > 2

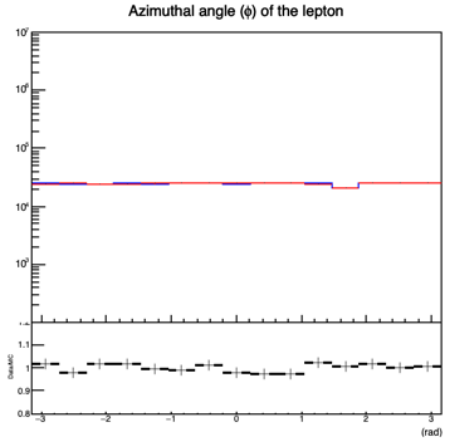
jets > 3

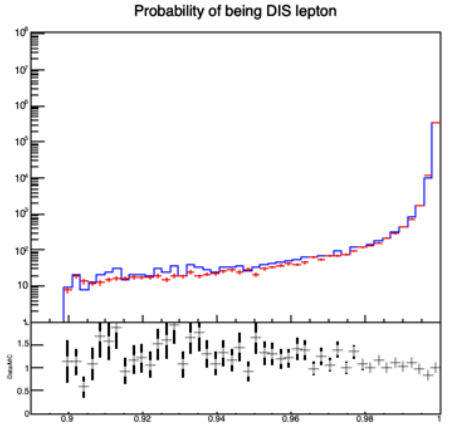
jets > 4

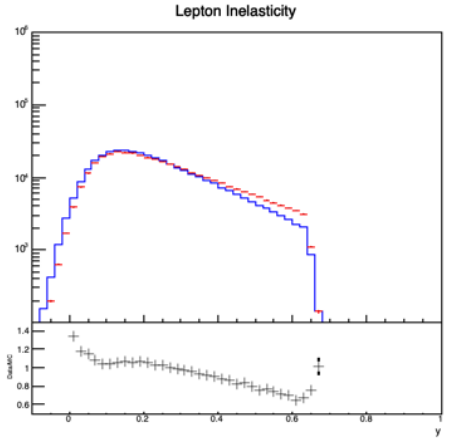












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Pt 3_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

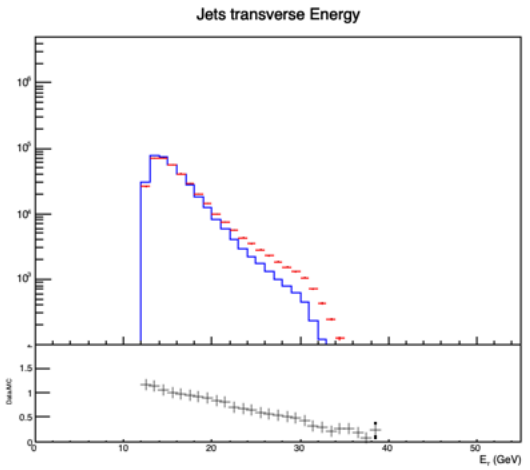
Jet multiplicity:

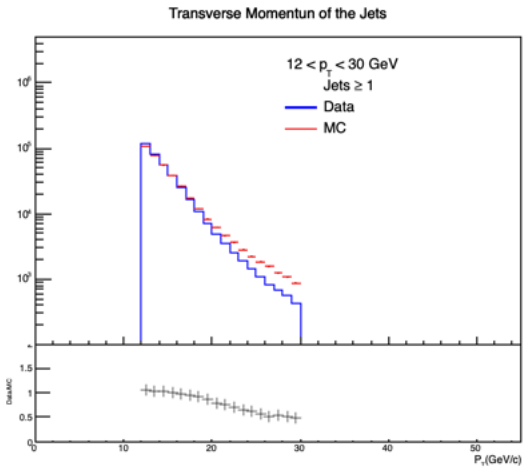
jets > 1

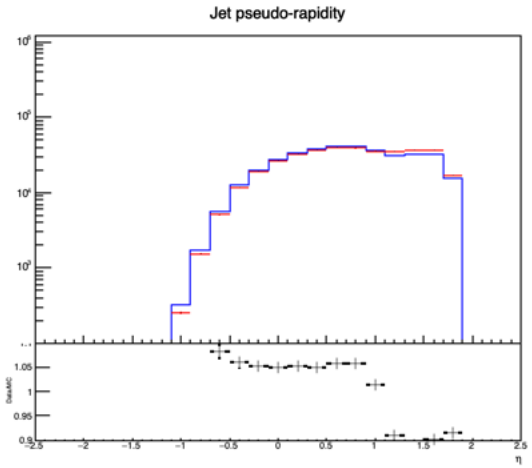
jets > 2

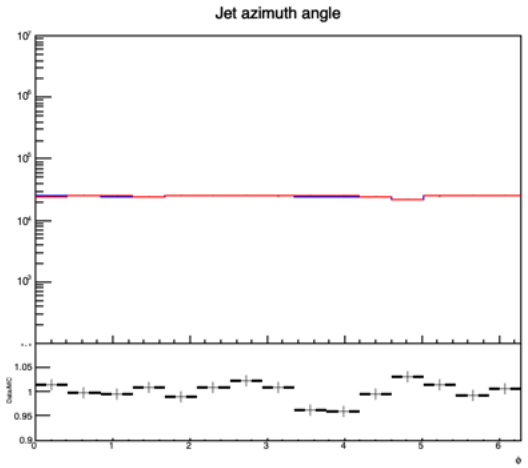
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 3_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

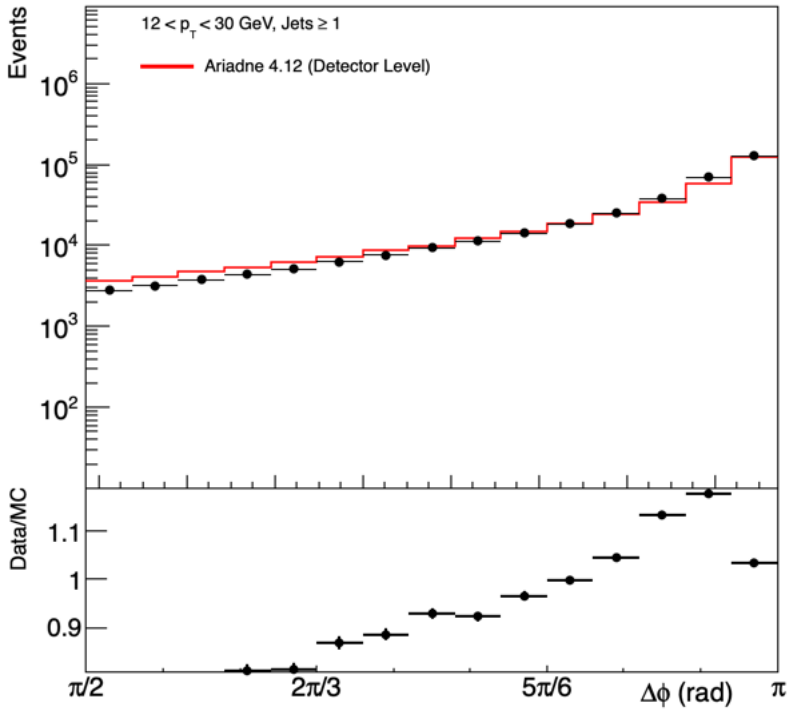
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event 0_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

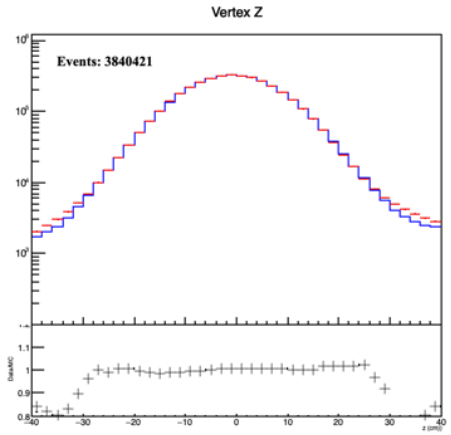
Jet multiplicity:

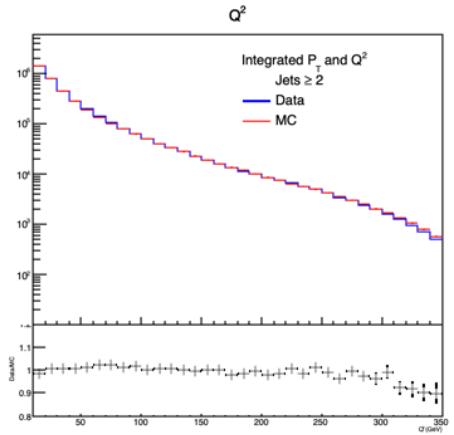
jets > 1

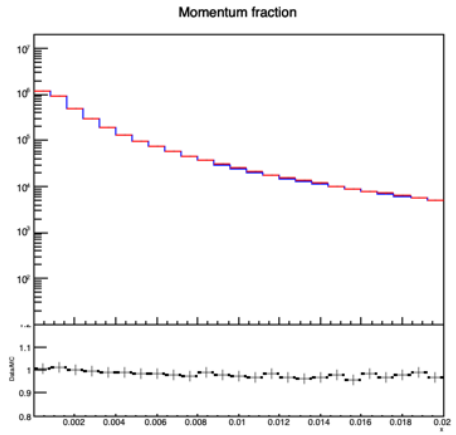
jets > 2

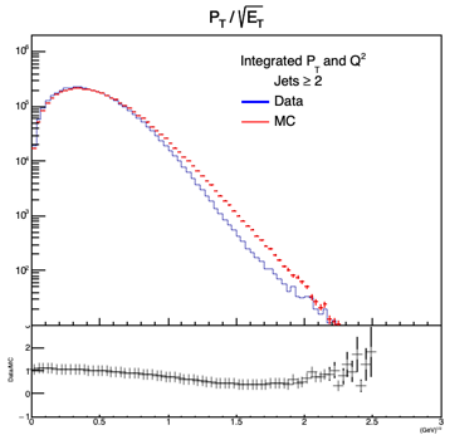
jets > 3

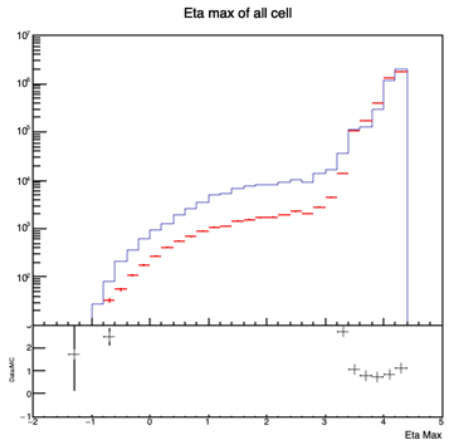
jets > 4

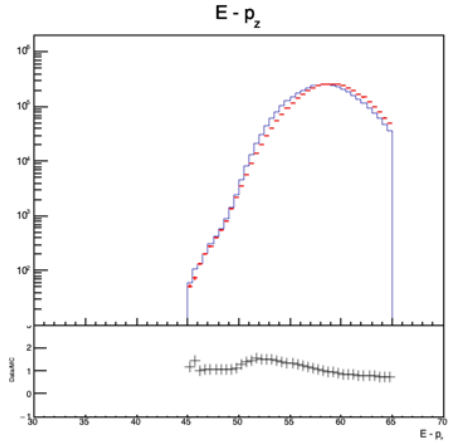












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton 0_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

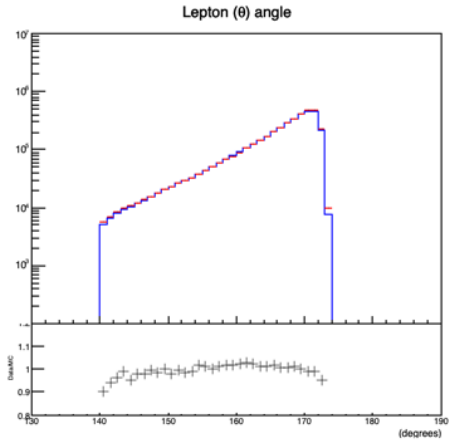
Jet multiplicity:

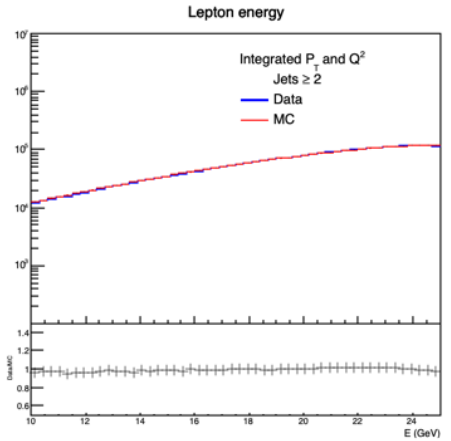
jets > 1

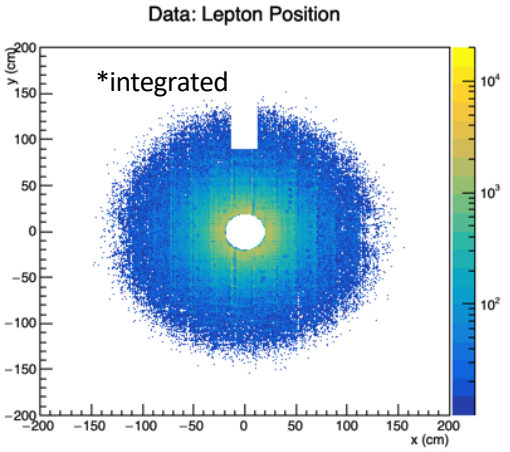
jets > 2

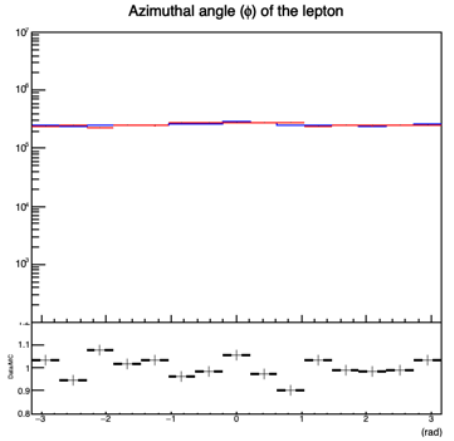
jets > 3

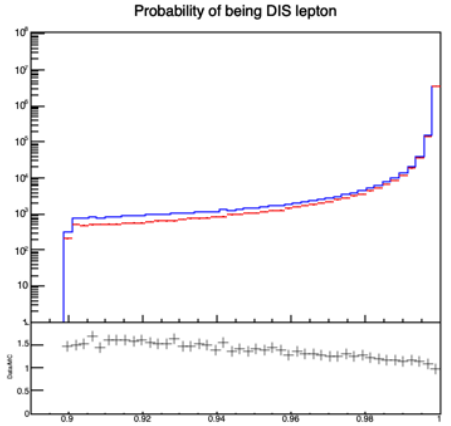
jets > 4

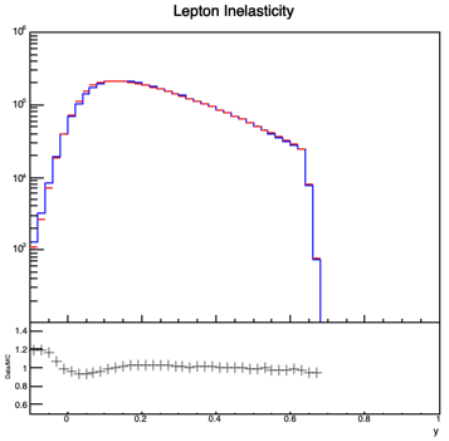












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet 0_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

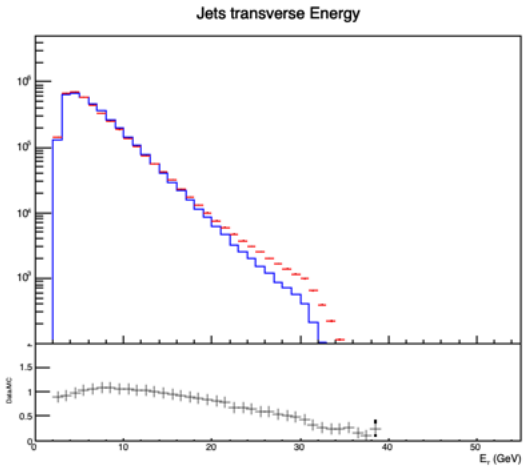
Jet multiplicity:

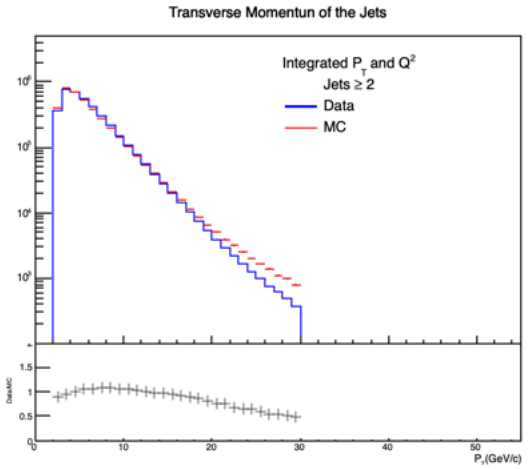
jets > 1

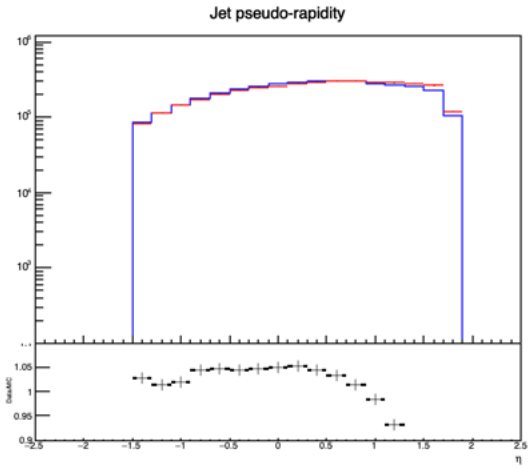
jets > 2

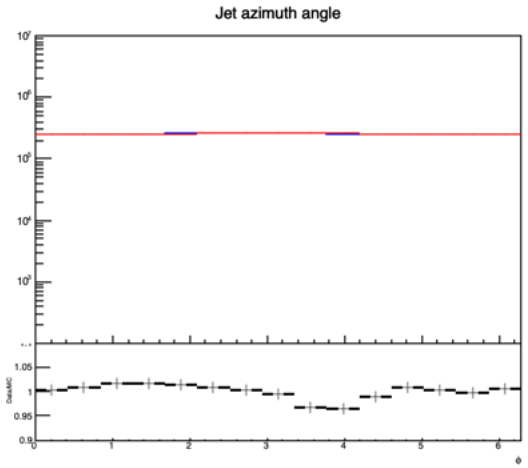
jets > 3

jets > 4









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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi 0_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

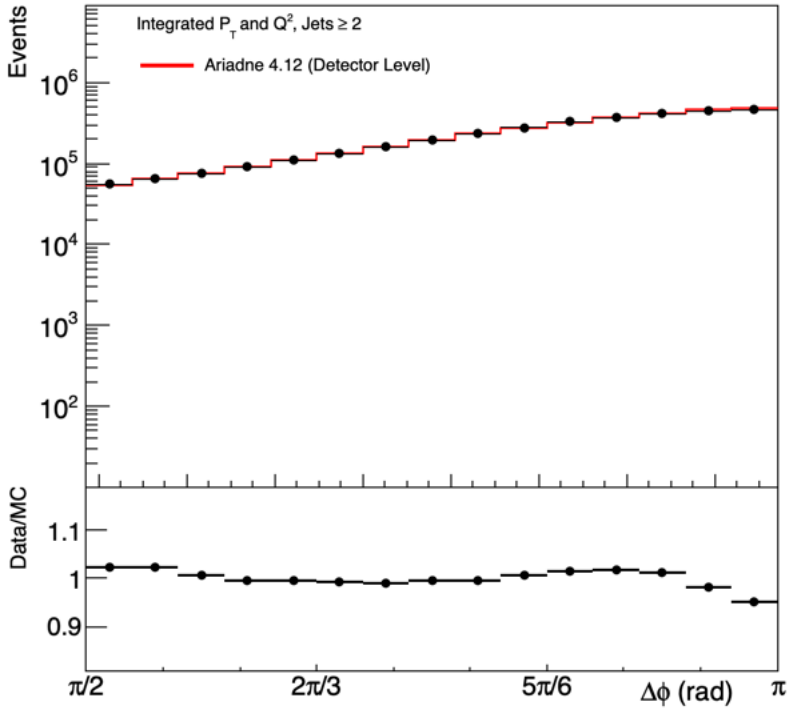
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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Event Pt 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

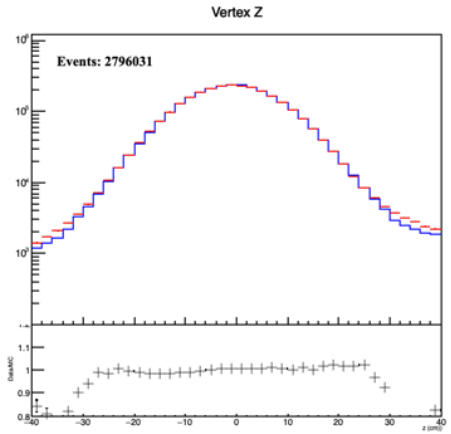
Jet multiplicity:

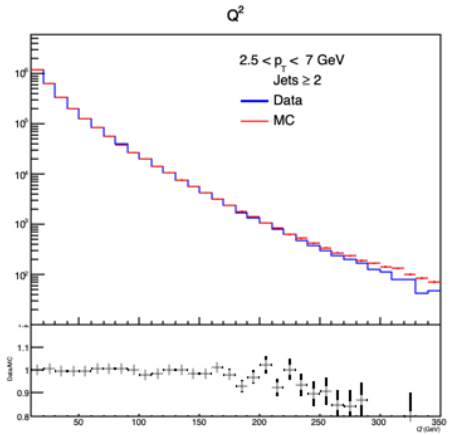
jets > 1

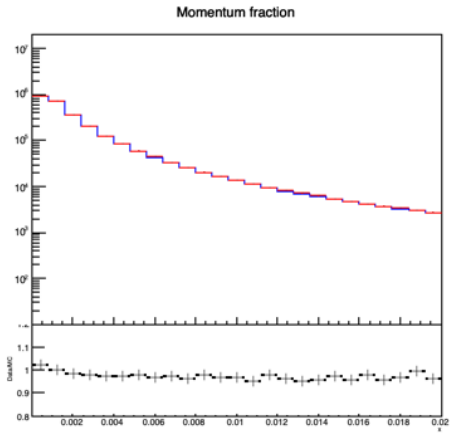
jets > 2

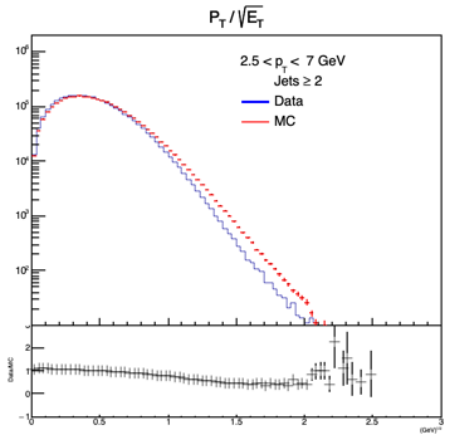
jets > 3

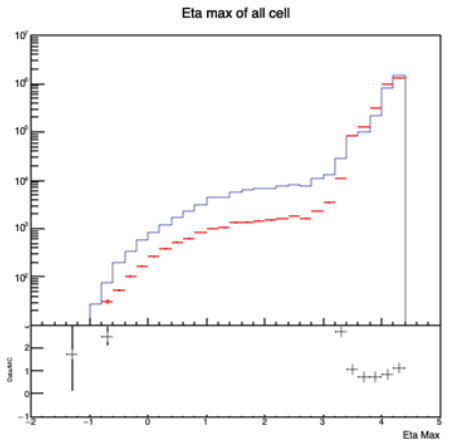
jets > 4

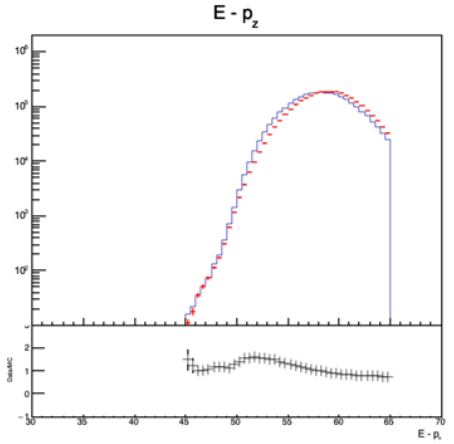












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

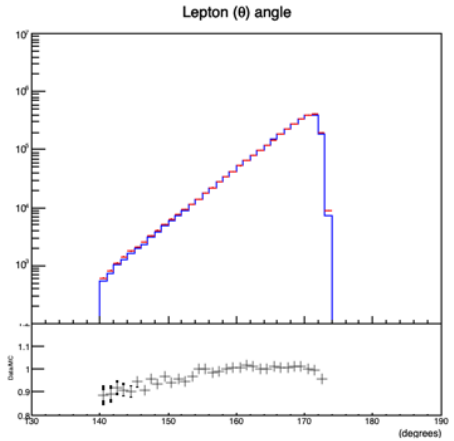
Jet multiplicity:

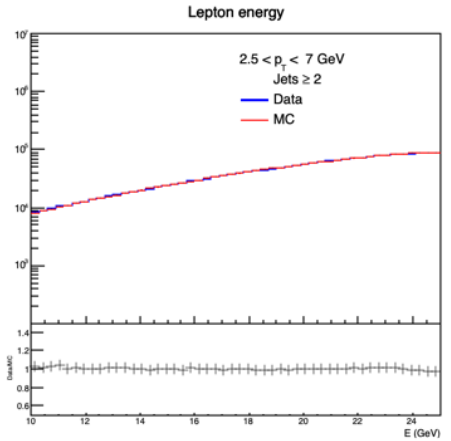
jets > 1

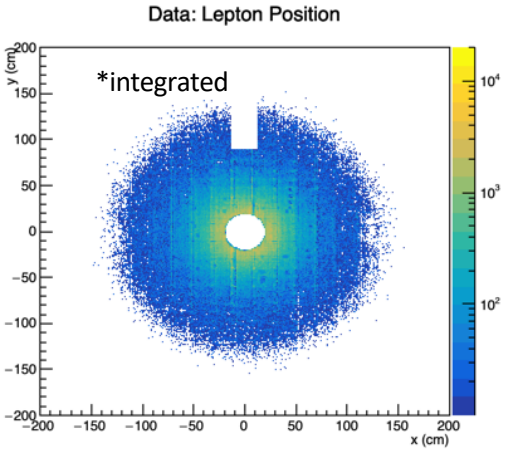
jets > 2

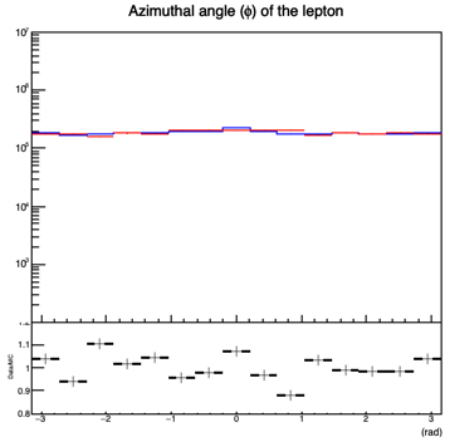
jets > 3

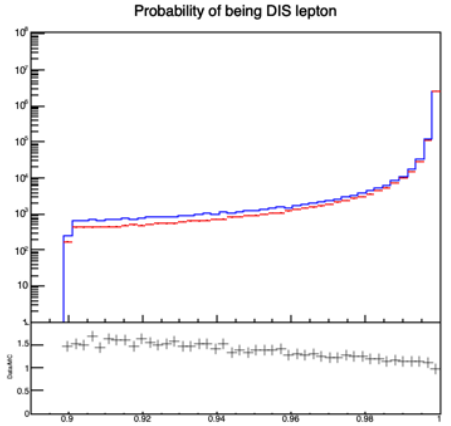
jets > 4

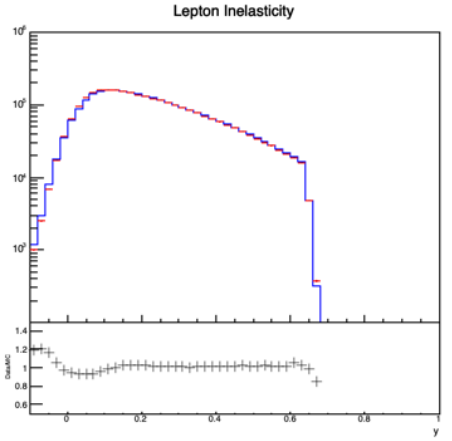












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Pt 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

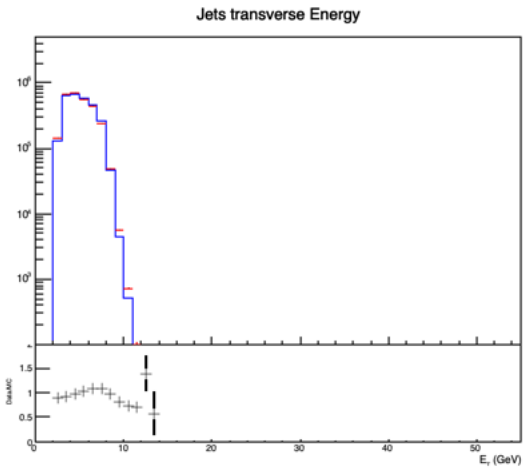
Jet multiplicity:

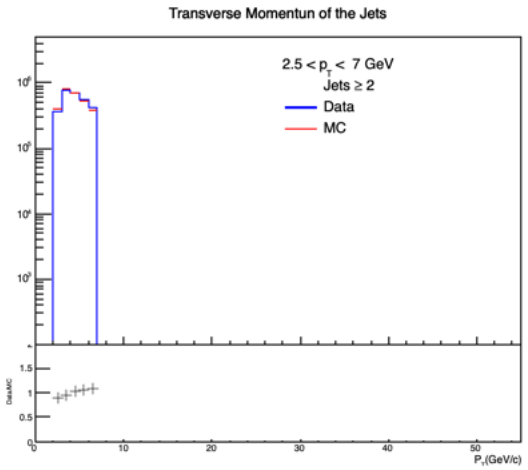
jets > 1

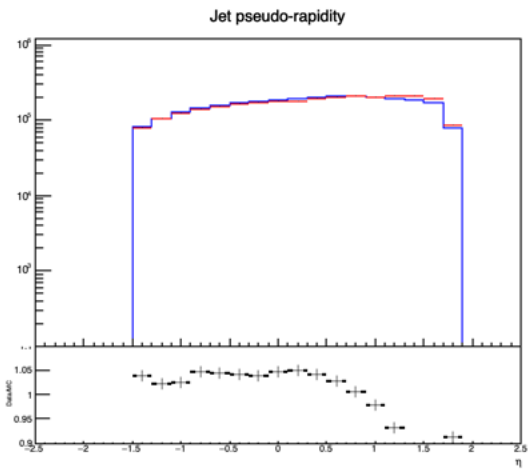
jets > 2

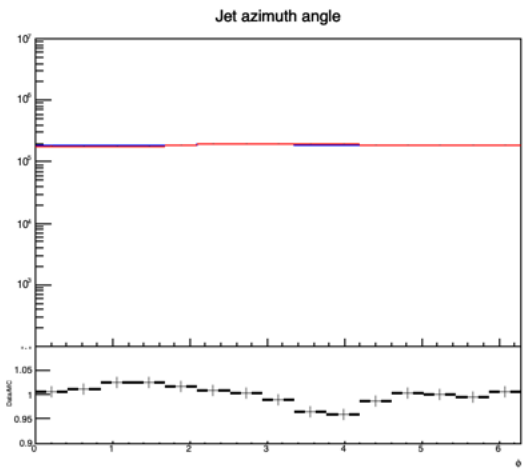
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

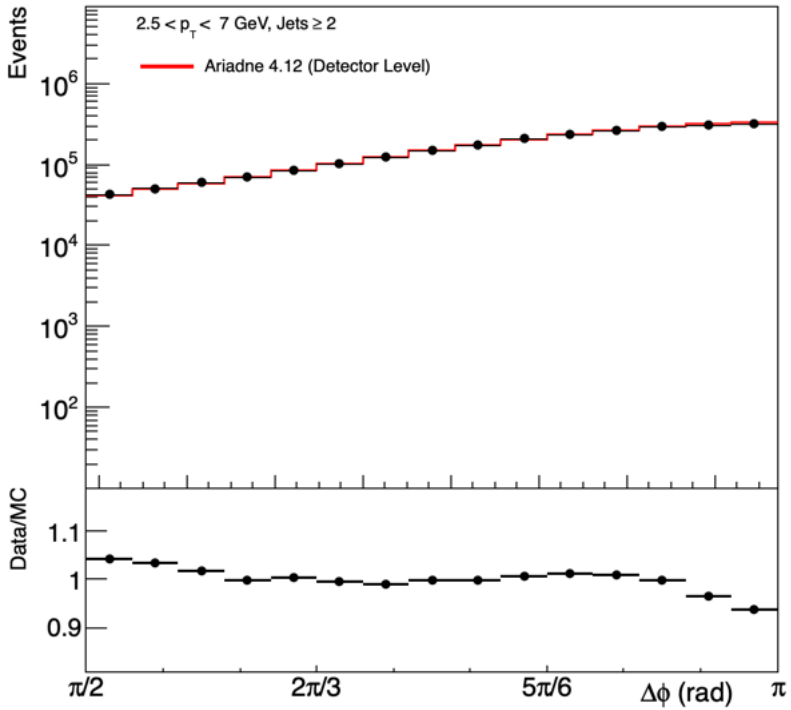
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Pt 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

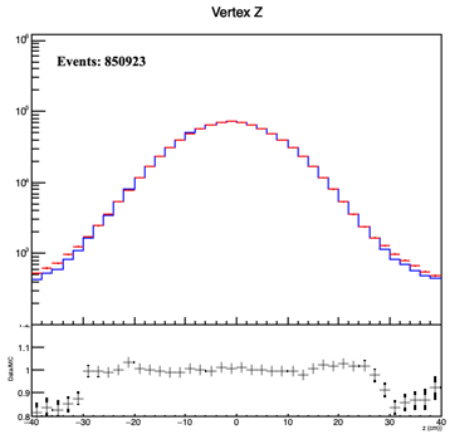
Jet multiplicity:

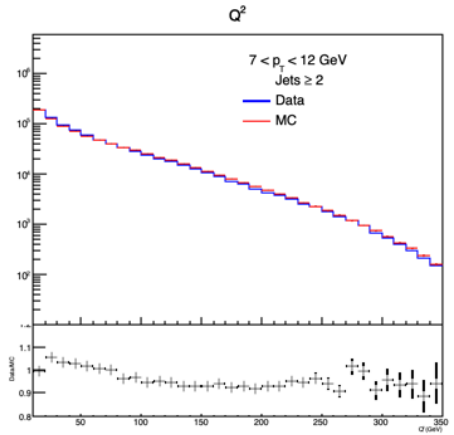
jets > 1

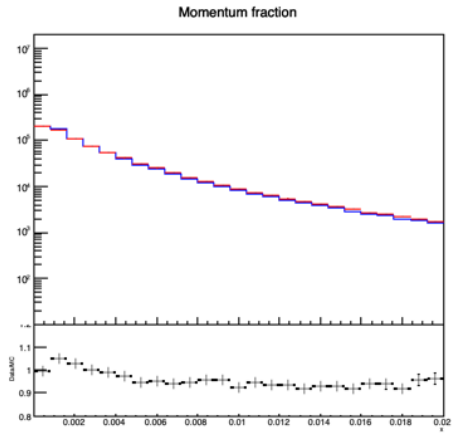
jets > 2

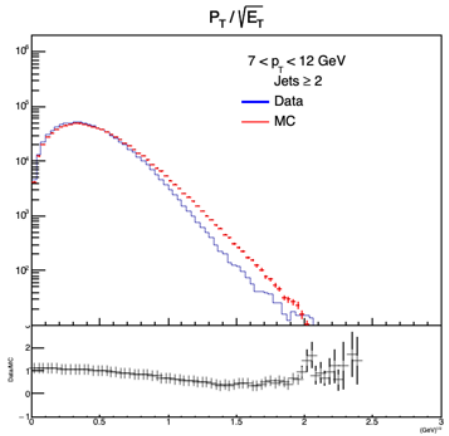
jets > 3

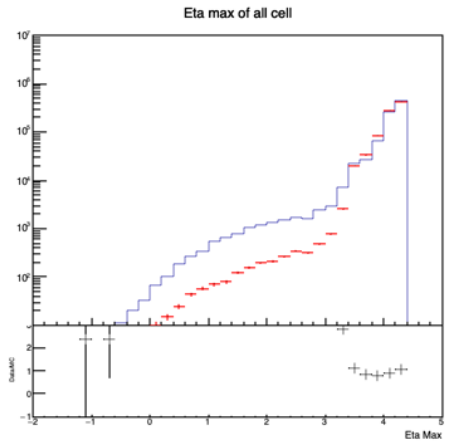
jets > 4

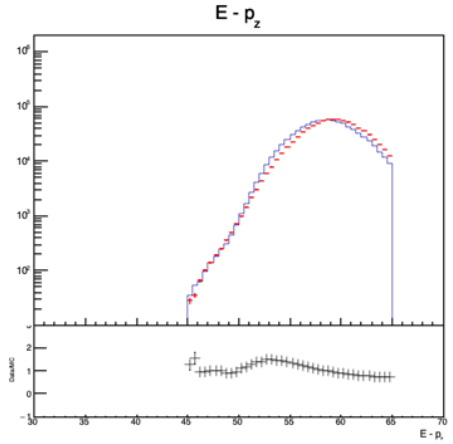












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

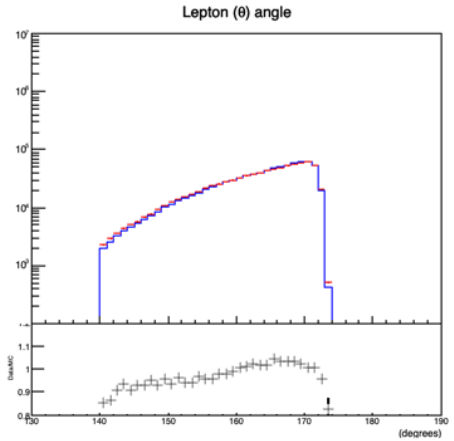
Jet multiplicity:

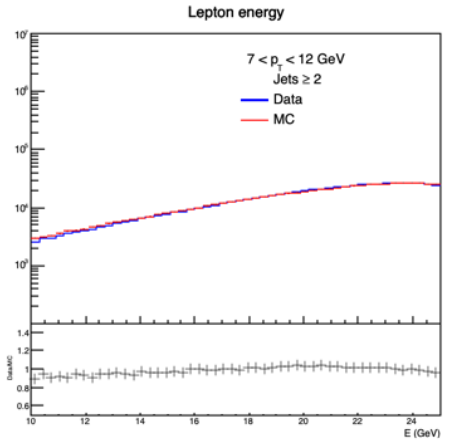
jets > 1

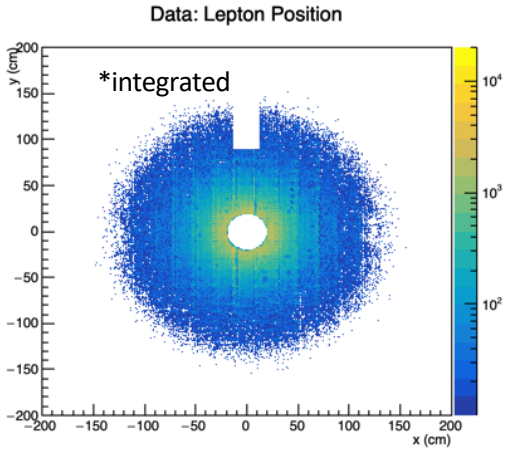
jets > 2

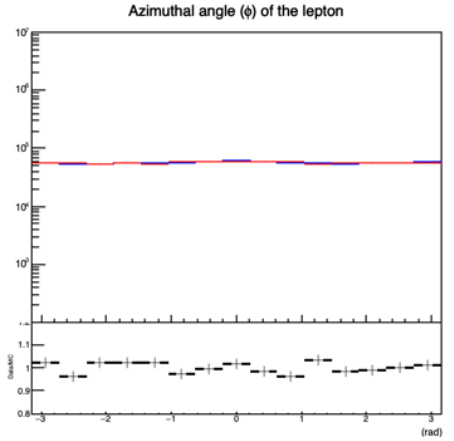
jets > 3

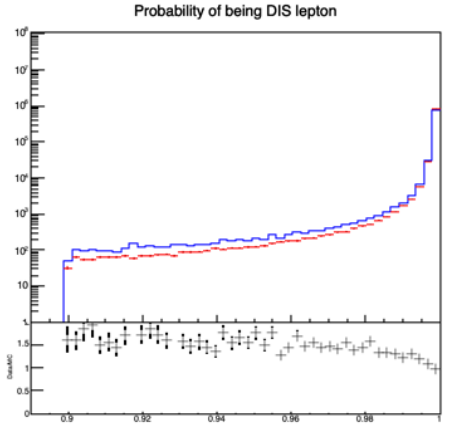
jets > 4

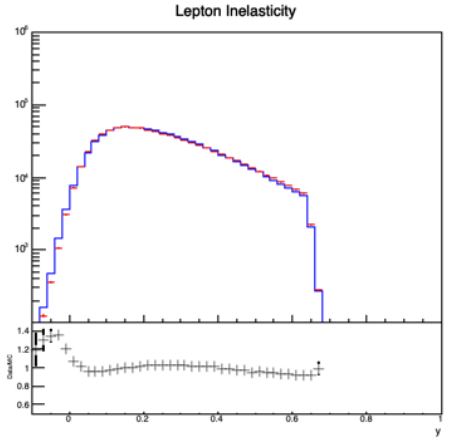












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Pt 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

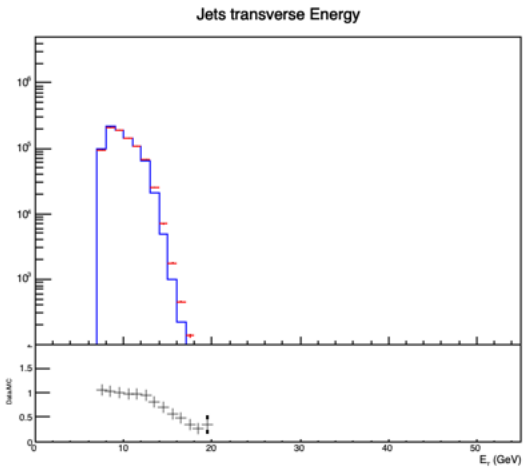
Jet multiplicity:

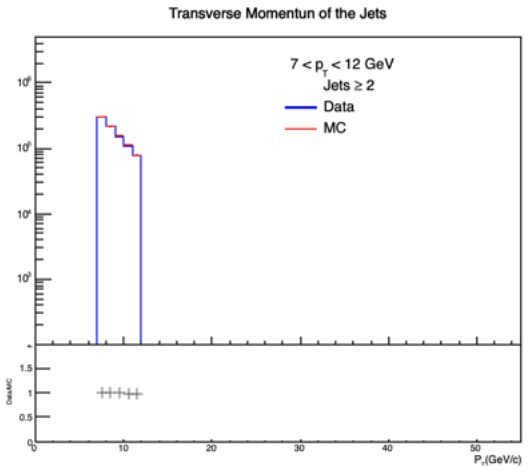
jets > 1

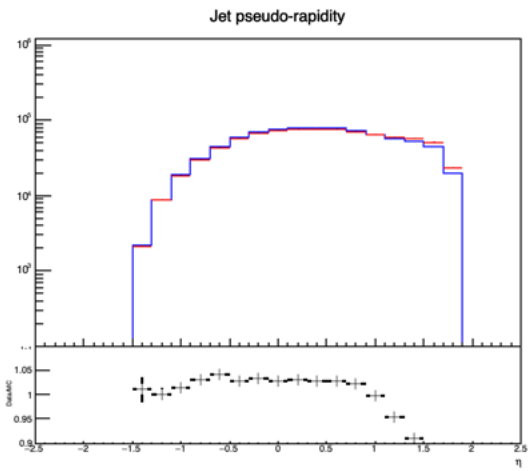
jets > 2

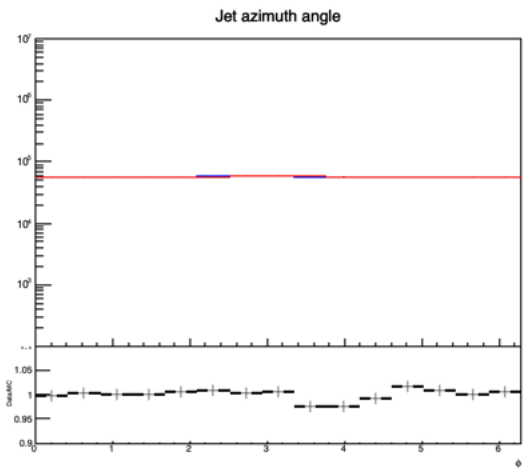
jets > 3

jets > 4









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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

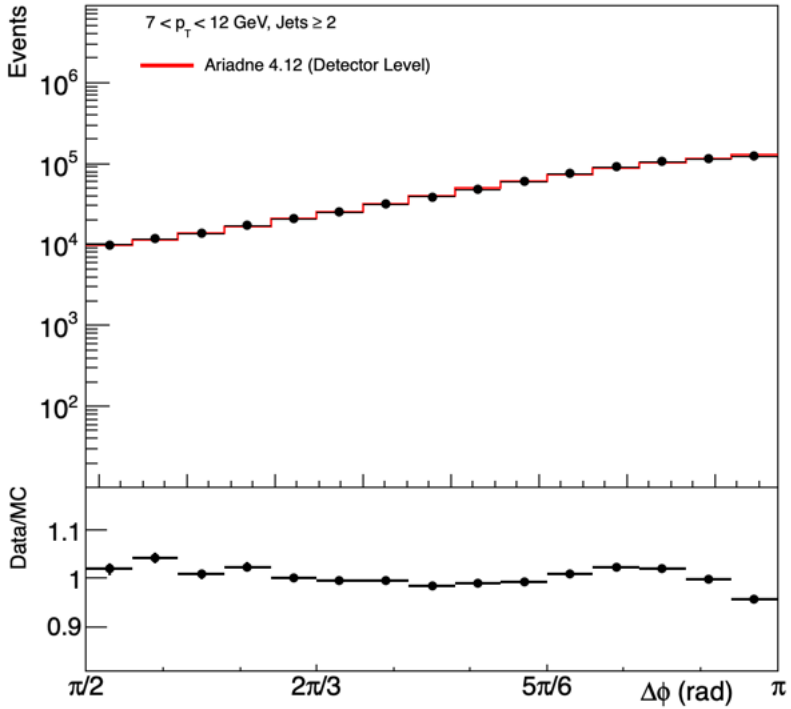
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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Event Pt 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

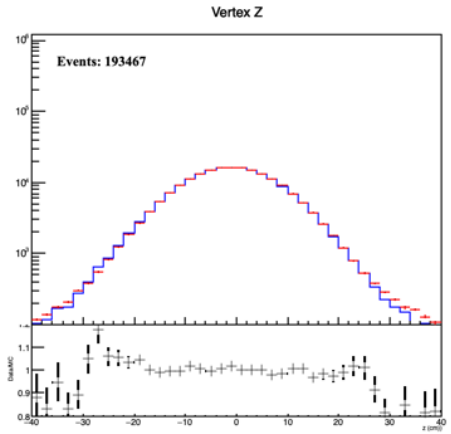
Jet multiplicity:

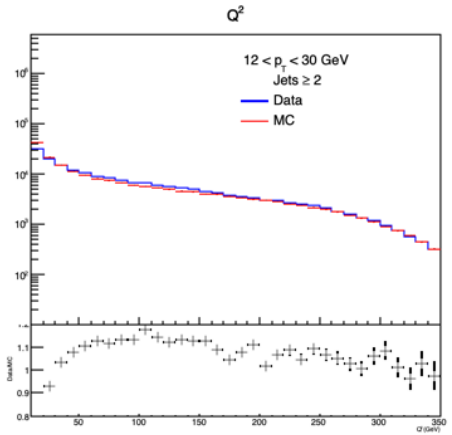
jets > 1

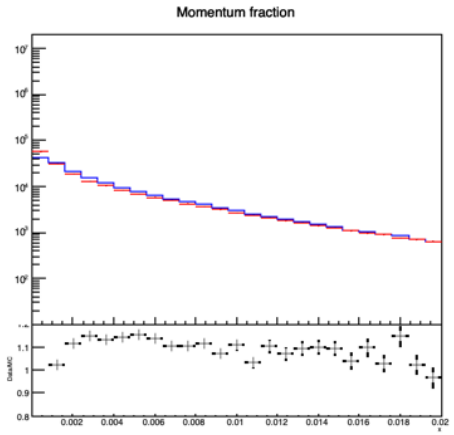
jets > 2

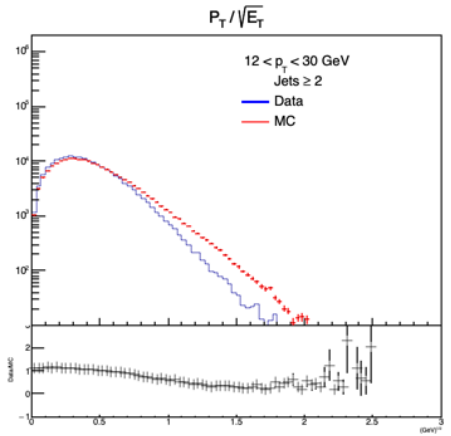
jets > 3

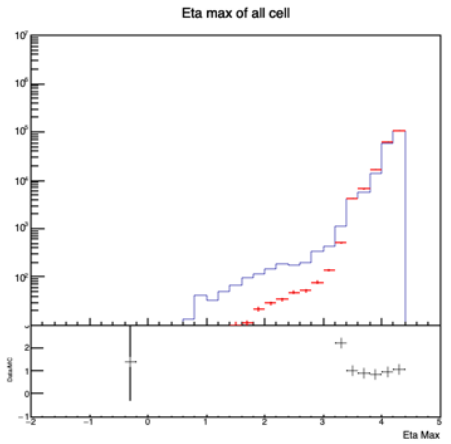
jets > 4

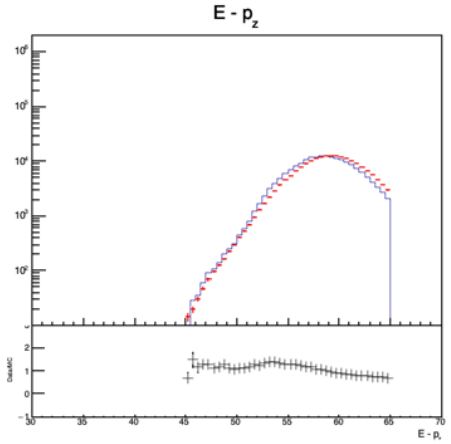












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

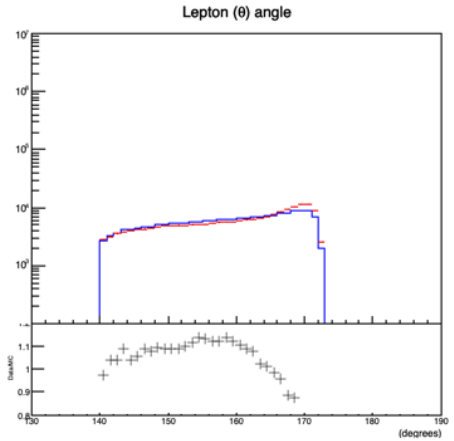
Jet multiplicity:

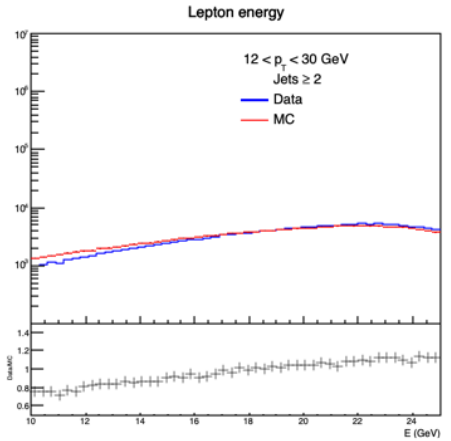
jets > 1

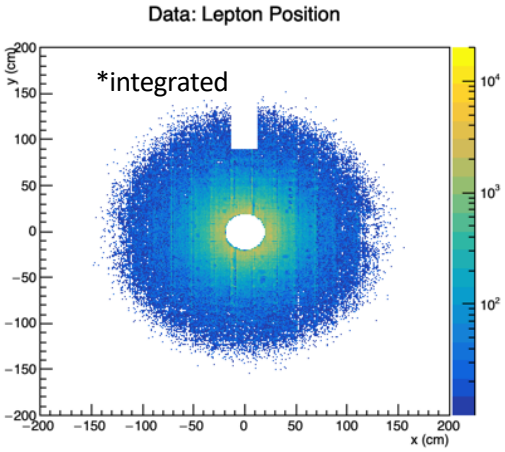
jets > 2

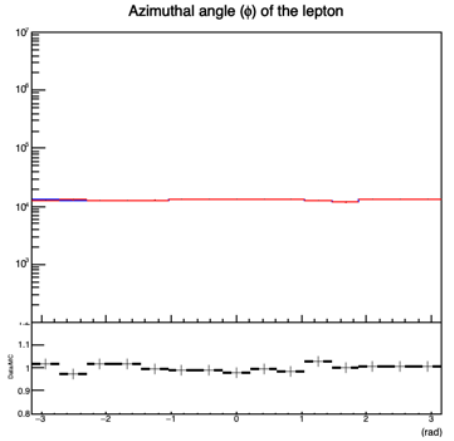
jets > 3

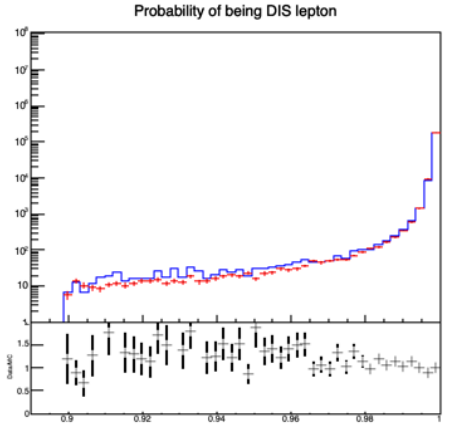
jets > 4

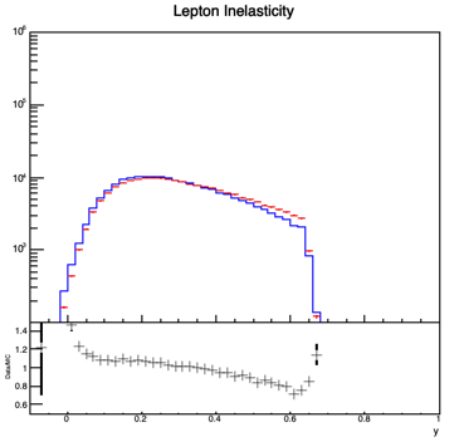












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Pt 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

