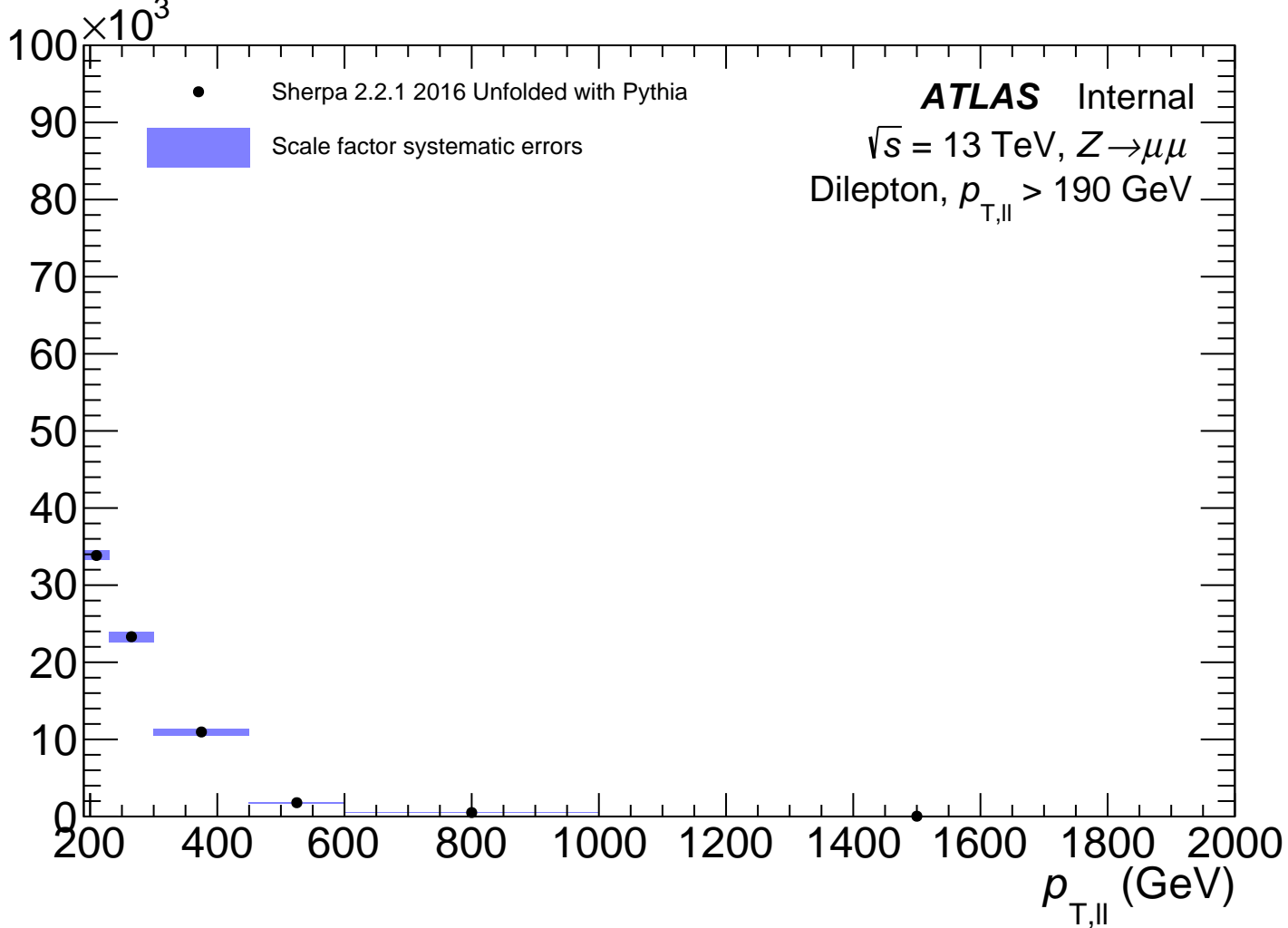
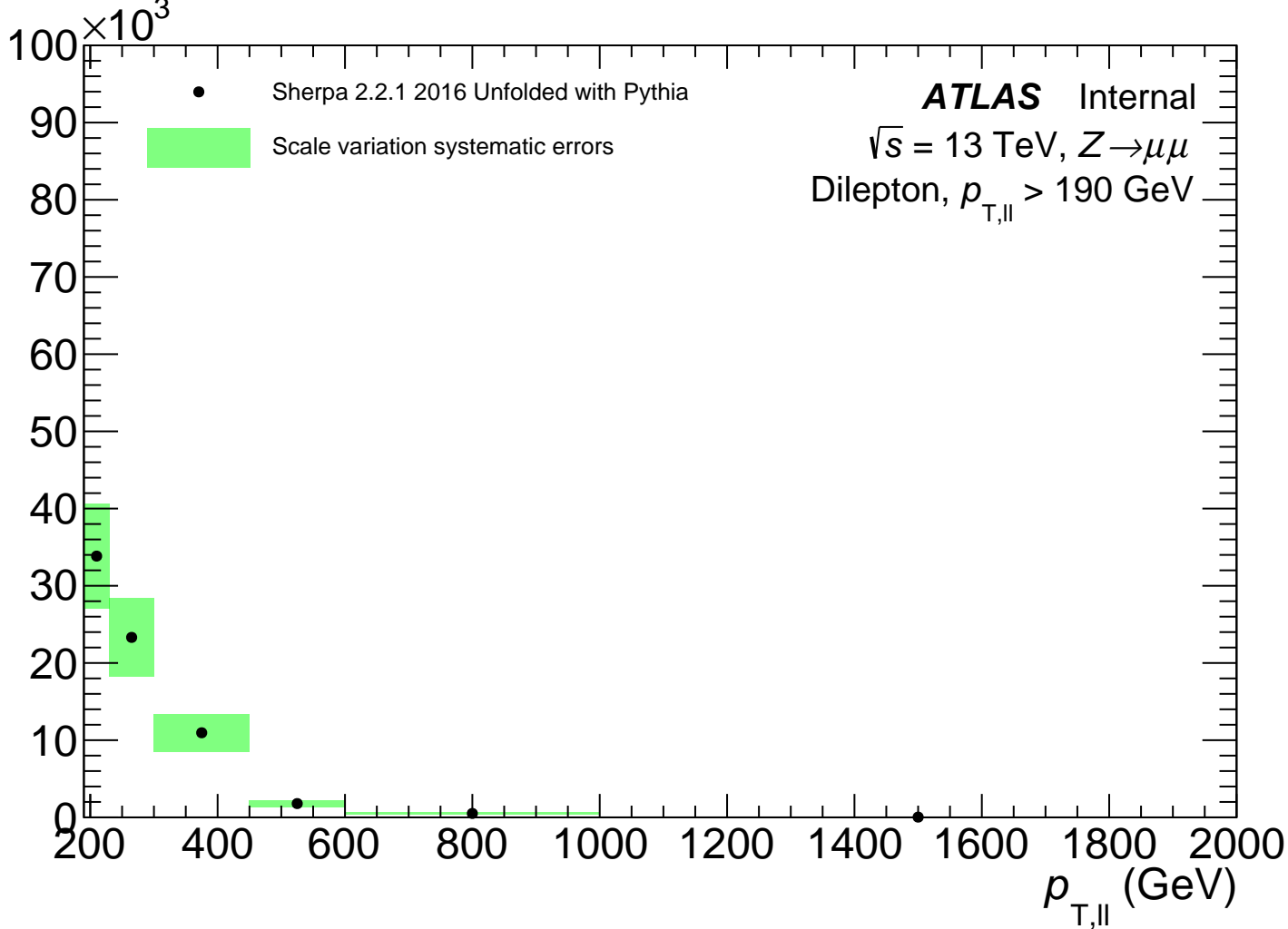


