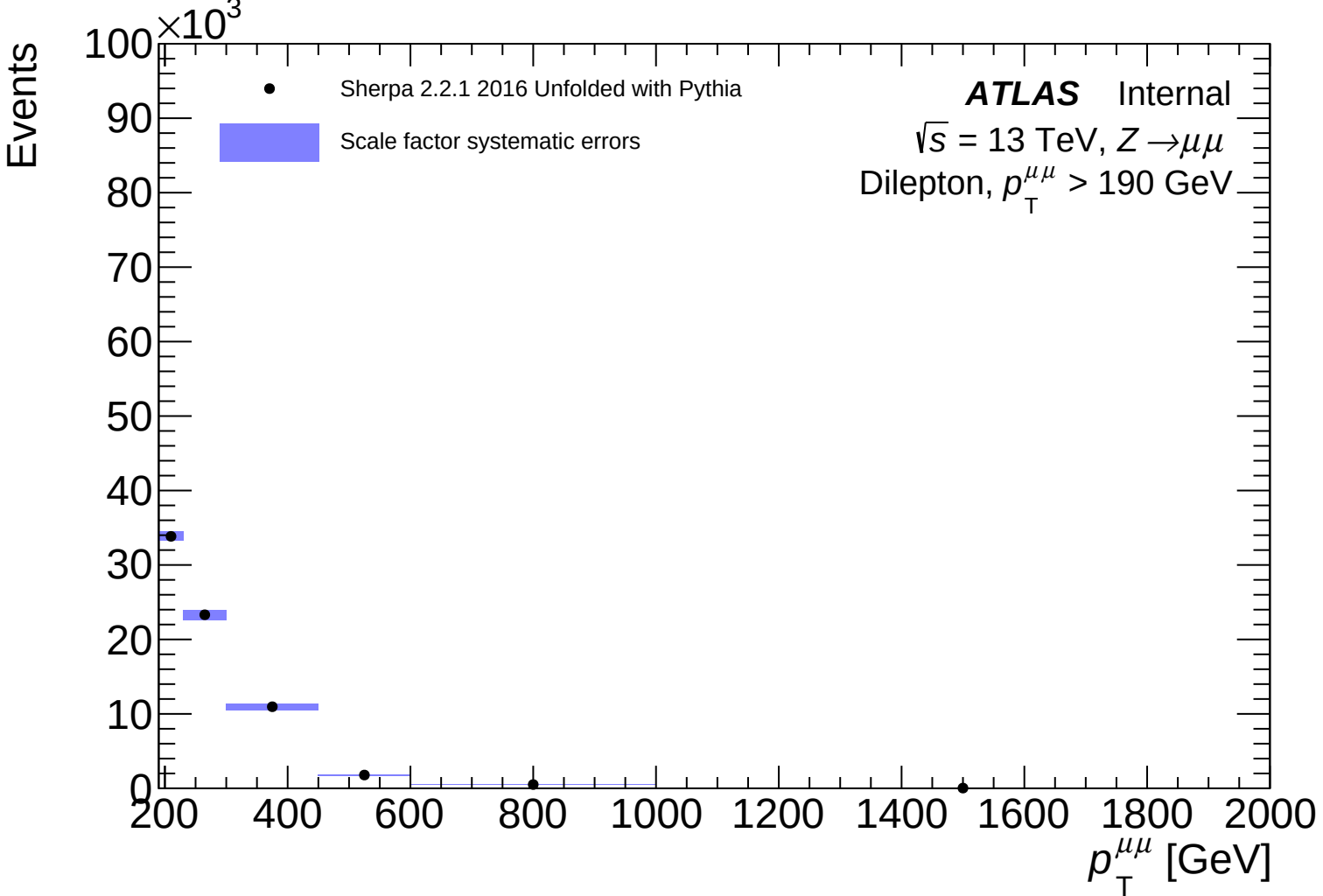
Events
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Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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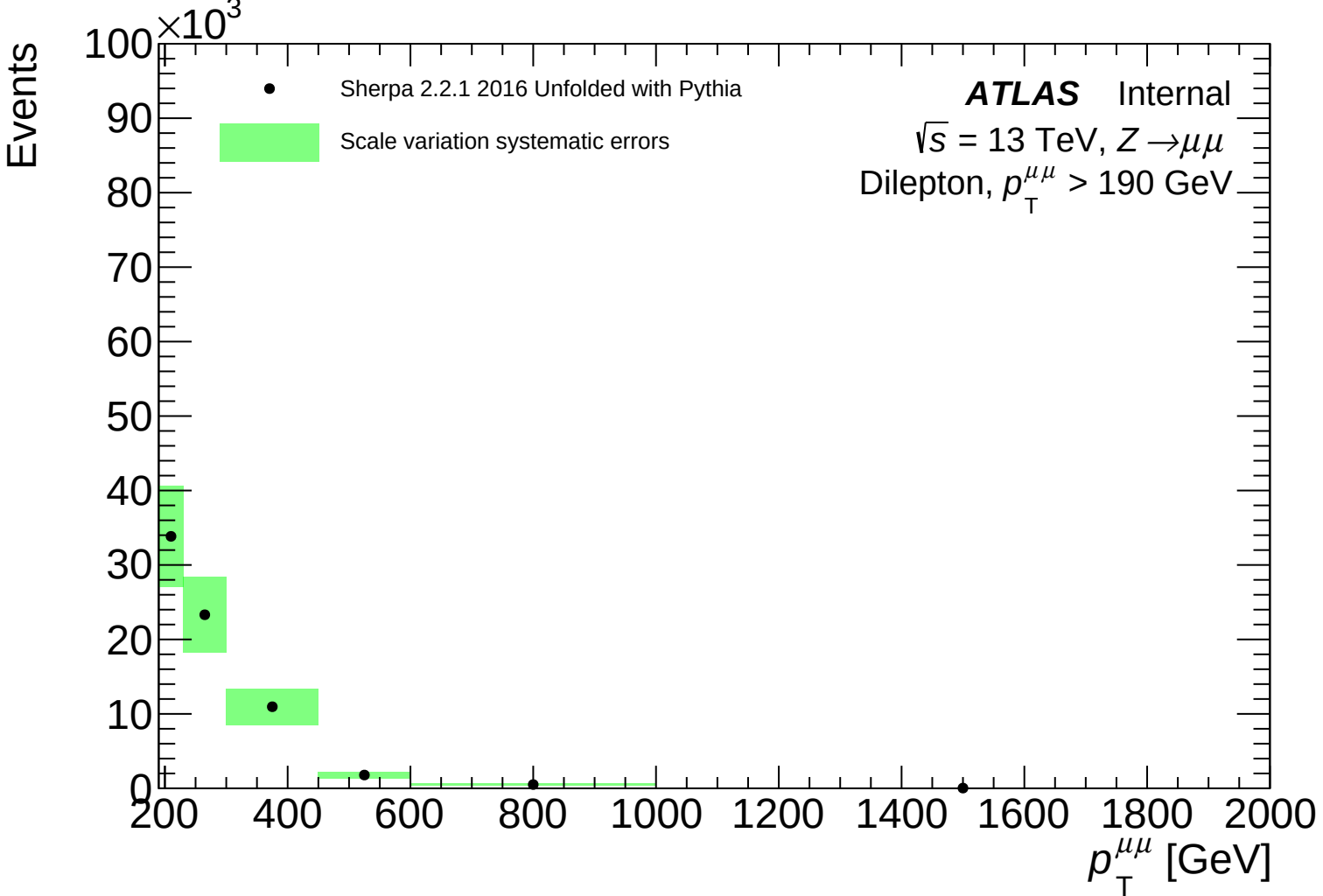
p_T^μμ [GeV]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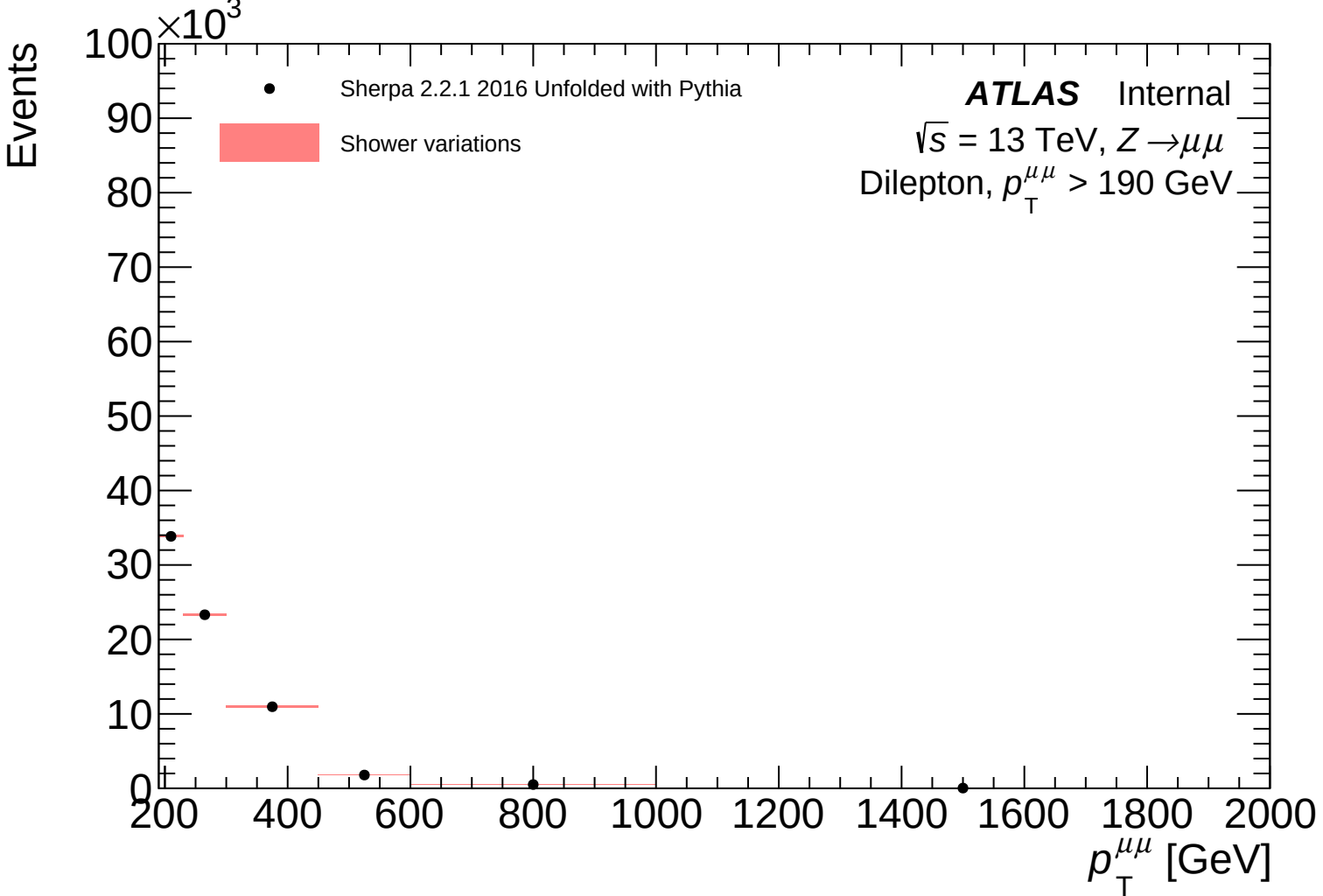
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV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Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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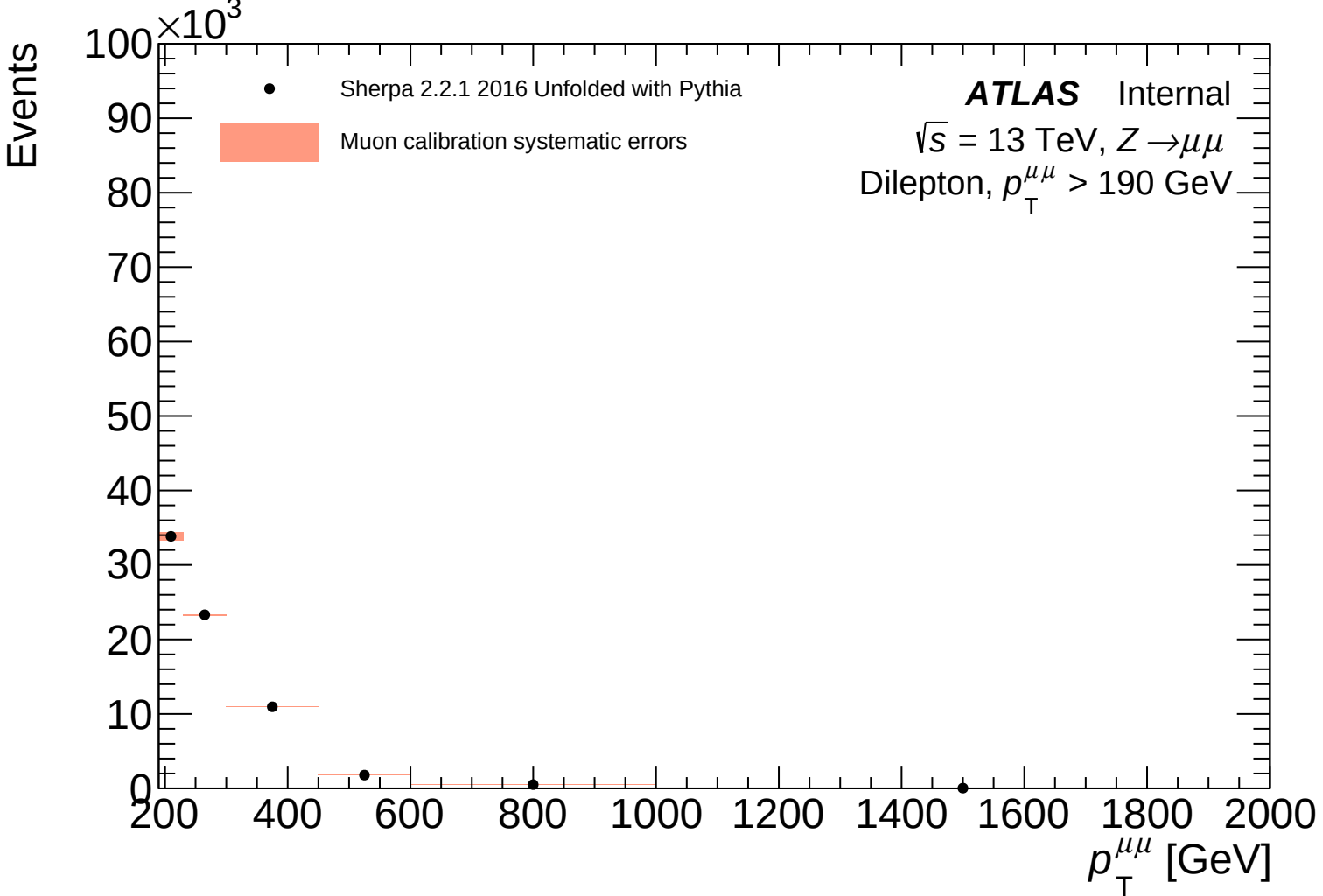
p_T^μμ [GeV]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Sherpa 2.2.1 2016 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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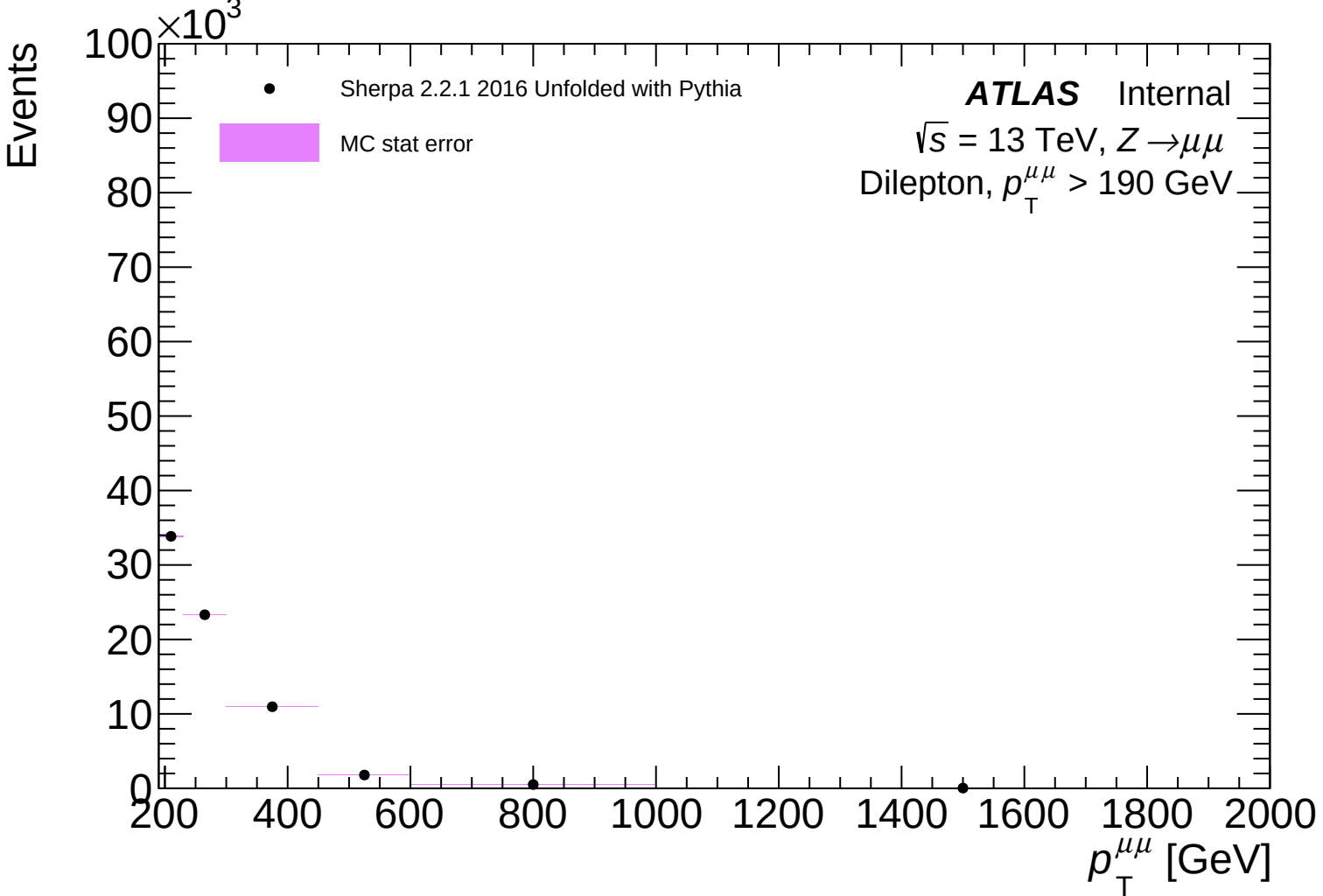
p_T^μμ [GeV]


Events
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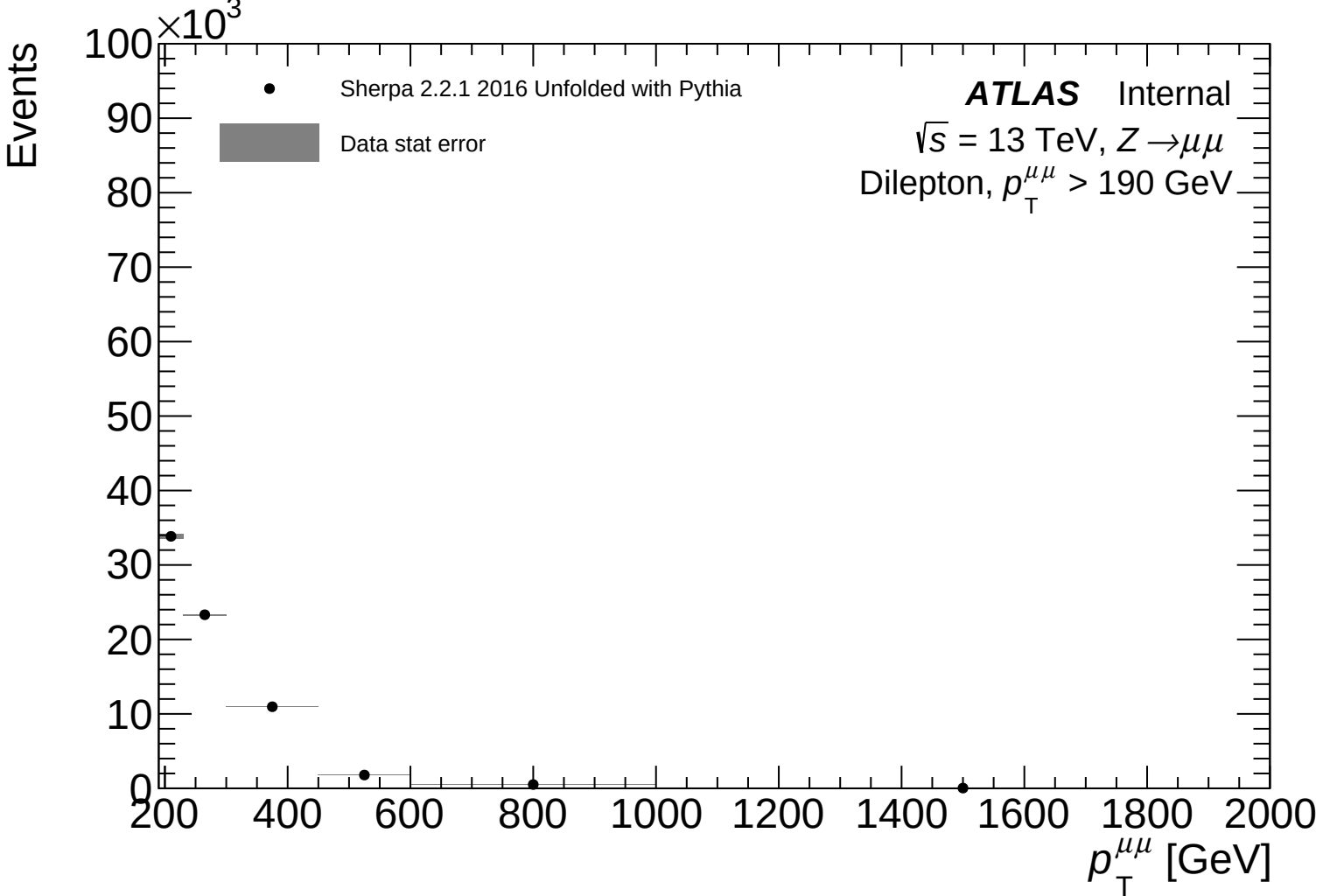
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu} > 190$ GeV
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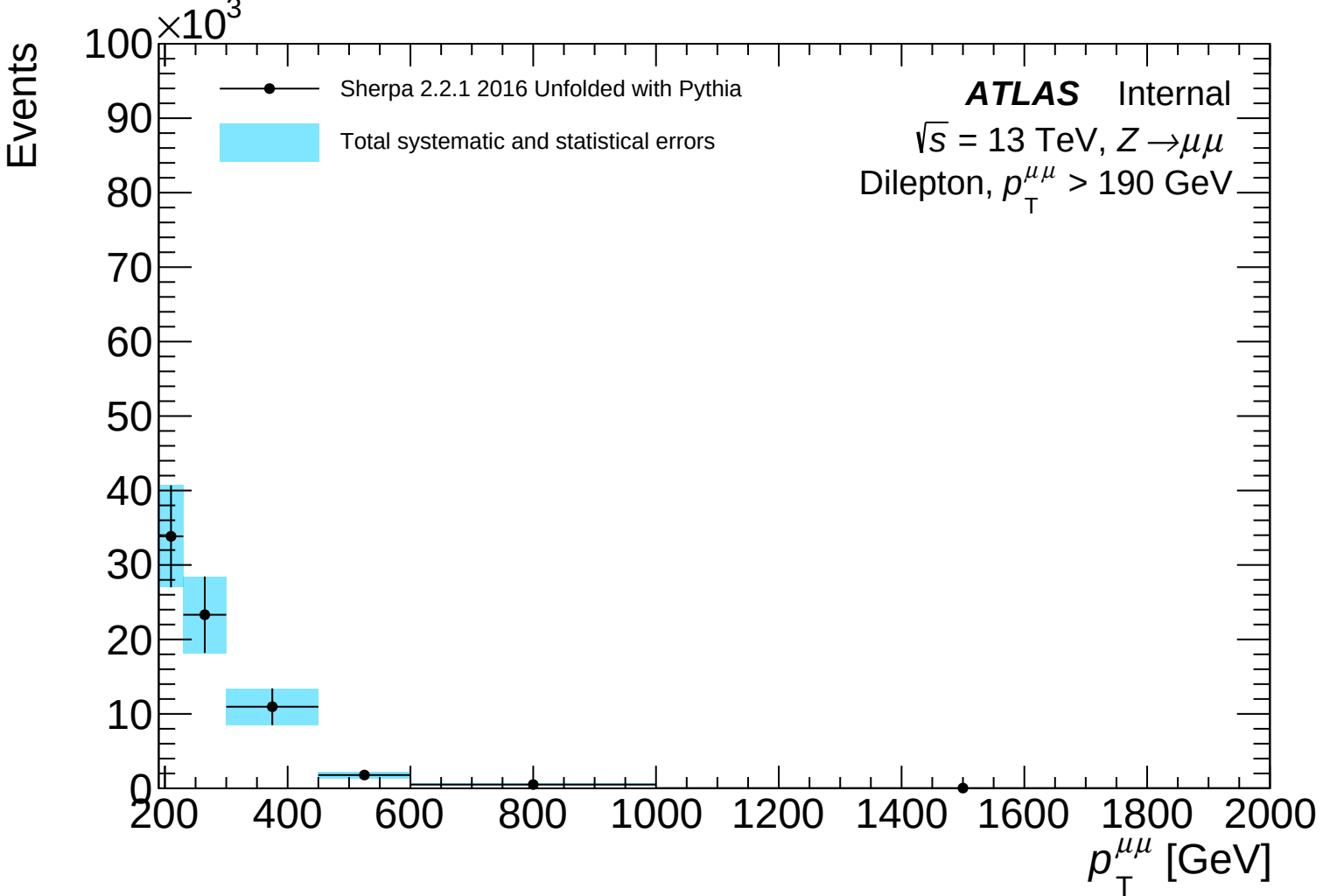
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]


Events
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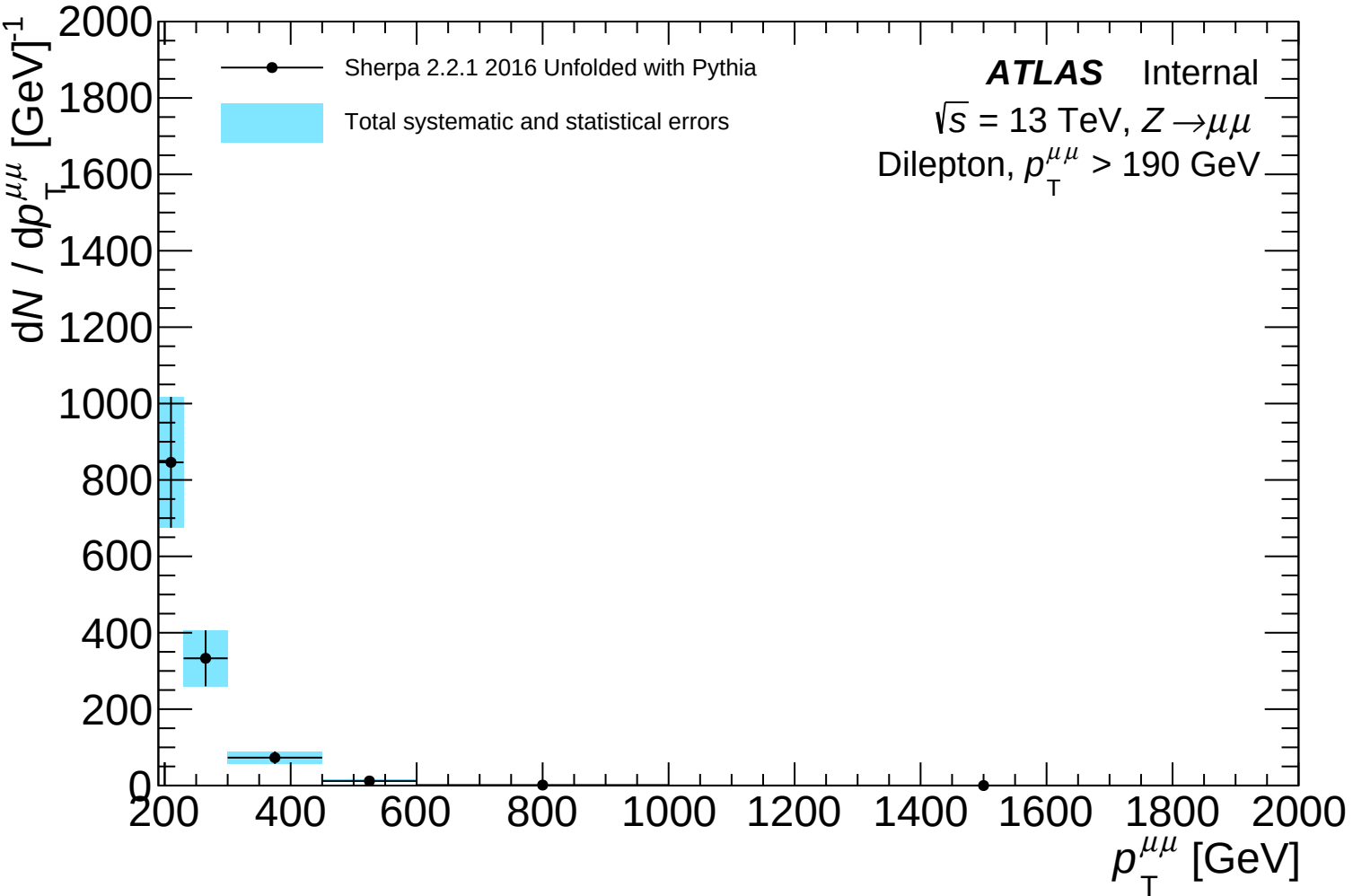
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μμ [GeV]^-1
p_T^μμ [GeV]
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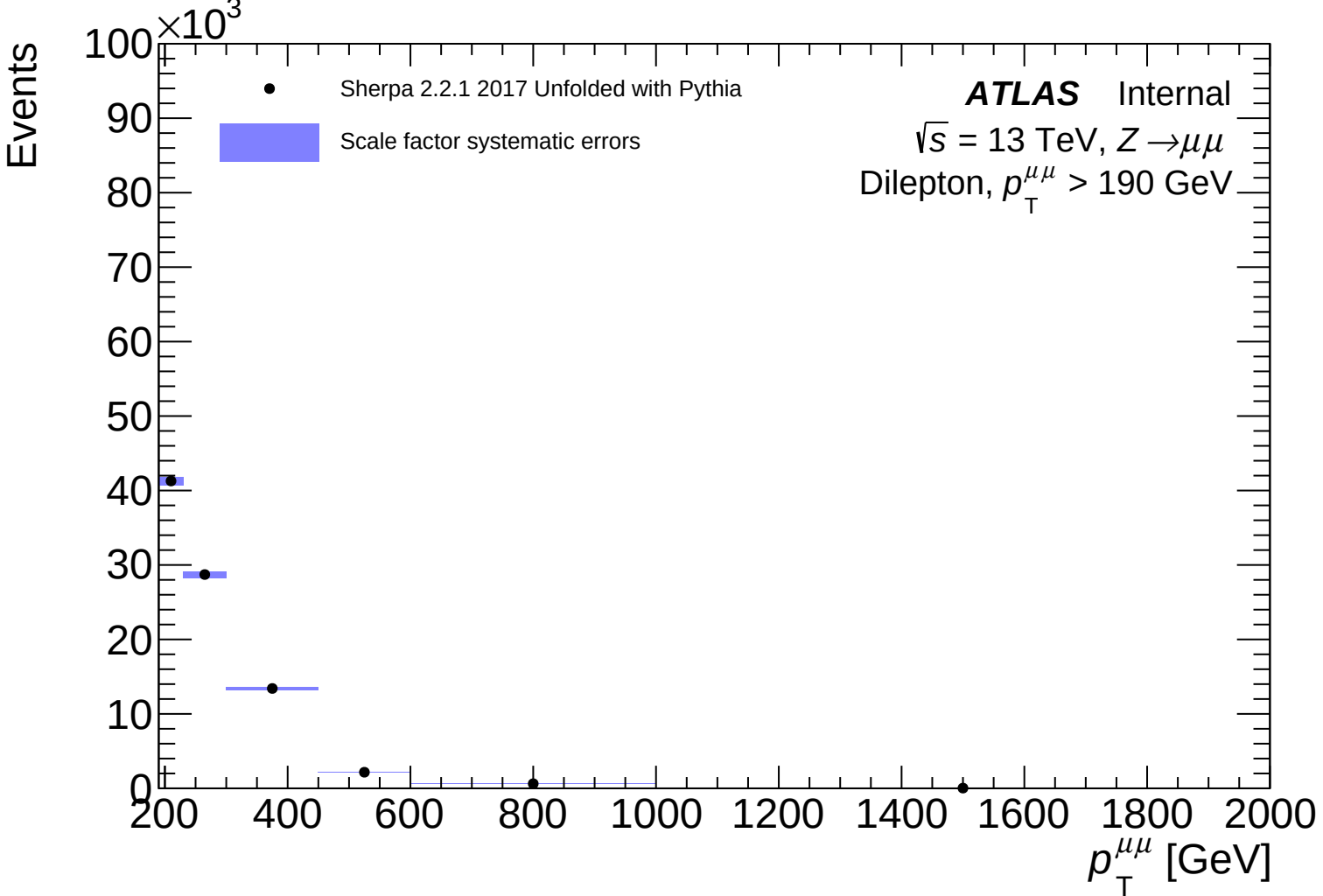
Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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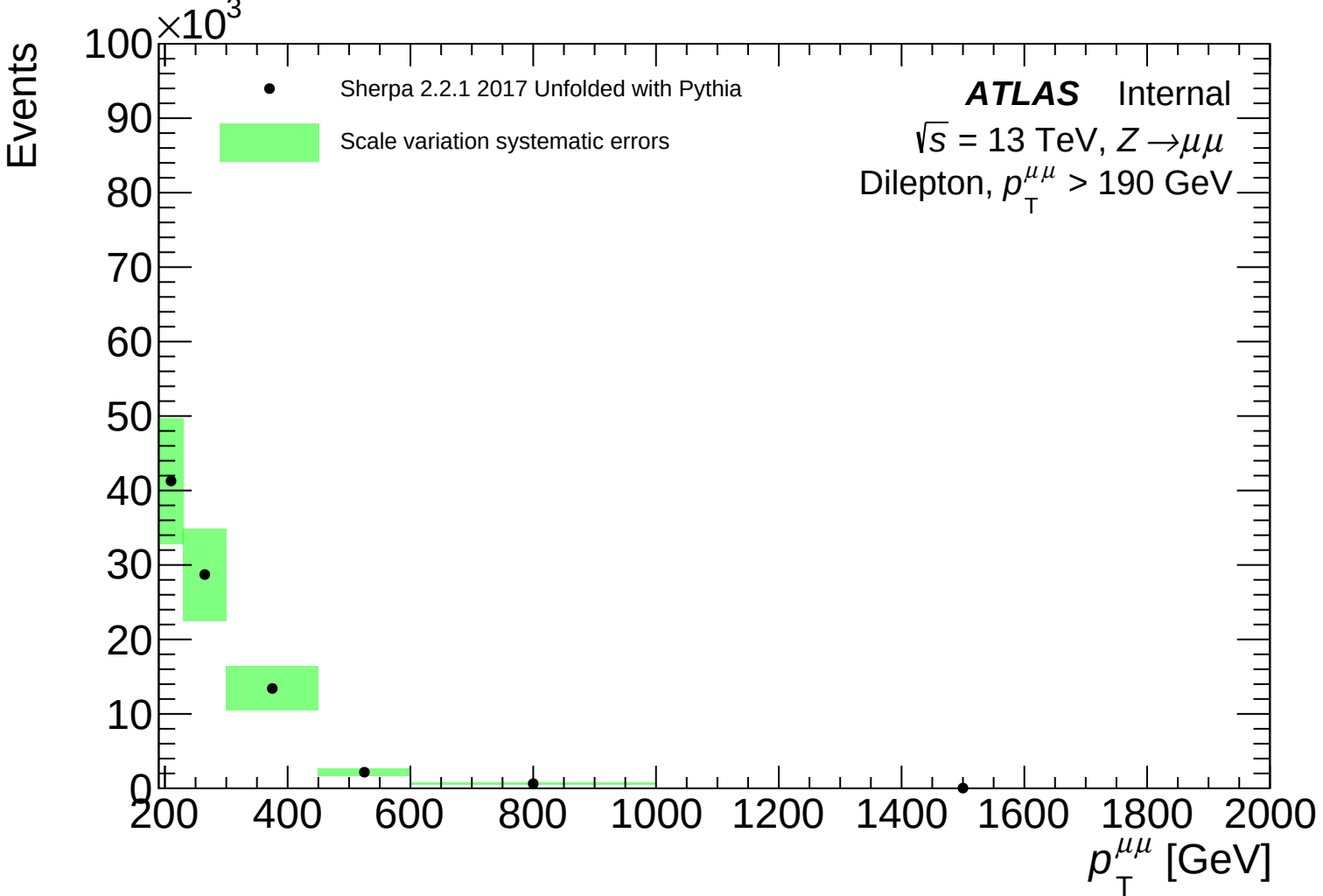
p_T^μμ [GeV]


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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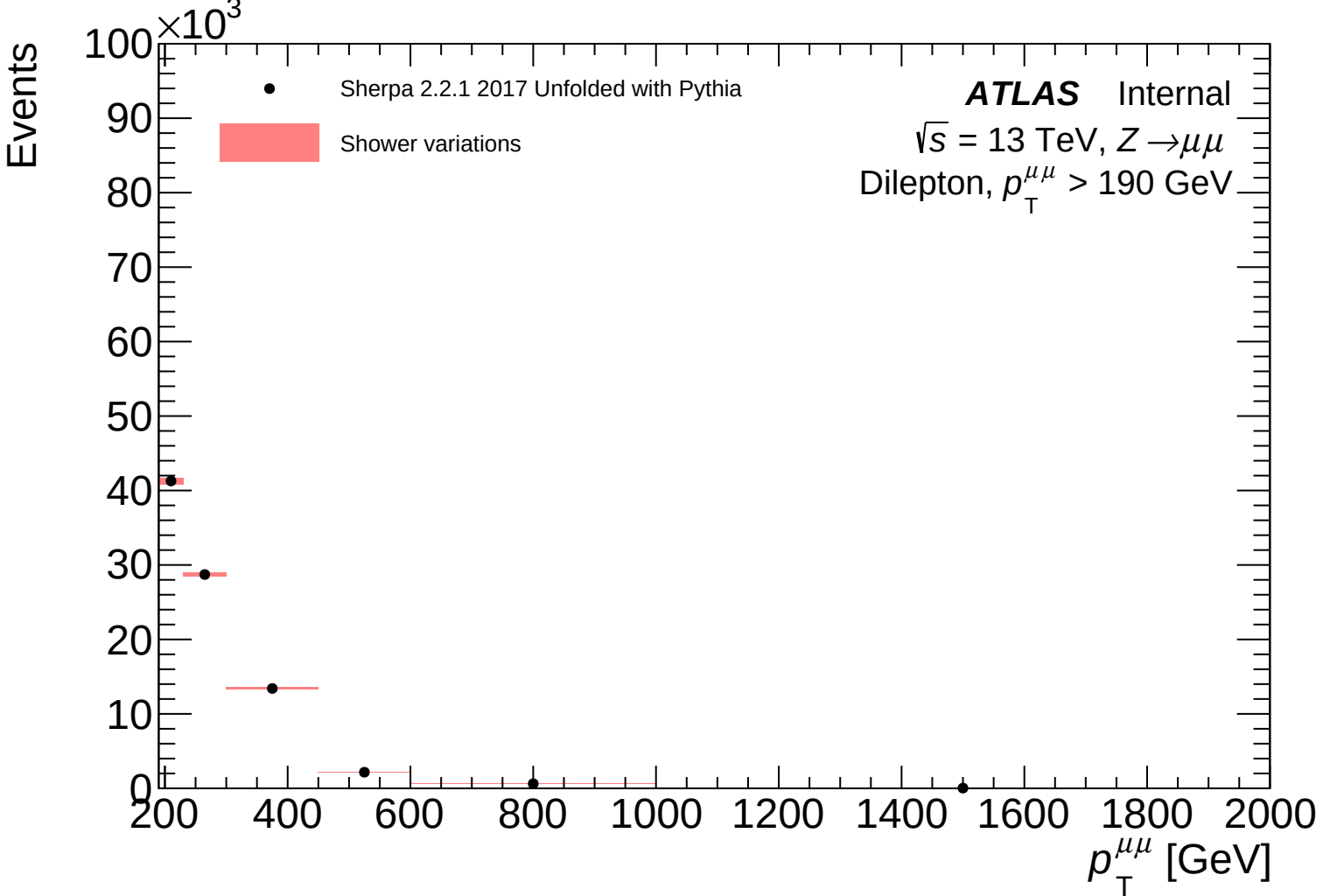
p_T^μμ [GeV]


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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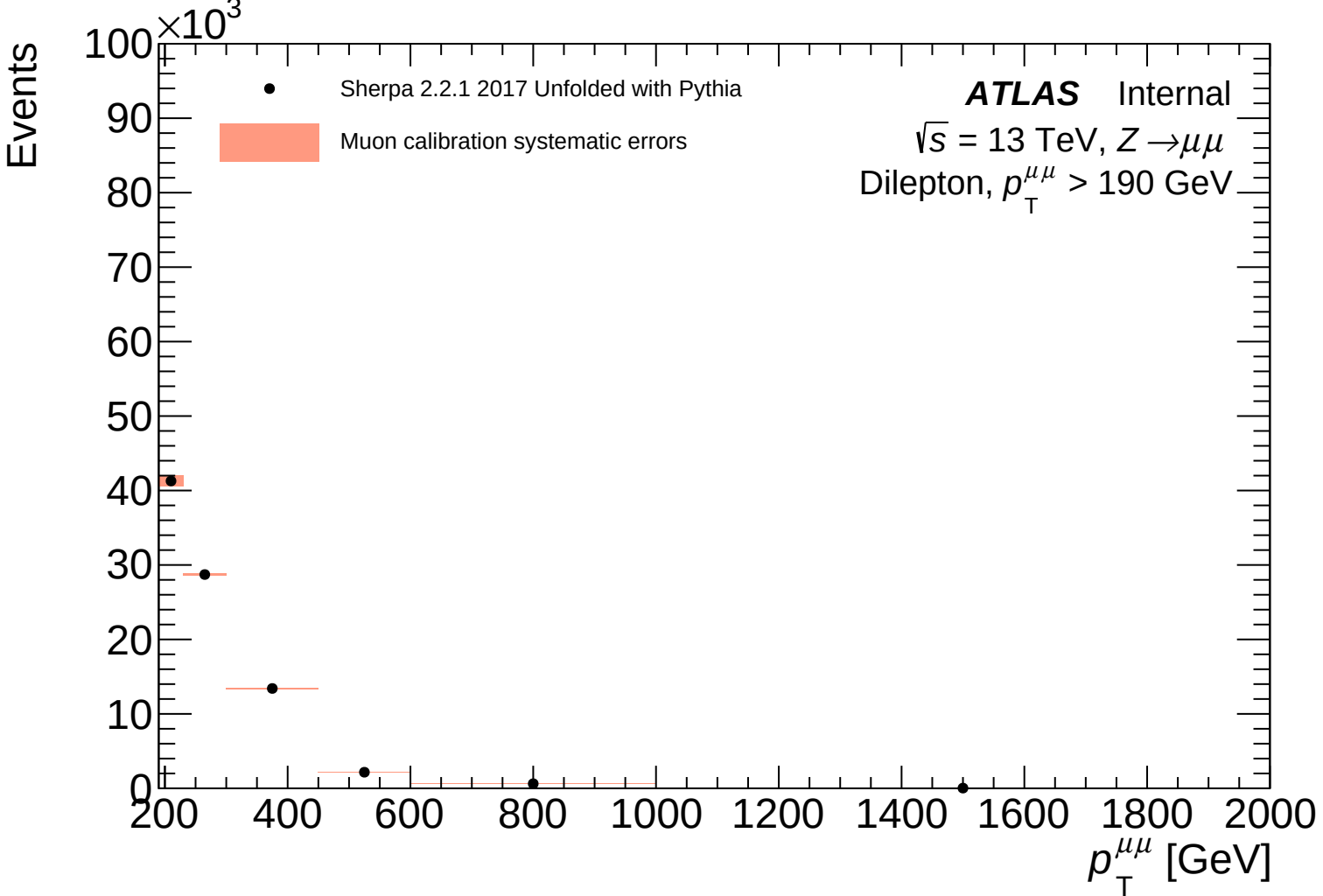
p_T^μμ [GeV]


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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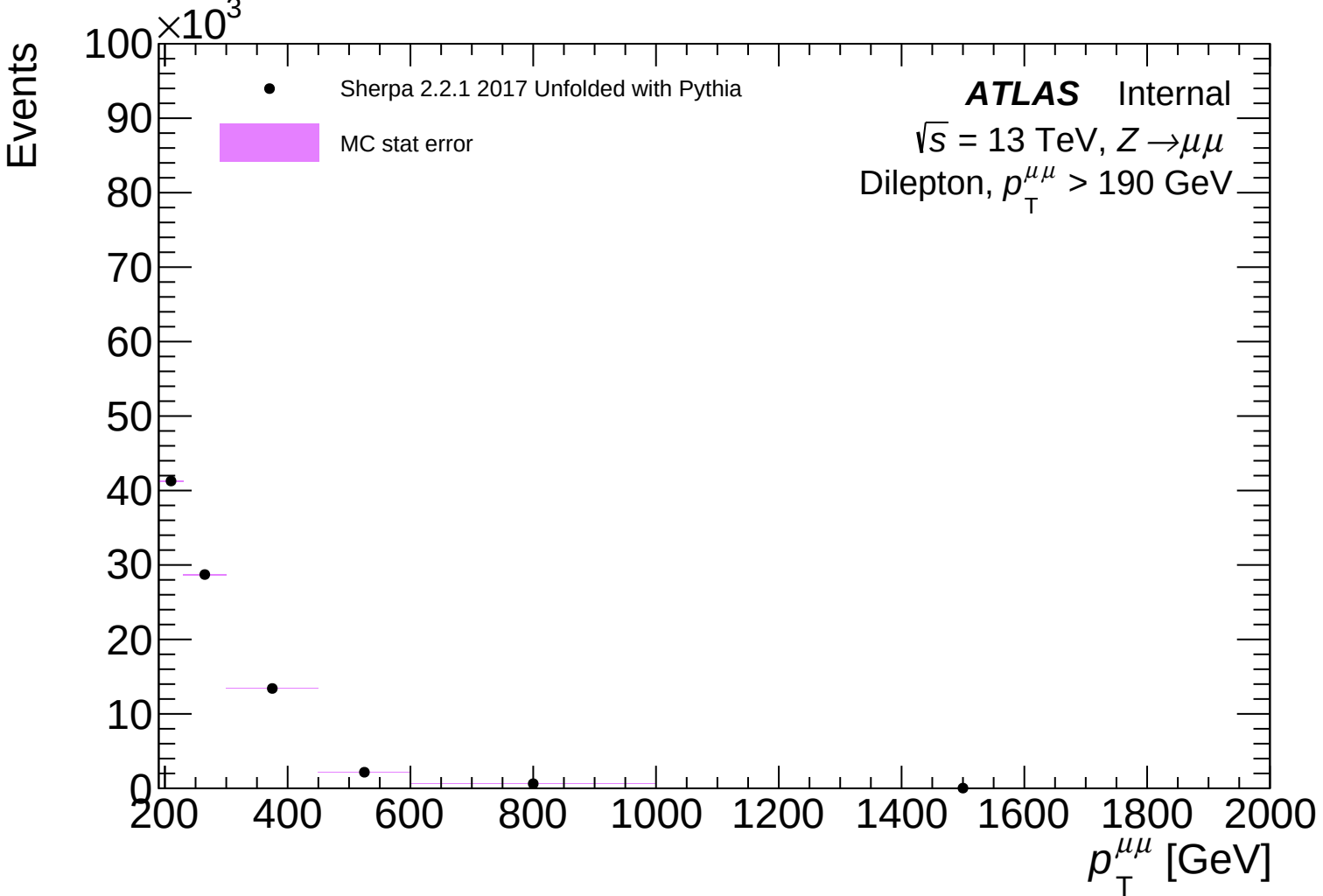
p_T^μμ [GeV]


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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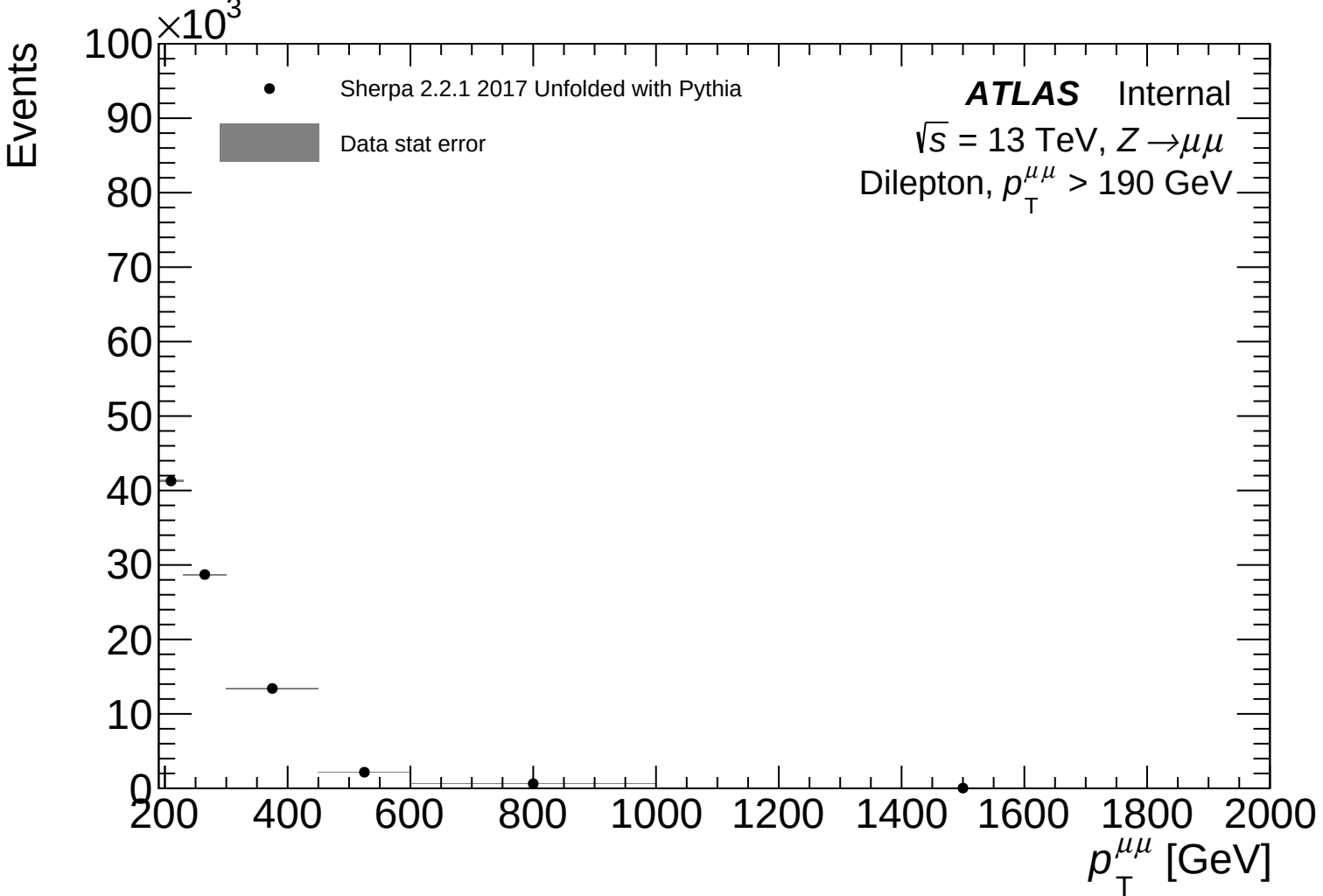
p_T^μμ [GeV]


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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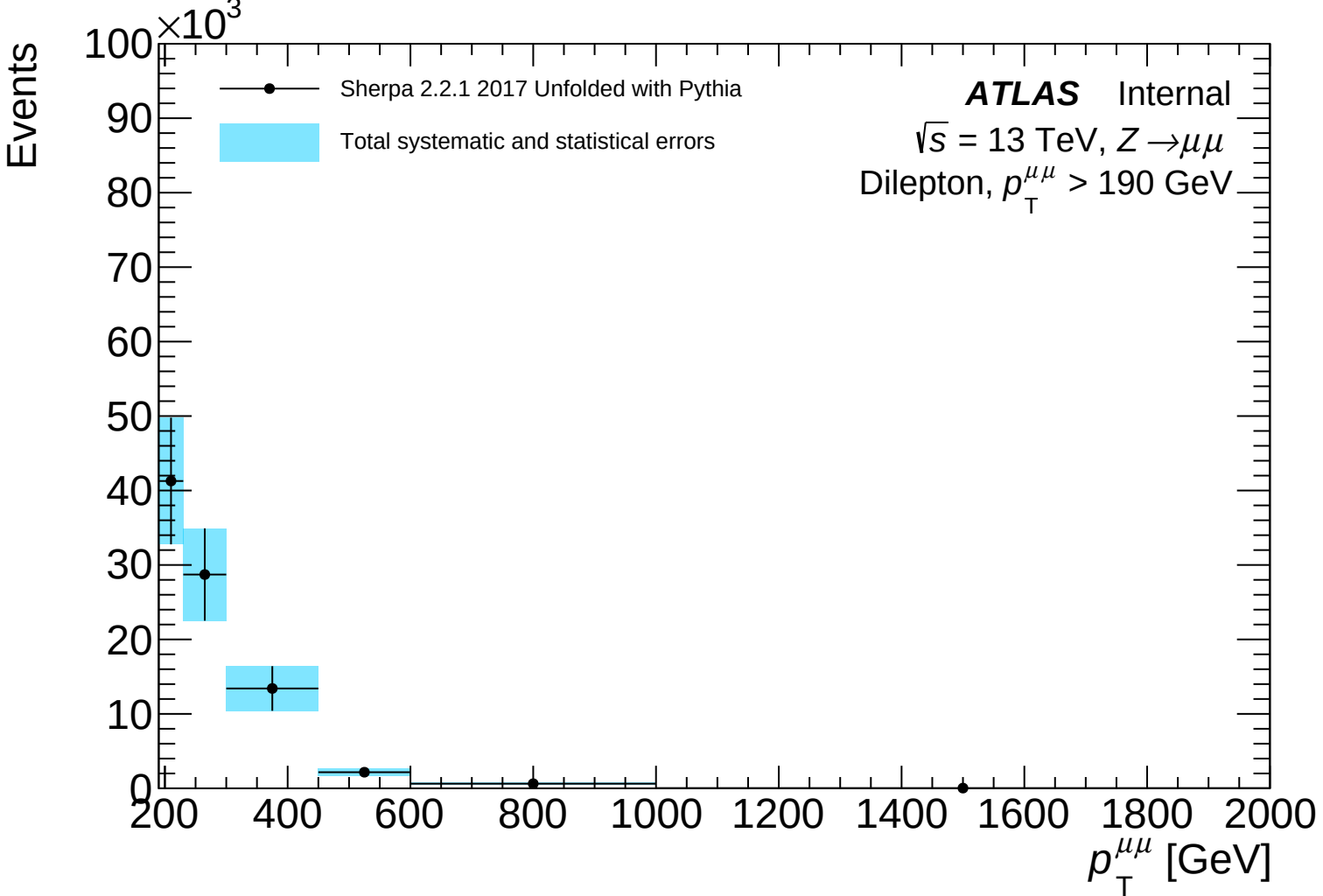
p_T^μμ [GeV]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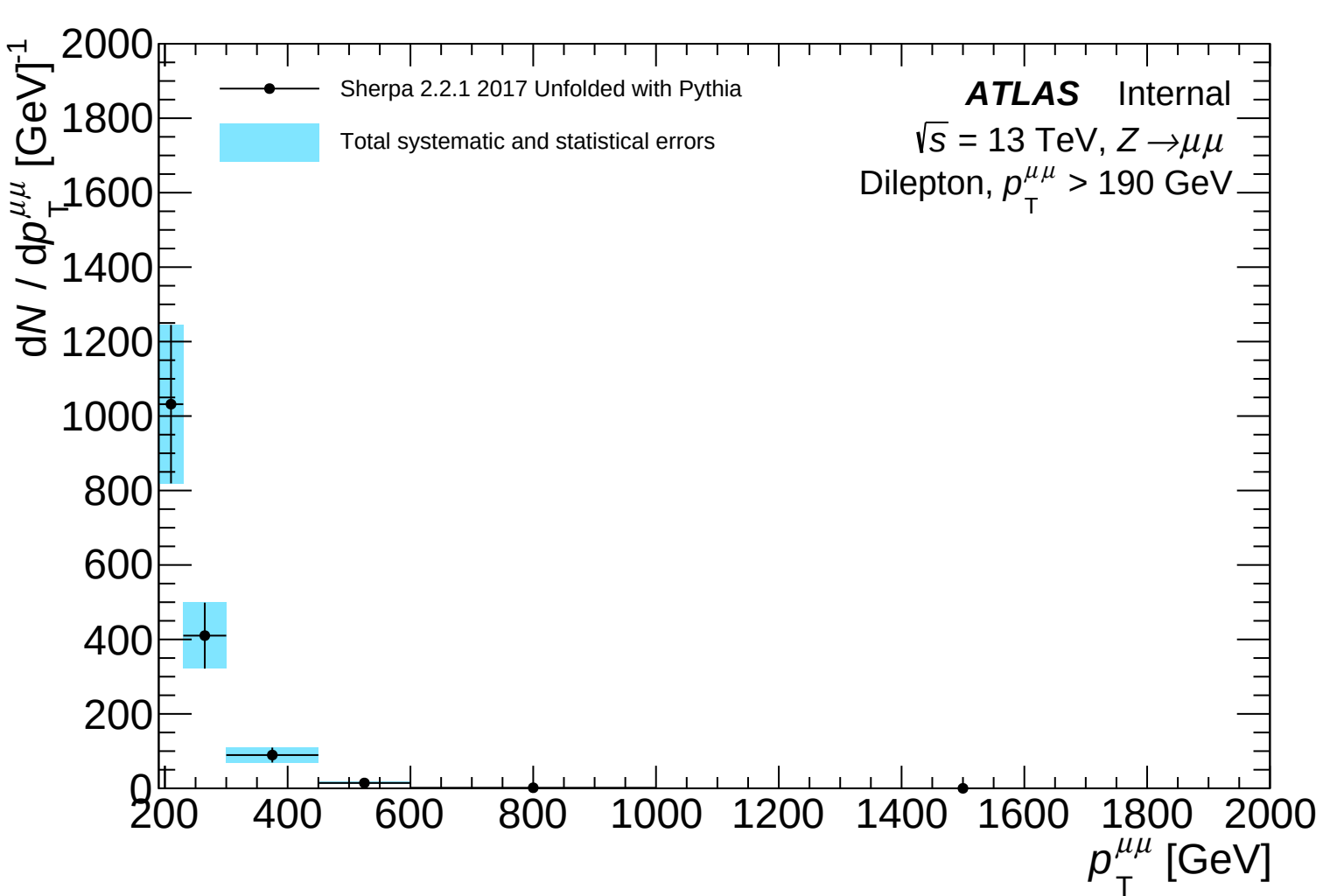
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μμ [GeV]^-1
p_T^μμ [GeV]
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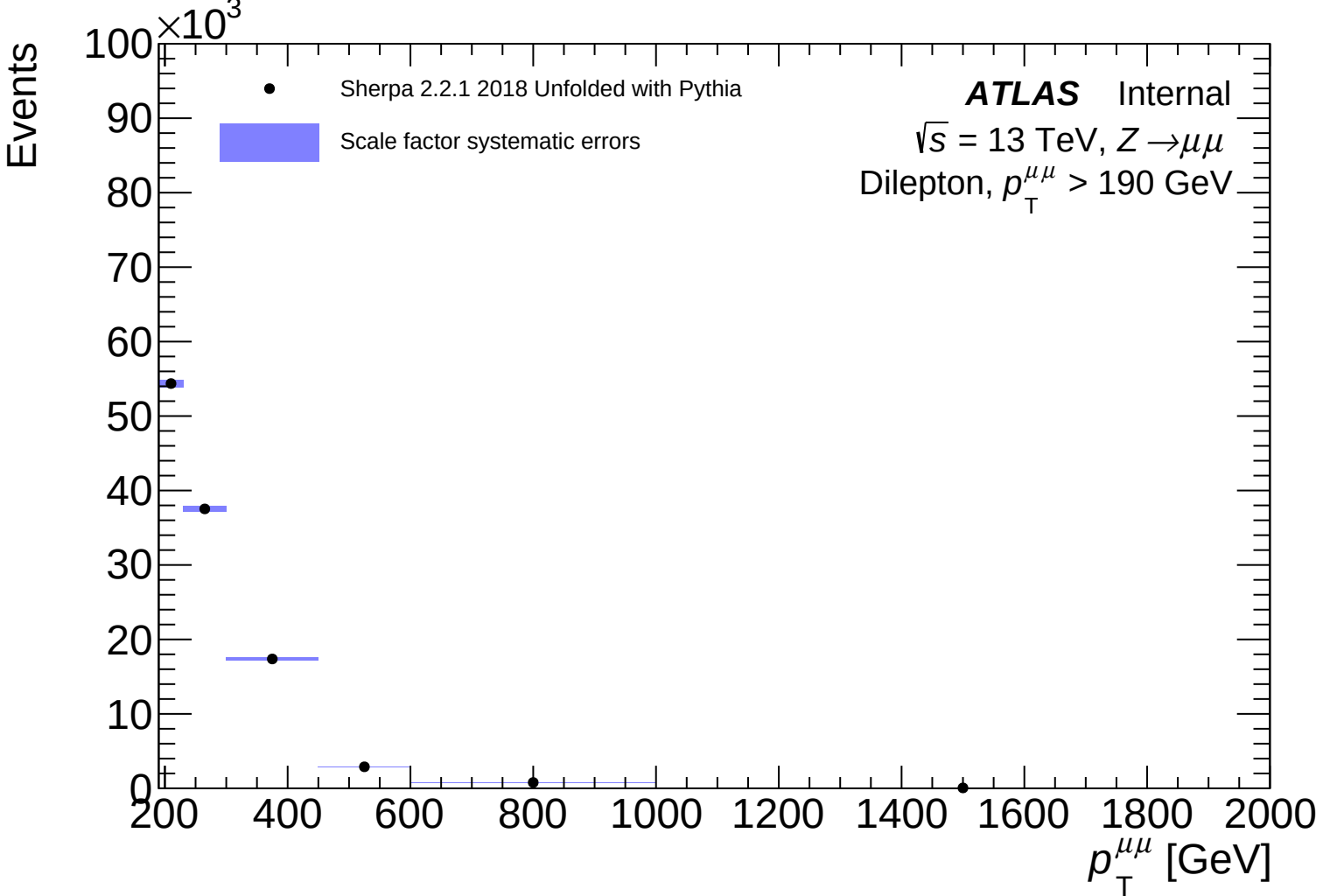
Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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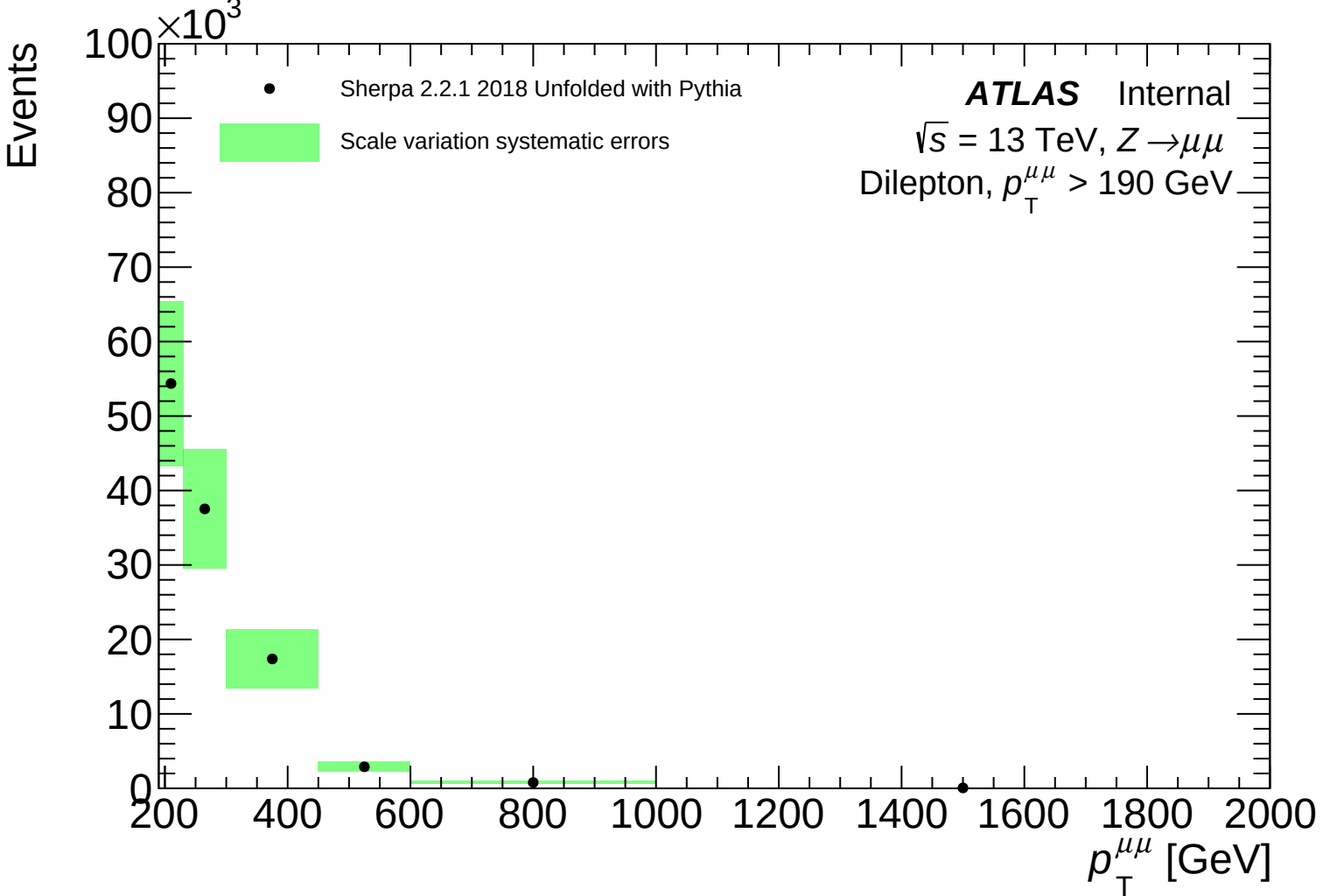
p_T^μμ [GeV]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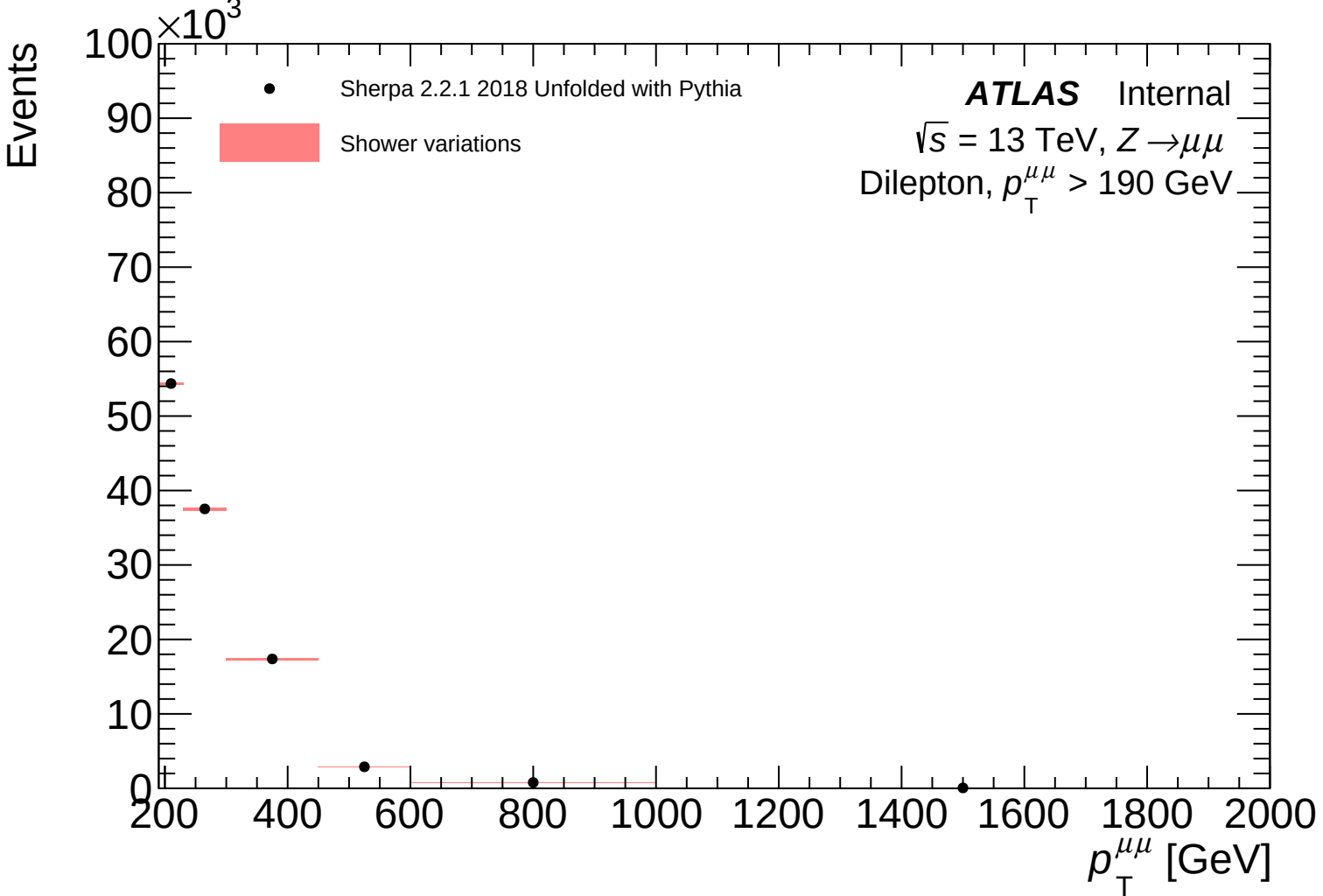
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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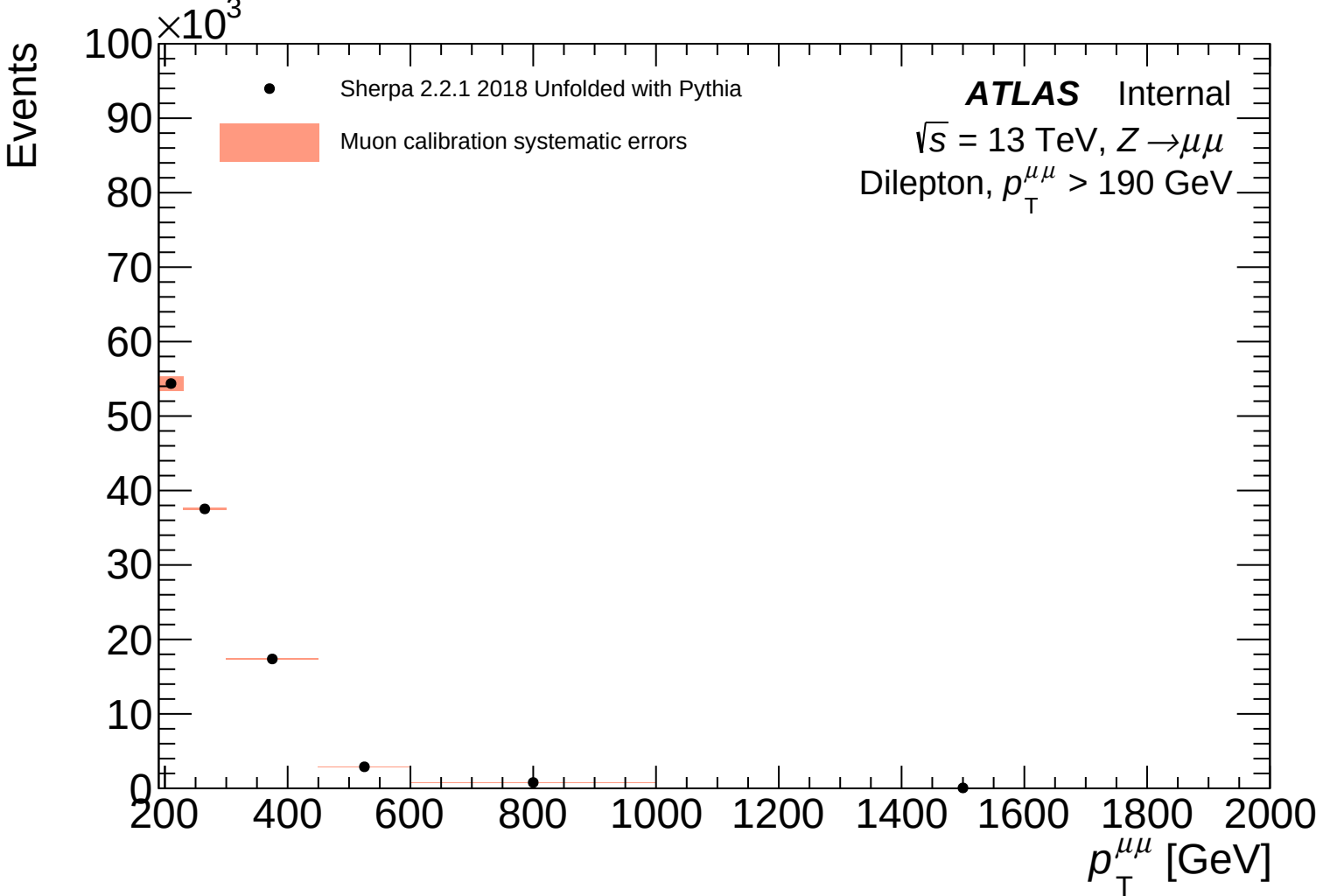
p_T^μμ [GeV]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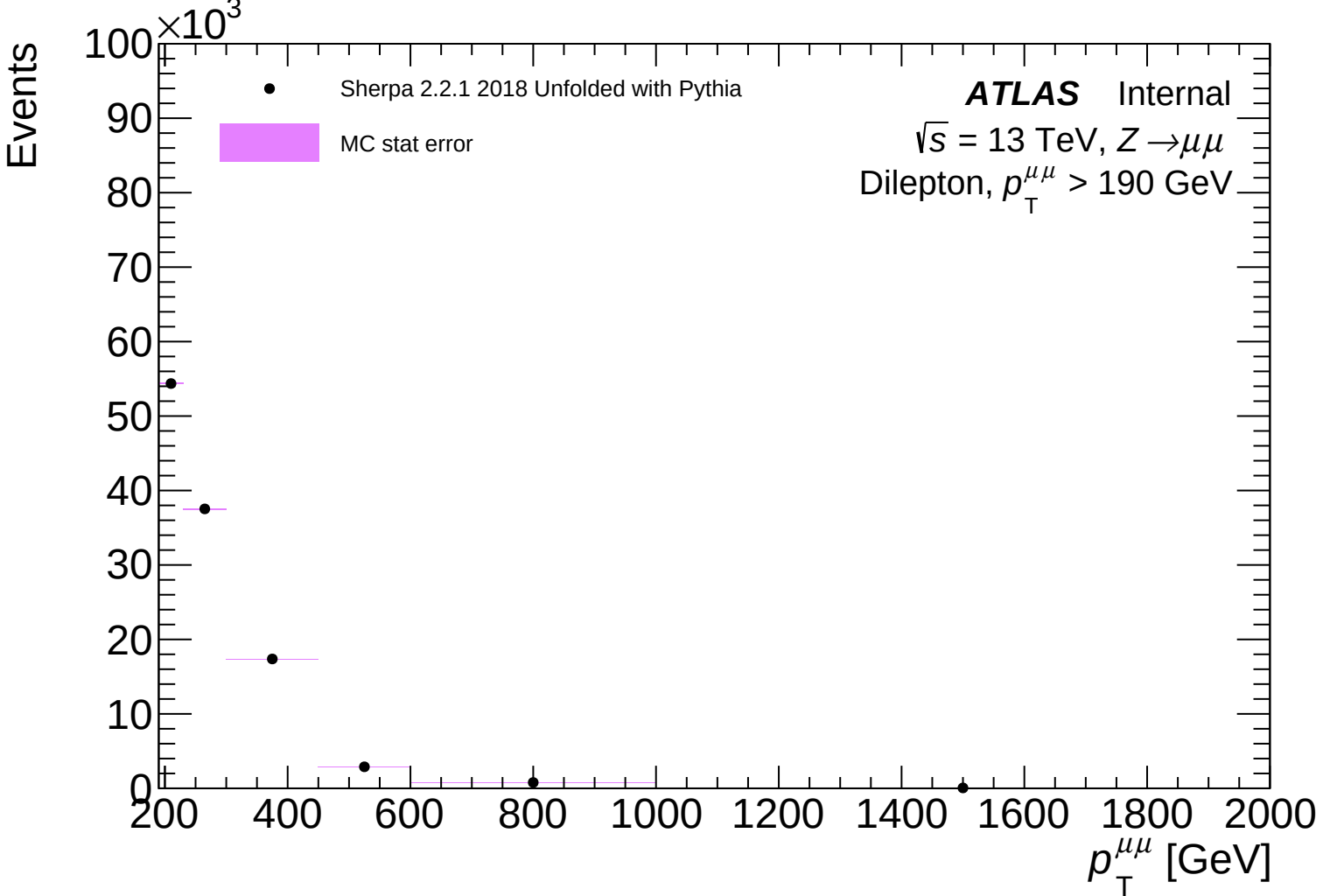
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
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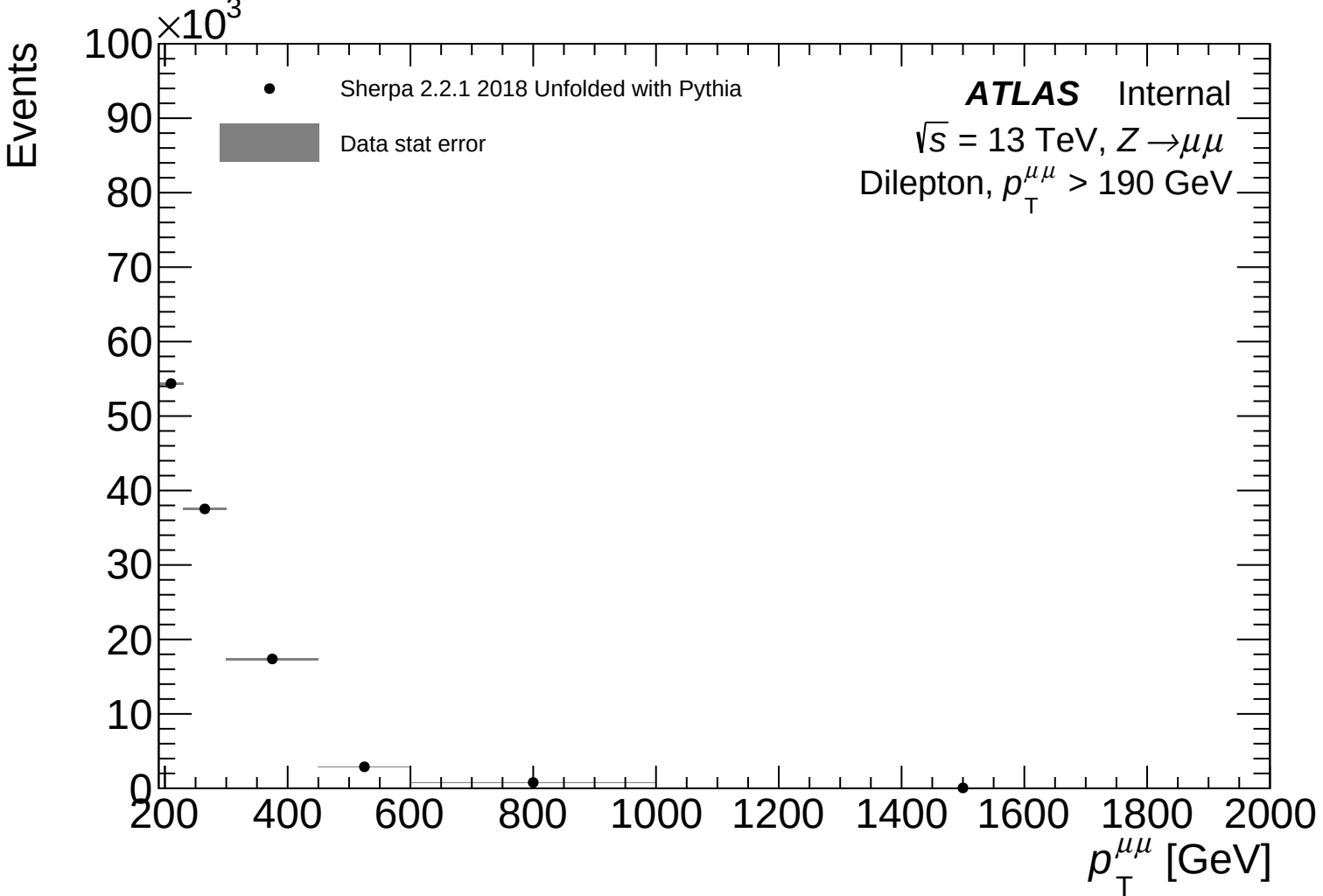
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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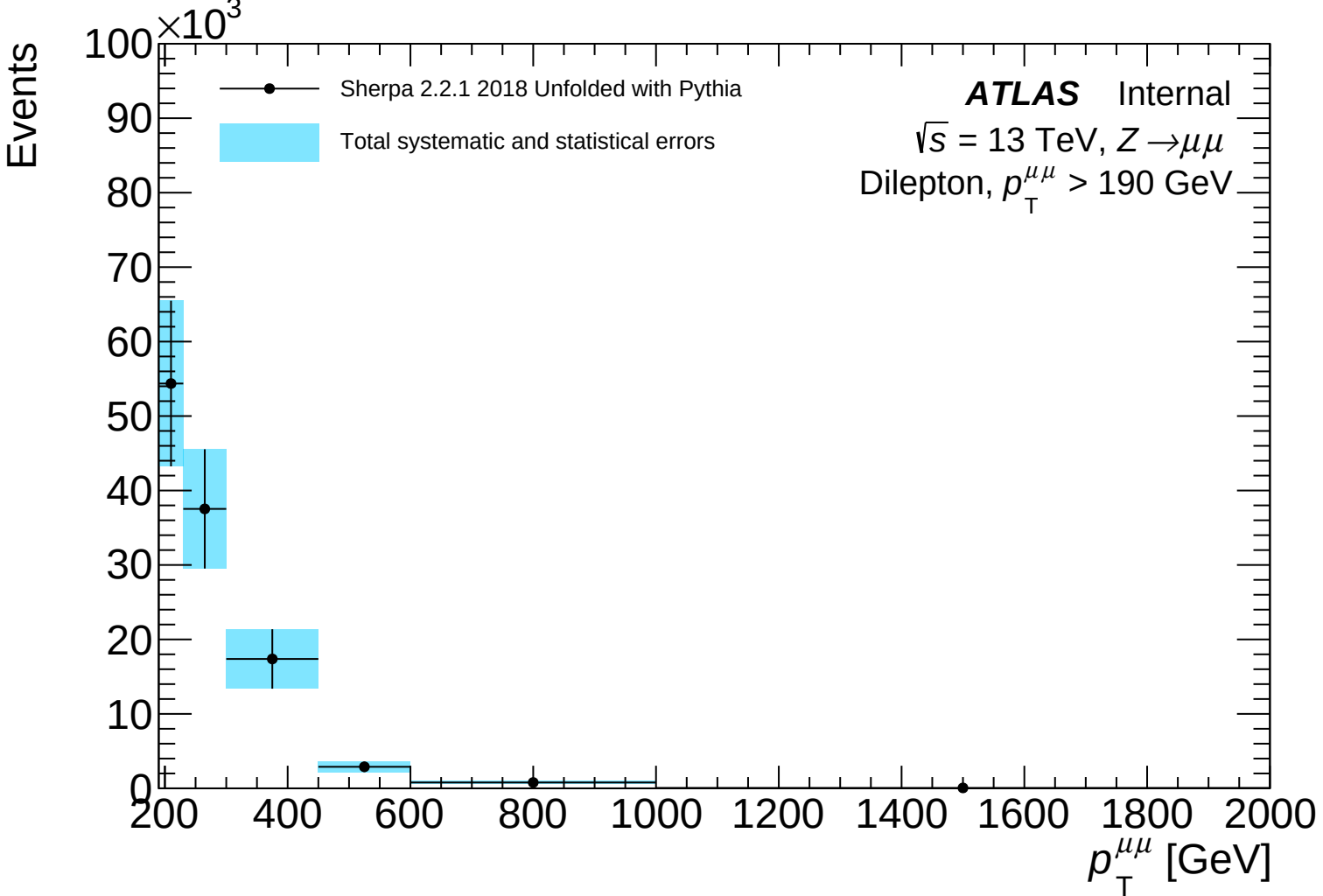
p_T^μμ [GeV]


Events
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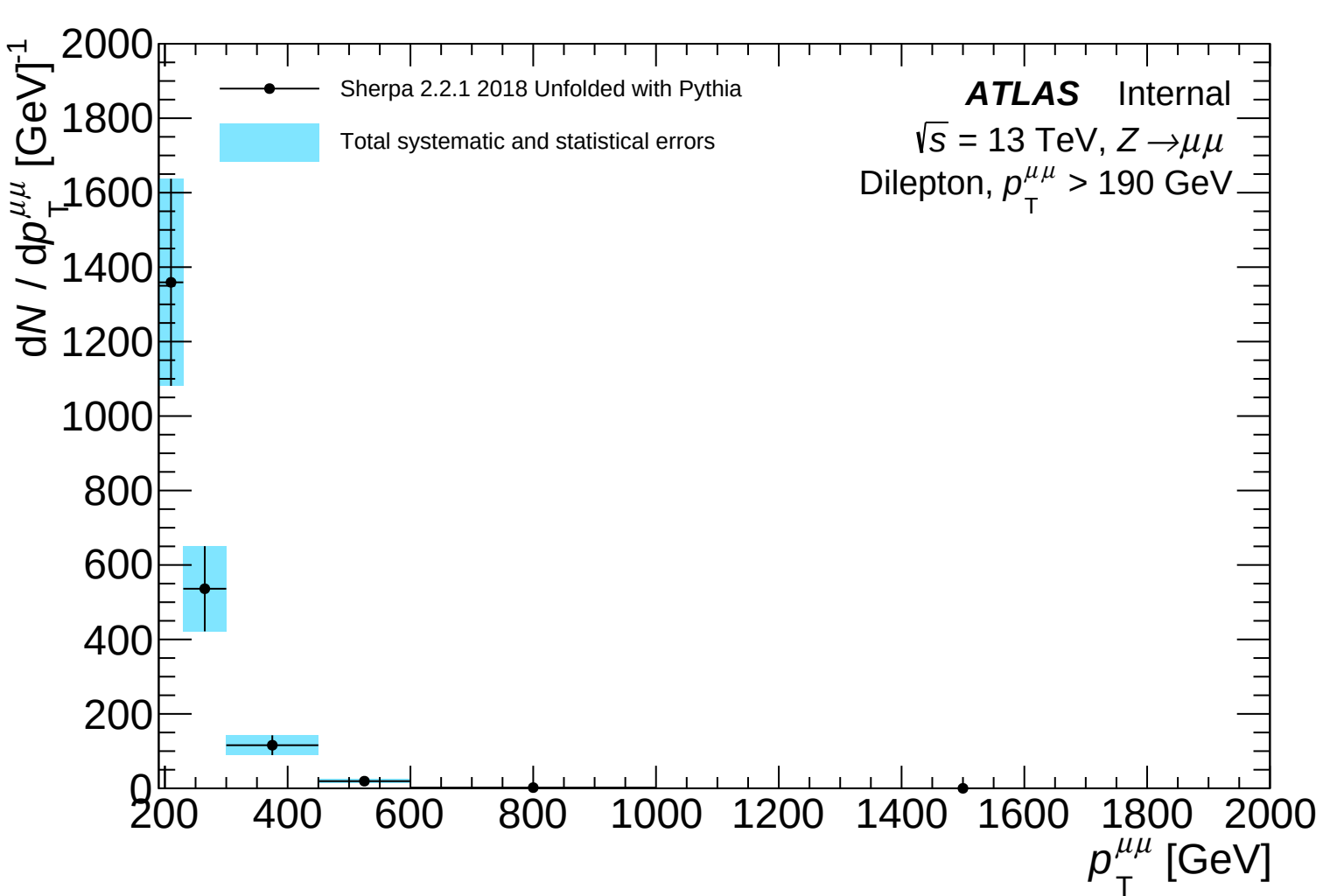
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV
$dN / dp_{T}^{\mu\mu}$ [GeV]$^{-1}$
$p_{T}^{\mu\mu}$ [GeV]
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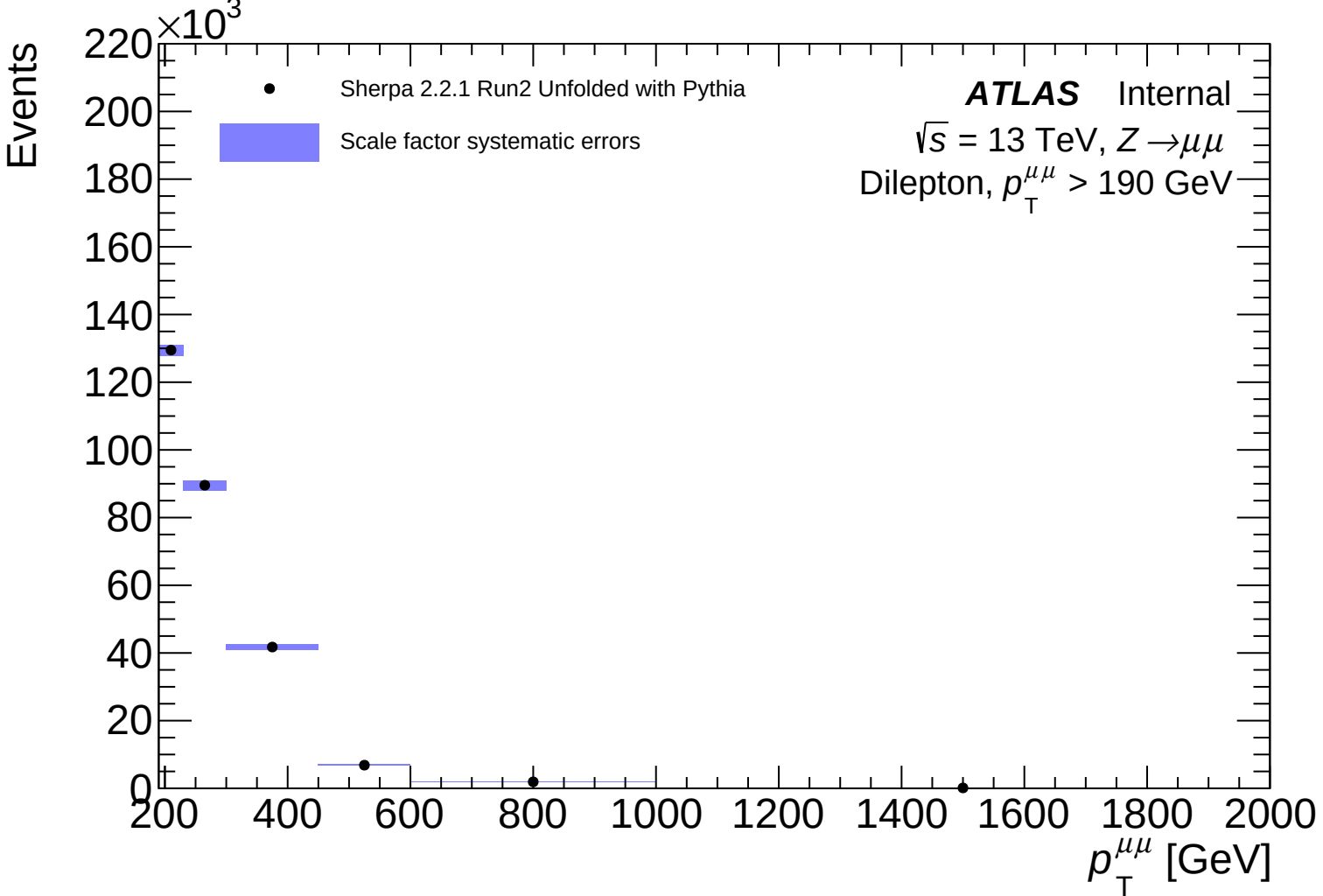
Events
×10^3
220
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100
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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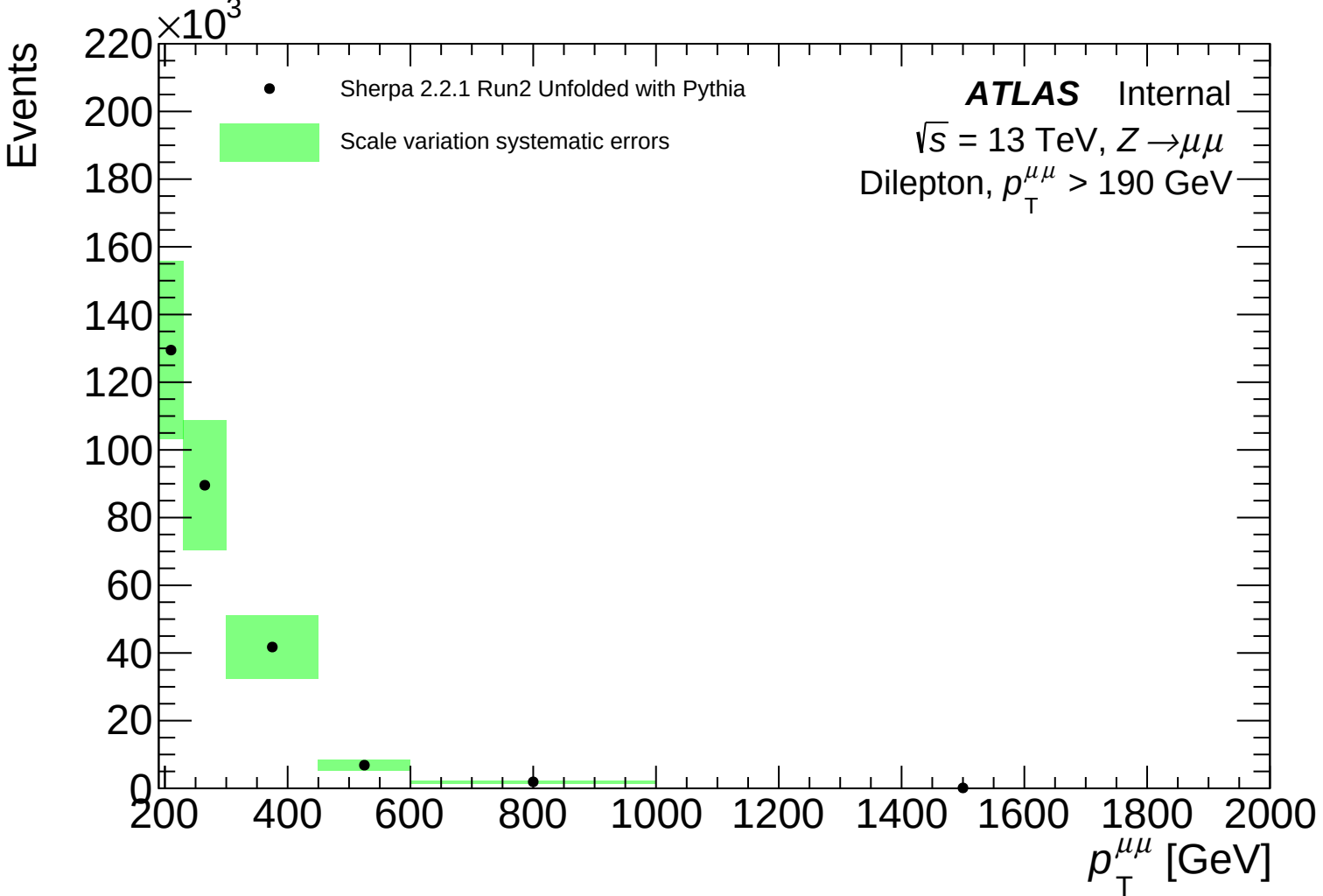
2000
p_T^μμ [GeV]


Events
×10^3
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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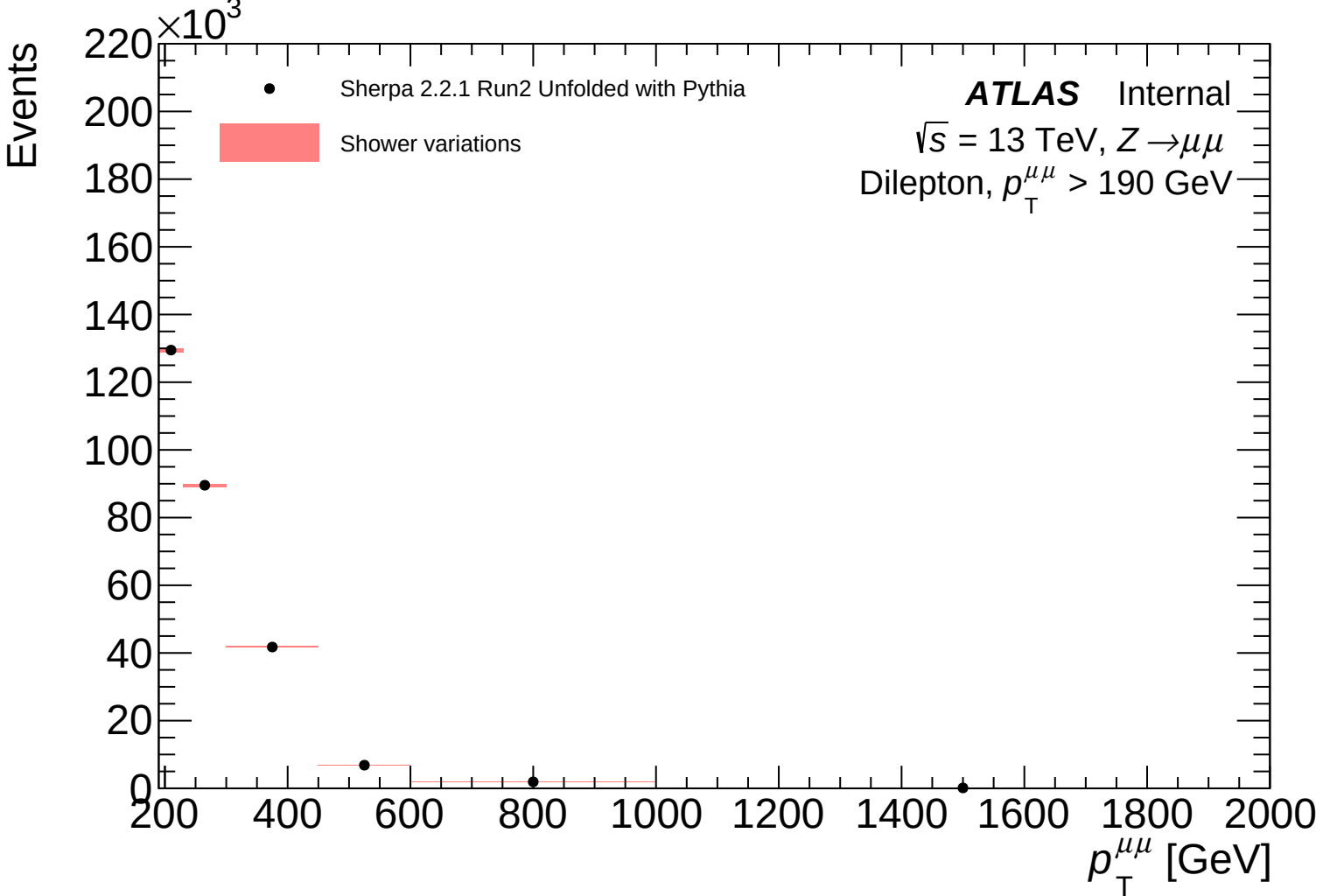
p_T^μμ [GeV]


Events
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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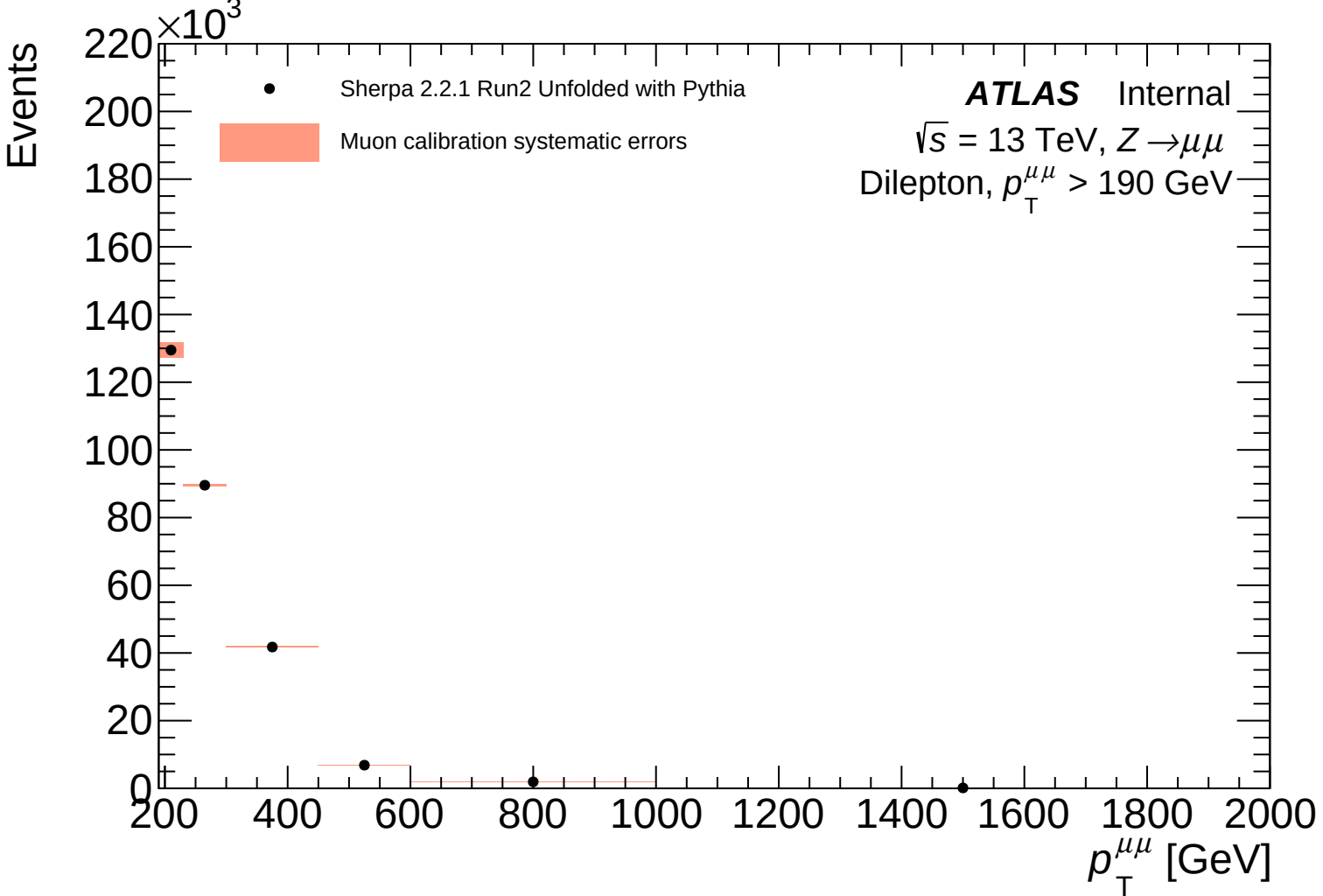
p_T^μμ [GeV]


Events
×10^3
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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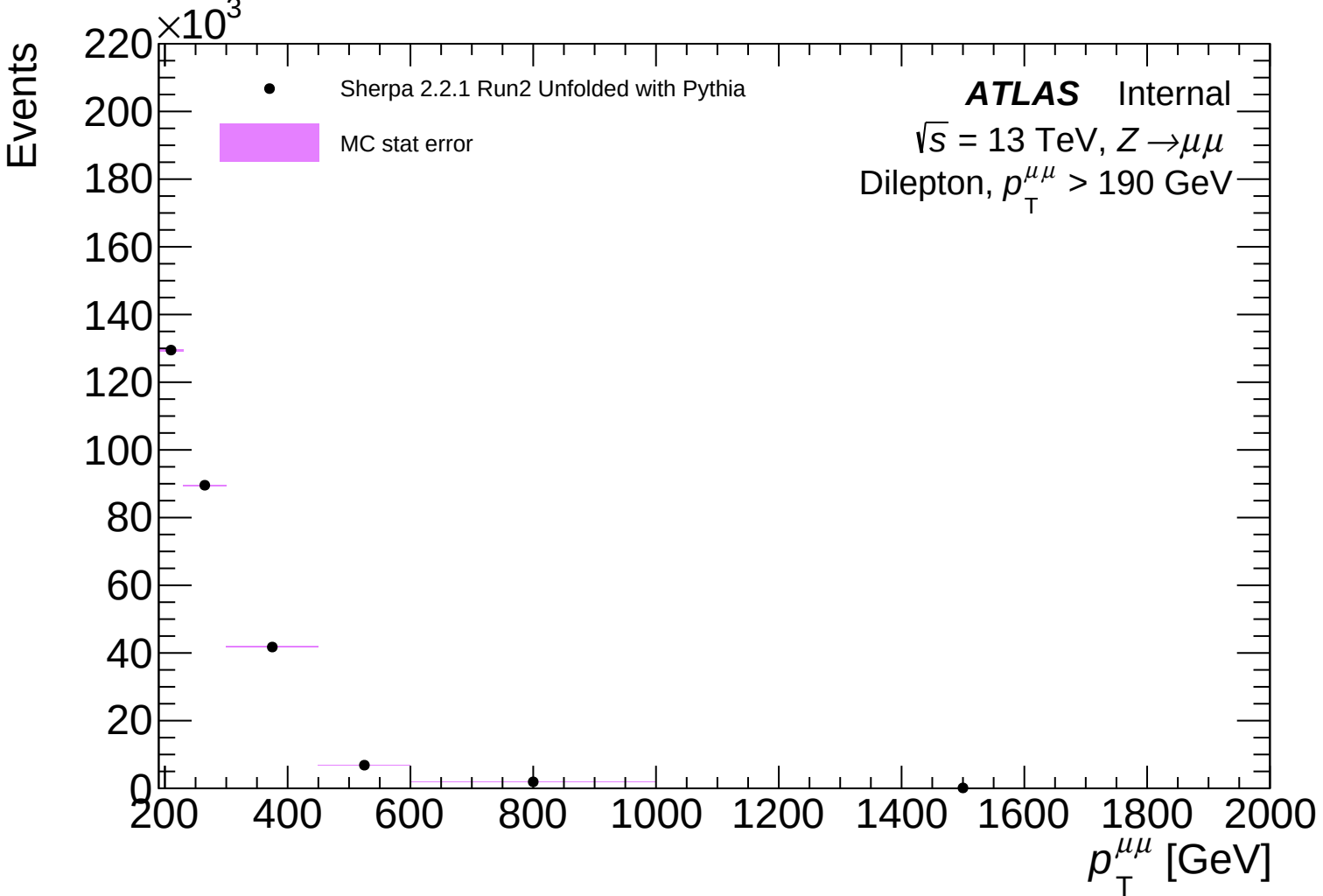
p_T^μμ [GeV]


Events
$\times 10^3$
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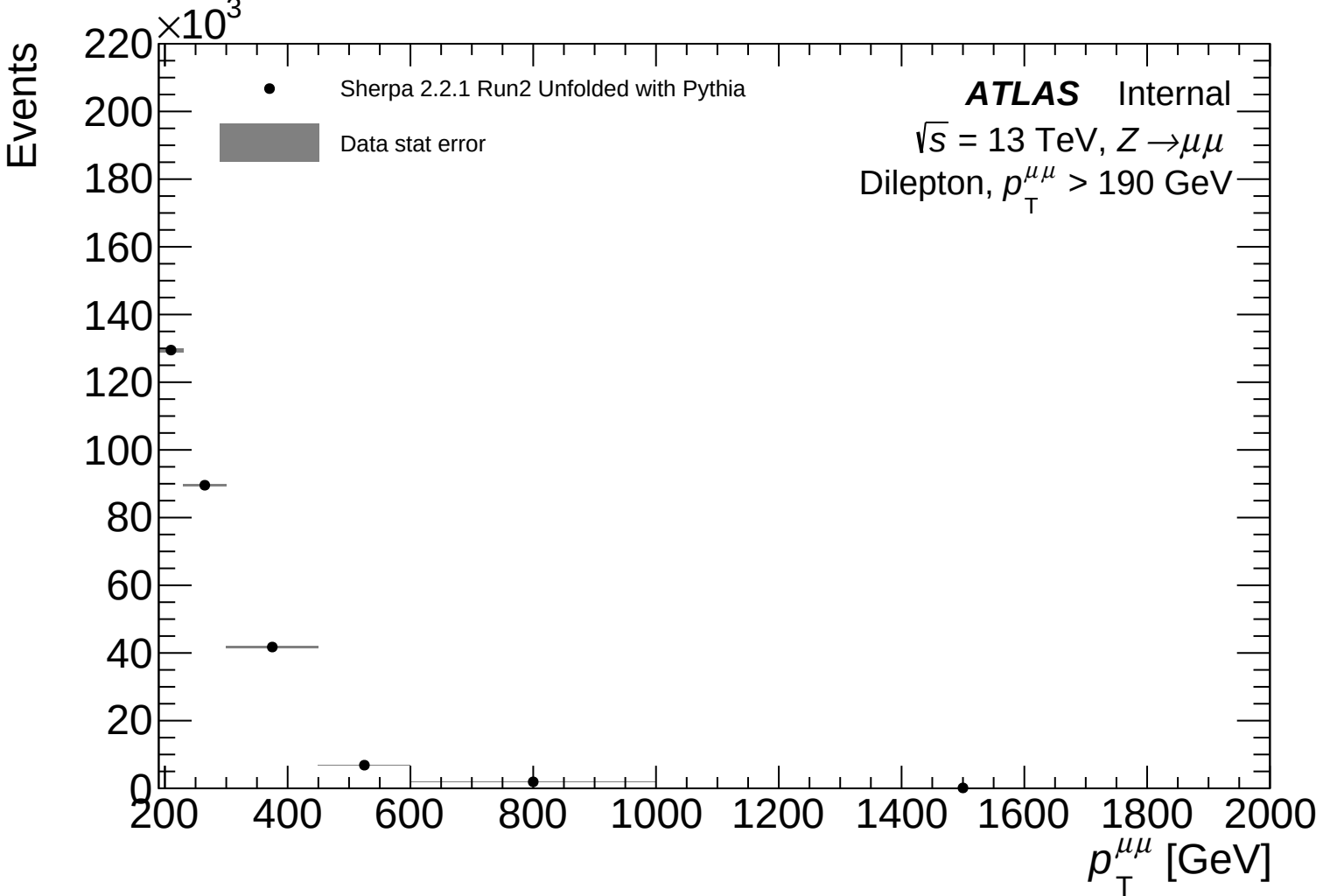
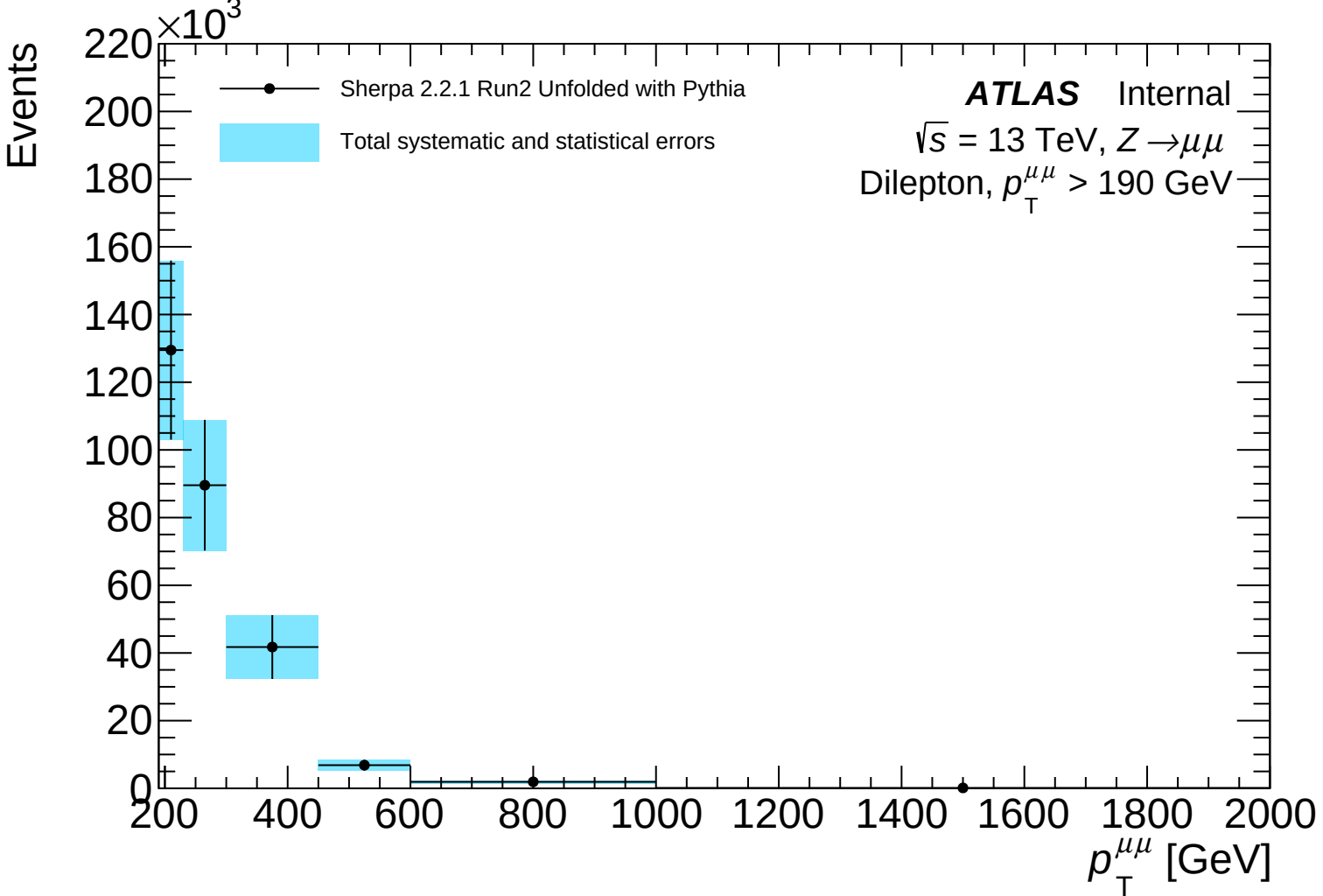
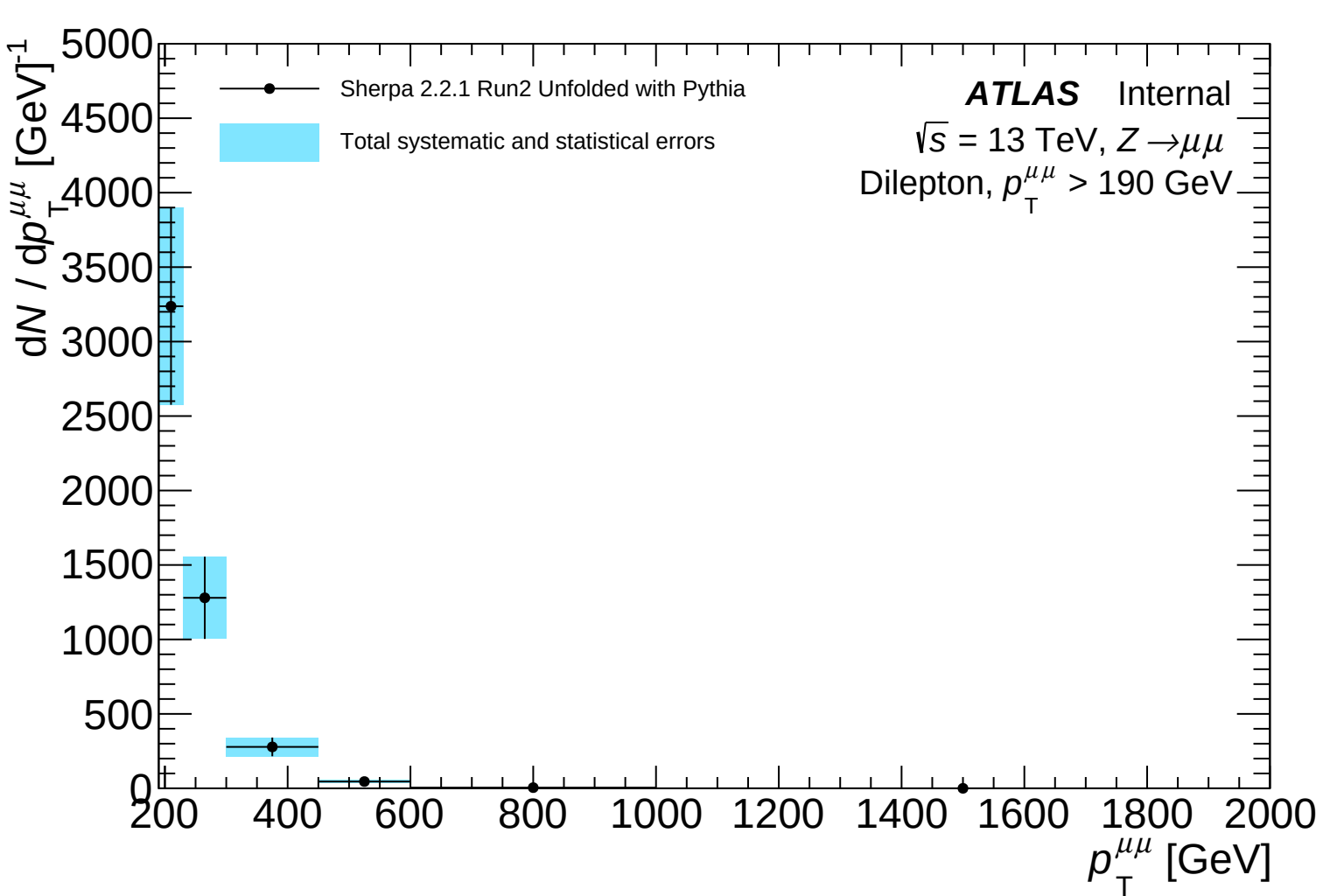
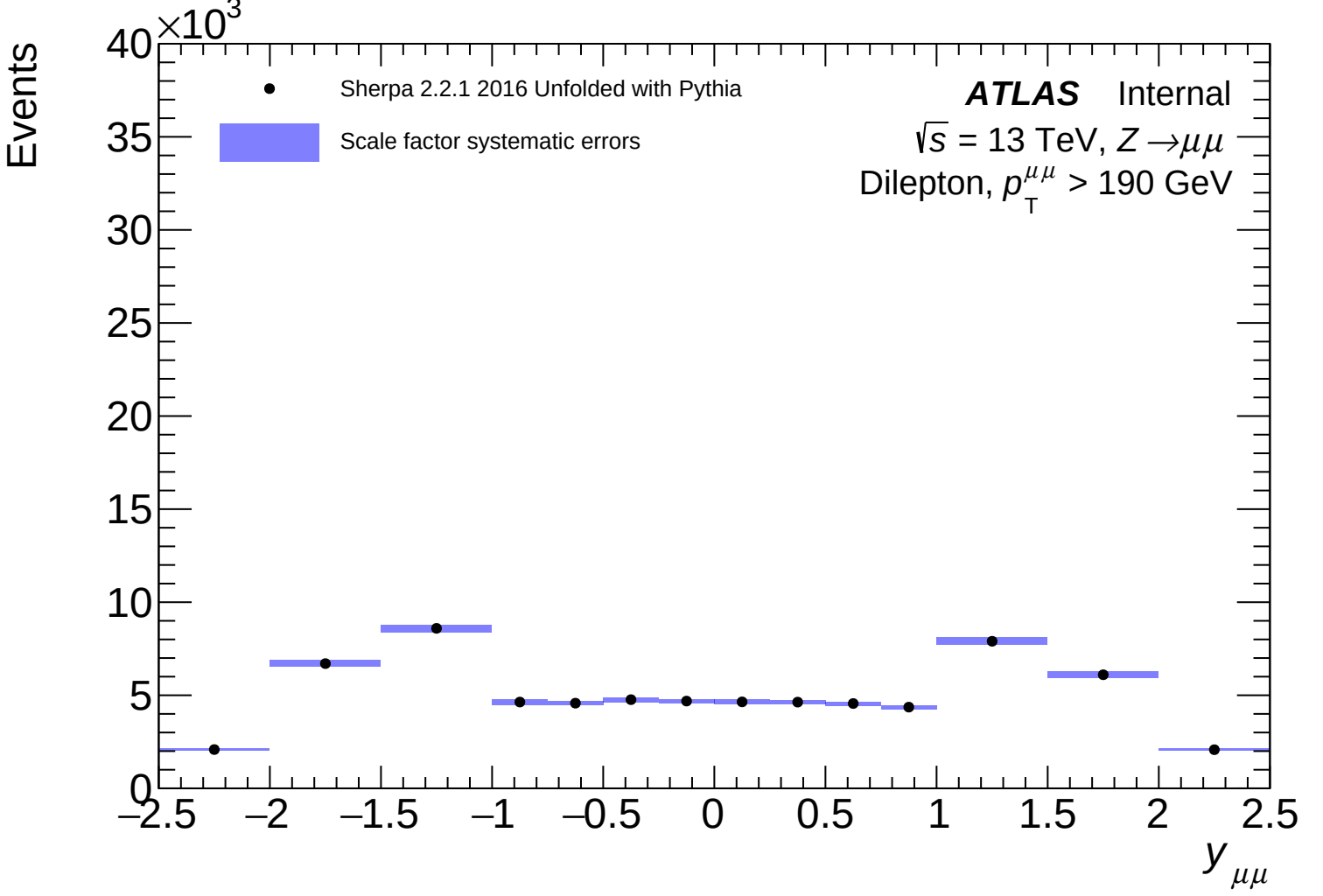
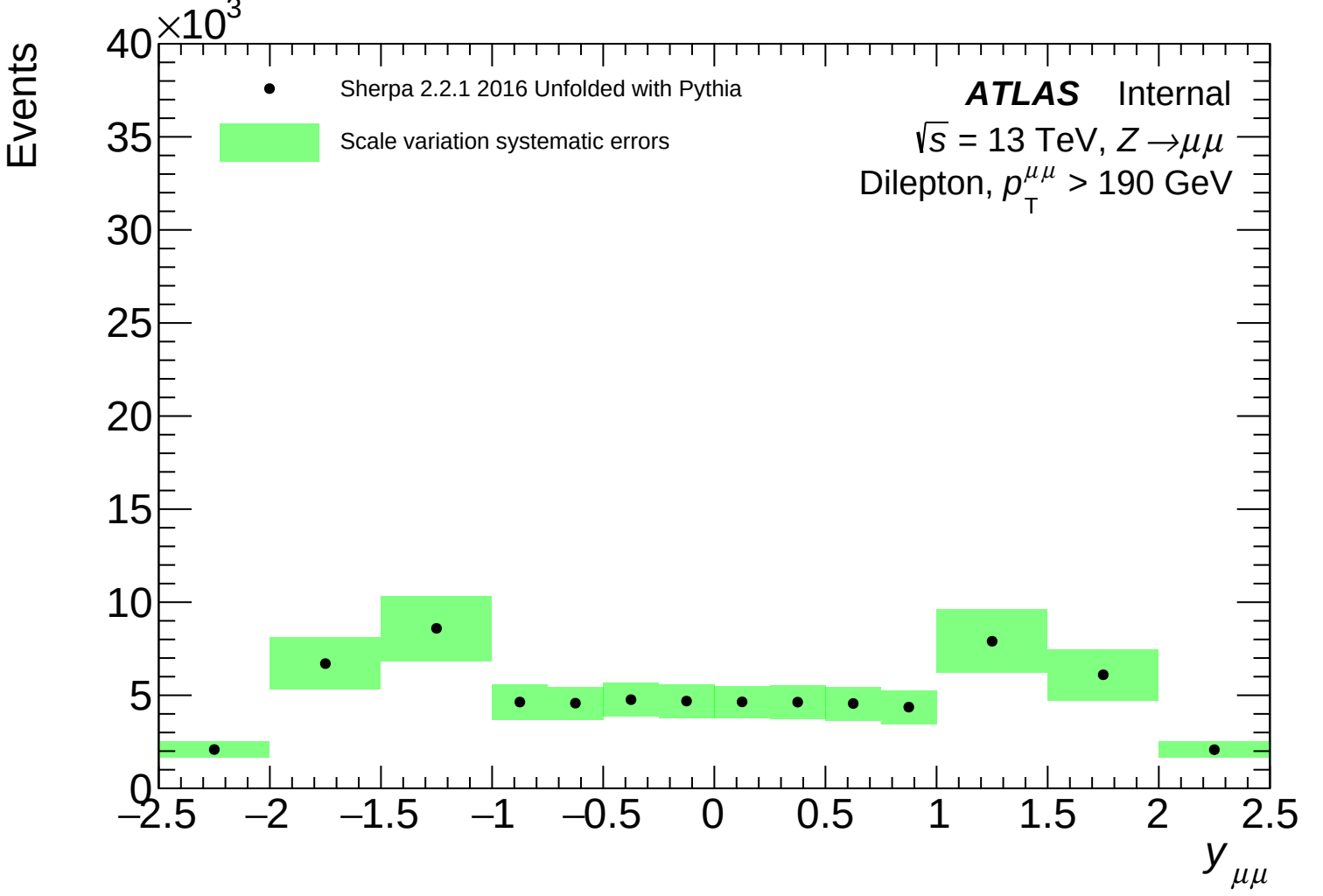
2000
$p_{\mathrm{T}}^{\mu\mu}$ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

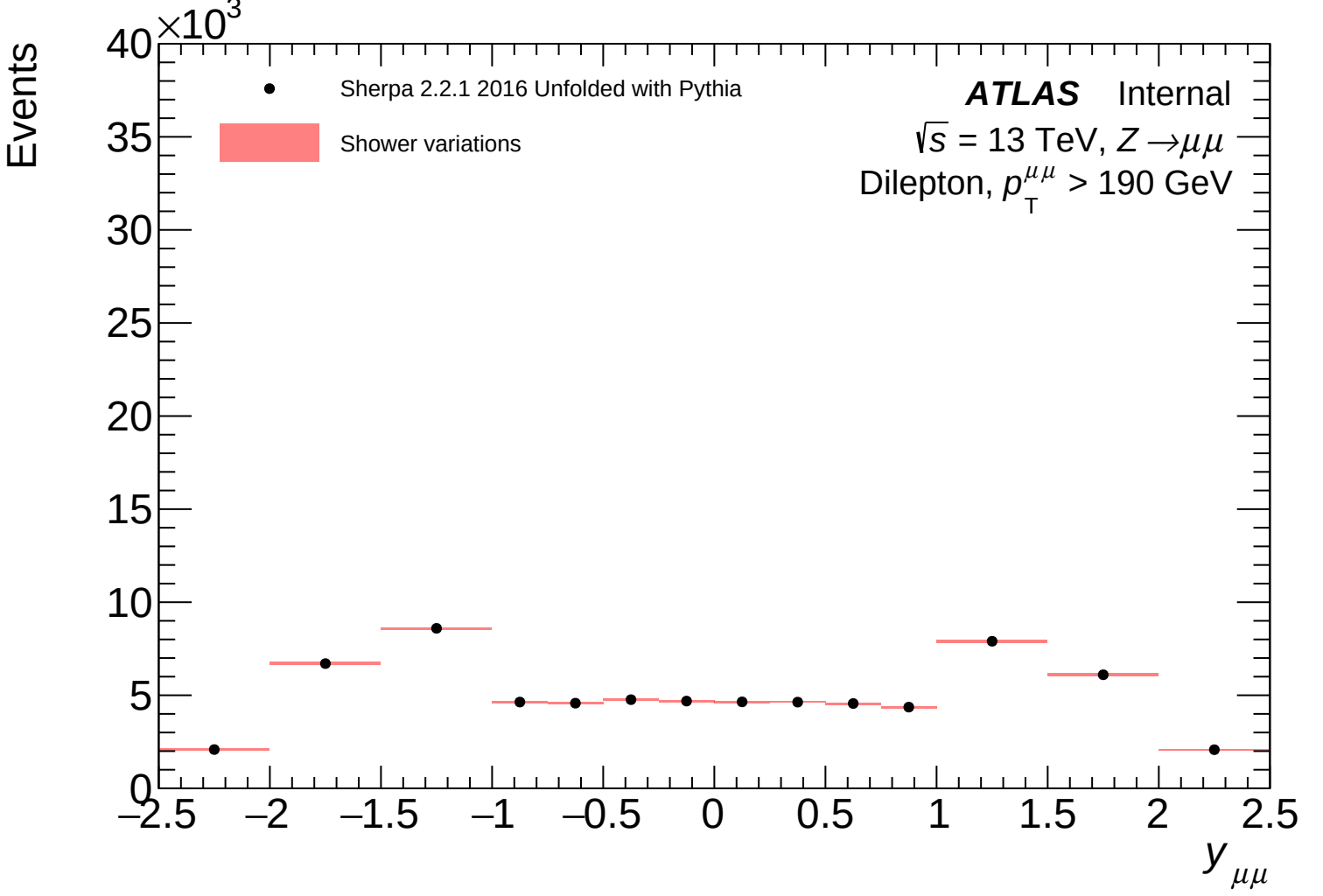

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μμ [GeV]

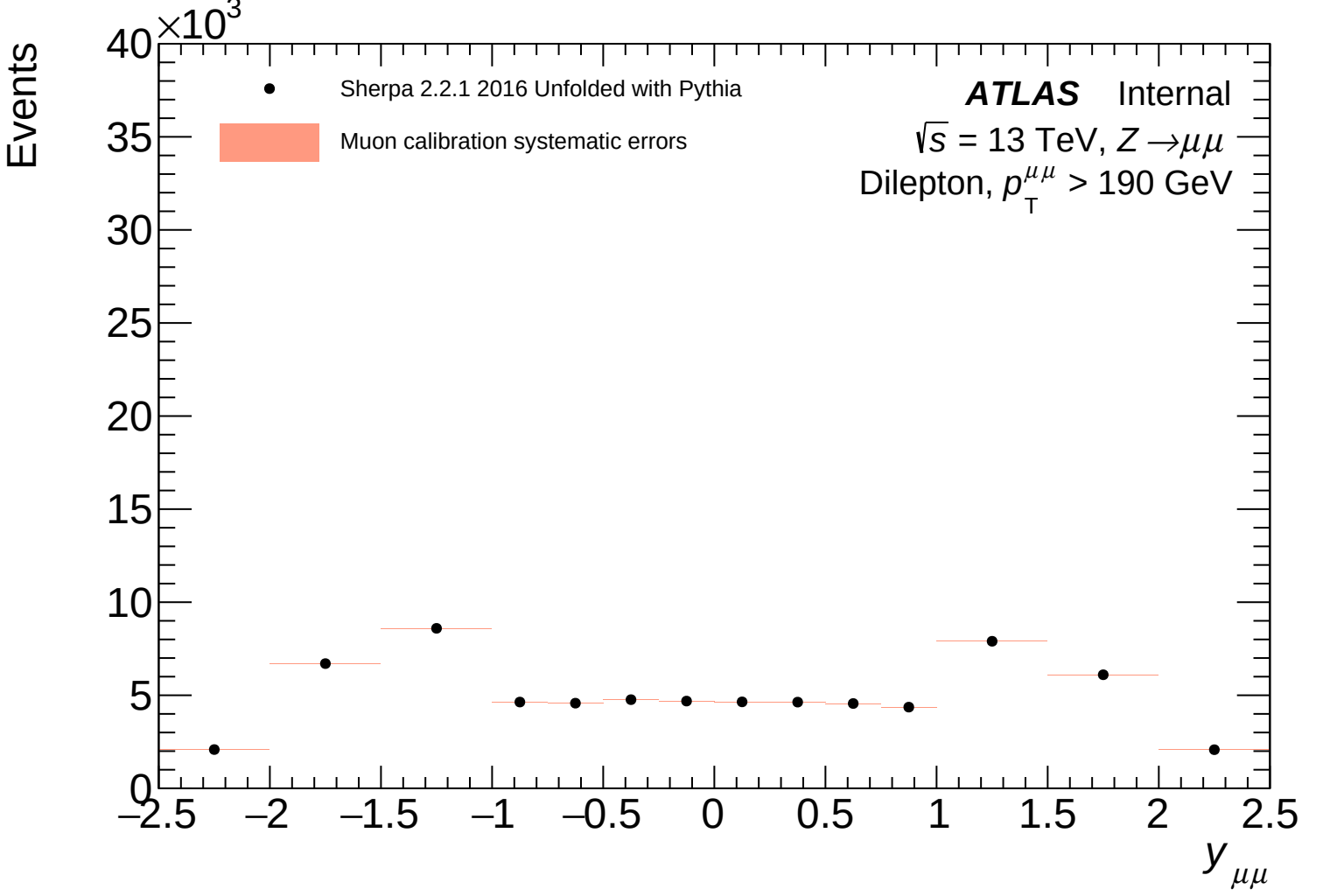

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μμ [GeV]

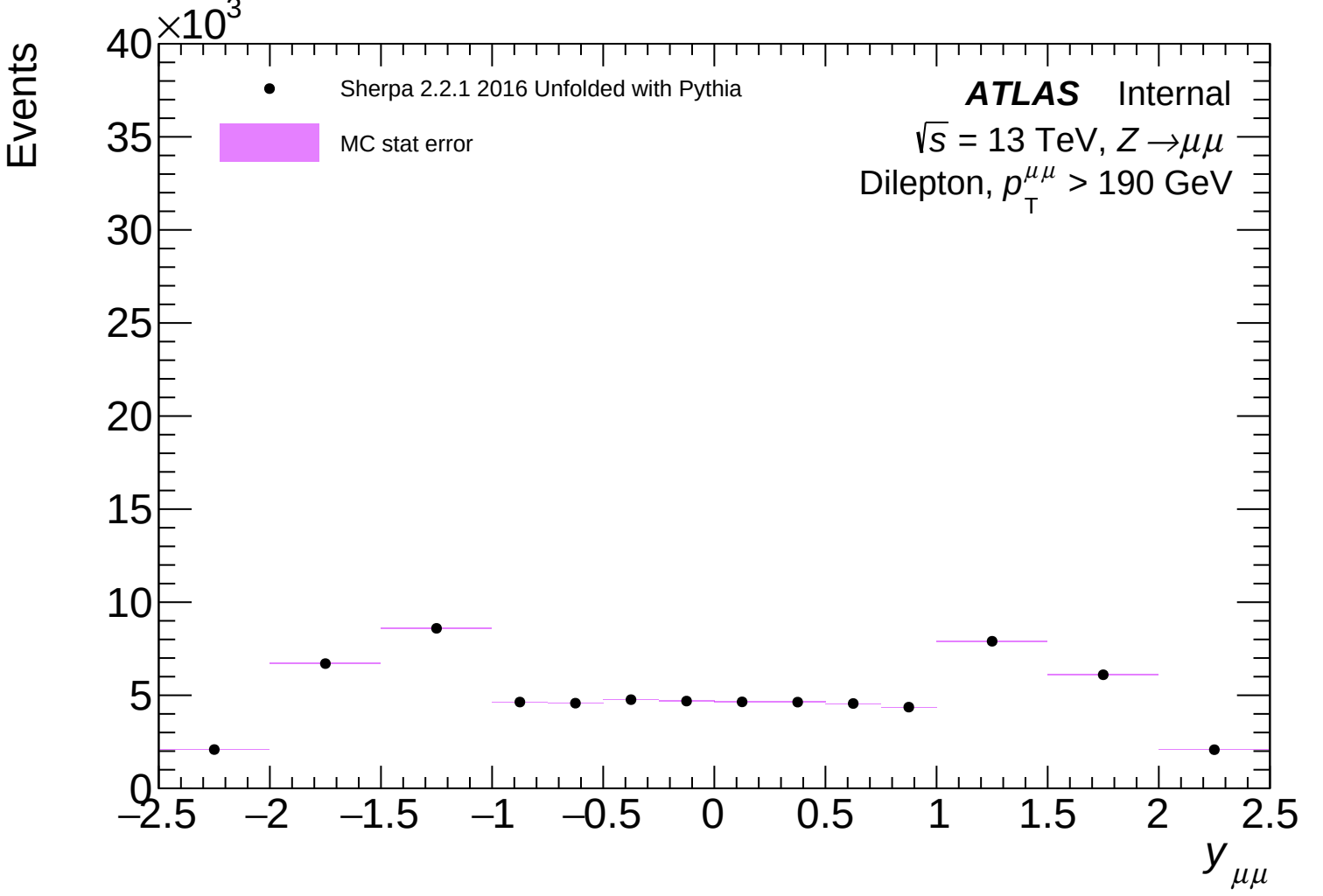

Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μμ [GeV]^-1
p_T^μμ [GeV]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
200
400
600
800
1000
1200
1400
1600
1800
2000

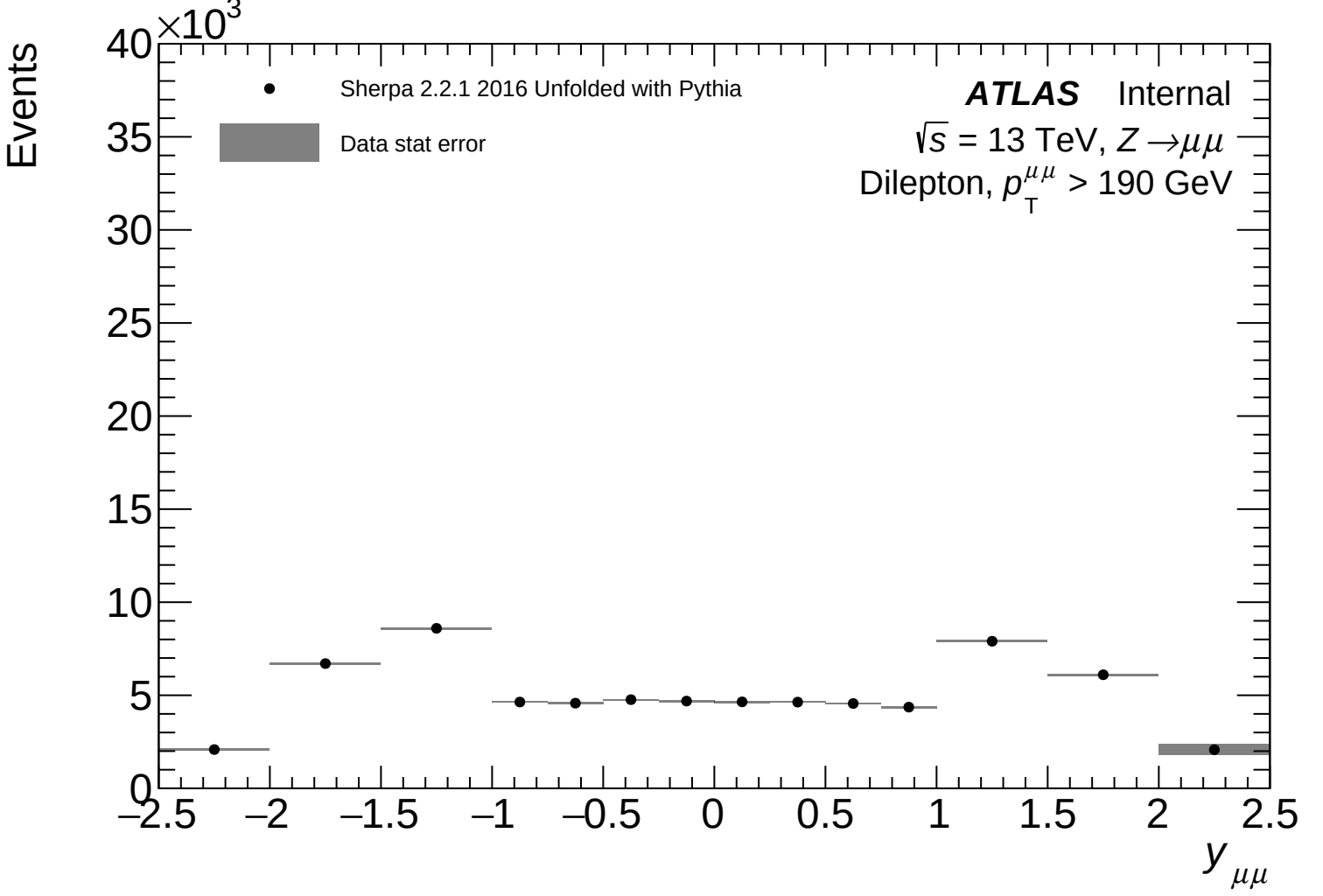

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

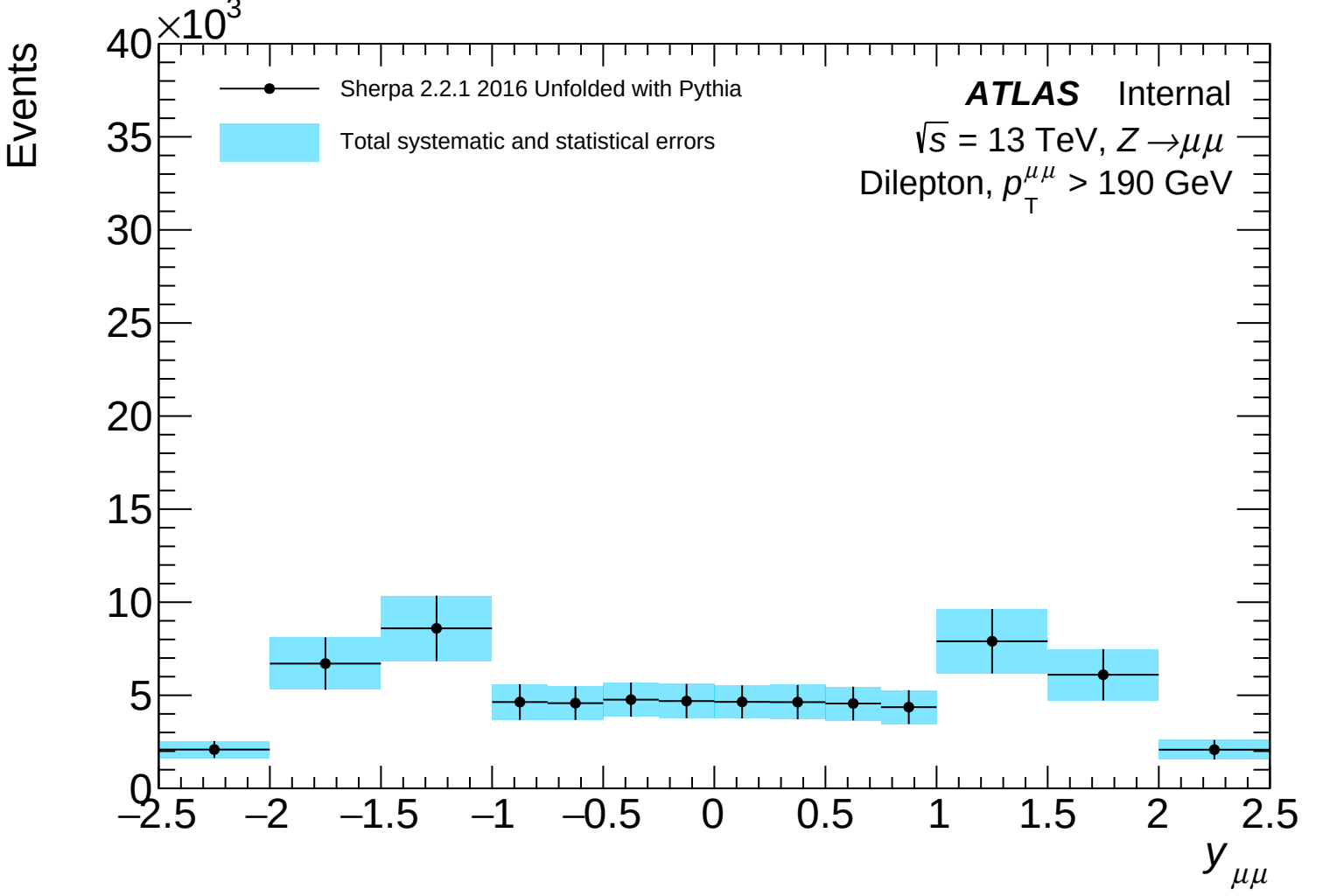

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

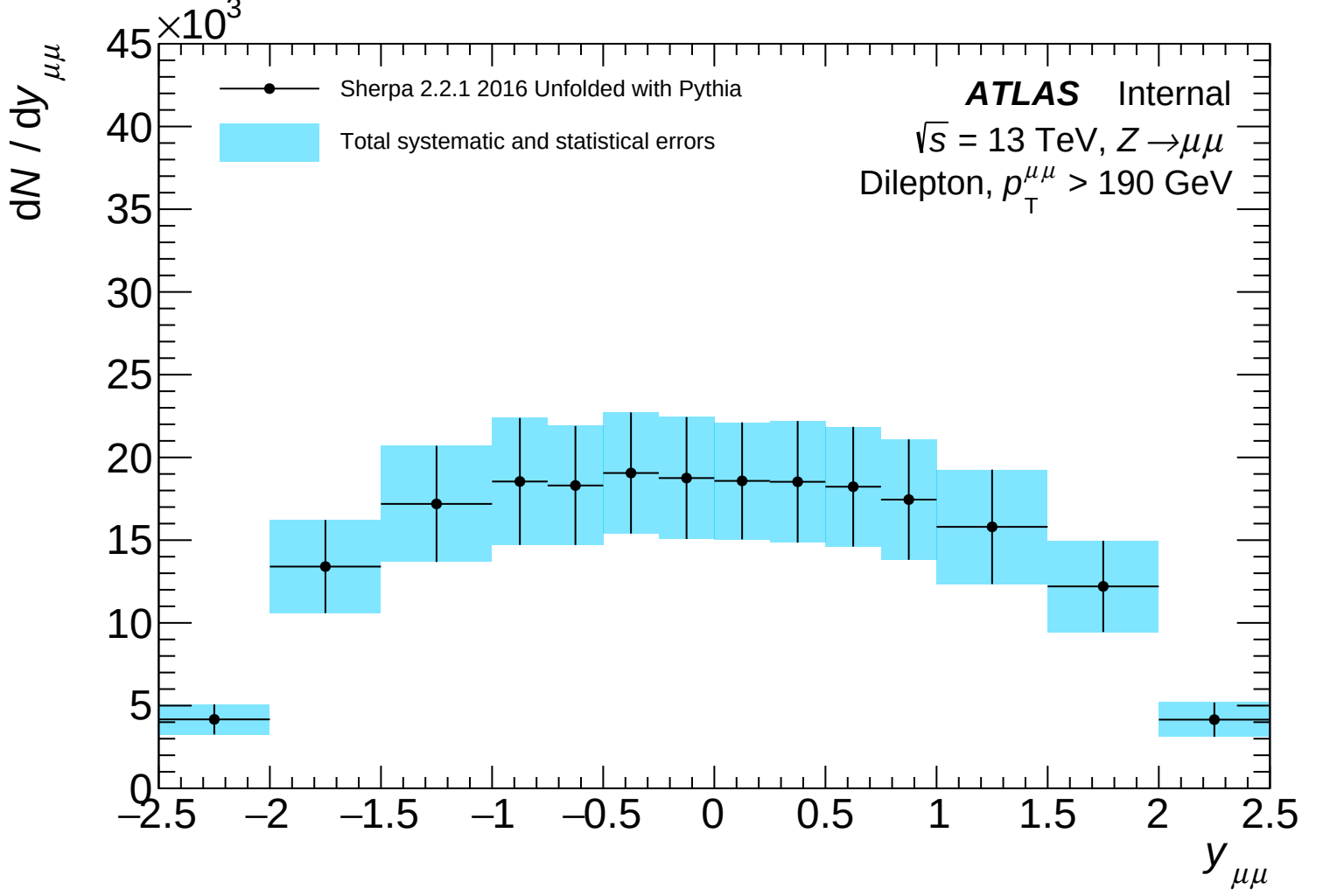

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

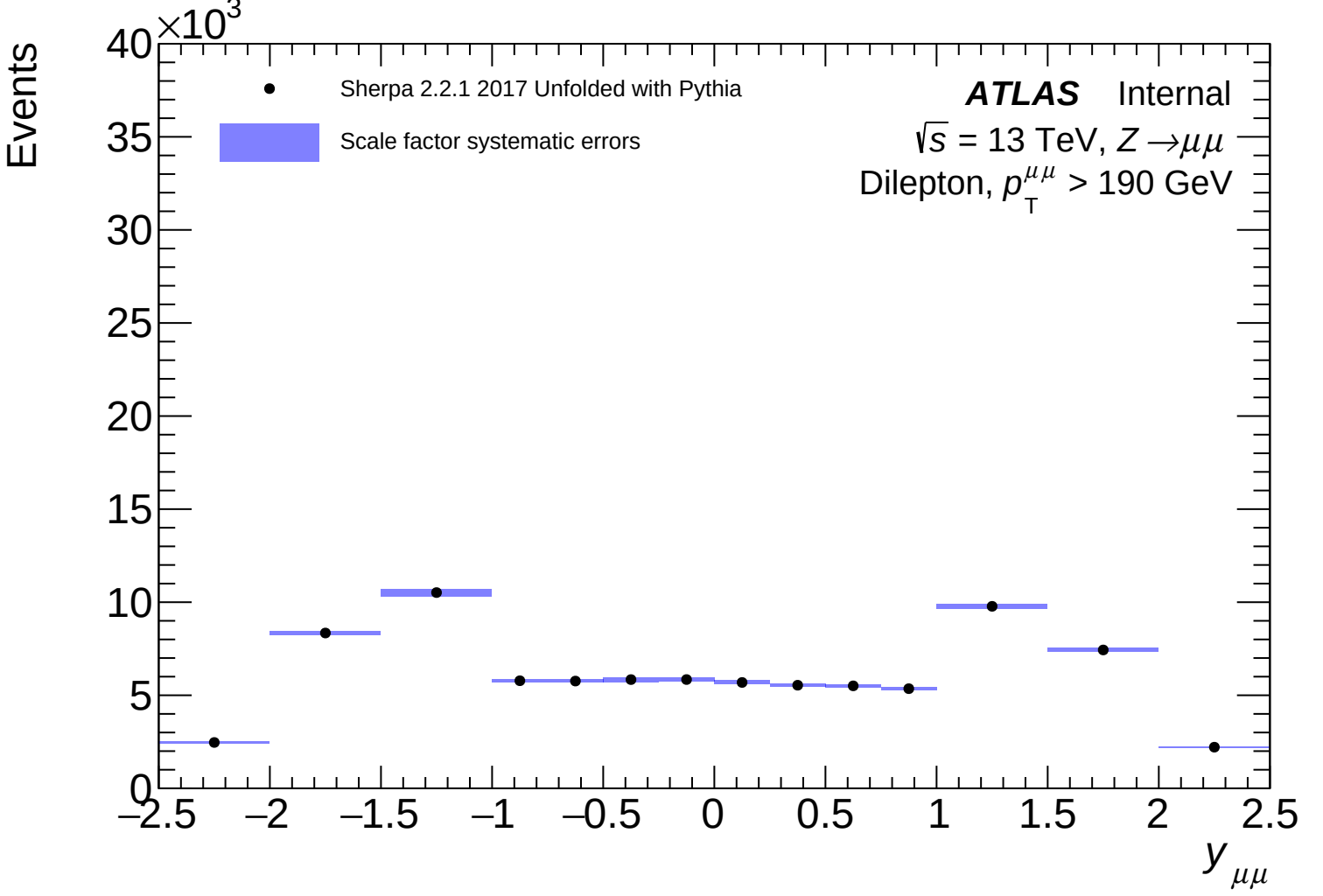

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

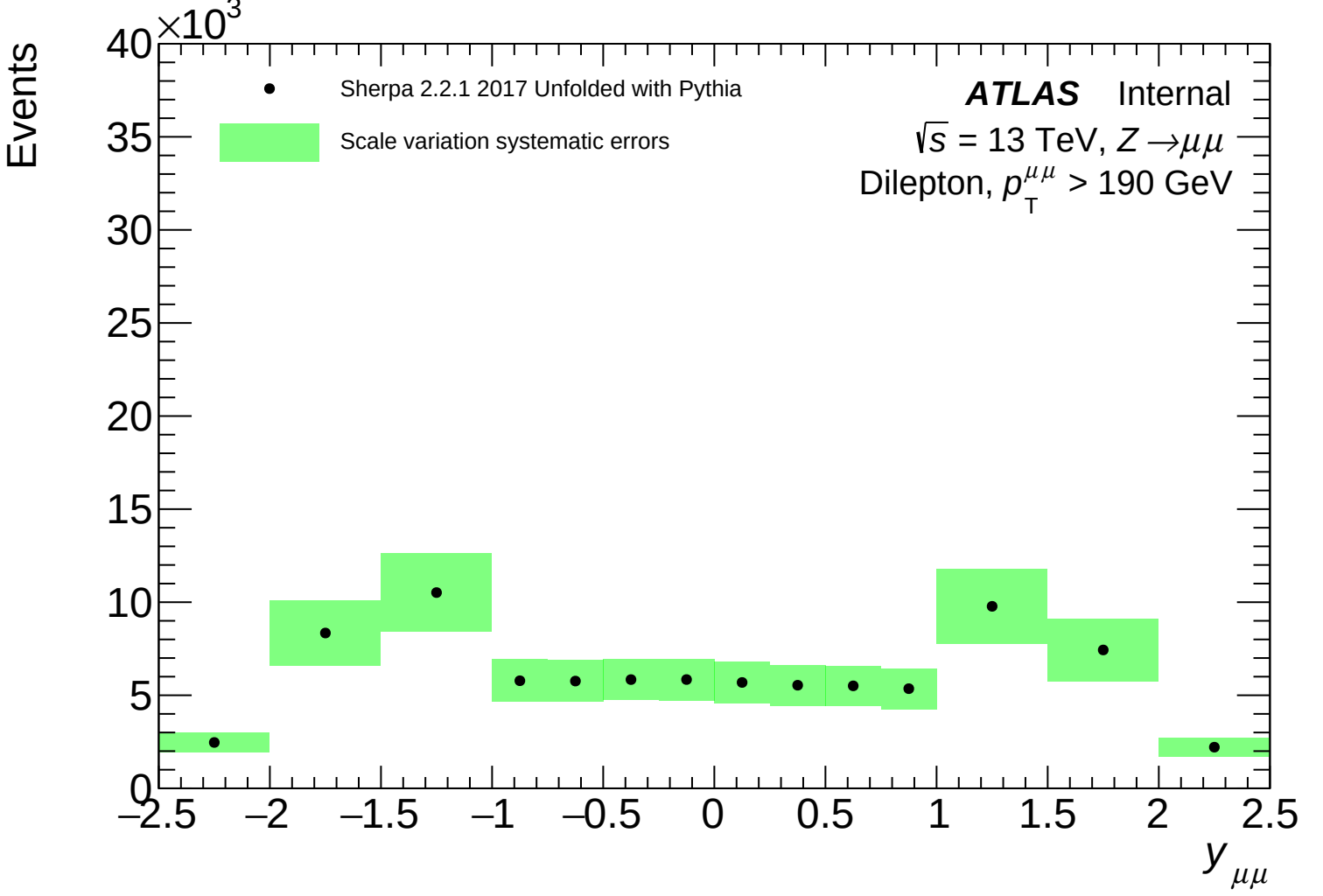

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

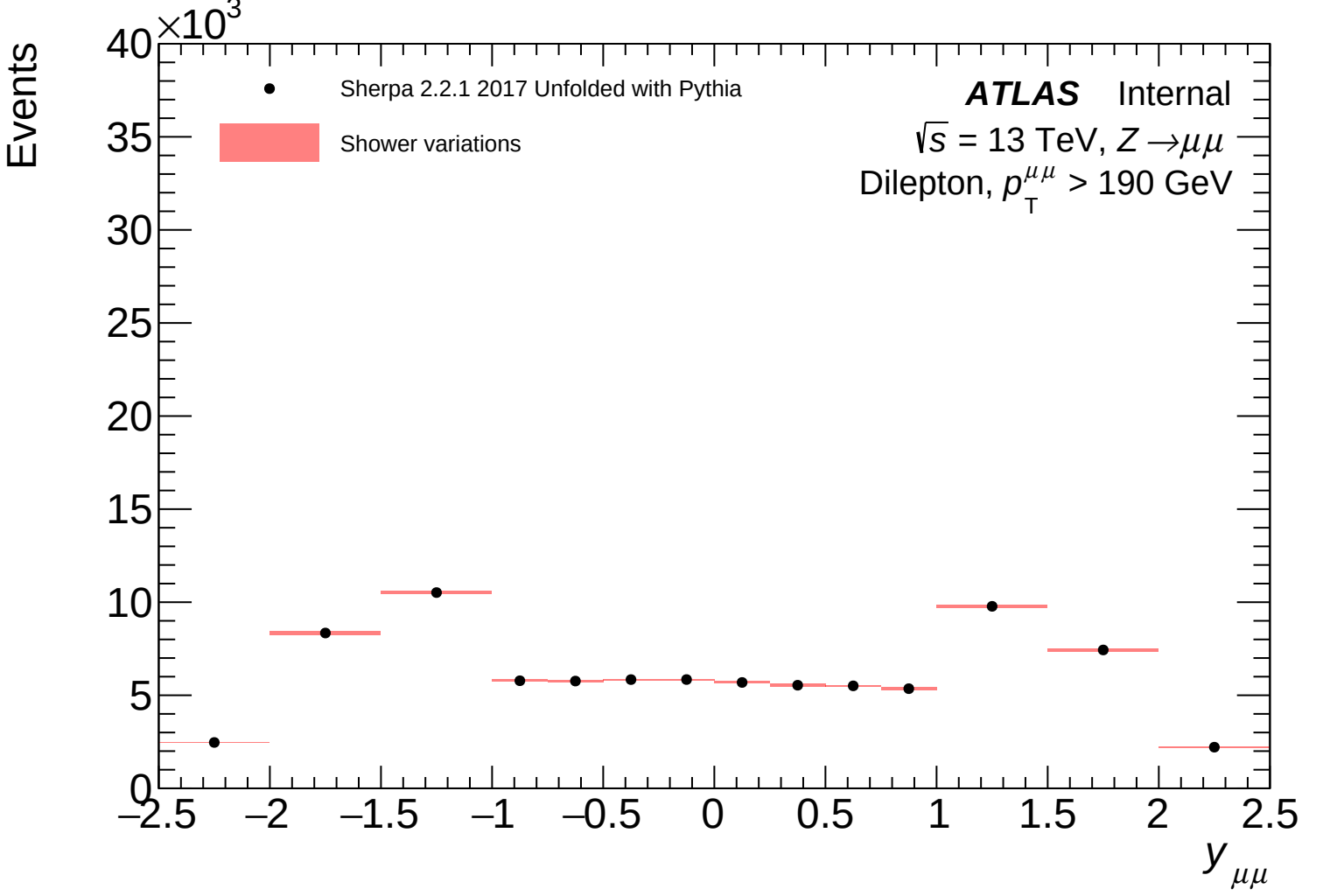

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

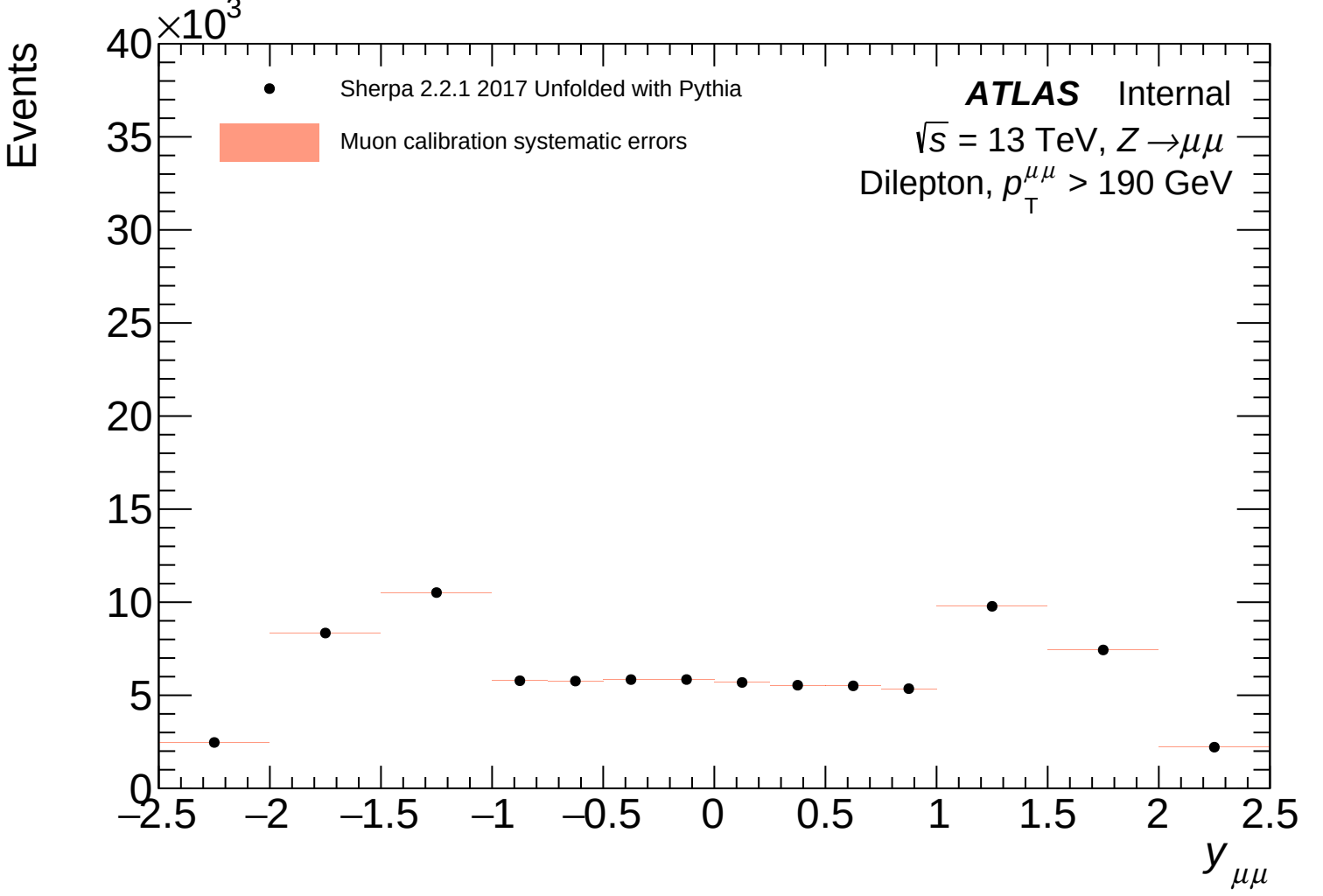

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

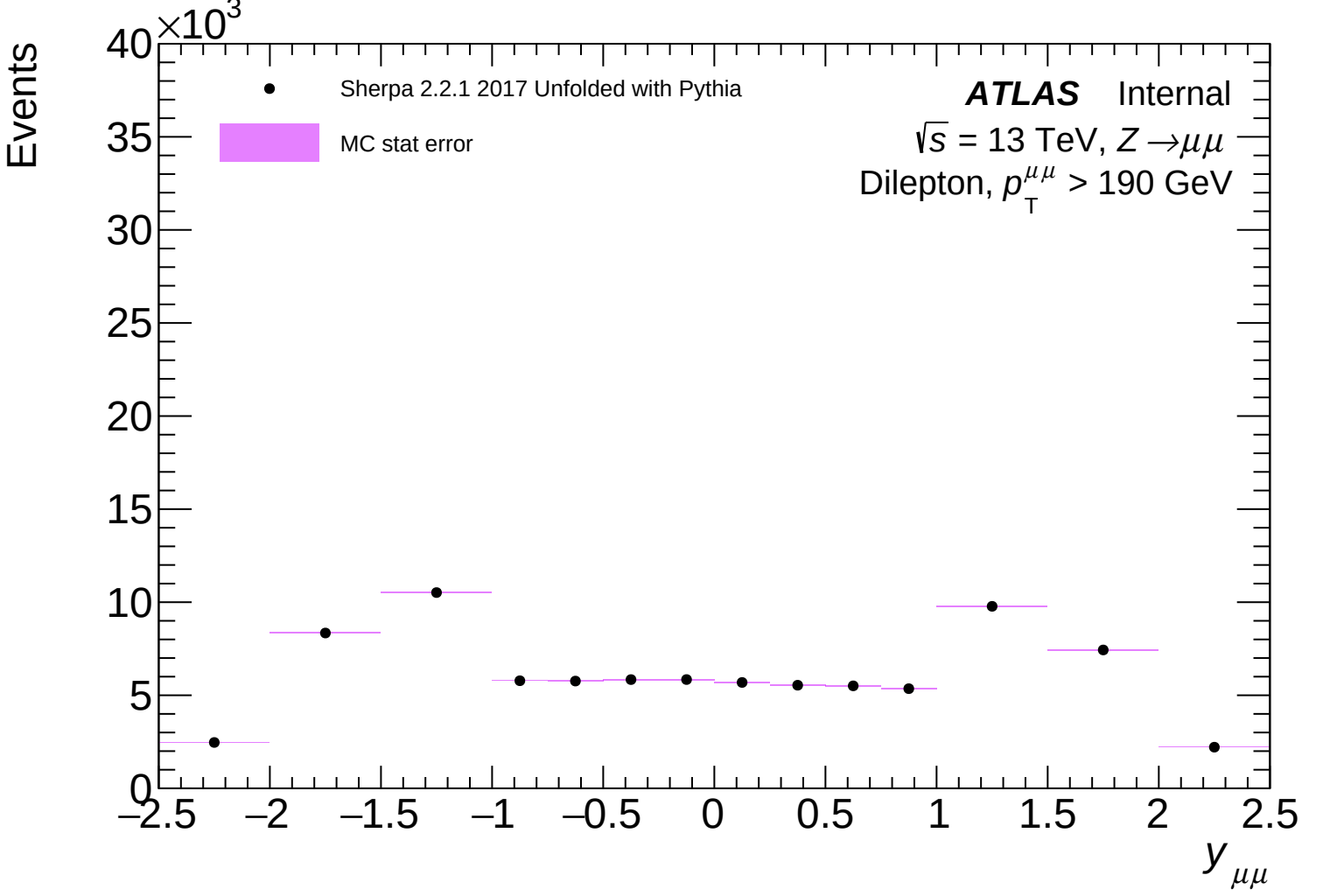

×10^3
dN / dy_μμ
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
45
40
35
30
25
20
15
10
5
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

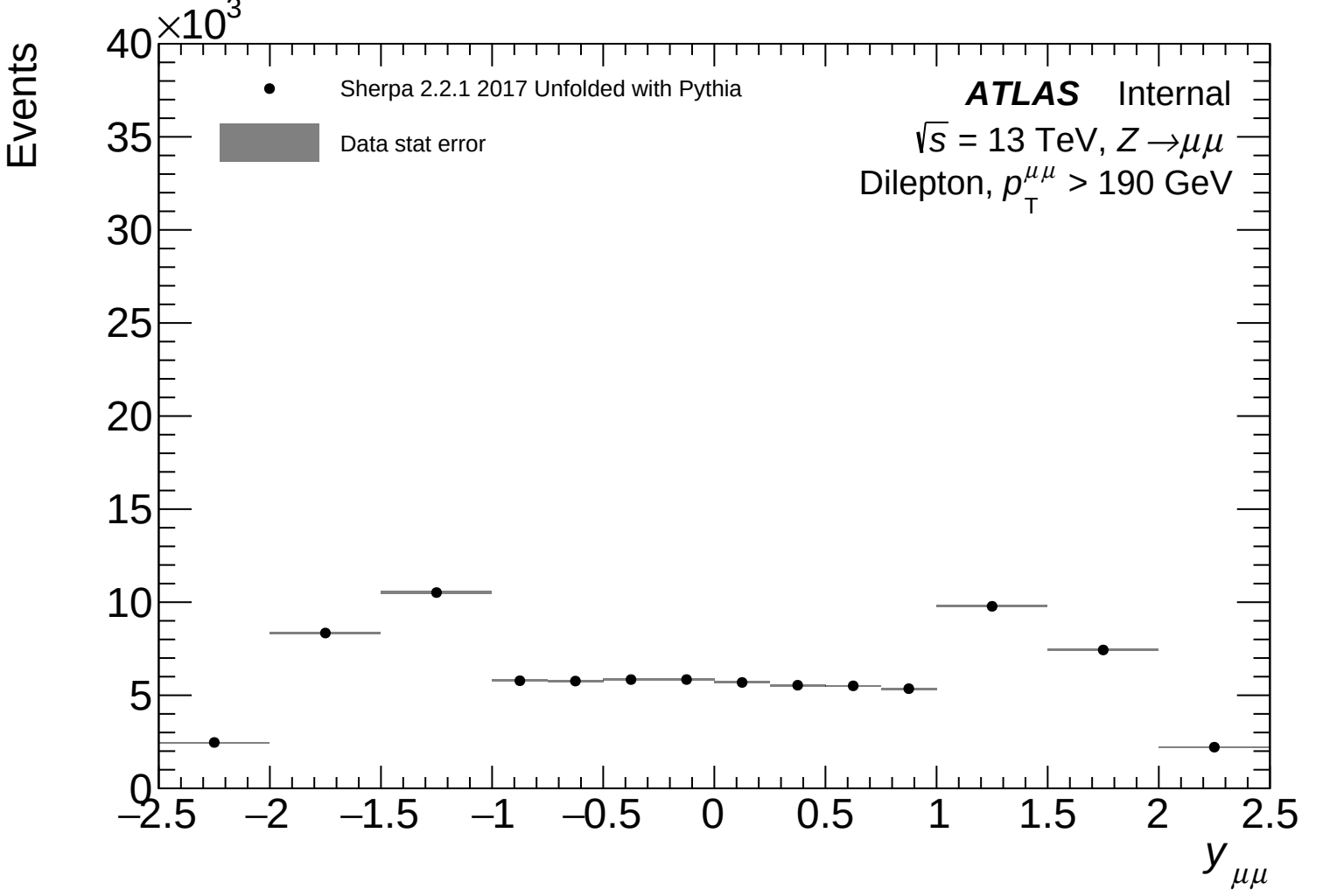

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

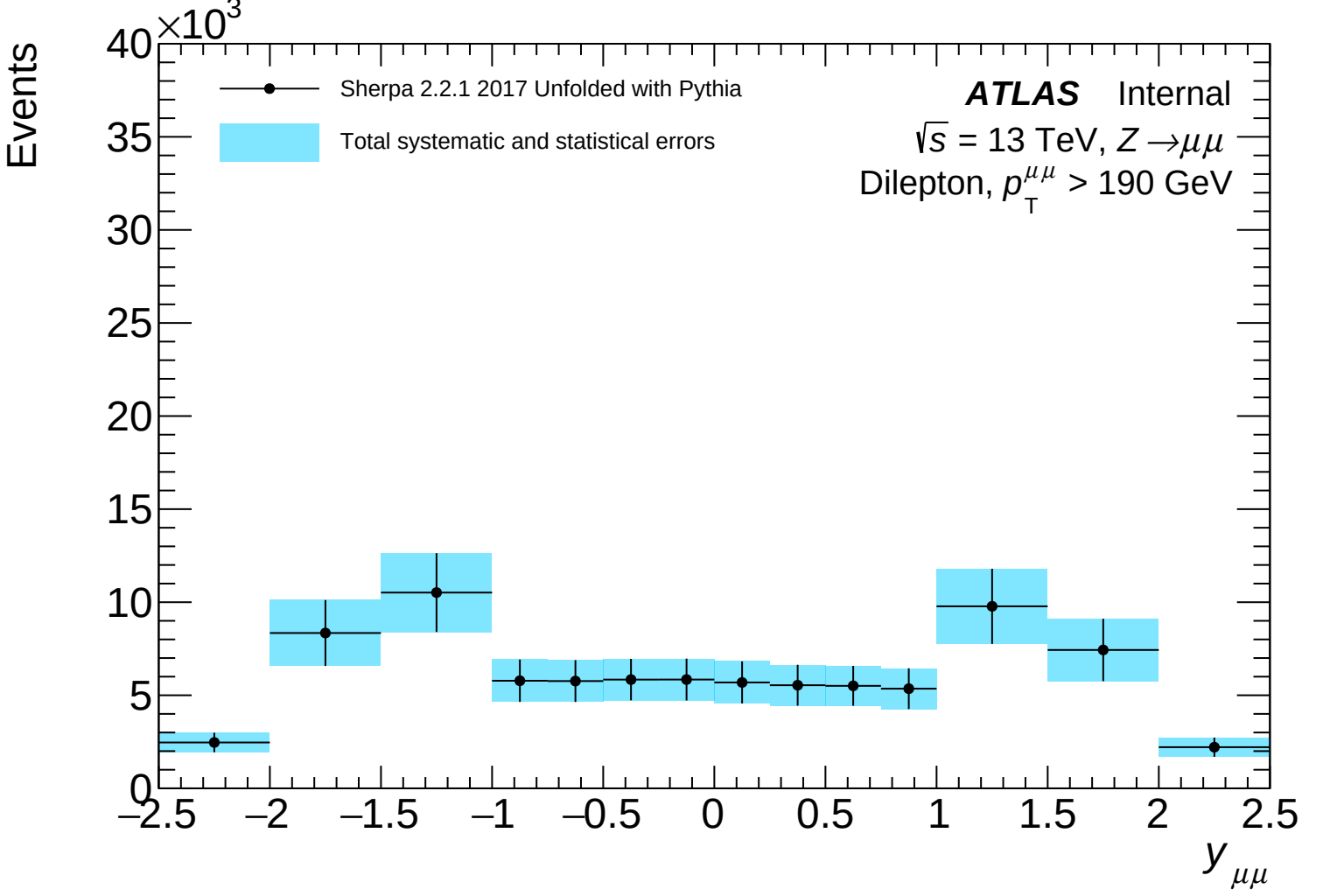

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

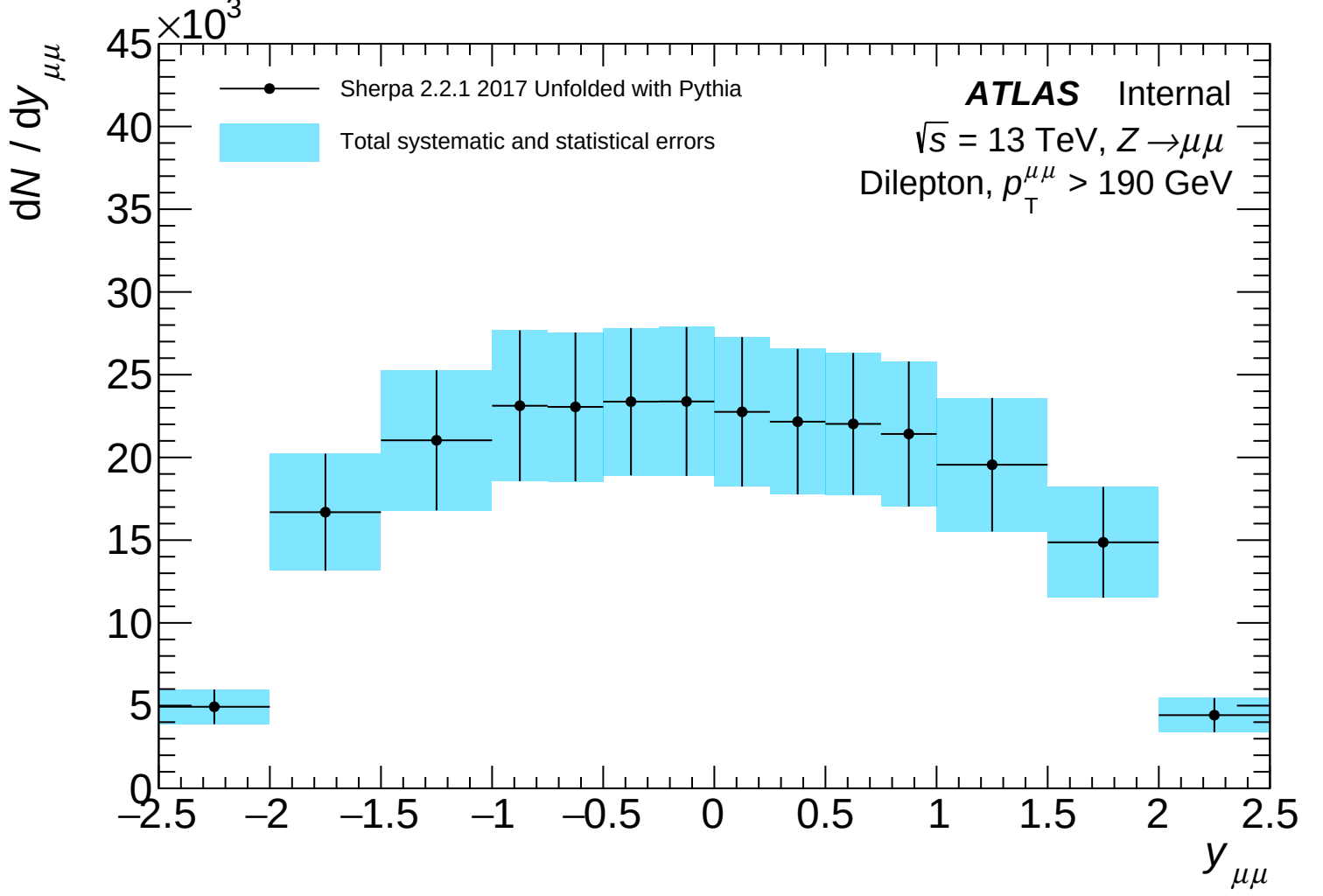

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

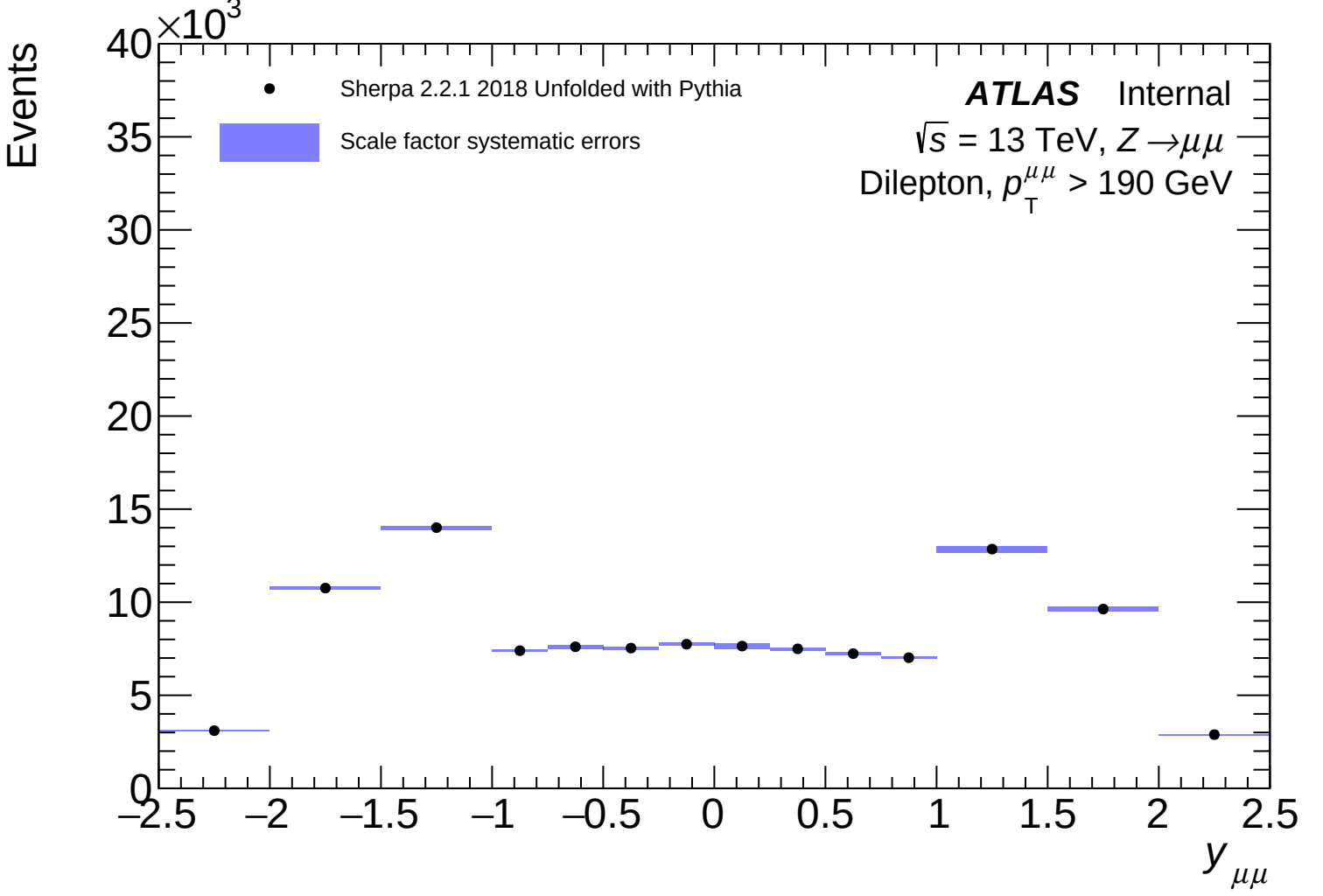

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

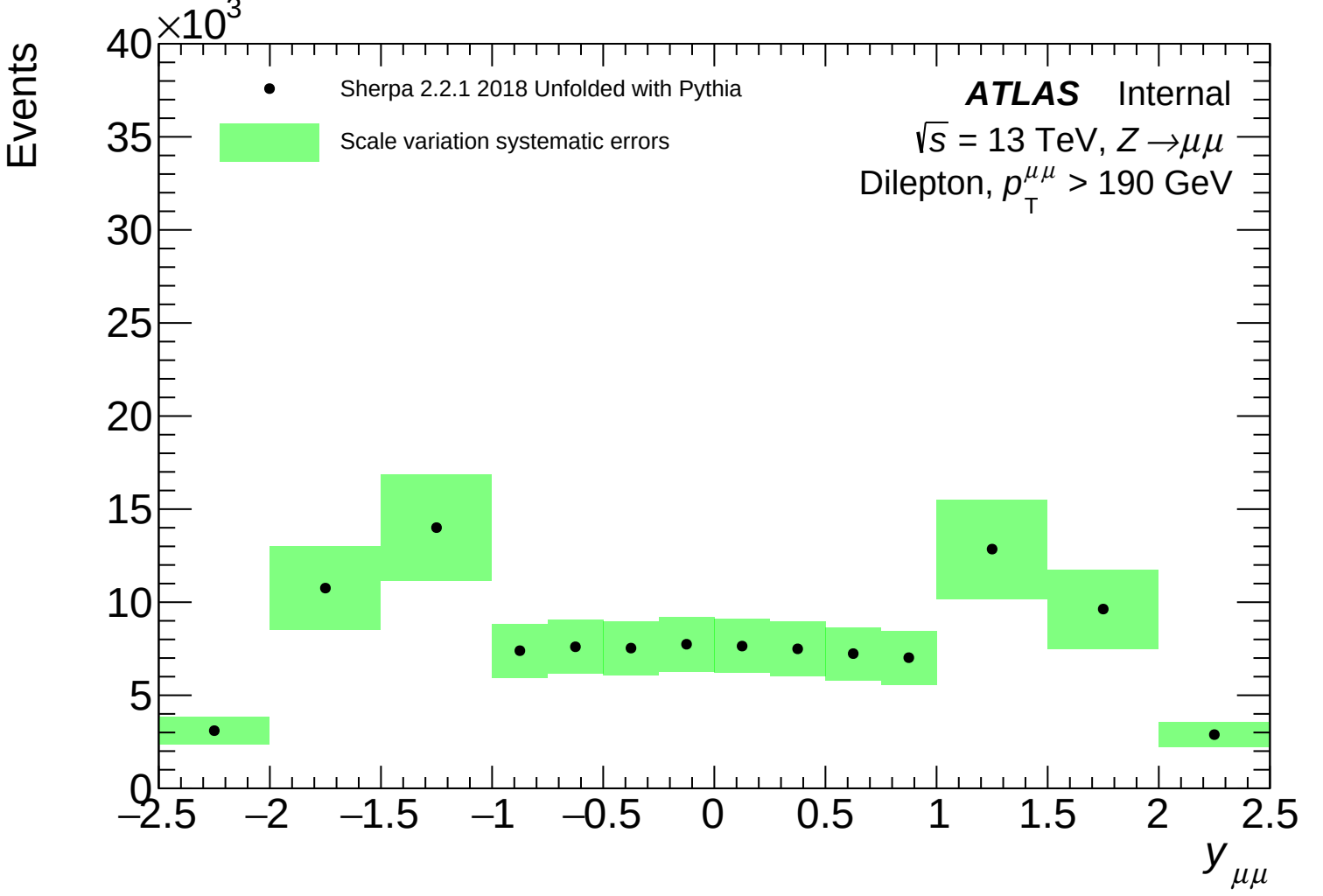

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

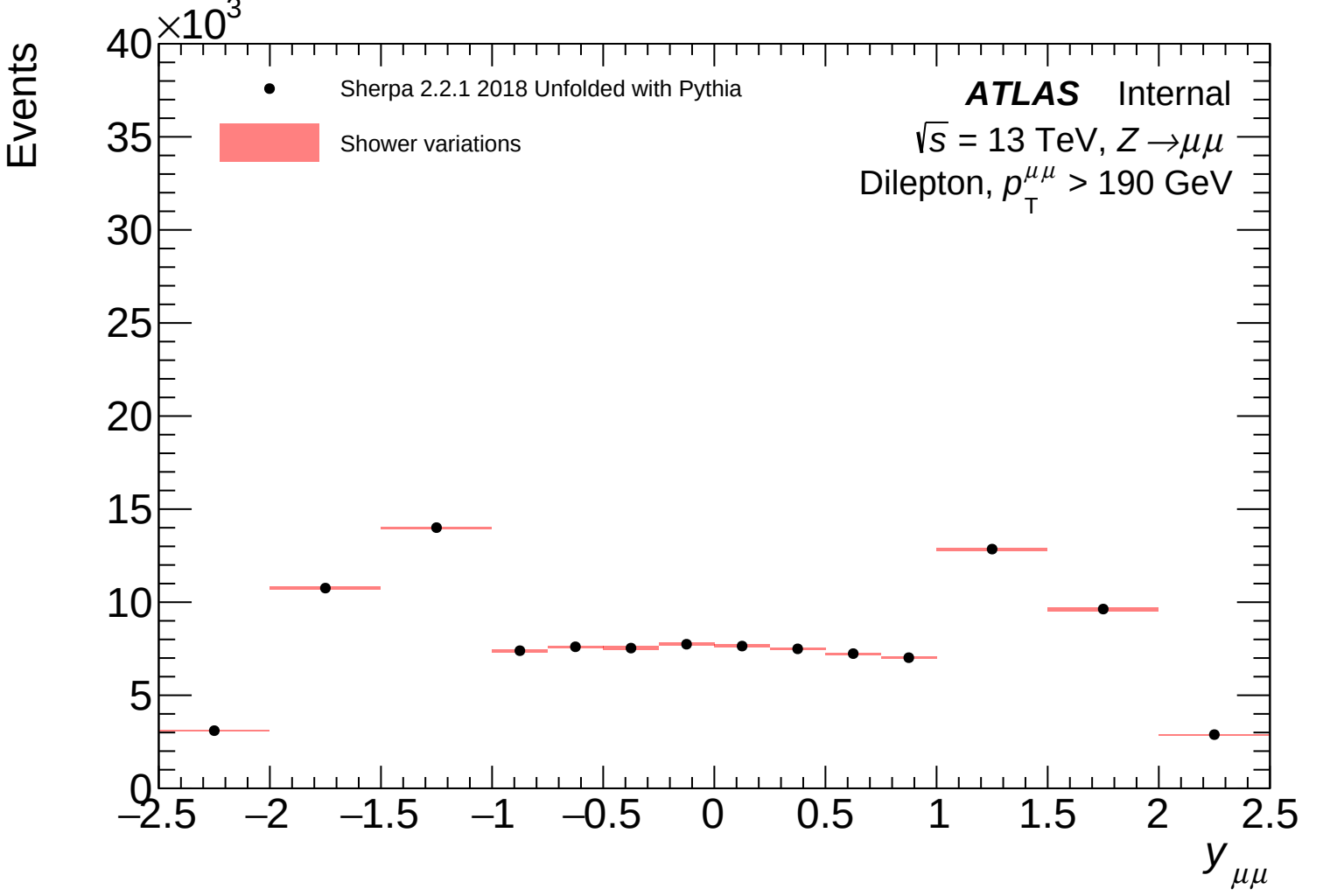

Events
$\times 10^3$
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \to \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
$y_{\mu\mu}$

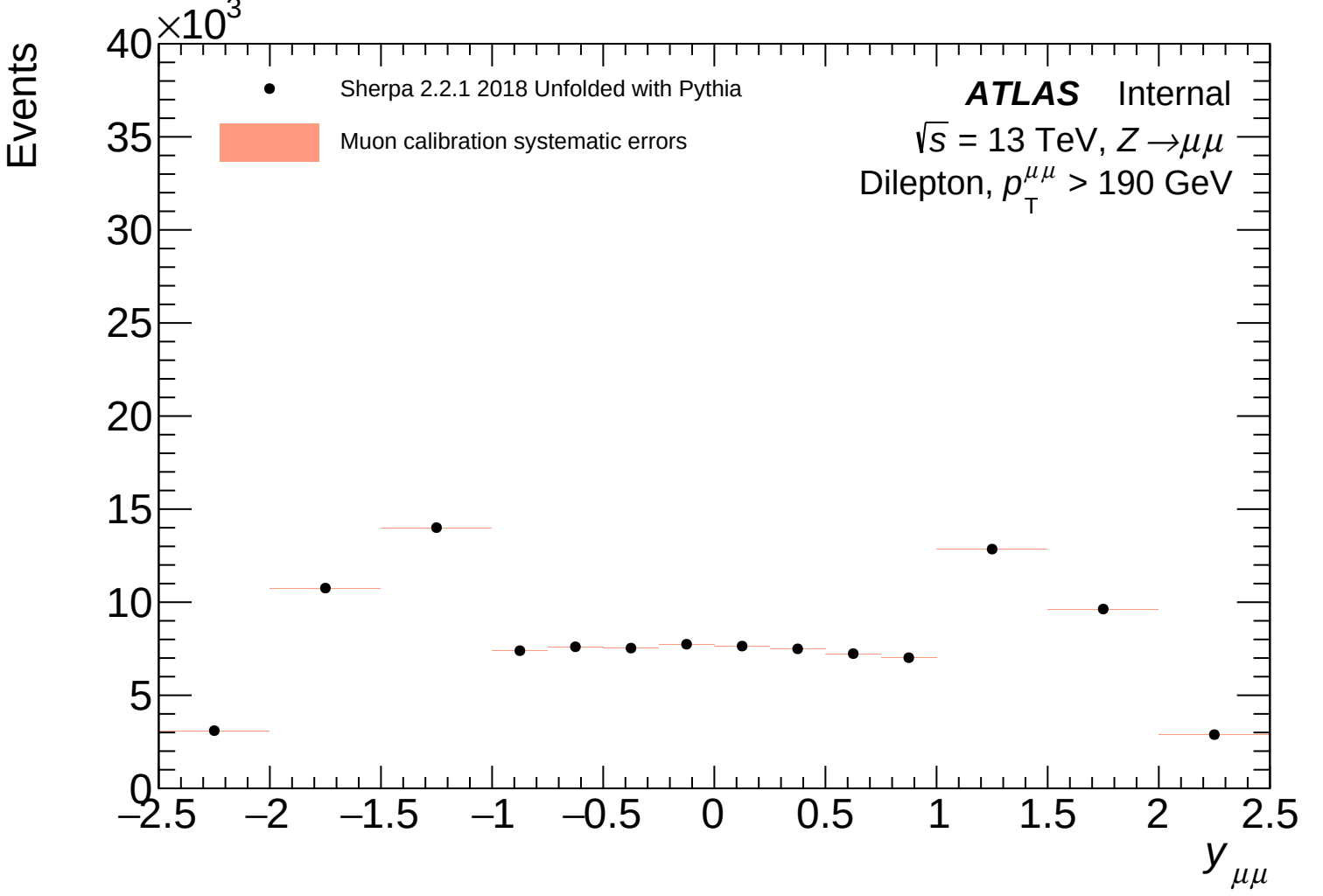

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

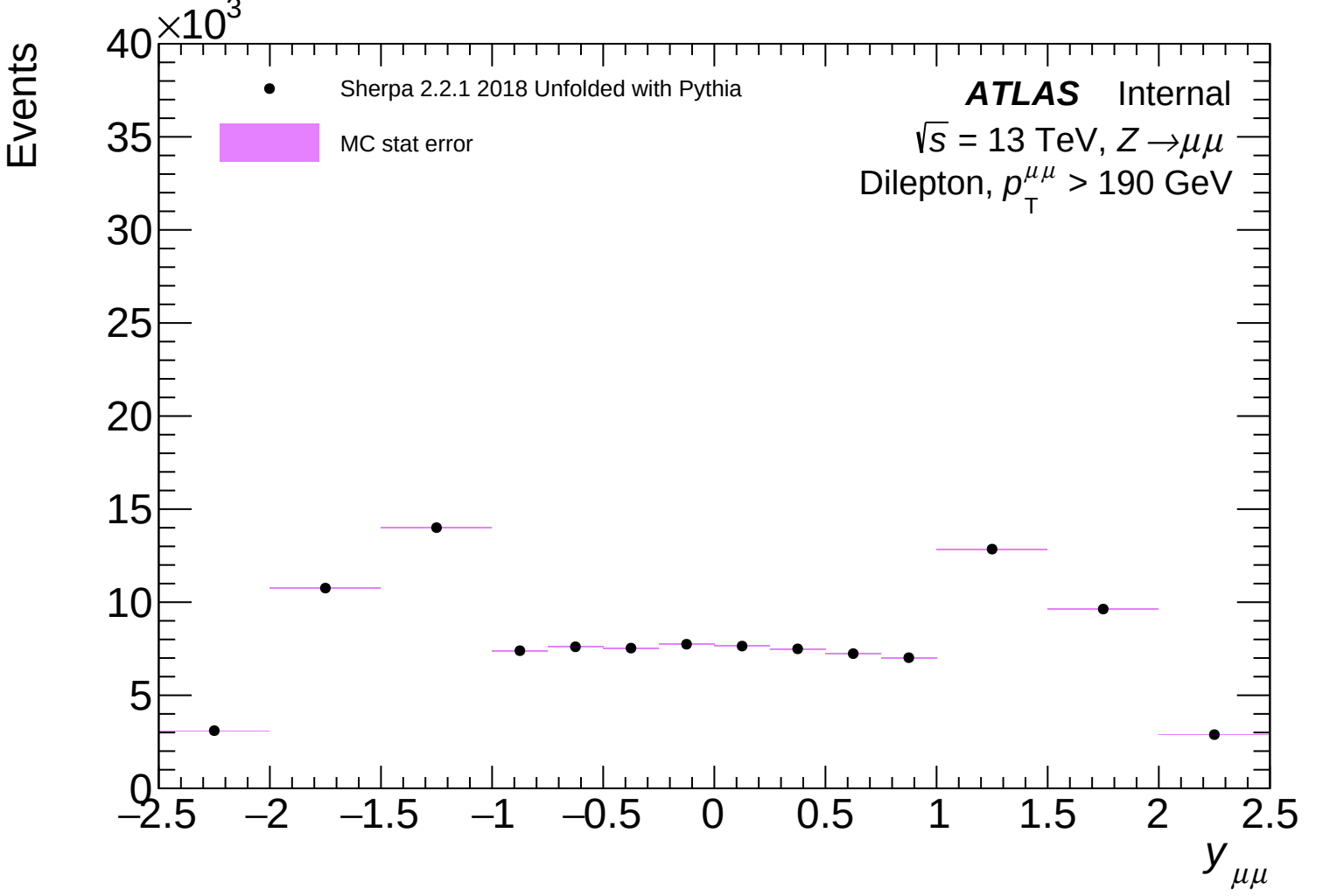

×10^3
dN / dy_μμ
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
45
40
35
30
25
20
15
10
5
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

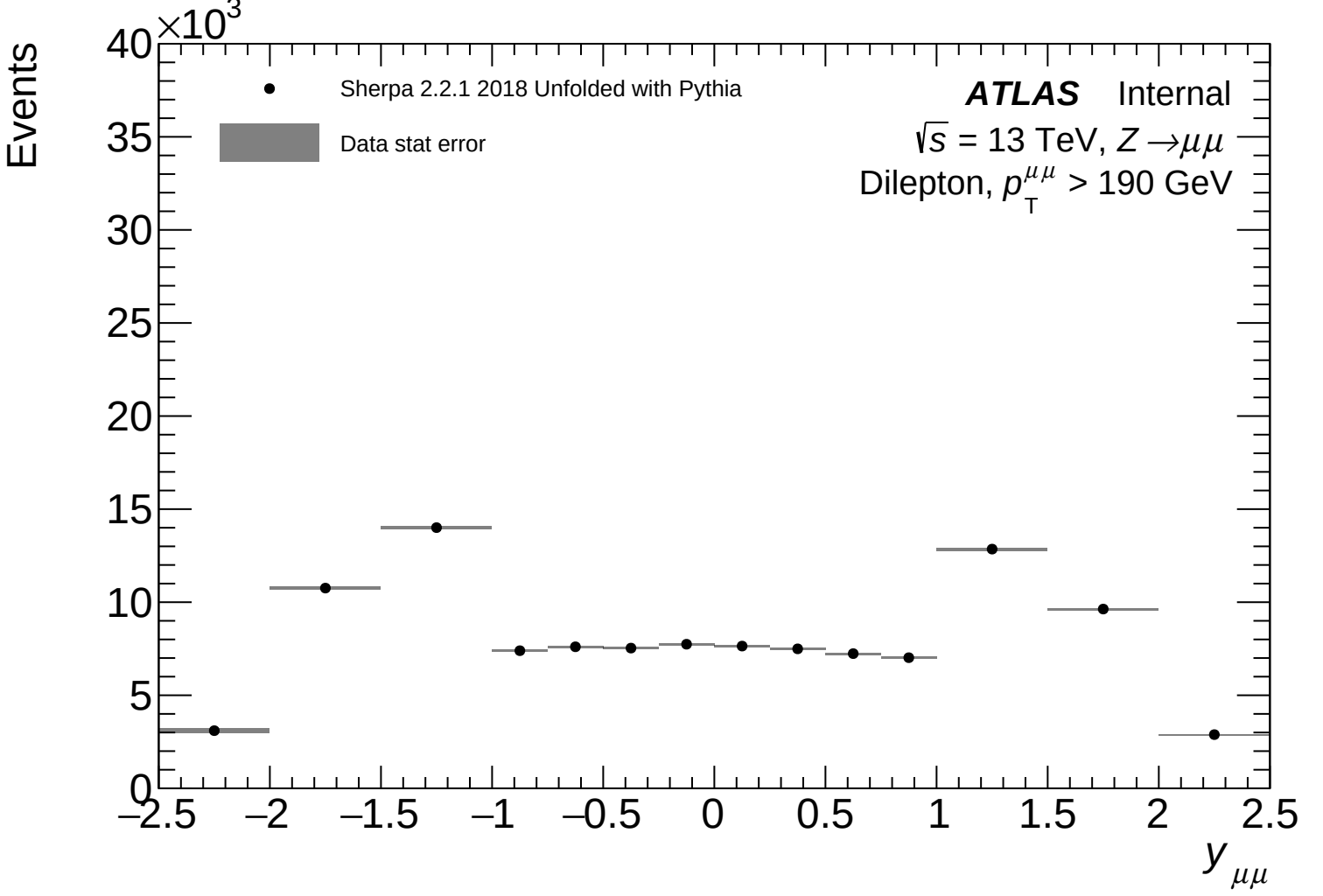

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

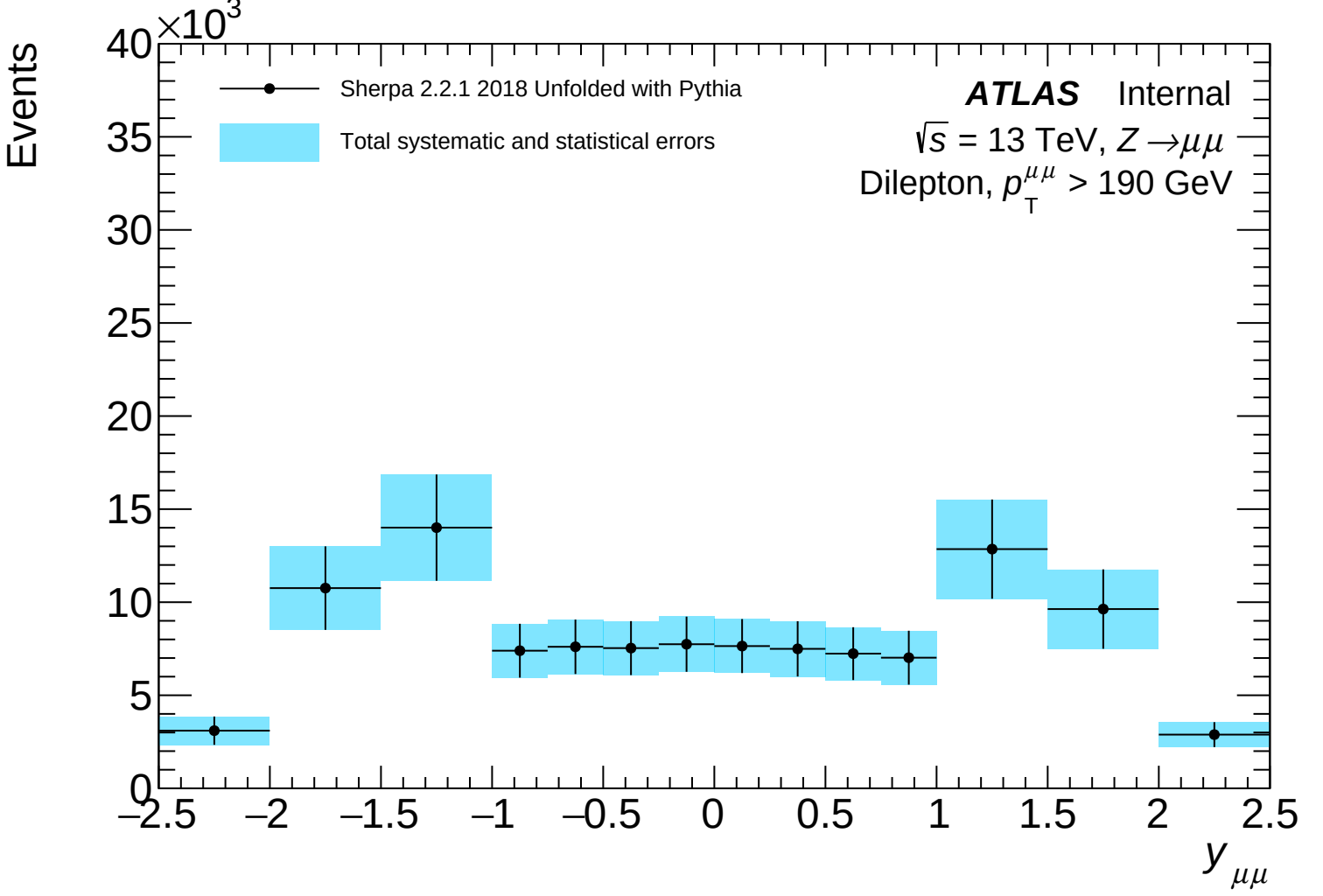

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

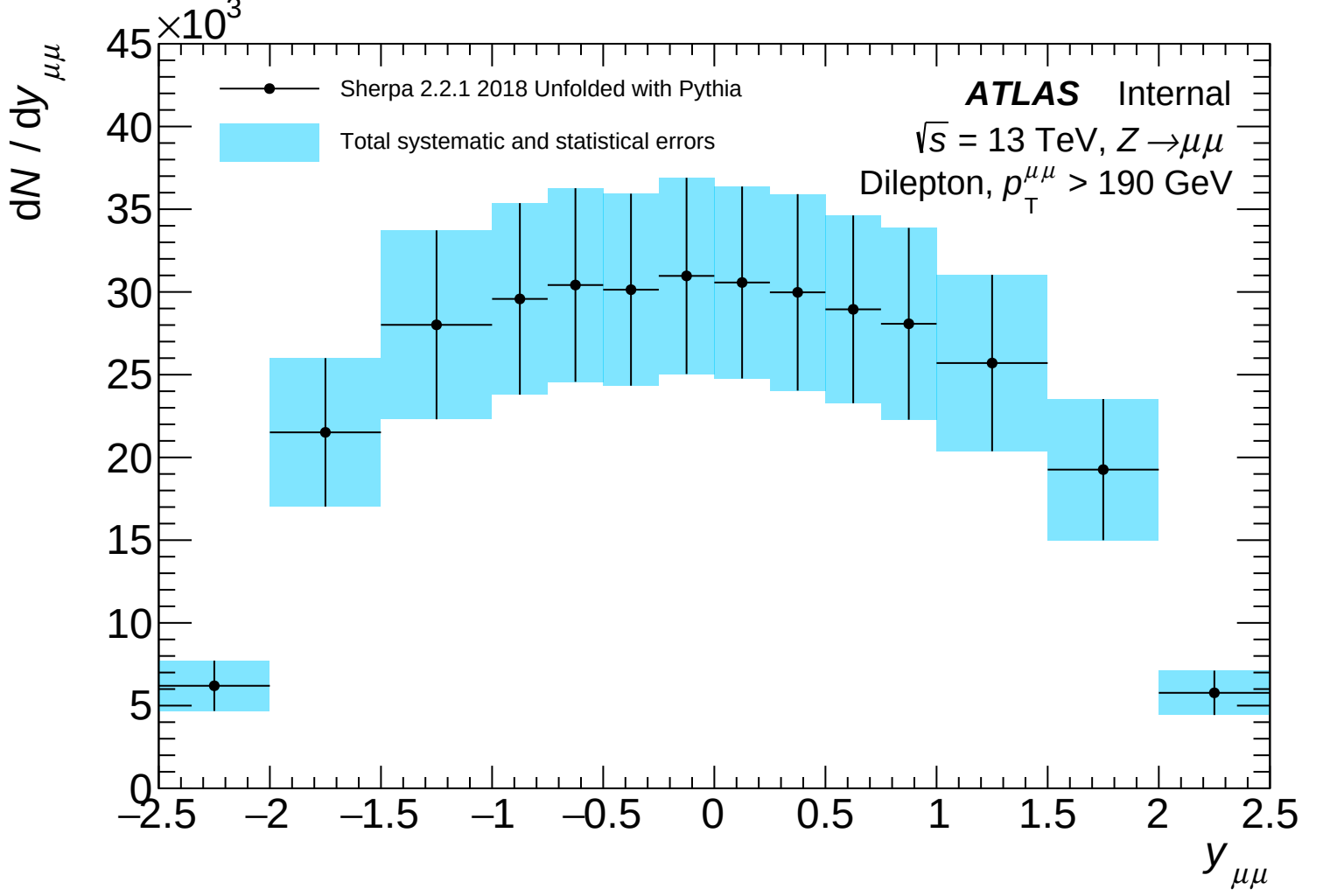

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

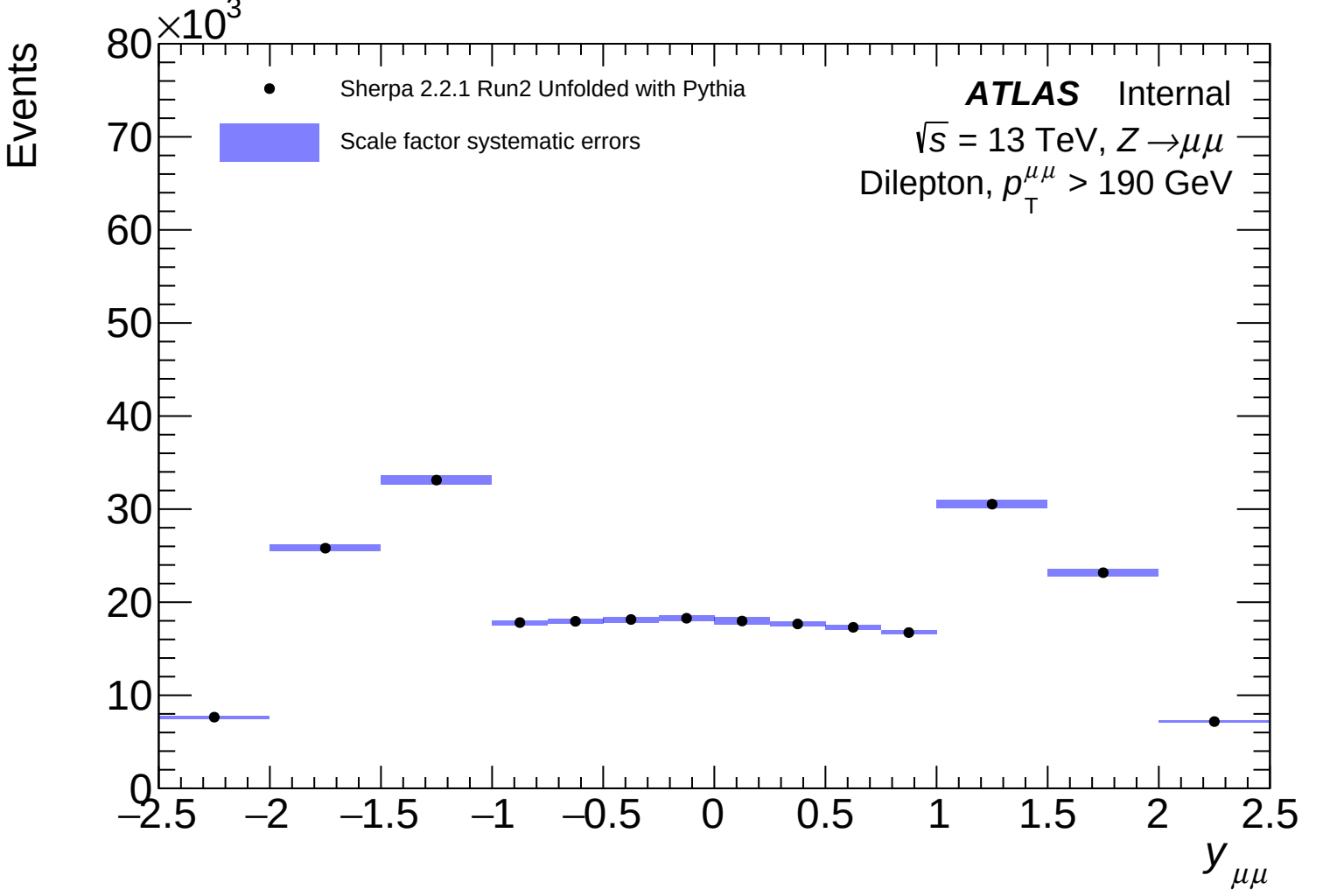

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

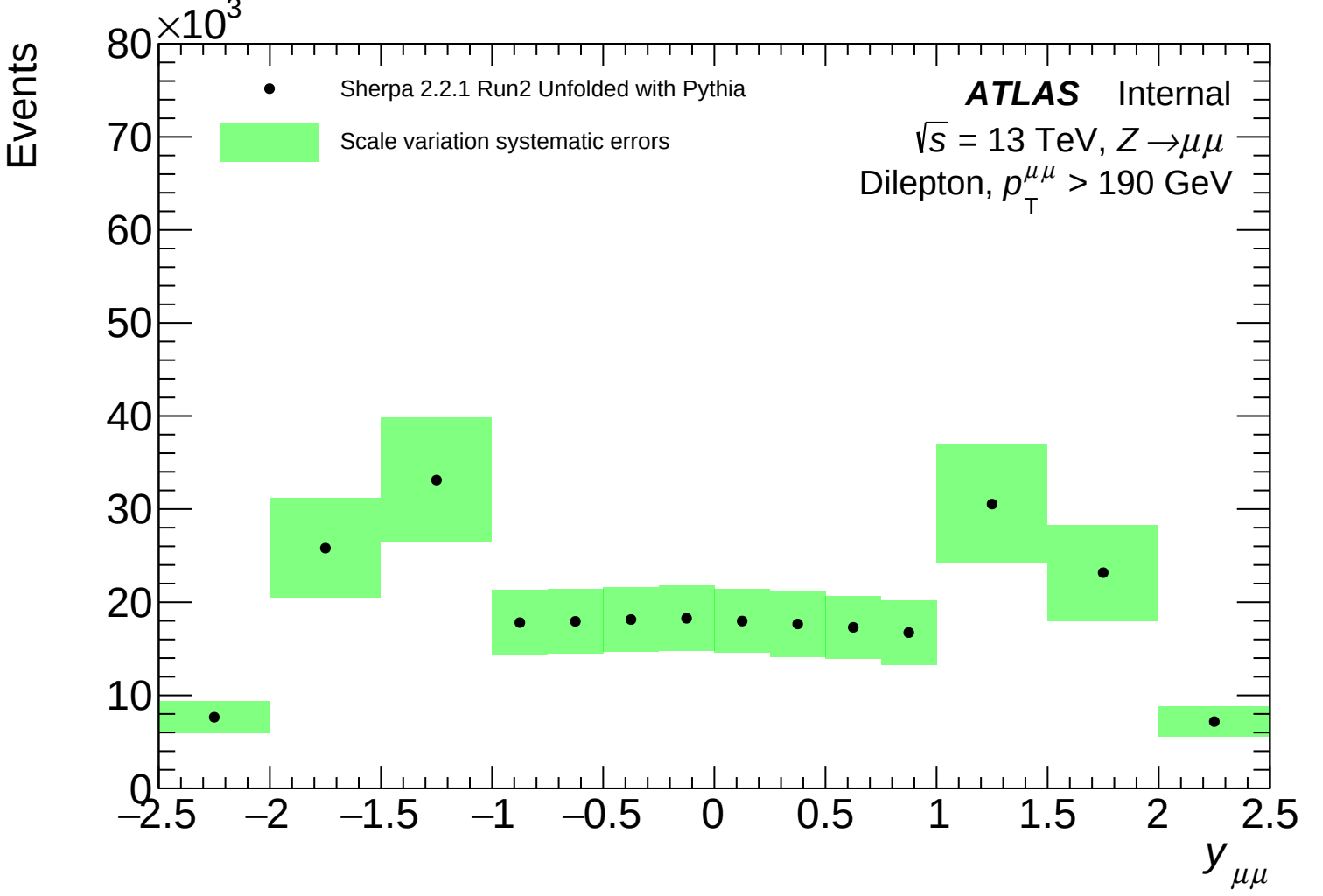

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

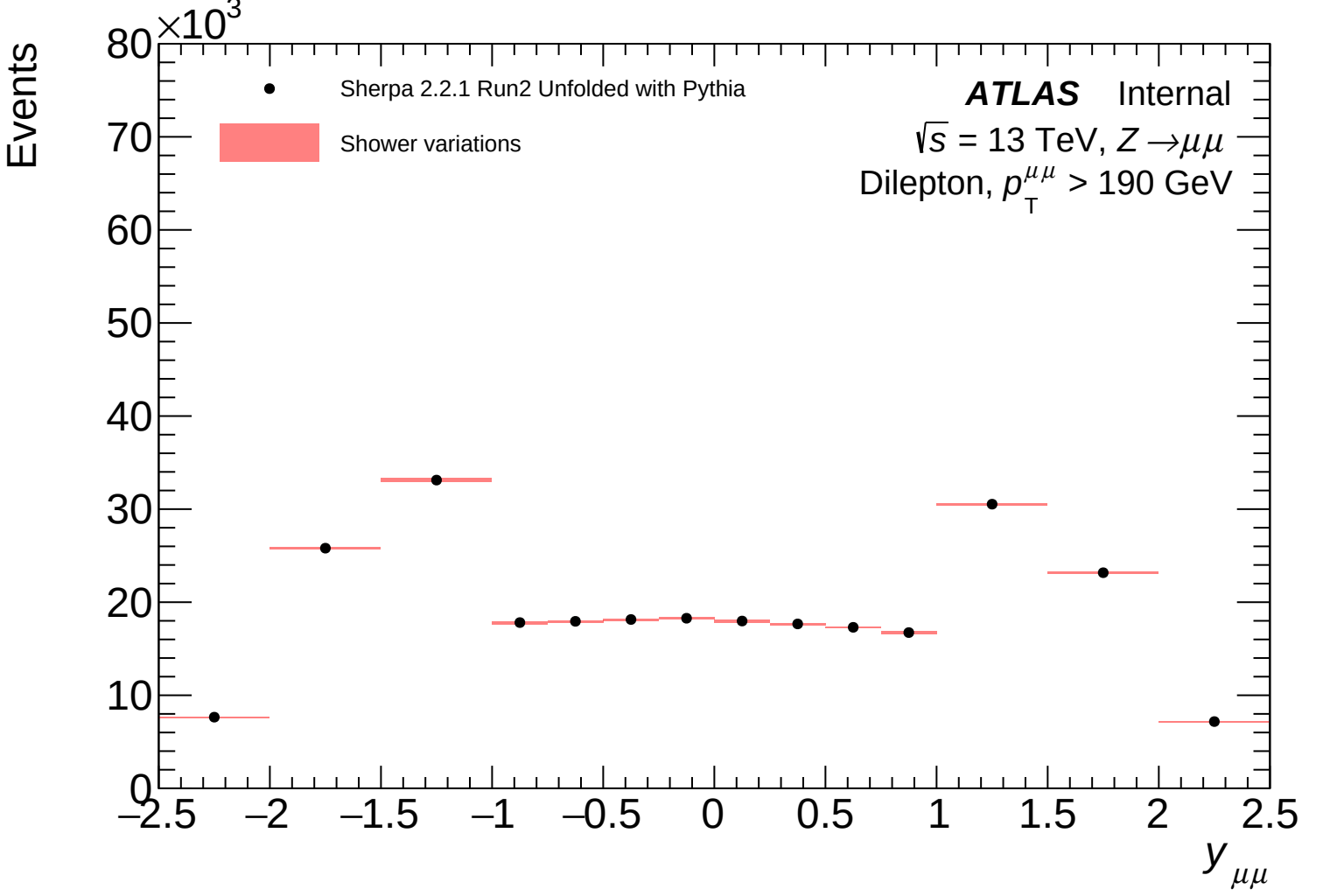

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ

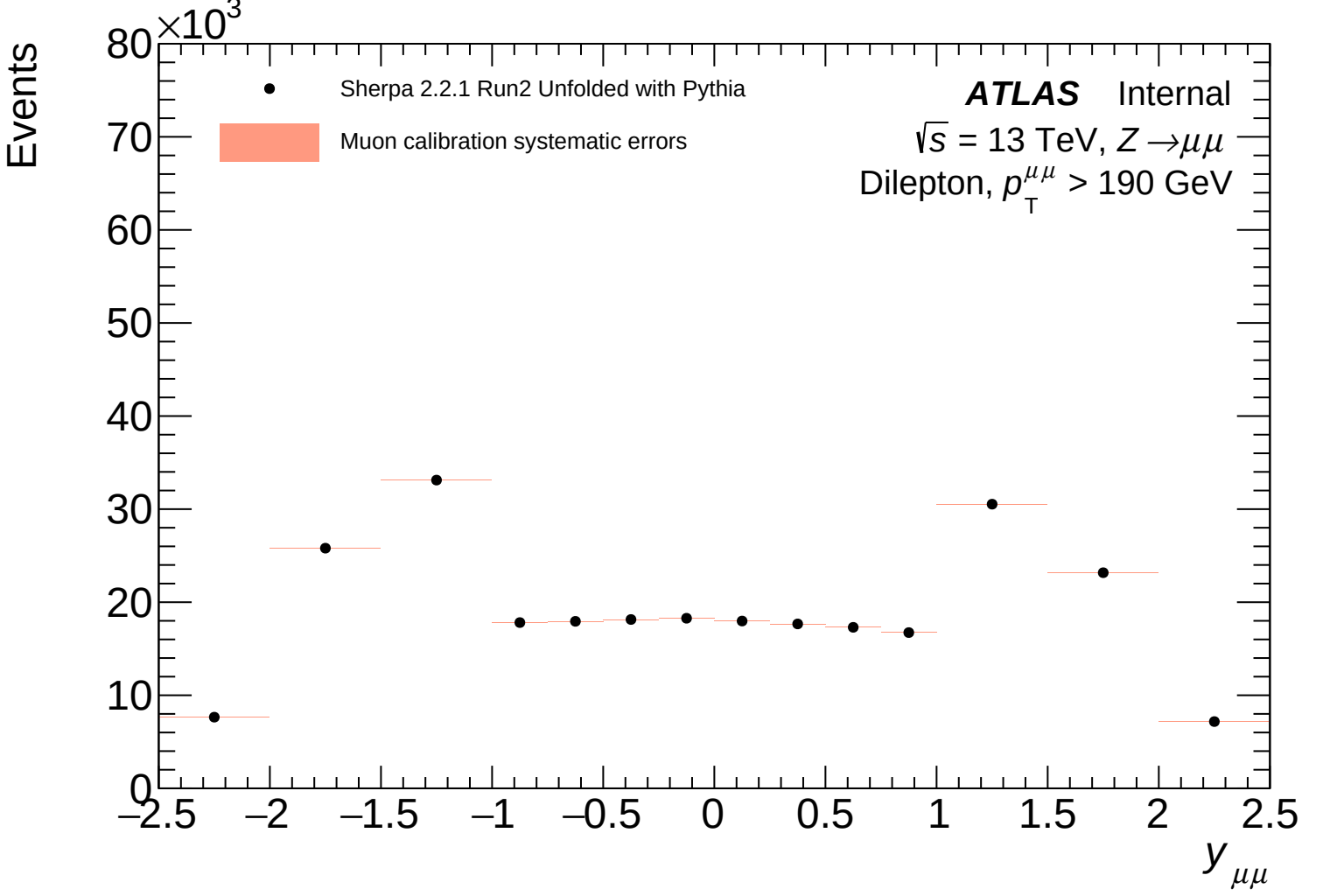

Events
×10^3
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
dN / dy_μμ
×10^3
y_μμ
45
40
35
30
25
20
15
10
5
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
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70
60
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40
30
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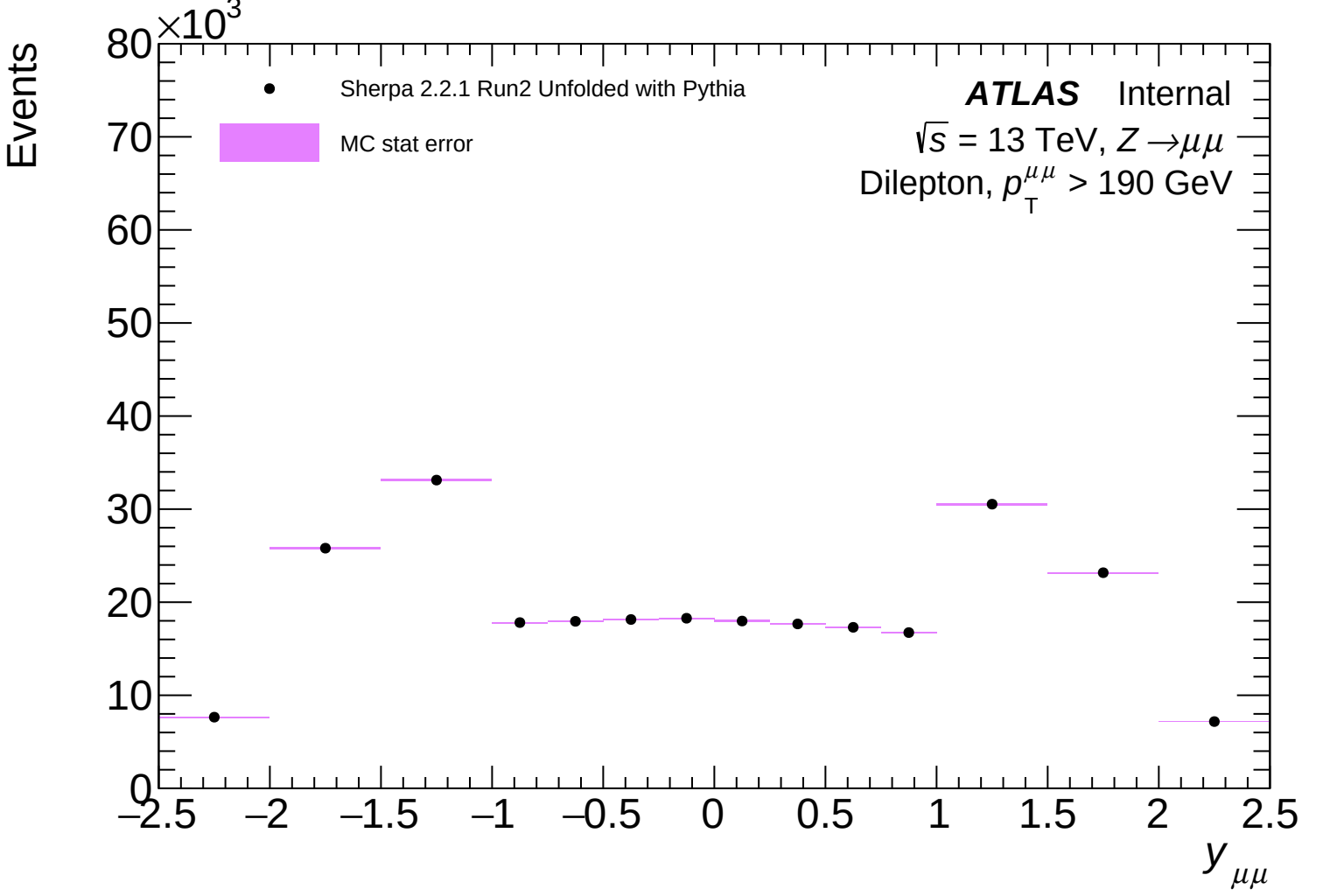
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
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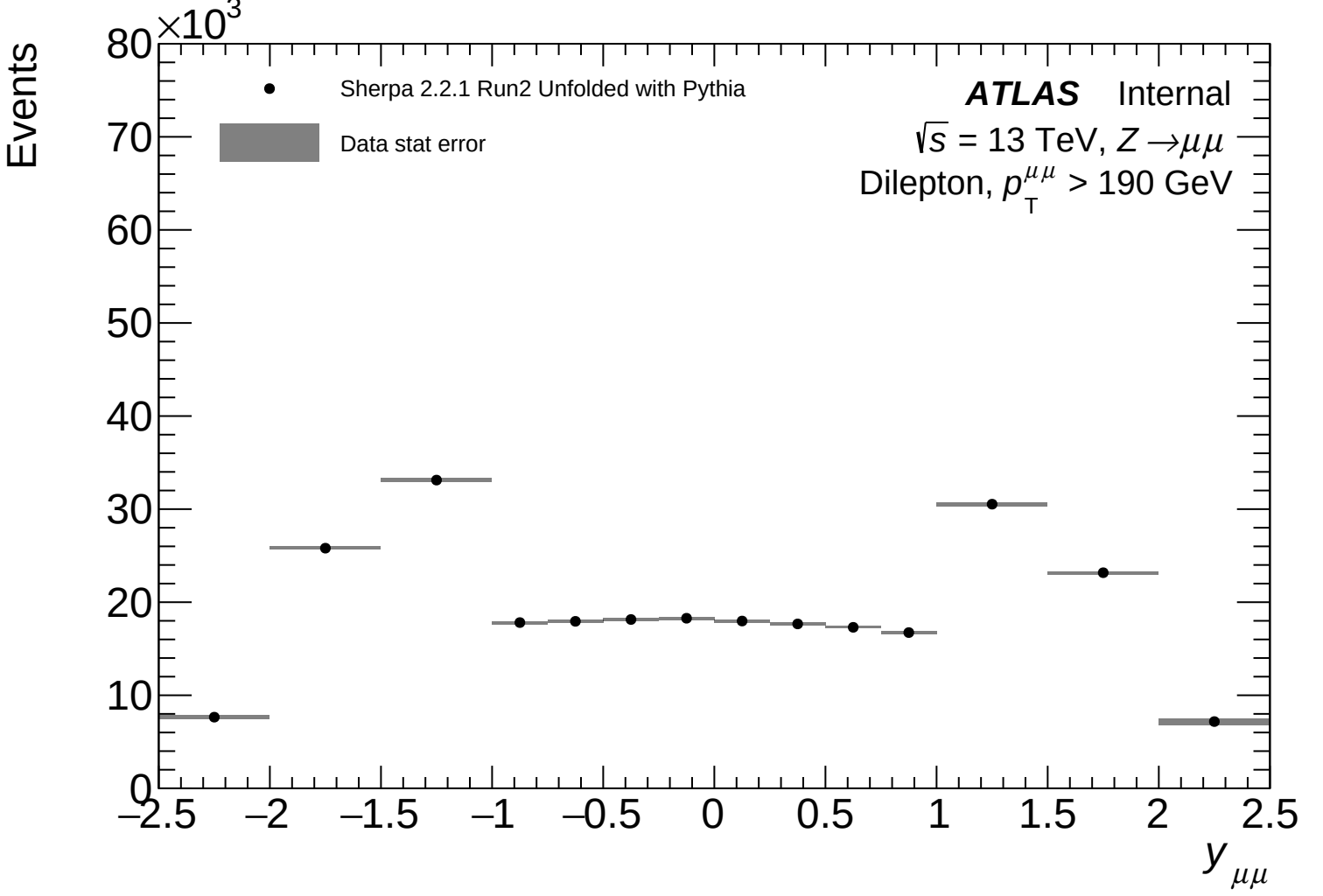
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
80
70
60
50
40
30
20
10
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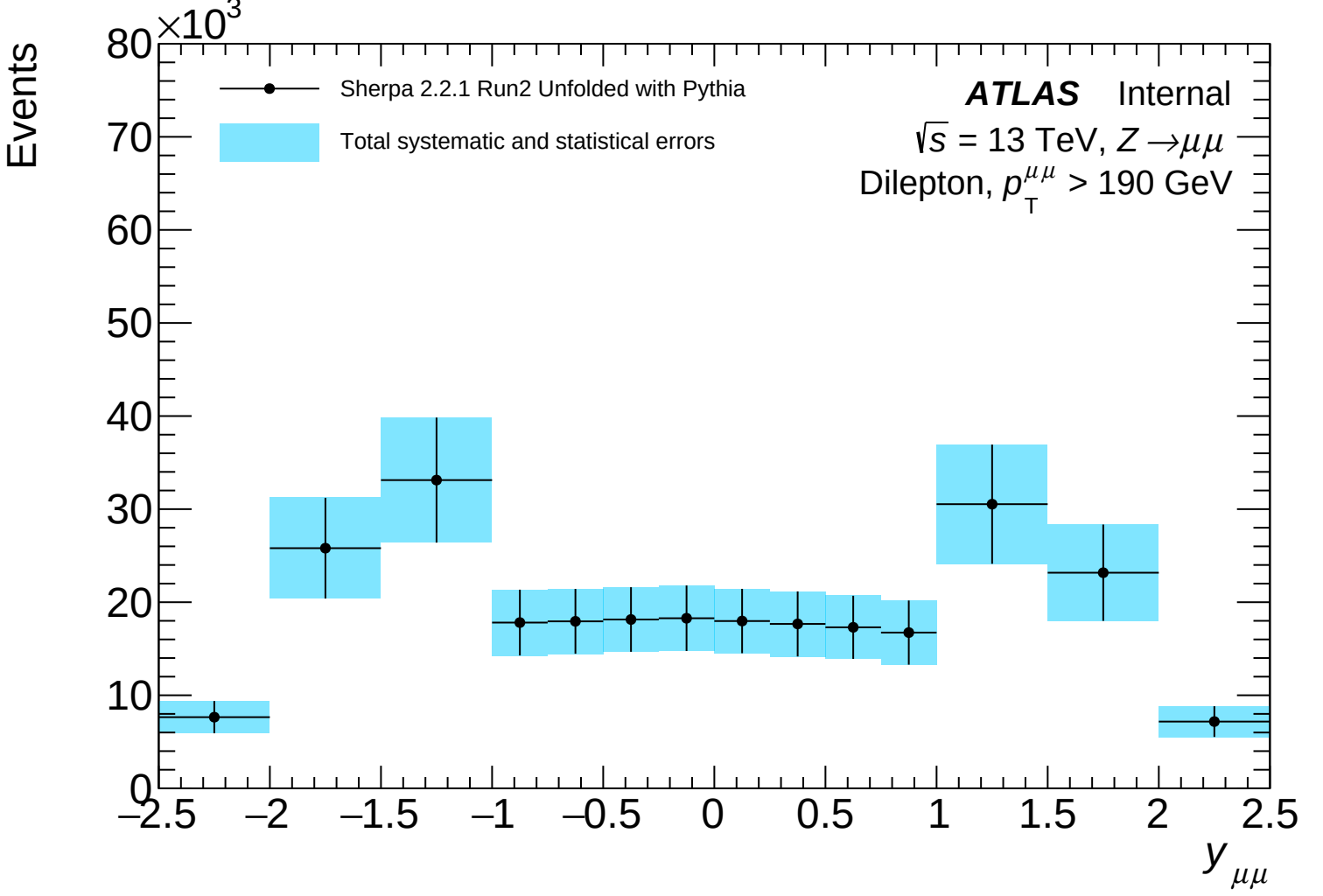
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
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40
30
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10
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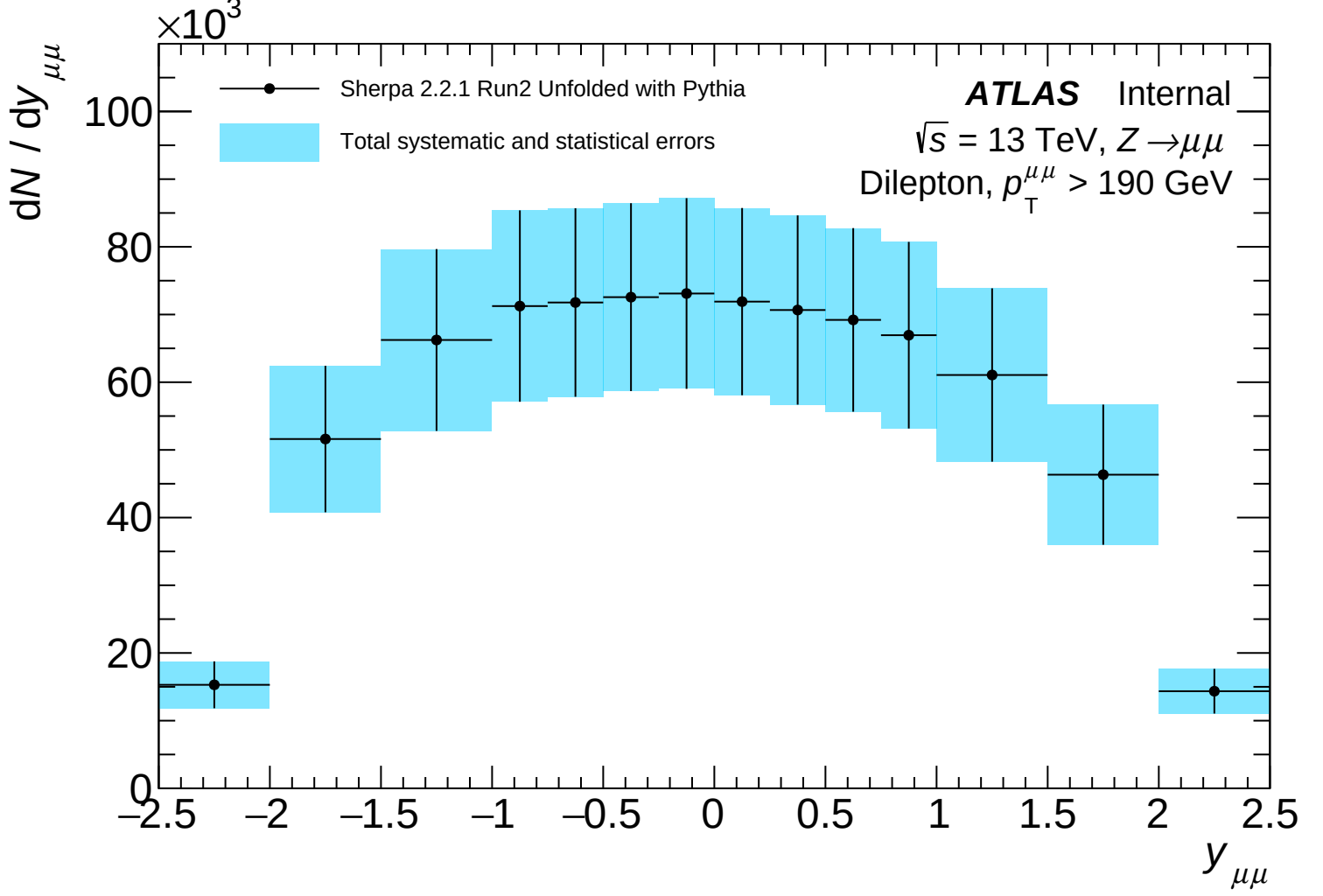
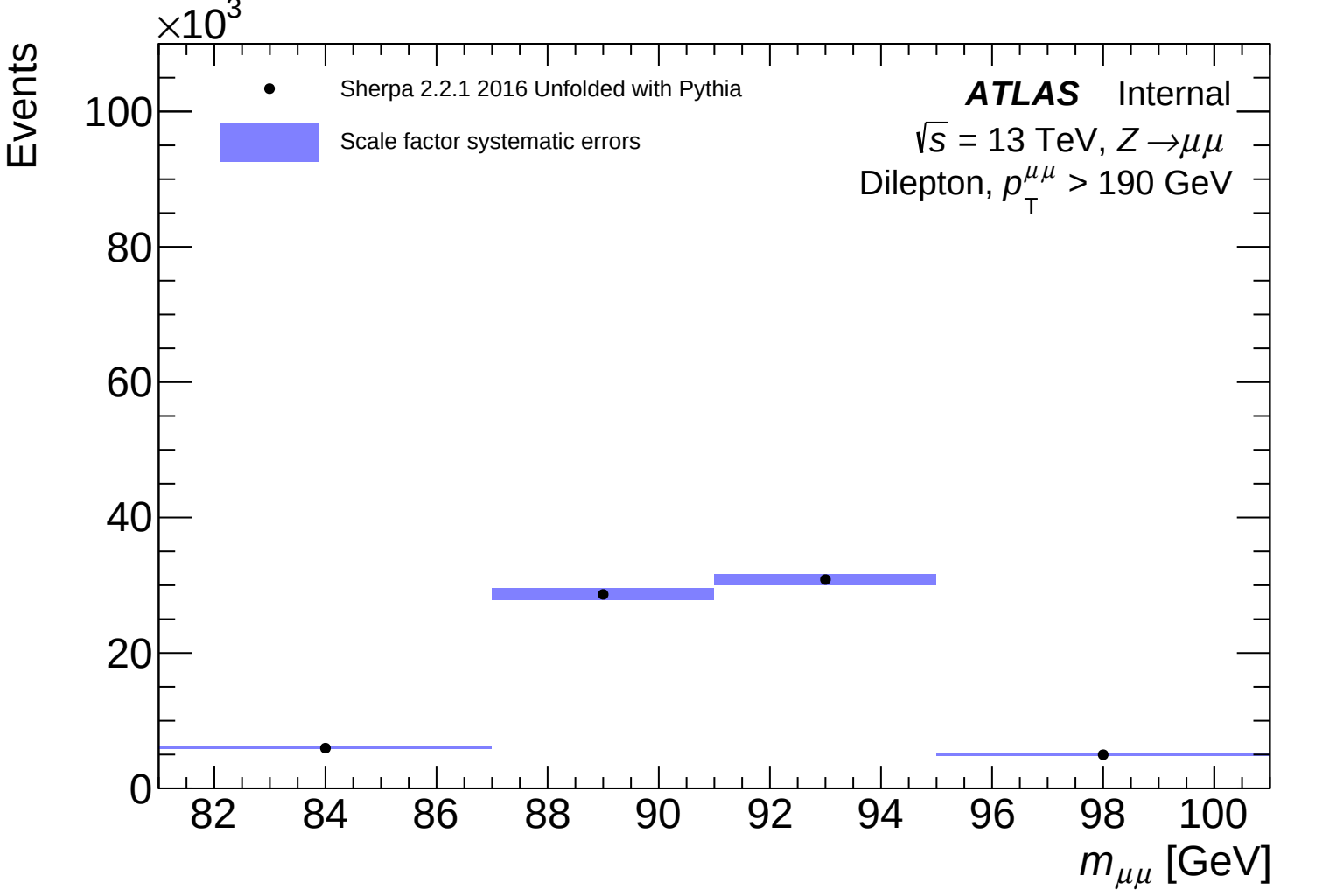
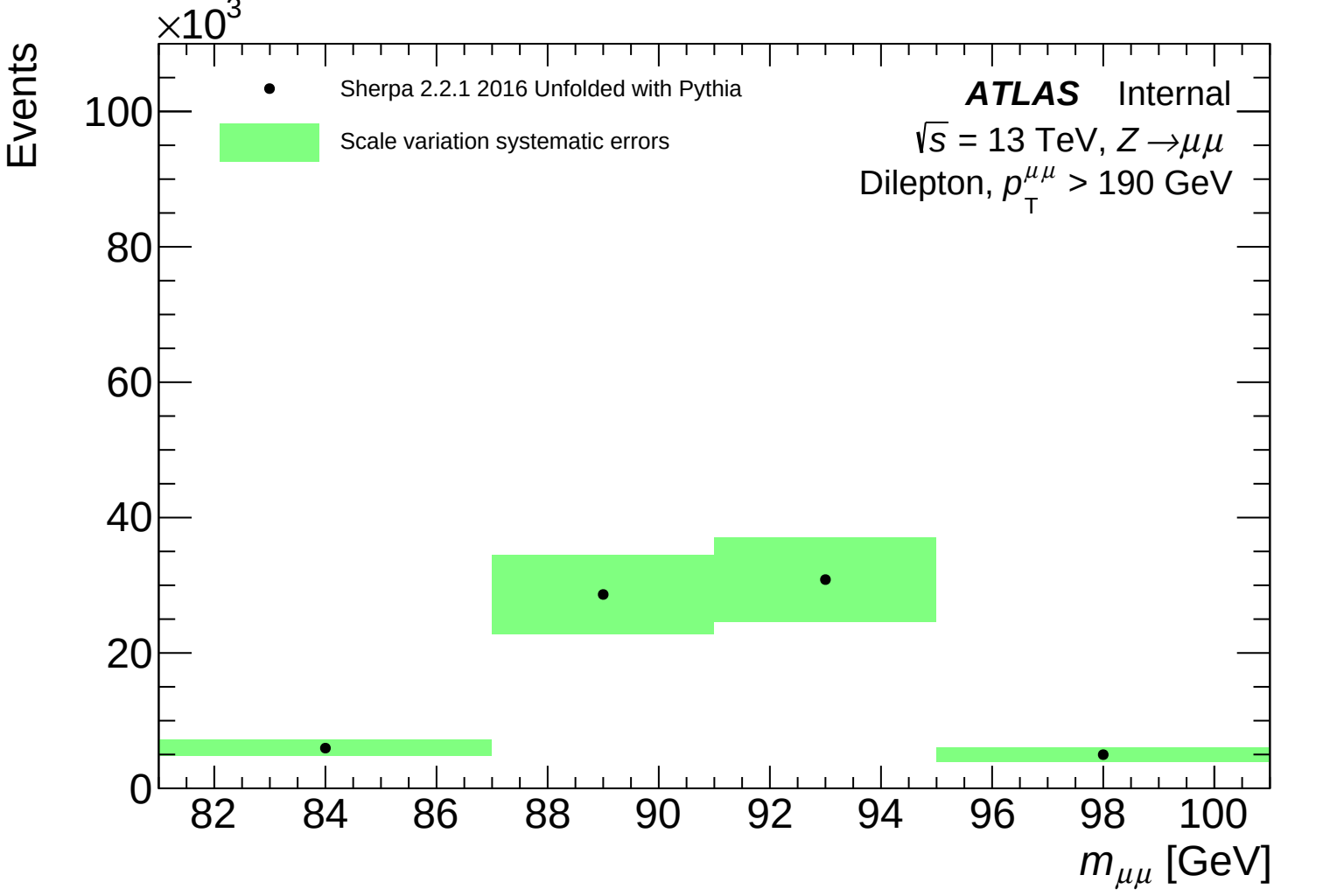
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


×10^3
dN / dy_μμ
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
80
60
40
20
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
y_μμ


Events
×10^3
100
80
60
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
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0
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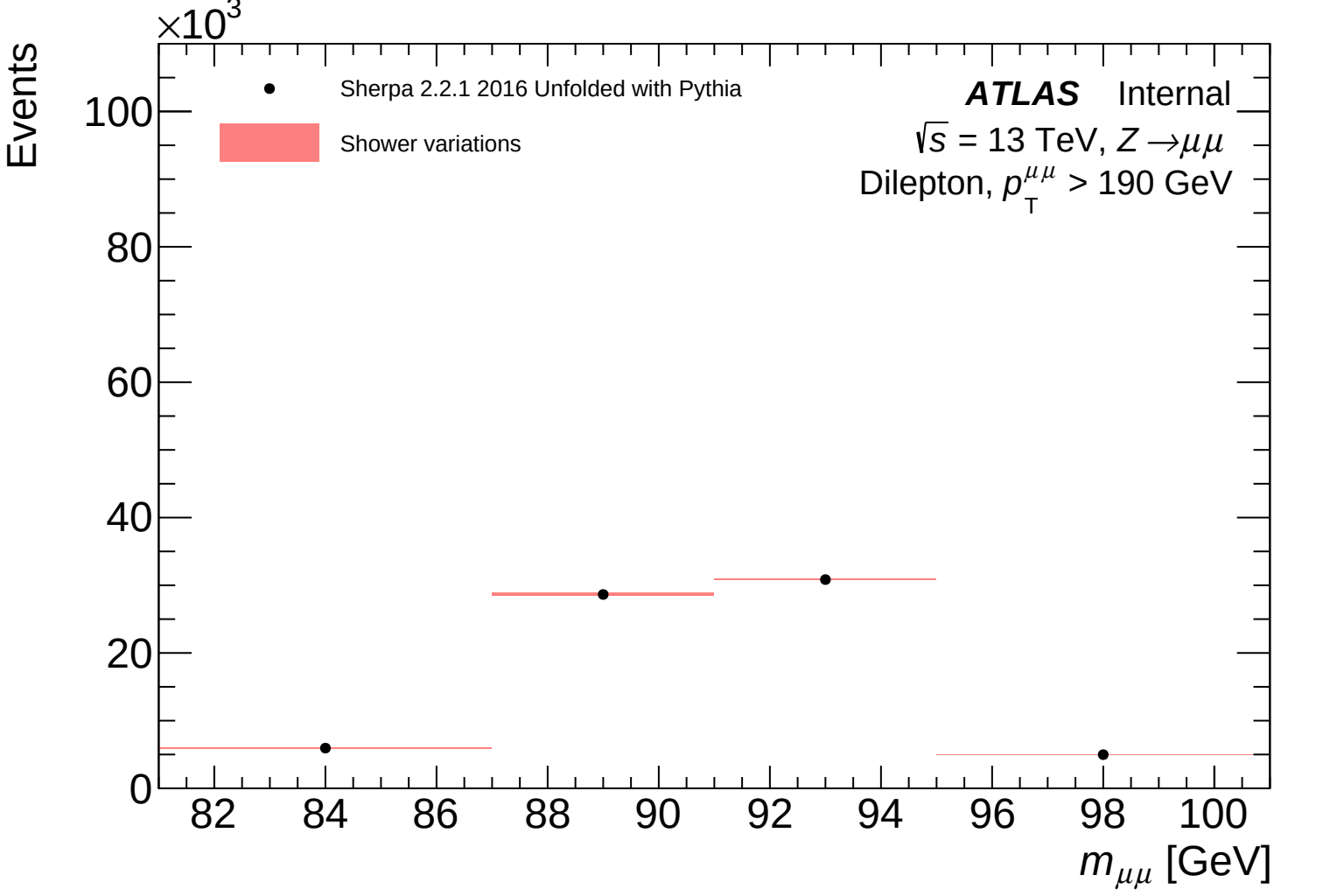
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
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0
82
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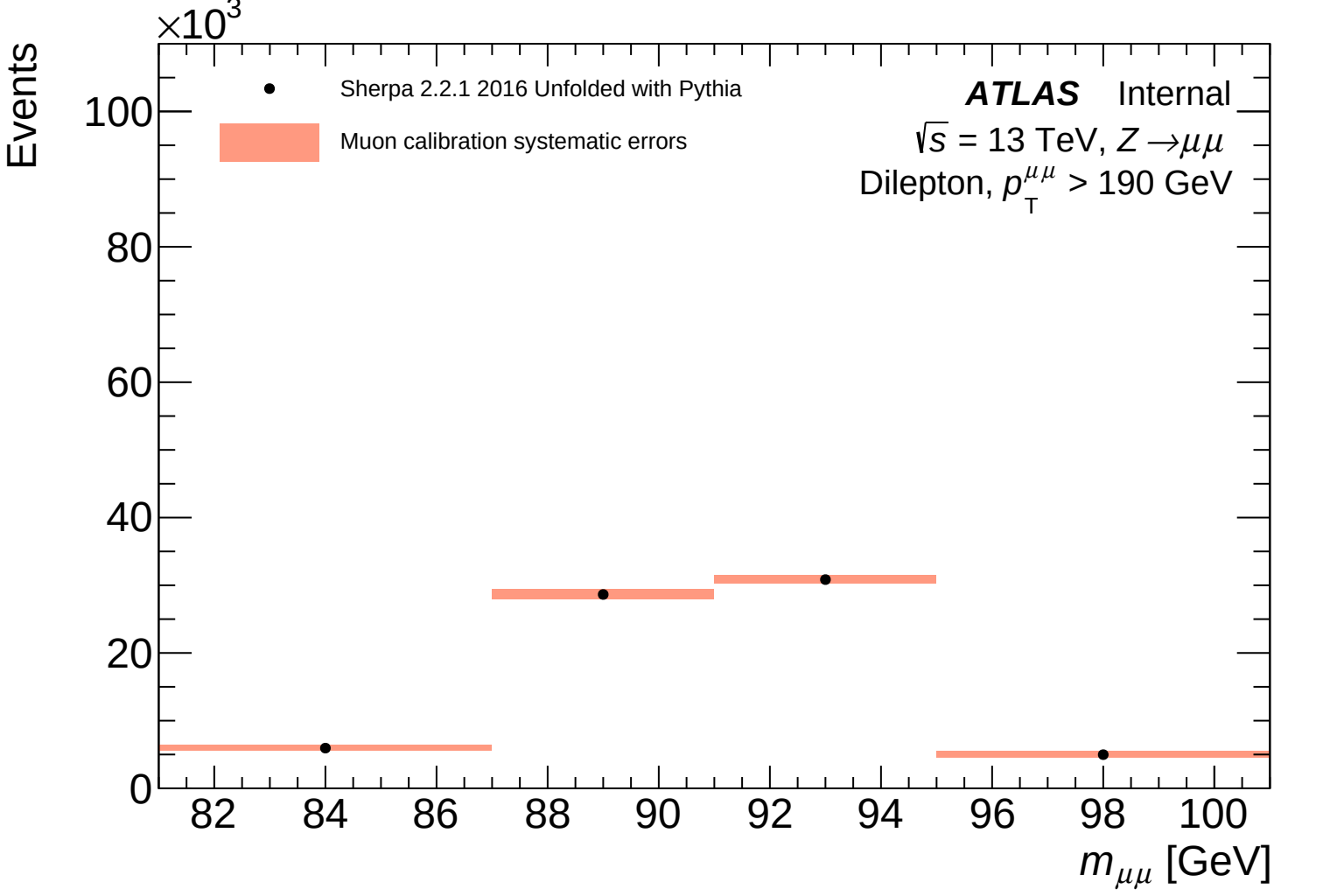
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
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0
82
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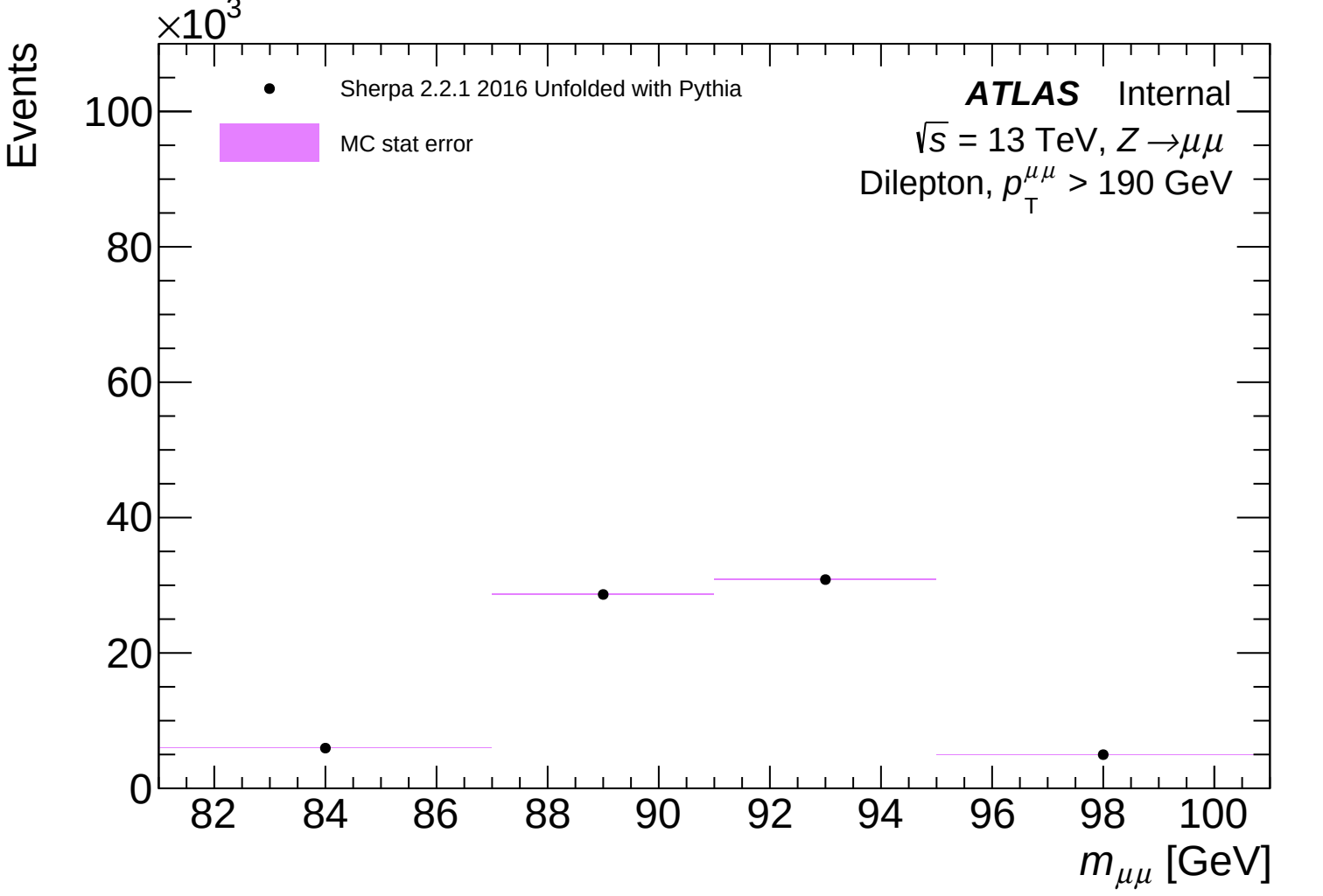
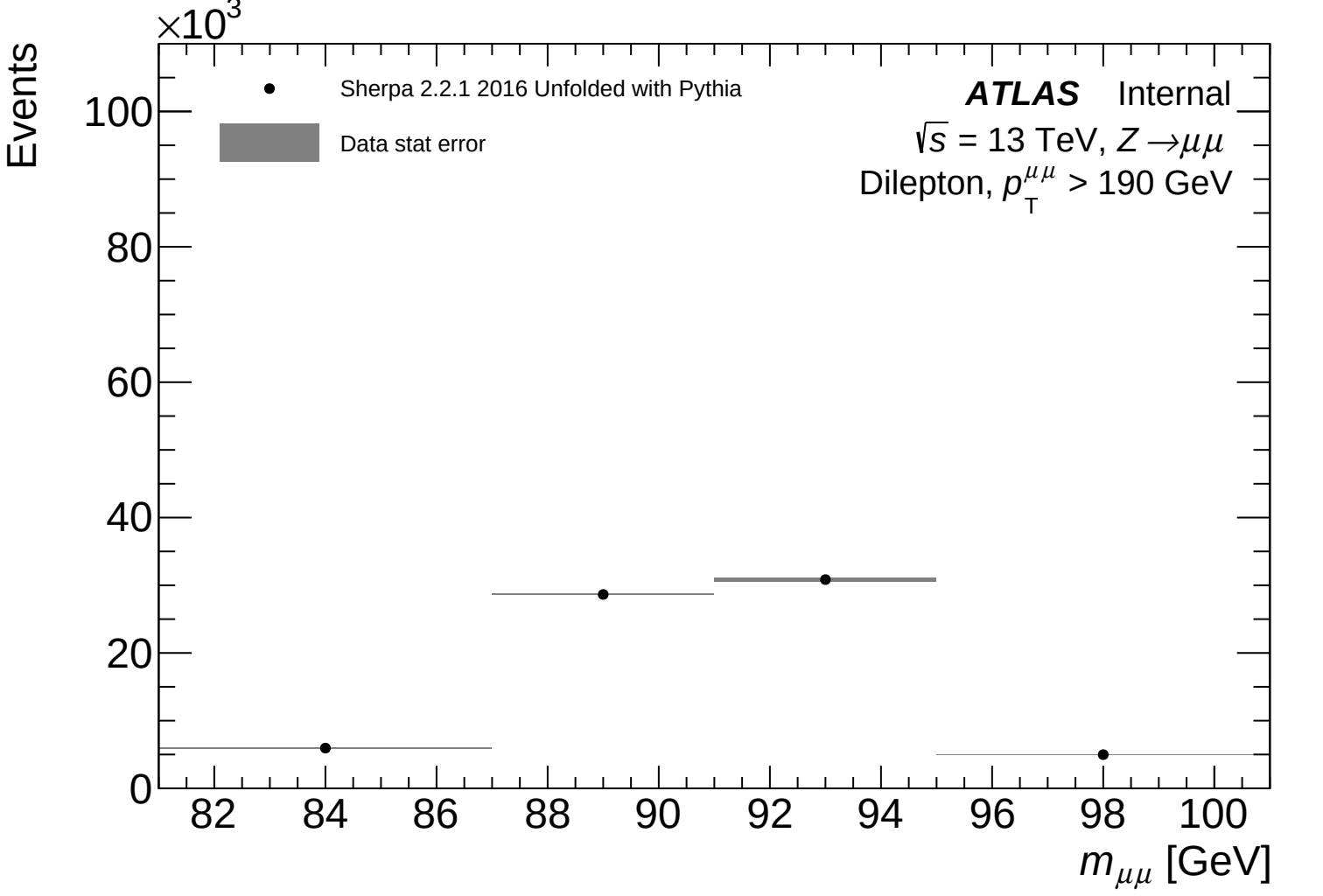
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
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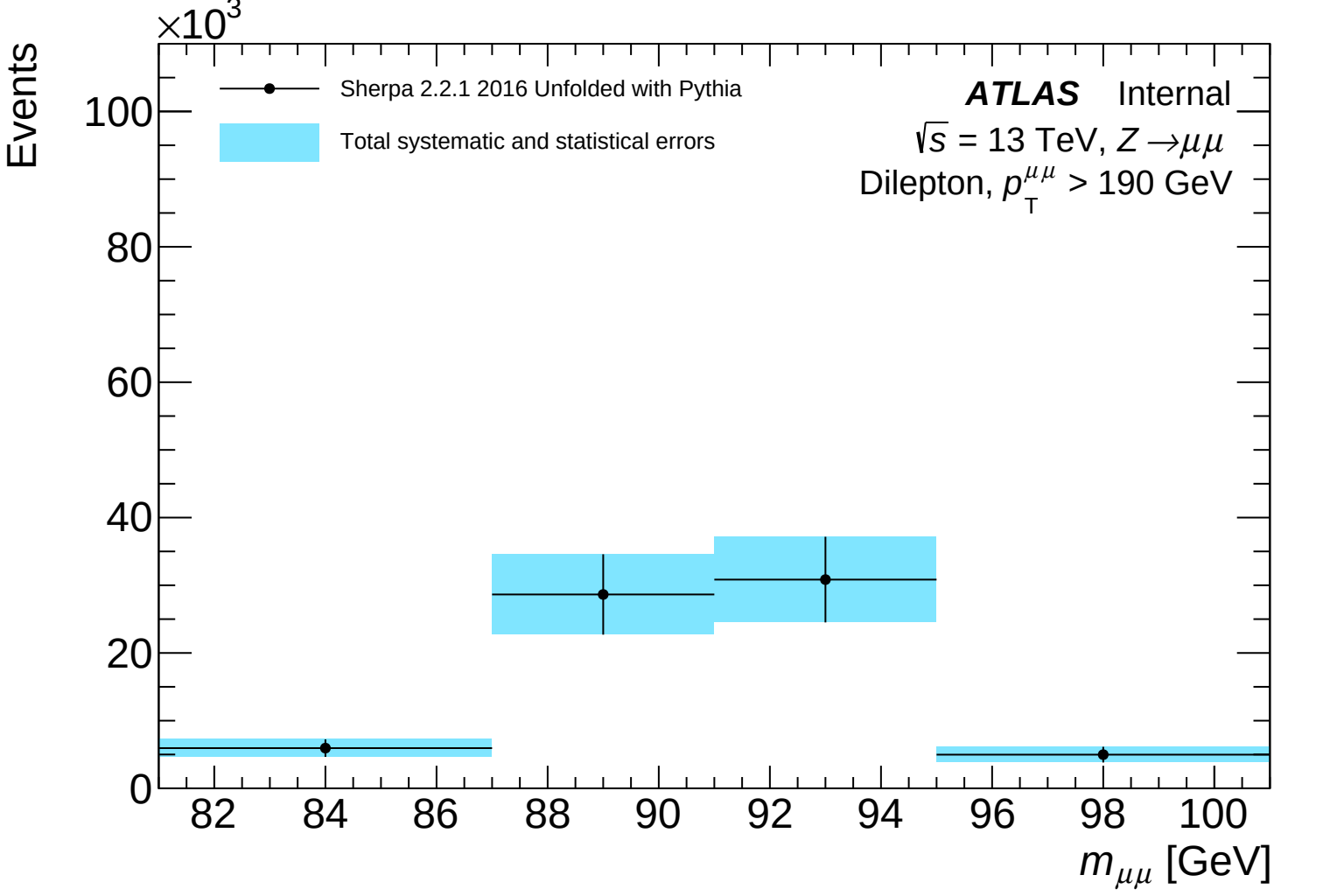
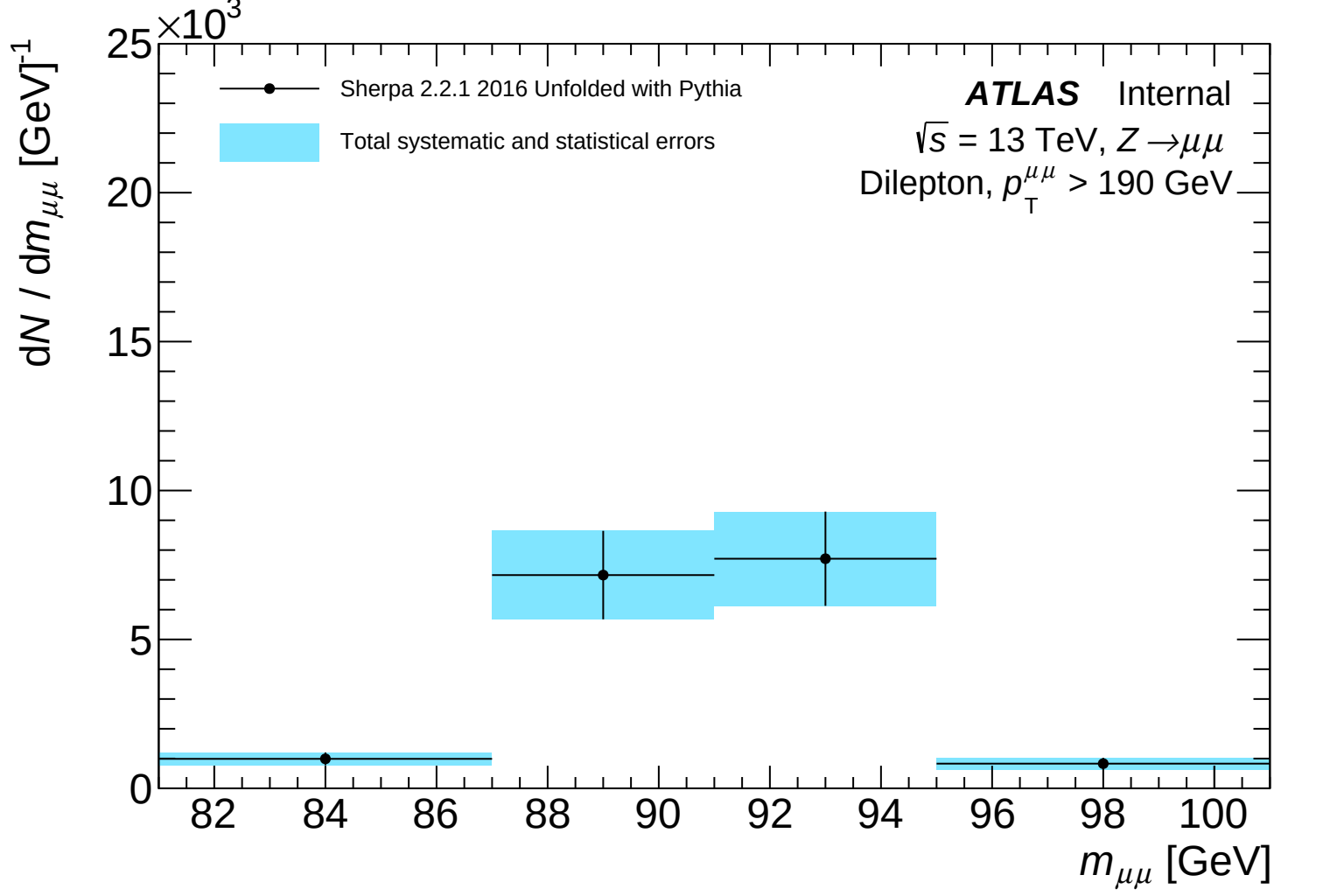
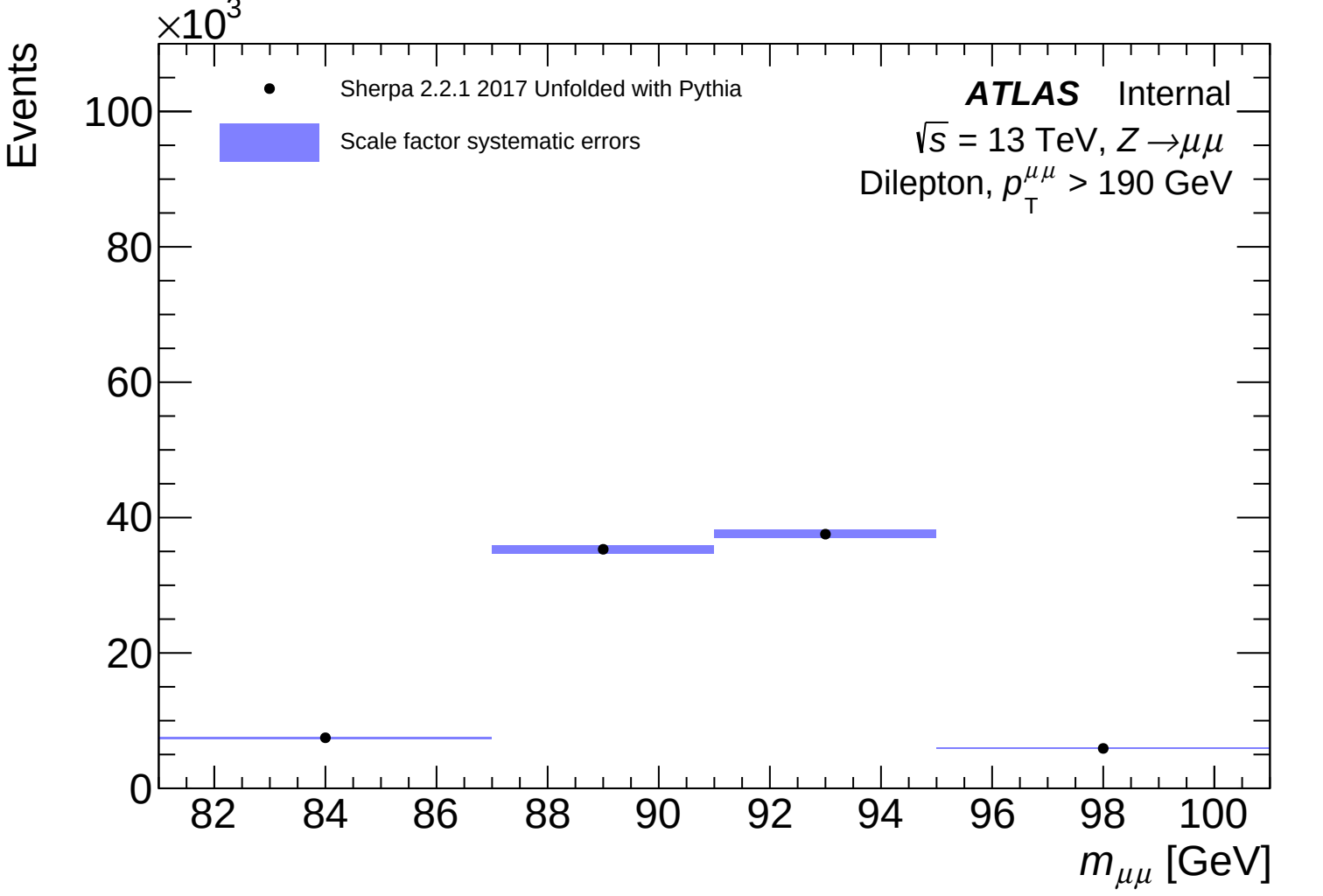
0
82
84
86
88
90
92
94
96
98
100
$m_{\mu\mu}$ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV


Events
×10^3
100
80
60
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


$\times 10^{3}$
25
20
15
10
5
0
$\mathrm{d}N\ /\ \mathrm{d}m_{\mu\mu}\ [\mathrm{GeV}]^{-1}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
82
84
86
88
90
92
94
96
98
100
$m_{\mu\mu}$ [GeV]


Events
×10^3
100
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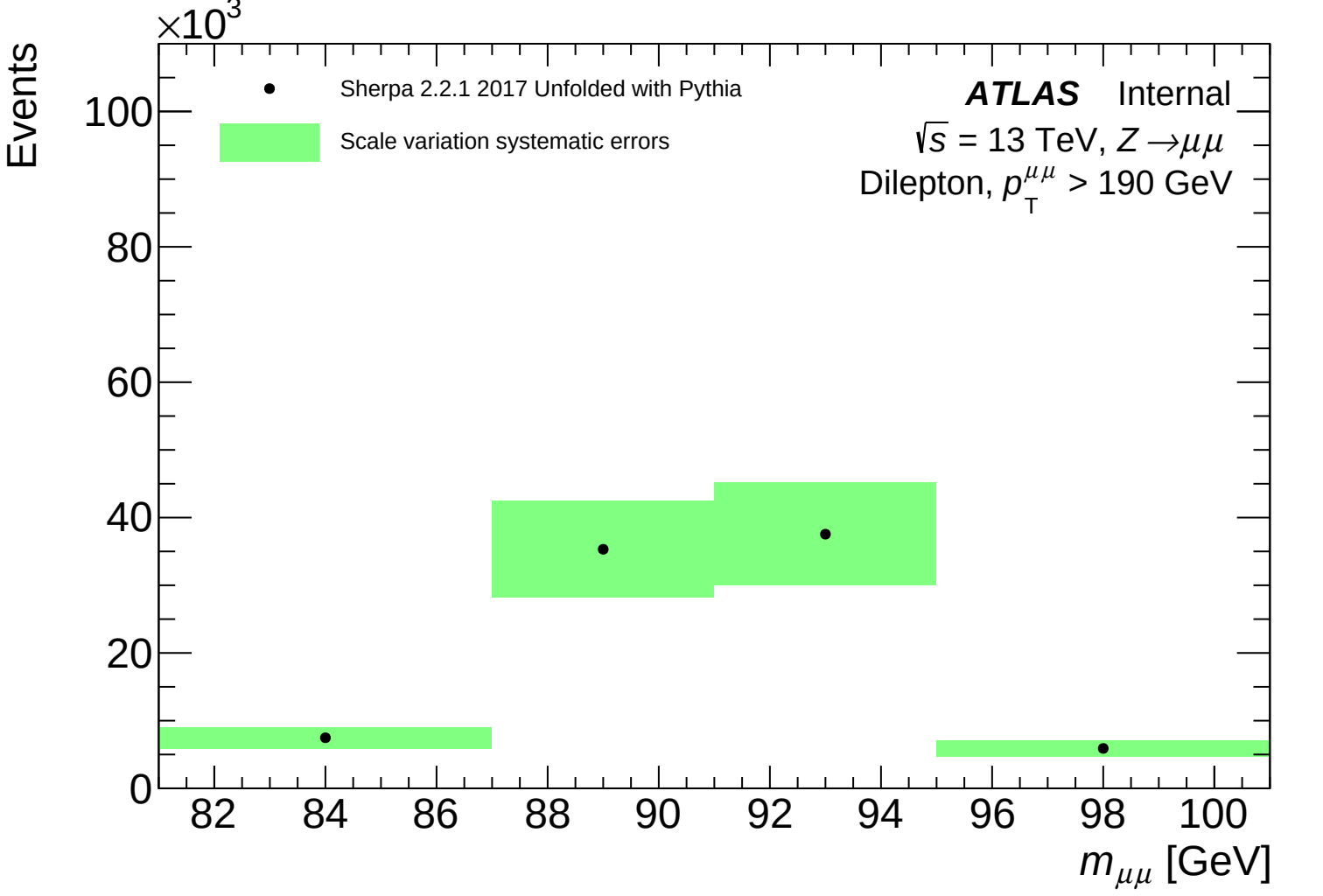
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
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80
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40
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0
82
84
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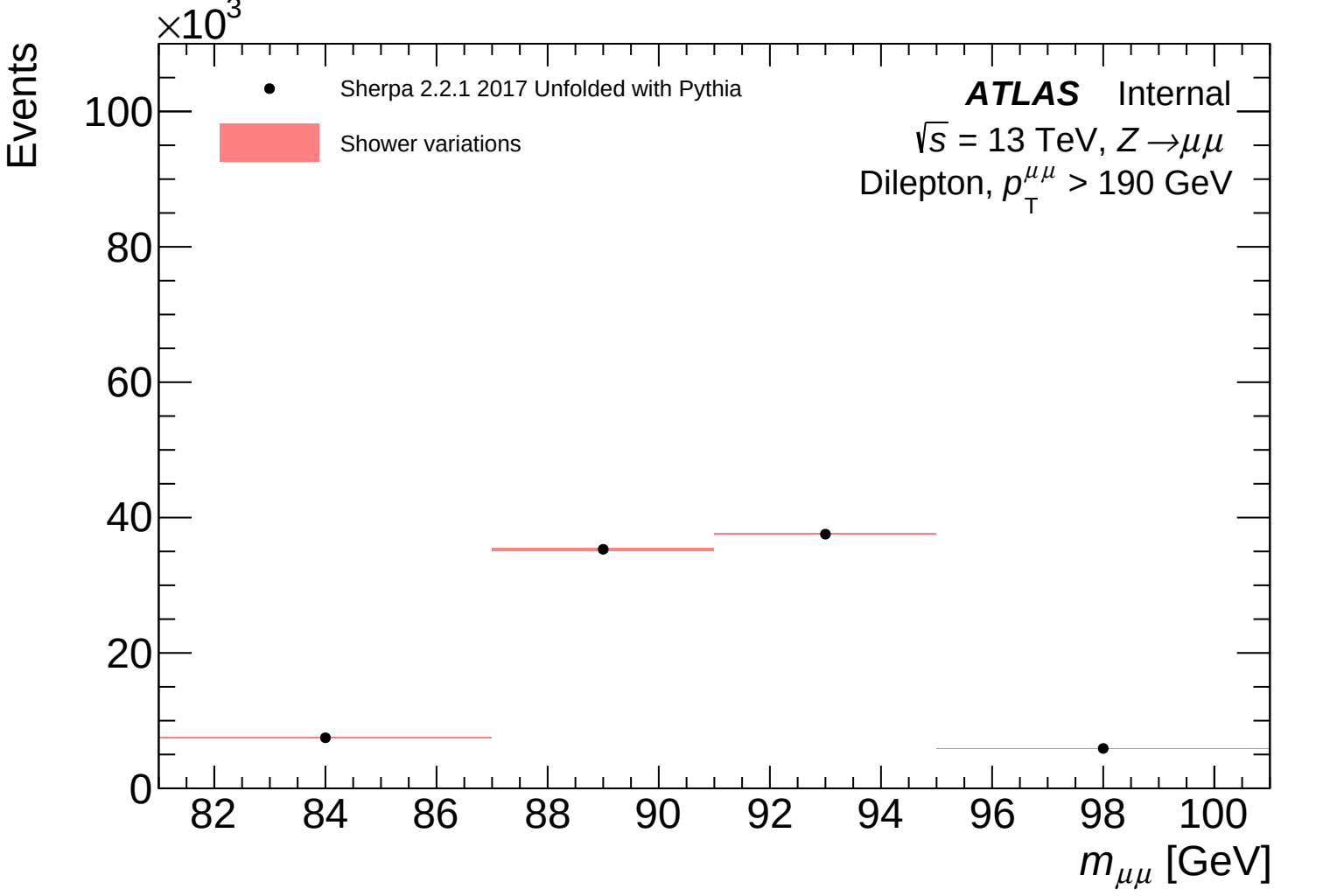
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
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40
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0
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84
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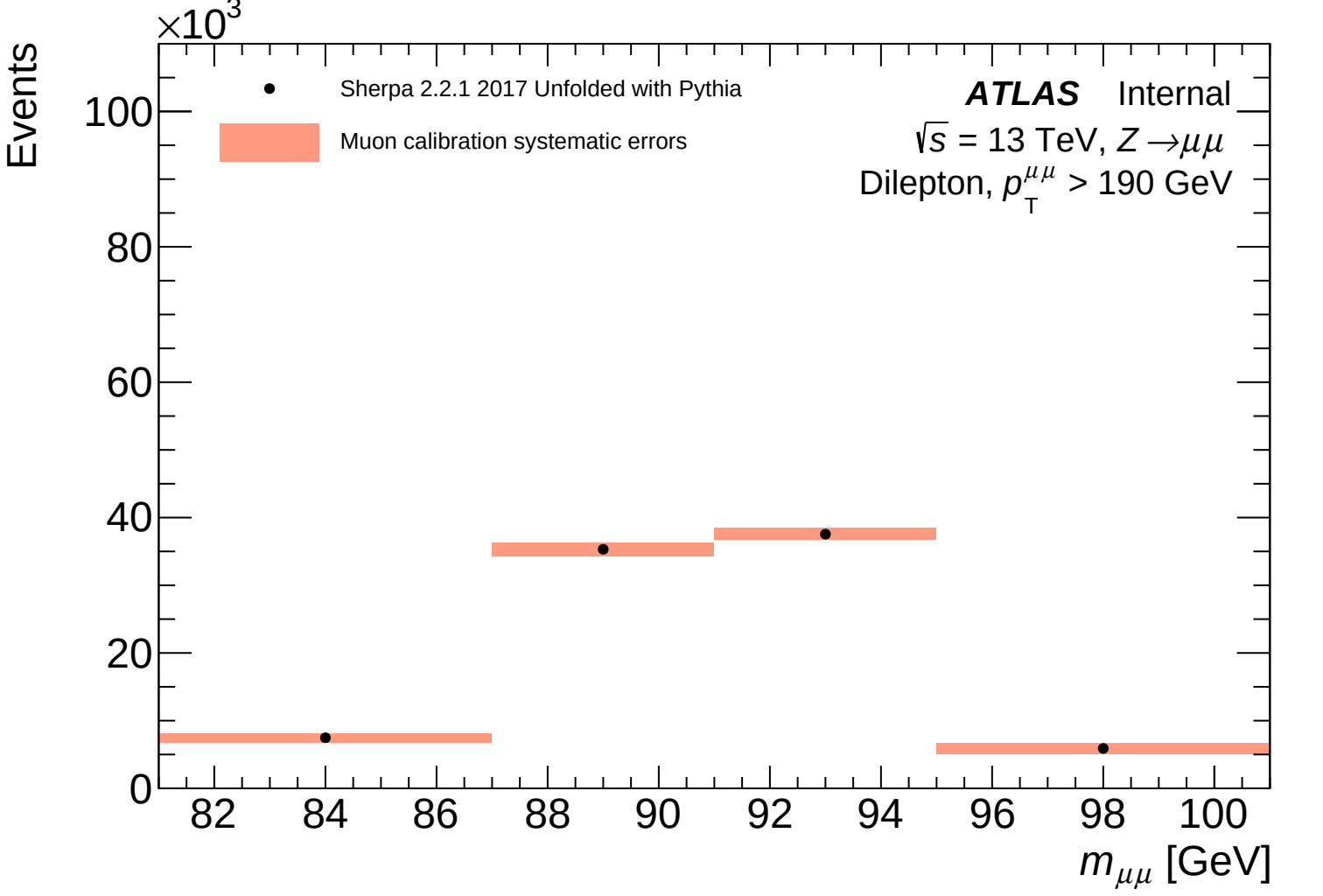
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
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40
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0
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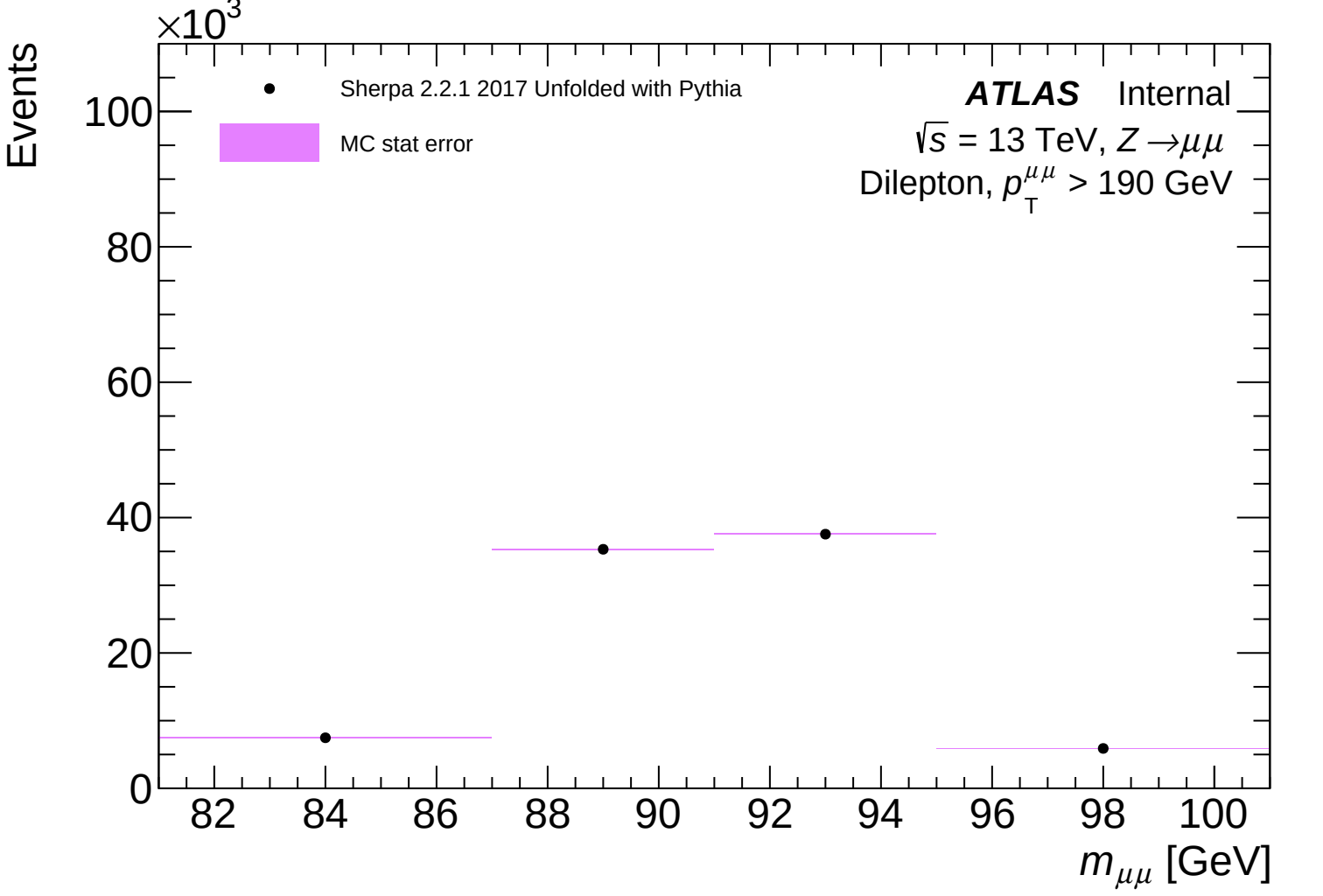
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
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0
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84
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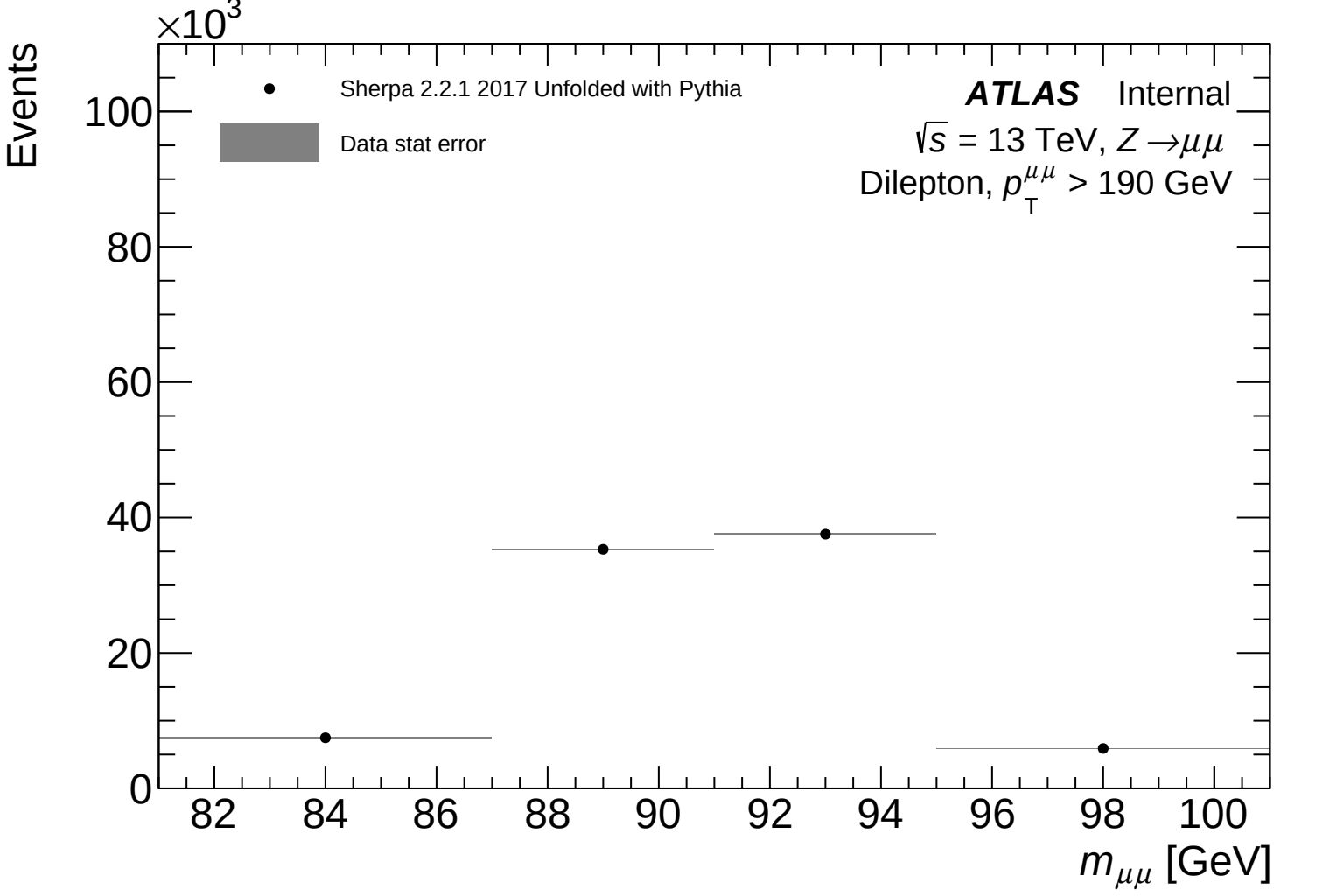
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
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0
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88
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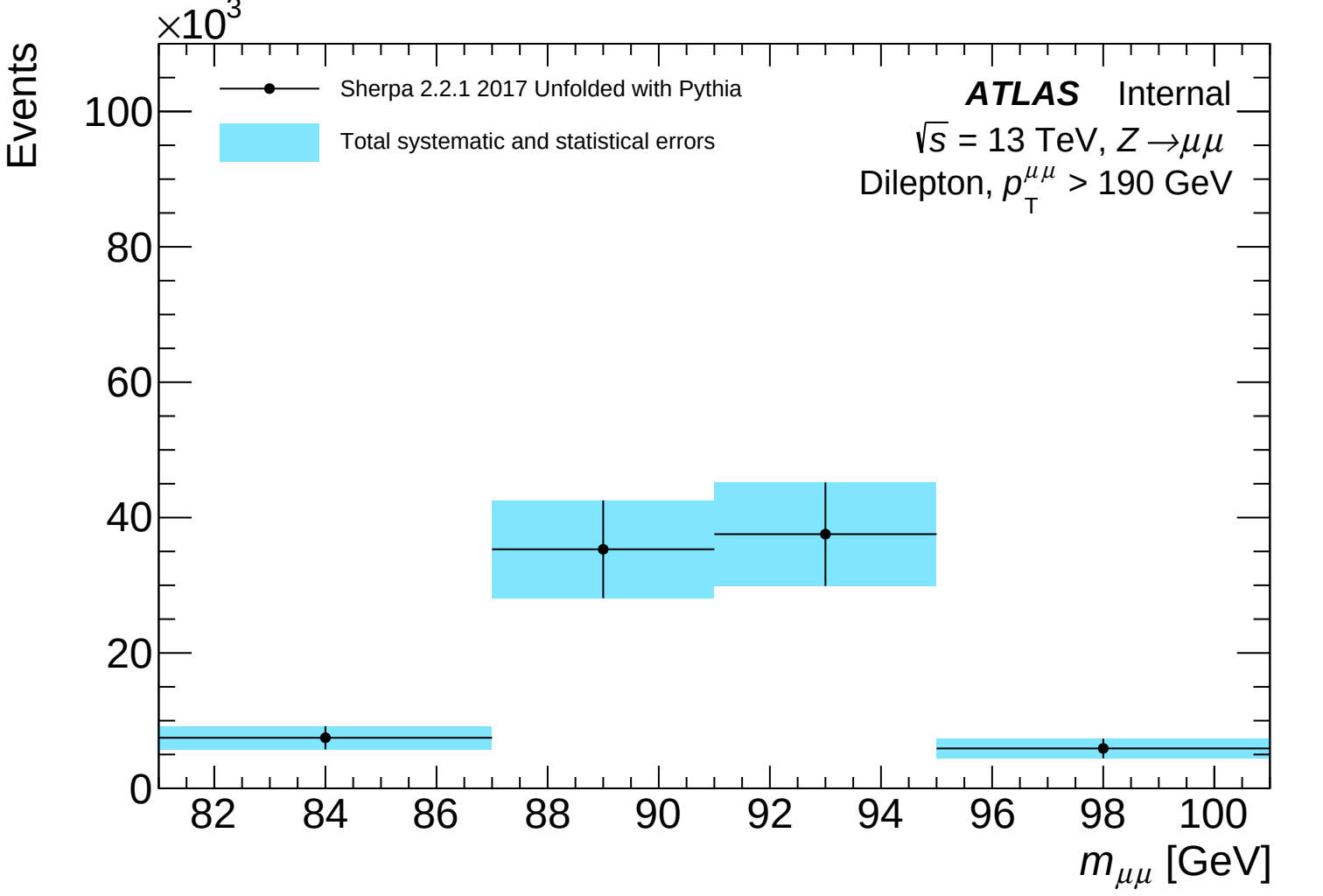
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
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40
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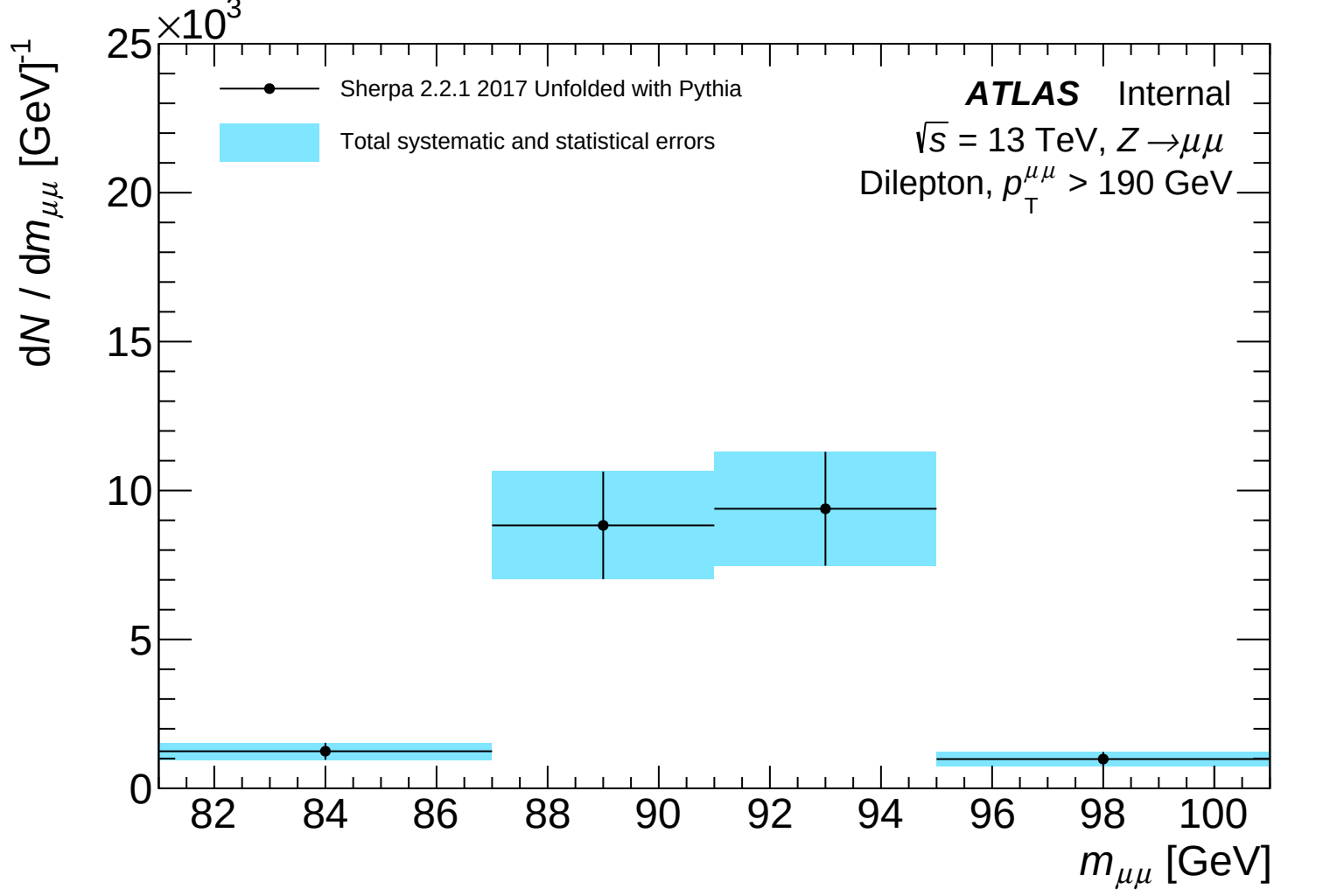
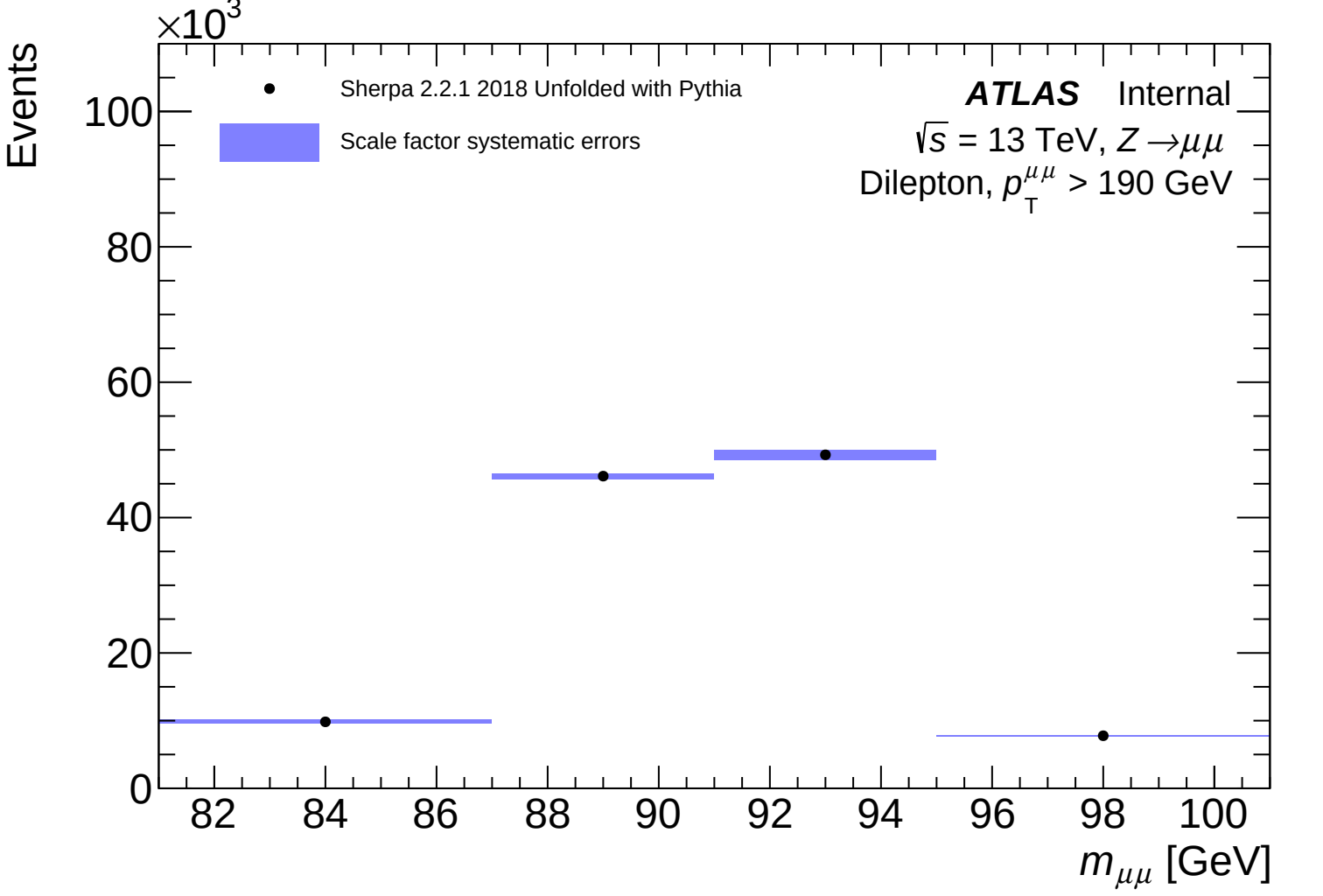
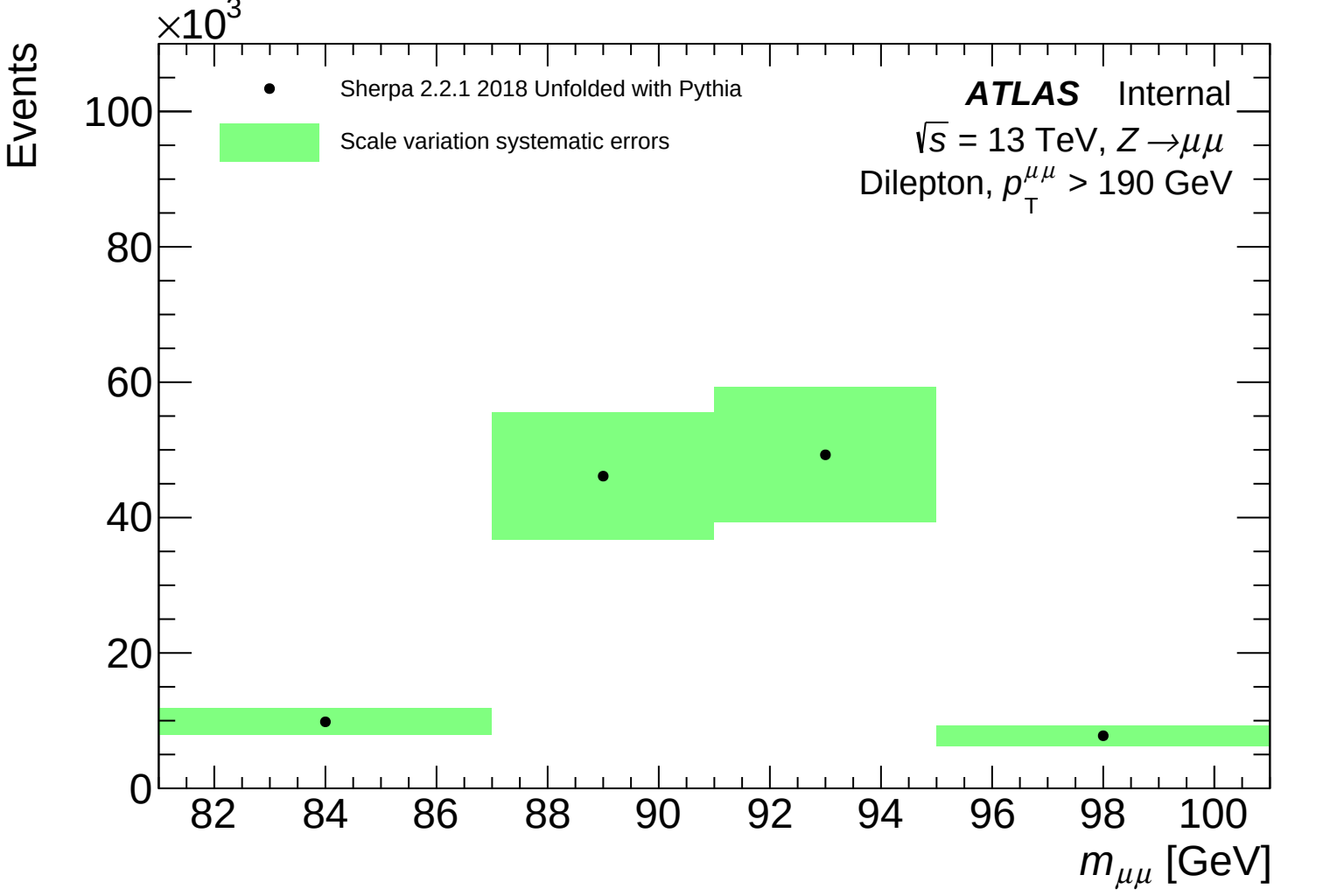
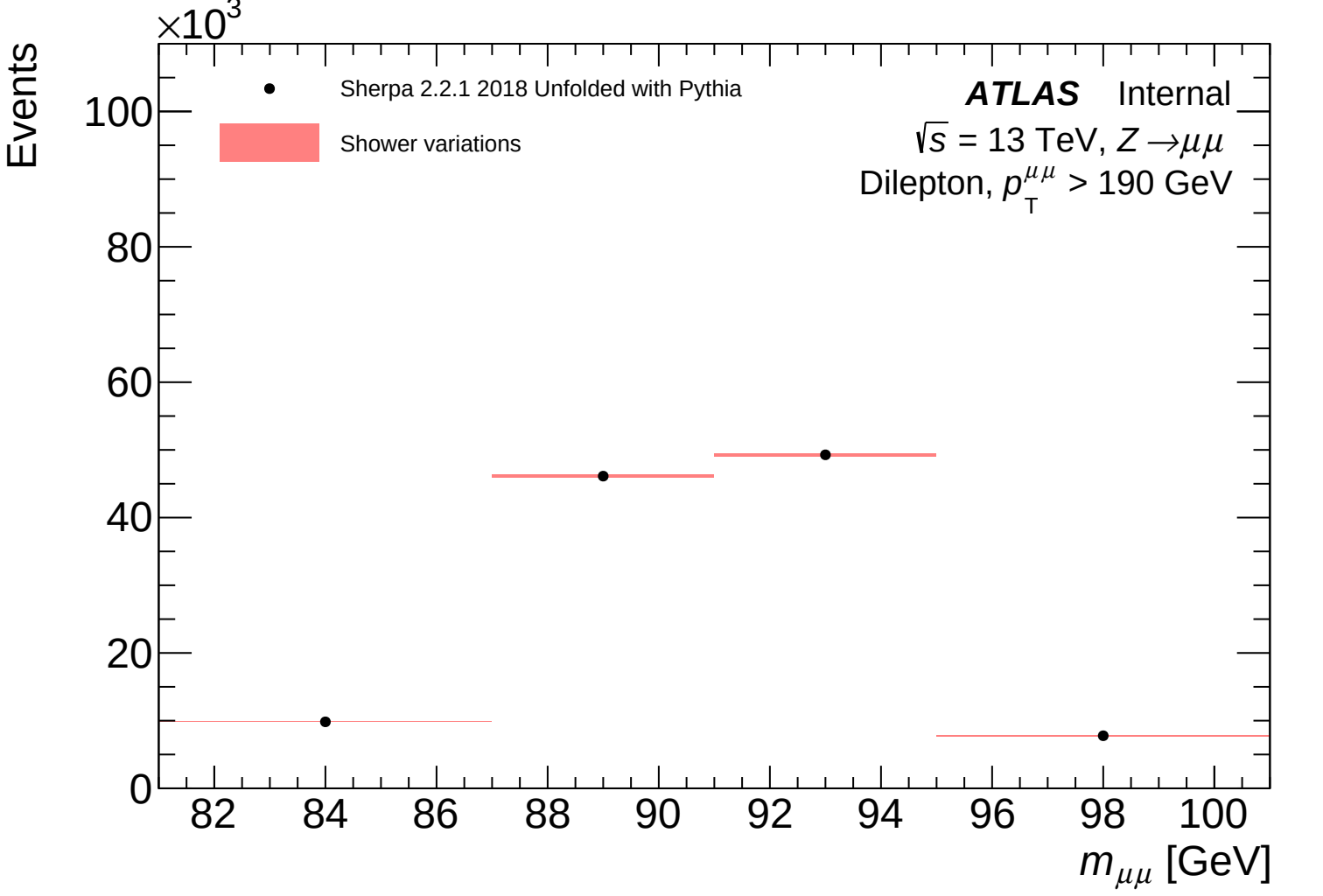
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
×10^3
dN / dm_μμ [GeV]^-1
m_μμ [GeV]
0
5
10
15
20
25
82
84
86
88
90
92
94
96
98
100


Events
×10^3
100
80
60
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
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0
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94
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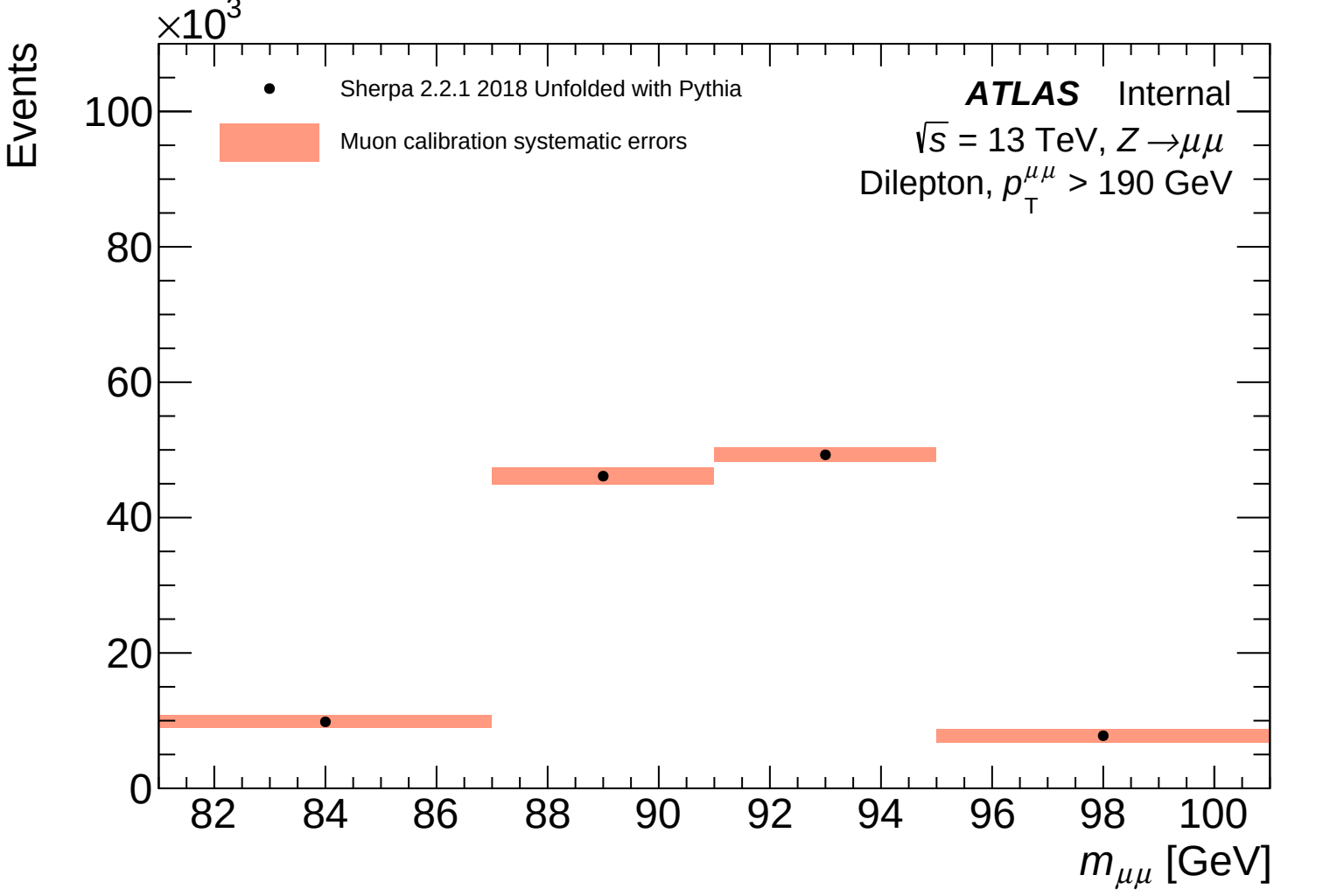
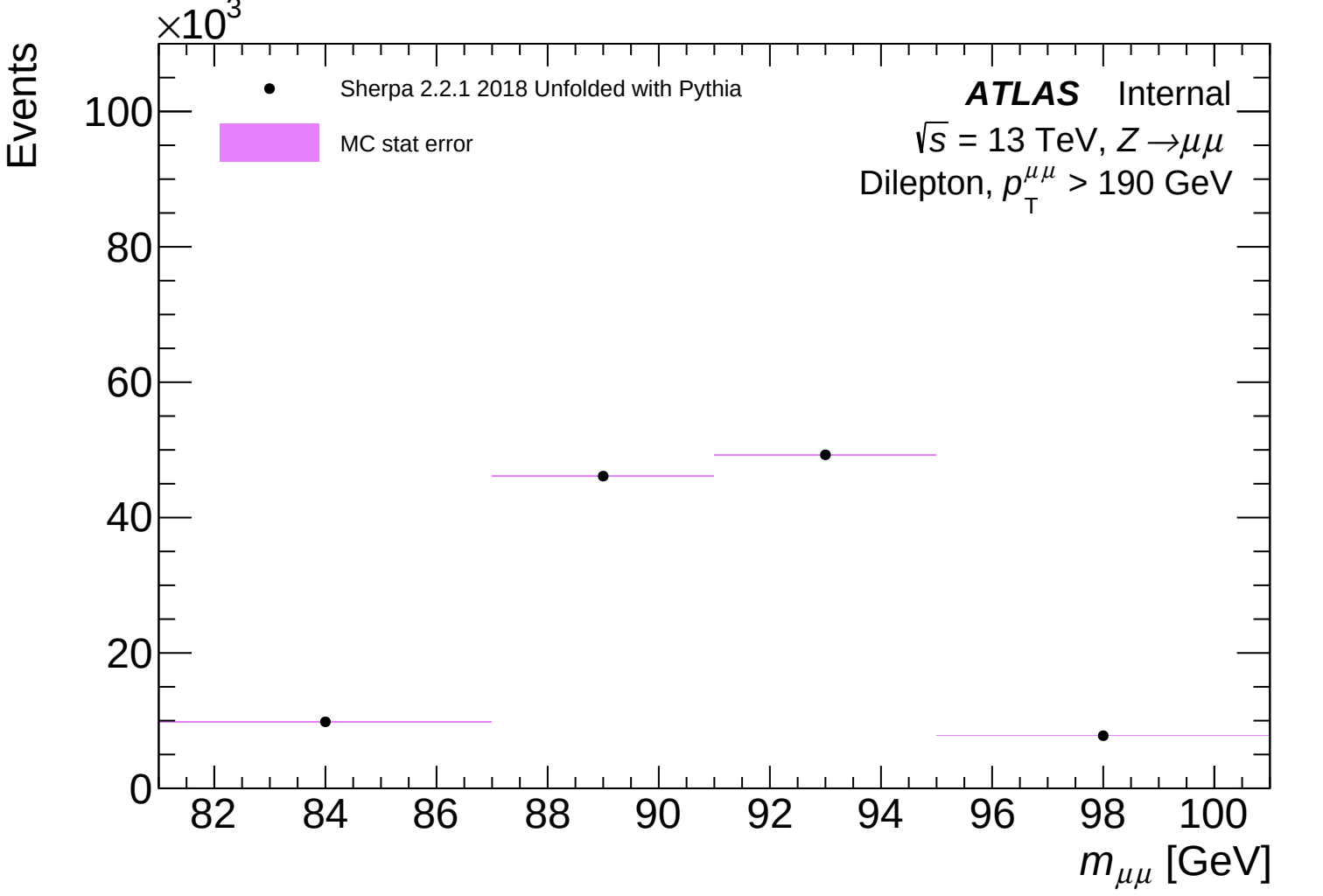
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
20
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
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0
82
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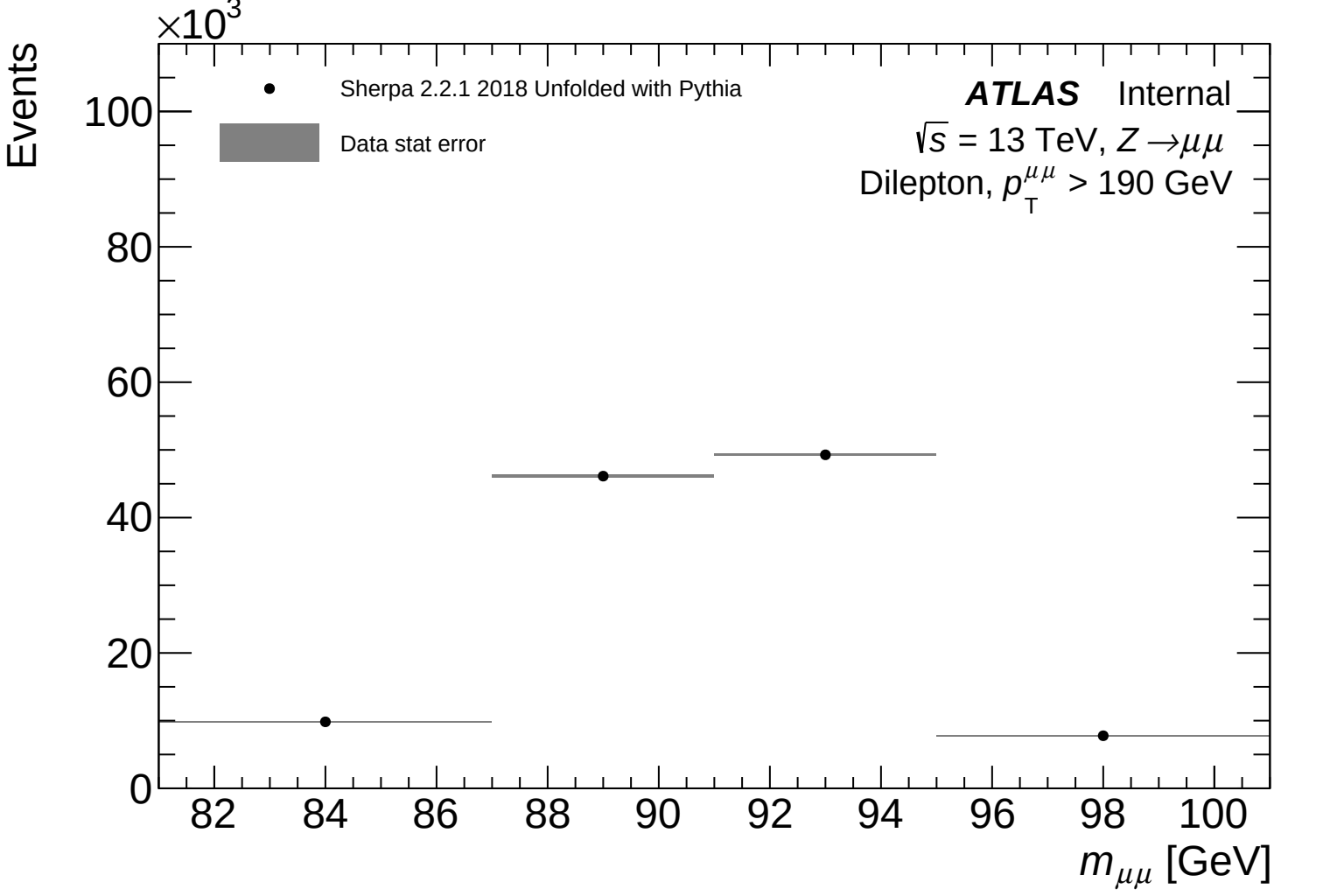
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
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40
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0
82
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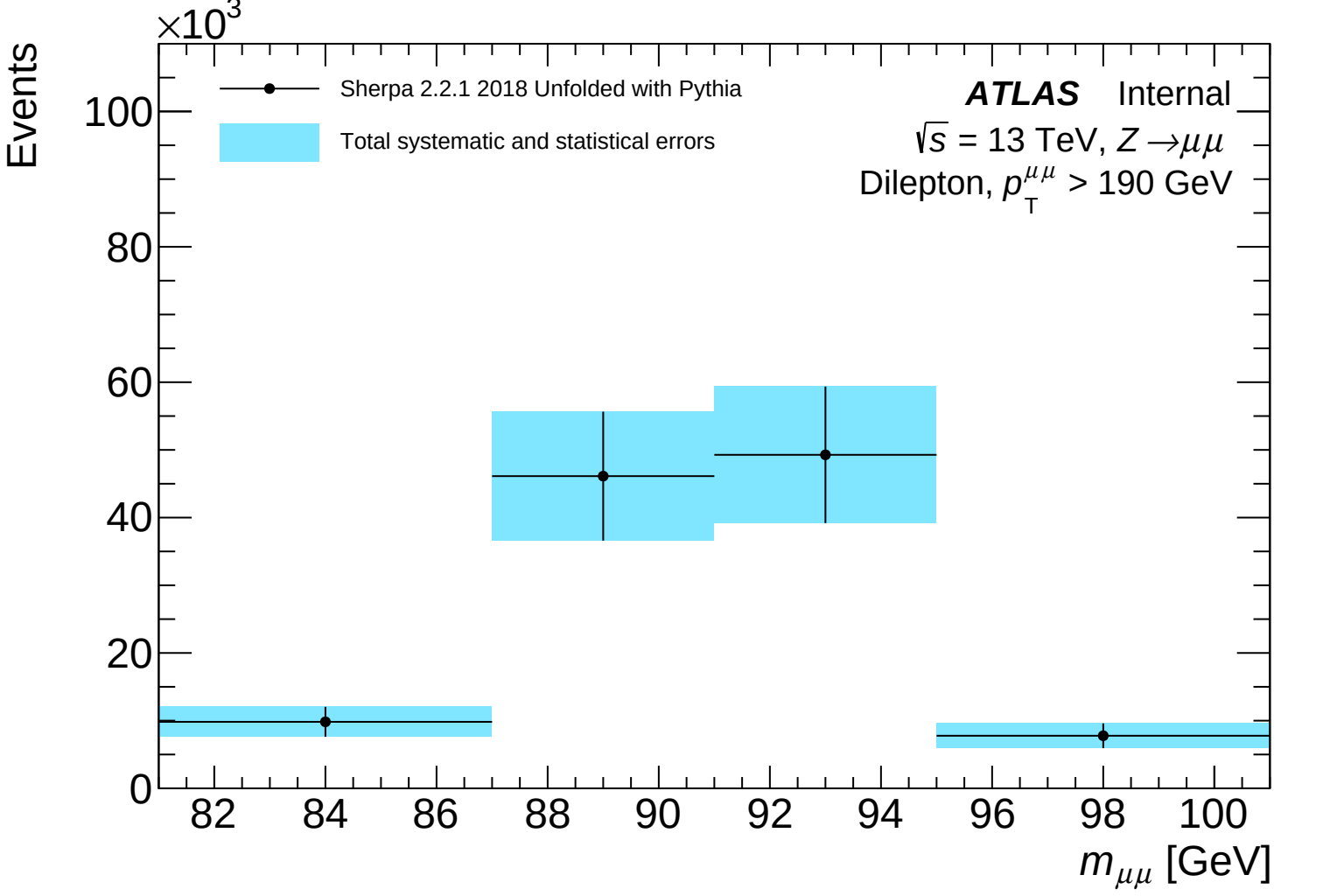
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
100
80
60
40
20
0
82
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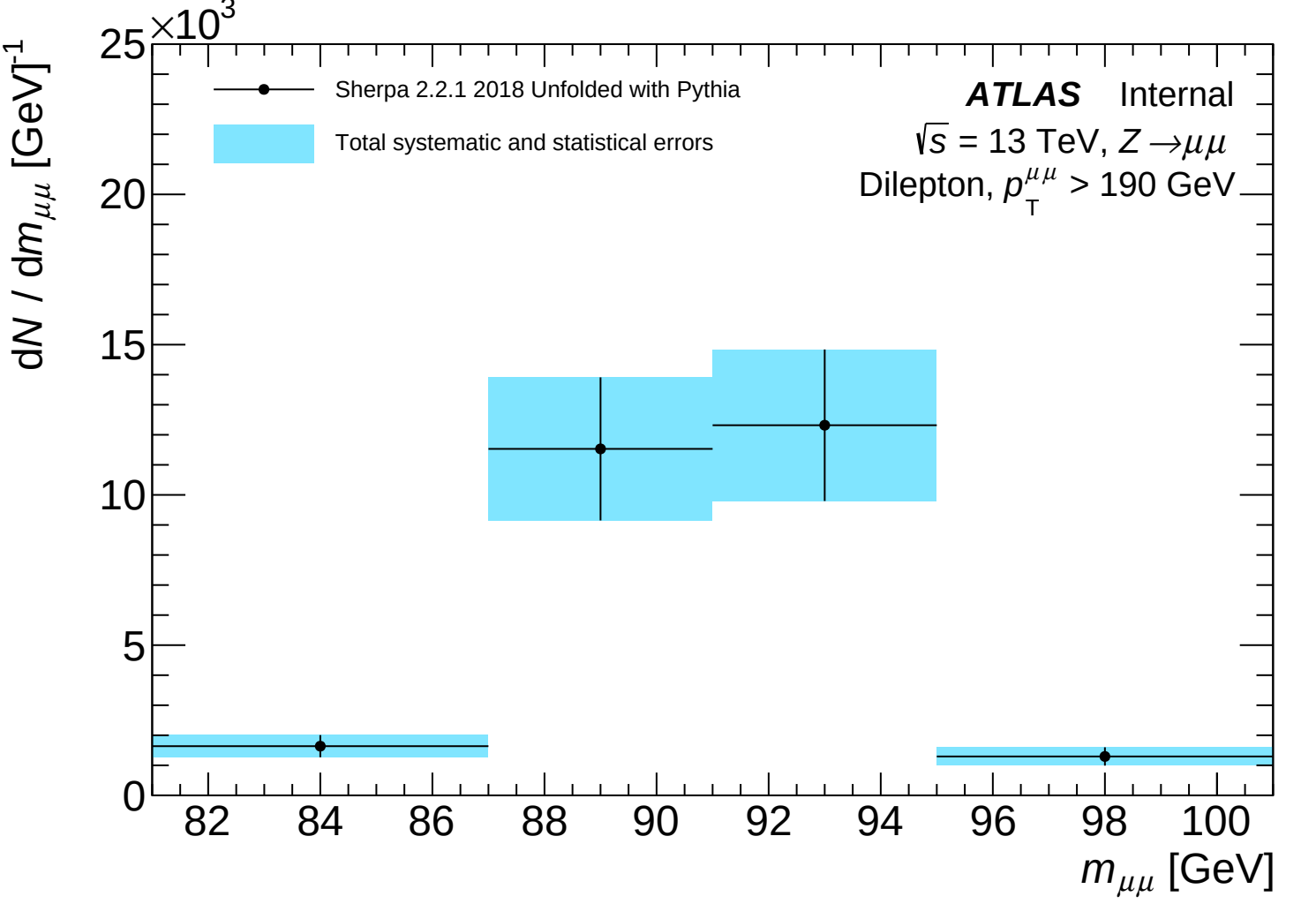
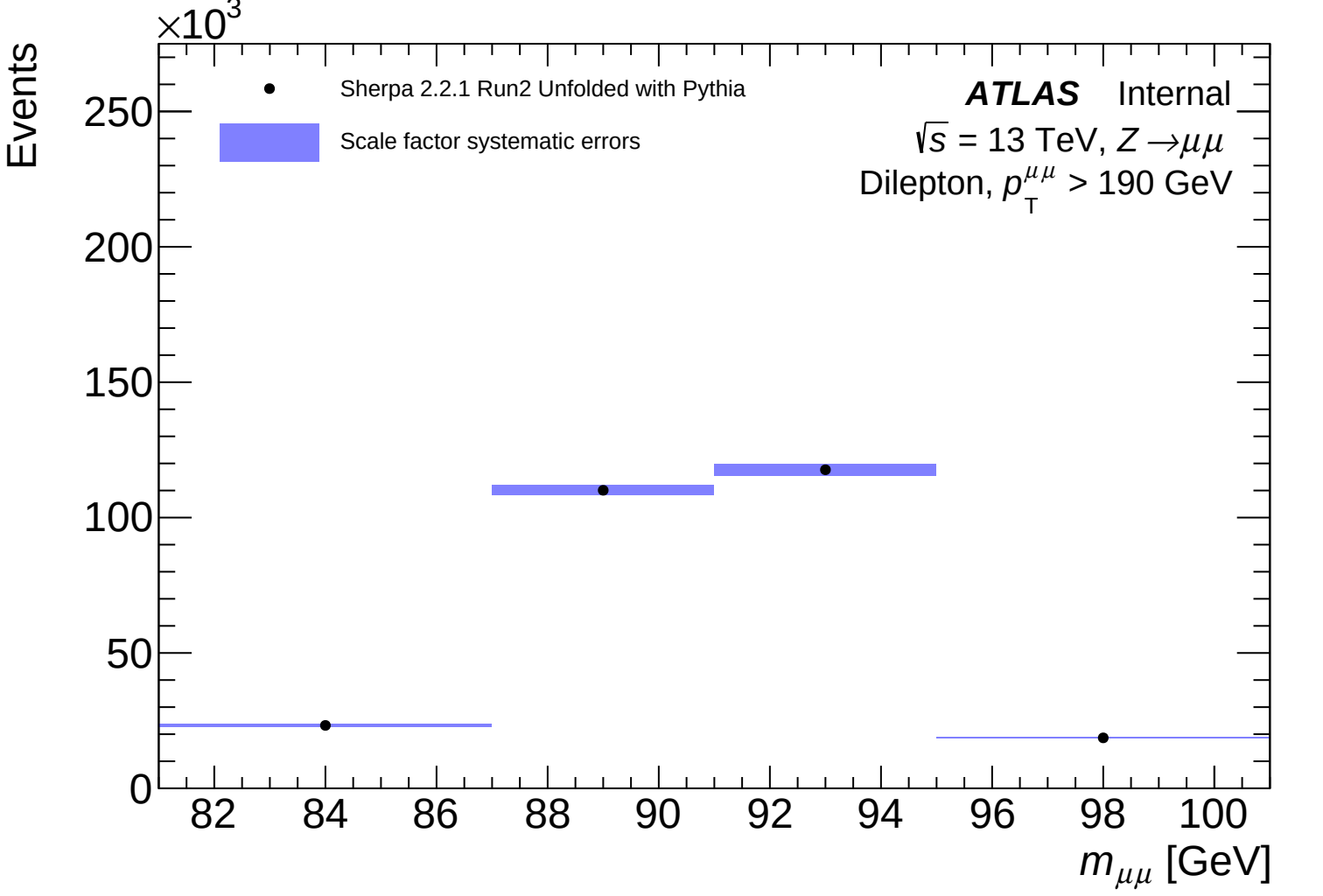
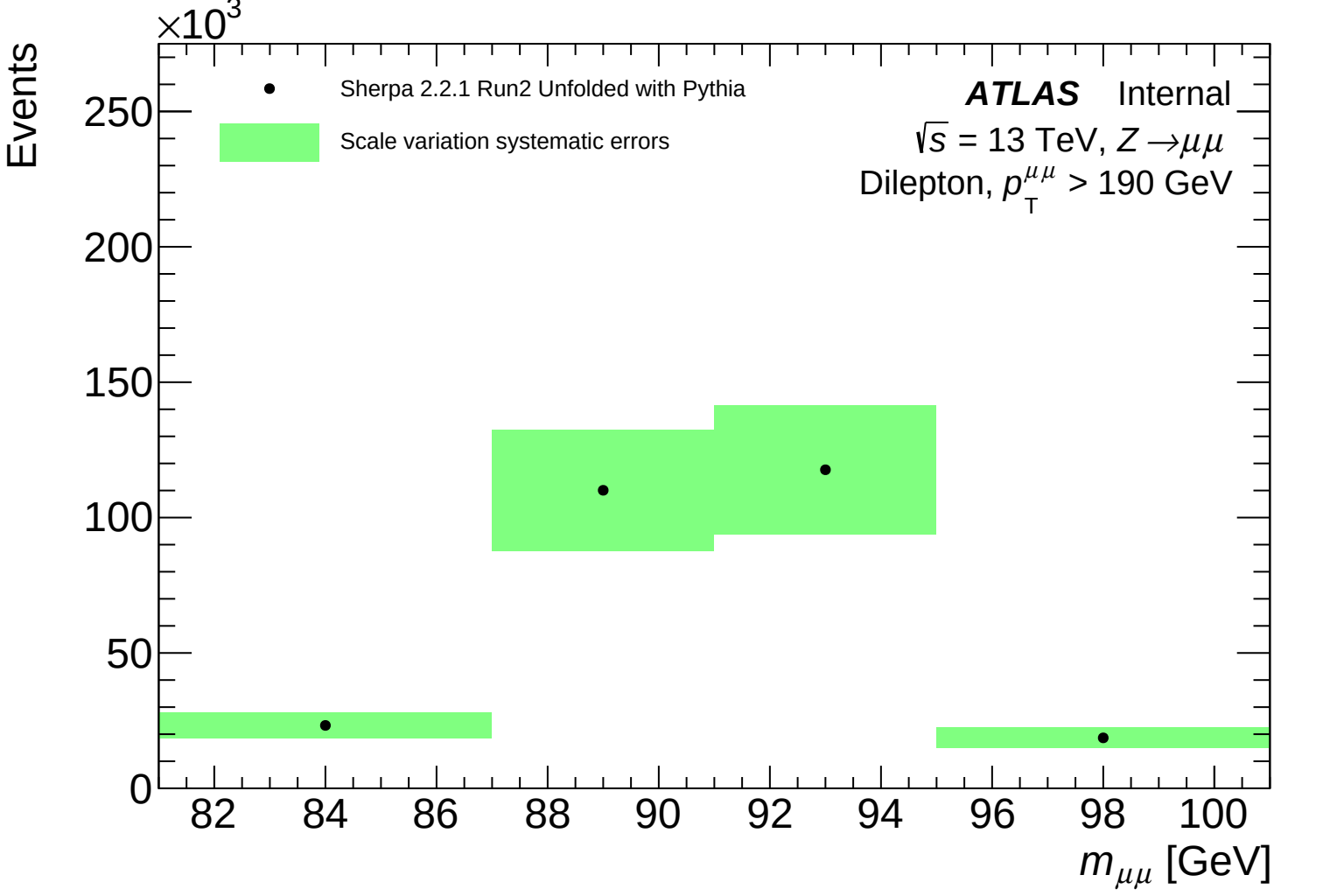
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
×10^3
dN / dm_μμ [GeV]^-1
m_μμ [GeV]
0
5
10
15
20
25
82
84
86
88
90
92
94
96
98
100


Events
×10^3
250
200
150
100
50
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
250
200
150
100
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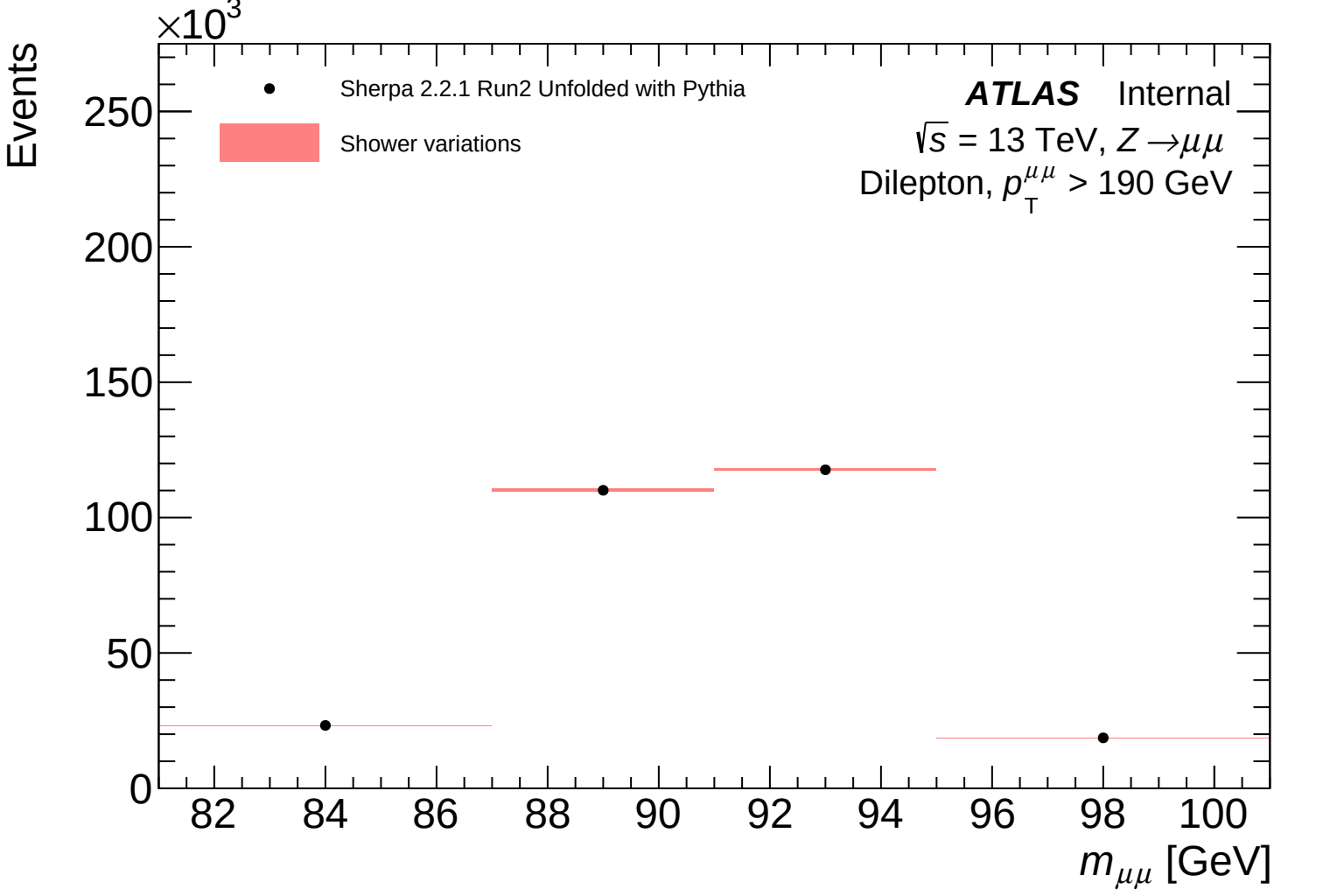
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
250
200
150
100
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0
82
84
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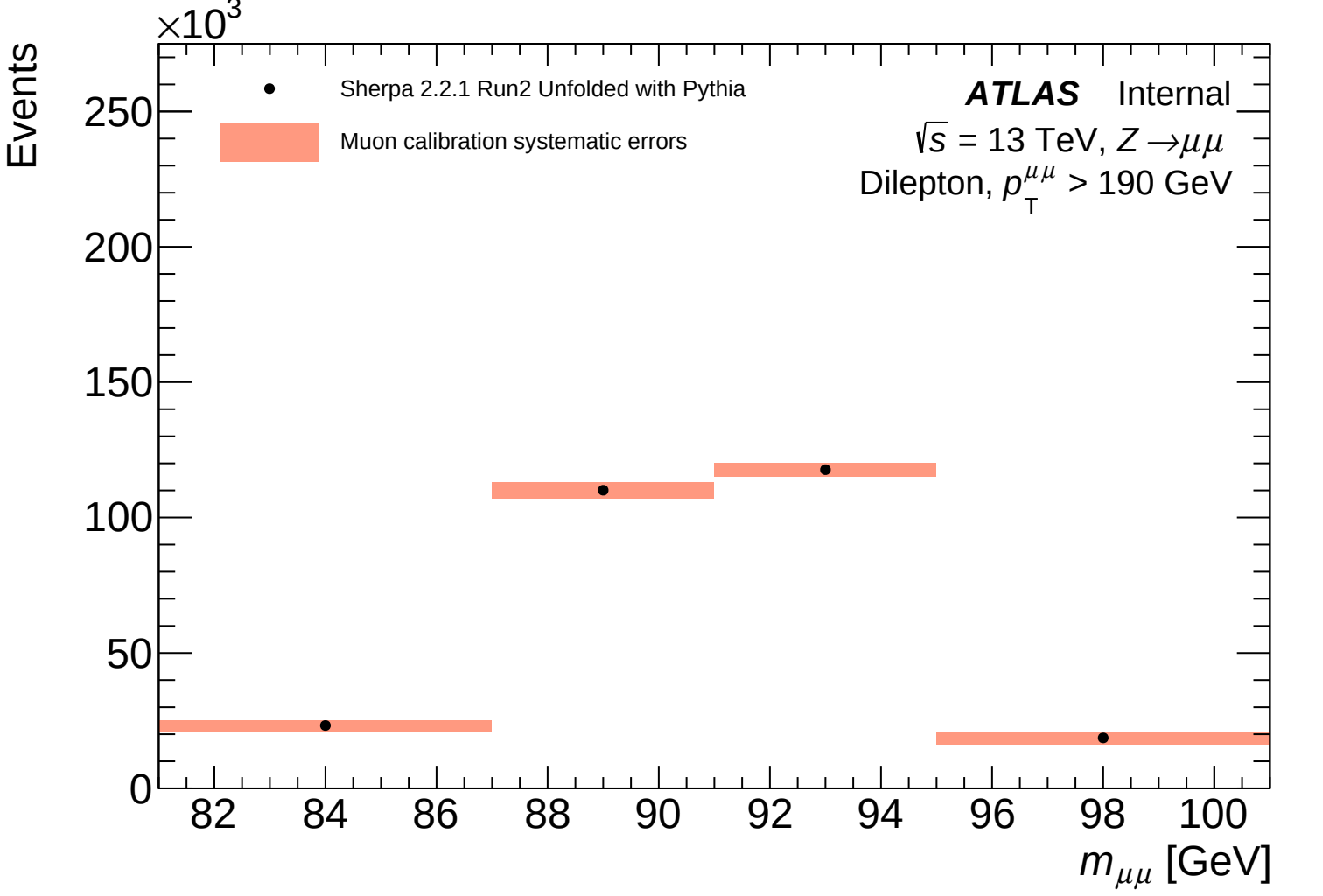
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
250
200
150
100
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0
82
84
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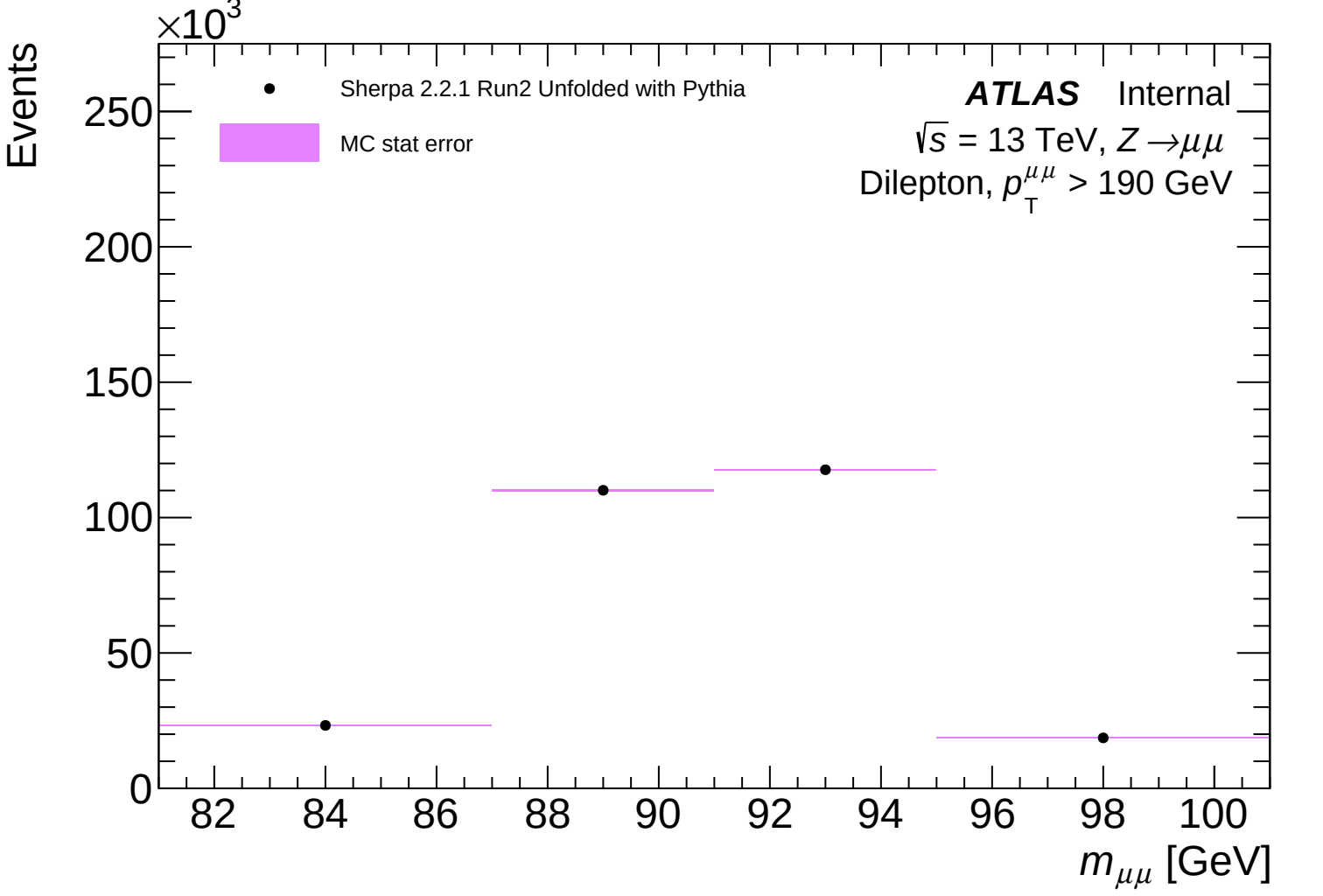
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
250
200
150
100
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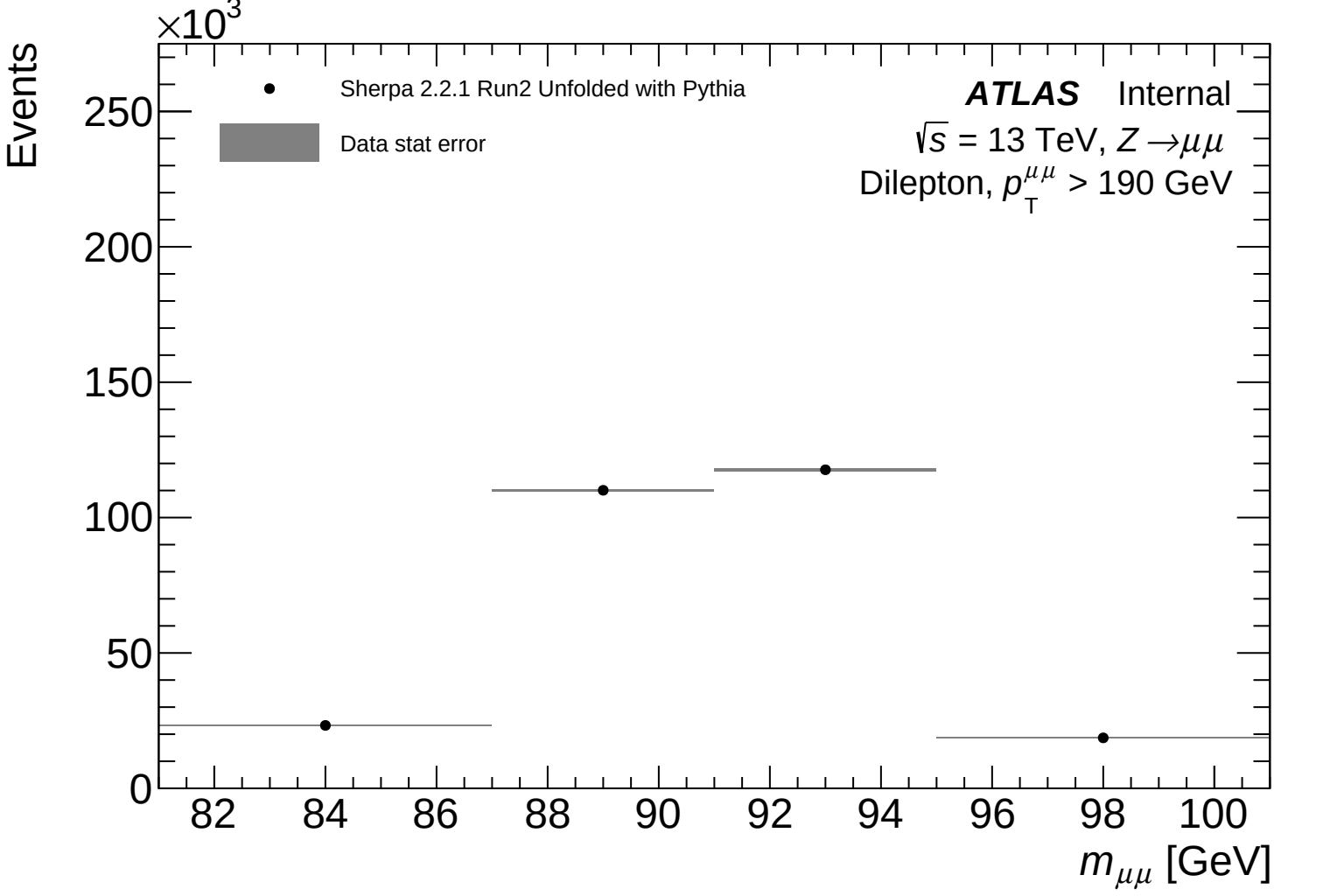
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
250
200
150
100
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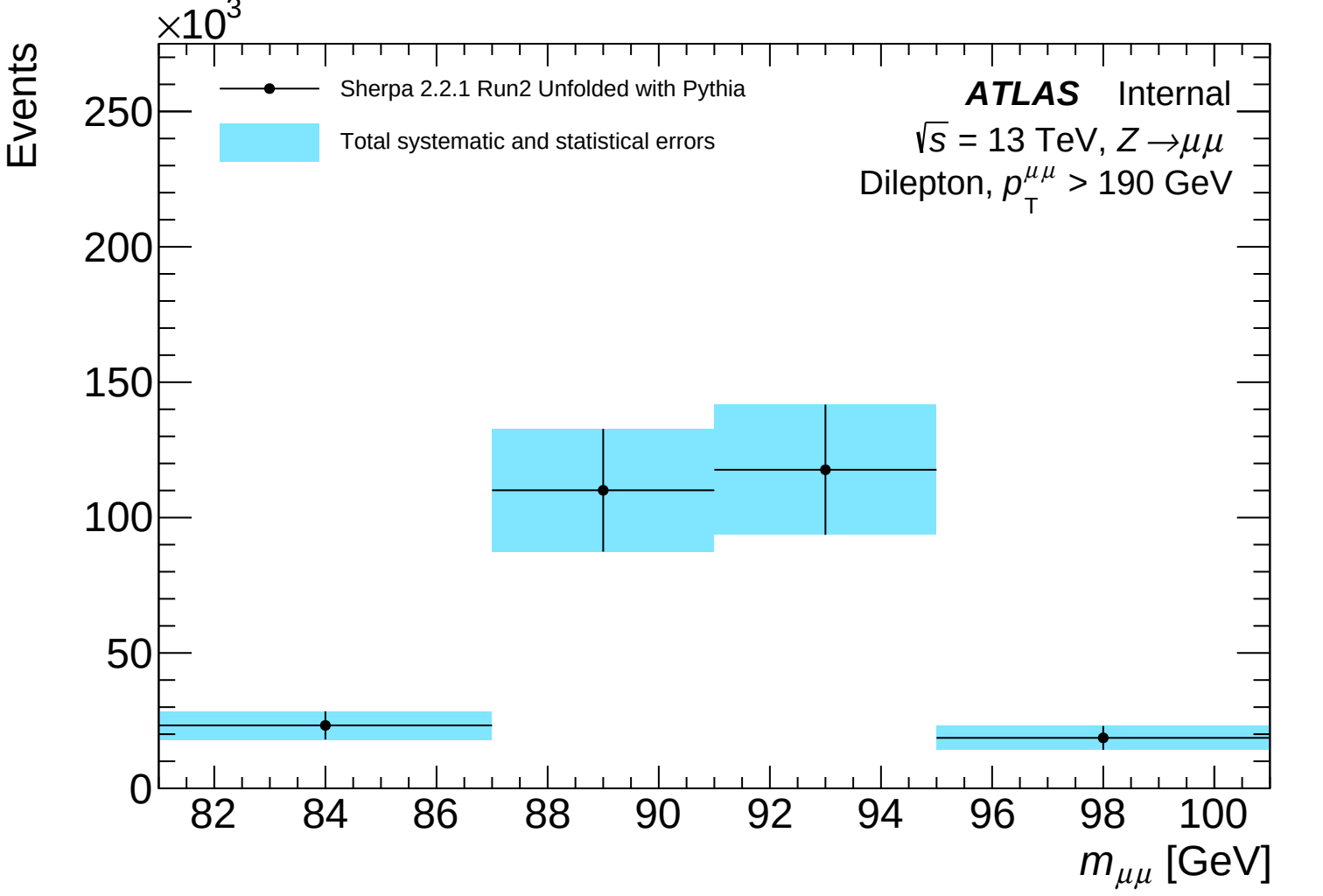
0
82
84
86
88
90
92
94
96
98
100
$m_{\mu\mu}$ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV


Events
×10^3
250
200
150
100
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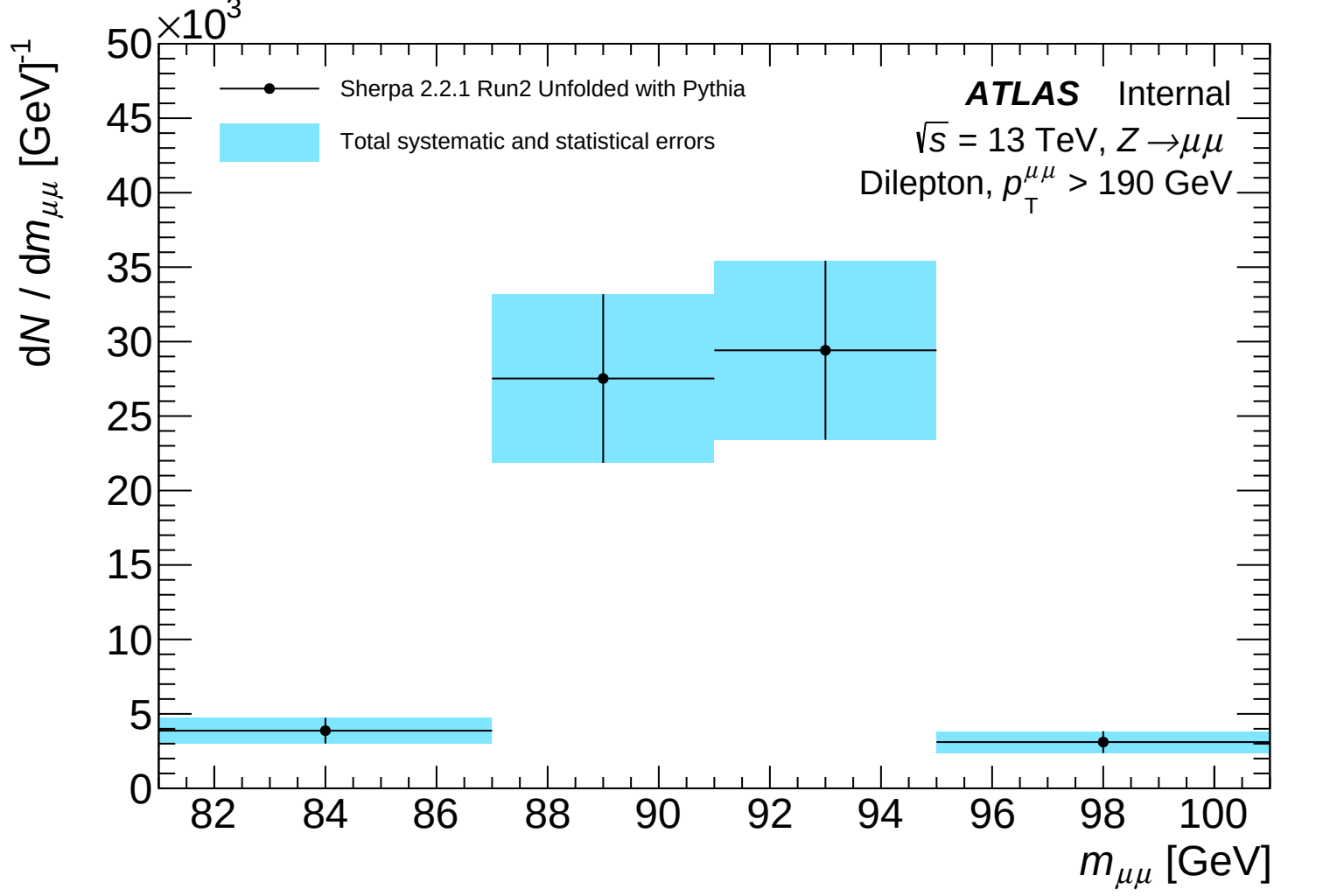
0
82
84
86
88
90
92
94
96
98
100
m_μμ [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
×10^3
dN / dm_μμ [GeV]^-1
m_μμ [GeV]
0
5
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50
82
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94
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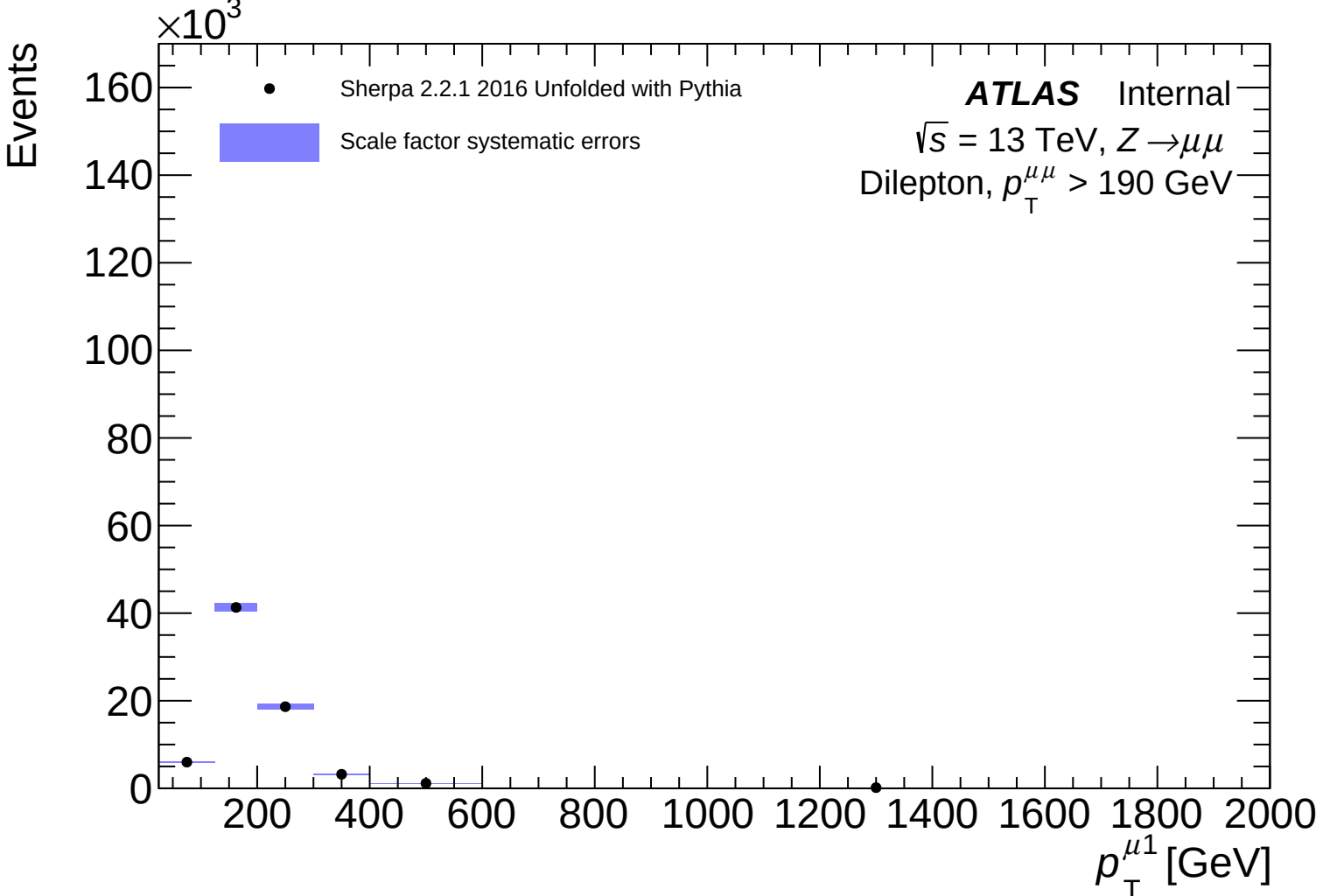
98
100