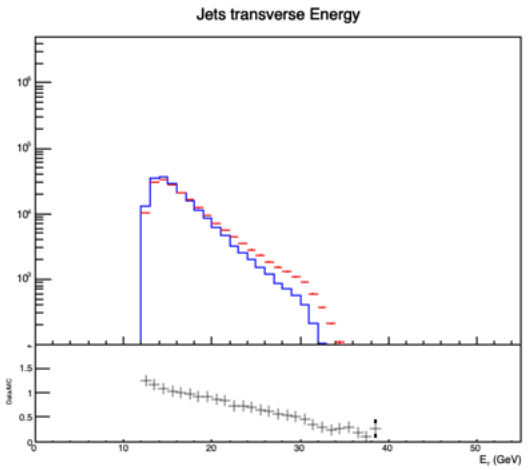
Jet multiplicity:

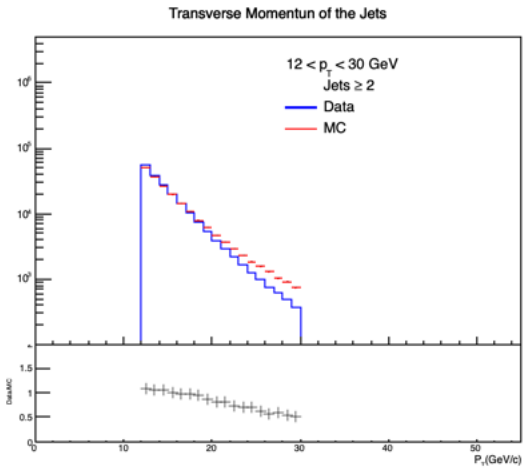
jets > 1

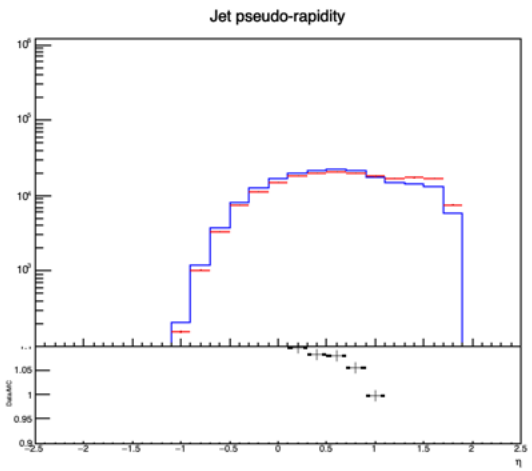
jets > 2

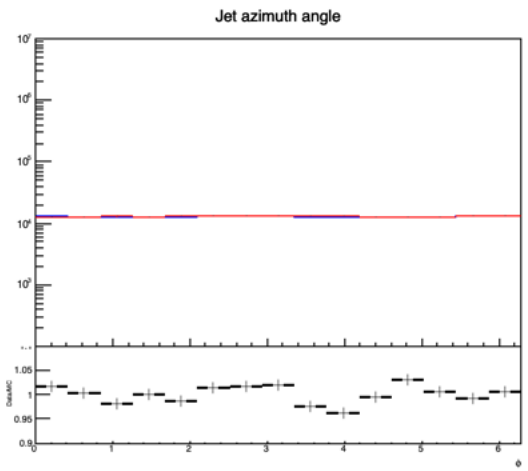
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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dPhi Pt 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

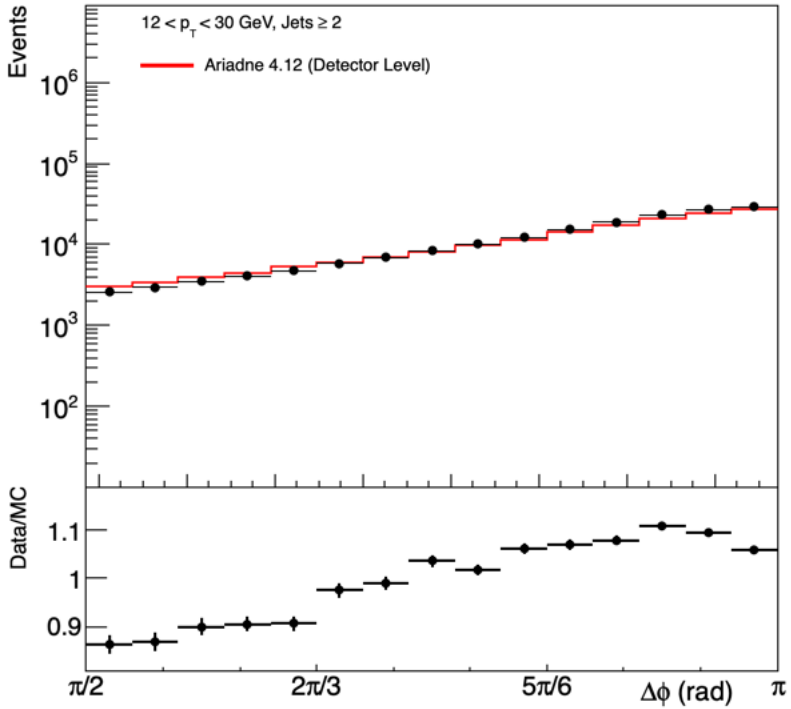
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event 0_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

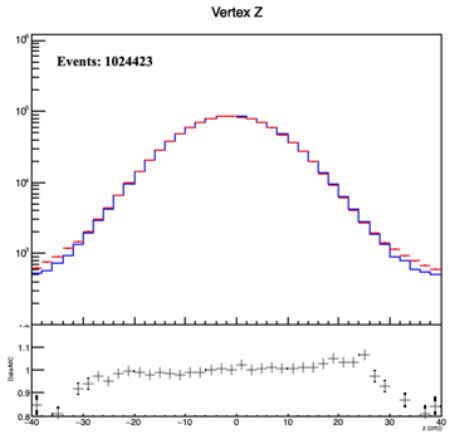
Jet multiplicity:

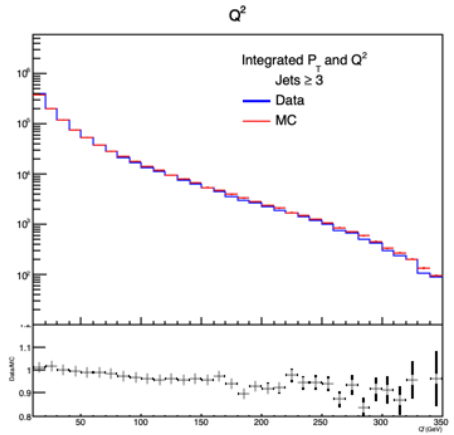
jets > 1

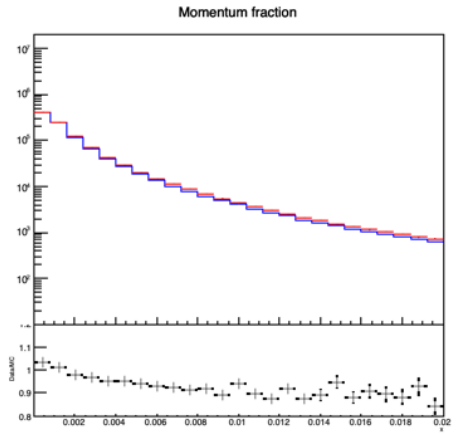
jets > 2

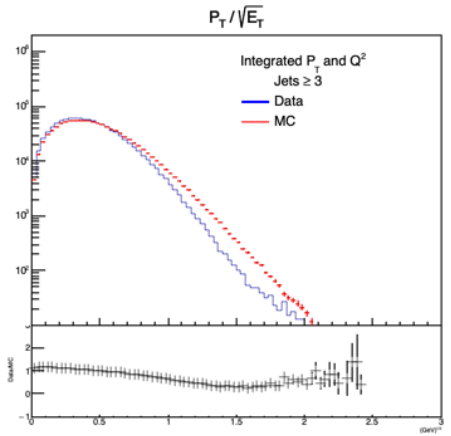
jets > 3

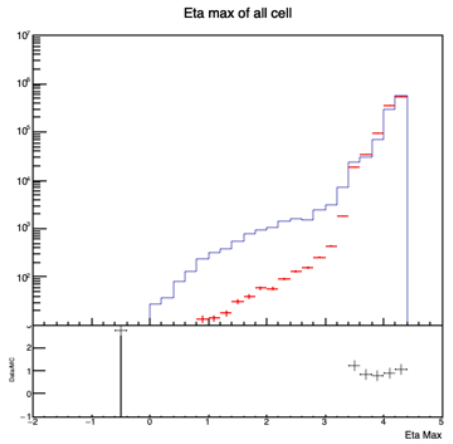
jets > 4

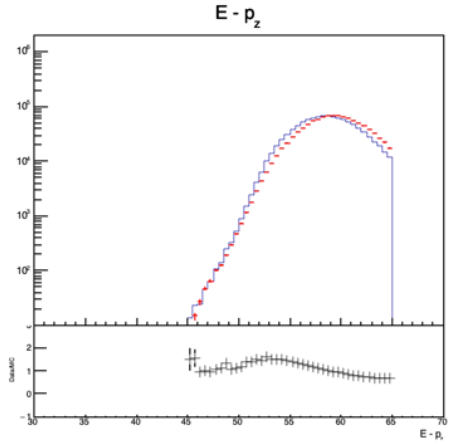












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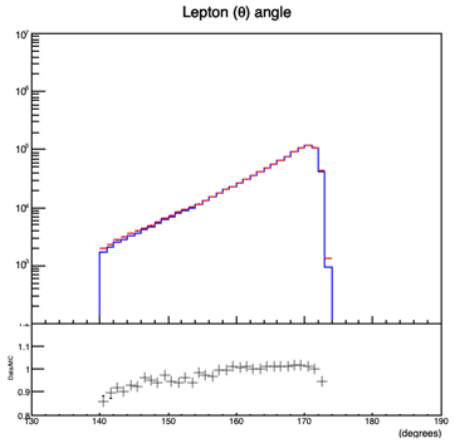
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

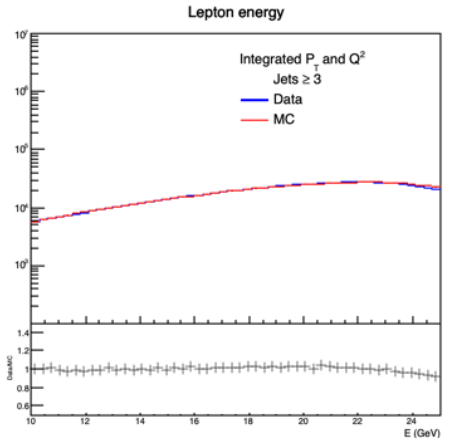
Lepton 0_2

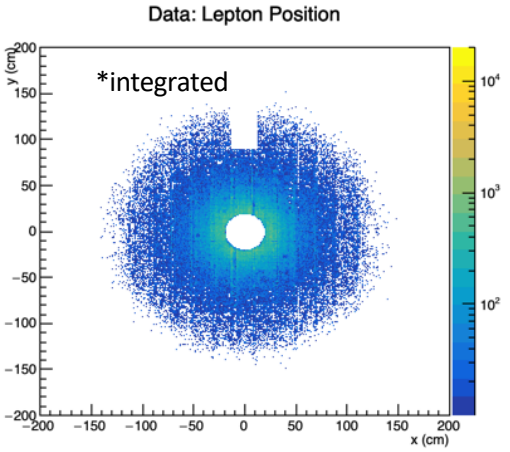
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

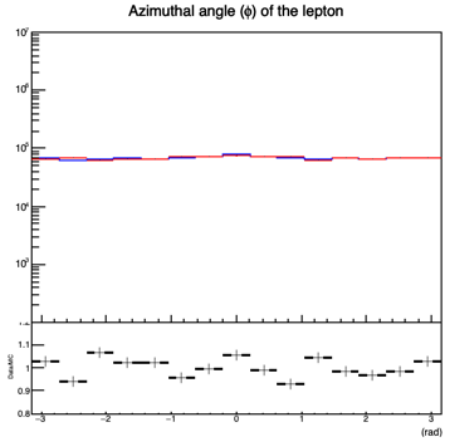
Jet multiplicity:

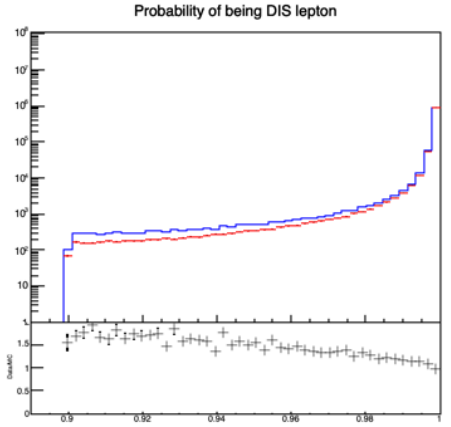
jets > 1
jets > 2
jets > 3
jets > 4

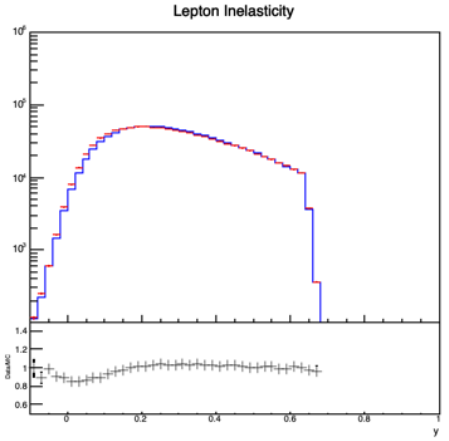












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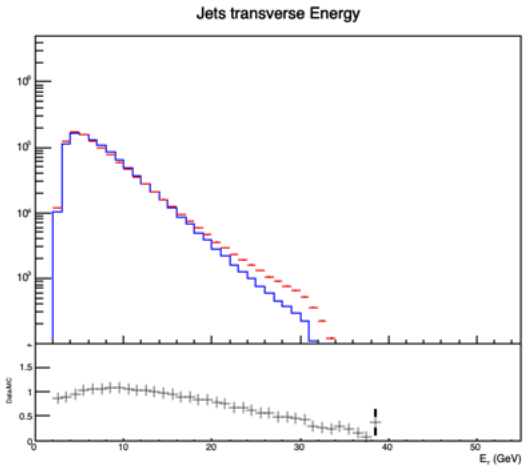
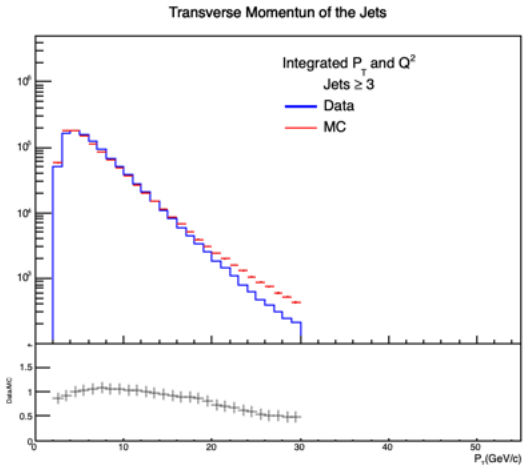
Jet 0_2

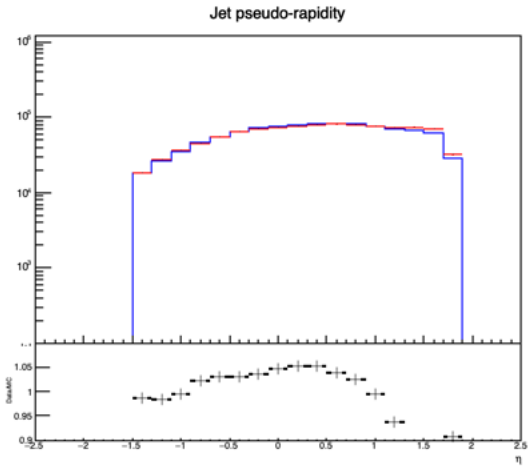
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

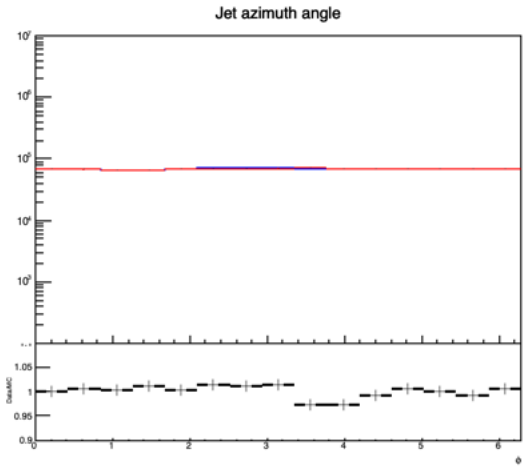
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

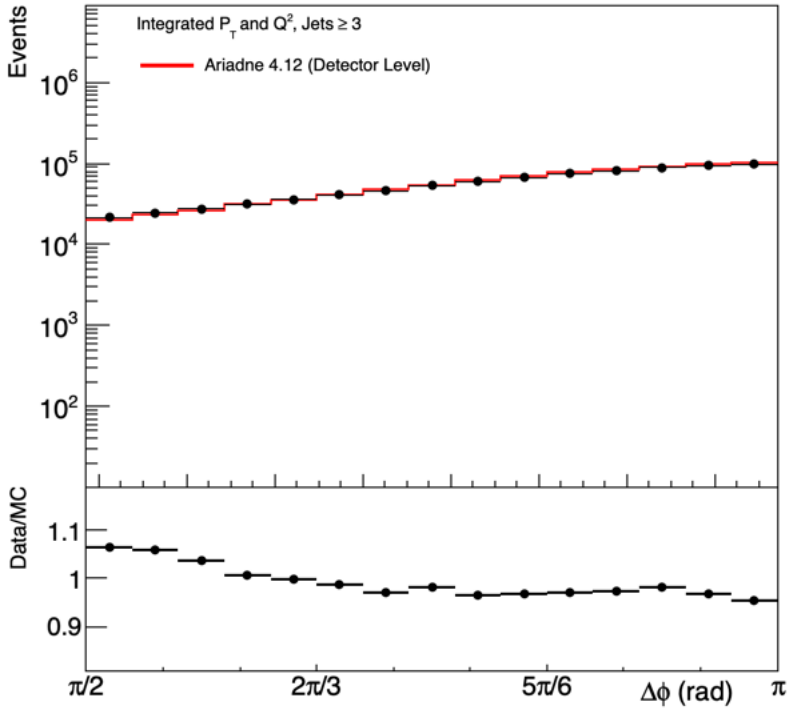
I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi 0_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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Event Pt 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

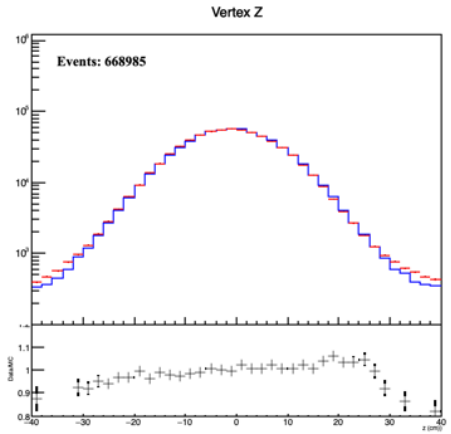
Jet multiplicity:

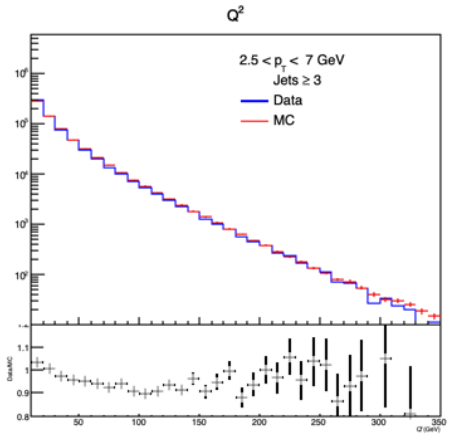
jets > 1

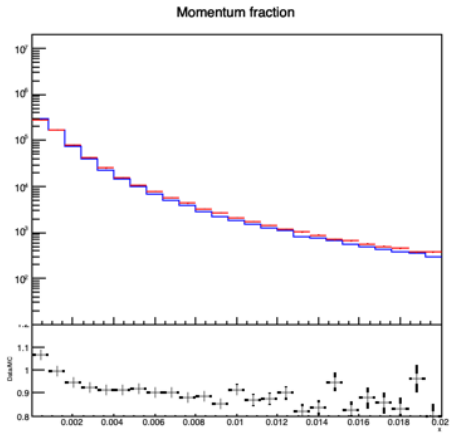
jets > 2

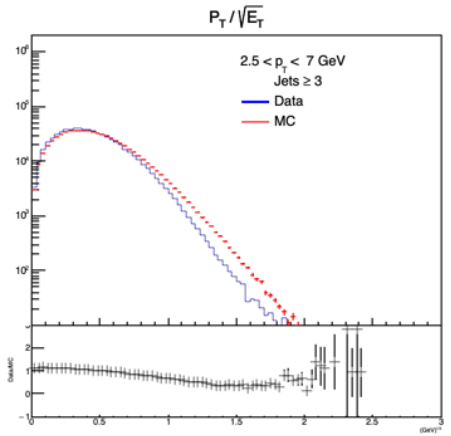
jets > 3

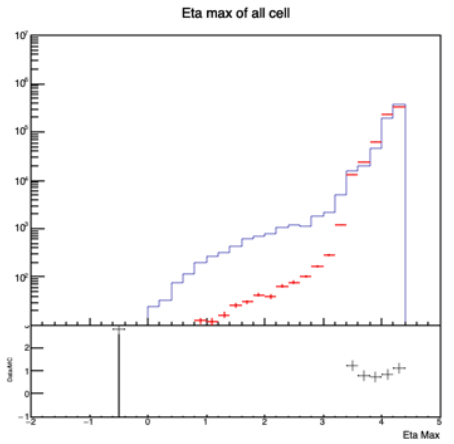
jets > 4

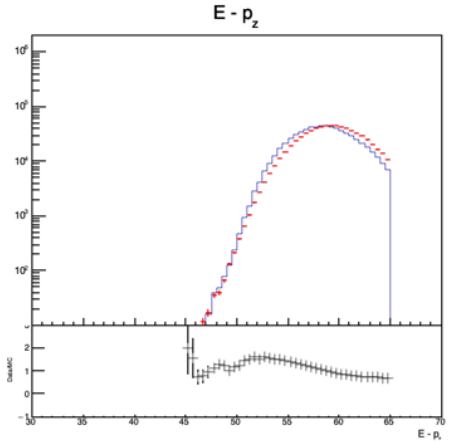












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

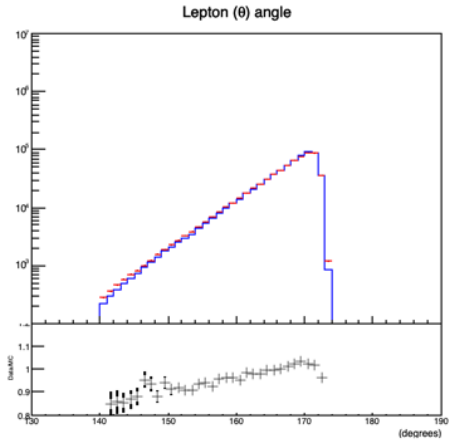
Jet multiplicity:

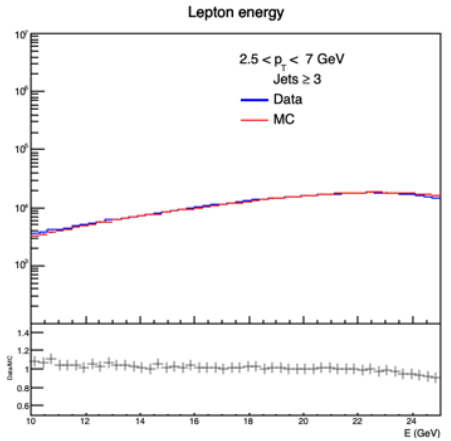
jets > 1

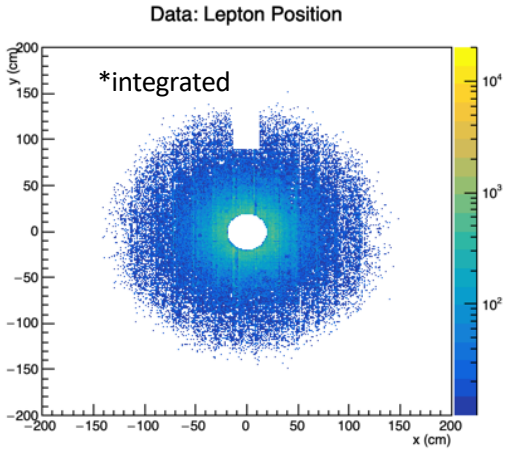
jets > 2

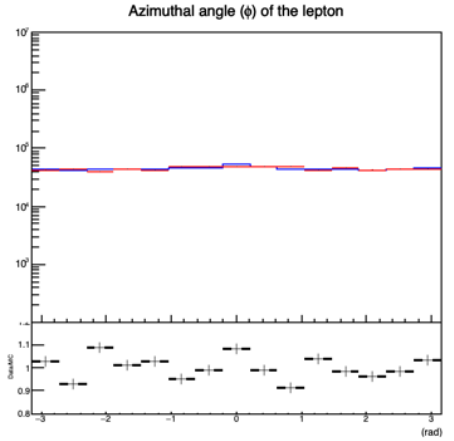
jets > 3

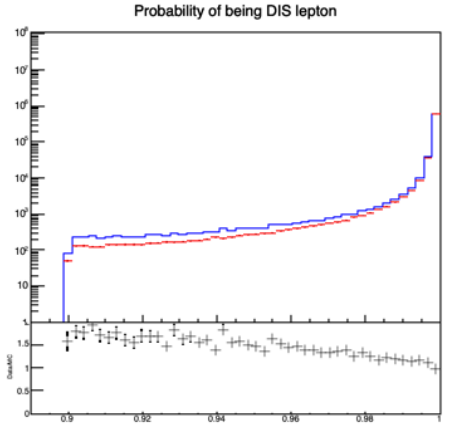
jets > 4

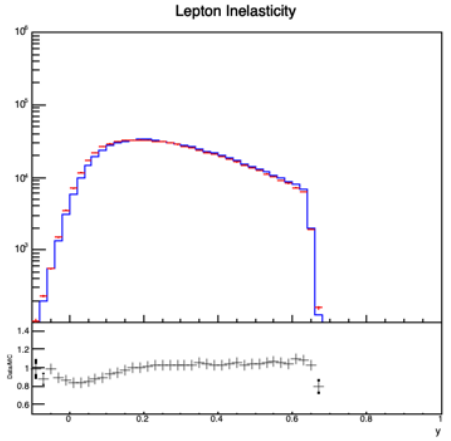












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Pt 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

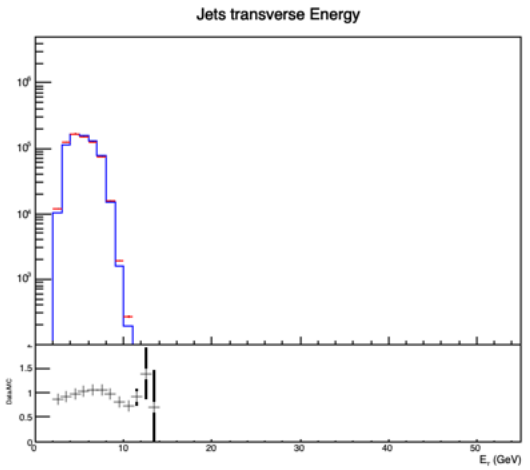
Jet multiplicity:

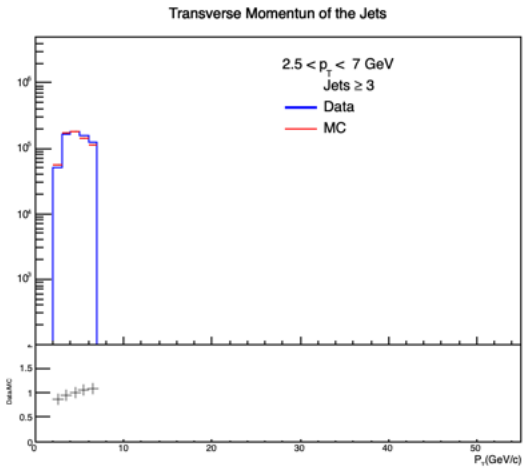
jets > 1

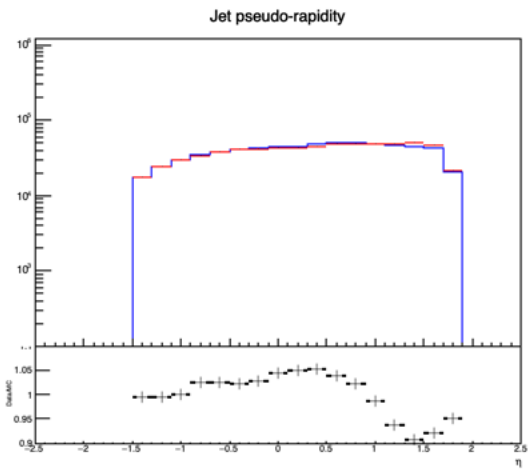
jets > 2

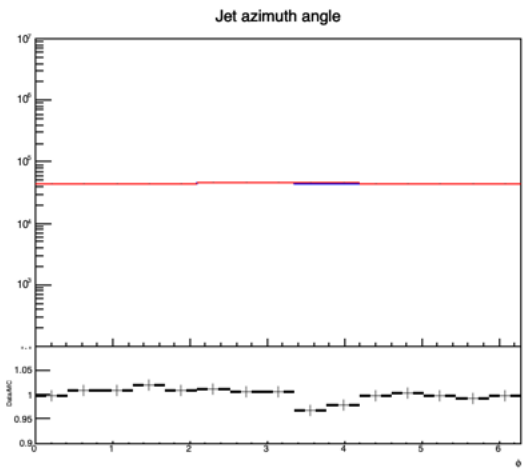
jets > 3

jets > 4









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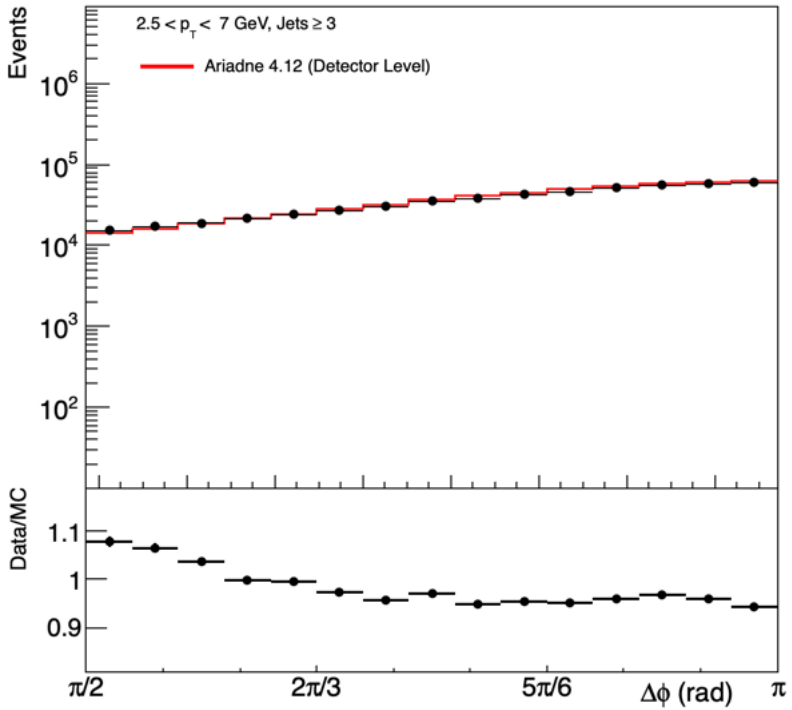
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Pt 2_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

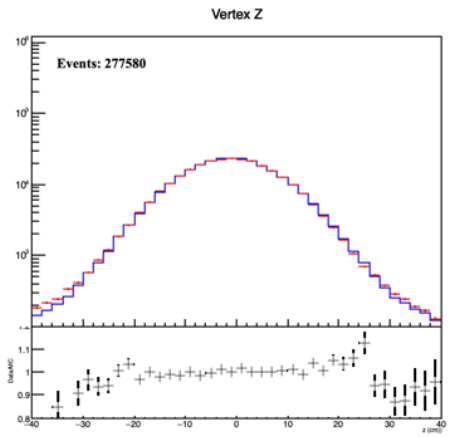
Jet multiplicity:

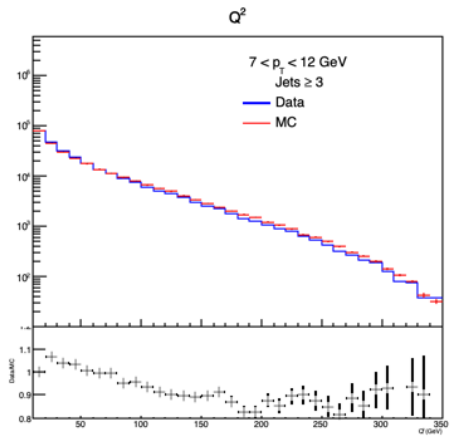
jets > 1

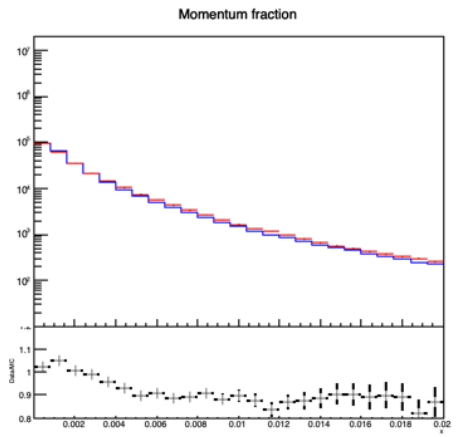
jets > 2

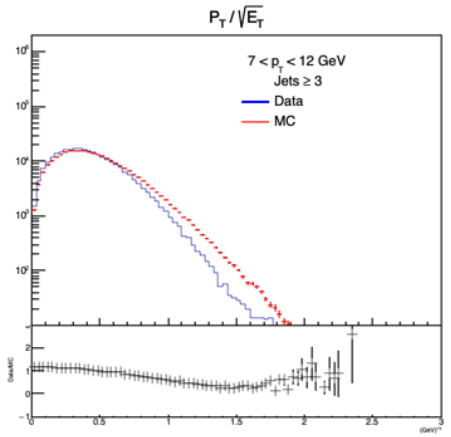
jets > 3

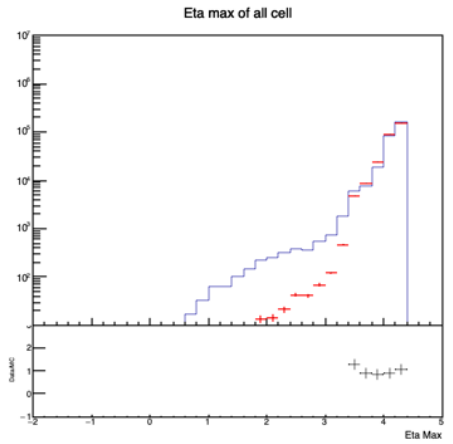
jets > 4

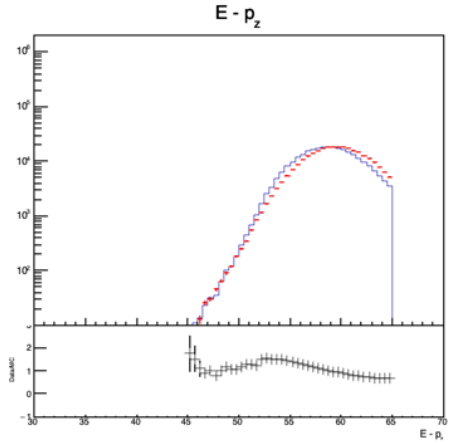












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 2_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

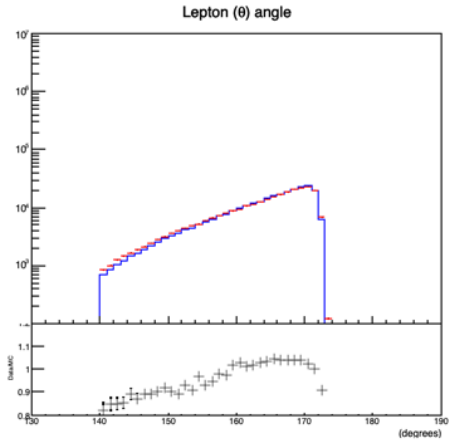
Jet multiplicity:

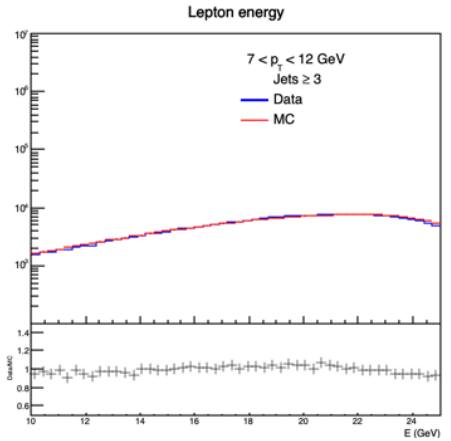
jets > 1

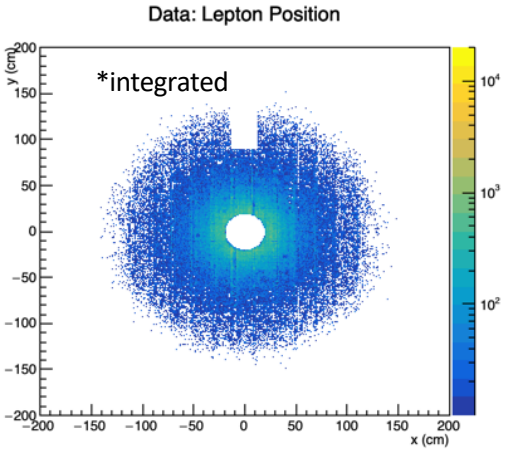
jets > 2

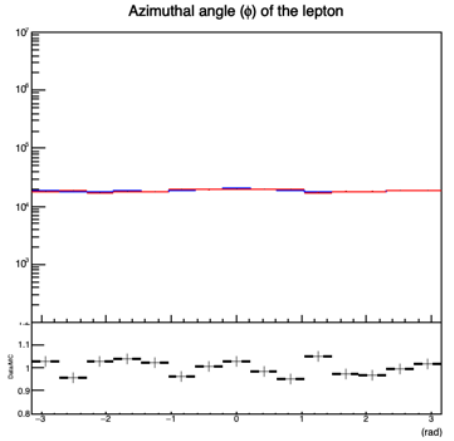
jets > 3

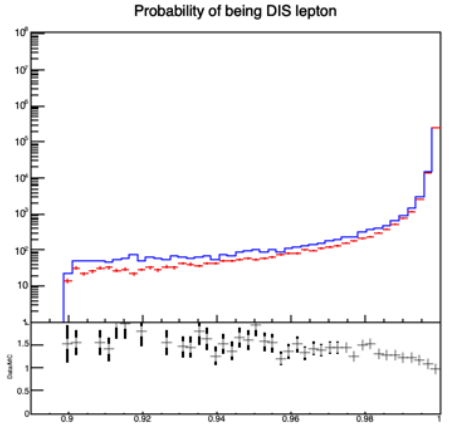
jets > 4

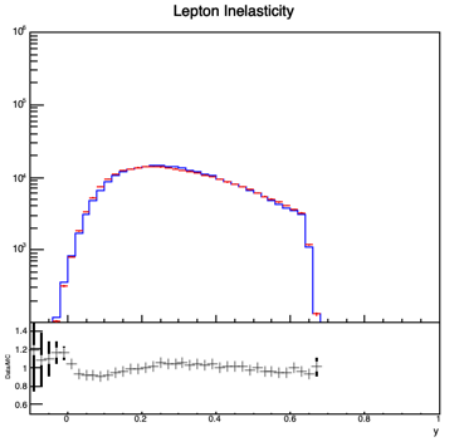












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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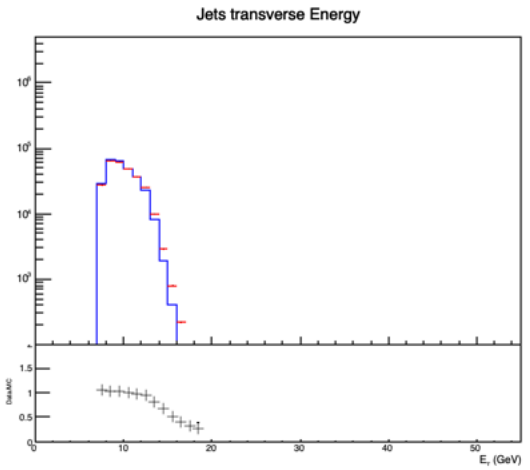
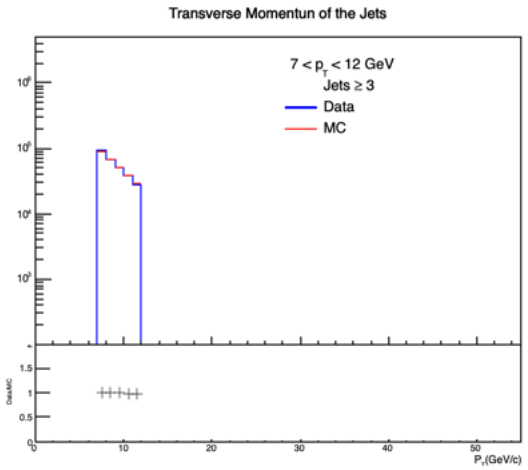
Jet Pt 2_2

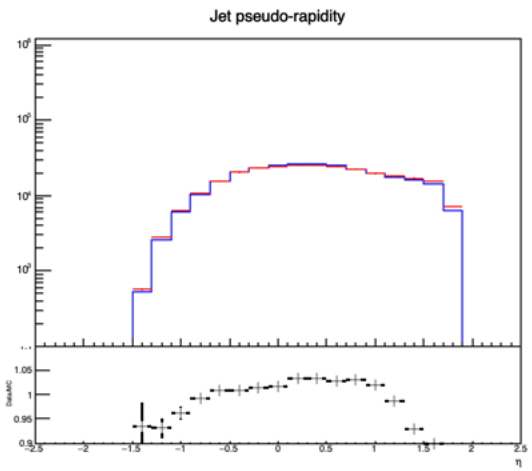
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

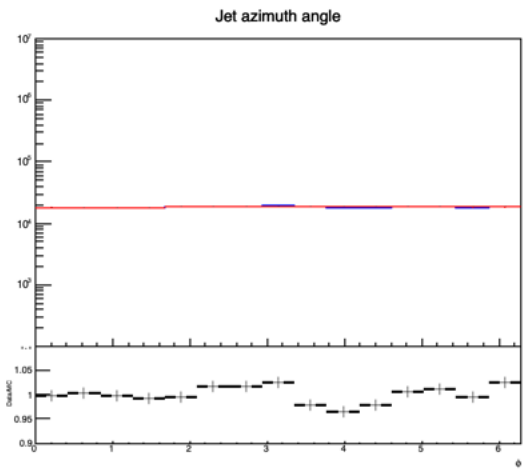
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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dPhi Pt 2_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

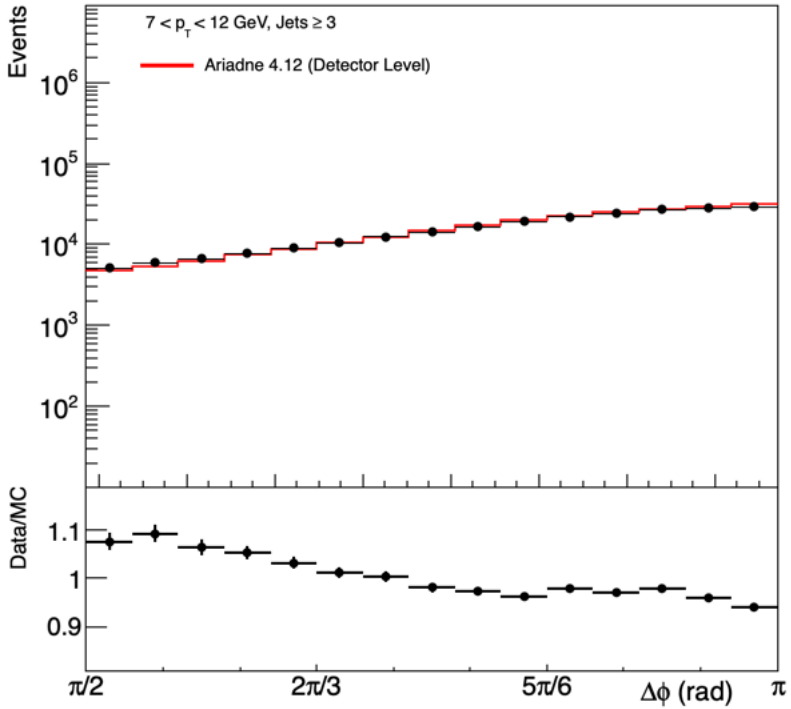
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Pt 3_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

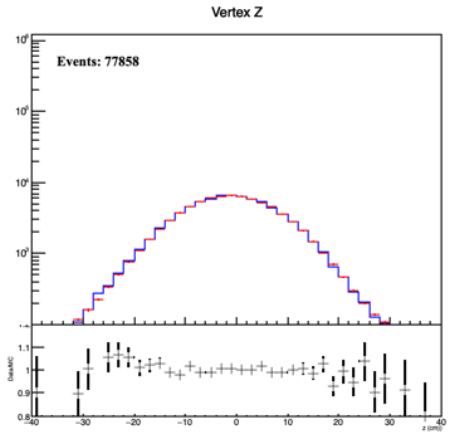
Jet multiplicity:

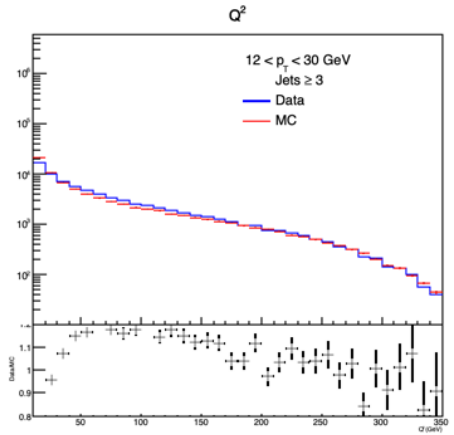
jets > 1

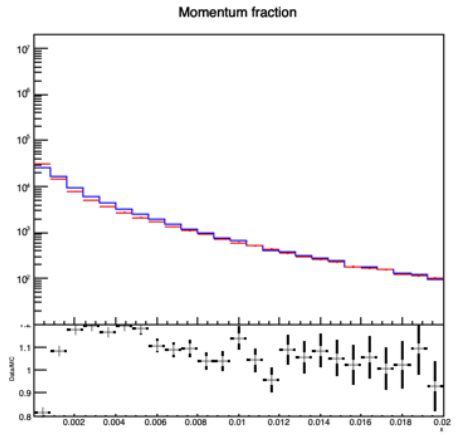
jets > 2

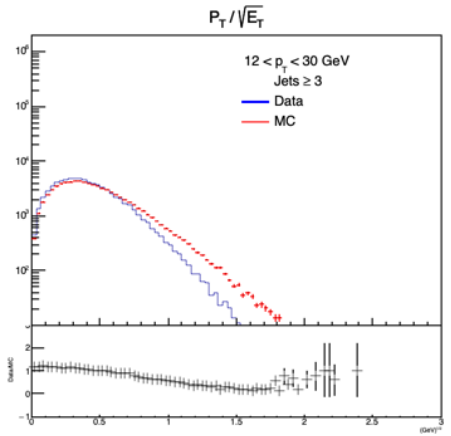
jets > 3

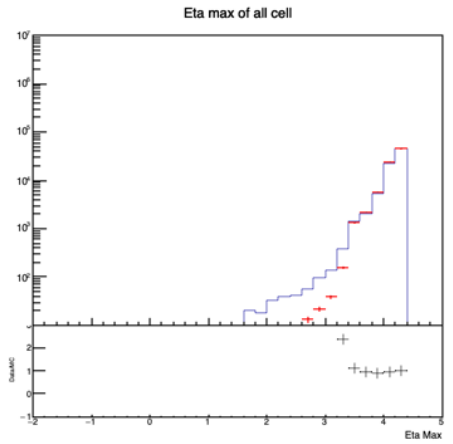
jets > 4

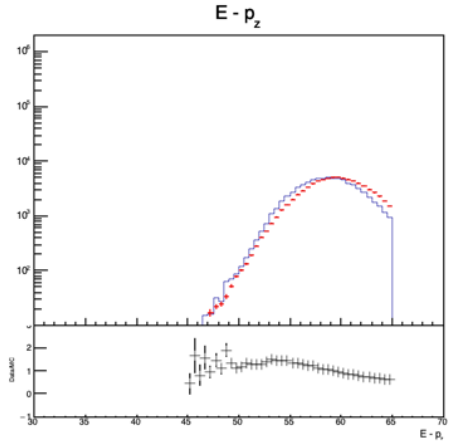












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Lepton Pt 3_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

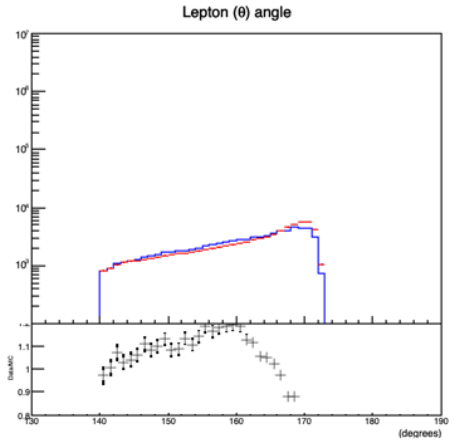
Jet multiplicity:

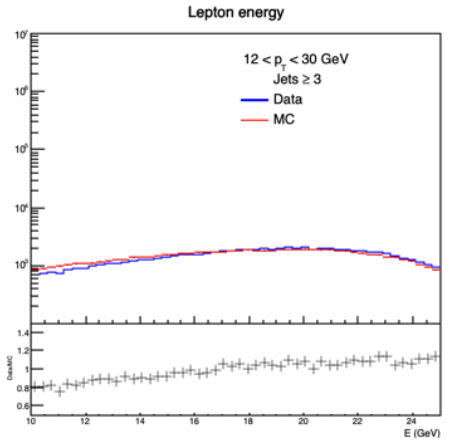
jets > 1

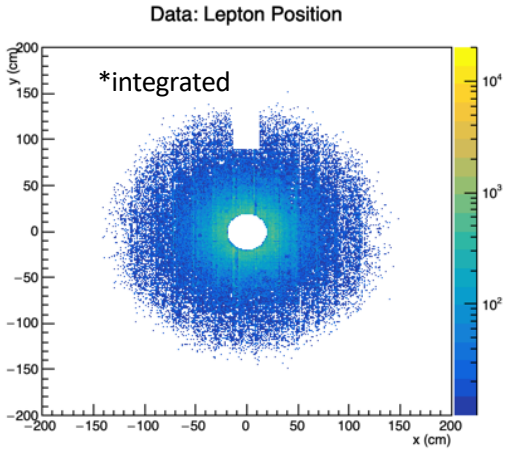
jets > 2

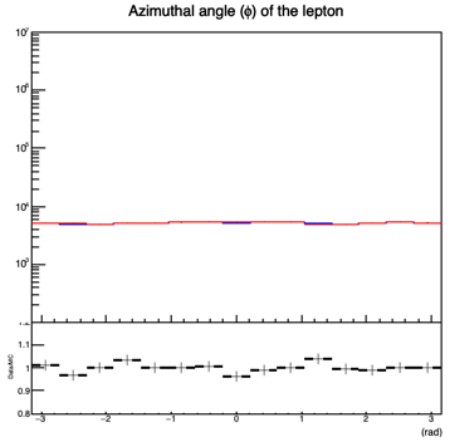
jets > 3

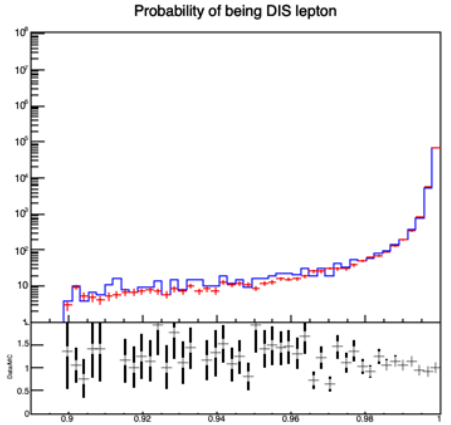
jets > 4

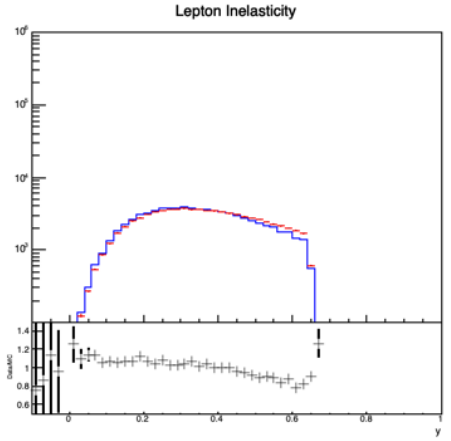












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

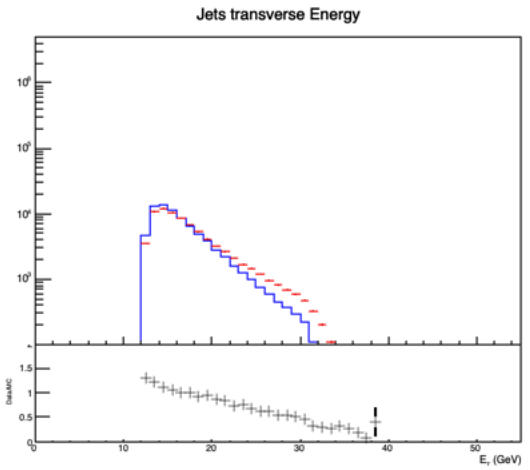
I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

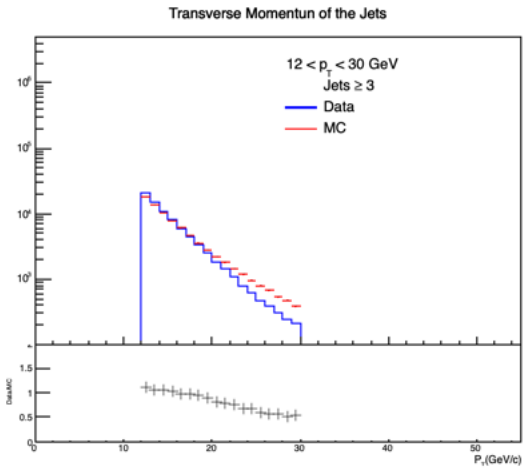
Jet Pt 3_2

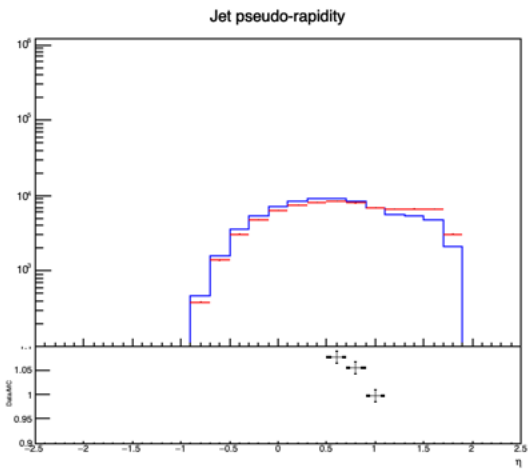
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