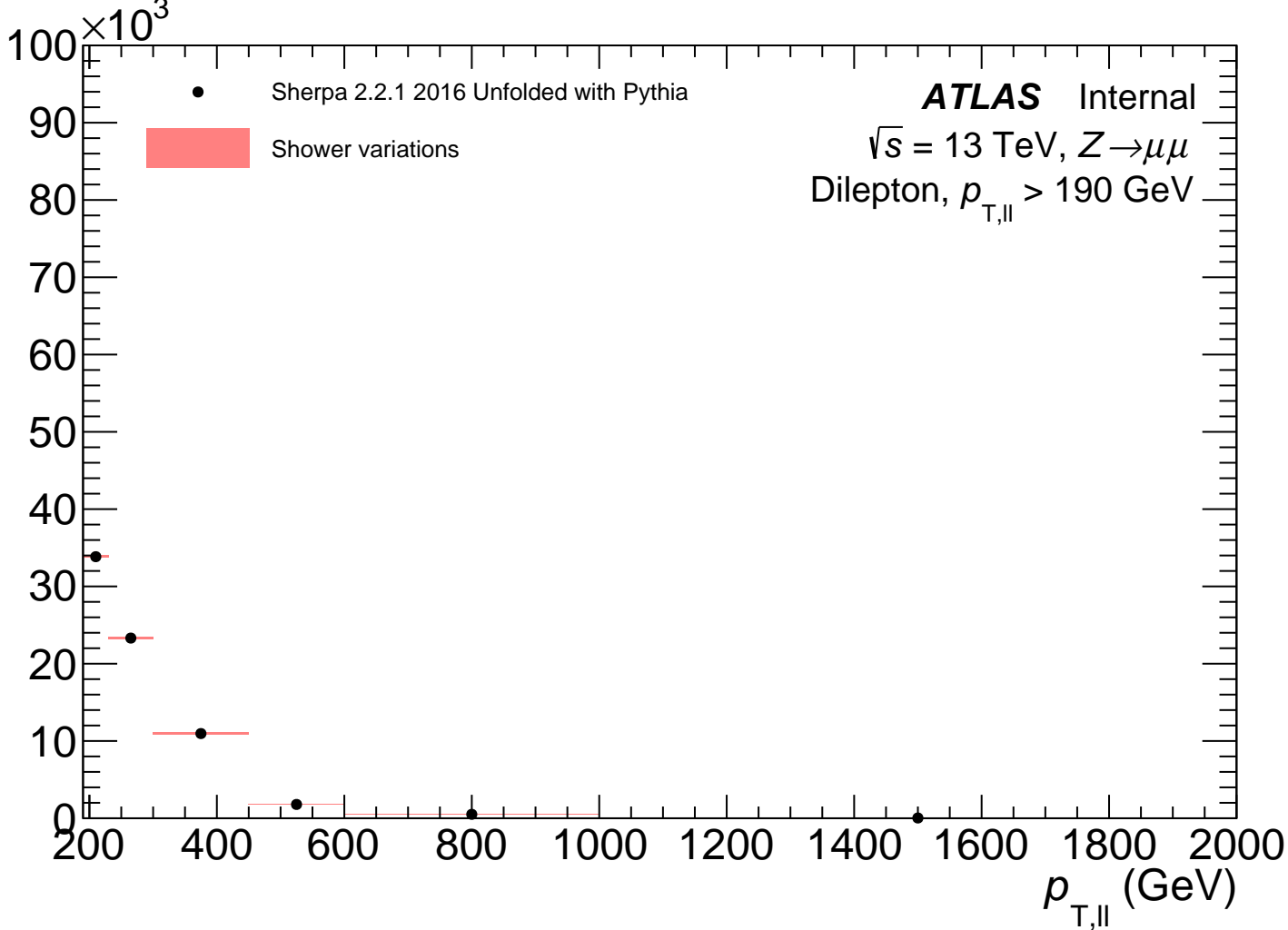
Events



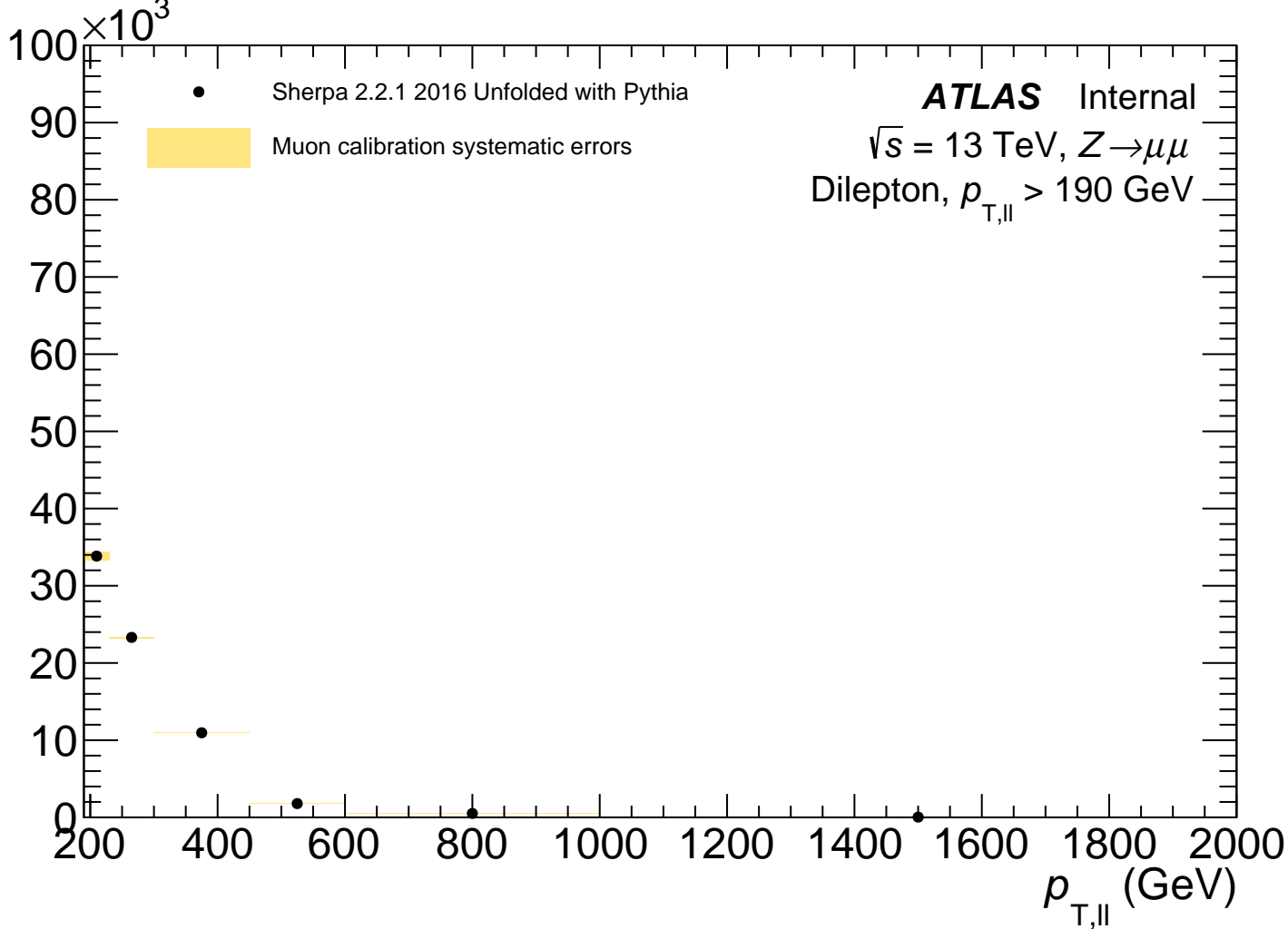
Events



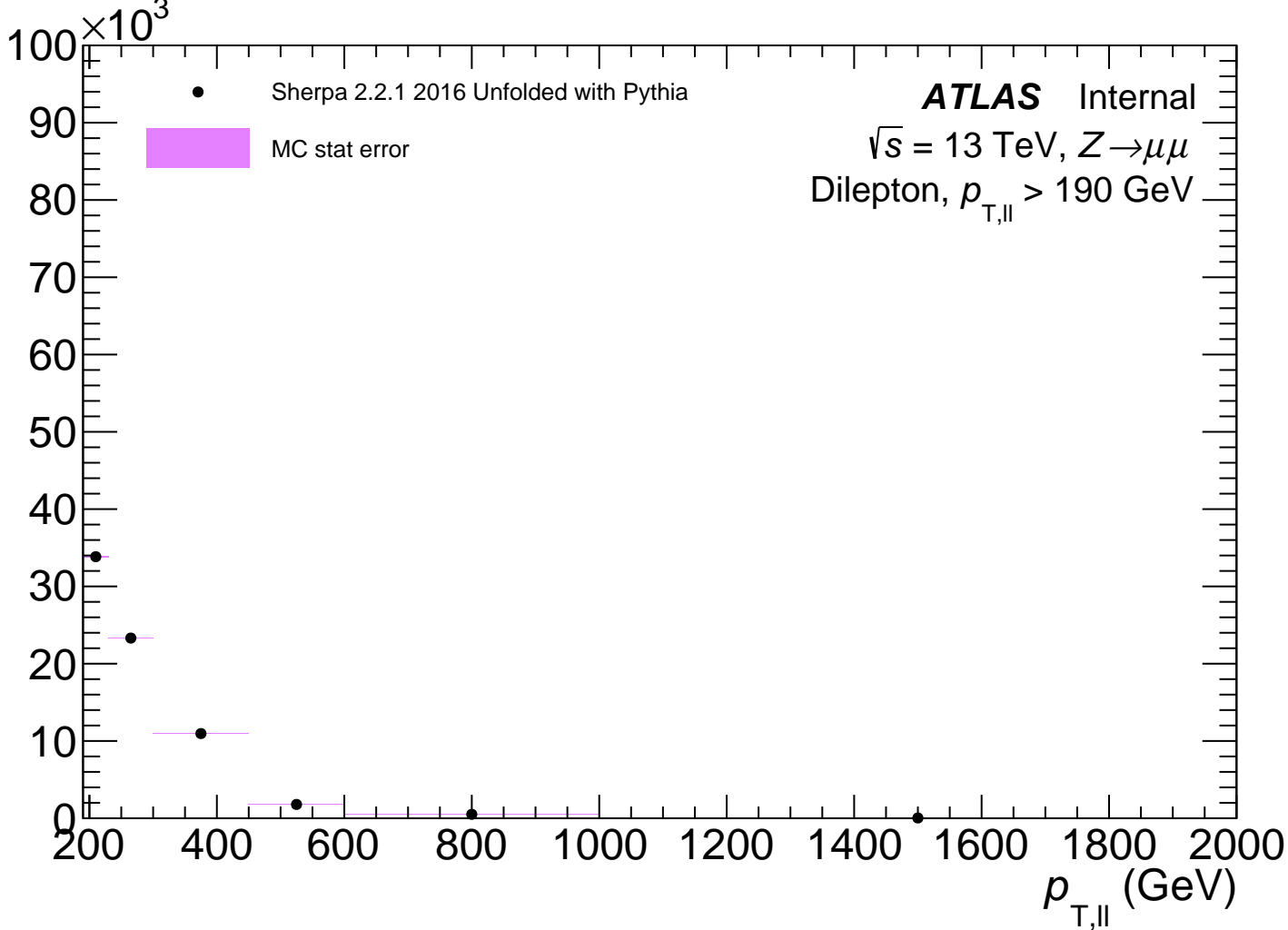
Events



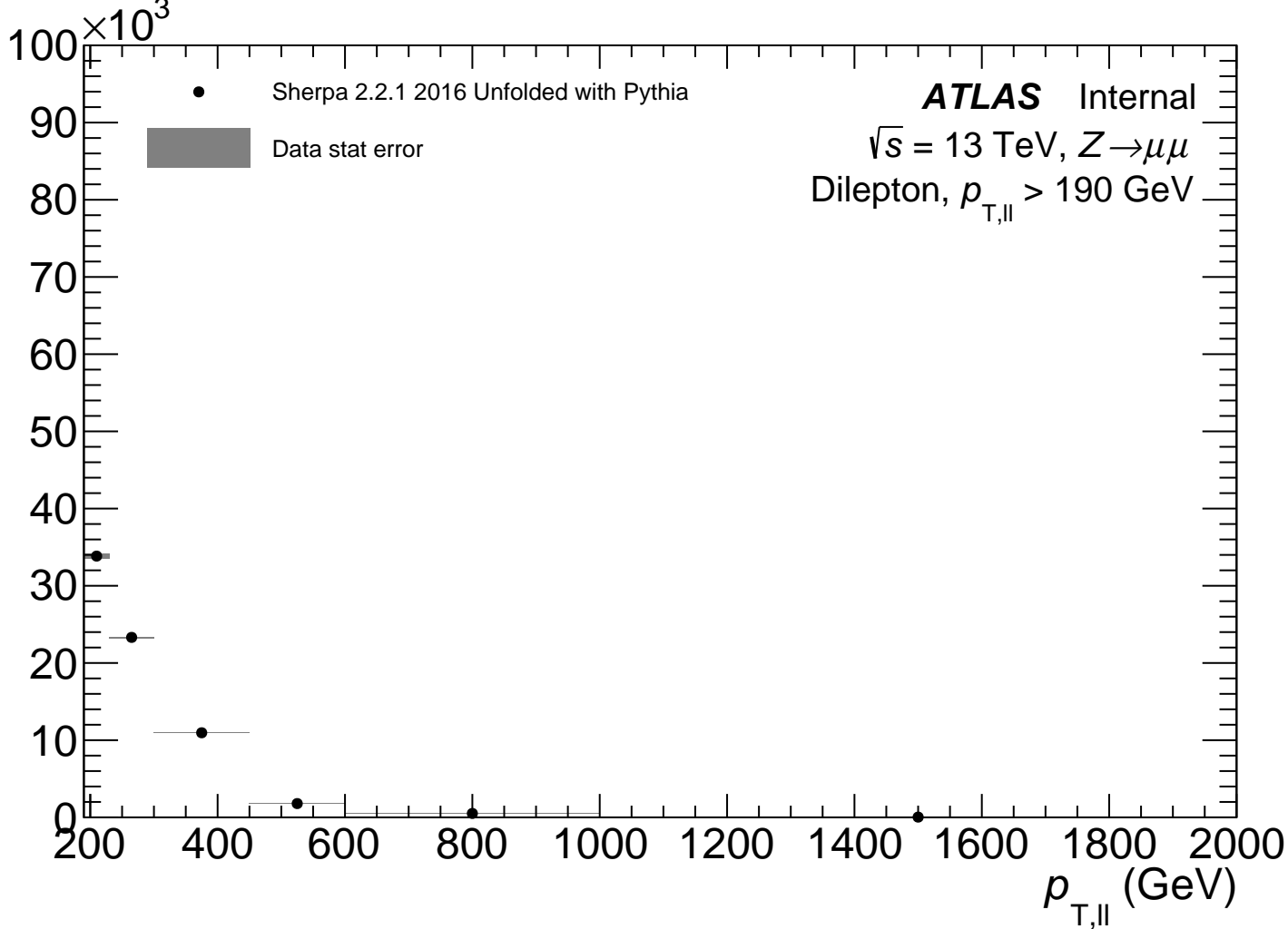
Events



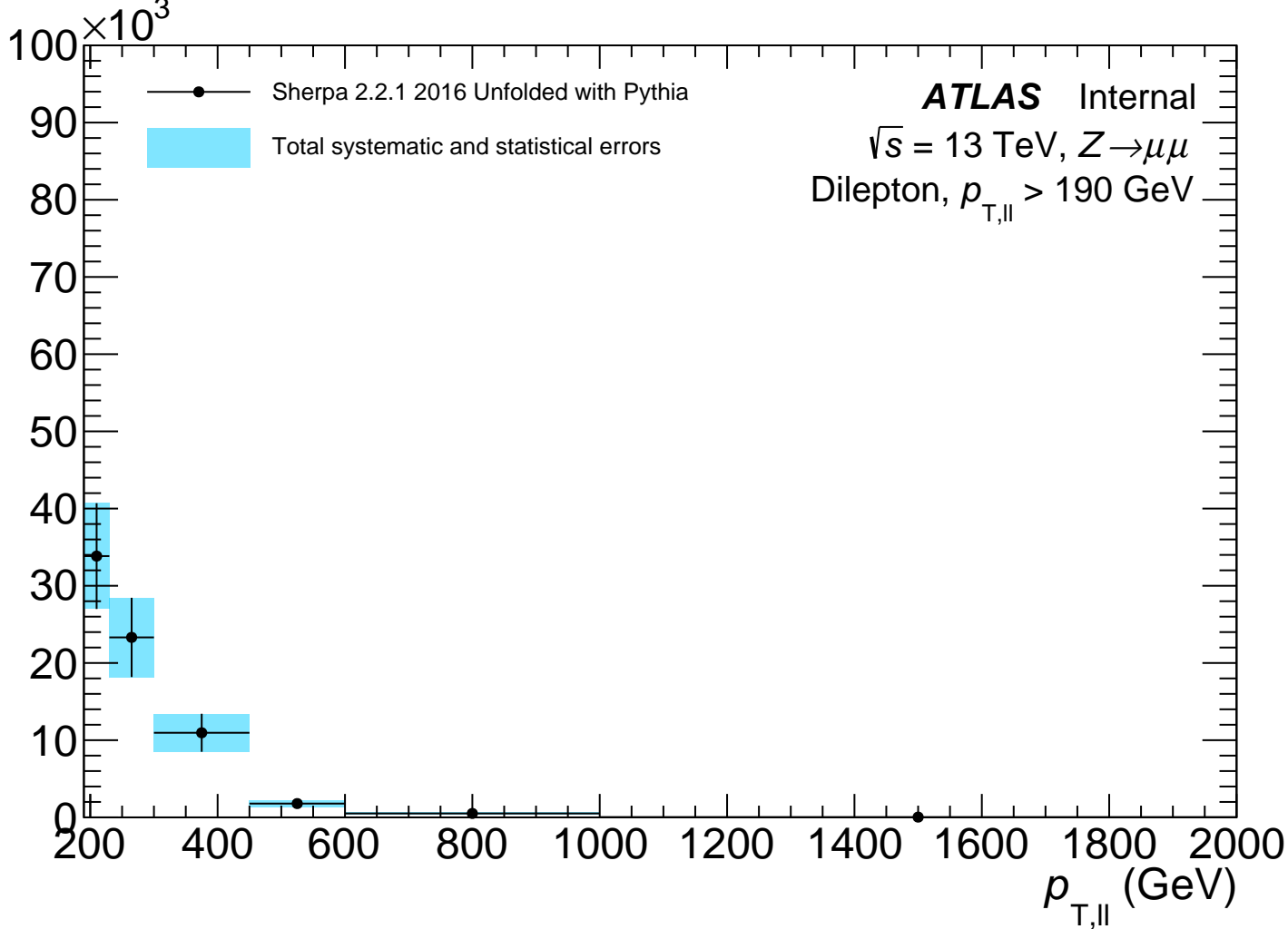
Events



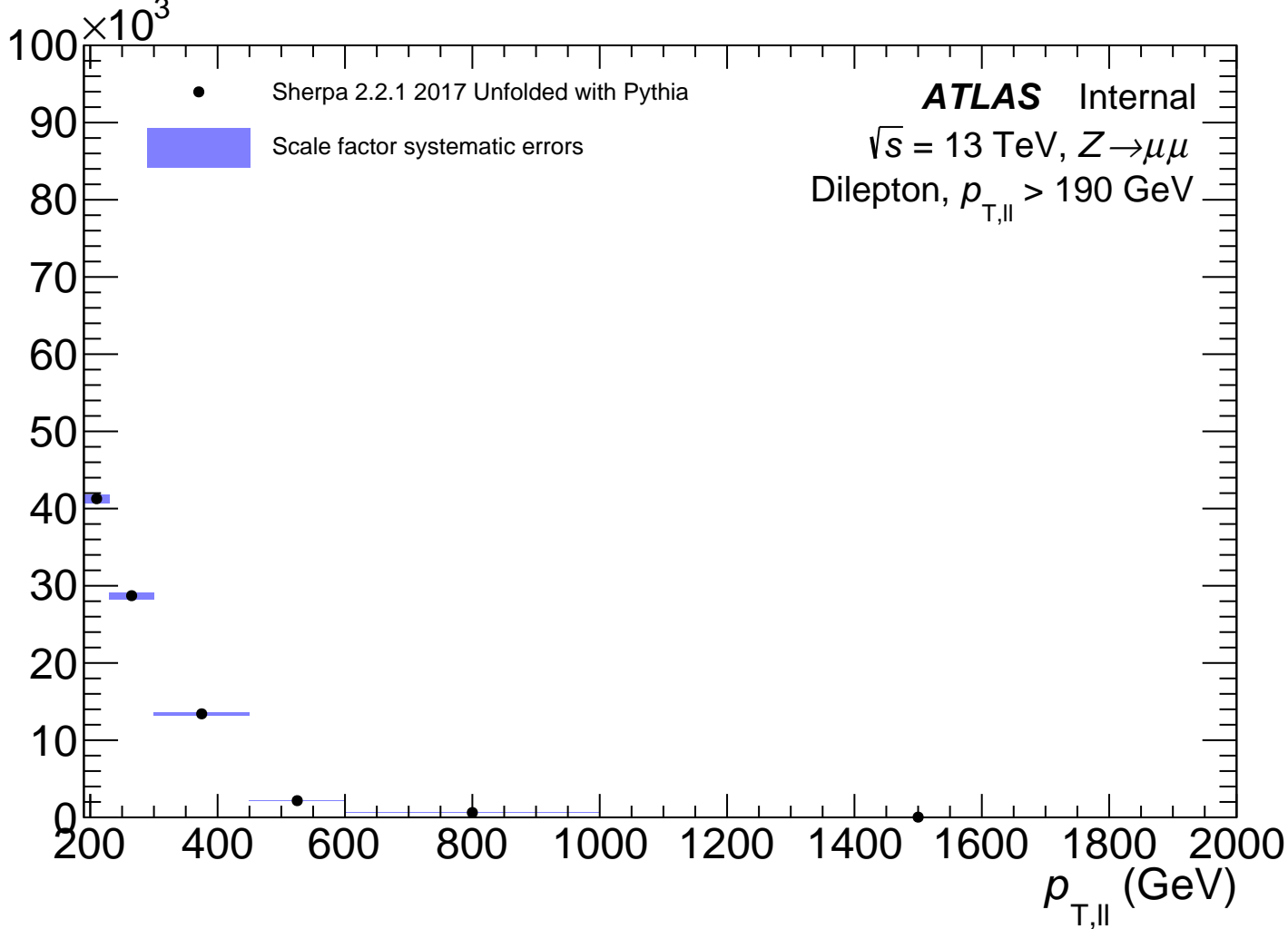
Events



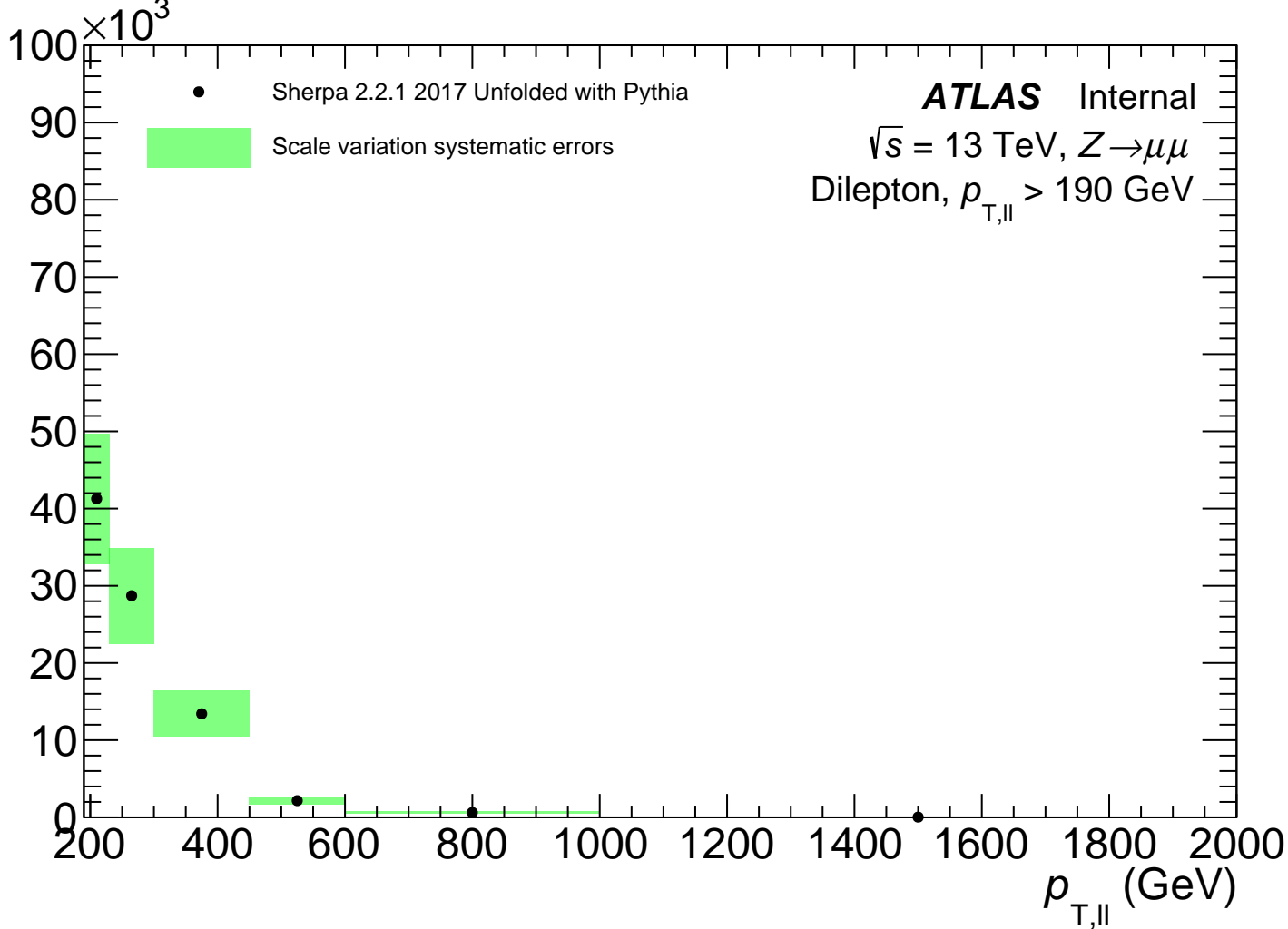
Events