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
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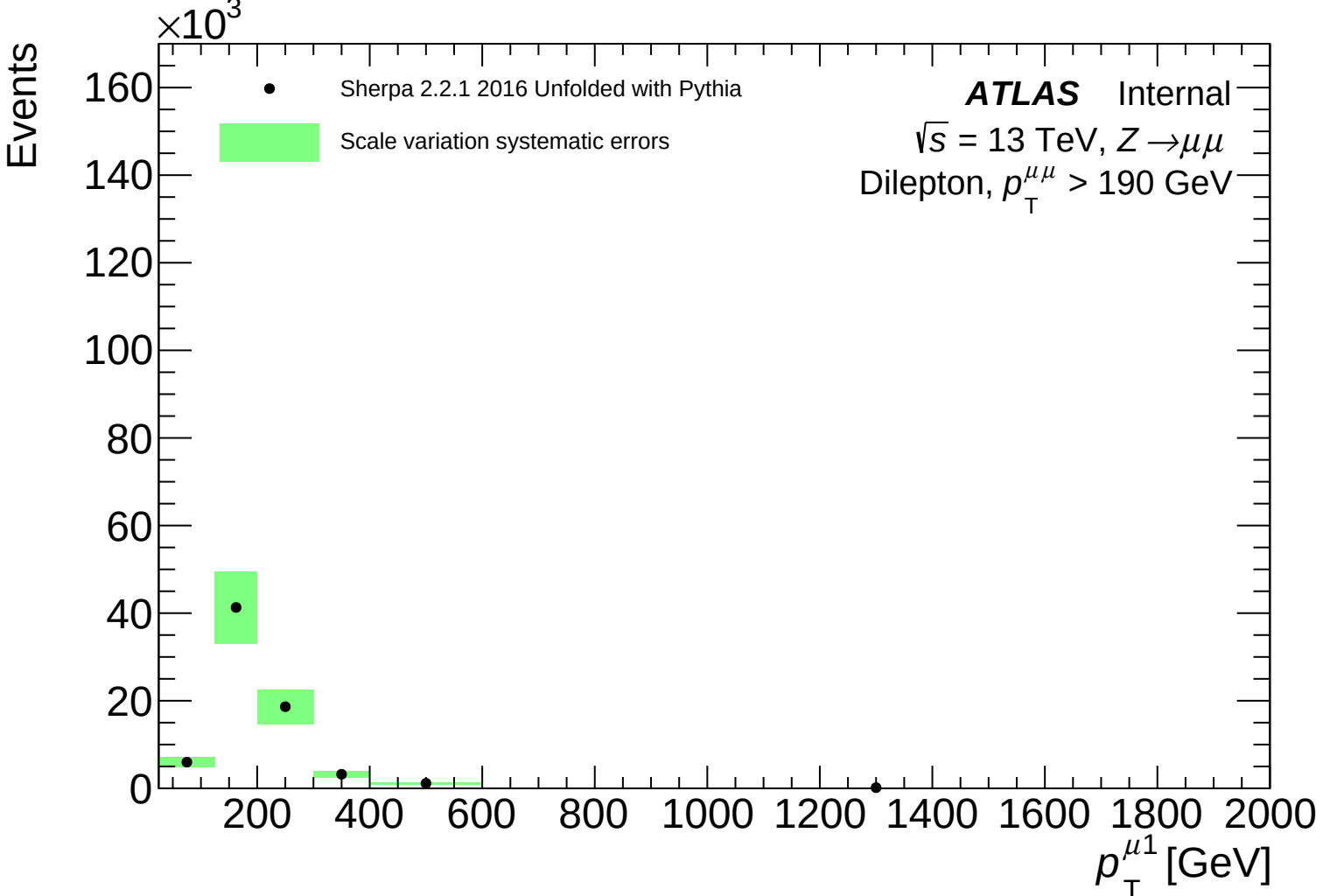
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
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0
200
400
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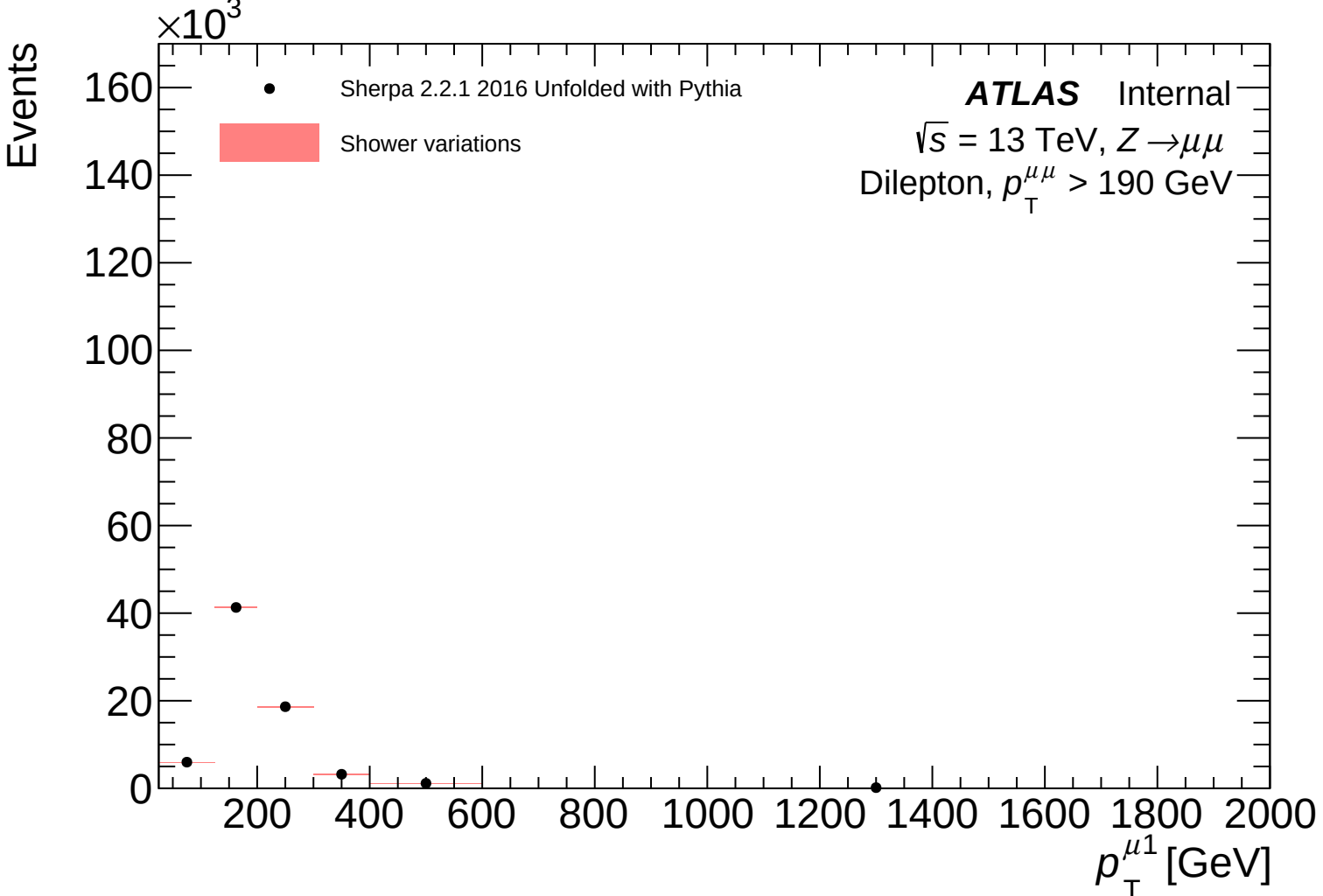
1000
1200
1400
1600
1800
2000
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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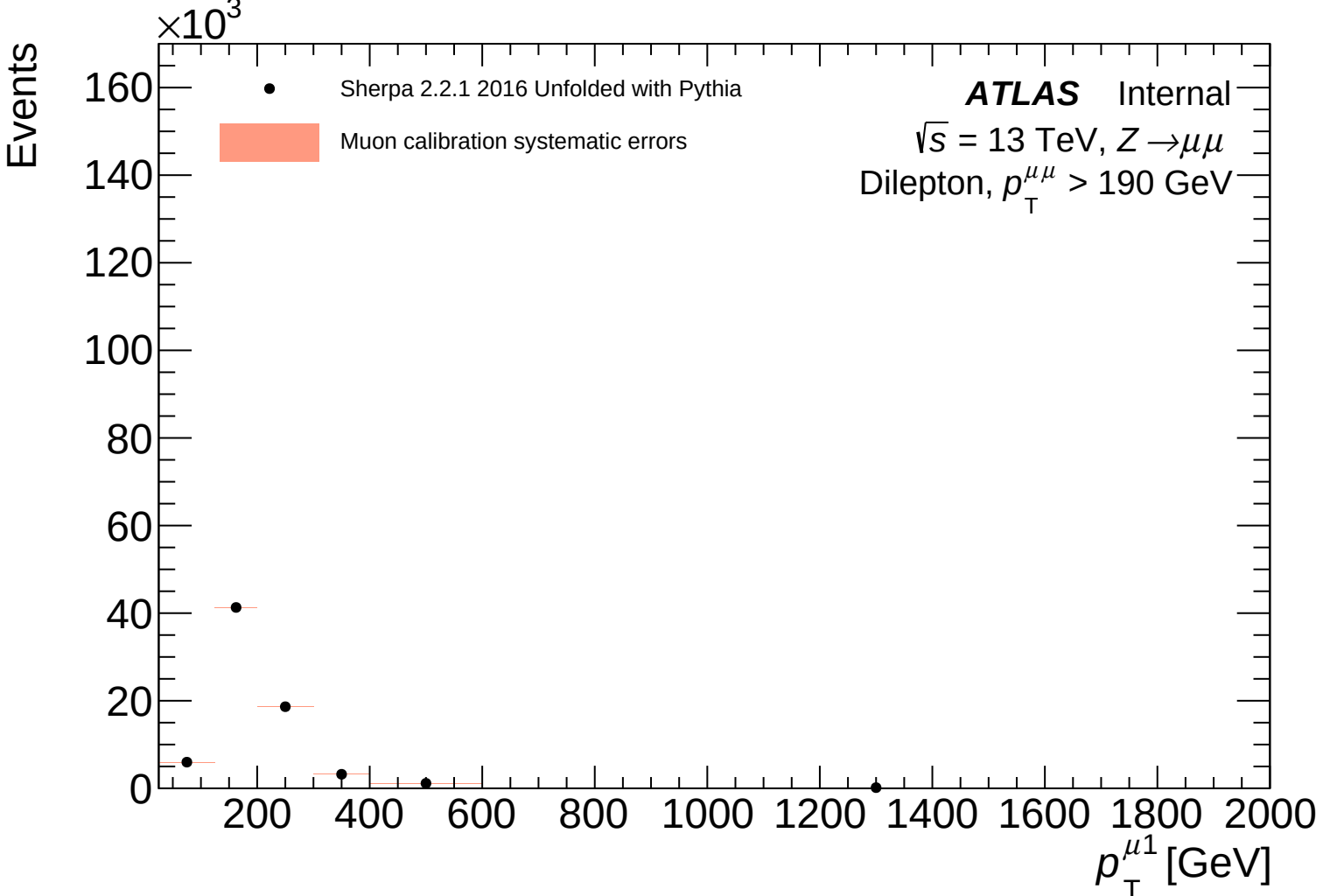
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
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100
80
60
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0
Sherpa 2.2.1 2016 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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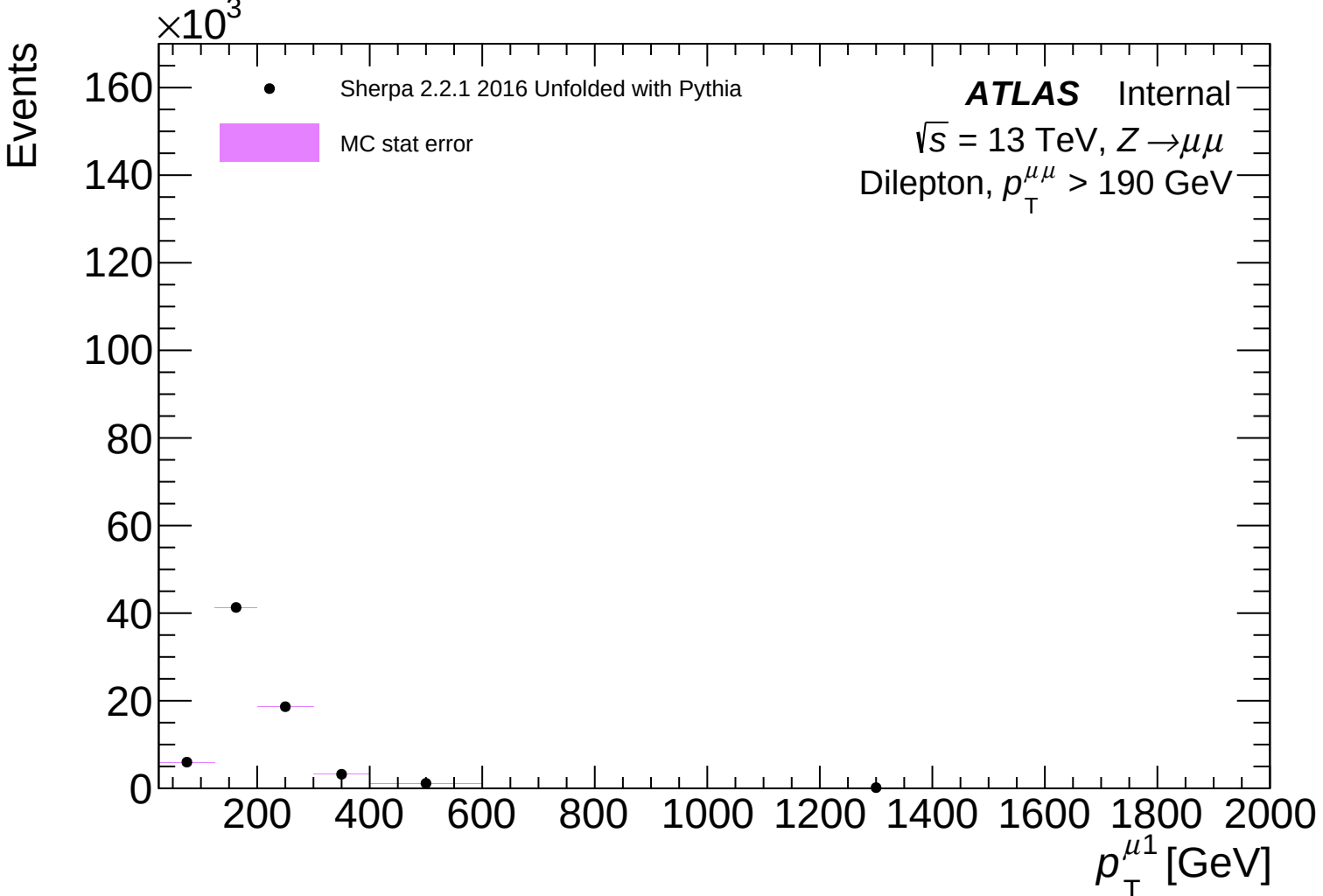
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
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60
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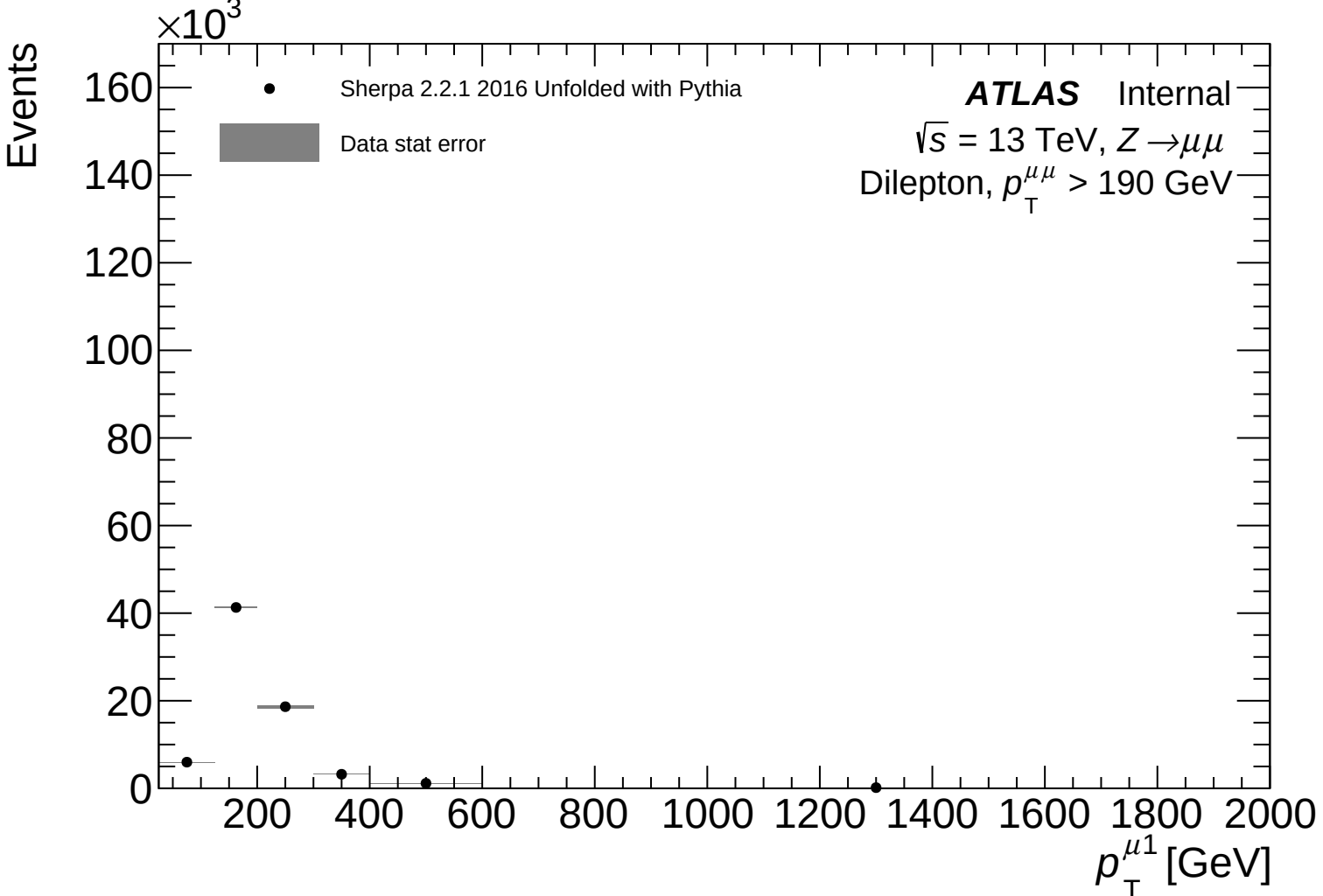
2000
$p_T^{\mu 1}$ [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
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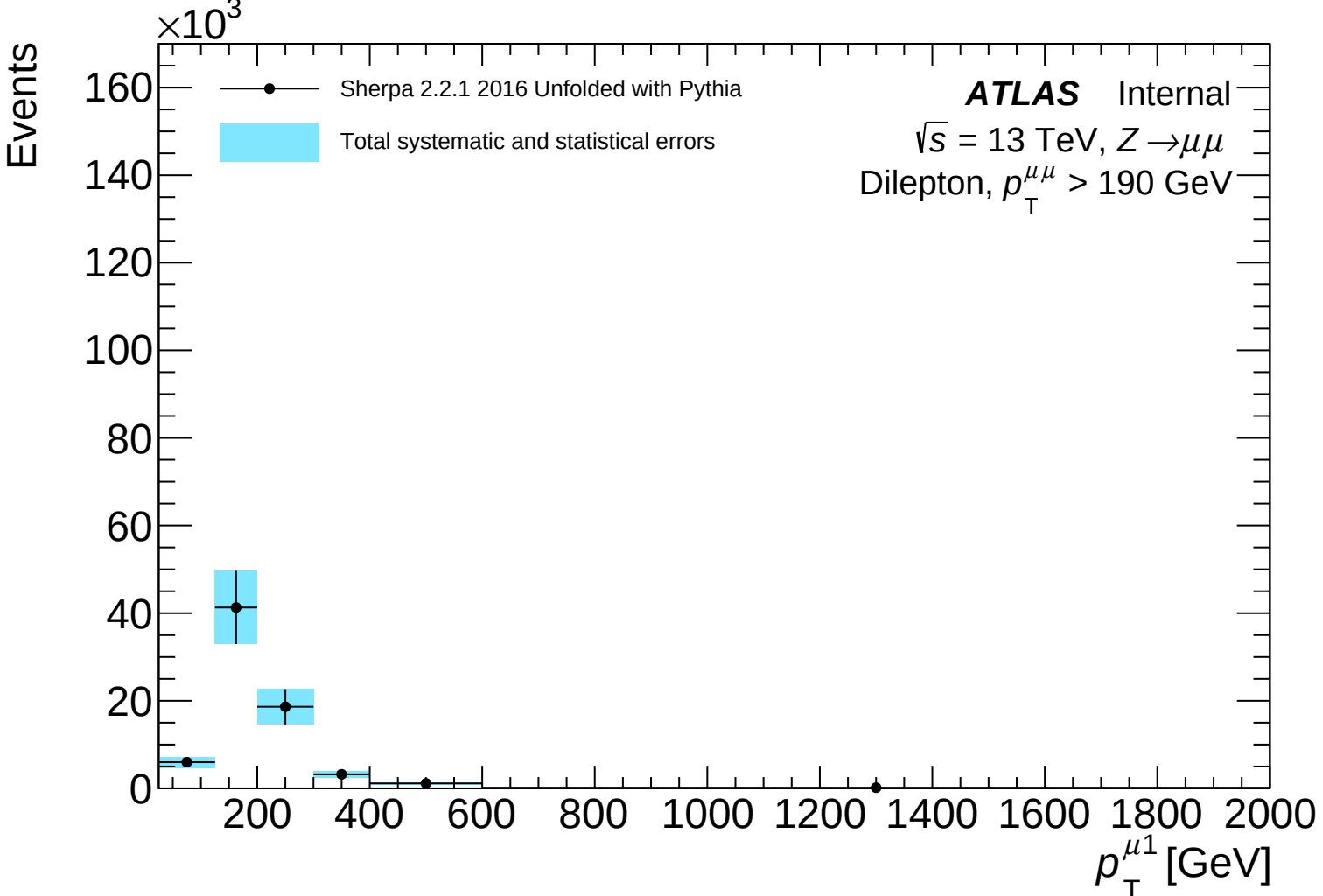
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
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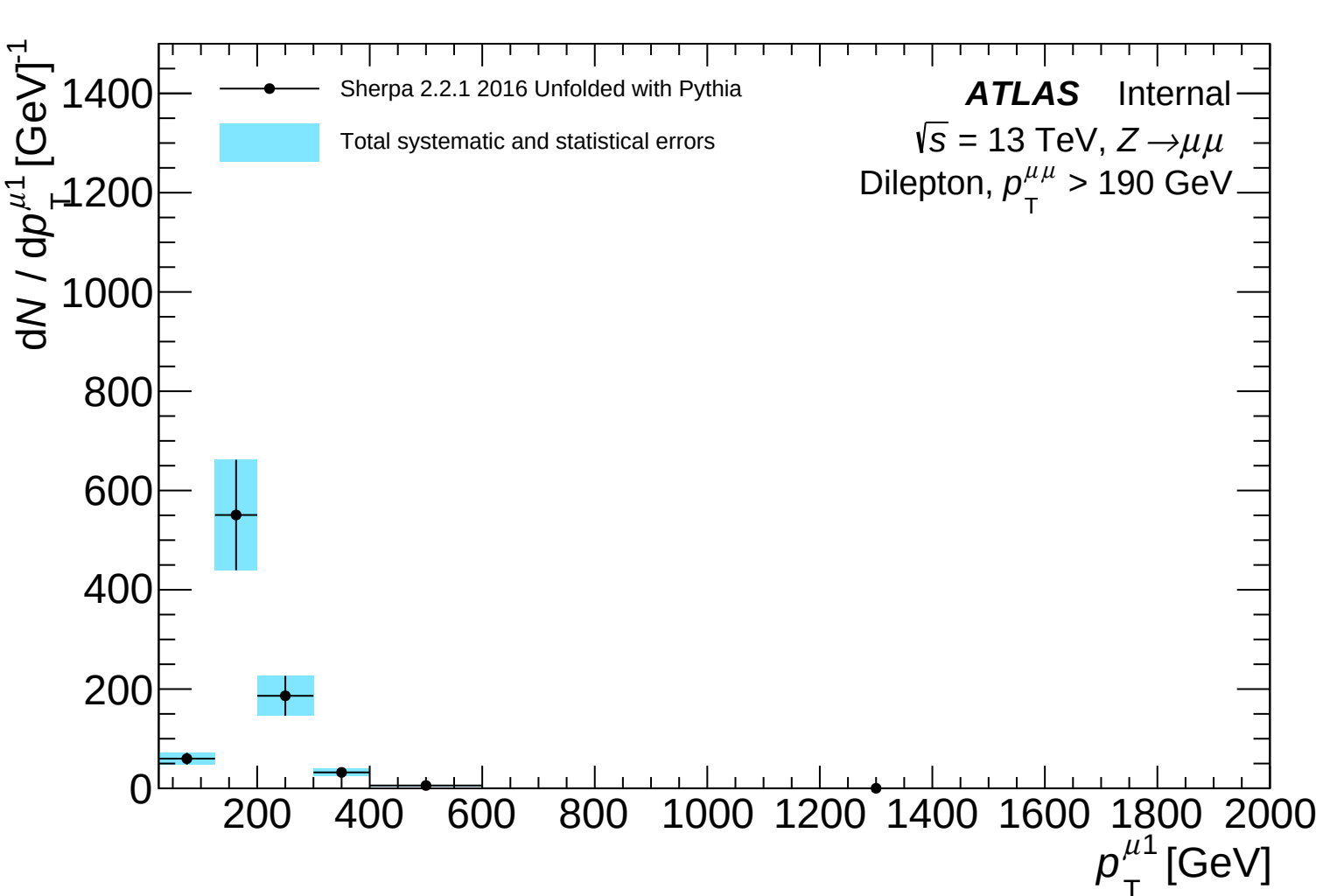
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
p_T^μ1 [GeV]


Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ1 [GeV]^-1
p_T^μ1 [GeV]
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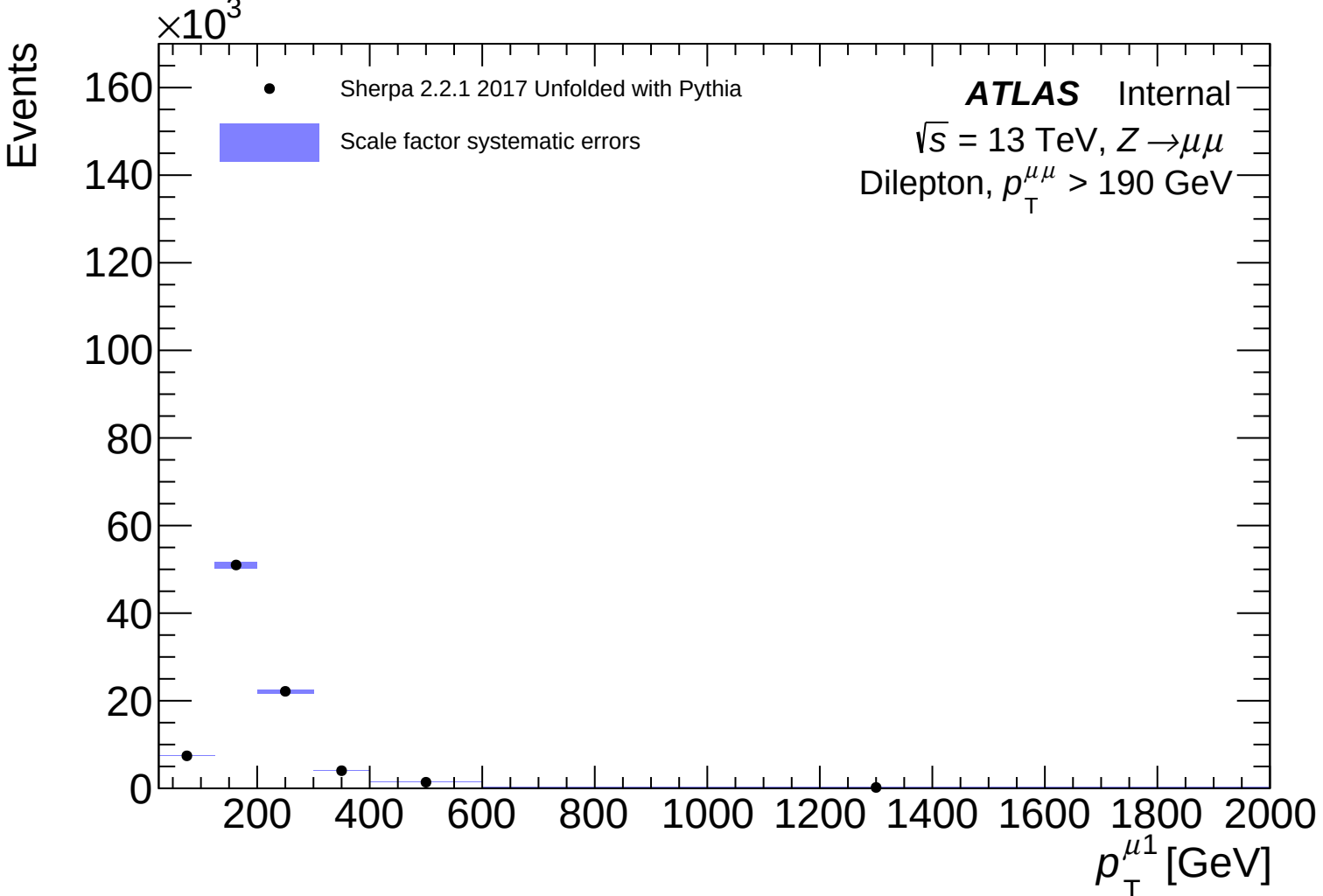
Events
×10^3
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0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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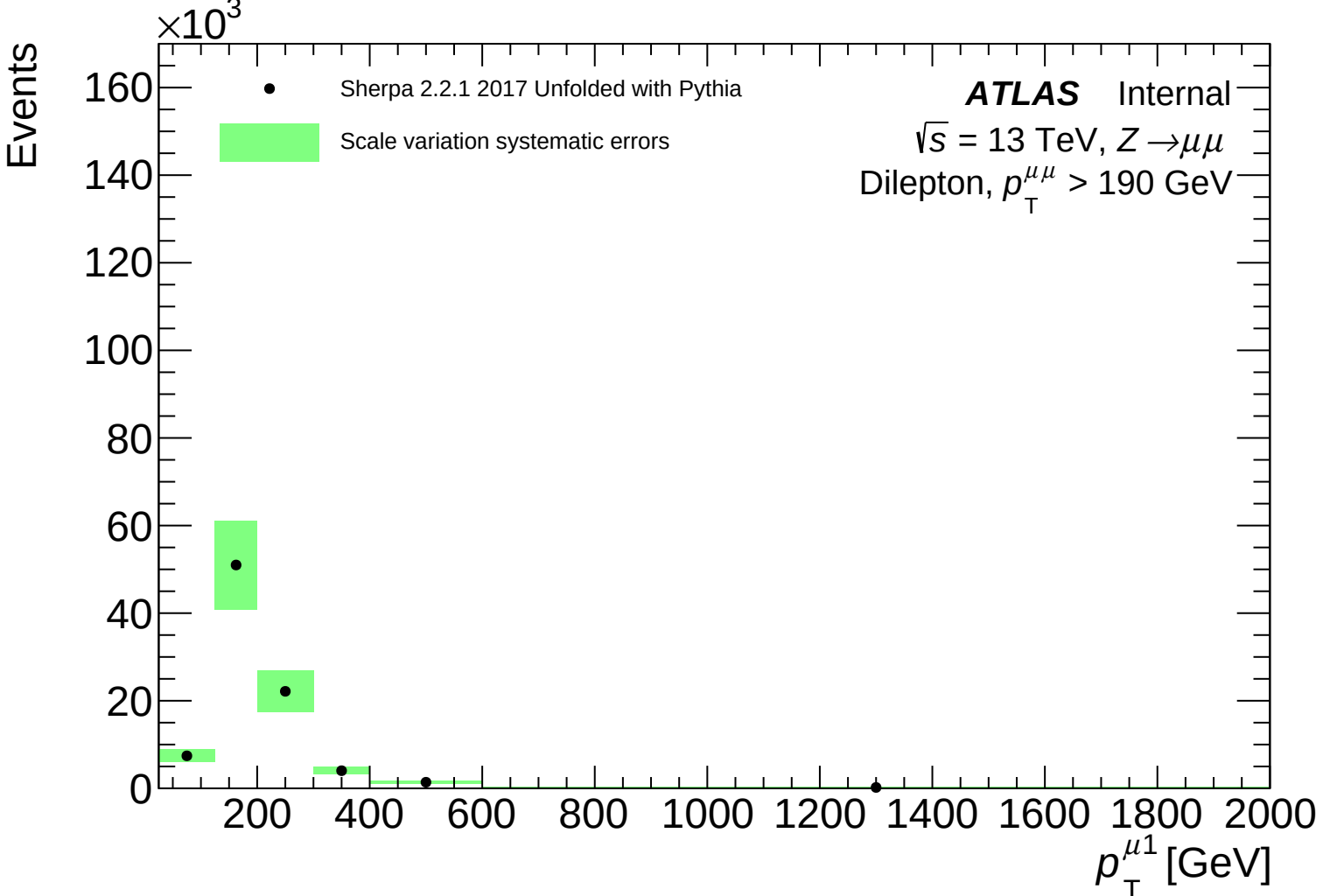
2000
p_T^μ1 [GeV]


Events
×10^3
160
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120
100
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20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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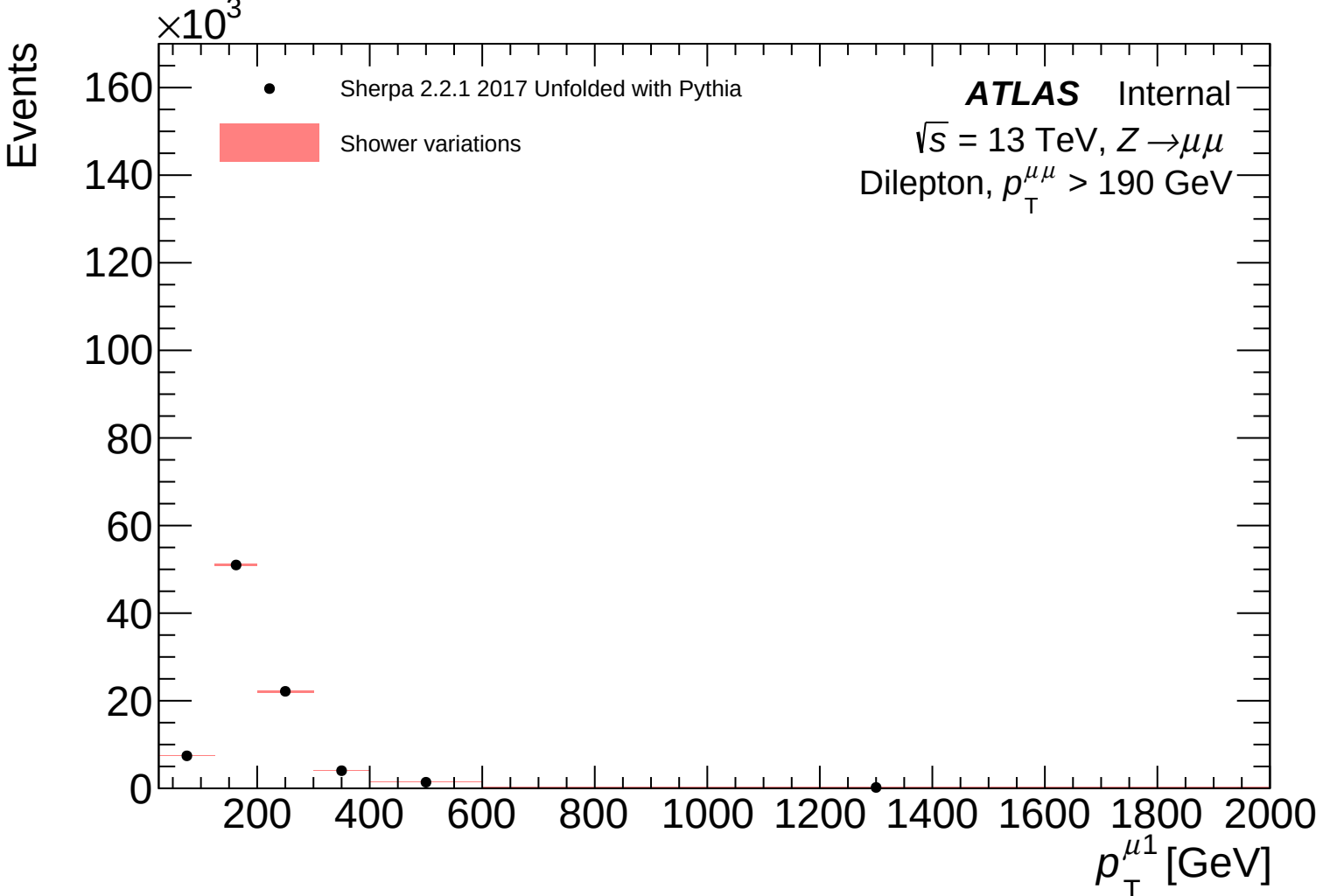
1800
2000
p_T^μ1 [GeV]


Events
×10^3
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140
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20
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Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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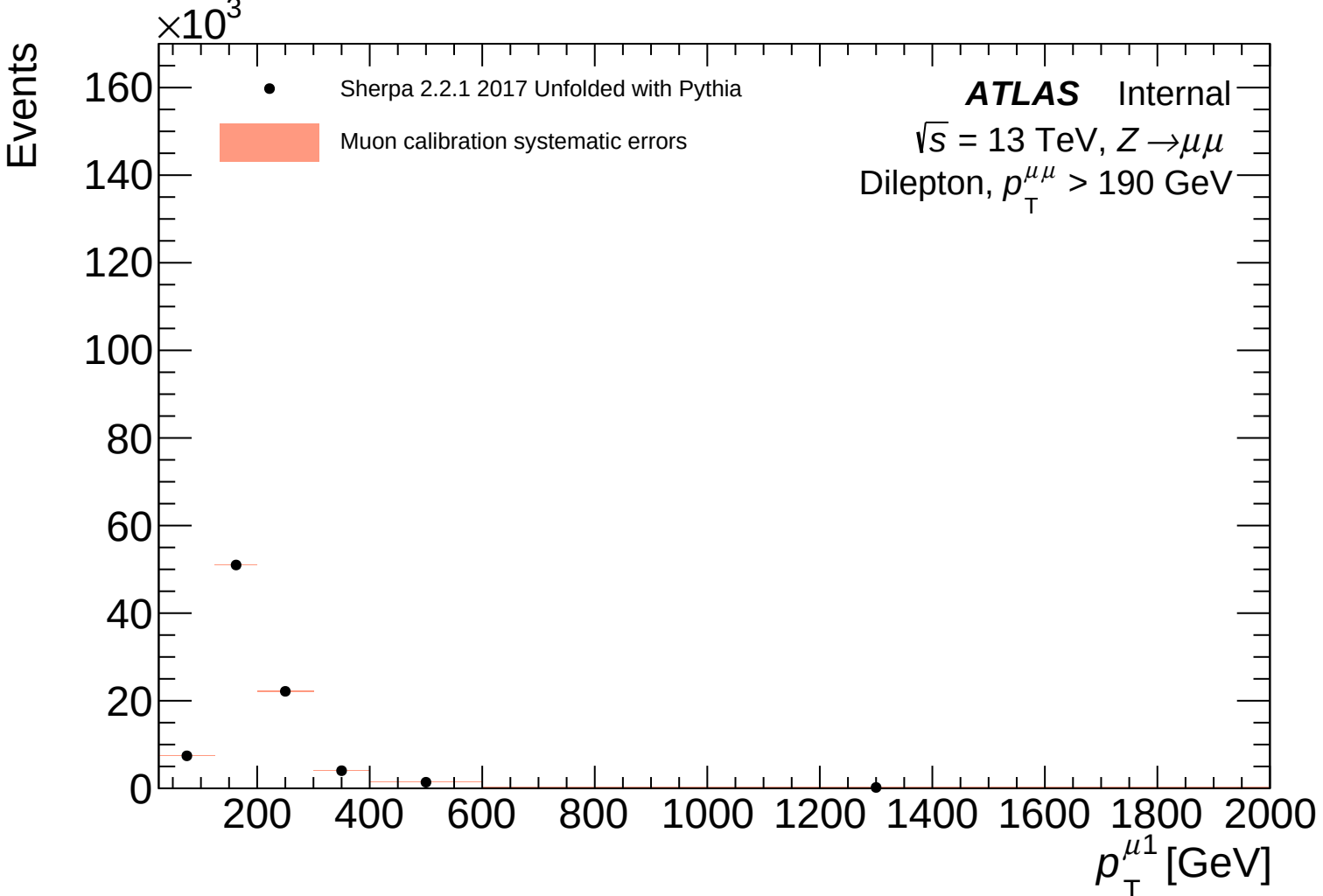
2000
p_T^μ1 [GeV]


Events
×10^3
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140
120
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60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
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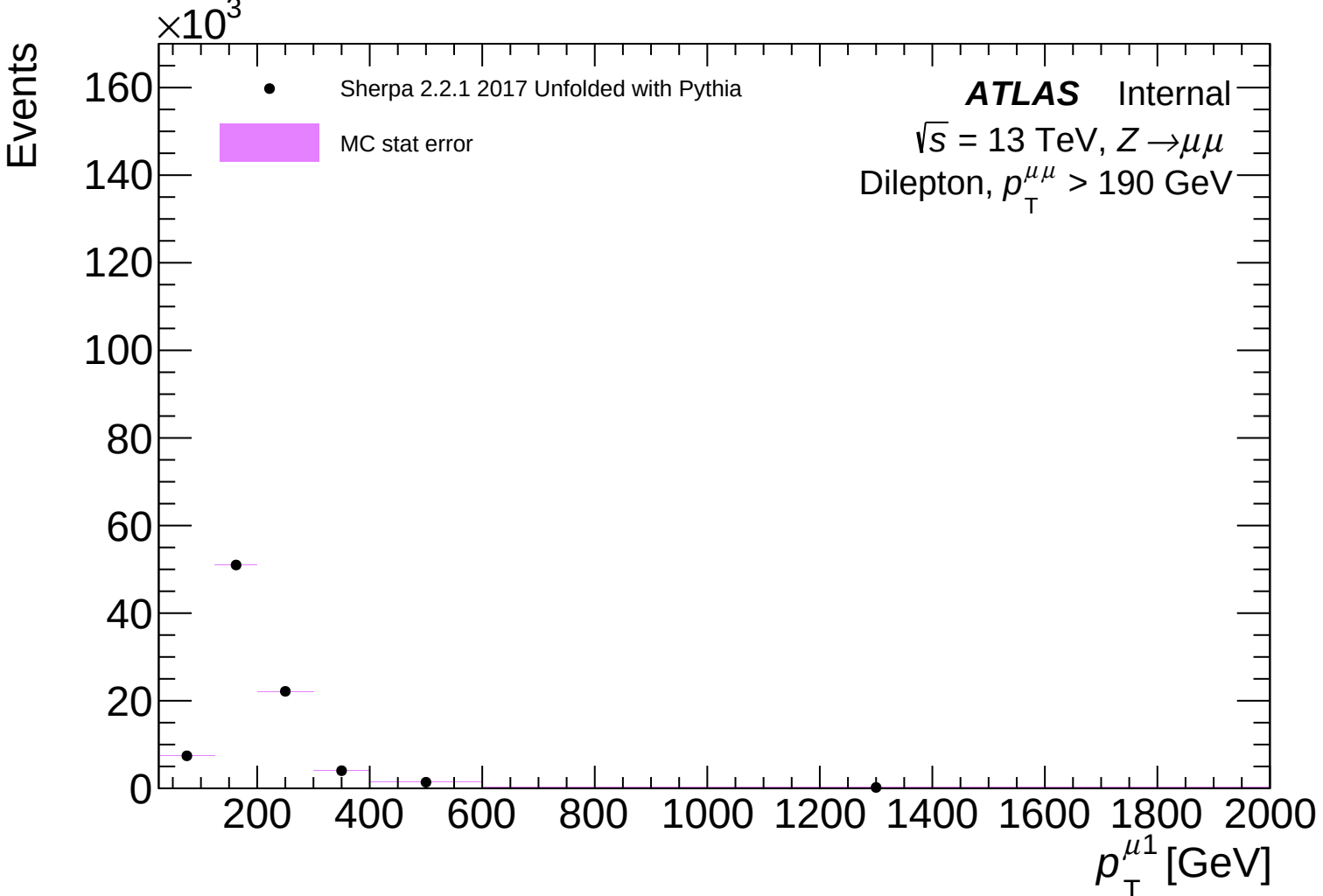
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
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100
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20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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600
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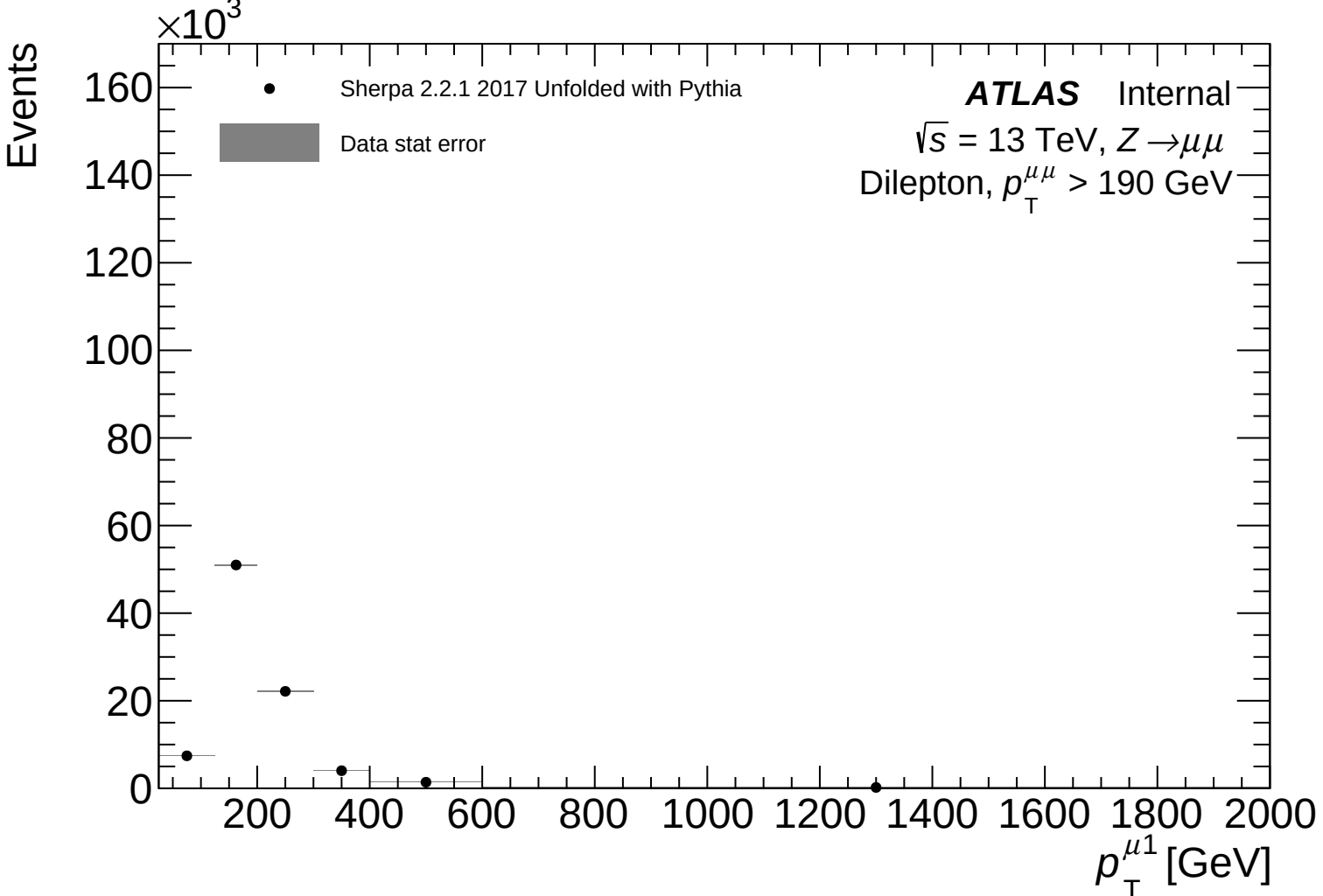
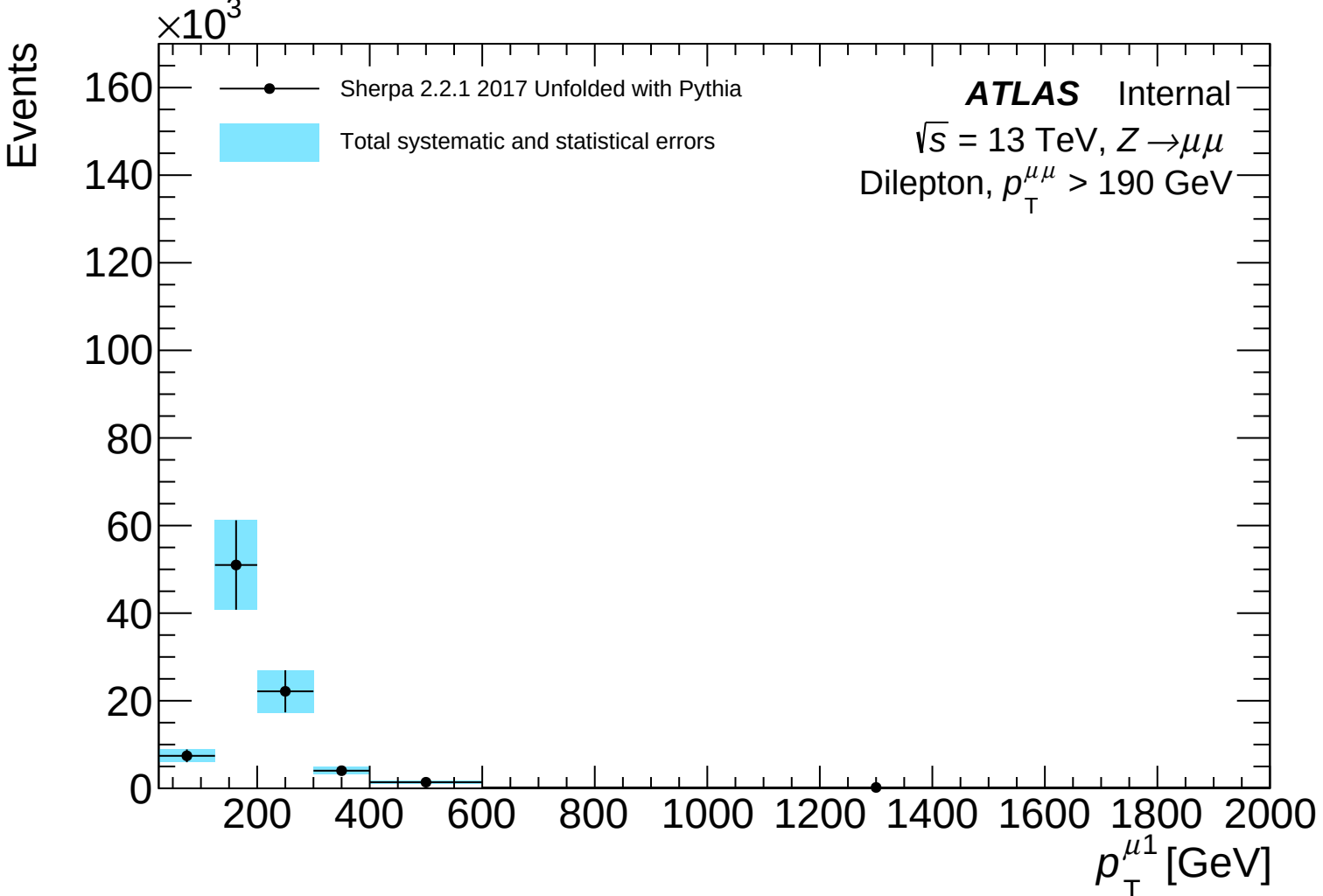
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
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100
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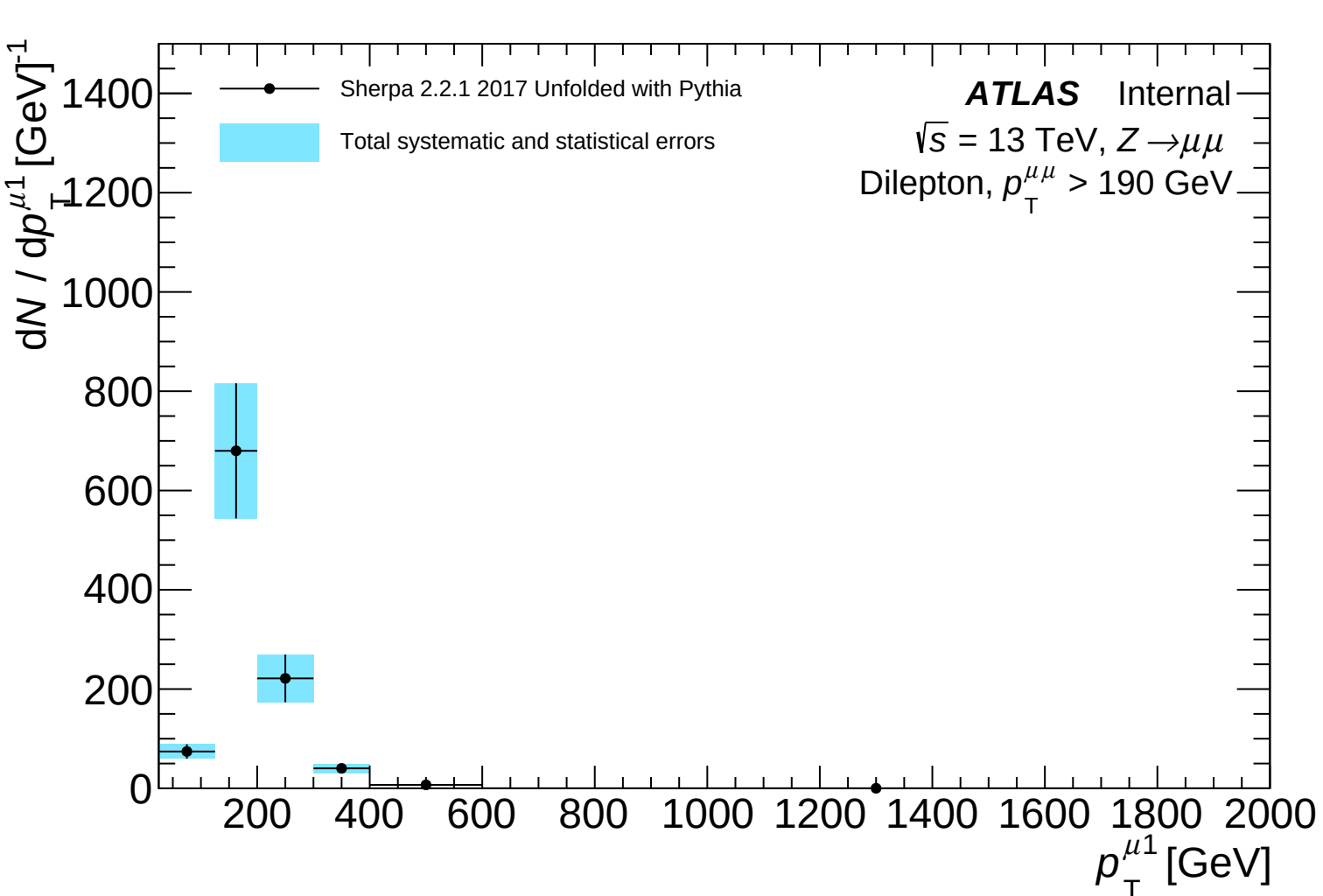
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
p_T^μ1 [GeV]


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ1 [GeV]^-1
p_T^μ1 [GeV]
0
200
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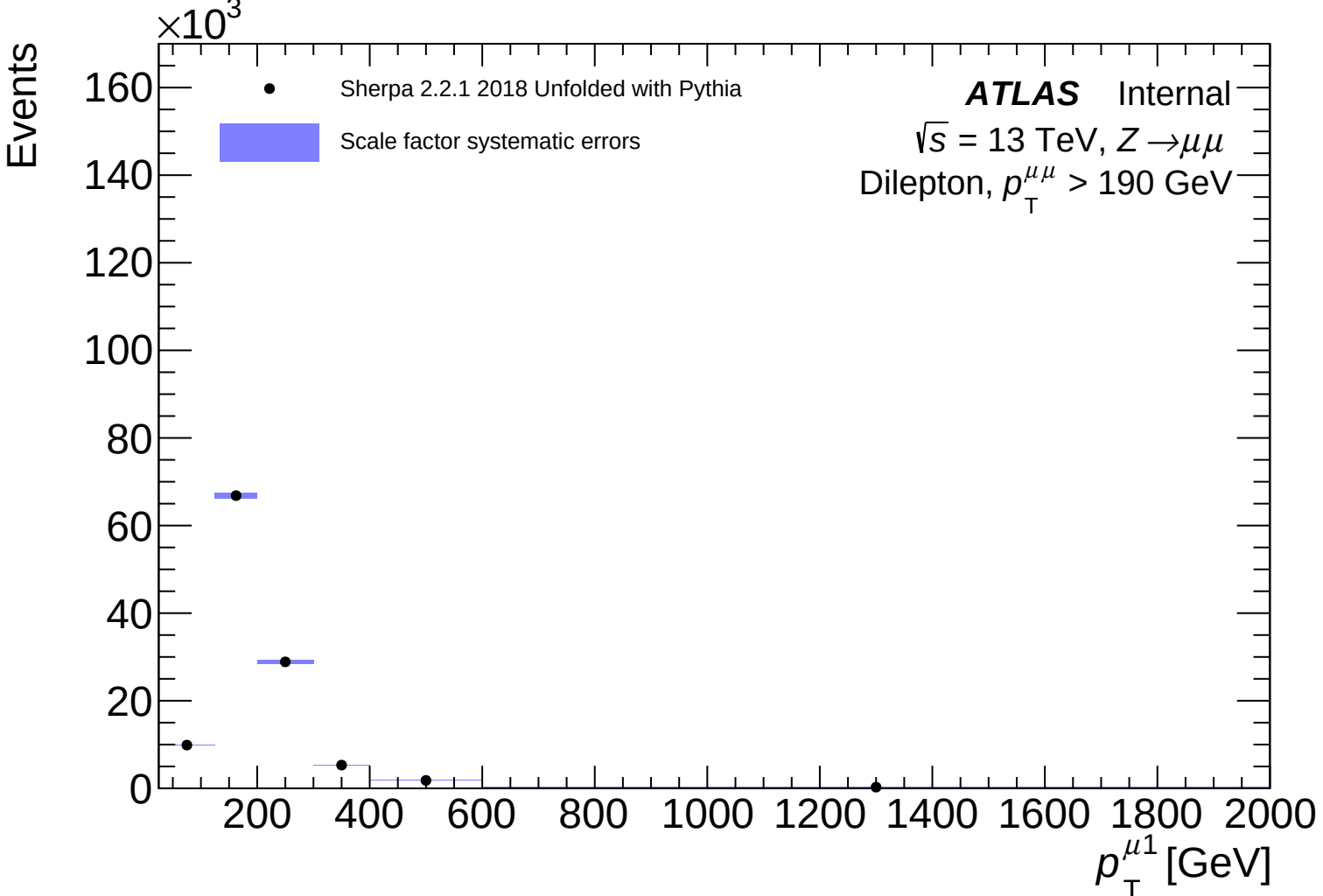
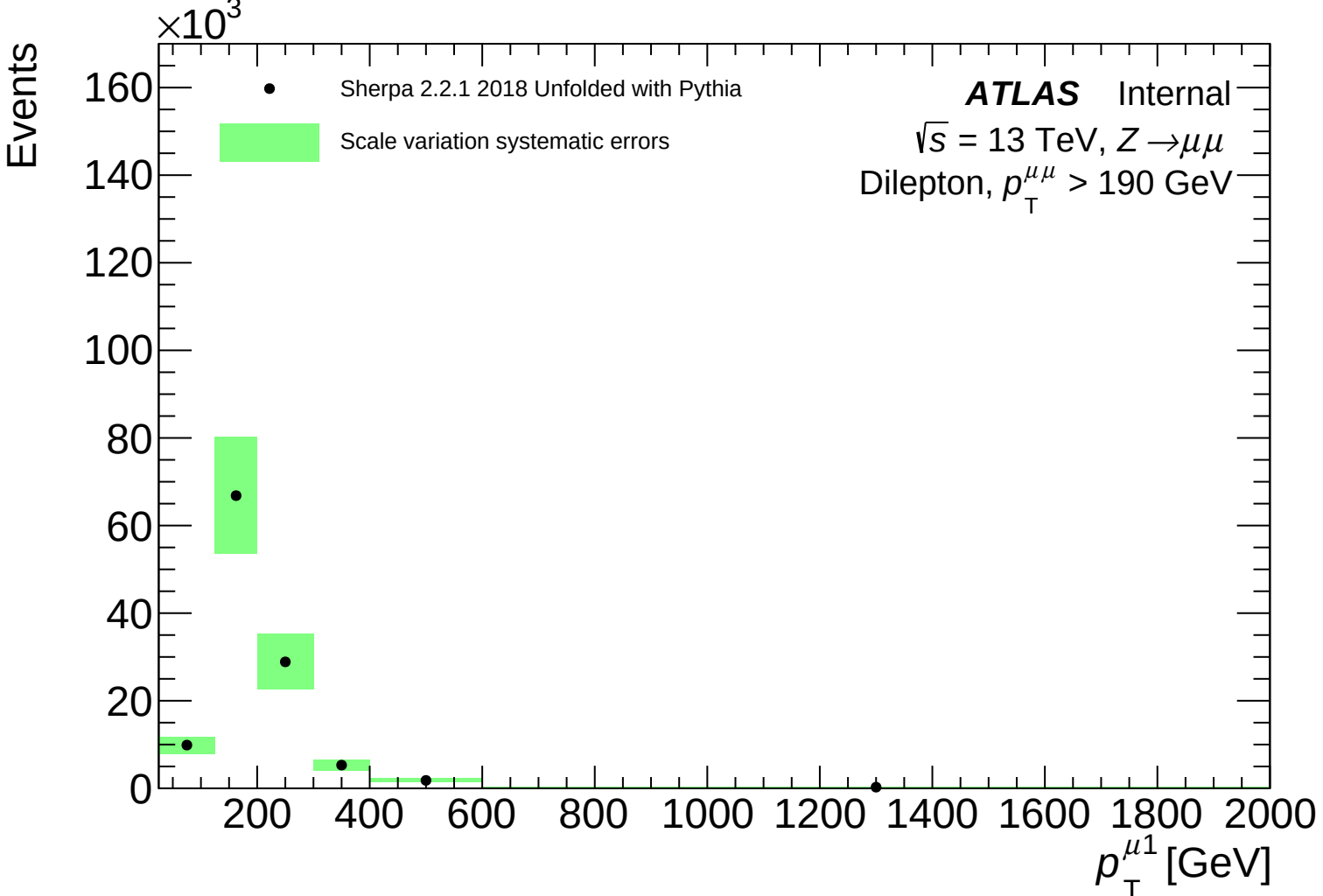
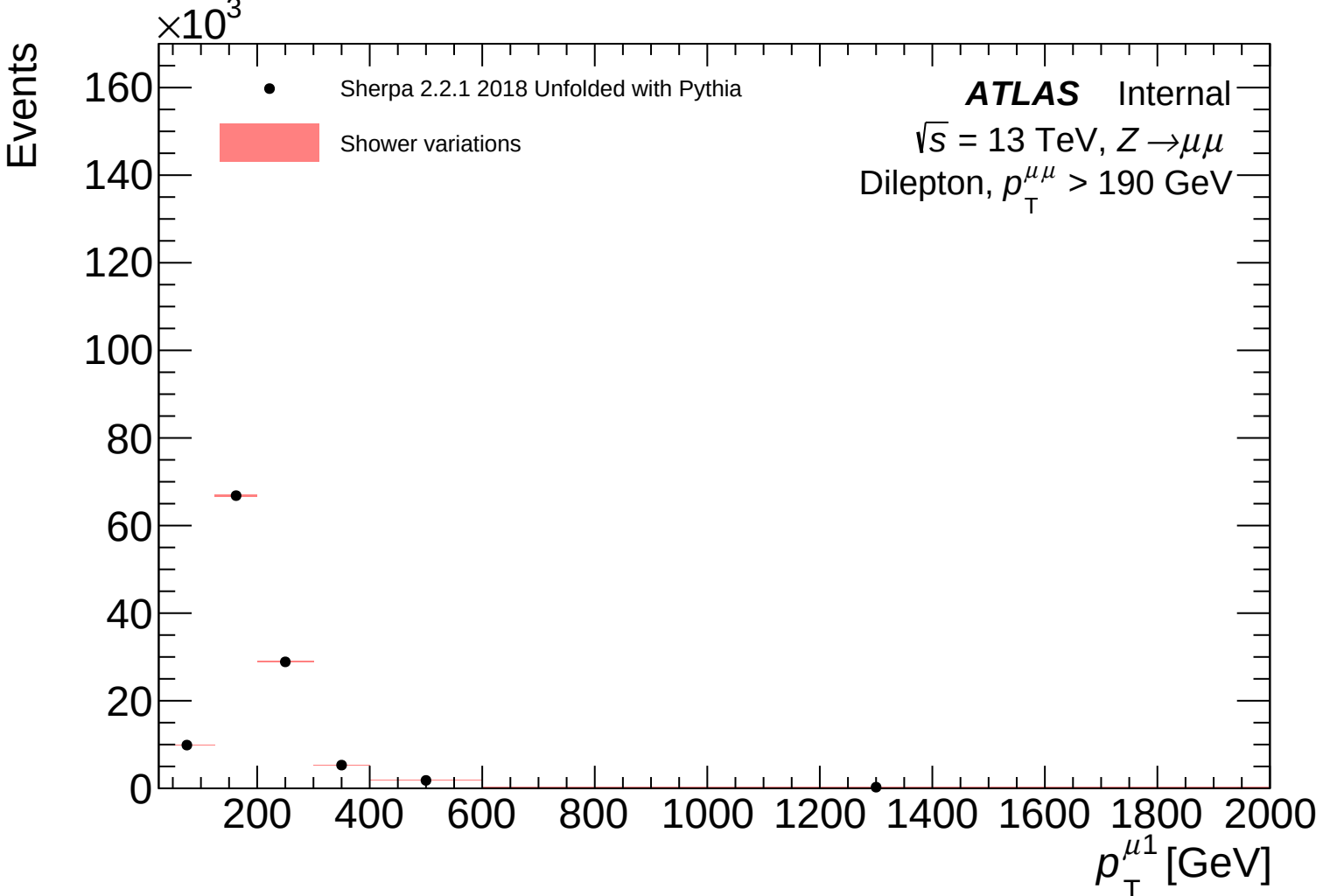
2000


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
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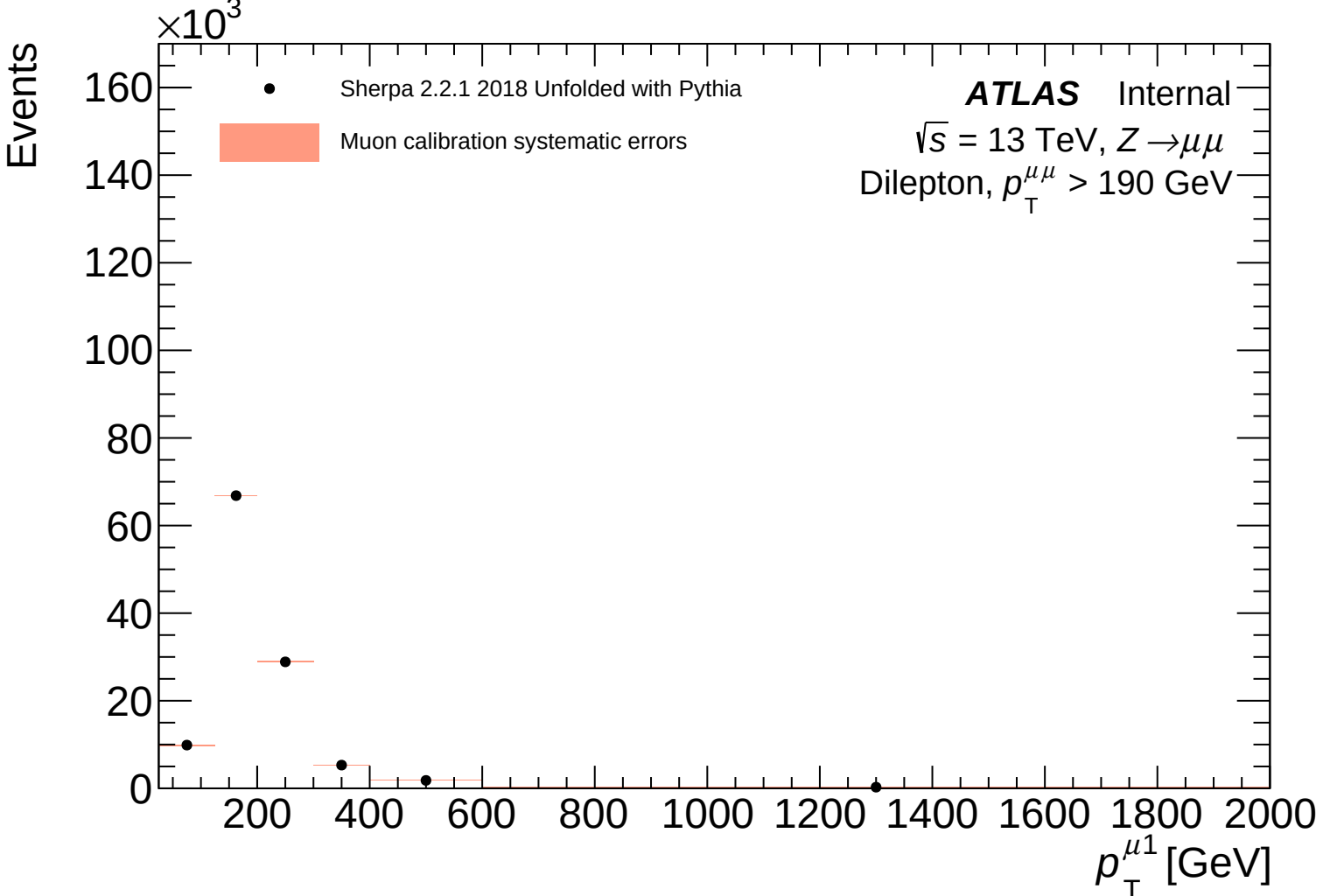
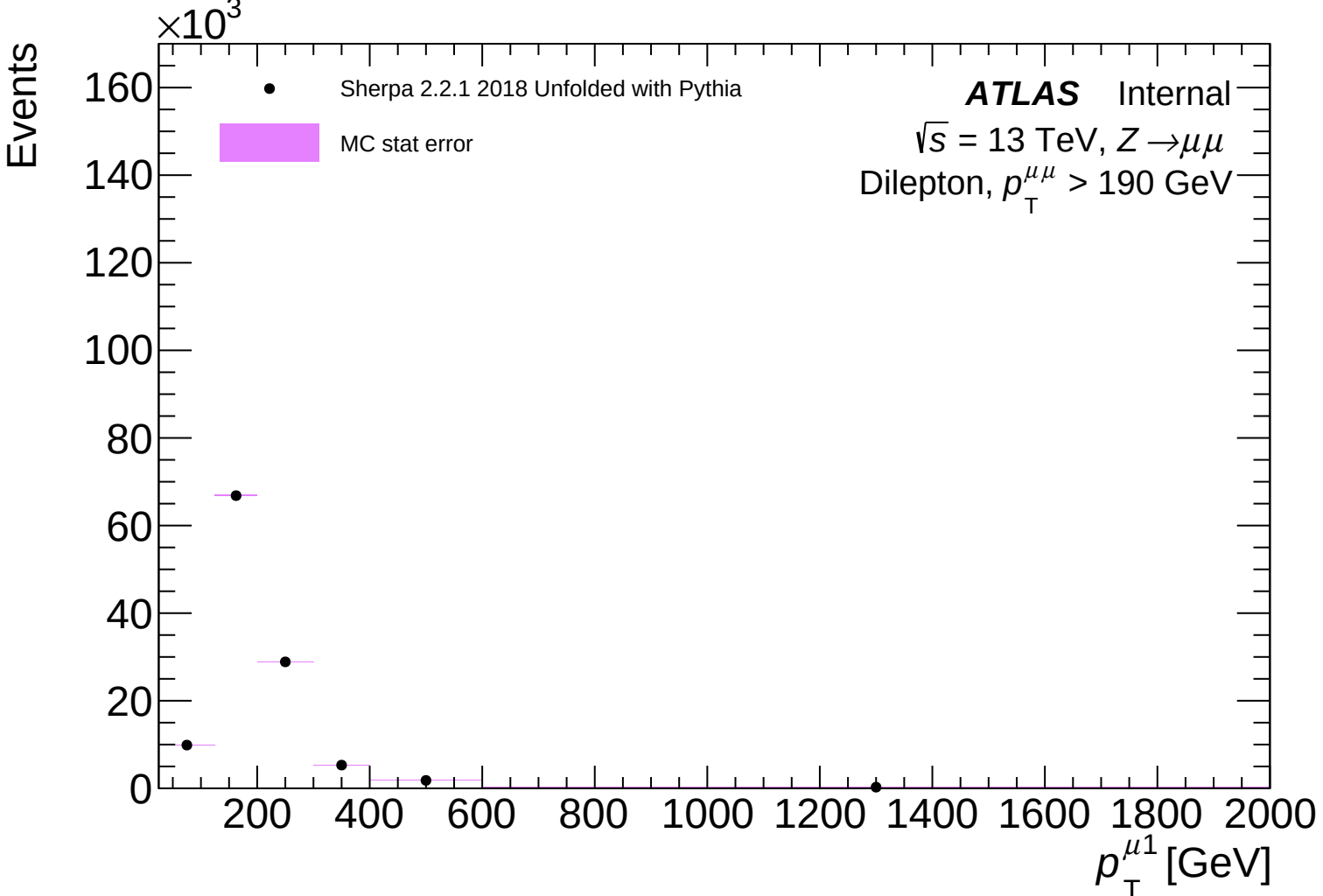
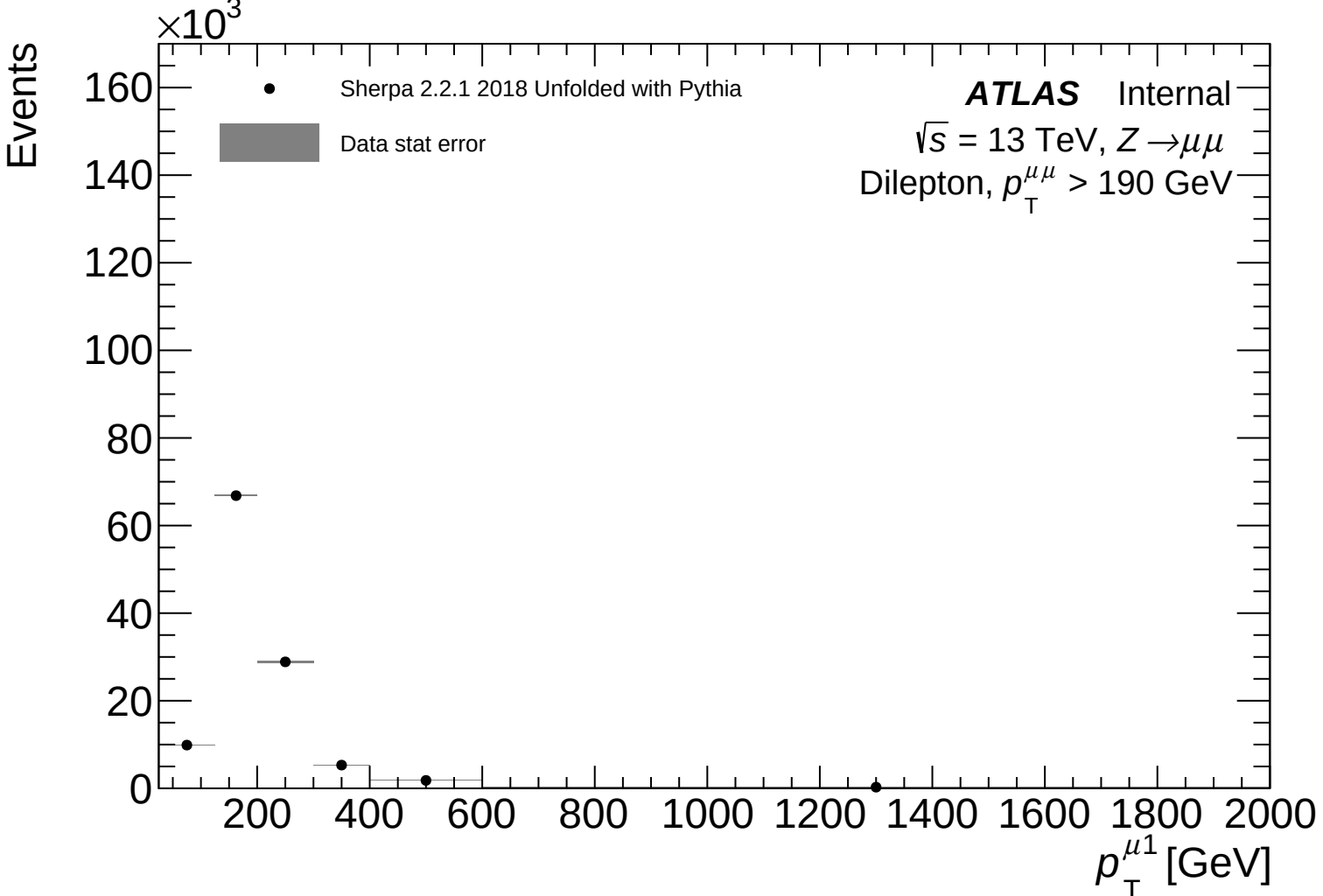
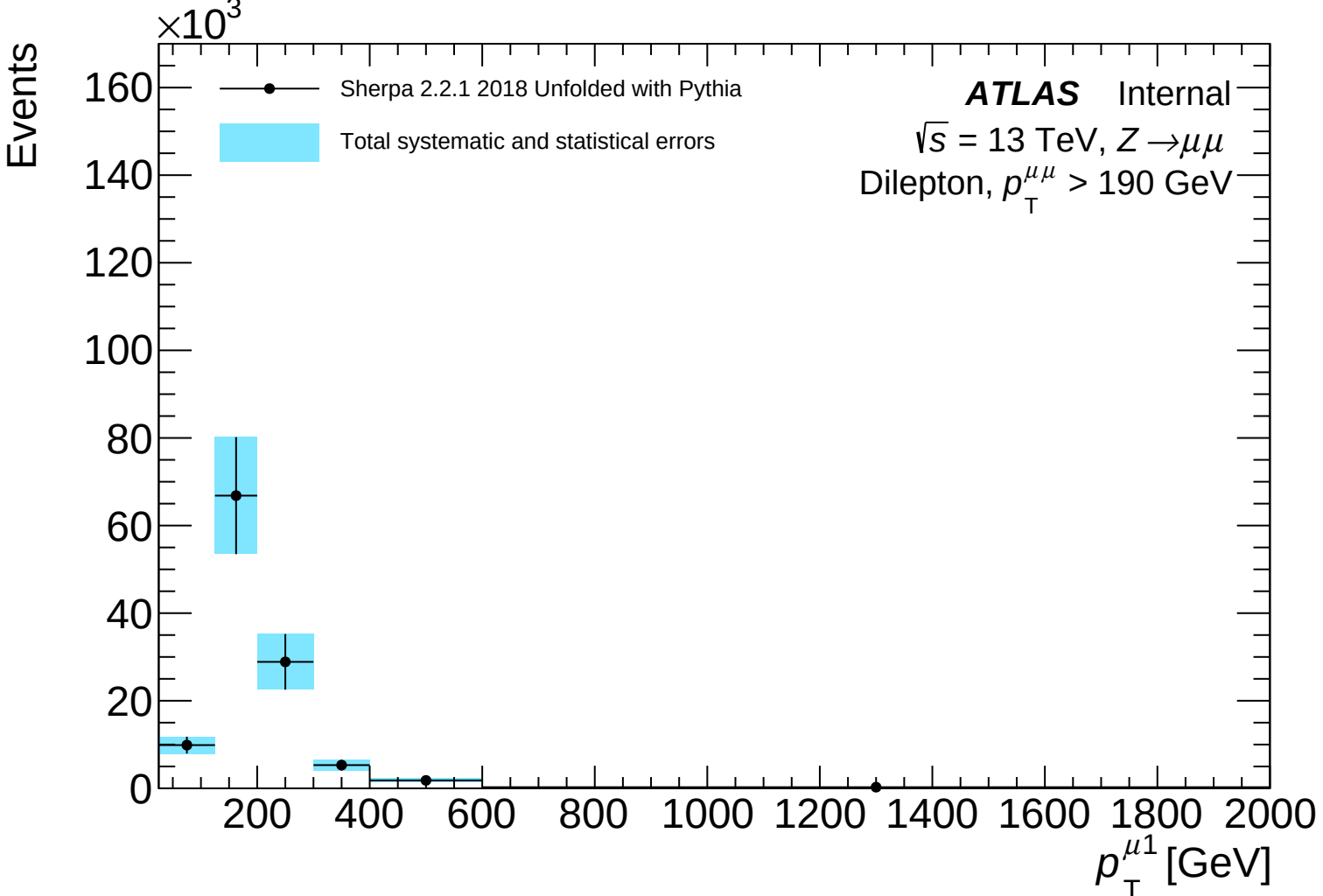
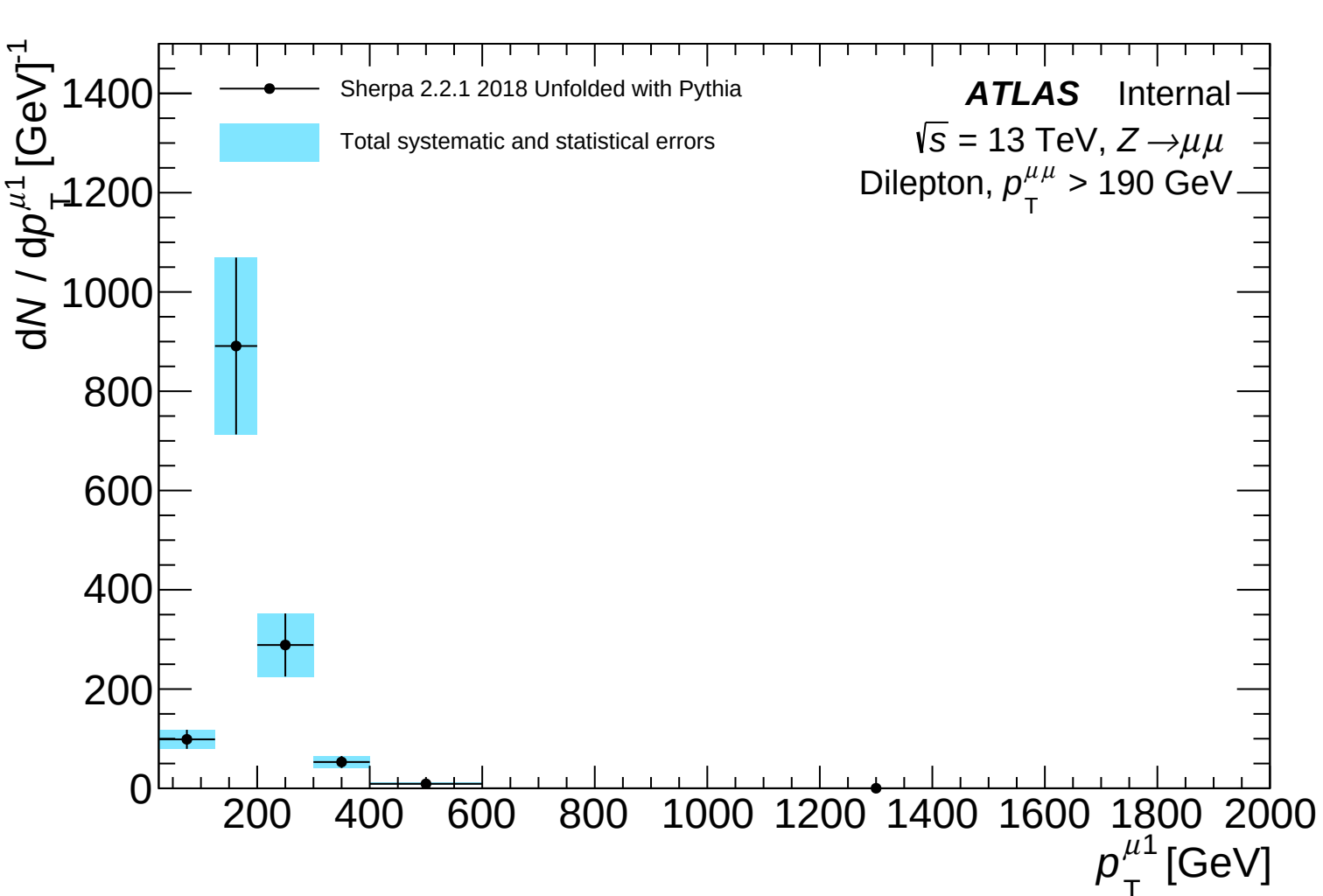
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]

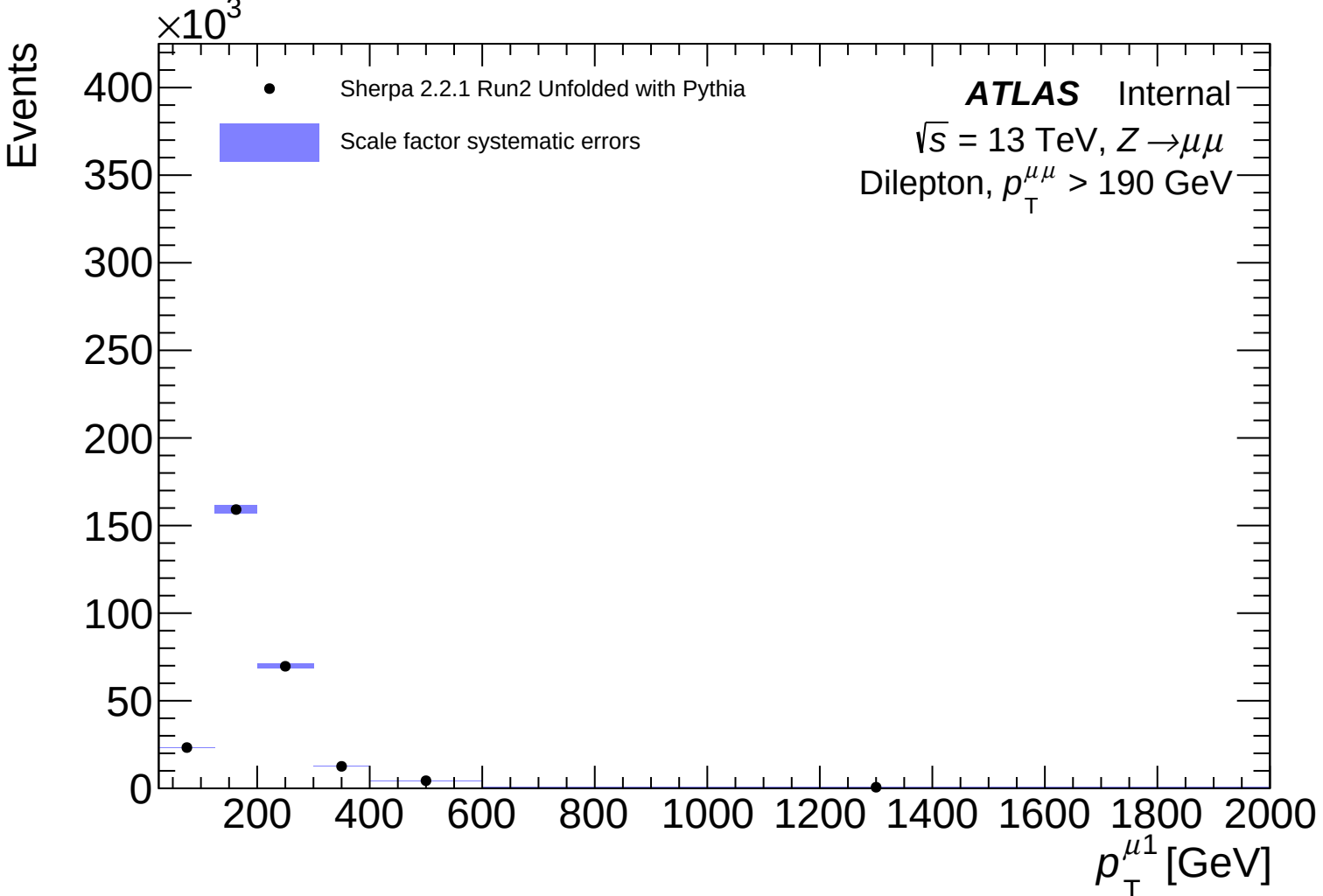

Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]

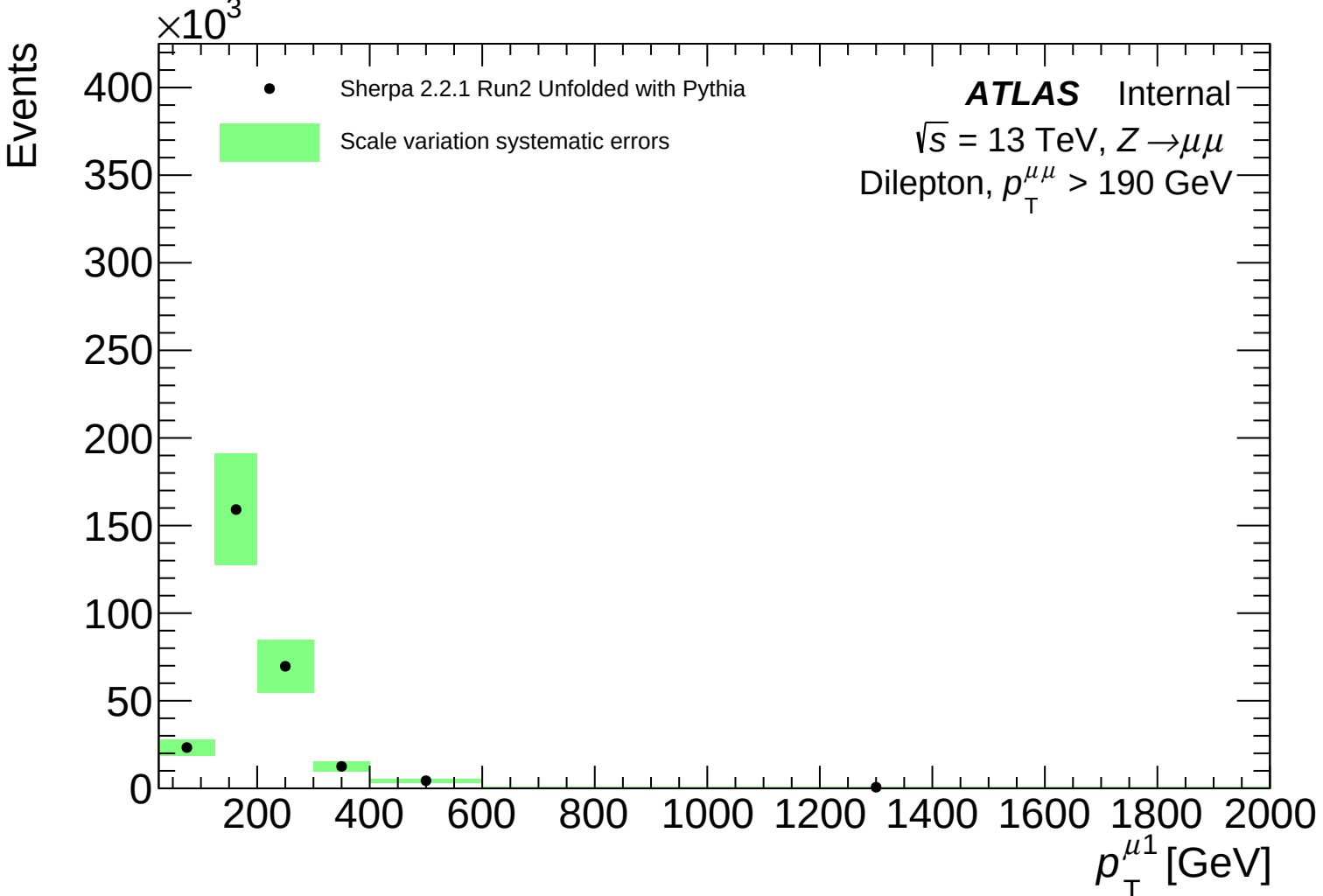

Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
160
140
120
100
80
60
40
20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
$p_T^{\mu 1}$ [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ1 [GeV]^-1
p_T^μ1 [GeV]
0
200
400
600
800
1000
1200
1400
1600
1800
2000


Events
×10^3
400
350
300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
800
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
400
350
300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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600
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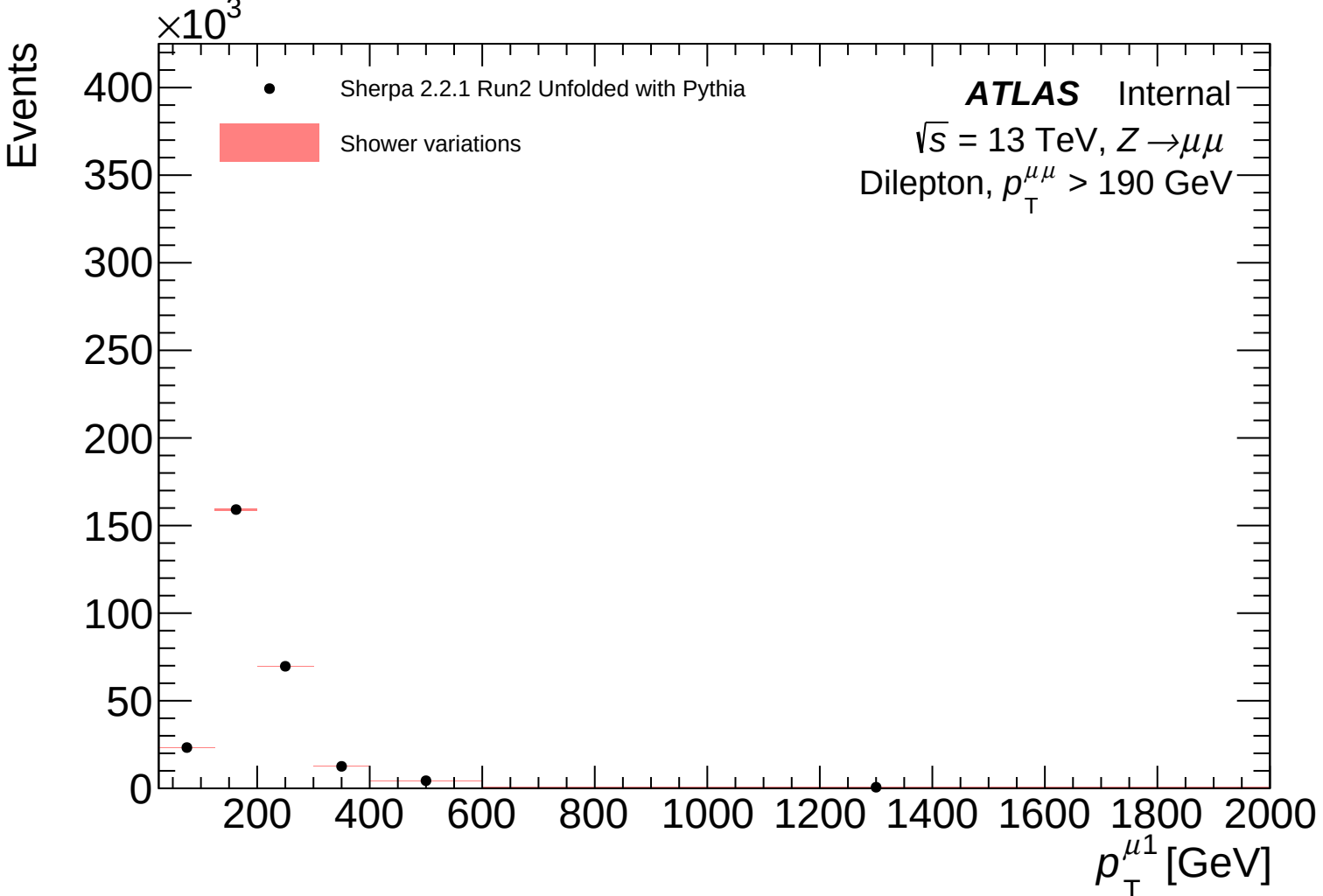
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
400
350
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250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
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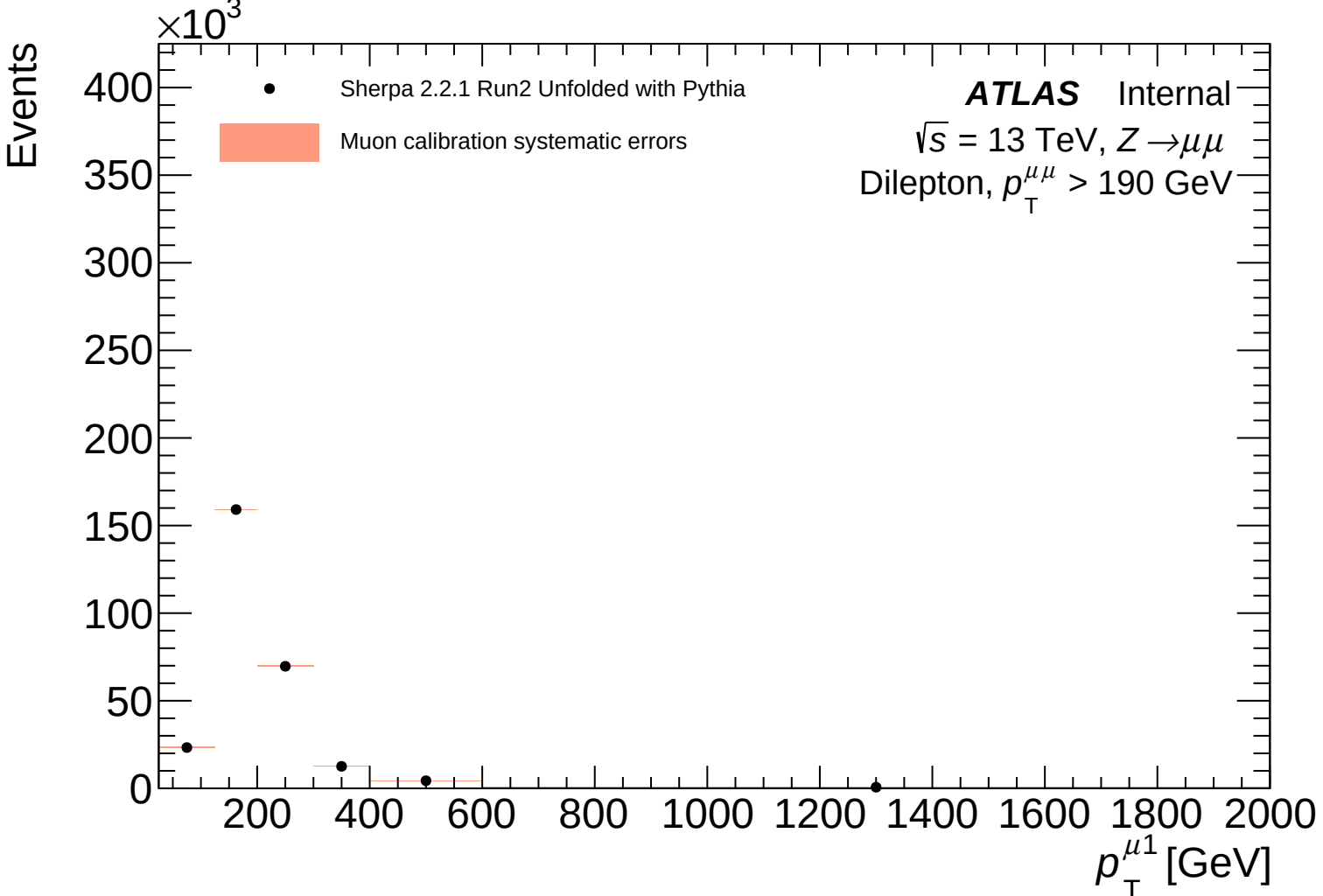
1000
1200
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
×10^3
400
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300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
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1000
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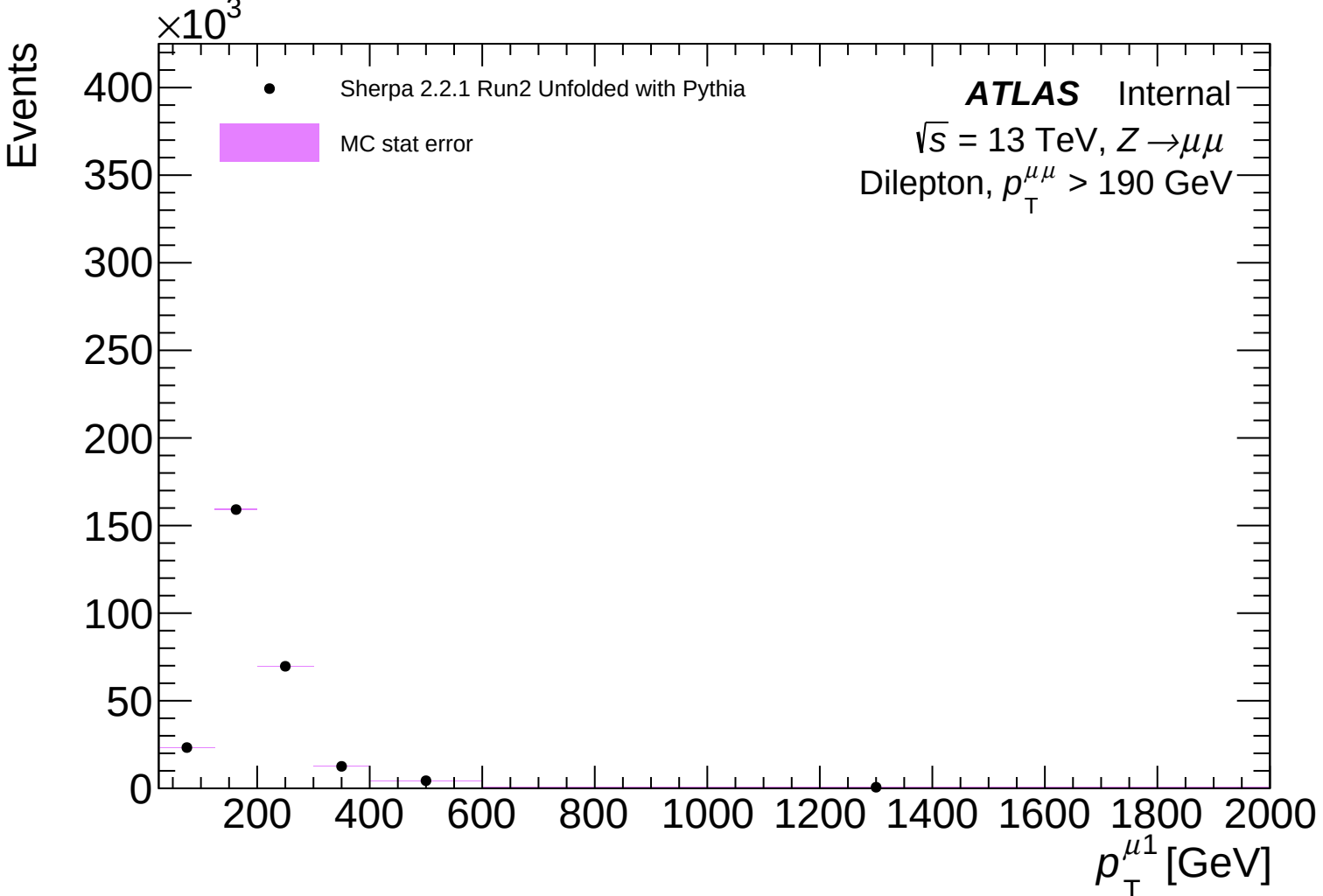
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
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400
350
300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
600
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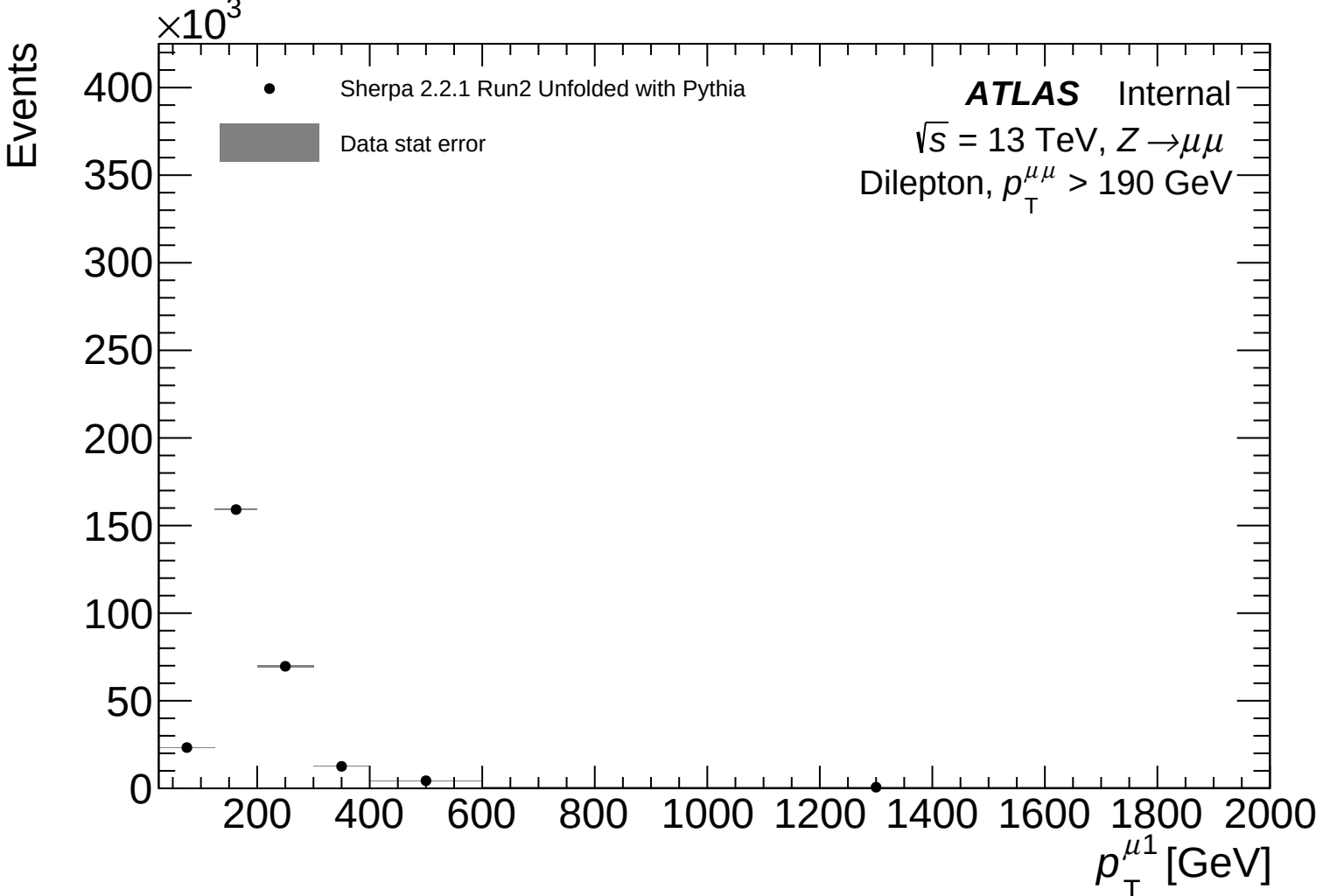
1400
1600
1800
2000
p_T^μ1 [GeV]


Events
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200
150
100
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0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
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600
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1400
1600
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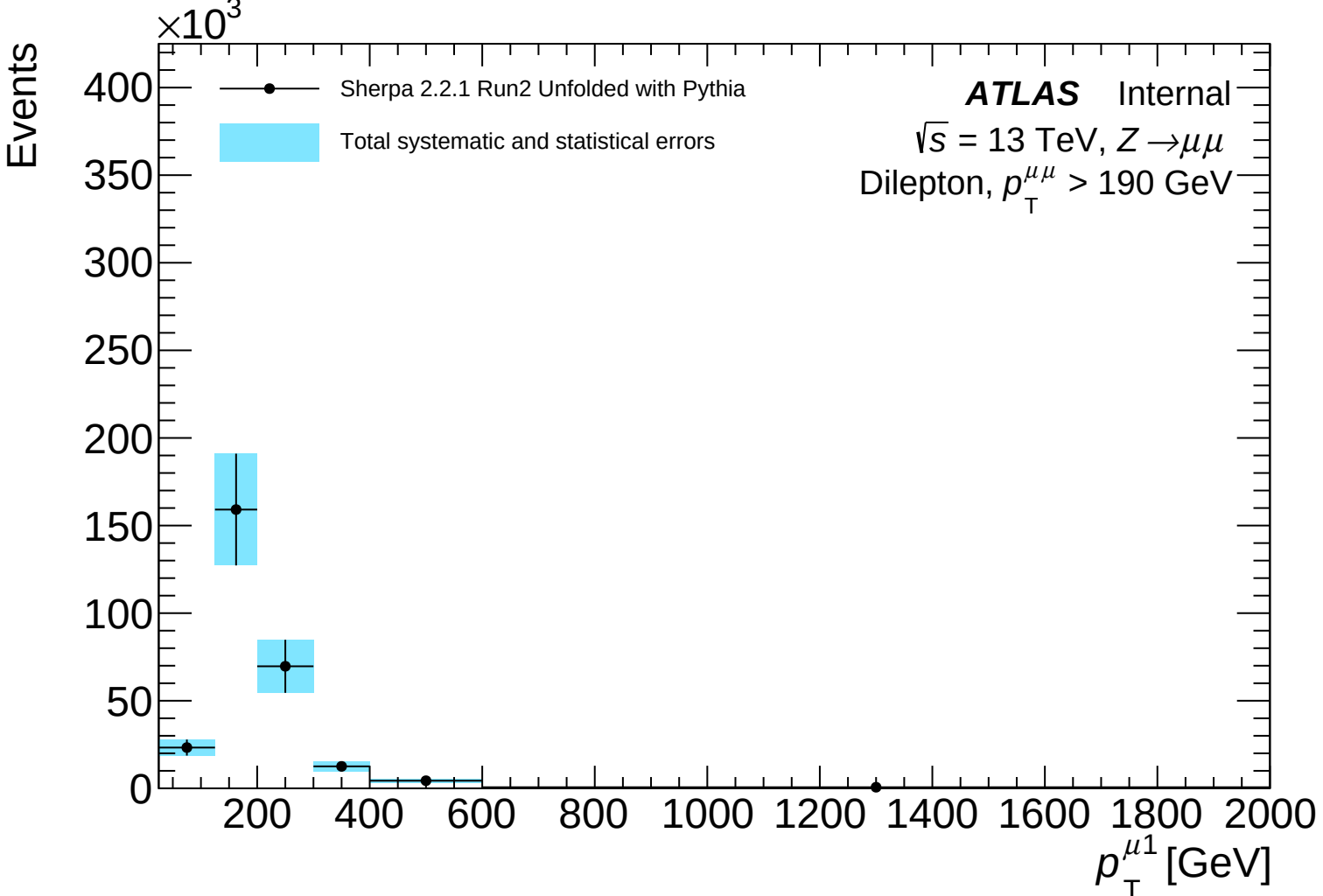
2000
p_T^μ1 [GeV]


Events
×10^3
400
350
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100
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0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
200
400
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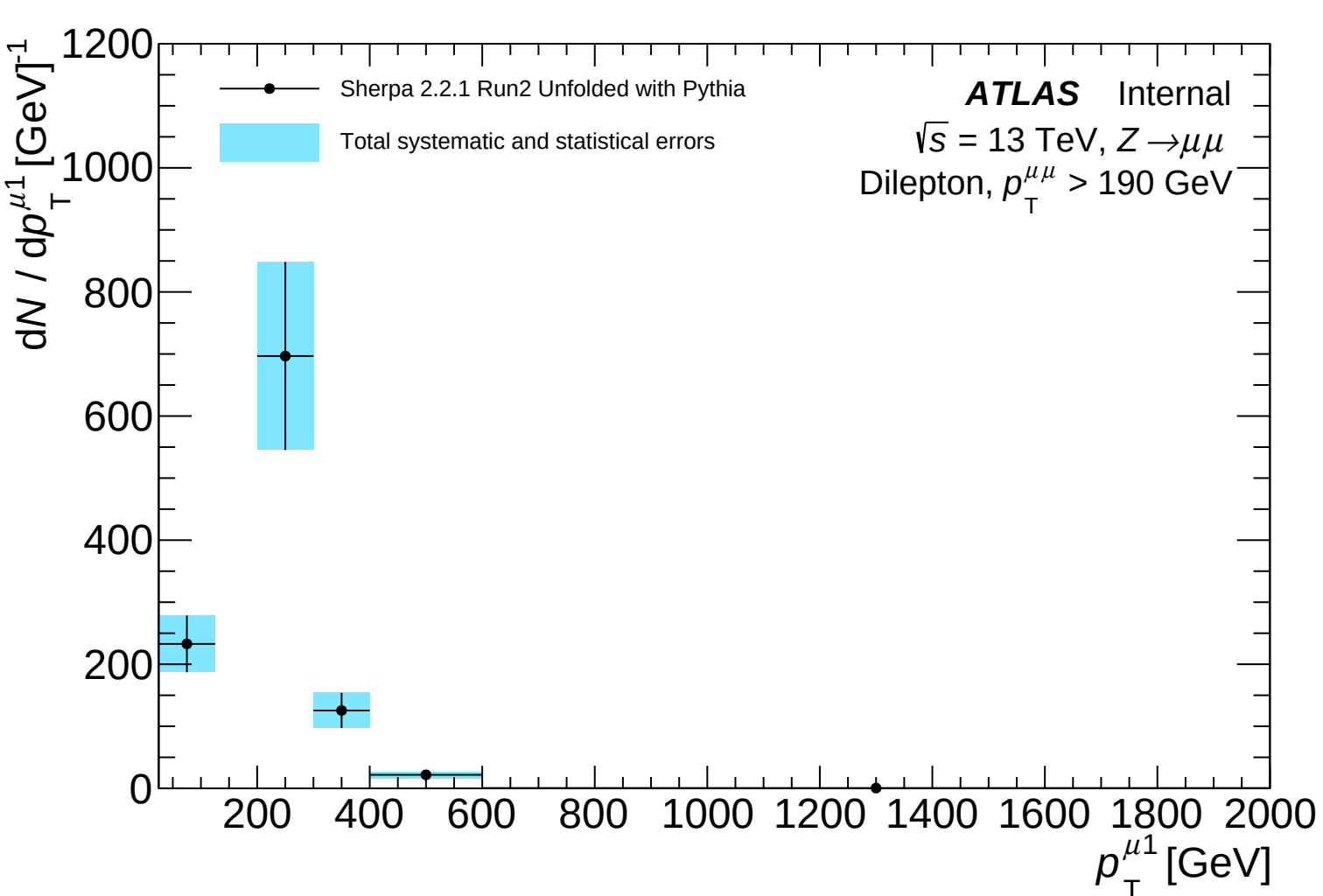
2000
p_T^μ1 [GeV]


Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ1 [GeV]^-1
p_T^μ1 [GeV]
0
200
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1000
1200
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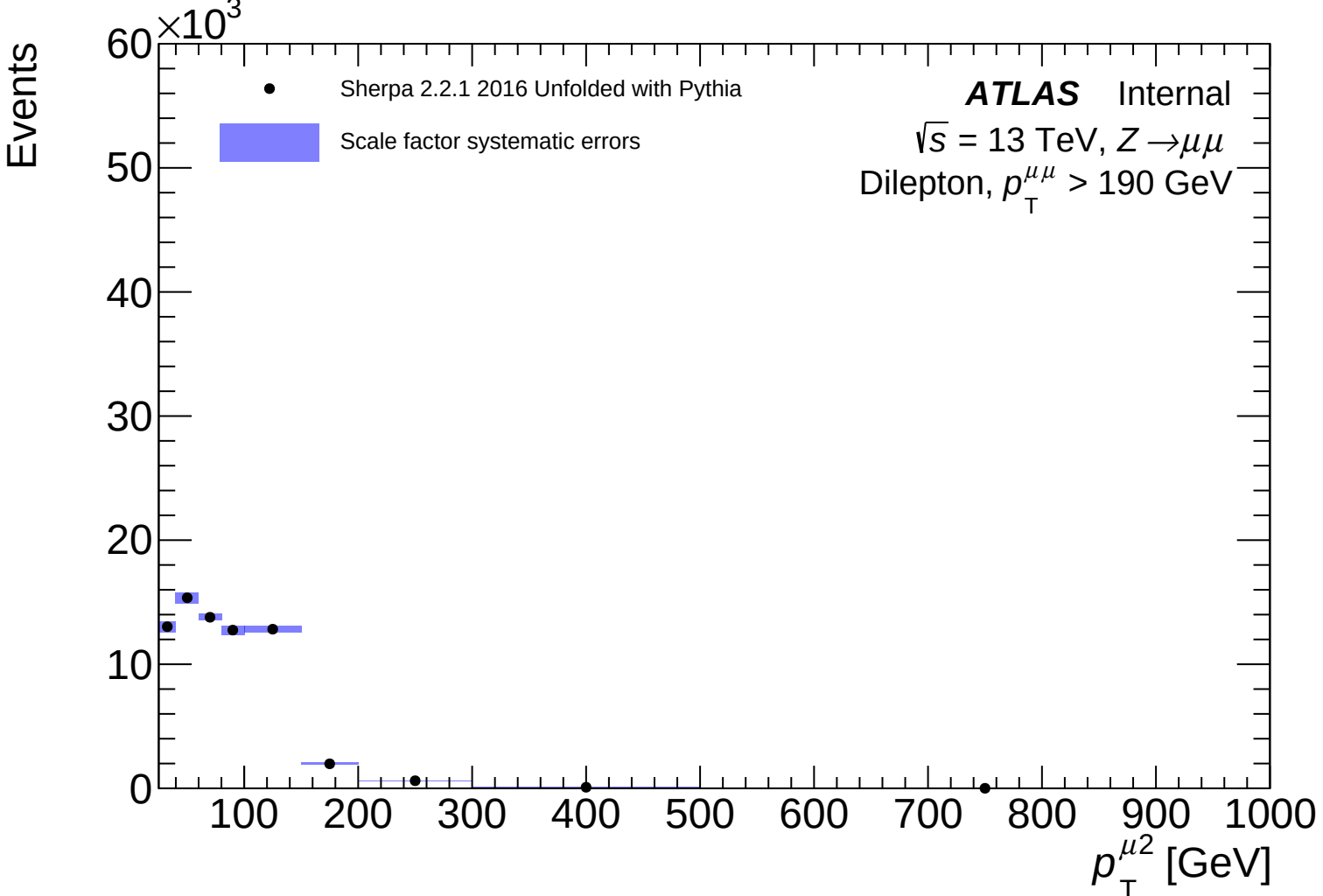
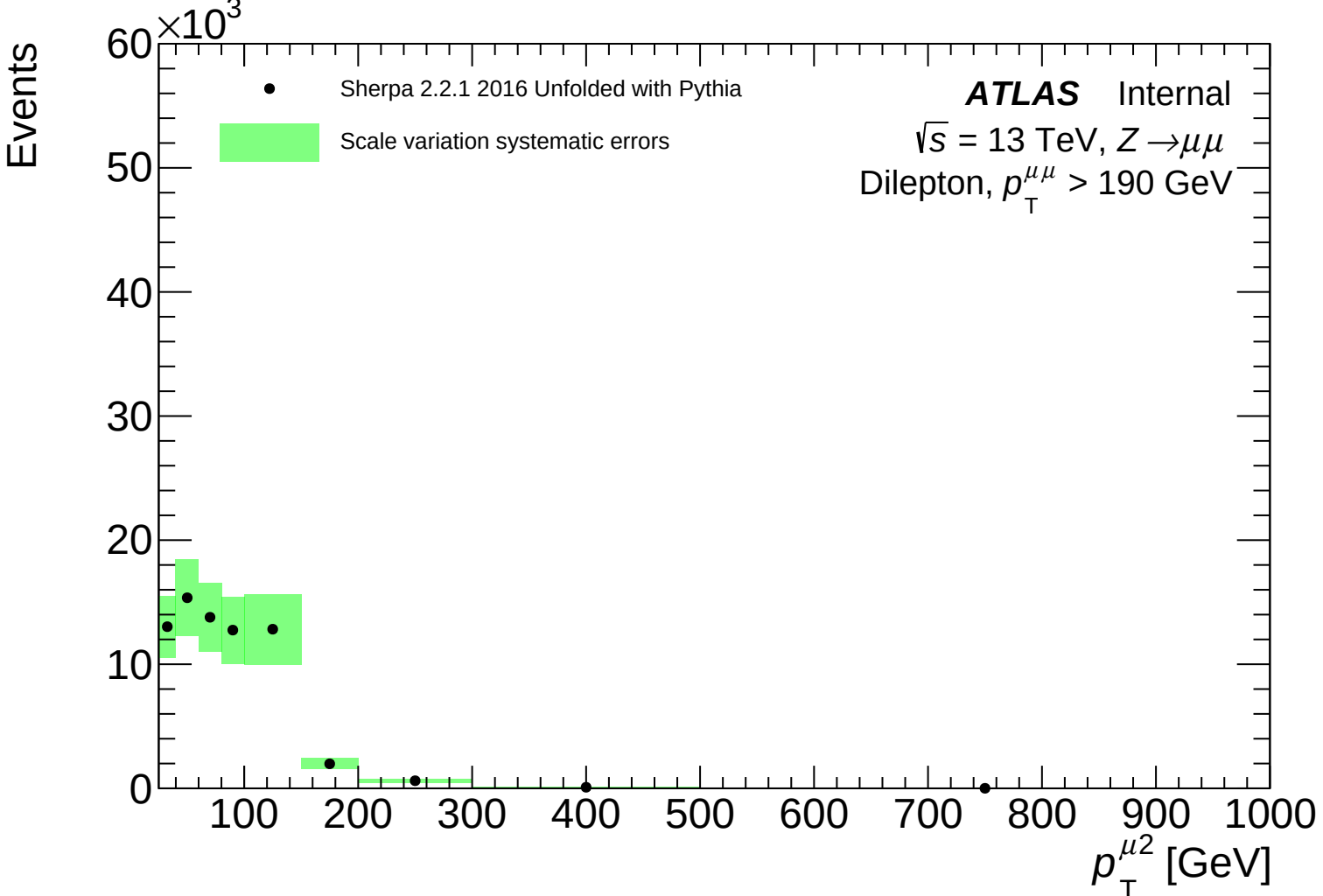
1800
2000


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]


Events
×10^3
60
50
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0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
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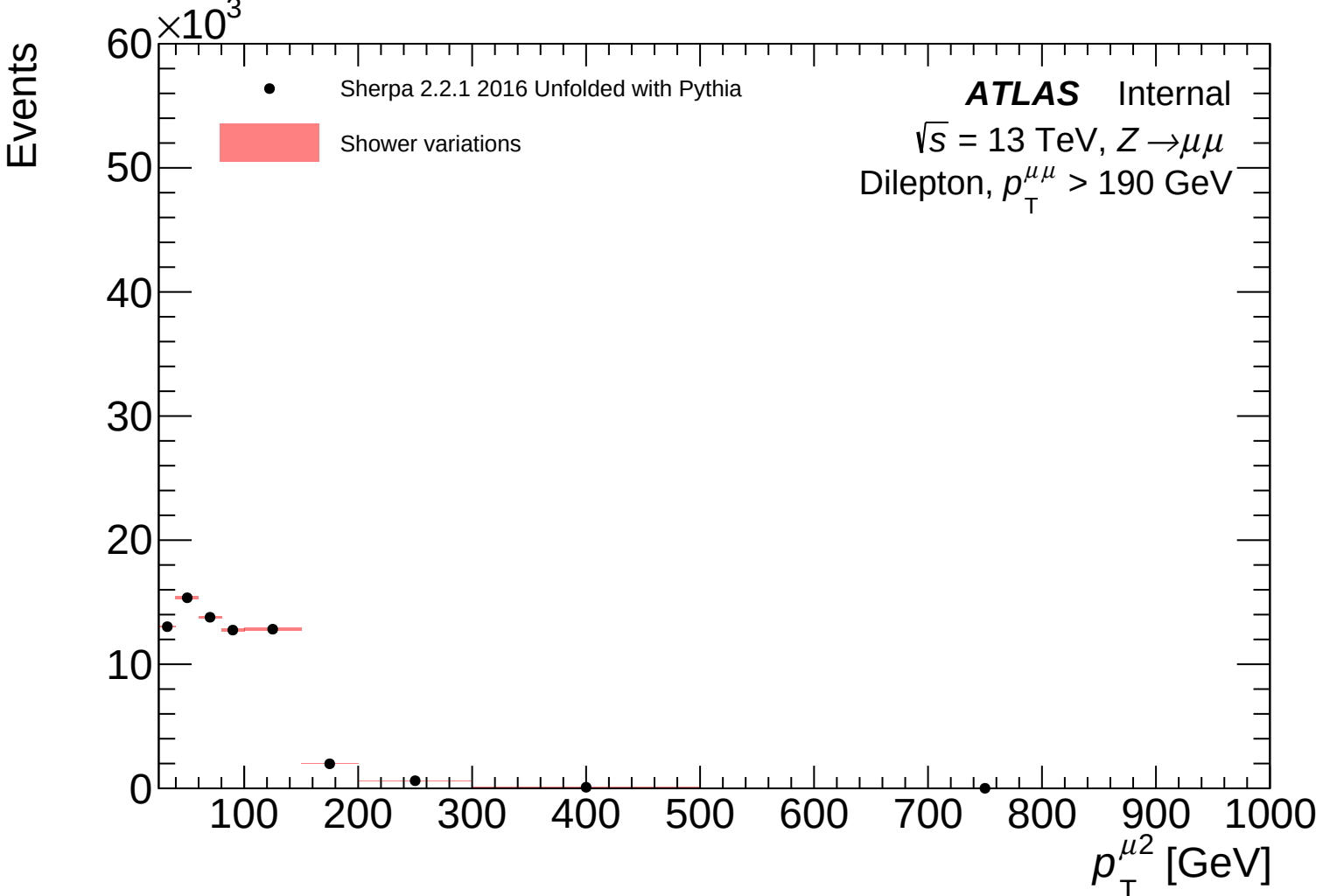
1000
p_T^μ2 [GeV]


Events
$\times 10^3$
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20
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0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu} > 190$ GeV
100
200
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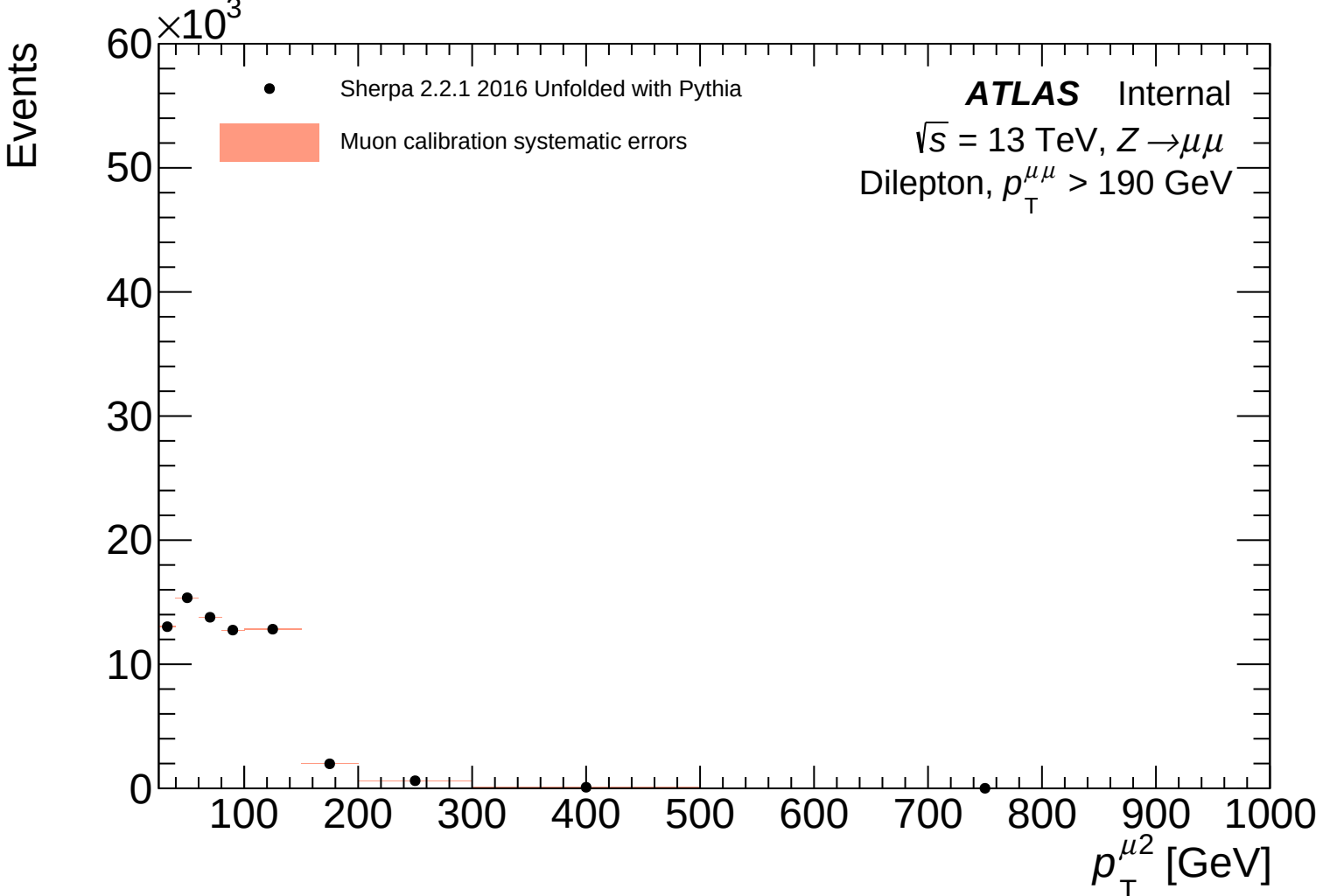
400
500
600
700
800
900
1000
$p_T^{\mu 2}$ [GeV]


Events
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50
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20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
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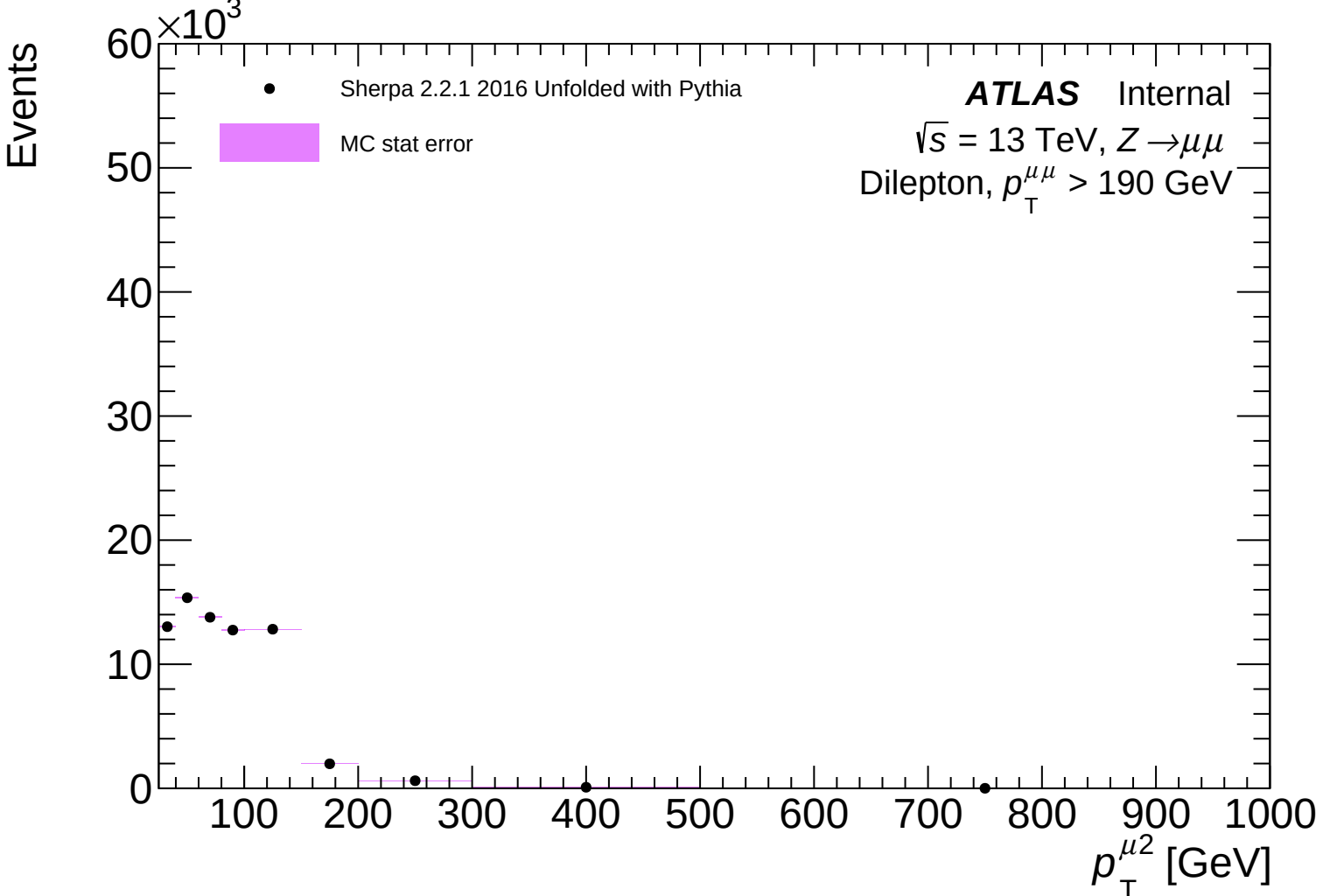
900
1000
p_T^μ2 [GeV]


Events
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Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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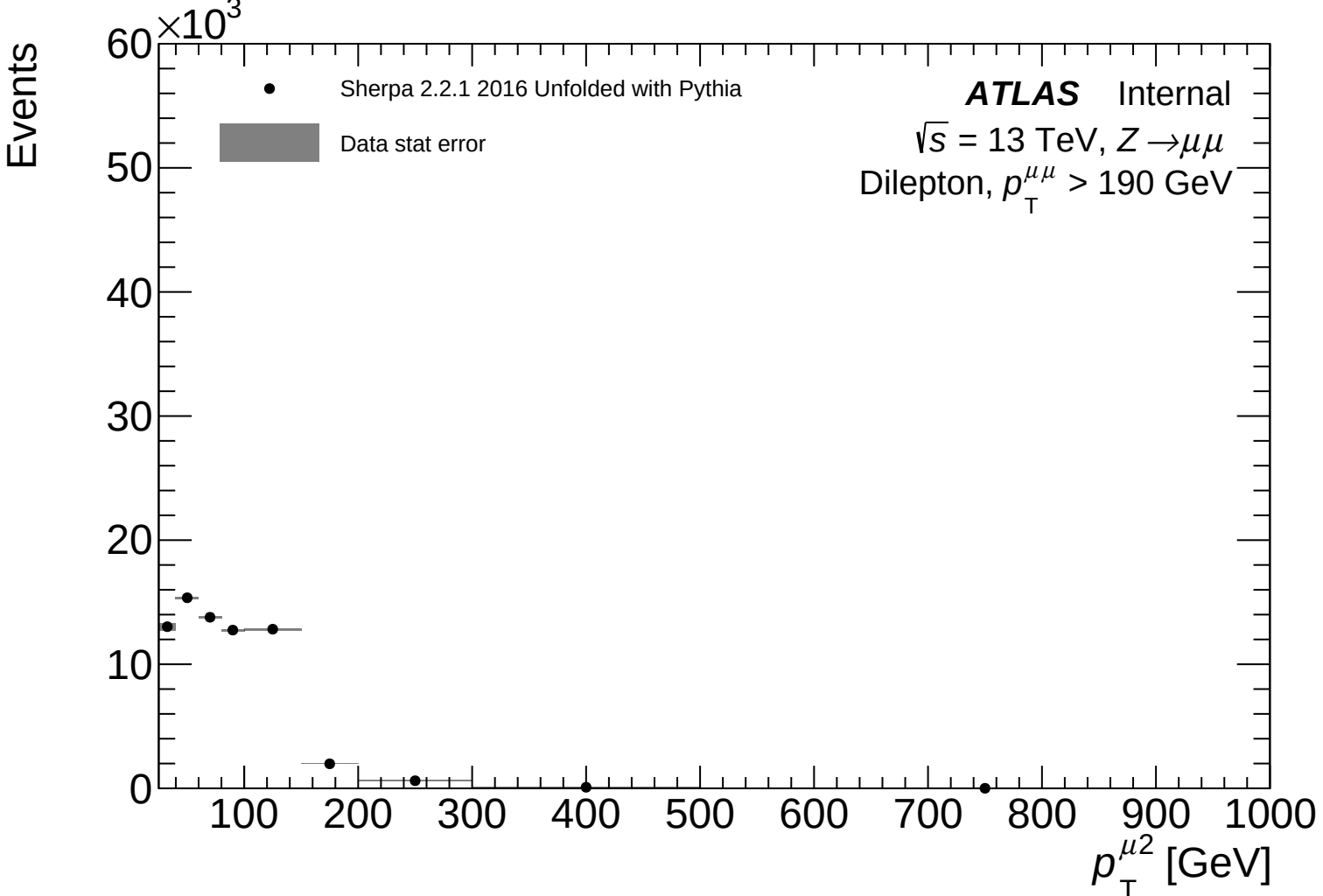
1000
p_T^μ2 [GeV]


Events
$\times 10^3$
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Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu} > 190$ GeV
100
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400
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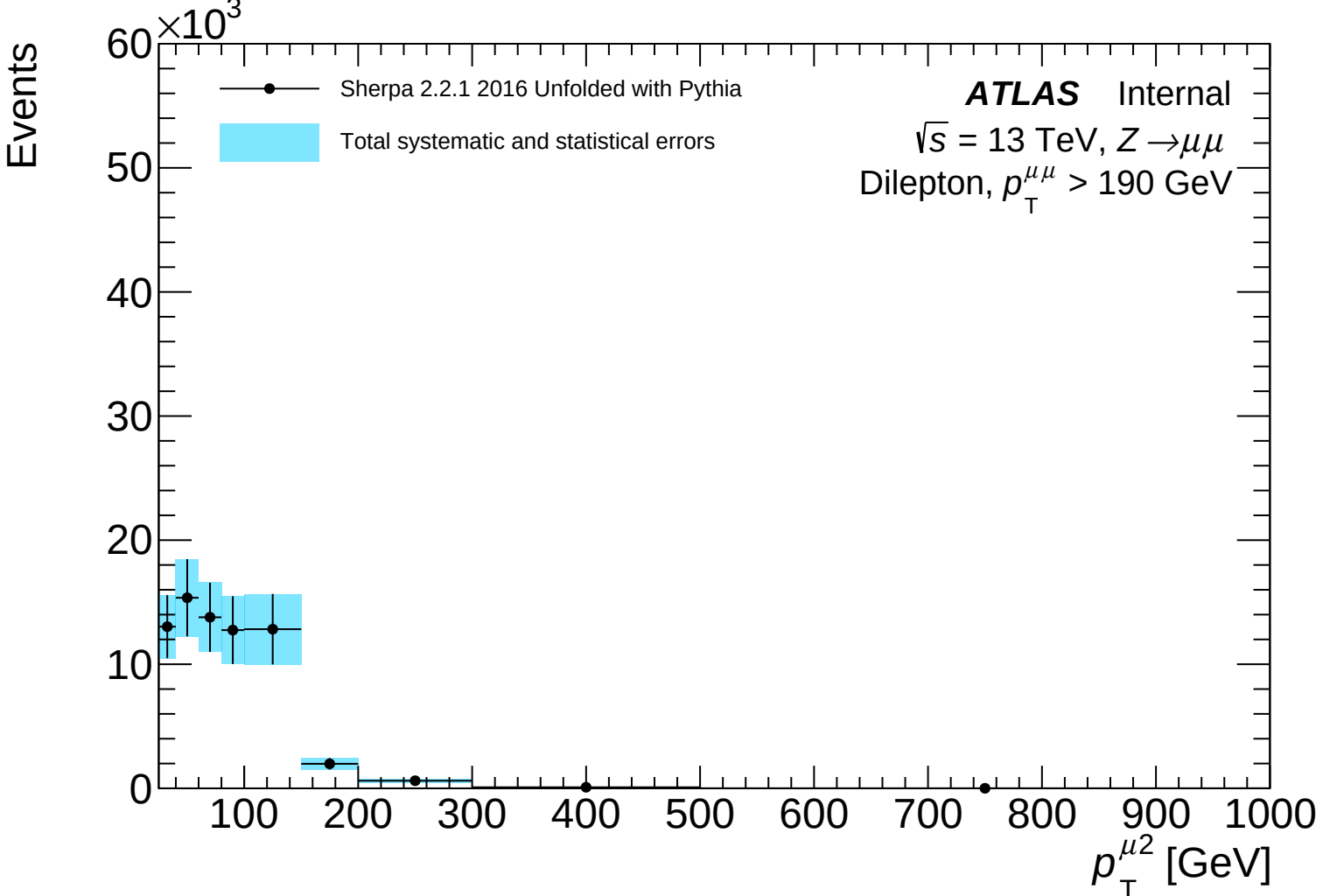
900
1000
$p_T^{\mu 2}$ [GeV]


Events
×10^3
60
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0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
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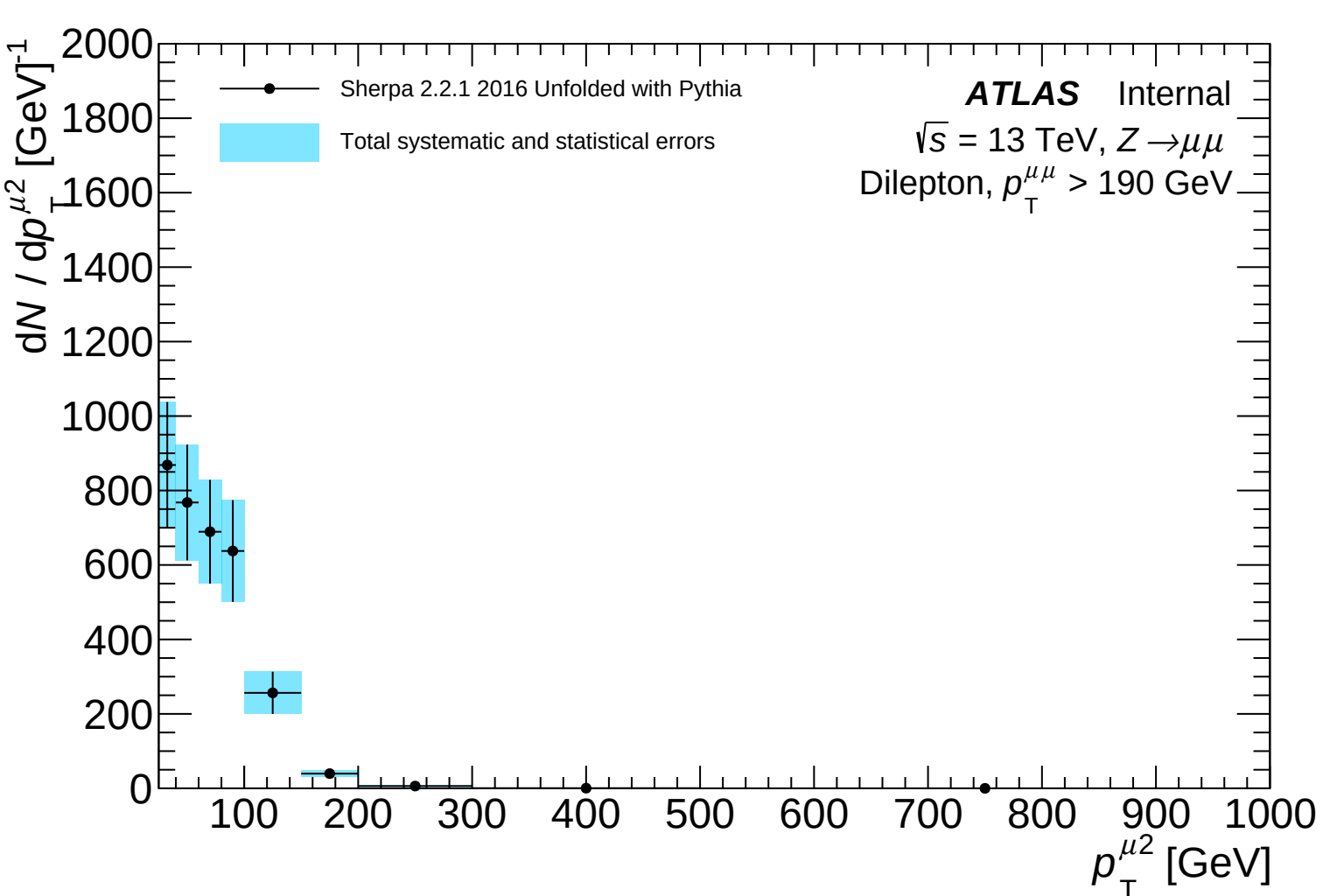
1000
p_T^μ2 [GeV]


Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ2 [GeV]^-1
p_T^μ2 [GeV]
0
200
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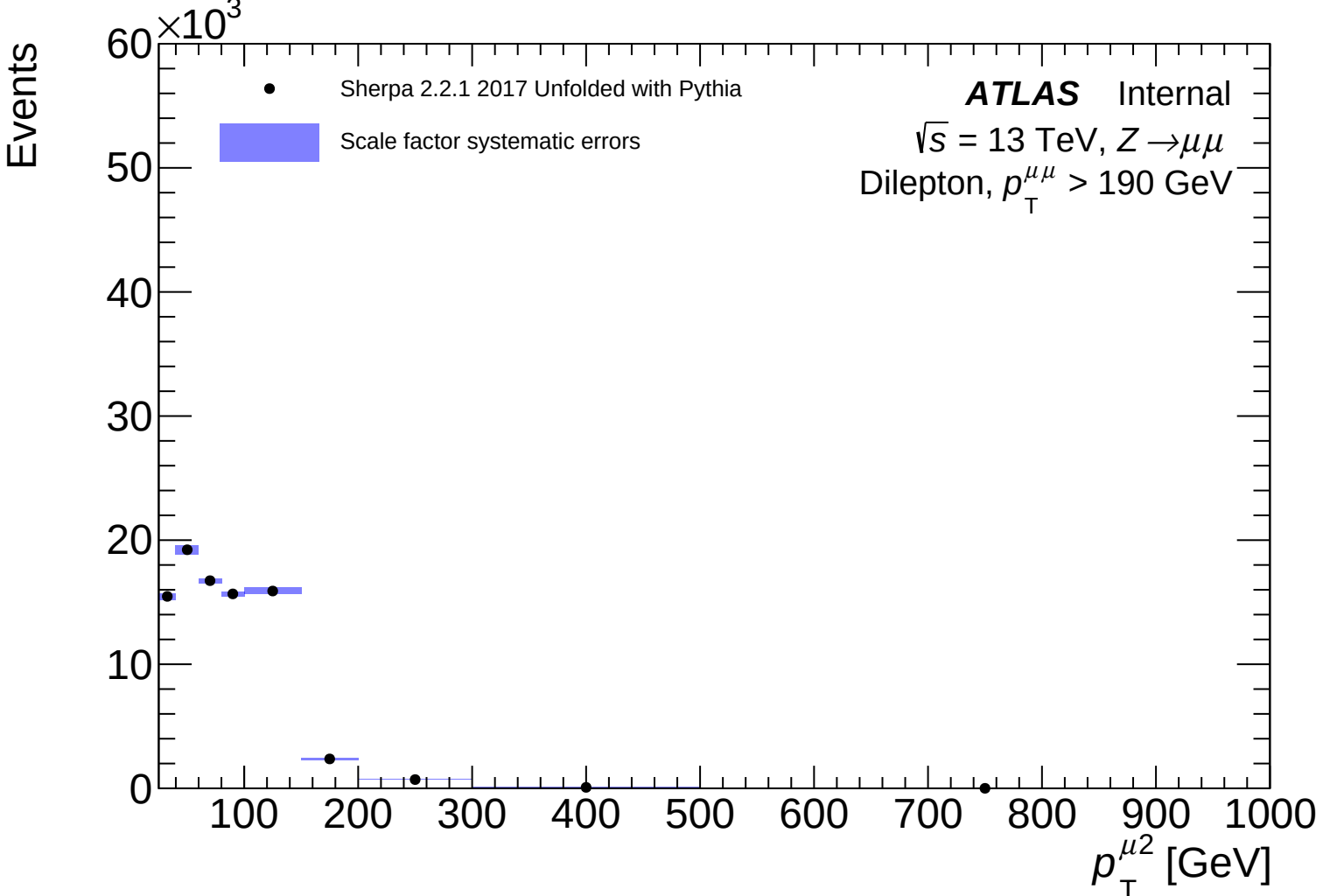
Events
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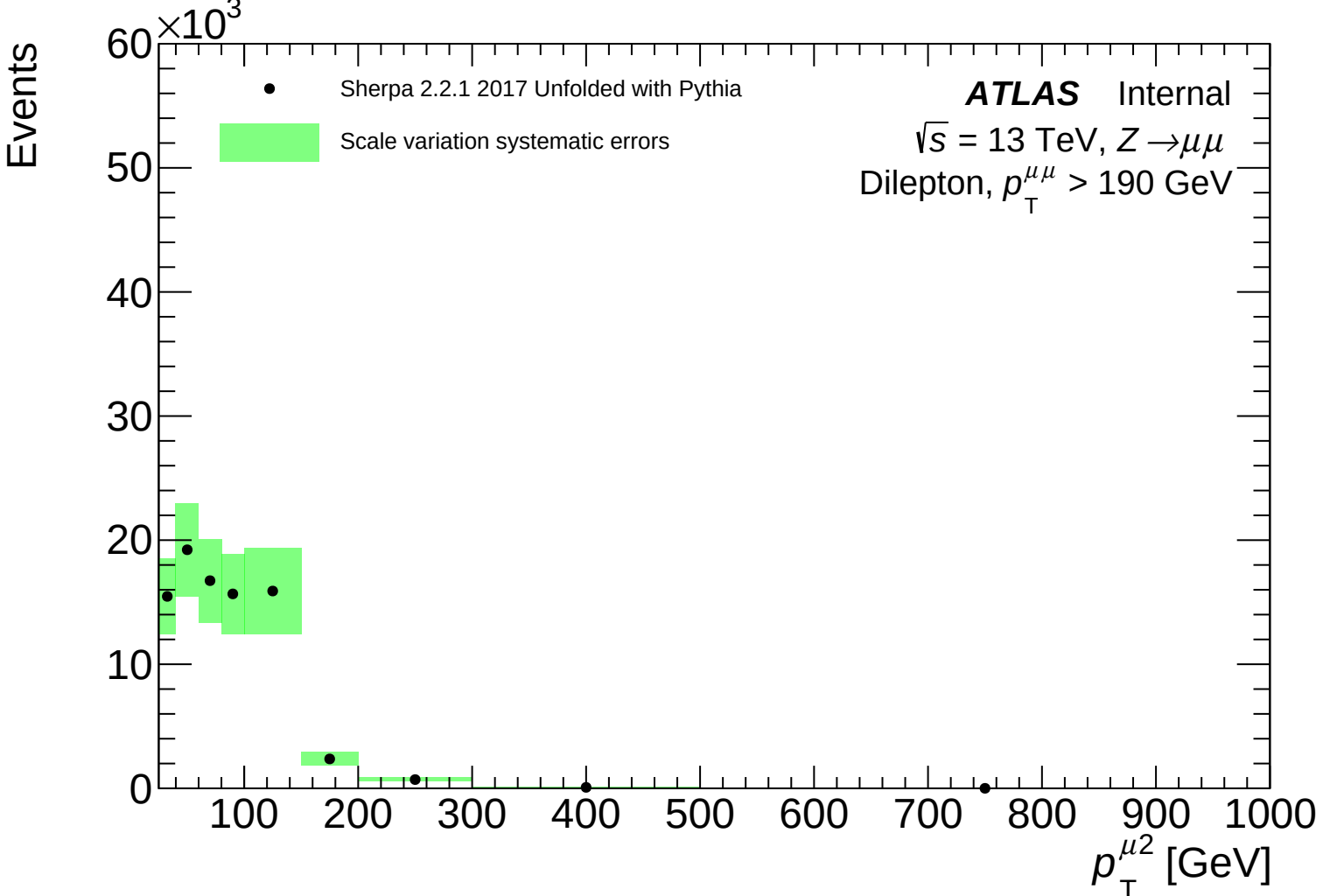
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
$p_T^{\mu 2}$ [GeV]


Events
$\times 10^3$
60
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10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
100
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300
400
500
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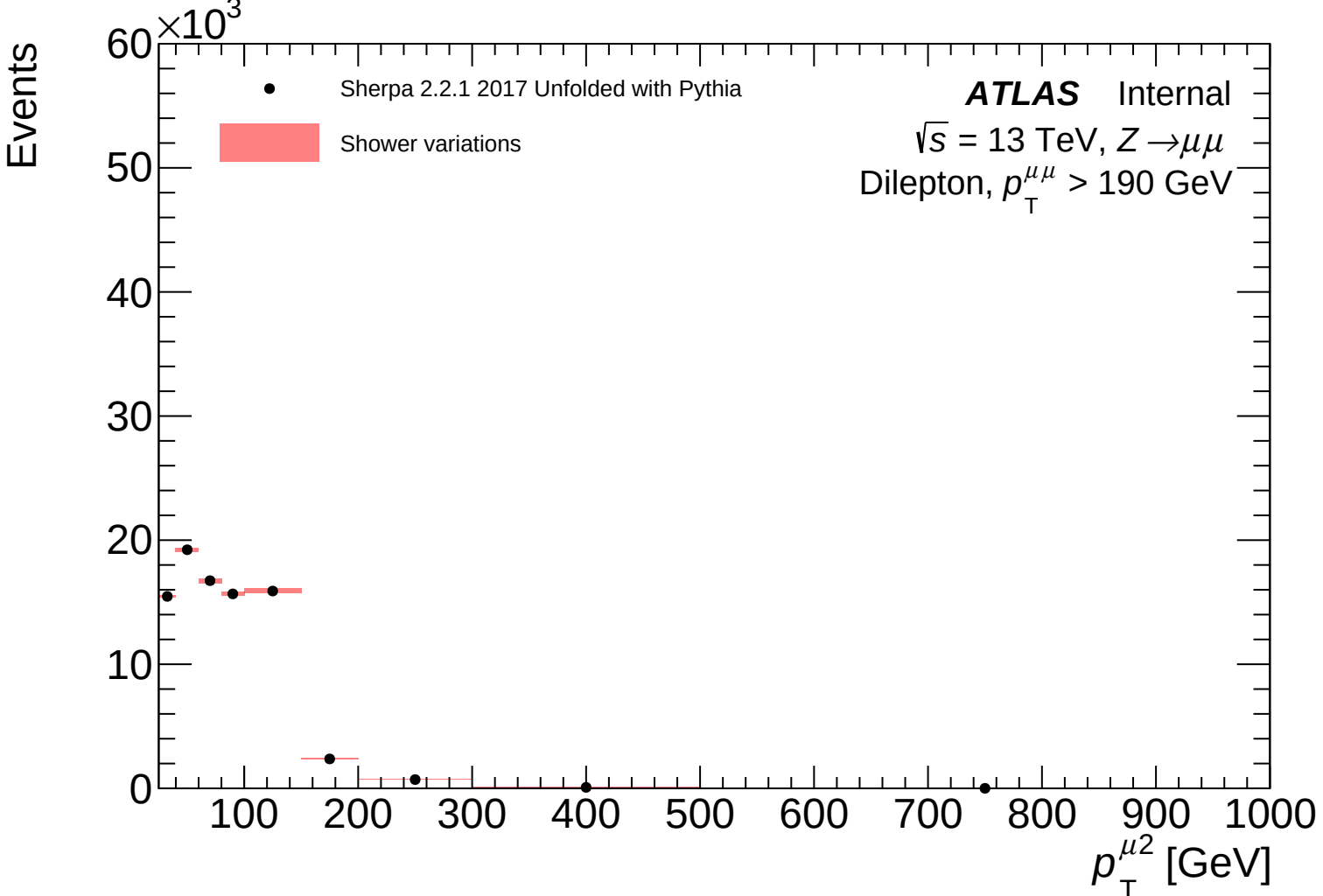
700
800
900
1000
$p_T^{\mu 2}$ [GeV]


Events
$\times 10^3$
60
50
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20
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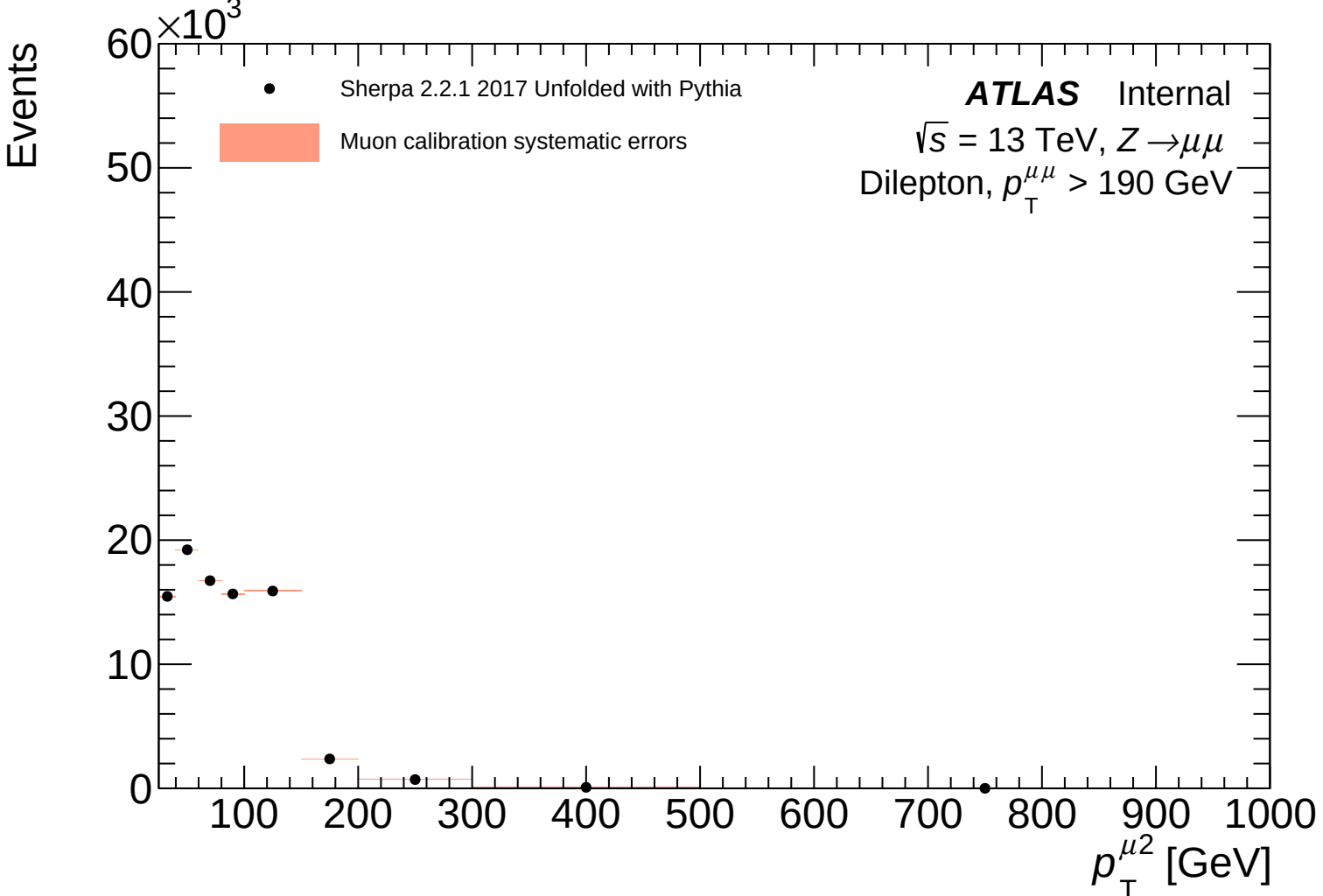
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_{\mathrm{T}}^{\mu 2}$ [GeV]


Events
×10^3
60
50
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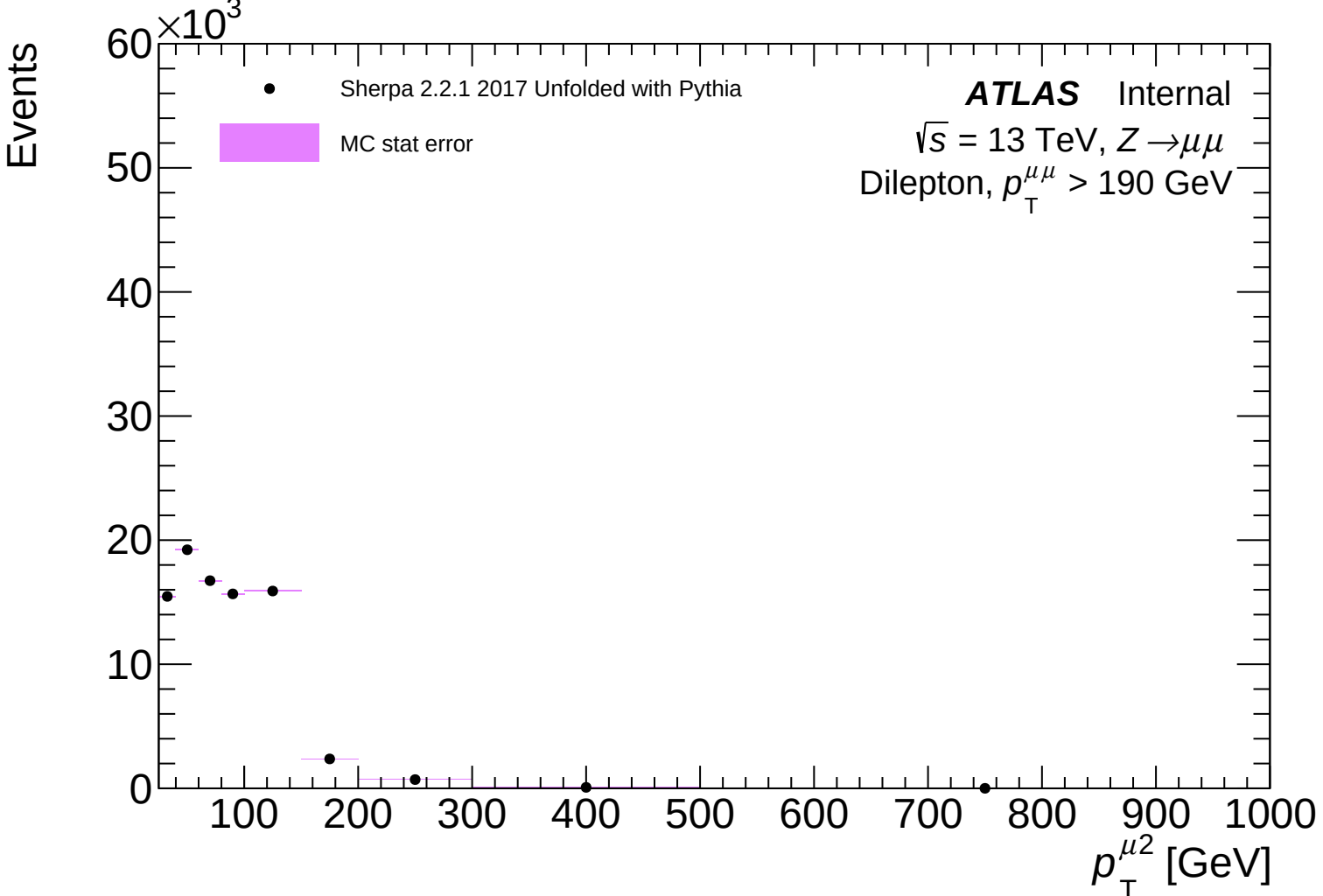
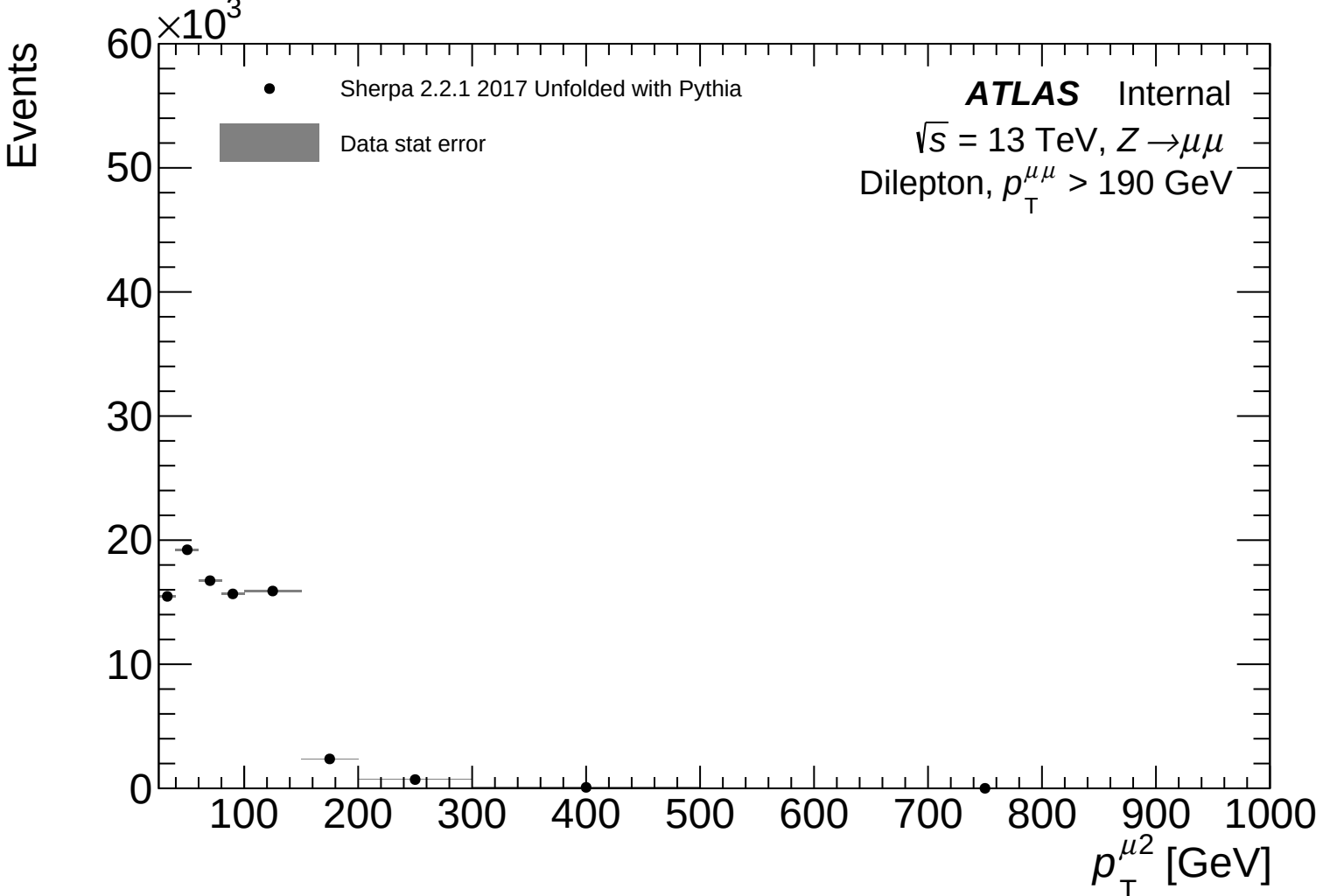
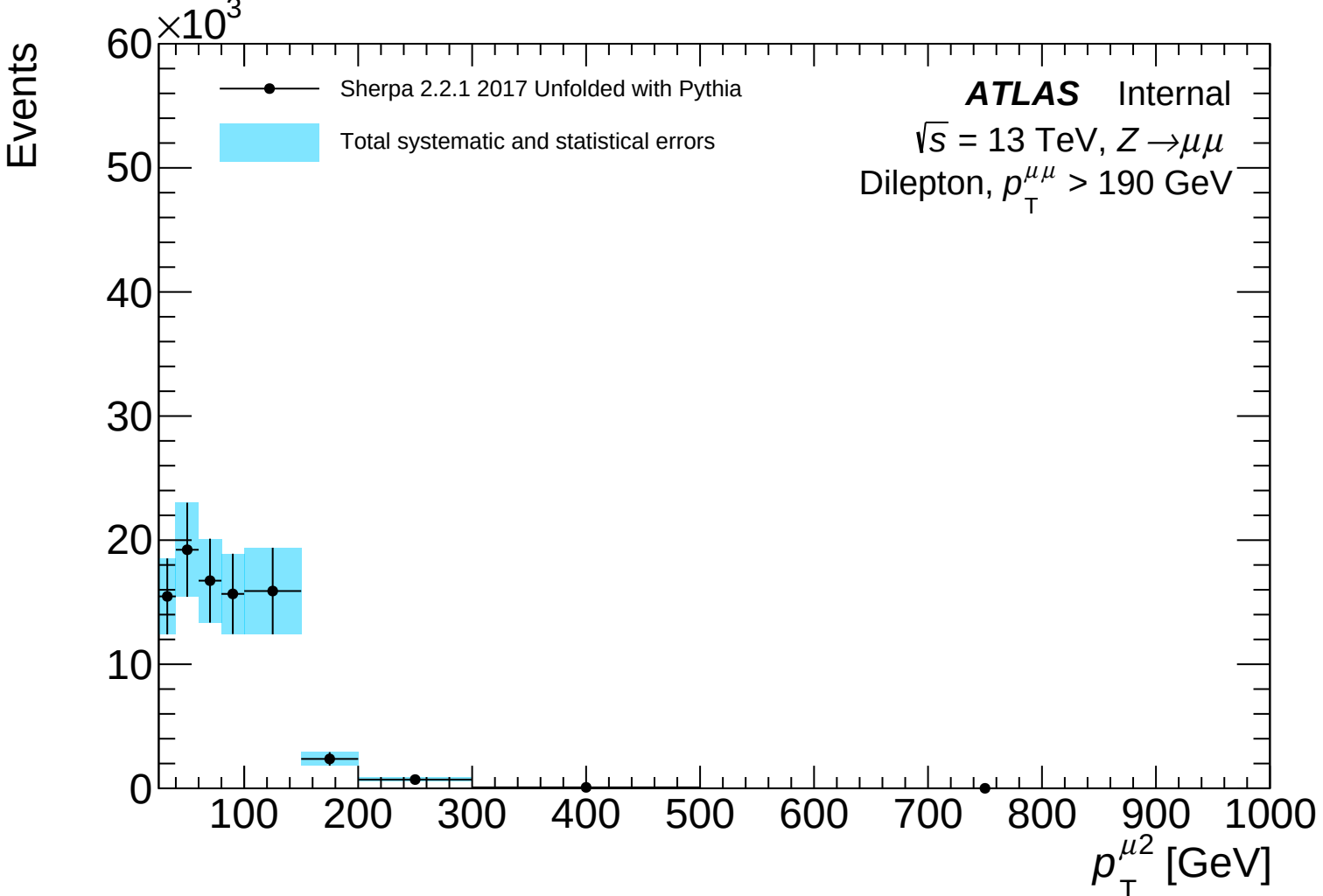
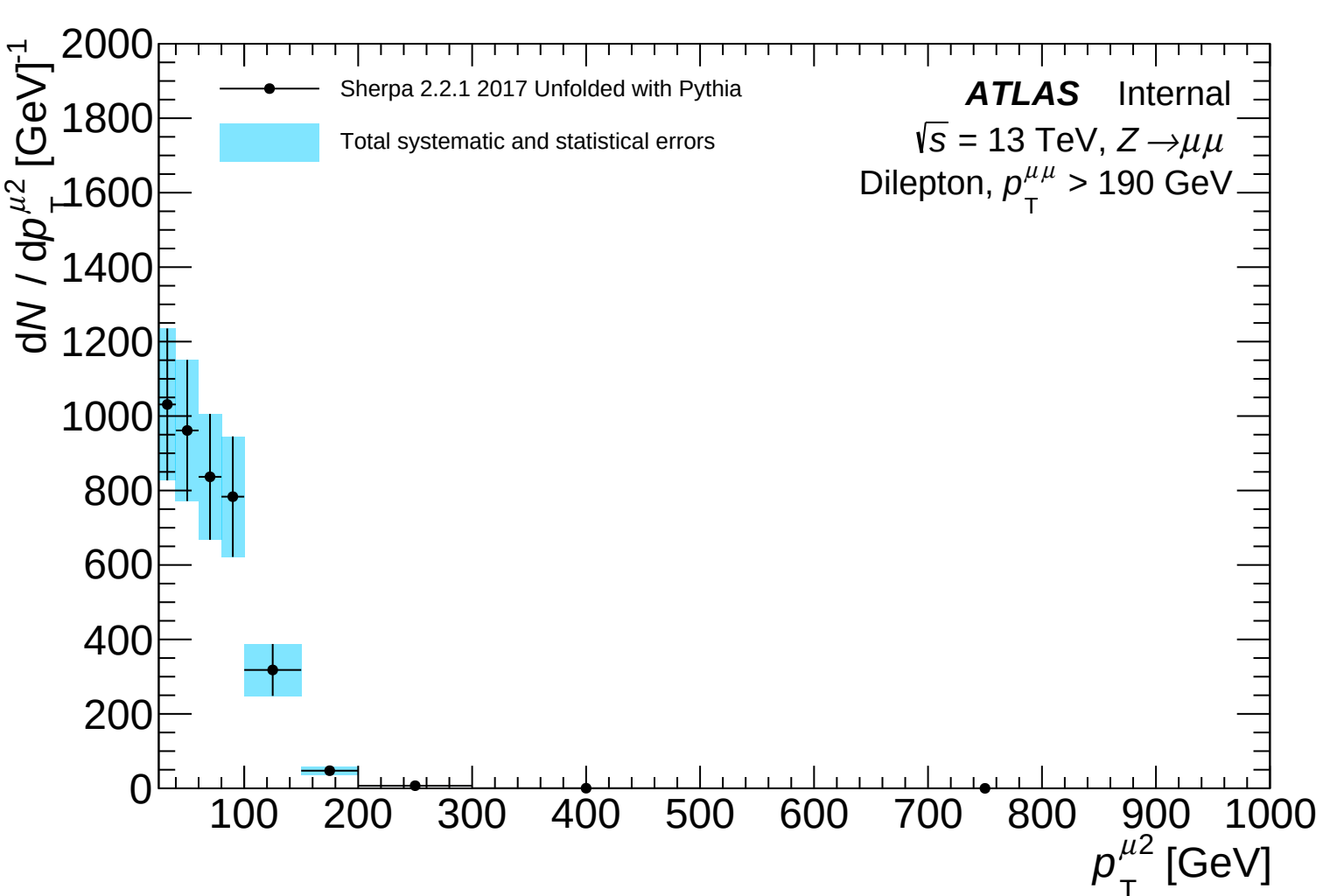
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]


Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
$p_T^{\mu 2}$ [GeV]


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ2 [GeV]^-1
p_T^μ2 [GeV]
0
200
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1000
1200
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1800
2000
100
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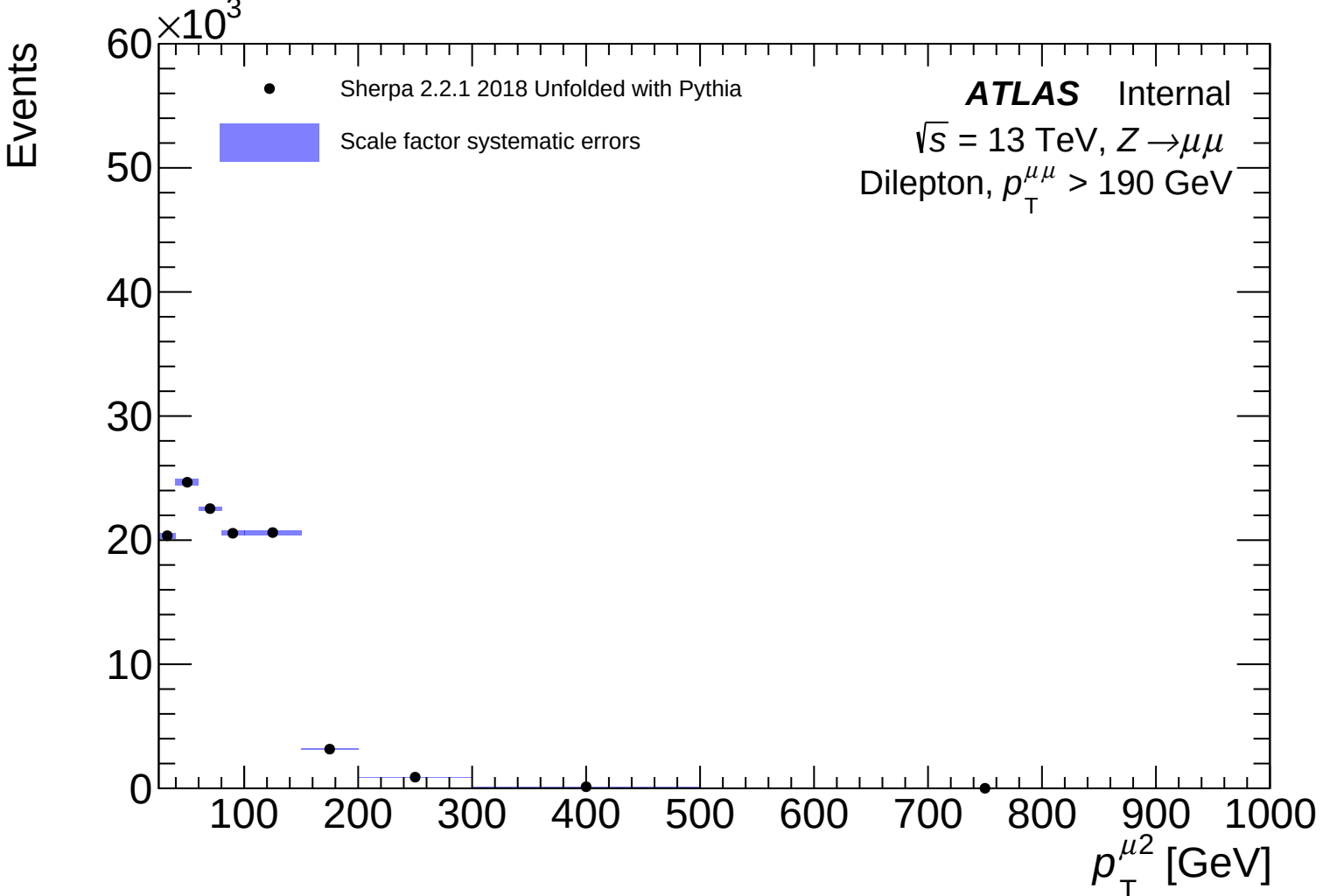
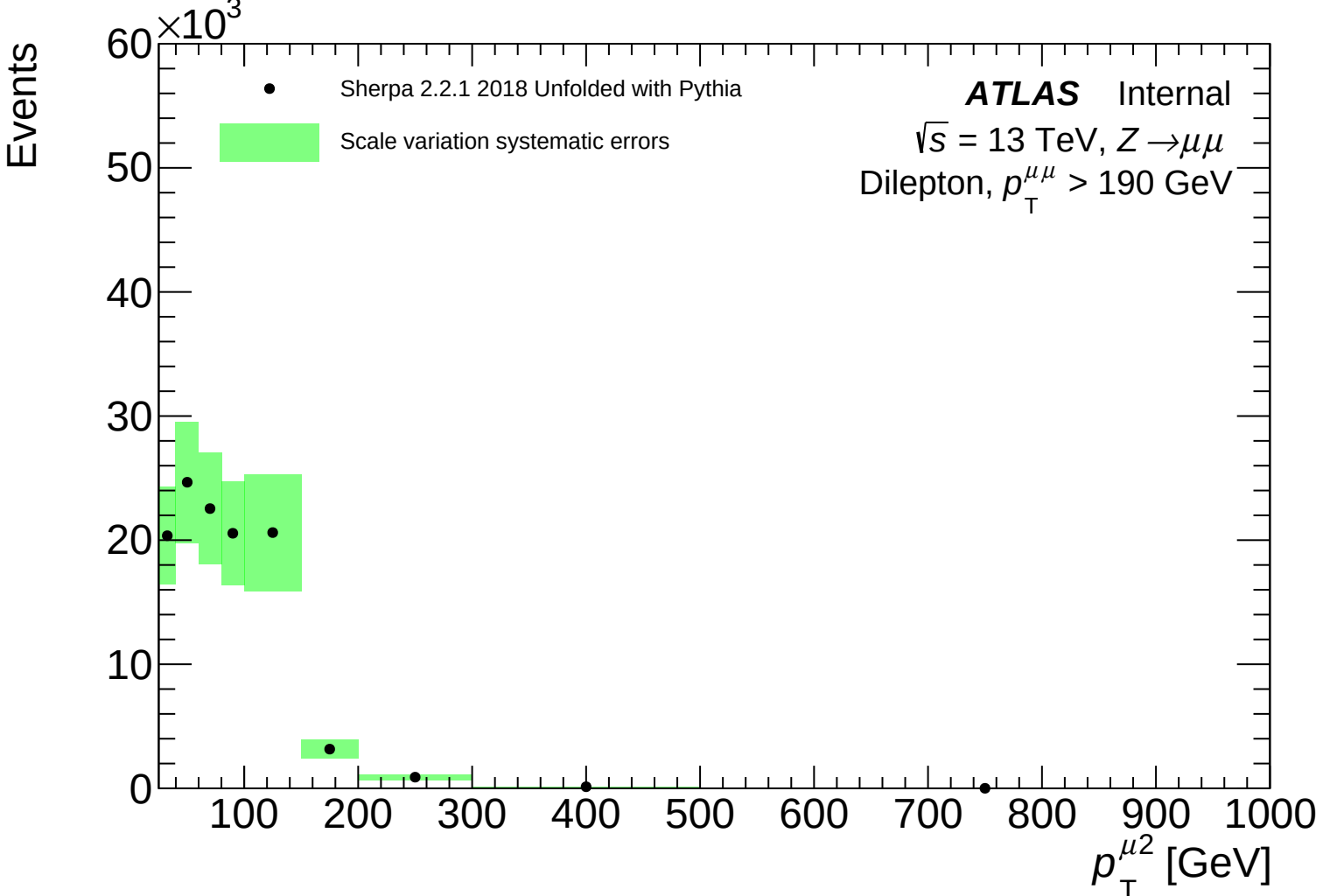
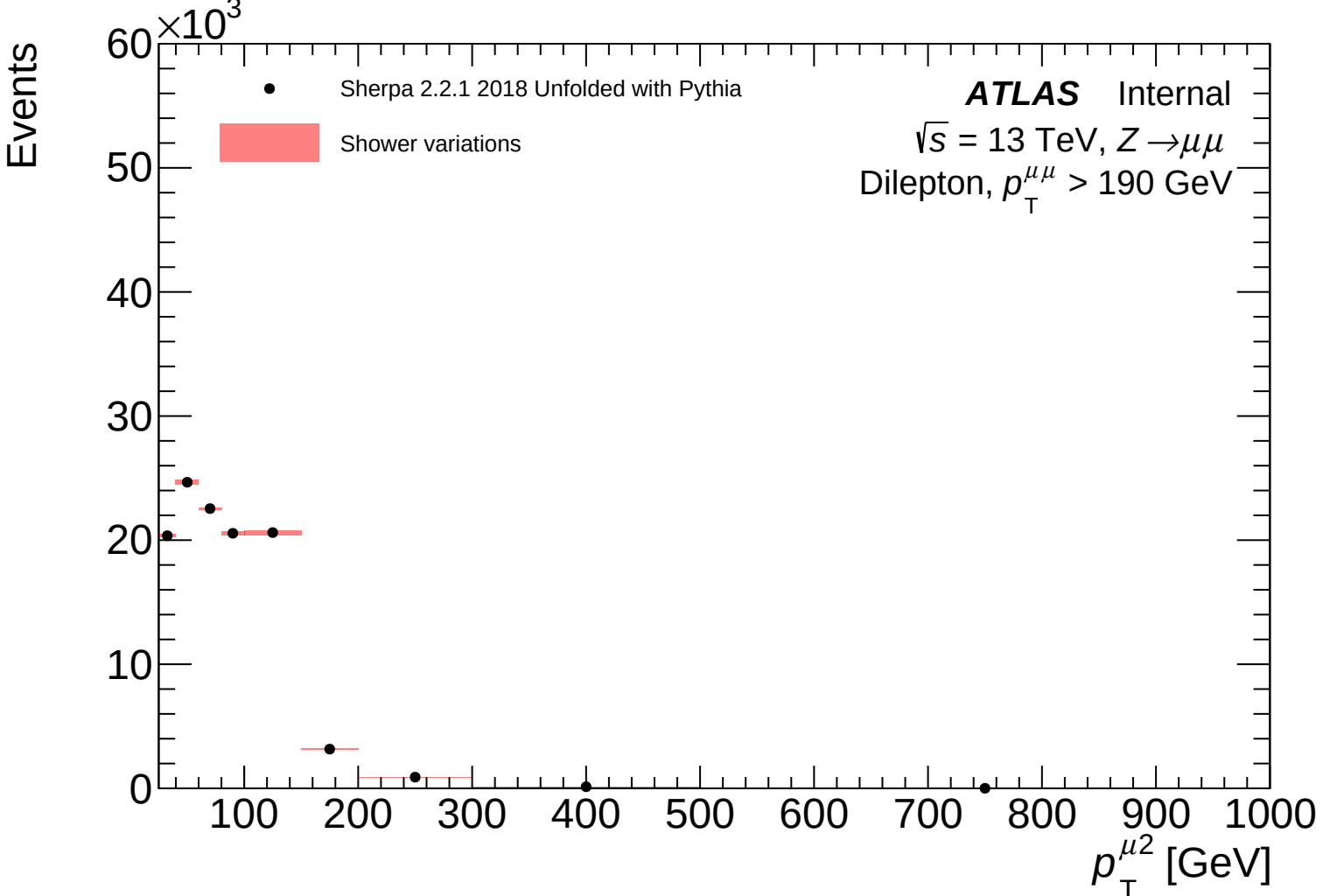
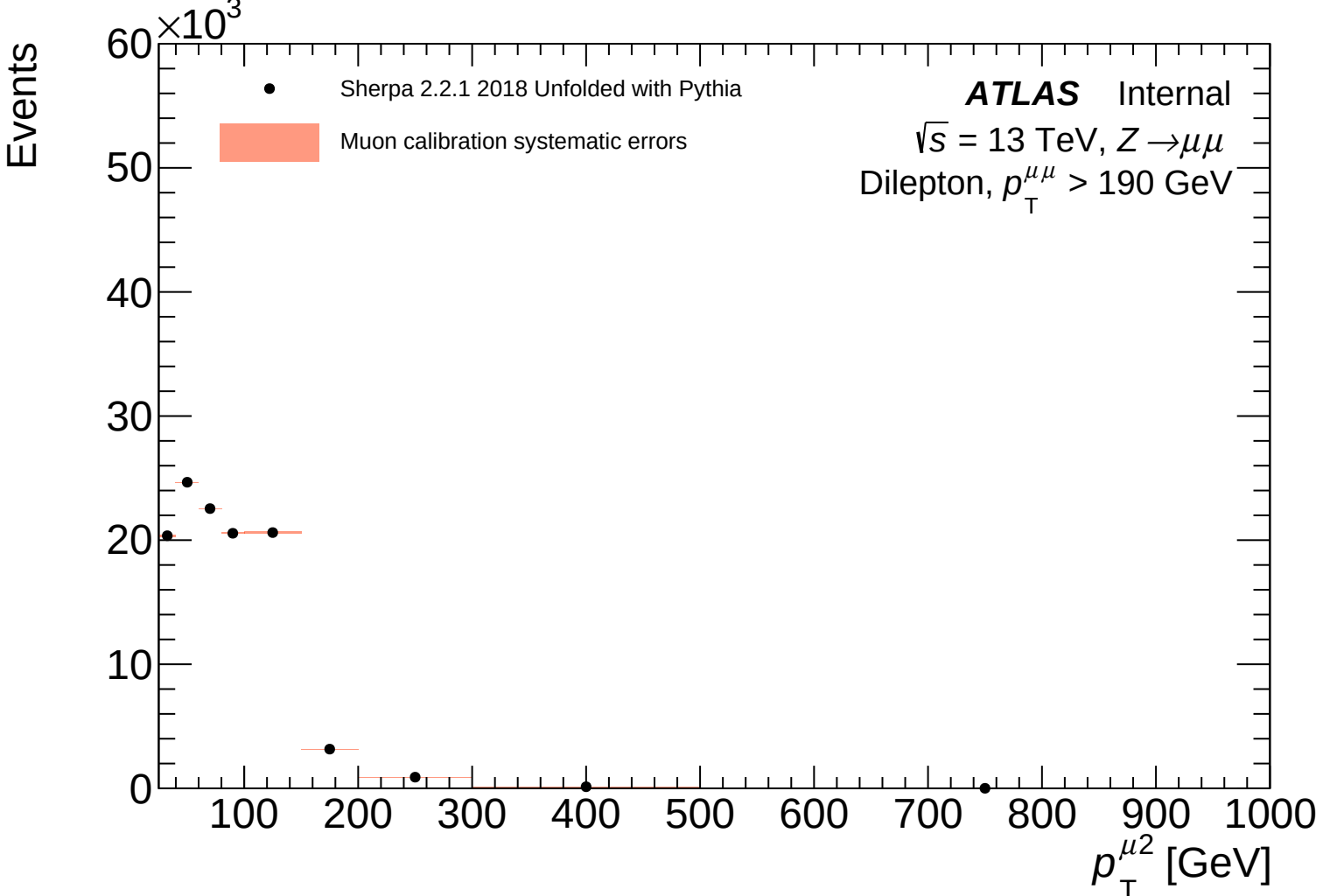
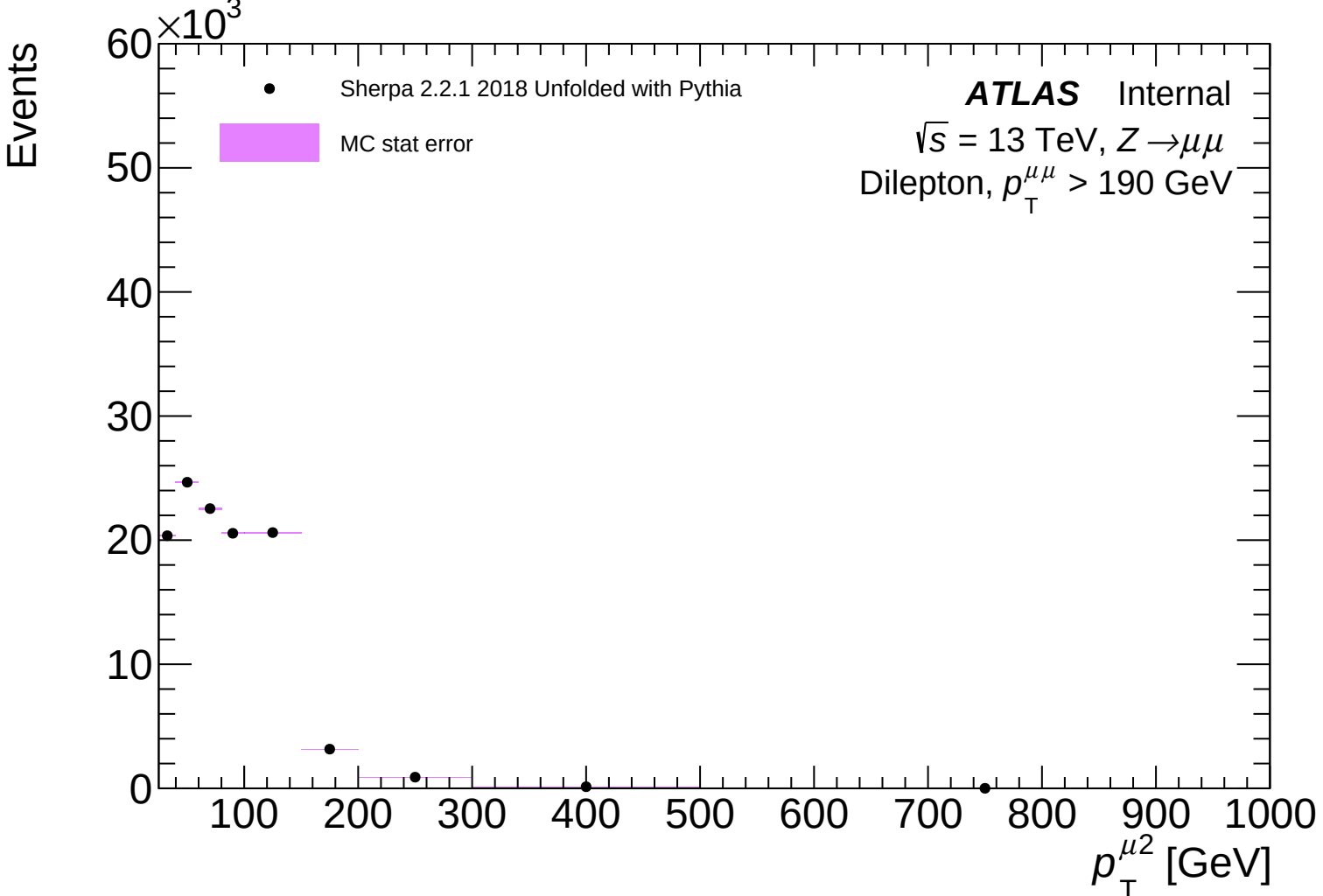
700
800
900
1000

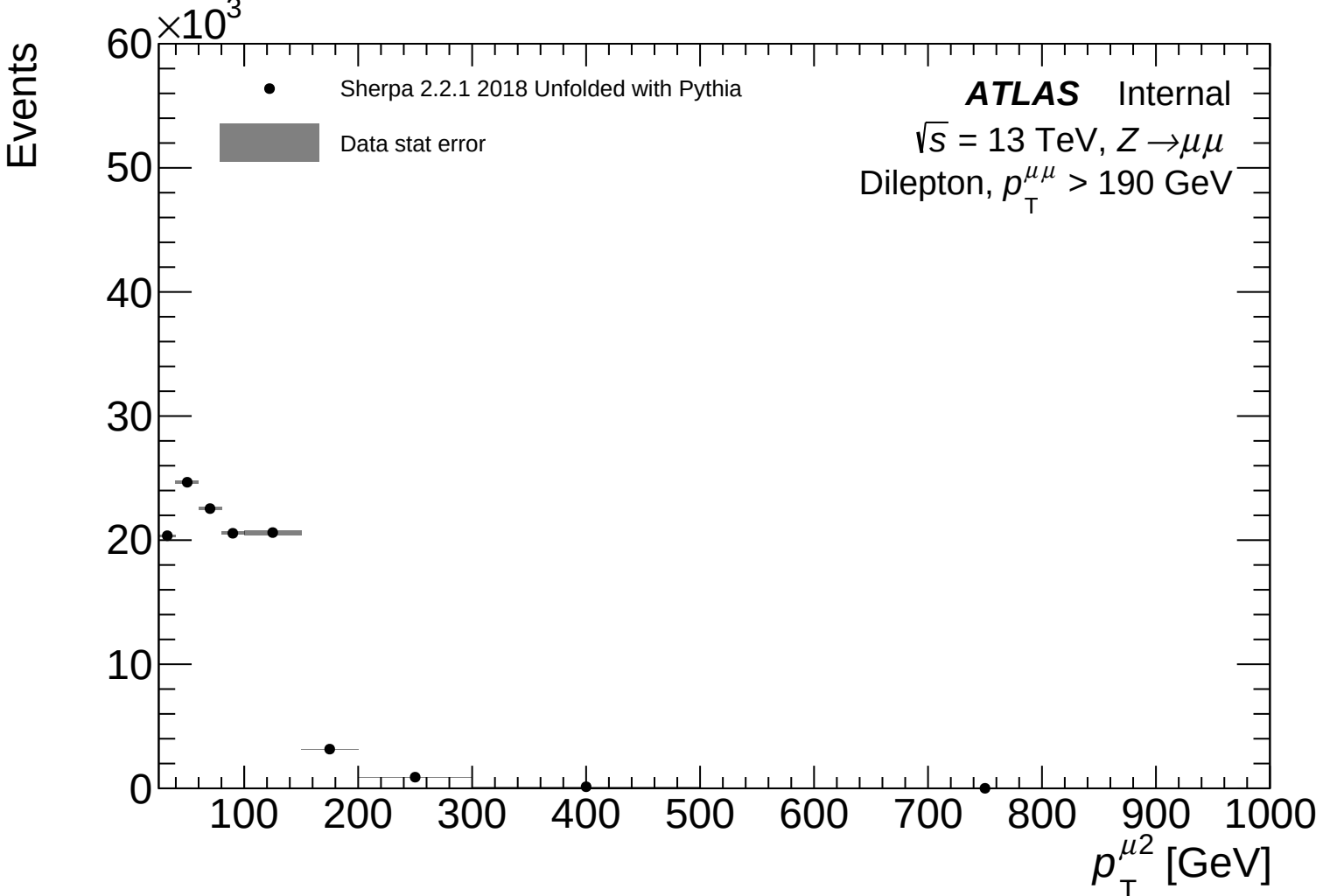

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]

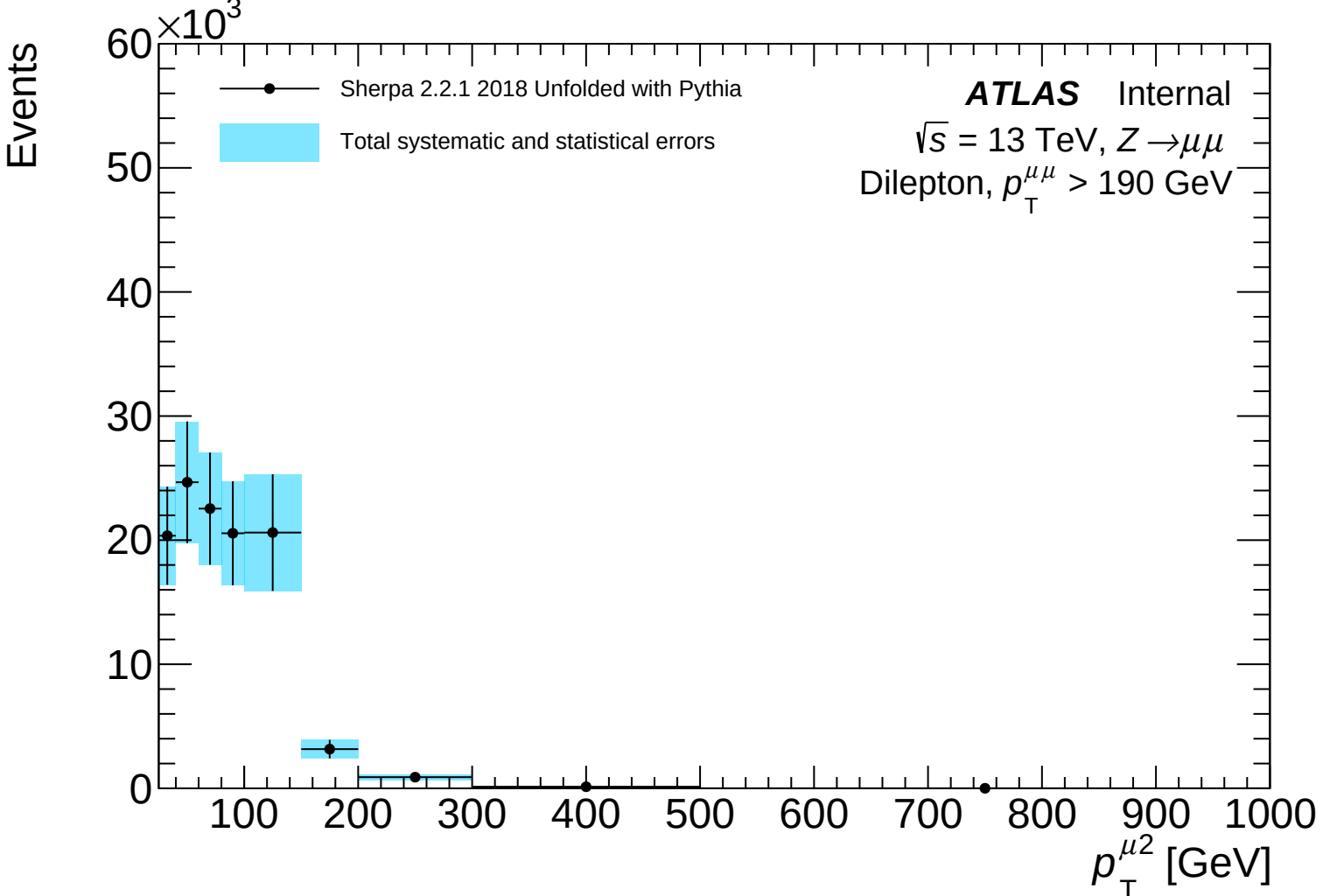

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]

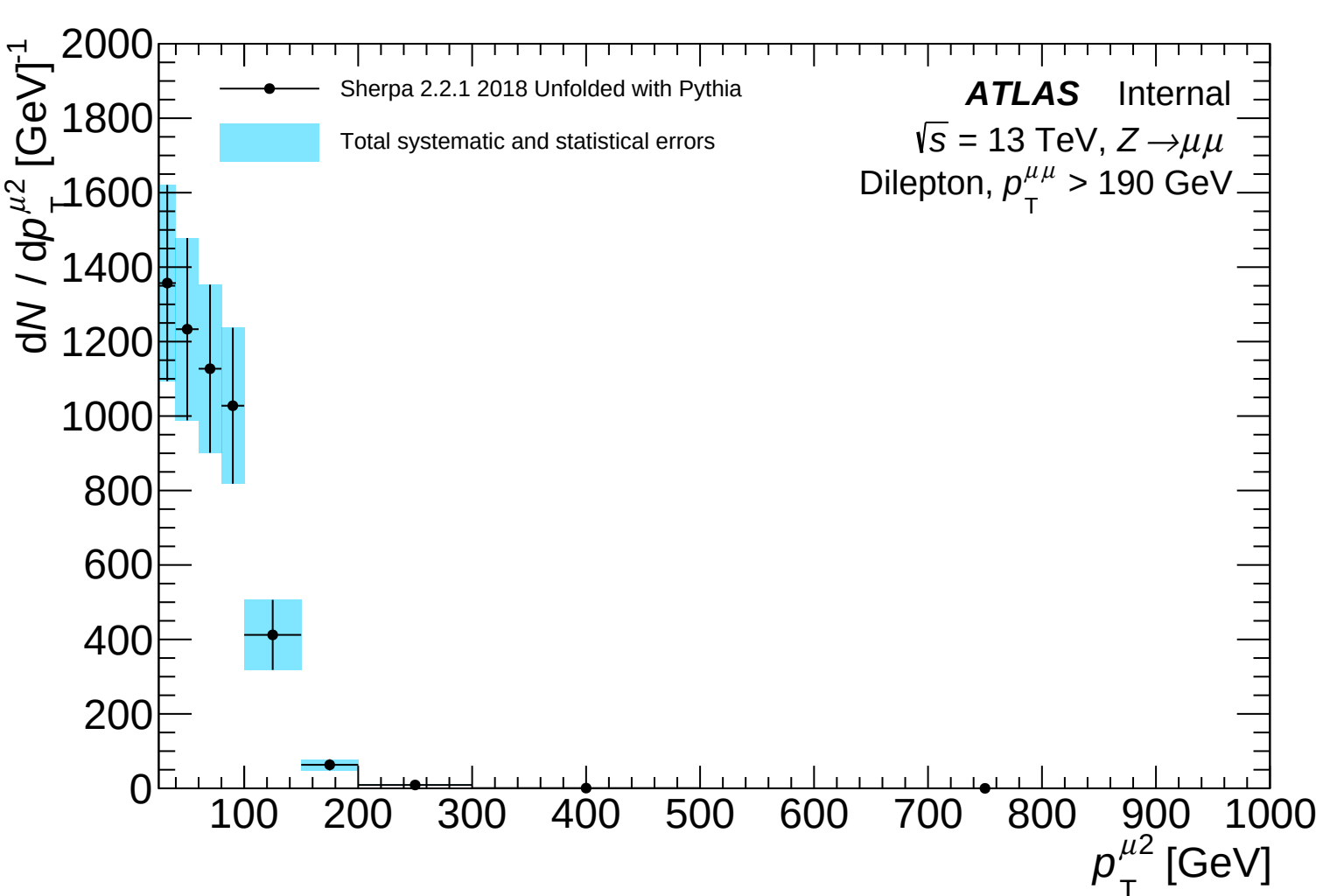

Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_{\mathrm{T}}^{\mu 2}$ [GeV]

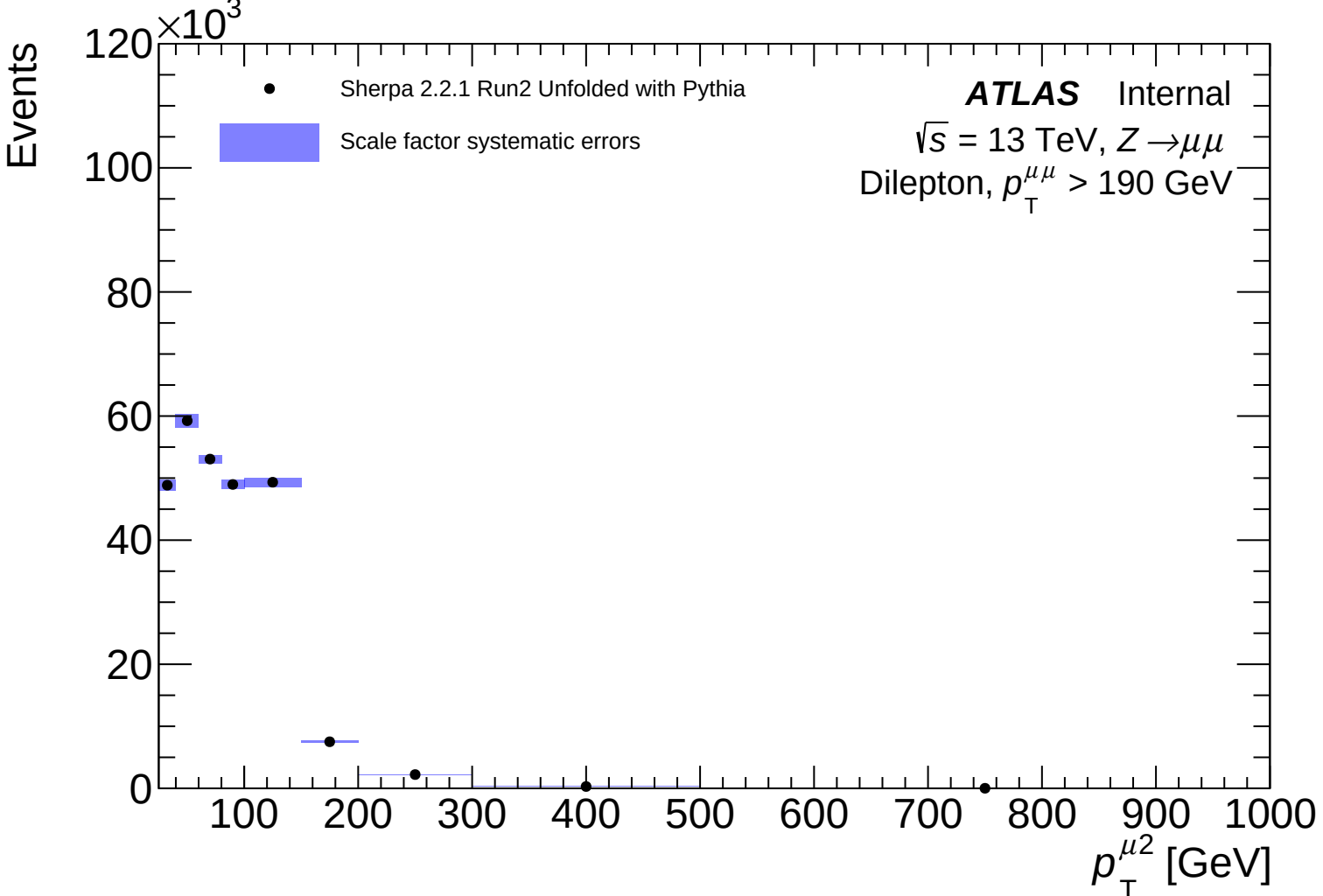

Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_{\mathrm{T}}^{\mu 2}$ [GeV]

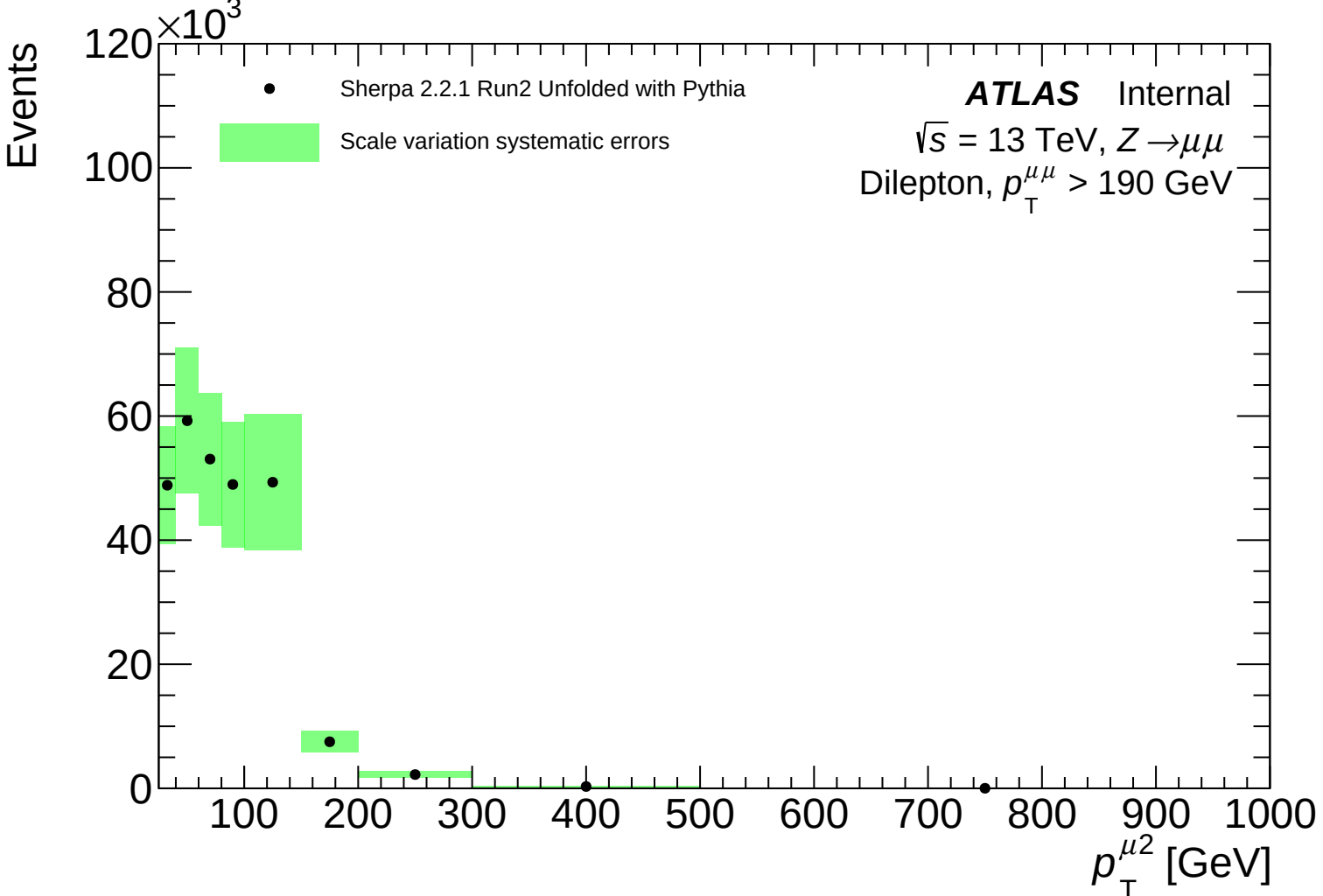

Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_T^{\mu 2}$ [GeV]

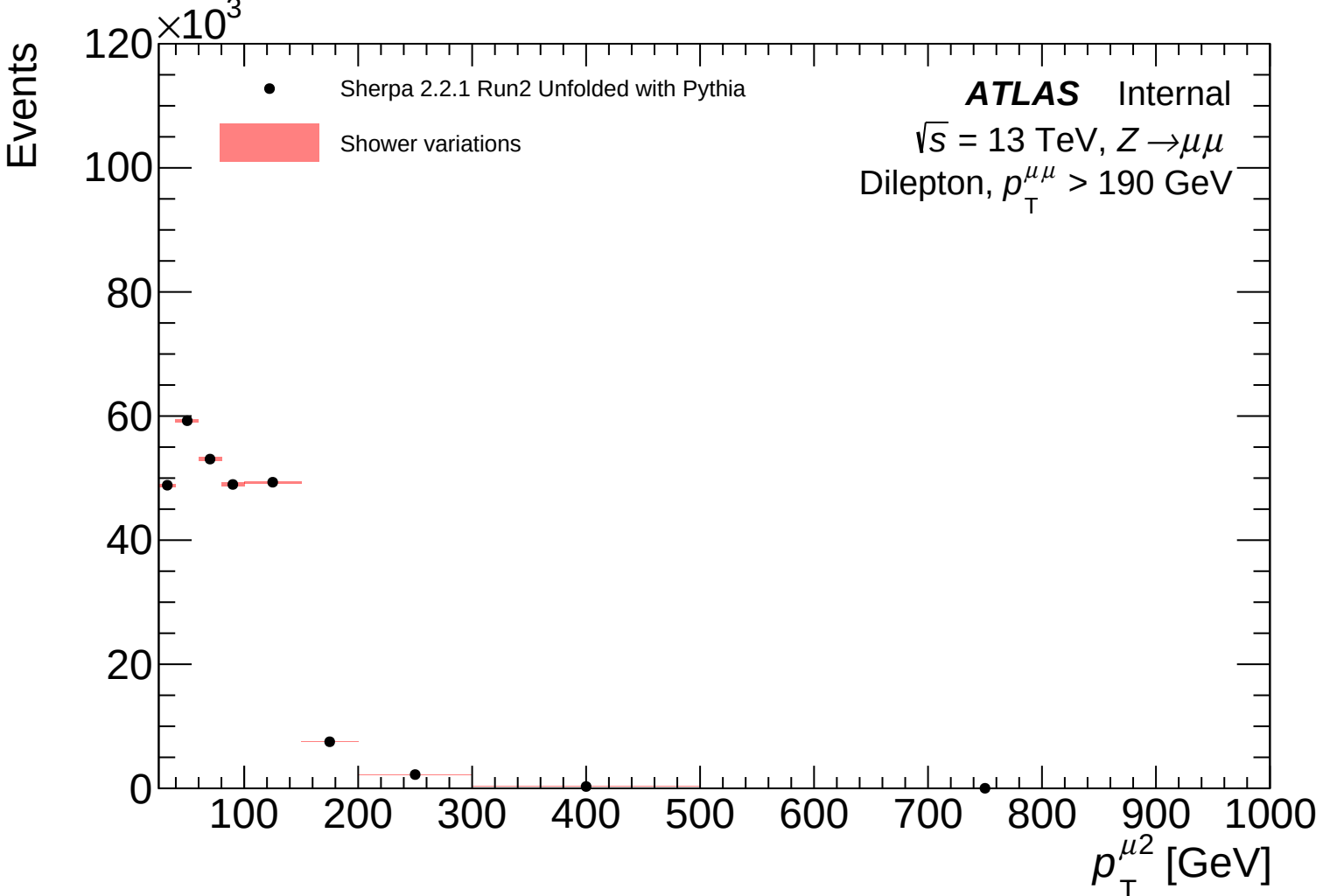

Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_{\mathrm{T}}^{\mu 2}$ [GeV]

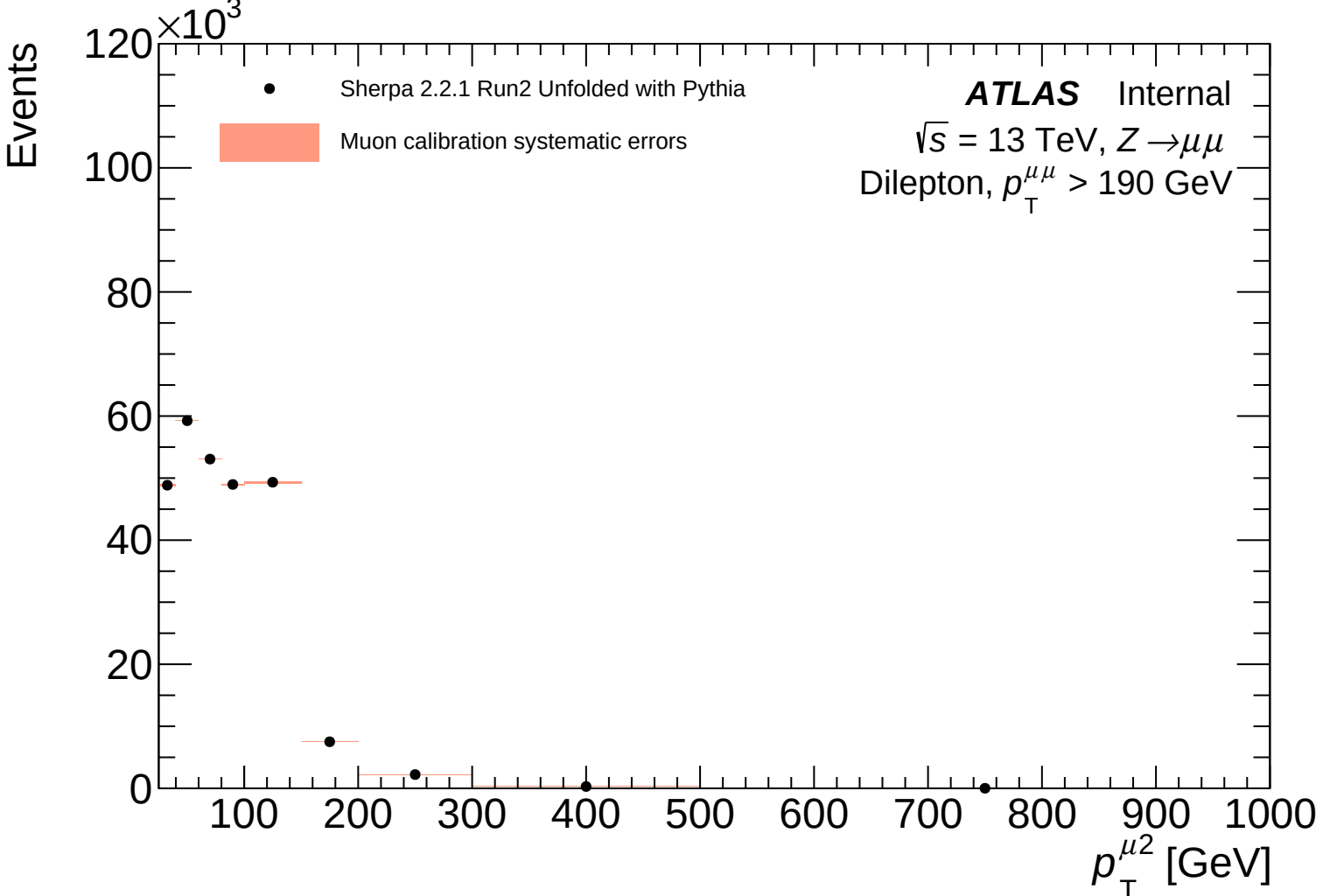

Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_{\mathrm{T}}^{\mu 2}$ [GeV]

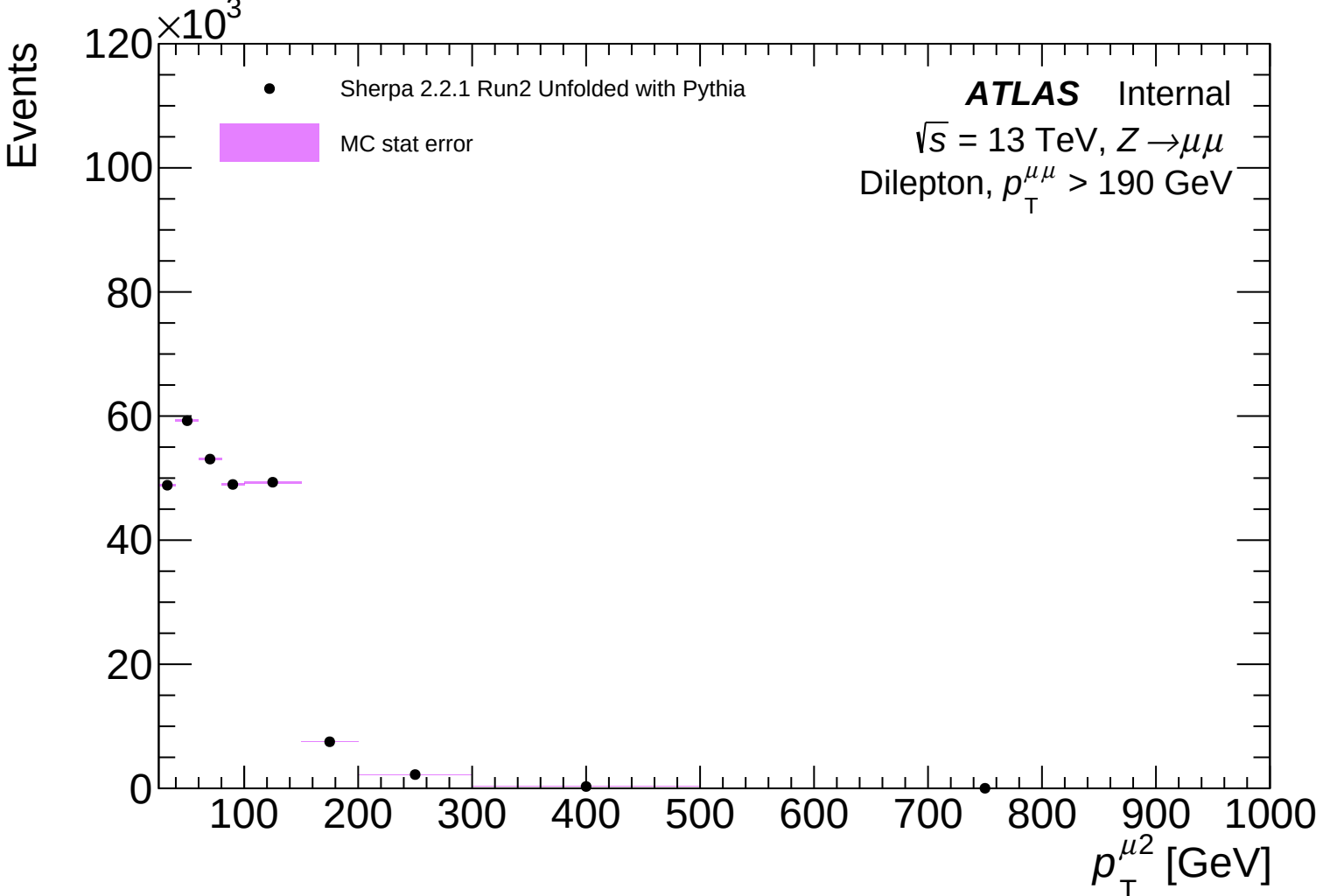

Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ2 [GeV]^-1
p_T^μ2 [GeV]
0
200
400
600
800
1000
1200
1400
1600
1800
2000
100
200
300
400
500
600
700
800
900
1000

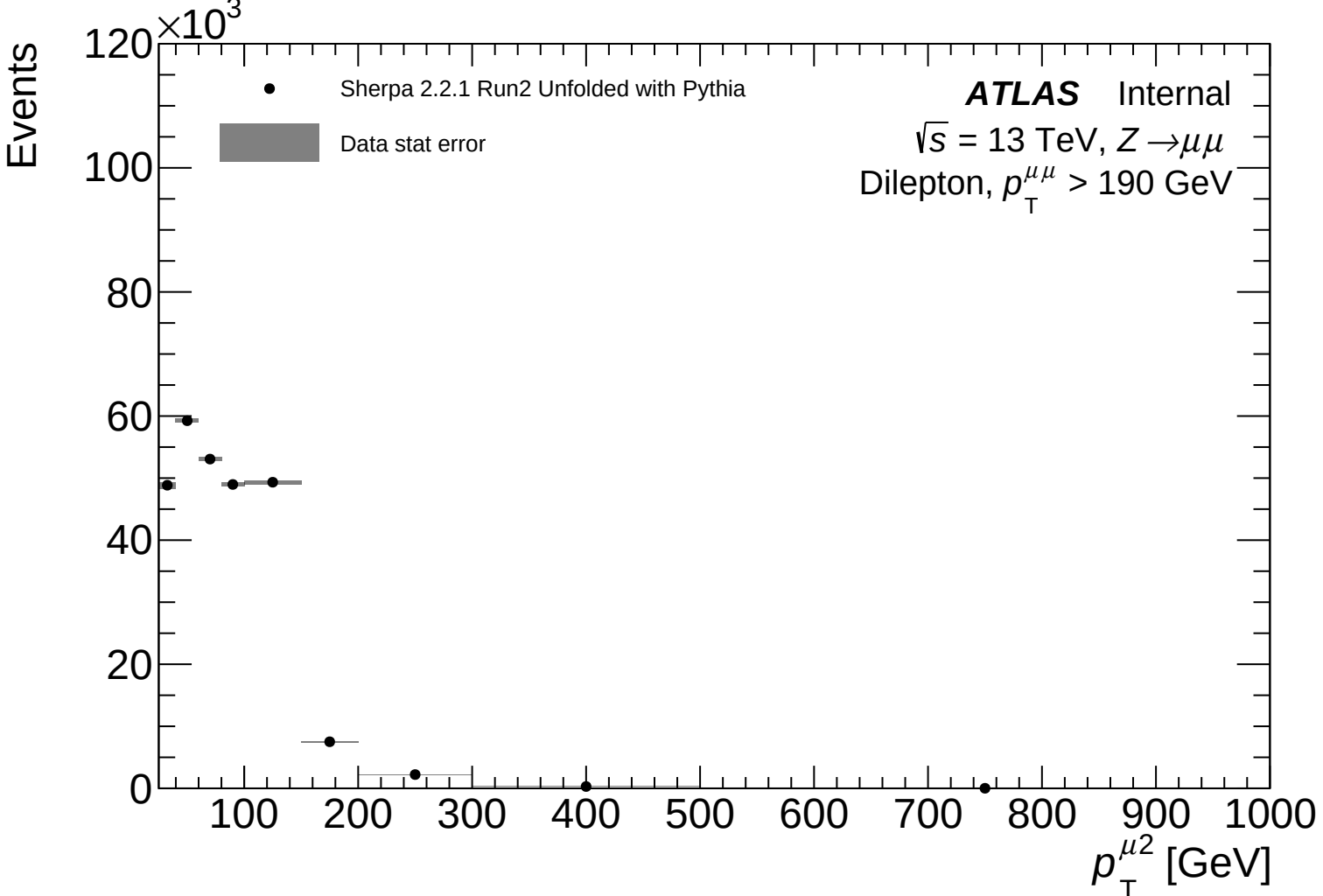

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]

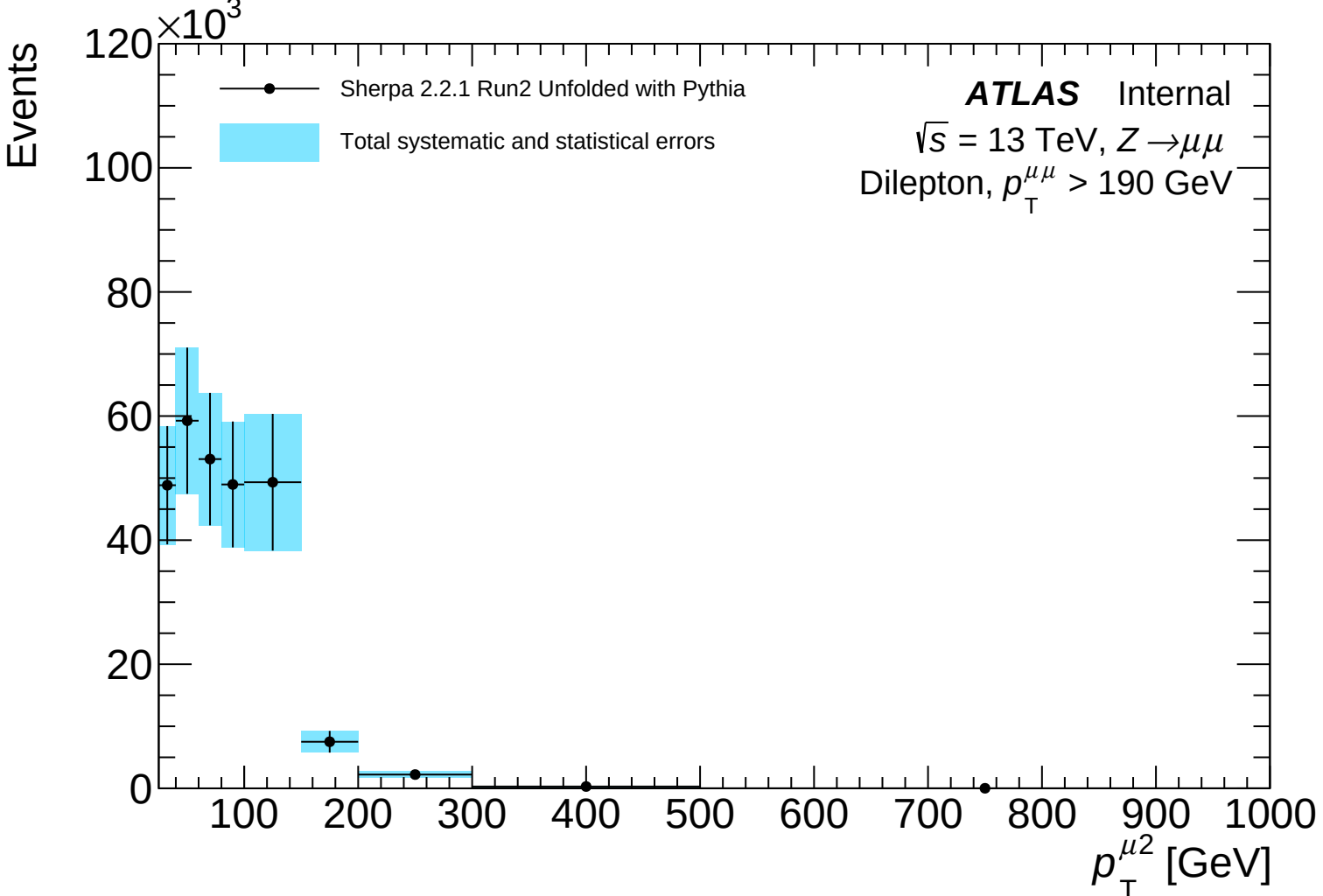

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]

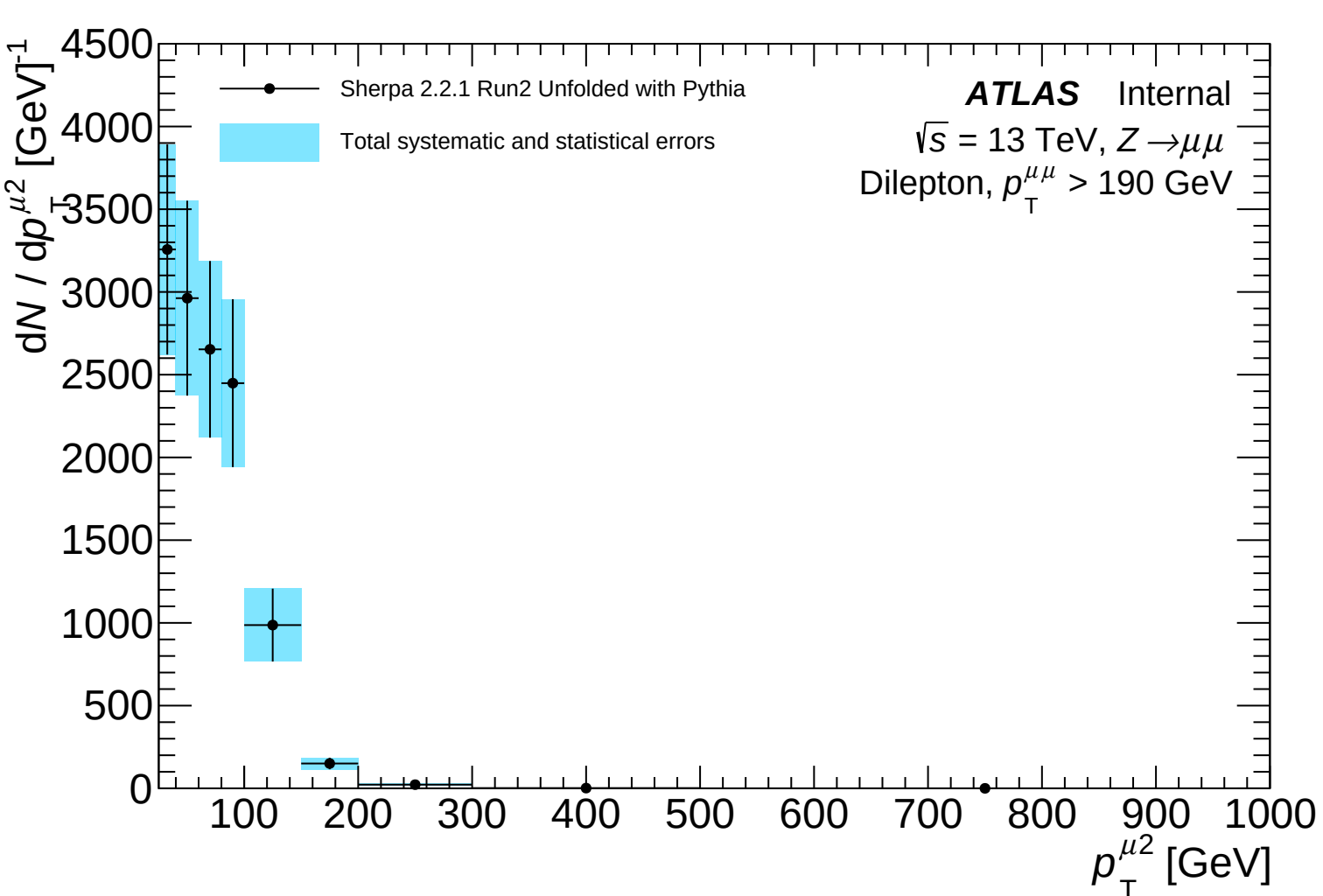

Events
$\times 10^3$
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_T^{\mu 2}$ [GeV]

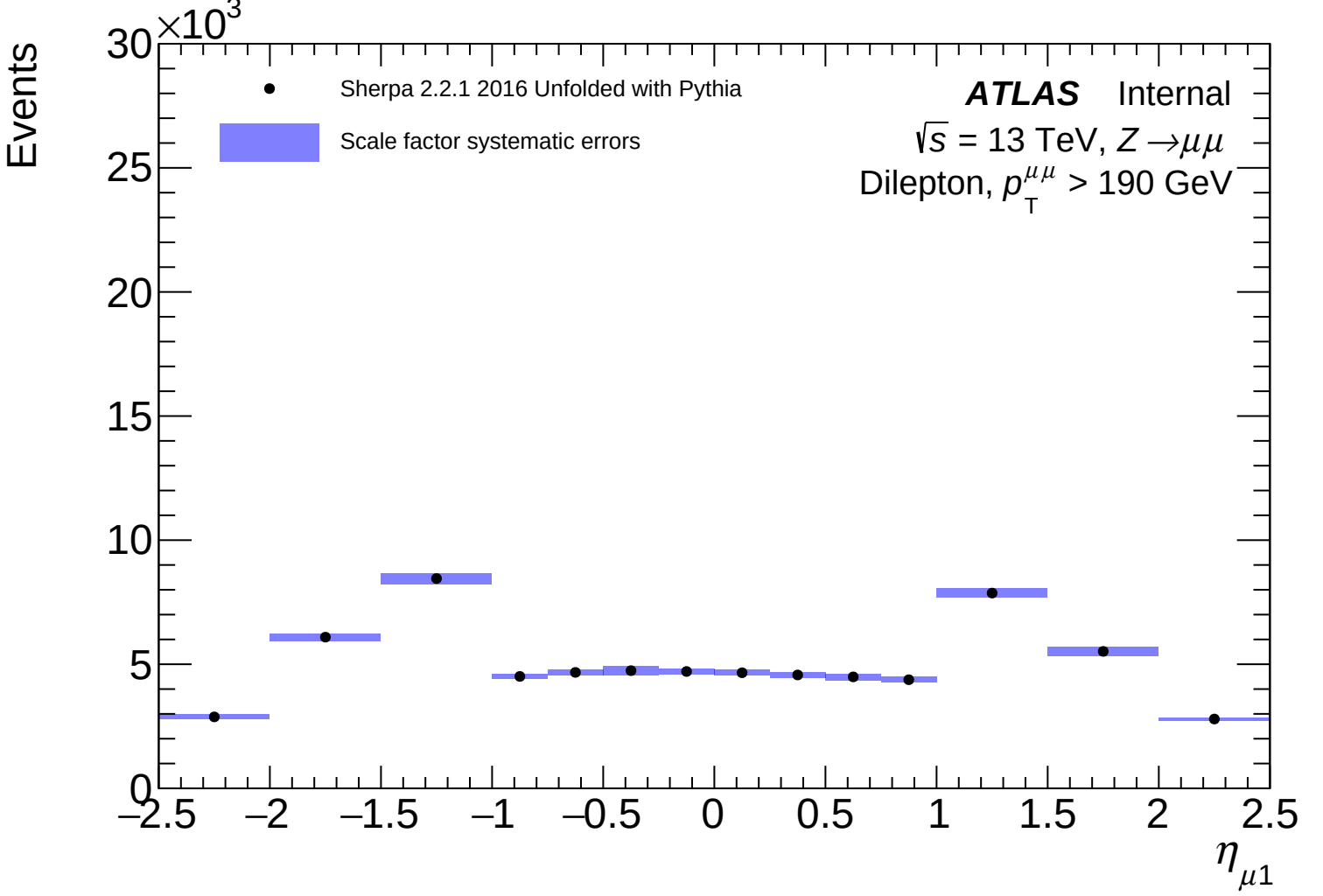

Events
$\times 10^3$
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Muon calibration systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu} > 190$ GeV
100
200
300
400
500
600
700
800
900
1000
$p_T^{\mu 2}$ [GeV]

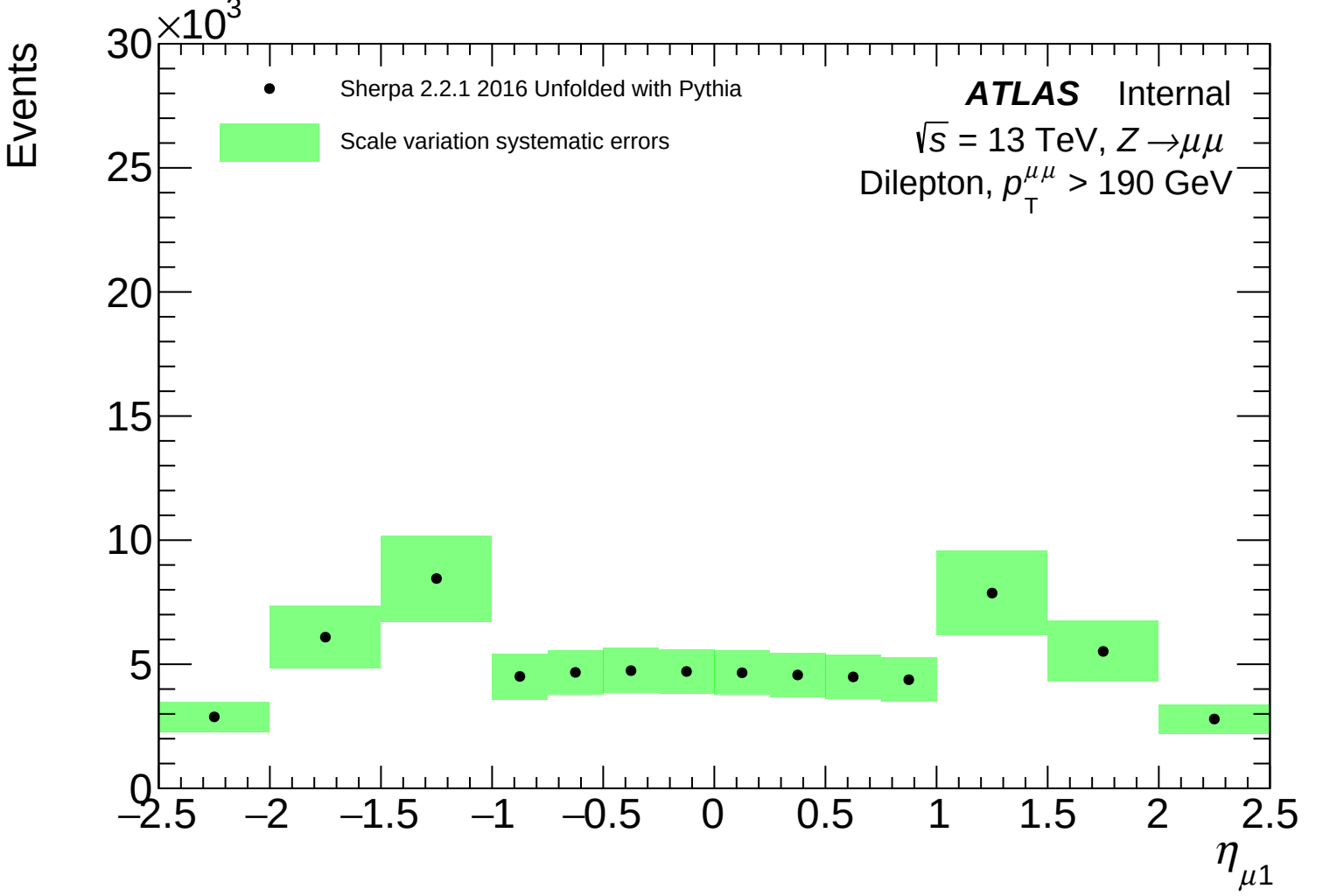

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]

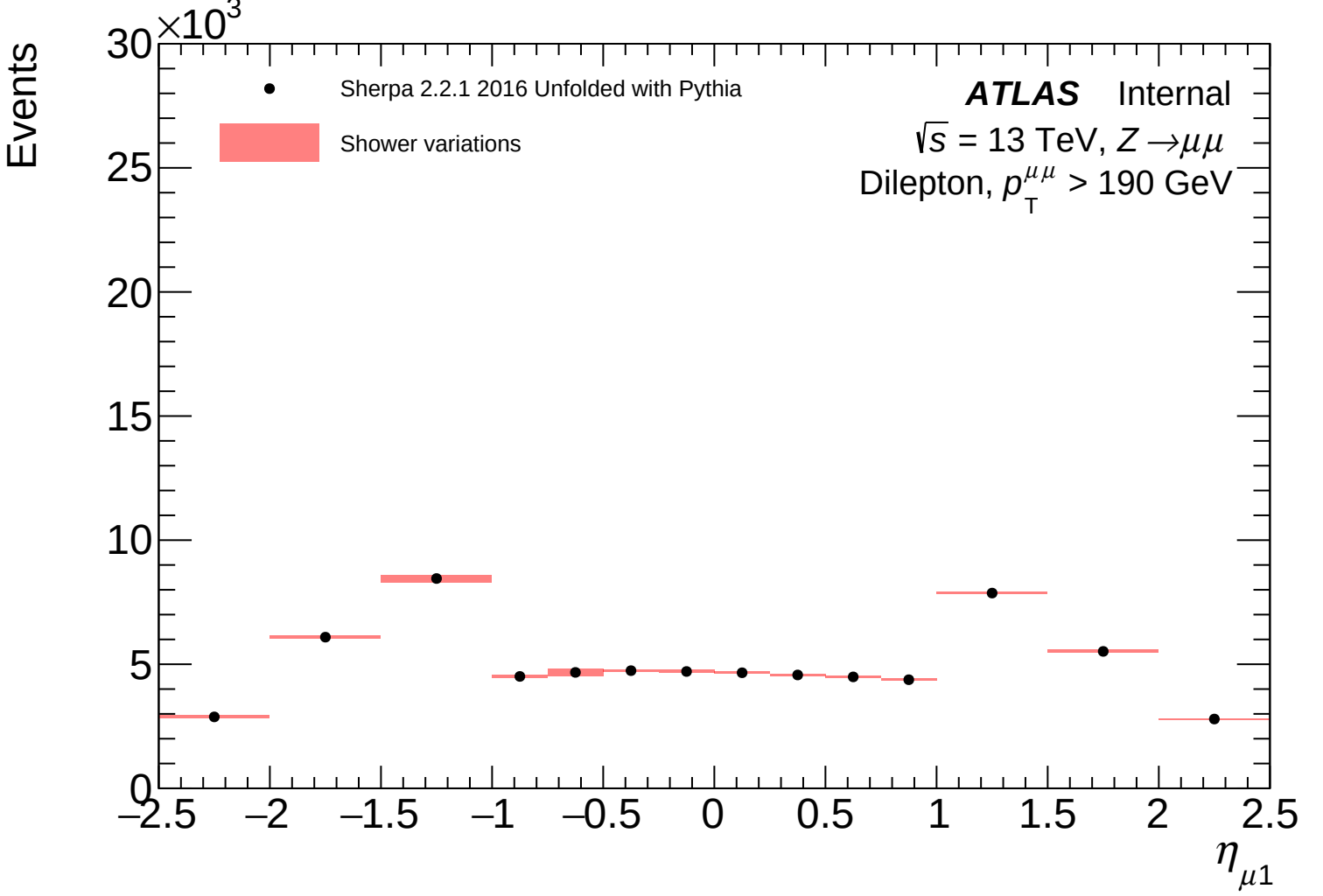

Events
$\times 10^3$
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
$p_{\mathrm{T}}^{\mu 2}$ [GeV]

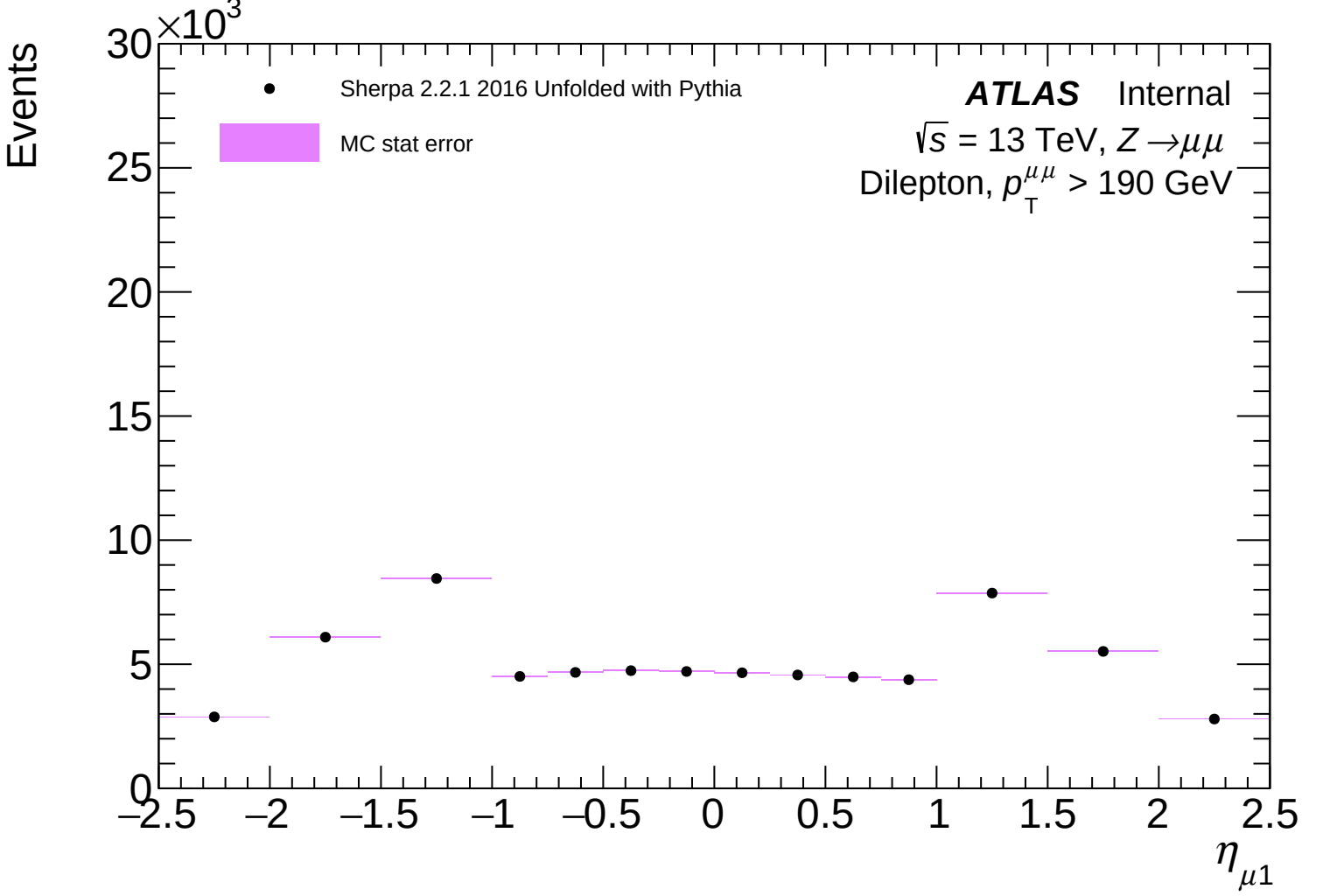

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
200
300
400
500
600
700
800
900
1000
p_T^μ2 [GeV]

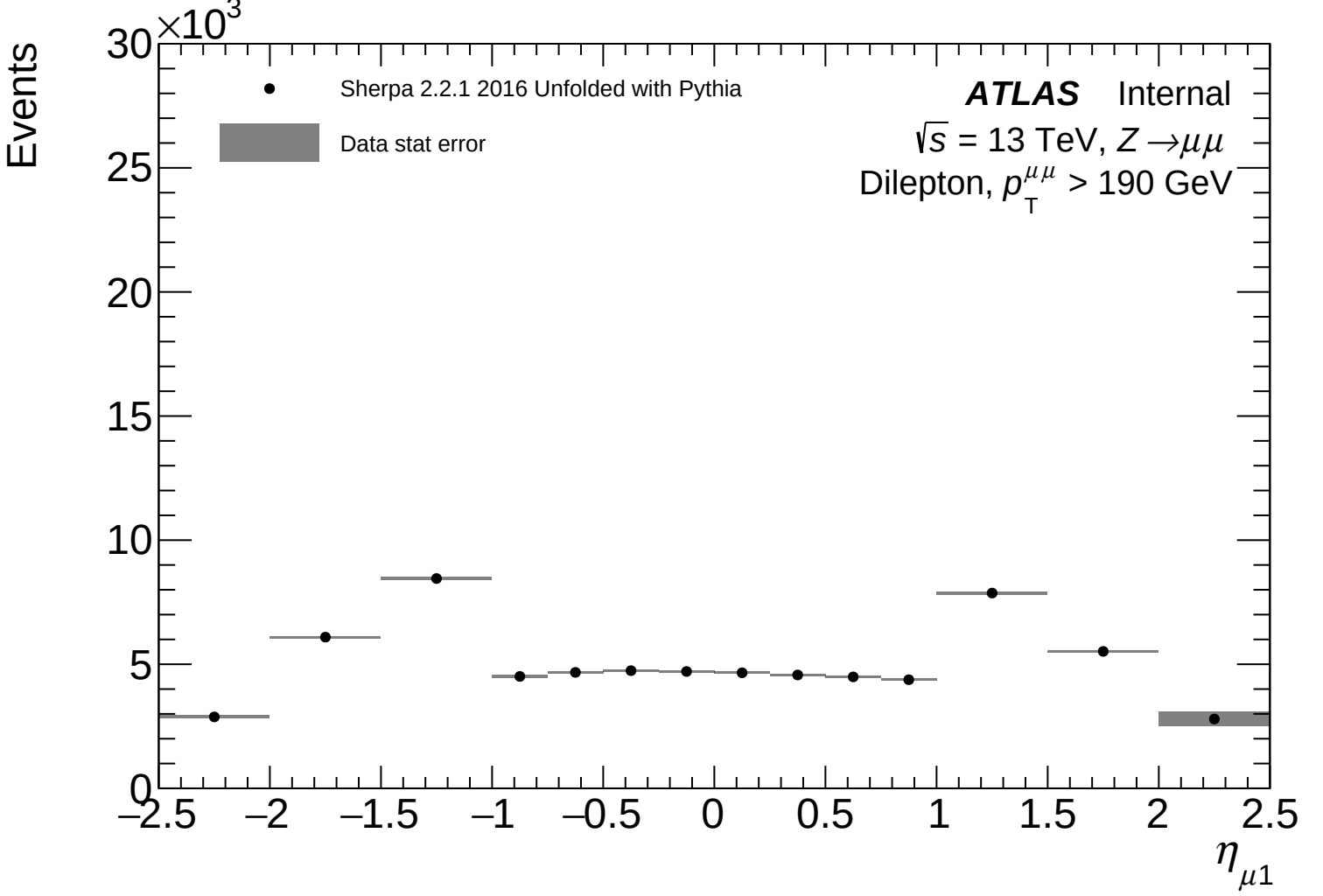

Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^μ2 [GeV]^-1
p_T^μ2 [GeV]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
100
200
300
400
500
600
700
800
900
1000

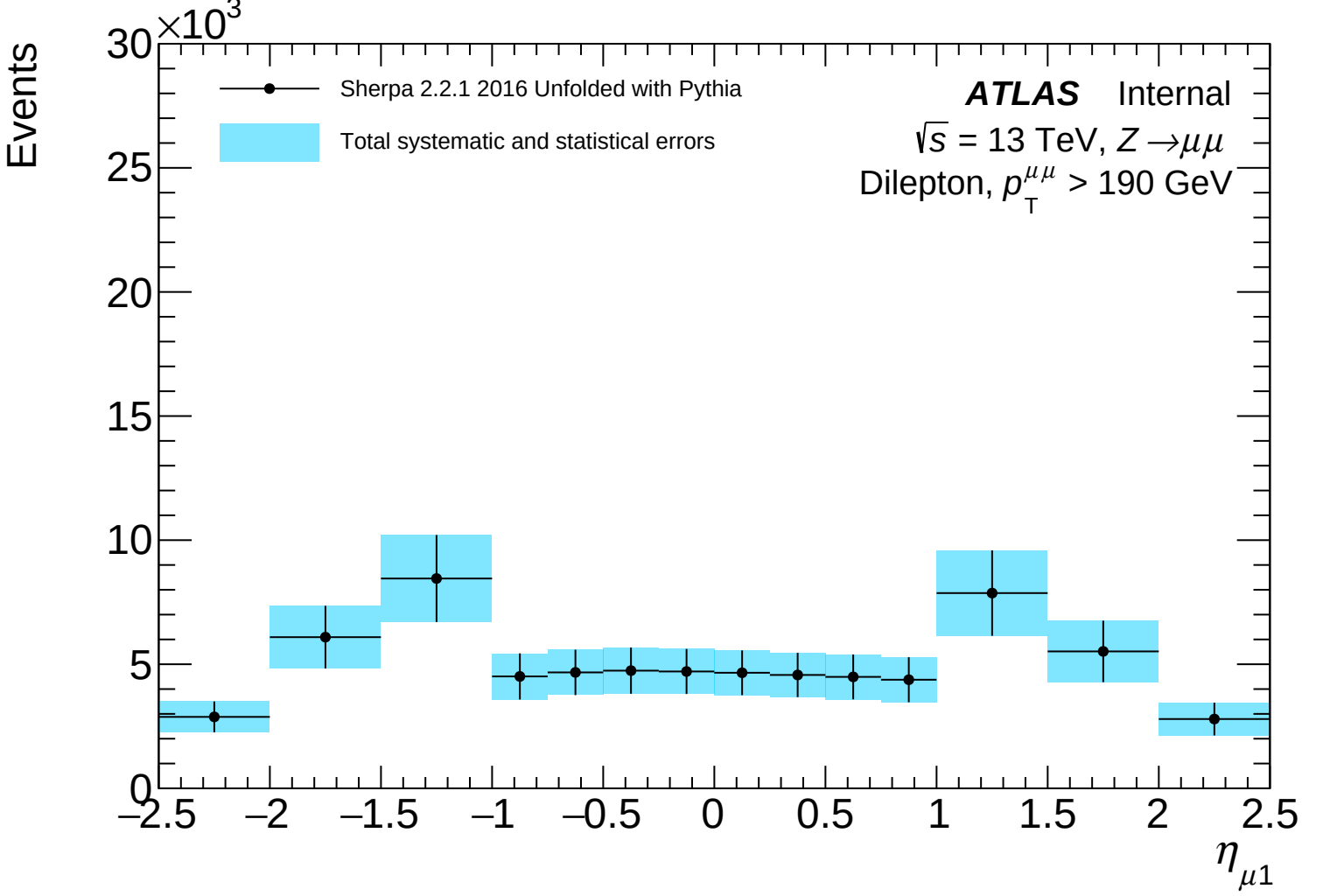

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

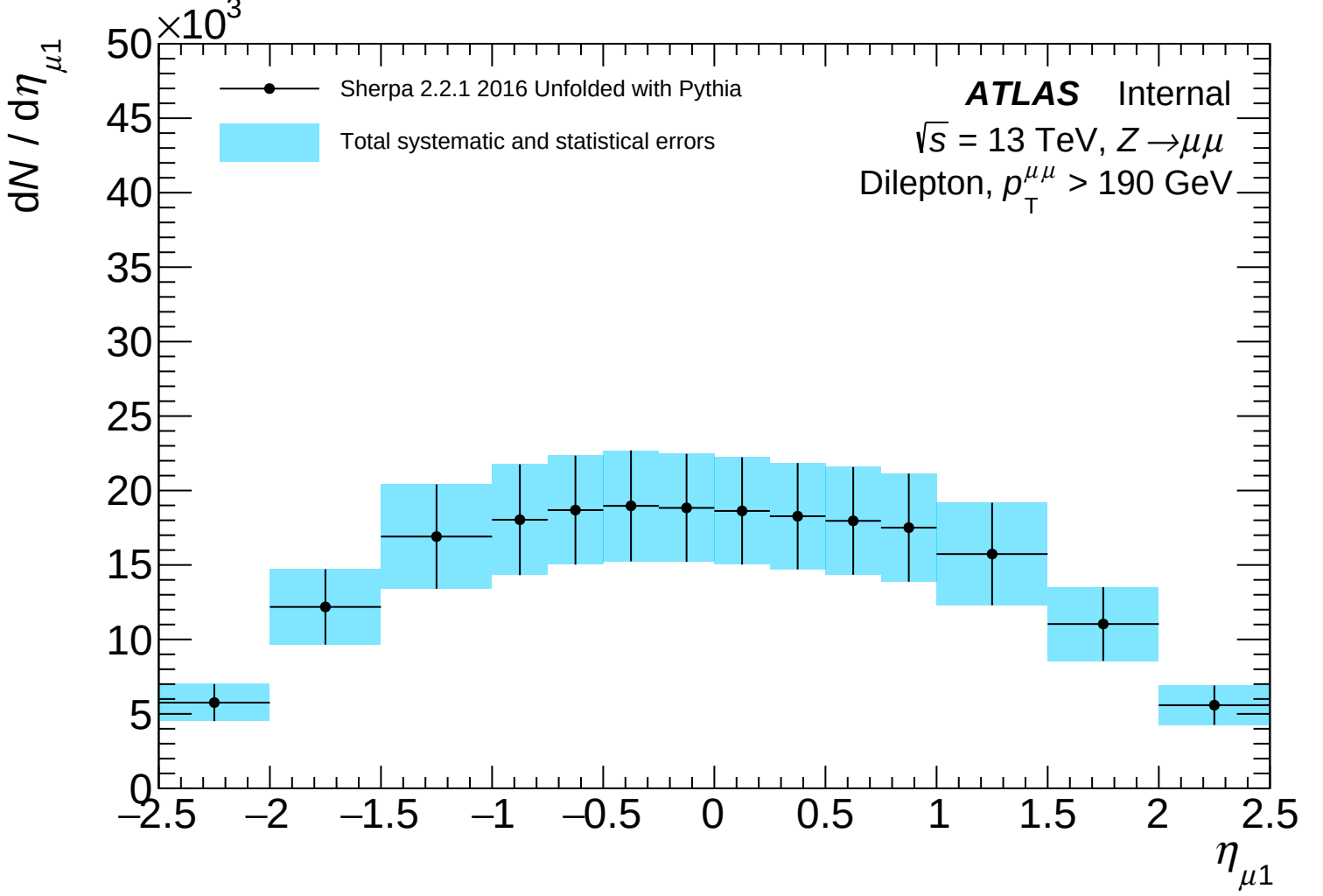

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

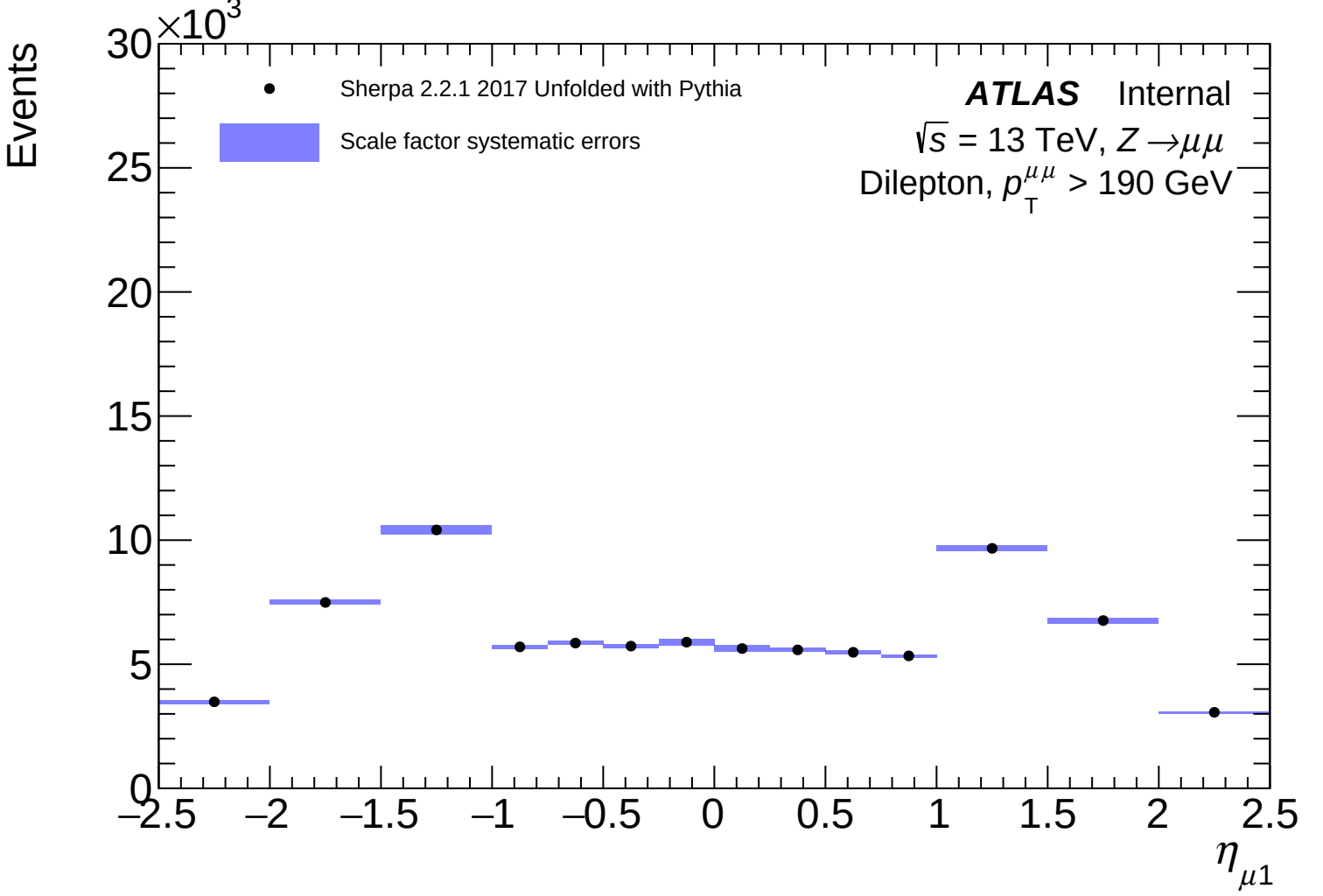

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

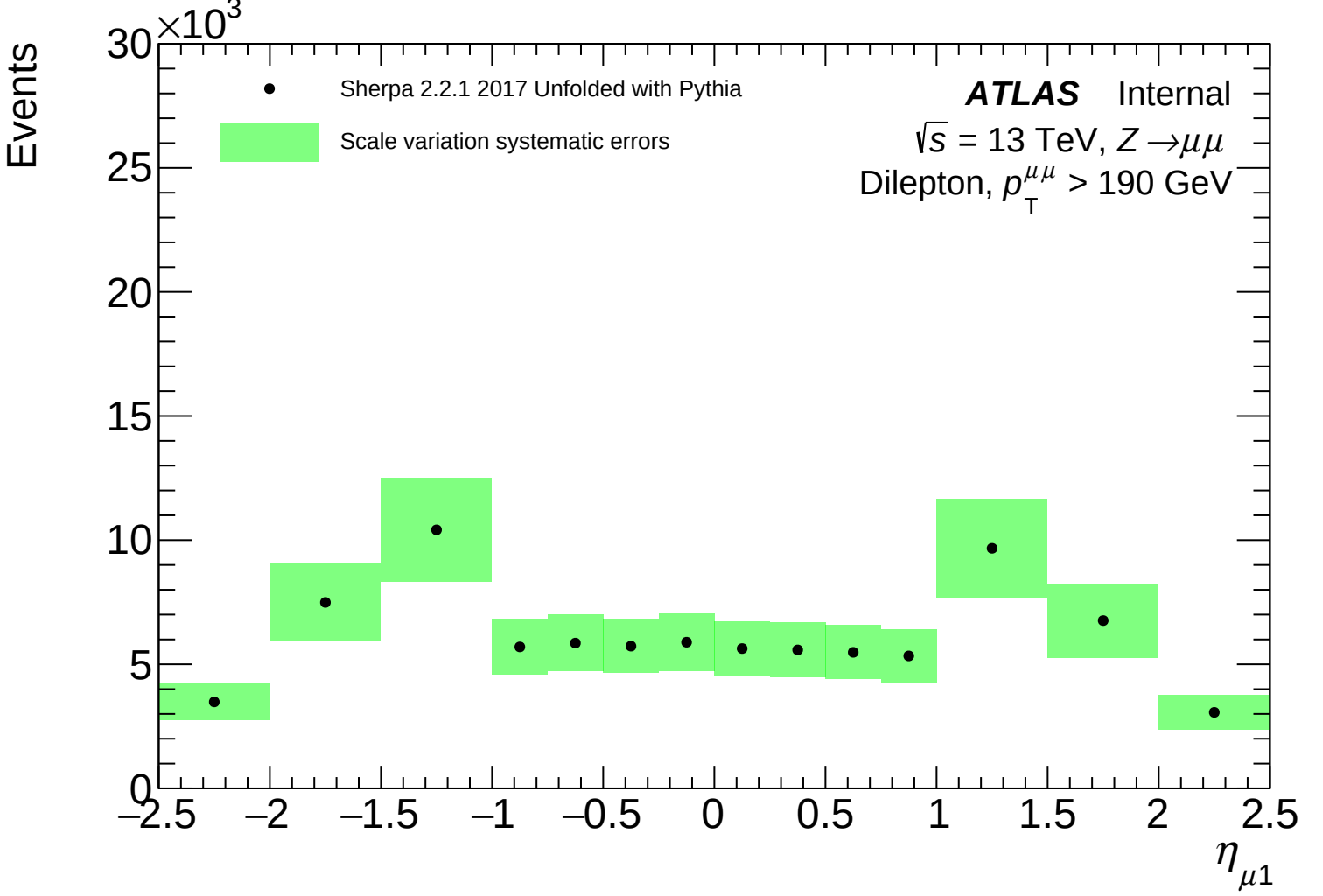

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

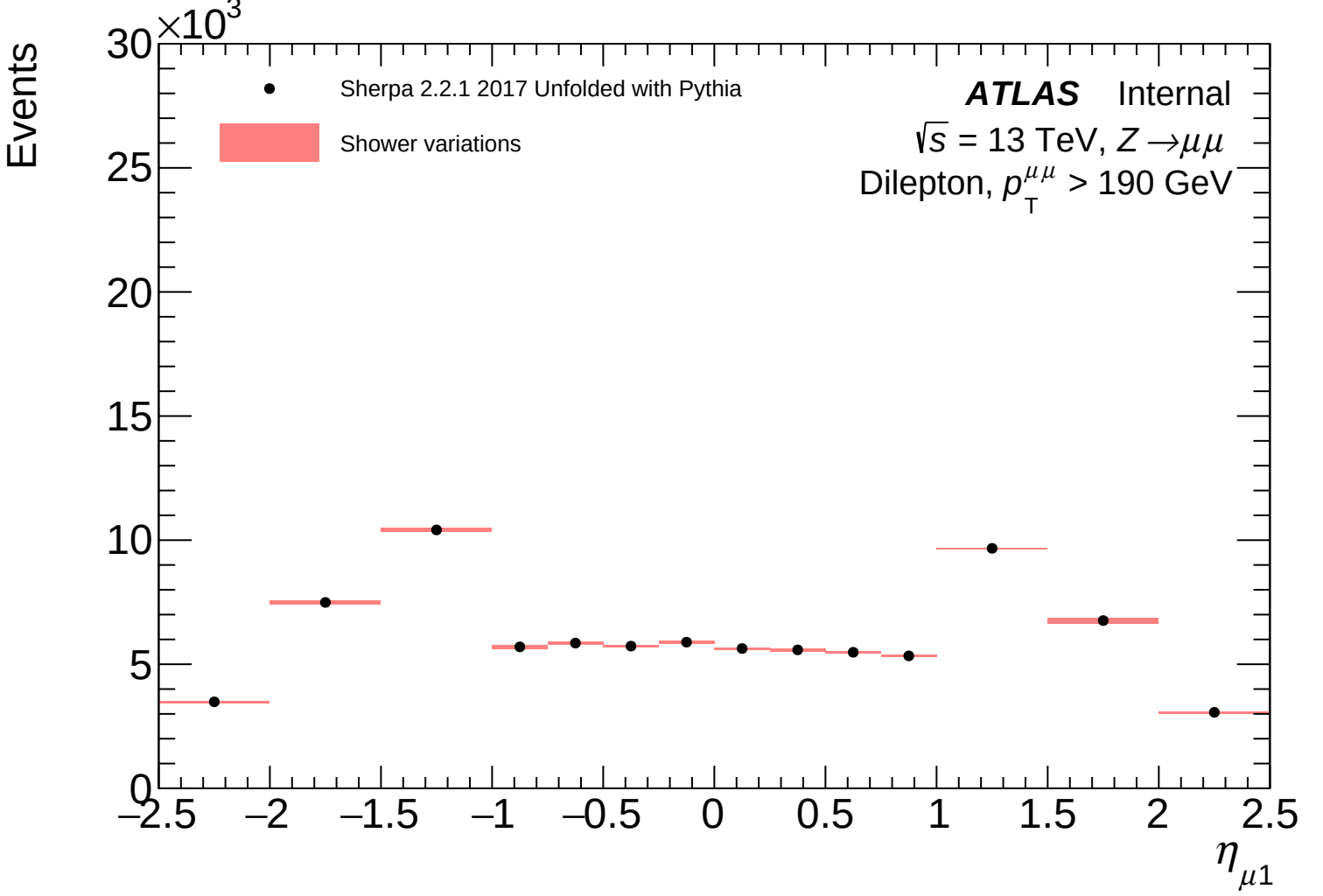

Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
$\eta_{\mu 1}$

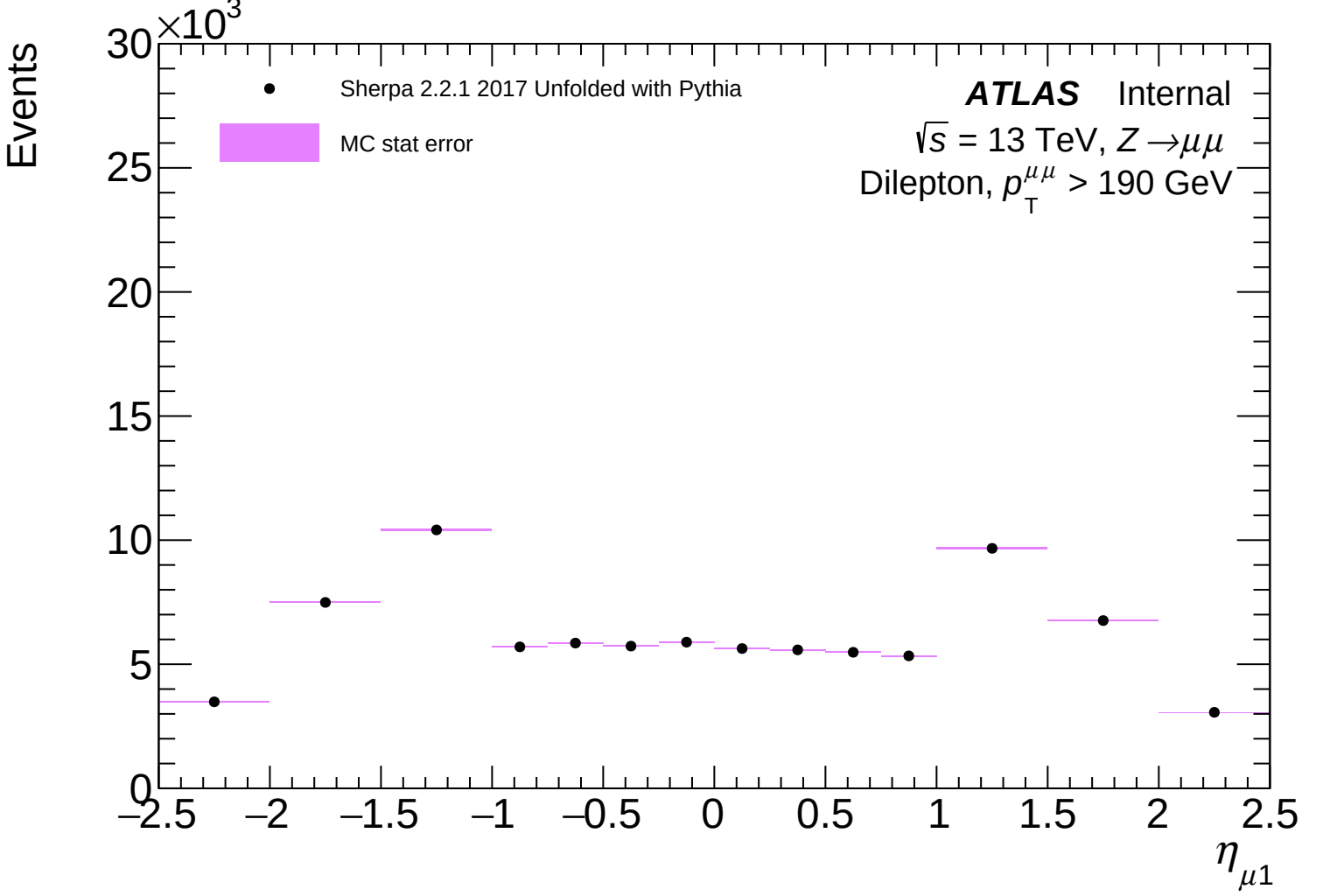

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

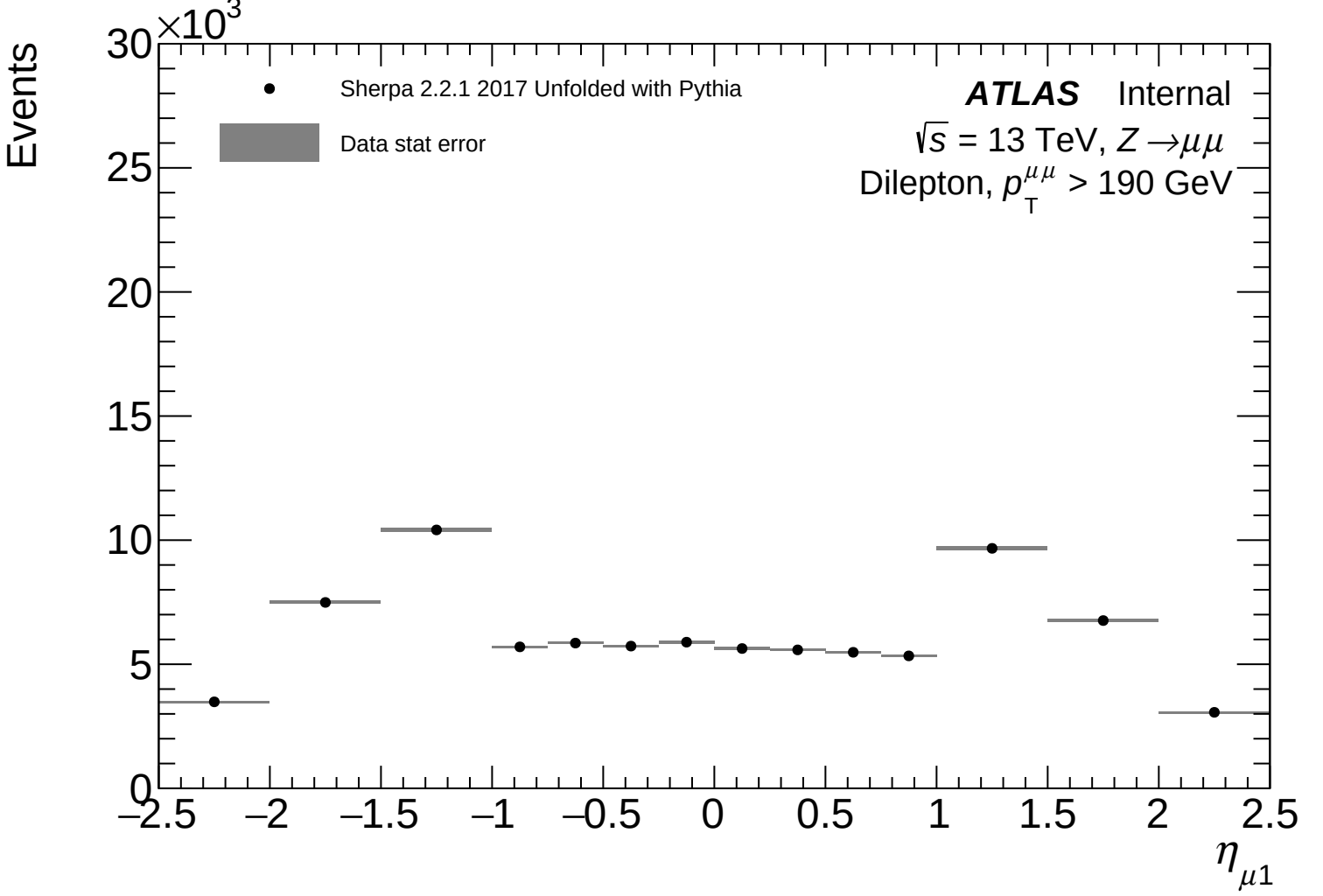

$\times 10^3$
$dN / d\eta_{\mu 1}$
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
$\eta_{\mu 1}$

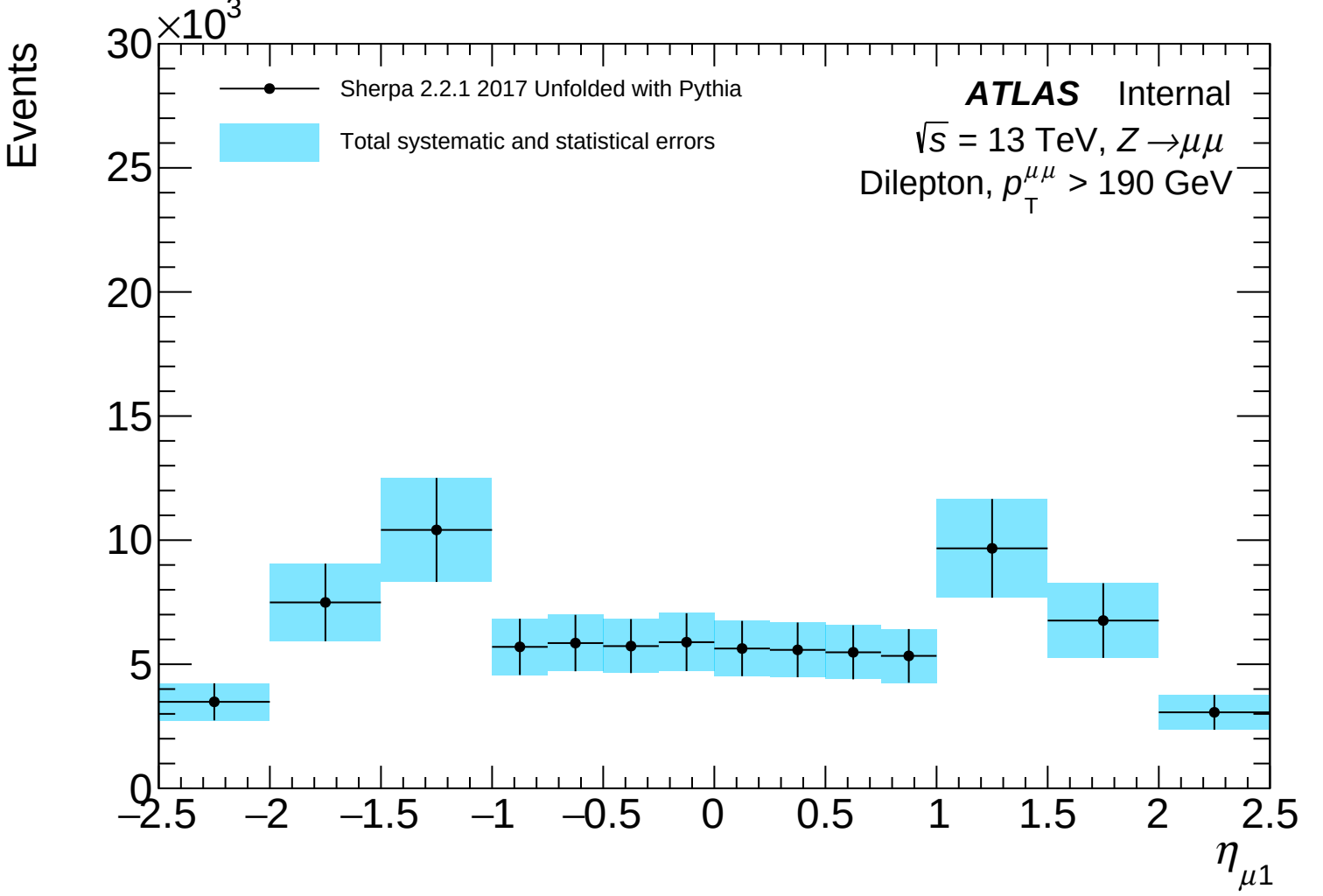

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

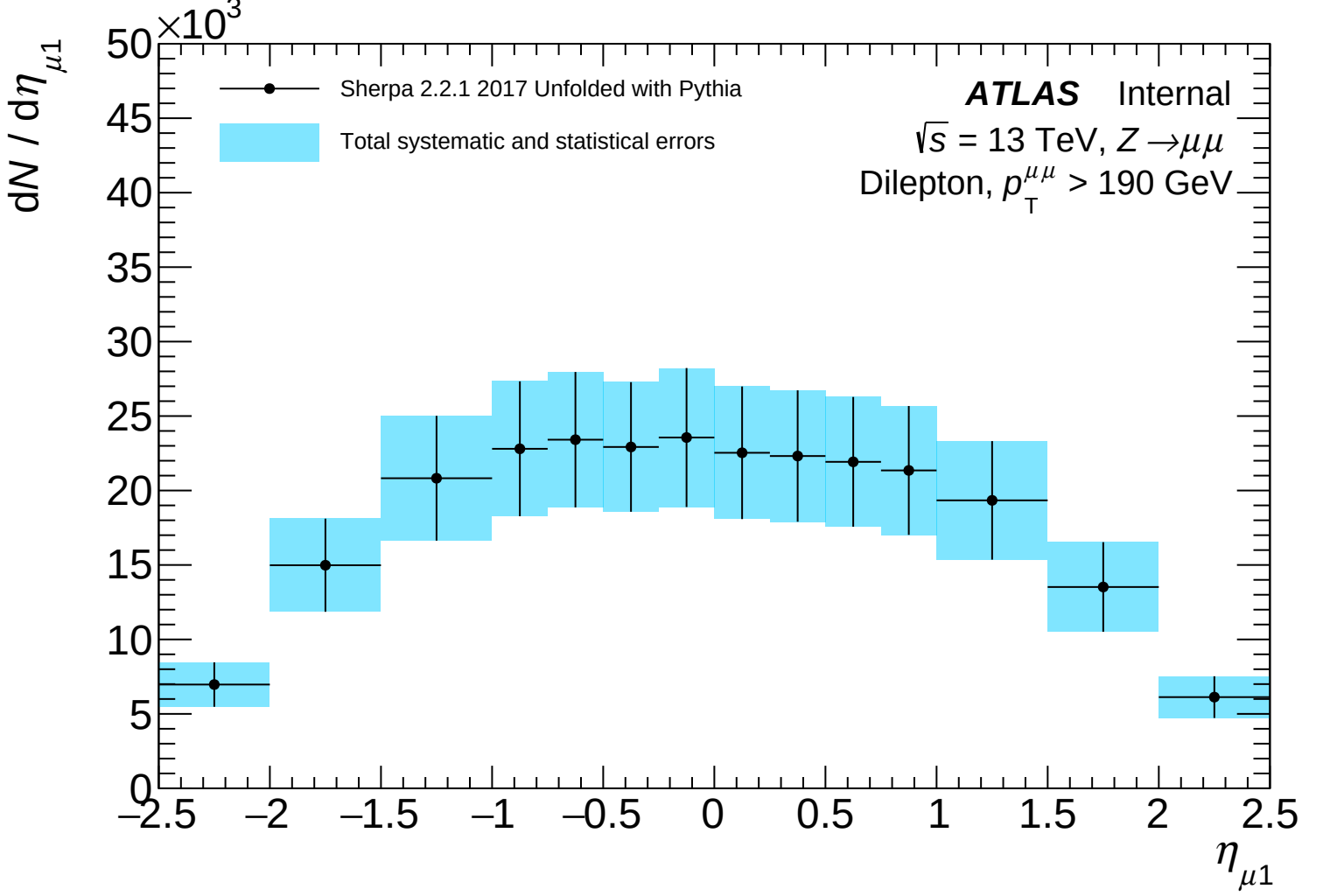

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

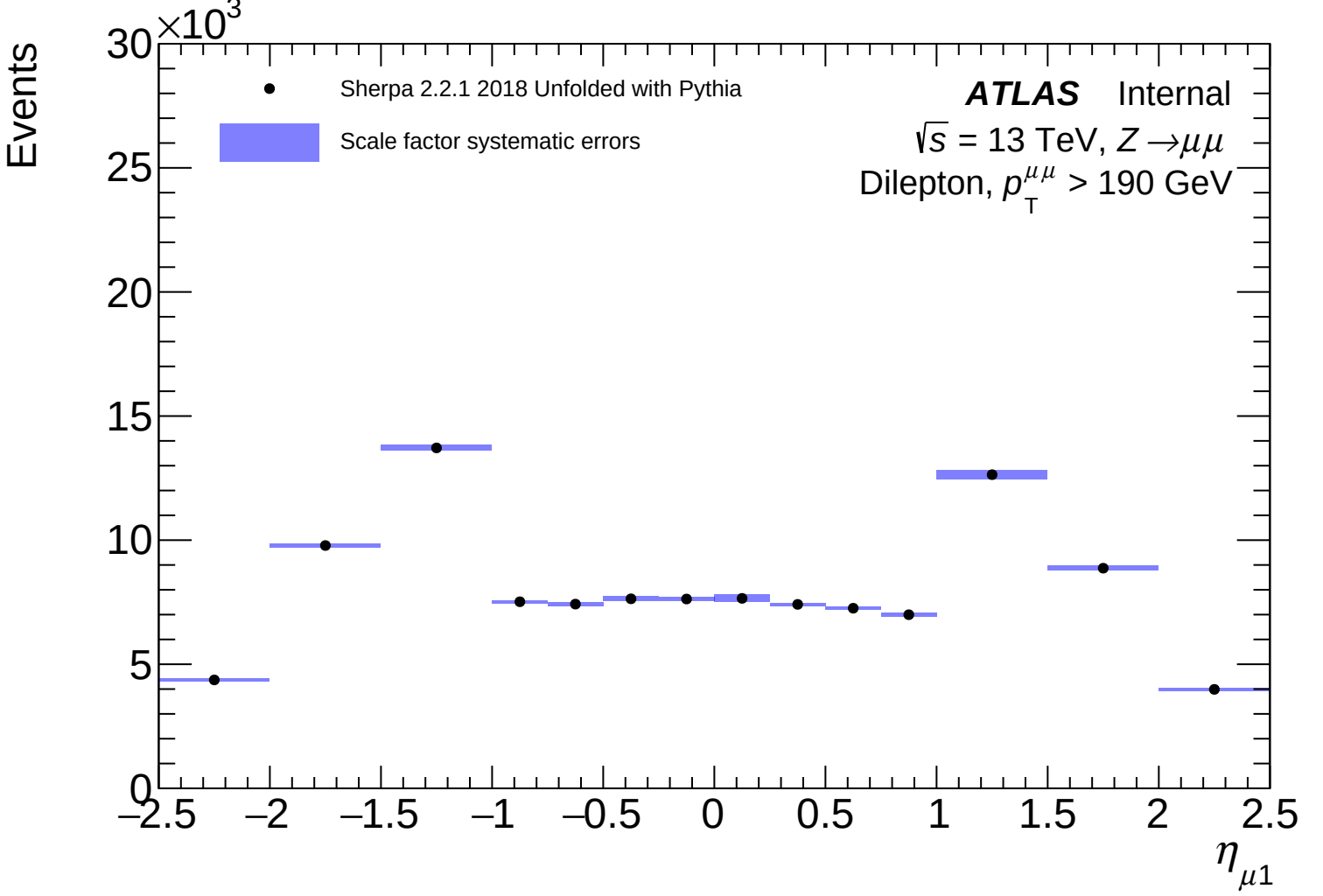

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

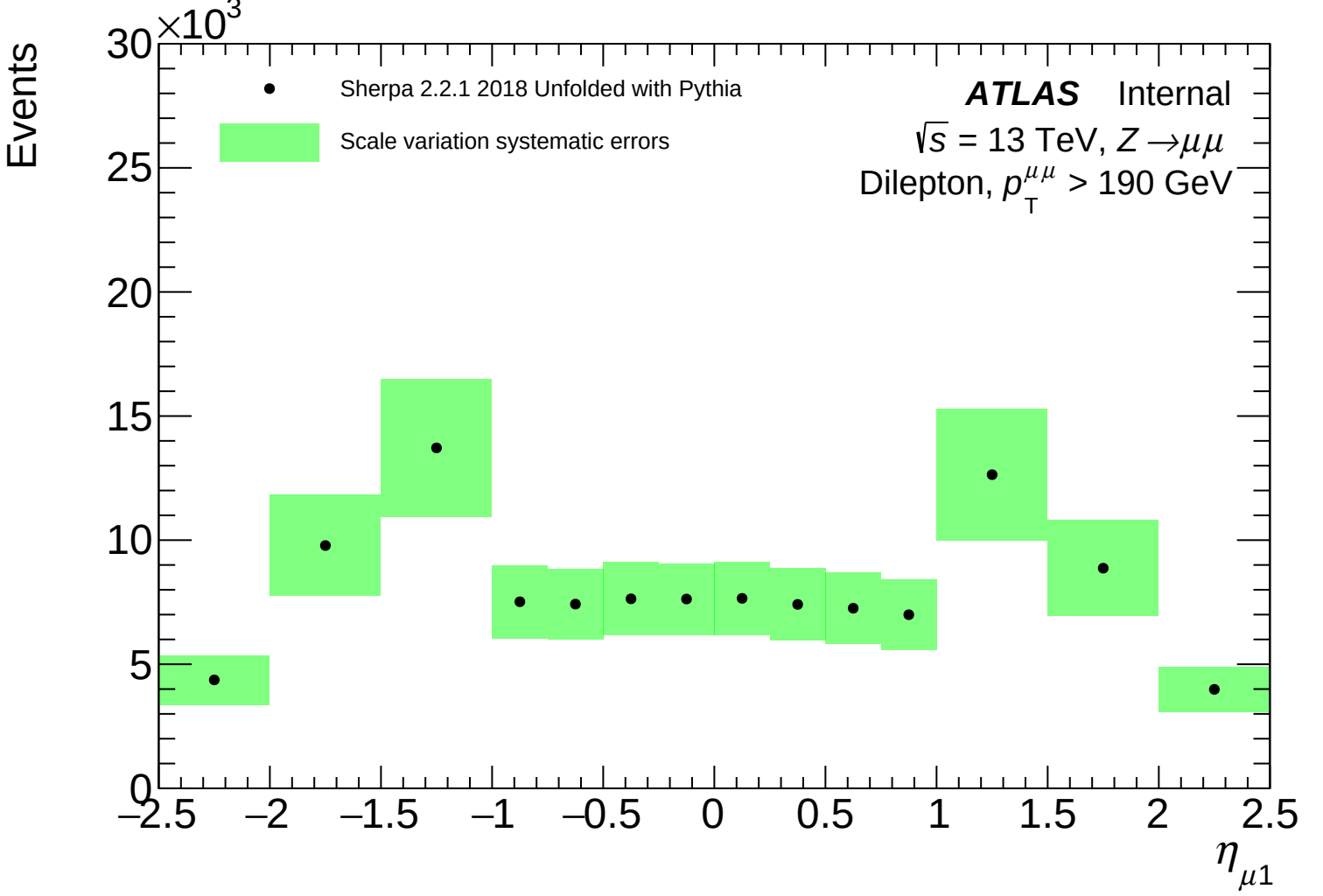

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

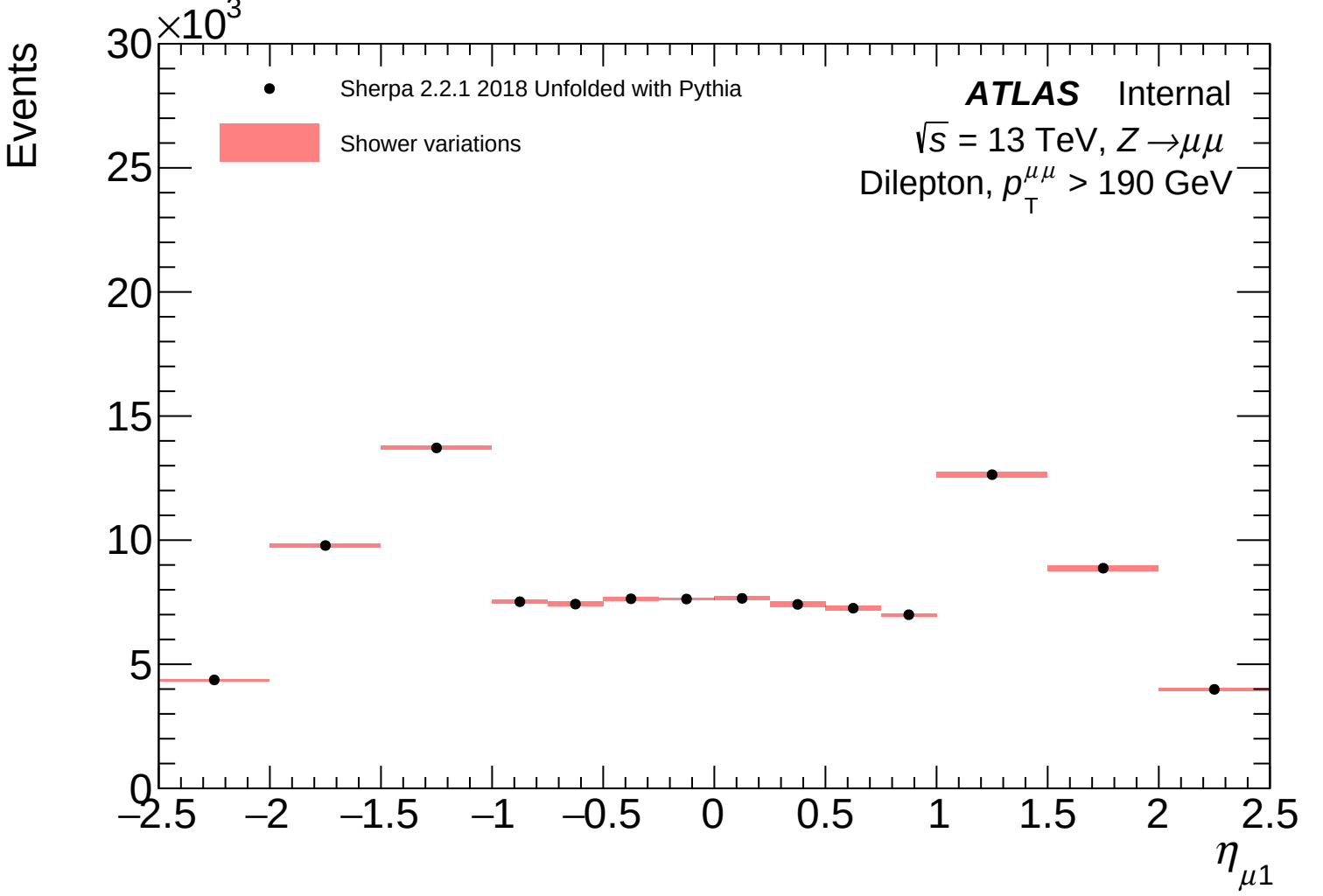

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

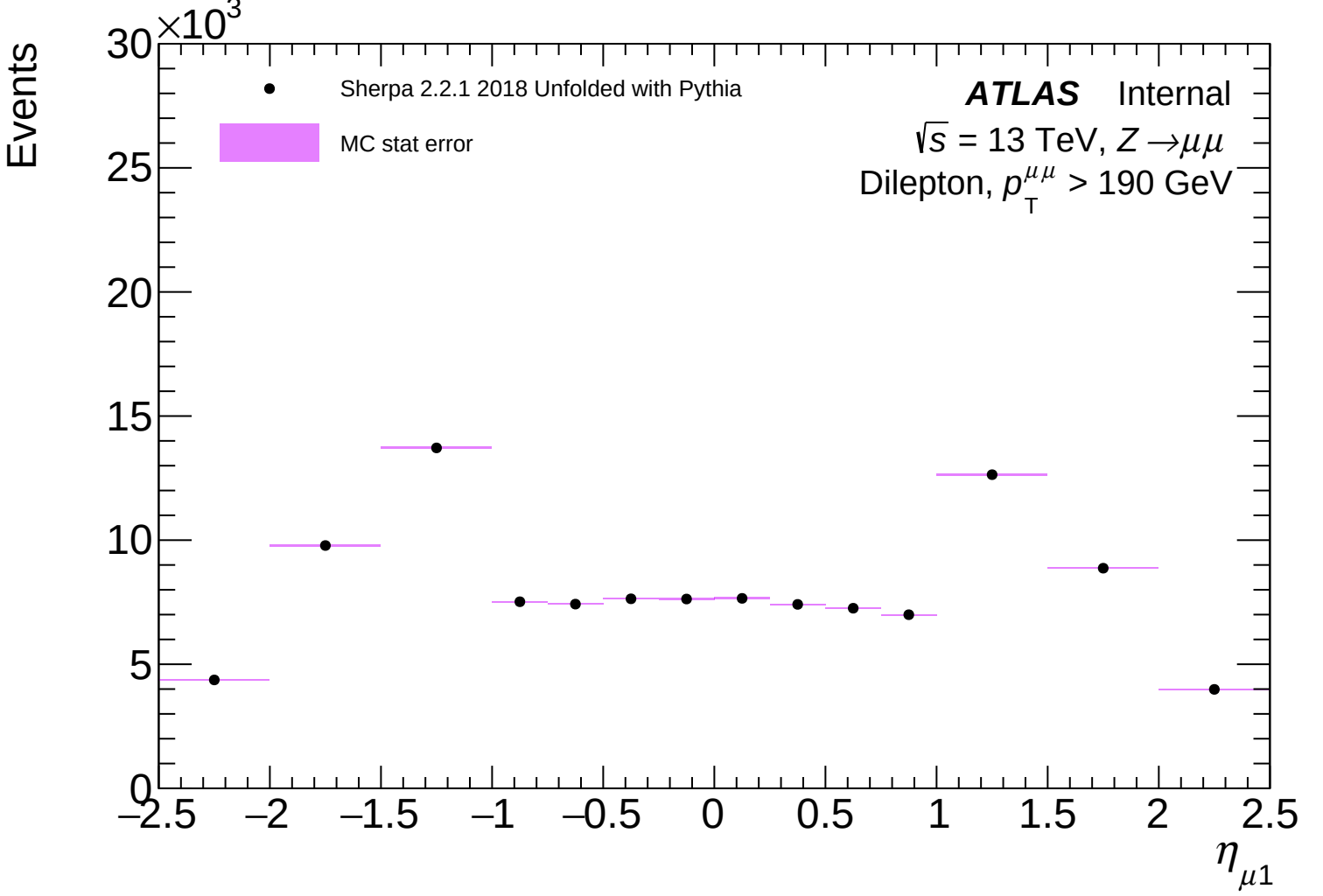

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

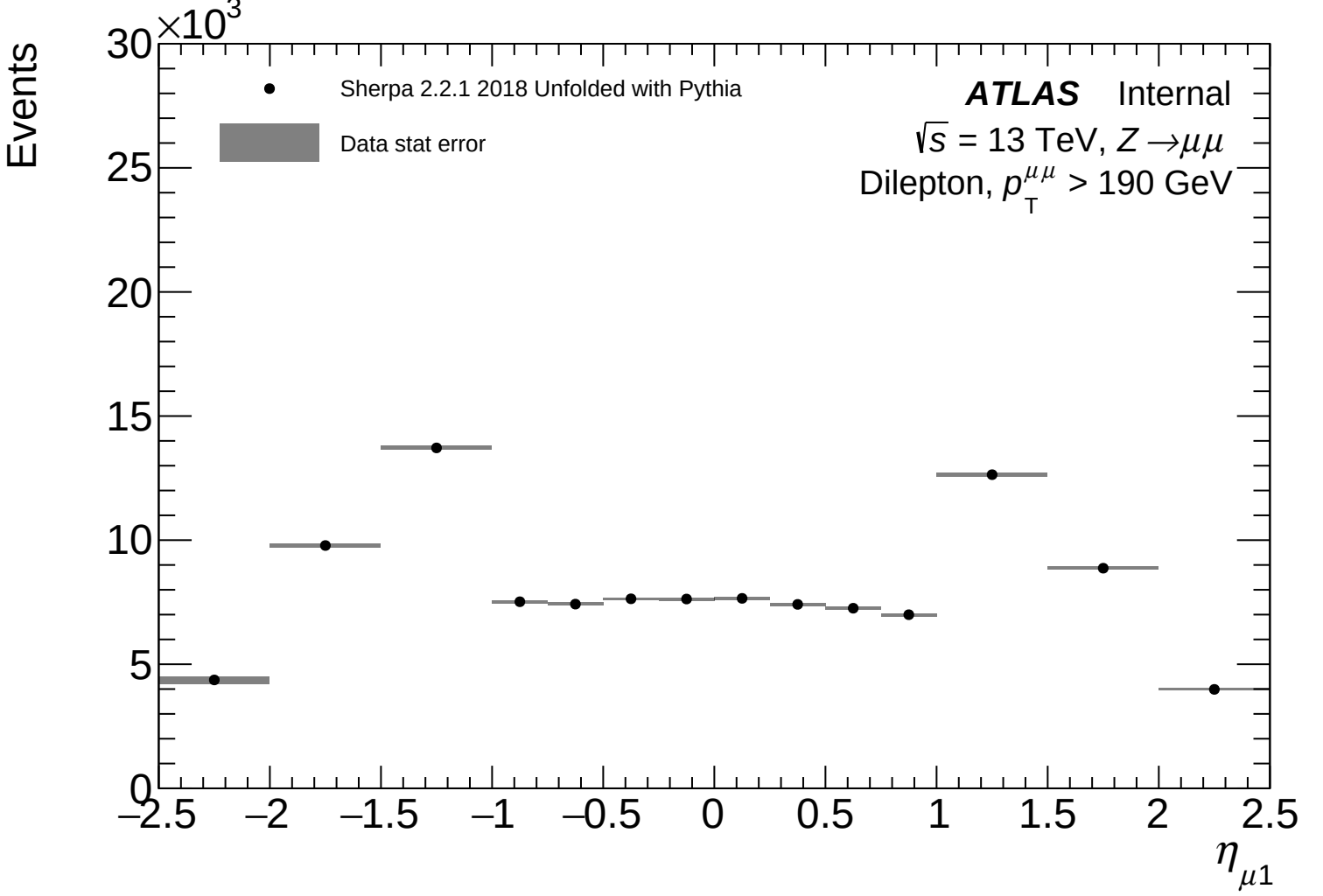

$\times 10^3$
$dN / d\eta_{\mu 1}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
50
45
40
35
30
25
20
15
10
5
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
$\eta_{\mu 1}$

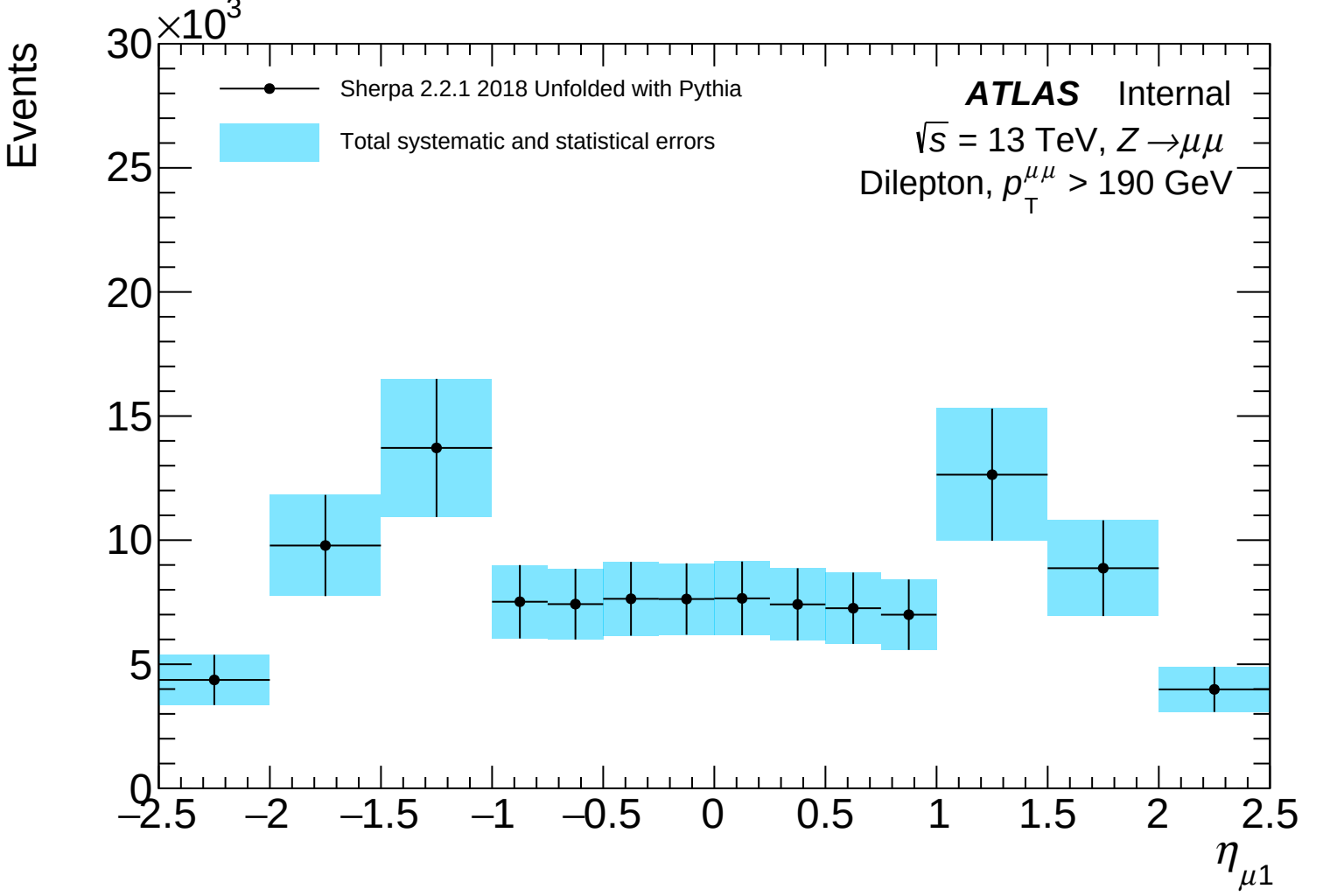

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

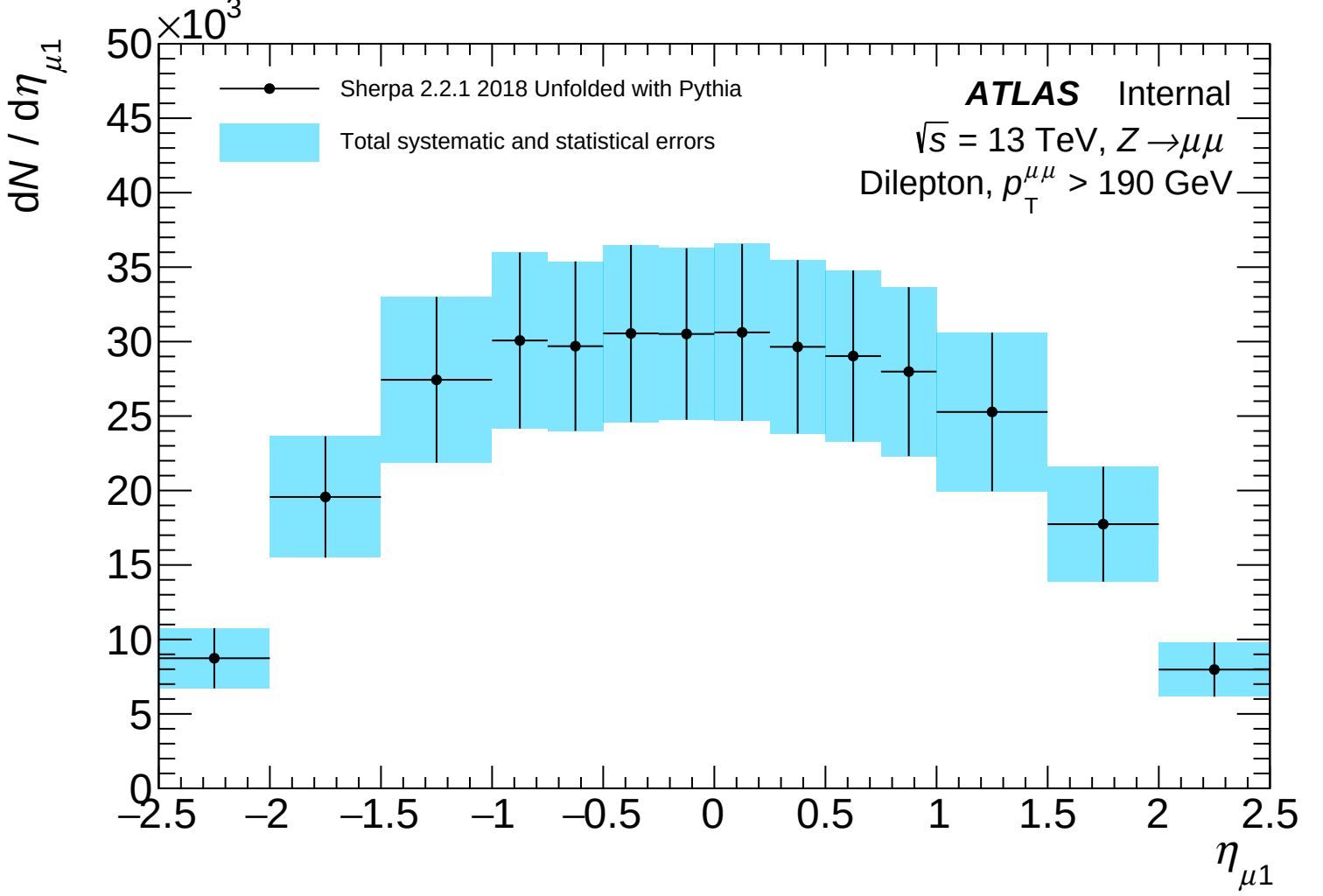

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

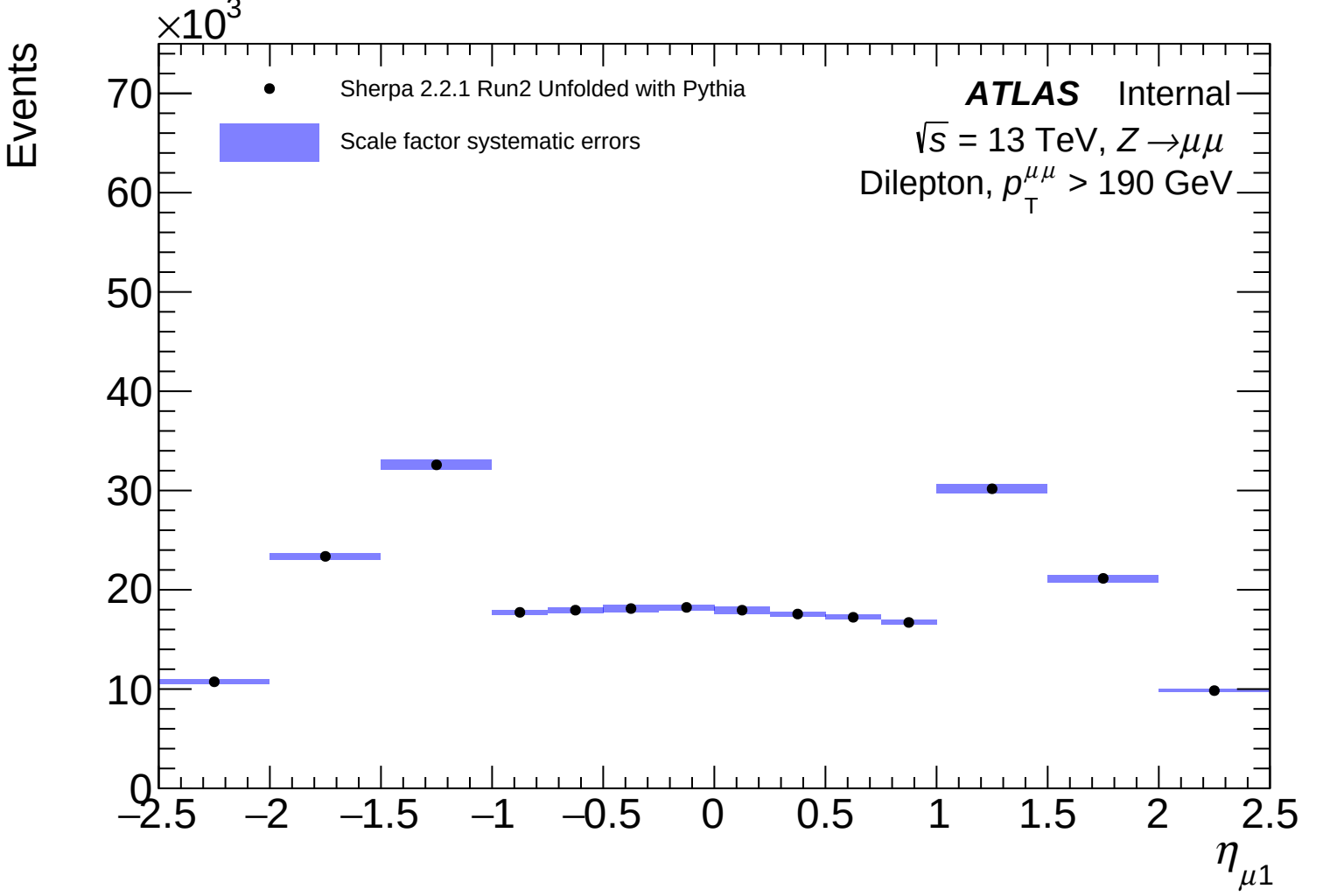

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

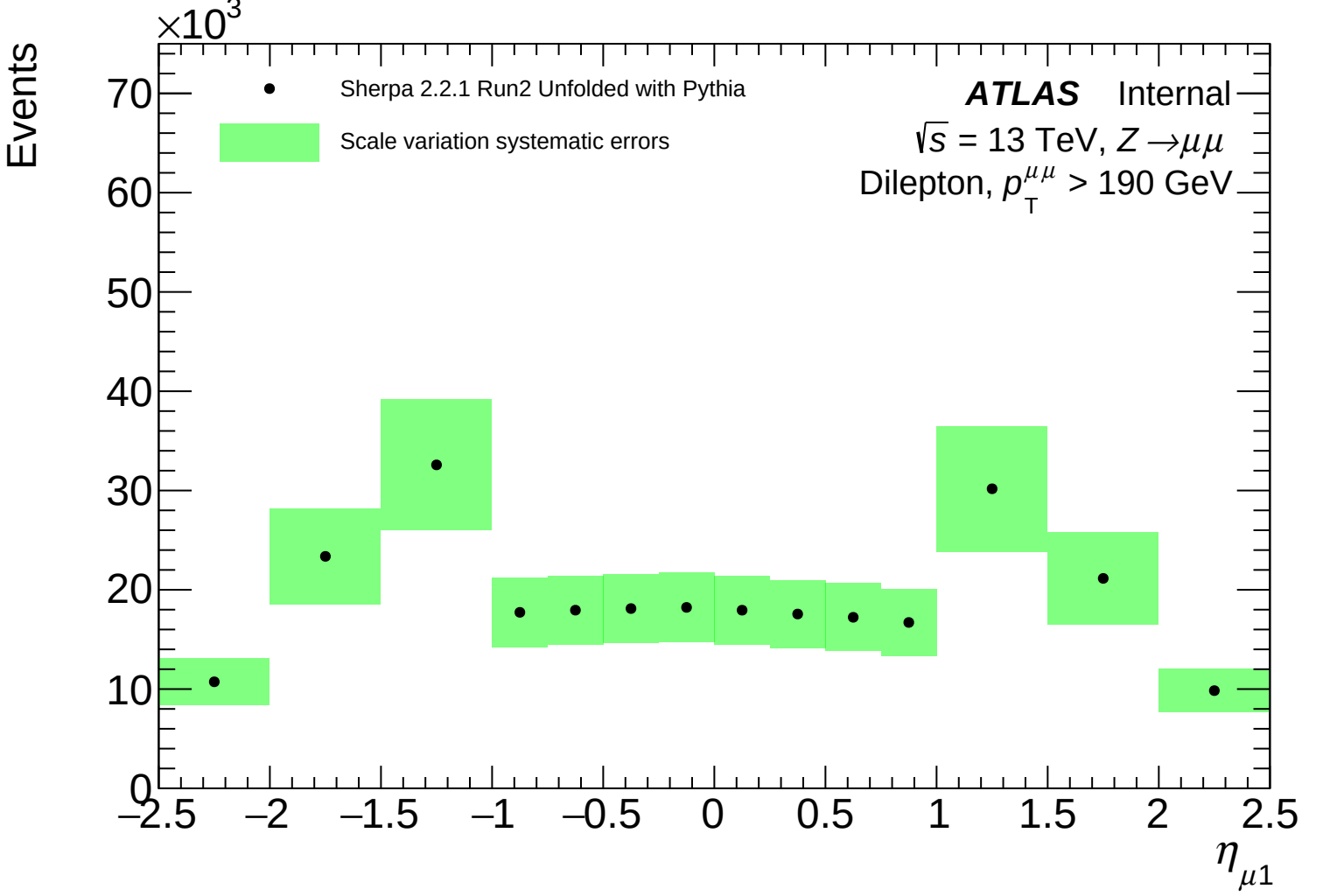

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

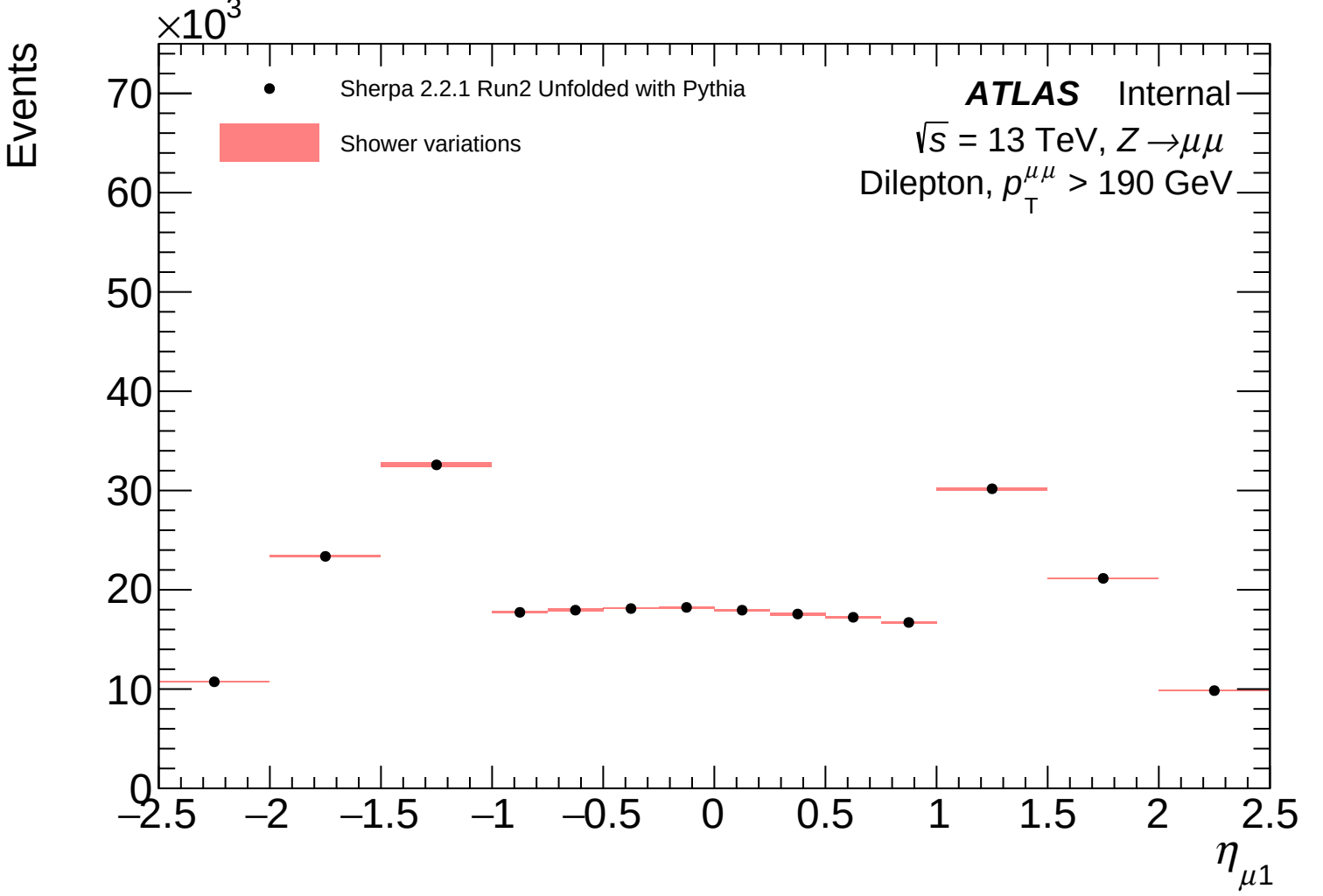

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

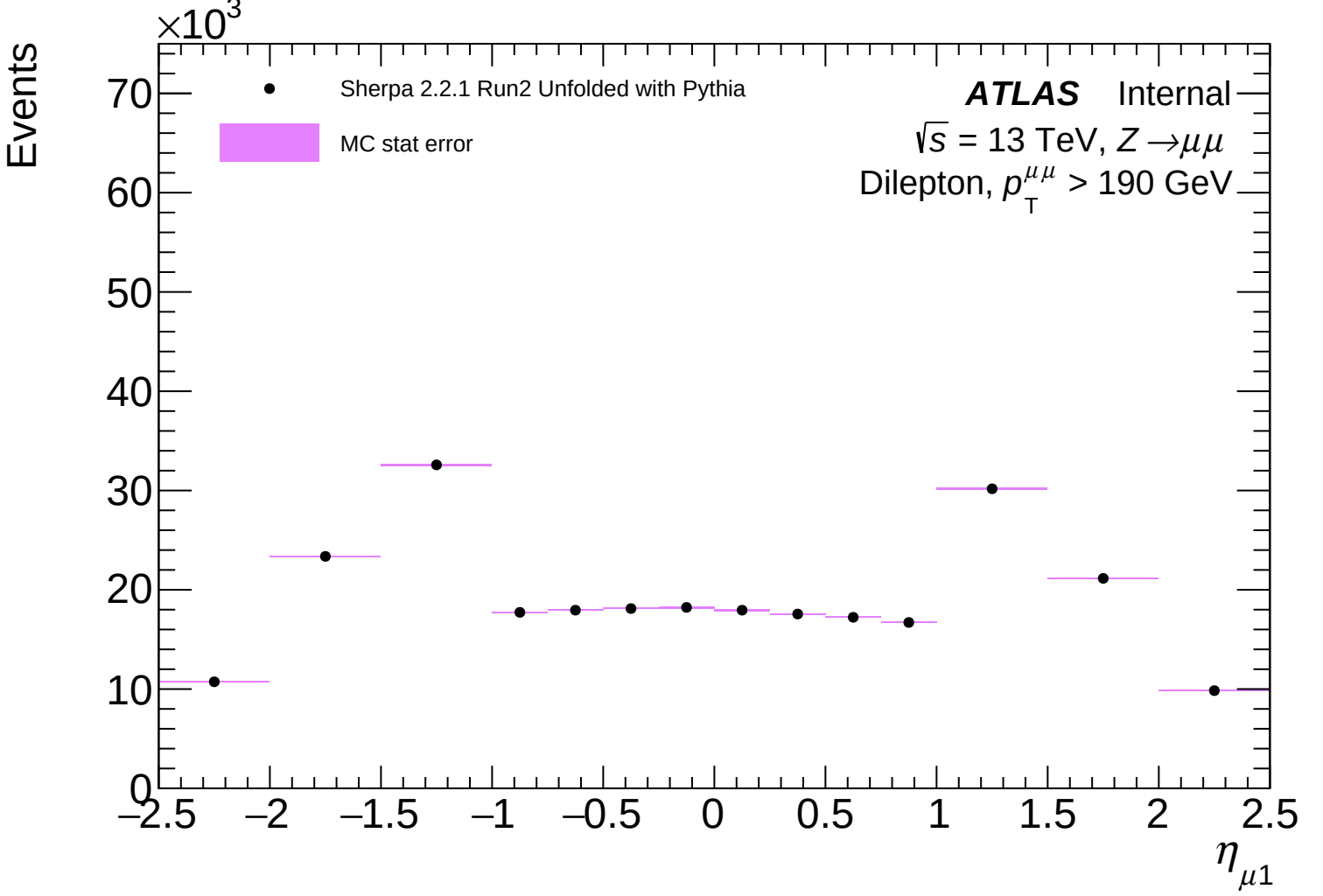

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

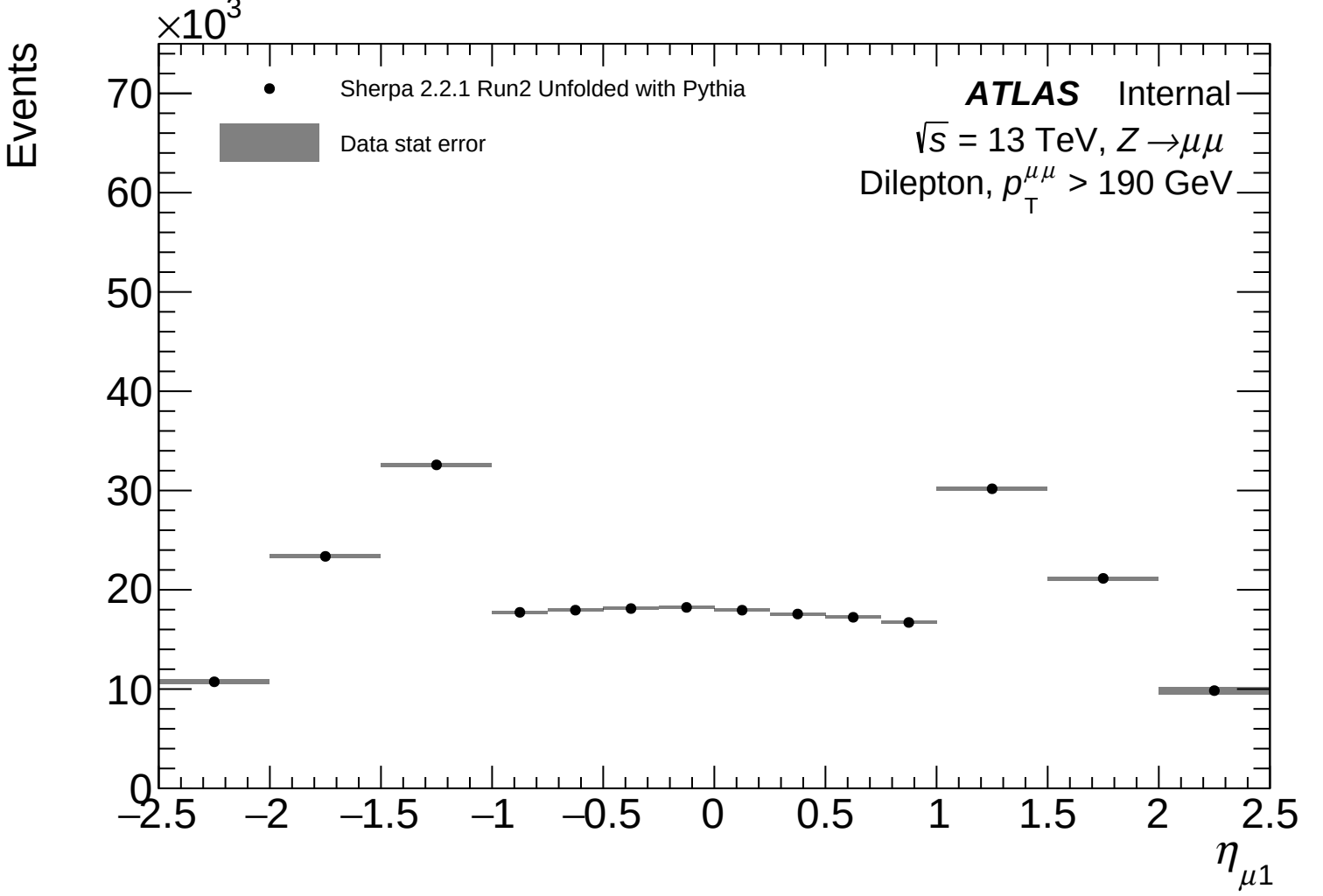

$\times 10^3$
$dN / d\eta_{\mu 1}$
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
$\eta_{\mu 1}$

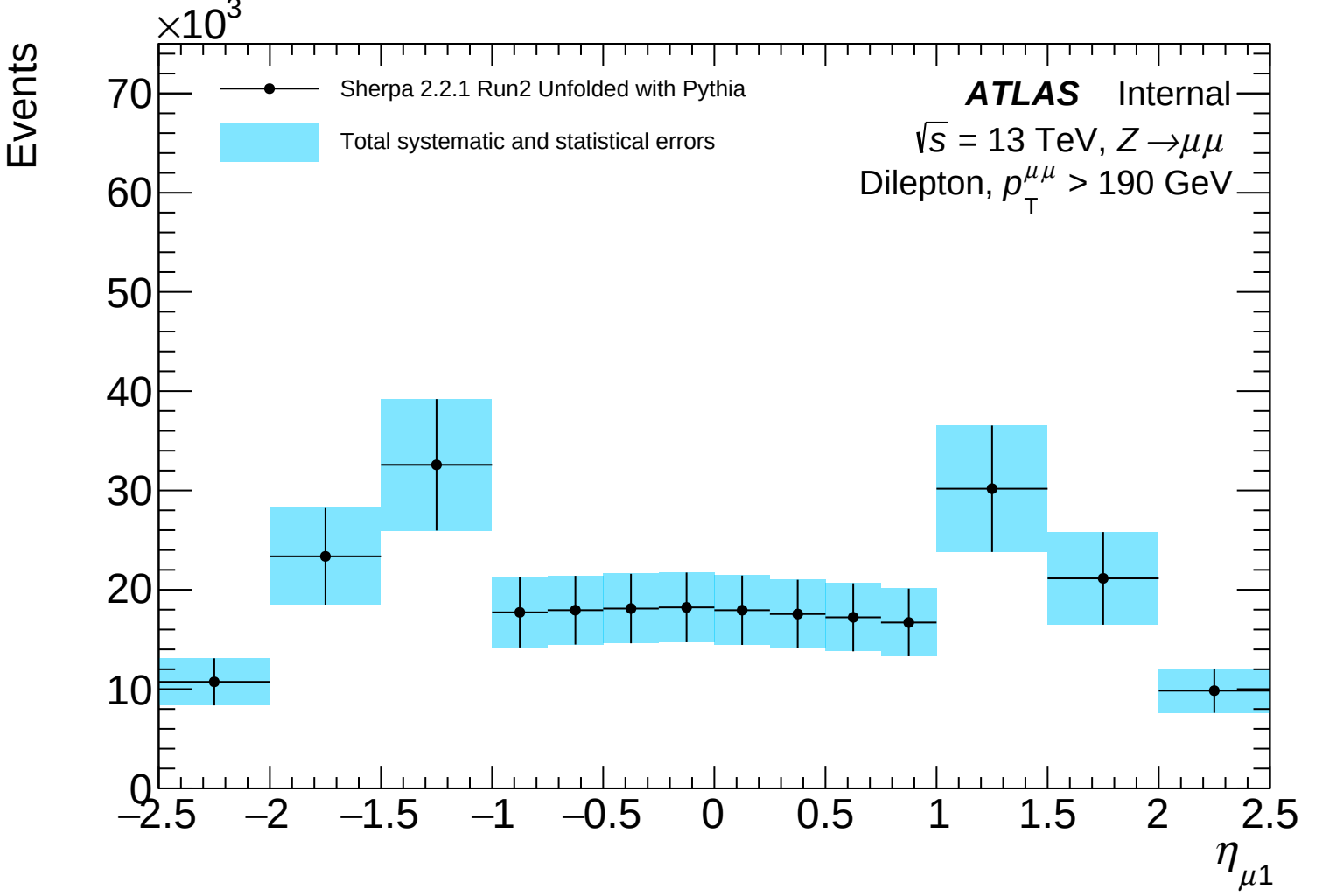

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

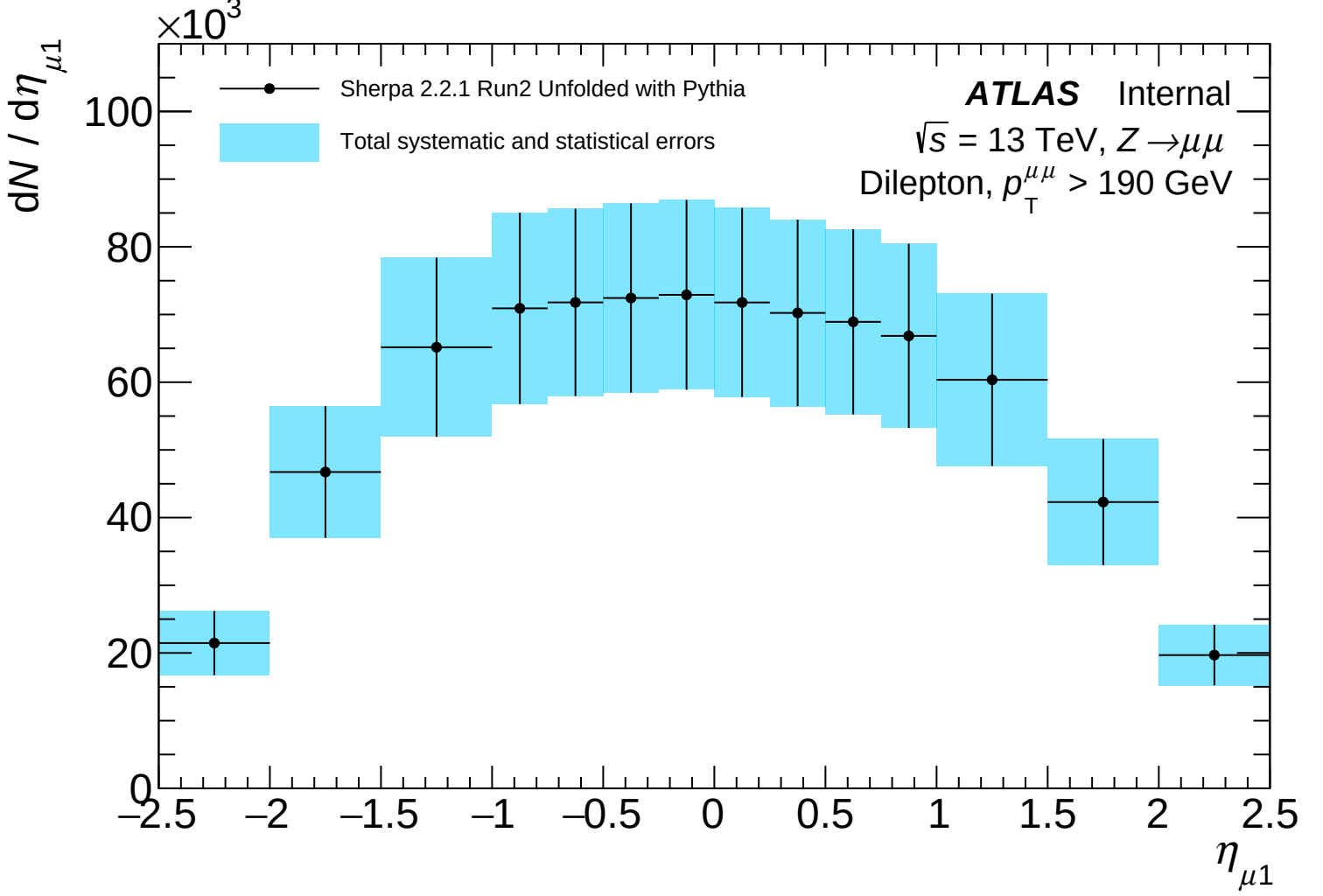

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

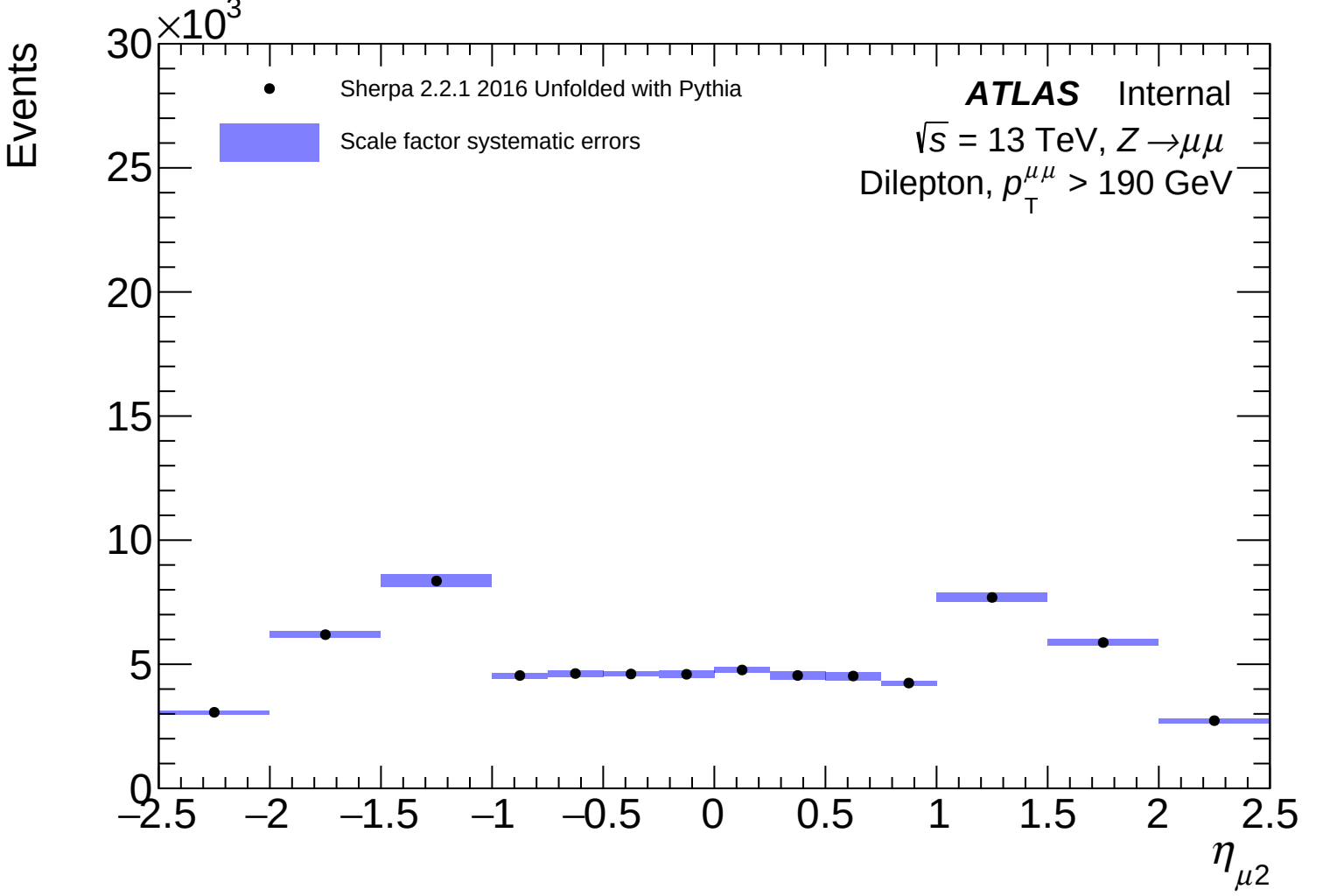

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

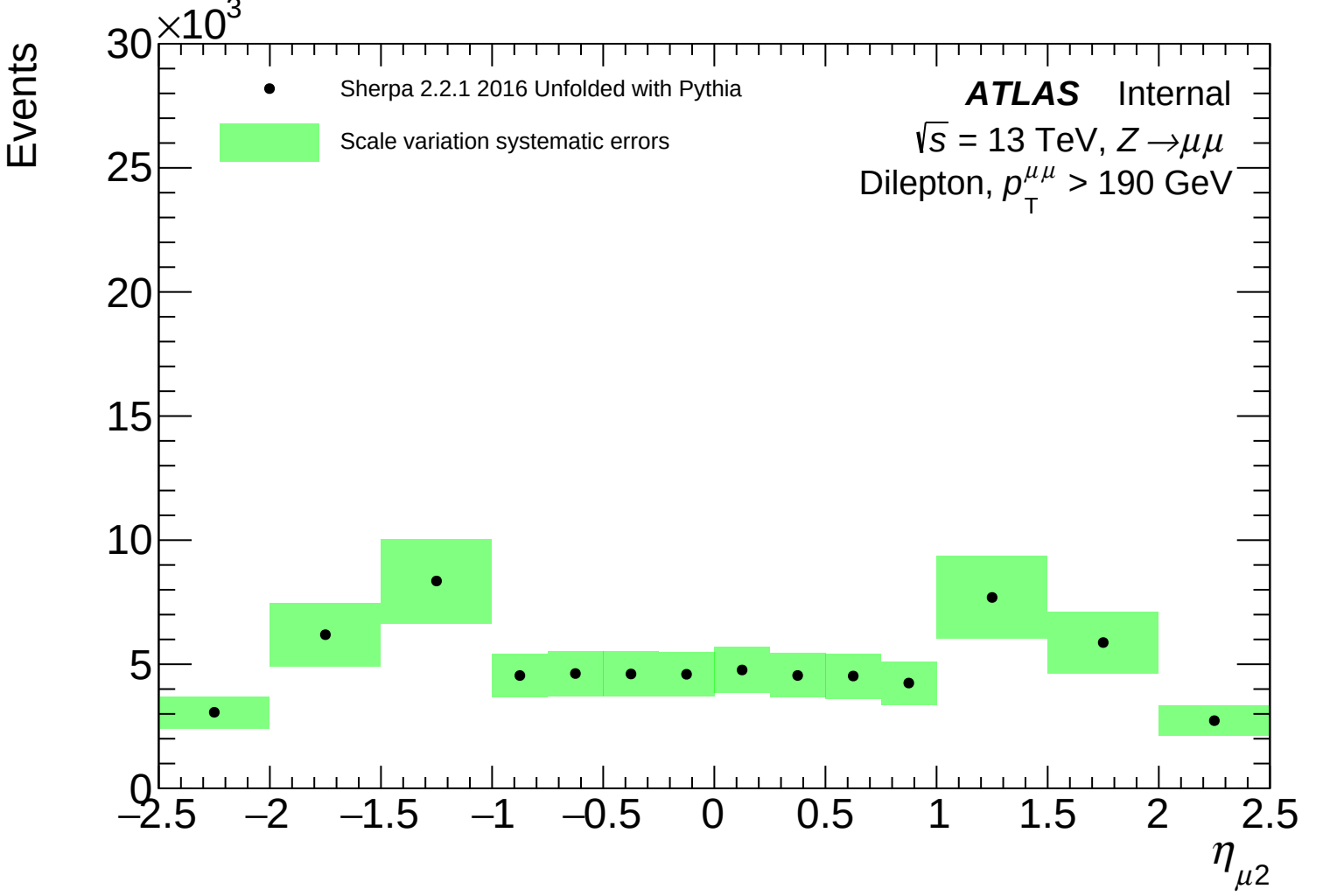

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

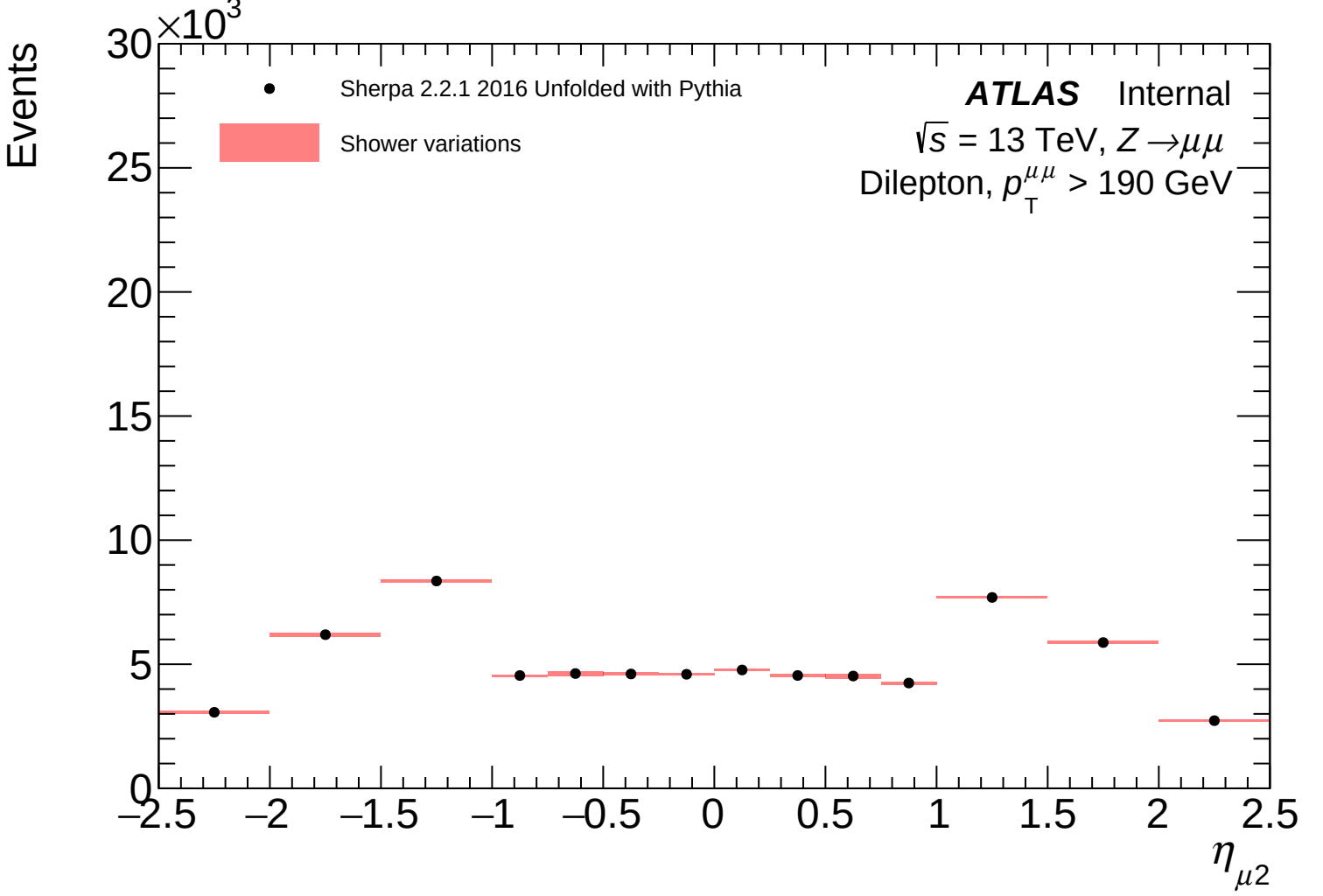

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

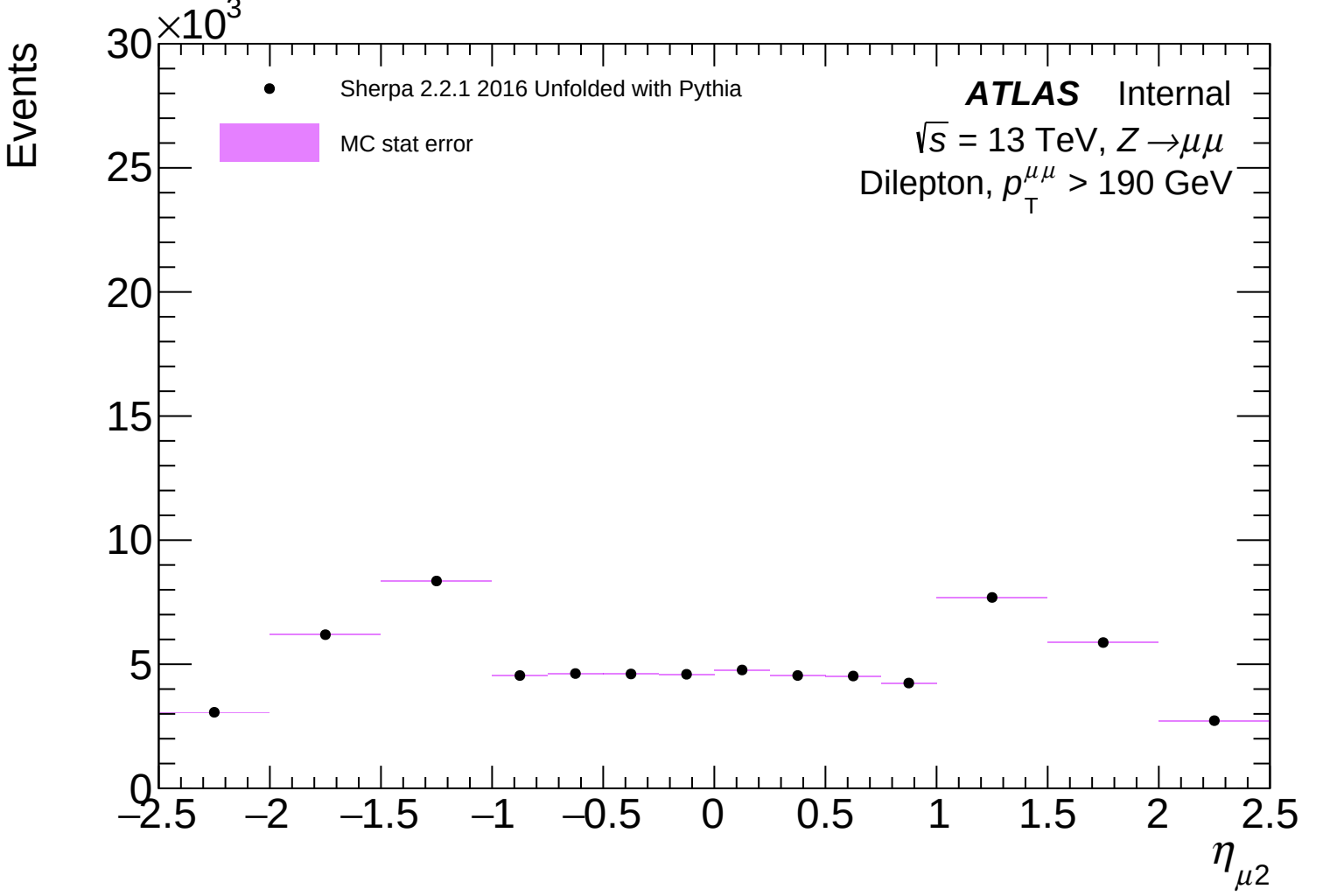

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

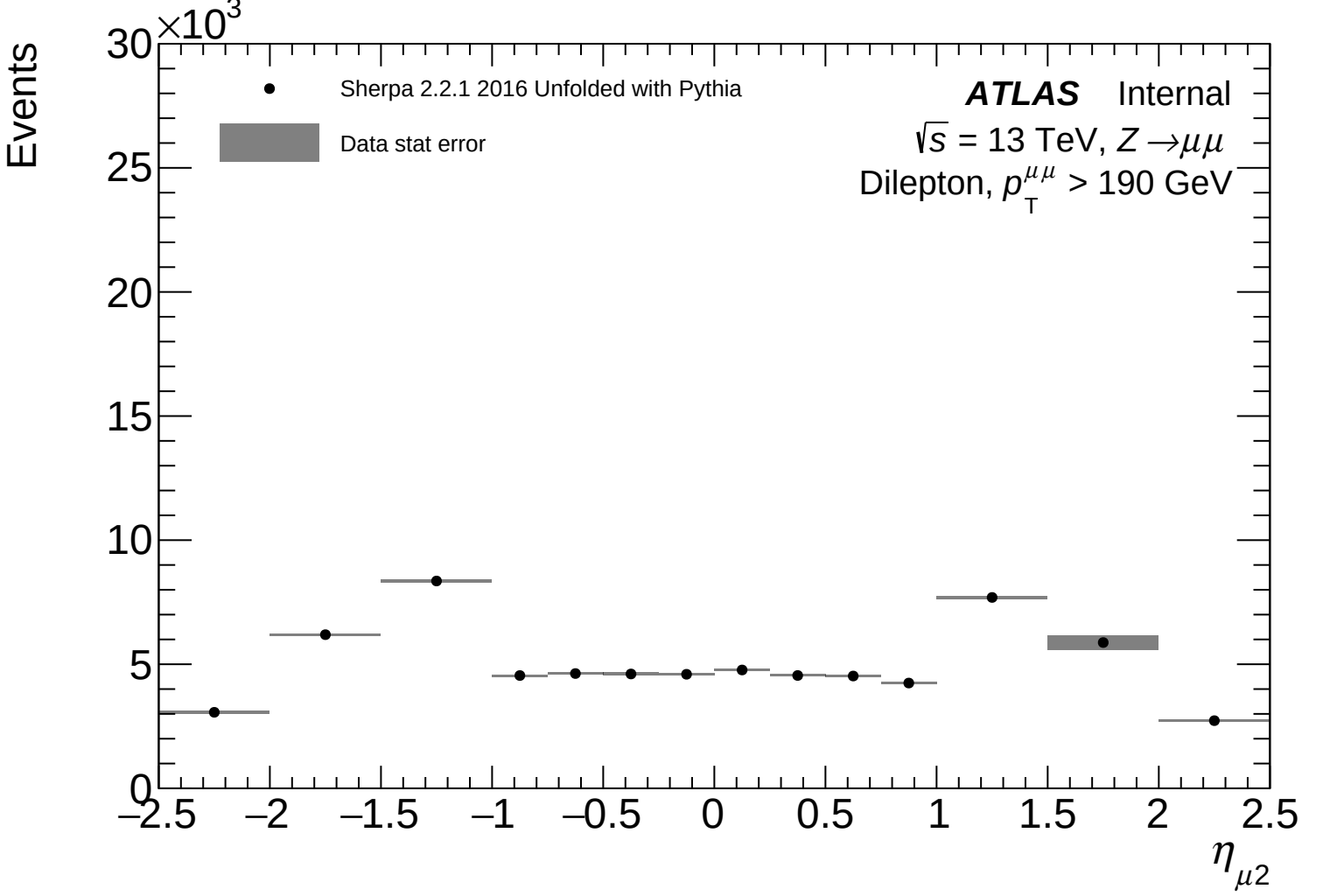

×10^3
dN / dη_μ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
80
60
40
20
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ1