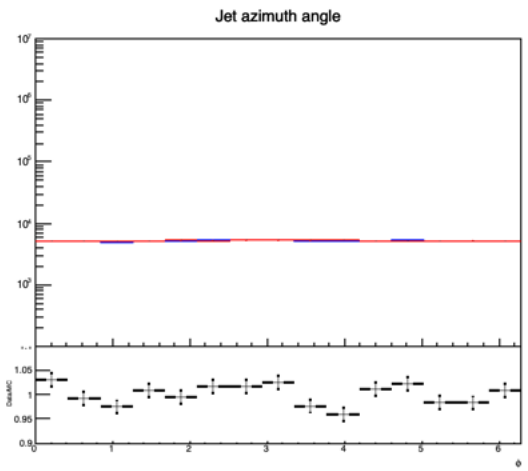
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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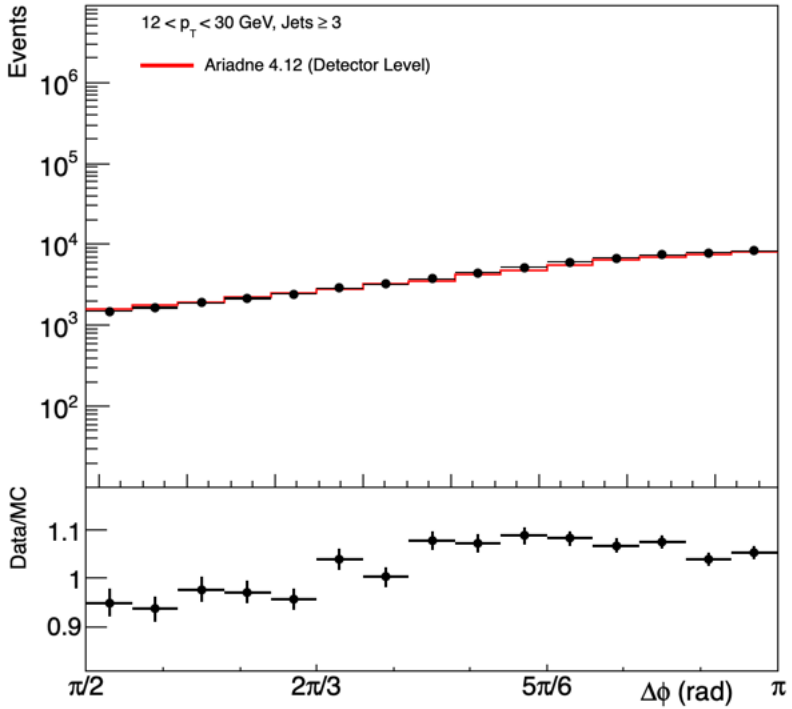
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 3_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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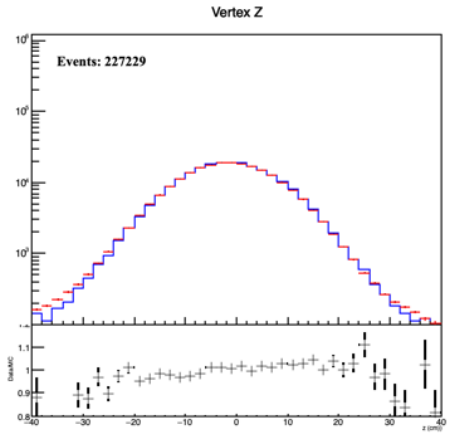
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

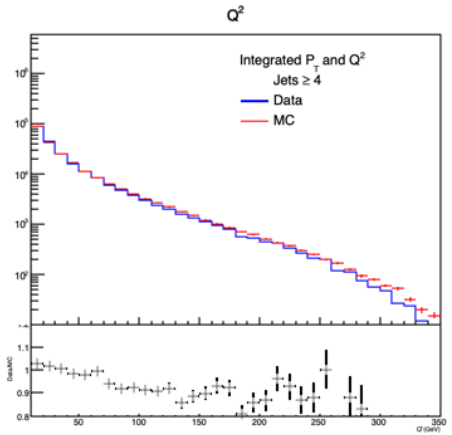
Event 0_3

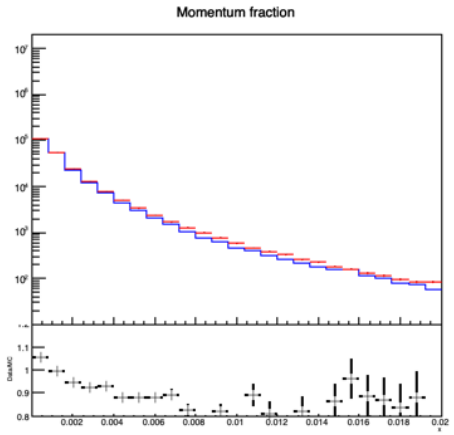
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

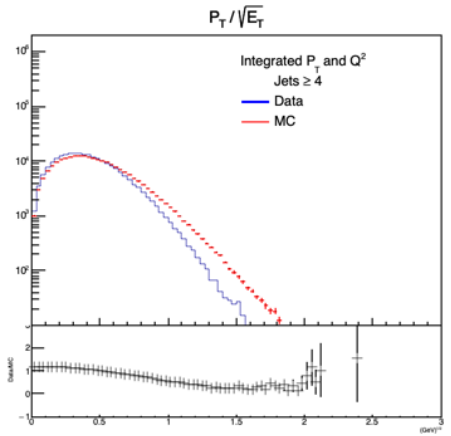
Jet multiplicity:

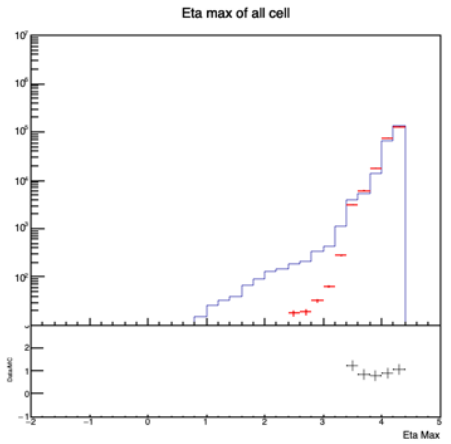
jets > 1
jets > 2
jets > 3
jets > 4

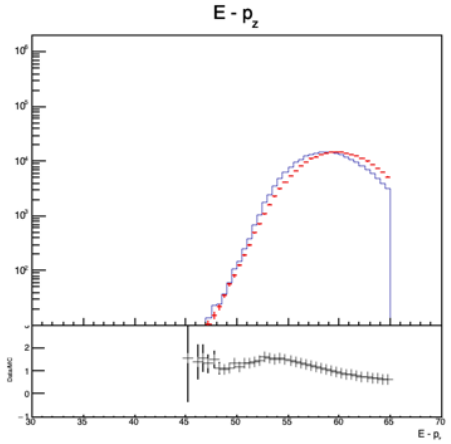












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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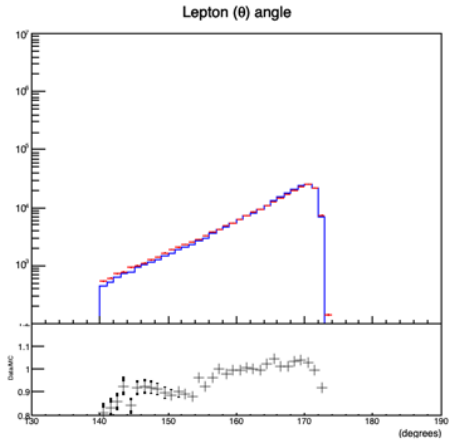
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

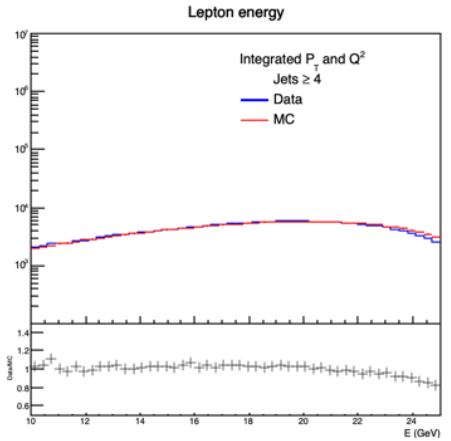
Lepton 0_3

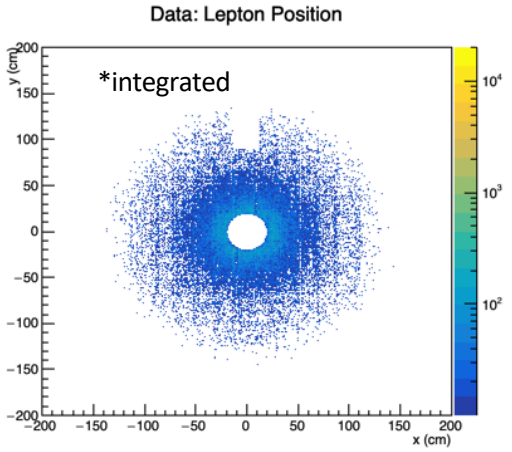
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

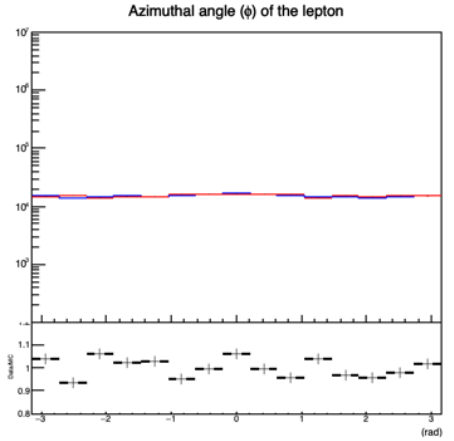
Jet multiplicity:

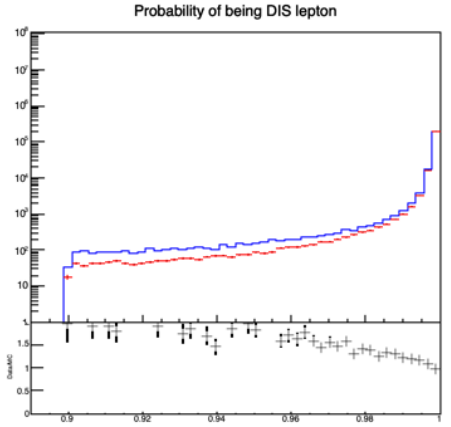
jets > 1
jets > 2
jets > 3
jets > 4

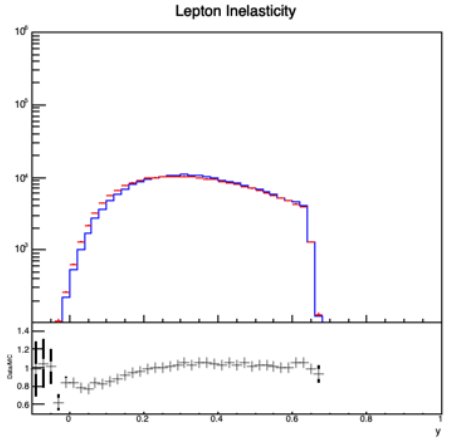












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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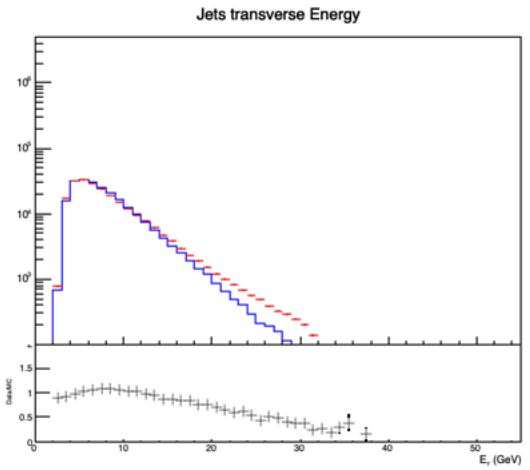
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

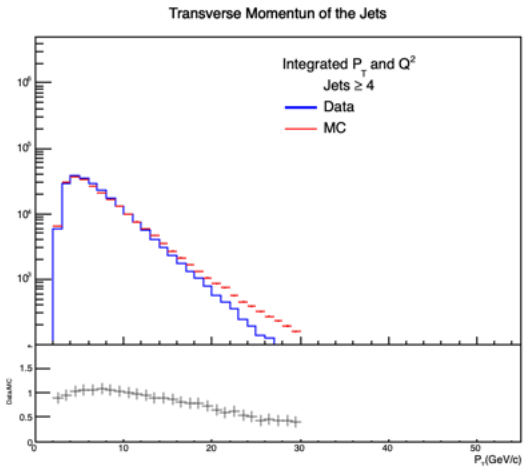
Jet 0_3

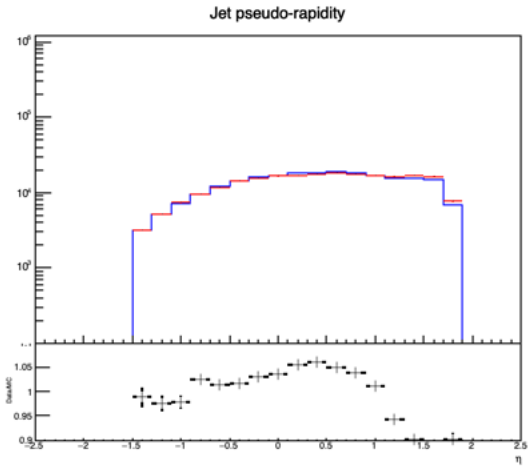
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

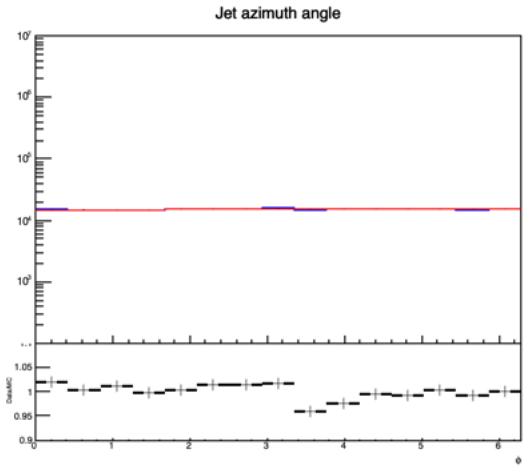
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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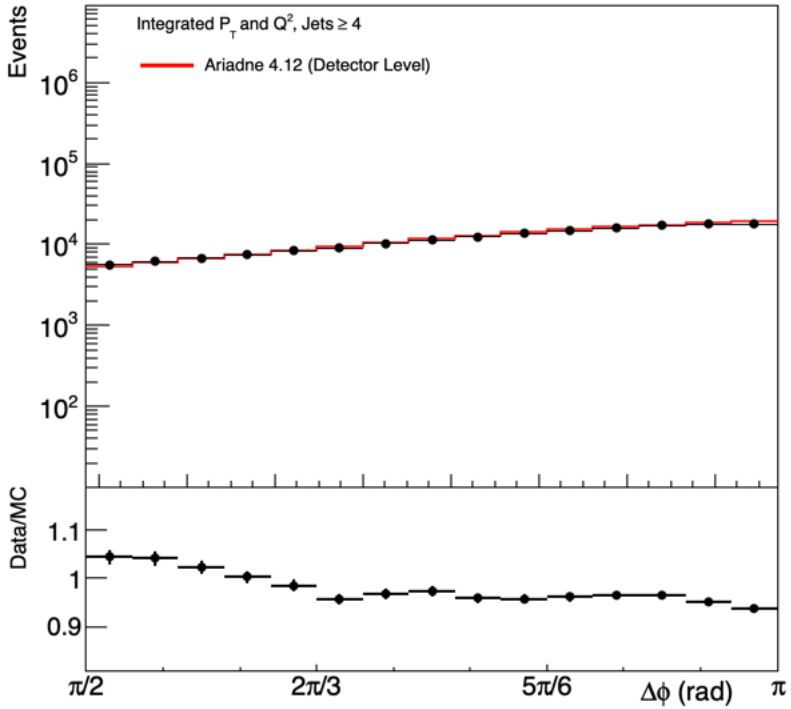
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi 0_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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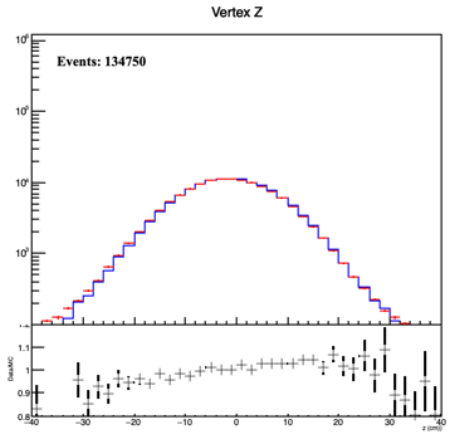
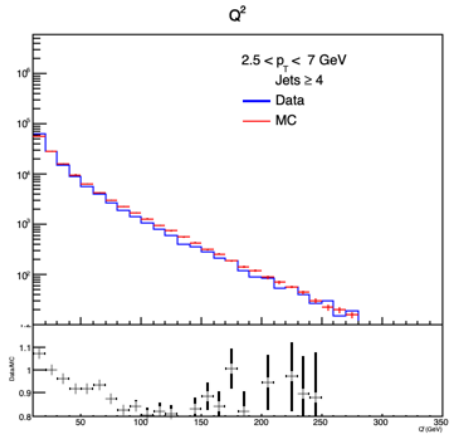
Event Pt 1_3

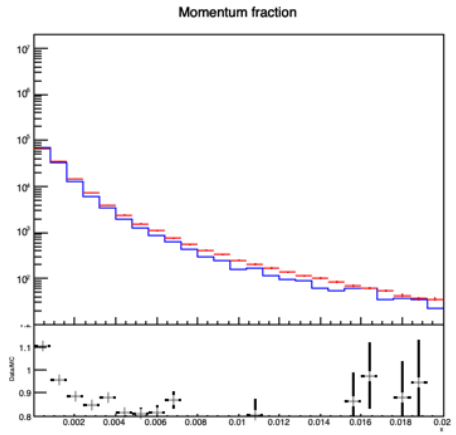
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

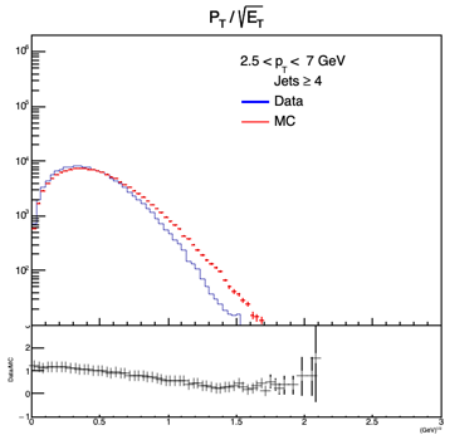
Jet multiplicity:

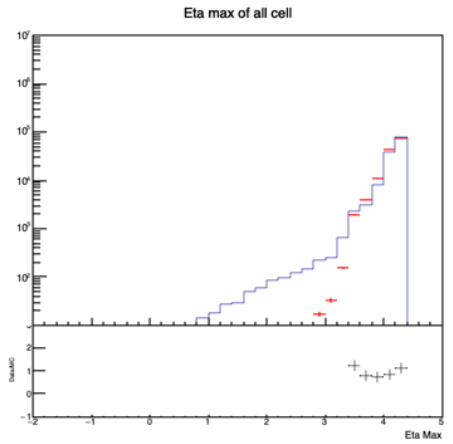
jets > 1
jets > 2
jets > 3
jets > 4

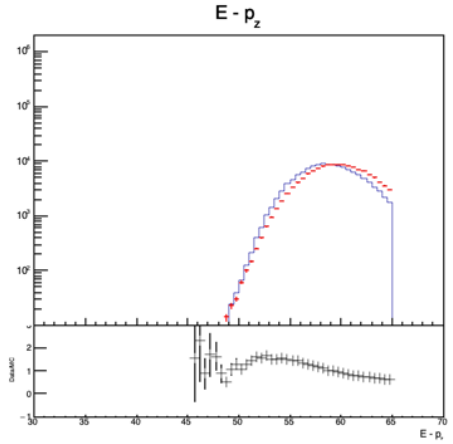












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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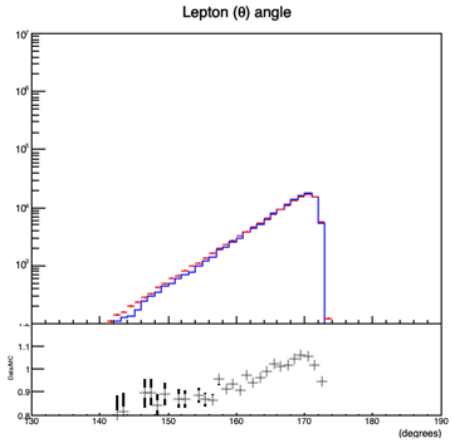
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

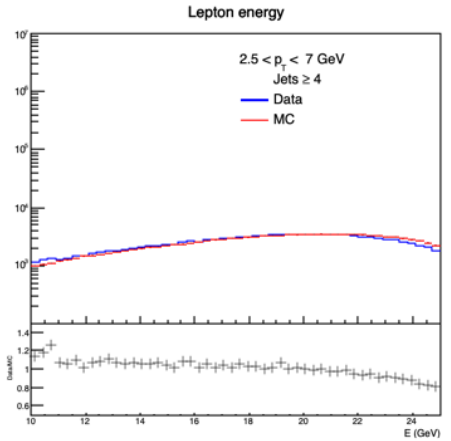
Lepton Pt 1_3

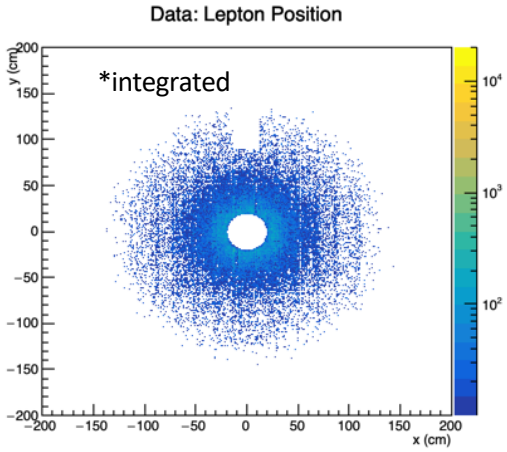
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

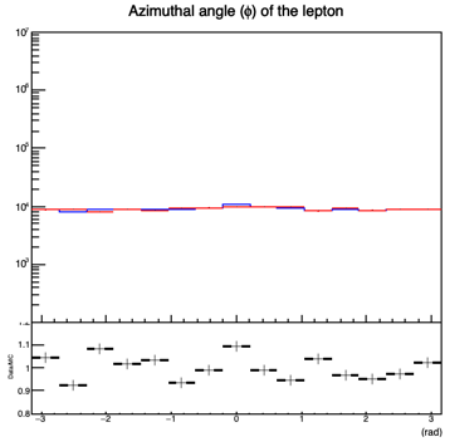
Jet multiplicity:

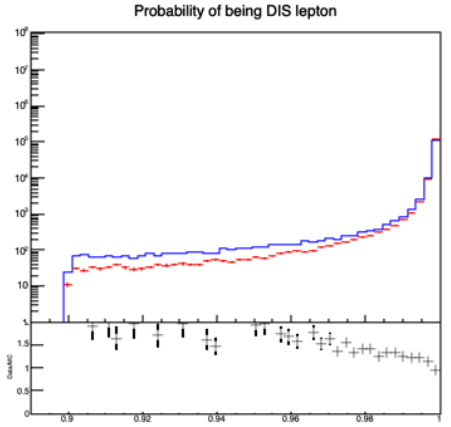
jets > 1
jets > 2
jets > 3
jets > 4

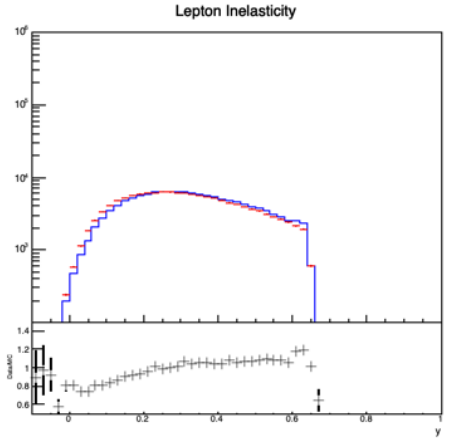












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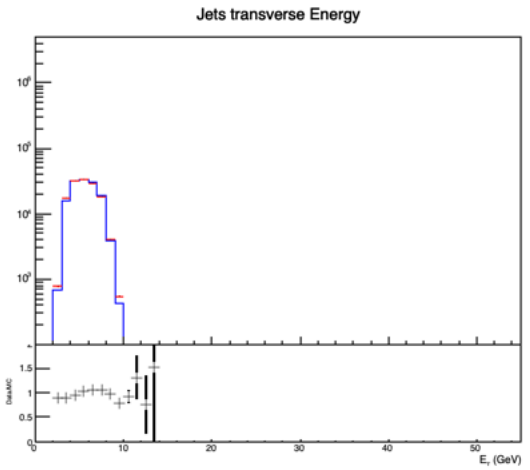
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

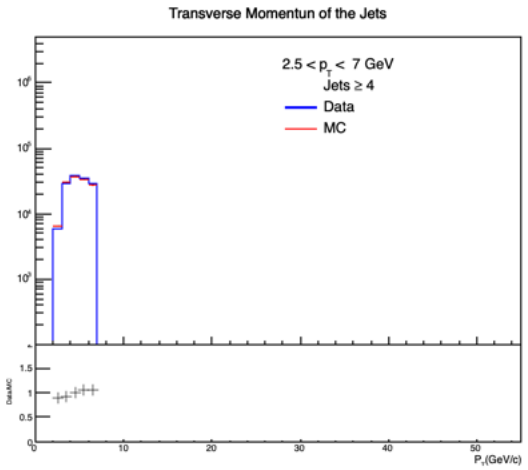
Jet Pt 1_3

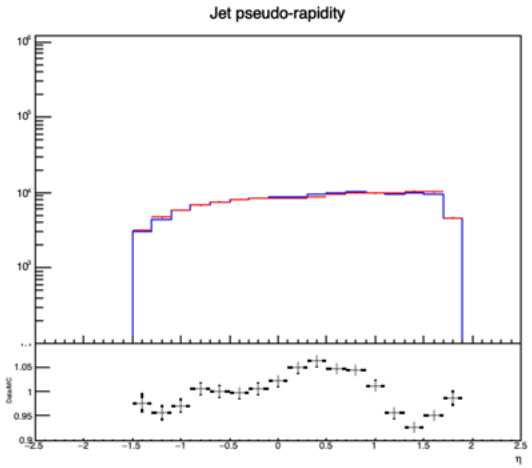
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

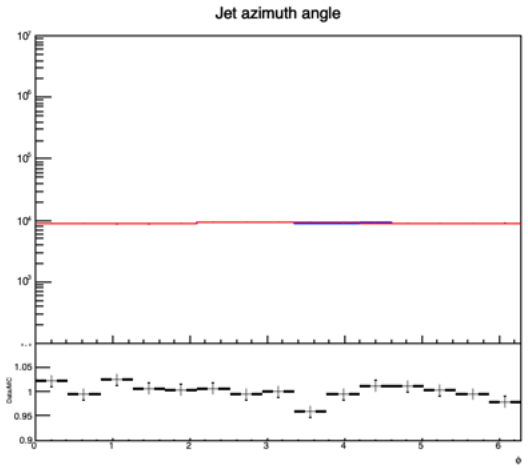
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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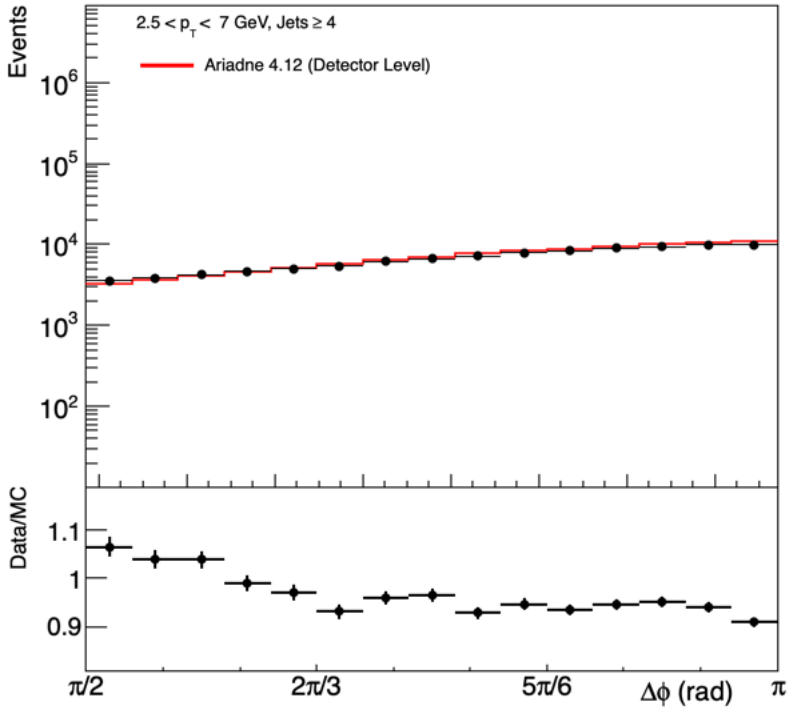
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 1_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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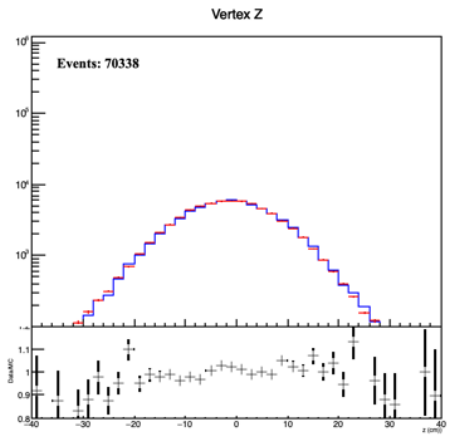
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

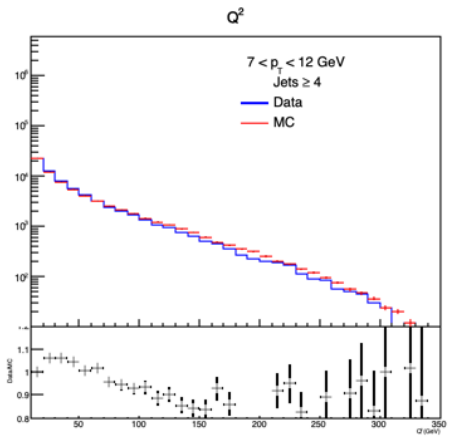
Event Pt 2_3

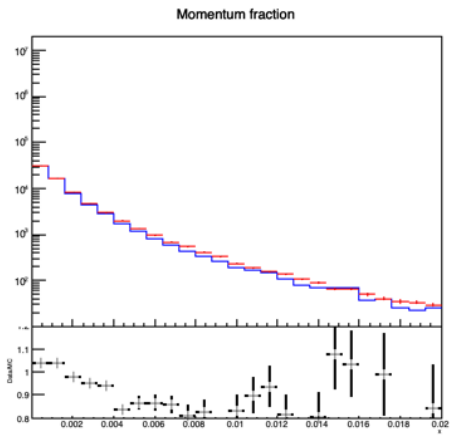
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

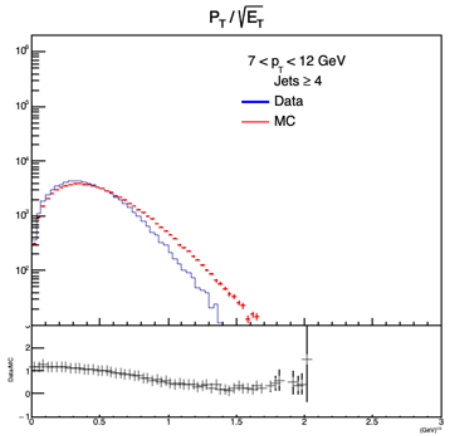
Jet multiplicity:

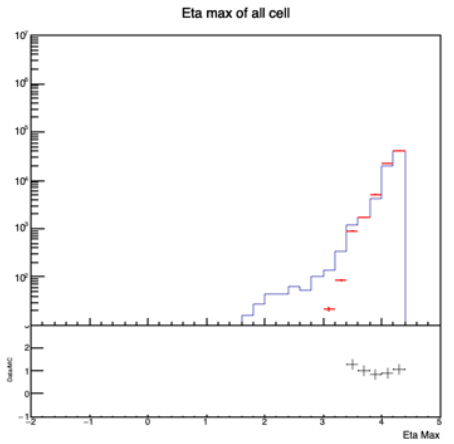
jets > 1
jets > 2
jets > 3
jets > 4

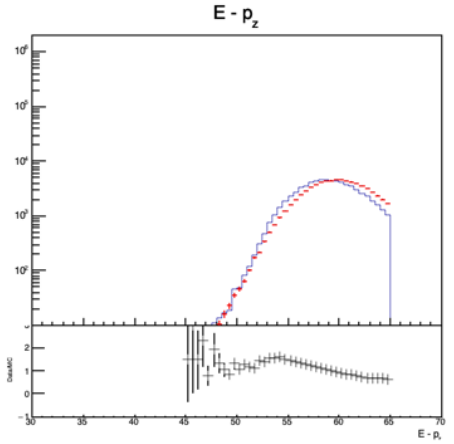












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Pt 2_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

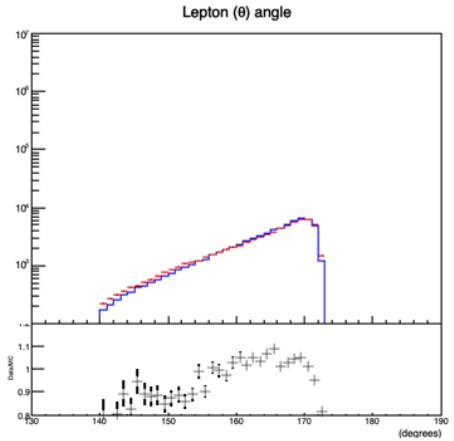
Jet multiplicity:

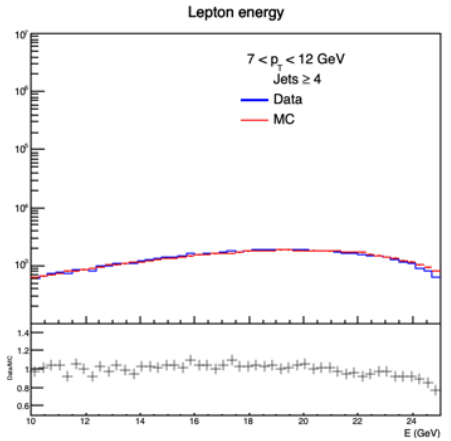
jets > 1

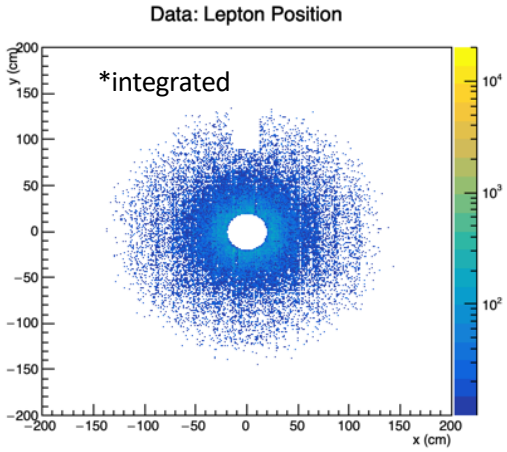
jets > 2

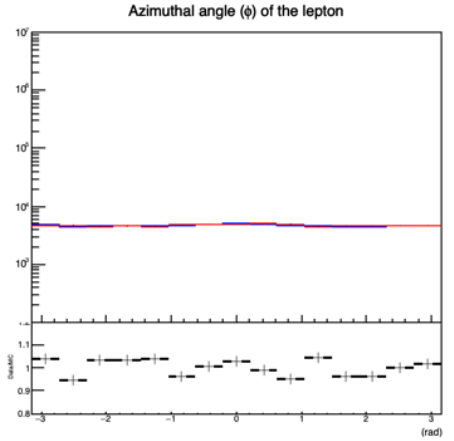
jets > 3

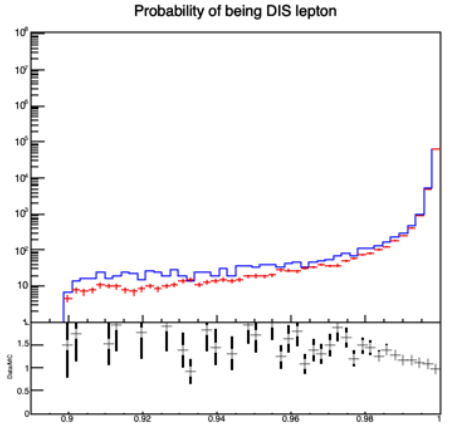
jets > 4

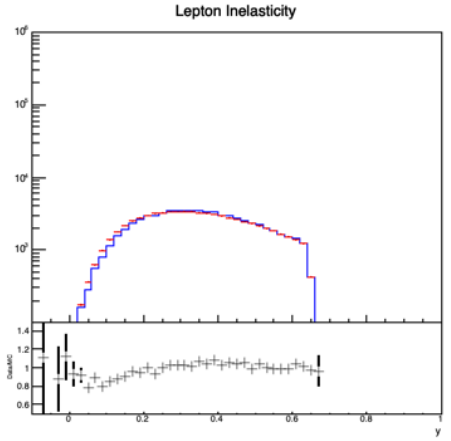












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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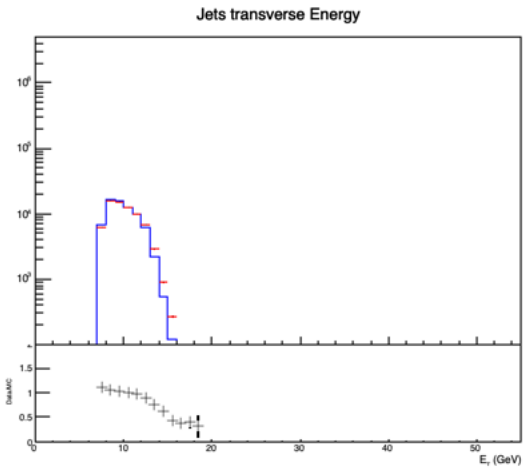
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

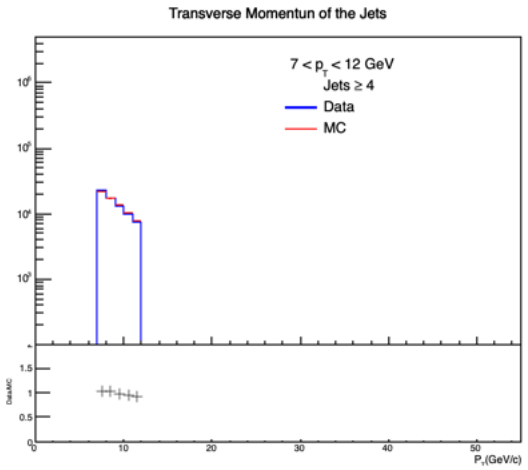
Jet Pt 2_3

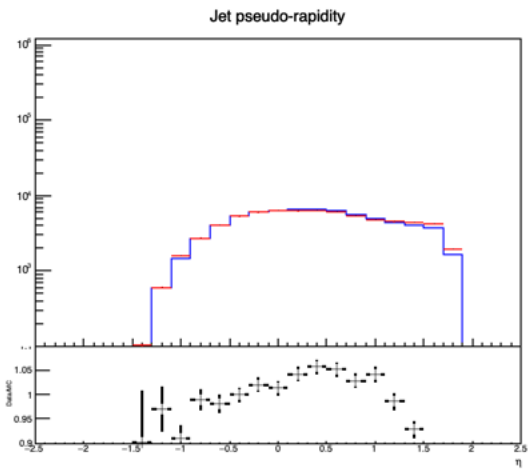
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

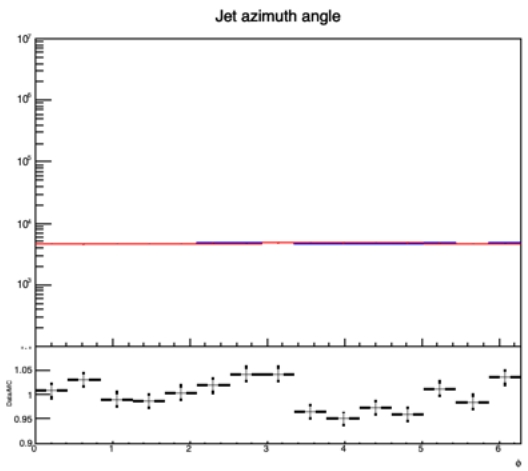
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 2_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
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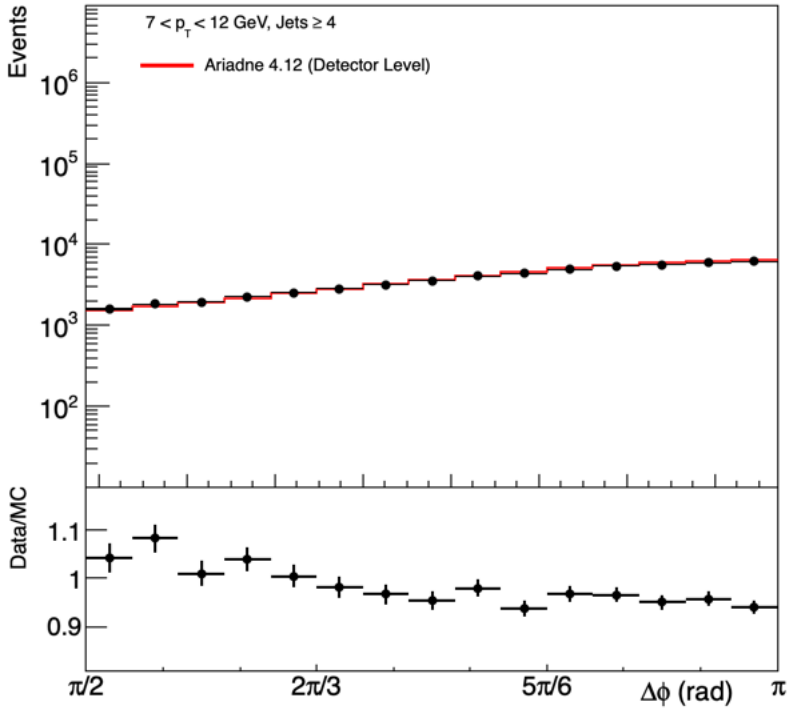

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Event Pt 3_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

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jets > 2
jets > 3
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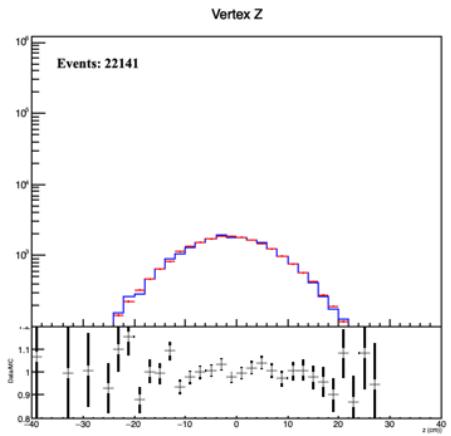

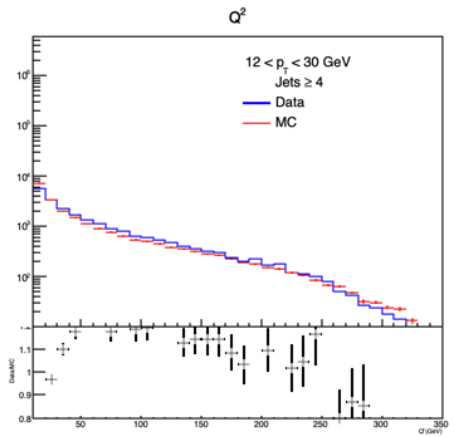

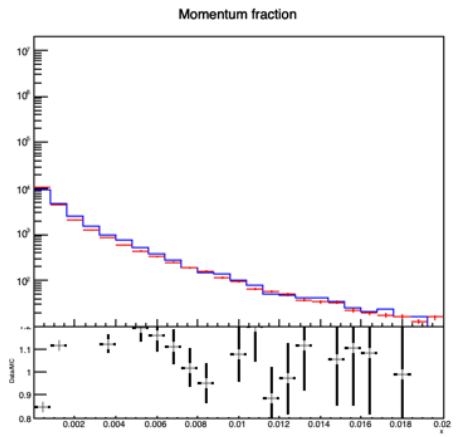

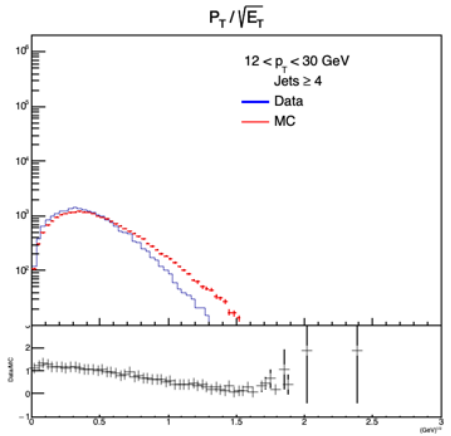

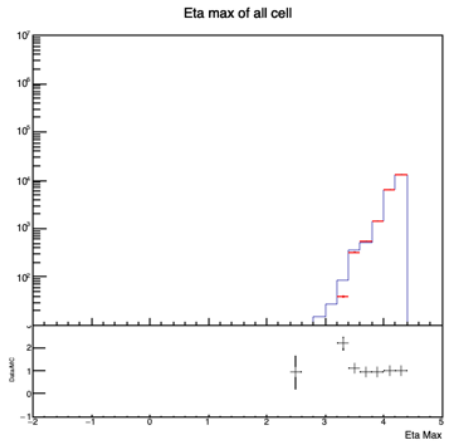

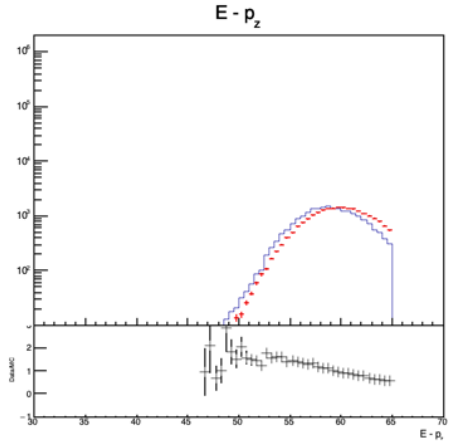

Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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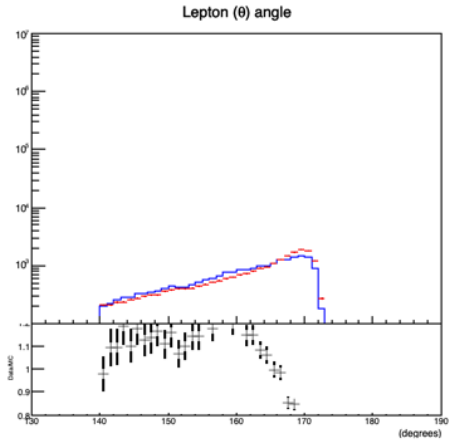
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

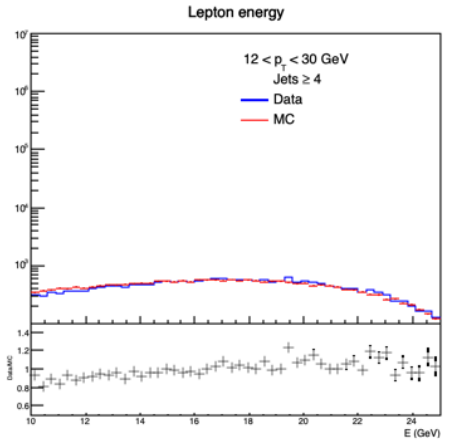
Lepton Pt 3_3

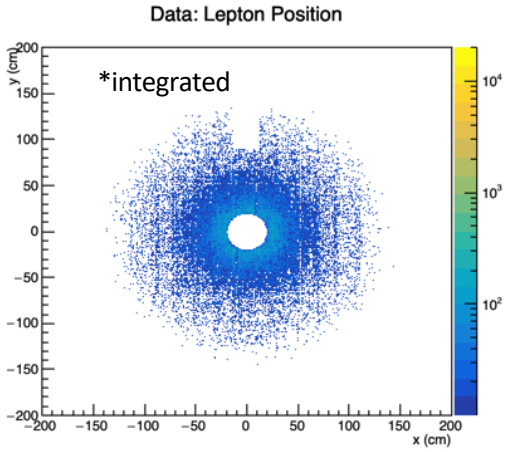
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

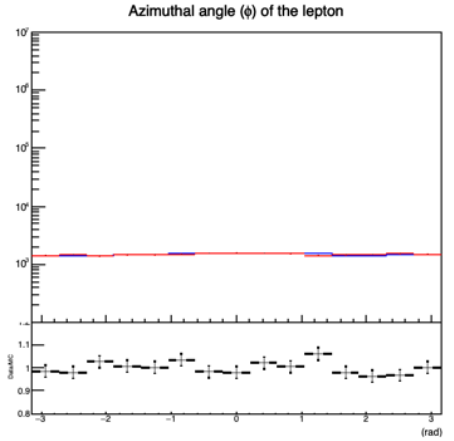
Jet multiplicity:

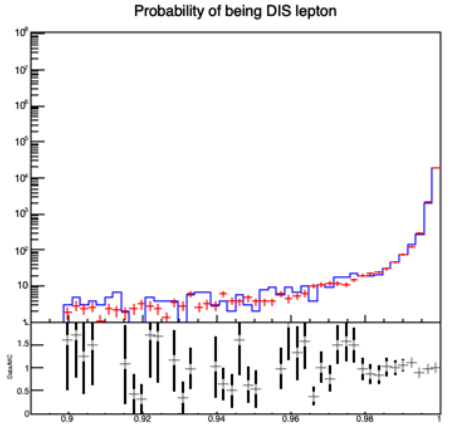
jets > 1
jets > 2
jets > 3
jets > 4

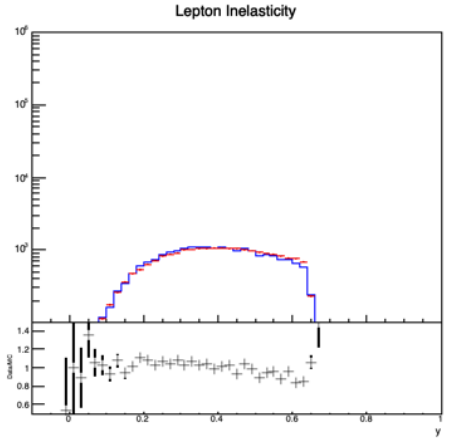












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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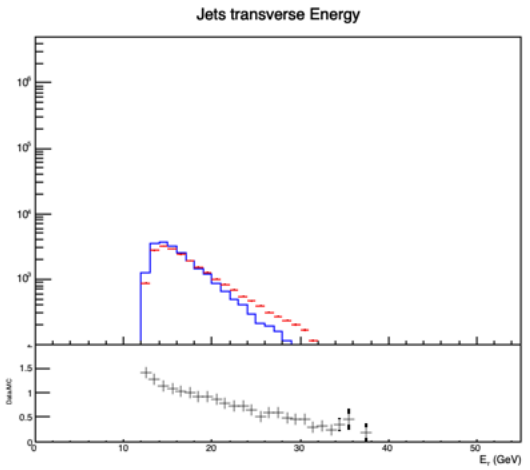
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

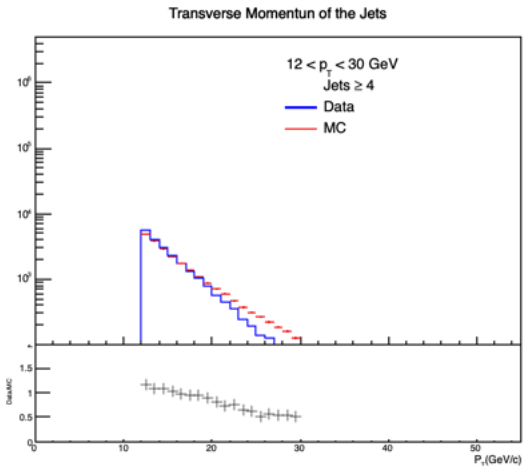
Jet Pt 3_3

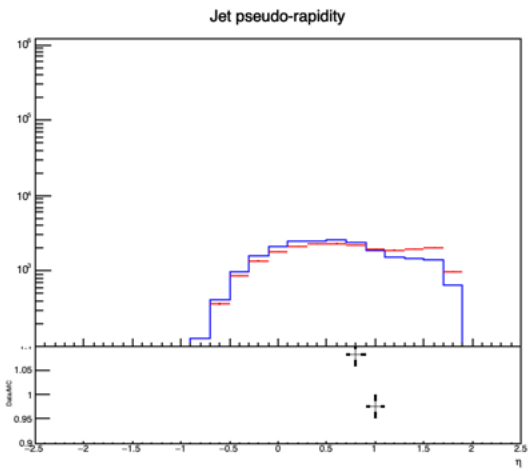
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

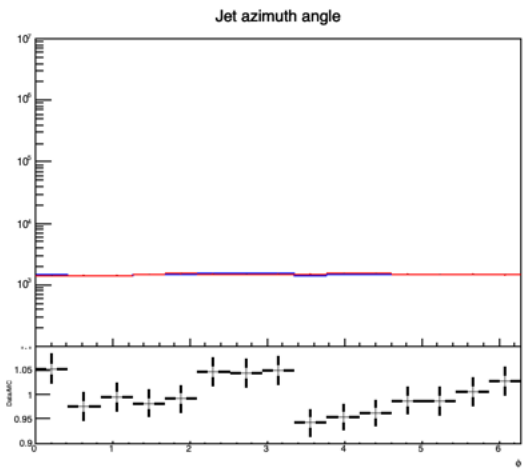
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Pt 3_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
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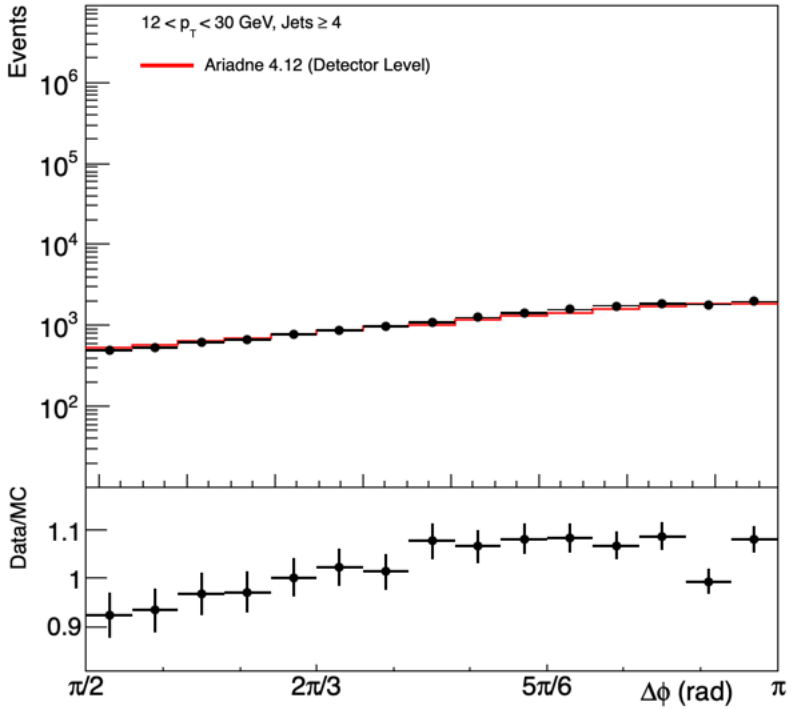