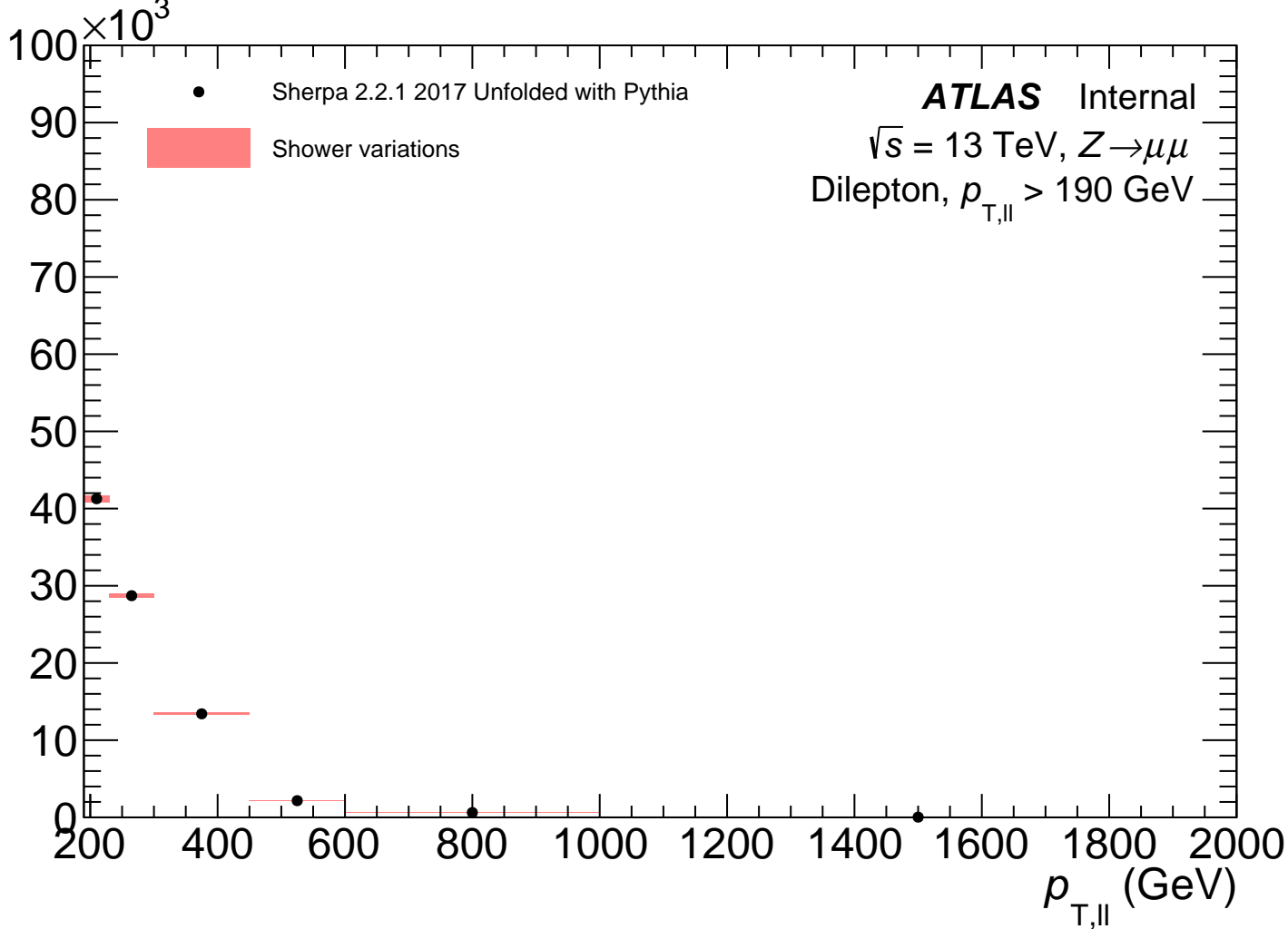
Events



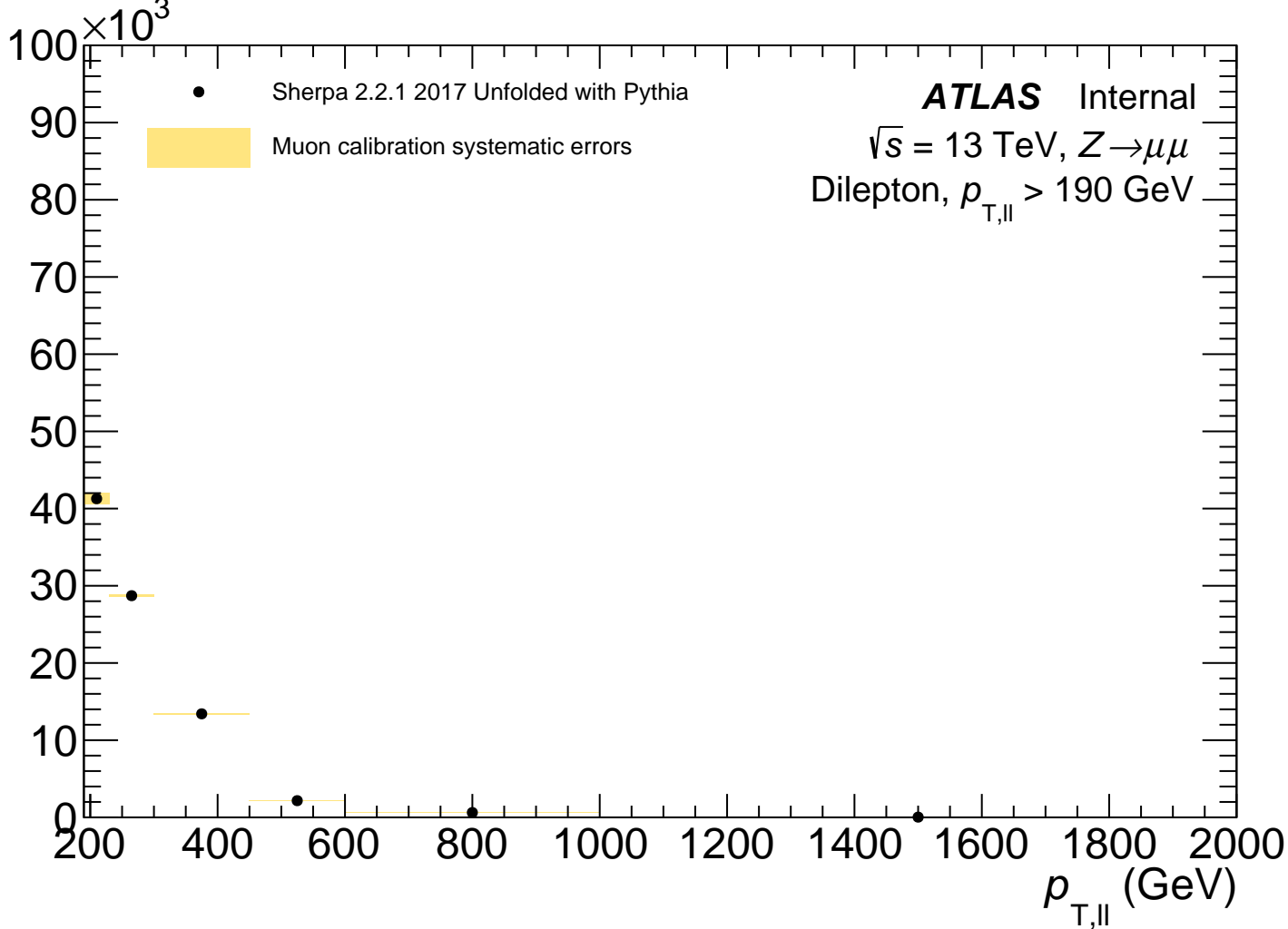
Events



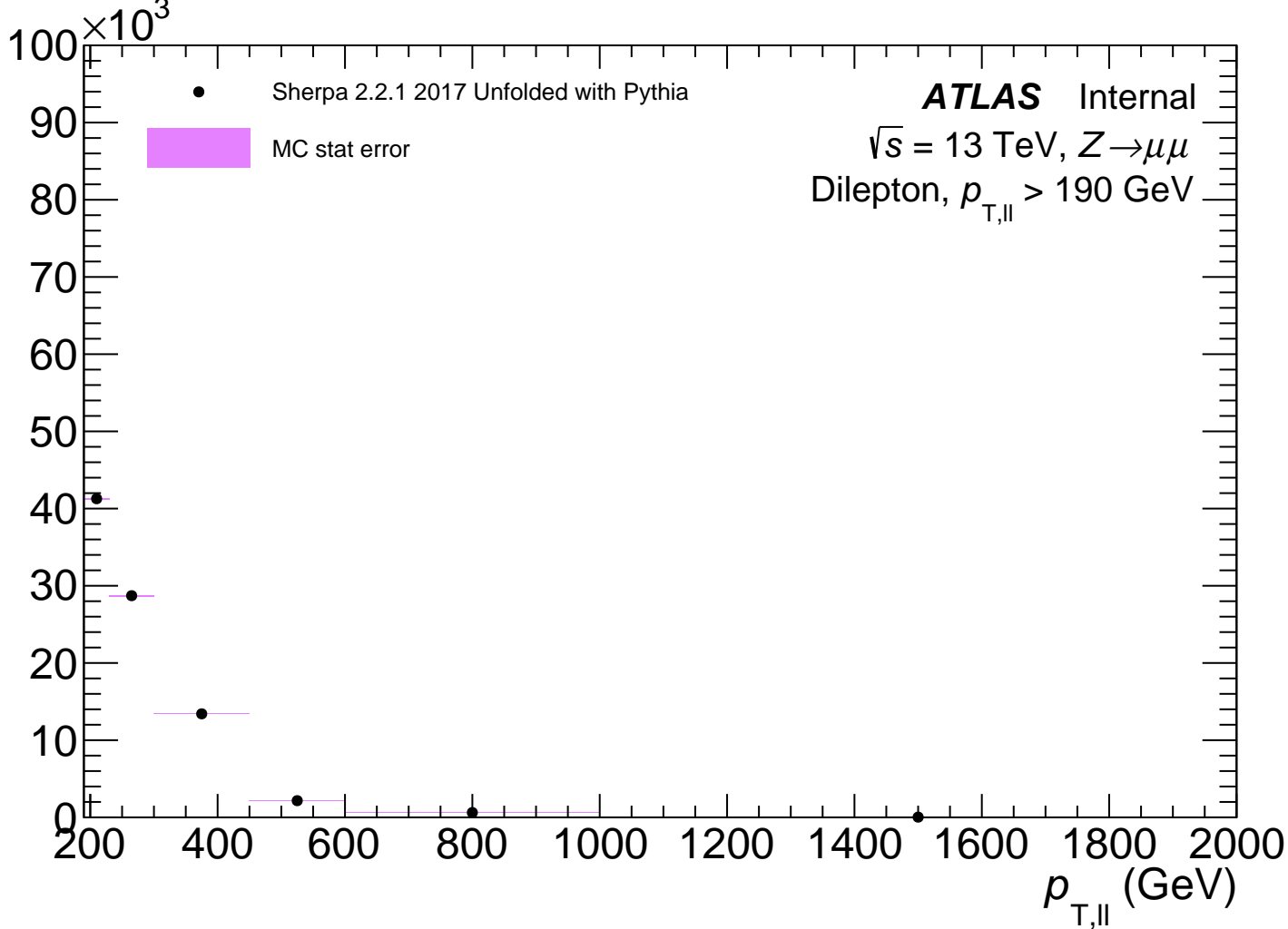
Events



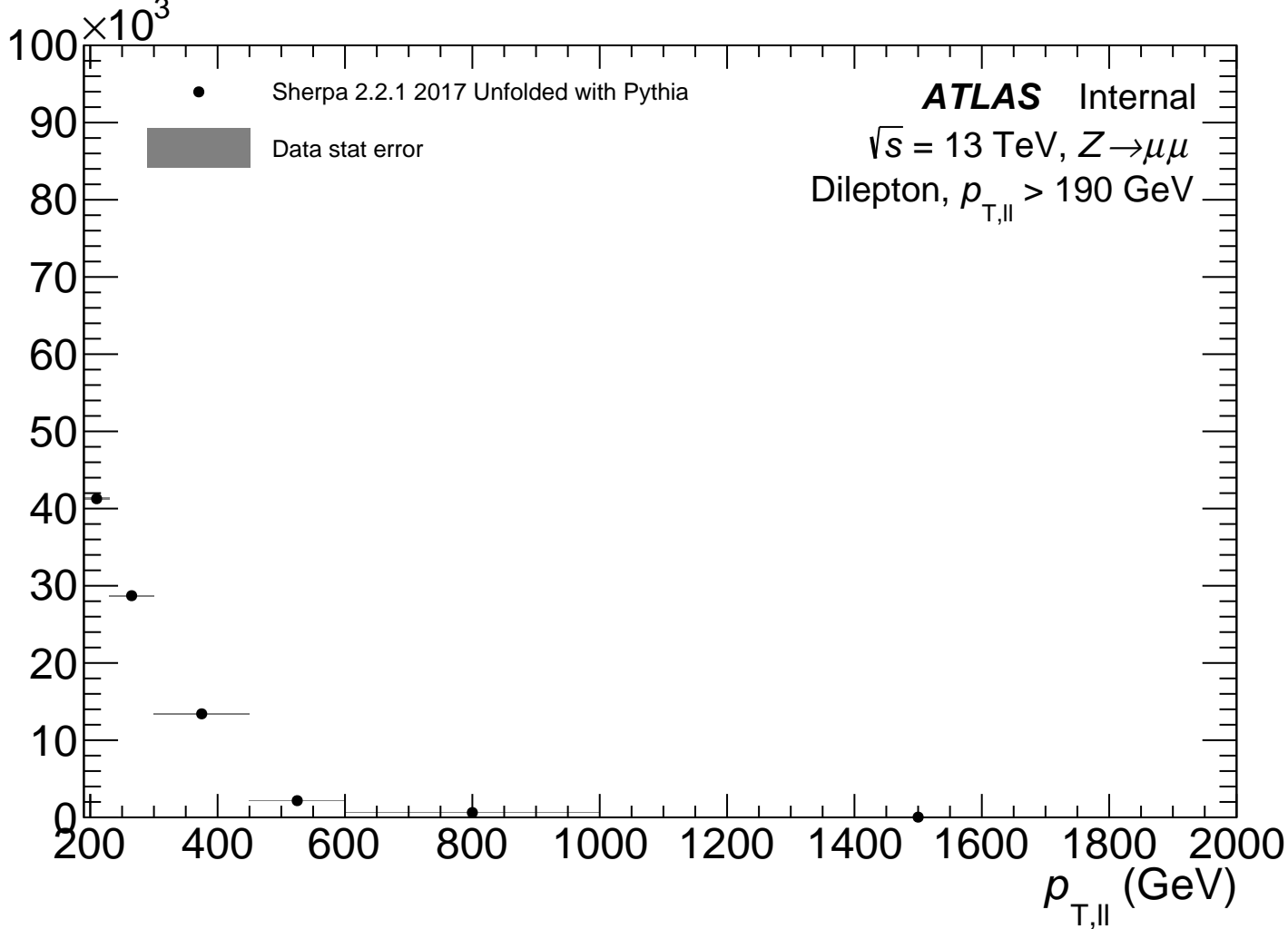
Events



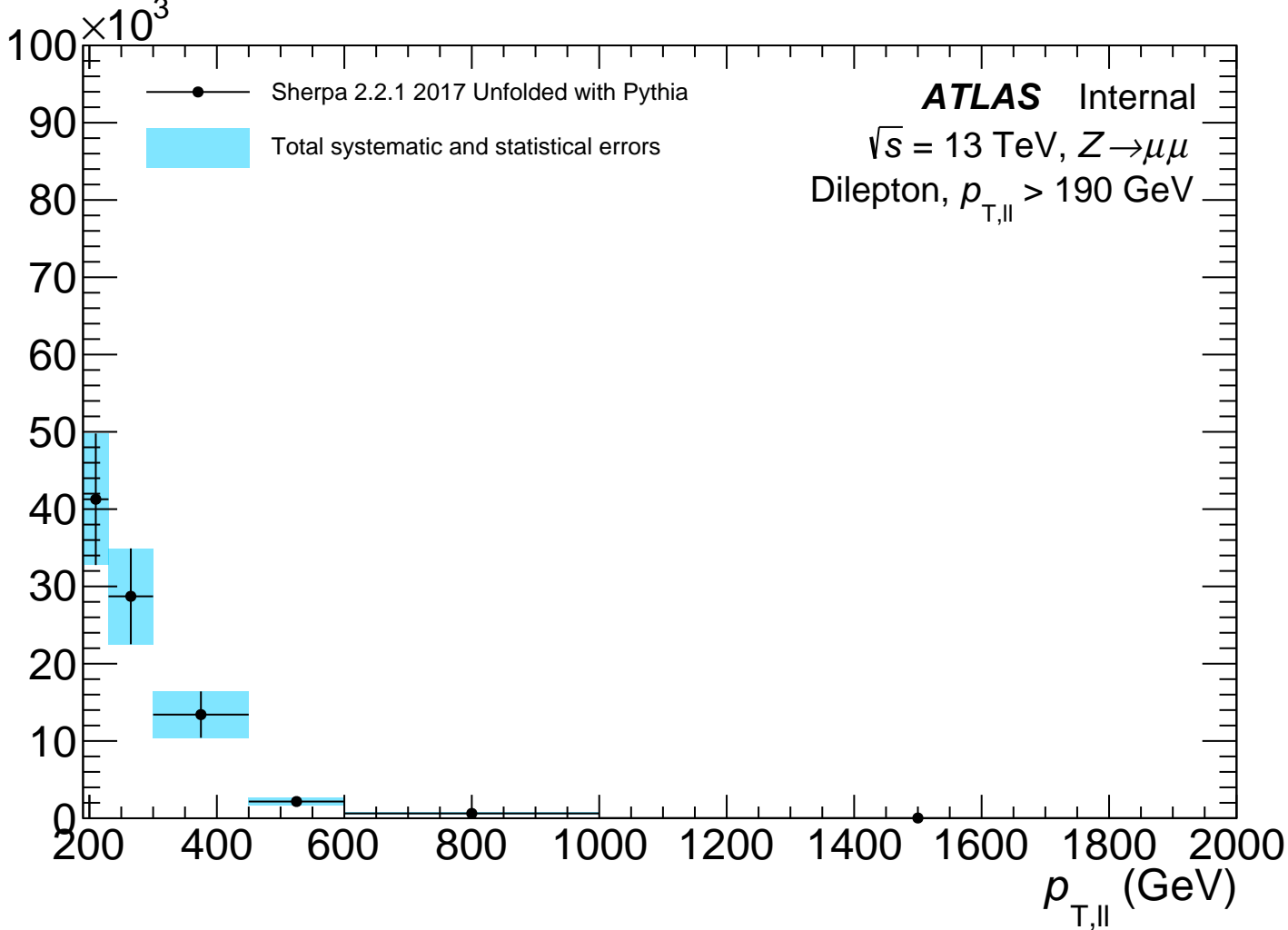
Events



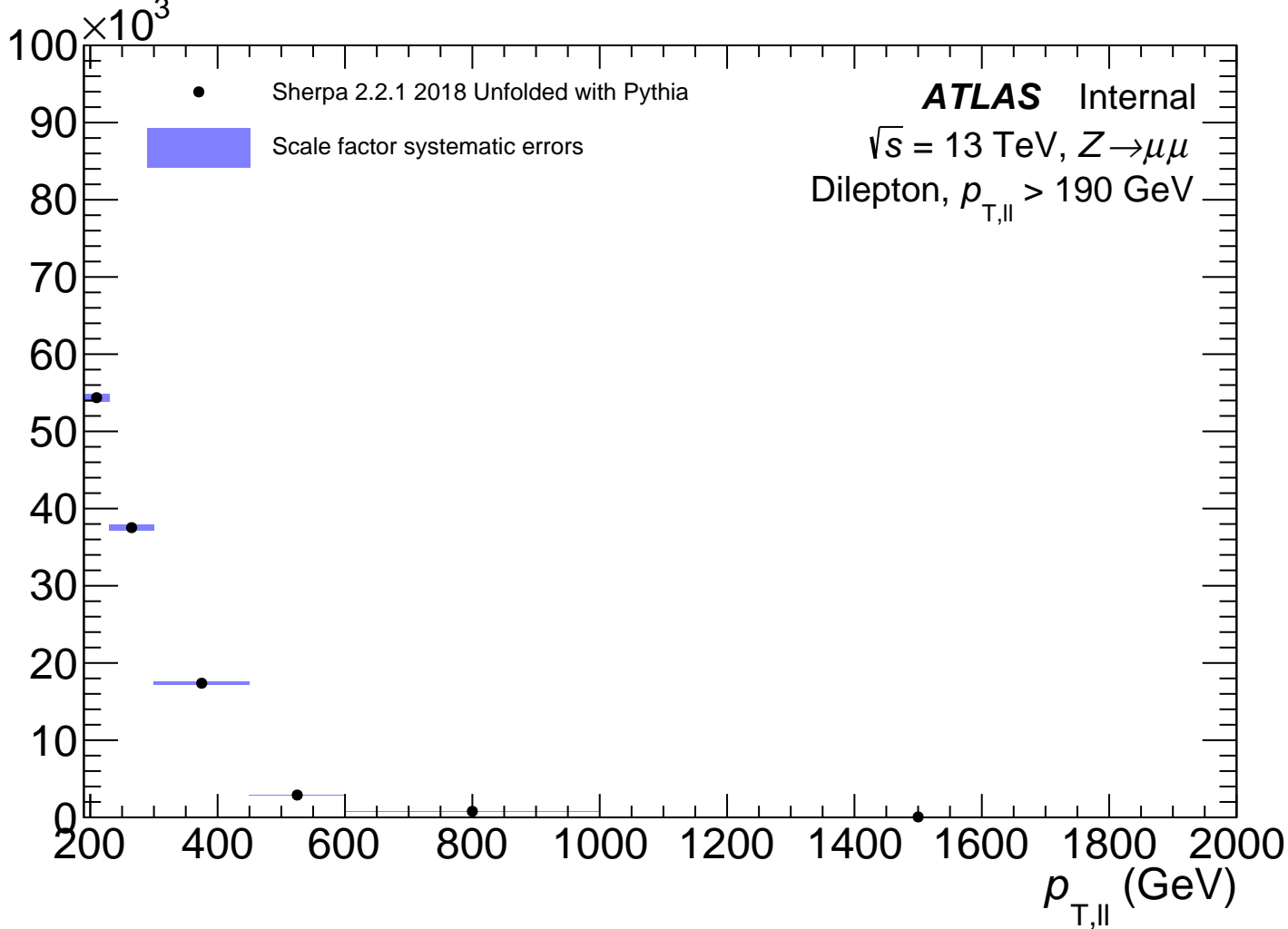
Events



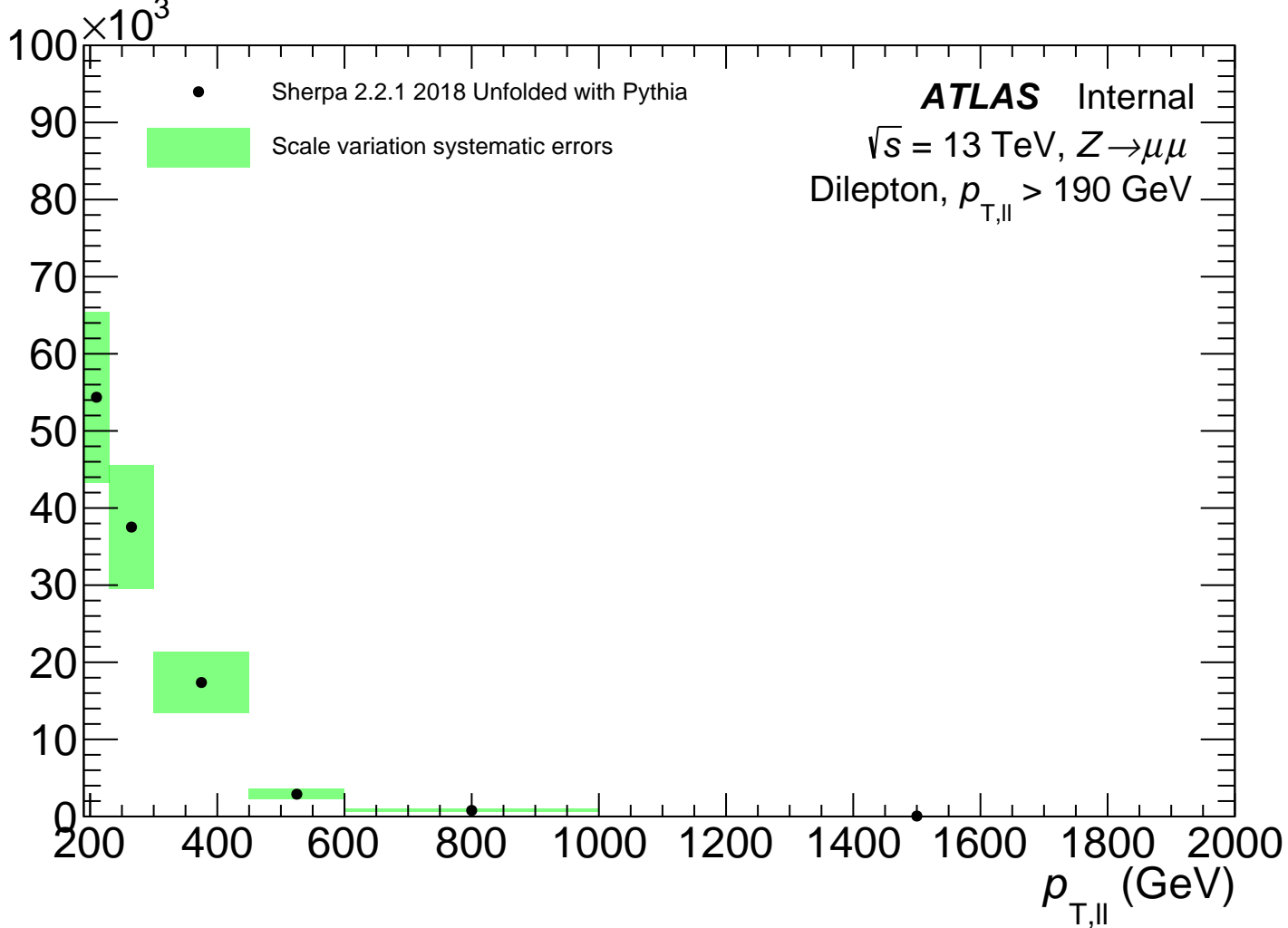
Events