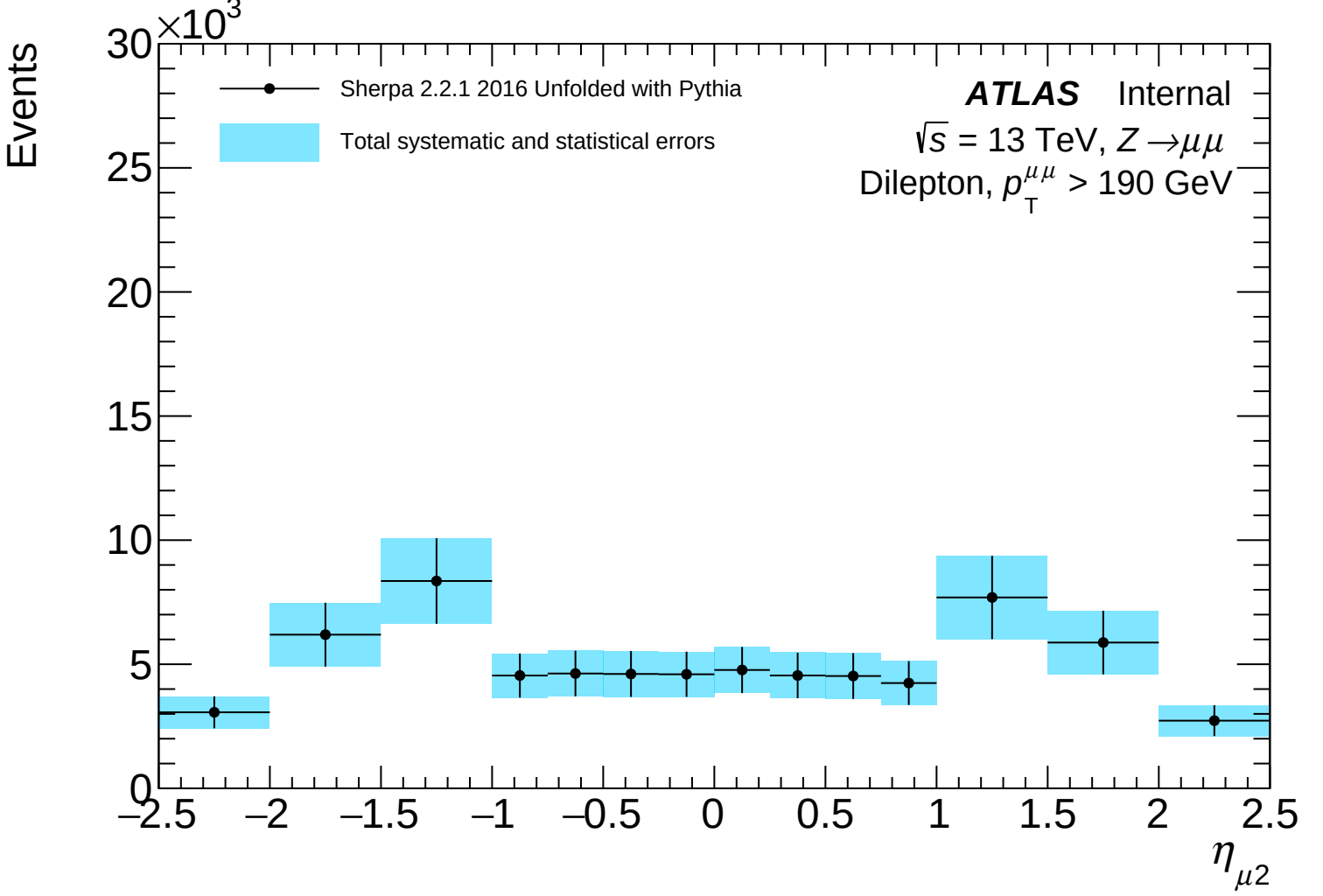

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

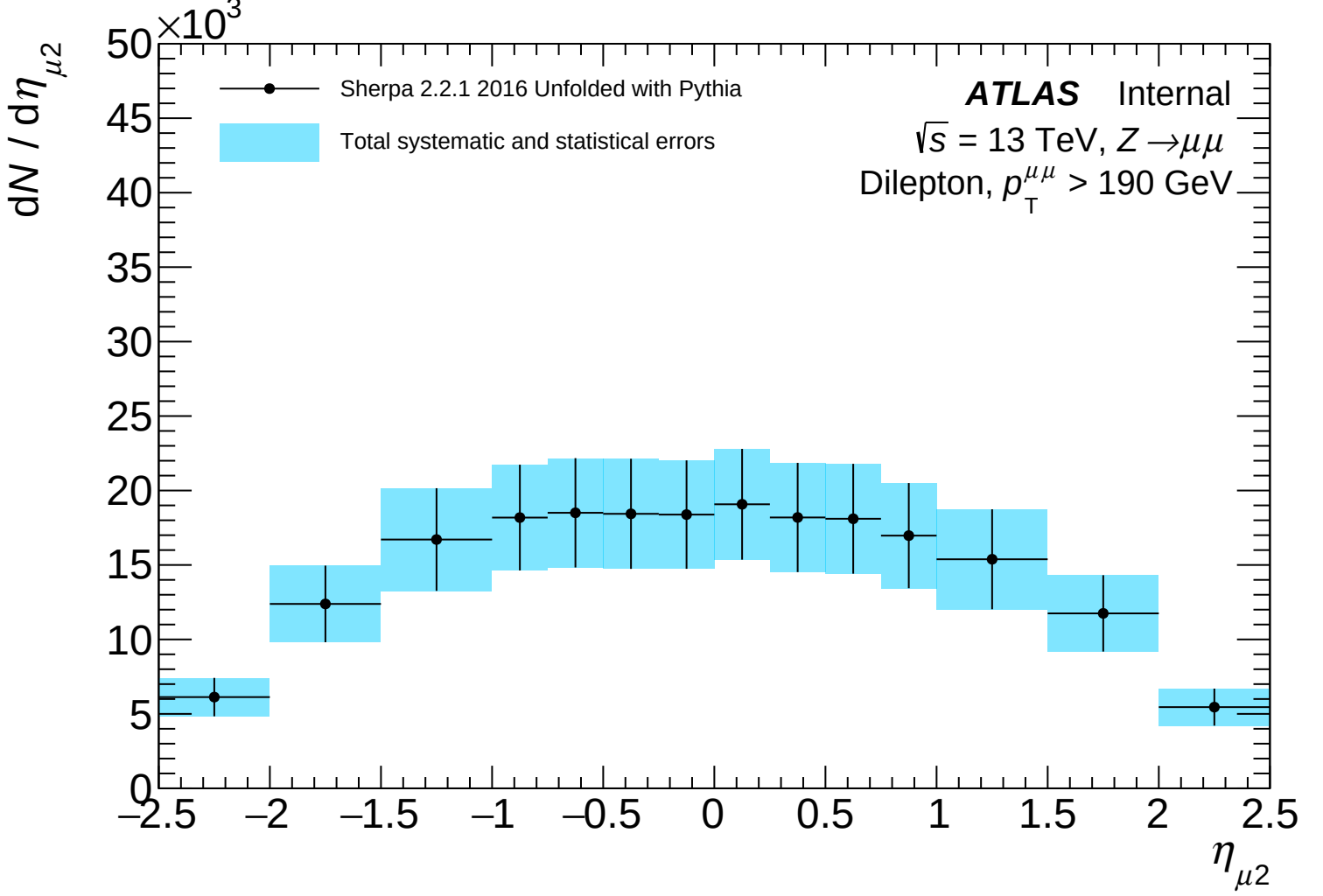

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

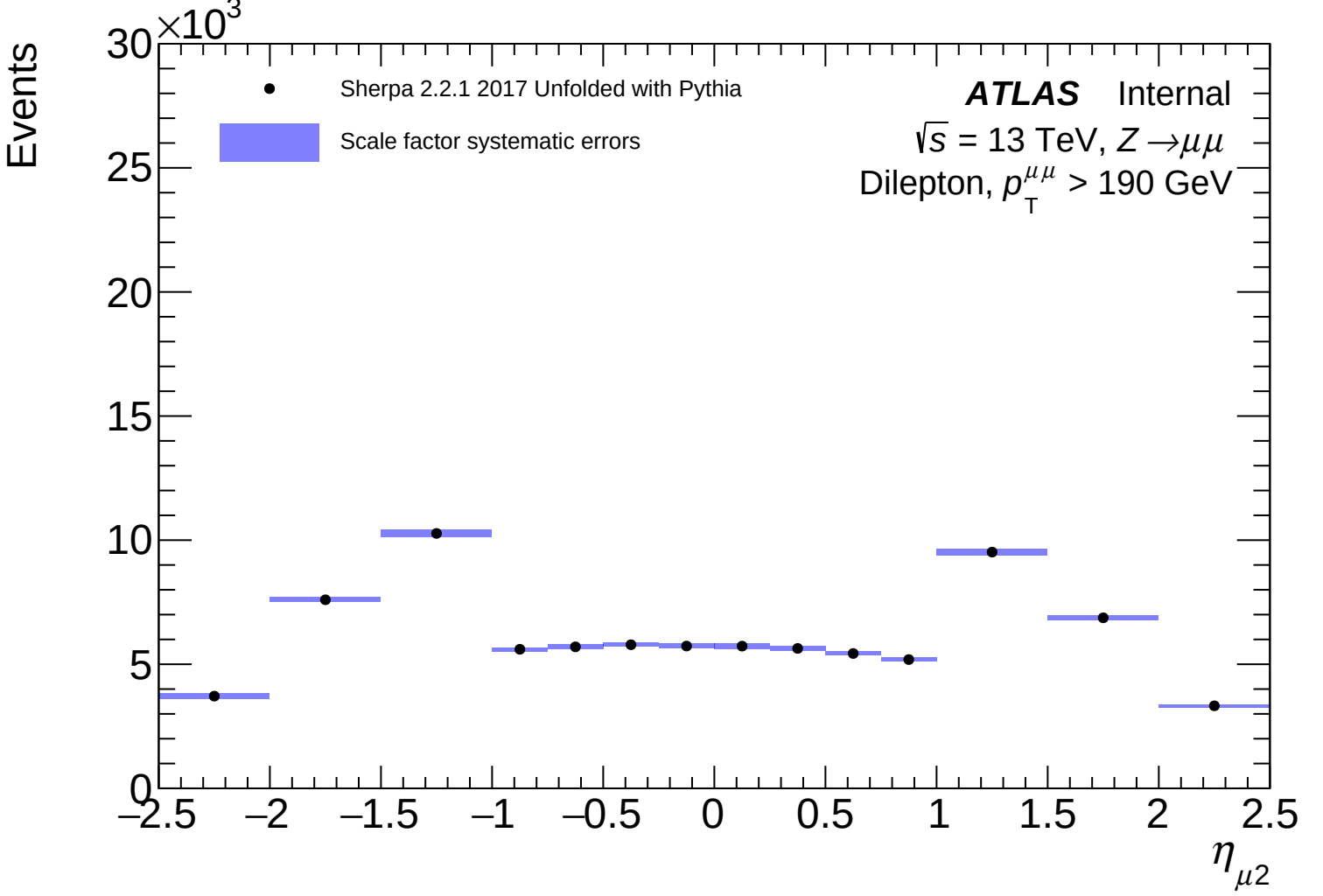

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

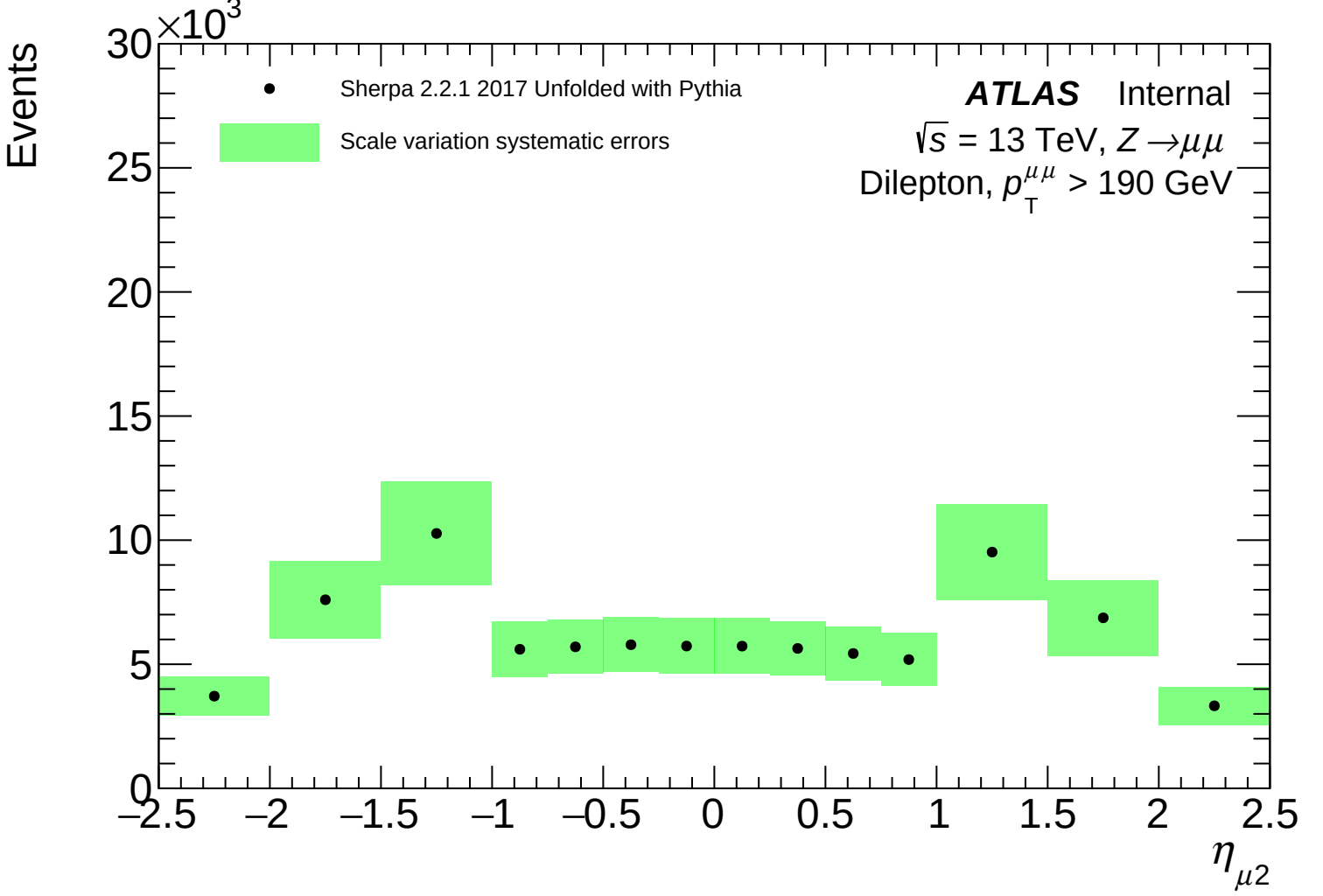

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

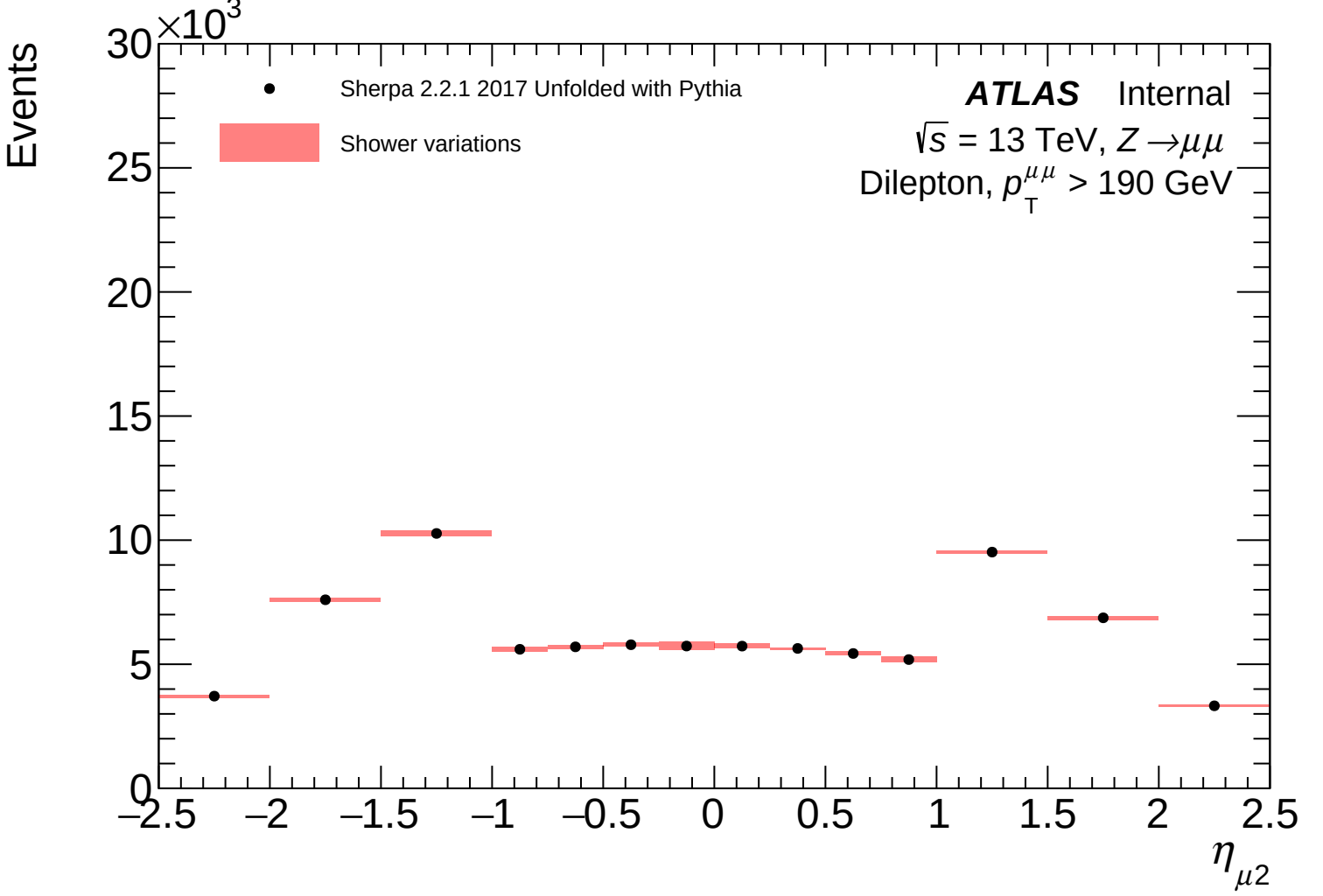

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

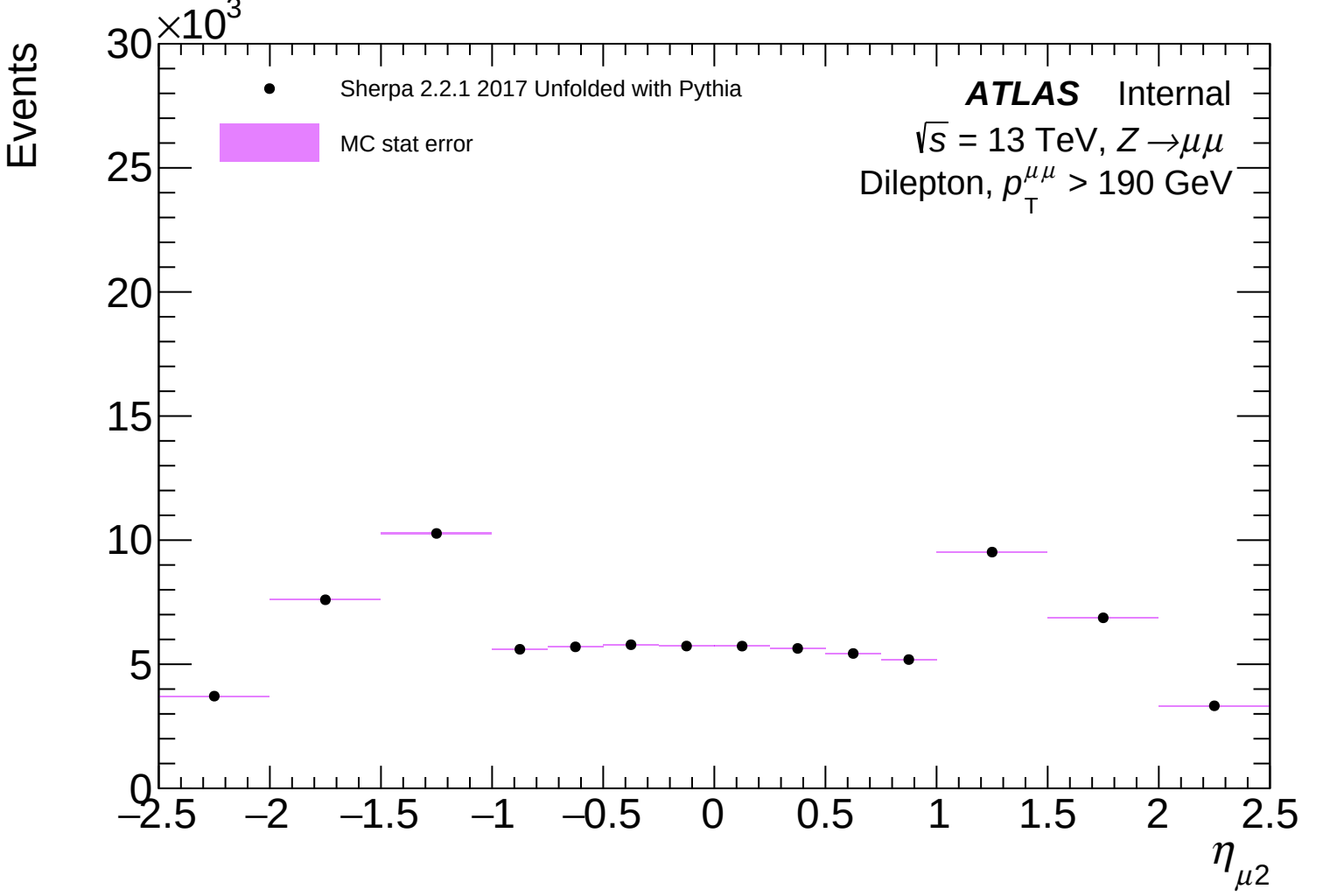

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

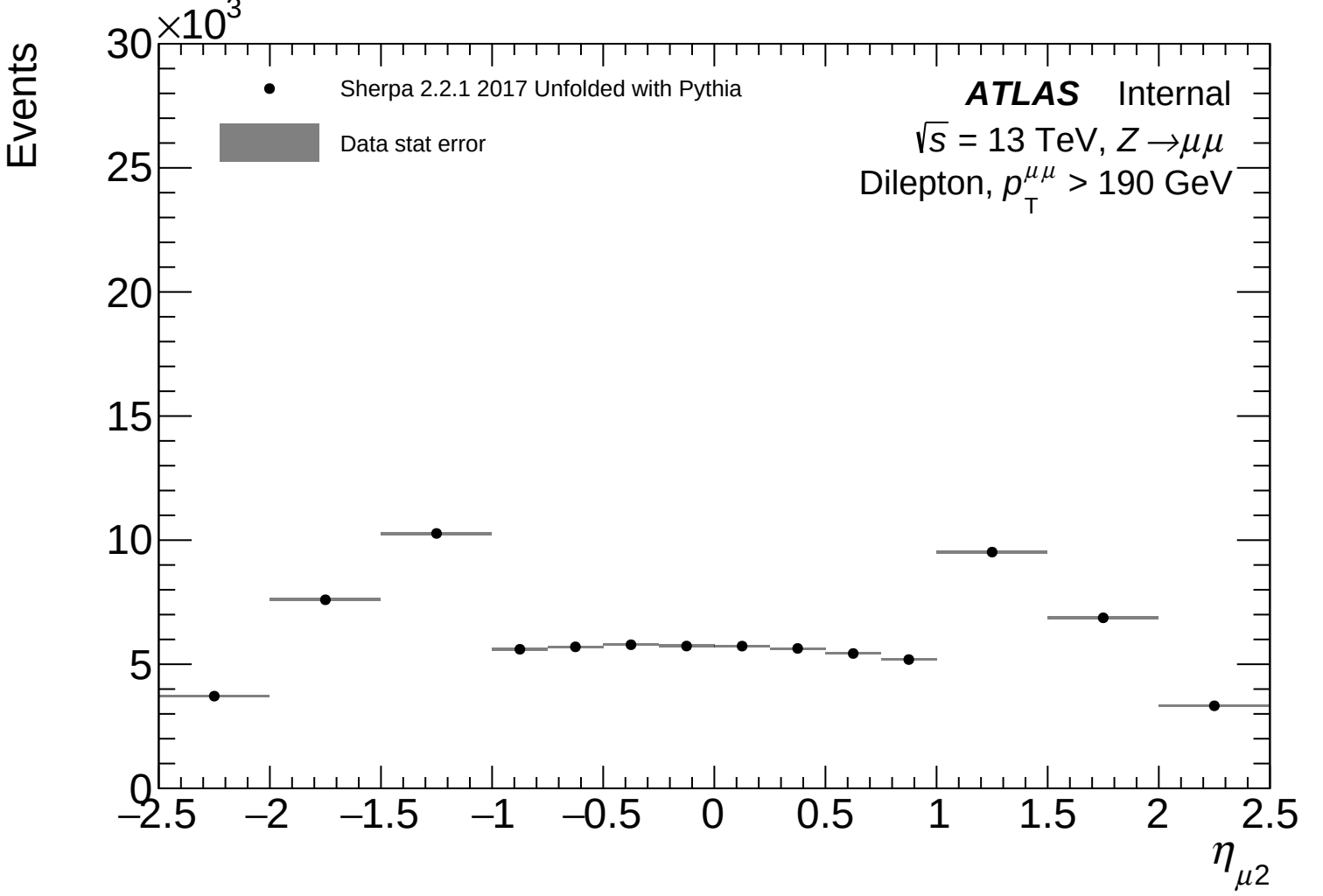

$\times 10^3$
50
45
40
35
30
25
20
15
10
5
0
$\mathrm{d}N$ / $\mathrm{d}\eta_{\mu 2}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
$\eta_{\mu 2}$

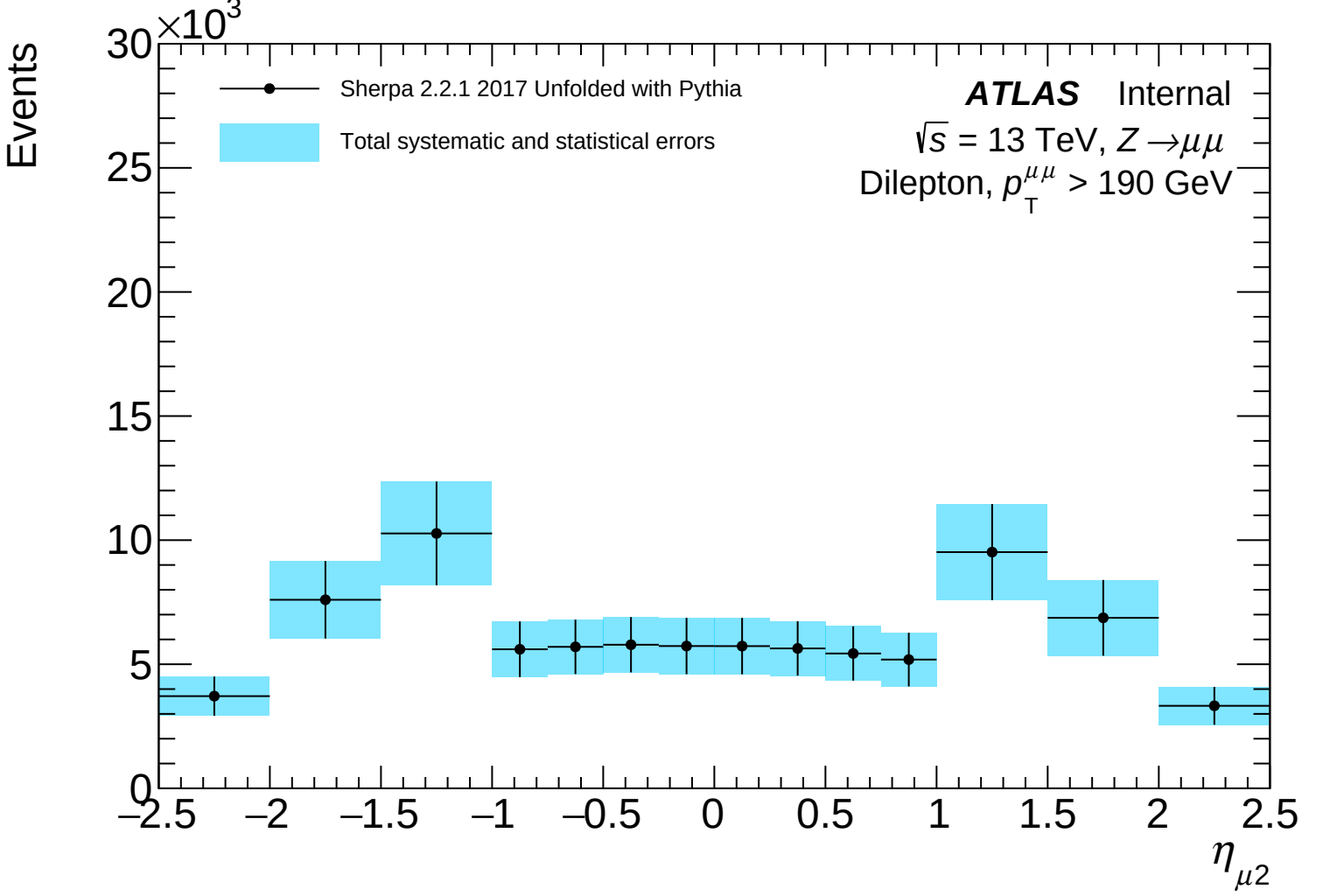

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

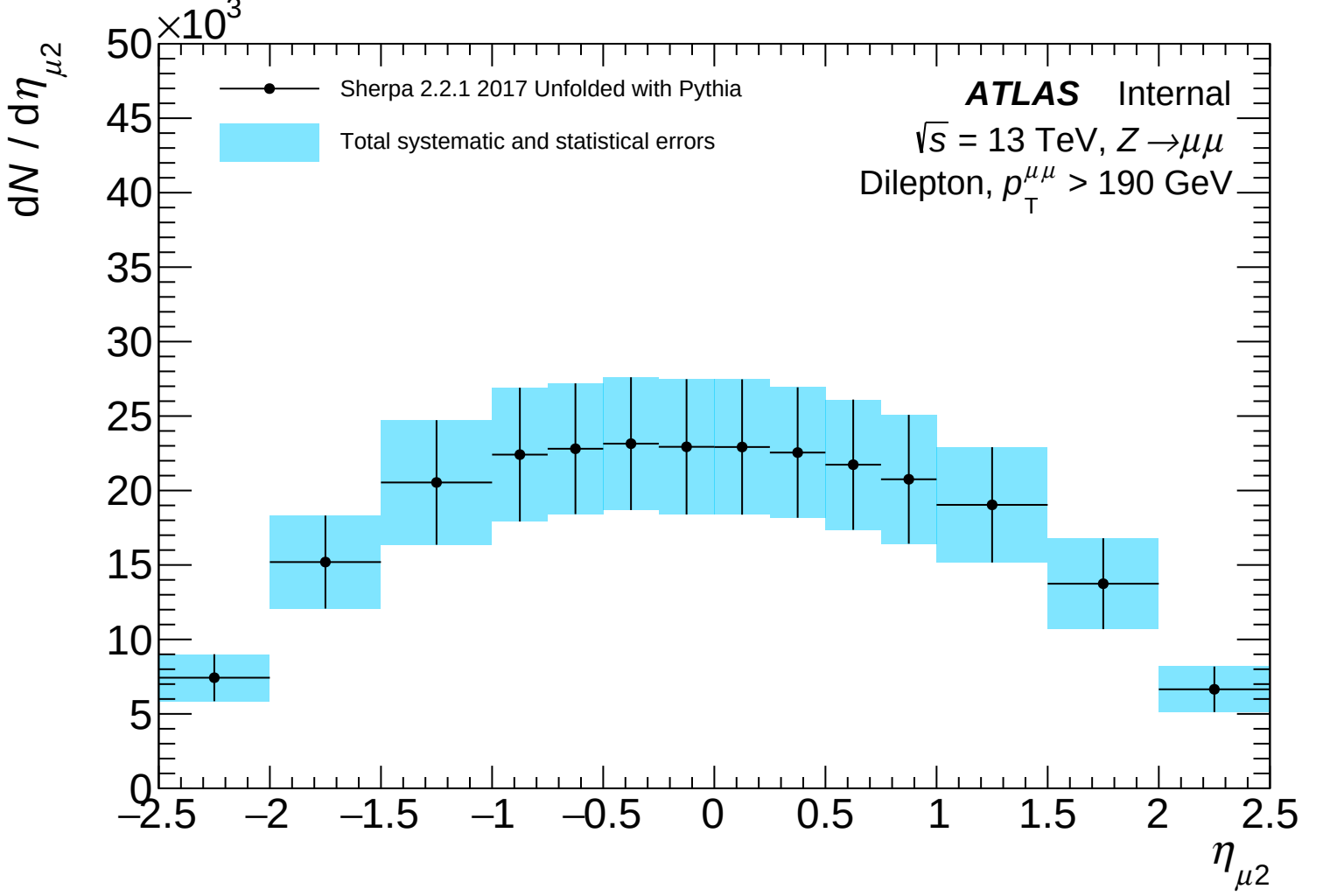

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

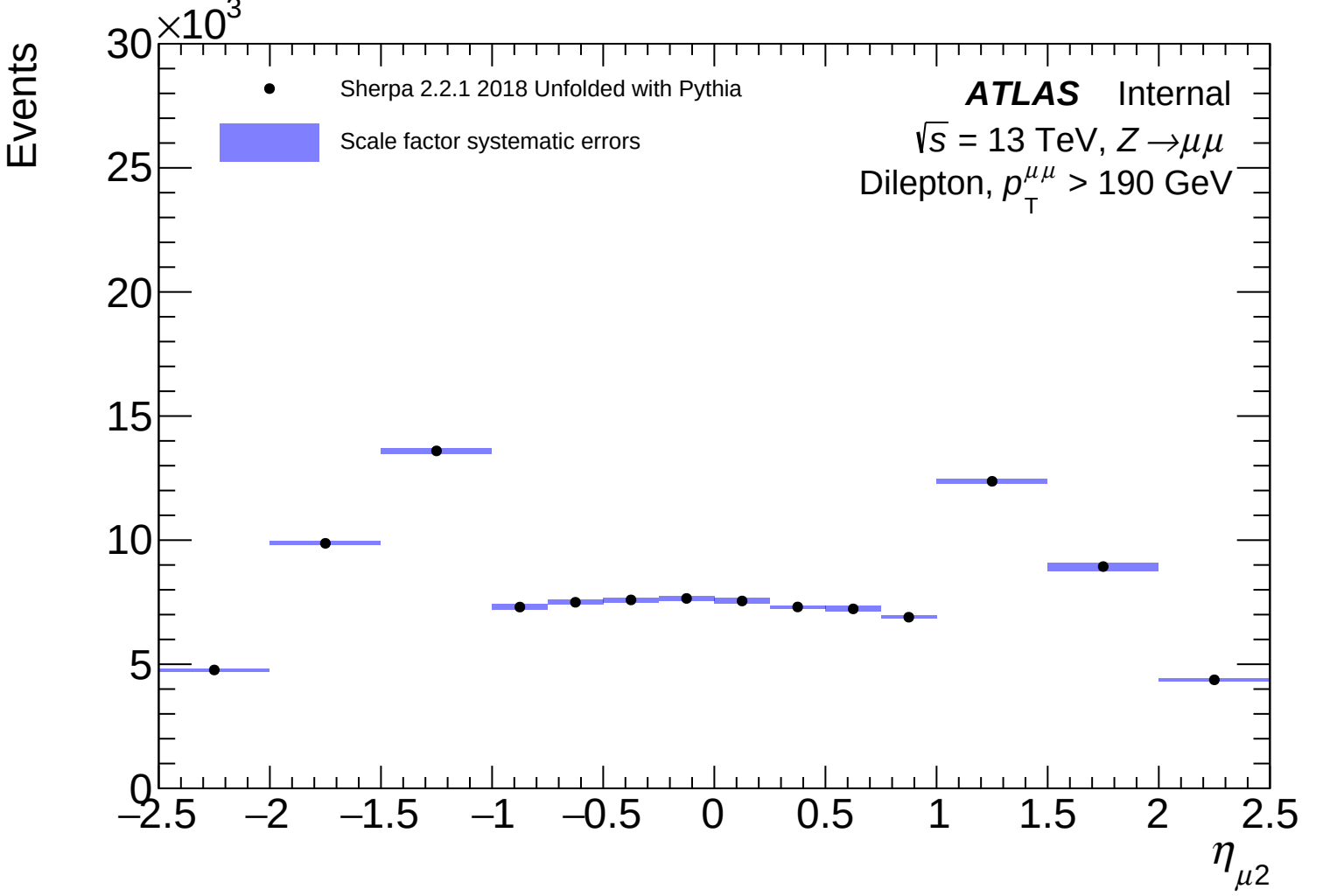

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

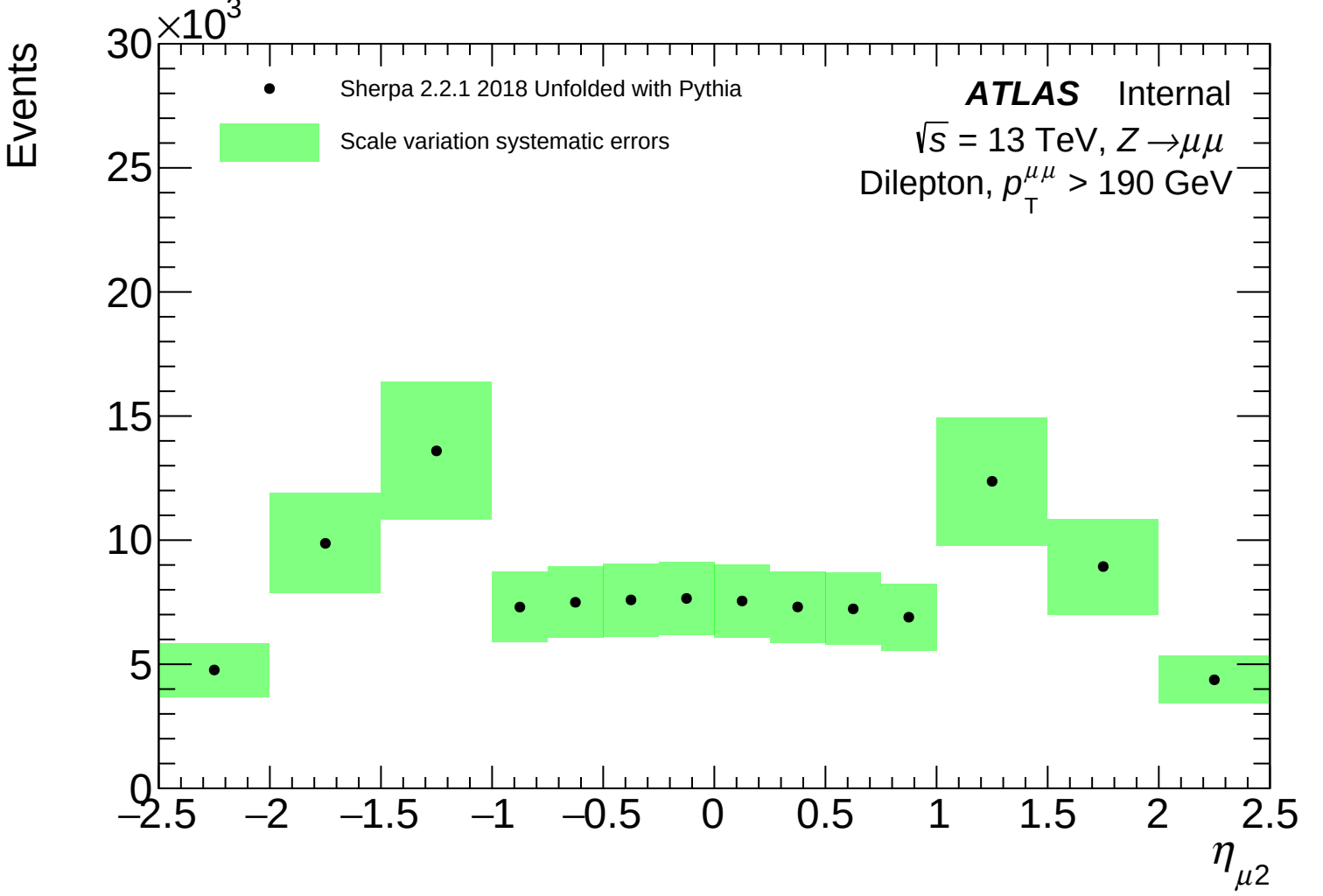

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

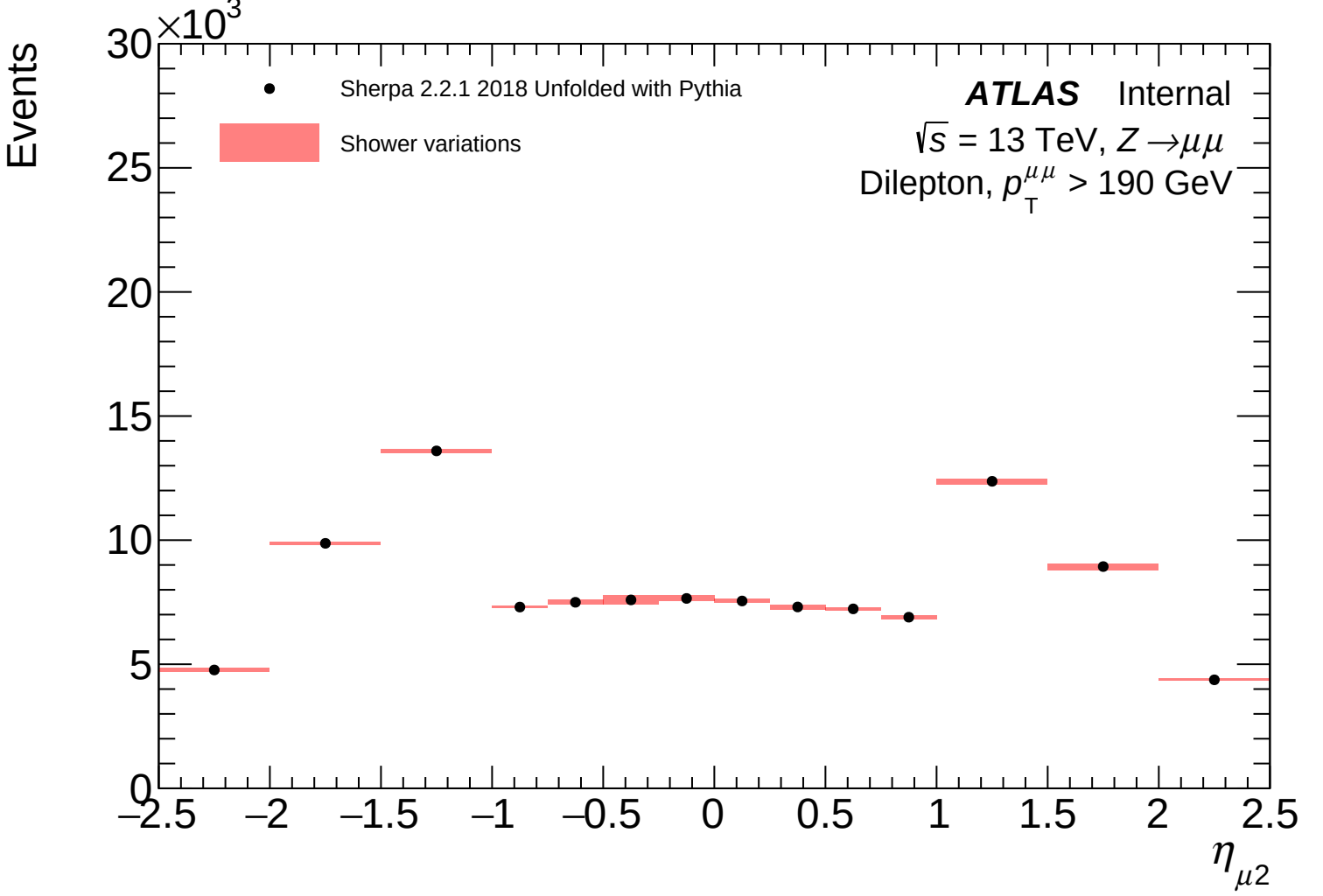

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

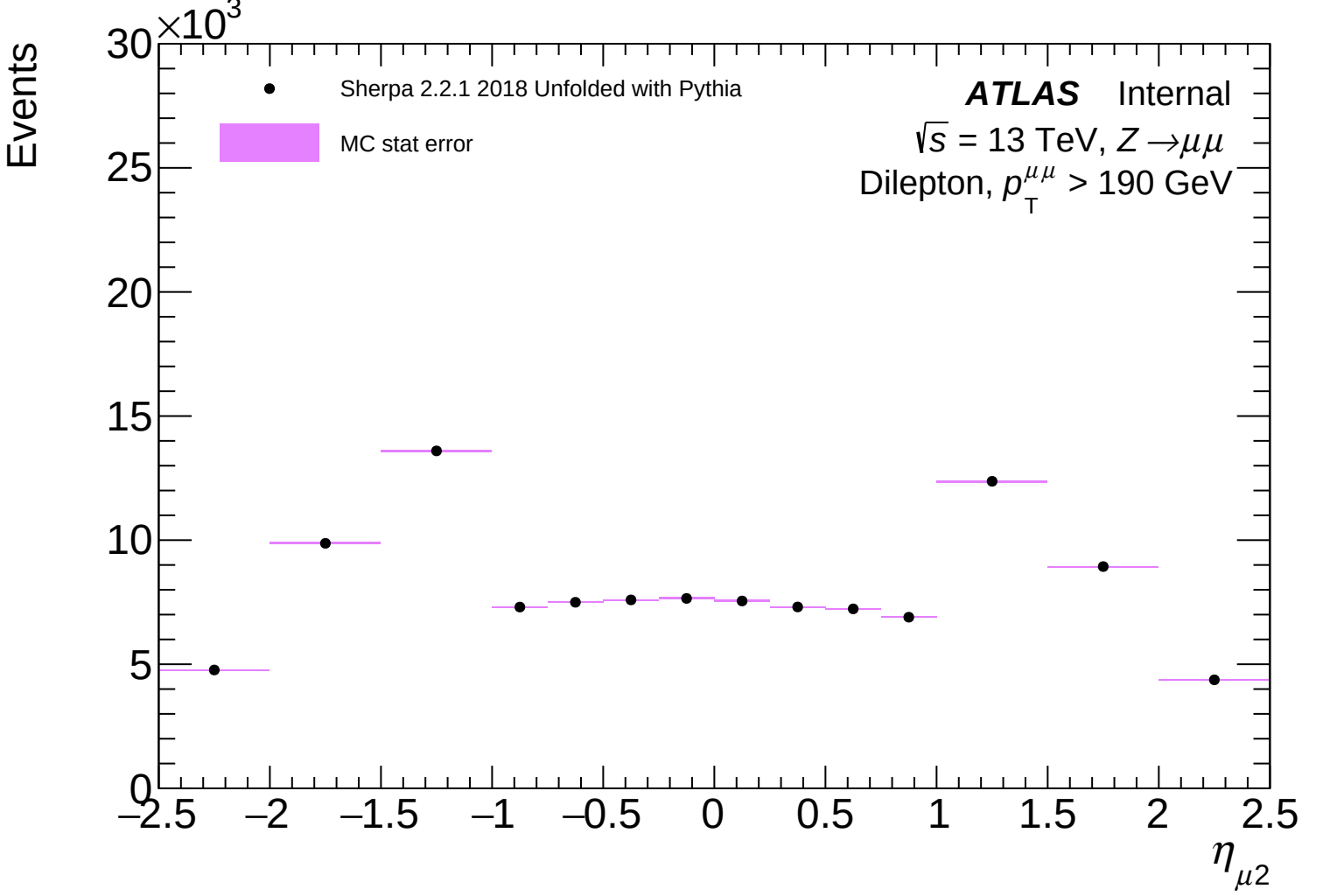

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

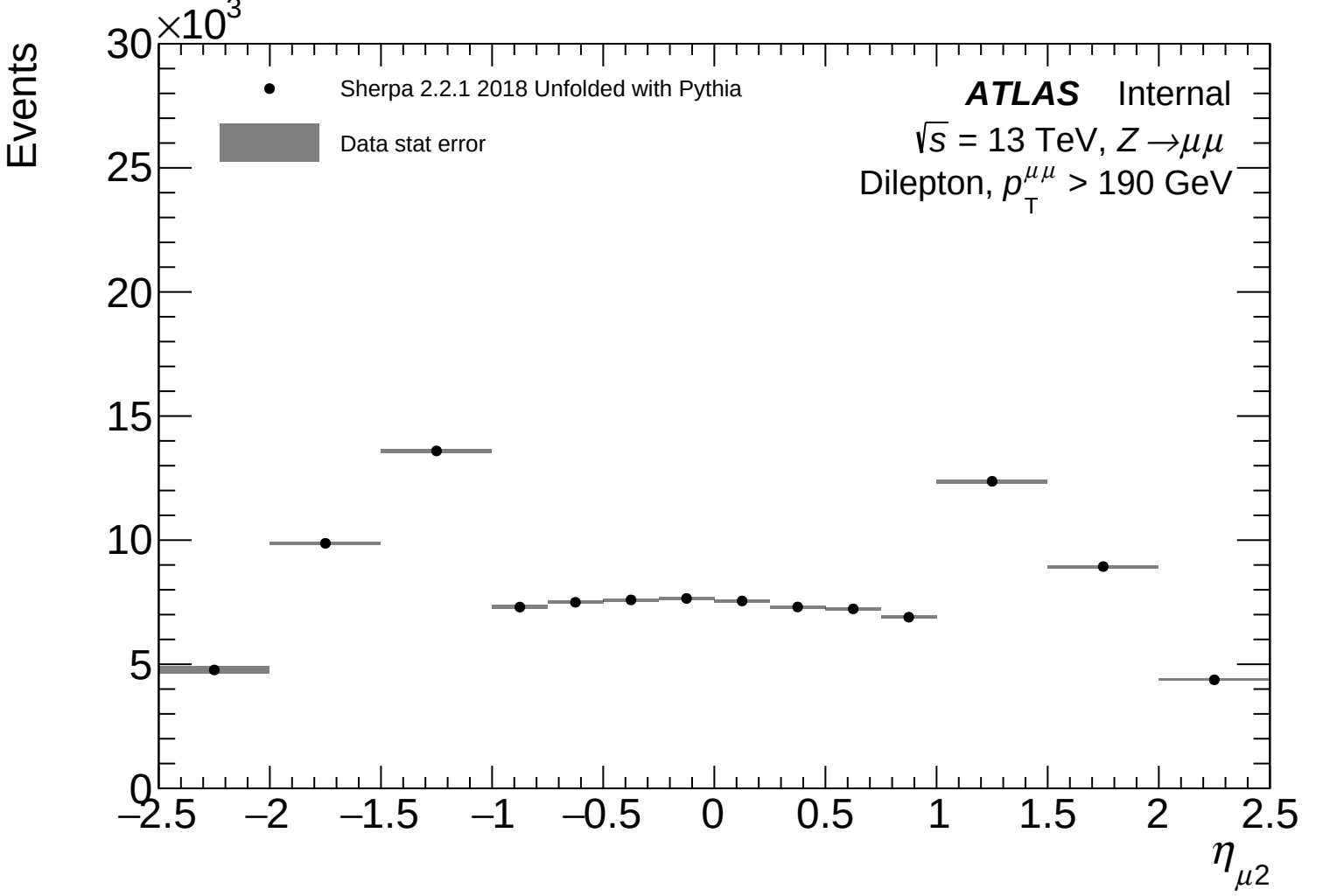

ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
dN / dη_μ2
×10^3
50
45
40
35
30
25
20
15
10
5
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

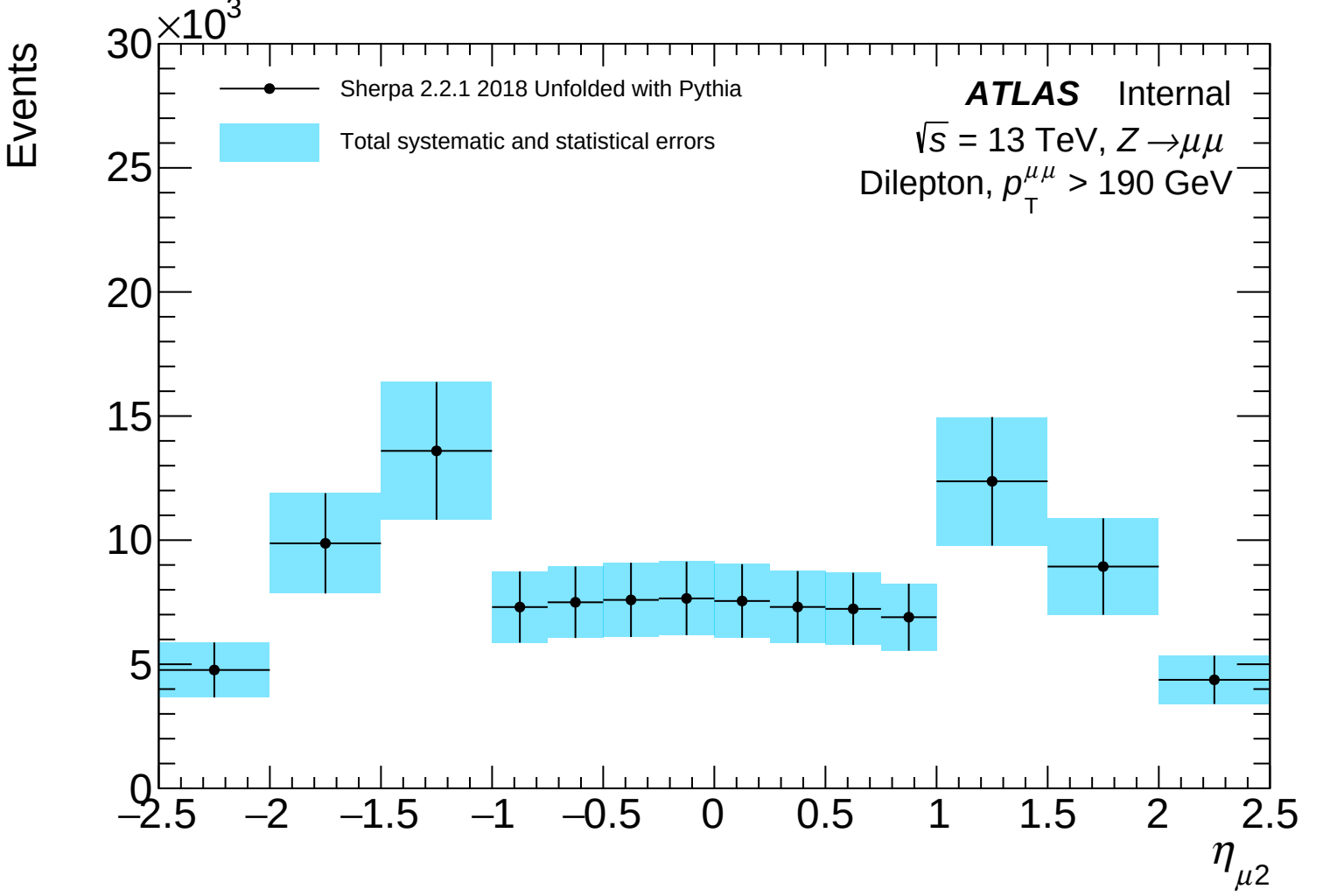

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

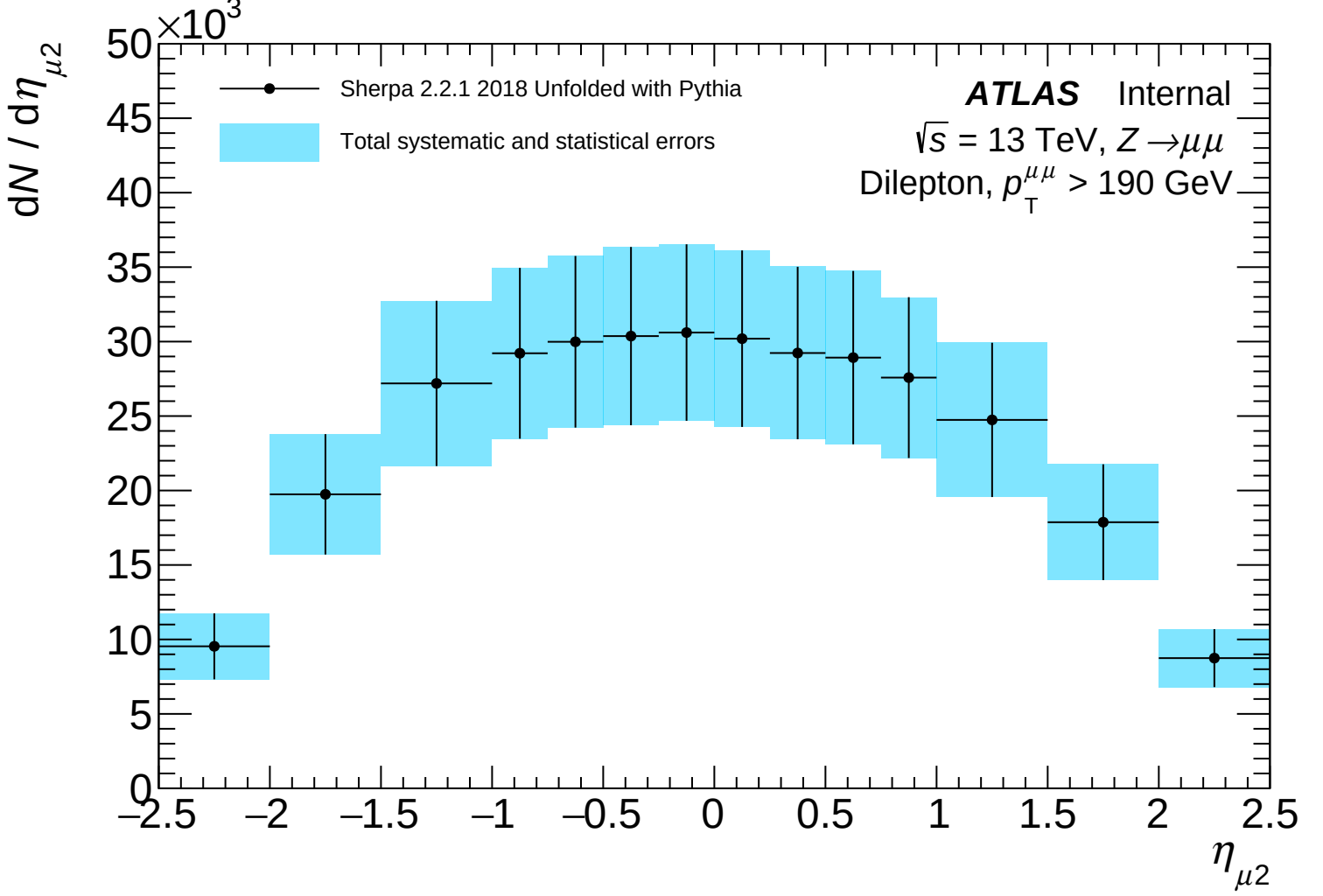

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

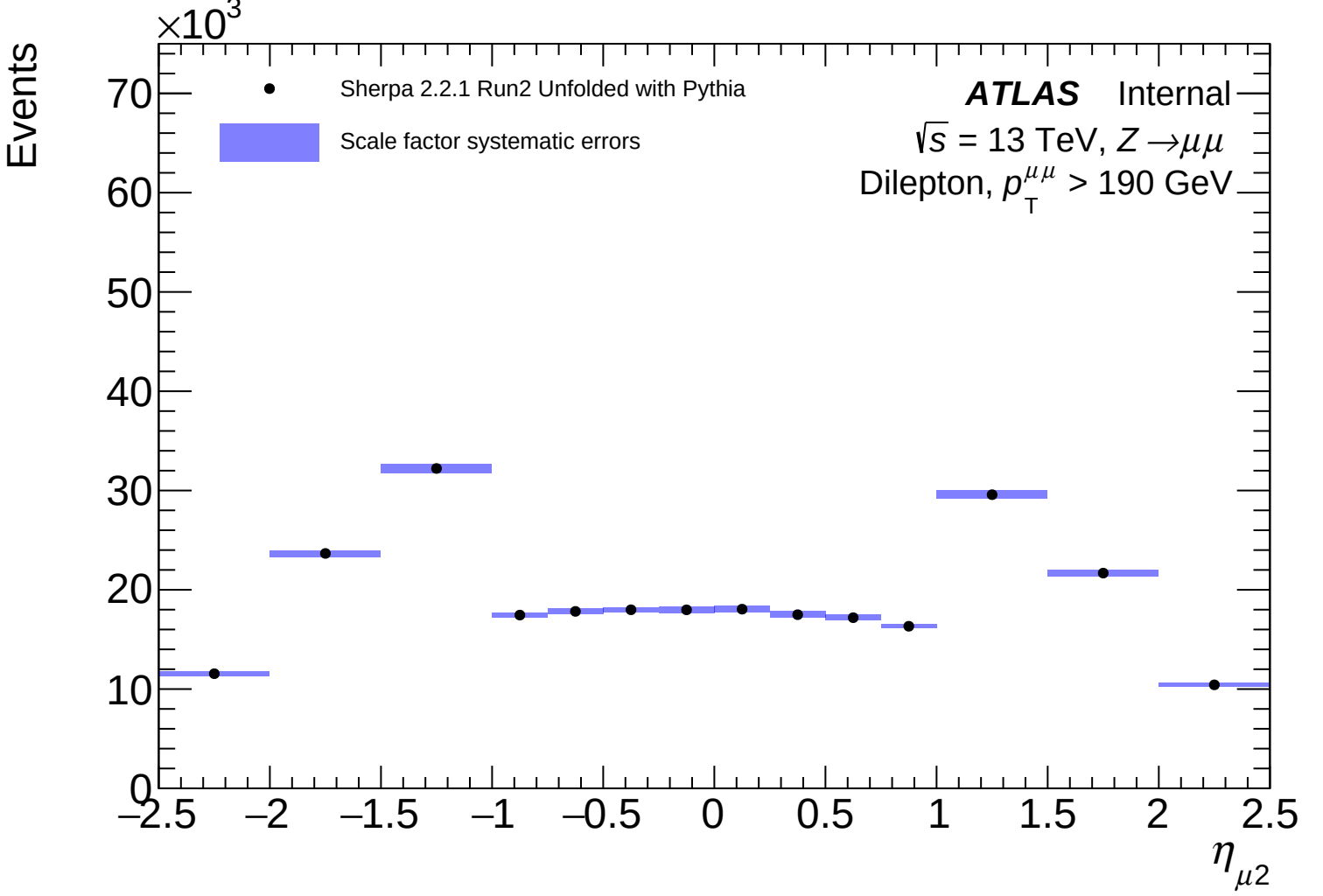

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

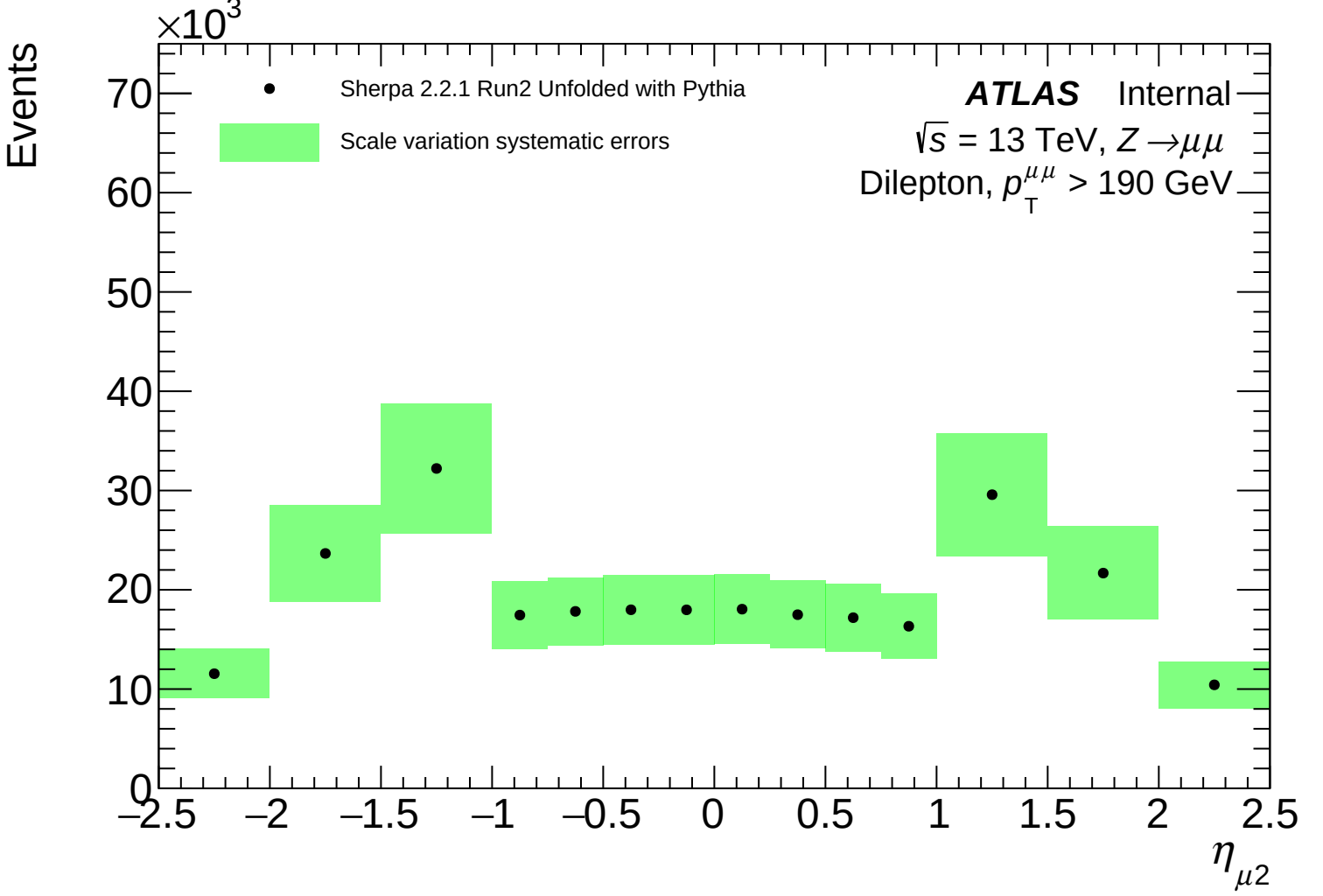

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

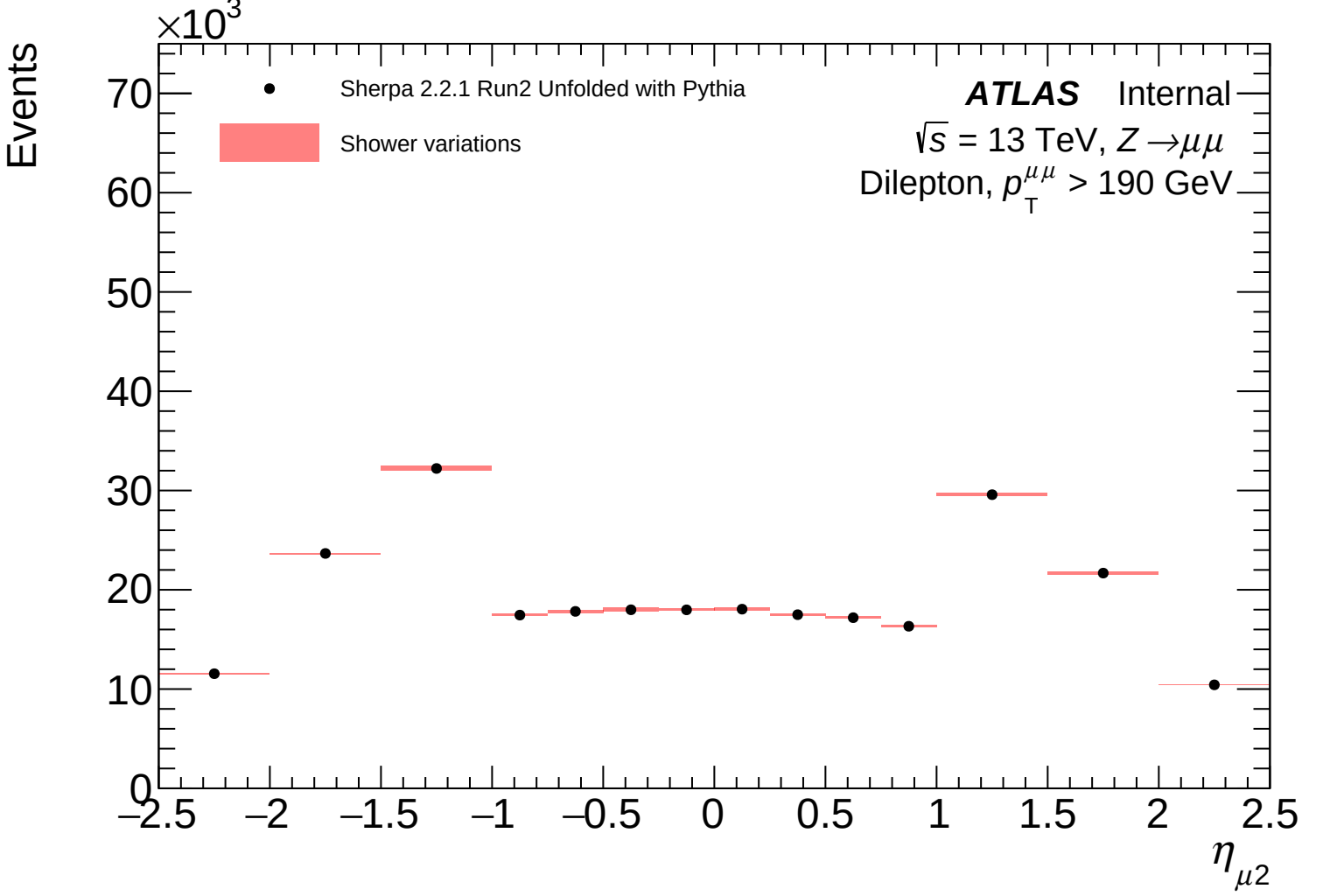

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

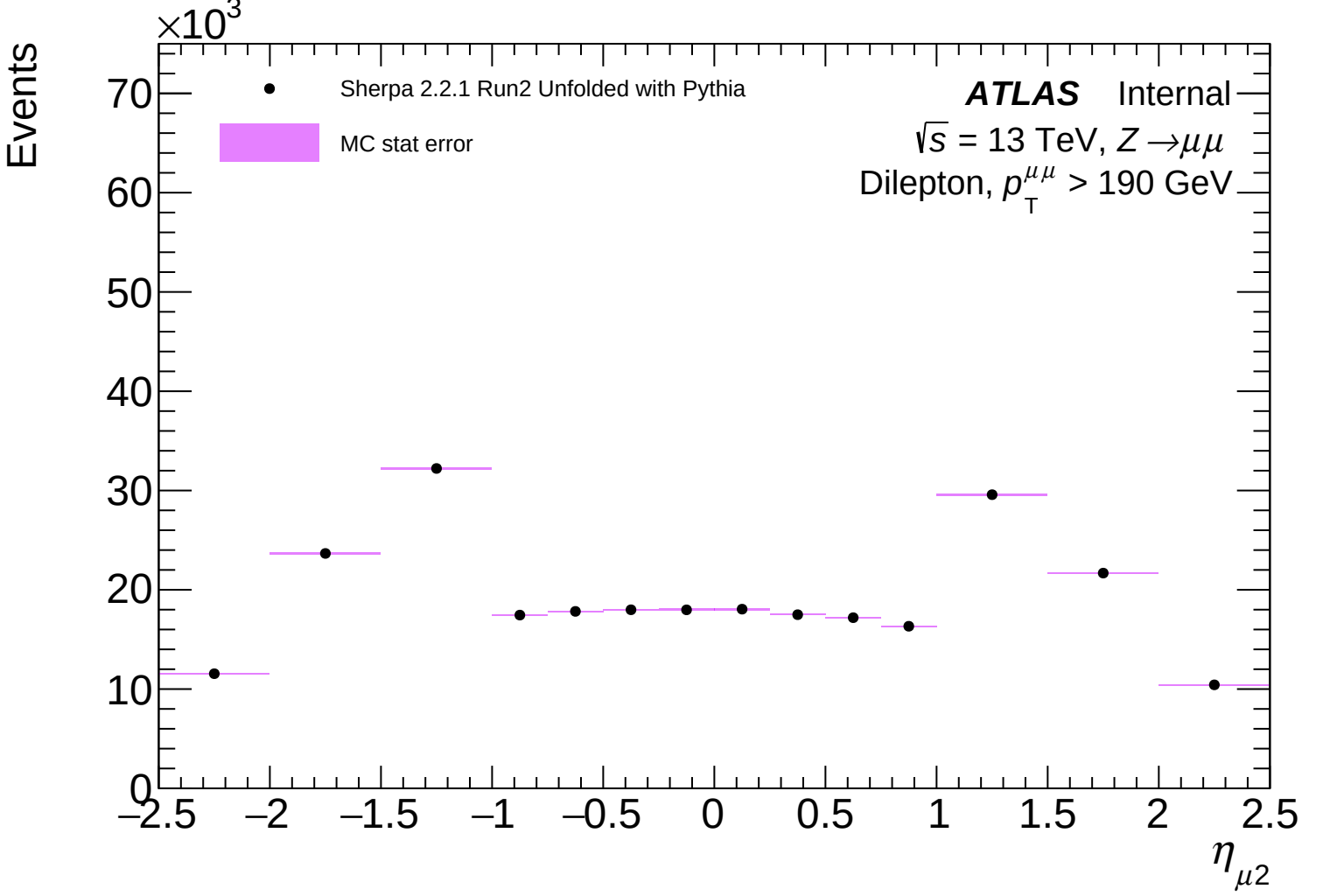

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

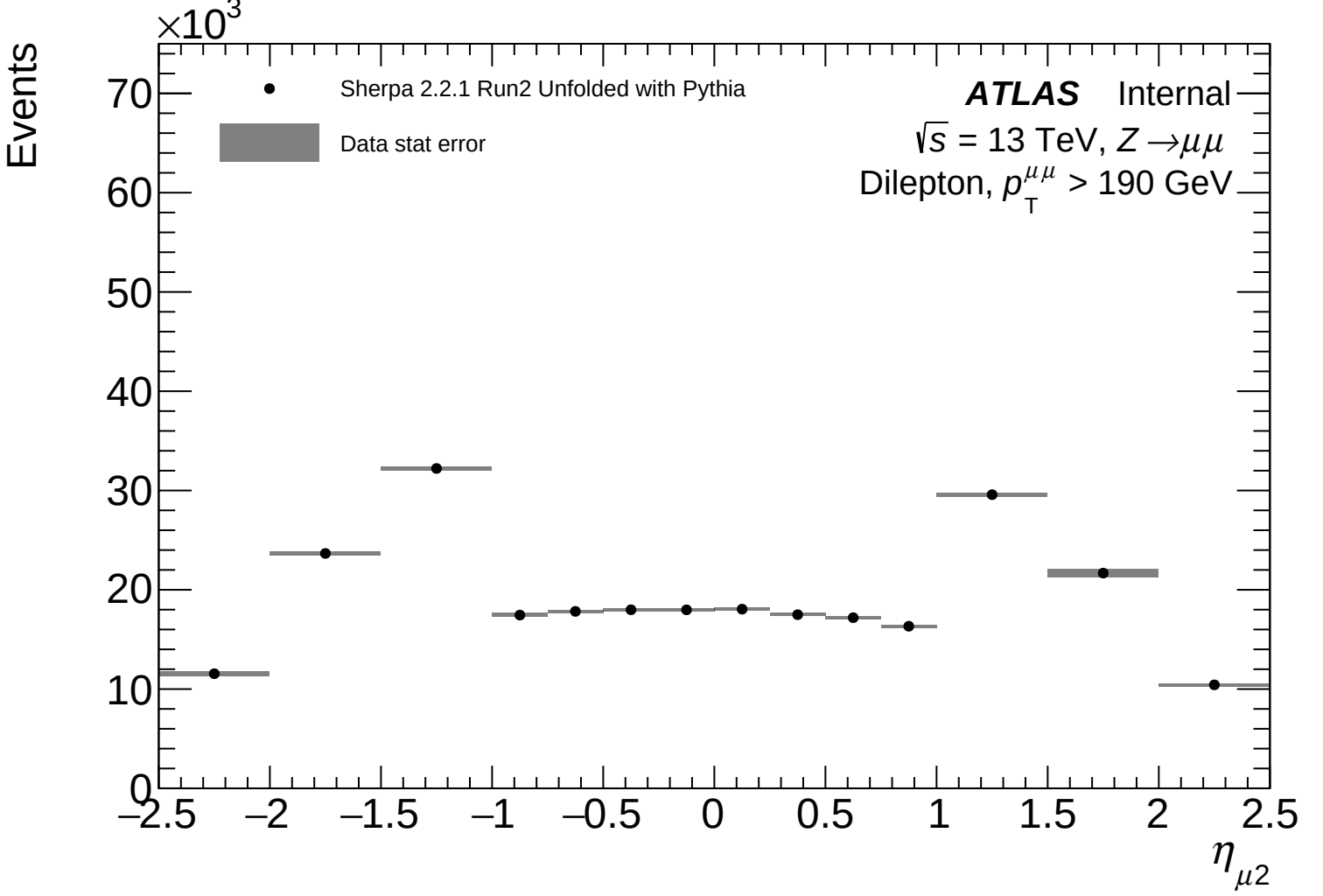

ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
dN / dη_μ2
×10^3
50
45
40
35
30
25
20
15
10
5
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

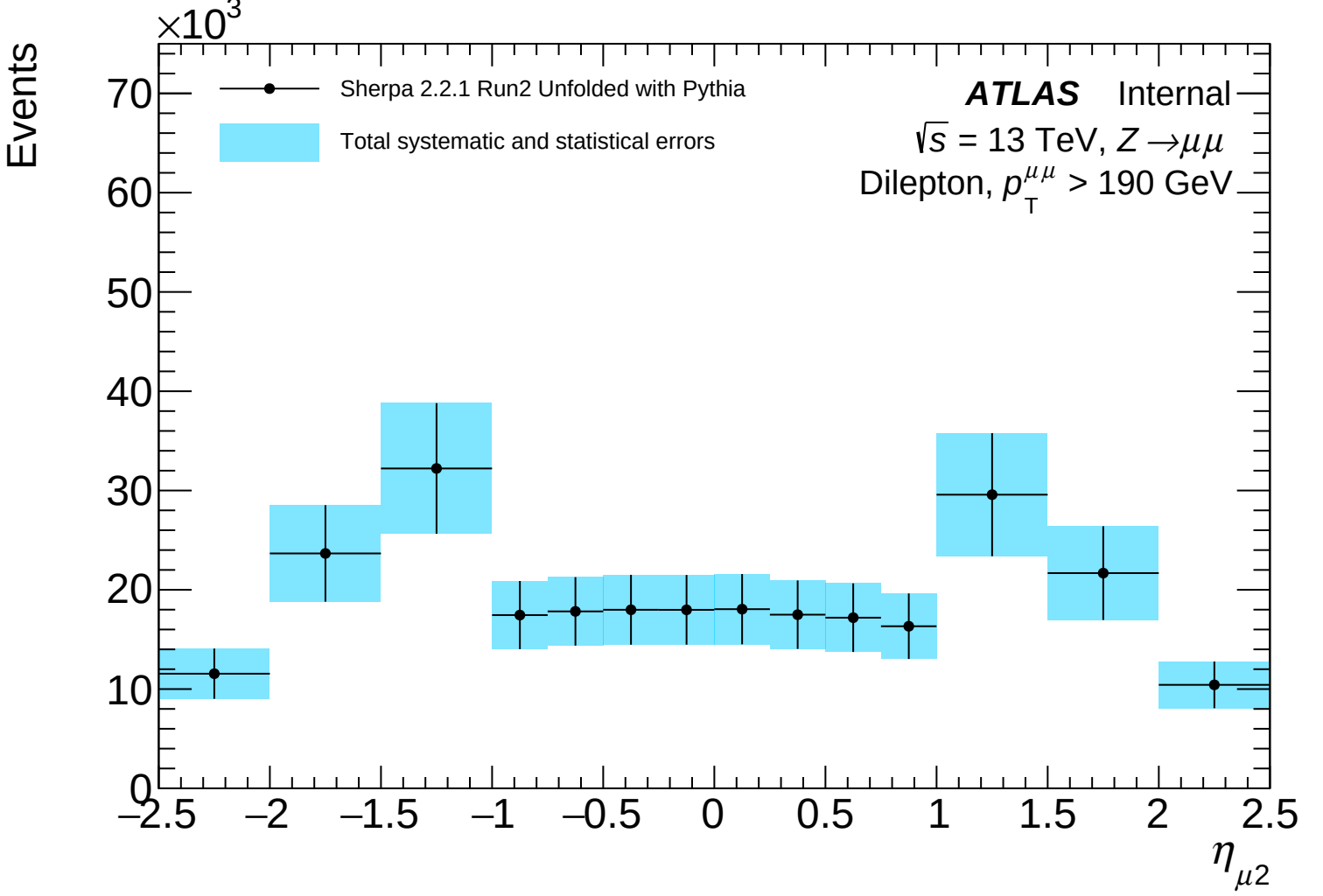

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

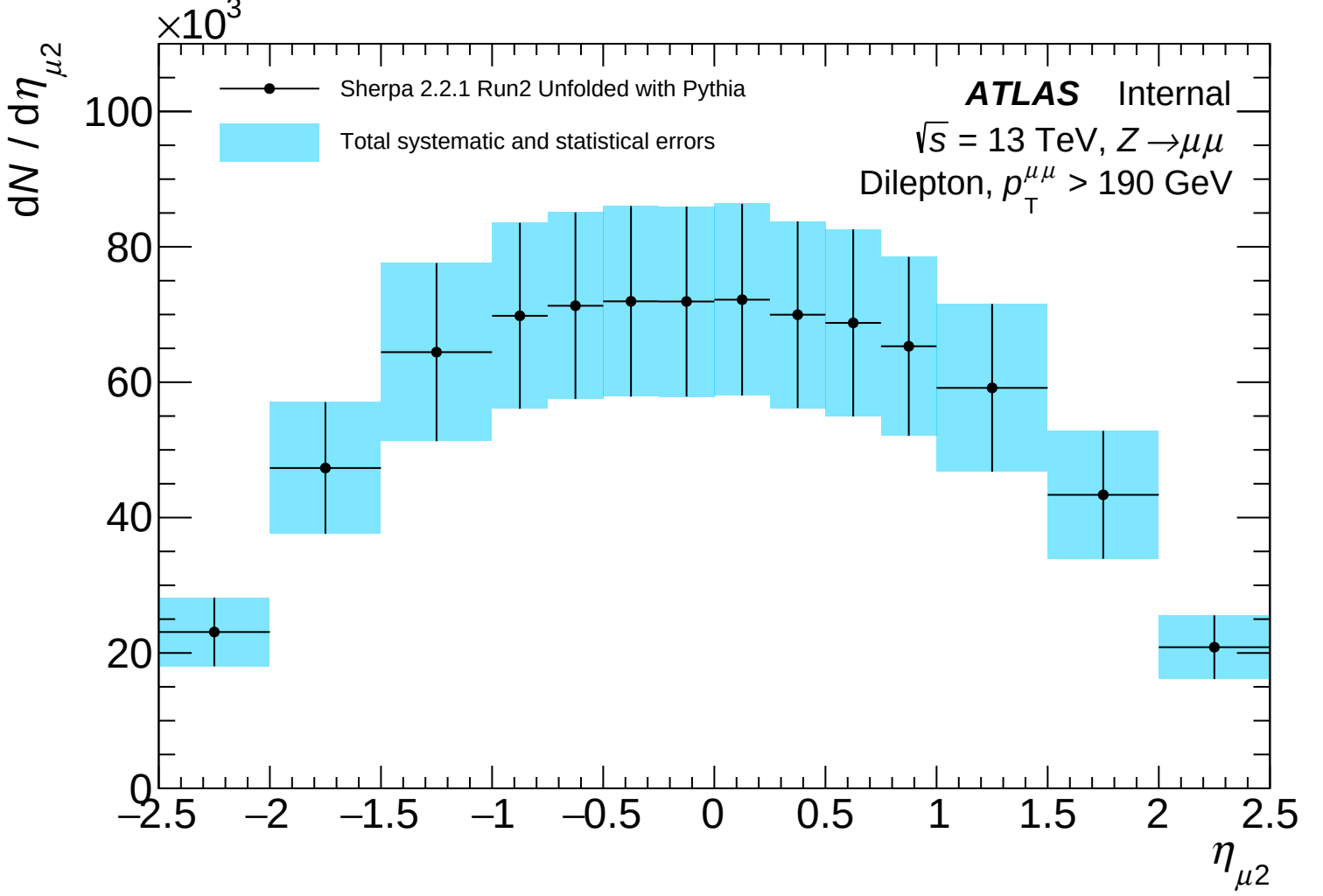

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

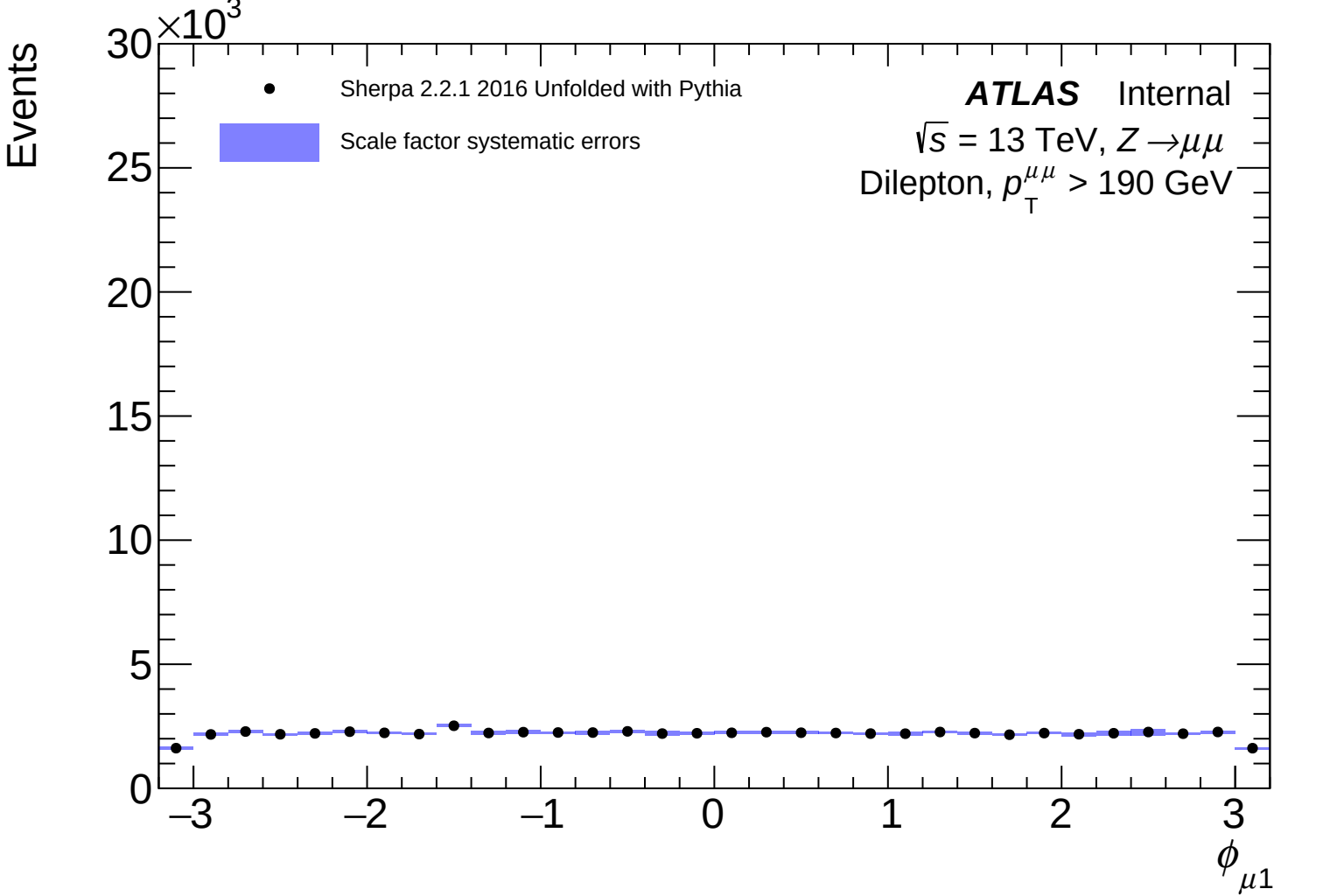

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

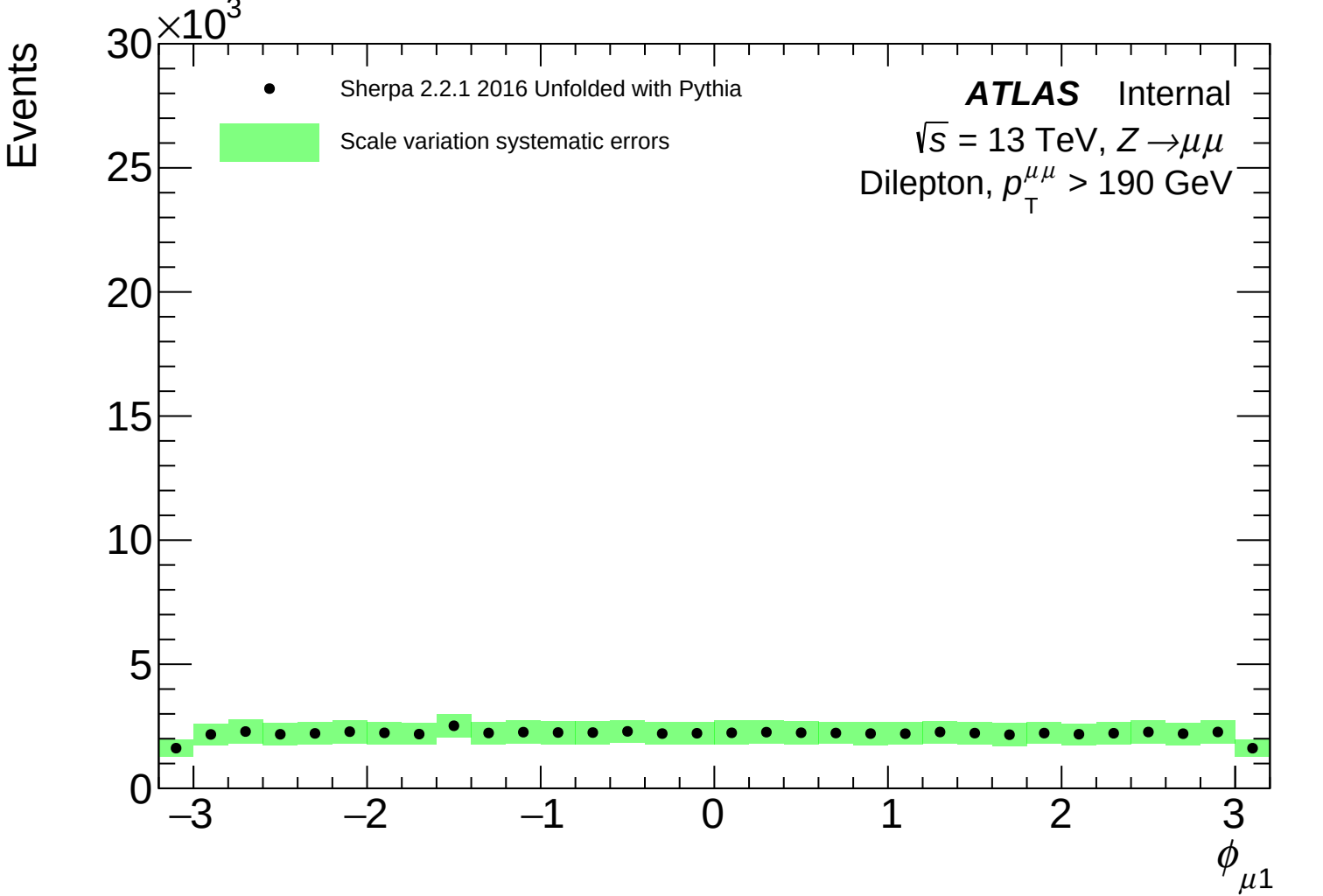

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

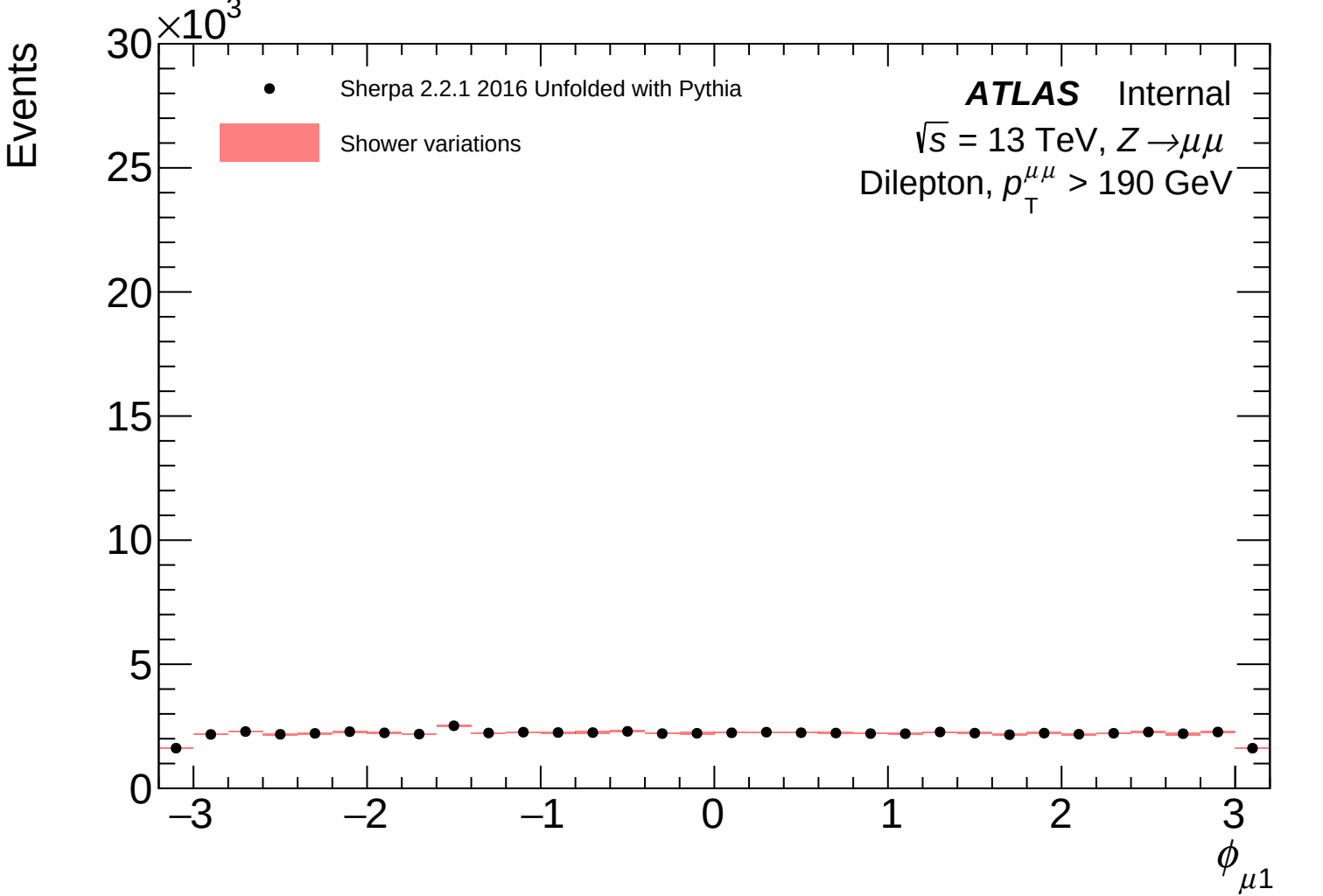

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

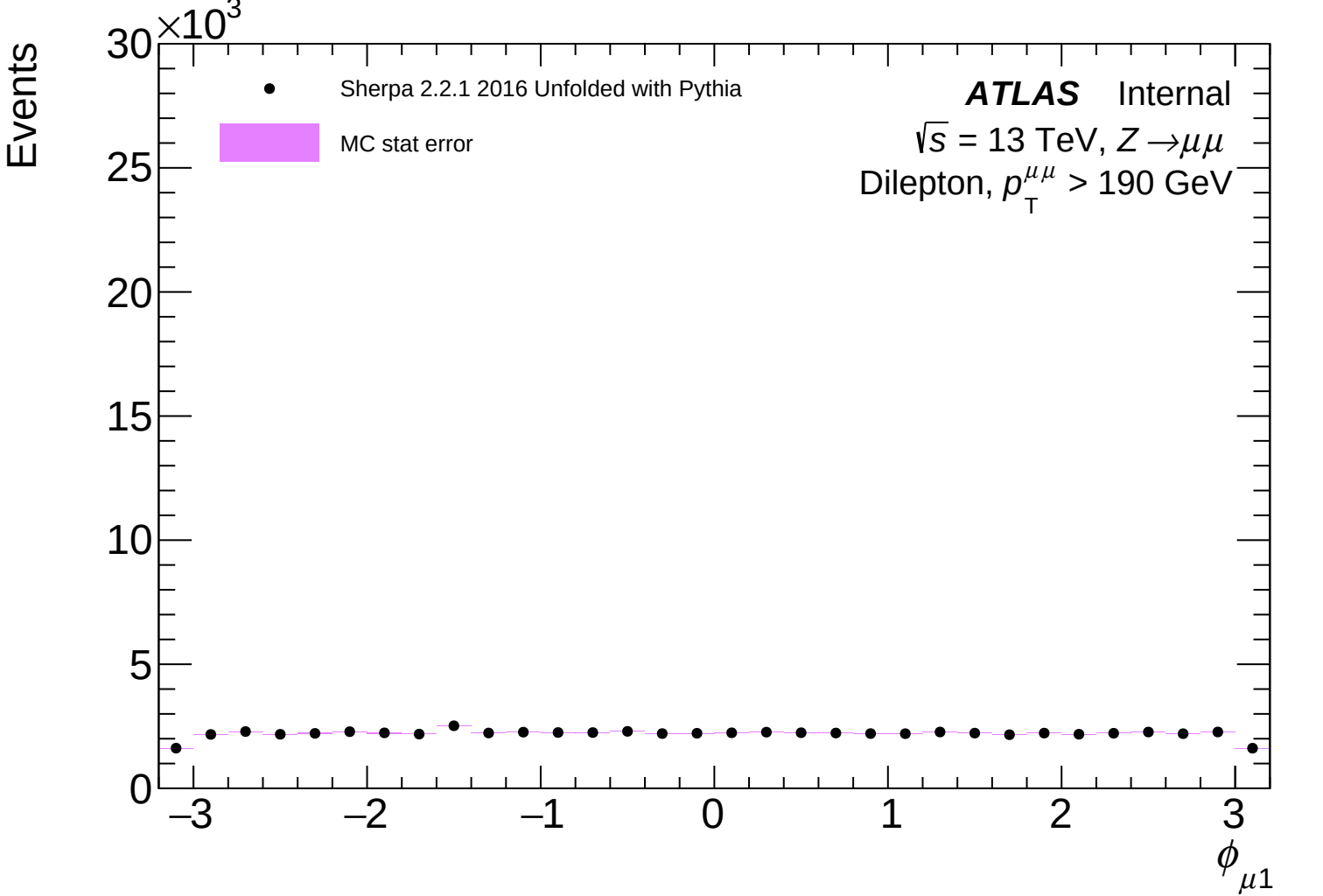

Events
×10^3
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

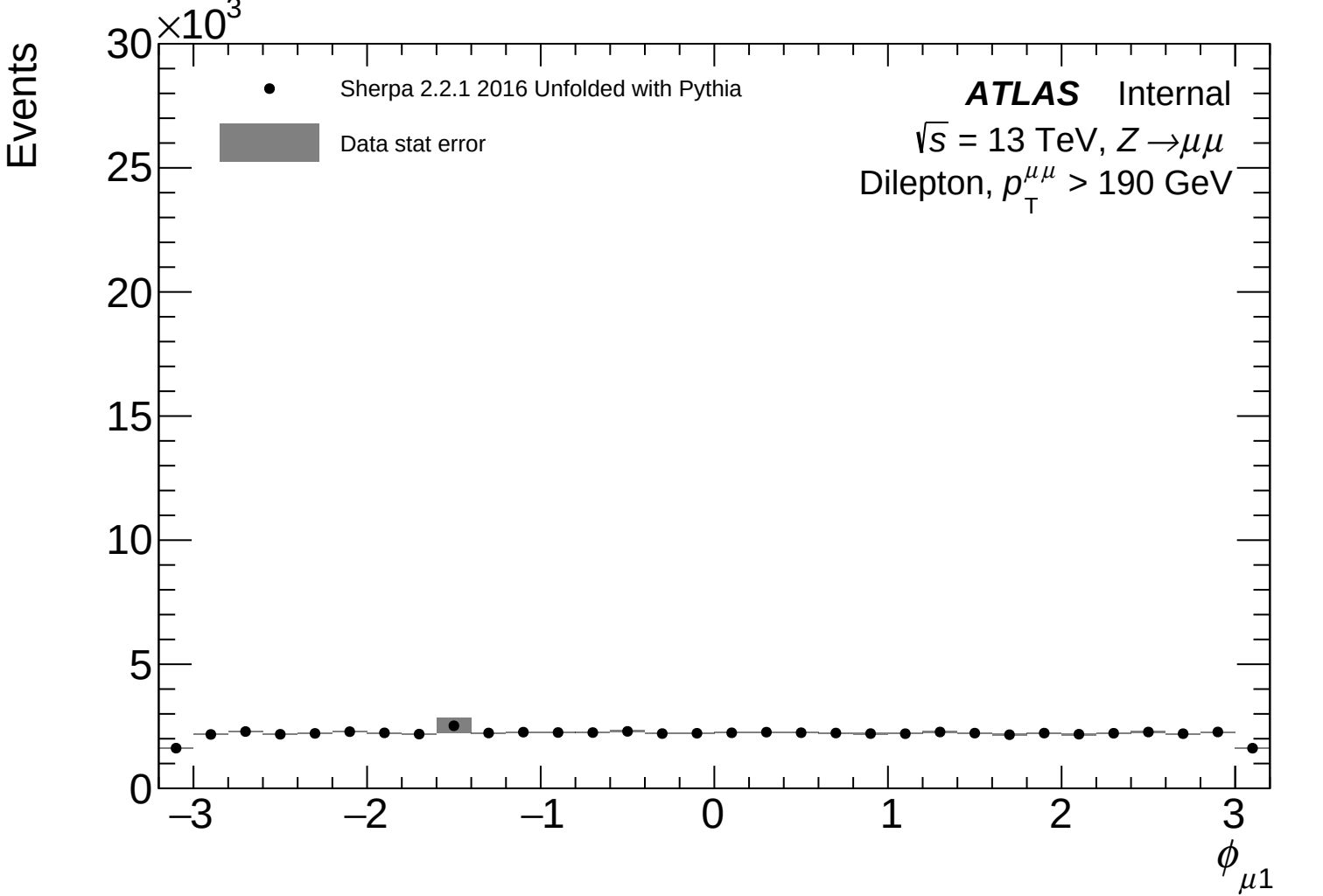

×10^3
dN / dη_μ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
80
60
40
20
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
η_μ2

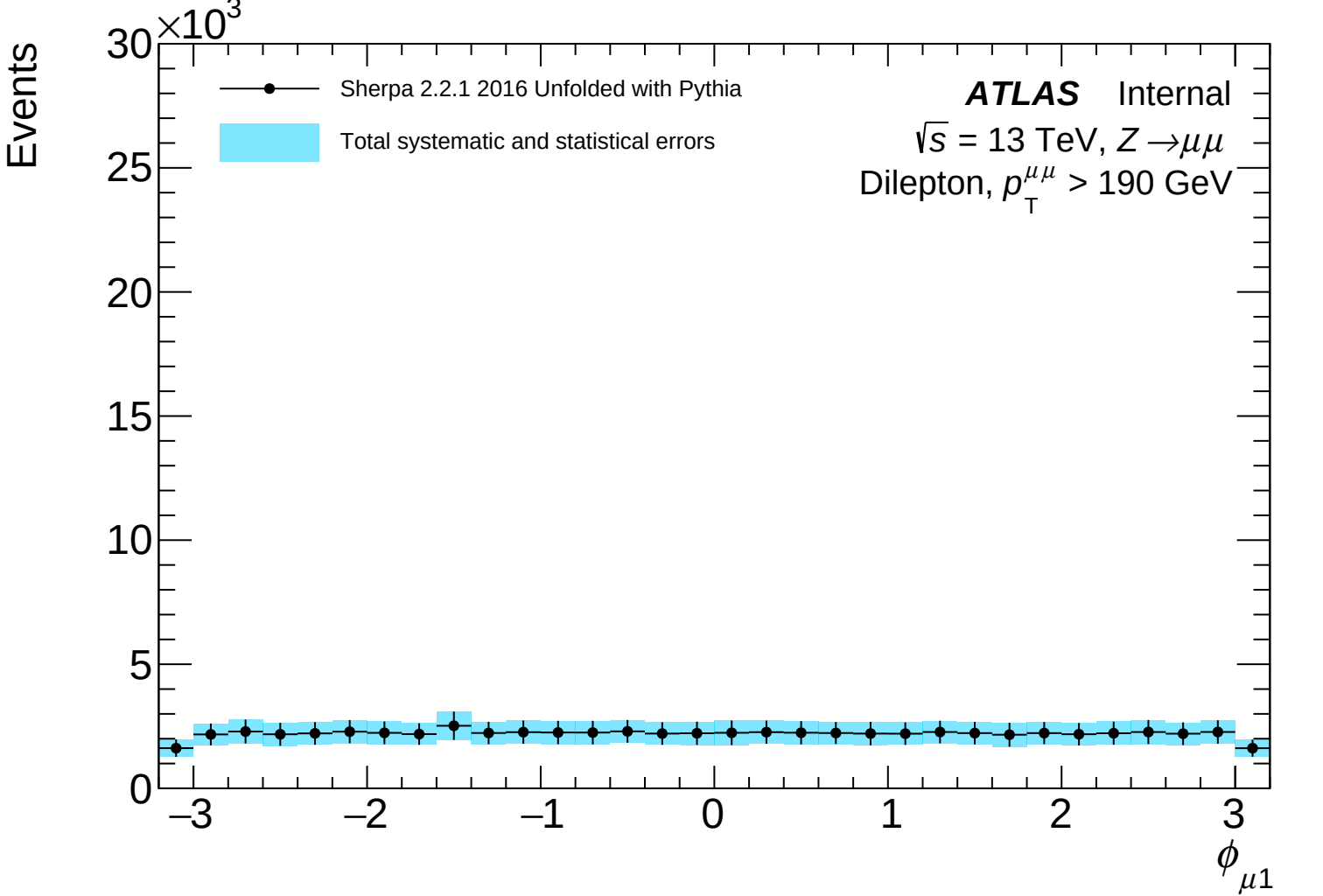

Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

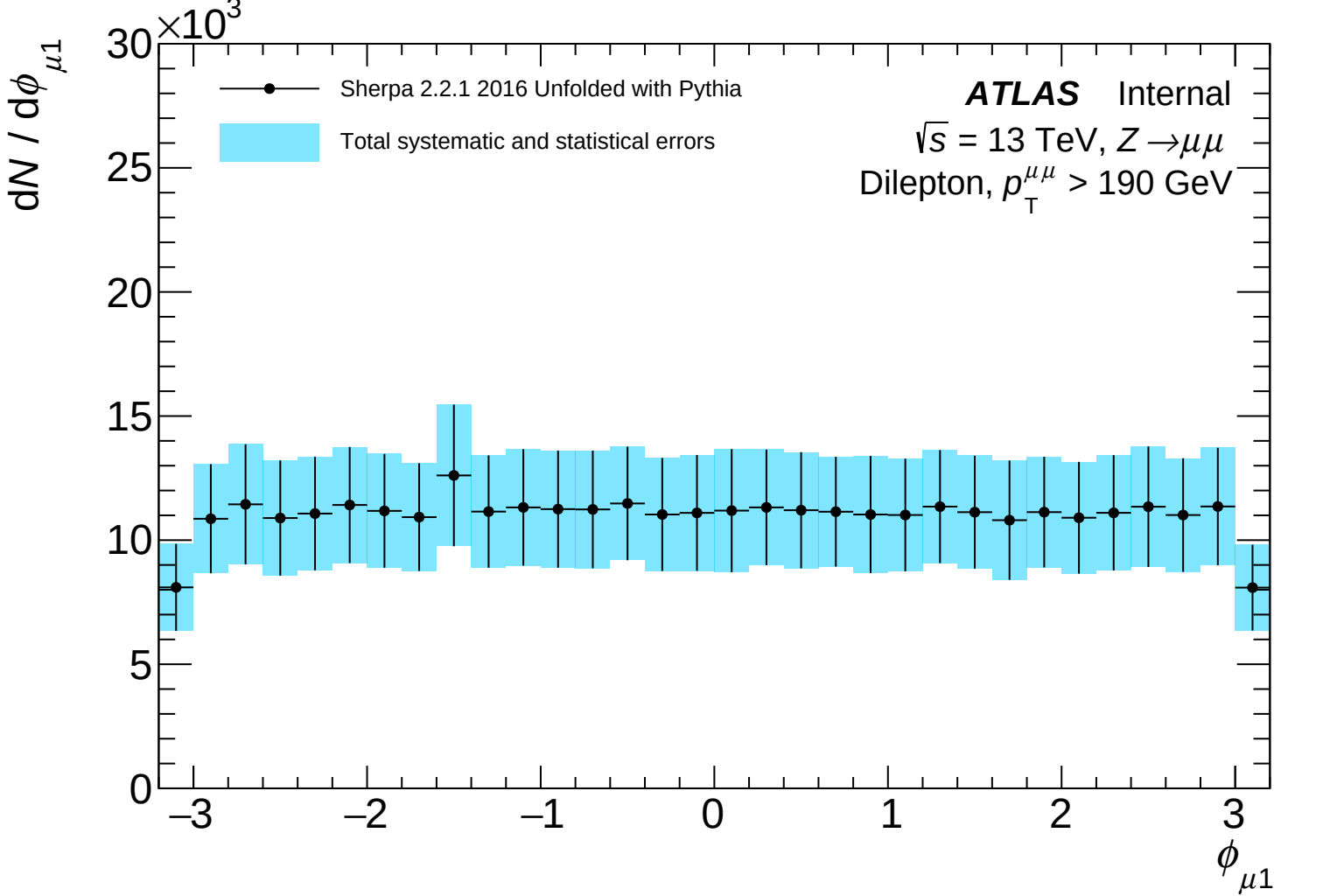

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

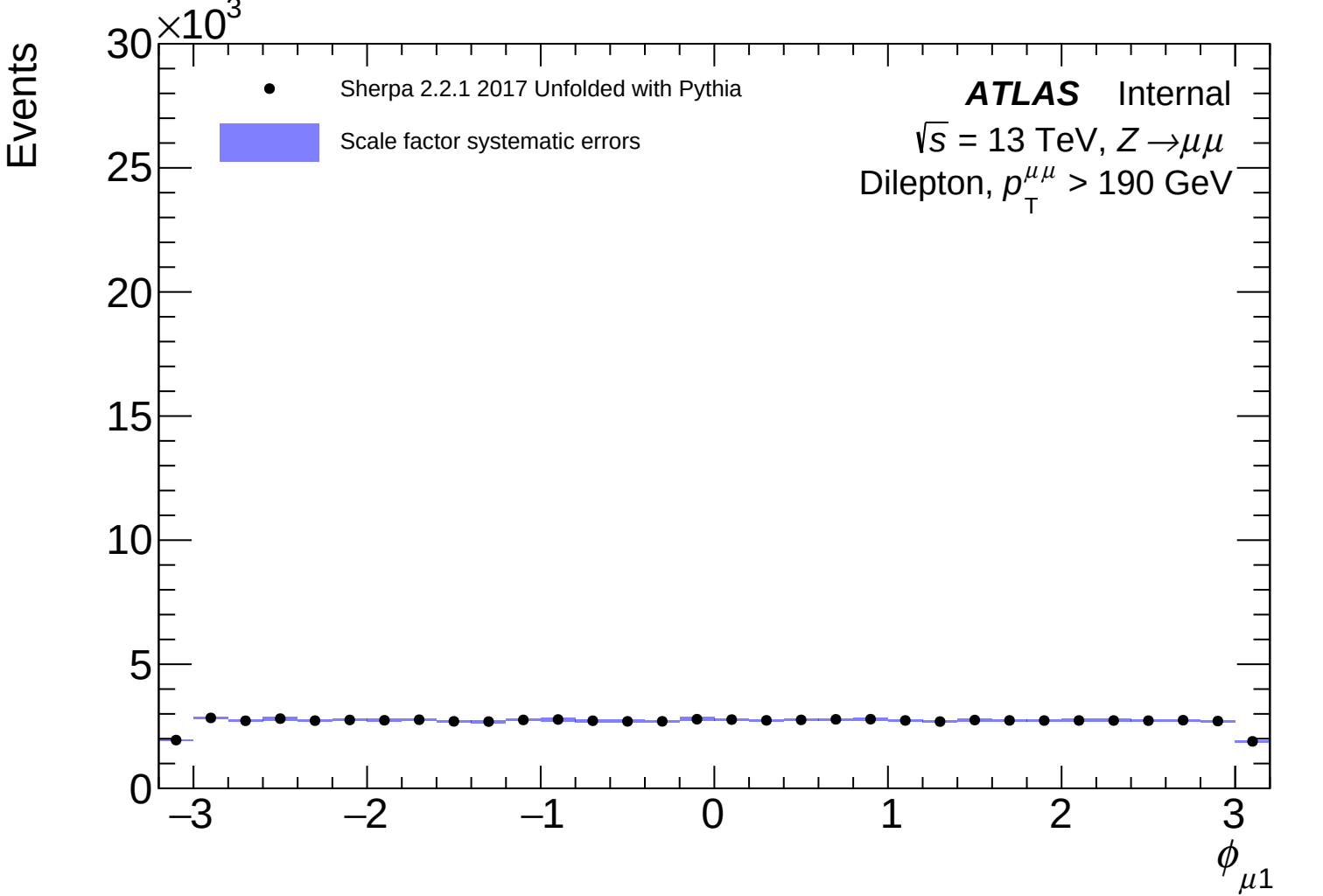

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

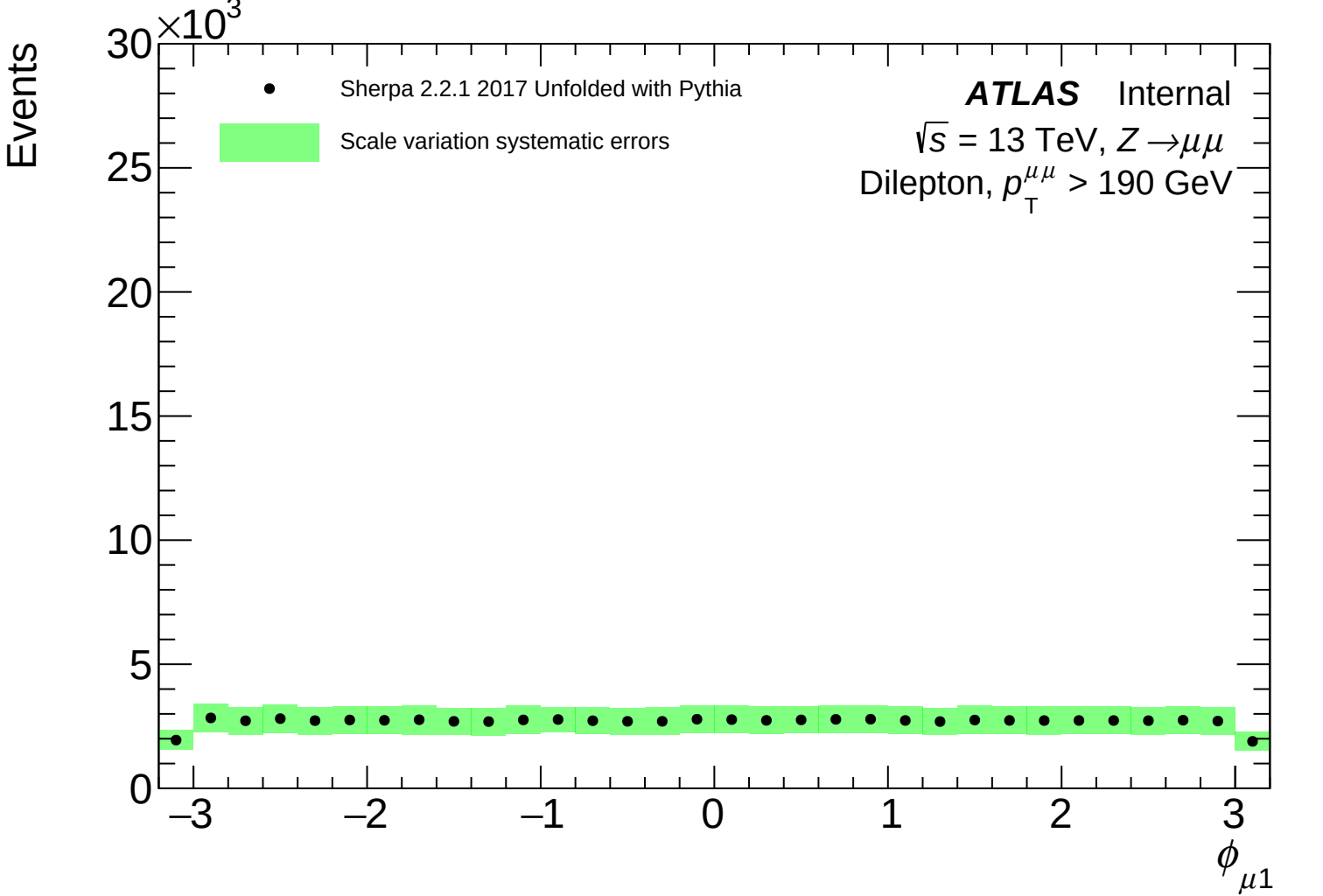

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

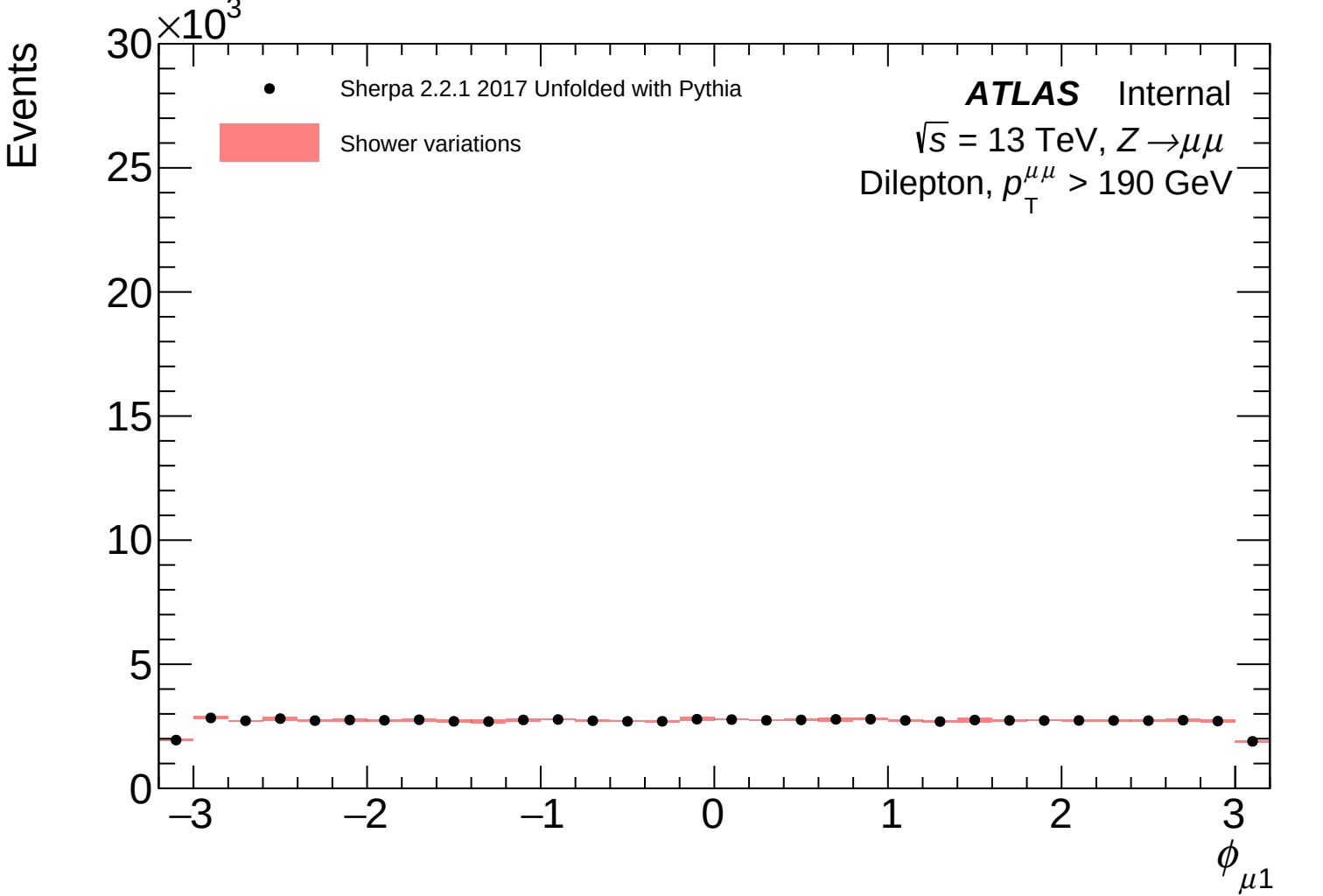

Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

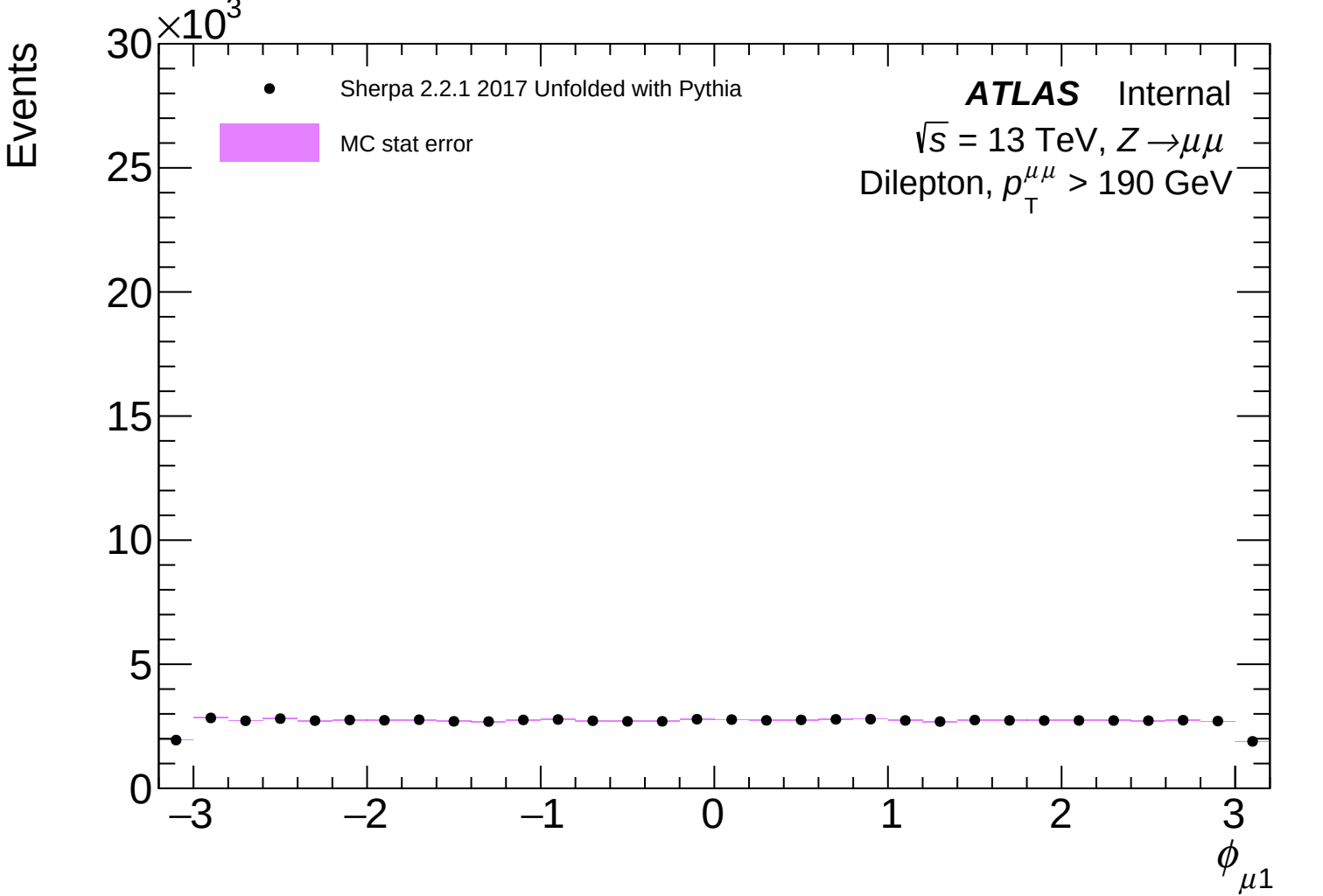

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

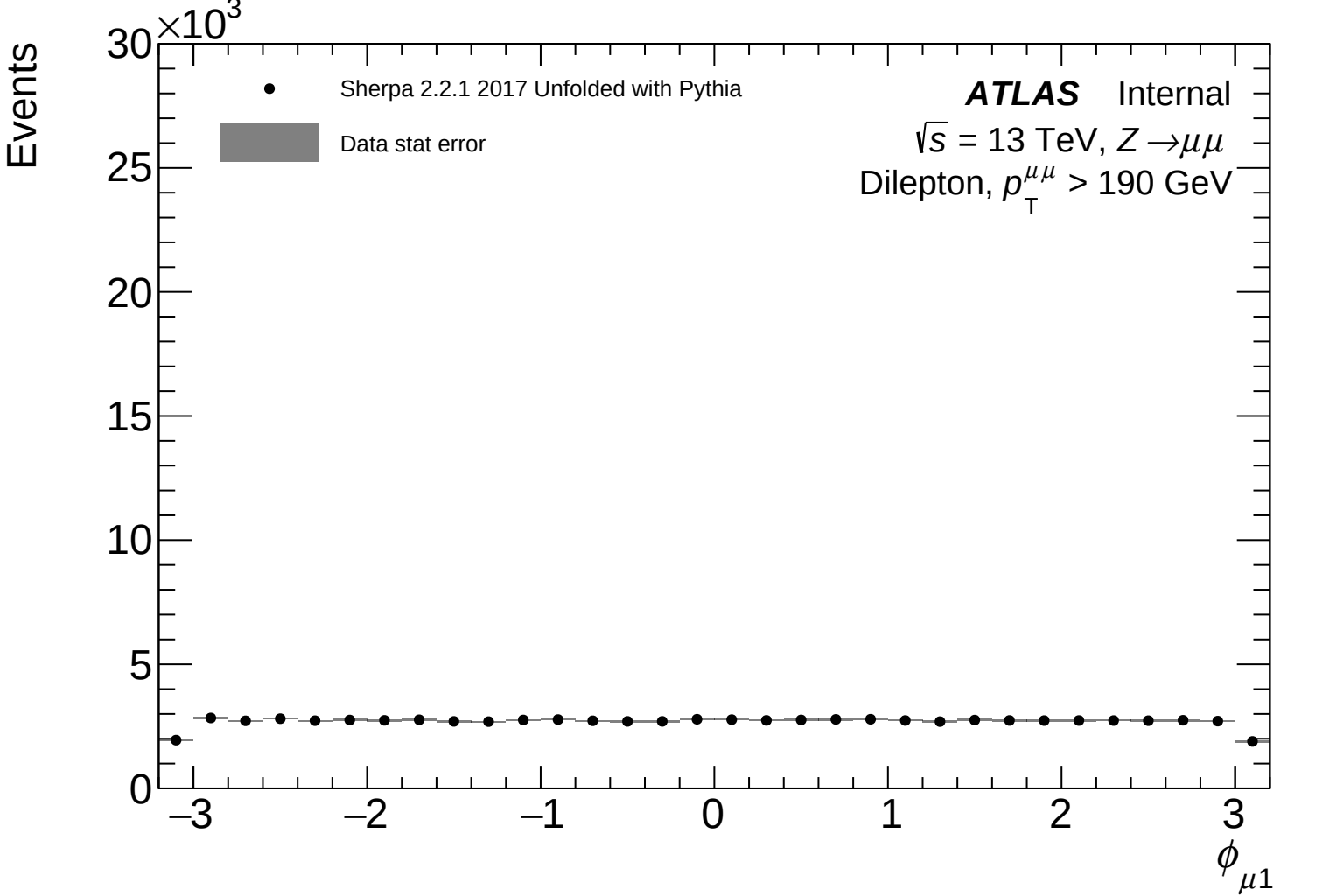

$\times 10^3$
30
25
20
15
10
5
0
$\mathrm{d}N$ / $\mathrm{d}\phi_{\mu 1}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

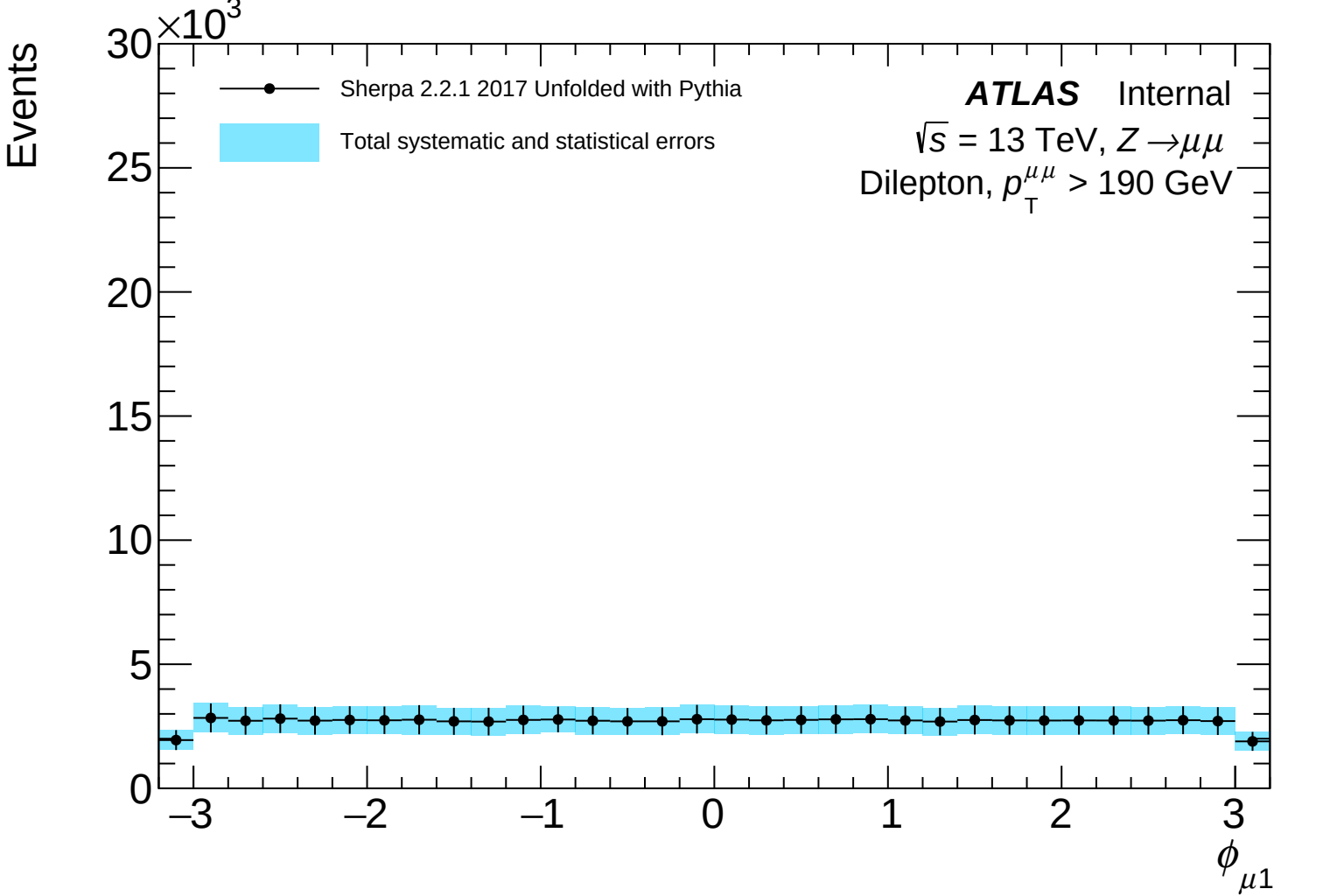

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

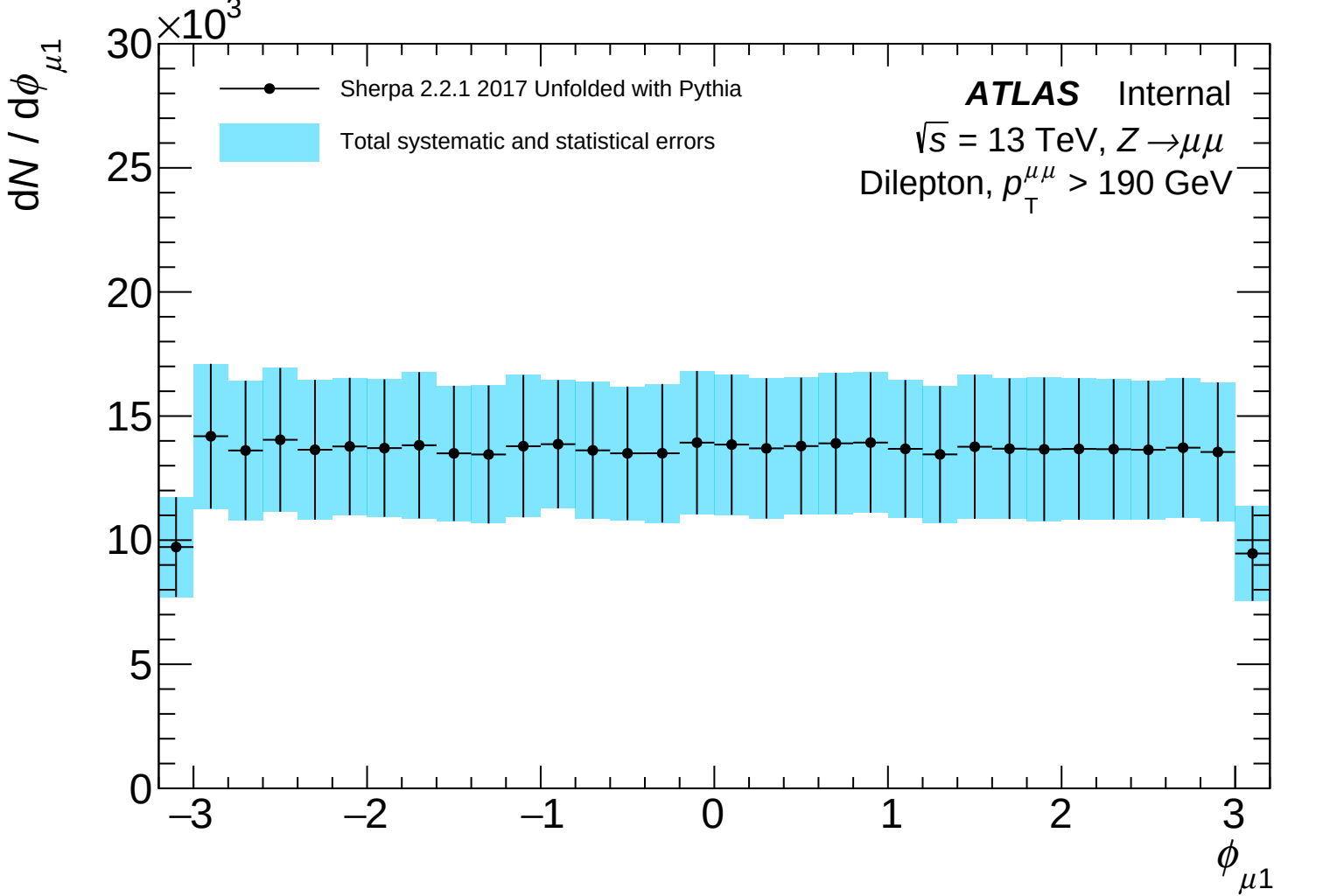

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

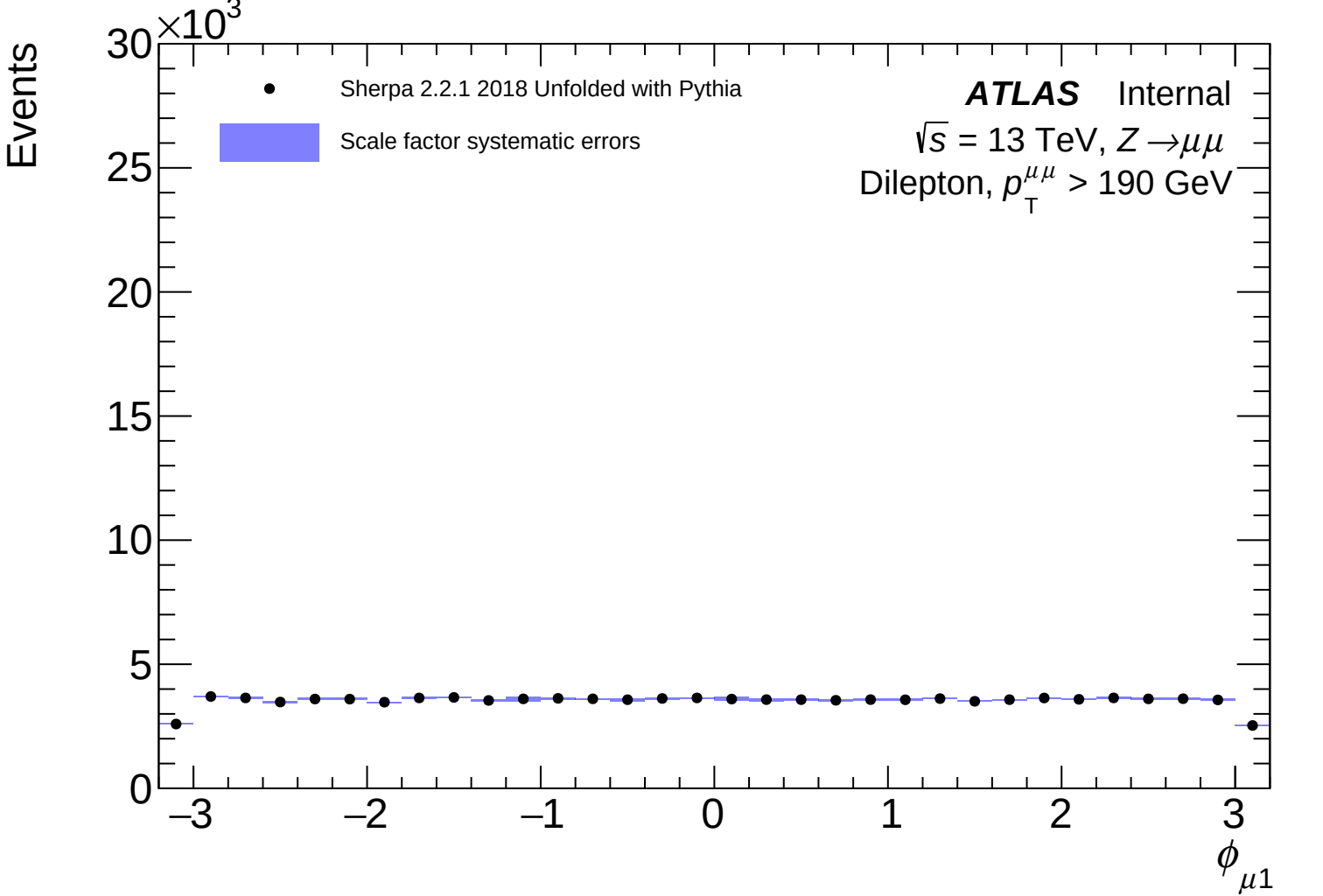

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

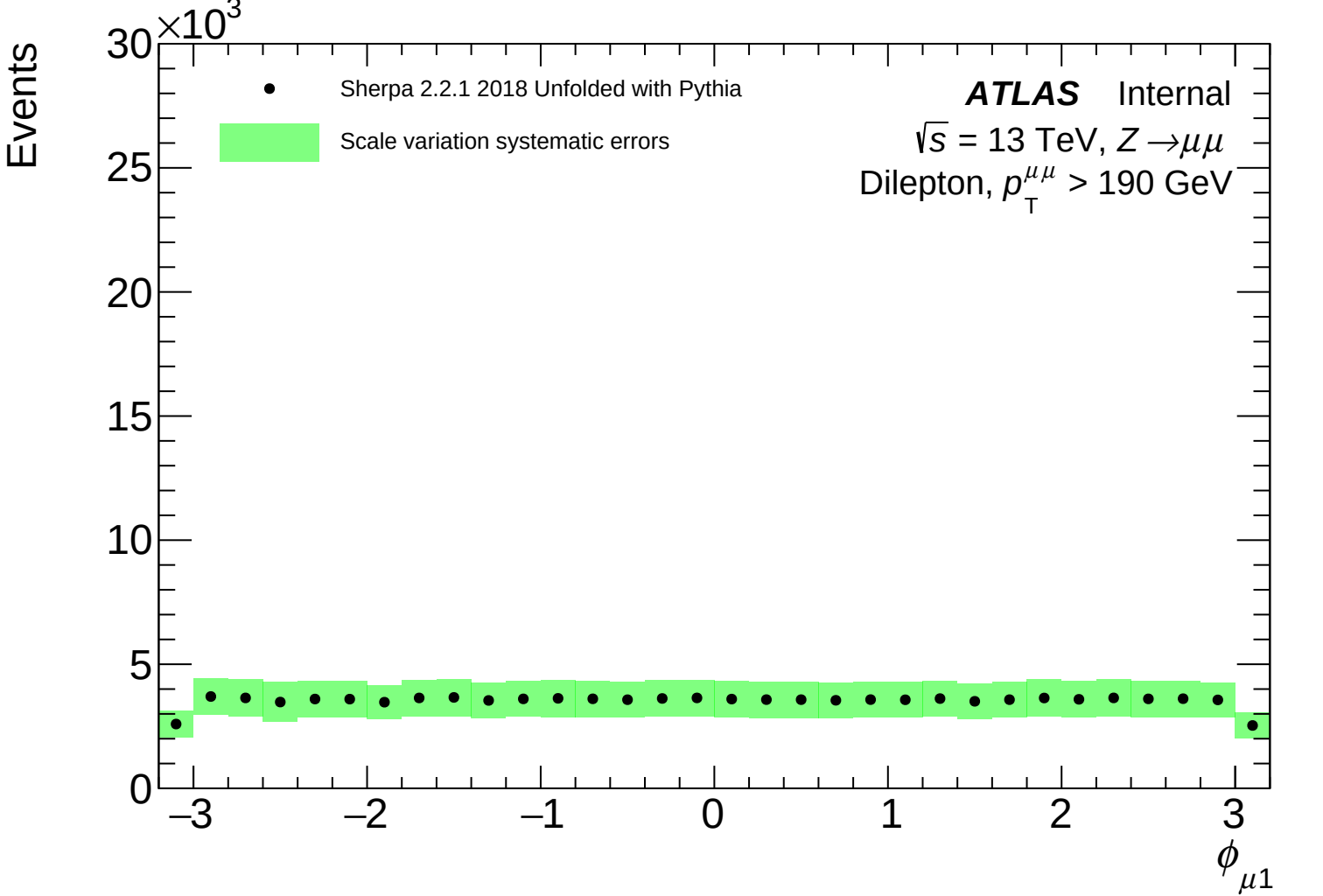

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

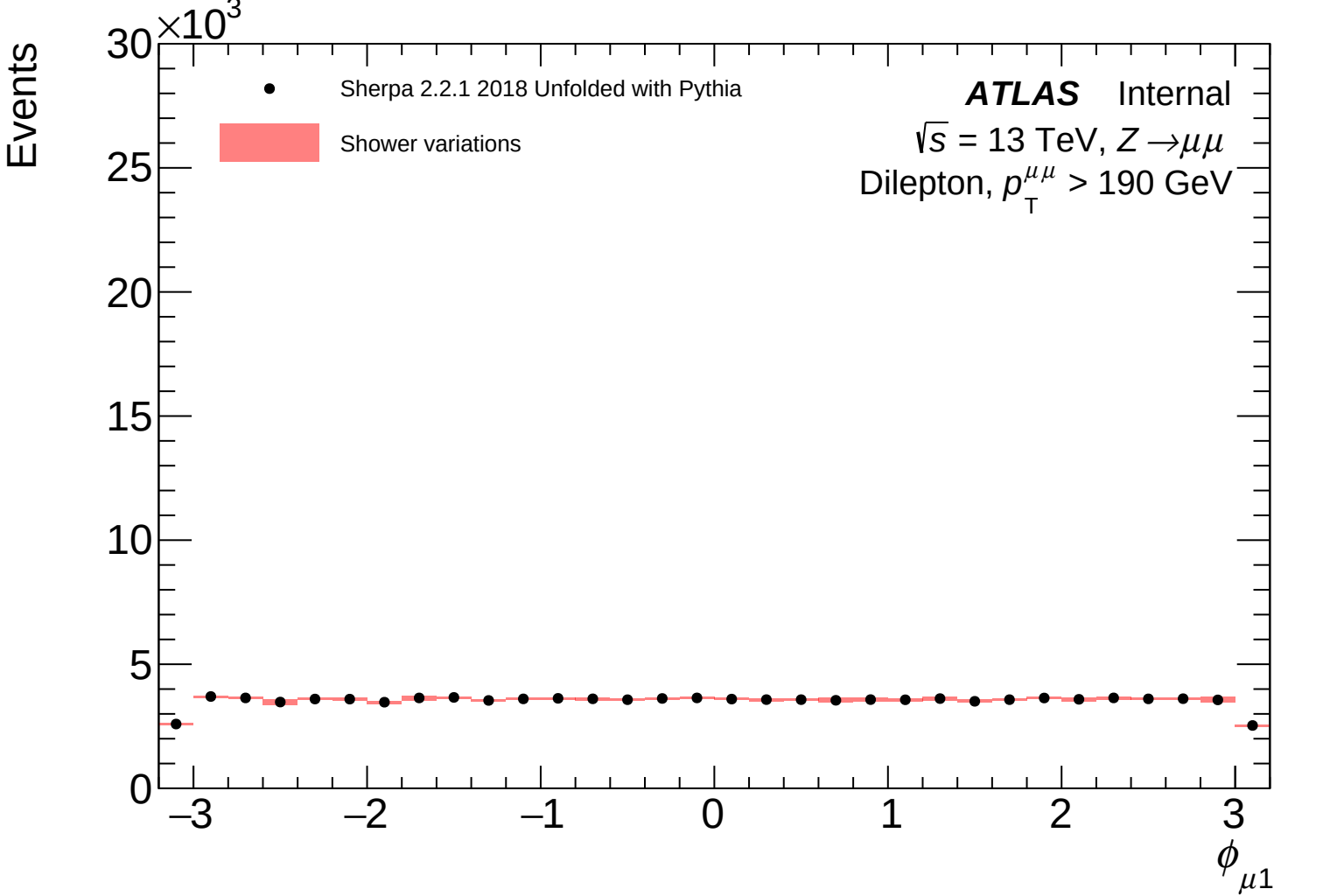

Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

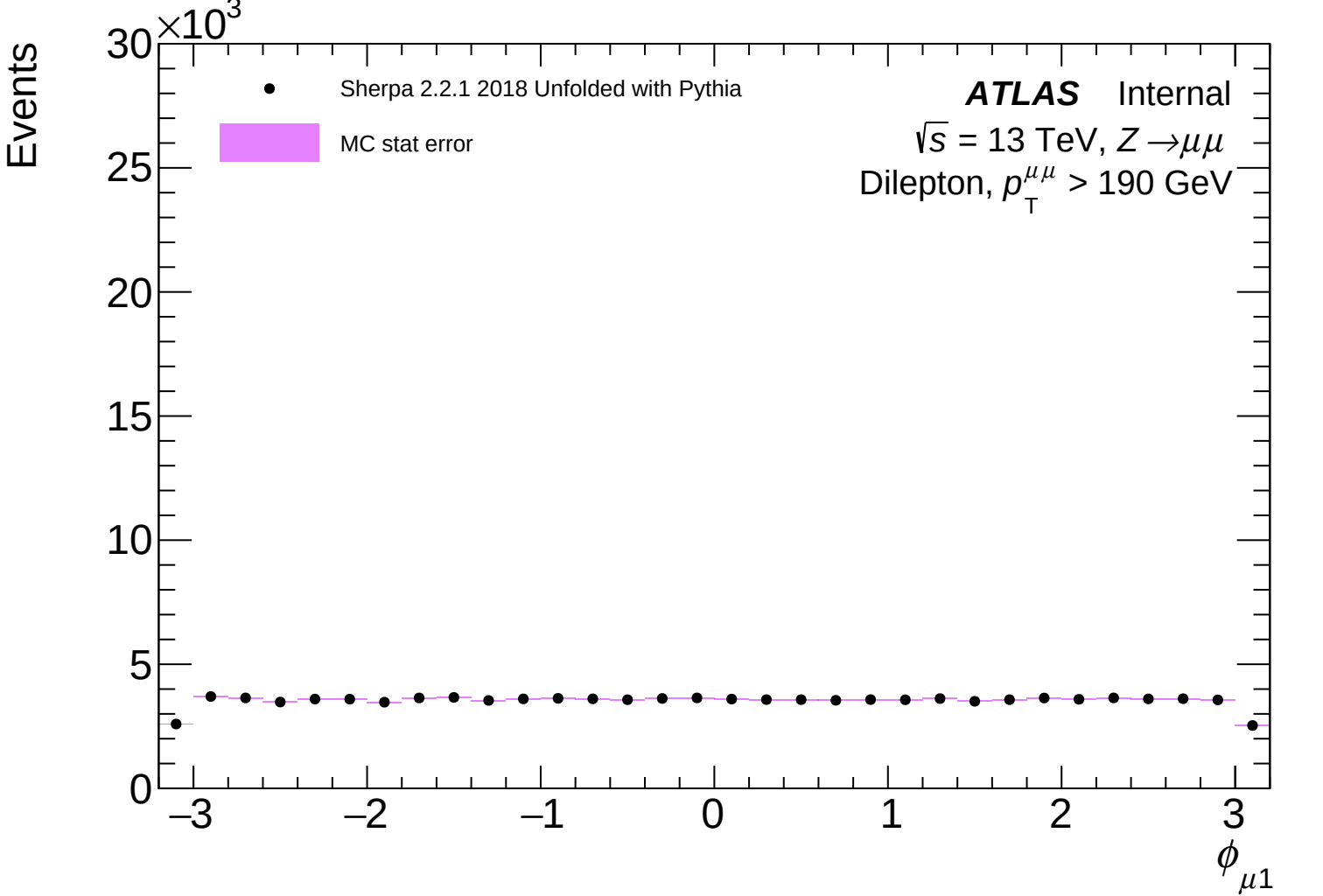

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

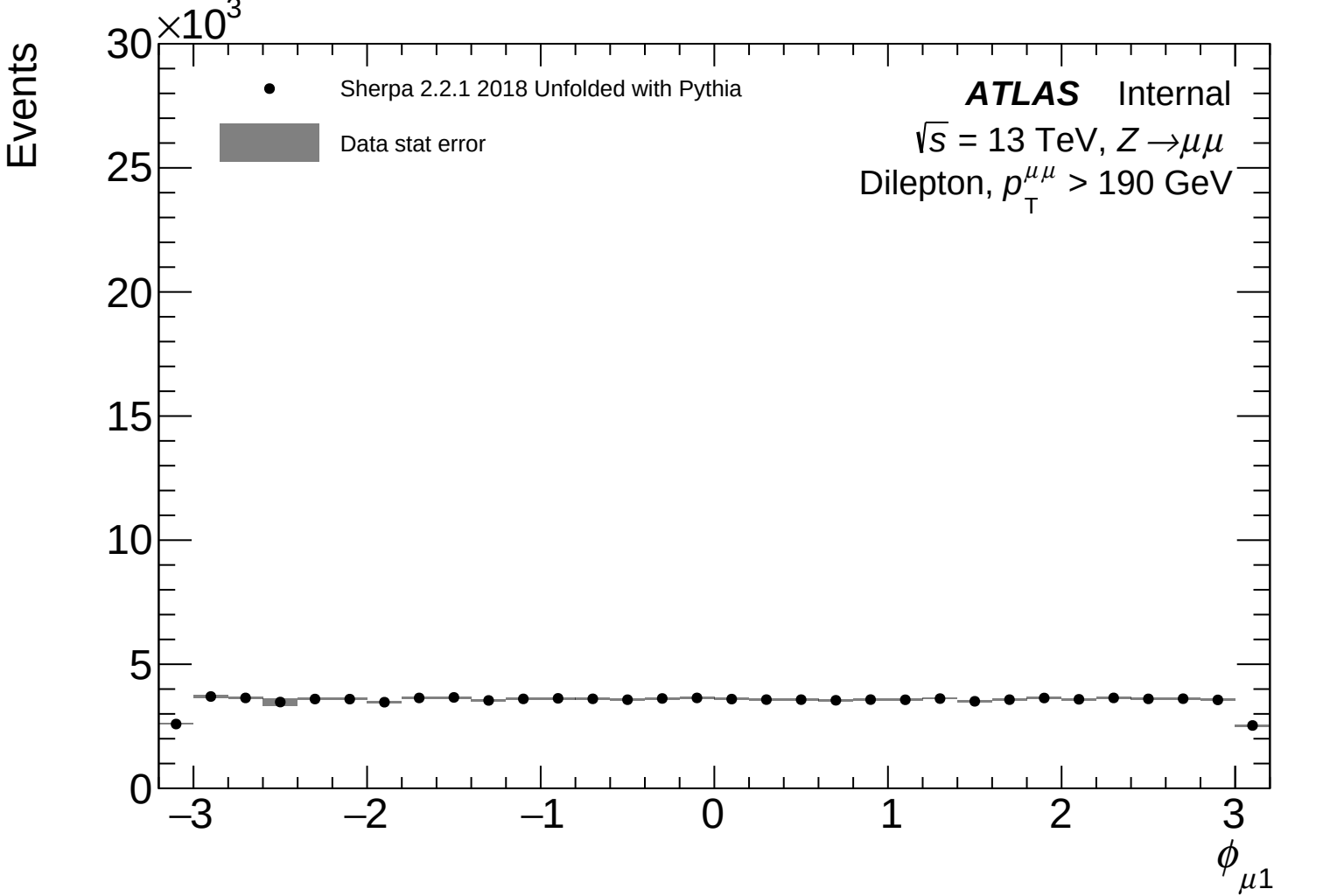

$\times 10^3$
30
25
20
15
10
5
0
$dN / d\phi_{\mu 1}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

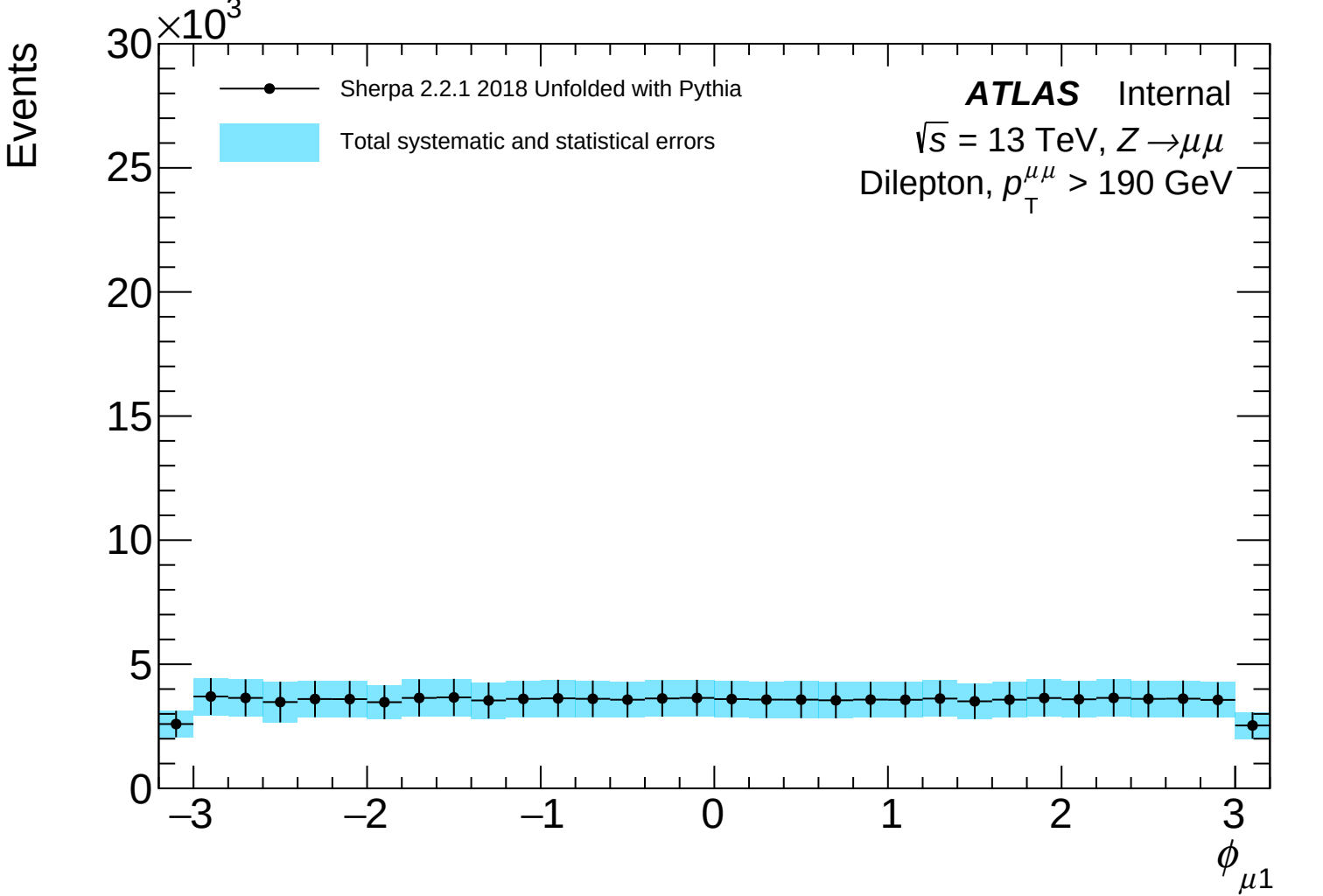

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

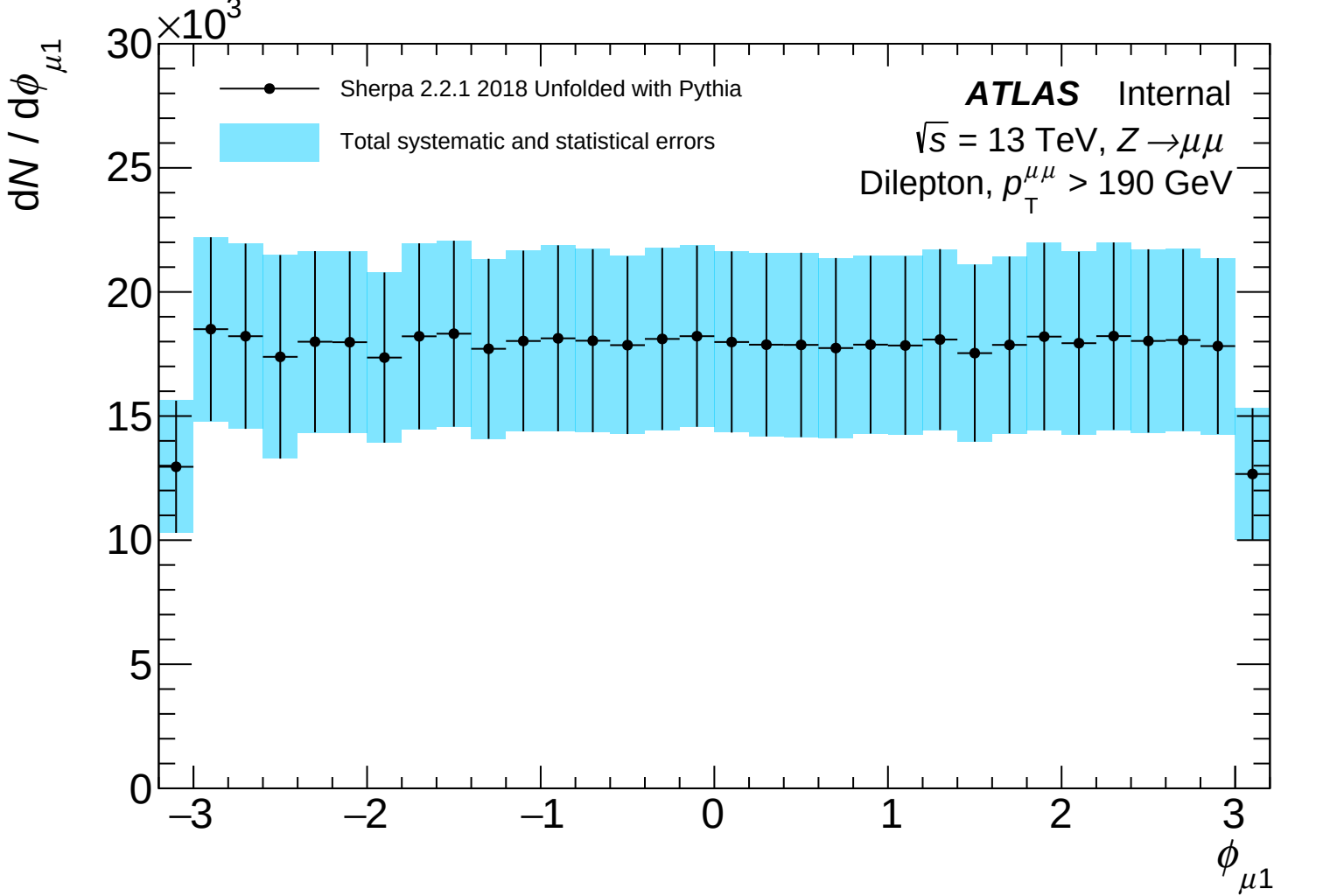

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

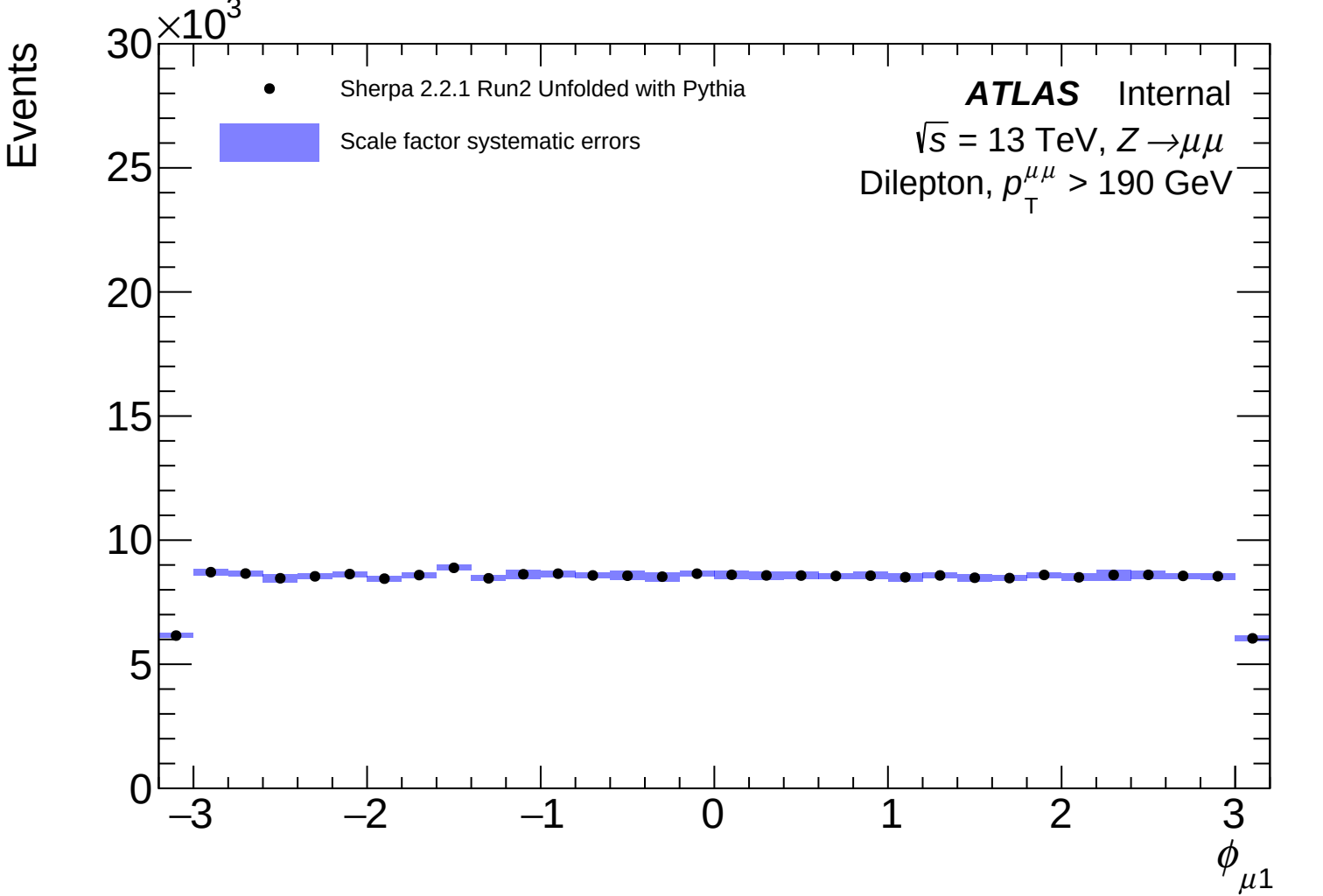

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

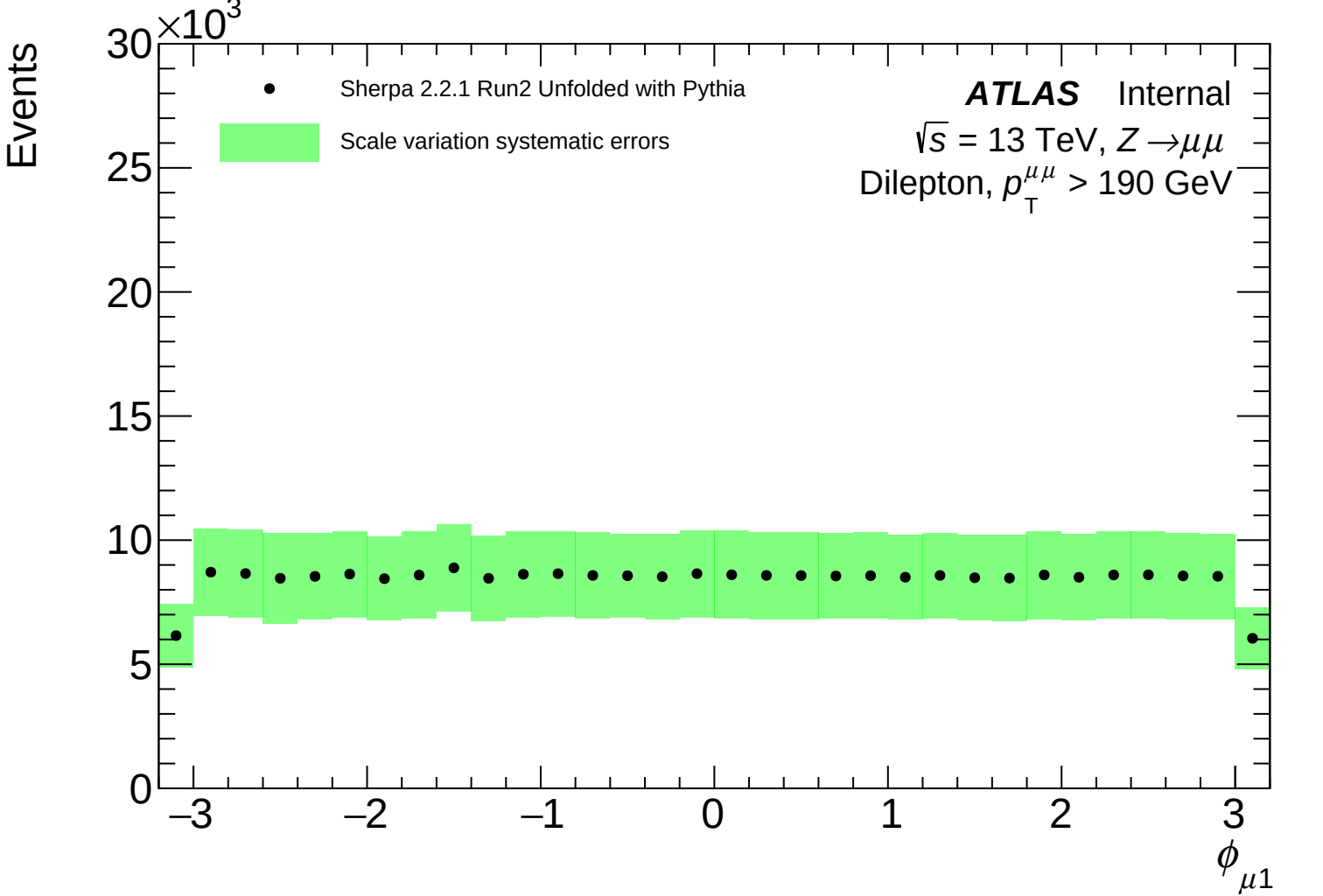

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

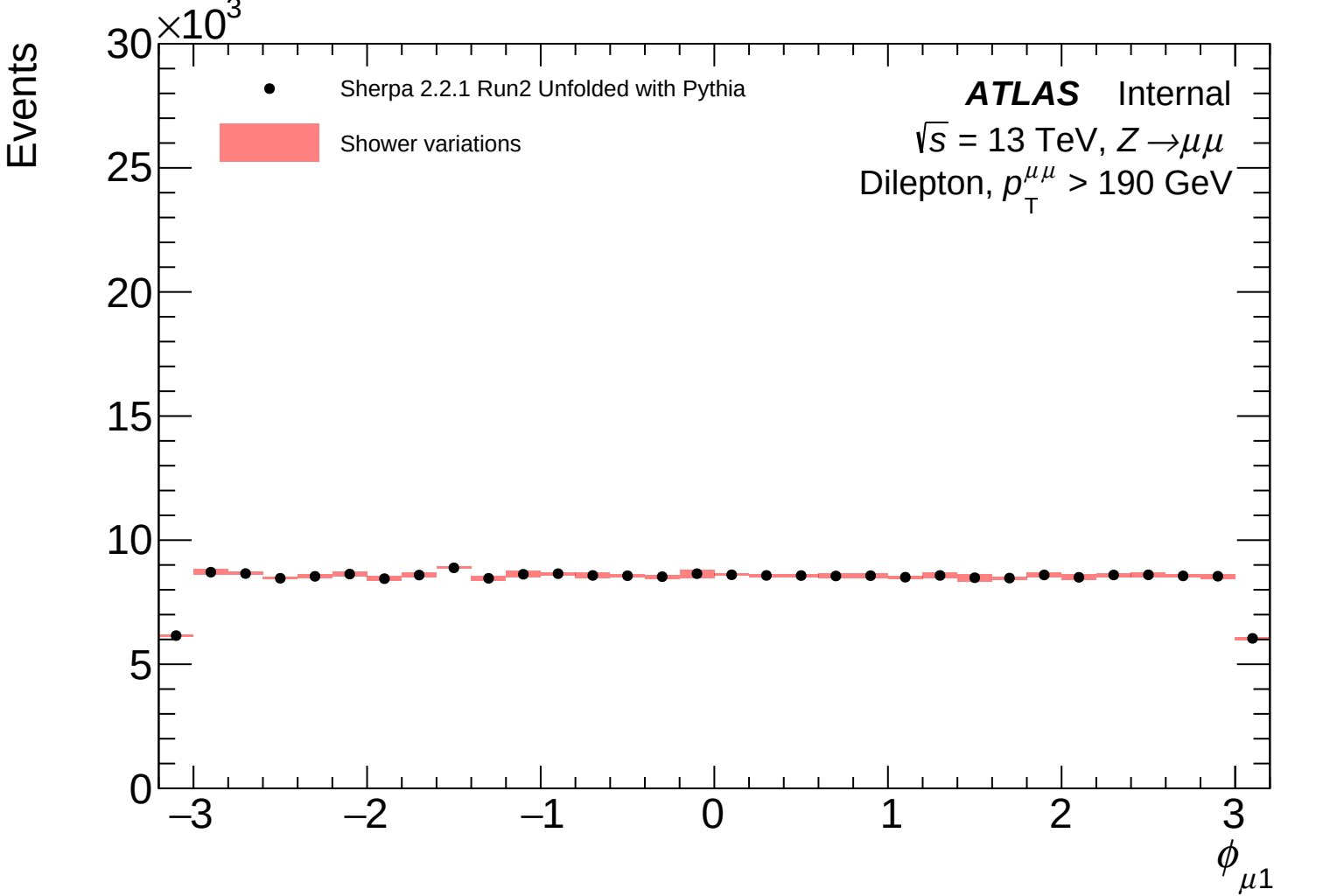

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

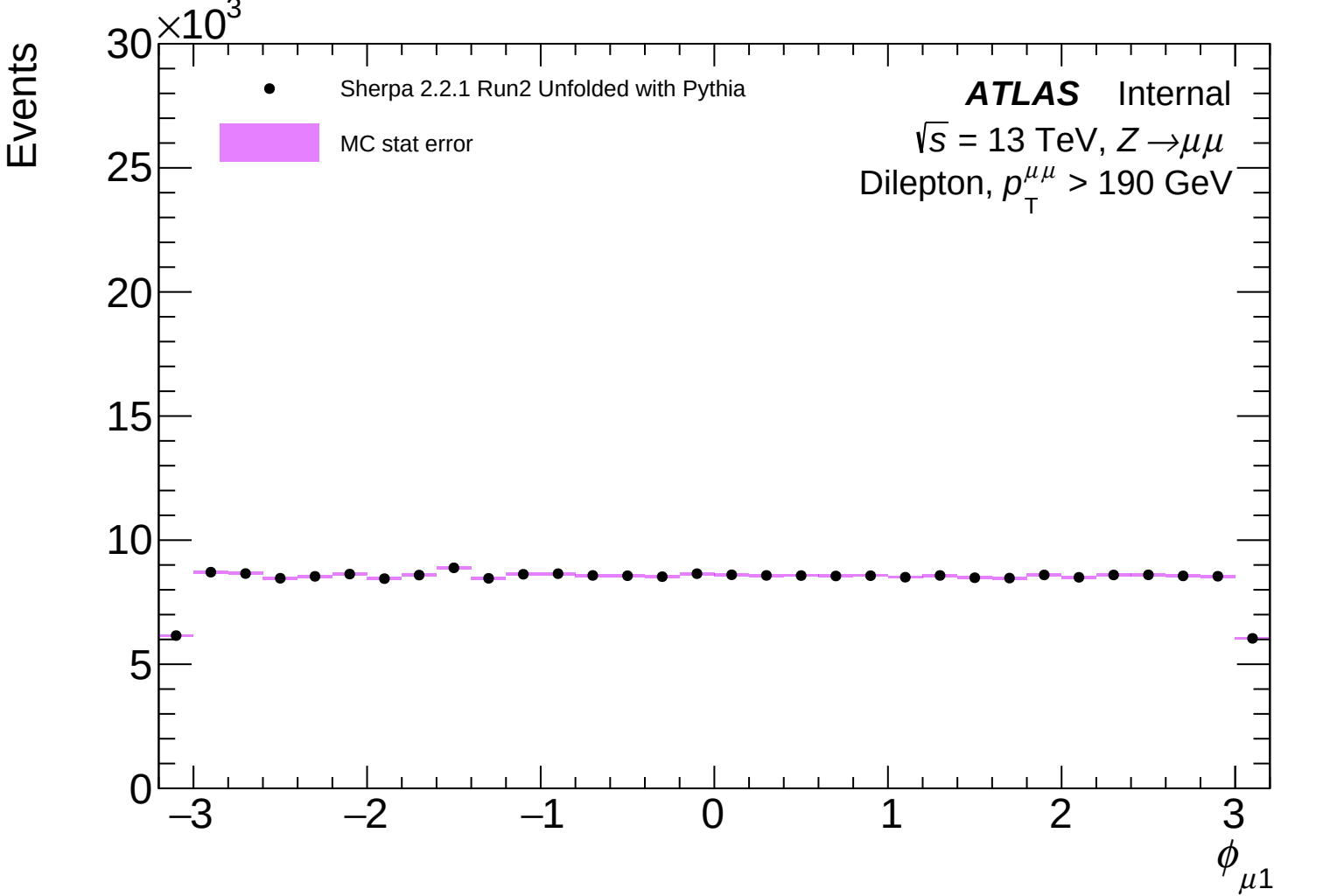

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

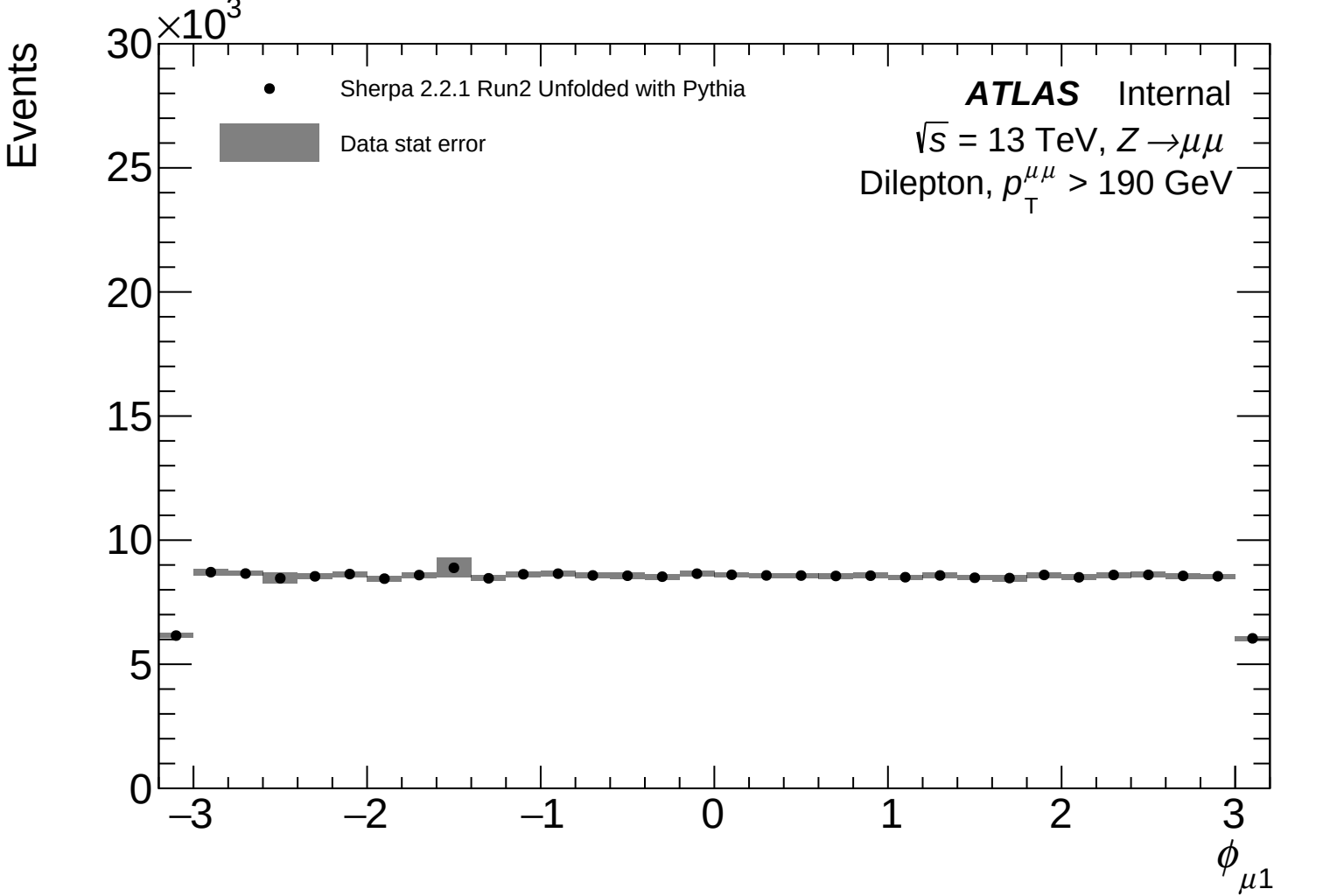

$\times 10^{3}$
30
25
20
15
10
5
0
$\mathrm{d}N$ / $\mathrm{d}\phi_{\mu 1}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

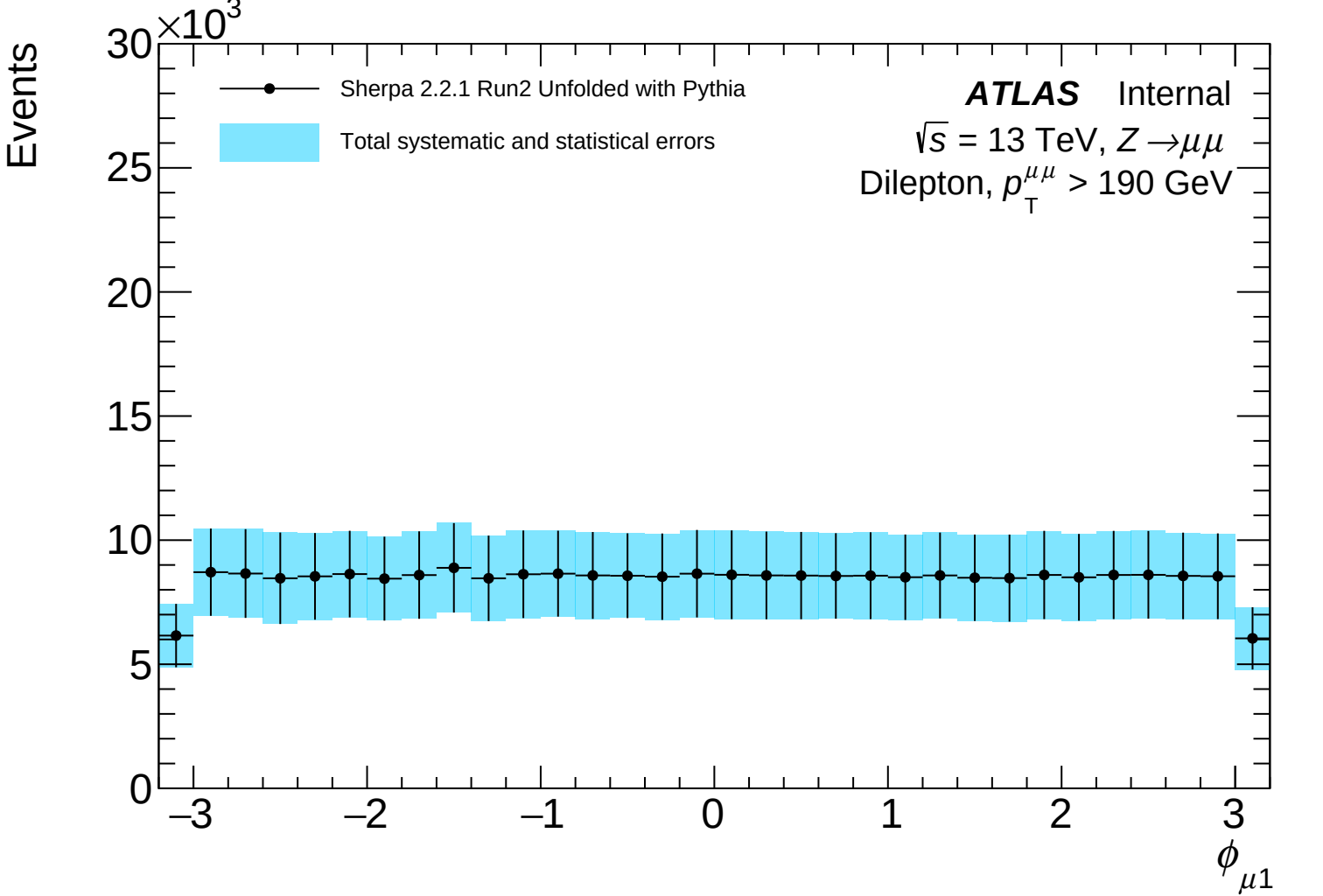

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

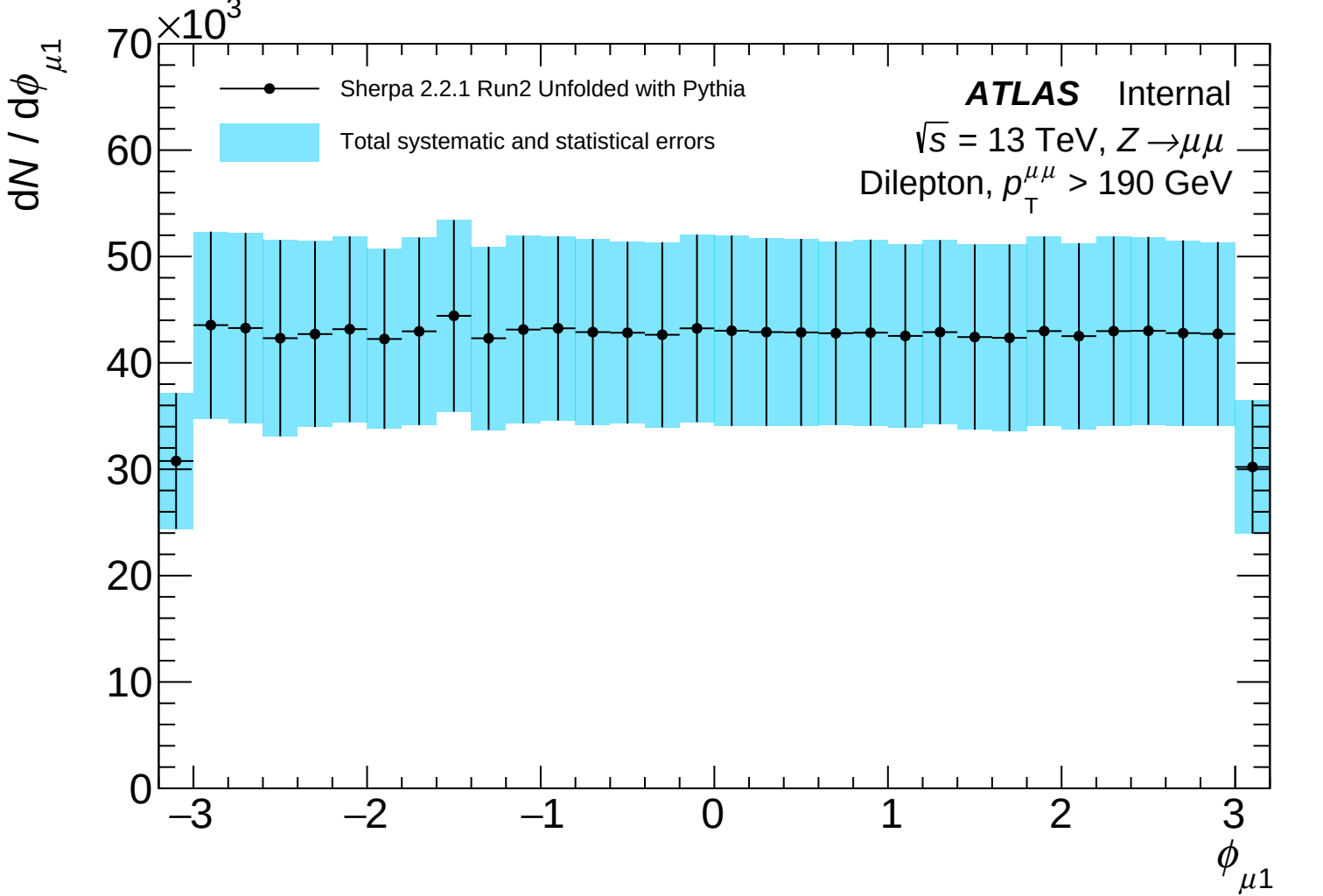

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

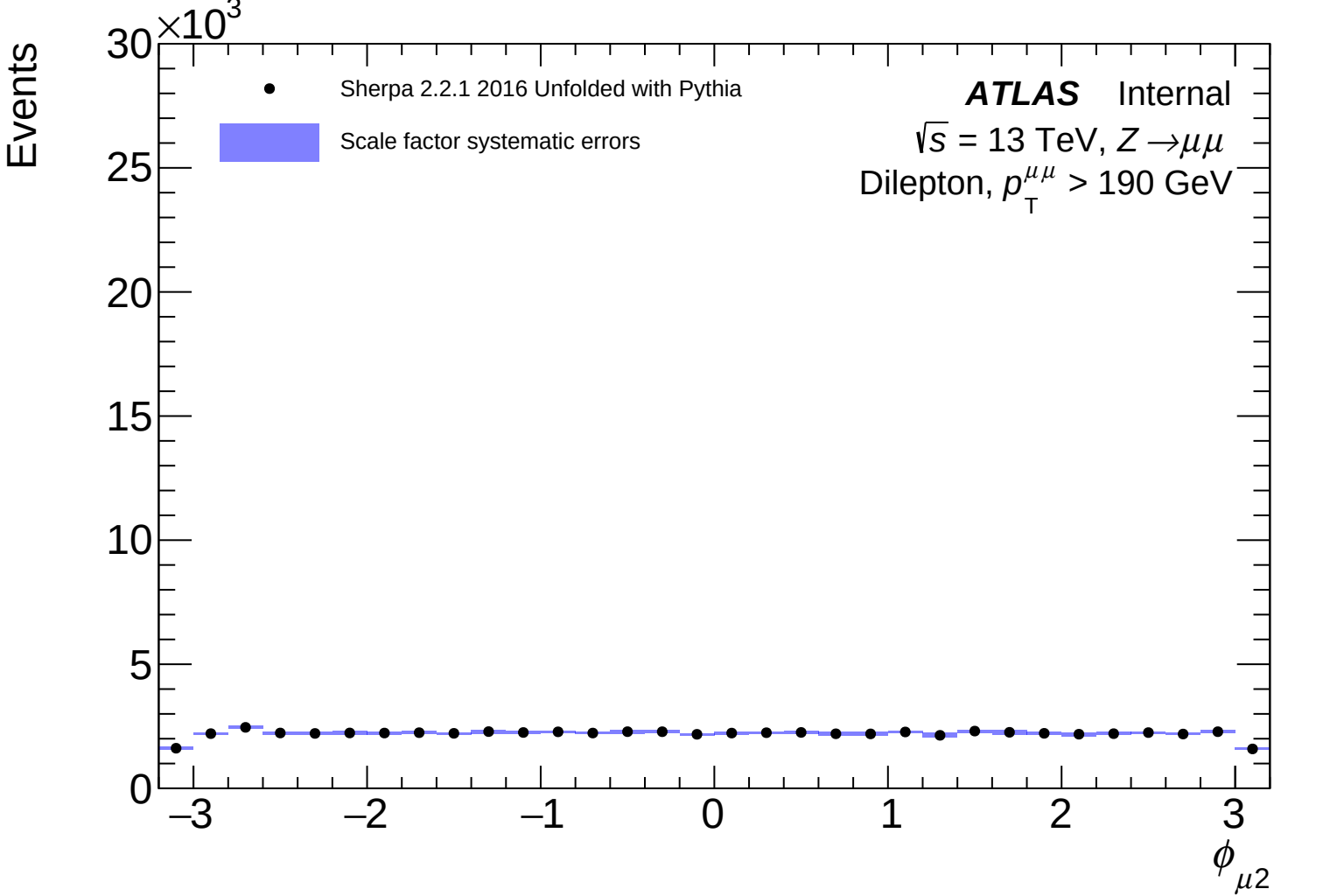

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

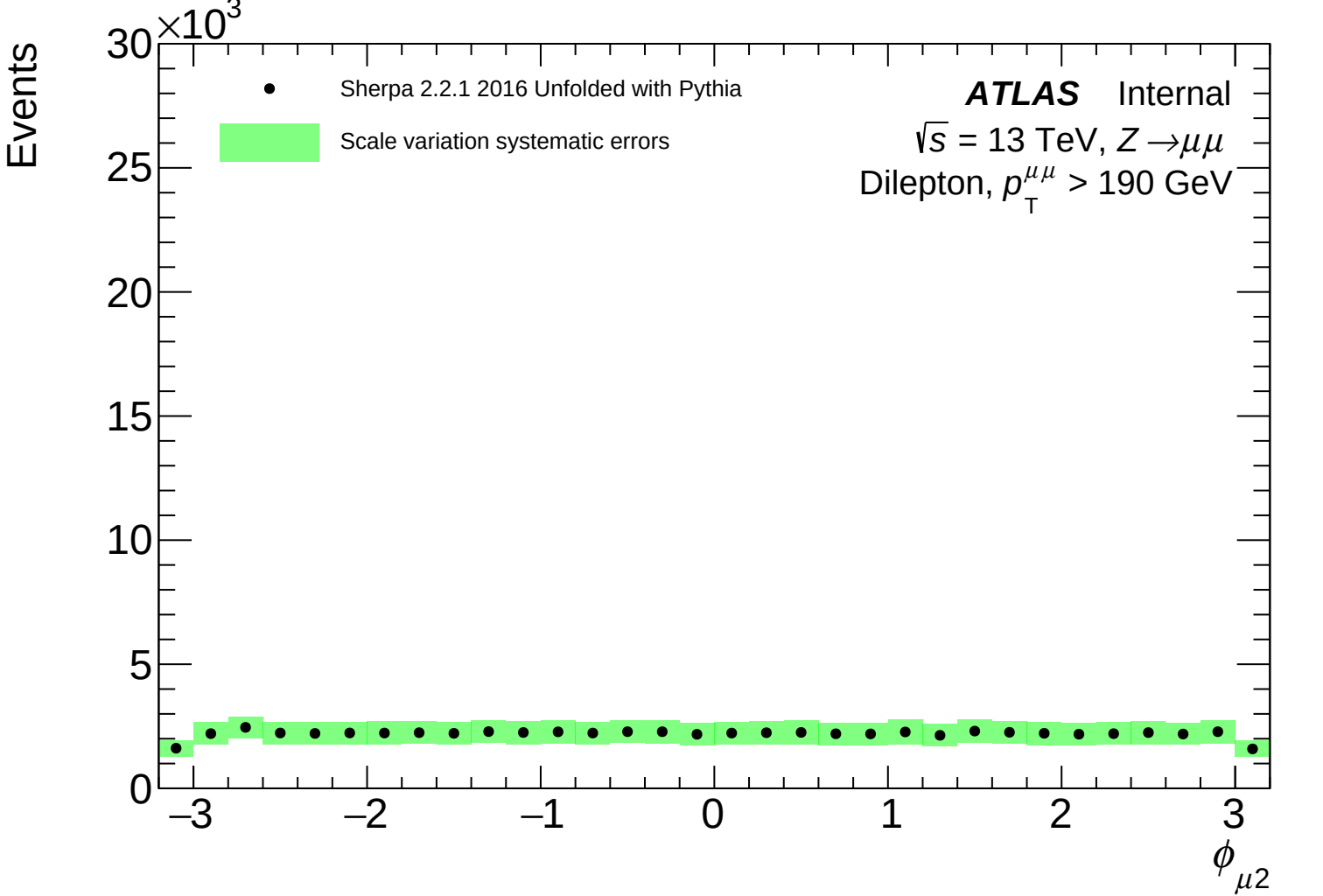

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

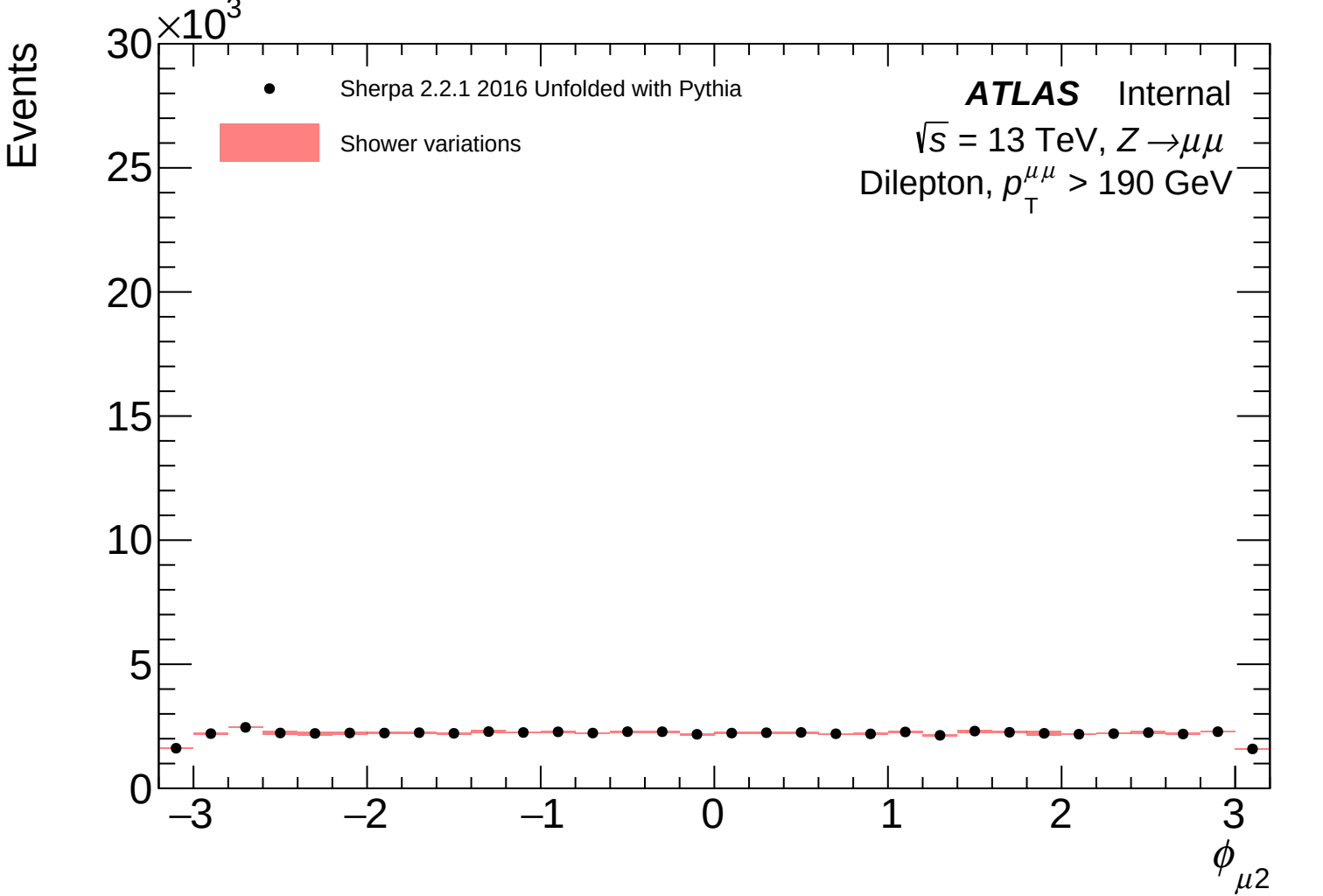

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

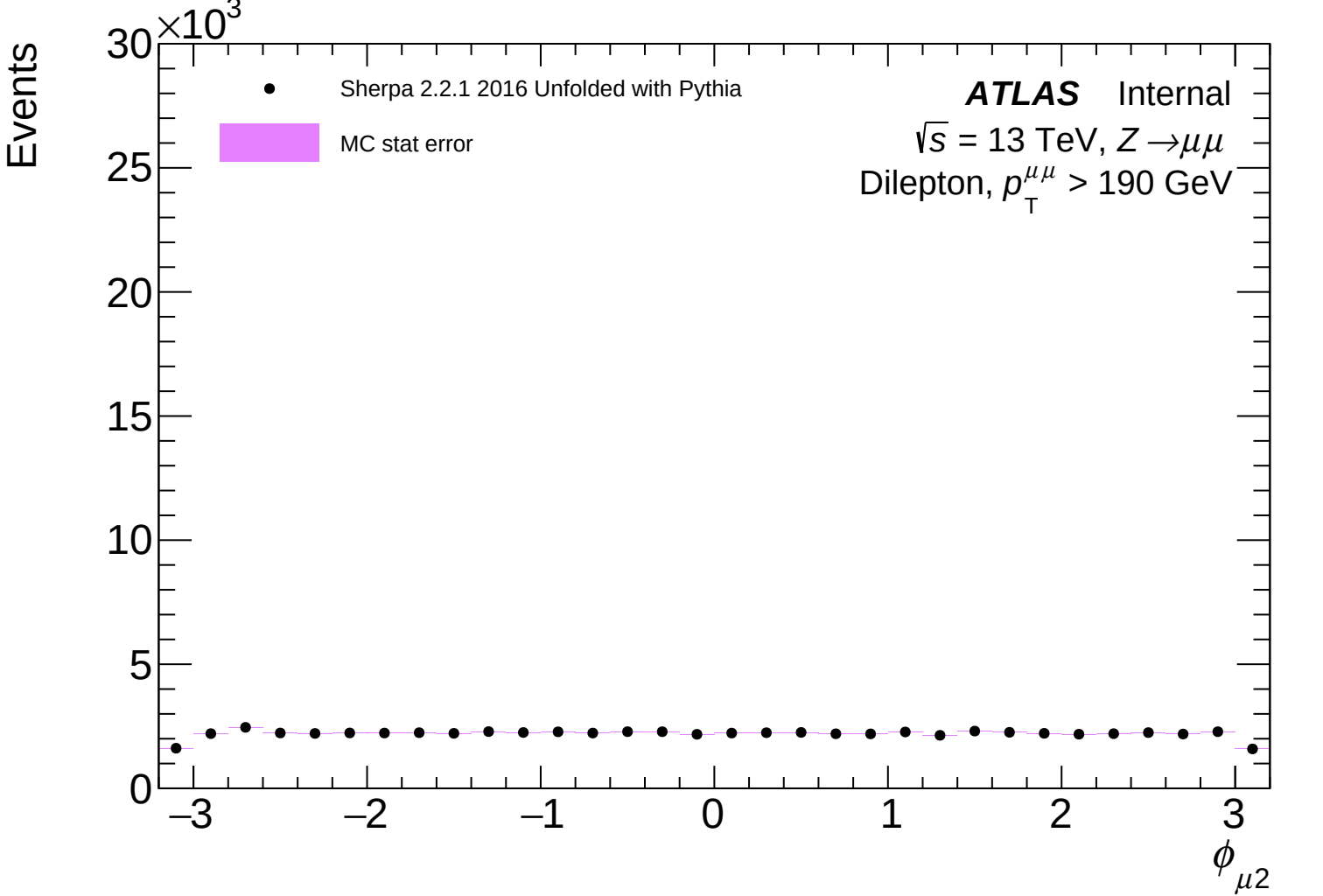

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ1

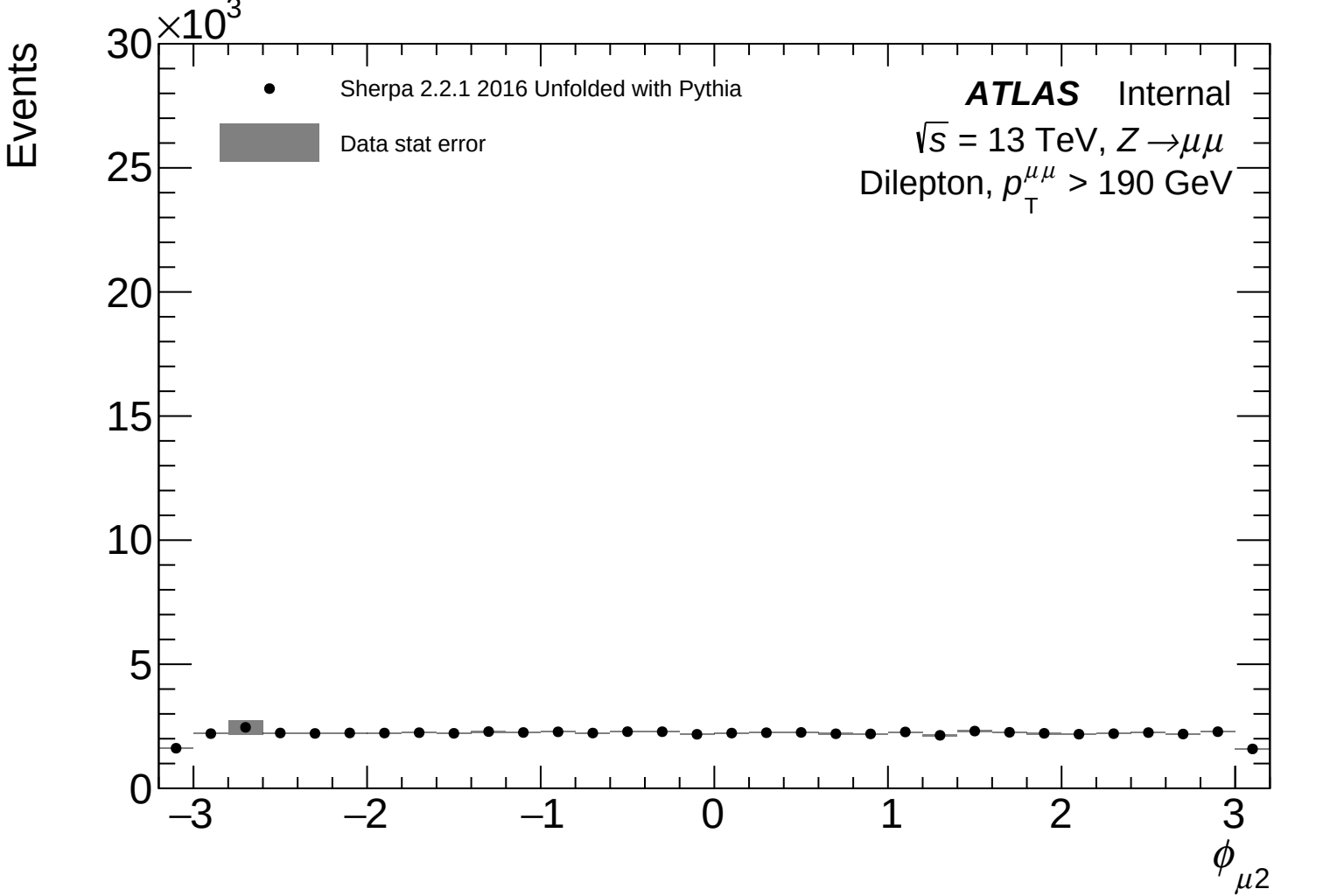

$\times 10^3$
70
60
50
40
30
20
10
0
dN / $d\phi_{\mu 1}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 1}$

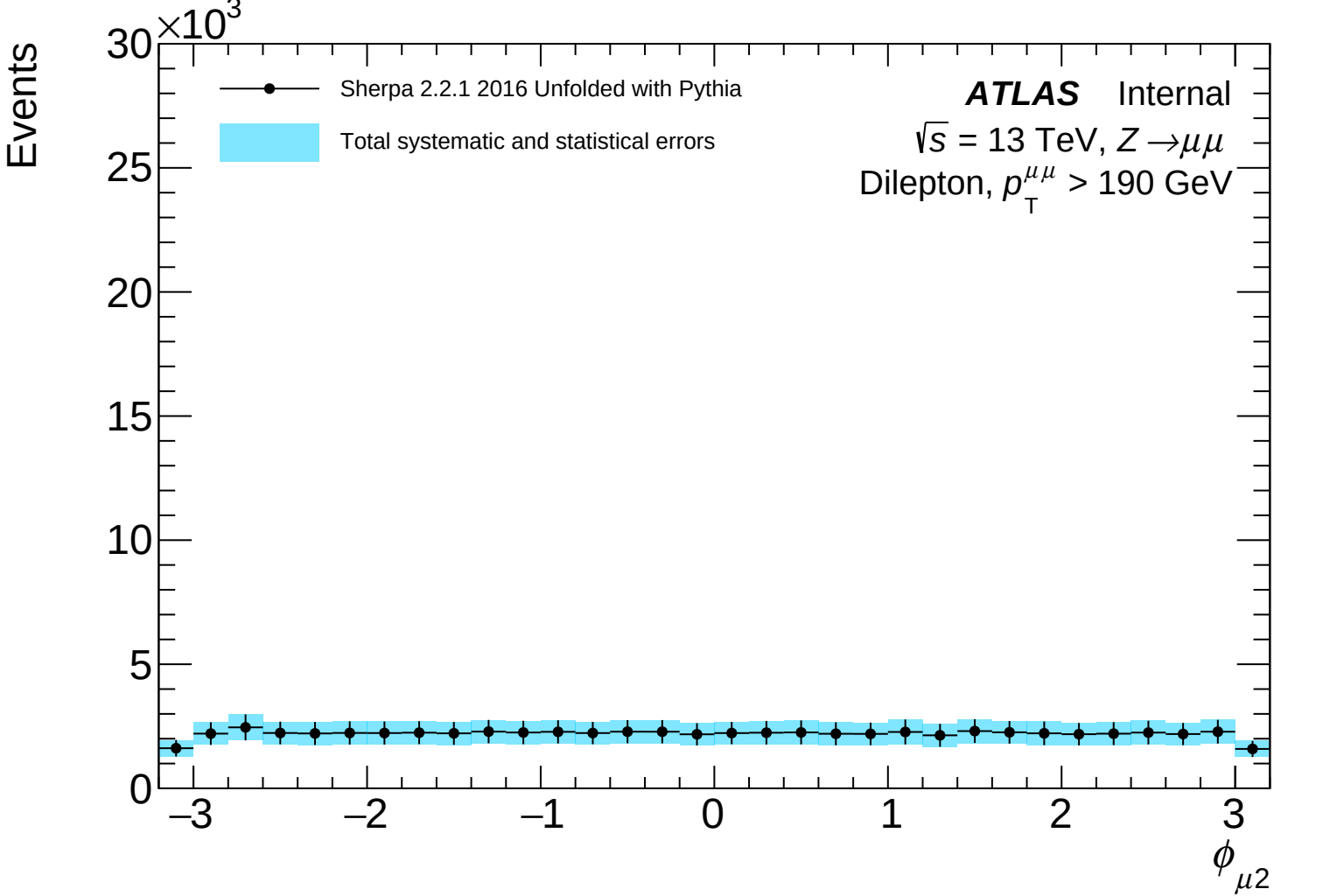

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2

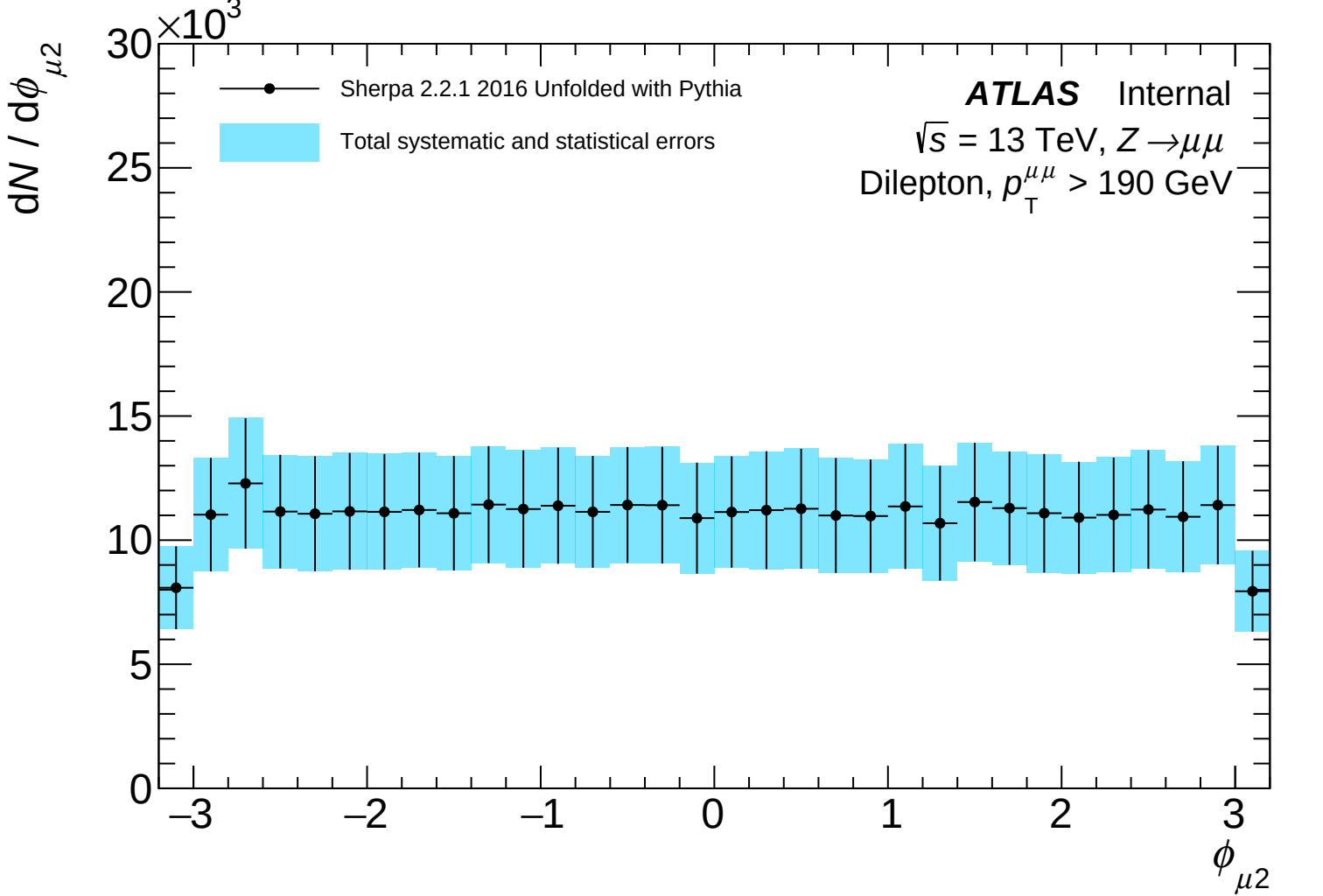

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2

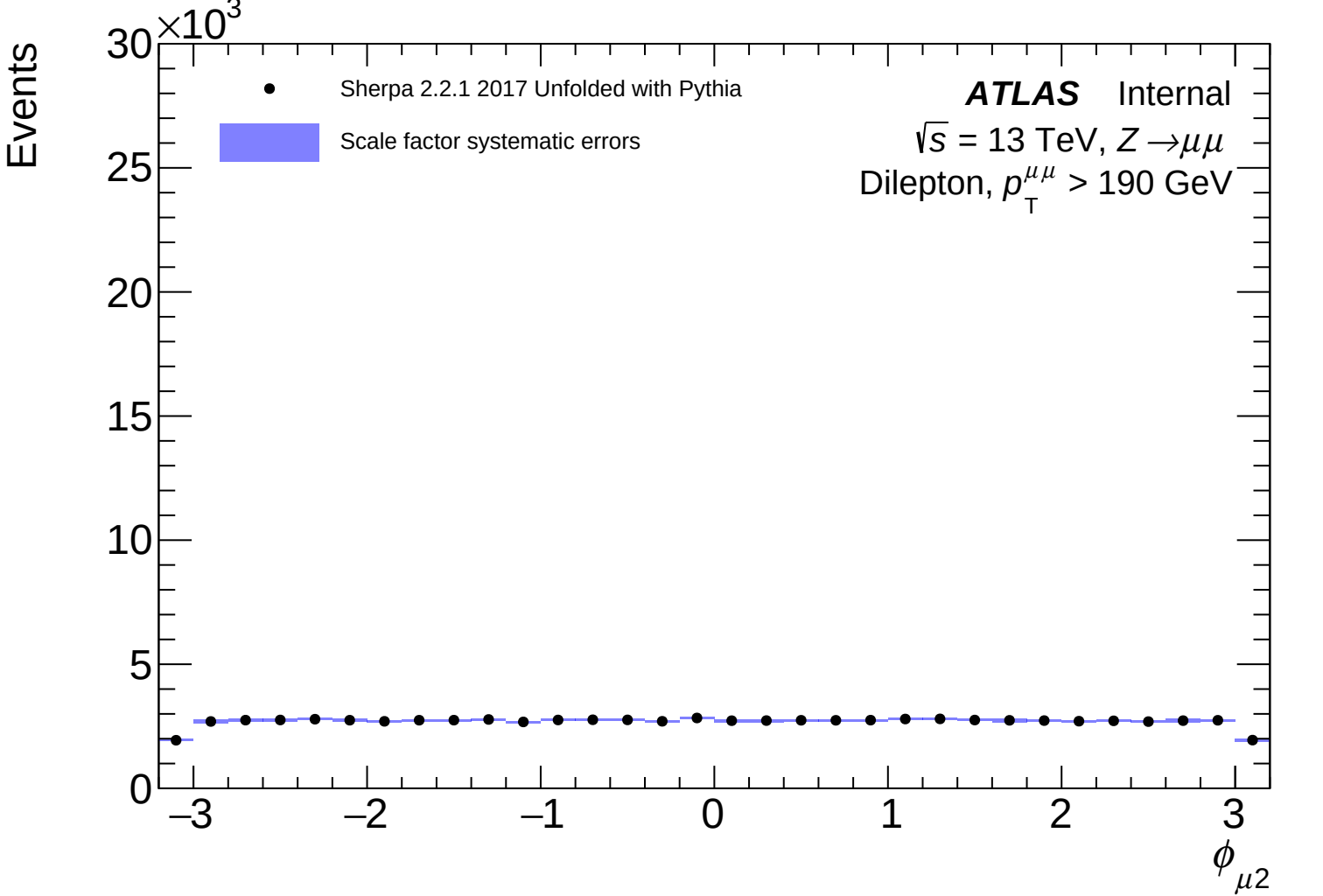

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 2}$


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


$\times 10^3$
30
25
20
15
10
5
0
$\mathrm{d}N$ / $\mathrm{d}\phi_{\mu 2}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 2}$


Events
×10^3
30
25
20
15
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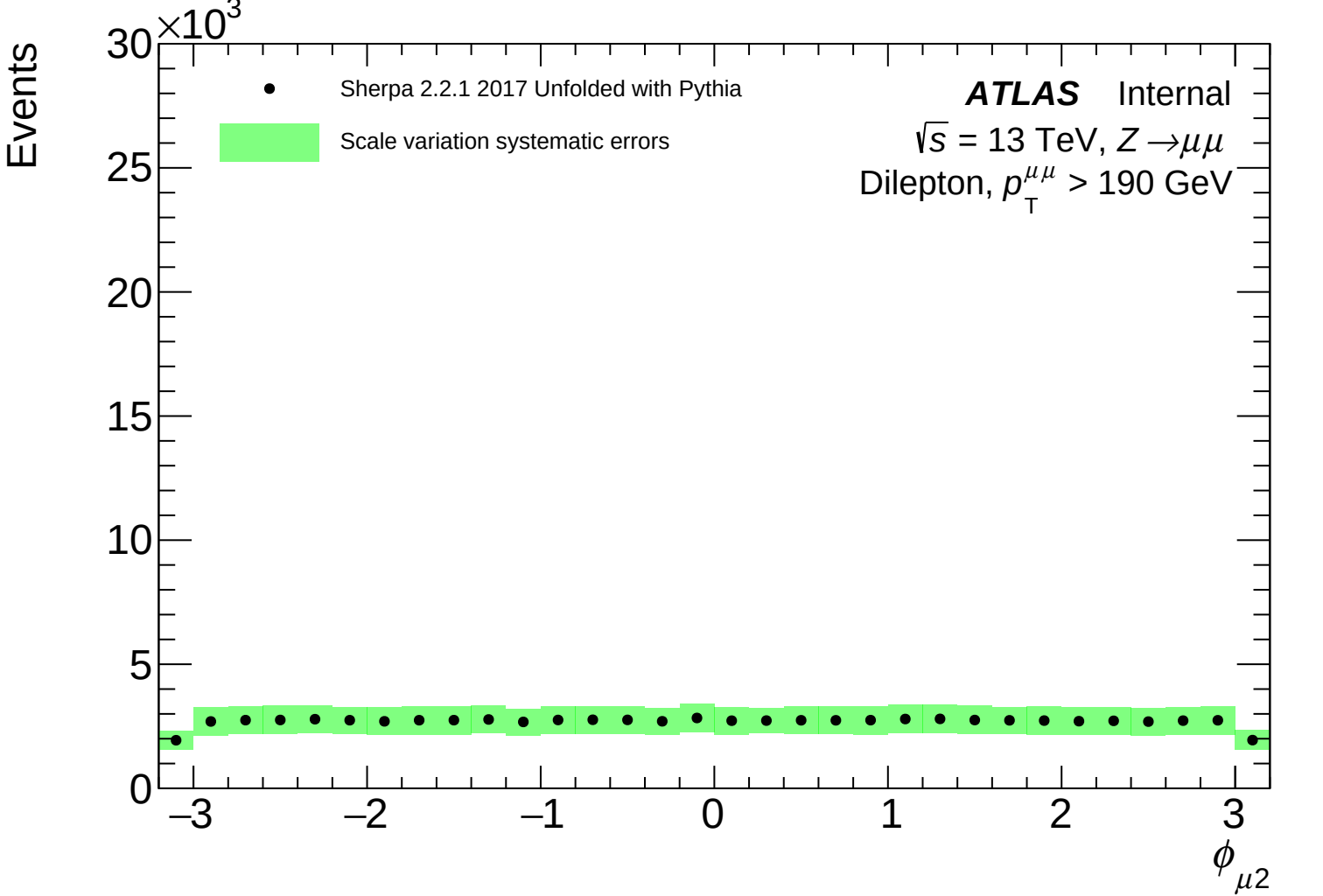
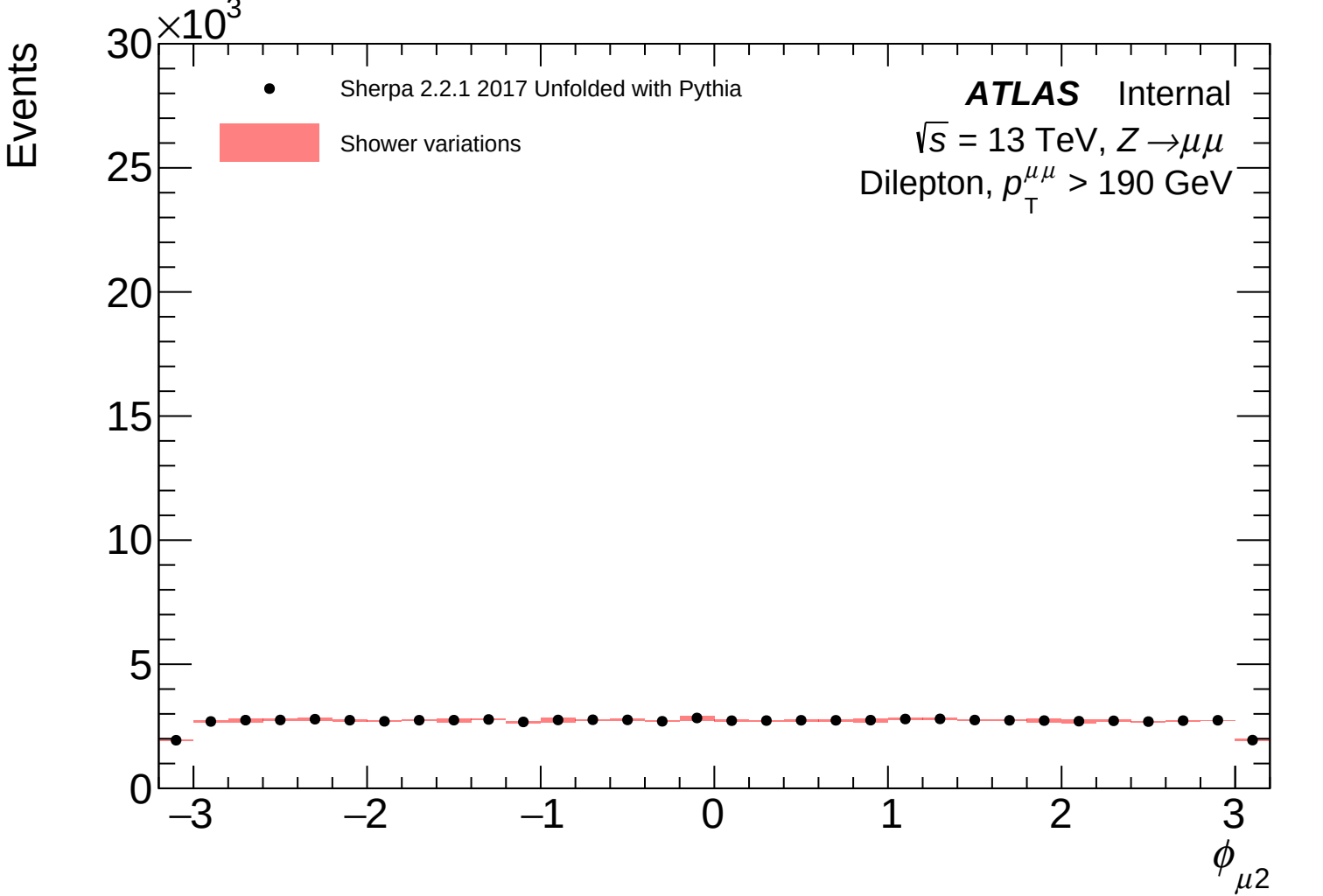
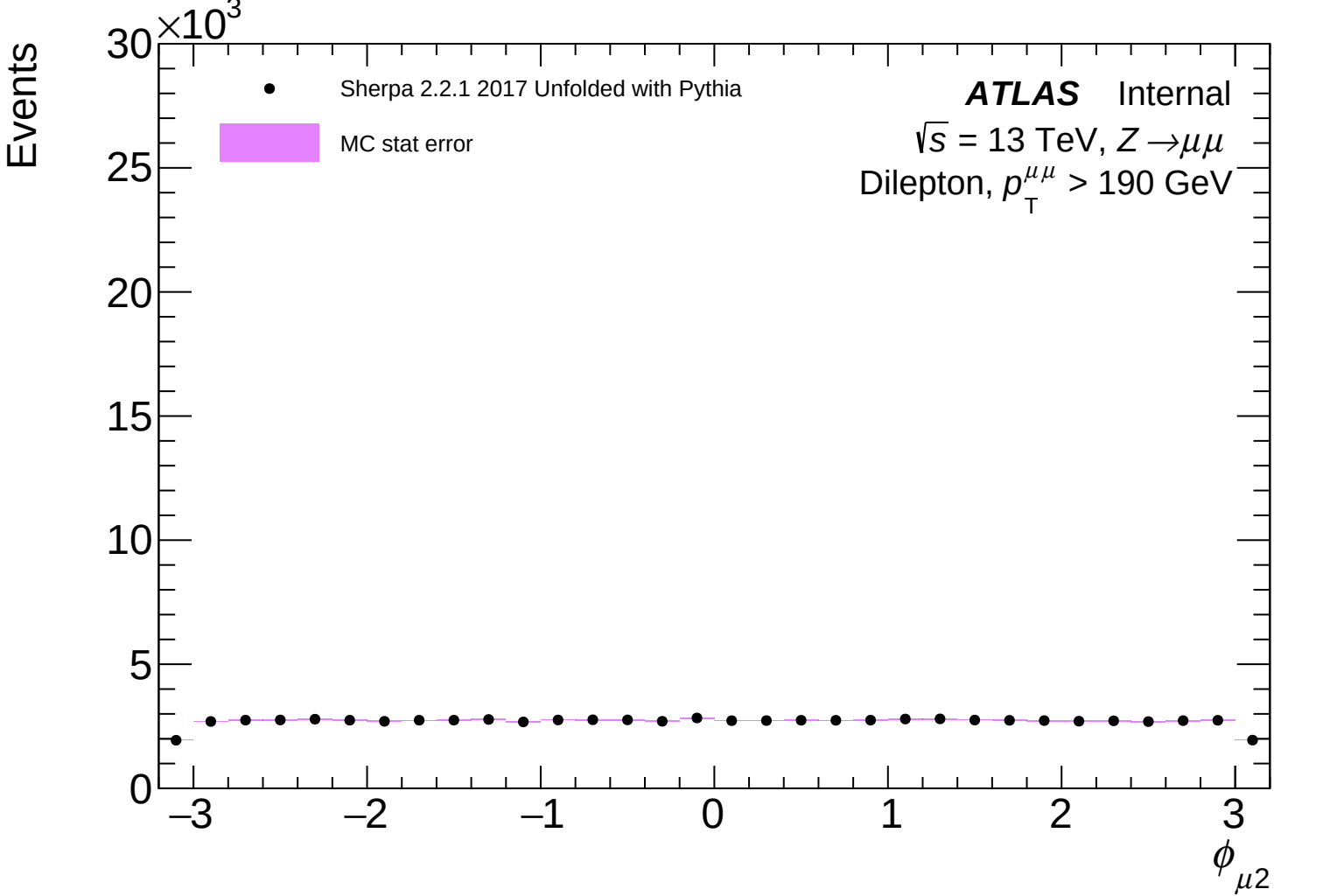
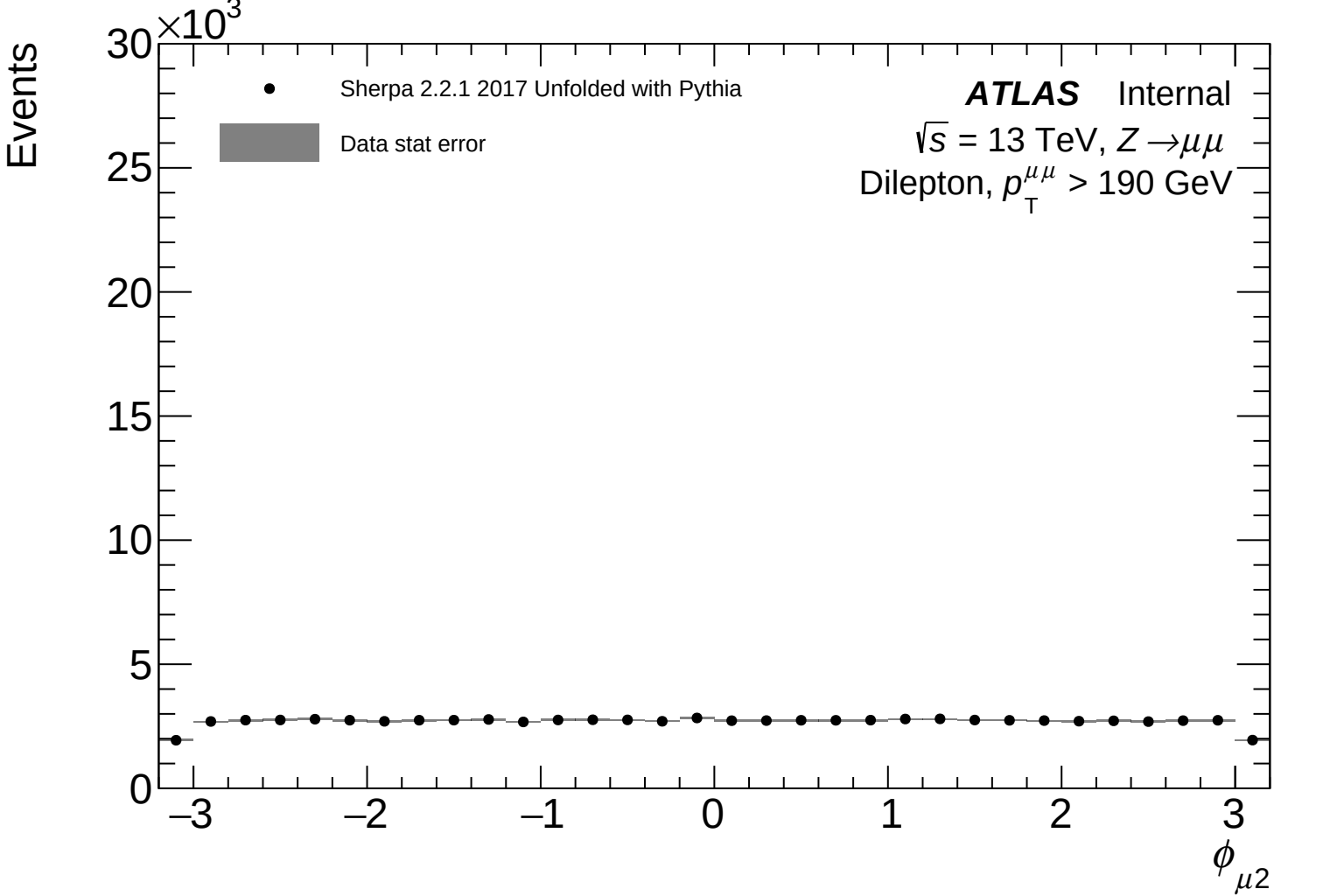
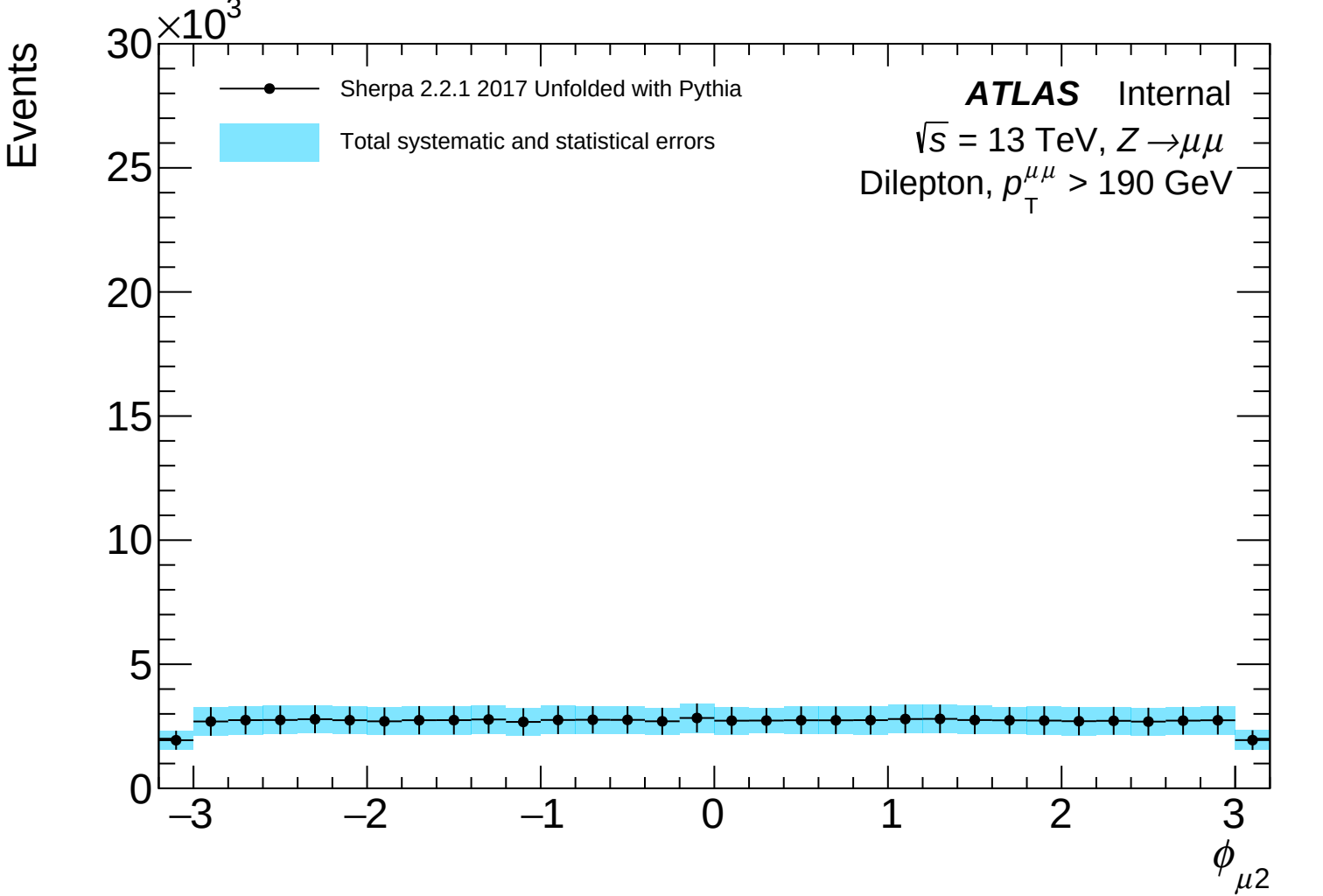
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2

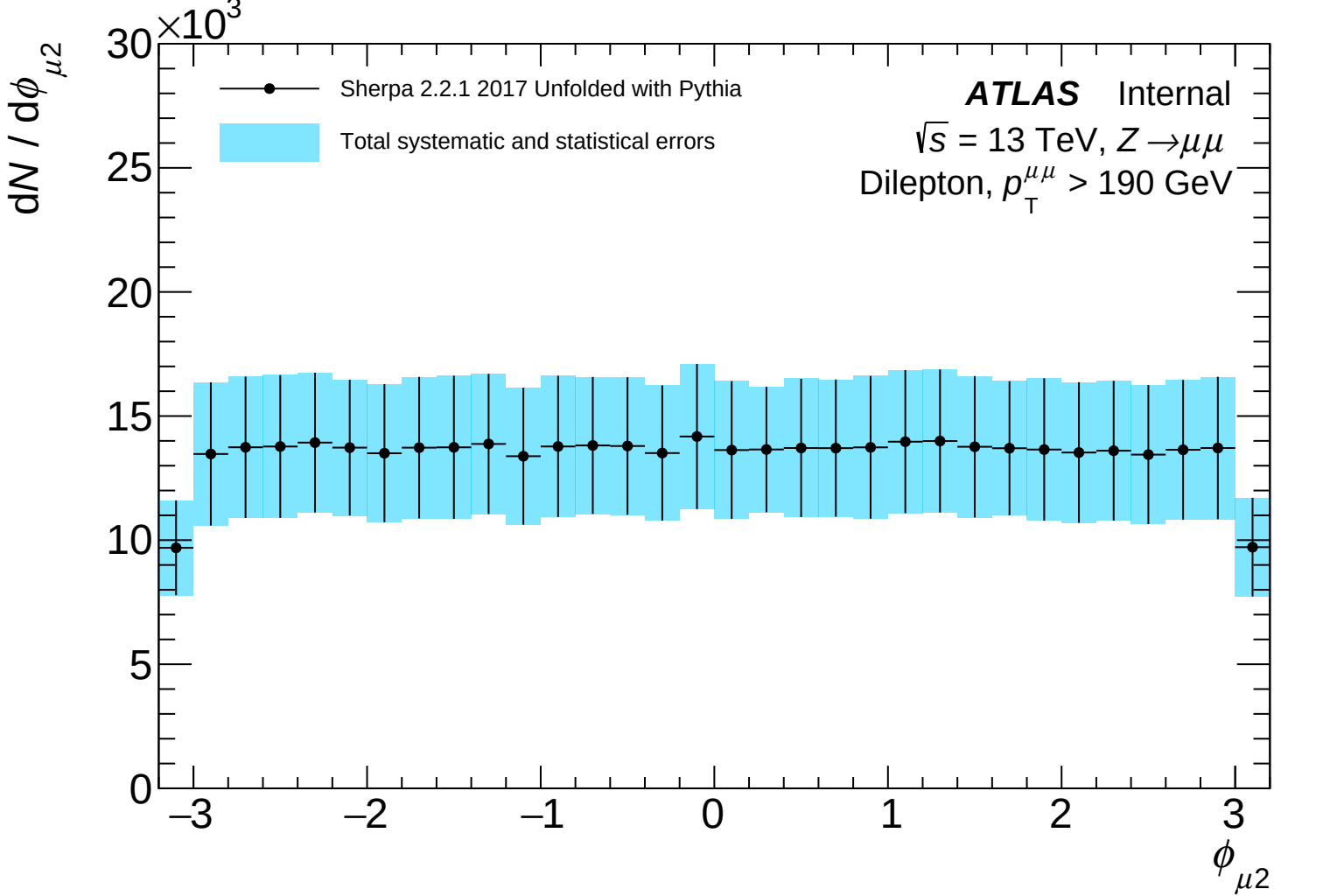

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2

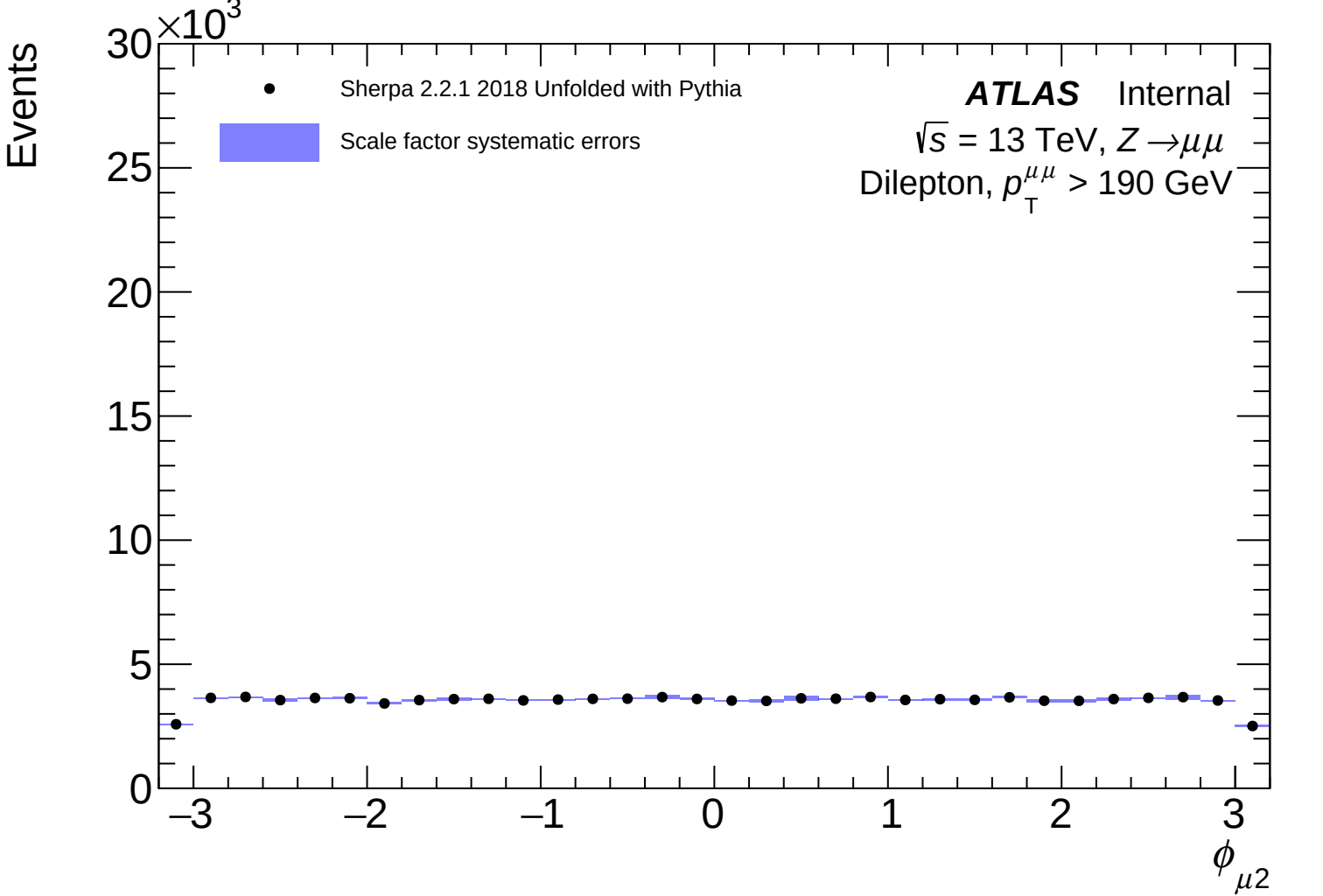

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


×10^3
30
25
20
15
10
5
0
dN / dφ_μ2
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
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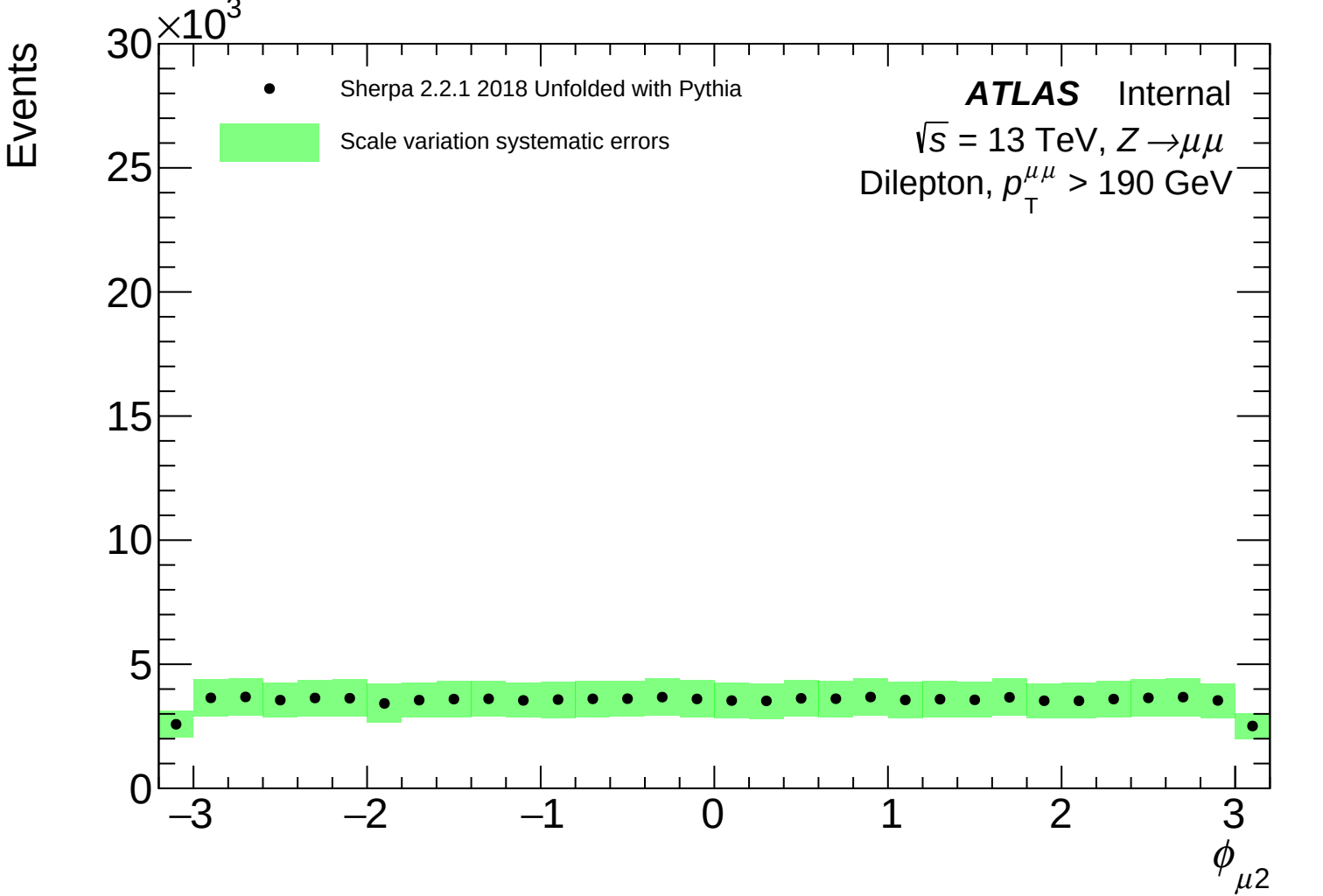
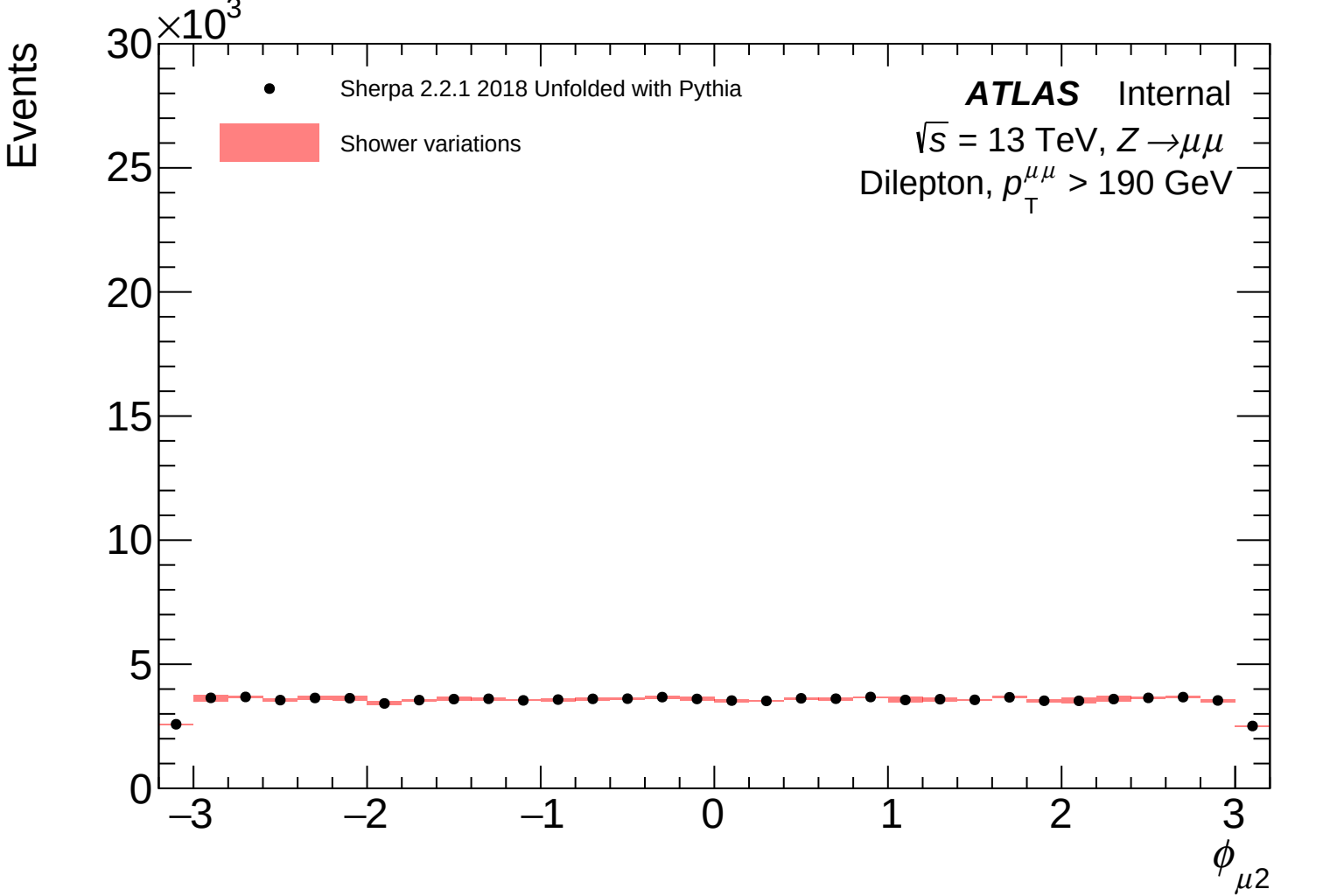
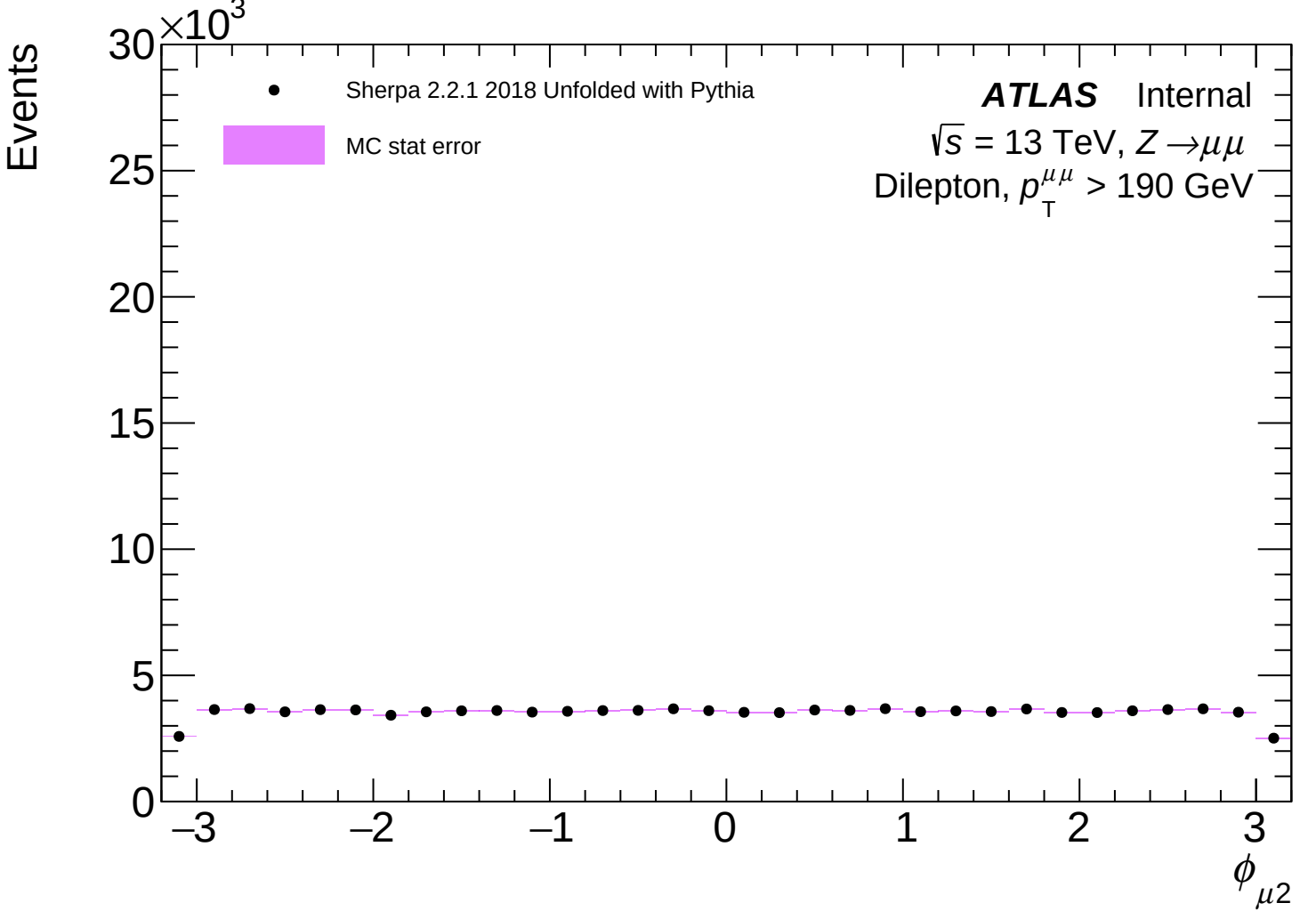
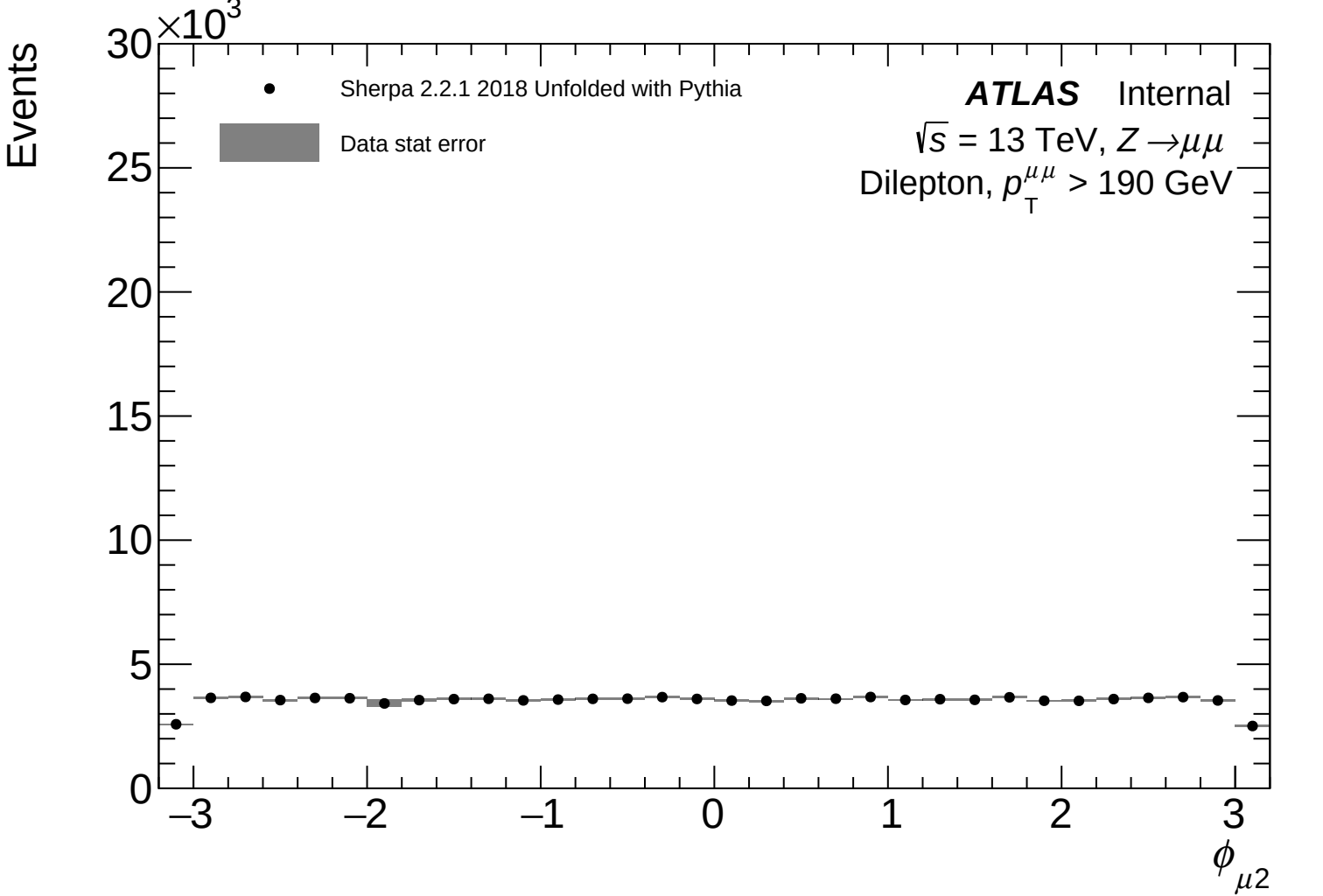
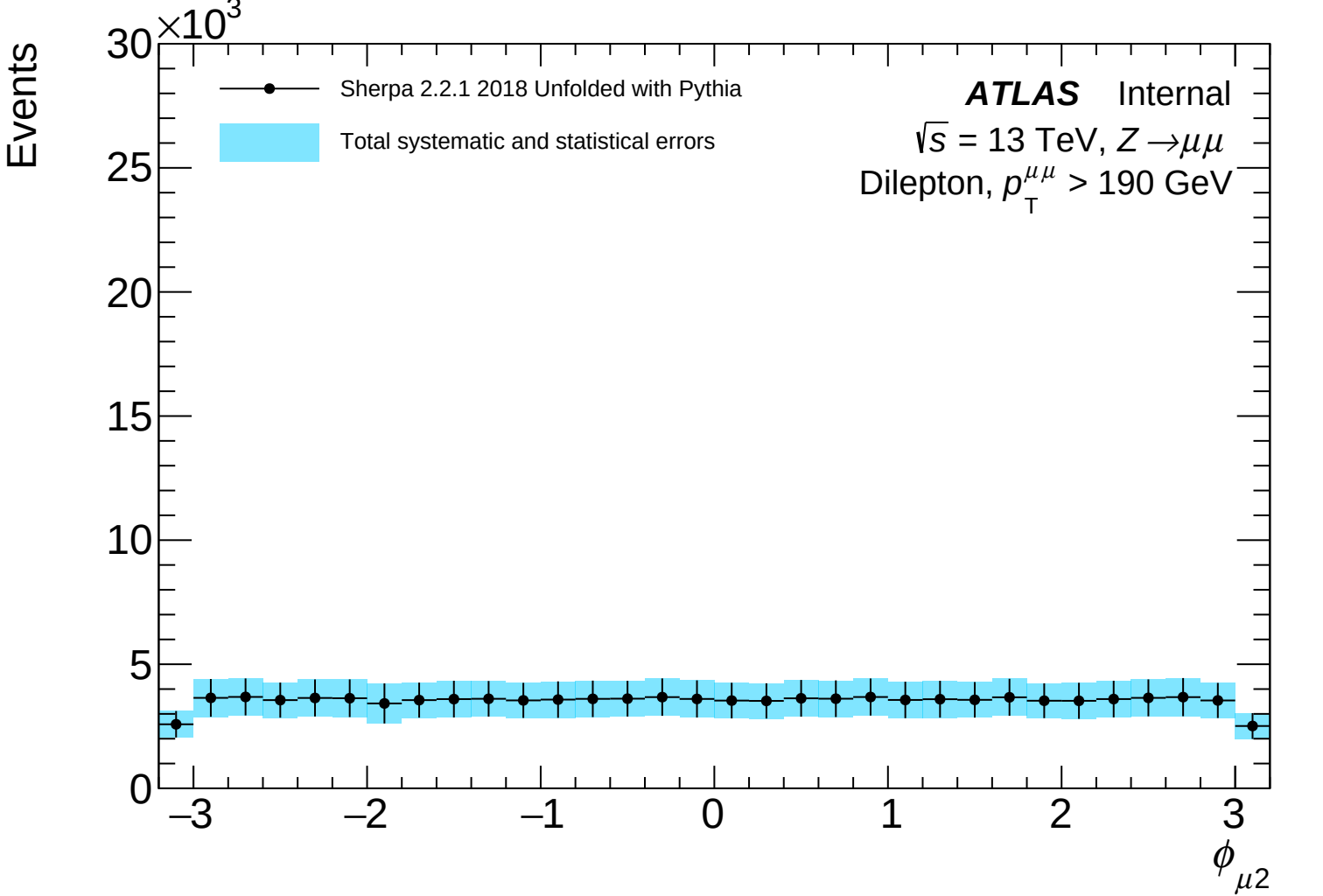
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2

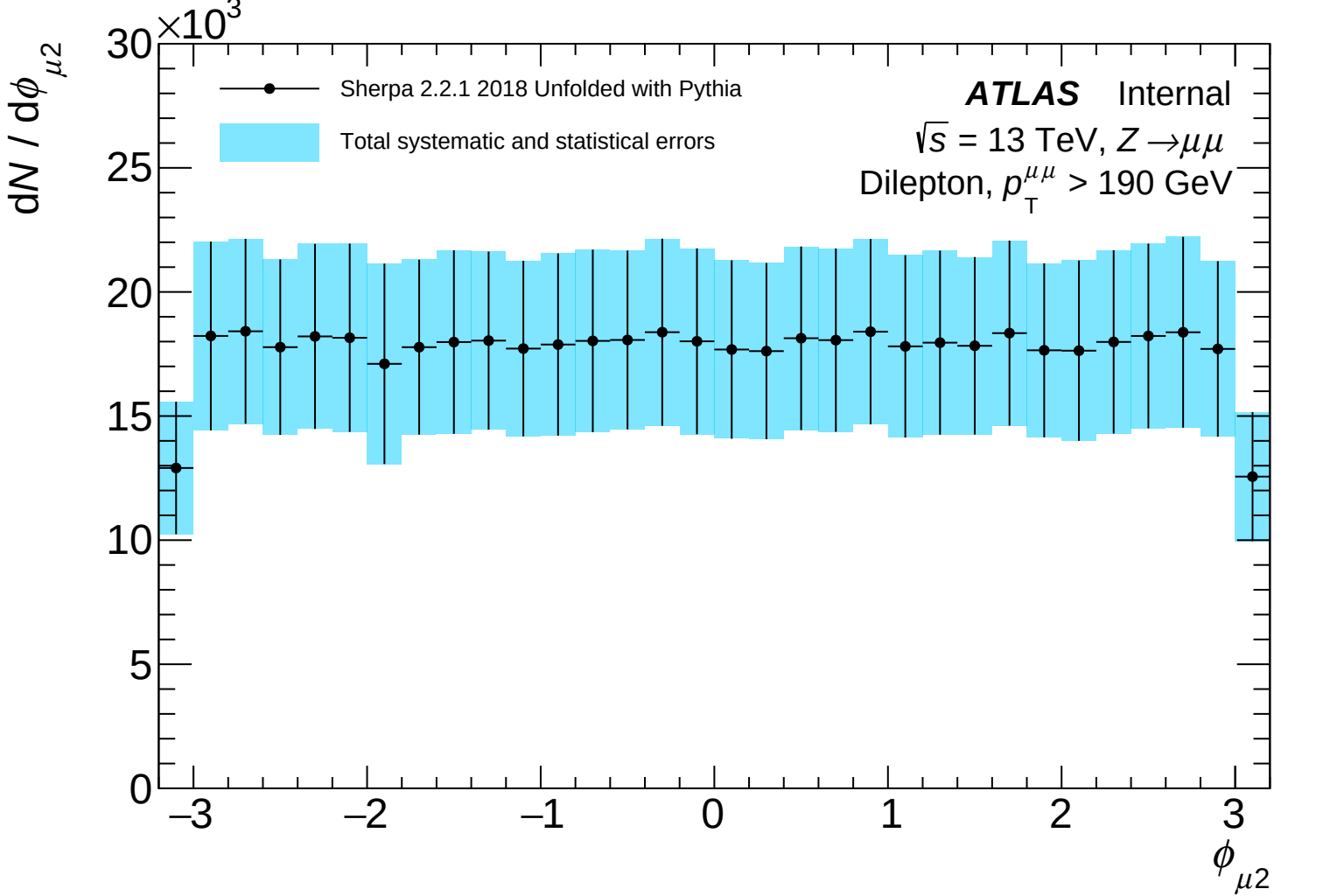

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2

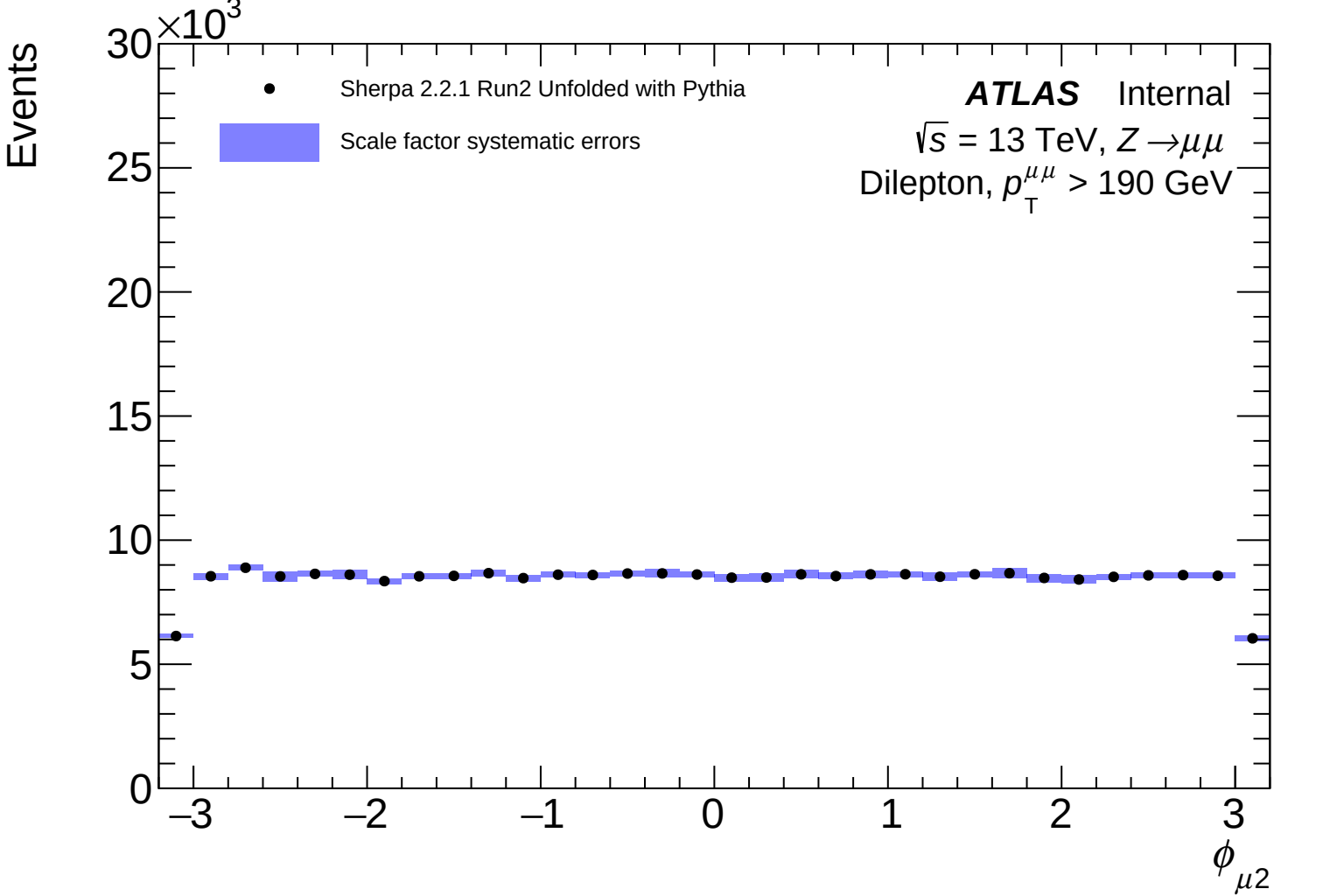

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
dN / dφ_μ2
×10^3
30
25
20
15
10
5
0
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
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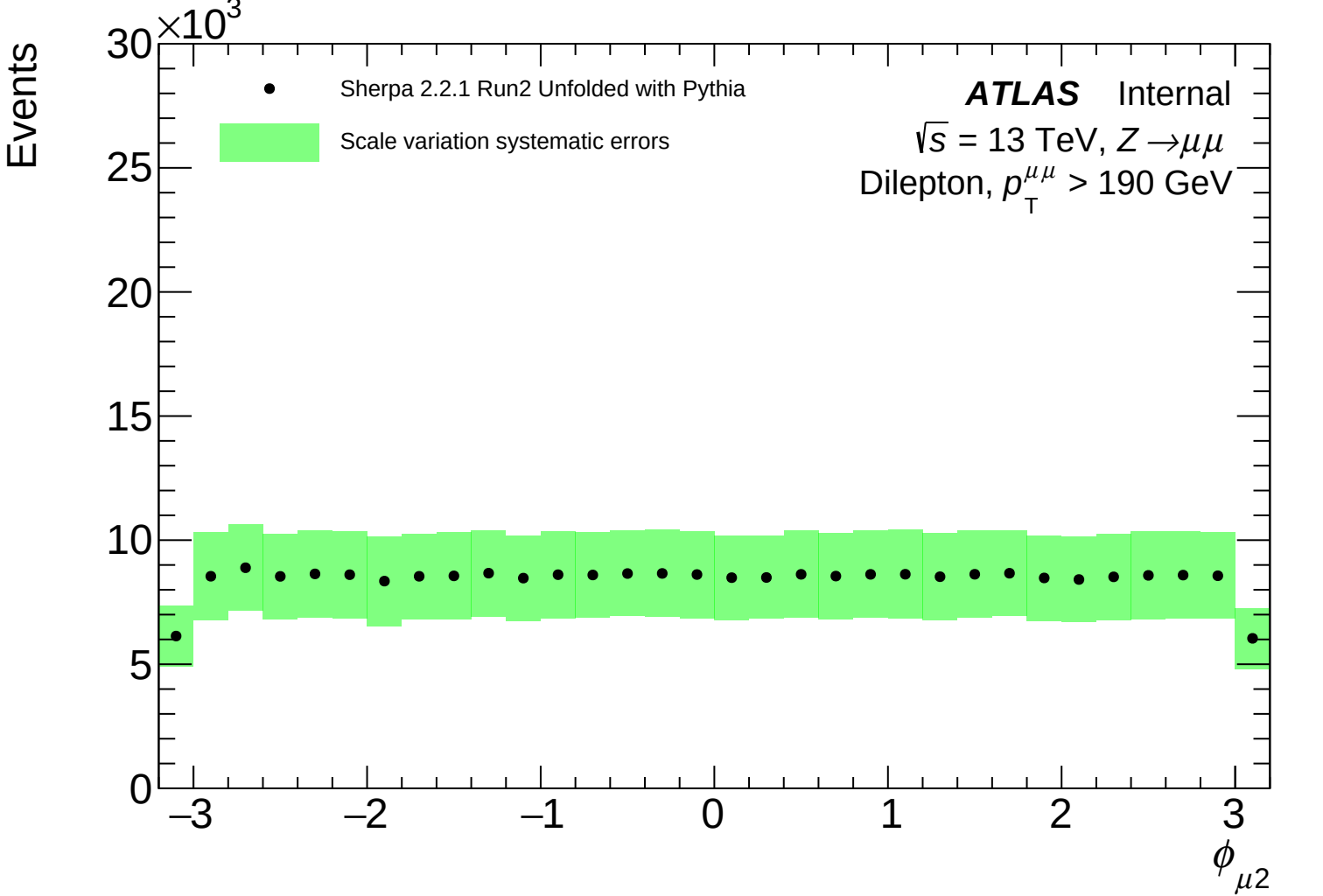
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
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15
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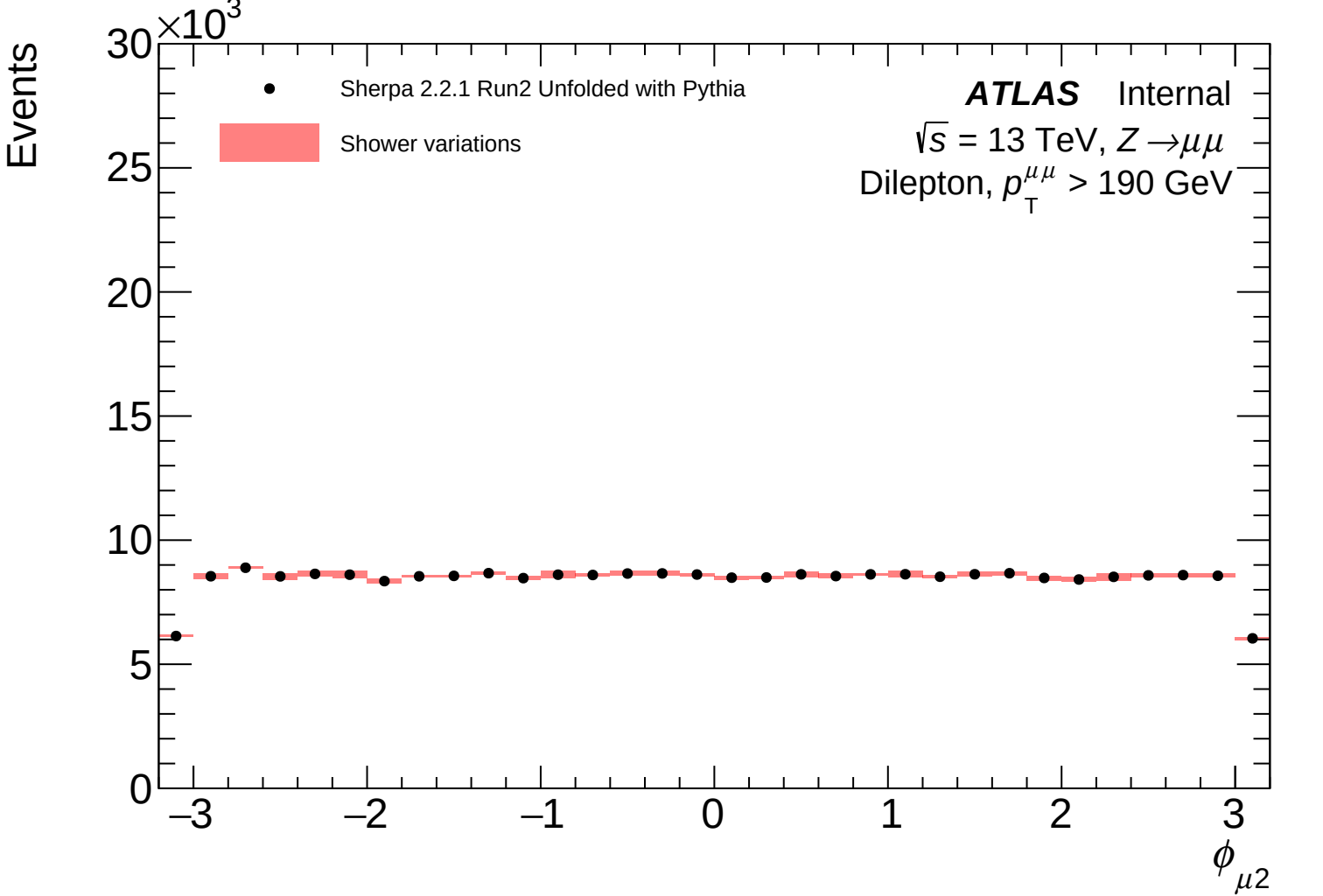
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
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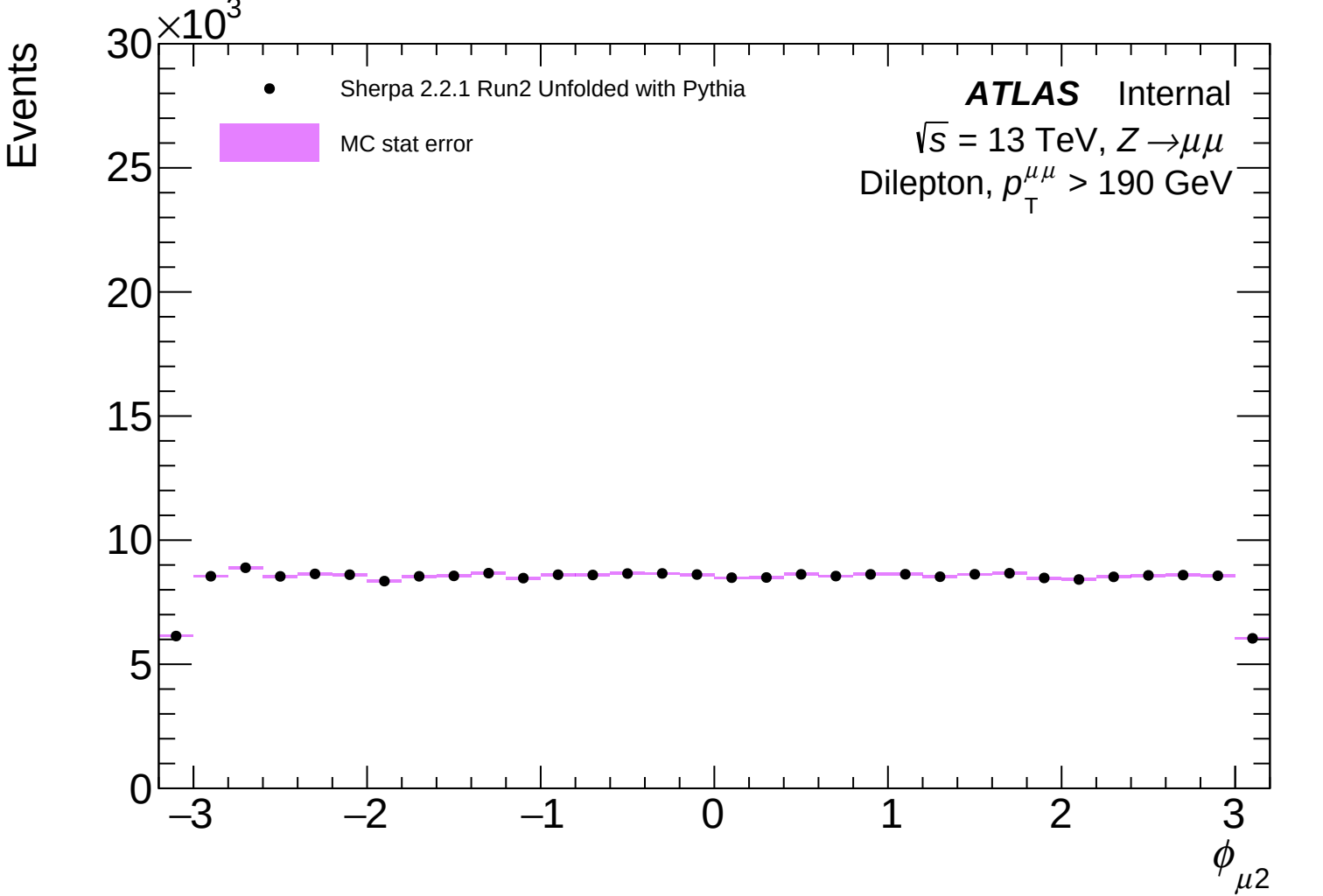
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
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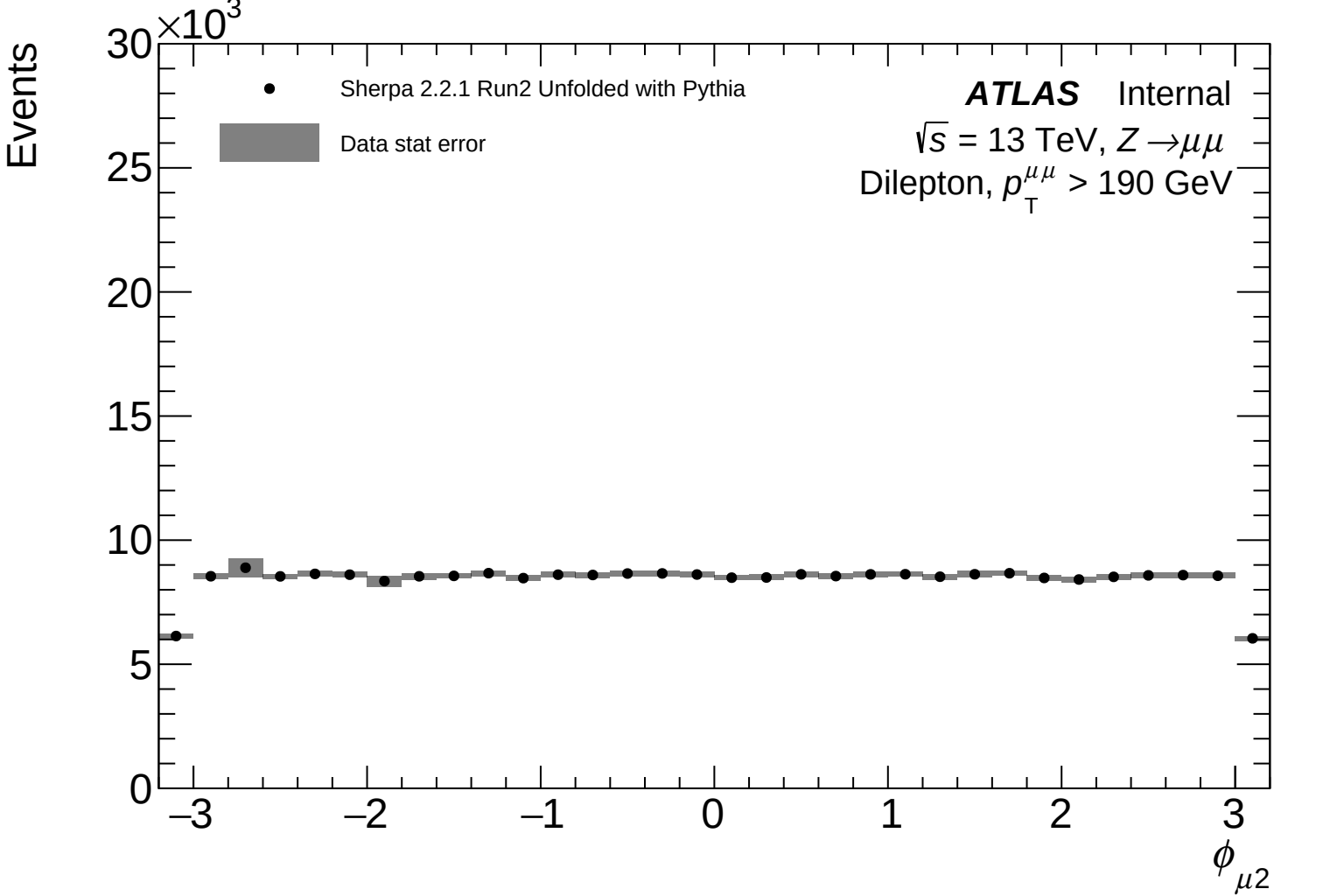
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
20
15
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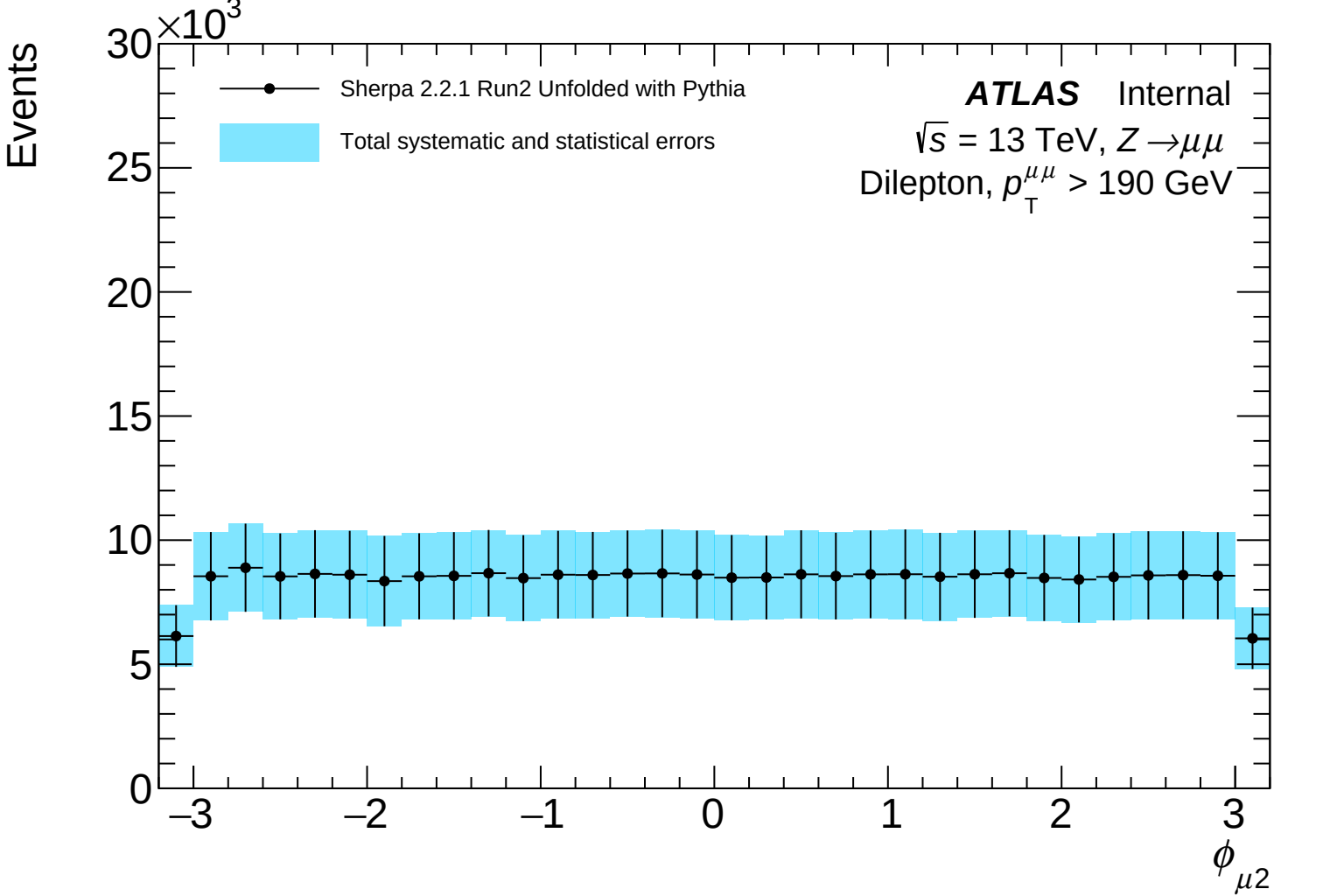
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


Events
×10^3
30
25
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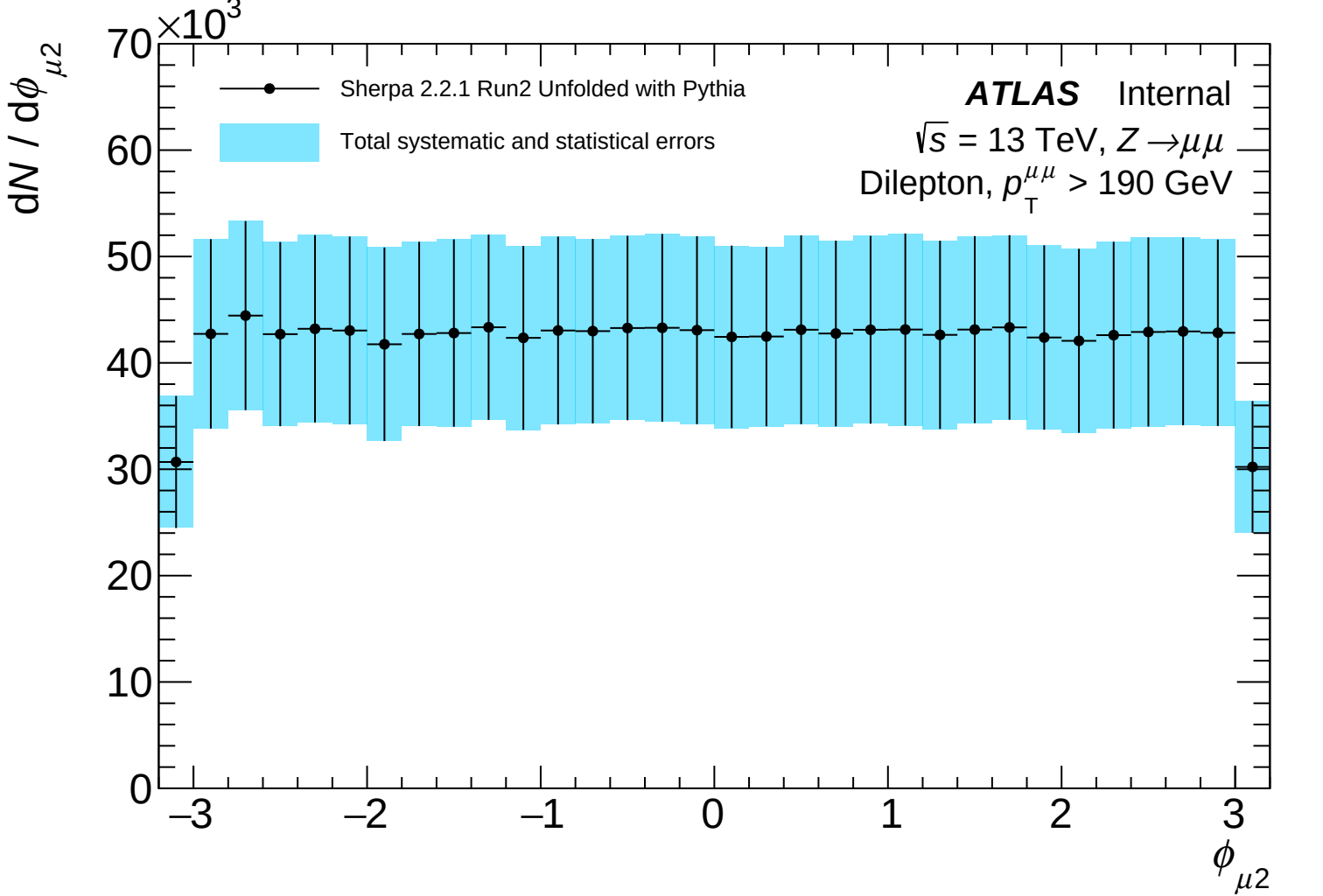
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
φ_μ2


$\times 10^3$
70
60
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40
30
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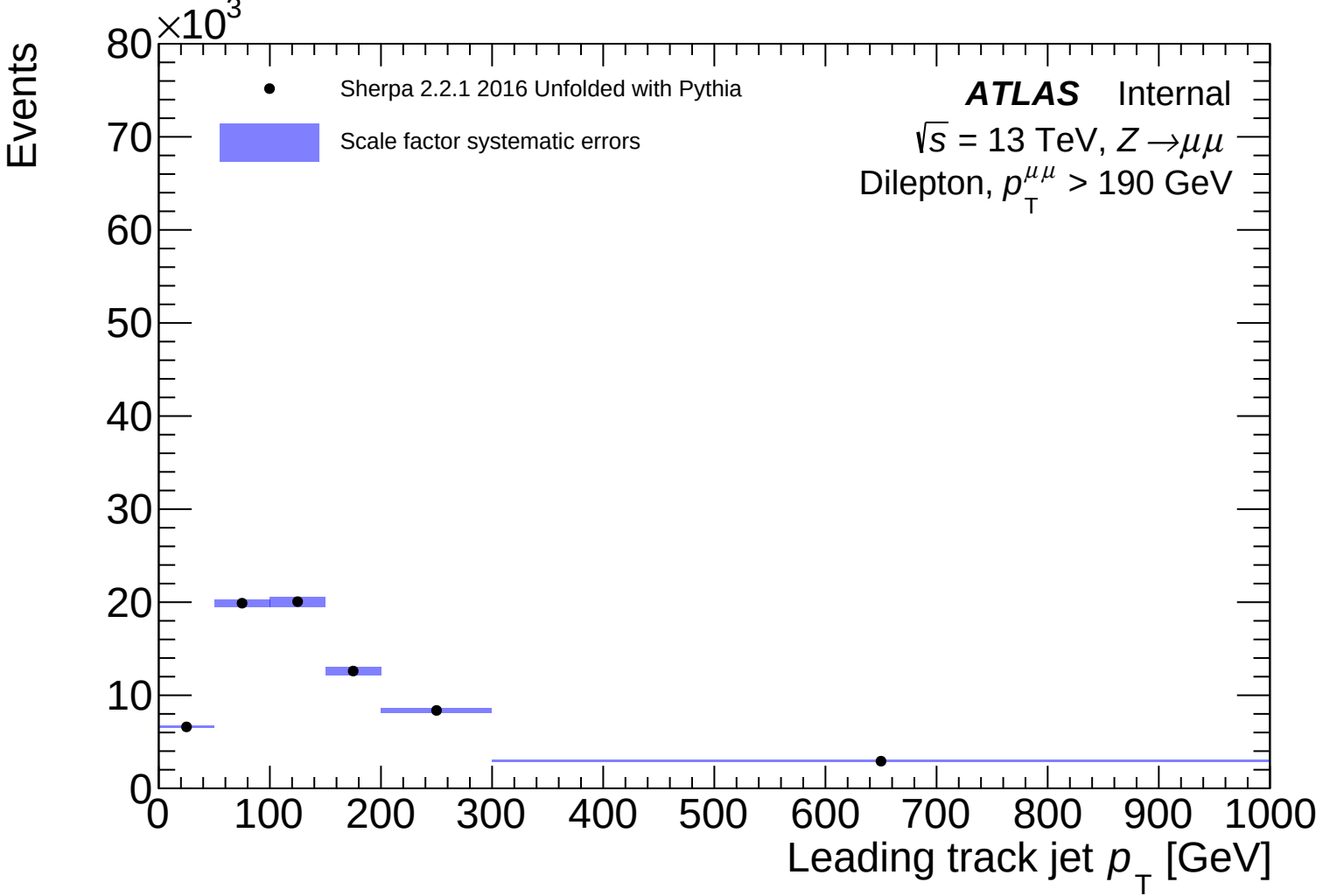
10
0
dN / $d\phi_{\mu 2}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
$\phi_{\mu 2}$


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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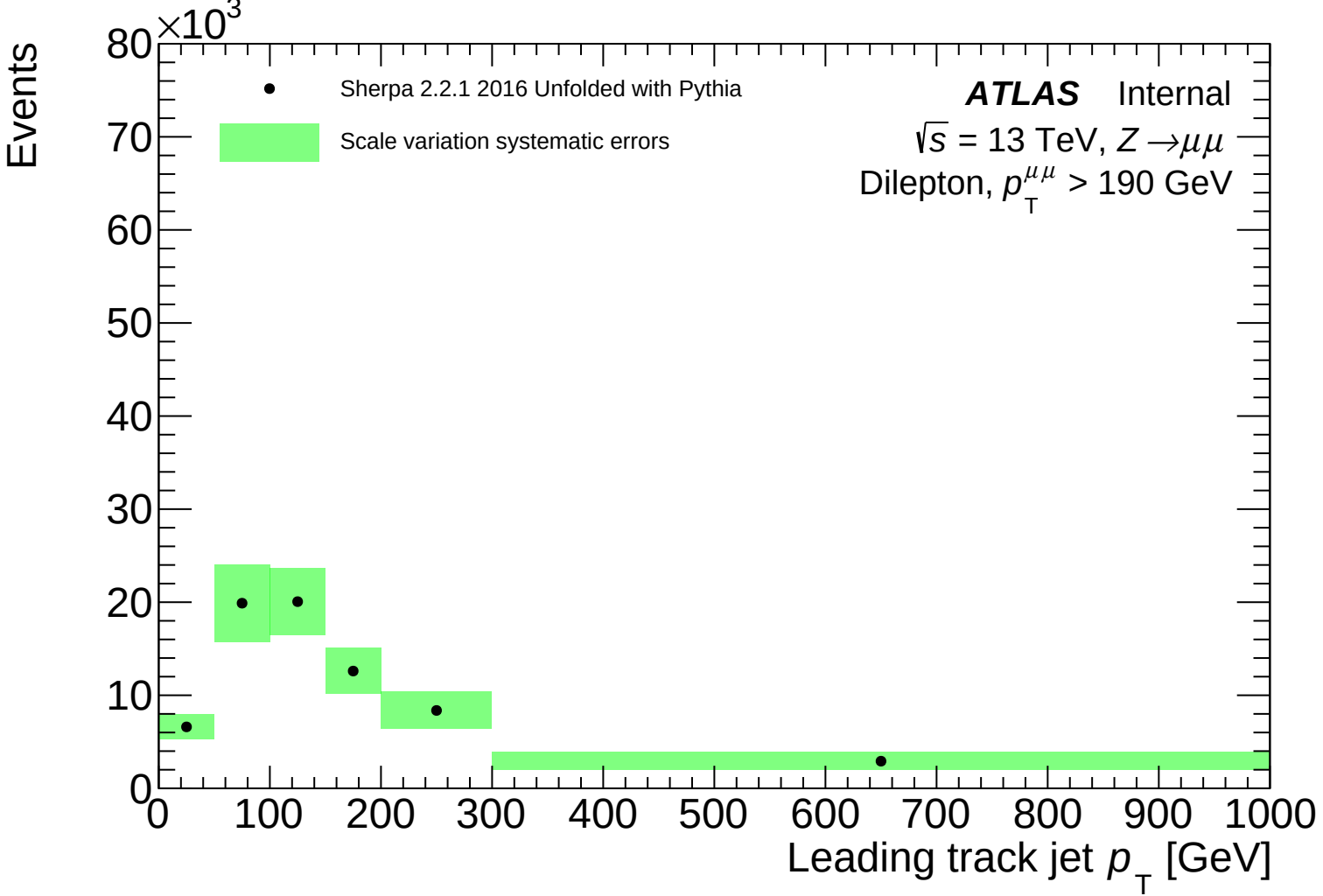
1000
Leading track jet p_T [GeV]


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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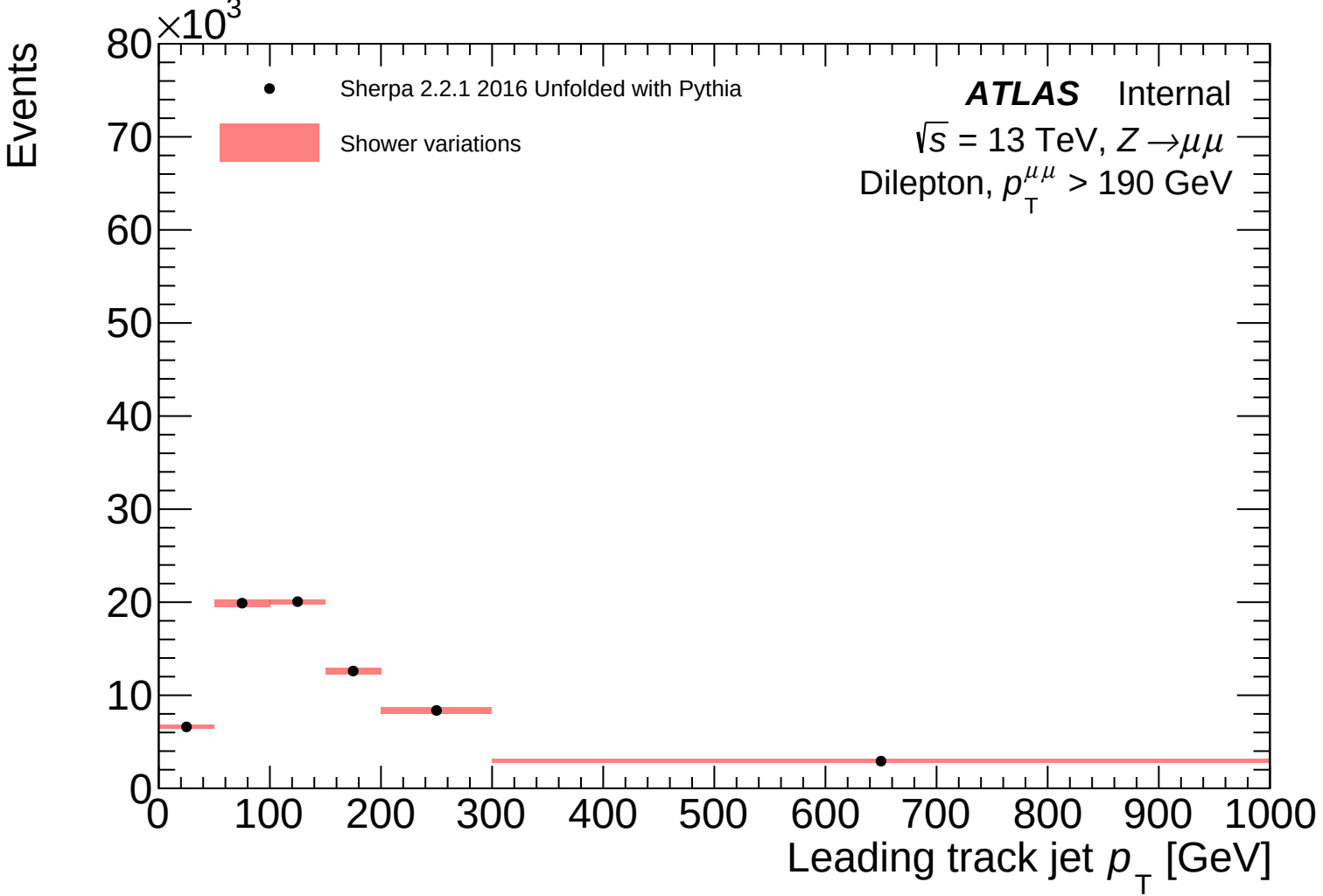
Leading track jet p_T [GeV]


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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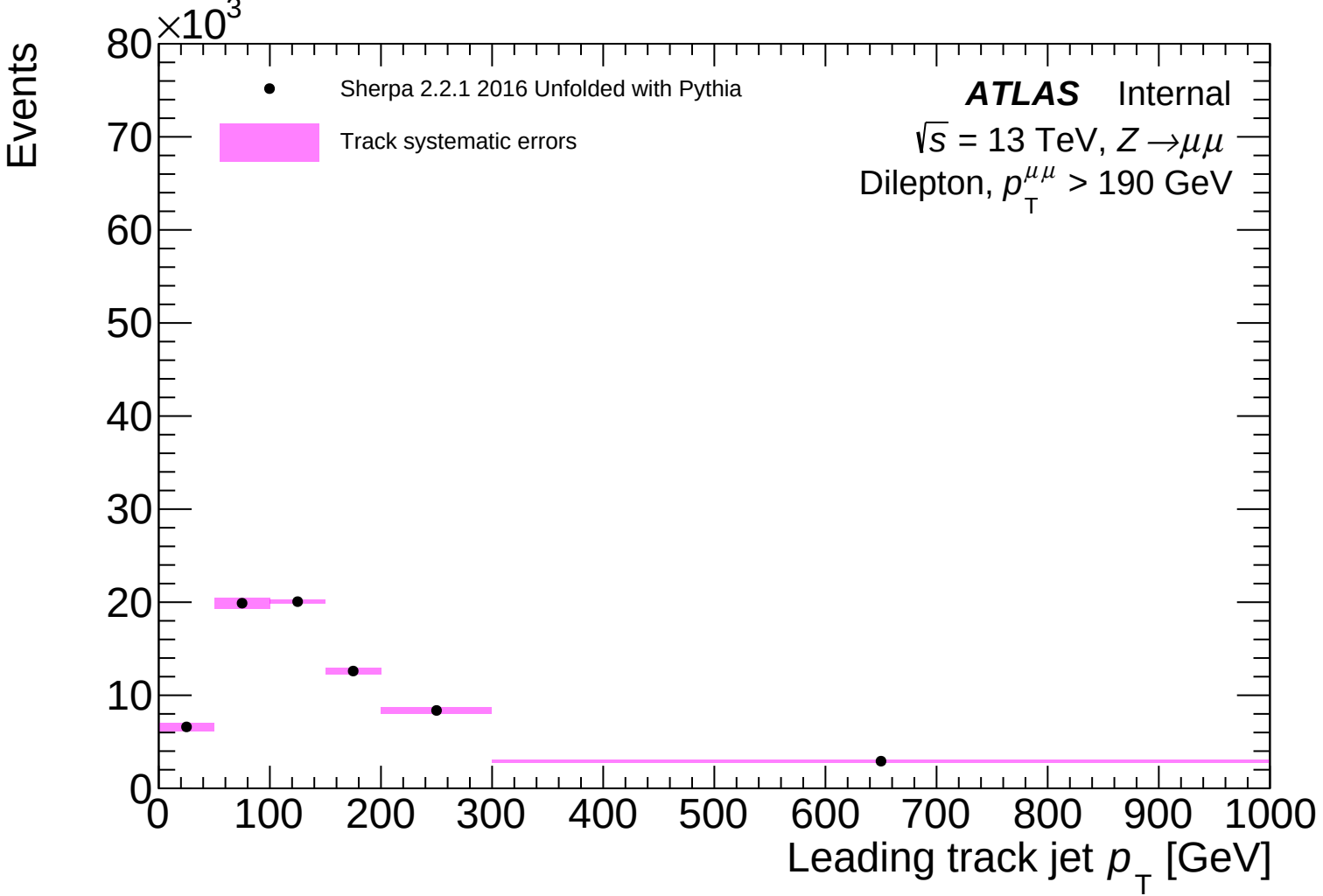
Leading track jet p_T [GeV]


Events
$\times 10^3$
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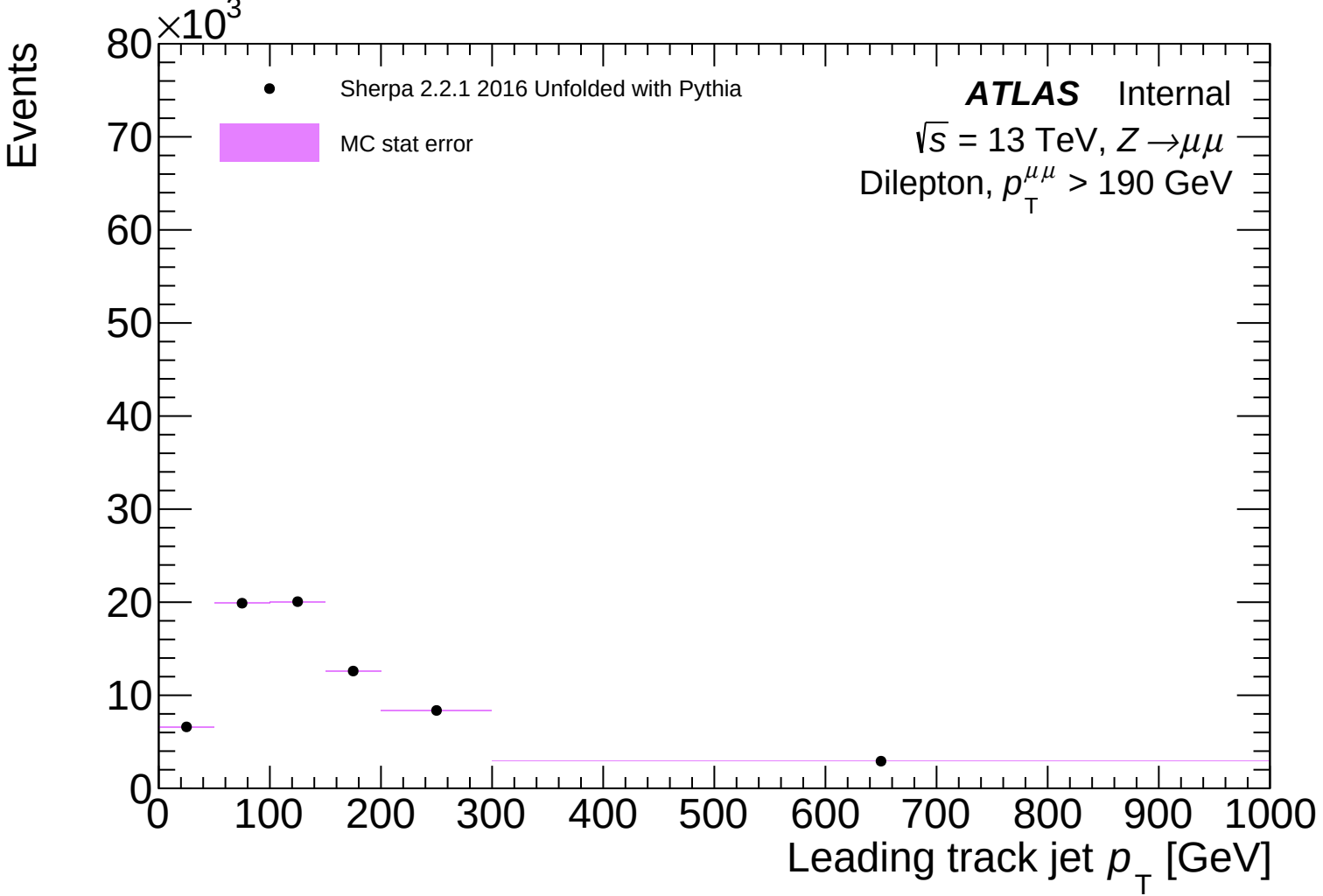
Leading track jet p_T [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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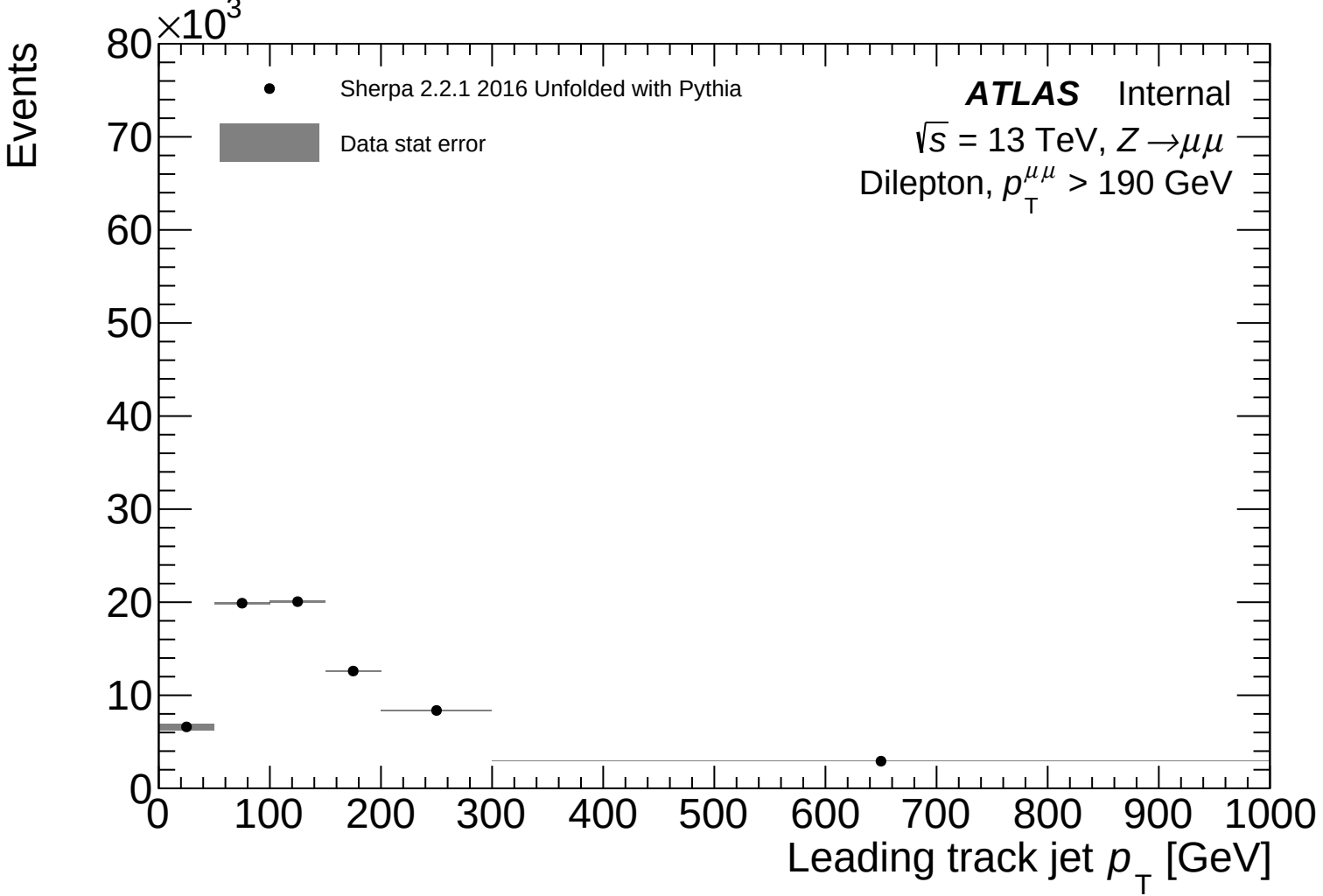
Leading track jet p_T [GeV]


Events
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Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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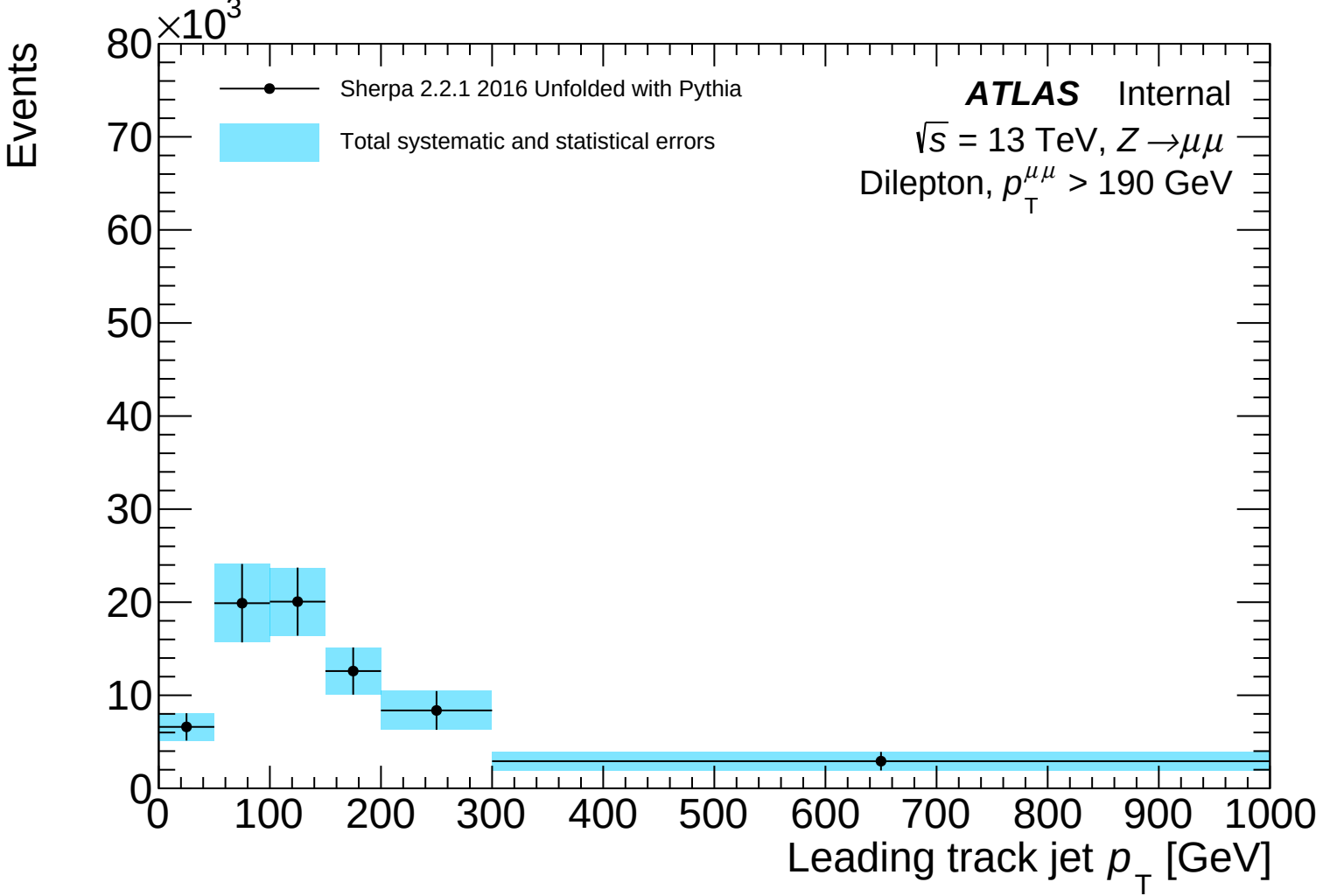
Leading track jet p_T [GeV]


Events
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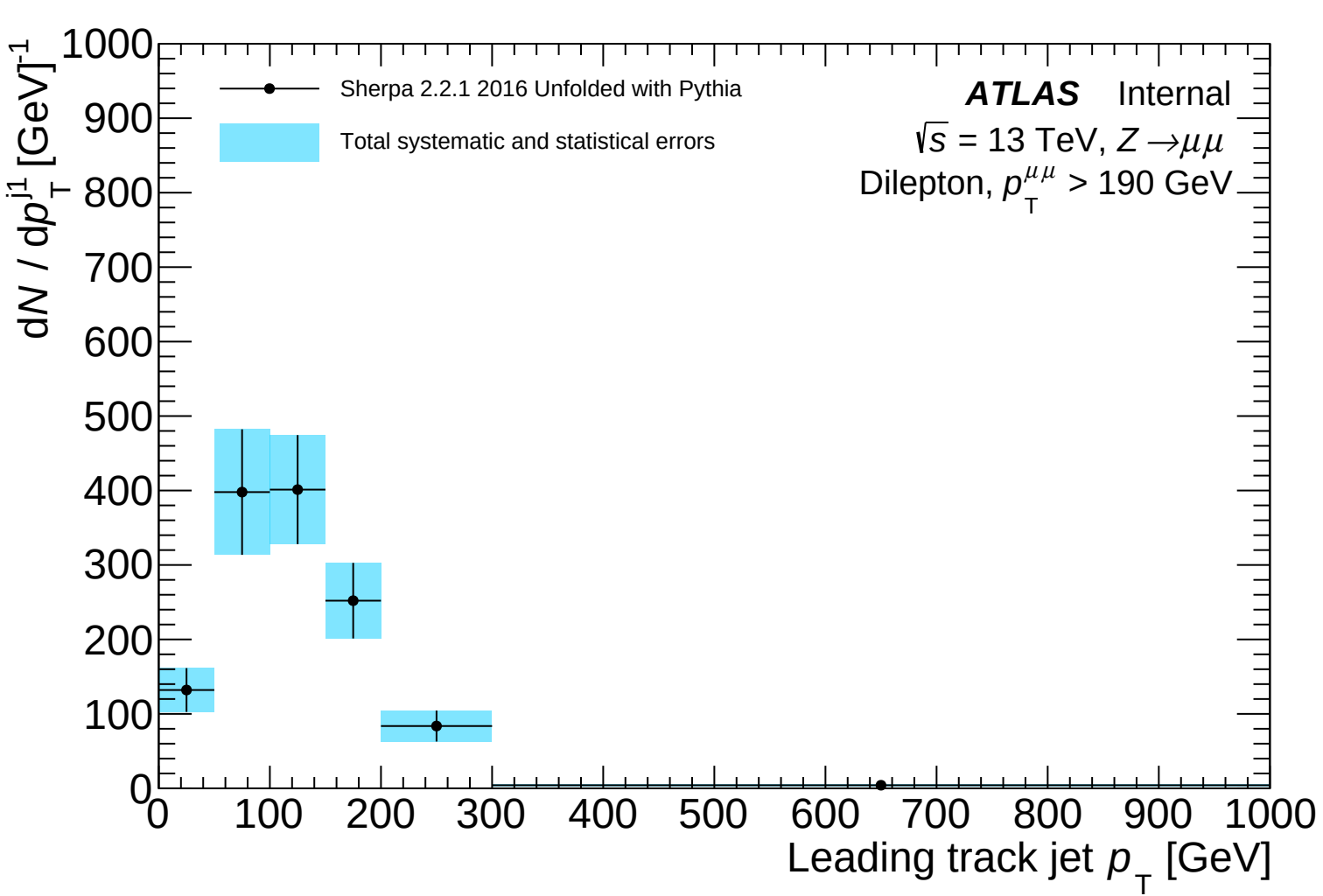
Leading track jet p_T [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j1 [GeV]^-1
Leading track jet p_T [GeV]
0
100
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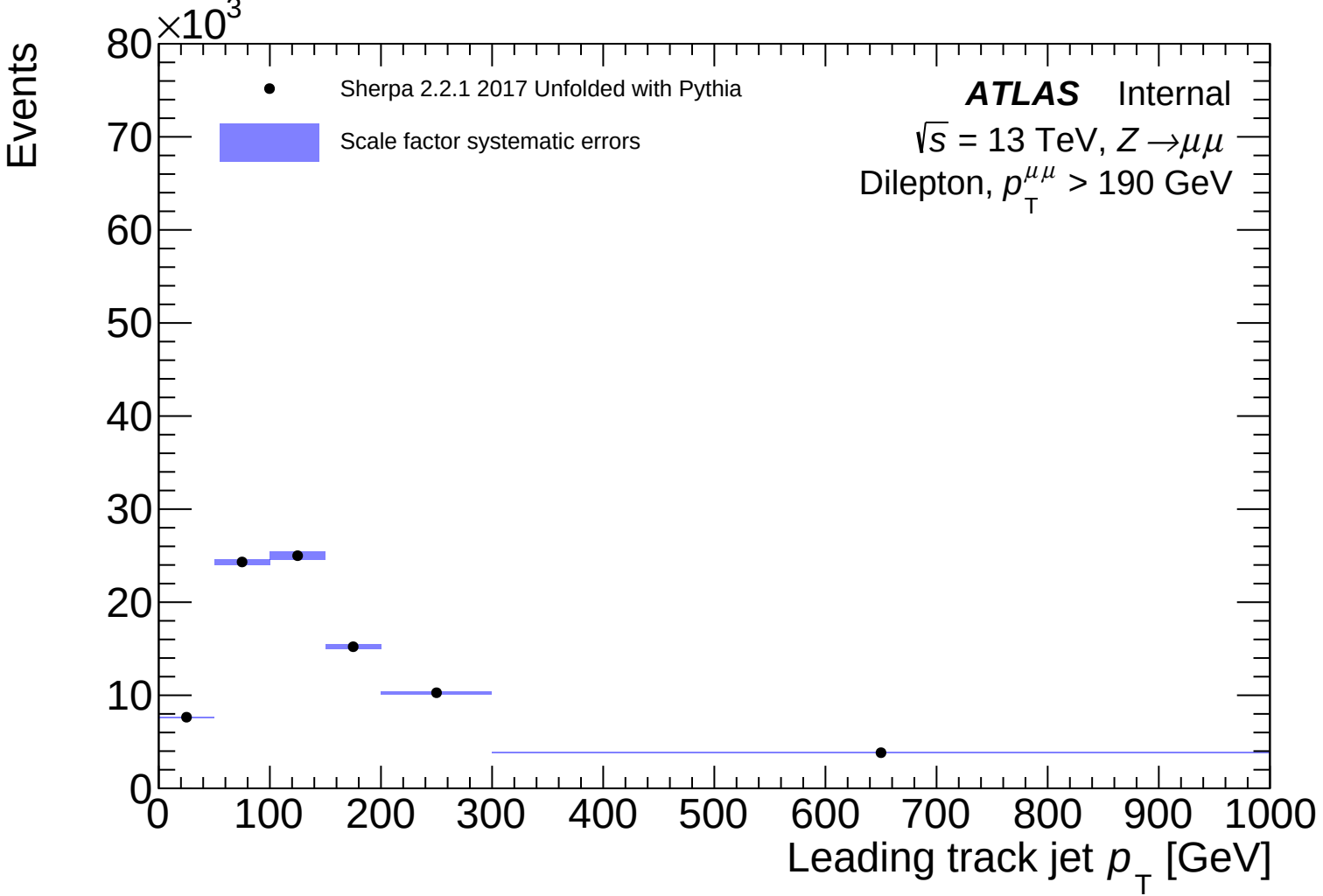
1000


Events
×10^3
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Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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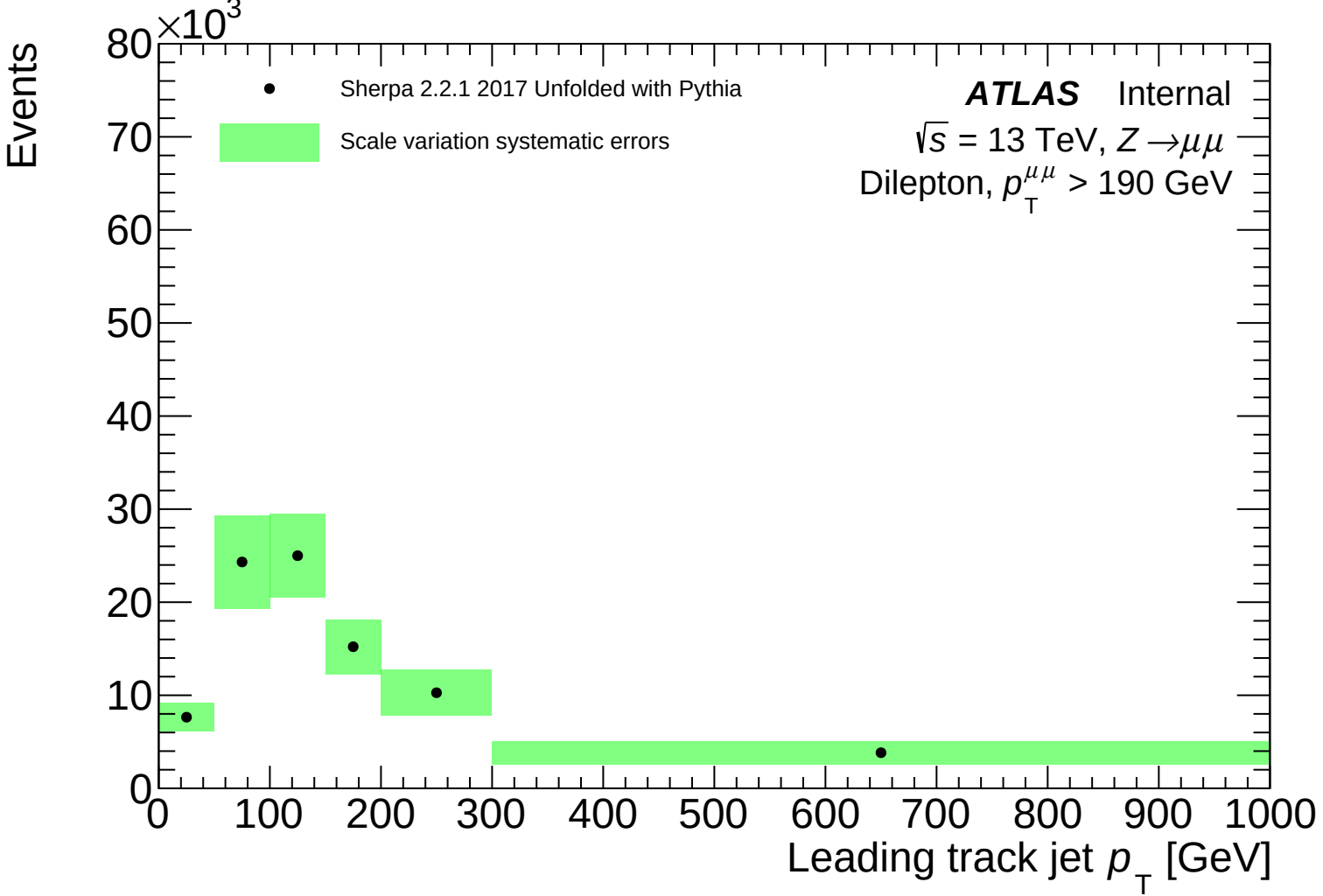
Leading track jet p_T [GeV]


Events
×10^3
80
70
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Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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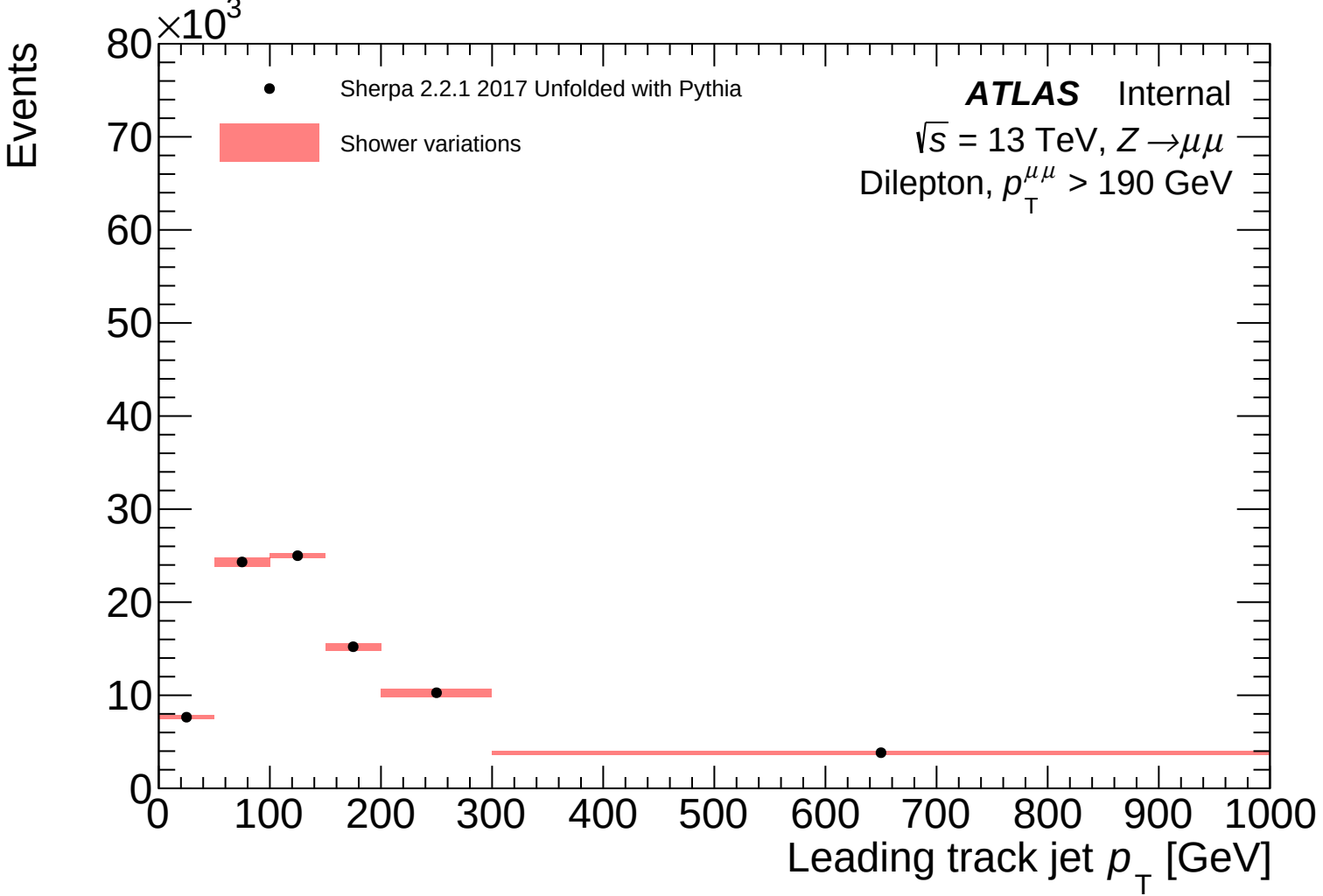
1000
Leading track jet p_T [GeV]


Events
$\times 10^3$
80
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Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
100
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500
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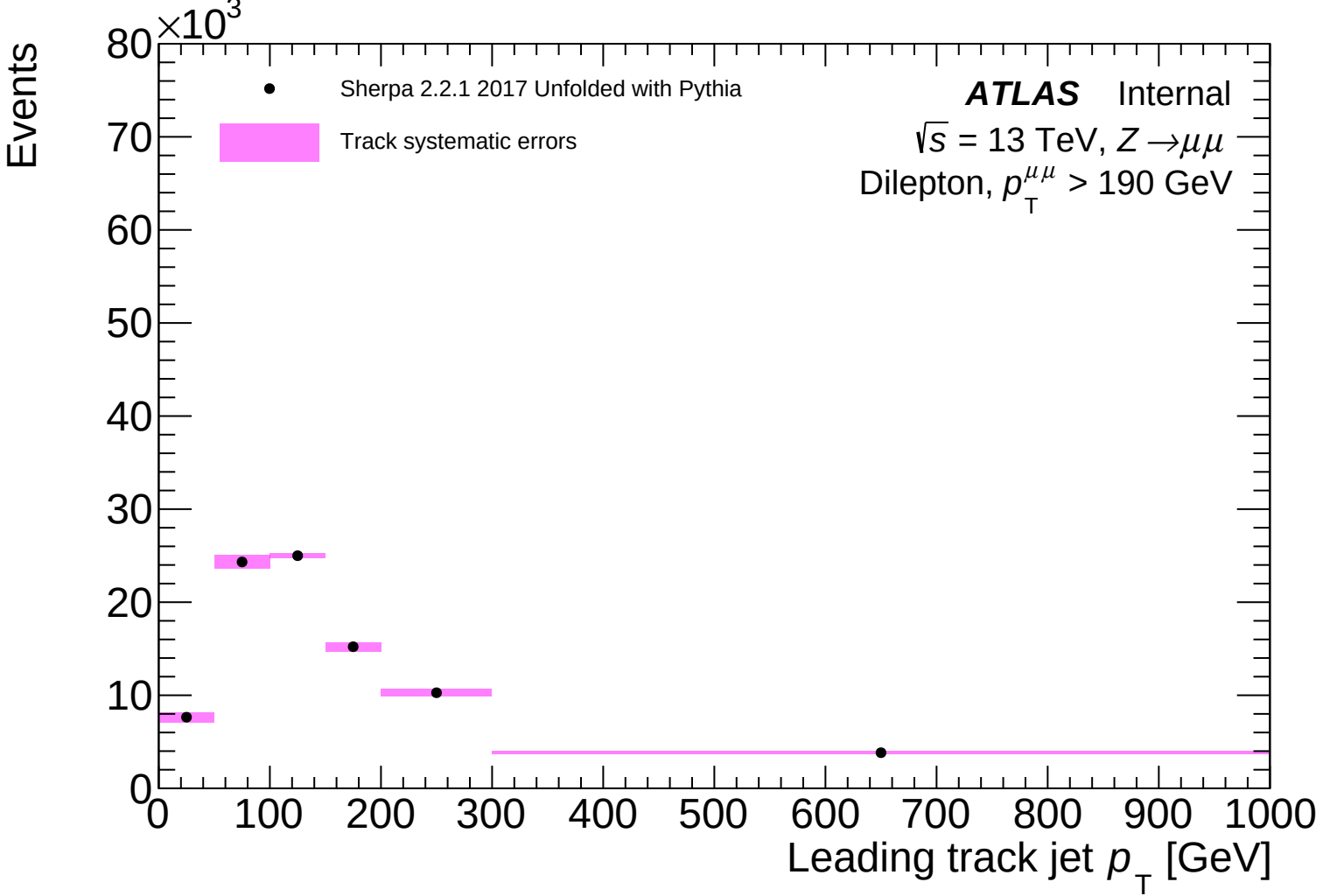
700
800
900
1000
Leading track jet p_{T} [GeV]


Events
×10^3
80
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Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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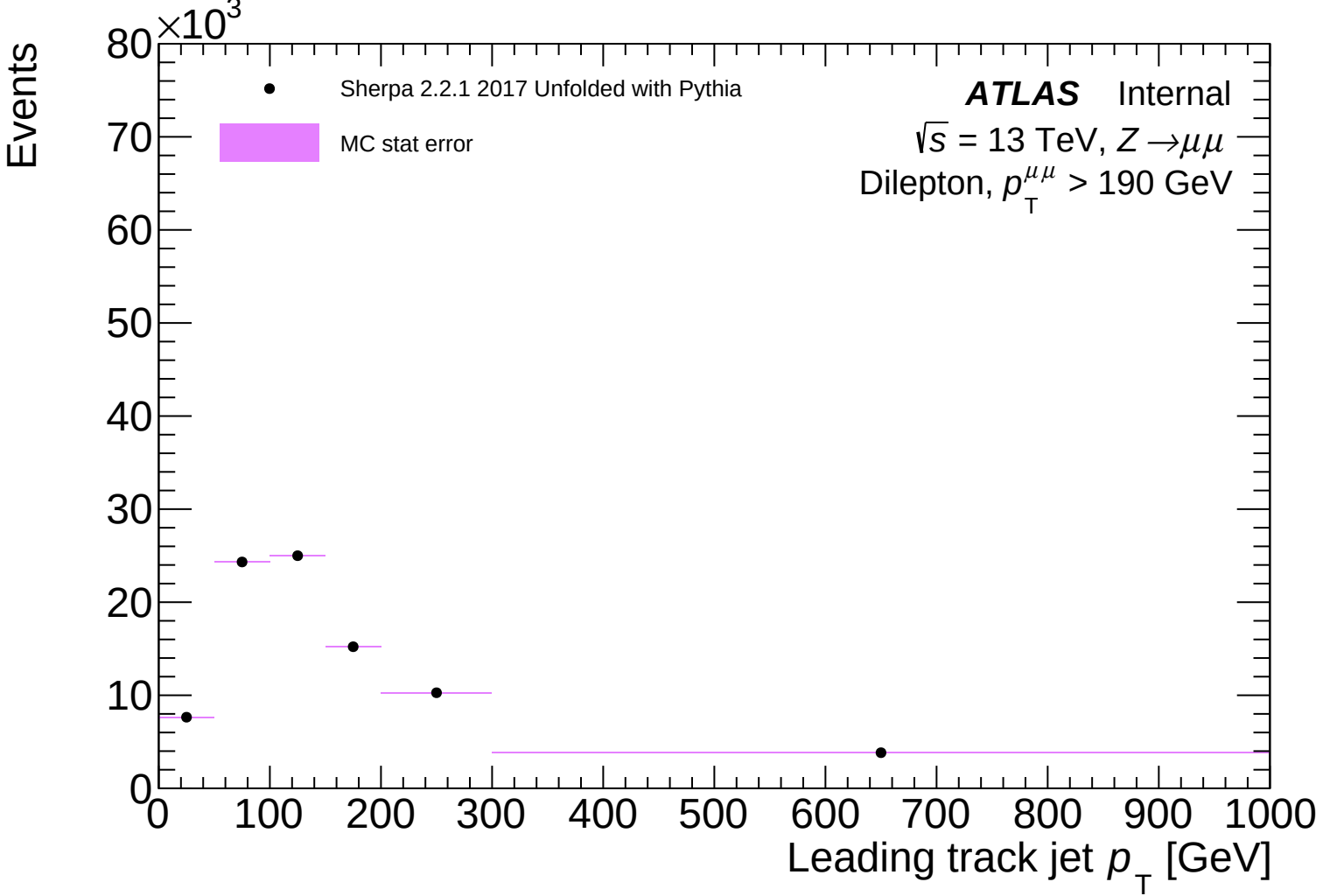
1000
Leading track jet p_T [GeV]


Events
×10^3
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Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
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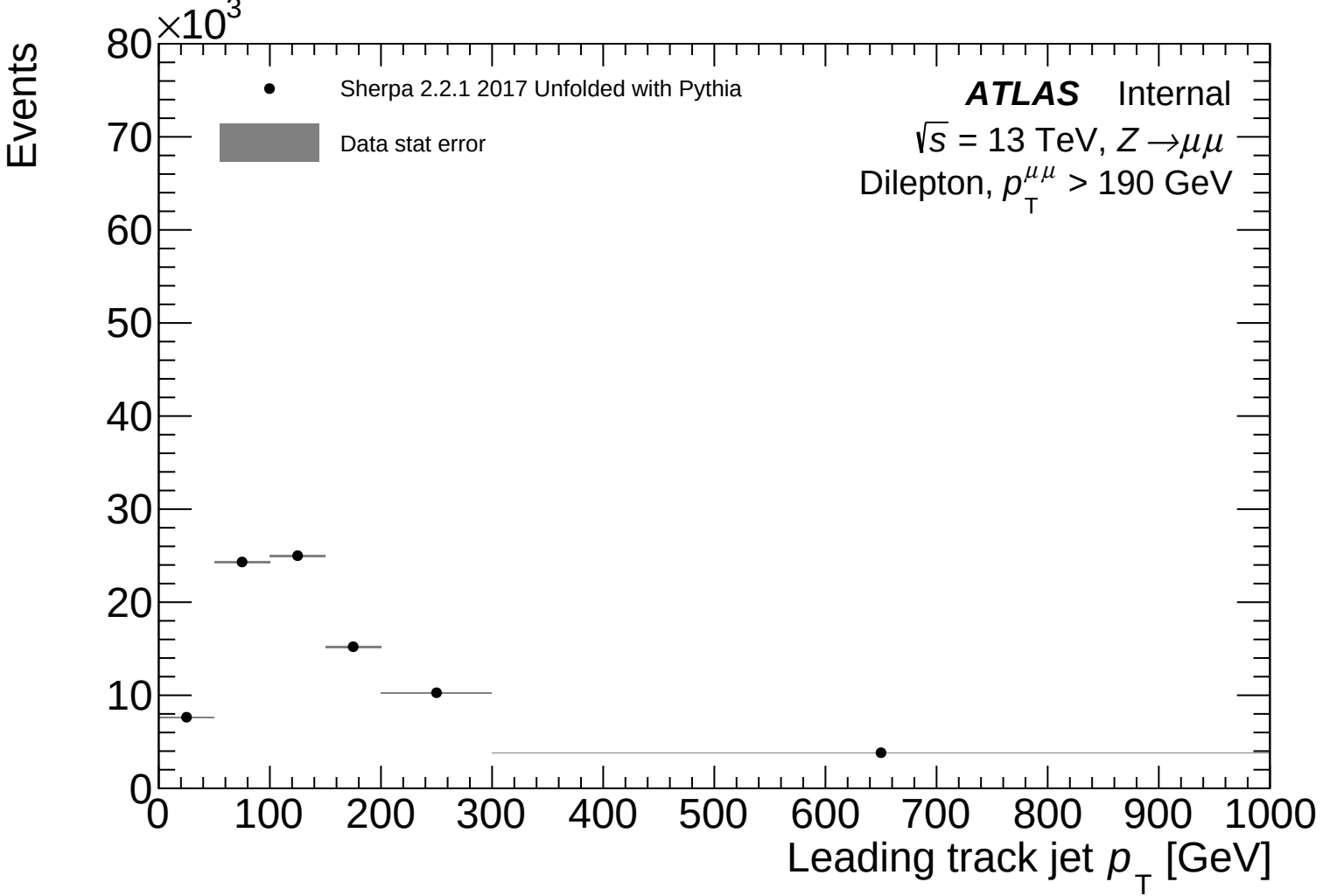
900
1000
Leading track jet p_T [GeV]


Events
×10^3
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Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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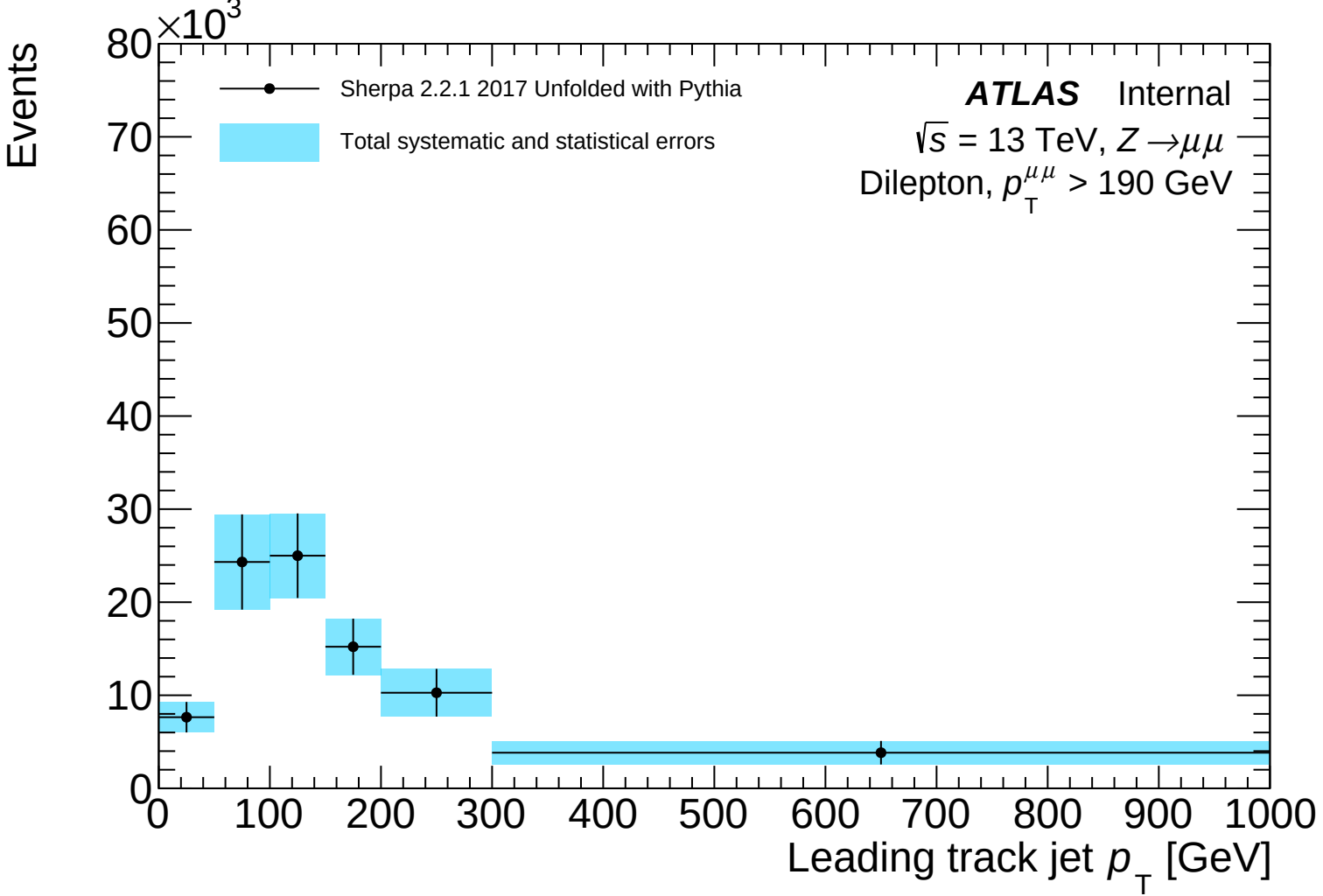
Leading track jet p_T [GeV]


Events
×10^3
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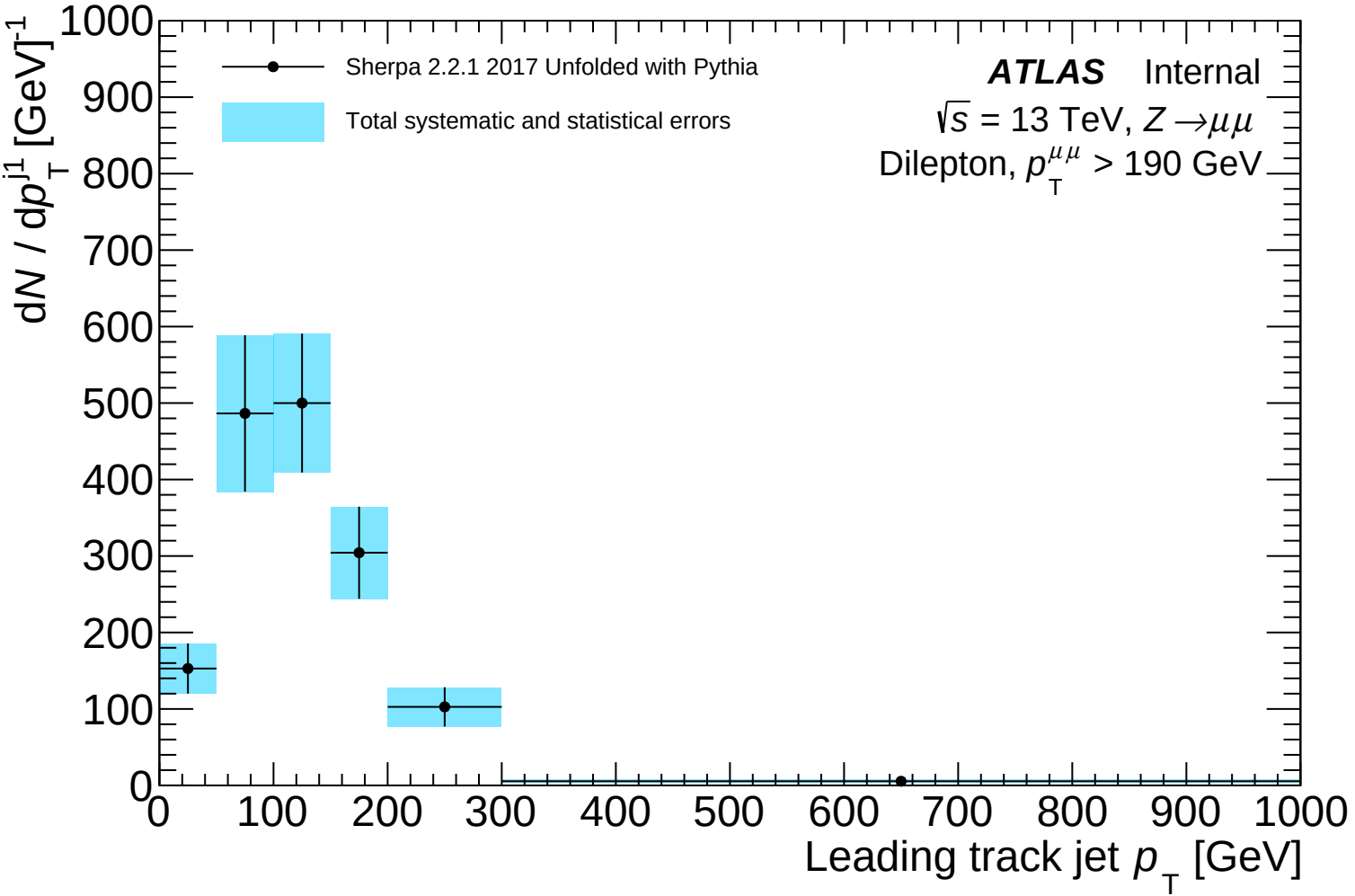
Leading track jet p_T [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
dN / dp_T^{j1} [GeV]$^{-1}$
Leading track jet p_T [GeV]
0
100
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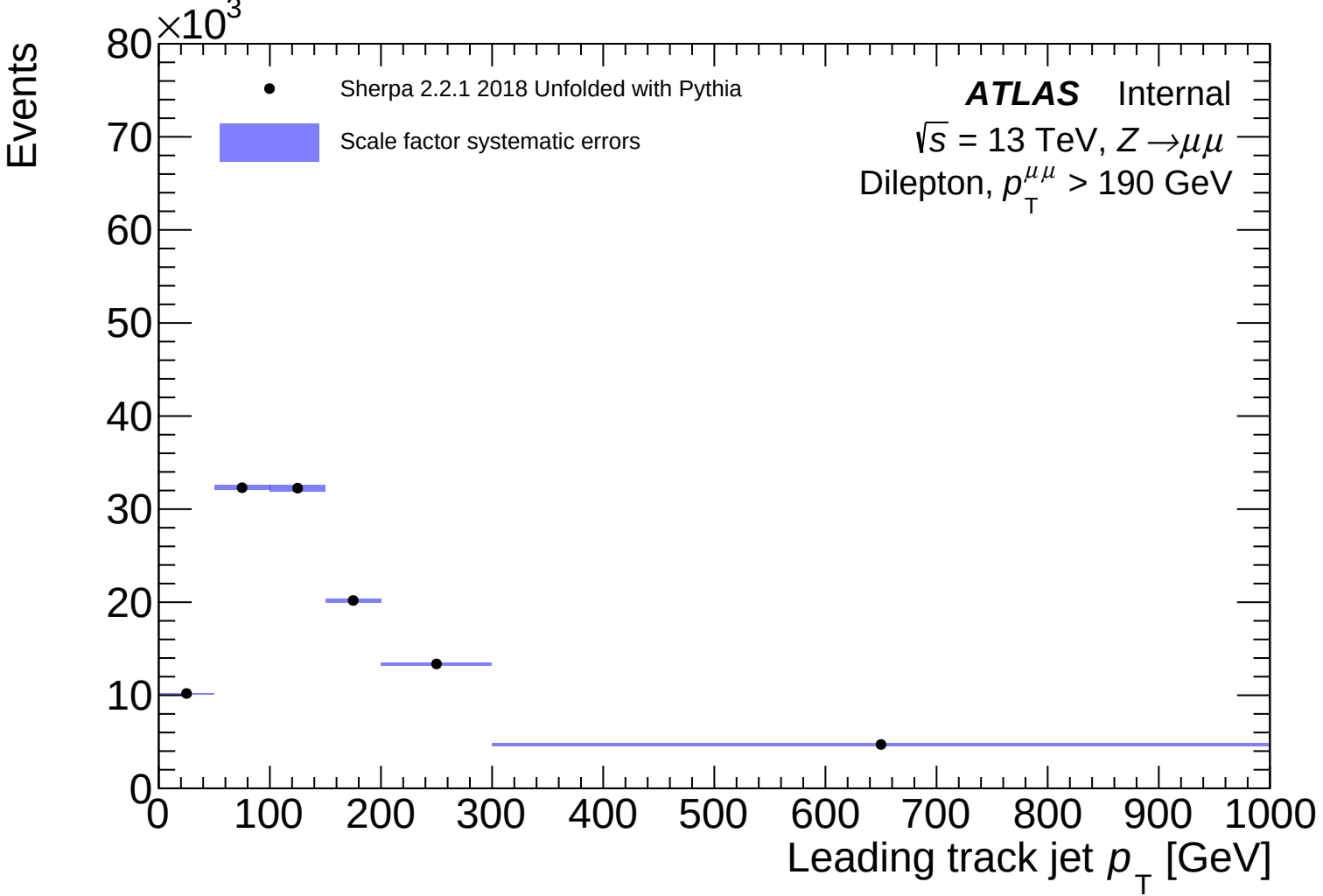
600
700
800
900
1000


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
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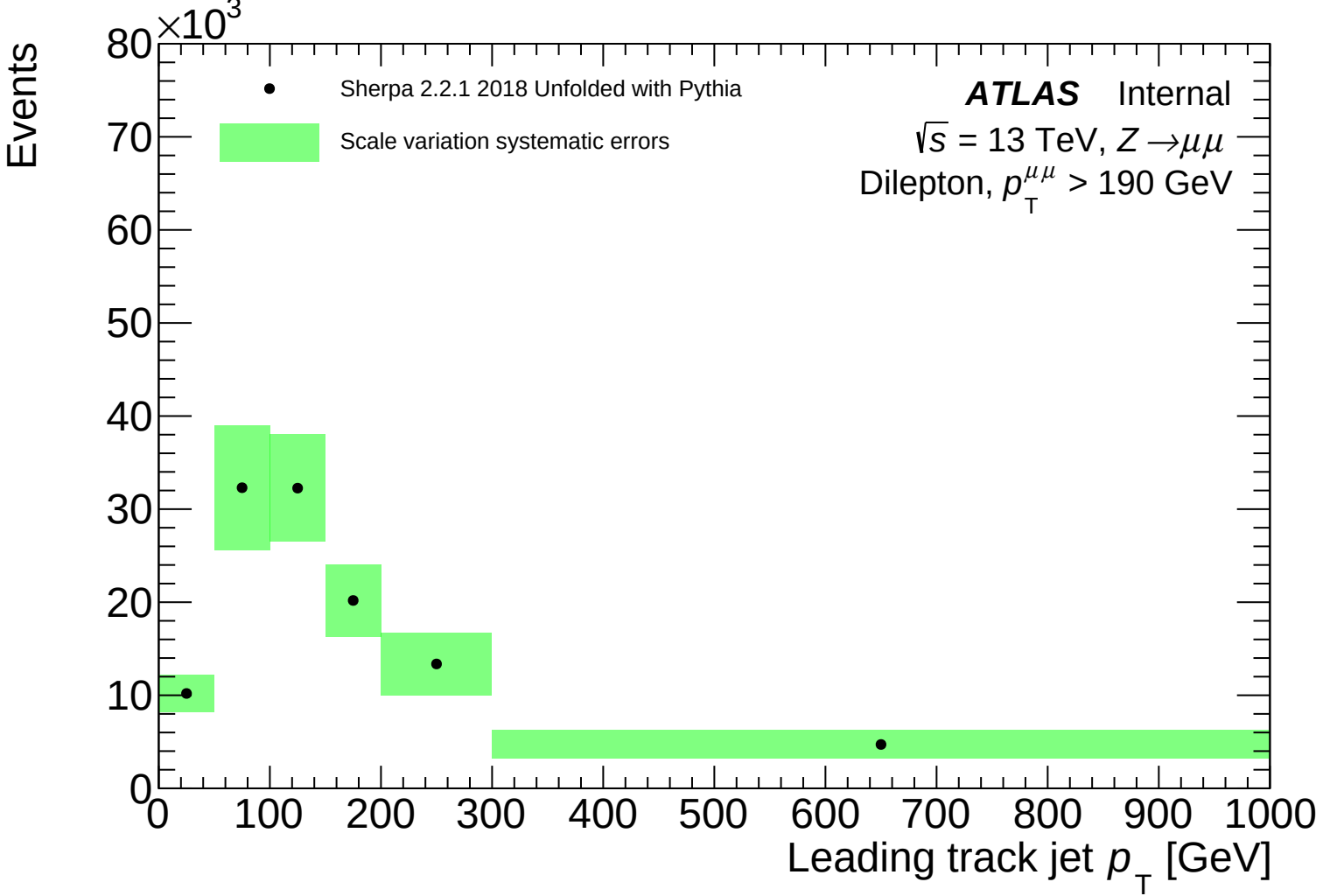
Leading track jet p_T [GeV]


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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100
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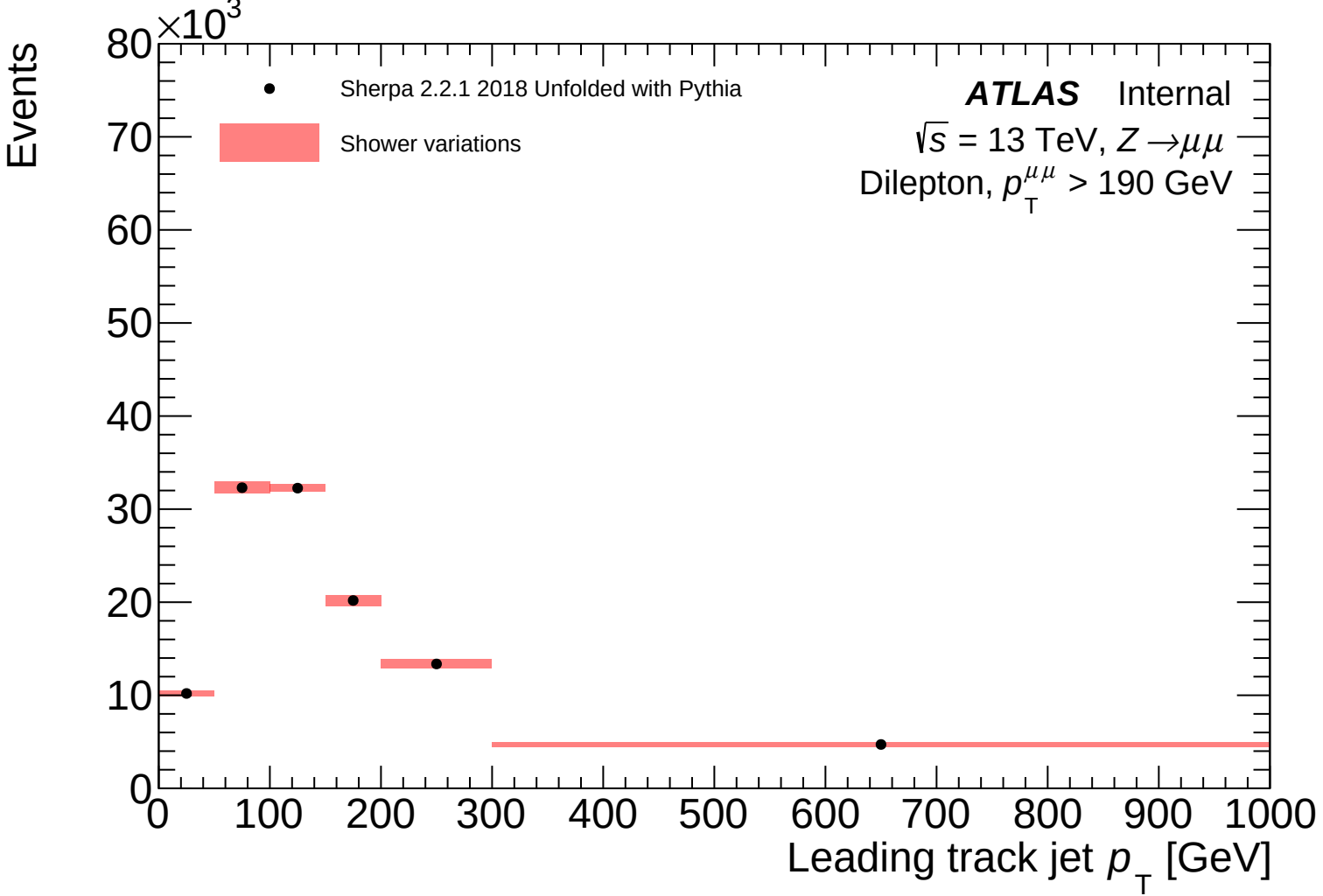
Leading track jet p_T [GeV]


Events
$\times 10^3$
80
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Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
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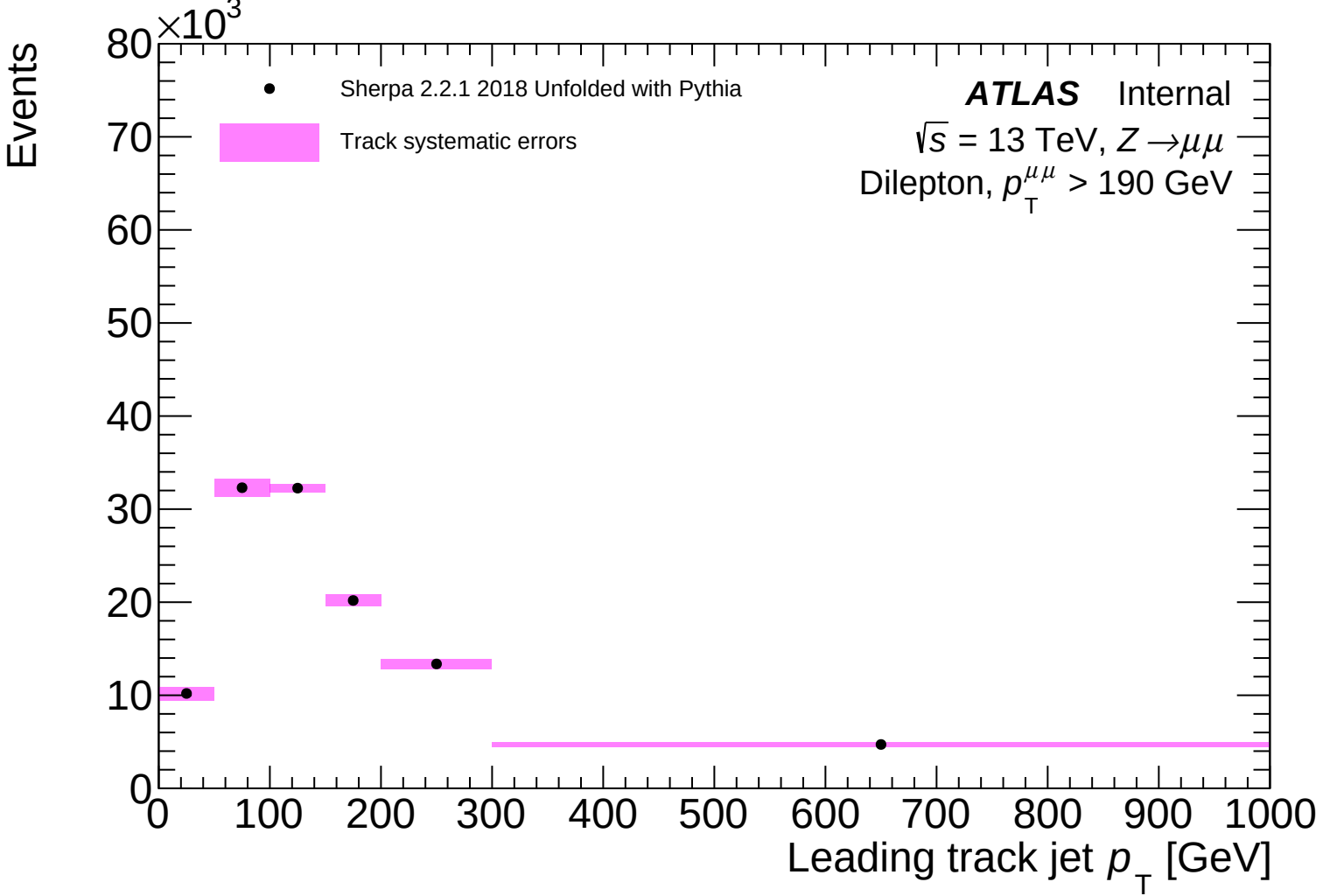
Leading track jet p_{T} [GeV]


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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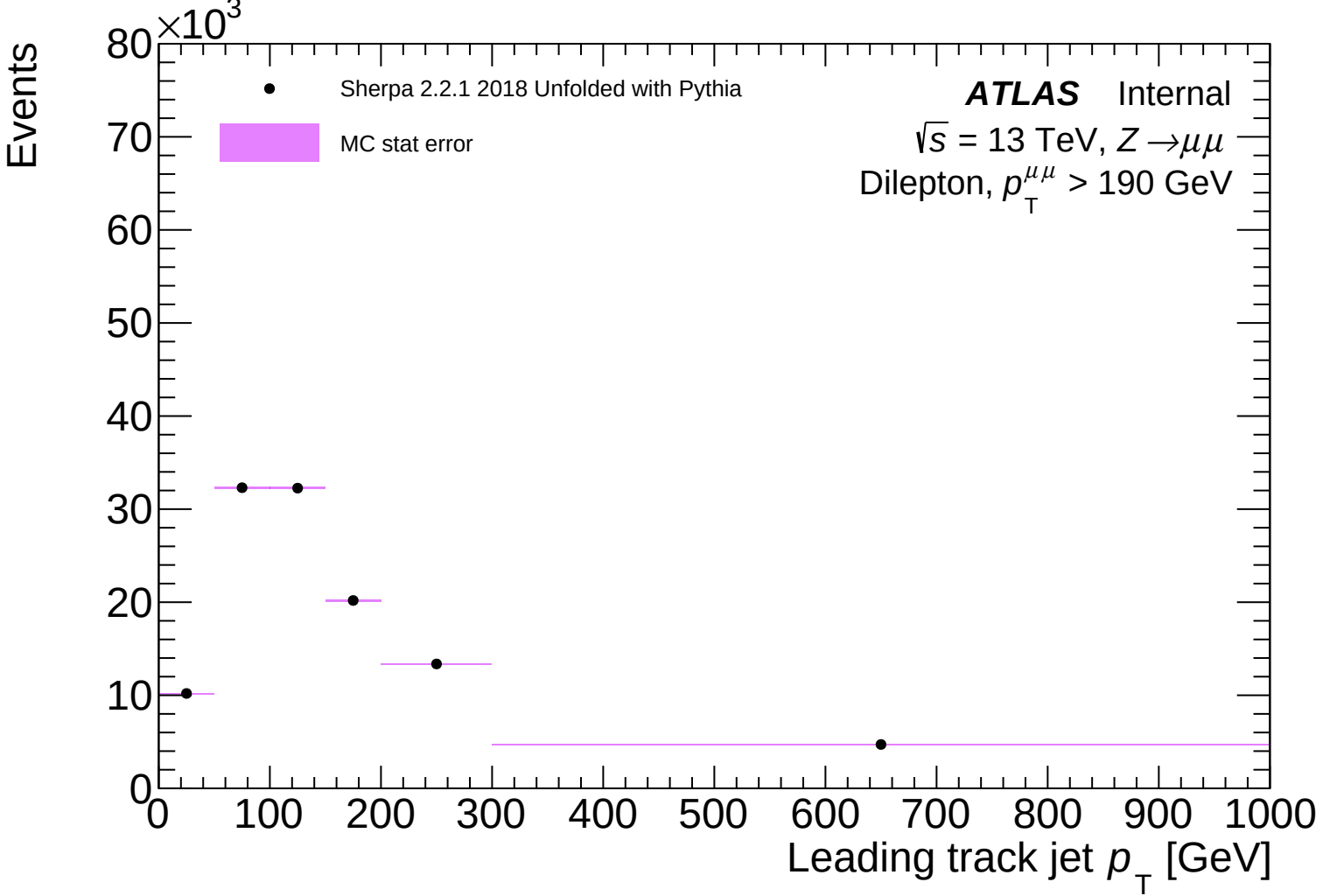
Leading track jet p_T [GeV]


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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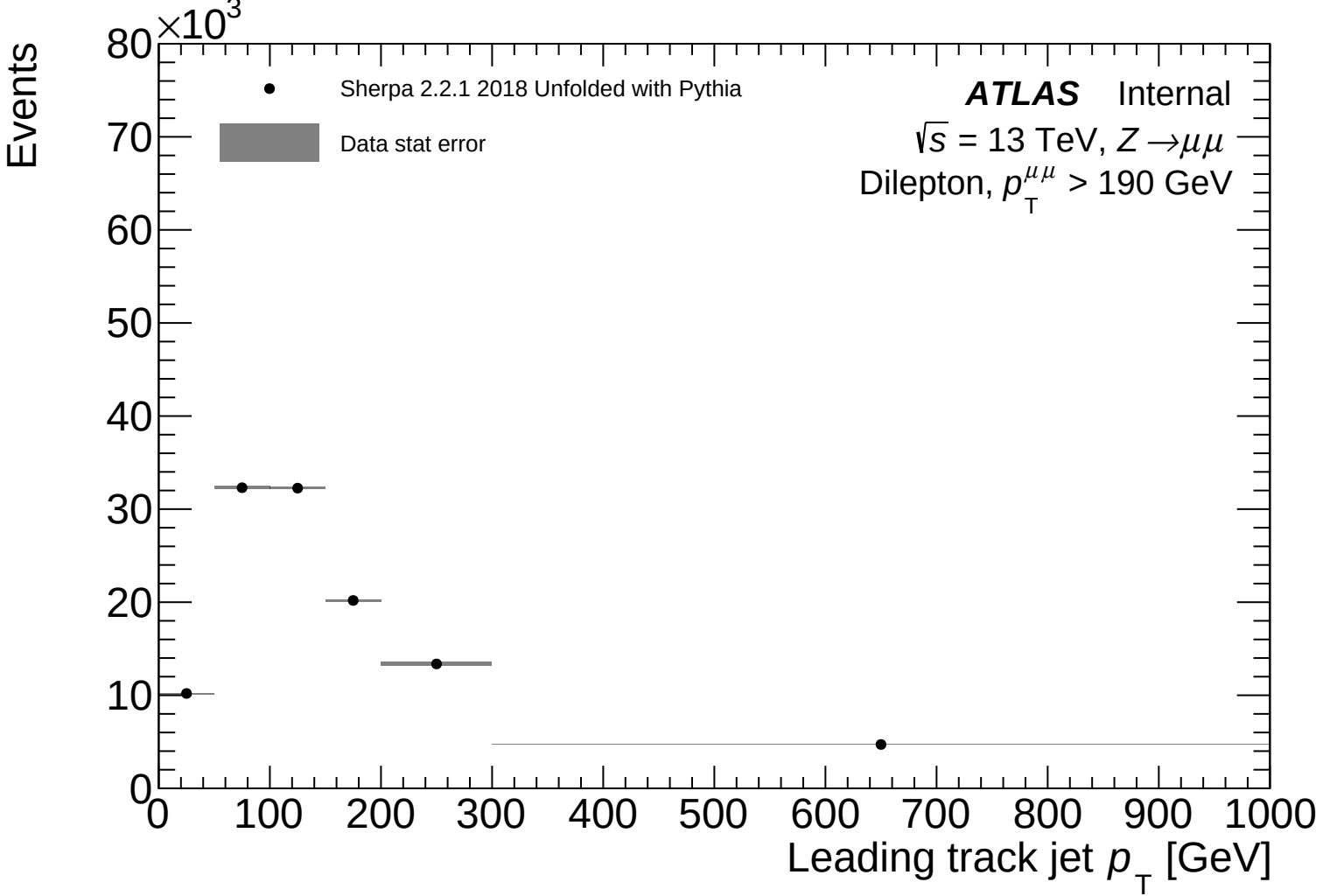
Leading track jet p_T [GeV]