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Event Q2 1-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

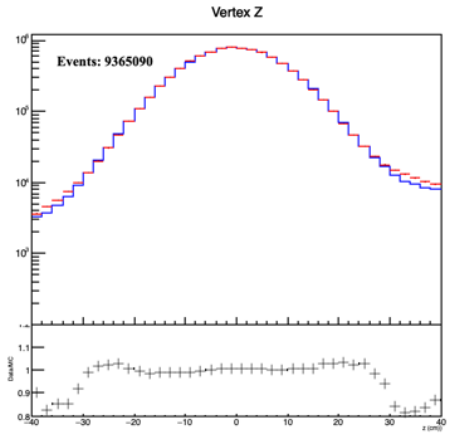
Jet multiplicity:

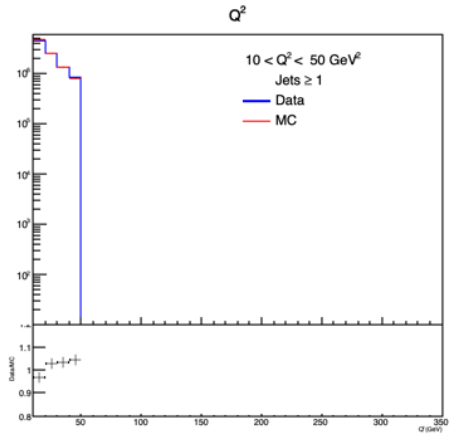
jets > 1

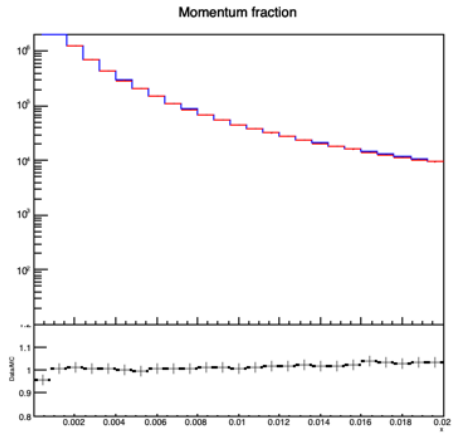
jets > 2

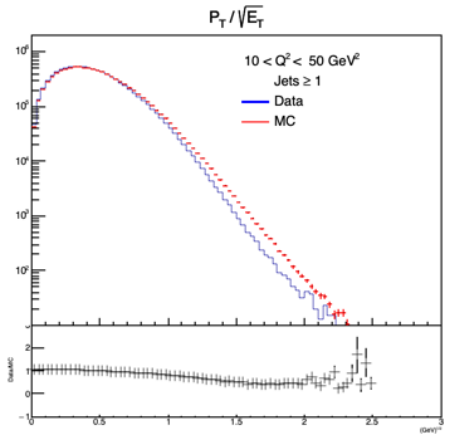
jets > 3

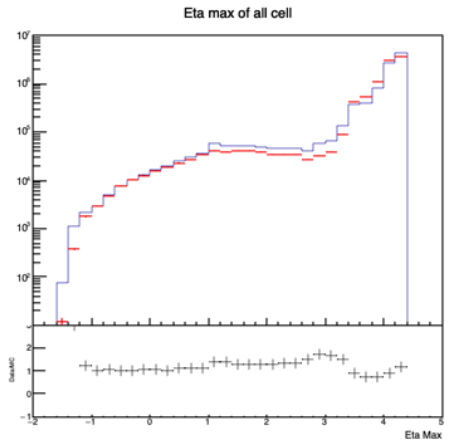
jets > 4

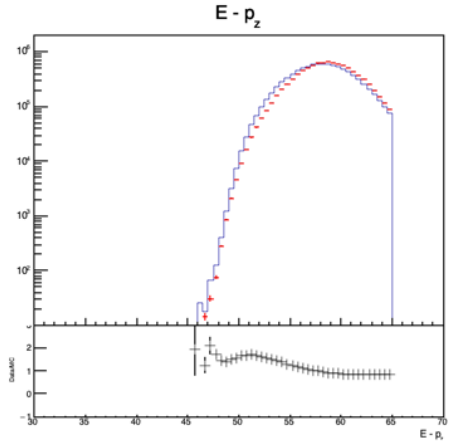












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Lepton Q2 1_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

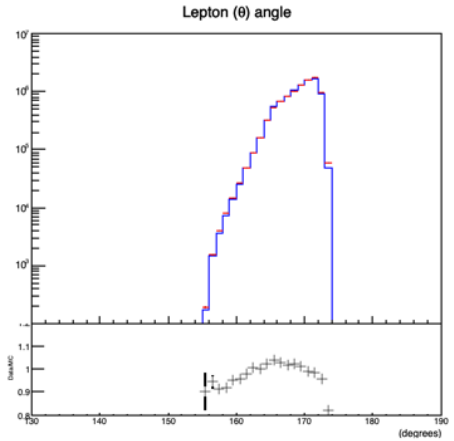
Jet multiplicity:

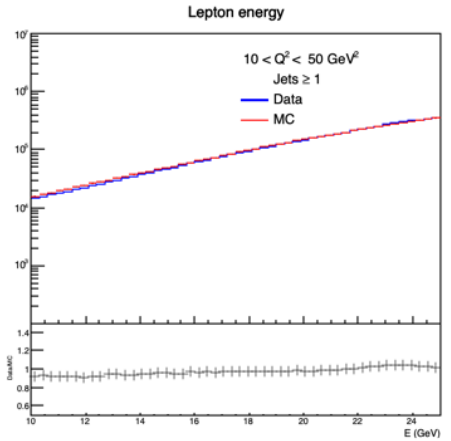
jets > 1

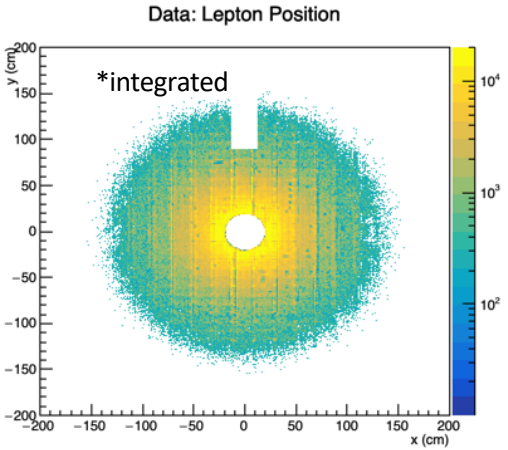
jets > 2

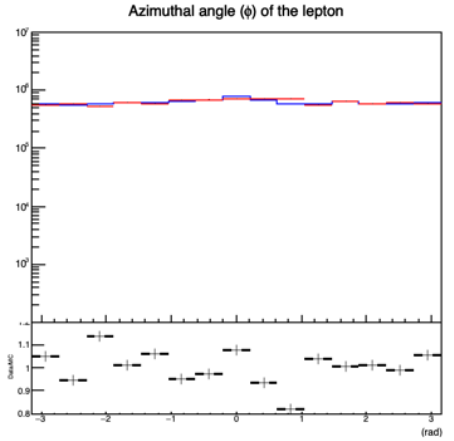
jets > 3

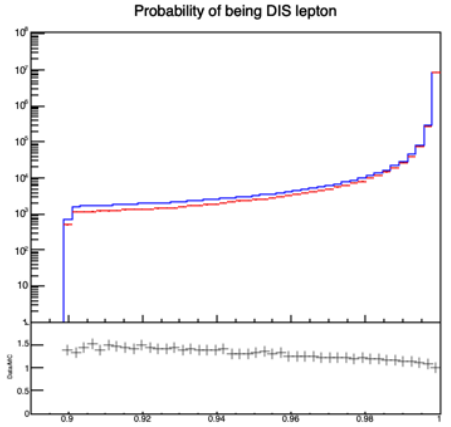
jets > 4

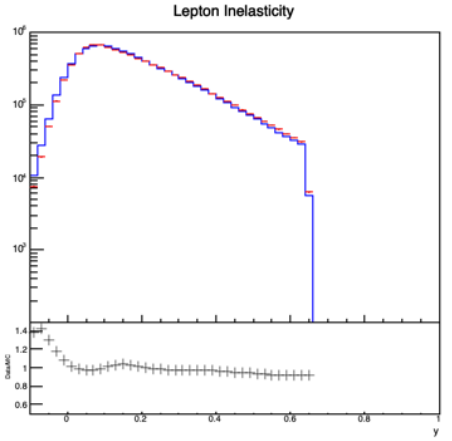












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Jet Q2 1_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

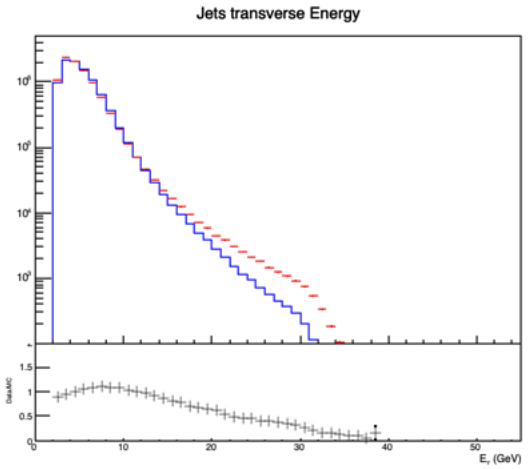
Jet multiplicity:

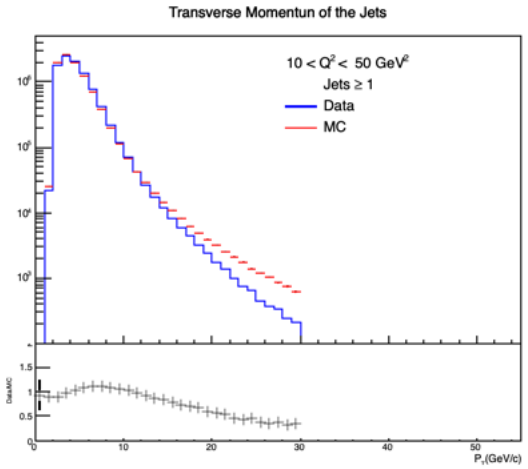
jets > 1

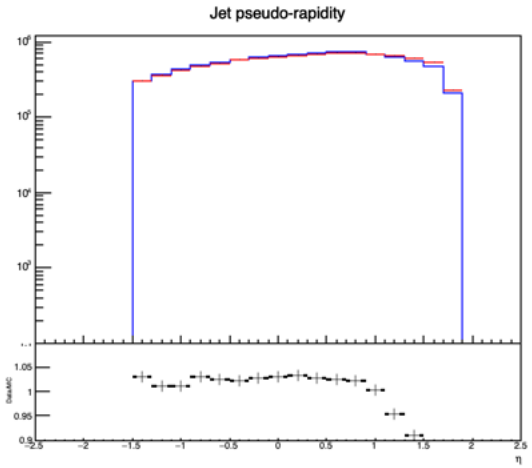
jets > 2

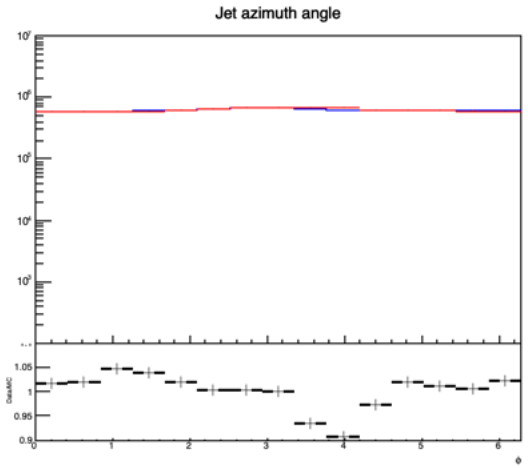
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 1_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

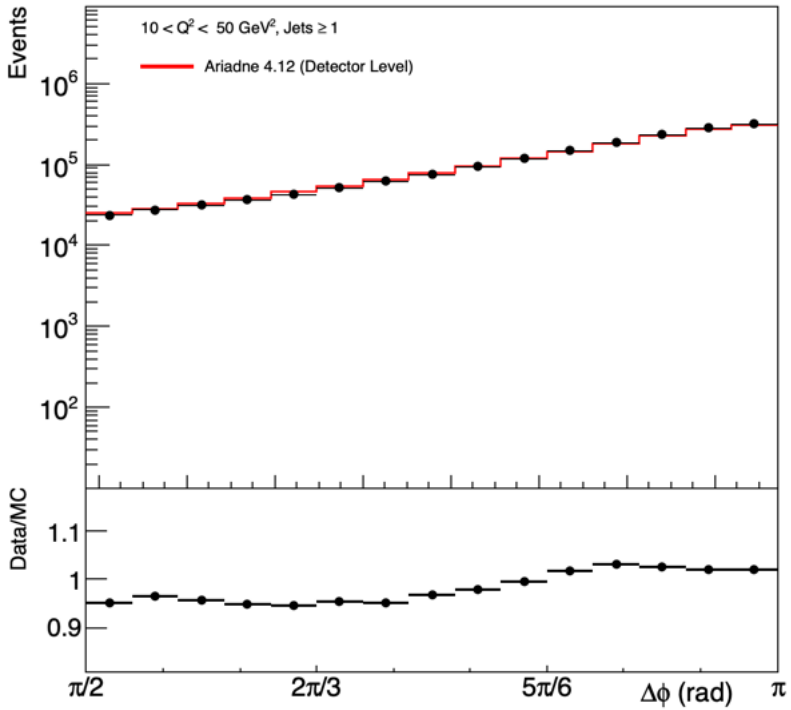
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Q2 2-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

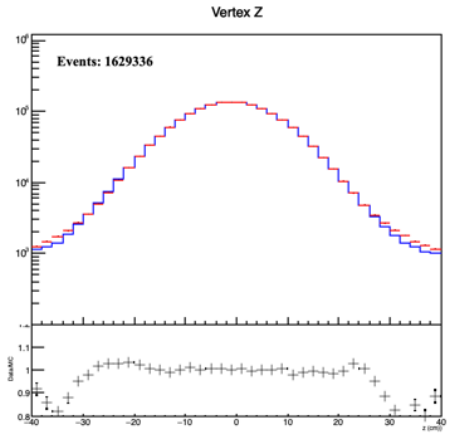
Jet multiplicity:

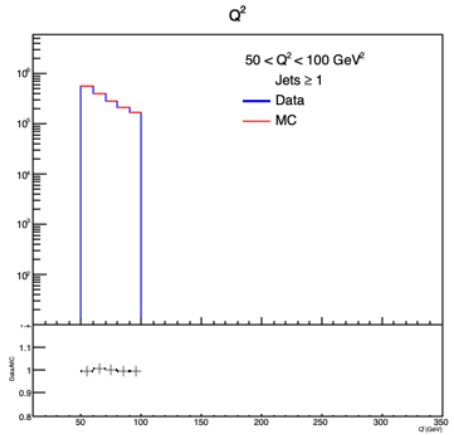
jets > 1

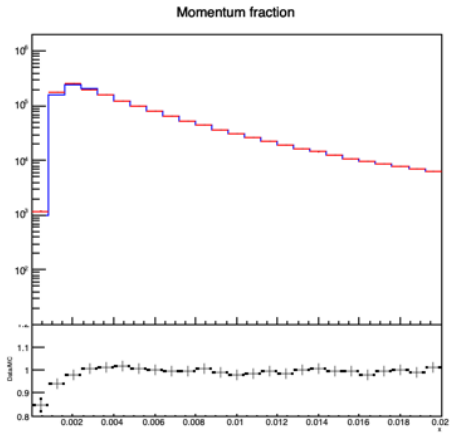
jets > 2

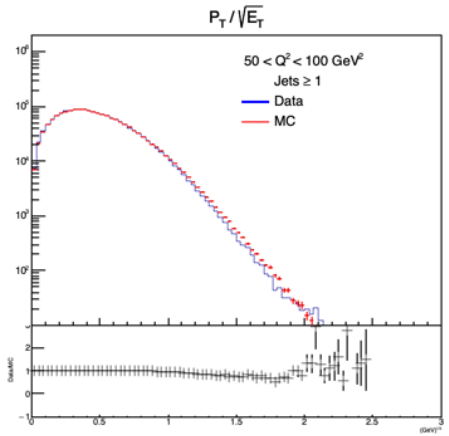
jets > 3

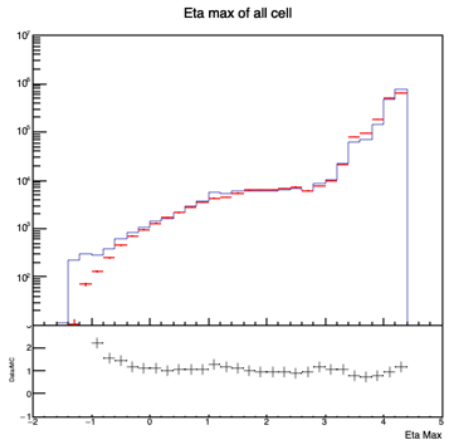
jets > 4

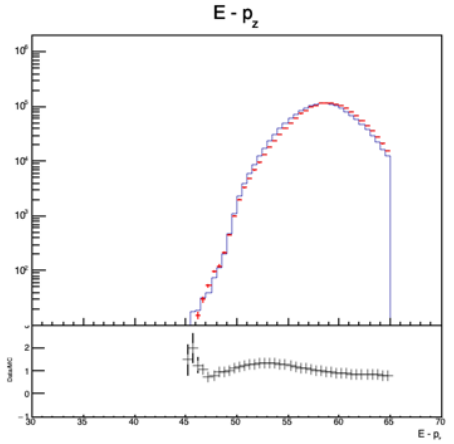












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Q2 2_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

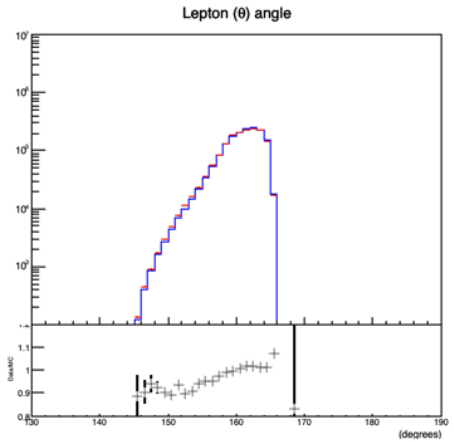
Jet multiplicity:

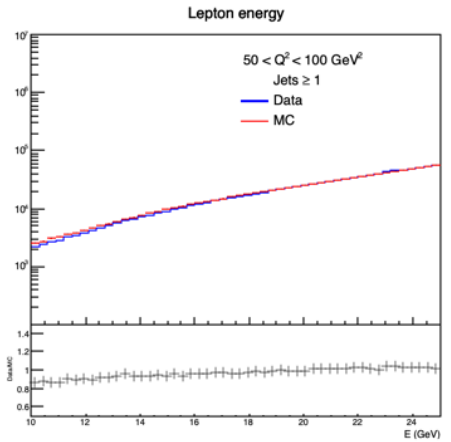
jets > 1

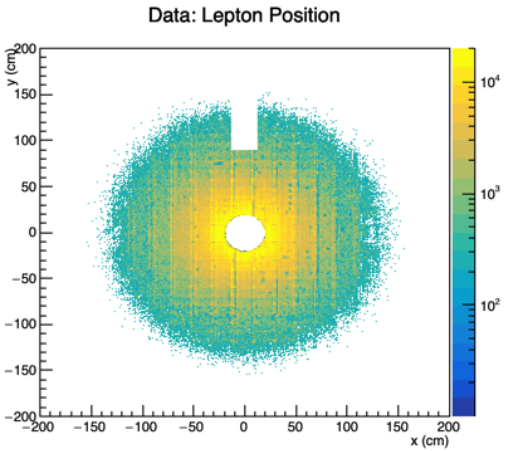
jets > 2

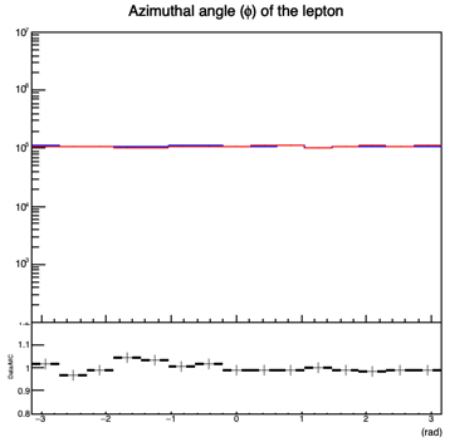
jets > 3

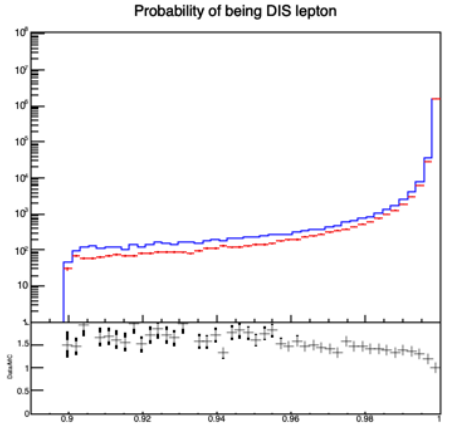
jets > 4

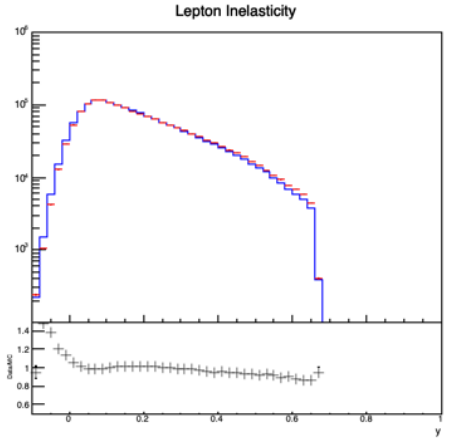












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Q2 2_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

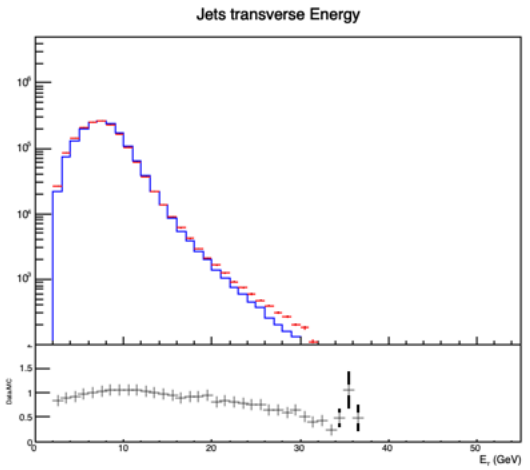
Jet multiplicity:

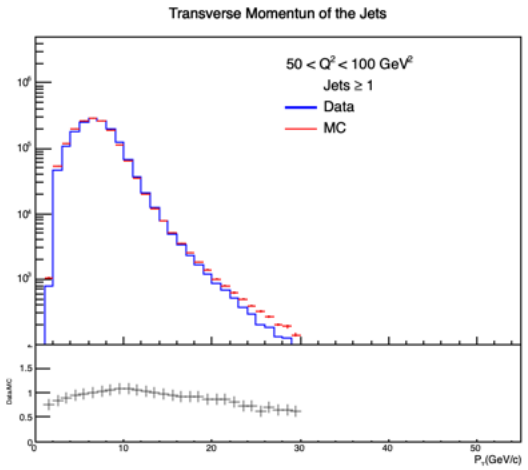
jets > 1

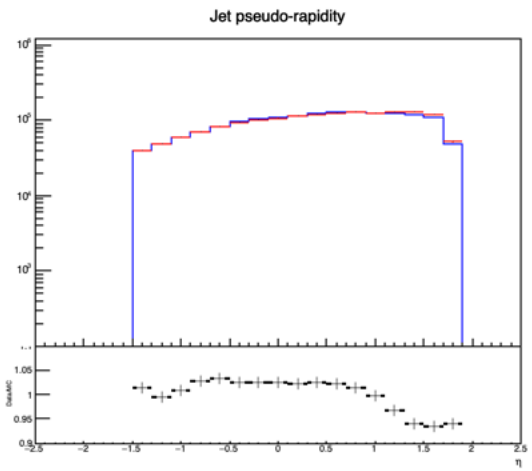
jets > 2

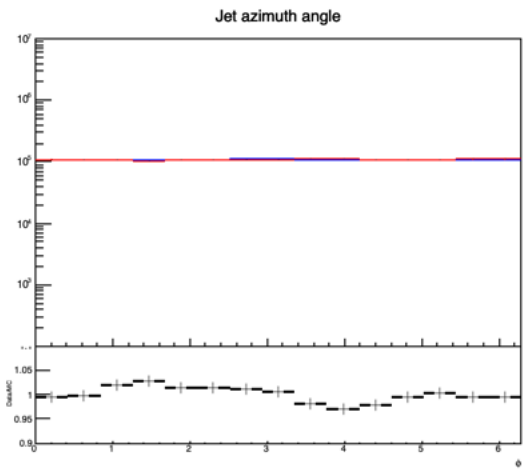
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 2_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

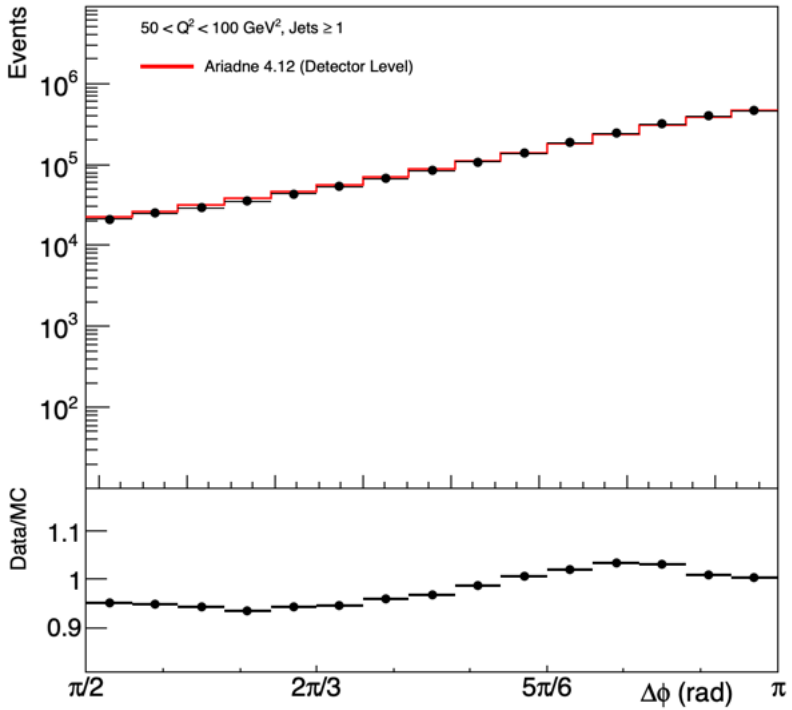
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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Event Q2 3-0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

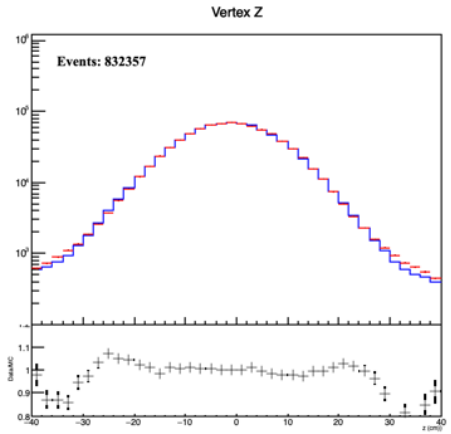
Jet multiplicity:

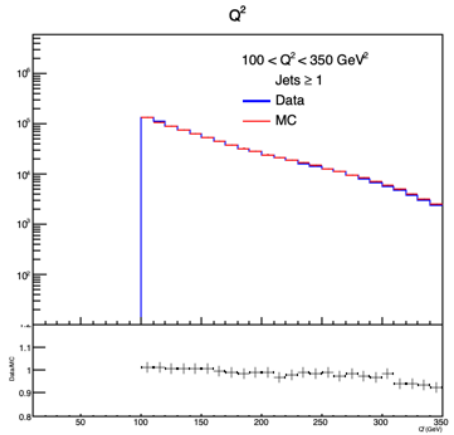
jets > 1

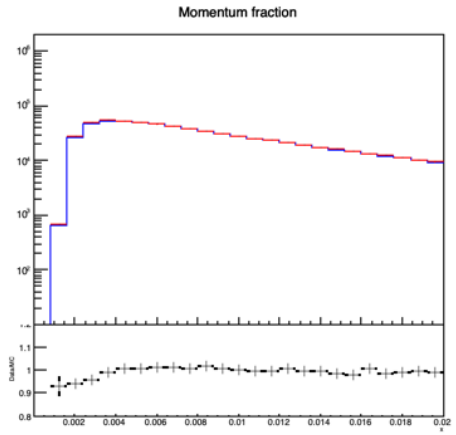
jets > 2

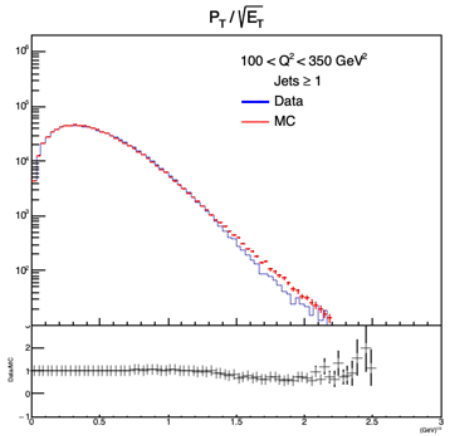
jets > 3

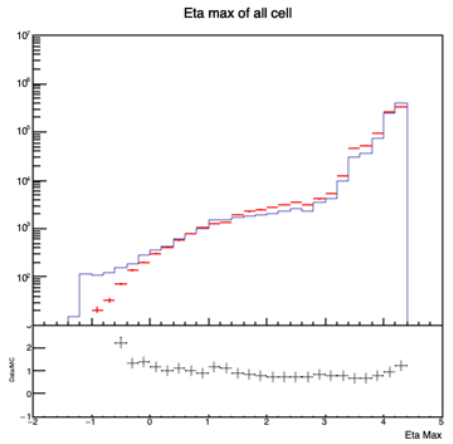
jets > 4

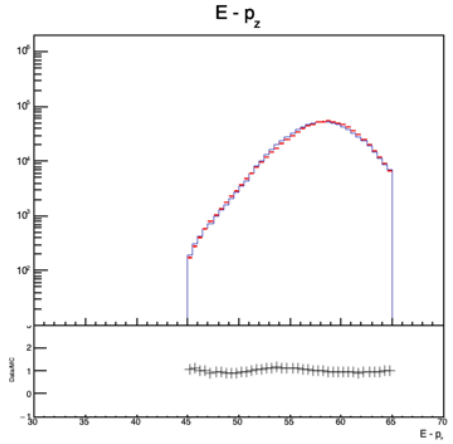












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Q2 3_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

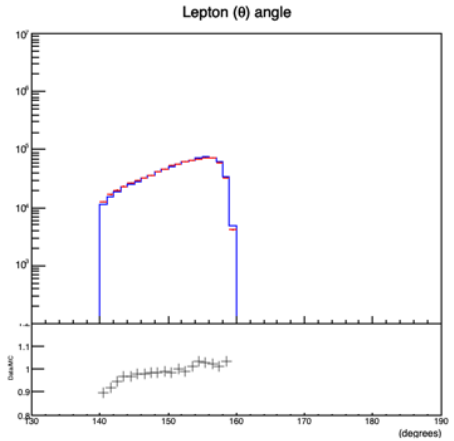
Jet multiplicity:

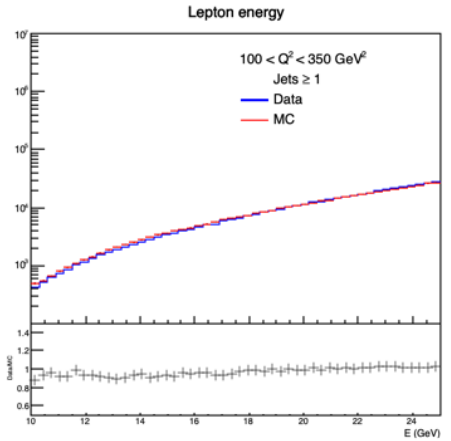
jets > 1

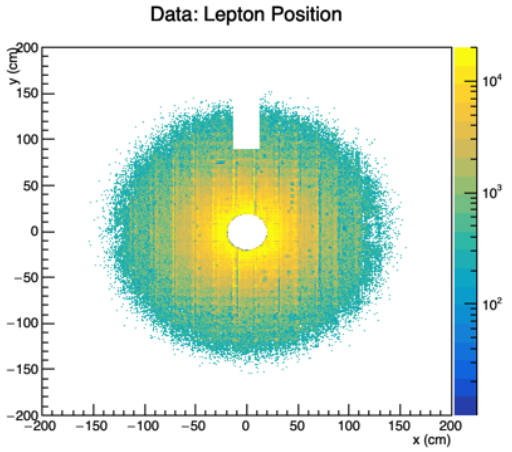
jets > 2

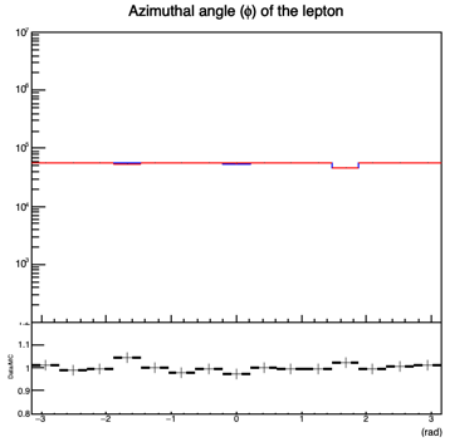
jets > 3

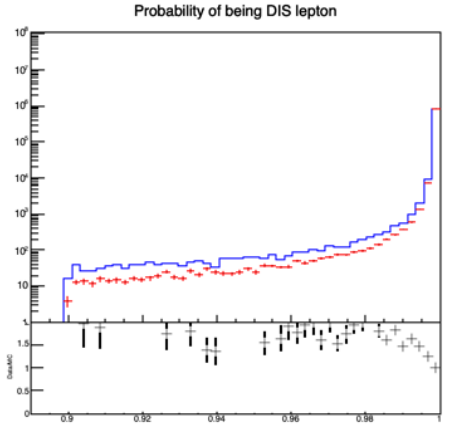
jets > 4

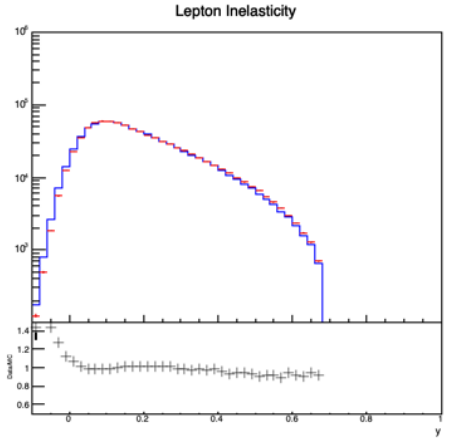












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Q2 3_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

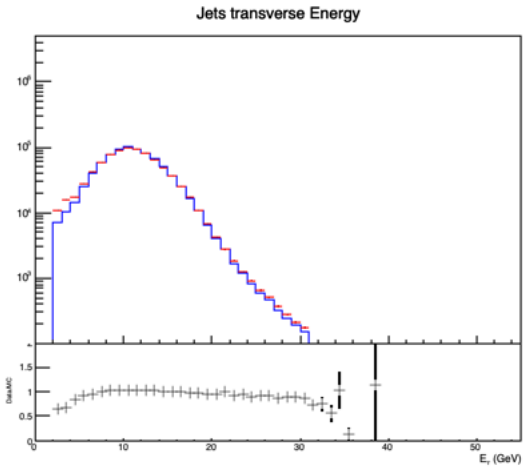
Jet multiplicity:

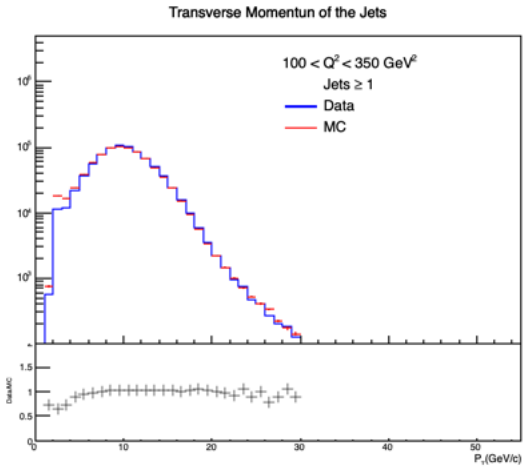
jets > 1

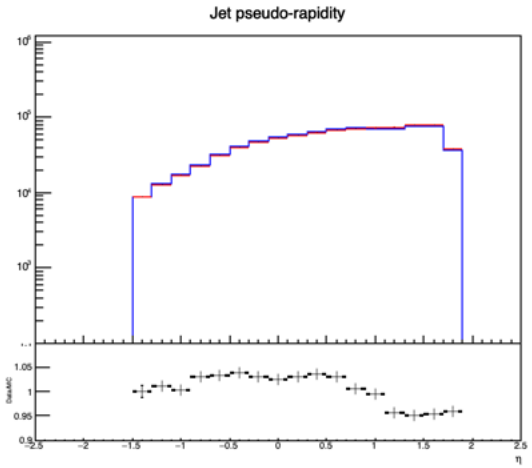
jets > 2

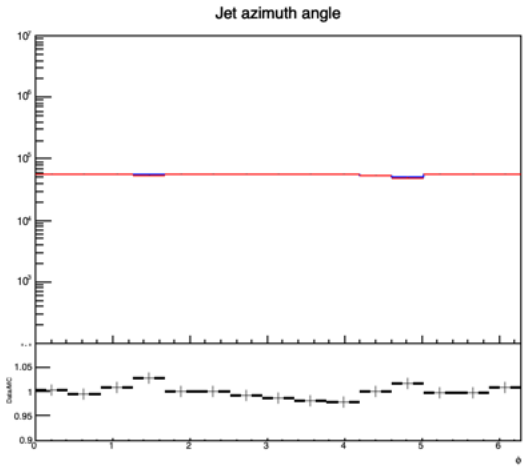
jets > 3

jets > 4









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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 3_0

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

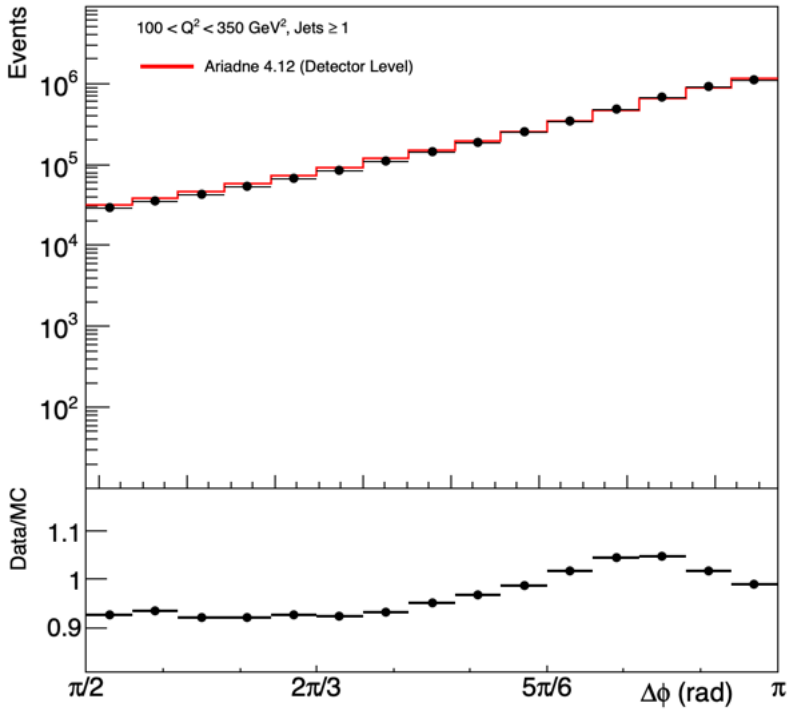
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Q2 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

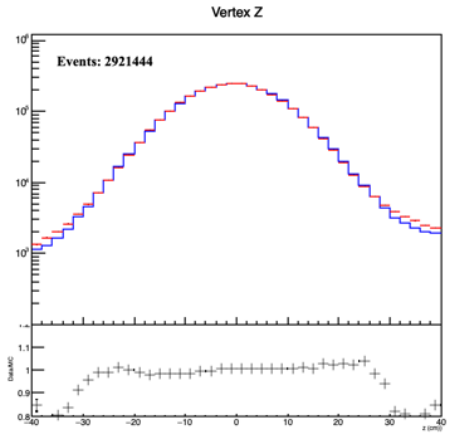
Jet multiplicity:

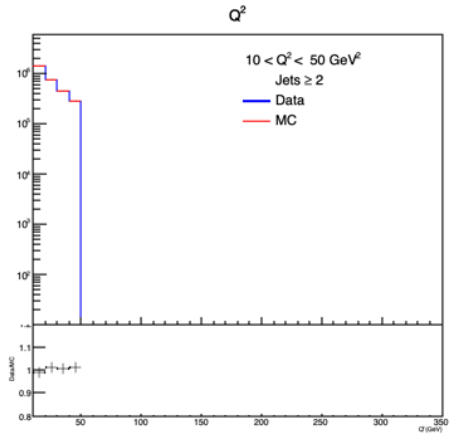
jets > 1

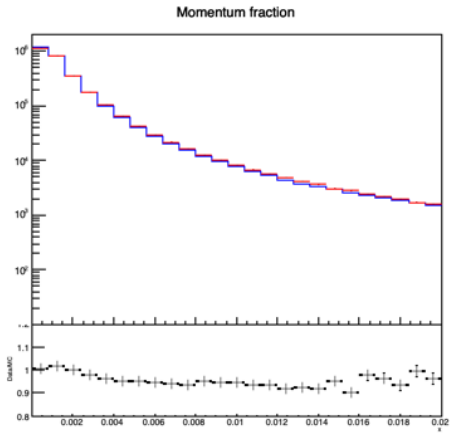
jets > 2

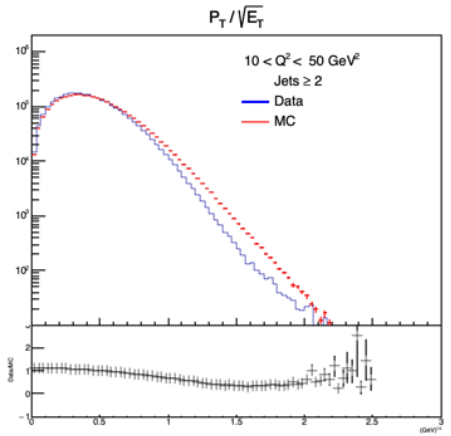
jets > 3

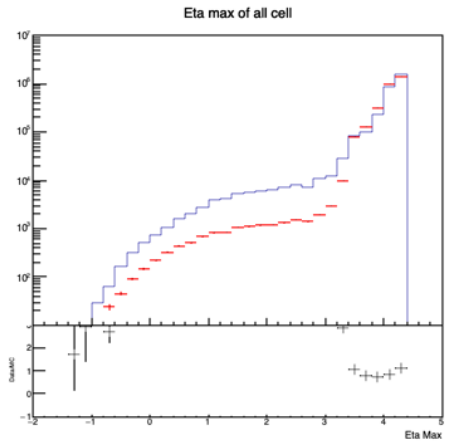
jets > 4

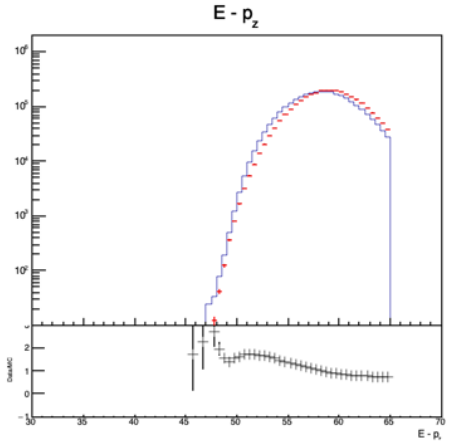












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Q2 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

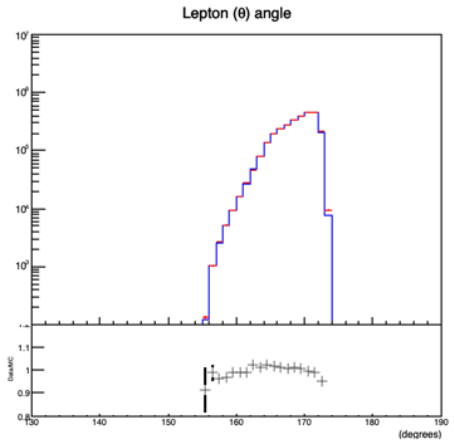
Jet multiplicity:

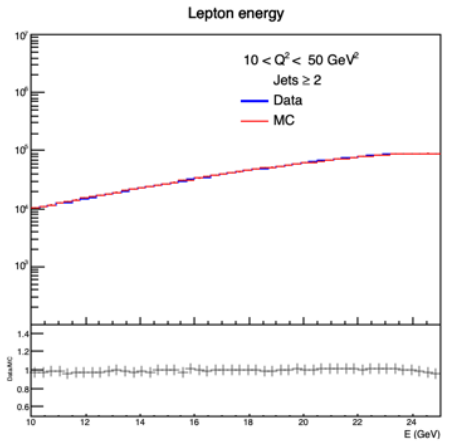
jets > 1

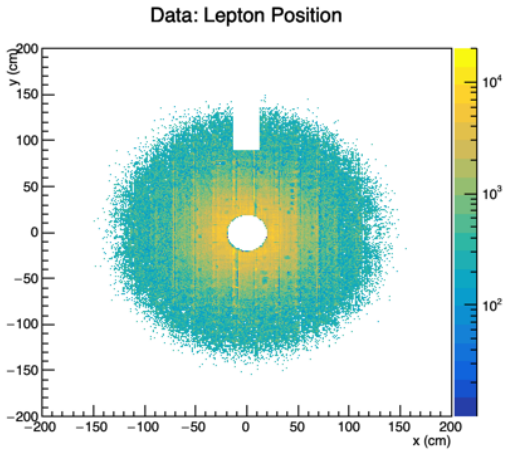
jets > 2

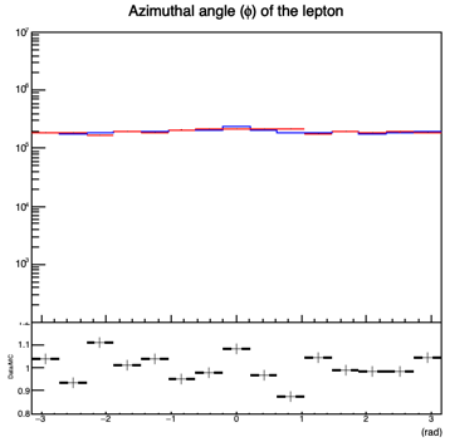
jets > 3

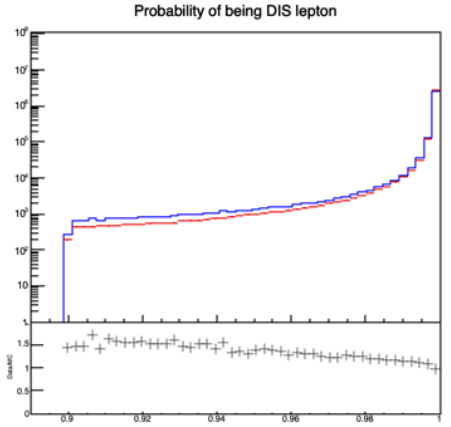
jets > 4

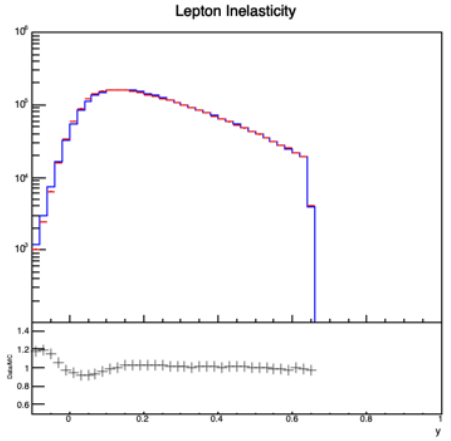












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Q2 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

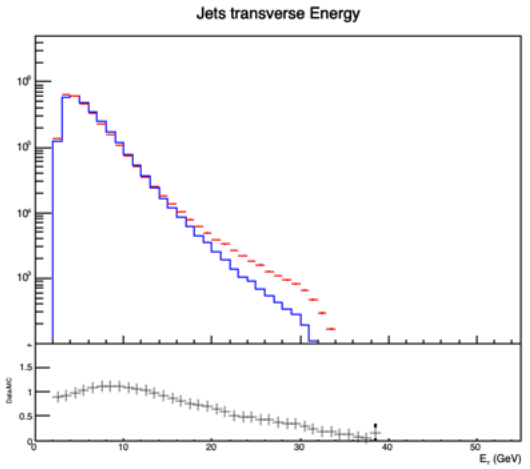
Jet multiplicity:

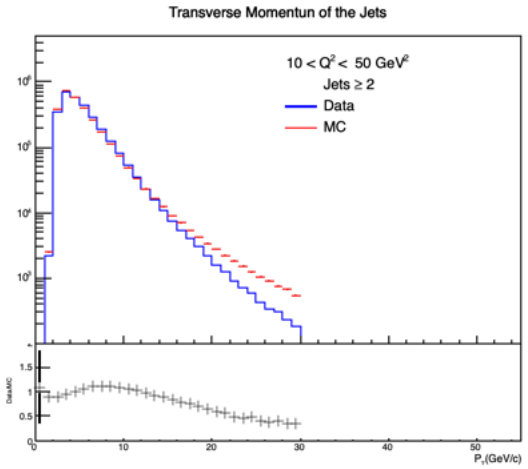
jets > 1

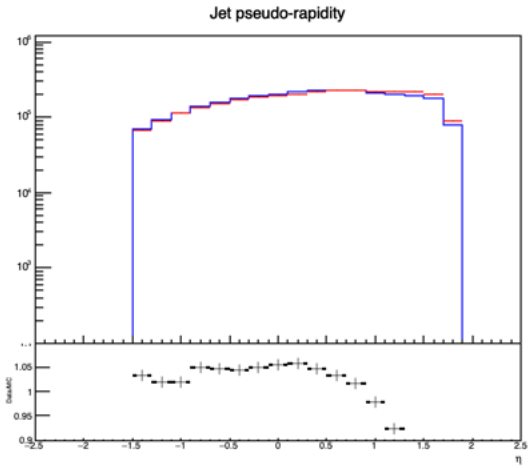
jets > 2

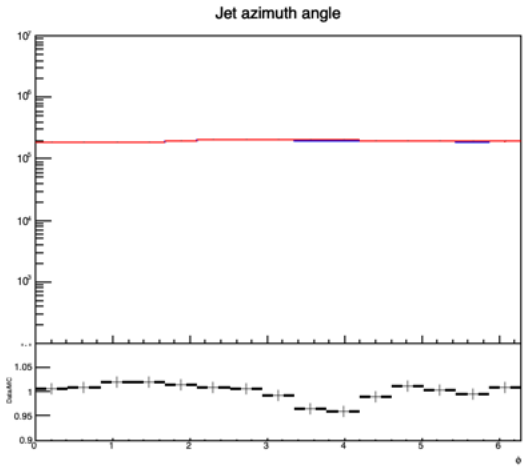
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 1_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

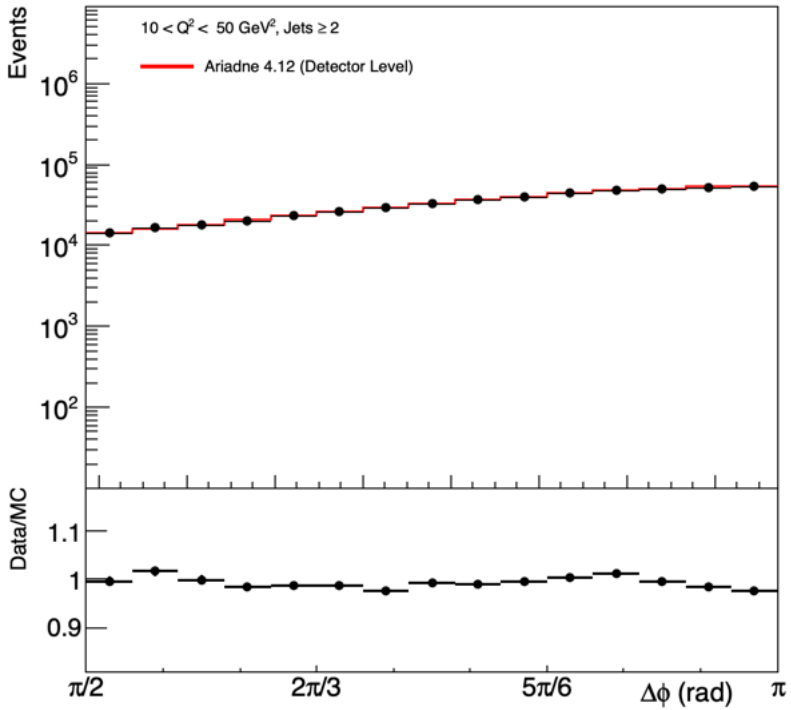
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Q2 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

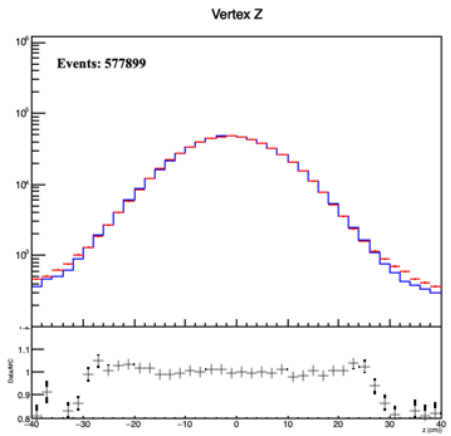
Jet multiplicity:

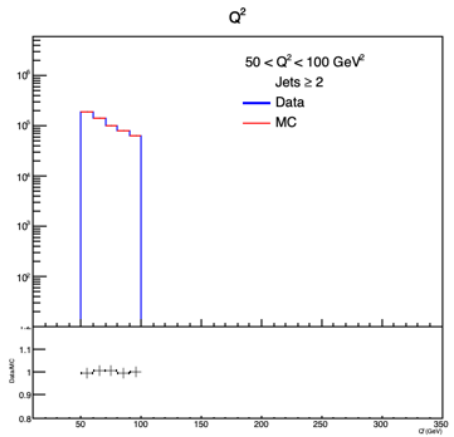
jets > 1

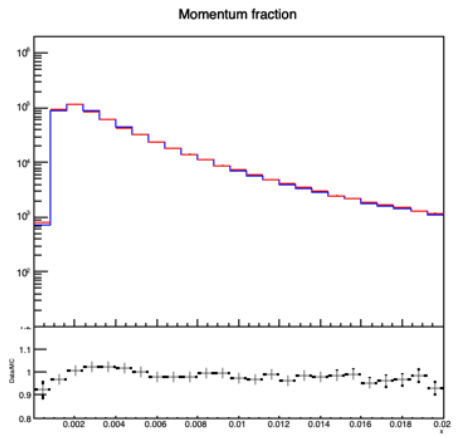
jets > 2

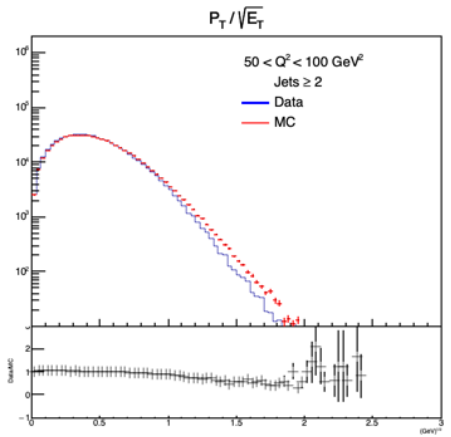
jets > 3

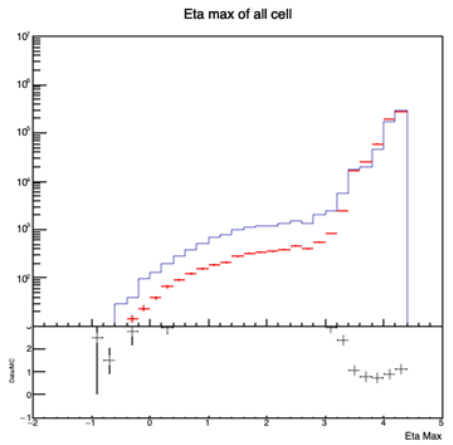
jets > 4

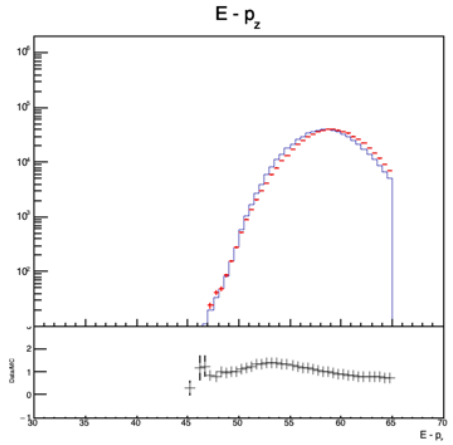












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Q2 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

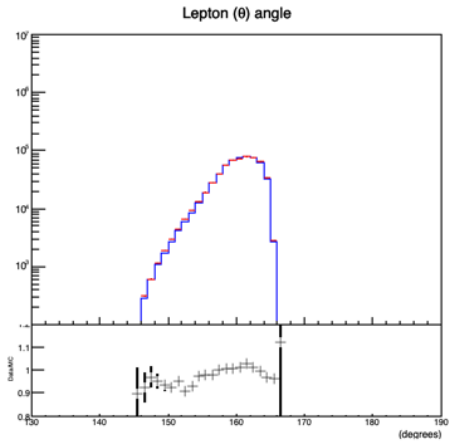
Jet multiplicity:

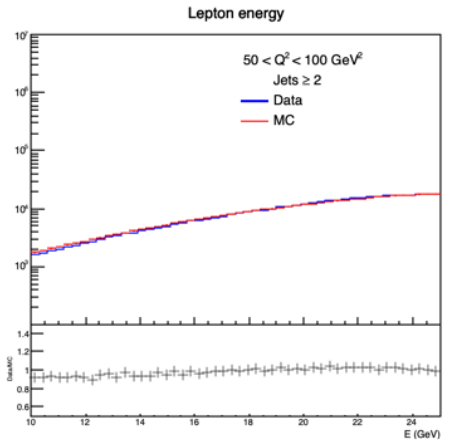
jets > 1

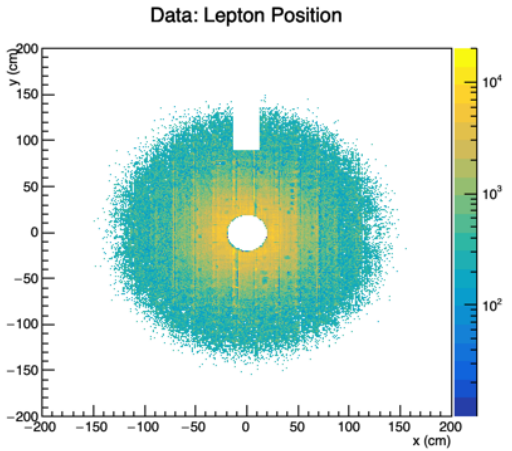
jets > 2

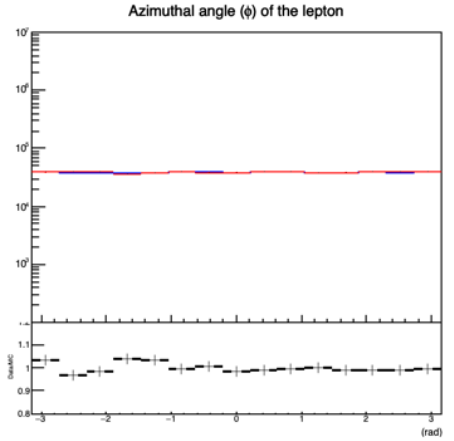
jets > 3

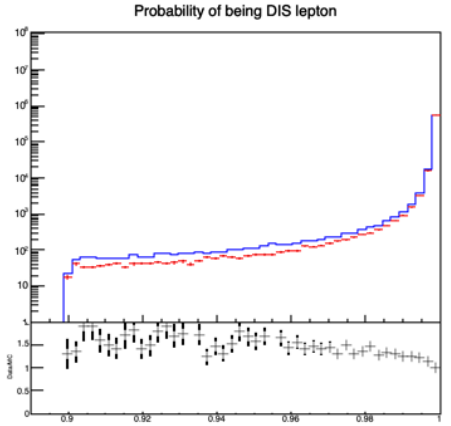
jets > 4

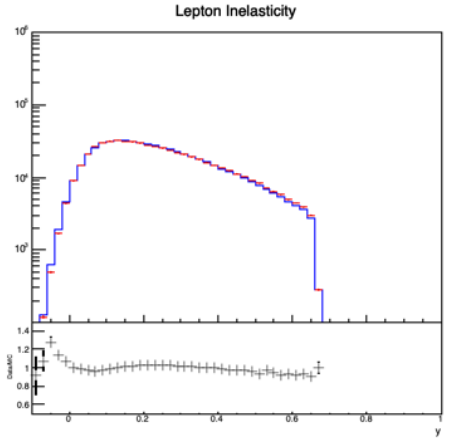












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Q2 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

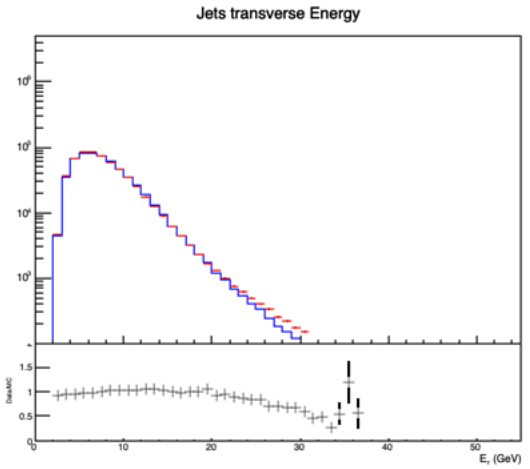
Jet multiplicity:

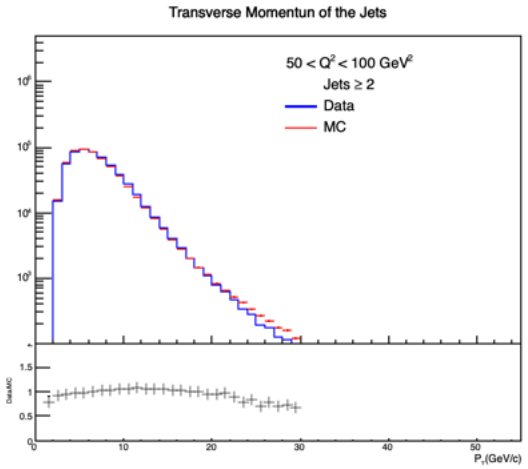
jets > 1

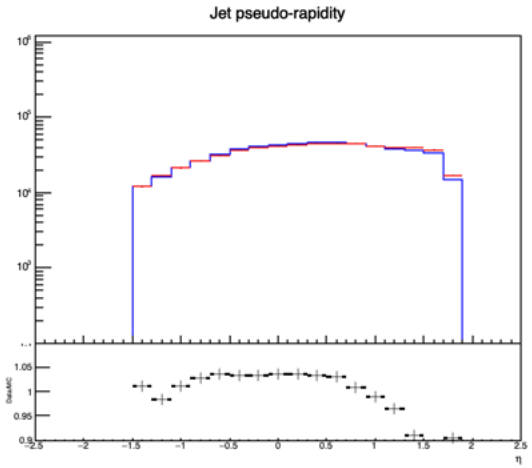
jets > 2

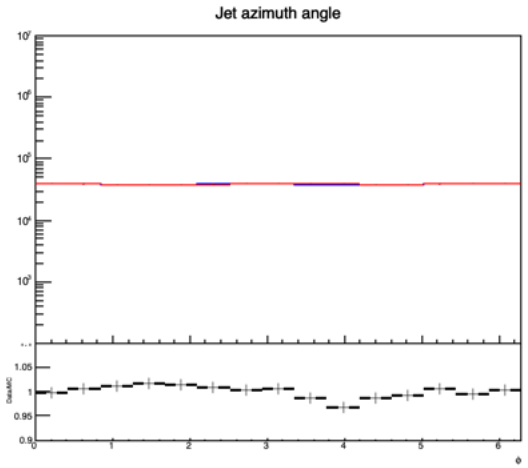
jets > 3

jets > 4









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dPhi Q2 2_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1

jets > 2

jets > 3

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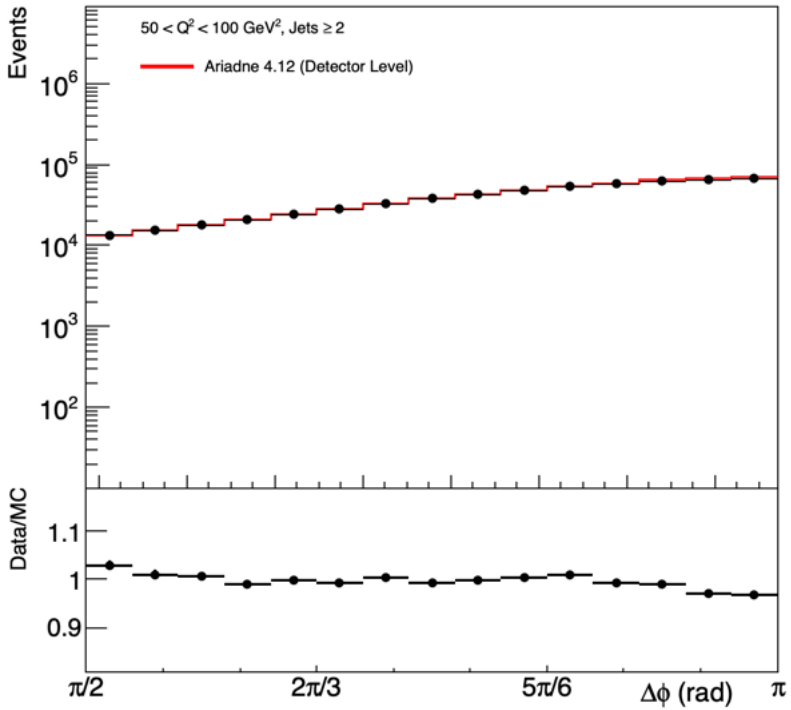

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Event Q2 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

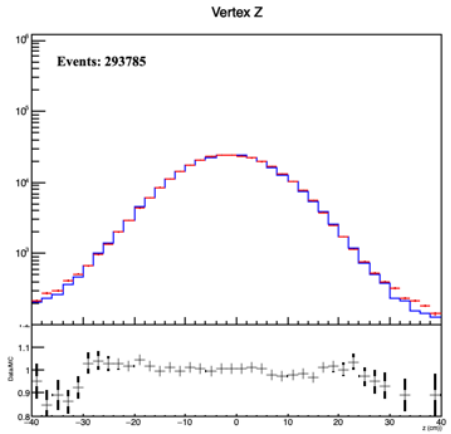
Jet multiplicity:

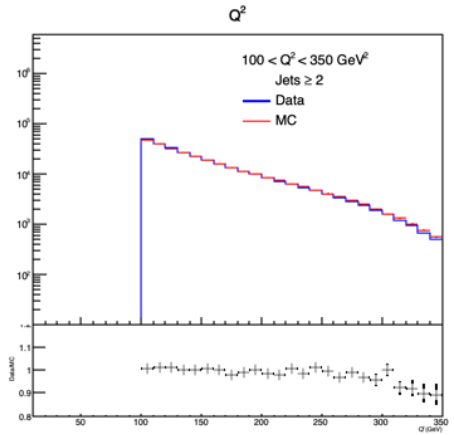
jets > 1

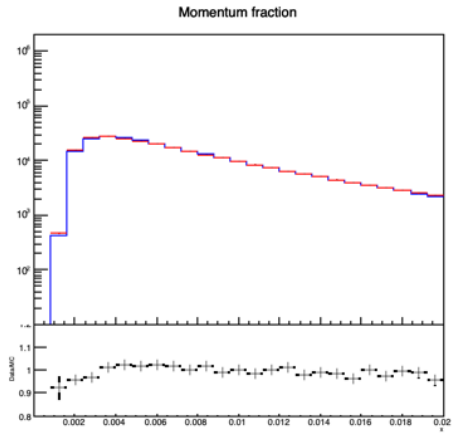
jets > 2

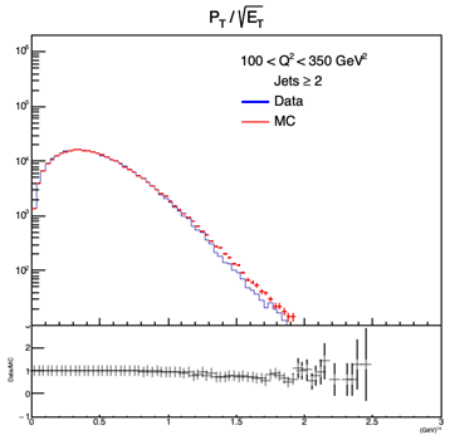
jets > 3

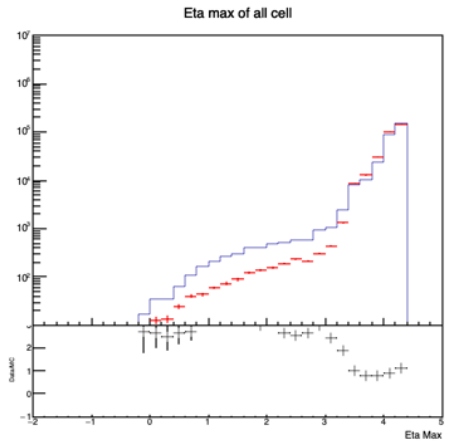
jets > 4

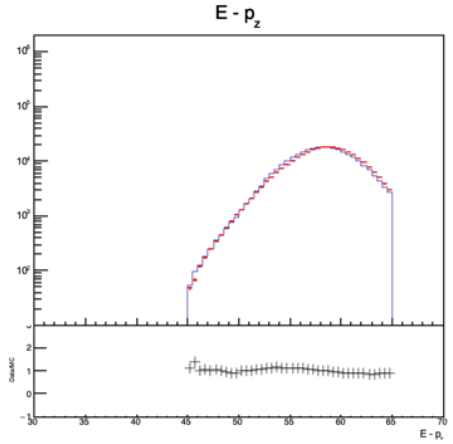












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Q2 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

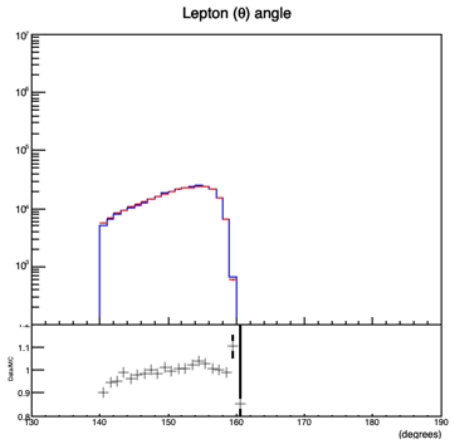
Jet multiplicity:

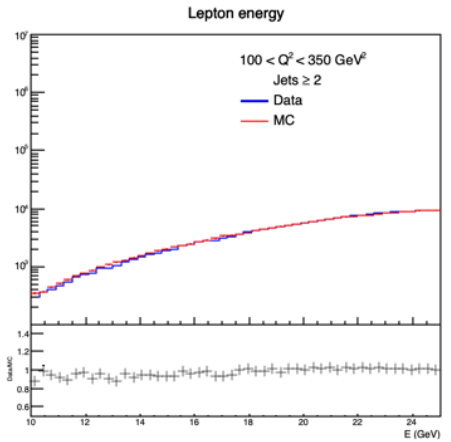
jets > 1

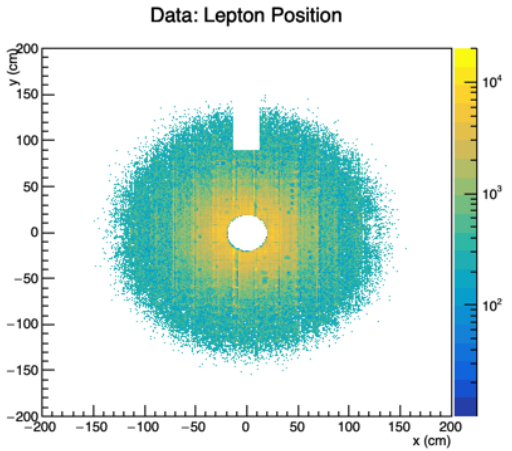
jets > 2

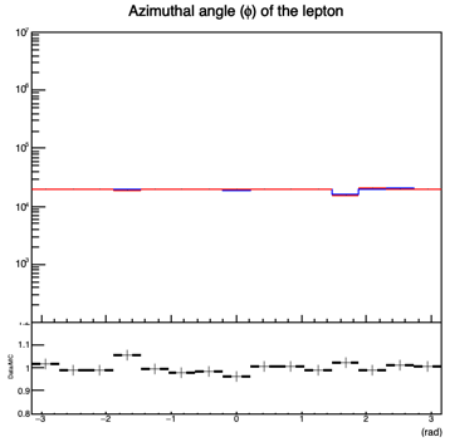
jets > 3

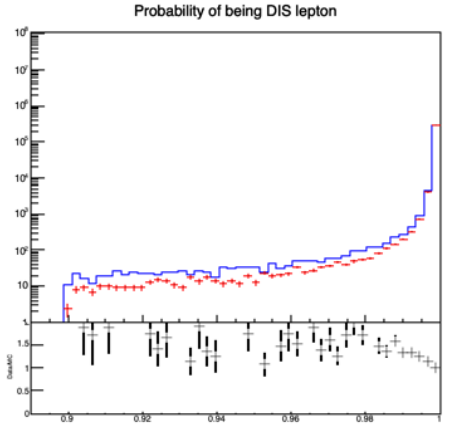
jets > 4

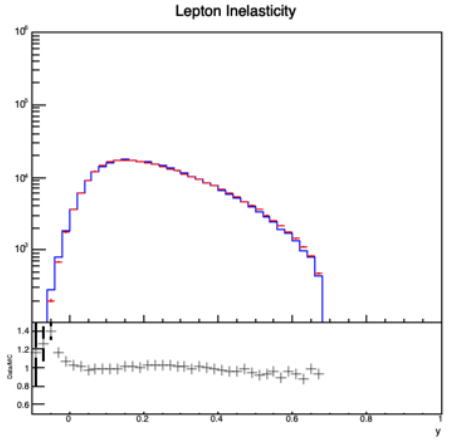












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Q2 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

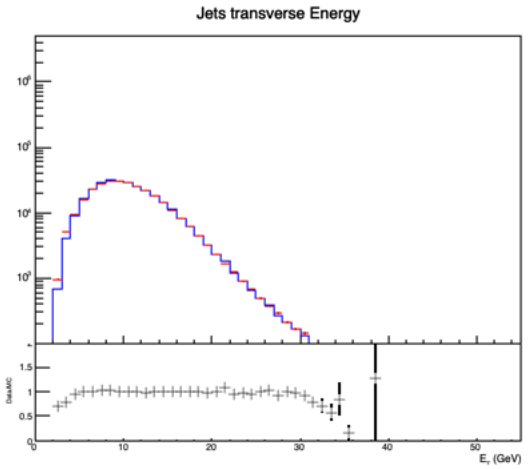
Jet multiplicity:

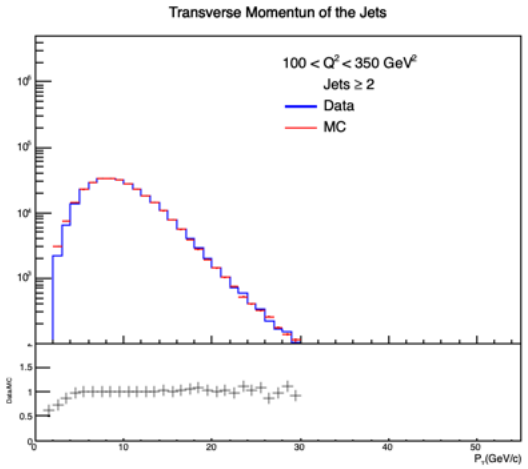
jets > 1

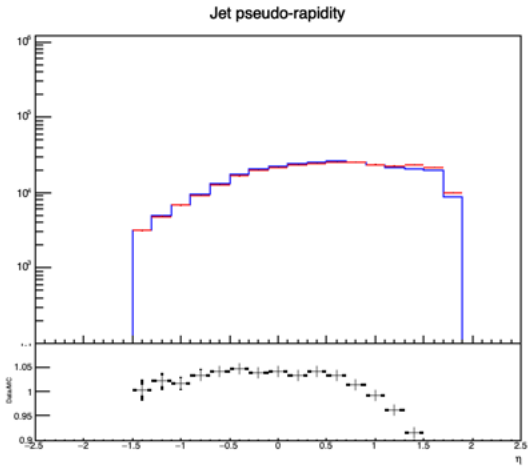
jets > 2

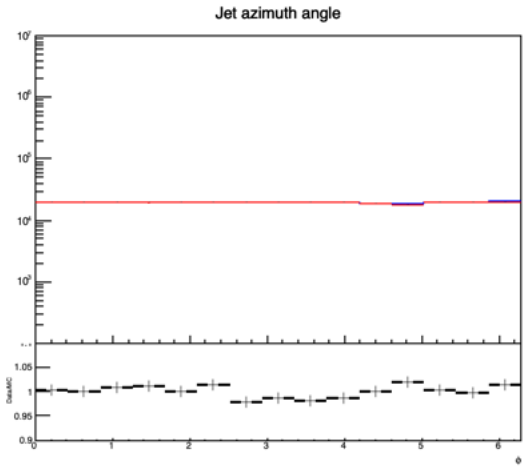
jets > 3

jets > 4









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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 3_1

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

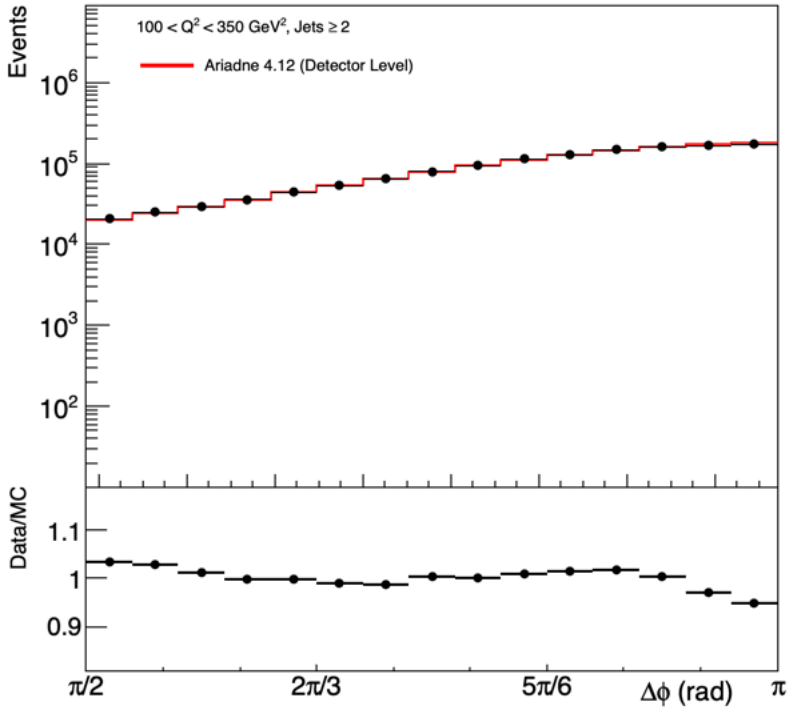
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Event Q2 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

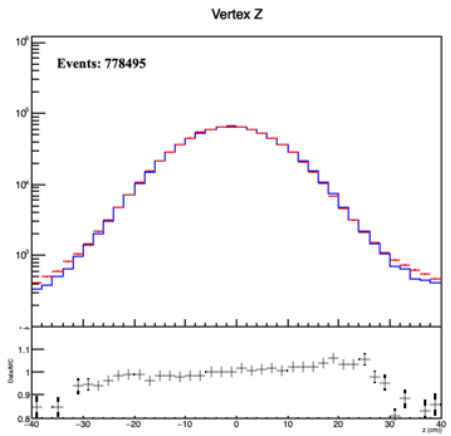
Jet multiplicity:

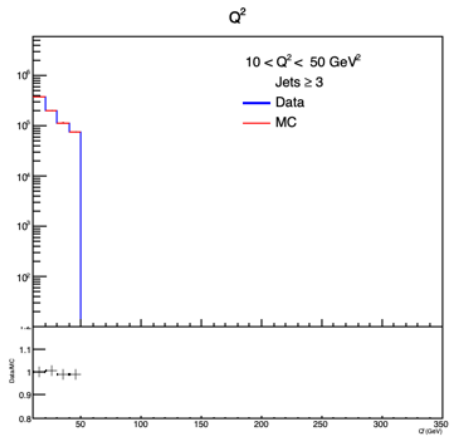
jets > 1

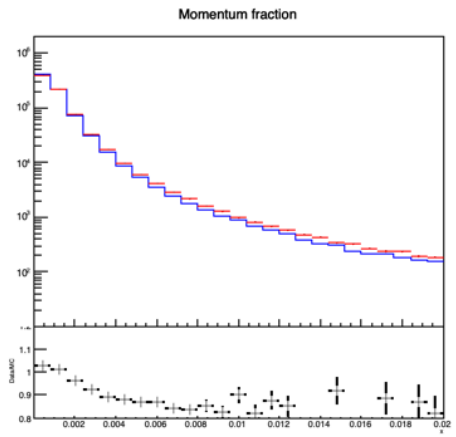
jets > 2

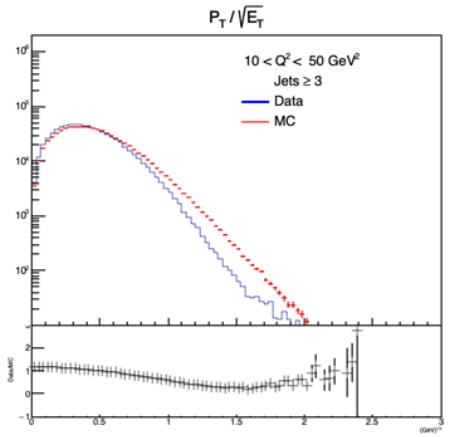
jets > 3

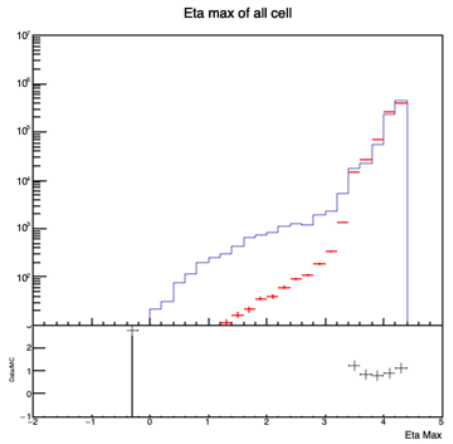
jets > 4

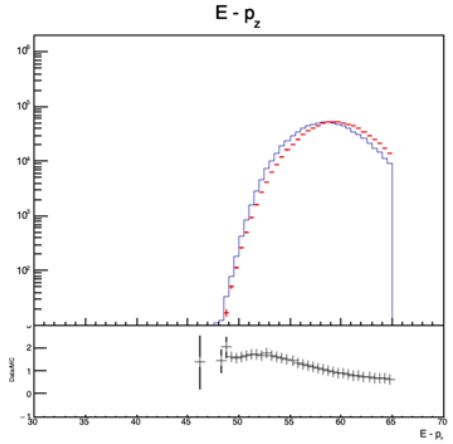












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Lepton Q2 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

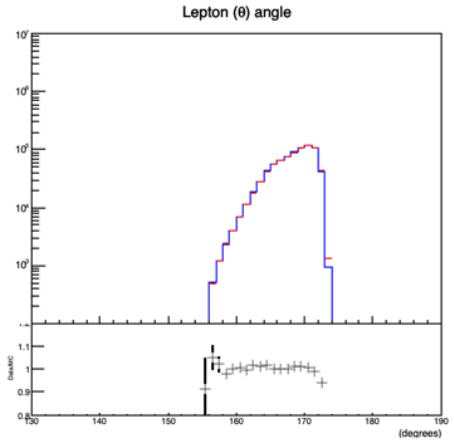
Jet multiplicity:

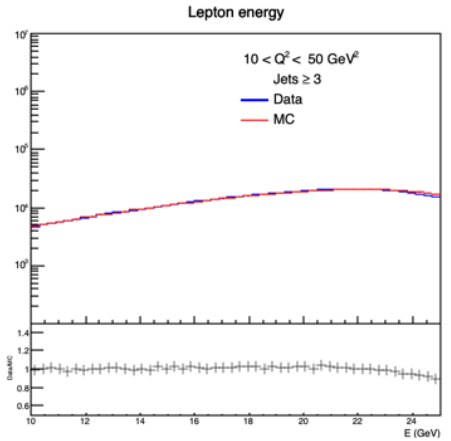
jets > 1

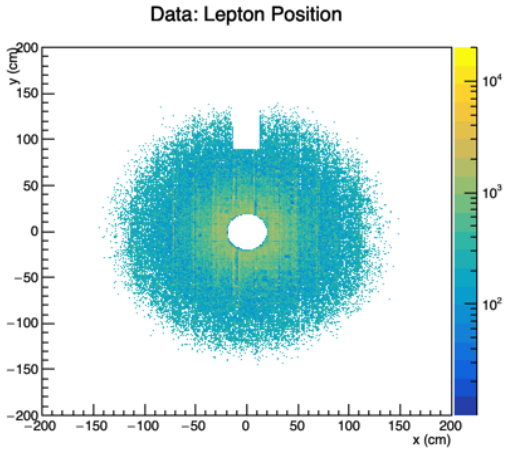
jets > 2

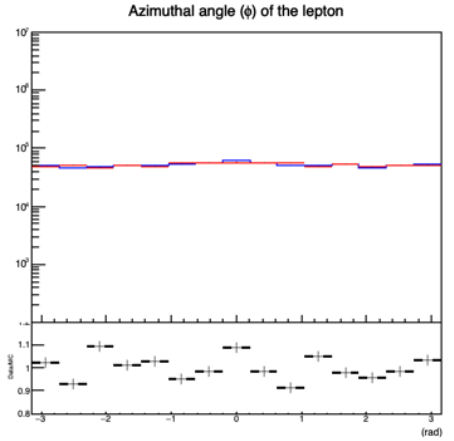
jets > 3

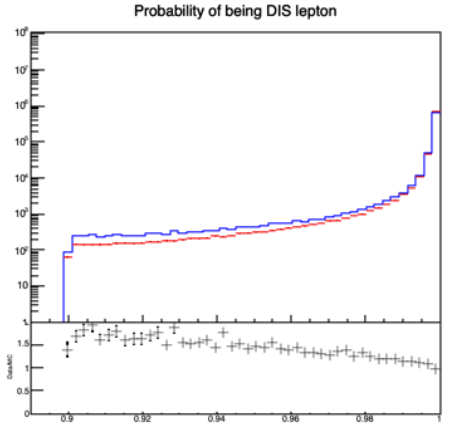
jets > 4

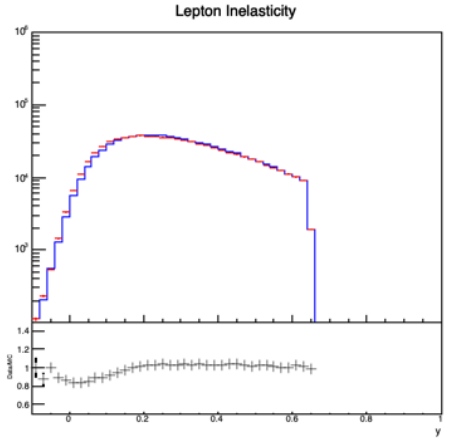












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[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Jet Q2 1_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

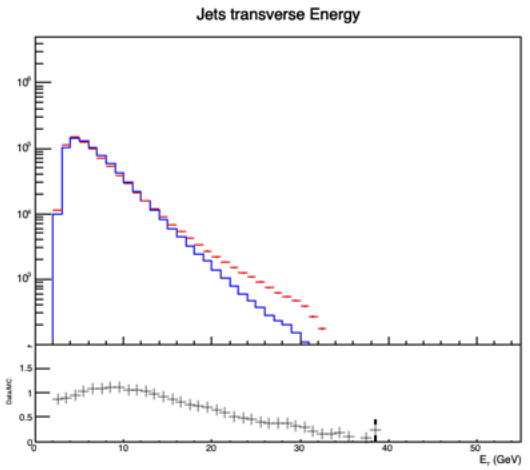
Jet multiplicity:

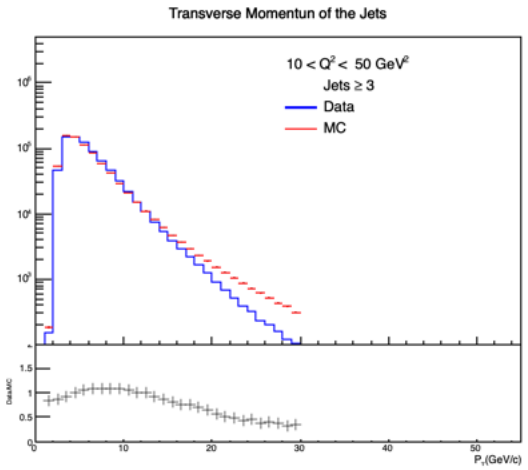
jets > 1

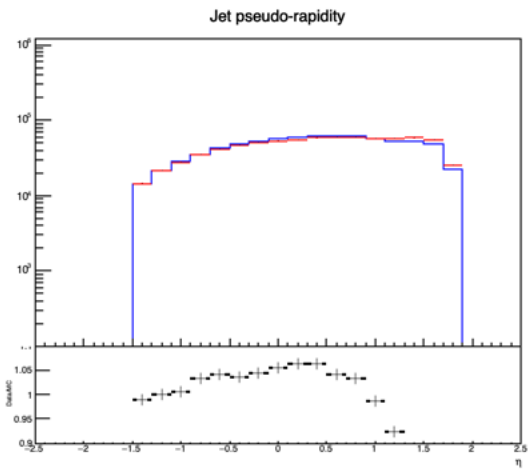
jets > 2

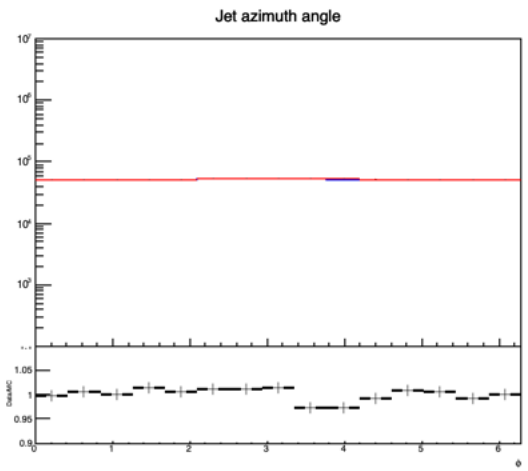
jets > 3

jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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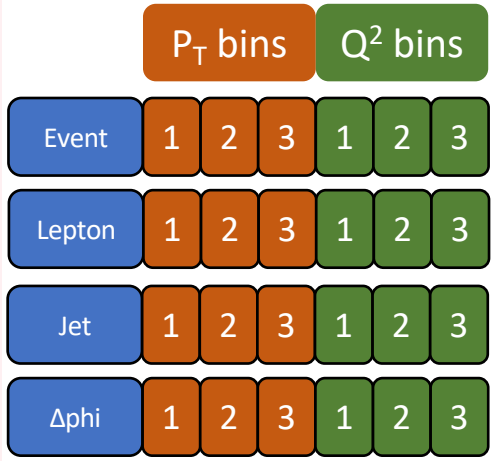
dPhi Q2 1_2



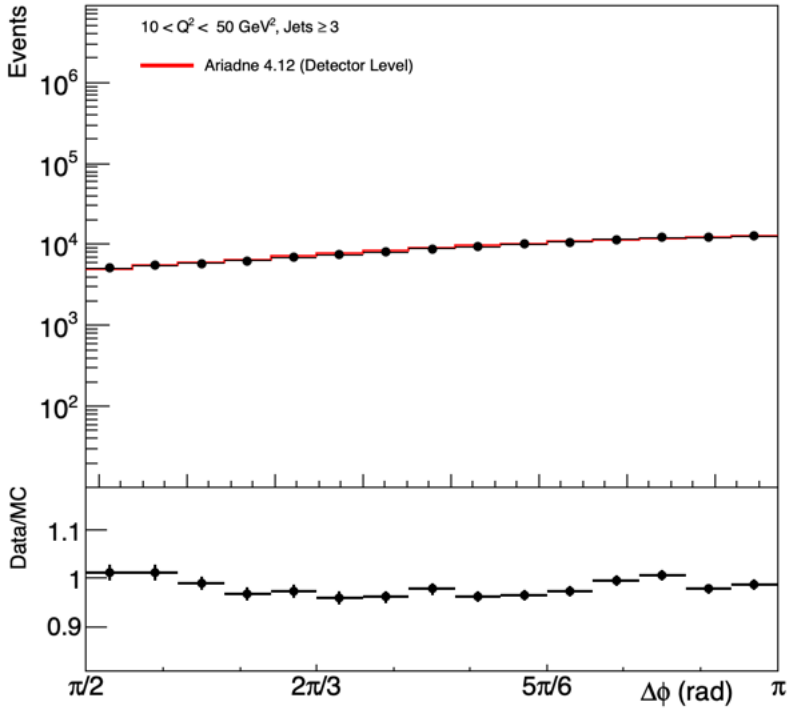
Jet multiplicity:

jets > 1

jets > 2

jets > 3

jets > 4



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Event Q2 2_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

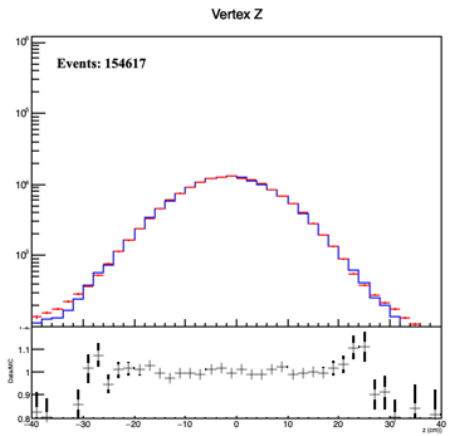
Jet multiplicity:

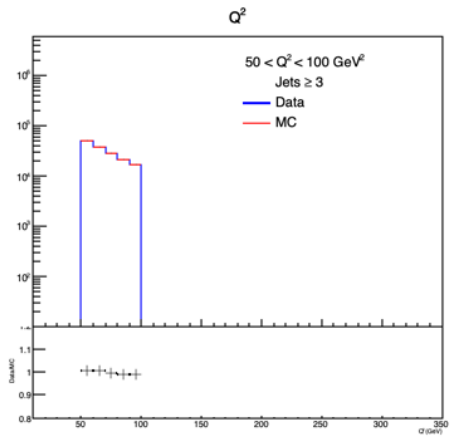
jets > 1

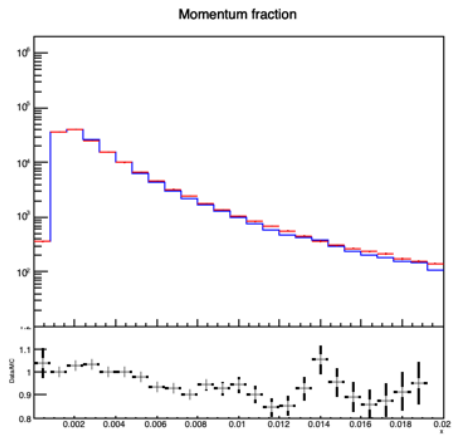
jets > 2

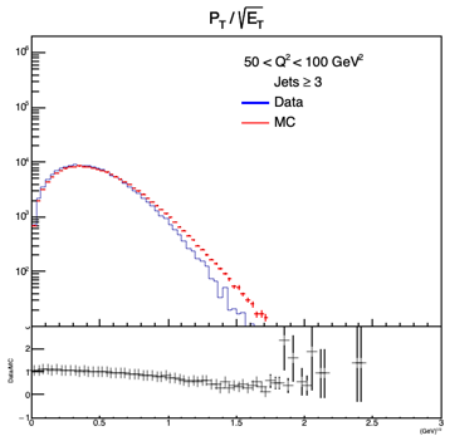
jets > 3

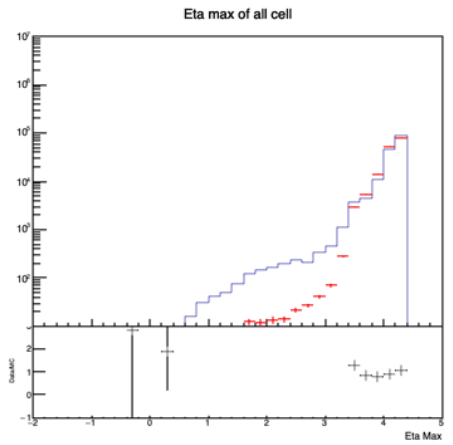
jets > 4

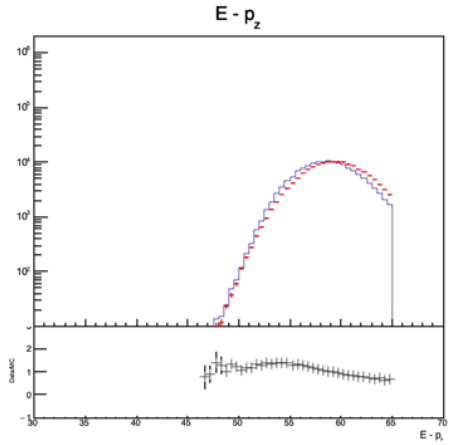












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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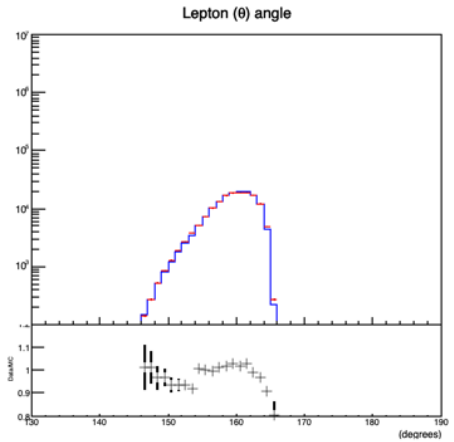
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

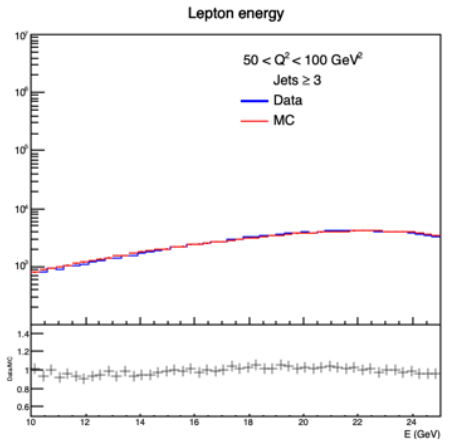
Lepton Q2 2_2

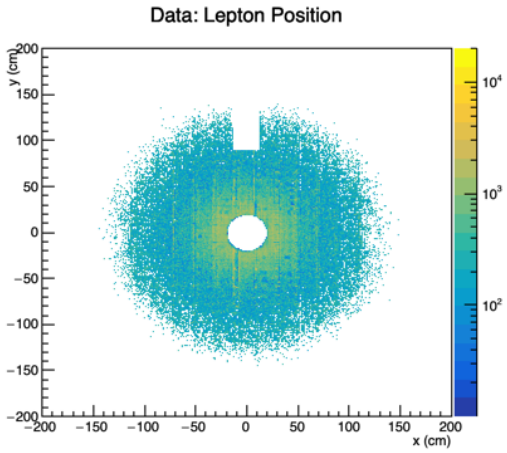
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

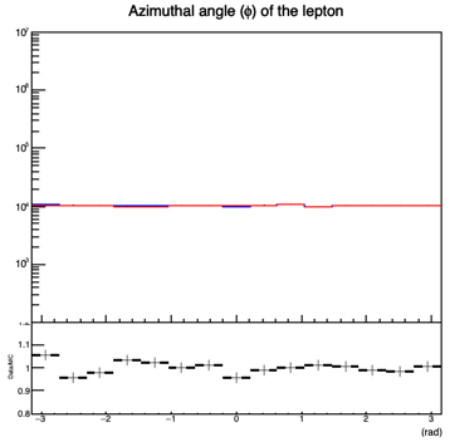
Jet multiplicity:

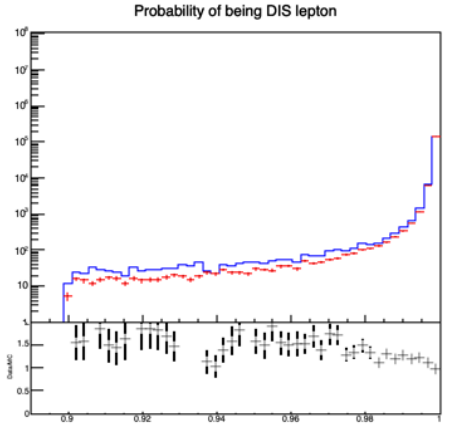
jets > 1
jets > 2
jets > 3
jets > 4

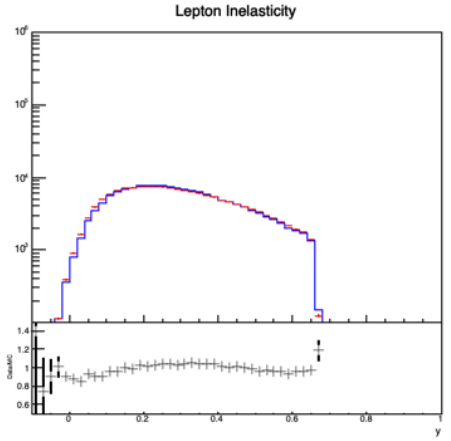












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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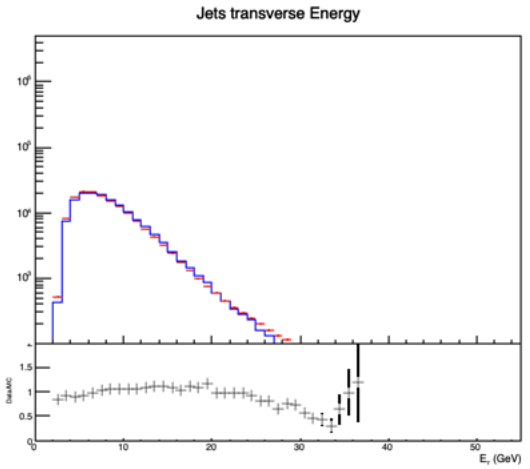
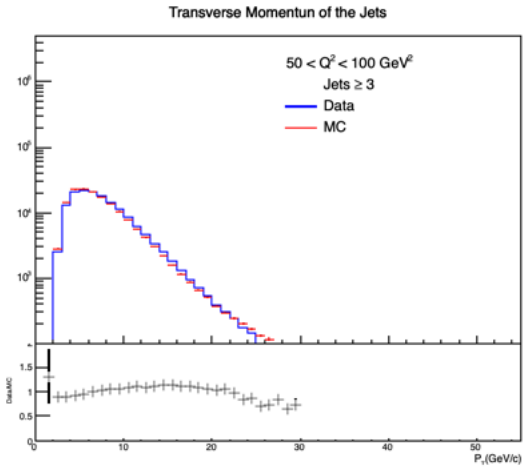
Jet Q2 2_2

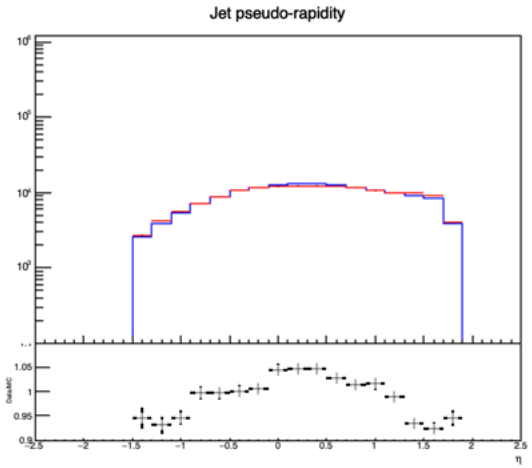
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

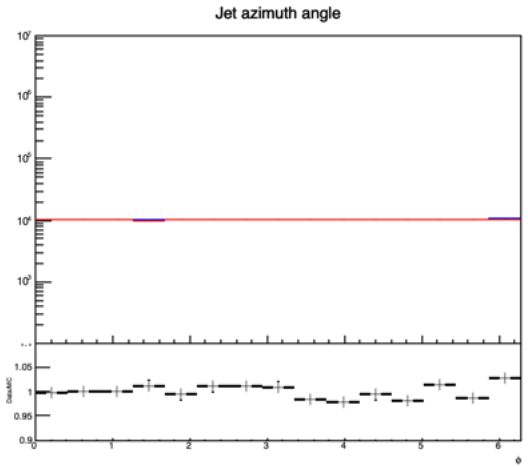
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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dPhi Q2 2_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
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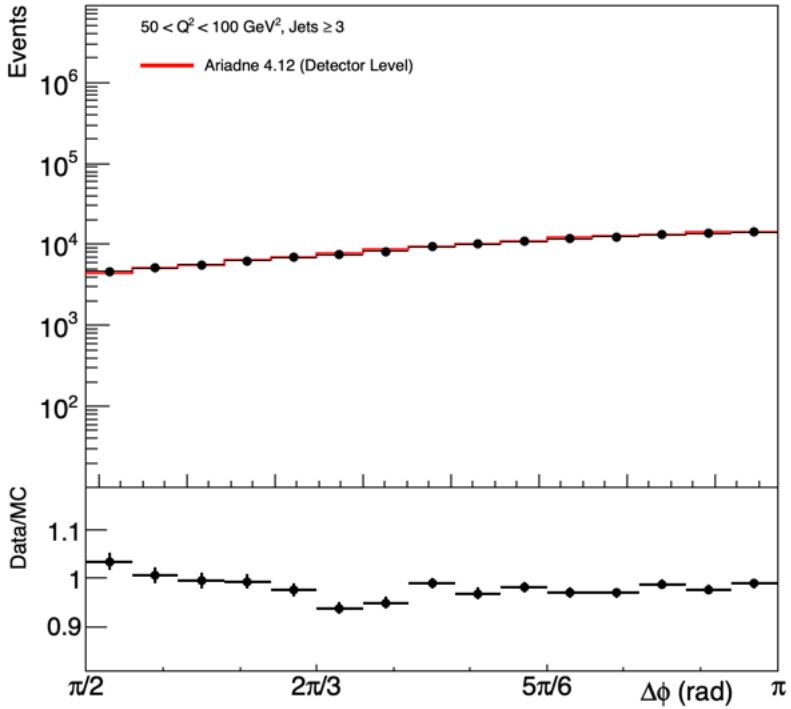

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Event Q2 3_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
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Jet multiplicity:

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jets > 3

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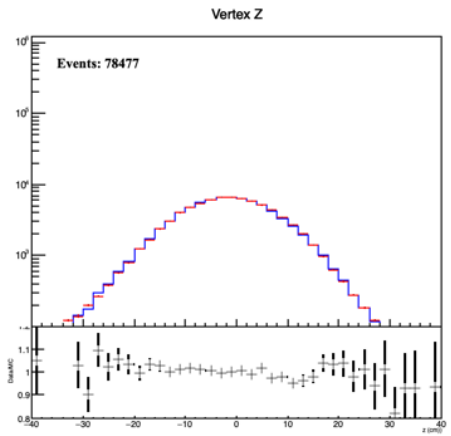