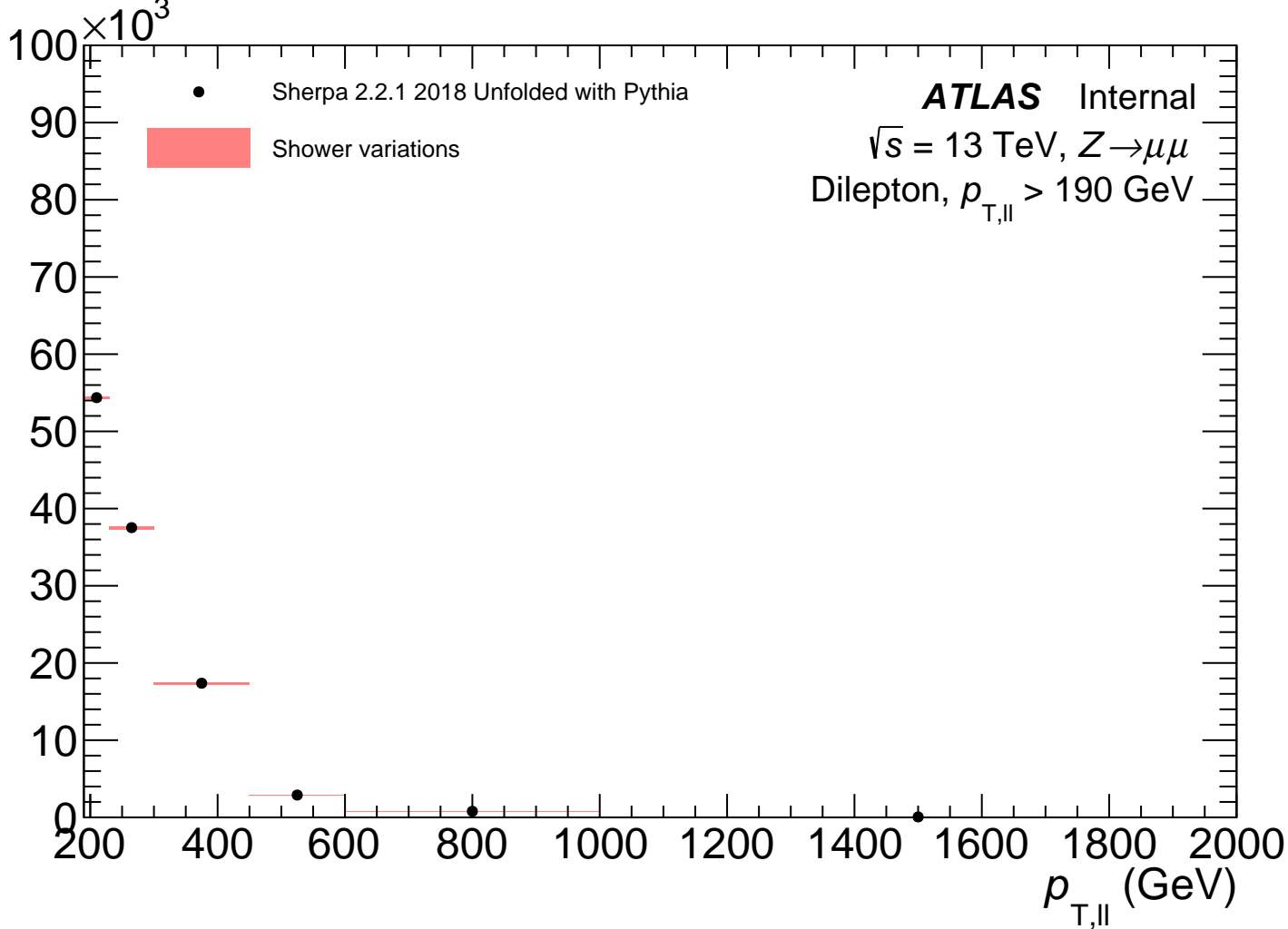
Events



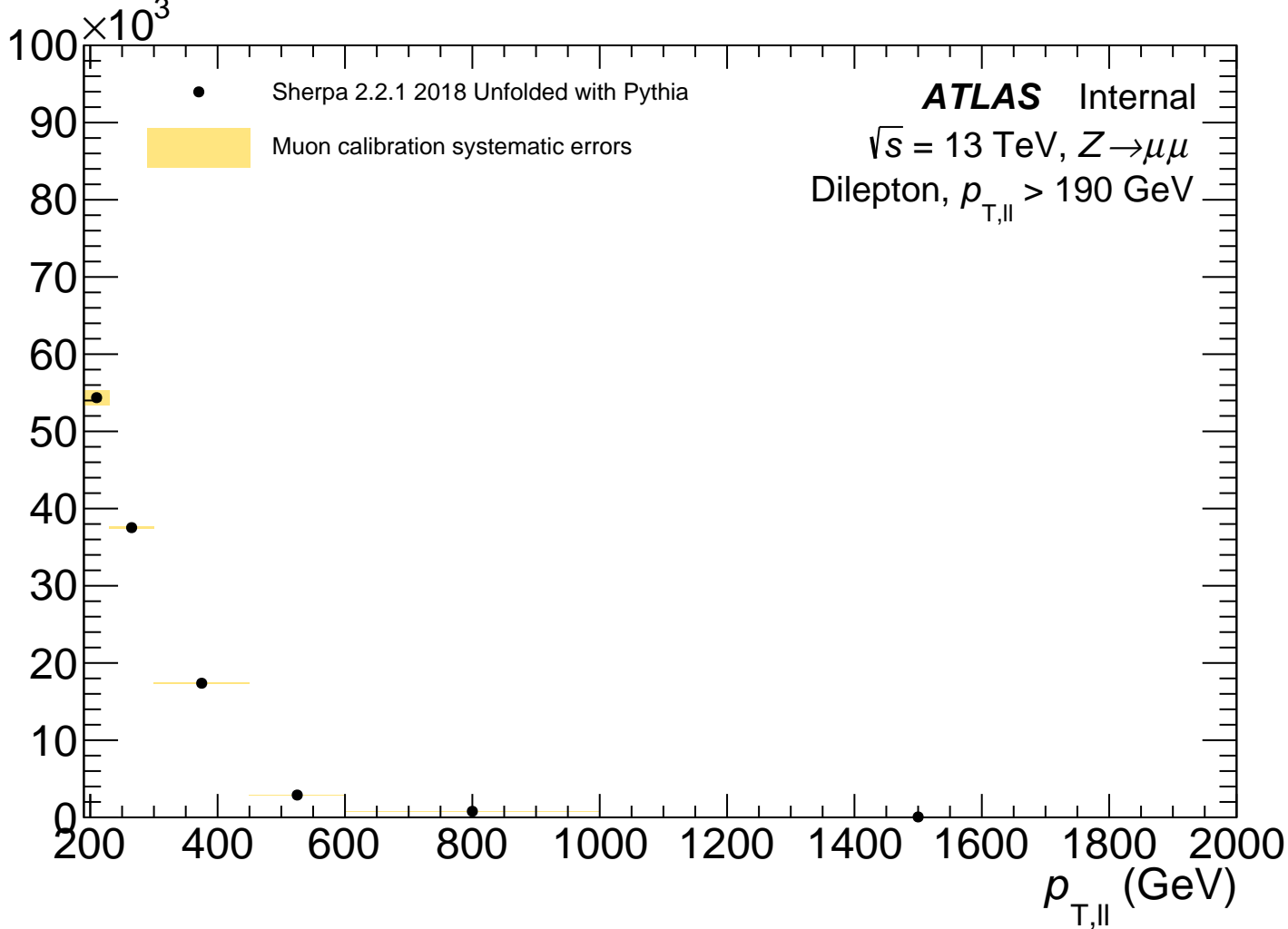
Events



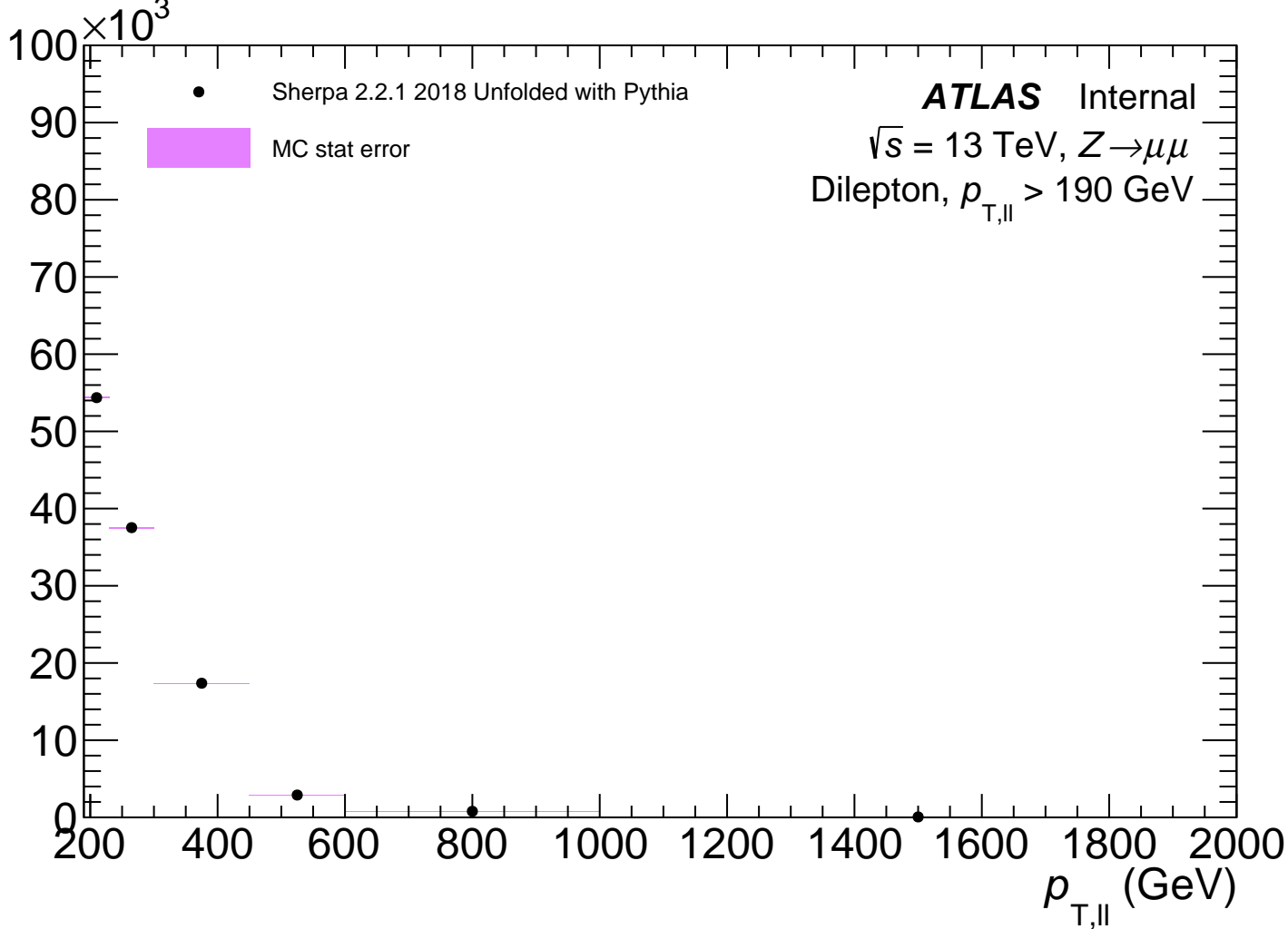
Events



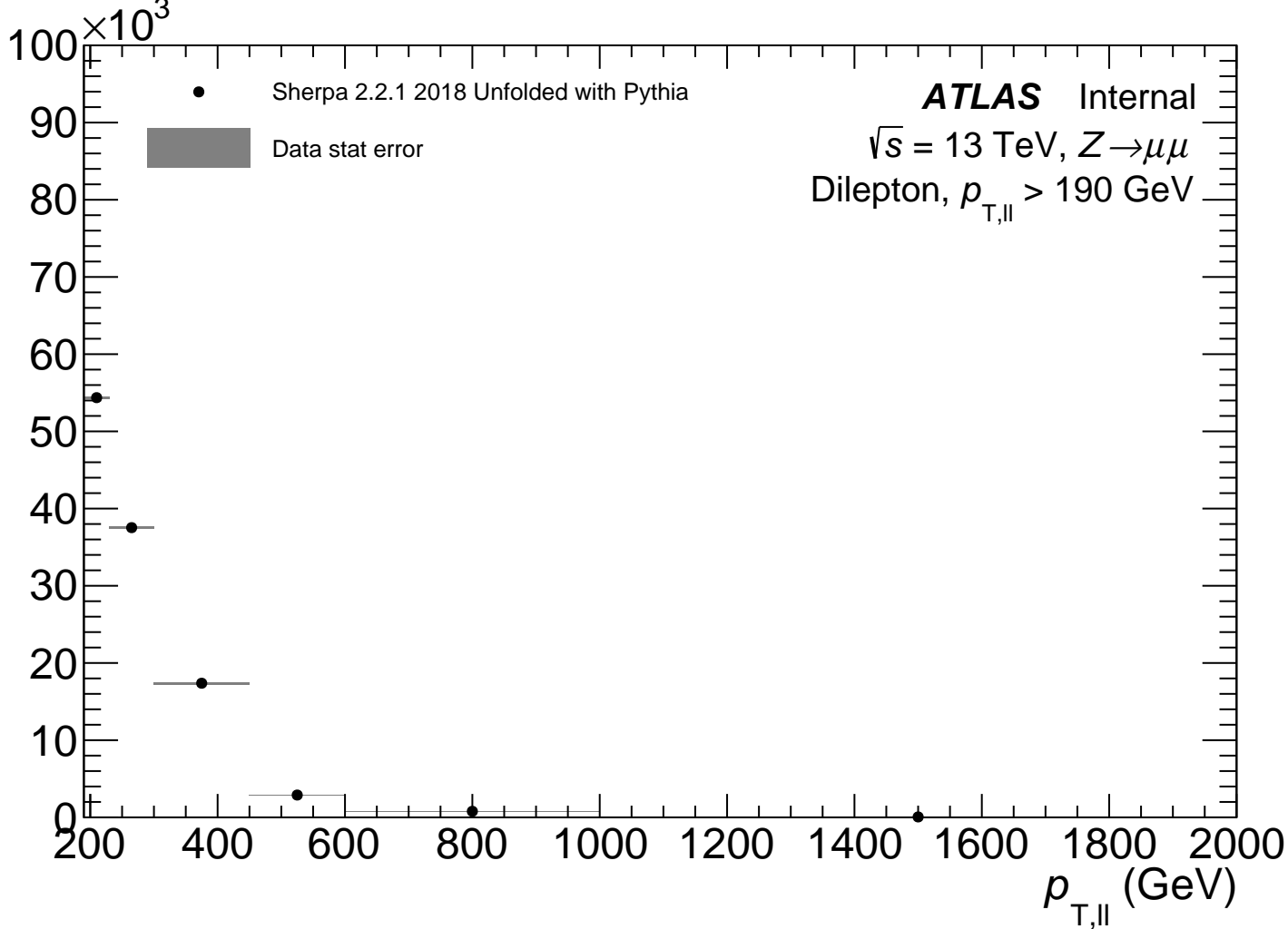
Events



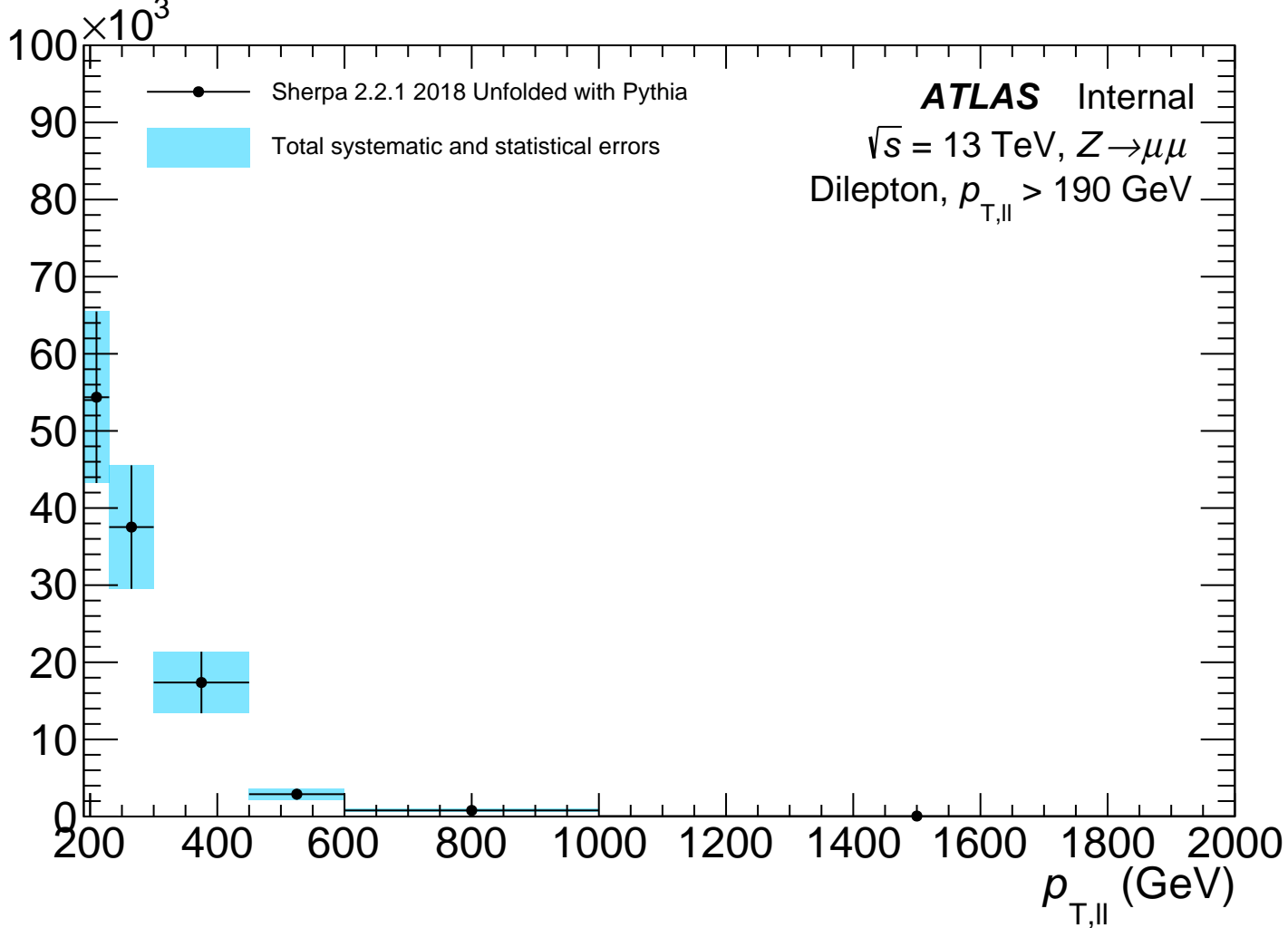
Events



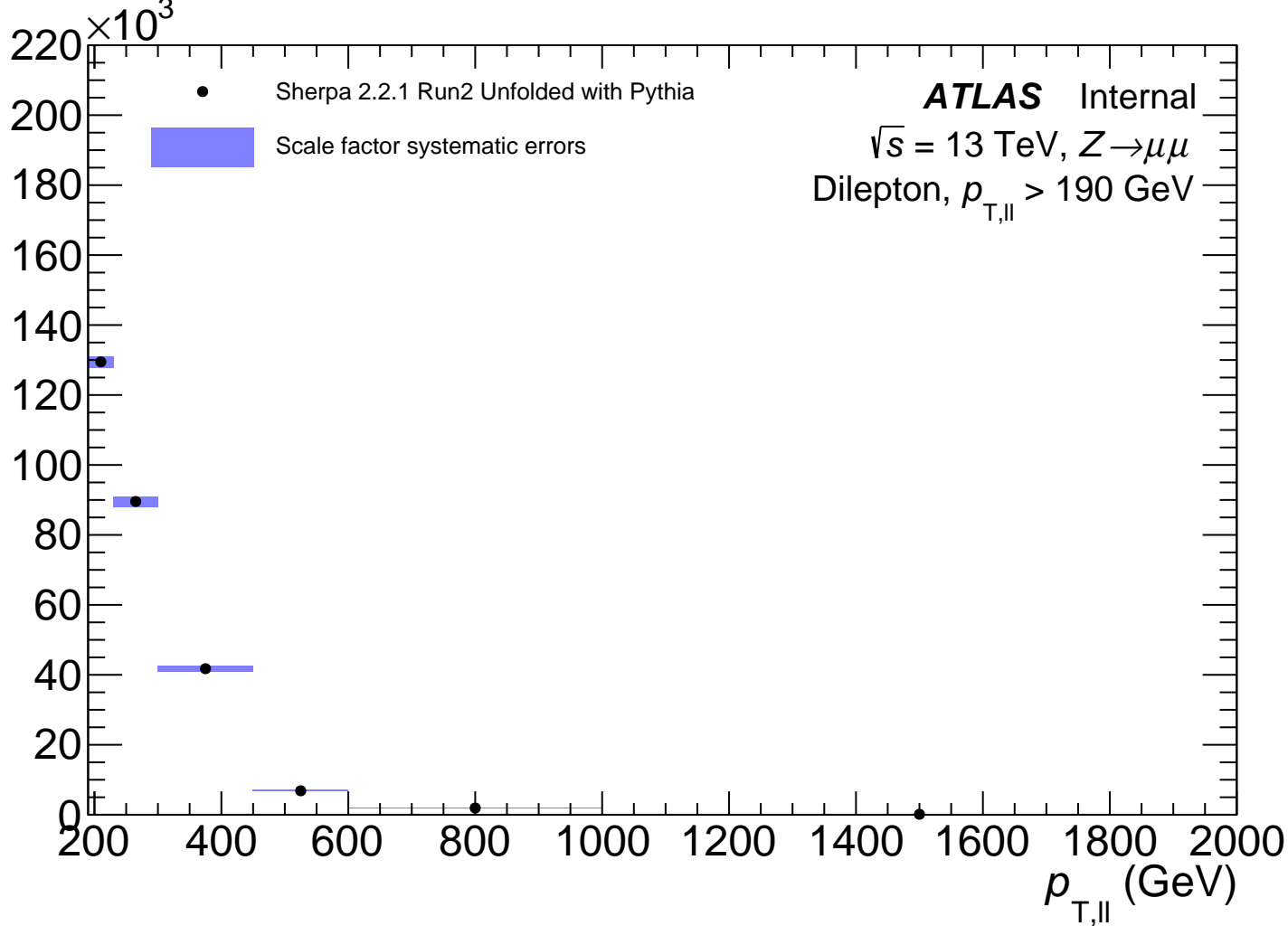
Events



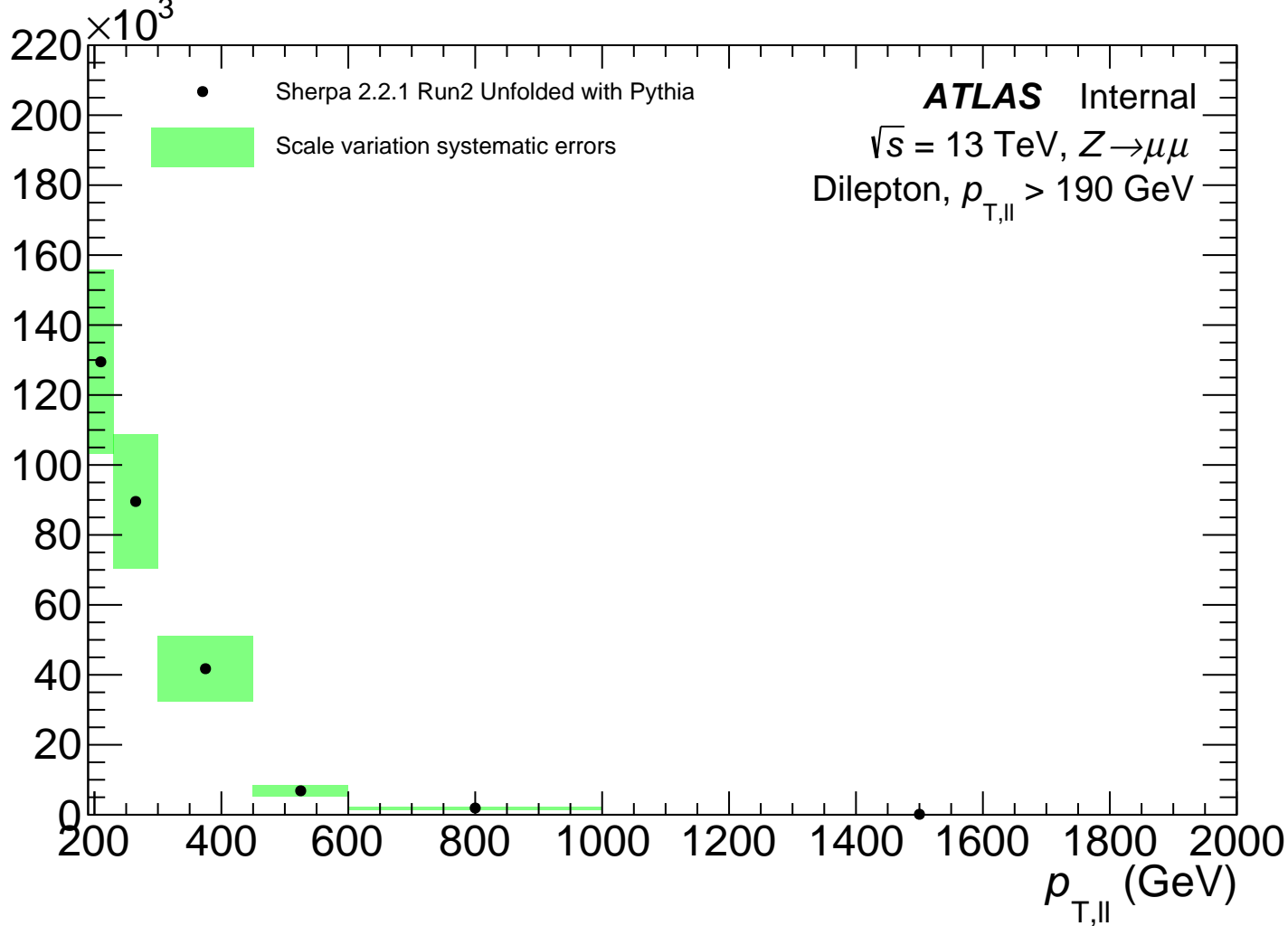
Events