Events
$\times 10^3$
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Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
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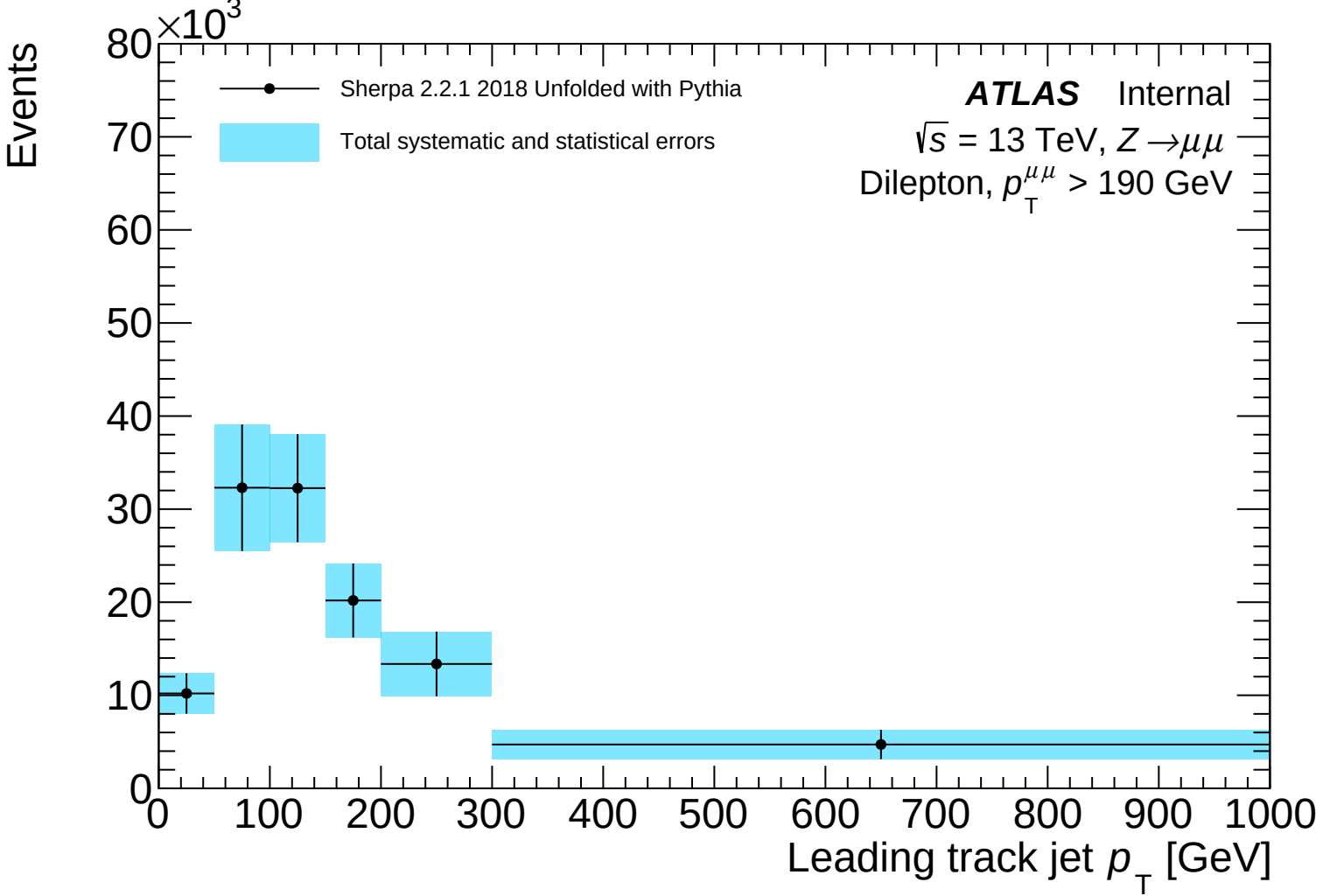
Leading track jet p_{T} [GeV]


Events
×10^3
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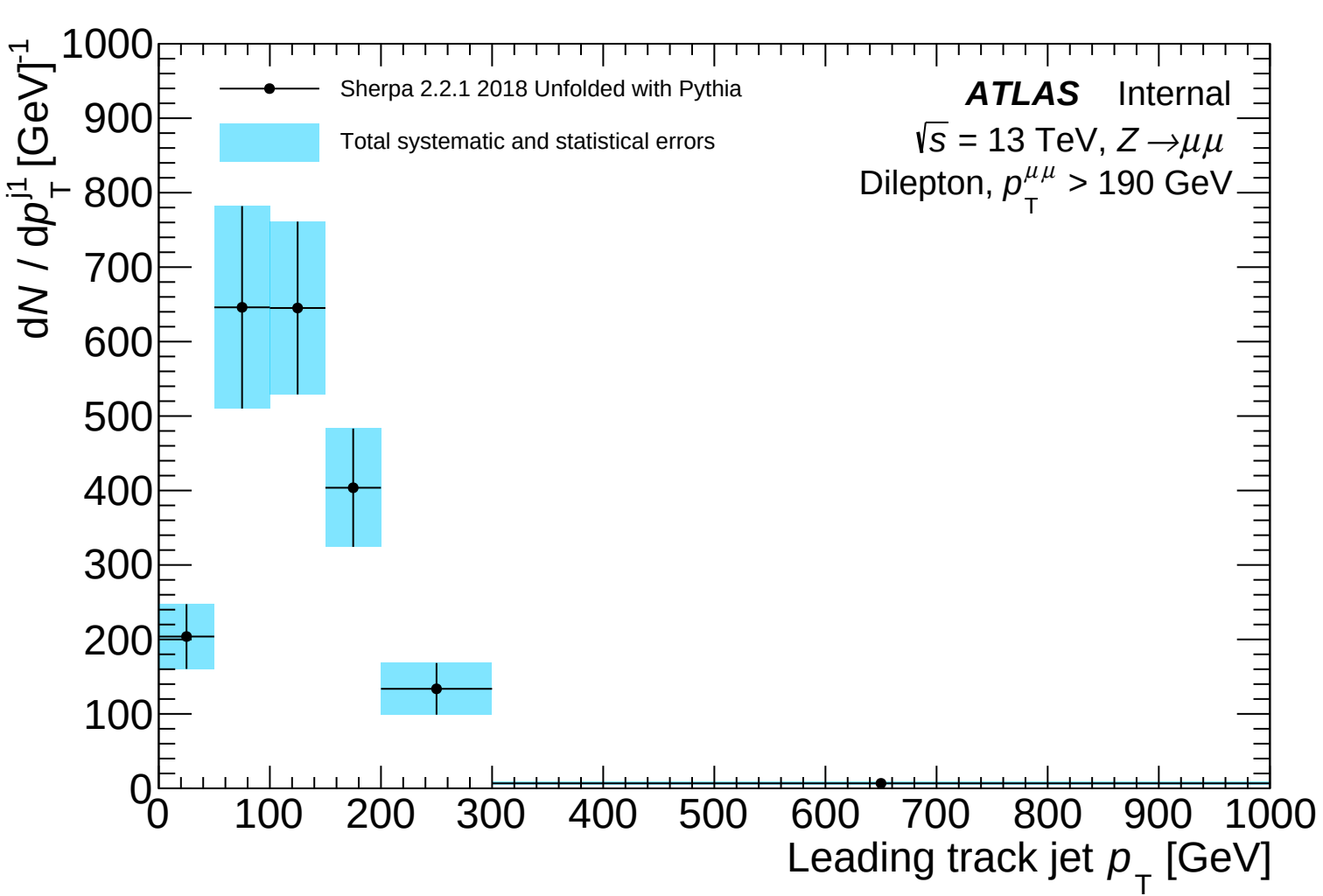
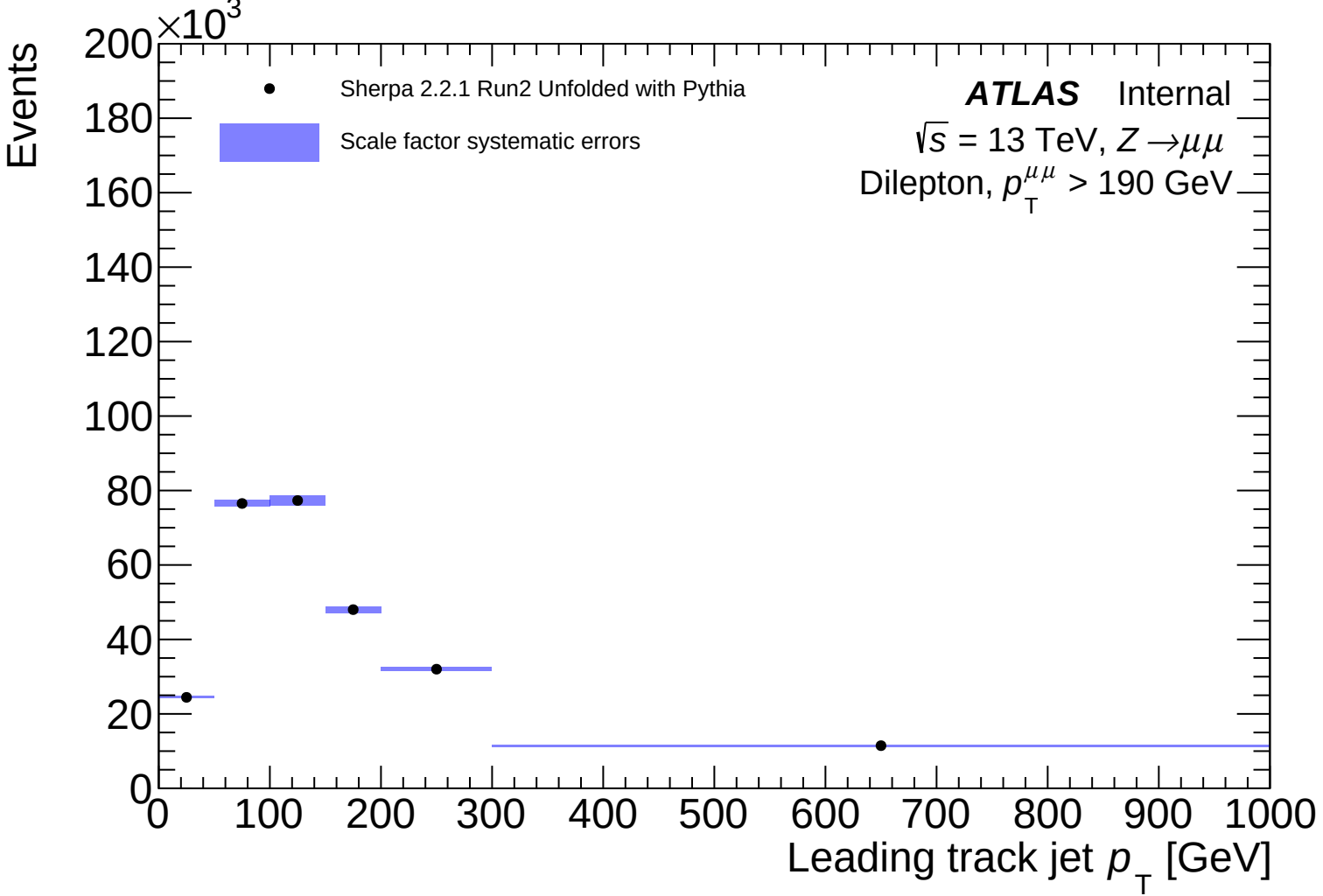
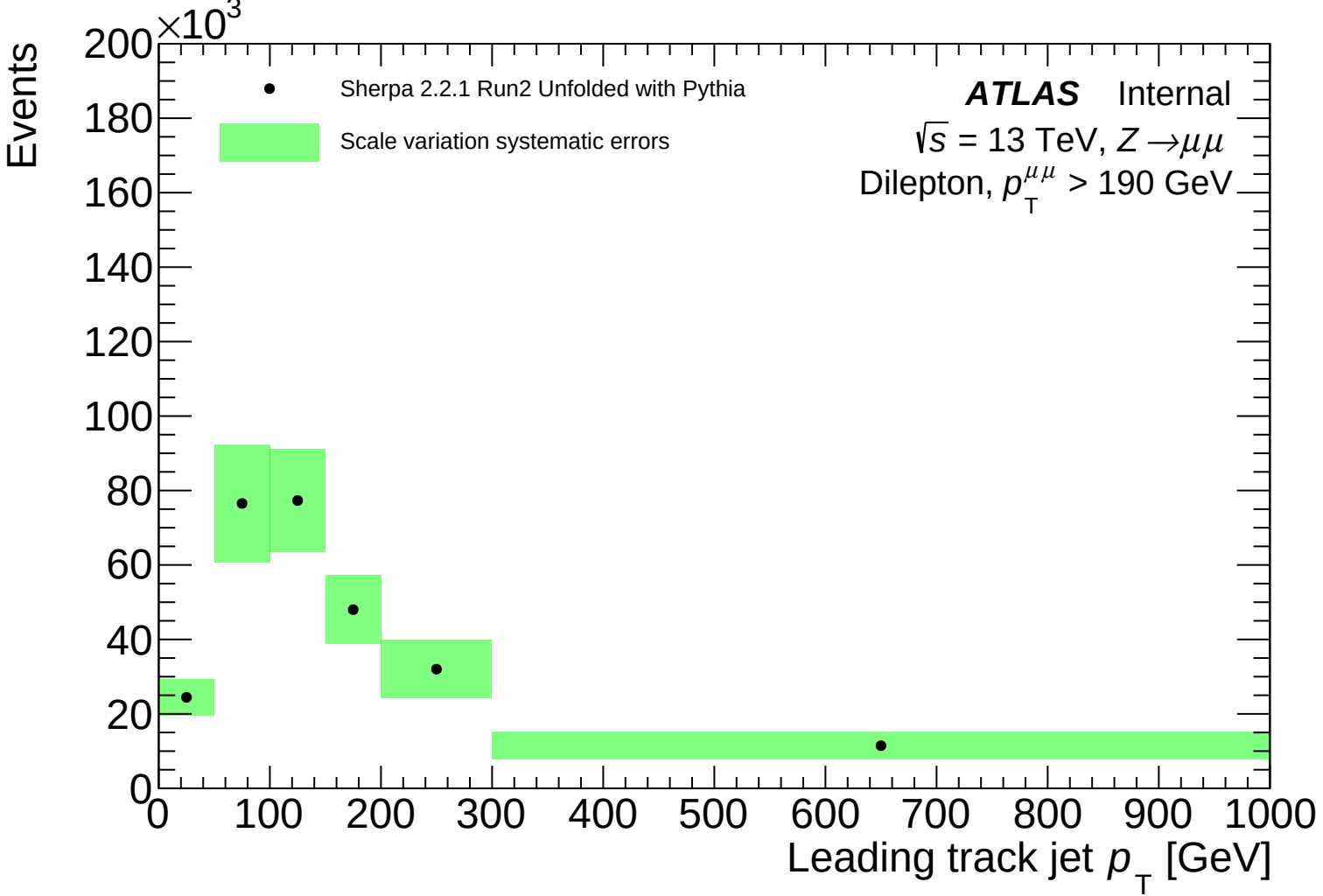
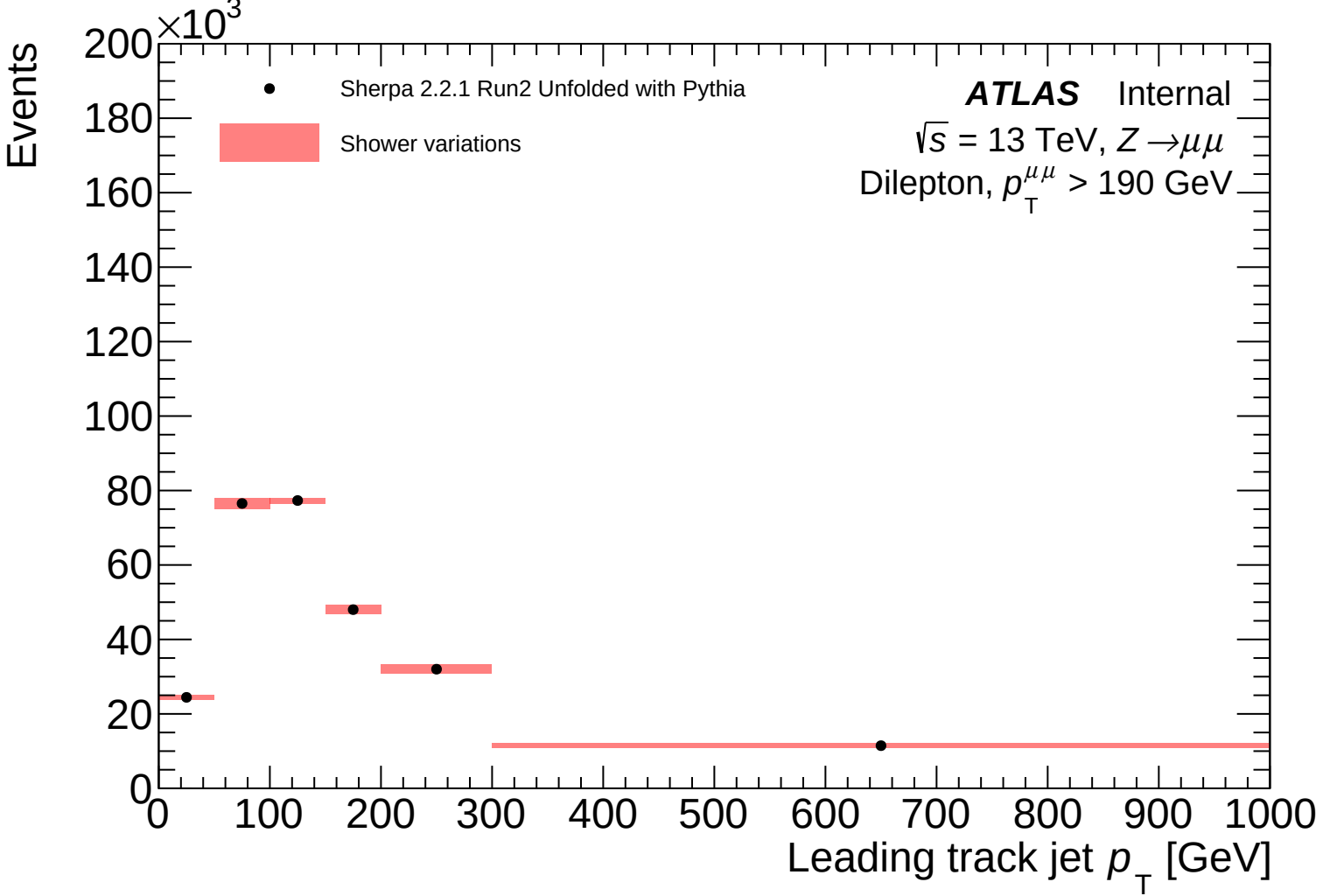
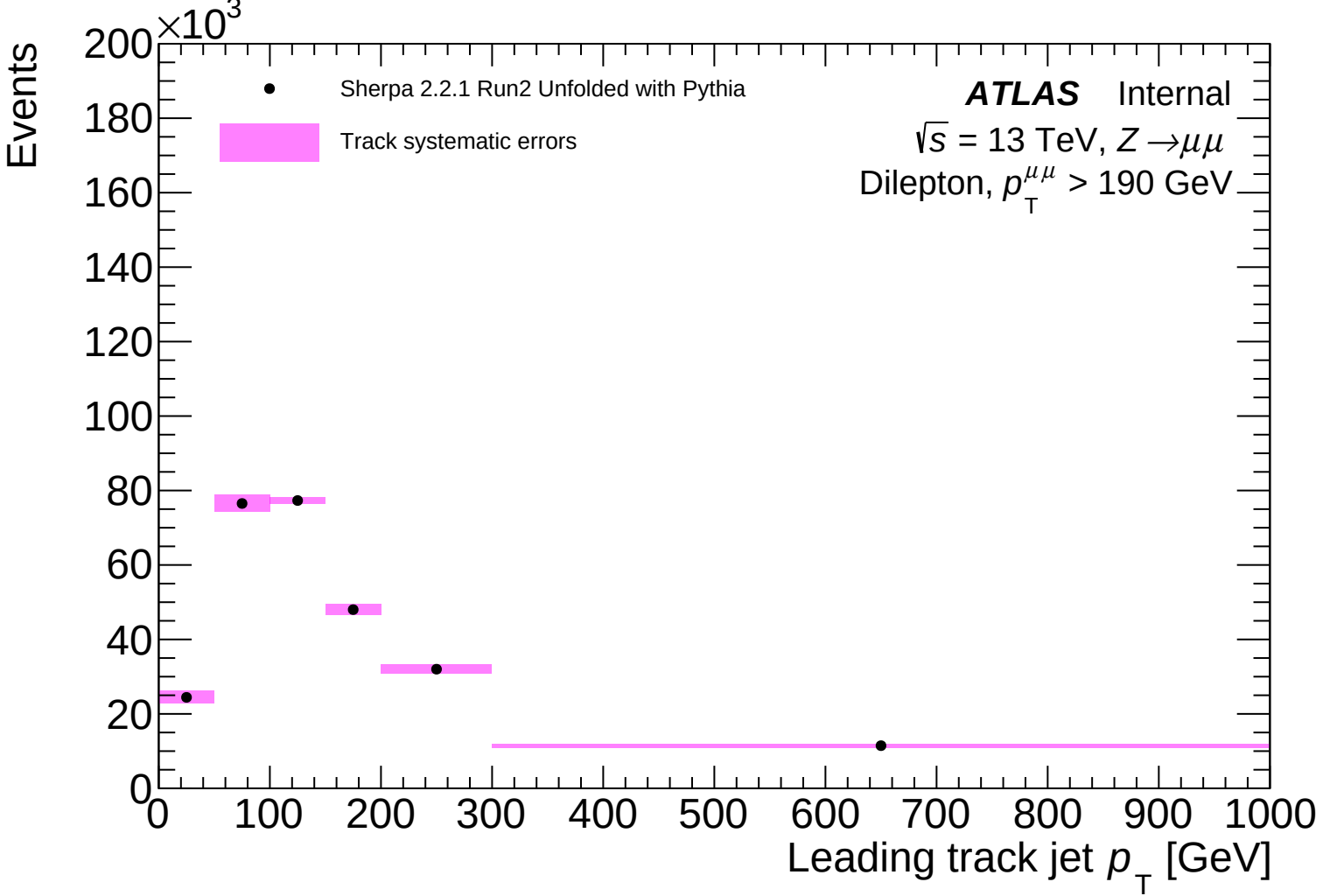
1000
Leading track jet p_T [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j1 [GeV]^-1
Leading track jet p_T [GeV]
0
100
200
300
400
500
600
700
800
900
1000


Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]


Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]


Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]


Events
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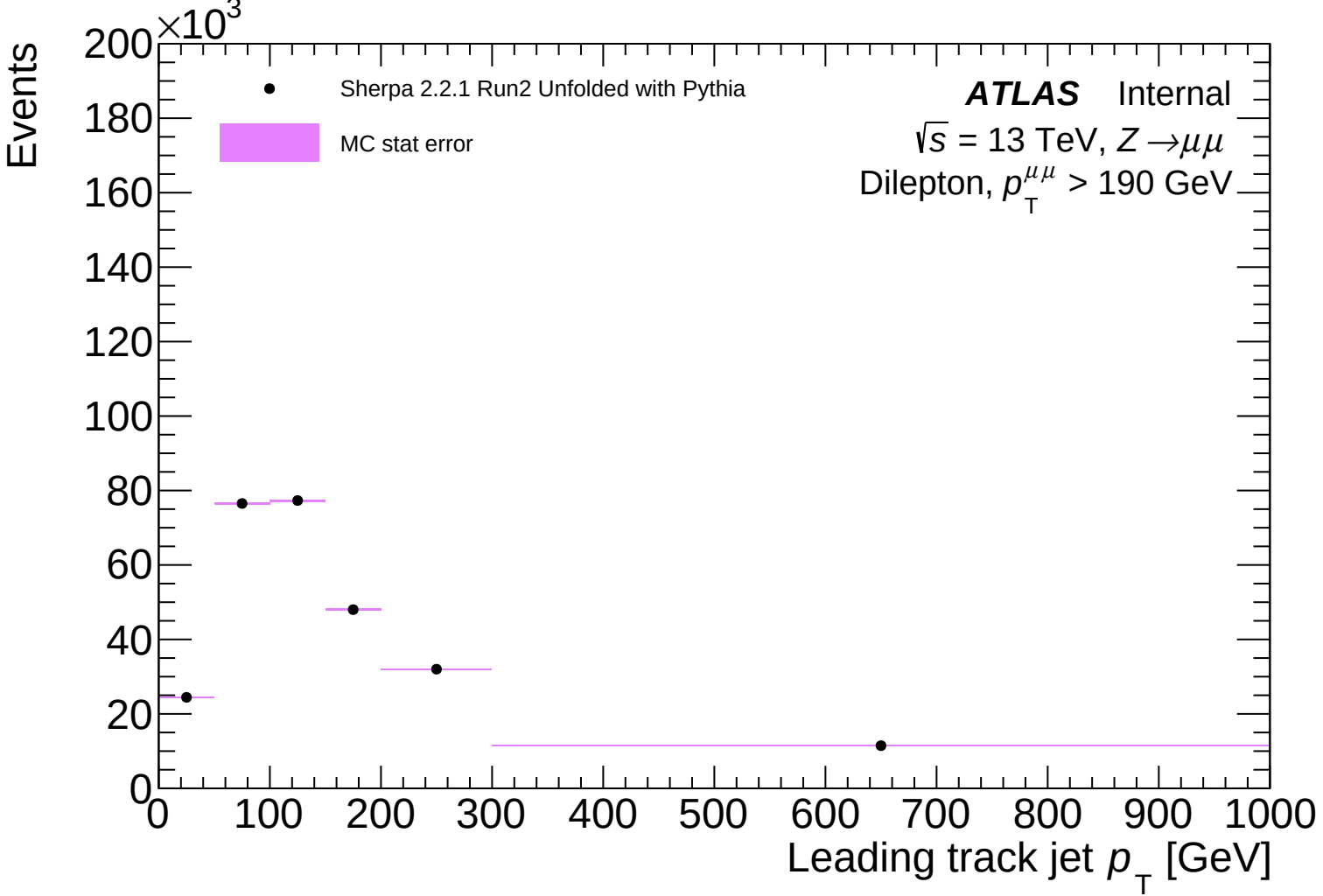
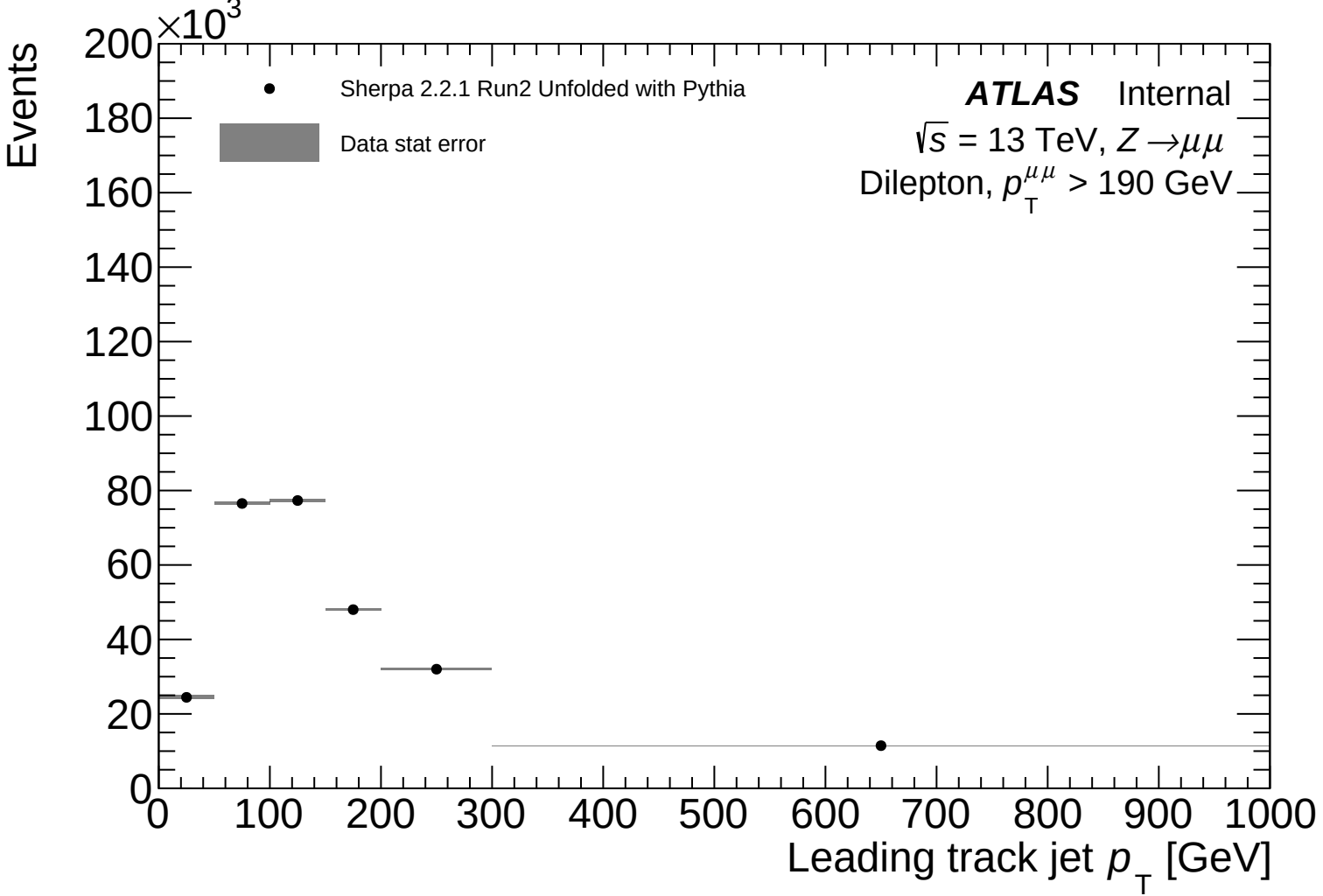
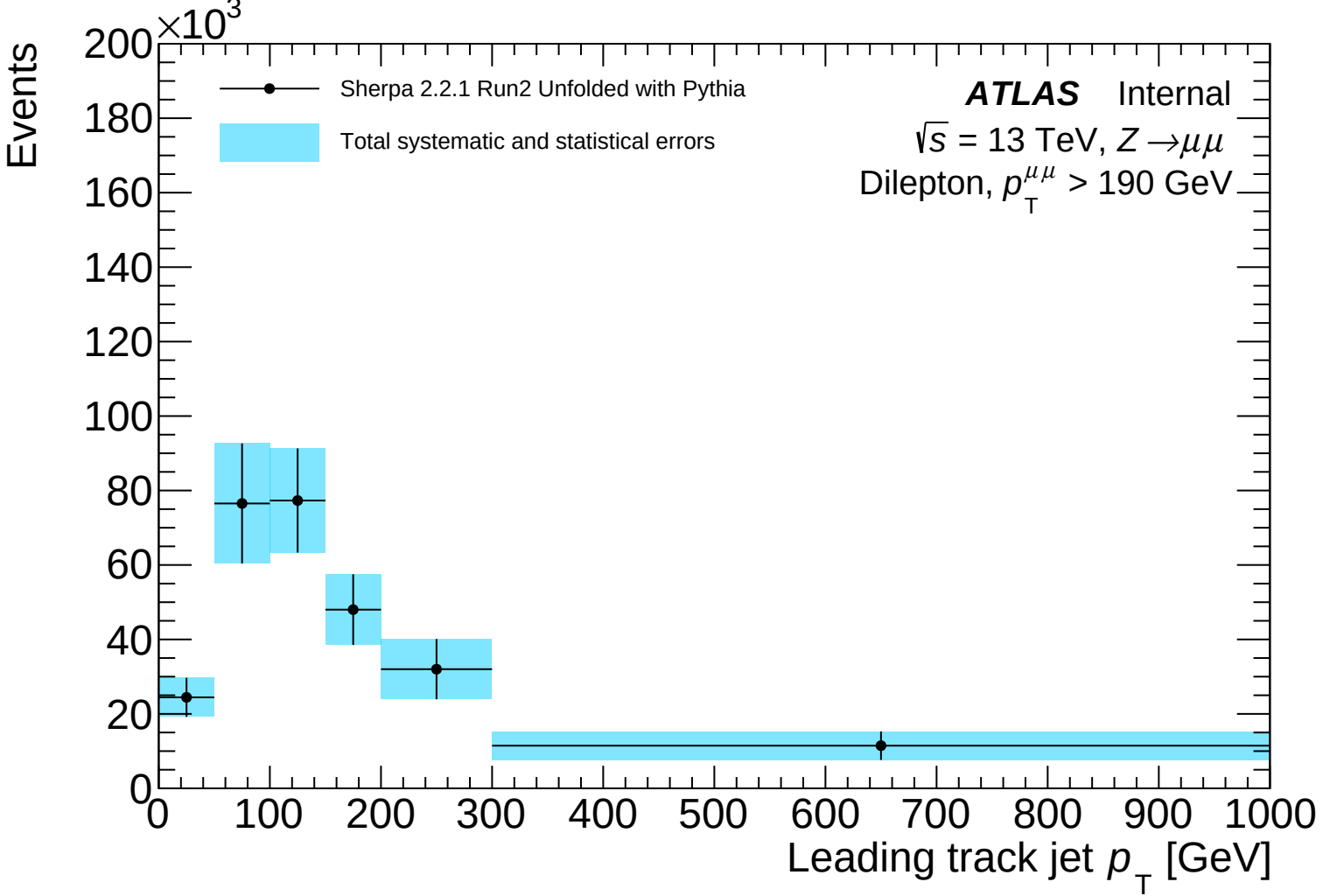
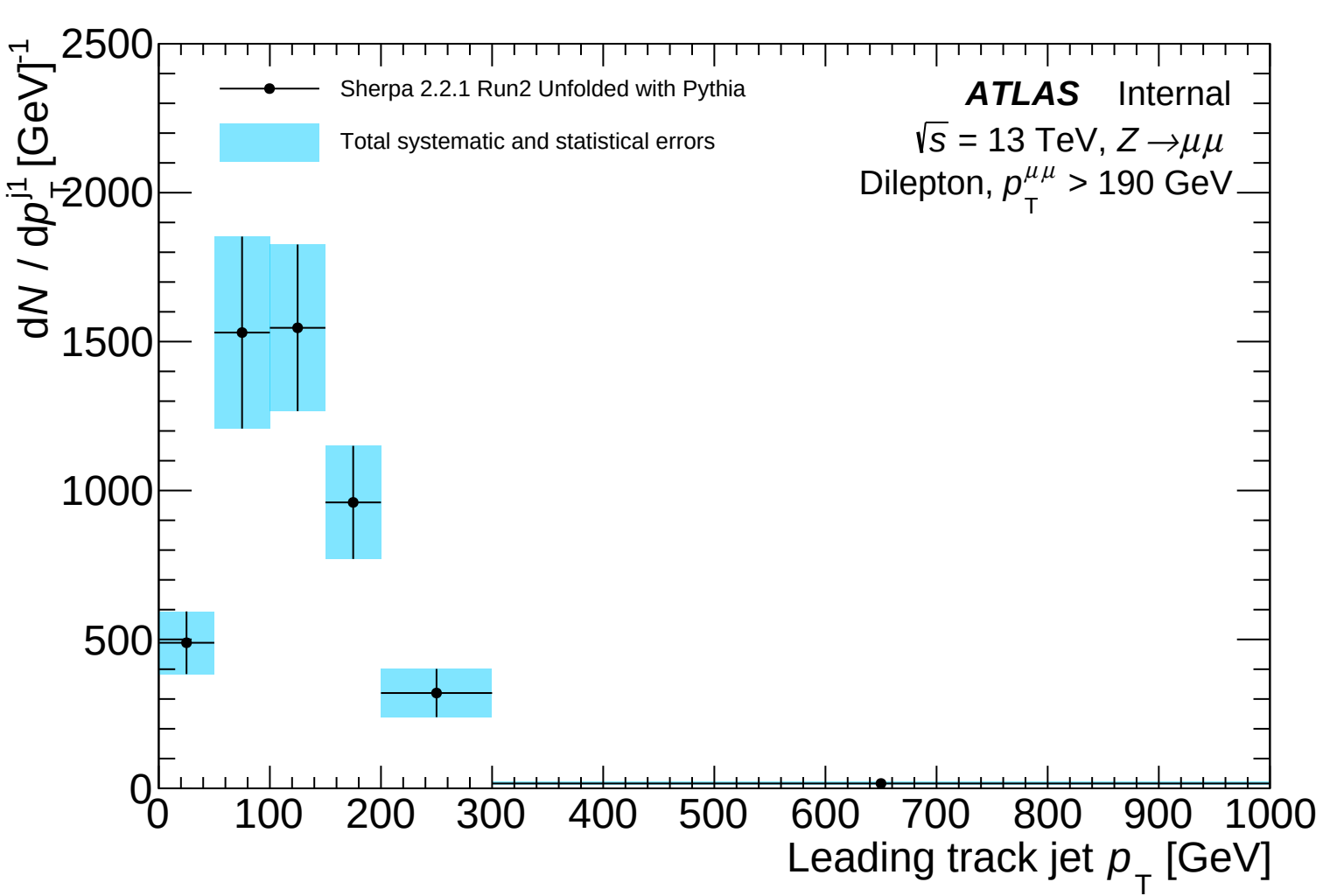
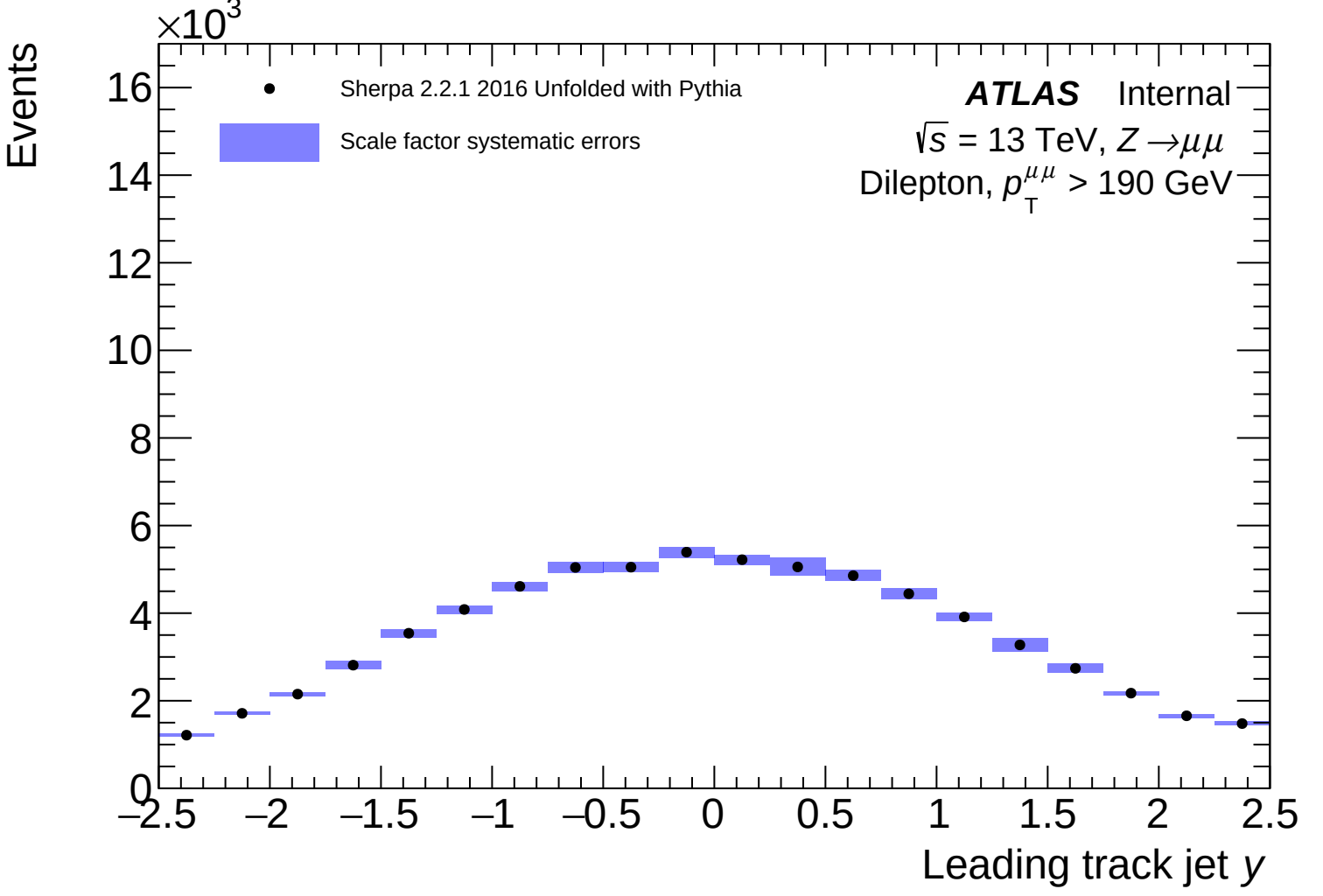
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]

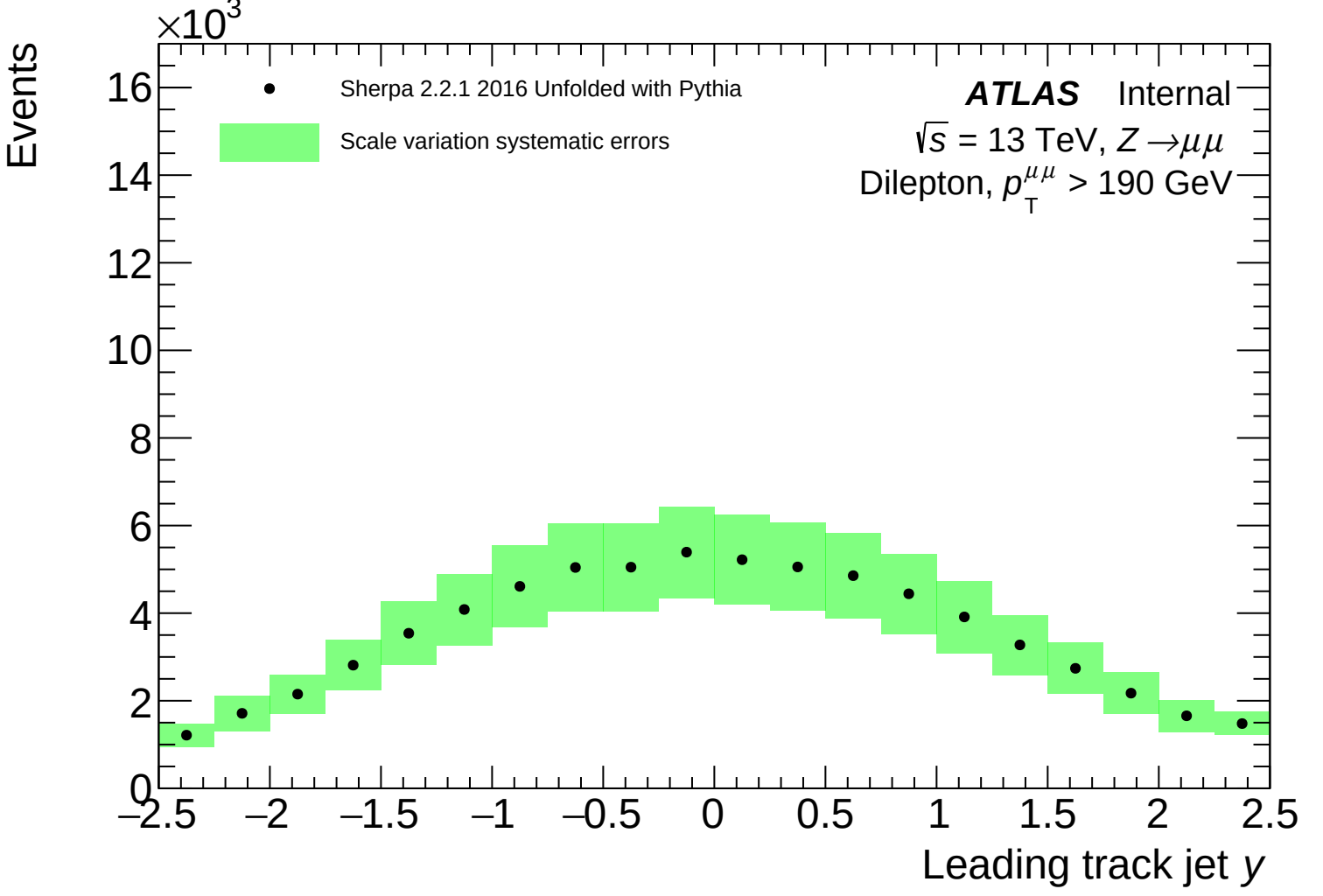

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]


Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]


Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
100
200
300
400
500
600
700
800
900
1000
Leading track jet p_T [GeV]


Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j1 [GeV]^-1
Leading track jet p_T [GeV]
0
500
1000
1500
2000
2500
0
100
200
300
400
500
600
700
800
900
1000


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
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Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
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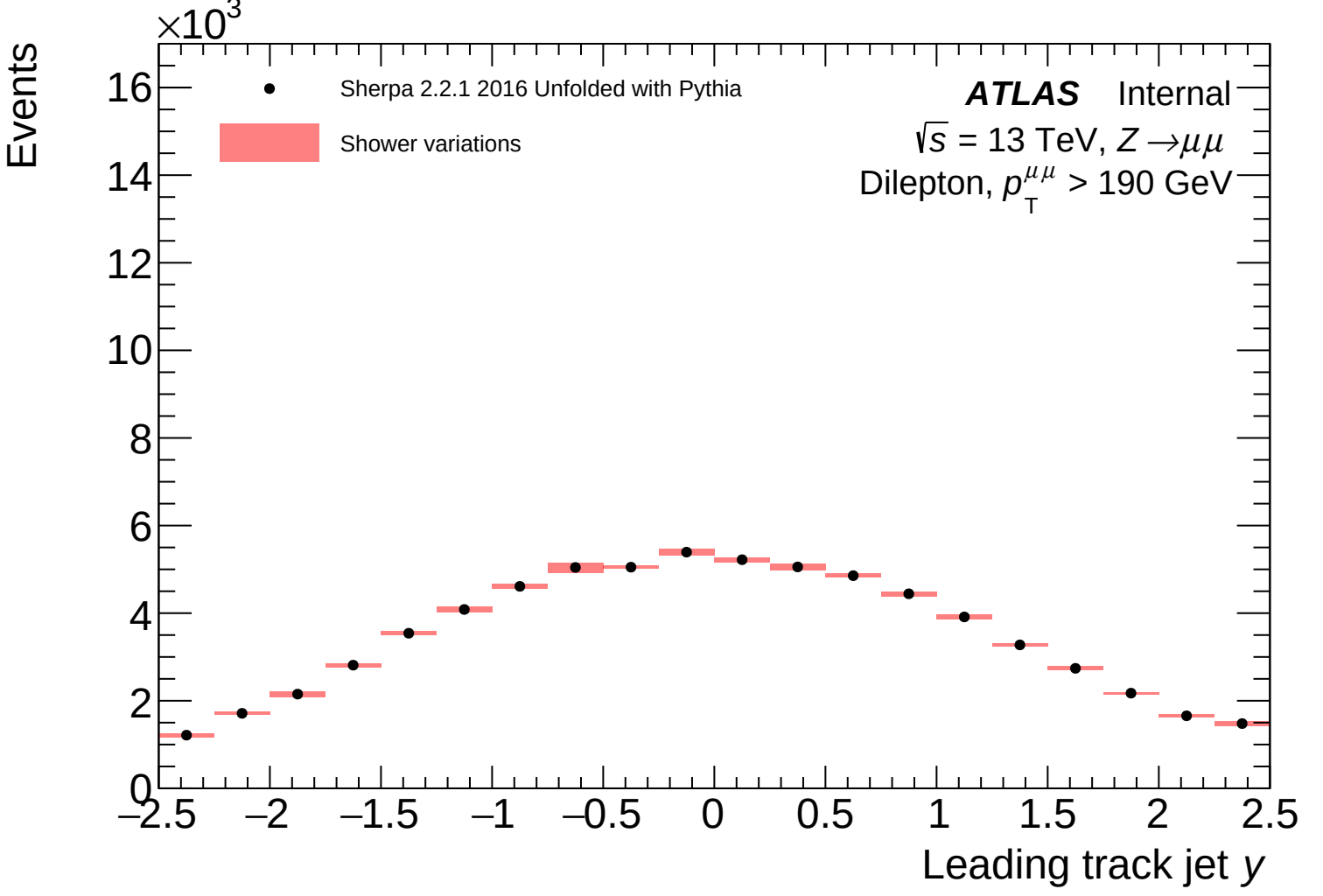
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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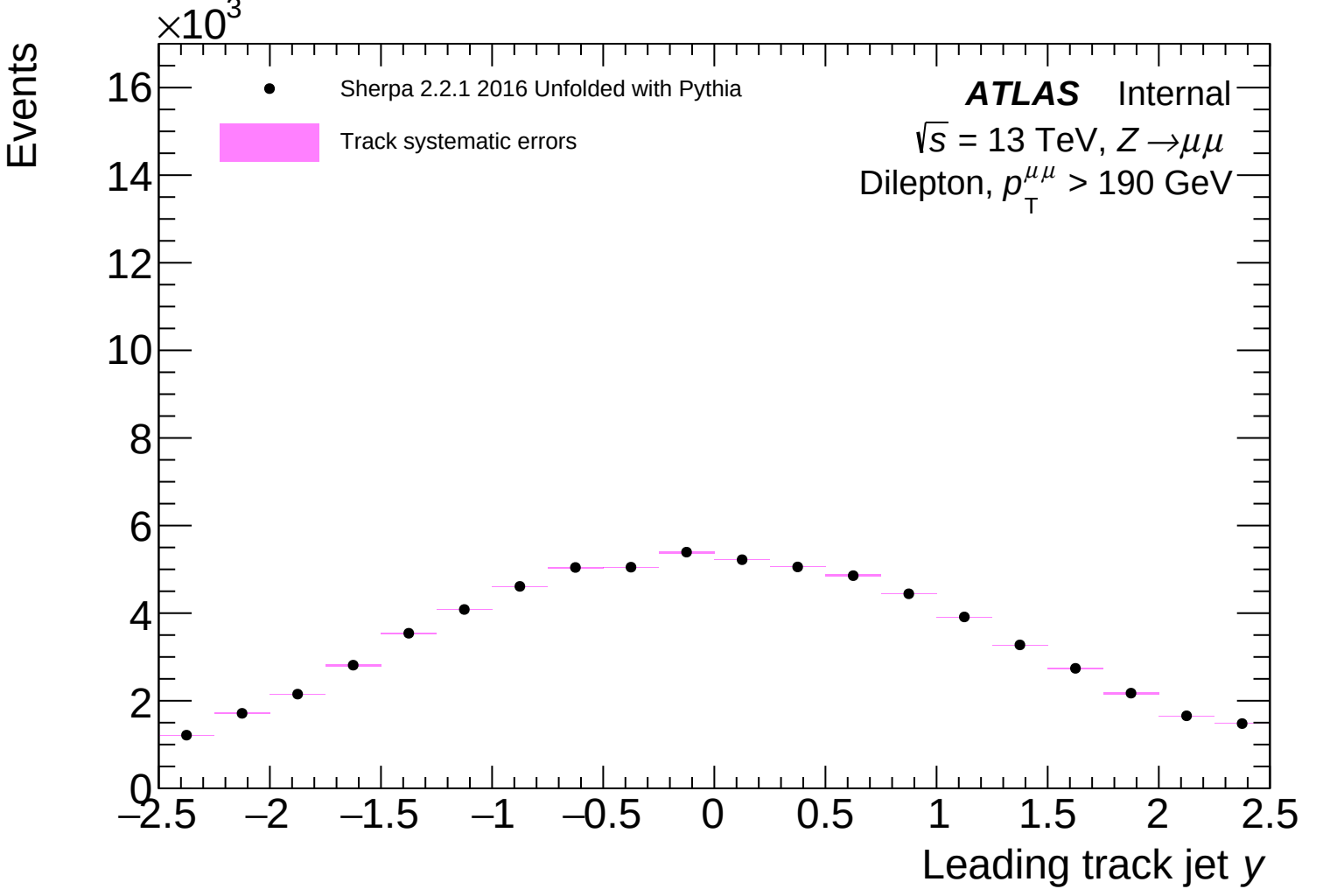
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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1
1.5
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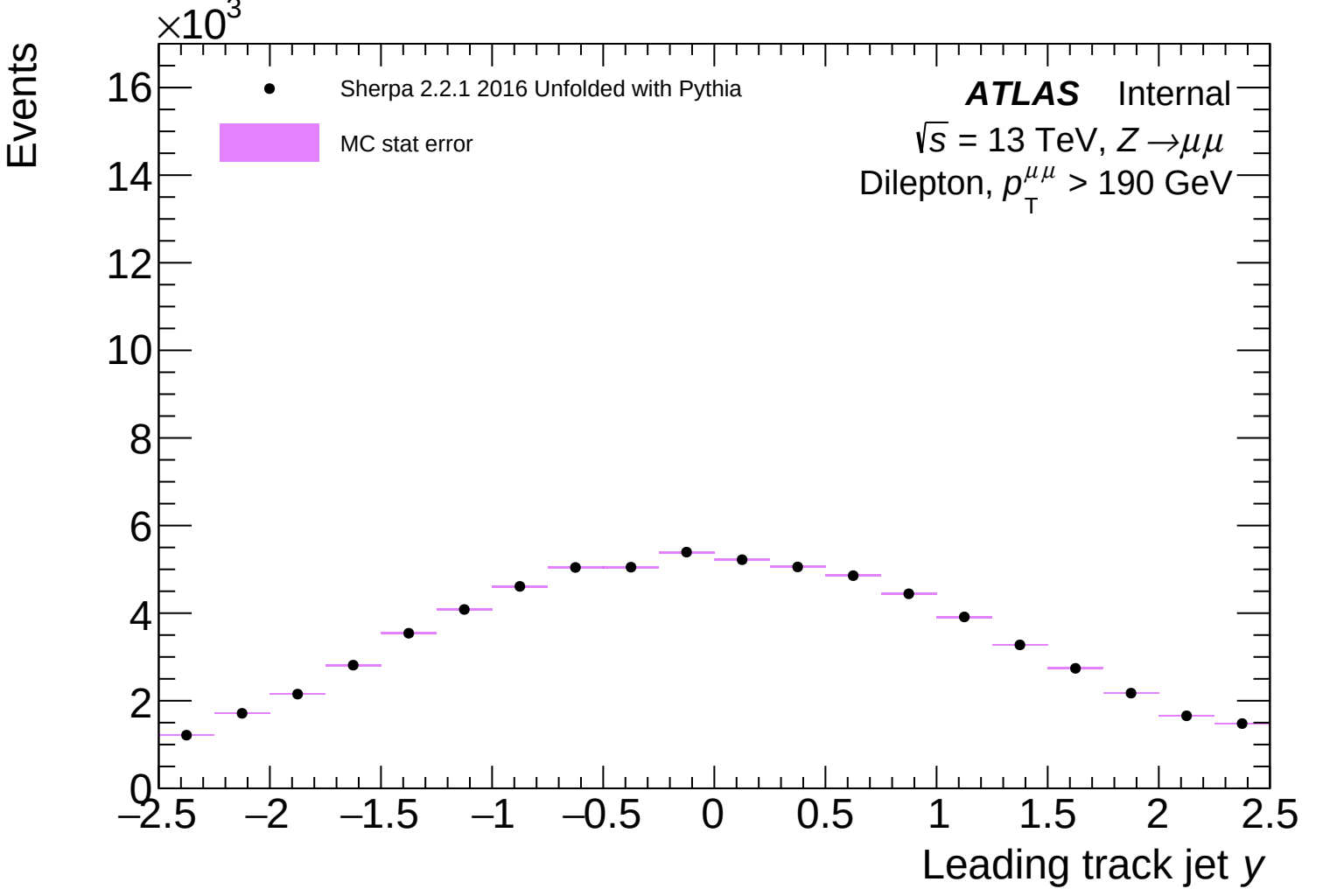
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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–1.5
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–0.5
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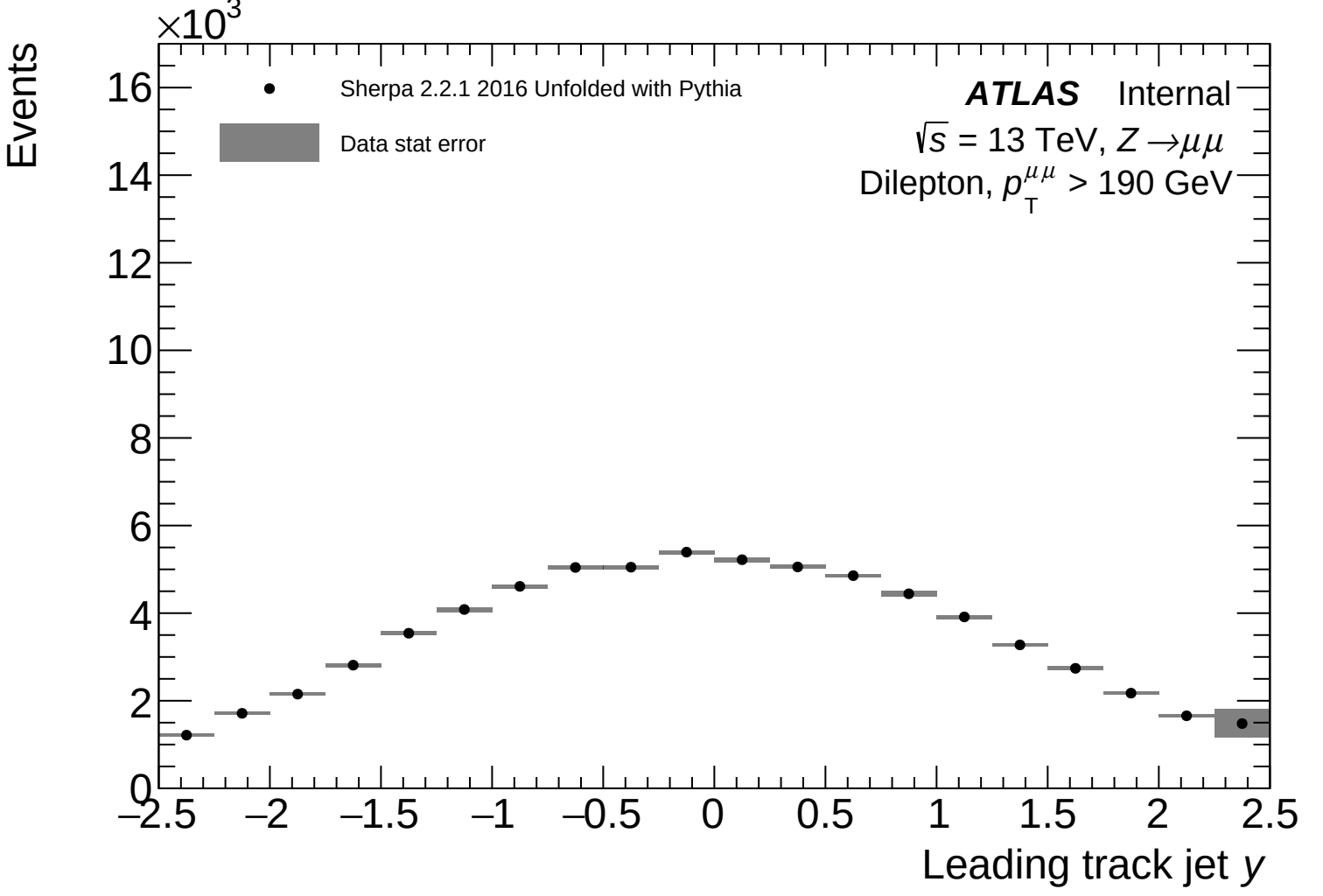
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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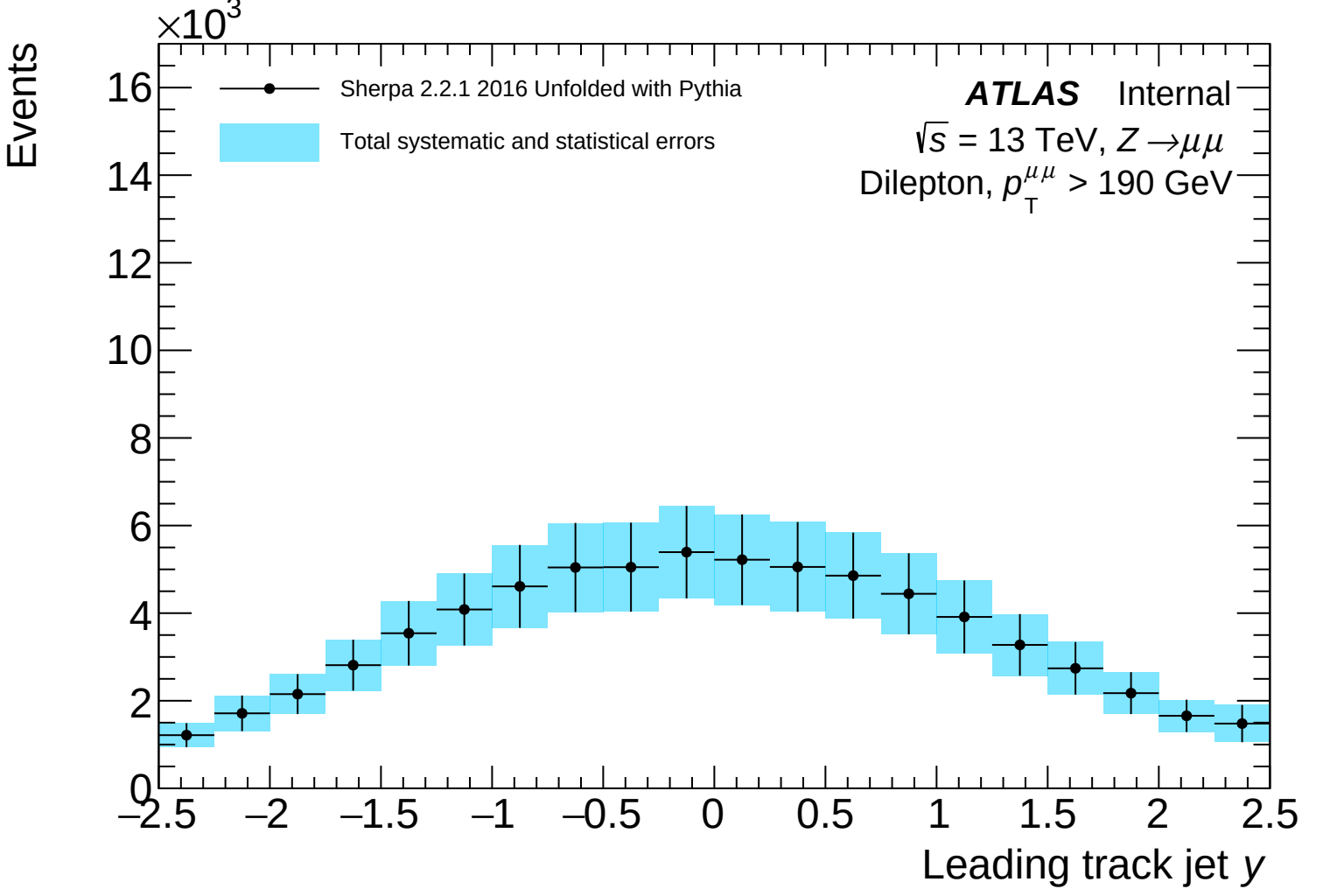
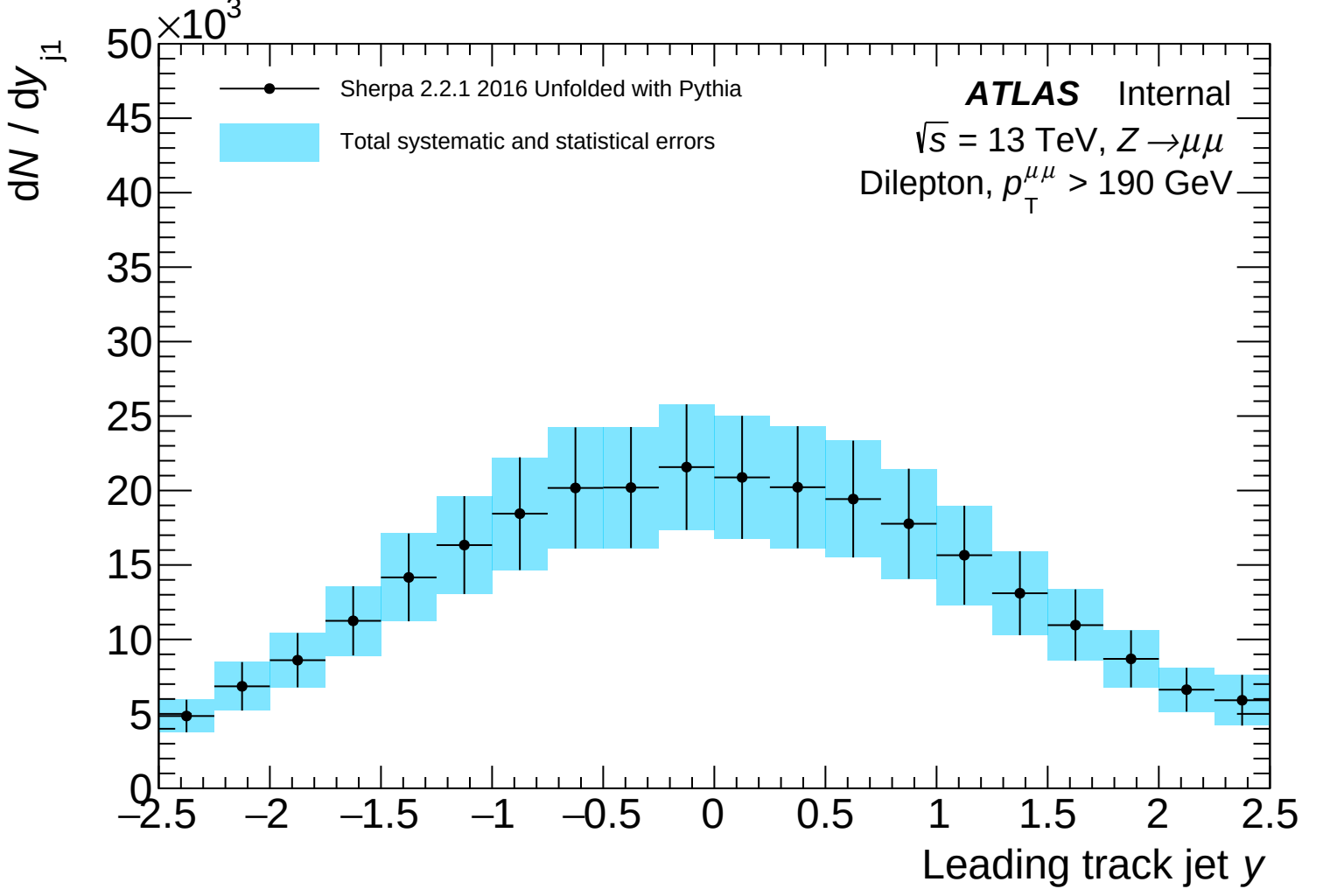
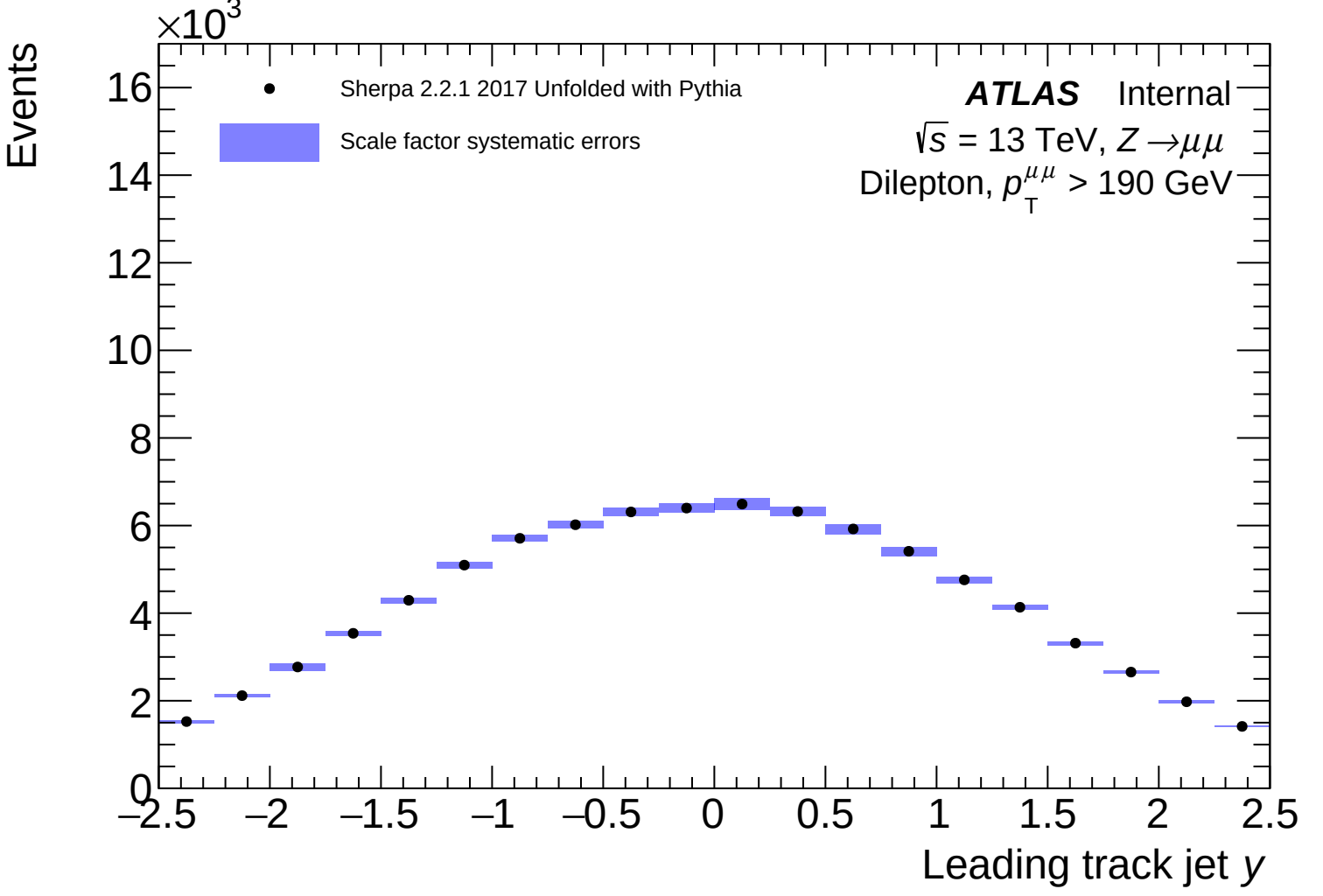
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


dN / dy_j1
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
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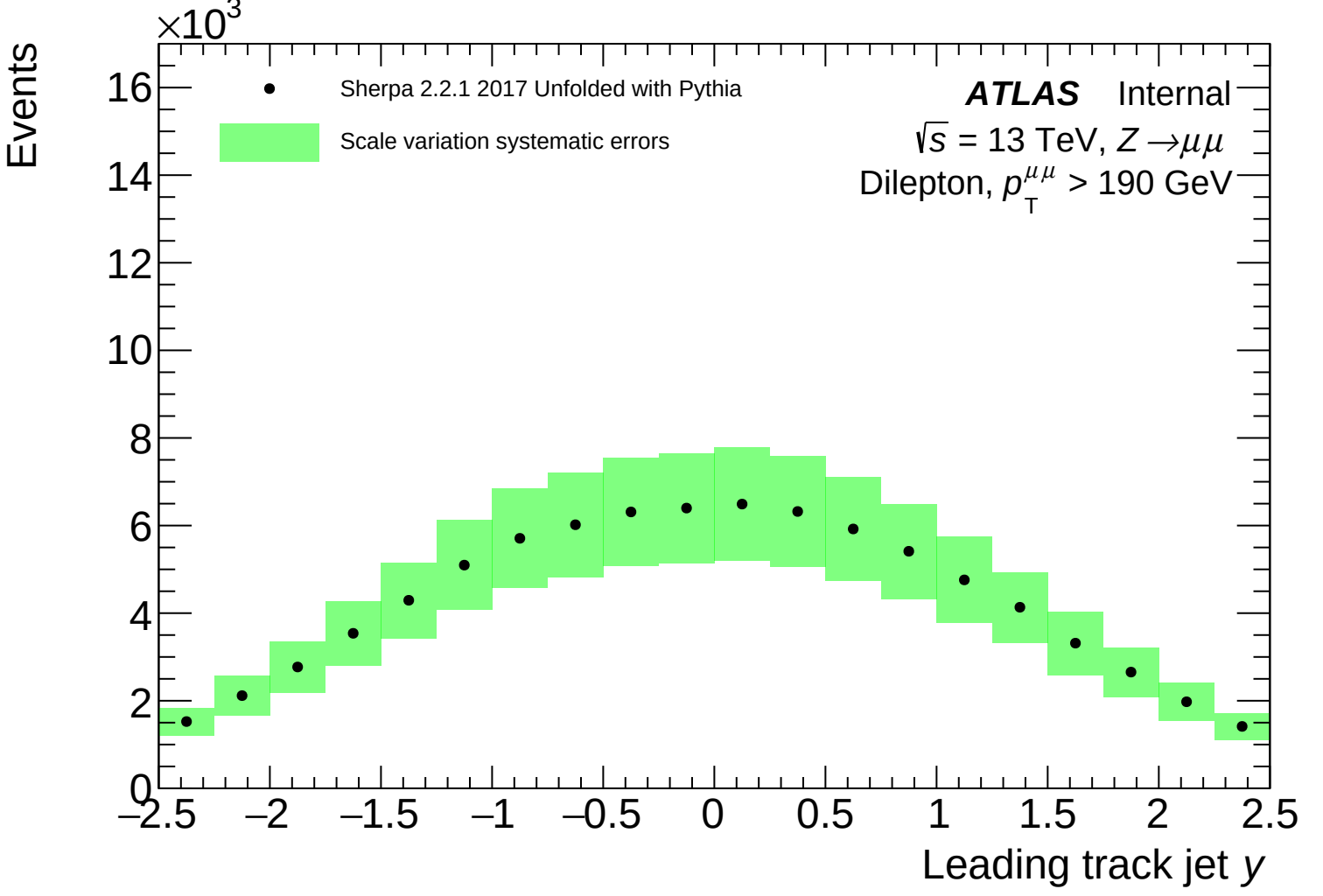
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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–1.5
–1
–0.5
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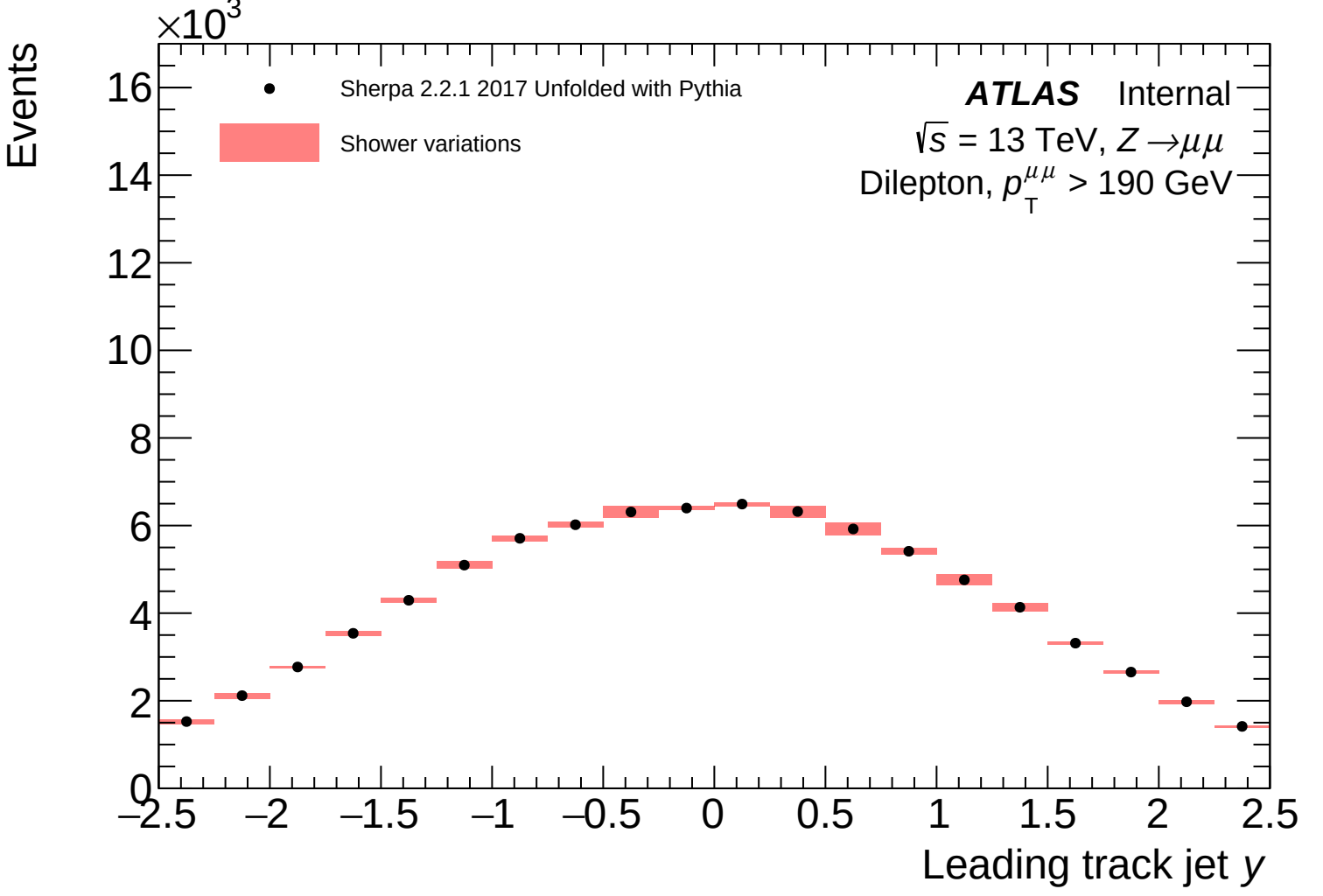
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
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–1.5
–1
–0.5
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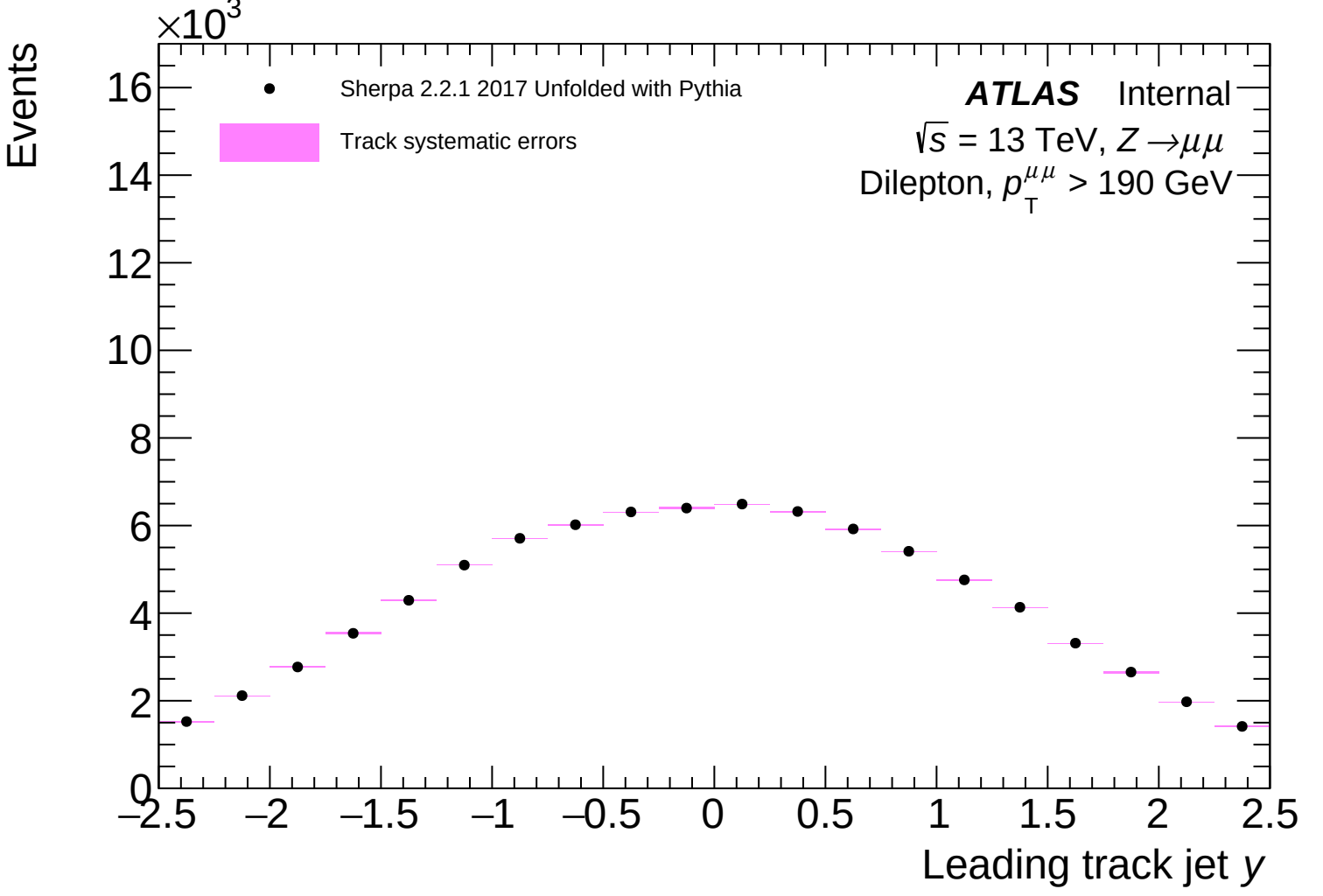
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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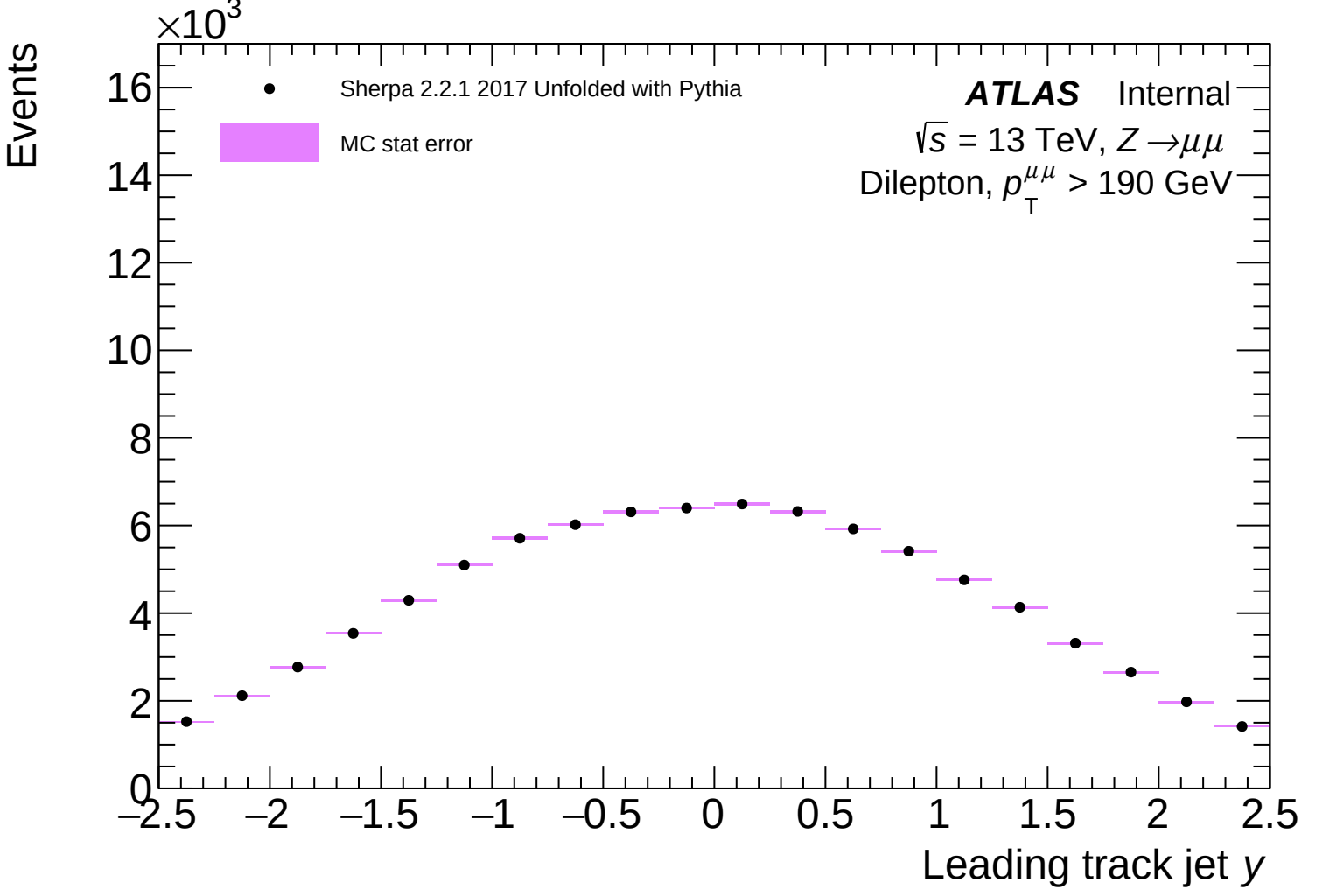
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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–0.5
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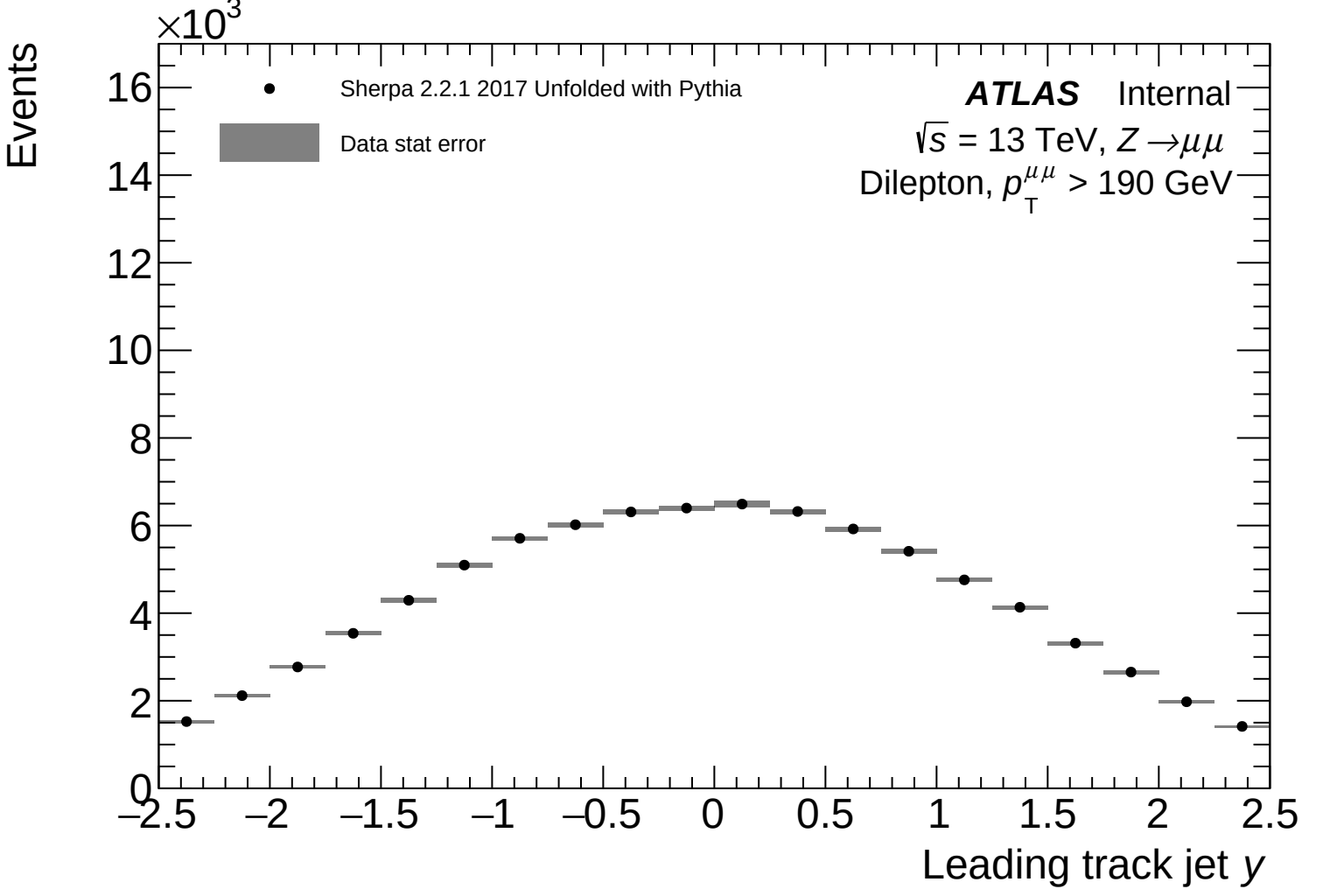
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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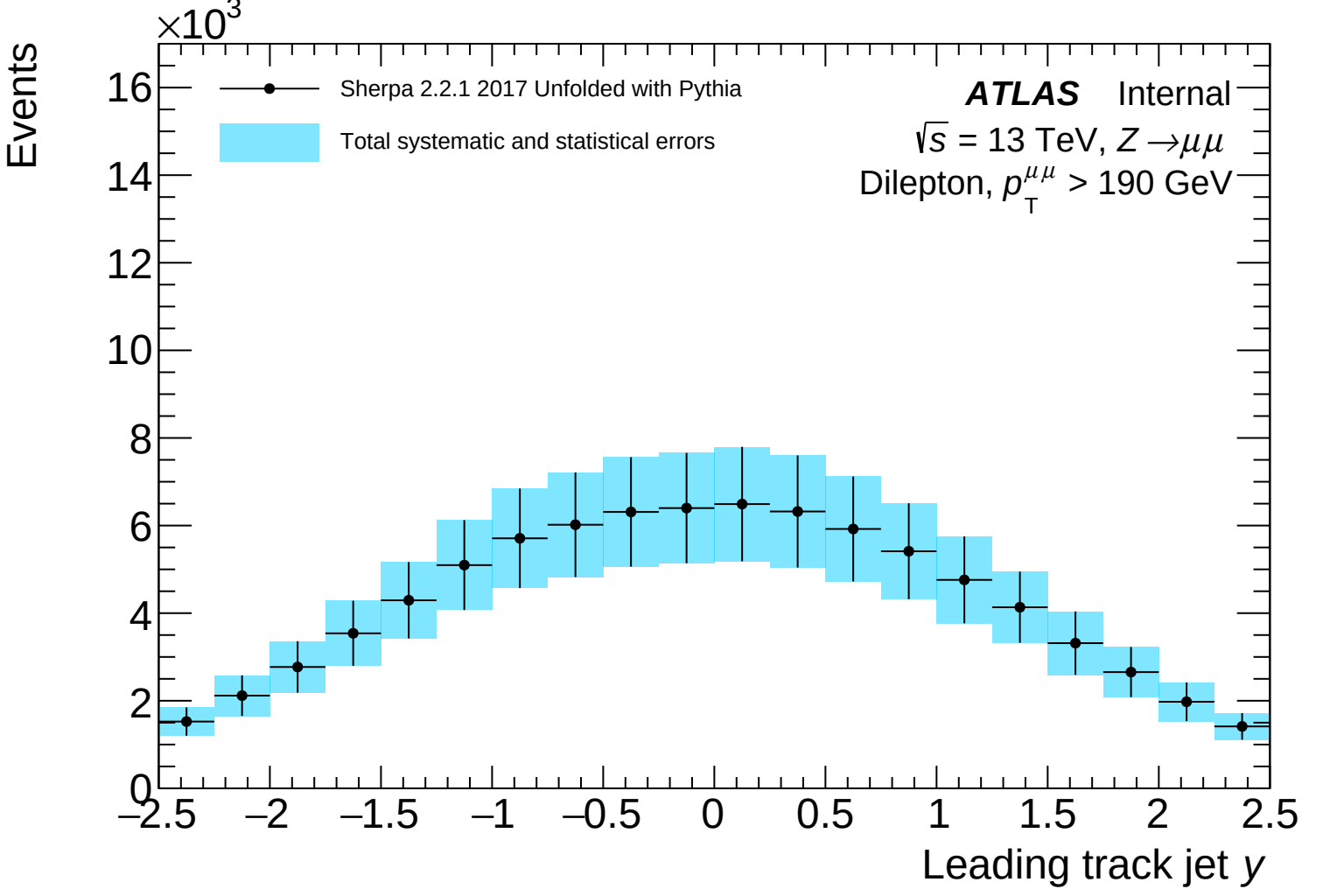
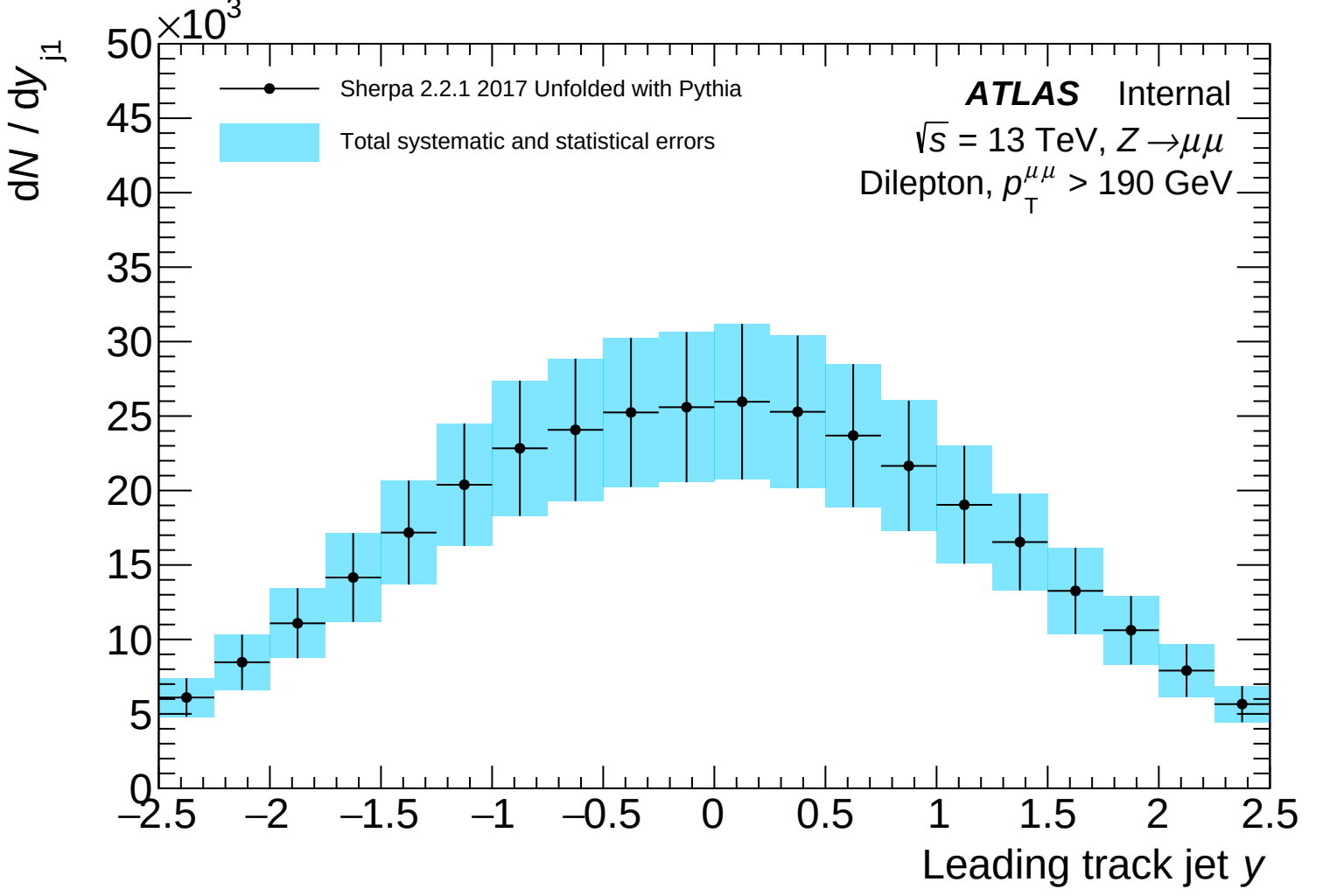
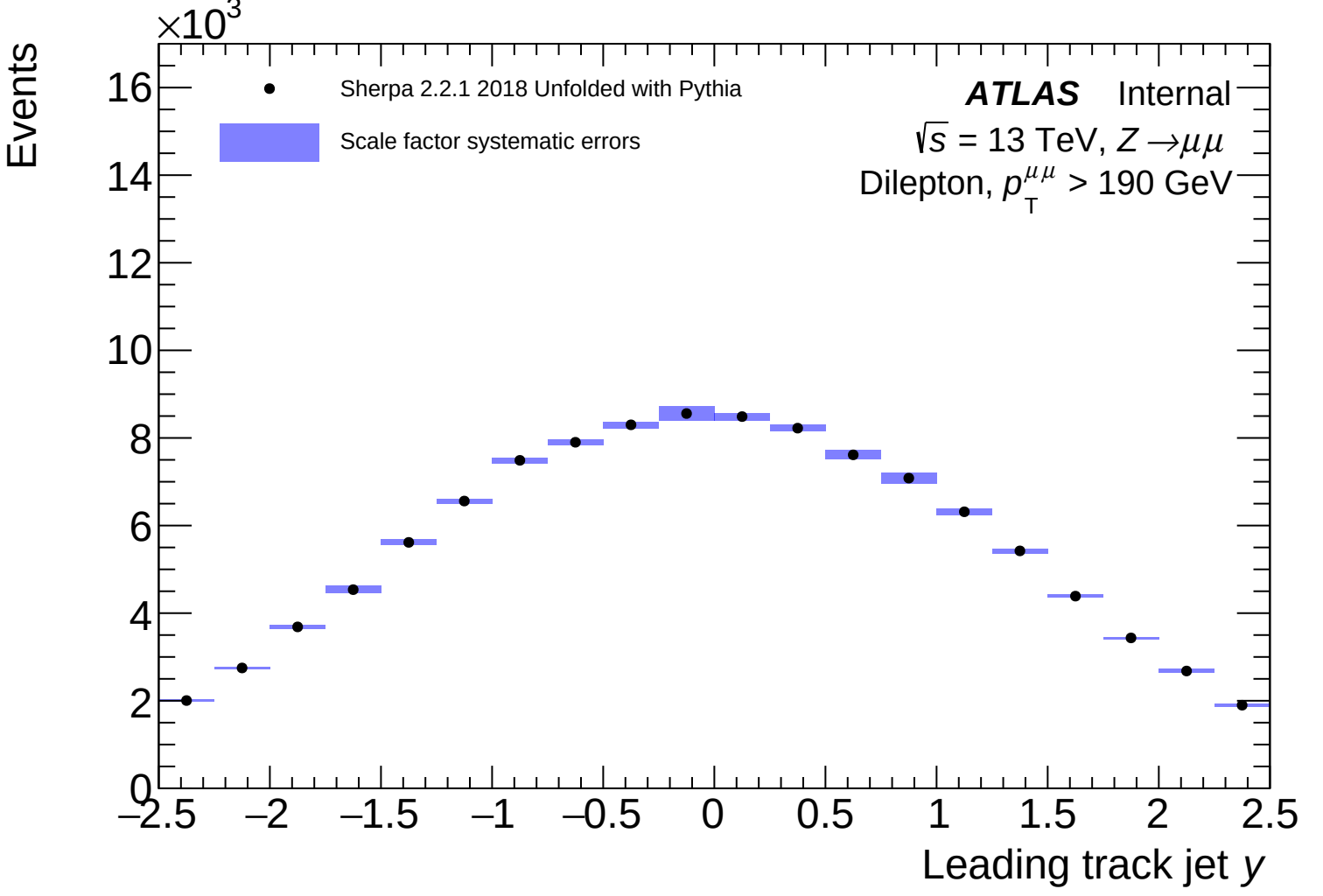
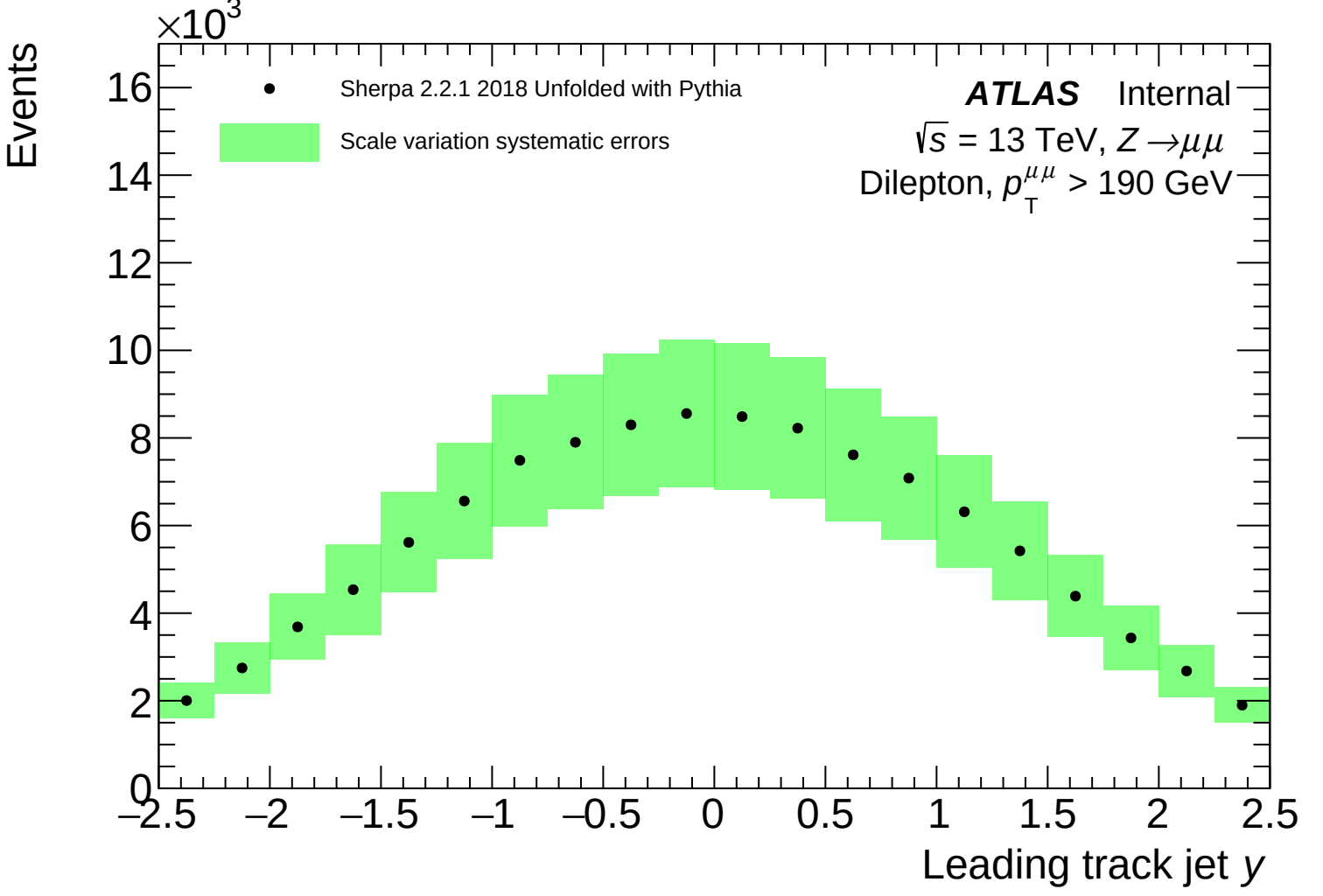
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
dN / dy_j1
×10^3
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y


Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
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–1.5
–1
–0.5
0
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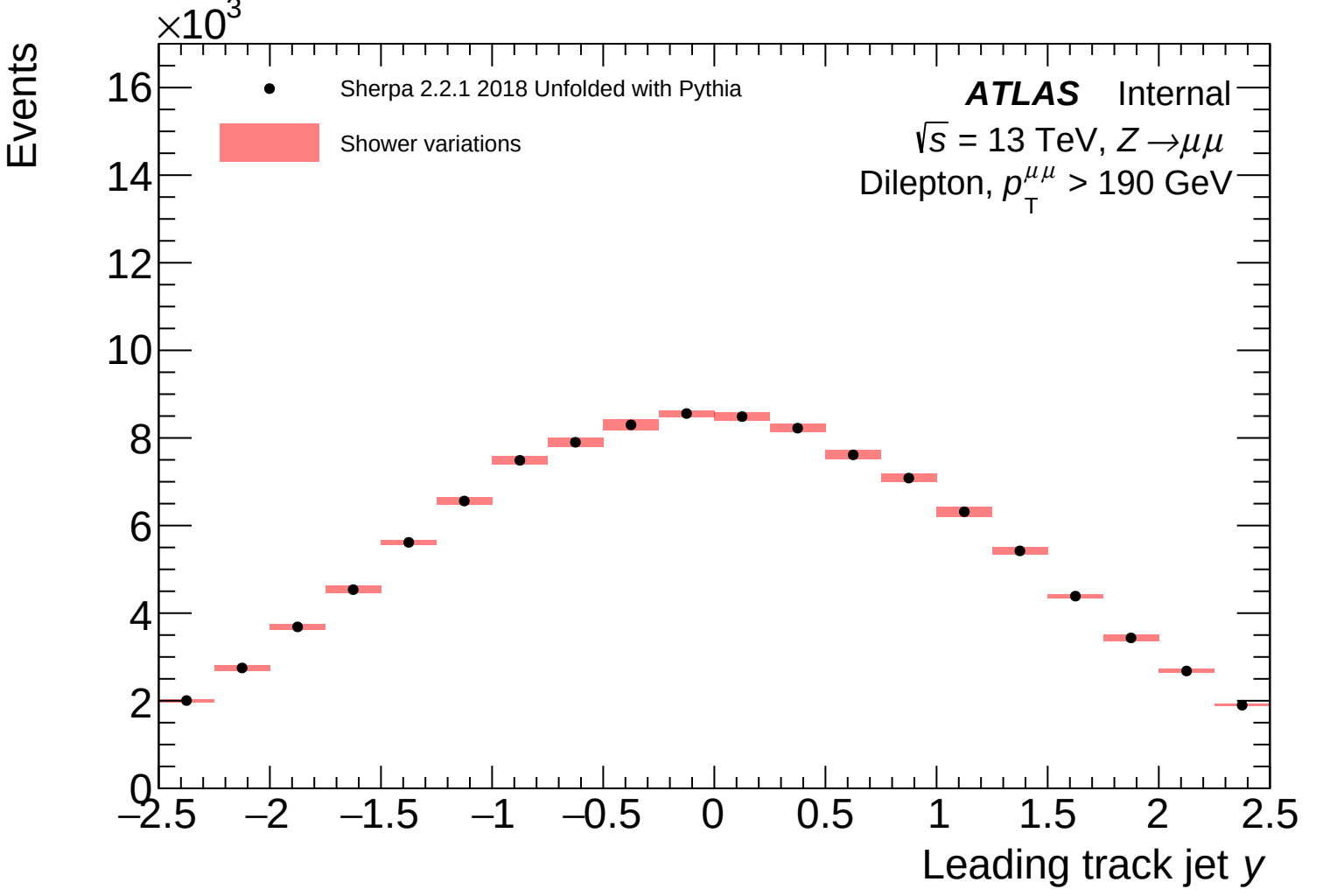
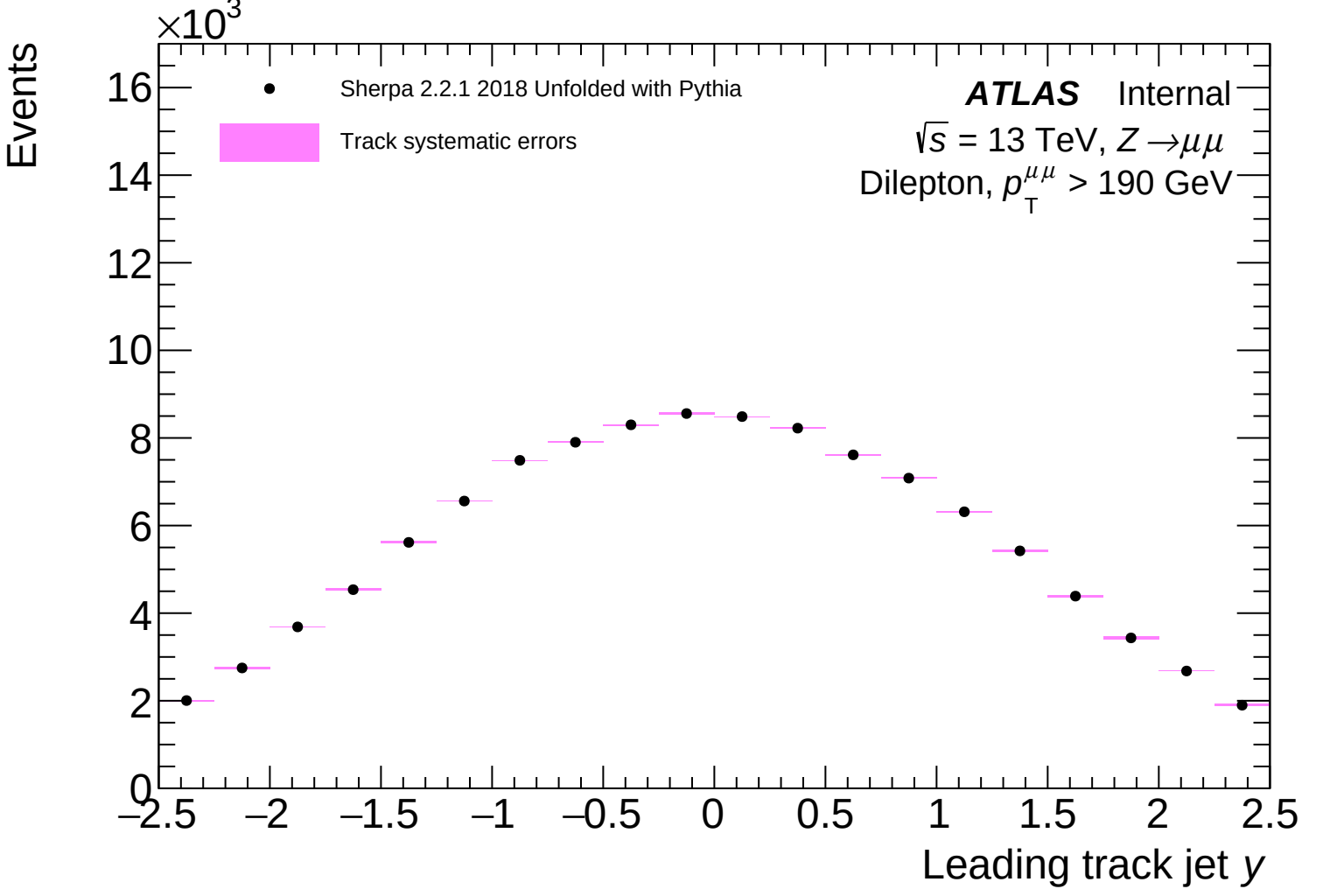
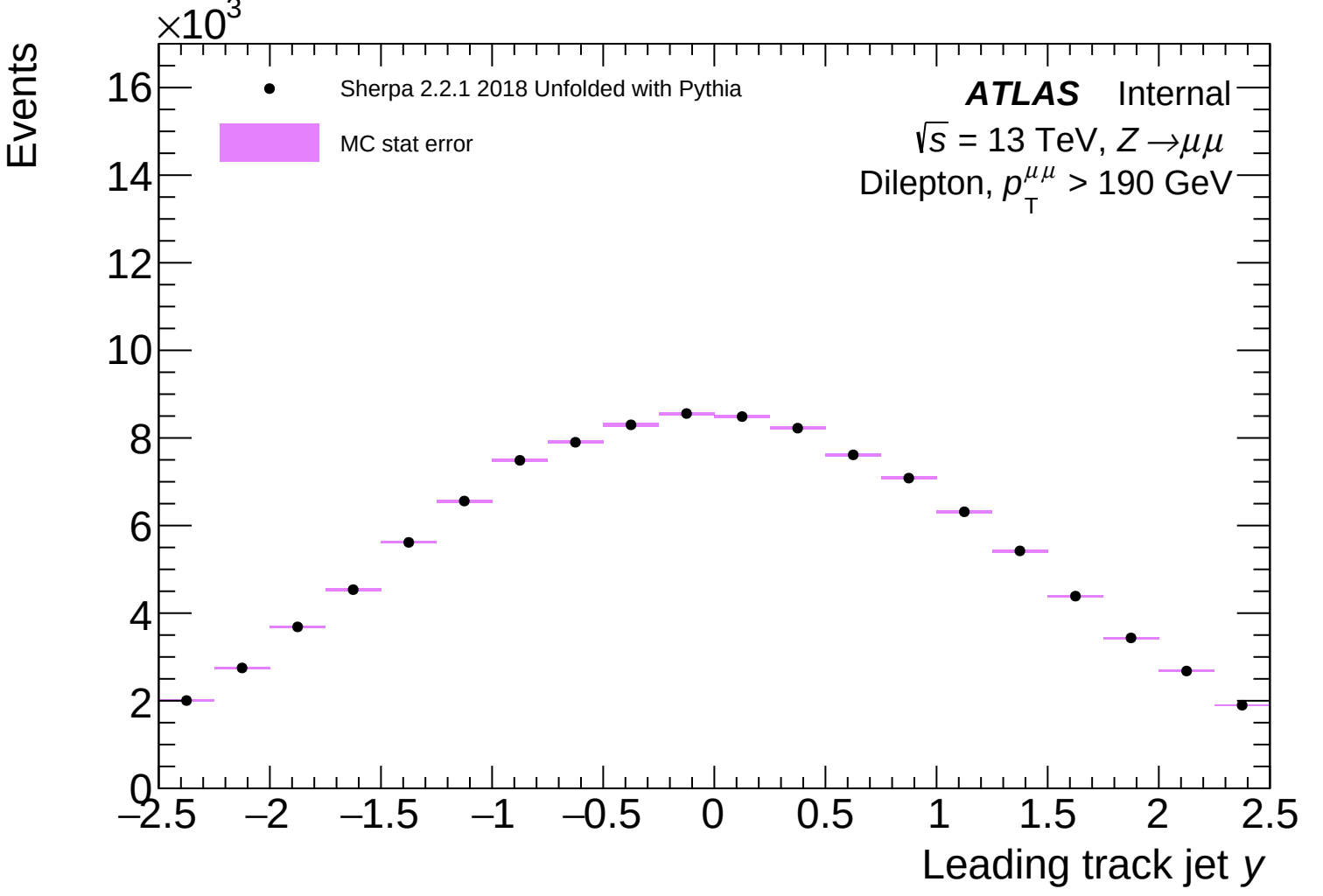
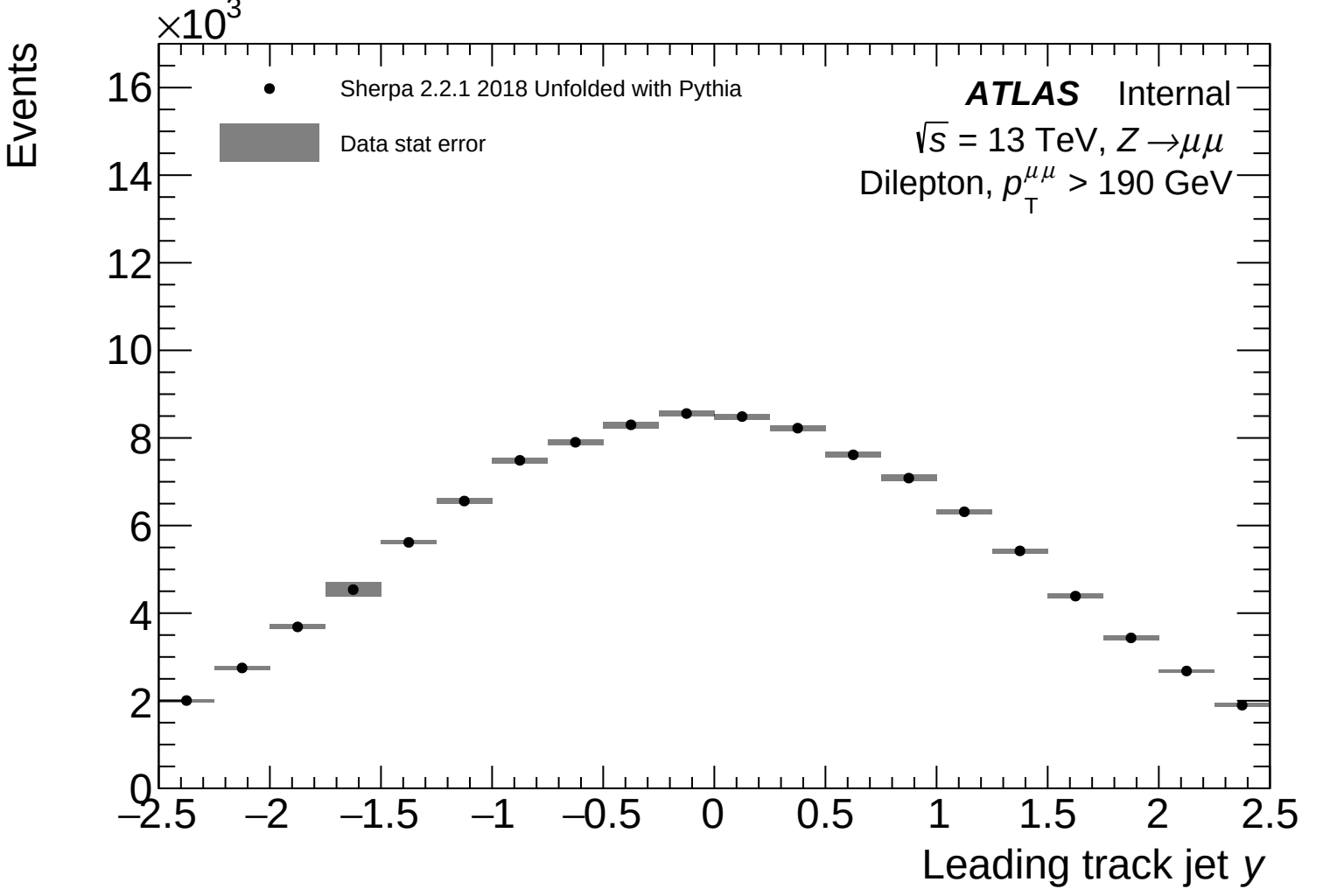
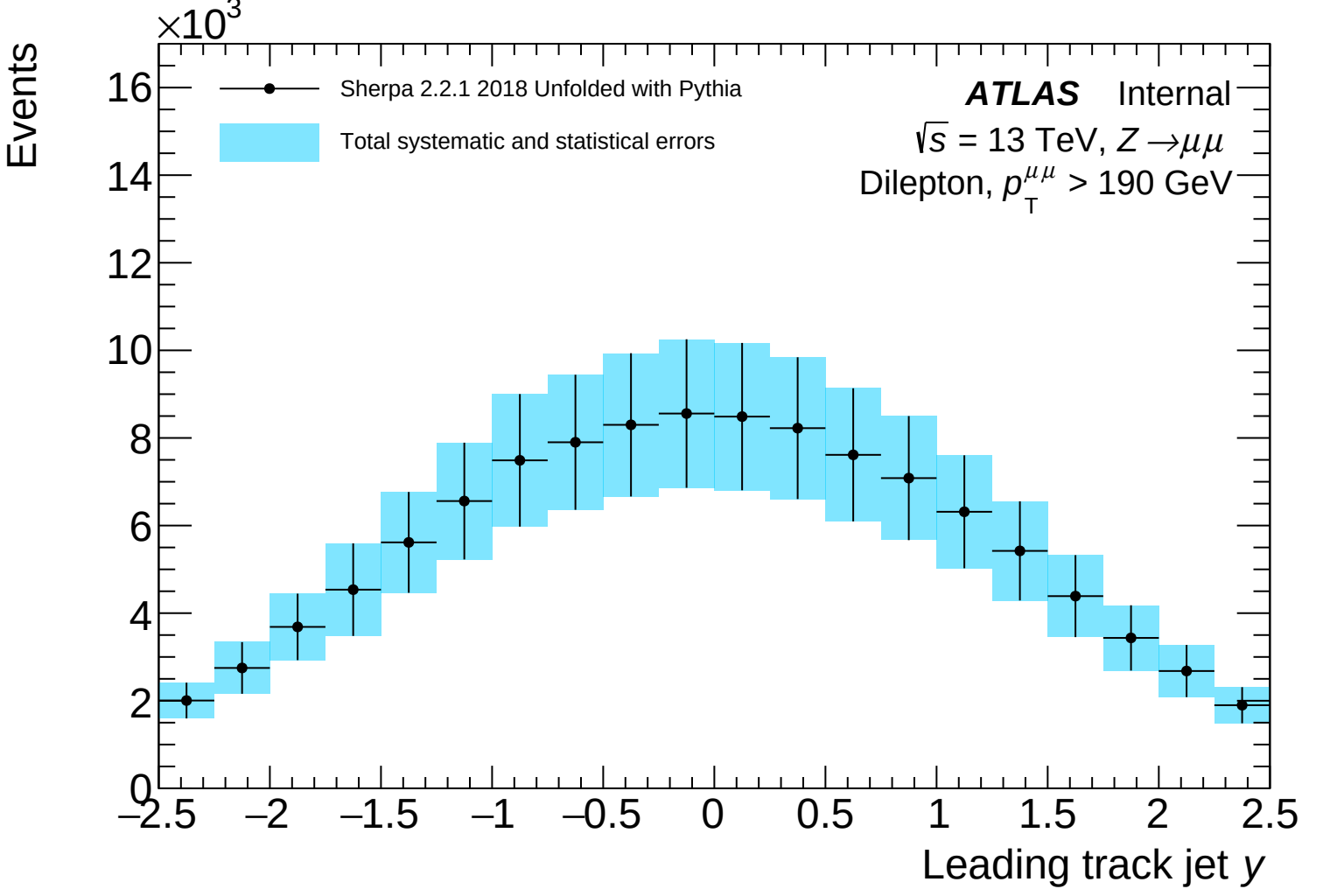
1
1.5
2
2.5
Leading track jet y

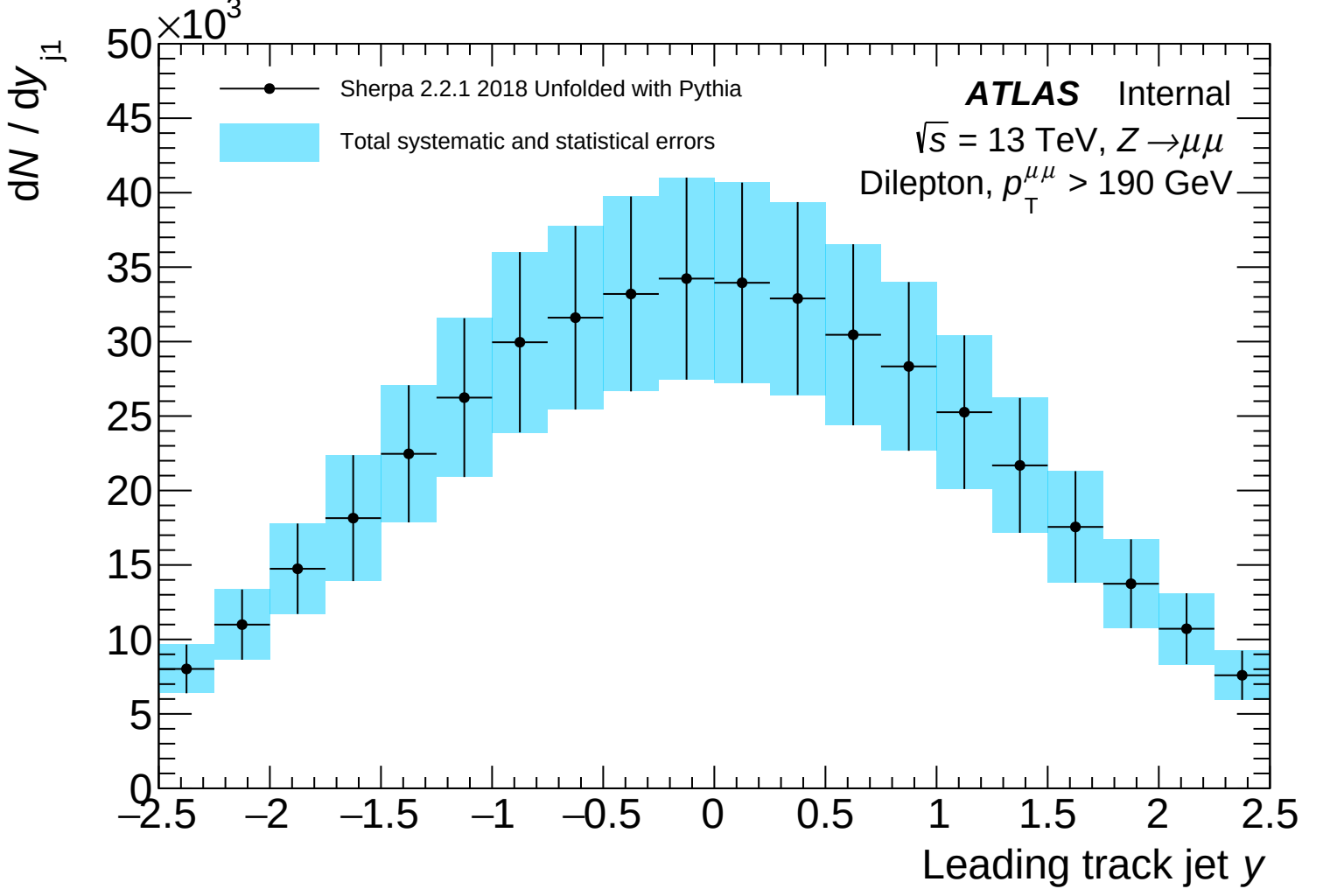

Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

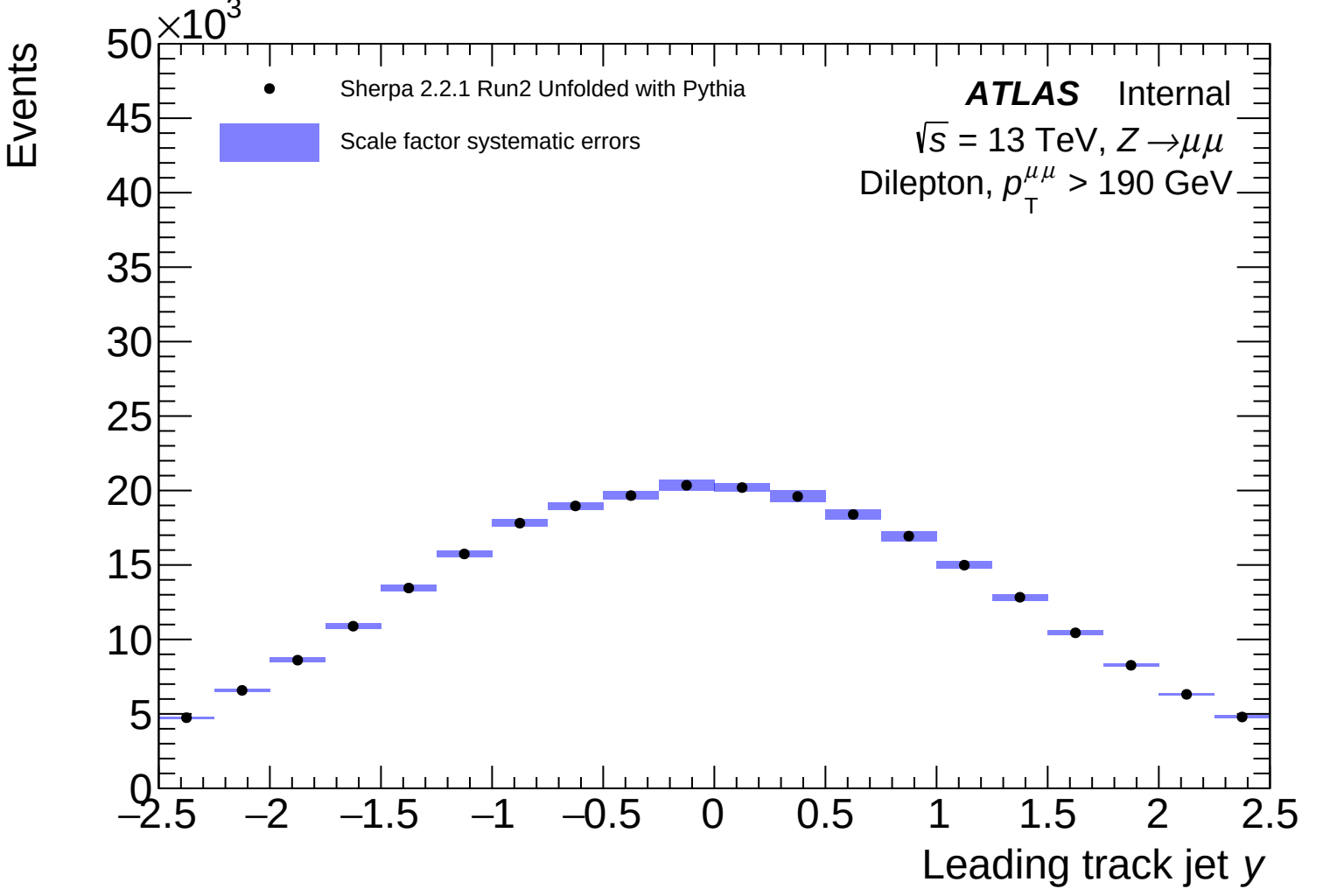

Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

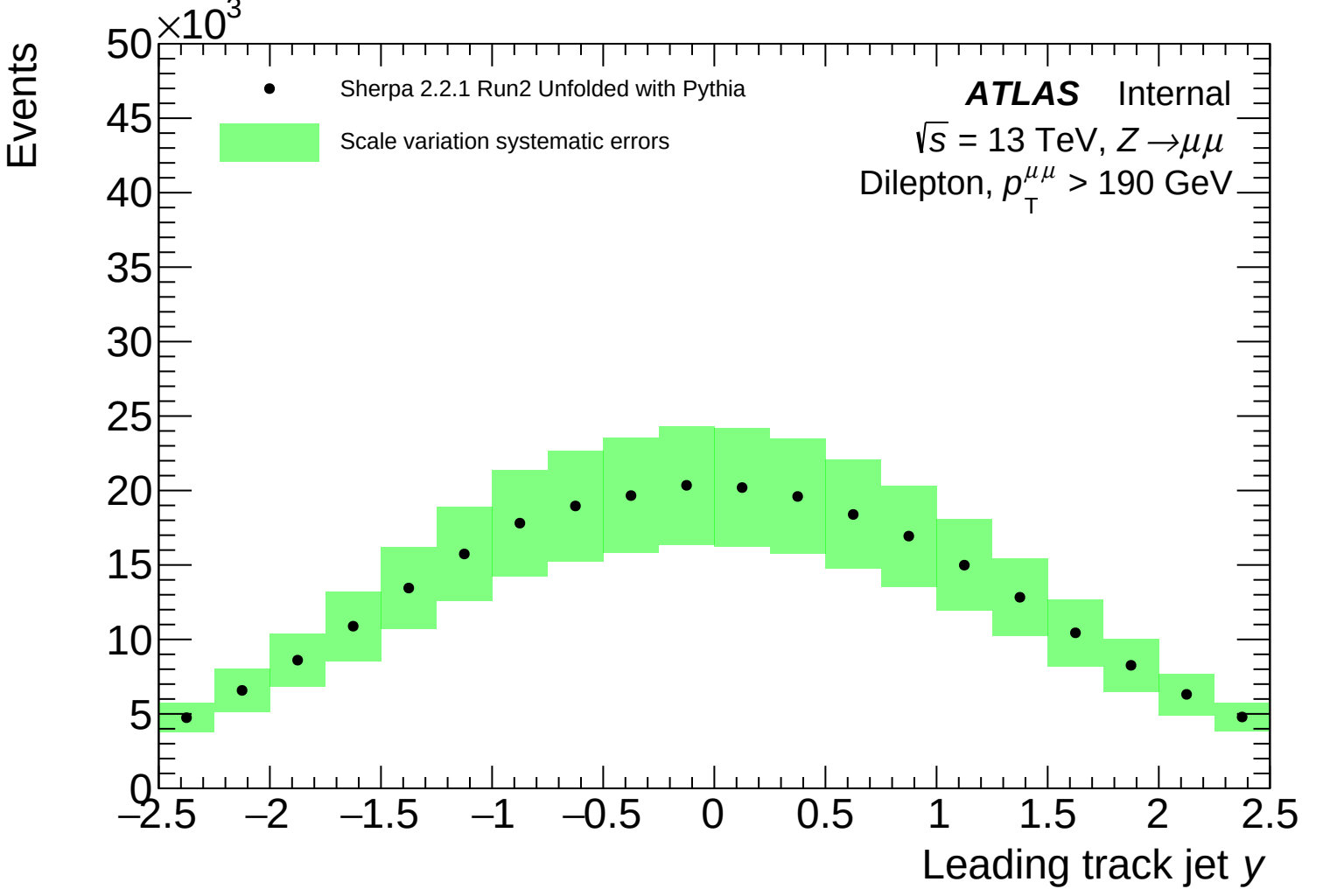

Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

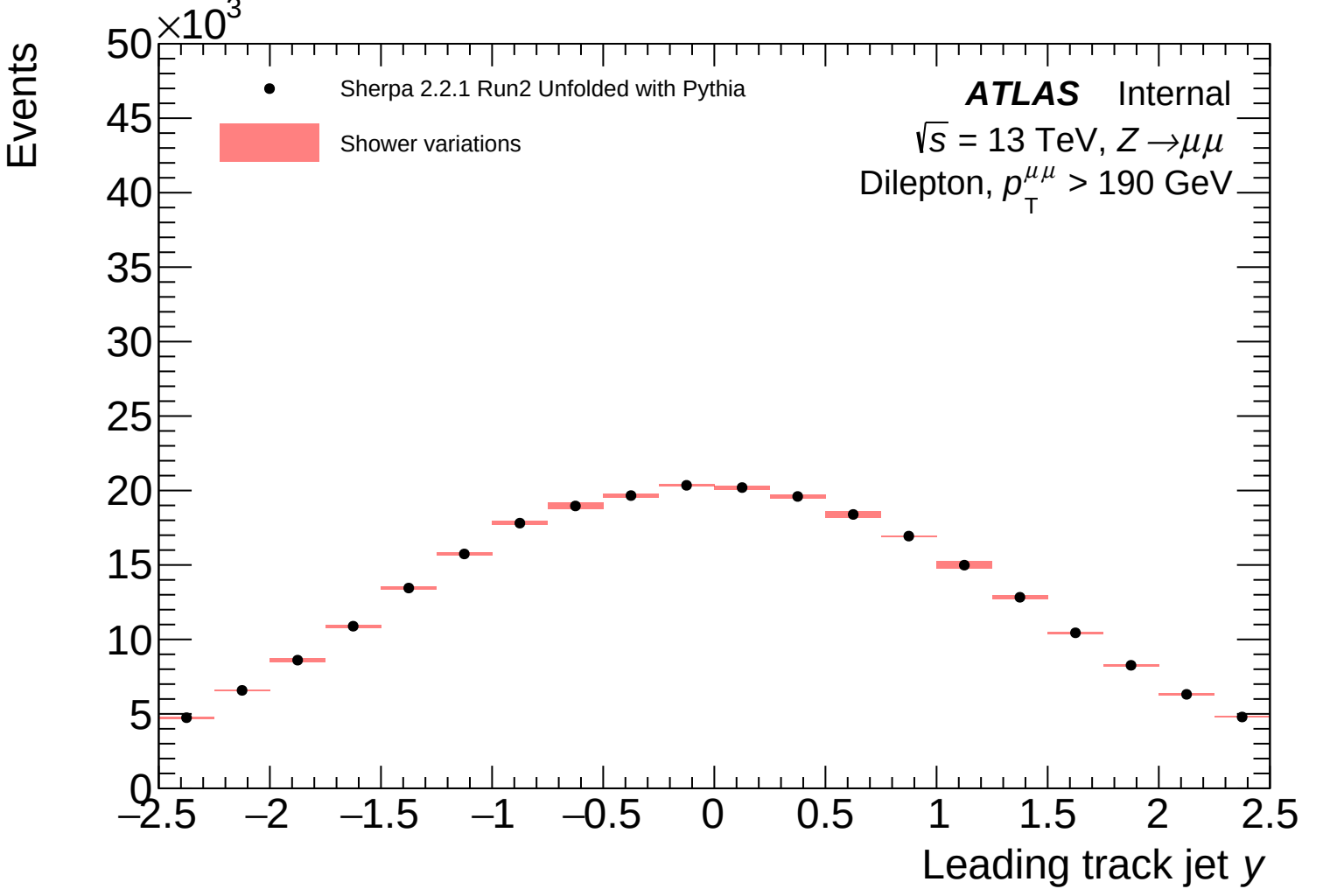

Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

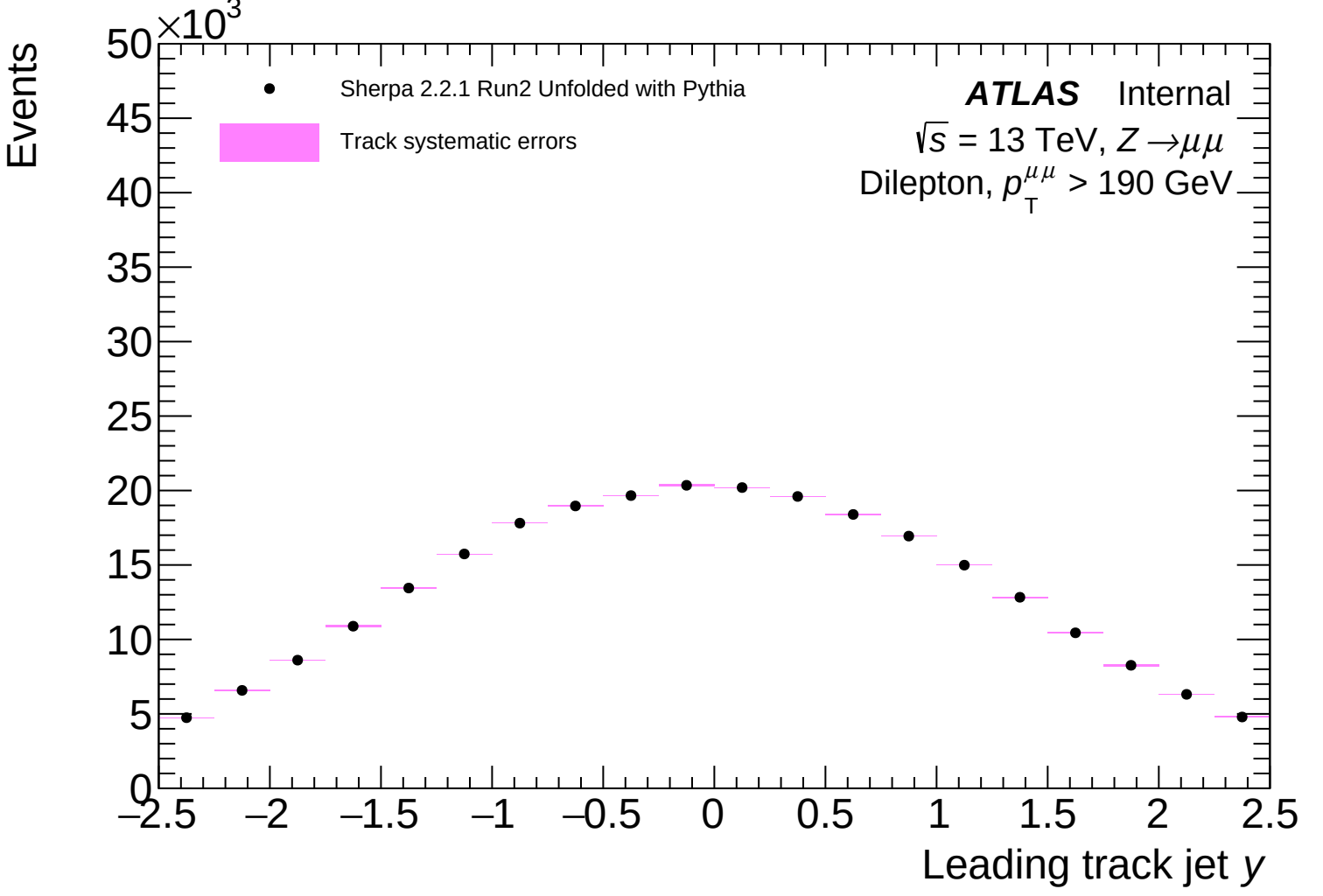

Events
×10^3
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

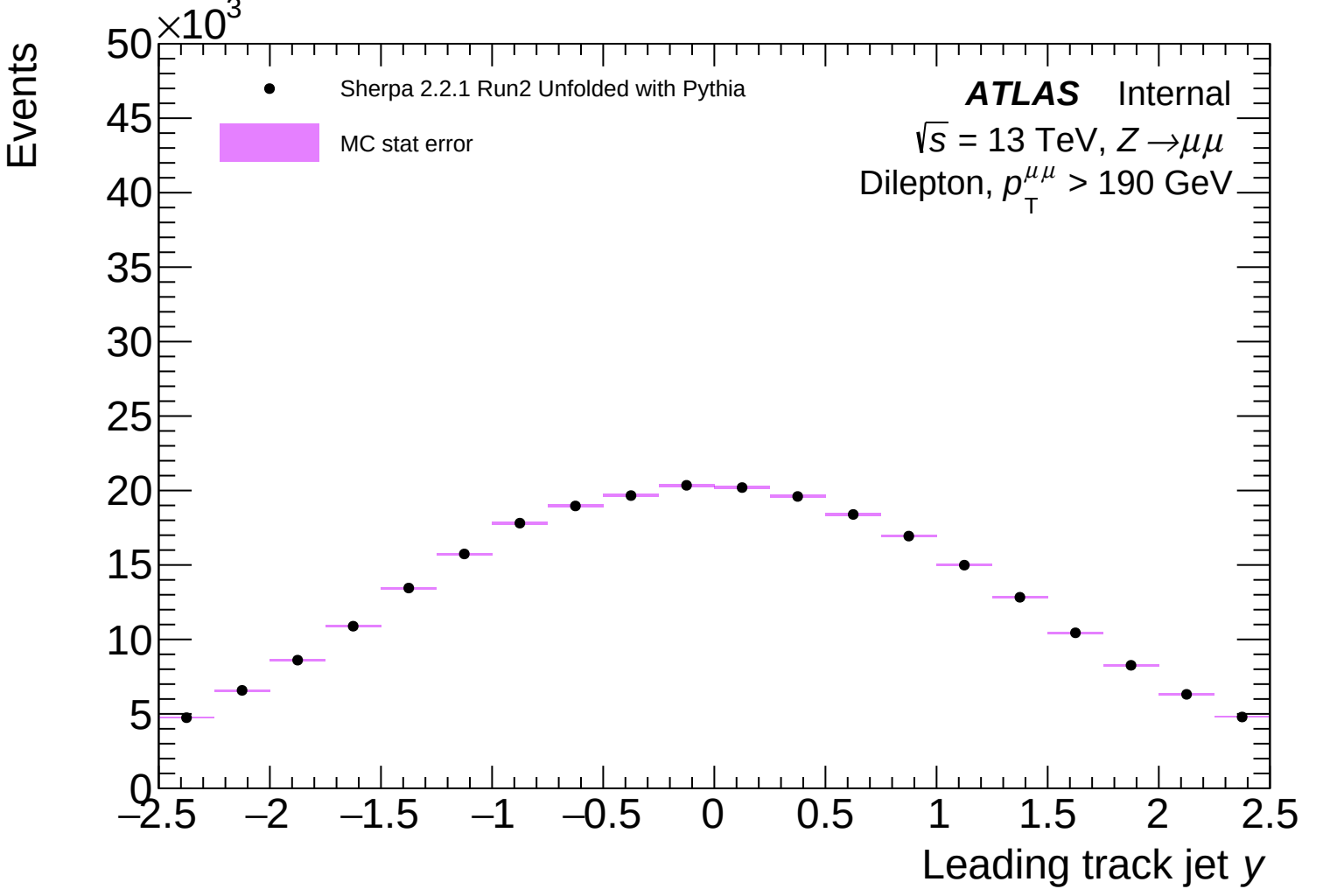

×10^3
dN / dy_j1
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

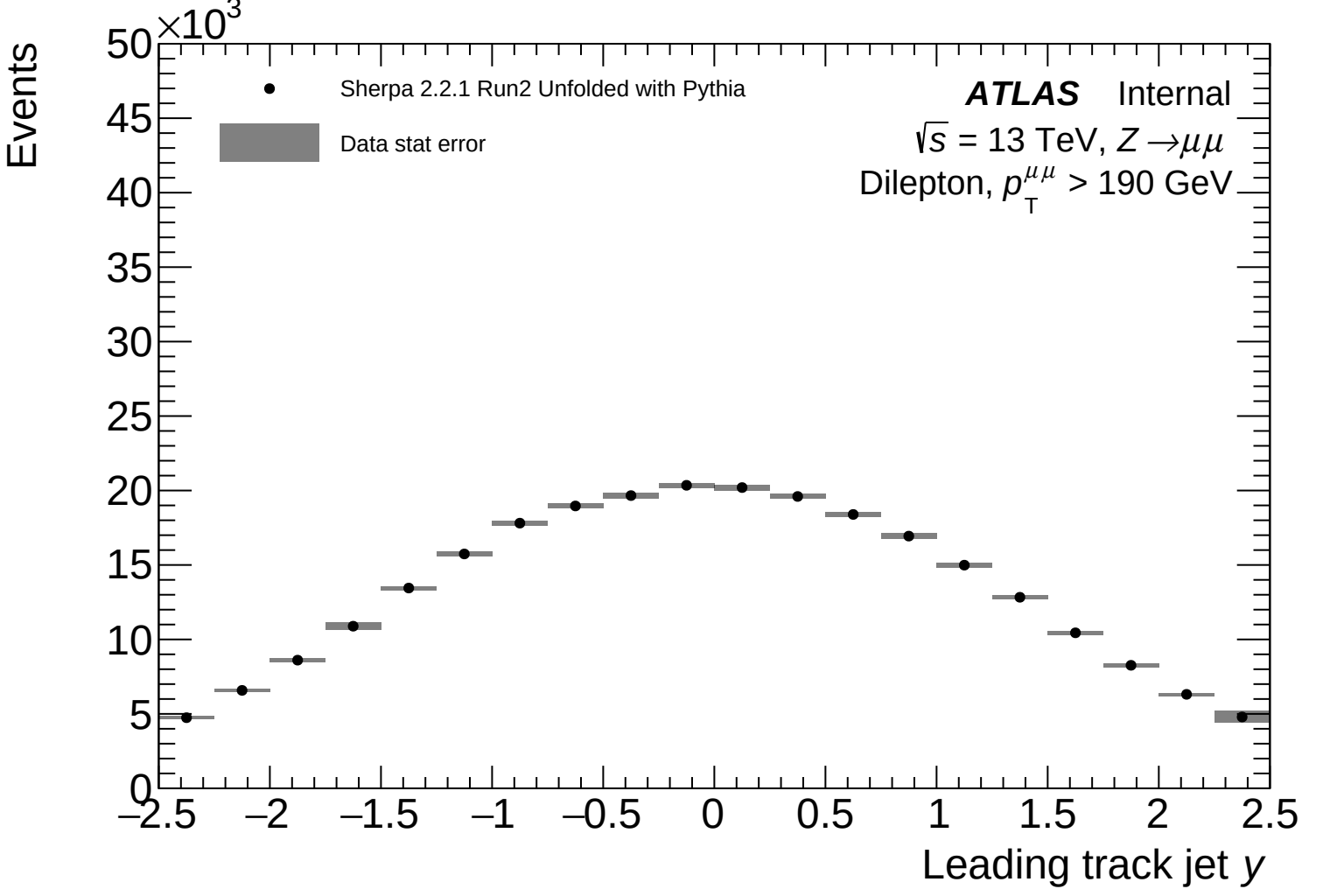

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

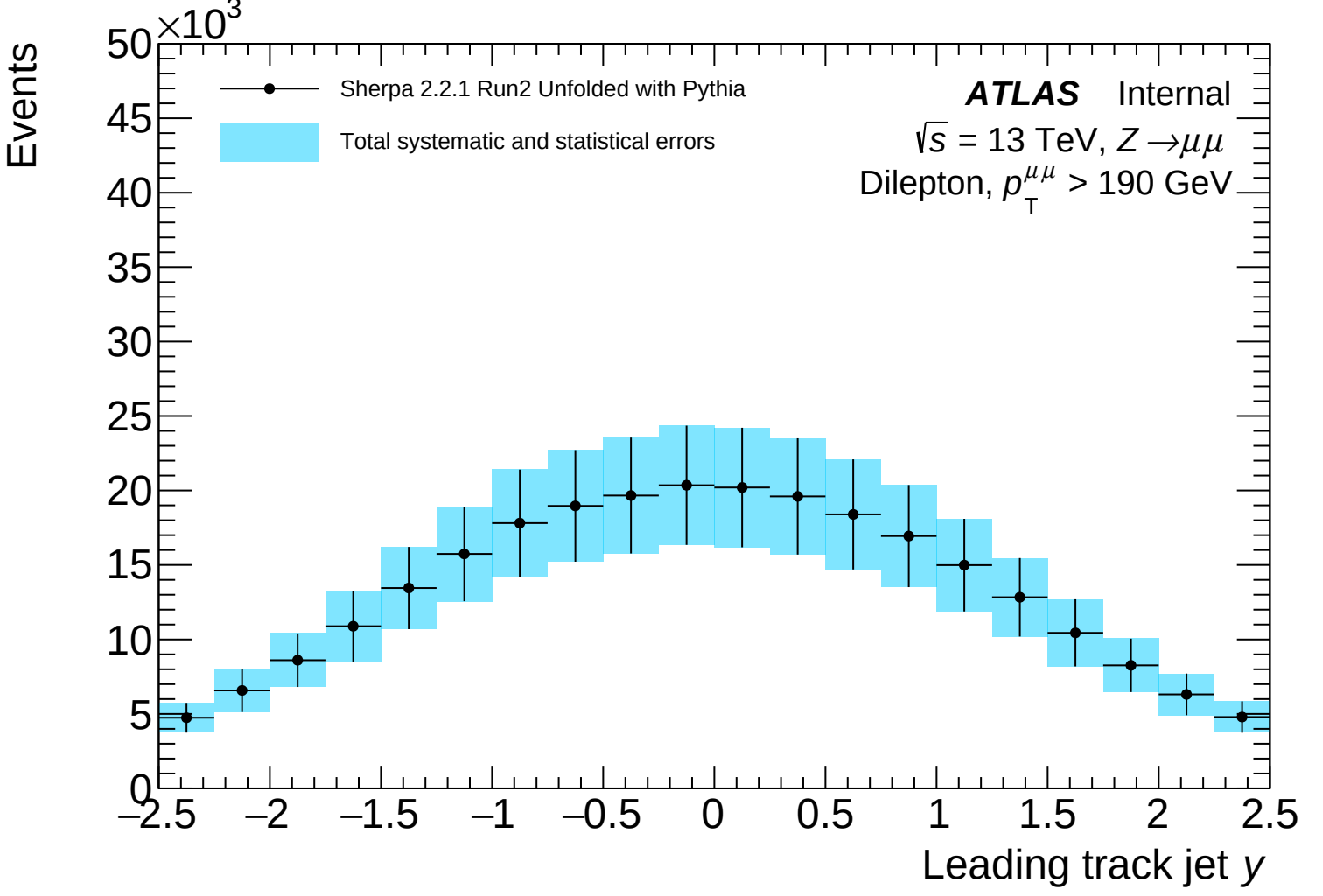

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

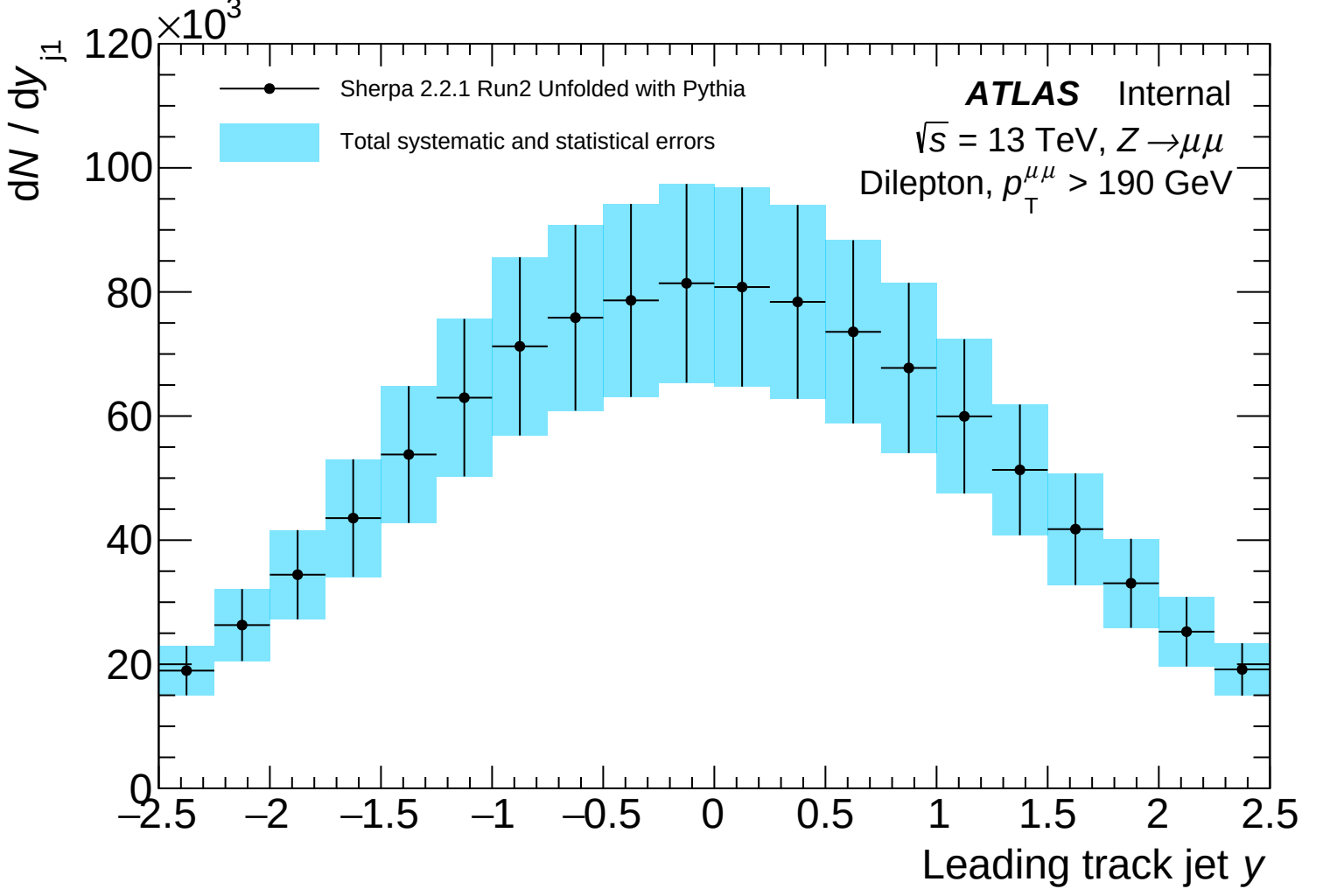

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

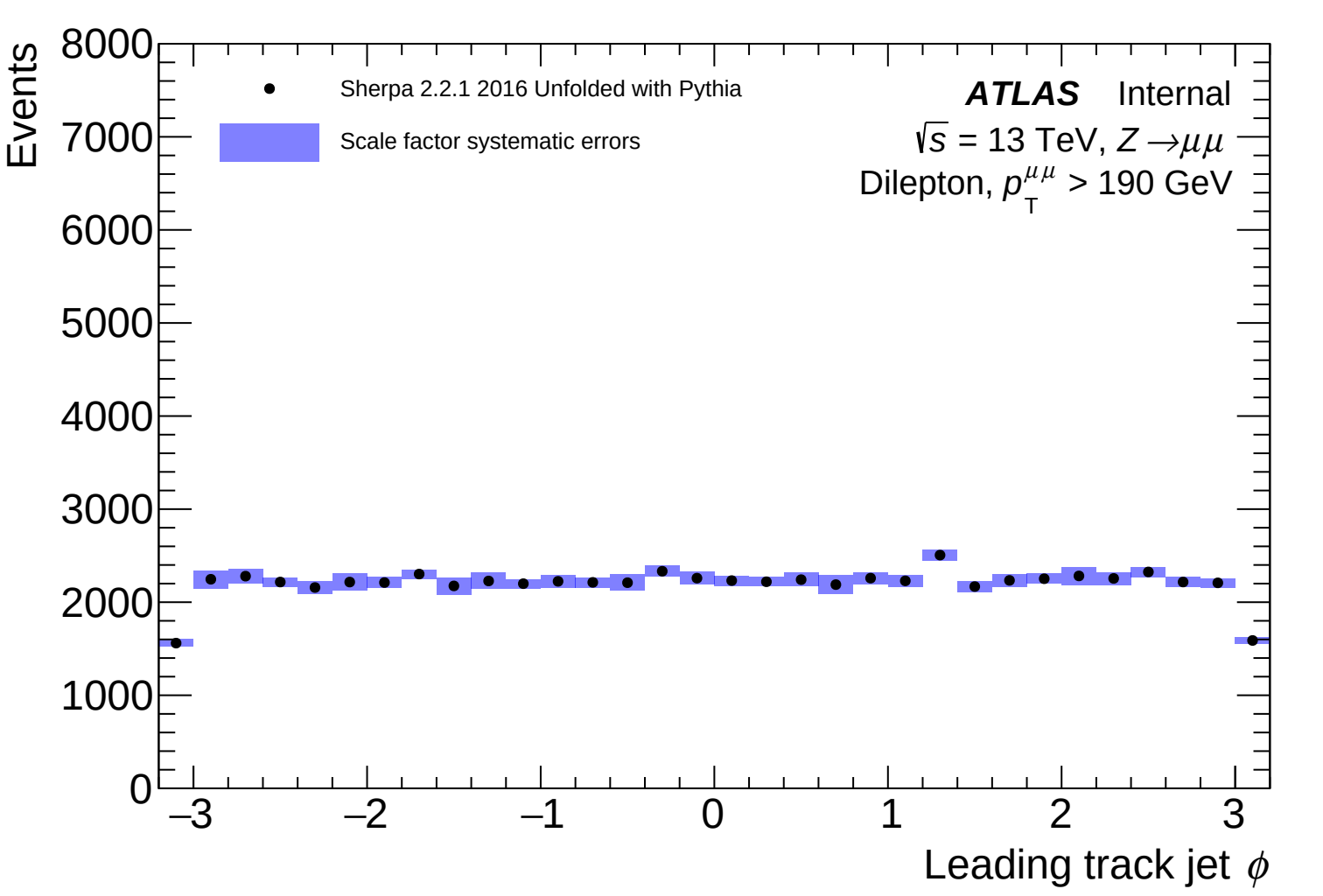

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

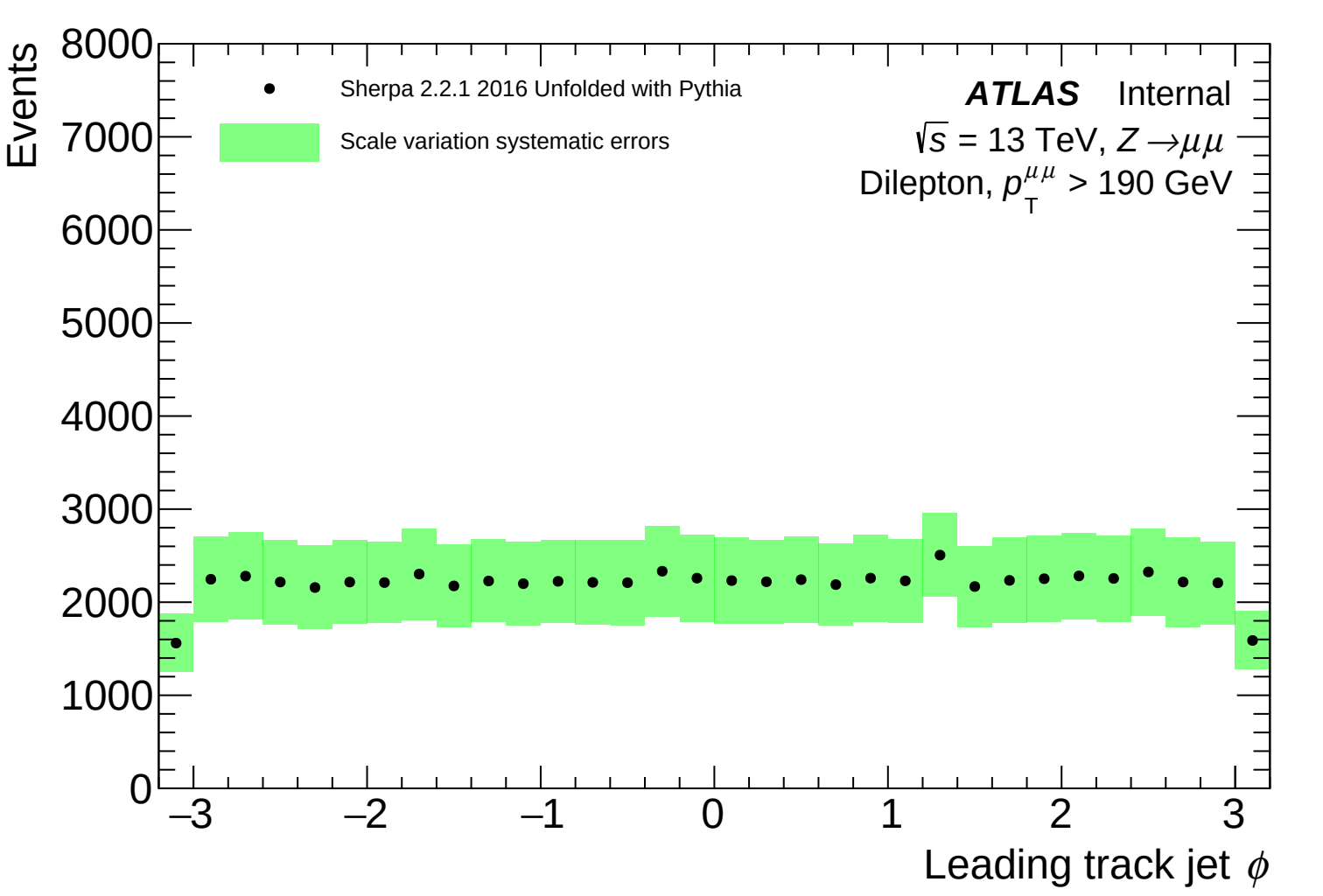

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

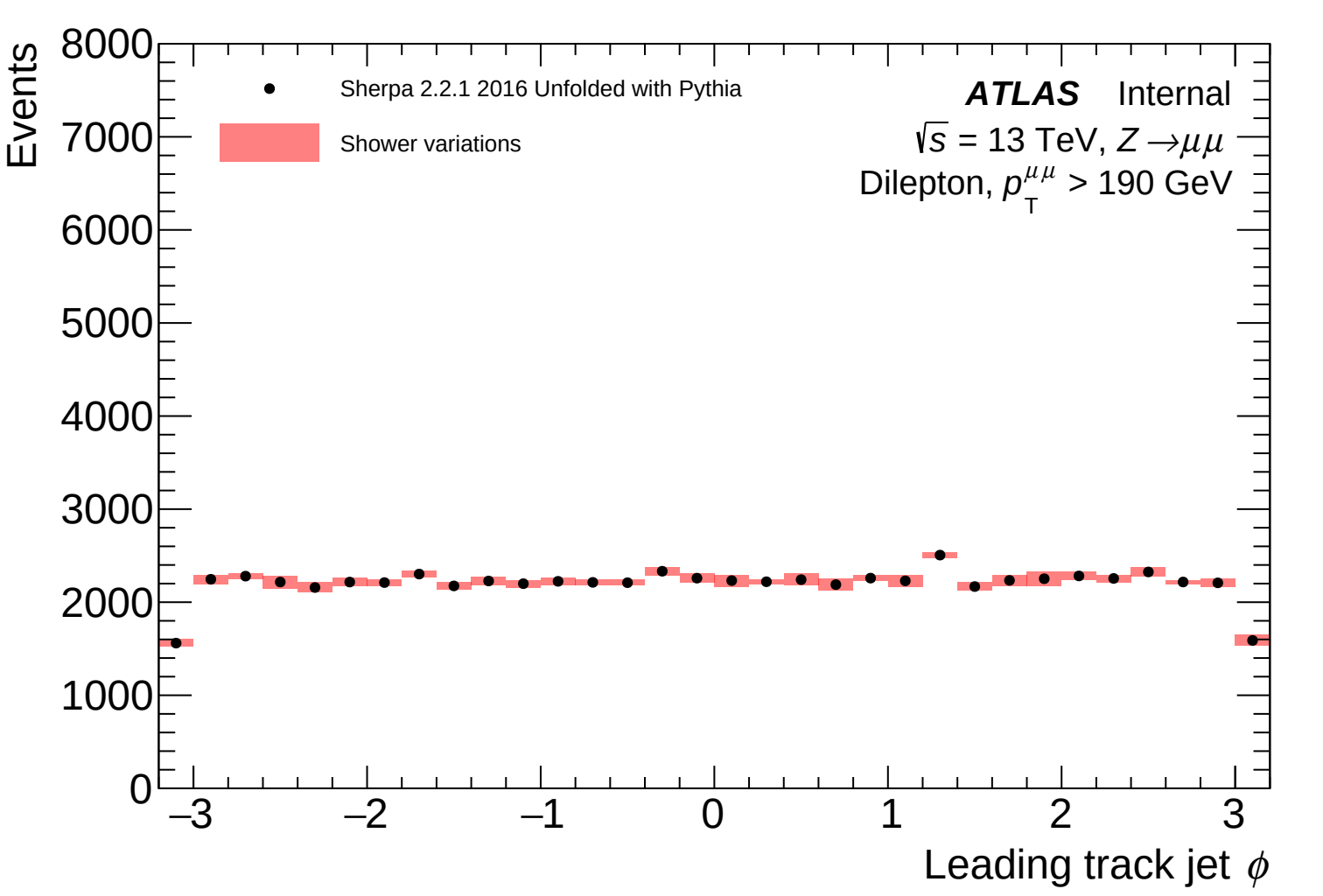

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

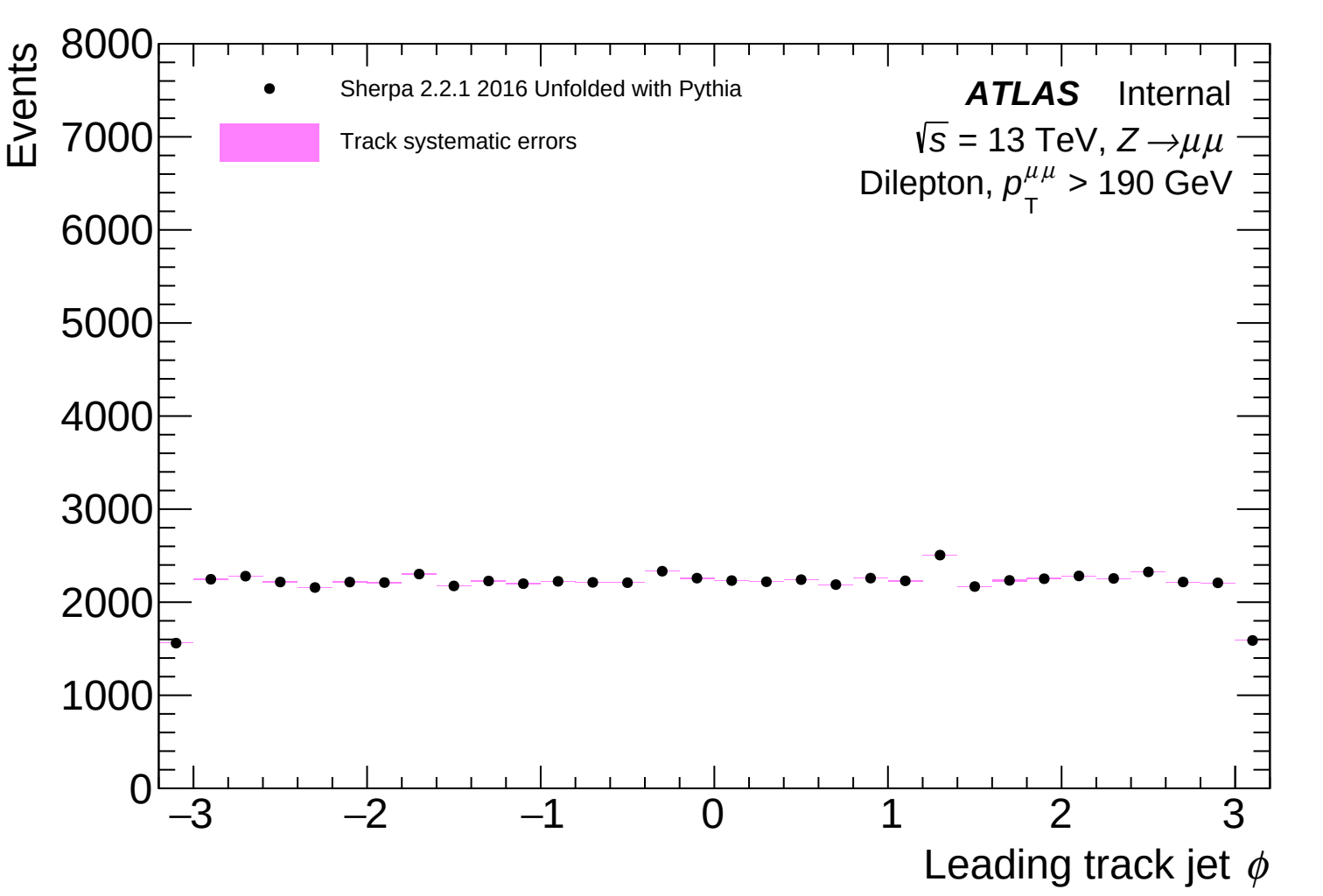

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

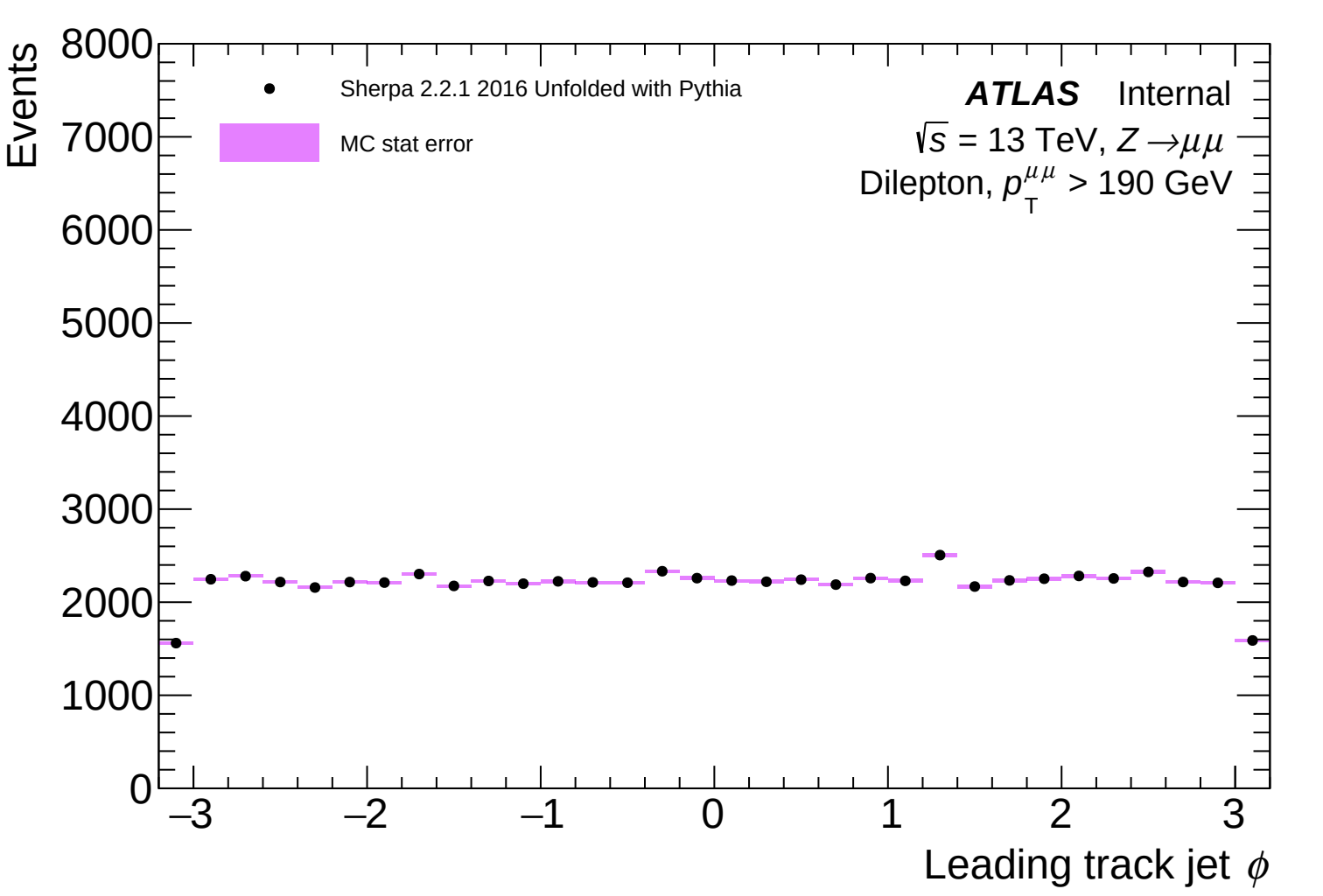

×10^3
dN / dy_j1
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Leading track jet y

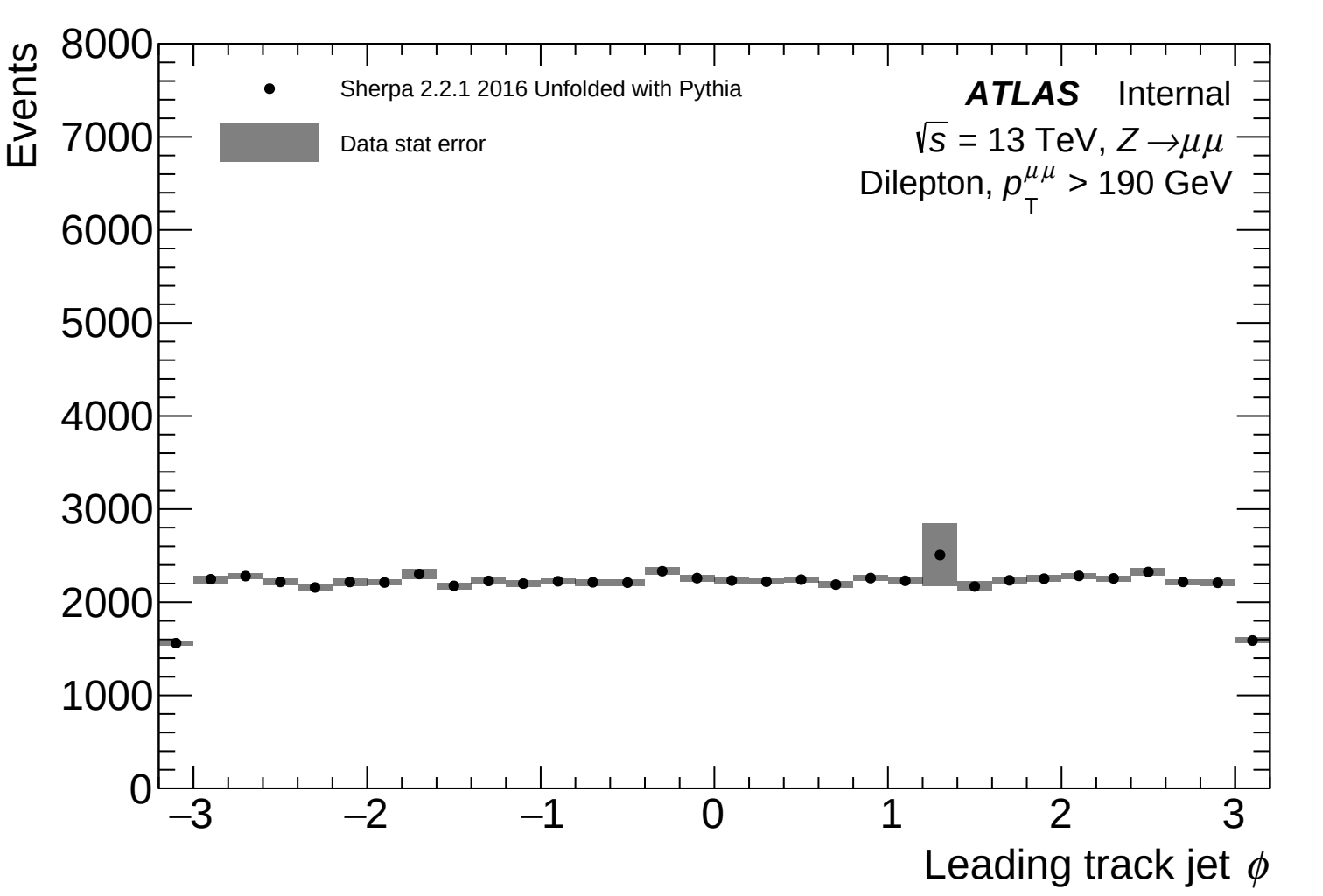

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ

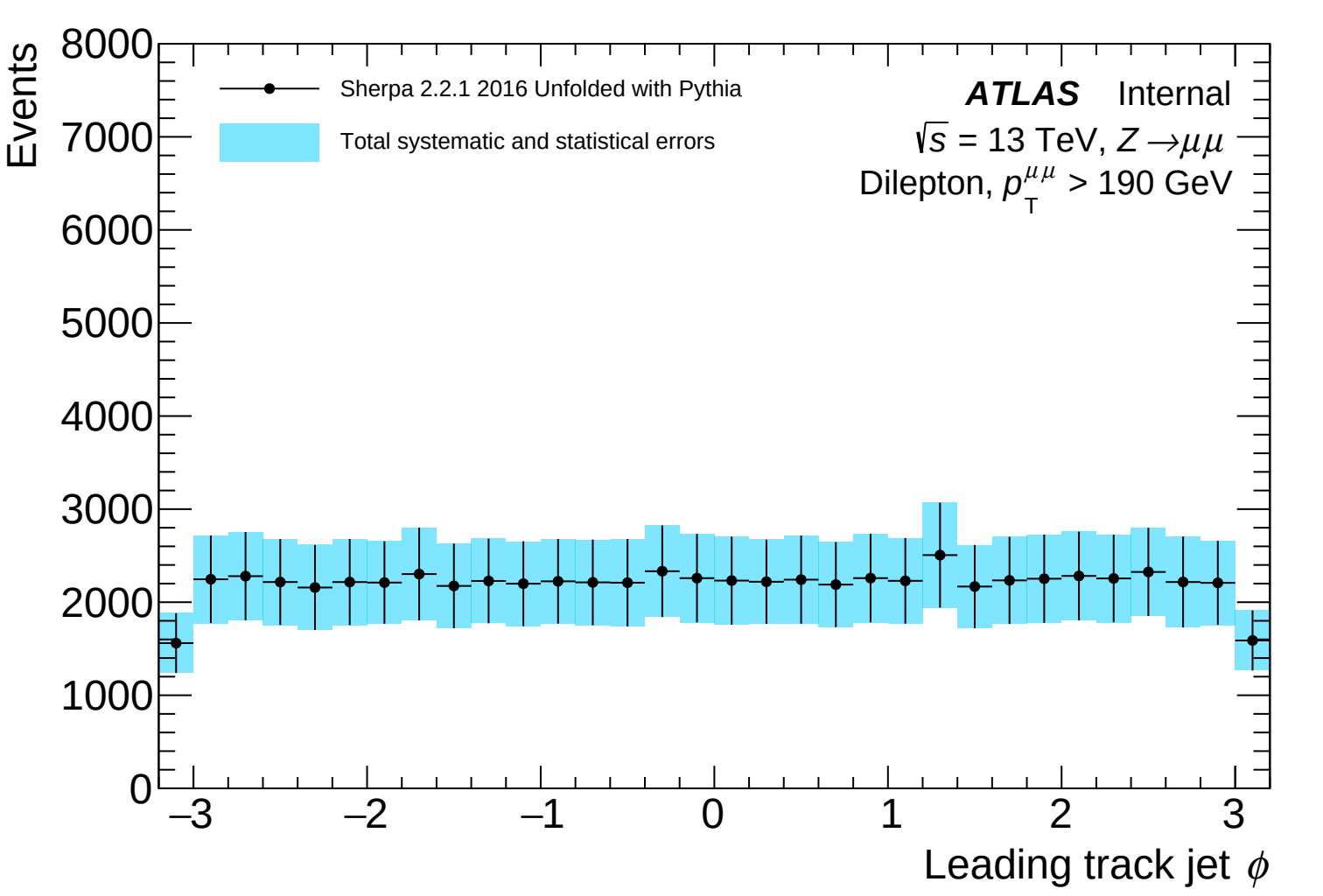

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

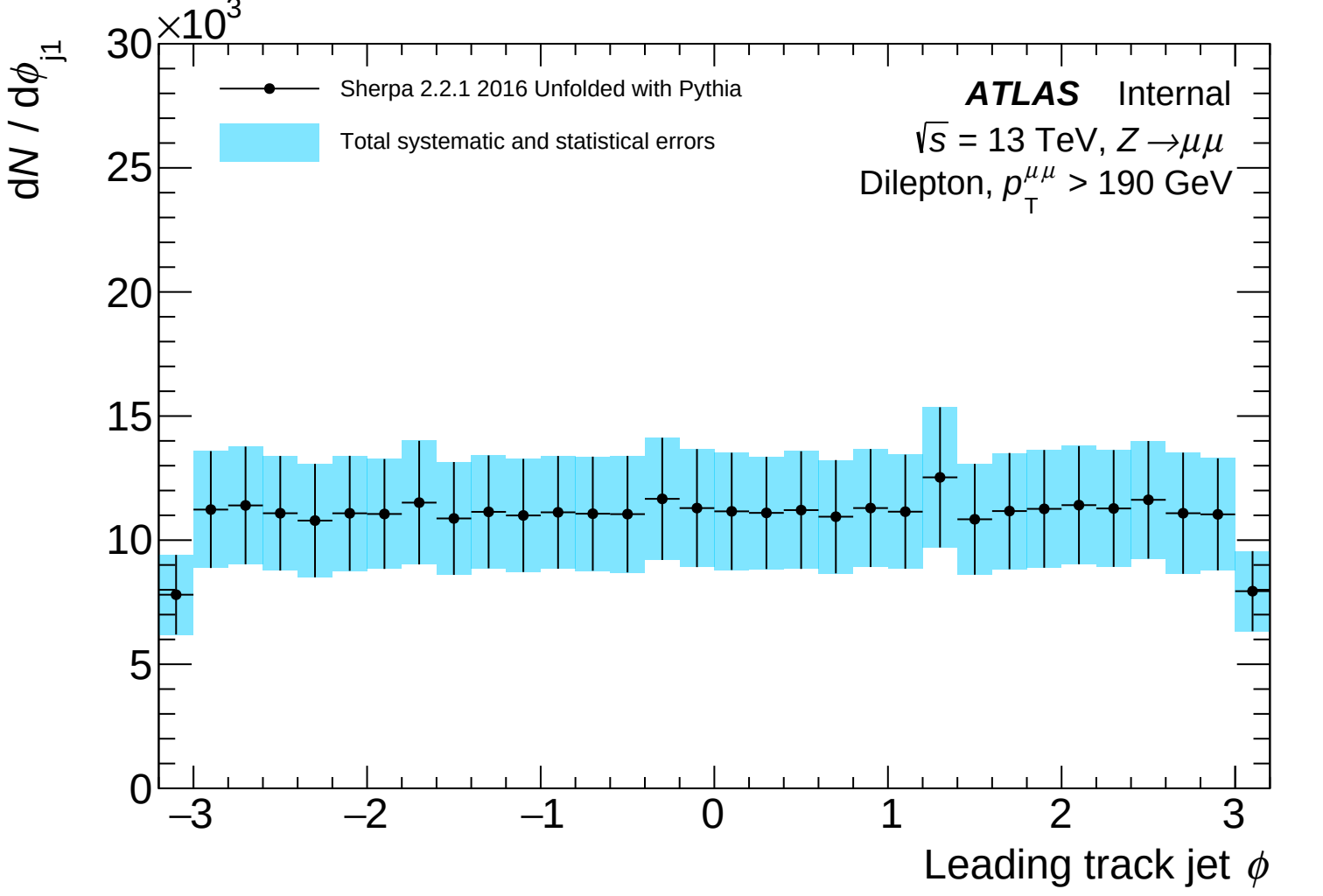

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

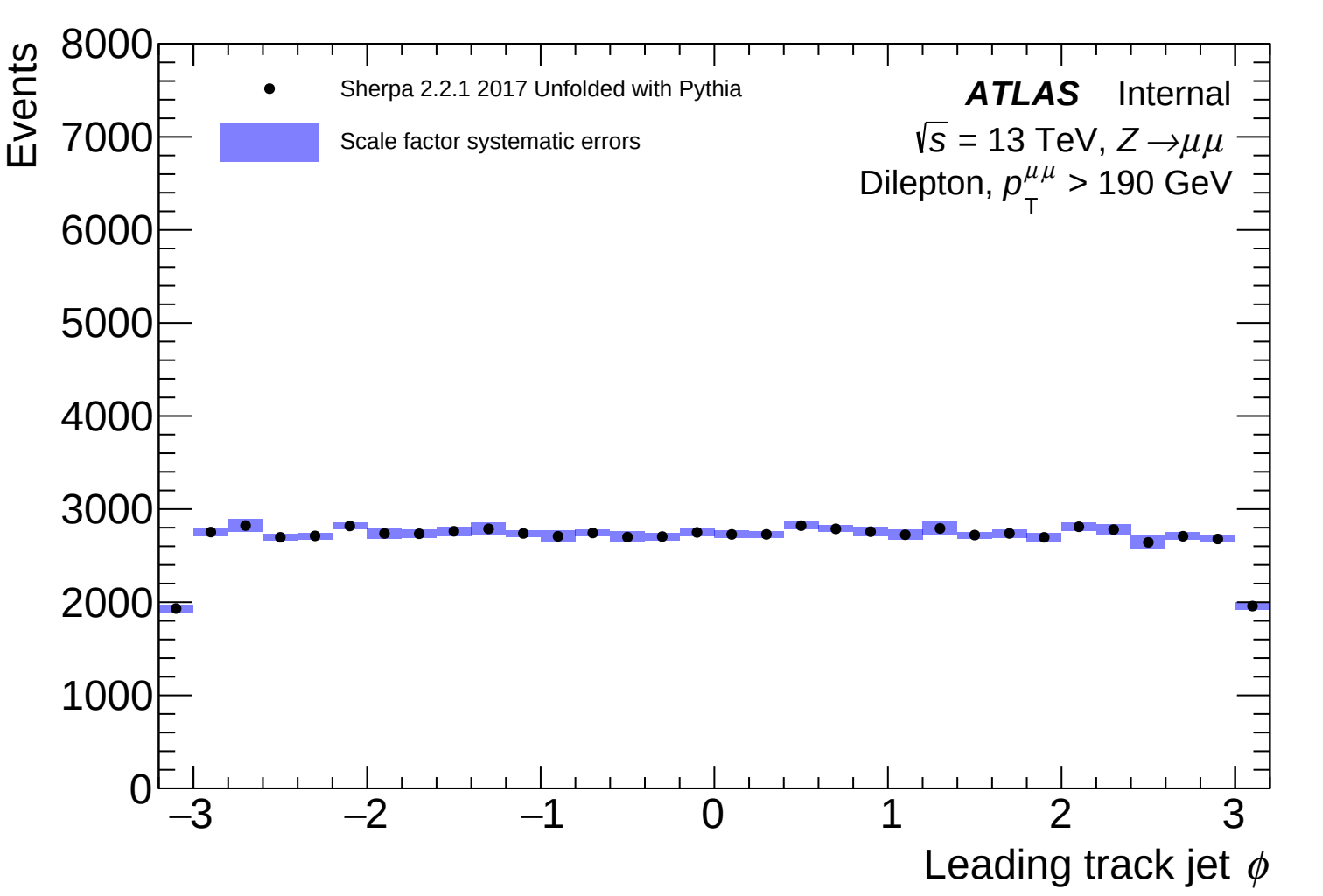

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

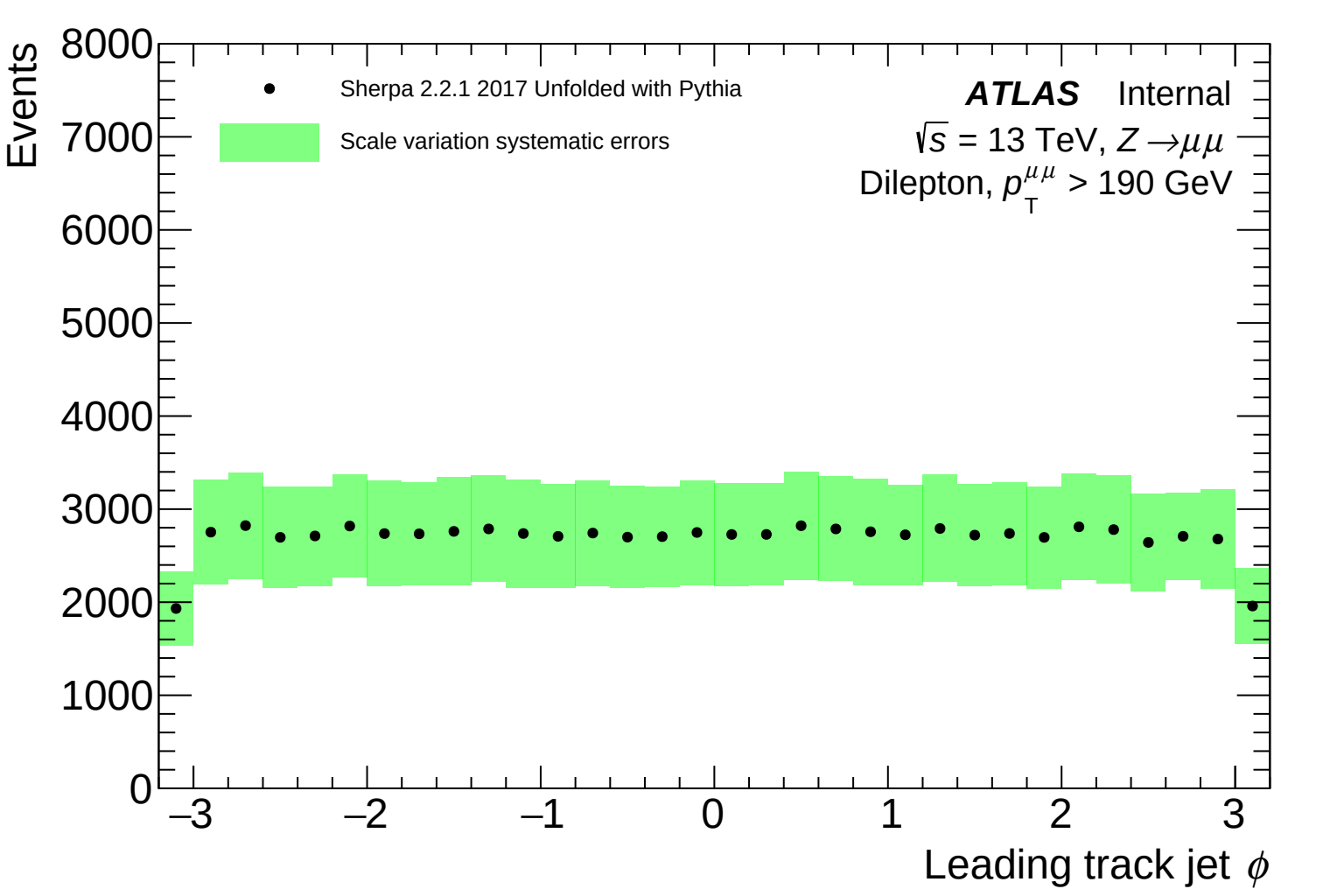

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

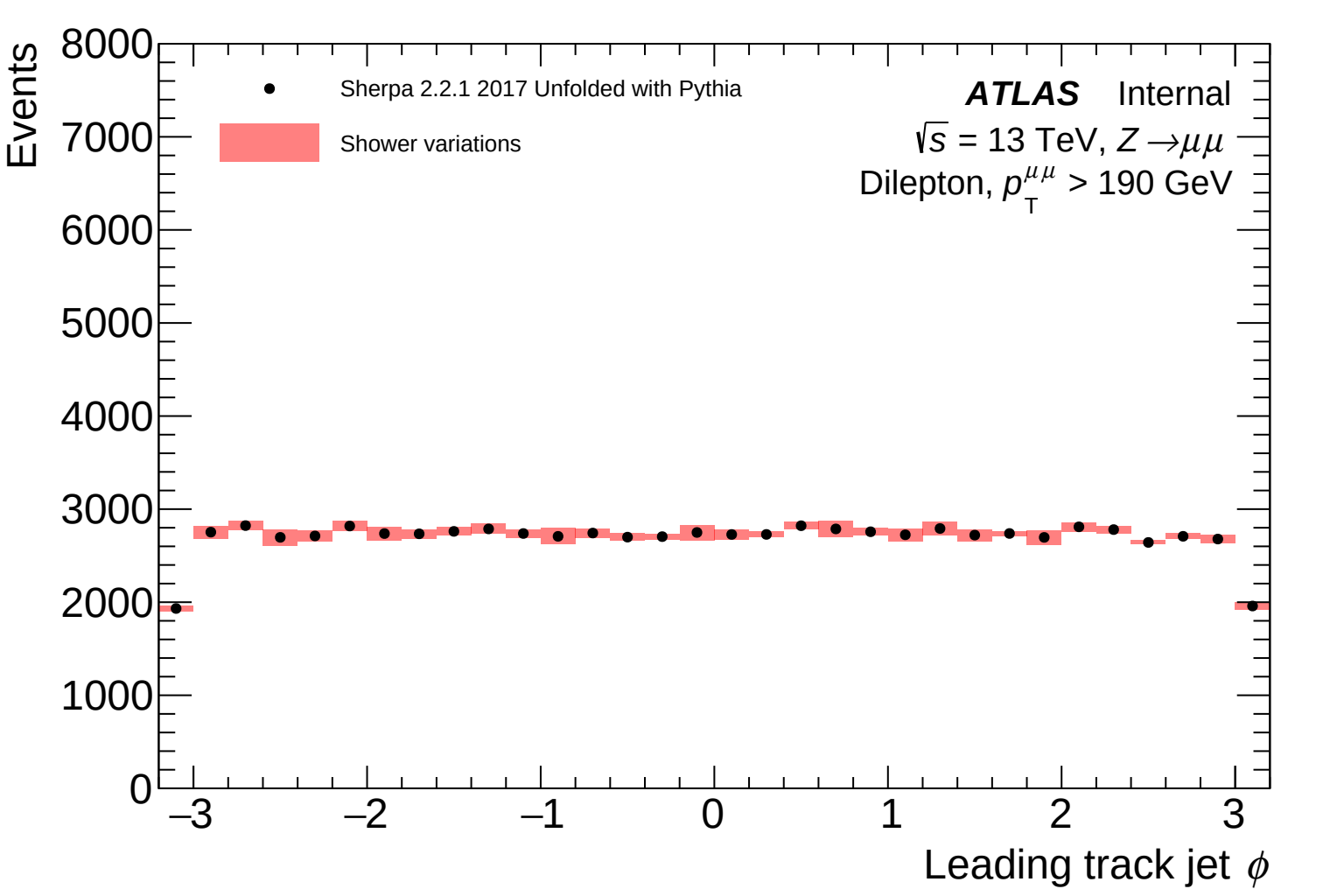

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

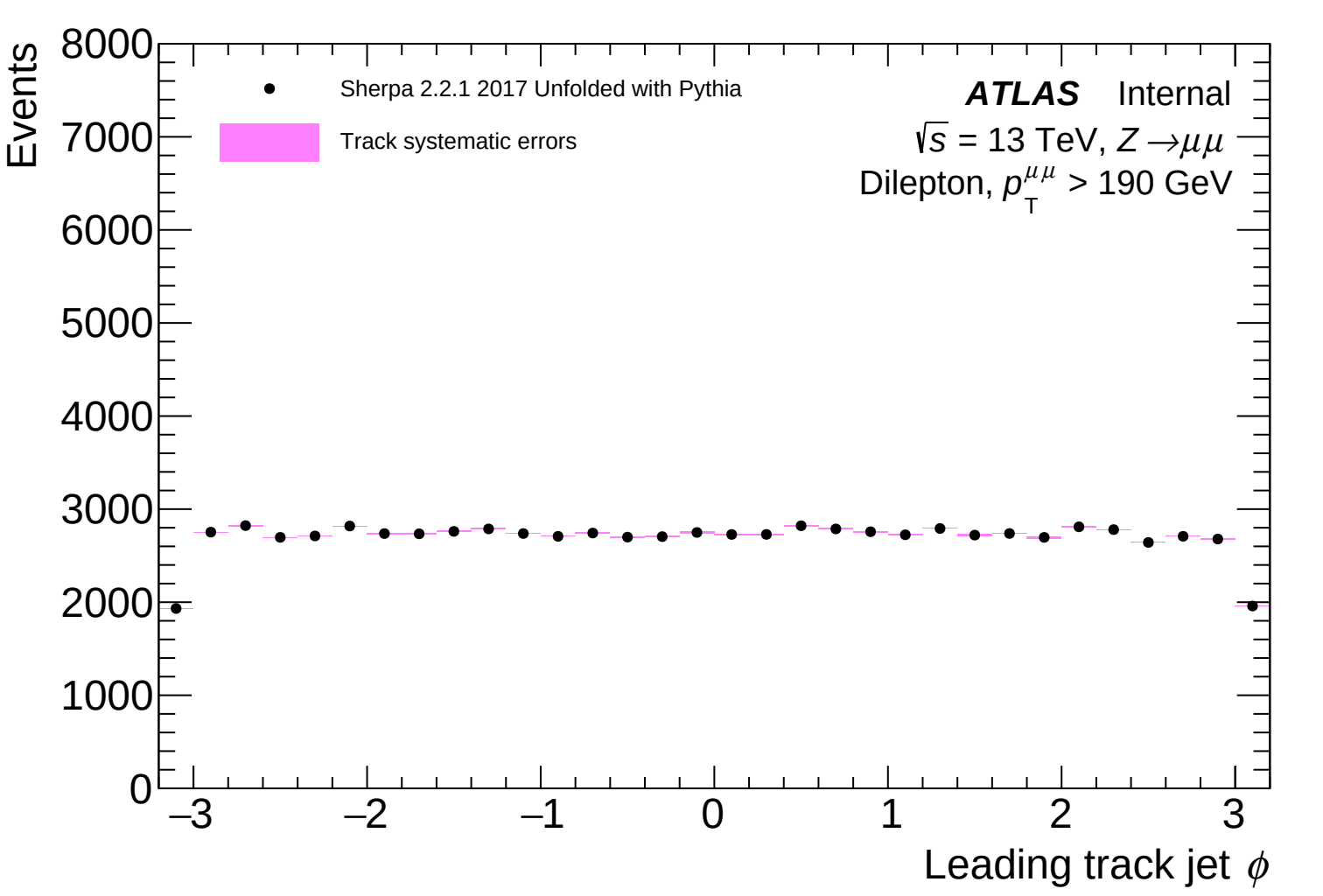

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

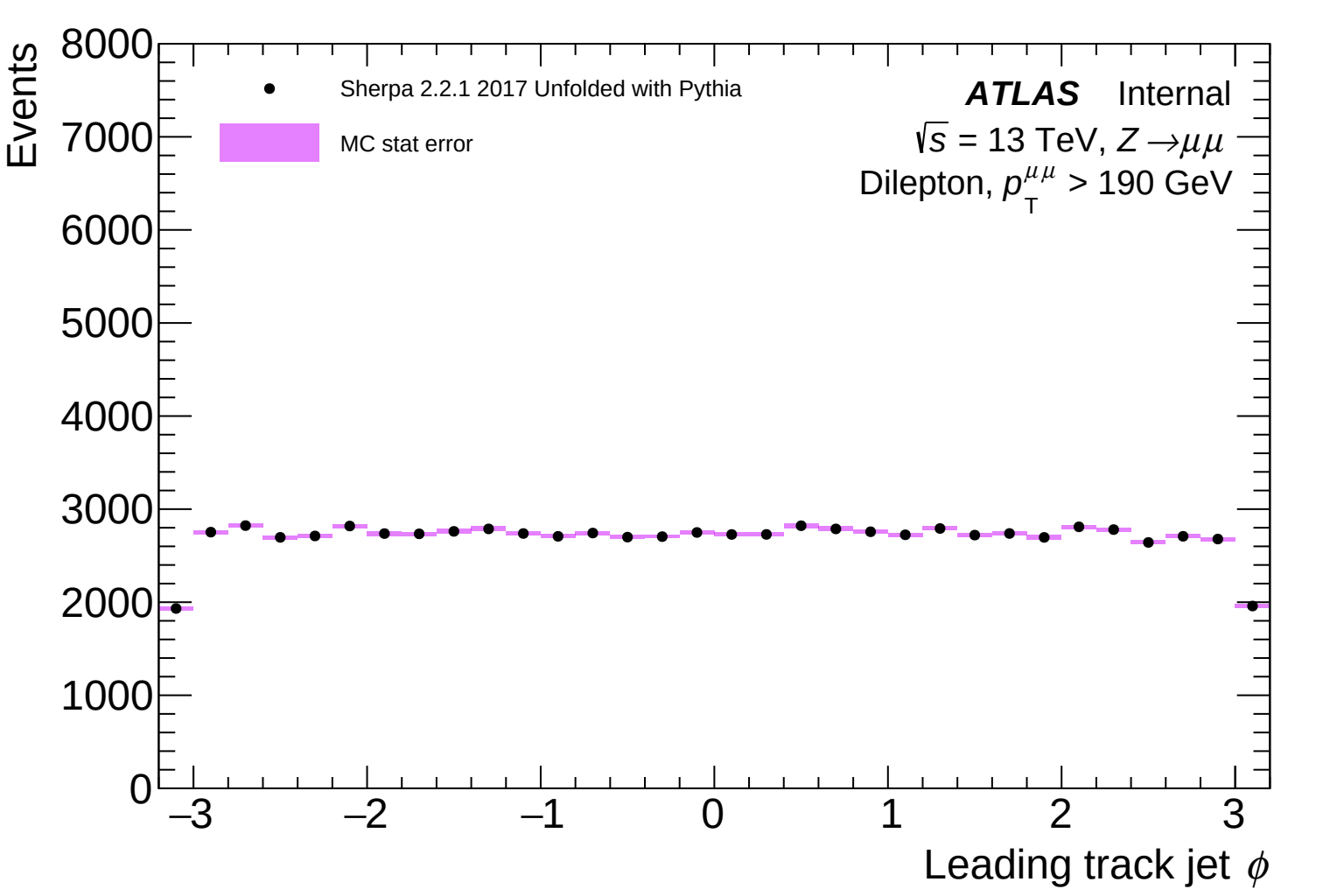

$\times 10^3$
30
25
20
15
10
5
0
$dN / d\phi_{j1}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu} > 190$ GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ

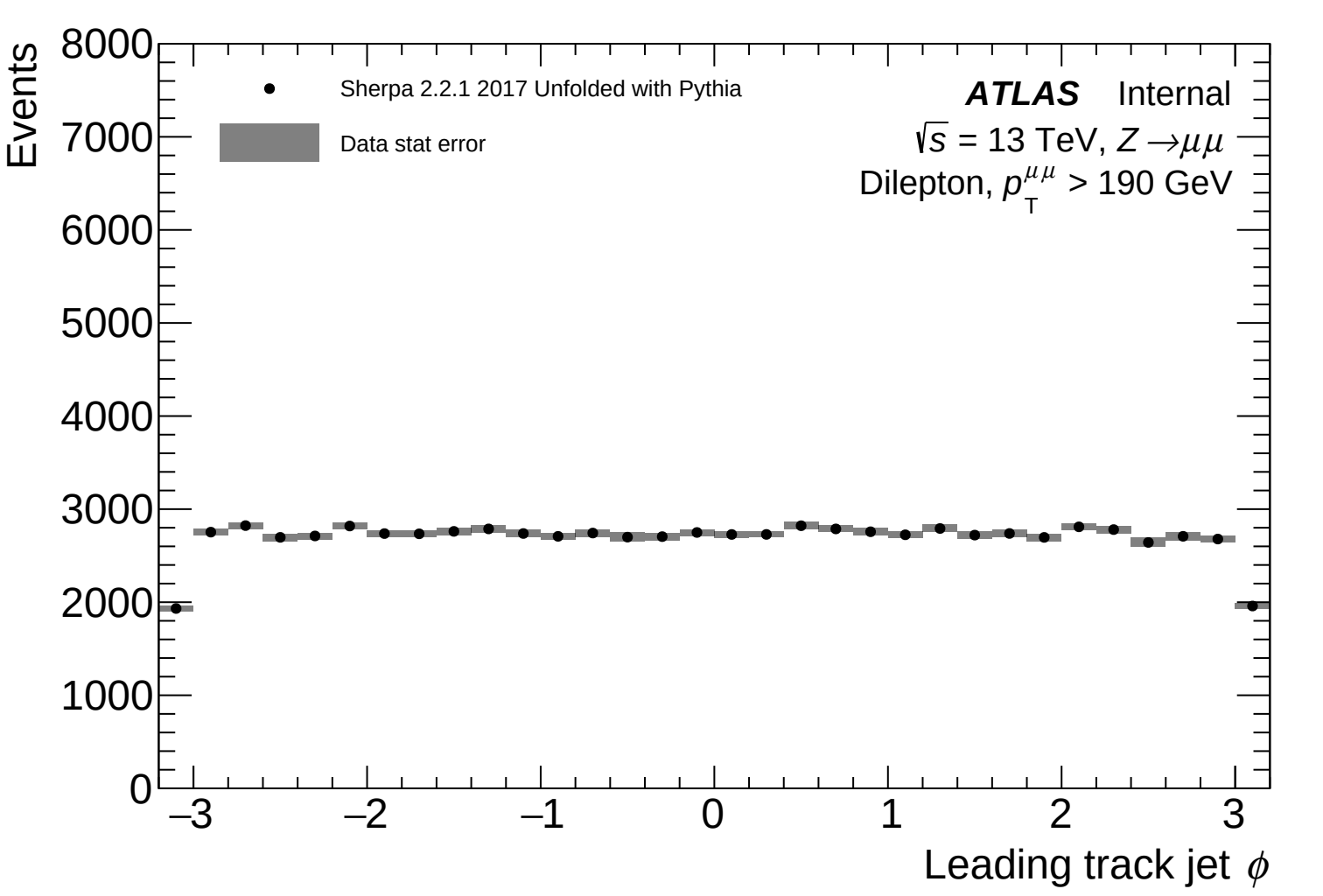

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

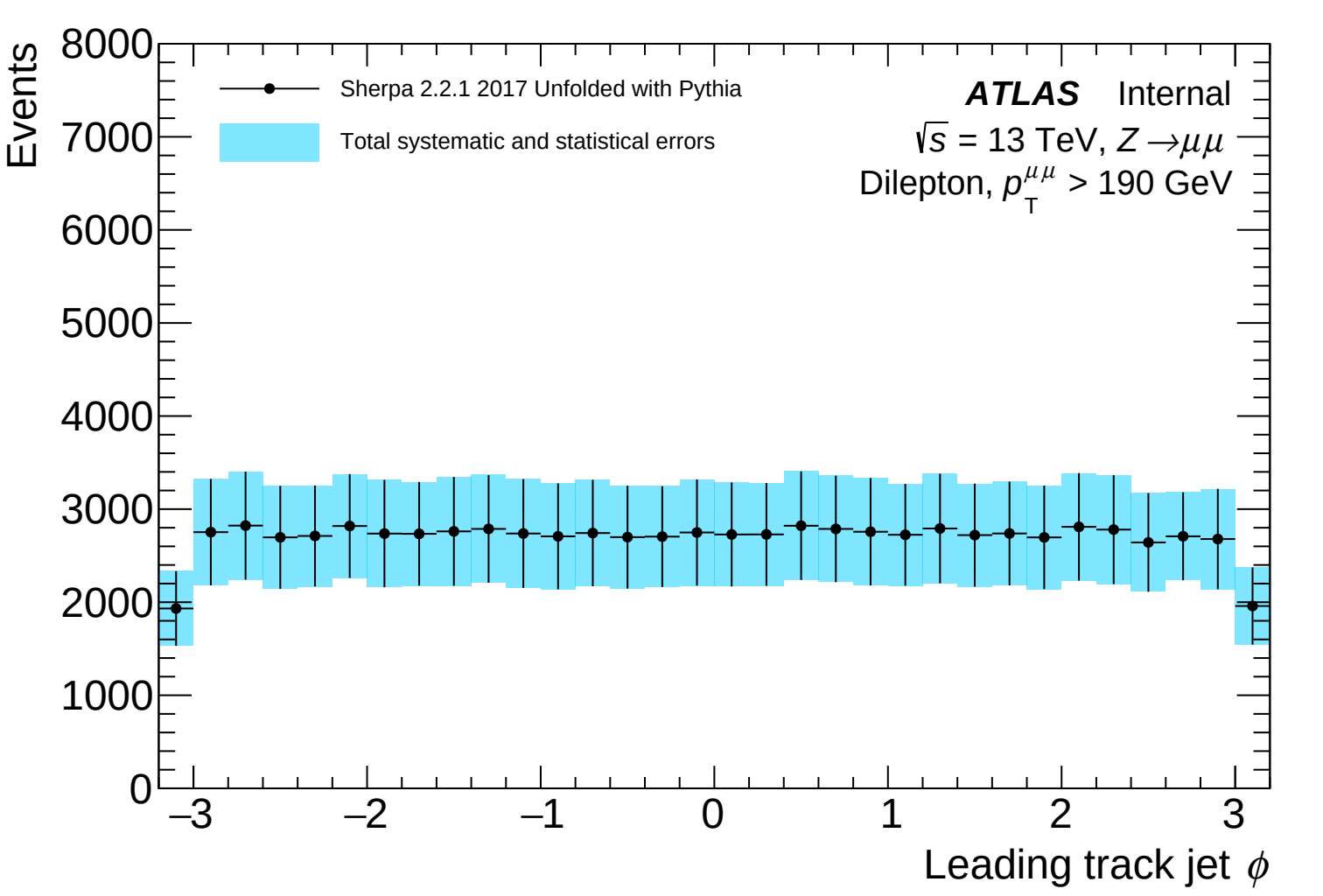

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

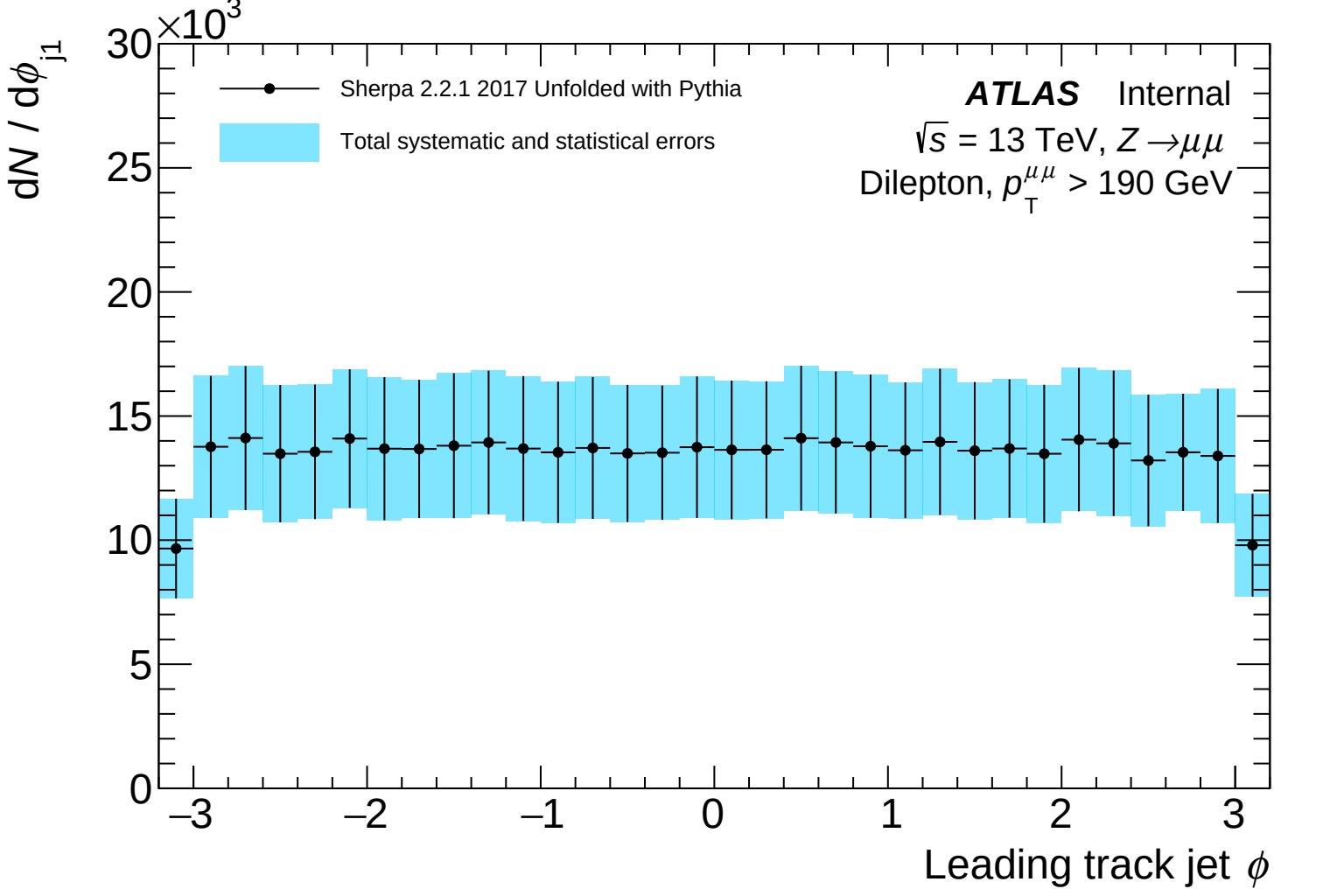

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

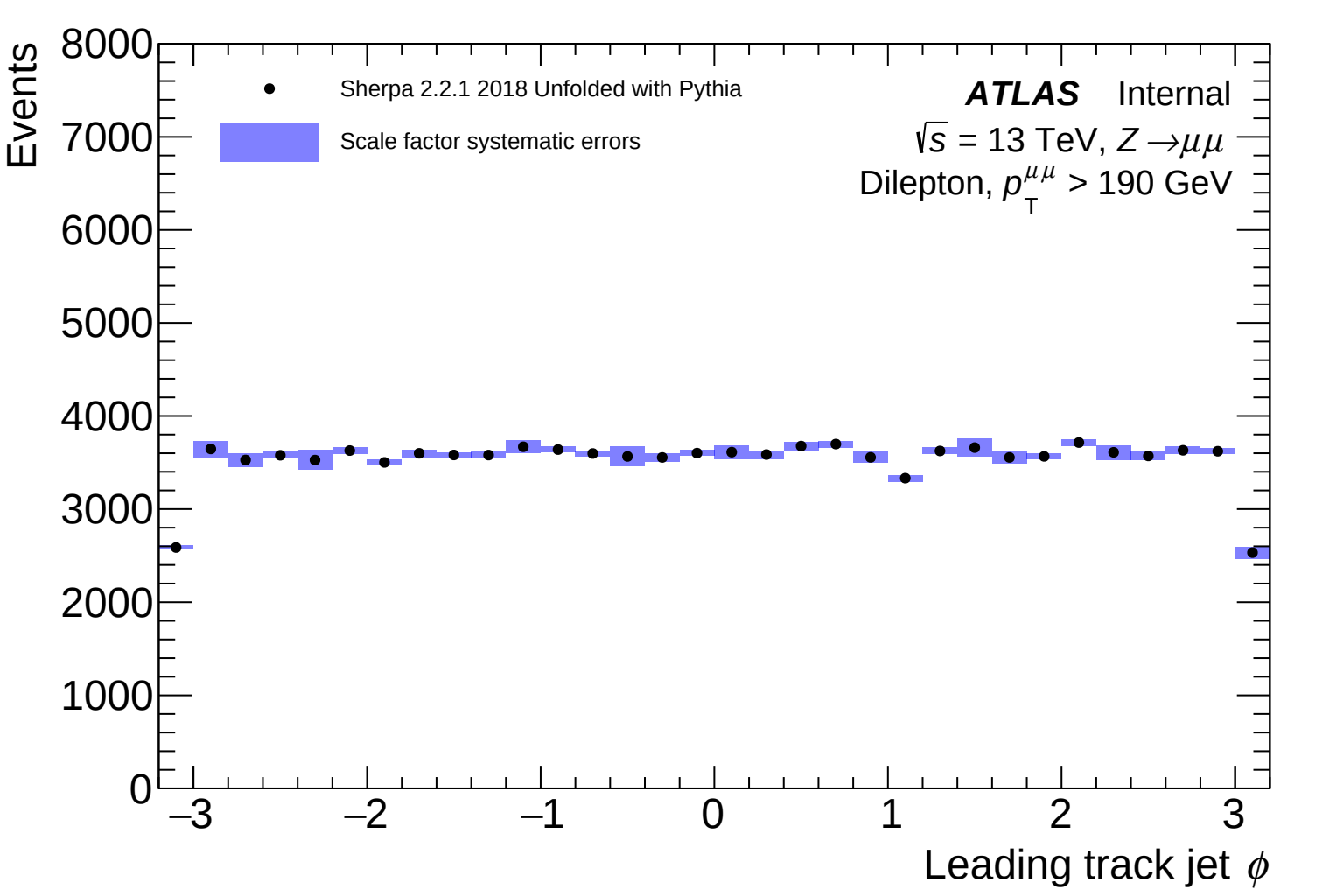

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

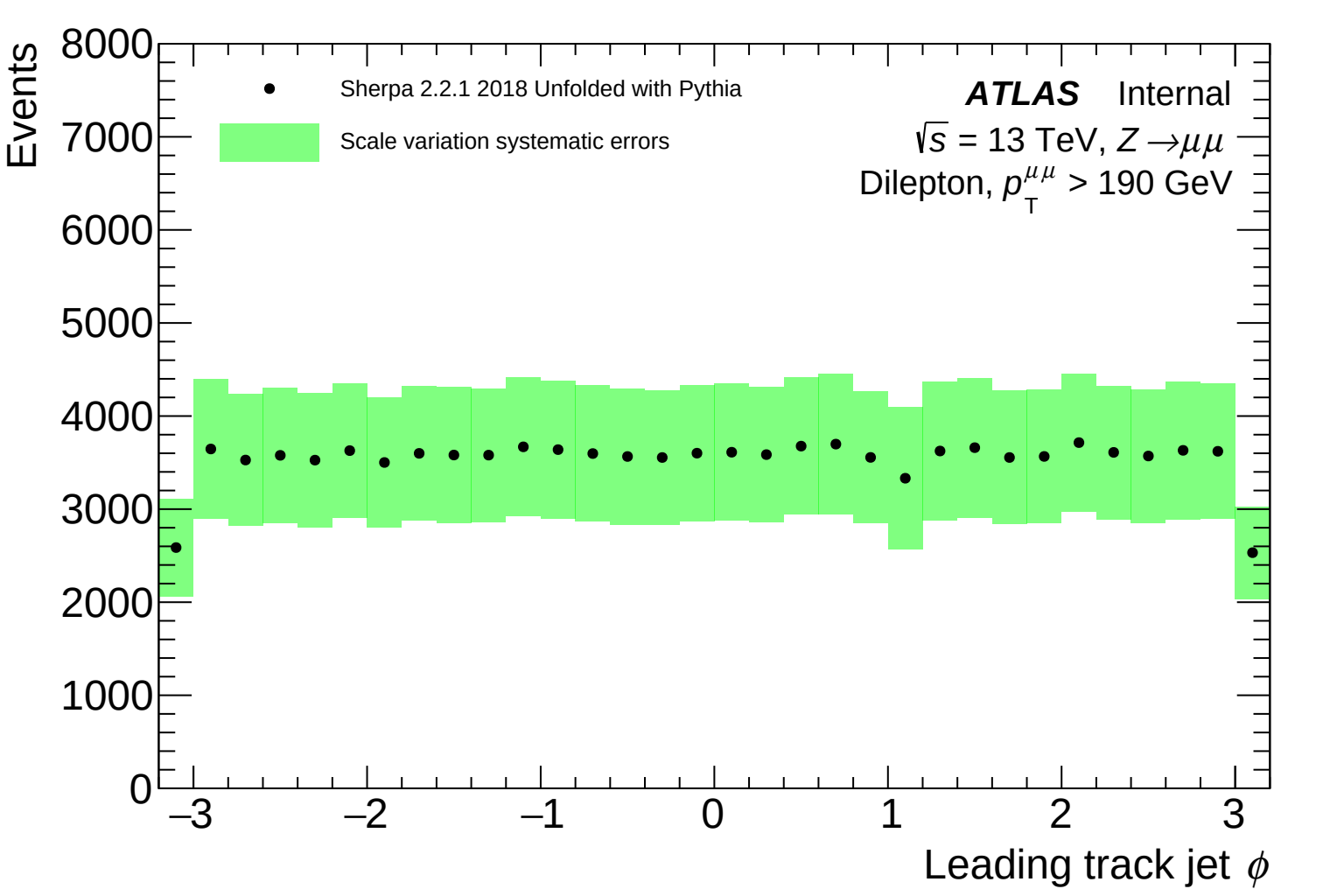

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

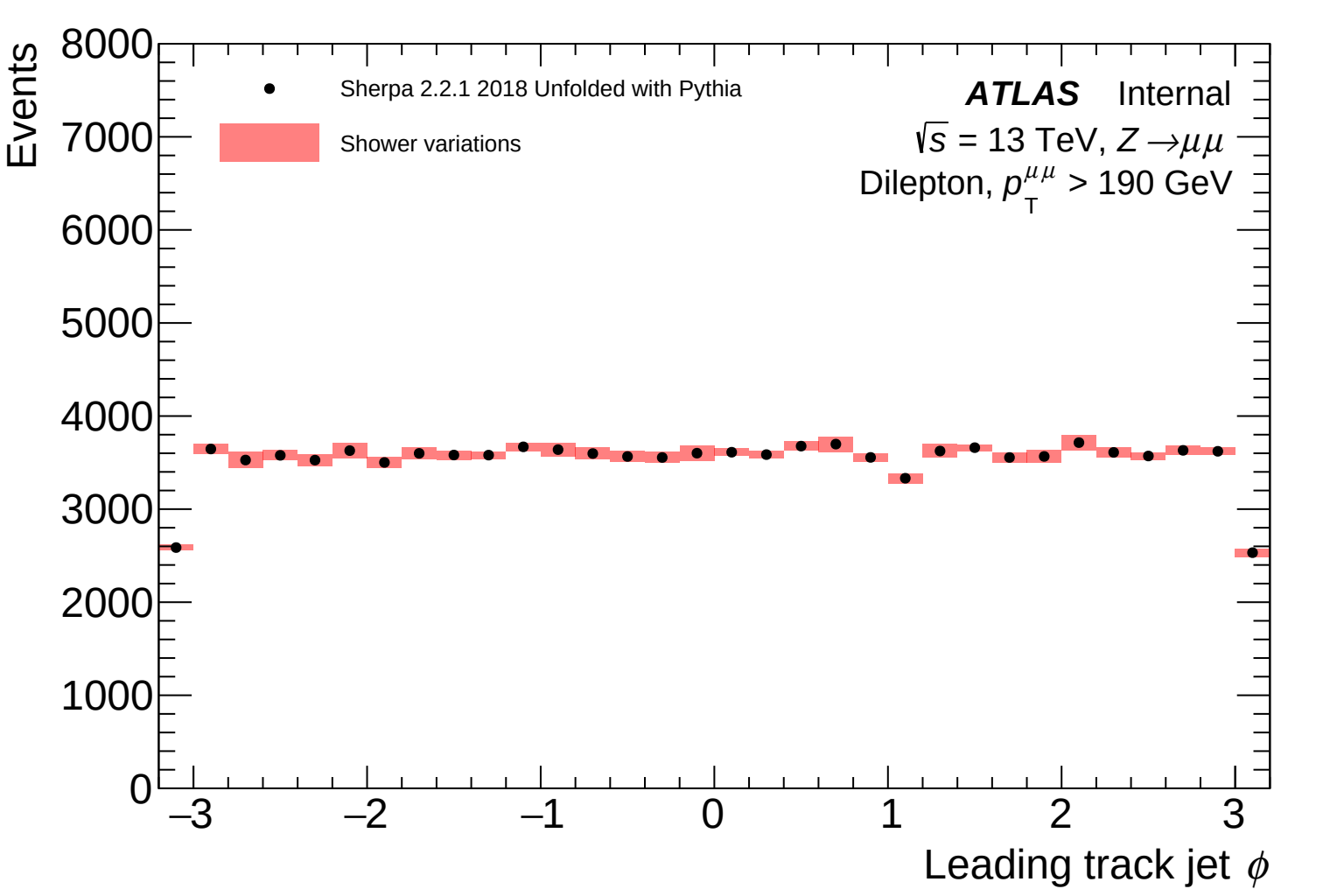

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

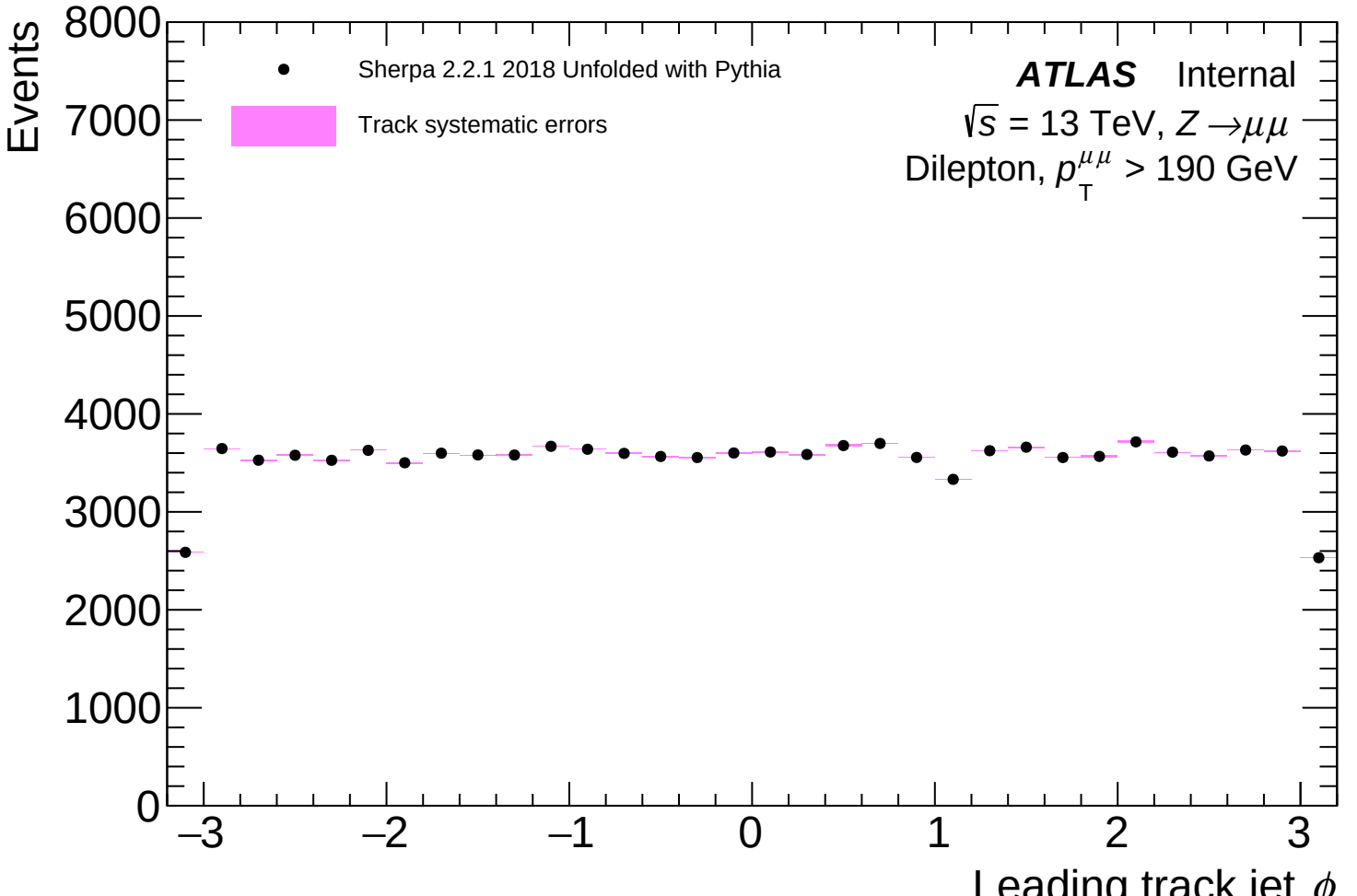

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

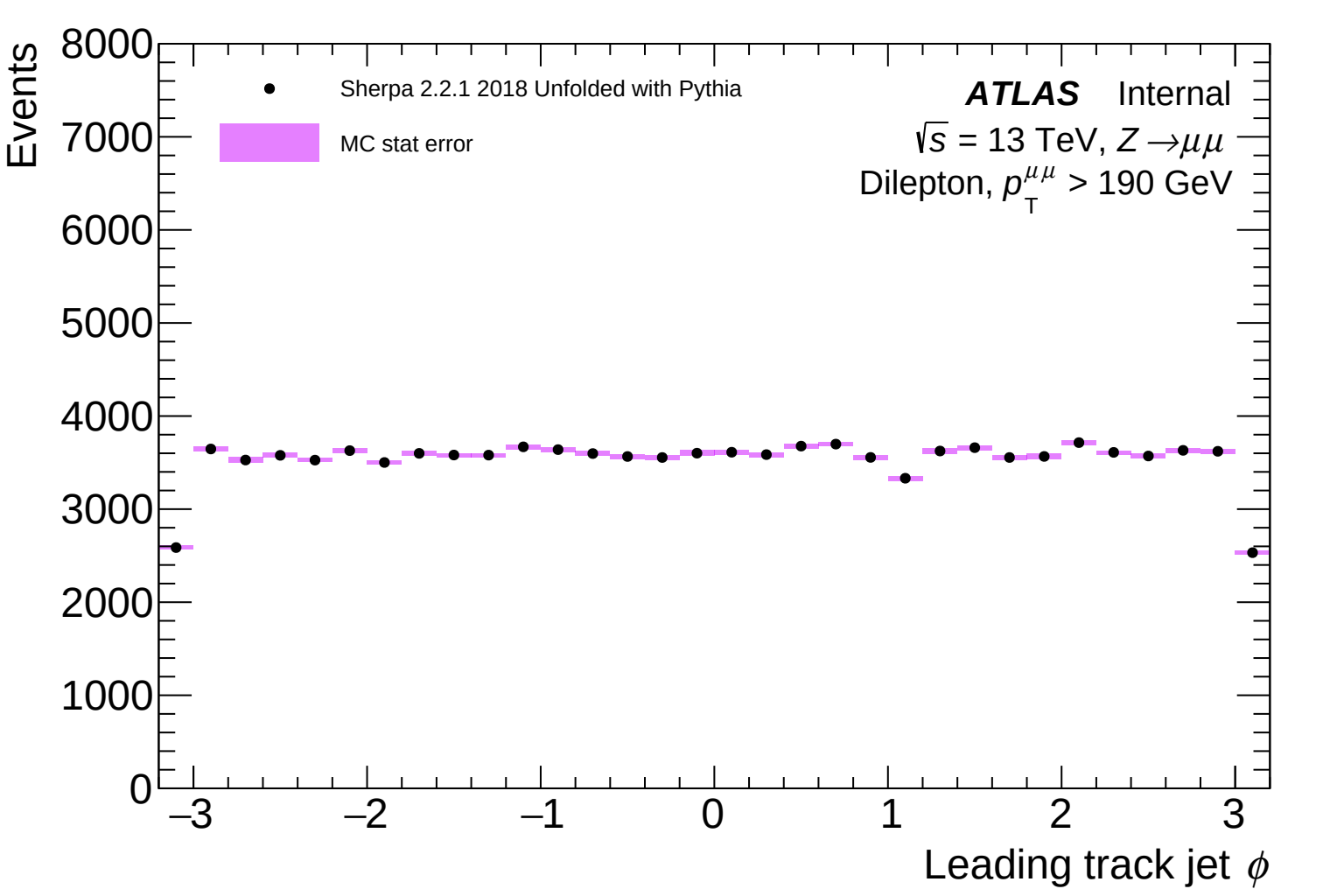

$\times 10^3$
30
25
20
15
10
5
0
$dN / d\phi_{j1}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ

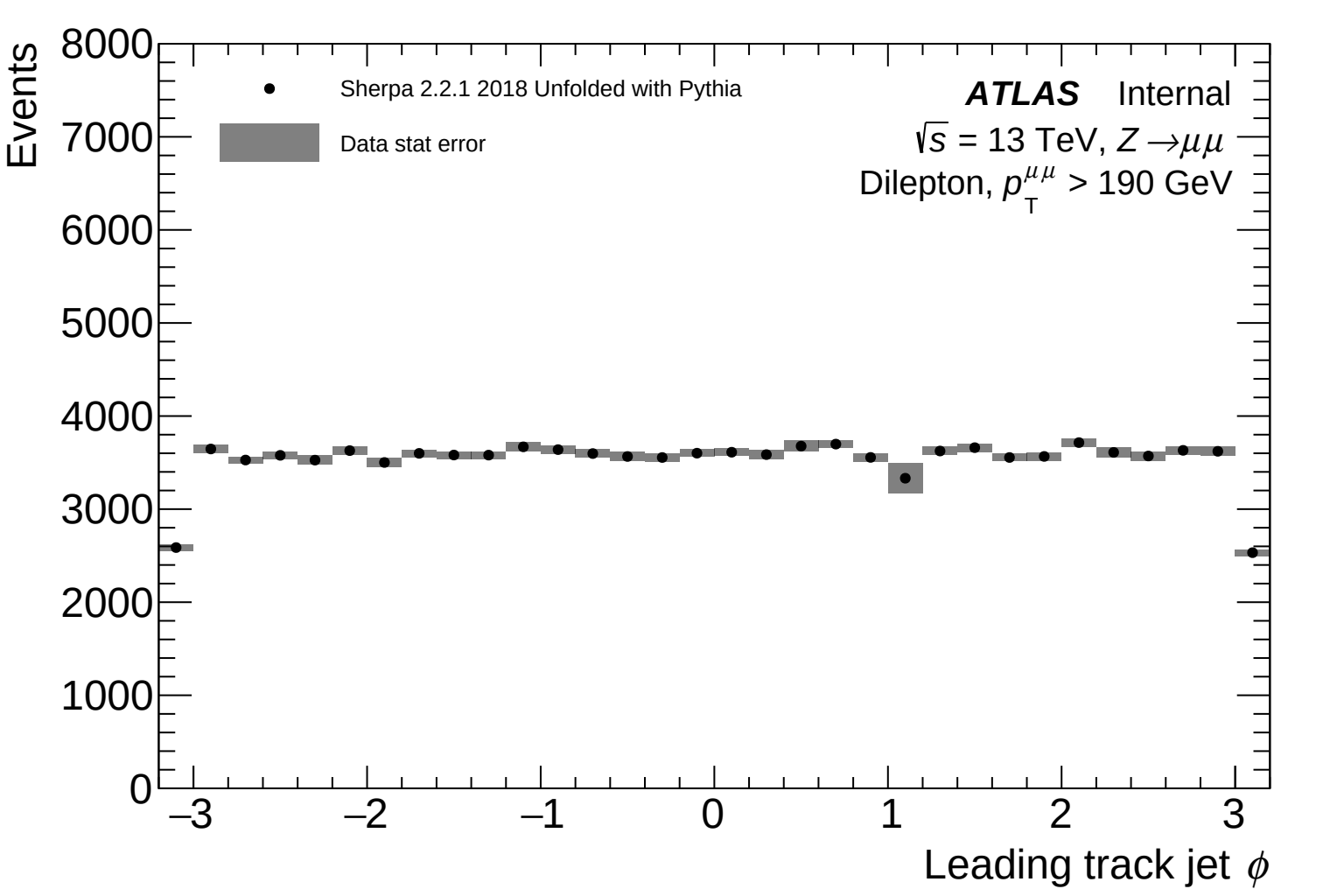

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ

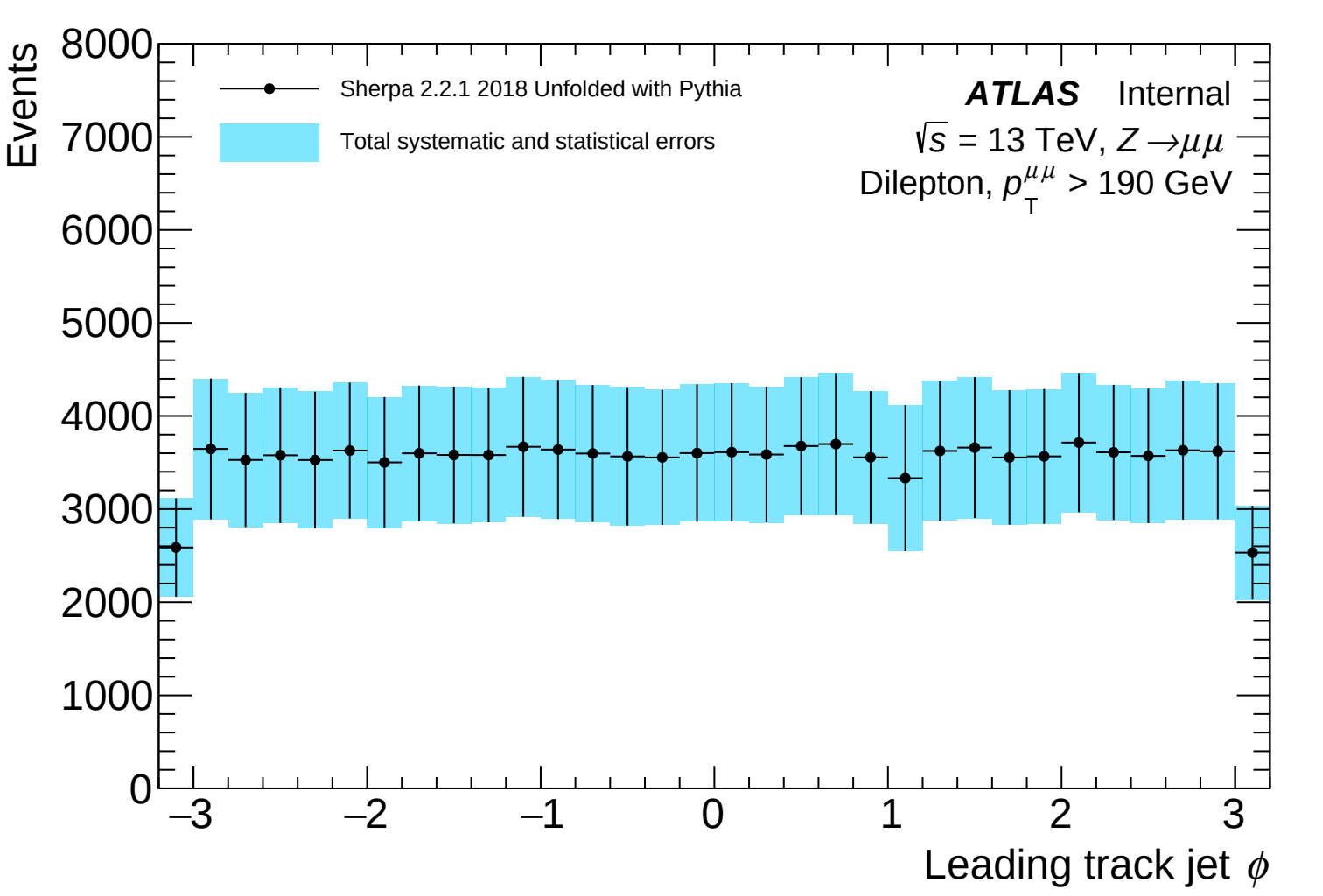

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

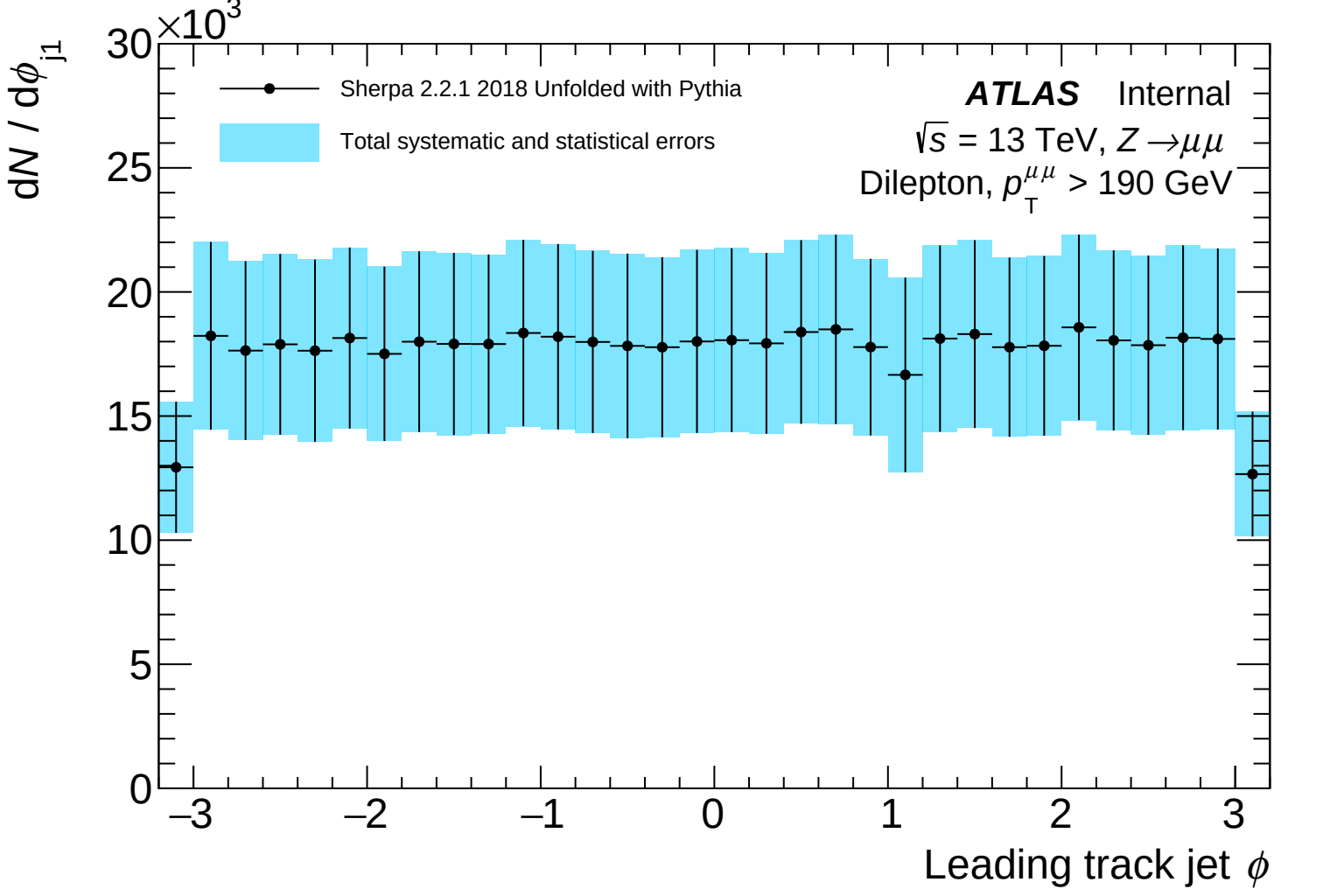

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

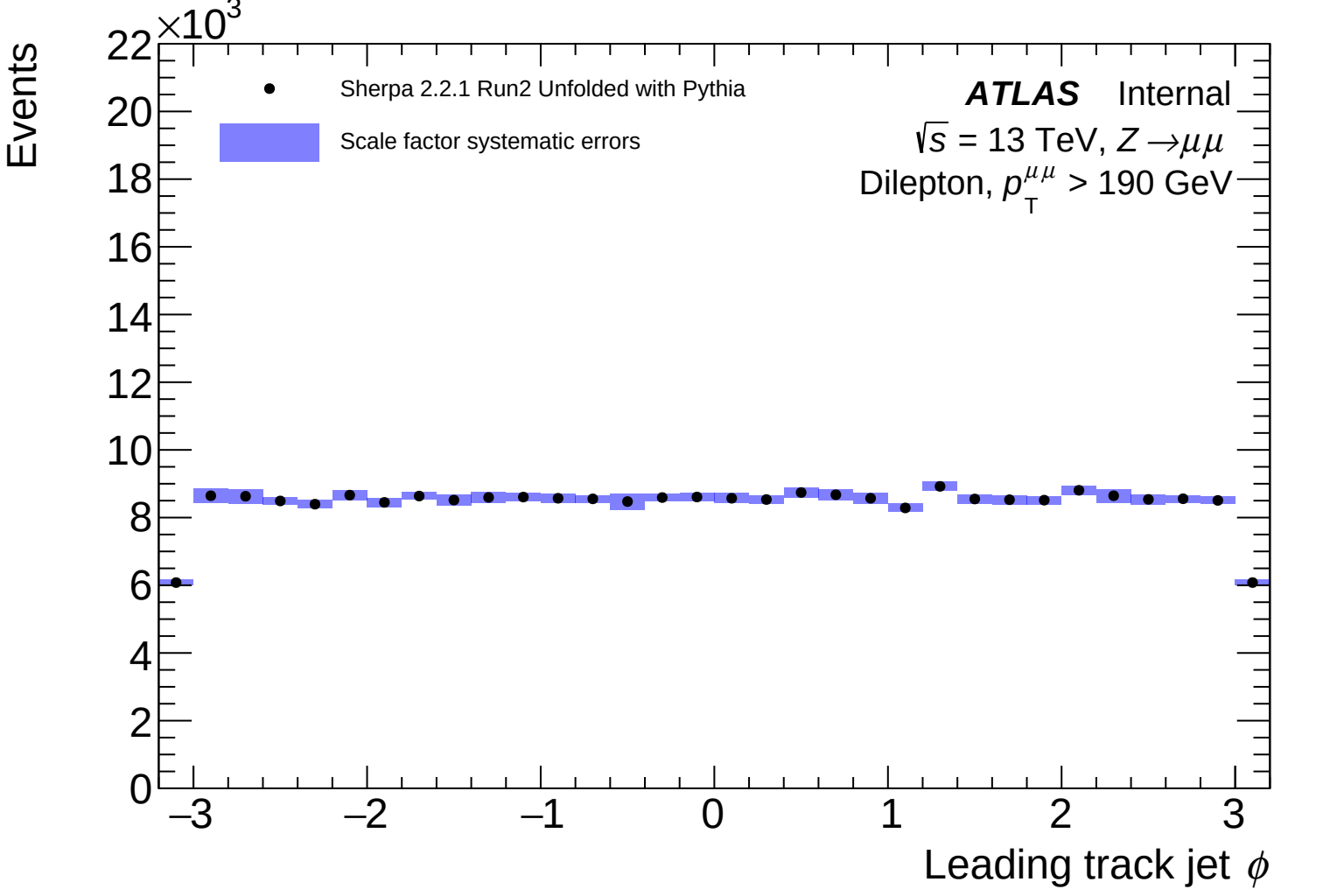

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ

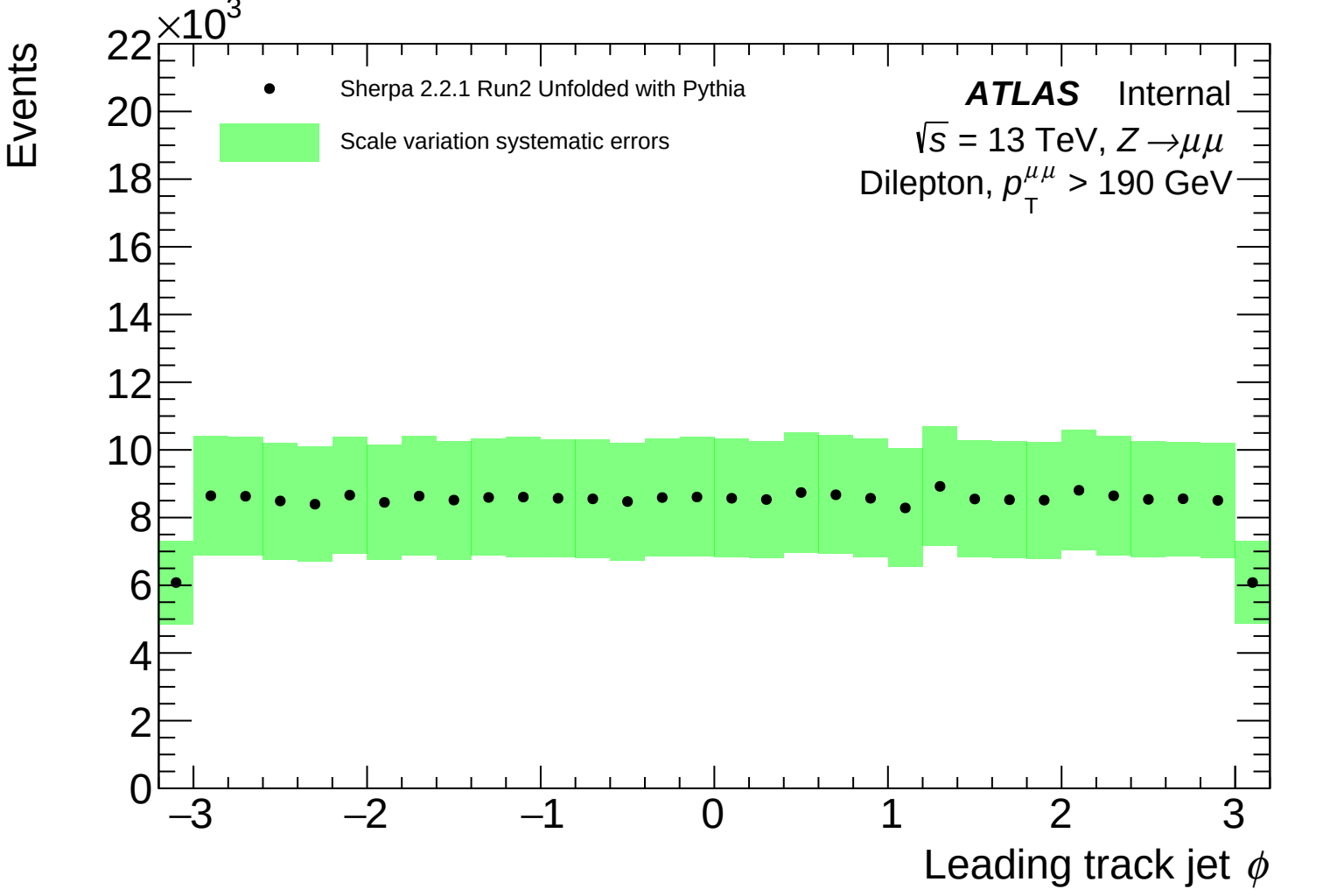

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

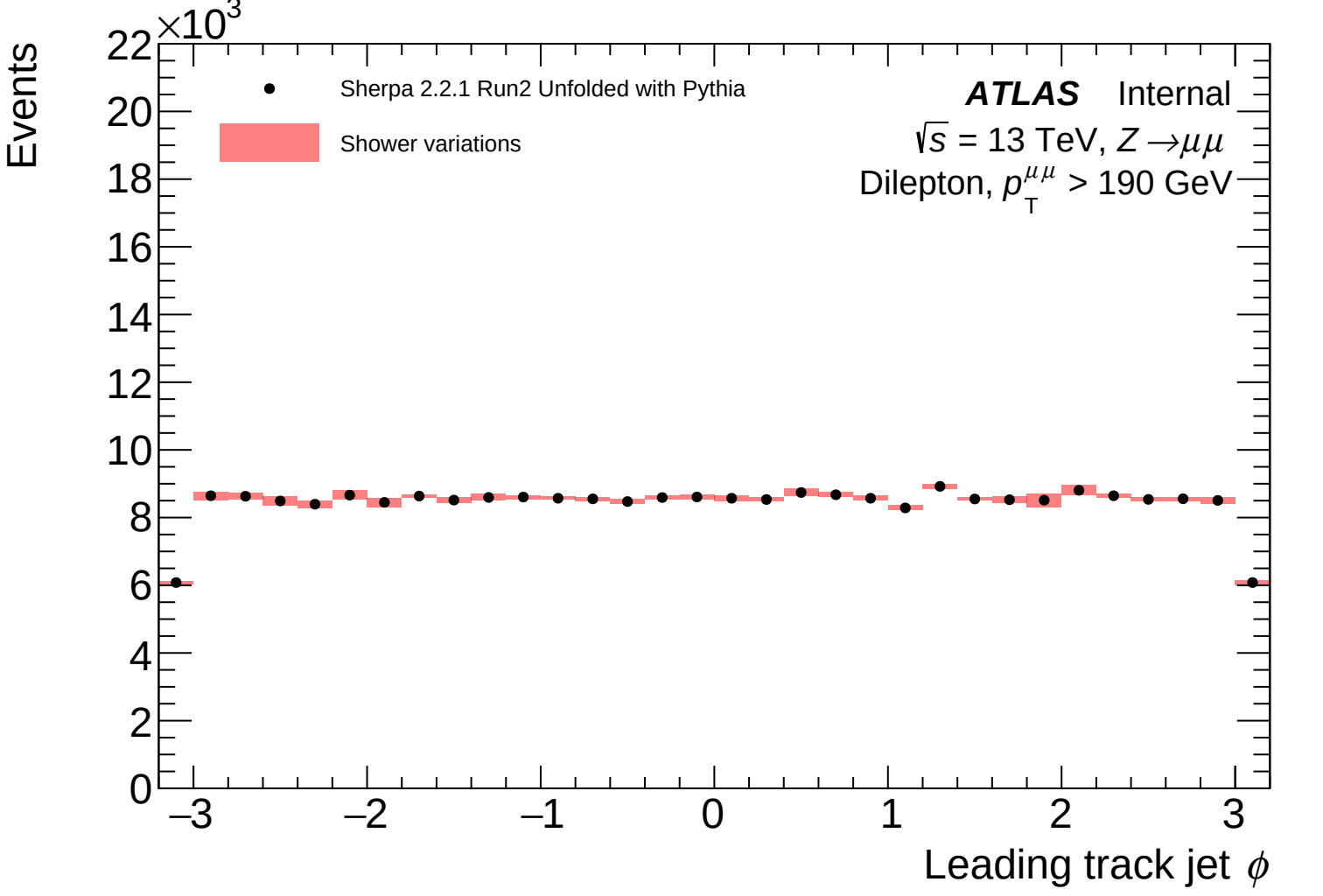

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

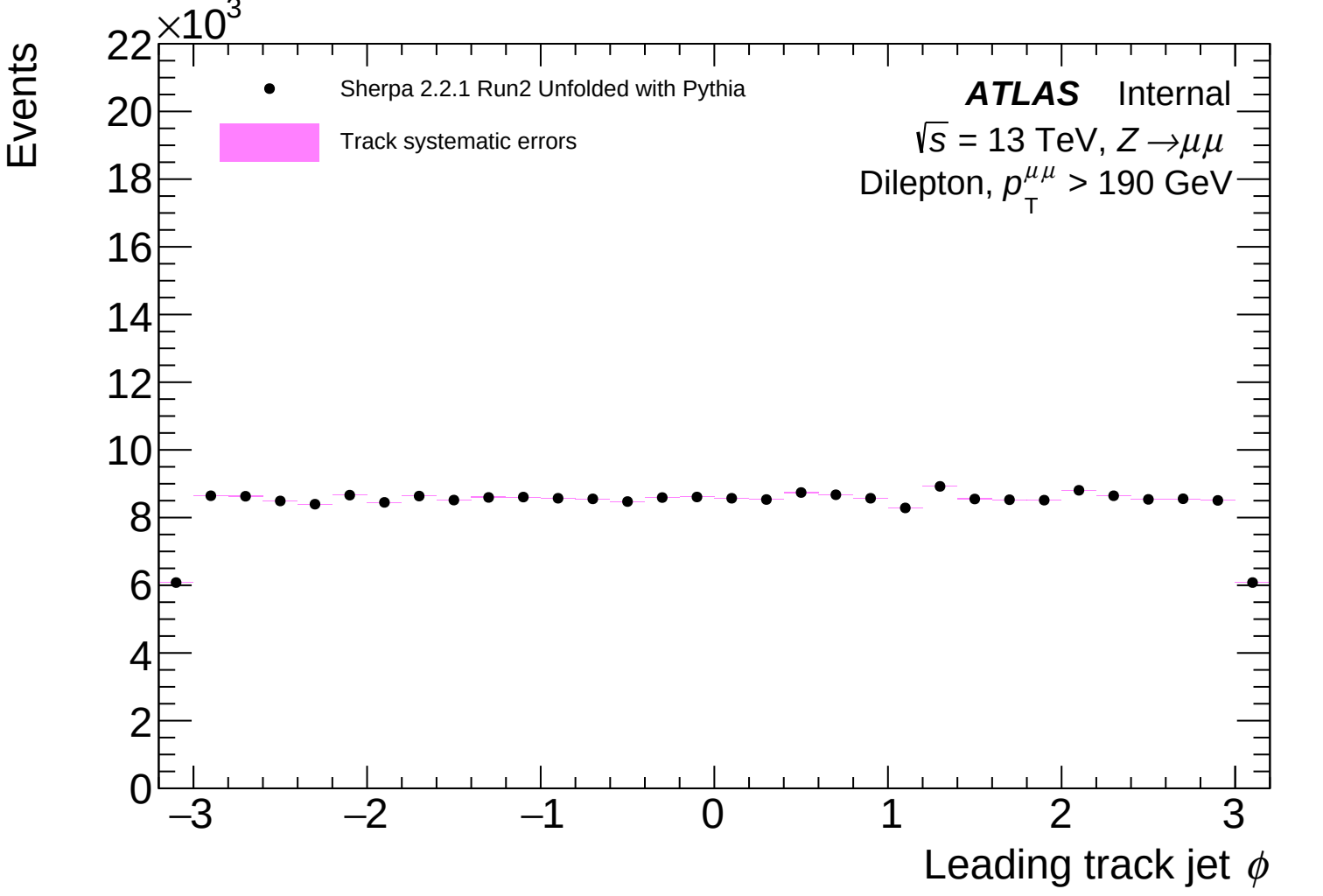

Events
8000
7000
6000
5000
4000
3000
2000
1000
0
–3
–2
–1
0
1
2
3
Leading track jet ϕ
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

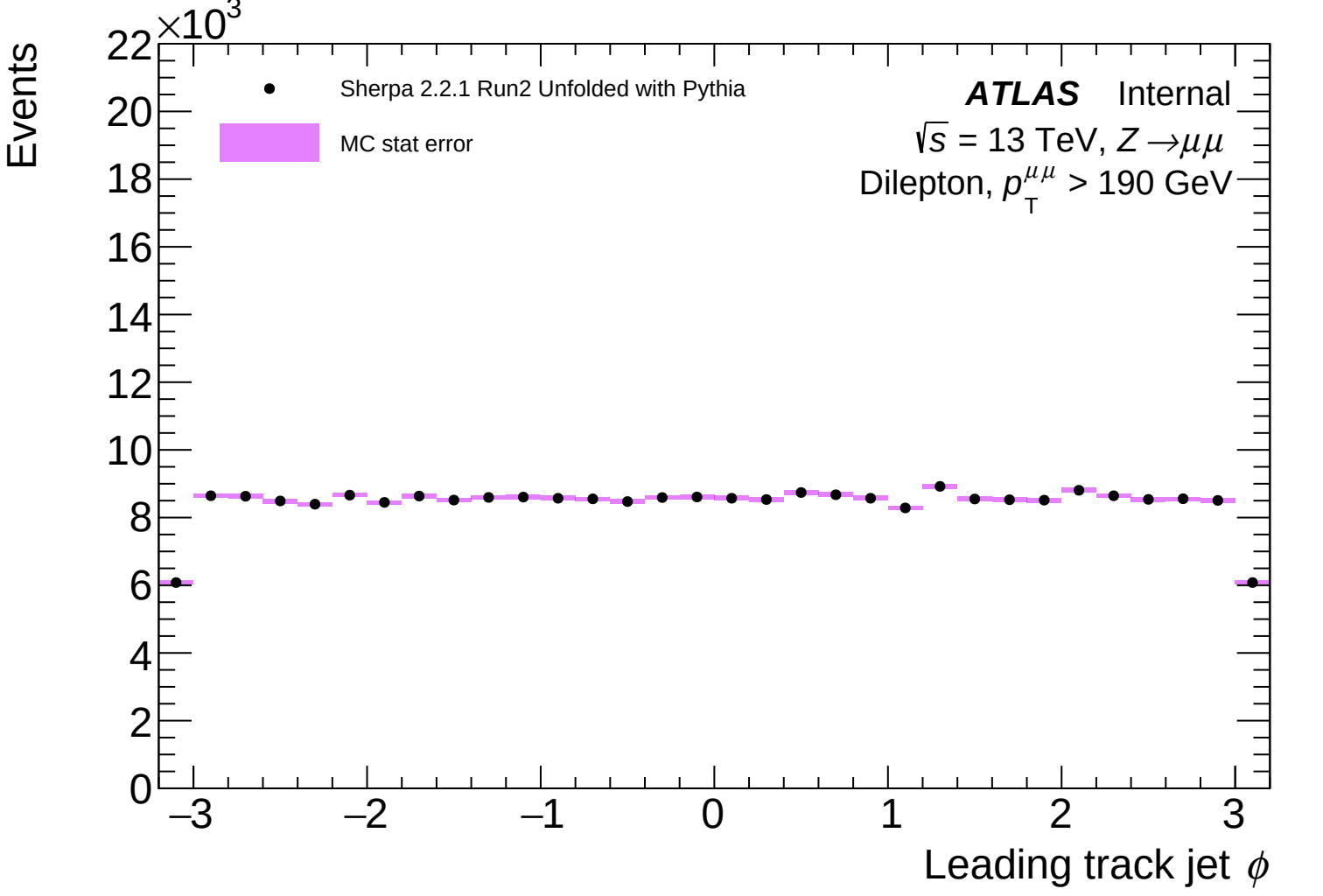

$\times 10^3$
30
25
20
15
10
5
0
$dN / d\phi_{j1}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ


Events
×10^3
22
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ


Events
×10^3
22
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ


Events
×10^3
22
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ


Events
×10^3
22
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ


Events
×10^3
22
20
18
16
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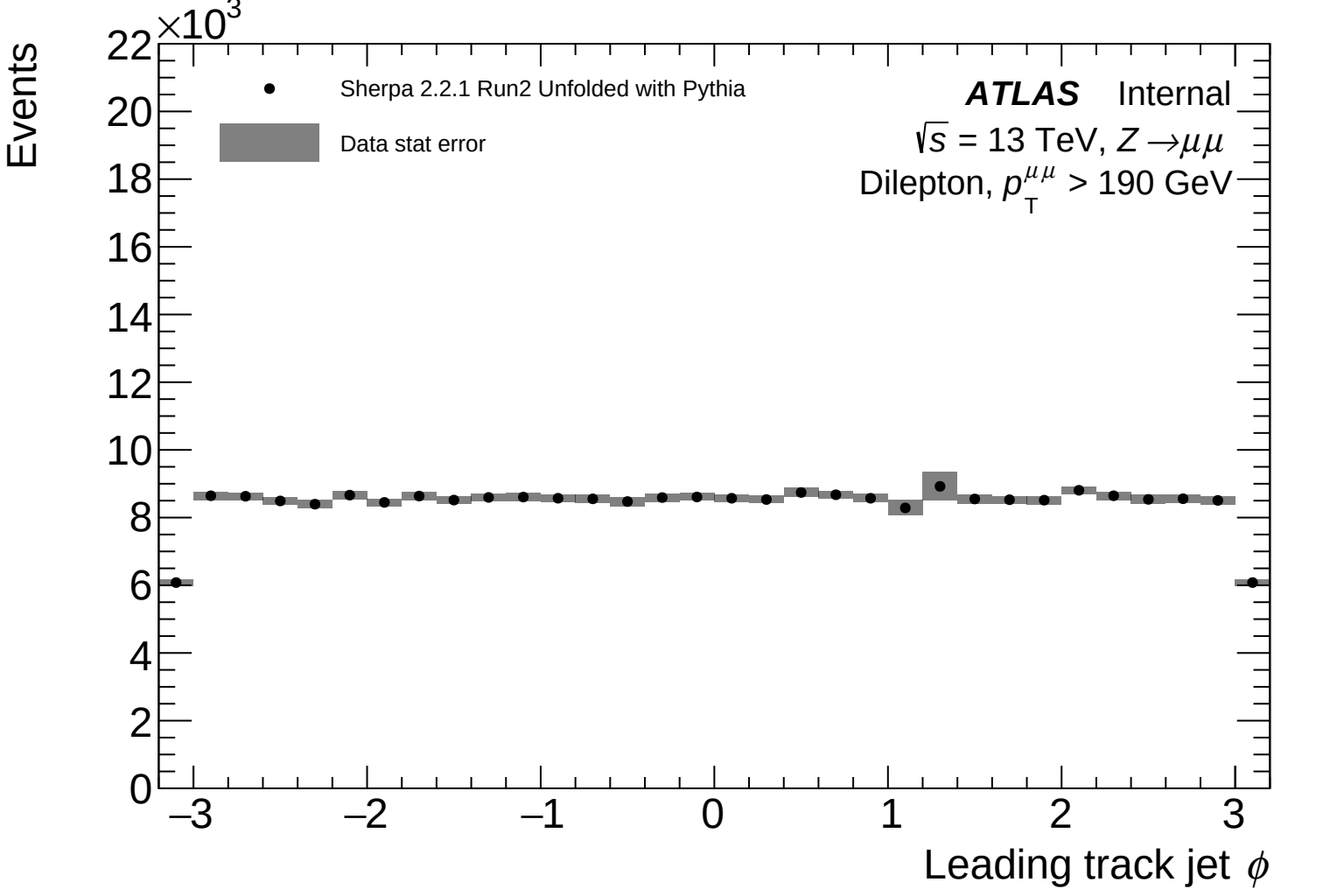
12
10
8
6
4
2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ


Events
×10^3
22
20
18
16
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12
10
8
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4
2
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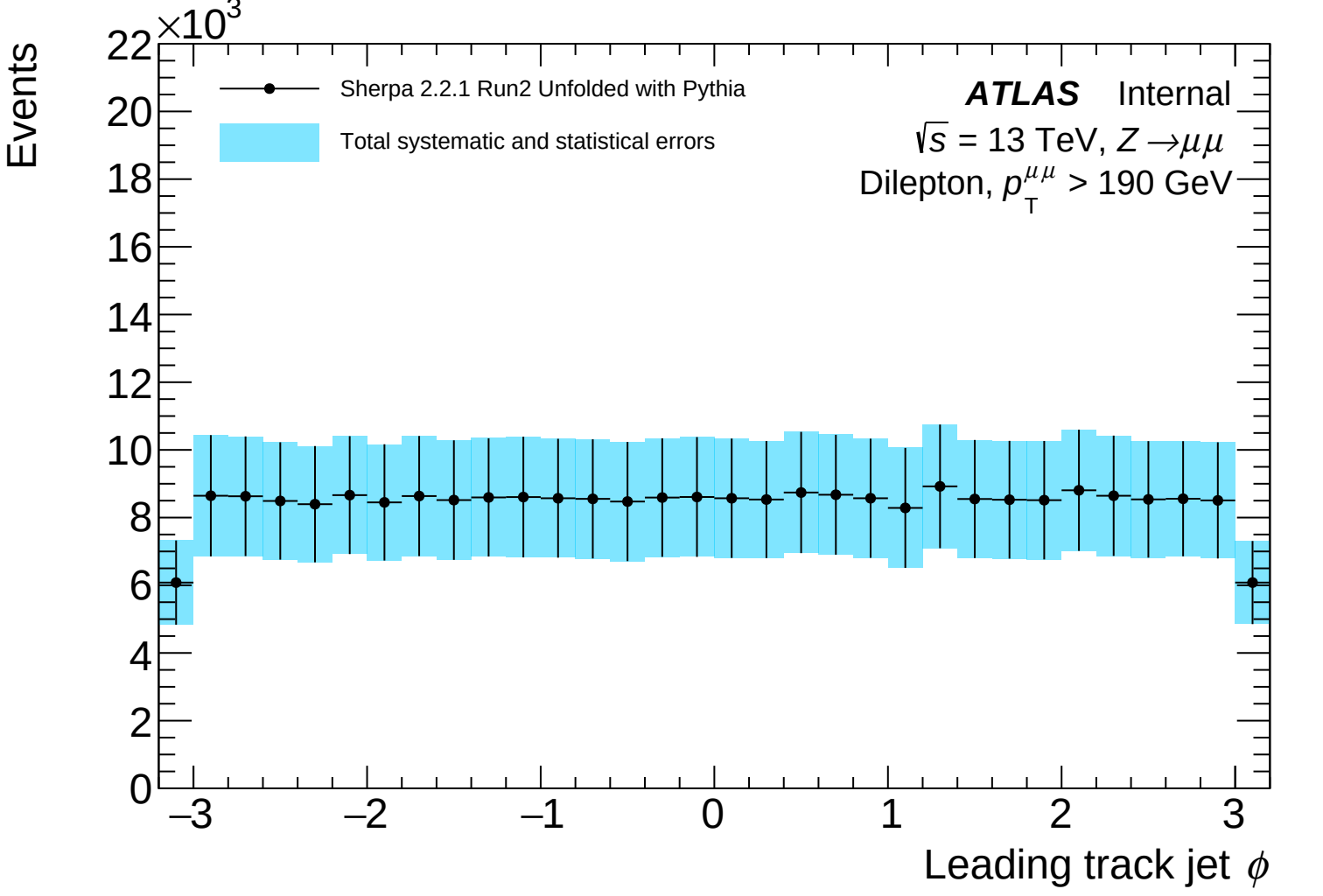
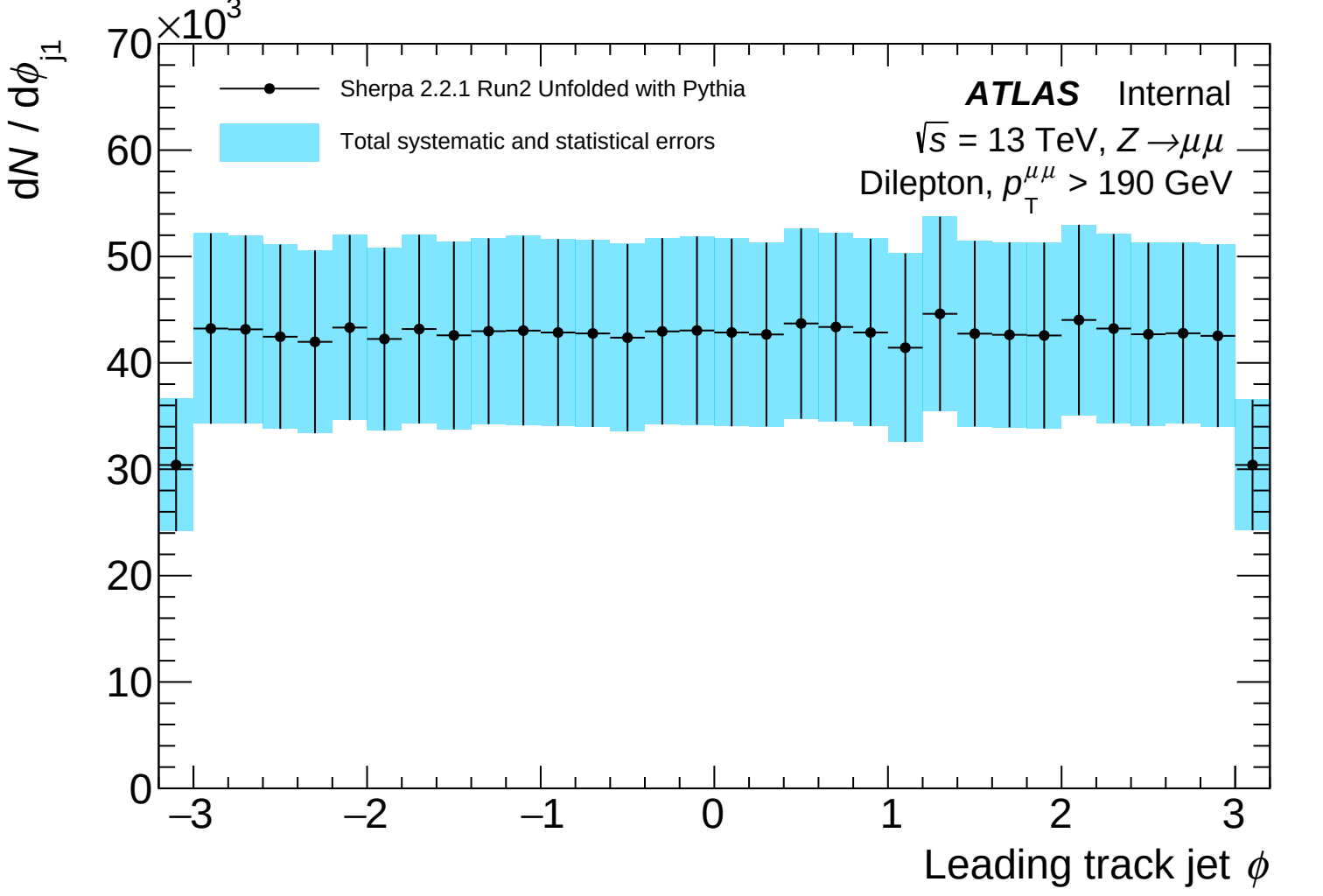
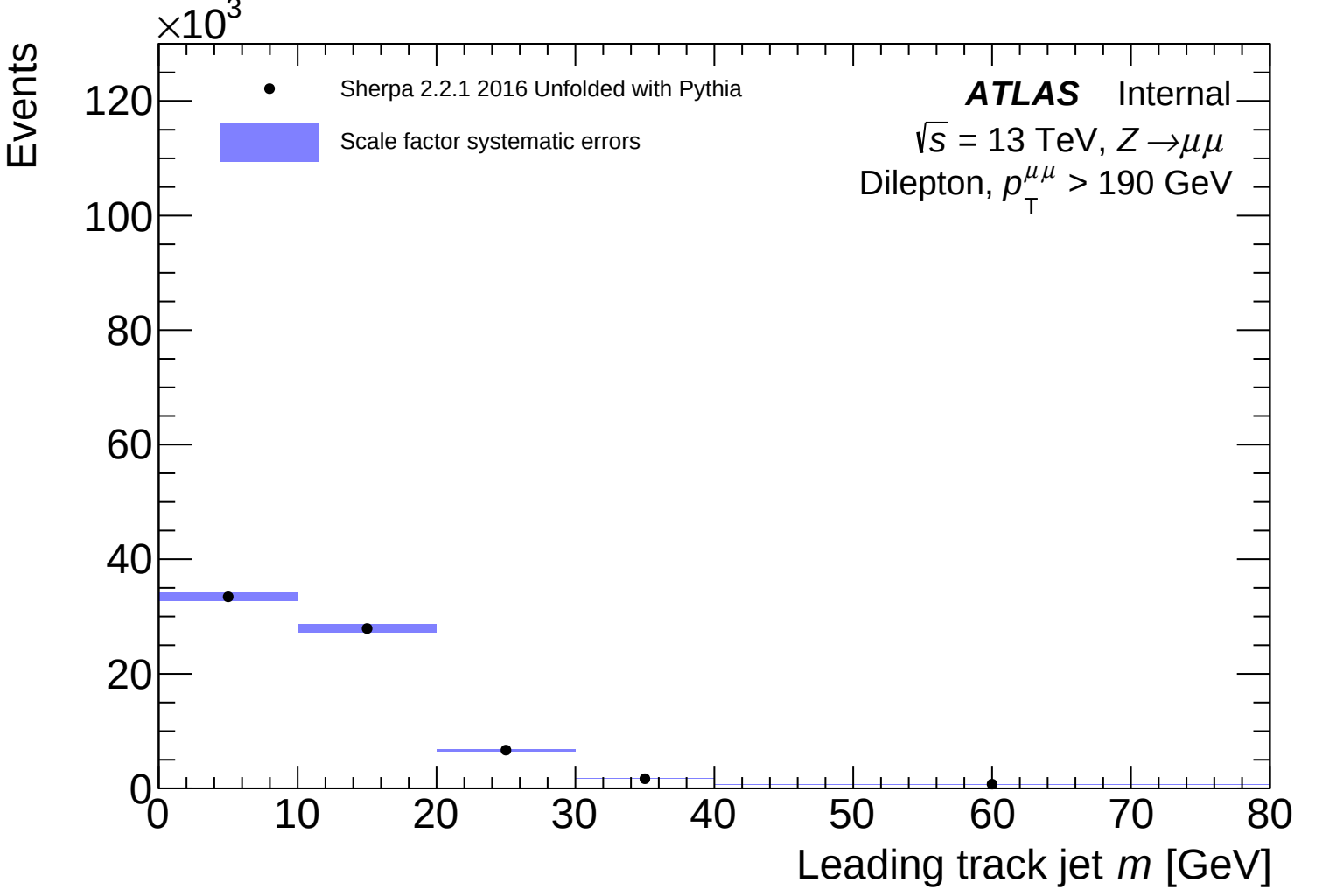
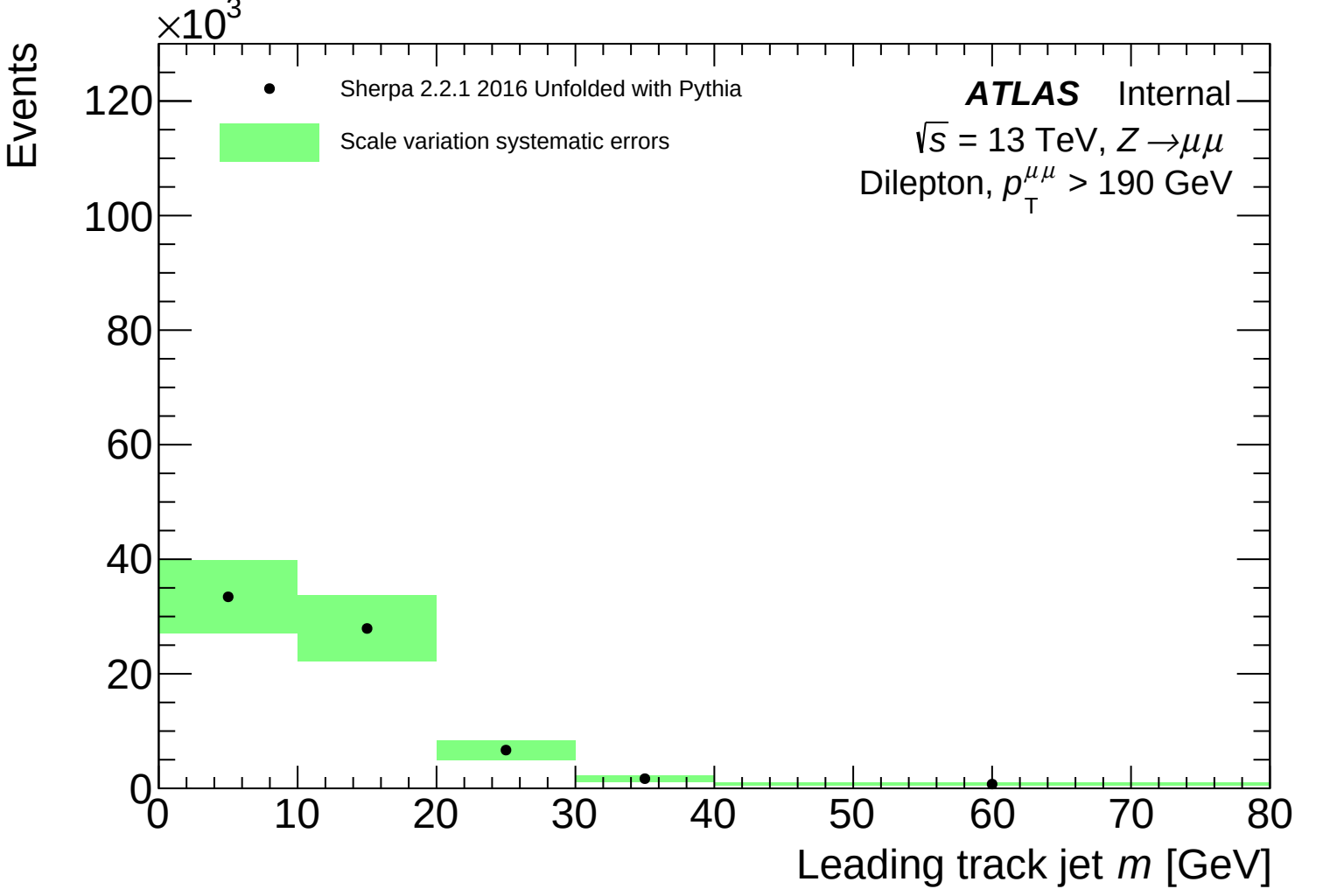
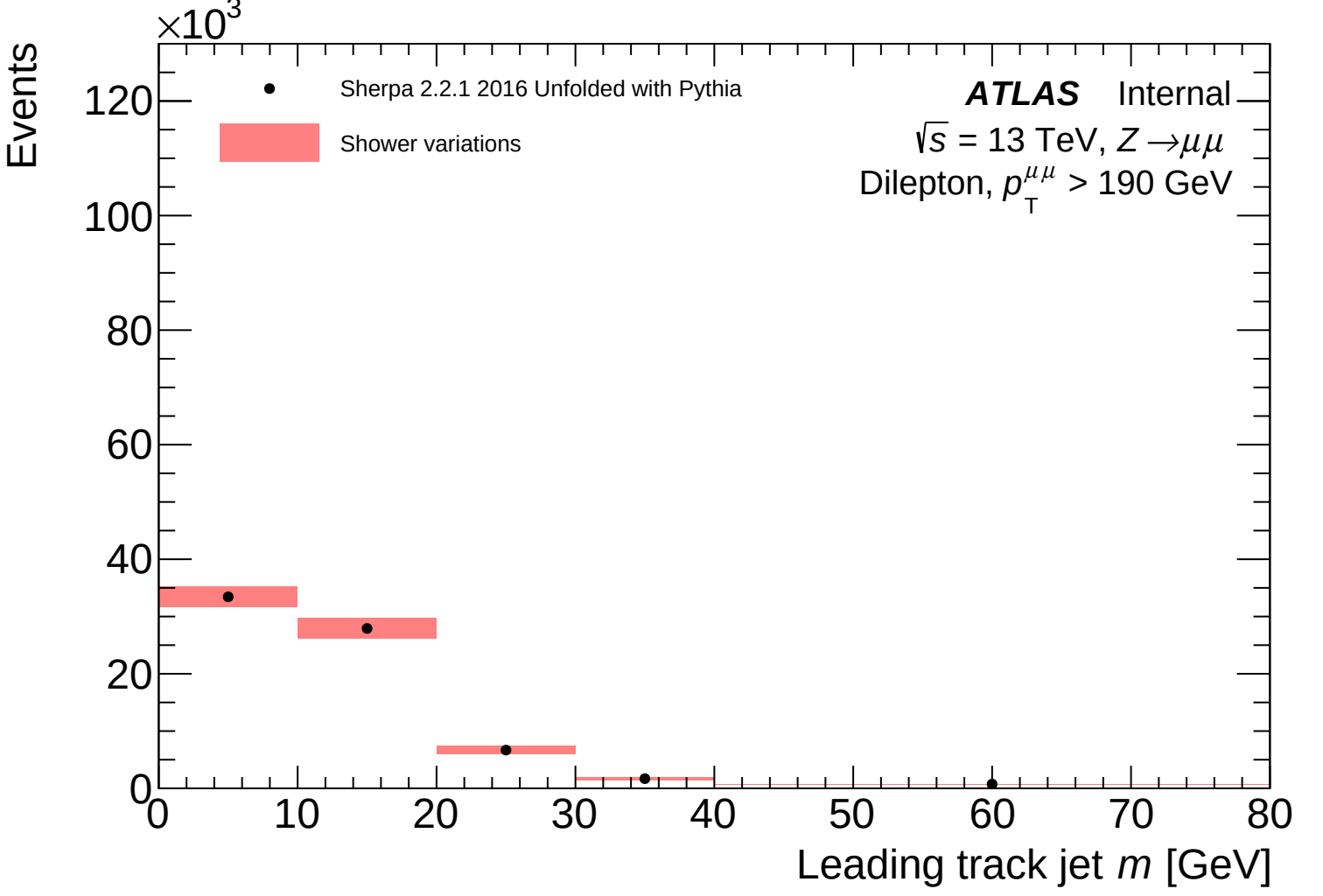
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

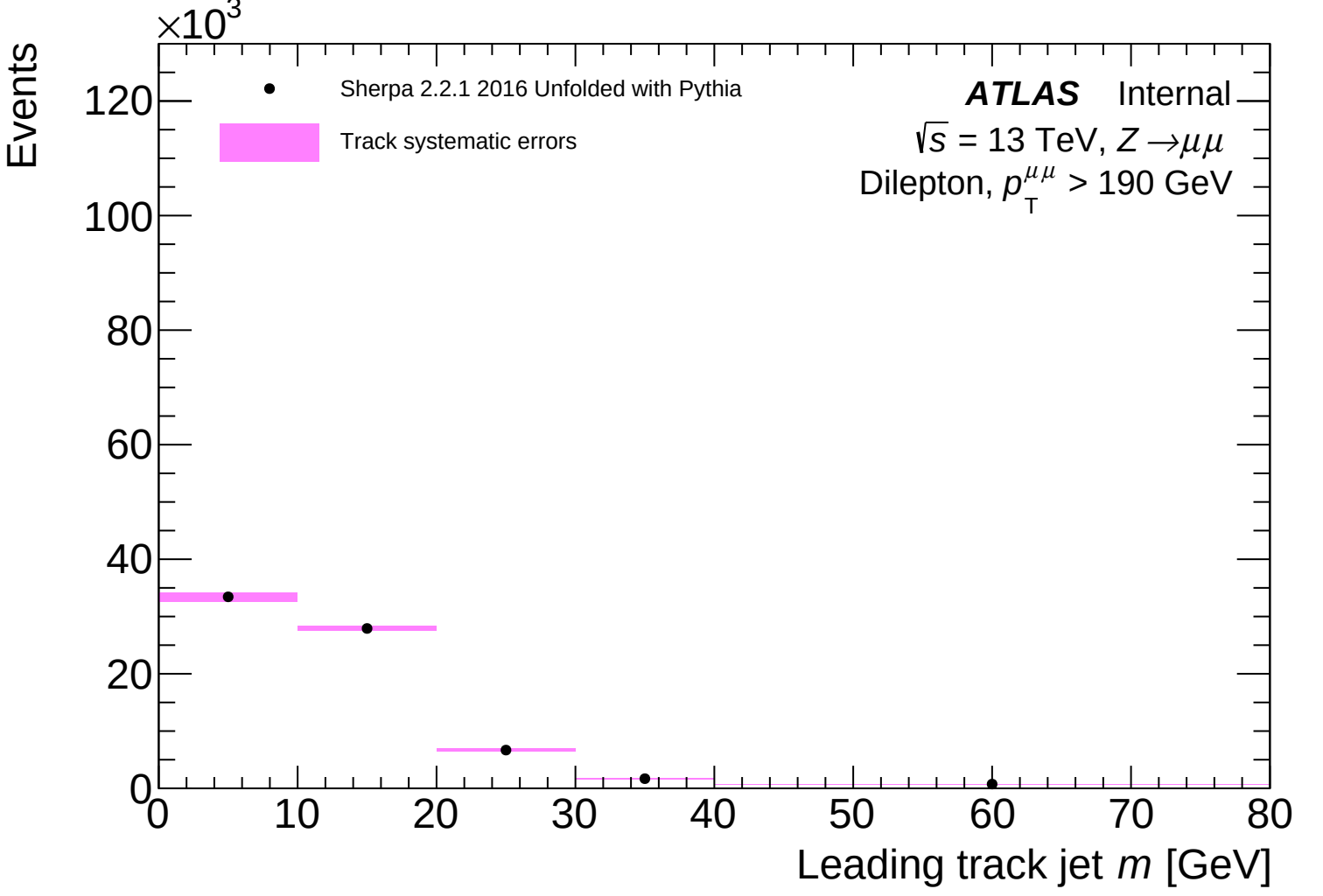

Events
×10^3
22
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet φ

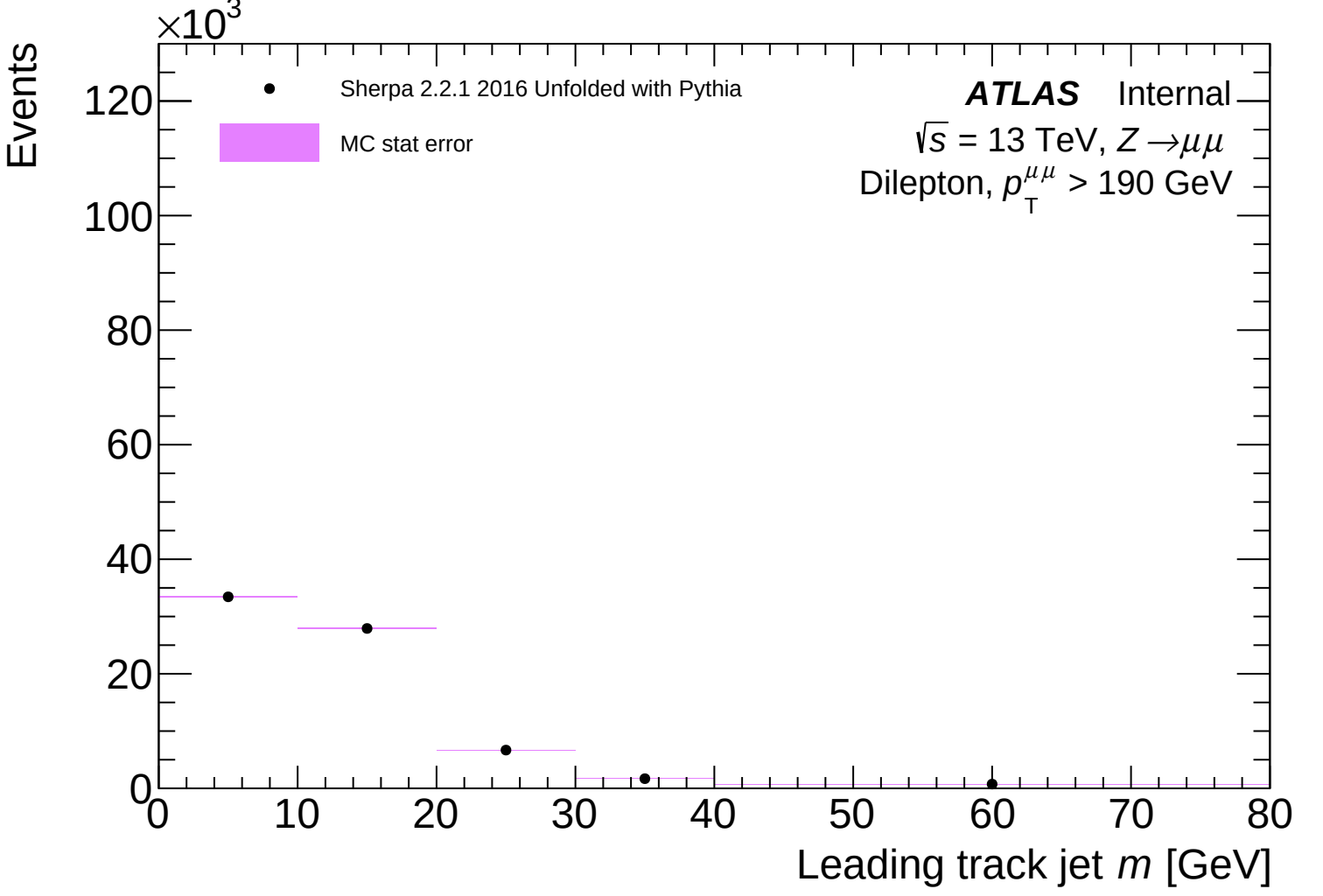

$\times 10^3$
70
60
50
40
30
20
10
0
$dN / d\phi_{j1}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Leading track jet ϕ

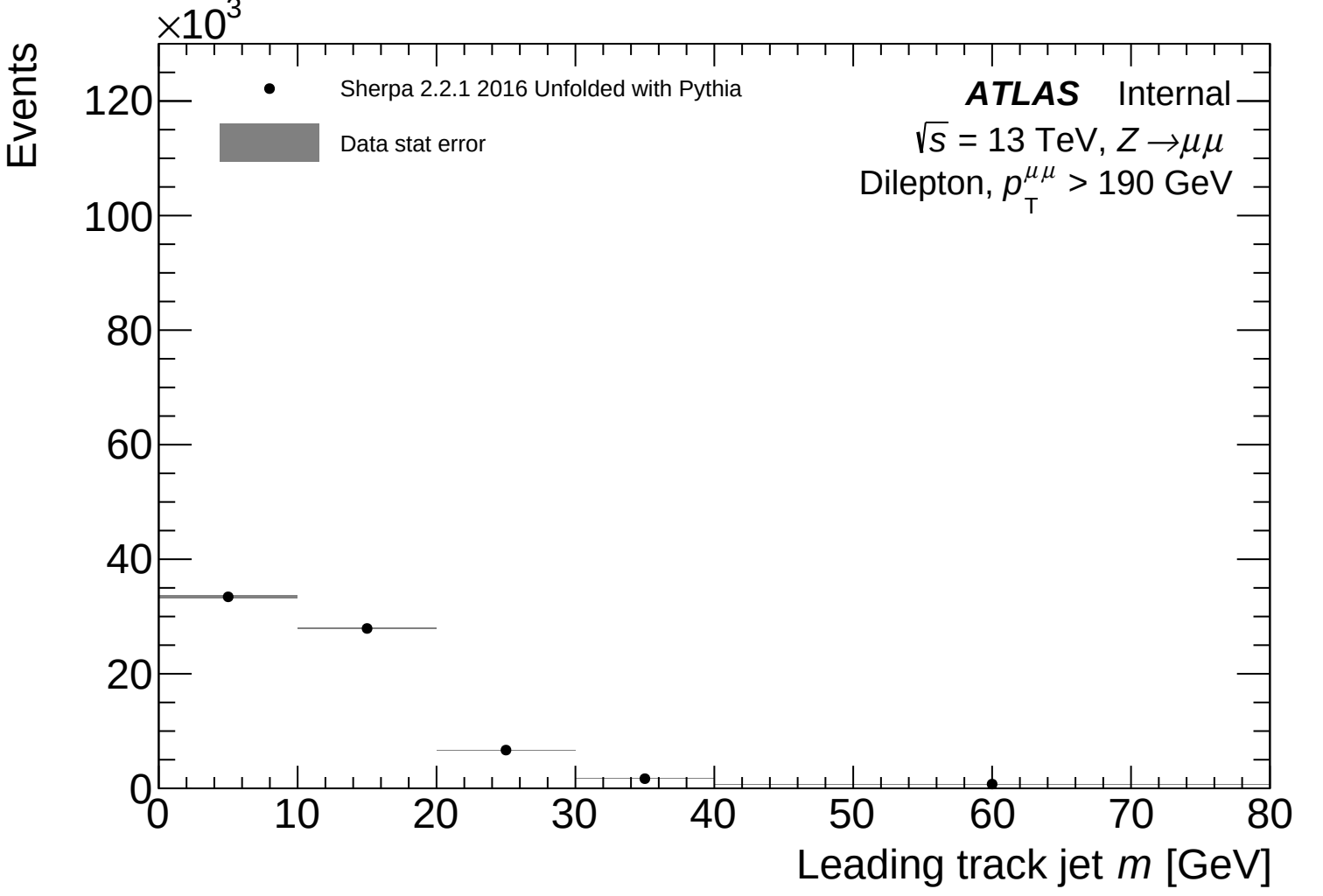

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
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20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
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20
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40
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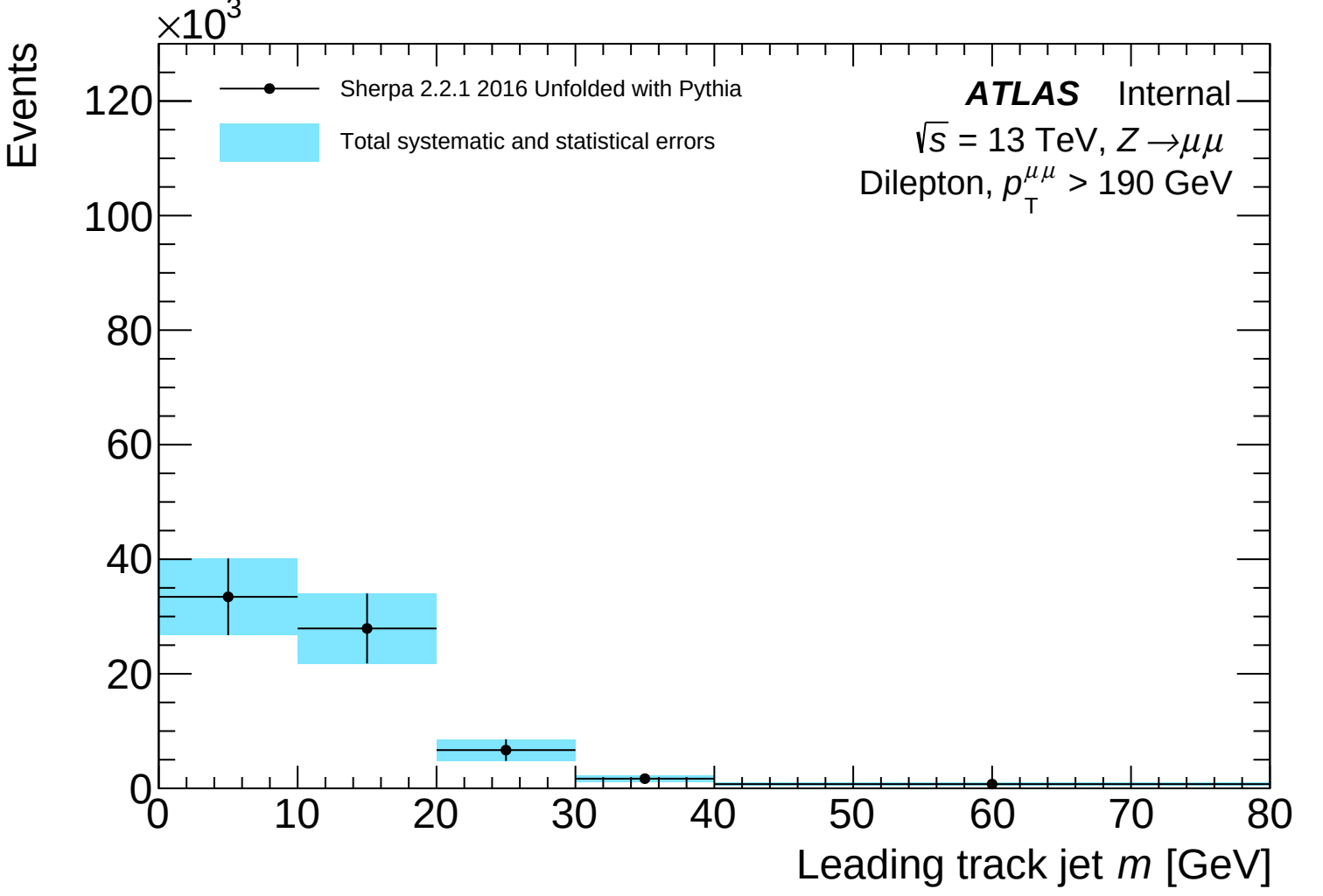
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
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20
0
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10
20
30
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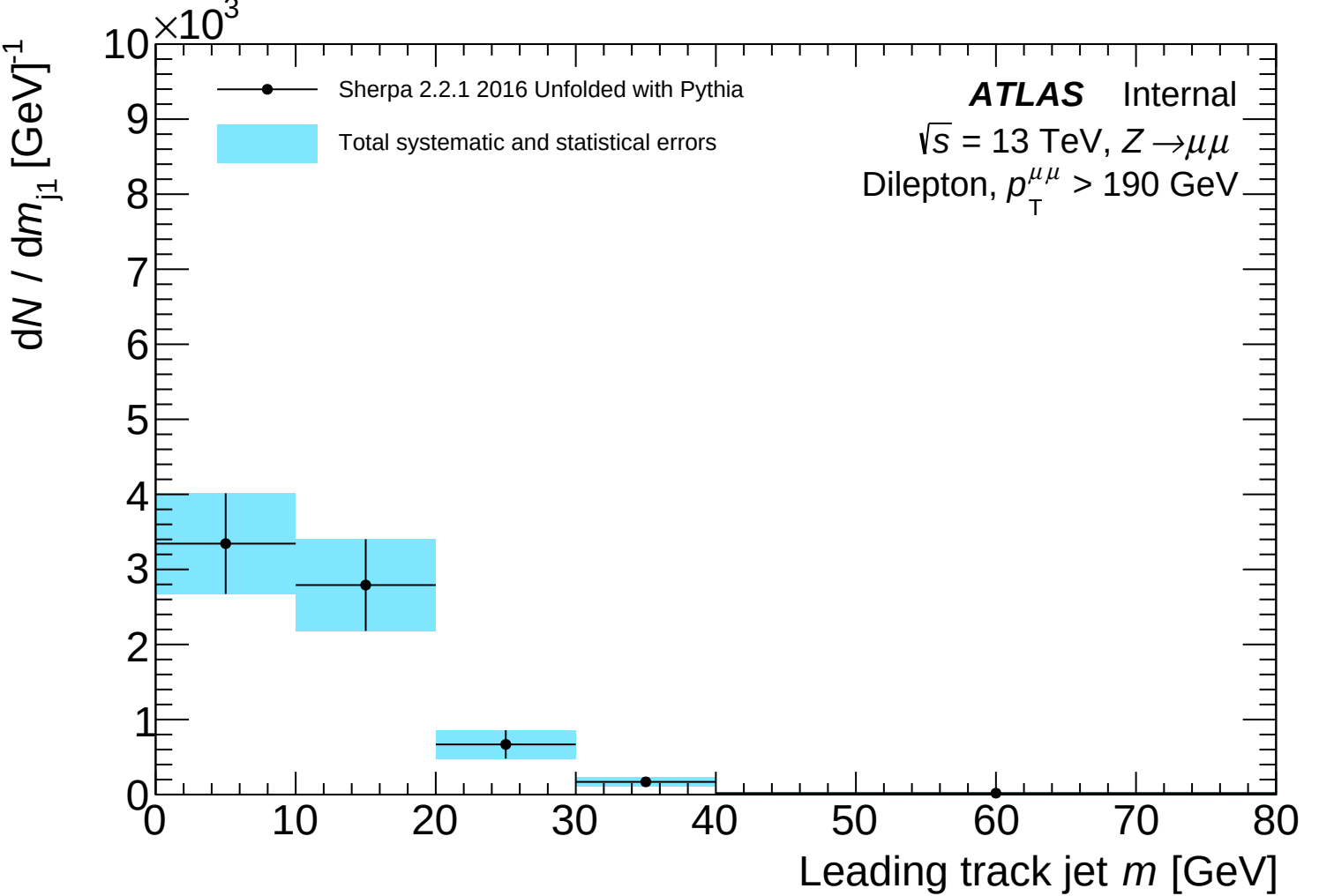
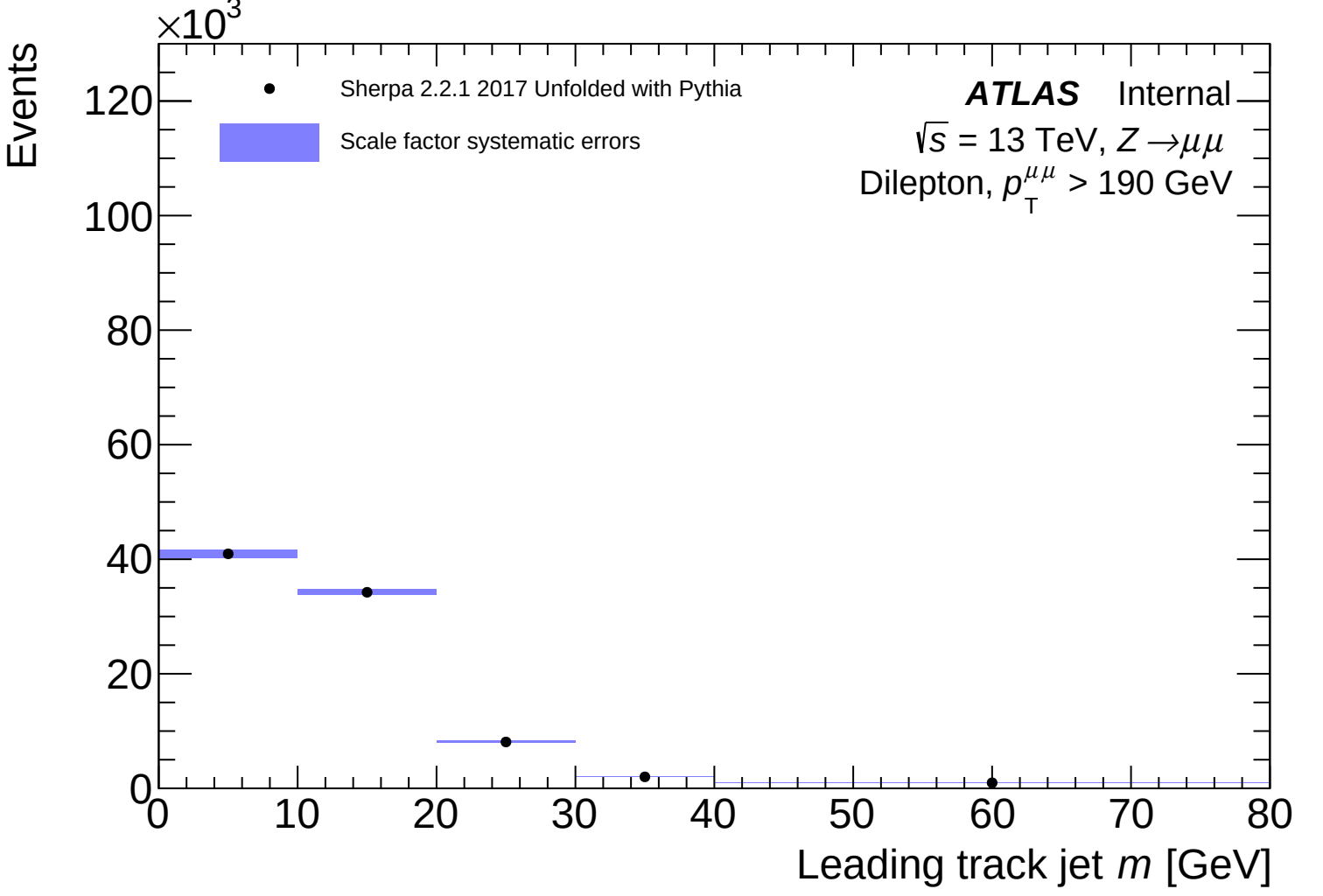
50
60
70
80
Leading track jet m [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


$\times 10^{3}$
$\frac{dN}{dm_{j1}}$ [GeV]$^{-1}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV
Leading track jet m [GeV]
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40
50
60
70
80


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
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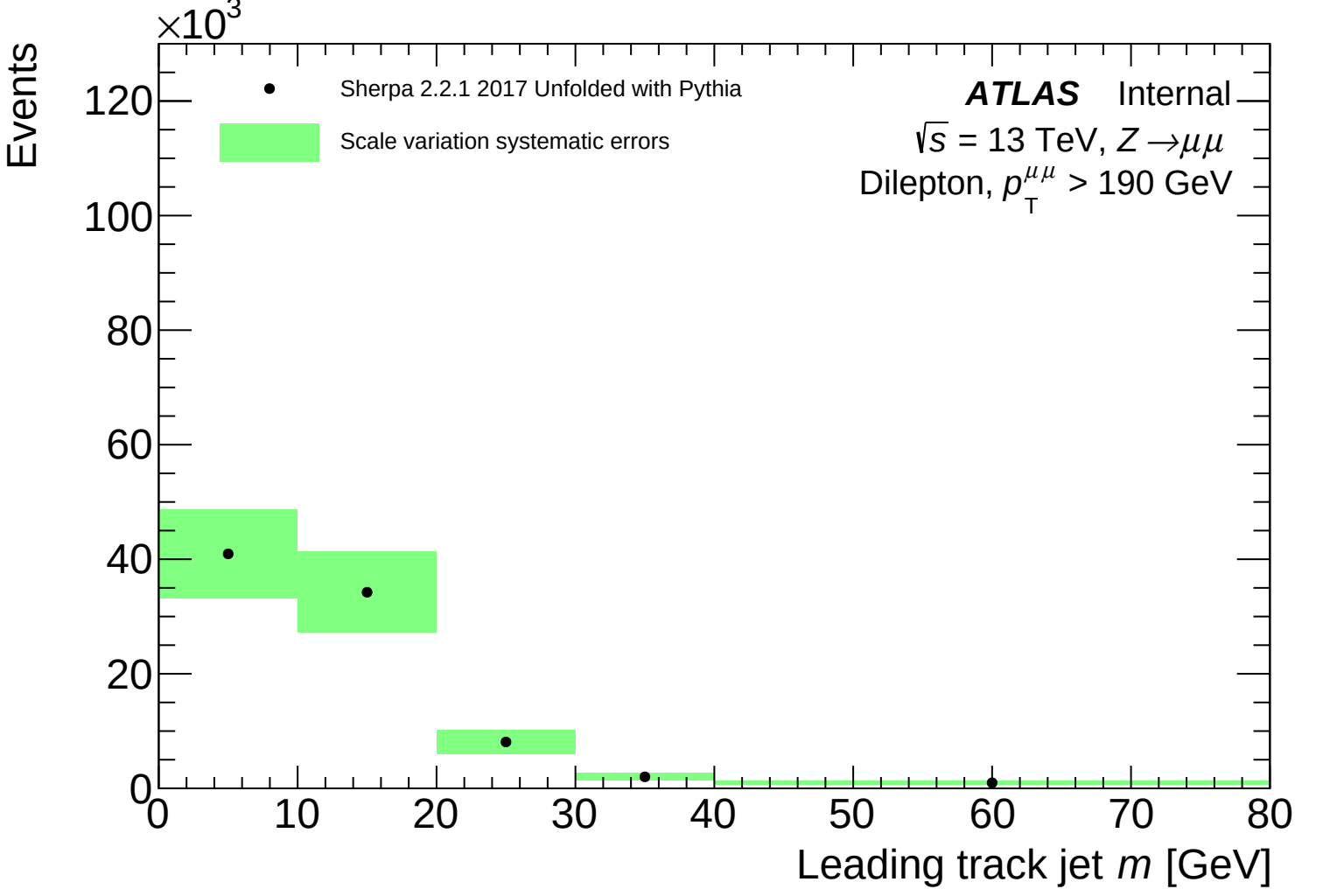
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
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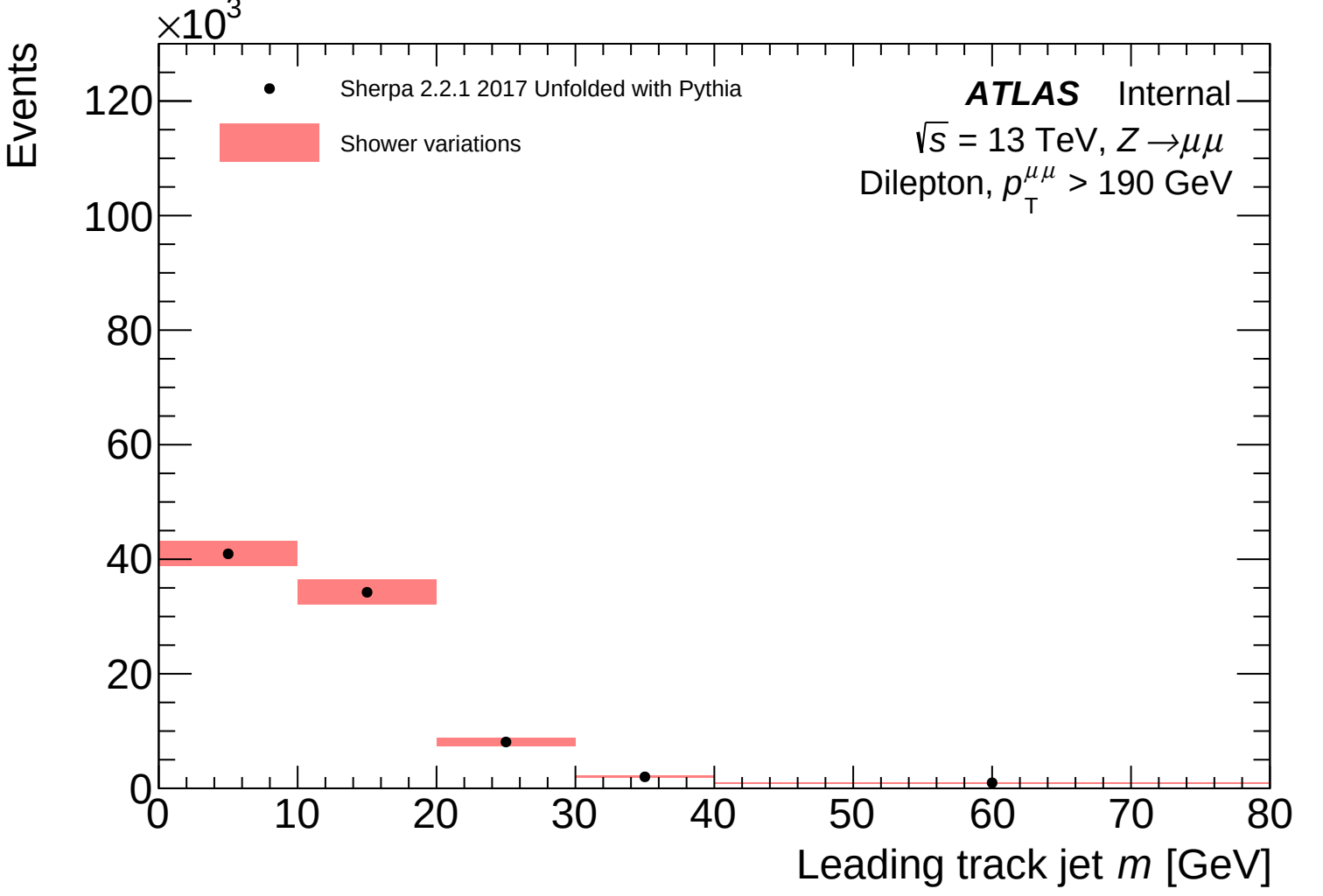
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
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20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
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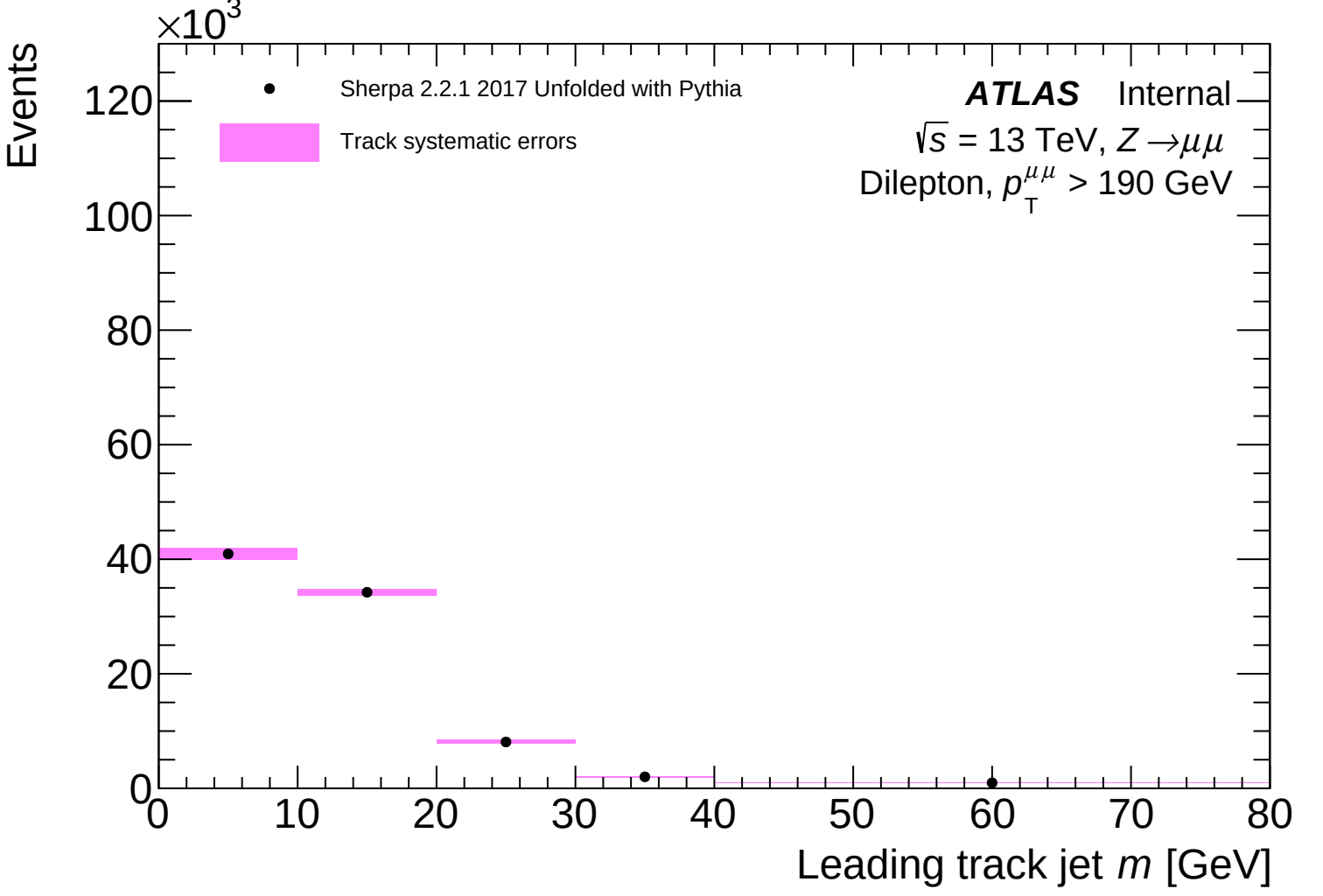
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
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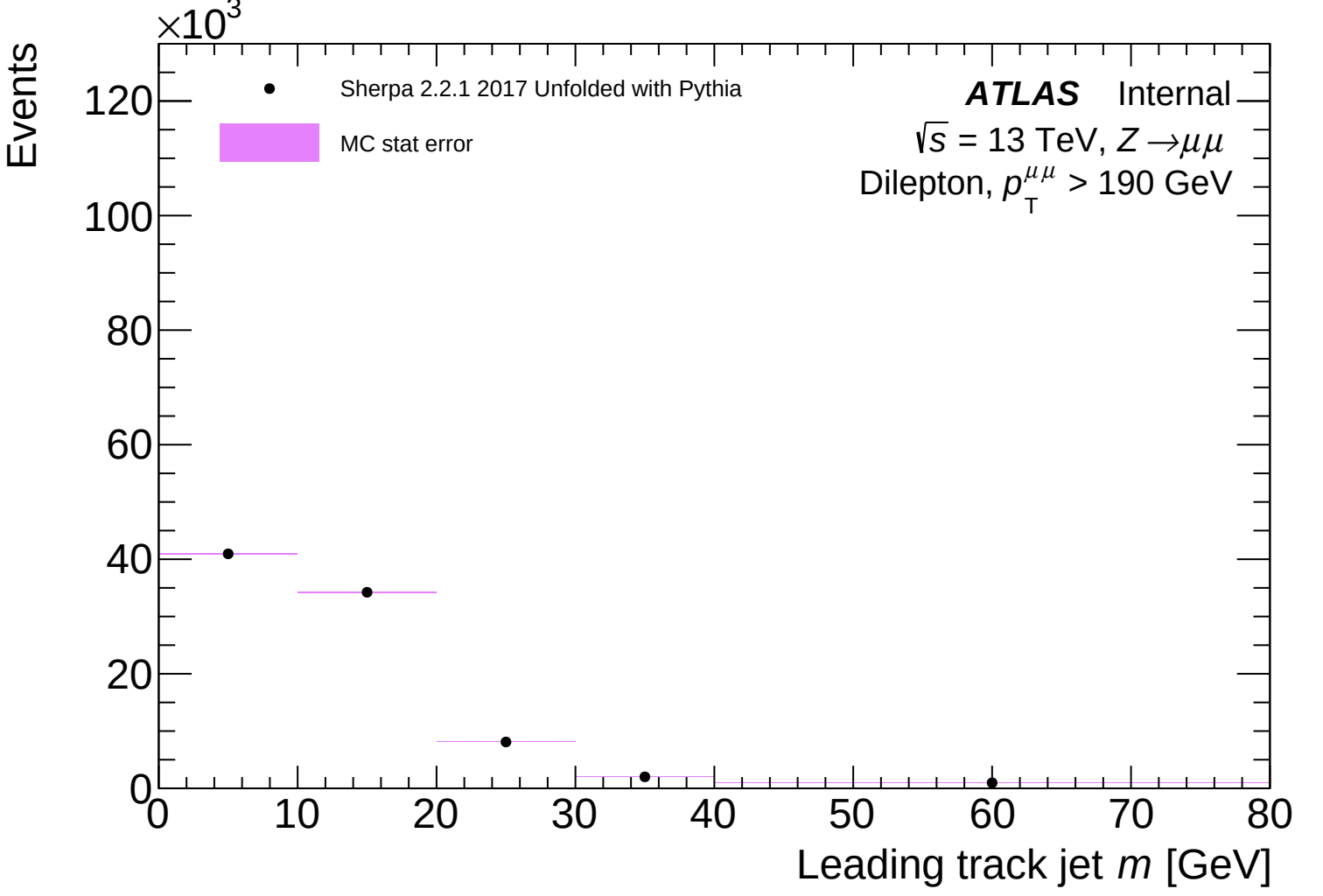
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
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40
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60
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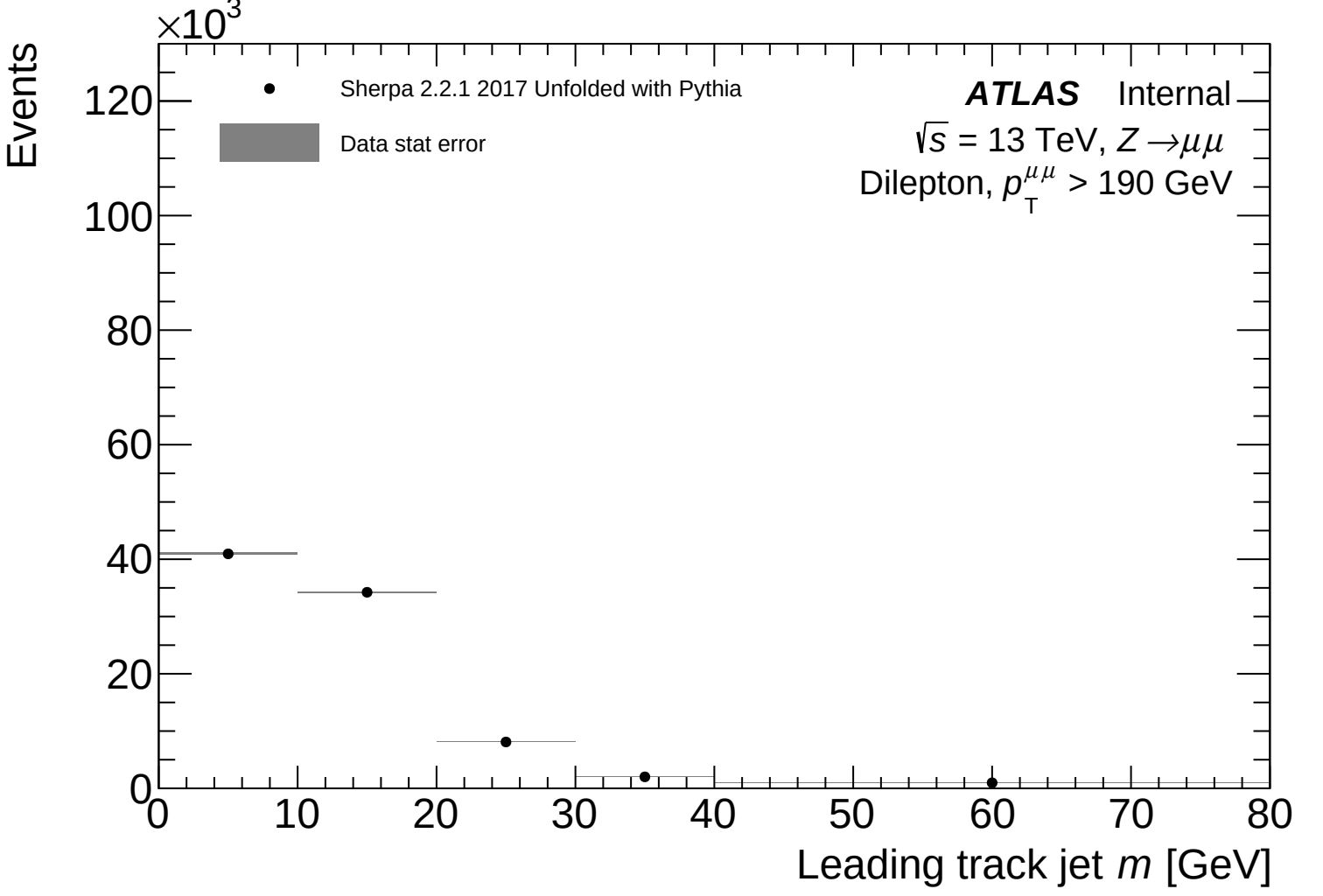
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
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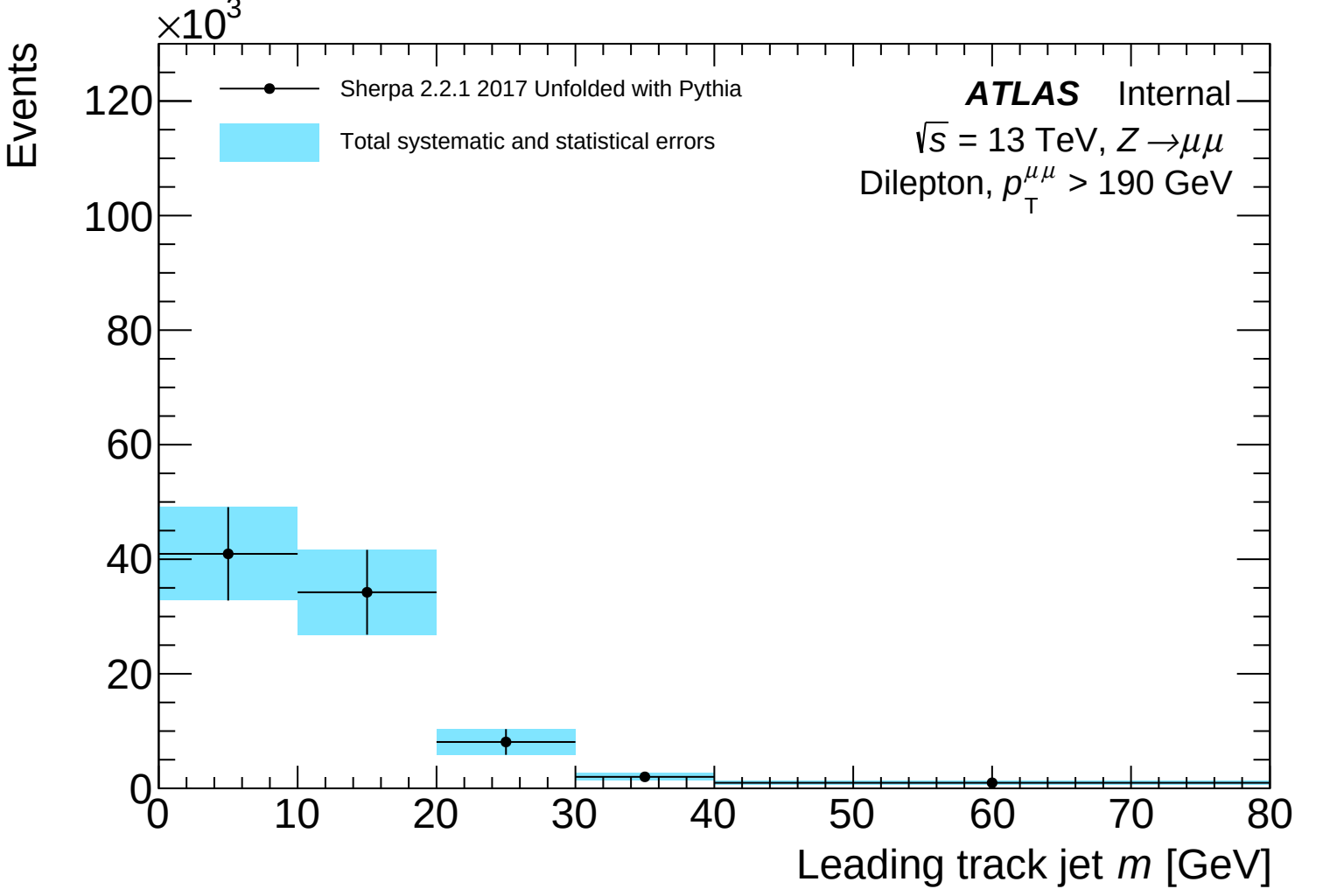
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
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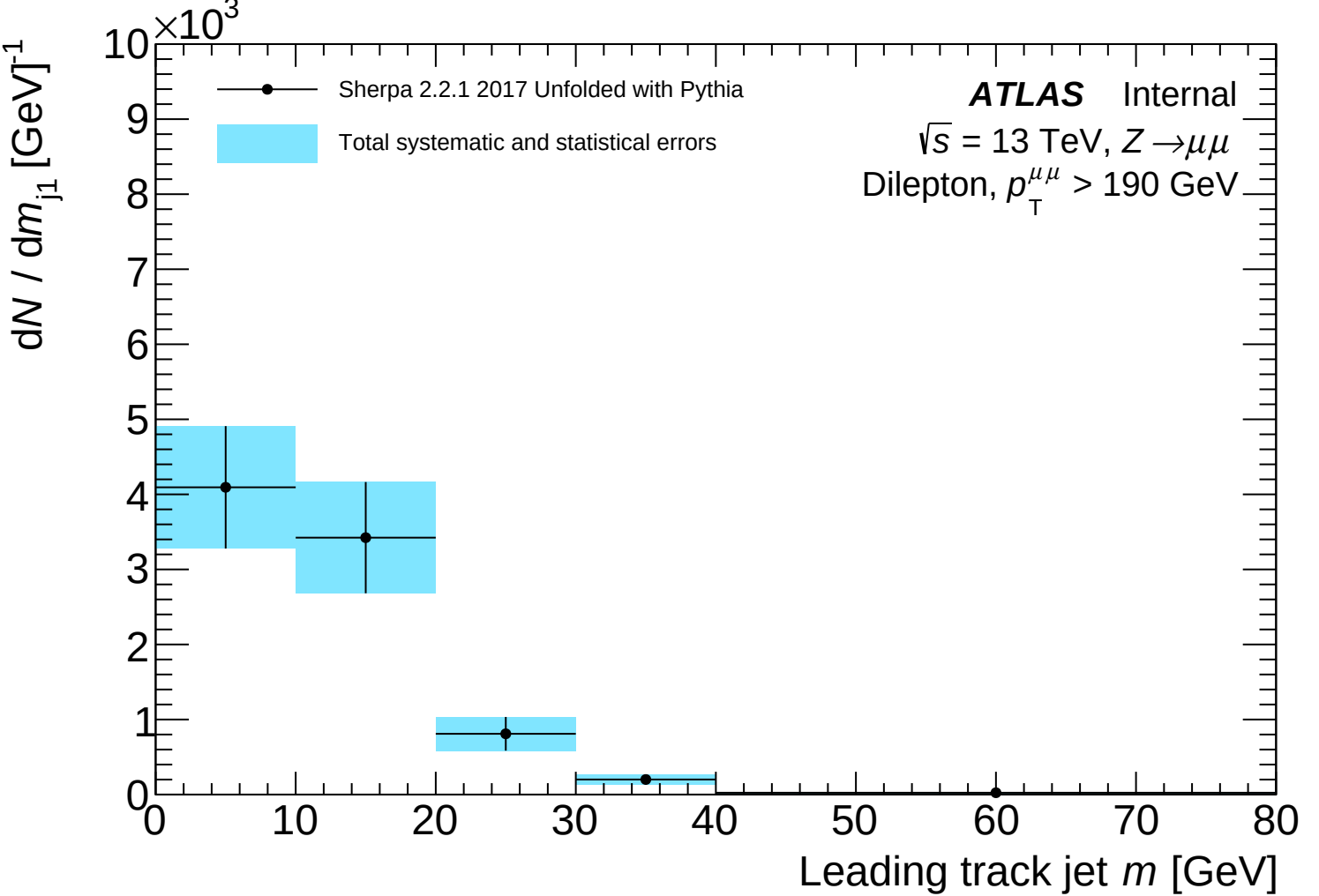
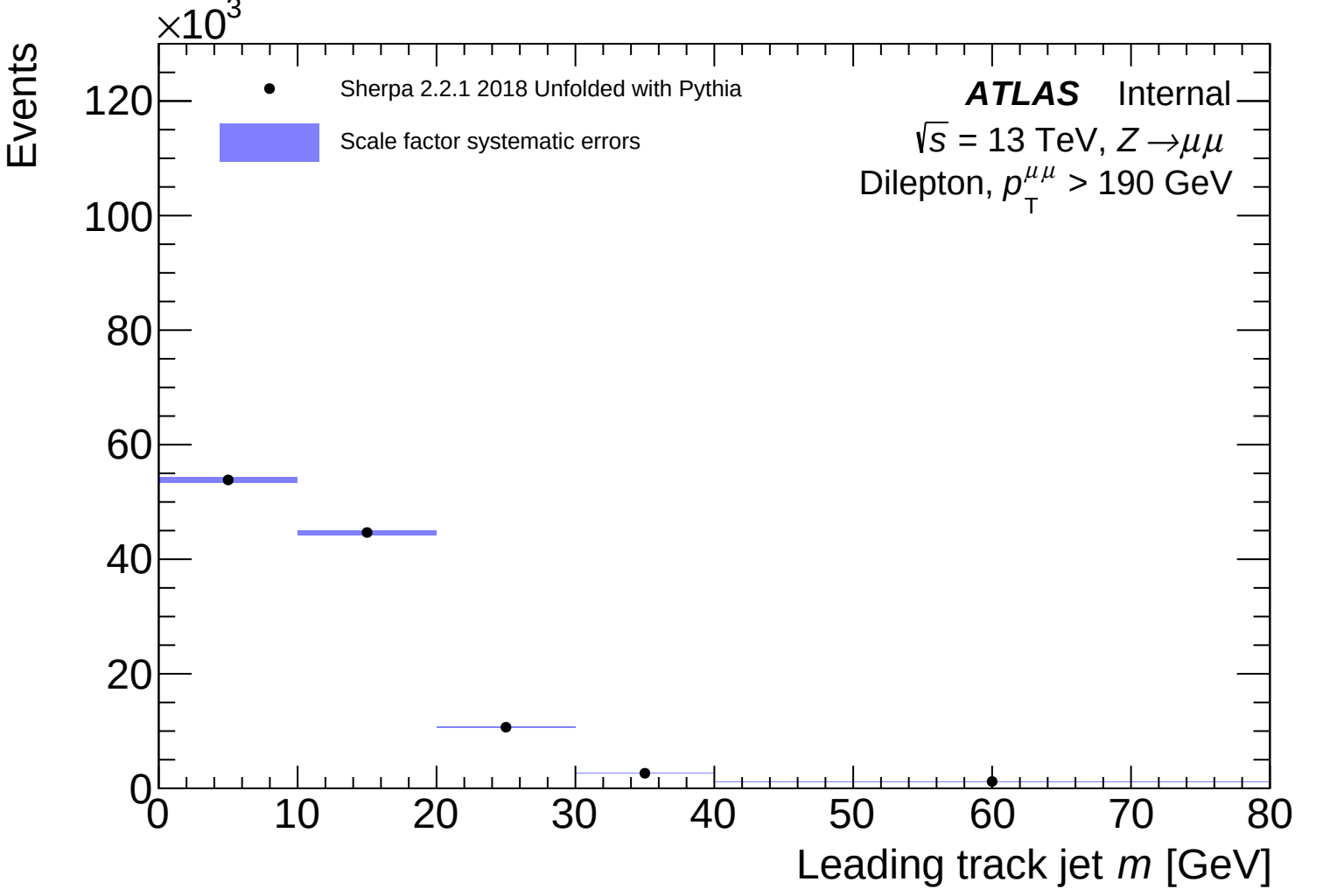
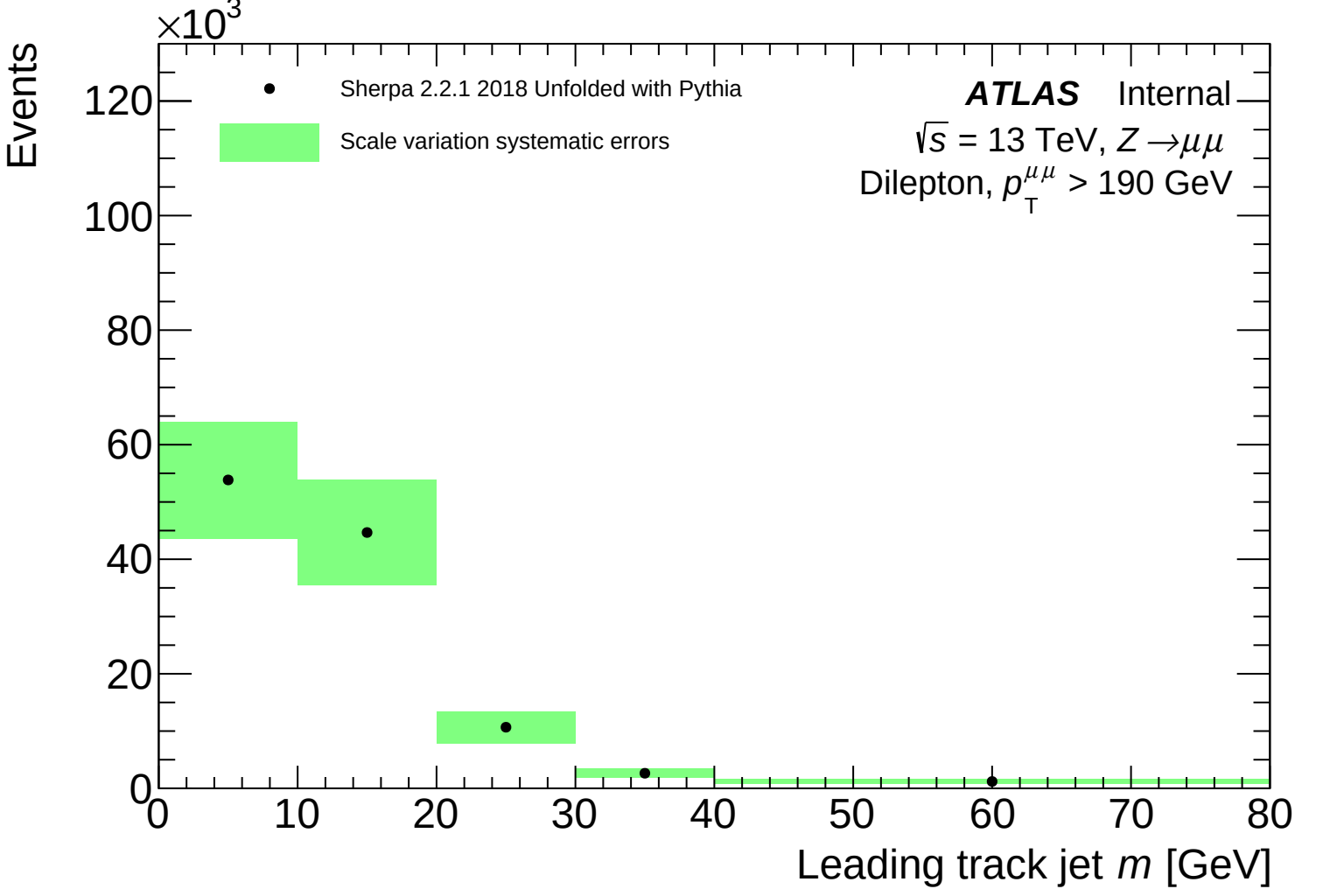
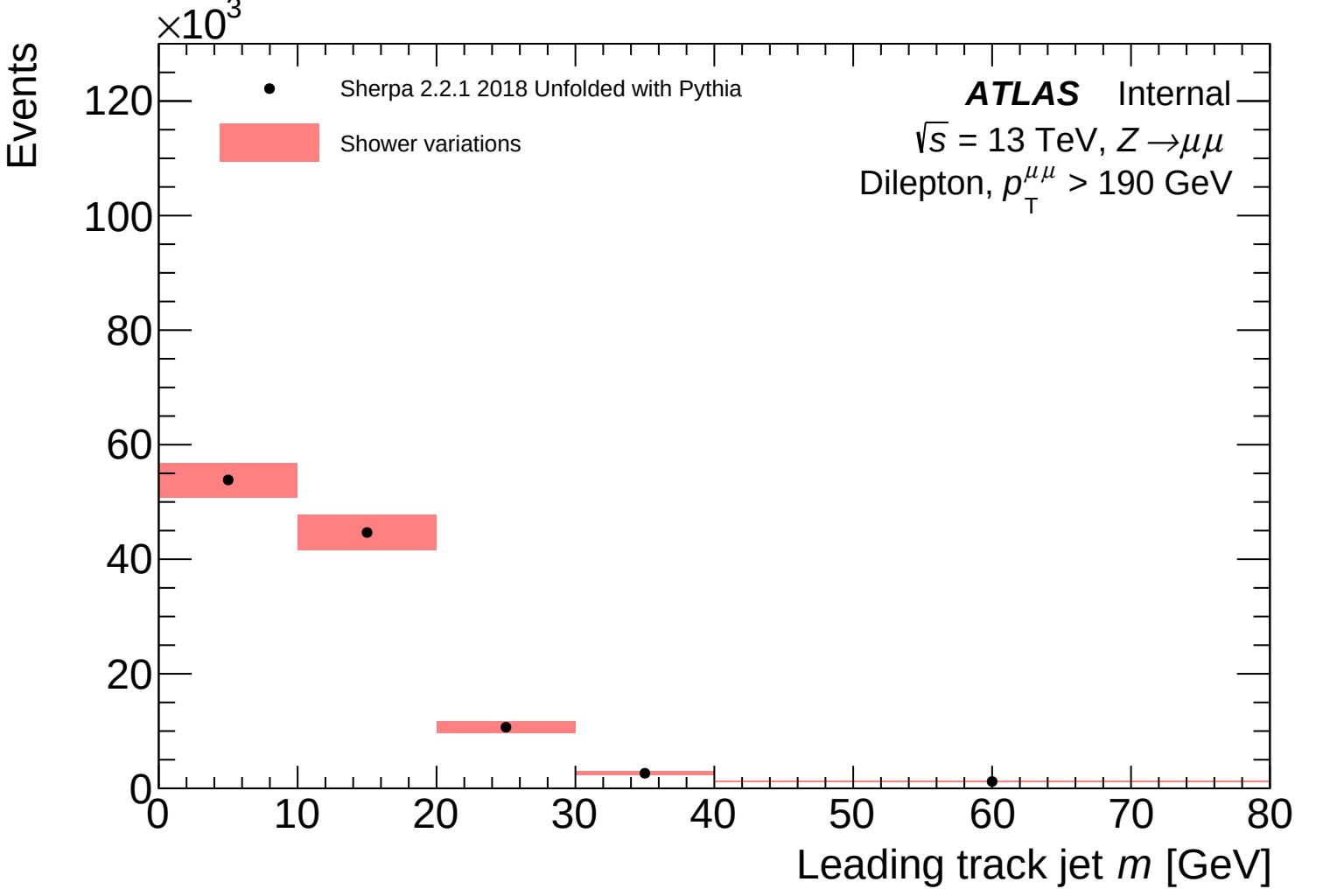
80
Leading track jet m [GeV]

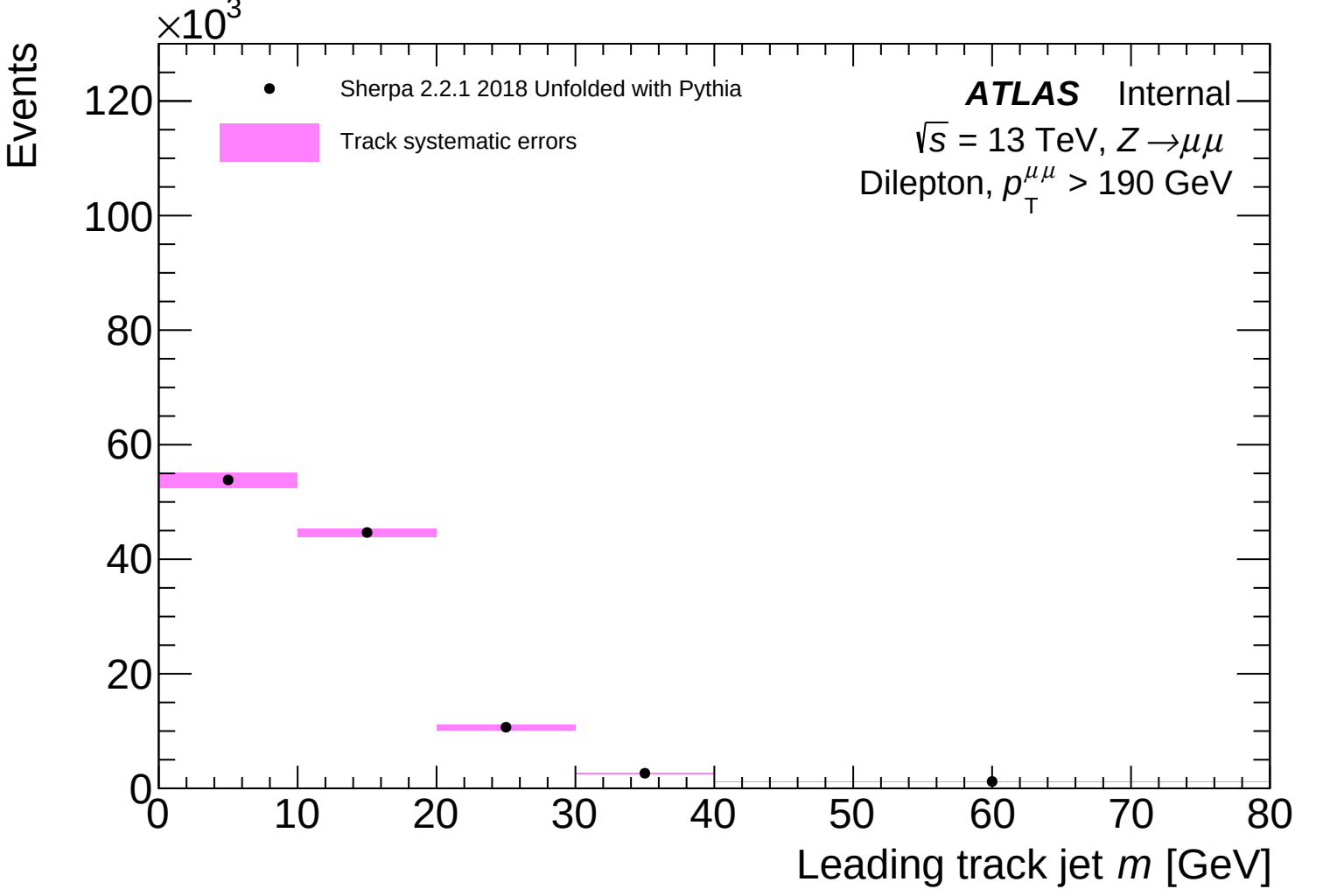


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \to \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
dN / dm_{j1} [GeV]$^{-1}$
$\times 10^3$
Leading track jet m [GeV]
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40
50
60
70
80


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
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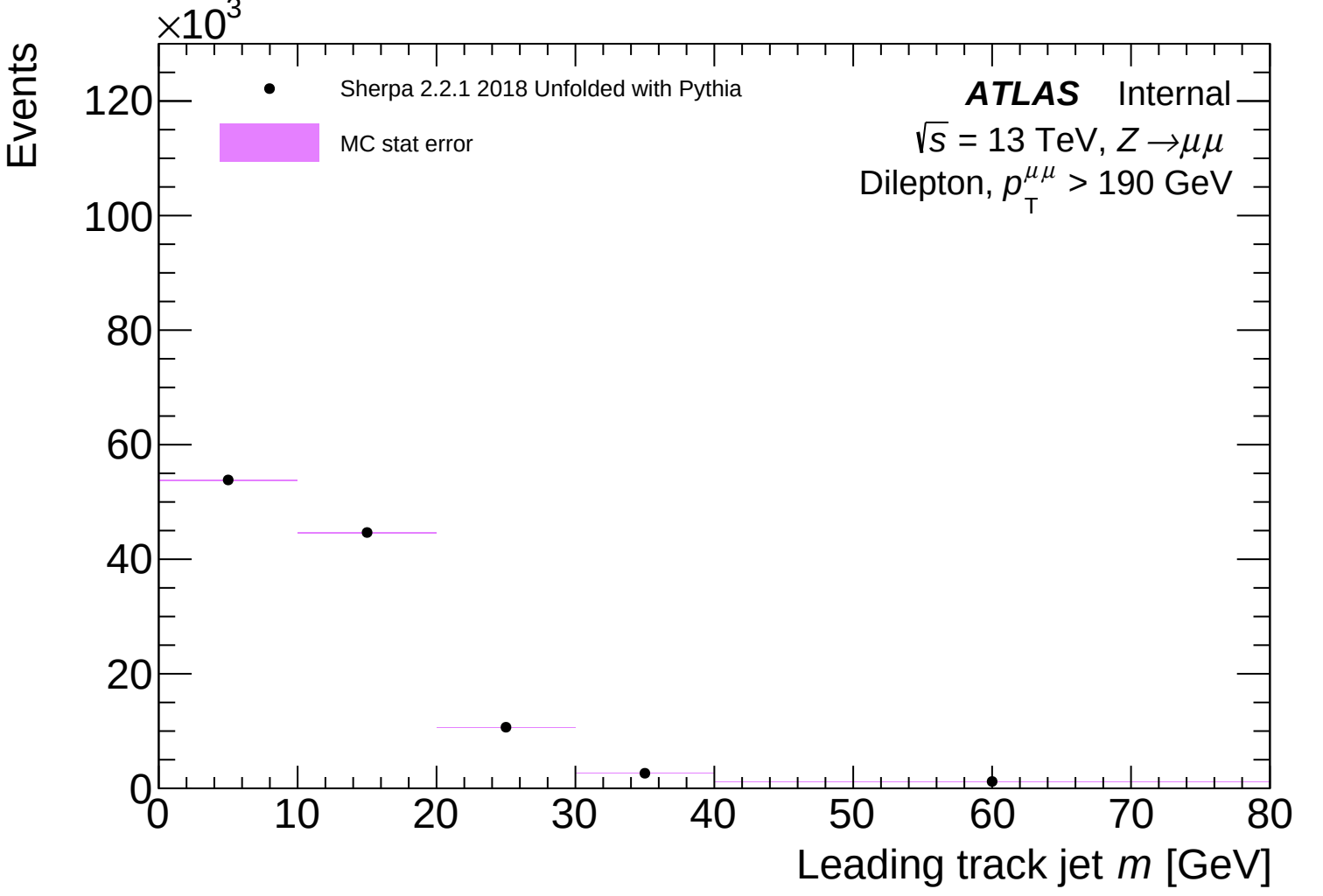
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
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40
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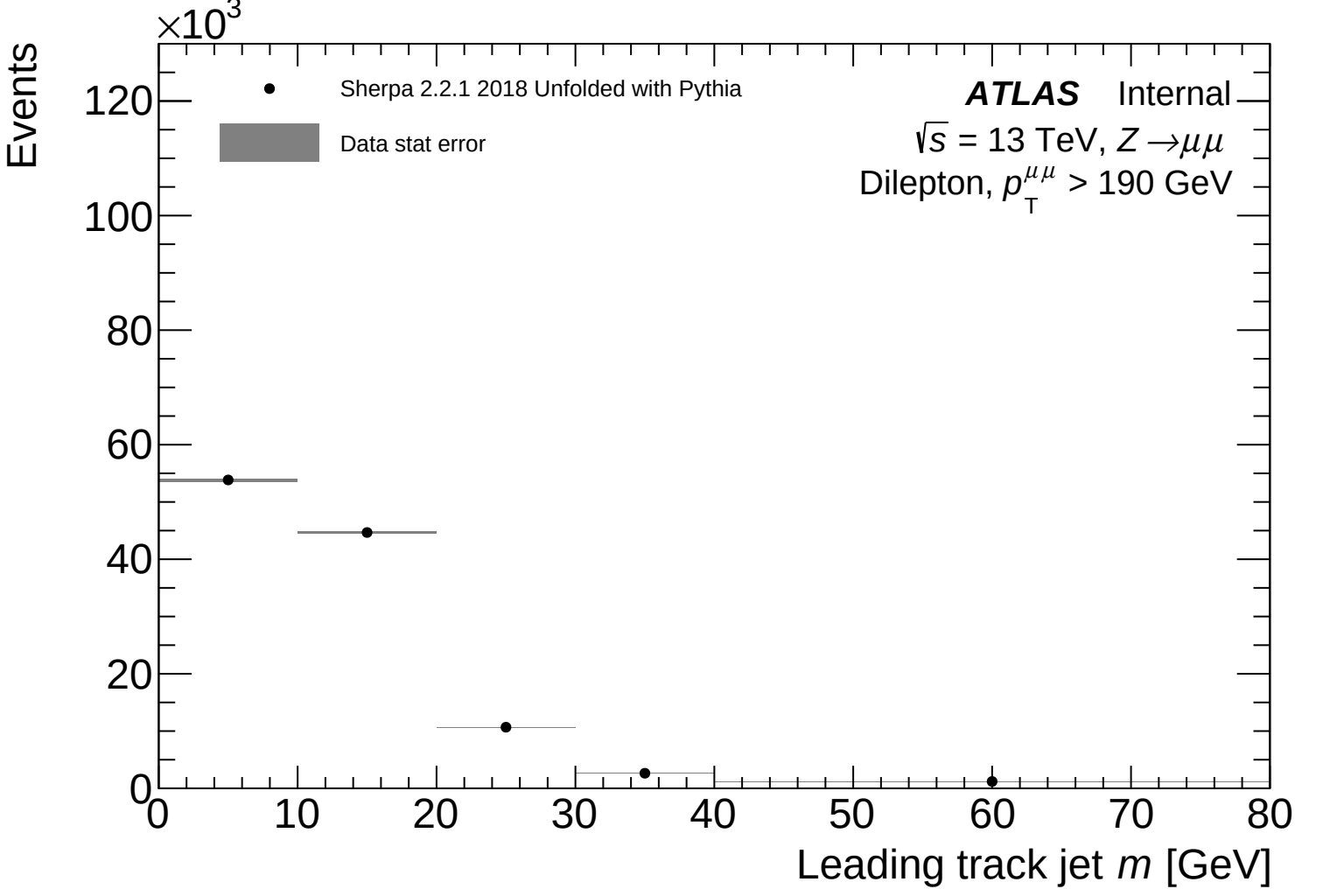
60
70
80
Leading track jet m [GeV]


Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
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40
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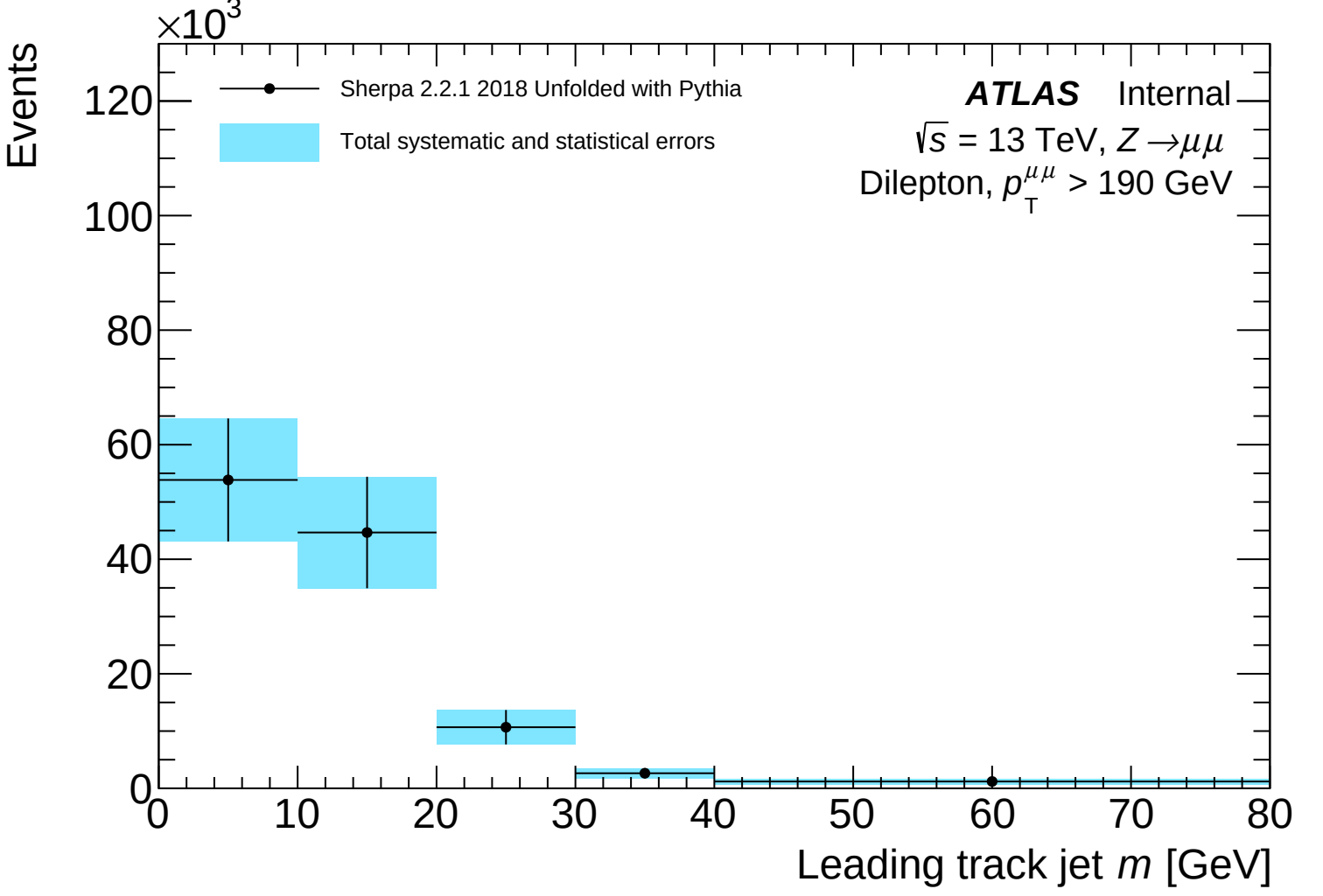
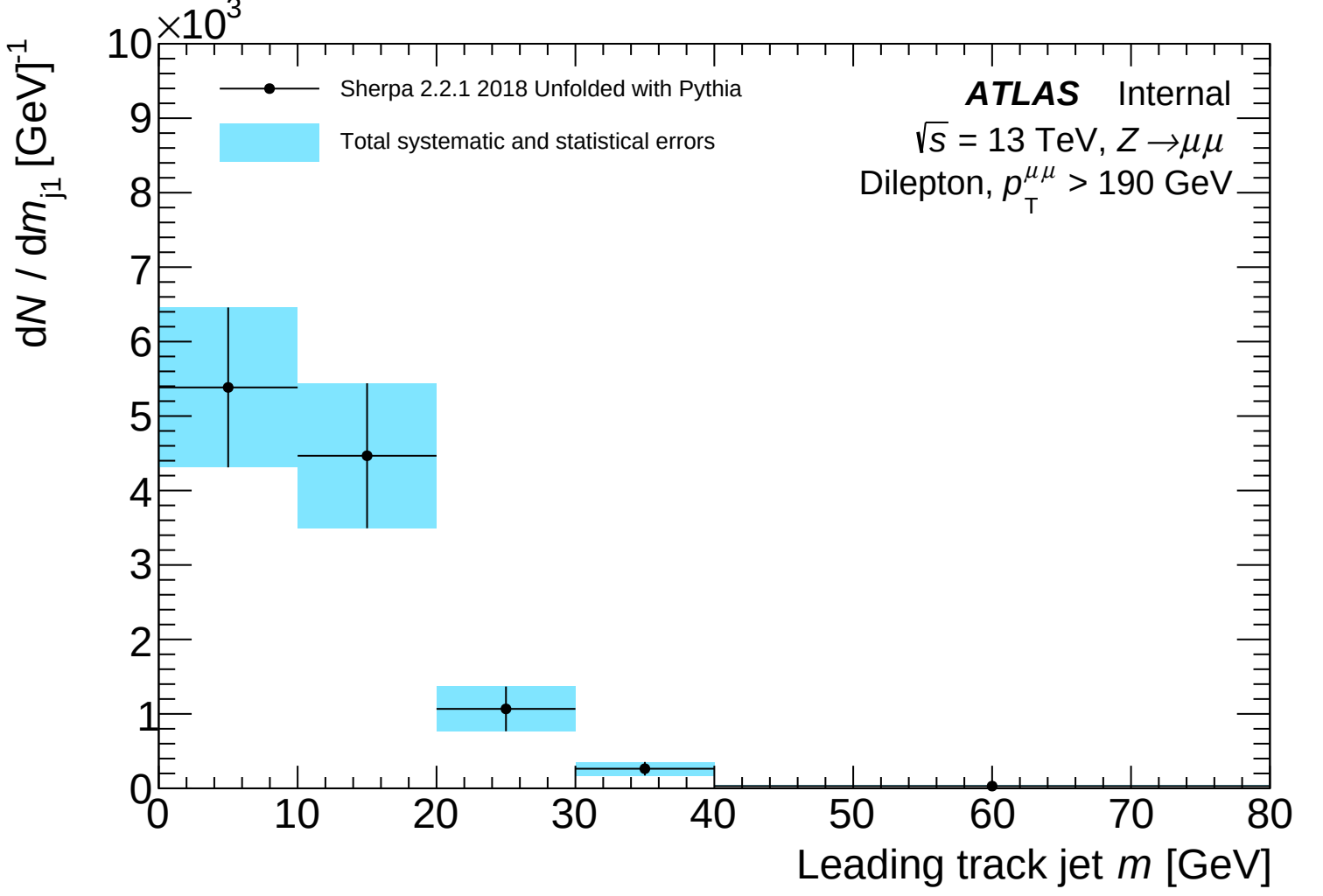
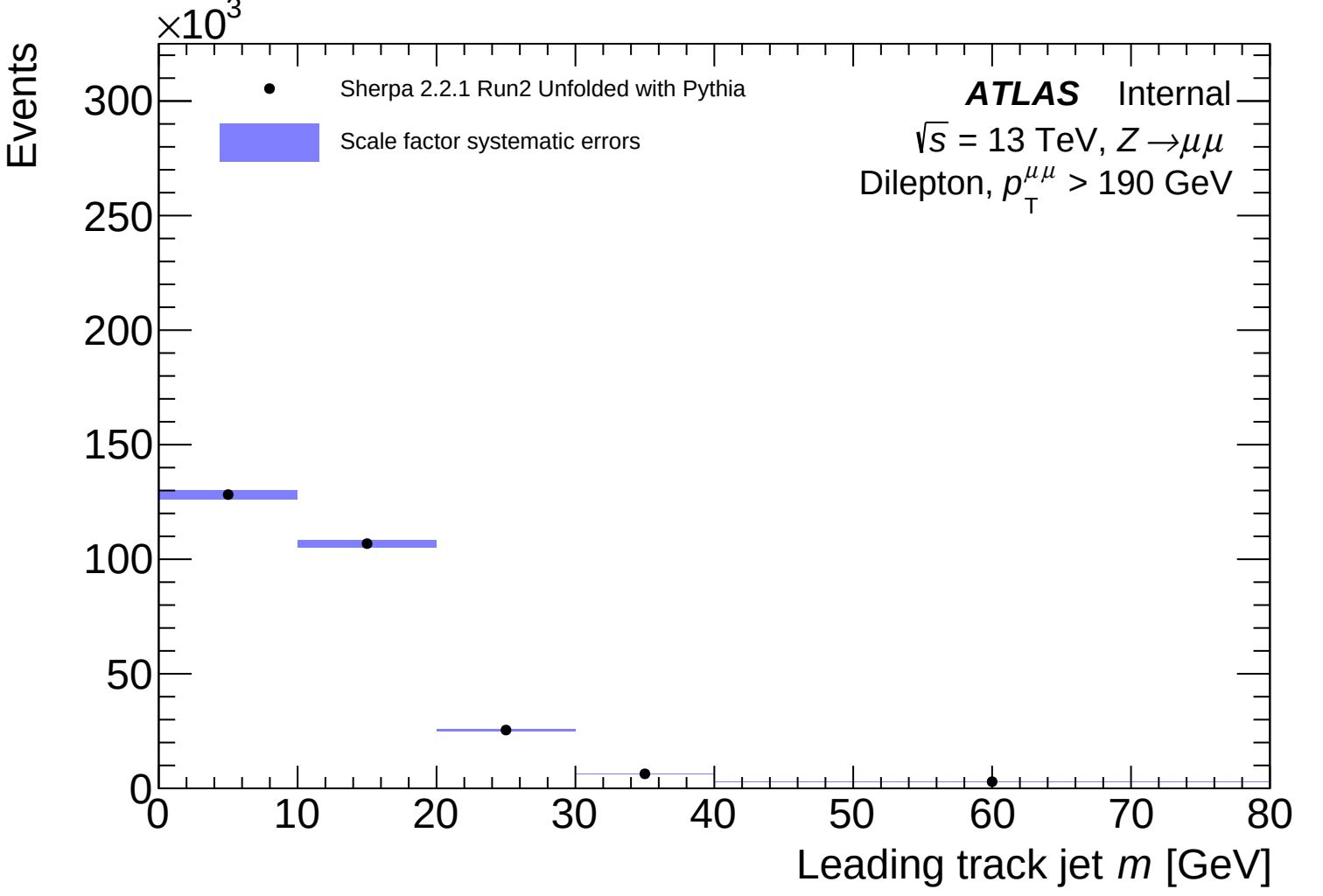
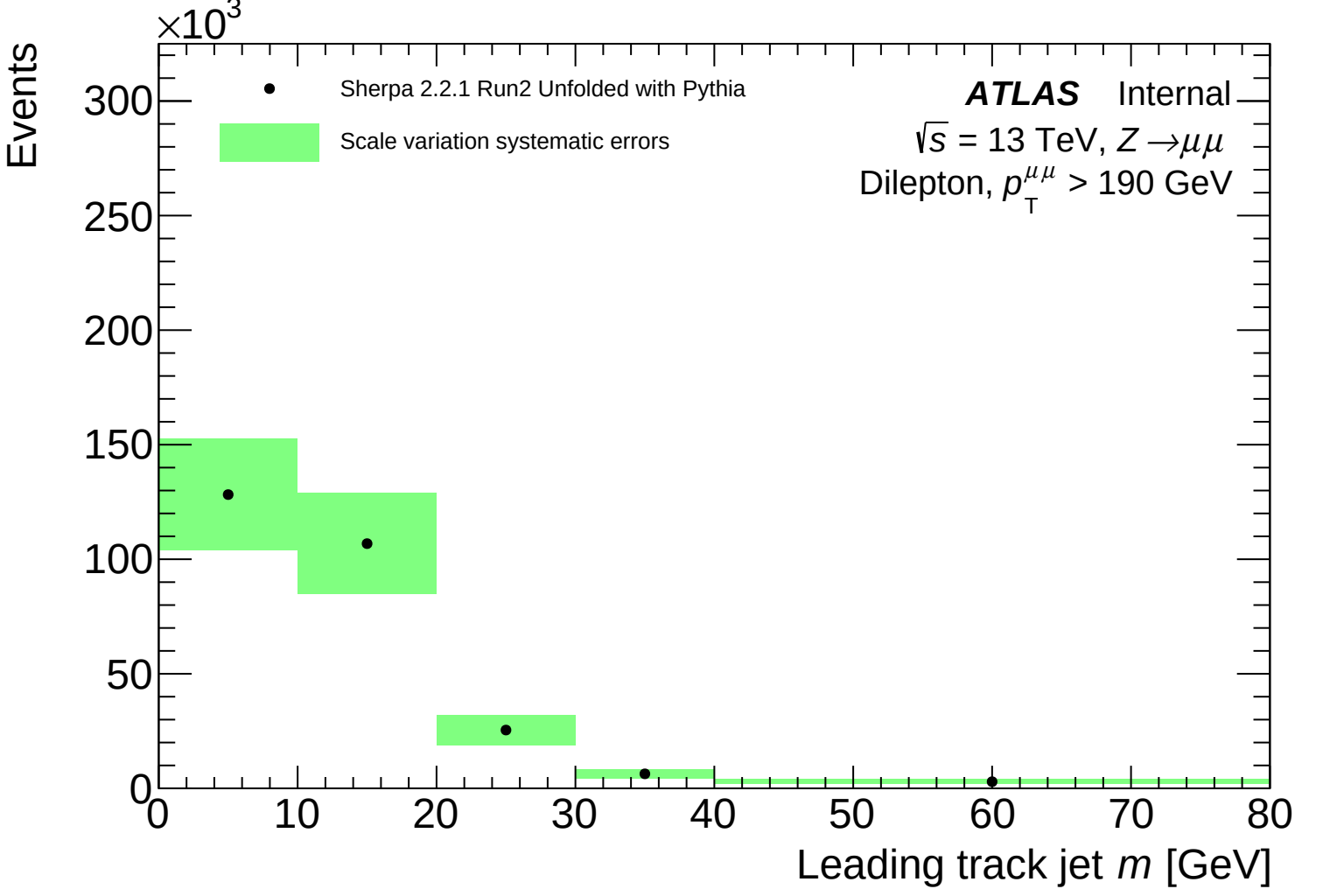
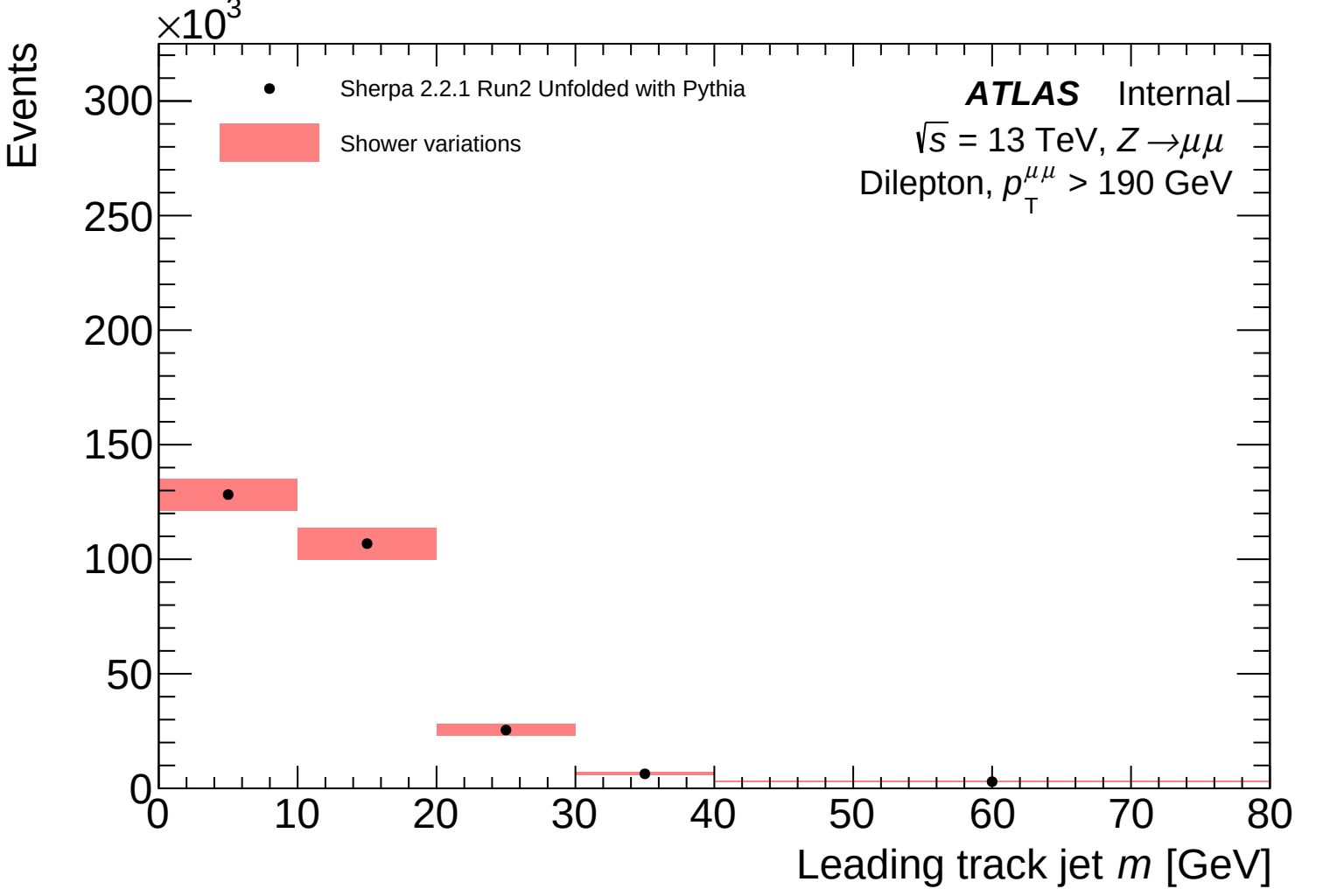
60
70
80
Leading track jet m [GeV]

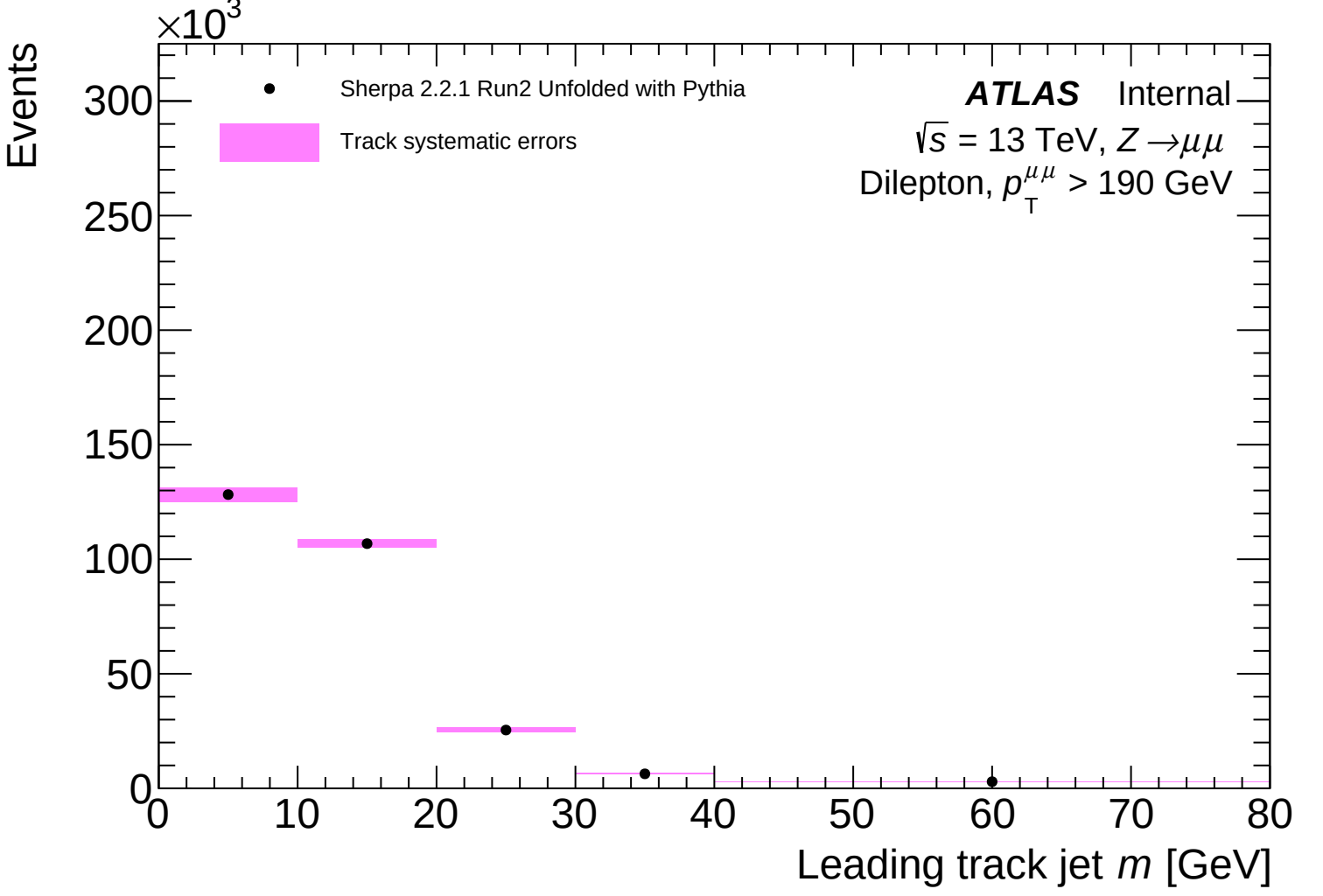

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]

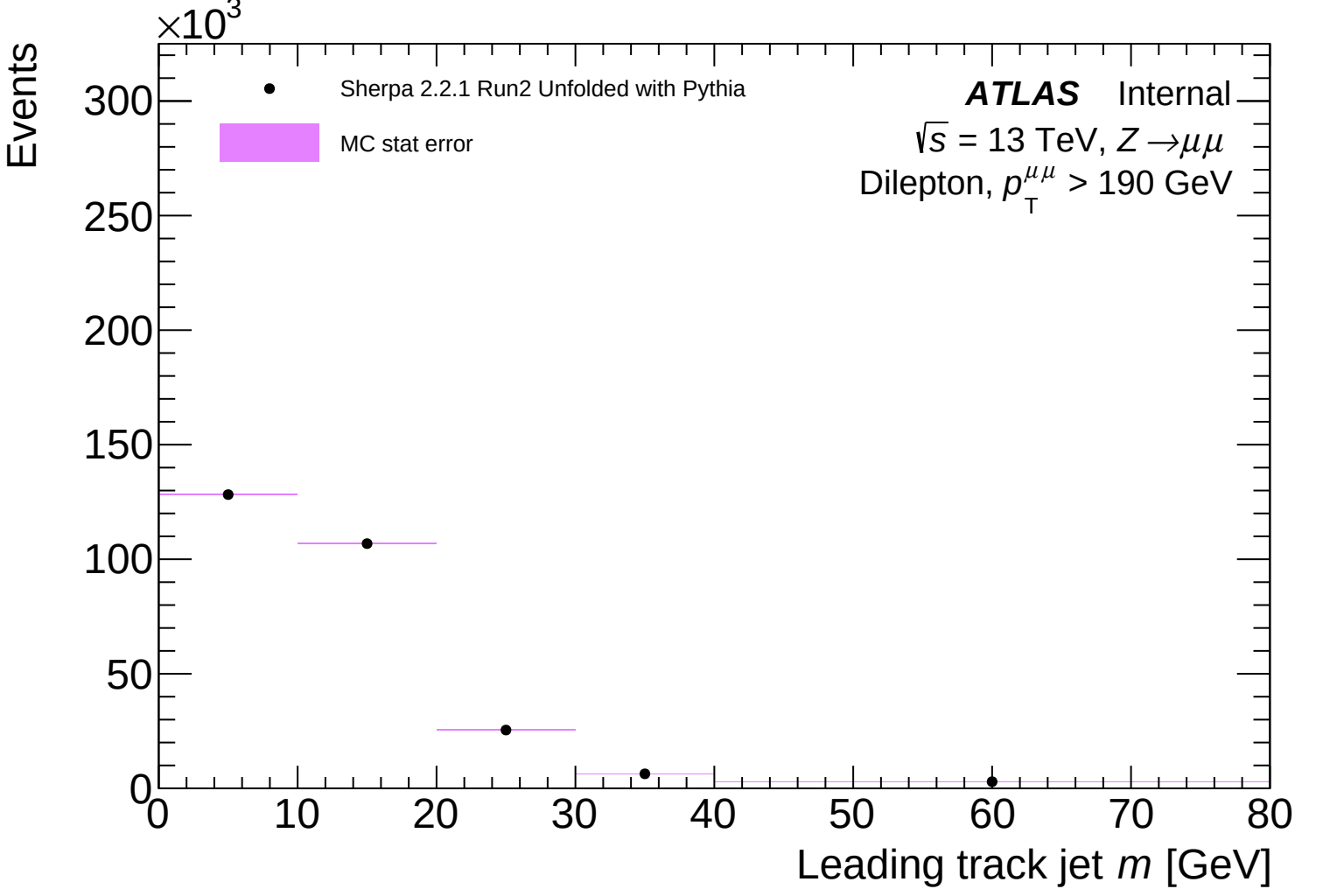

$\times 10^{3}$
dN / dm_{j1} [GeV]$^{-1}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV
Leading track jet m [GeV]
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40
50
60
70
80

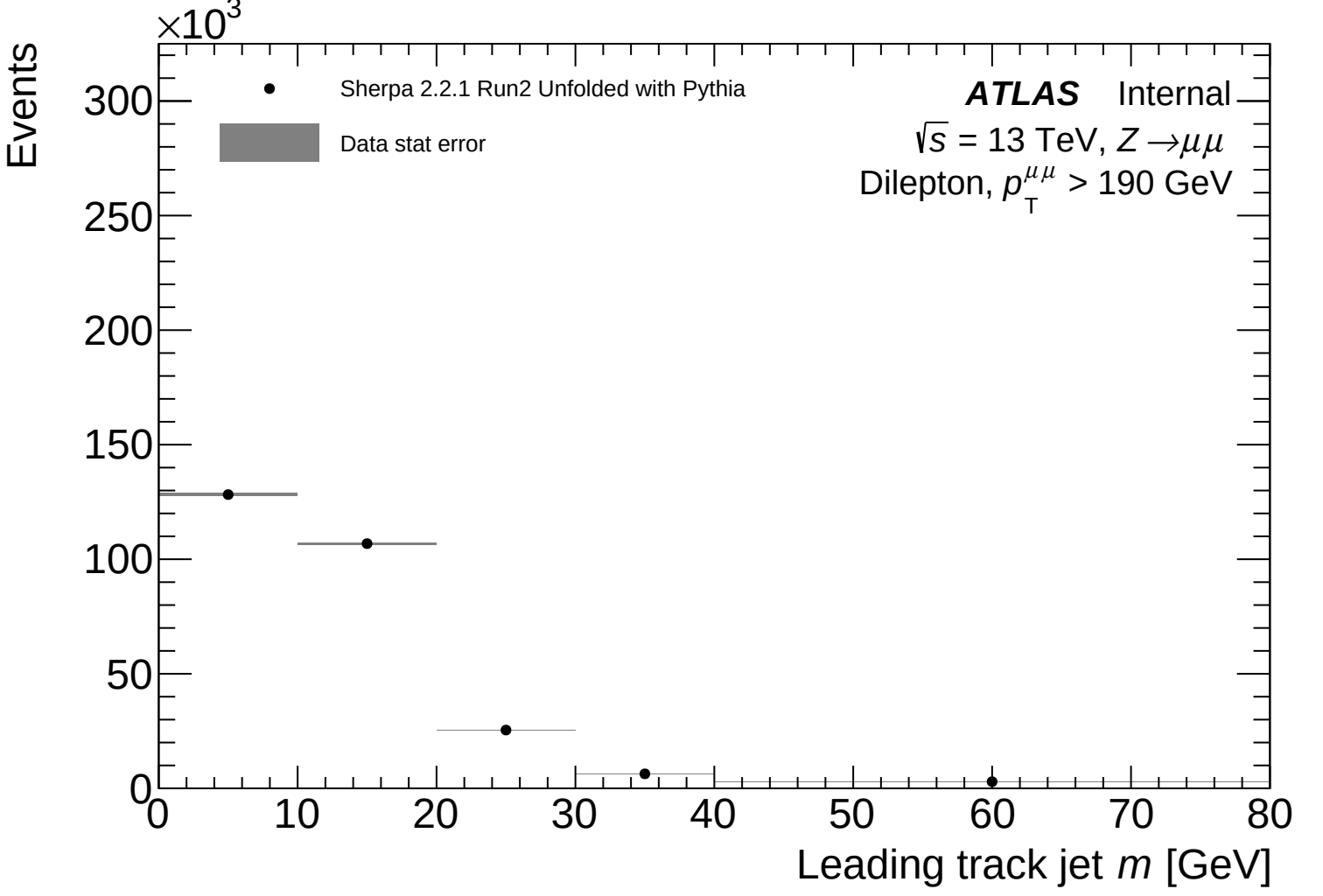

Events
×10^3
300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]

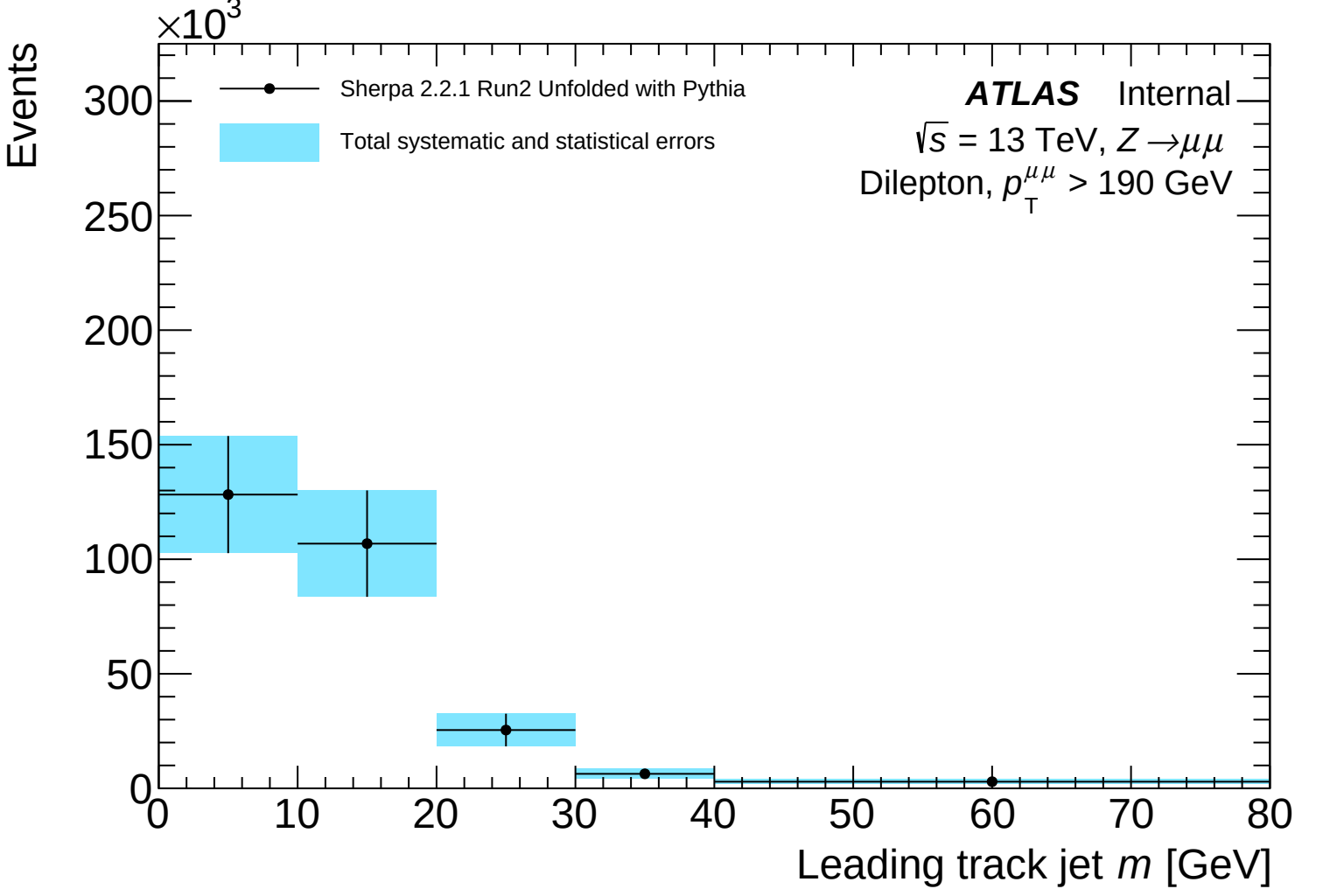

Events
×10^3
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

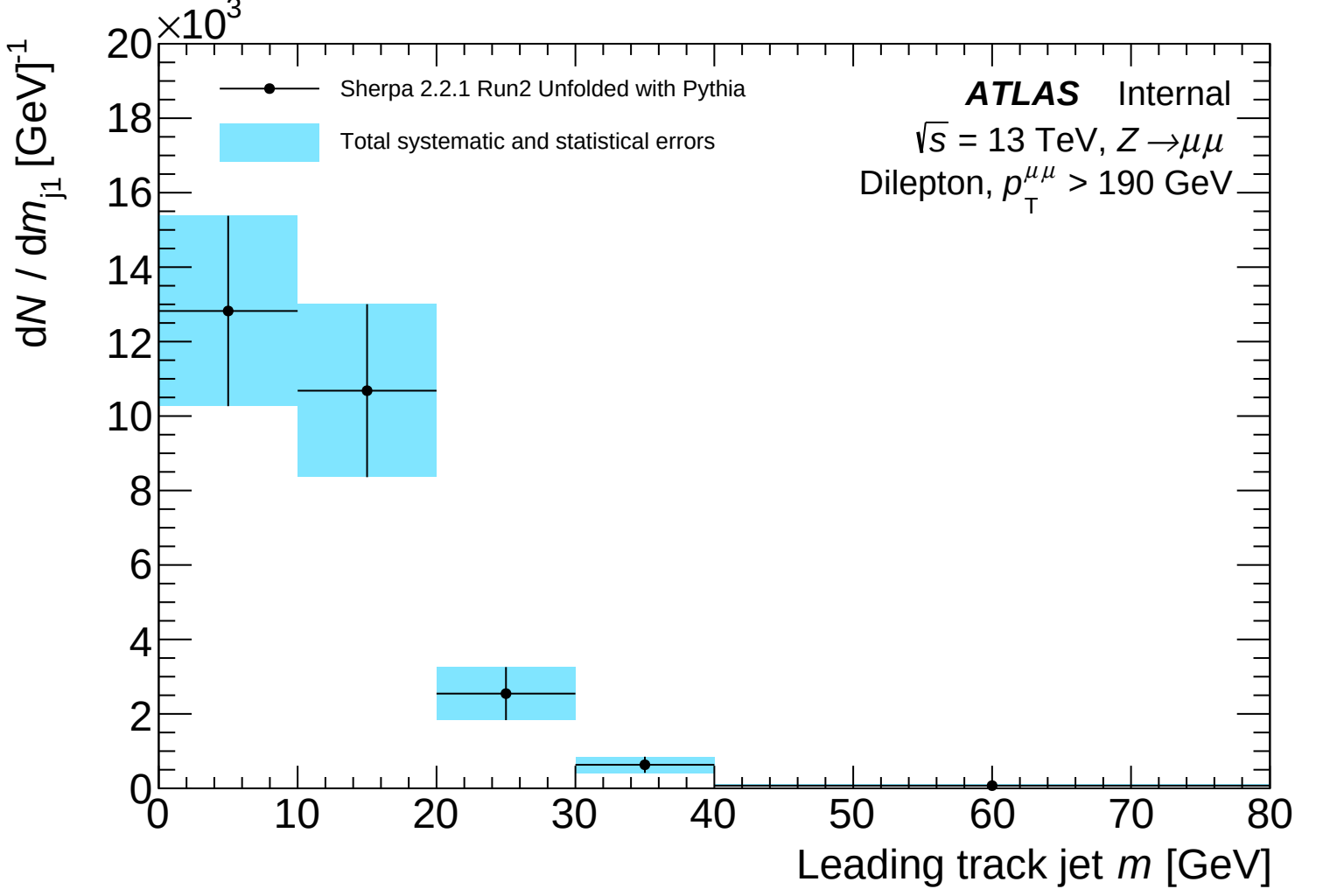

Events
×10^3
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV

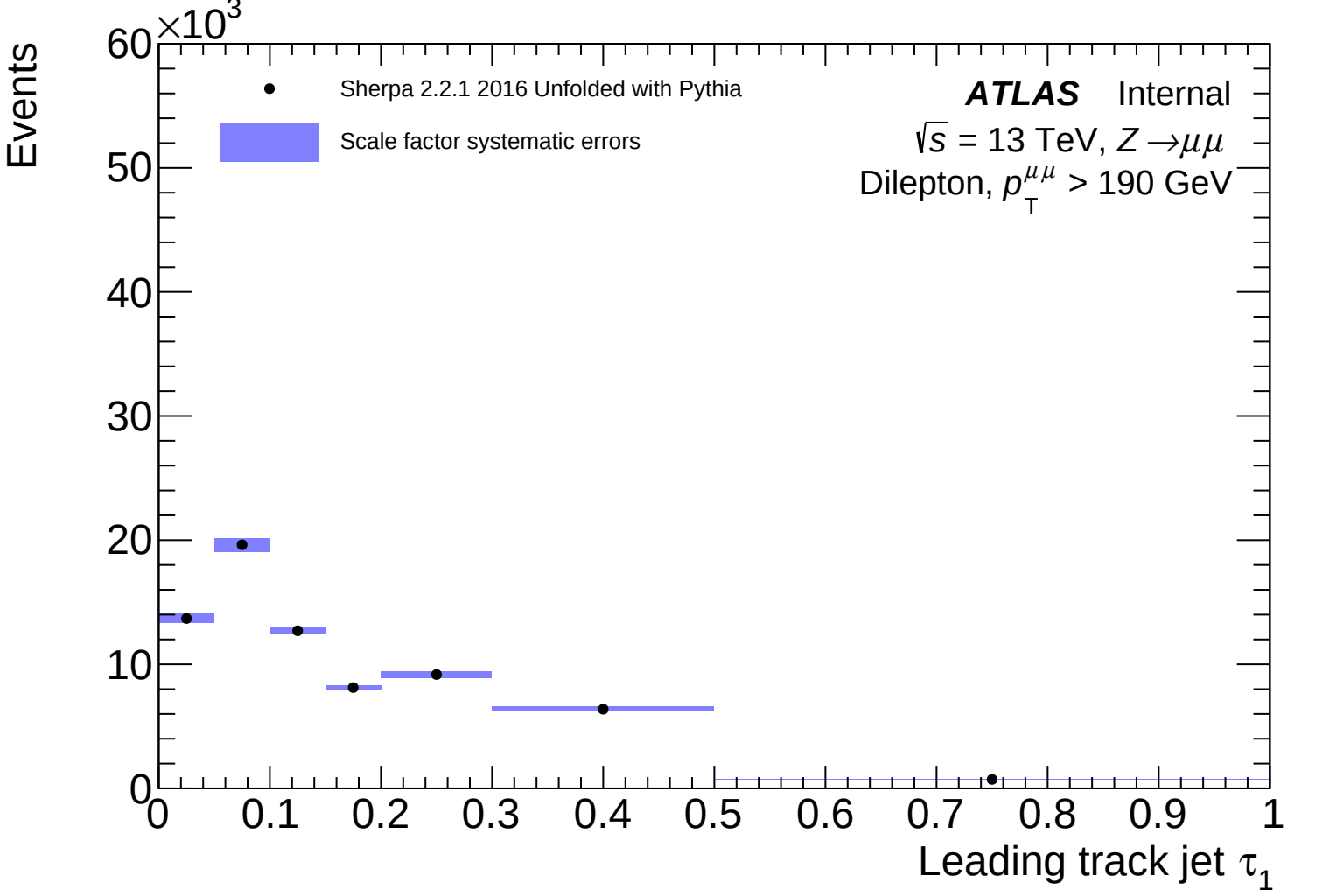

Events
×10^3
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

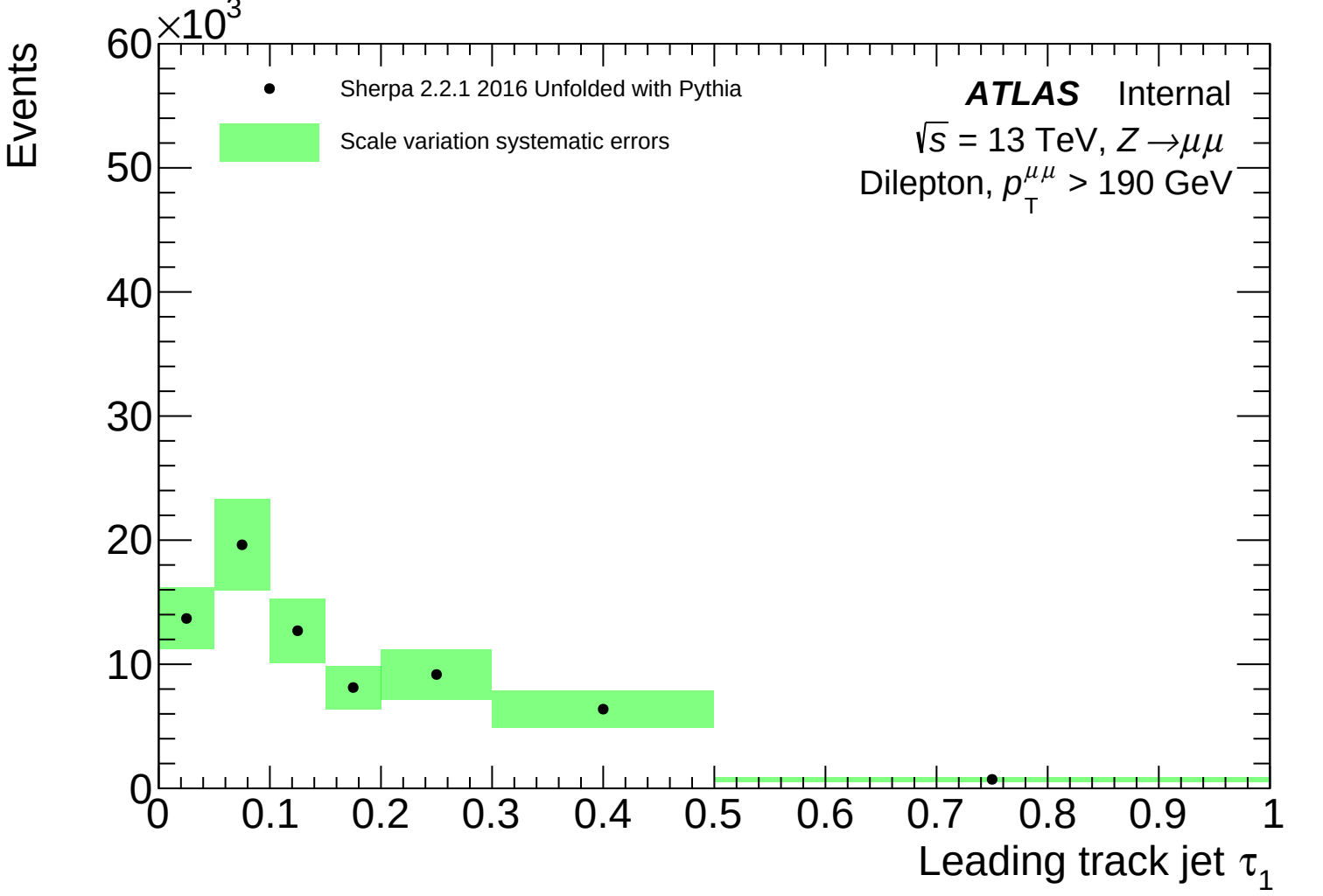

Events
×10^3
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

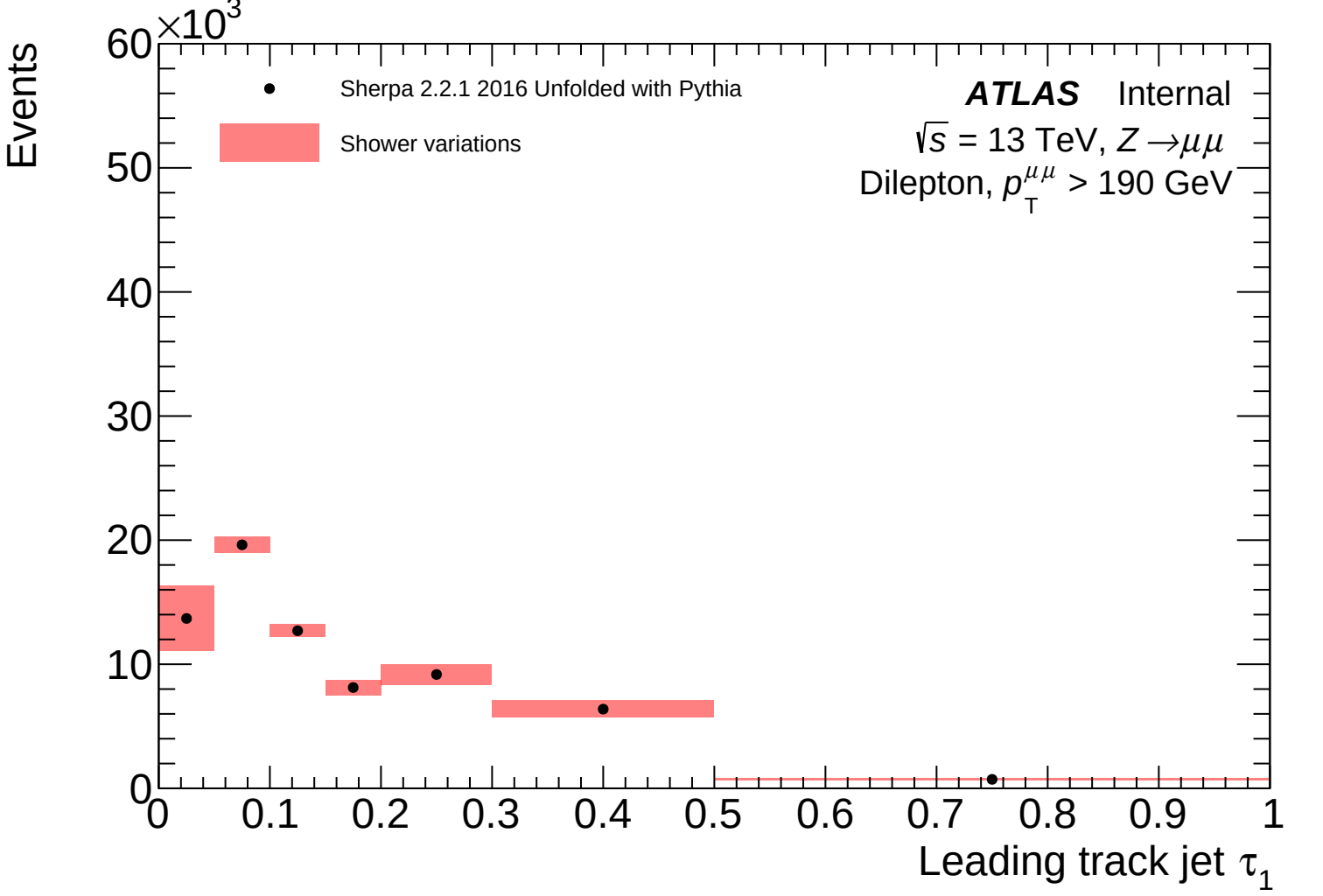

Events
×10^3
300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]

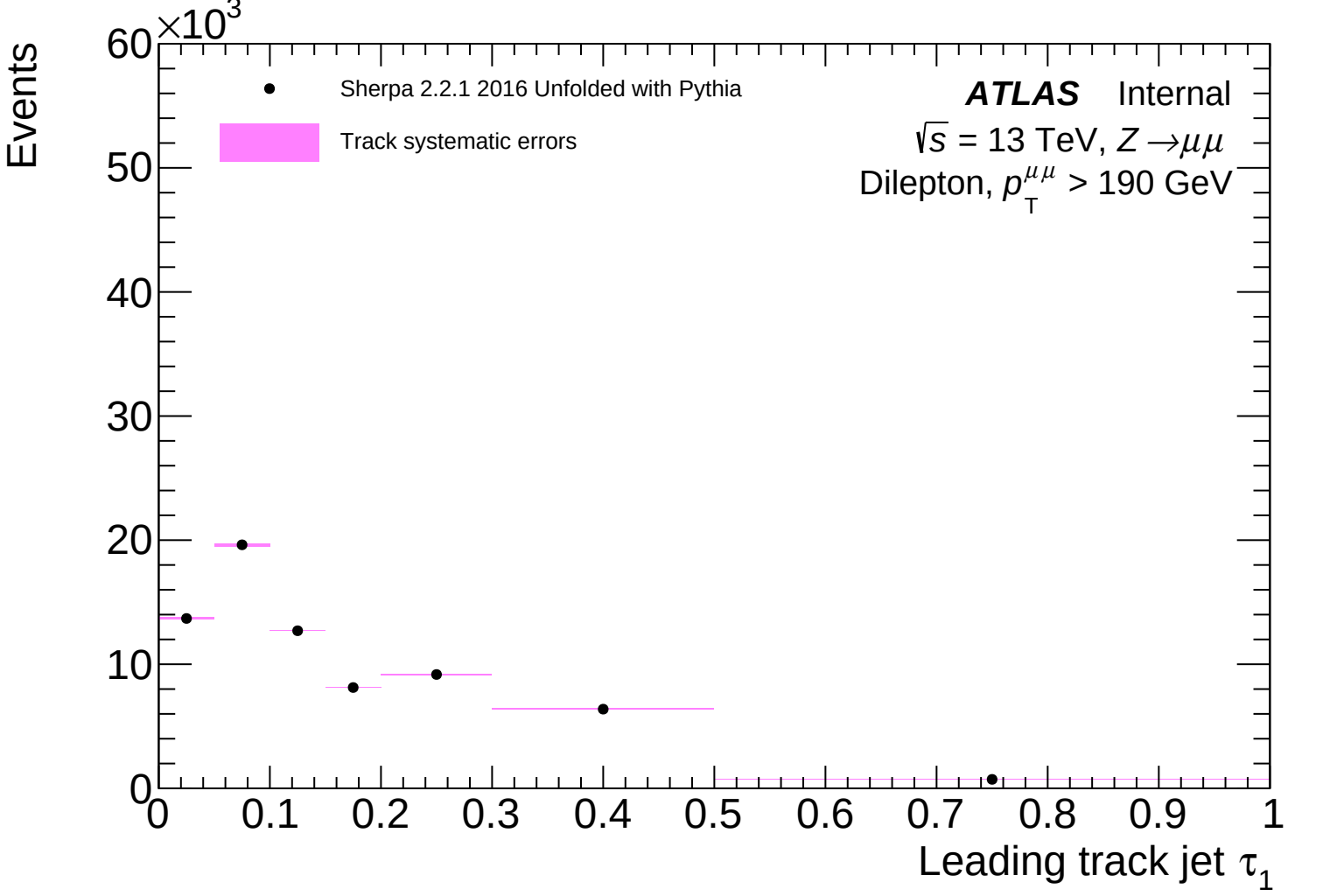

Events
×10^3
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Leading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
×10^3
dN / dm_j1 [GeV]^-1
Leading track jet m [GeV]
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70
80


Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1


Events
$\times 10^3$
60
50
40
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20
10
0
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0.1
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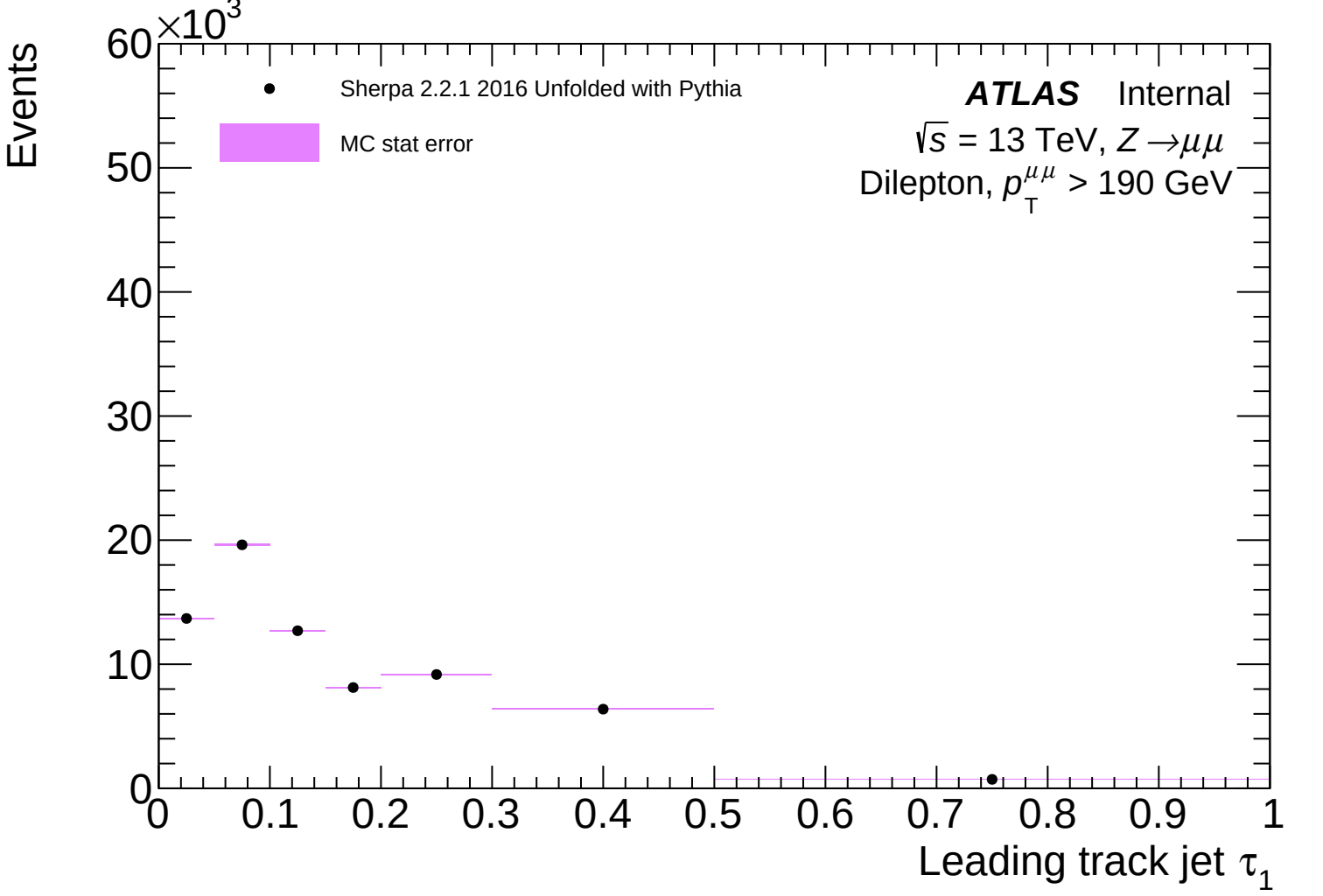
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
$\times 10^3$
60
50
40
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20
10
0
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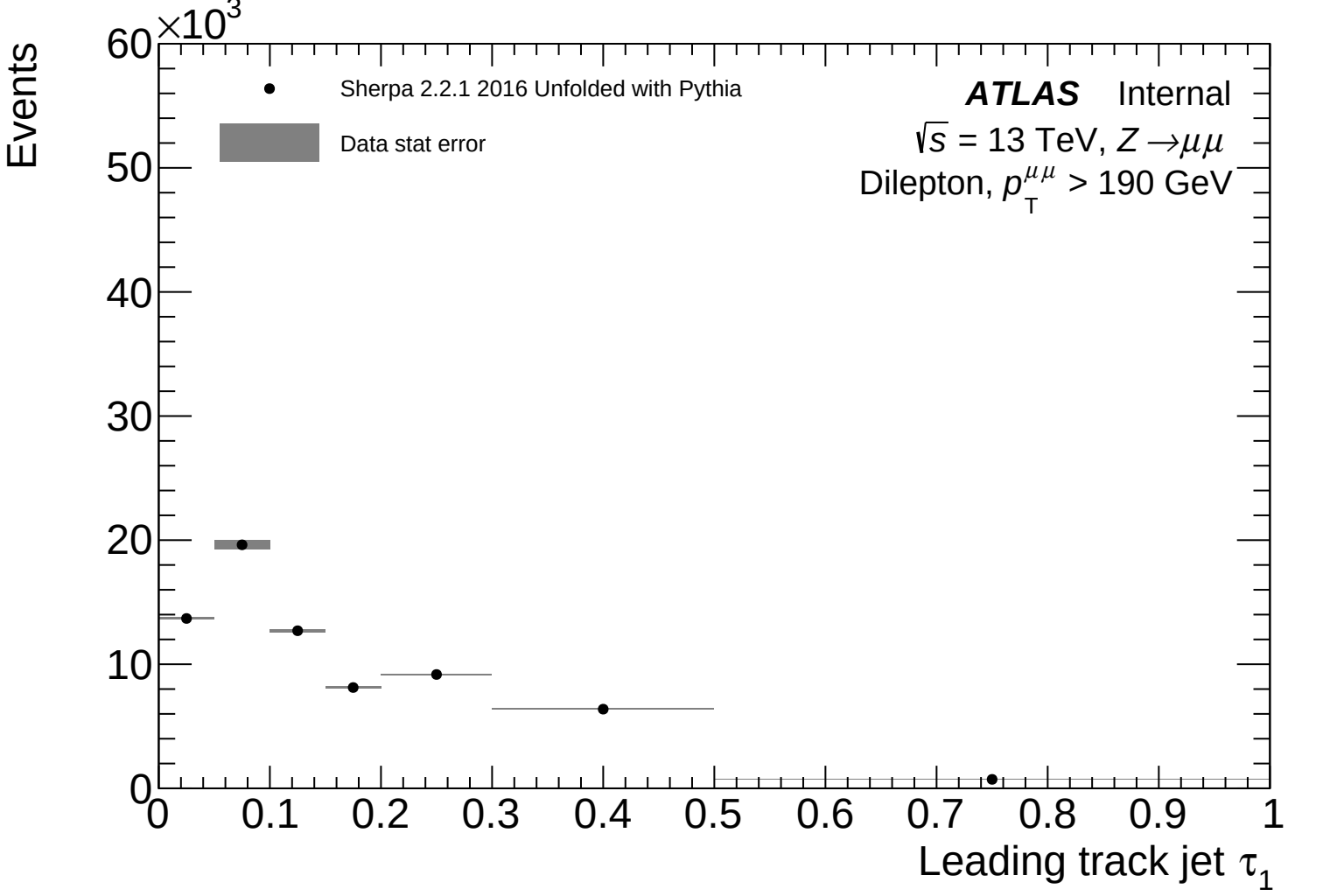
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
$\times 10^3$
60
50
40
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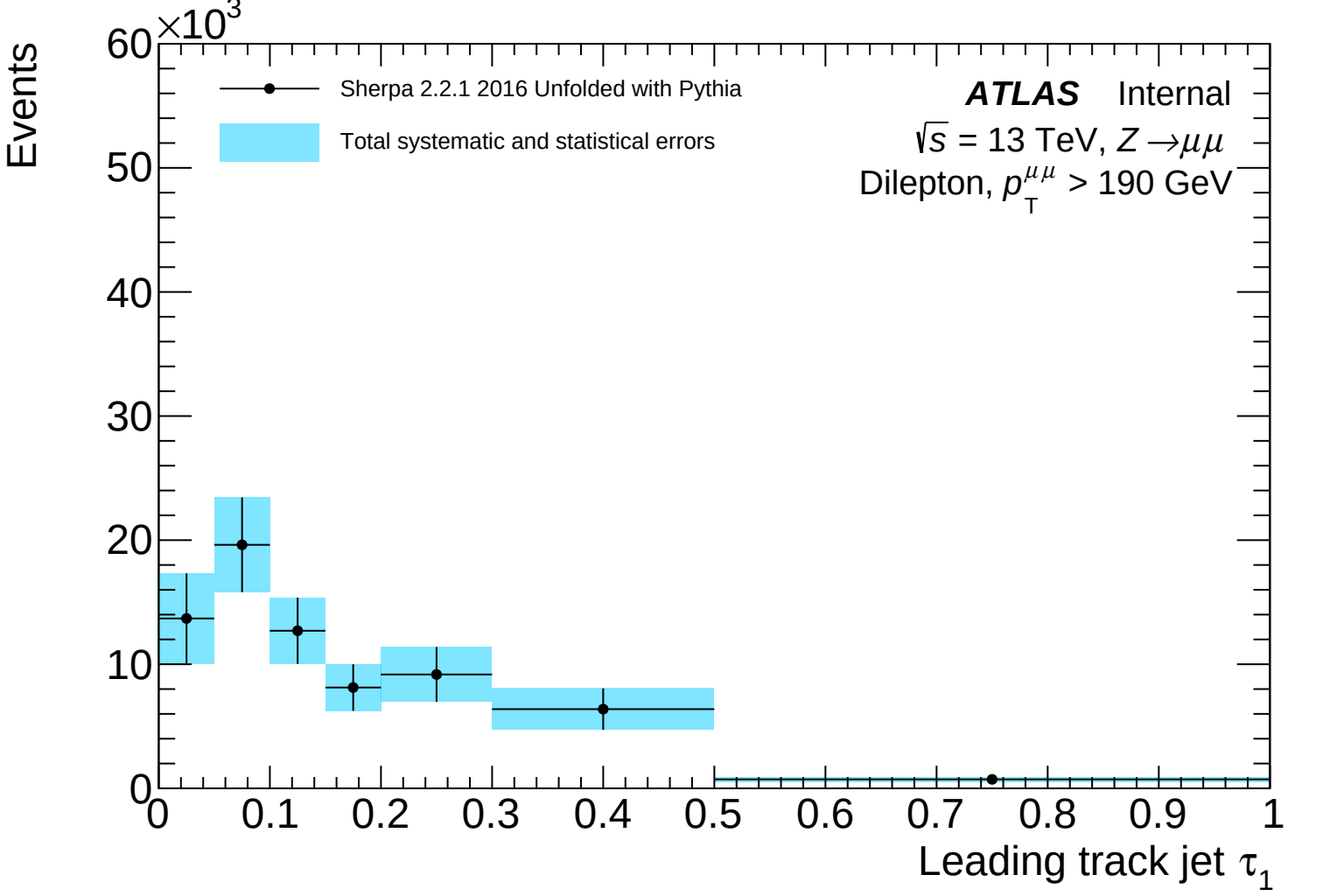
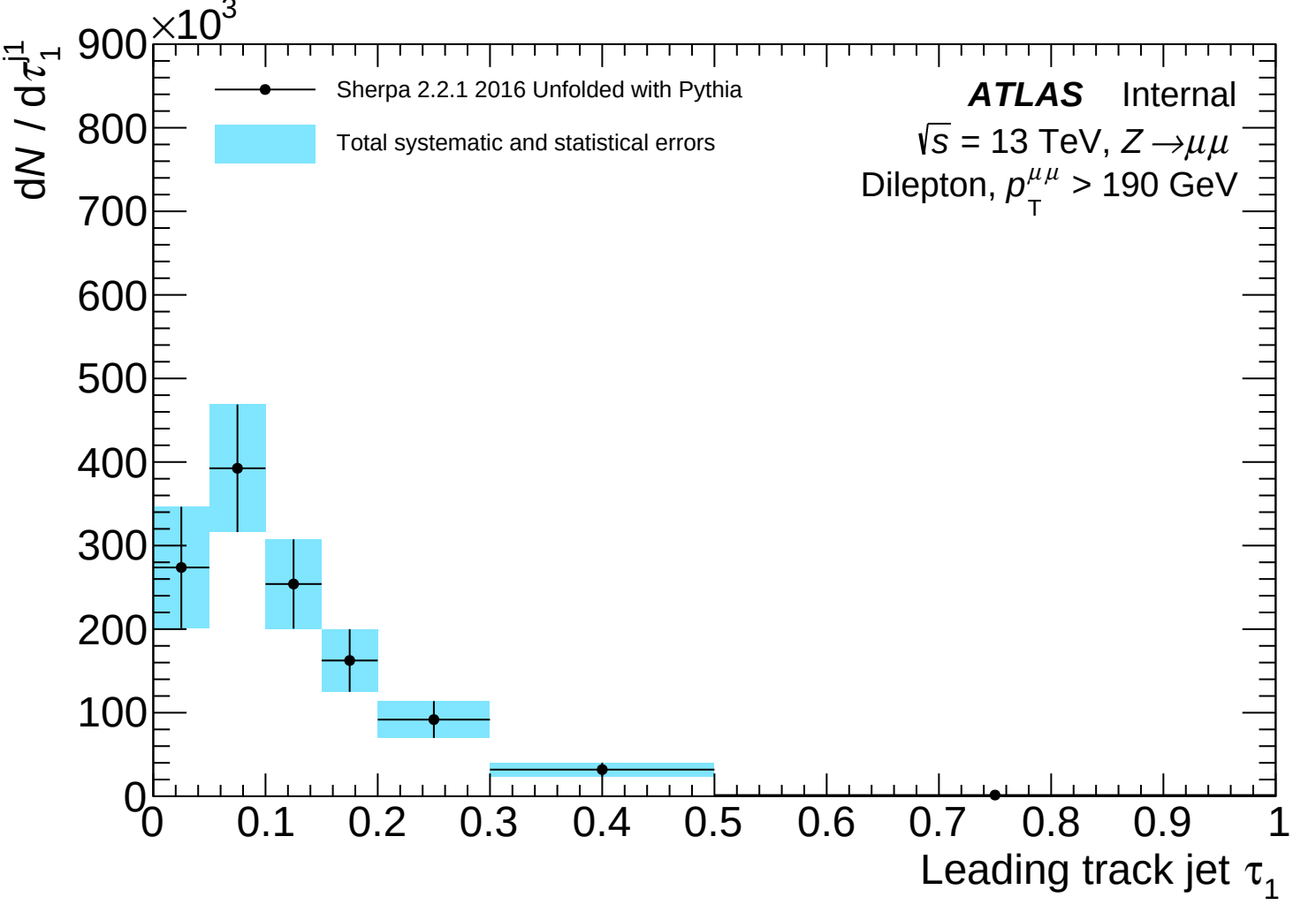
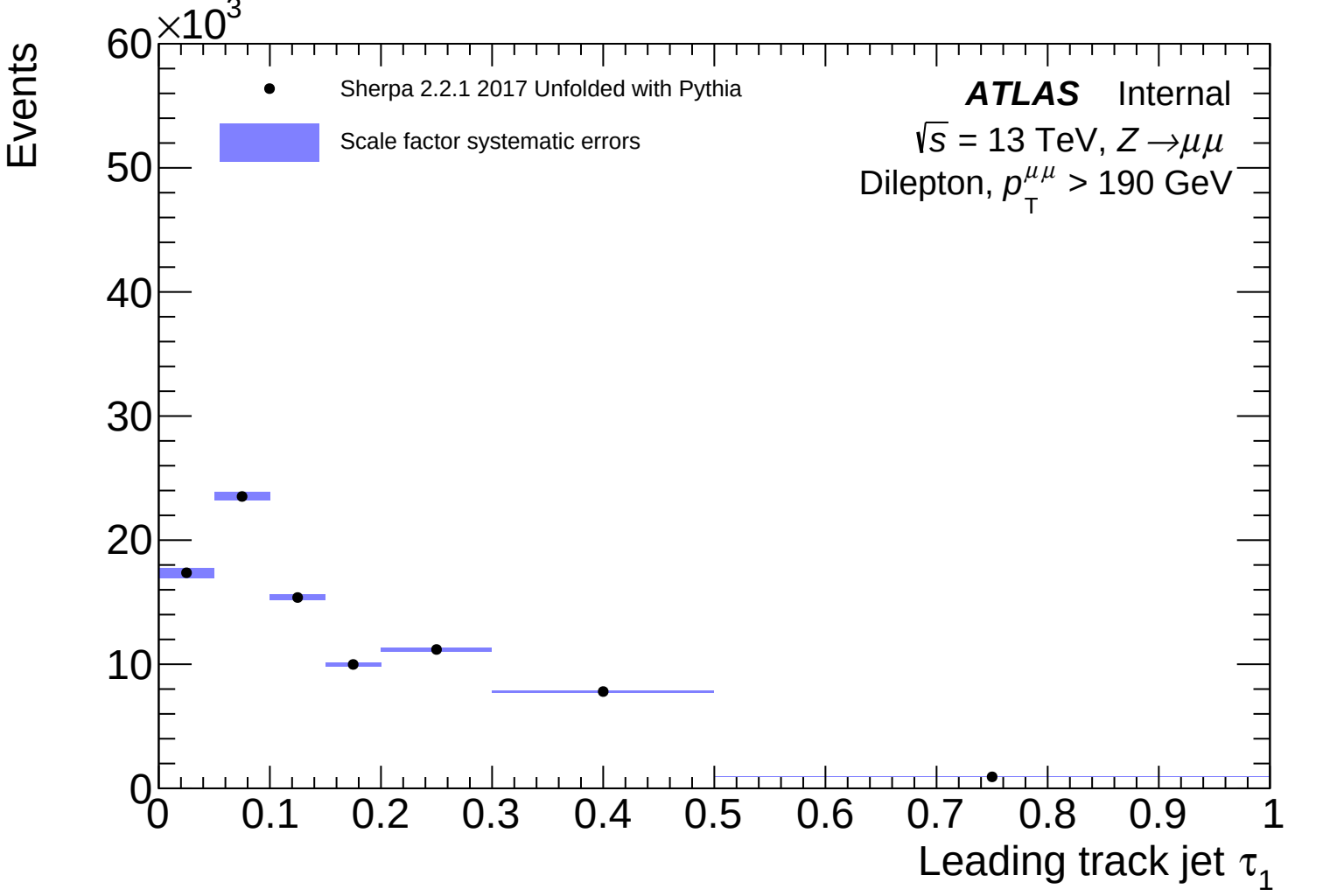
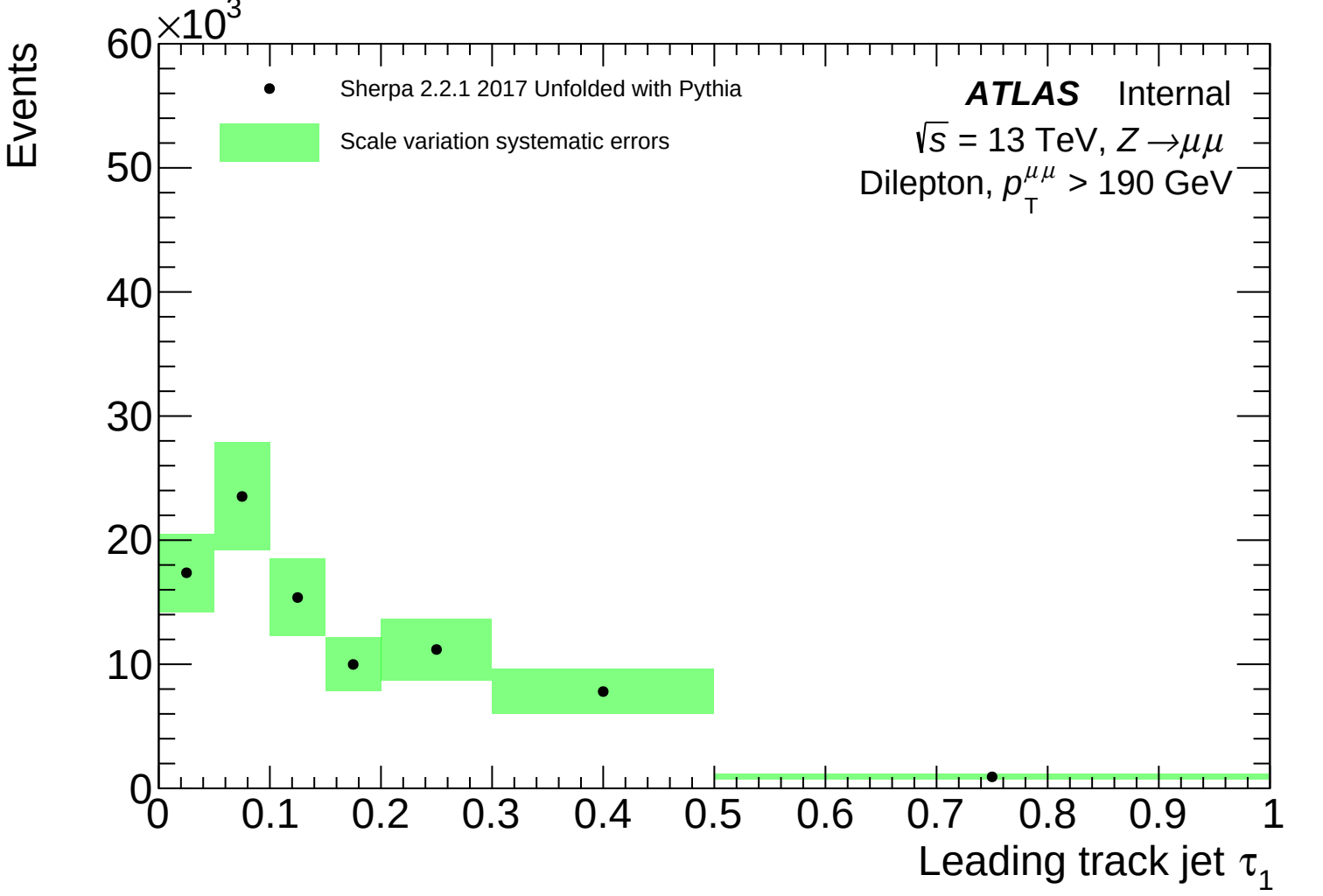
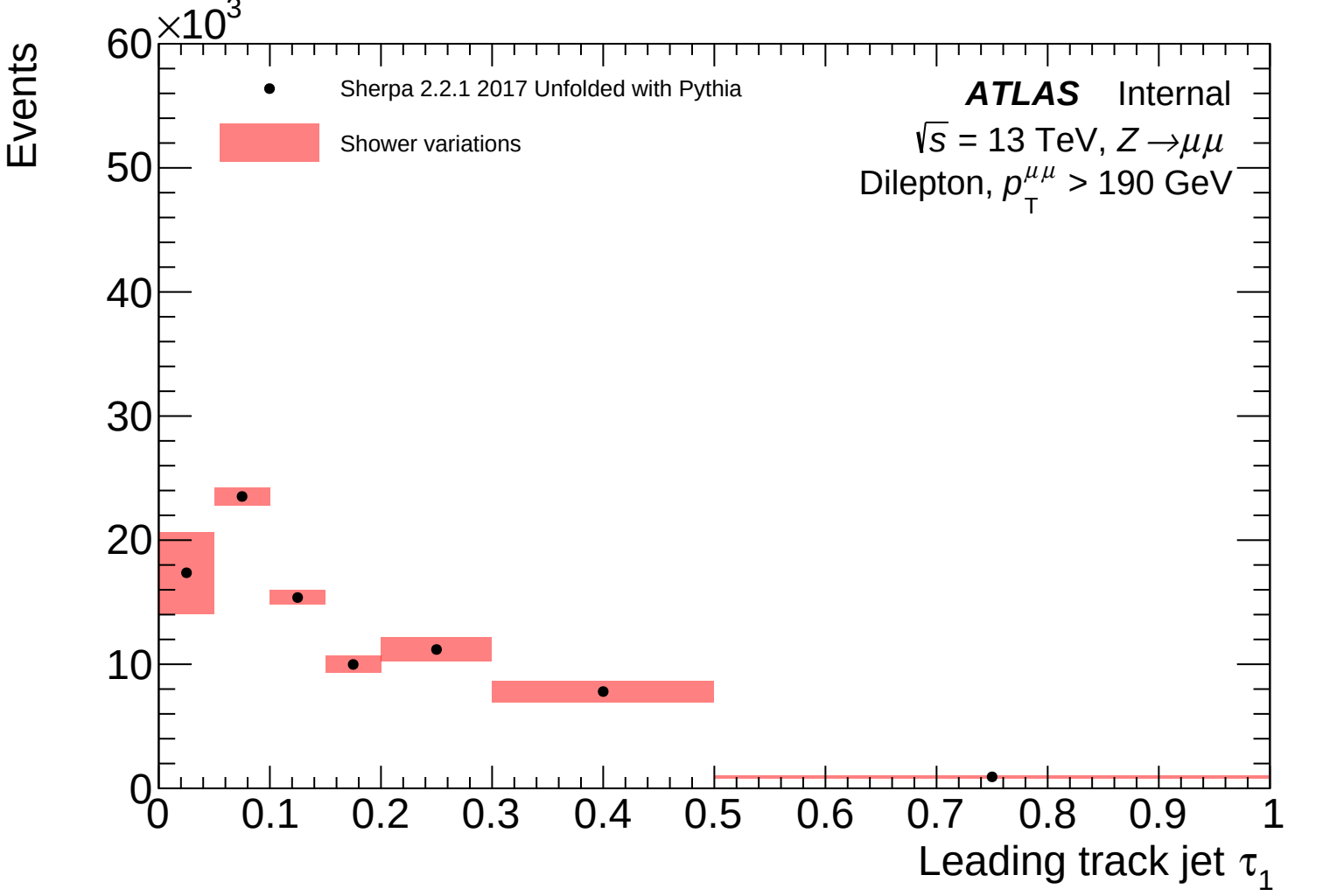
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

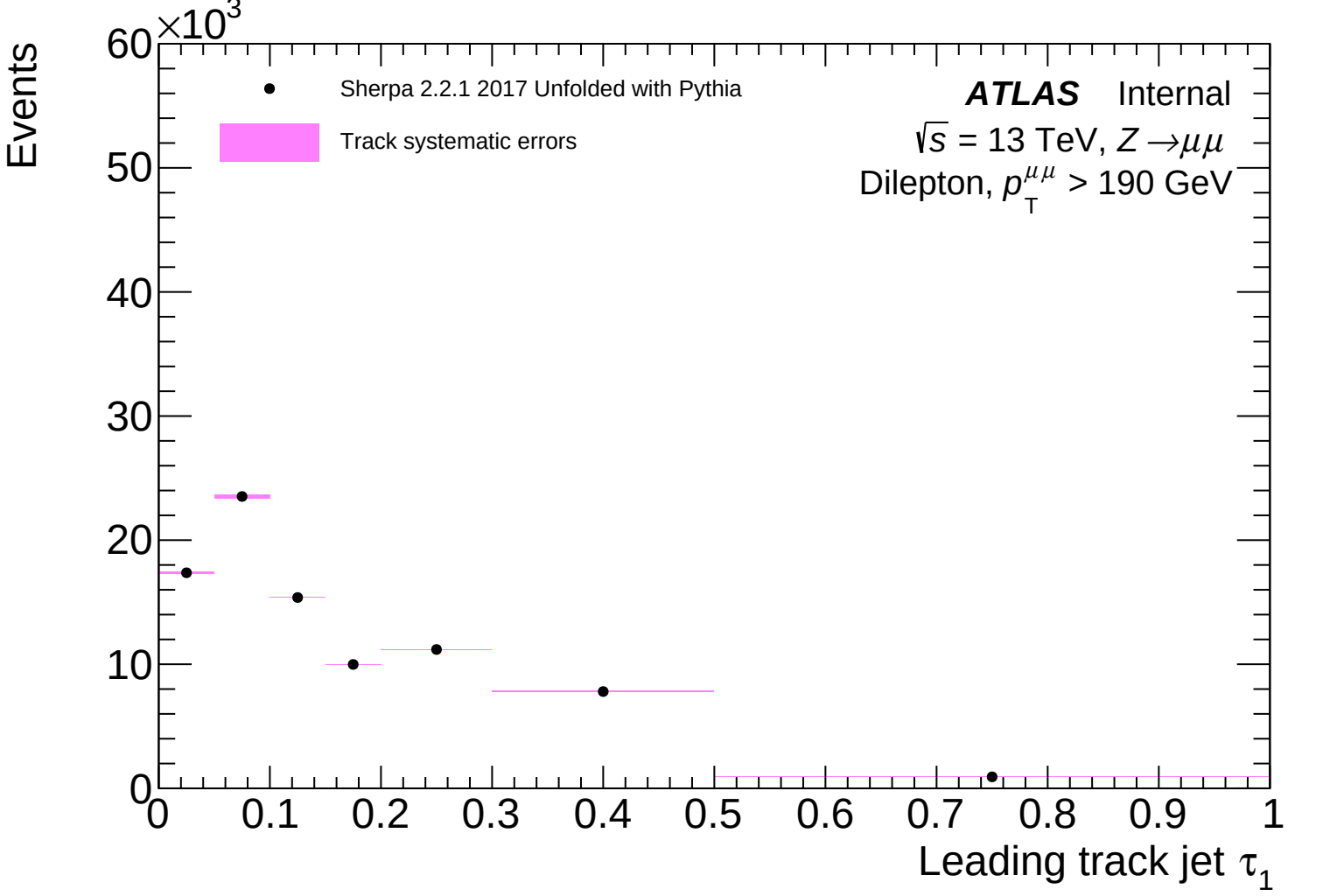

Events
×10^3
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ1
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

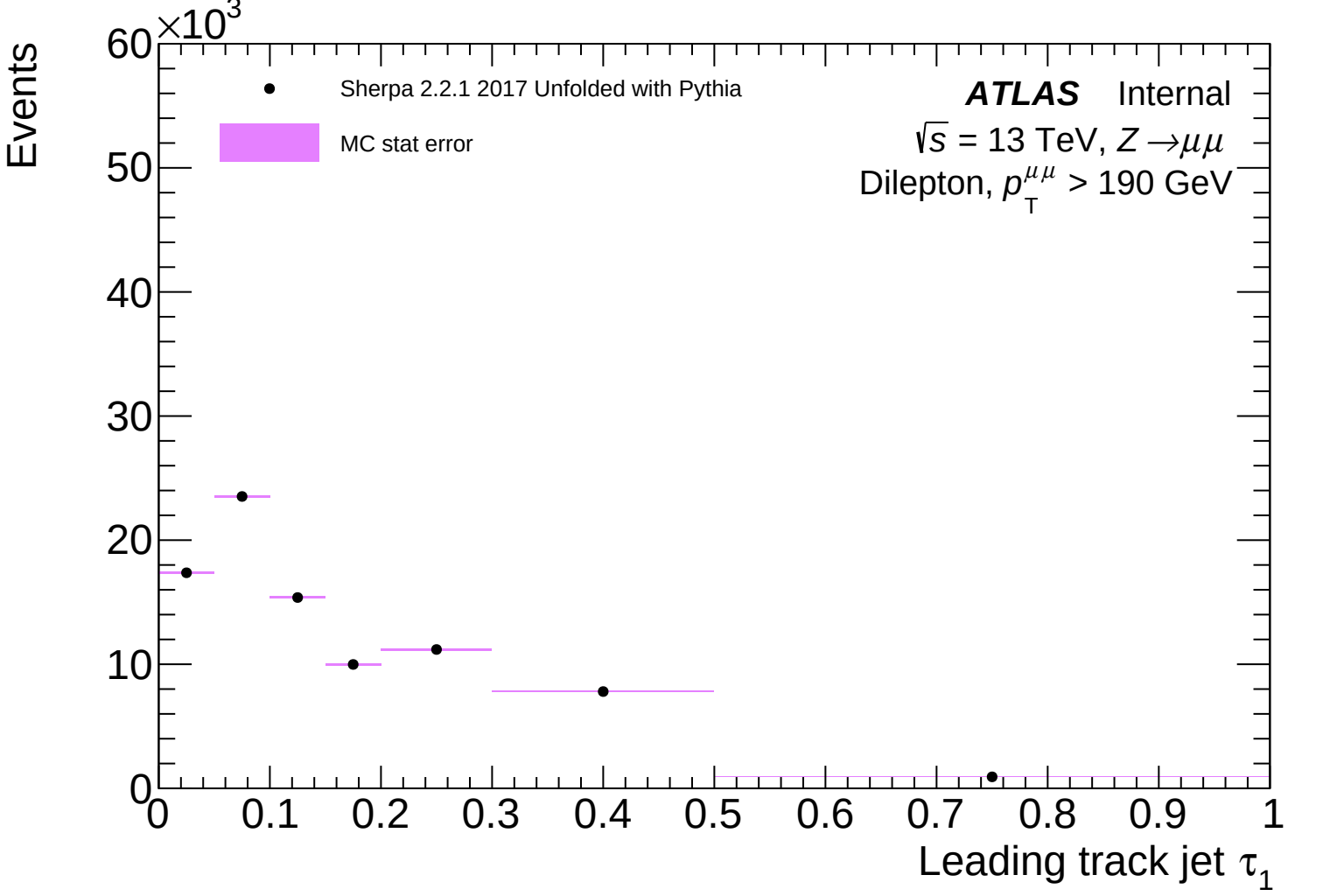

$\times 10^3$
900
800
700
600
500
400
300
200
100
0
$\mathrm{d}N\ /\ \mathrm{d}\tau_1^{j1}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

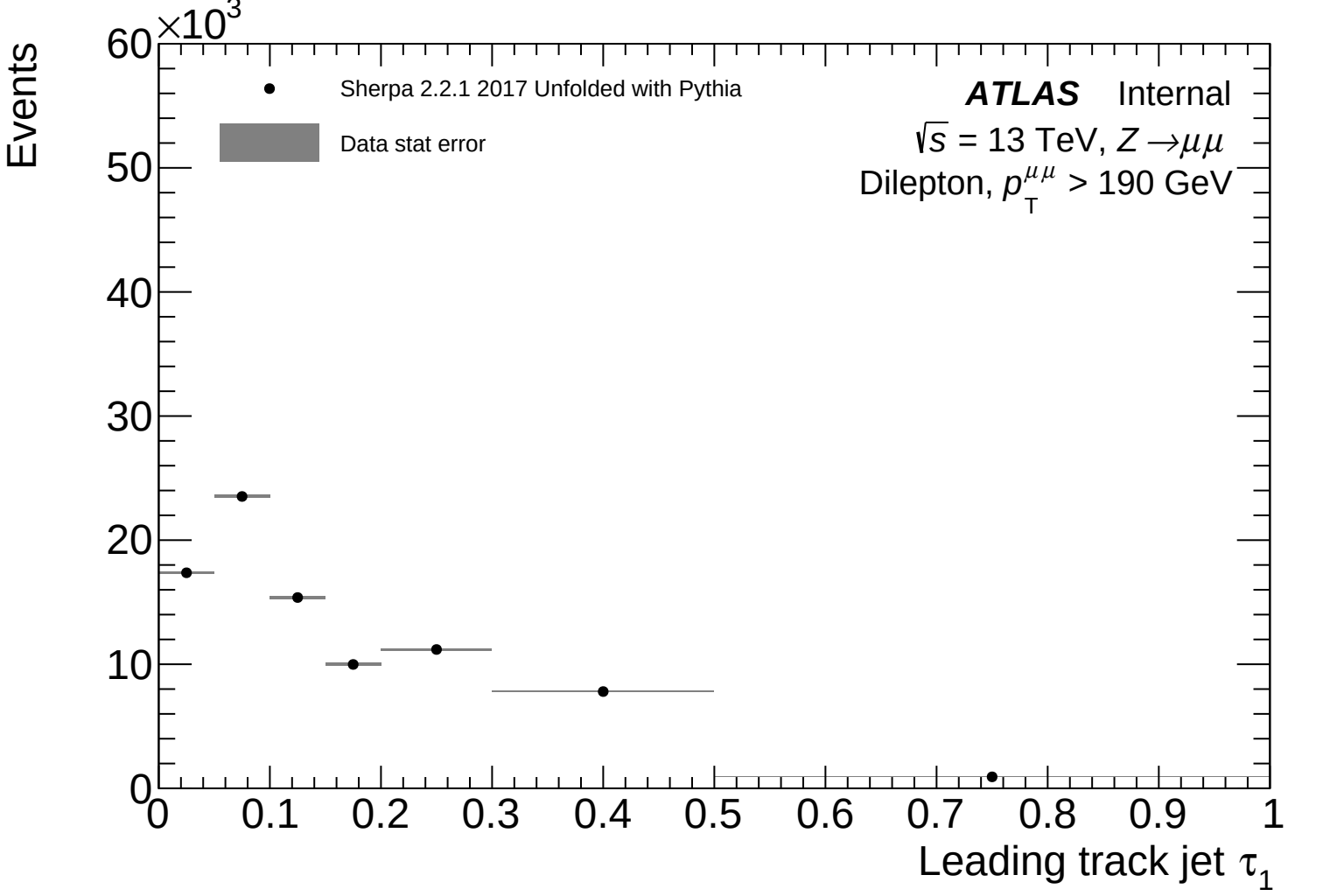

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

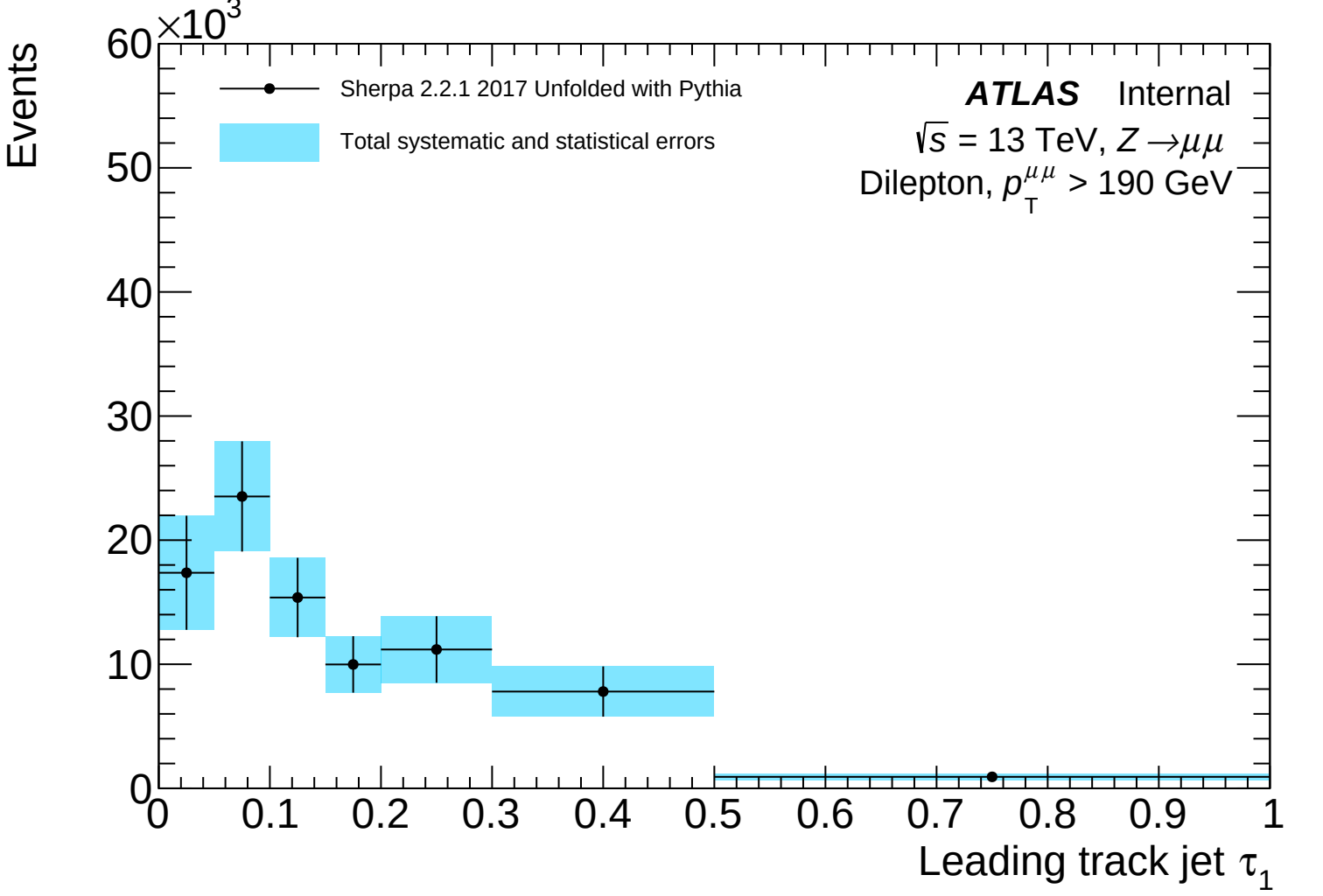

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

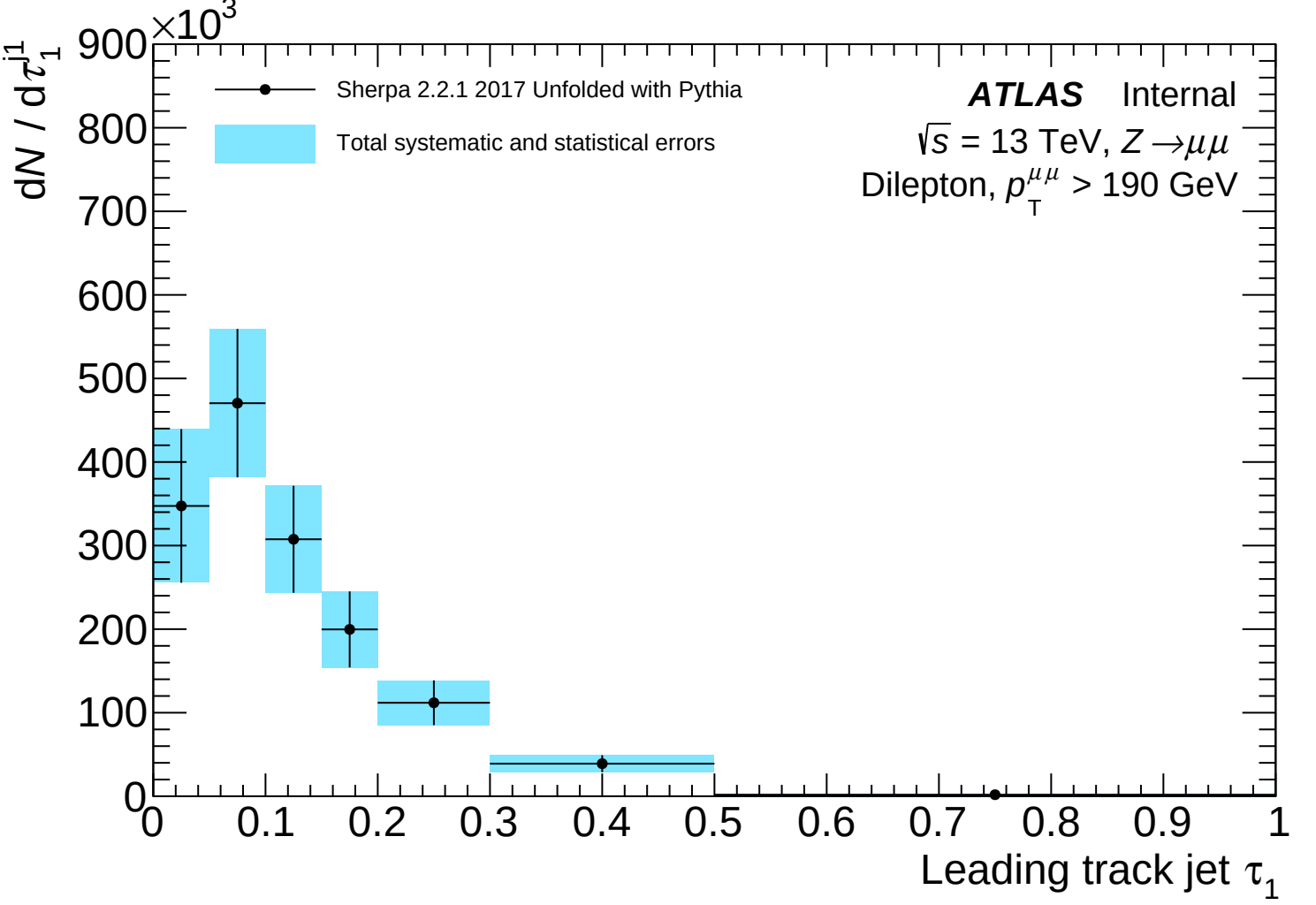

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

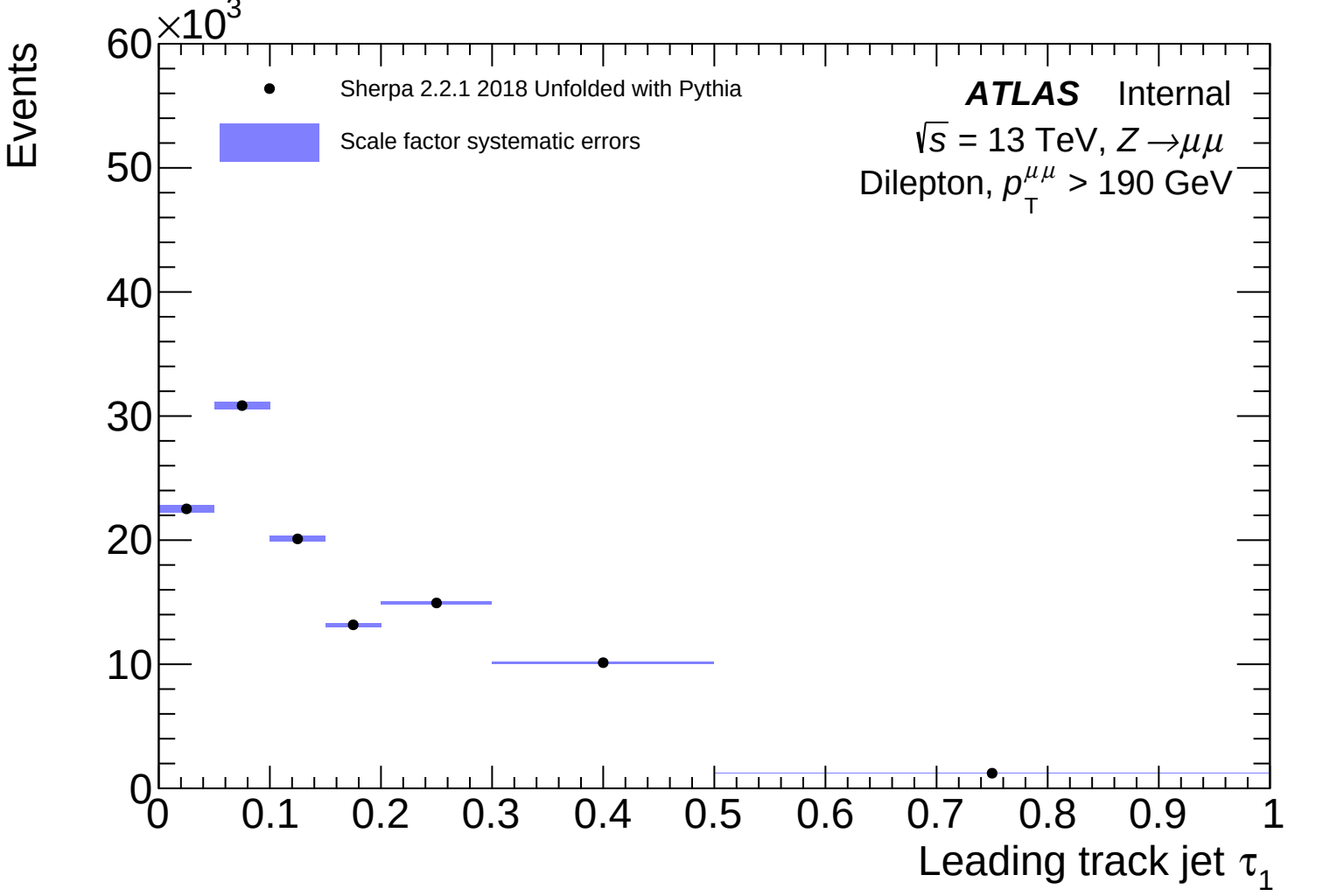

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

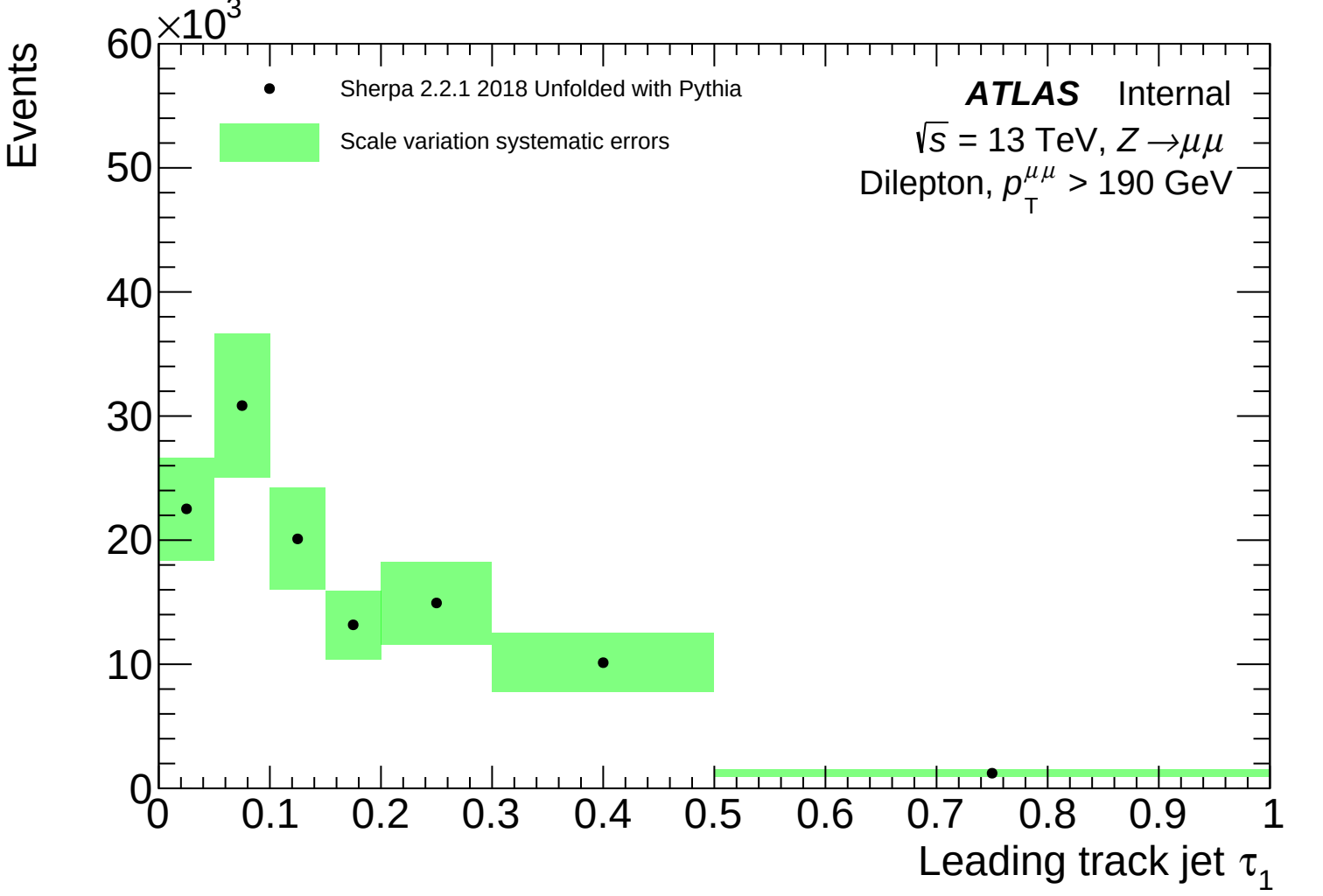

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

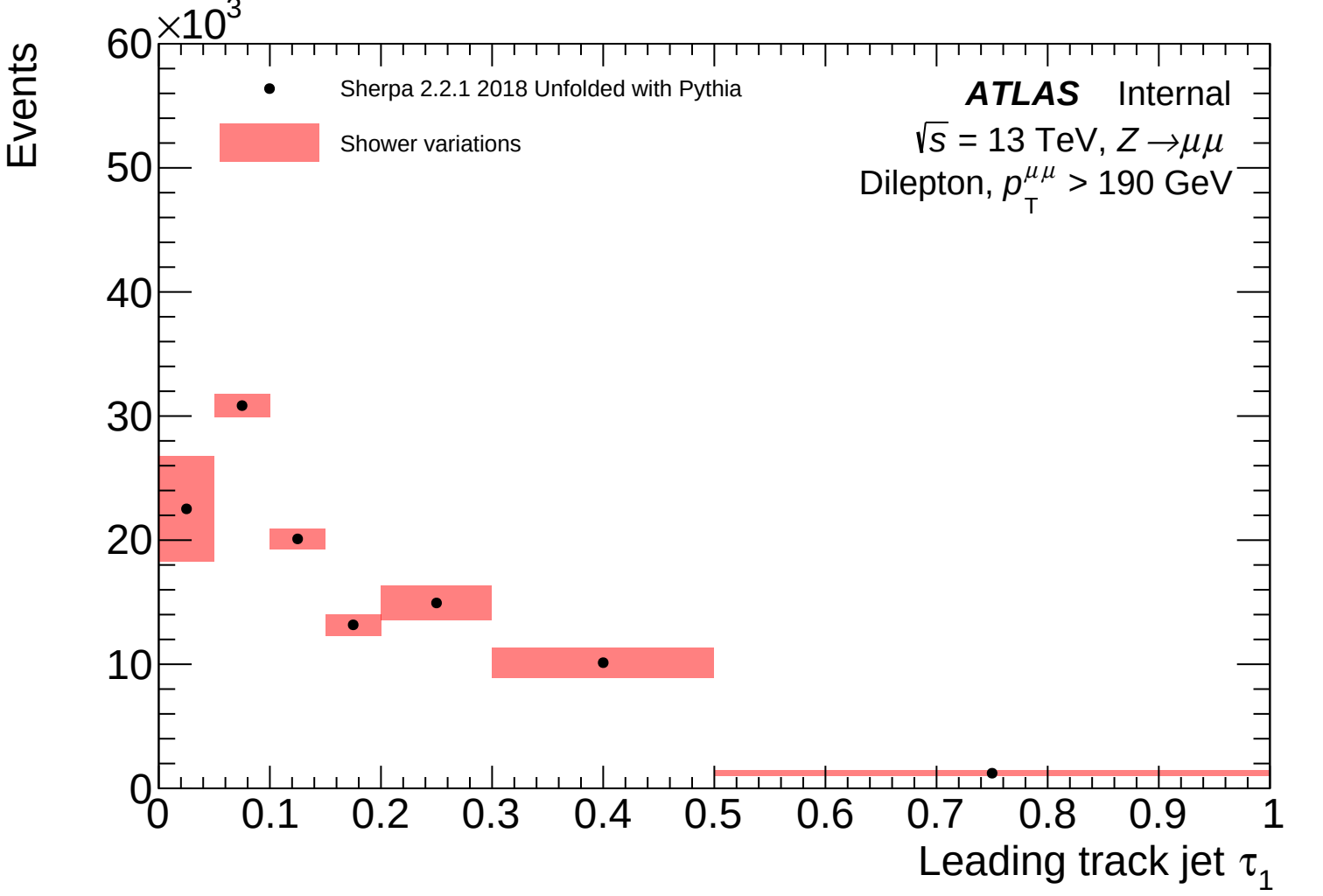

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

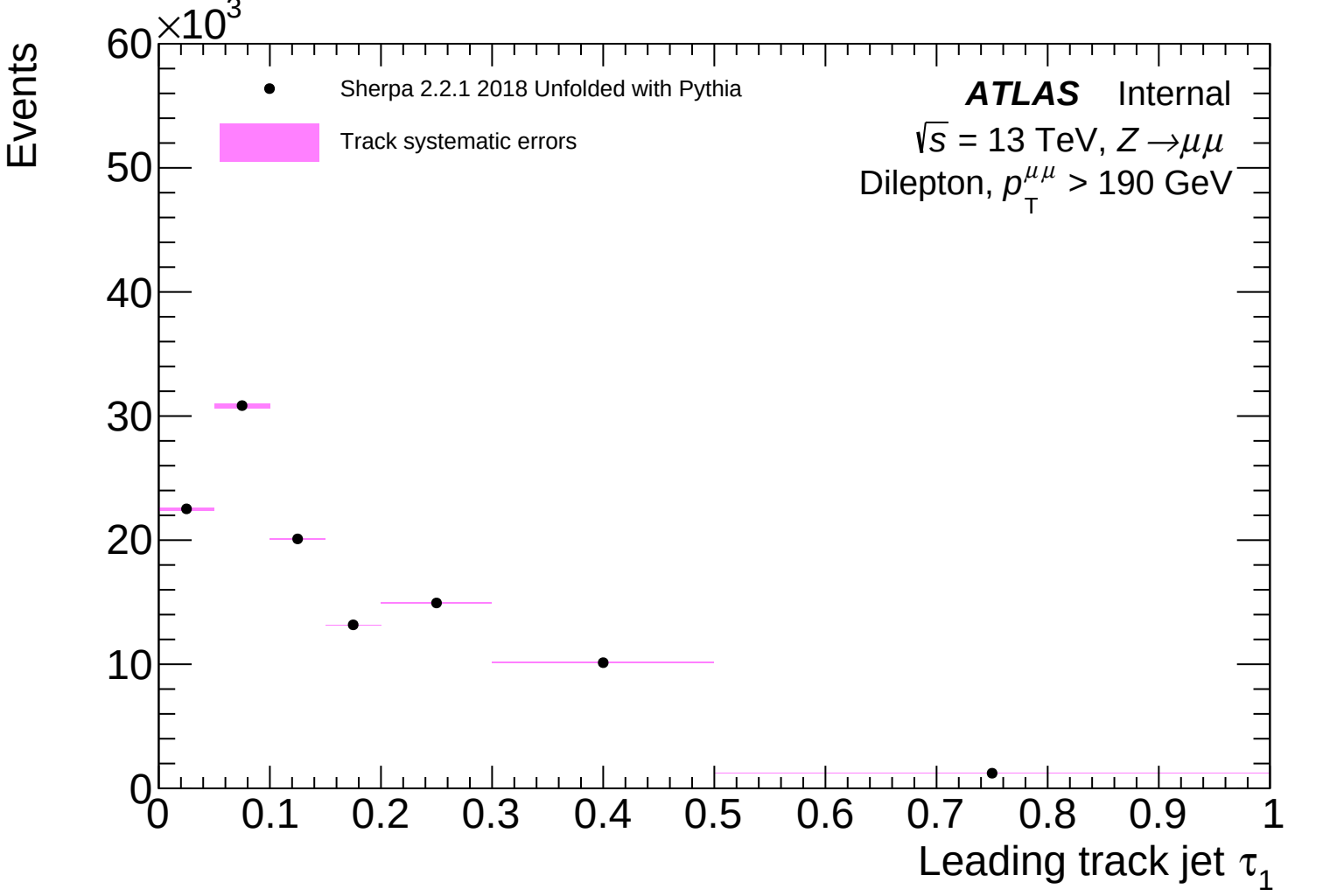

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

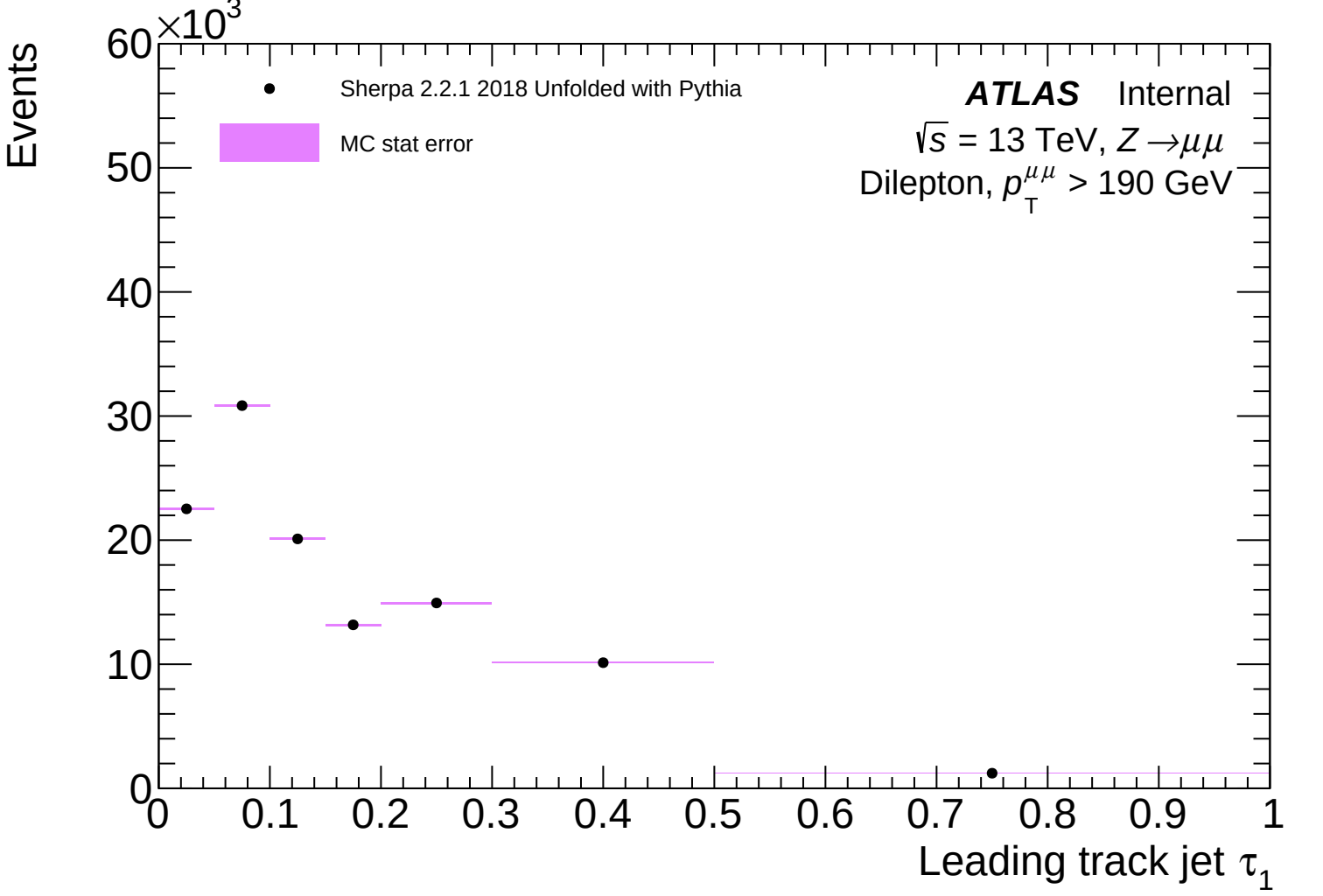

$\times 10^3$
$\frac{dN}{d\tau_1^{j1}}$
900
800
700
600
500
400
300
200
100
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

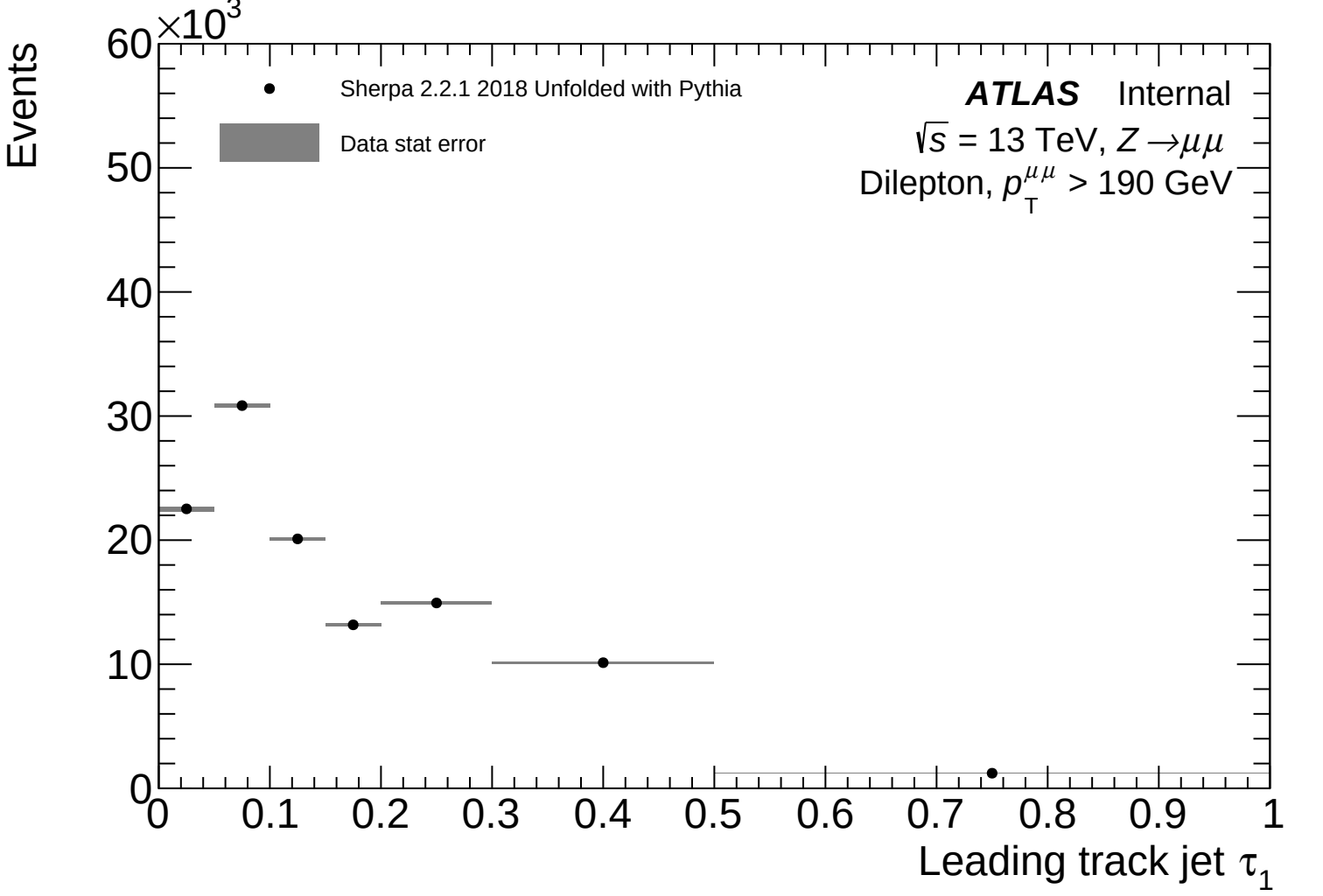

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

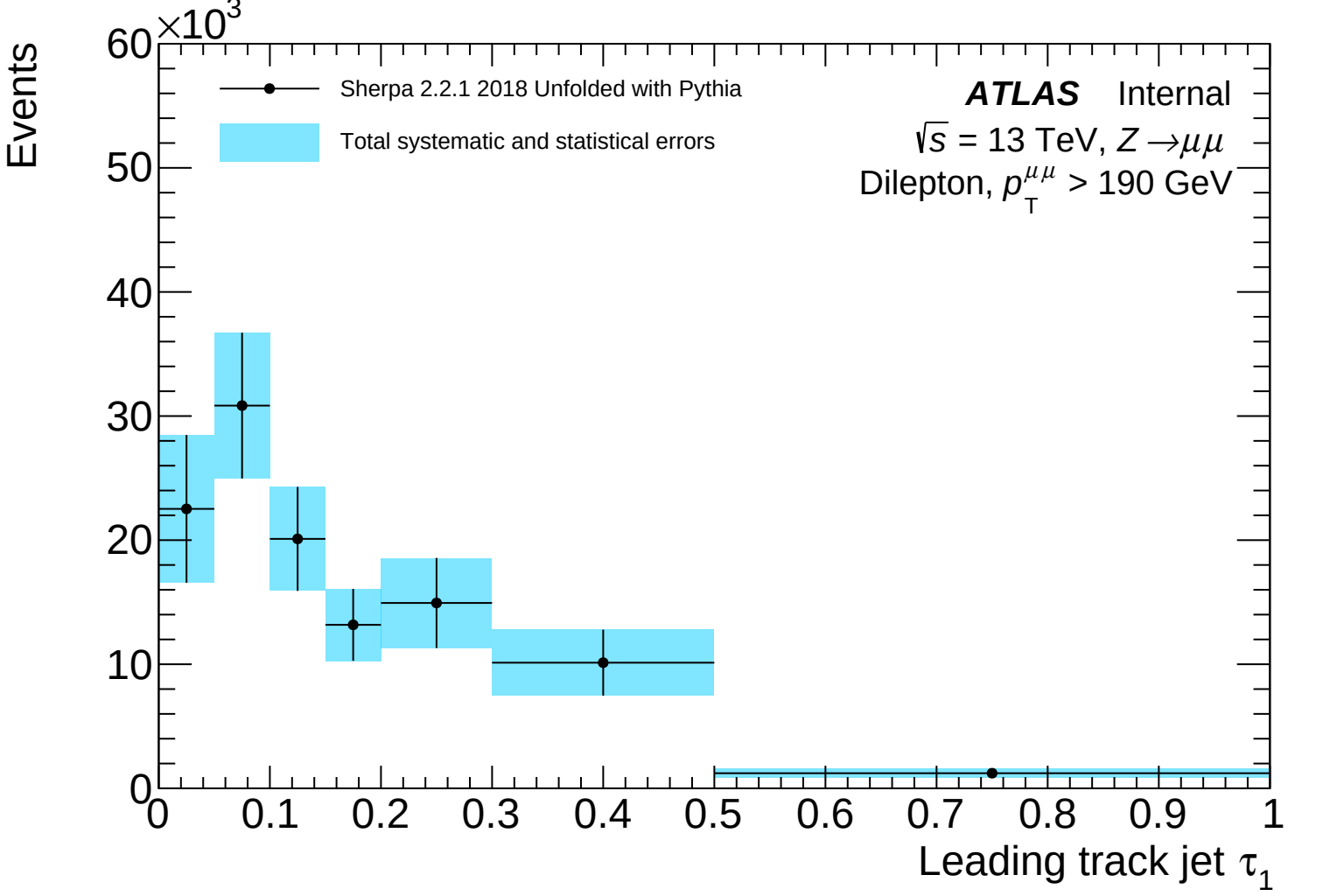

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

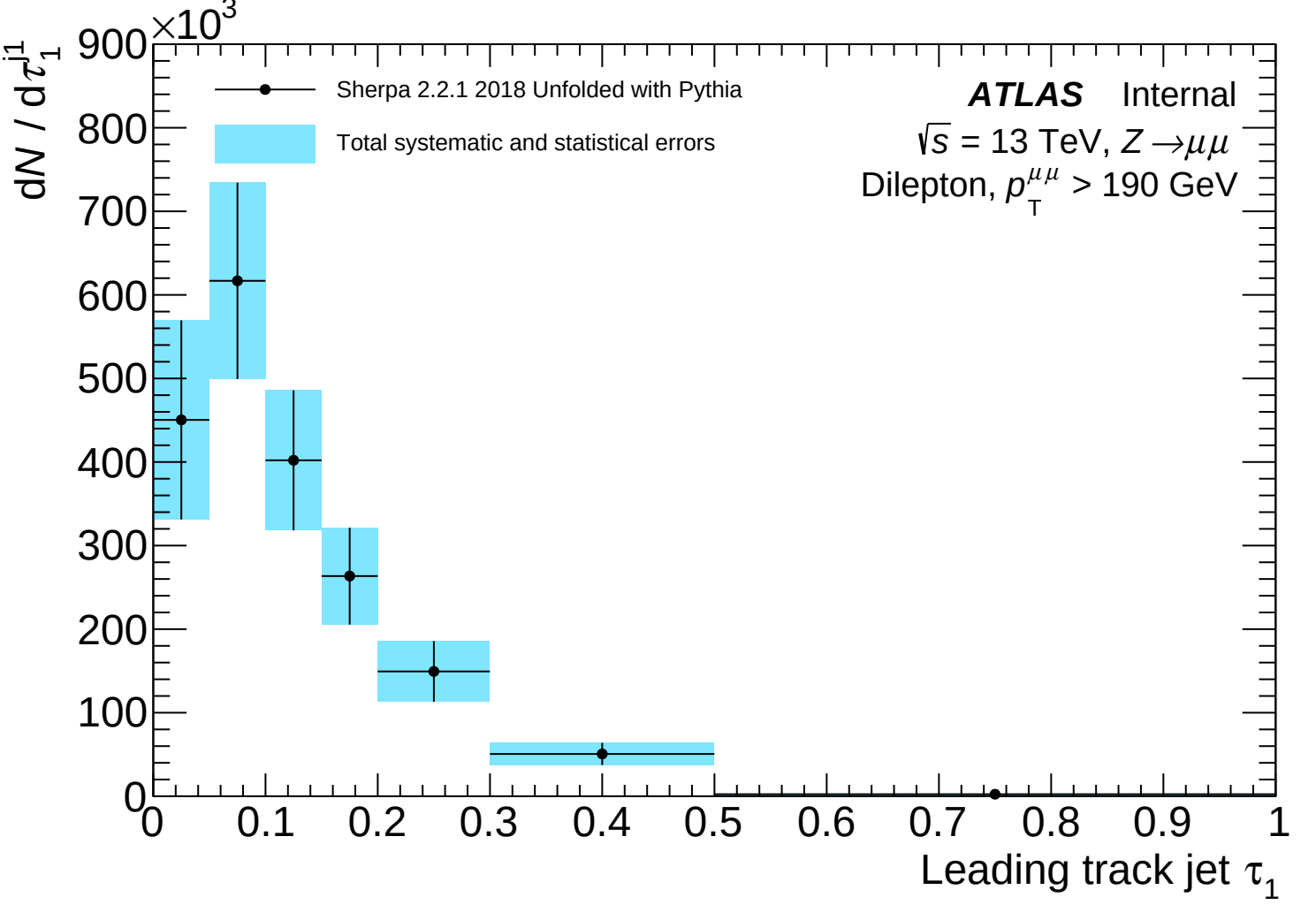

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

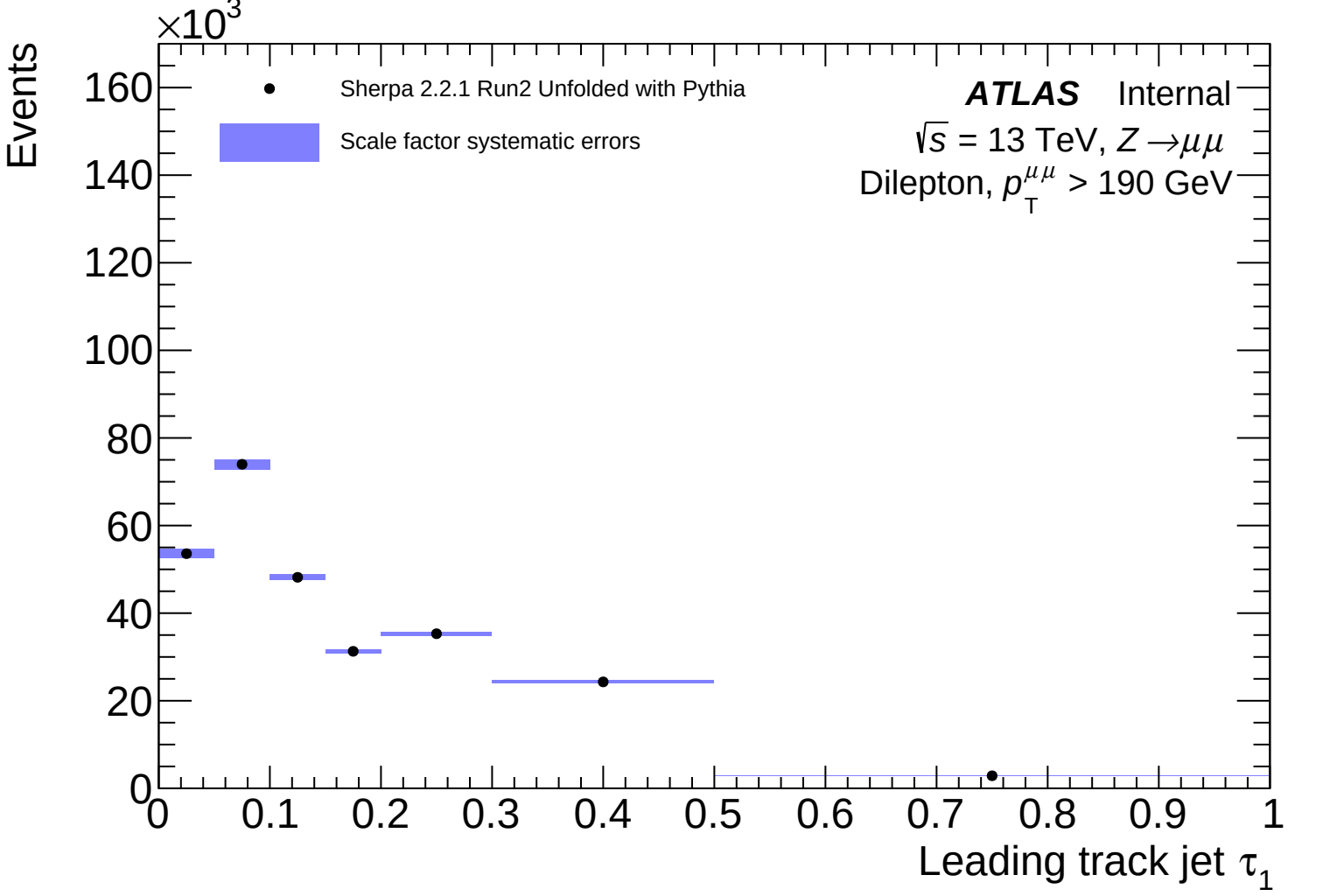

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

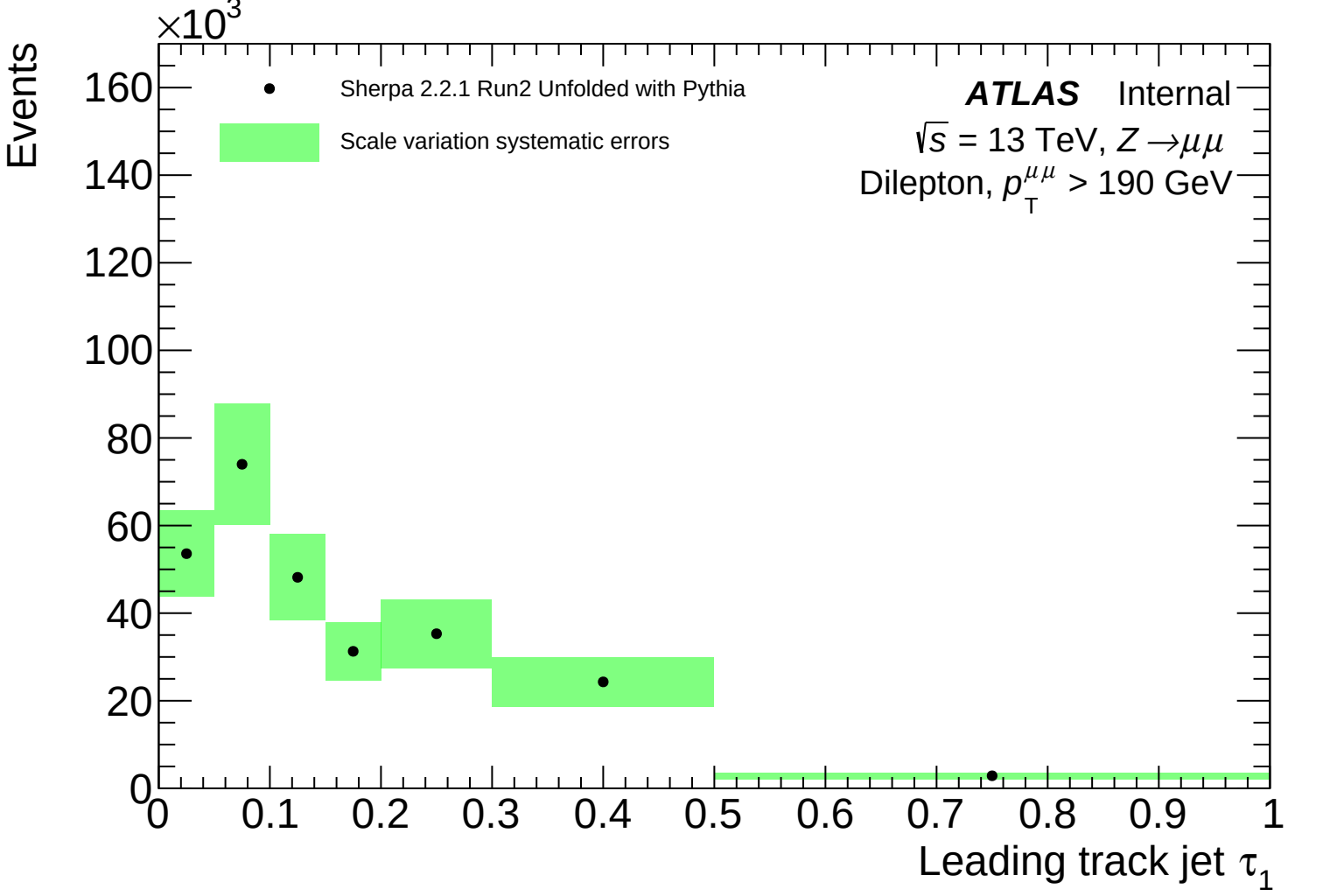

Events
×10^3
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

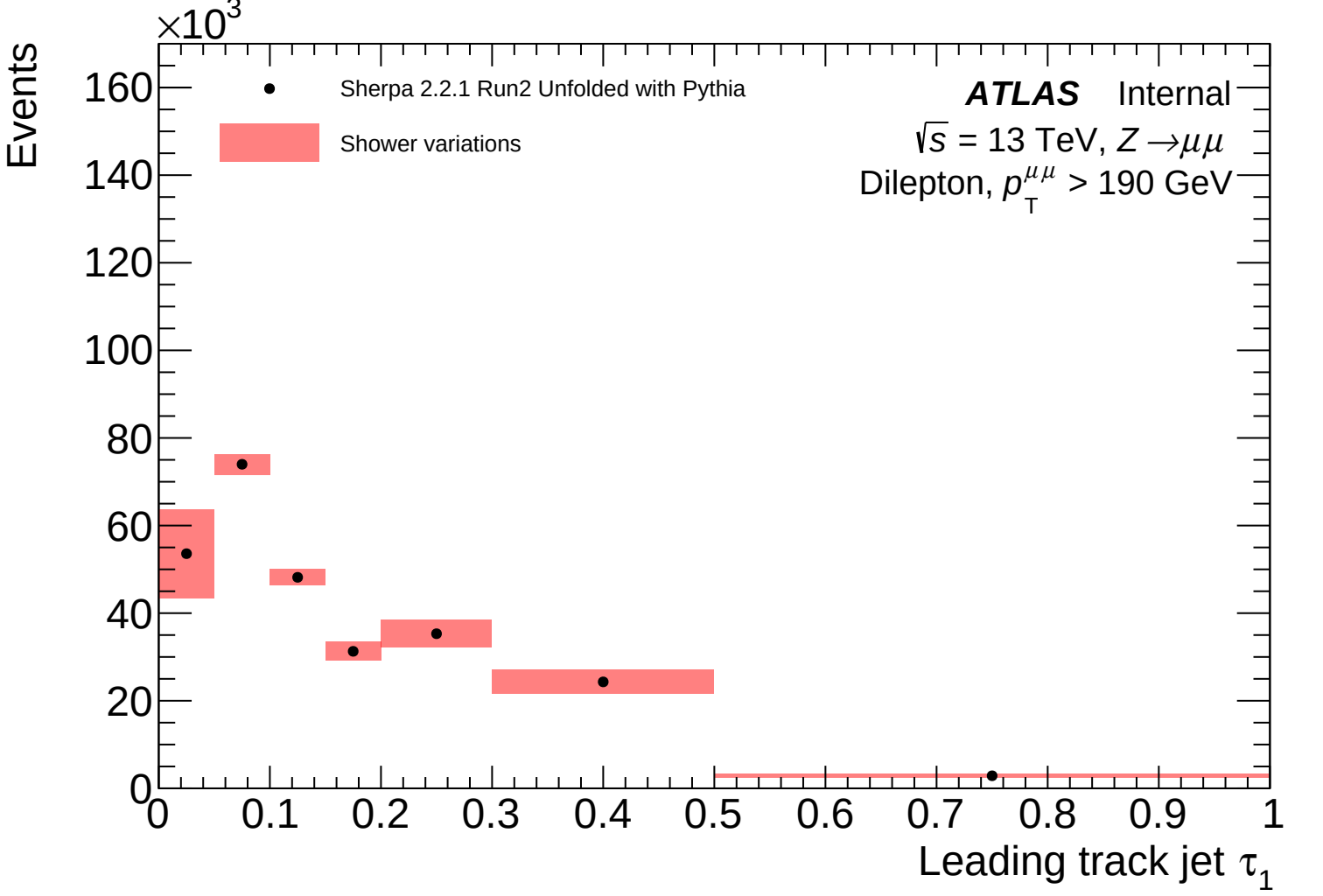

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

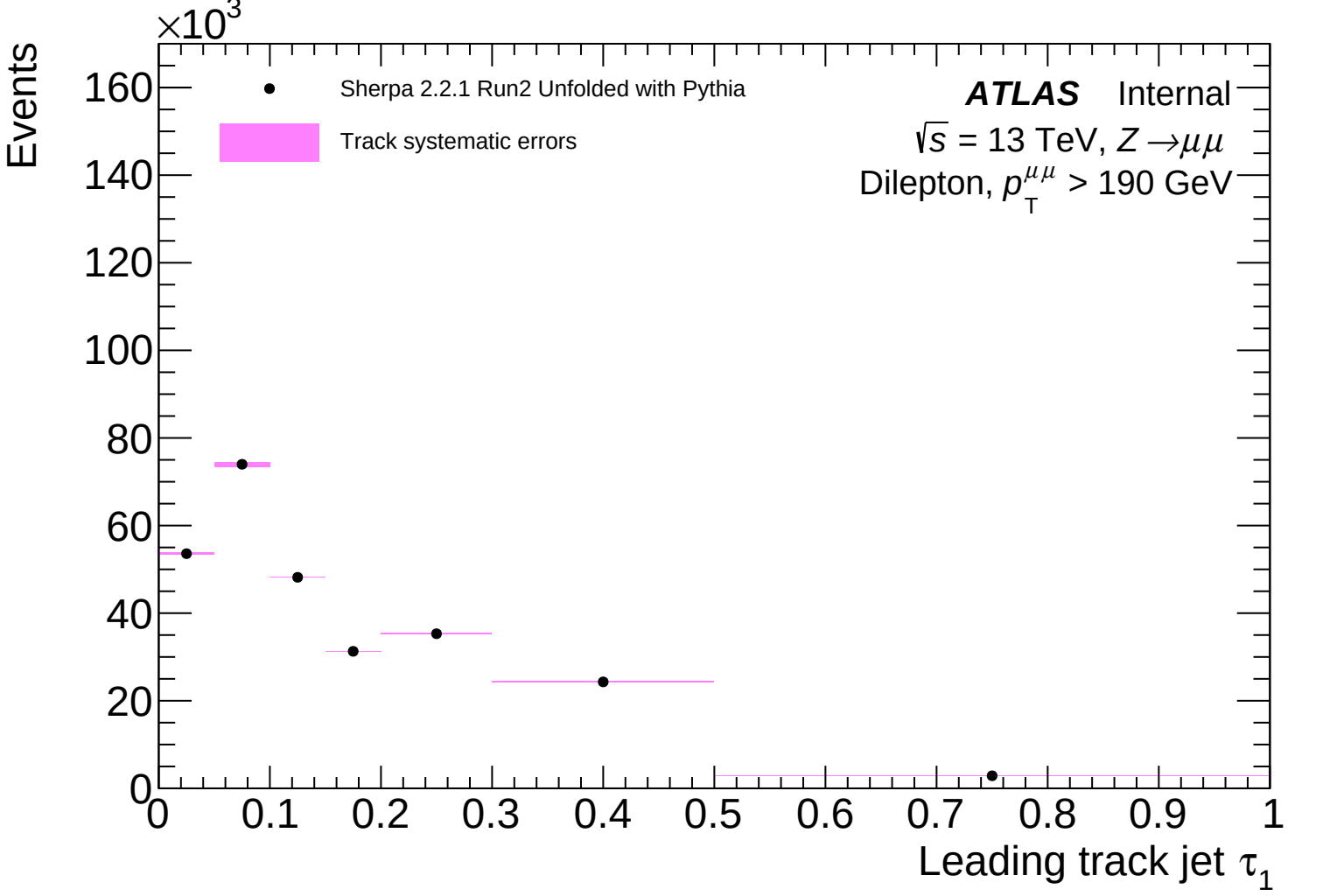

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

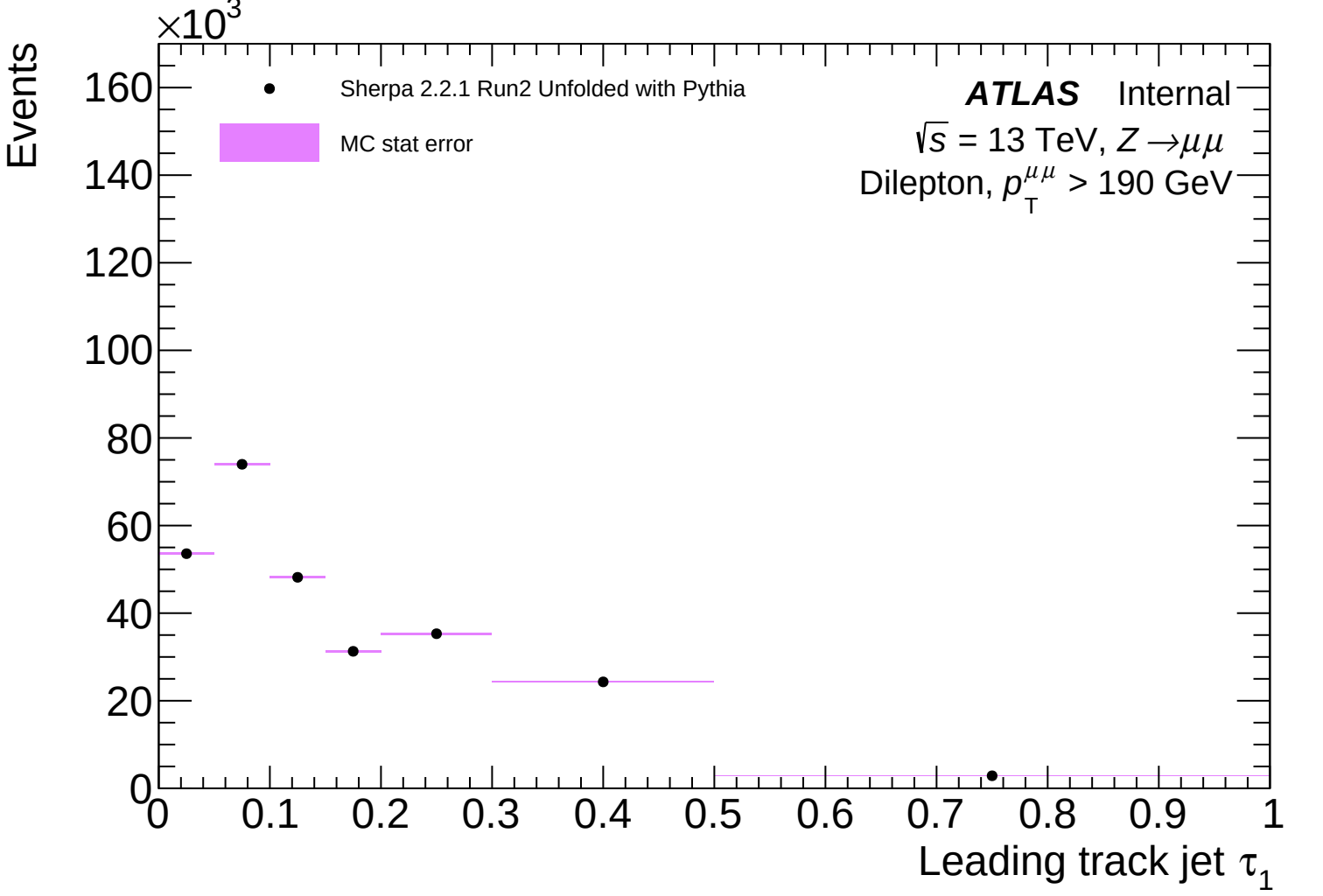

$\times 10^3$
$\frac{dN}{d\tau_1^{j1}}$
900
800
700
600
500
400
300
200
100
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

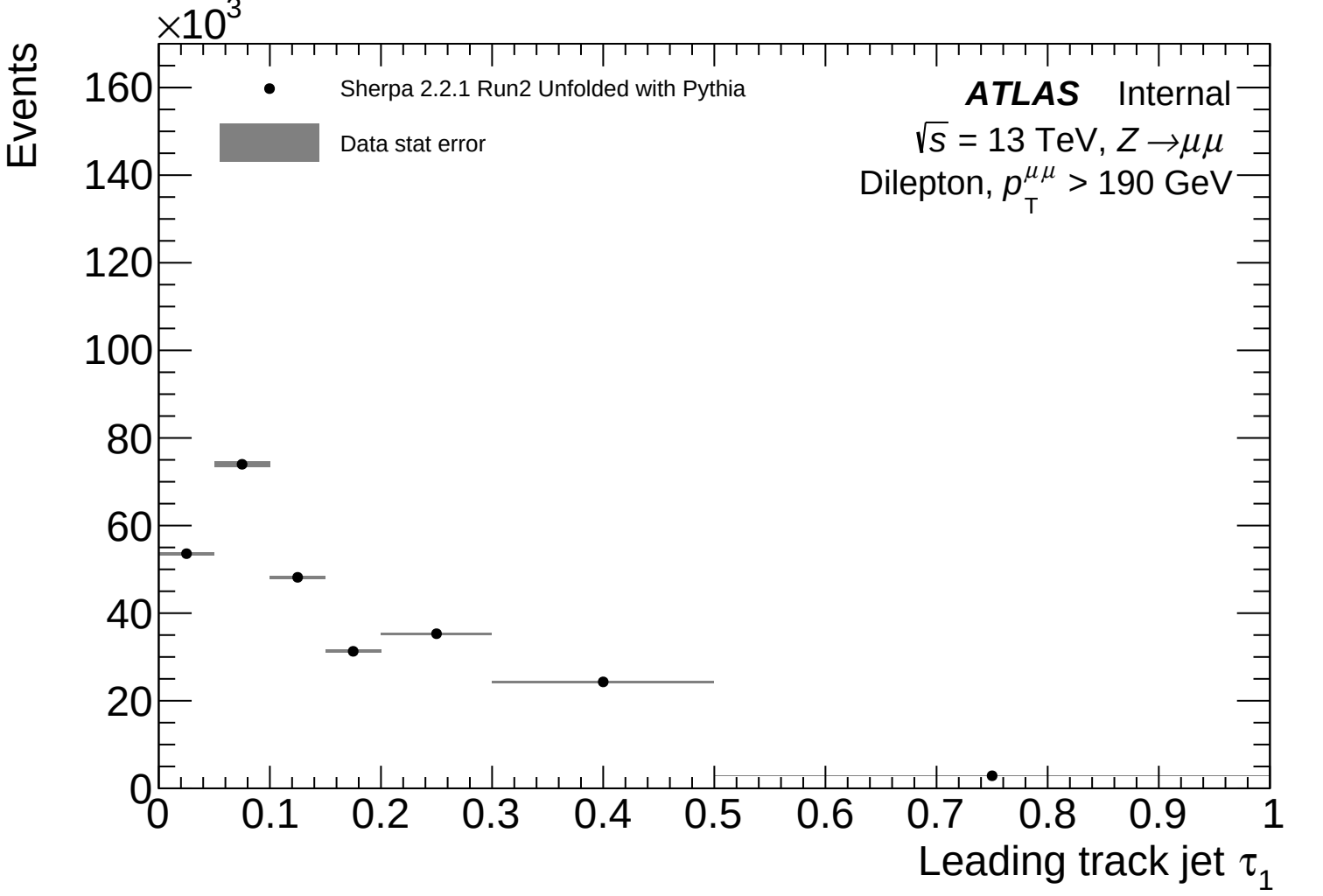

Events
×10^3
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

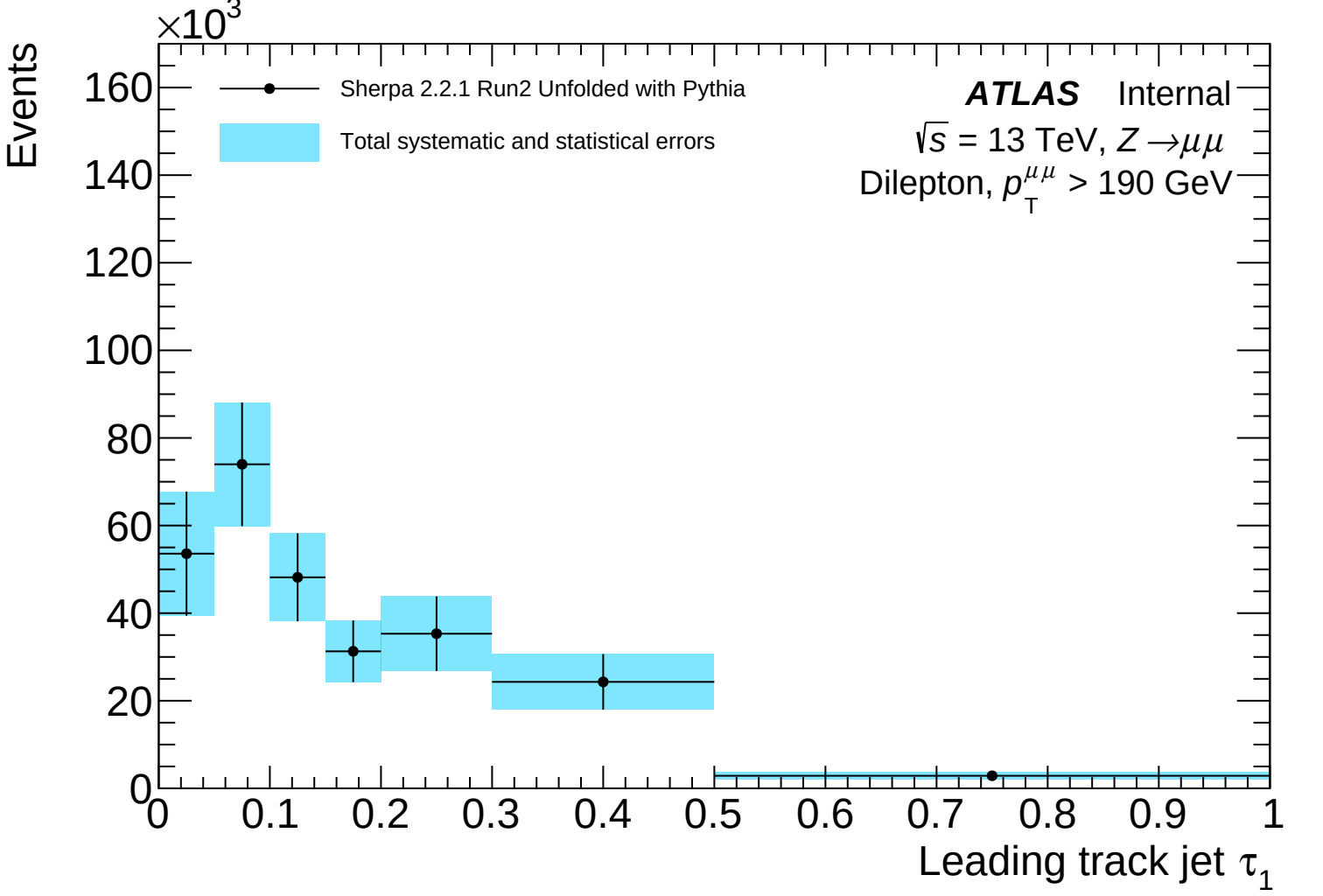

Events
×10^3
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

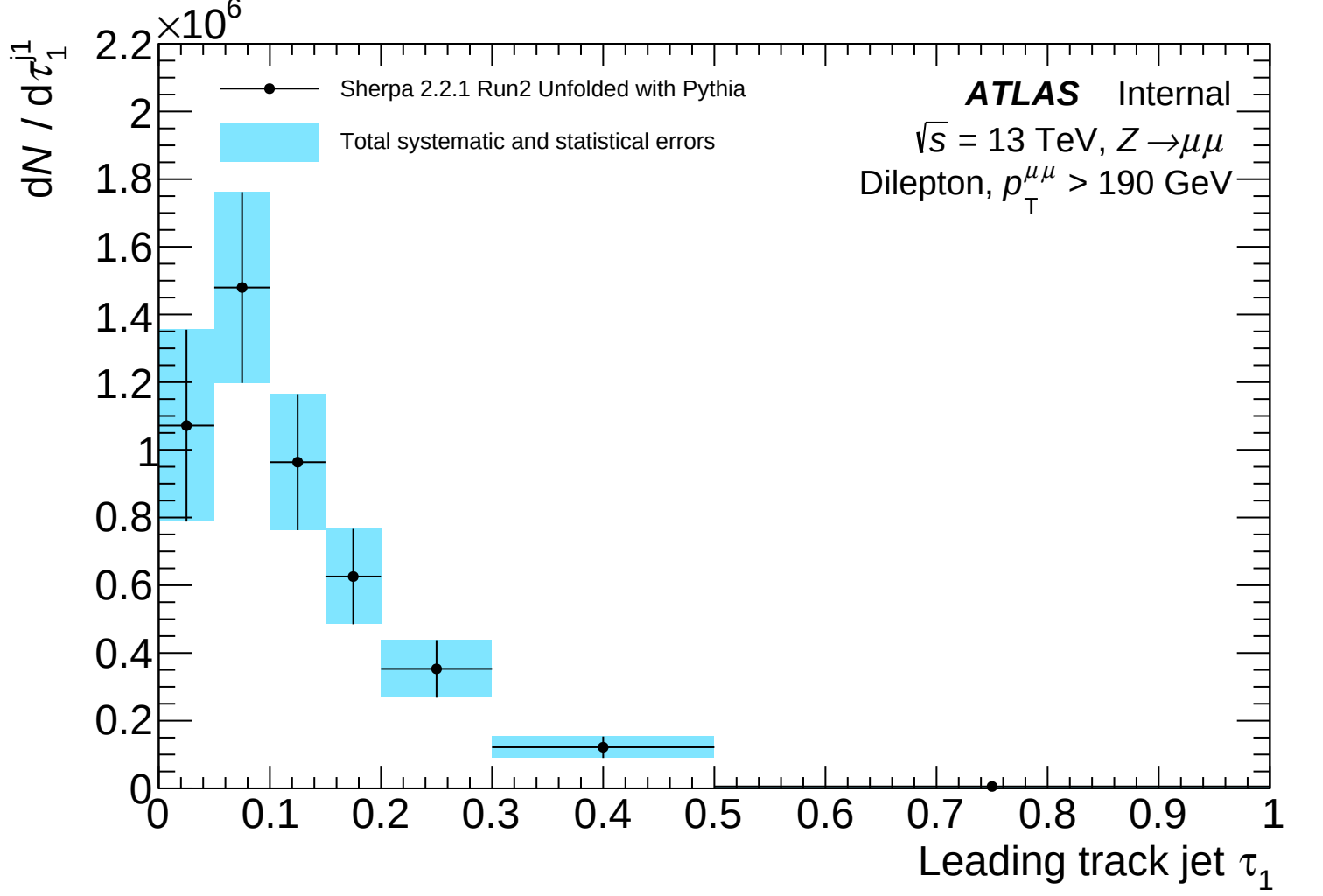

Events
×10^3
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

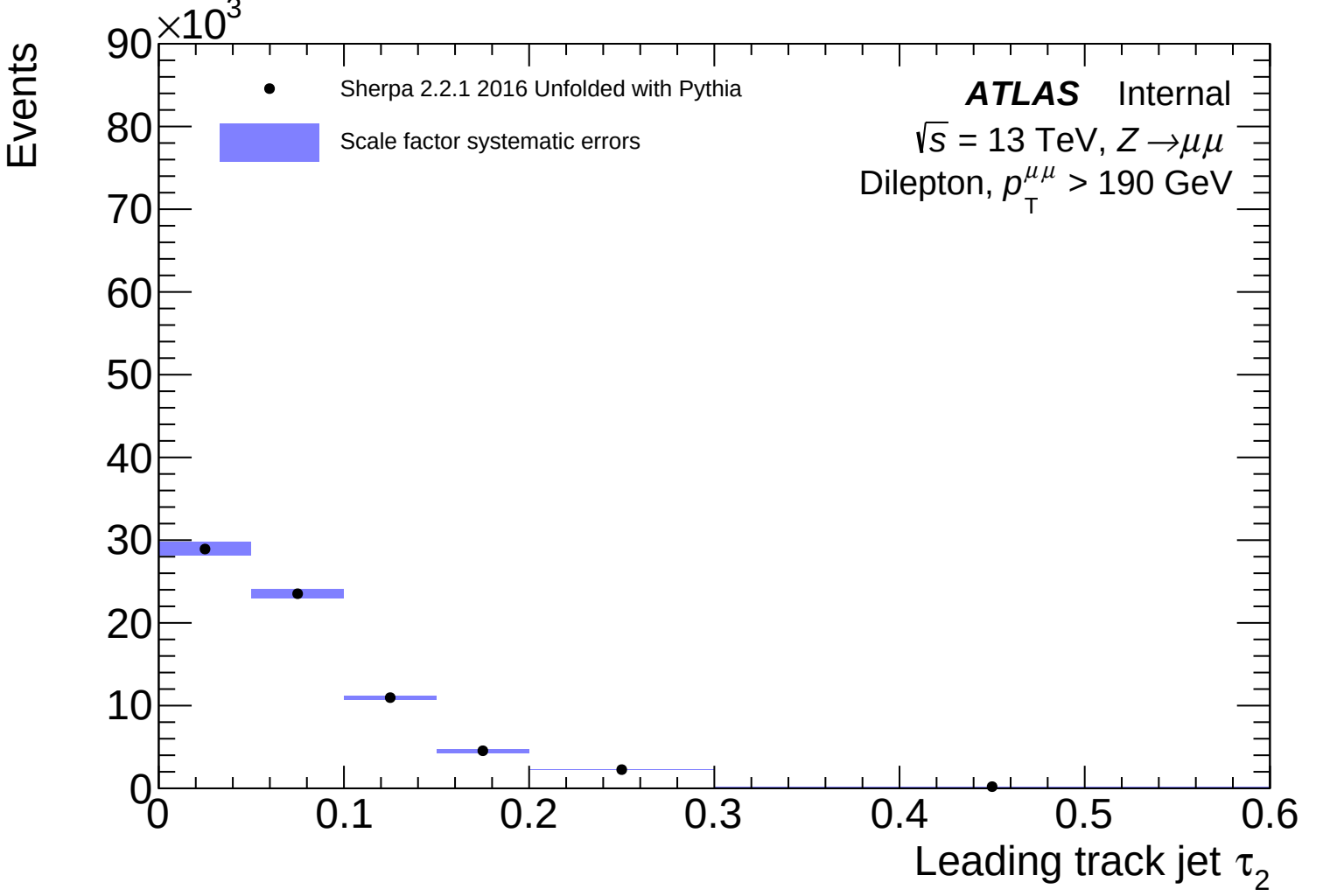

Events
×10^3
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

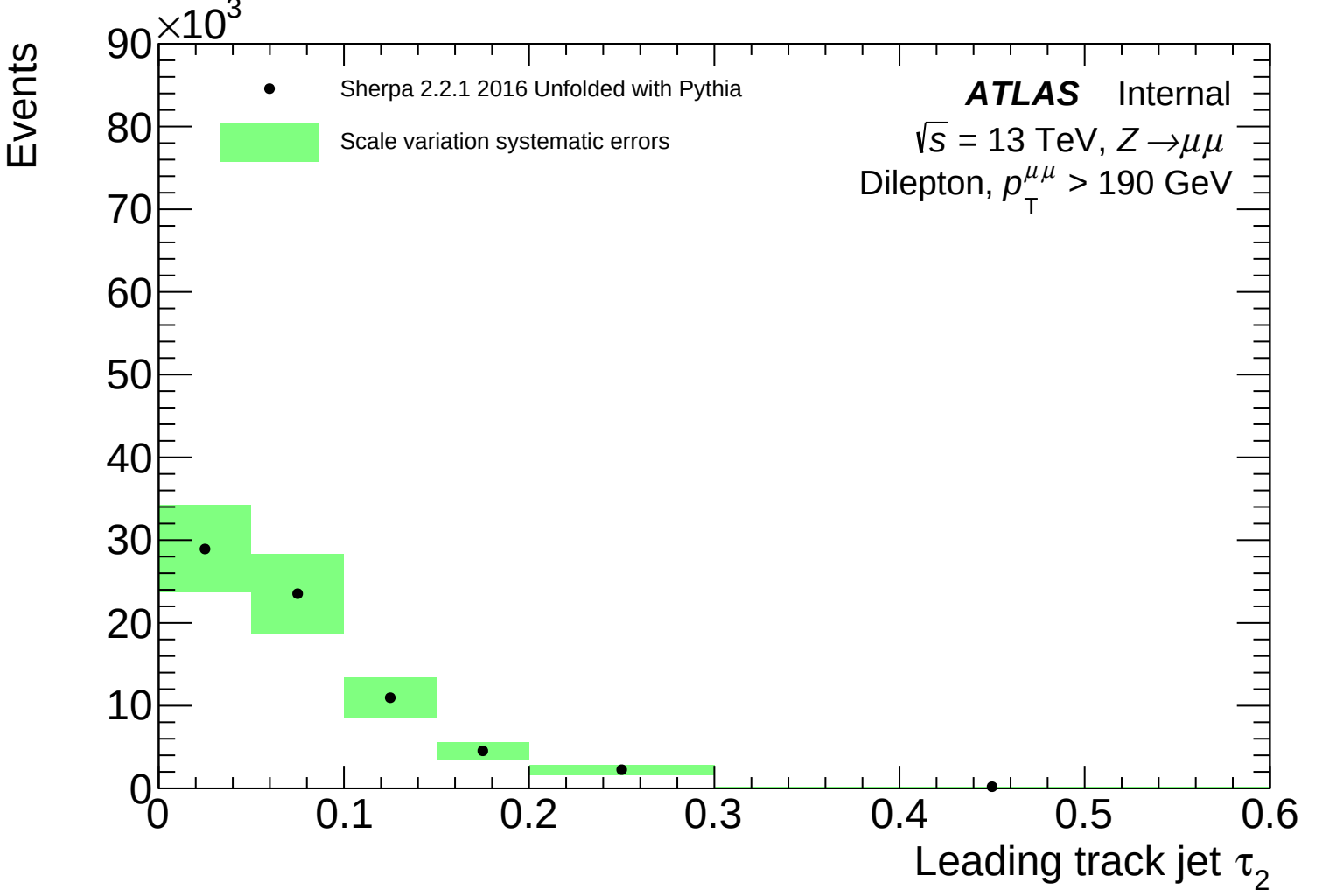

Events
×10^3
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

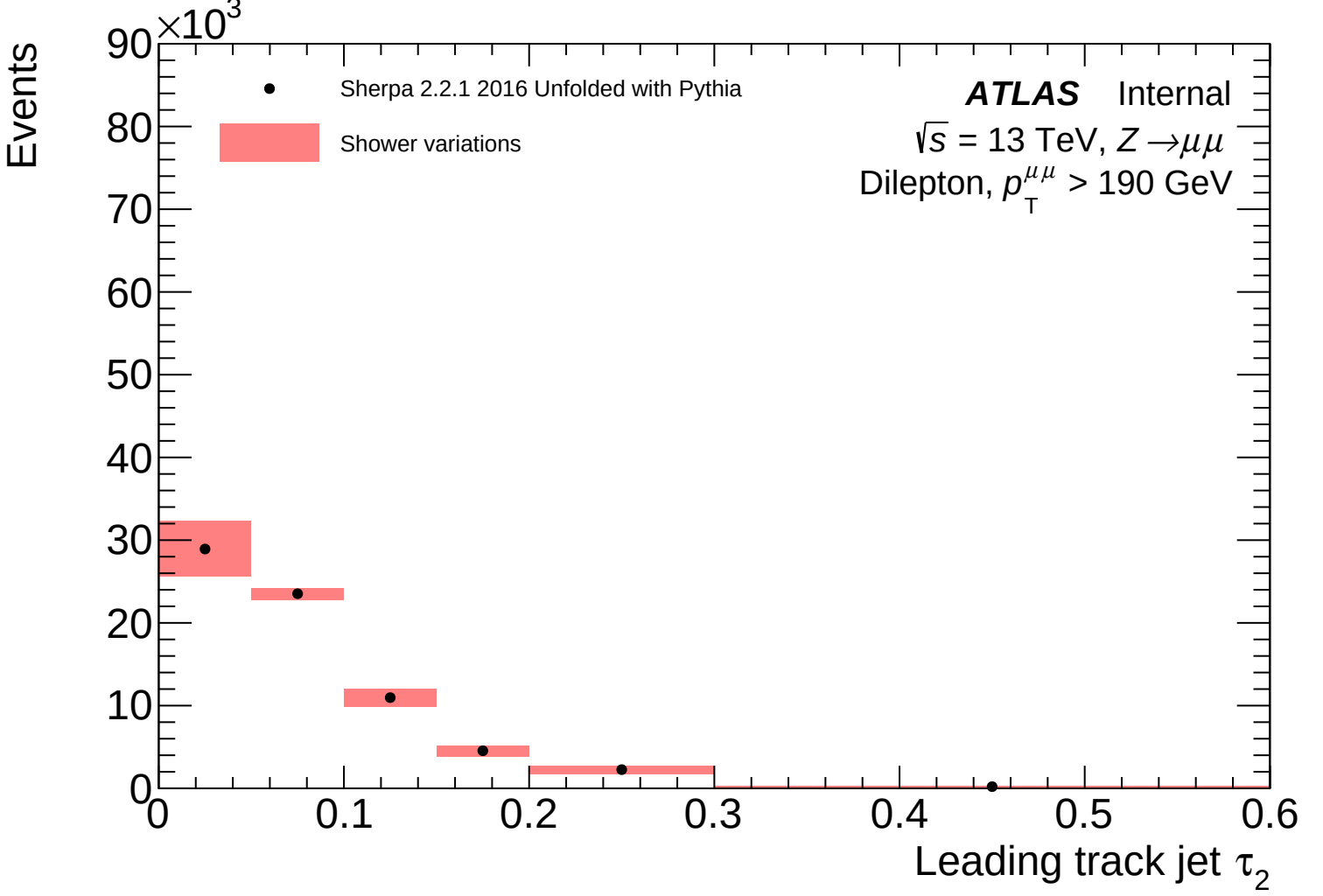

Events
×10^3
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

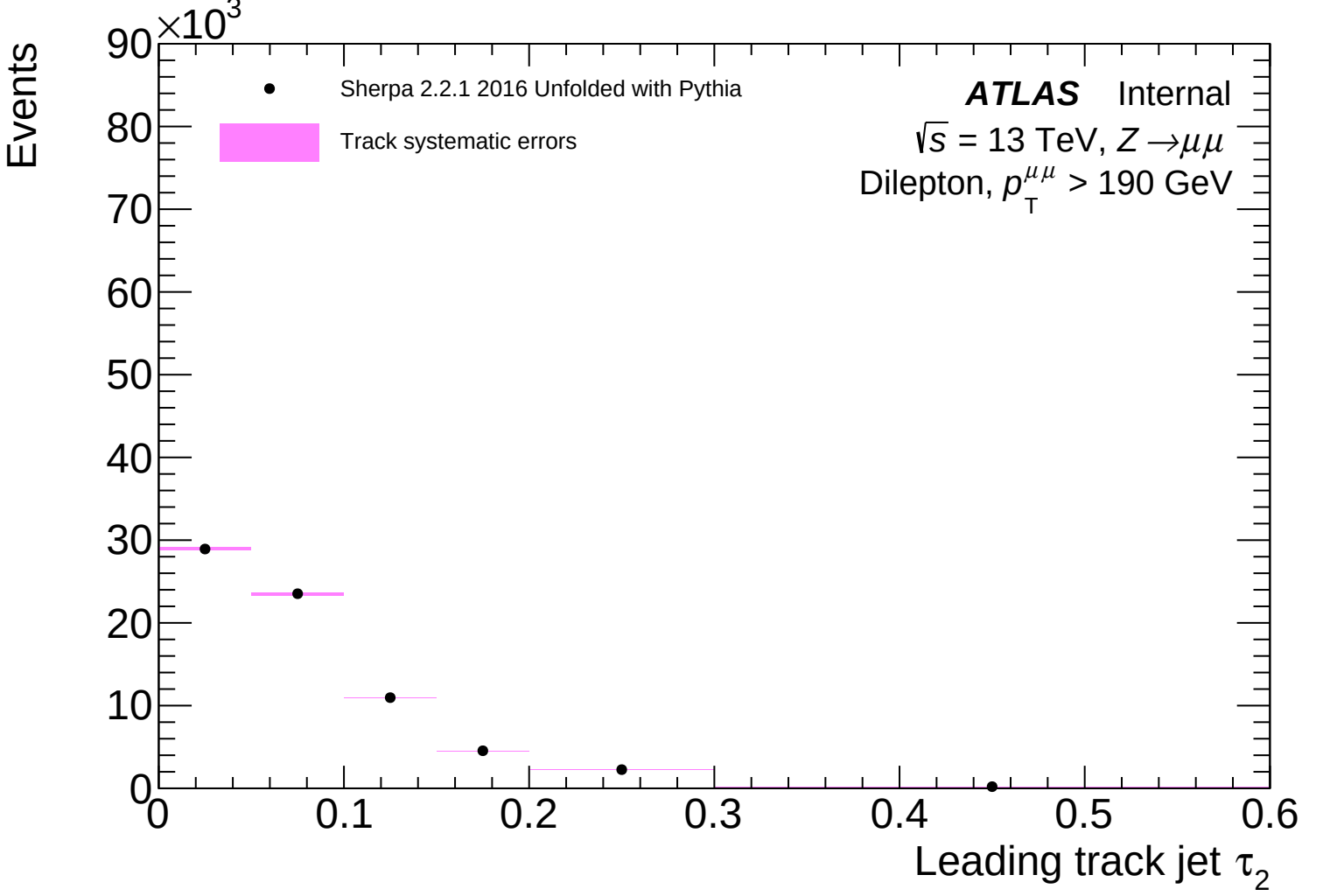

Events
×10^3
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV

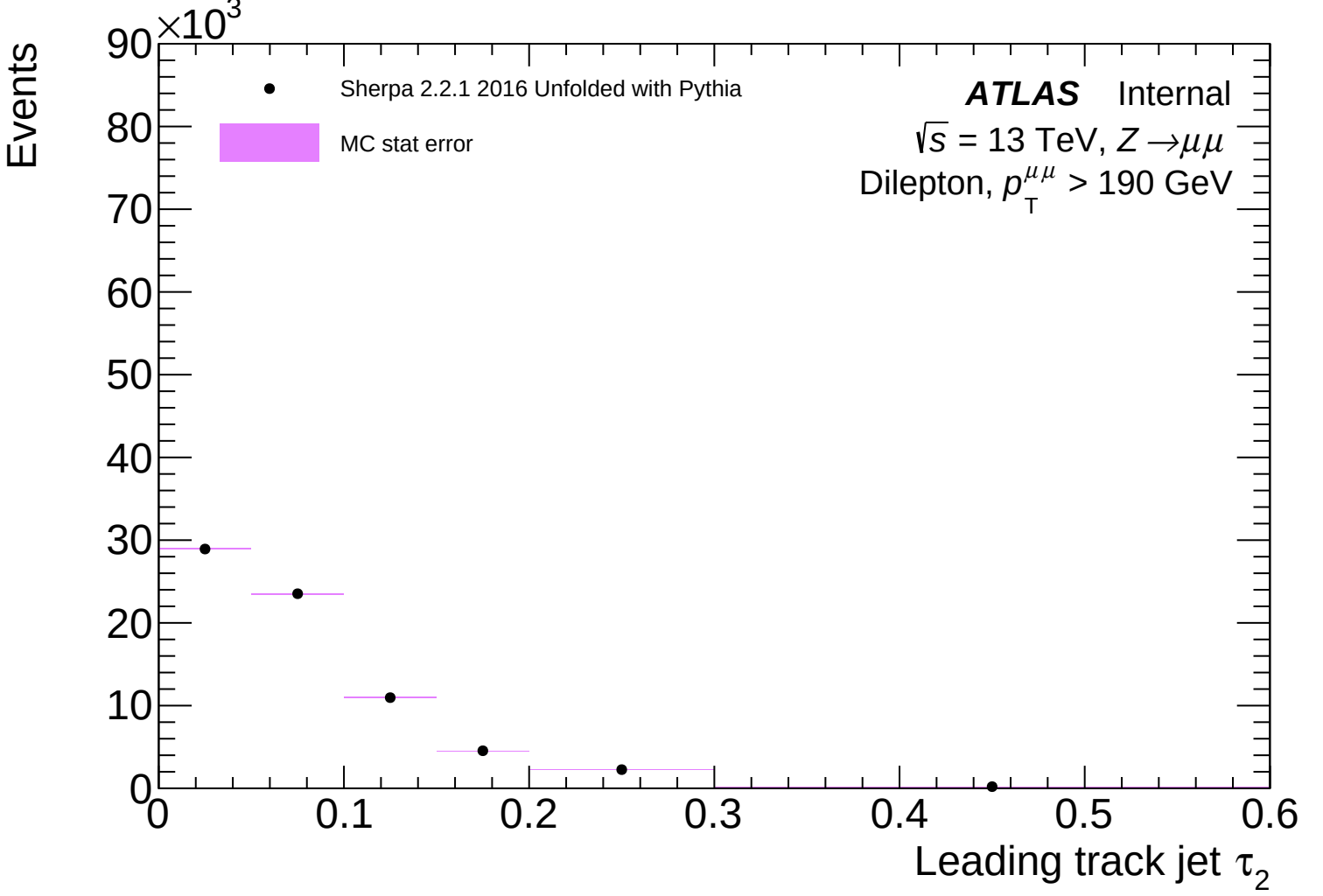

$\times 10^{6}$
$\mathrm{d}N\ /\ \mathrm{d}\tau_1^{j1}$
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Leading track jet τ_1

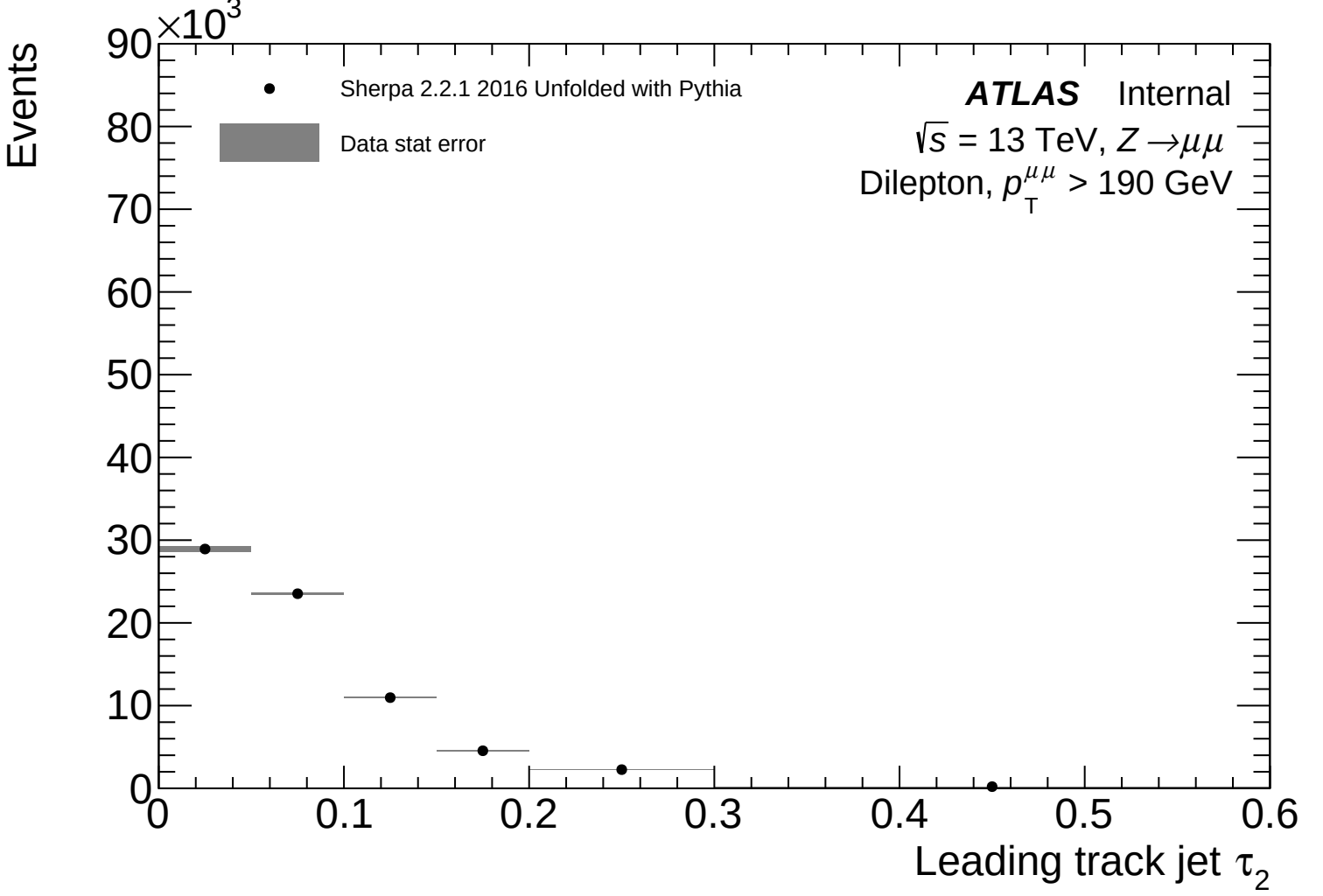

Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

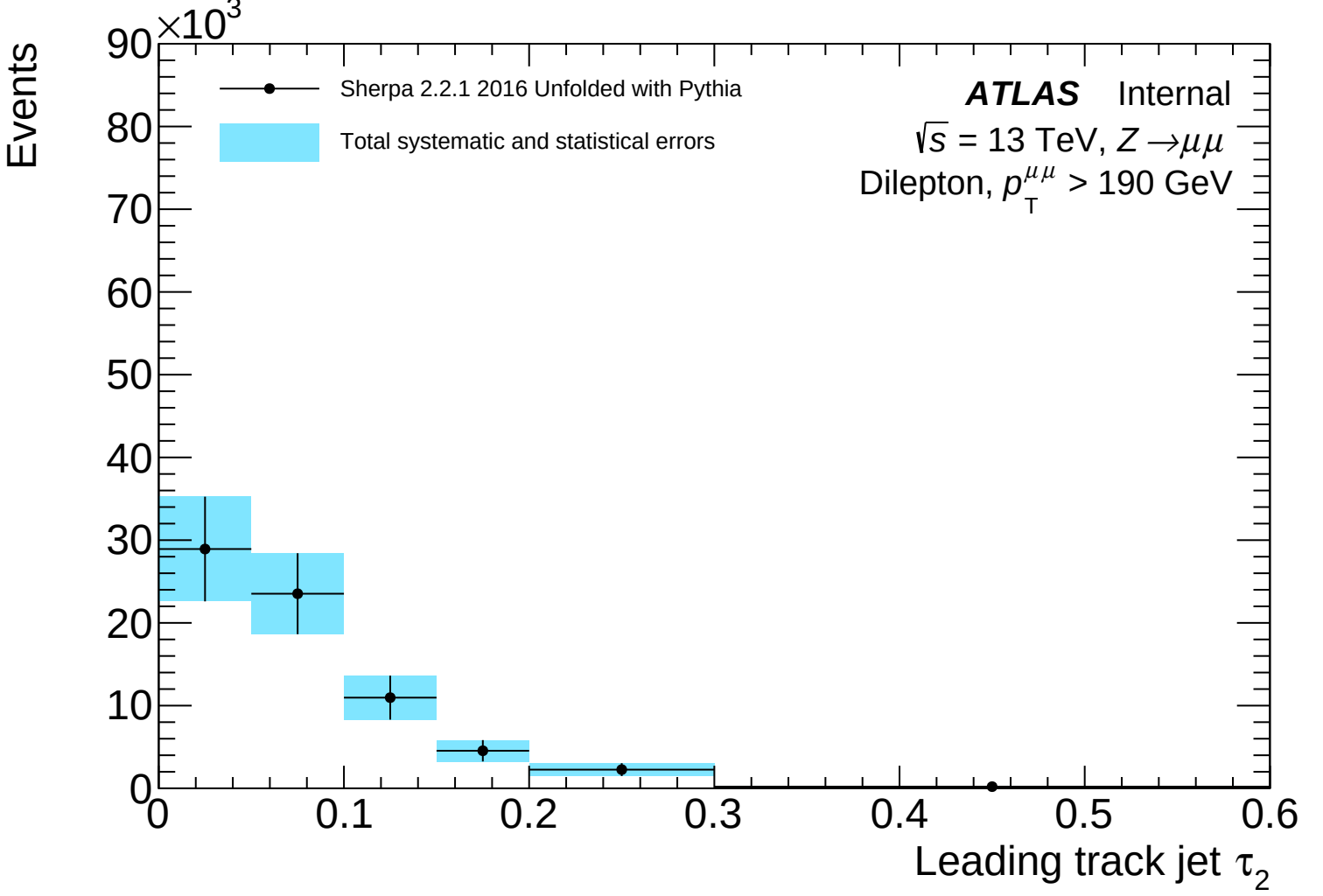

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

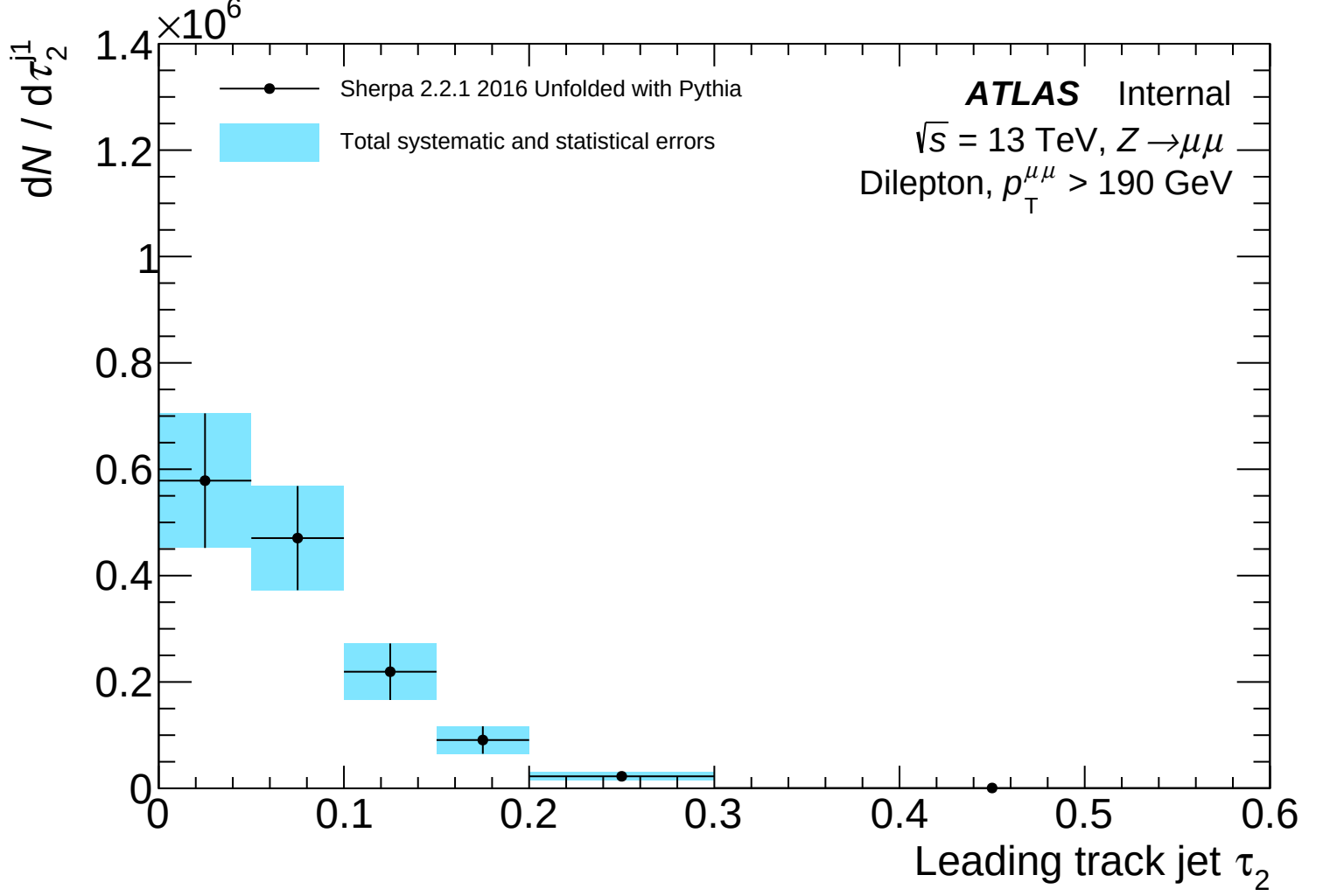

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

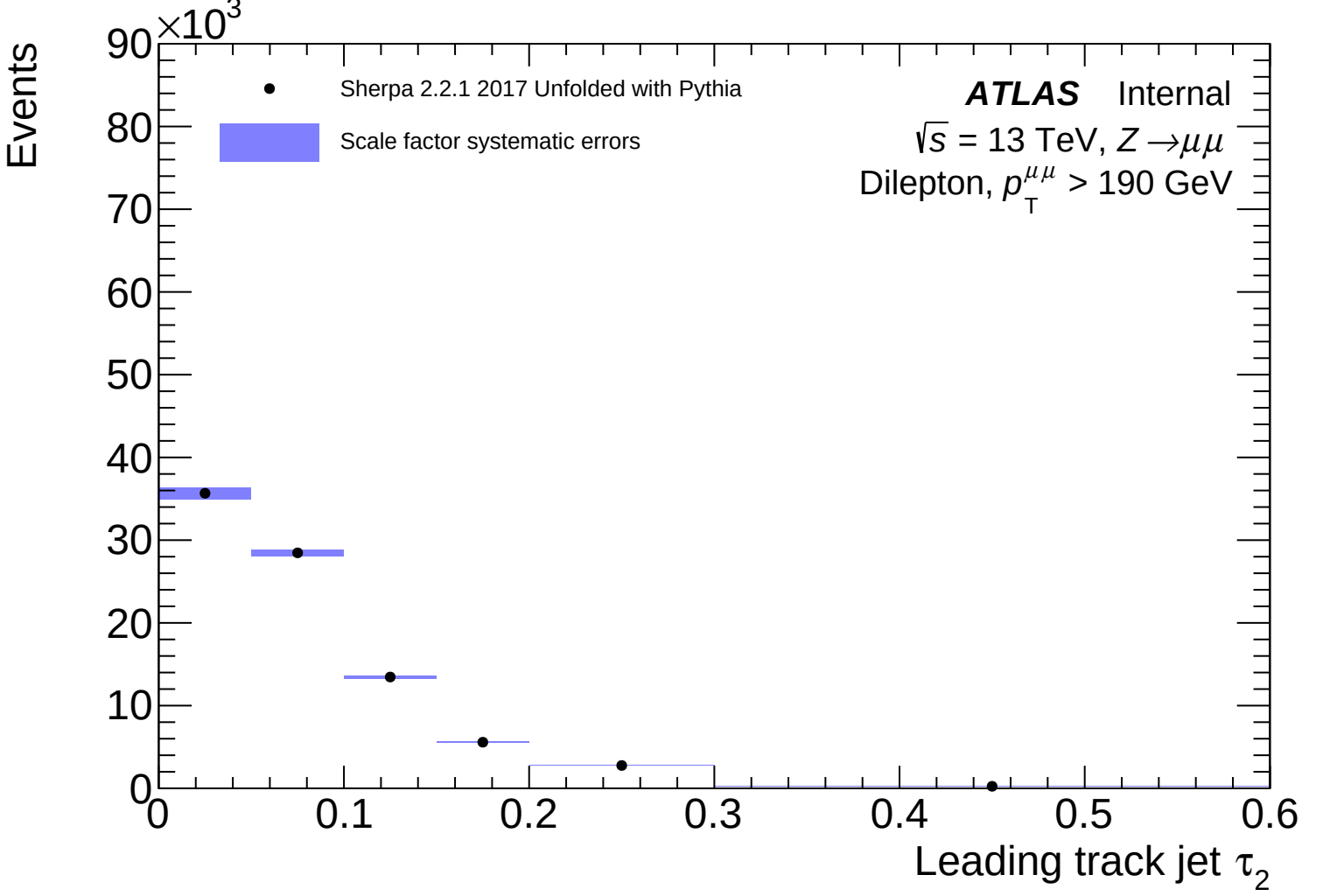

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

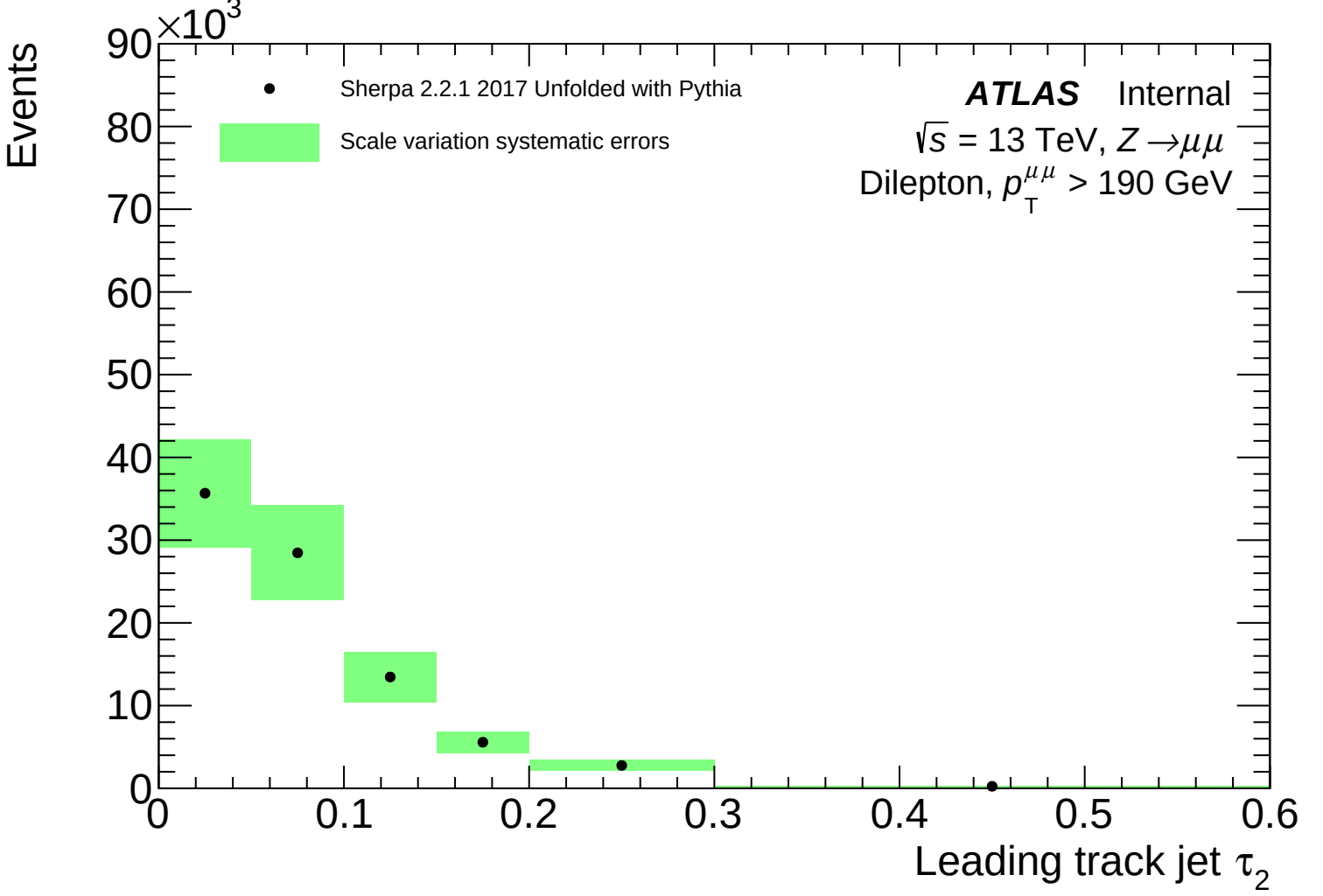

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

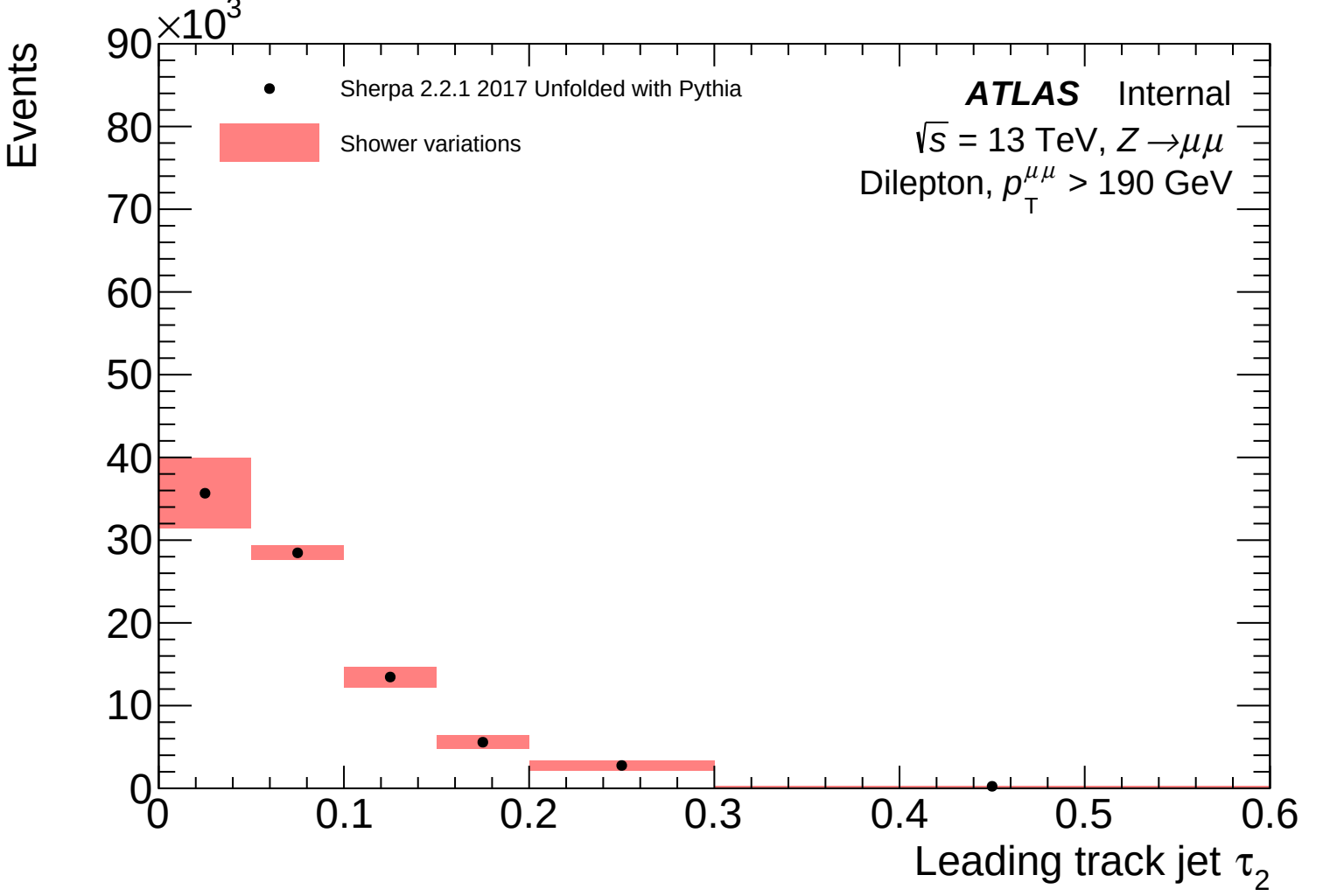

Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

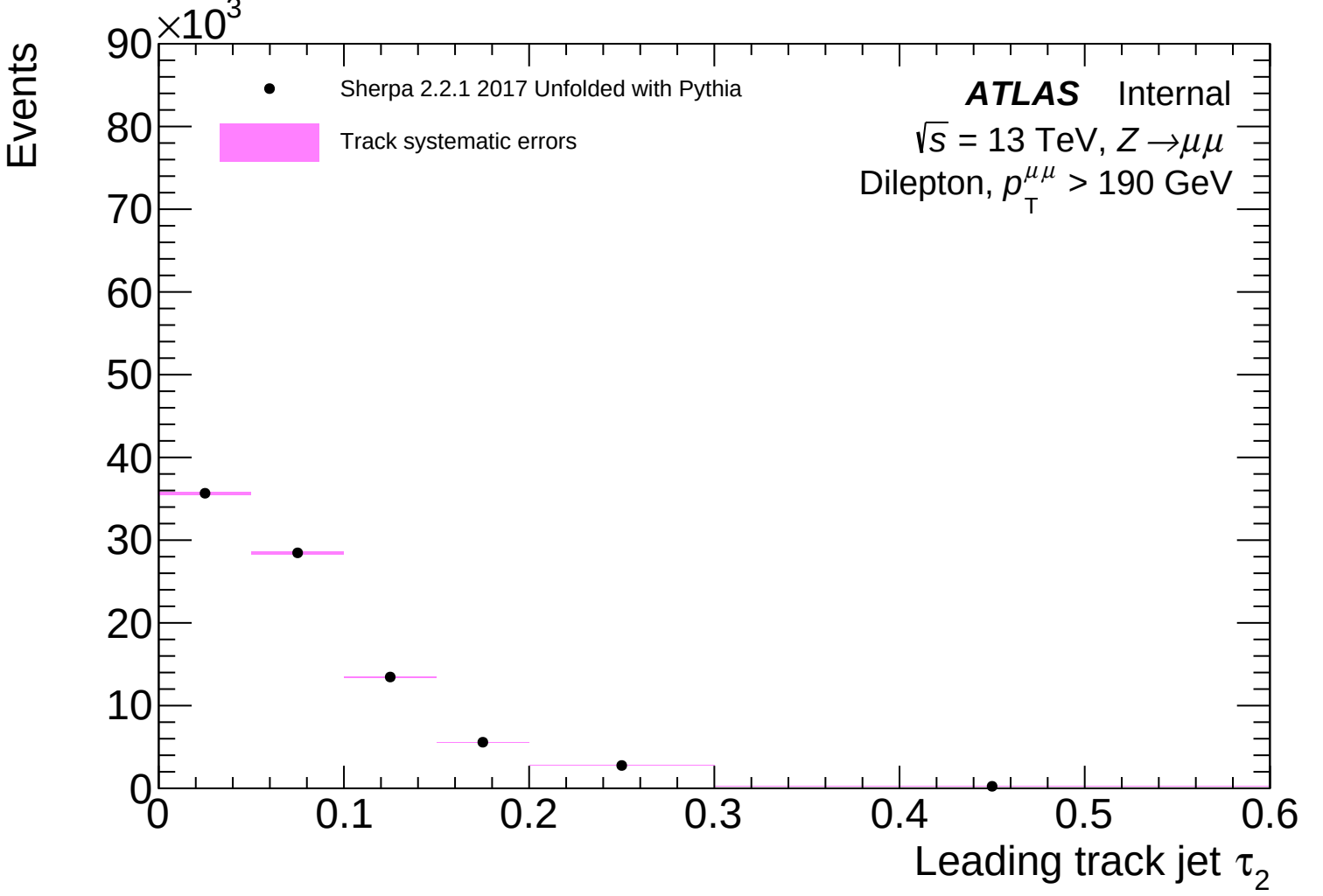

Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

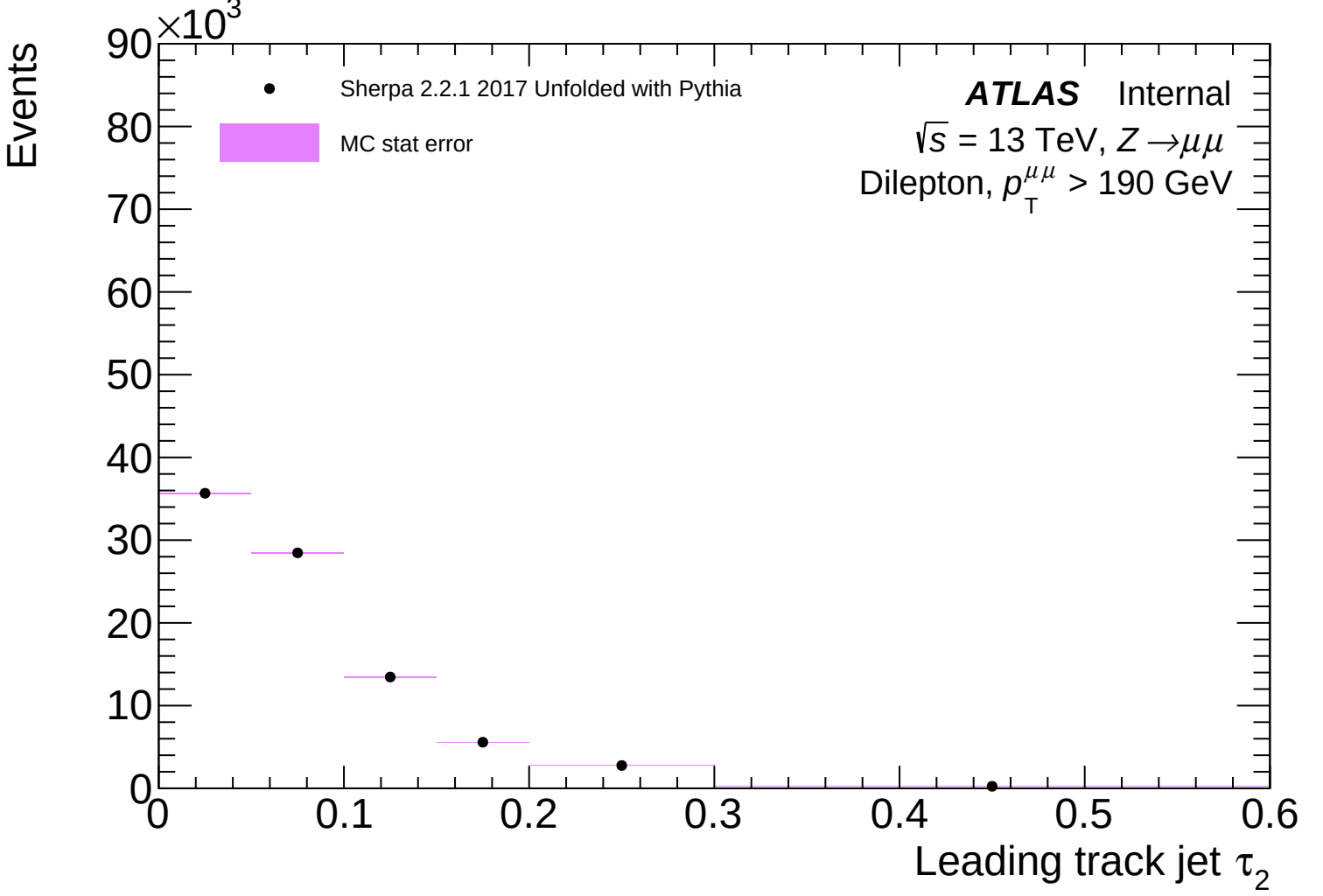

$\times 10^{6}$
1.4
1.2
1
0.8
0.6
0.4
0.2
0
$\mathrm{d}N\ /\ \mathrm{d}\tau_2^{j1}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

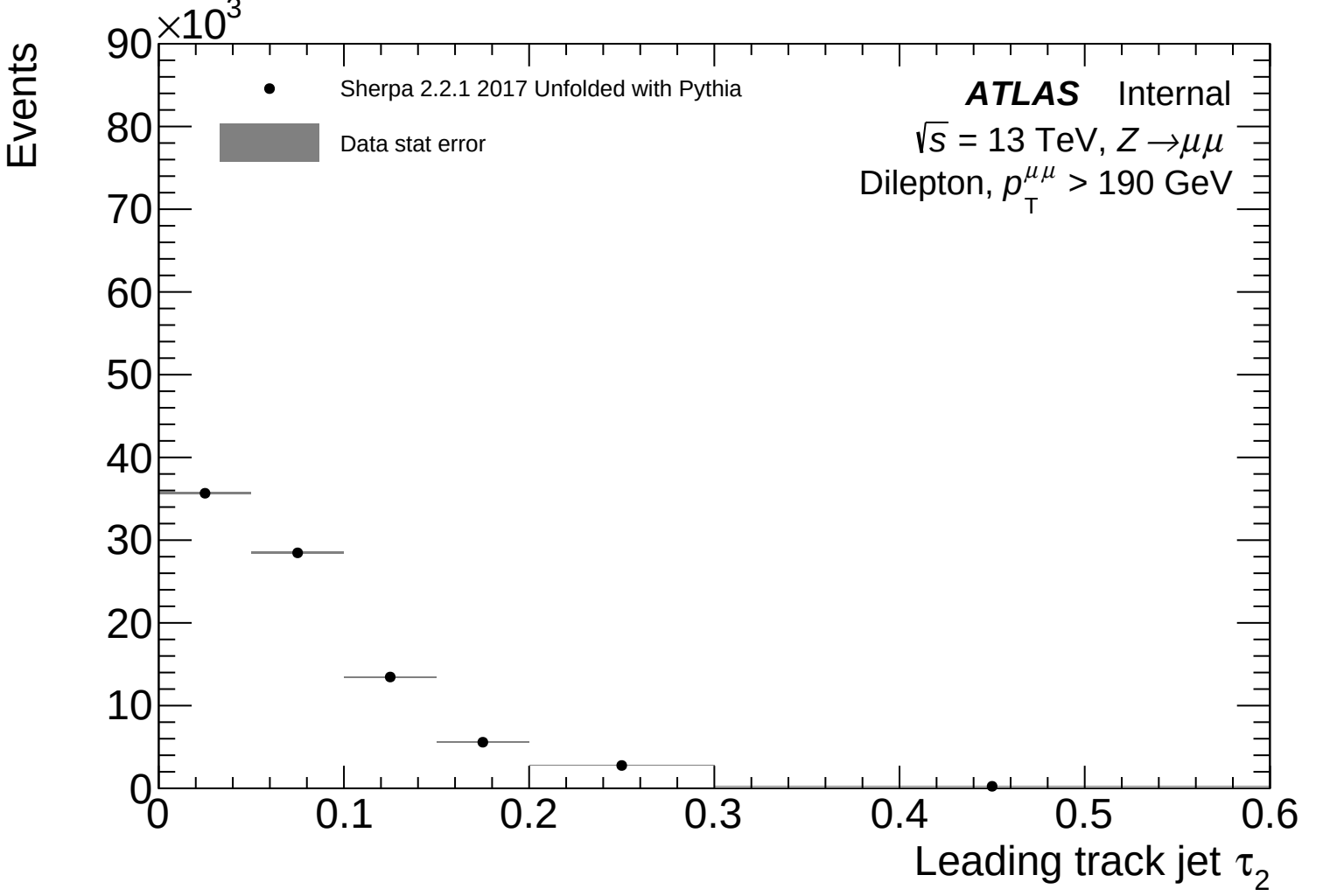

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

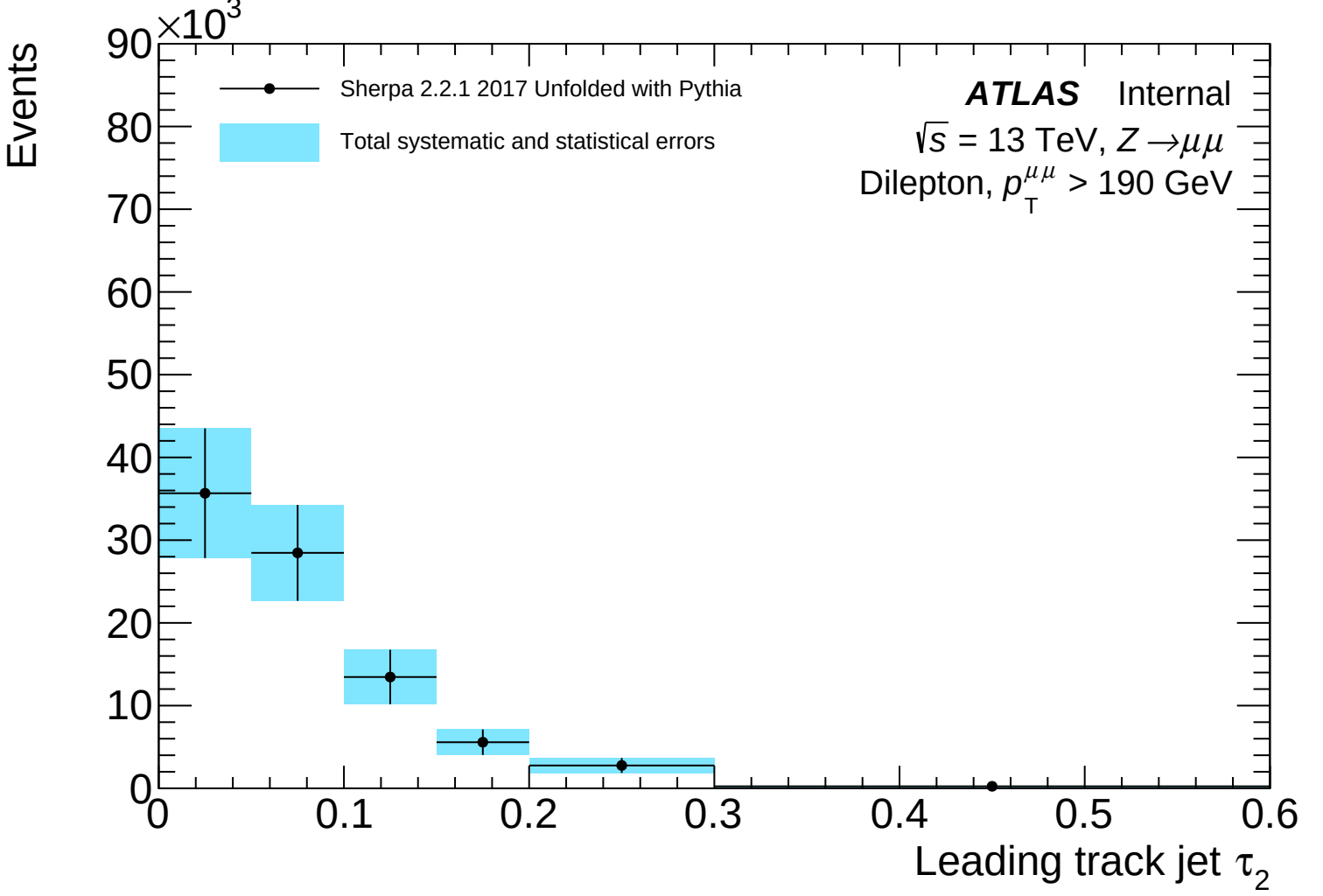

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

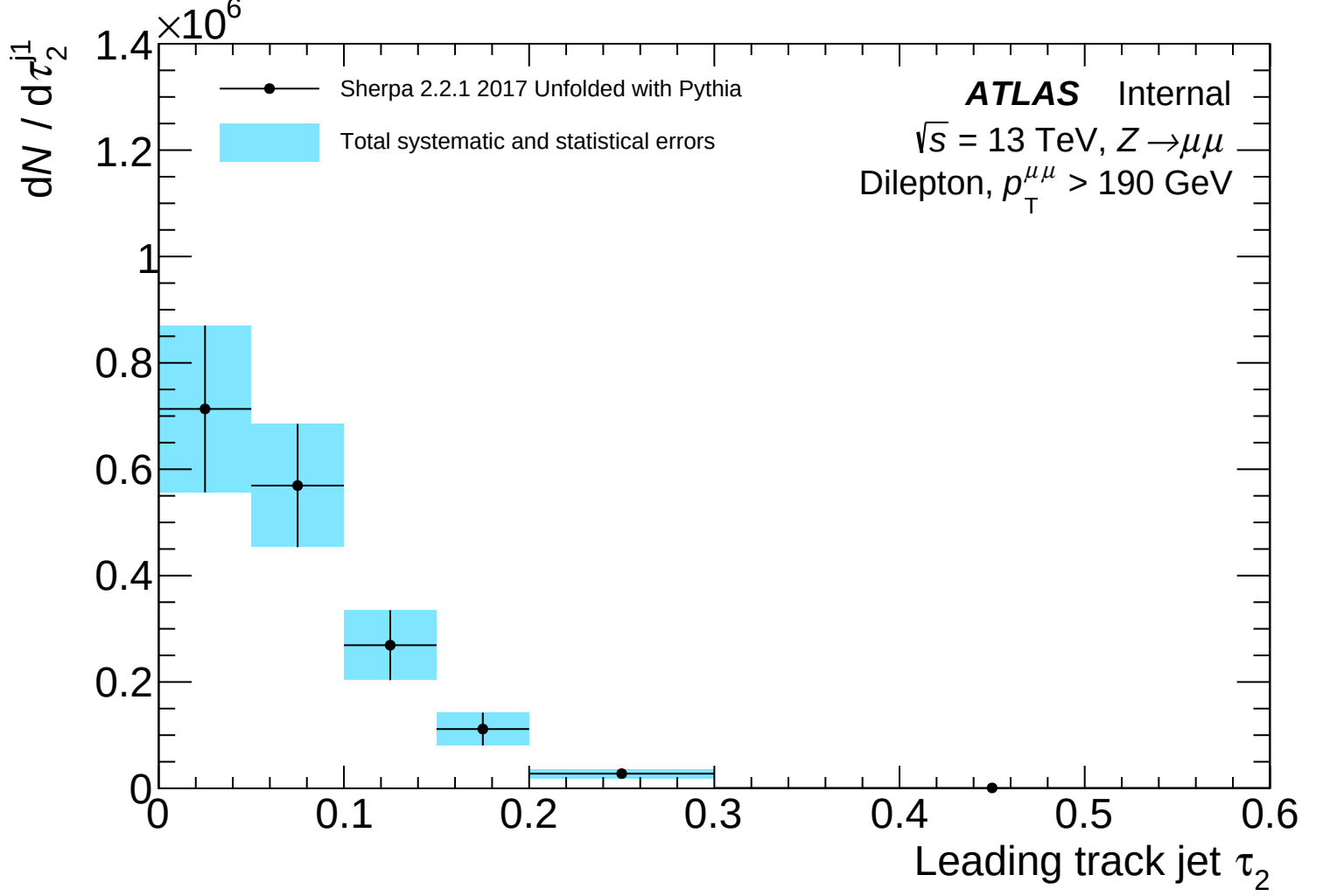

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

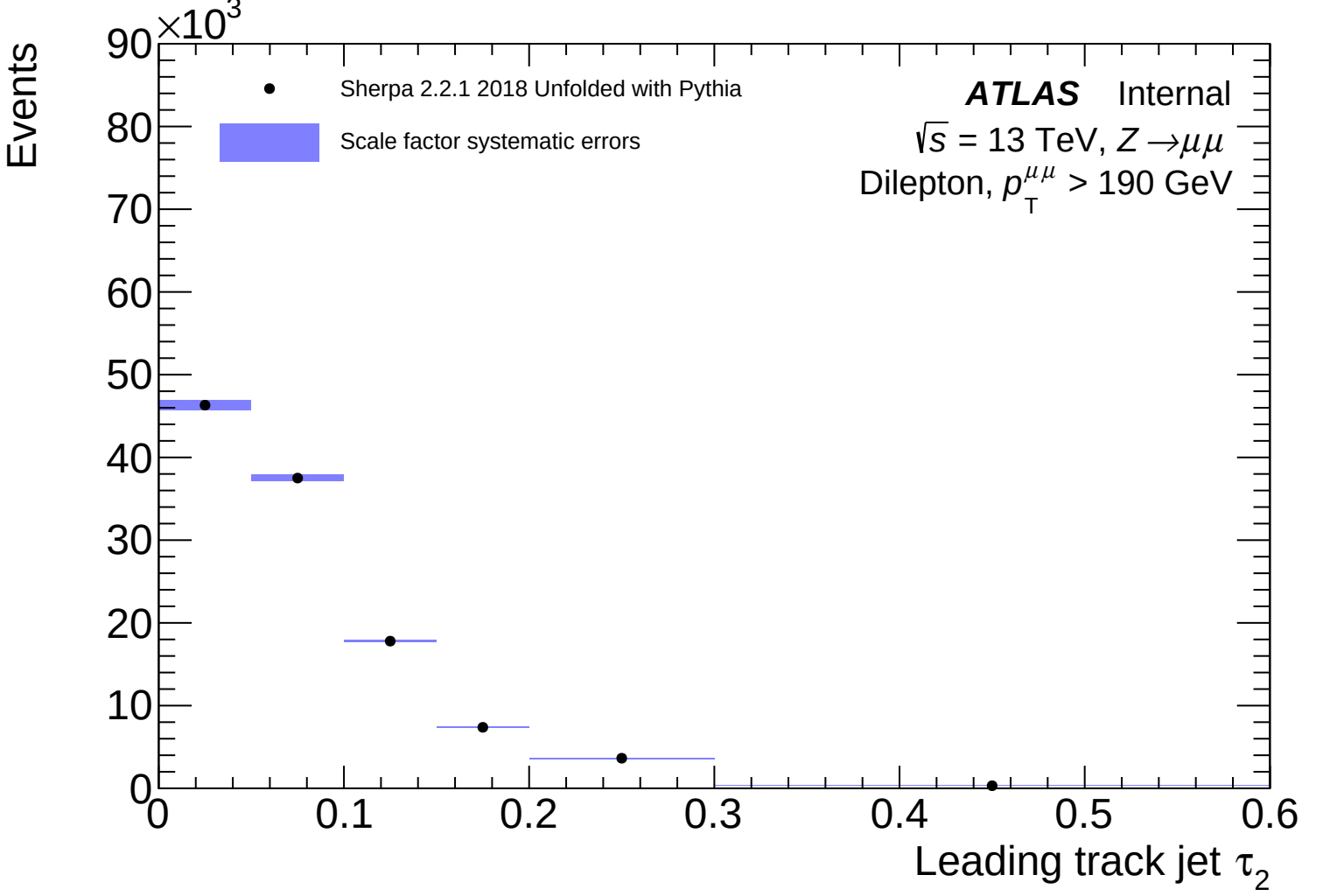

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

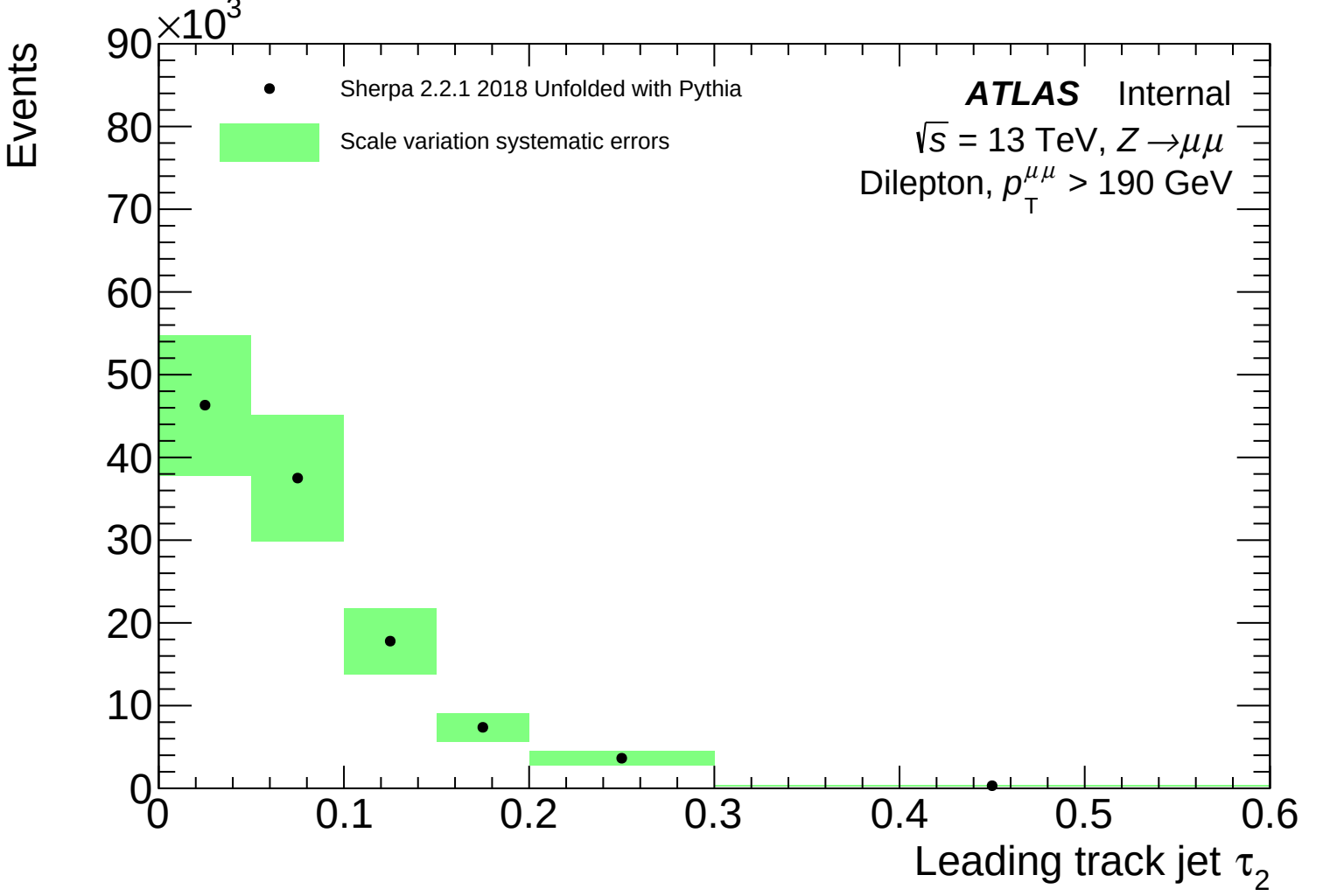

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

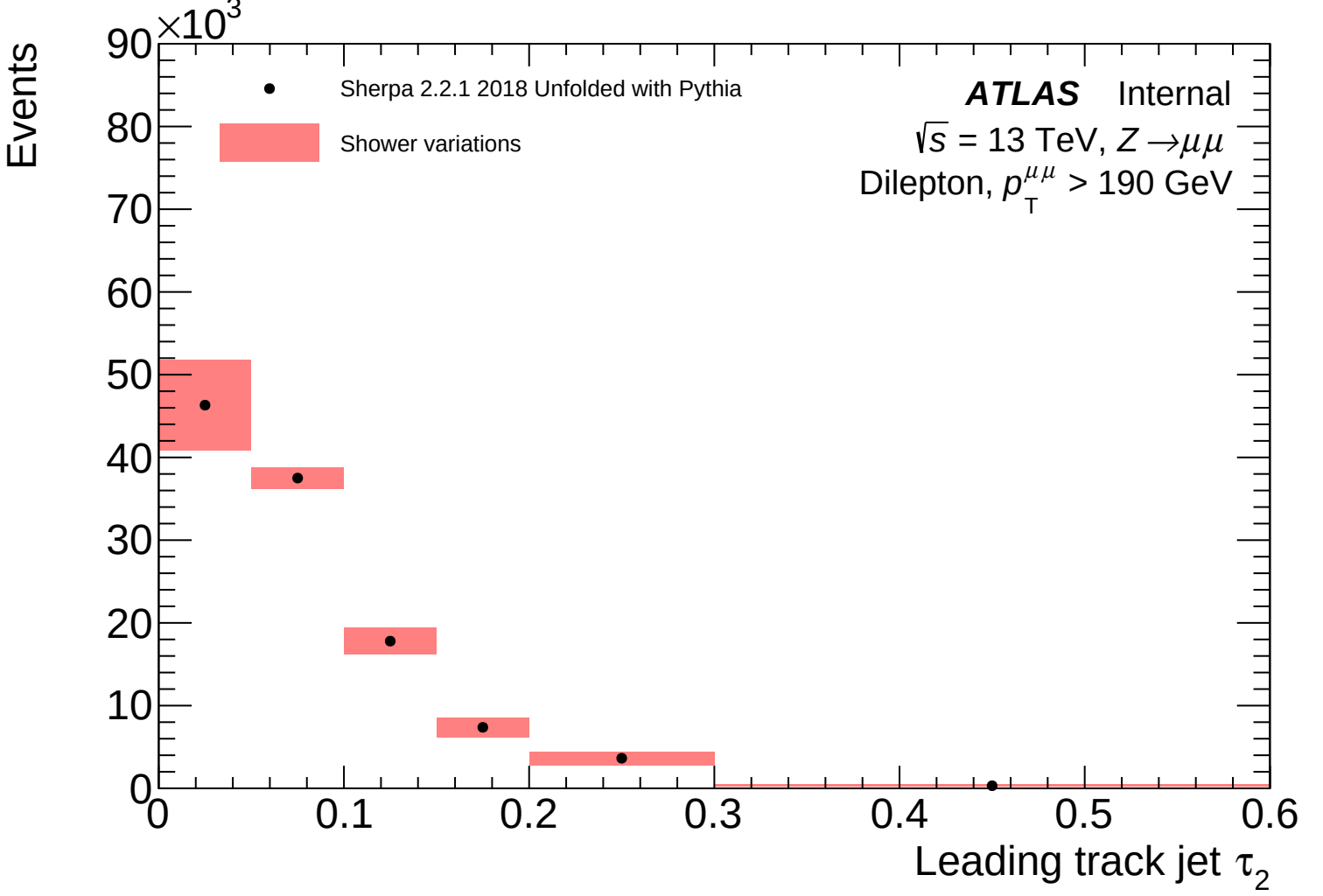

Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

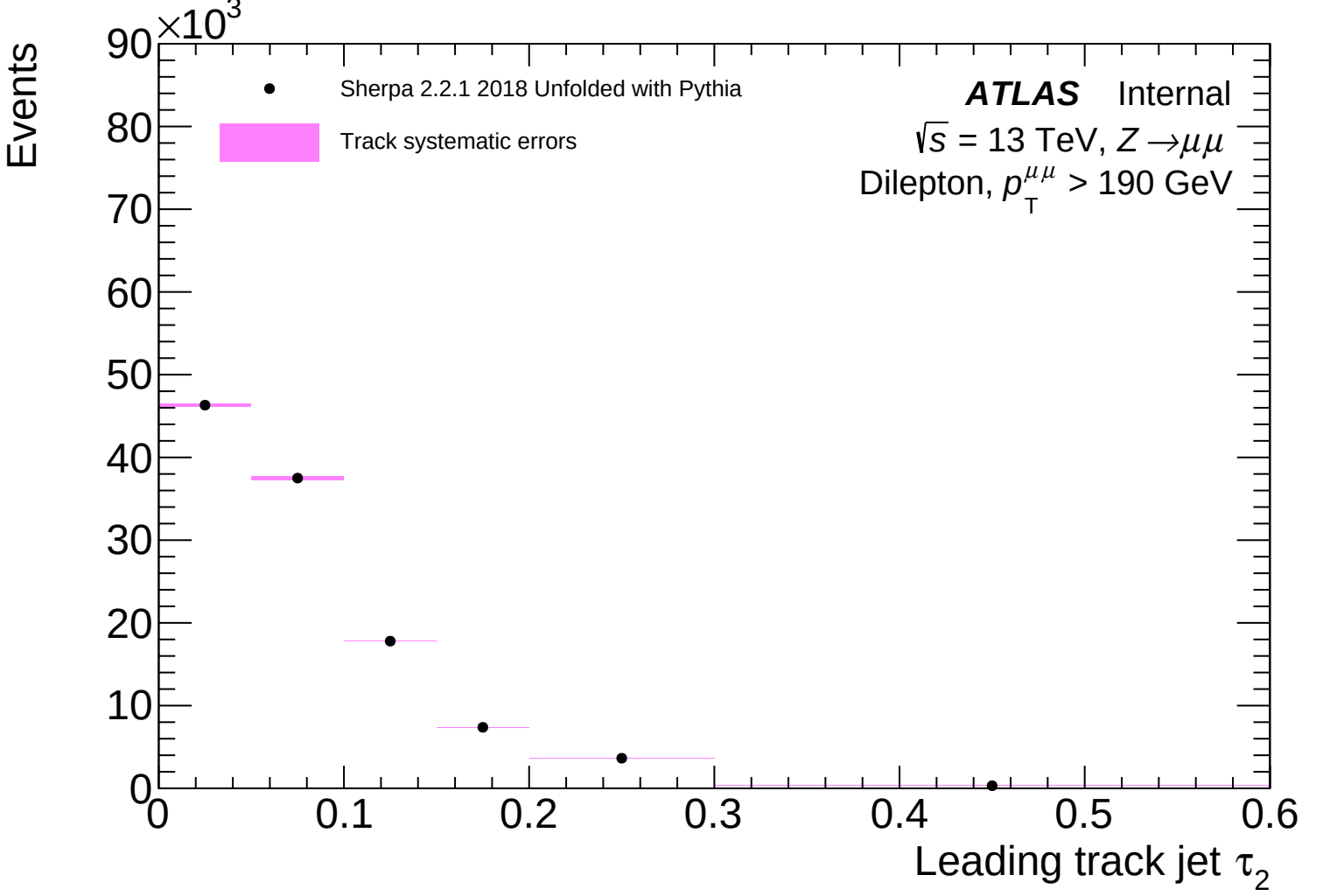

Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

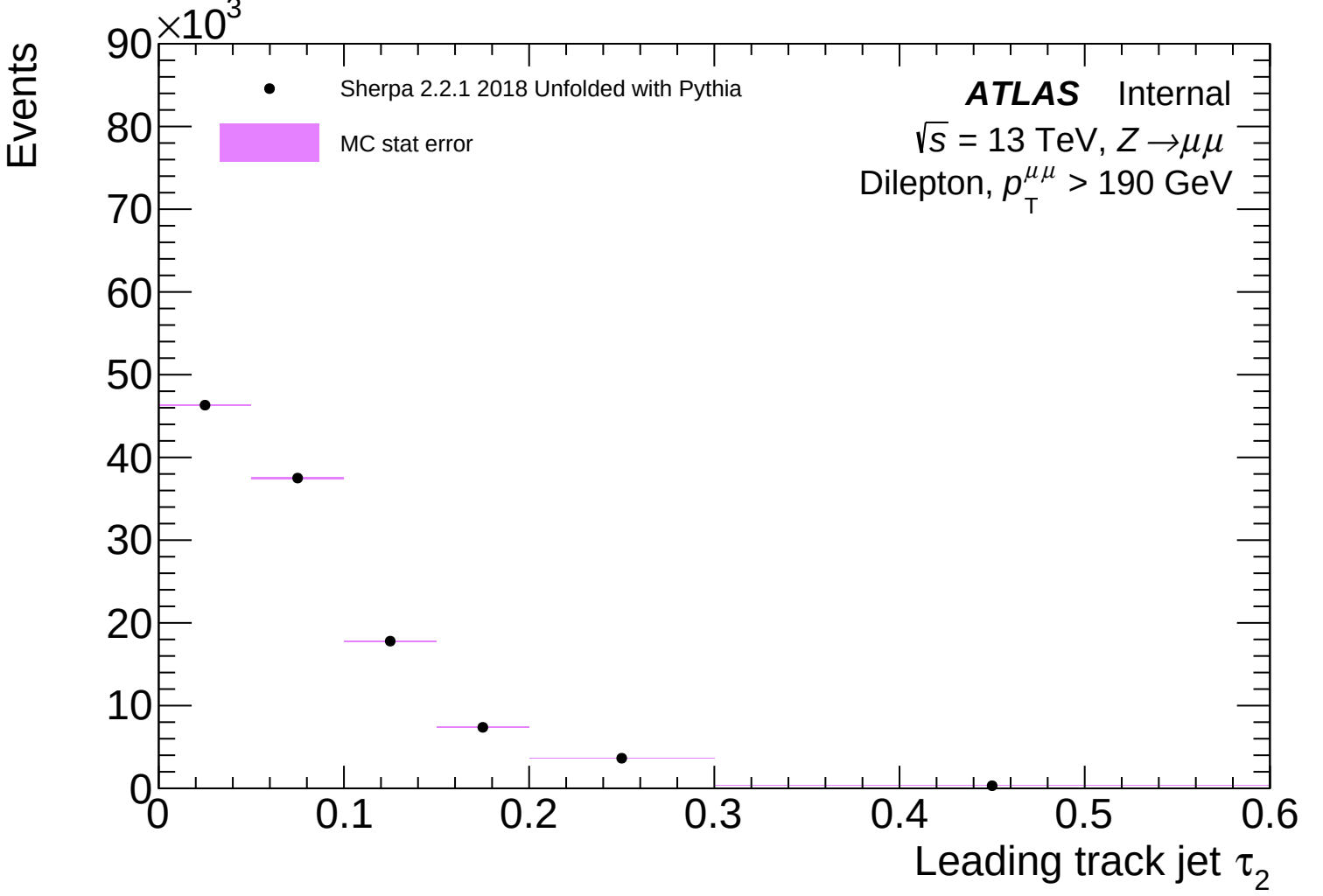

$\times 10^{6}$
1.4
1.2
1
0.8
0.6
0.4
0.2
0
$dN / d\tau_2^{j1}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

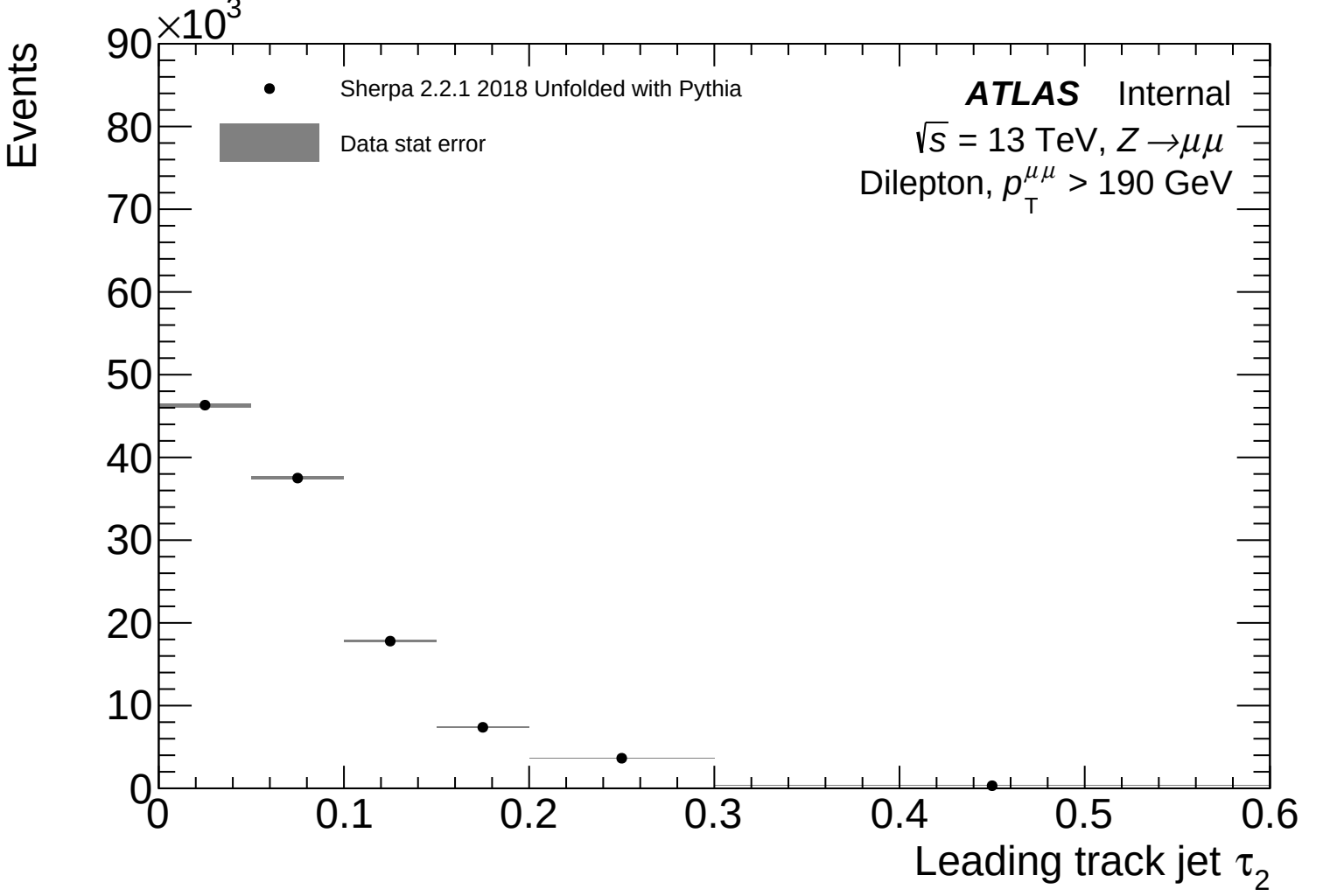

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

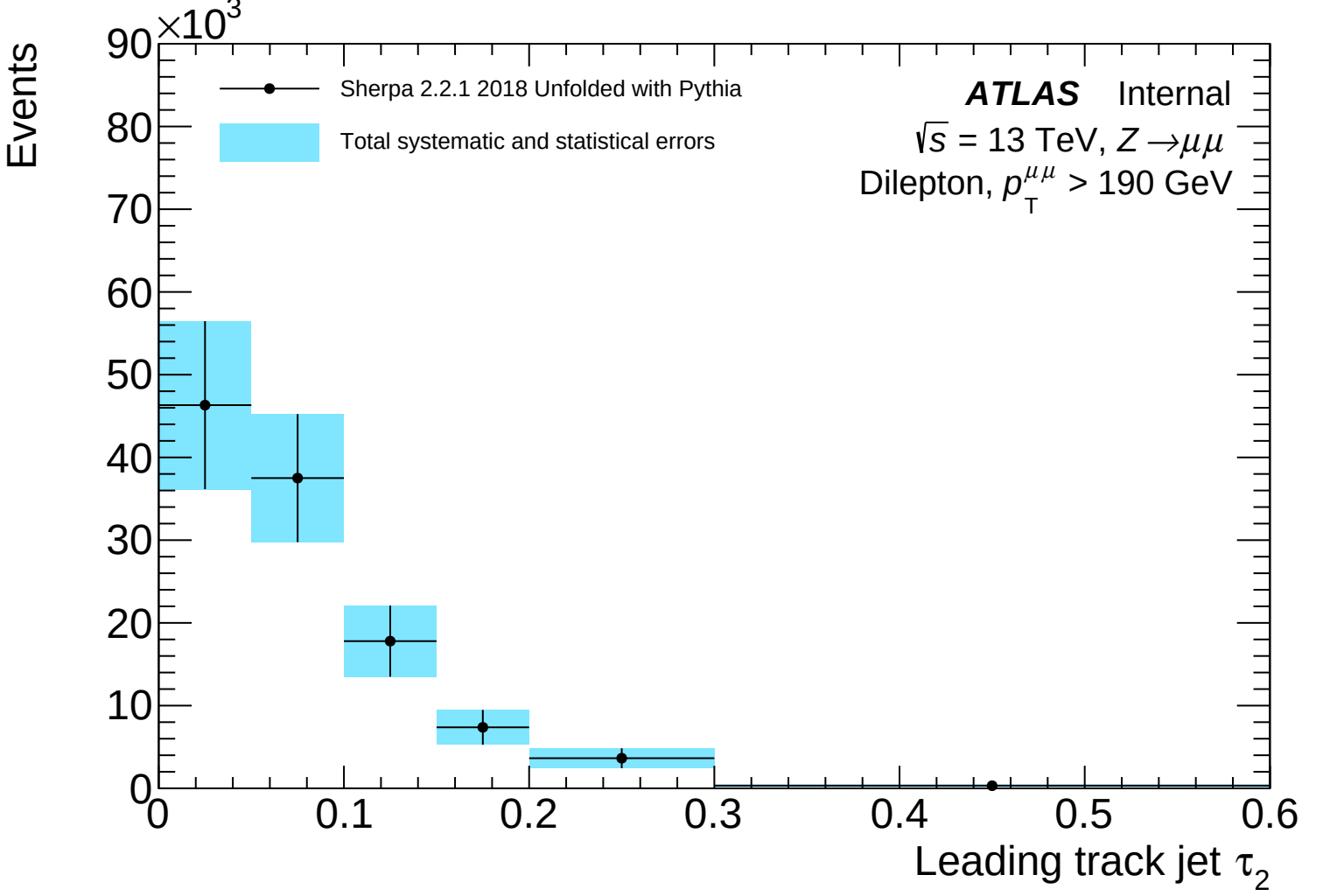

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

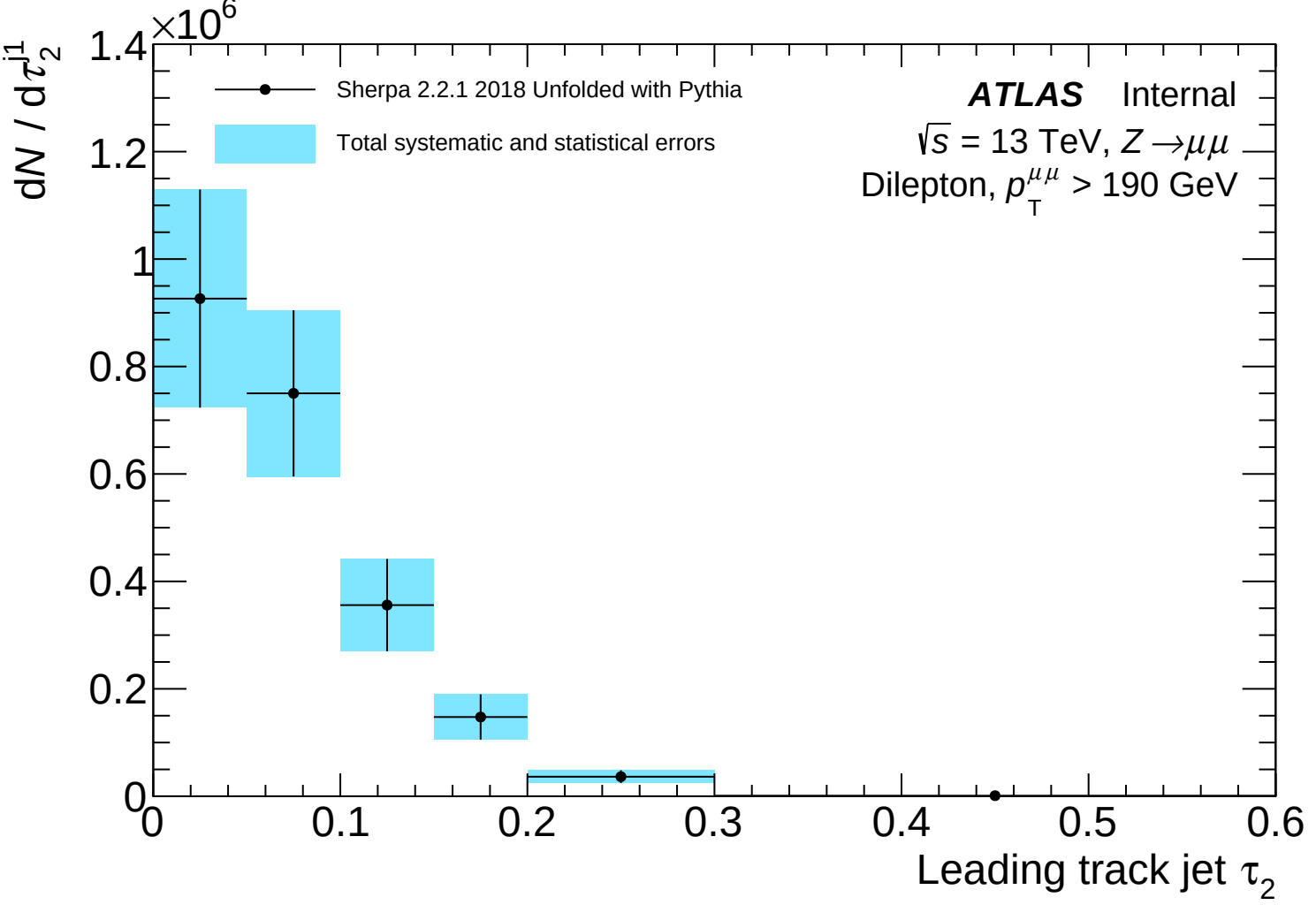

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

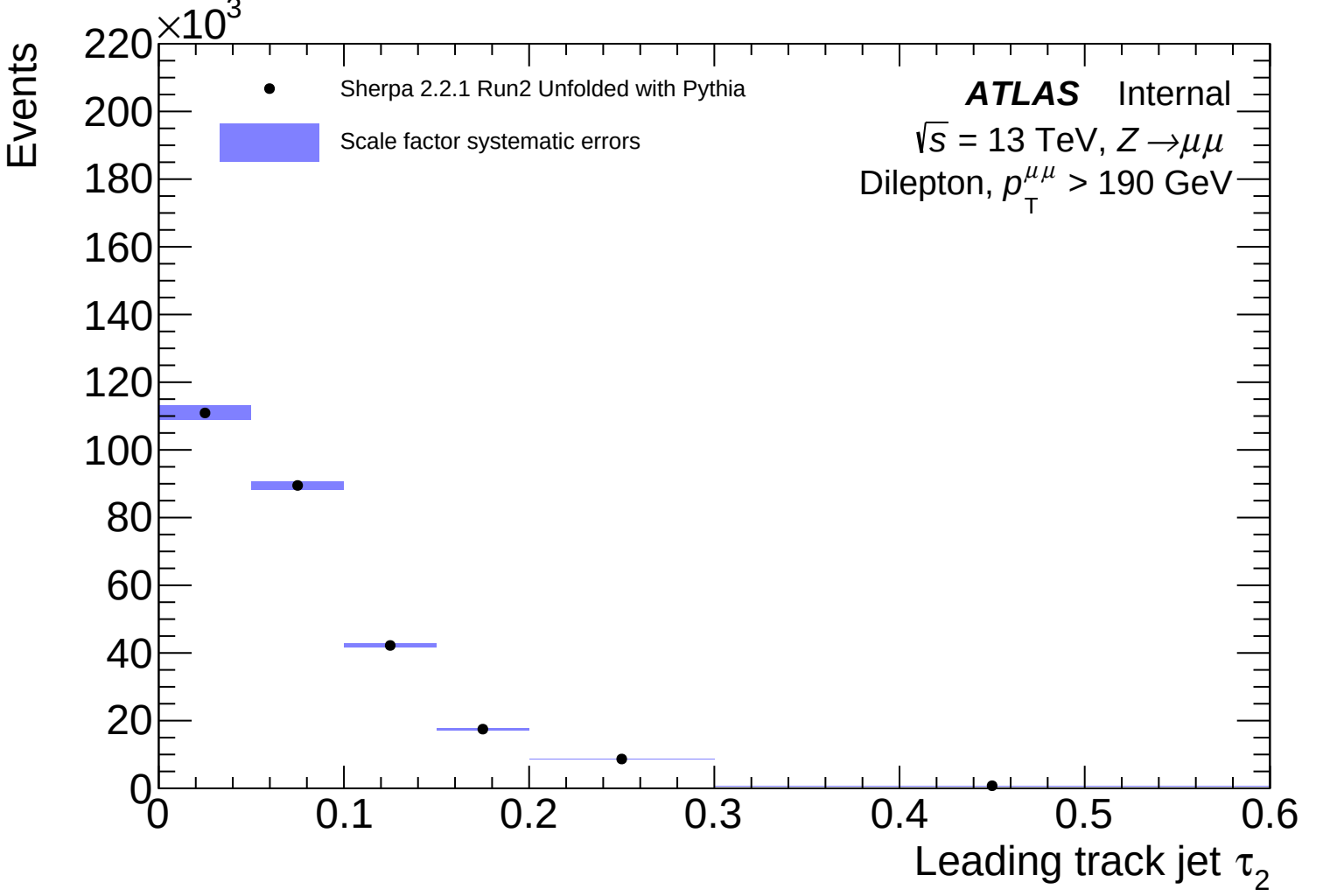

Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z→μμ
Dilepton, p_T^μμ > 190 GeV

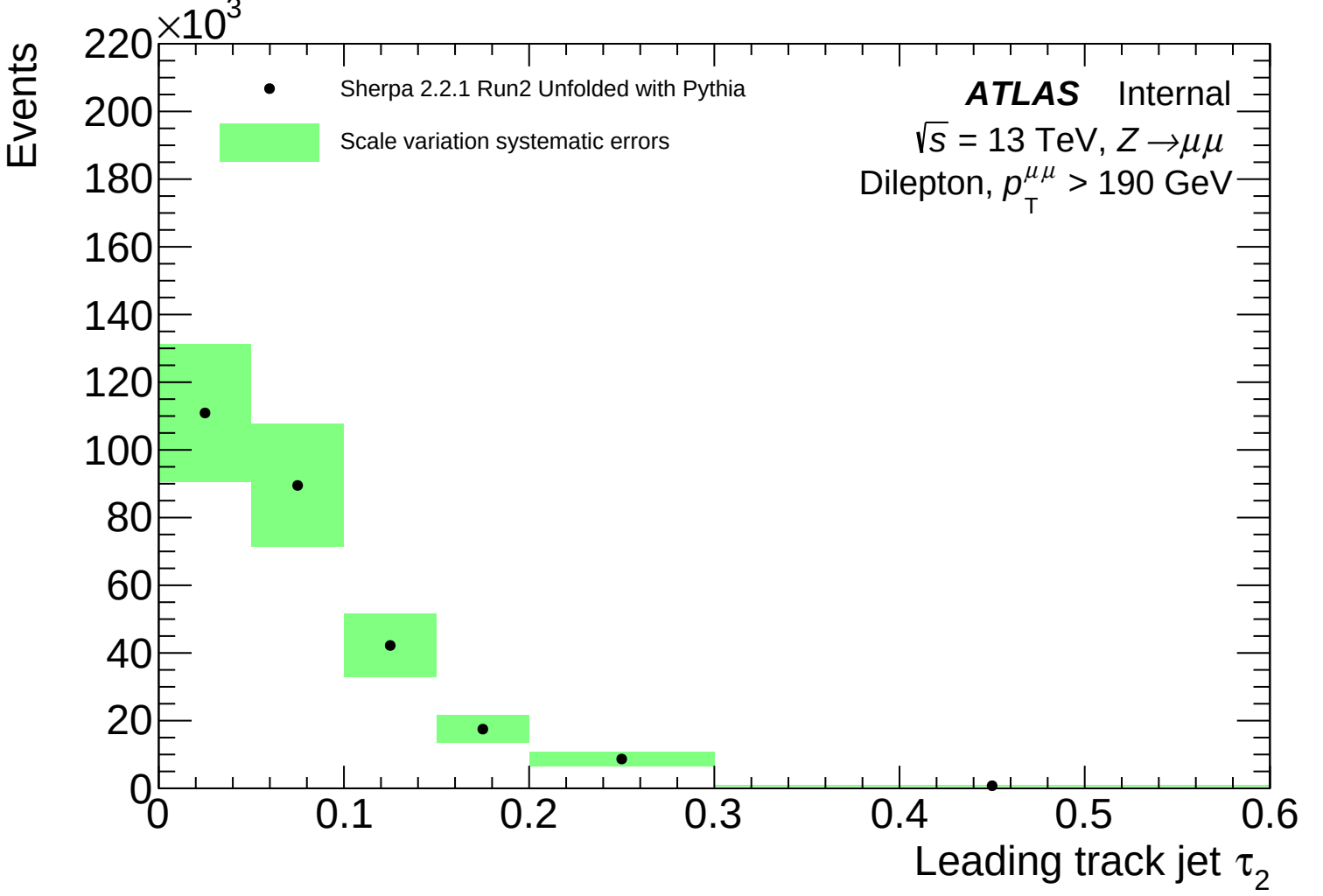

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

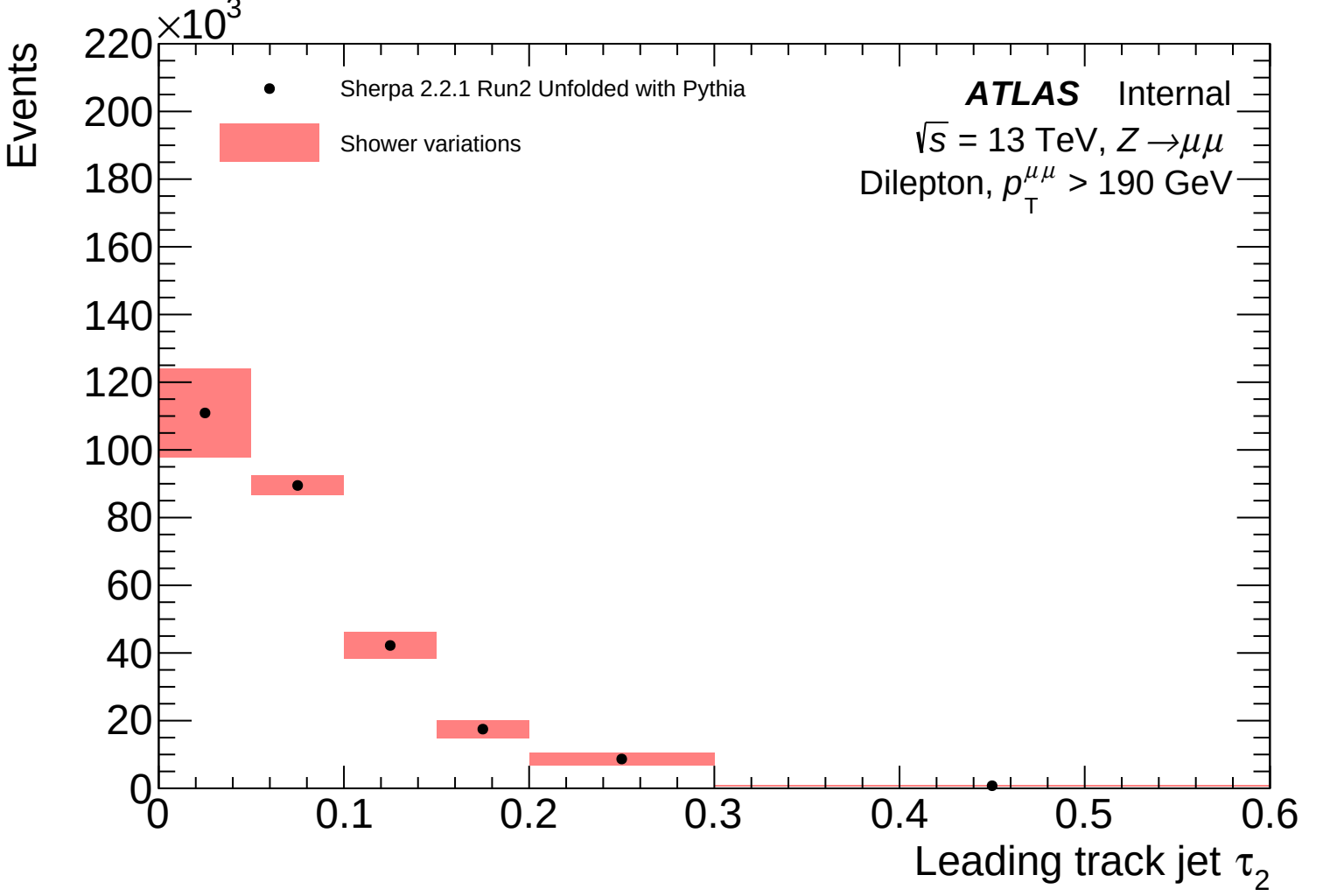

Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2

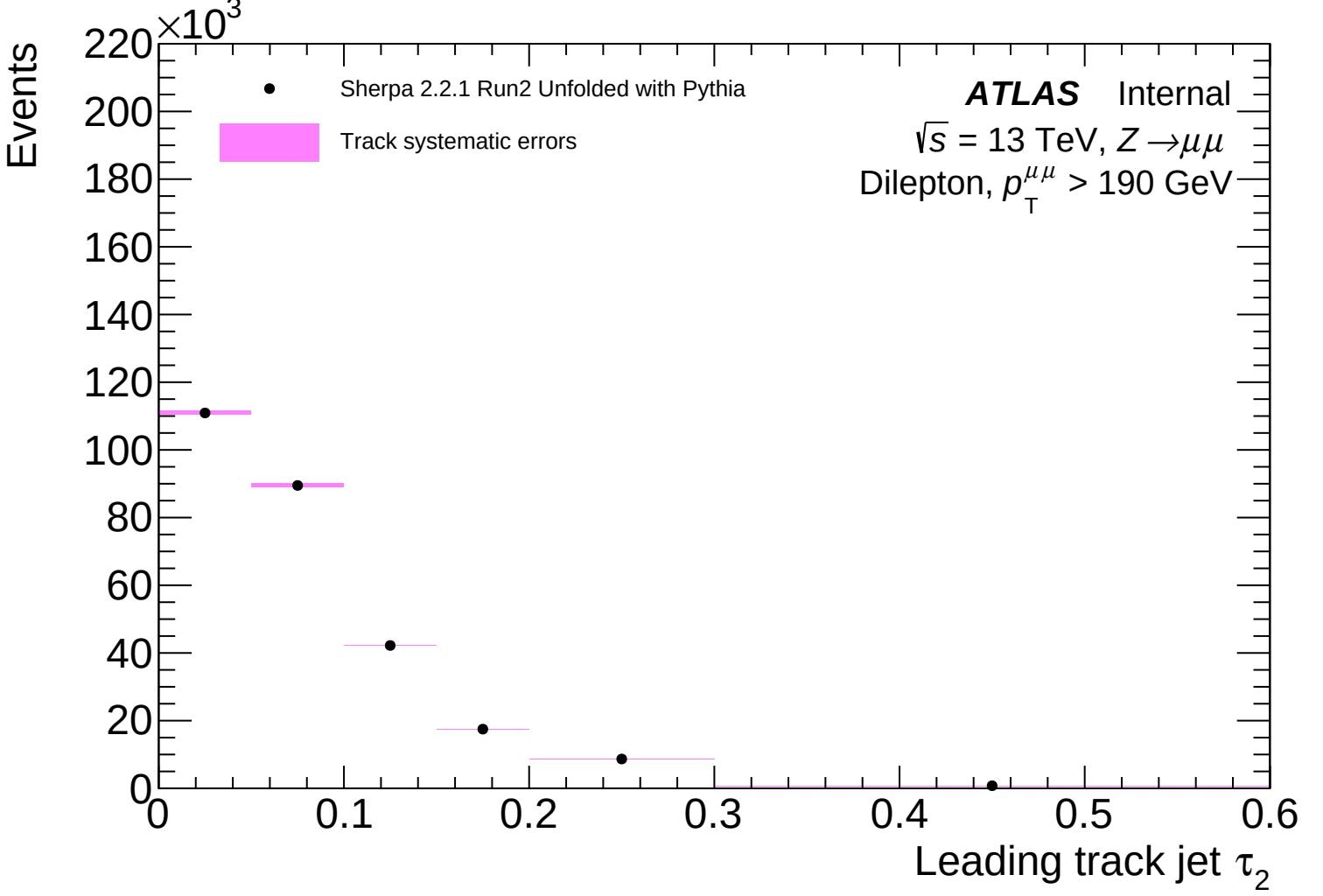

Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

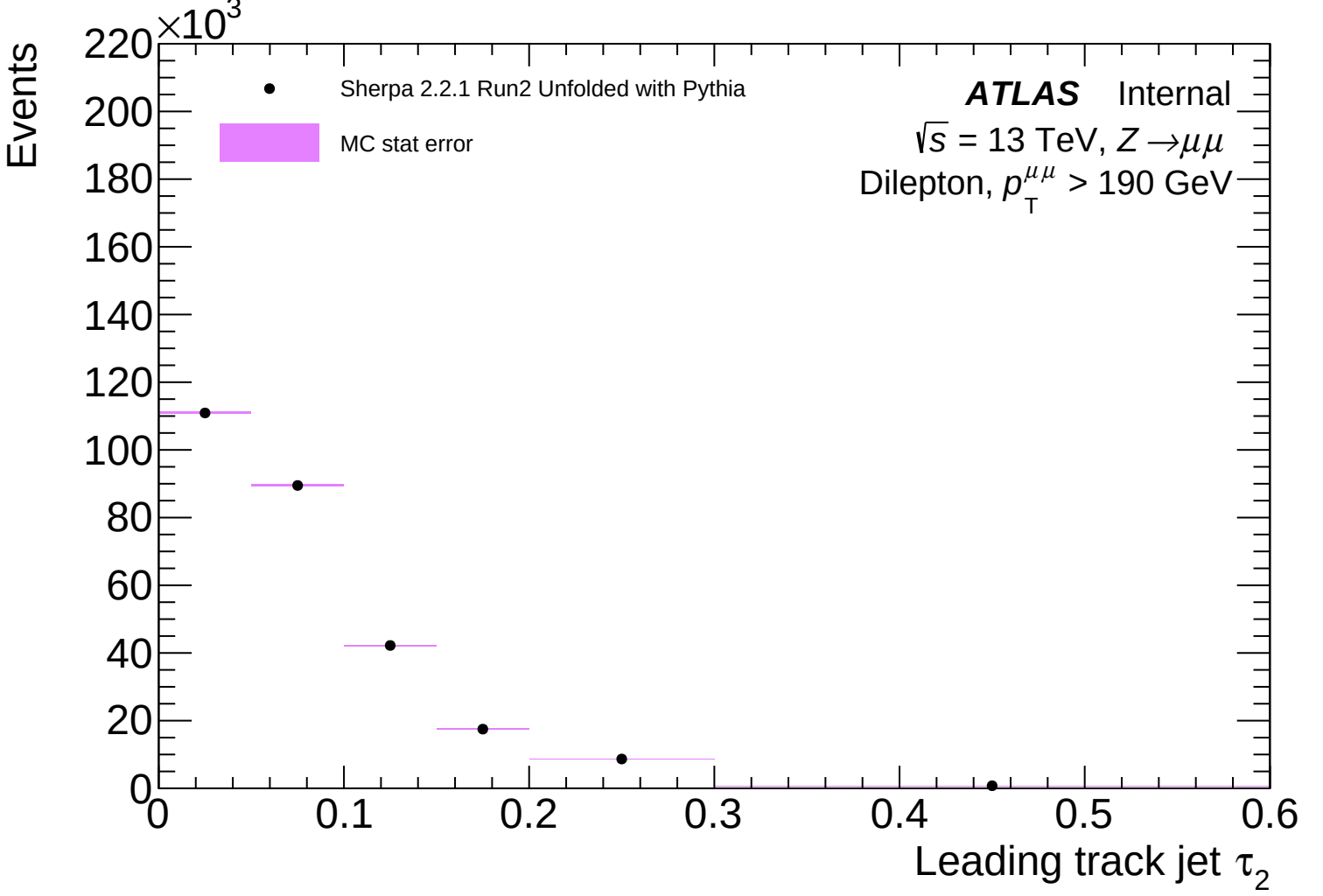

$\times 10^{6}$
1.4
1.2
1
0.8
0.6
0.4
0.2
0
$\mathrm{d}N\ /\ \mathrm{d}\tau_2^{j1}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

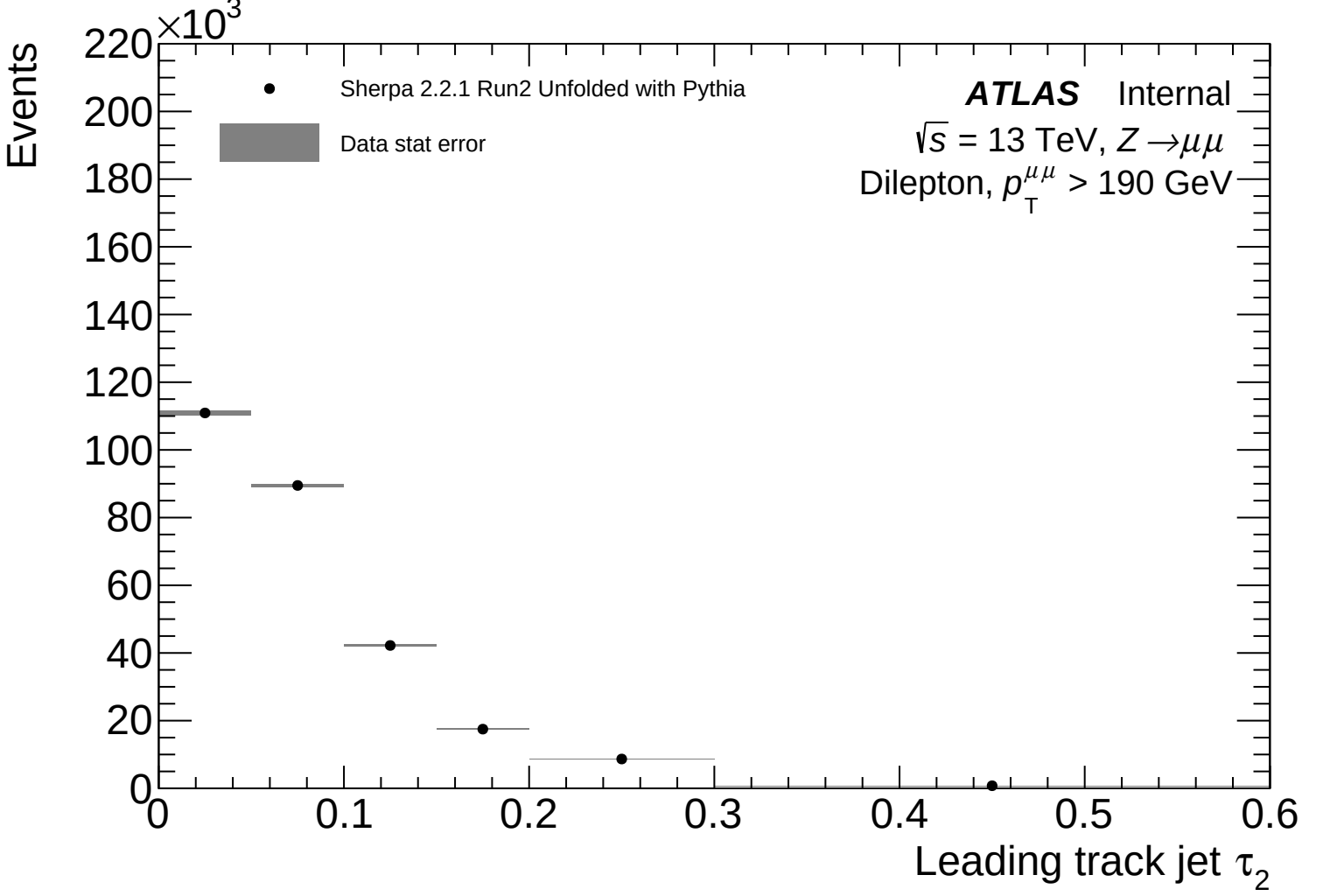

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

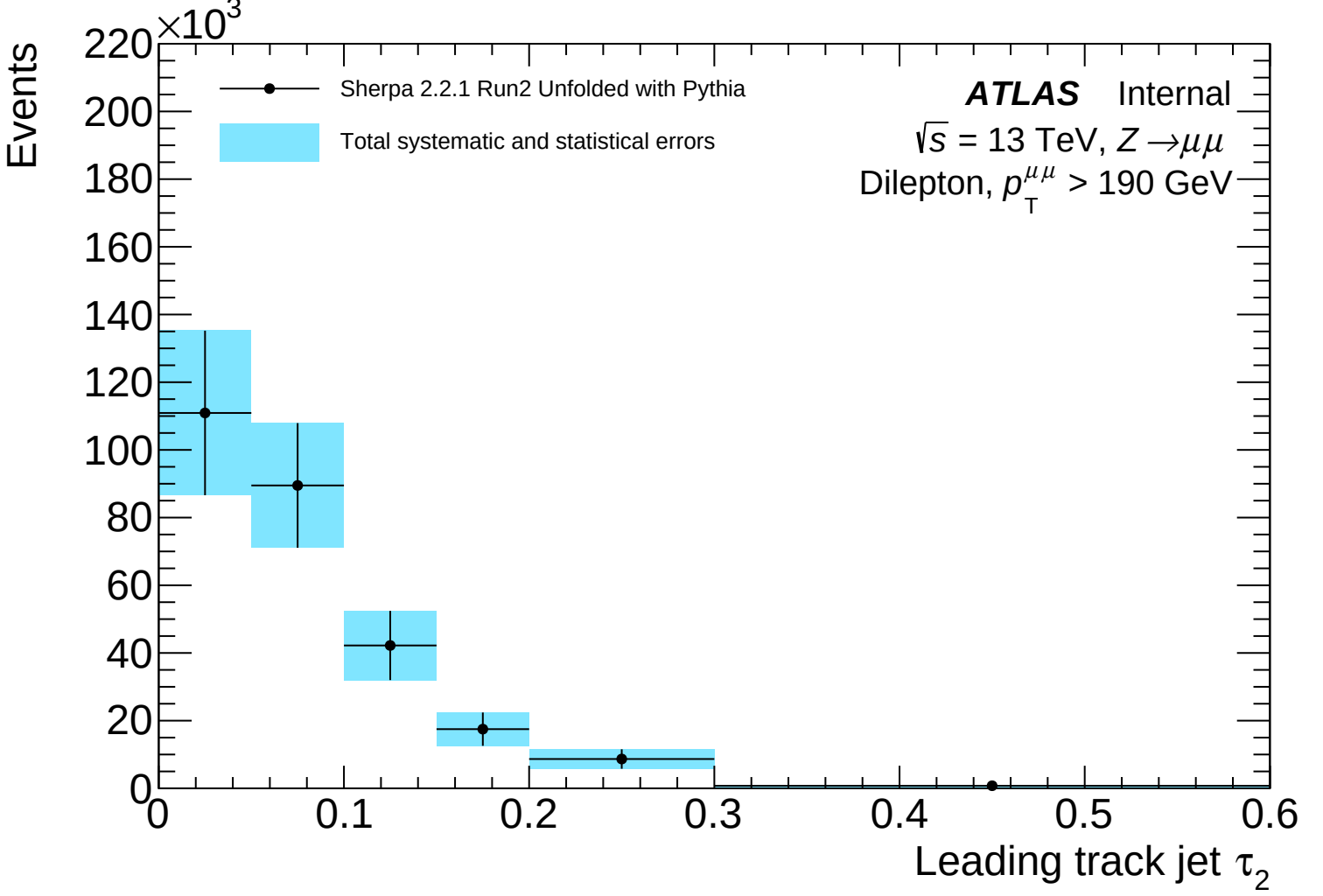

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

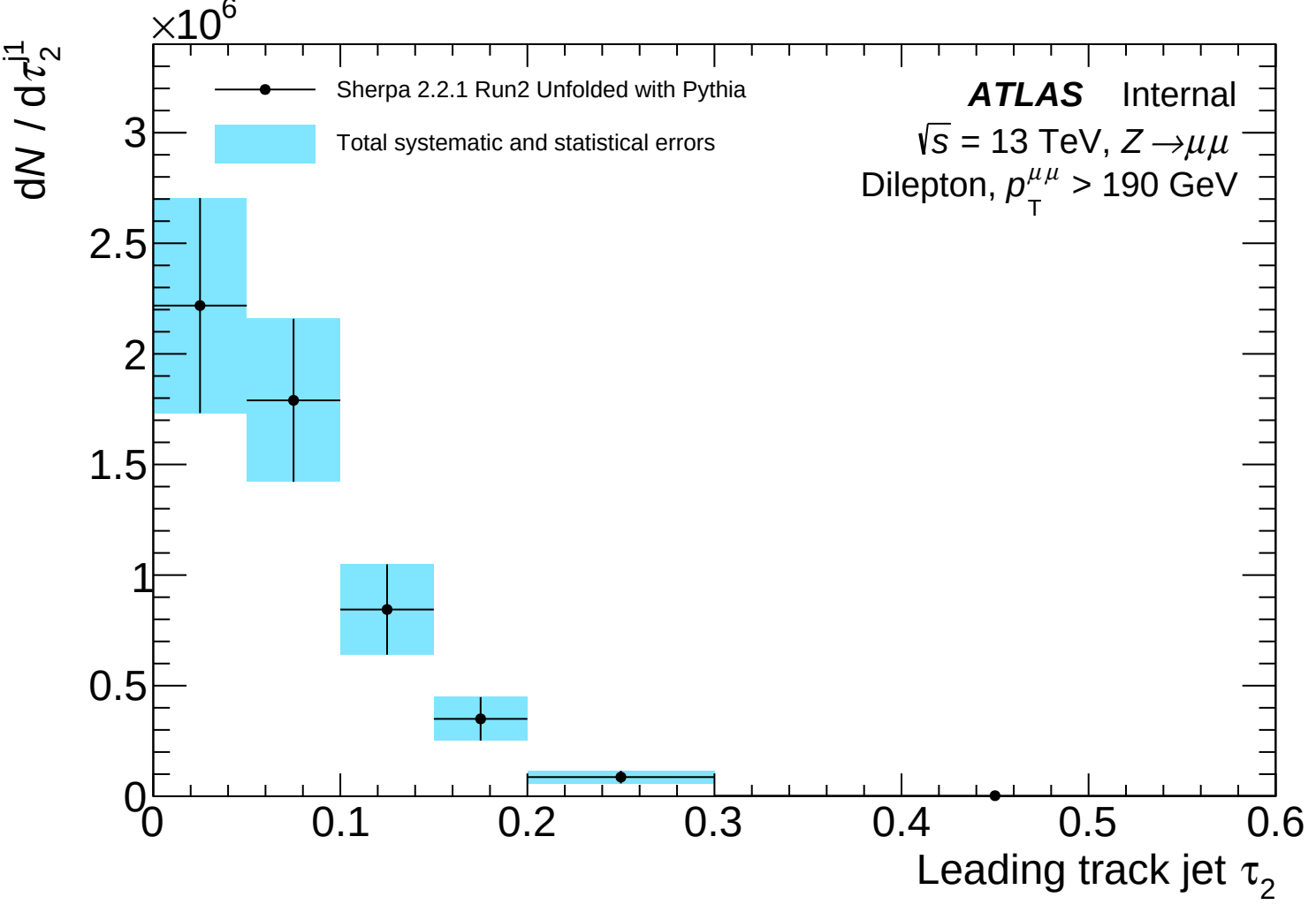

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

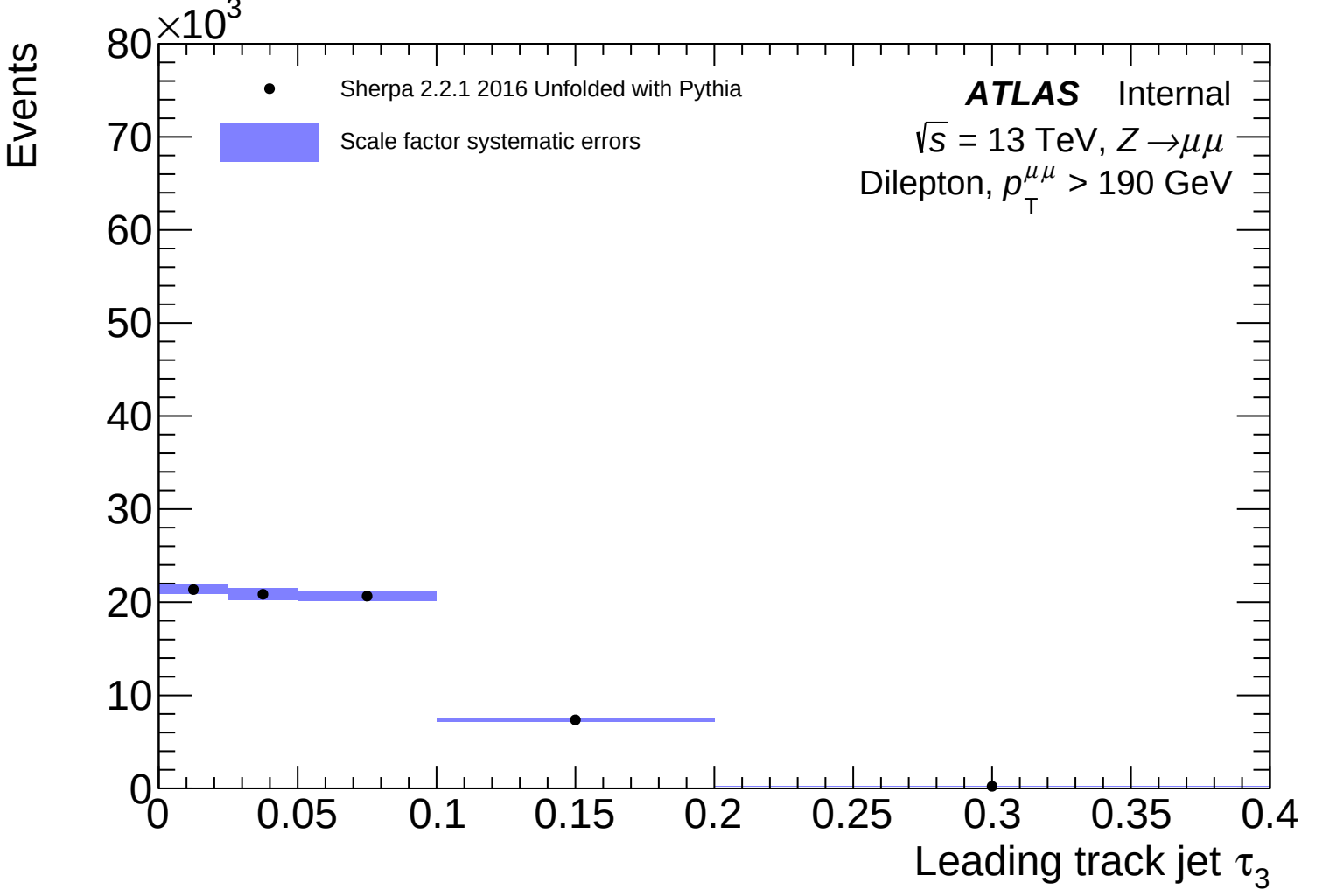

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

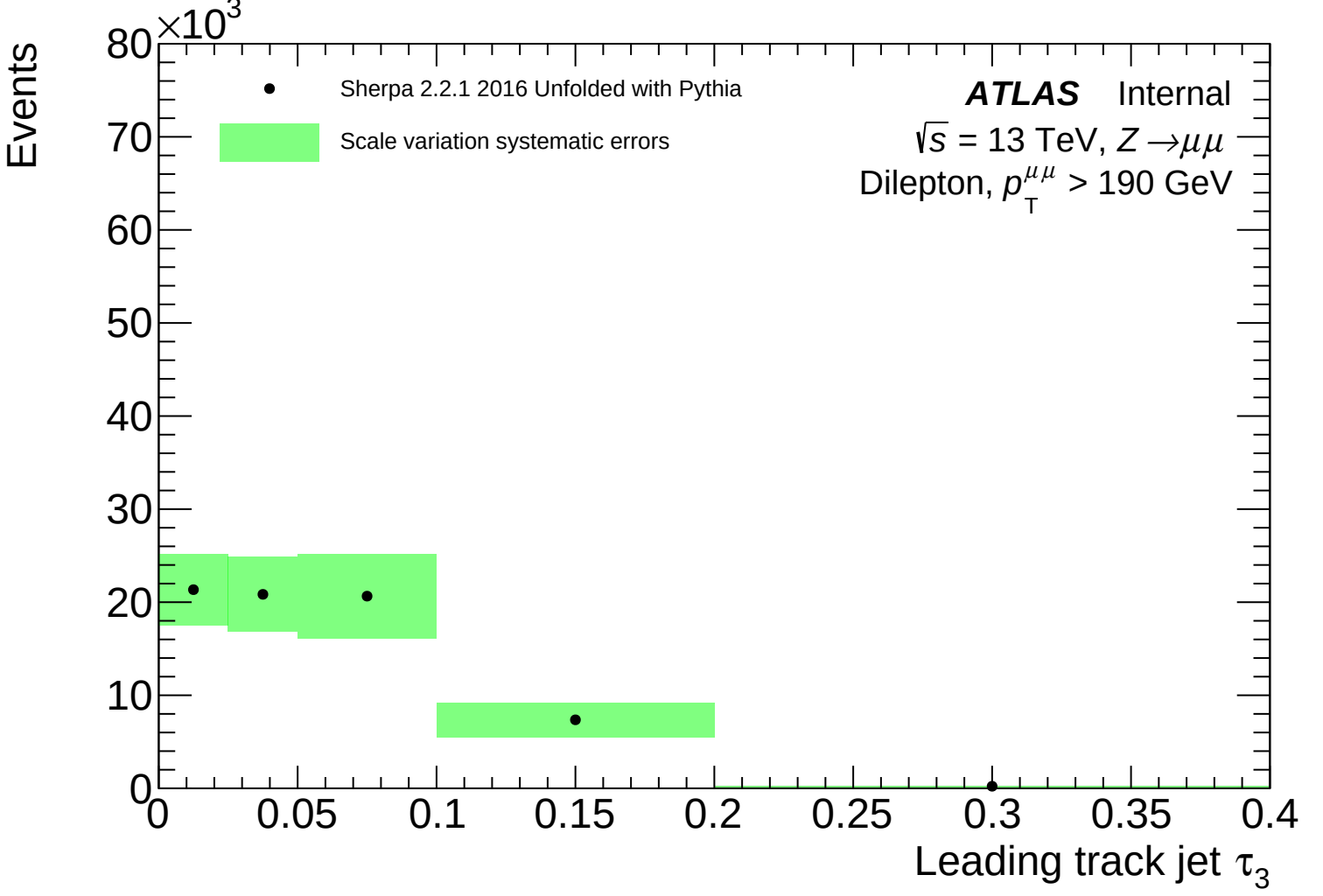

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

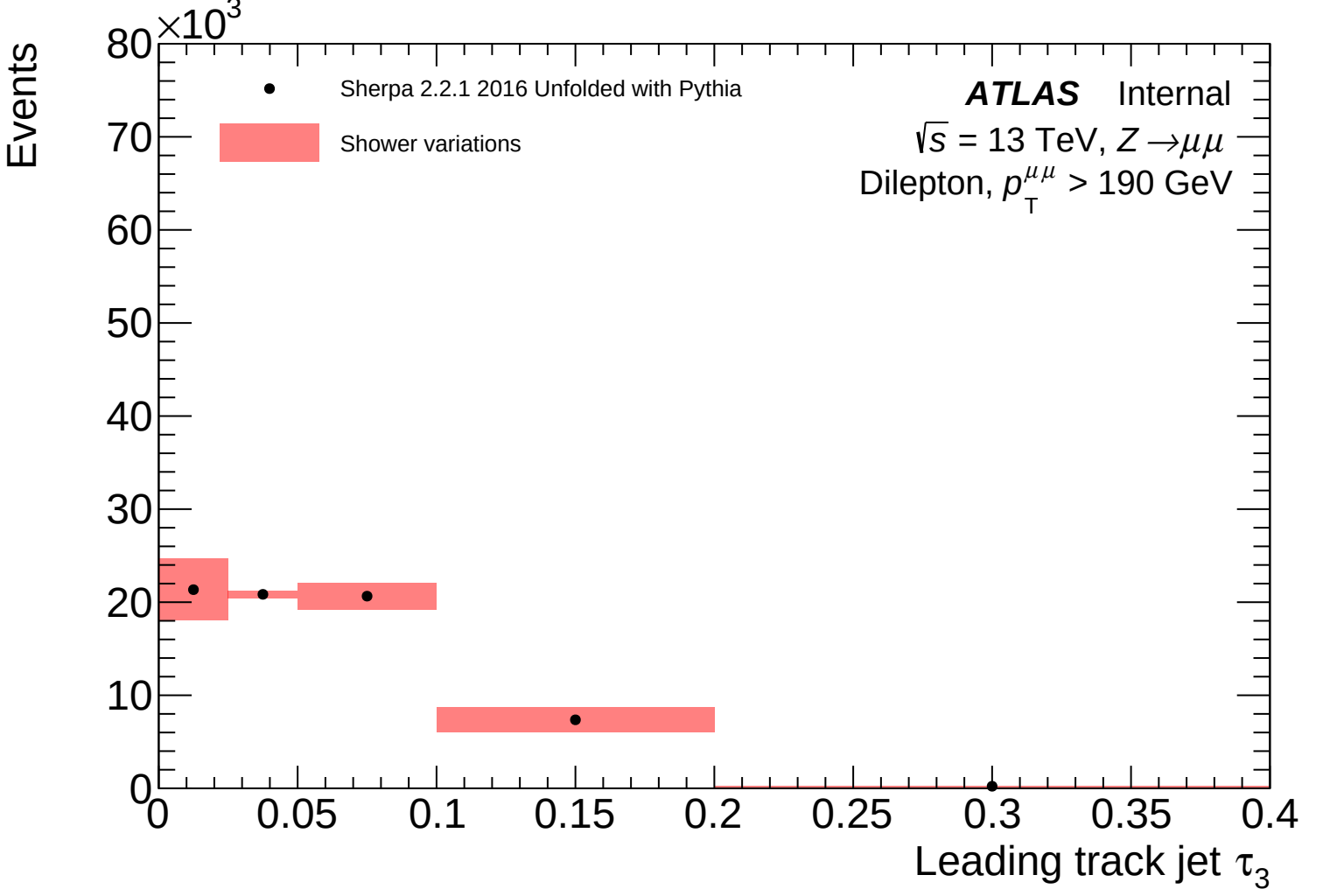

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

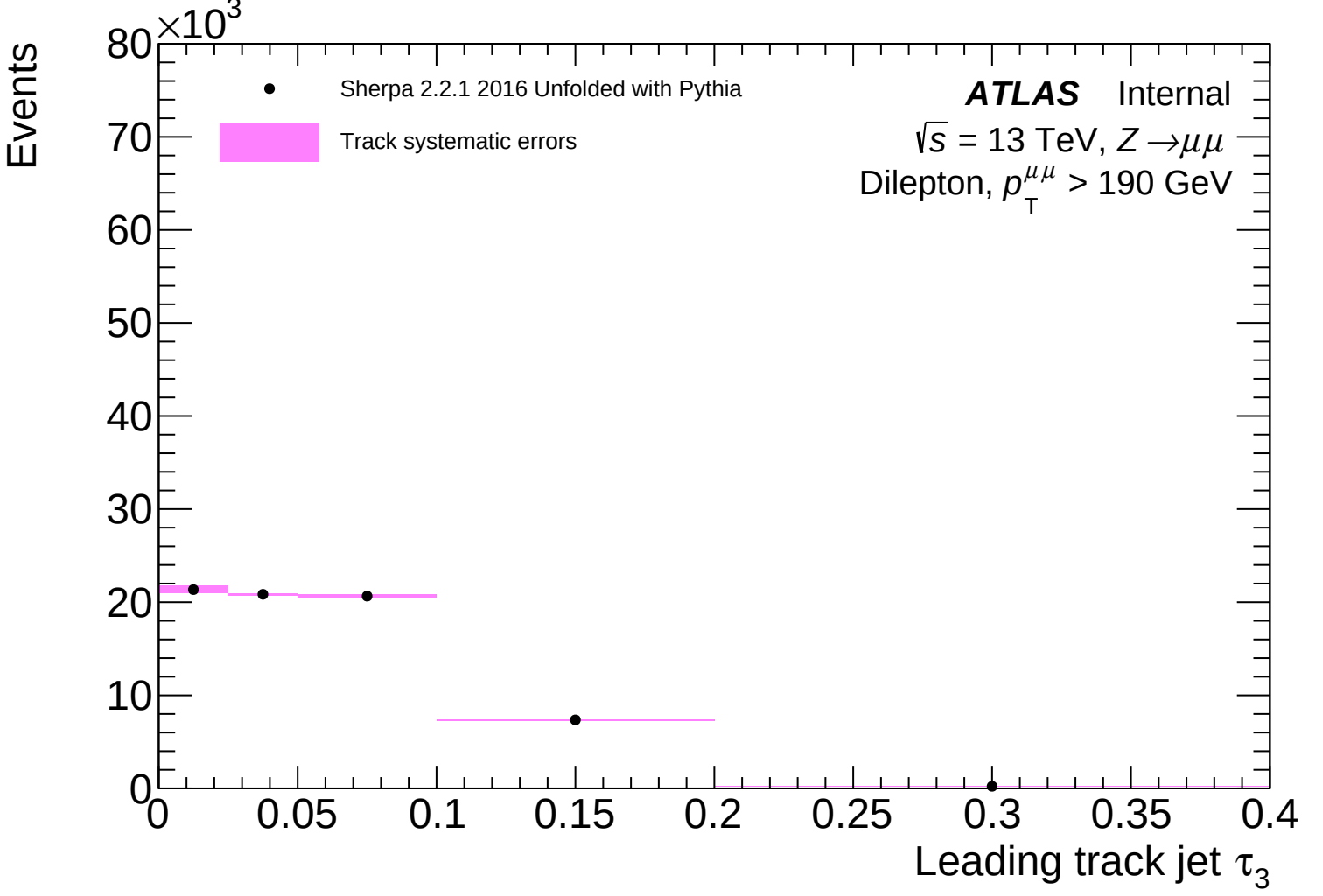

Events
×10^3
220
200
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

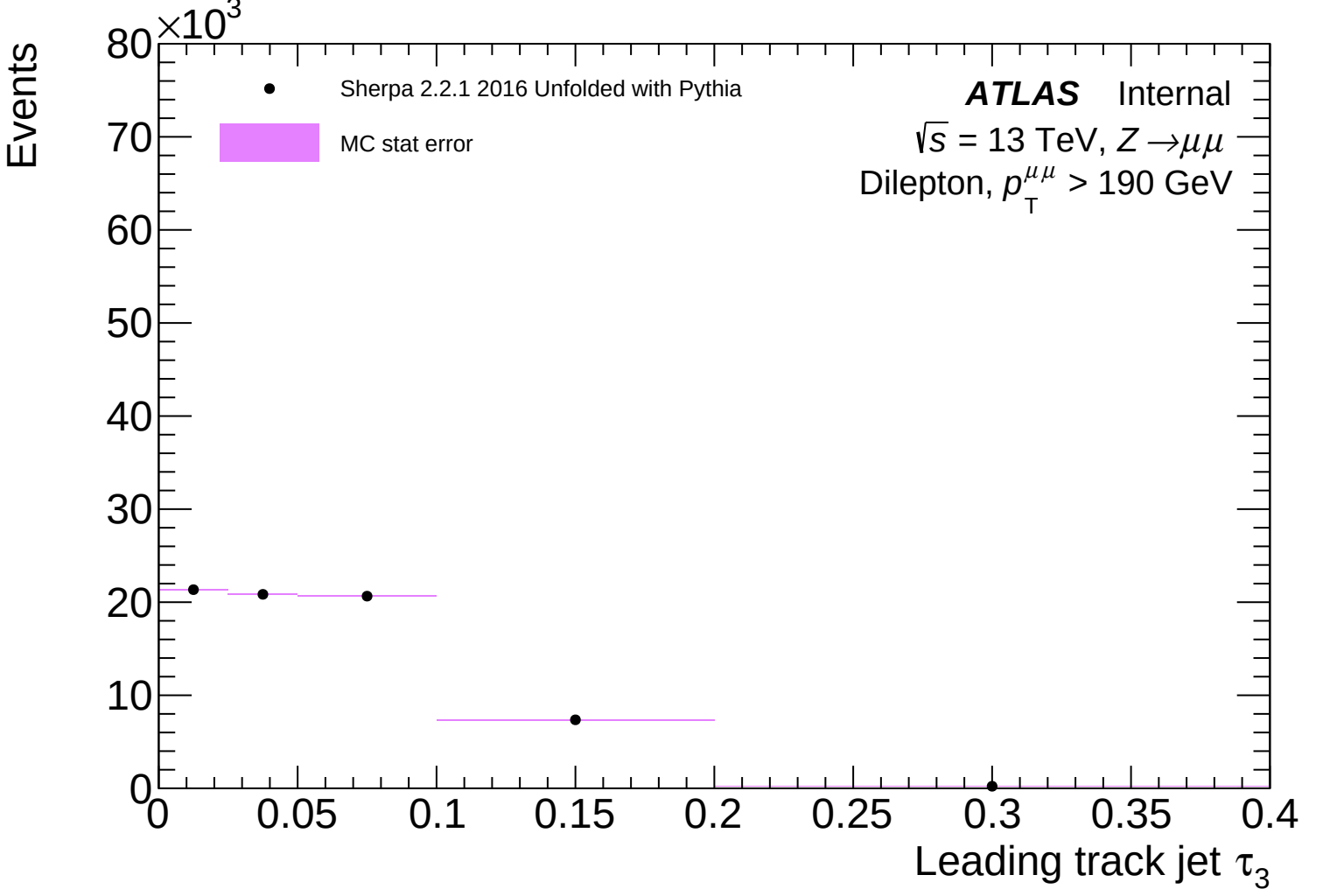

$\times 10^6$
$dN / d\tau_2^{j1}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
3
2.5
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Leading track jet τ_2

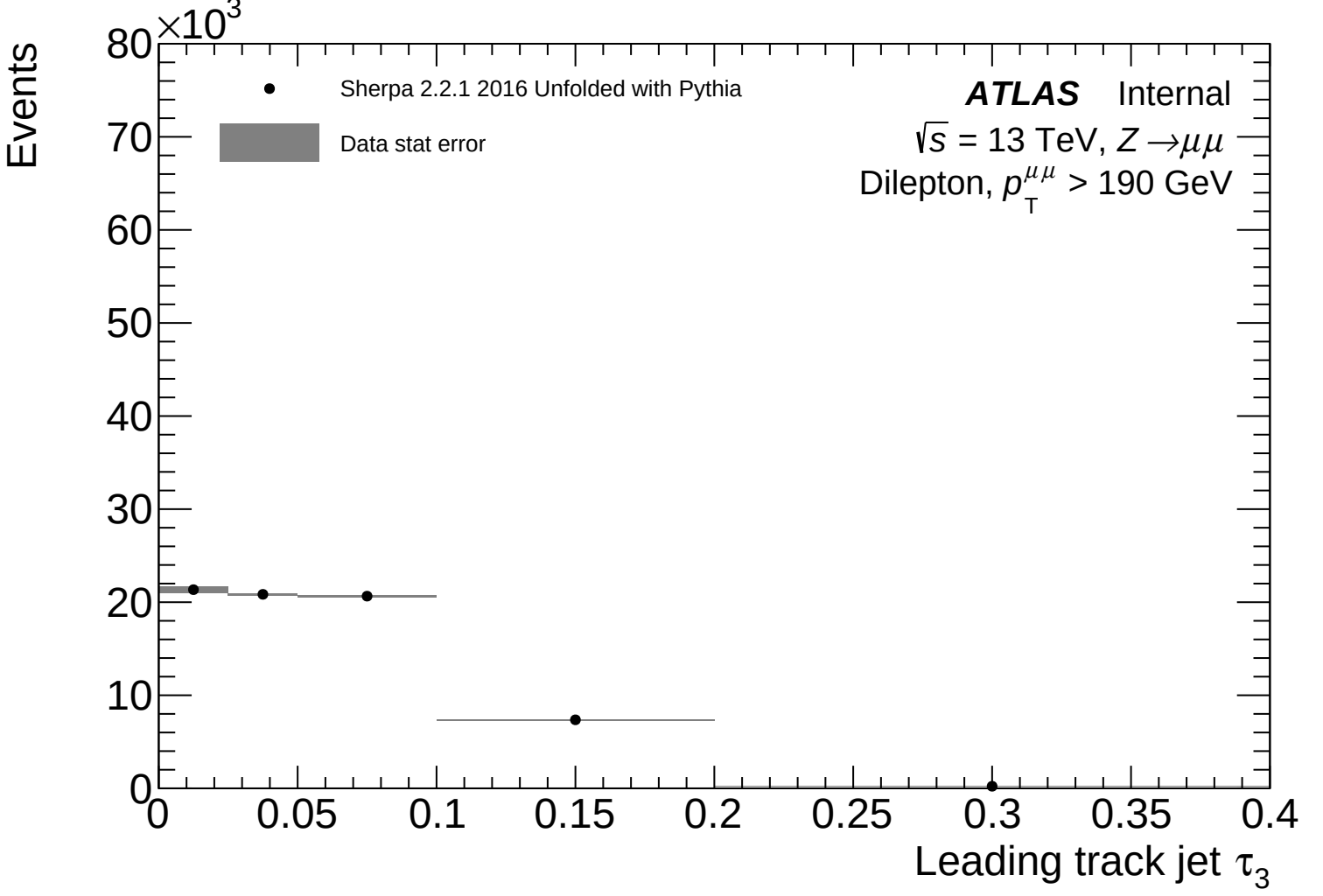

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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0.05
0.1
0.15
0.2
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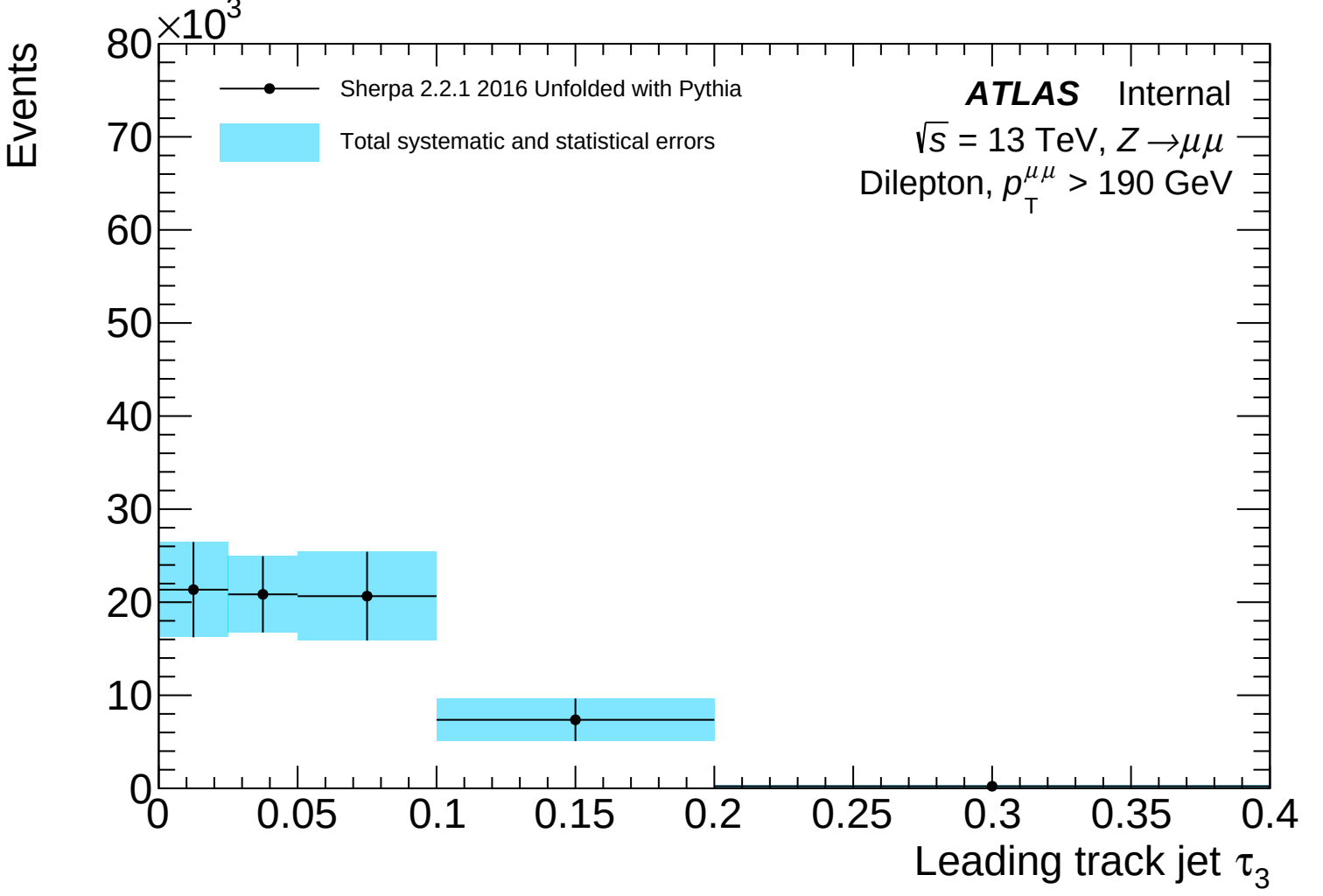
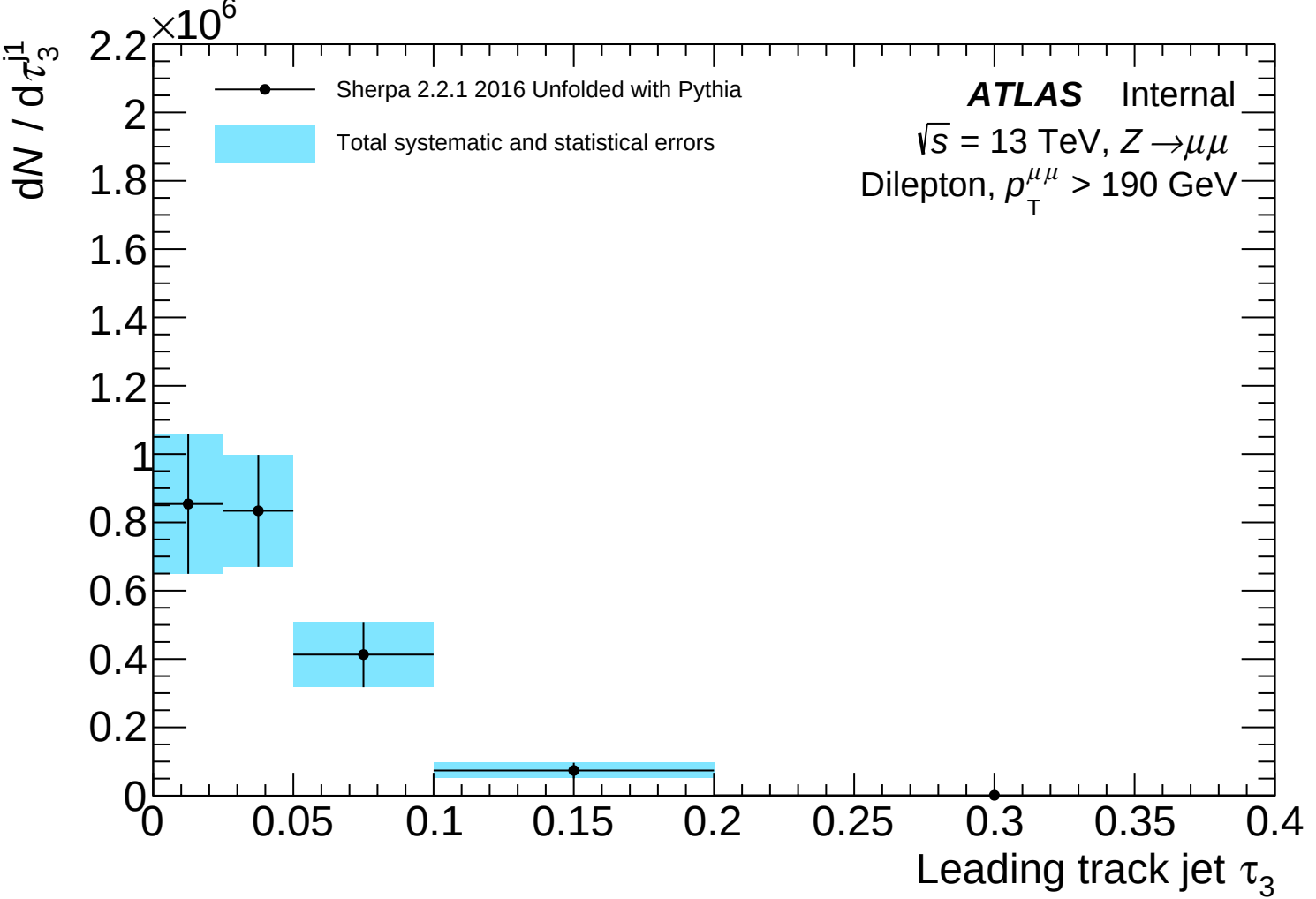
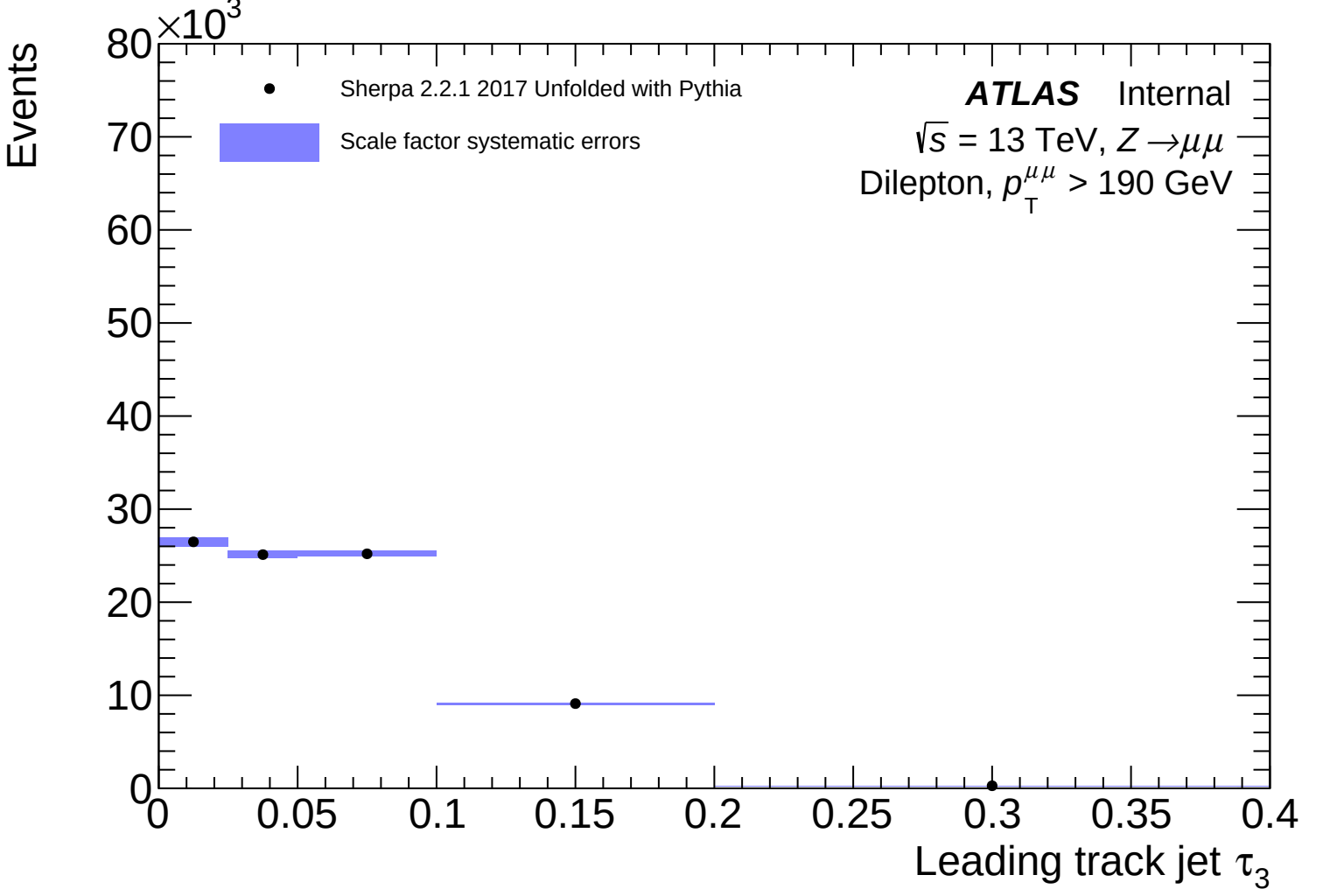
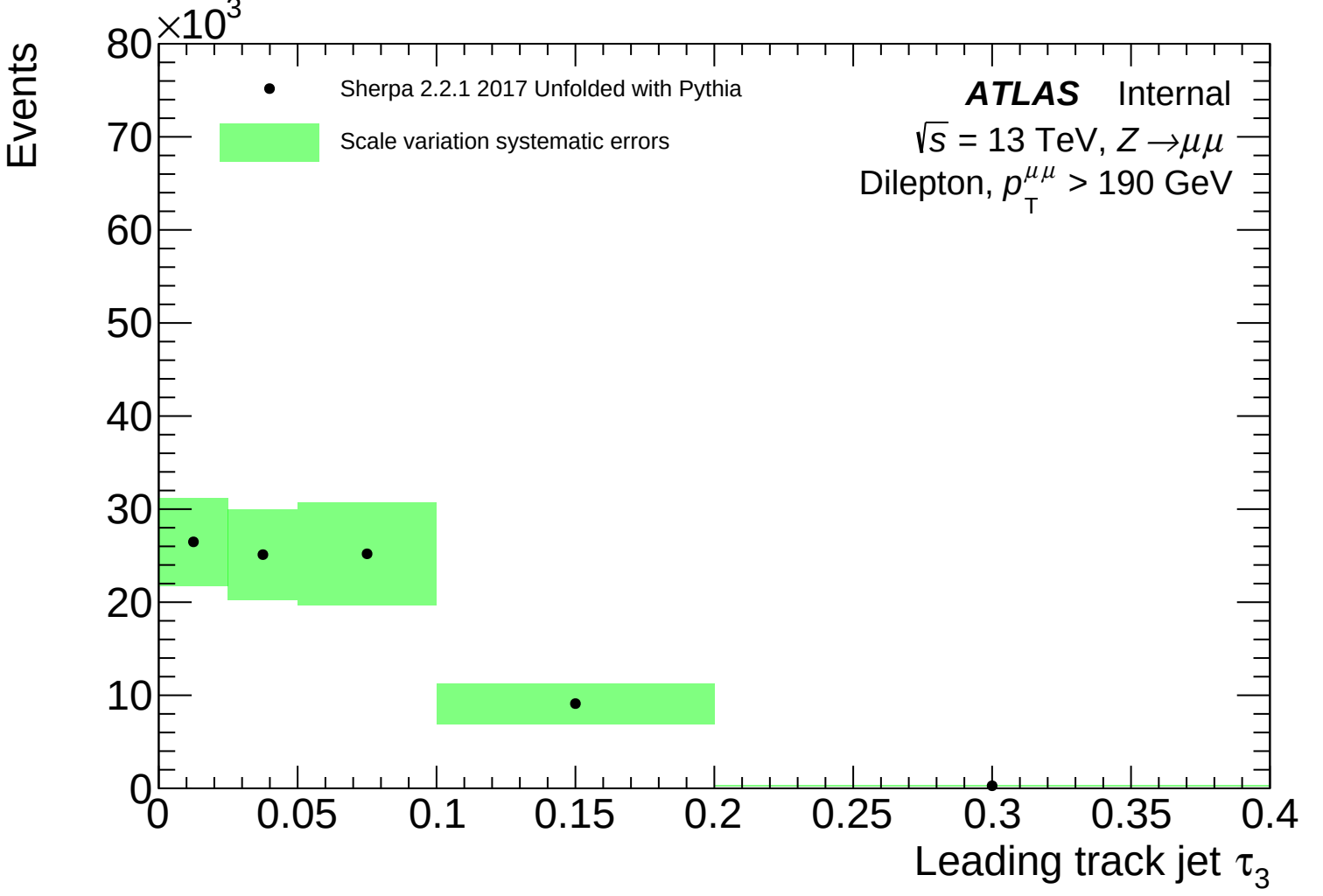
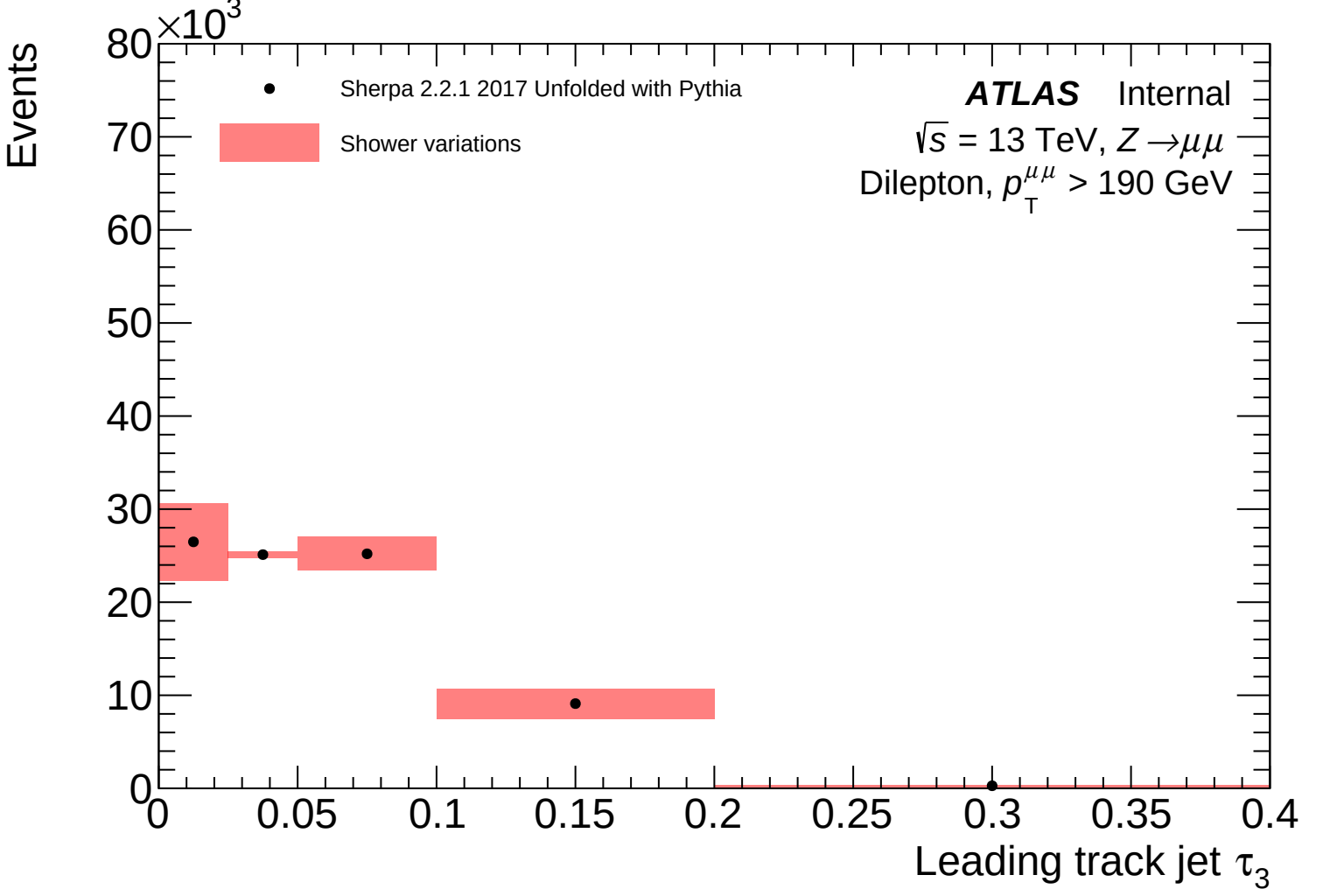
0.3
0.35
0.4
Leading track jet τ3

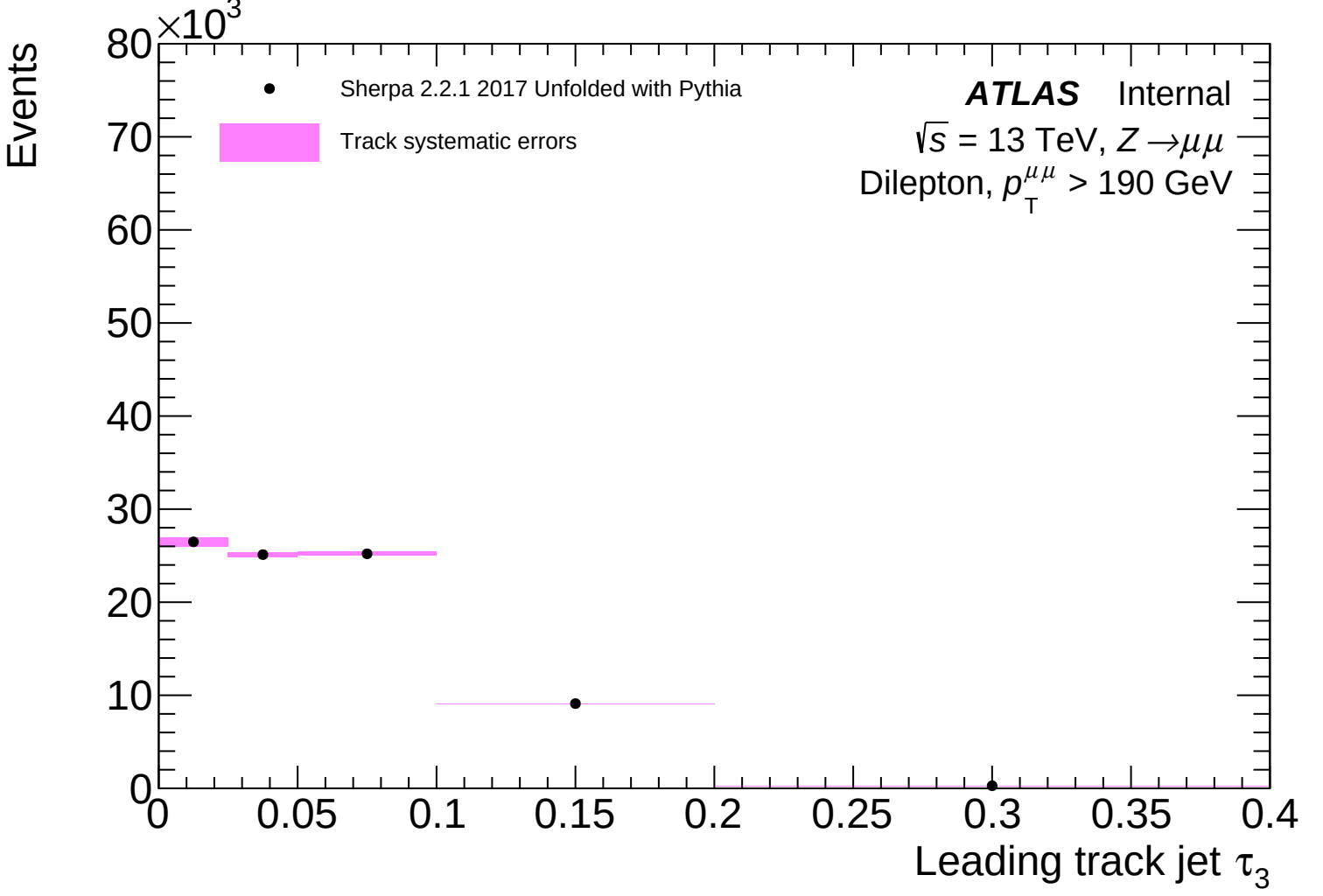

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


$\times 10^{6}$
$dN / d\tau_3^{j1}$
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
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80
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60
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40
30
20
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0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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0.15
0.2
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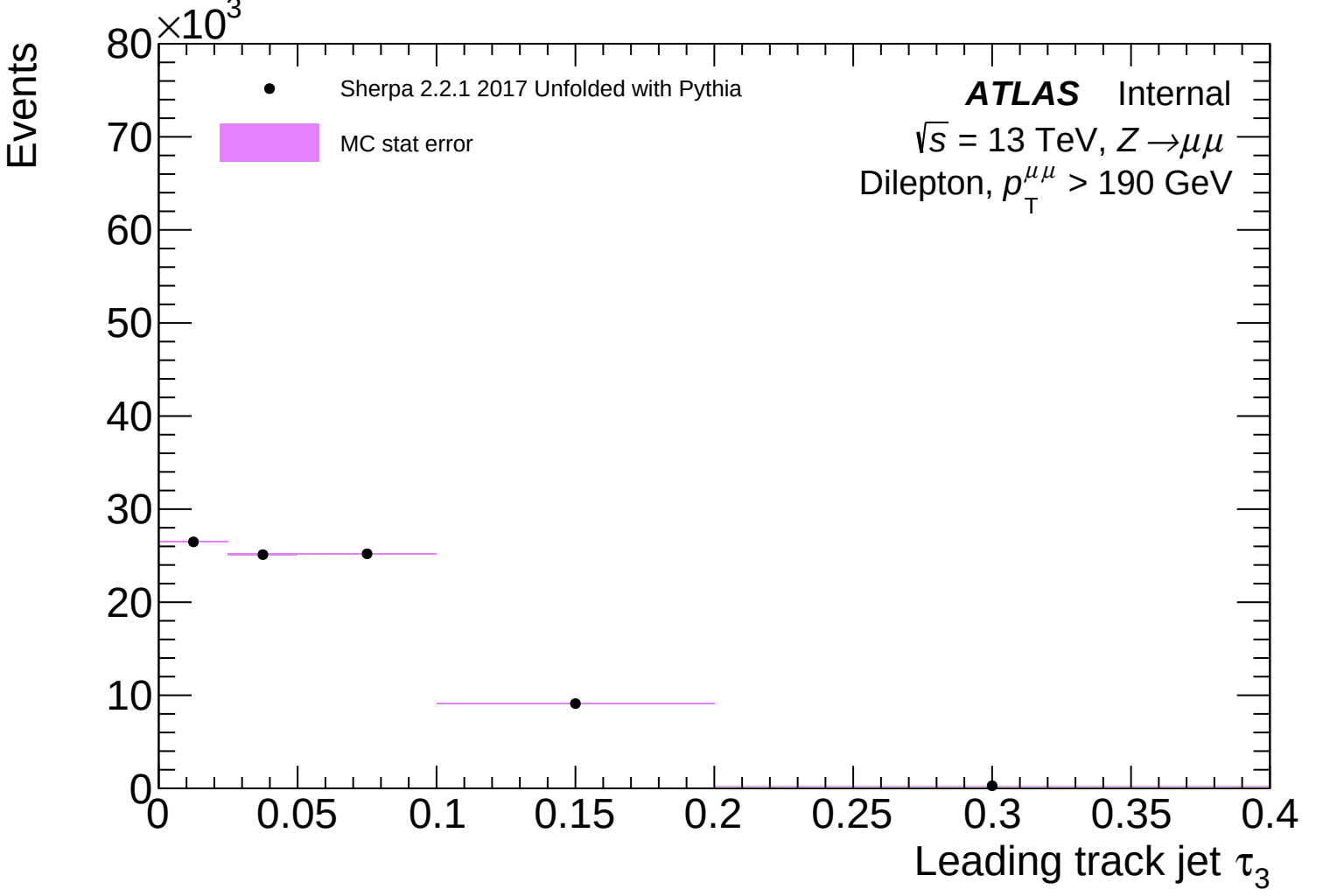
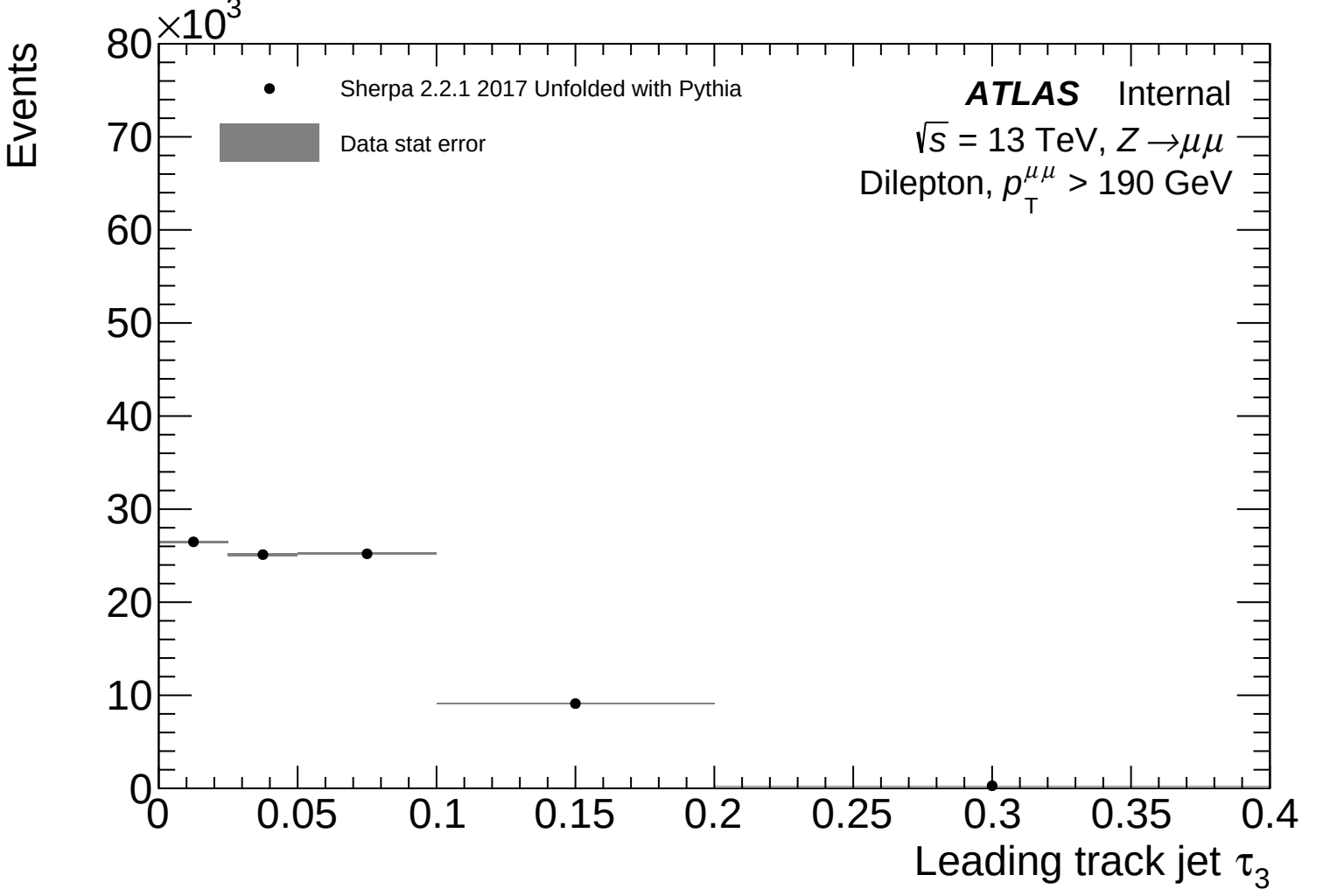
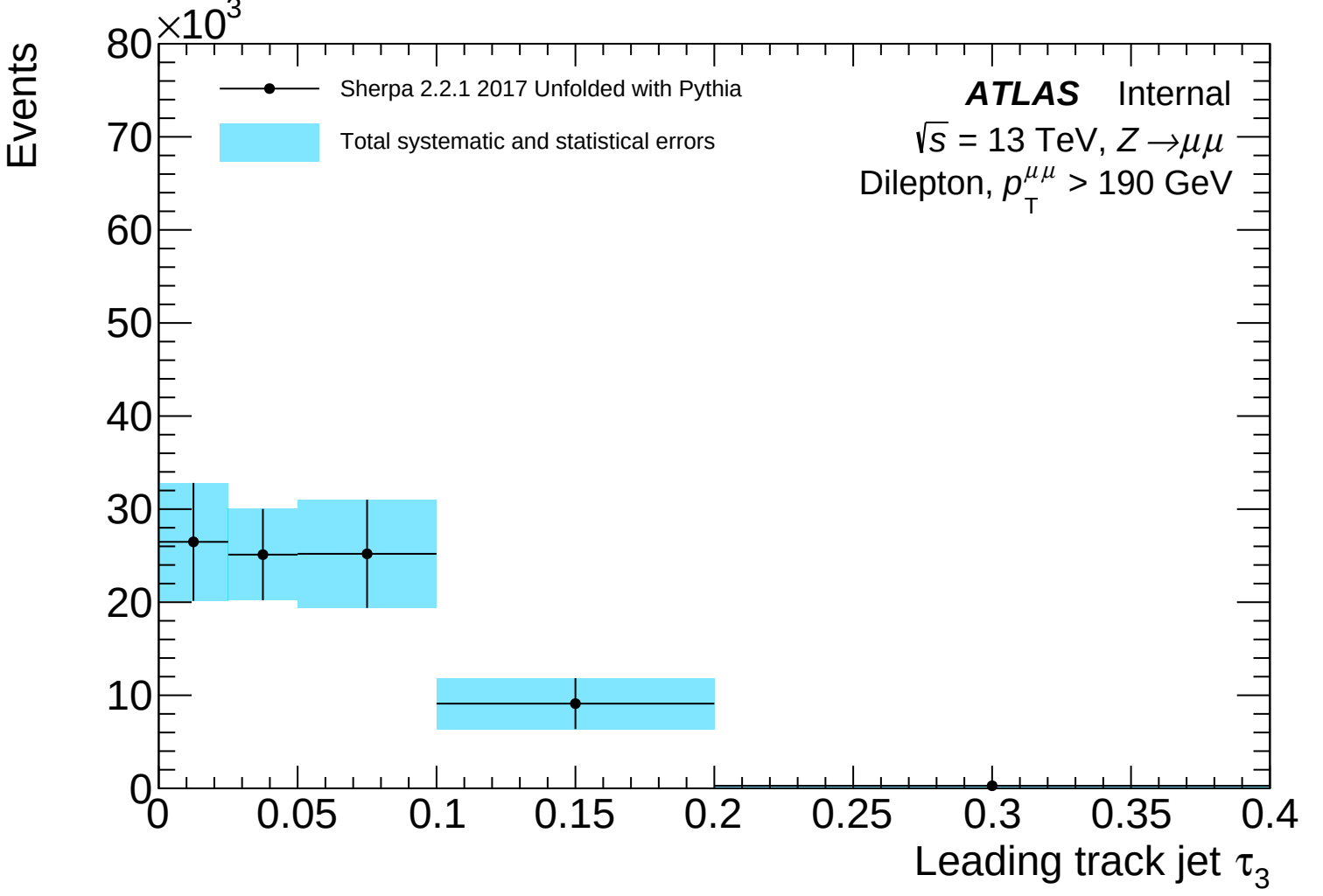
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3


Events
$\times 10^3$
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3


Events
×10^3
80
70
60
50
40
30
20
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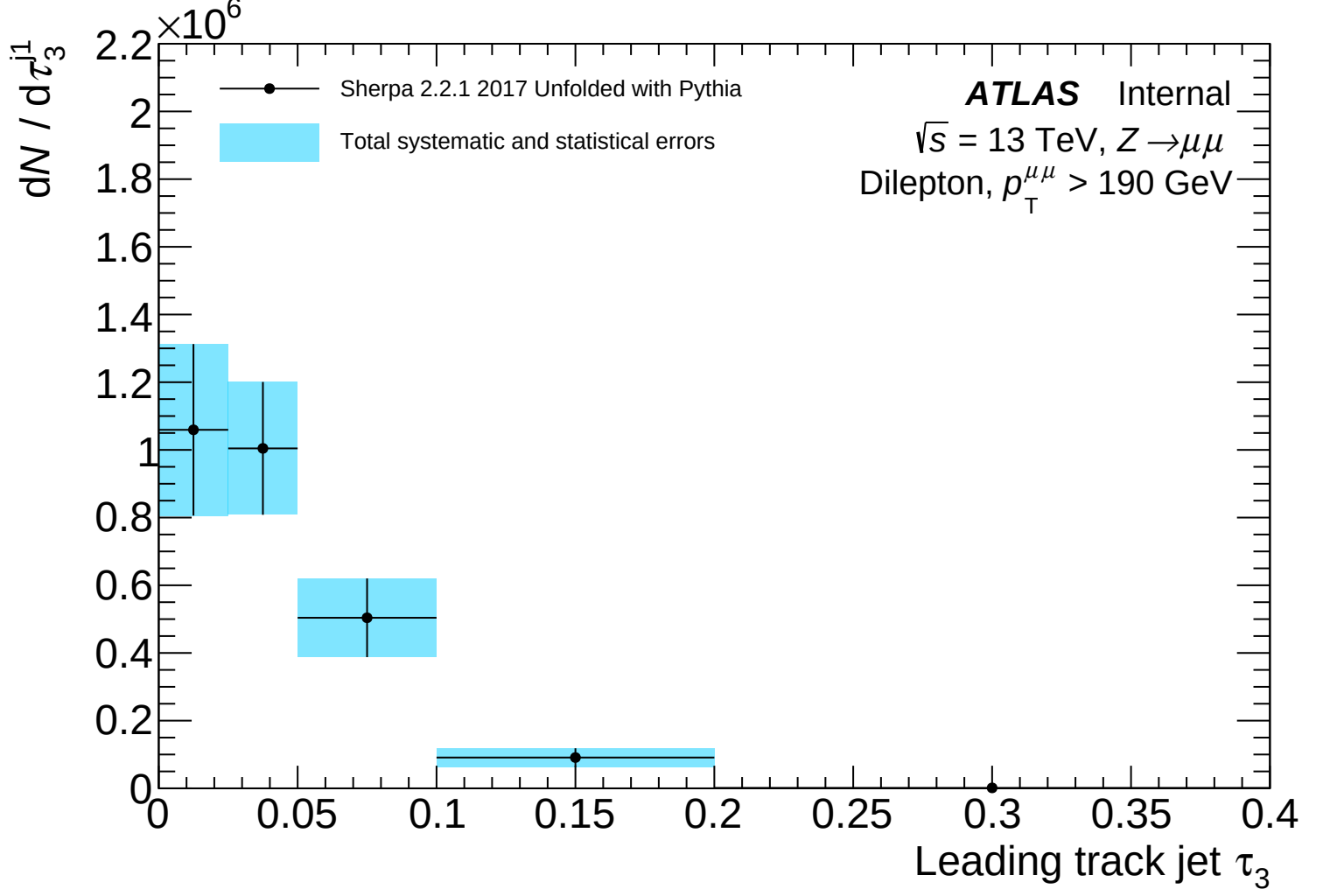
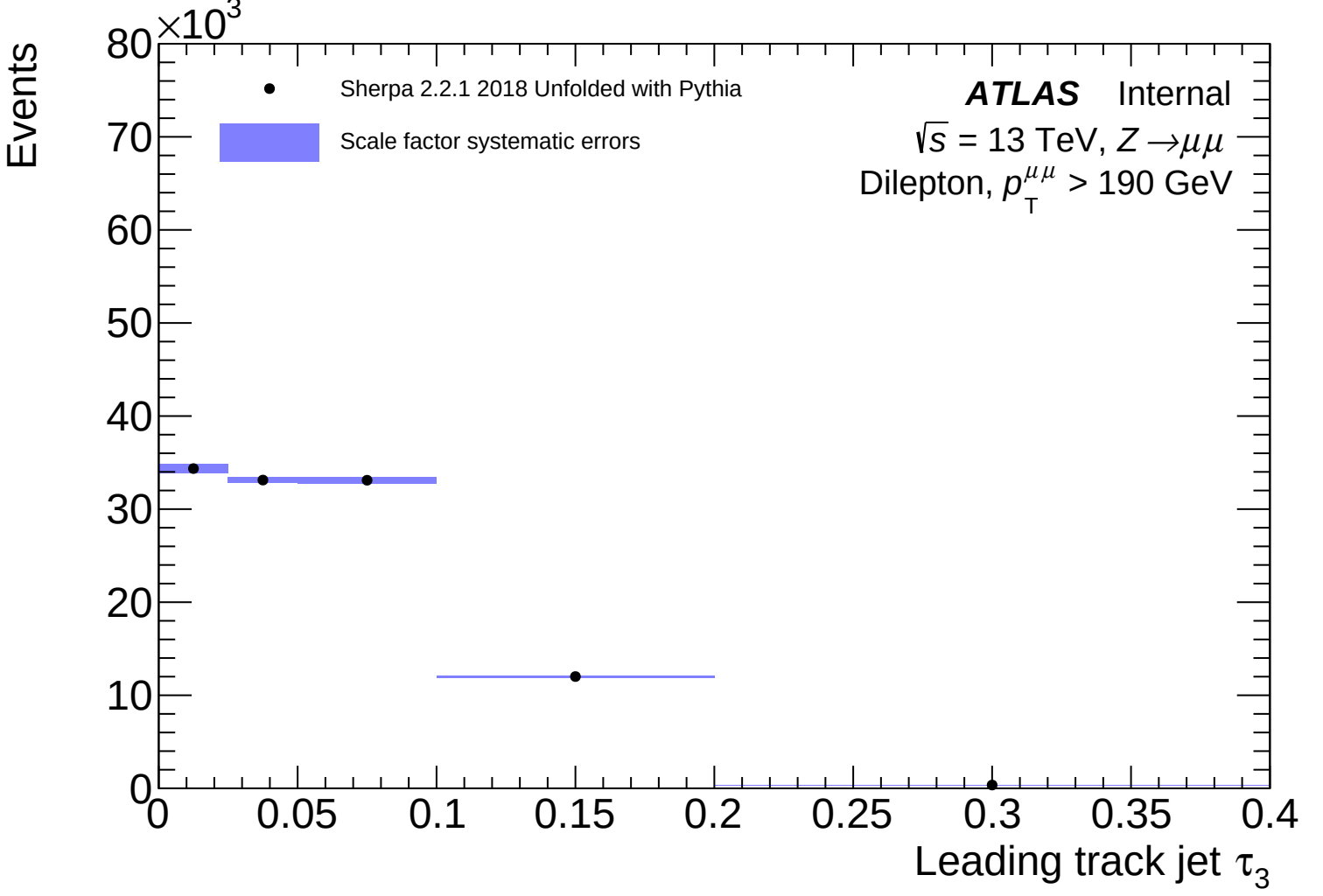
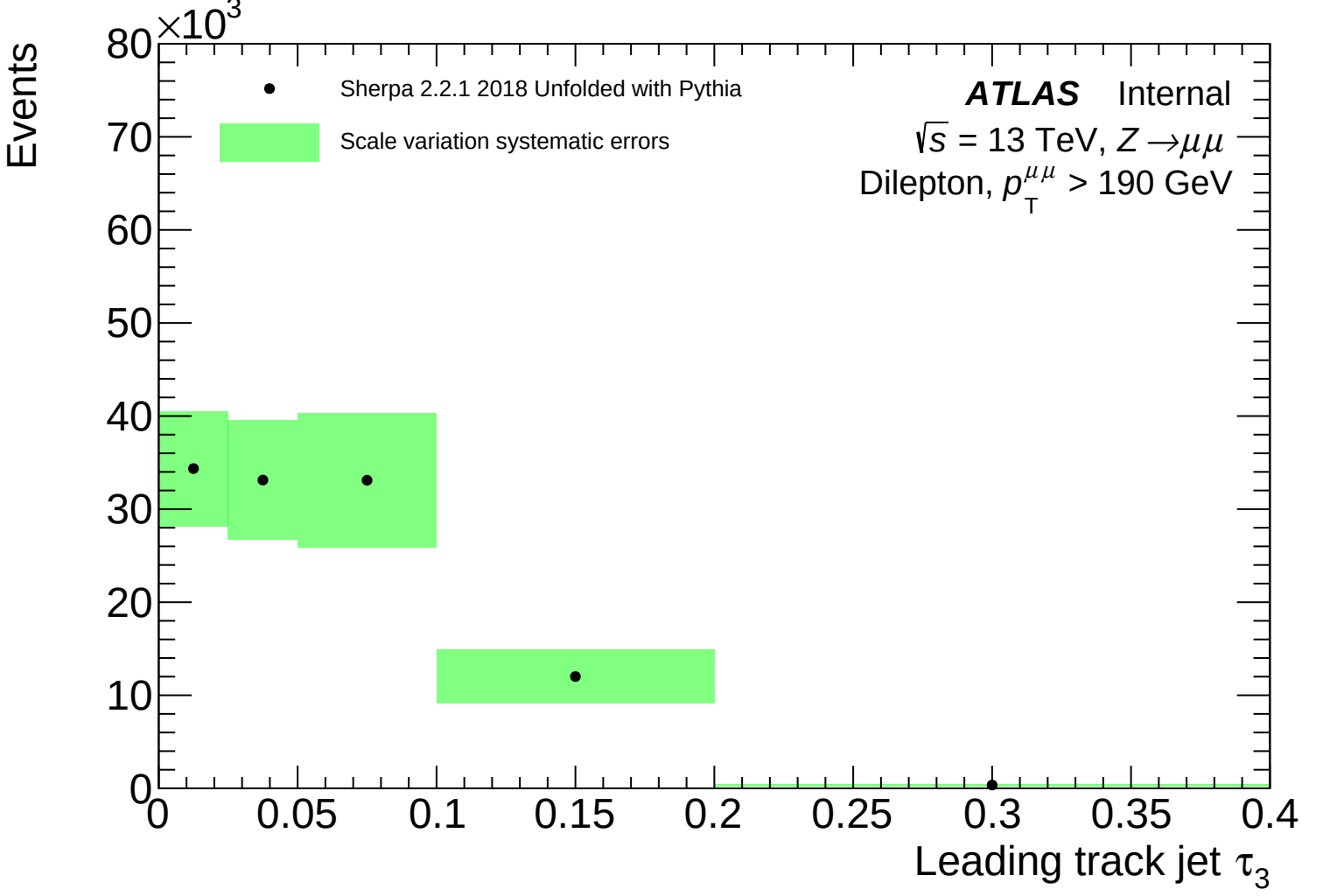
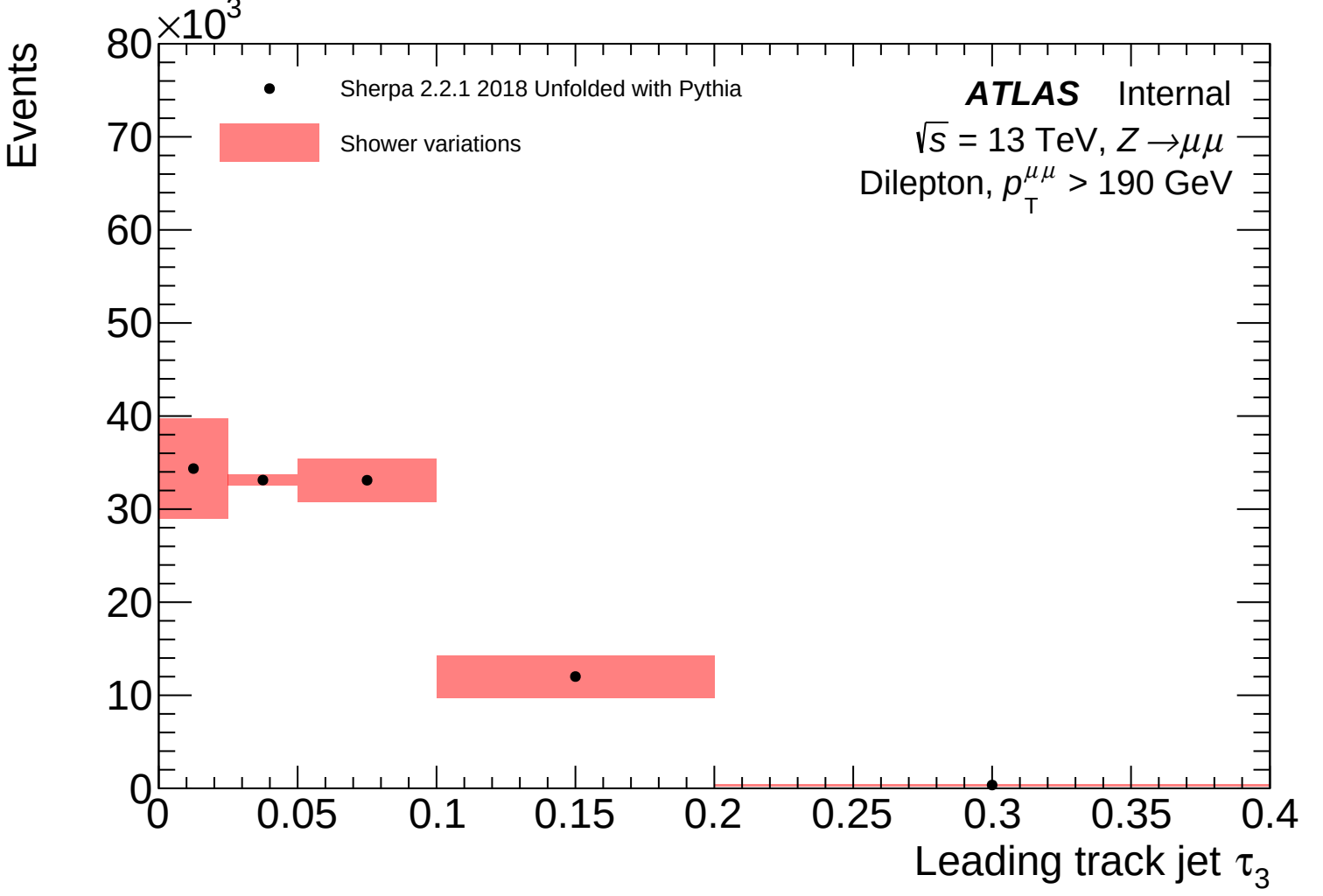
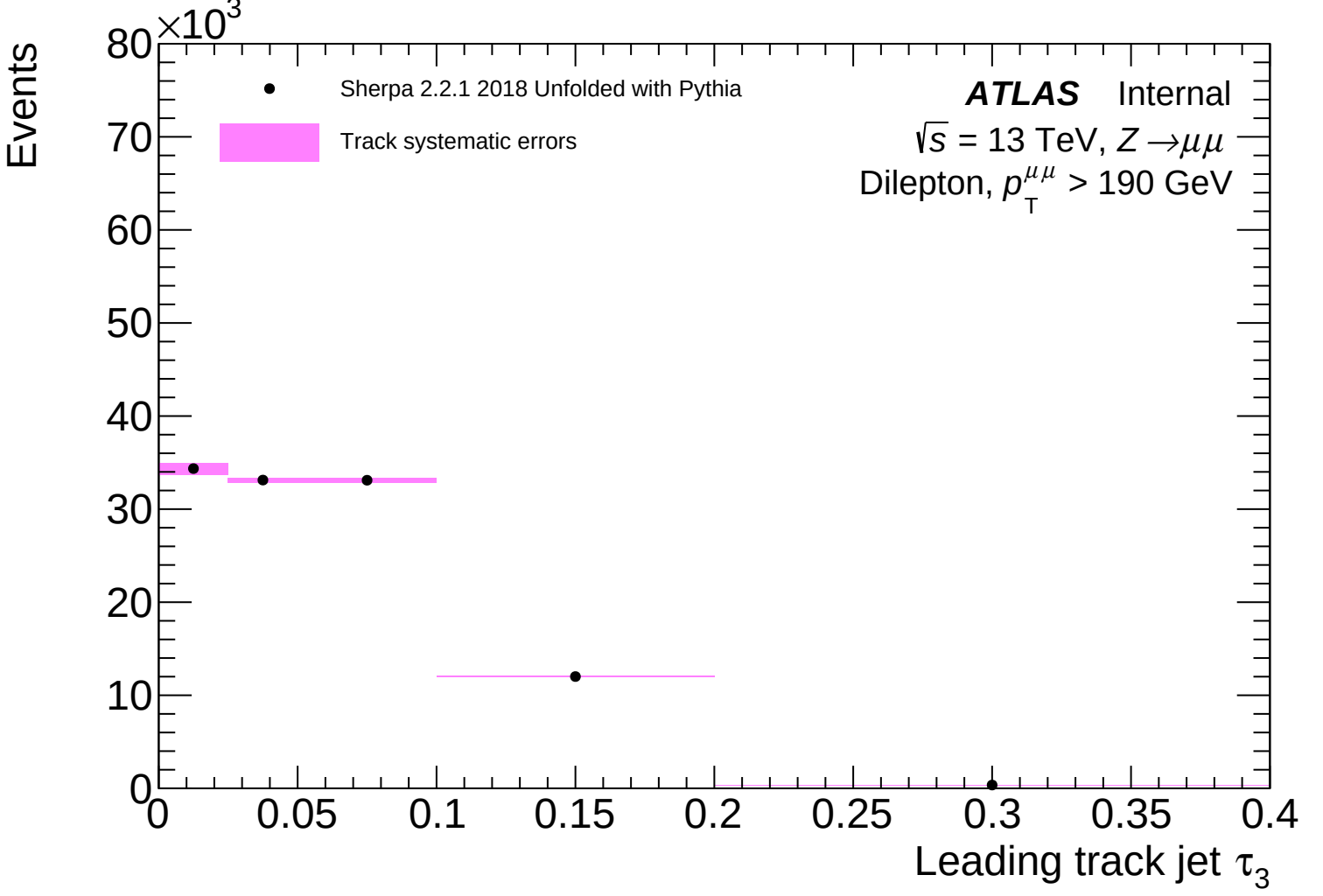
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


$\times 10^{6}$
$dN / d\tau_3^{j1}$
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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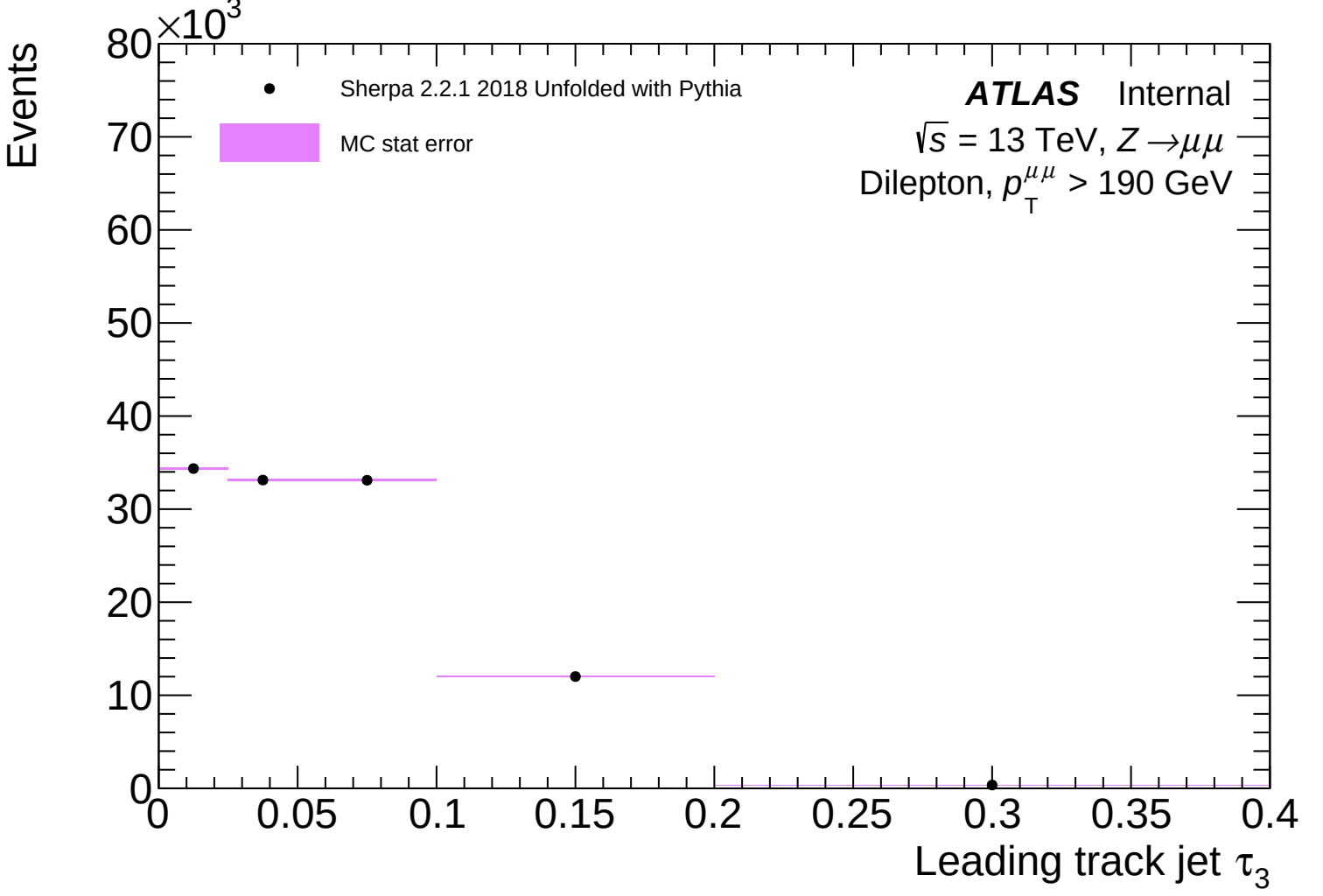
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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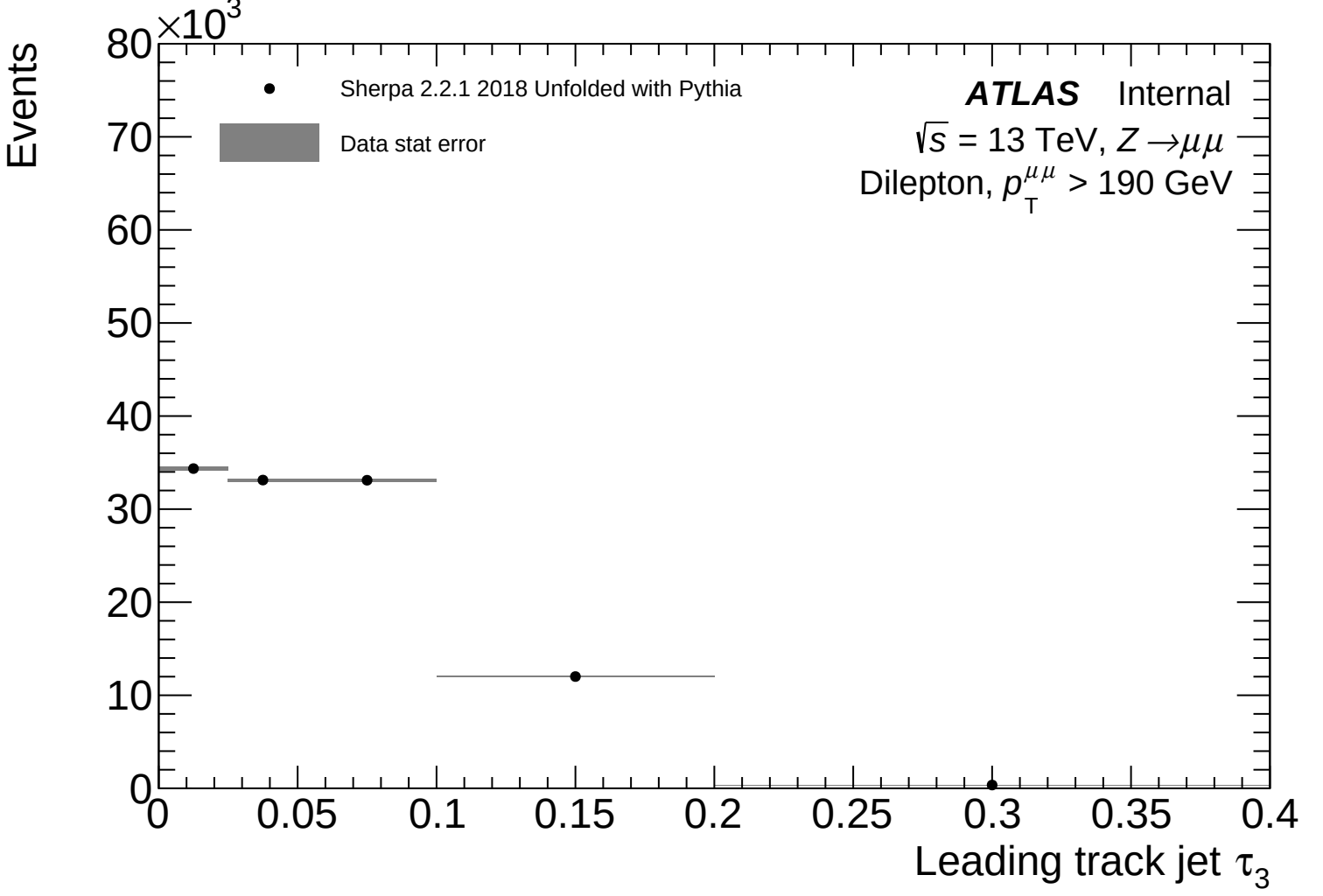
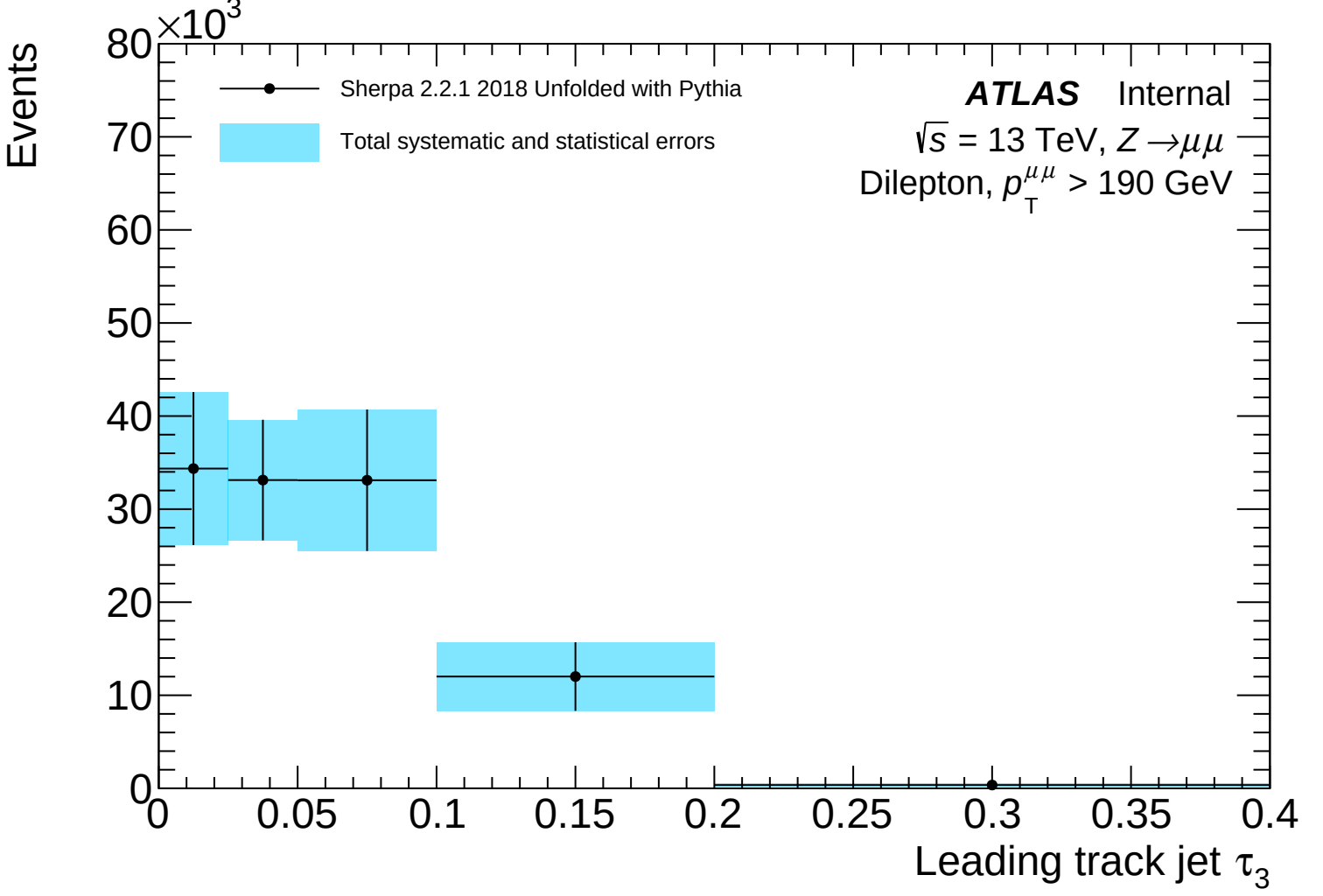
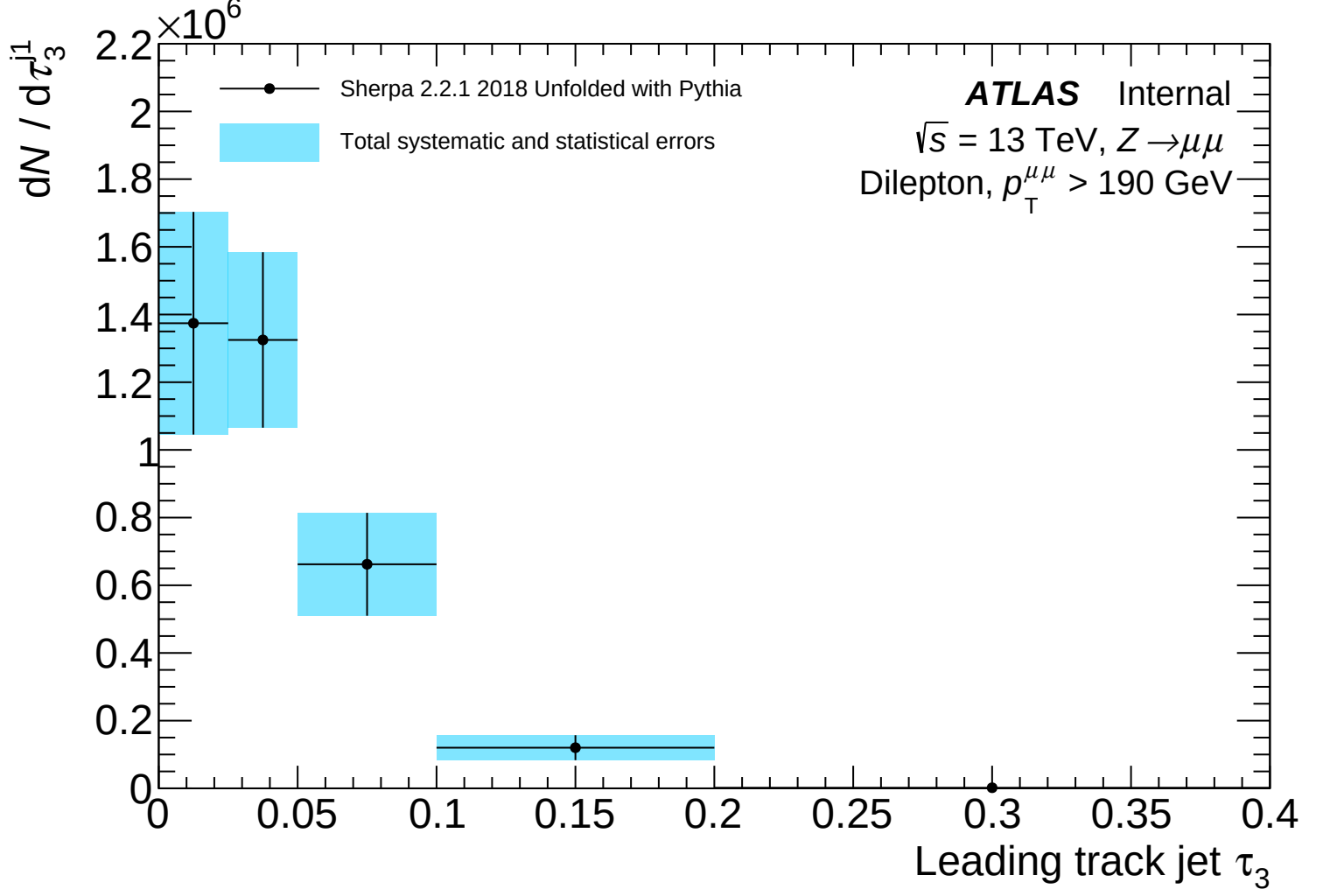
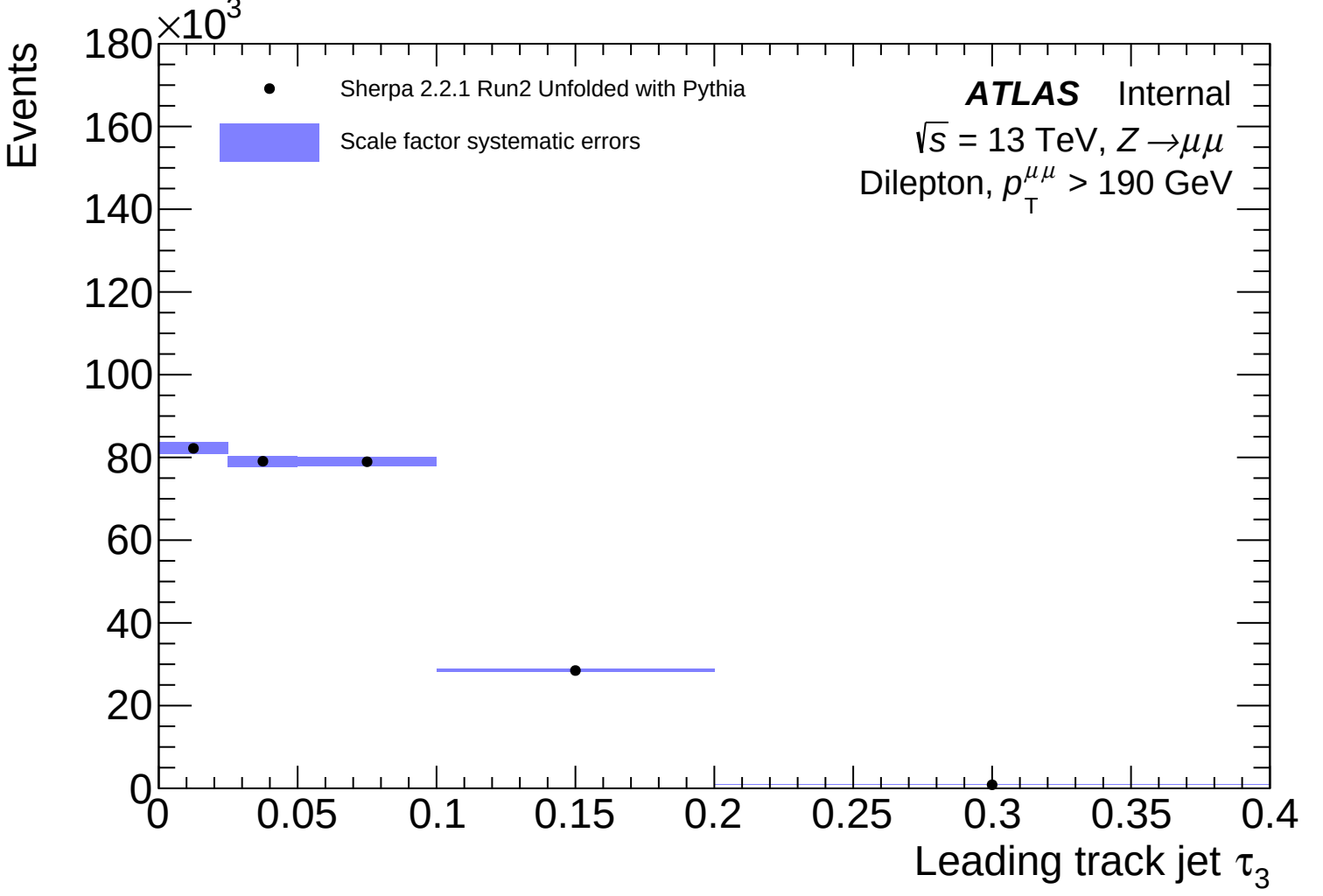
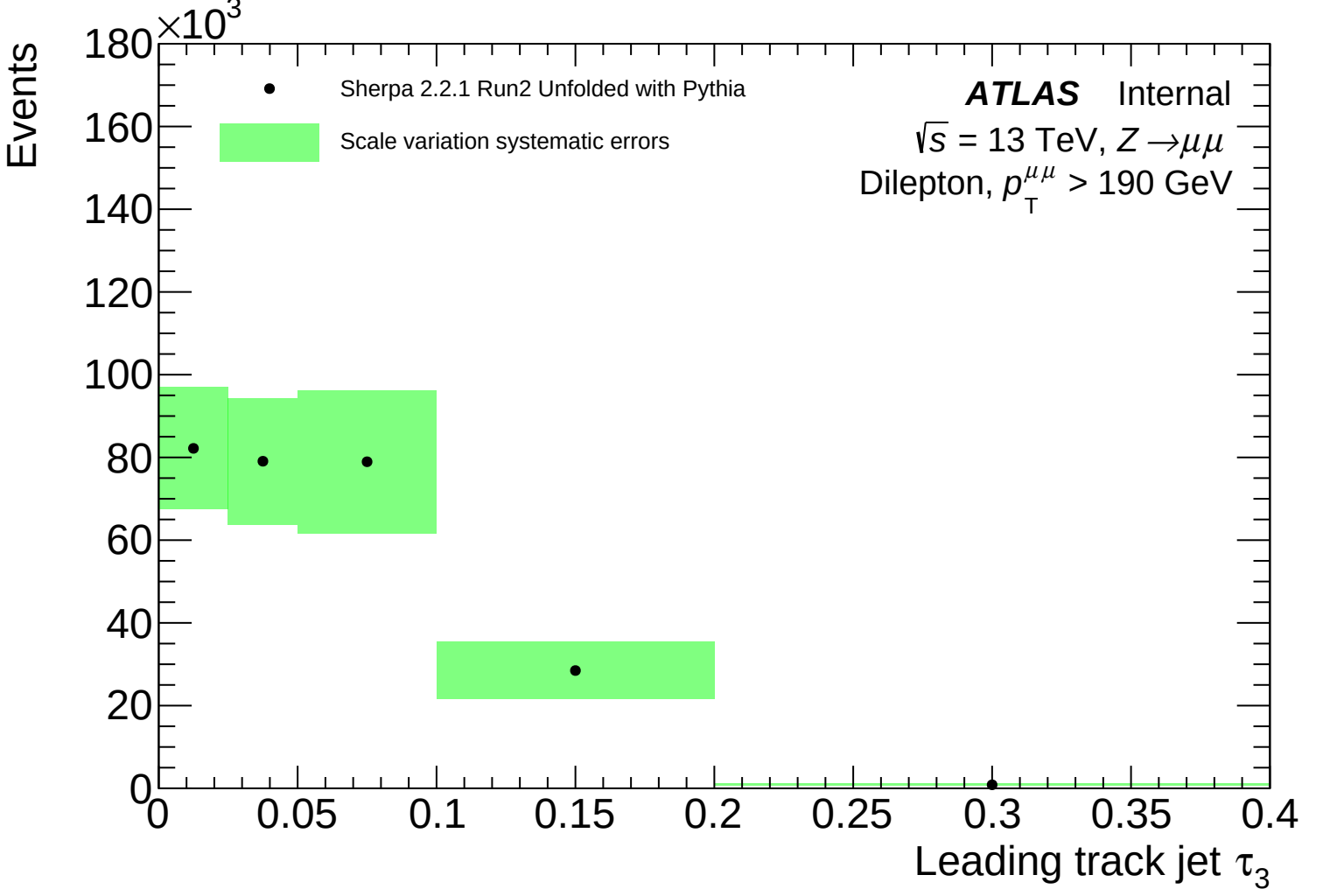
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3