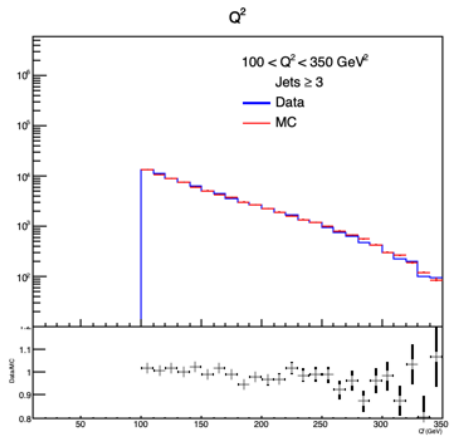

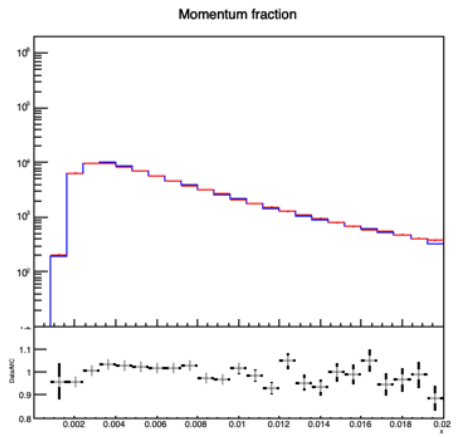

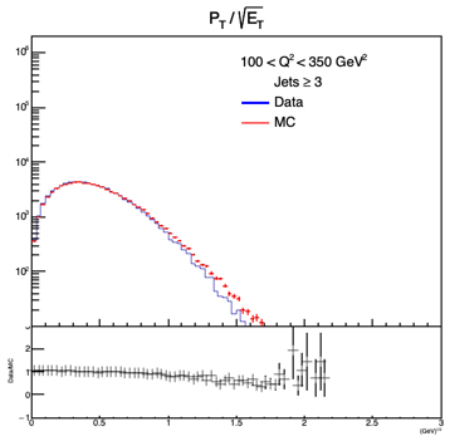

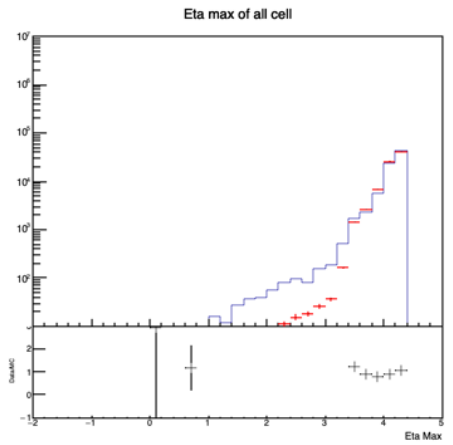

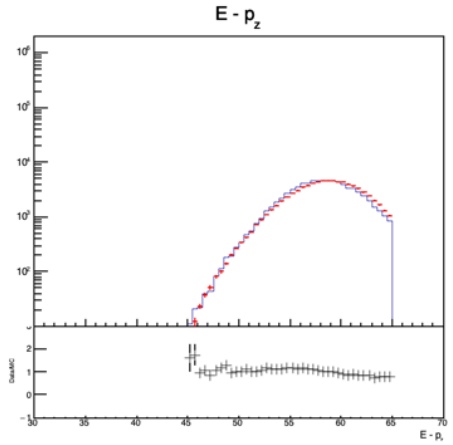

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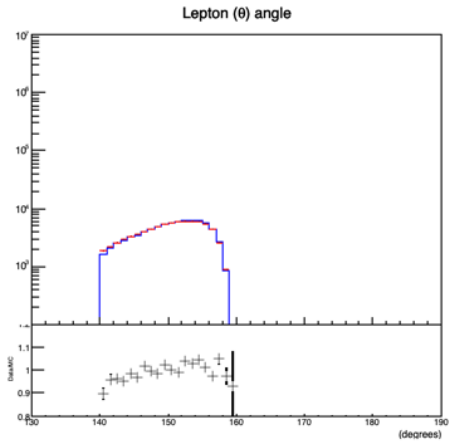
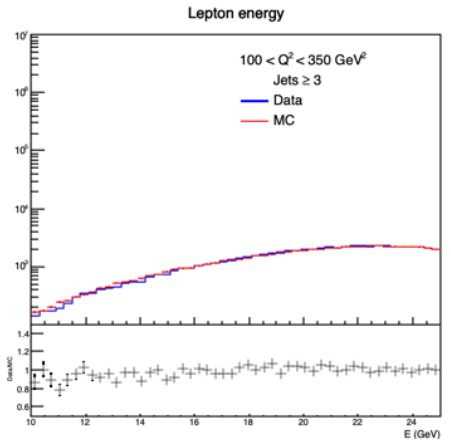
Lepton Q2 3_2

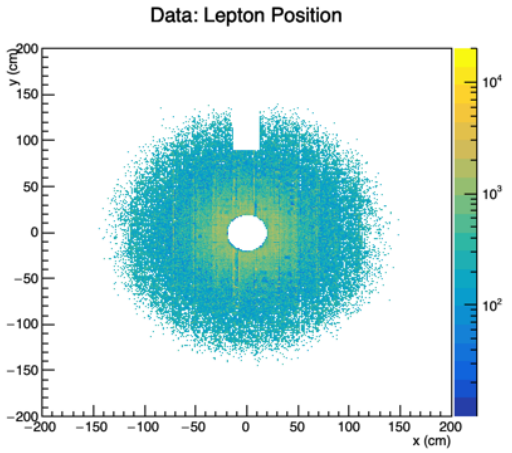
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

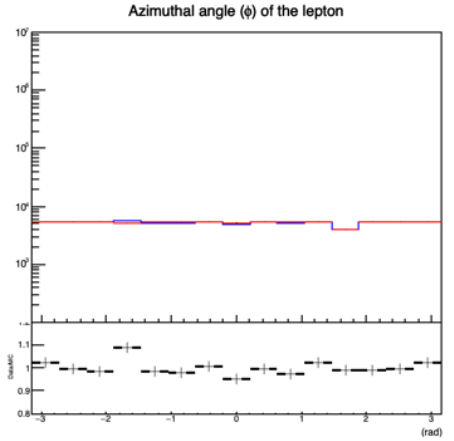
Jet multiplicity:

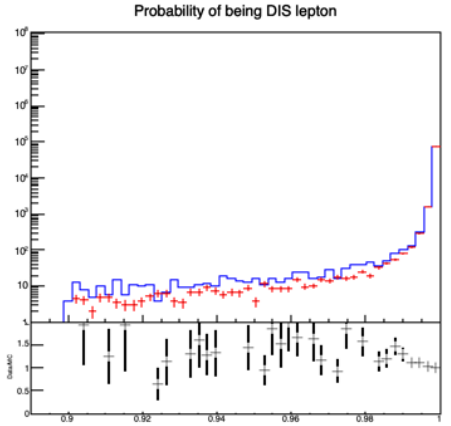
jets > 1
jets > 2
jets > 3
jets > 4

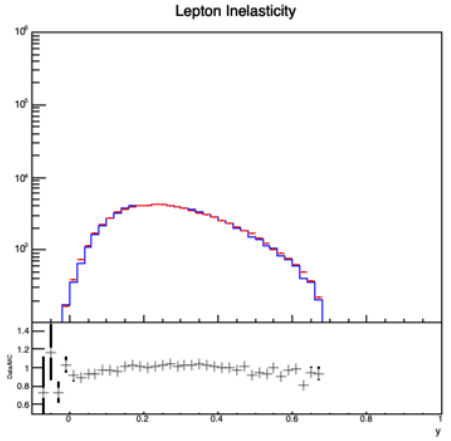












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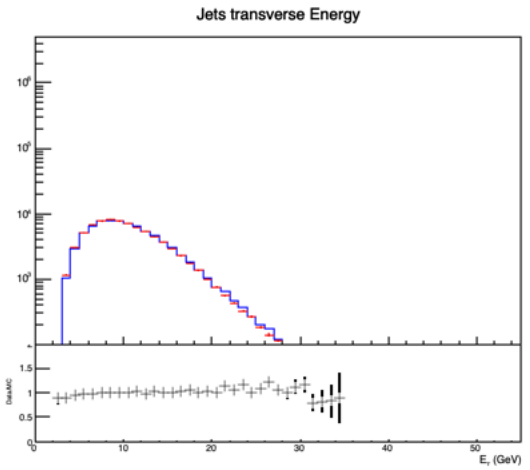
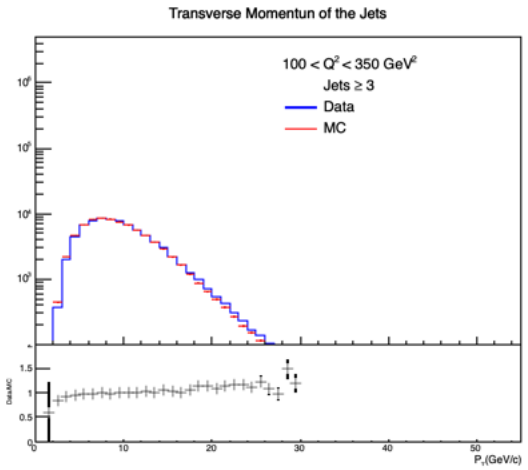
Jet Q2 3_2

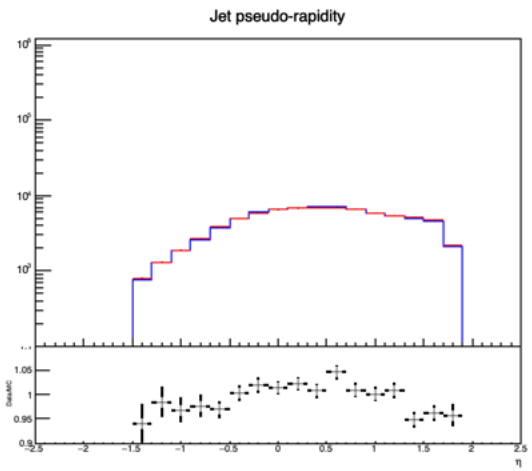
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

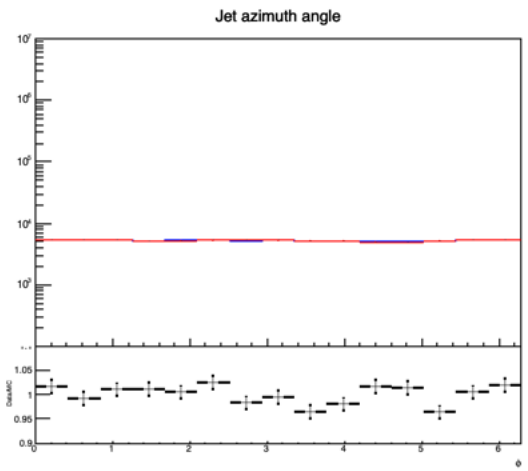
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

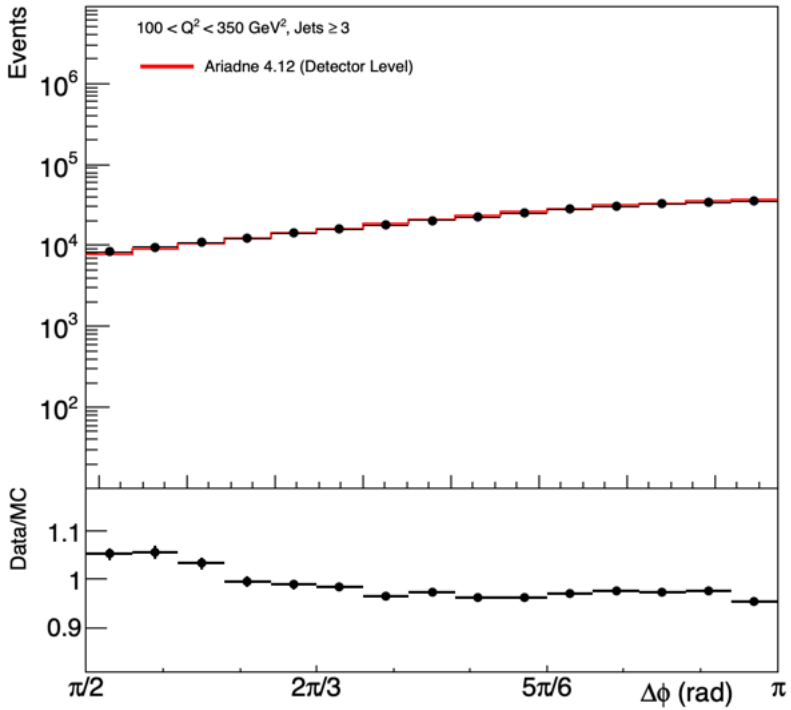
I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 3_2

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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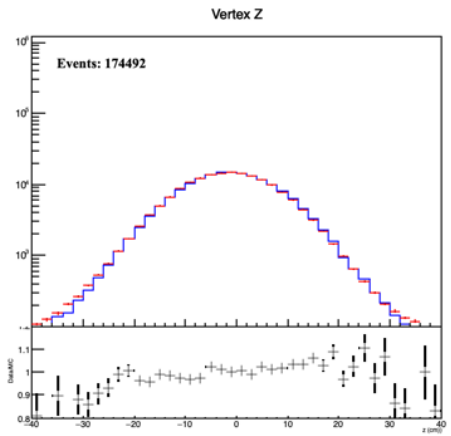
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

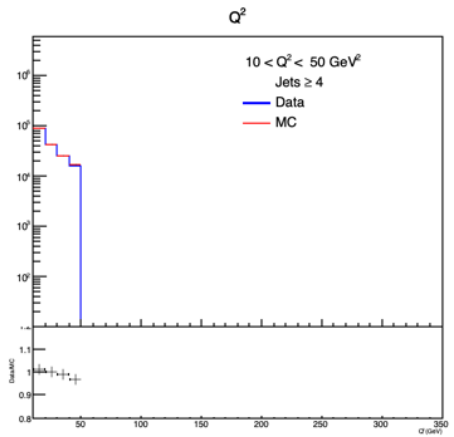
Event Q2 1_3

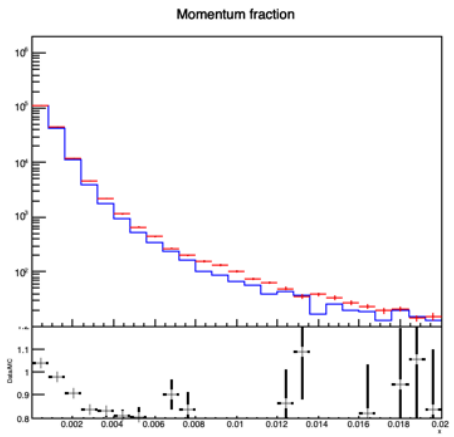
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

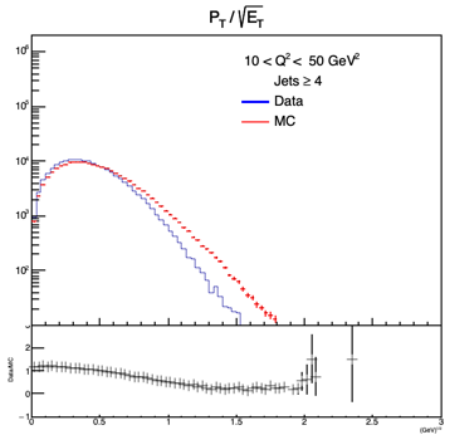
Jet multiplicity:

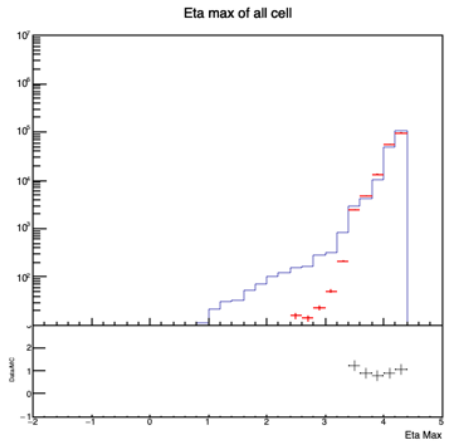
jets > 1
jets > 2
jets > 3
jets > 4

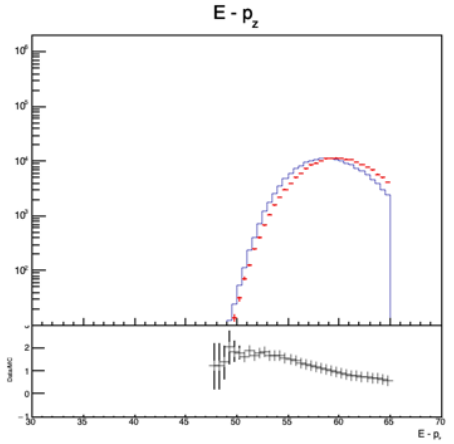












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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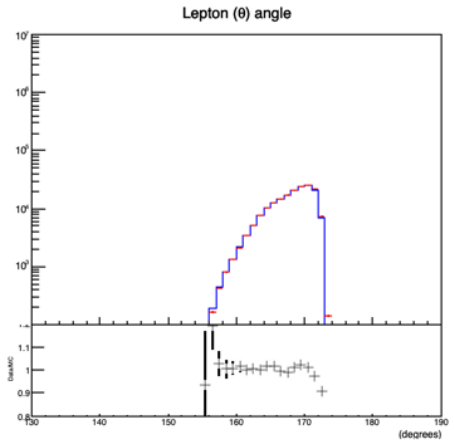
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

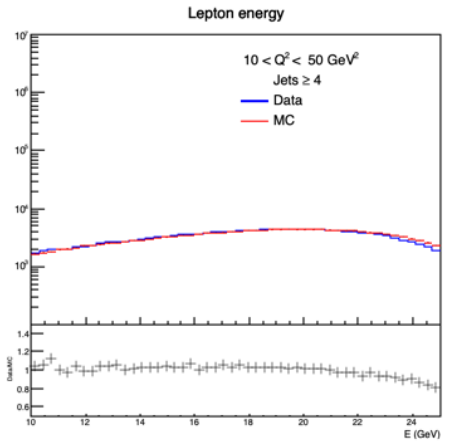
Lepton Q2 1_3

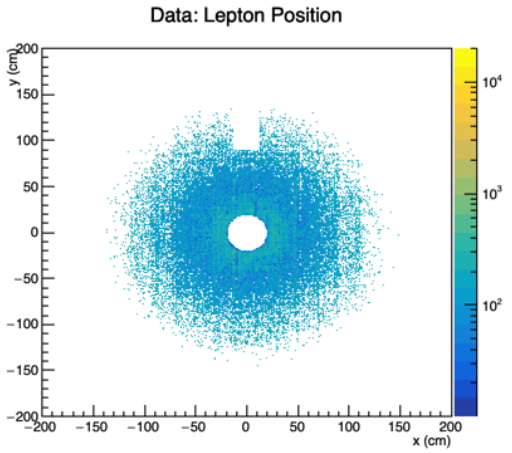
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

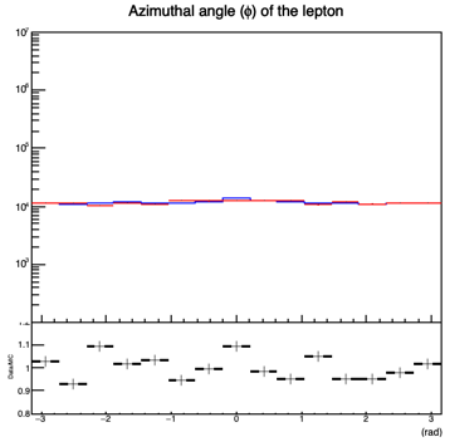
Jet multiplicity:

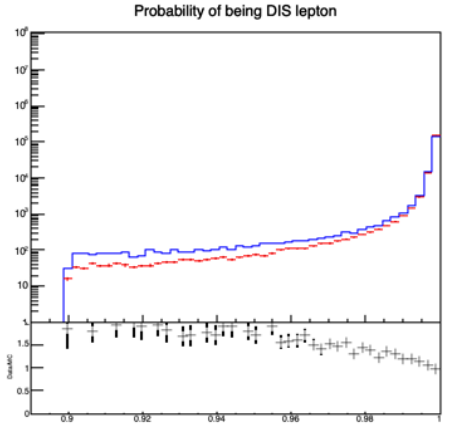
jets > 1
jets > 2
jets > 3
jets > 4

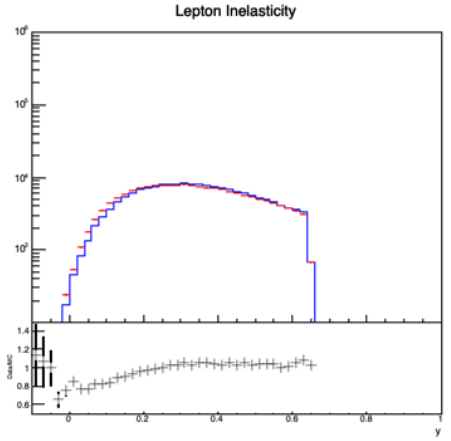












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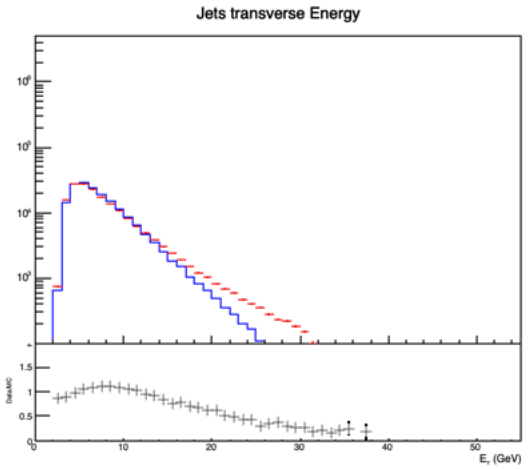
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

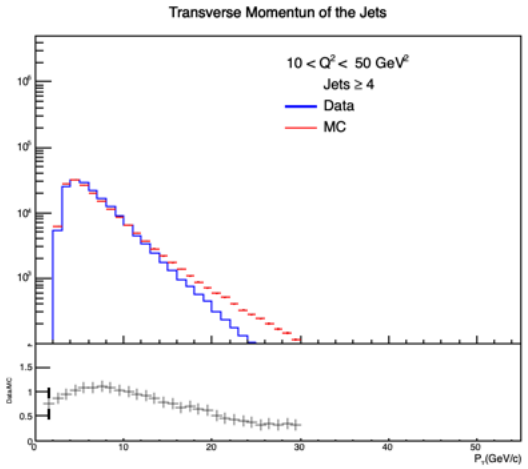
Jet Q2 1_3

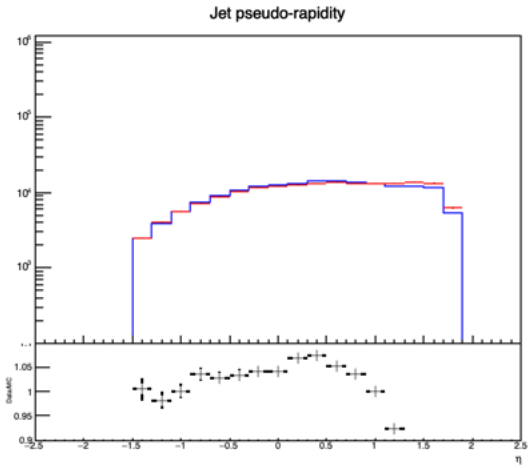
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

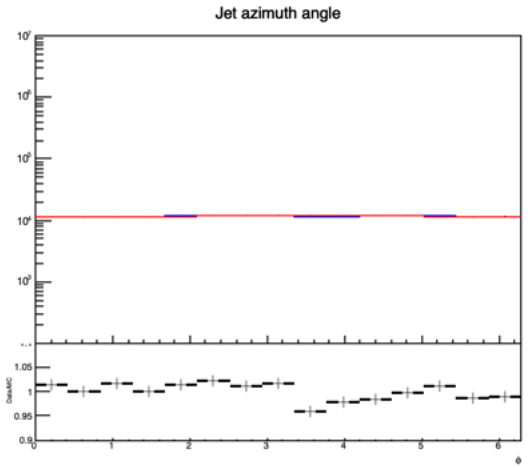
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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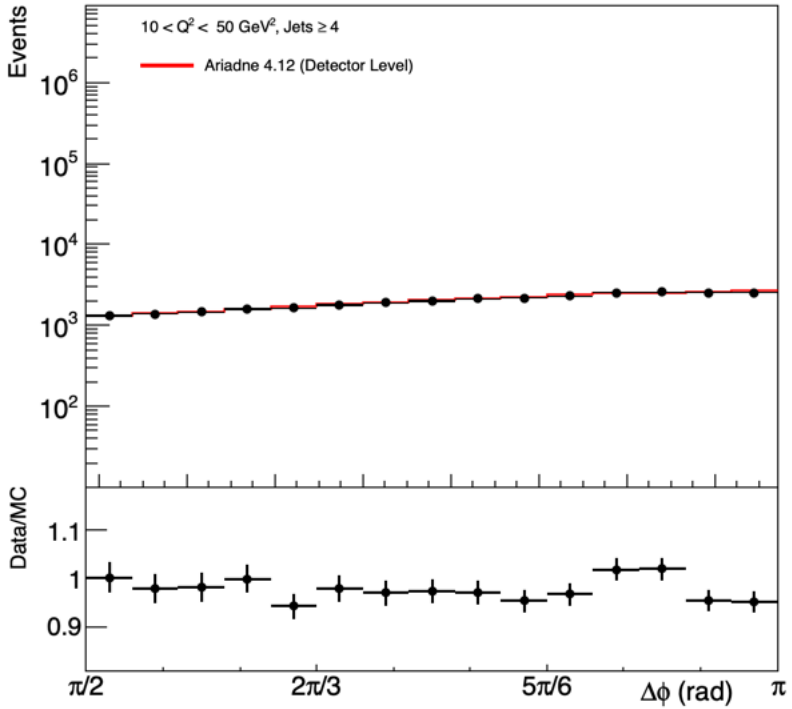
dPhi Q2 1_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



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Event Q2 2_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
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jets > 3
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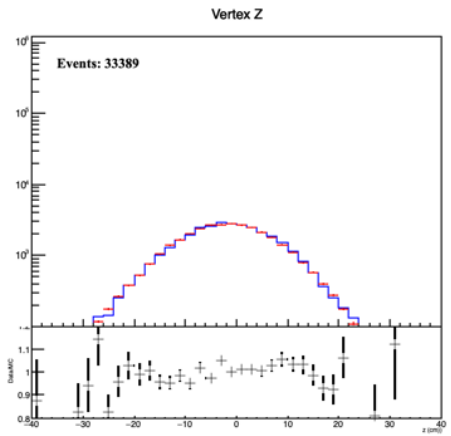

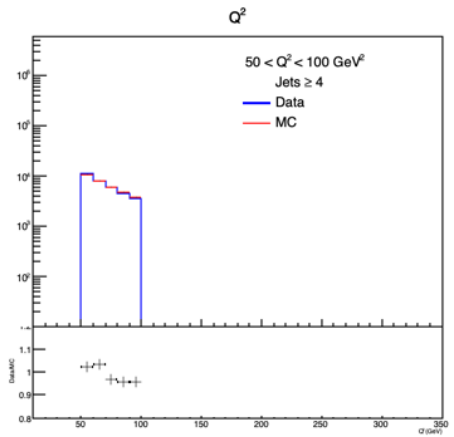

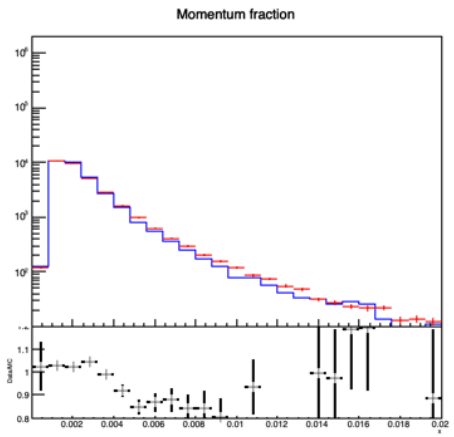

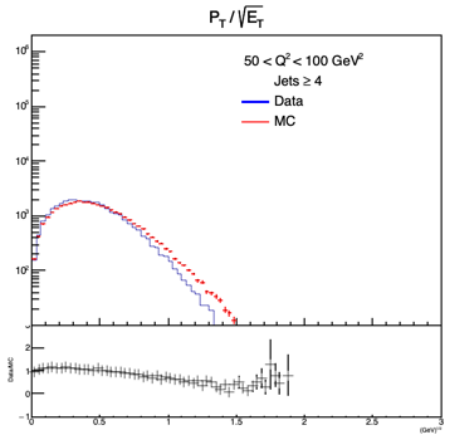

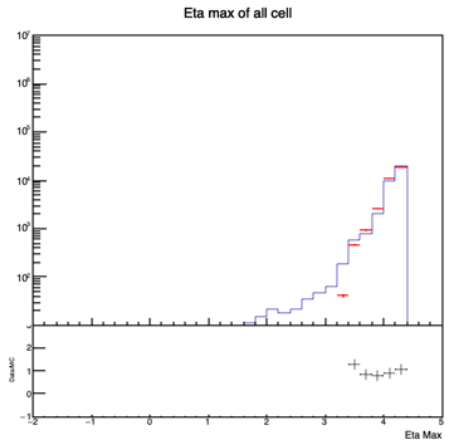

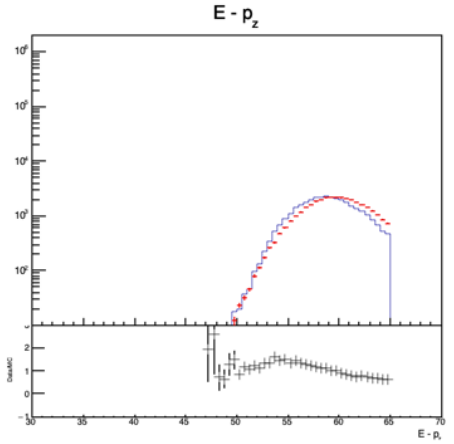

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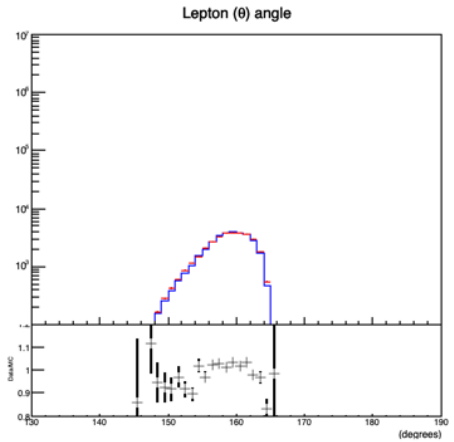
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

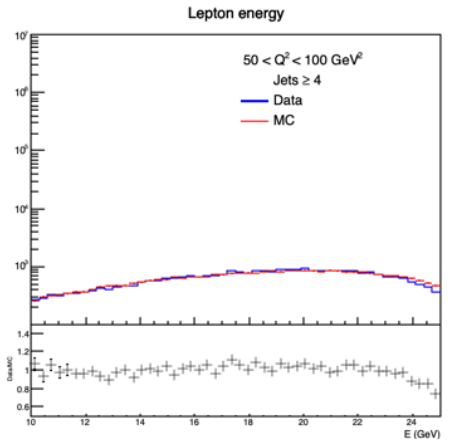
Lepton Q2 2_3

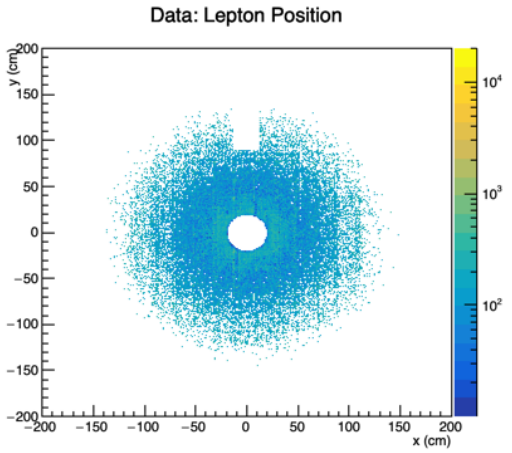
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

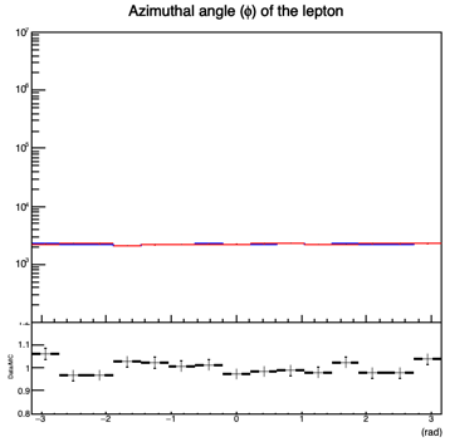
Jet multiplicity:

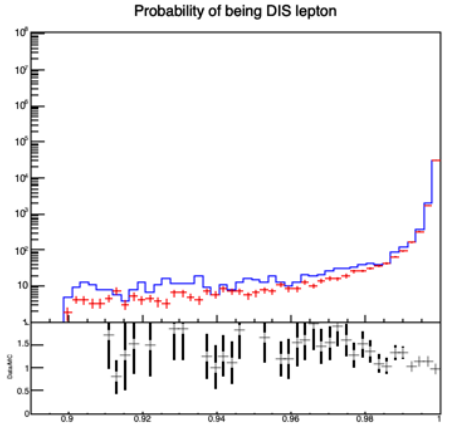
jets > 1
jets > 2
jets > 3
jets > 4

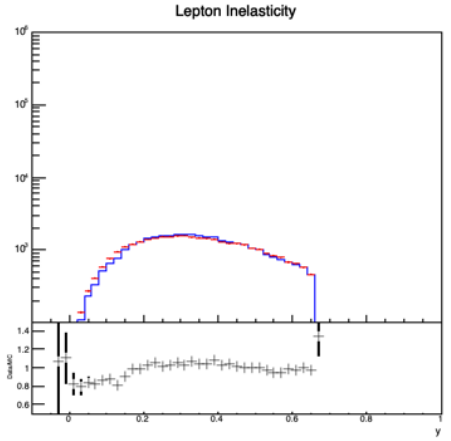












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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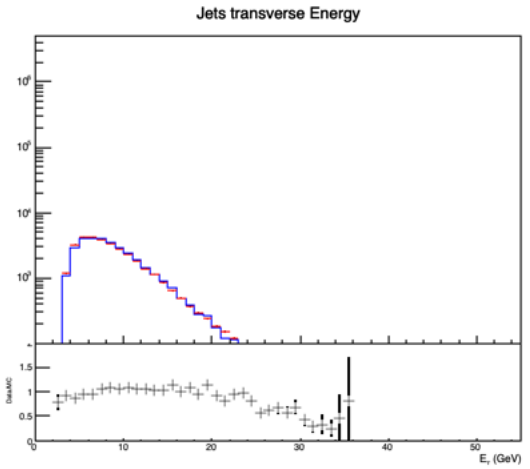
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

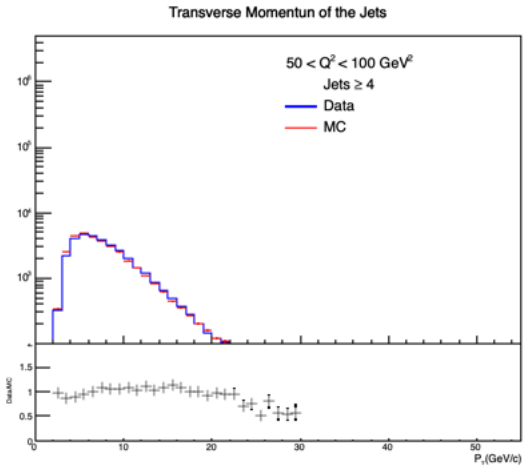
Jet Q2 2_3

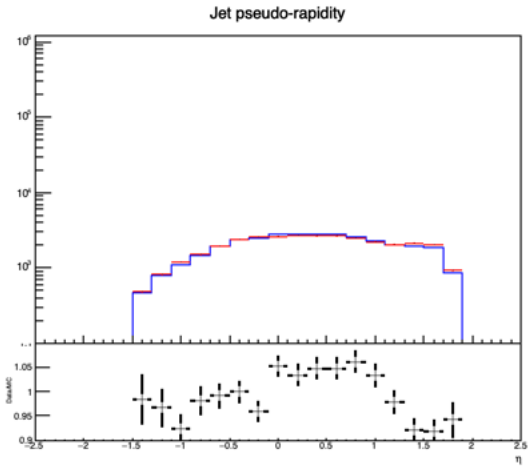
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

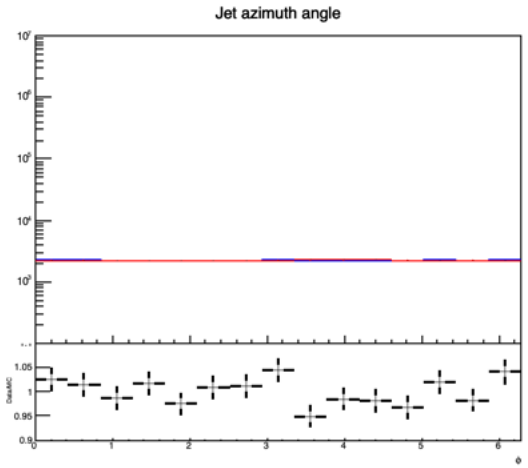
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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dPhi Q2 2_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

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jets > 2
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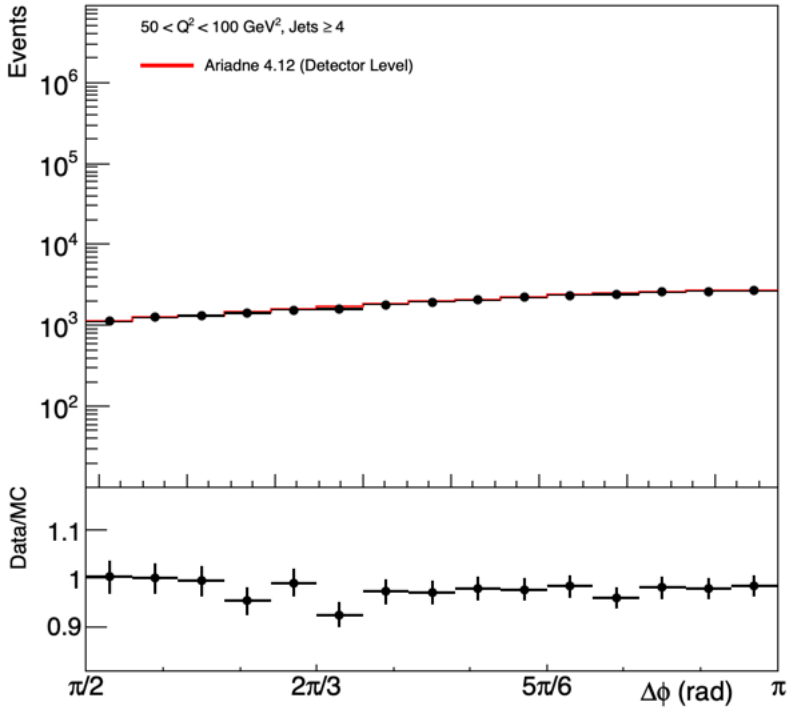

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Event Q2 3_3

	P_T bins			Q^2 bins		
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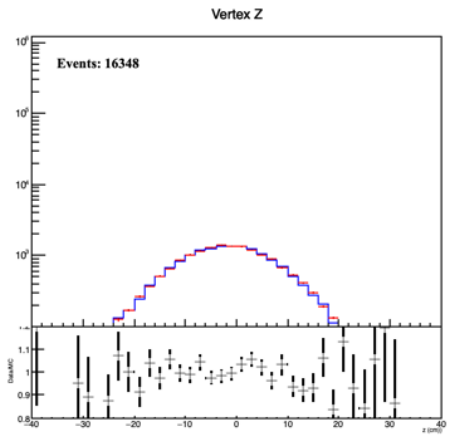

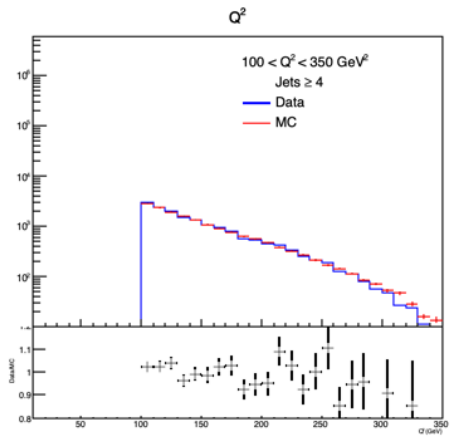

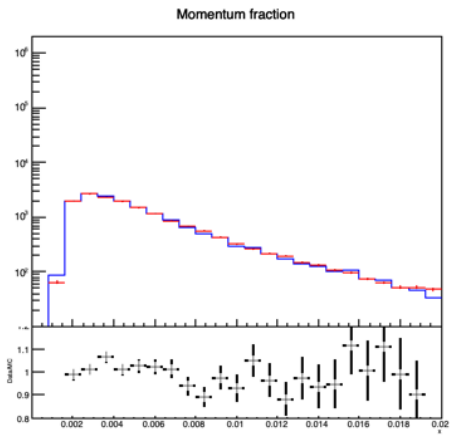

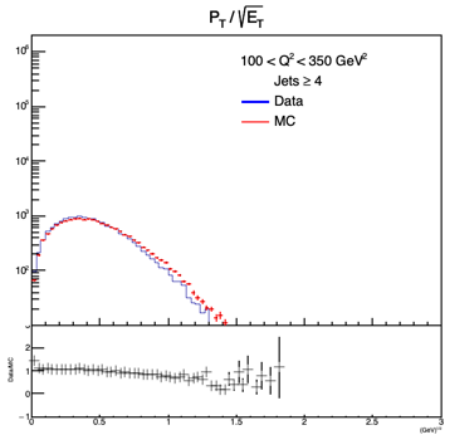

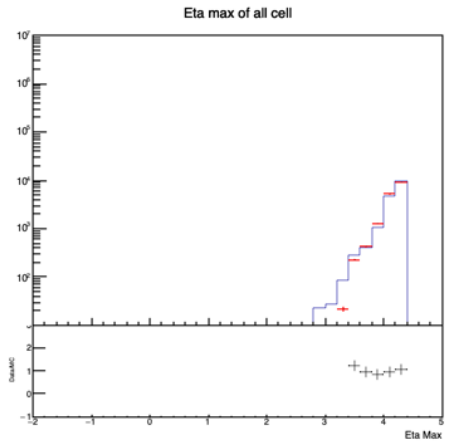

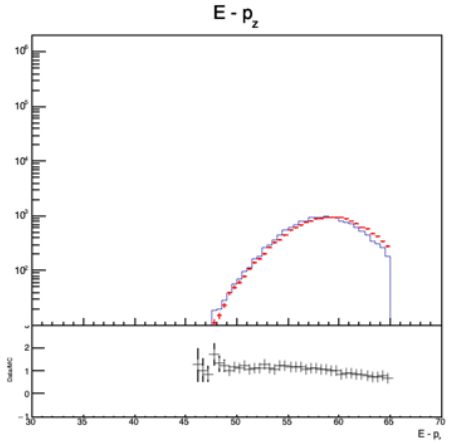

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Lepton Q2 3_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

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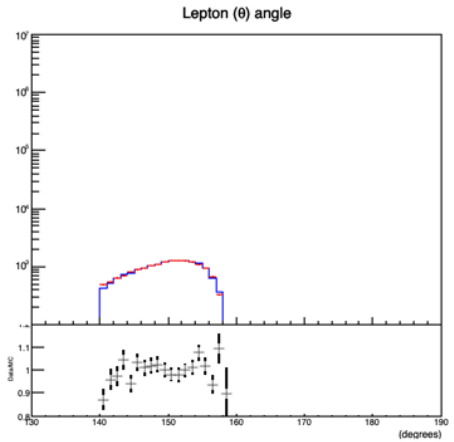
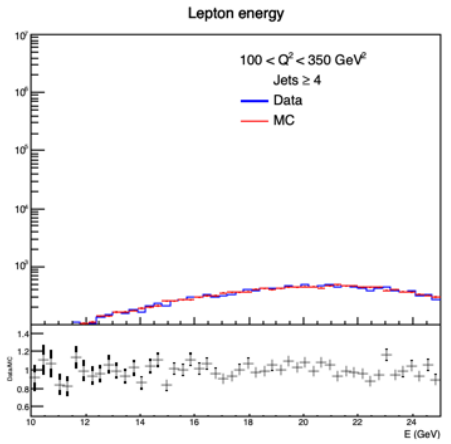
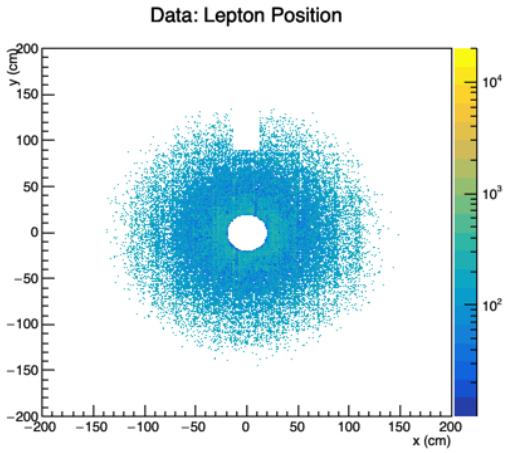
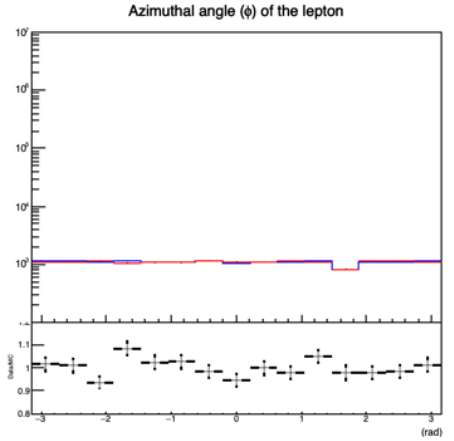
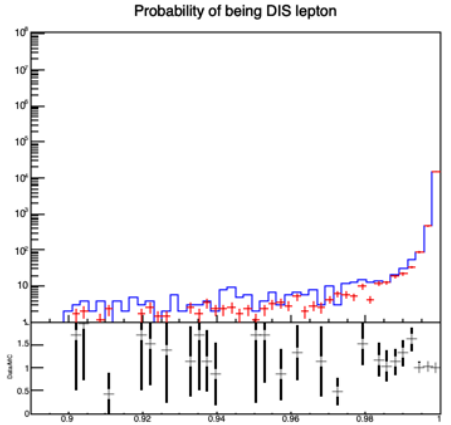
jets > 3
jets > 4

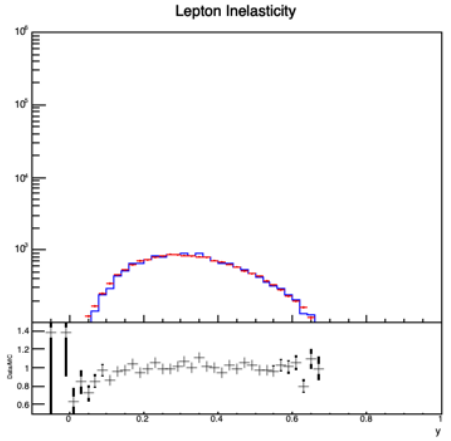












Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

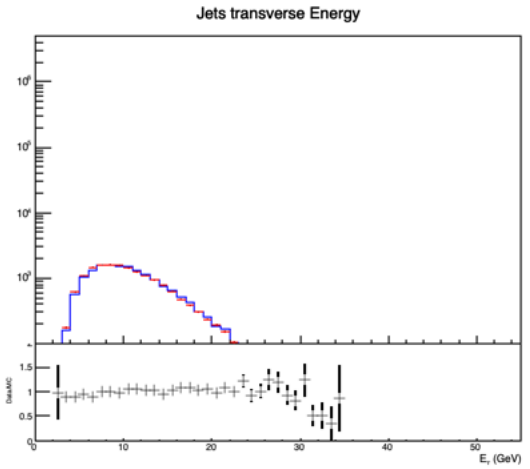
I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

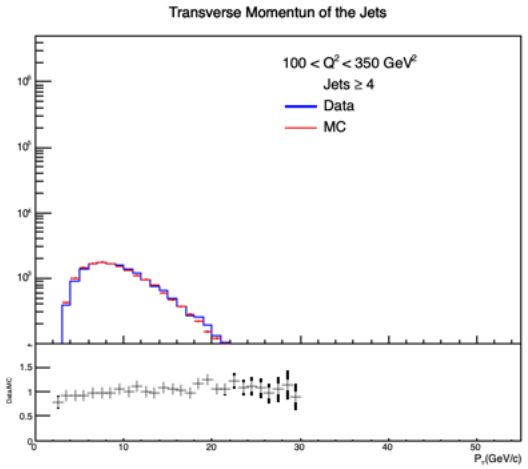
Jet Q2 3_3

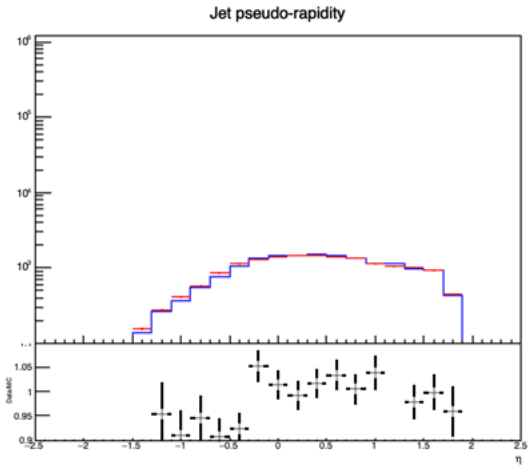
	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

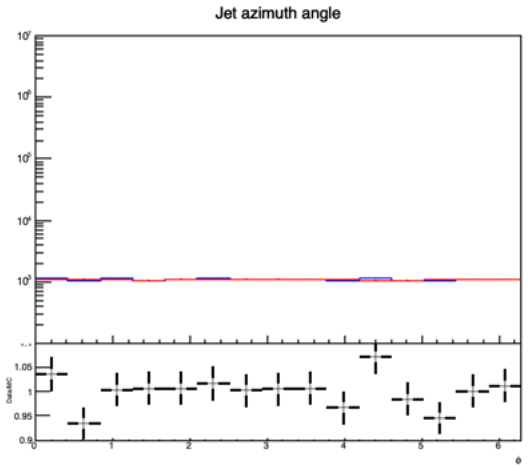
Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4









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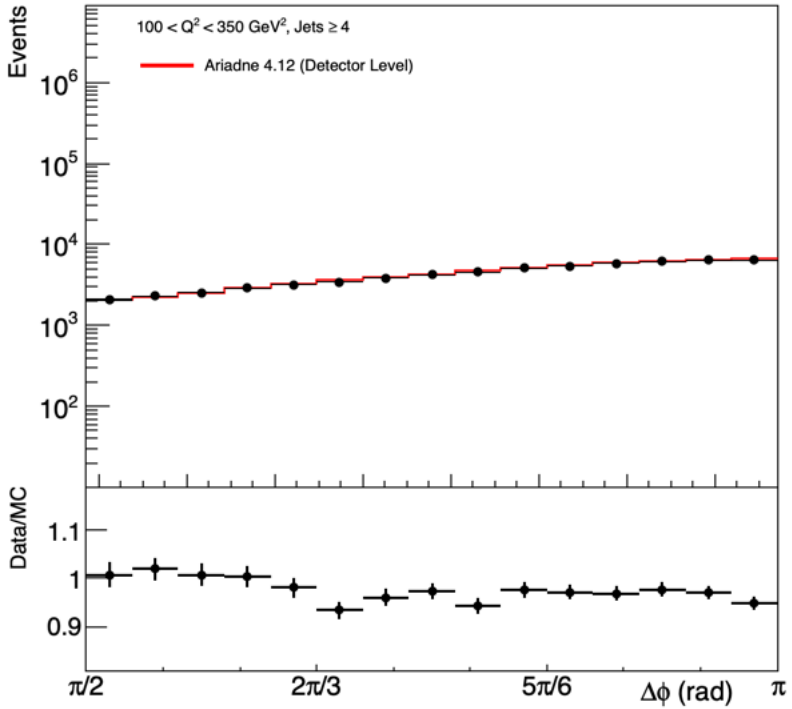
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

dPhi Q2 3_3

	P_T bins			Q^2 bins		
Event	1	2	3	1	2	3
Lepton	1	2	3	1	2	3
Jet	1	2	3	1	2	3
Δphi	1	2	3	1	2	3

Jet multiplicity:

jets > 1
jets > 2
jets > 3
jets > 4



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Systematics_1 Lepton Energy

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

- Previous Zeus analyses, mention a variation of ±2% of the lepton energy.
- The lepton energy is not directly involved in these measurements.
- Use the variation of **Q^2 ±4%**, supposing that Q^2 is linearly proportional to E^2_{lepton}
- **The average uncertainty is less than 0.1%.**

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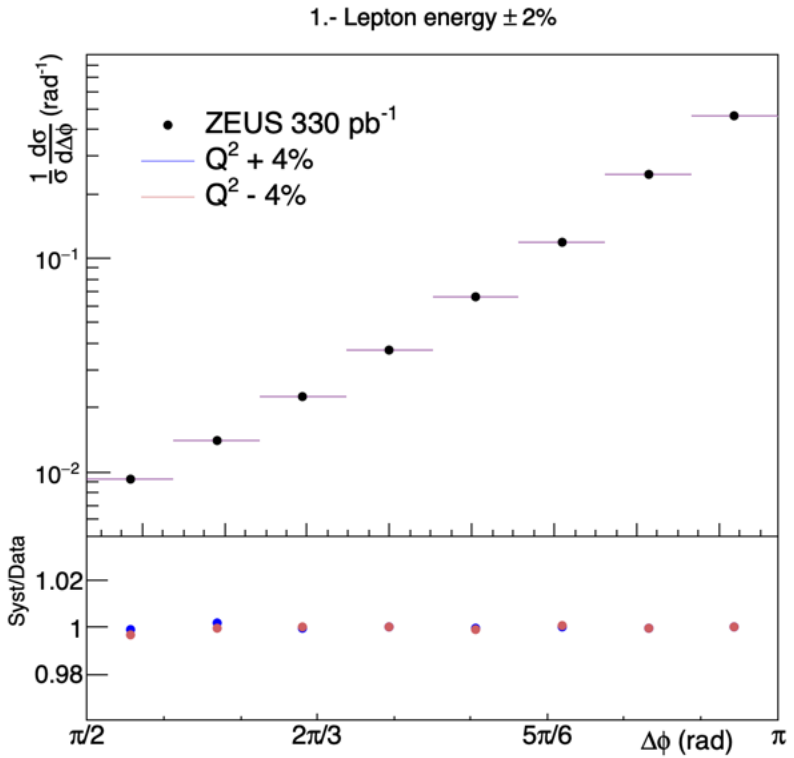
Systematics 1

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



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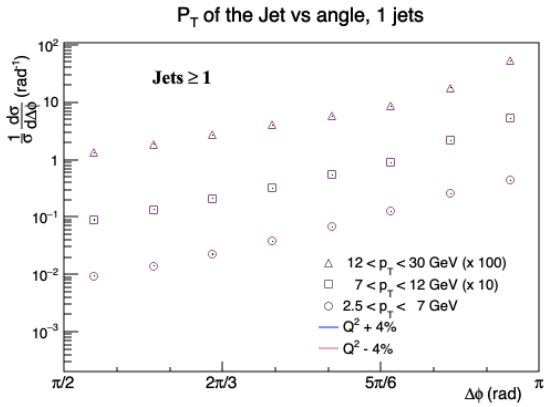
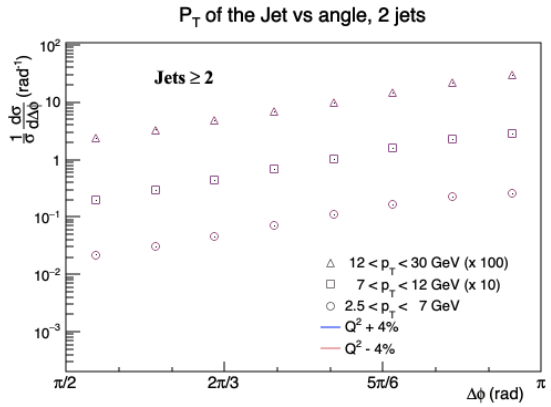
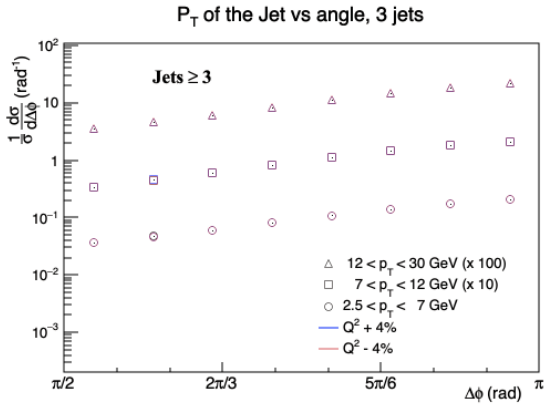
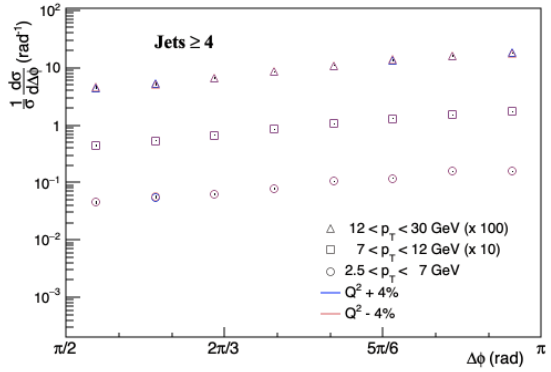
Systematics 1 Pt