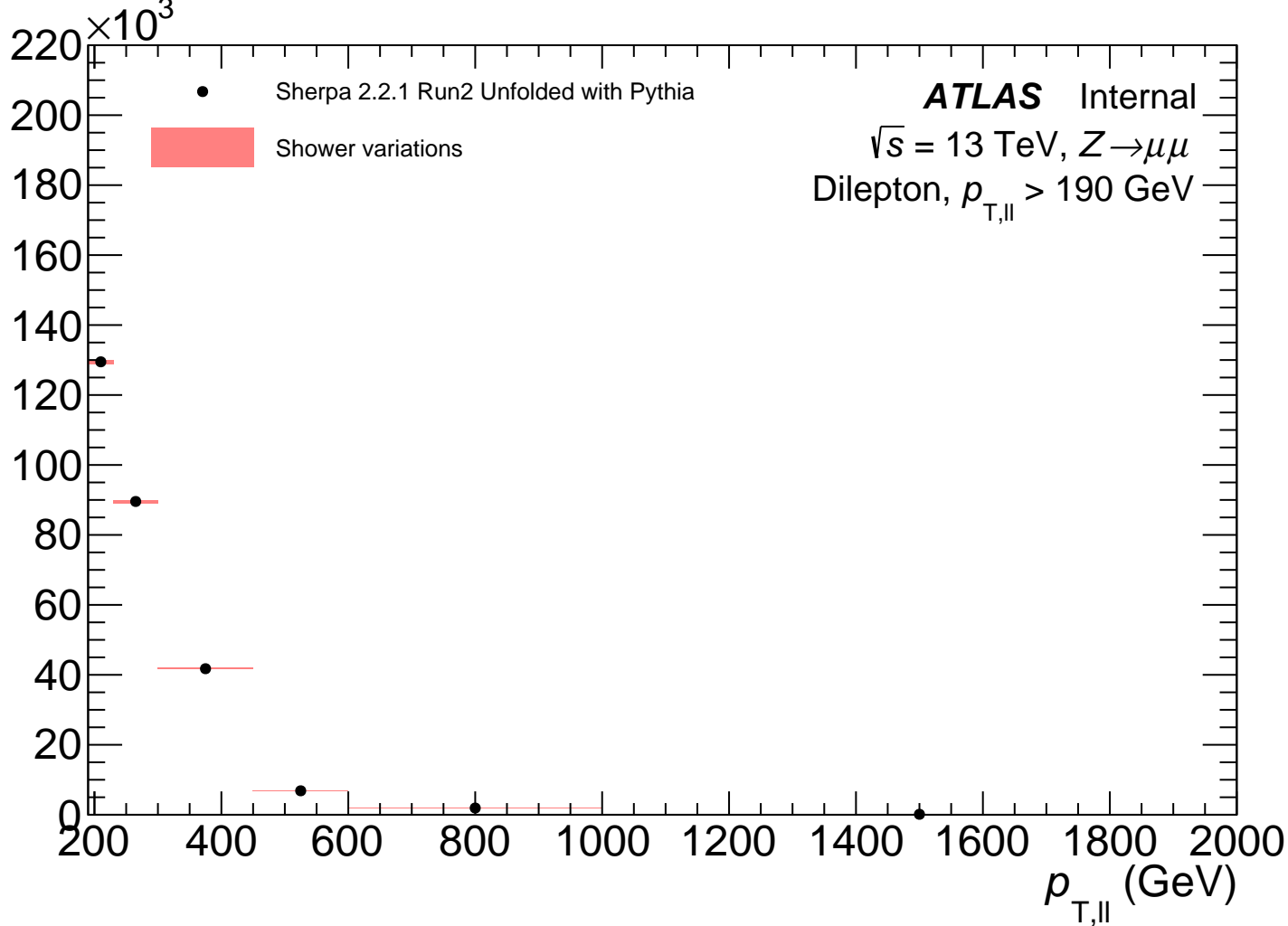
Events



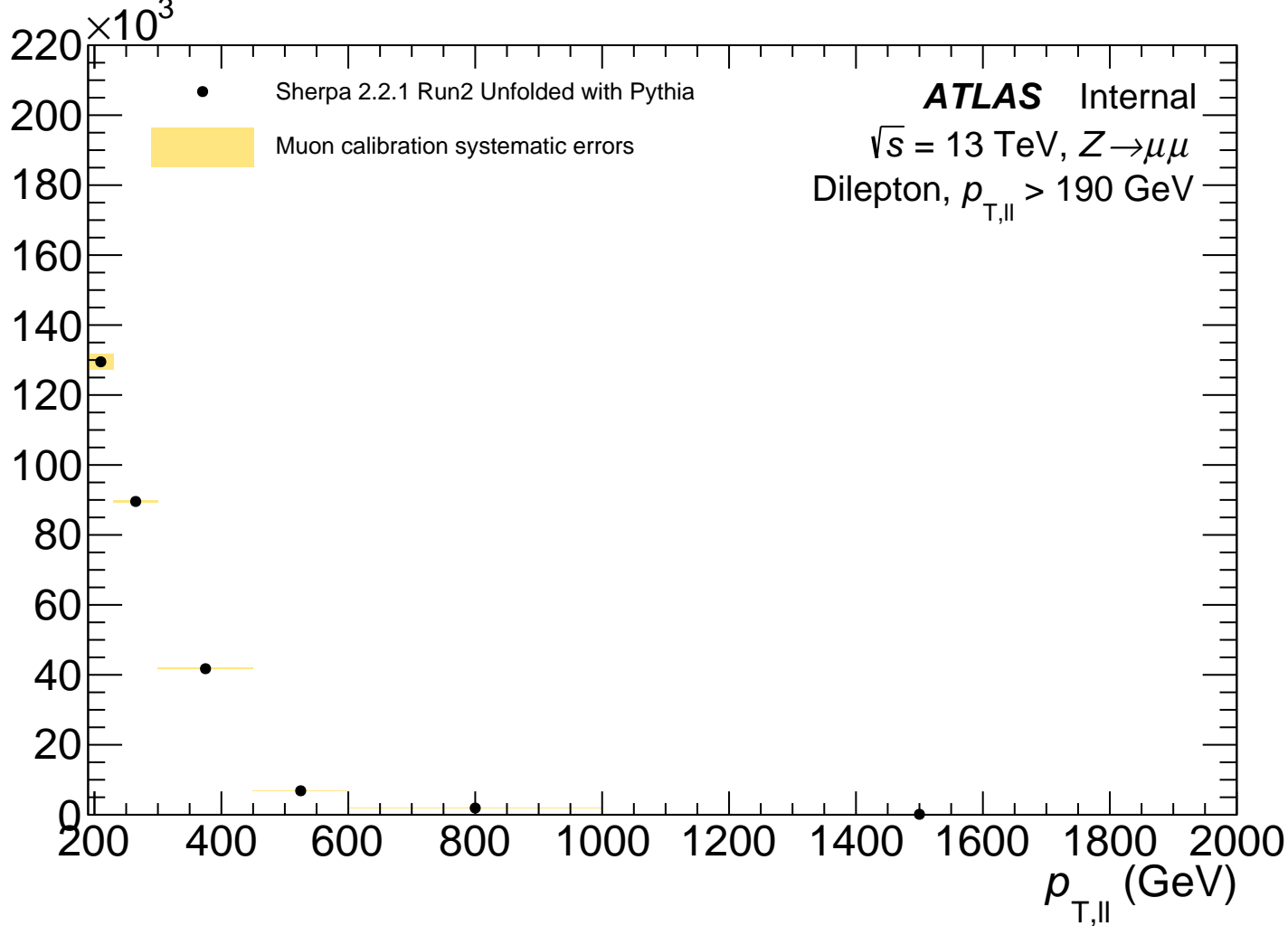
Events



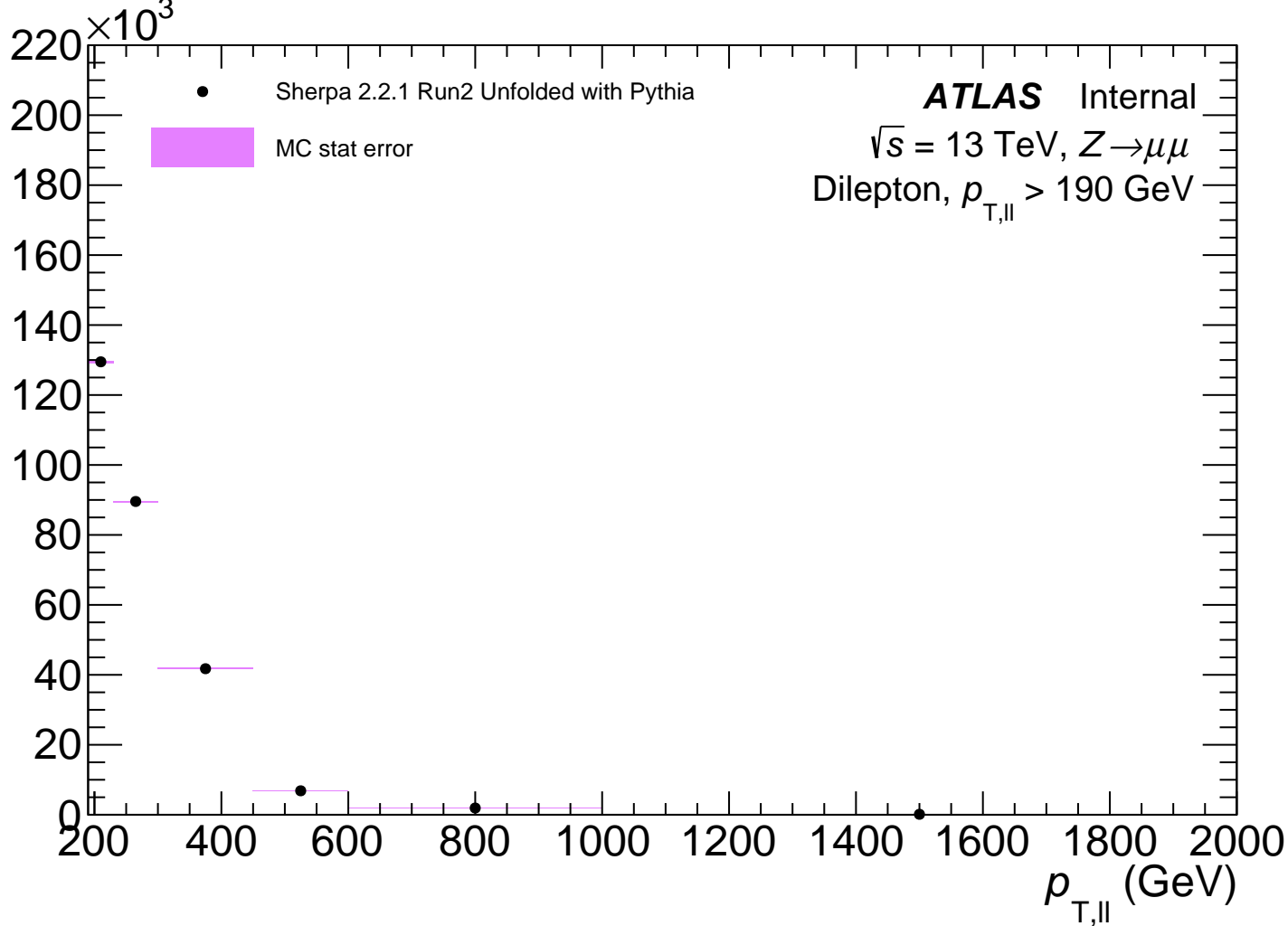
Events



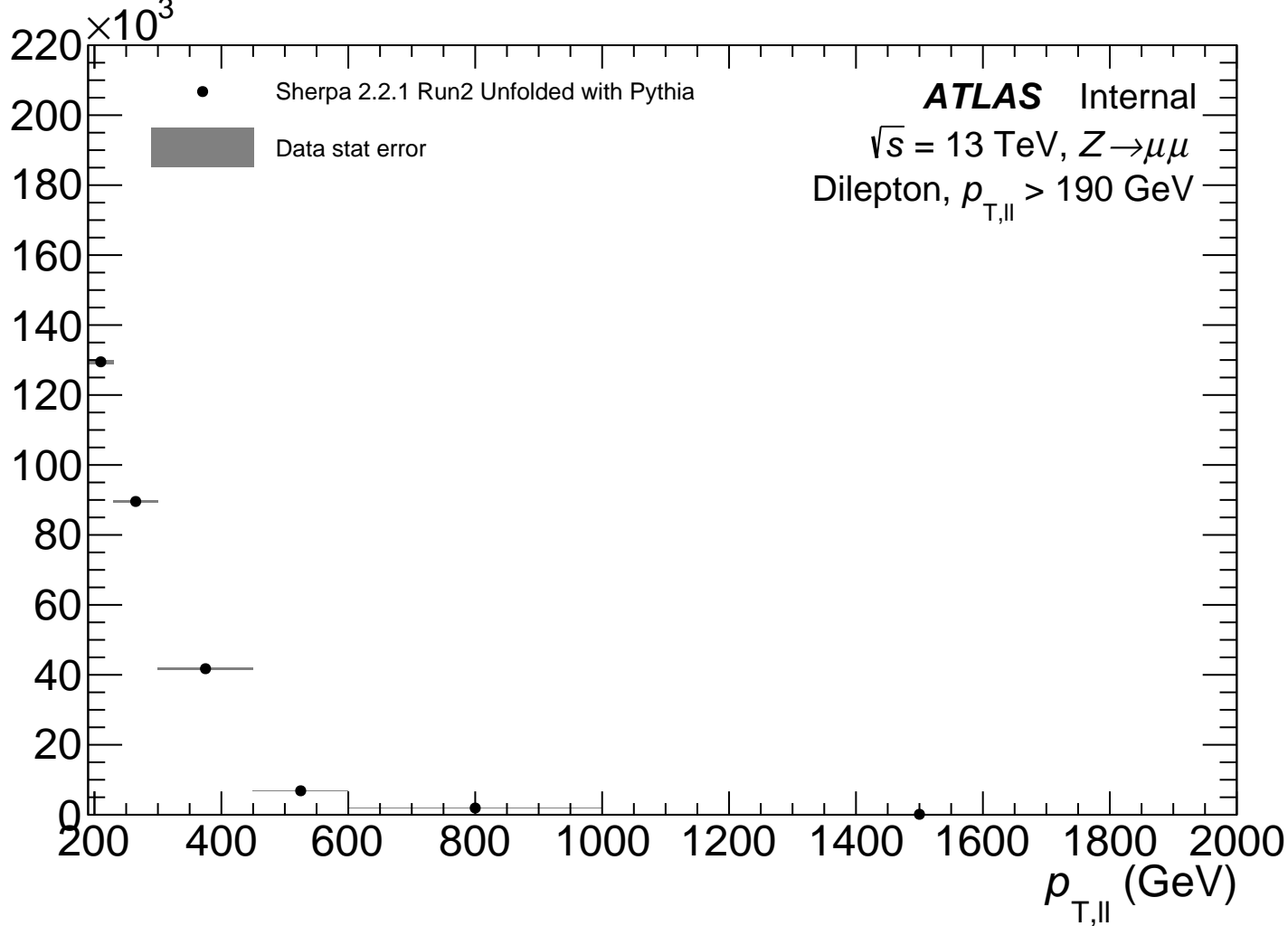
Events



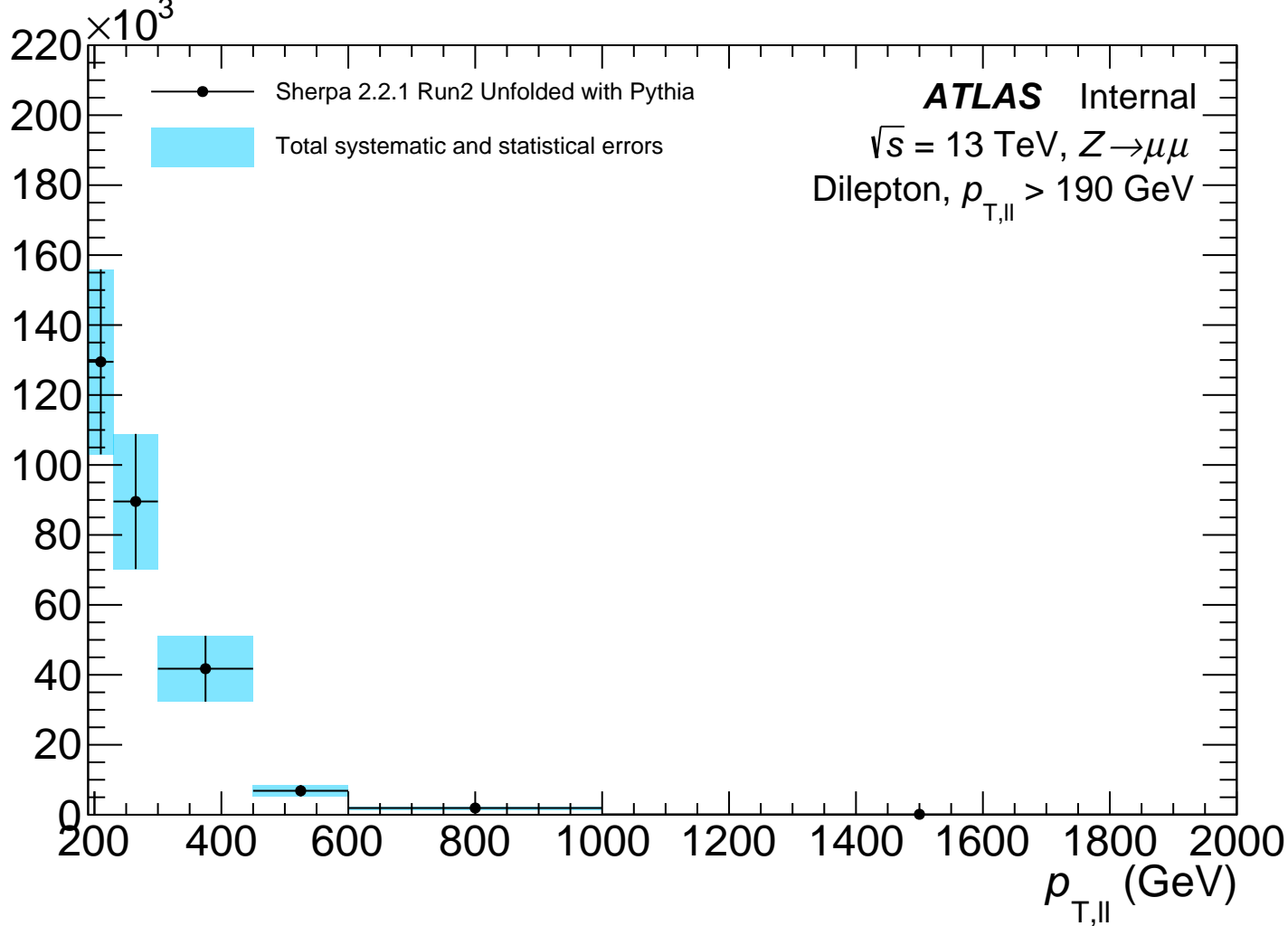
Events



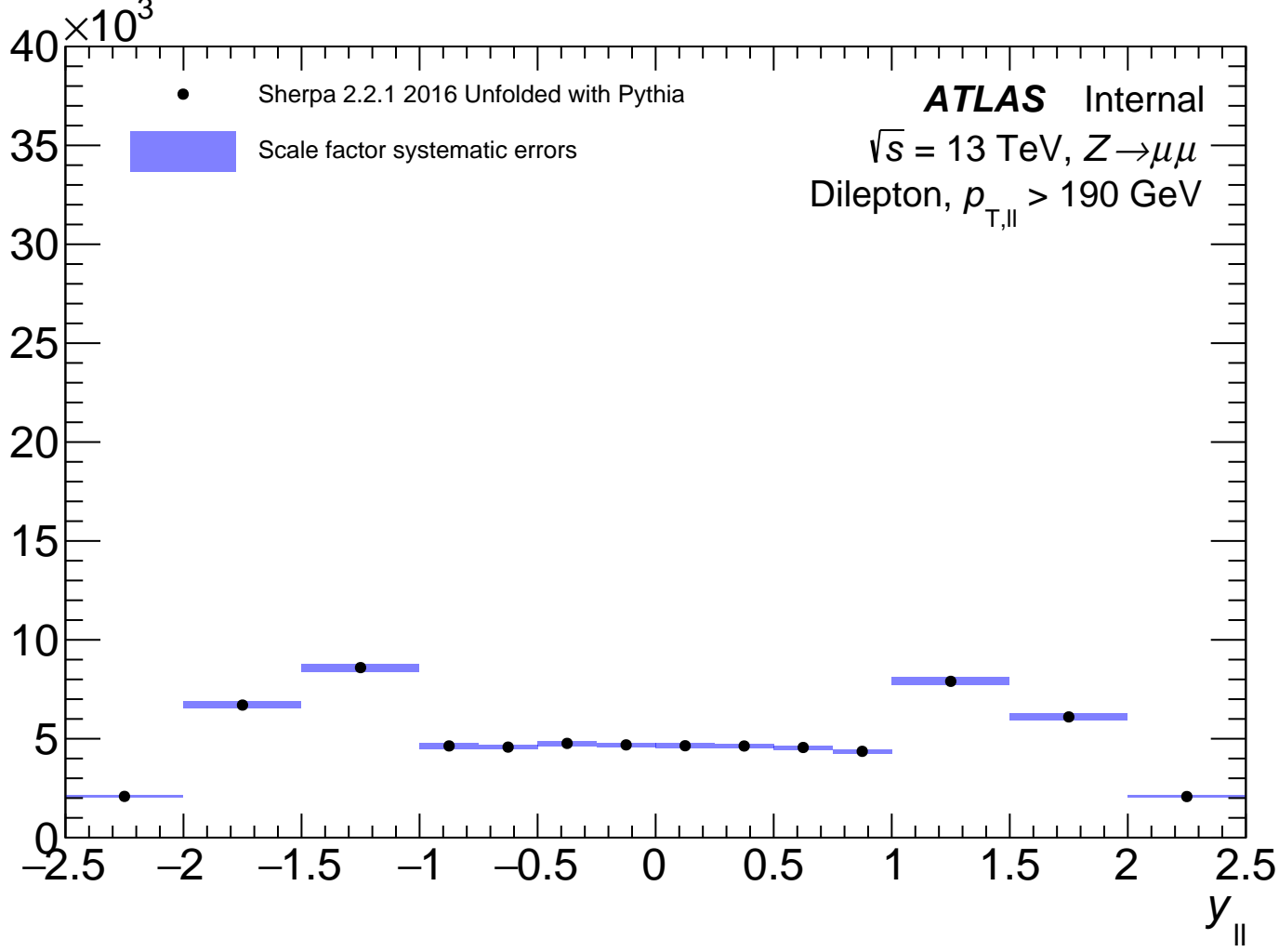
Events



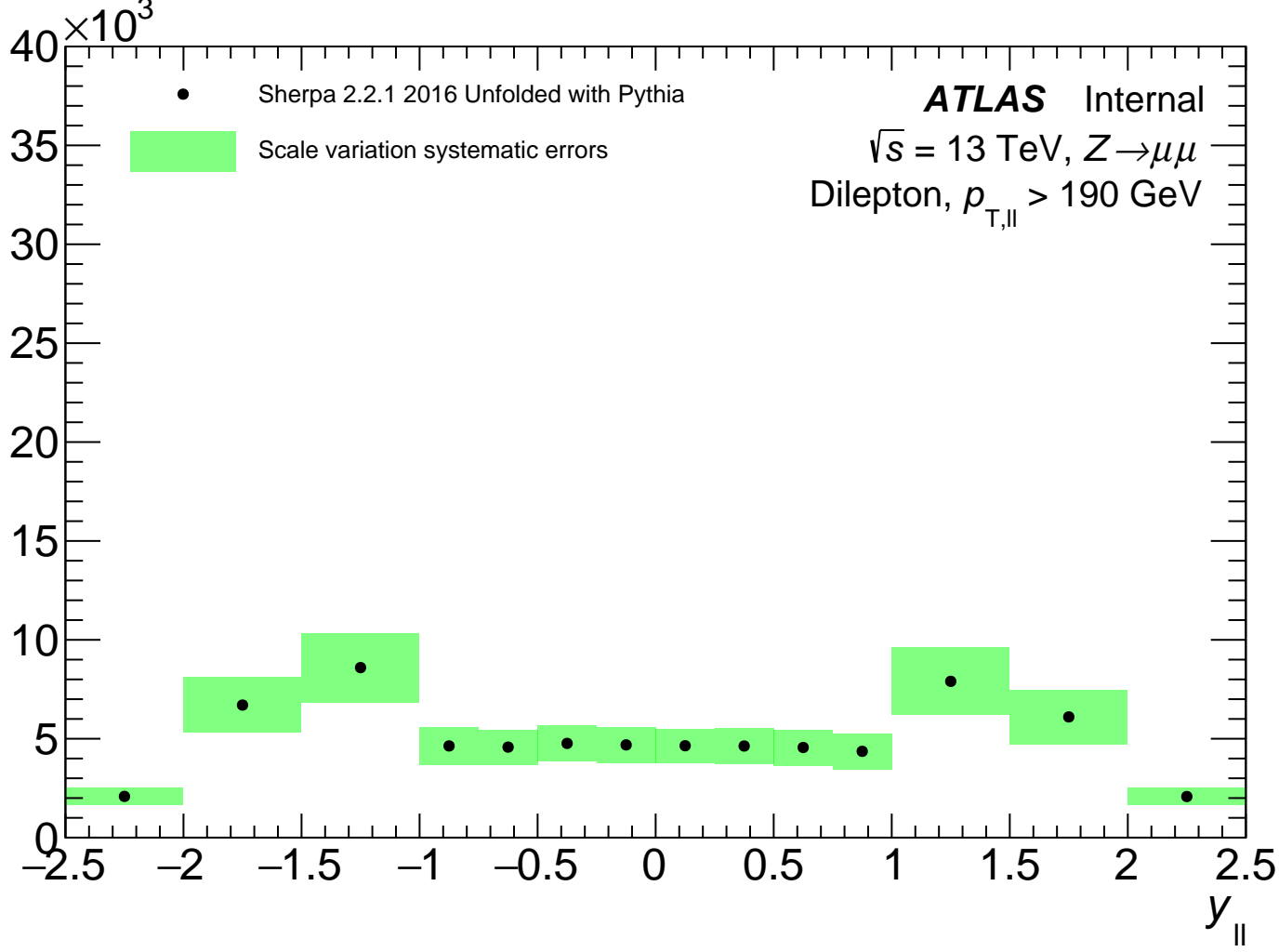
Events