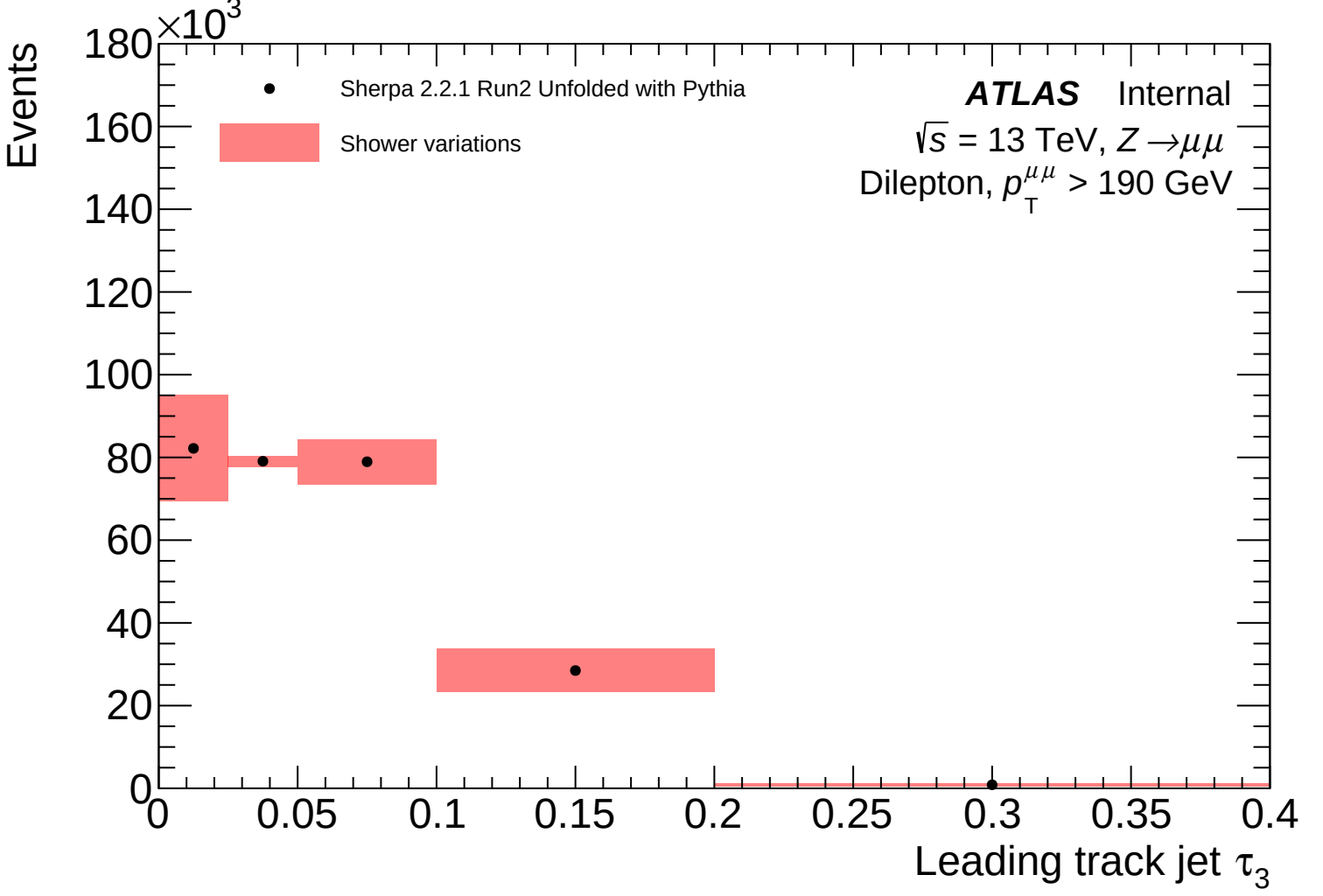

Events
$\times 10^3$
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3

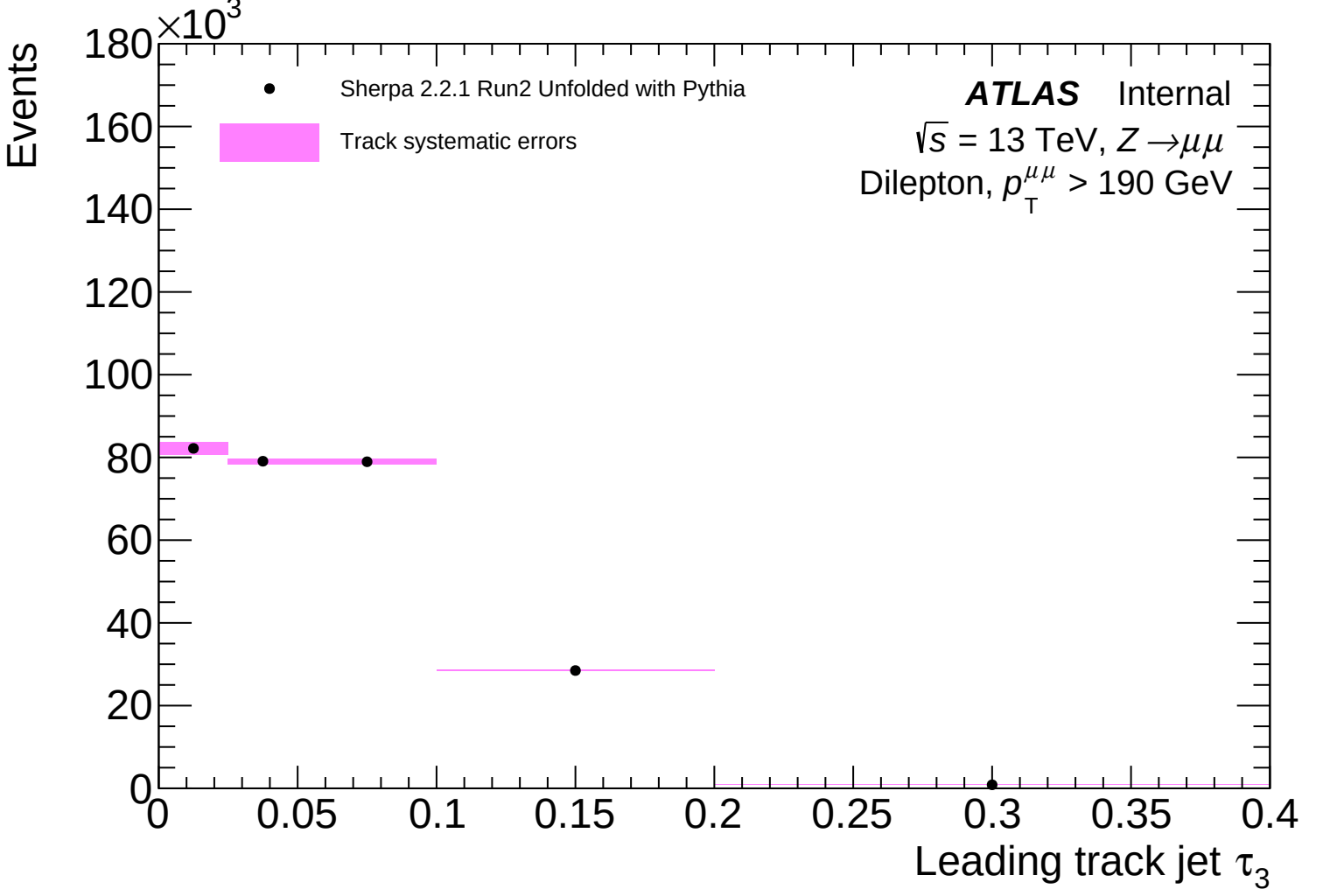

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3

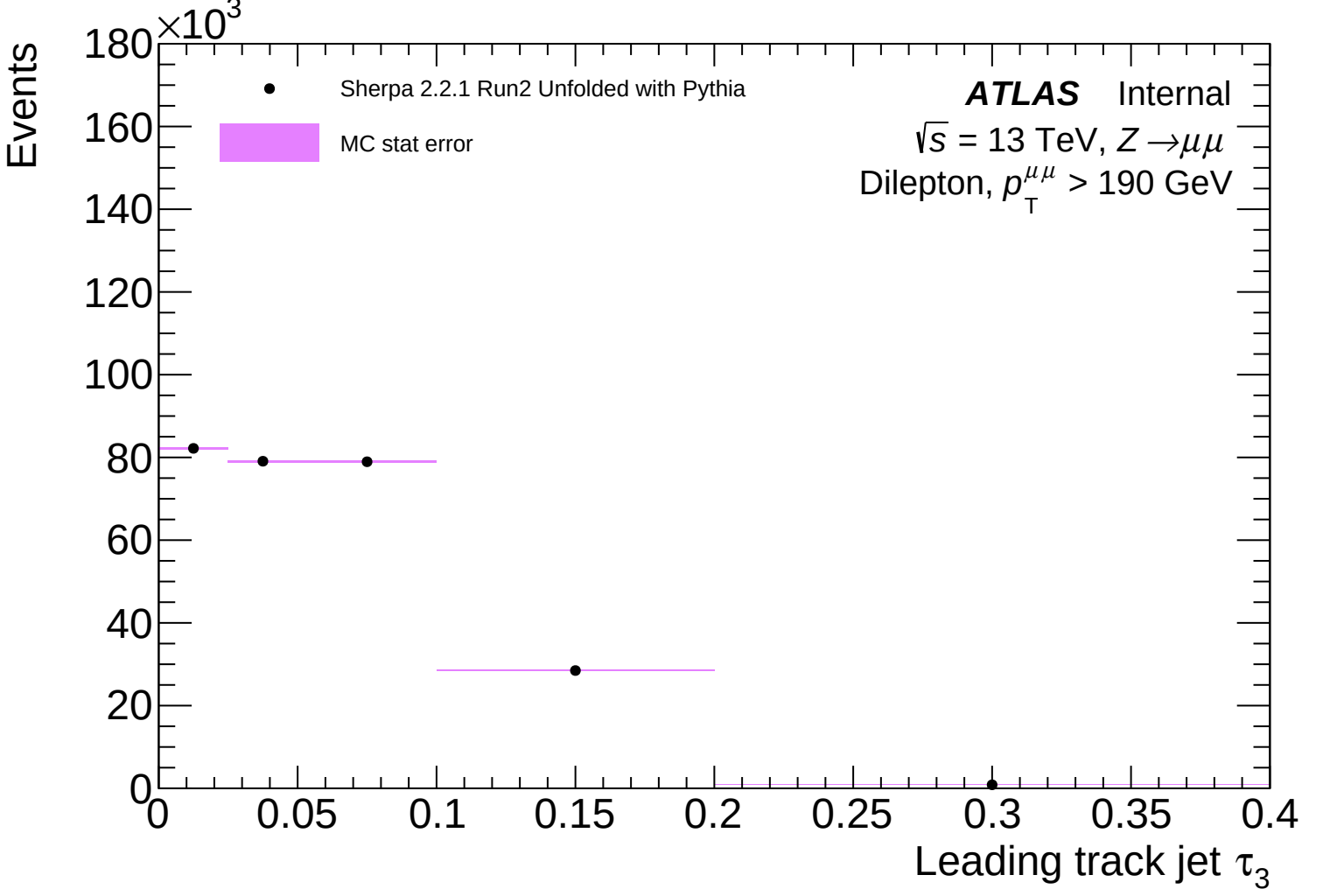

$\times 10^{6}$
$\mathrm{d}N\ /\ \mathrm{d}\tau_3^{j1}$
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ_3


Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
180
160
140
120
100
80
60
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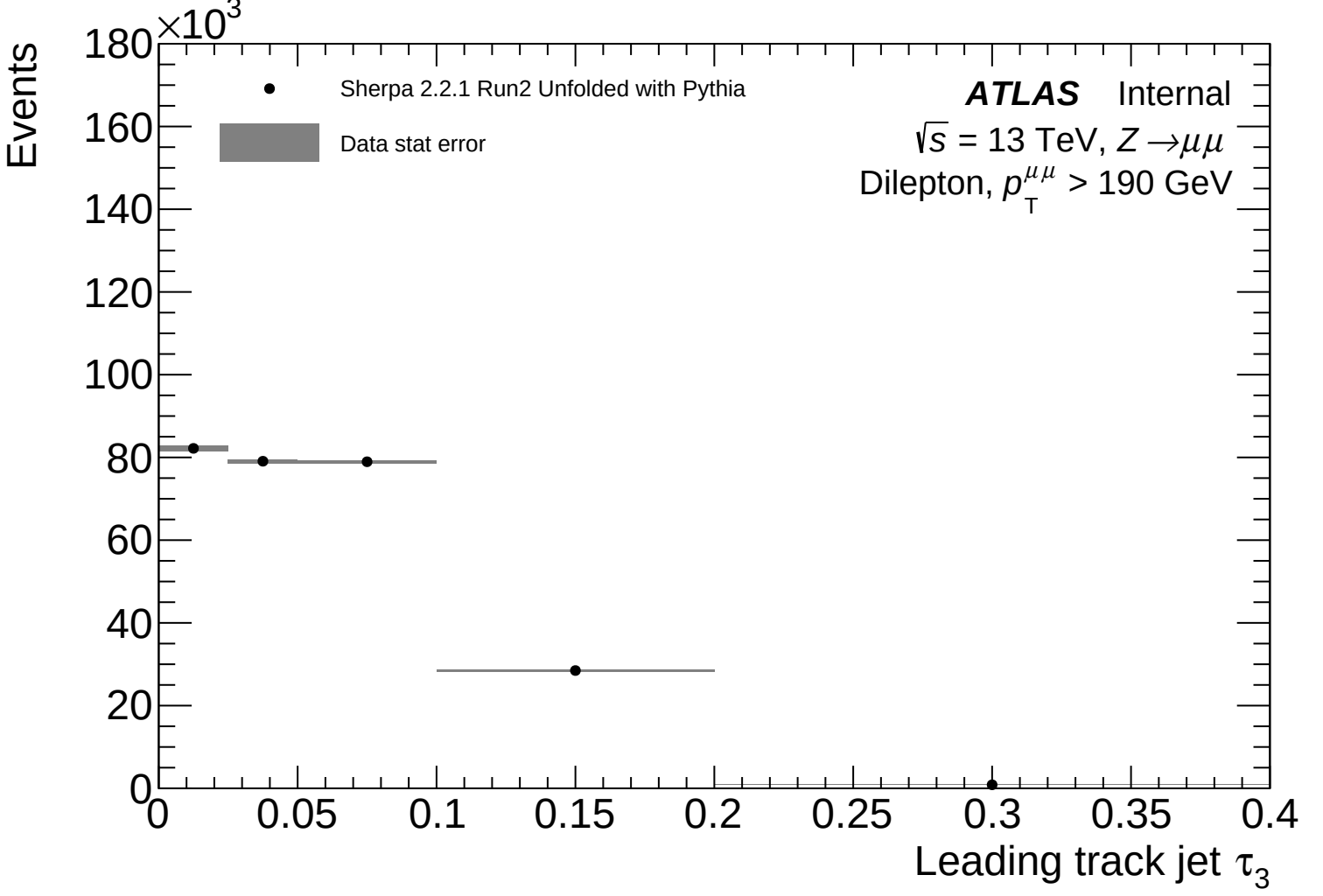
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
180
160
140
120
100
80
60
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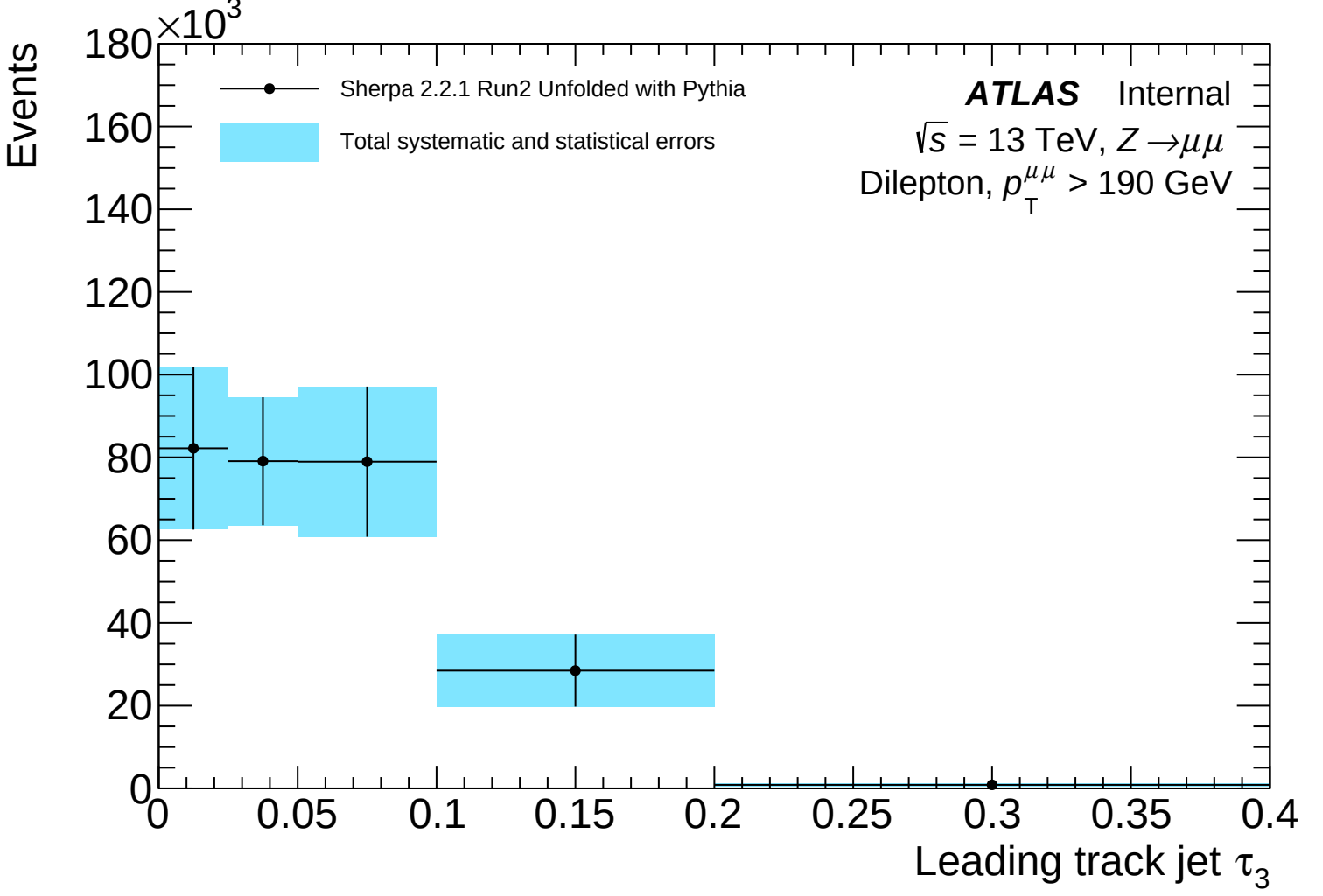
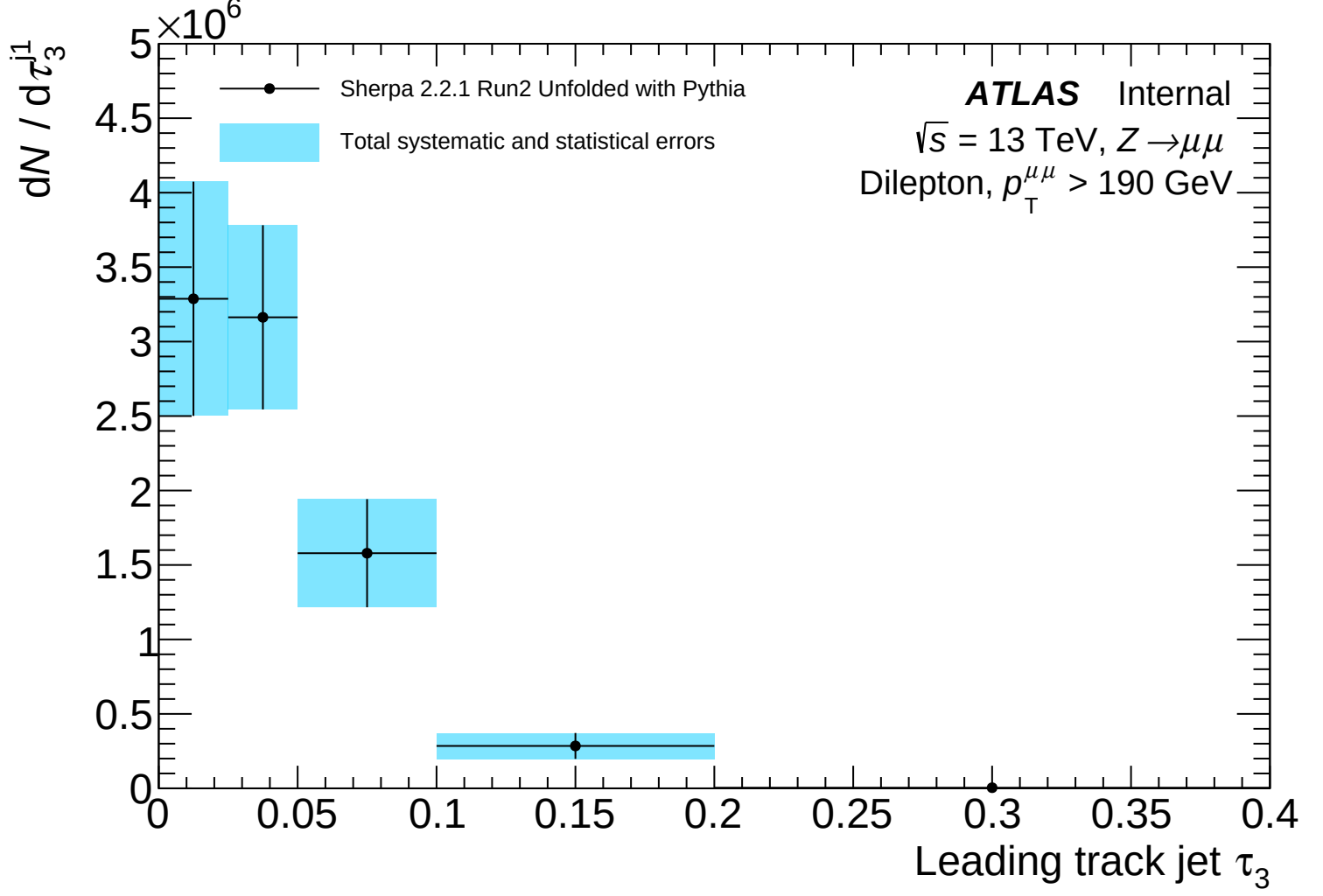
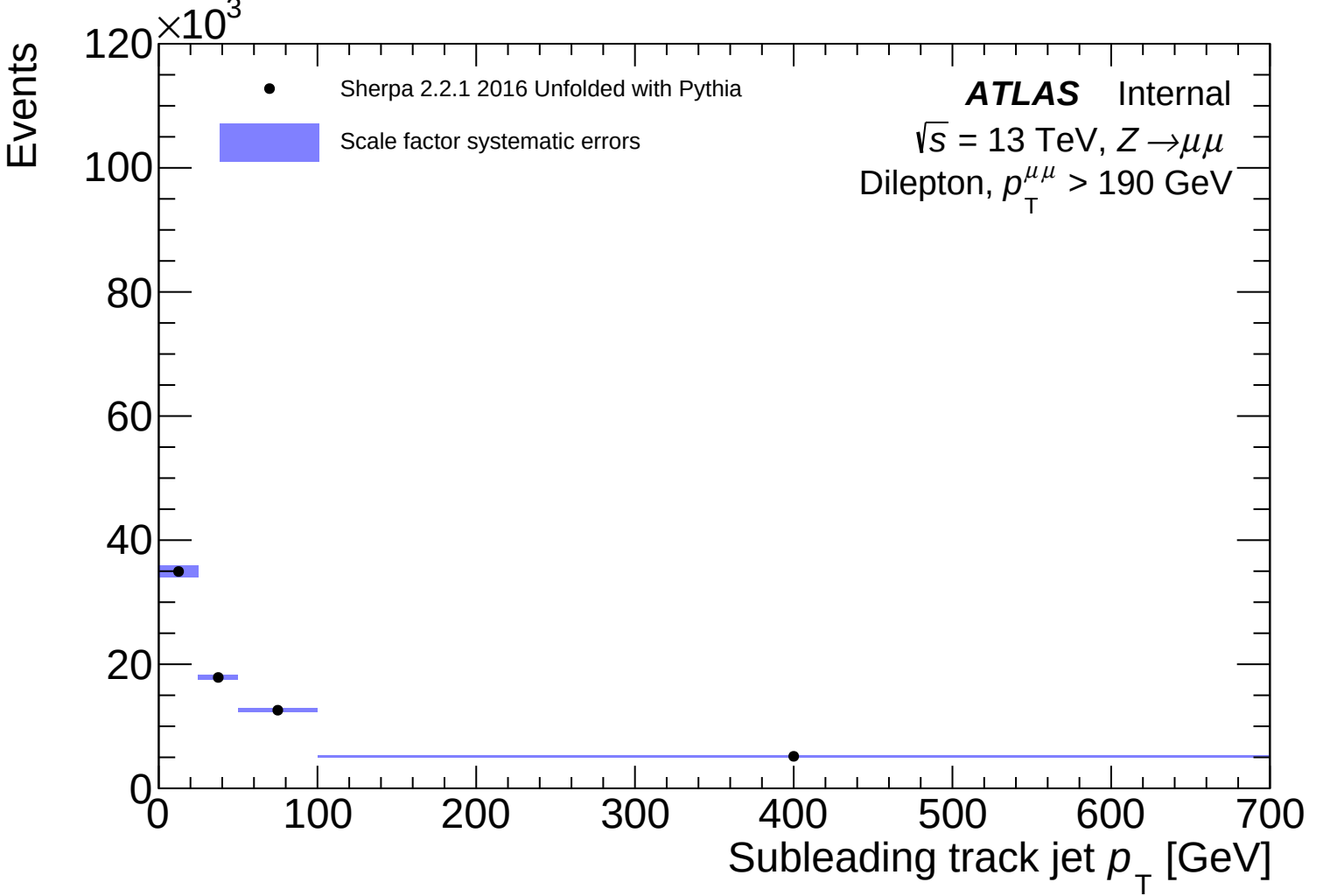
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Leading track jet τ3


$\times 10^{6}$
$\mathrm{d}N\ /\ \mathrm{d}\tau_3^{j1}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
Leading track jet τ_3
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4


Events
×10^3
120
100
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60
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20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
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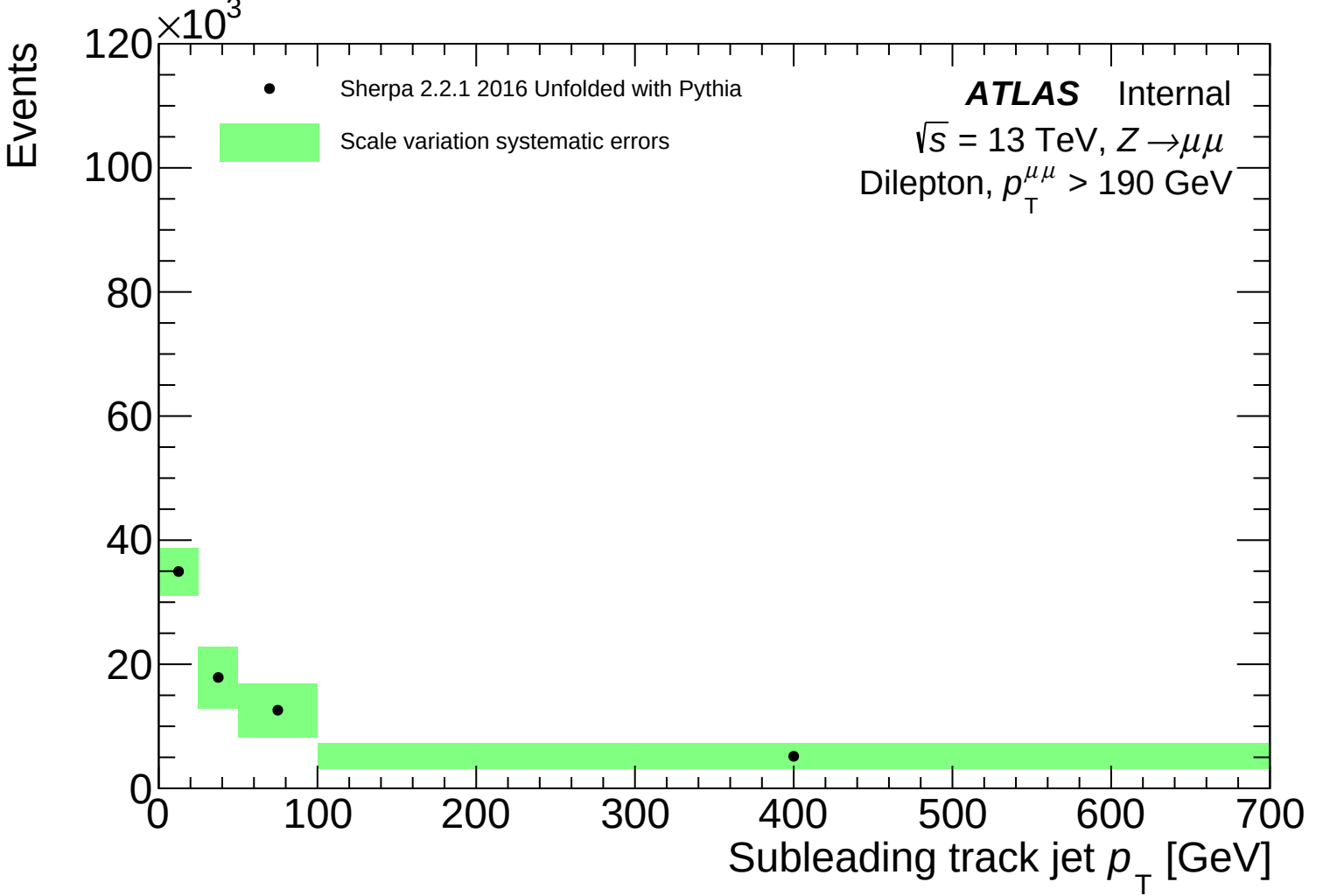
700
Subleading track jet p_T [GeV]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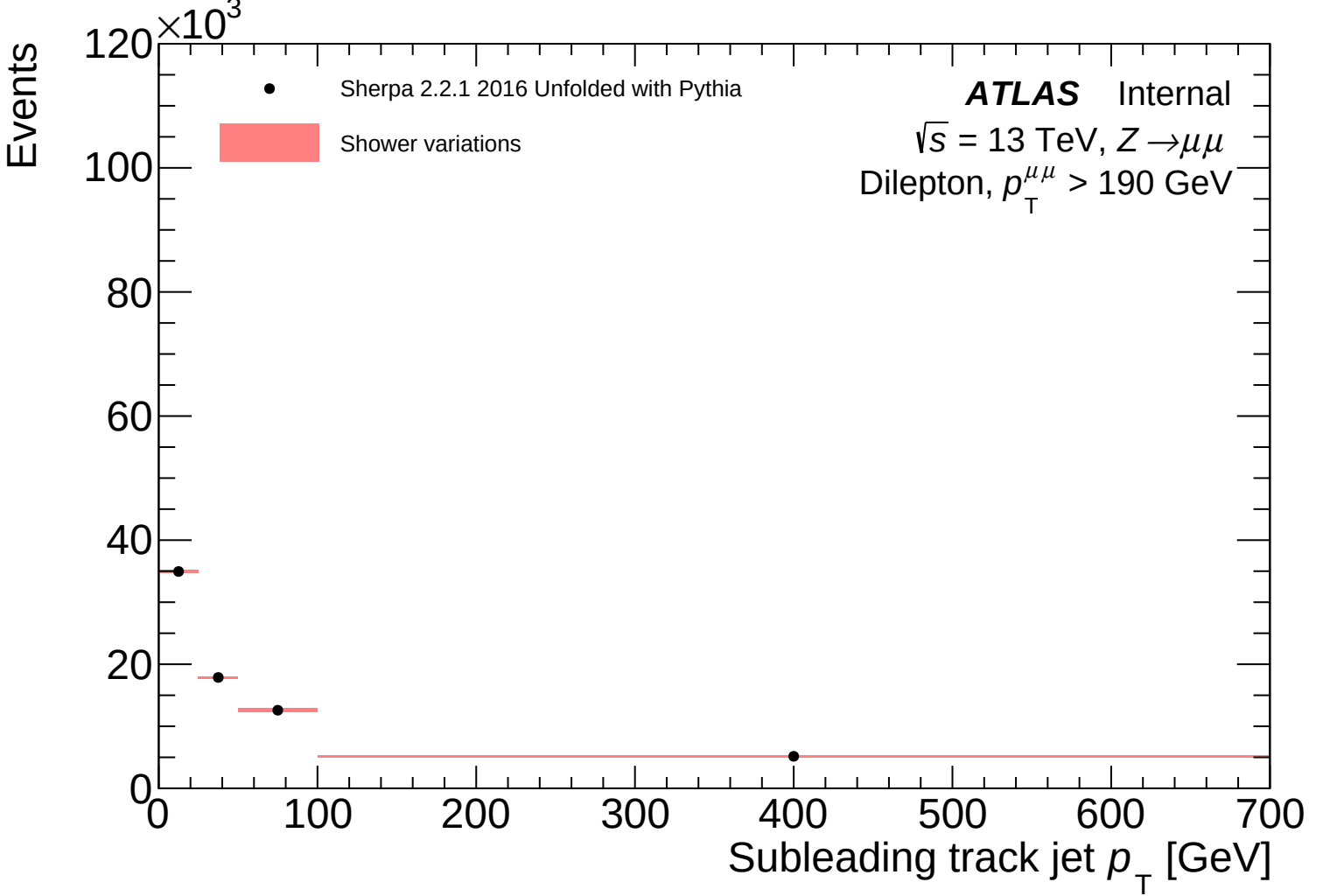
Subleading track jet p_T [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV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Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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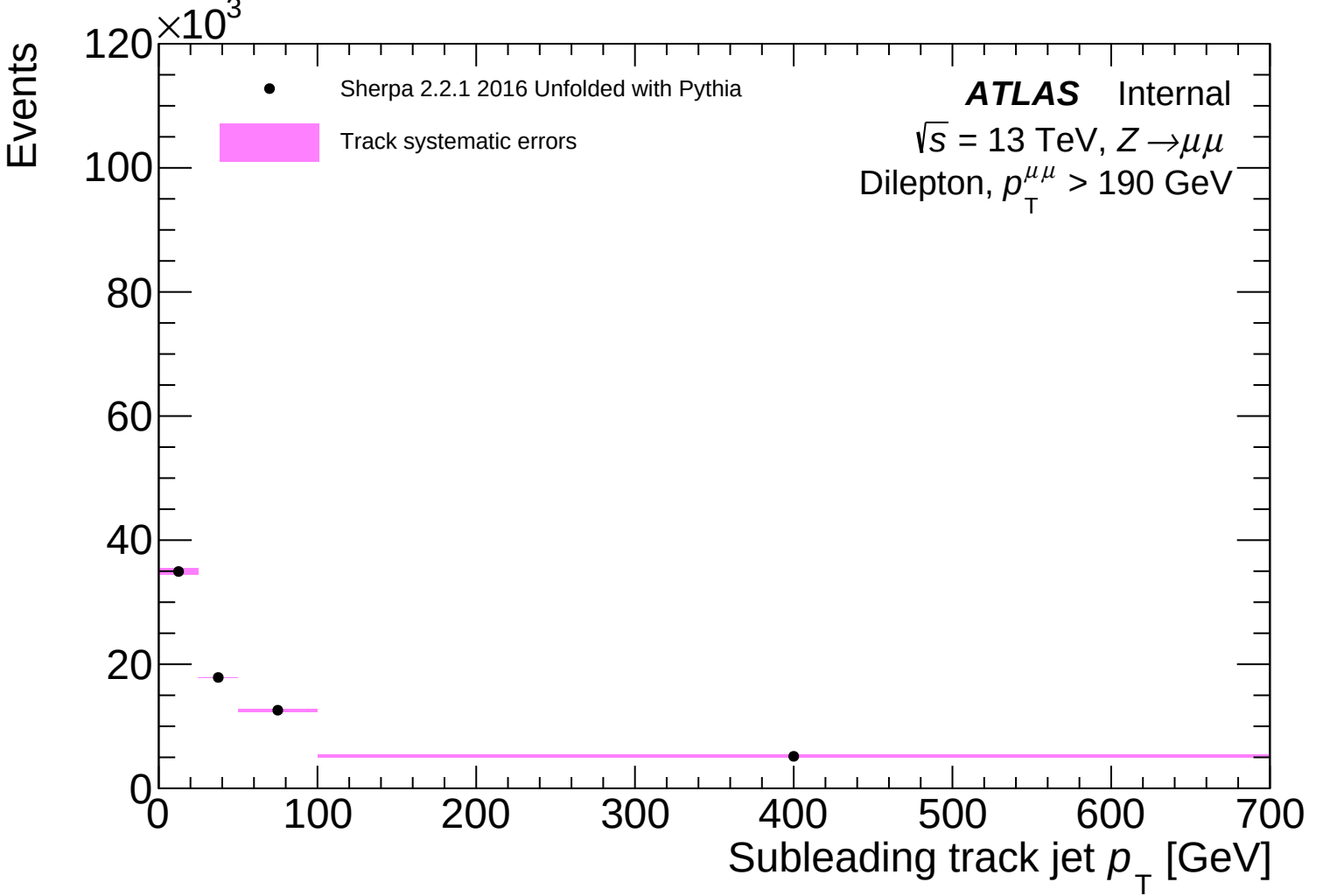
700
Subleading track jet p_T [GeV]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Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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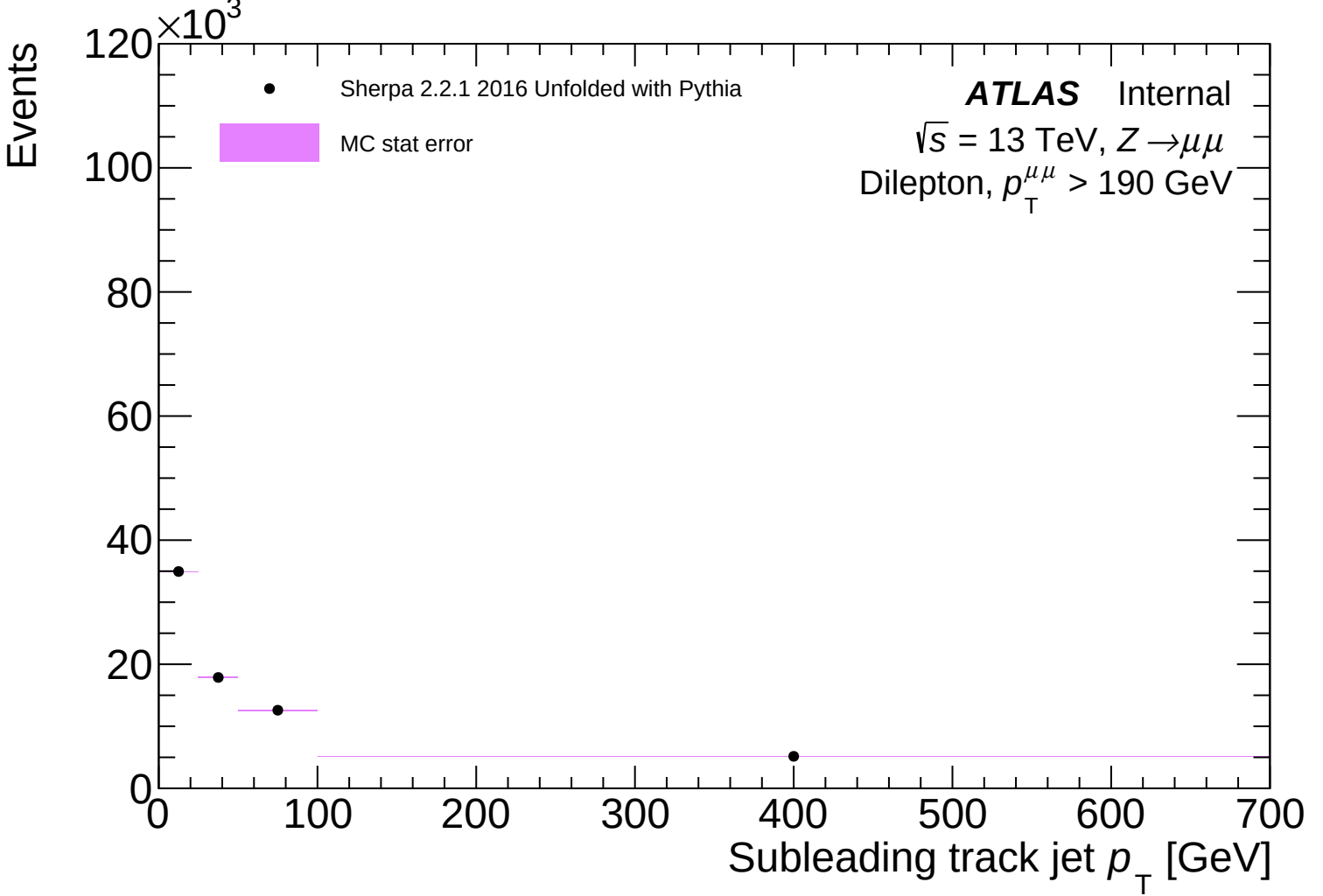
Subleading track jet p_T [GeV]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Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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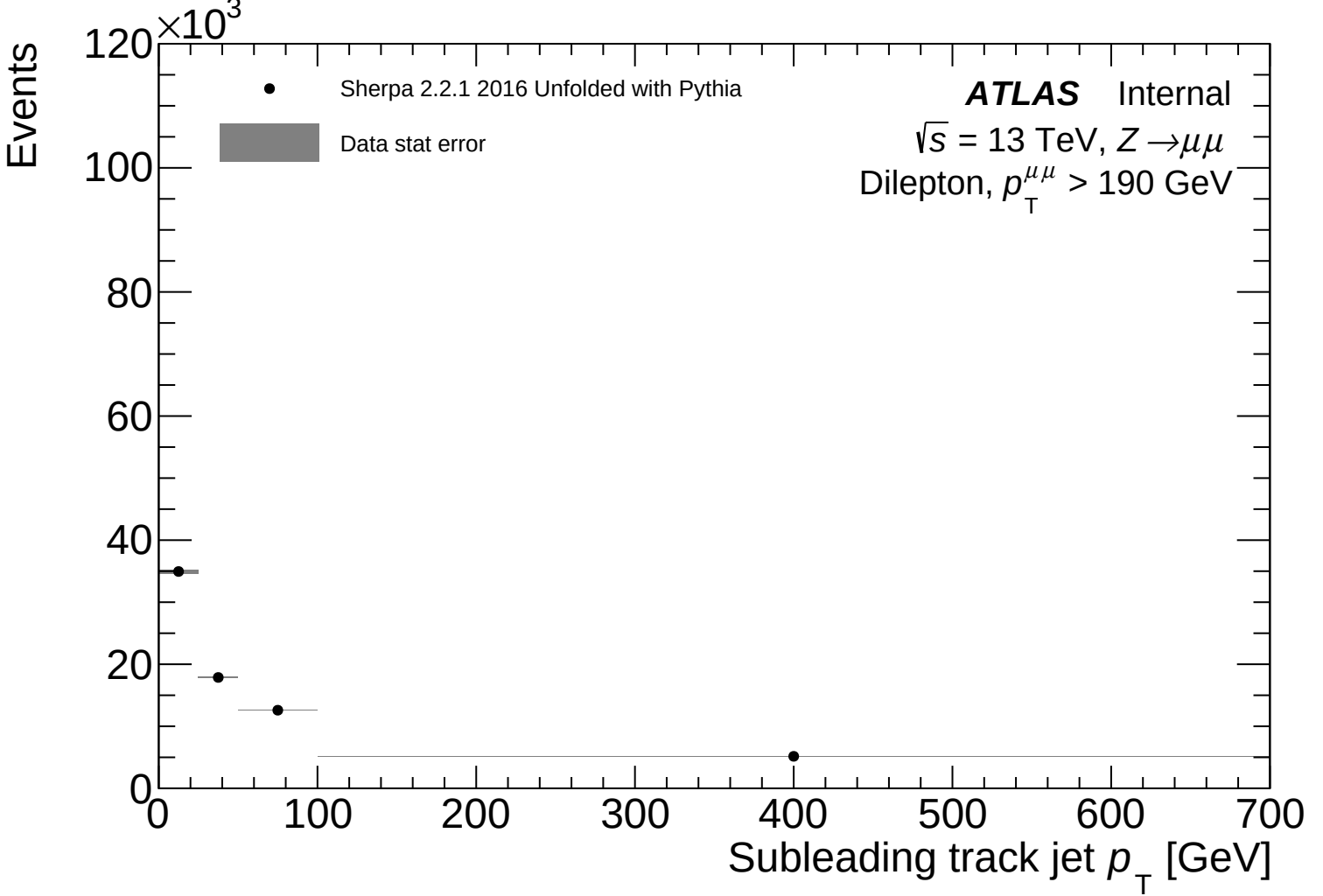
Subleading track jet p_T [GeV]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Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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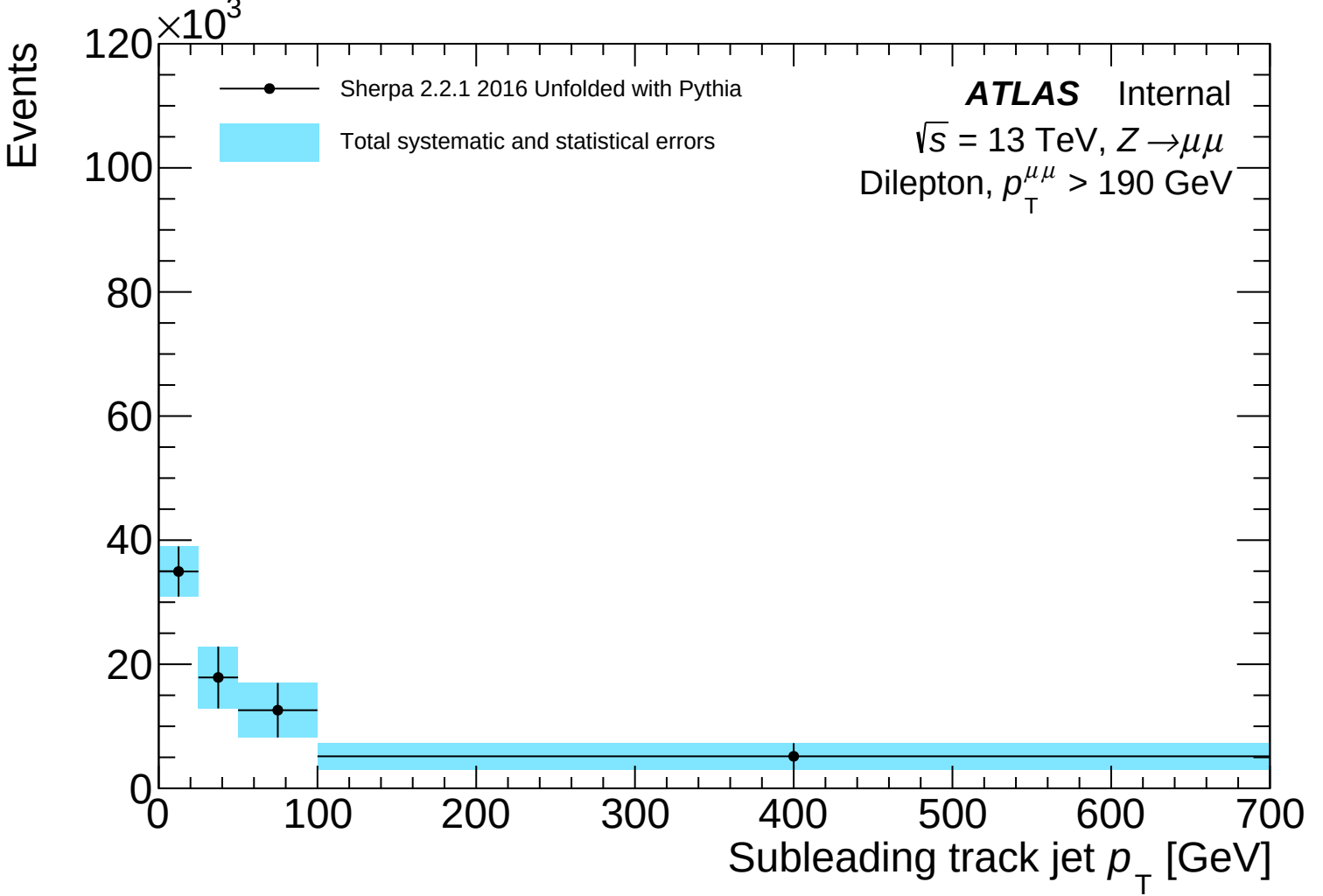
Subleading track jet p_T [GeV]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Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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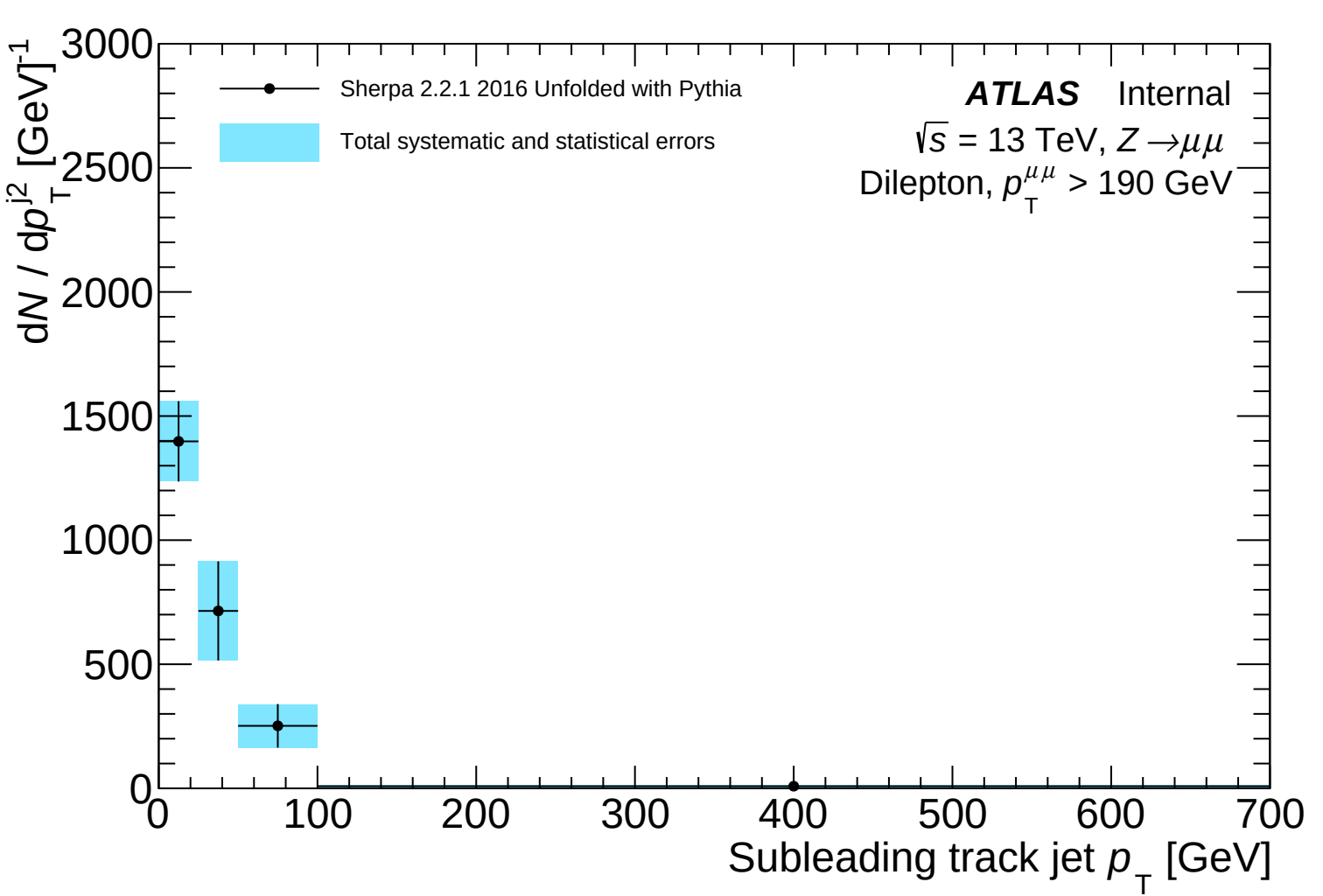
Subleading track jet p_T [GeV]


Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j2 [GeV]^-1
Subleading track jet p_T [GeV]
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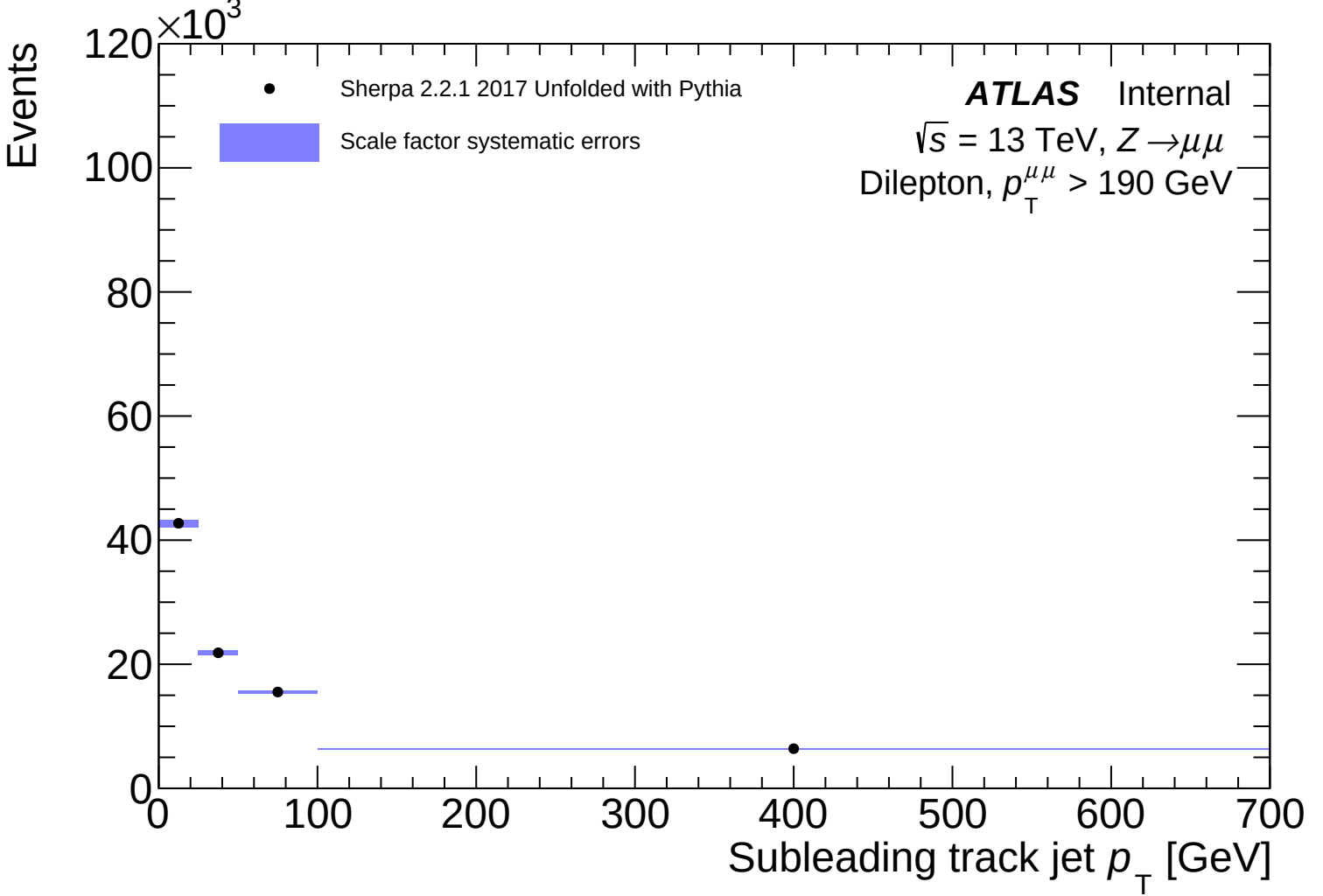
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Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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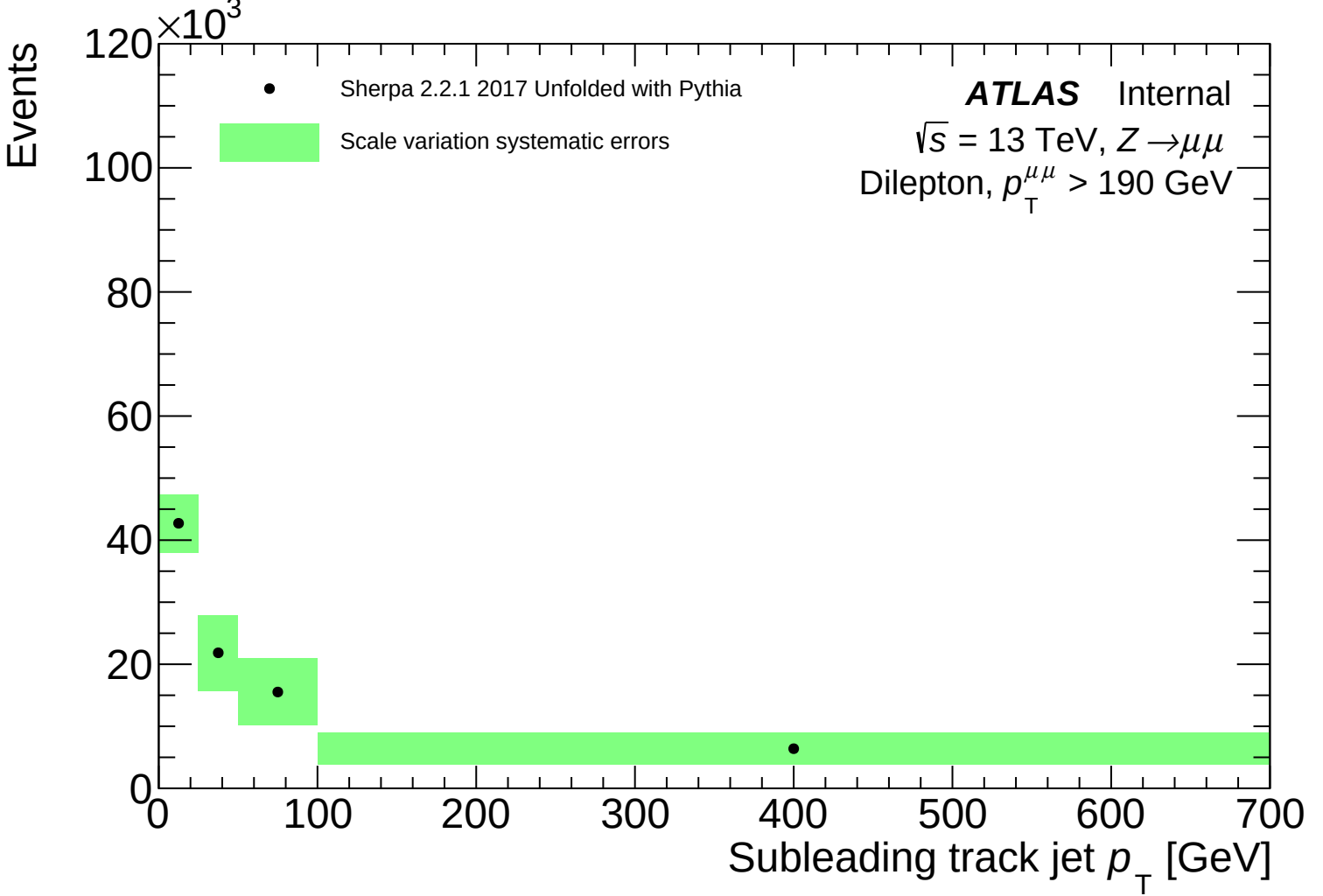
Subleading track jet p_T [GeV]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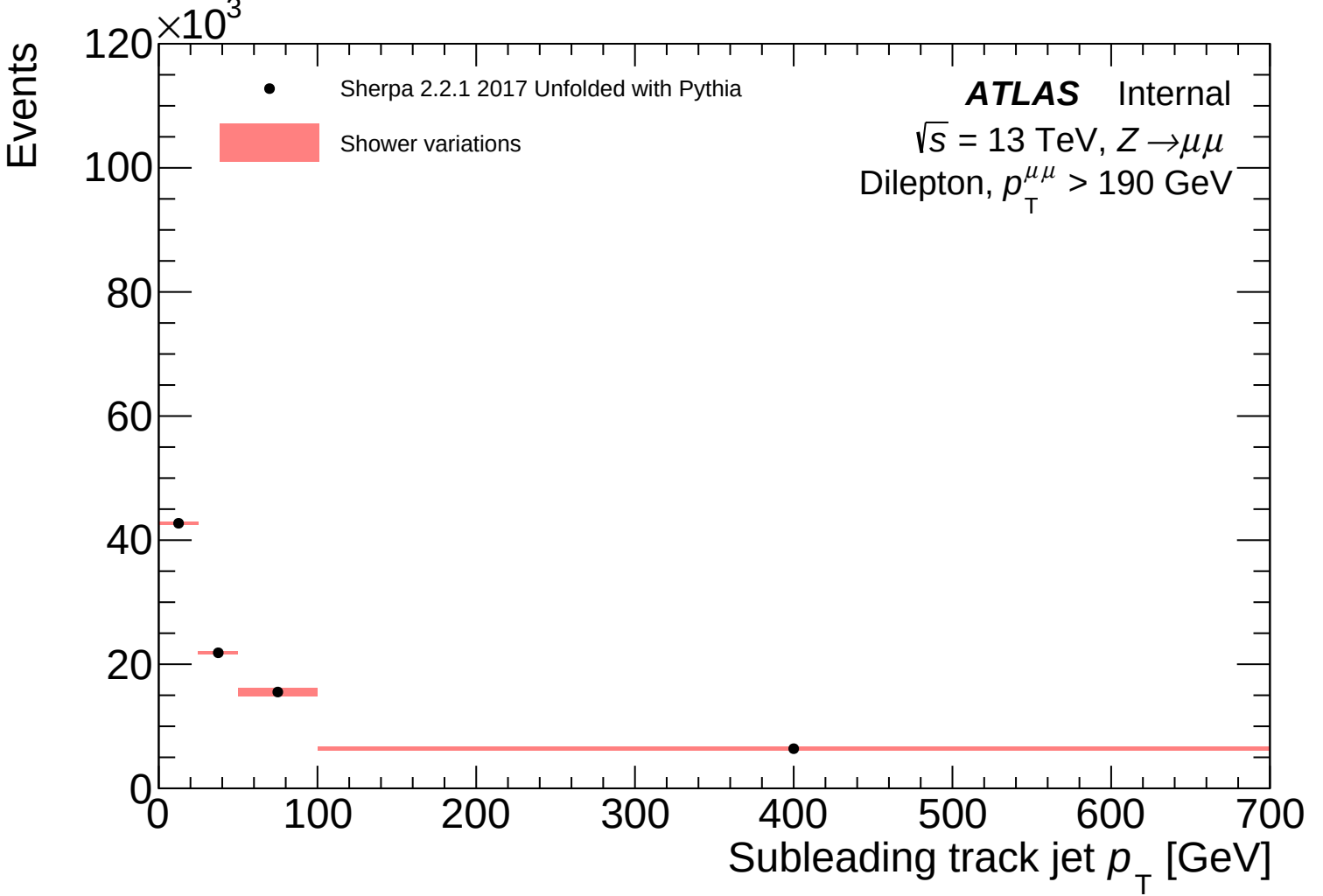
Subleading track jet p_T [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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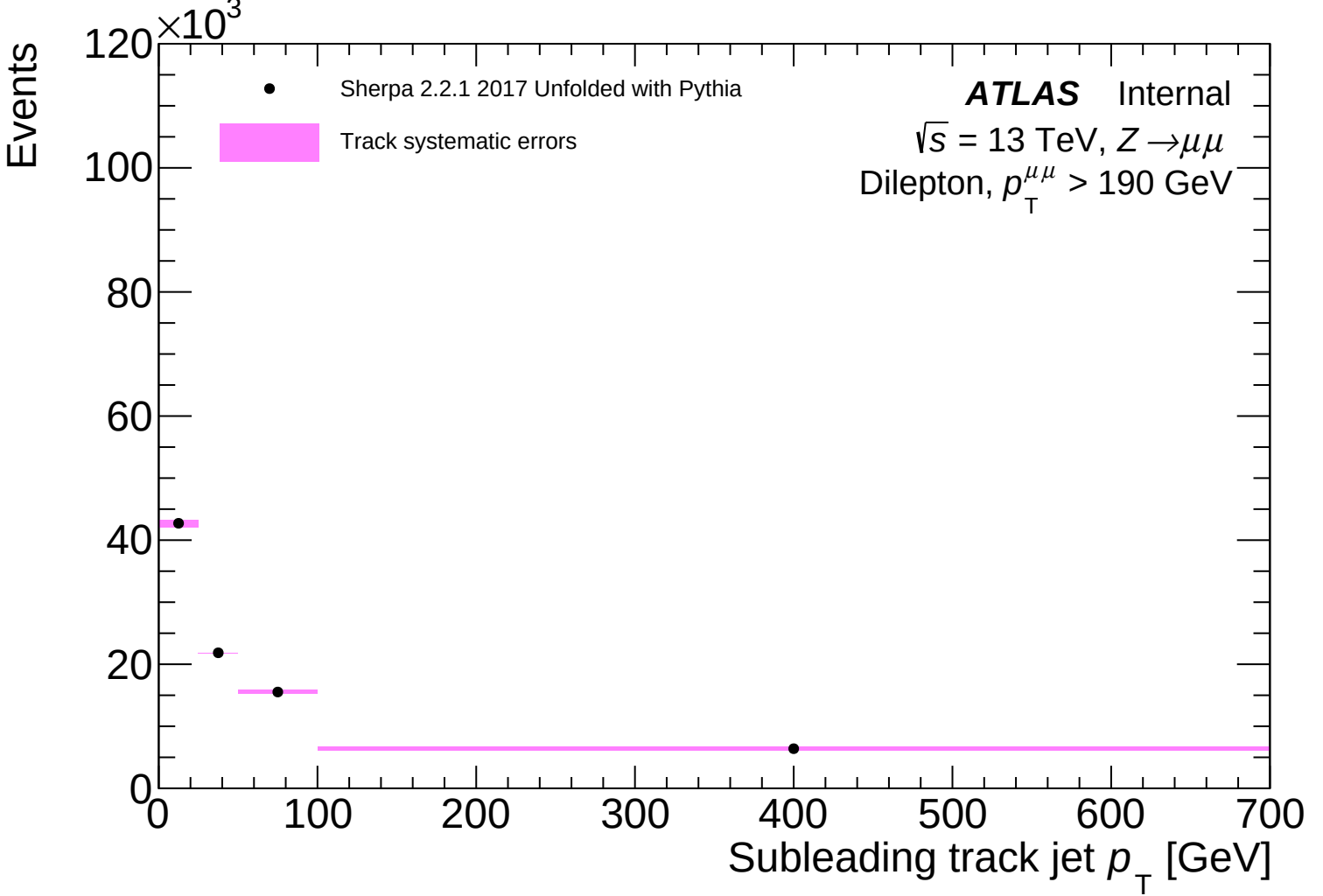
Subleading track jet p_T [GeV]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Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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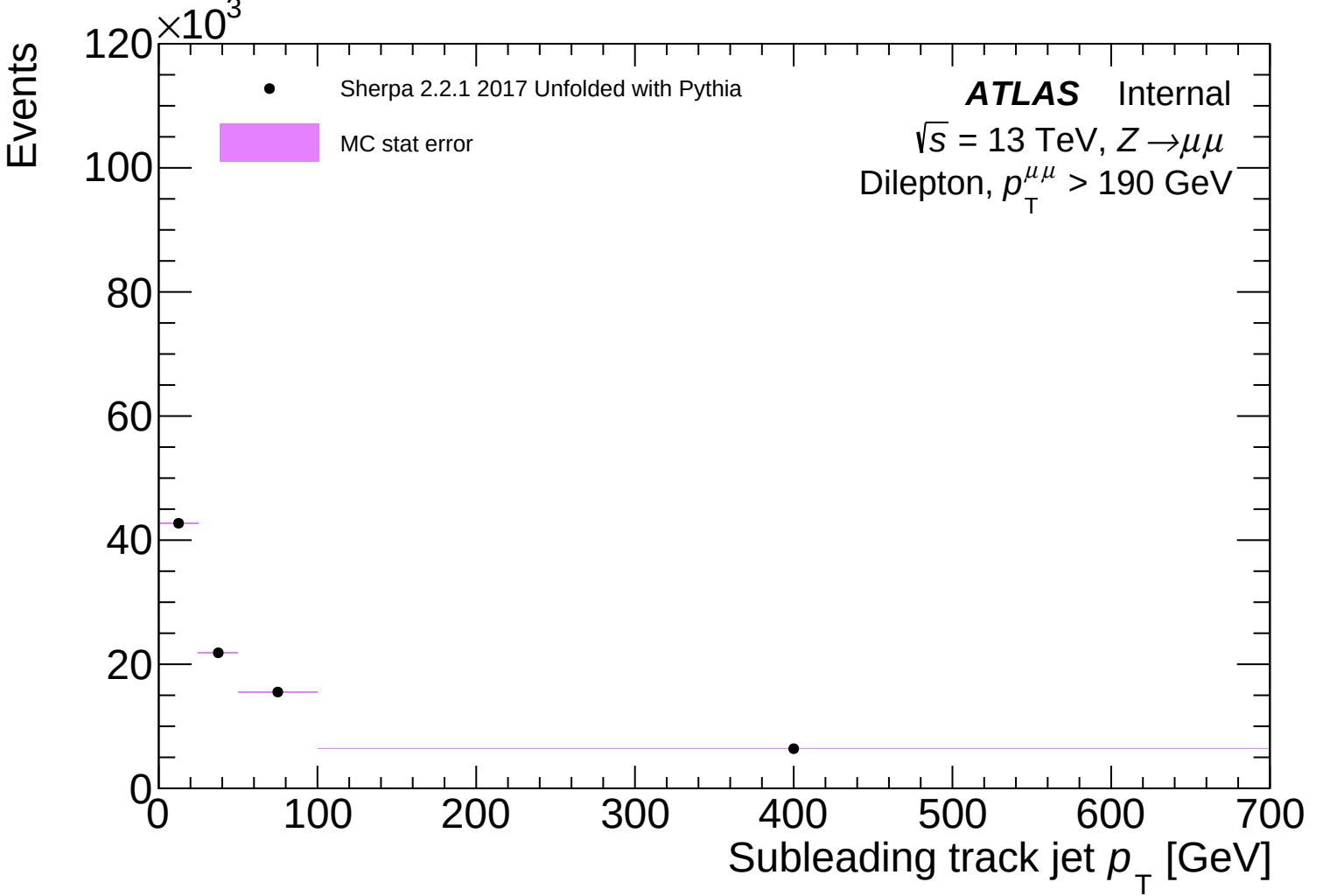
Subleading track jet p_T [GeV]


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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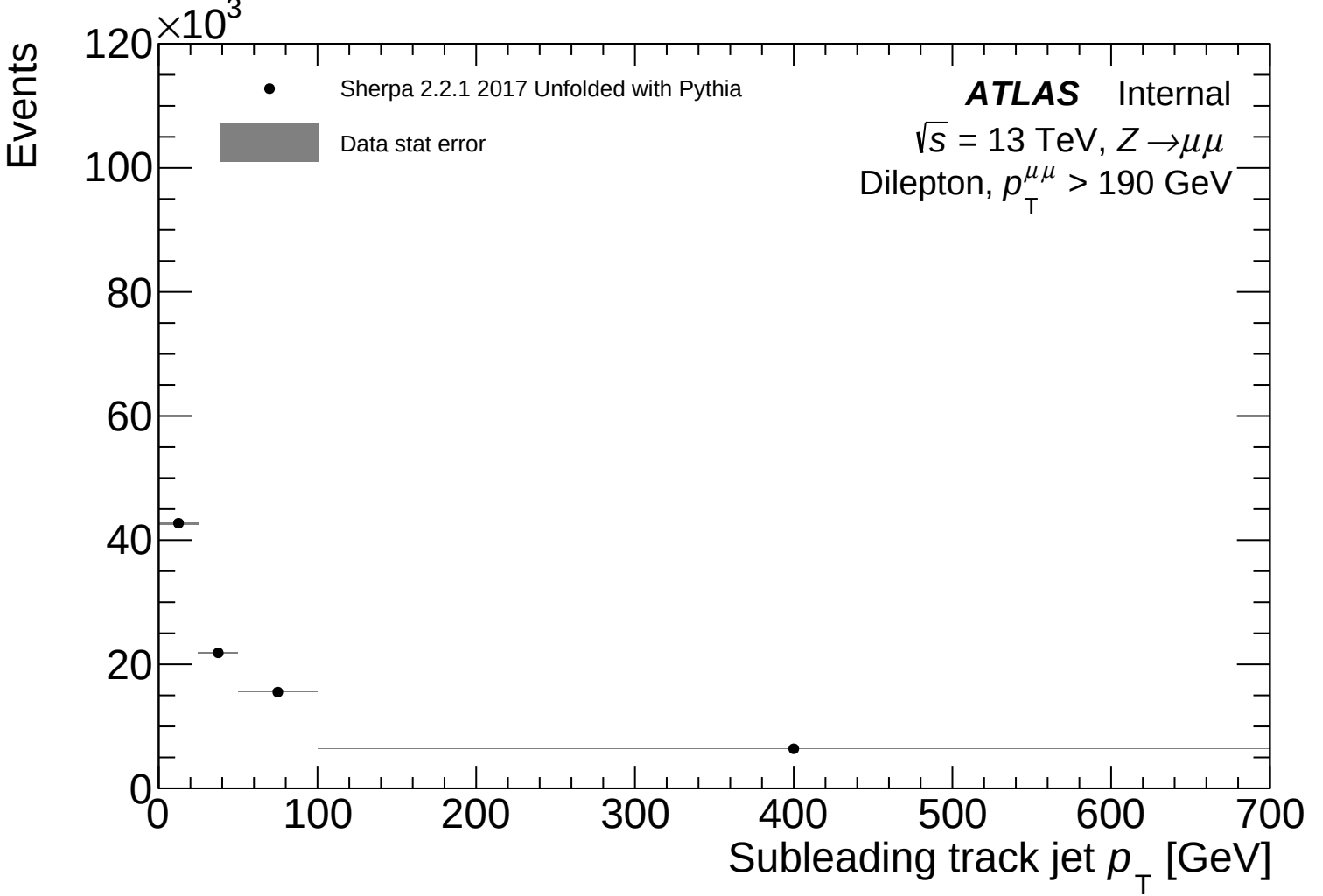
Subleading track jet p_T [GeV]


Events
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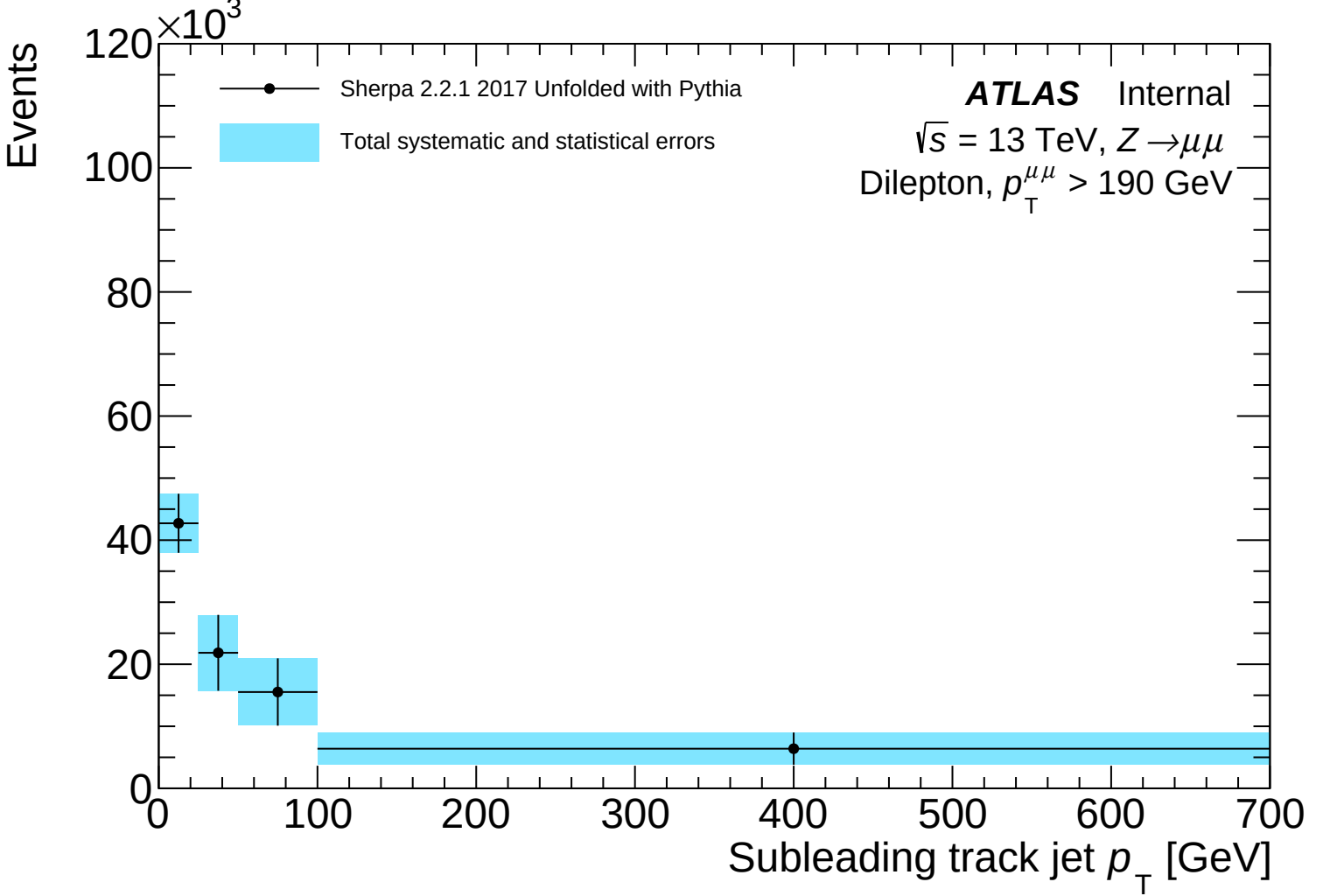
Subleading track jet p_T [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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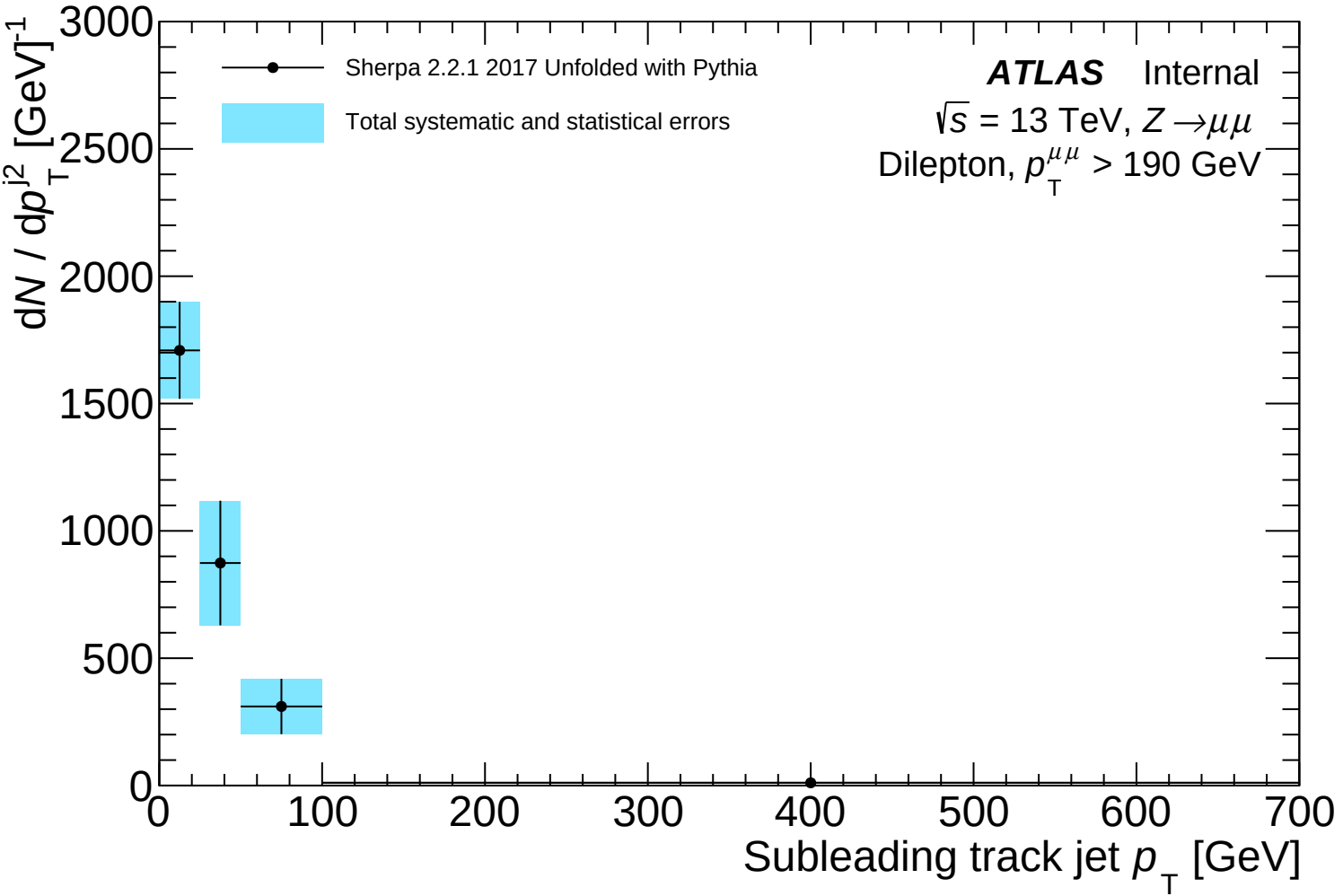
Subleading track jet p_T [GeV]


Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j2 [GeV]^-1
Subleading track jet p_T [GeV]
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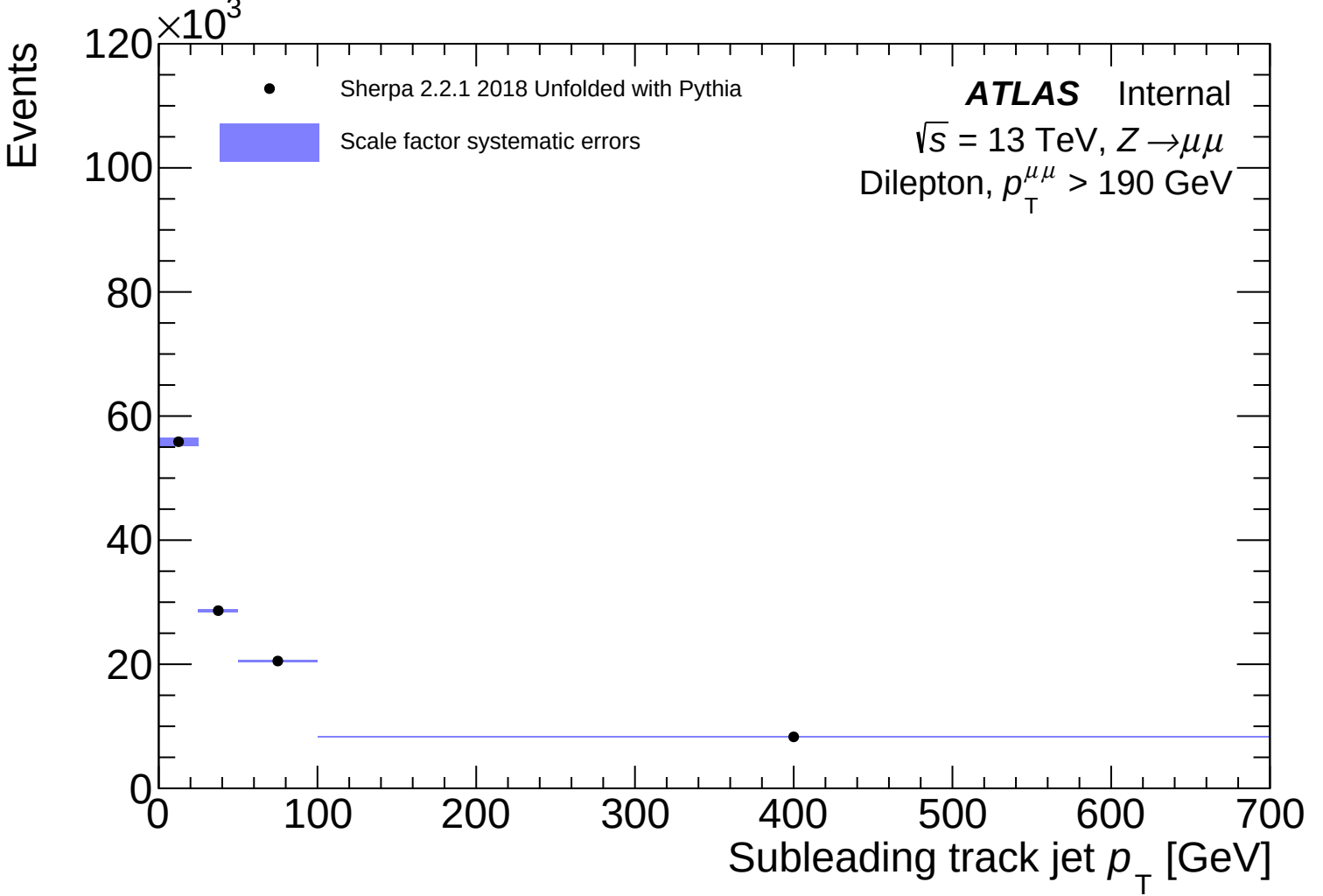
Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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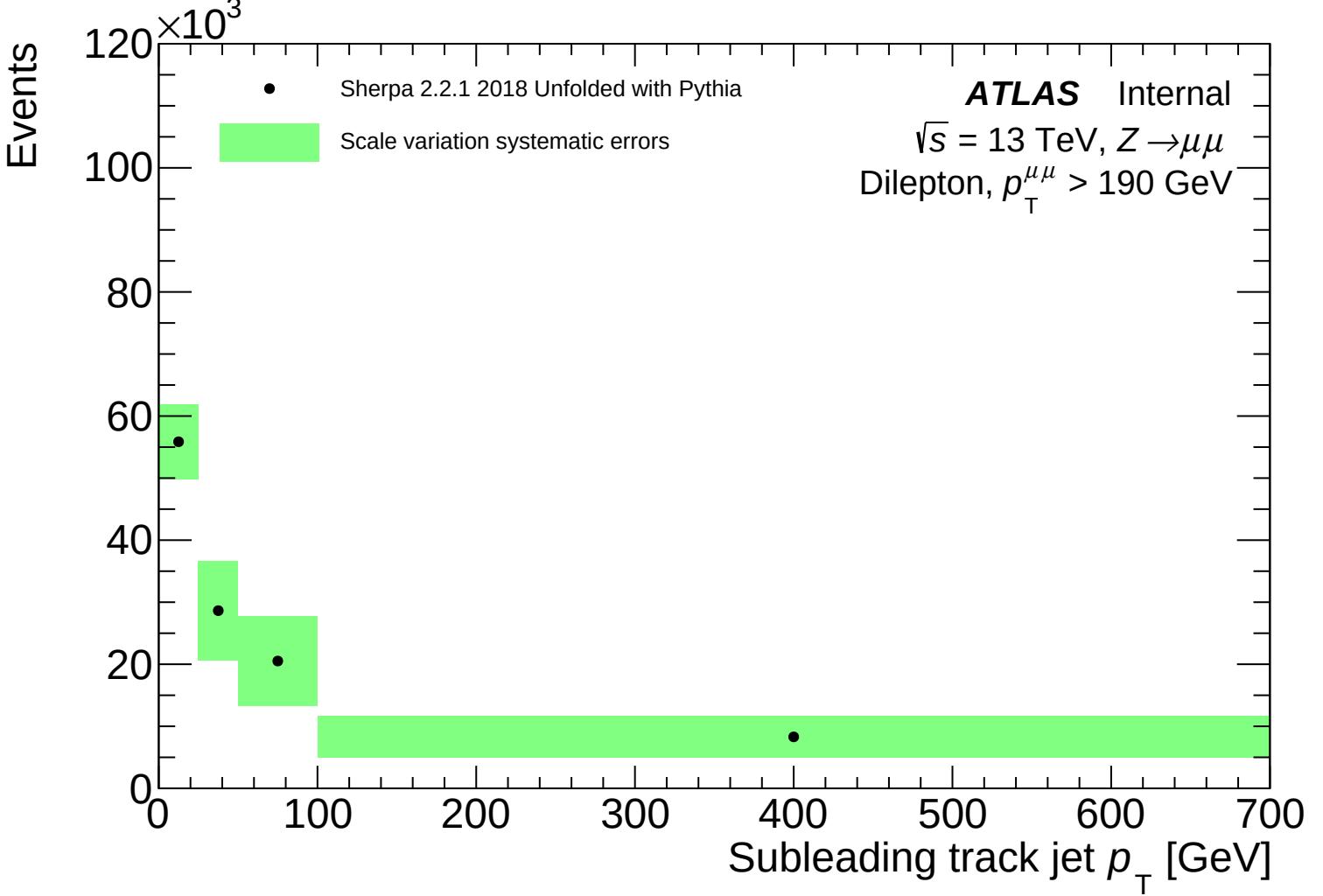
Subleading track jet p_T [GeV]


Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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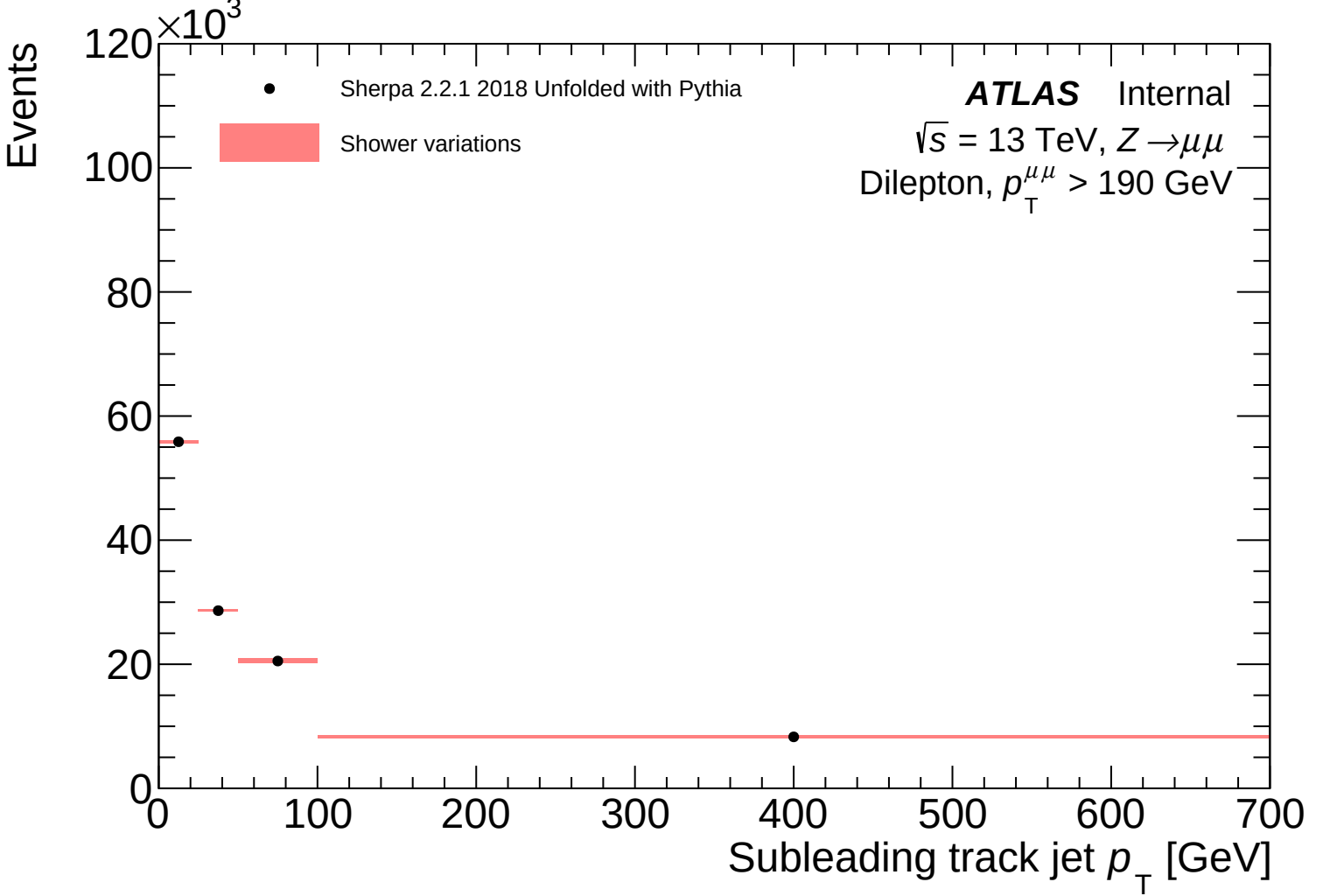
Subleading track jet p_T [GeV]


Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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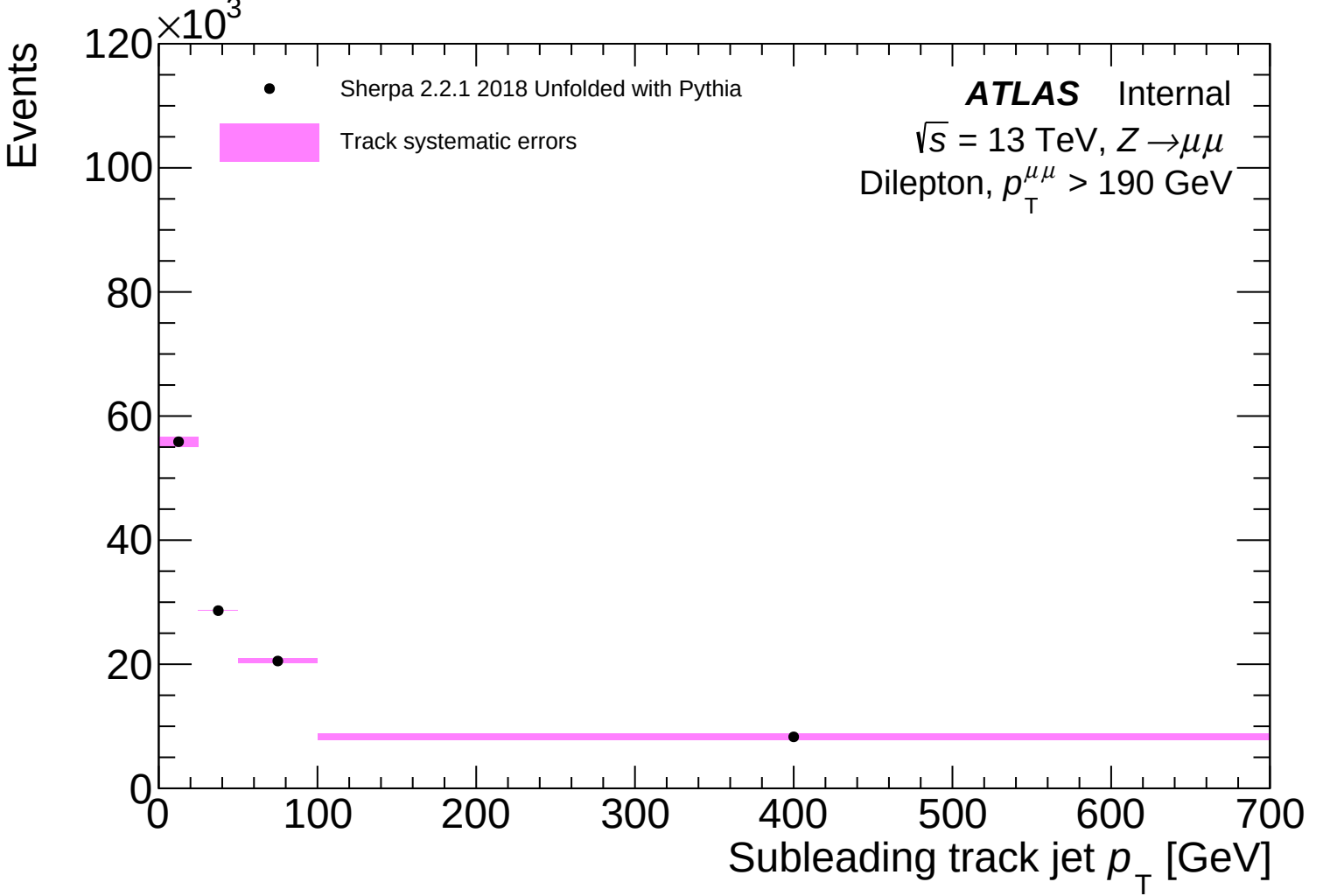
Subleading track jet p_T [GeV]


Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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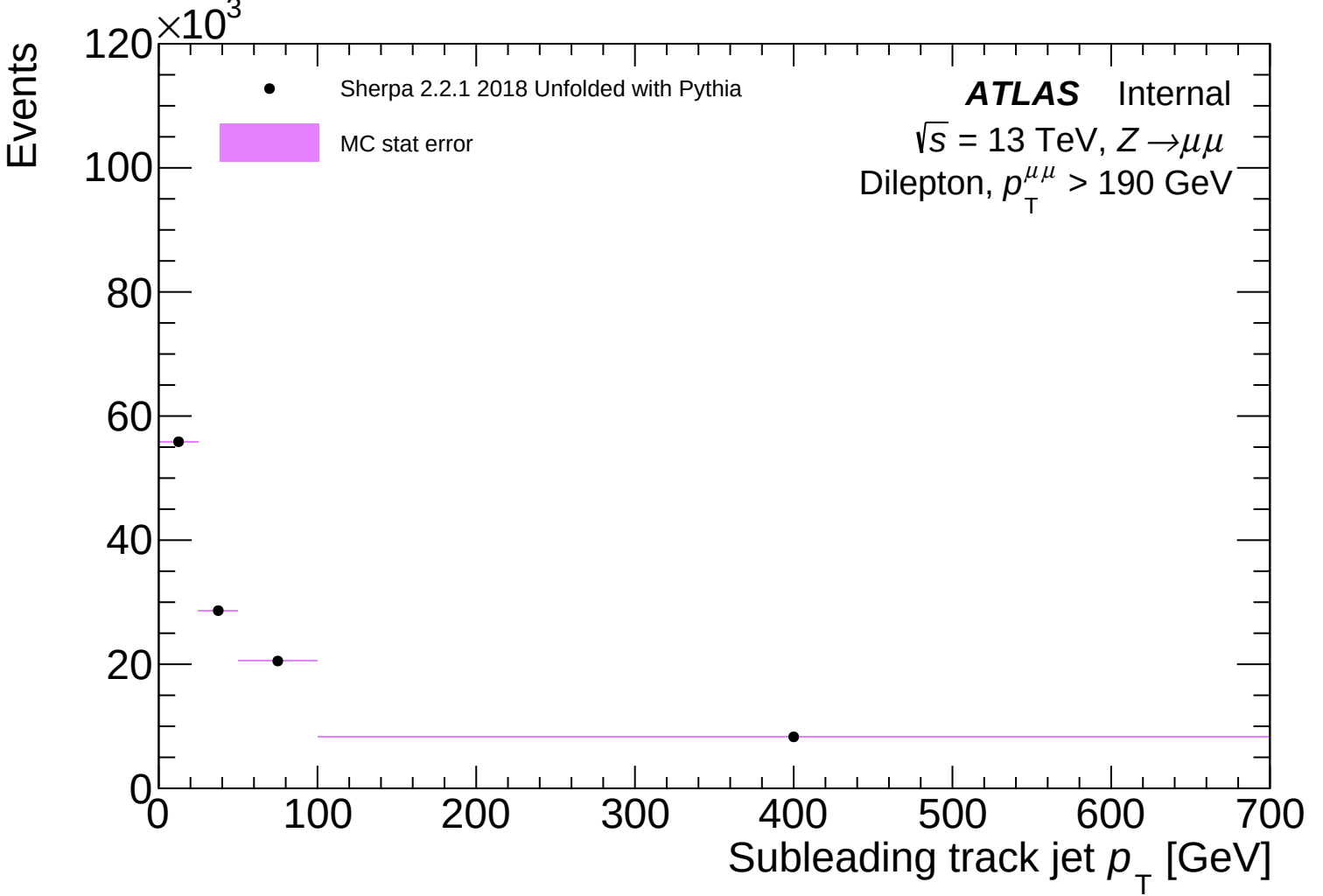
Subleading track jet p_T [GeV]


Events
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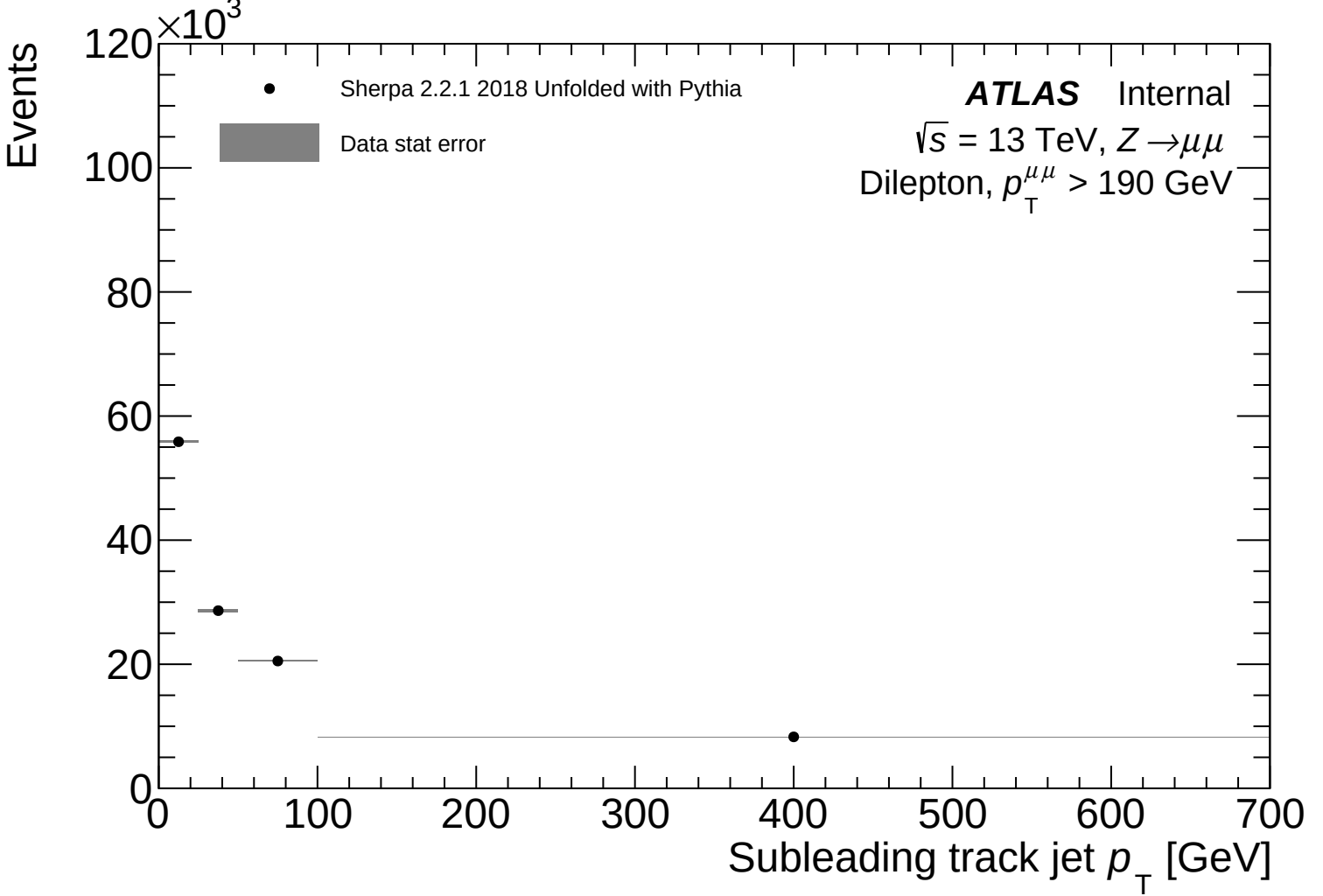
Subleading track jet p_T [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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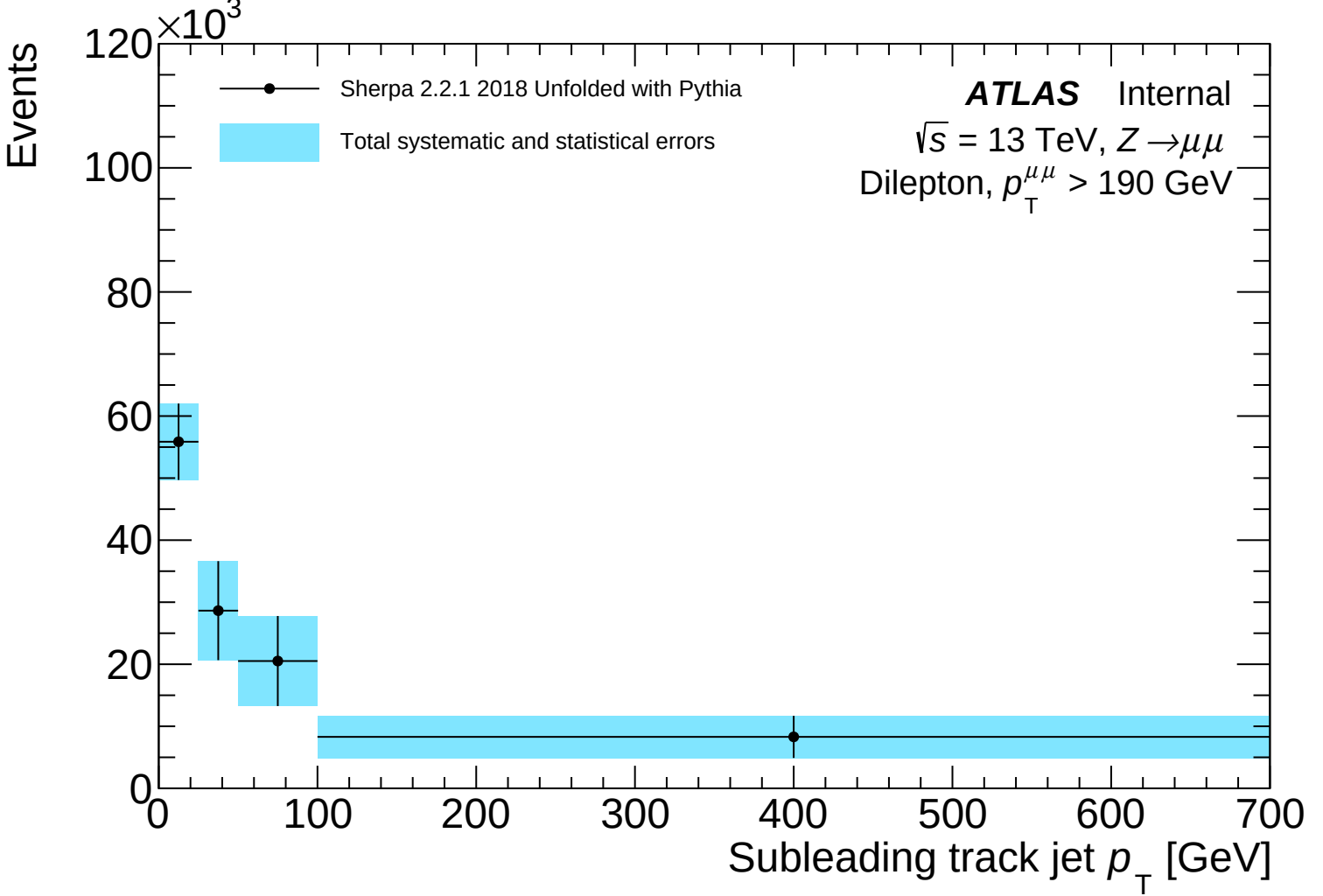
Subleading track jet p_T [GeV]


Events
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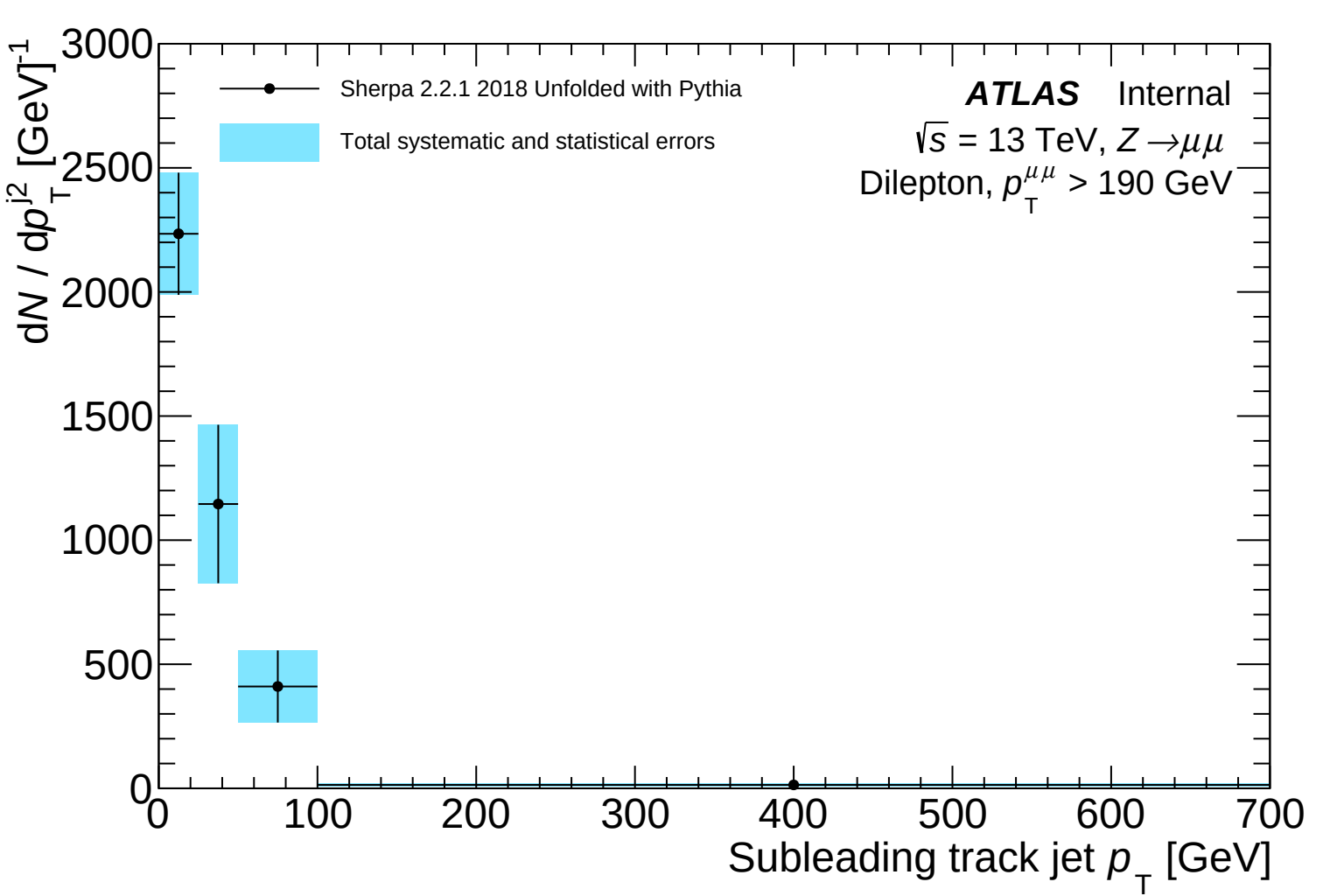
Subleading track jet p_T [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j2 [GeV]^-1
Subleading track jet p_T [GeV]
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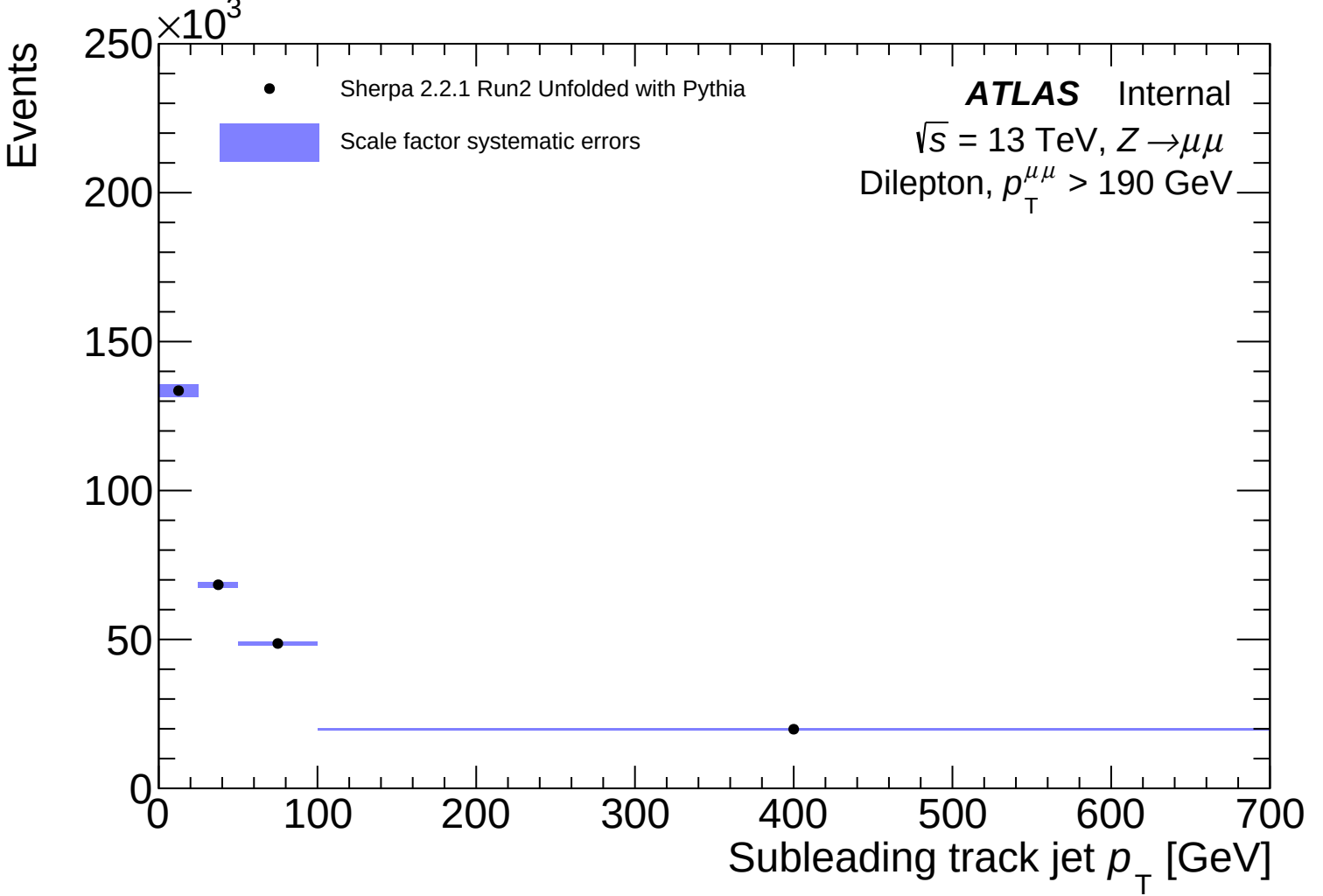
Events
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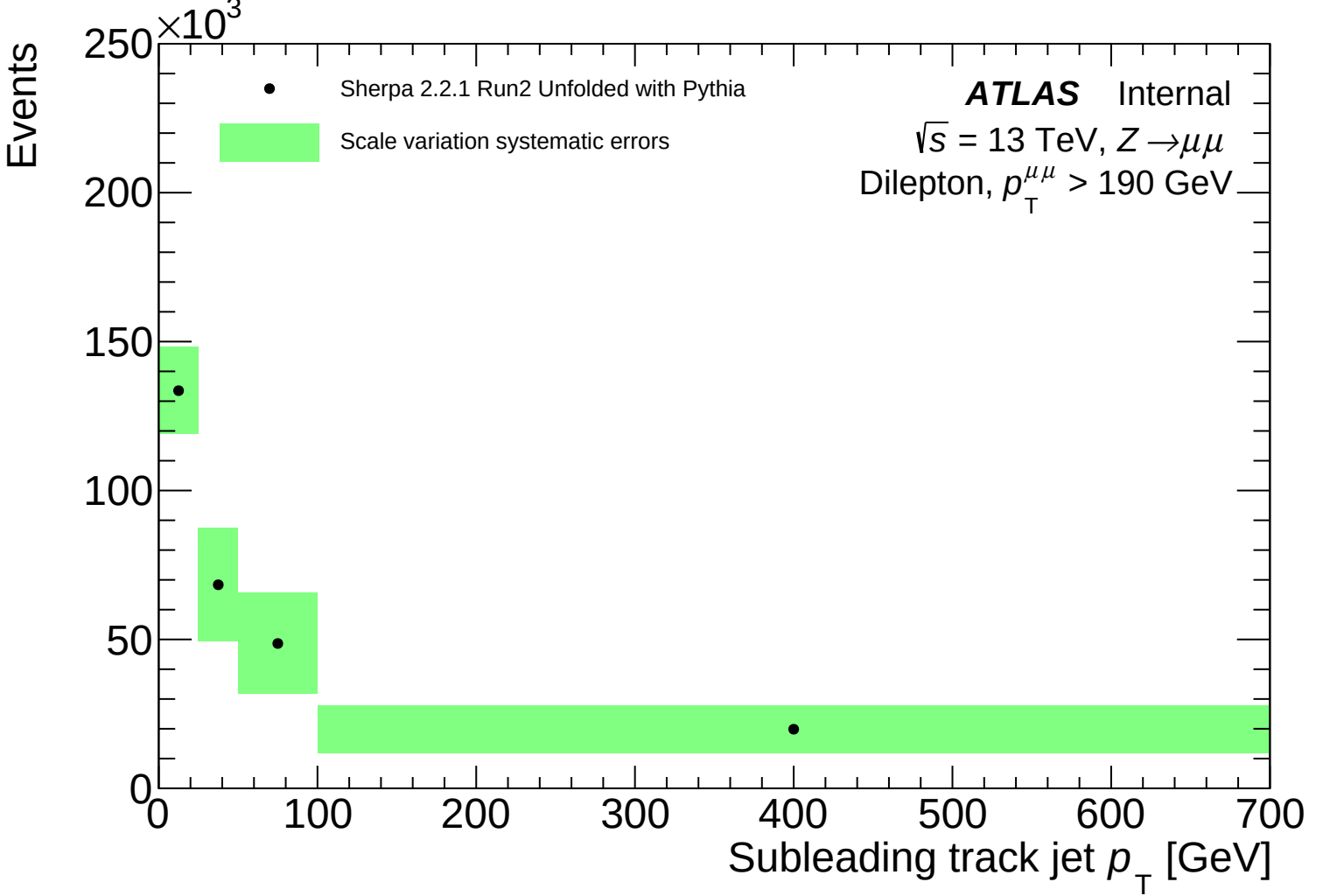
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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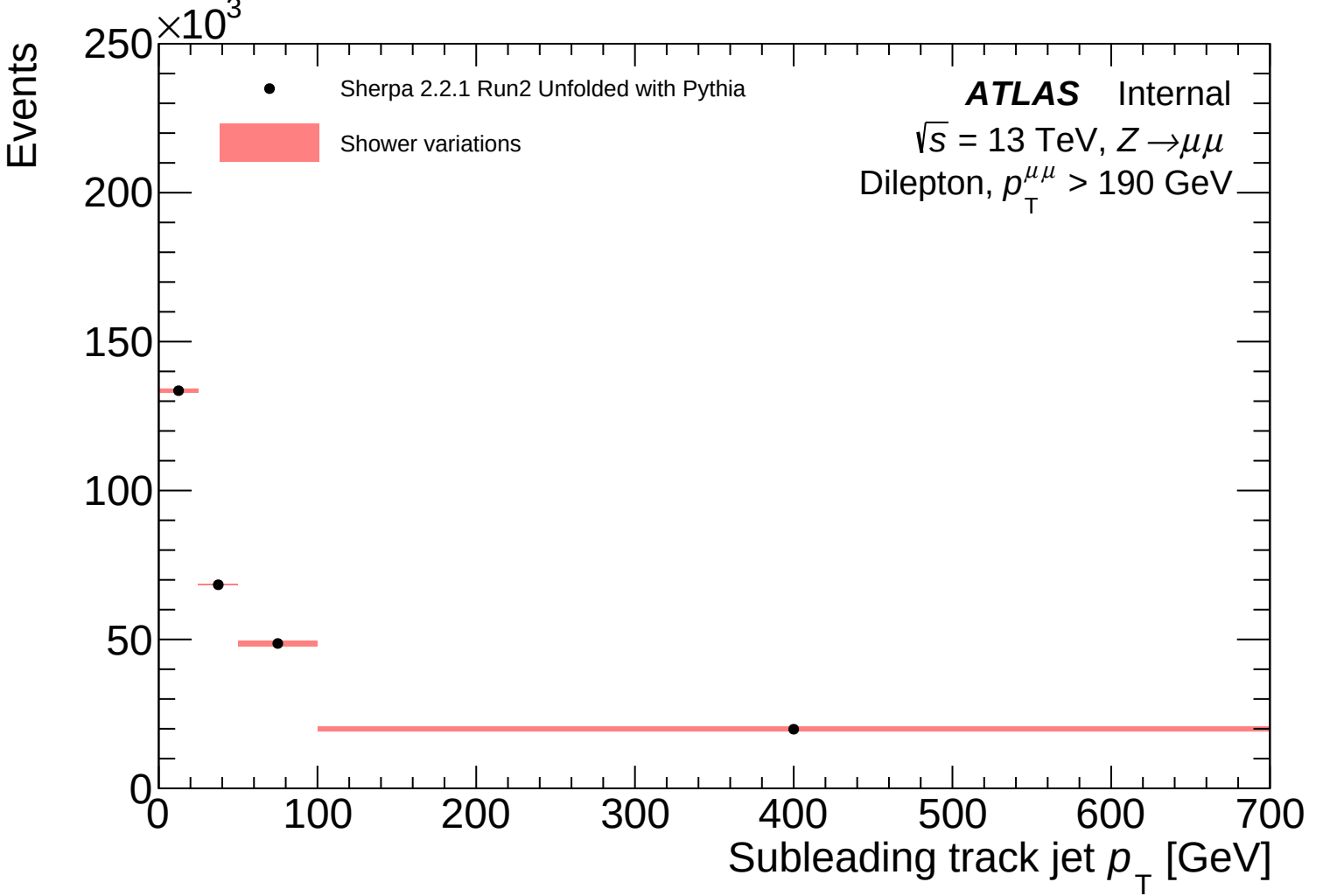
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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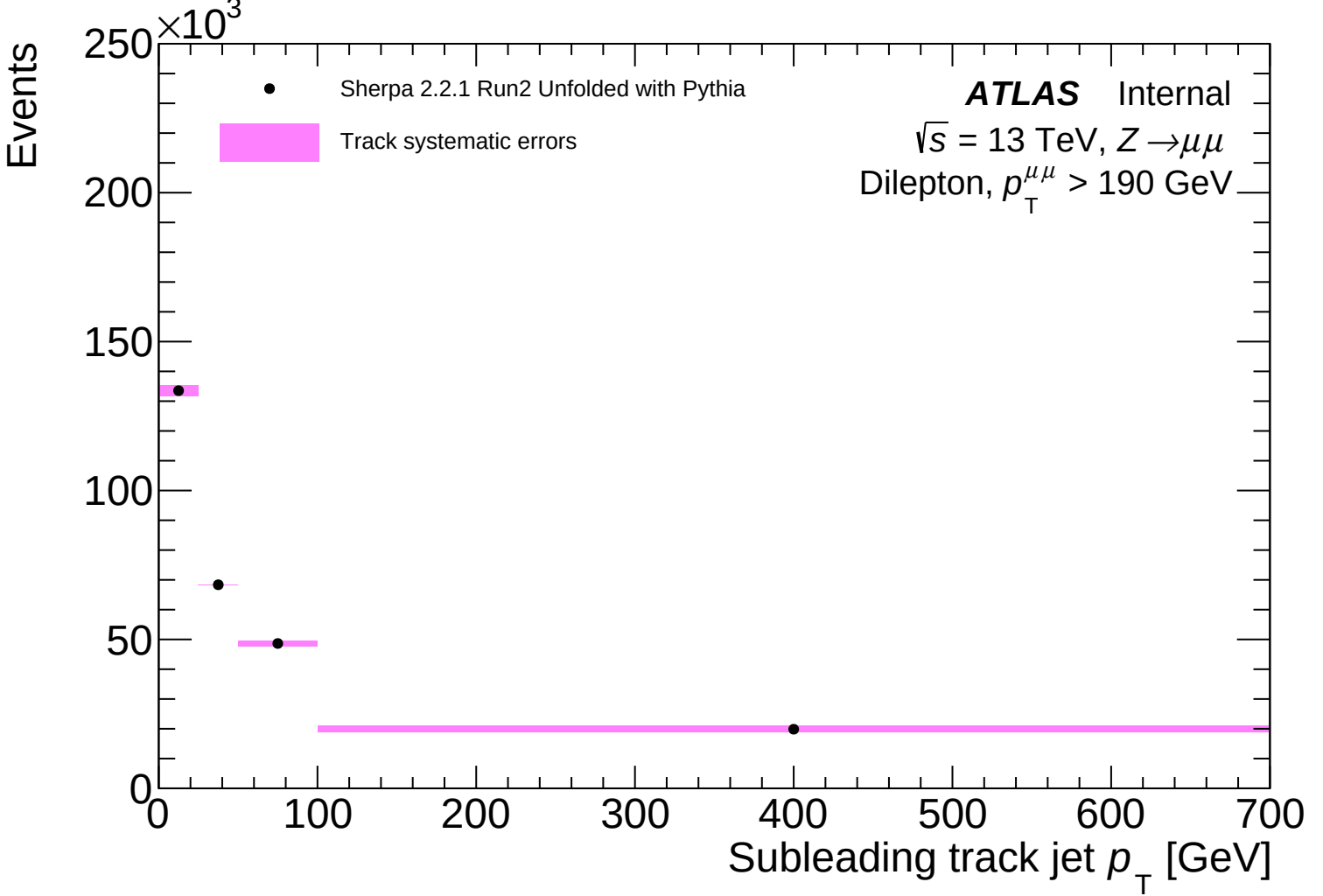
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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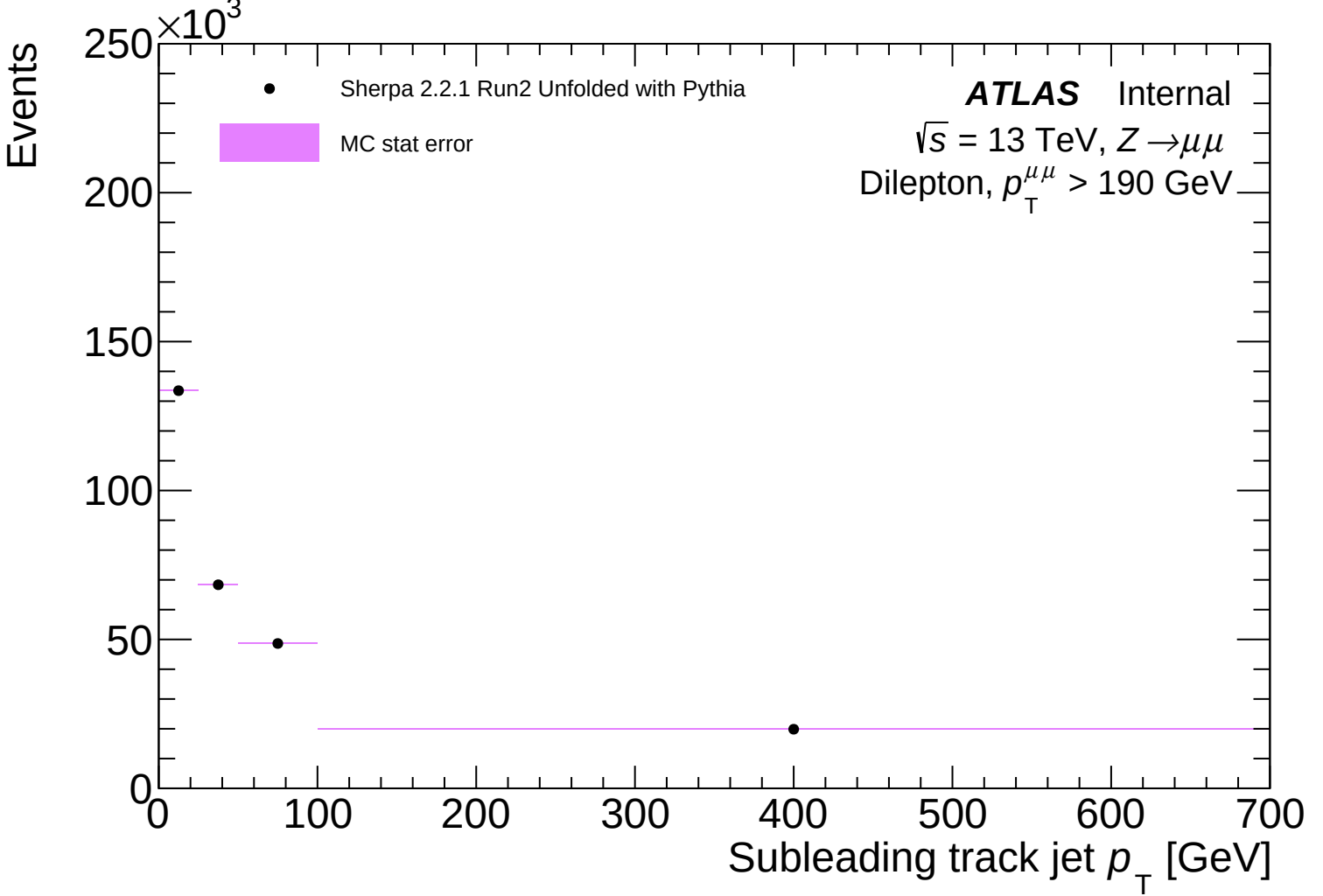
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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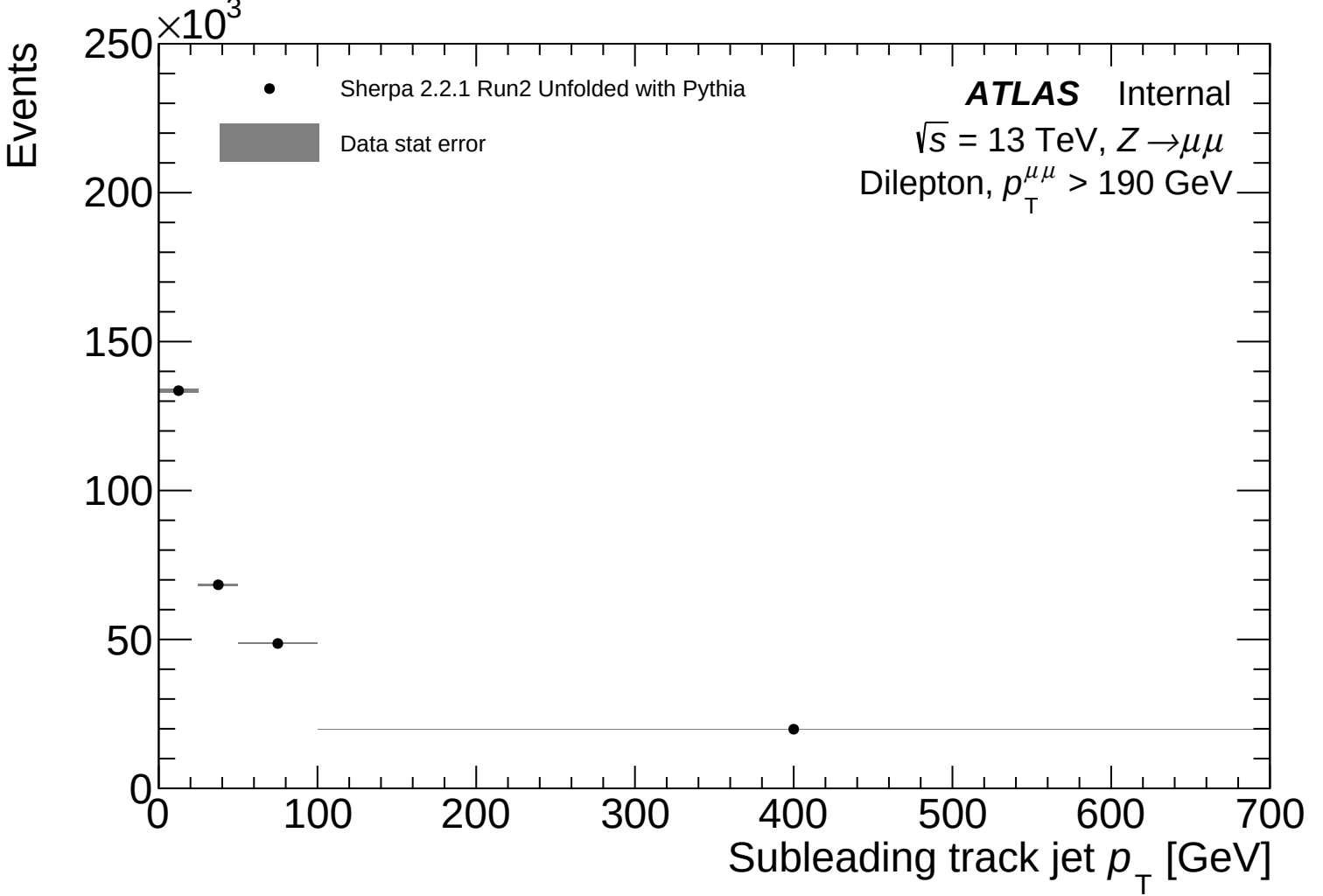
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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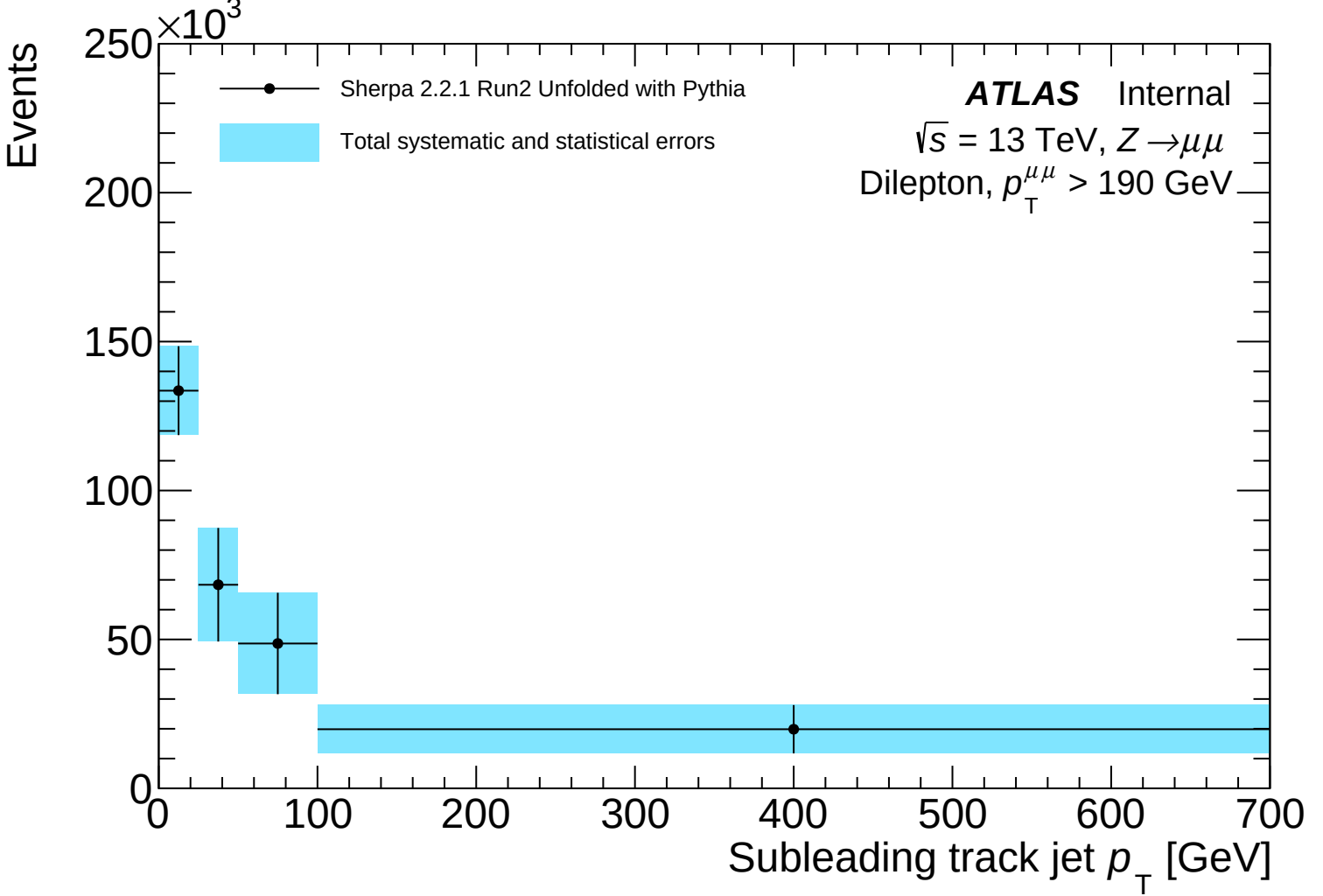
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
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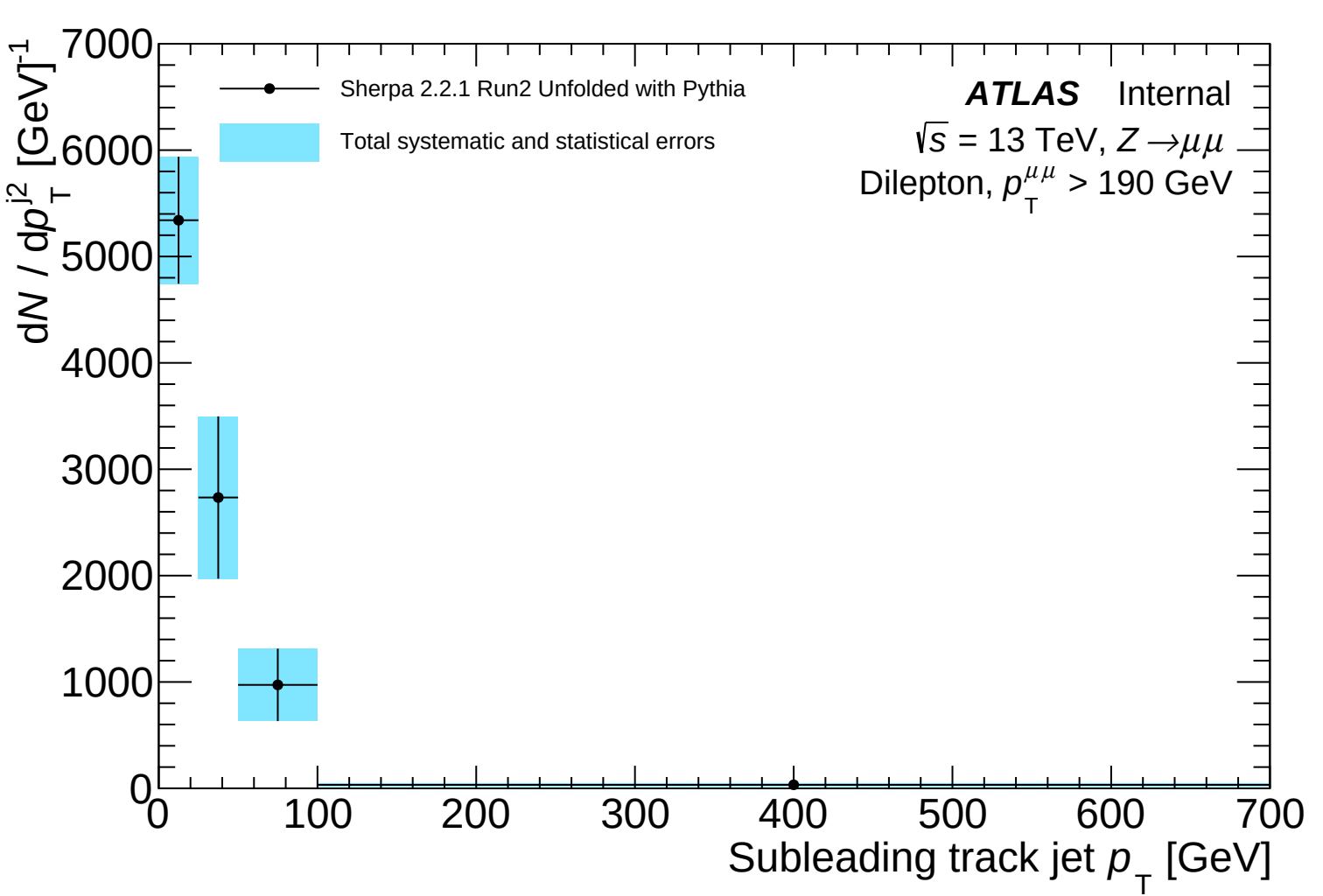
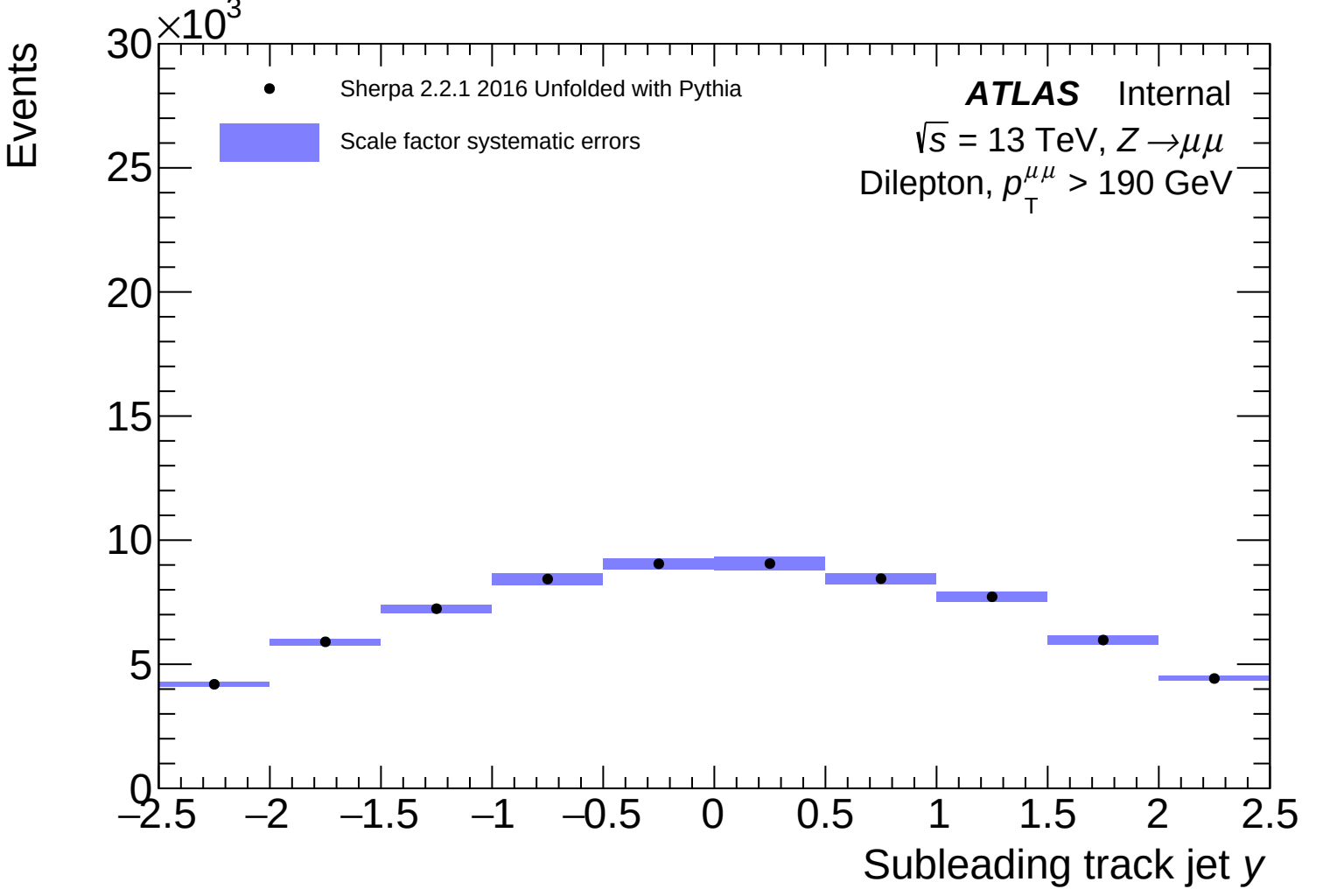
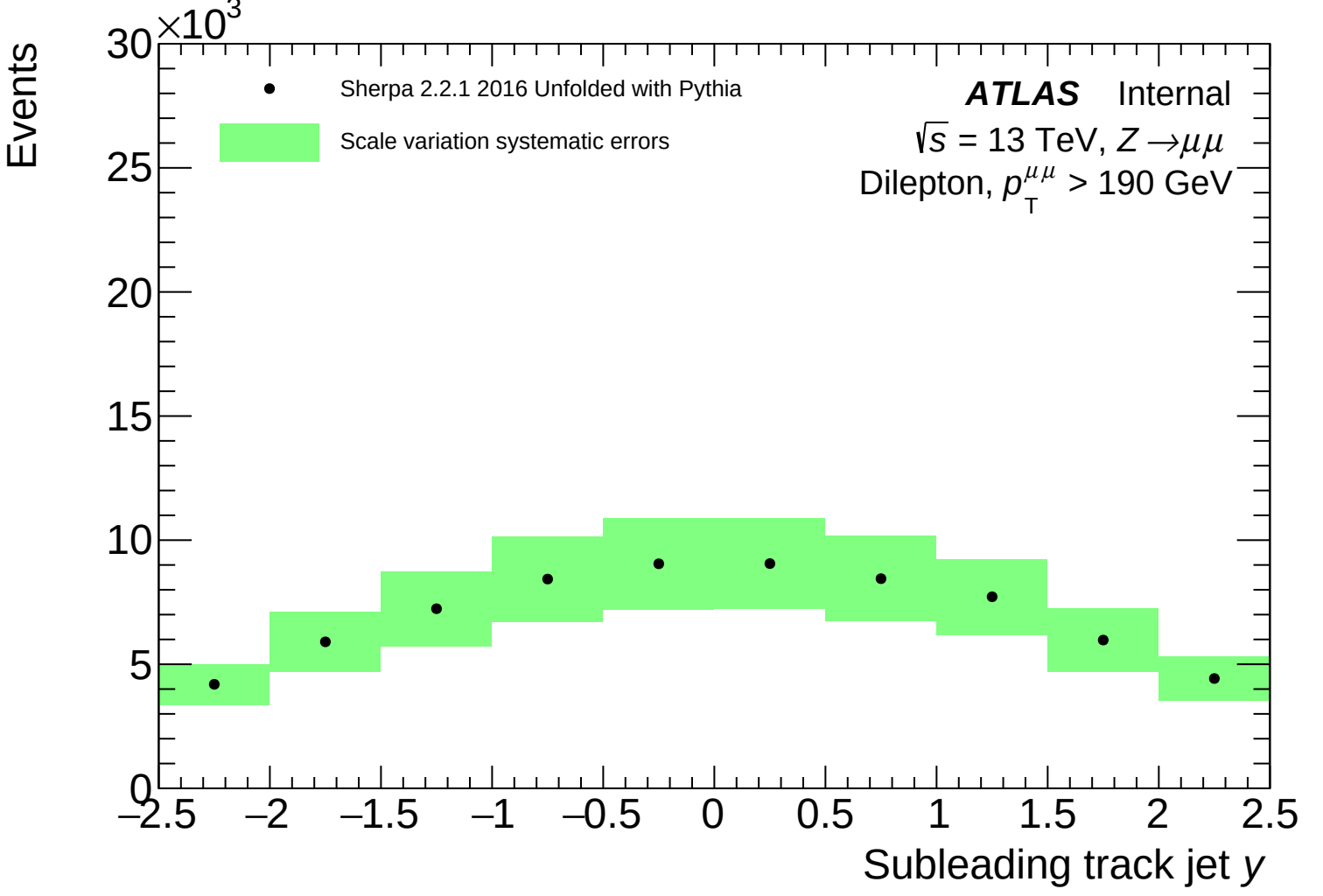
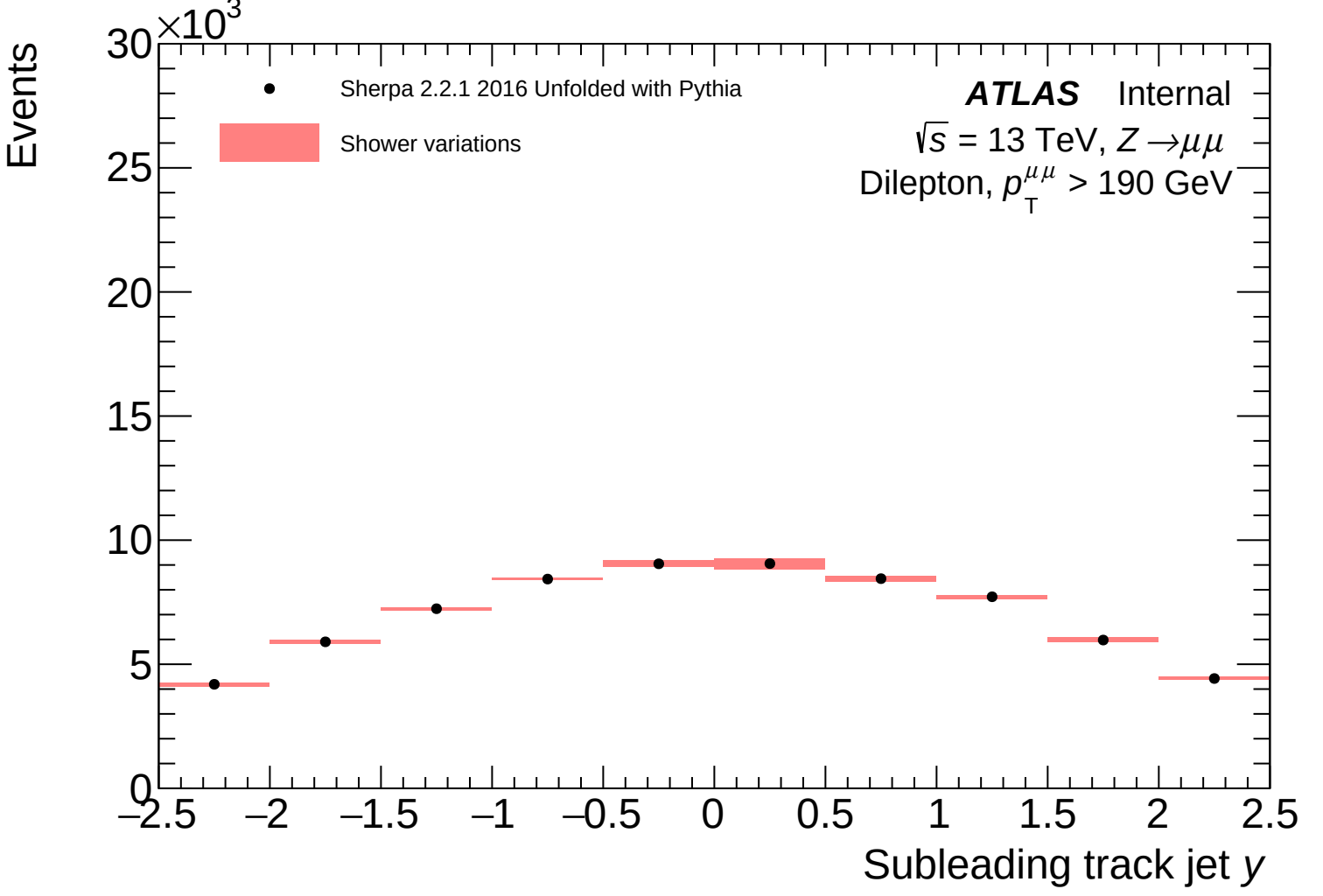
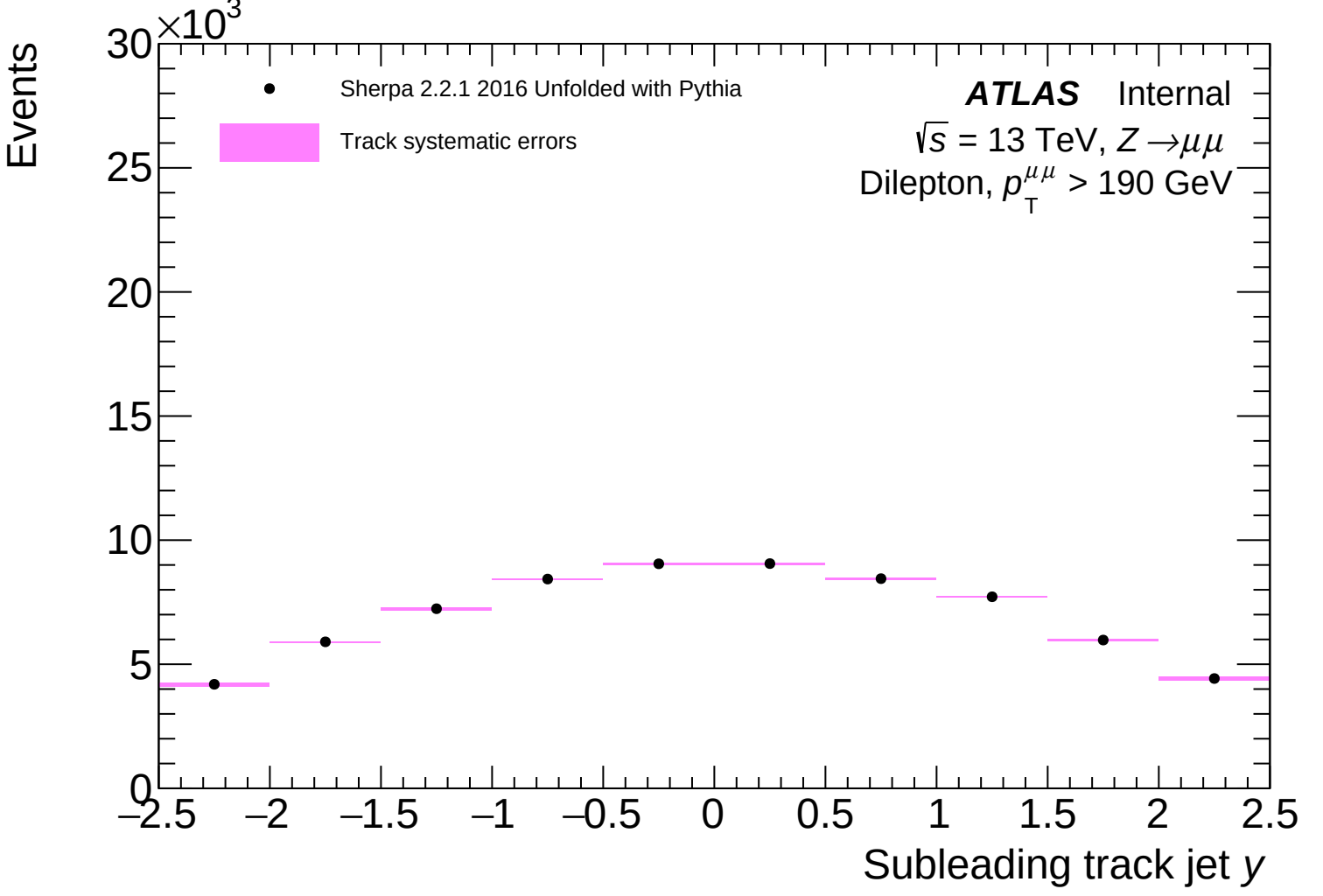
Subleading track jet p_T [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

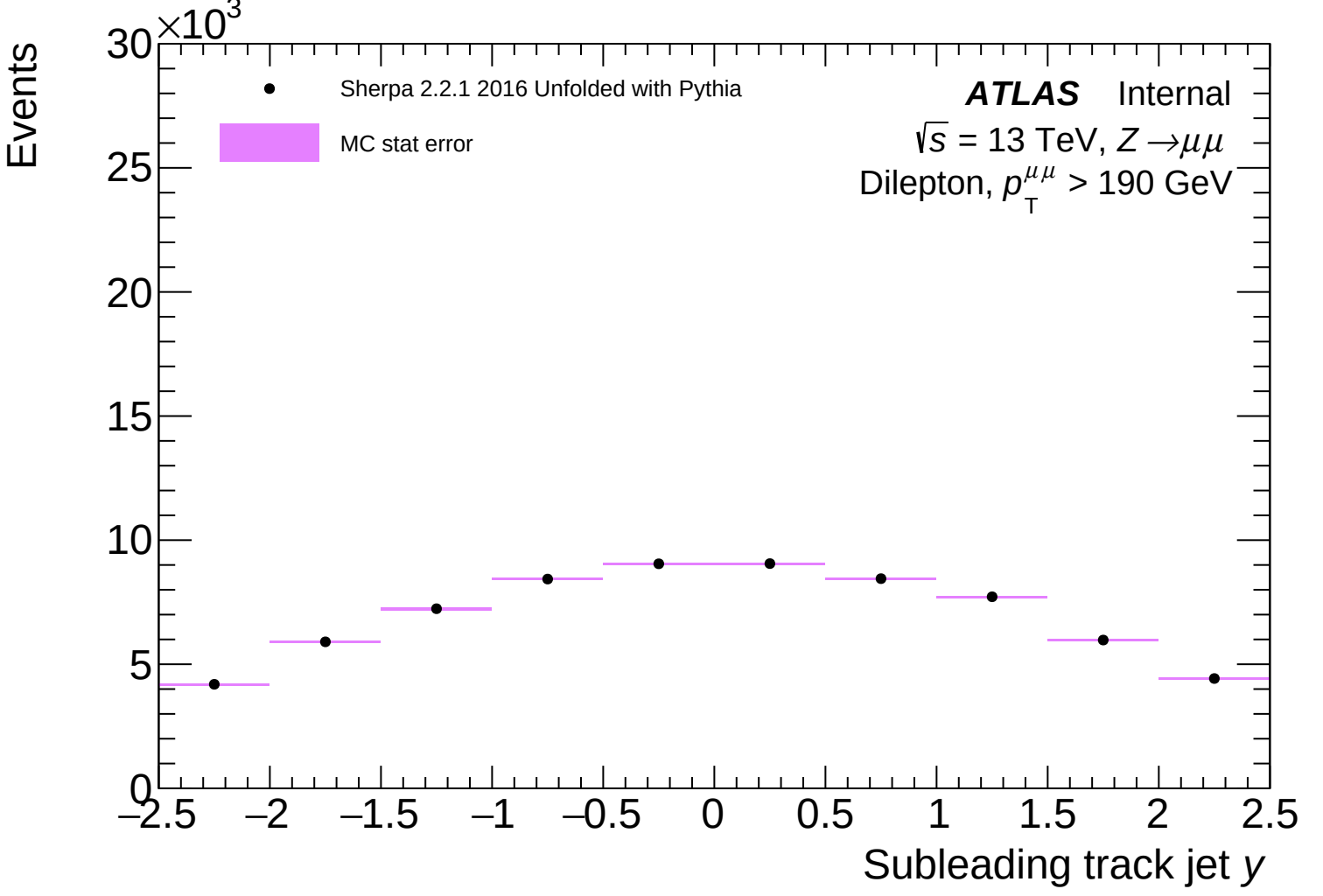

Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
dN / dp_T^j2 [GeV]^-1
Subleading track jet p_T [GeV]
0
1000
2000
3000
4000
5000
6000
7000
0
100
200
300
400
500
600
700

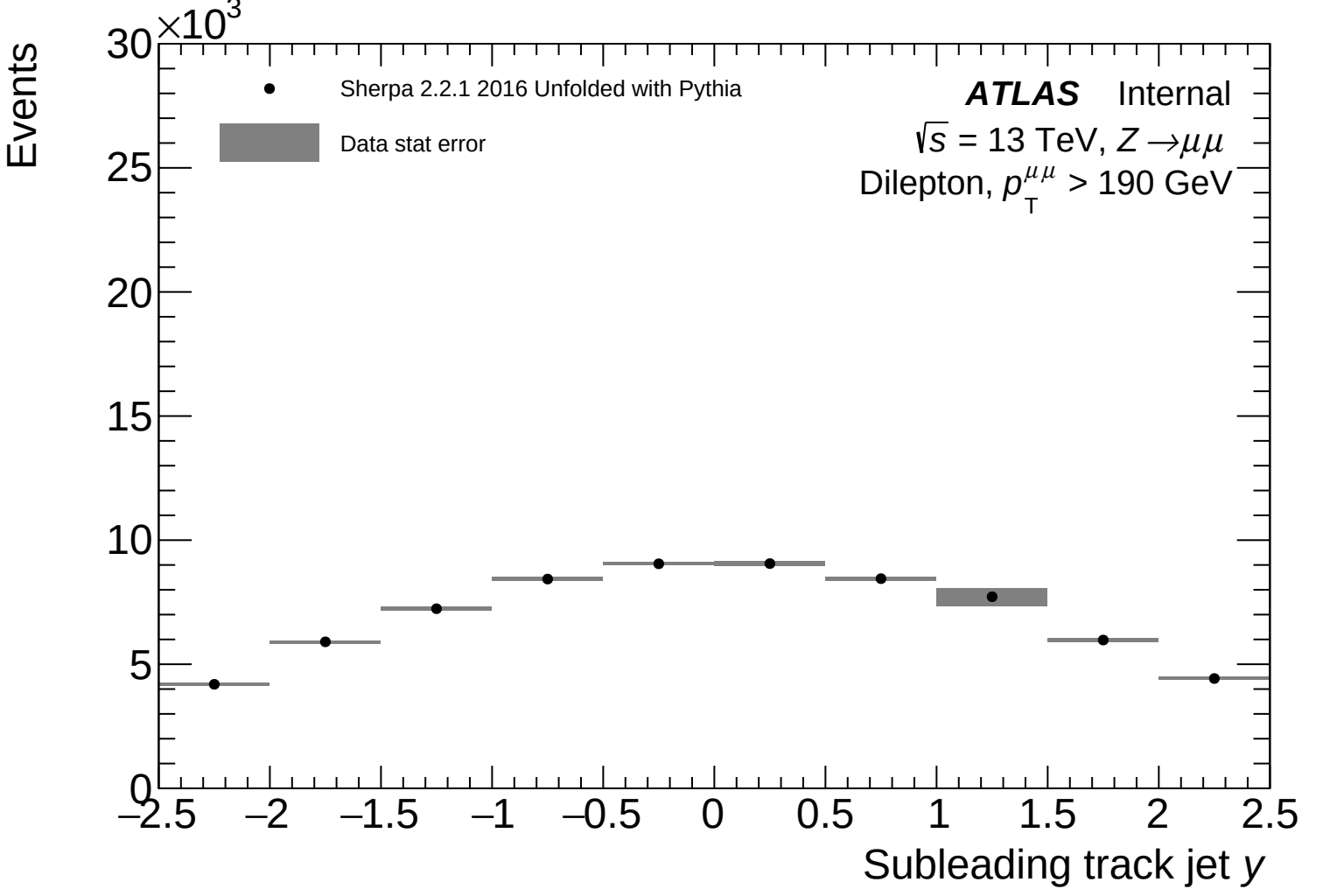

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

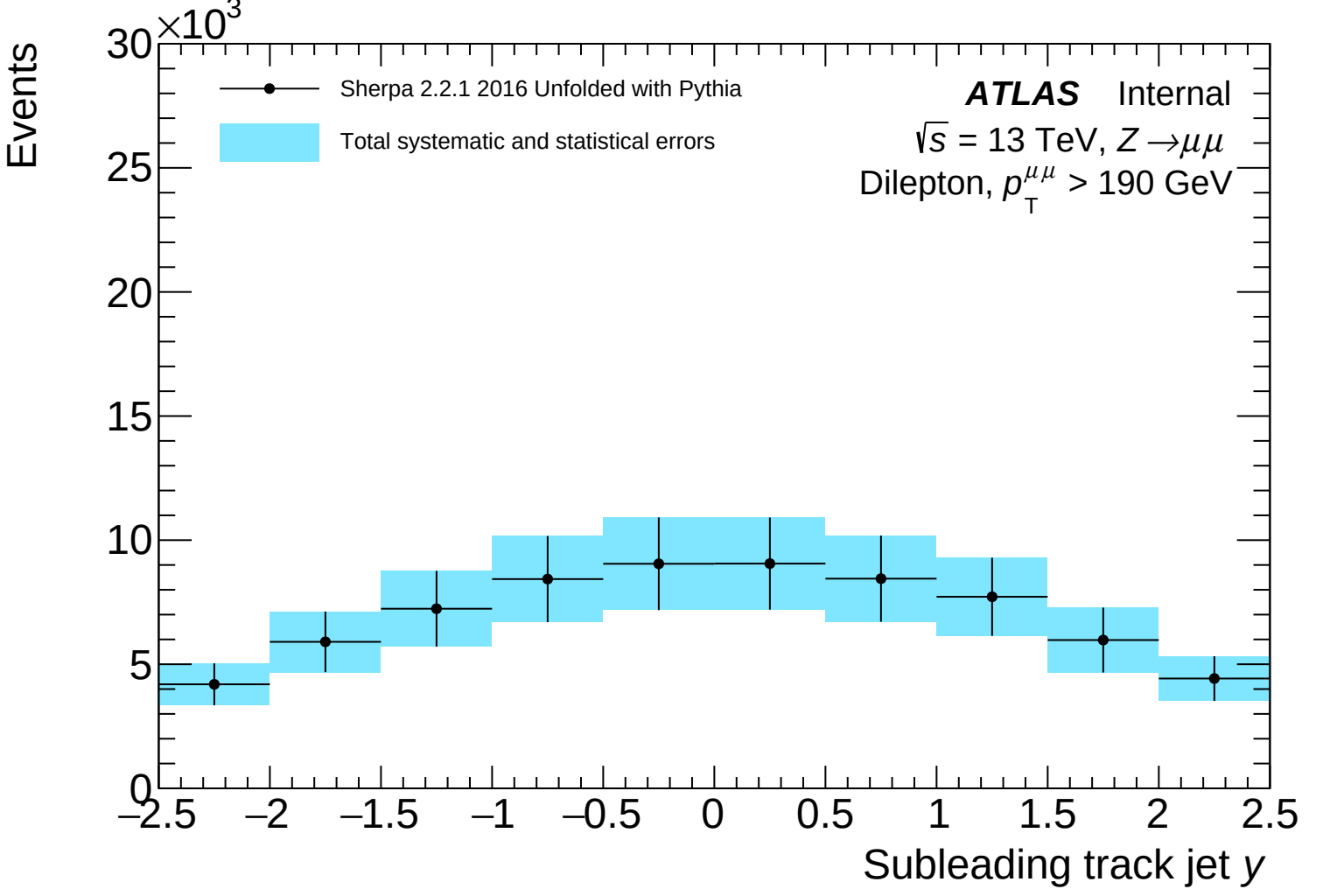

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

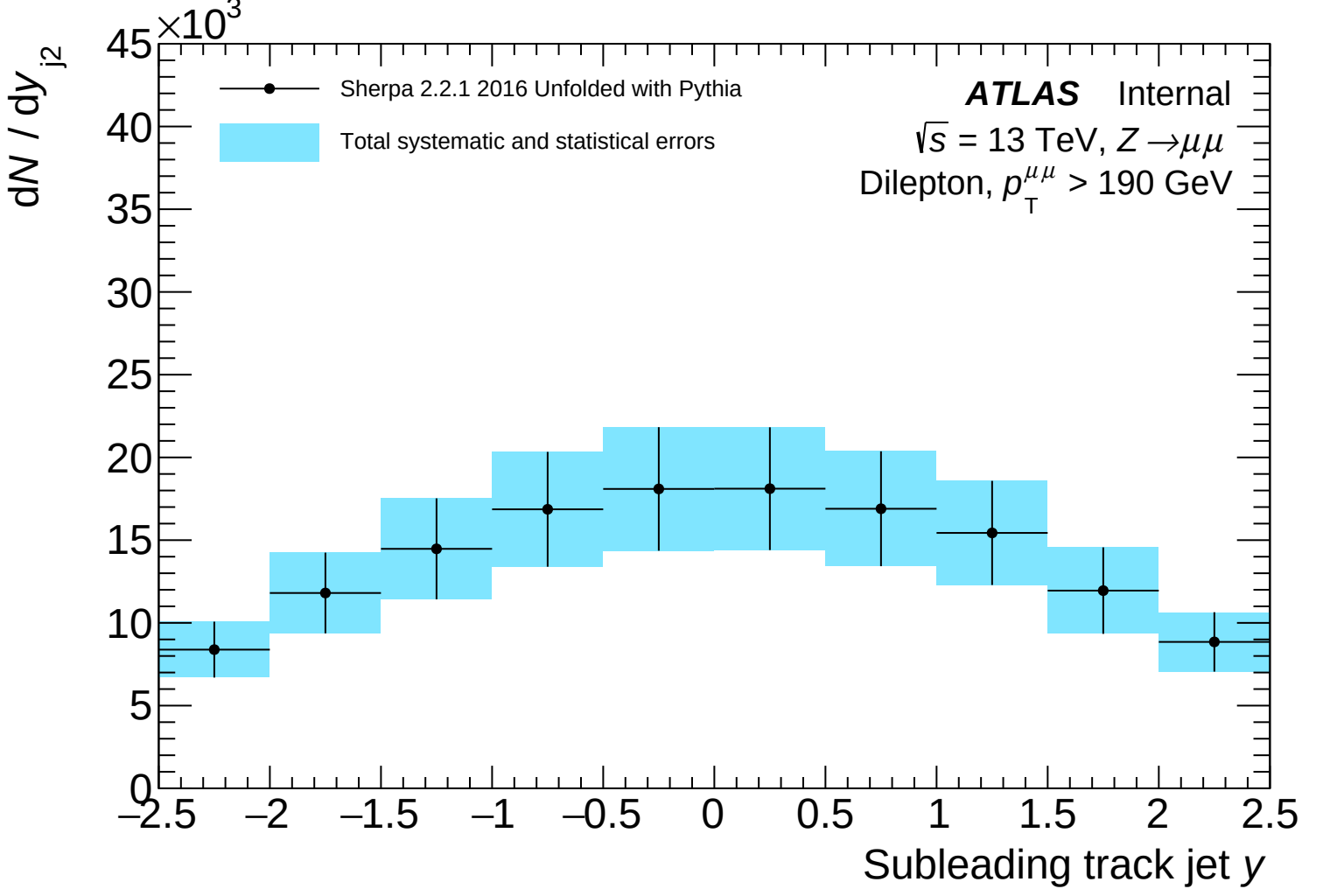

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

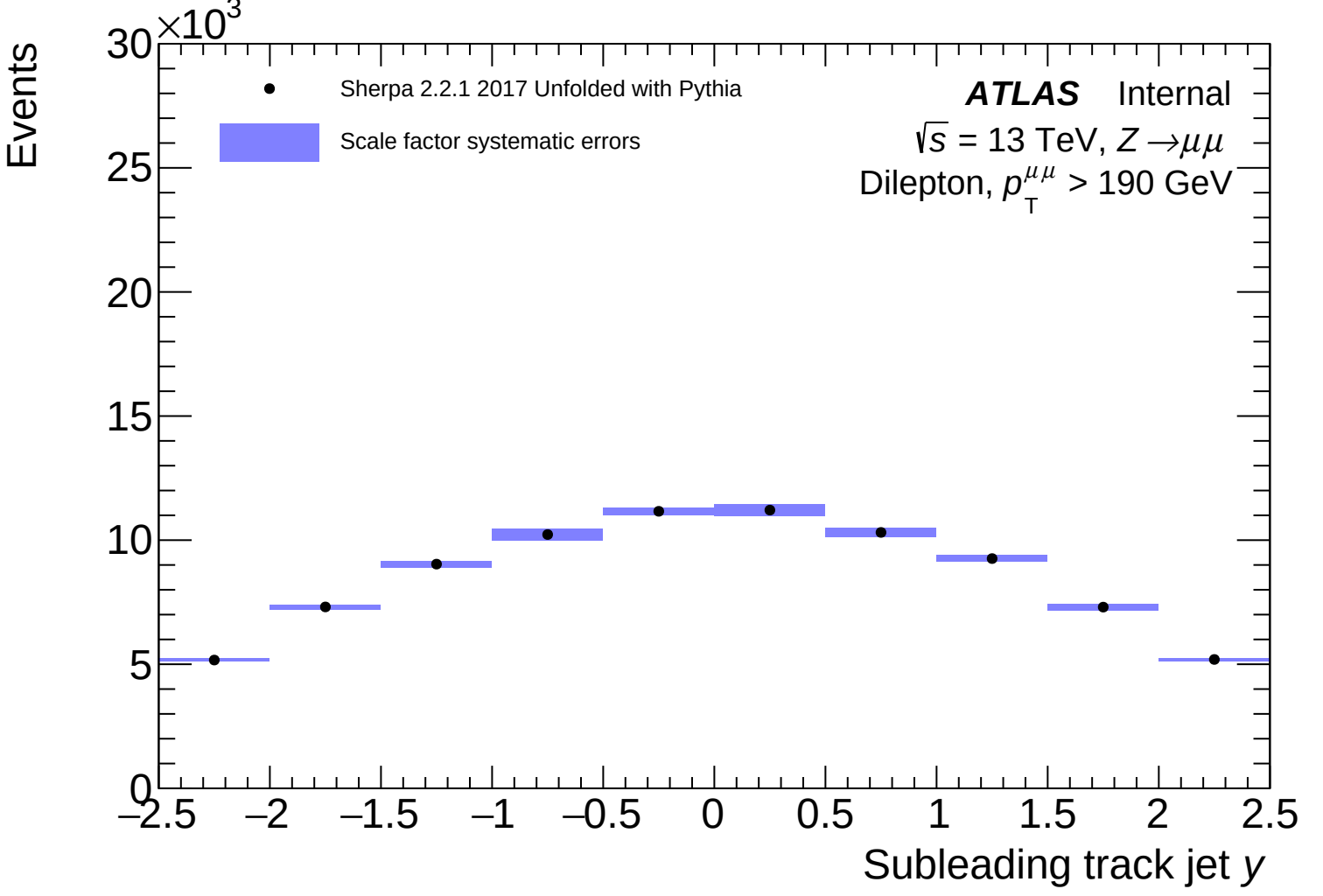

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

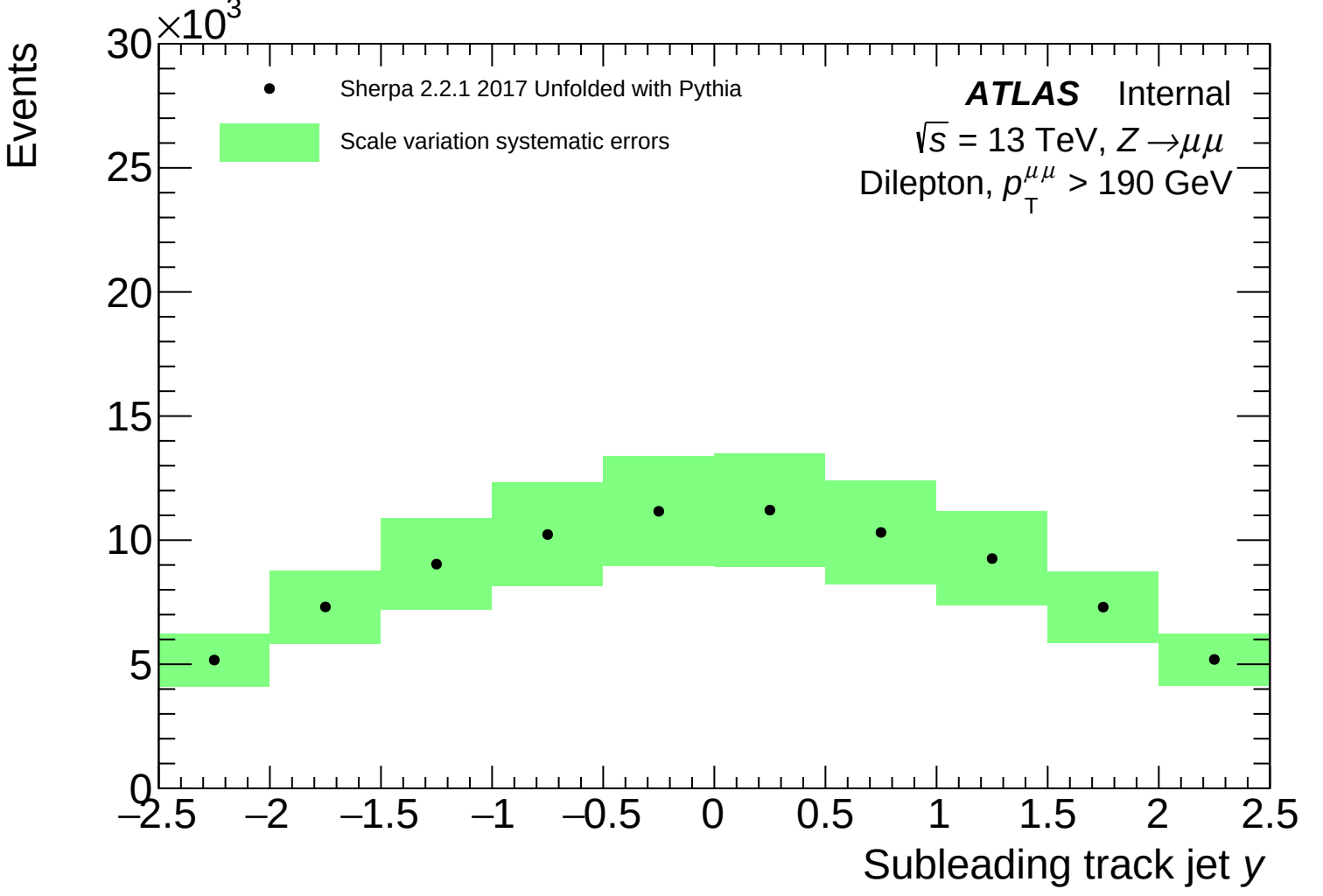

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

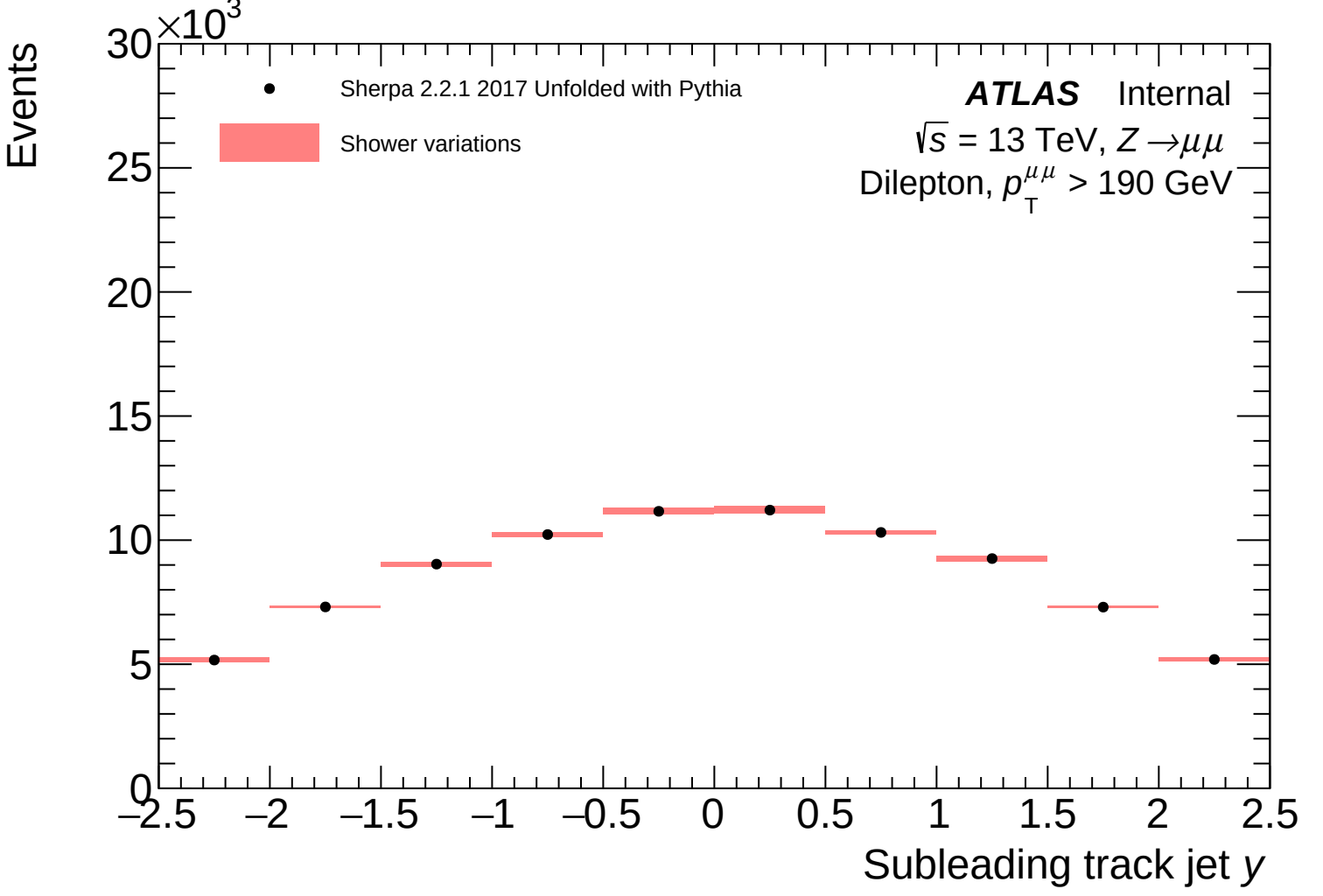

Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

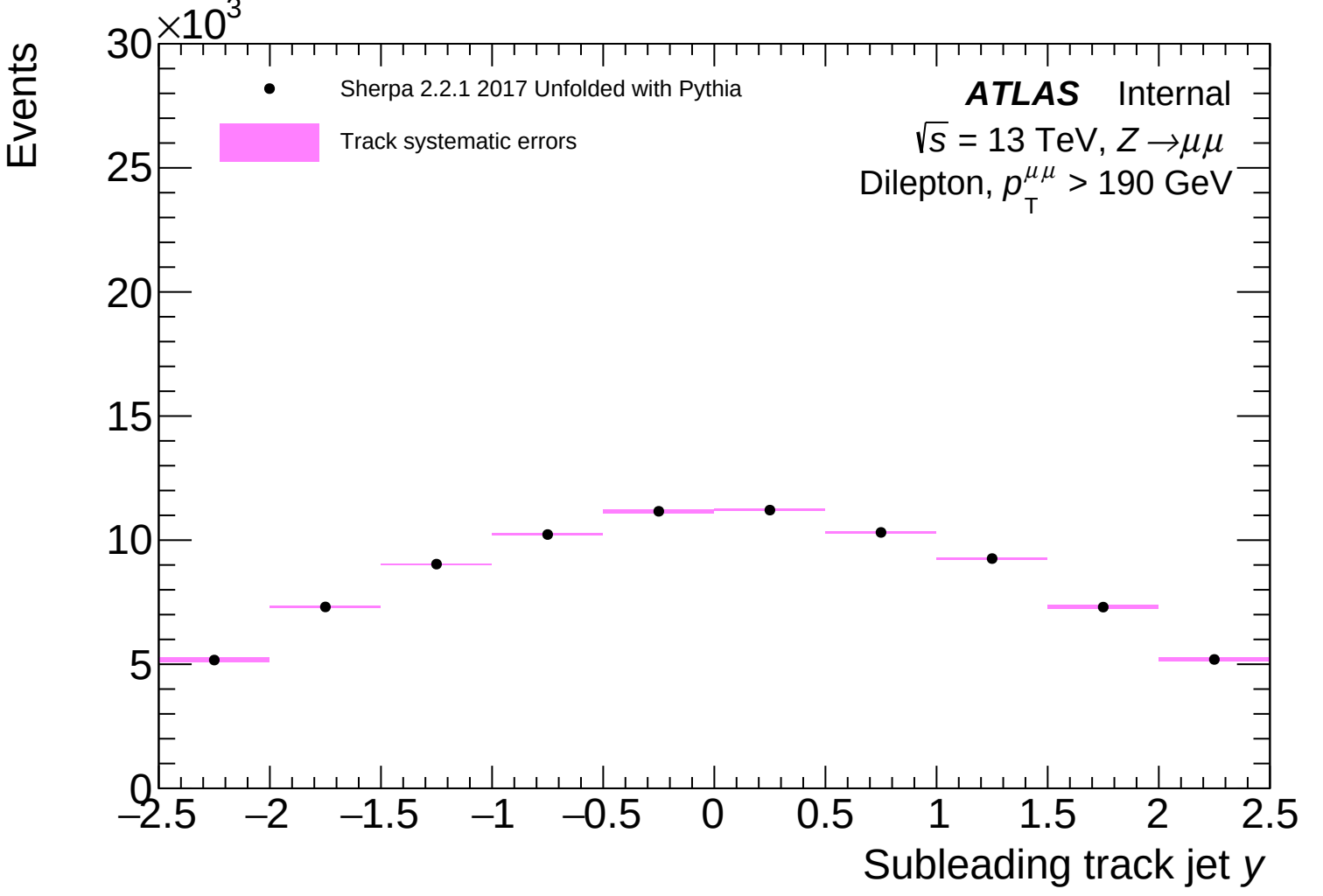

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

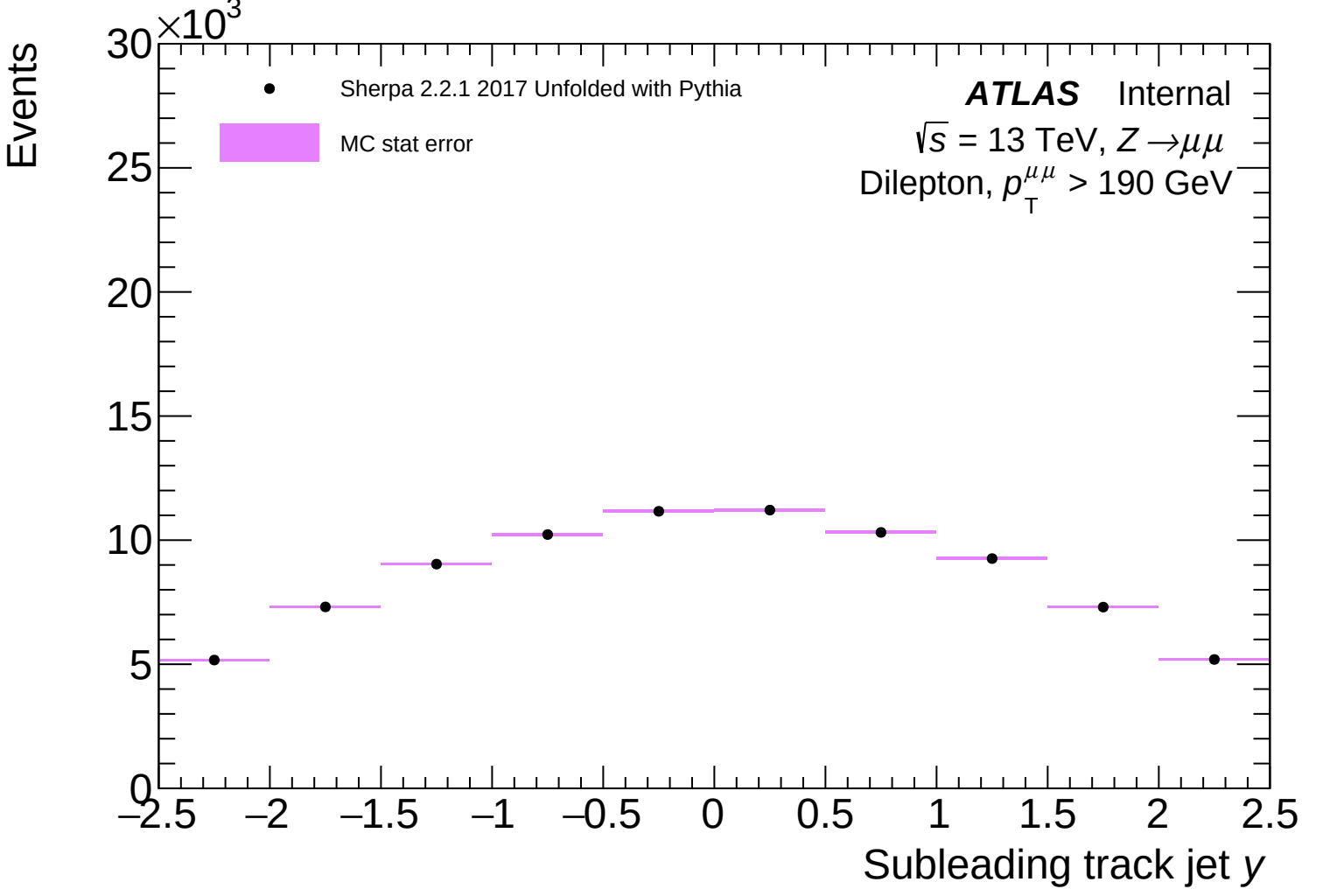

×10^3
45
40
35
30
25
20
15
10
5
0
dN / dy_j2
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

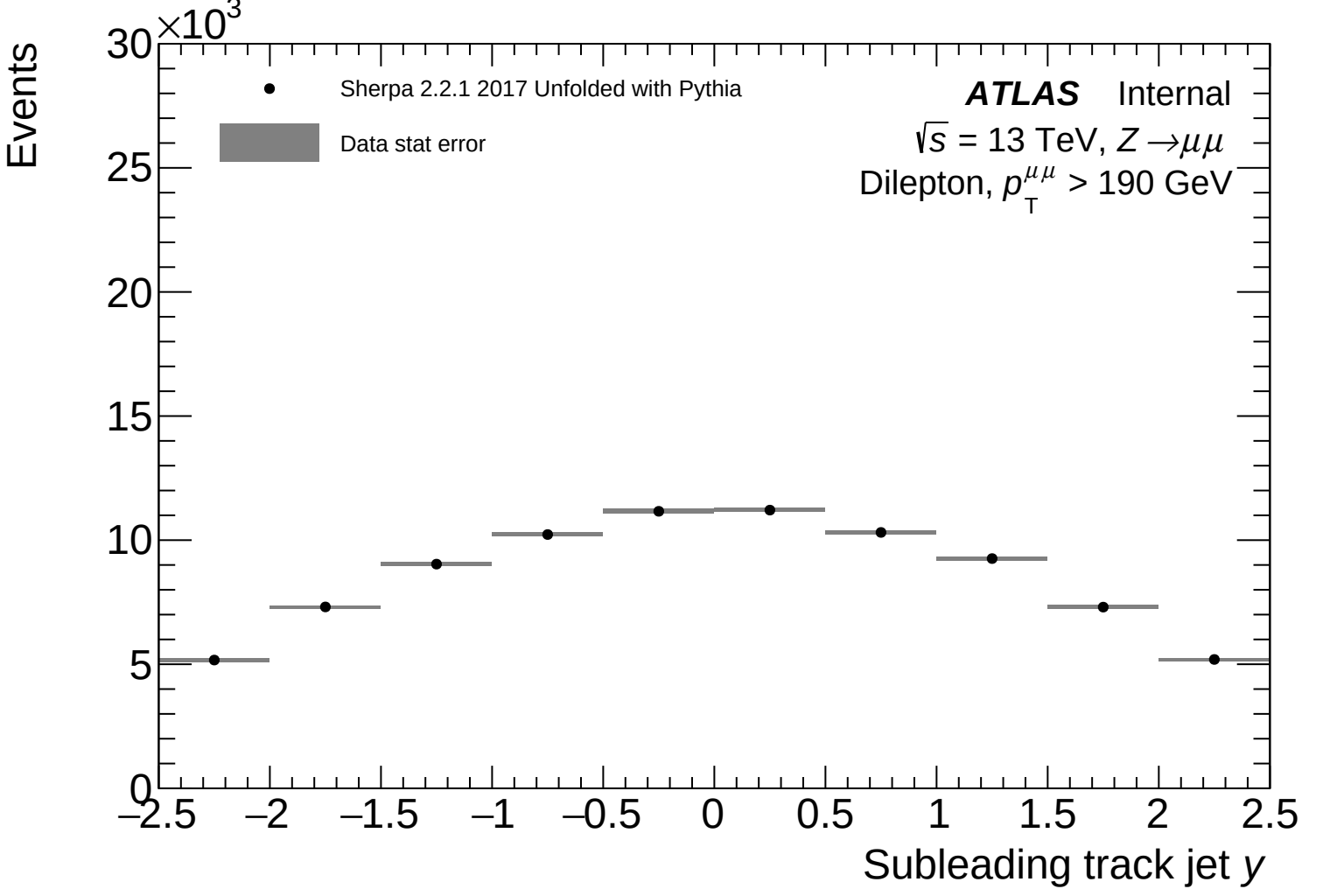

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

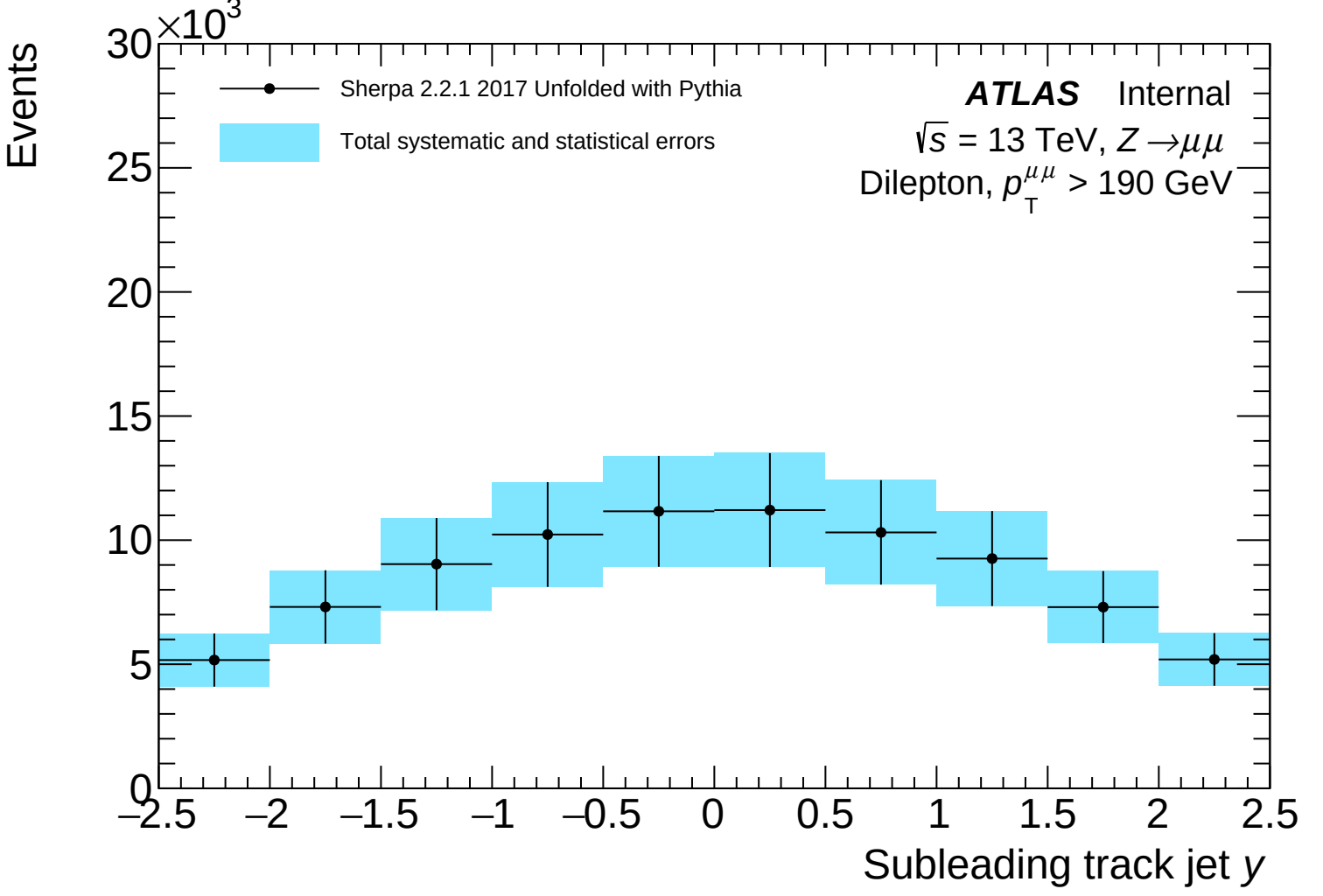

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

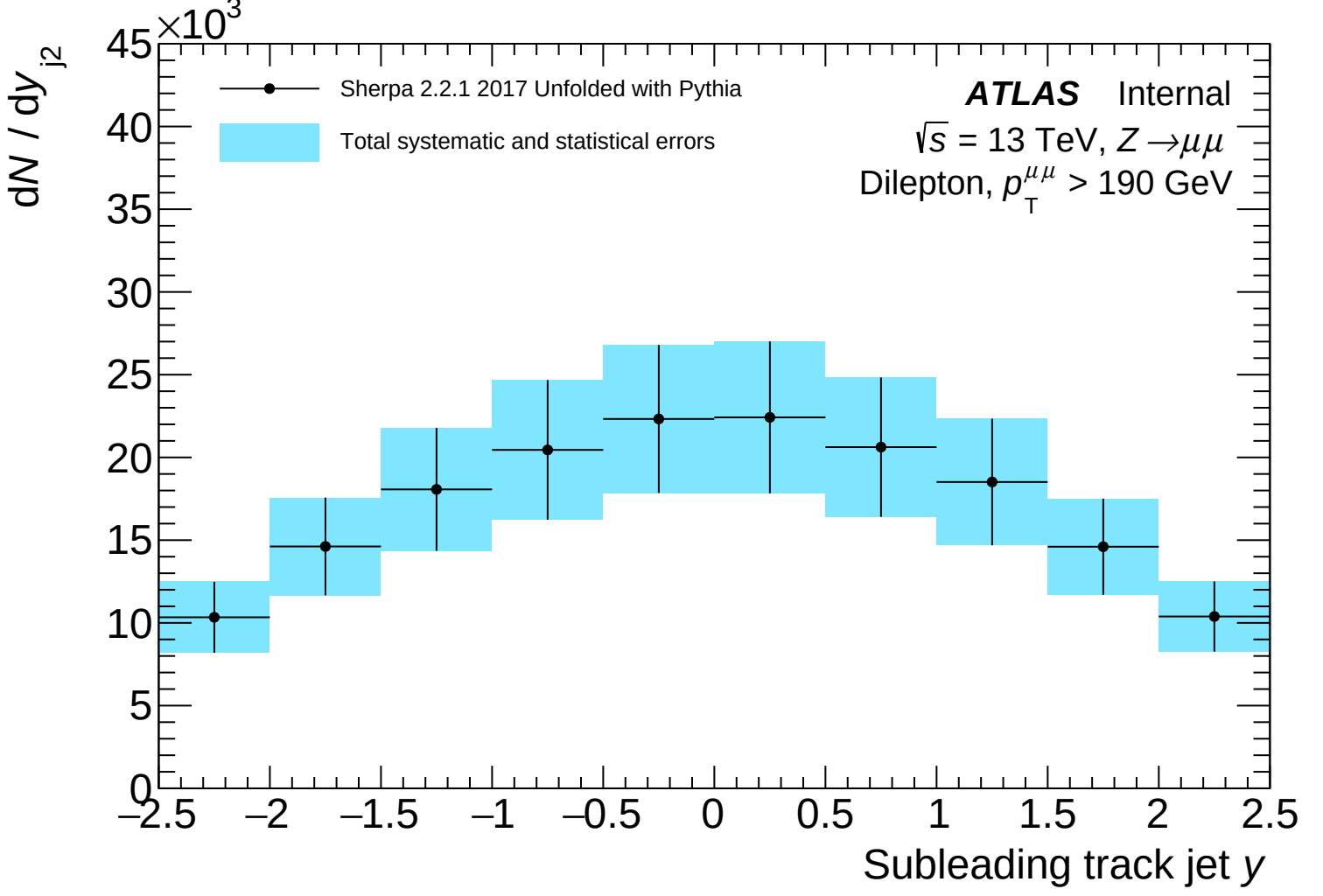

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

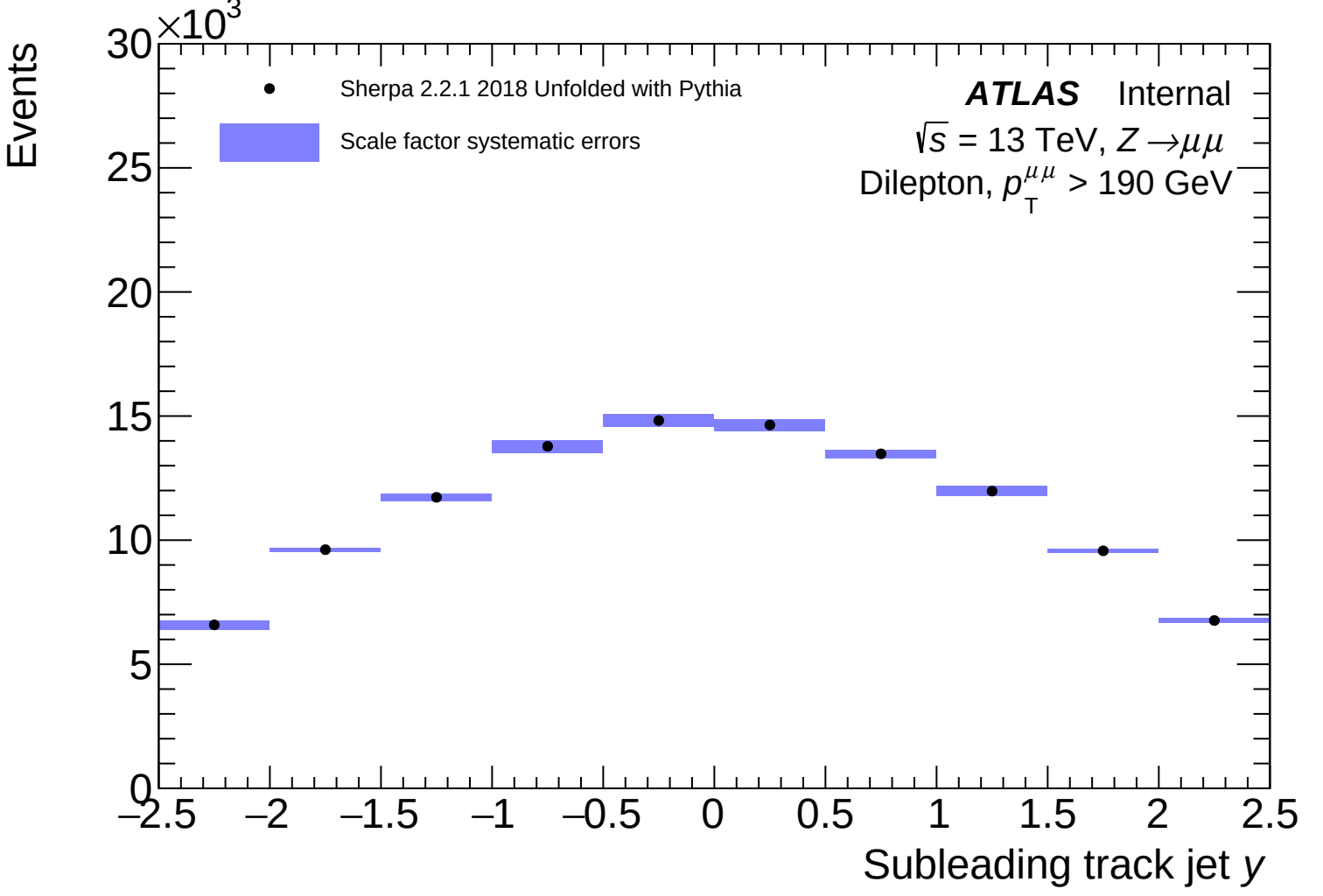

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

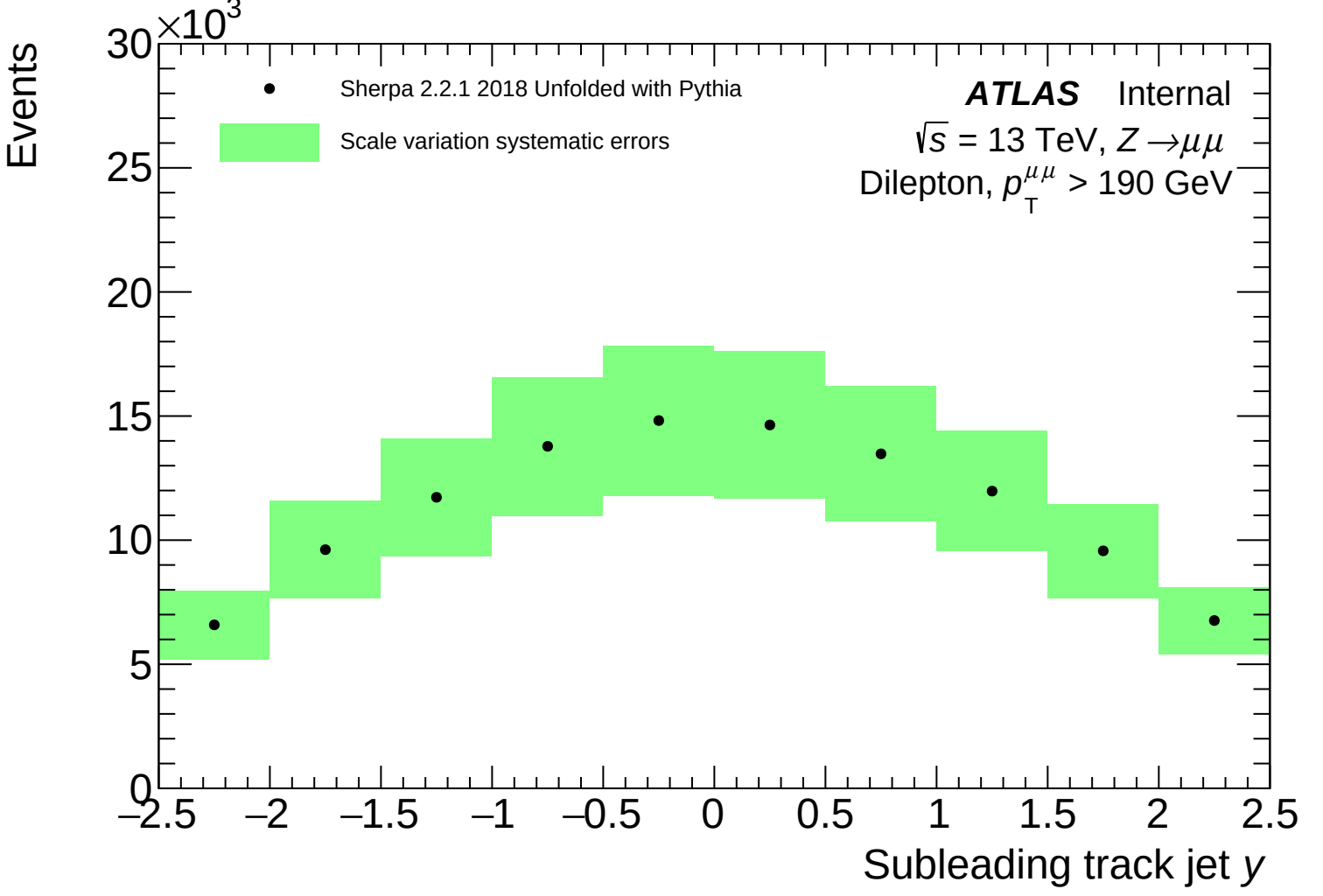

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

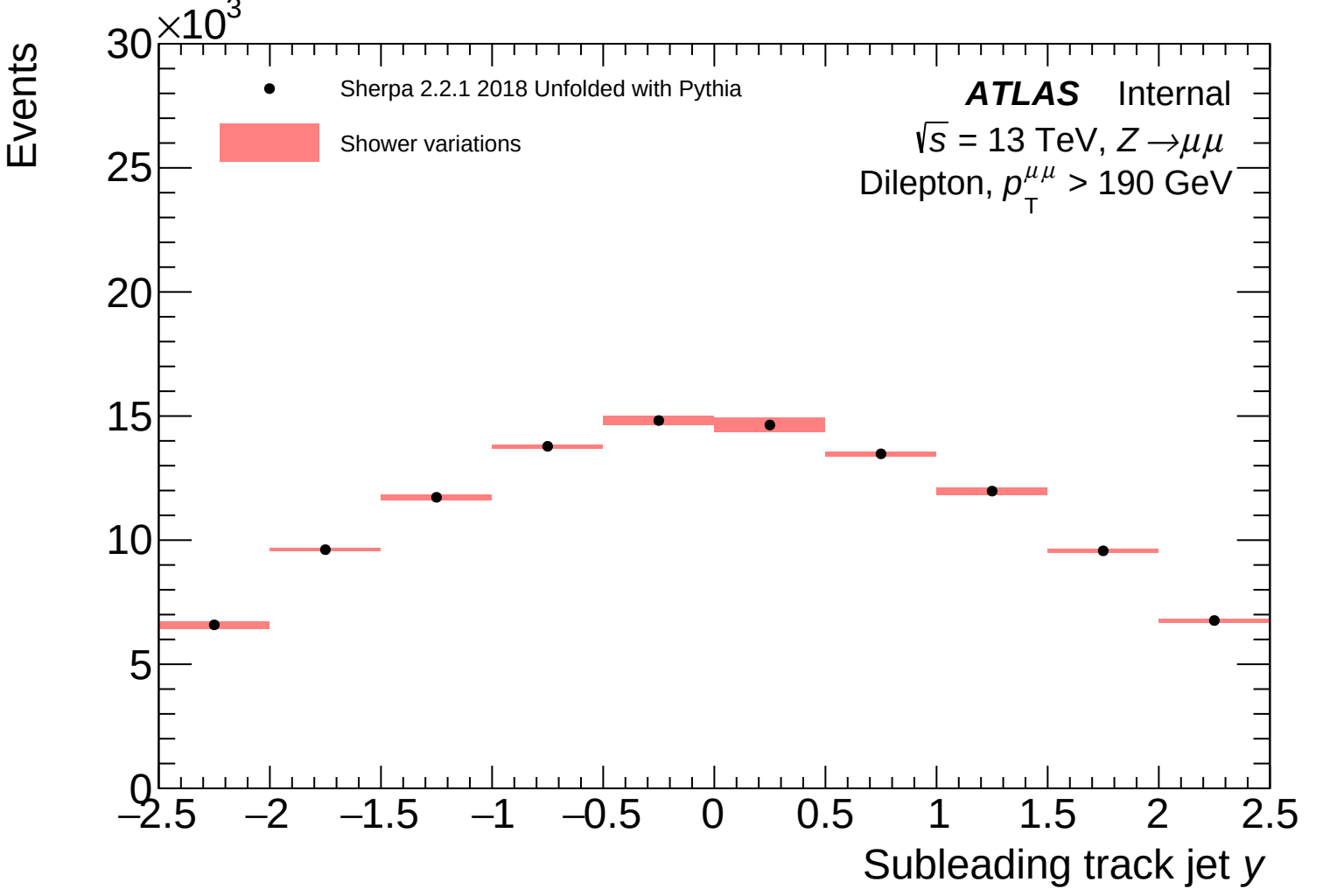

Events
$\times 10^3$
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

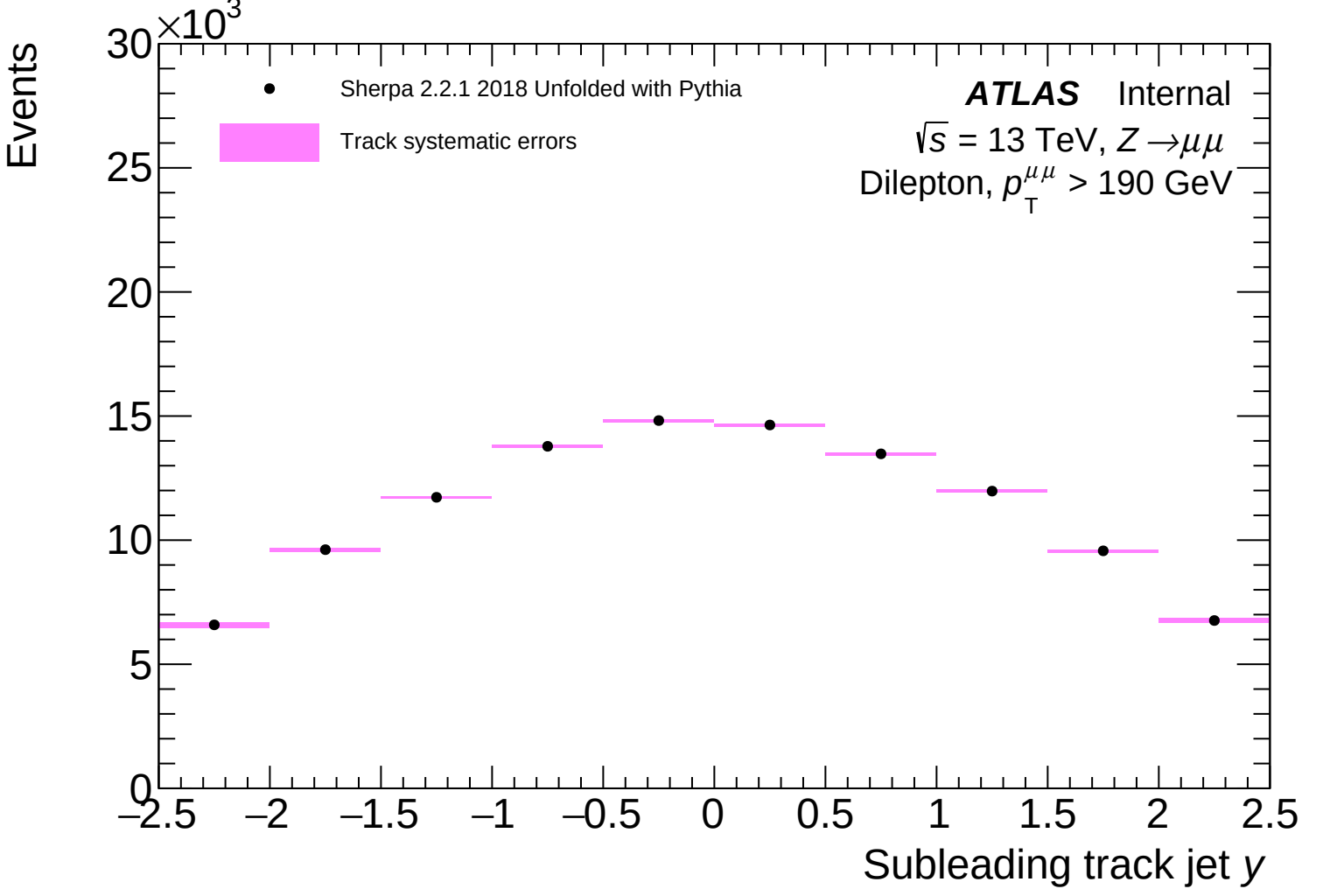

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

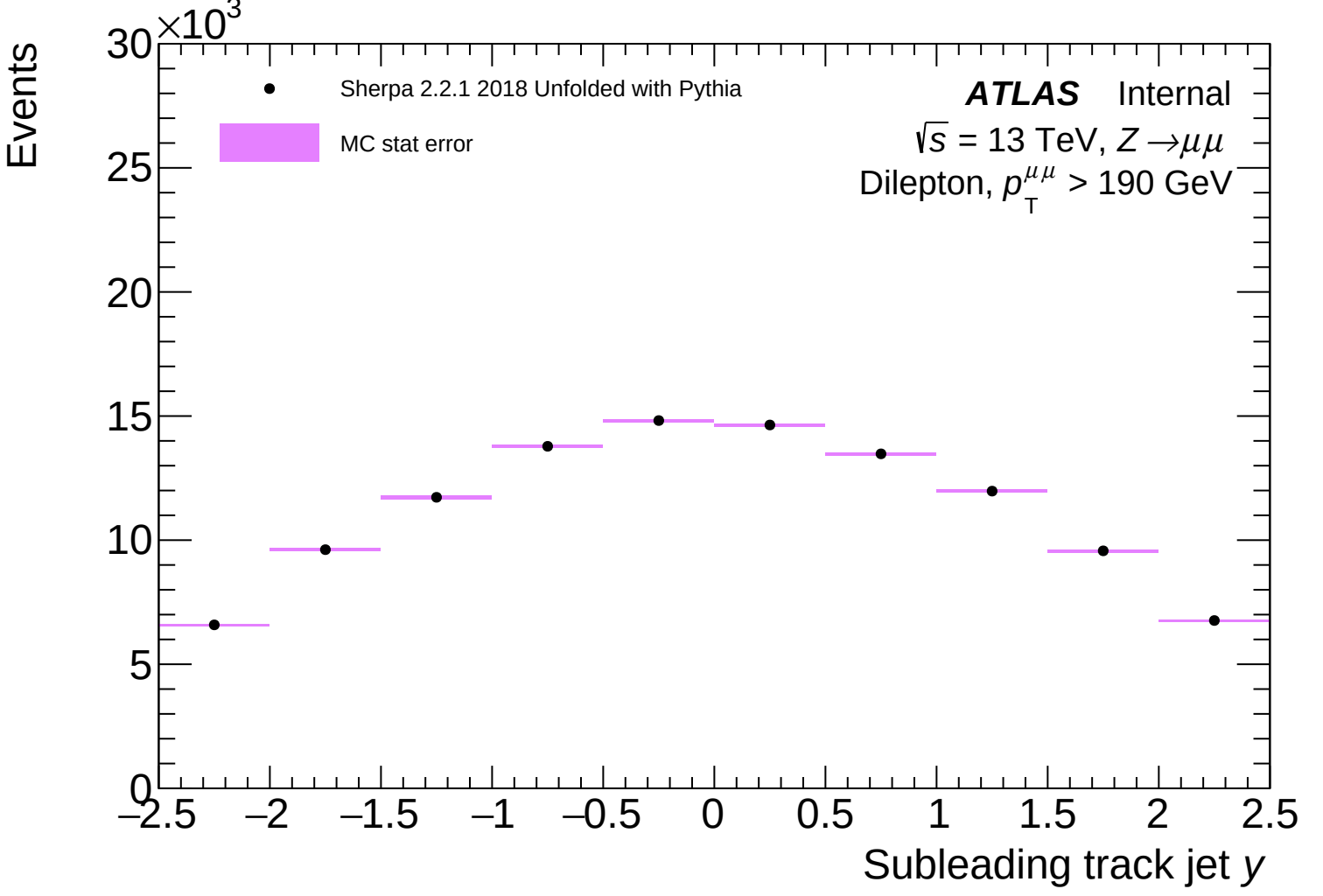

$\times 10^3$
45
40
35
30
25
20
15
10
5
0
dN / dy_{j2}
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

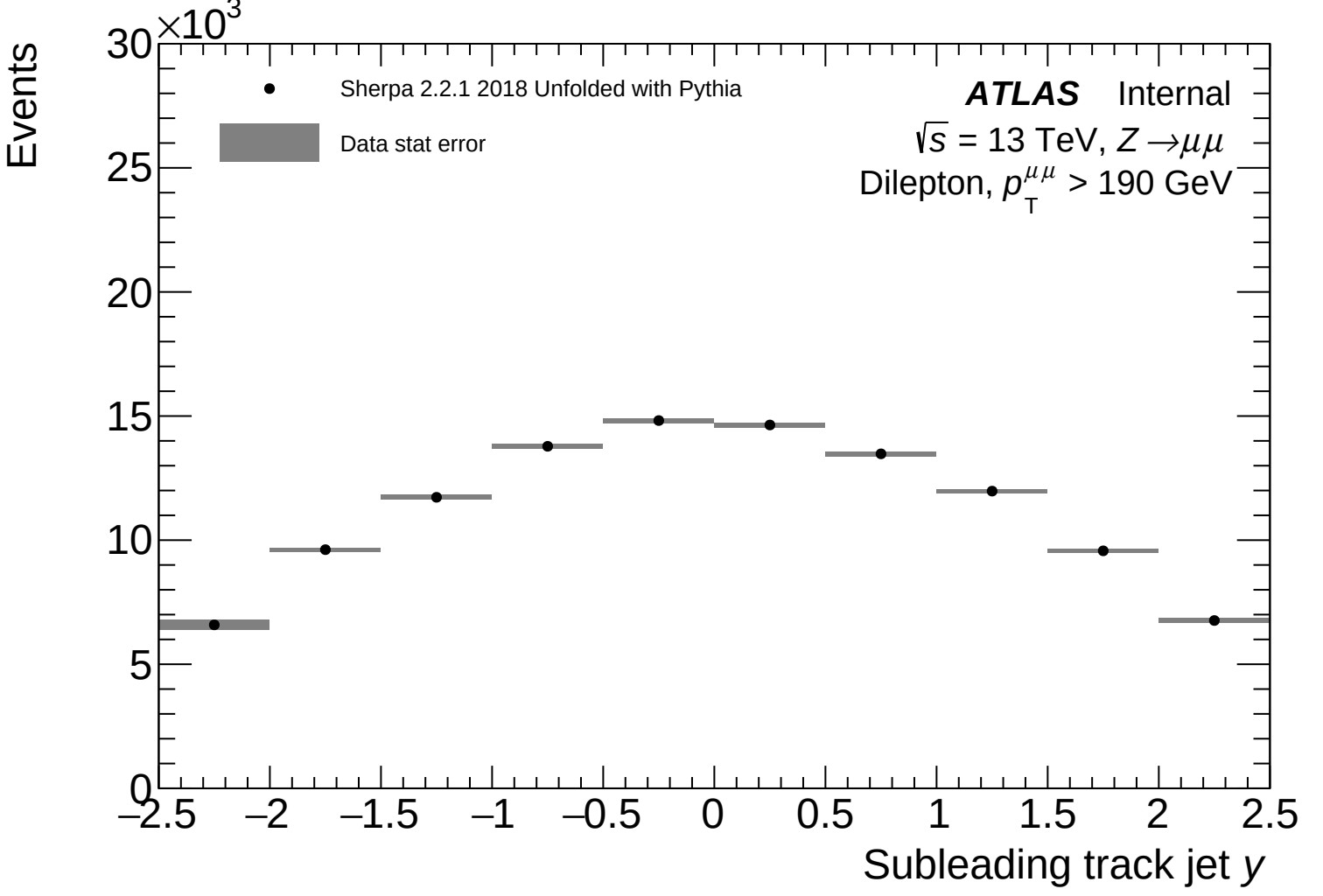

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

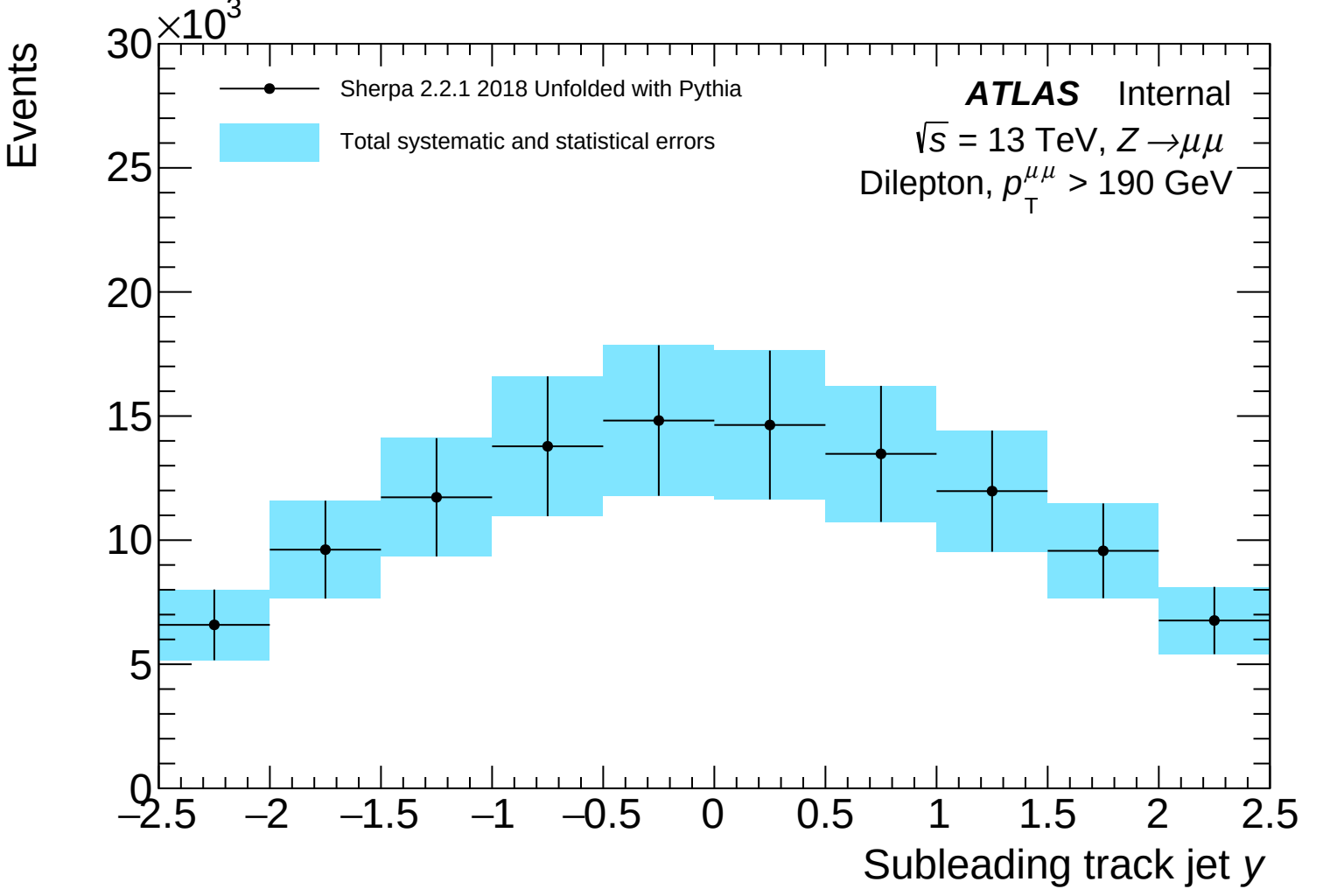

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

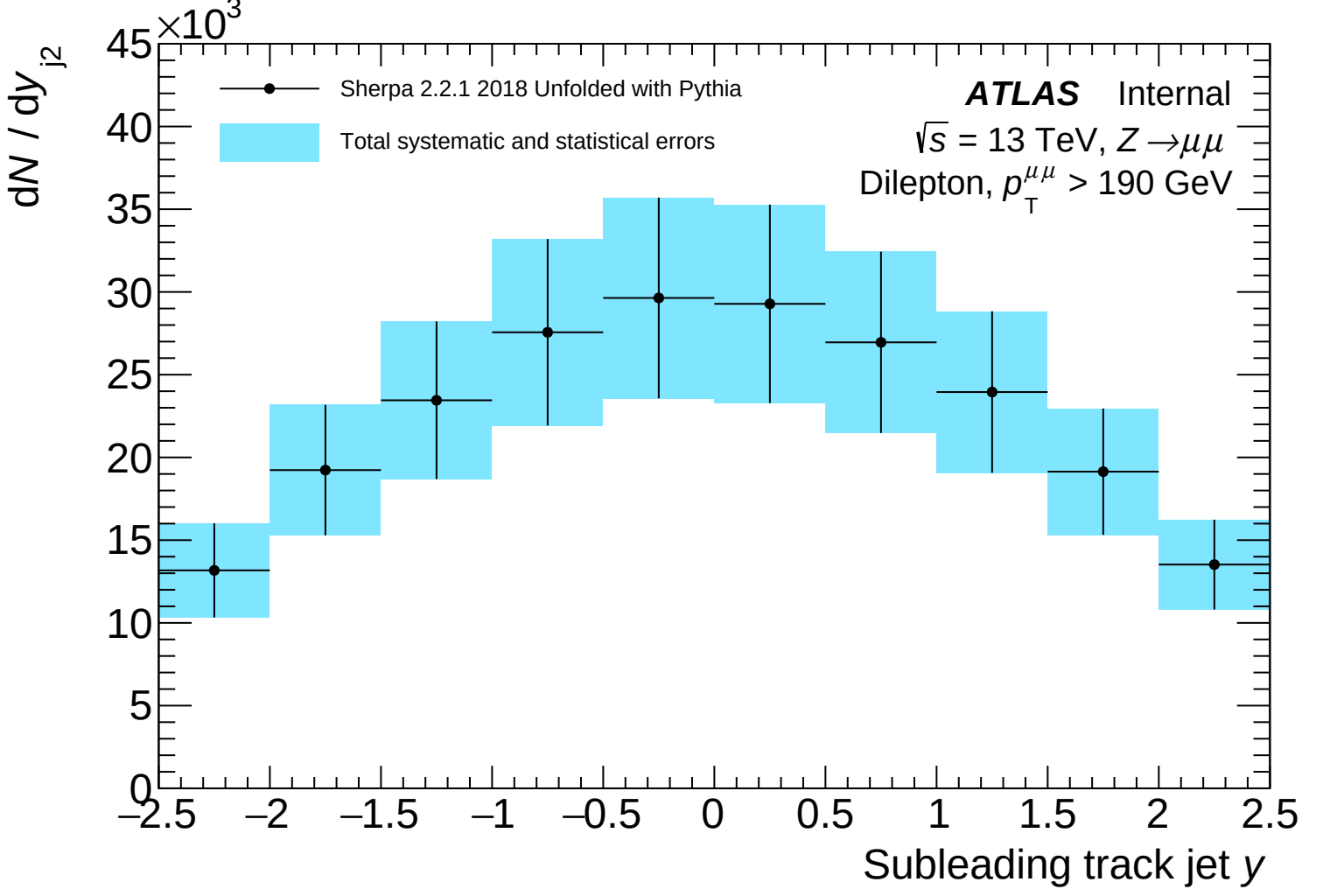

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

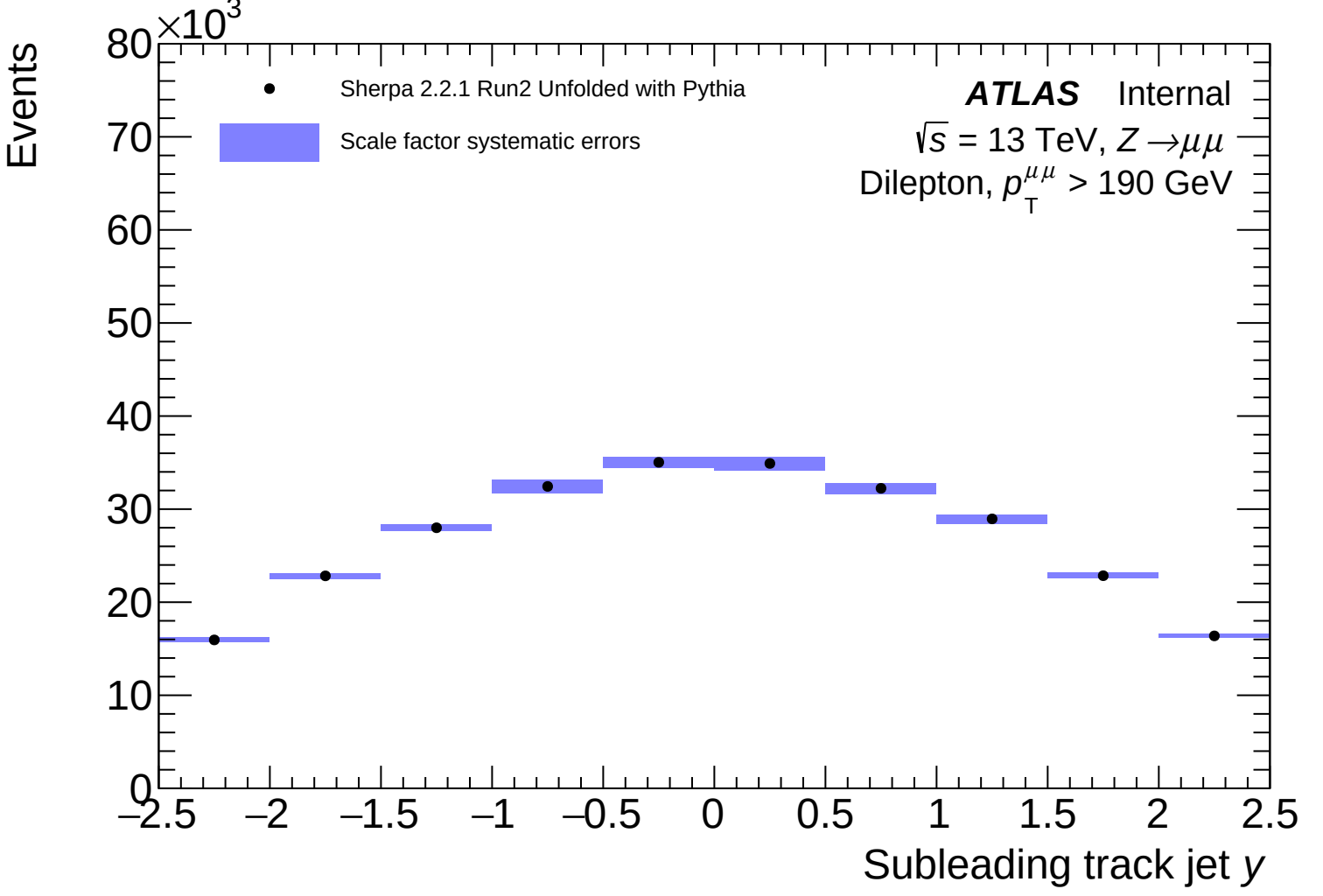

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

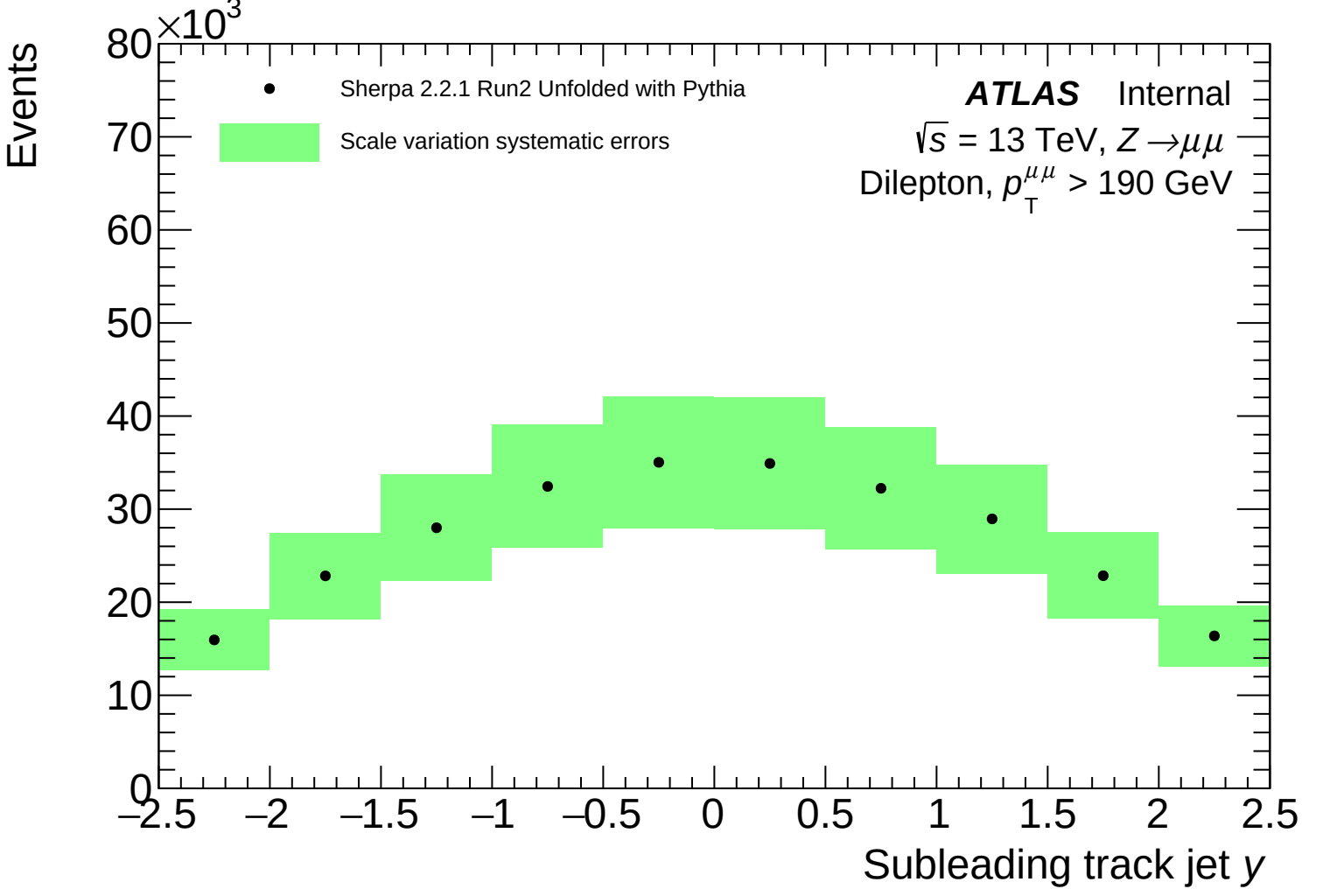

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

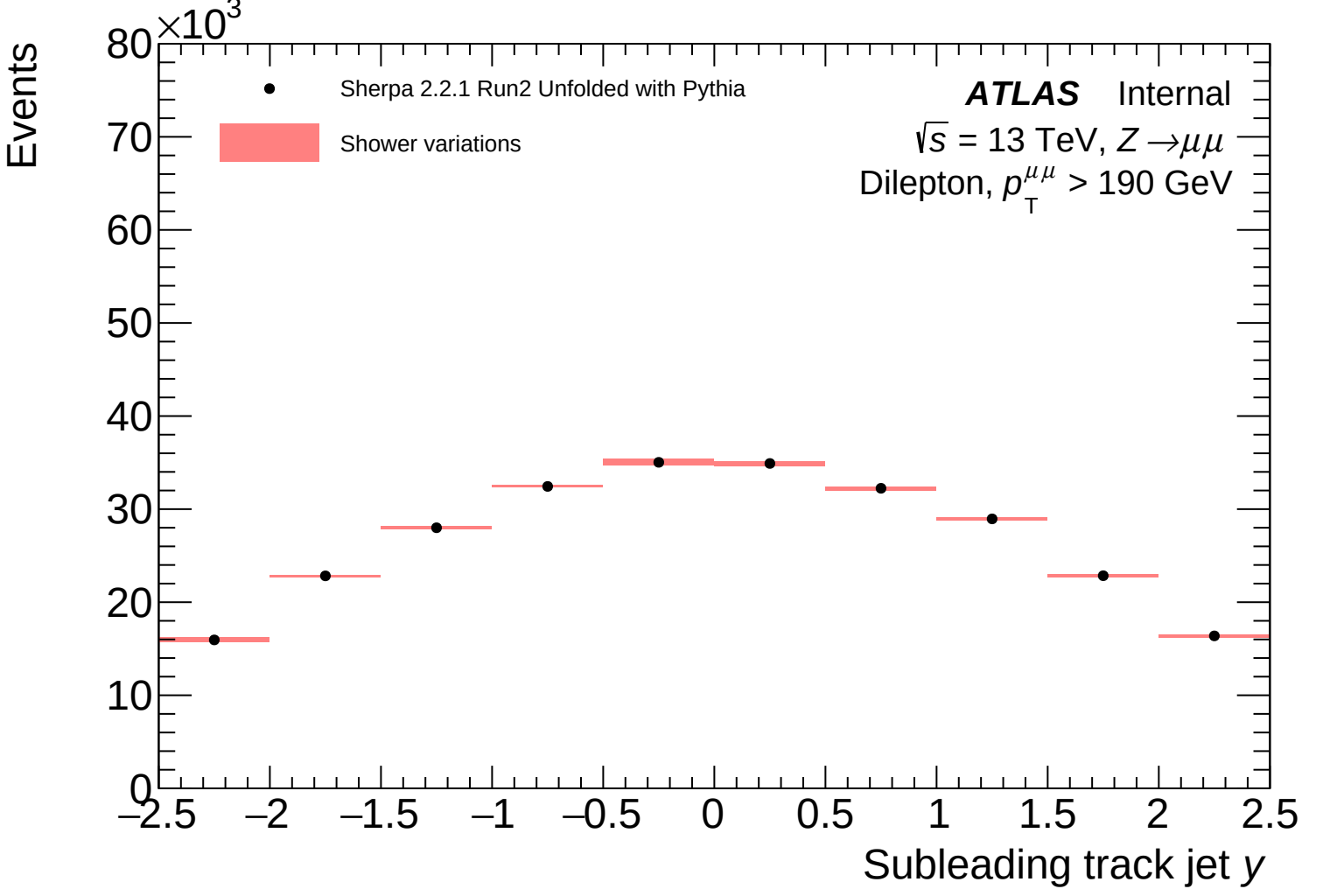

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

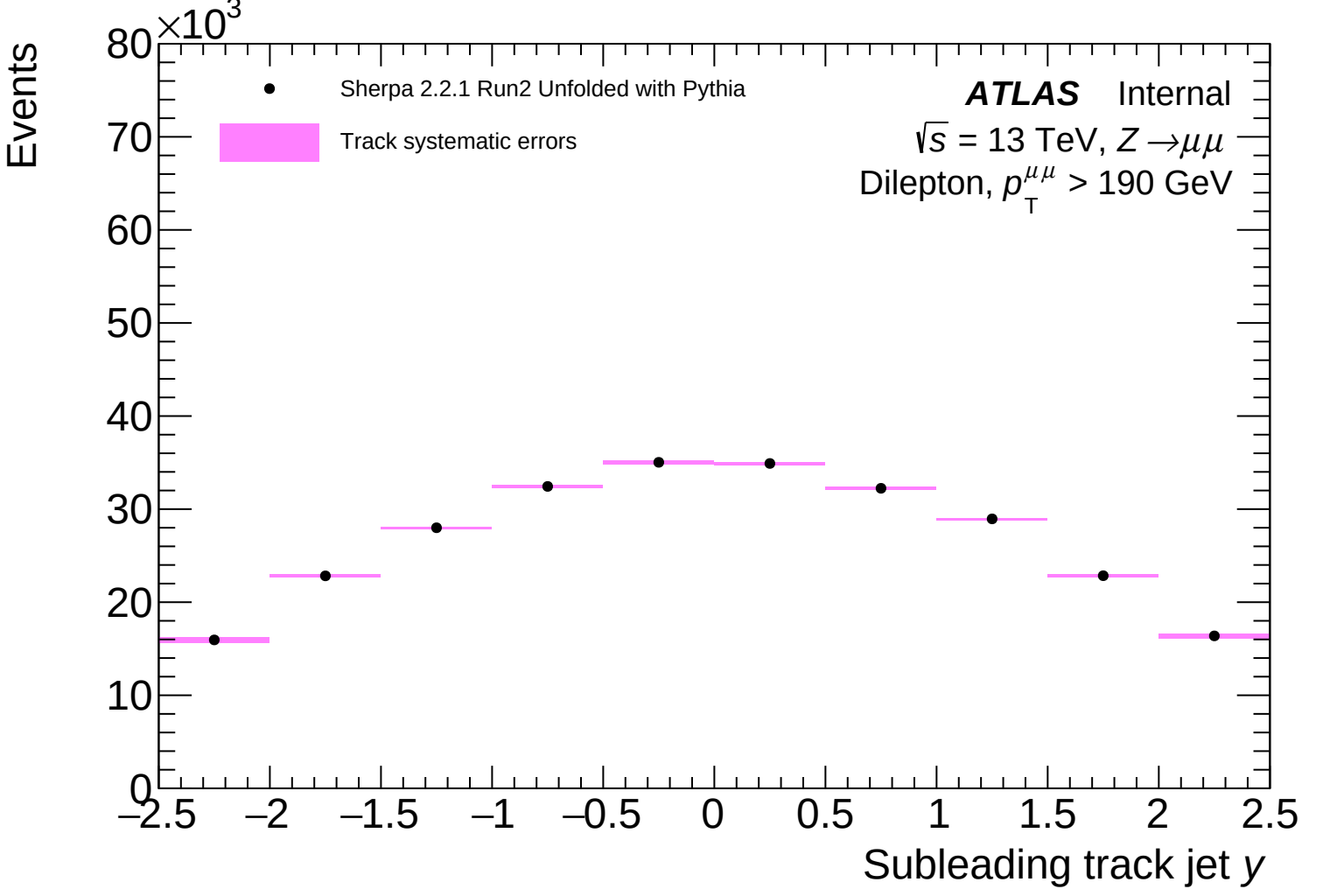

Events
×10^3
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

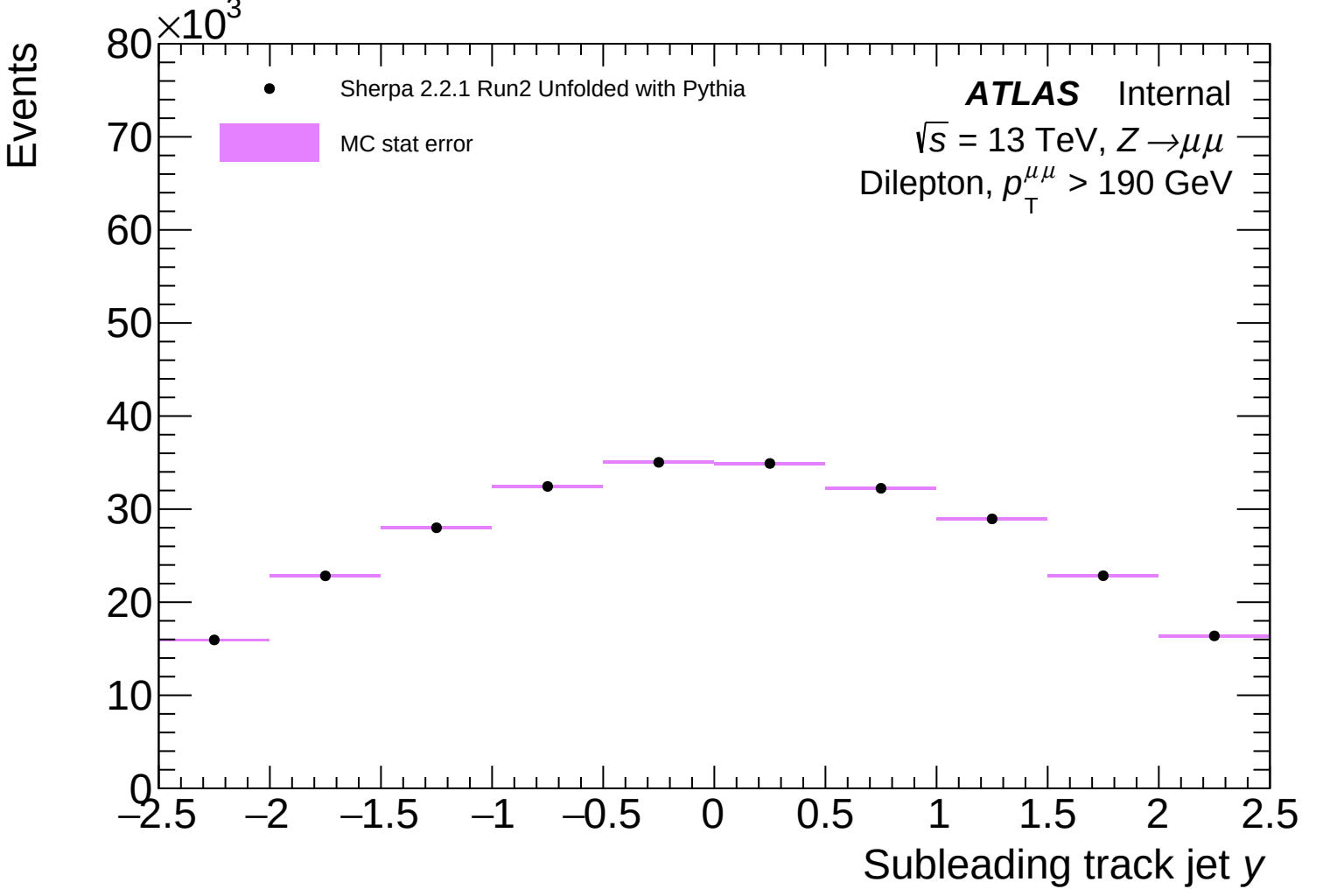

$\times 10^3$
dN / dy_{j2}
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

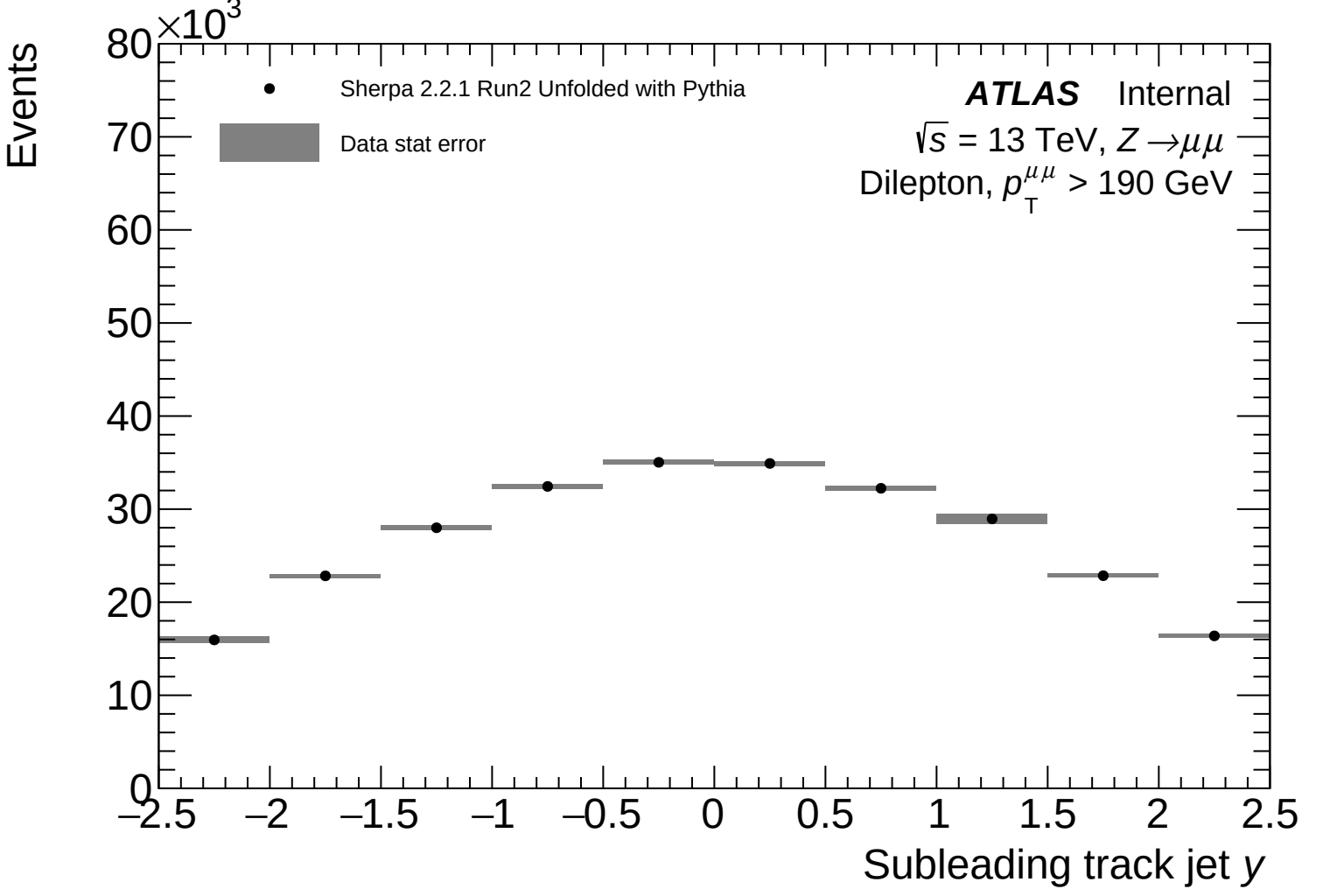

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

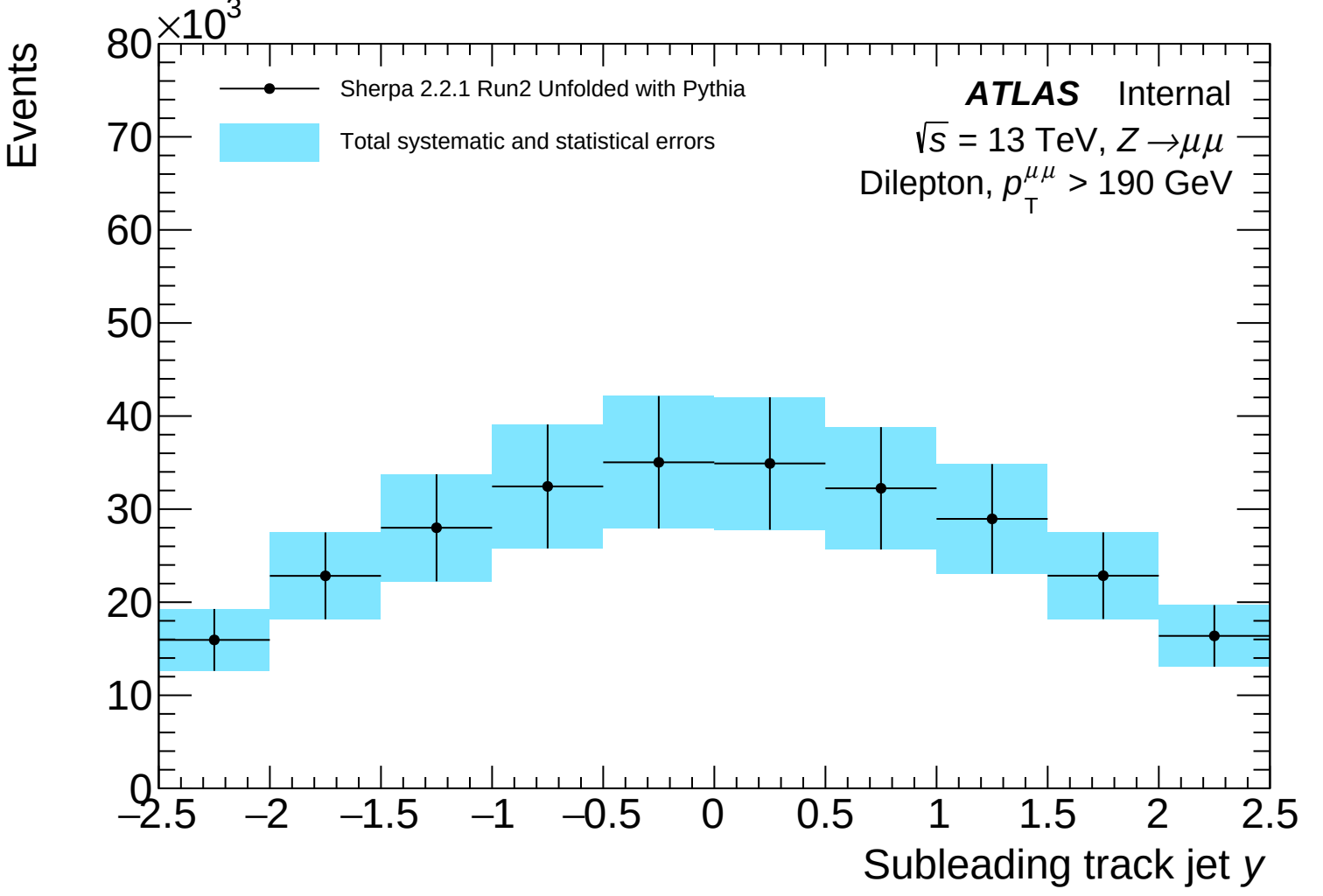

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

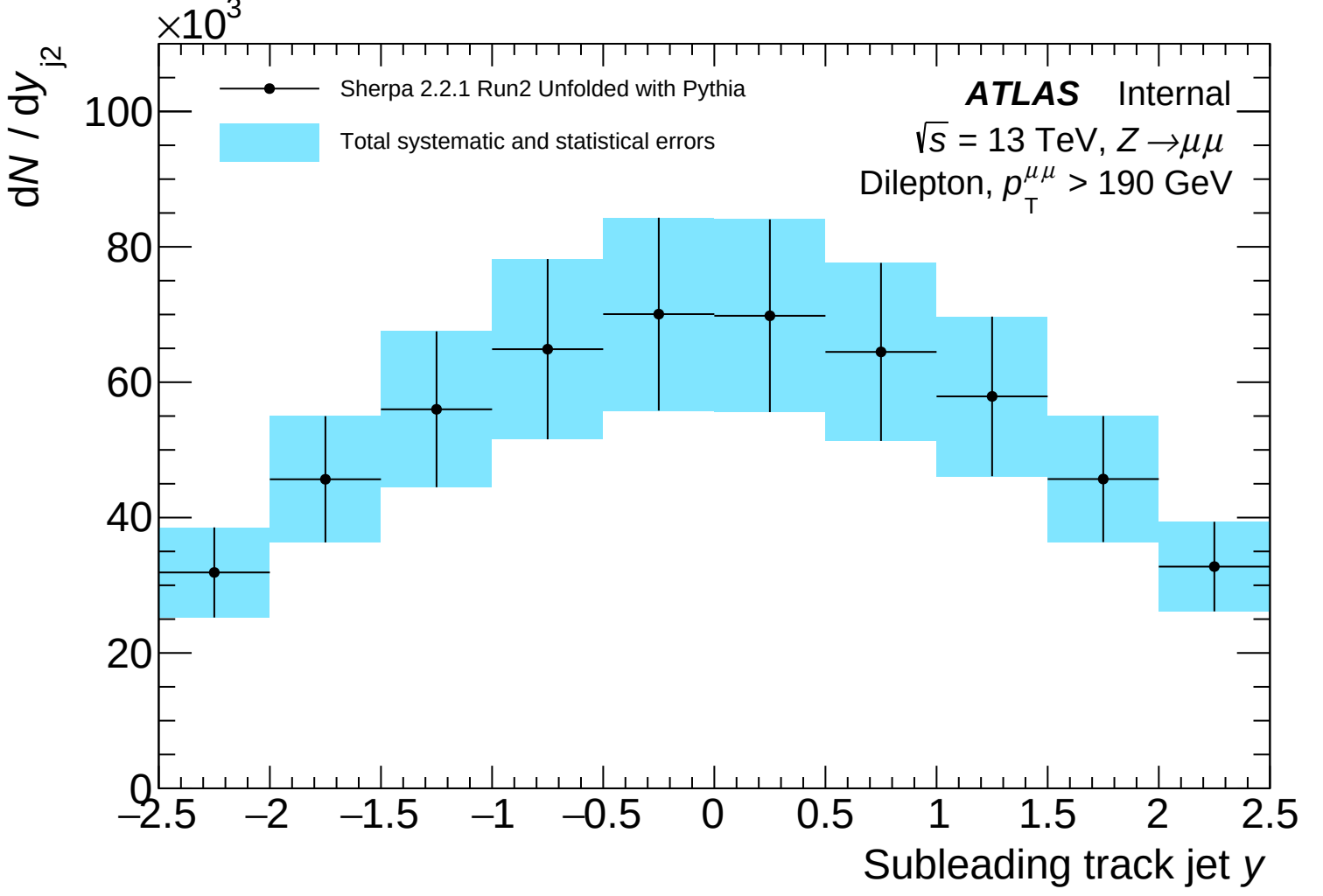

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

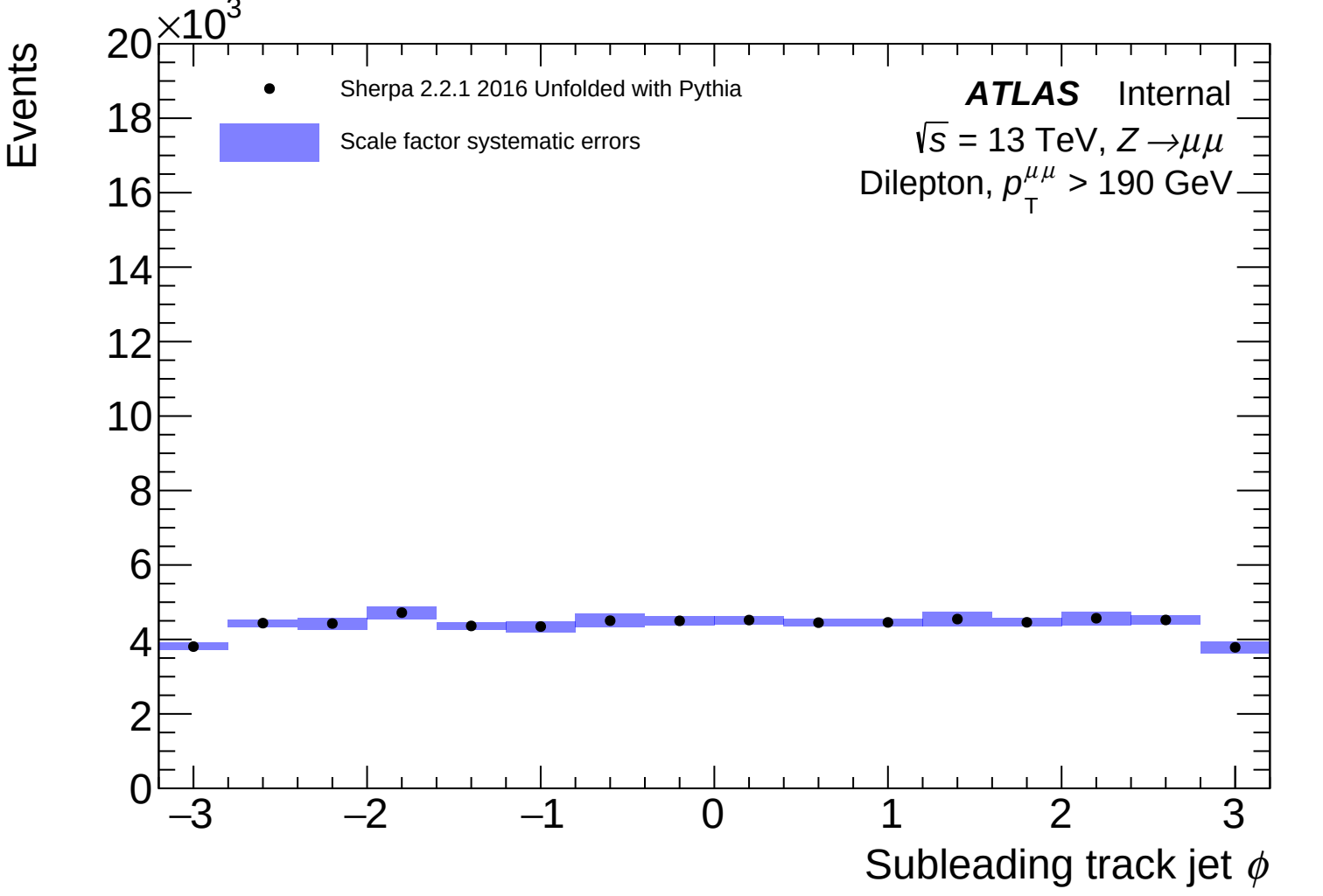

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

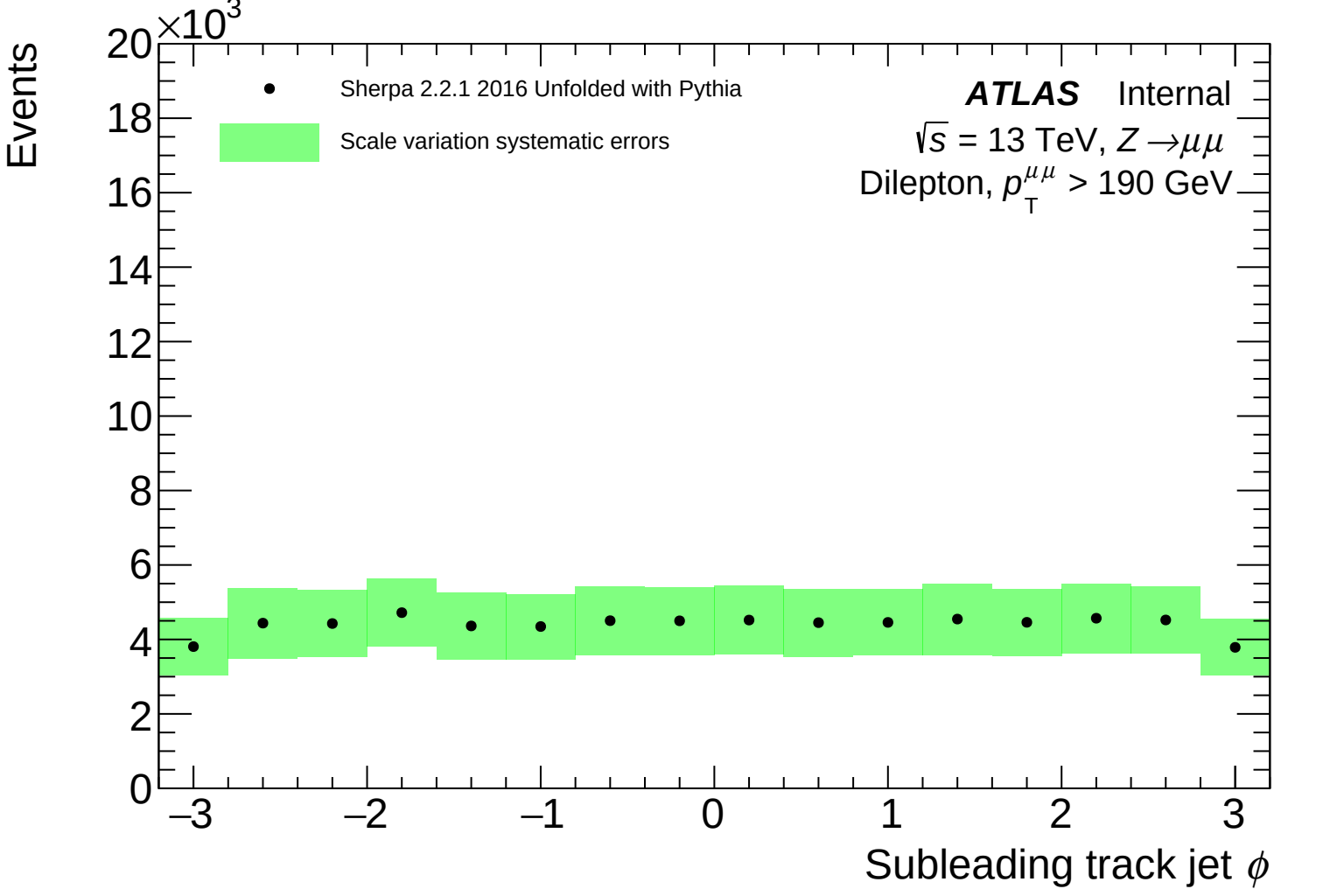

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

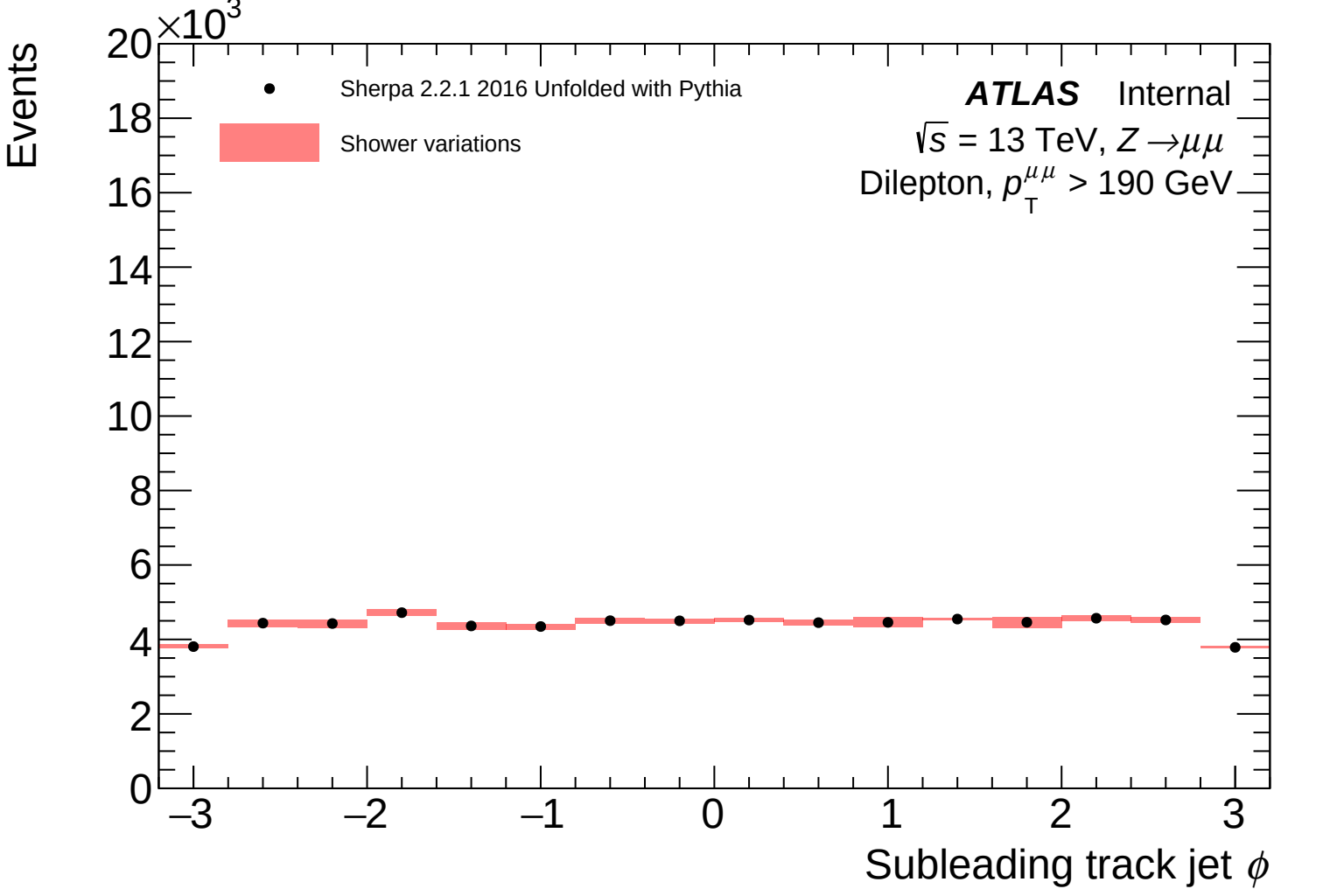

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

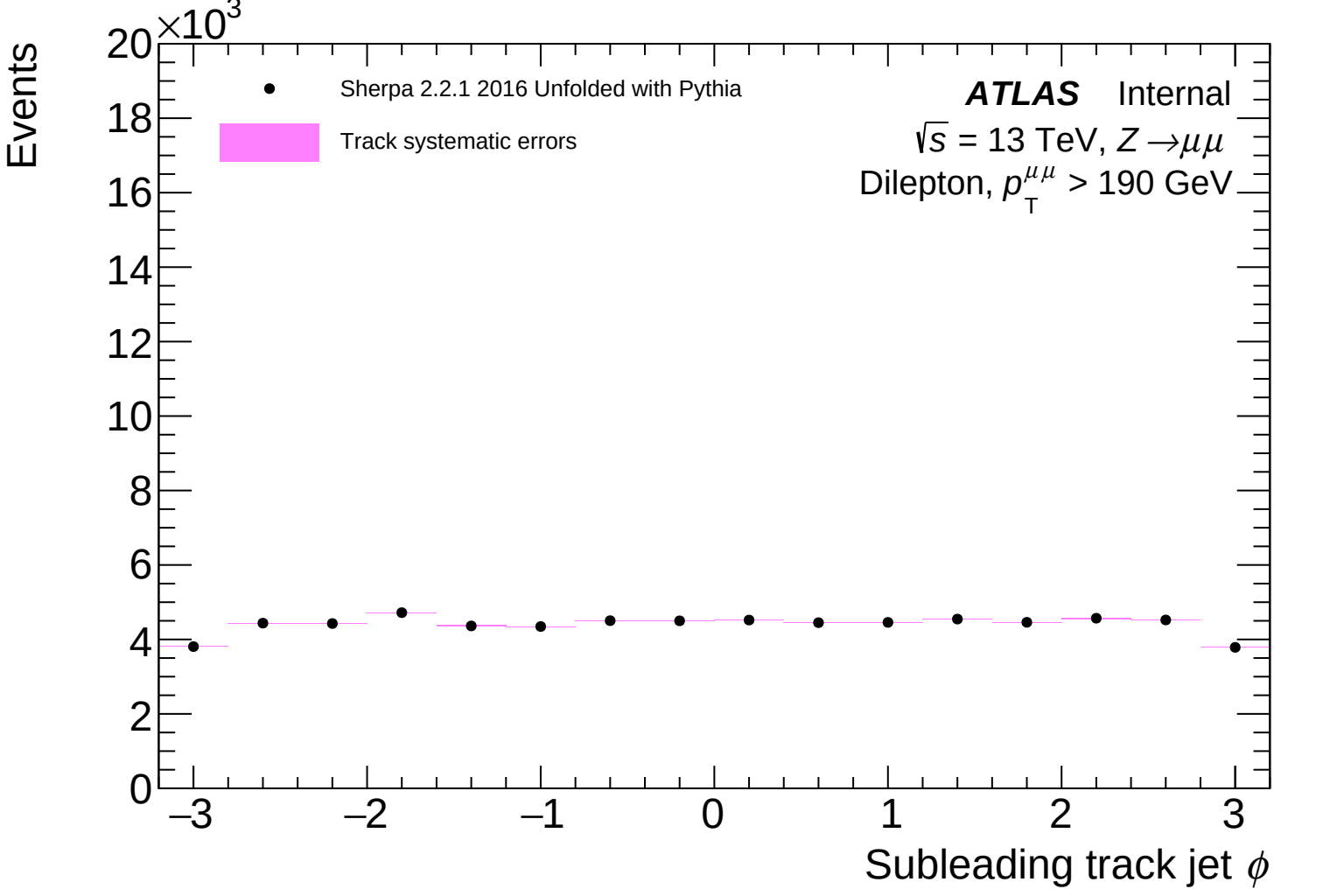

Events
×10^3
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

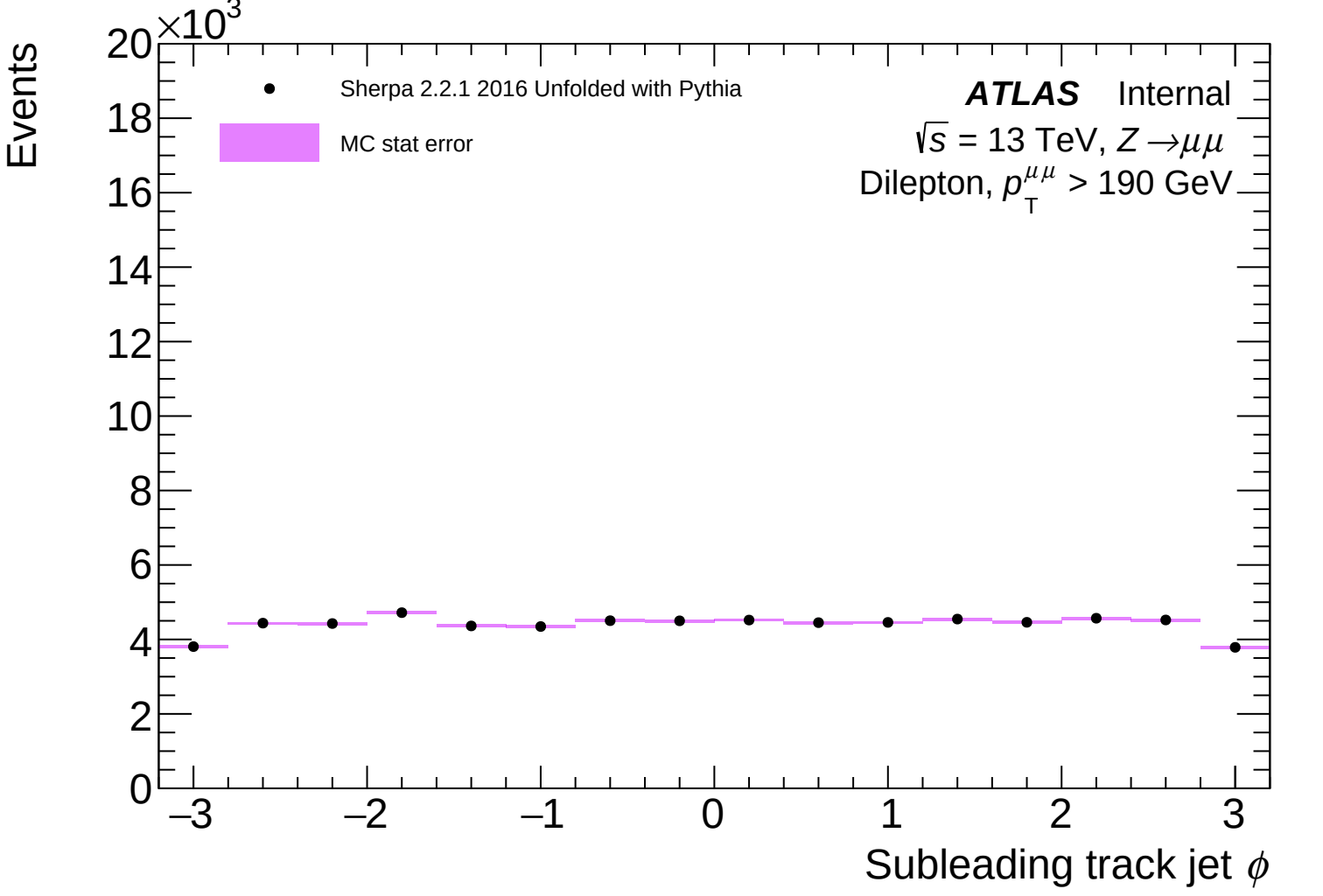

×10^3
dN / dy_j2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
100
80
60
40
20
0
–2.5
–2
–1.5
–1
–0.5
0
0.5
1
1.5
2
2.5
Subleading track jet y

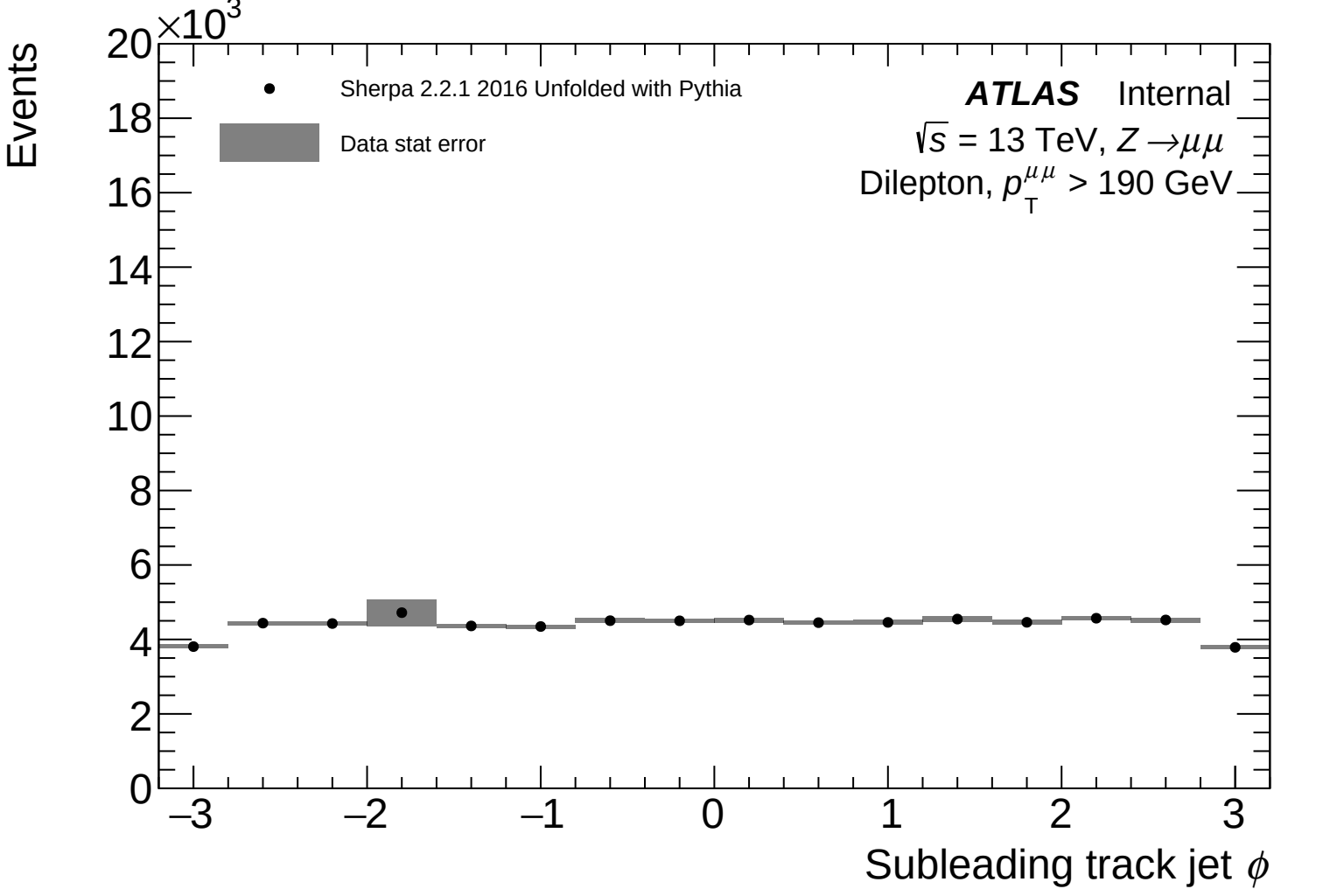

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

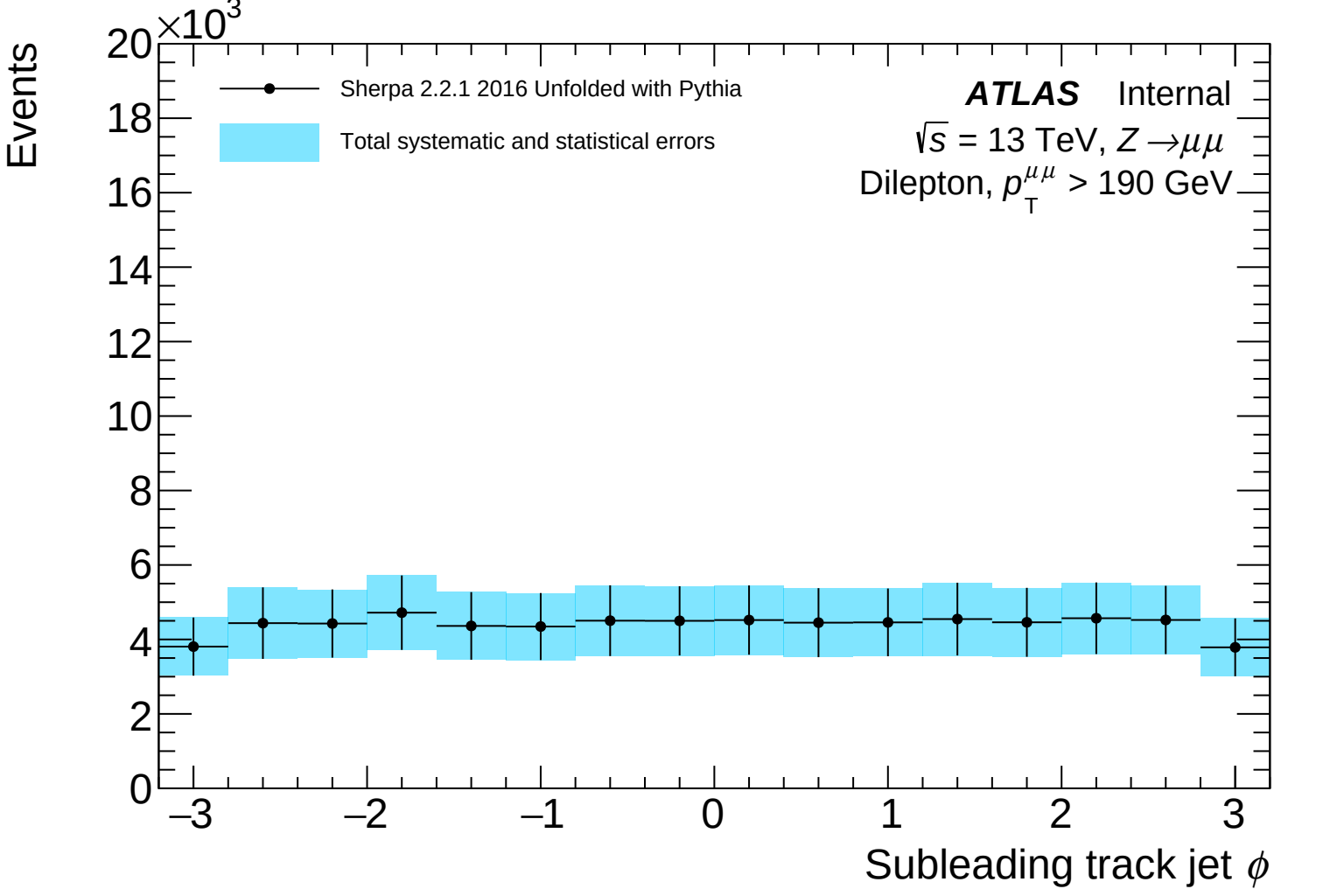

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

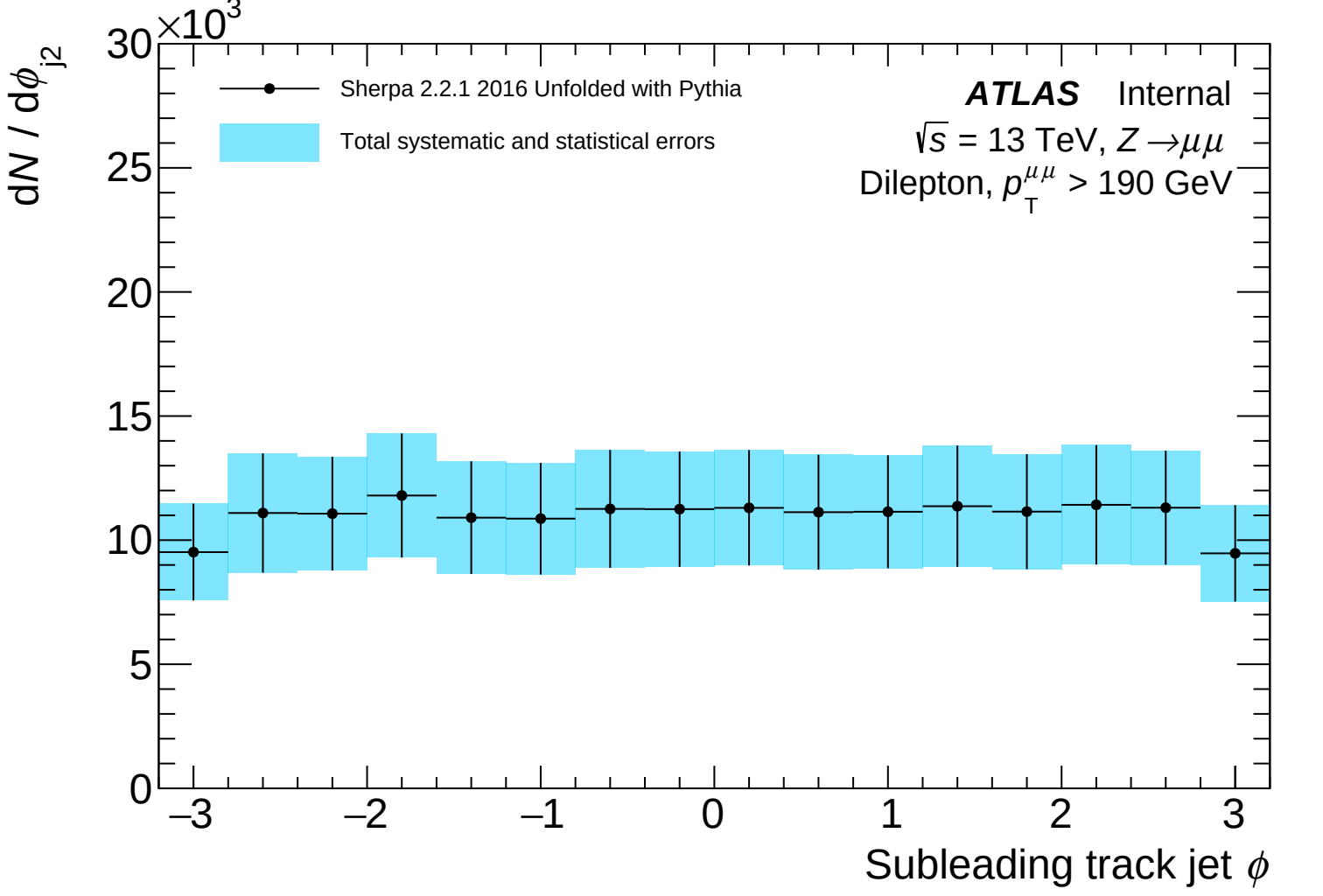

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

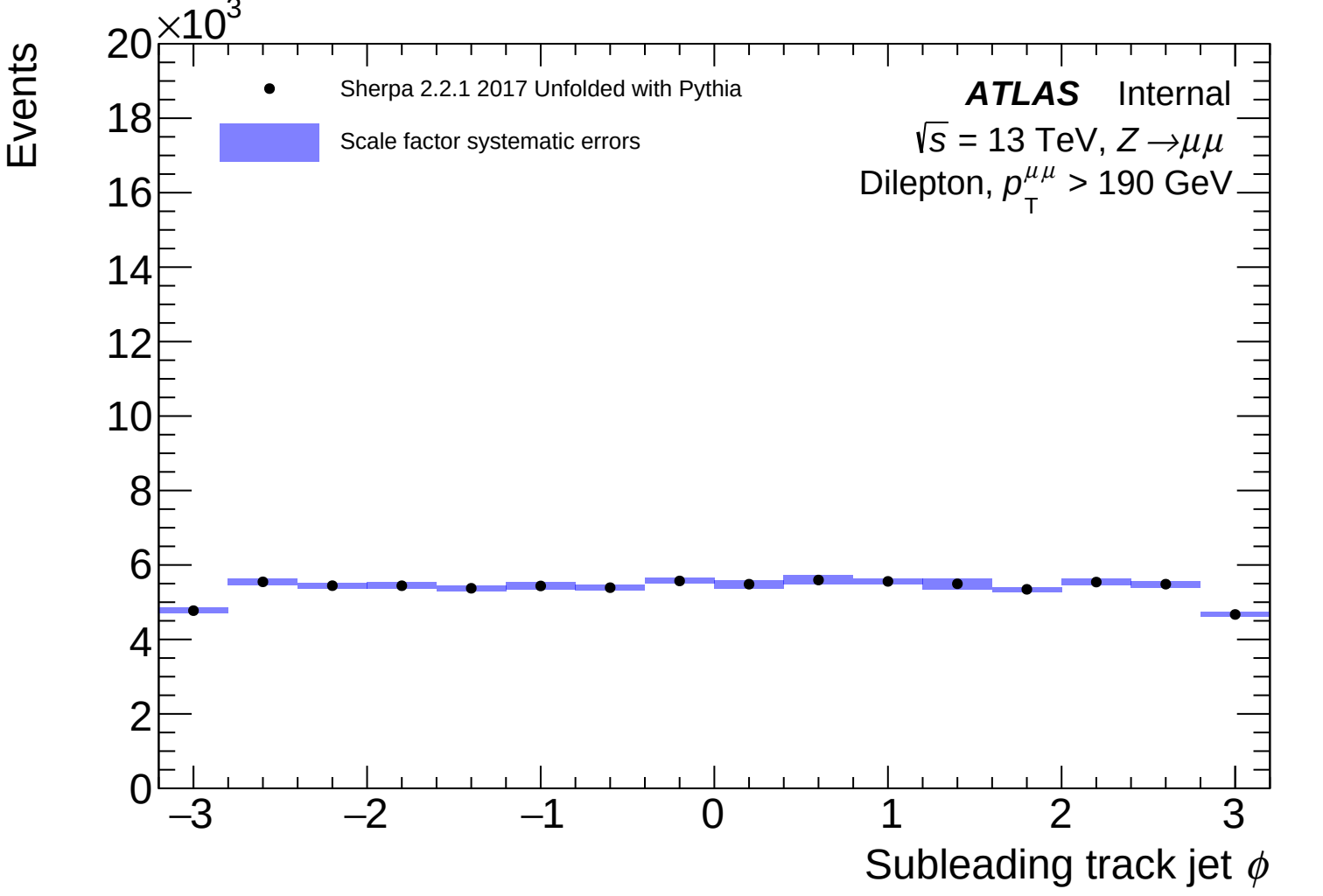

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

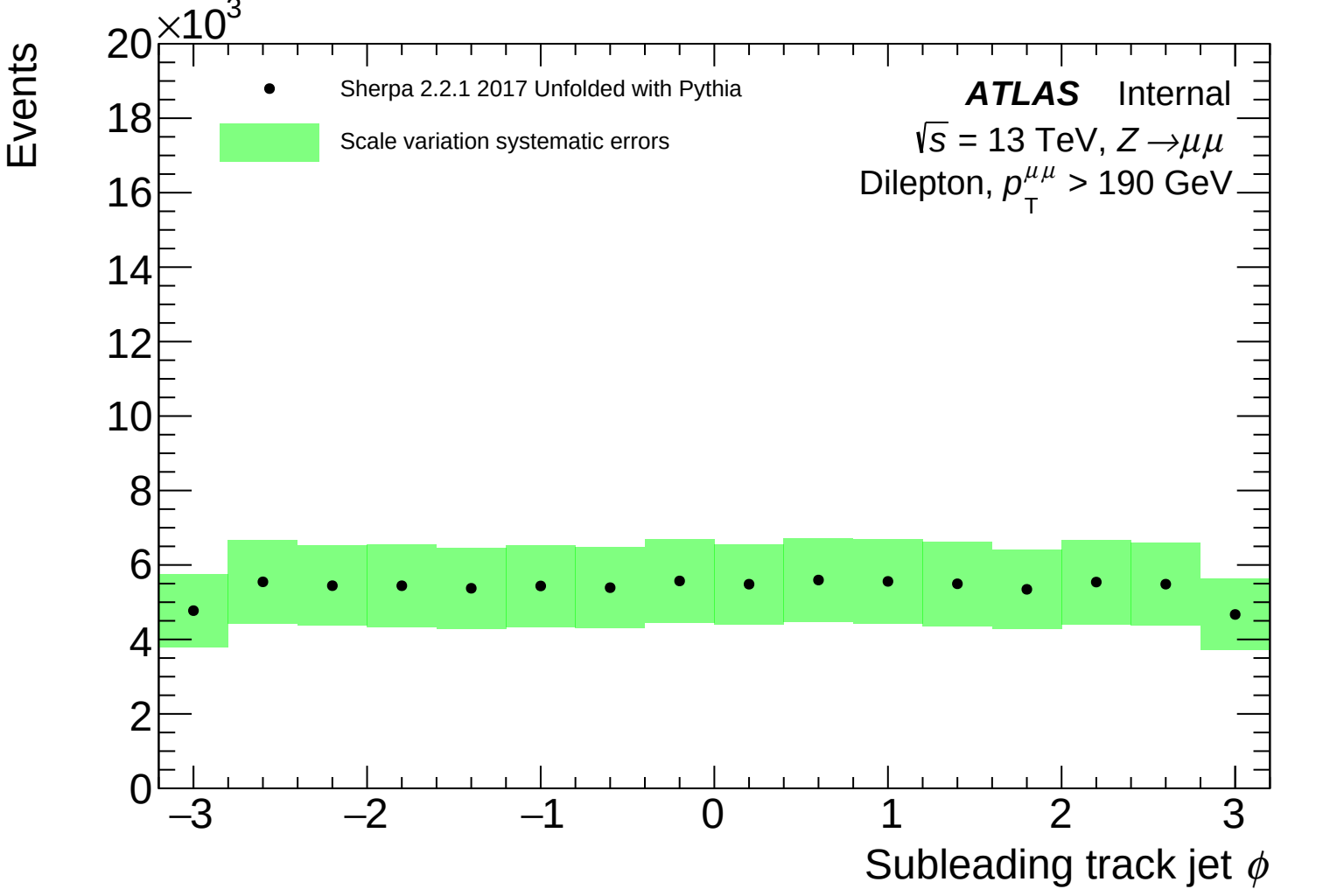

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

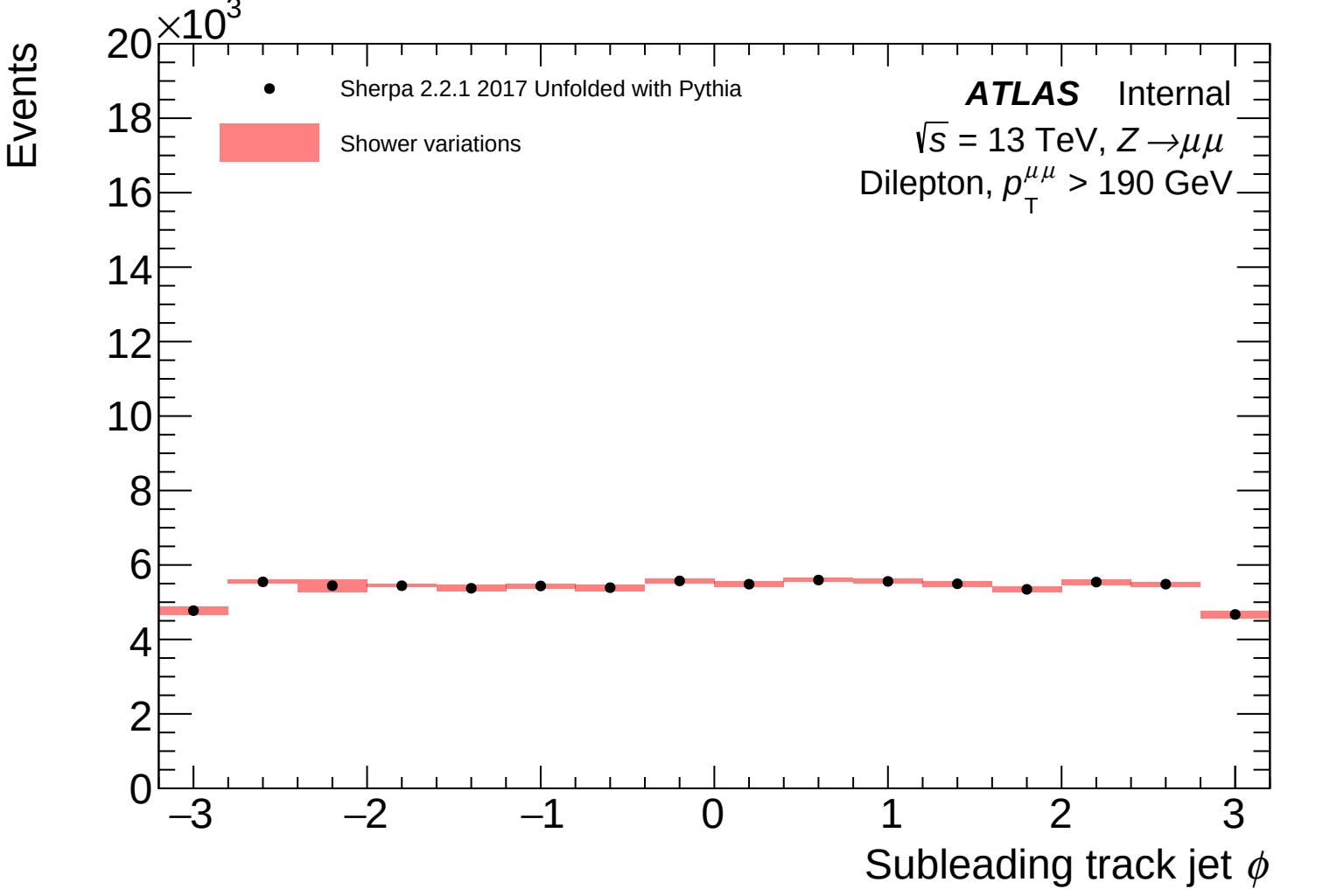

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

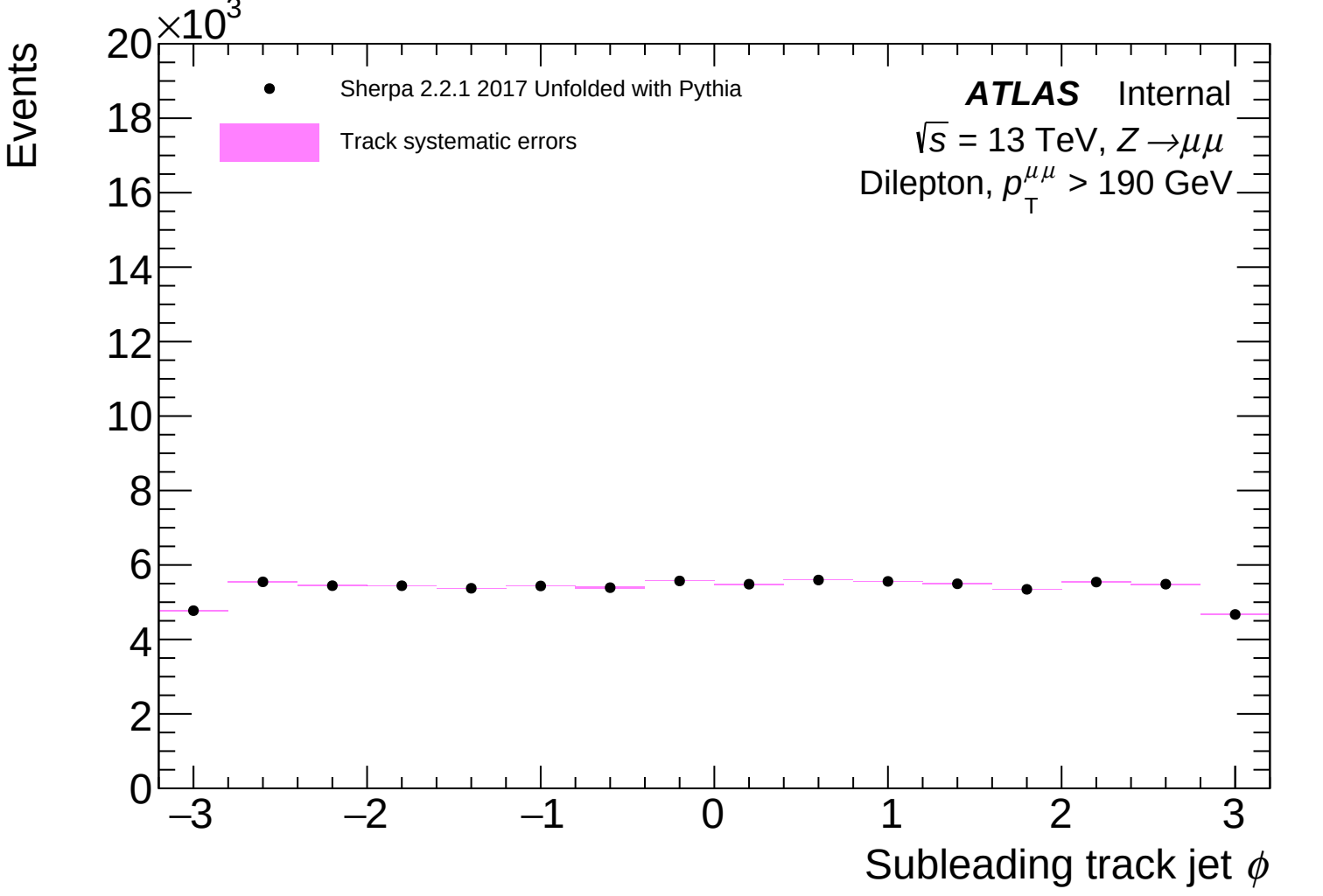

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

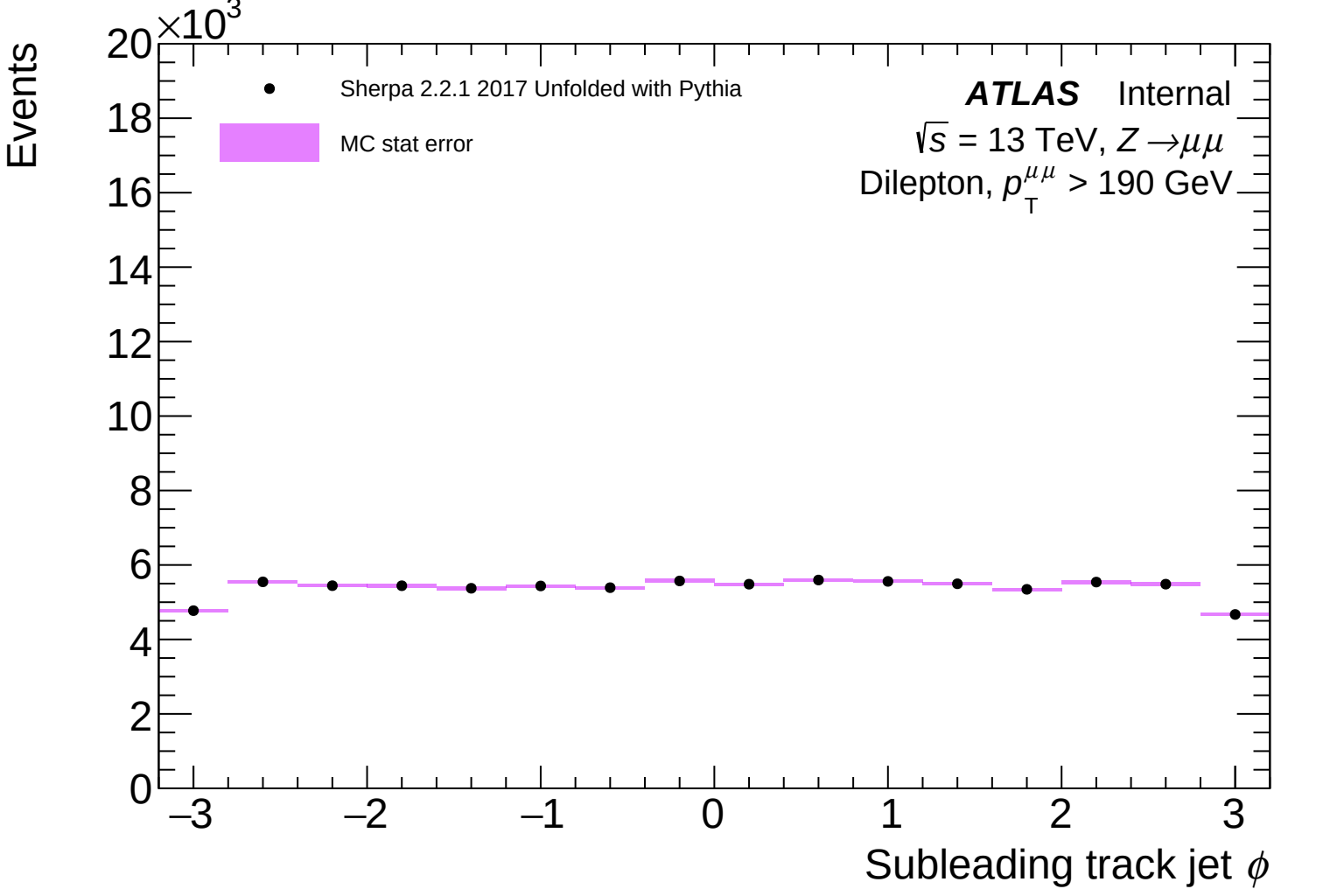

$\times 10^{3}$
30
25
20
15
10
5
0
dN / $d\phi_{j2}$
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet ϕ

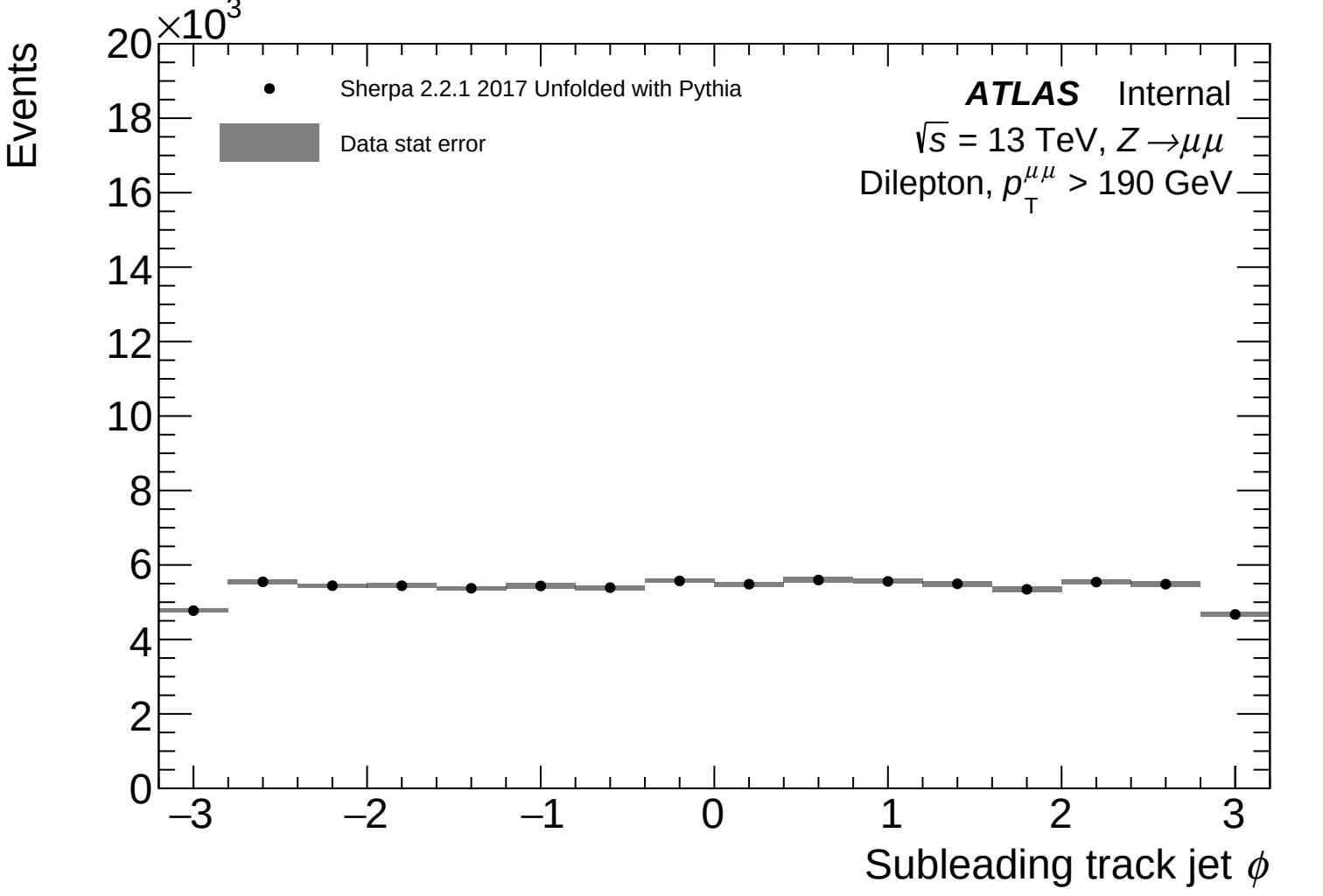

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

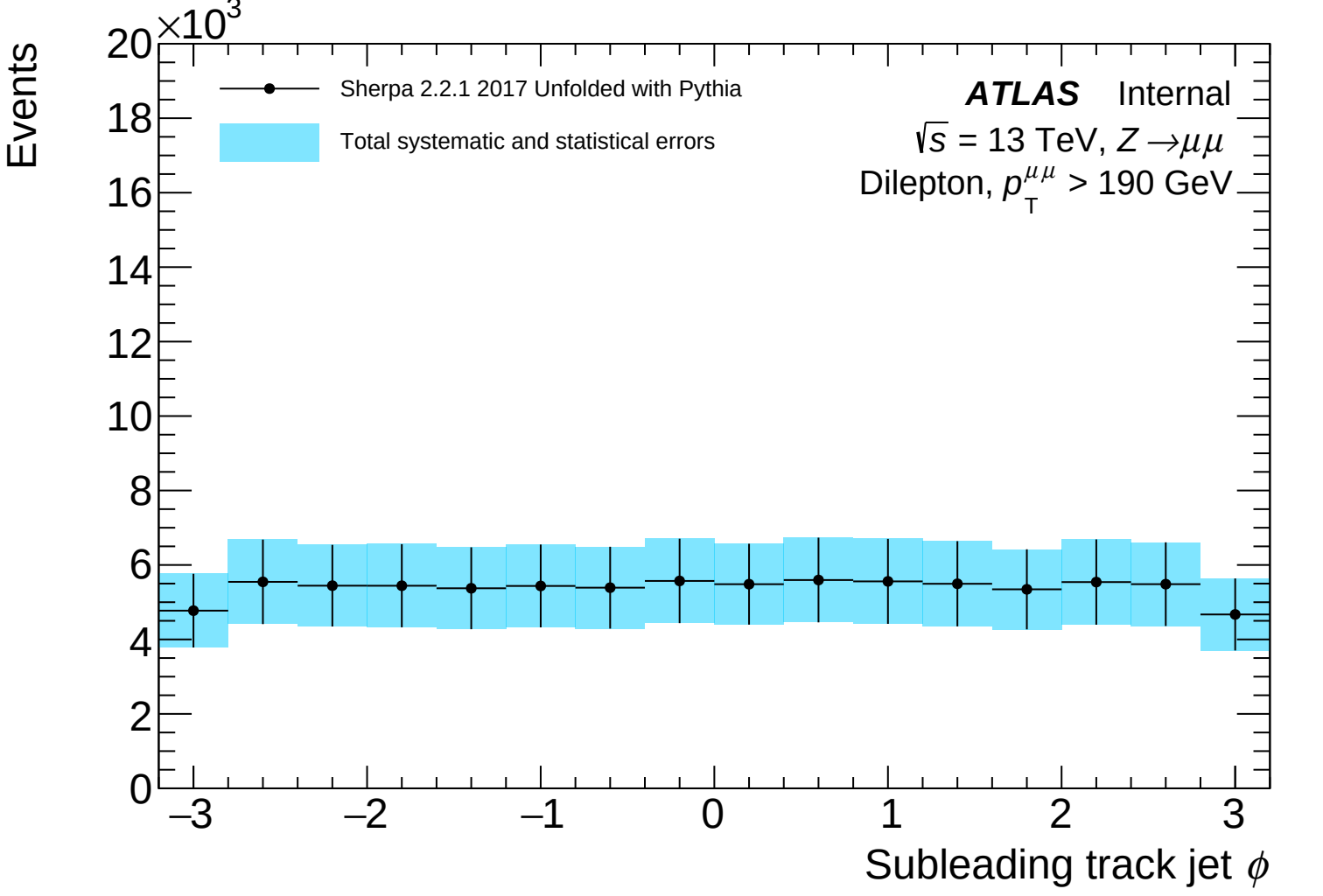

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

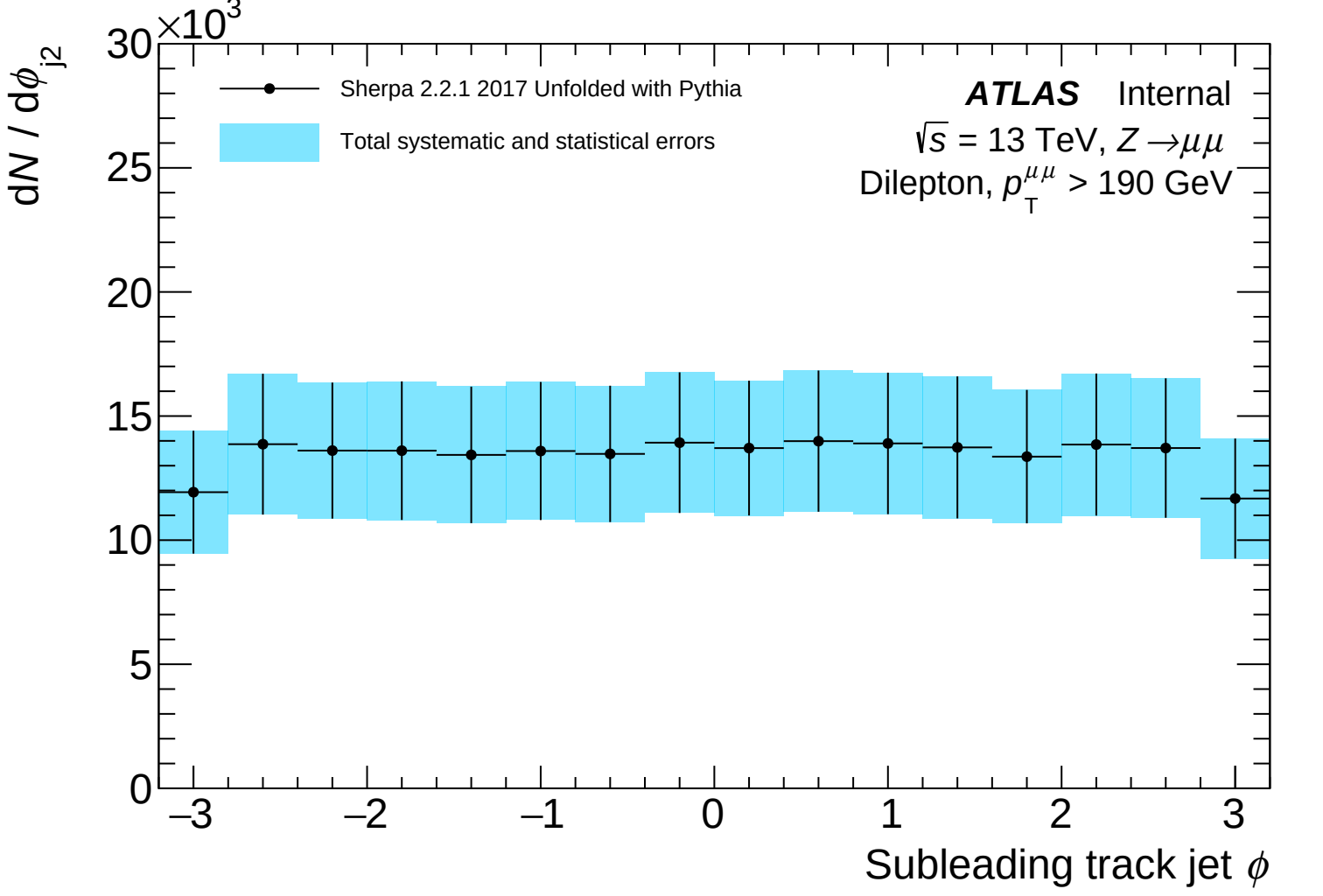

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

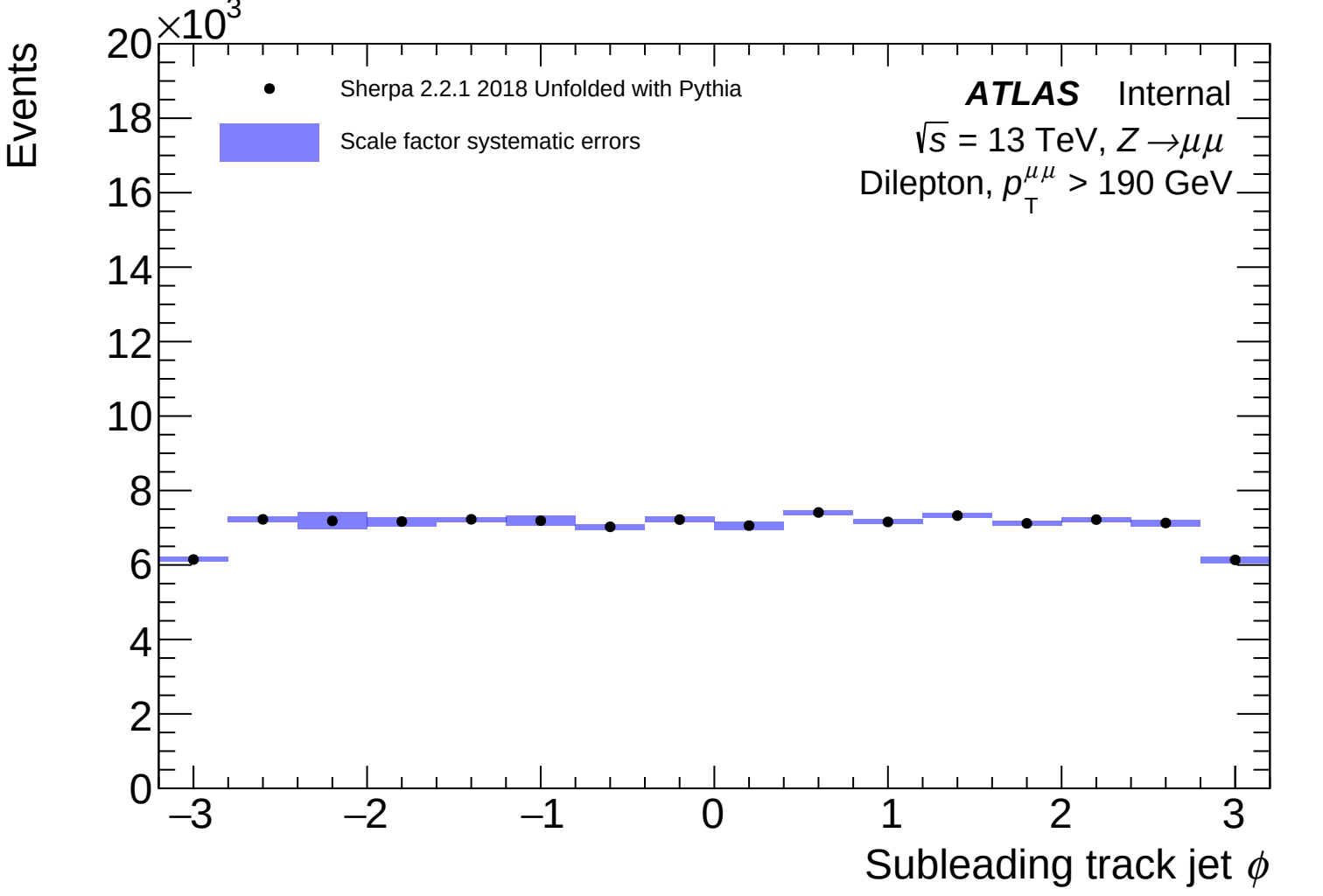

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

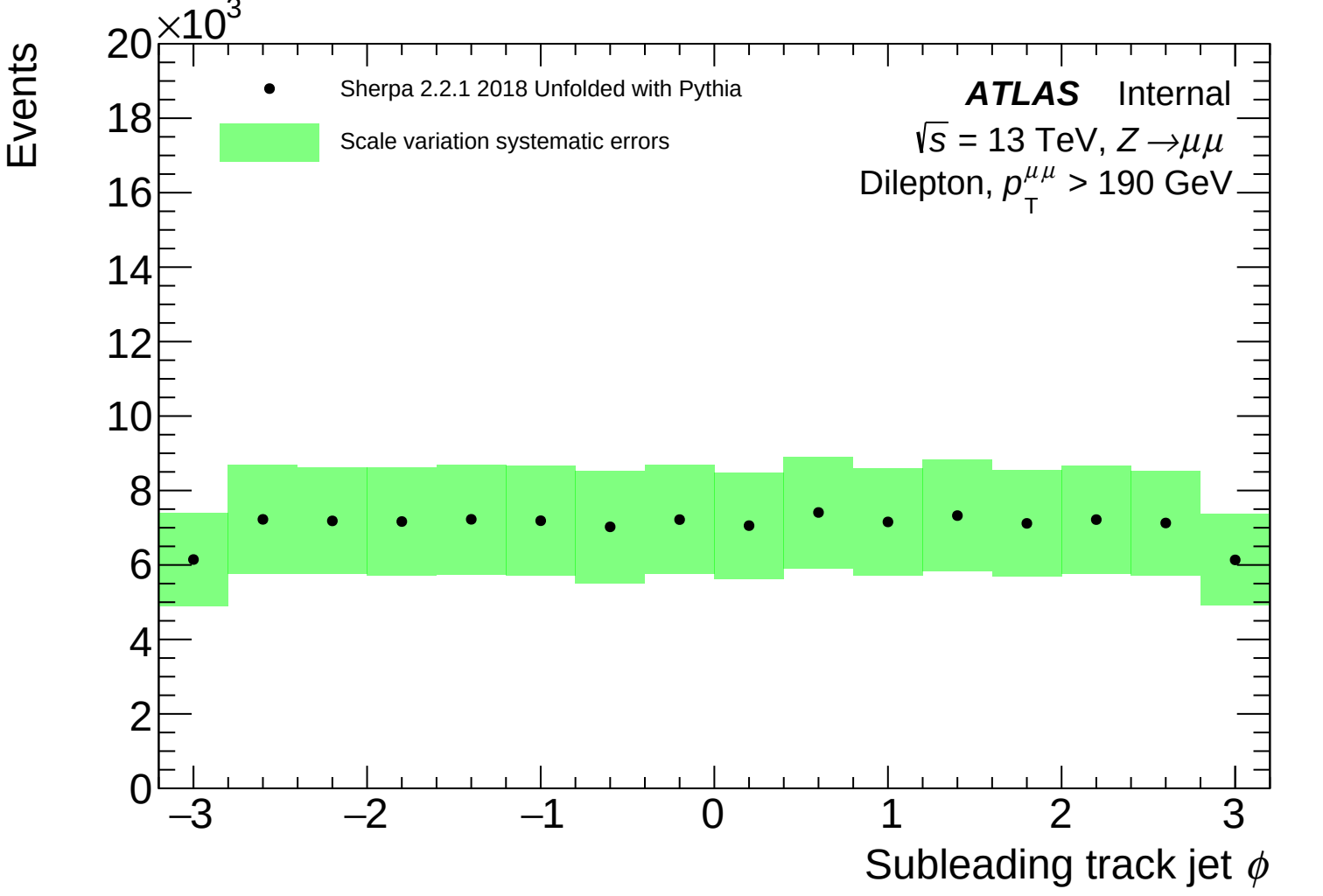

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

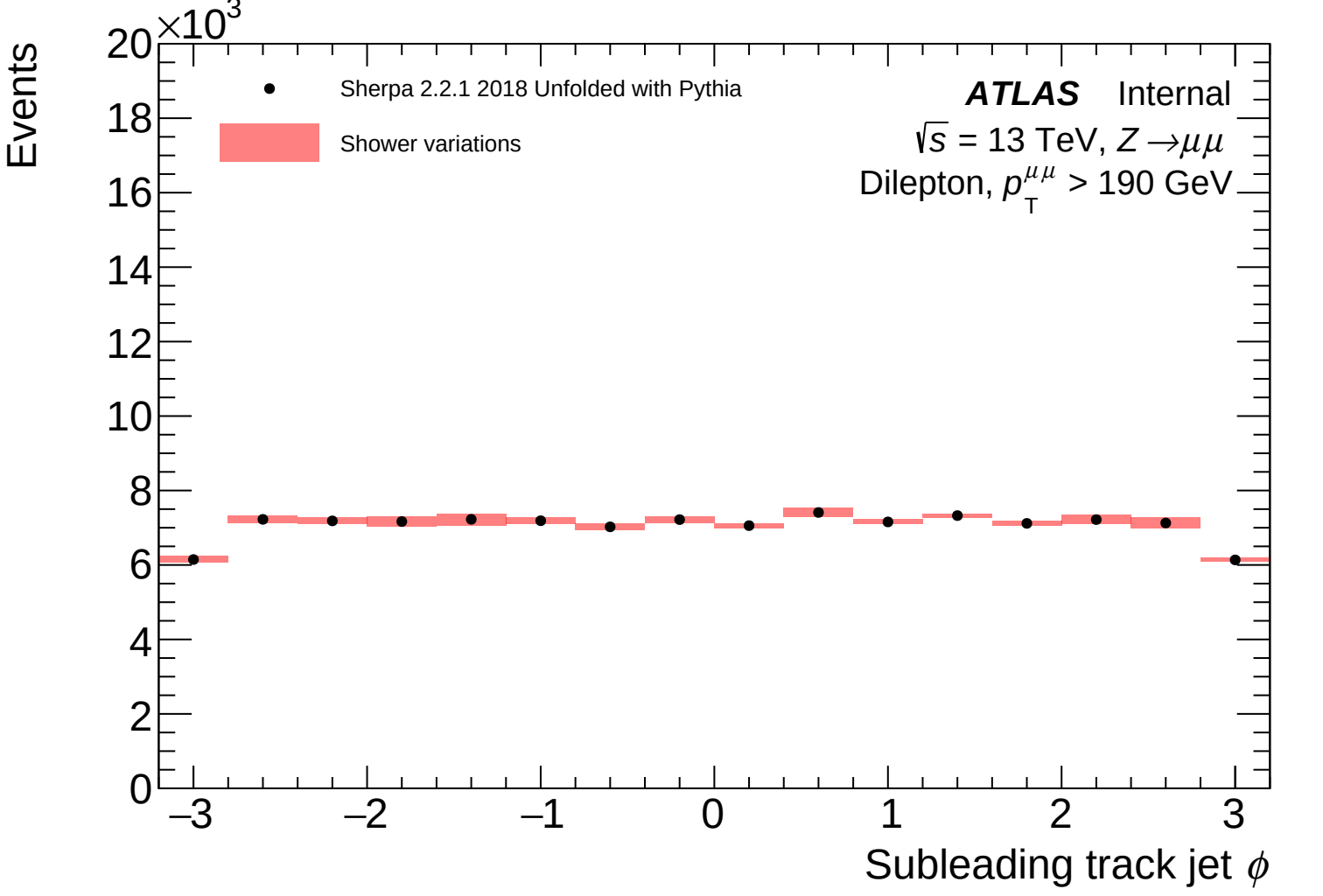

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

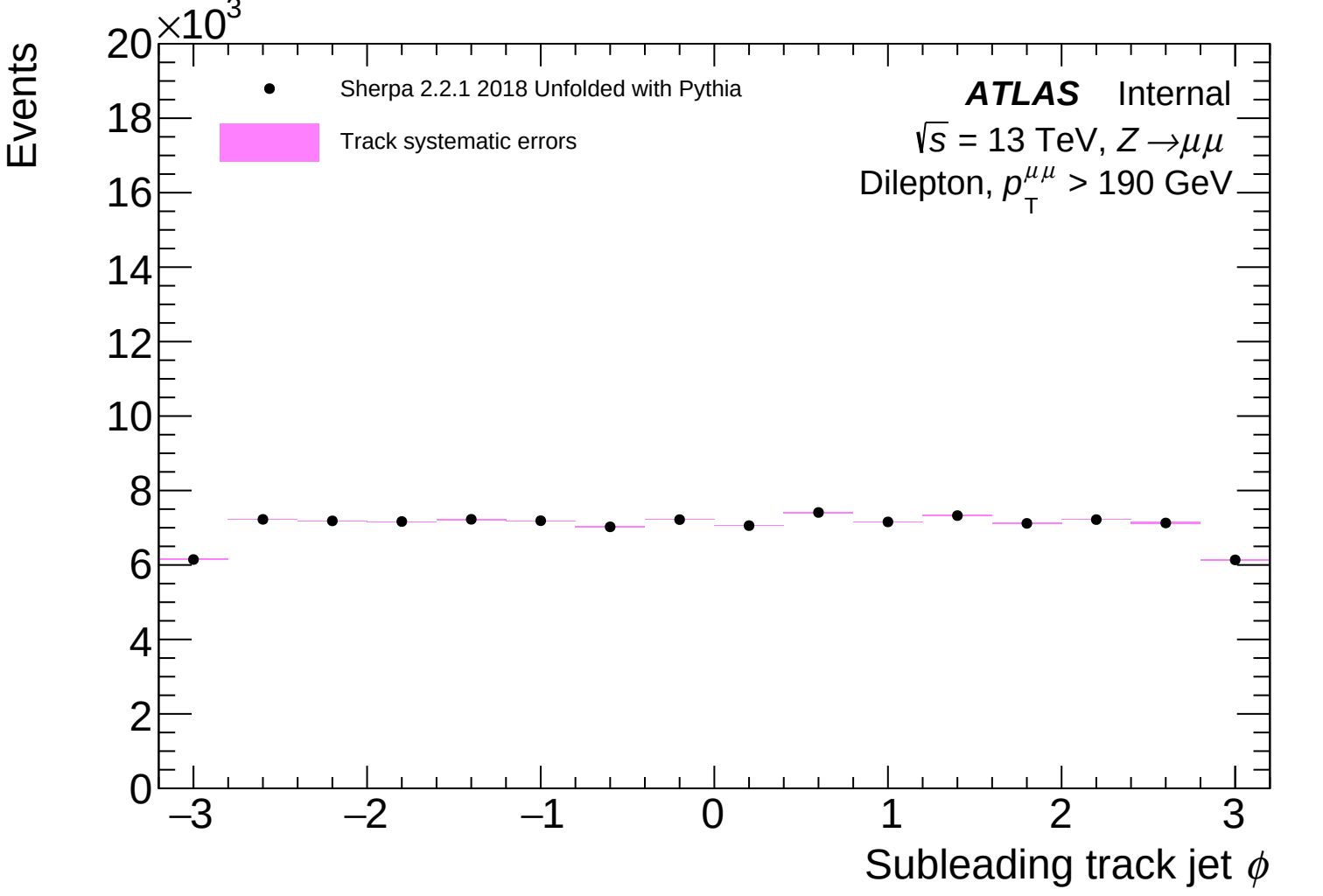

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

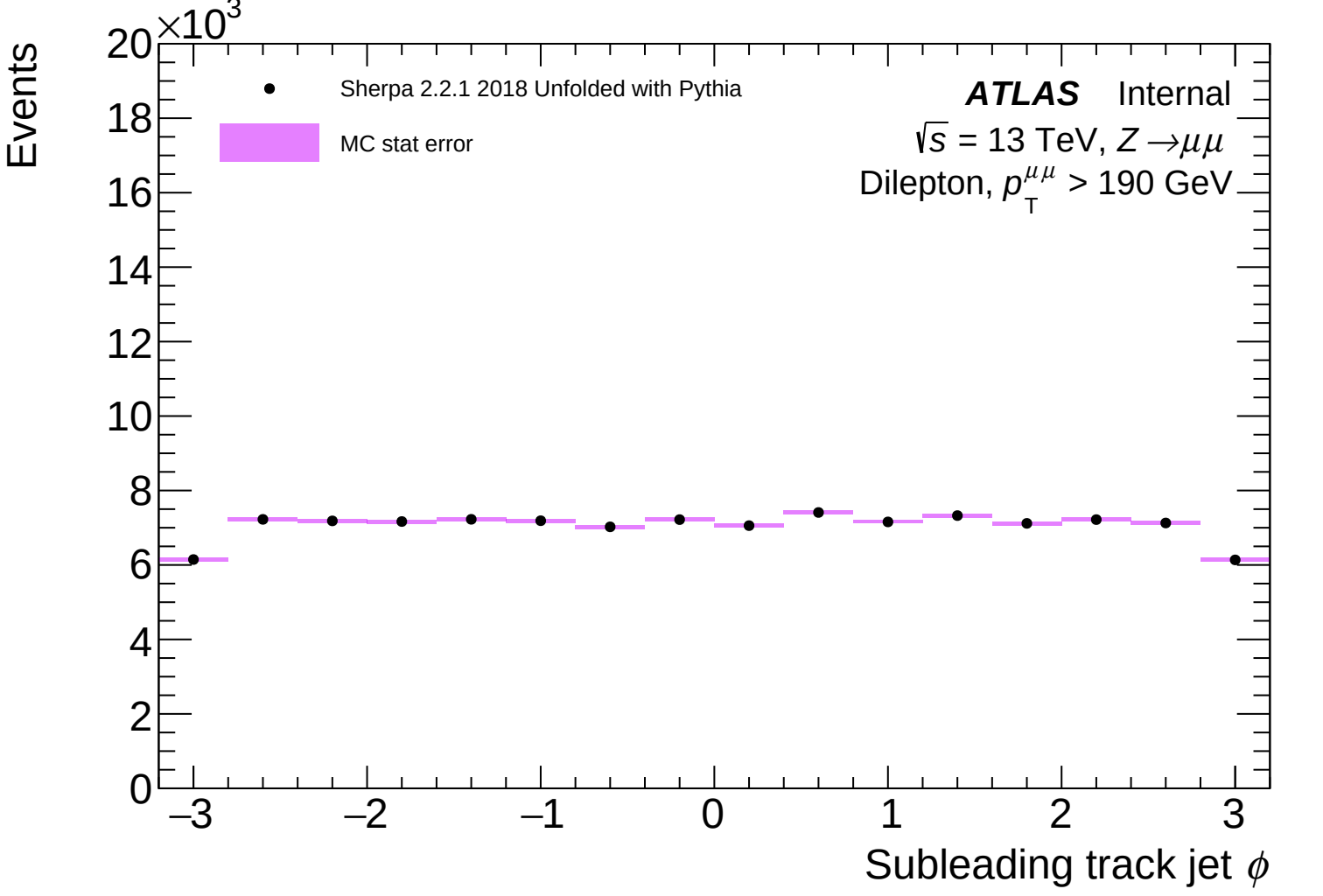

$\times 10^{3}$
30
25
20
15
10
5
0
$dN / d\phi_{j2}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet ϕ

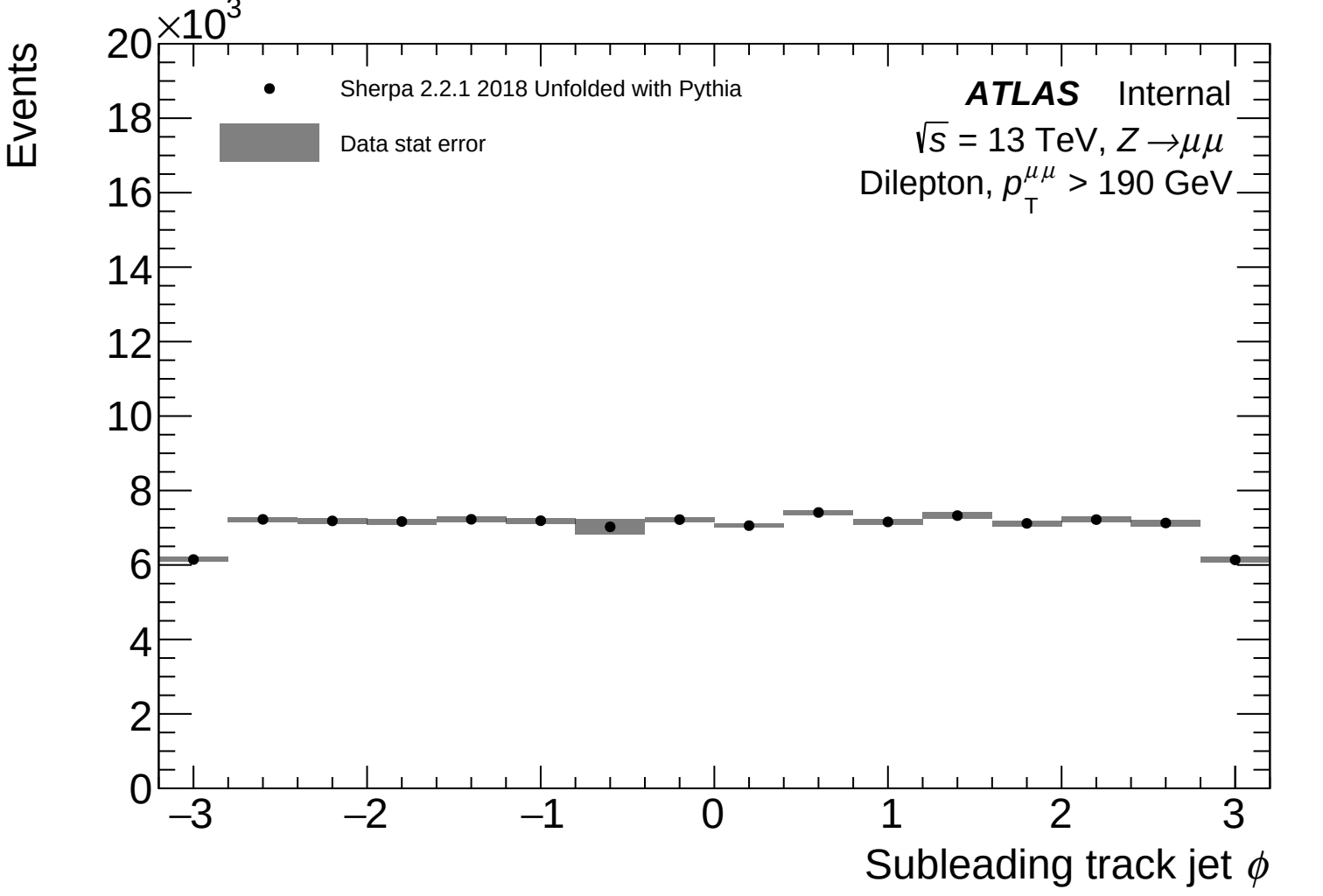

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

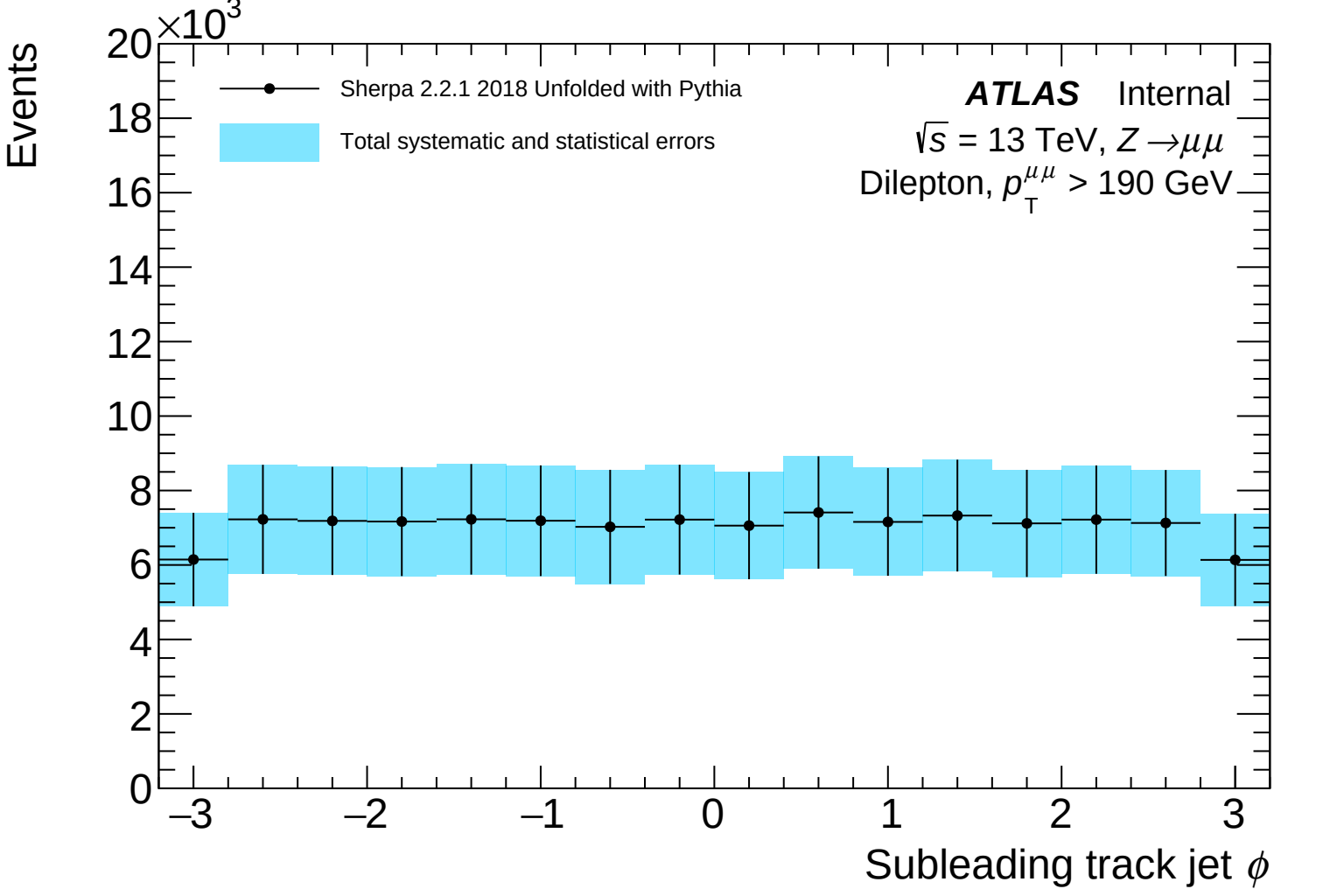

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

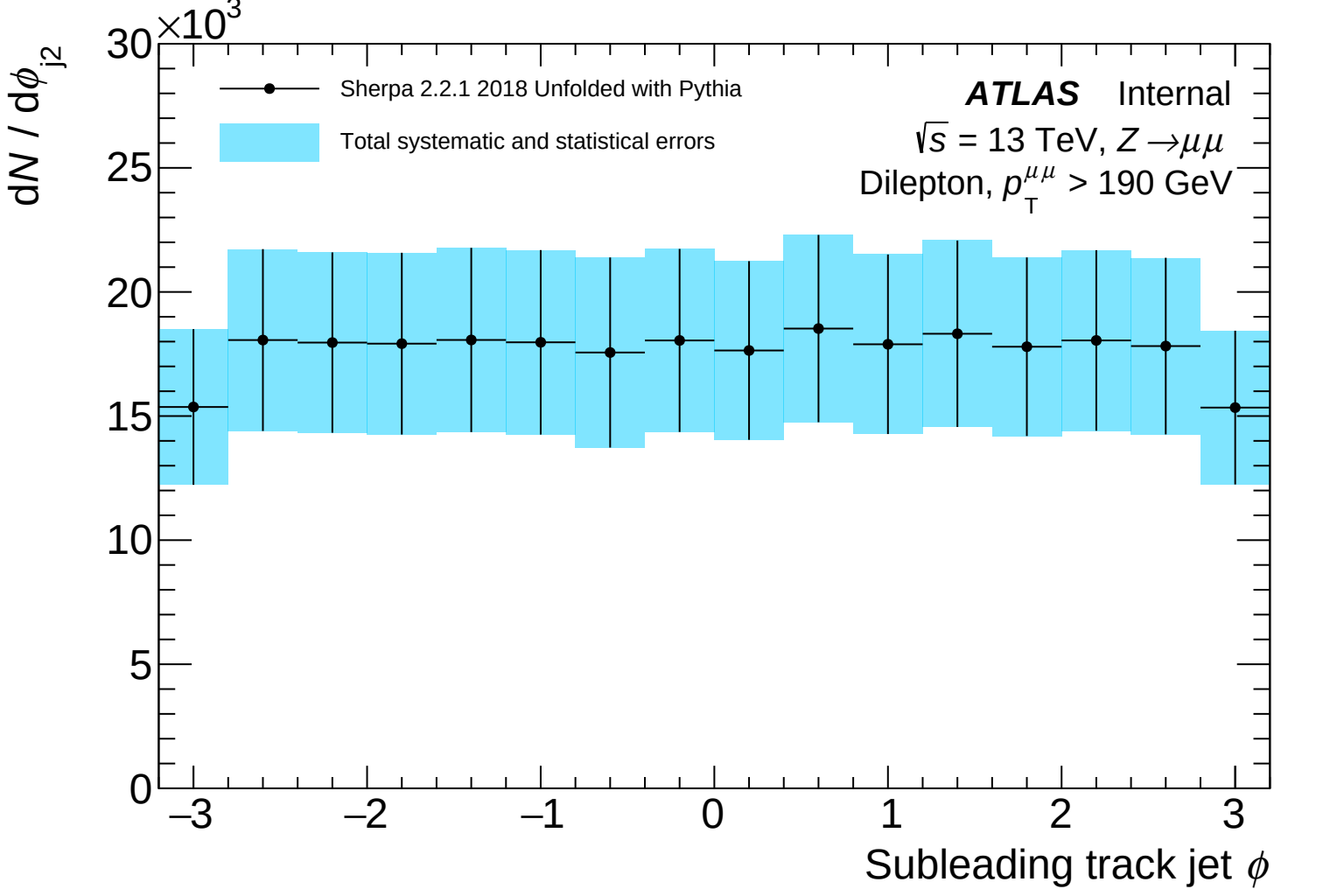

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

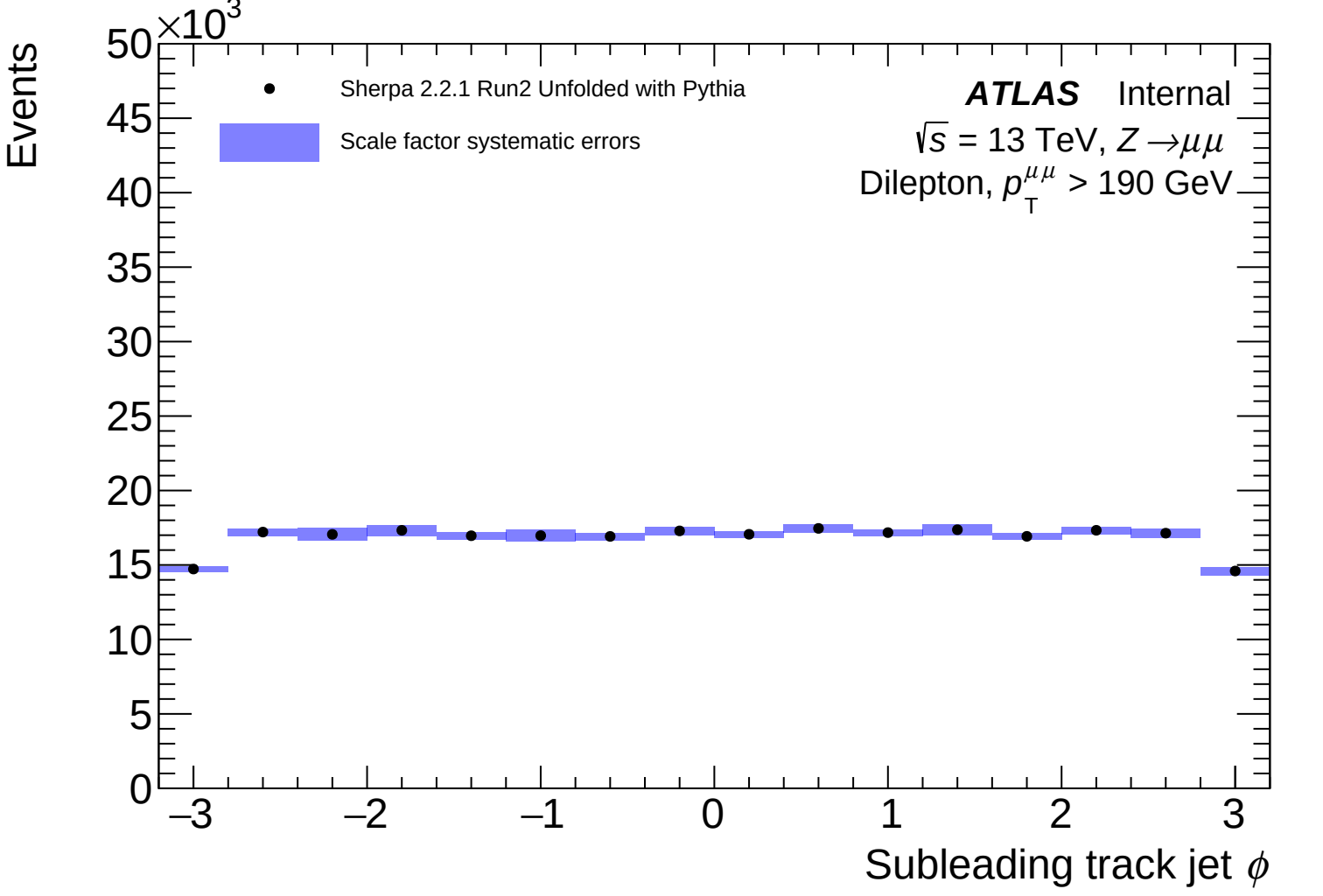

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

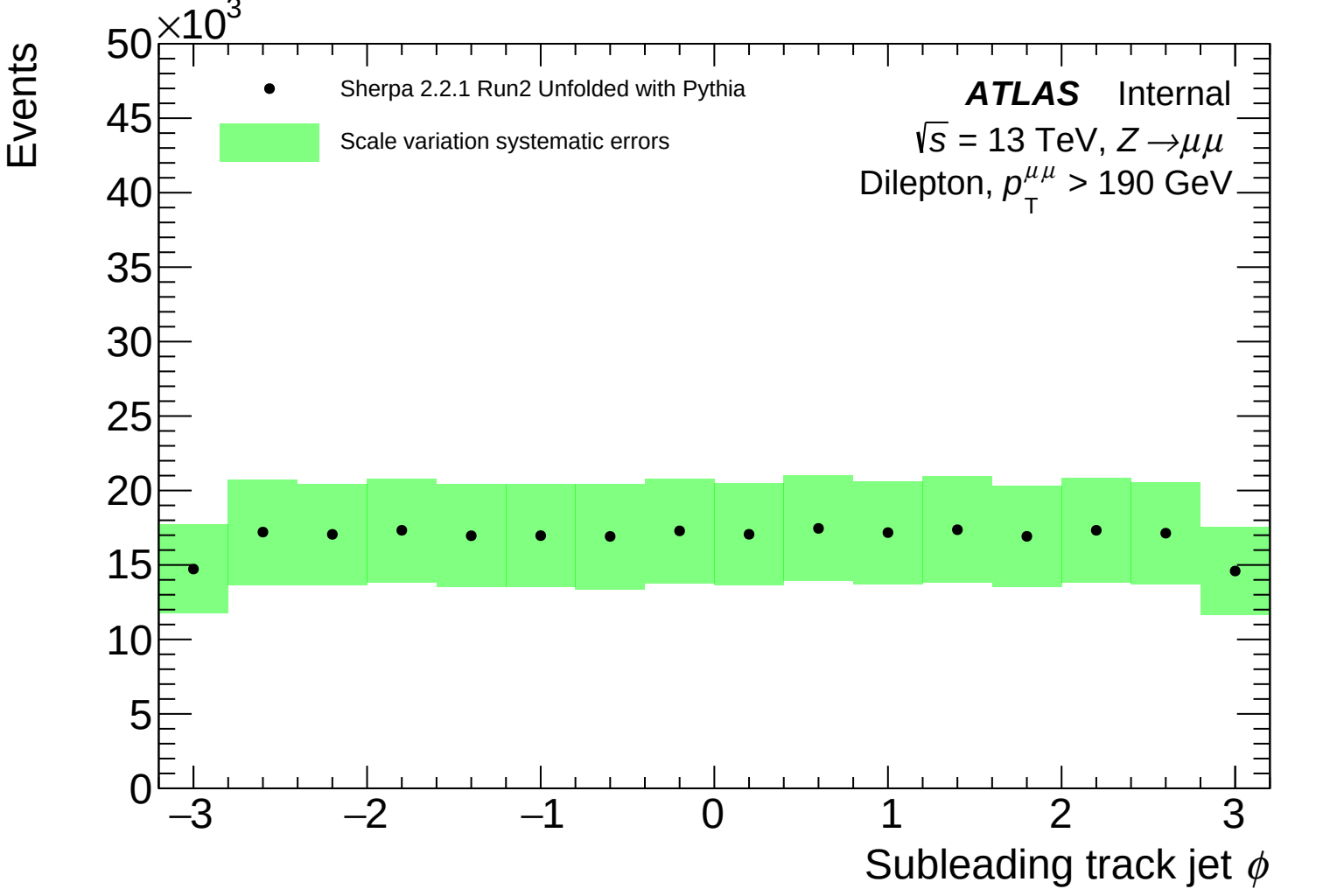

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

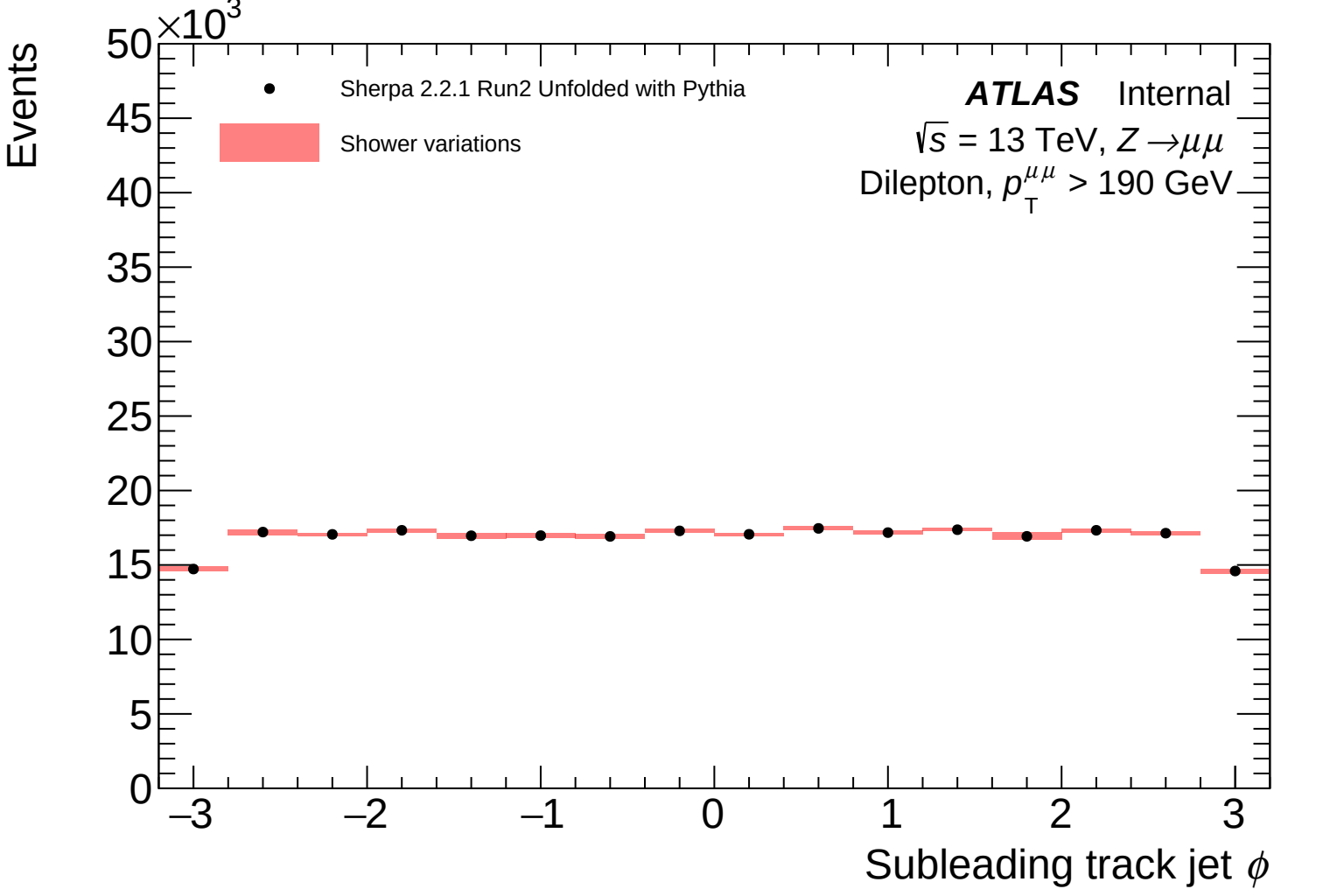

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

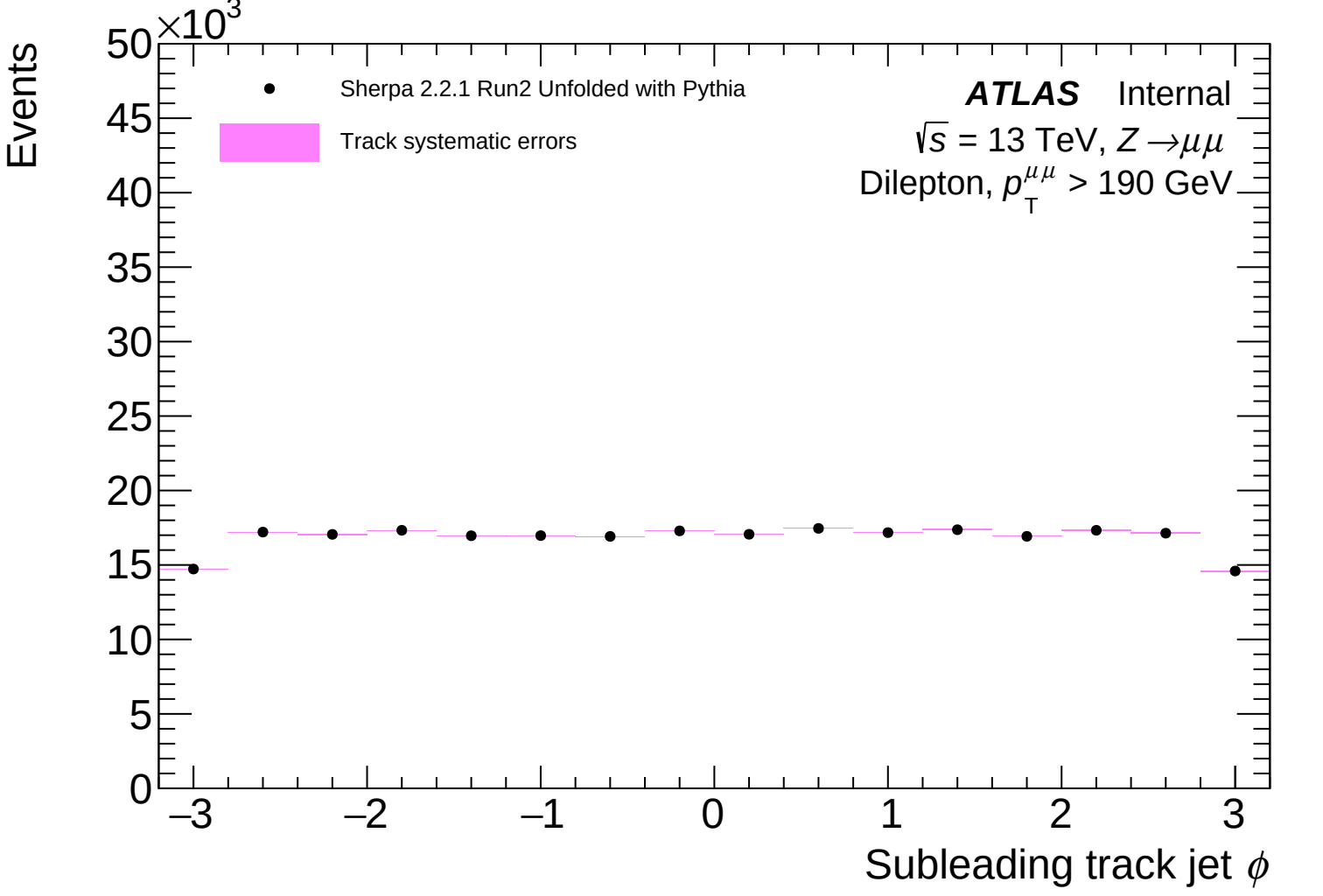

Events
×10^3
20
18
16
14
12
10
8
6
4
2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