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins









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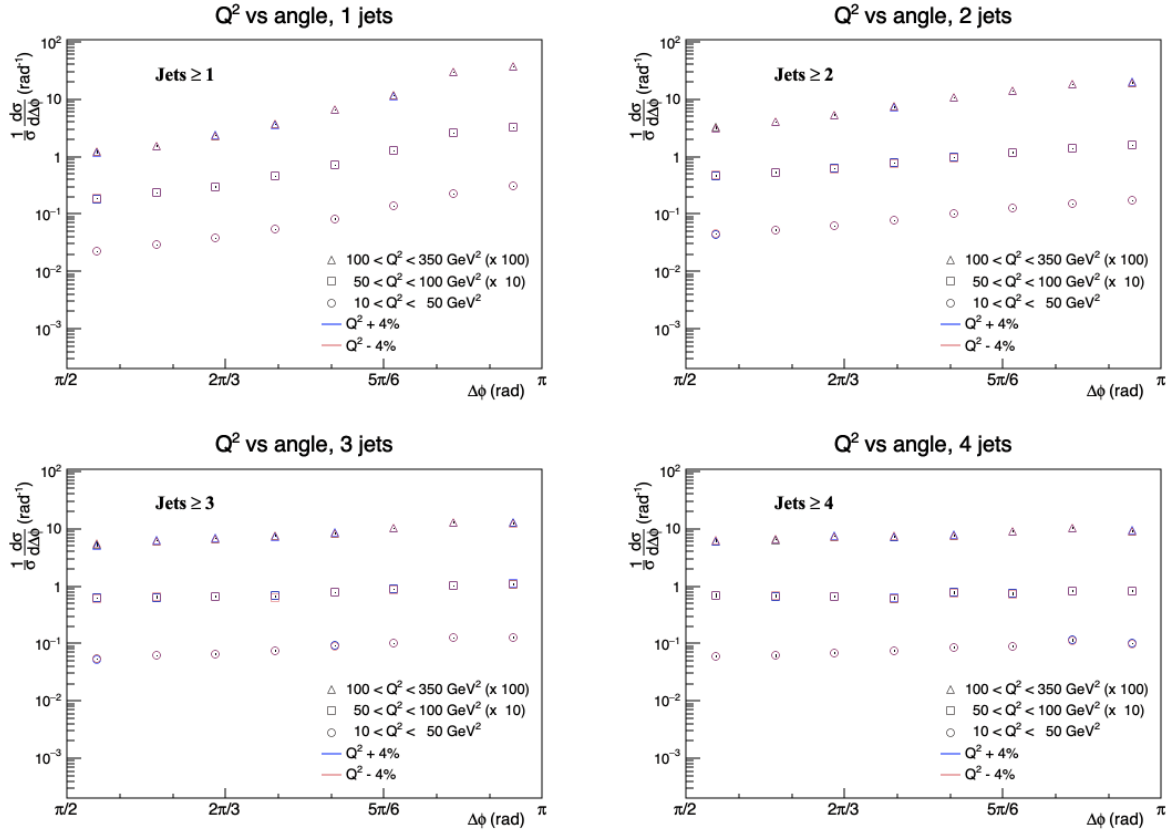
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Systematics 1 Q^2

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



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Systematics_2 Jet Energy

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

- A variation of ±4% for jet energies less that 10 GeV, else ±2.5%, was applied as previous analyses.
- **The average variation is less than 0.1%.**

Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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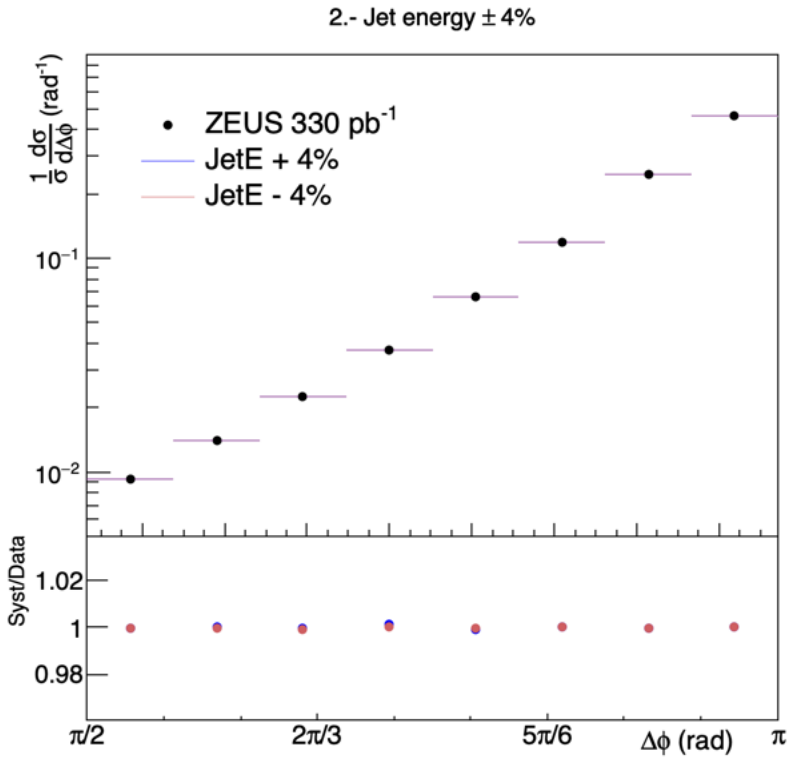
Systematics 2

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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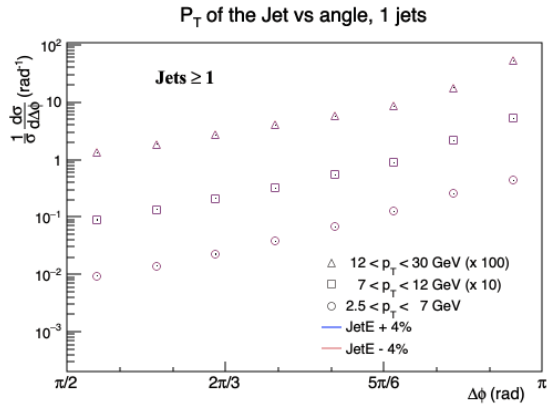
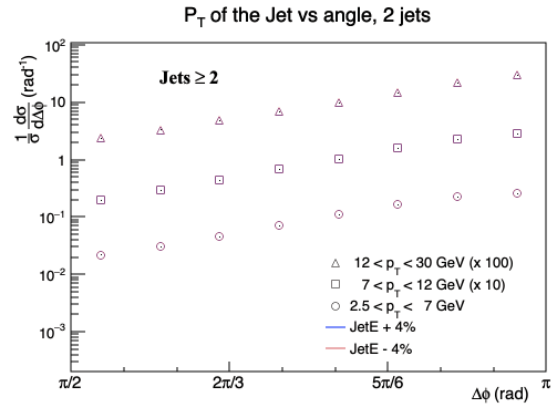
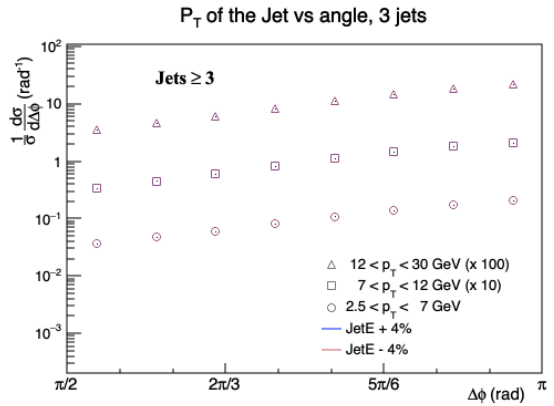
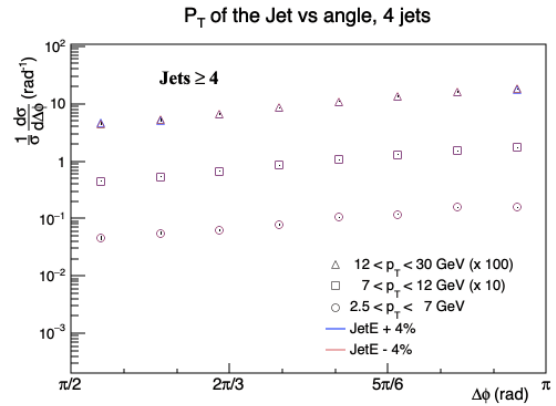
Systematics 2 Pt

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins









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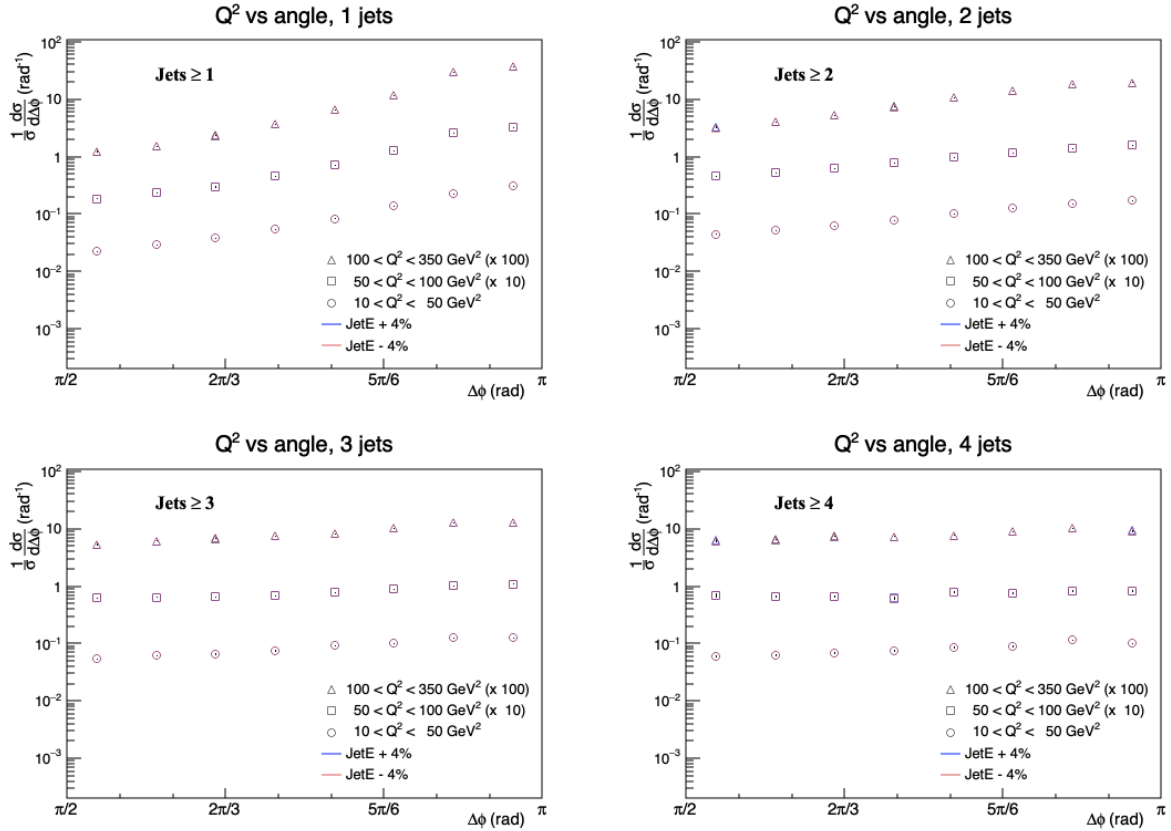
Systematics 2 Q^2

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



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Systematics_3 Cuts

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

- |eta|<1
- Vary E-pz cut ± 3 (units of Empz)*
- Vary Et_jet cut +2.5%
- Vary Lepton Energy cut ± 2%
- Lepton prob cut ± 0.002*
- Inelasticity cut ± (electron 0.027) (JB 0.01)*
- **The average variation is less than 3%.**

*Cut range obtained with the resolution from MC information

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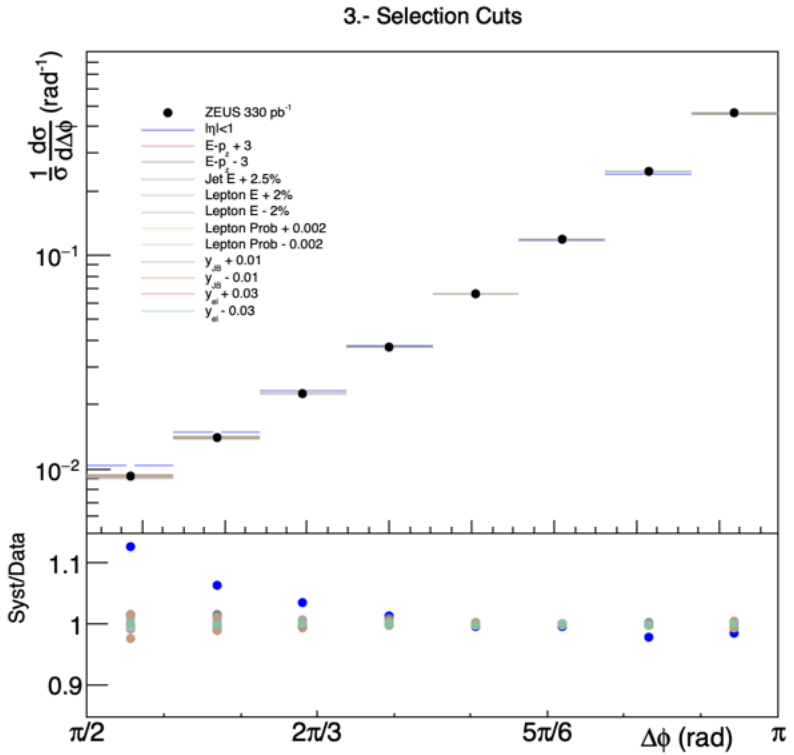
Systematics 3

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



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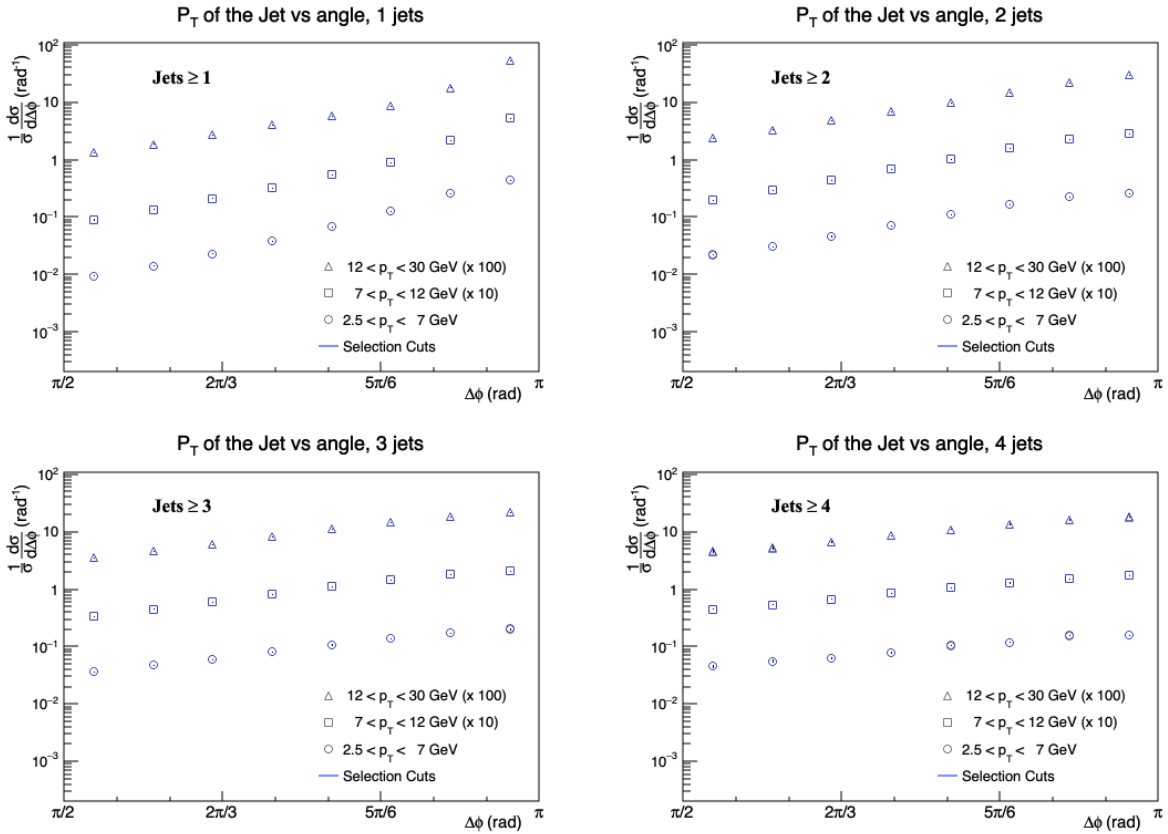
Systematics 3 Pt

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

*Taking the bin migration matrix as the weighted average of all selection cuts matrices, then performing the unfolding.



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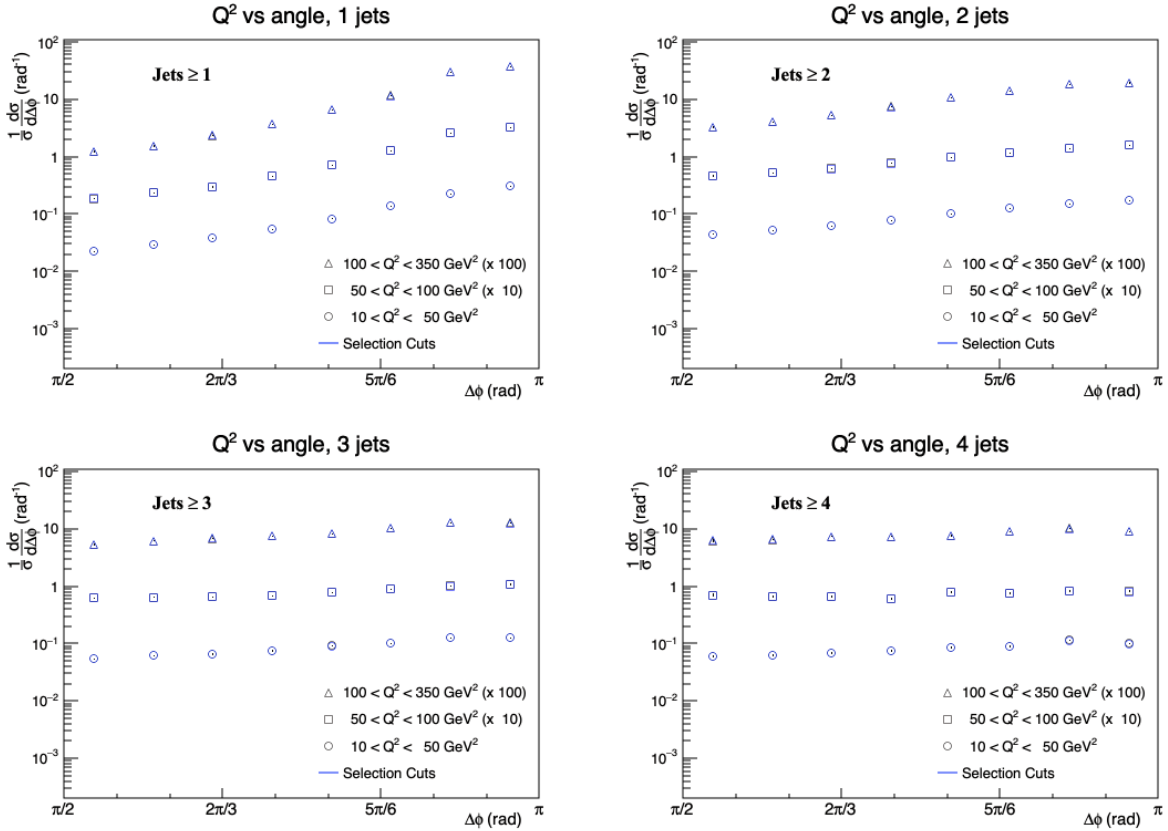
Systematics 3 Q^2

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

*Taking the bin migration matrix as the weighted average of all selection cuts matrices, then performing the unfolding.



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Systematics_4 Lepto-Ariadne

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

- The differences in the results obtained by using either Ariadne or Lepto-MEPS to correct the data for detector effects were taken to represent systematic uncertainties.
- Using the same nominal selection cuts but running Lepto sample instead of Ariadne.
- **The average variation is about 2%.**

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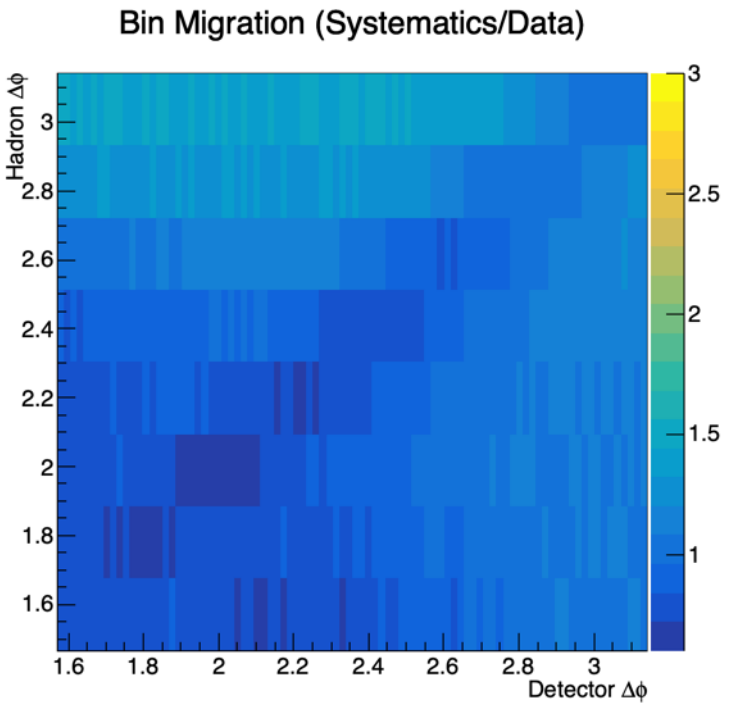
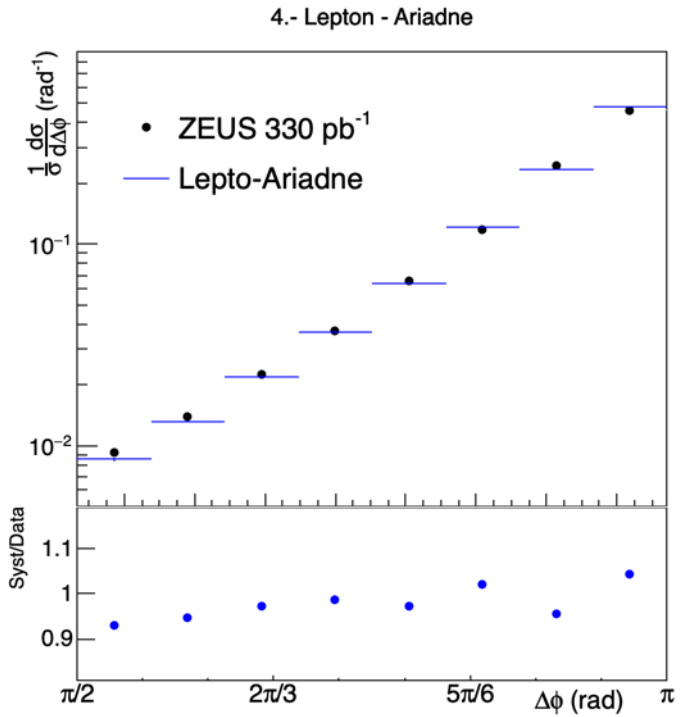
Systematics 4

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

Plotting the bin migration matrix of the systematics 4 (lepto- ariadne) divided by the nominal bin migration matrix





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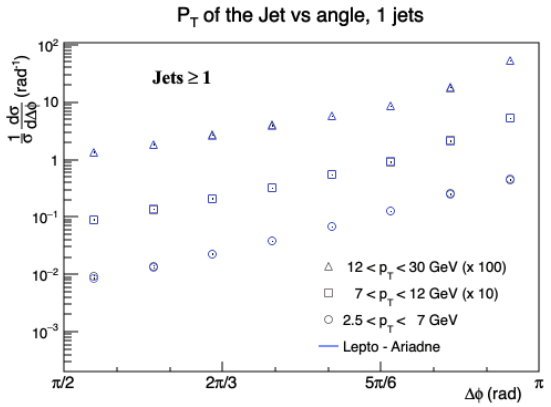
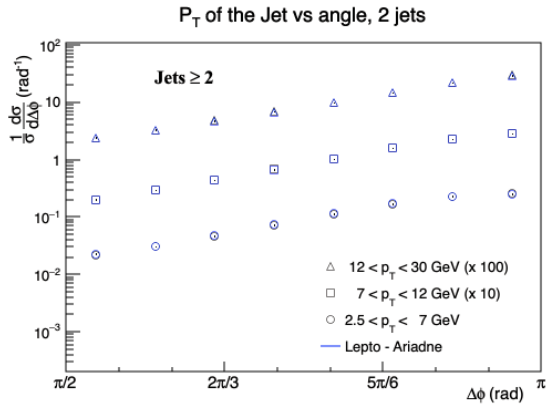
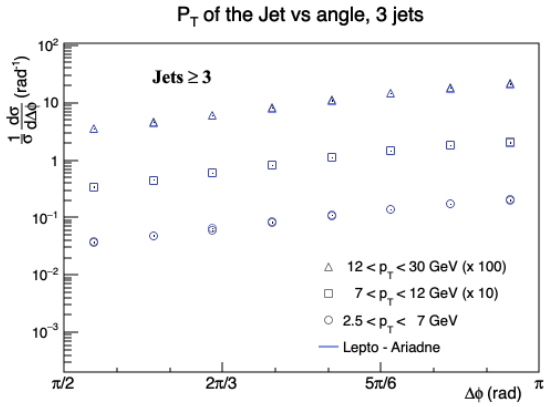
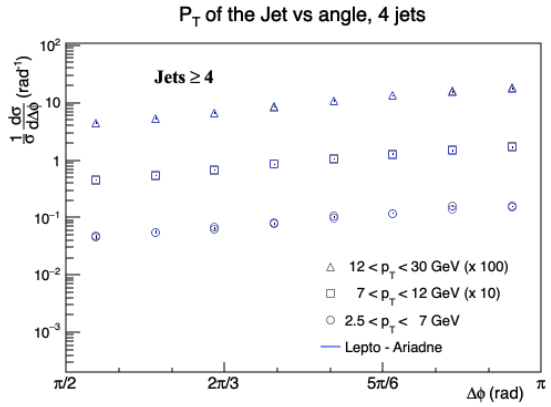
Systematics 4 Pt

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins









Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

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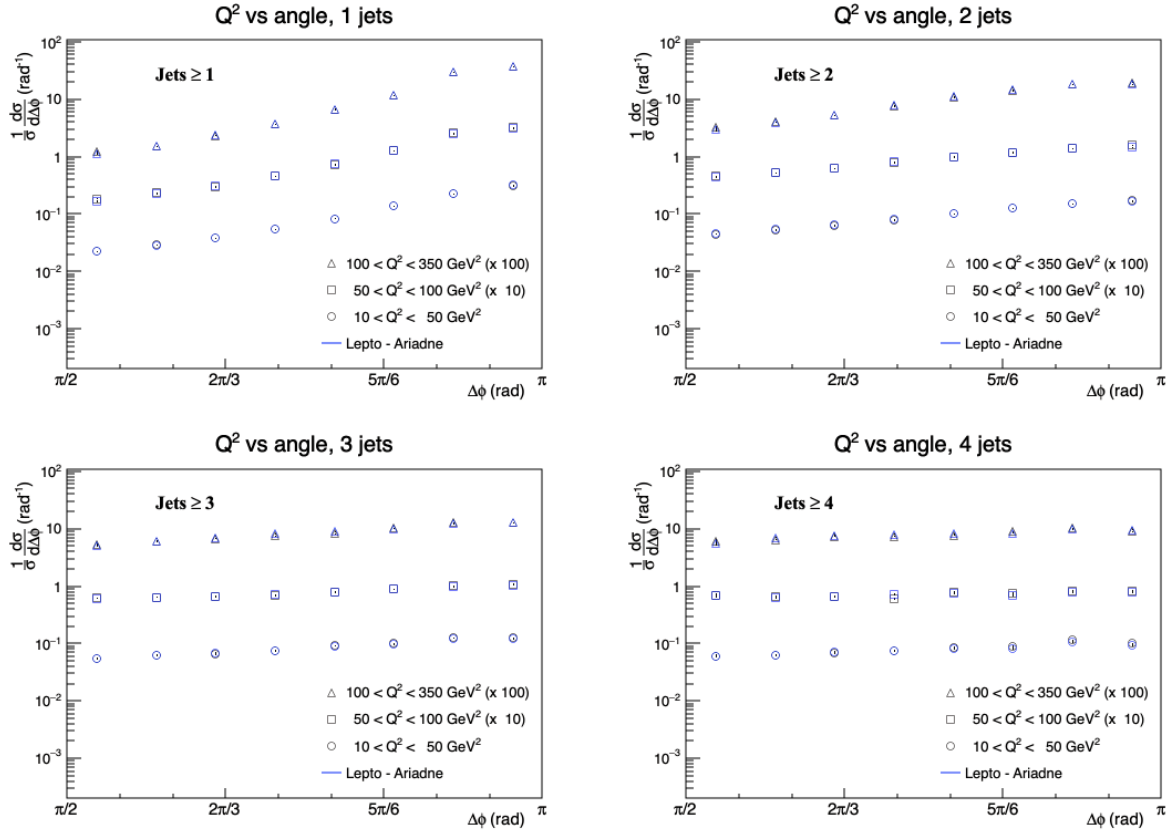
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Systematics 4 Q^2

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



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Systematics_5 Breit Frame

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins

- Use the azimuthal angle of the scattered electron from the associated track, instead of that angle derived from the calorimeter. Similar to previous analyses.
- In the code: change “Siph[0]” by “Sitrkph[SiNcand]”
- Remove Sitrkph[0]=-999.99
- **The average variation is less than 10%.**

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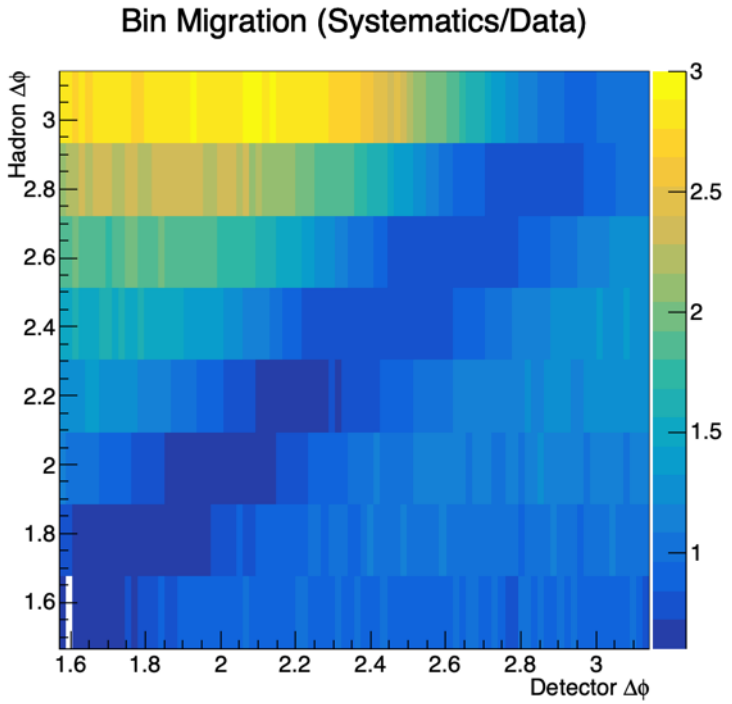
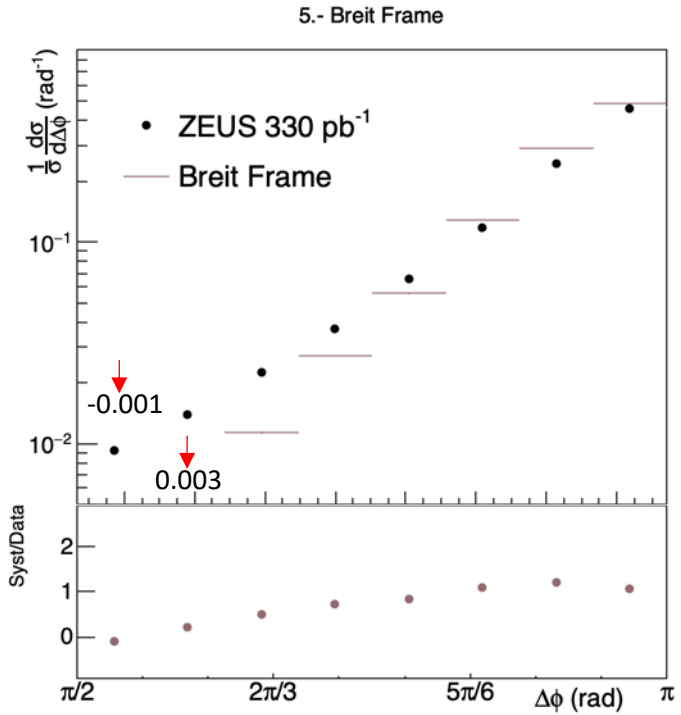
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

Systematics 5

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins



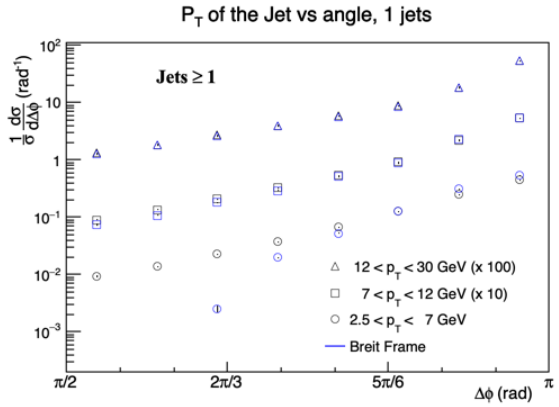


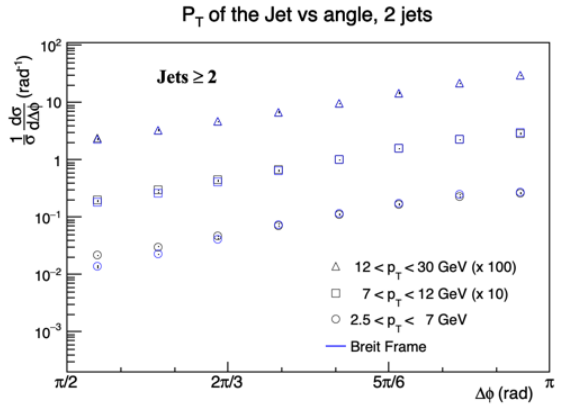
Measurement of the azimuthal decorrelation angle between the leading jet and scattered lepton in deep inelastic scattering at HERA

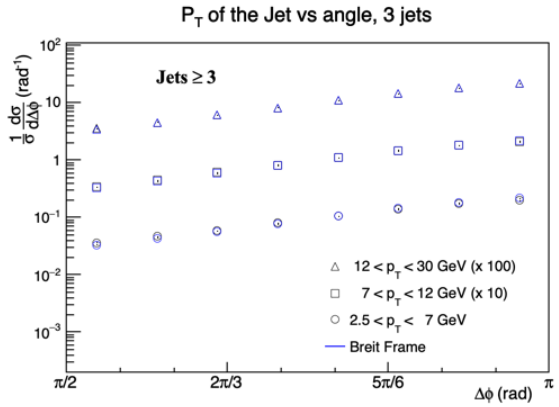
I.Pidhurskyi[1], M.Shchedrolosiev[1], J.Nam[2], A.Quintero[2], B.Surrow[2]
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

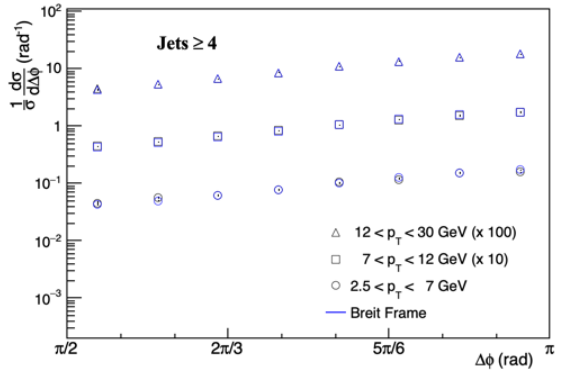
Systematics 5 Pt

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins









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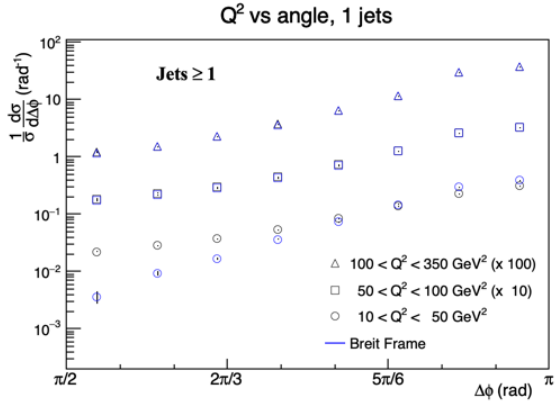
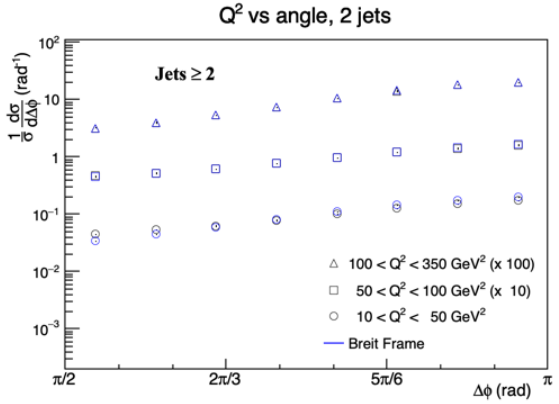
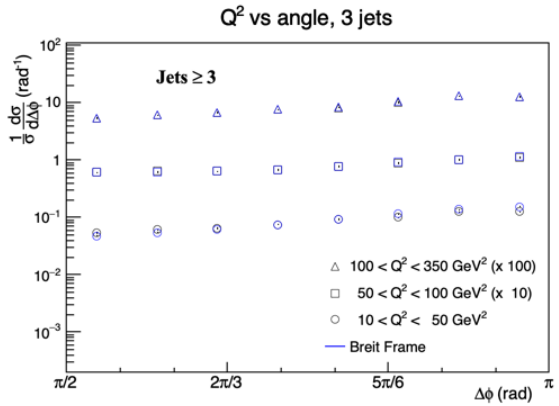
[1]Taras Shevchenko National University of Kyiv, [2]Temple University

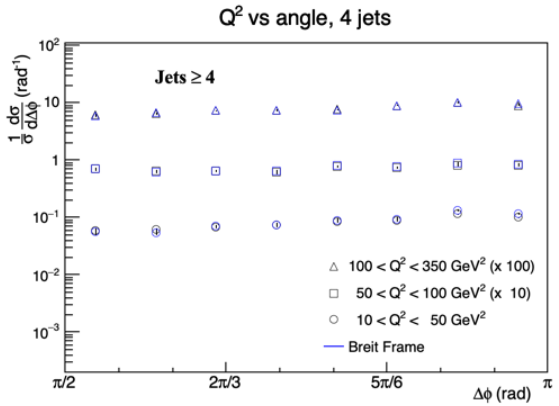
Systematics 5 Q^2

Q2	P_T bins	Q^2 bins
Jet E	P_T bins	Q^2 bins
Cut	P_T bins	Q^2 bins
Lepto	P_T bins	Q^2 bins
Breit	P_T bins	Q^2 bins









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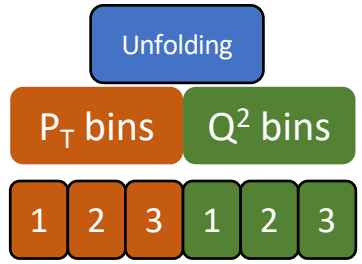
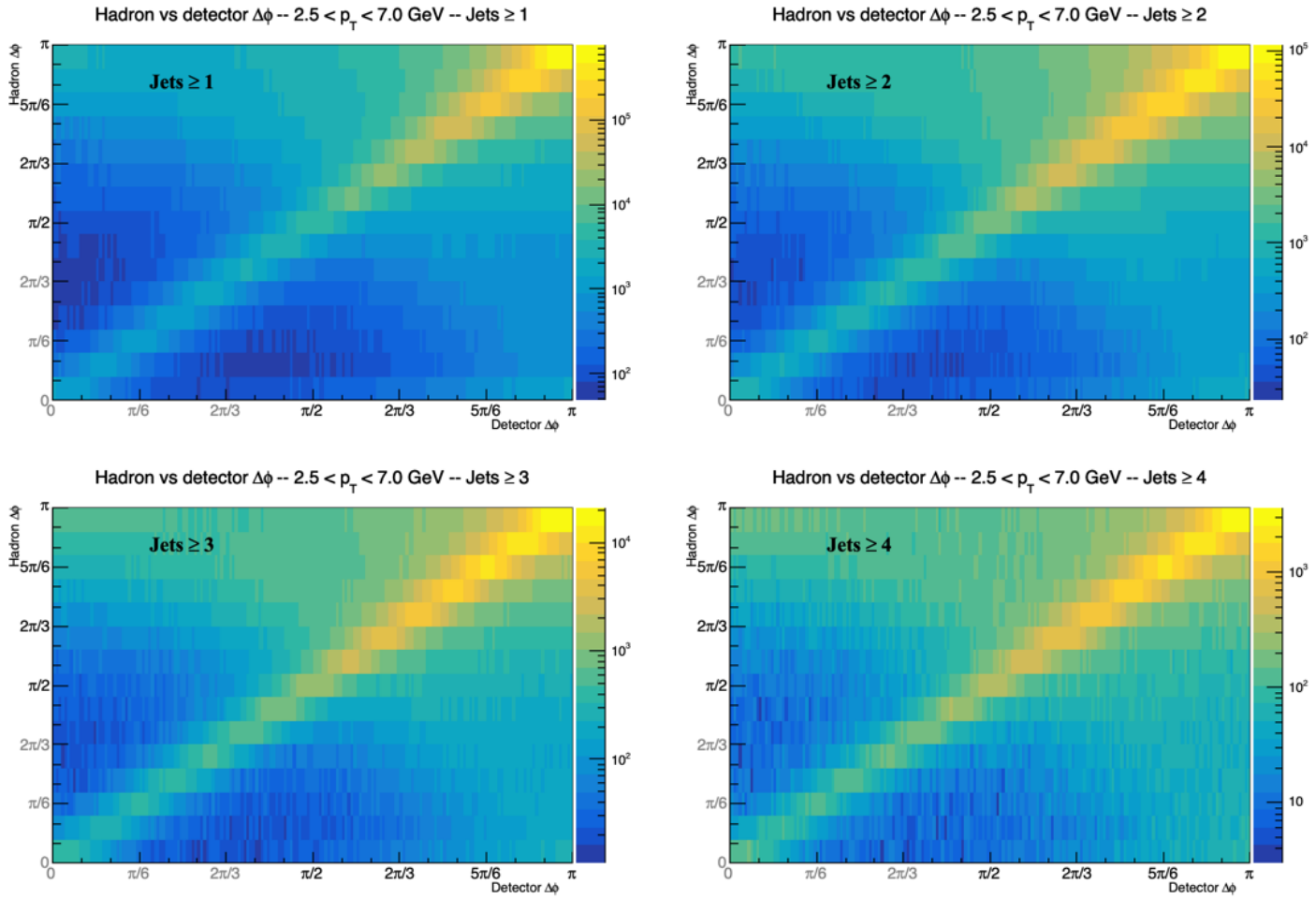
Pt Bin 1 Migration Matrix





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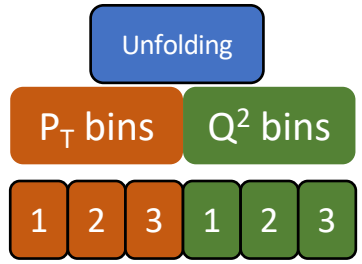
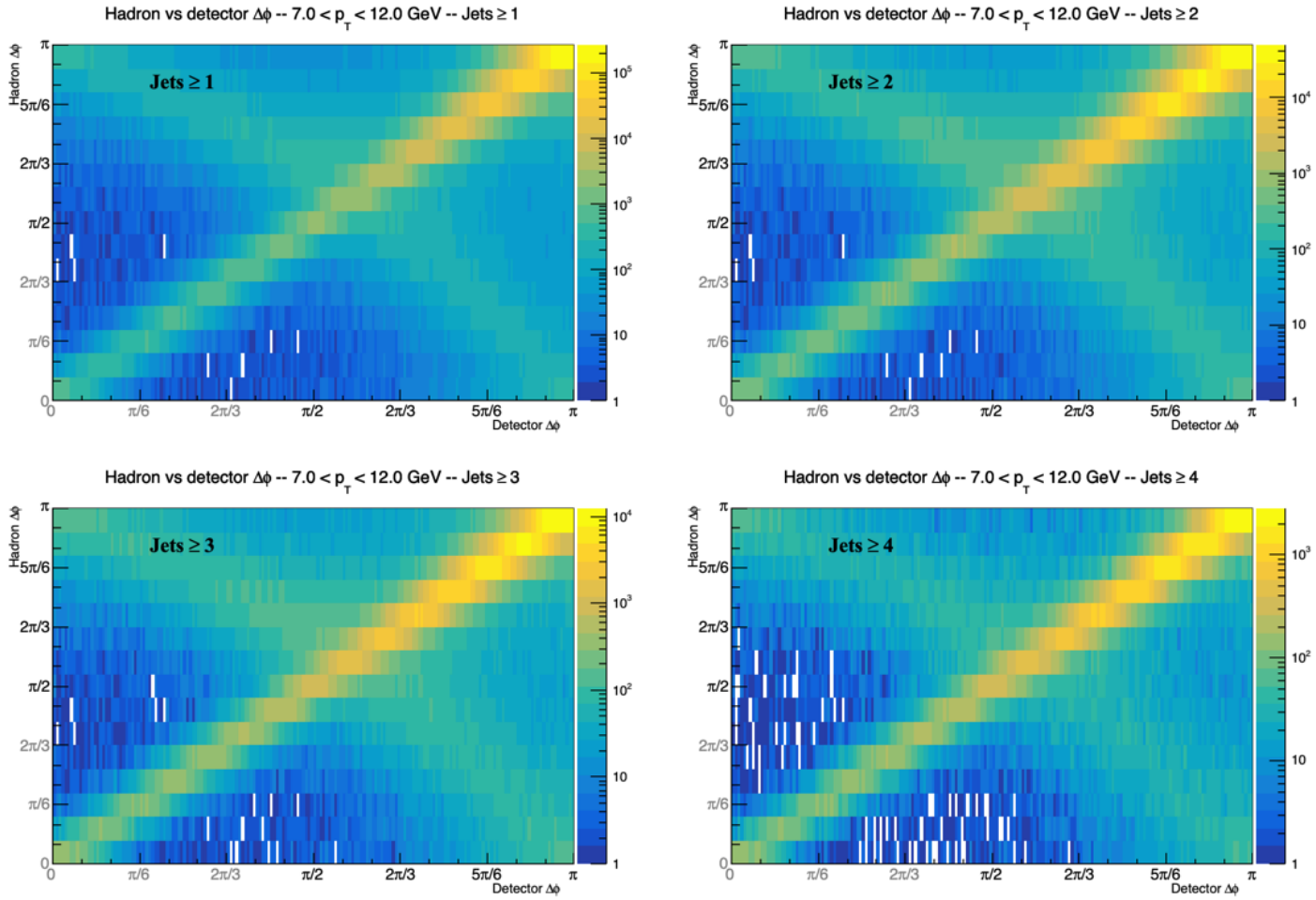
Pt Bin 2 Migration Matrix





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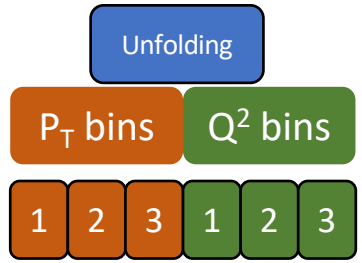
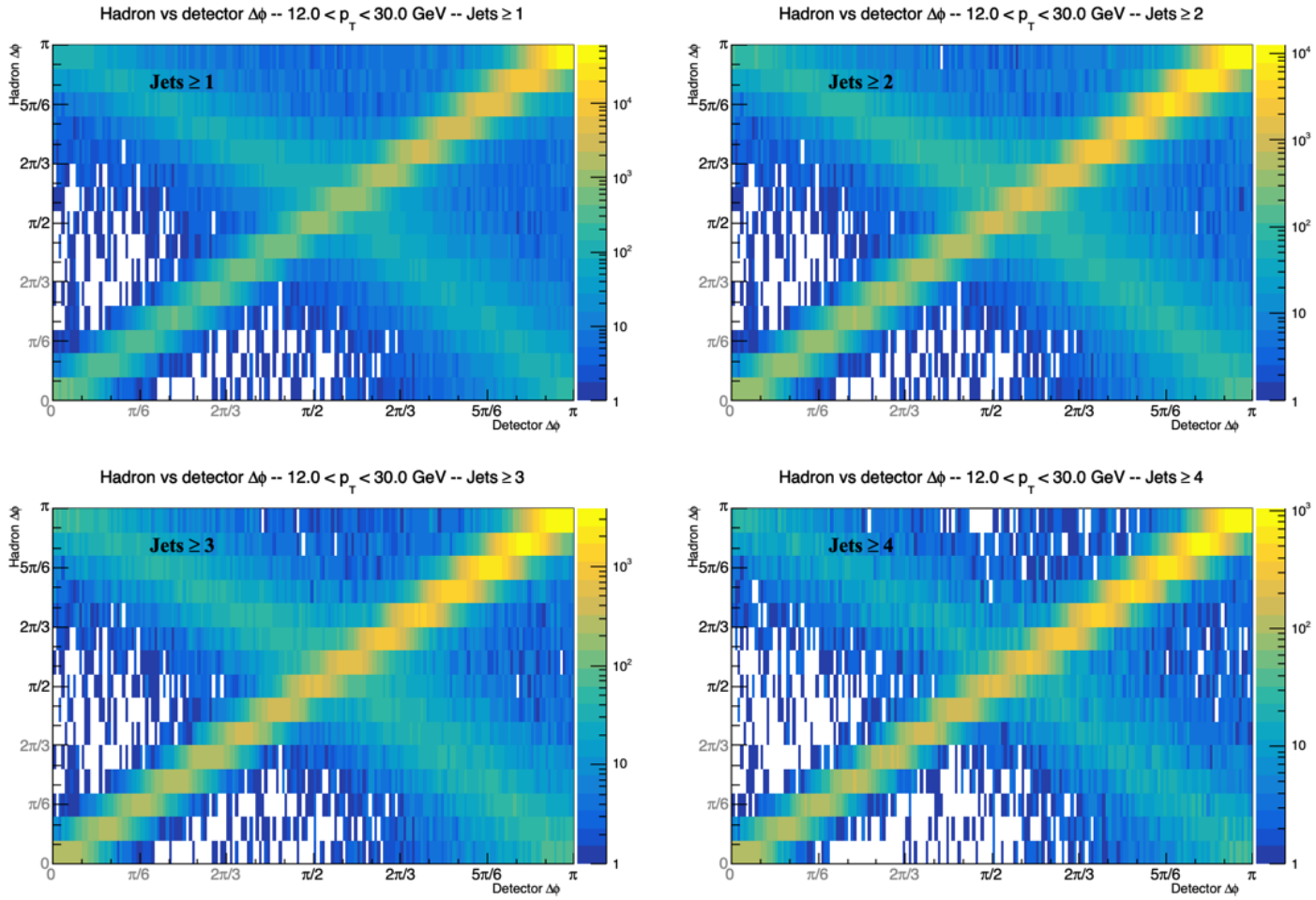
Pt Bin 3 Migration Matrix