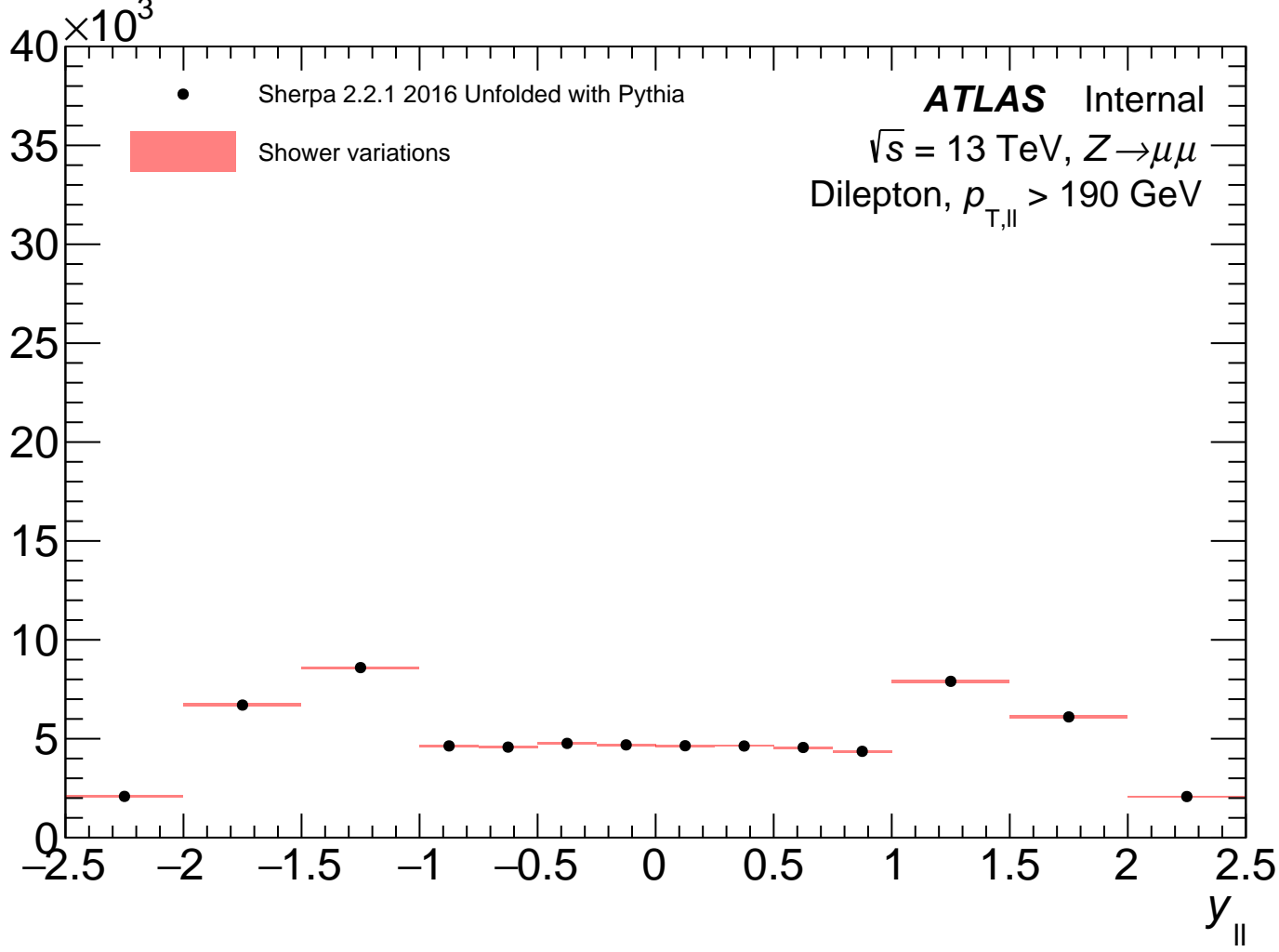
Events



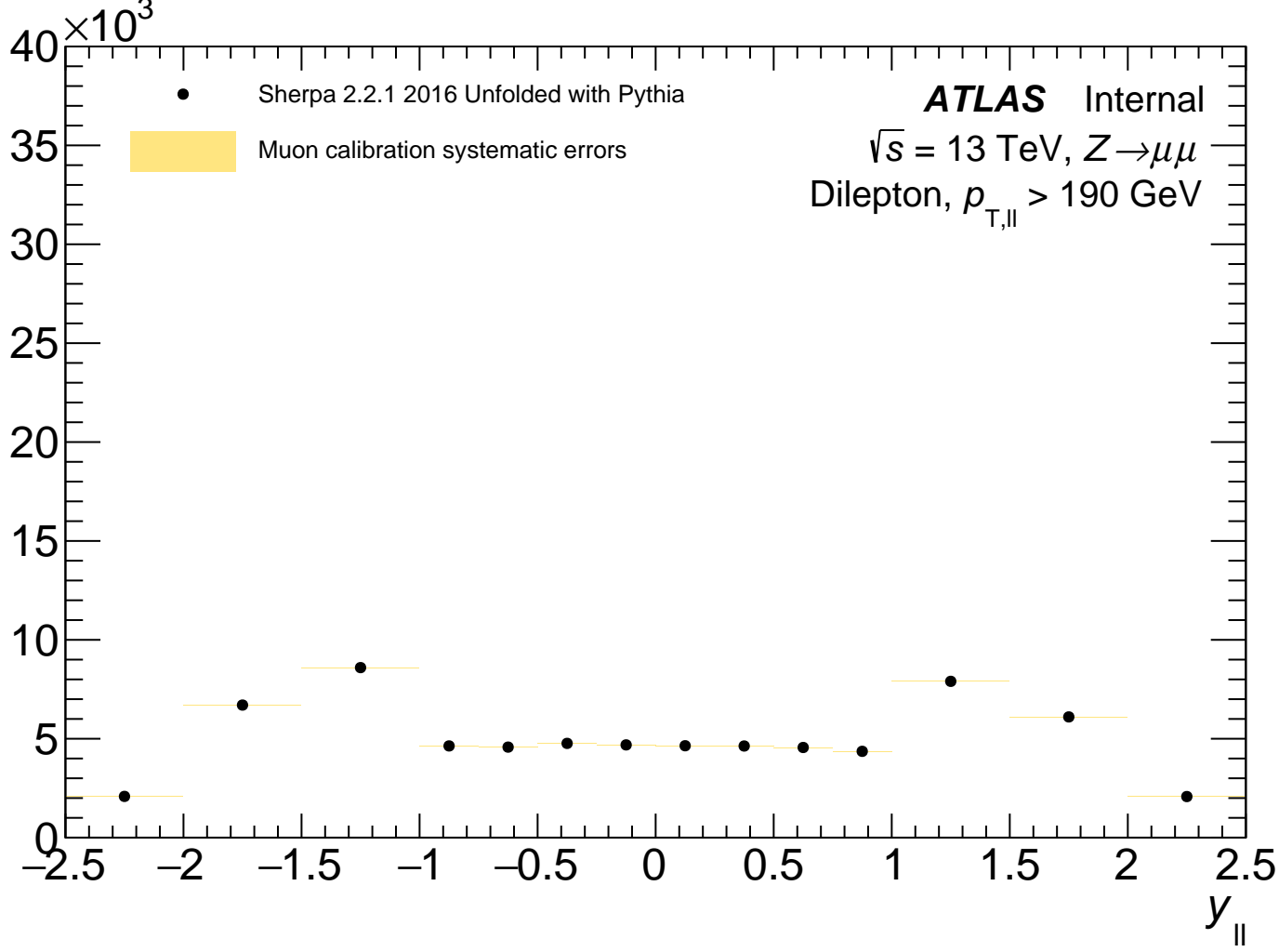
Events



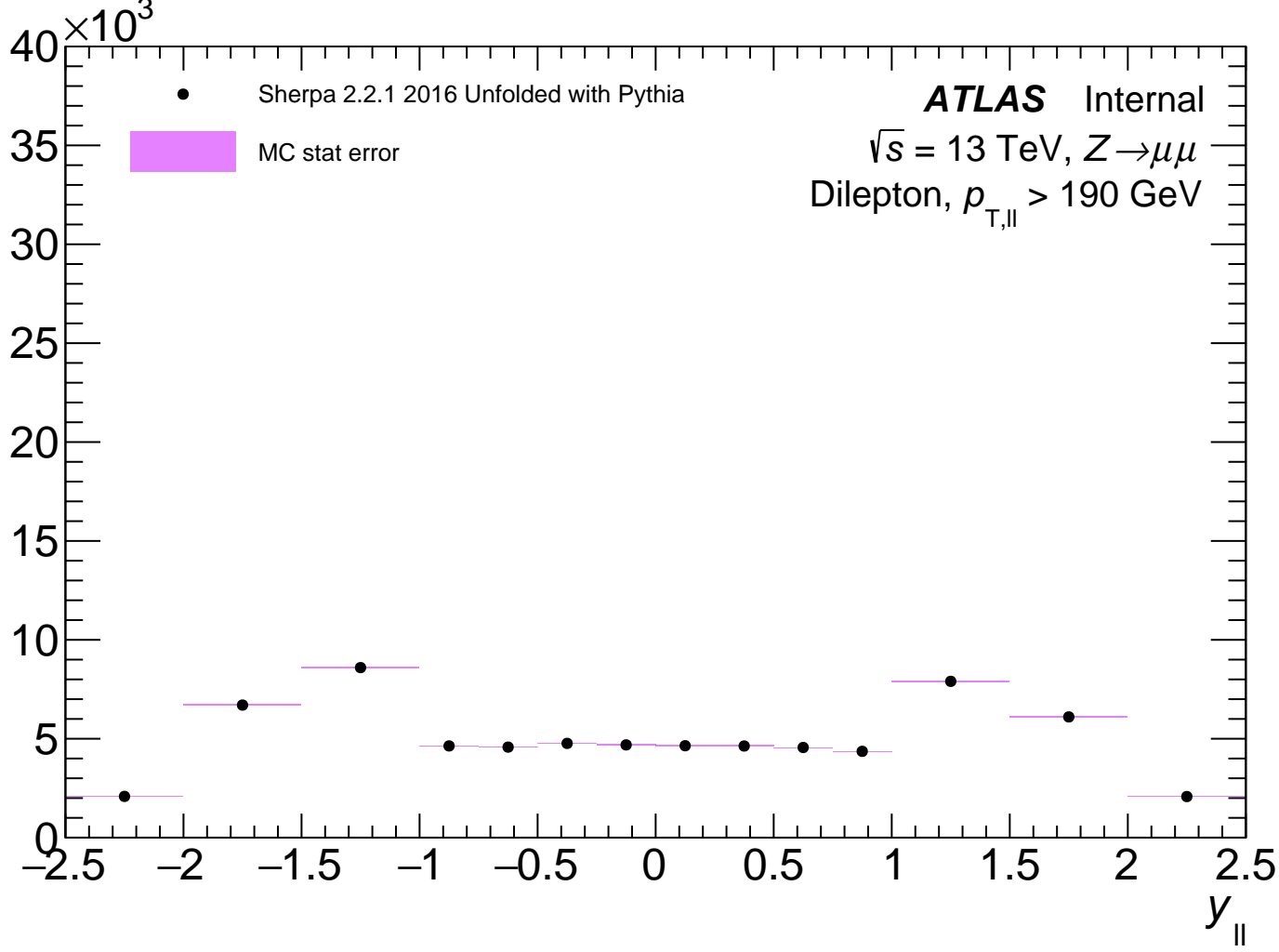
Events



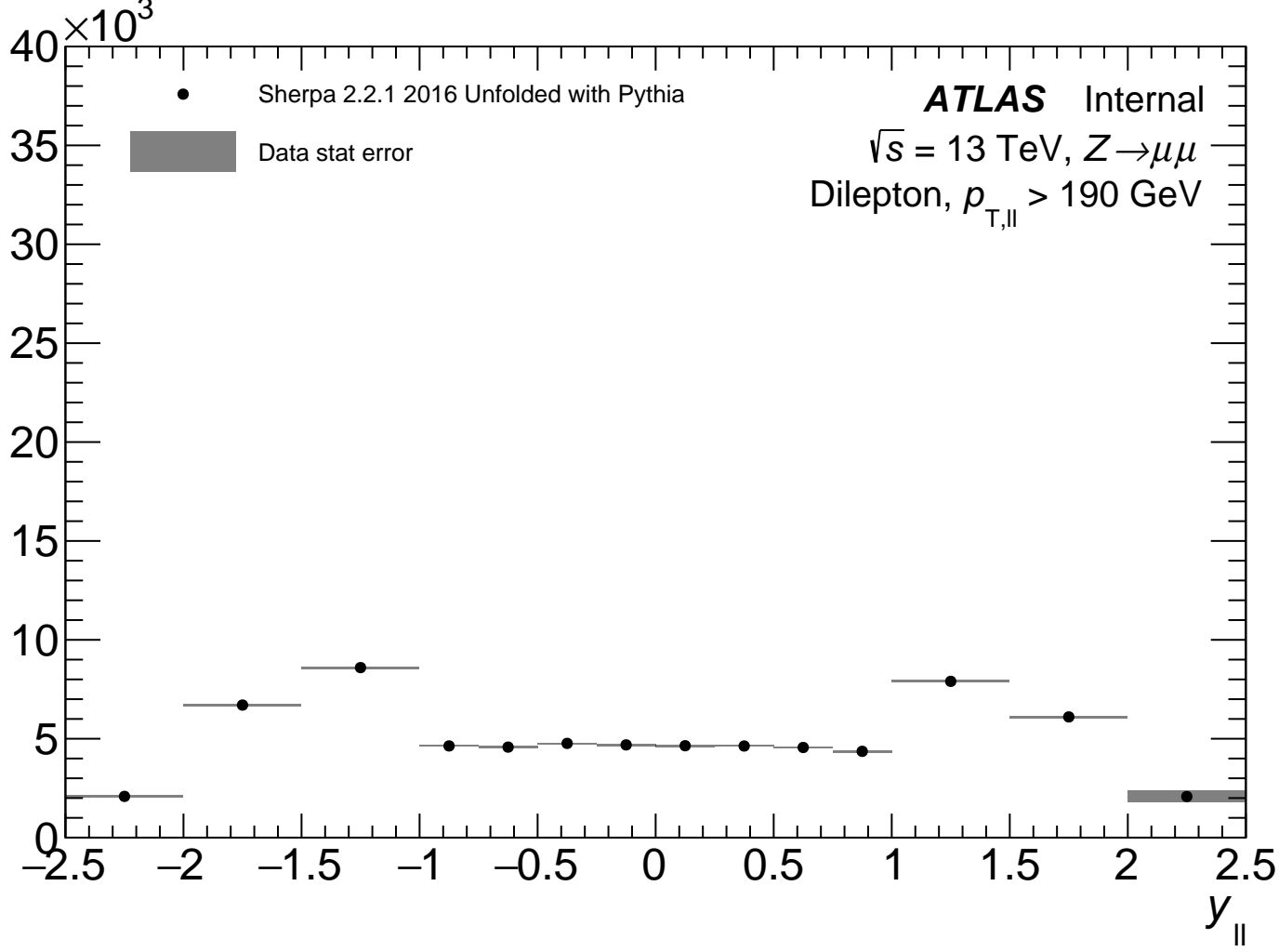
Events



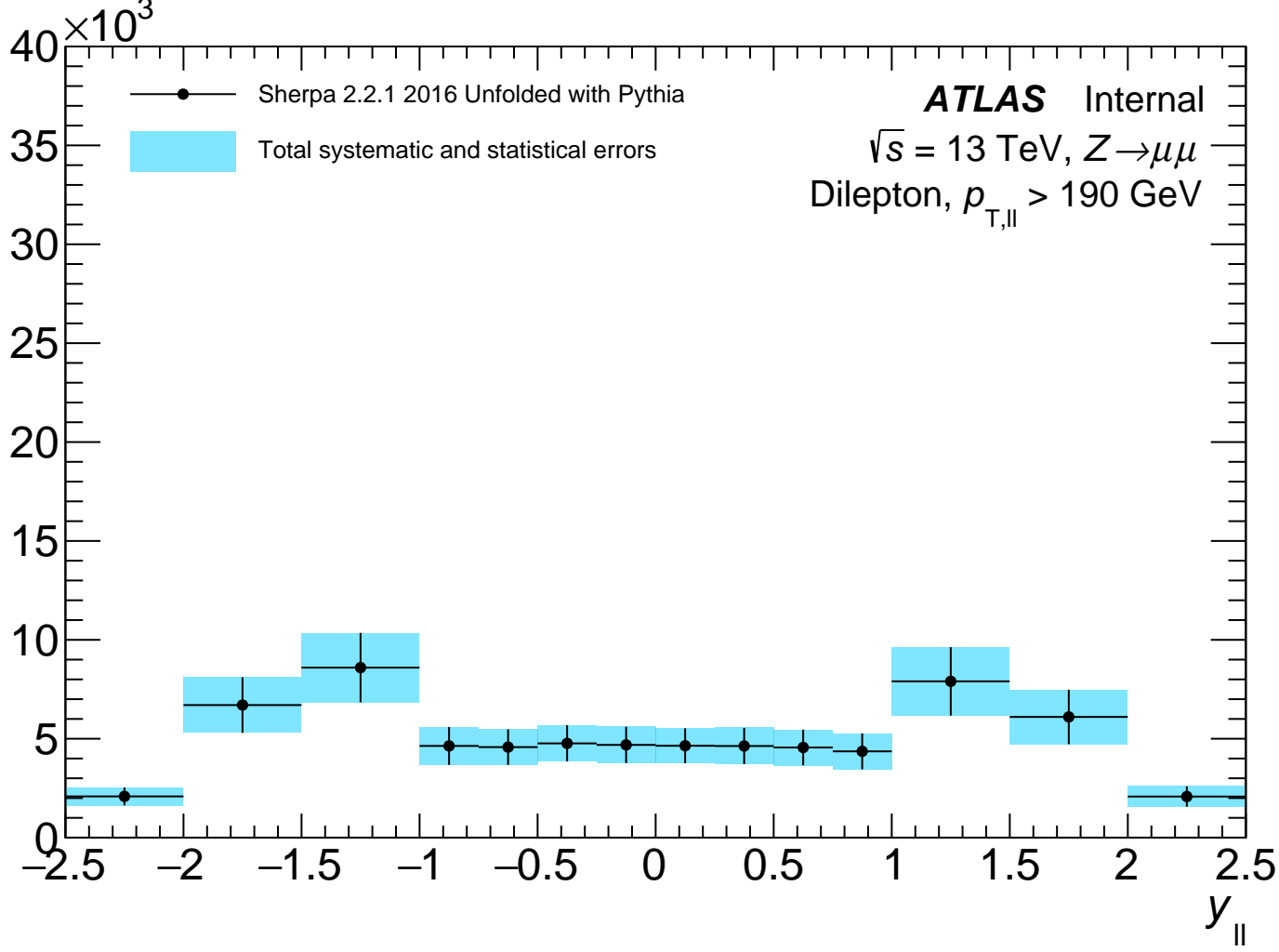
Events



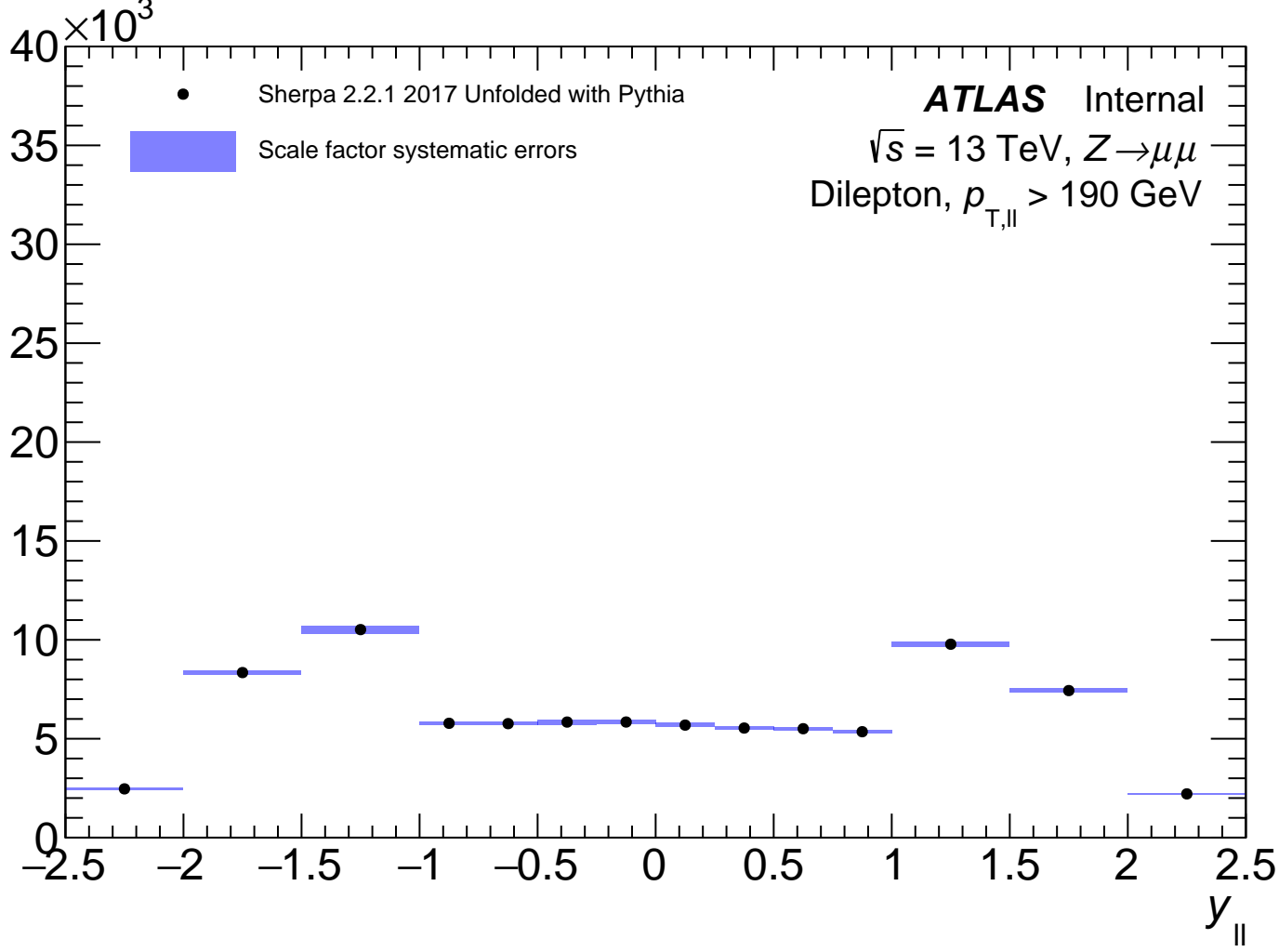
Events



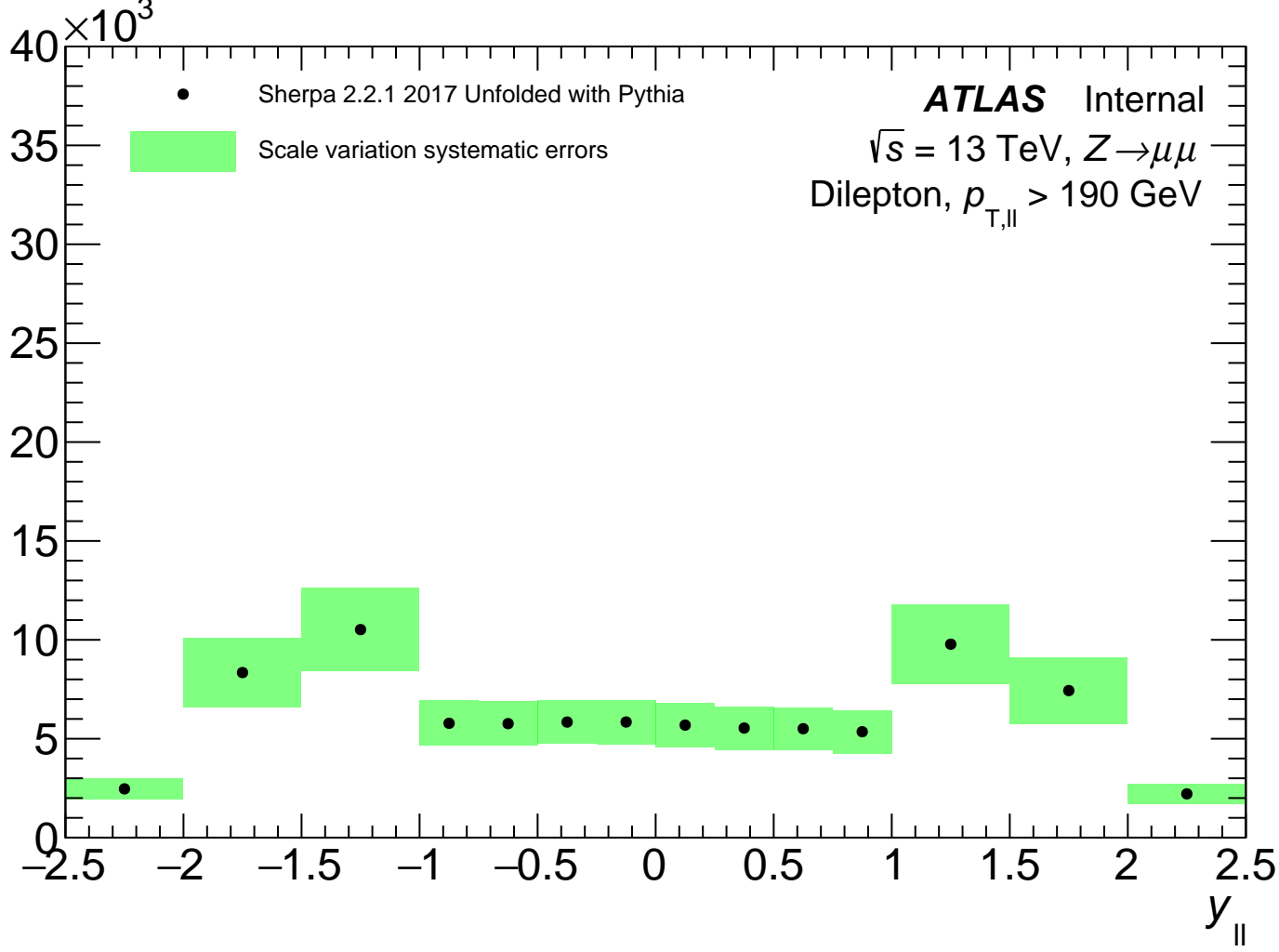
Events