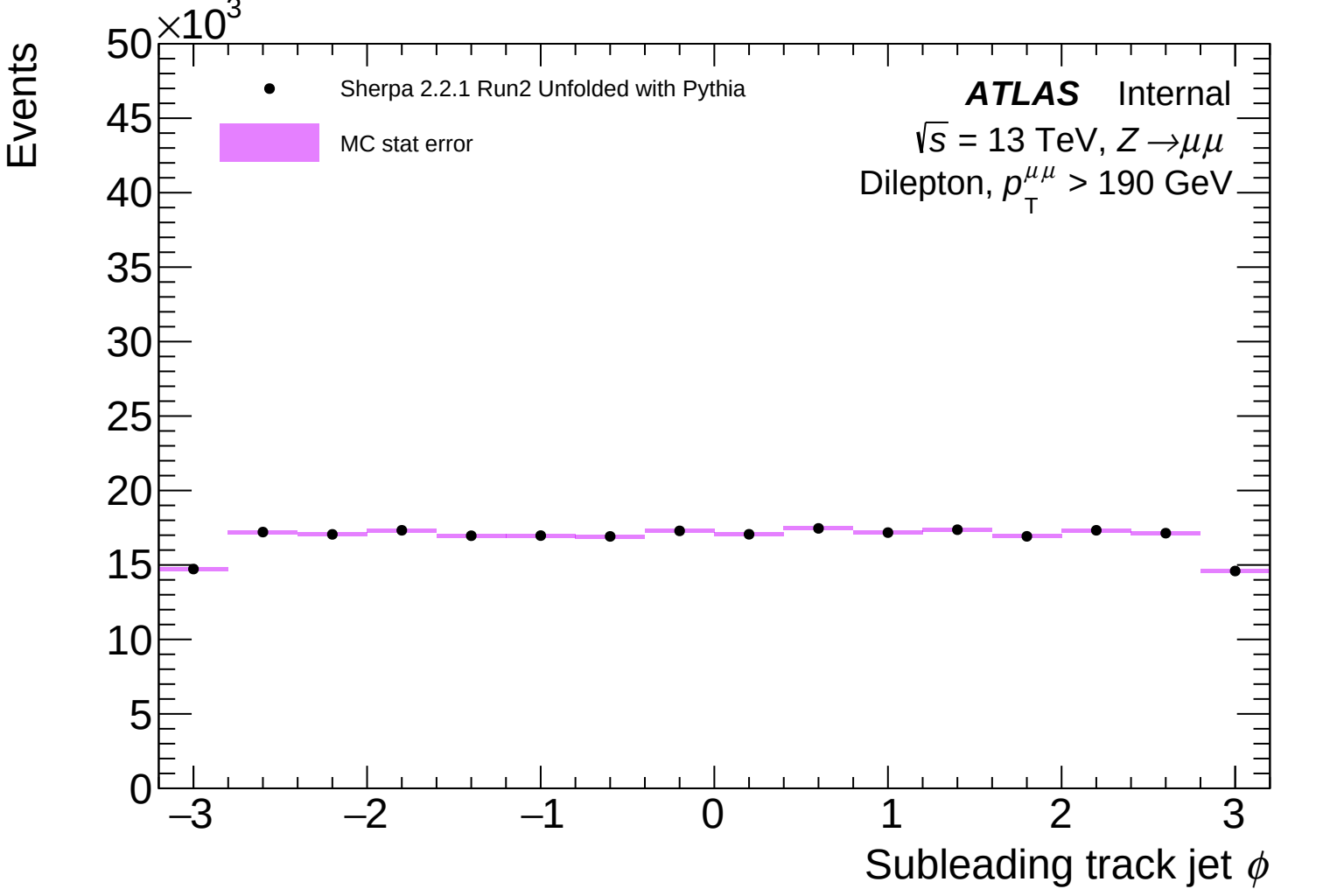

$\times 10^3$
30
25
20
15
10
5
0
dN / $d\phi_{j2}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet ϕ

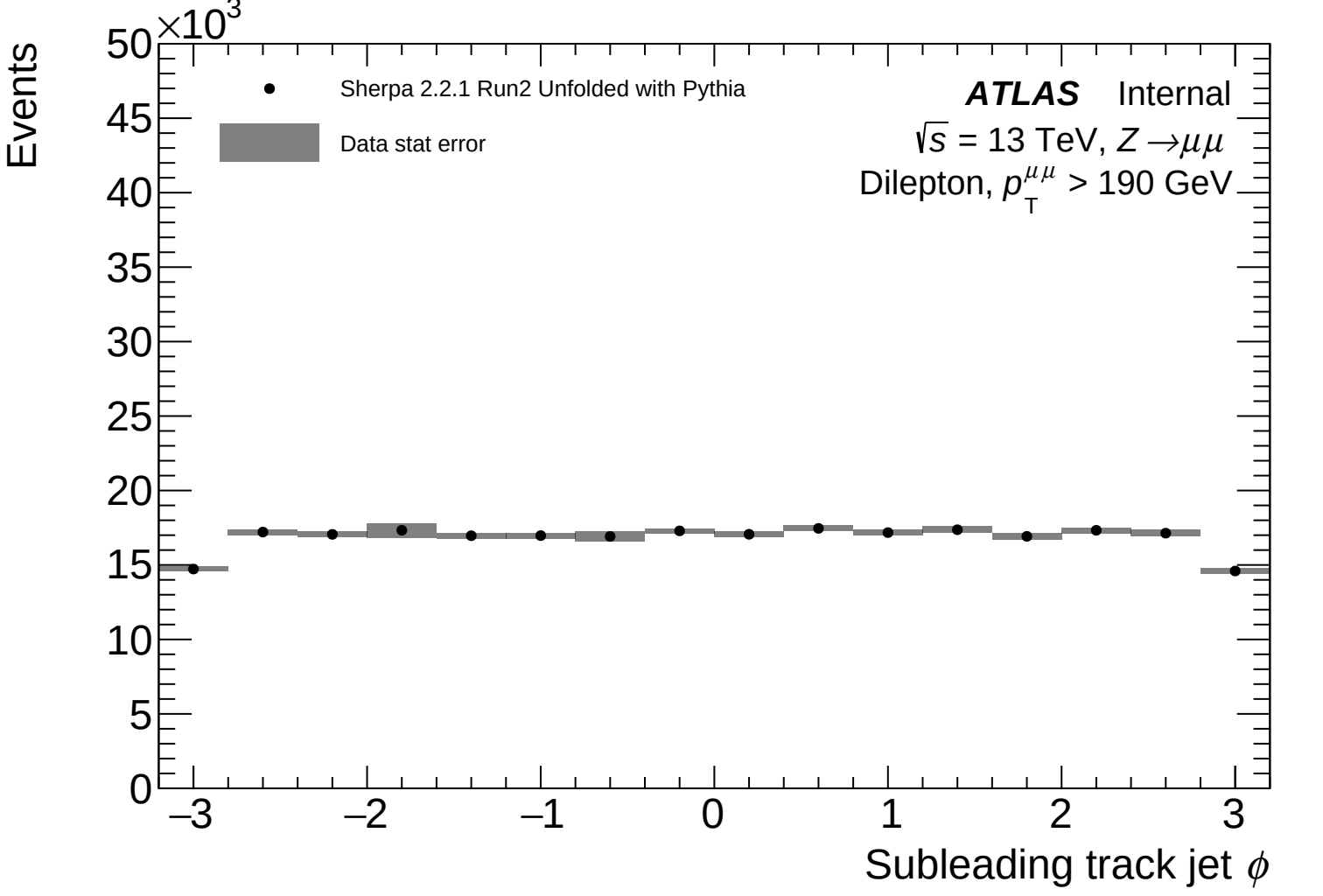

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

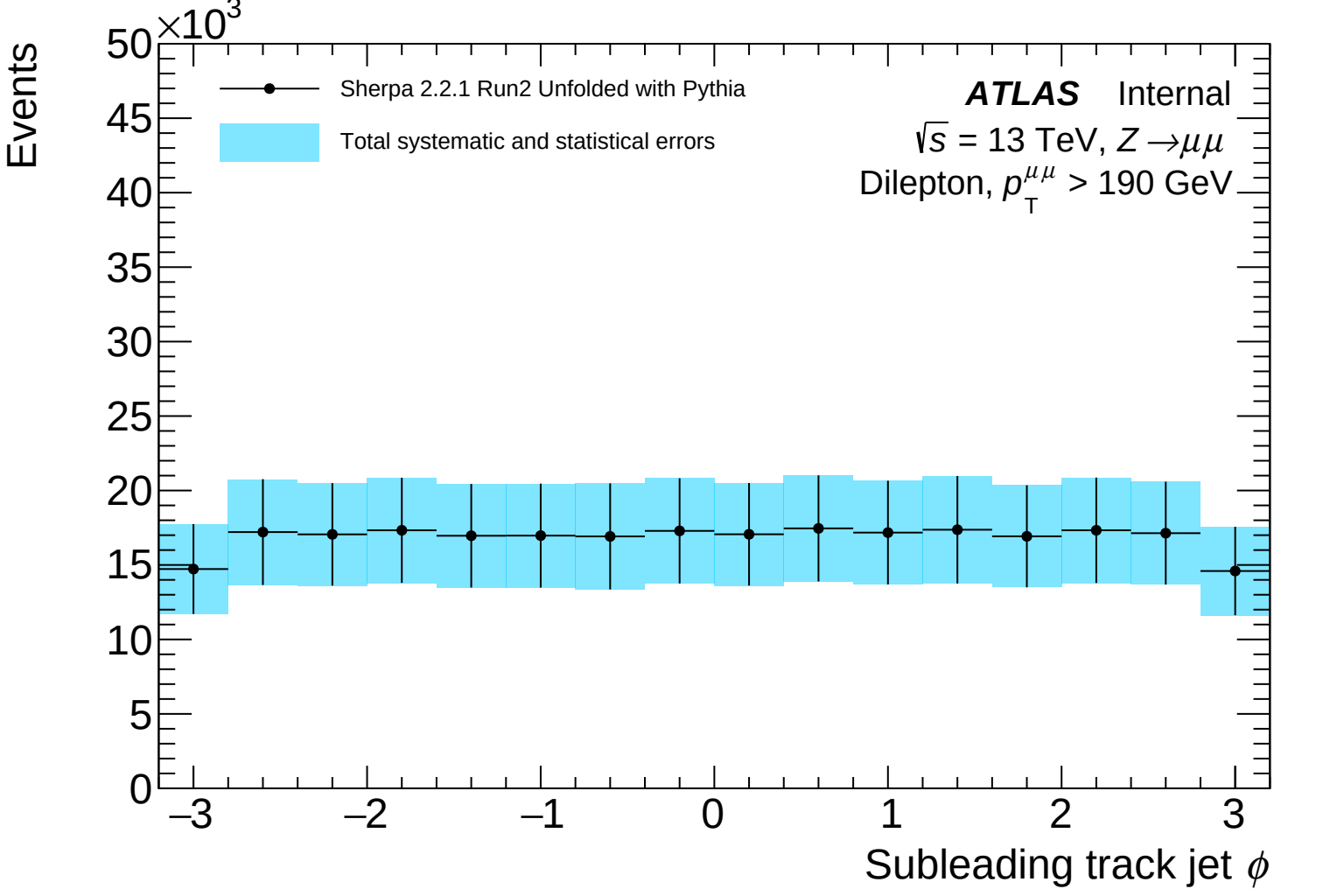

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

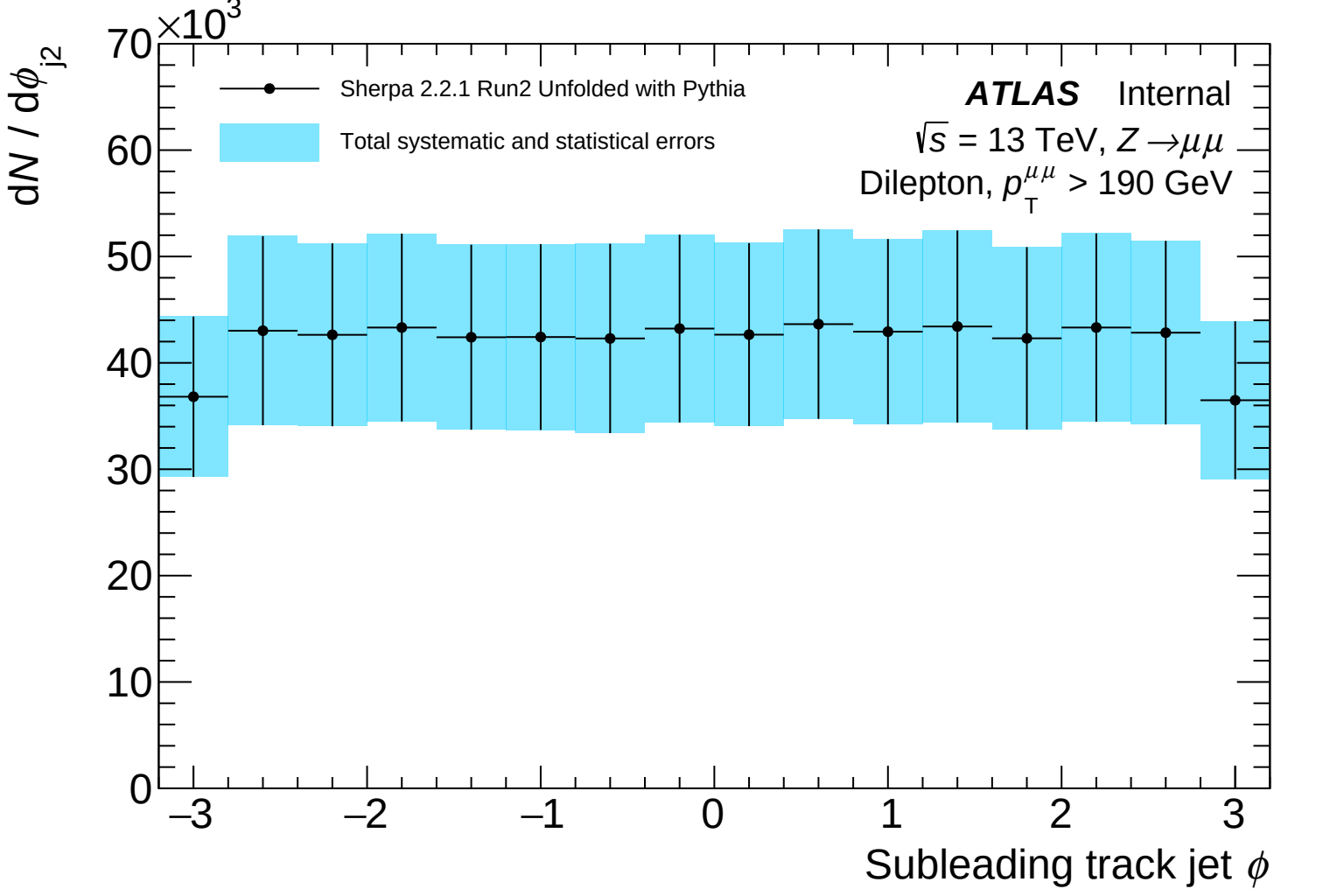

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

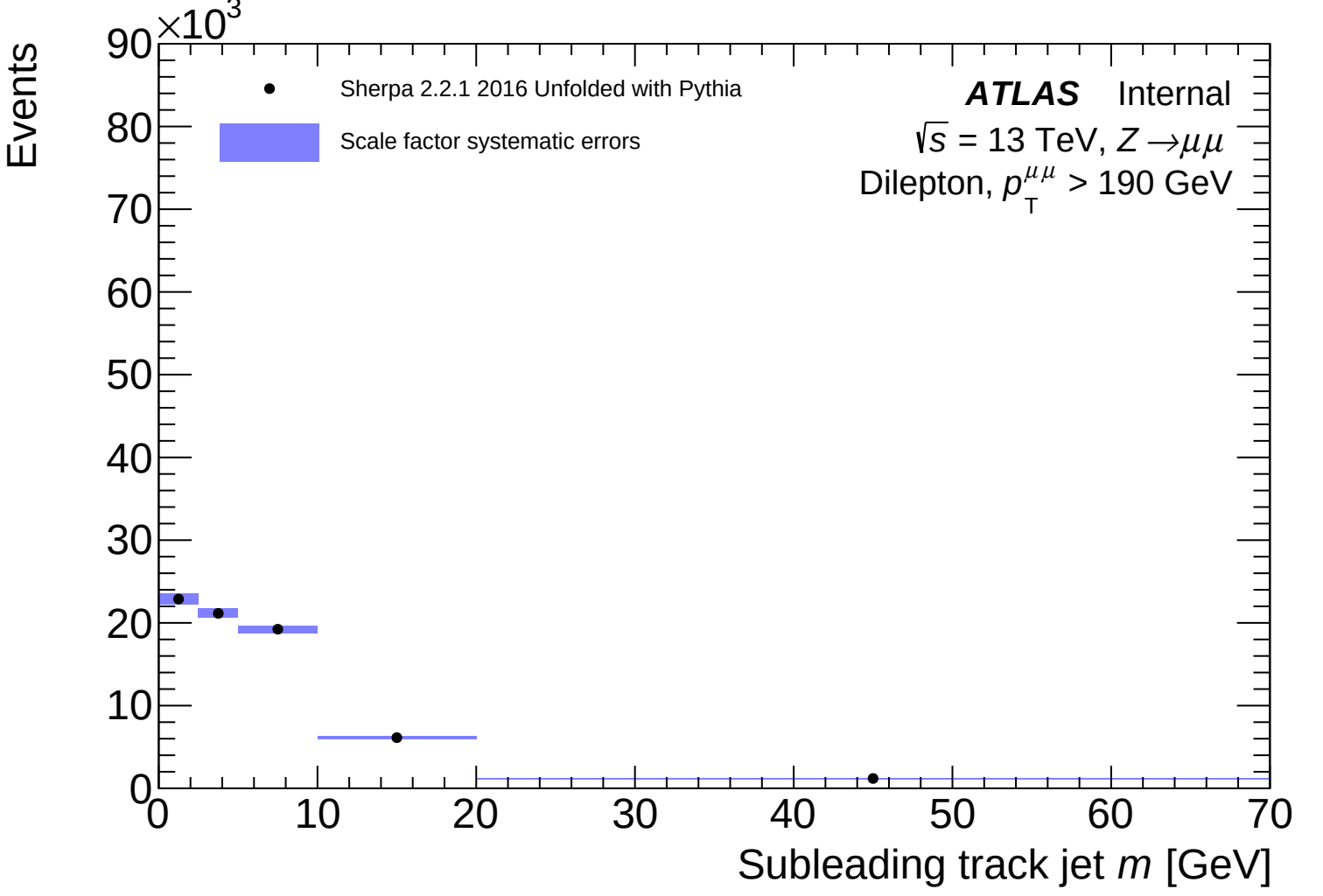

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

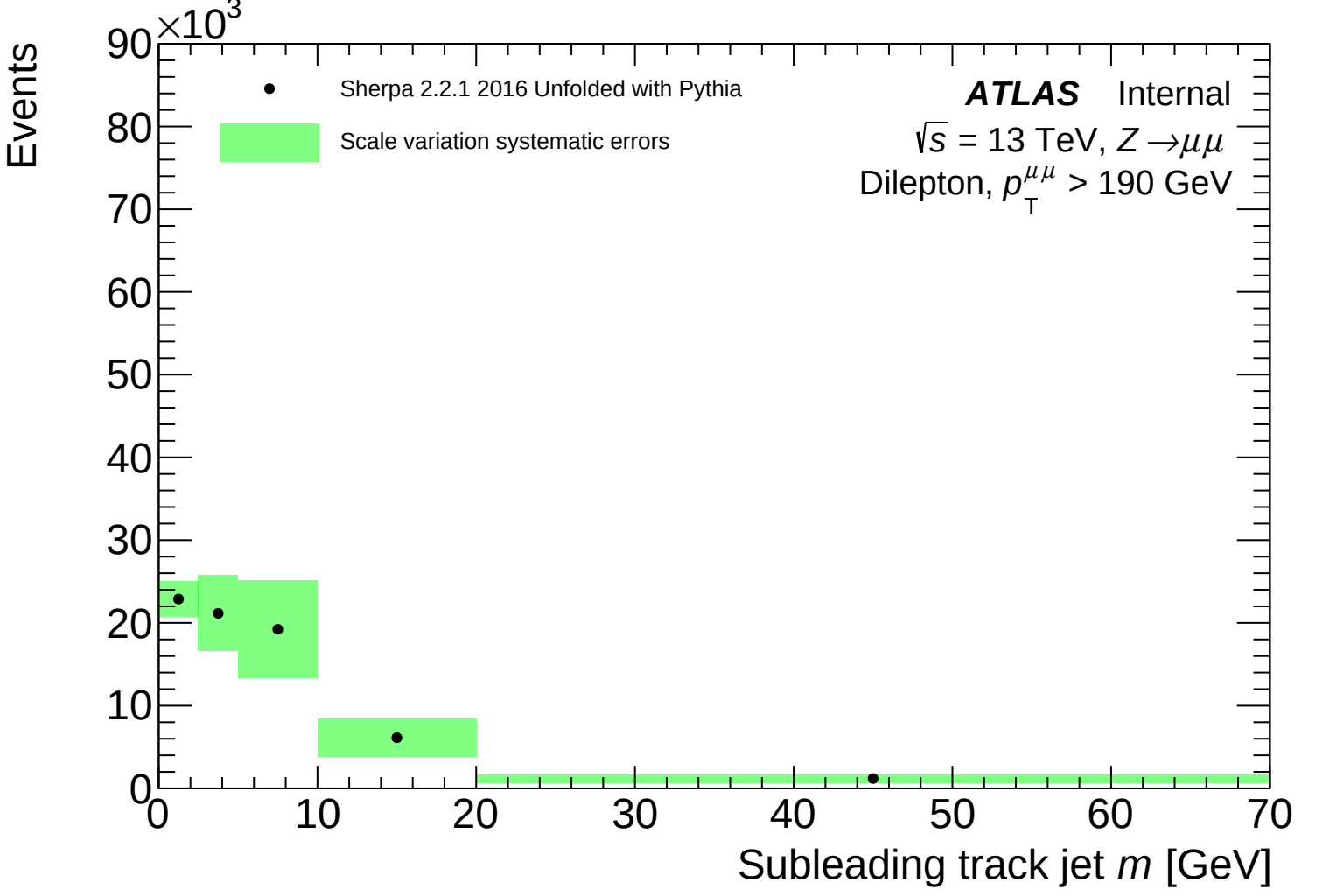

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

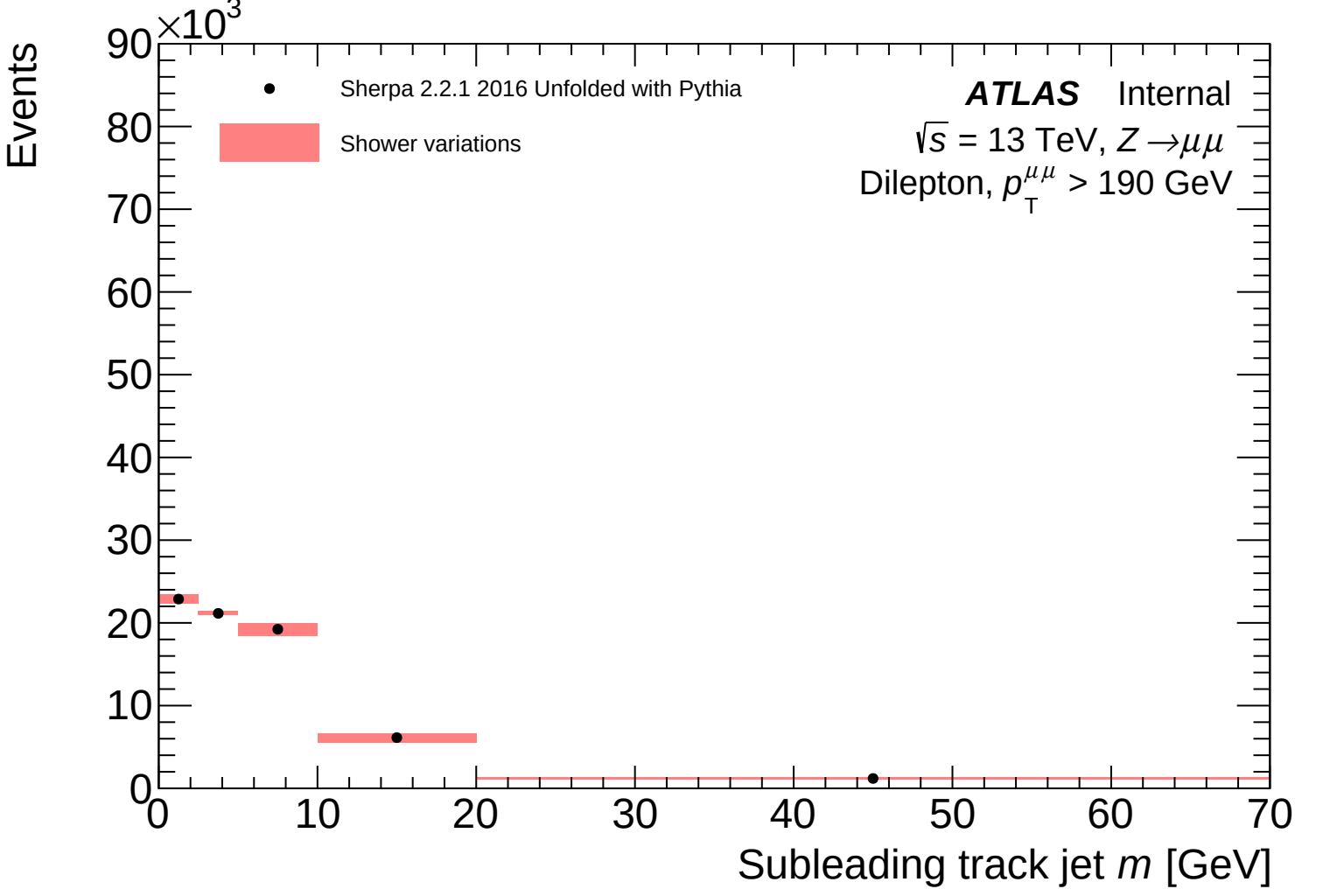

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

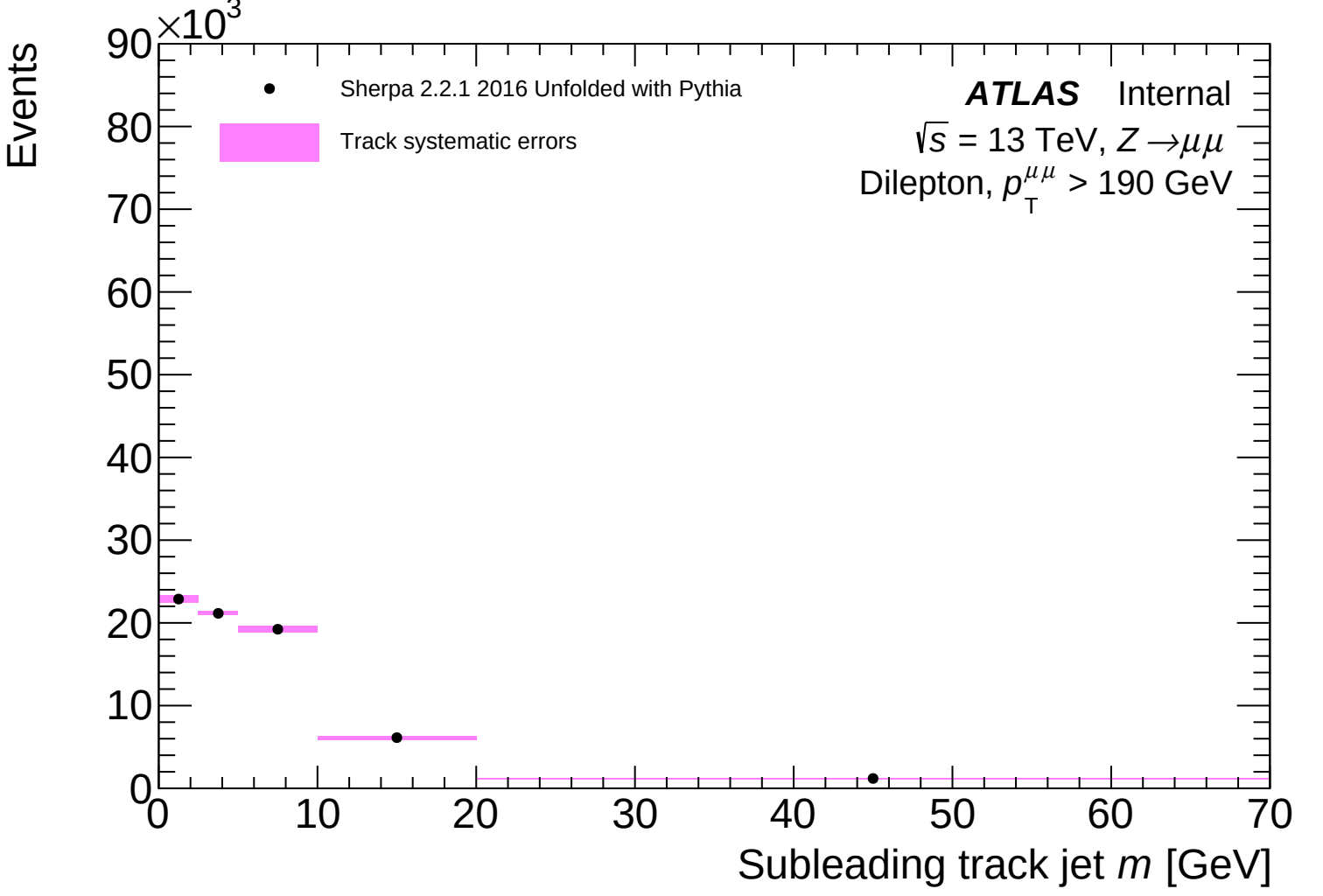

Events
×10^3
50
45
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet φ

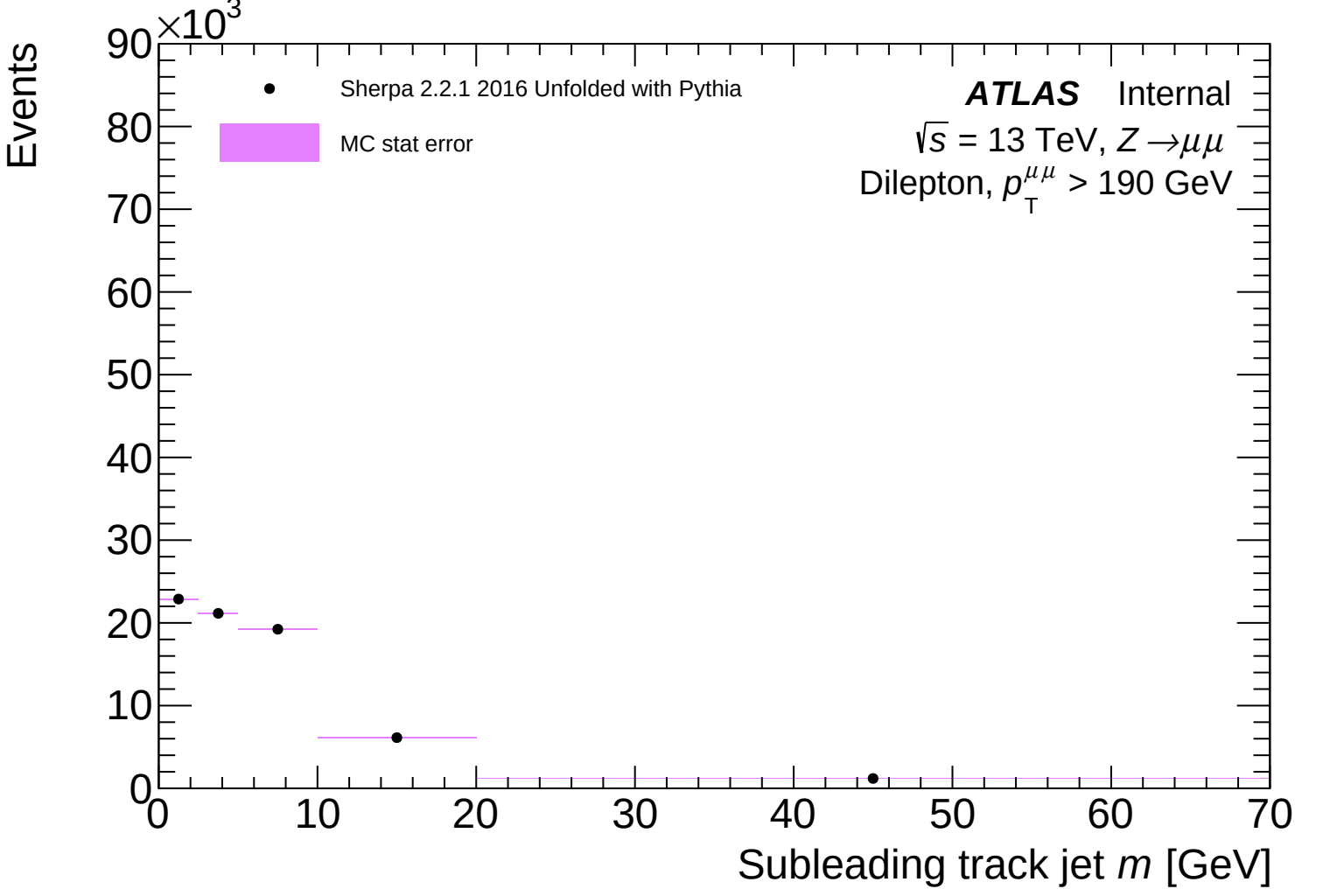

$\times 10^3$
70
60
50
40
30
20
10
0
dN / $d\phi_{j2}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
–3
–2
–1
0
1
2
3
Subleading track jet ϕ

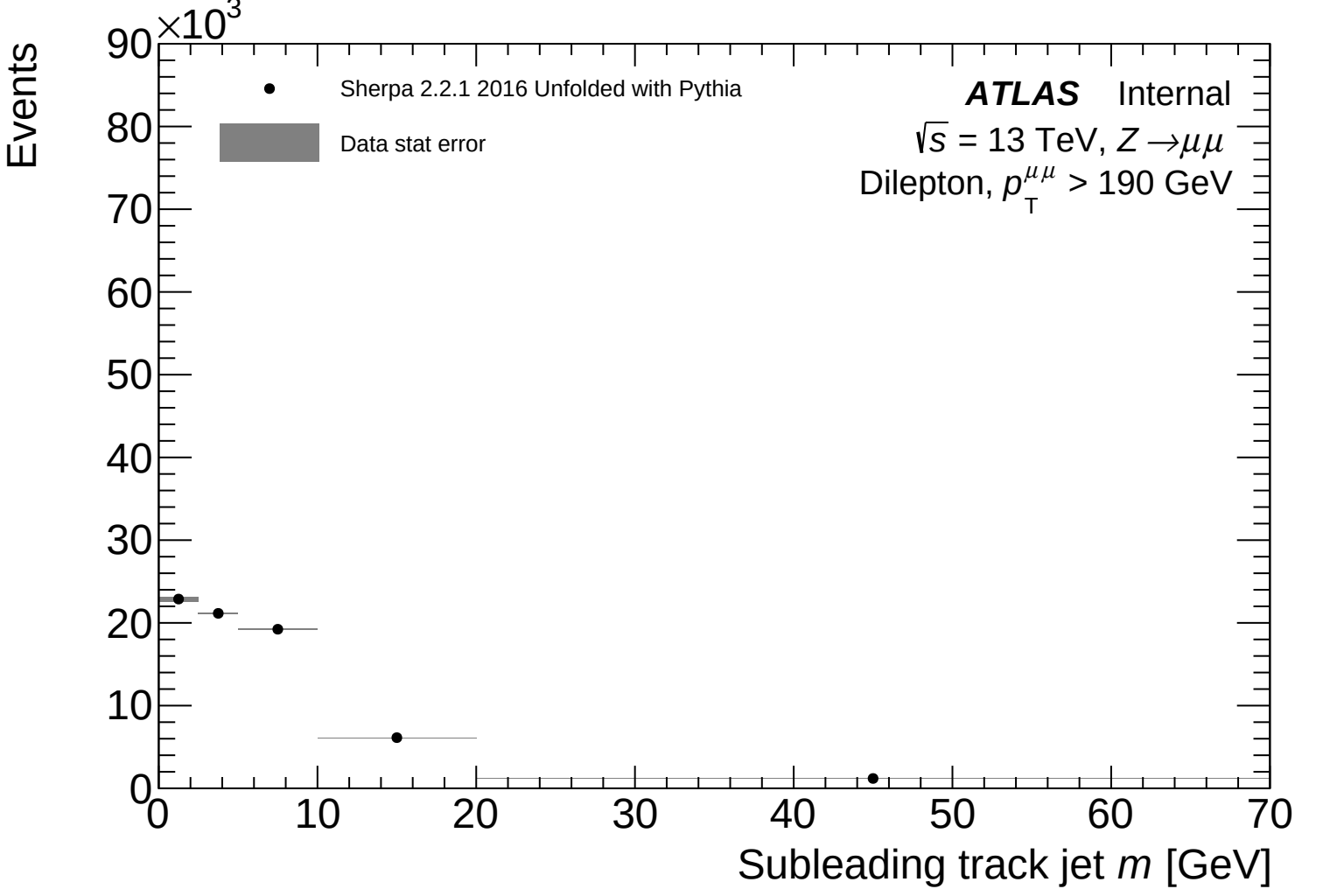

Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]


Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
×10^3
90
80
70
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]


Events
$\times 10^3$
90
80
70
60
50
40
30
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10
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0
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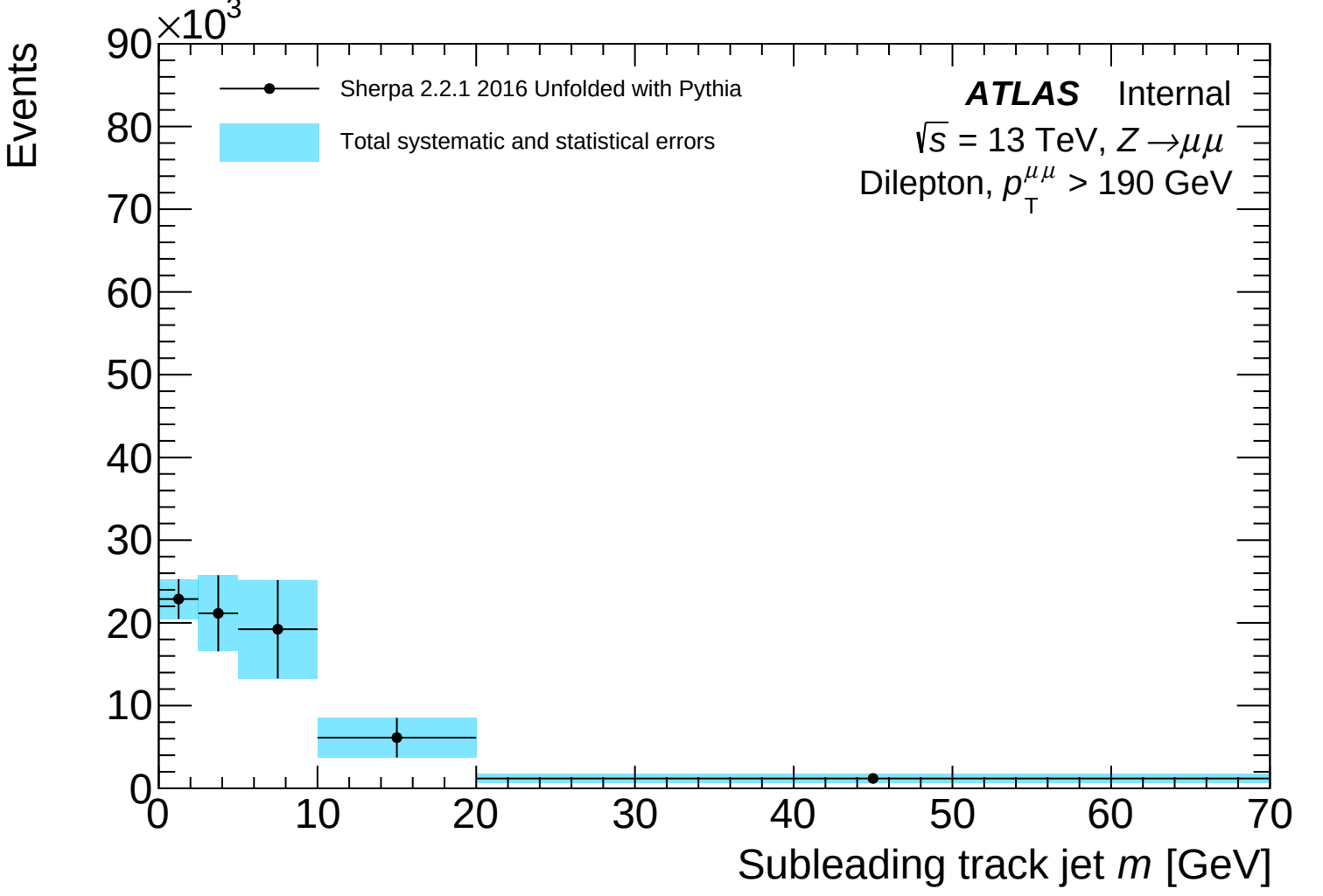
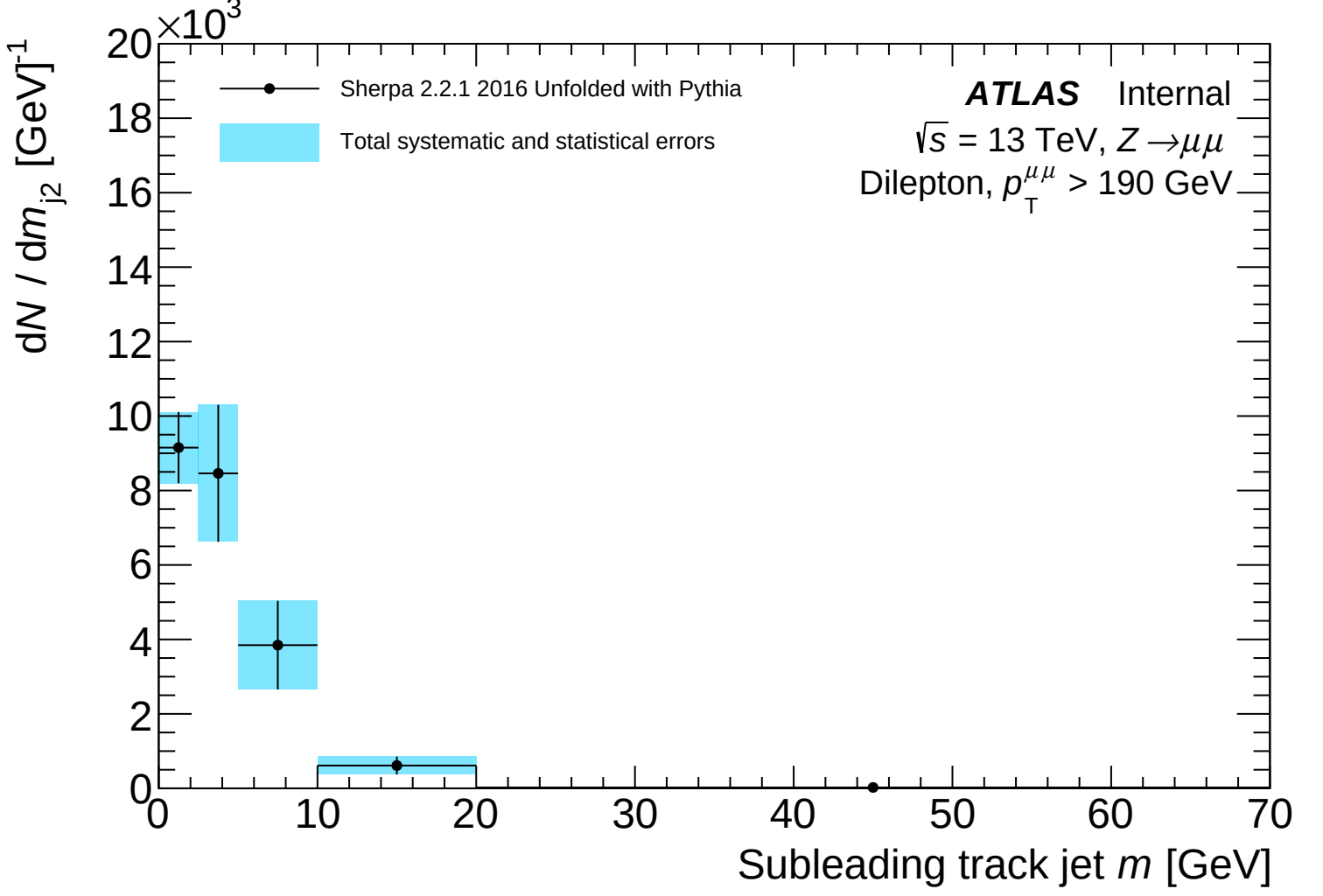
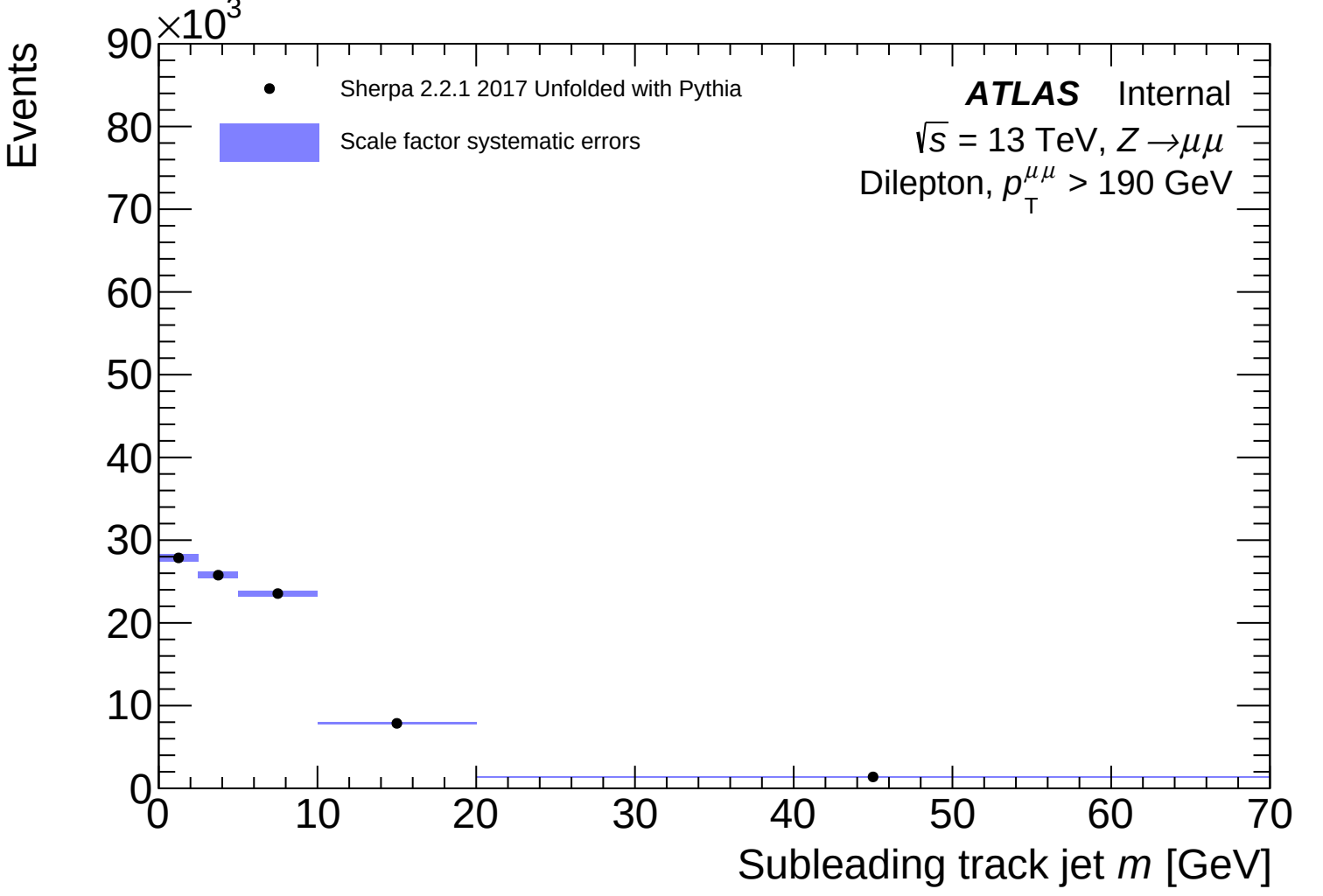
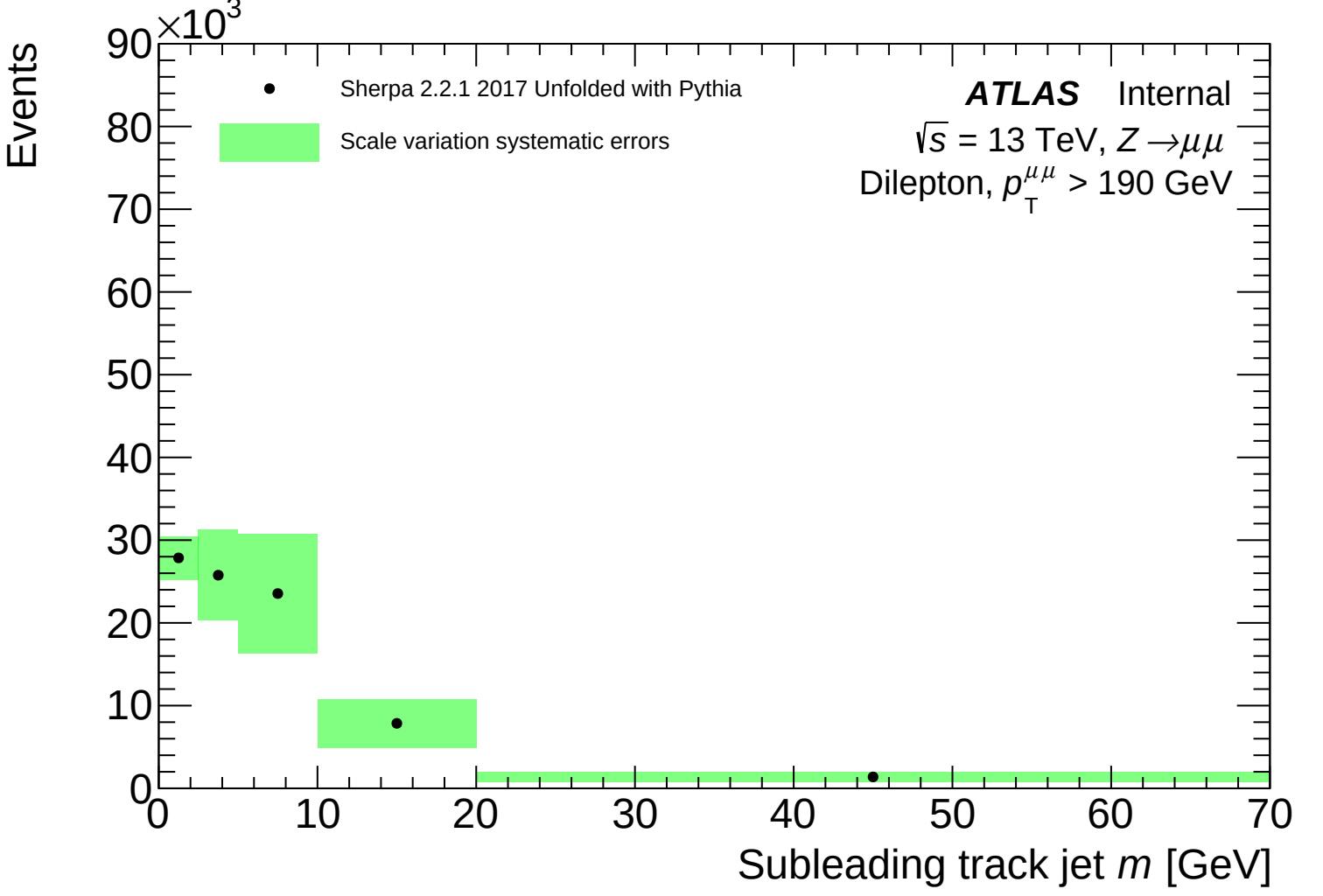
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
×10^3
dN / dm_j2 [GeV]^-1
Subleading track jet m [GeV]
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70


Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
90
80
70
60
50
40
30
20
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0
0
10
20
30
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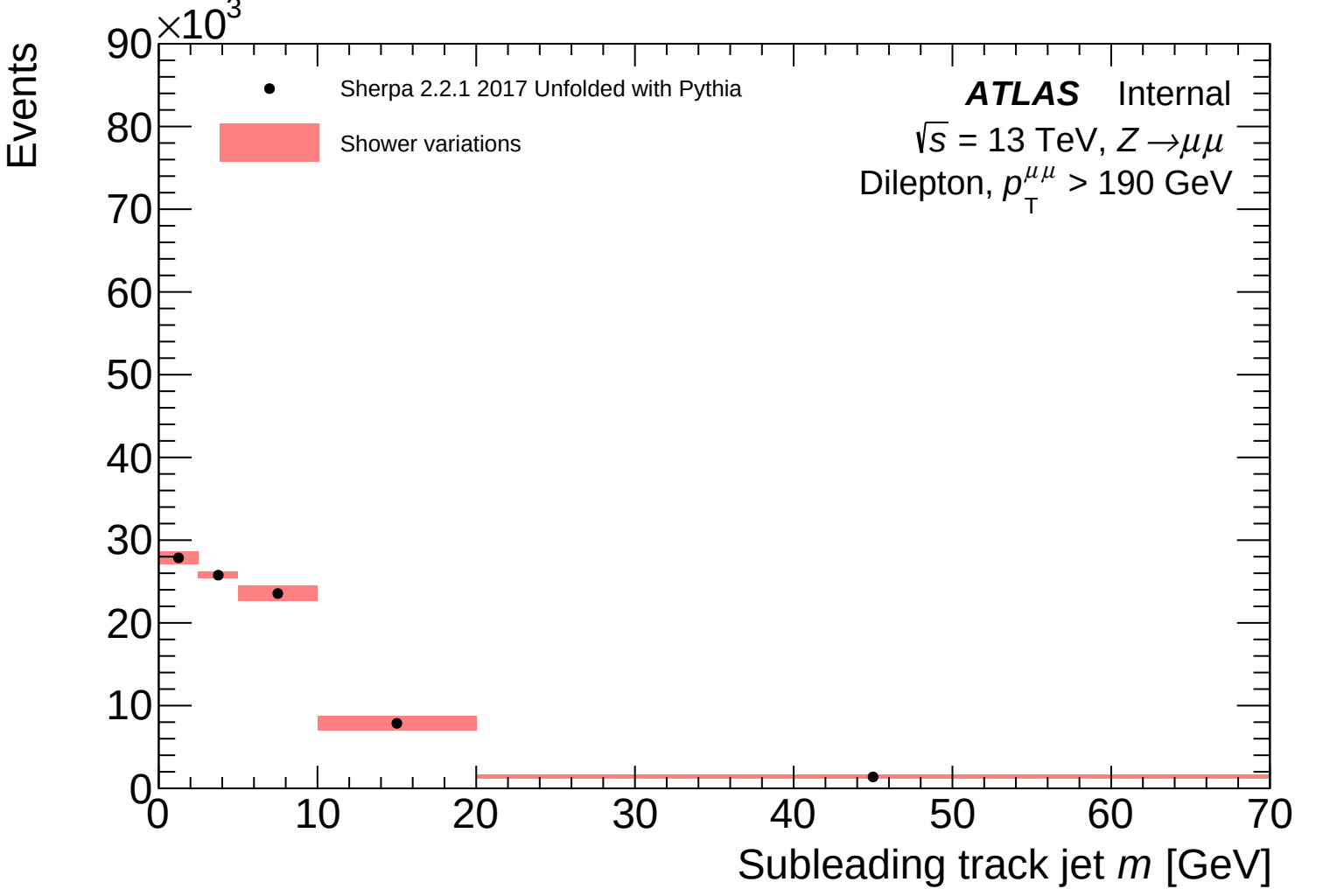
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
90
80
70
60
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40
30
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0
0
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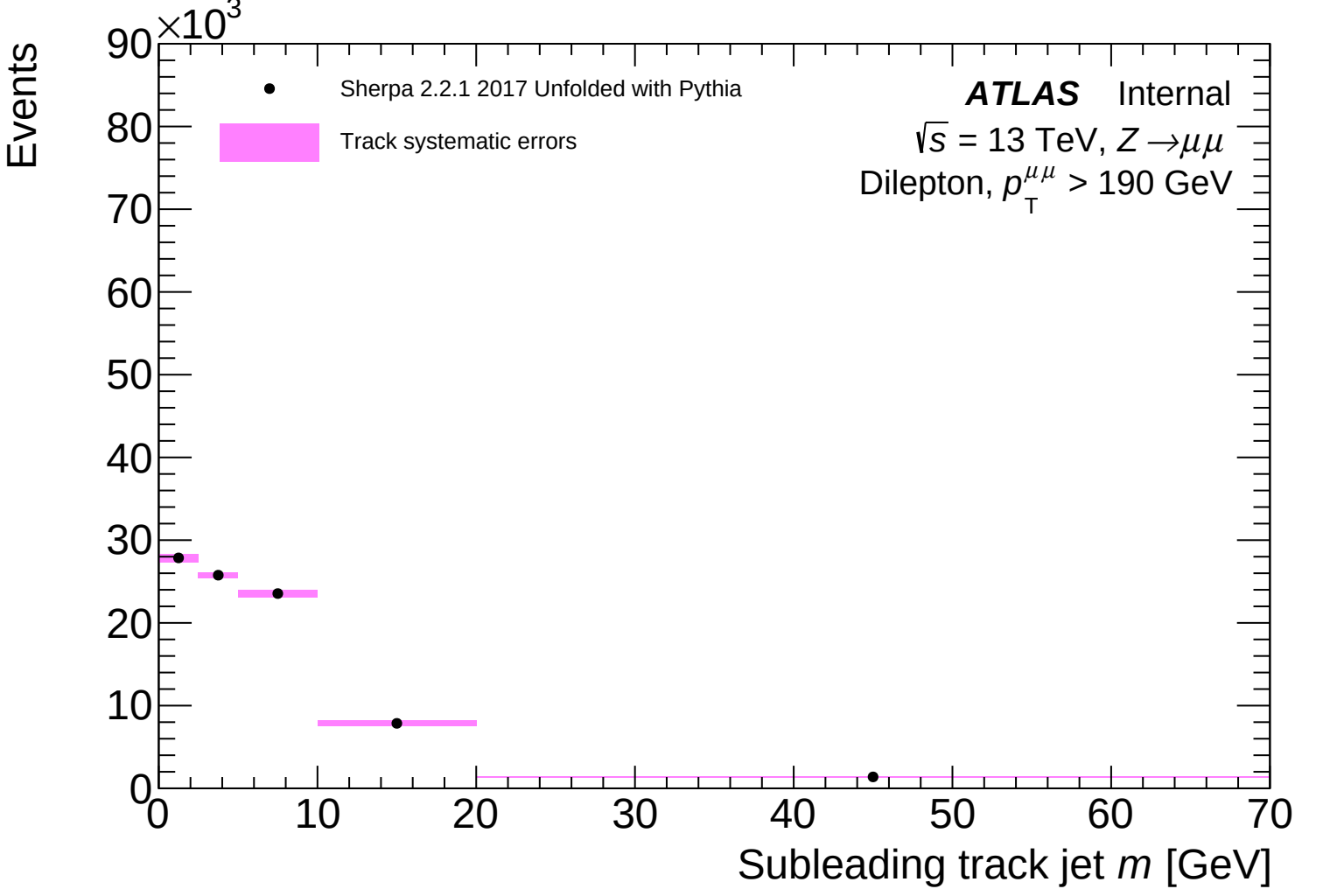
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
90
80
70
60
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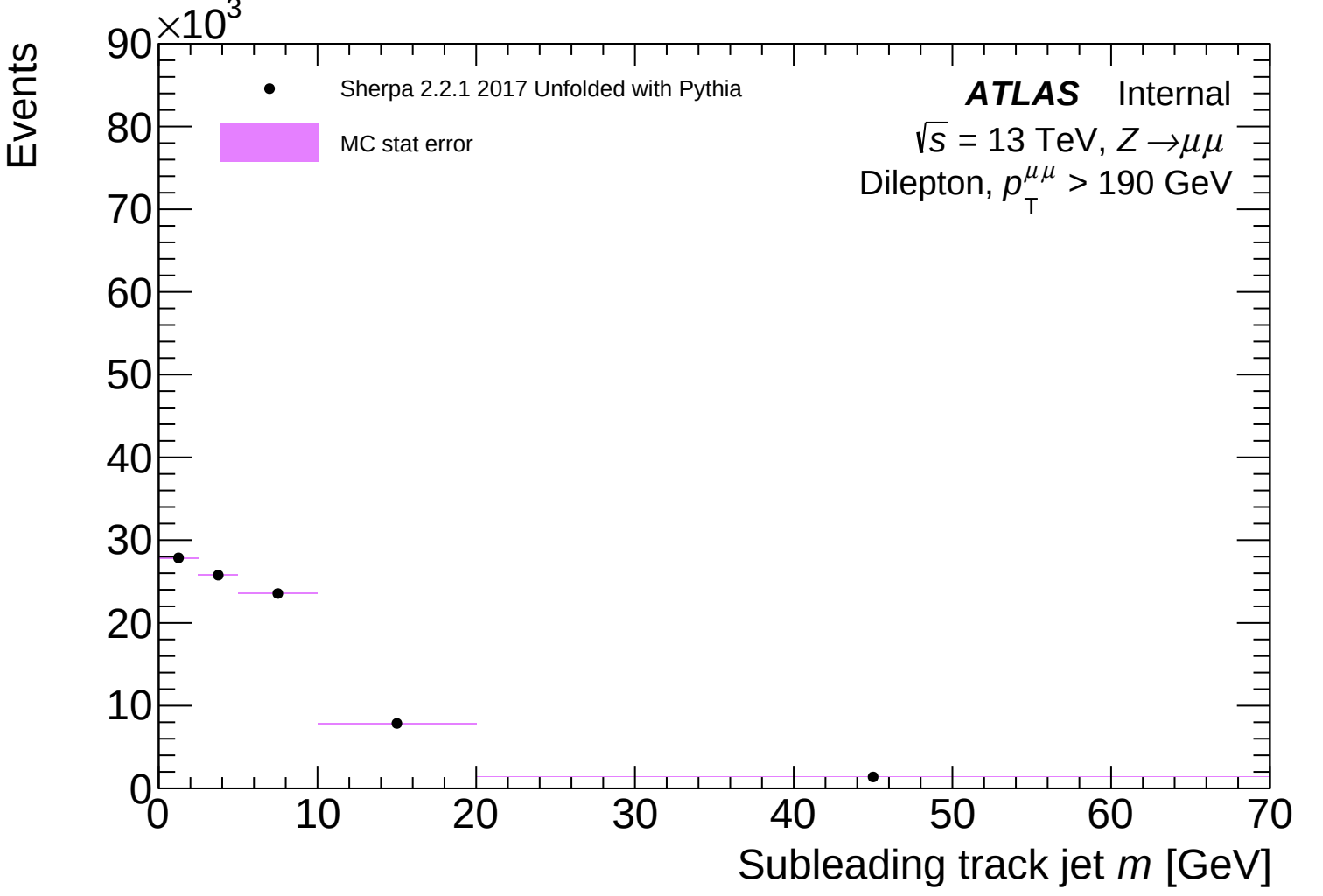
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
90
80
70
60
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40
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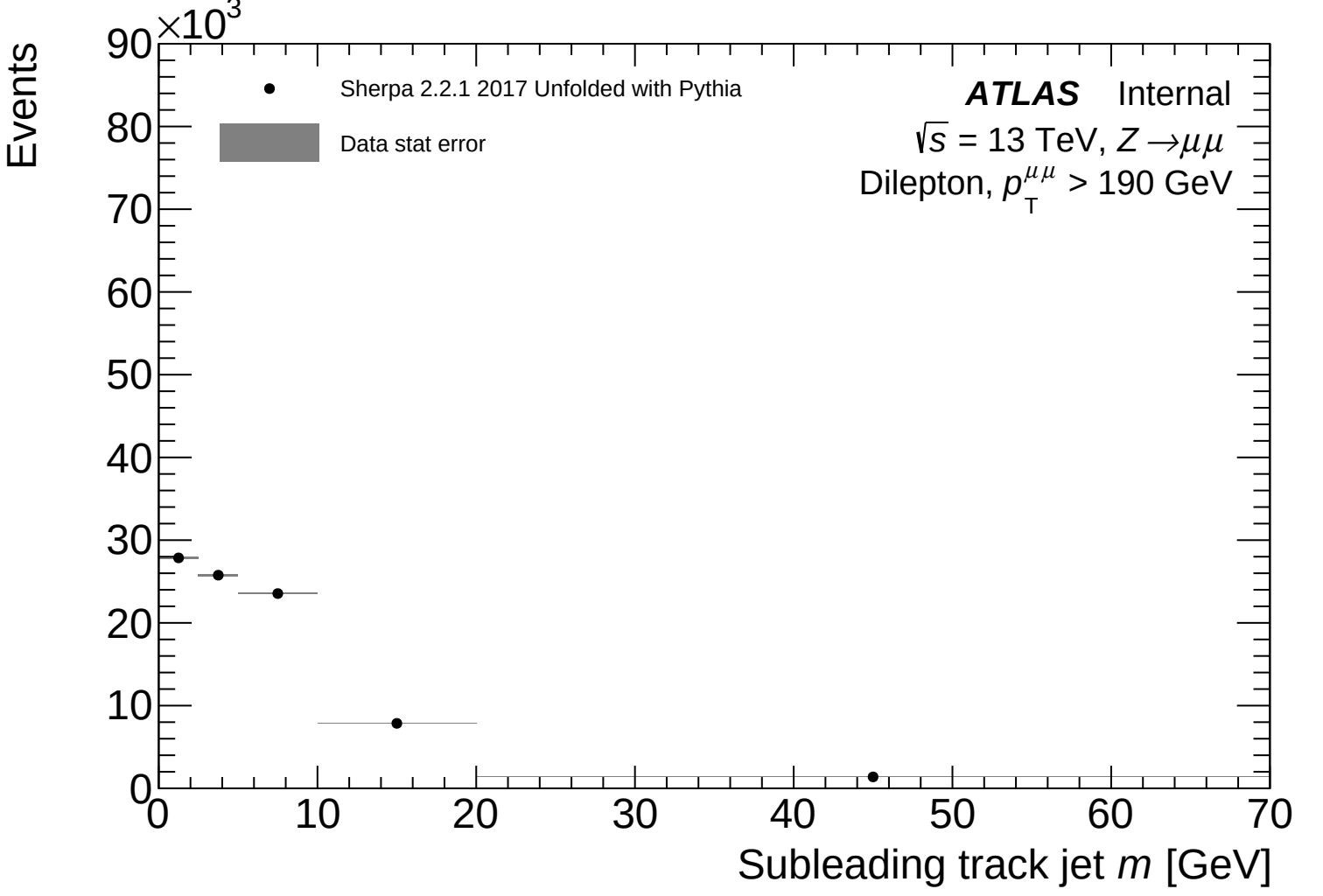
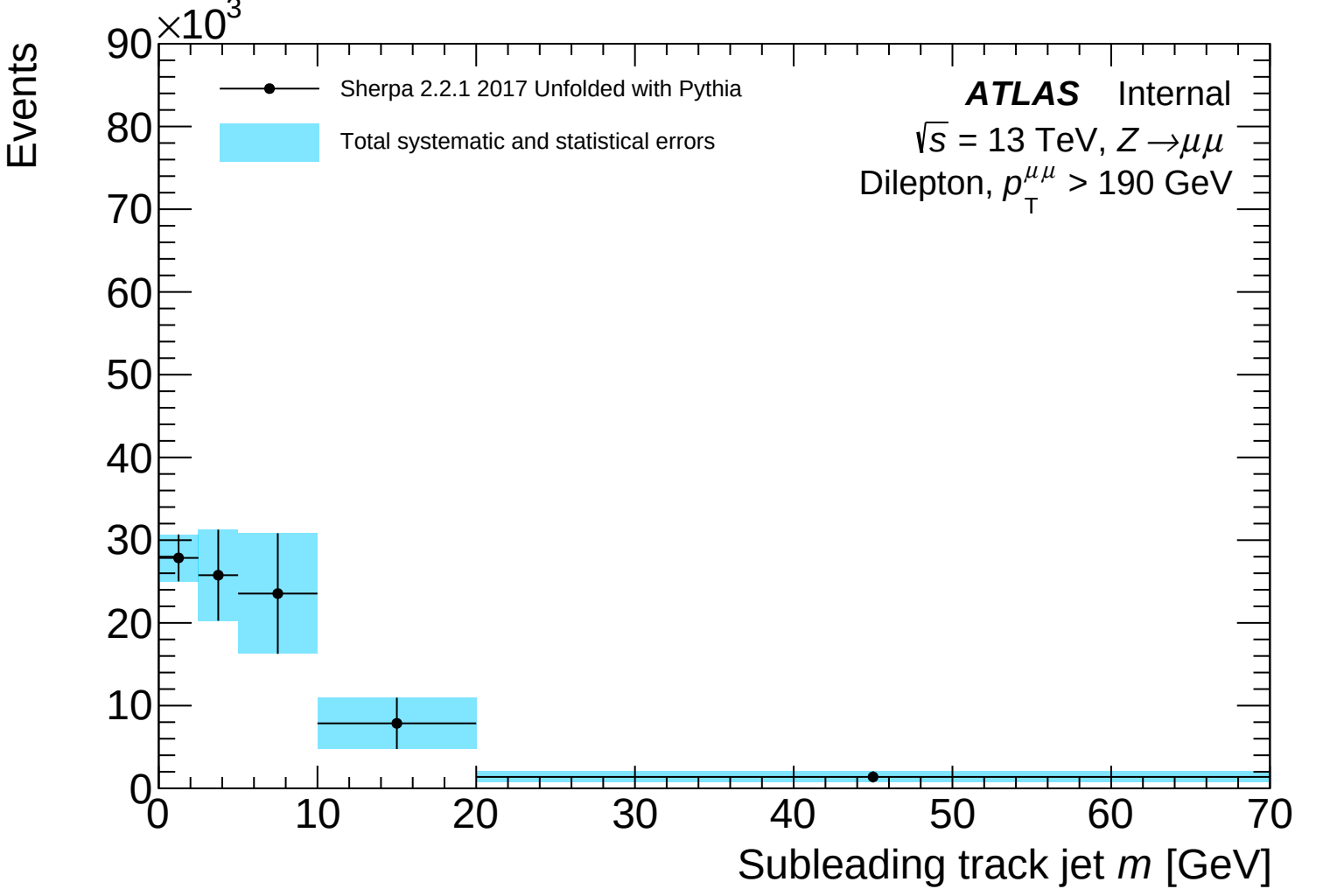
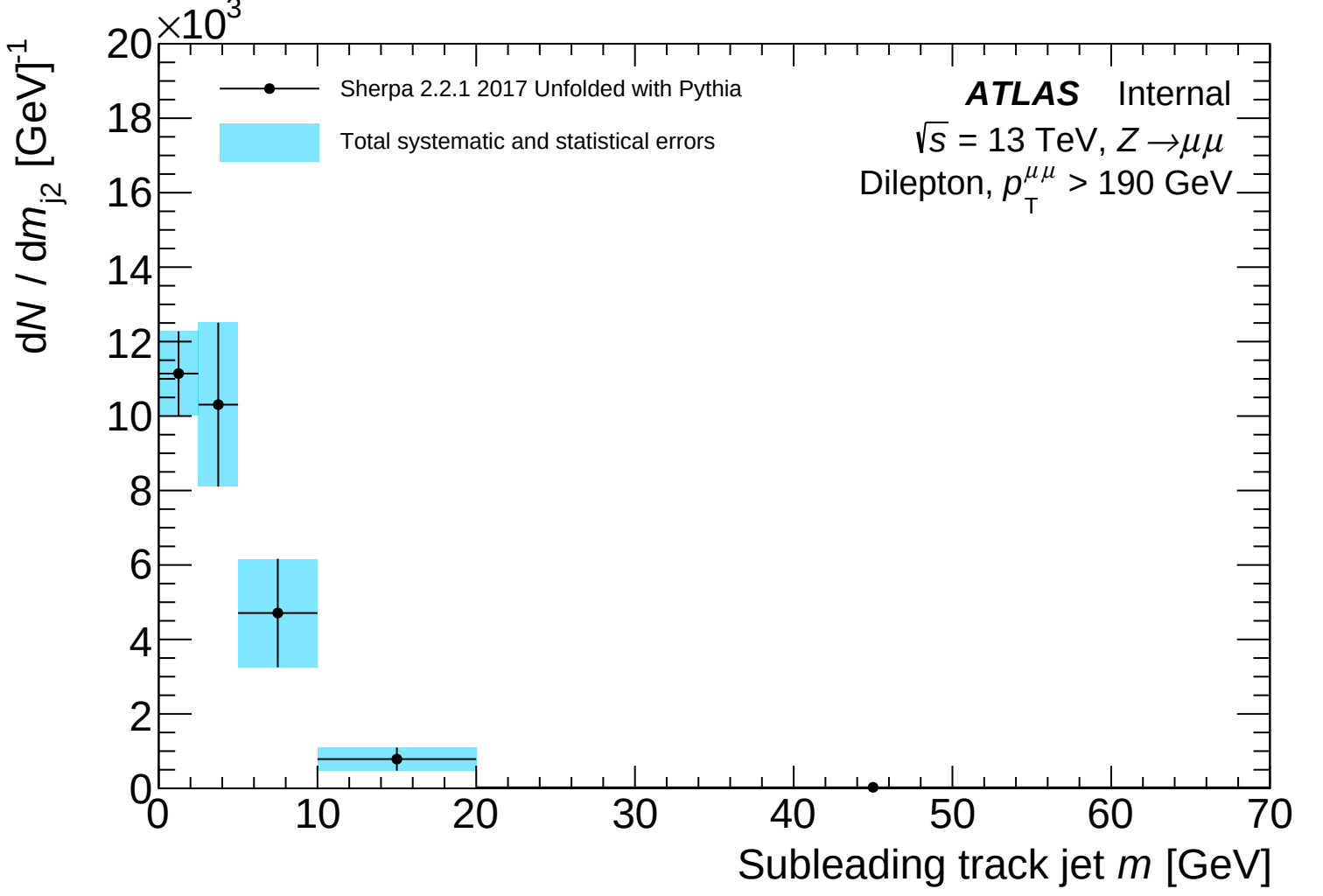
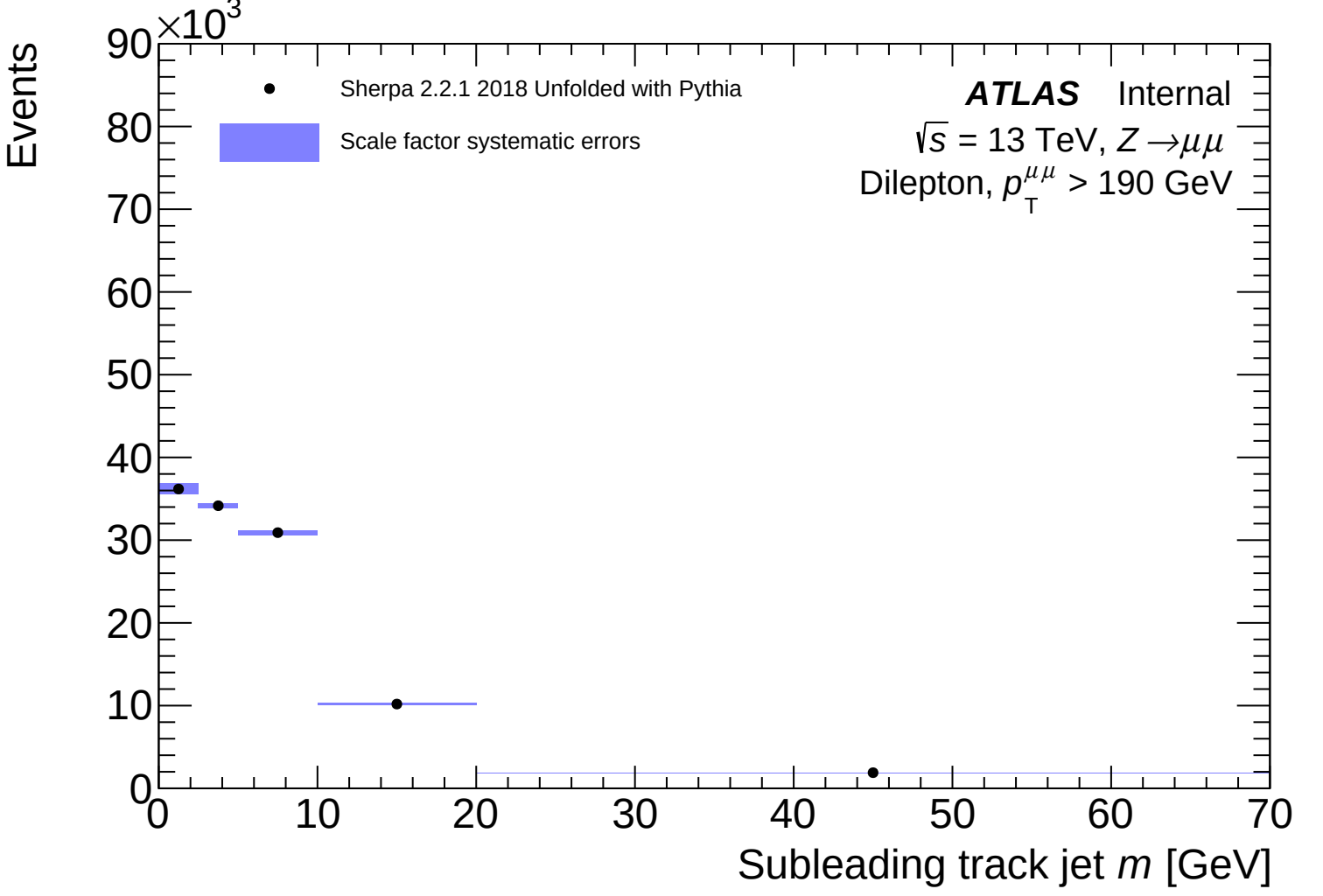
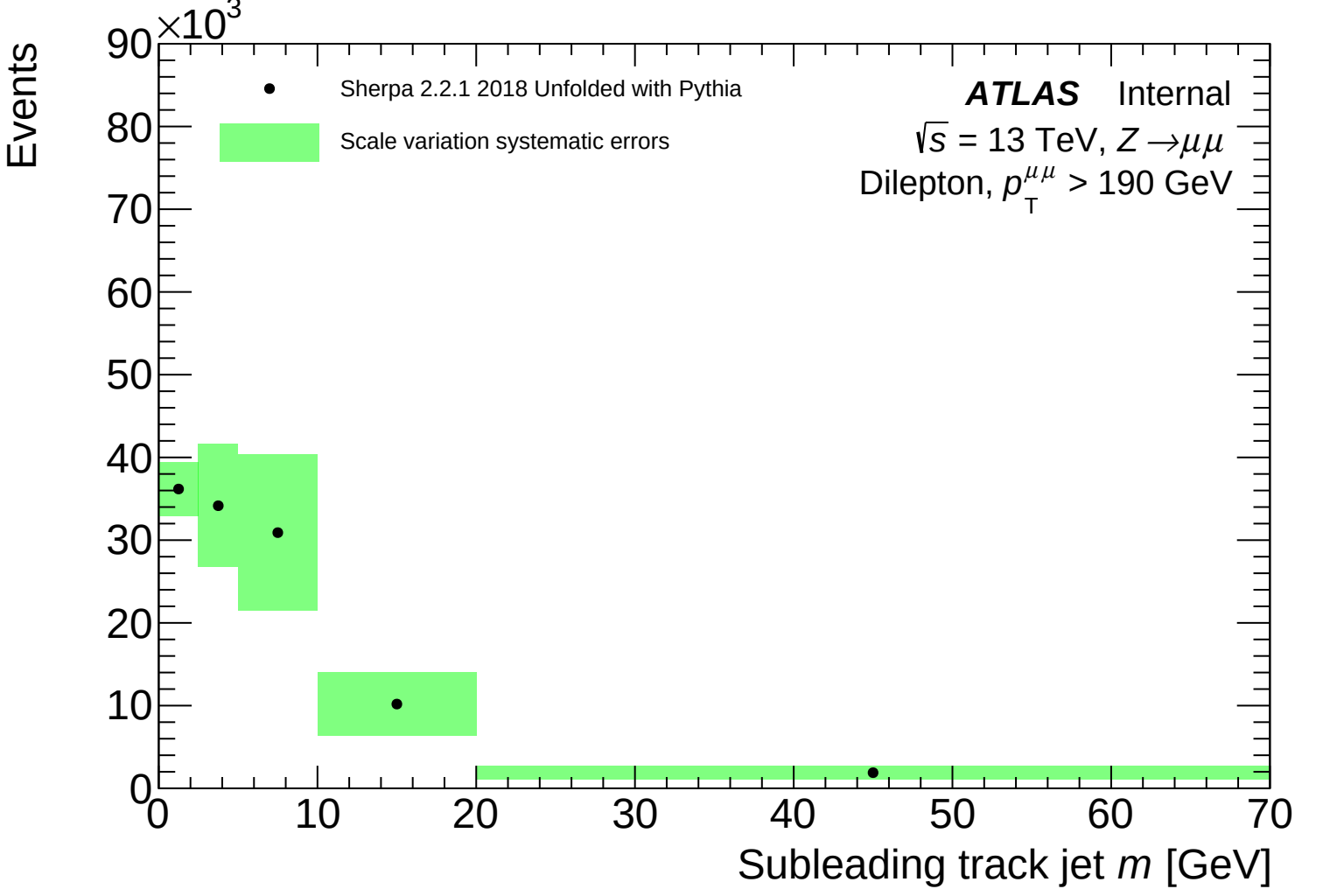
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

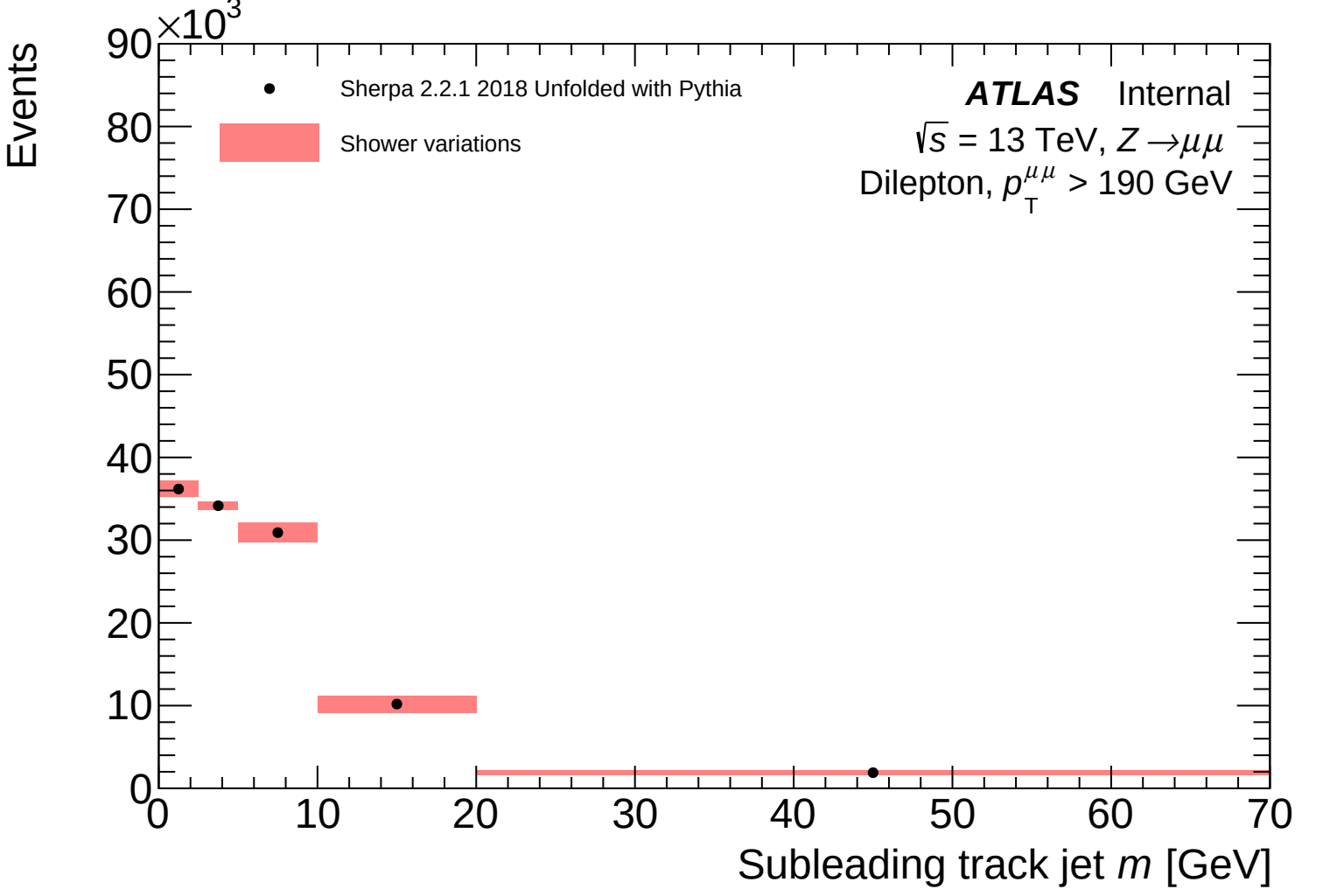

Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
$\times 10^3$
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


$\times 10^{3}$
$\mathrm{d}N\ /\ \mathrm{d}m_{\mathrm{j2}}\ [\mathrm{GeV}]^{-1}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
Subleading track jet m [GeV]
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70


Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
$\times 10^3$
90
80
70
60
50
40
30
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0
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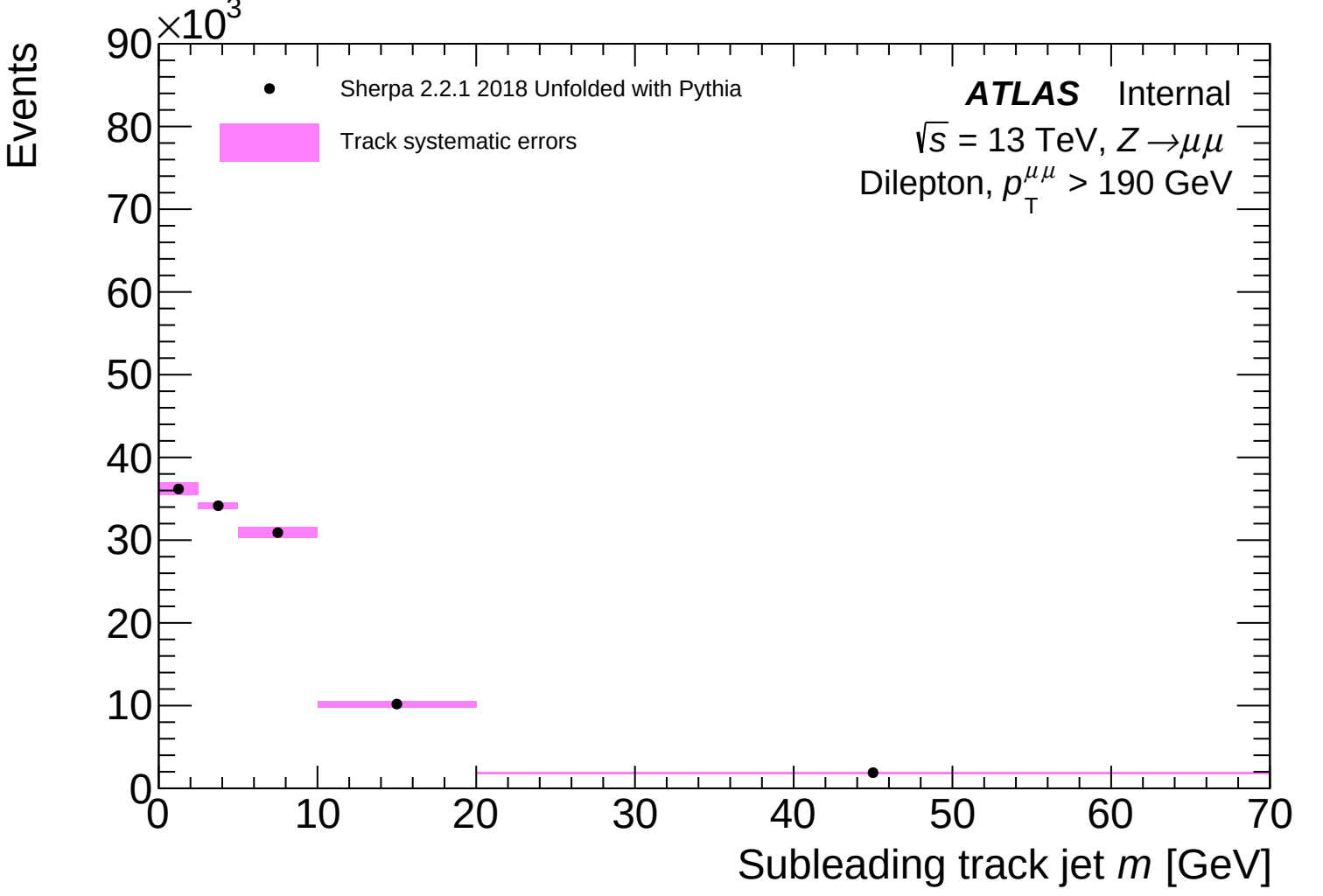
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
$\times 10^3$
90
80
70
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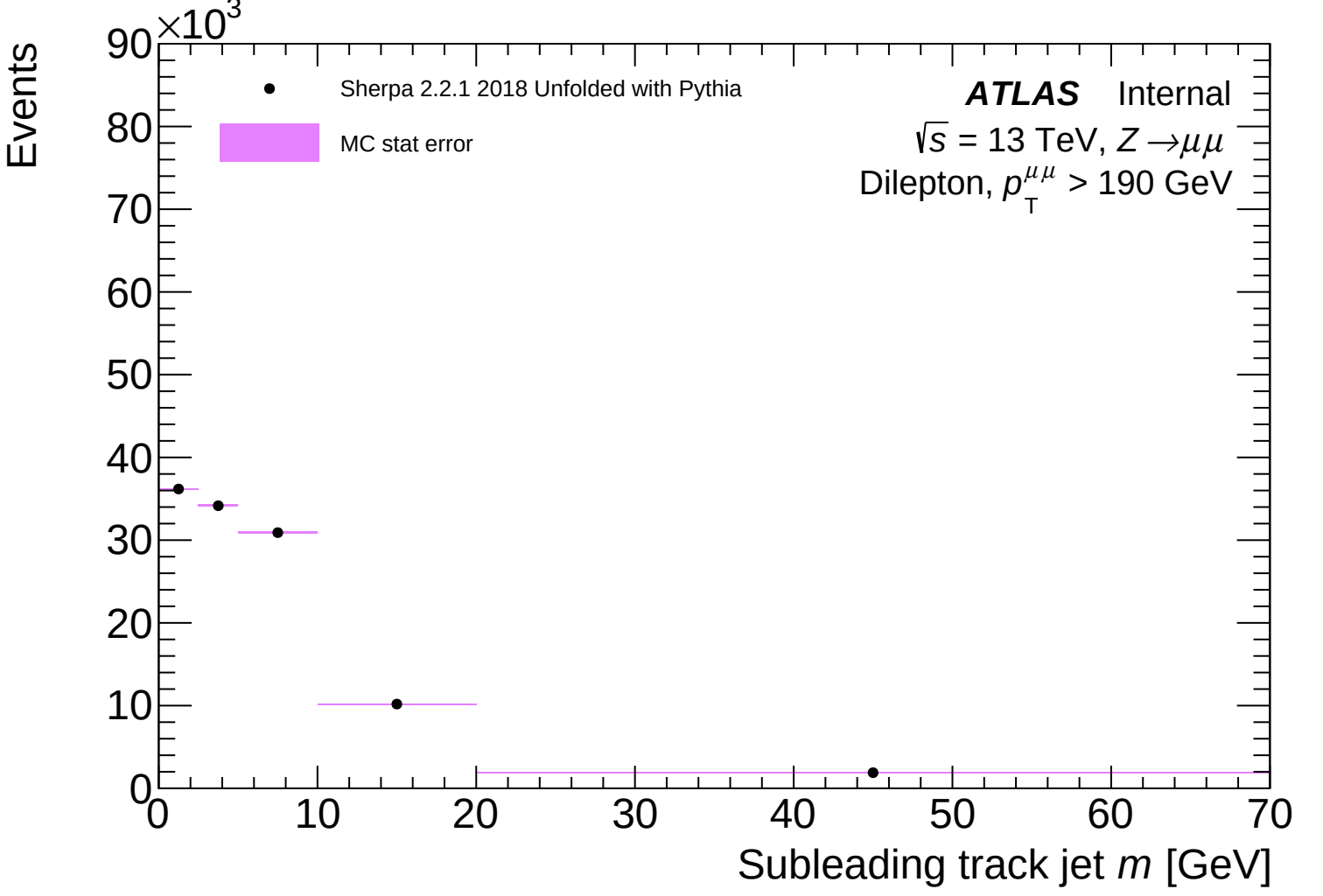
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV


Events
×10^3
90
80
70
60
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40
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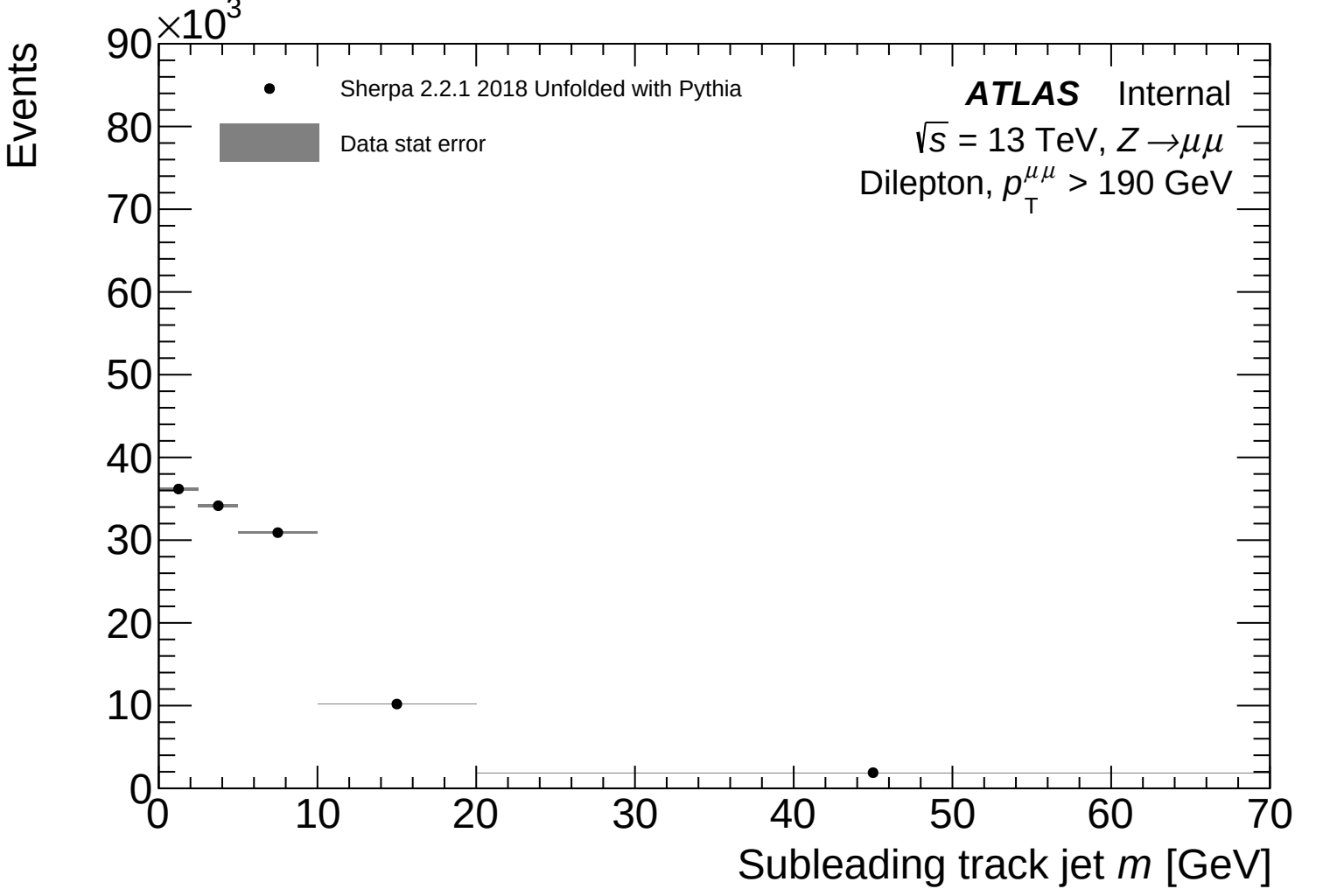
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV


Events
$\times 10^3$
90
80
70
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40
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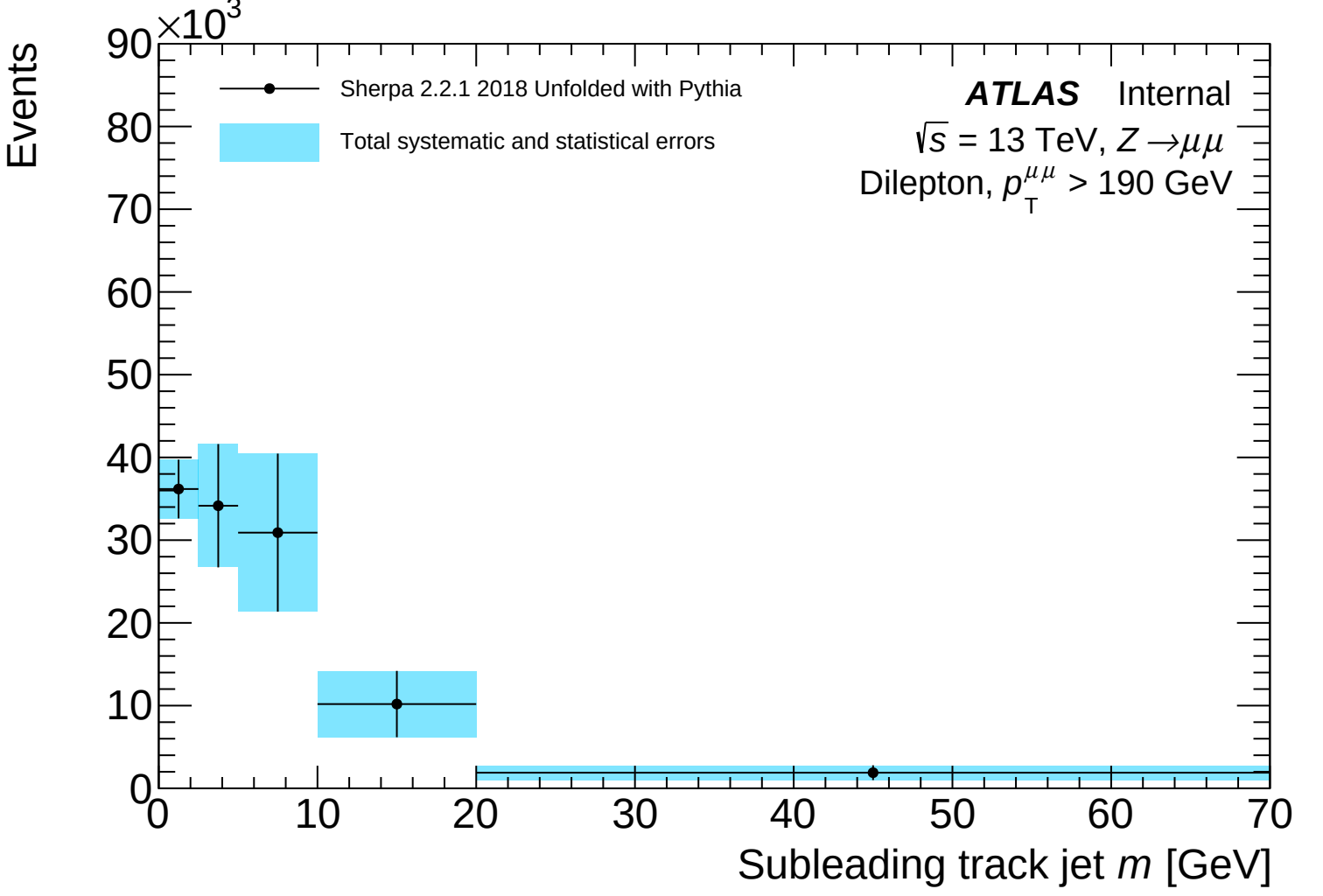
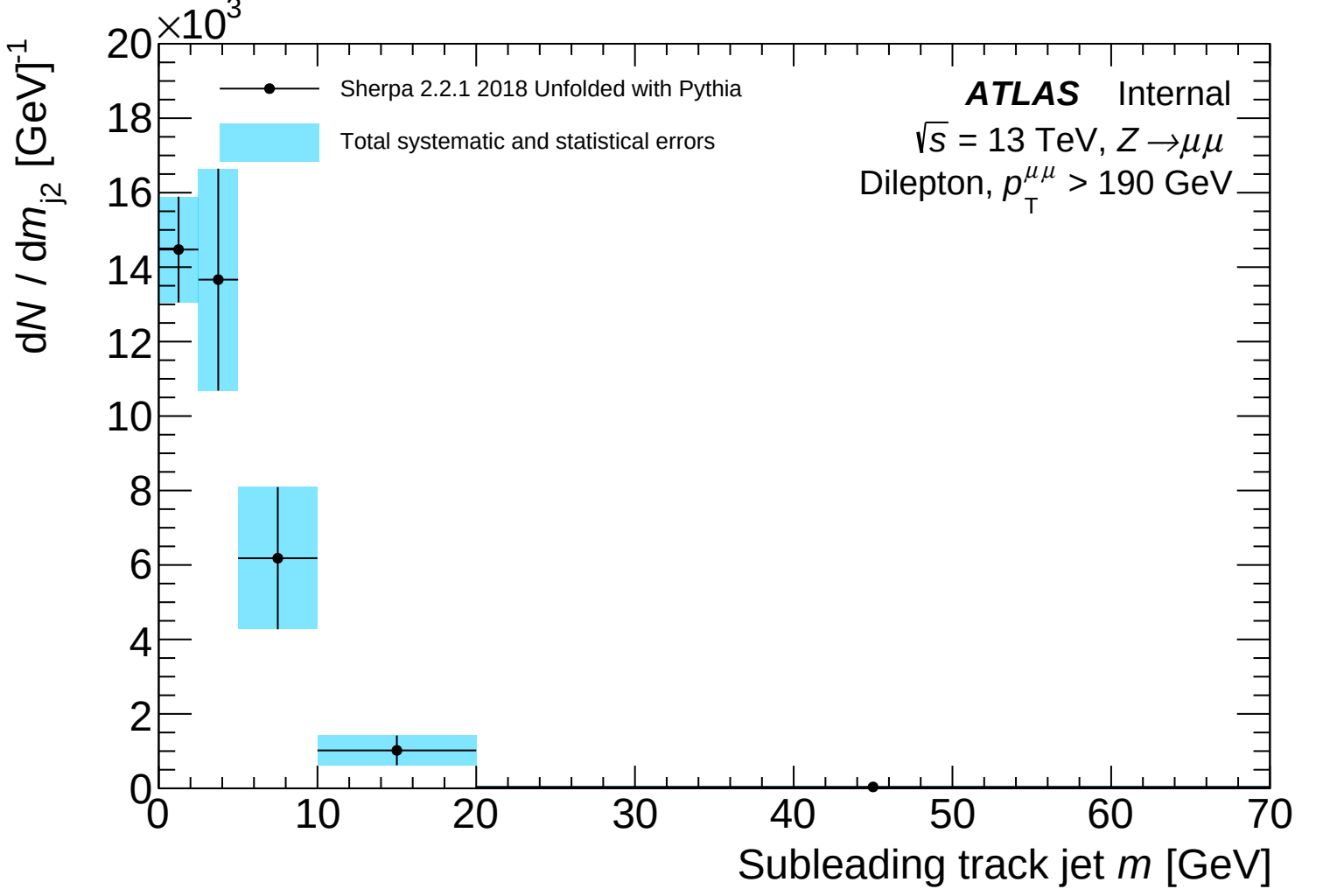
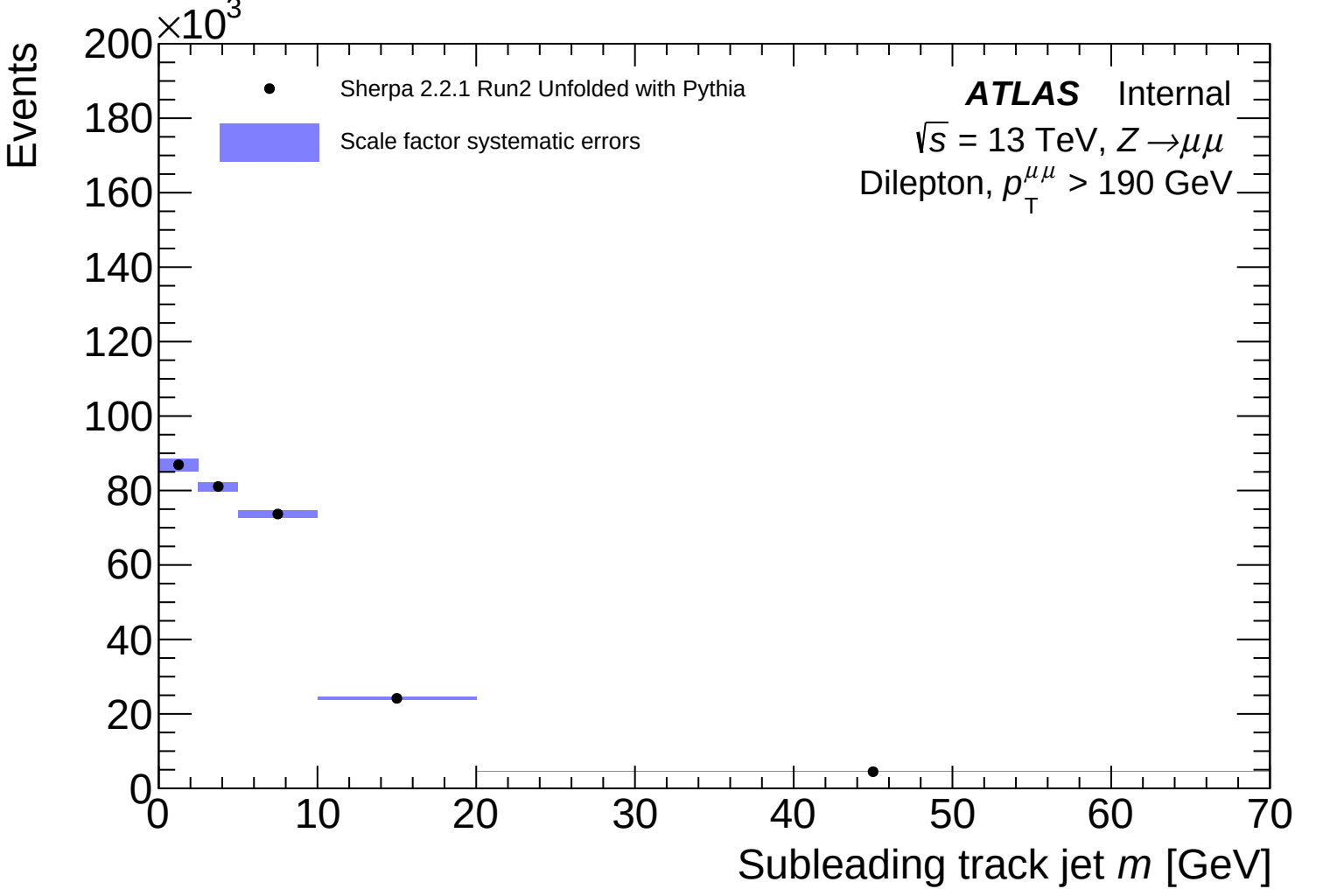
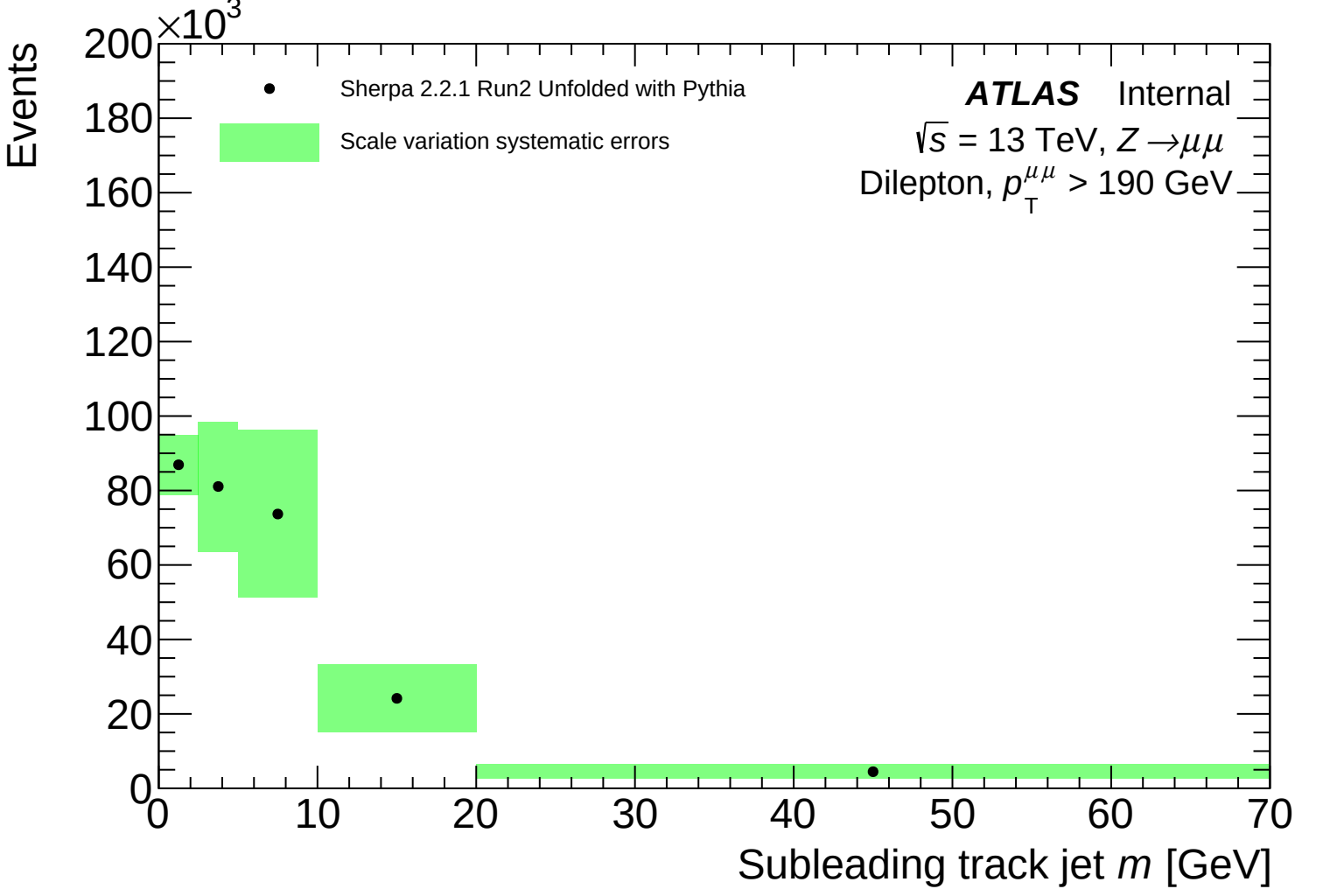
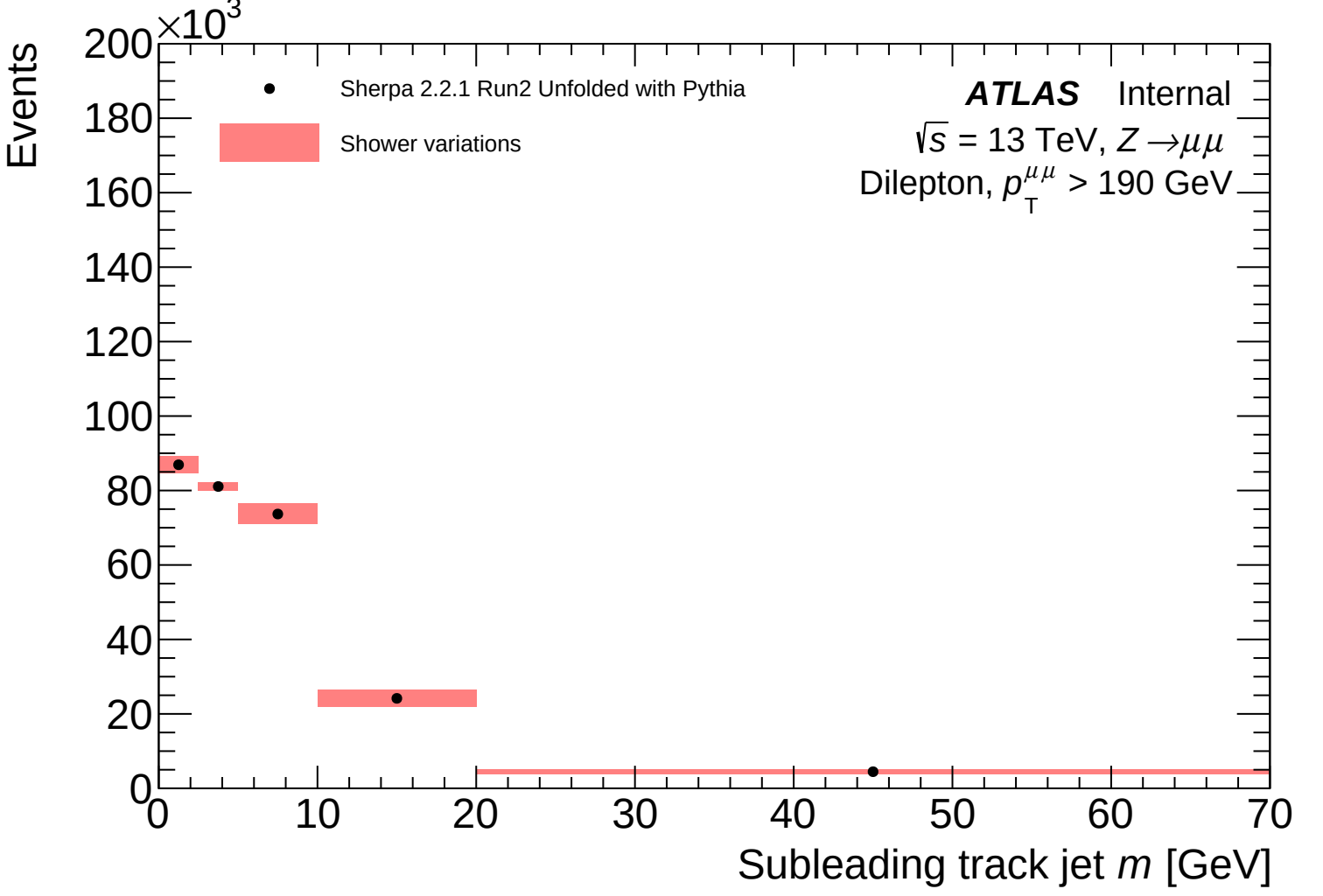
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

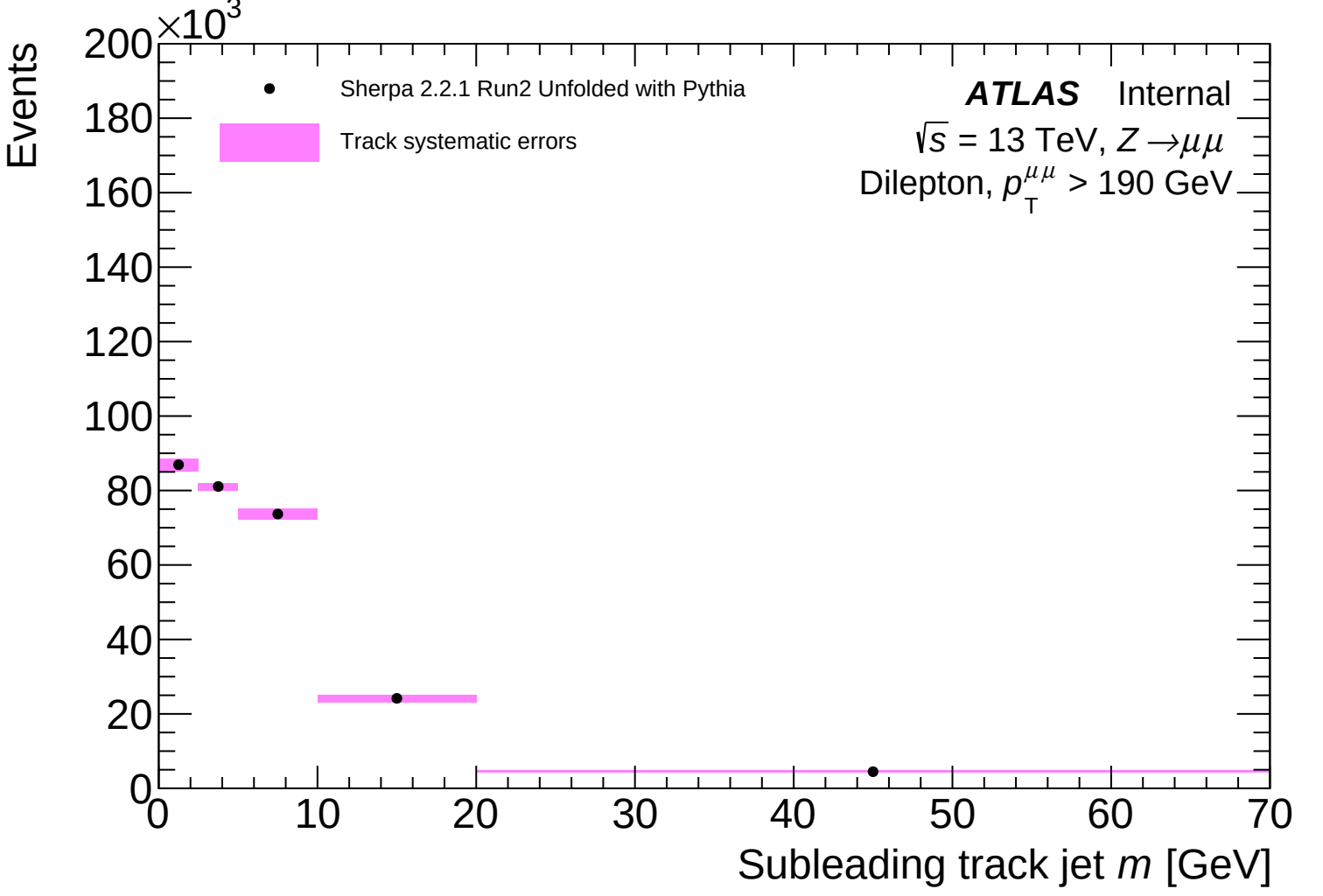

Events
×10^3
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

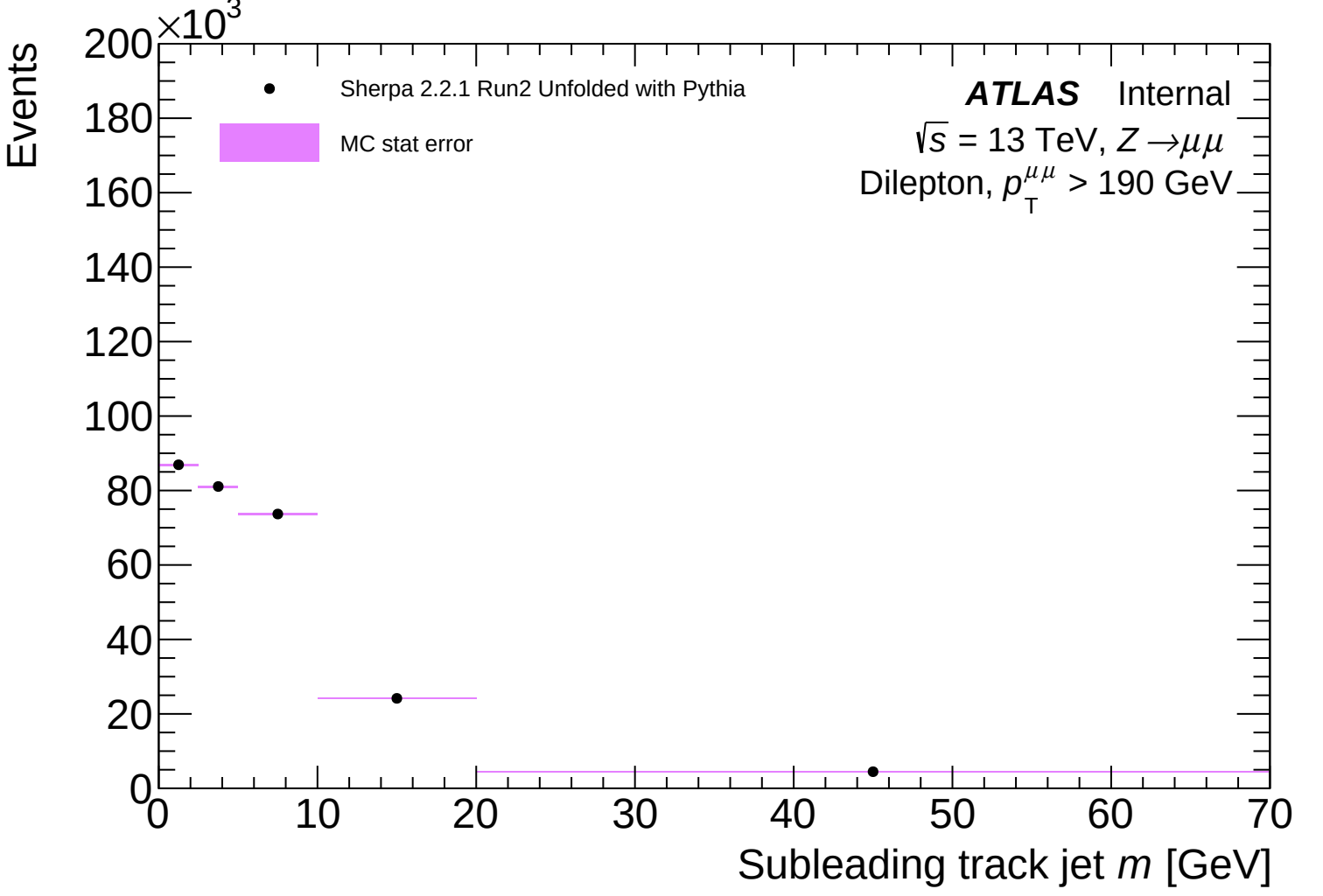

$\times 10^{3}$
$\mathrm{d}N\ /\ \mathrm{d}m_{\mathrm{j2}}$ [GeV]$^{-1}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
Subleading track jet m [GeV]
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70

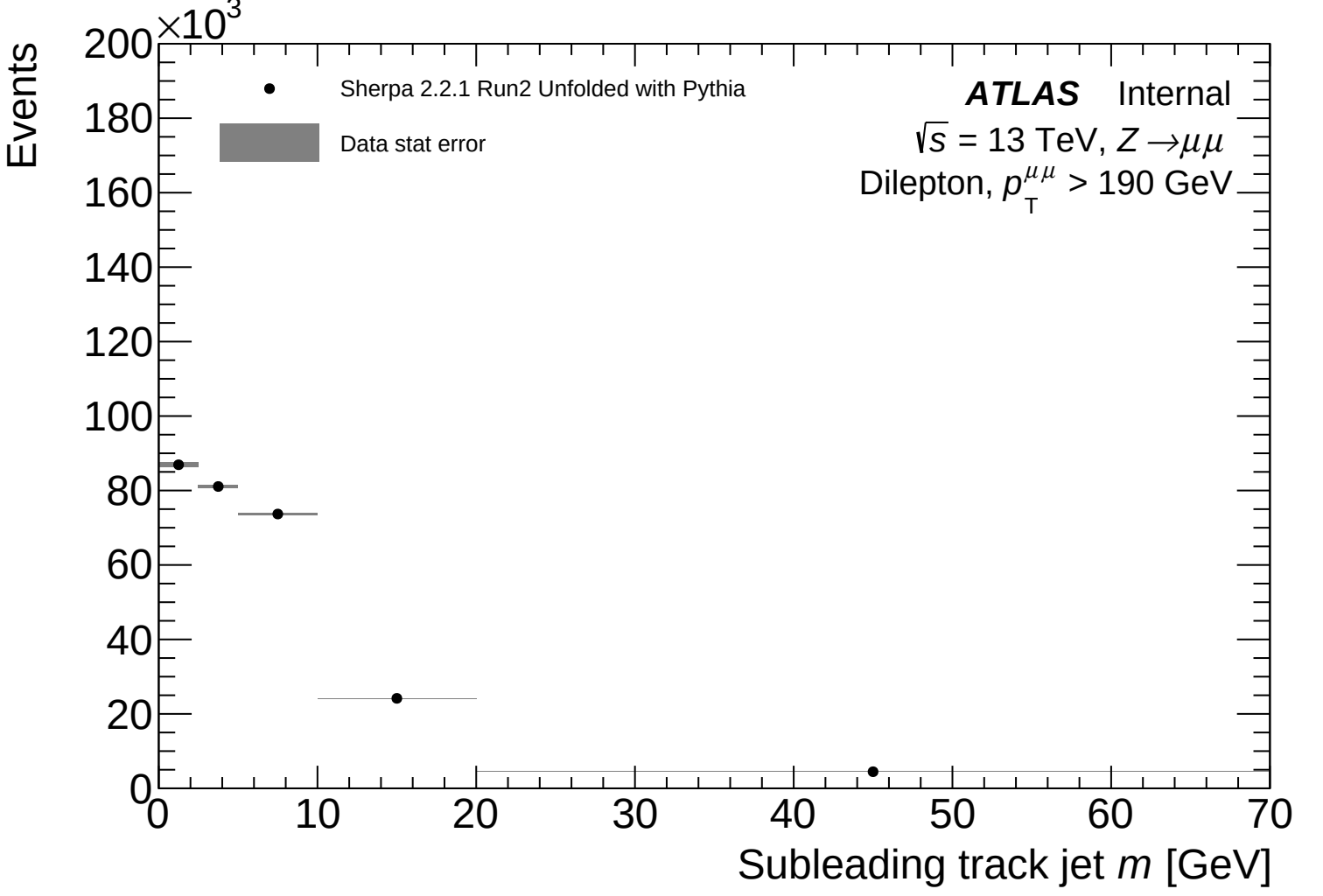

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

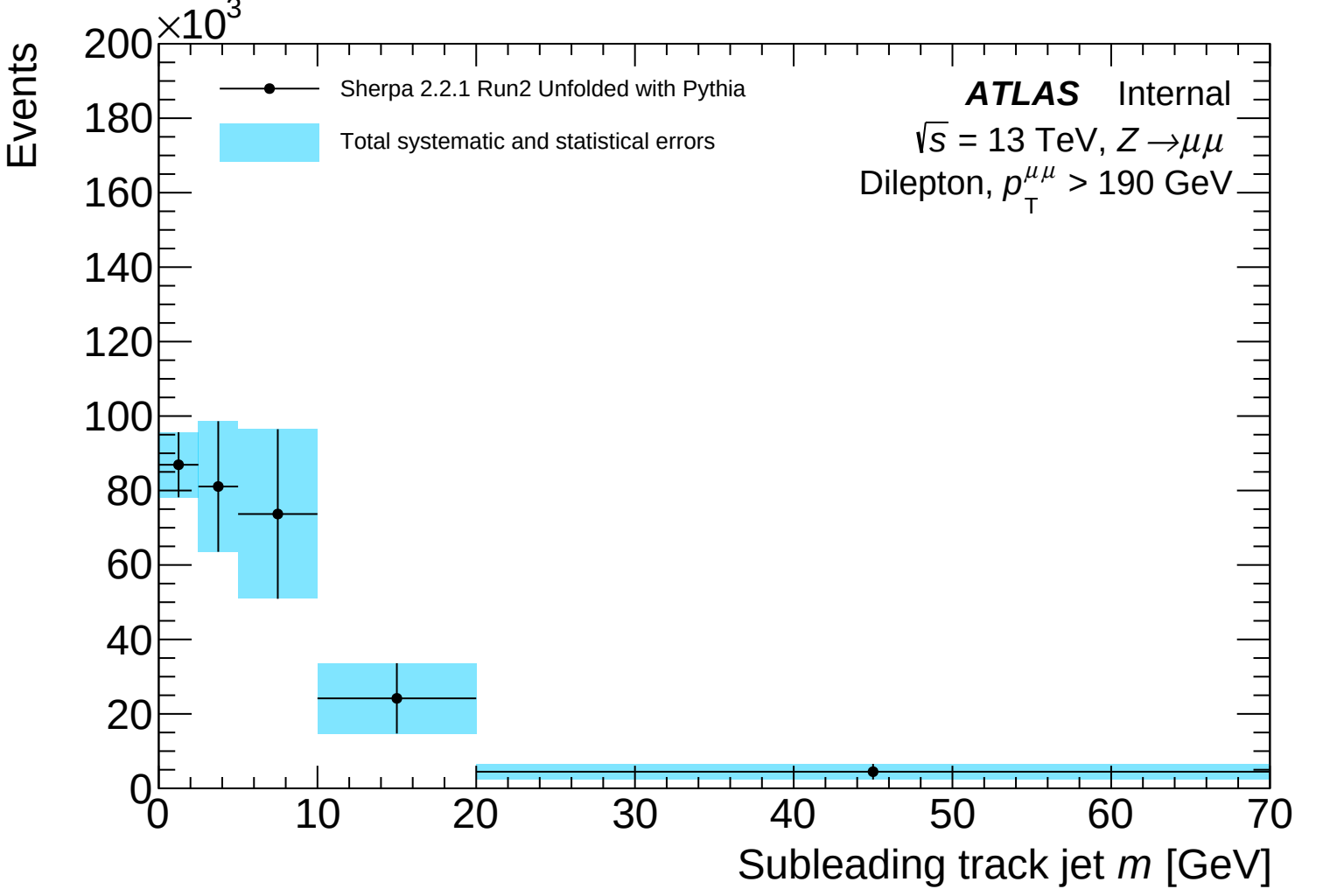

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

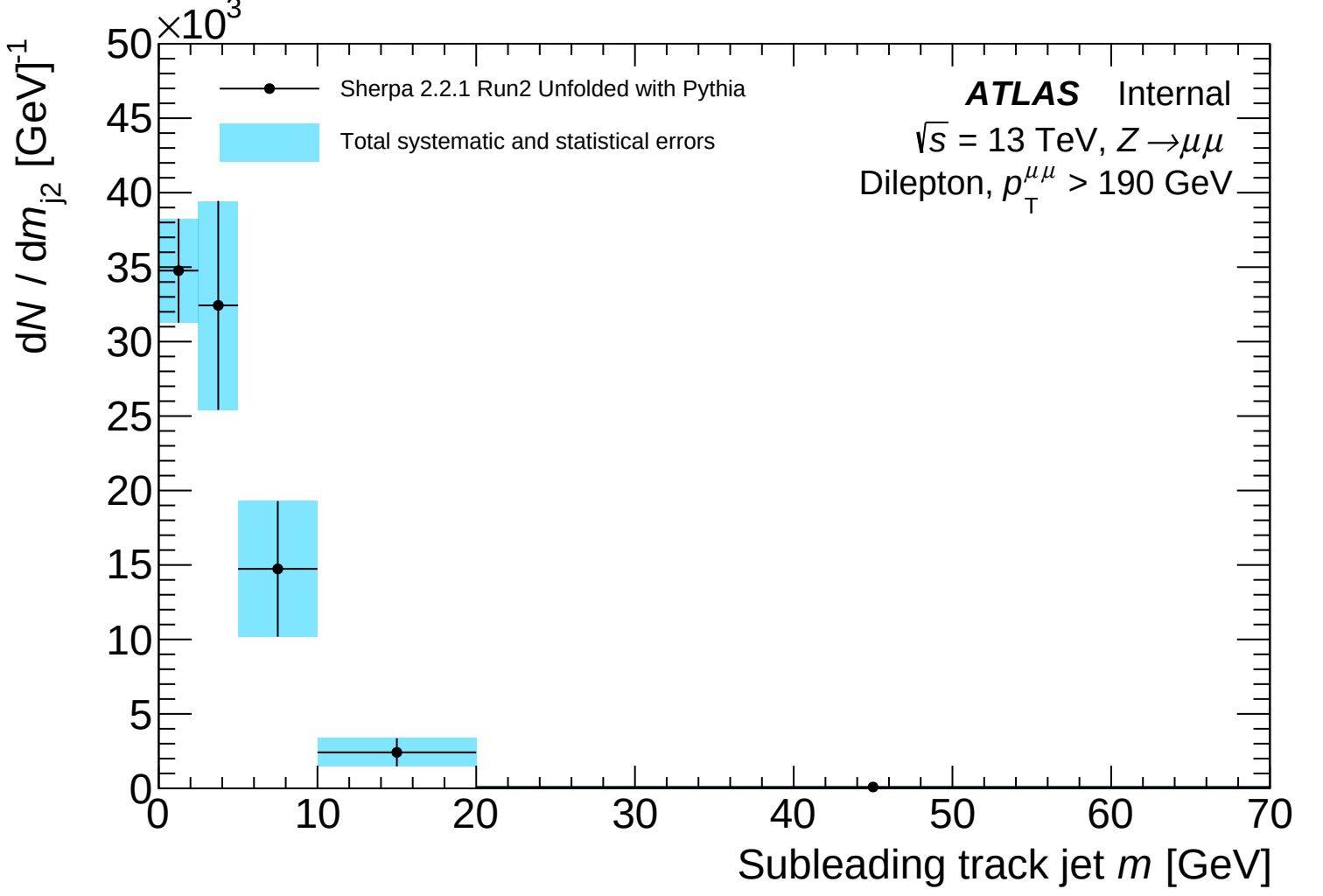

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

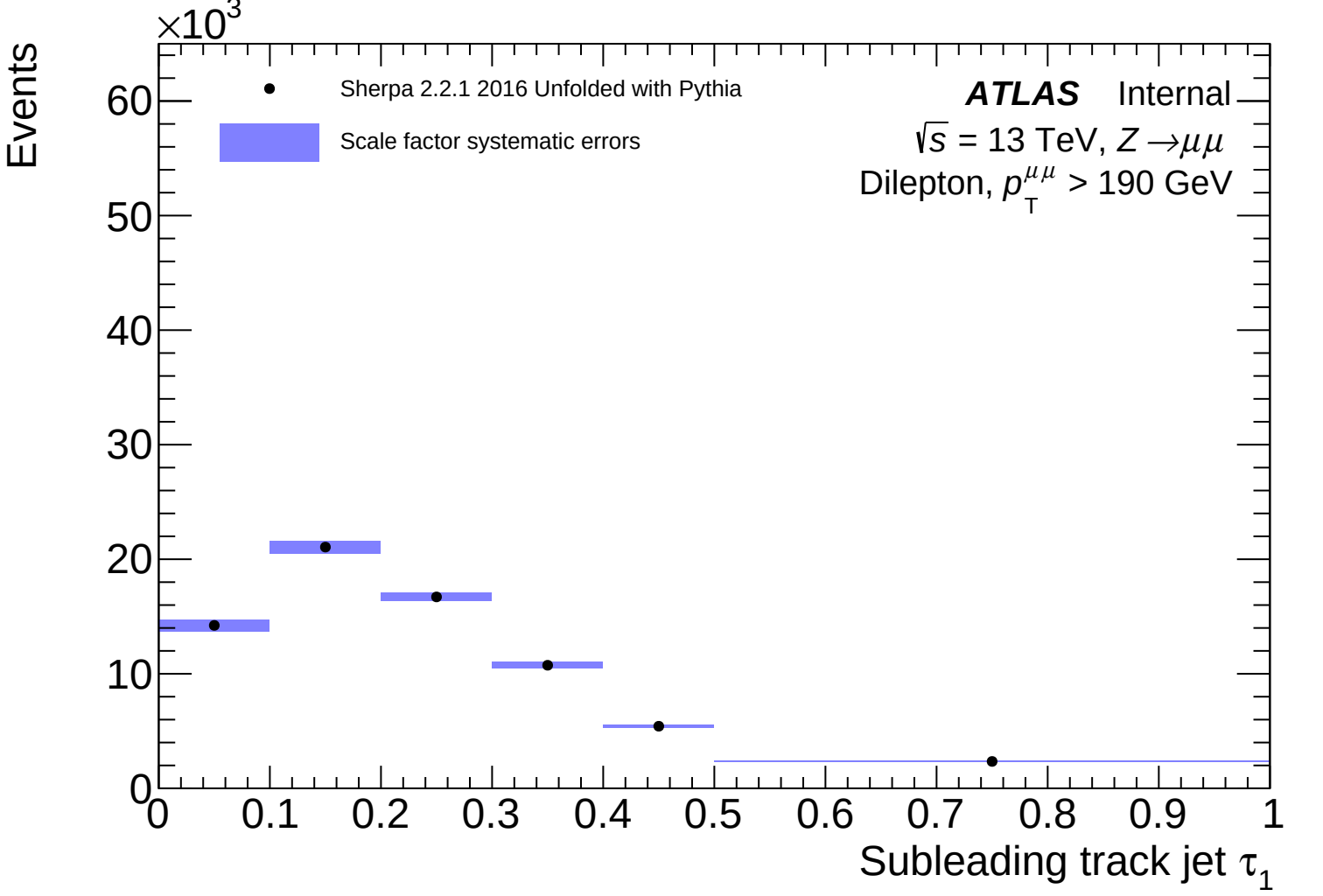

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

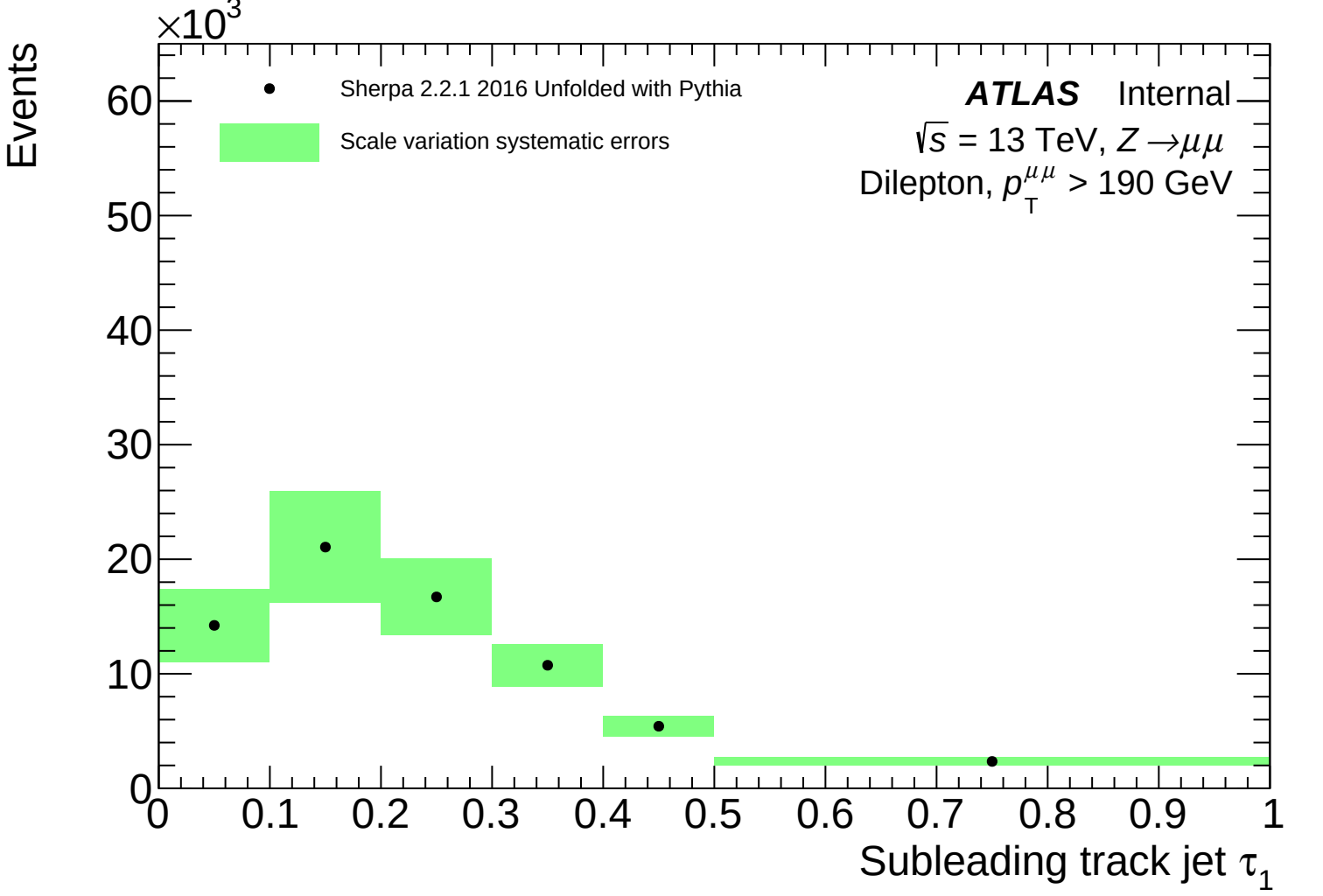

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

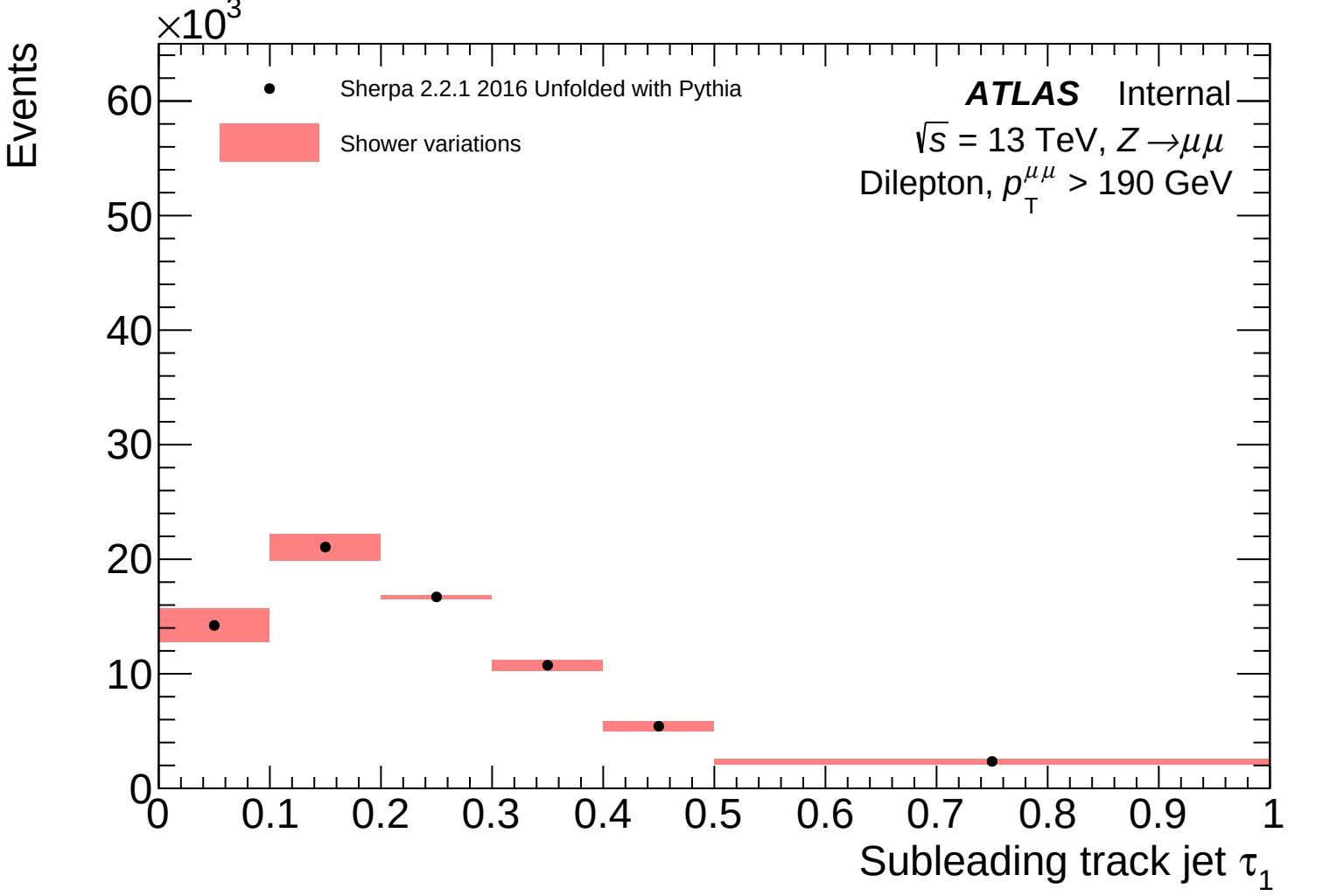

Events
×10^3
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

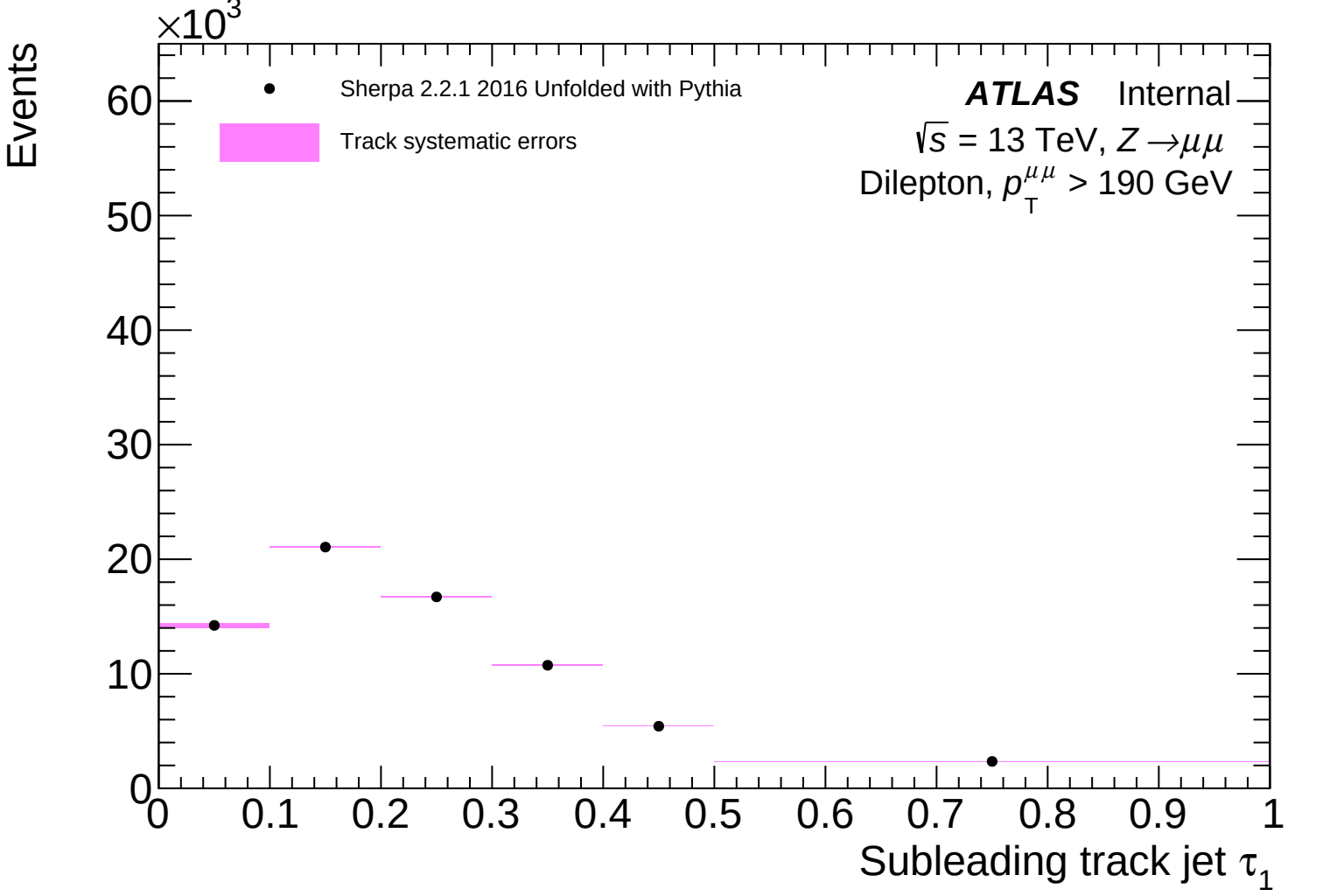

Events
$\times 10^3$
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Subleading track jet m [GeV]
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

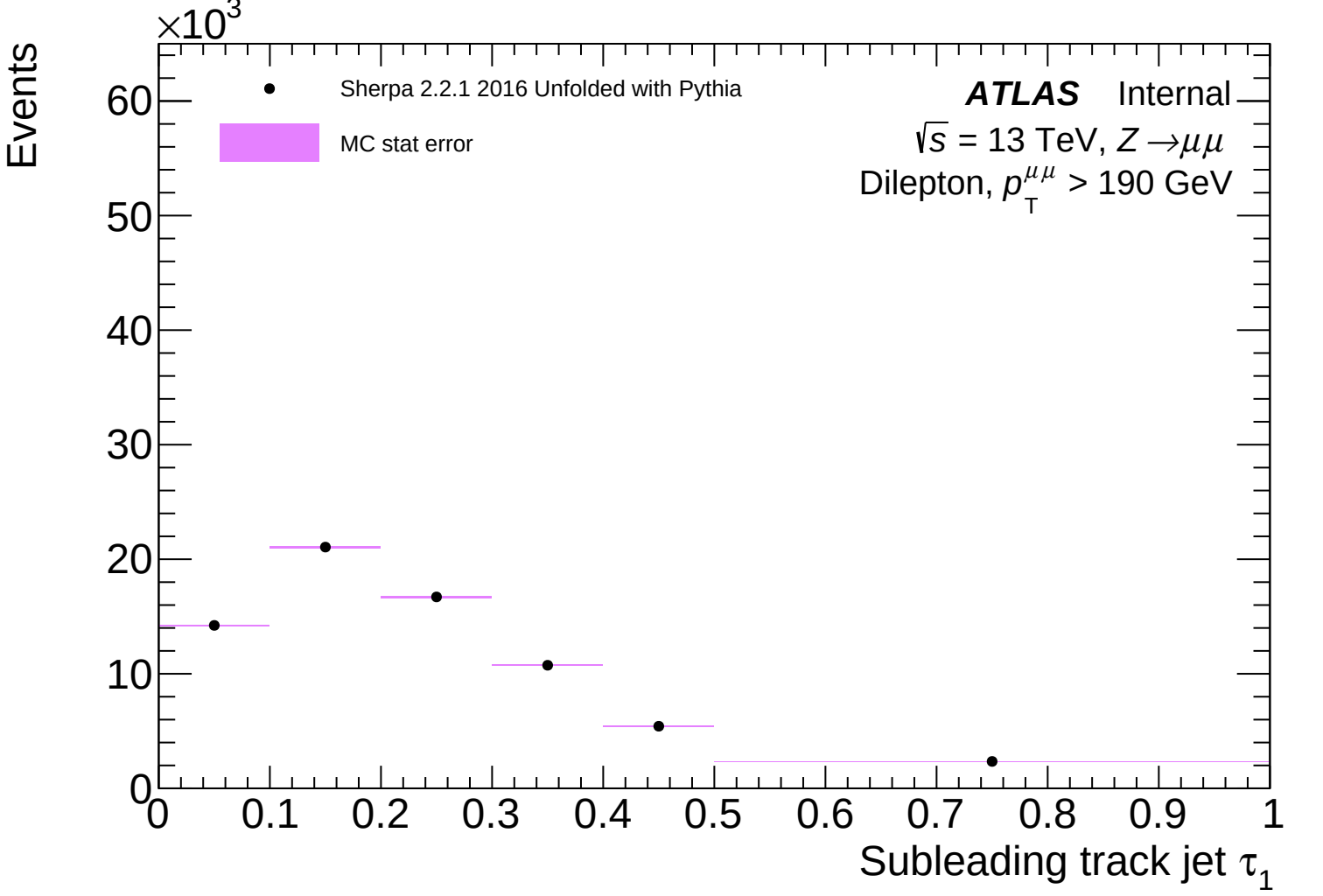

Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
×10^3
dN / dm_j2 [GeV]^-1
Subleading track jet m [GeV]
0
5
10
15
20
25
30
35
40
45
50
0
10
20
30
40
50
60
70

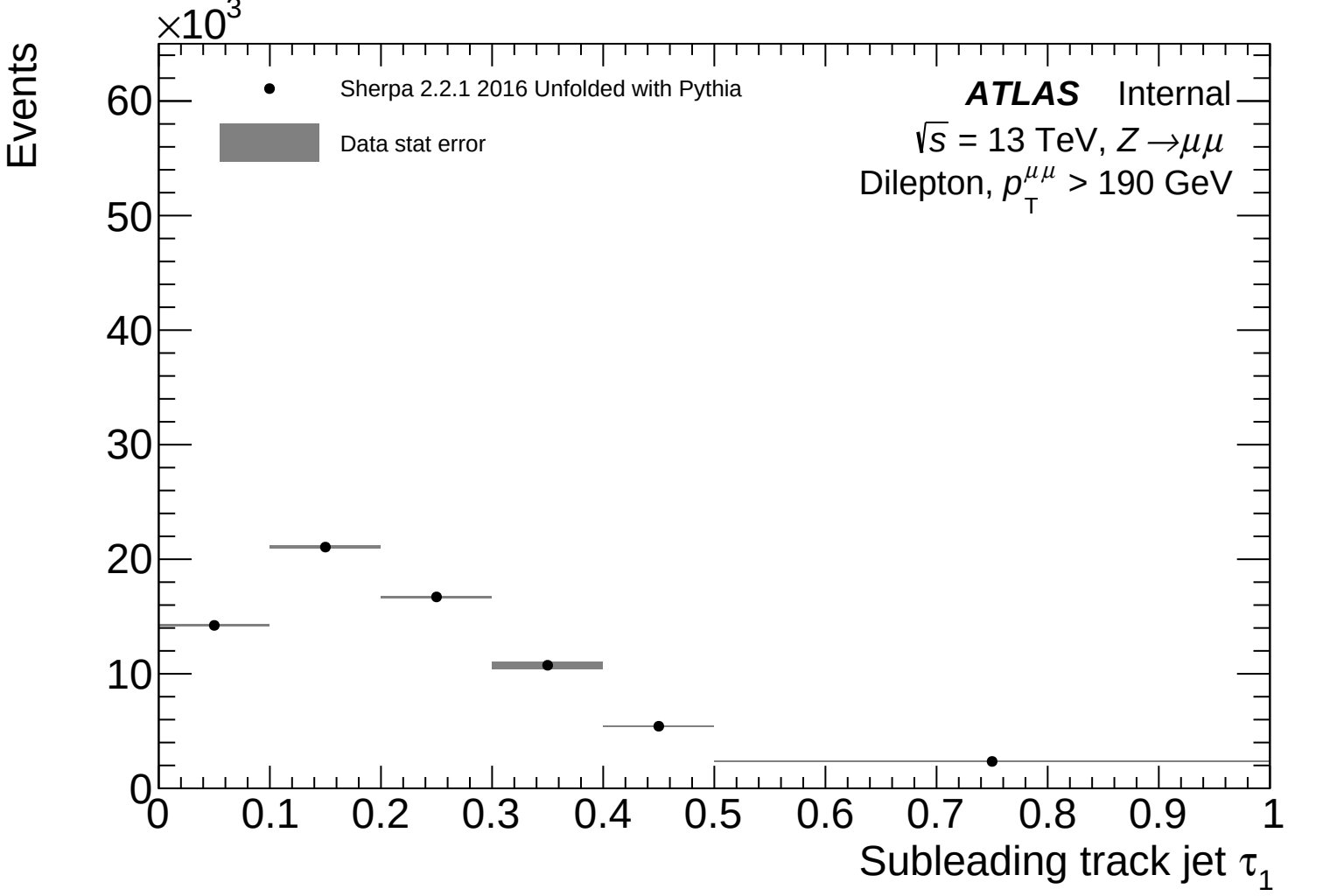

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

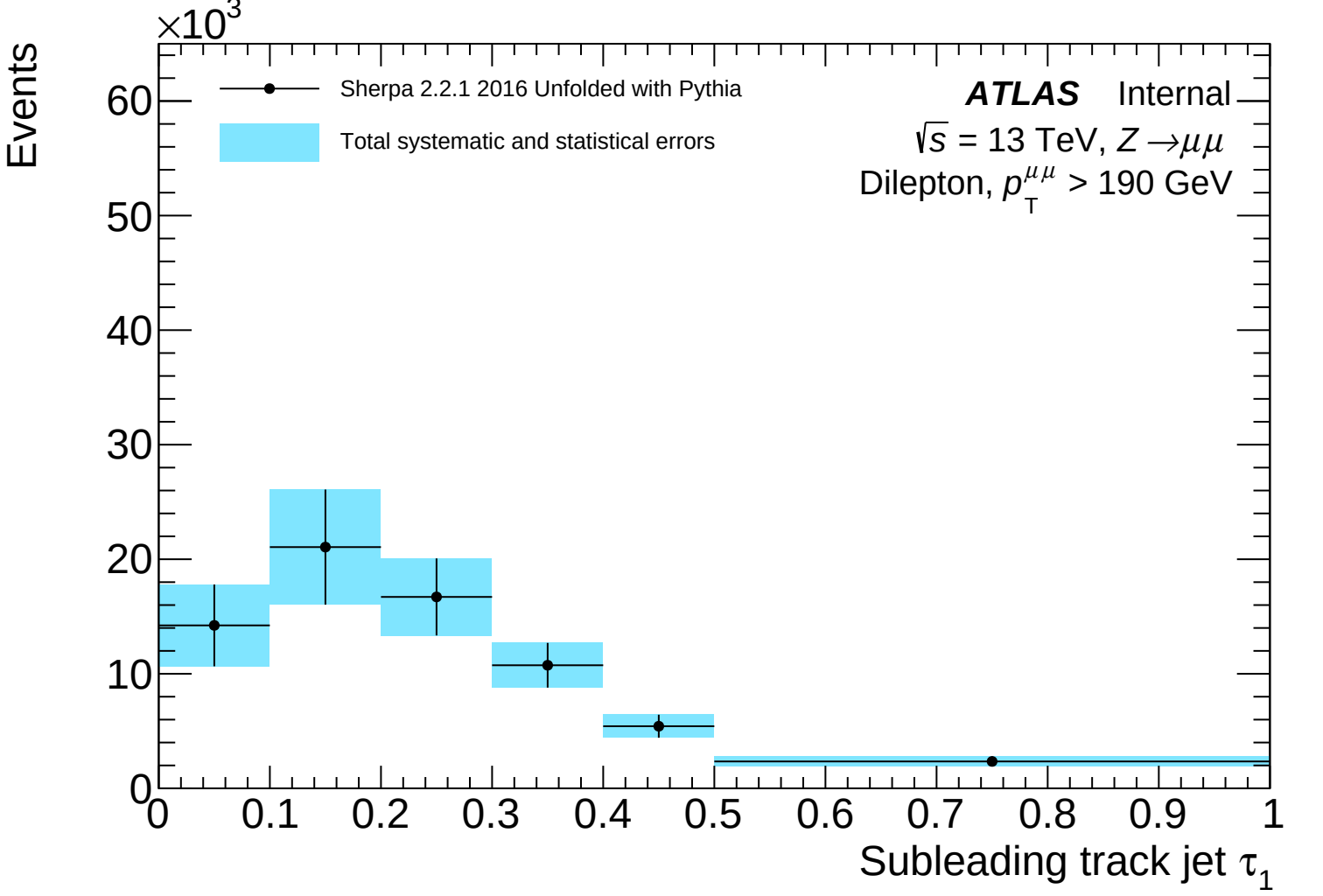

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

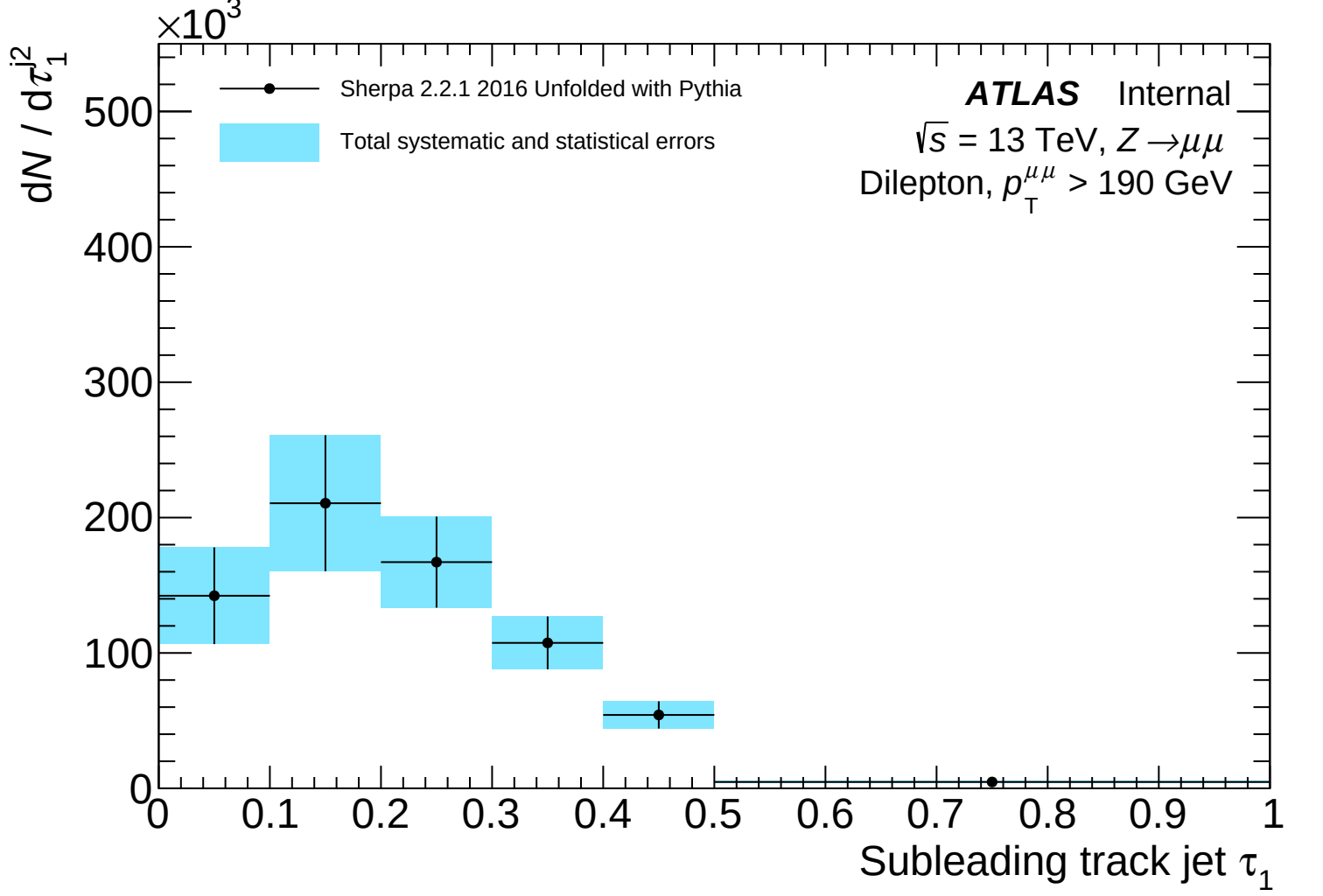

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

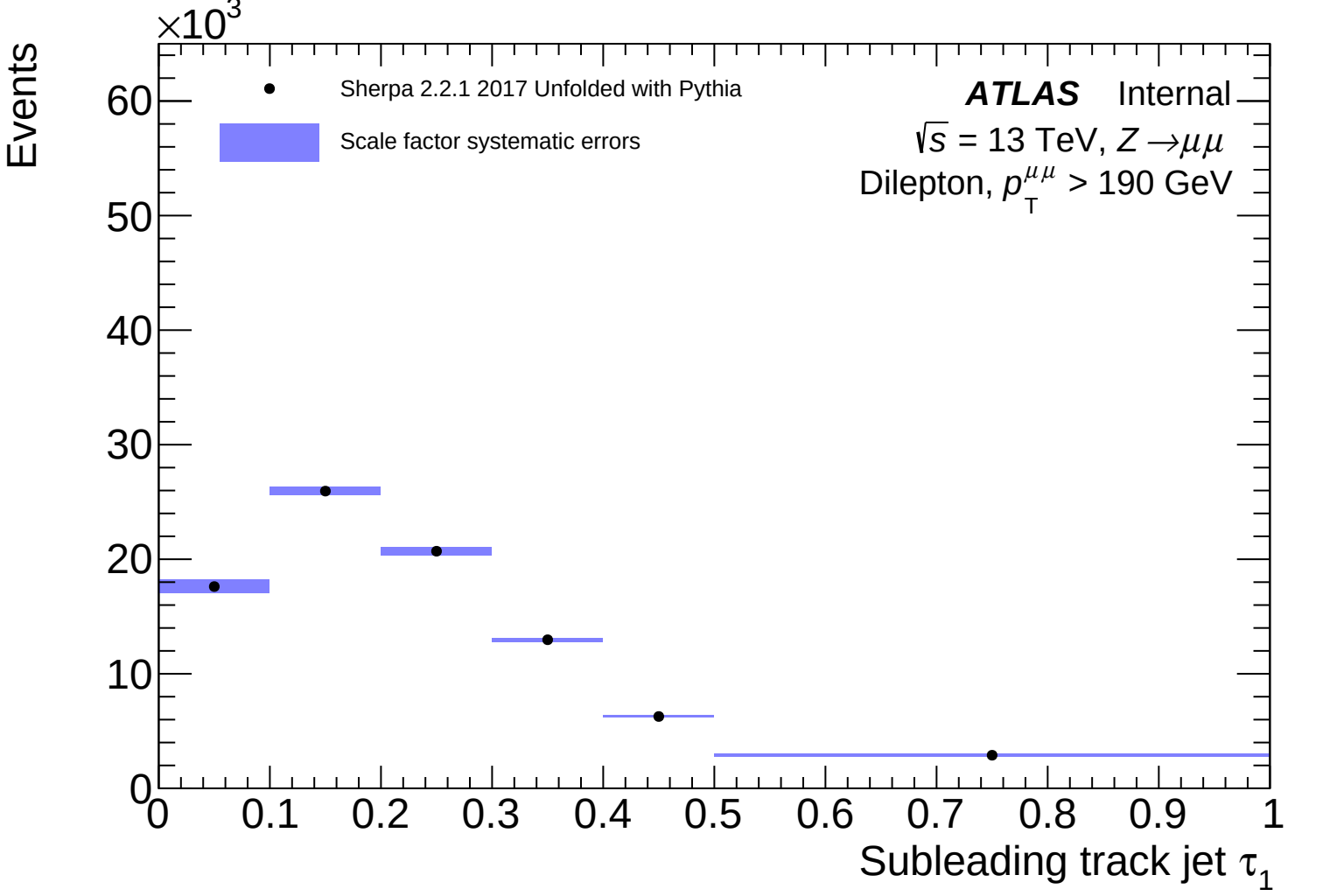

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

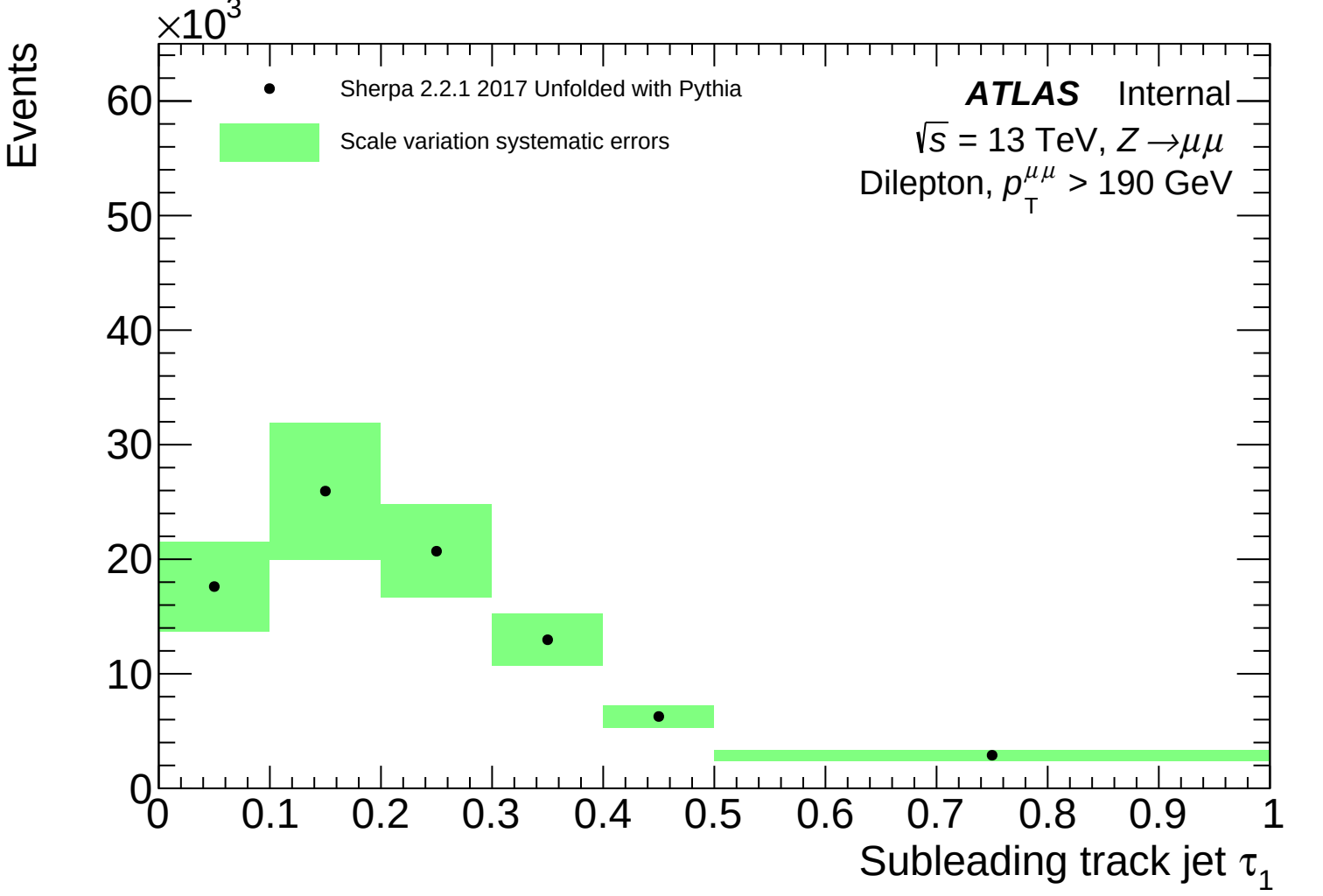

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

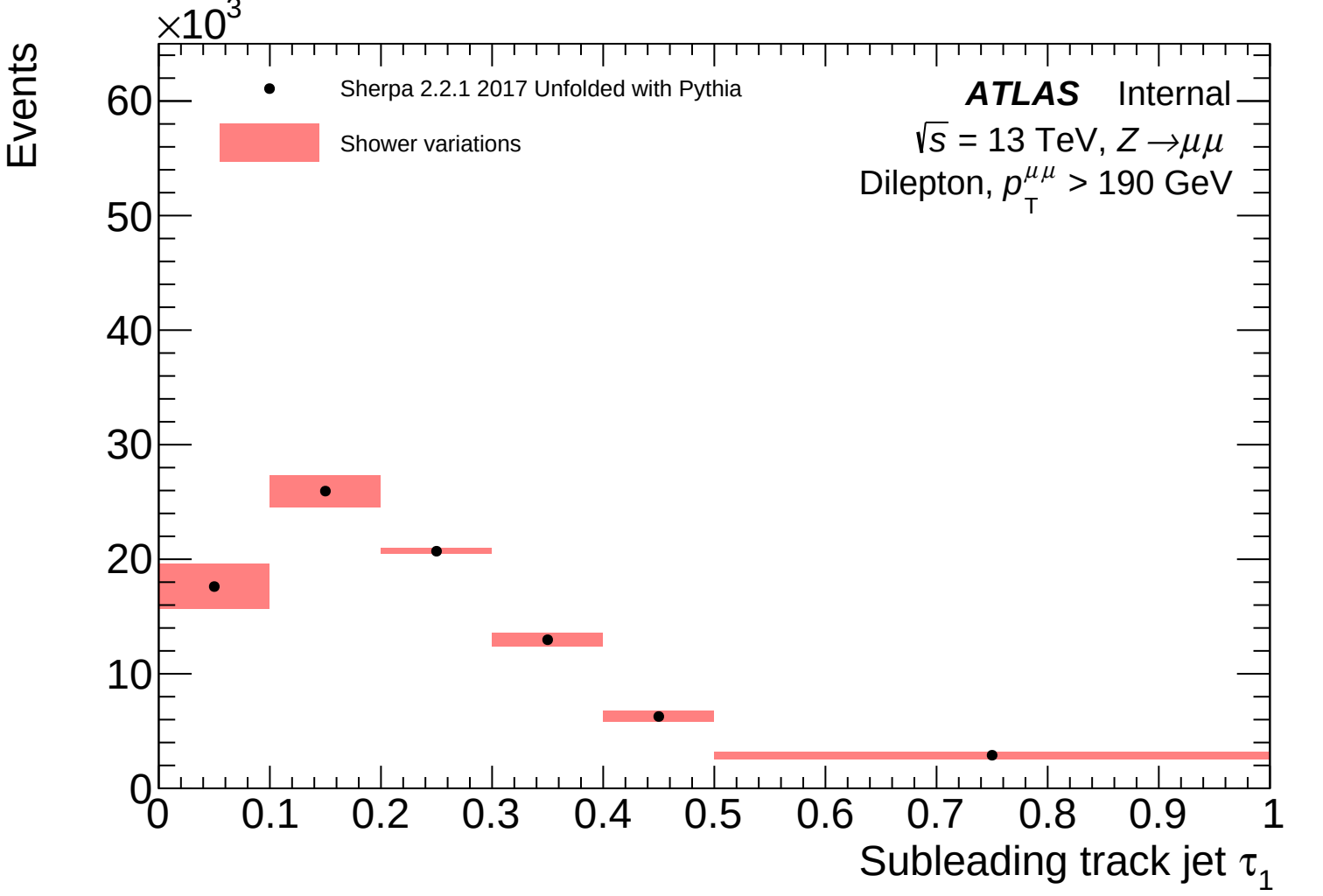

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

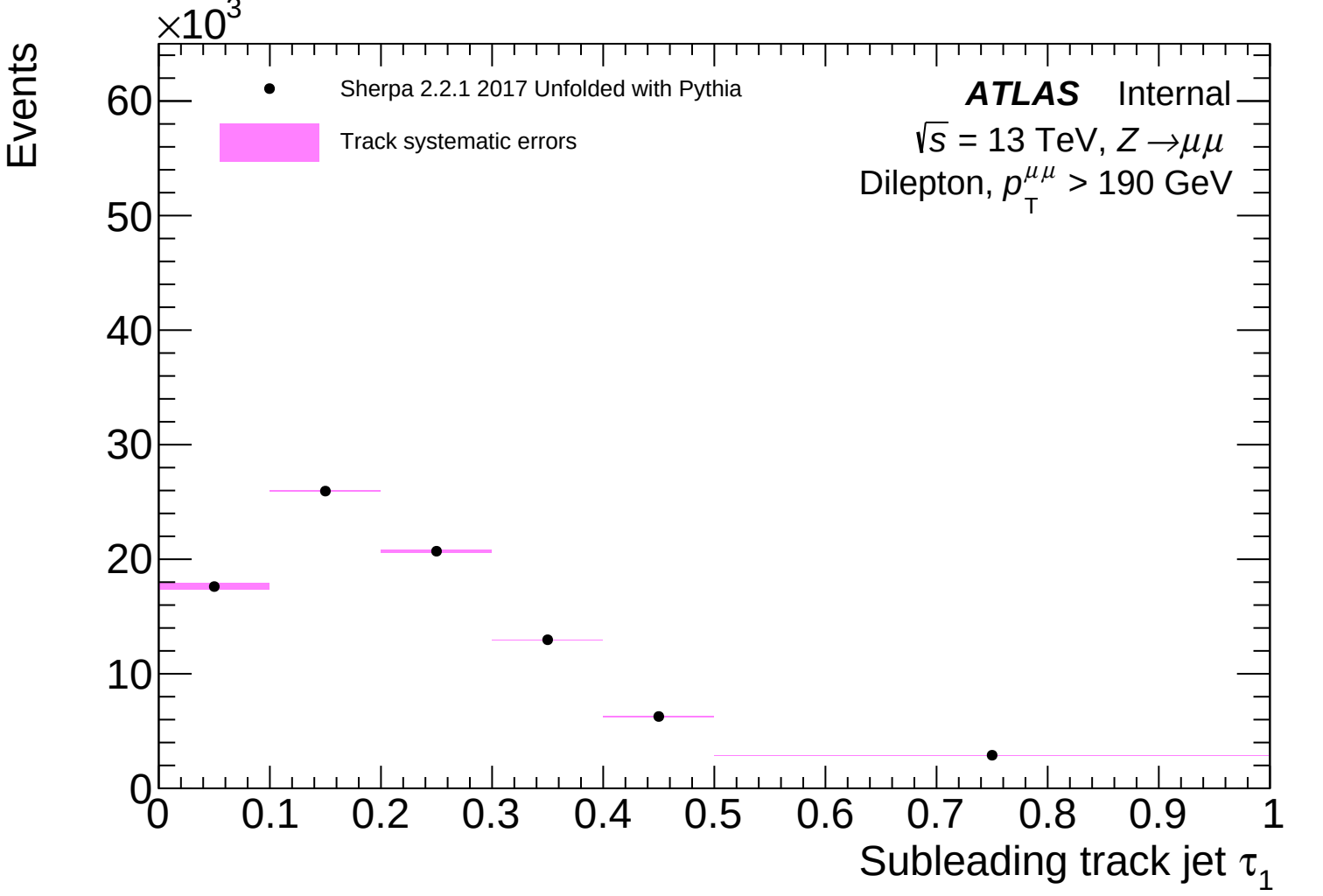

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

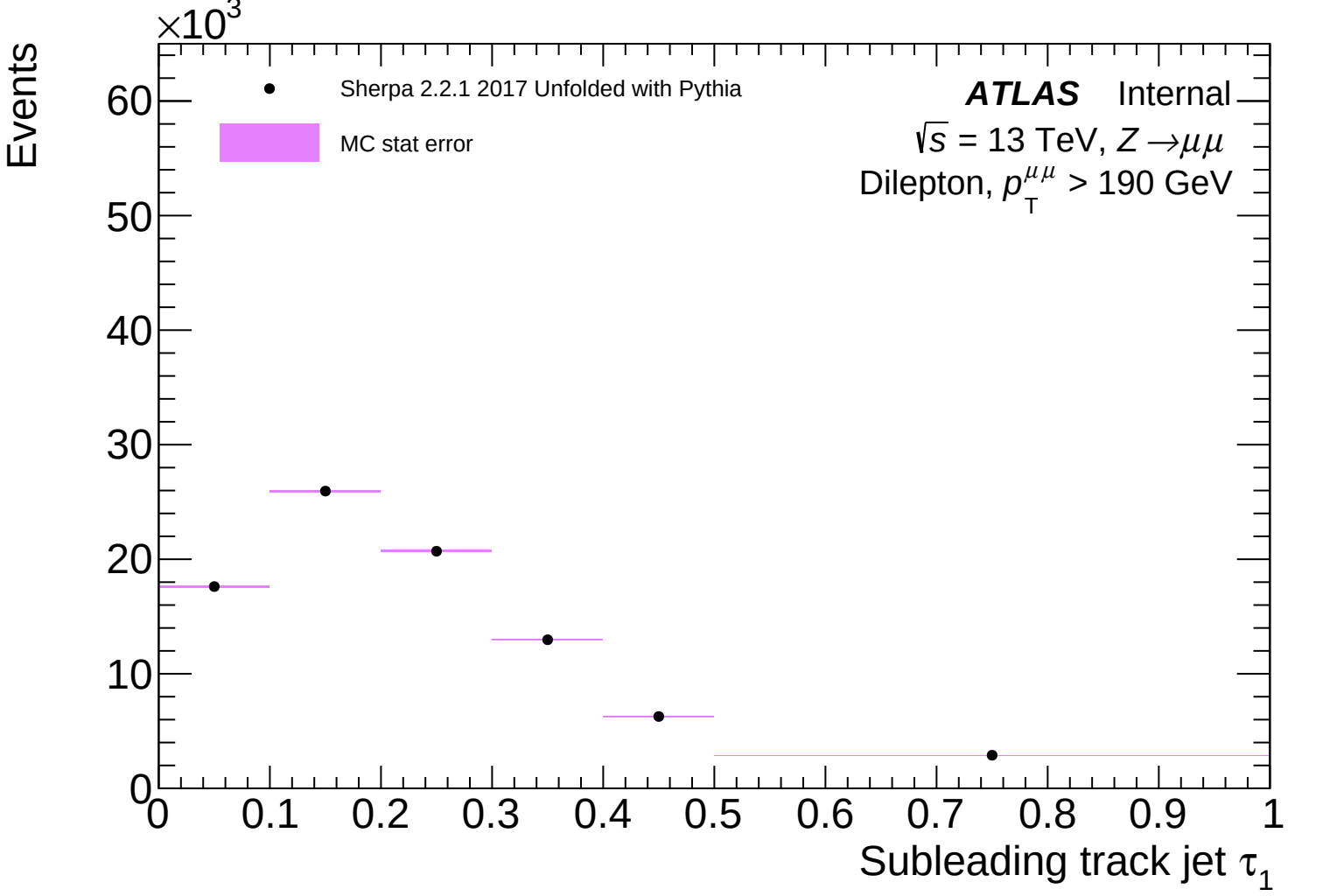

×10^3
dN / dτ_1^{j2}
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
500
400
300
200
100
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

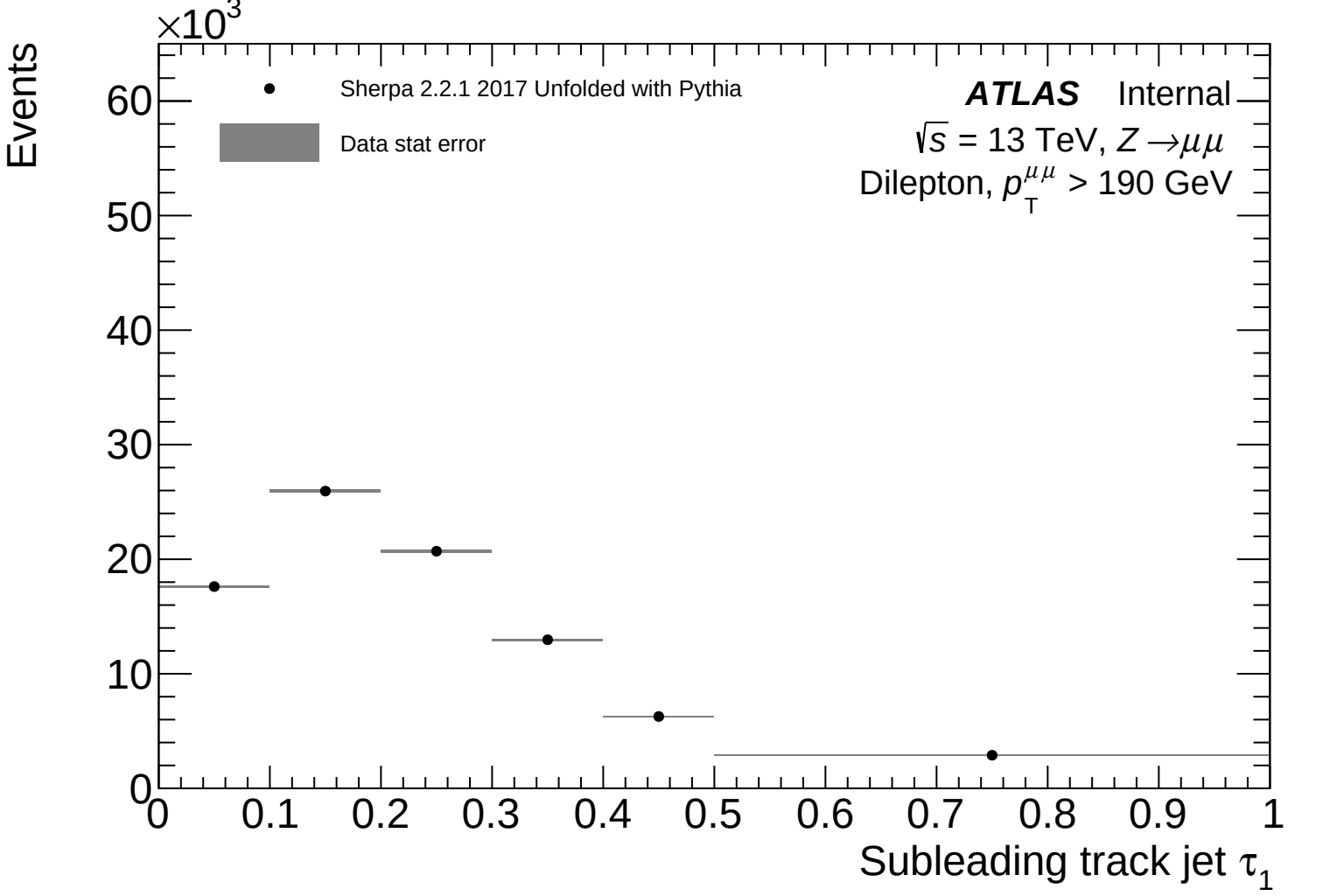

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

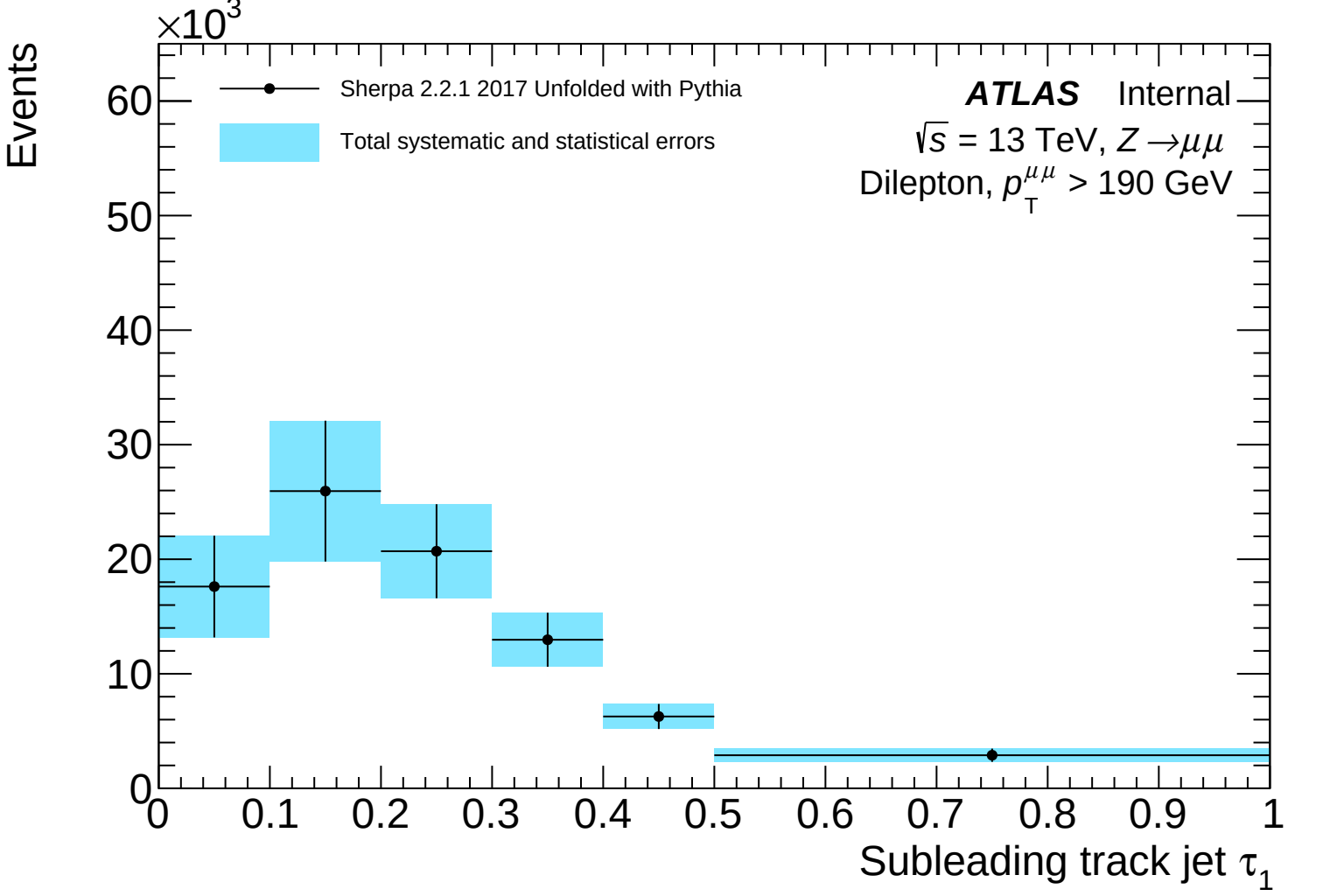

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

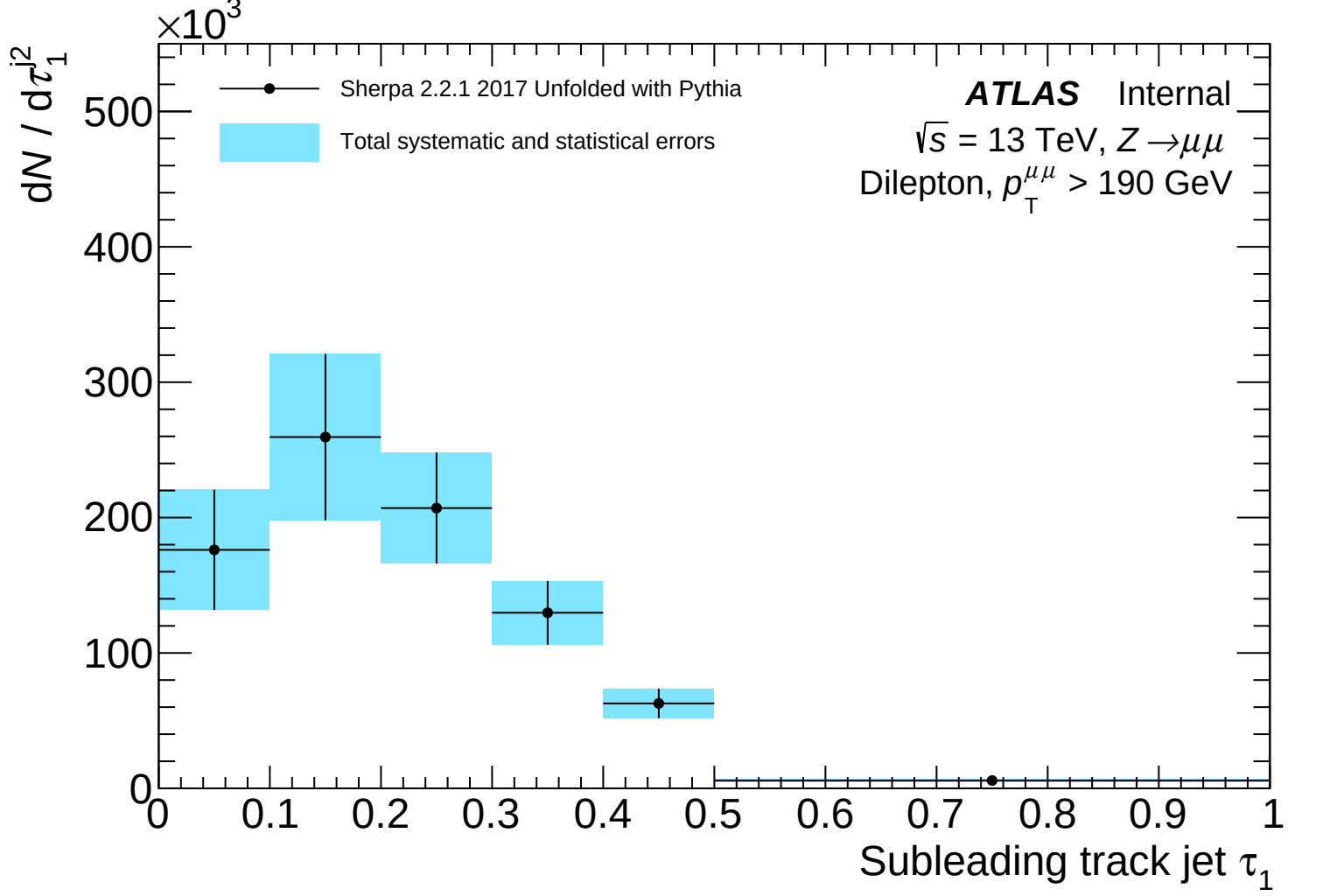

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

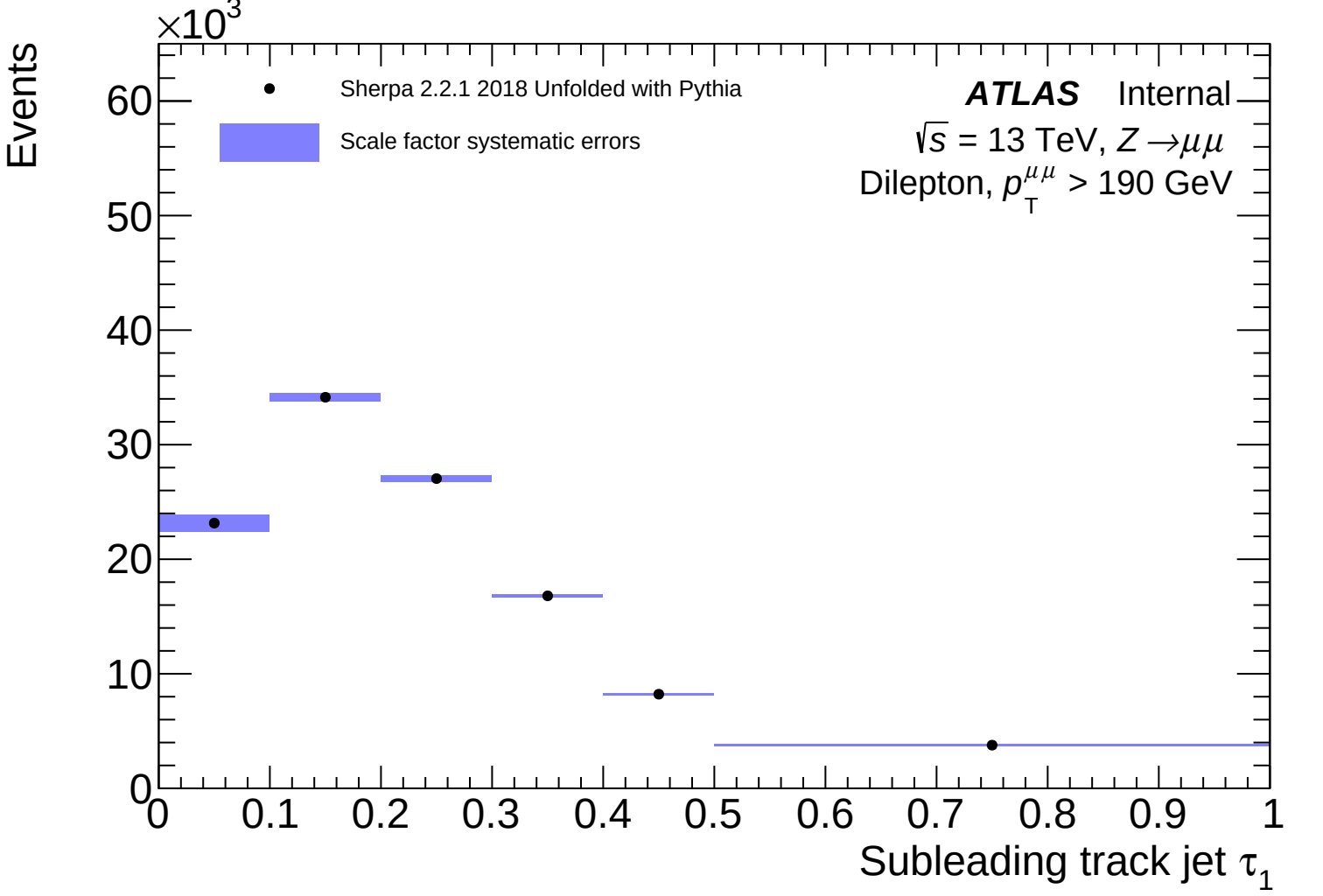

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

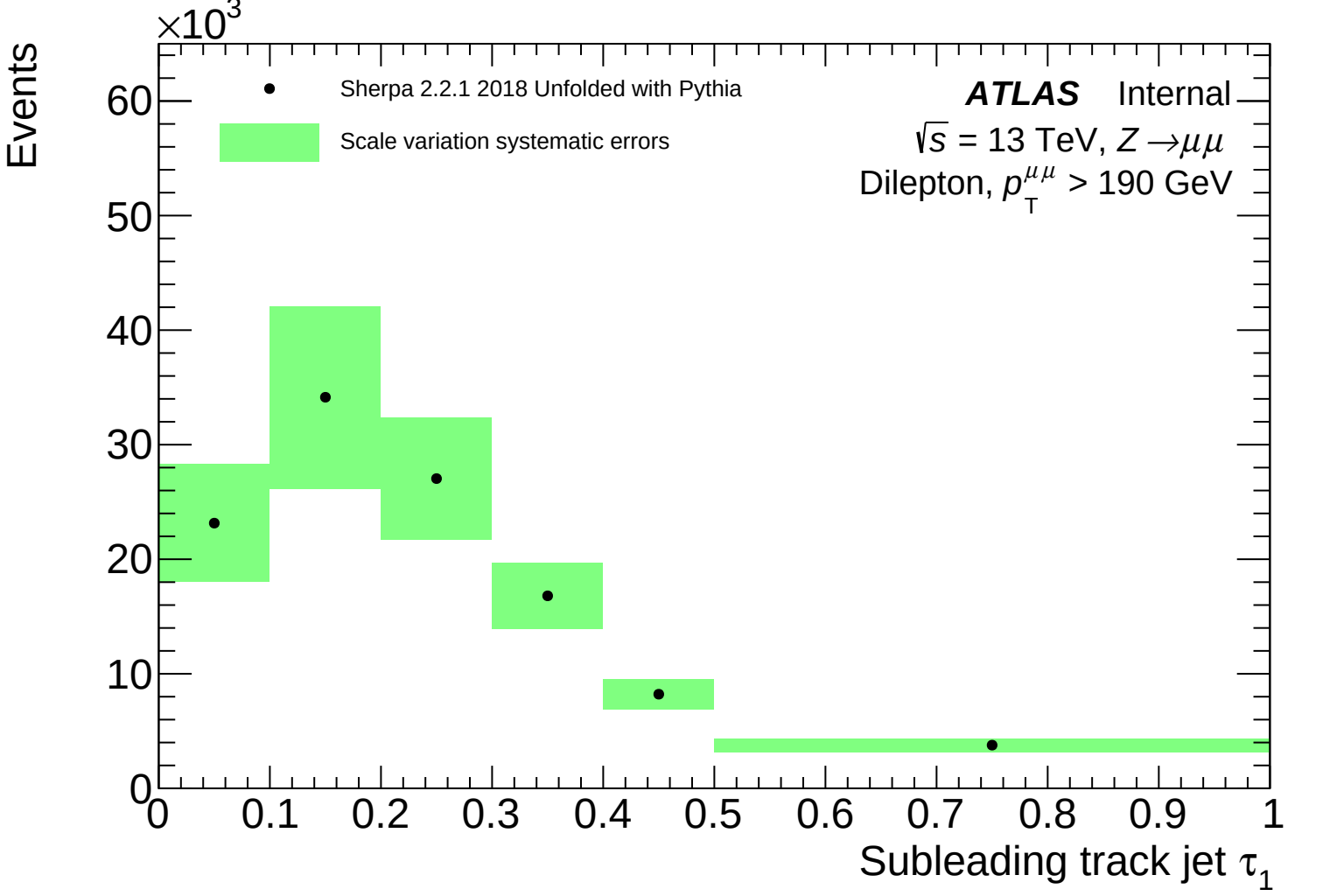

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

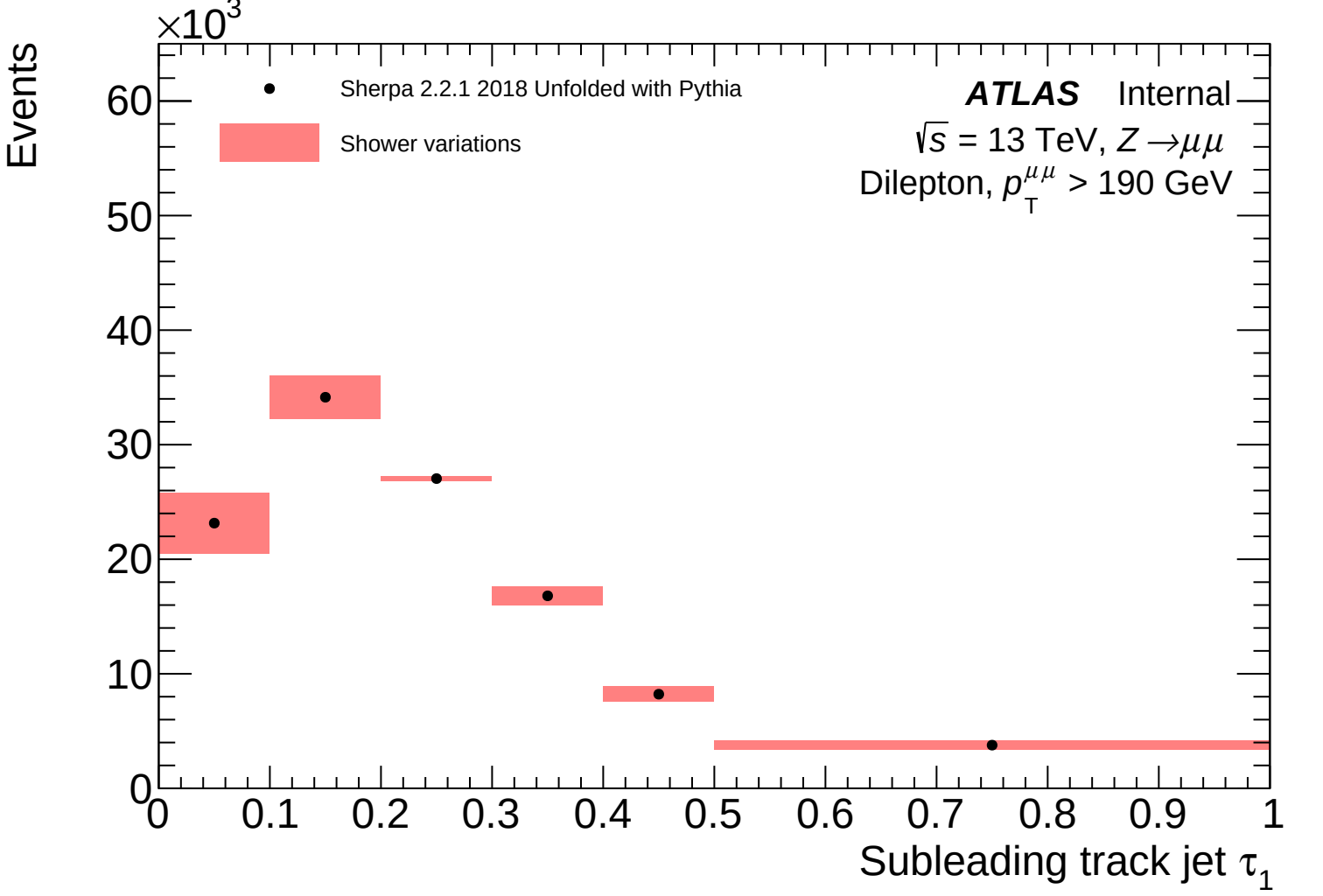

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

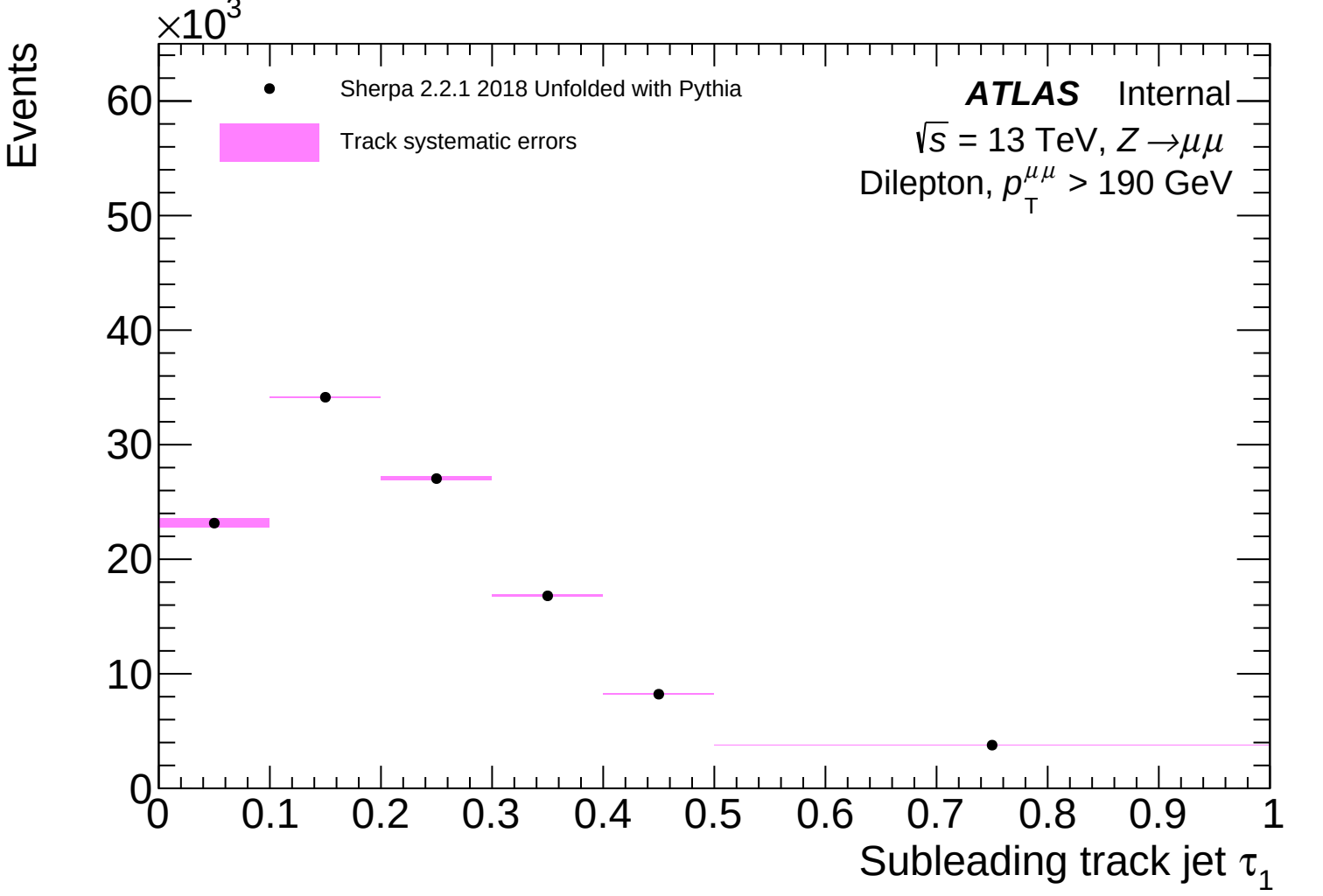

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

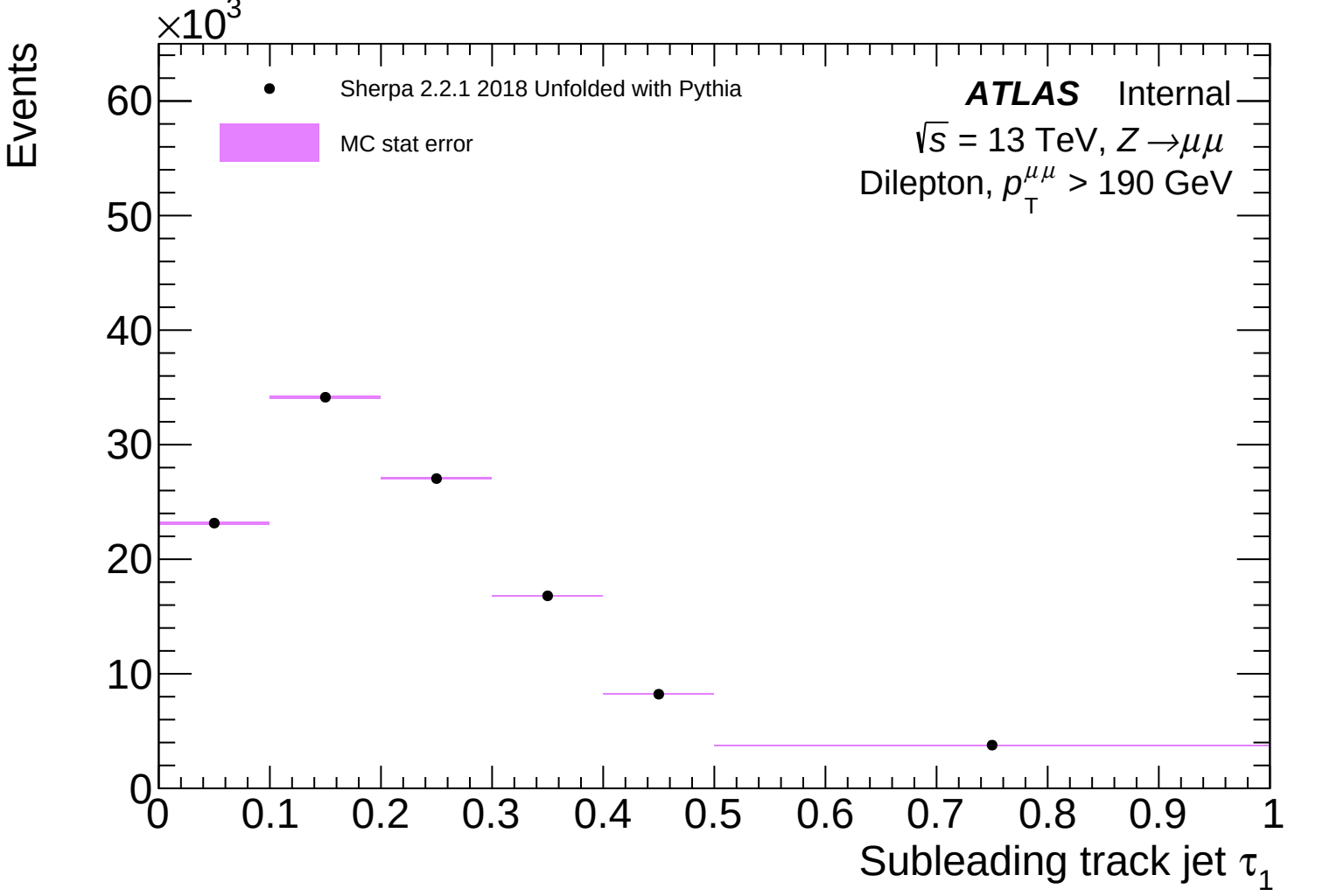

$\times 10^3$
$\frac{dN}{d\tau_1^{j2}}$
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
500
400
300
200
100
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

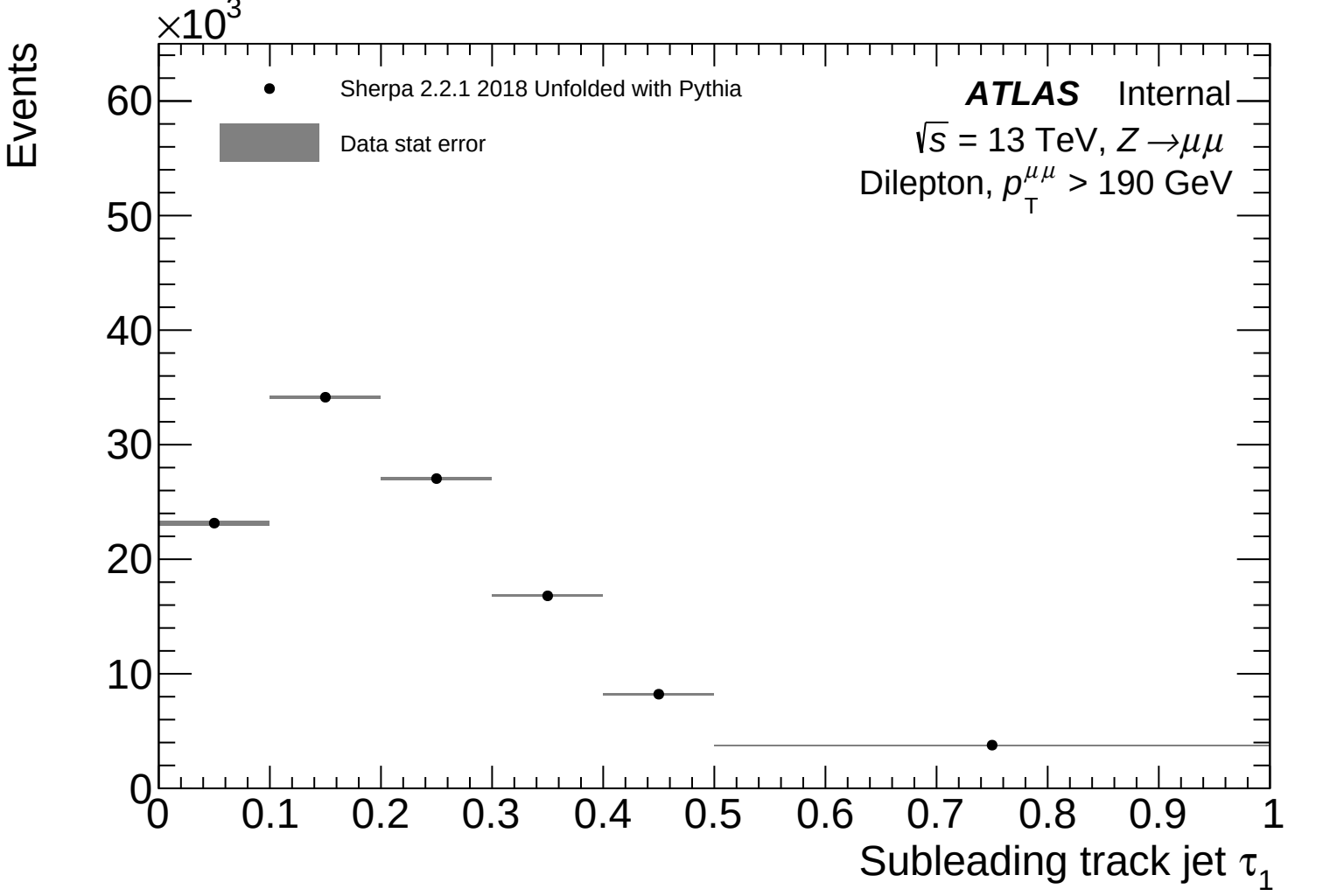

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

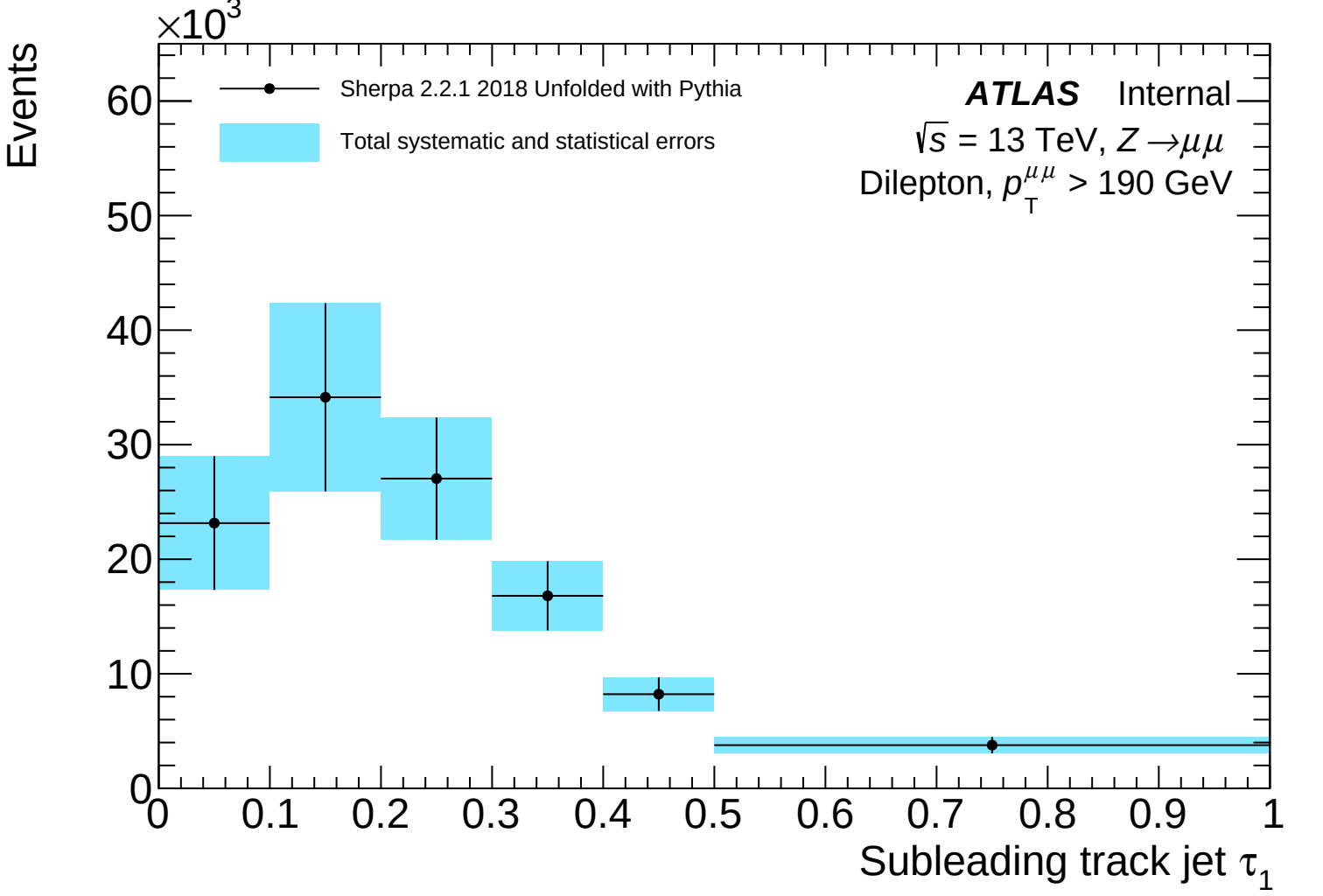

Events
×10^3
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ1
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

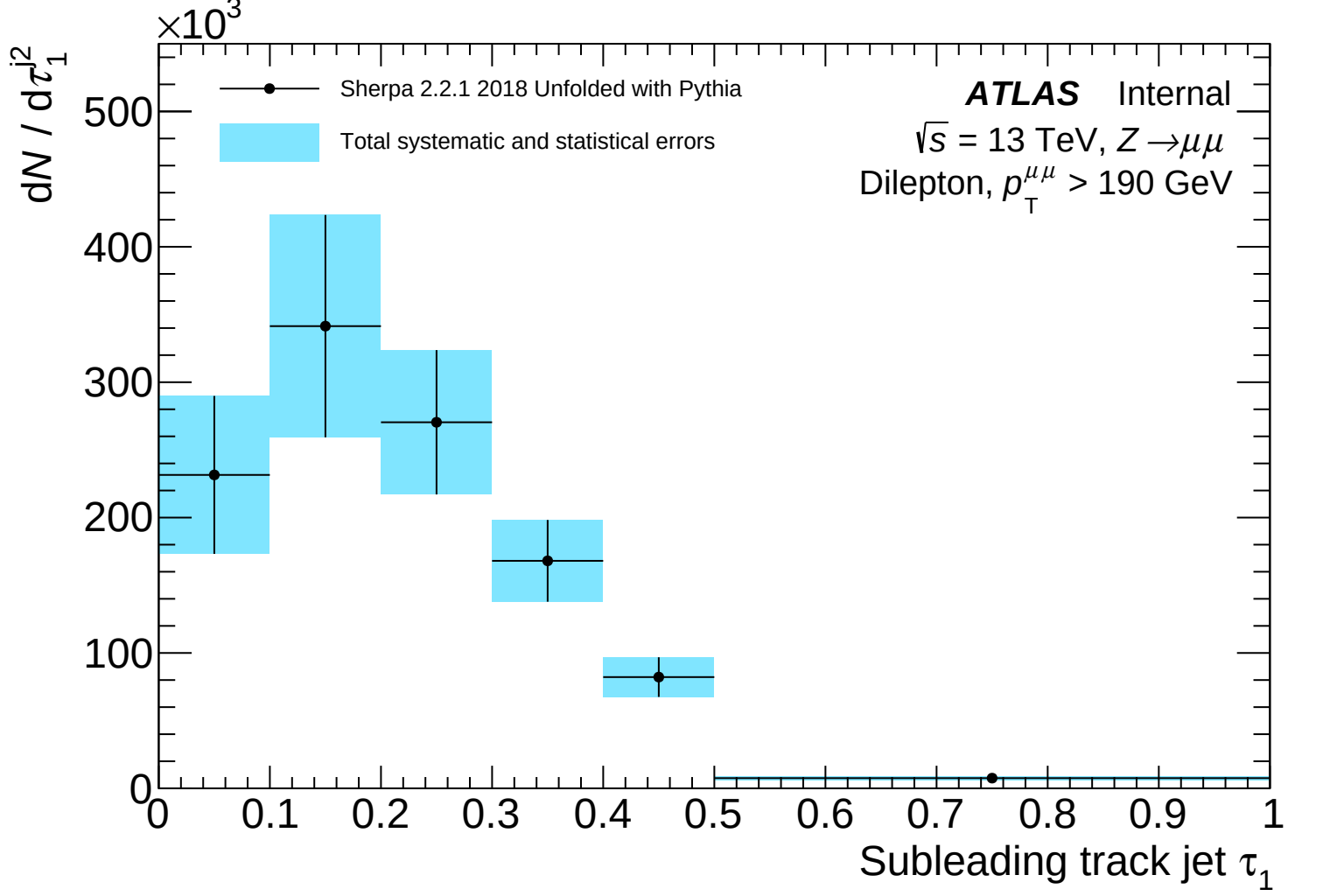

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

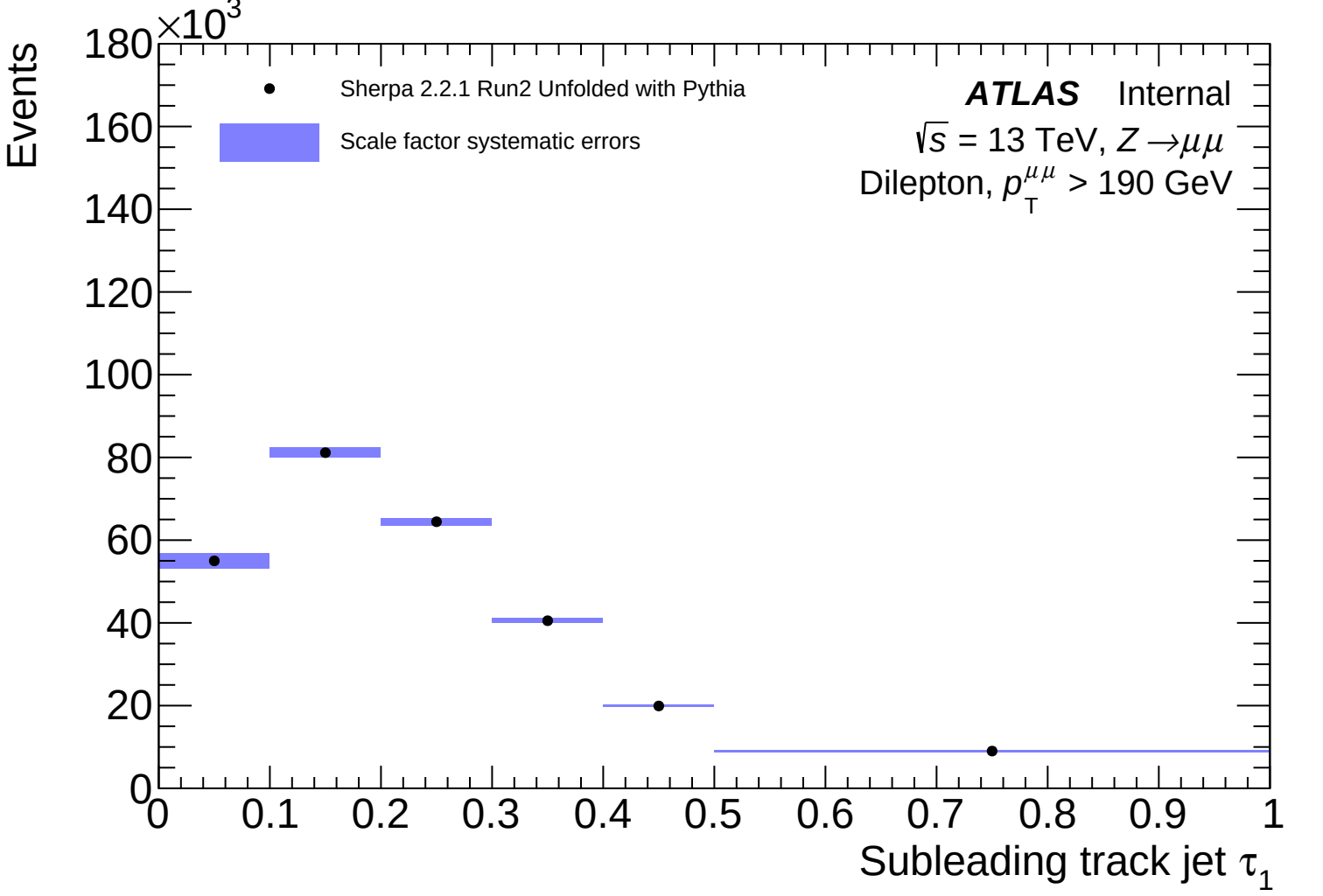

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

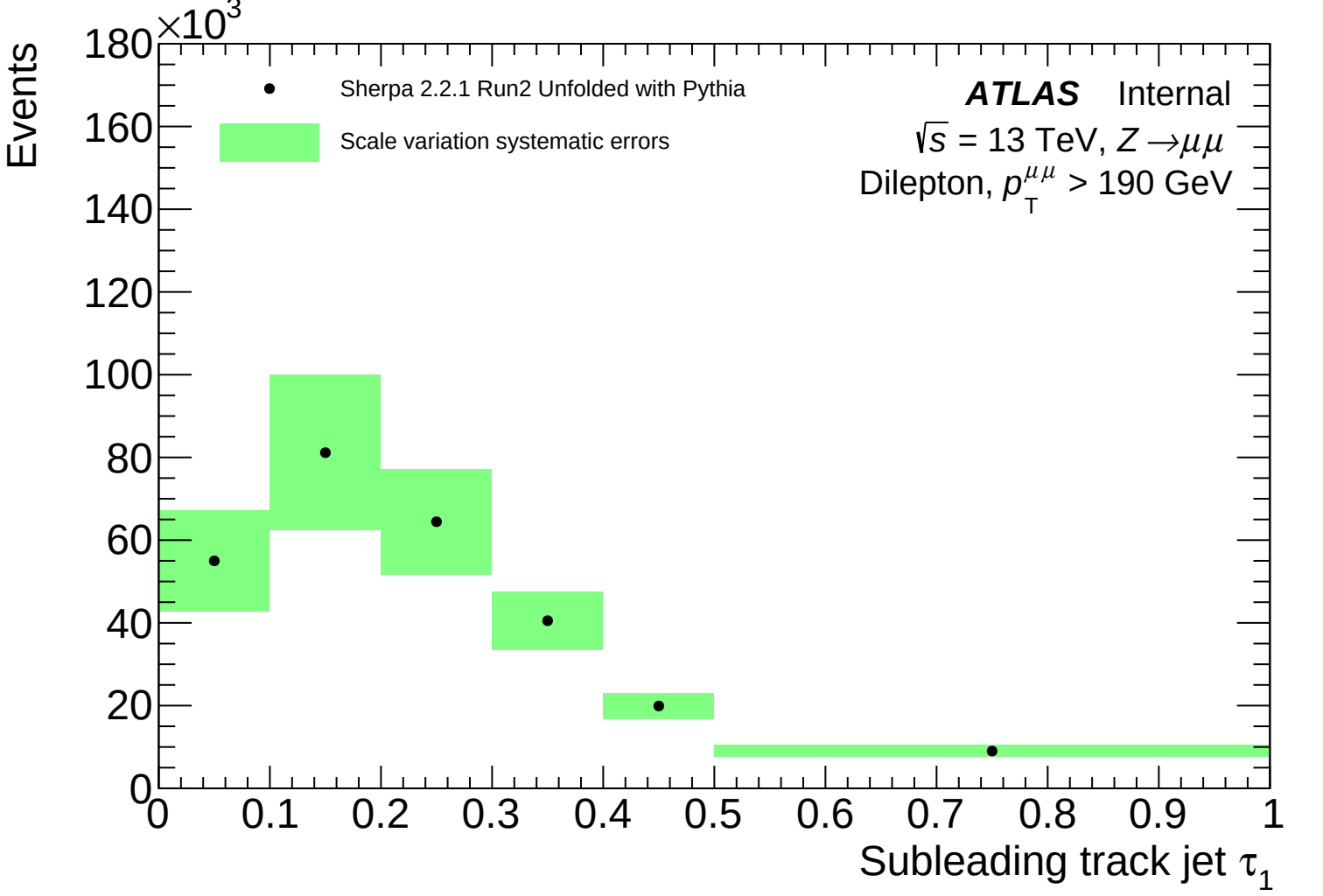

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

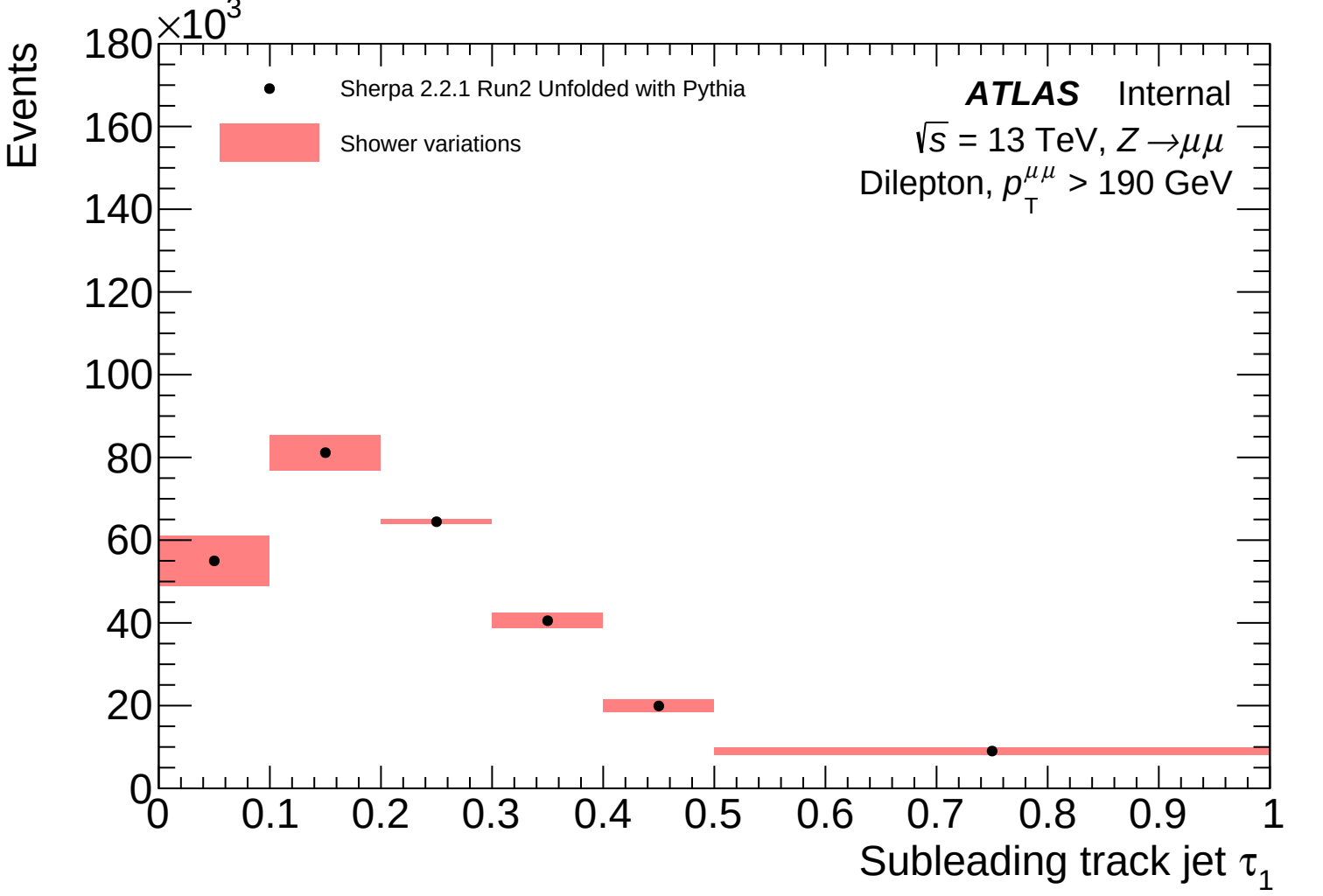

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

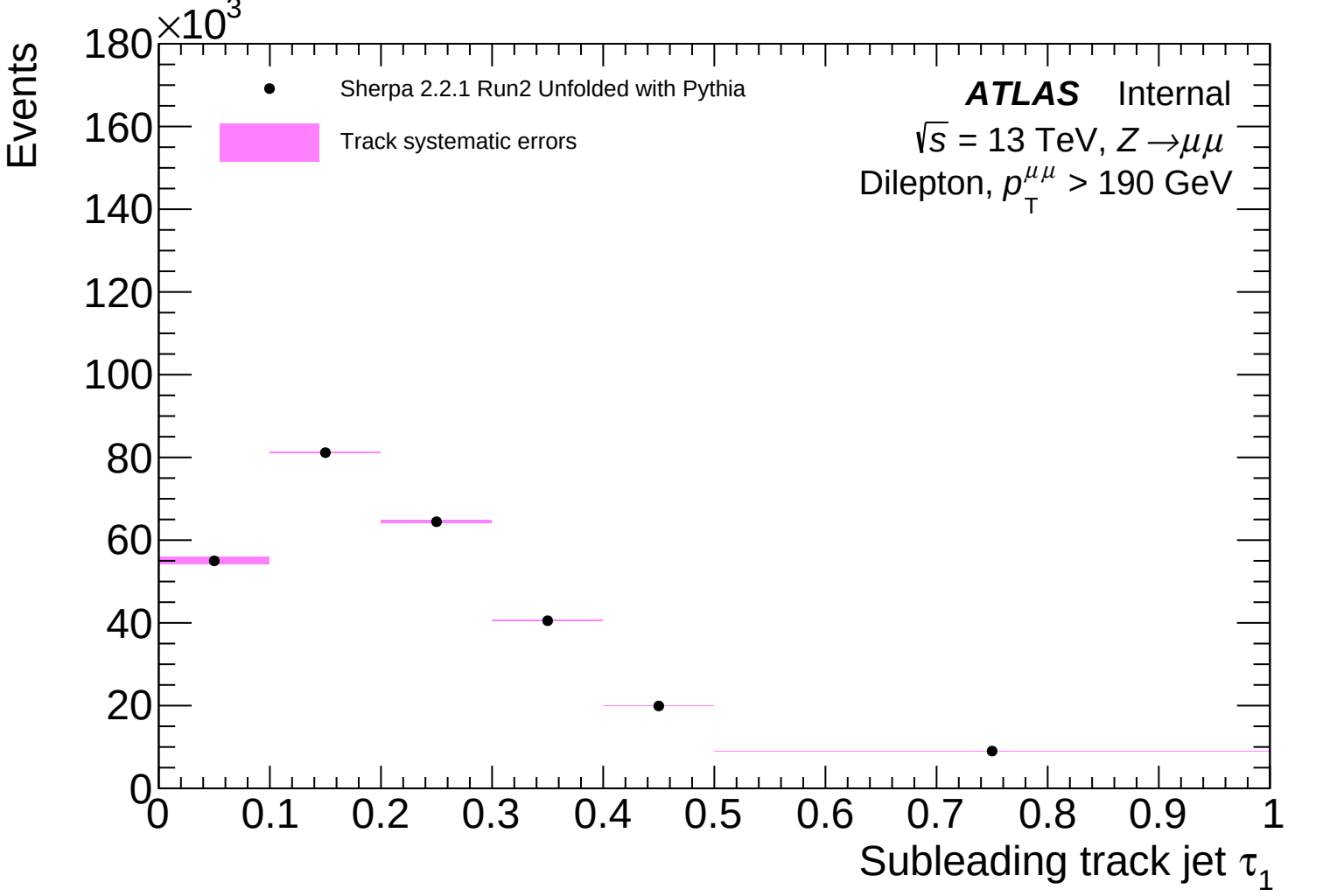

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

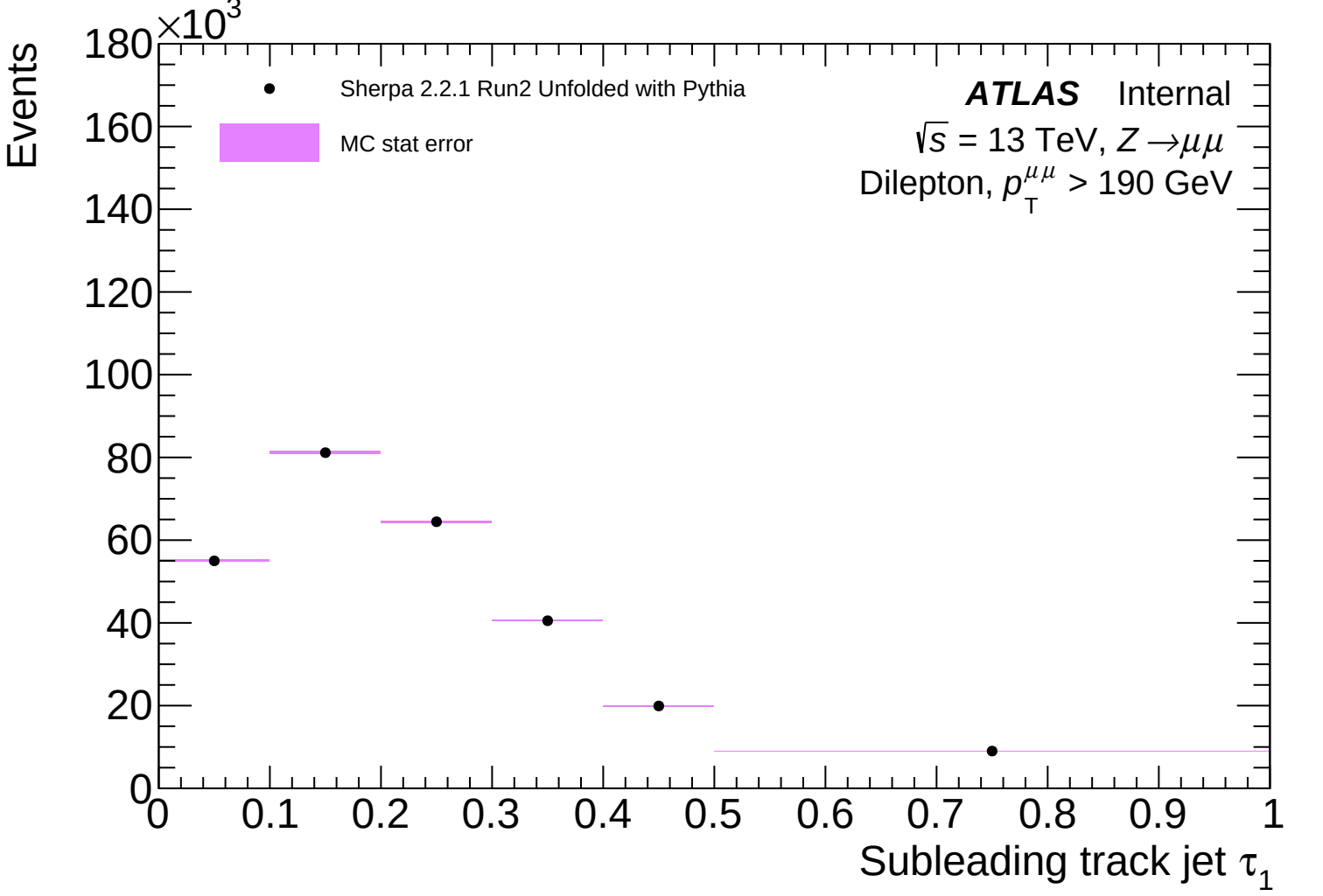

$\times 10^3$
$\frac{dN}{d\tau_1^{j2}}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
500
400
300
200
100
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

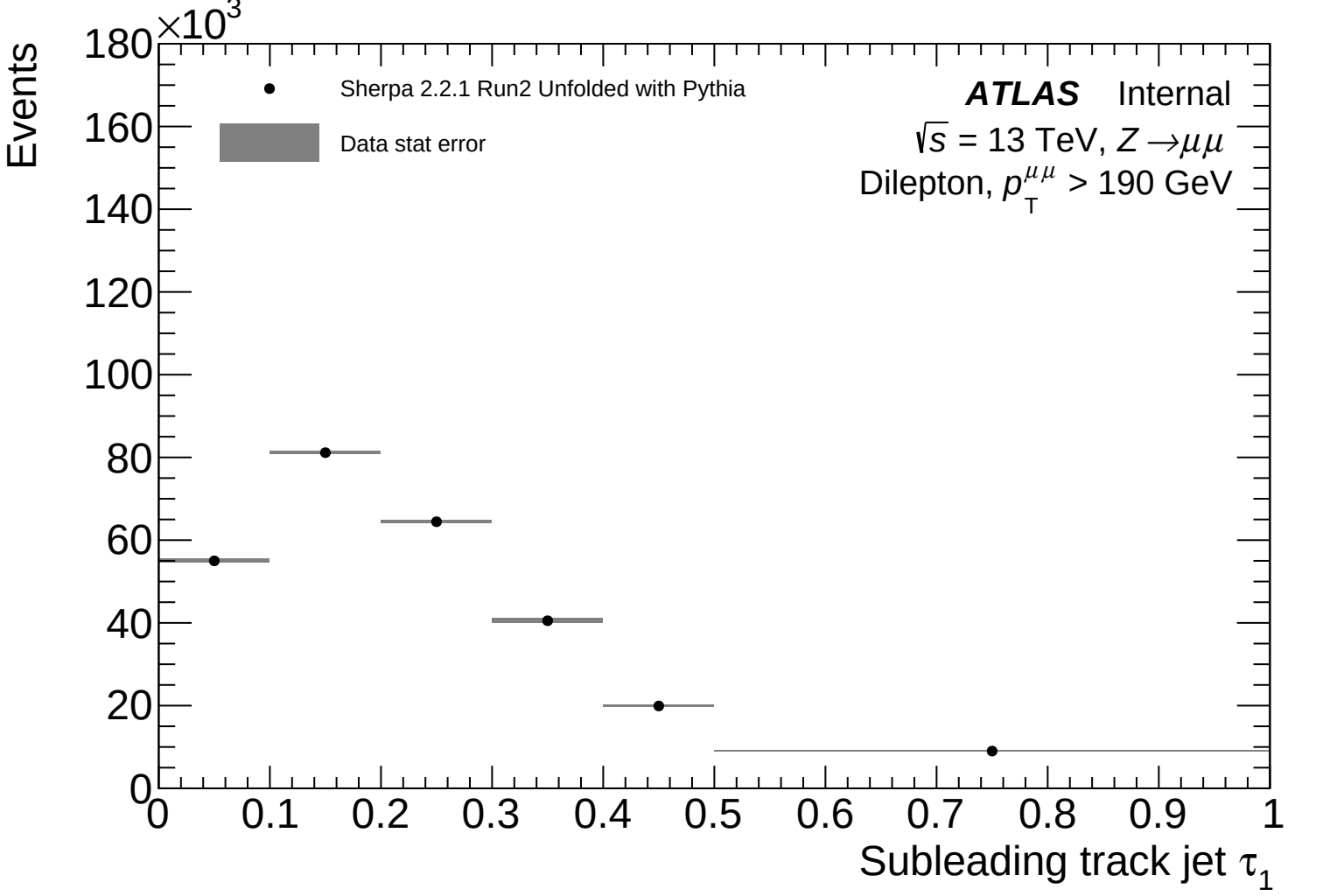

Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

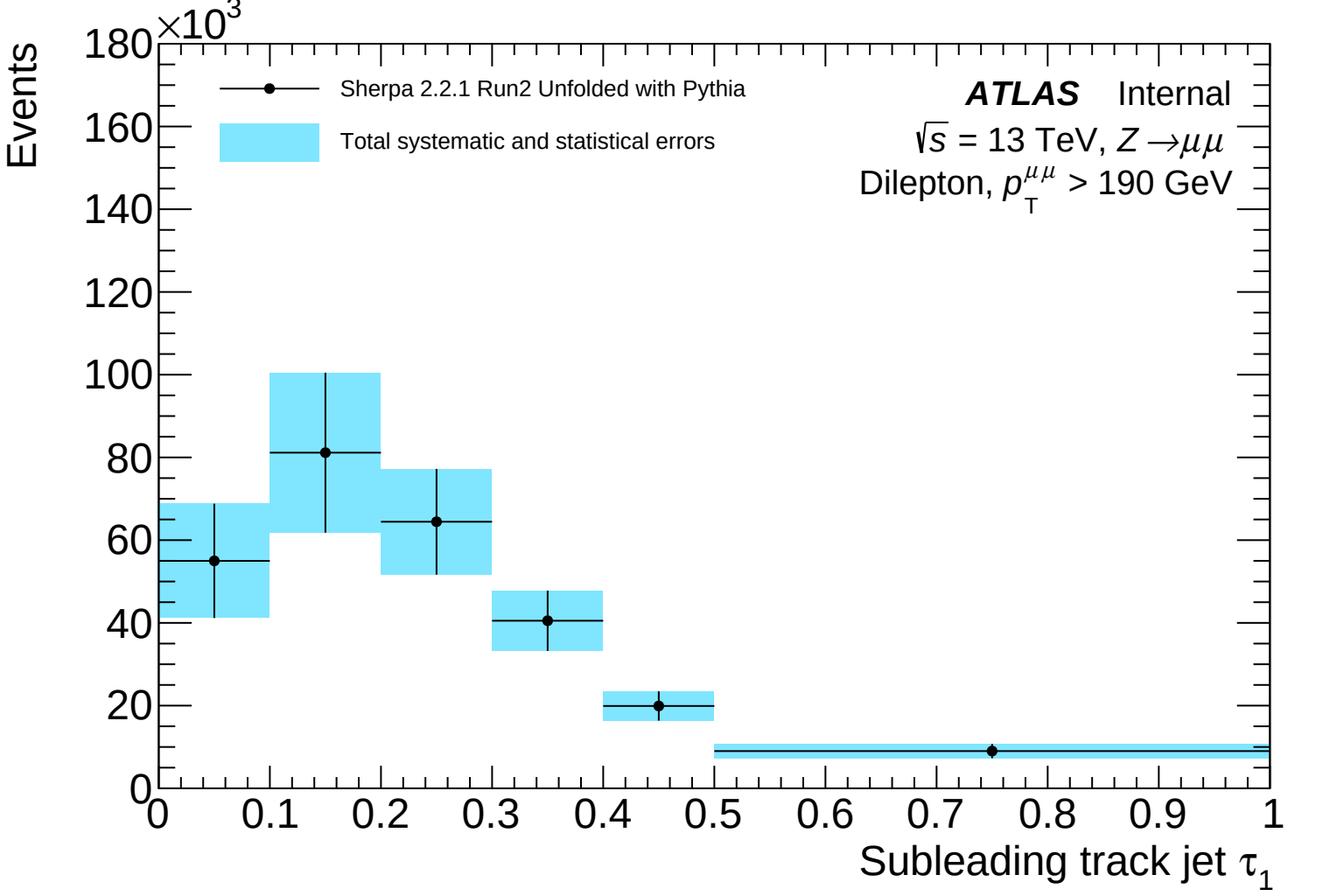

Events
×10^3
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

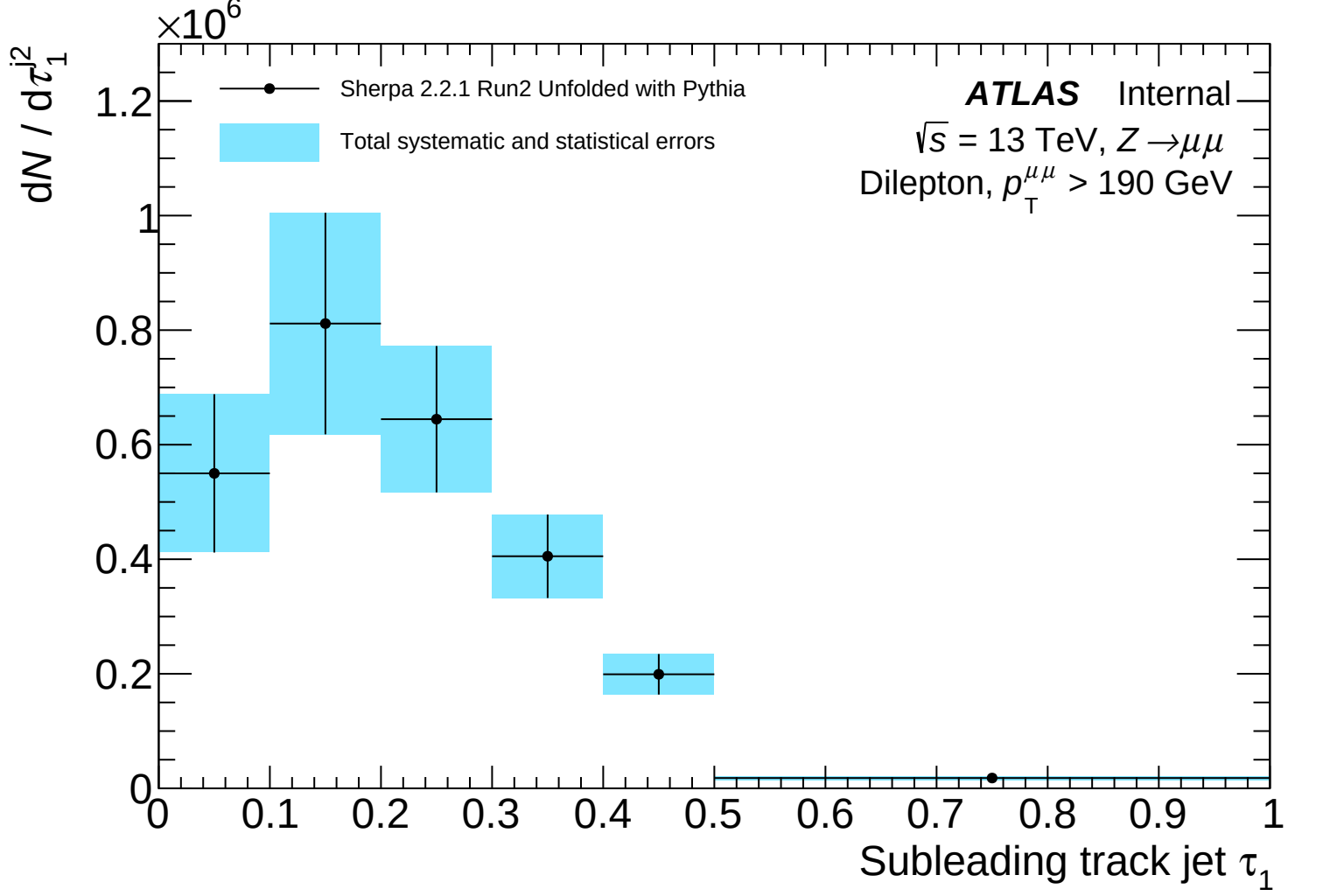

Events
×10^3
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

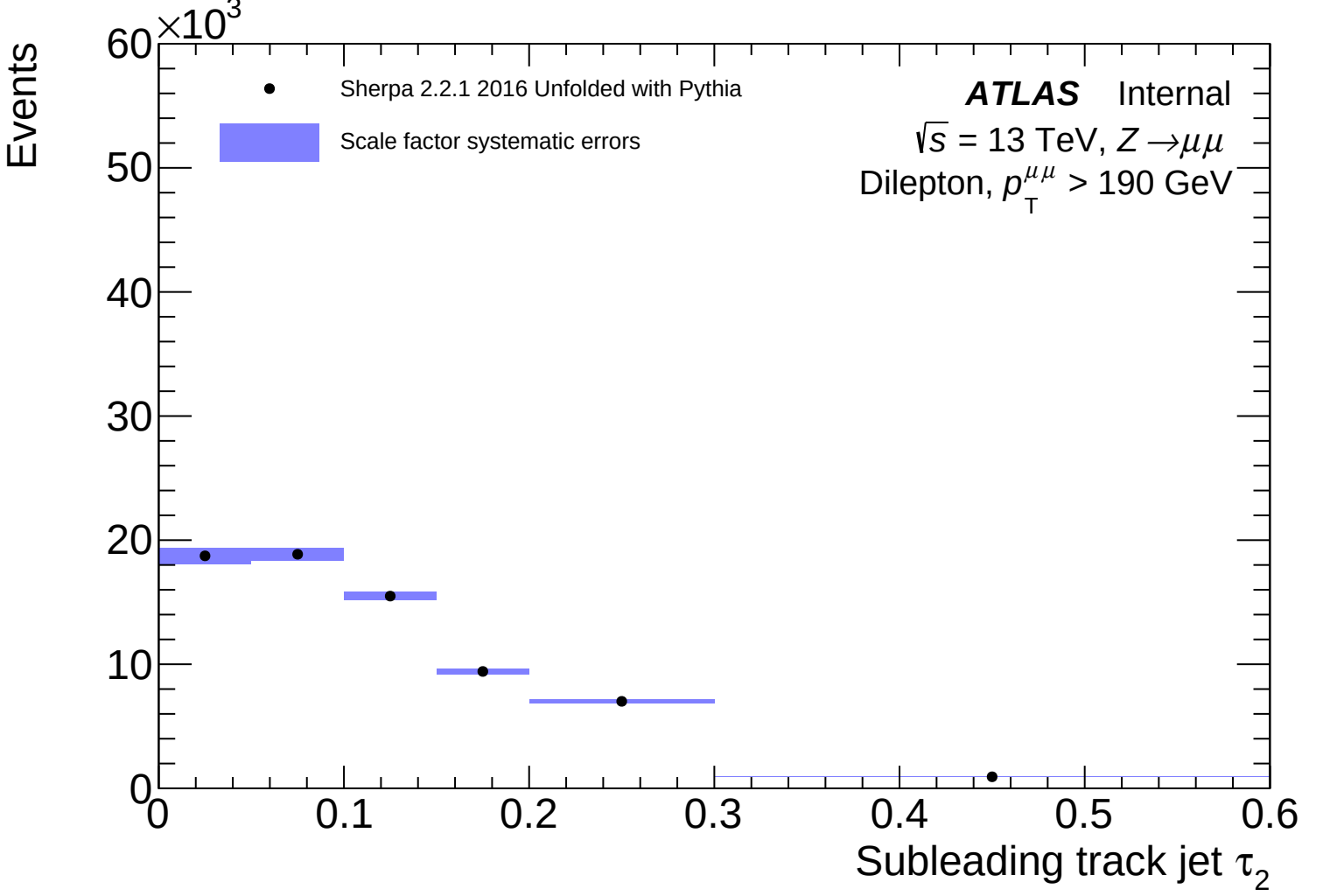

Events
$\times 10^3$
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

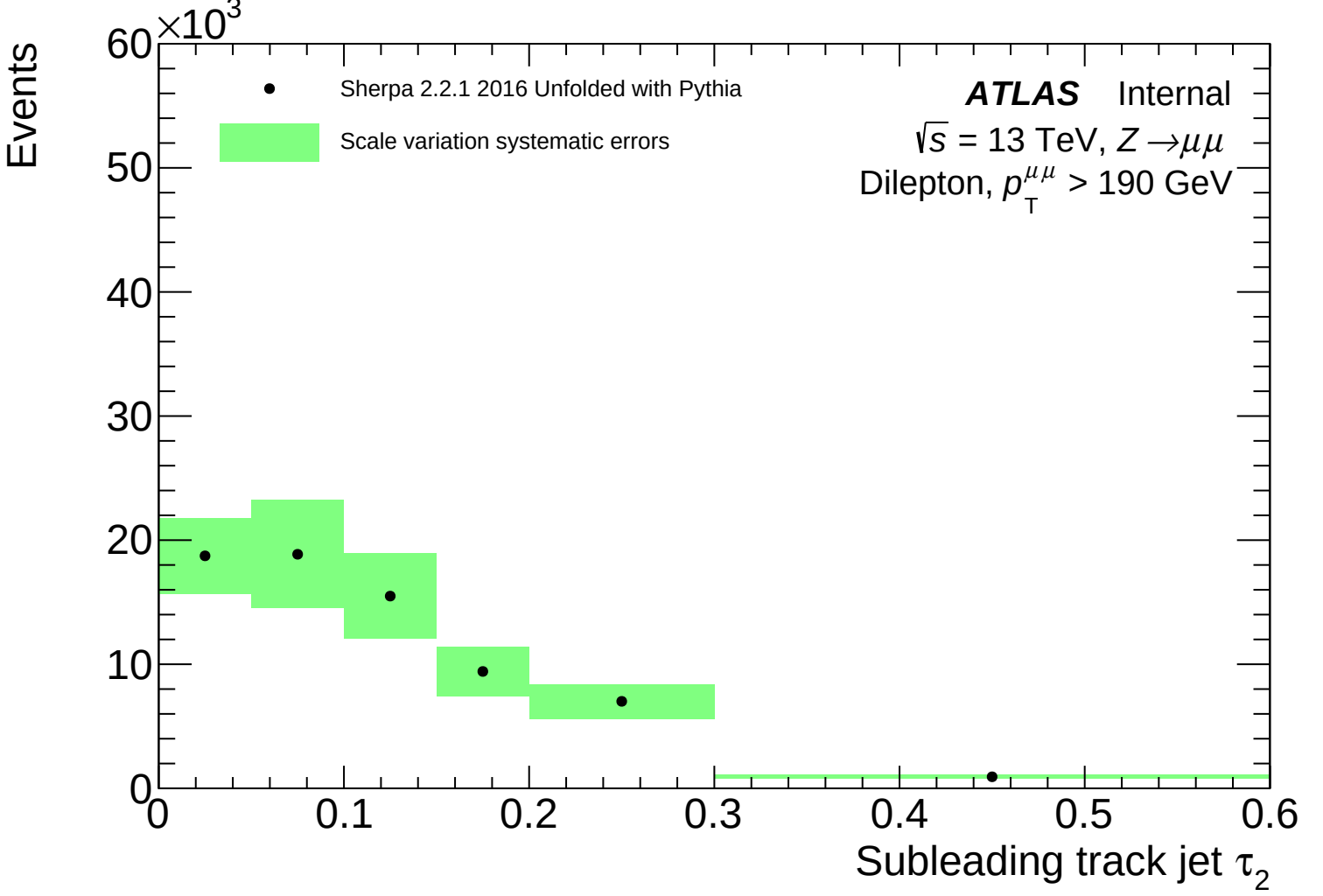

Events
×10^3
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

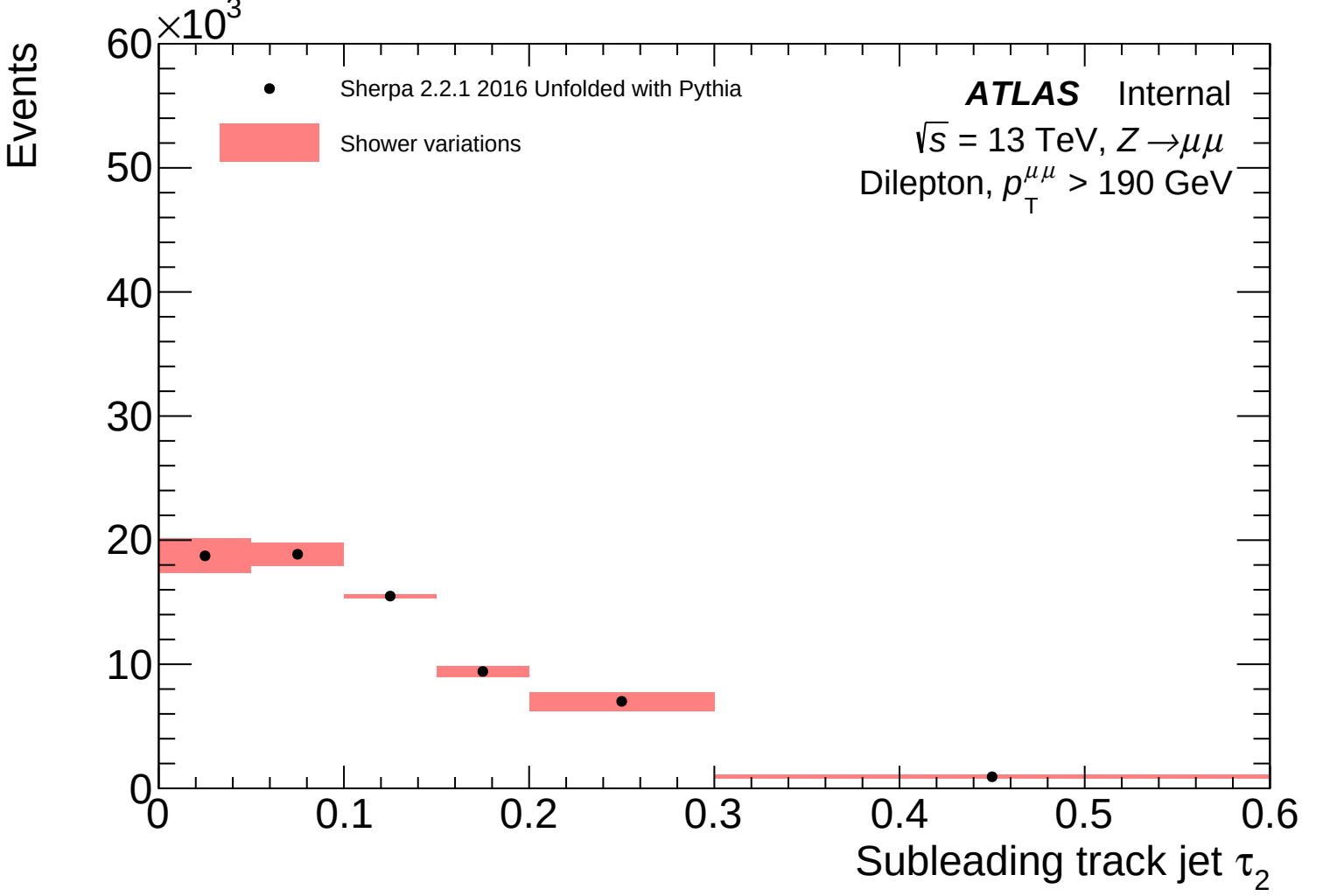

Events
×10^3
180
160
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ_1

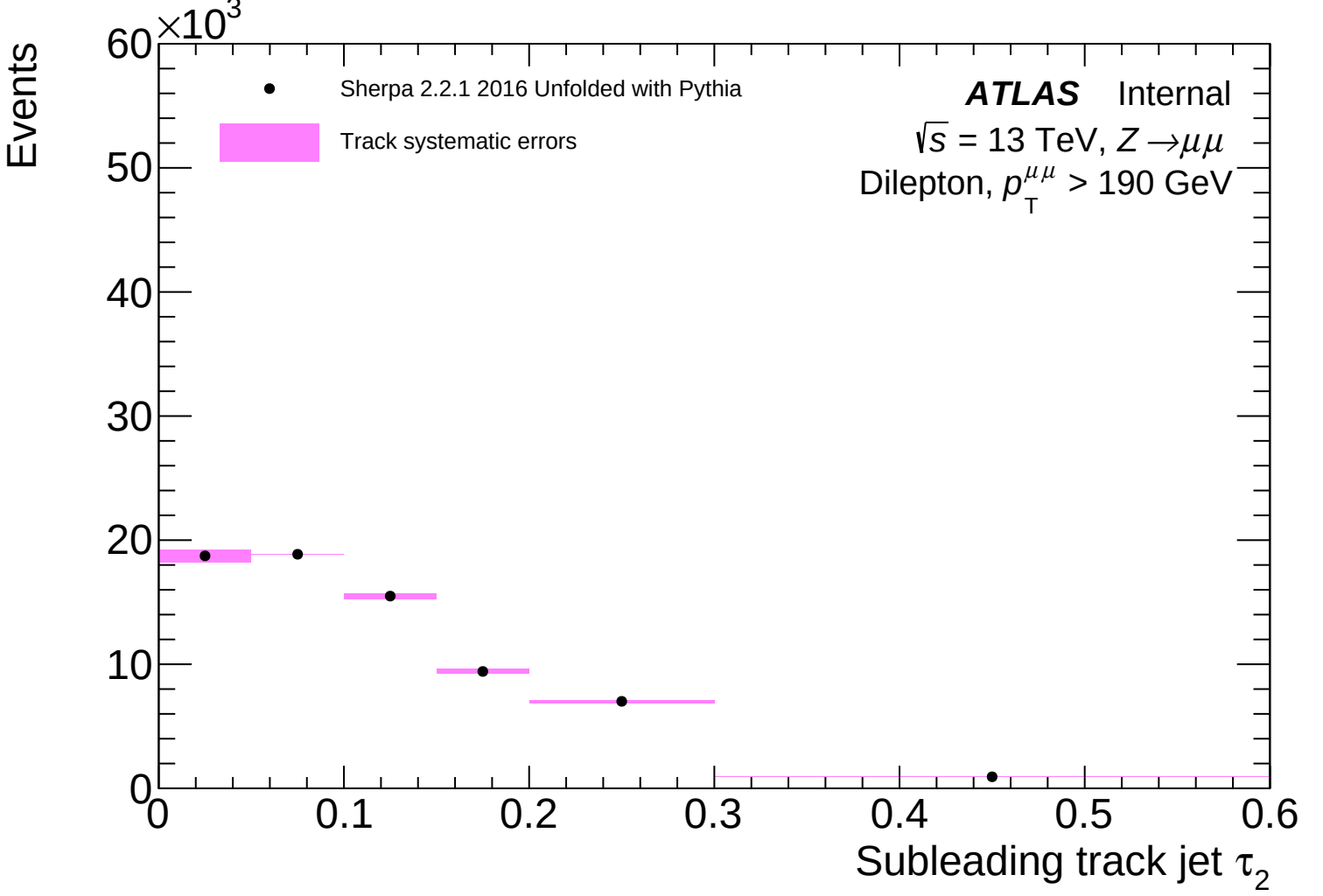

Events
×10^3
180
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Subleading track jet τ1
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

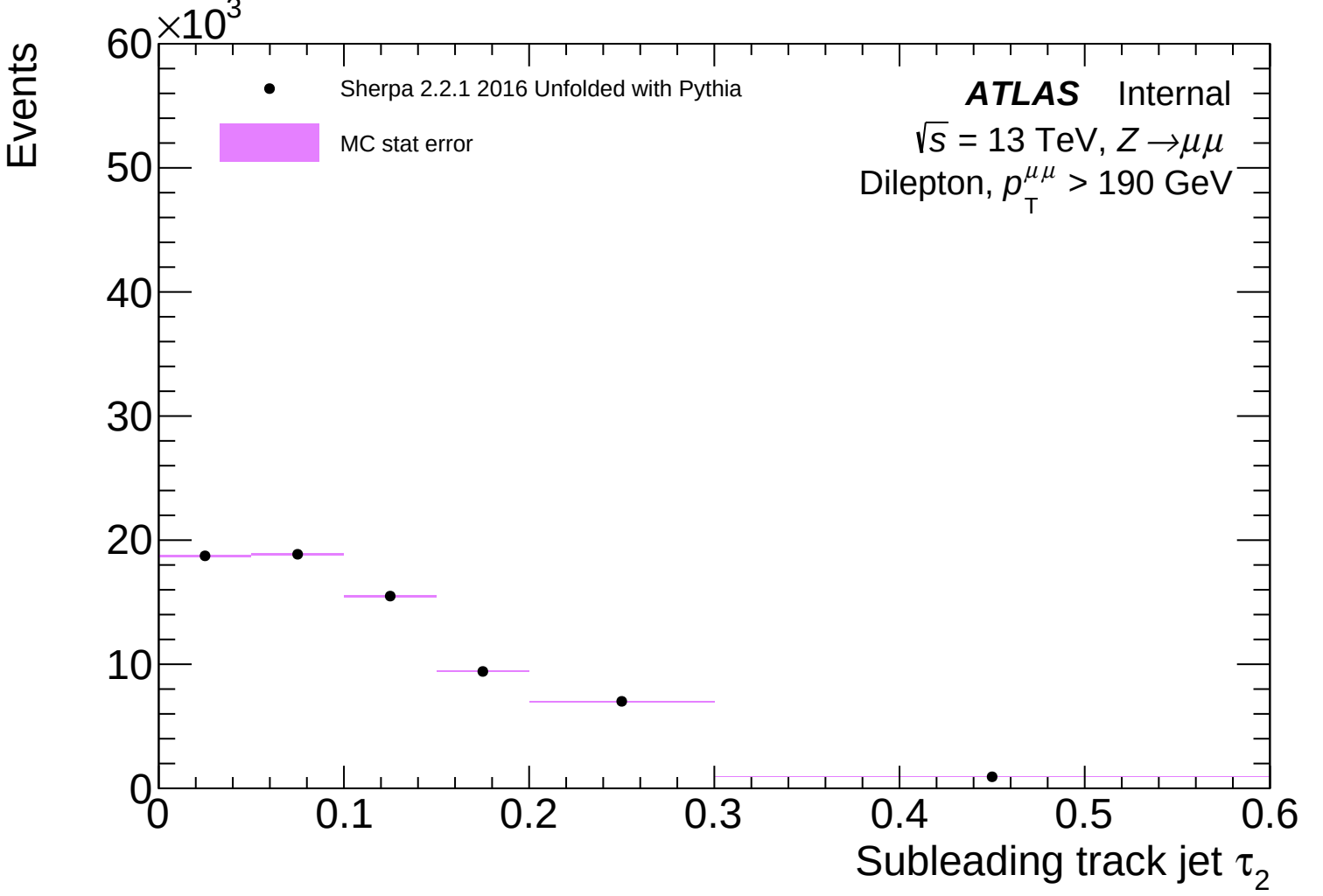

×10^6
dN / d τ_1^j2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
1.2
1
0.8
0.6
0.4
0.2
0
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Subleading track jet τ_1

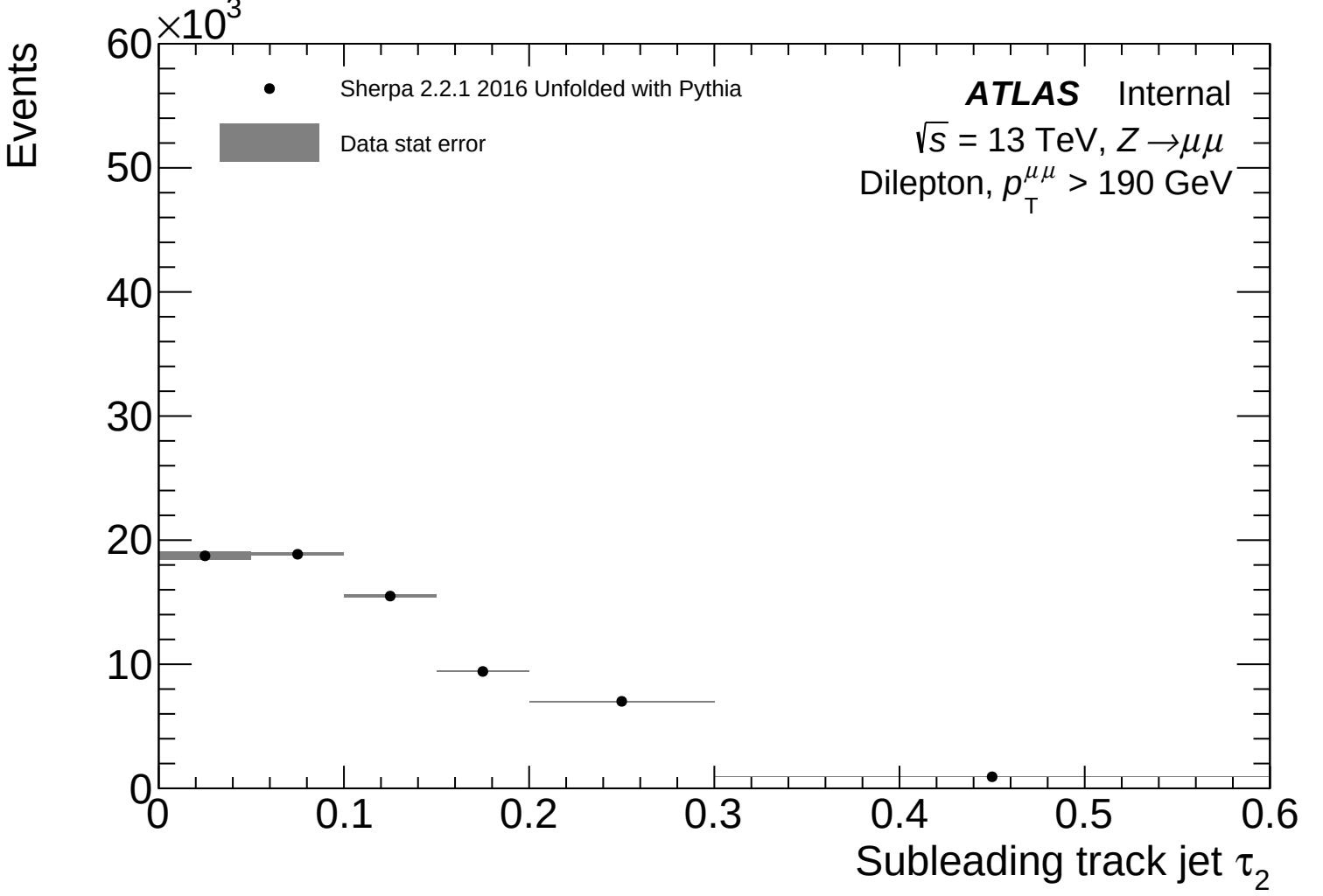

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

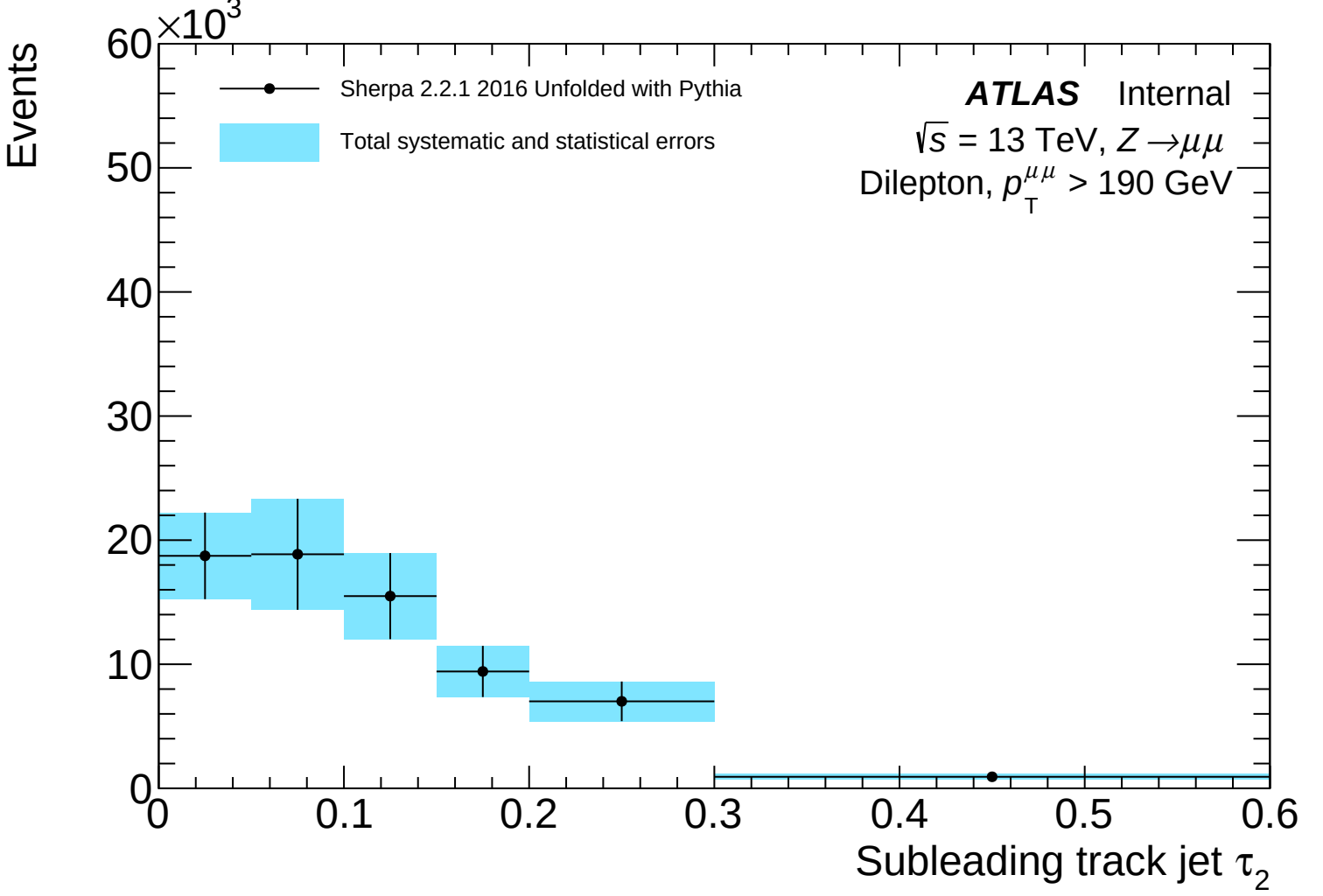

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

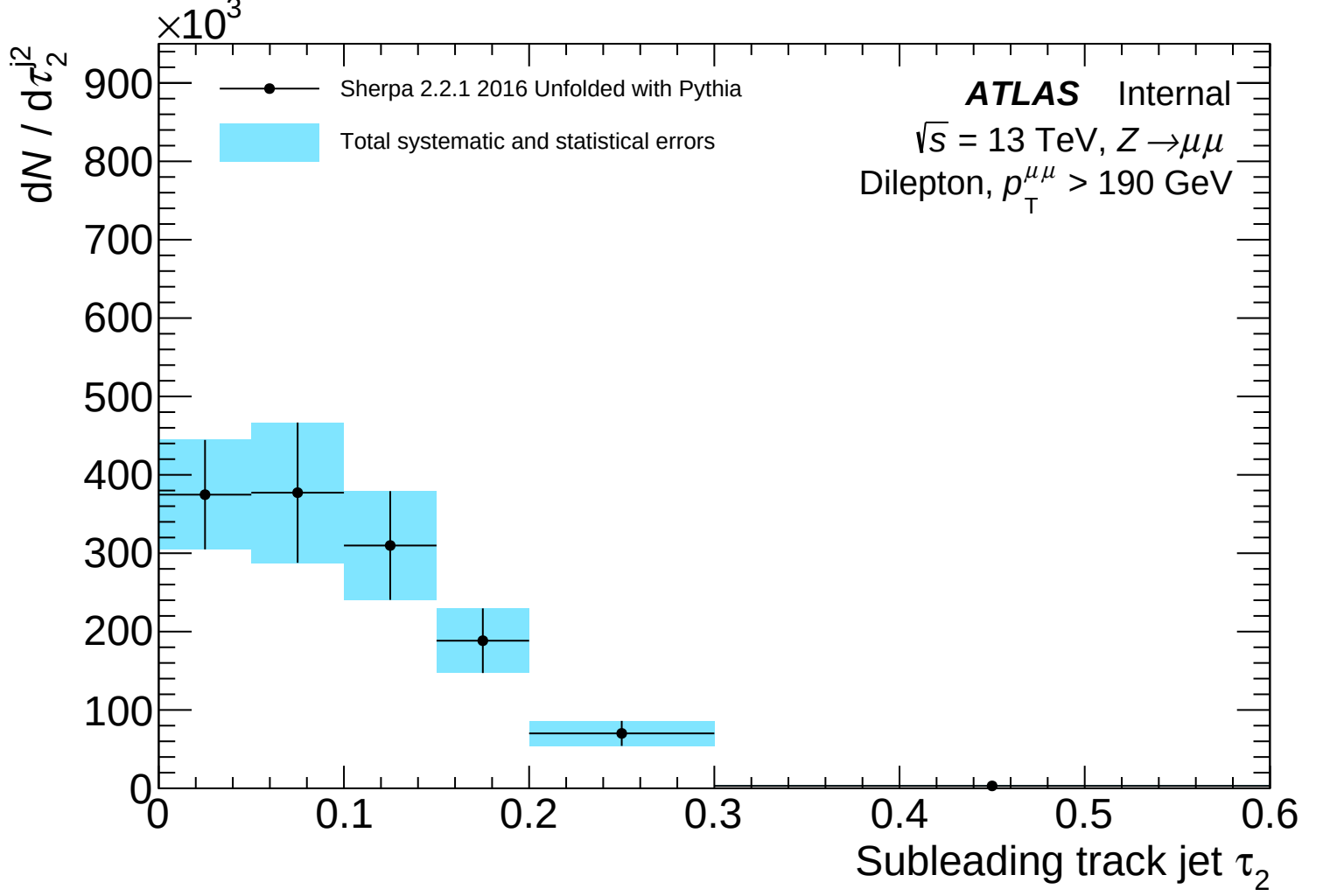

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

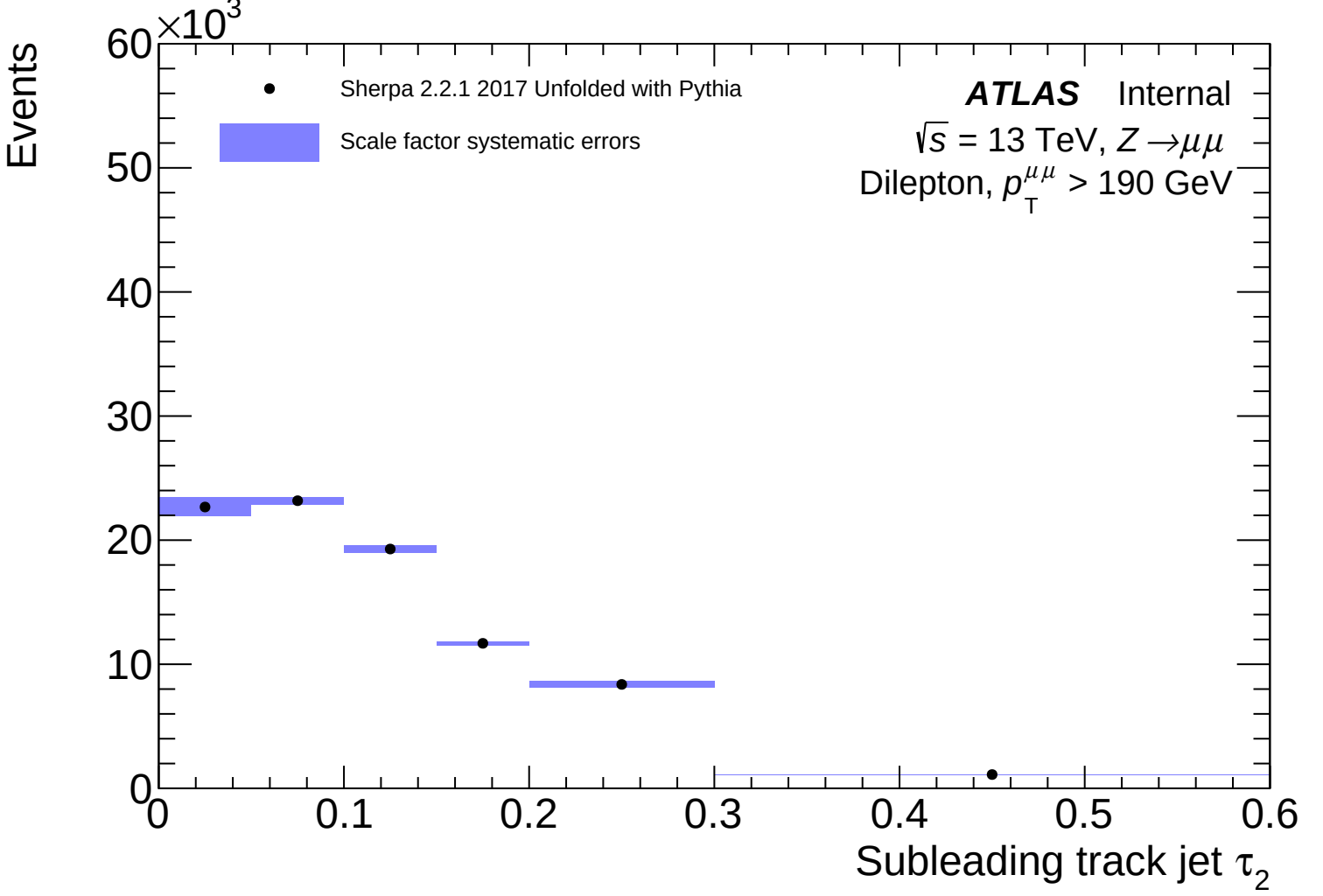

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

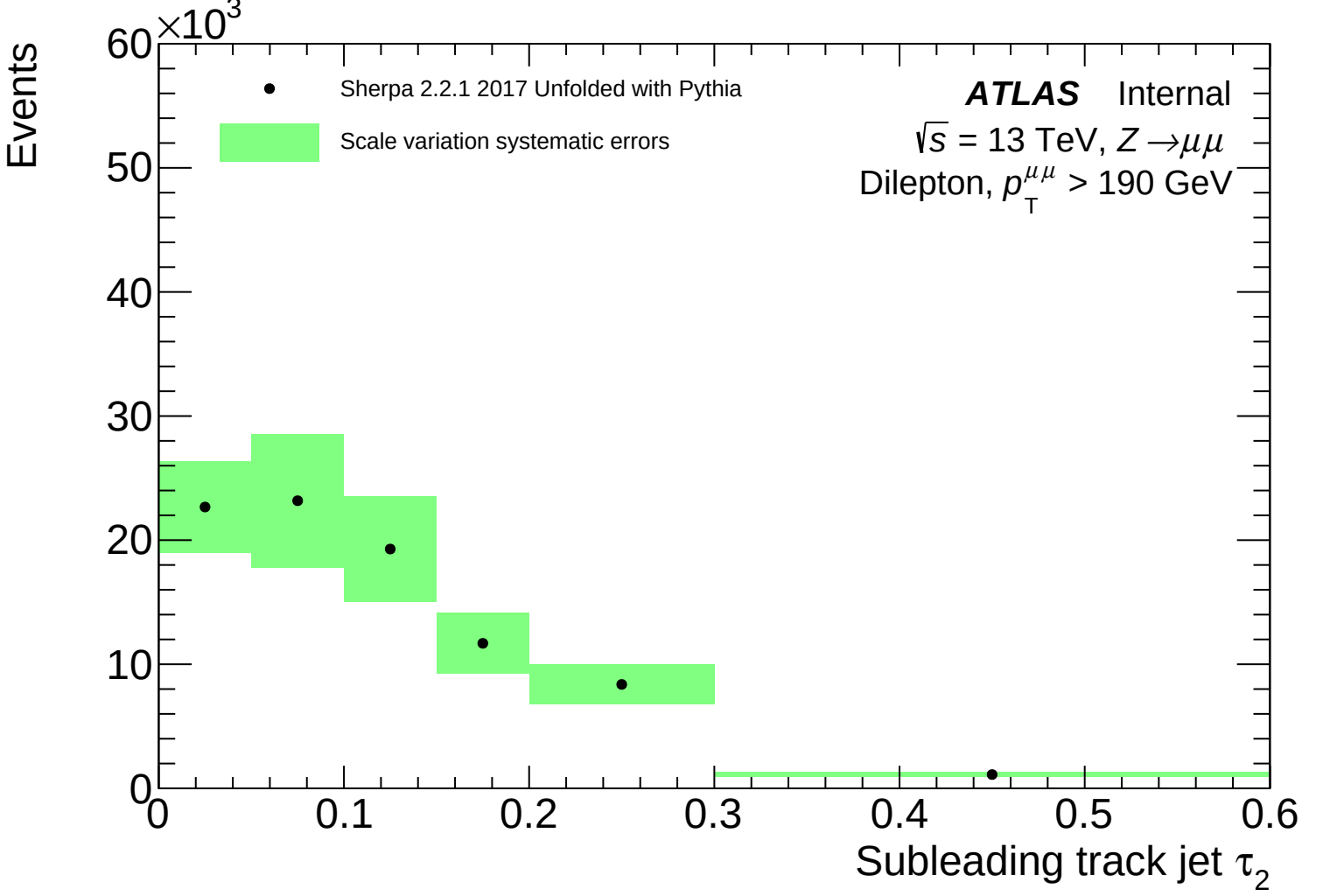

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

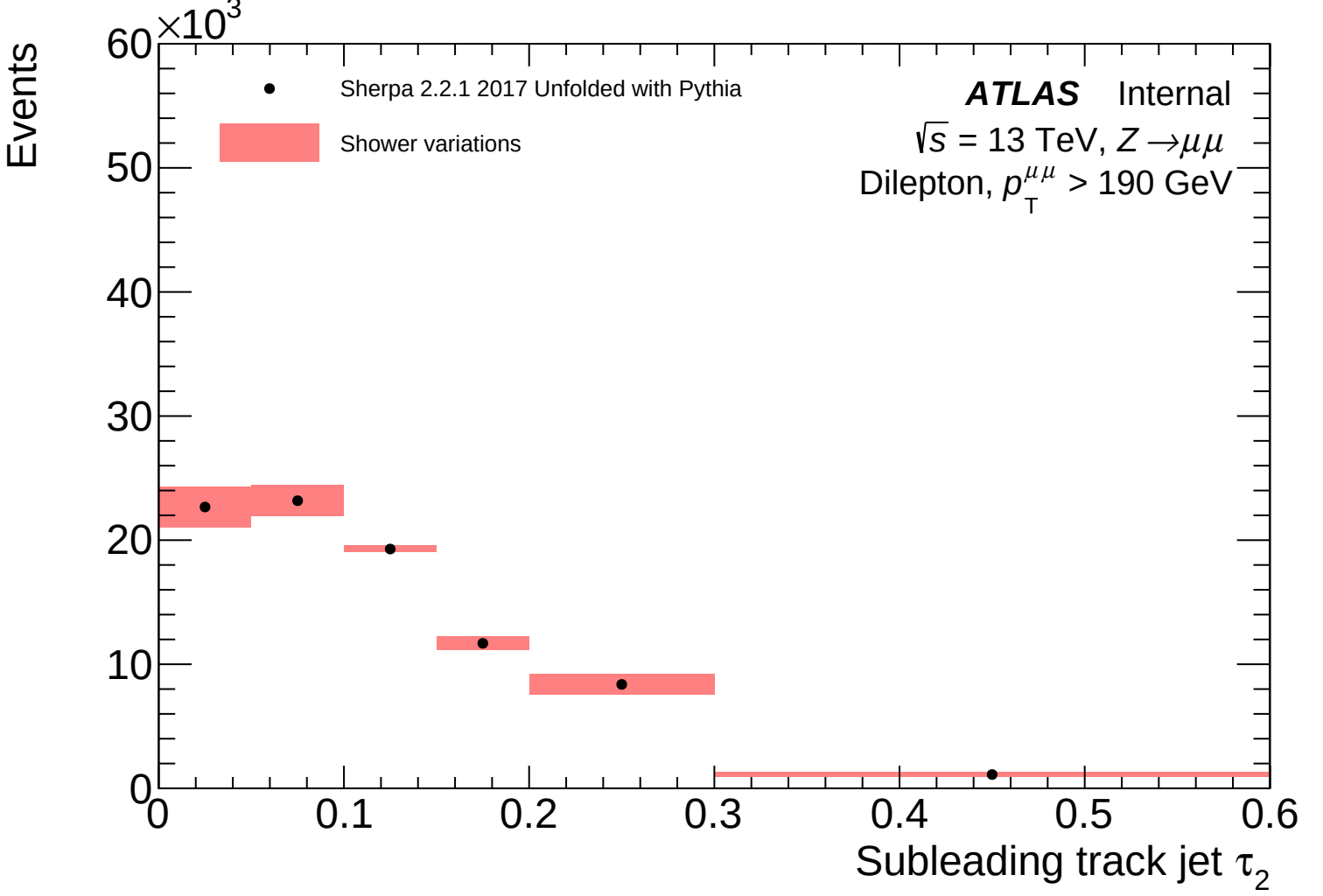

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

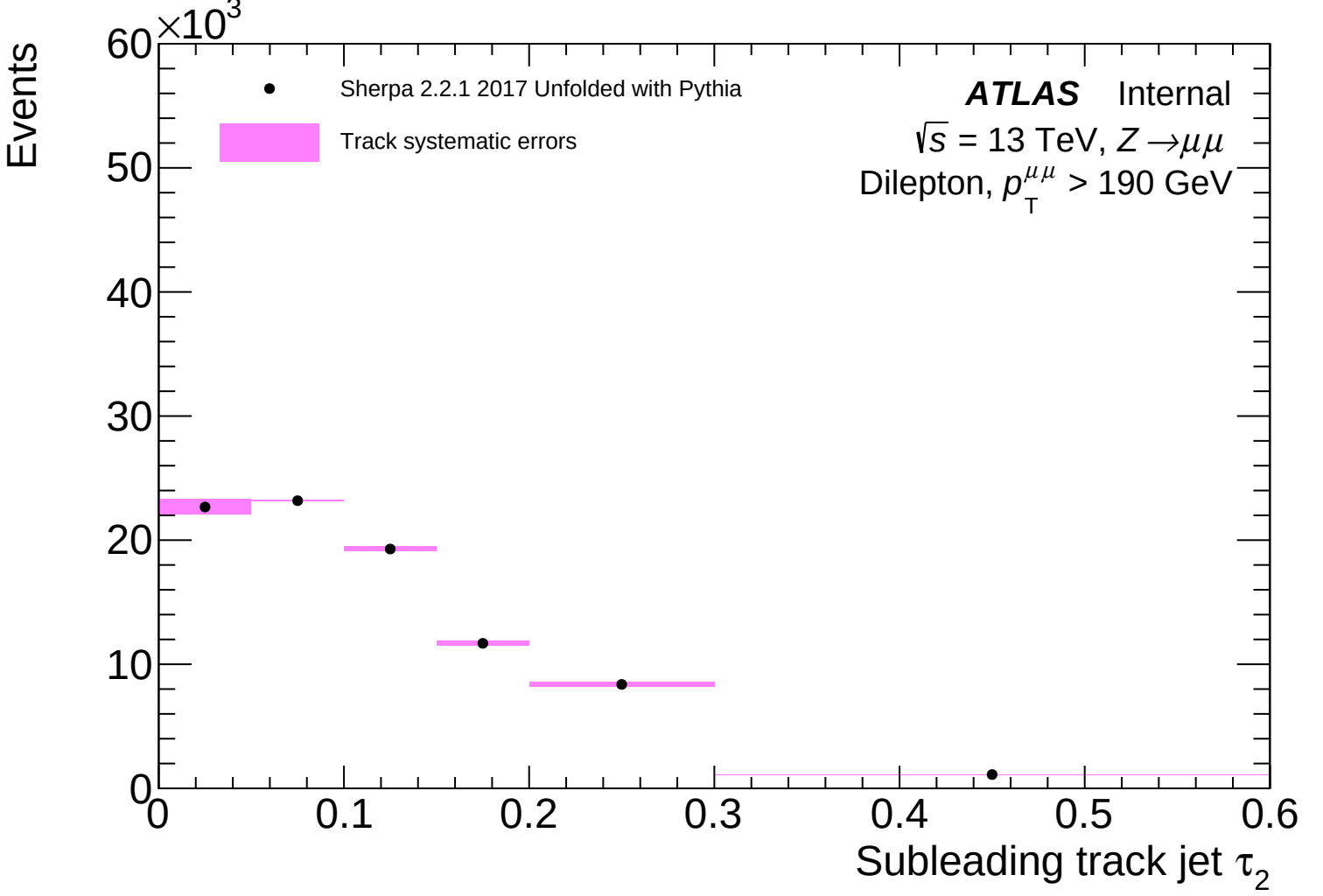

Events
×10^3
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV

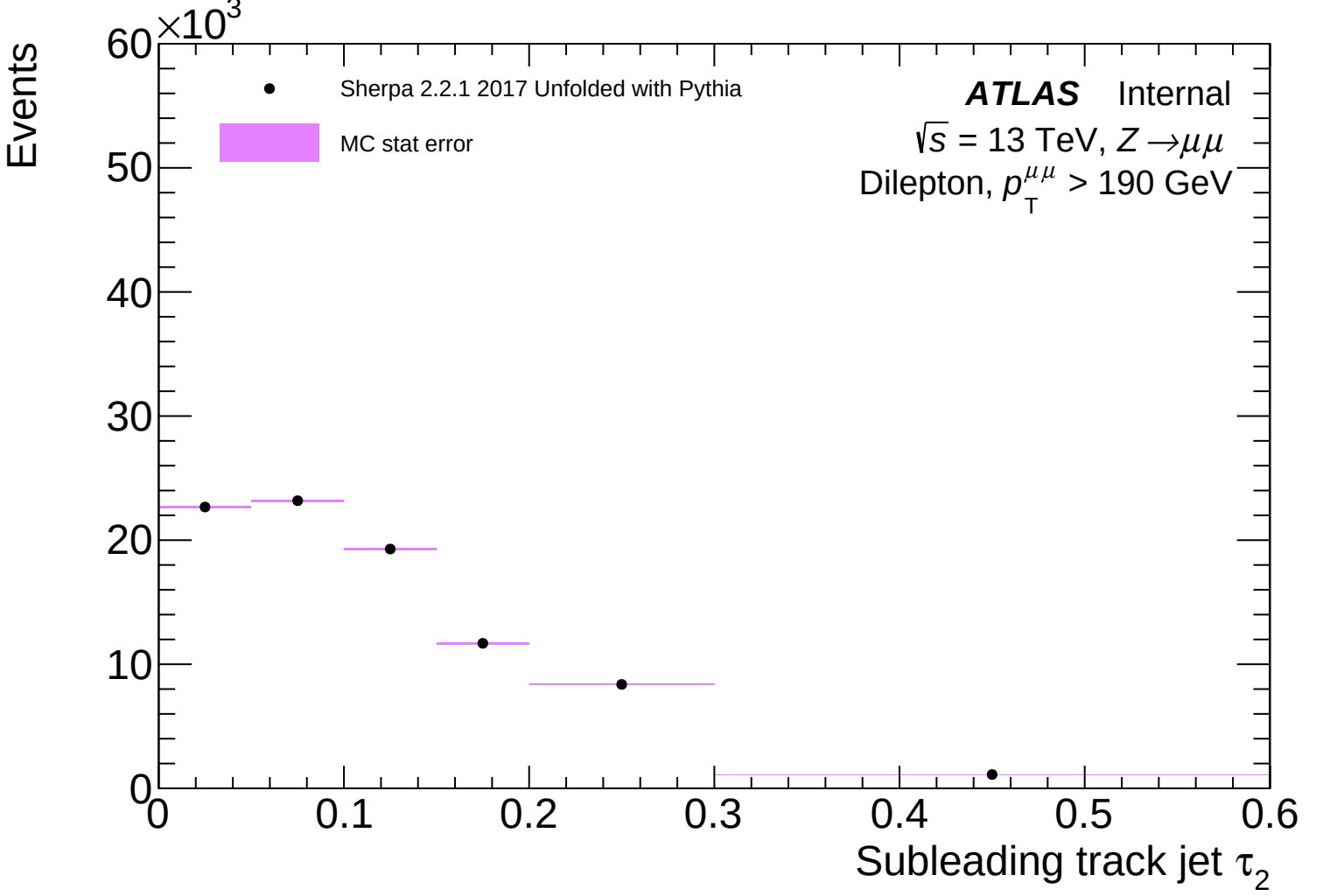

×10^3
dN / dτ_2^j2
900
800
700
600
500
400
300
200
100
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2

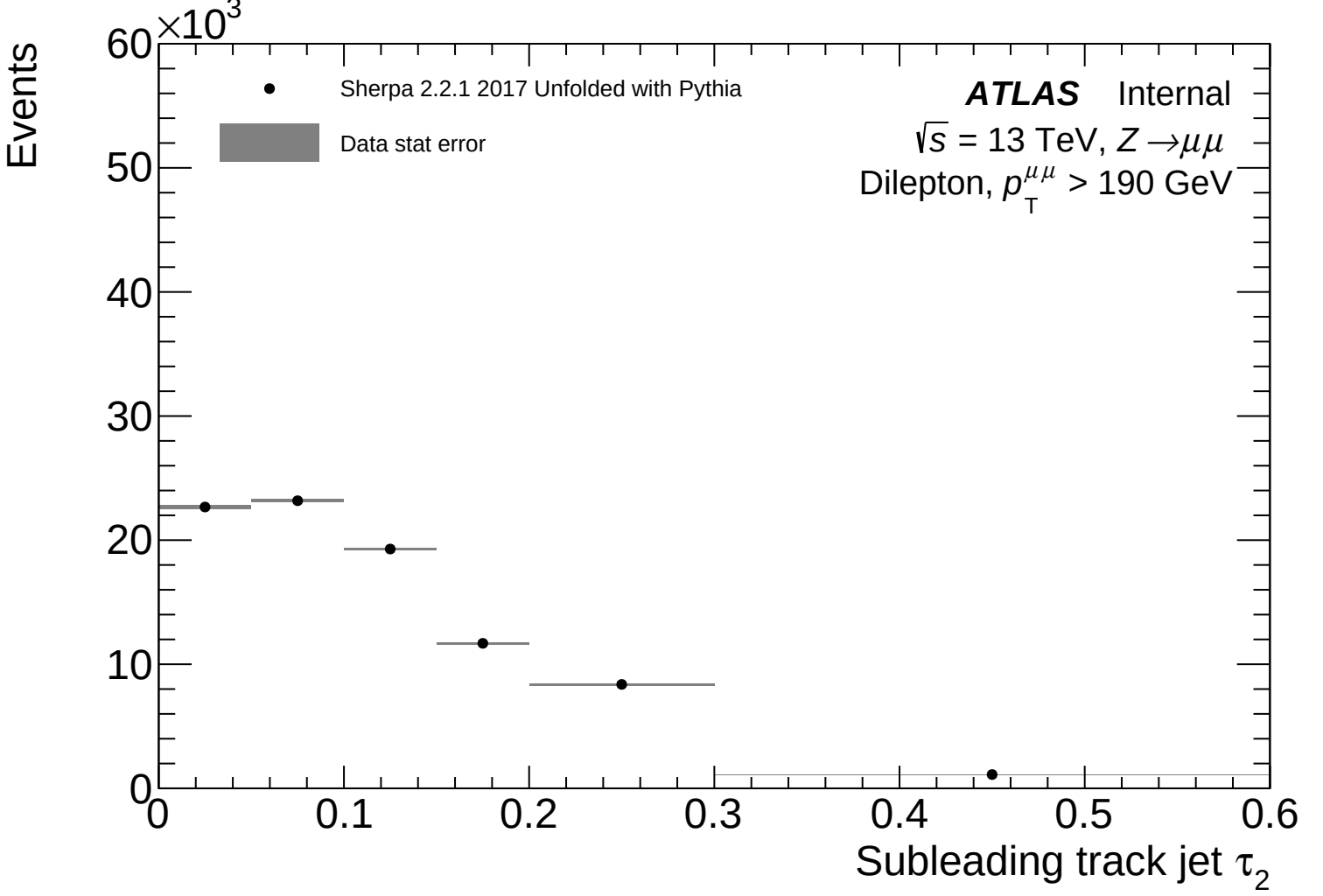

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

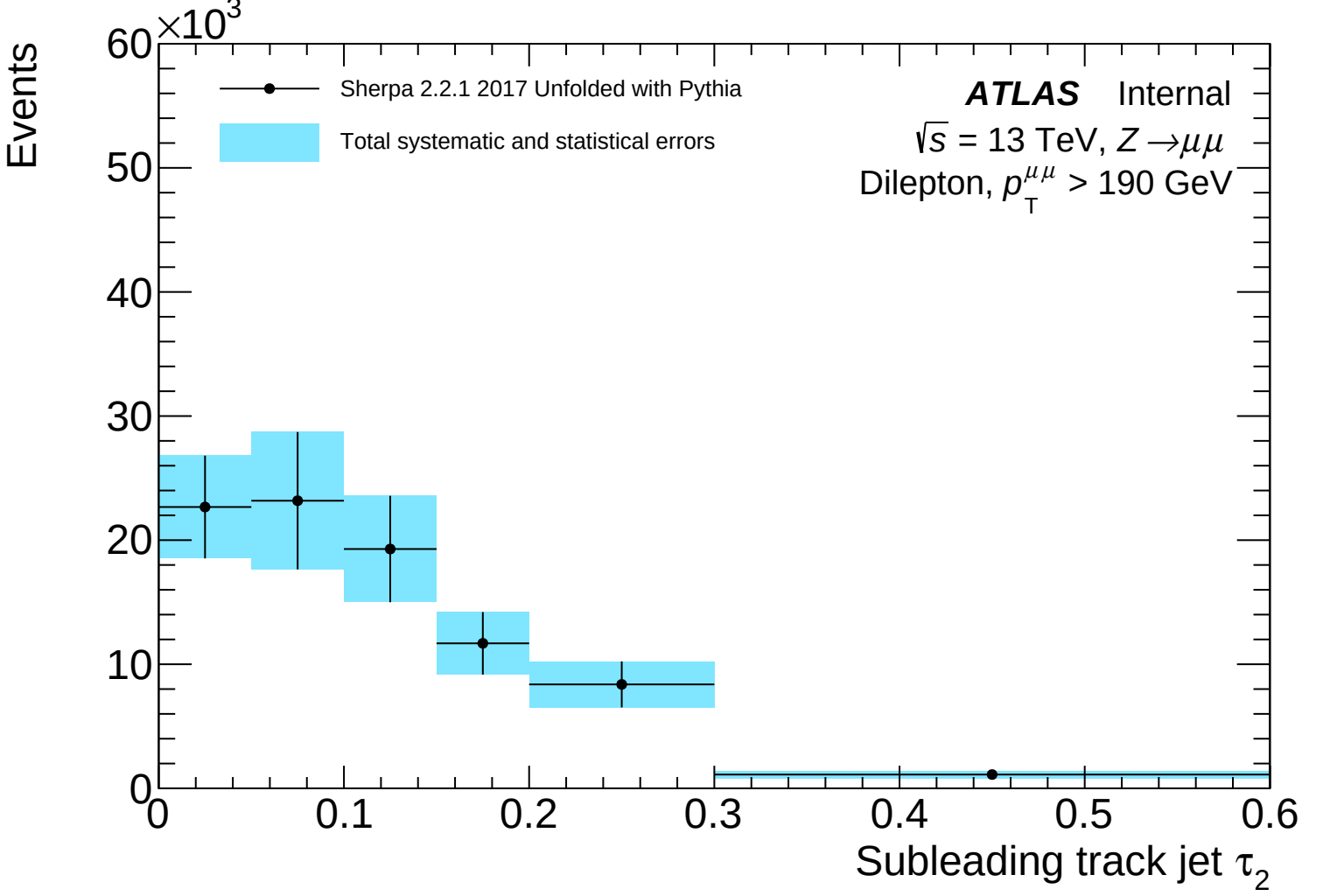

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

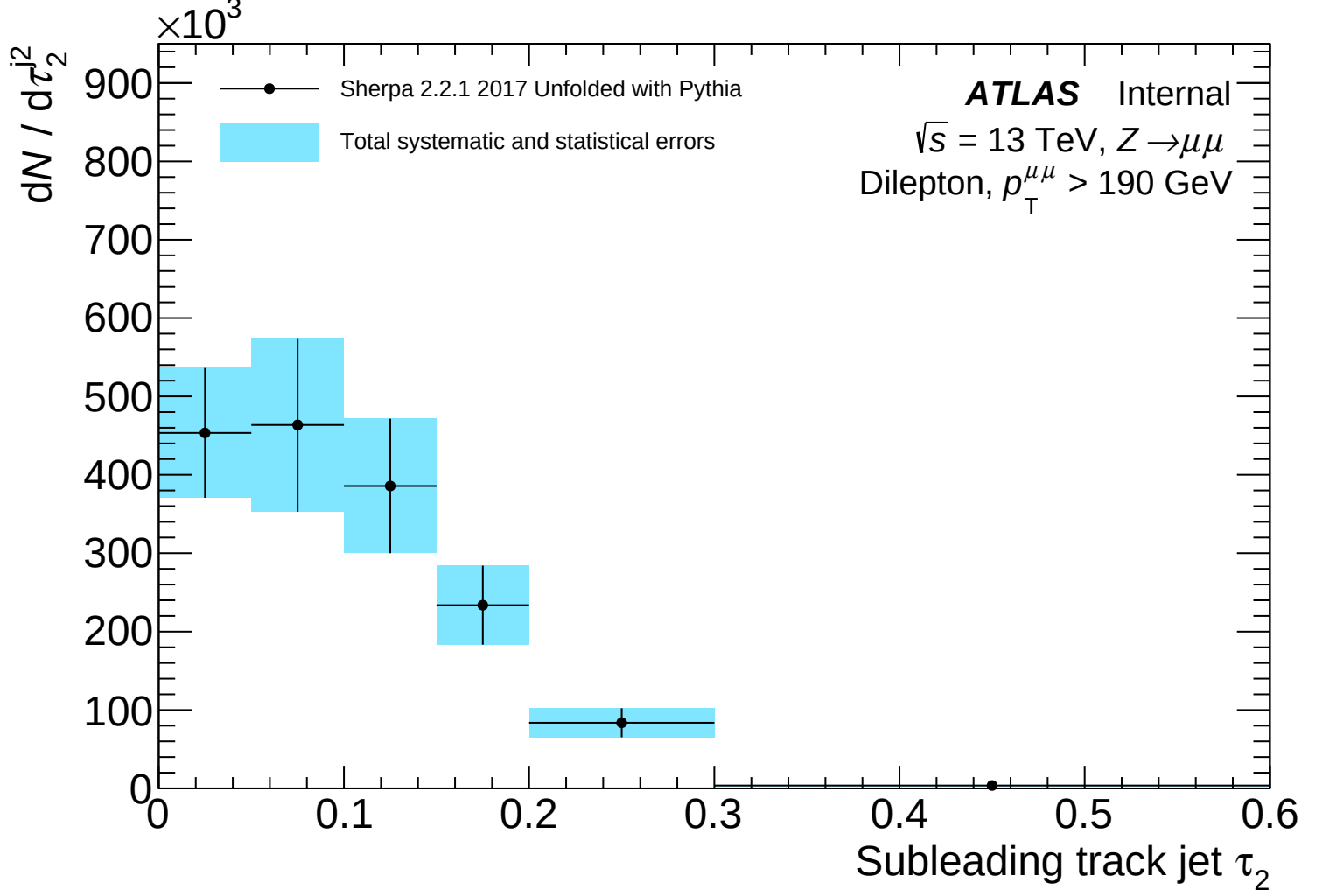

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

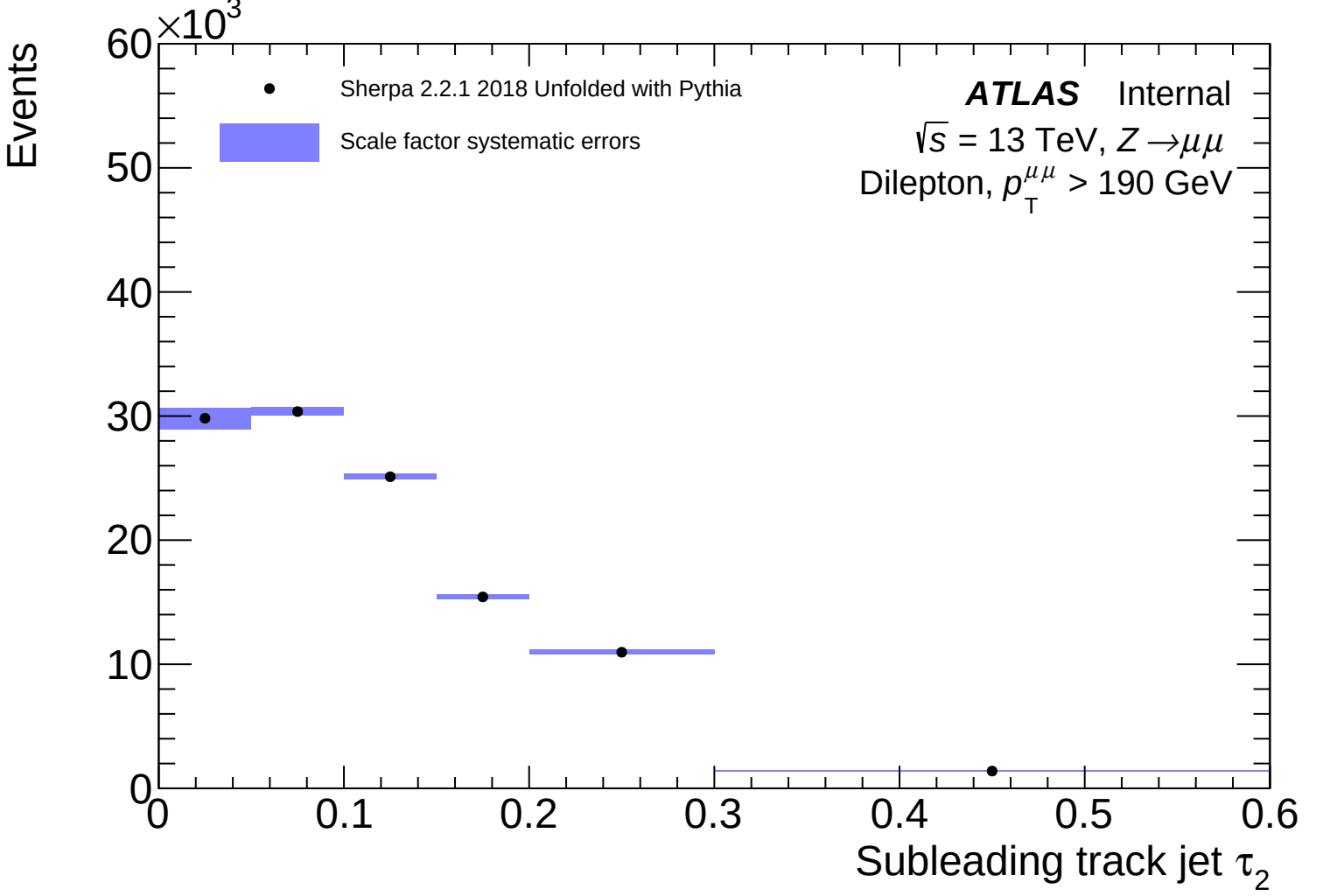

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

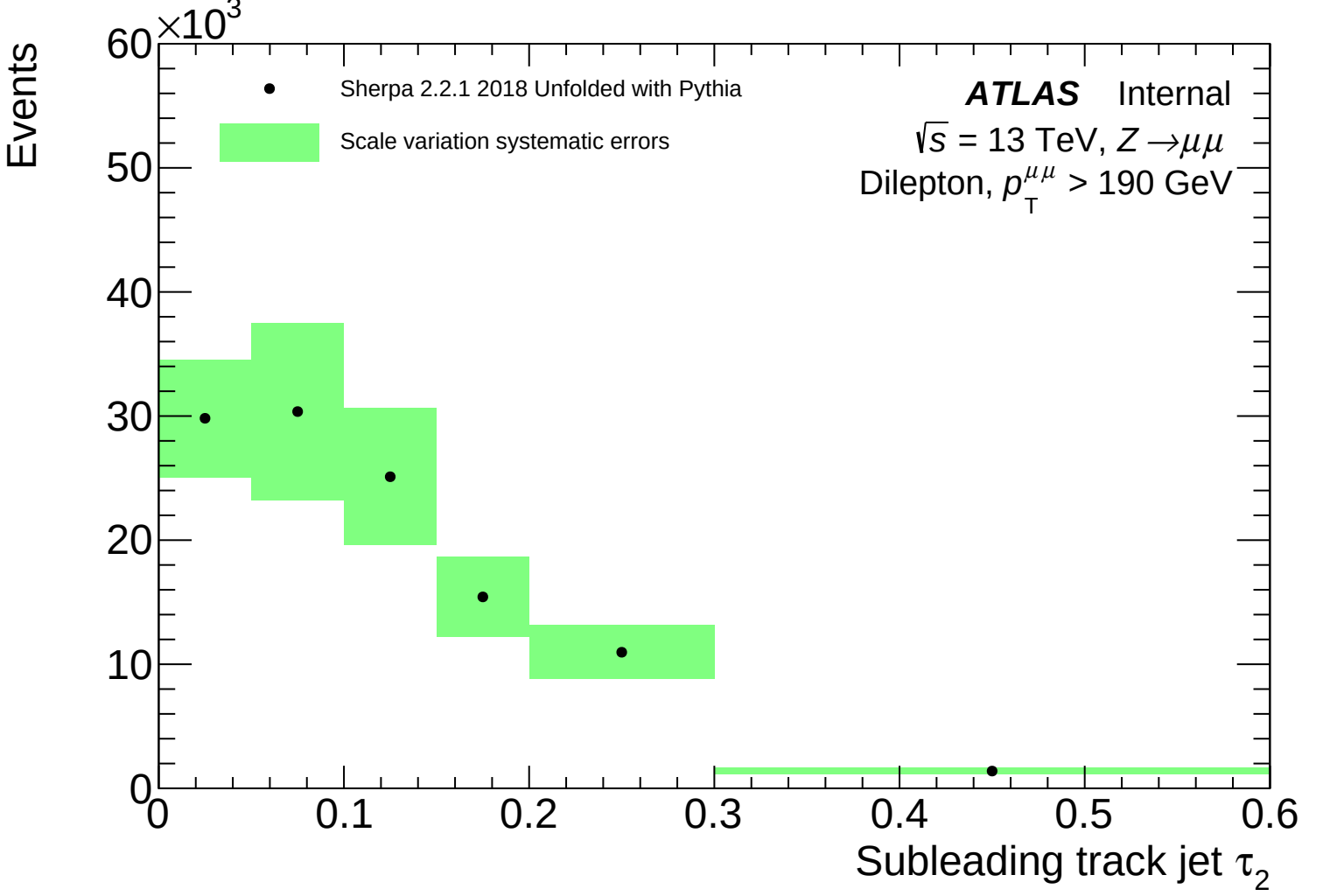

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

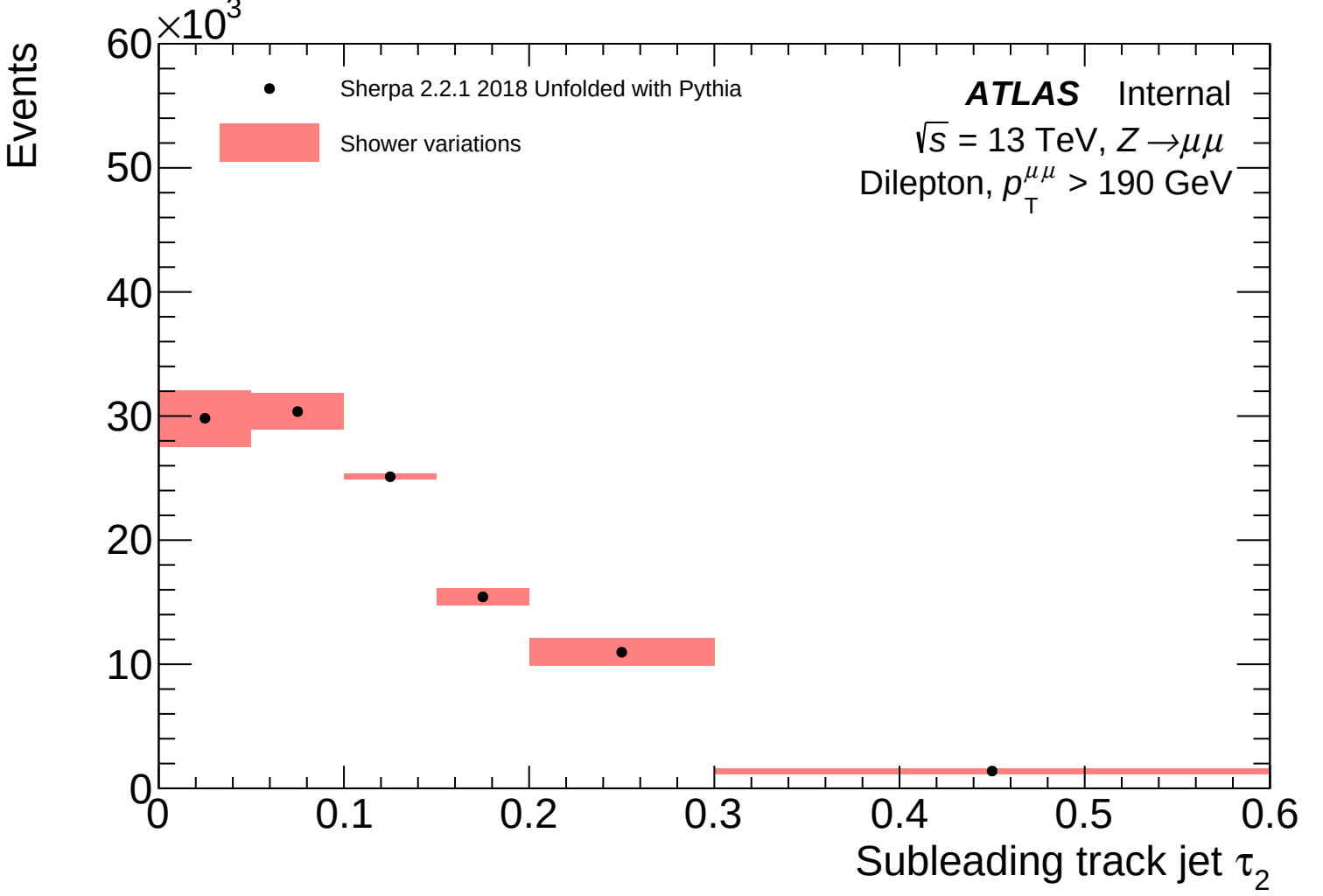

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

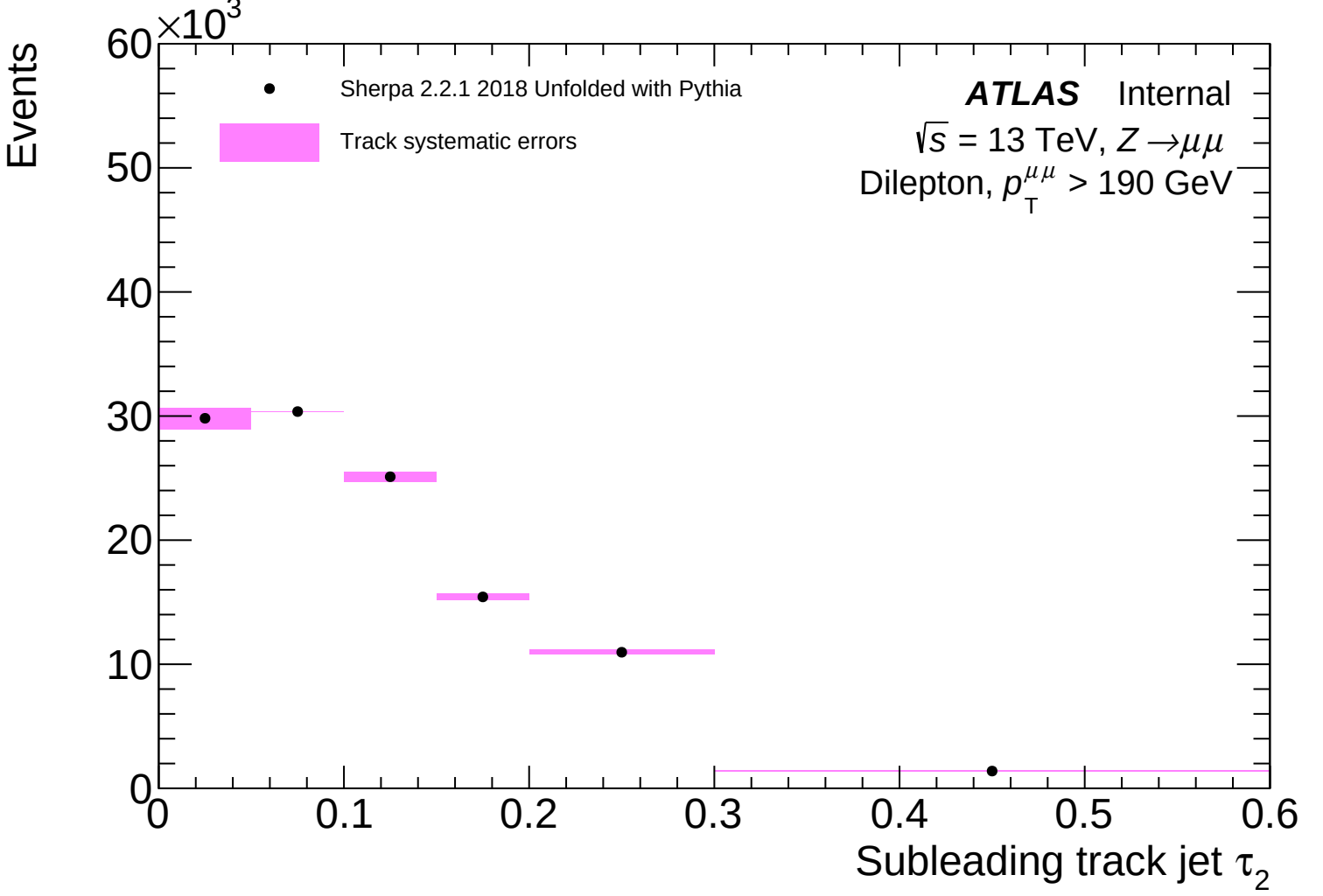

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

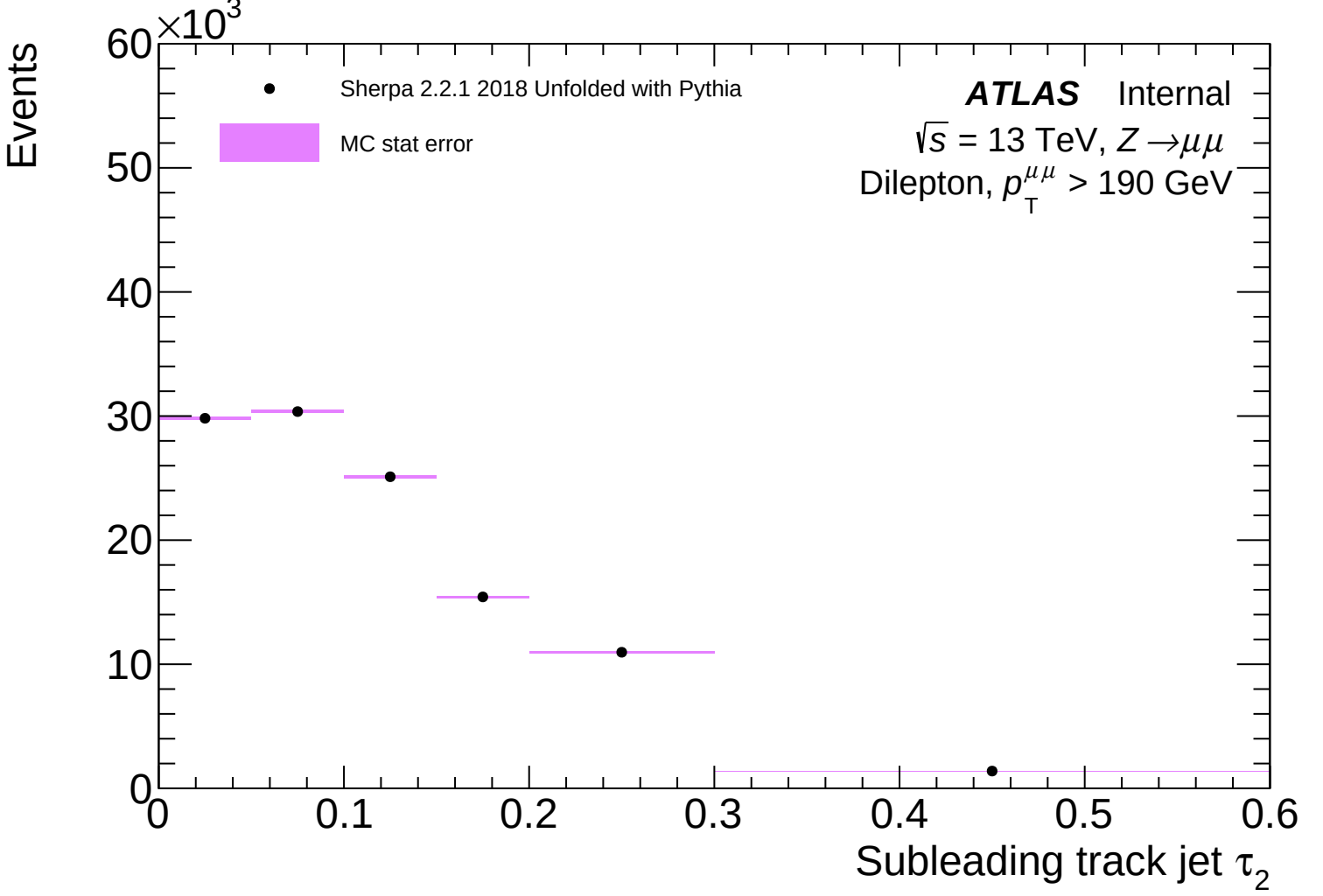

×10^3
dN / dτ_2^j2
900
800
700
600
500
400
300
200
100
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

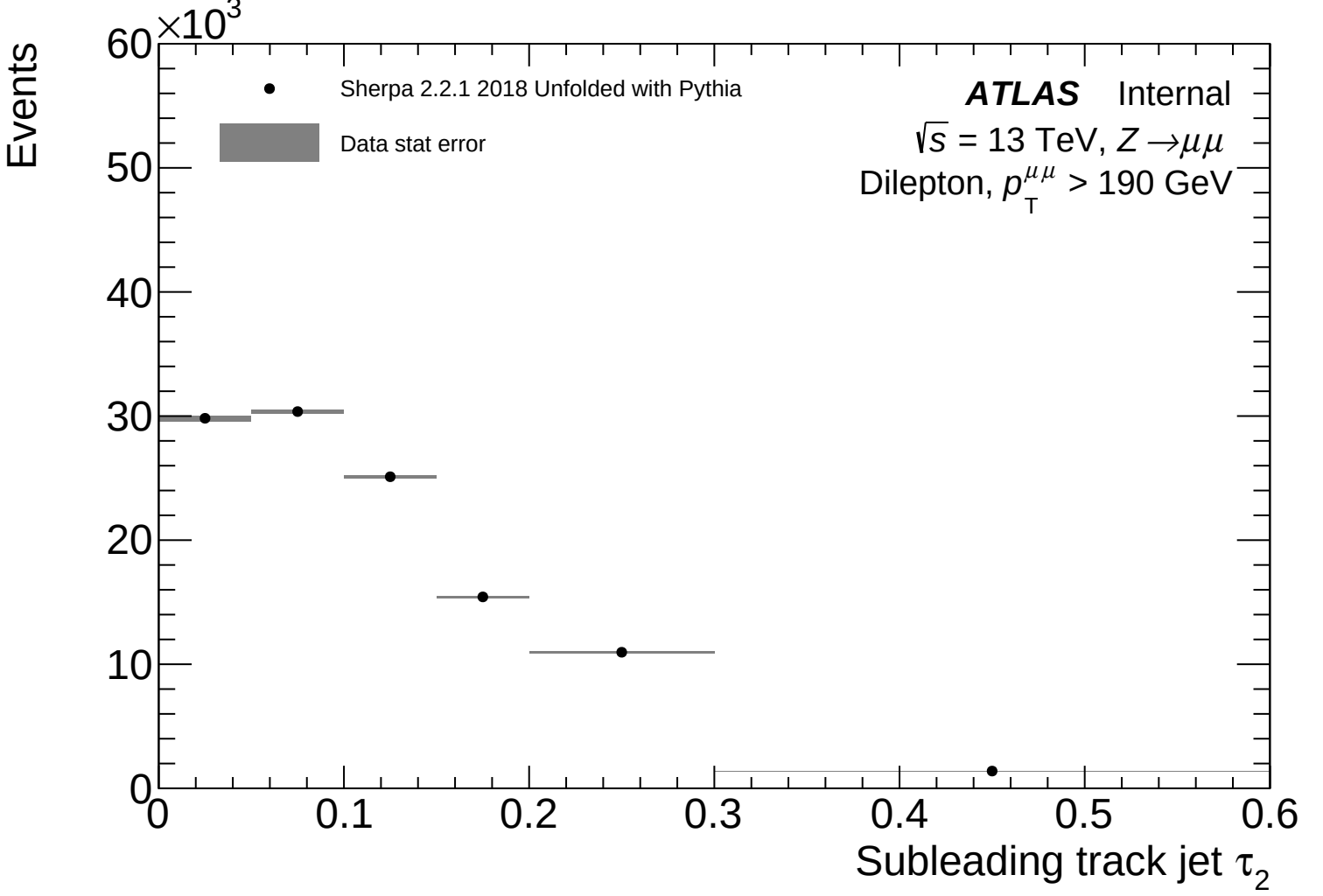

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

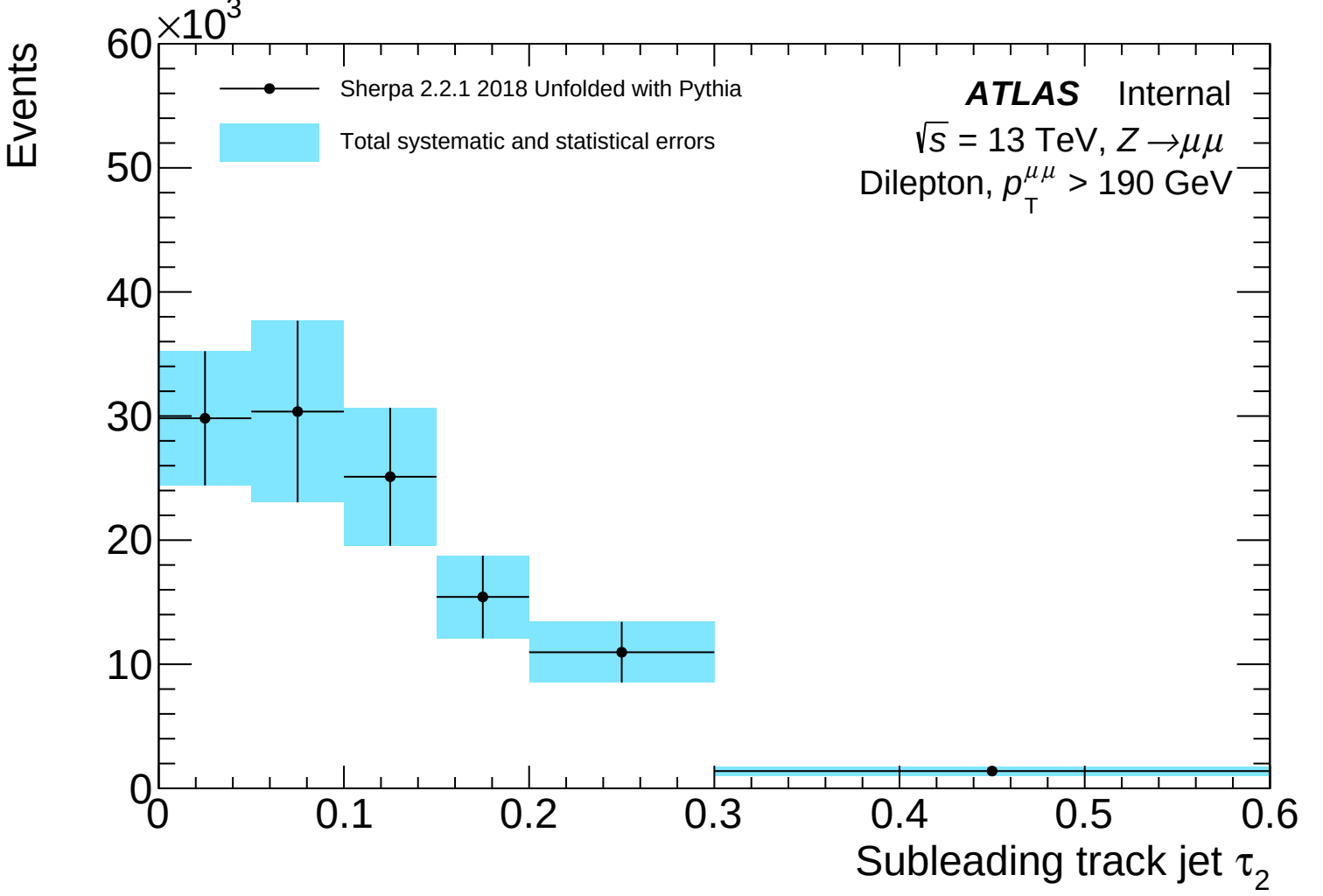

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

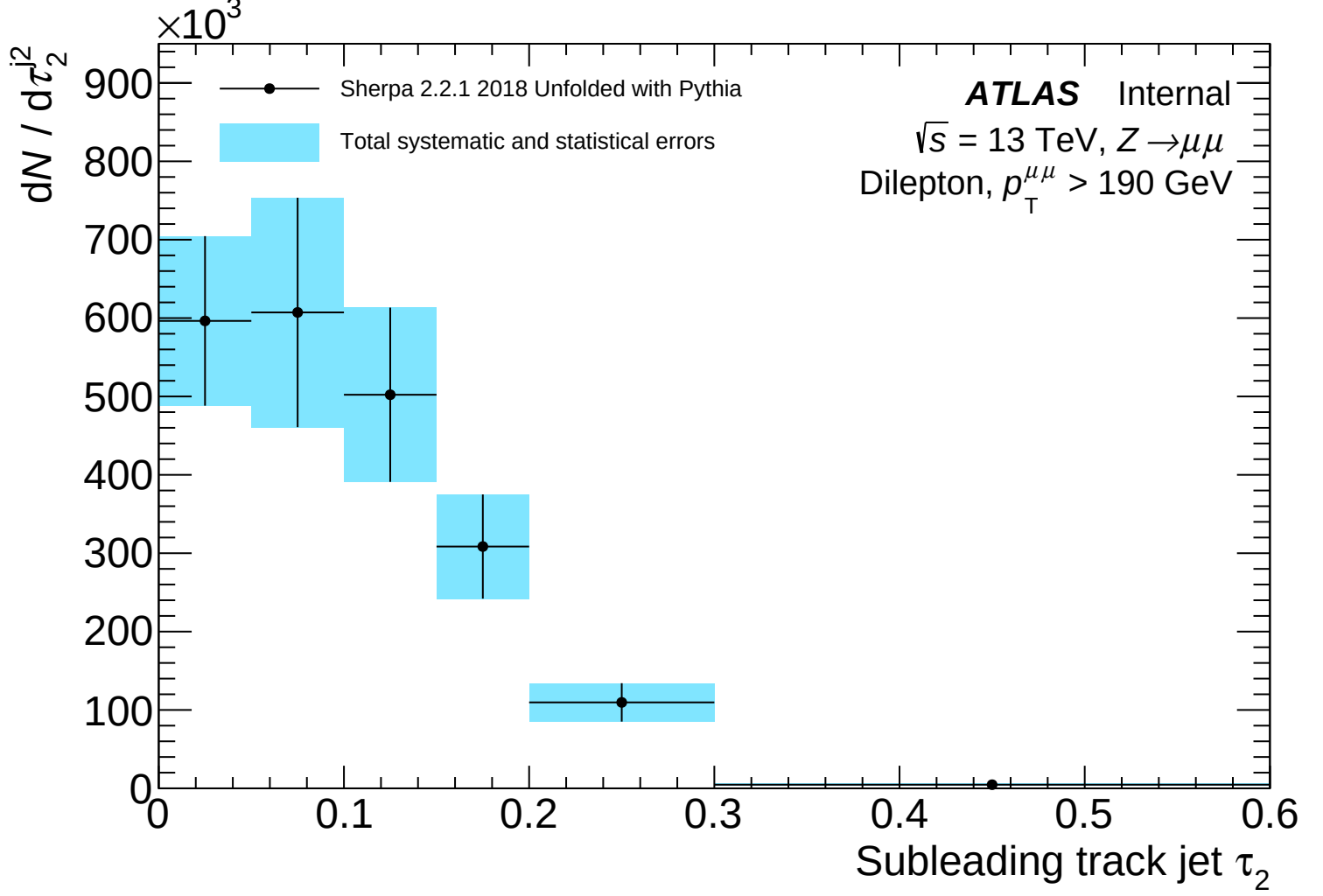

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

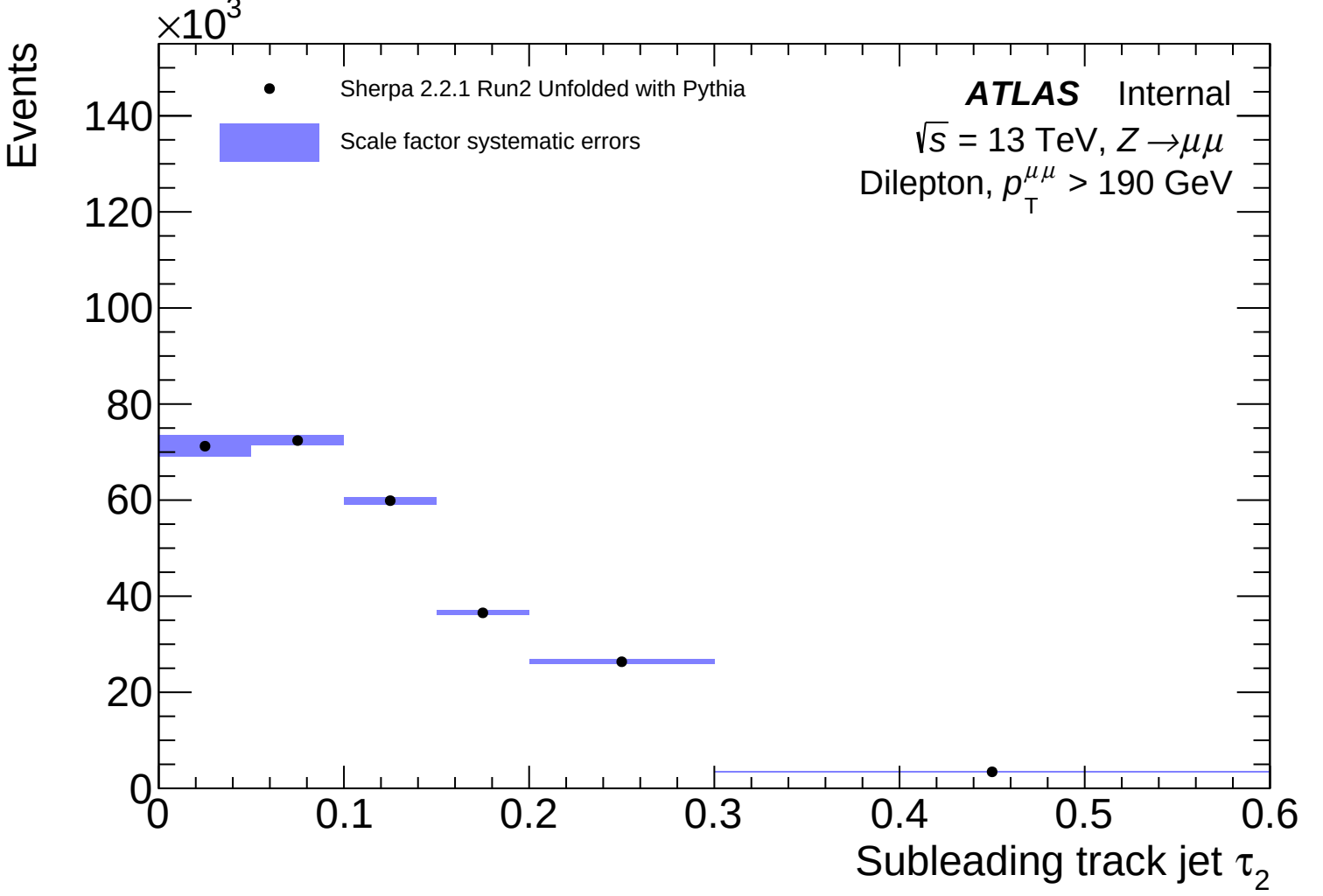

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

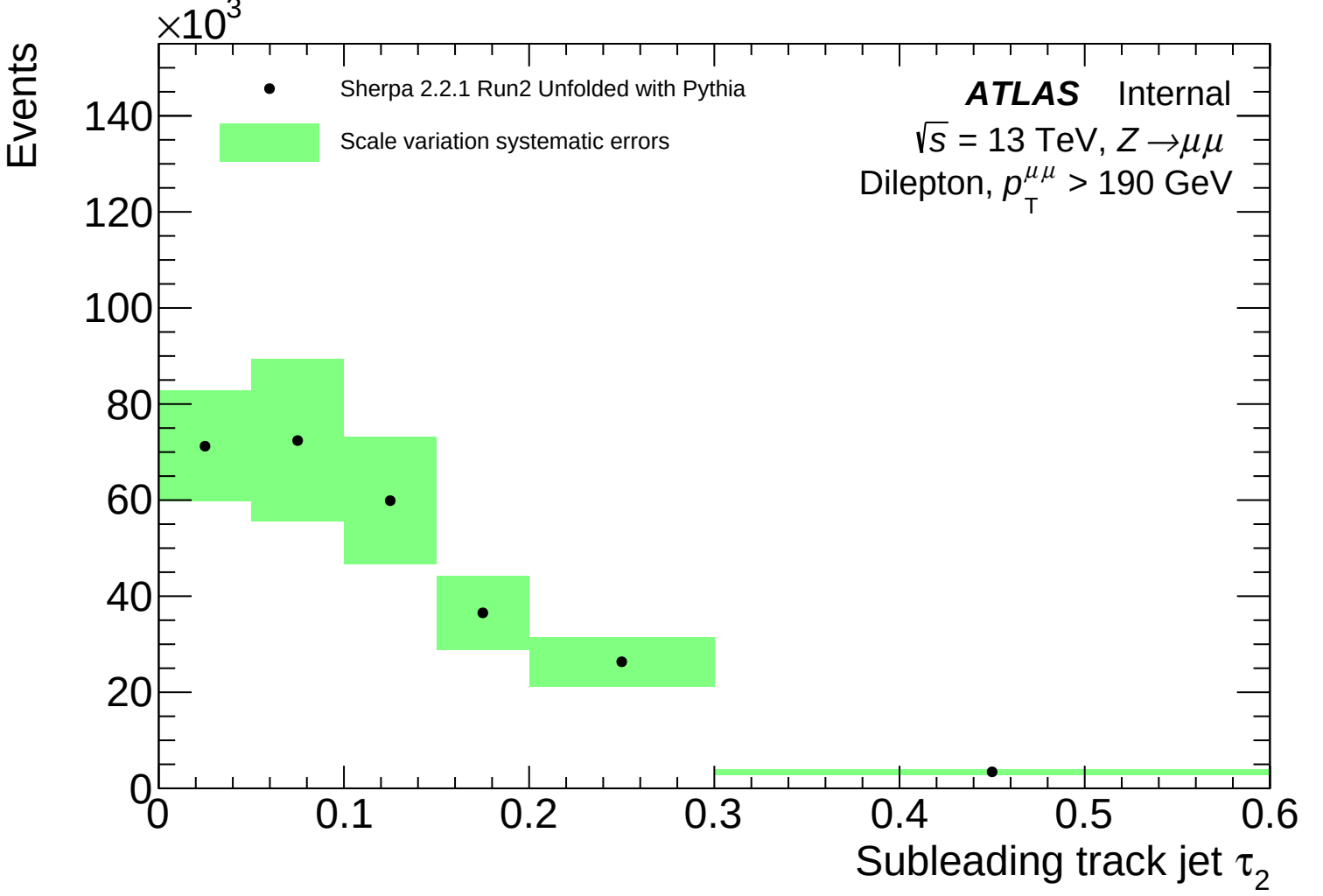

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2

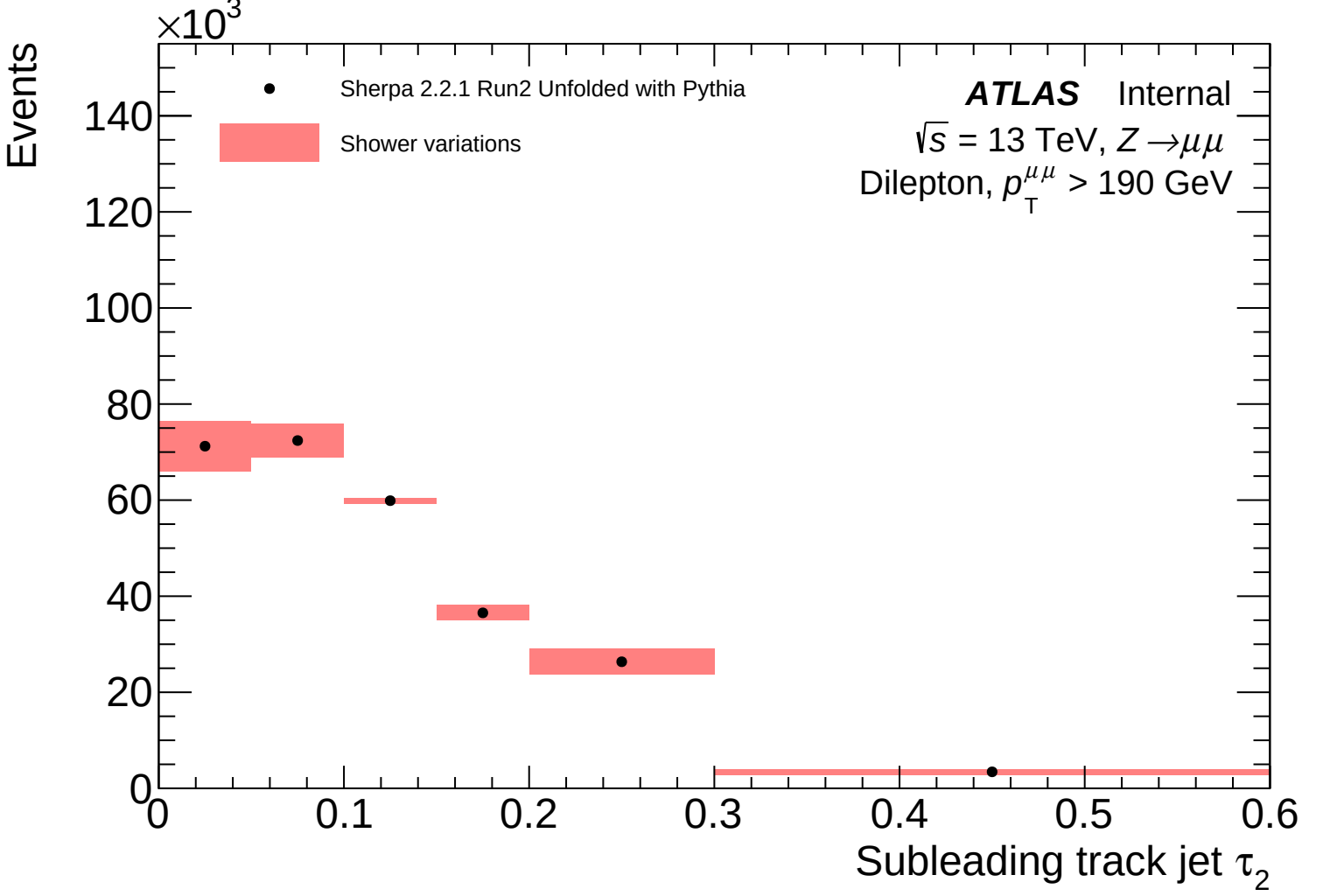

Events
$\times 10^3$
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV

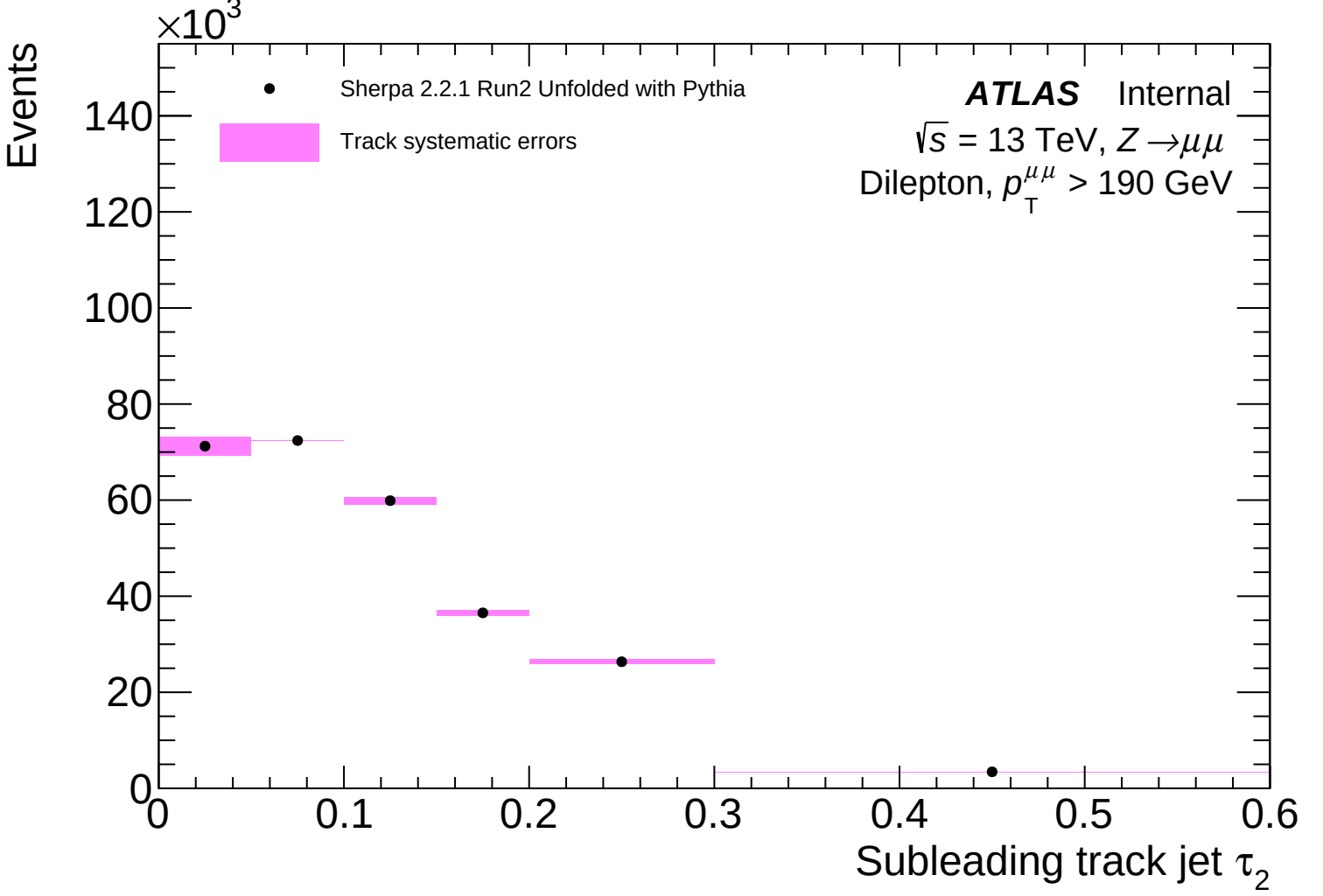

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

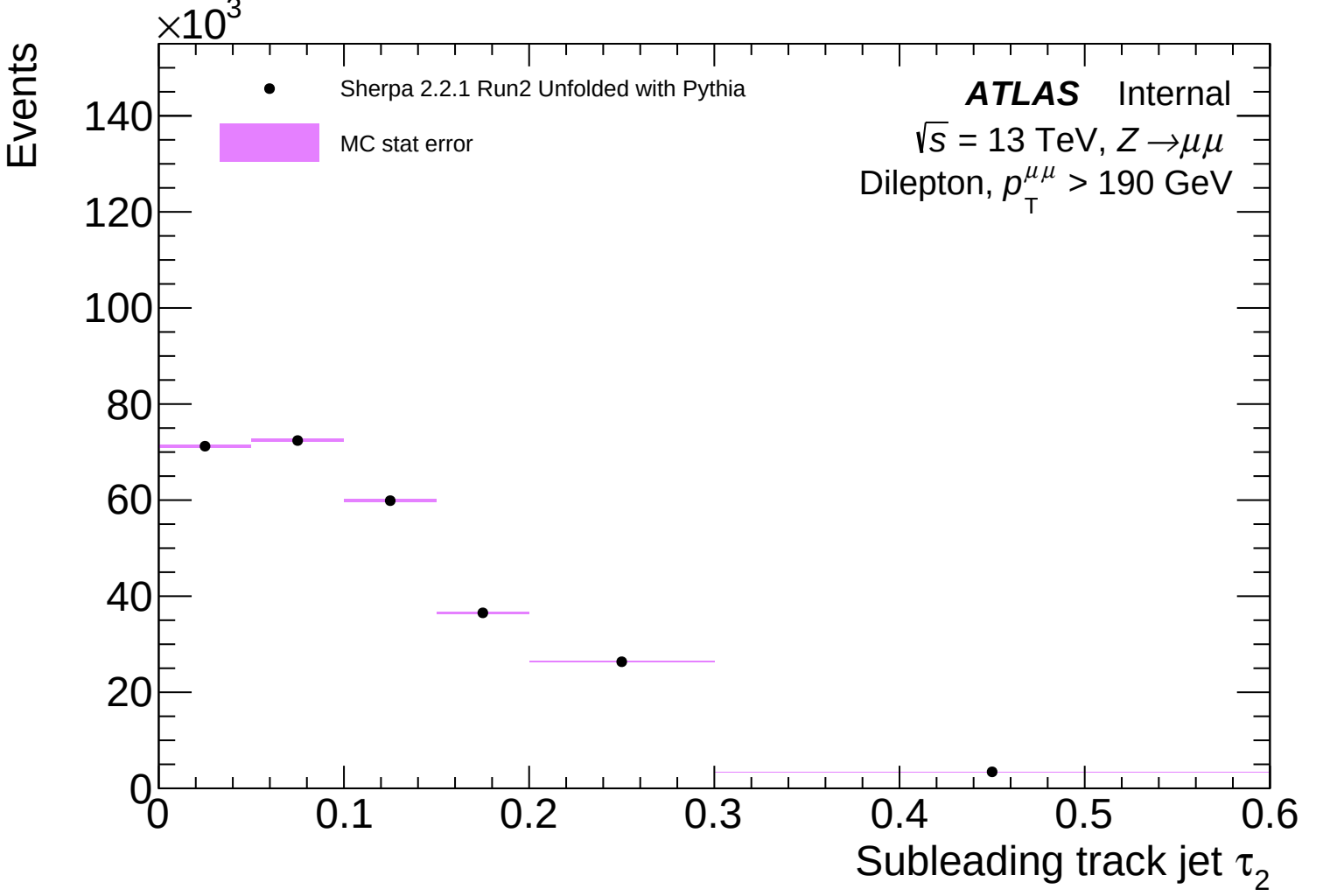

$\times 10^3$
$\frac{dN}{d\tau_2^{j2}}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
900
800
700
600
500
400
300
200
100
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2

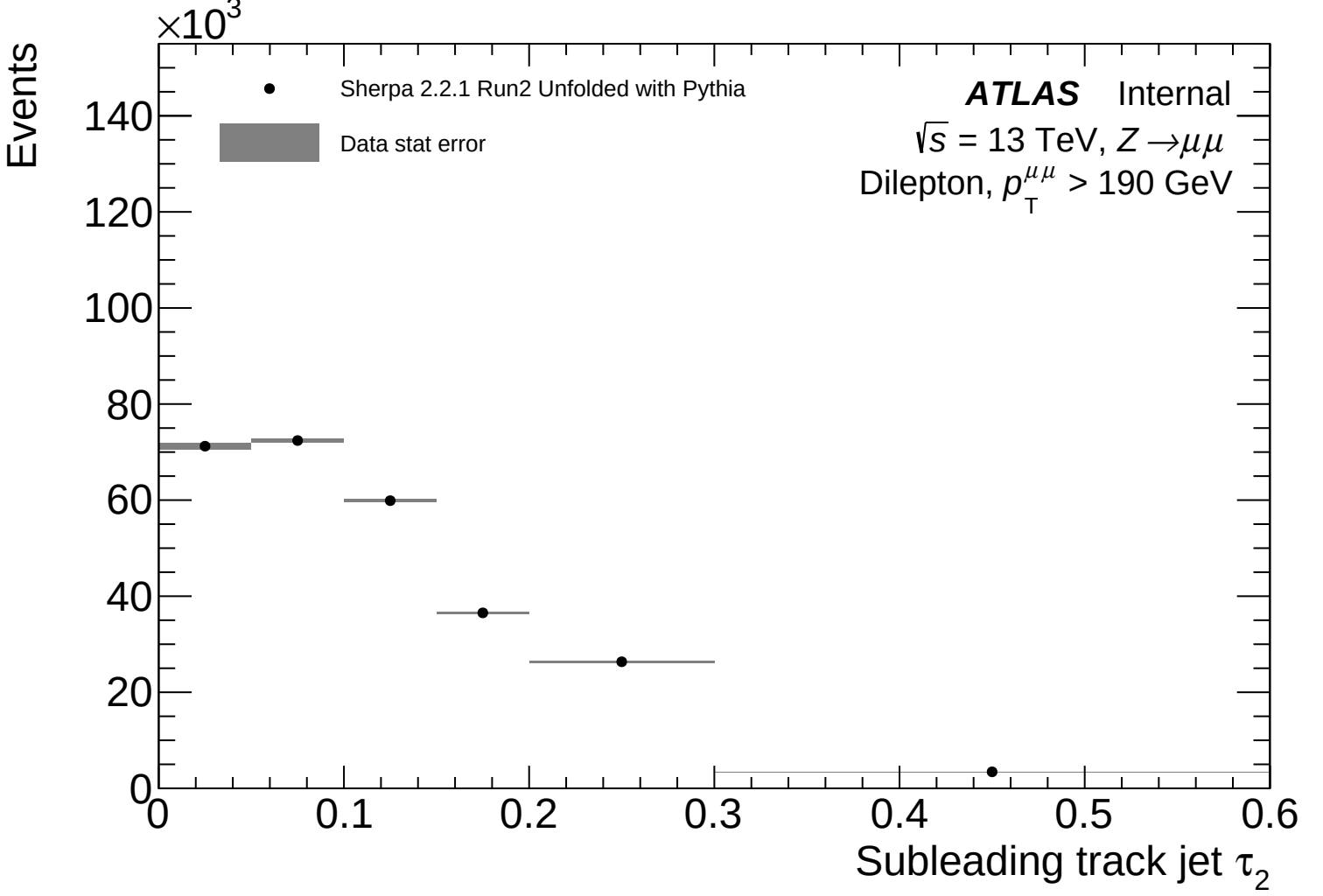

Events
×10^3
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

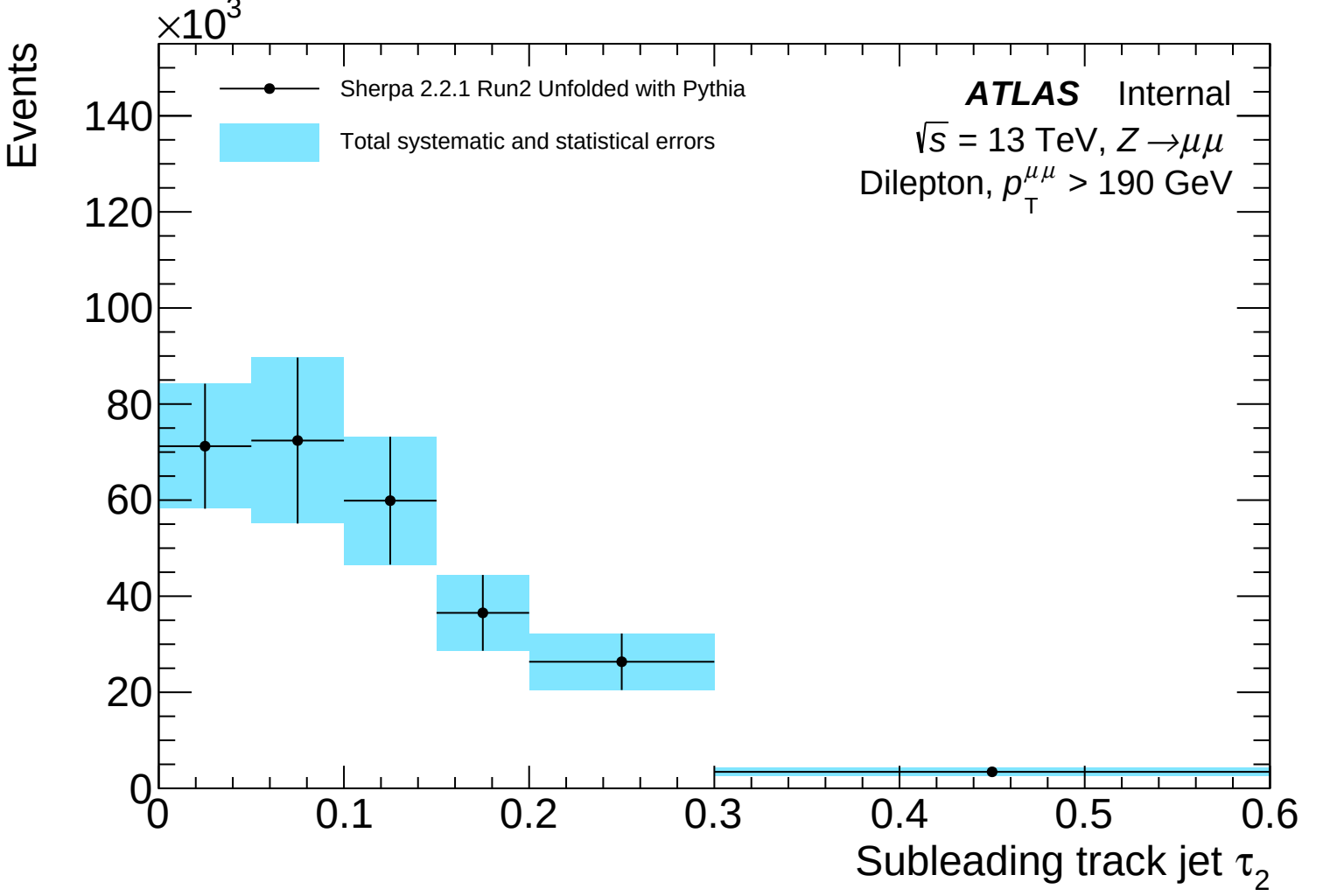

Events
×10^3
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

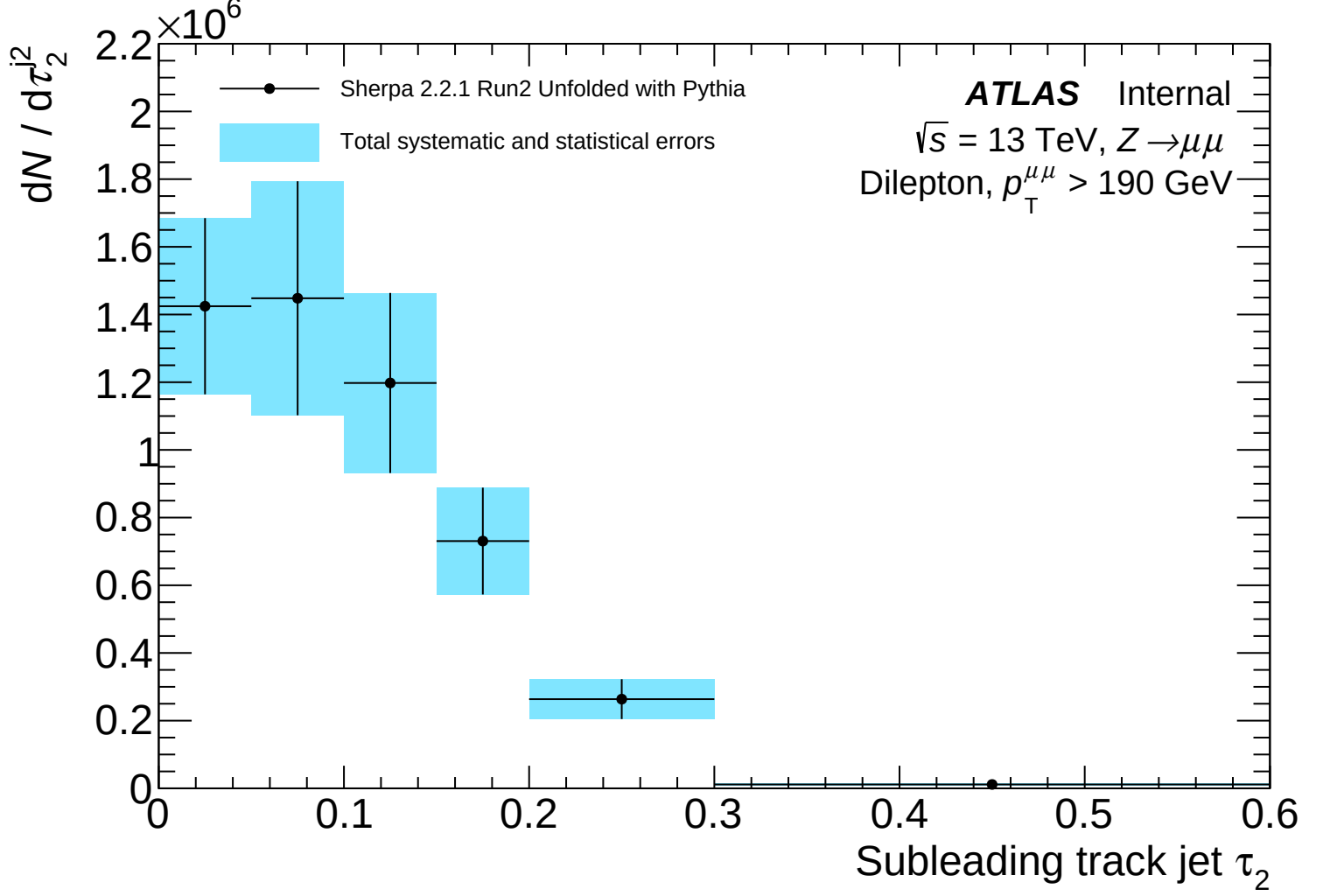

Events
×10^3
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z→μμ
Dilepton, p_T^μμ > 190 GeV