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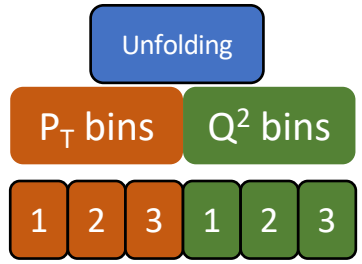
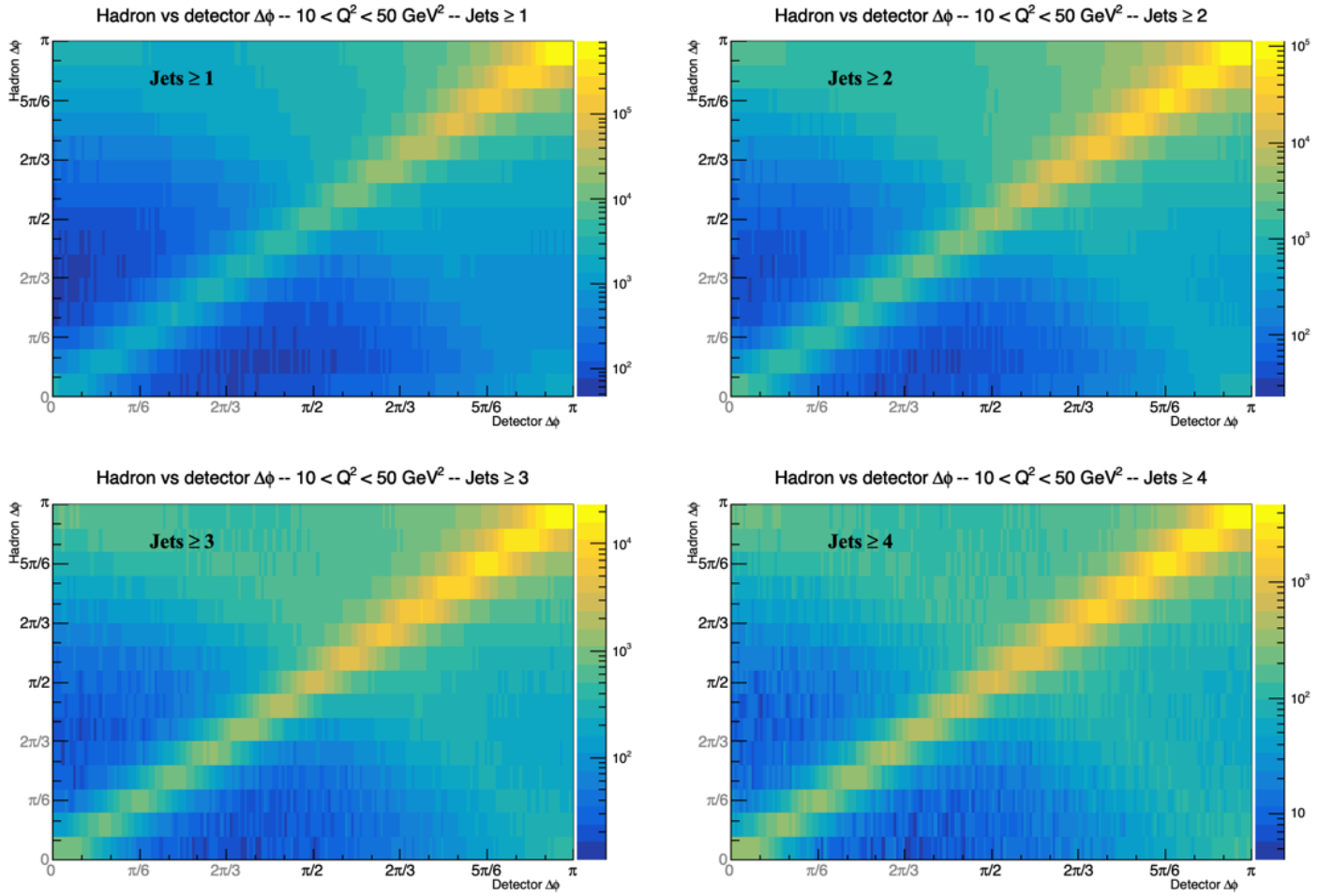
Q2 Bin 1 Migration Matrix





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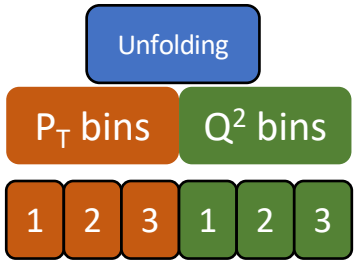
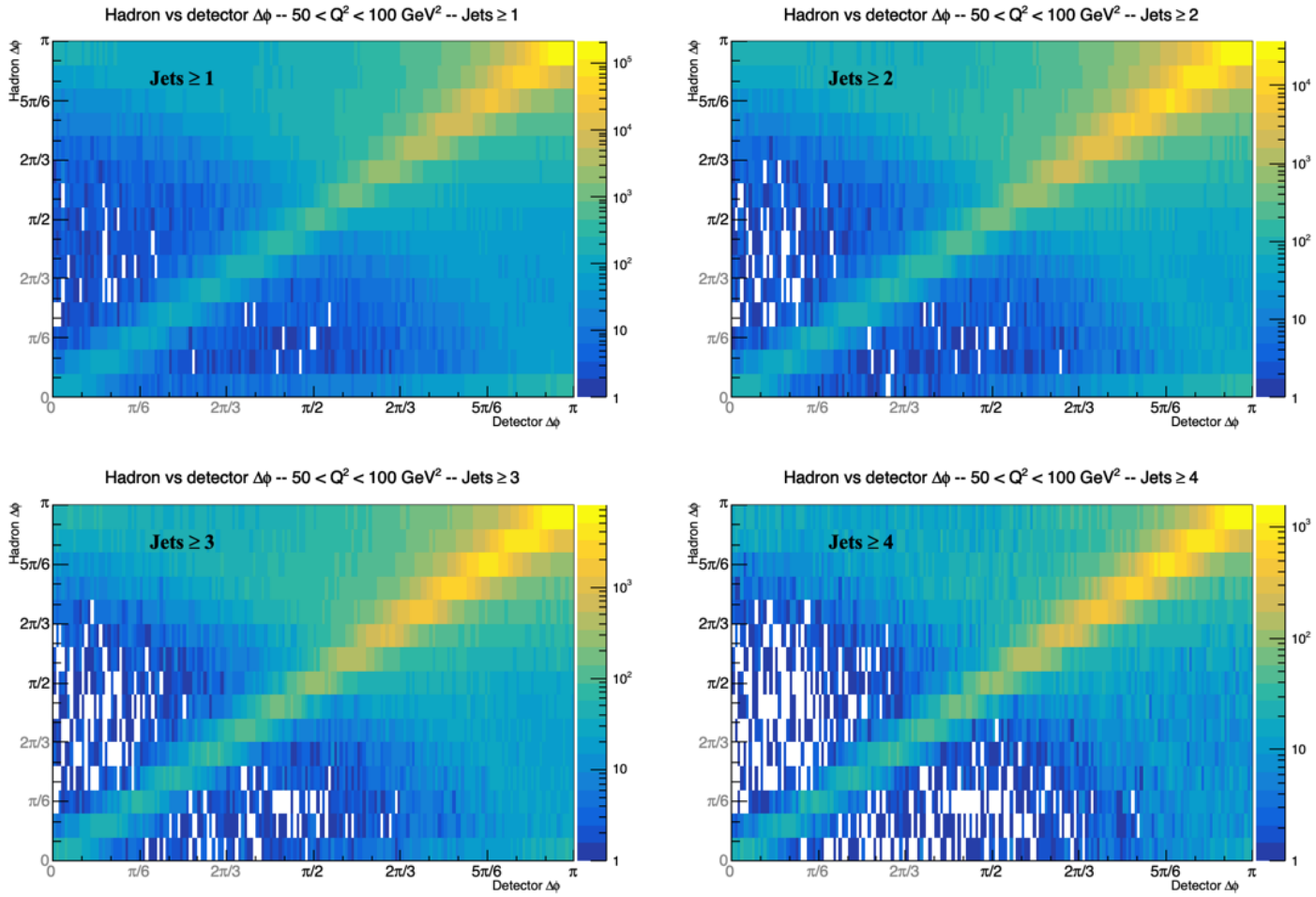
Q2 Bin 2 Migration Matrix





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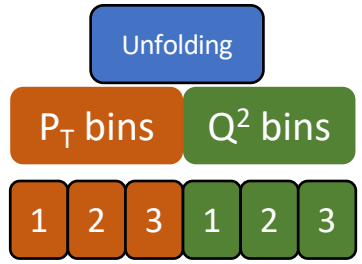
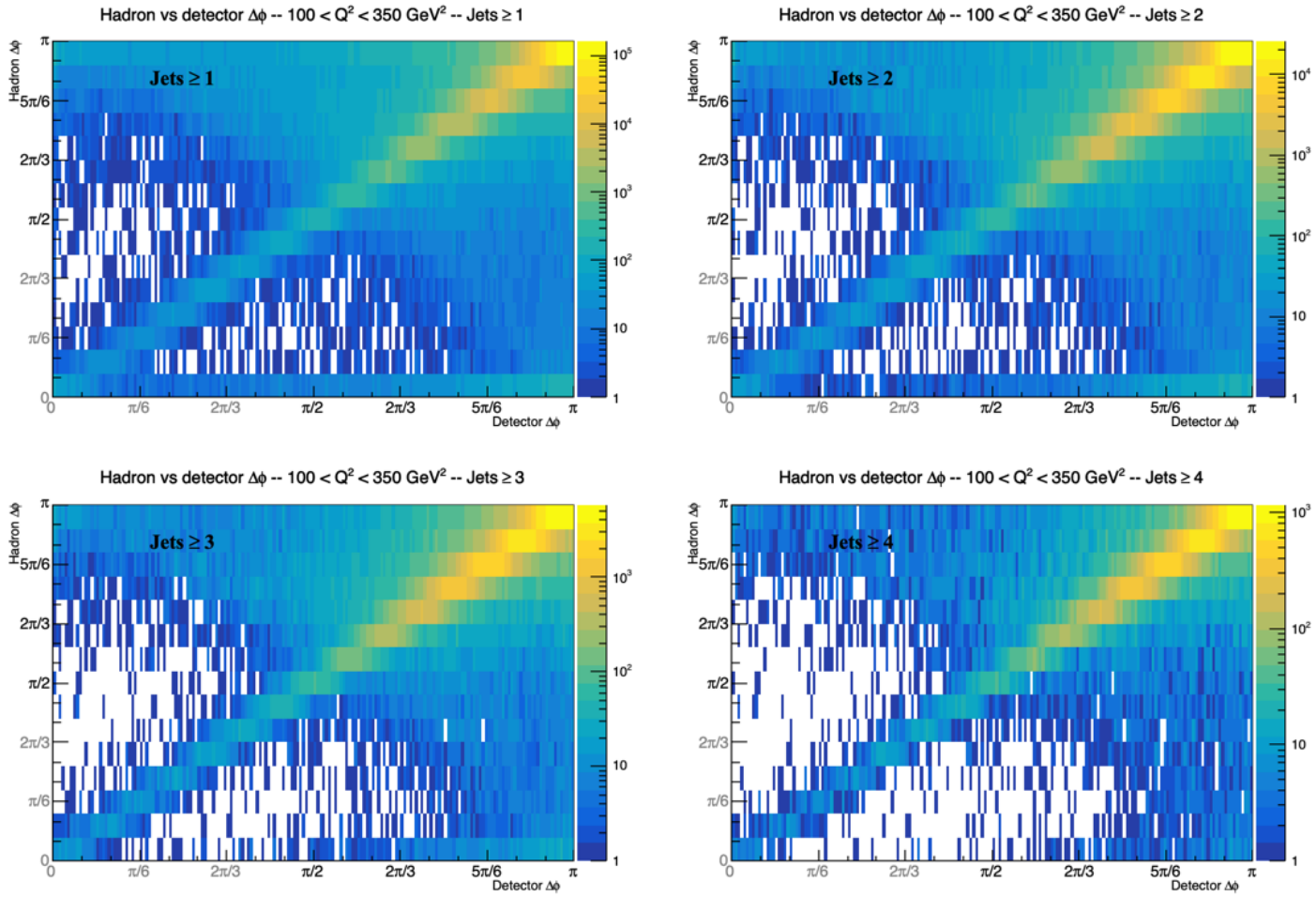
Q2 Bin 3 Migration Matrix





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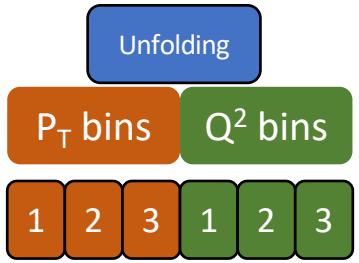
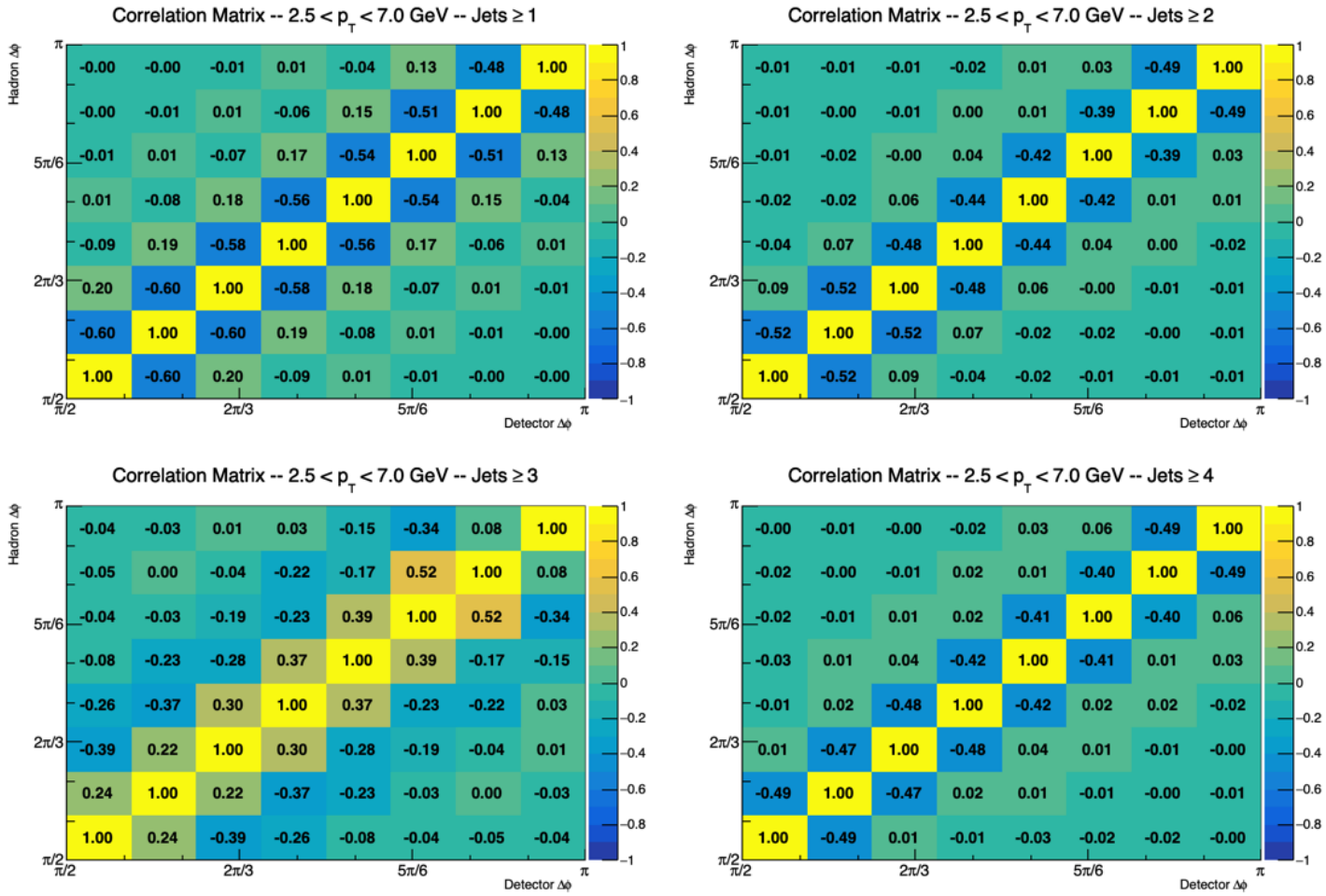
Pt bin 1 correlation matrices (stat. only)



Statistics only



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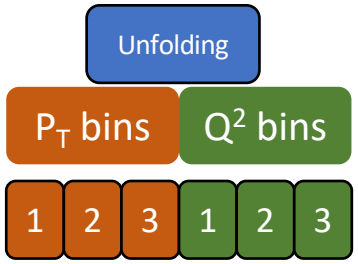
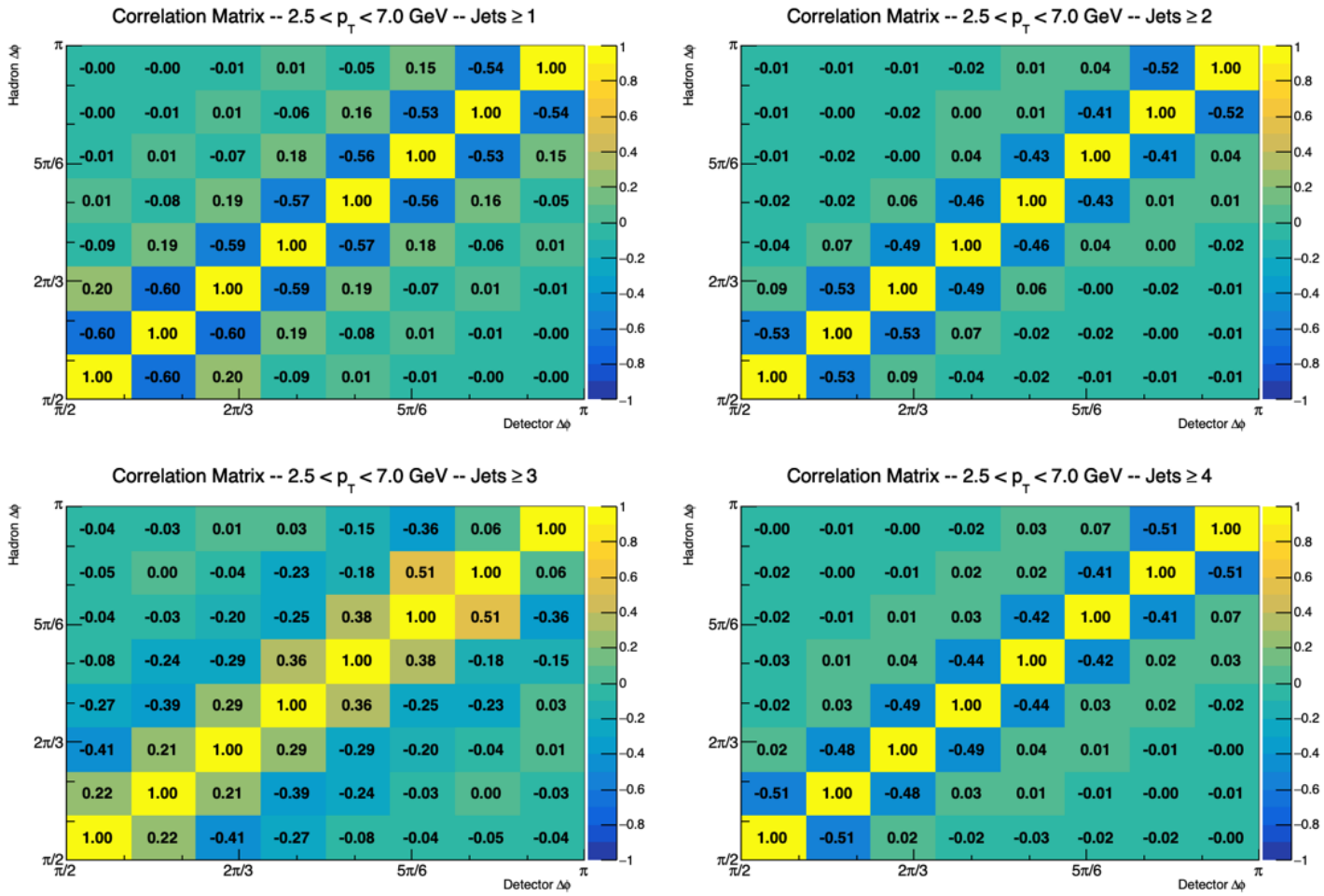
Pt bin 1 correlation matrices



Statistics only



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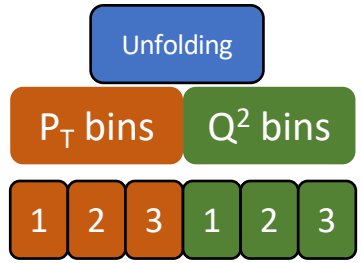
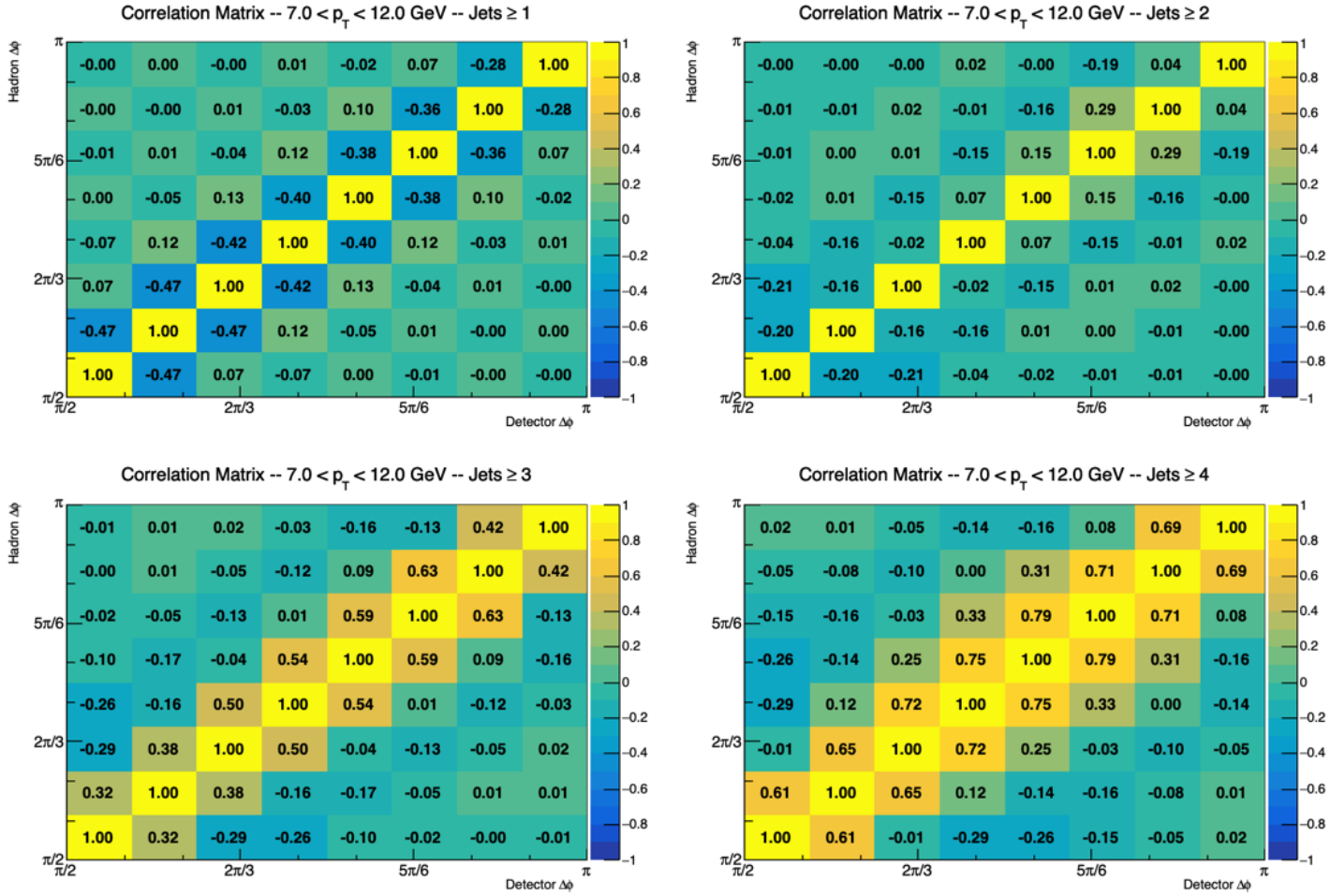
Pt bin 2 correlation matrices (stat. only)



Statistics only



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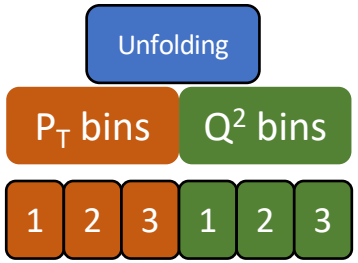
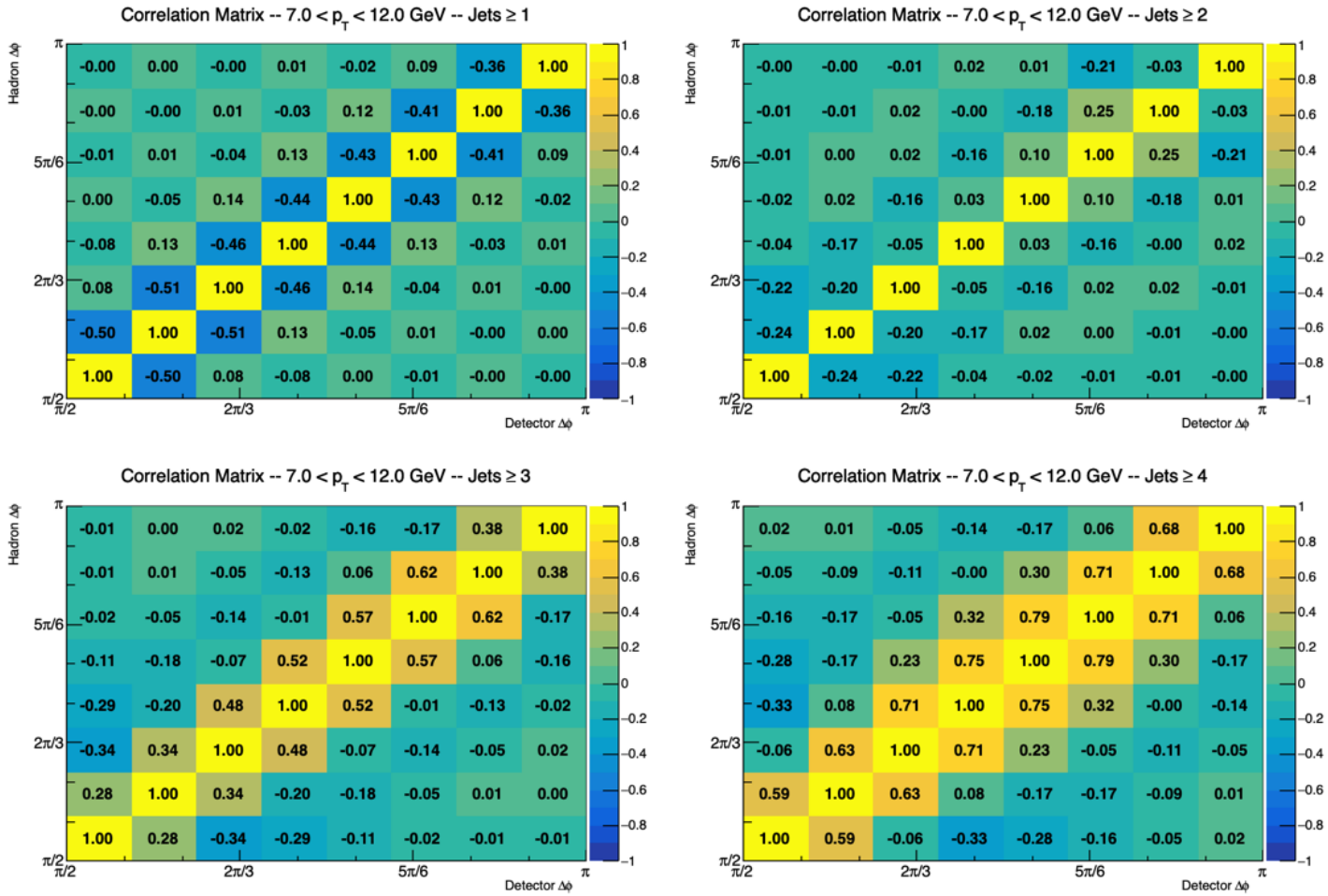
Pt bin 2 correlation matrices



Statistics only



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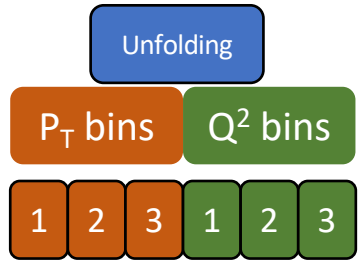
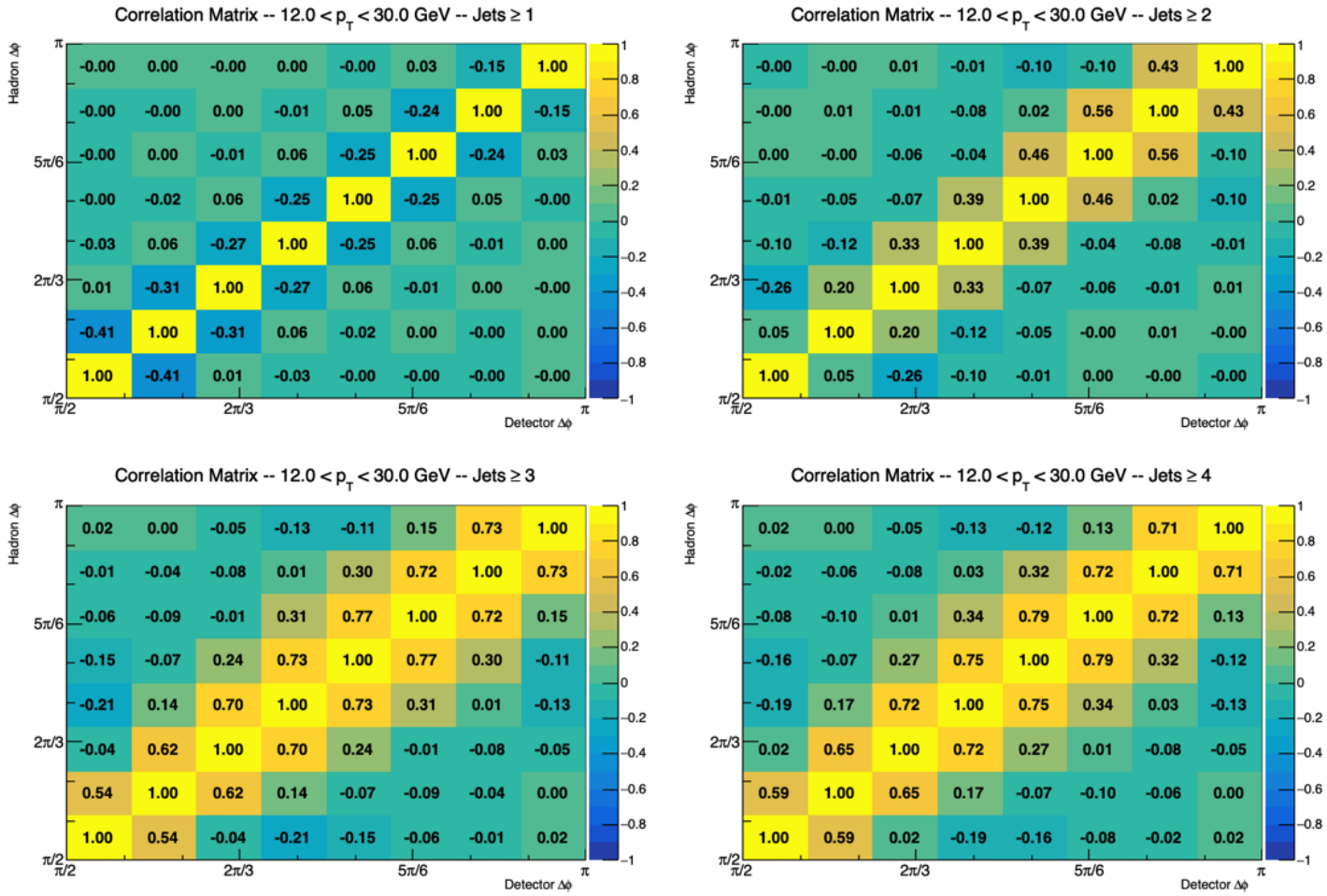
Pt bin 3 correlation matrices (stat. only)



Statistics only



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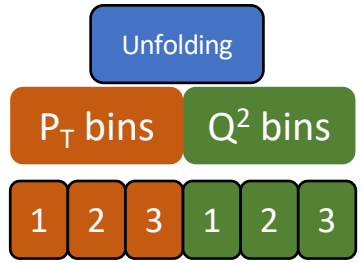
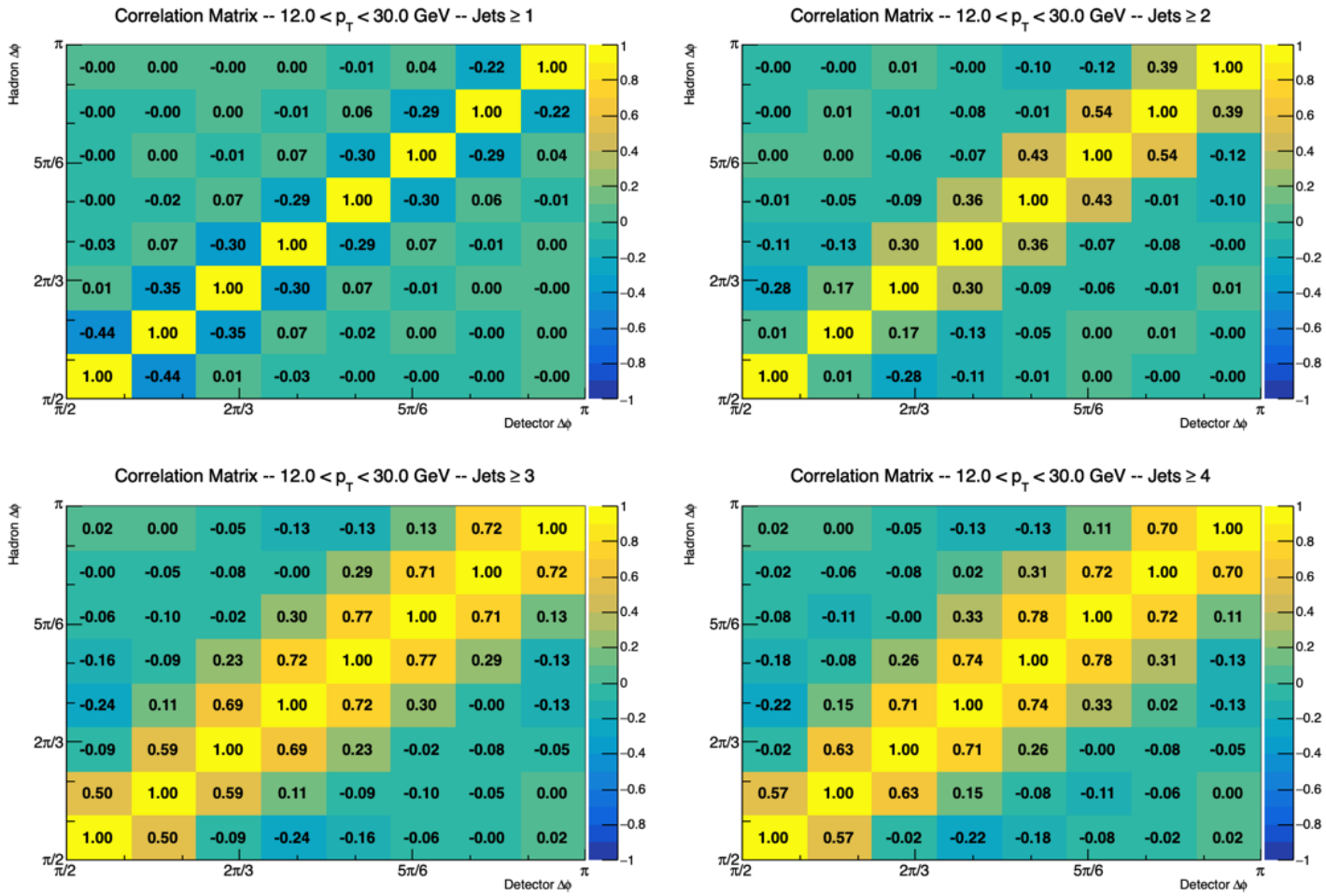
Pt bin 3 correlation matrices



Statistics only



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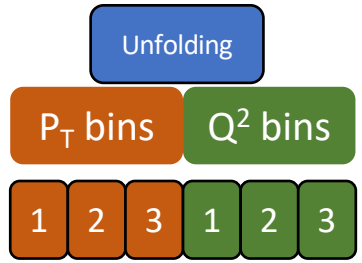
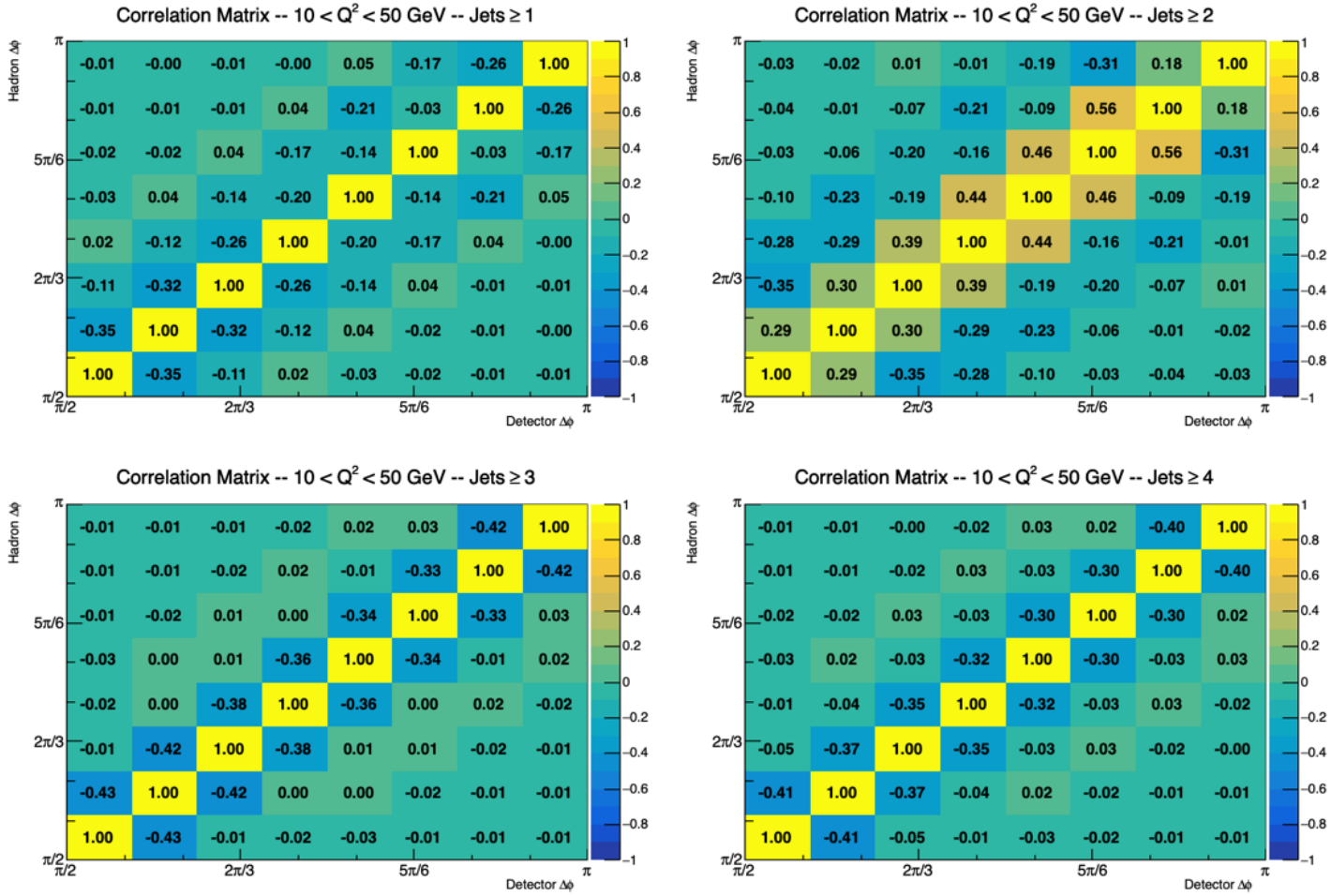
Q2 bin 1 correlation matrices (stat. only)



Statistics only



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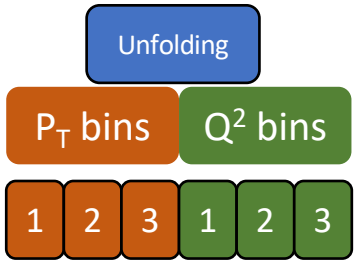
Q2 bin 1 correlation matrices



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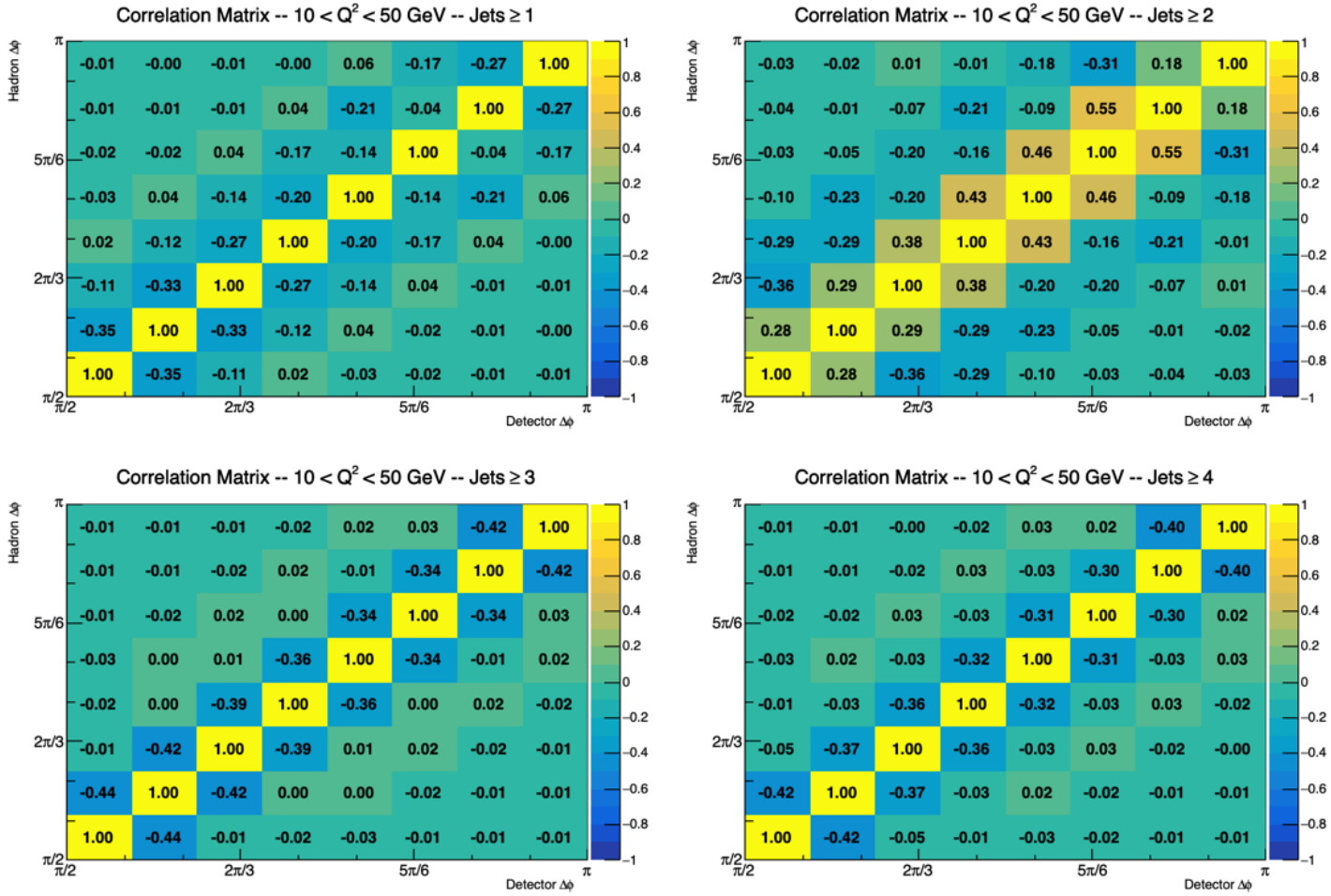

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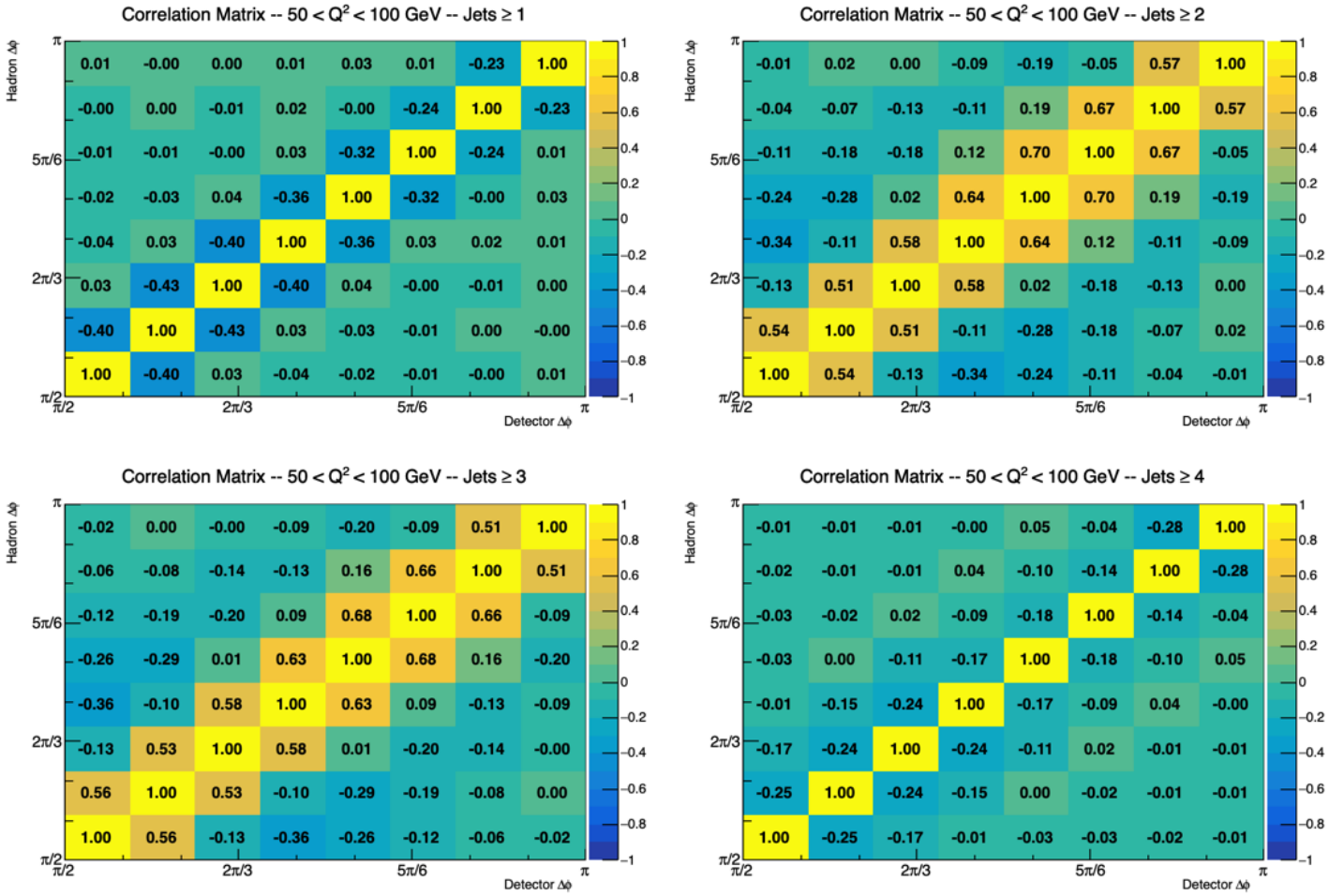
Q2 bin 2 correlation matrices (stat. only)

Unfolding

P_T bins | Q^2 bins

1 2 3 1 2 3

Statistics only



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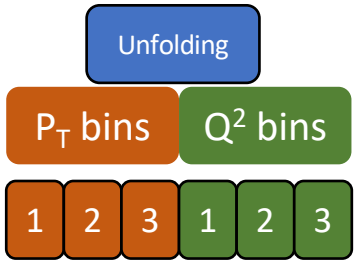
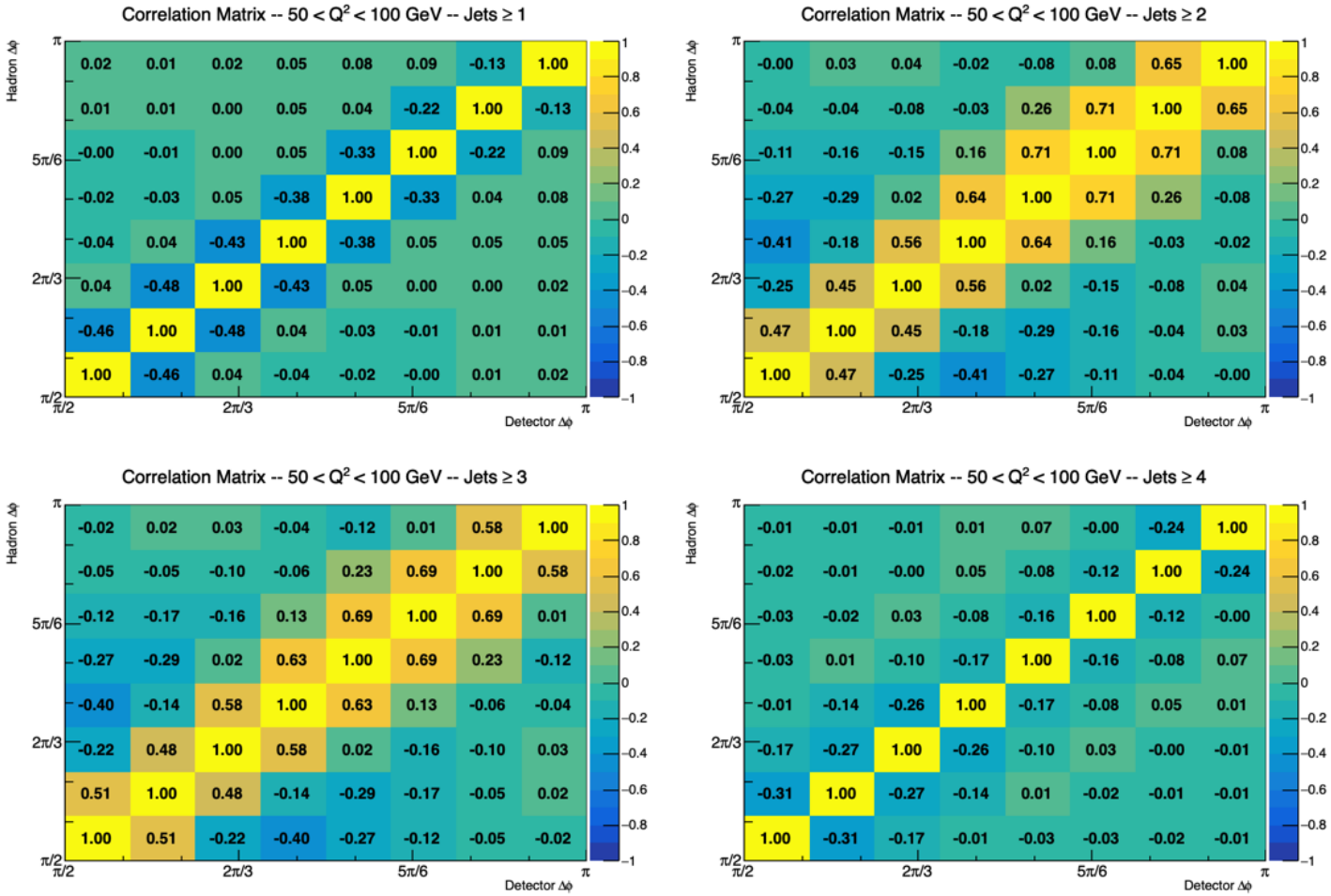
Q2 bin 2 correlation matrices



Statistics only



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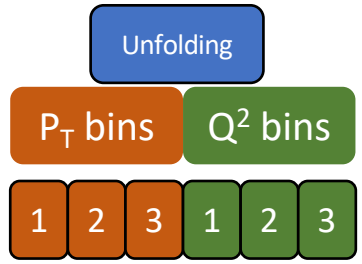
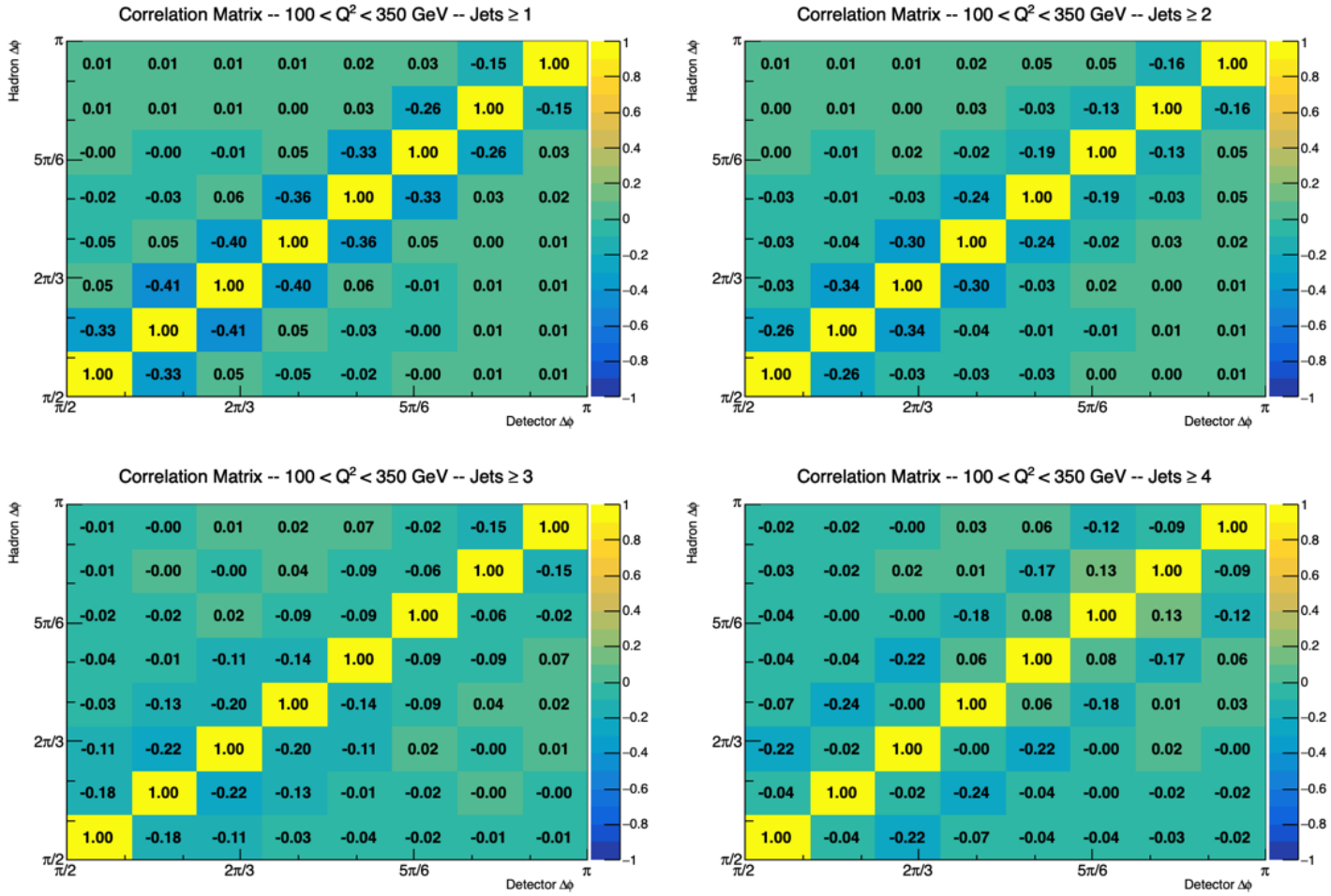
Q2 bin 3 correlation matrices (stat. only)



Statistics only



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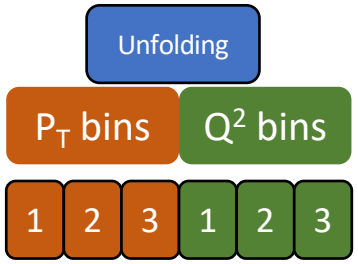
Q2 bin 3 correlation matrices



Statistics only