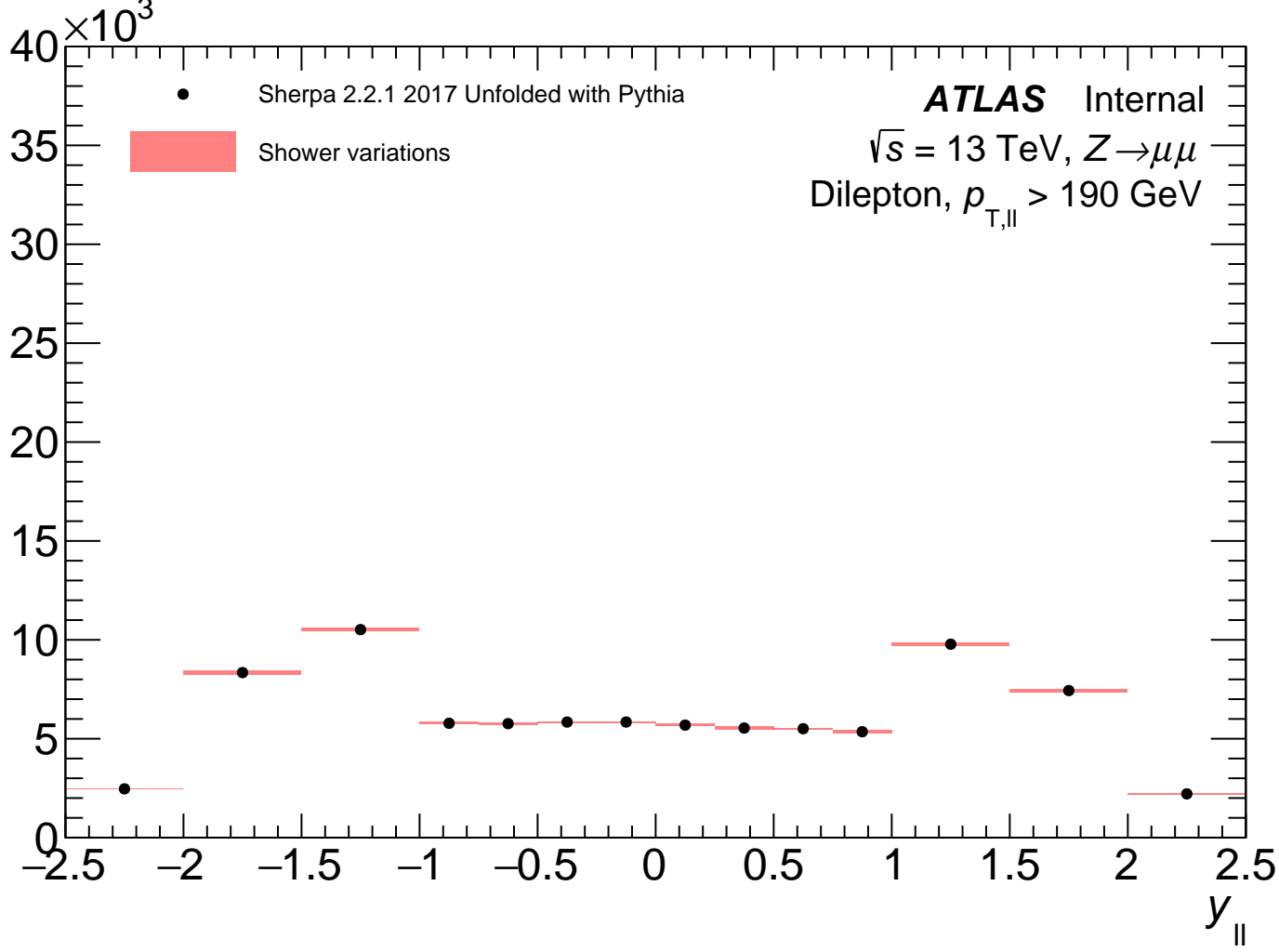
Events



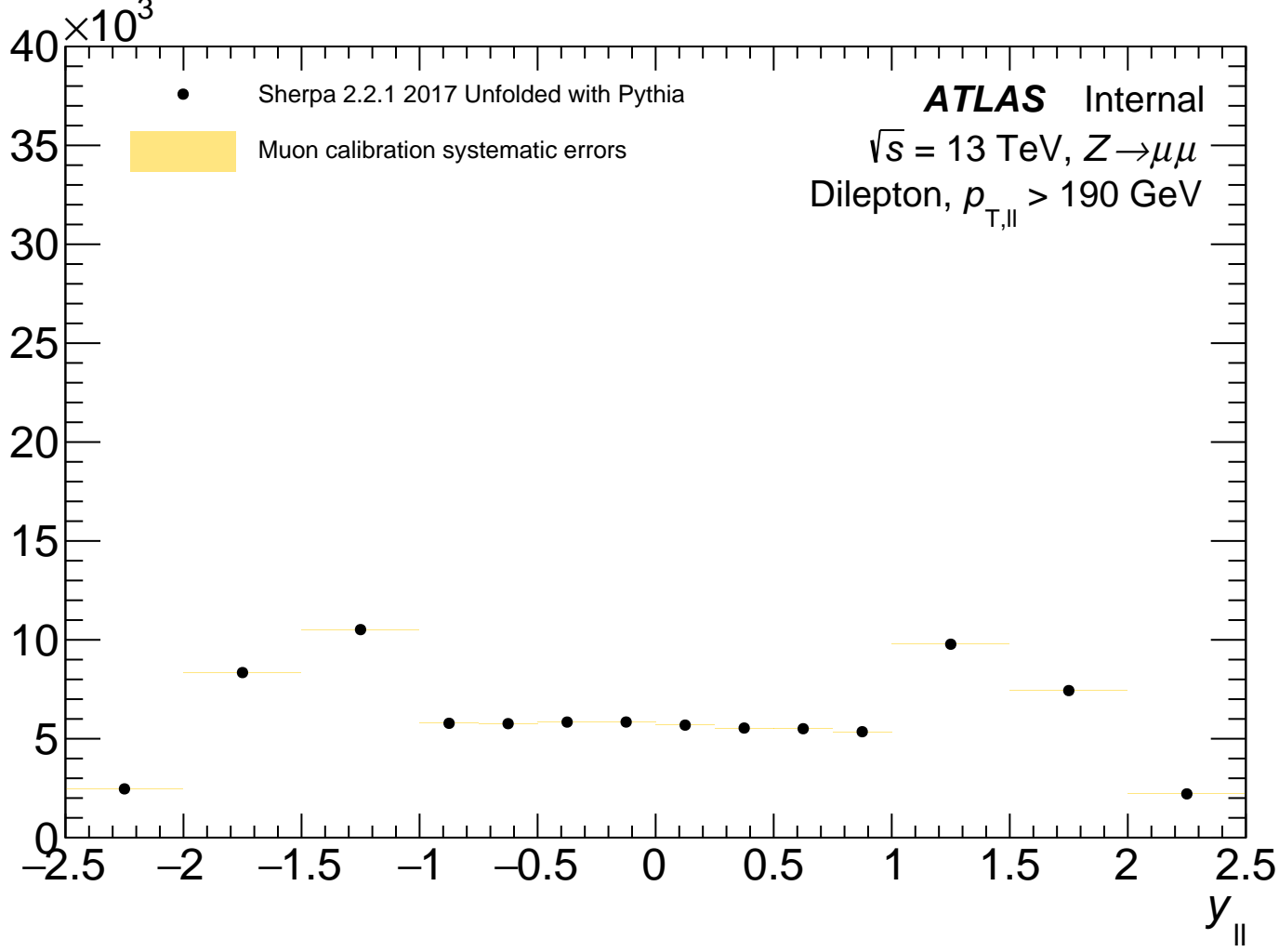
Events



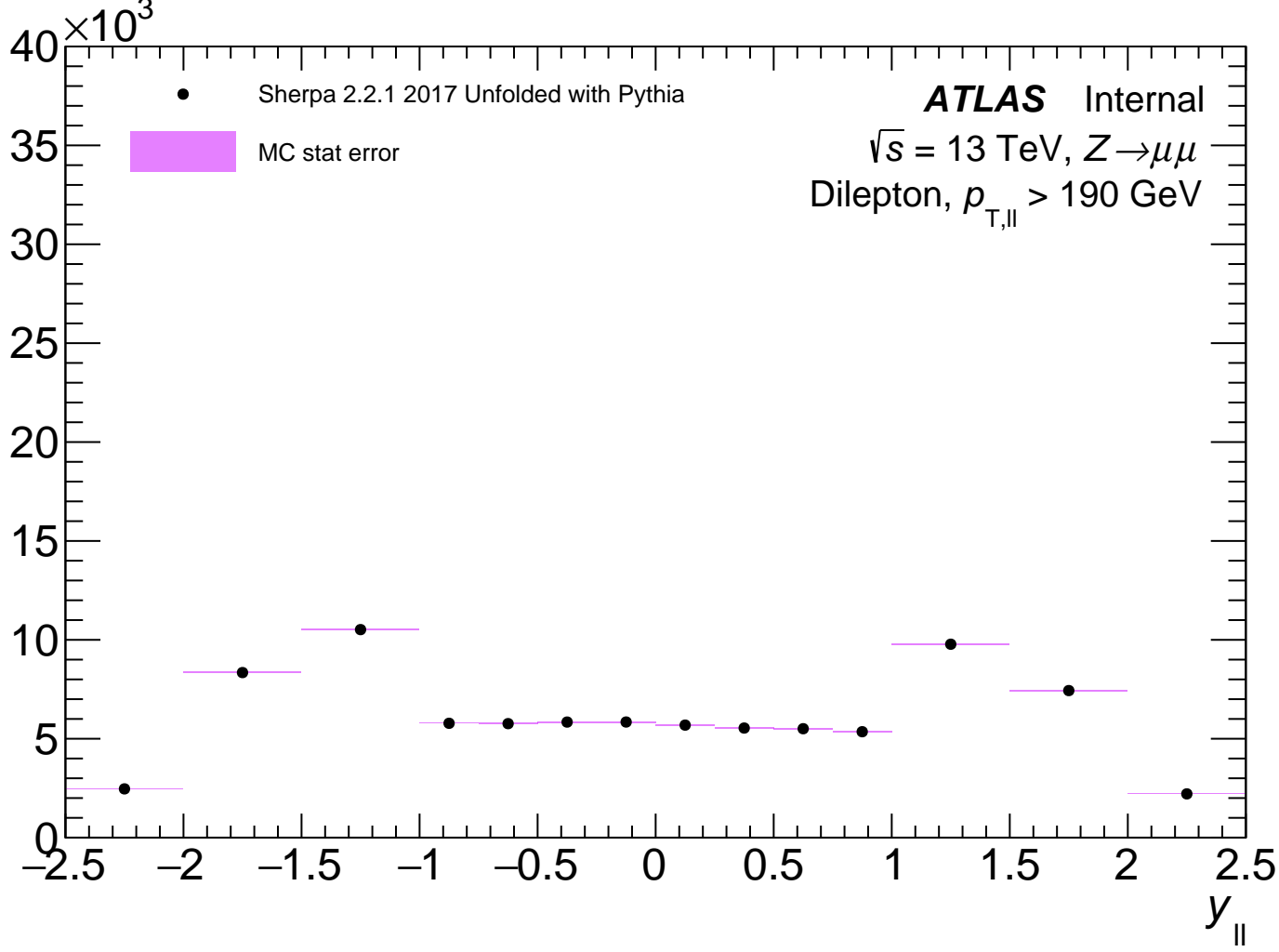
Events



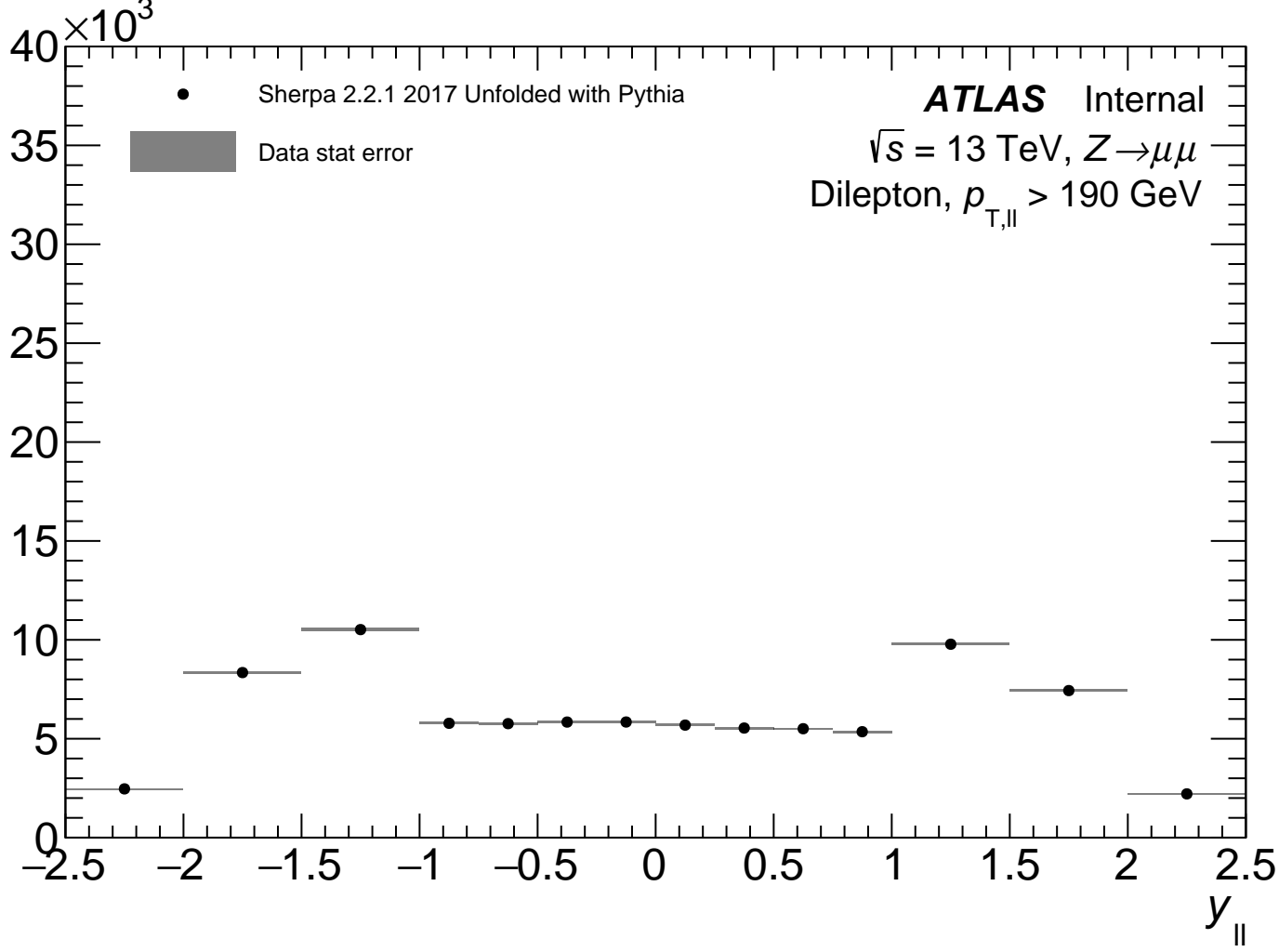
Events



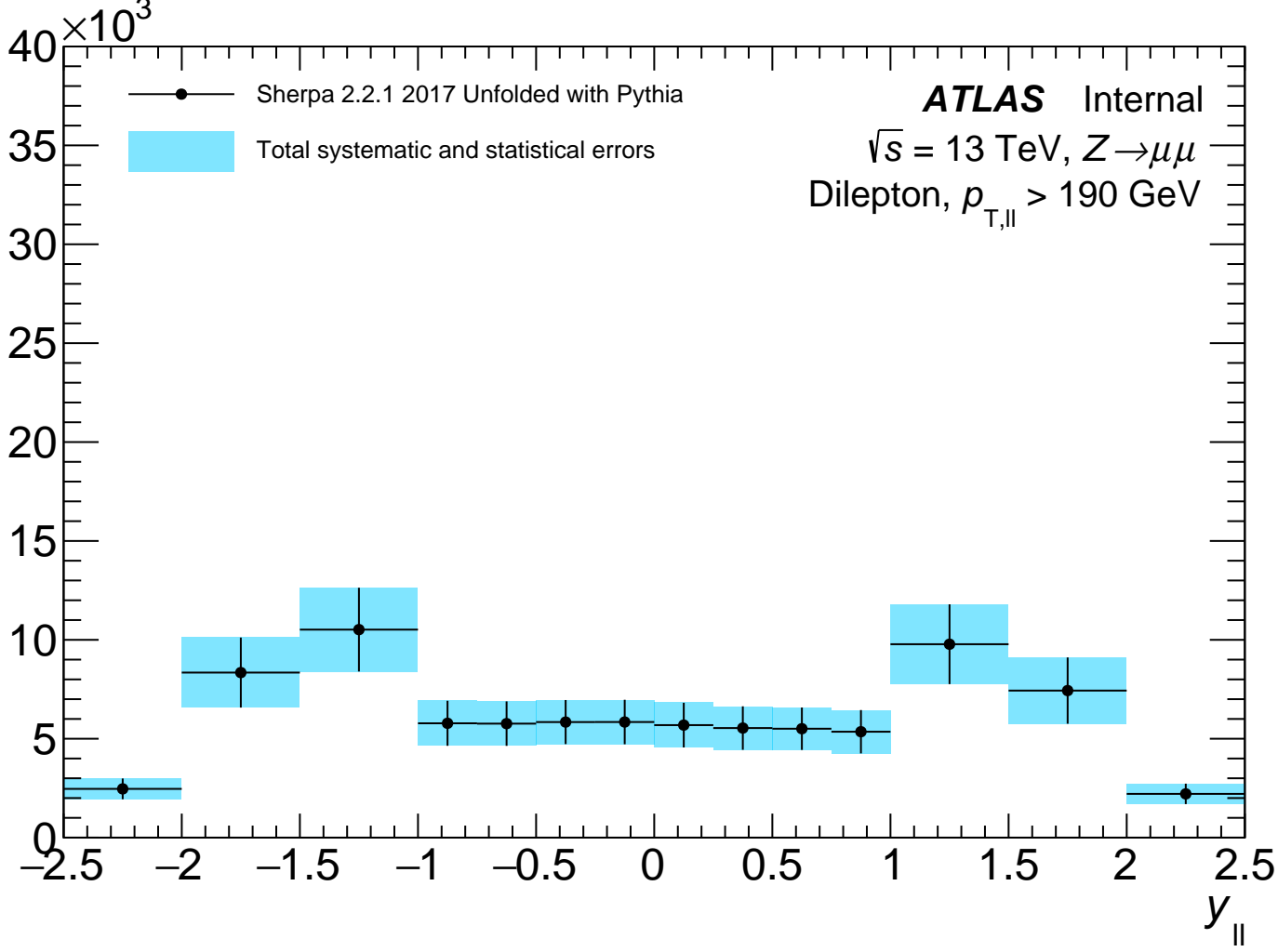
Events



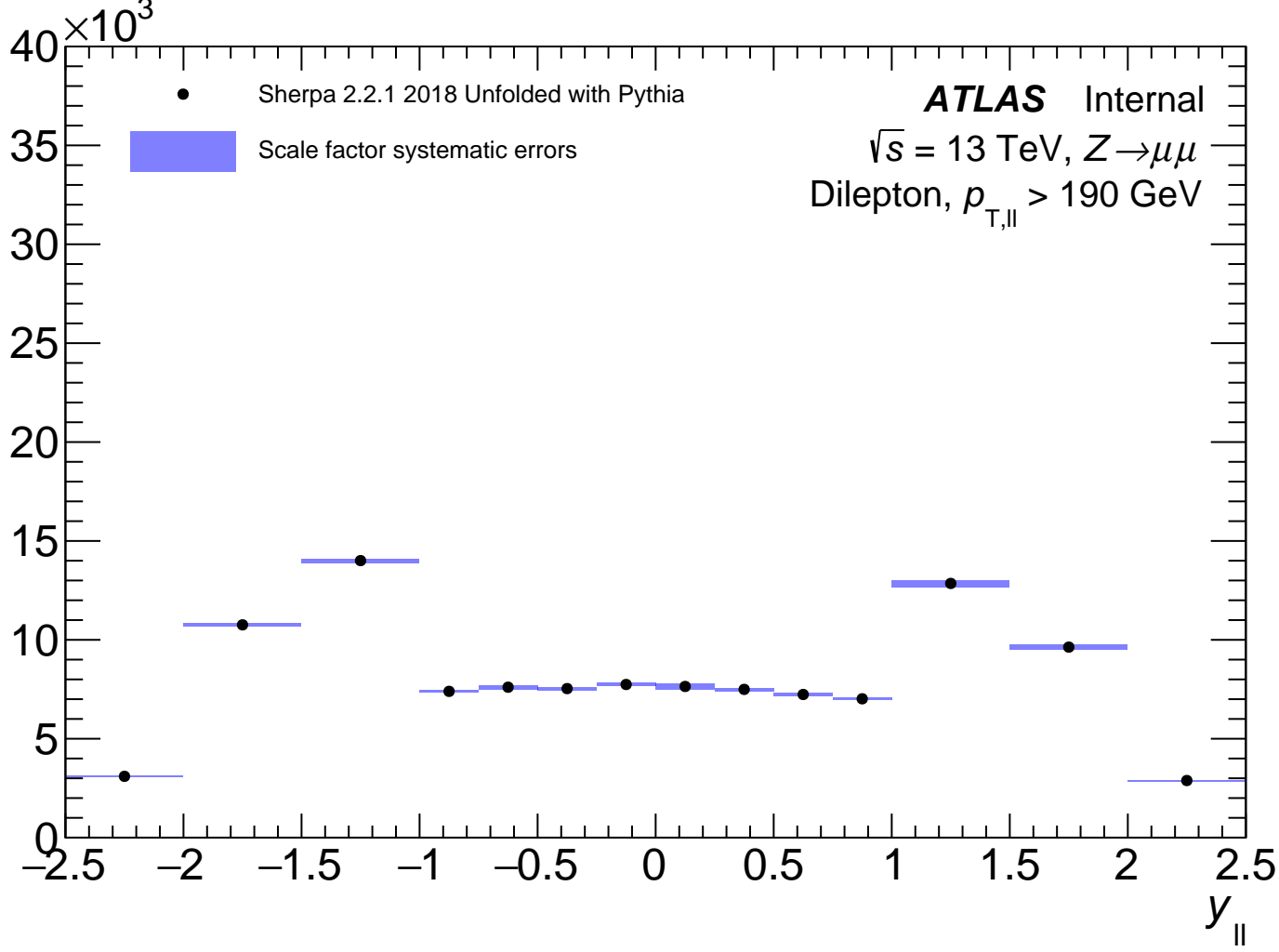
Events



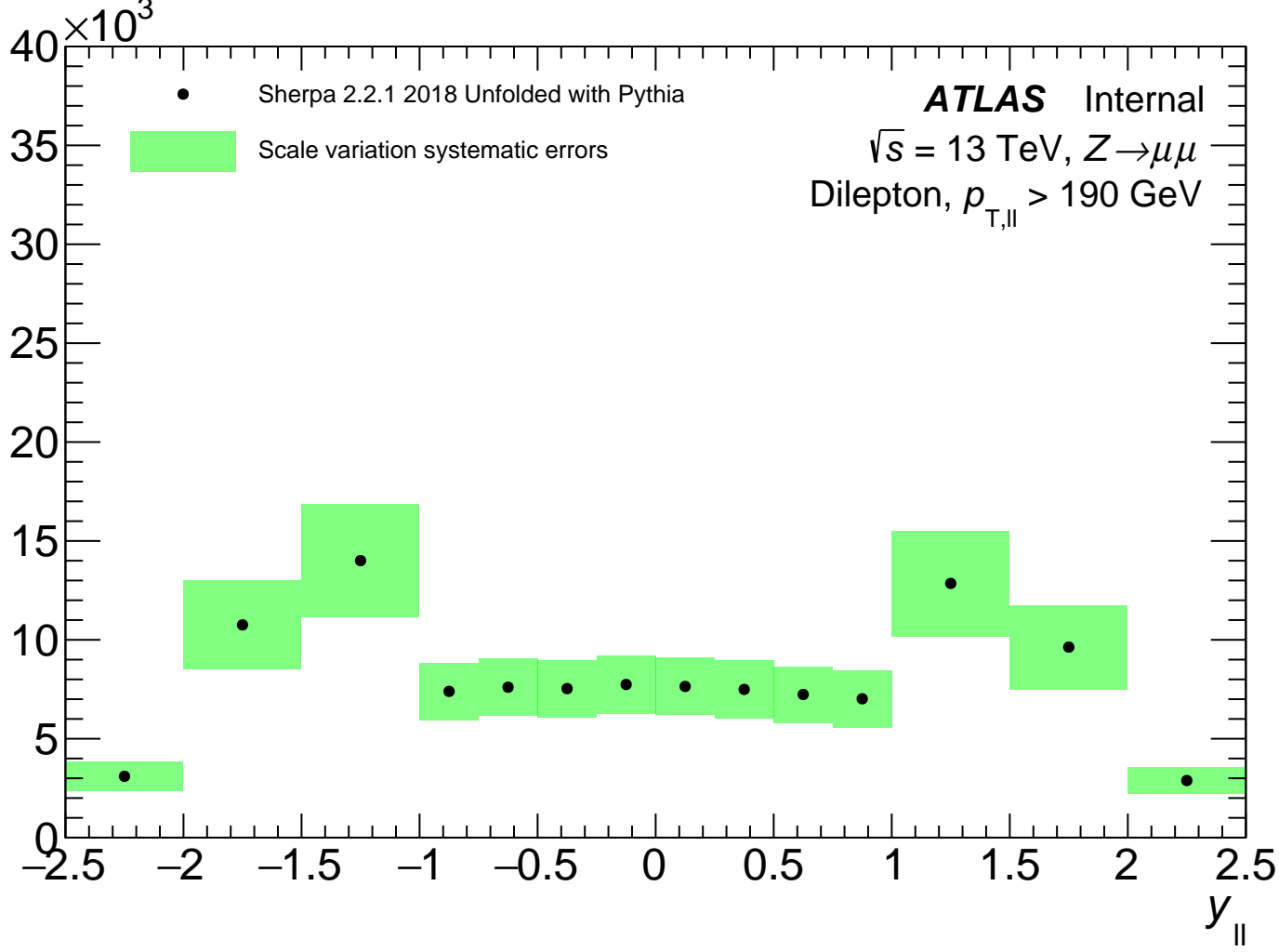
Events