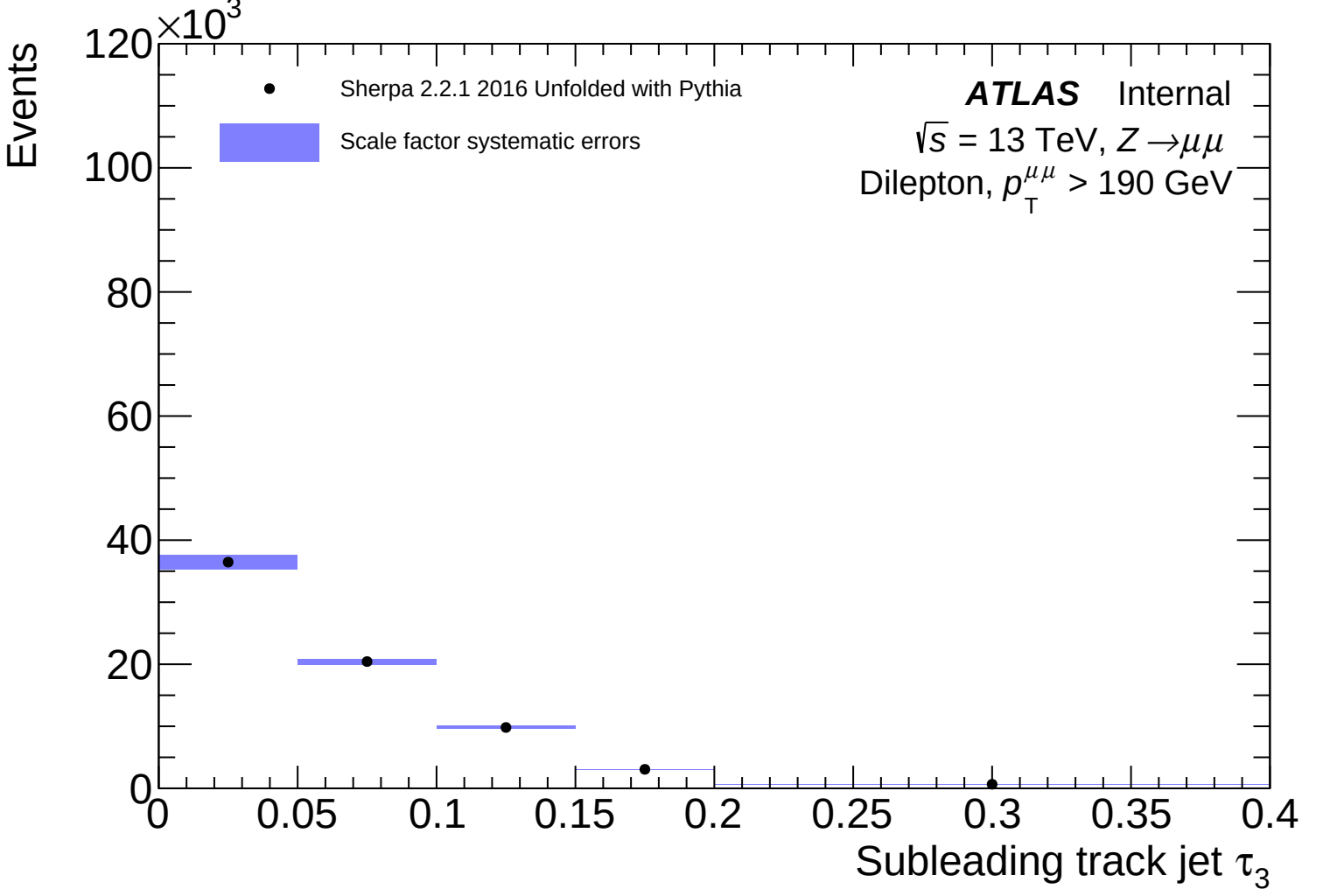

Events
×10^3
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z→μμ
Dilepton, p_T^μμ > 190 GeV

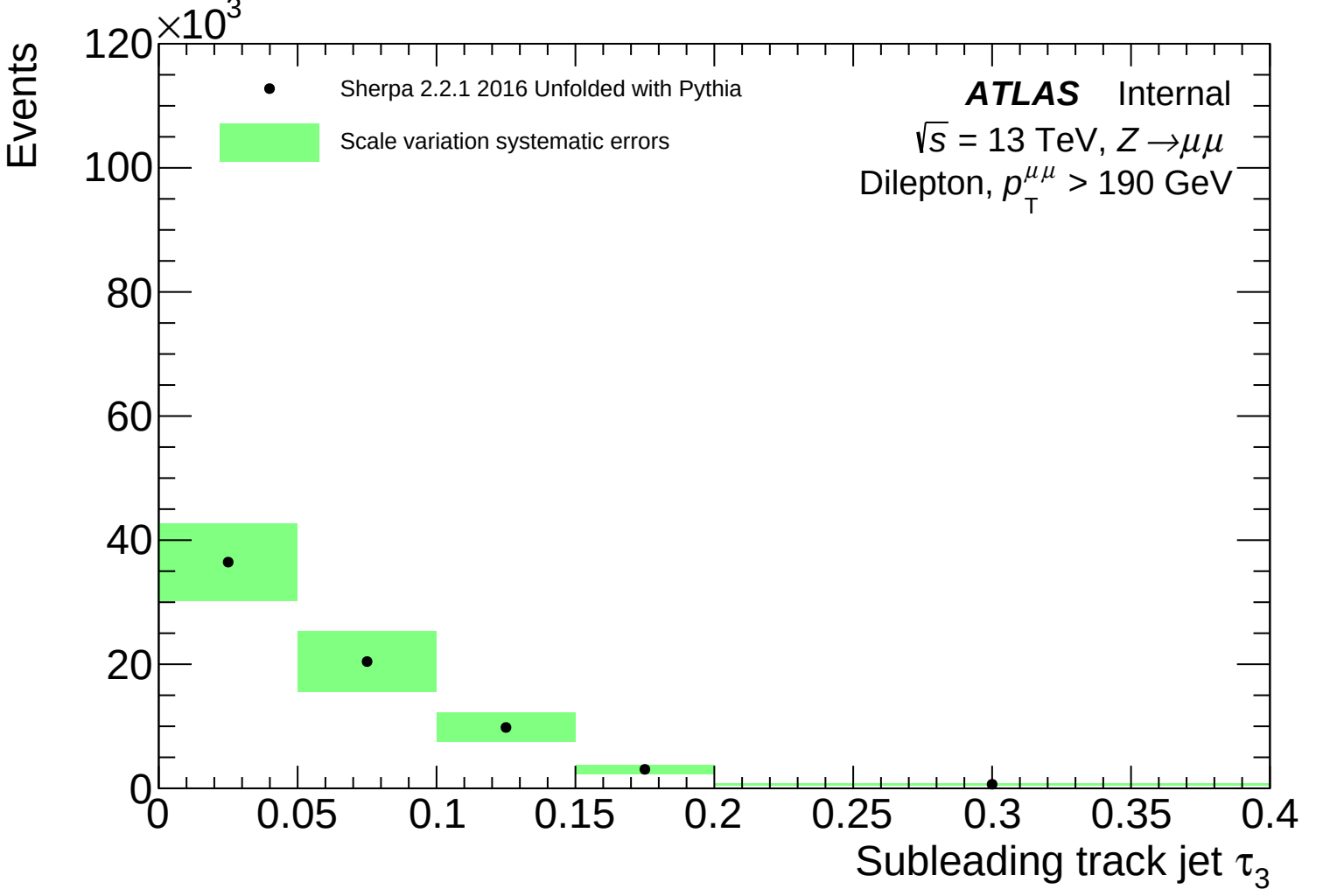

Events
×10^3
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z→μμ
Dilepton, p_T^μμ > 190 GeV

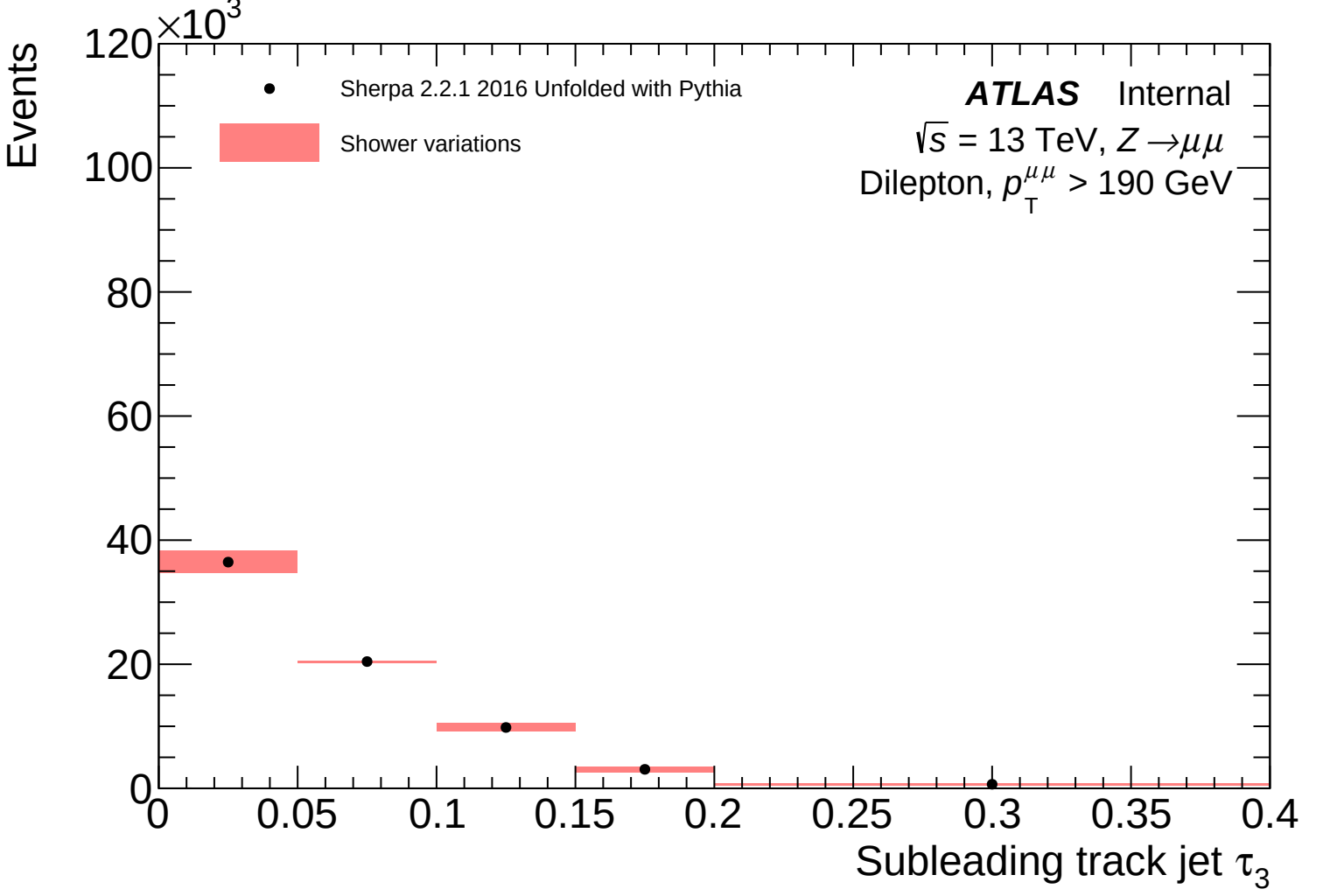

Events
×10^3
140
120
100
80
60
40
20
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2

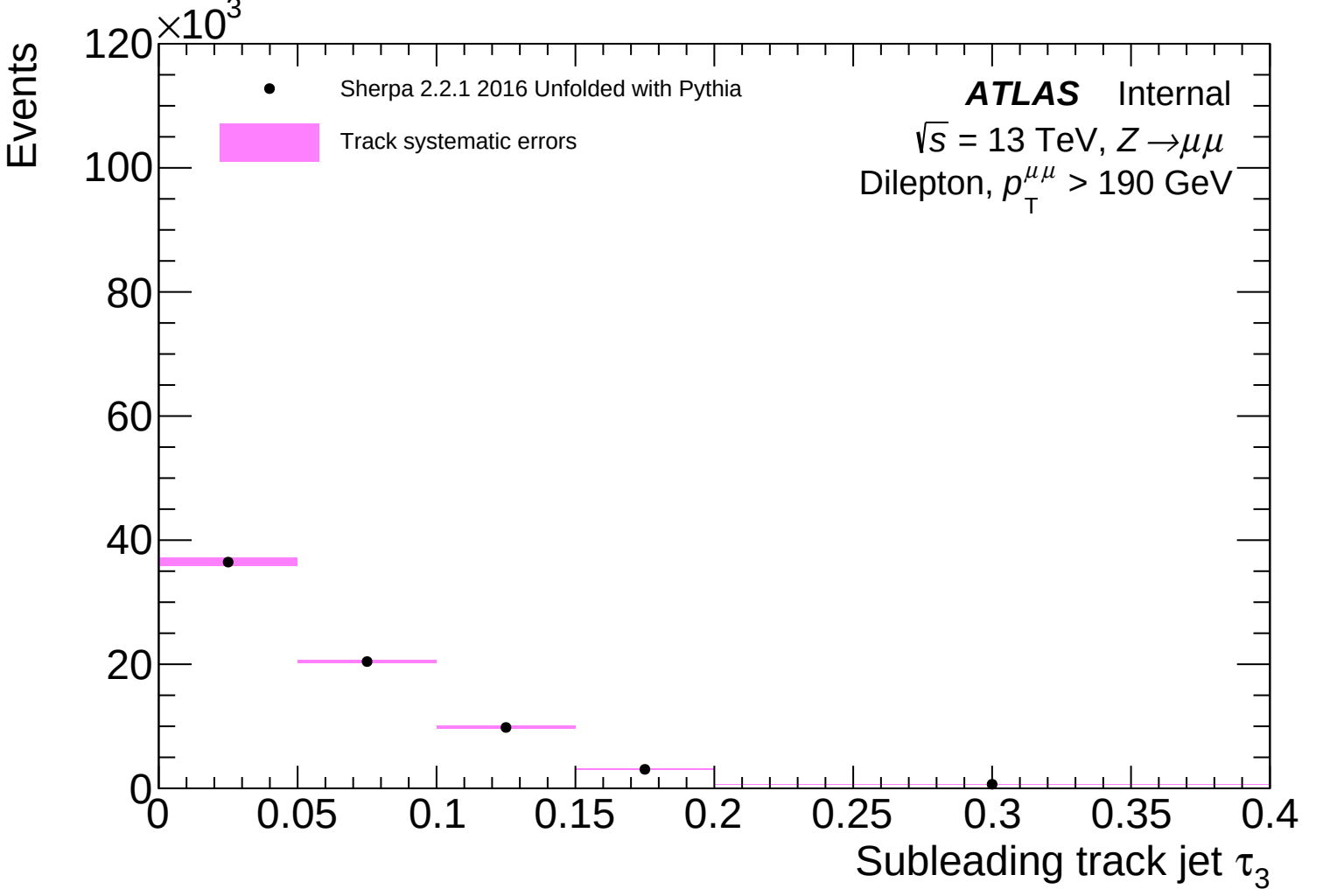

Events
×10^3
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ2
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

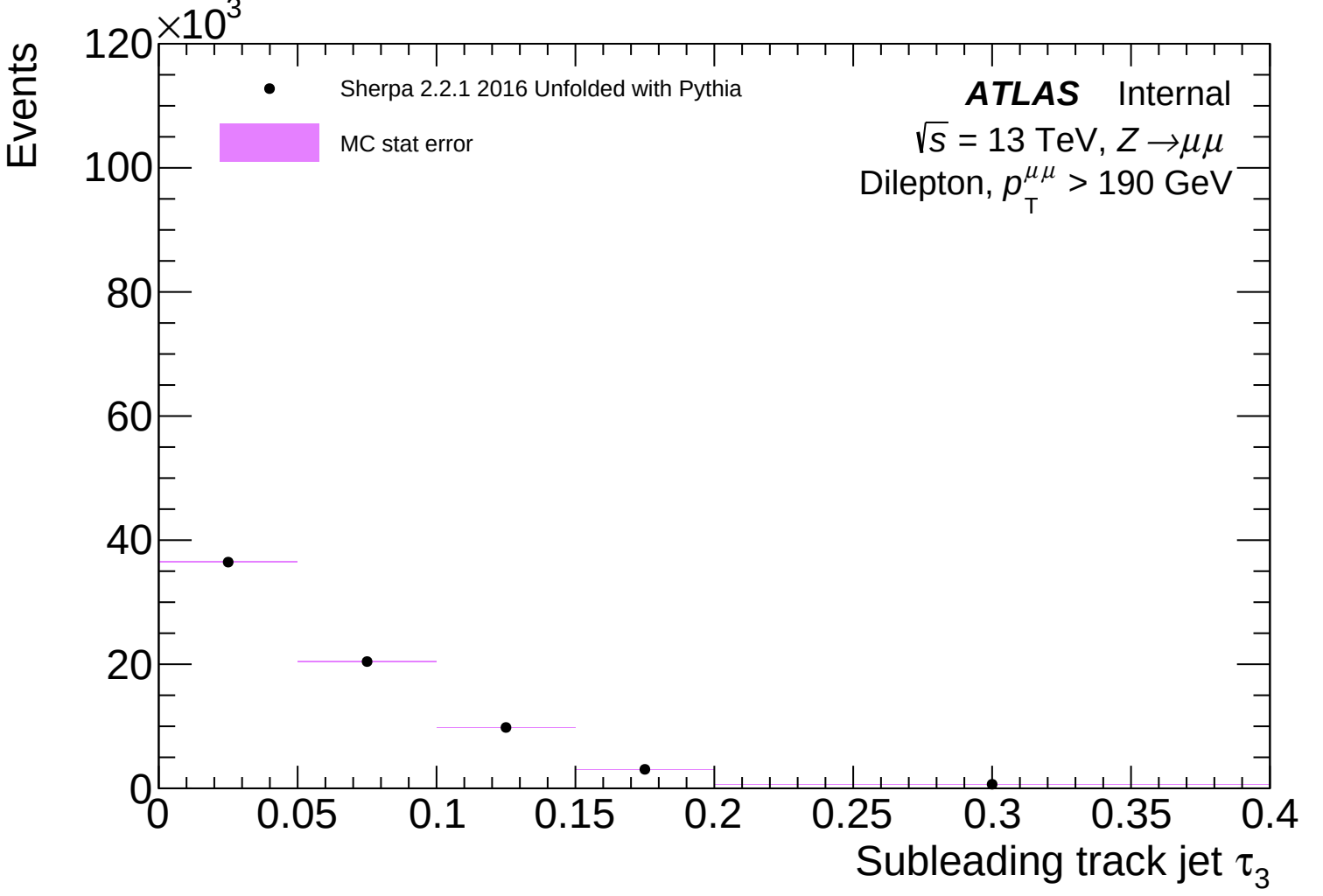

$\times 10^{6}$
$dN / d\tau_2^{j2}$
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
0
0.1
0.2
0.3
0.4
0.5
0.6
Subleading track jet τ_2

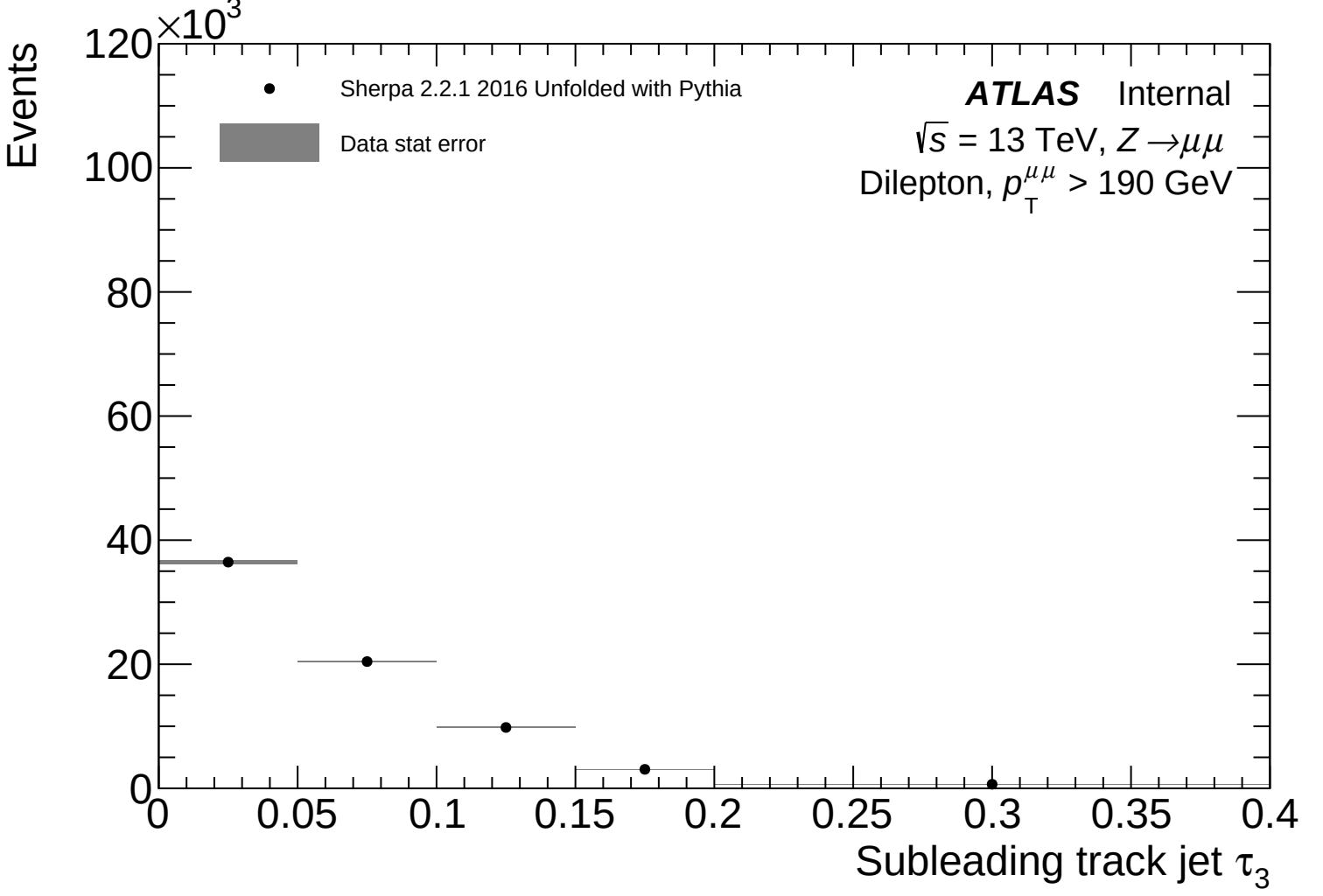

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

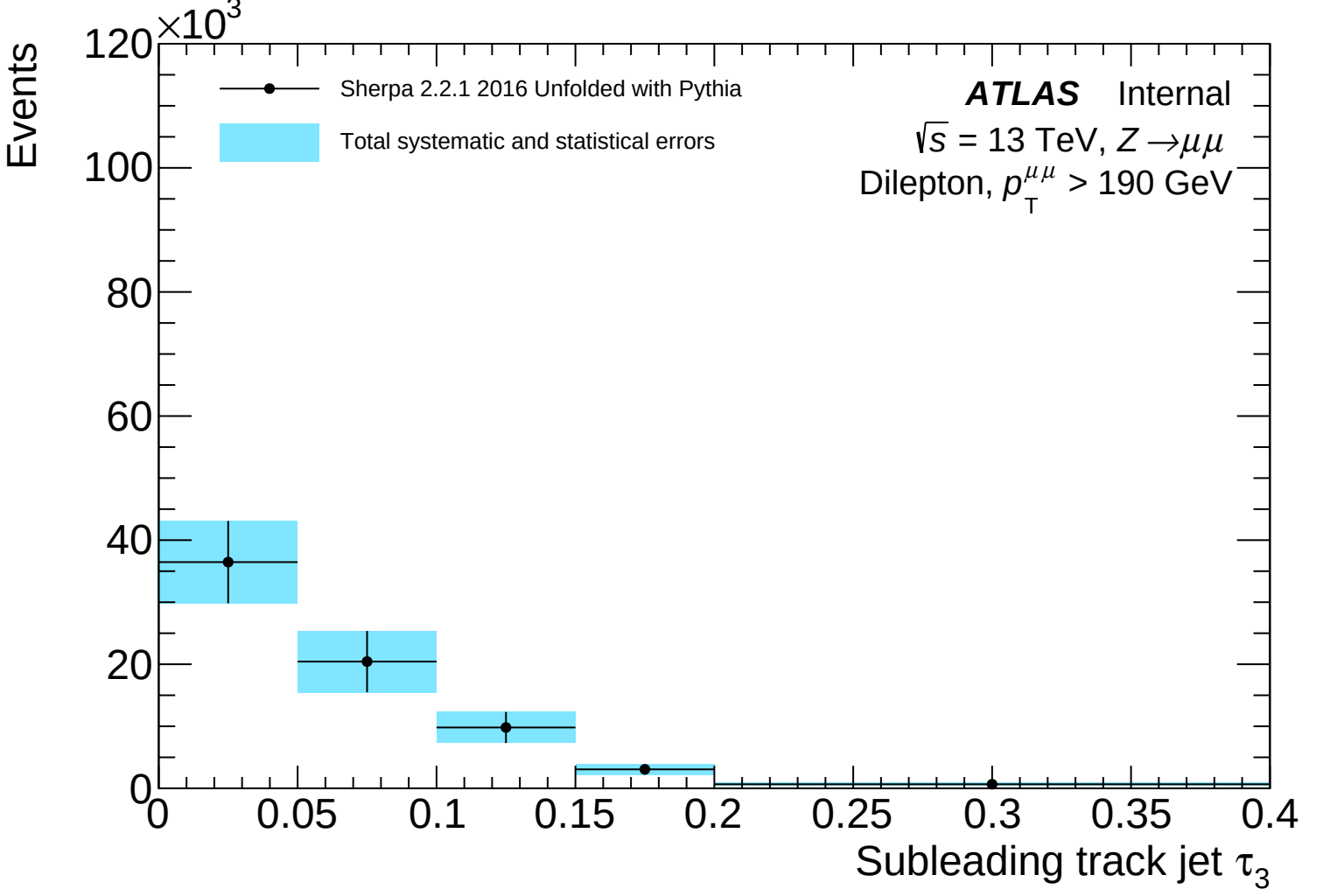

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

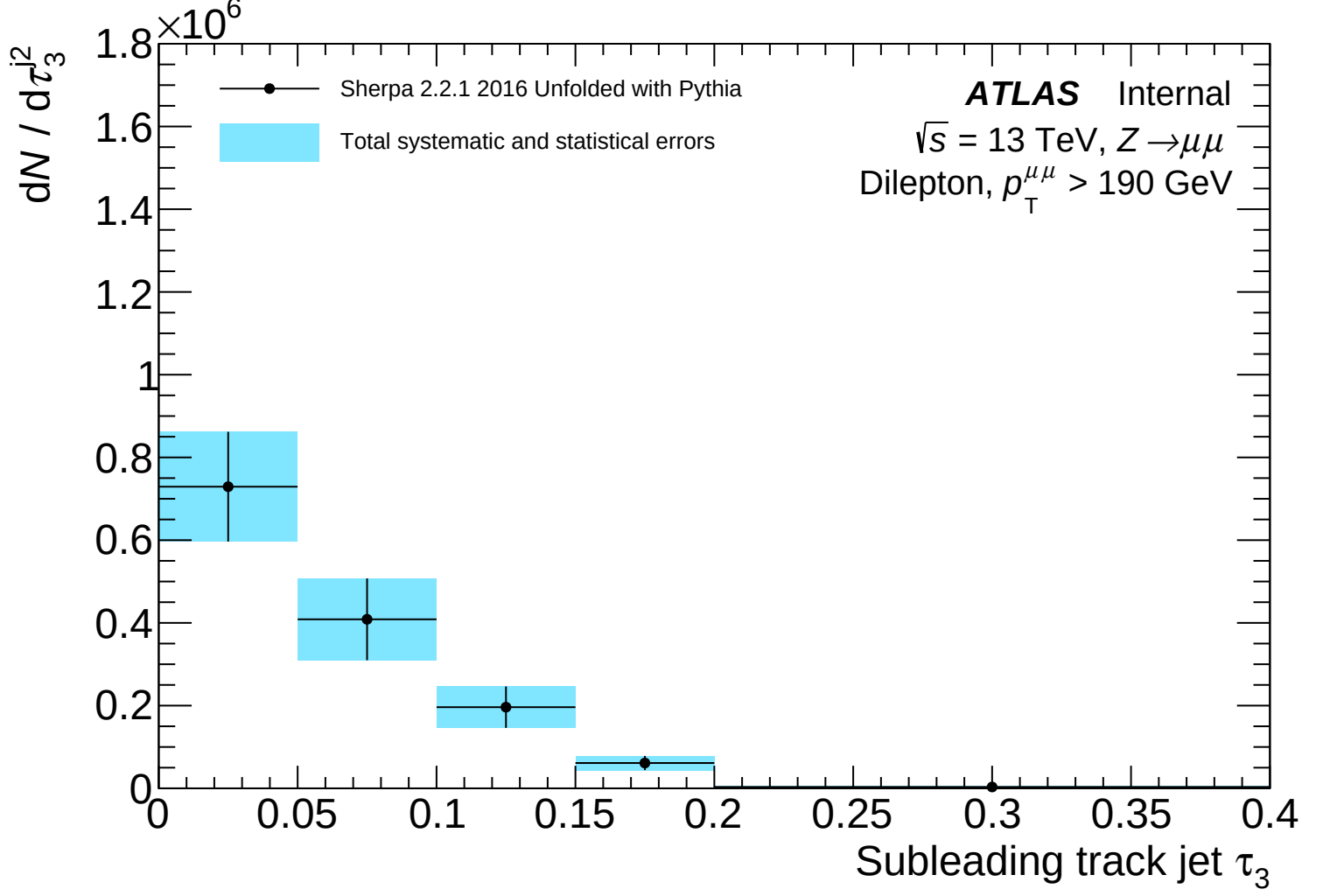

Events
$\times 10^3$
120
100
80
60
40
20
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ_3
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

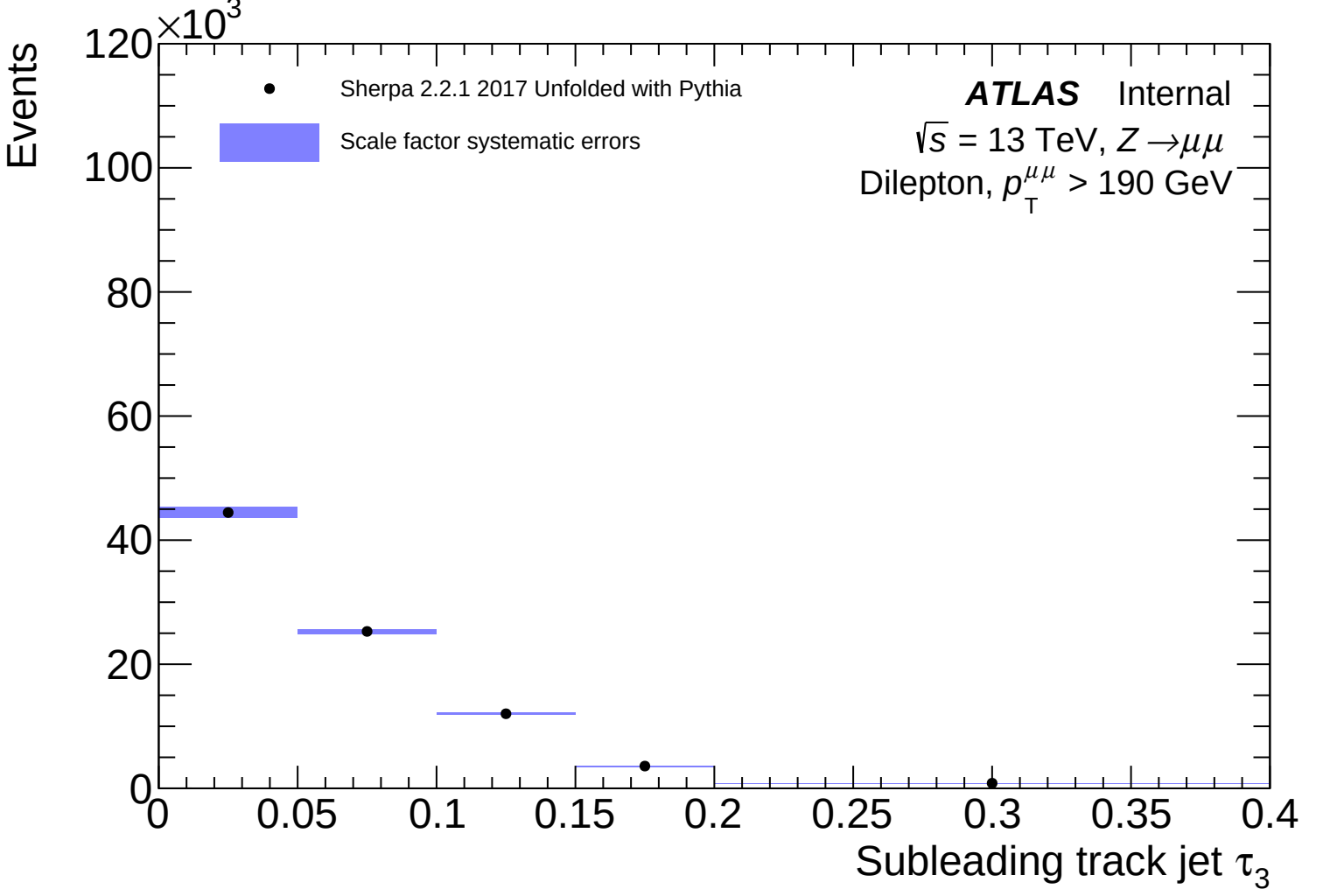

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

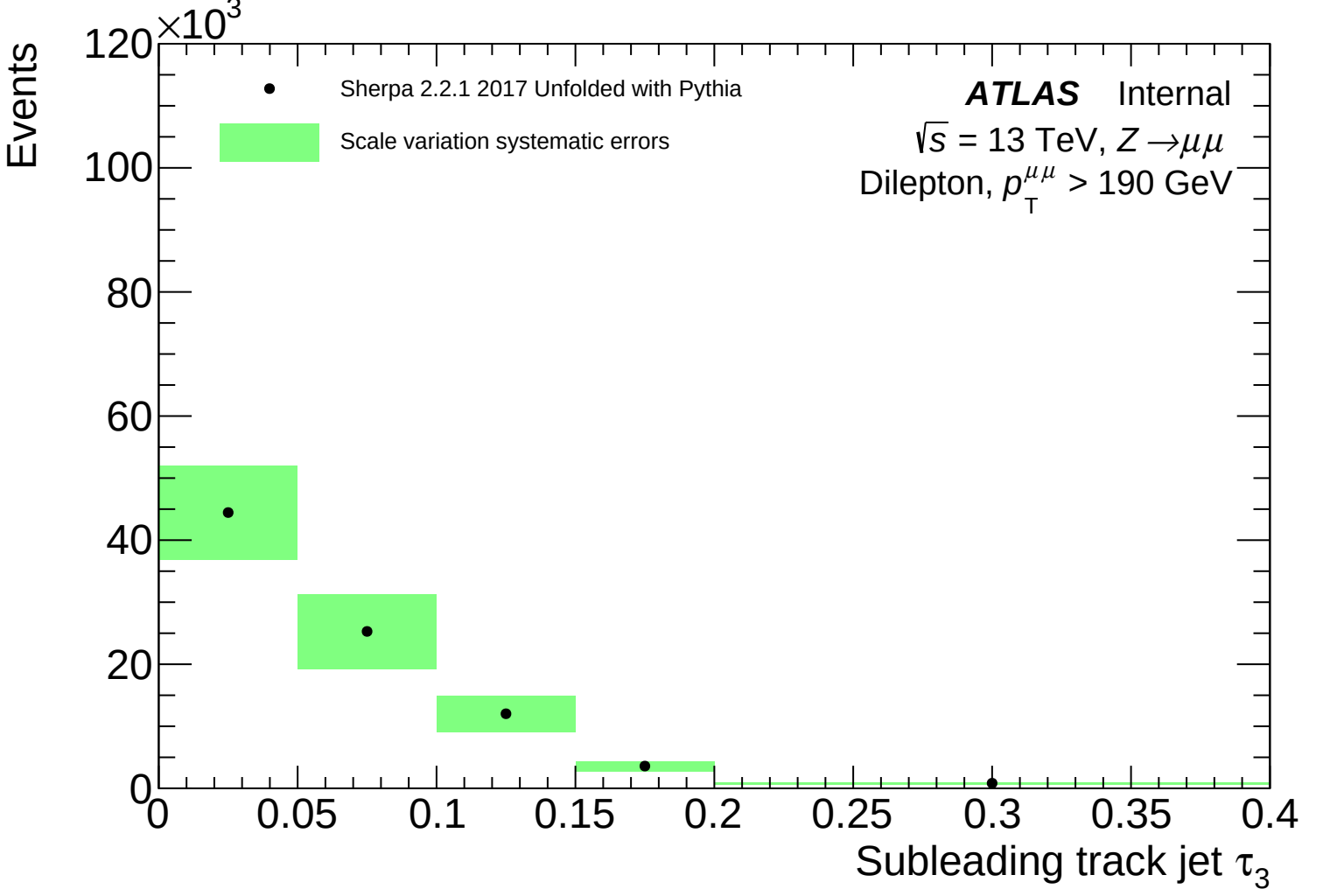

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

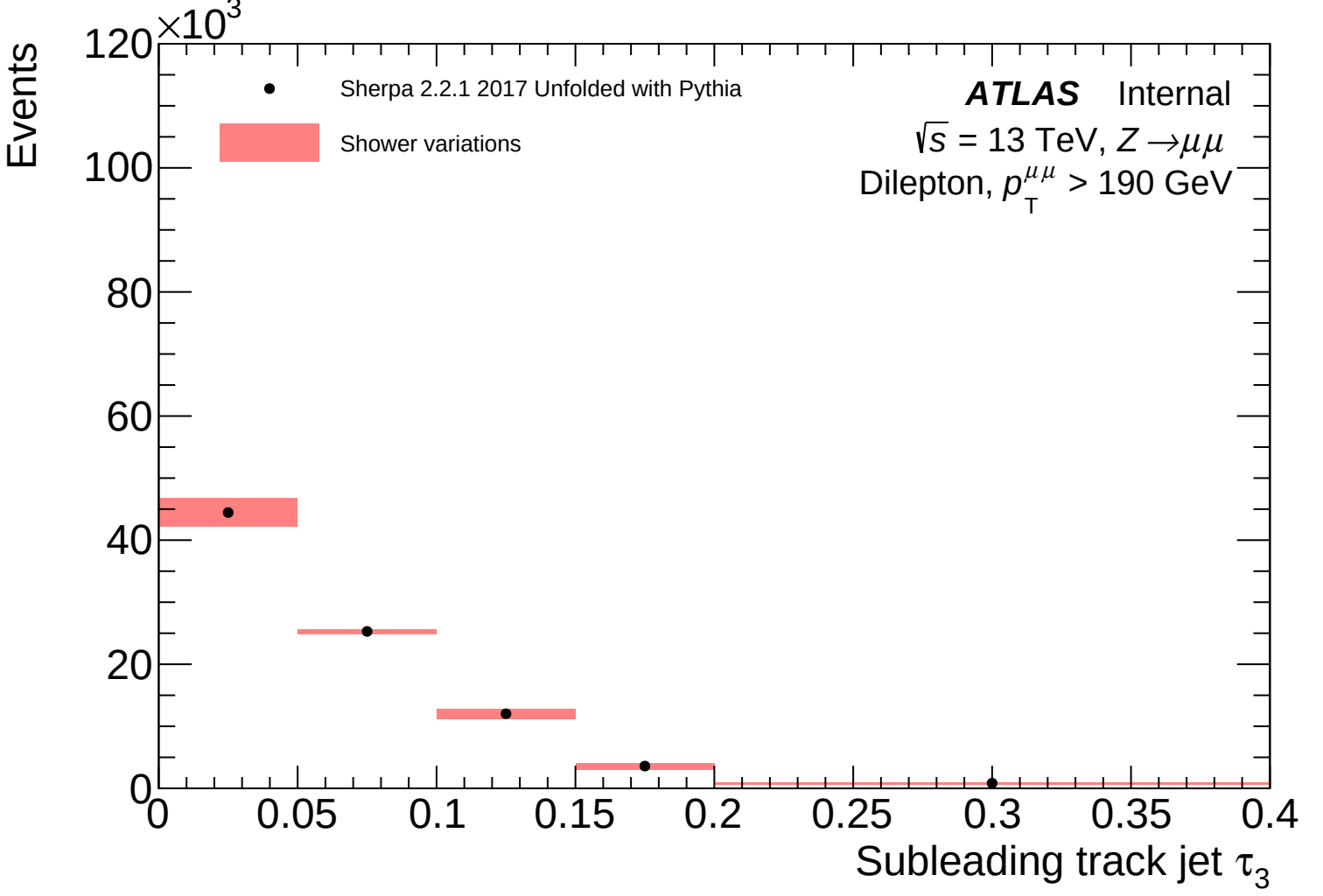

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

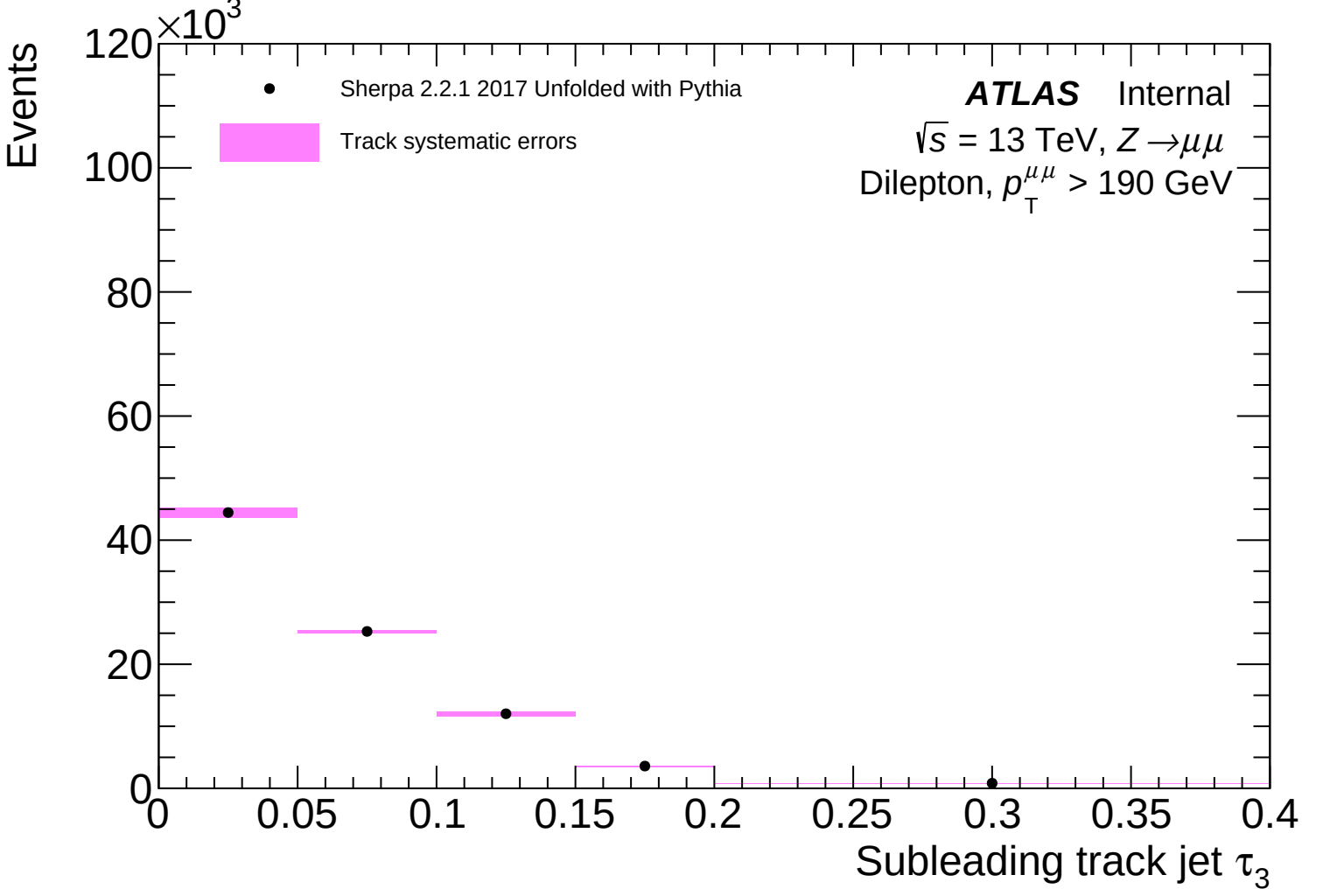

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

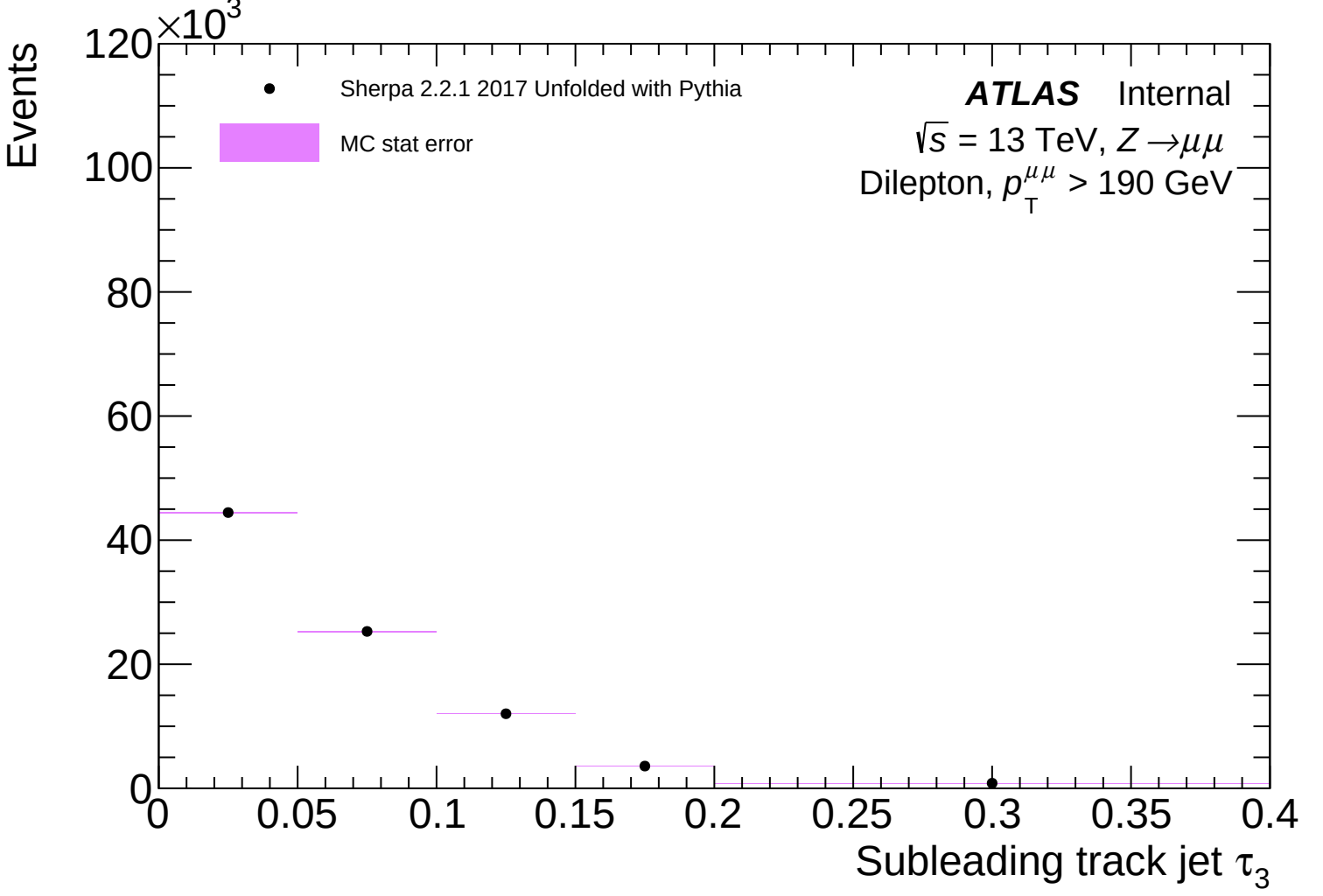

$\times 10^{6}$
$dN / d\tau_3^{j2}$
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{T}^{\mu\mu}$ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ_3

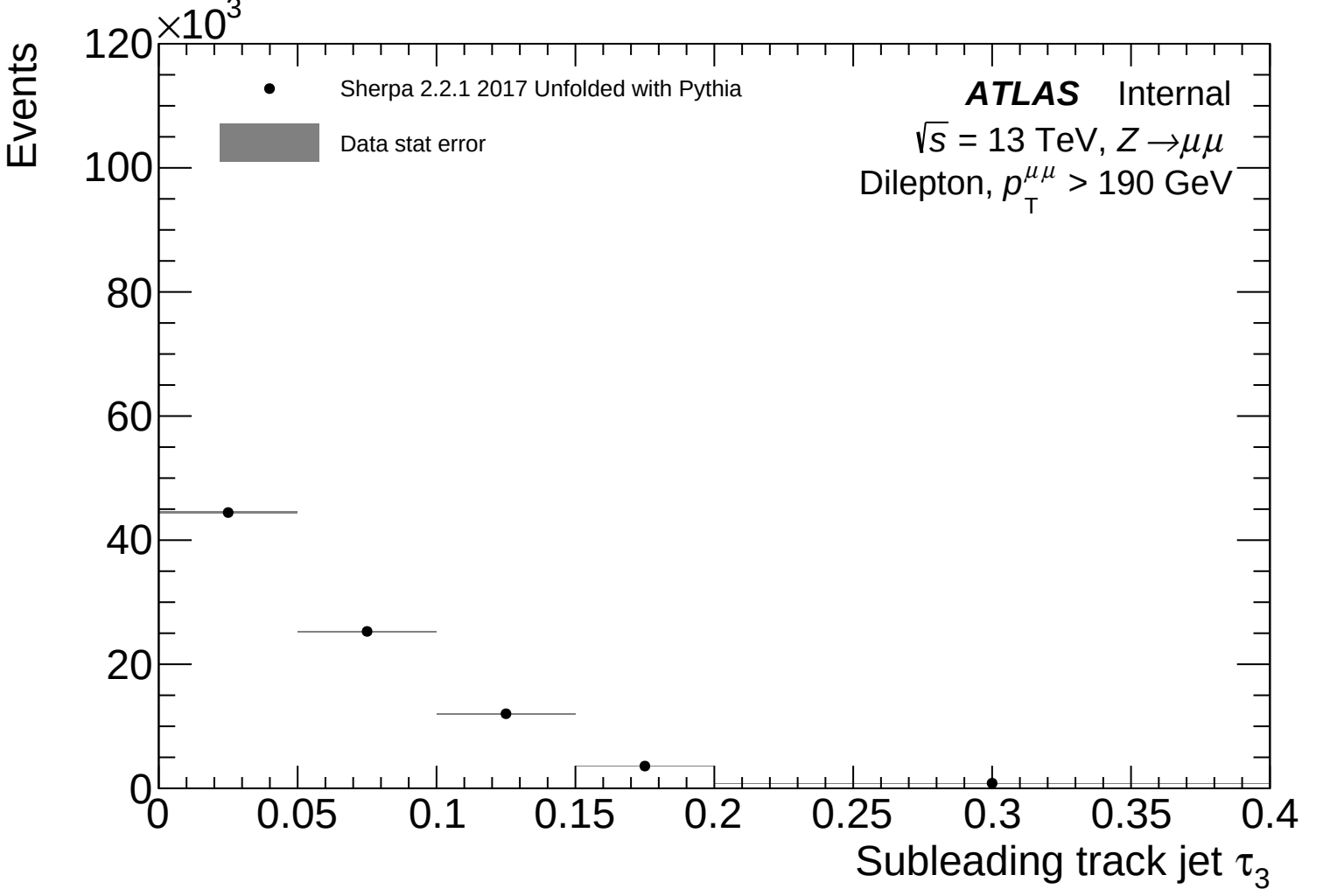

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

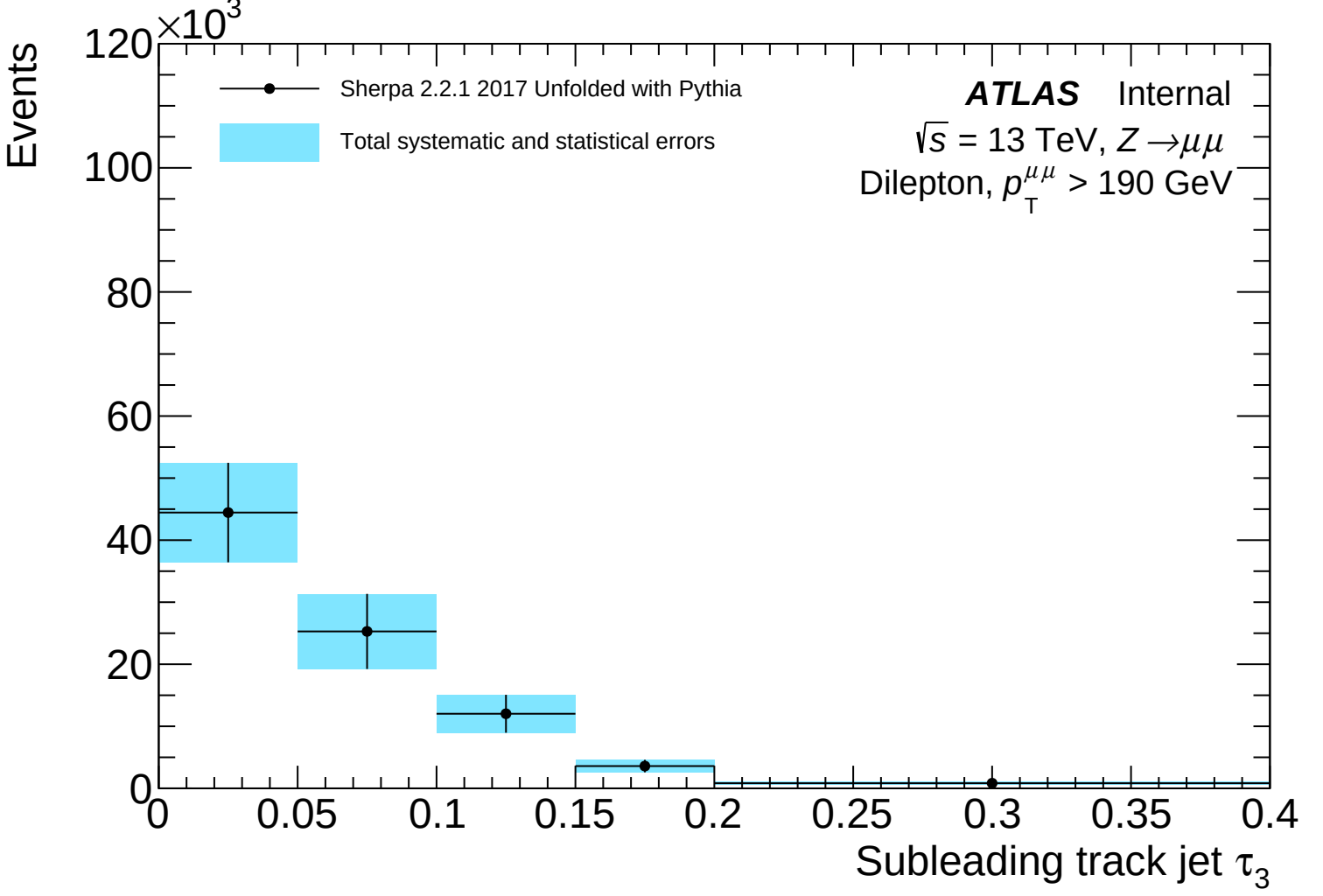

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

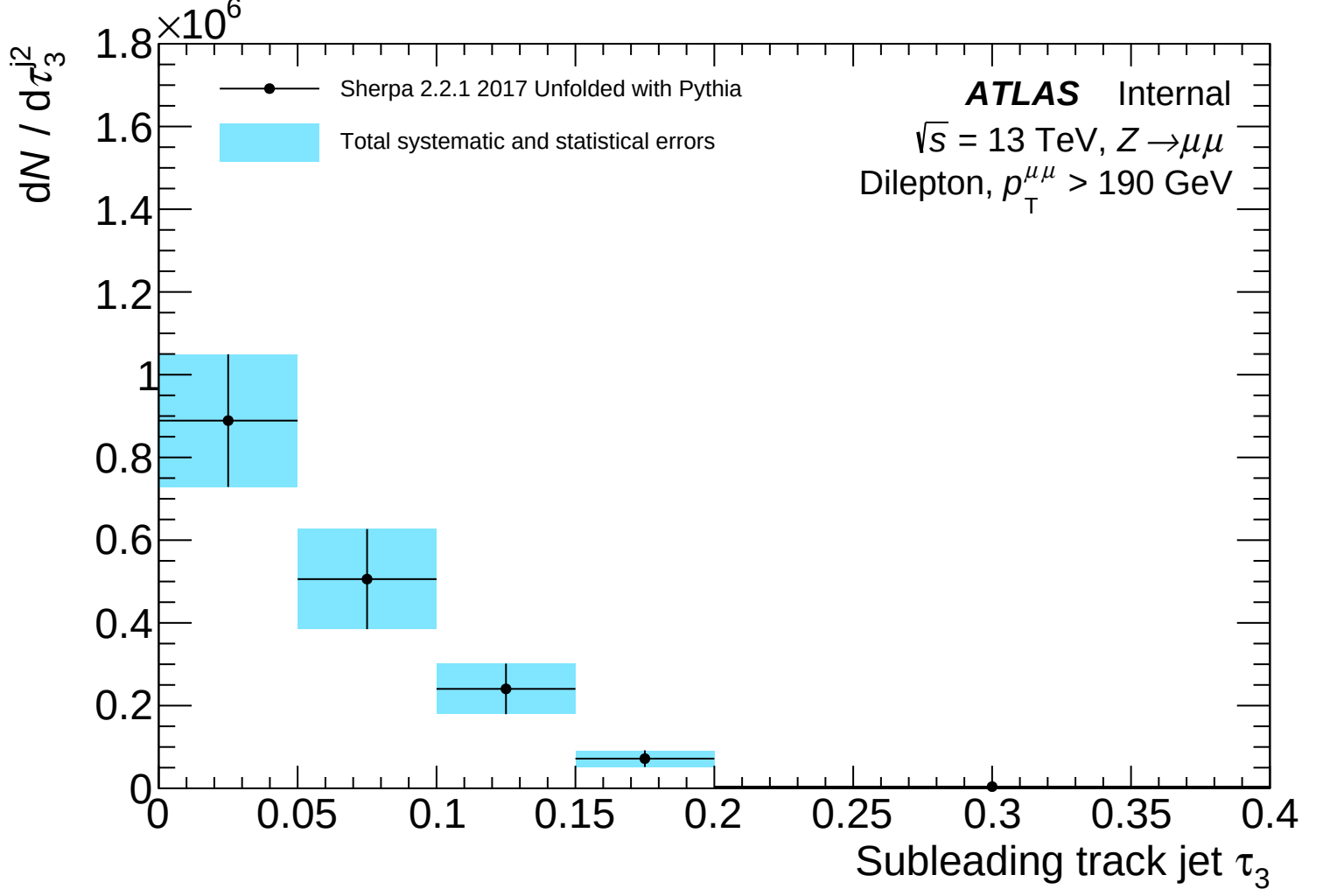

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

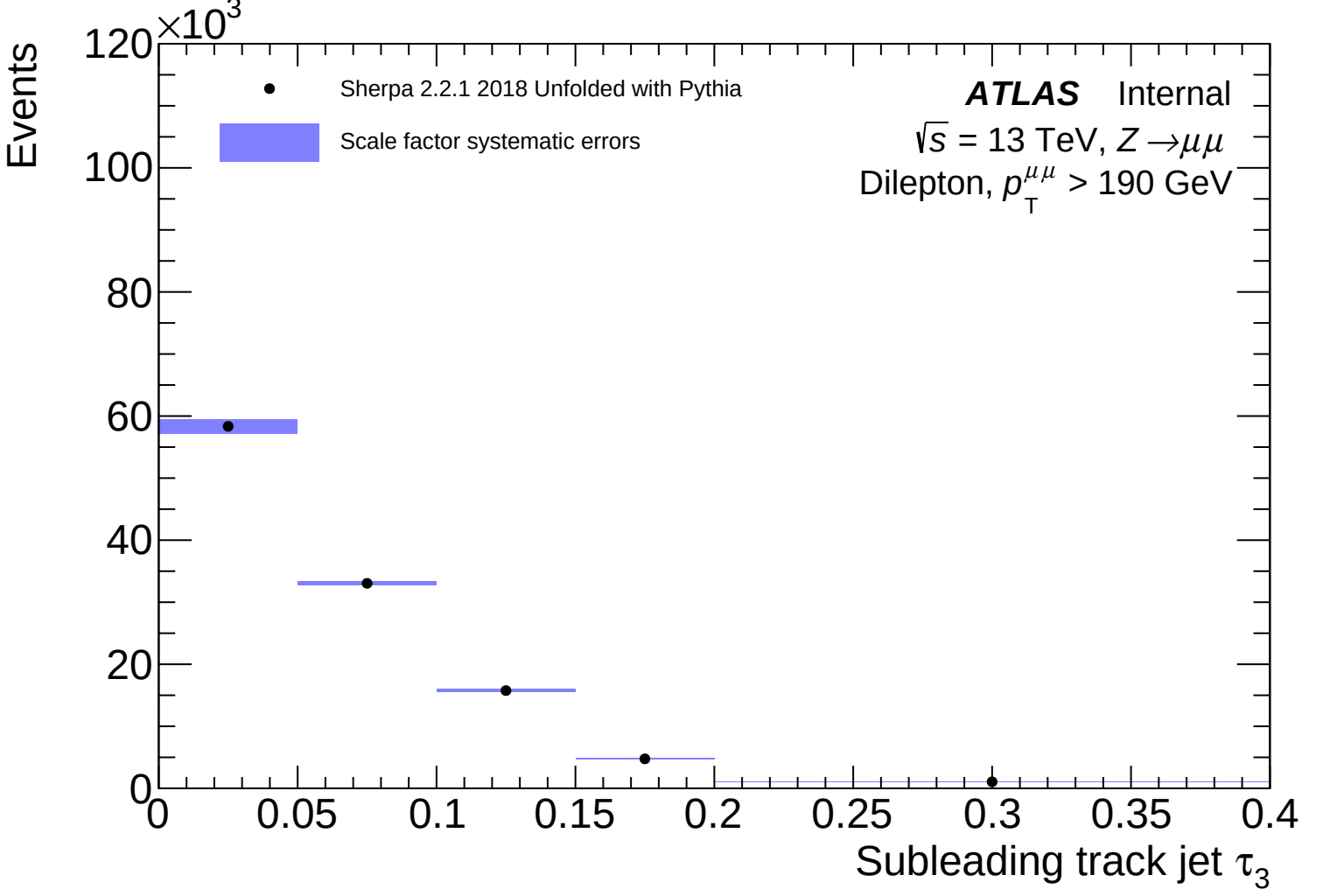

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

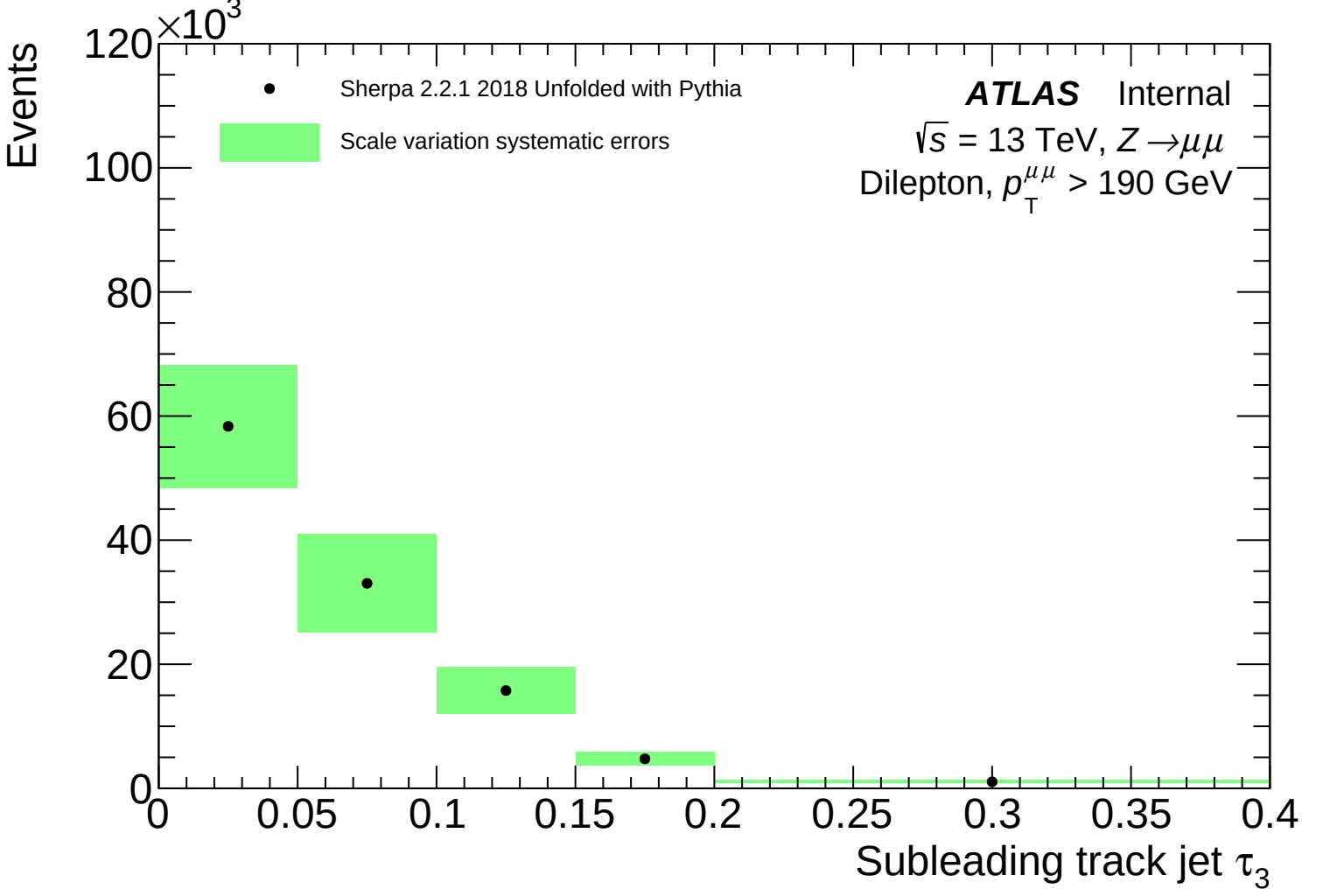

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

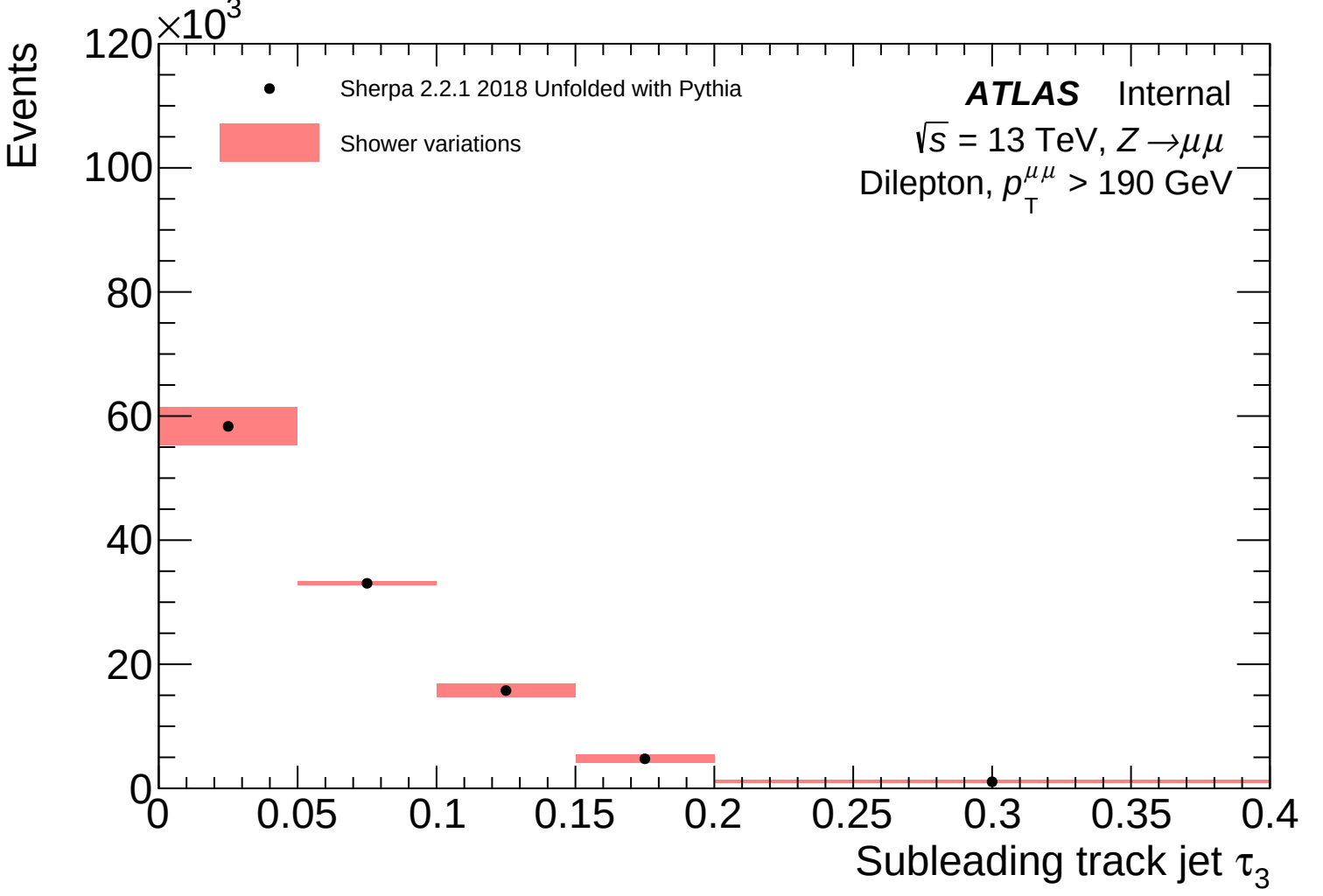

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

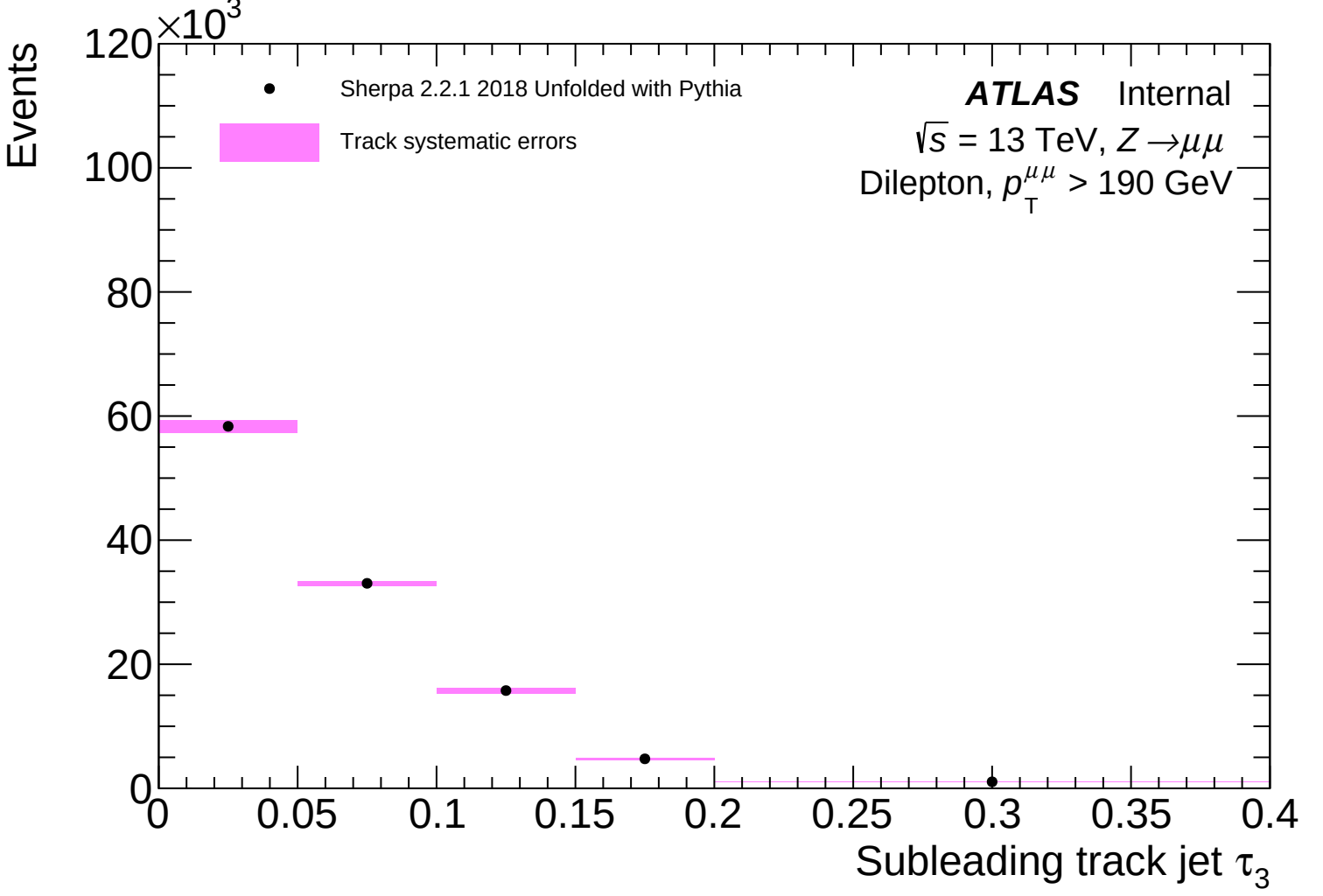

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

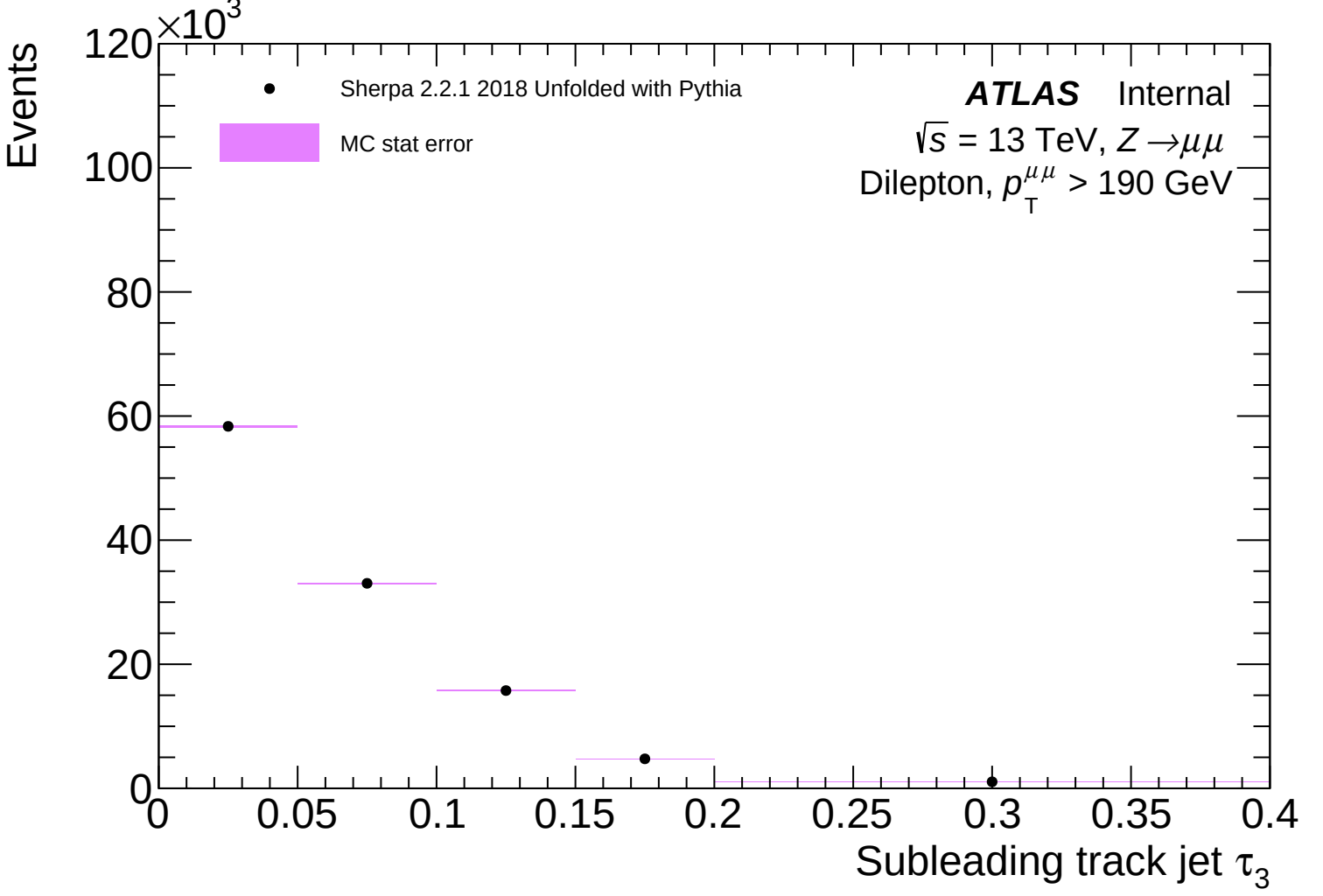

$\times 10^{6}$
$dN / d\tau_3^{j2}$
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ_3

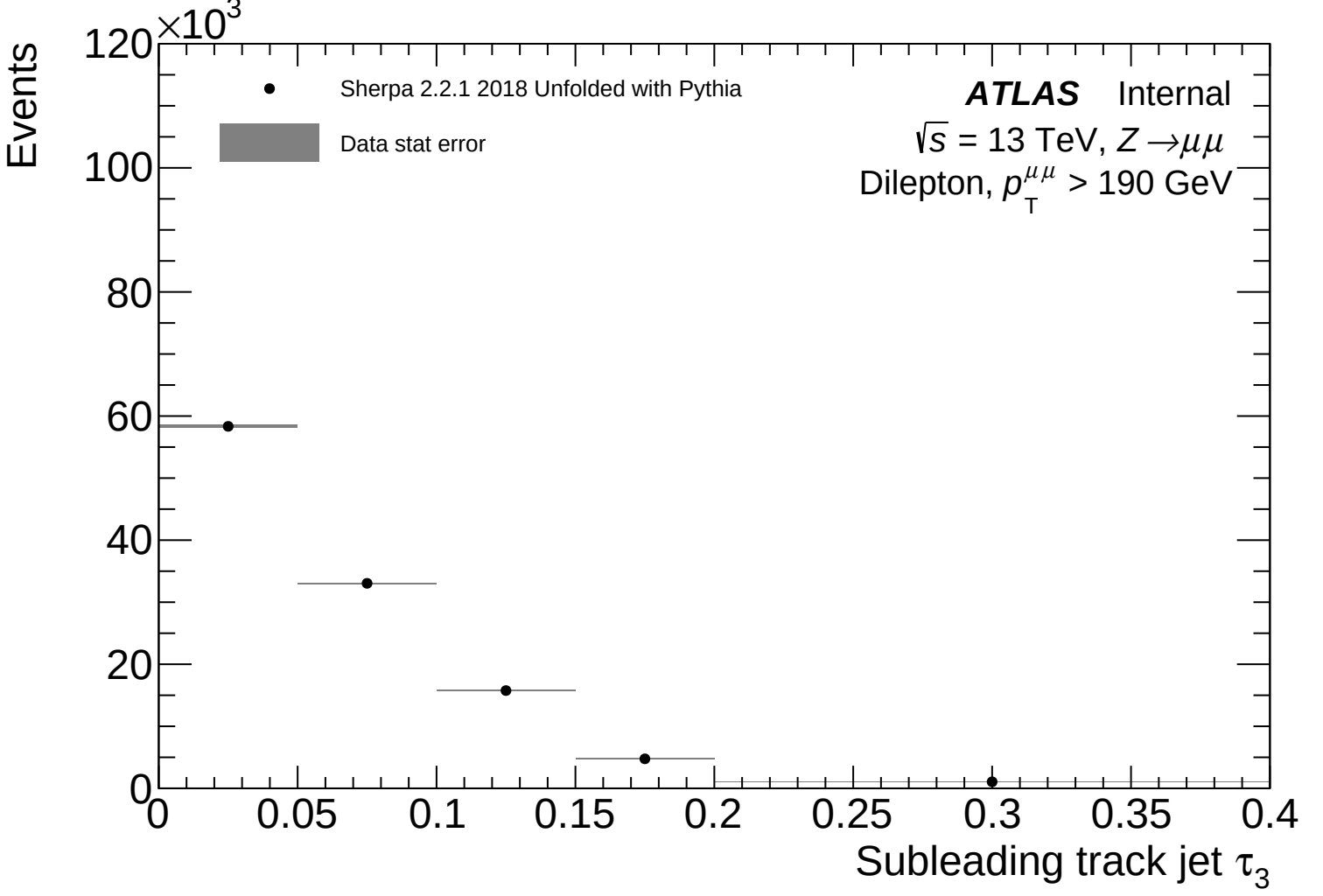

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

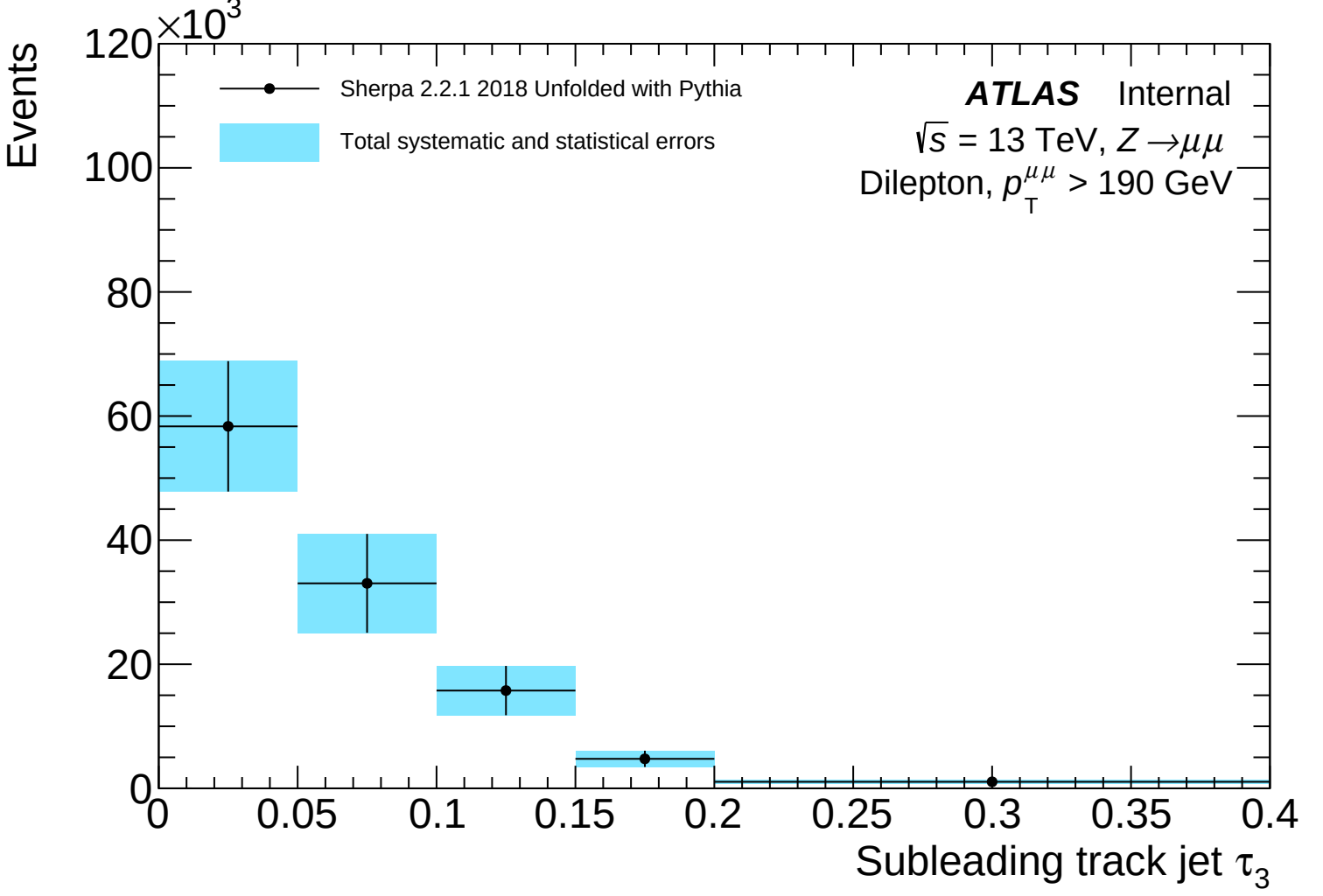

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

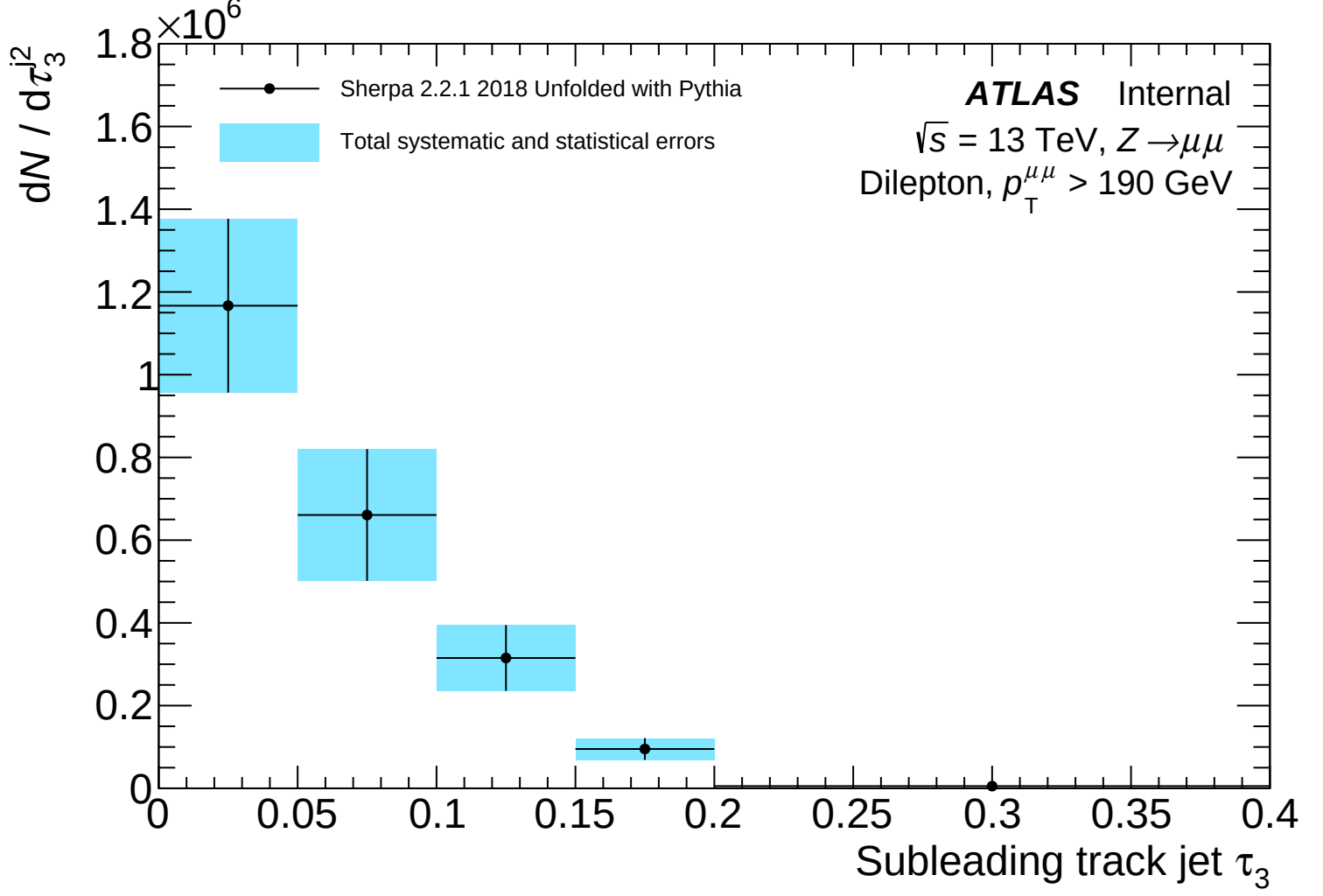

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

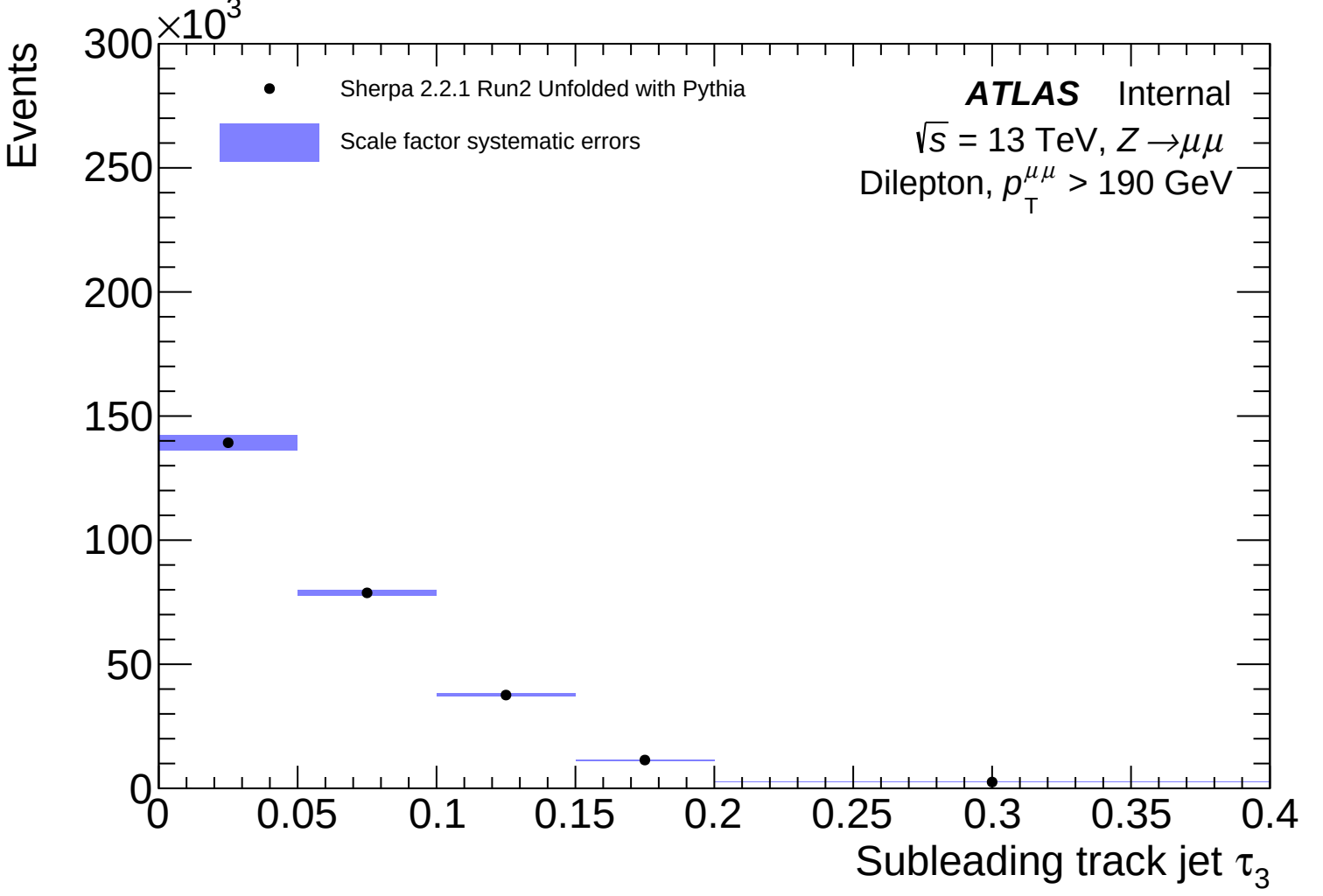

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

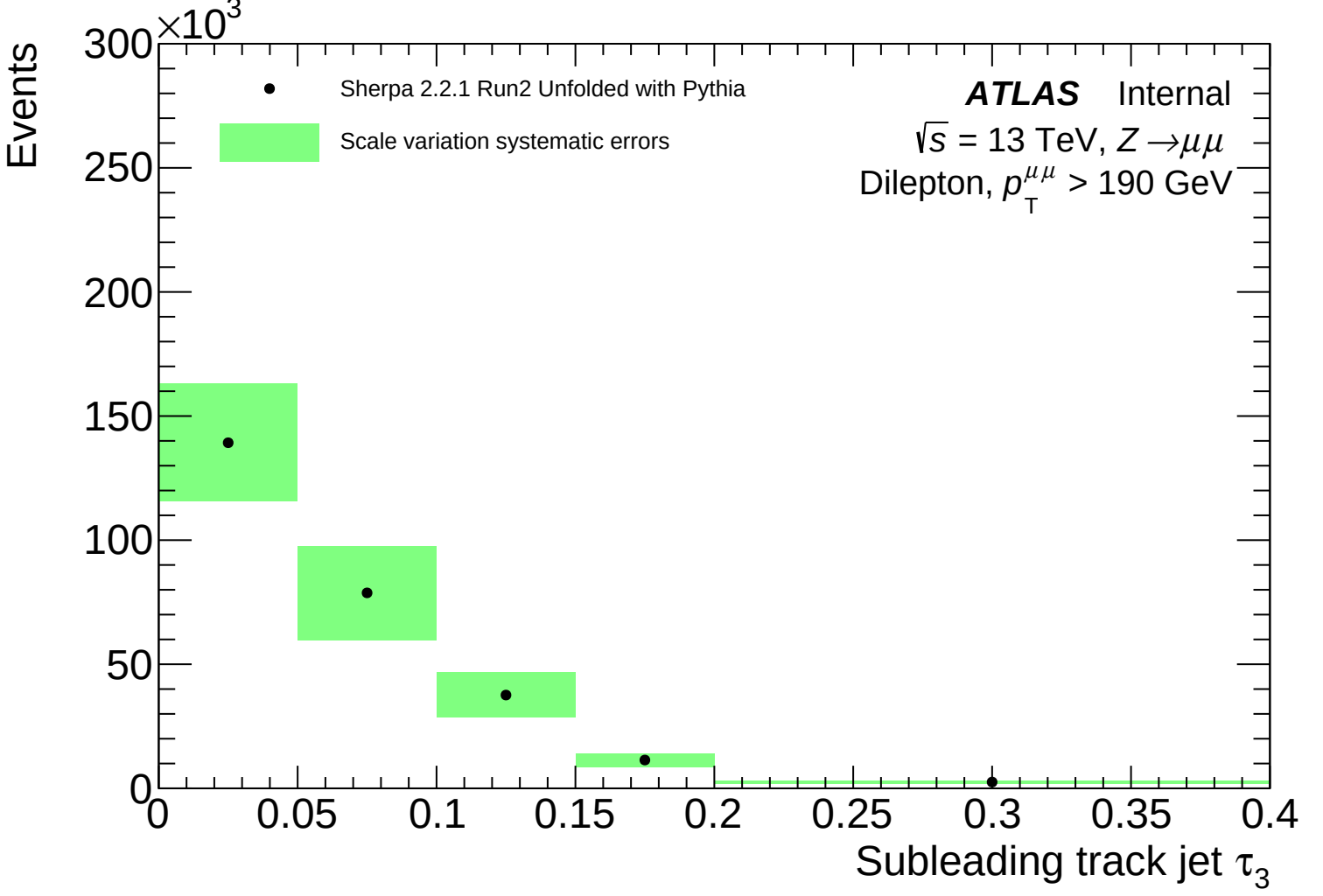

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

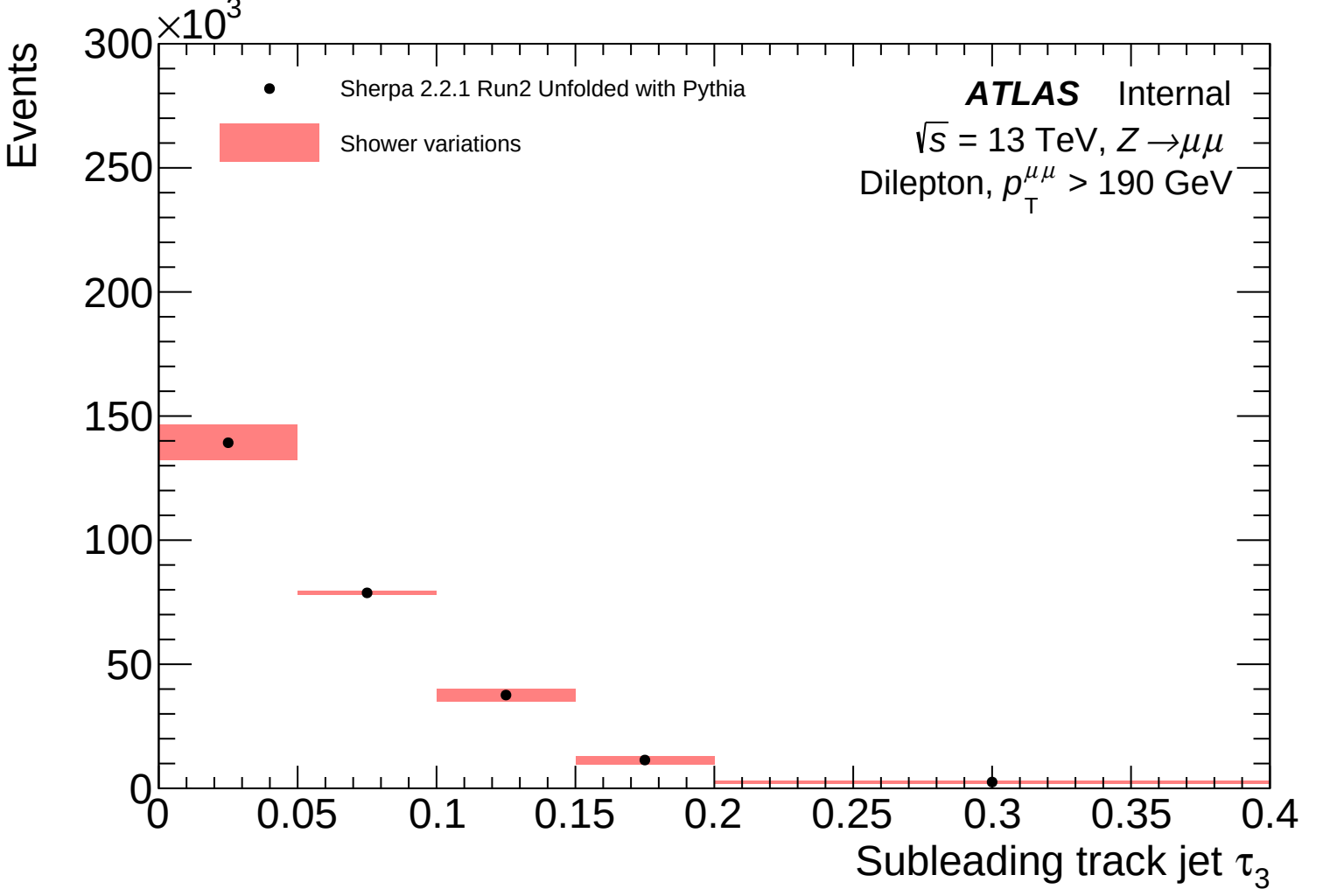

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

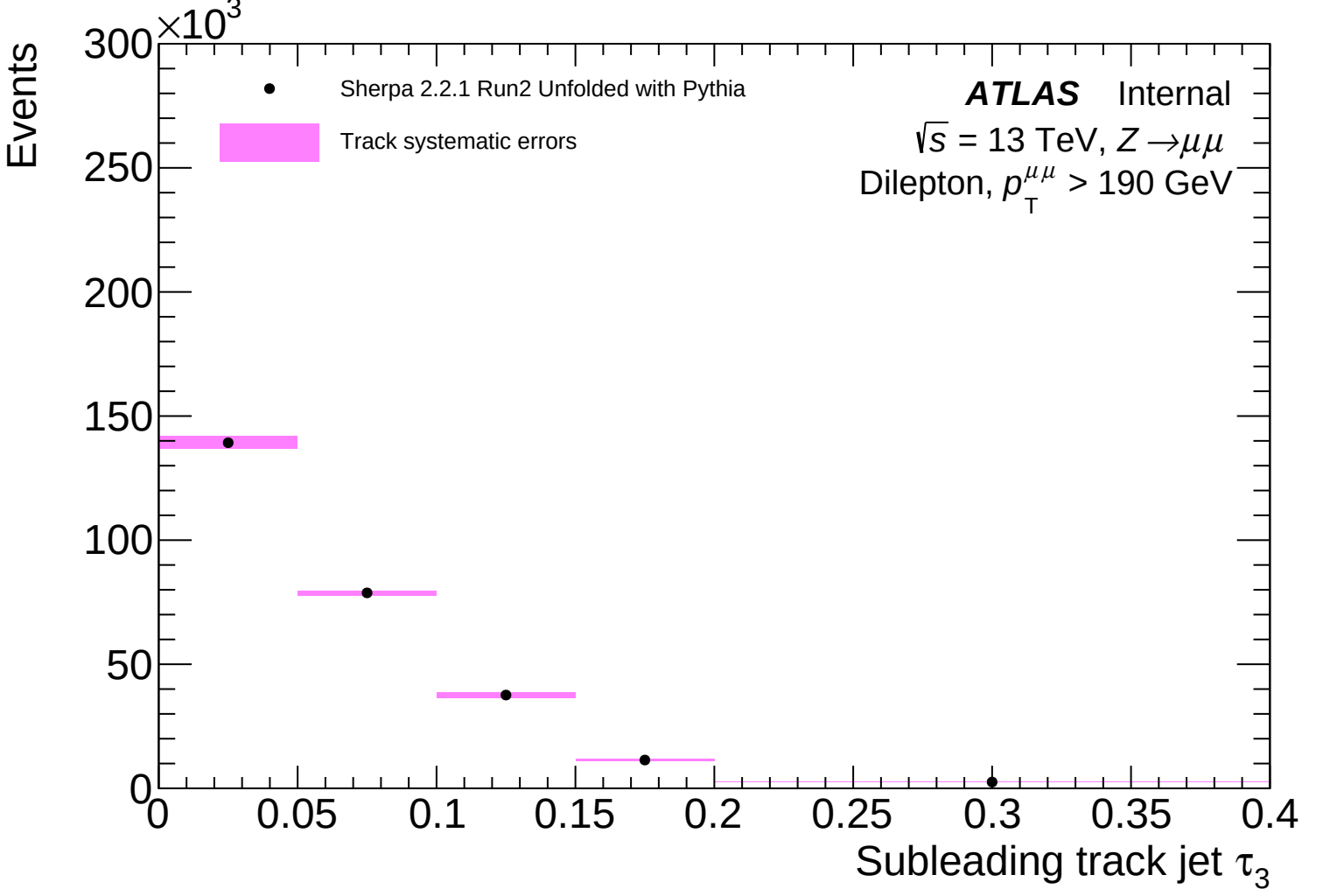

Events
×10^3
120
100
80
60
40
20
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

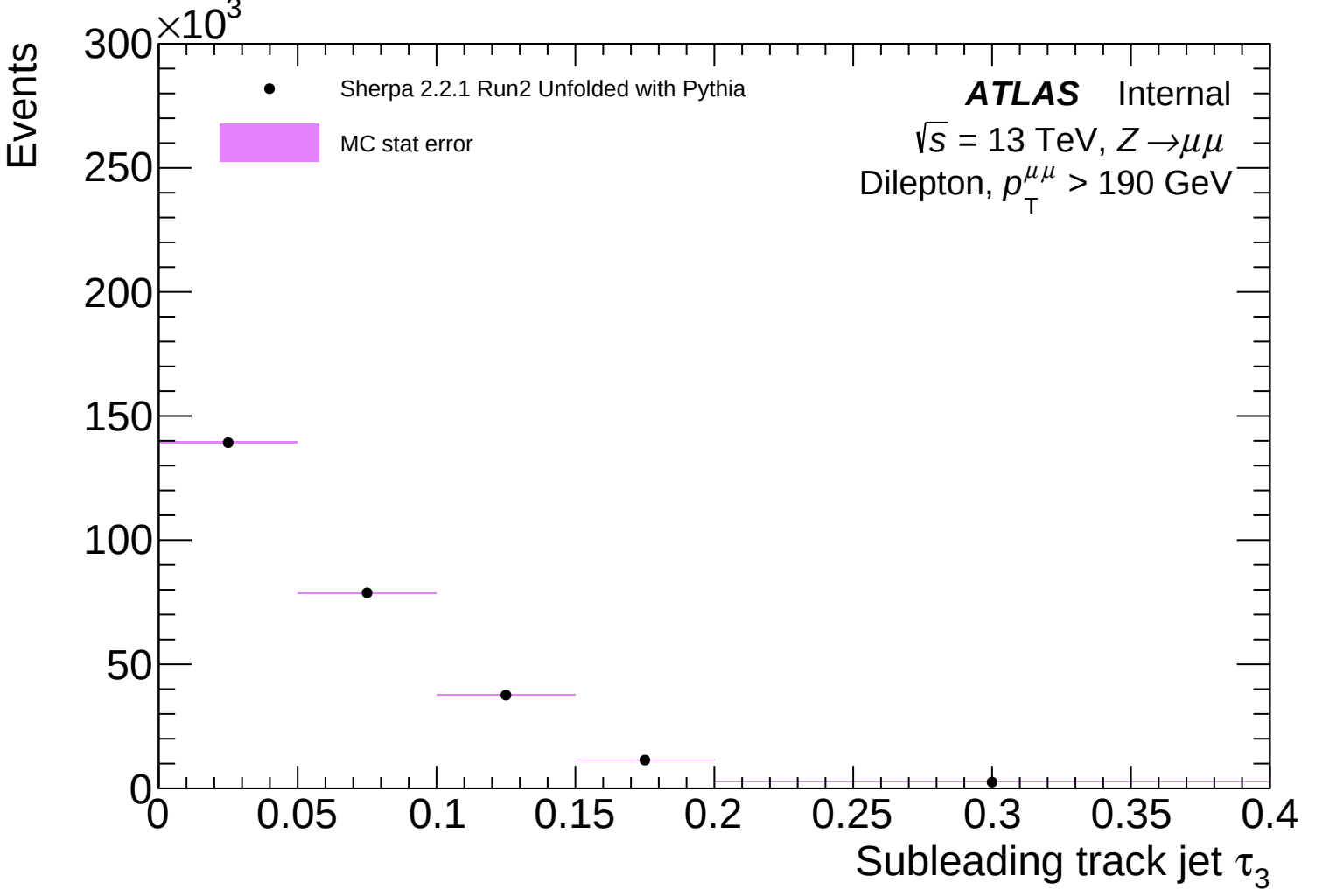

$\times 10^{6}$
$\mathrm{d}N$ / $\mathrm{d}\tau_3^{j2}$
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ_3

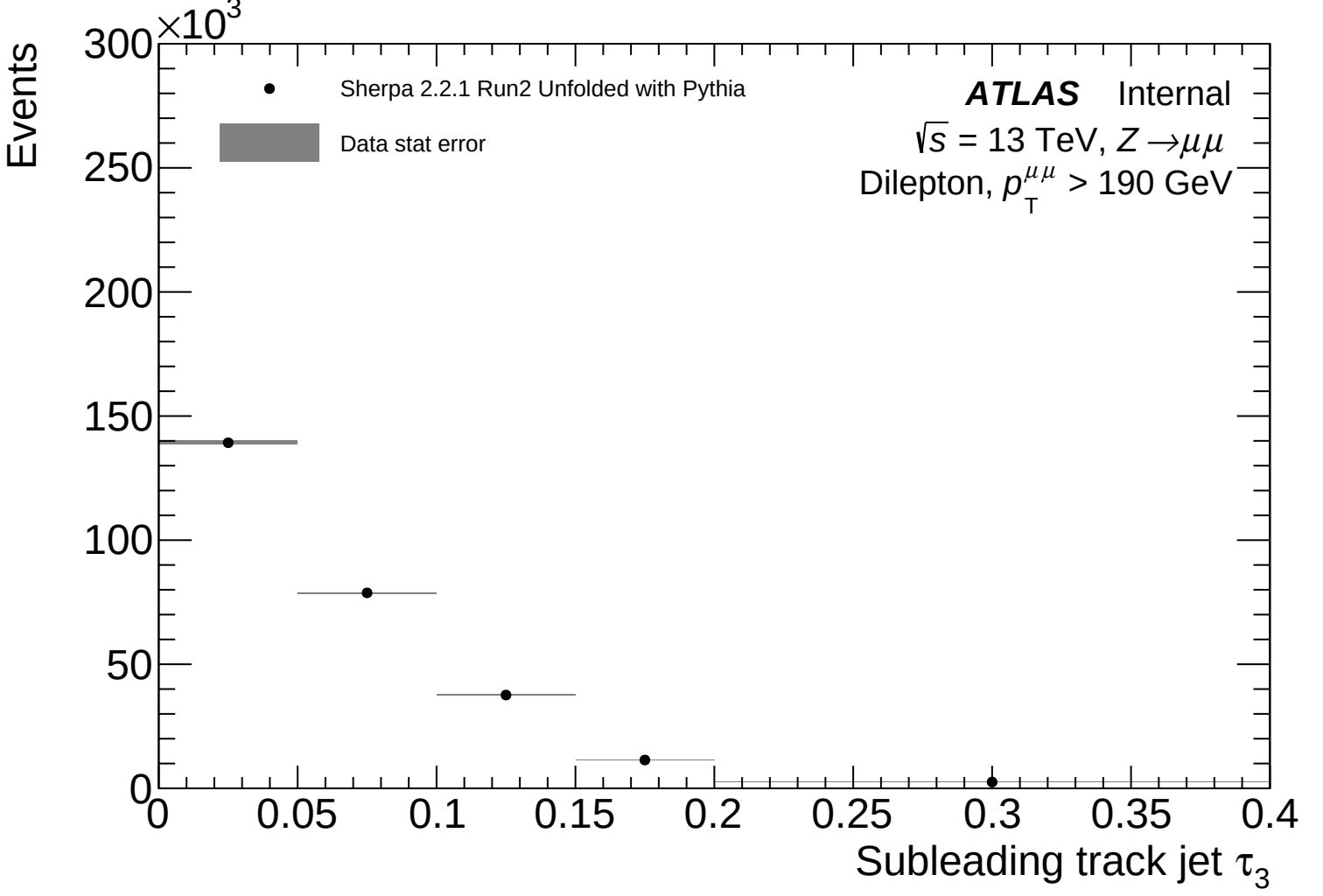

Events
×10^3
300
250
200
150
100
50
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

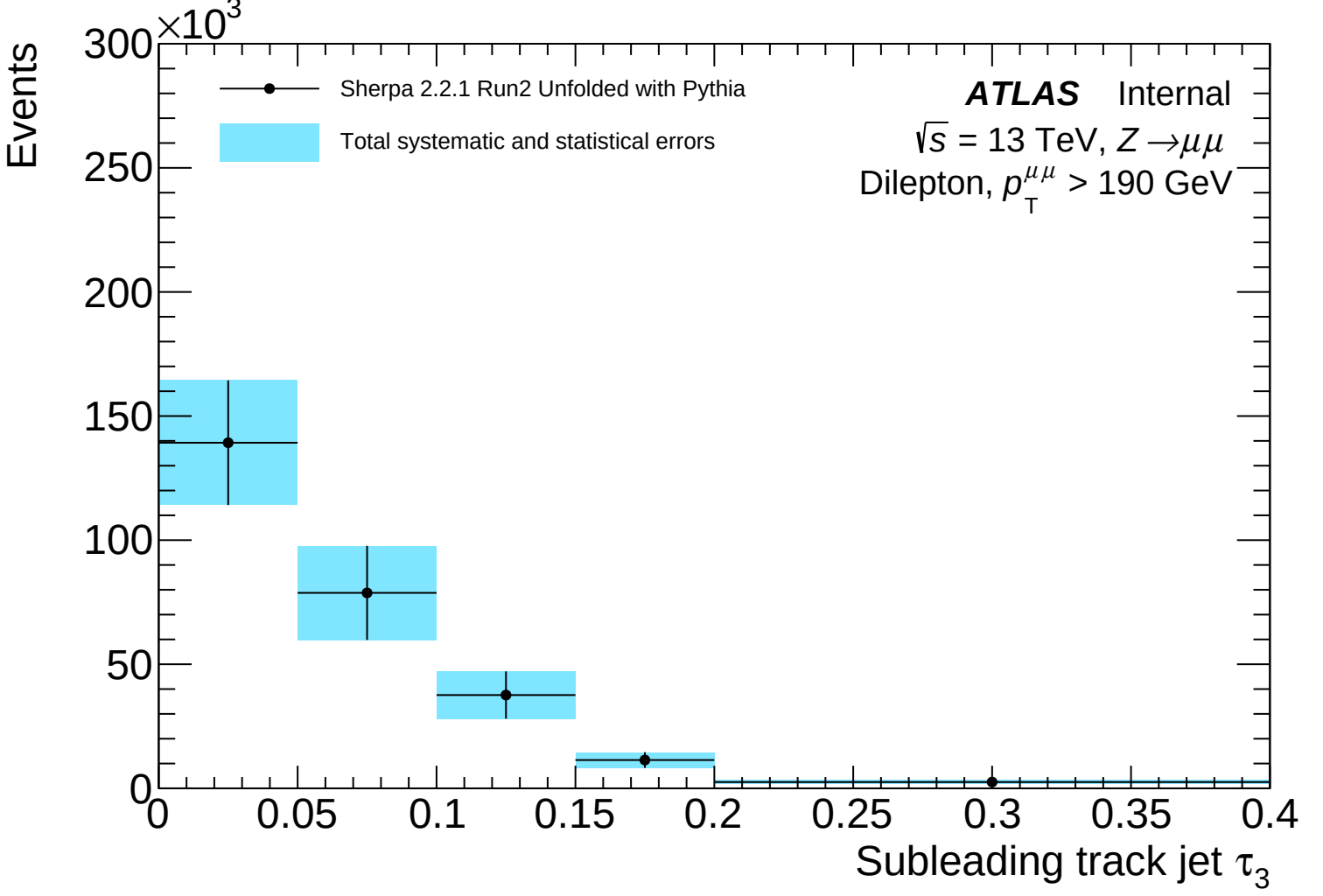

Events
×10^3
300
250
200
150
100
50
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

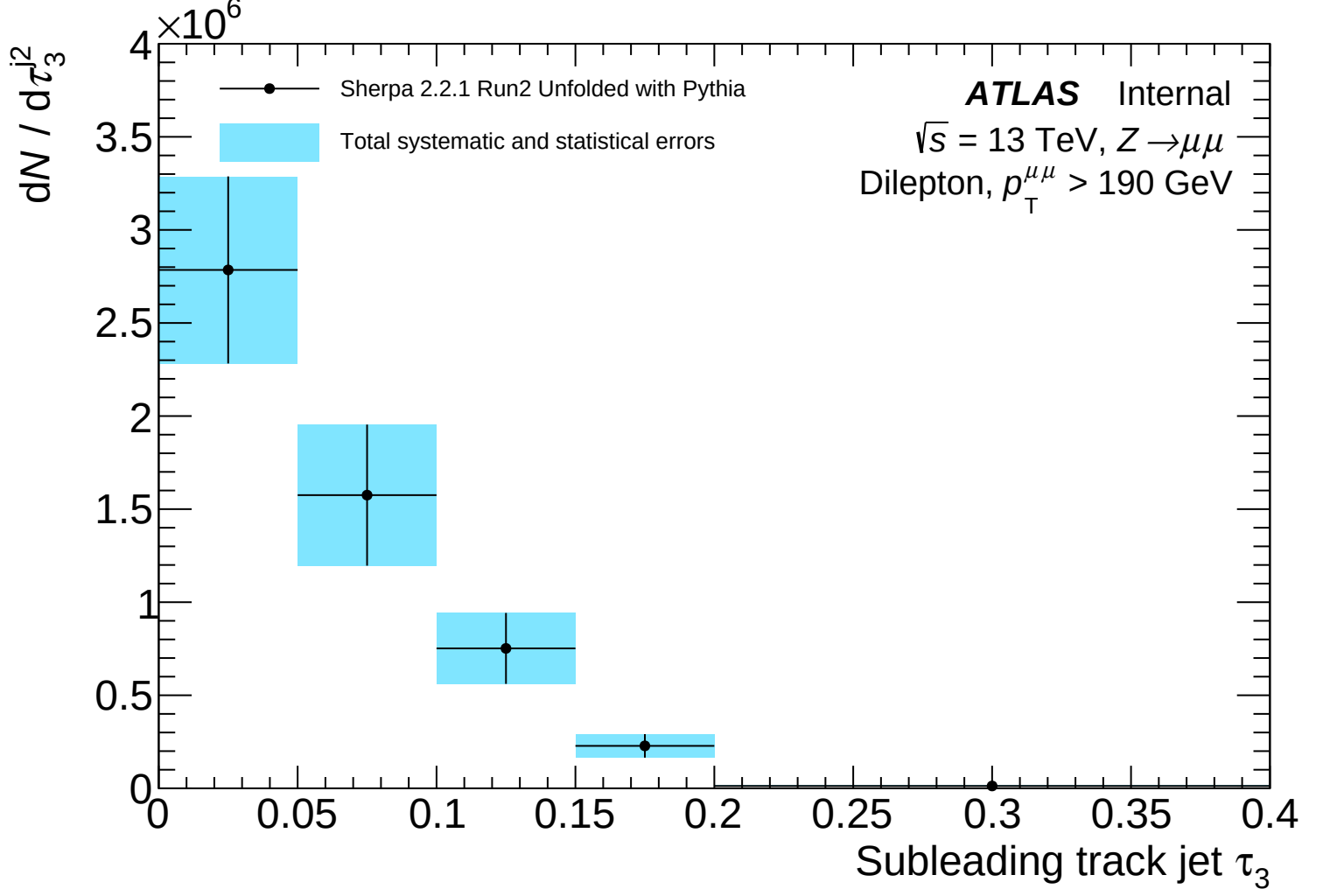

Events
×10^3
300
250
200
150
100
50
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ_3
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

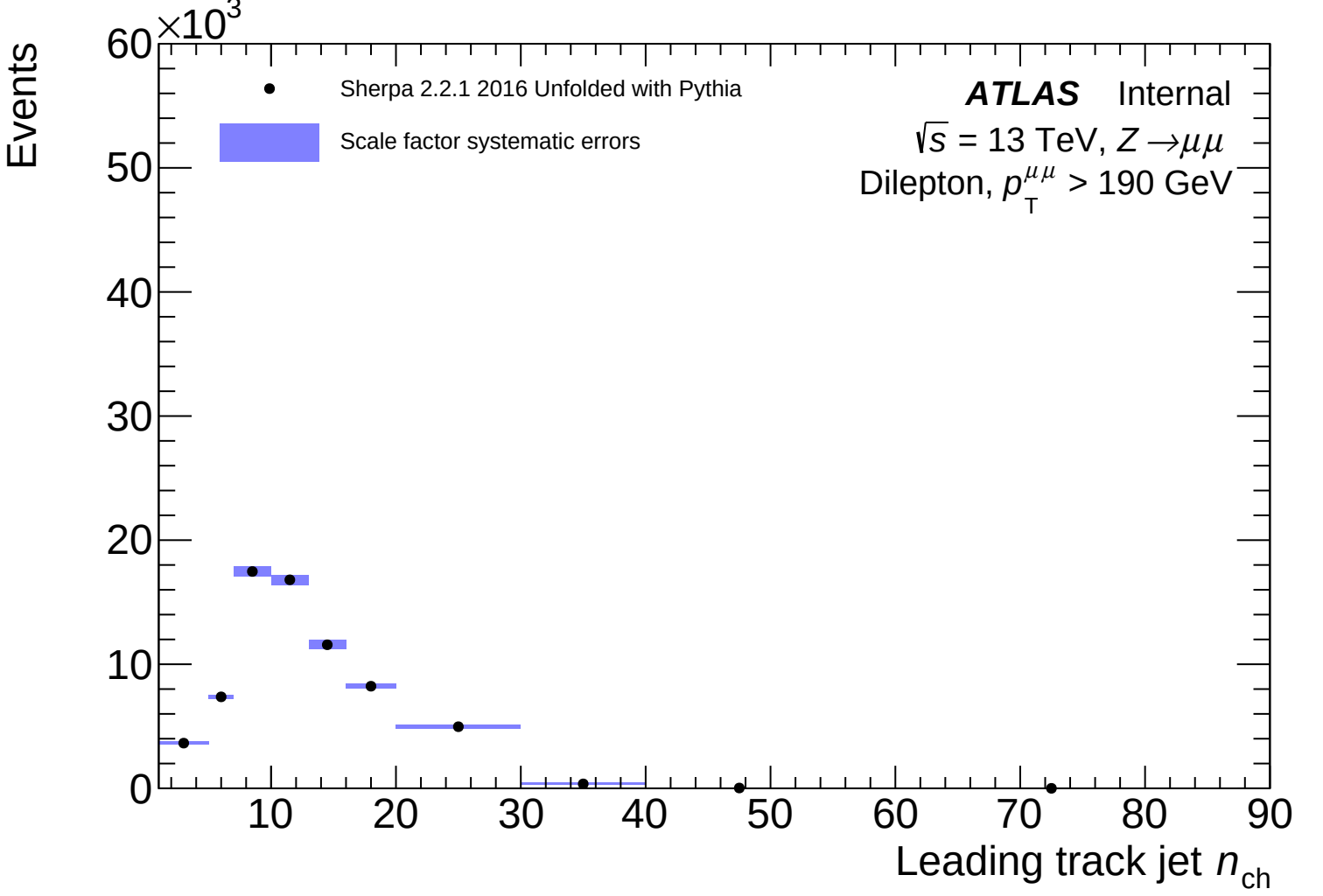

Events
$\times 10^3$
300
250
200
150
100
50
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ_3
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV

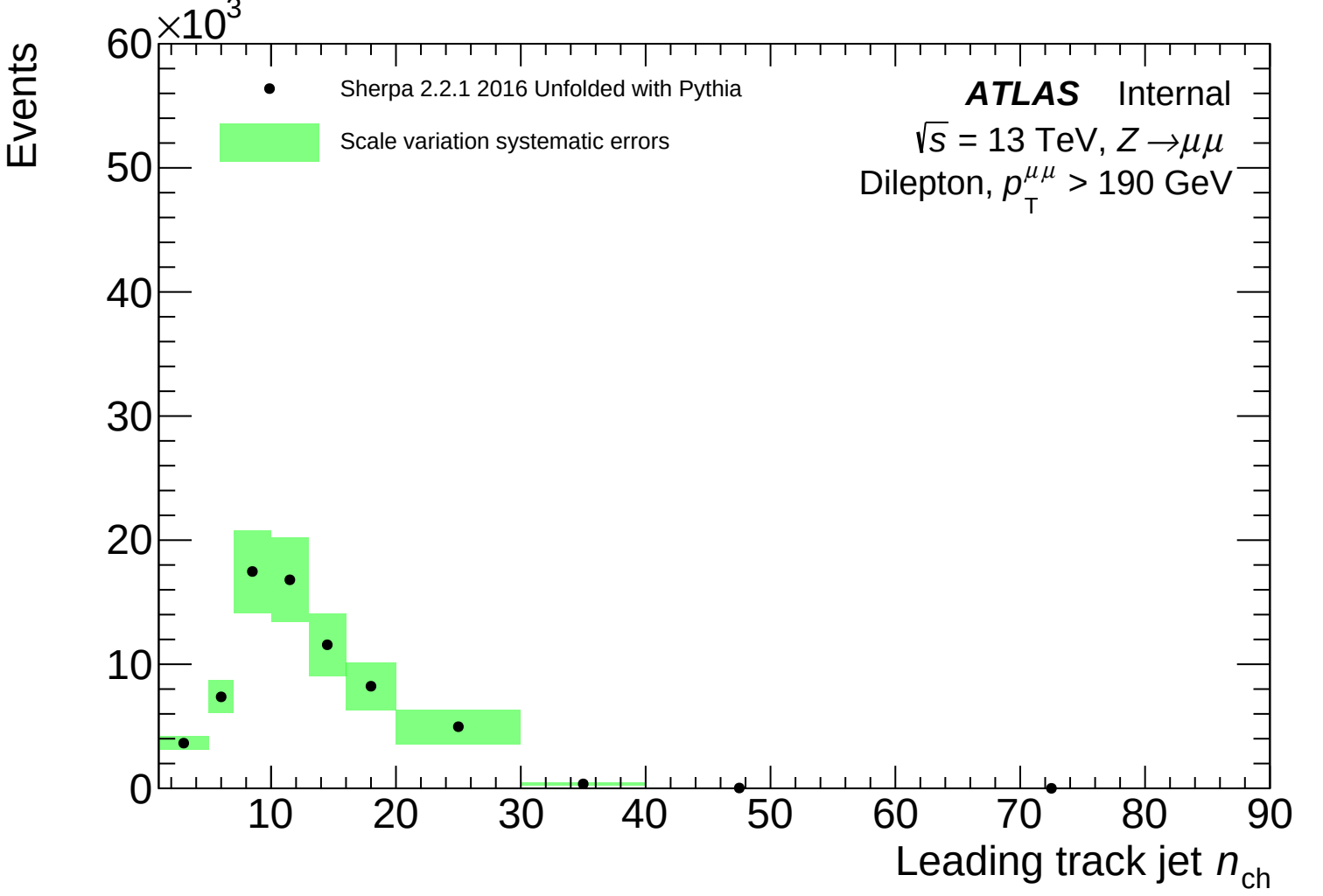

Events
×10^3
300
250
200
150
100
50
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

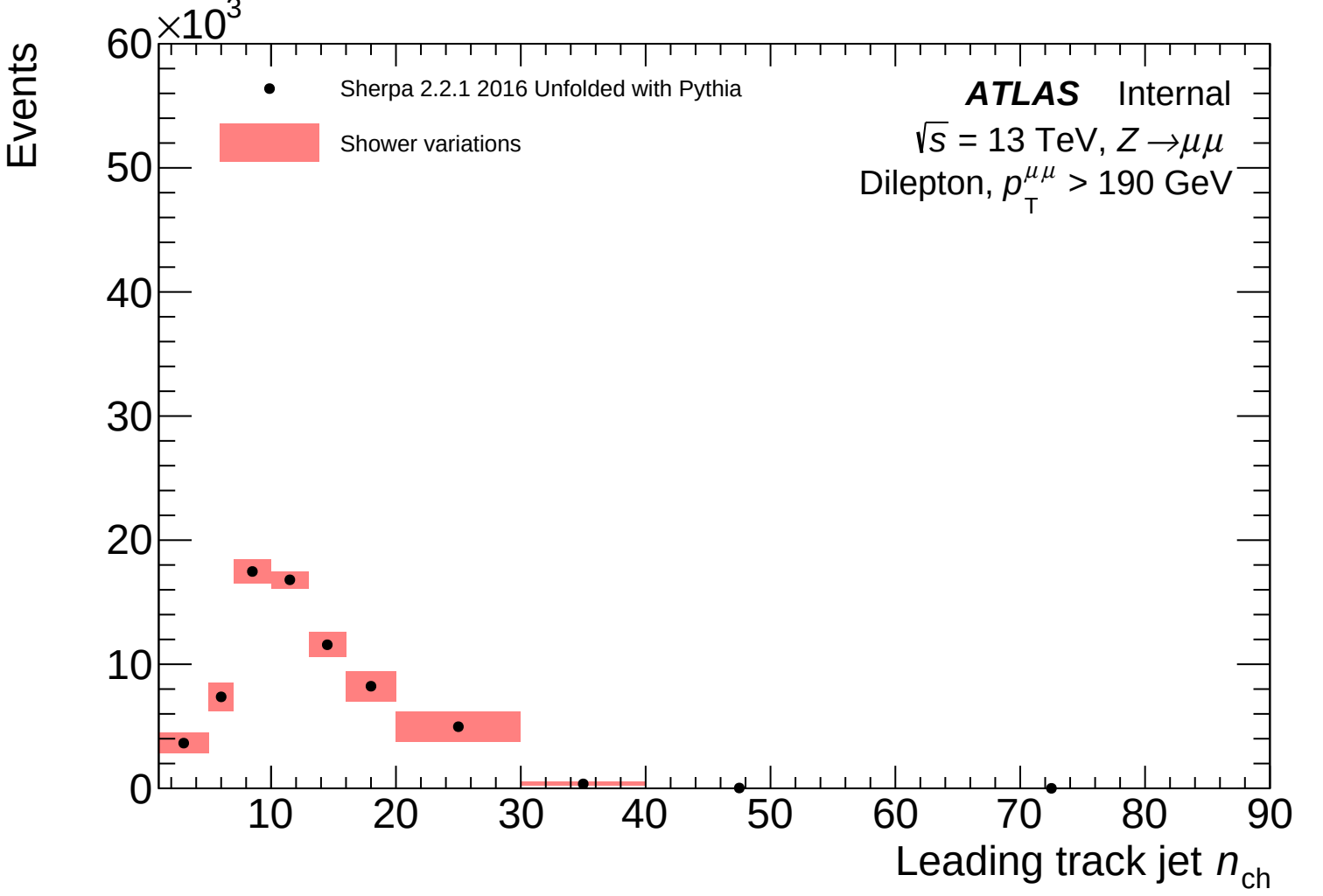

Events
×10^3
300
250
200
150
100
50
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3

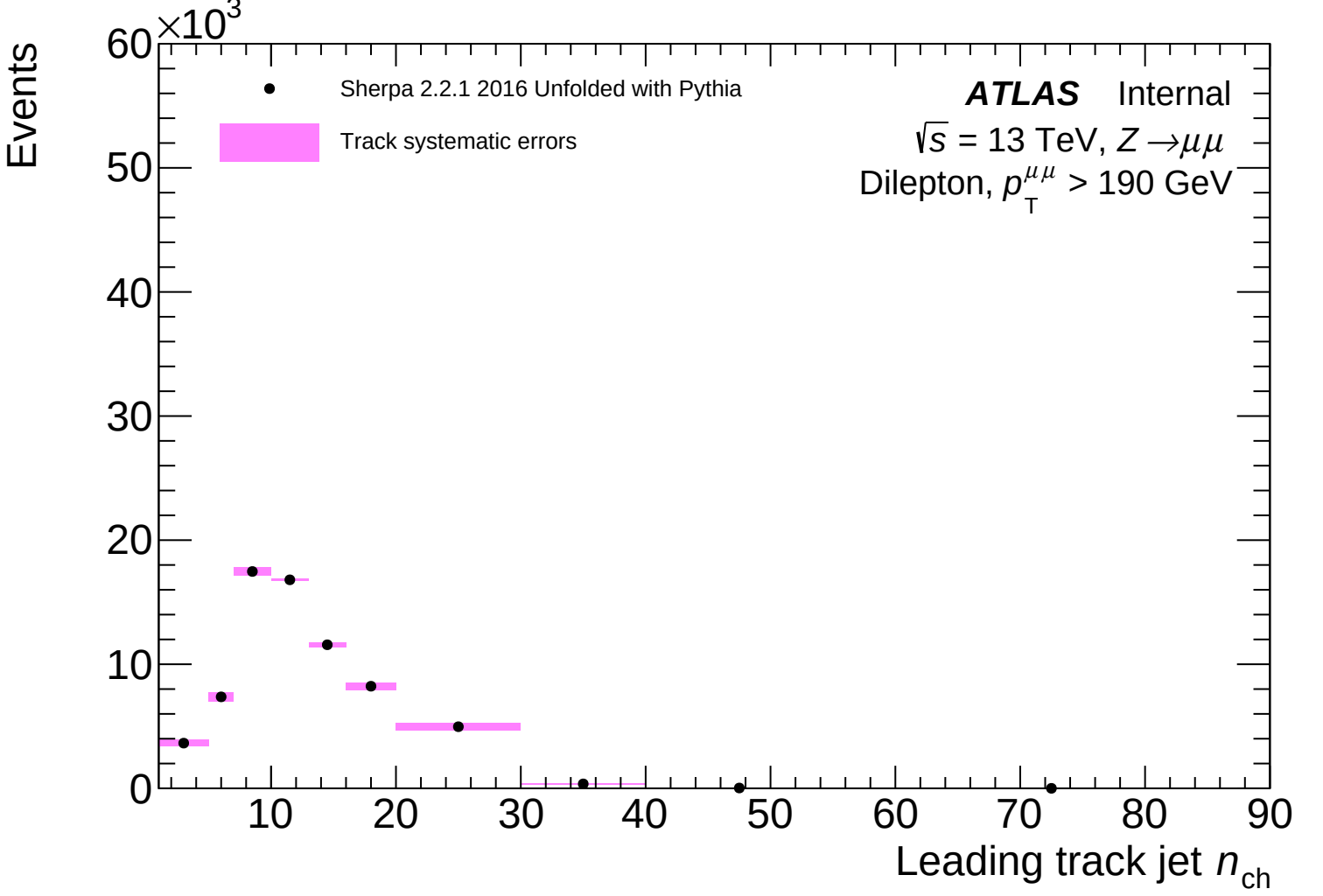

Events
×10^3
300
250
200
150
100
50
0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Subleading track jet τ3
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV

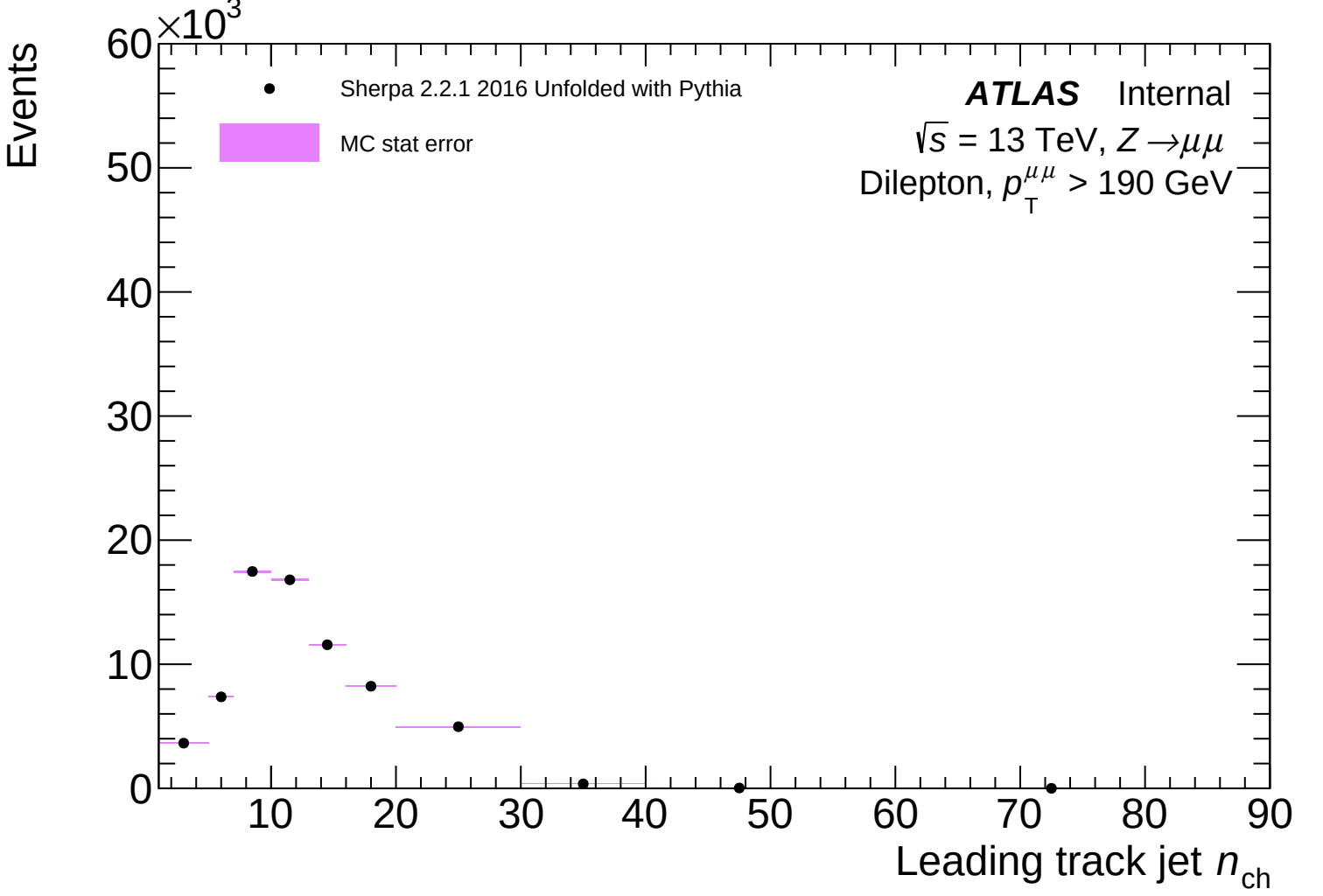

$\times 10^{6}$
$dN / d\tau_3^{j2}$
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
Subleading track jet τ_3
0
0.5
1
1.5
2
2.5
3
3.5
4
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4

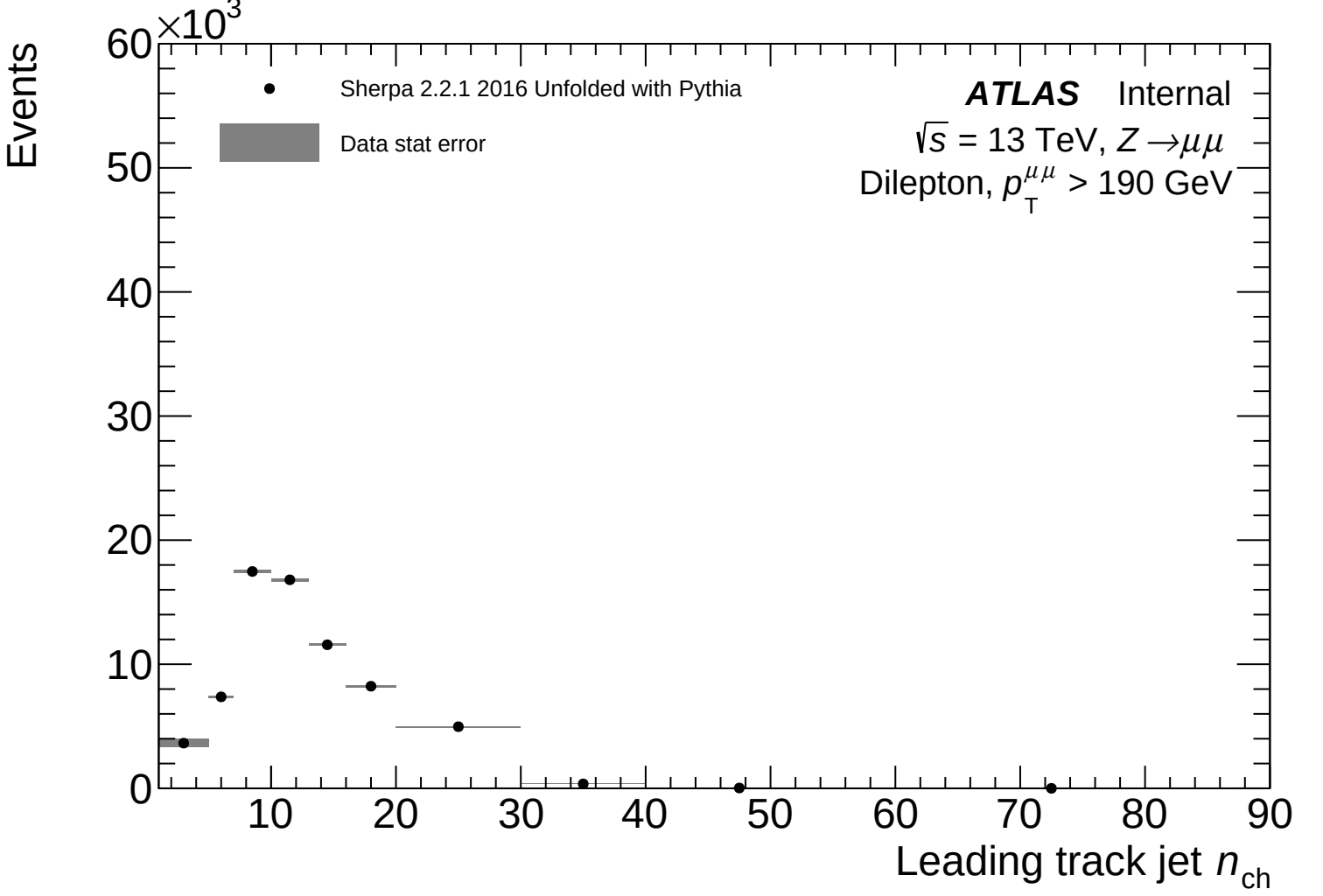

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch

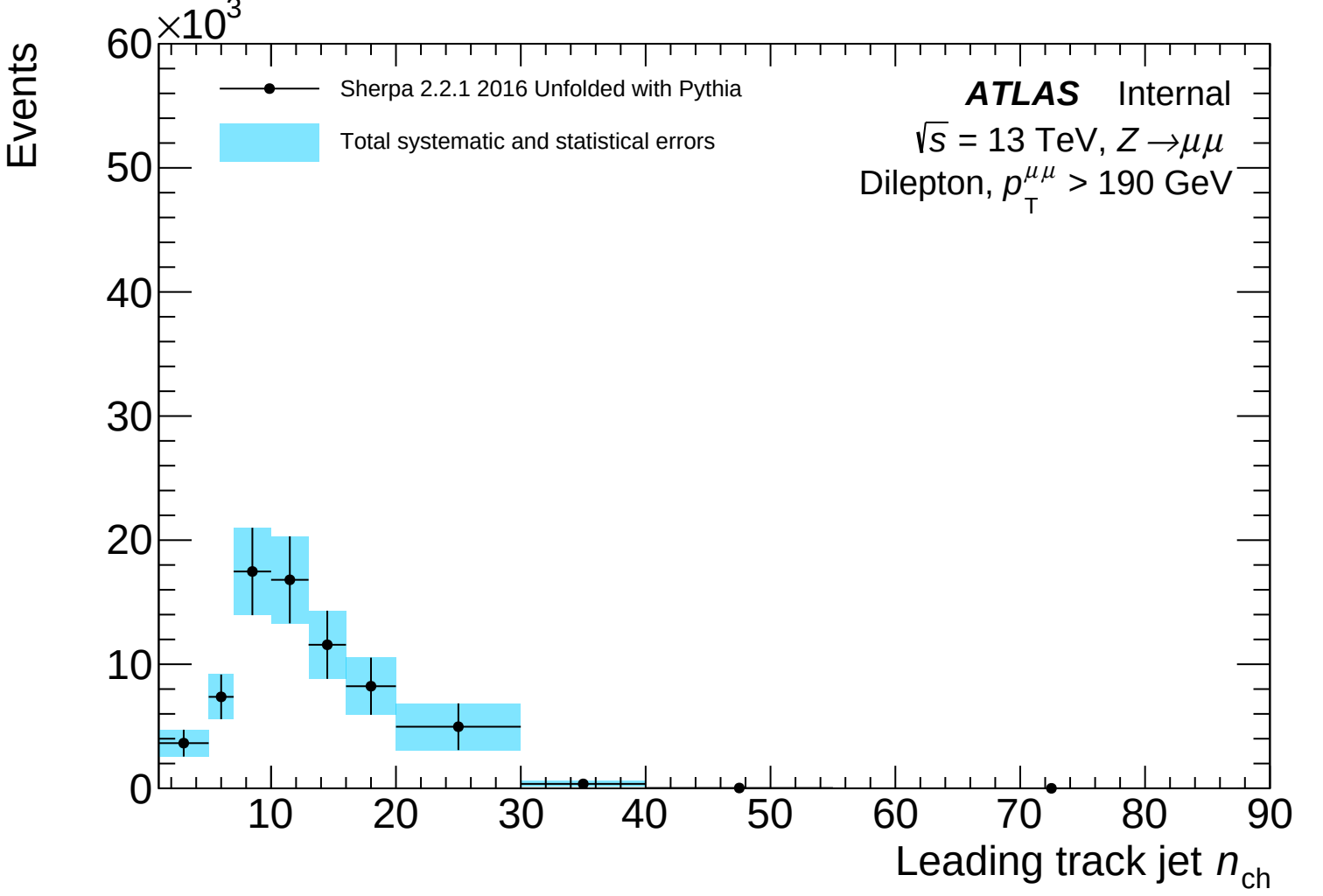

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch

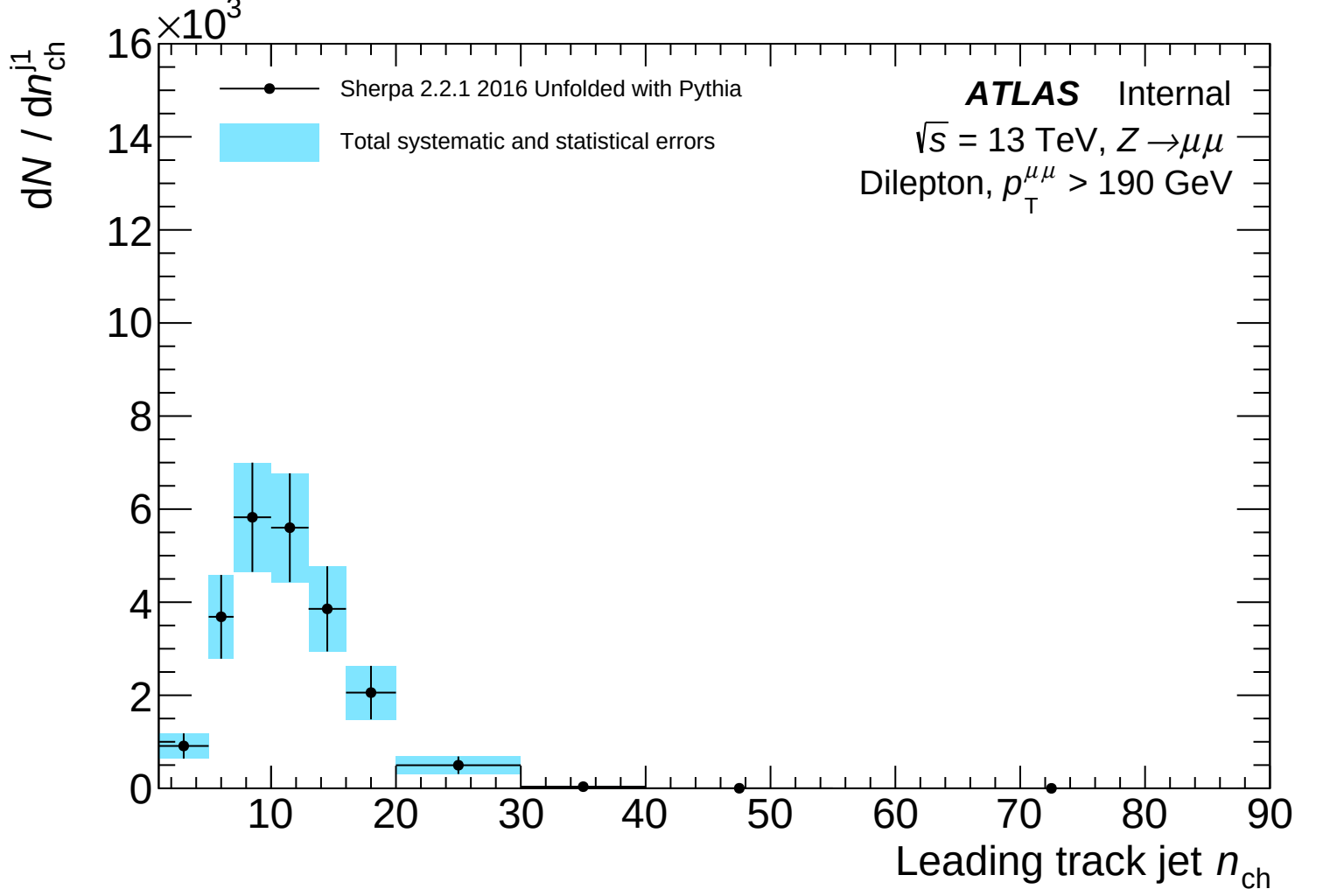

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch

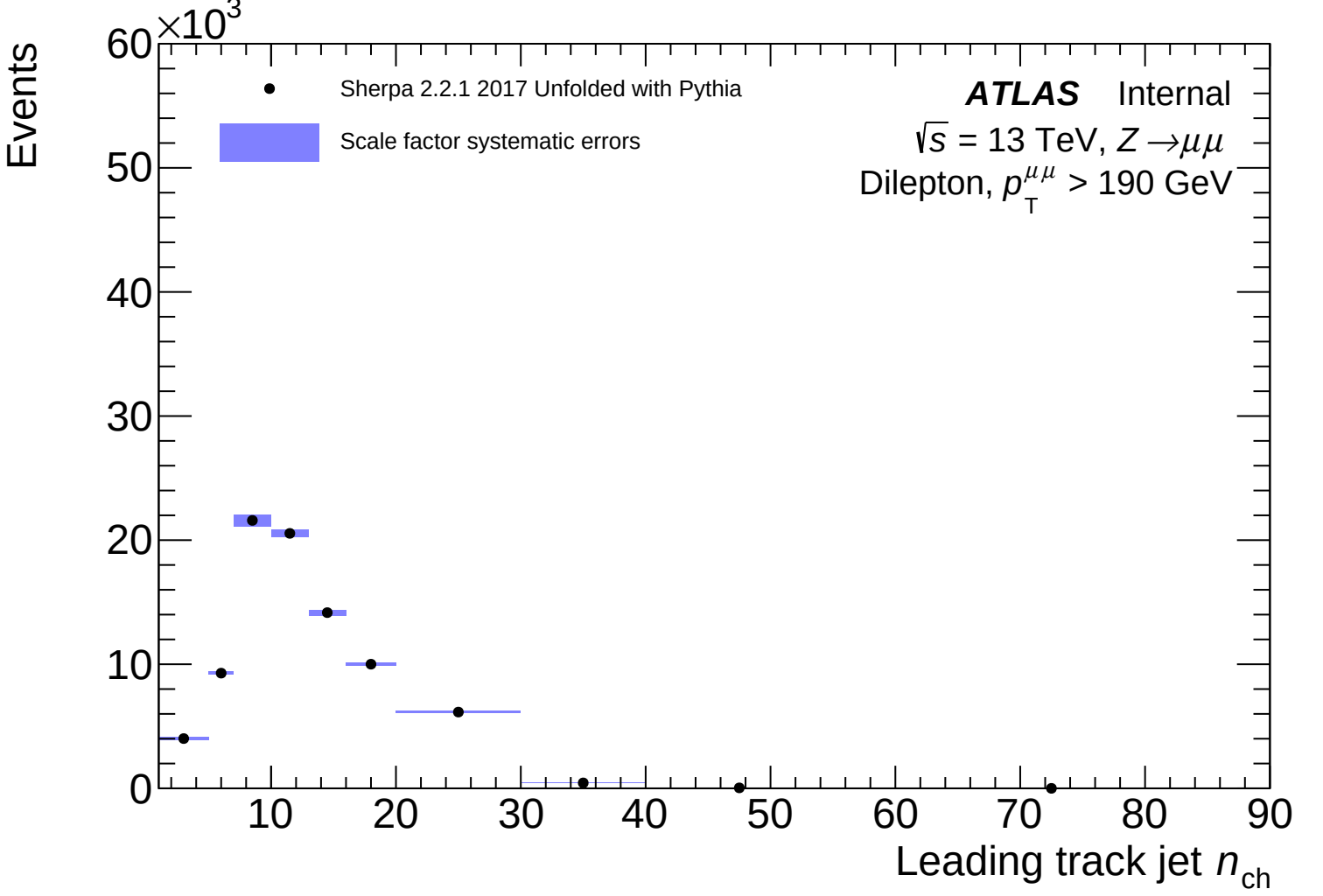

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch

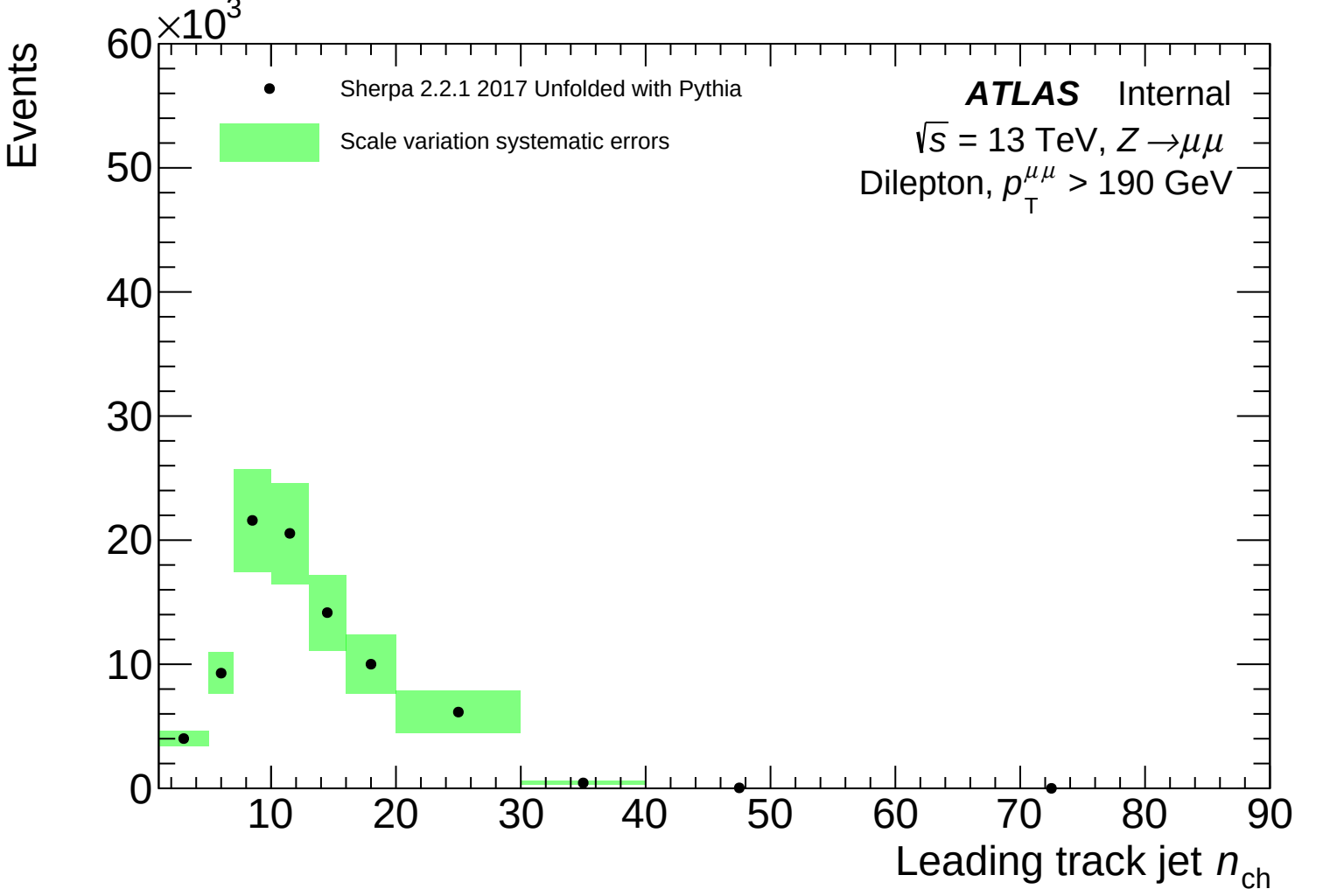

Events
$\times 10^3$
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_{ch}

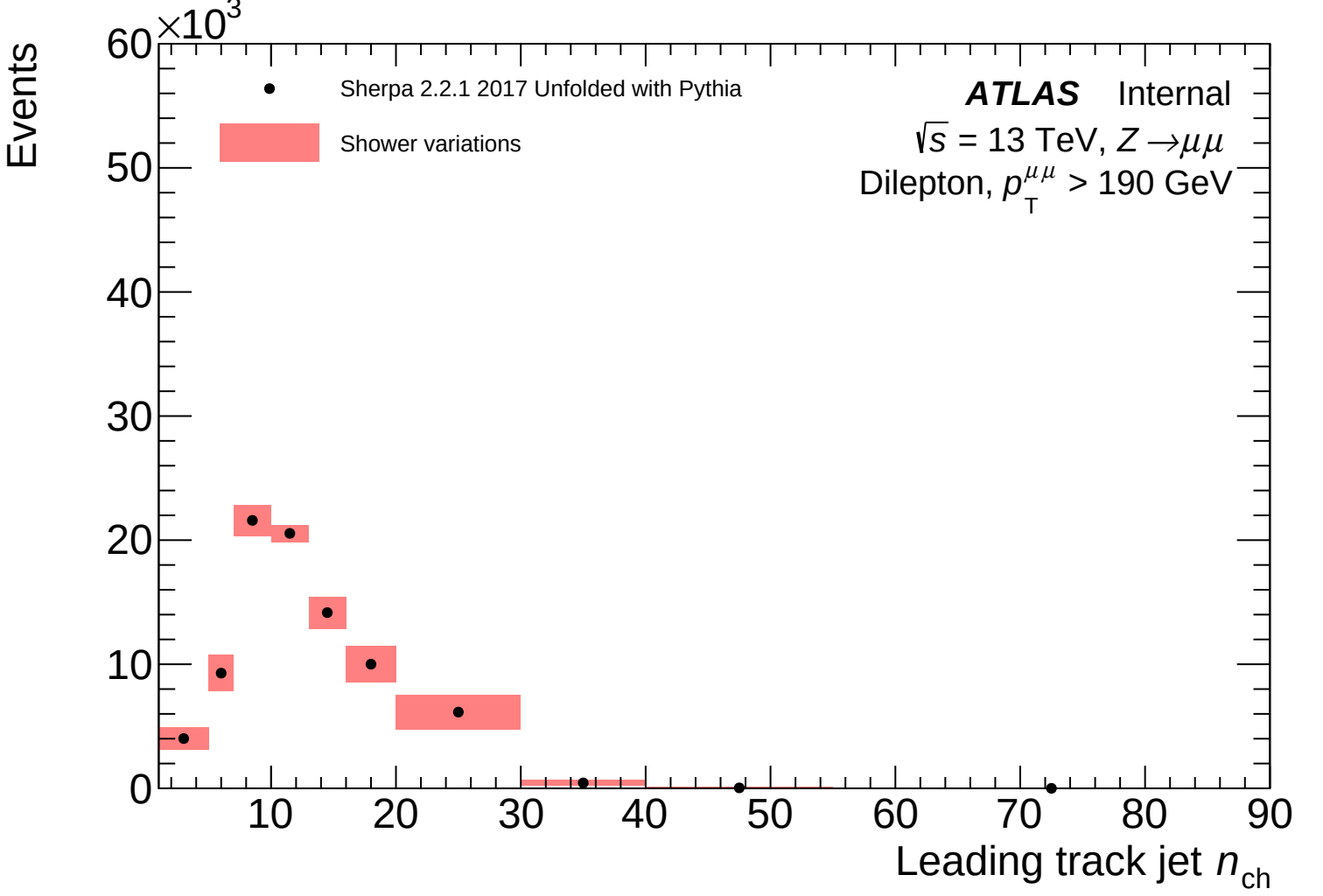

Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch



×10^3
dN / dn_ch^j1
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
Leading track jet n_ch
0
2
4
6
8
10
12
14
16
10
20
30
40
50
60
70
80
90


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
90
Leading track jet n_ch


Events
×10^3
60
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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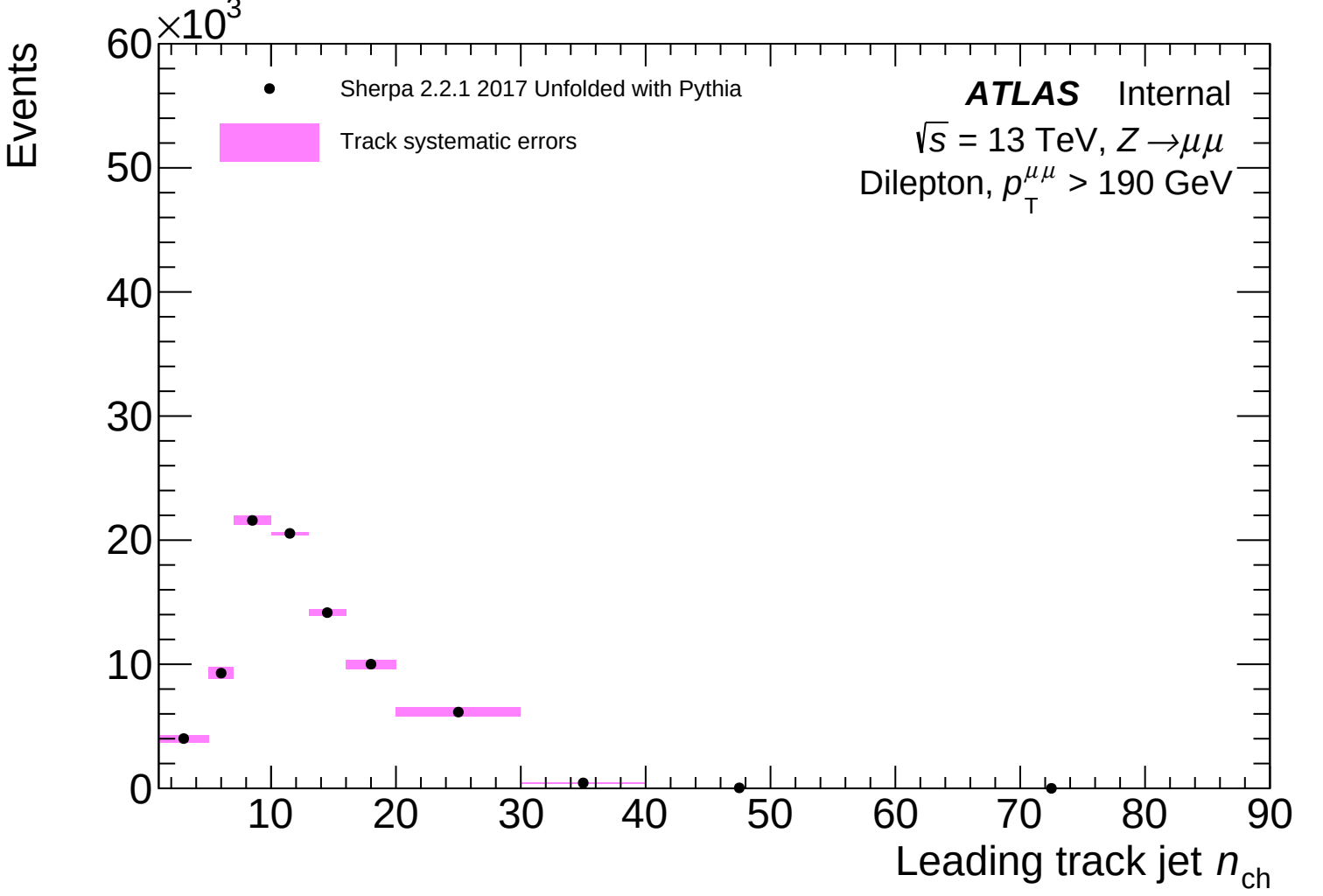
90
Leading track jet n_ch


Events
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10
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Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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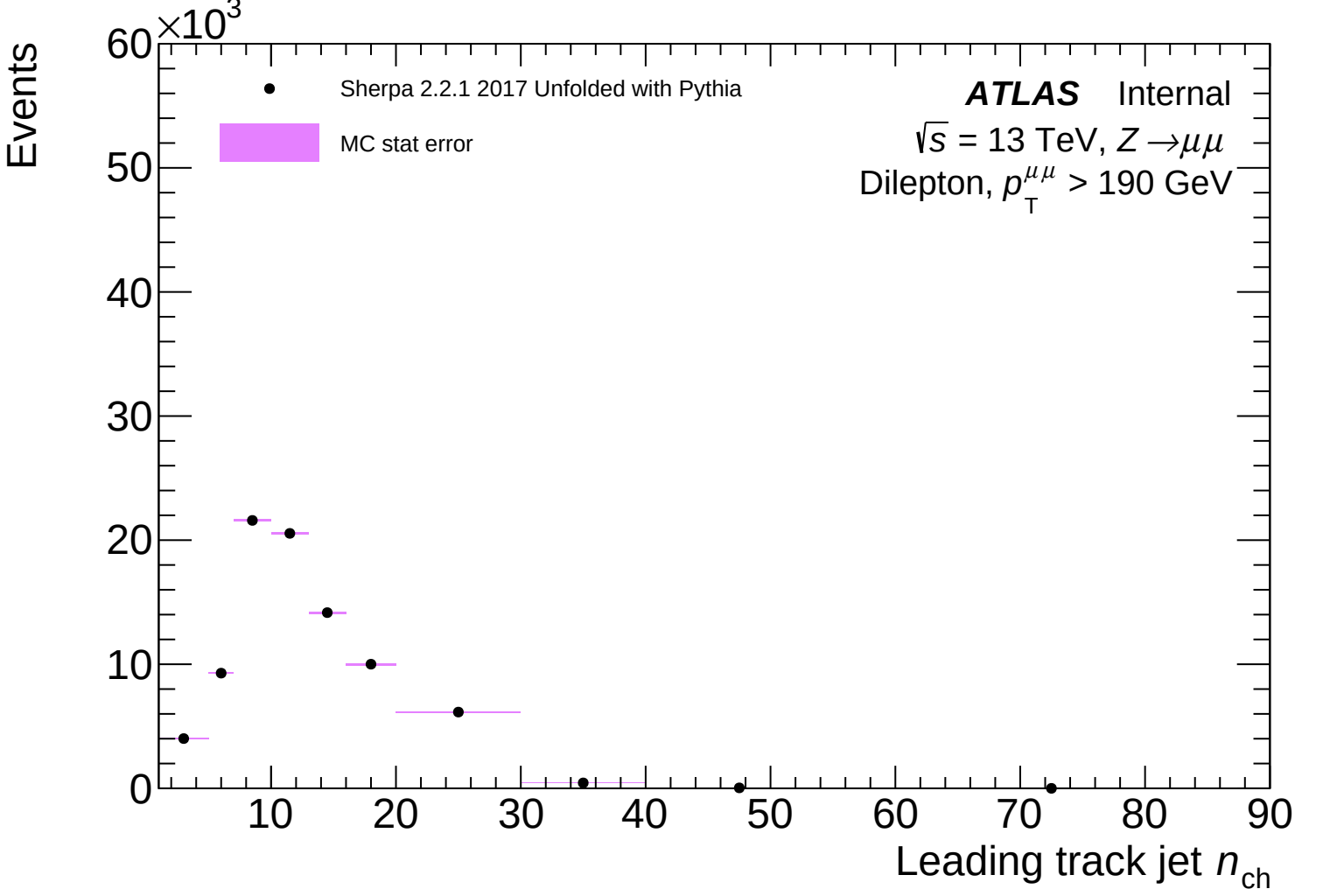
90
Leading track jet n_ch


Events
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0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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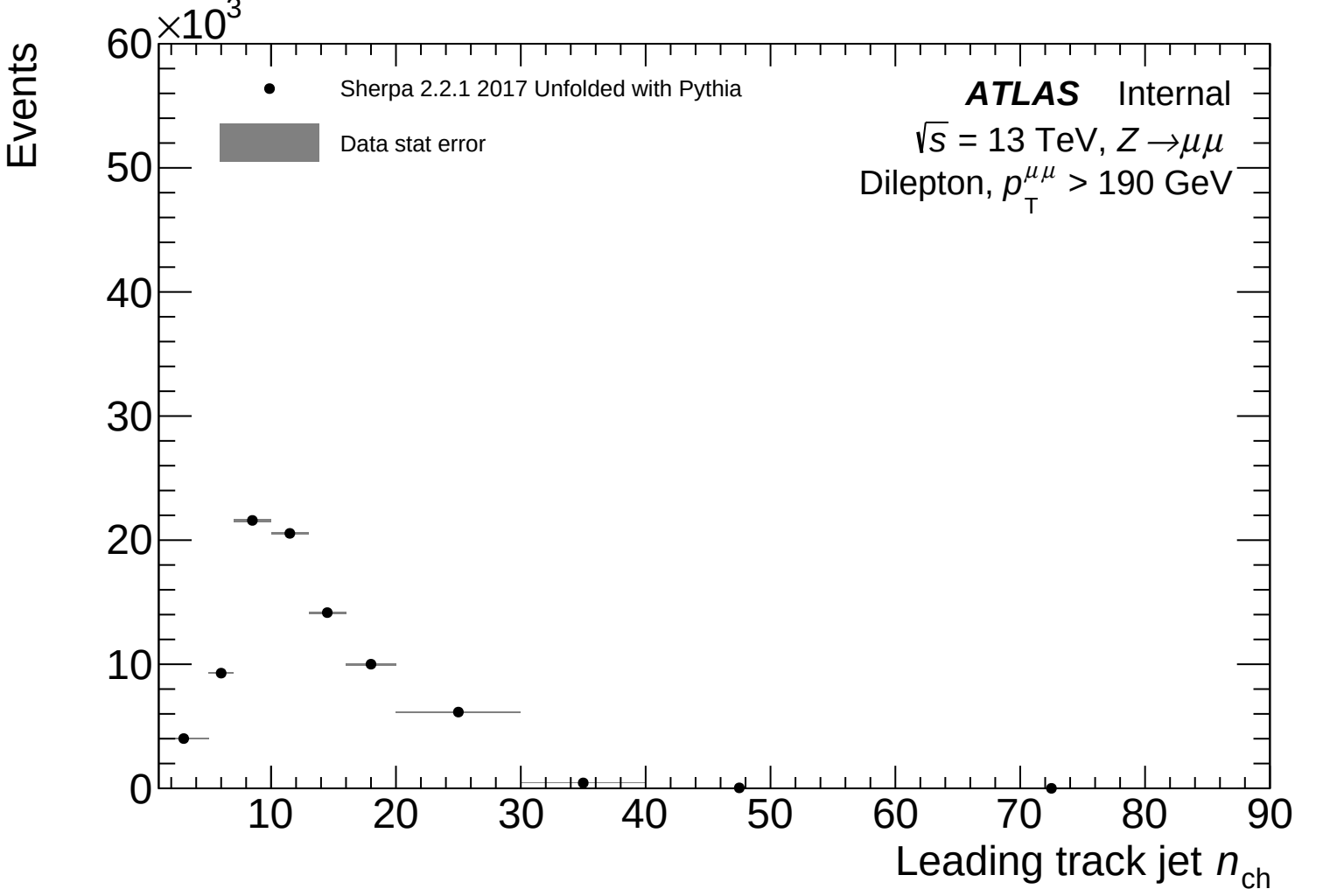
Leading track jet n_ch


Events
$\times 10^3$
60
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Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
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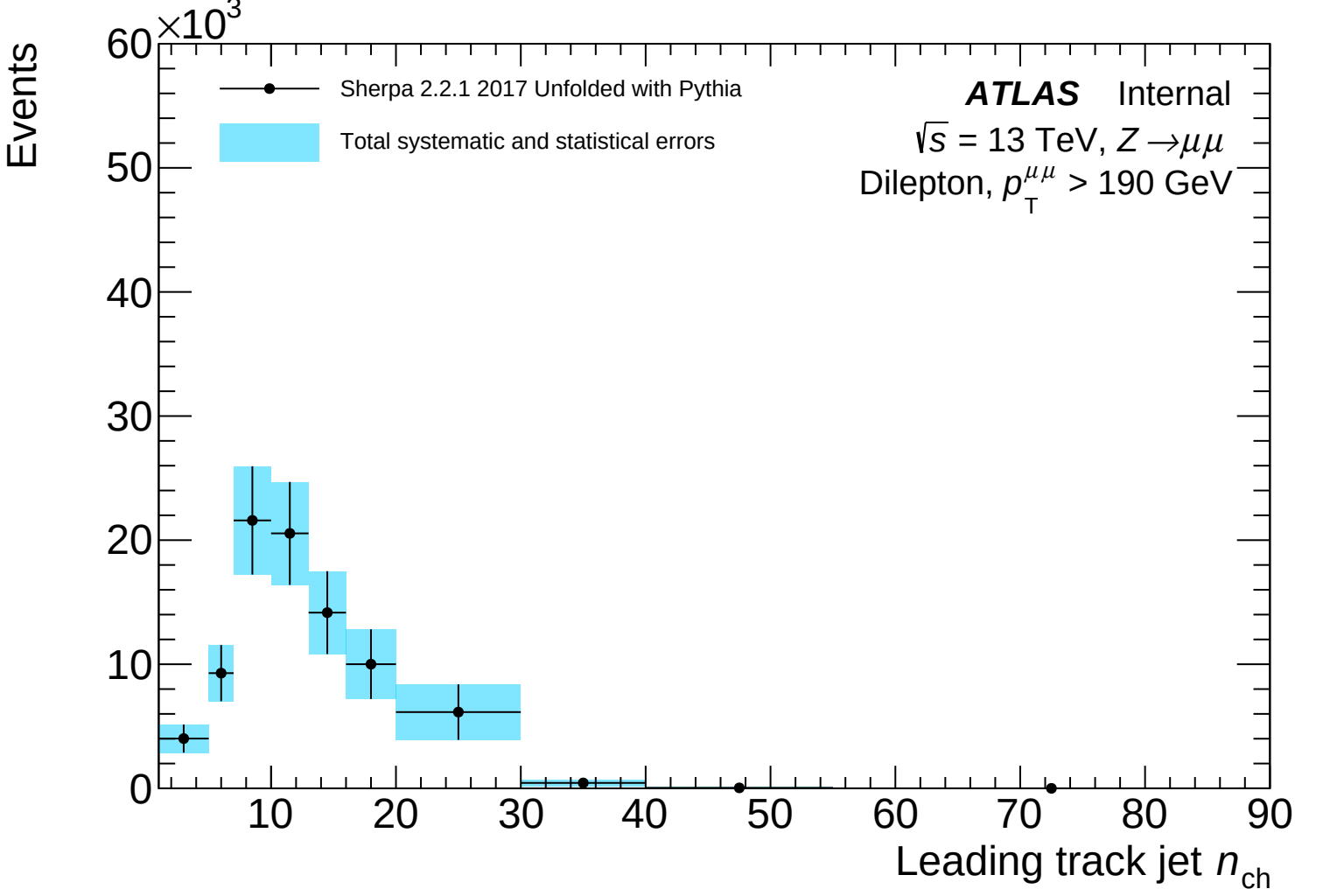
Leading track jet n_{ch}


Events
×10^3
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Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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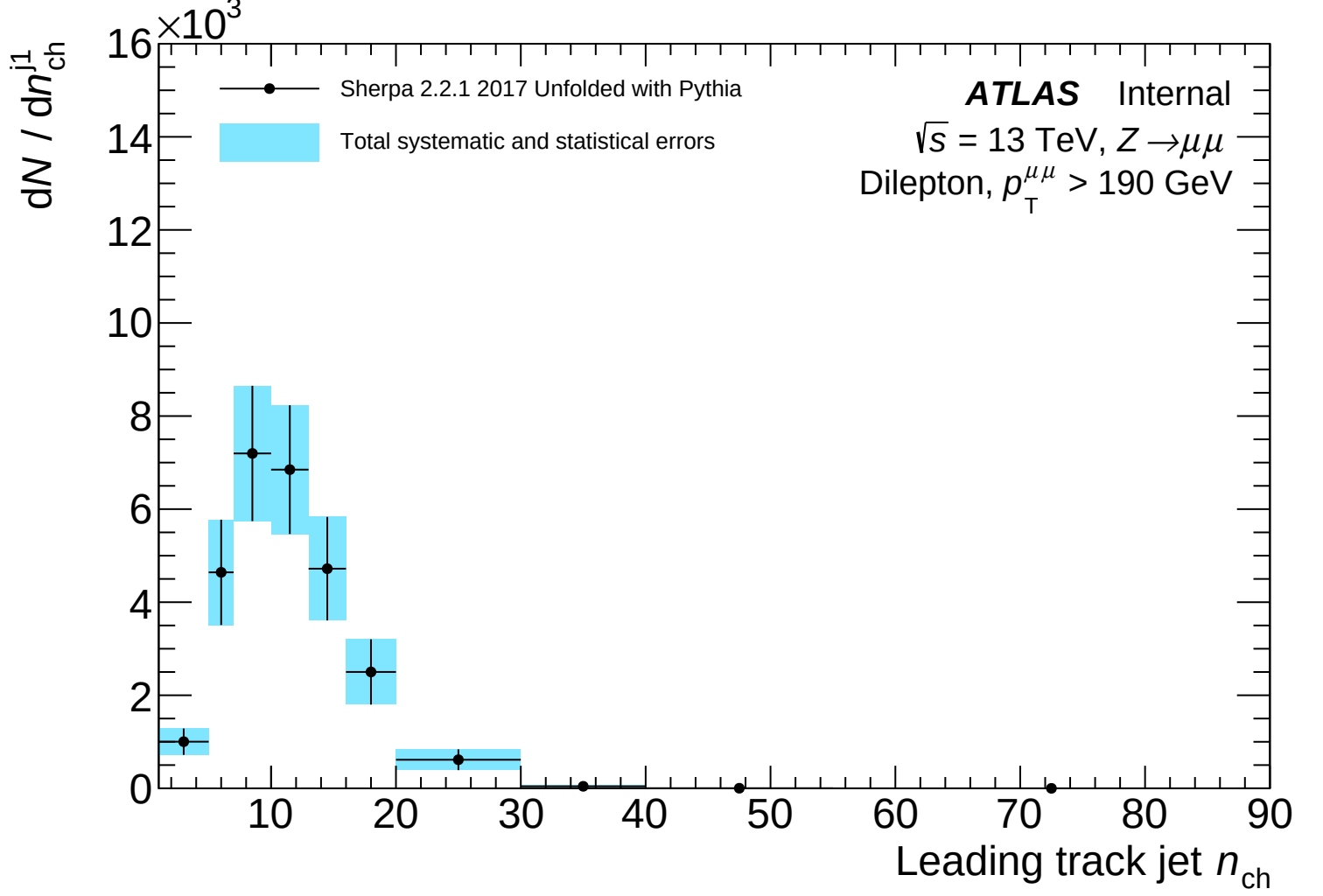
Leading track jet n_ch



Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \to \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
dN / dn_{ch}^{j1}
$\times 10^3$
Leading track jet n_{ch}
0
2
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8
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12
14
16
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20
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40
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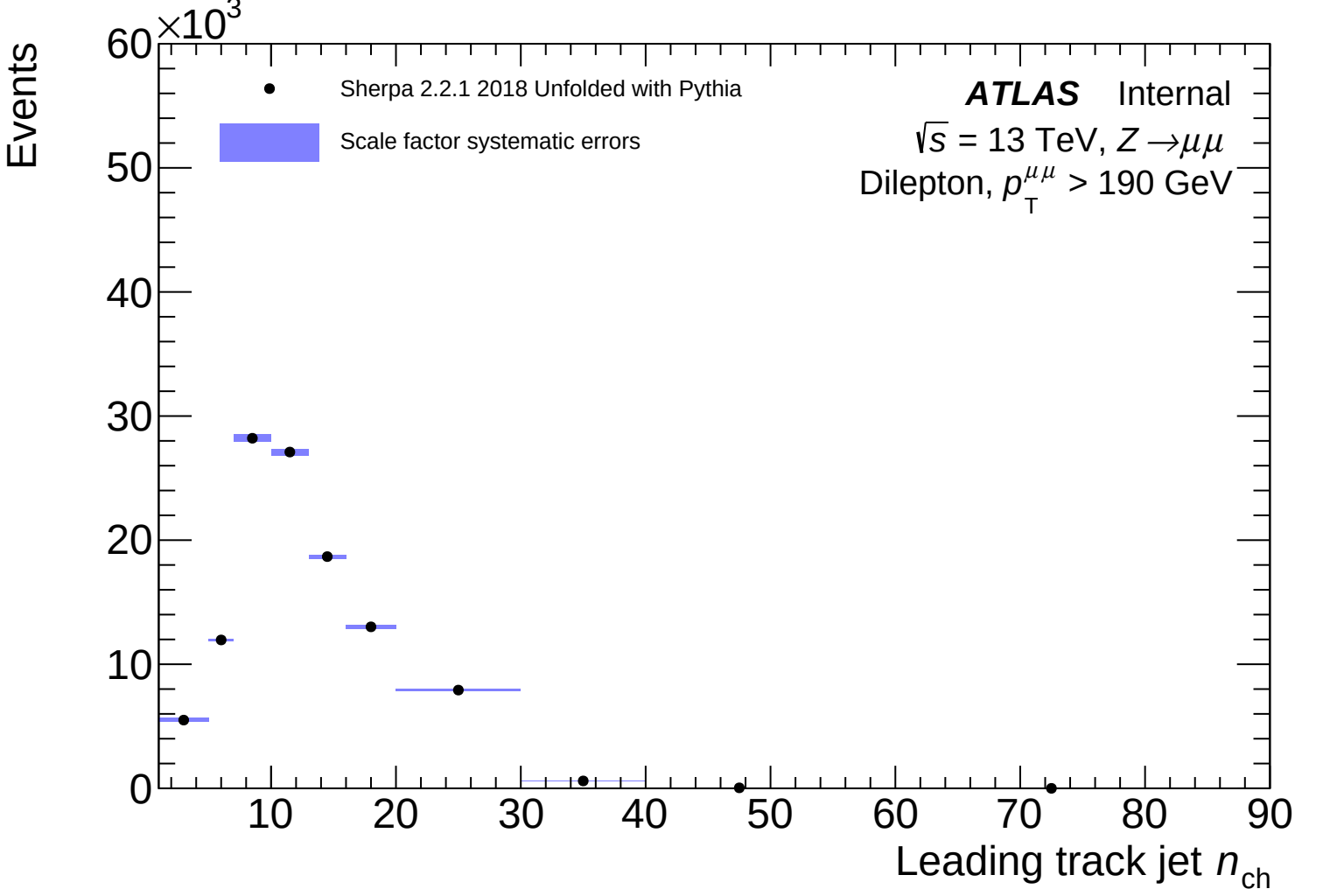
60
70
80
90


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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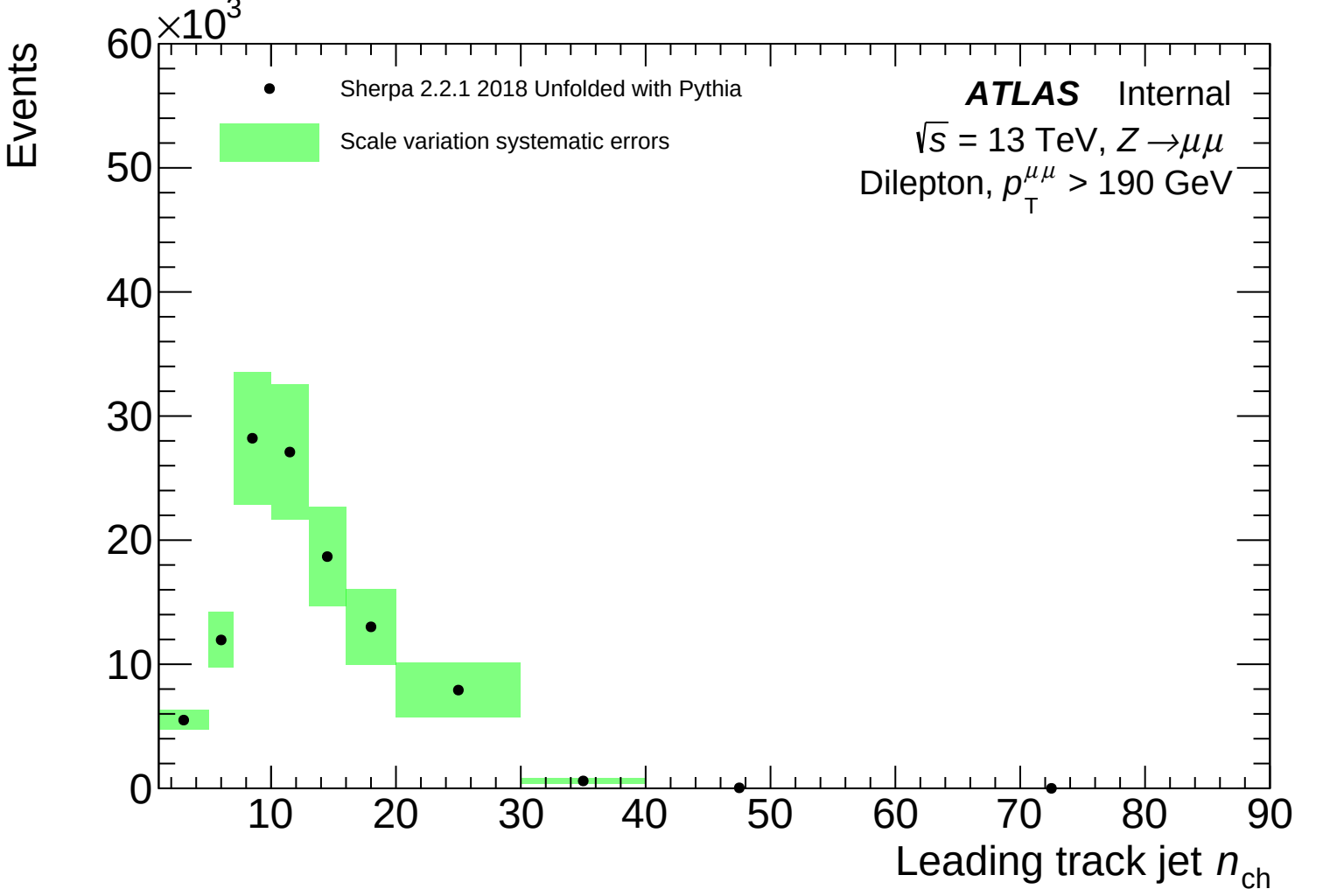
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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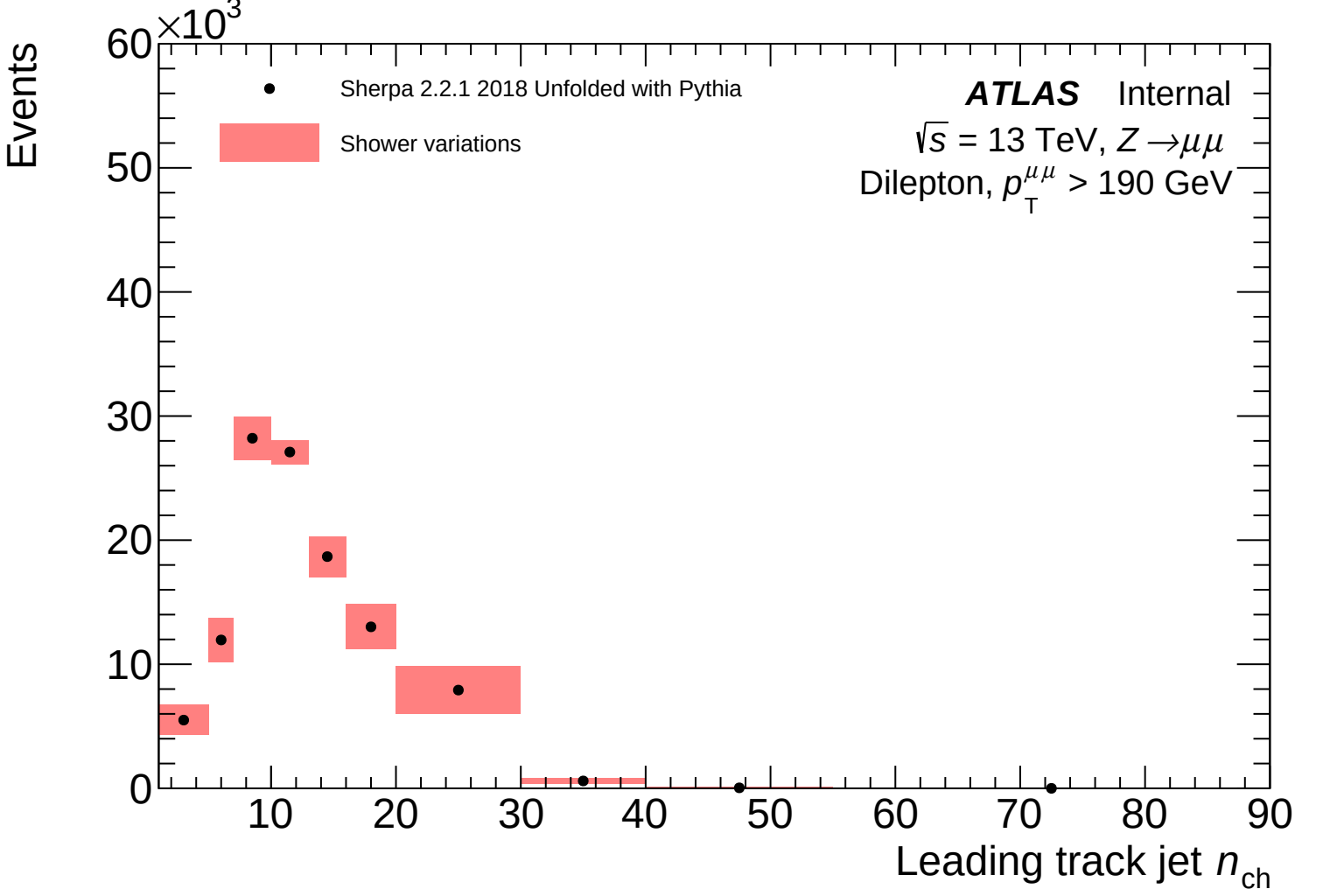
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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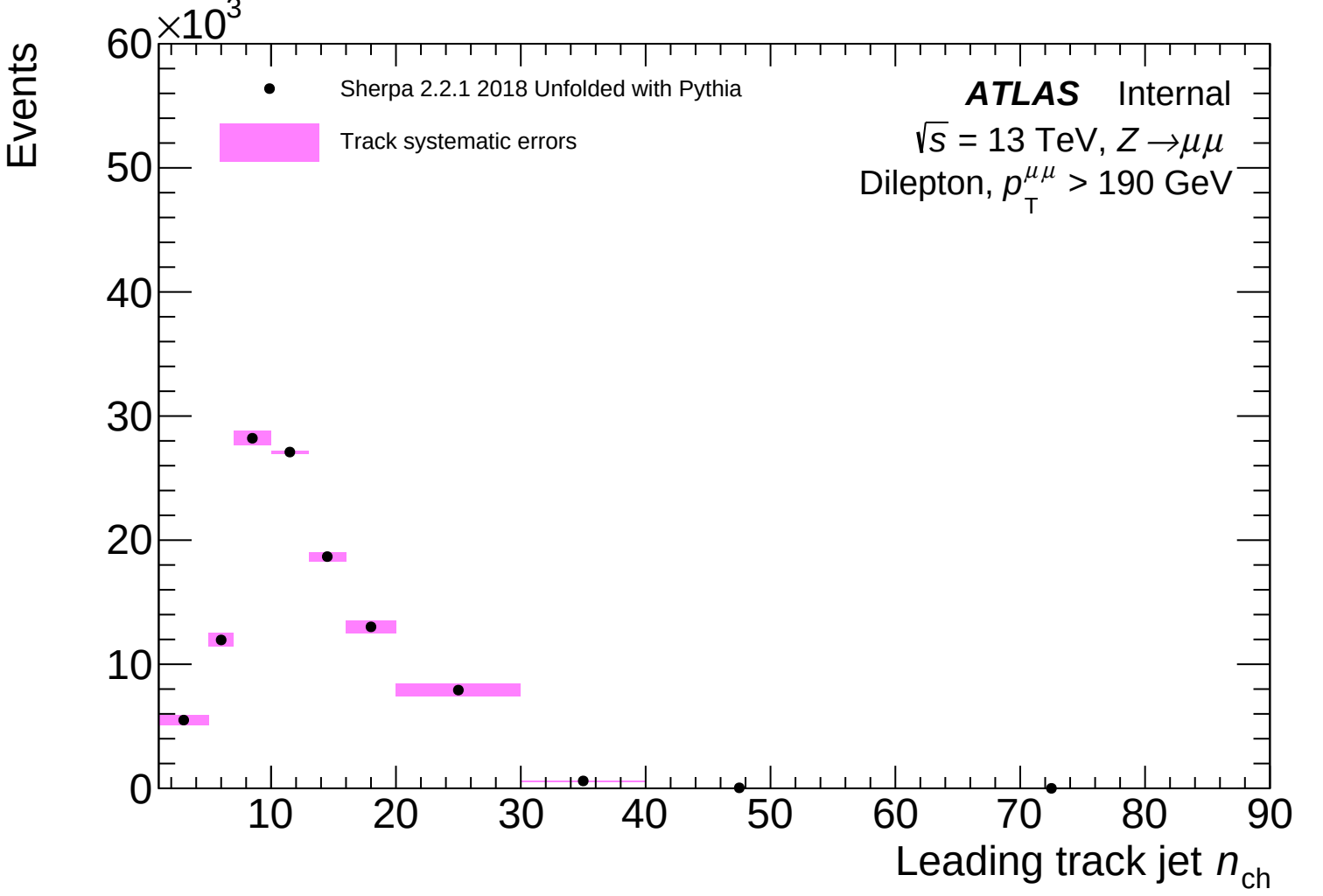
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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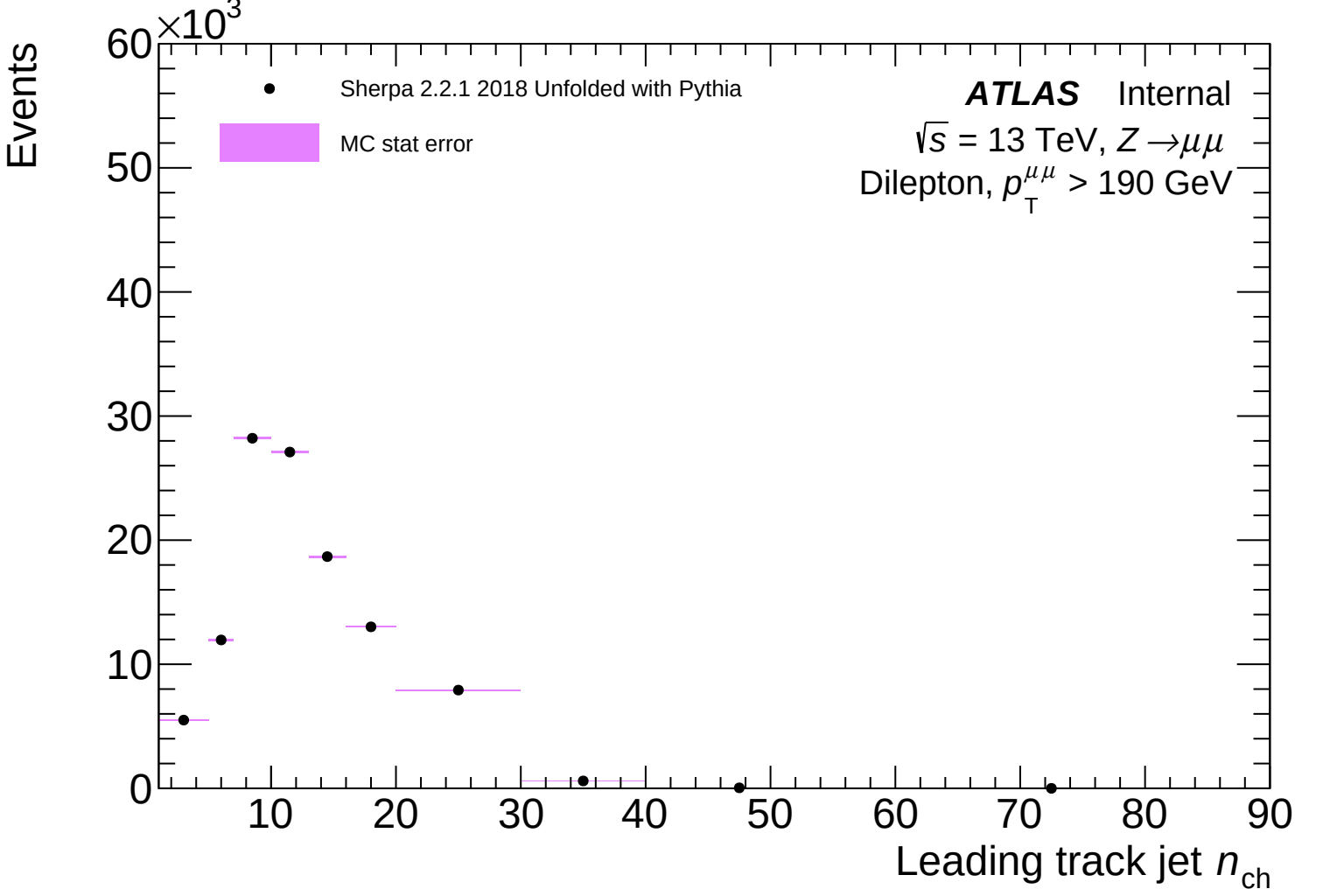
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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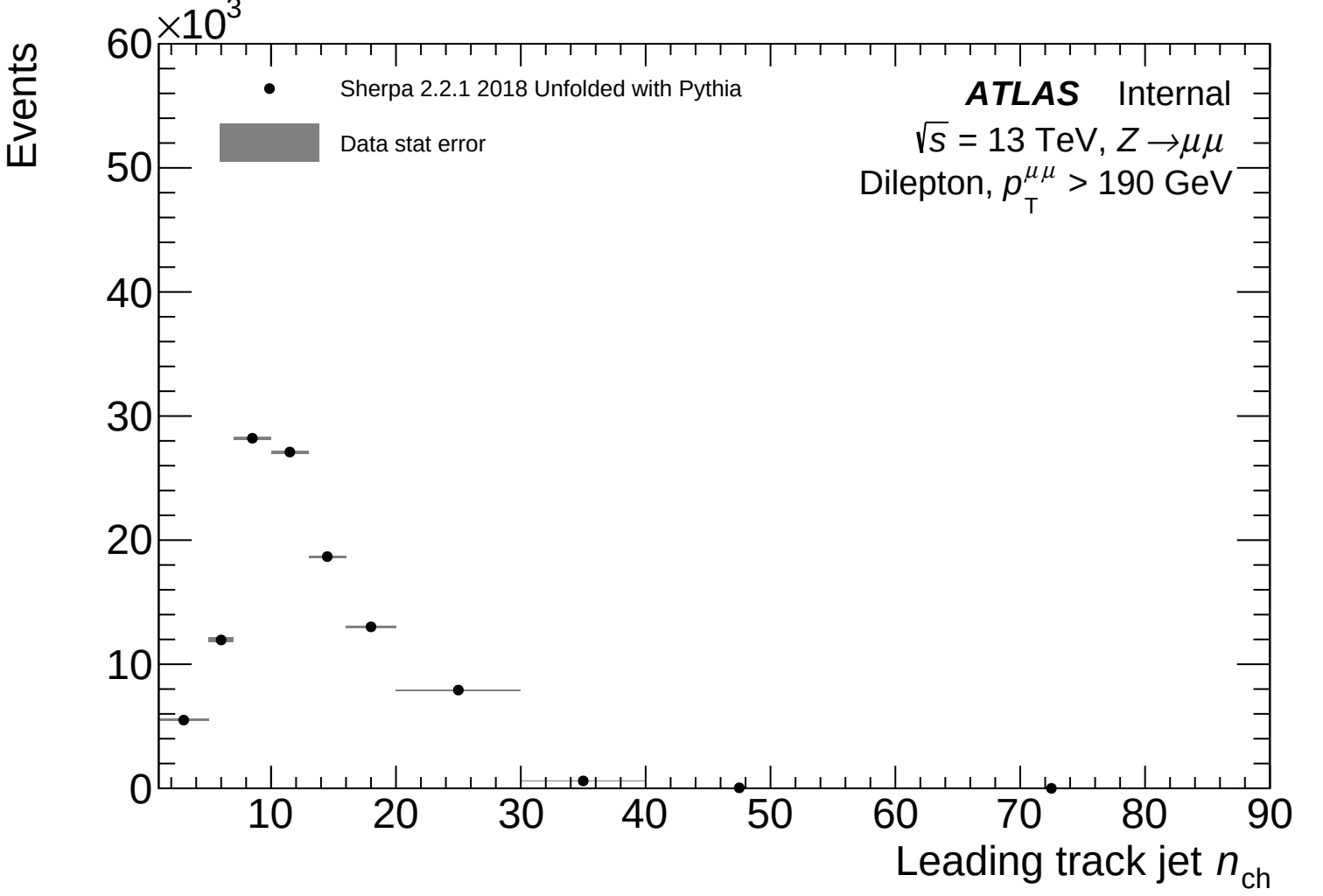
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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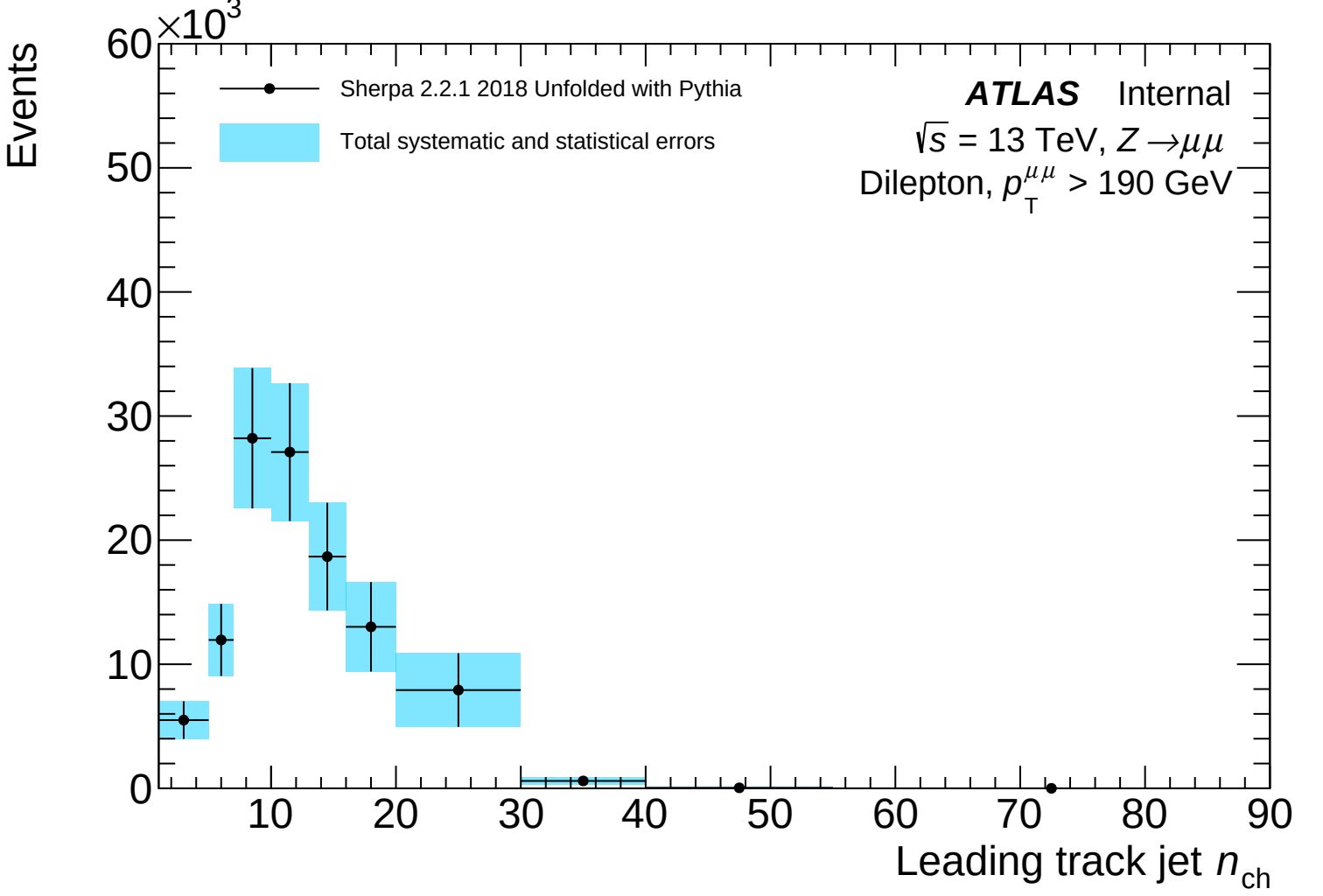
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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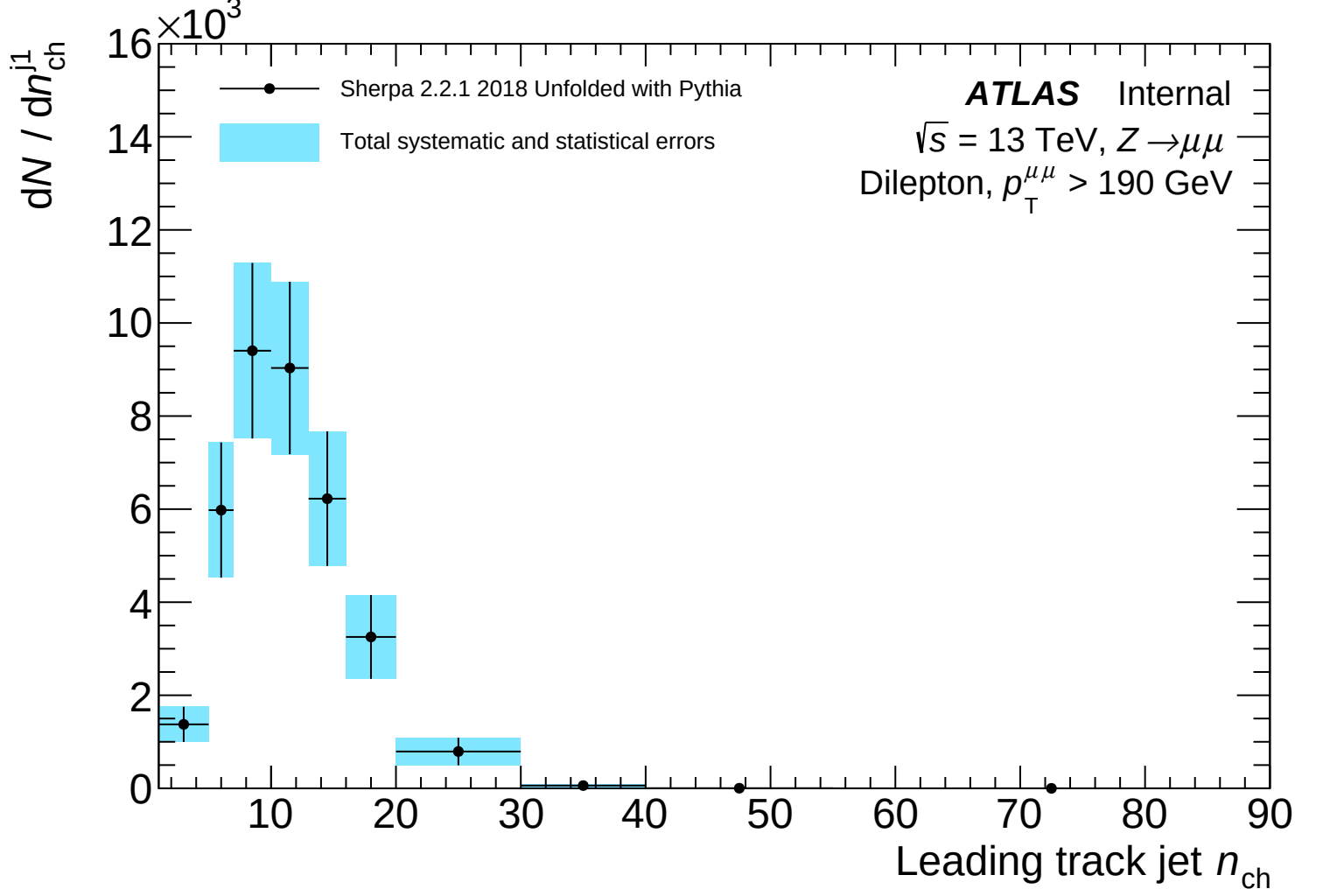
Leading track jet n_ch


$\times 10^3$
dN / dn_{ch}^{j1}
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
Leading track jet n_{ch}
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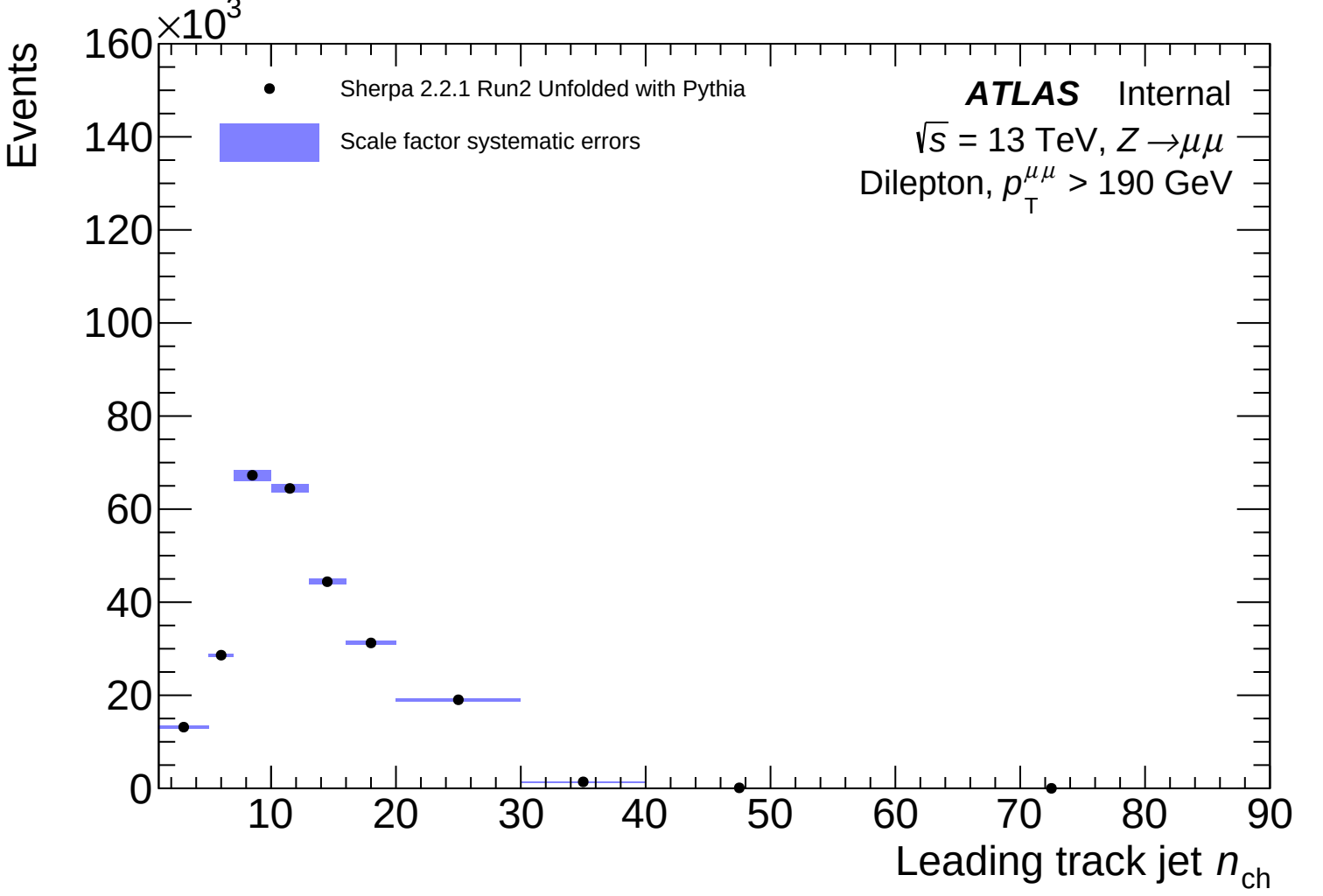
Events
×10^3
160
140
120
100
80
60
40
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0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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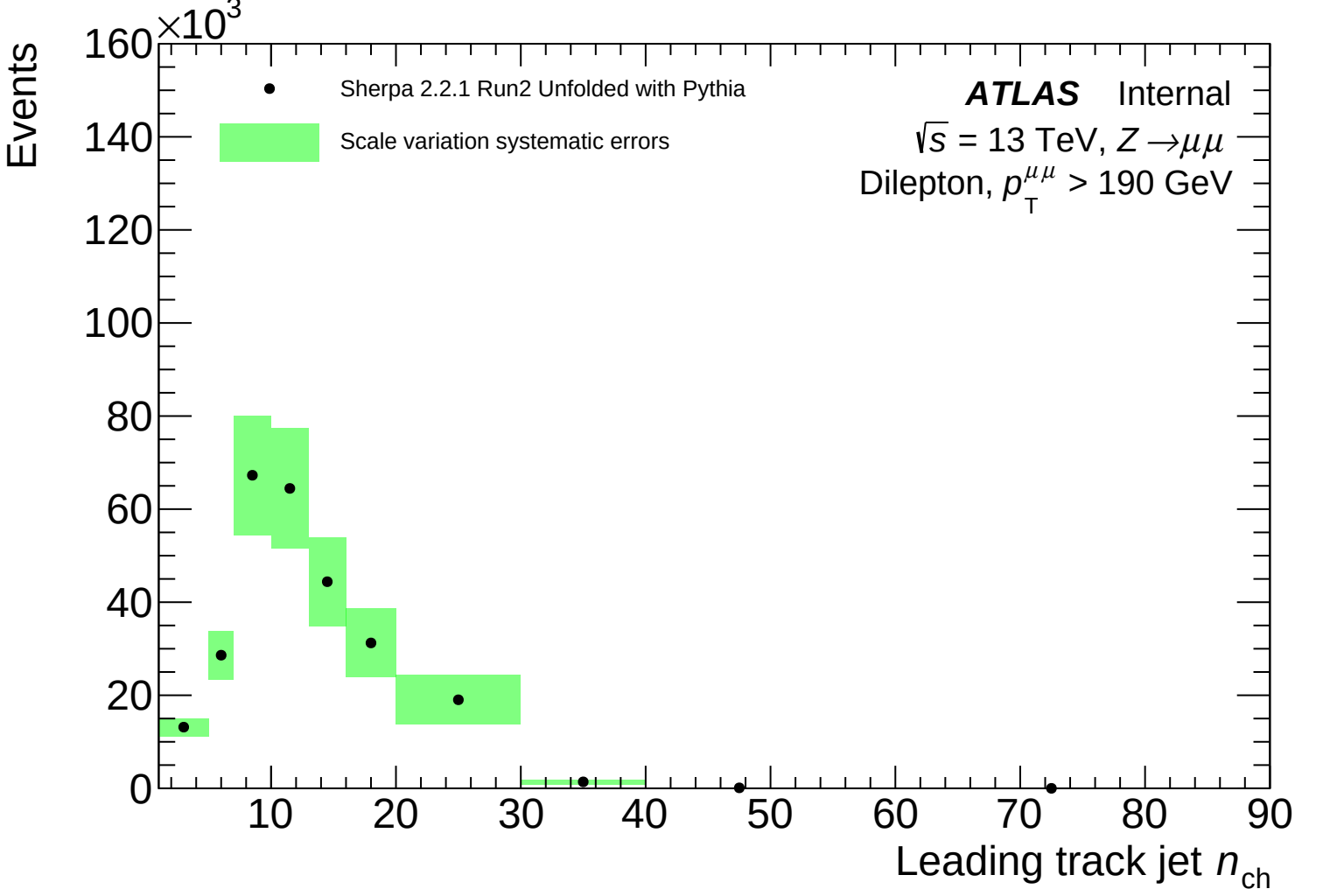
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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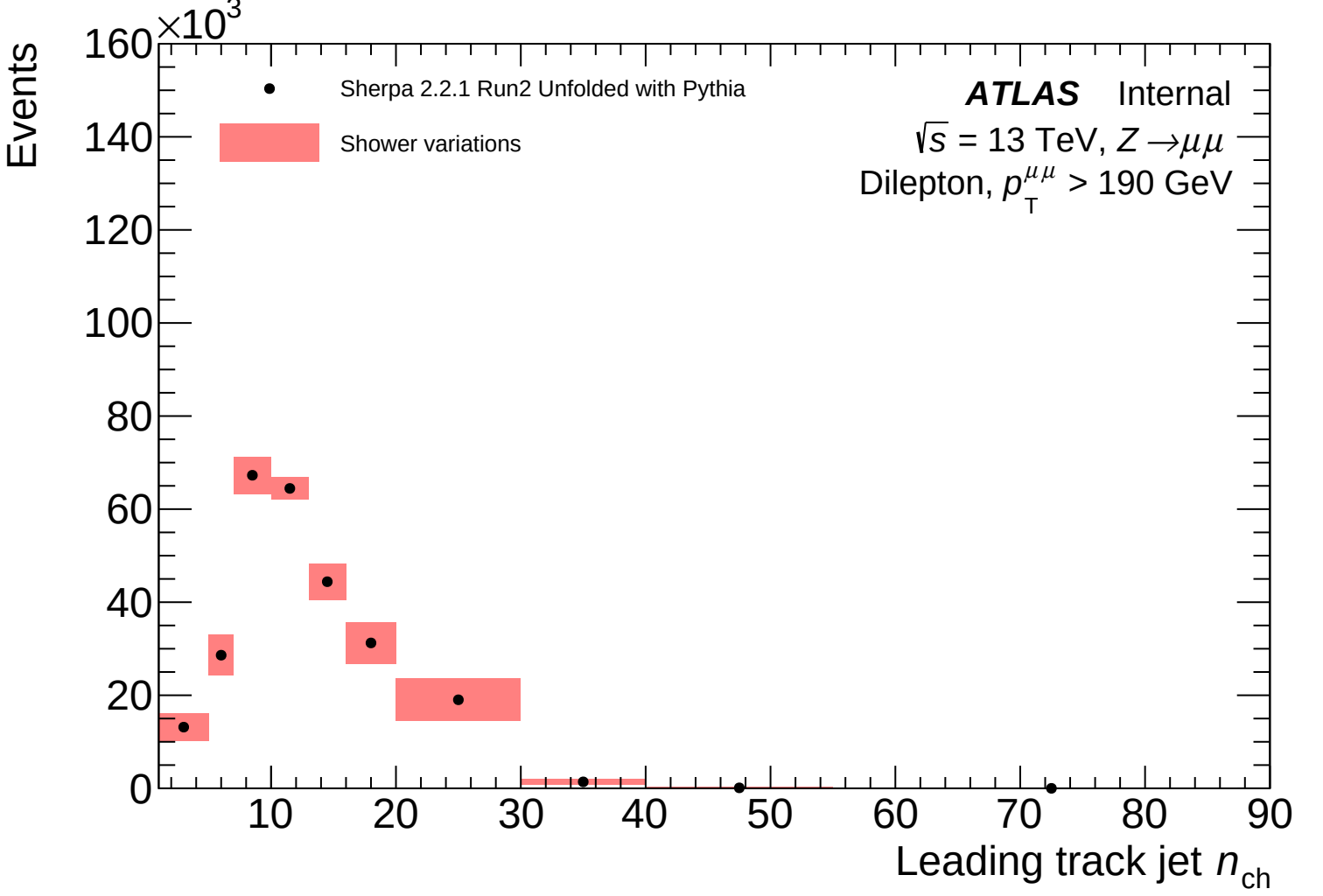
Leading track jet n_ch


Events
×10^3
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140
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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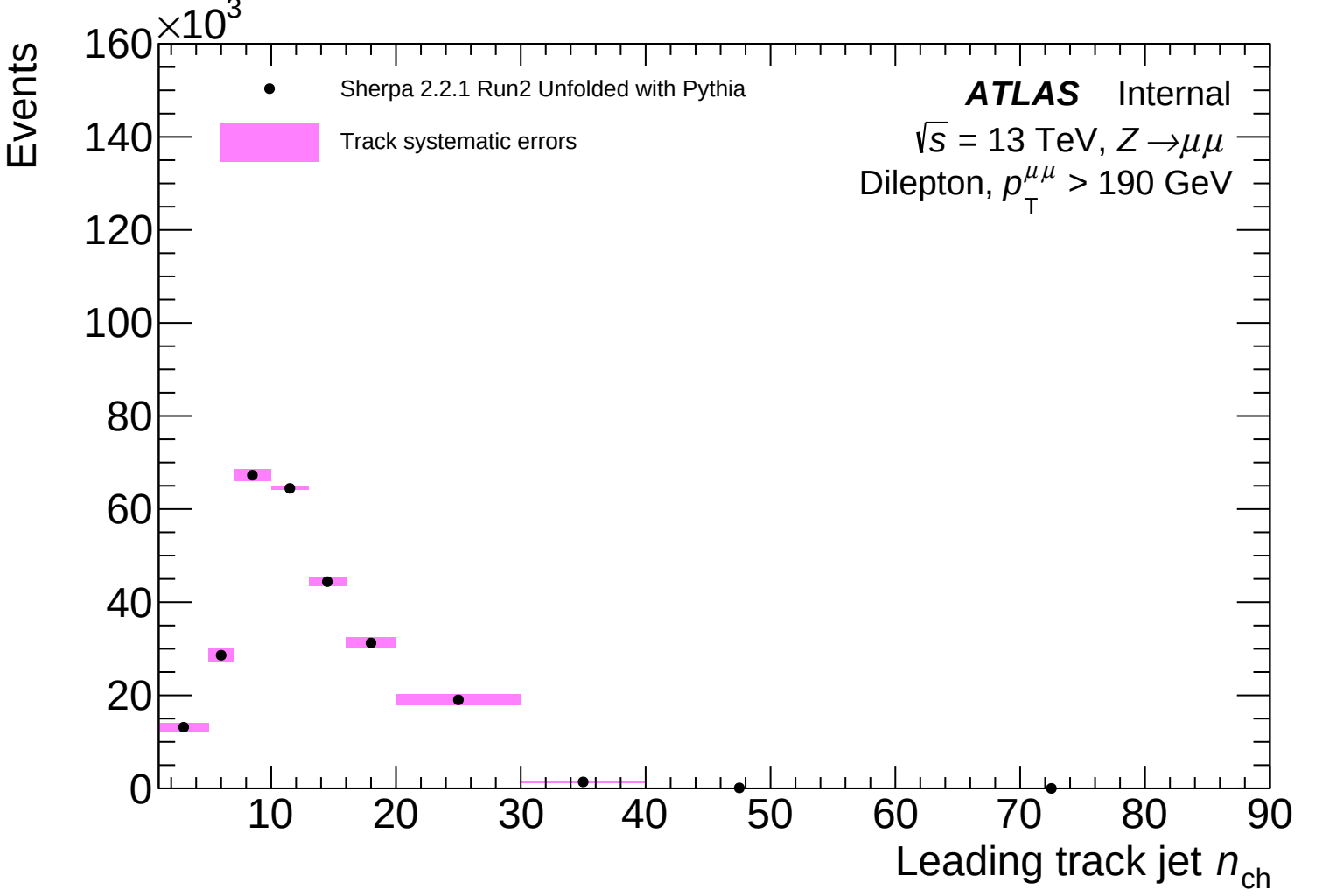
Leading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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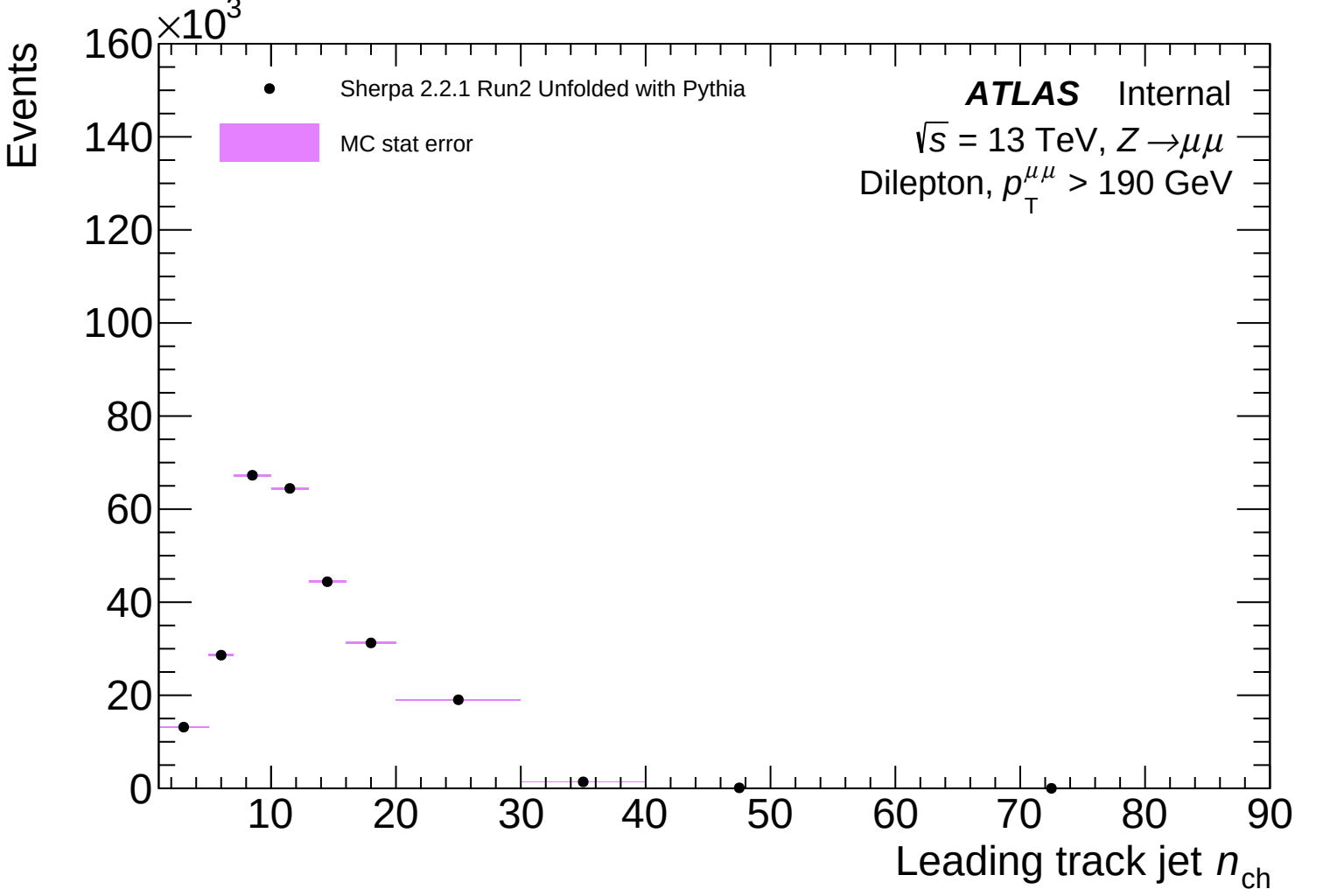
Leading track jet n_ch


Events
×10^3
160
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0
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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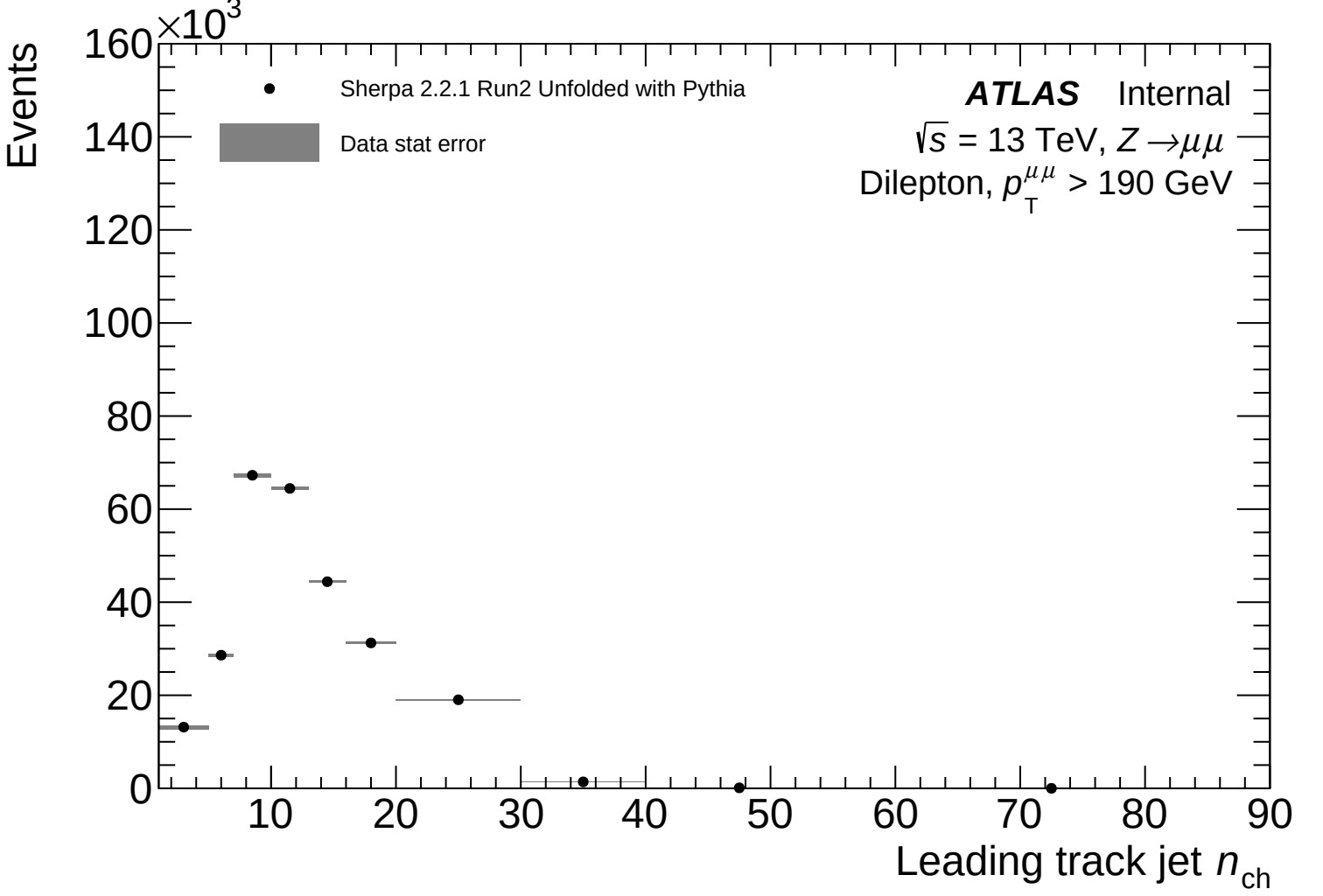
Leading track jet n_ch


Events
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Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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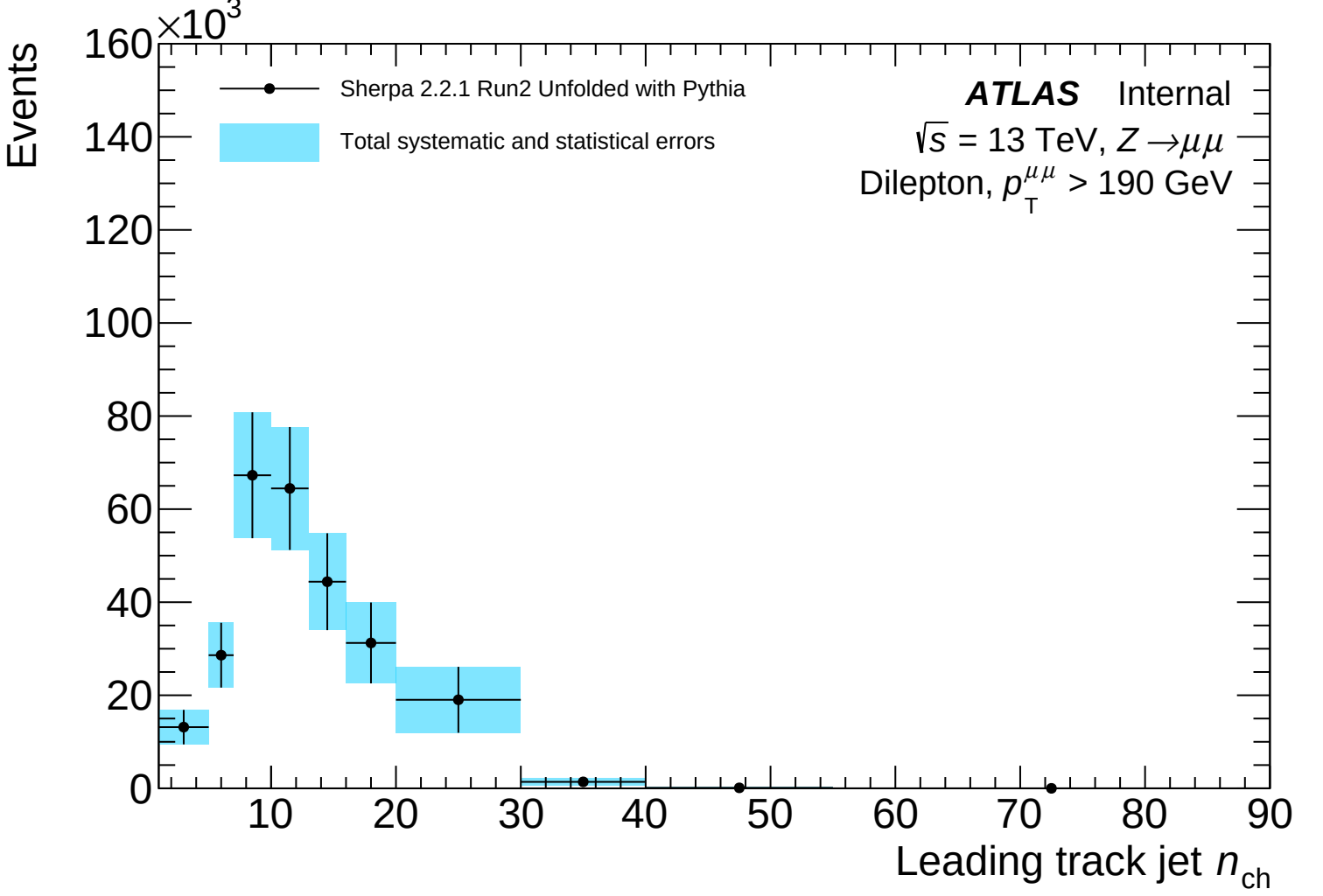
Leading track jet n_ch


Events
×10^3
160
140
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100
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60
40
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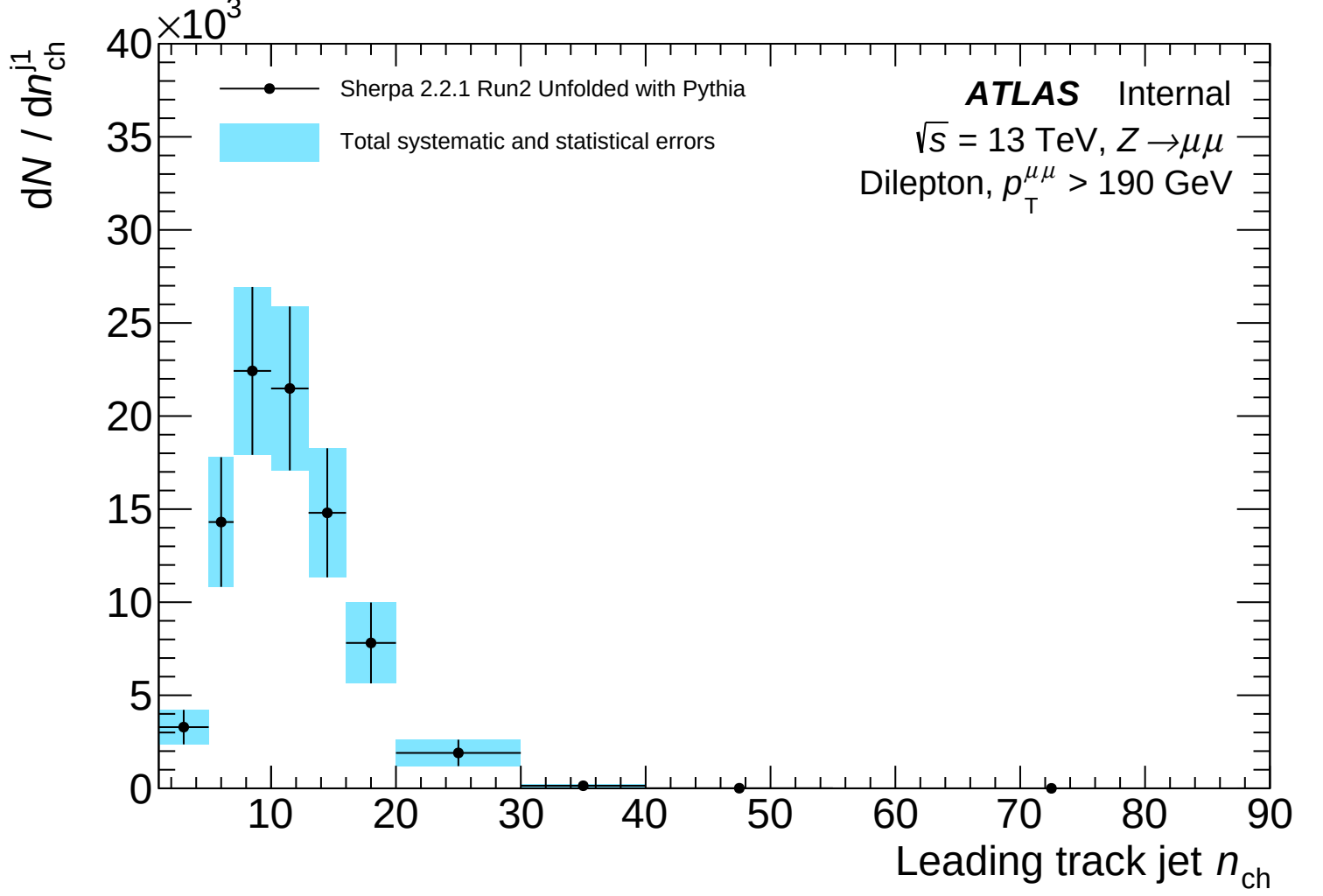
Leading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


$\times 10^3$
$dN\ /\ dn_{\mathrm{ch}}^{j1}$
40
35
30
25
20
15
10
5
0
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
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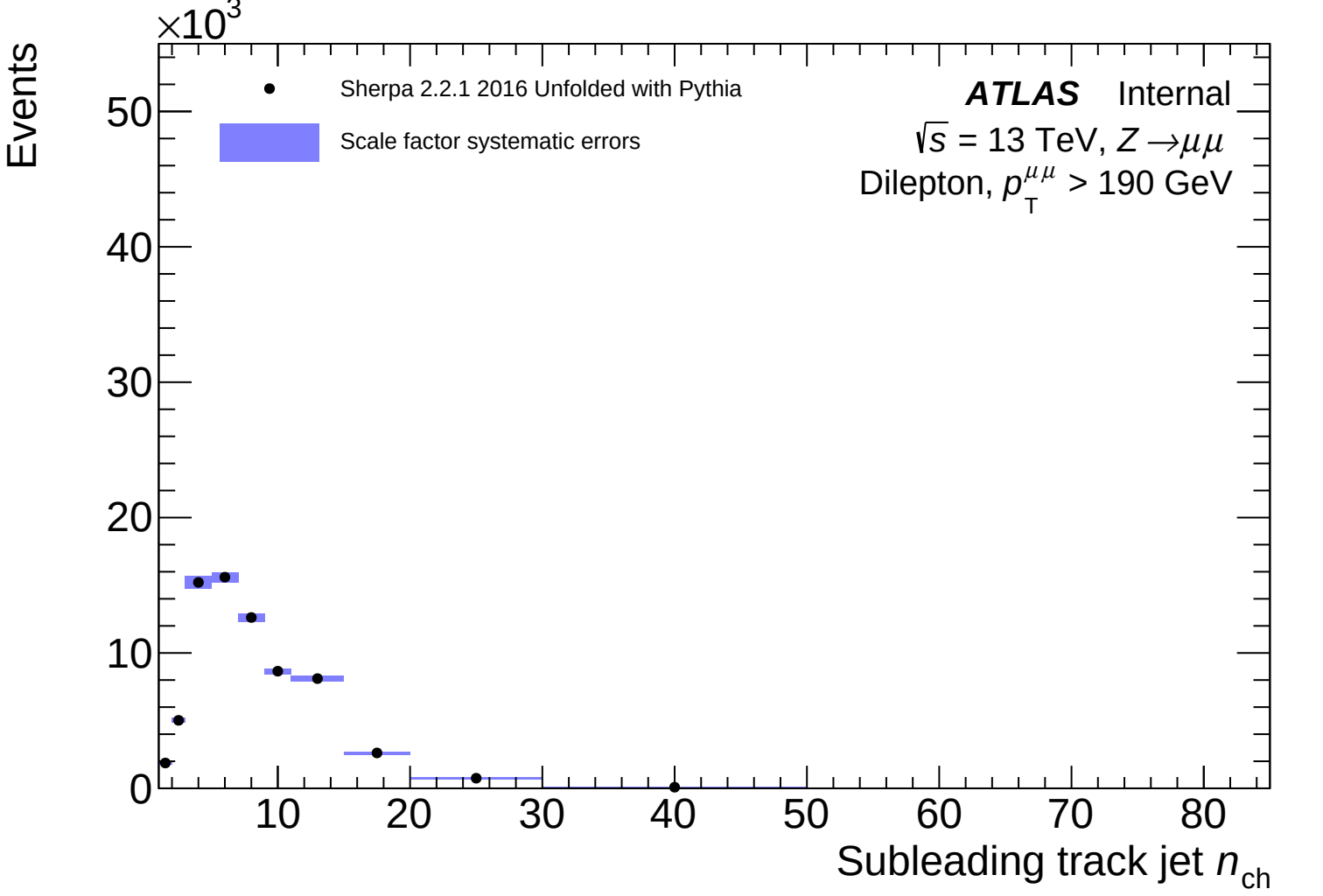
90
Leading track jet n_{ch}


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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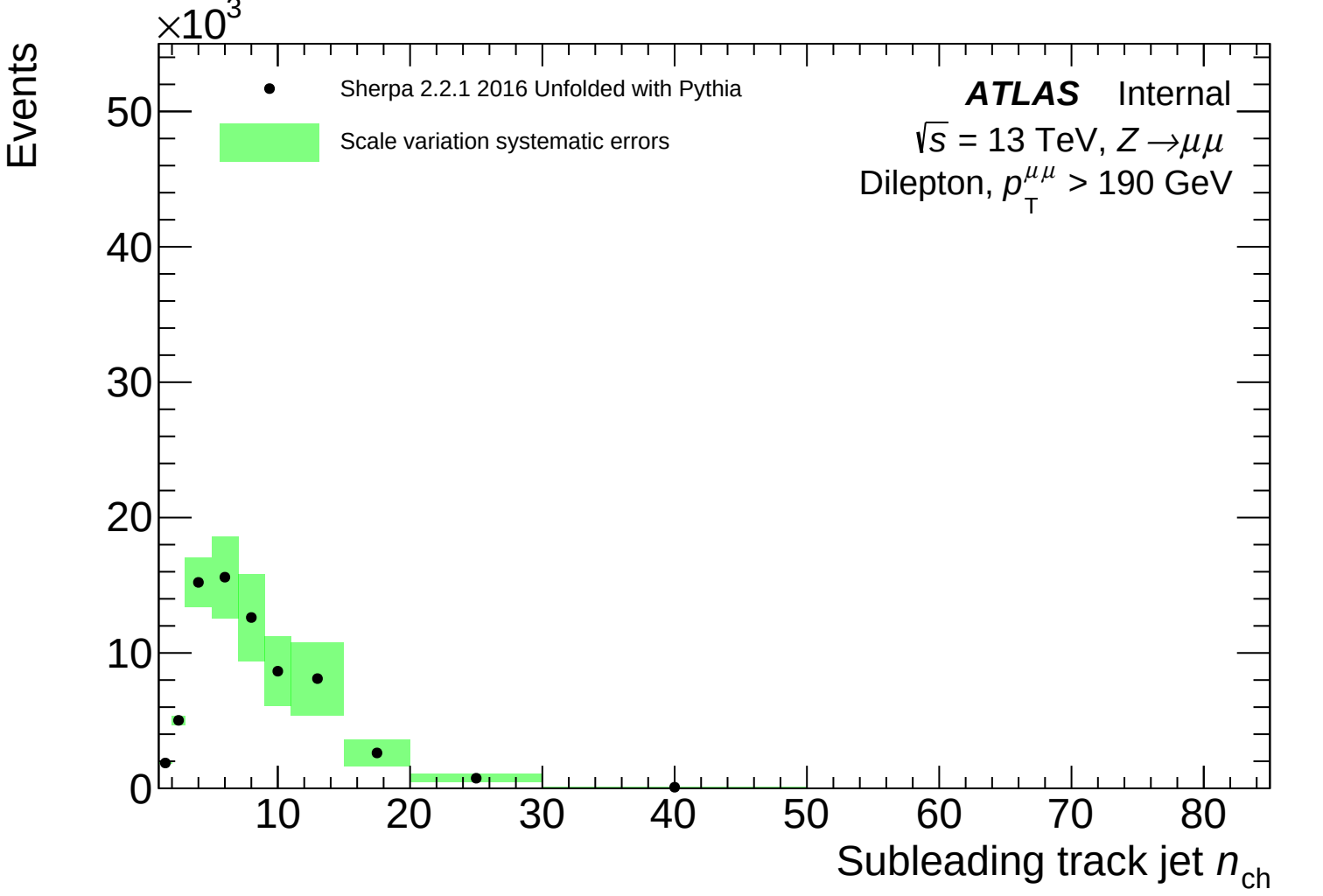
Subleading track jet n_ch


Events
×10^3
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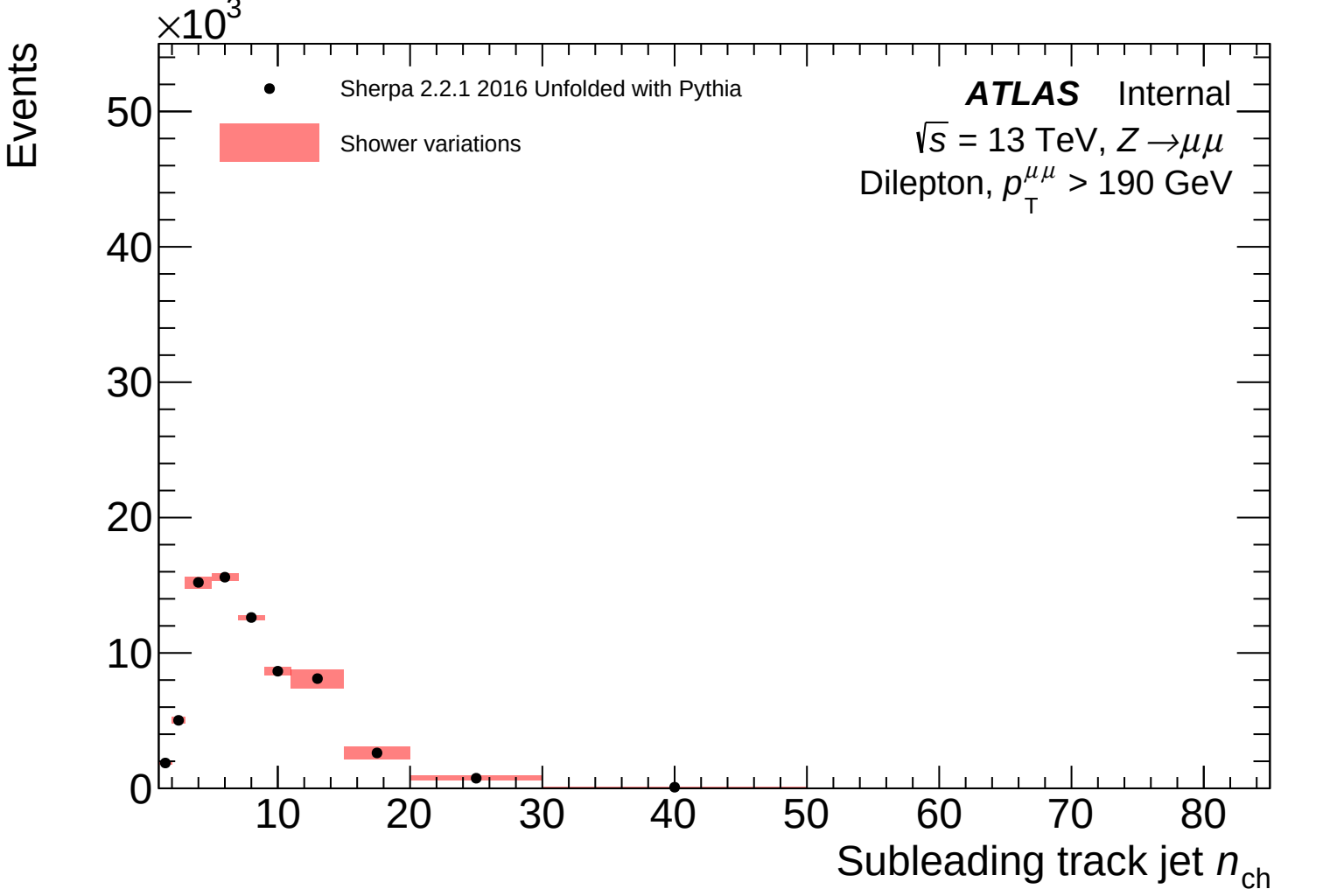
Subleading track jet n_{ch}
Sherpa 2.2.1 2016 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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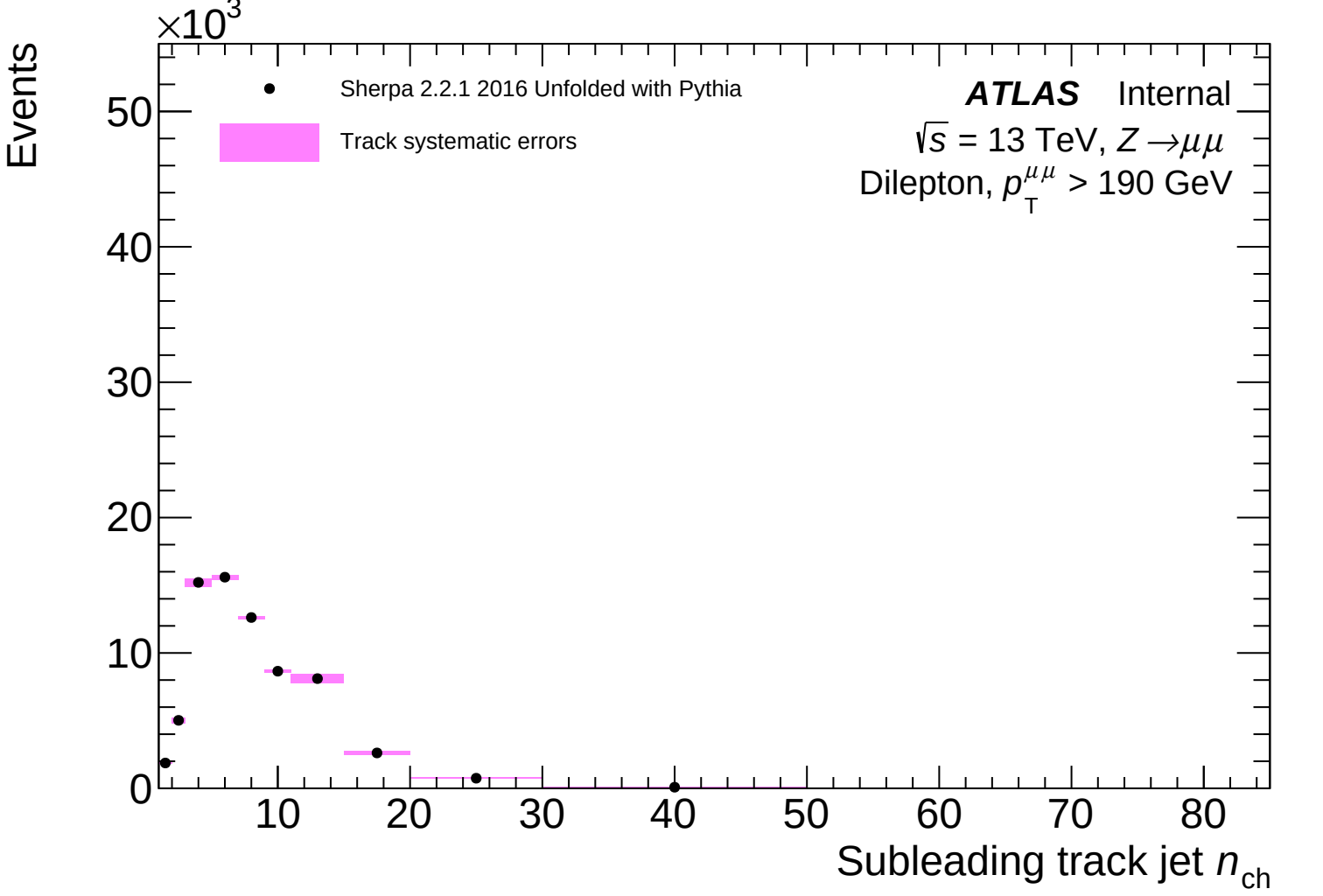
Subleading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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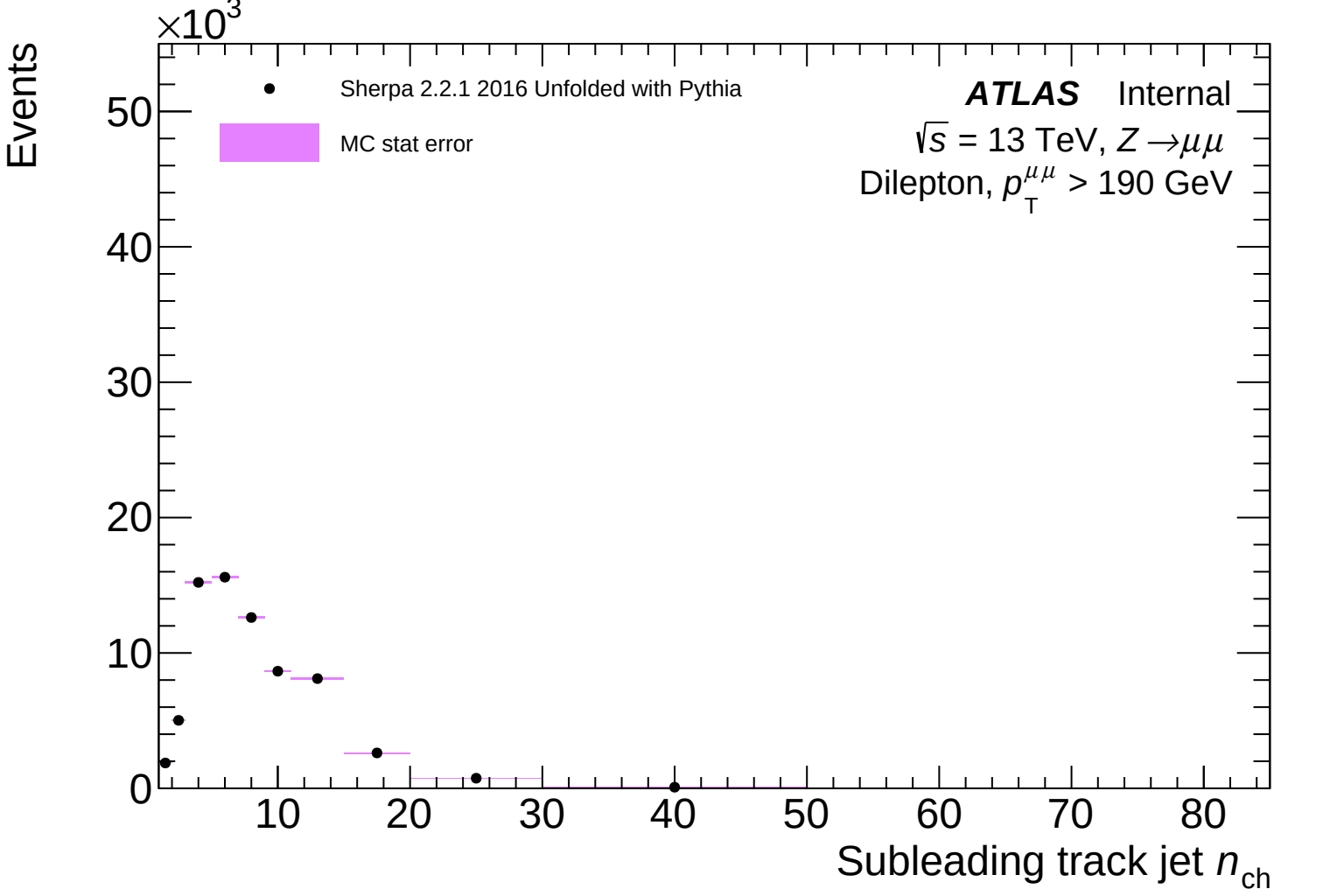
Subleading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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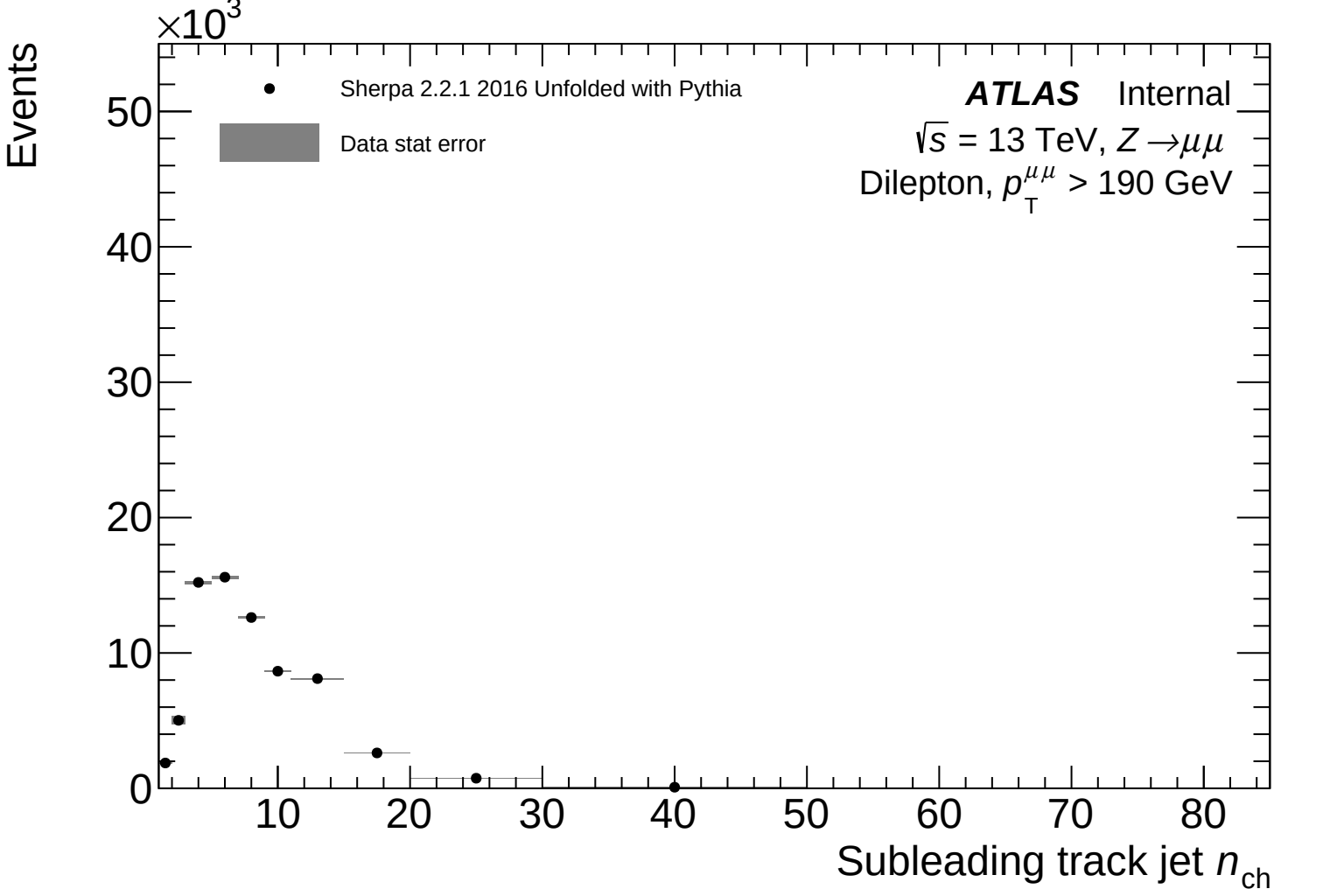
Subleading track jet n_ch


Events
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Sherpa 2.2.1 2016 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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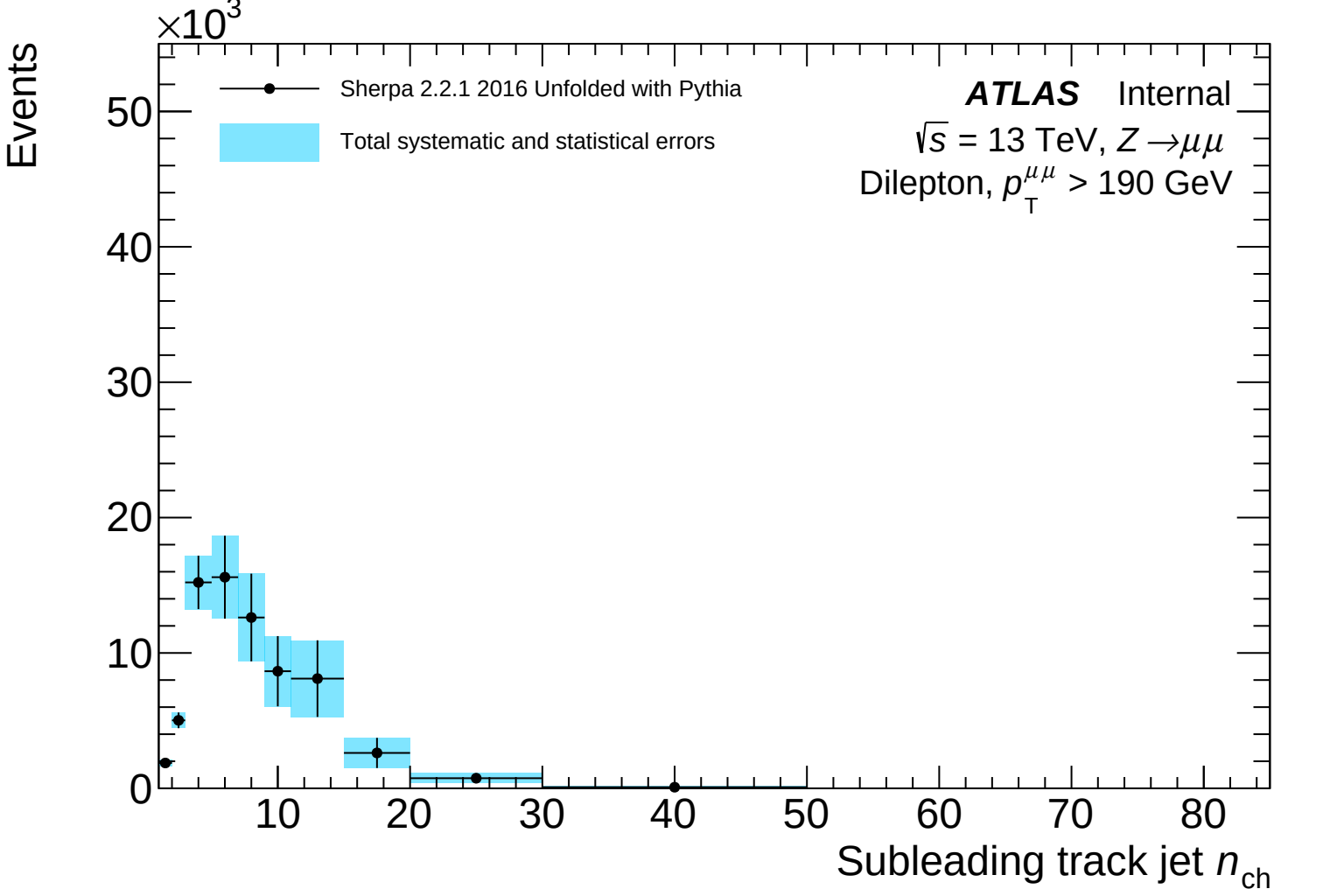
Subleading track jet n_ch


Events
×10^3
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Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
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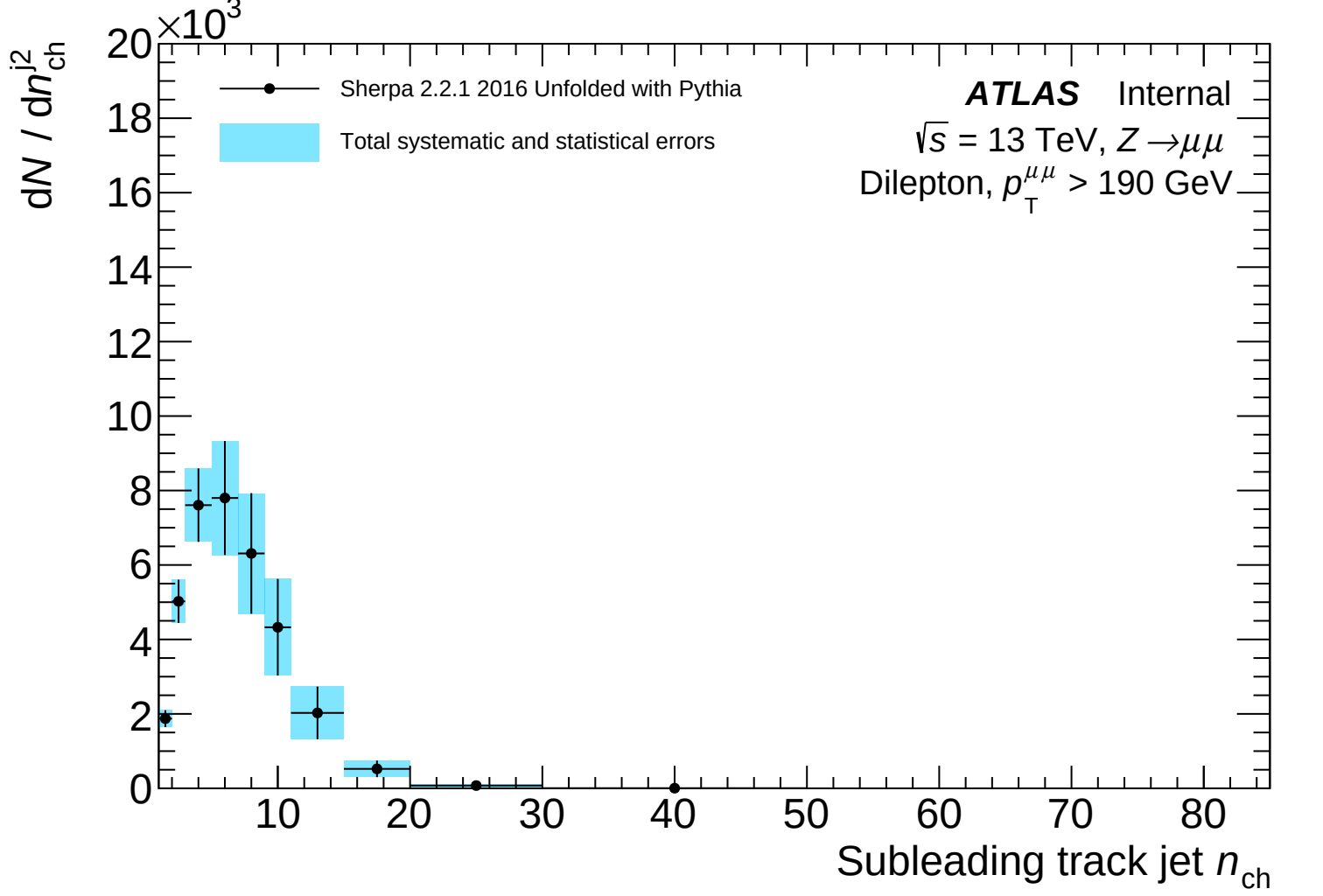
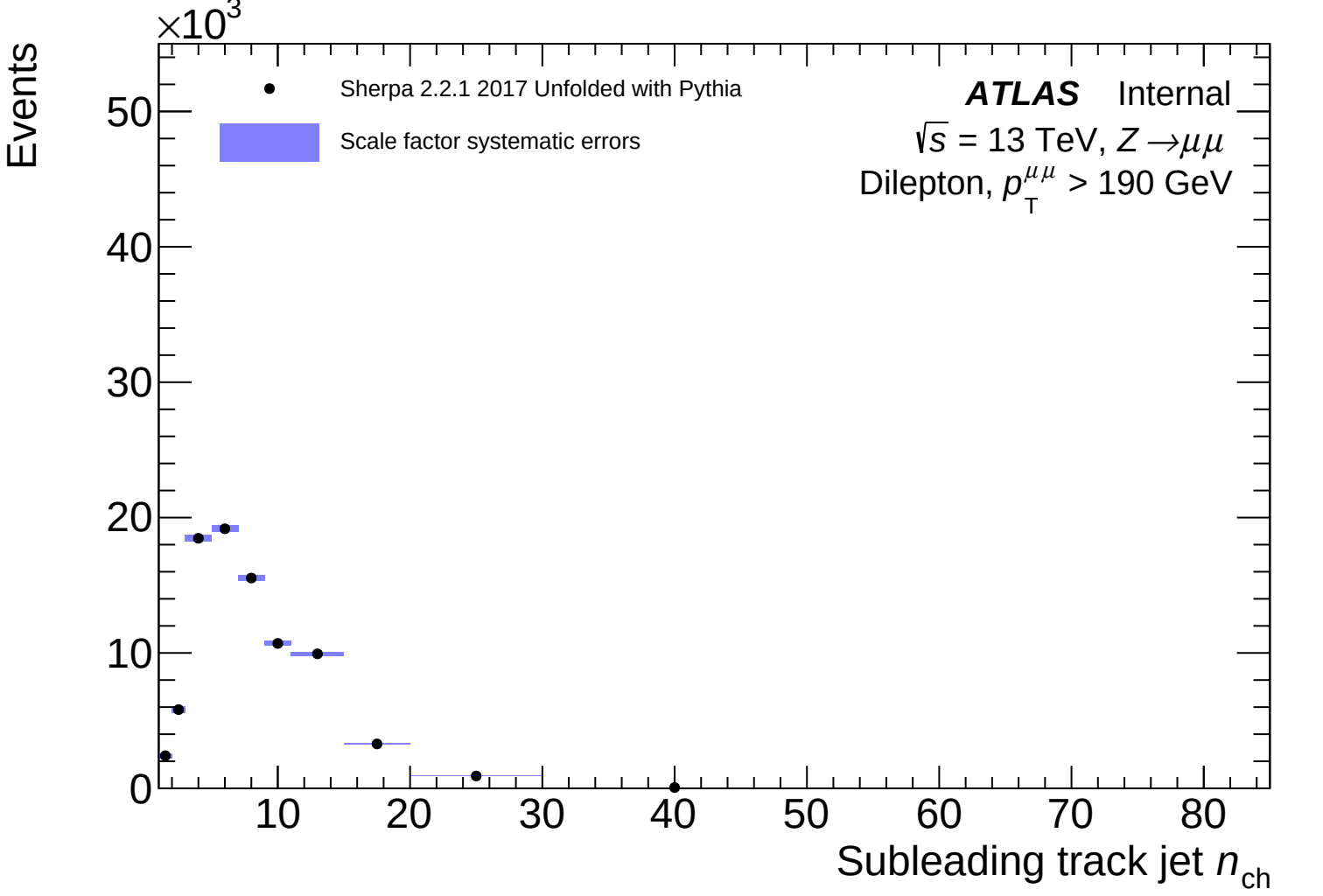
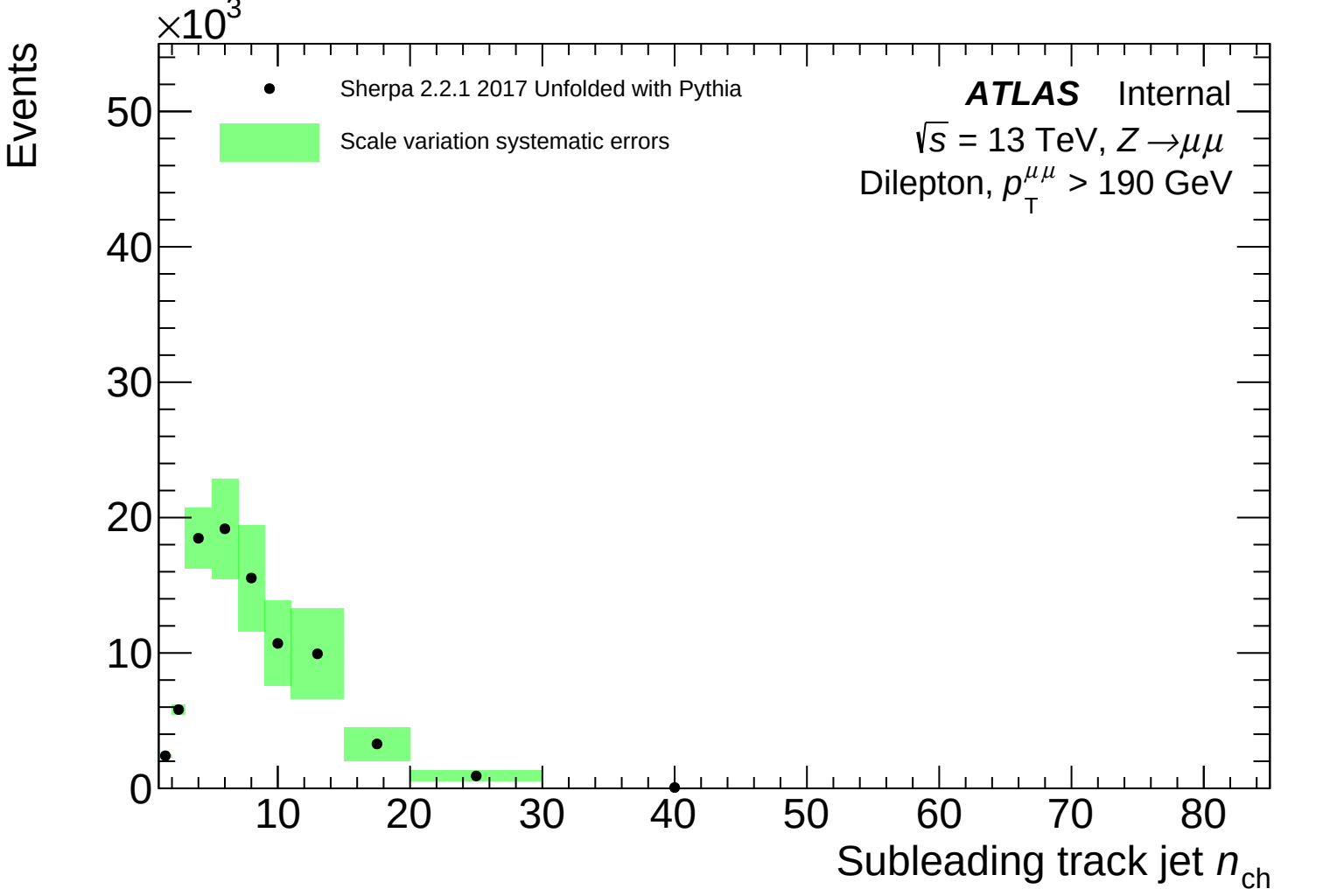
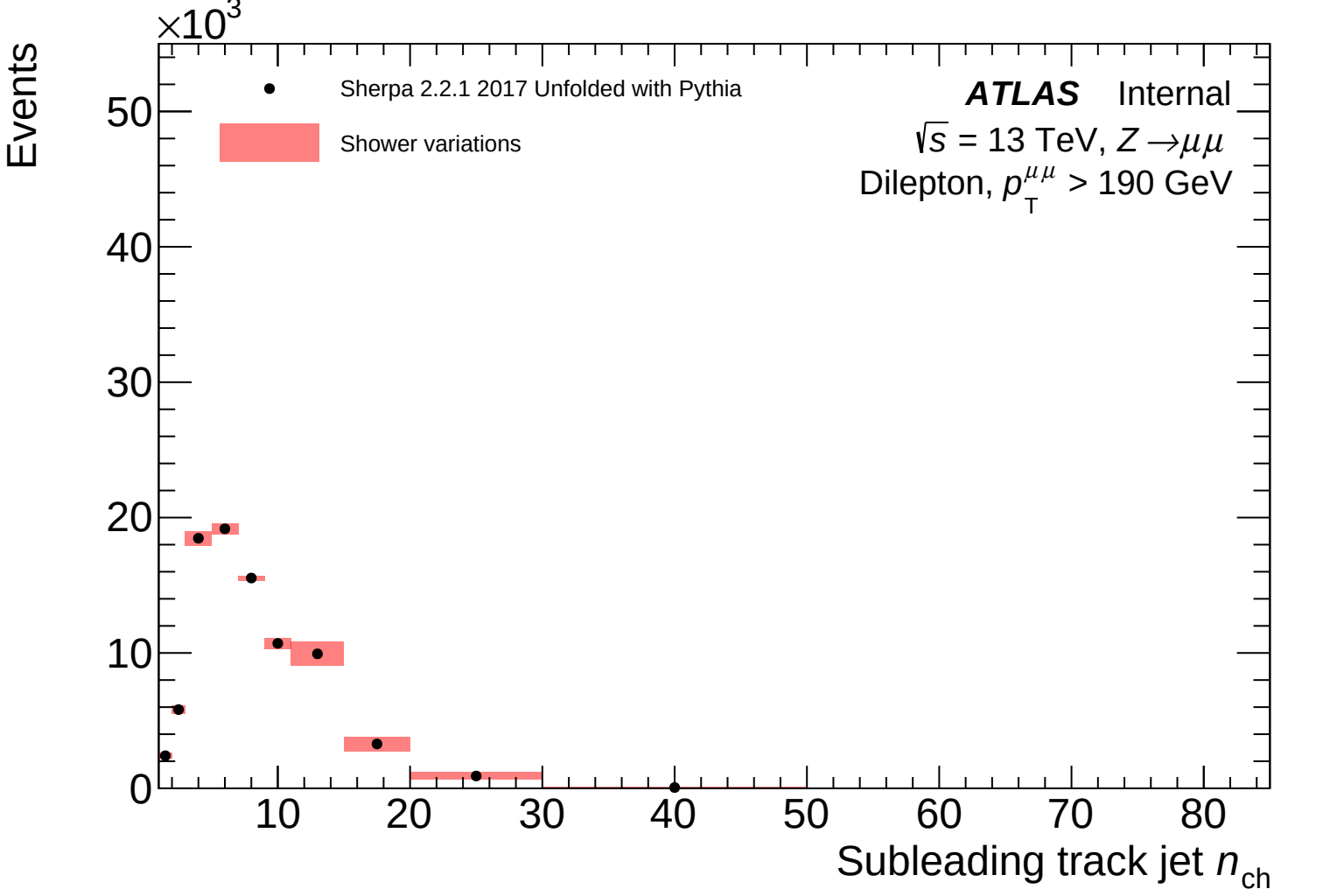
Subleading track jet n_ch



×10^3
dN / dn_ch^j2
Sherpa 2.2.1 2016 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z →μμ
Dilepton, p_T^μμ > 190 GeV
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
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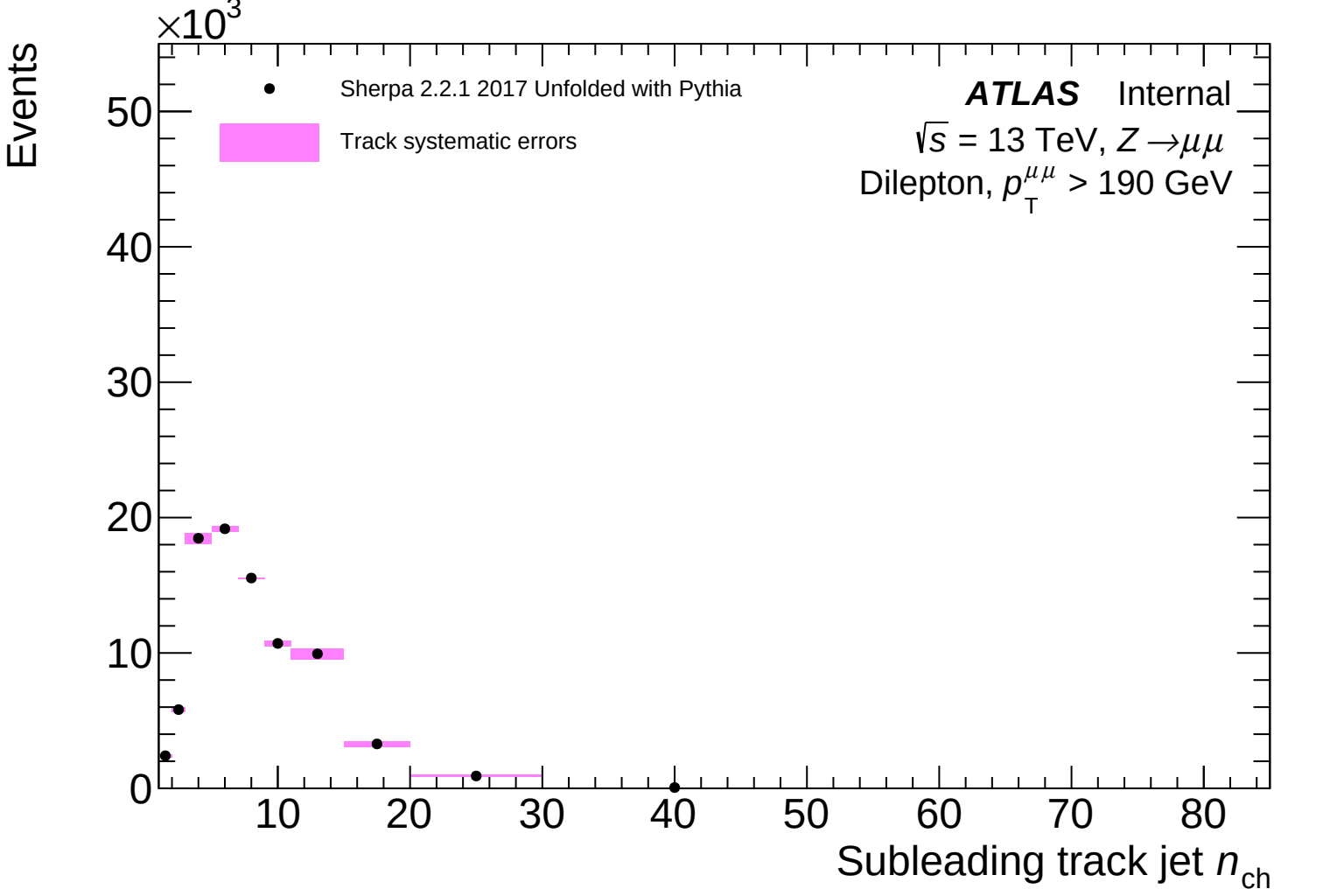
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Track systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
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30
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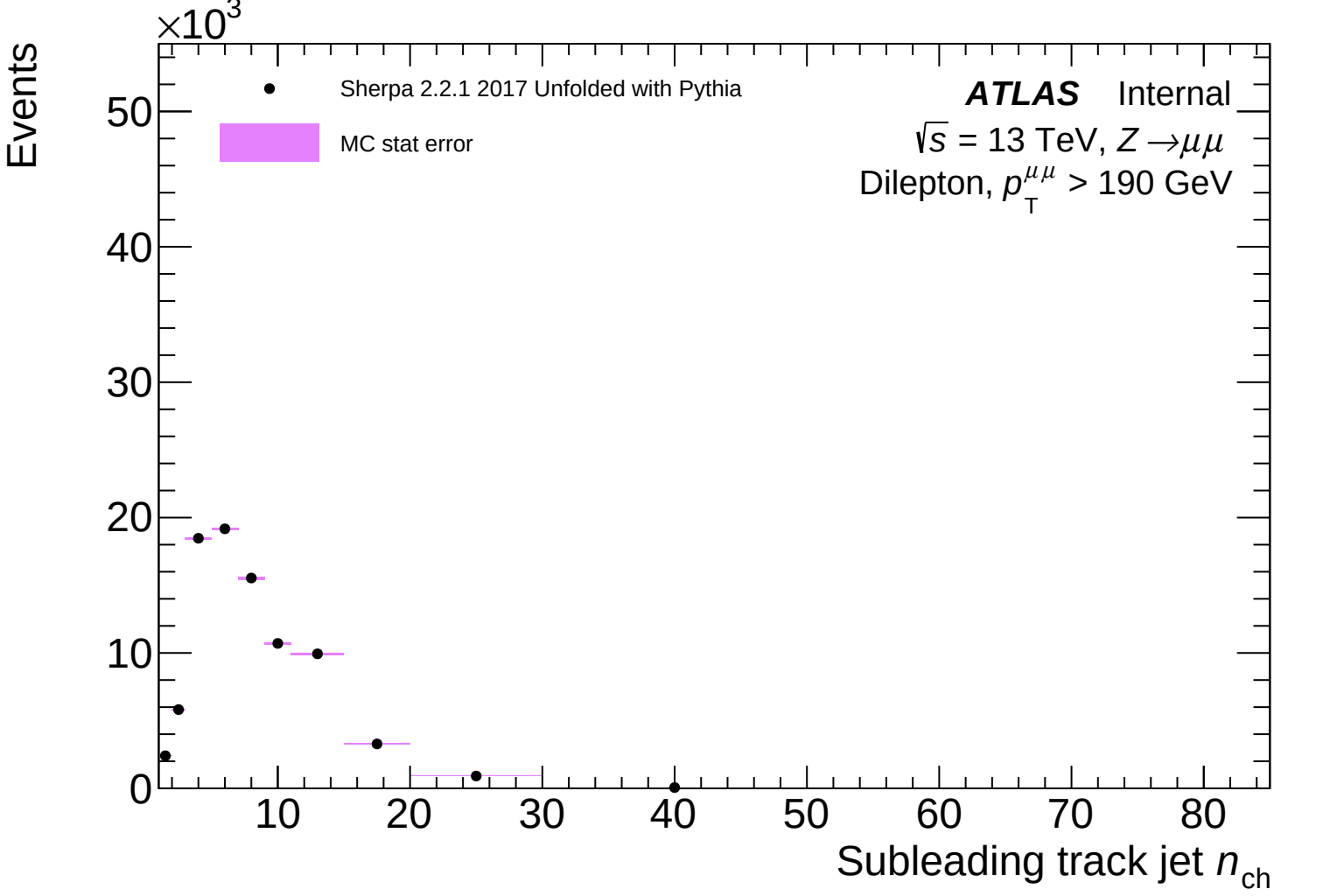
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
MC stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
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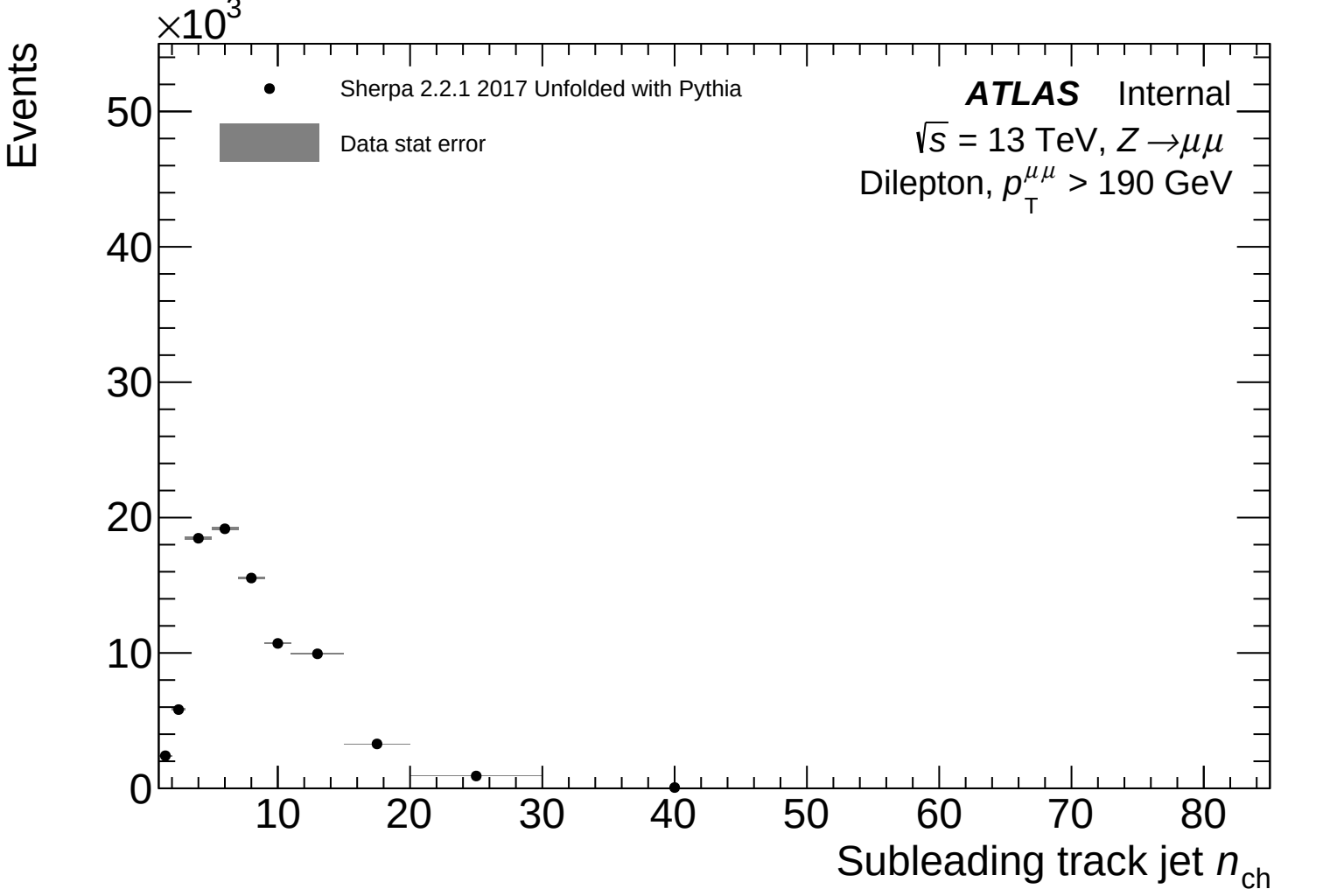
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2017 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
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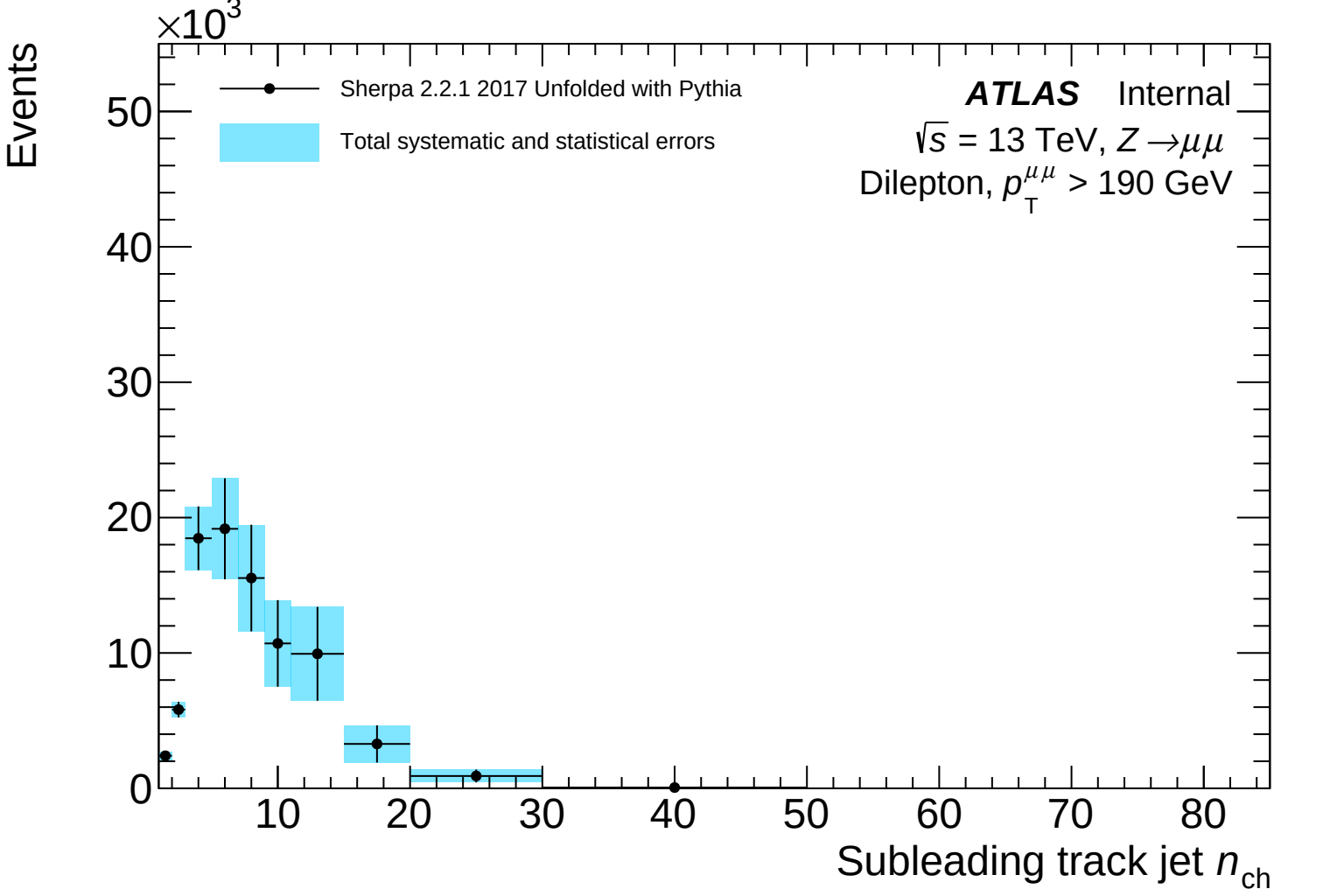
50
60
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
10
20
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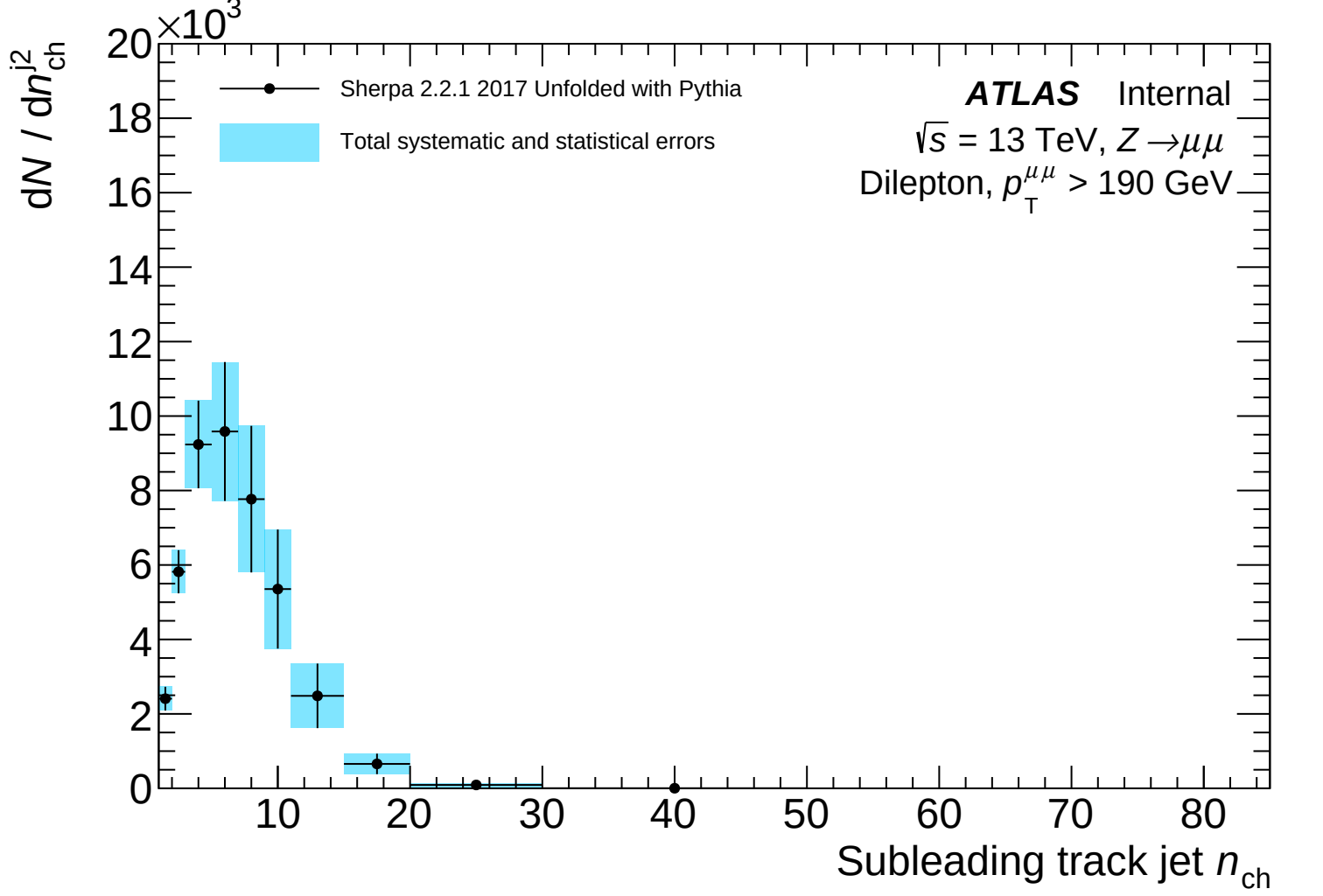
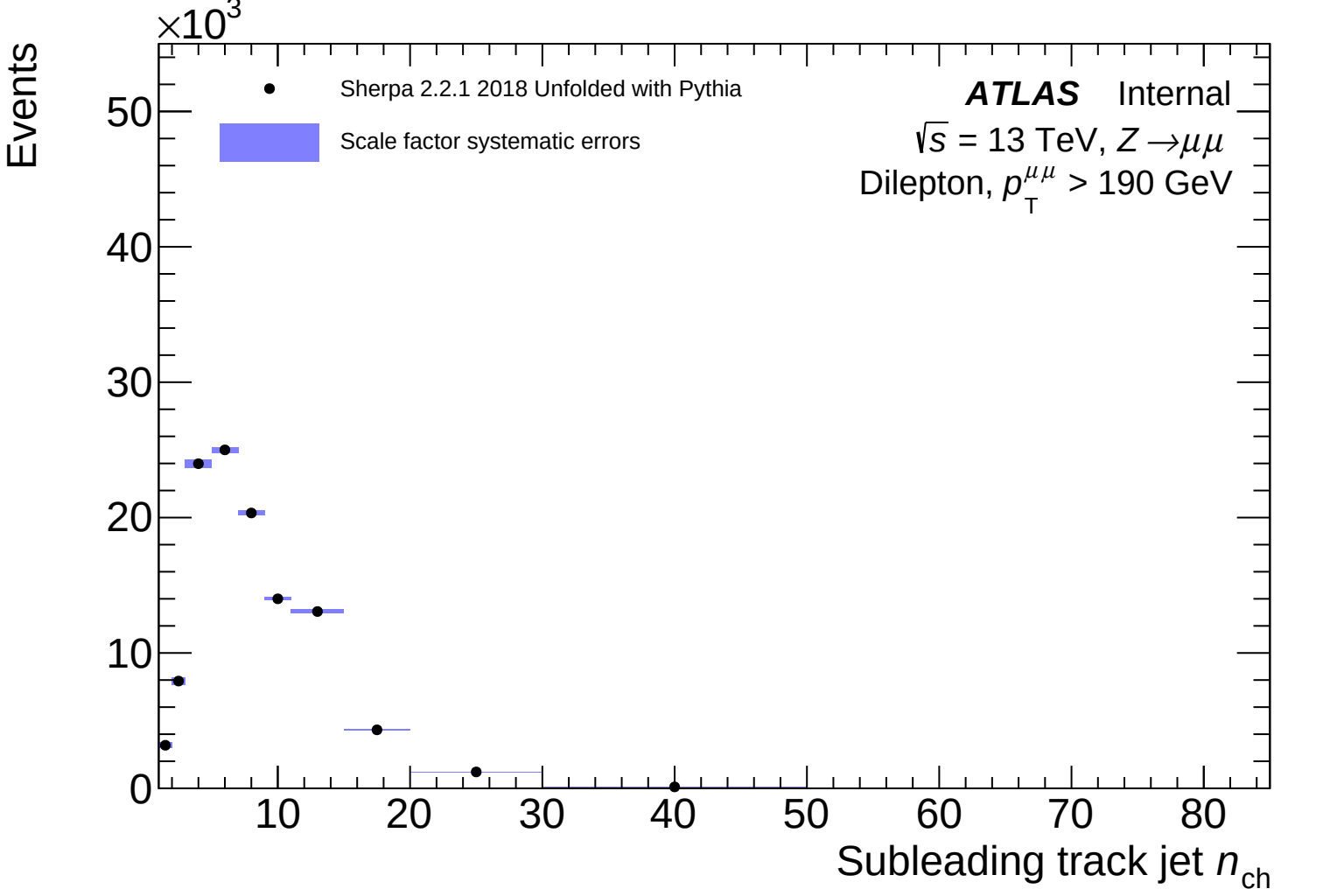
40
50
60
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


$\times 10^3$
dN / dn_{ch}^{j2}
Sherpa 2.2.1 2017 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV
Subleading track jet n_{ch}
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
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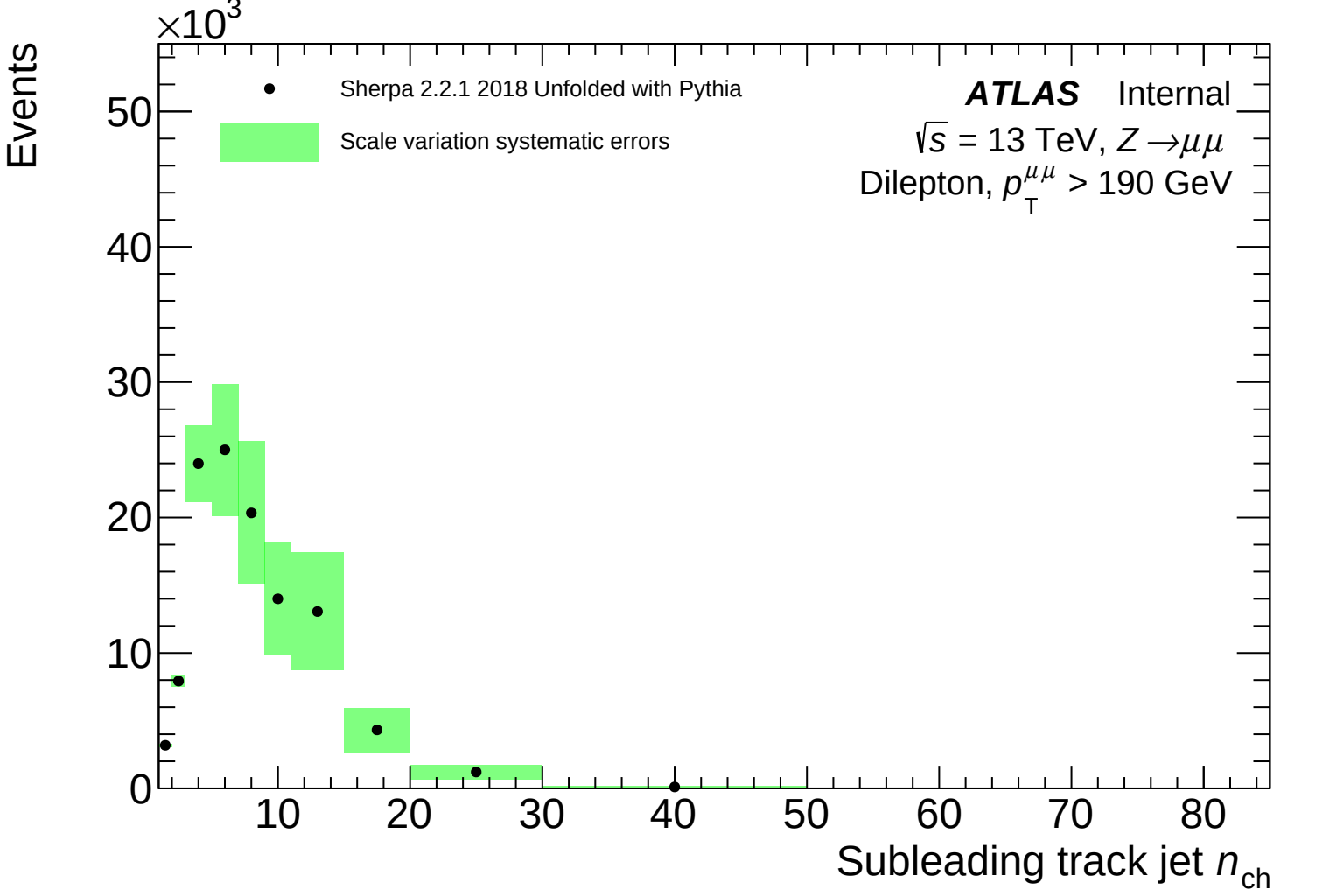
50
60
70
80
Subleading track jet n_ch


Events
×10^3
50
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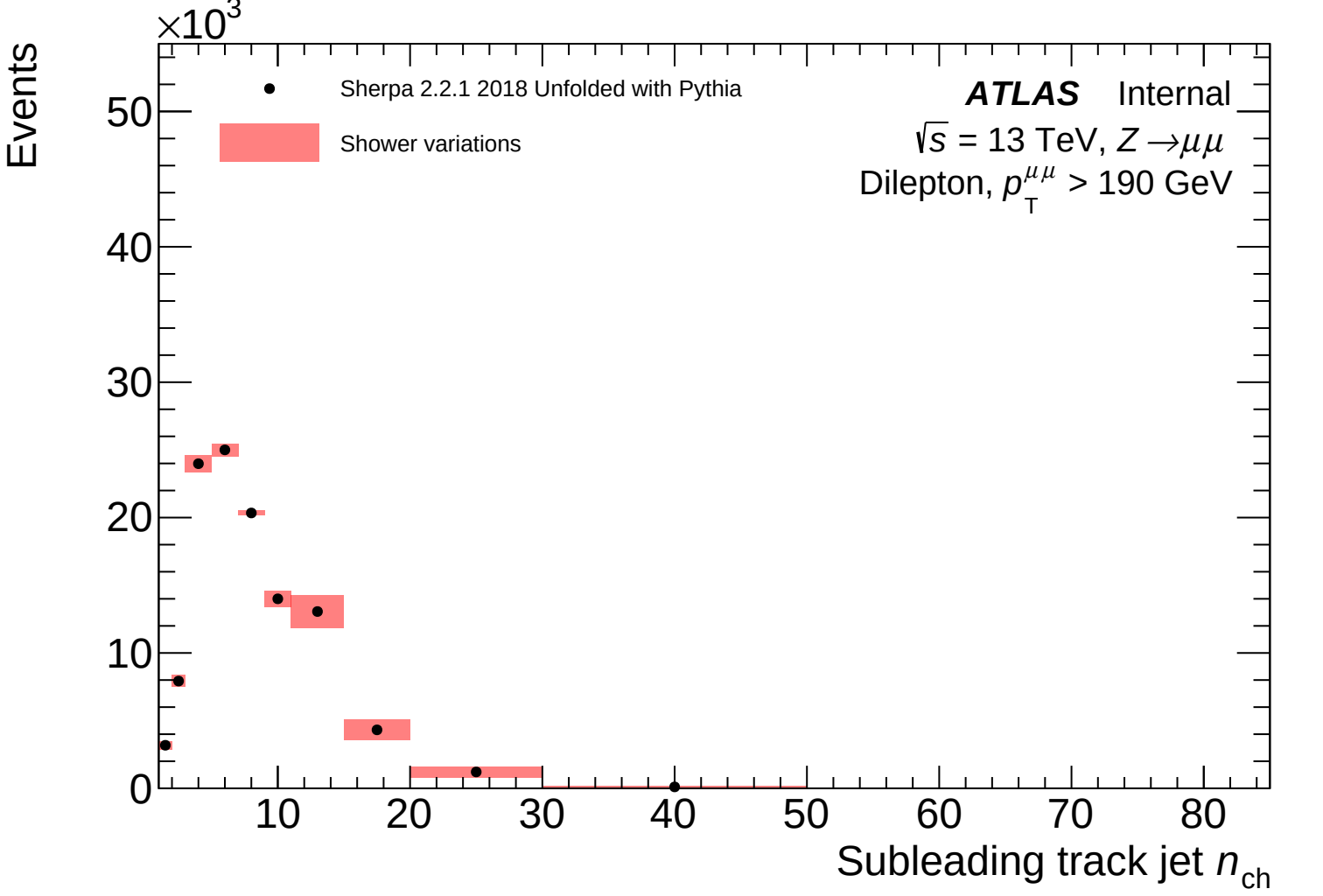
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 2018 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
50
40
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10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Shower variations
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
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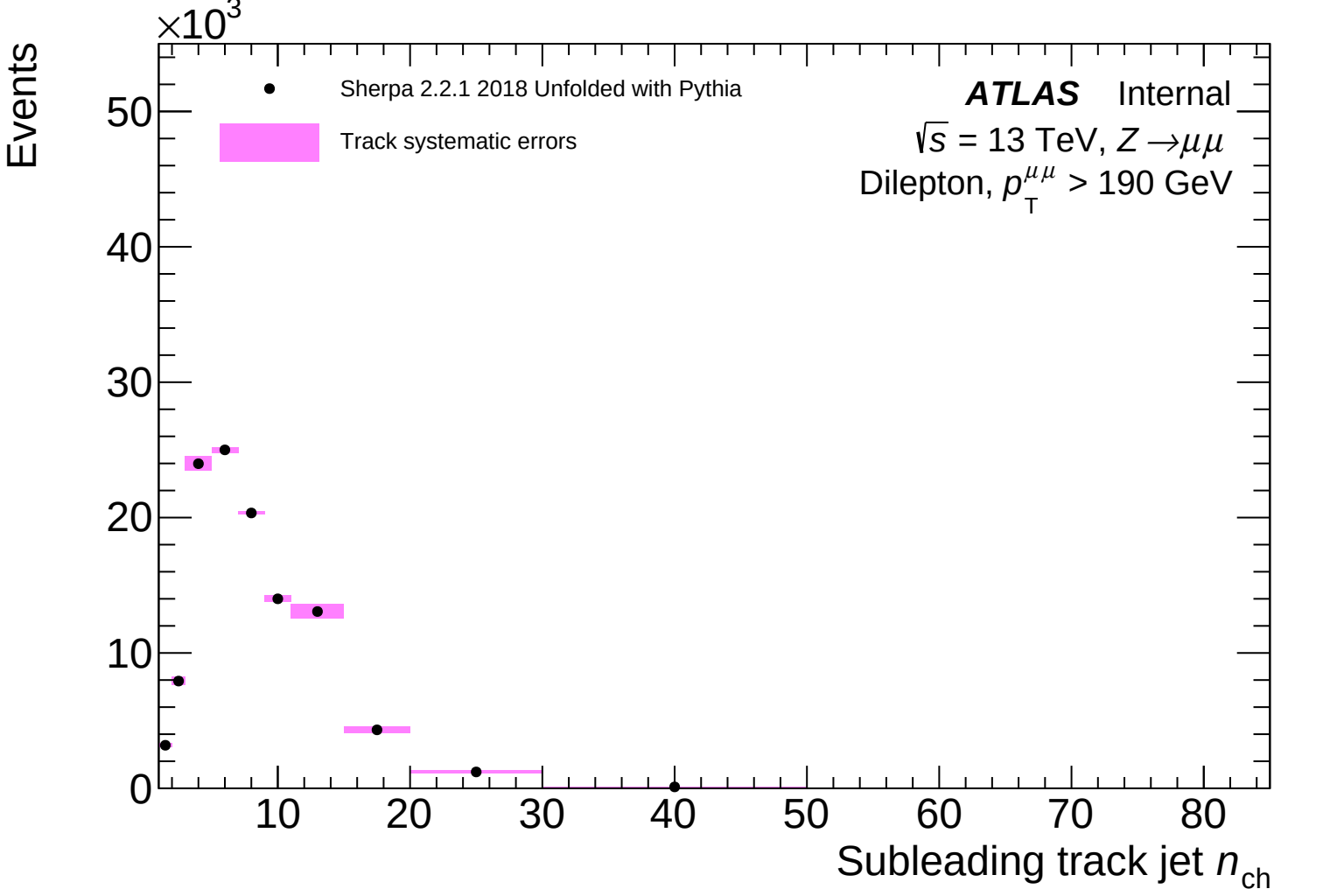
80
Subleading track jet n_ch


Events
×10^3
50
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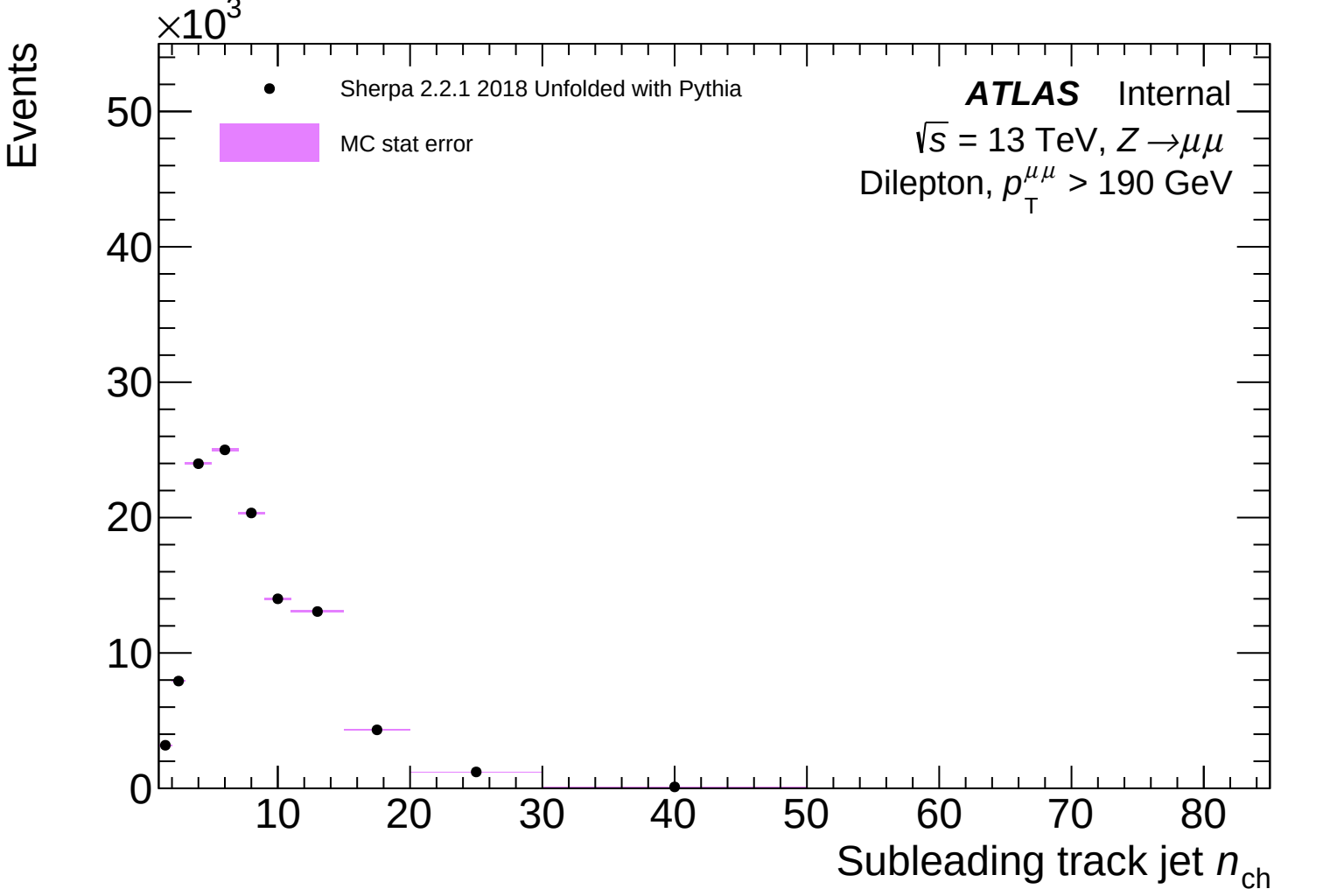
Subleading track jet n_{ch}
Sherpa 2.2.1 2018 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
50
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0
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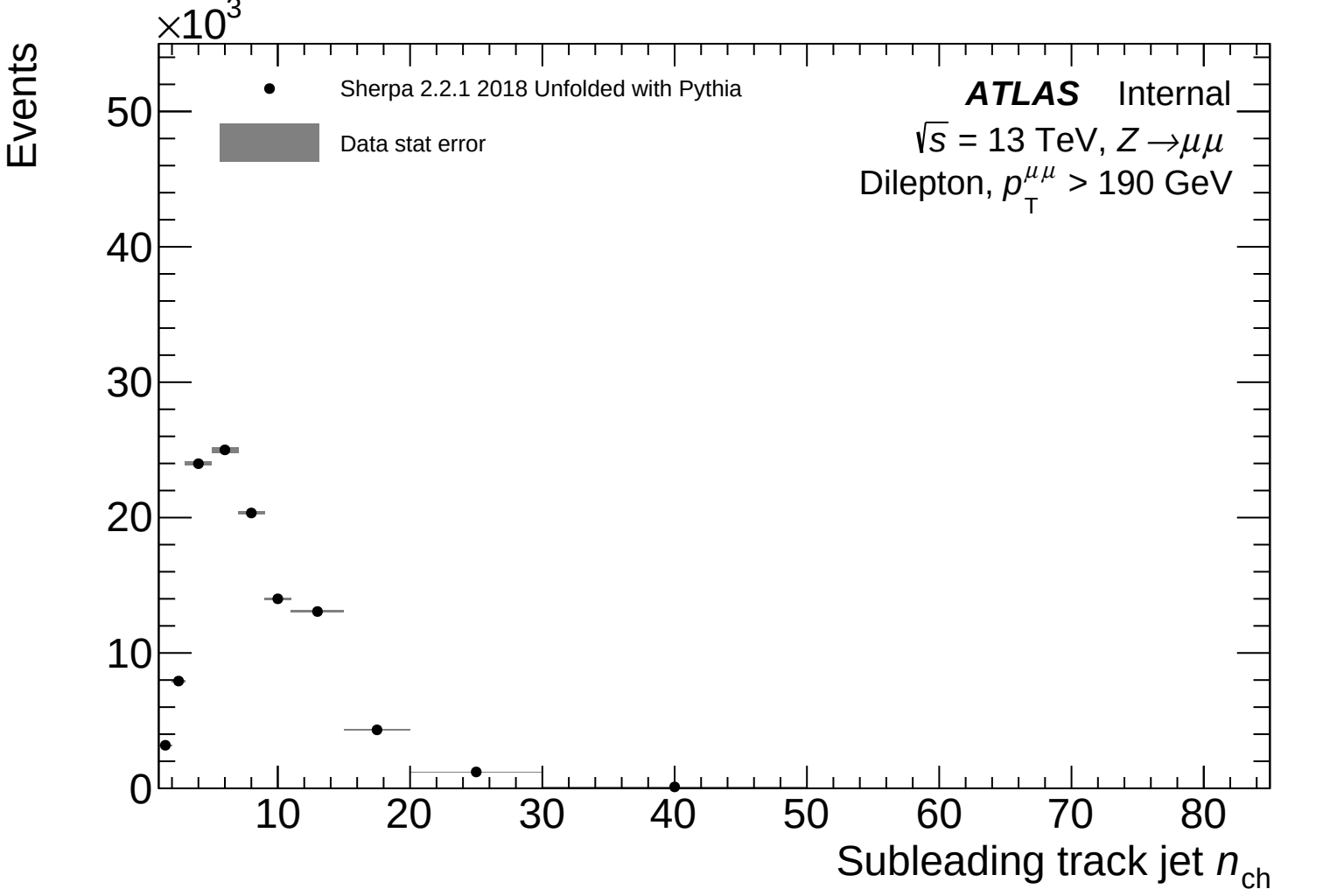
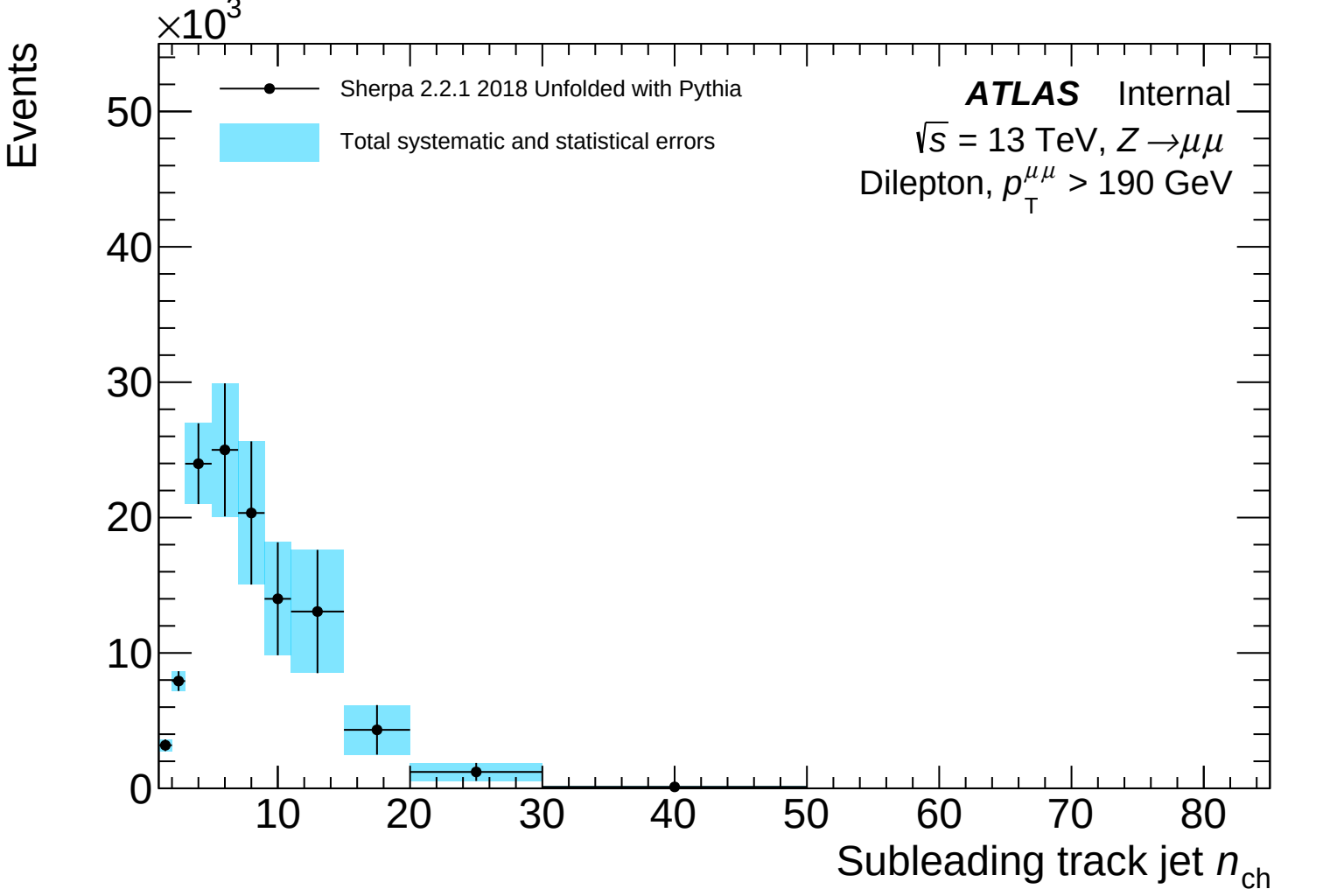
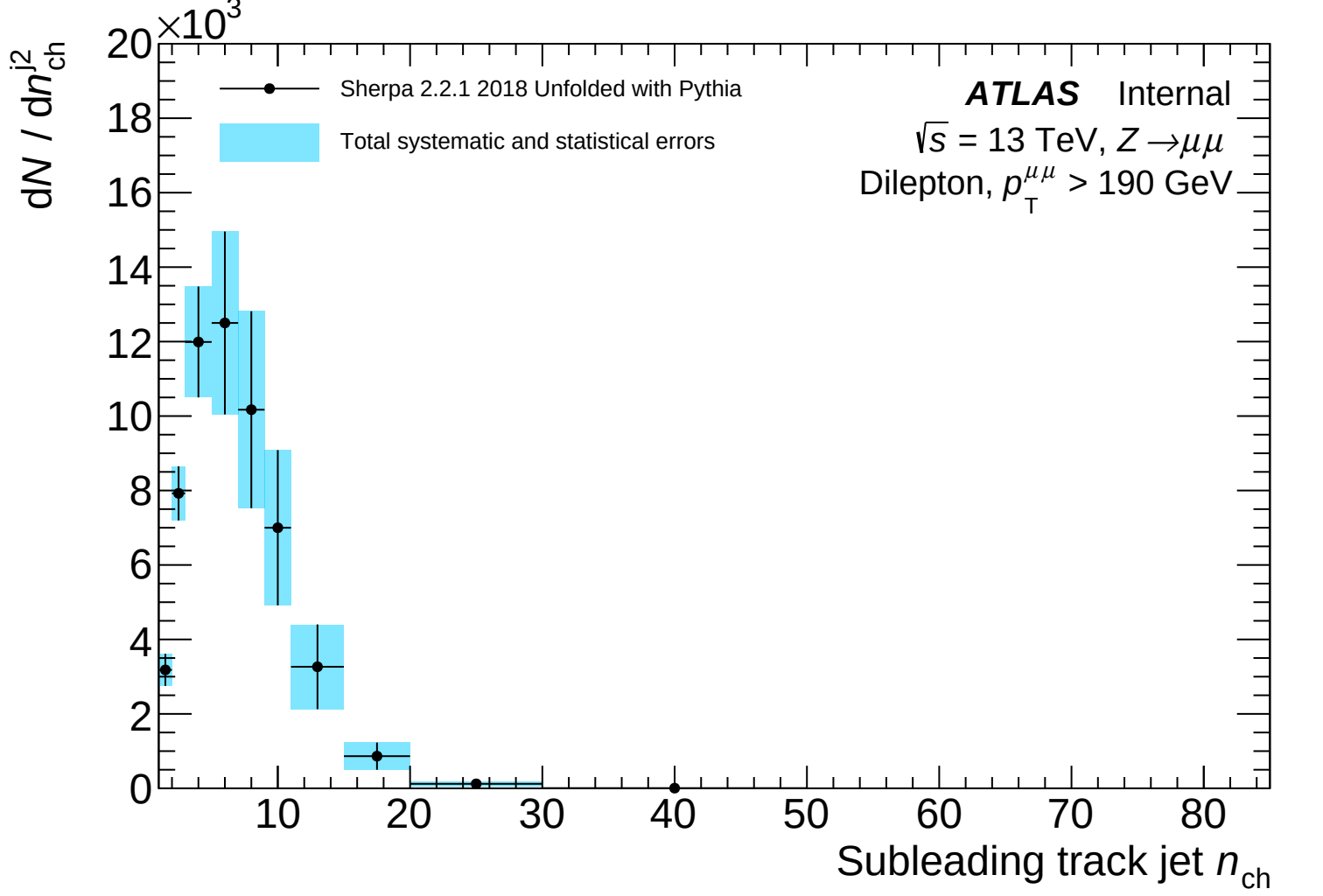
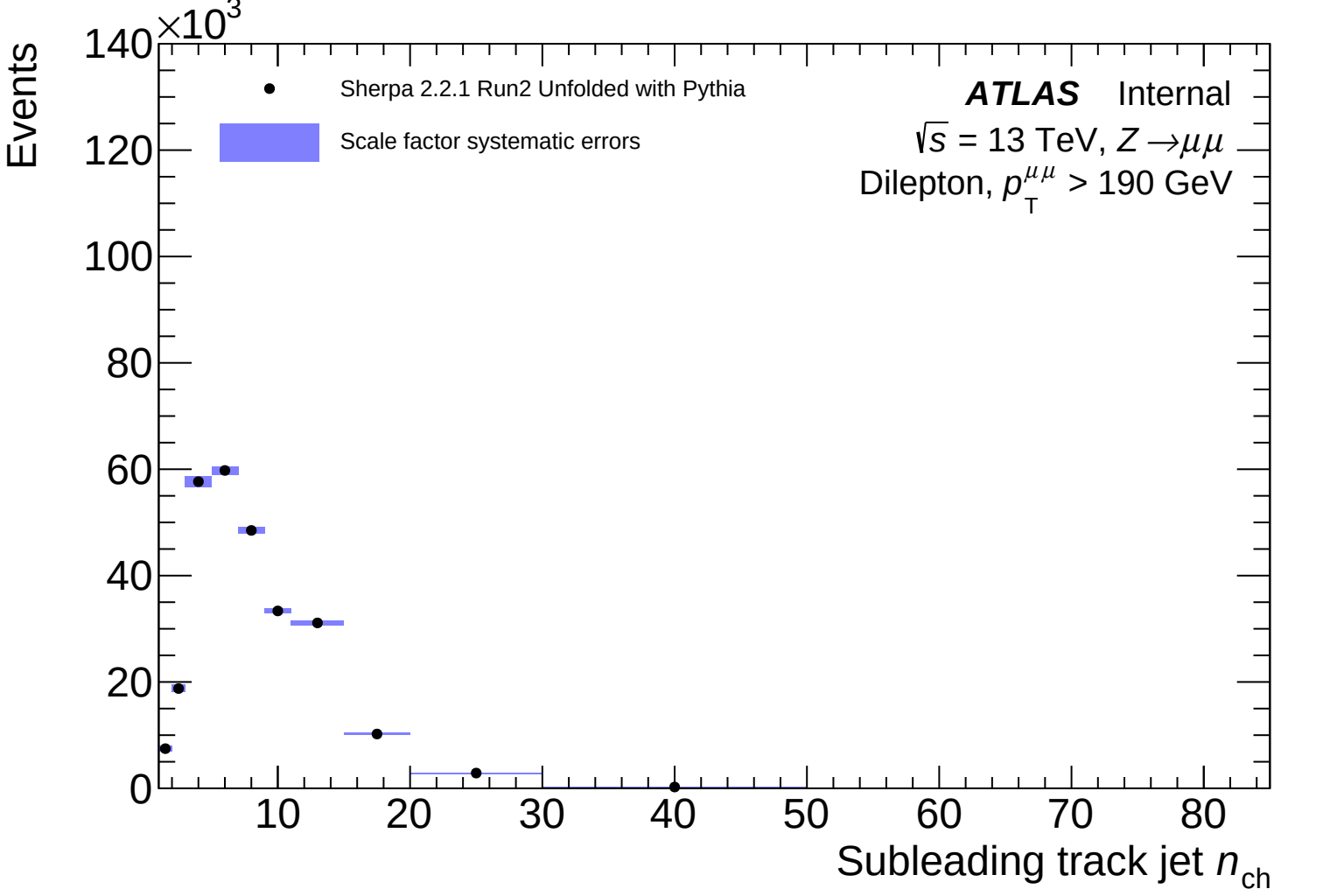
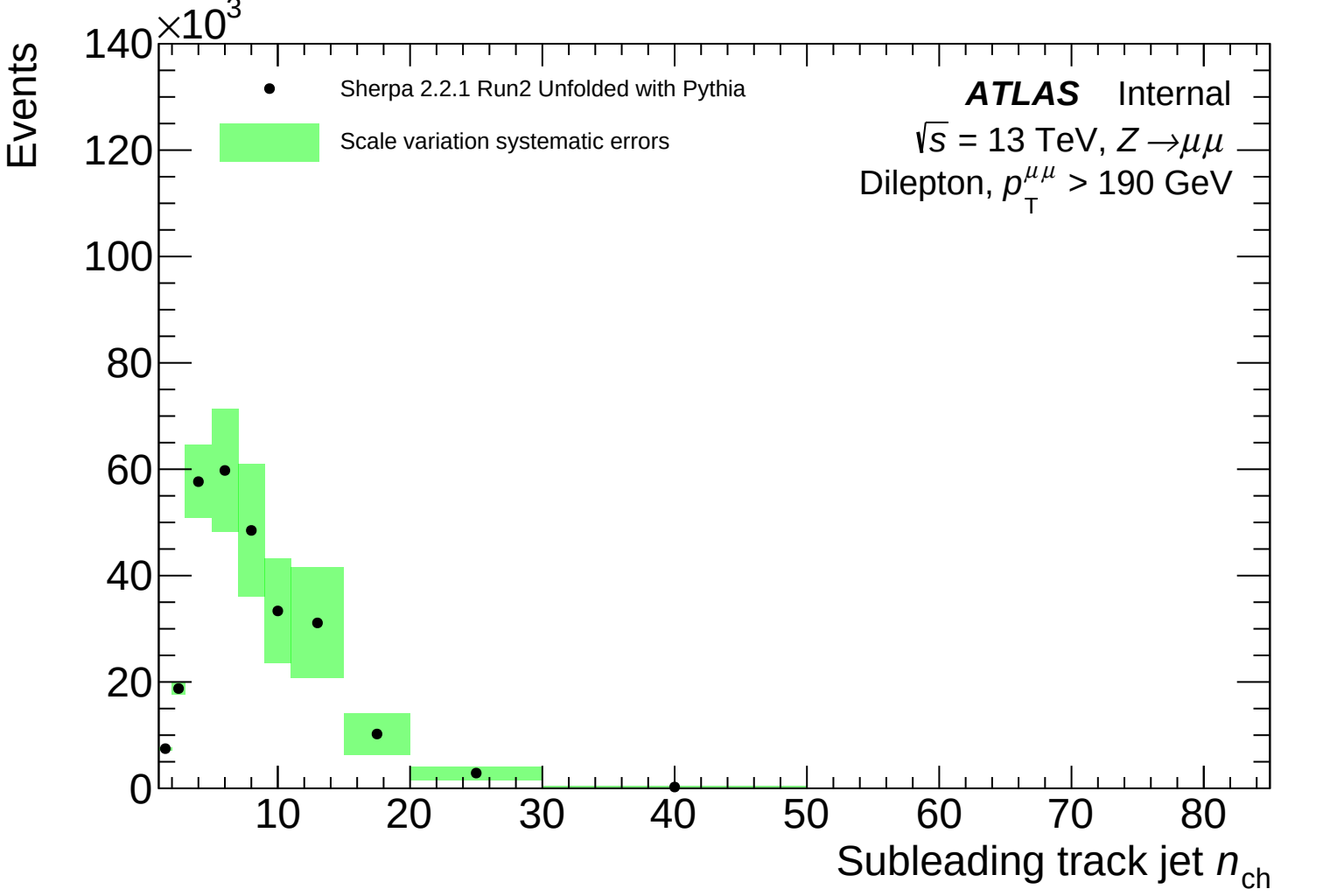
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 2018 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
50
40
30
20
10
0
Sherpa 2.2.1 2018 Unfolded with Pythia
Data stat error
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
10
20
30
40
50
60
70
80
Subleading track jet n_ch


Events
×10^3
50
40
30
20
10
0
10
20
30
40
50
60
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


$\times 10^3$
$dN\ /\ dn_{\mathrm{ch}}^{j2}$
Sherpa 2.2.1 2018 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_{\mathrm{T}}^{\mu\mu}$ > 190 GeV
Subleading track jet n_{ch}
0
2
4
6
8
10
12
14
16
18
20
10
20
30
40
50
60
70
80


Events
×10^3
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale factor systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
140
120
100
80
60
40
20
0
10
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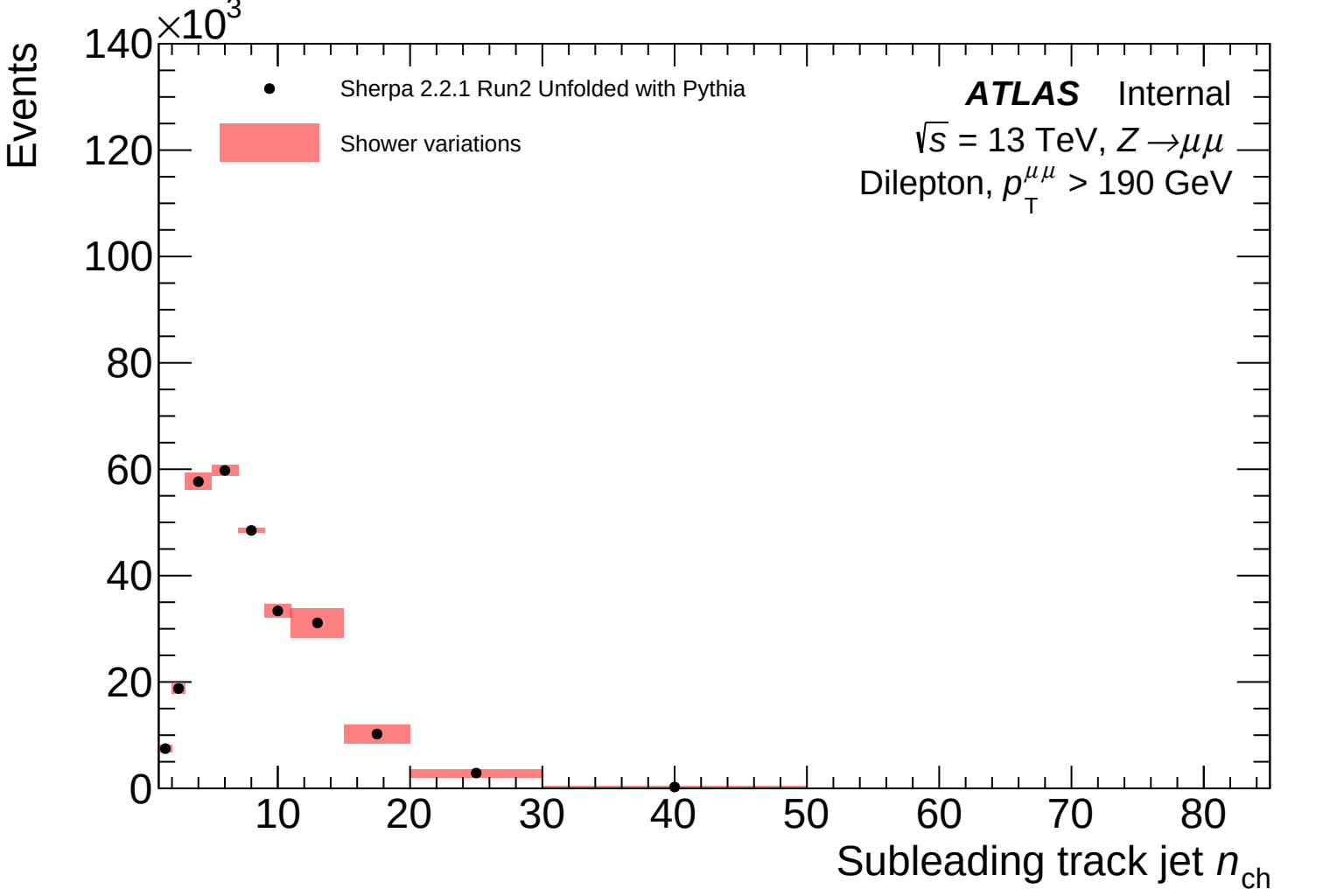
40
50
60
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Scale variation systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
140
120
100
80
60
40
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0
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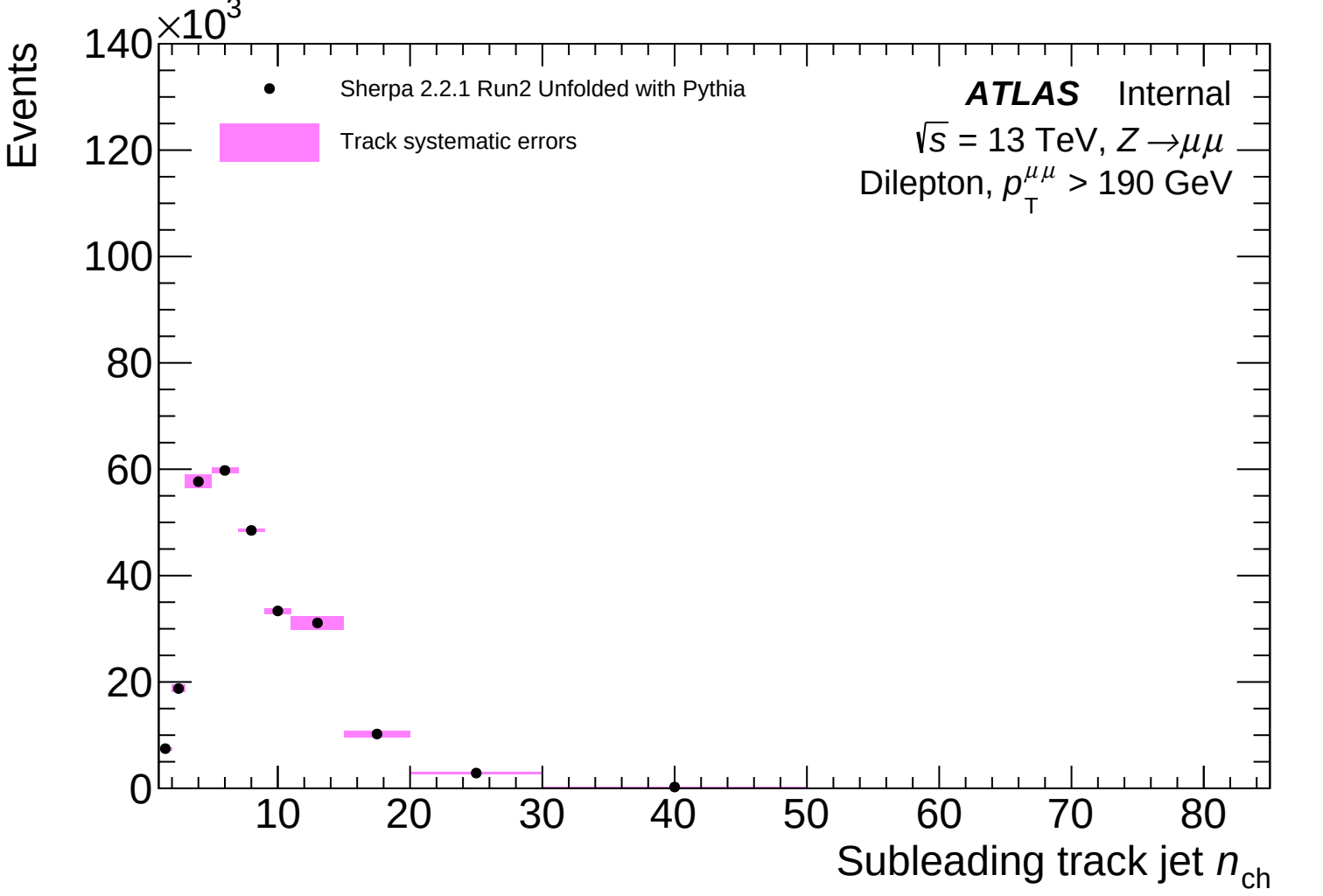
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Shower variations
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
140
120
100
80
60
40
20
0
10
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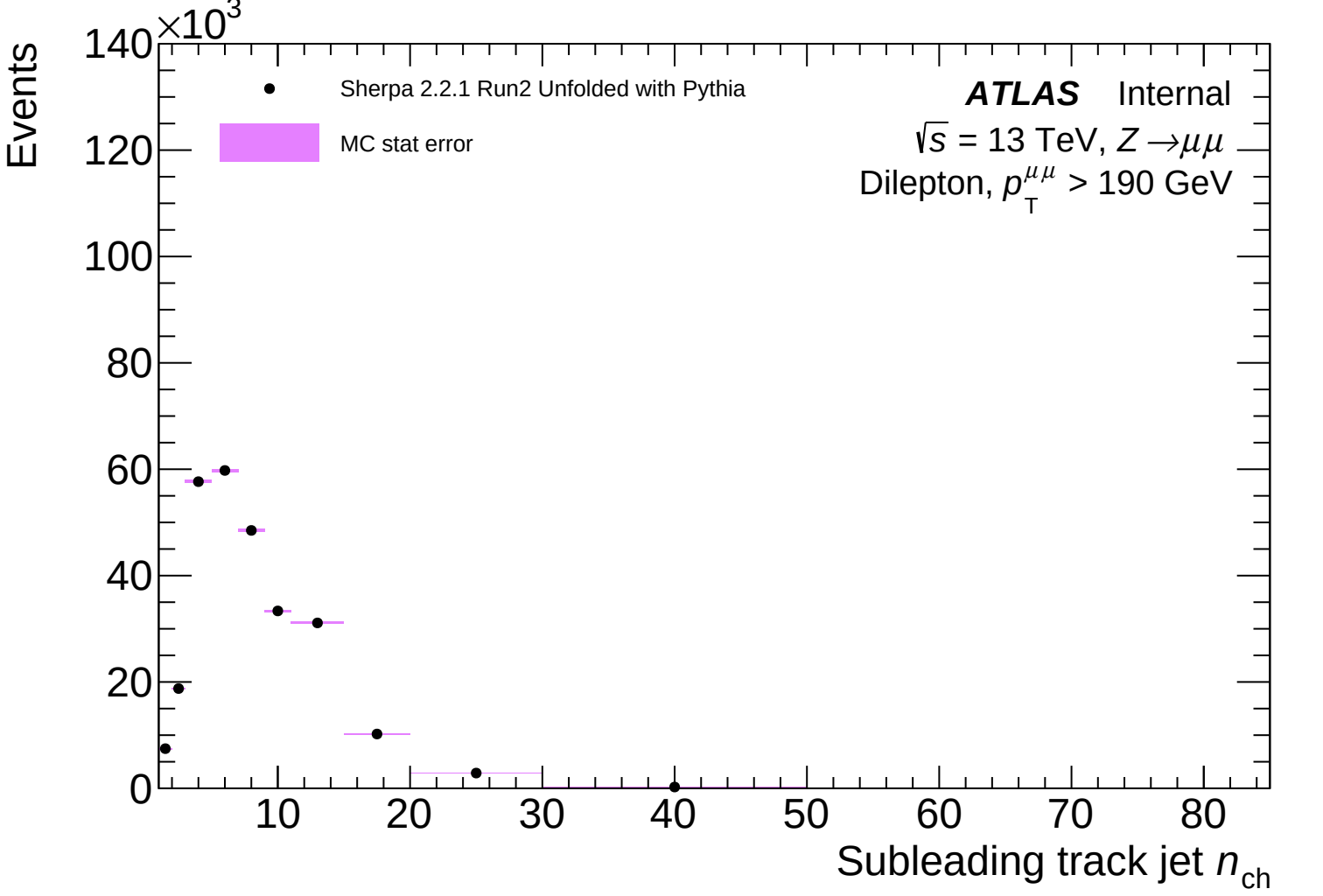
30
40
50
60
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Track systematic errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
140
120
100
80
60
40
20
0
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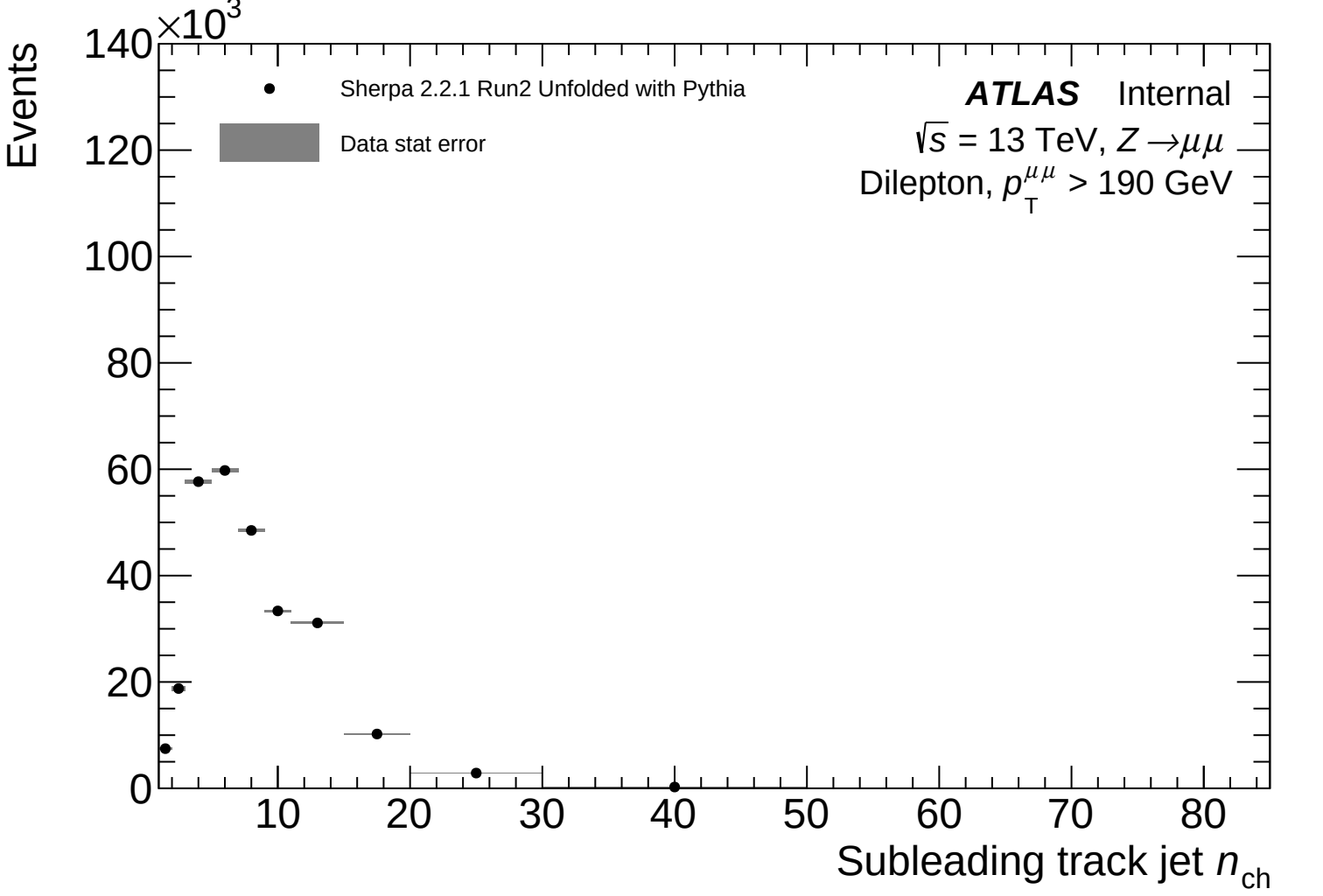
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
MC stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
140
120
100
80
60
40
20
0
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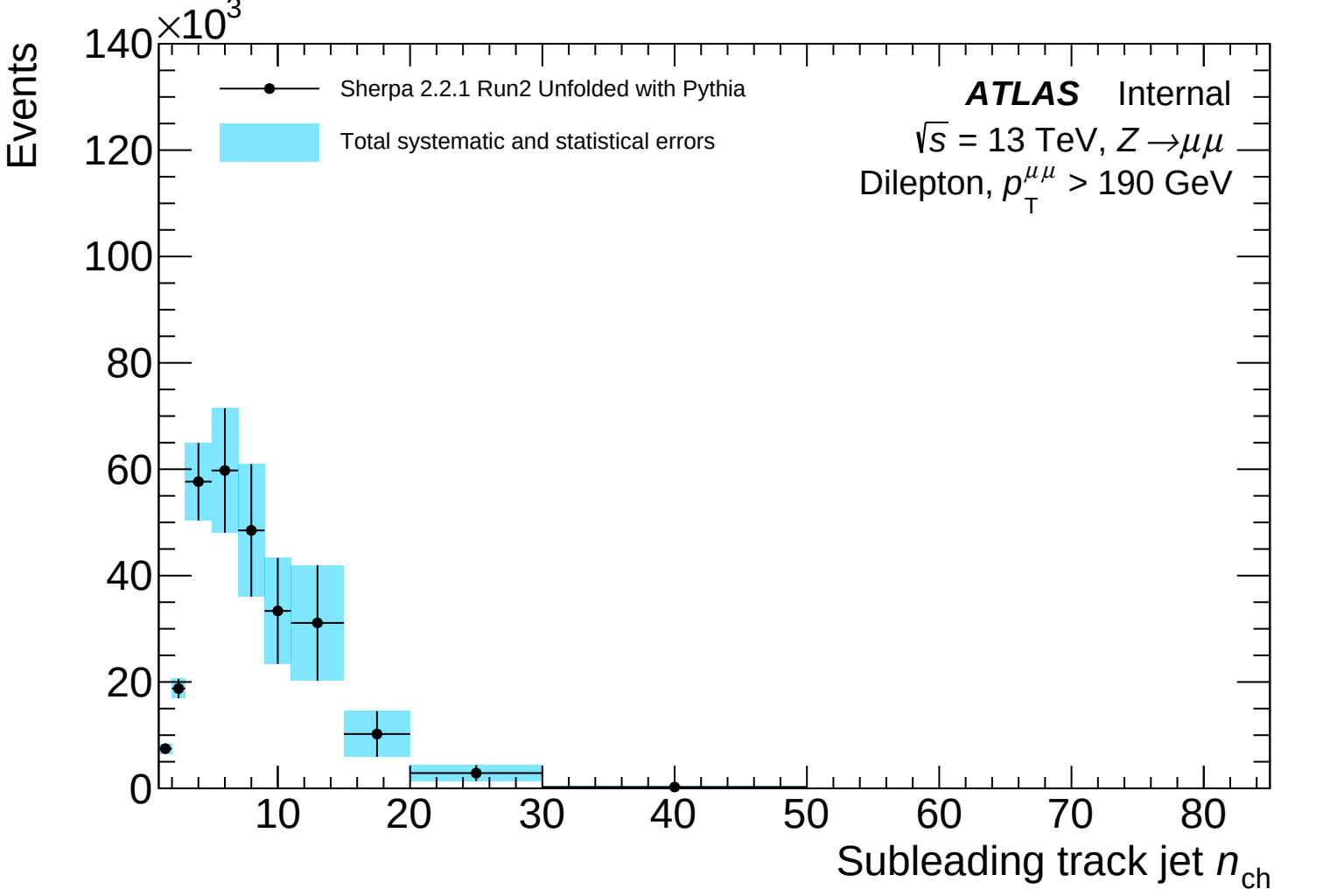
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Data stat error
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Events
×10^3
140
120
100
80
60
40
20
0
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30
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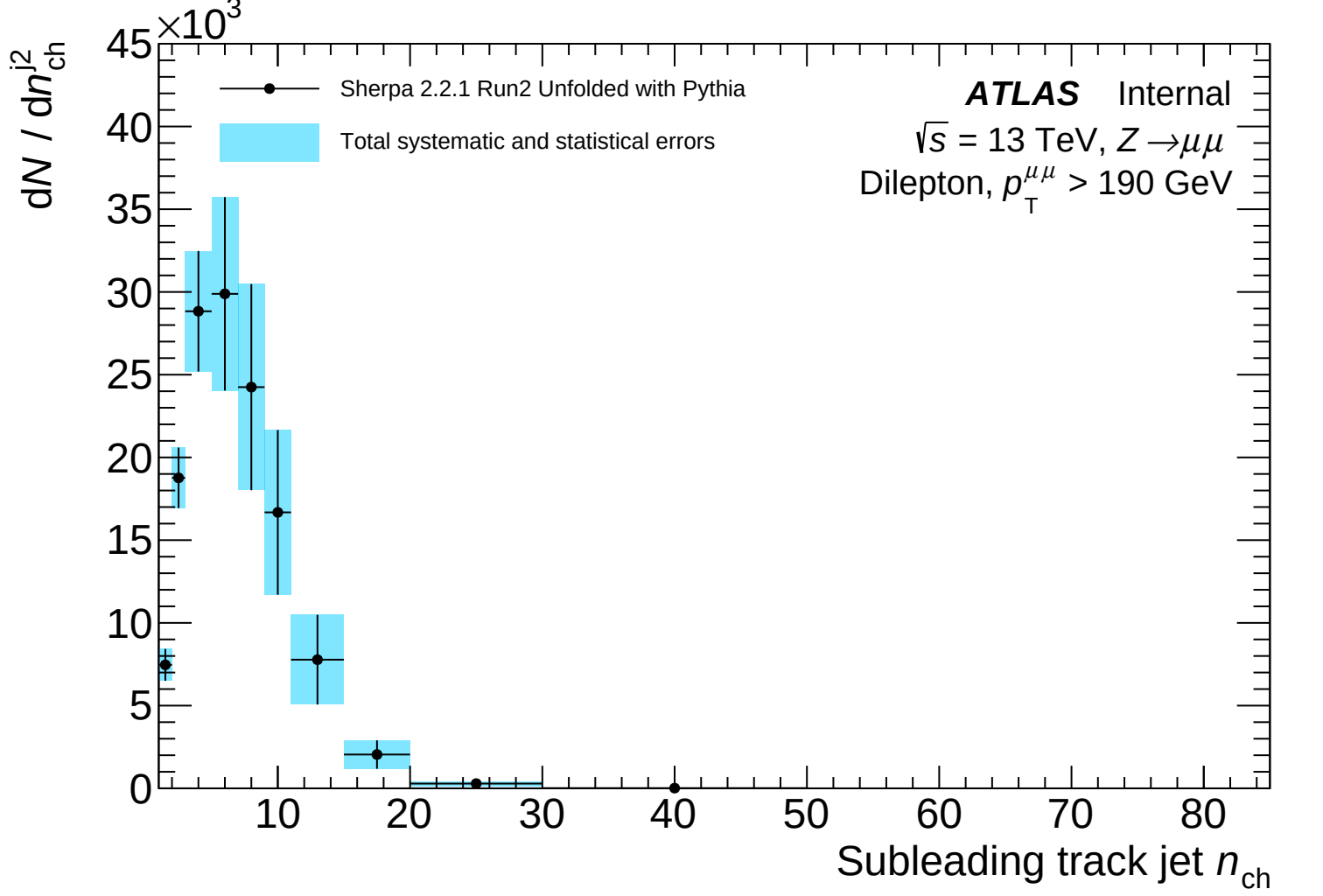
60
70
80
Subleading track jet n_{ch}
Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
$\sqrt{s}$ = 13 TeV, $Z \rightarrow \mu\mu$
Dilepton, $p_T^{\mu\mu}$ > 190 GeV


Sherpa 2.2.1 Run2 Unfolded with Pythia
Total systematic and statistical errors
ATLAS Internal
√s = 13 TeV, Z → μμ
Dilepton, p_T^μμ > 190 GeV
dN / dn_ch^j2
×10^3
Subleading track jet n_ch
0
5
10
15
20
25
30
35
40
45
10
20
30
40
50
60
70
80