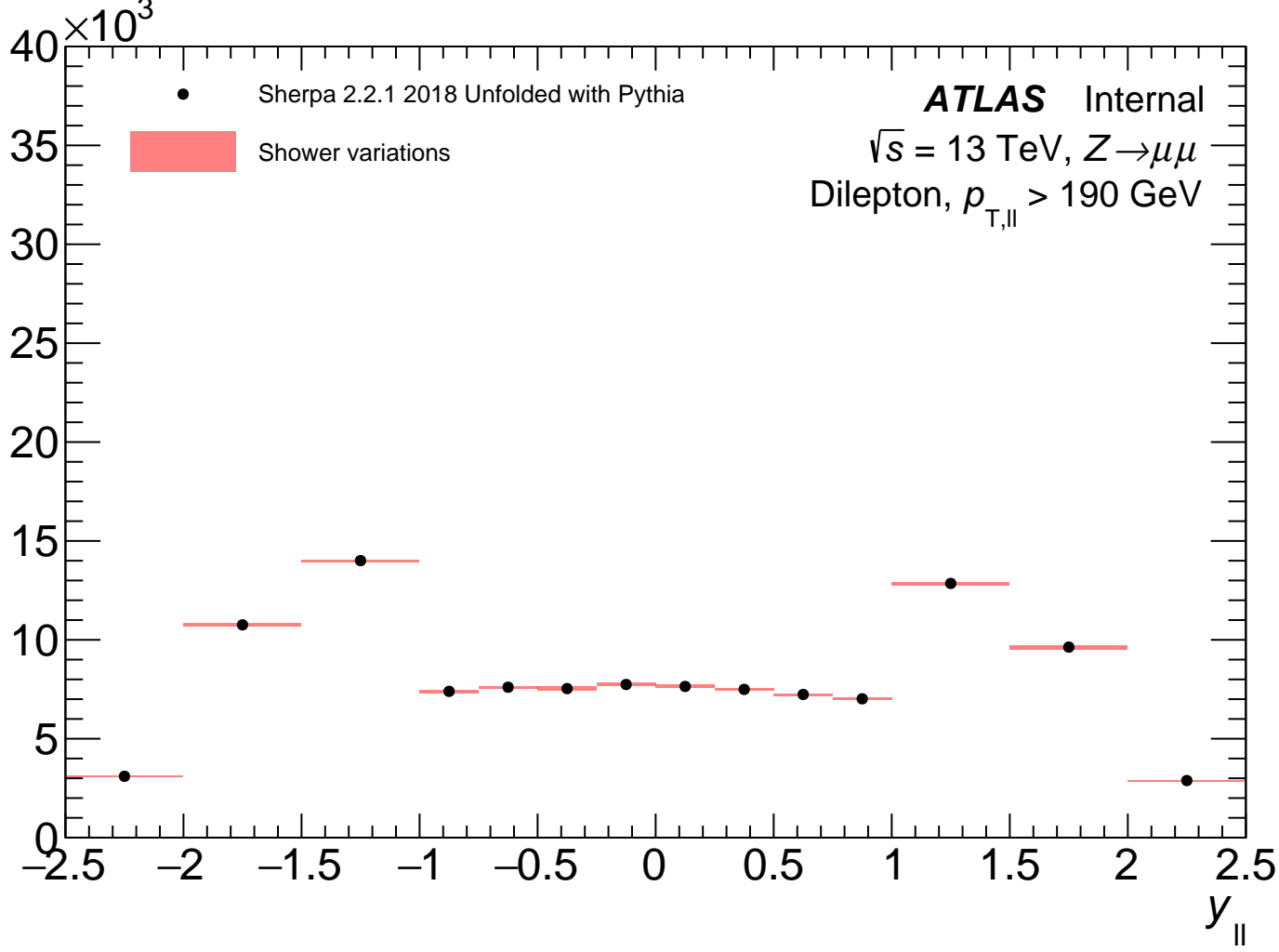
Events



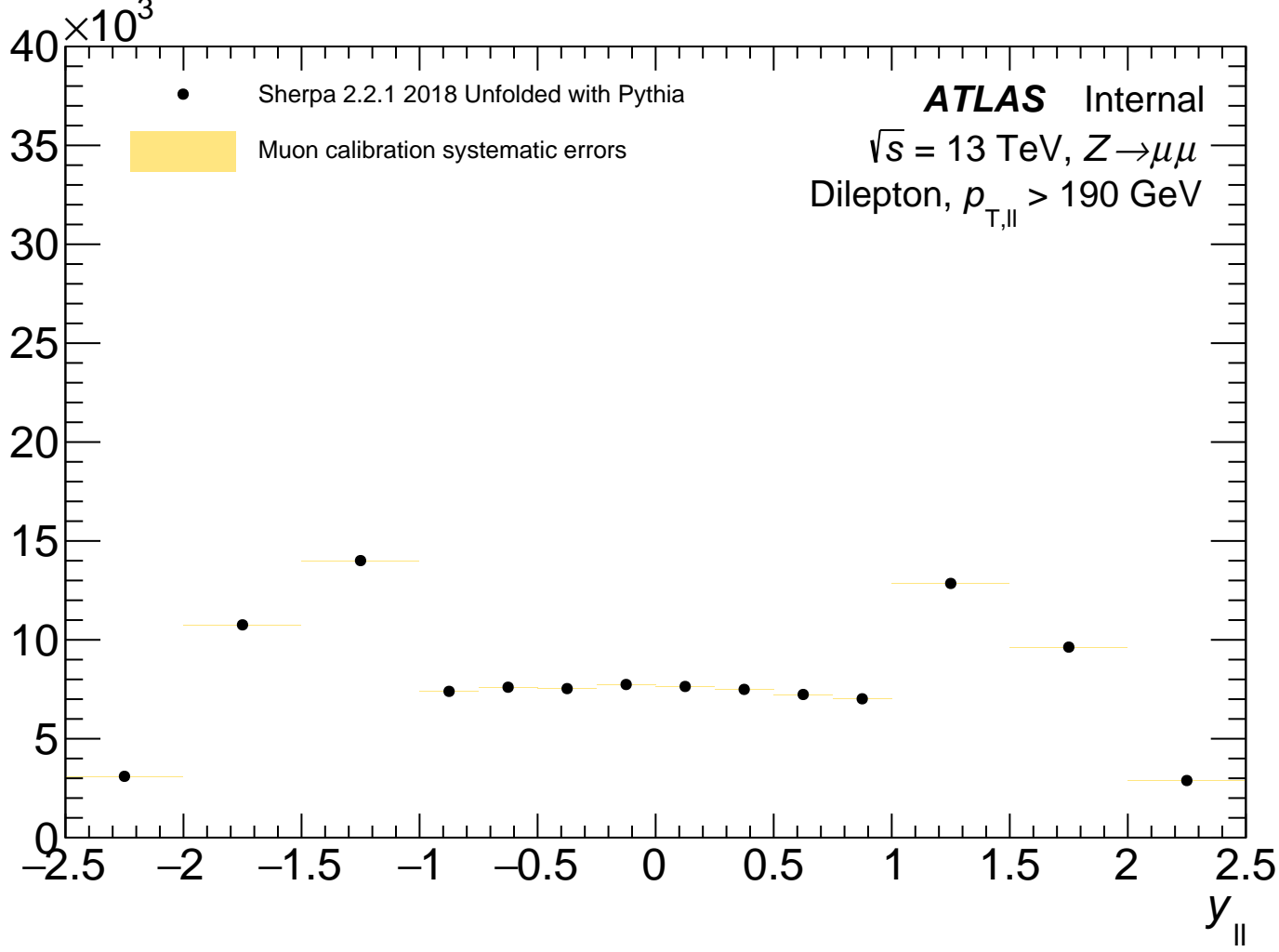
Events



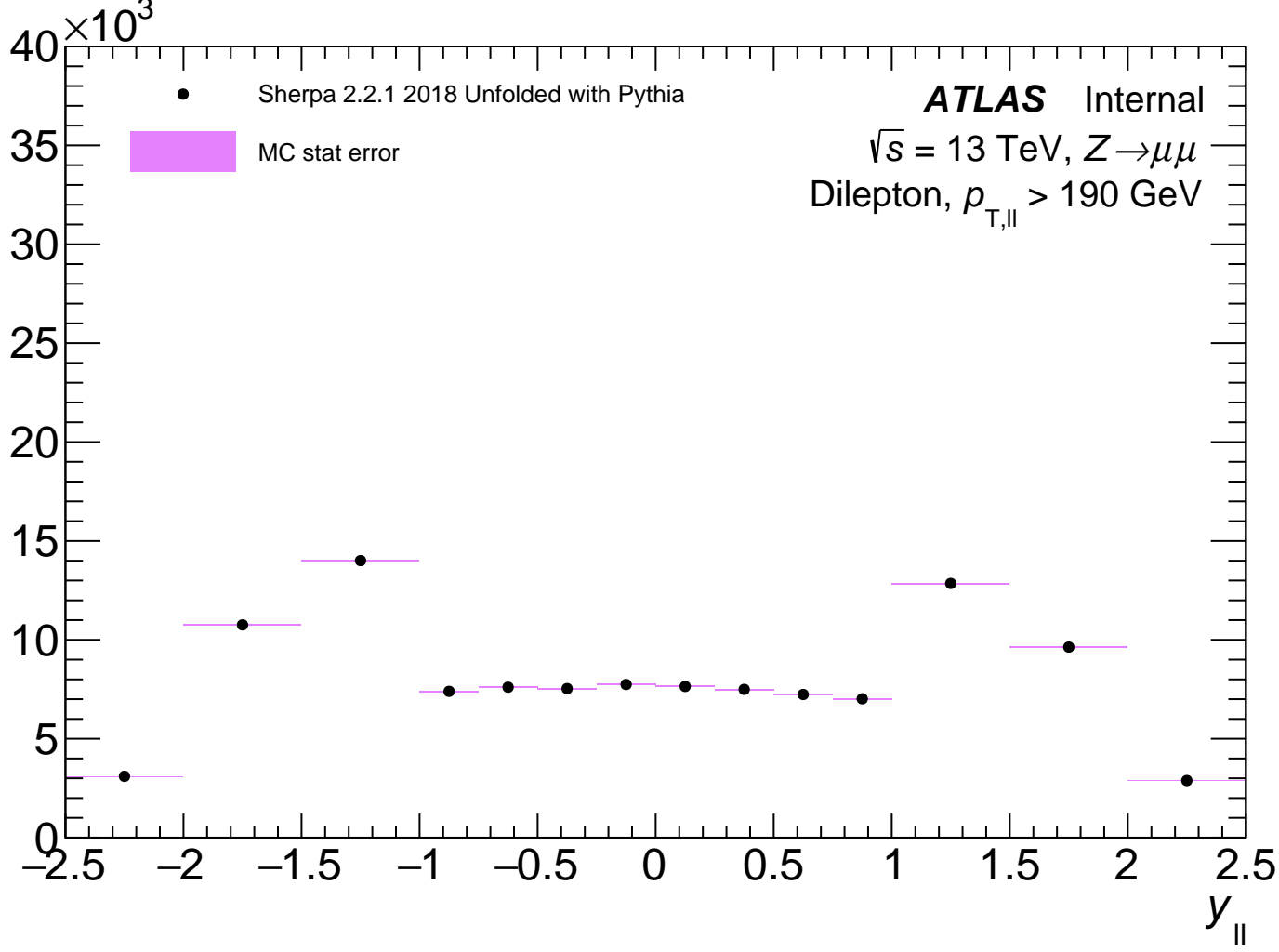
Events



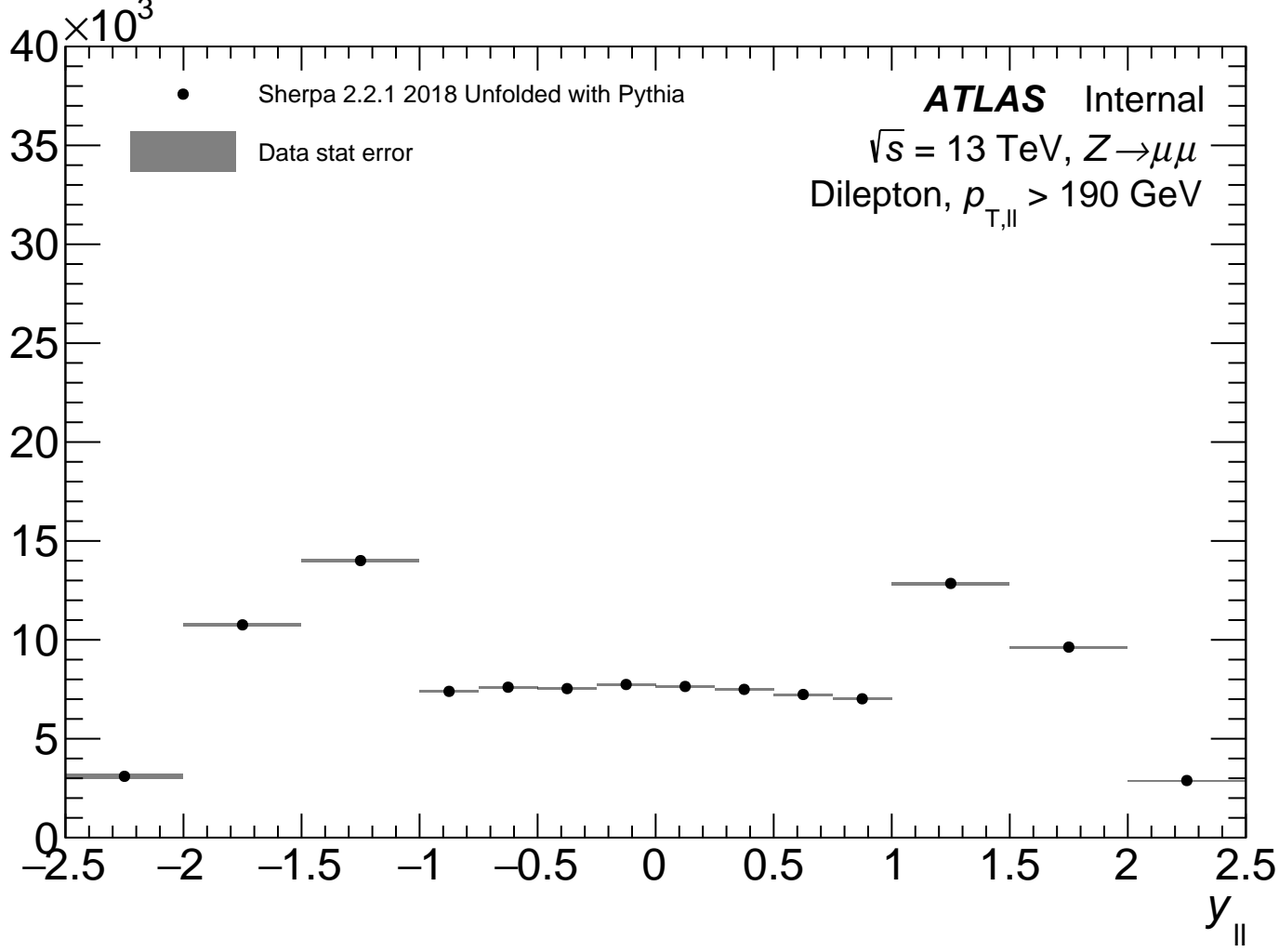
Events



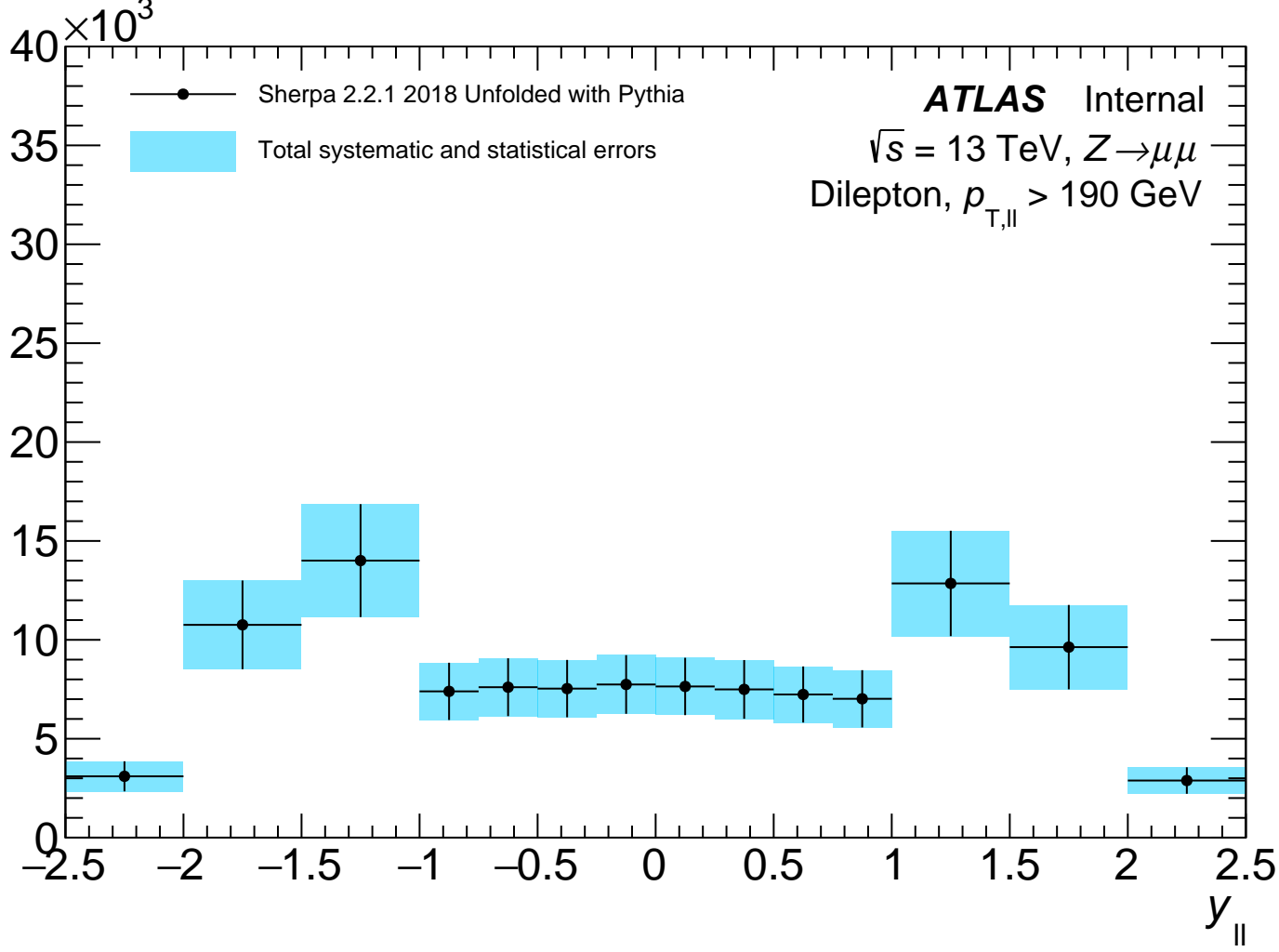
Events



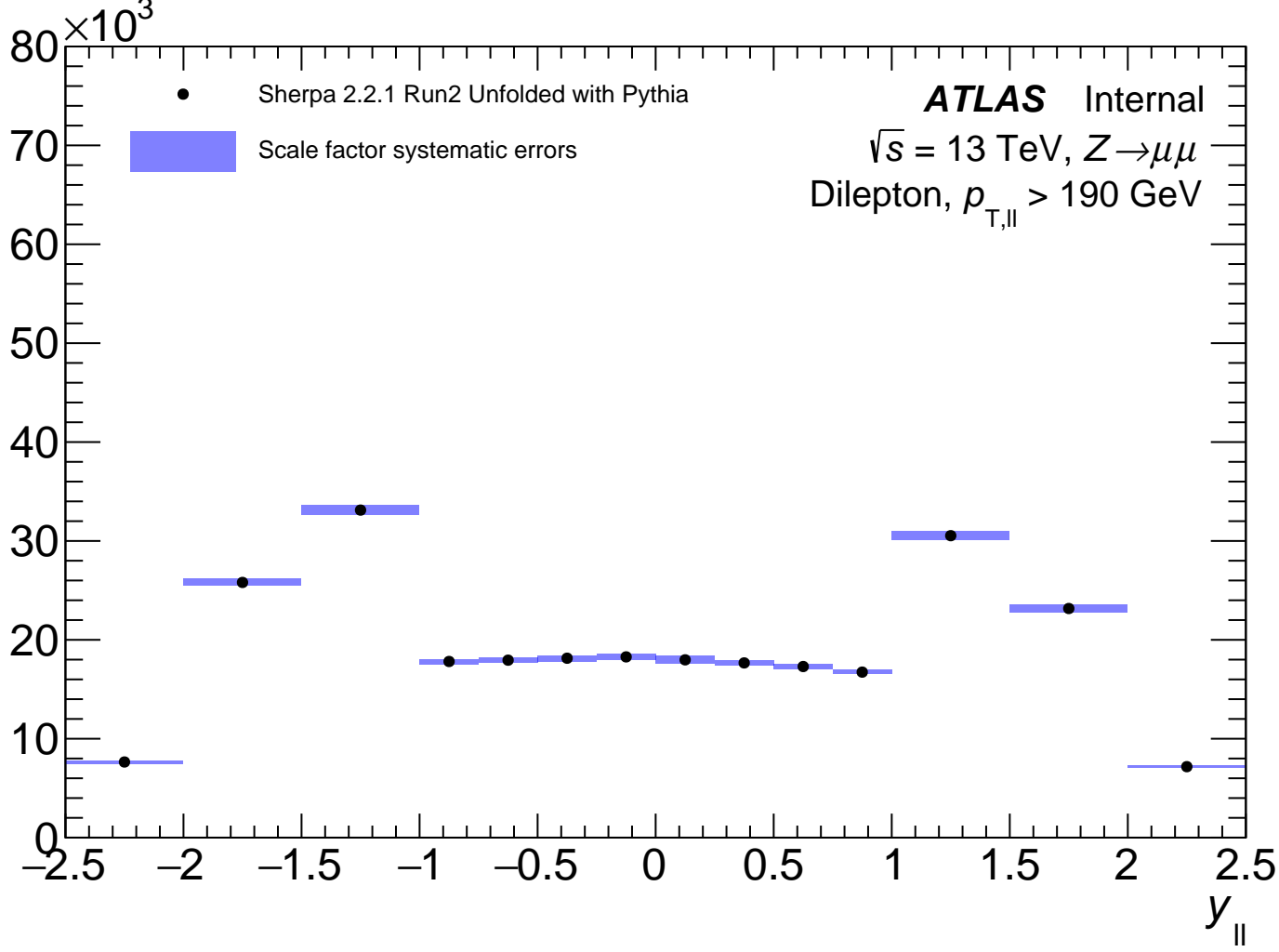
Events



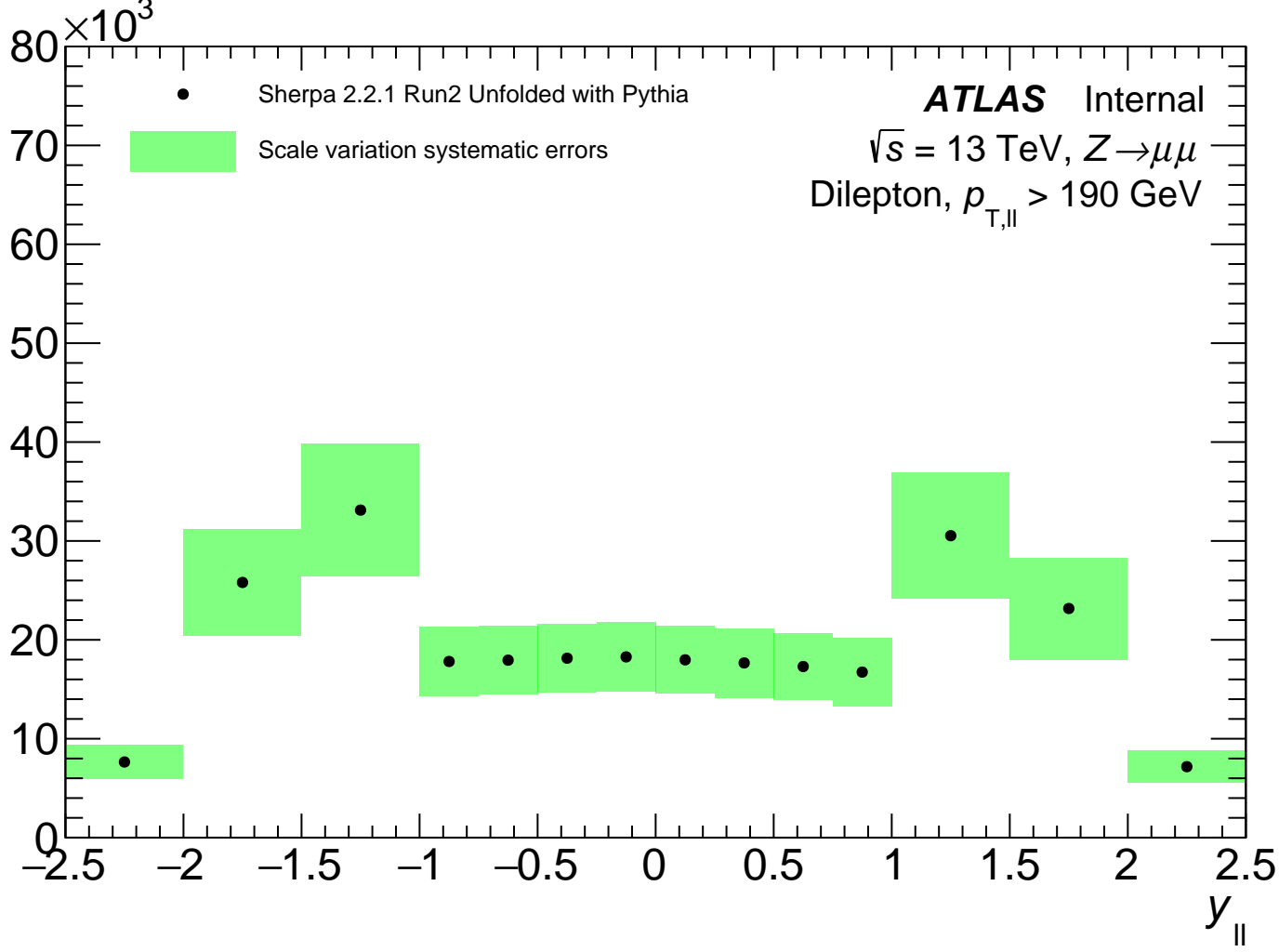
Events



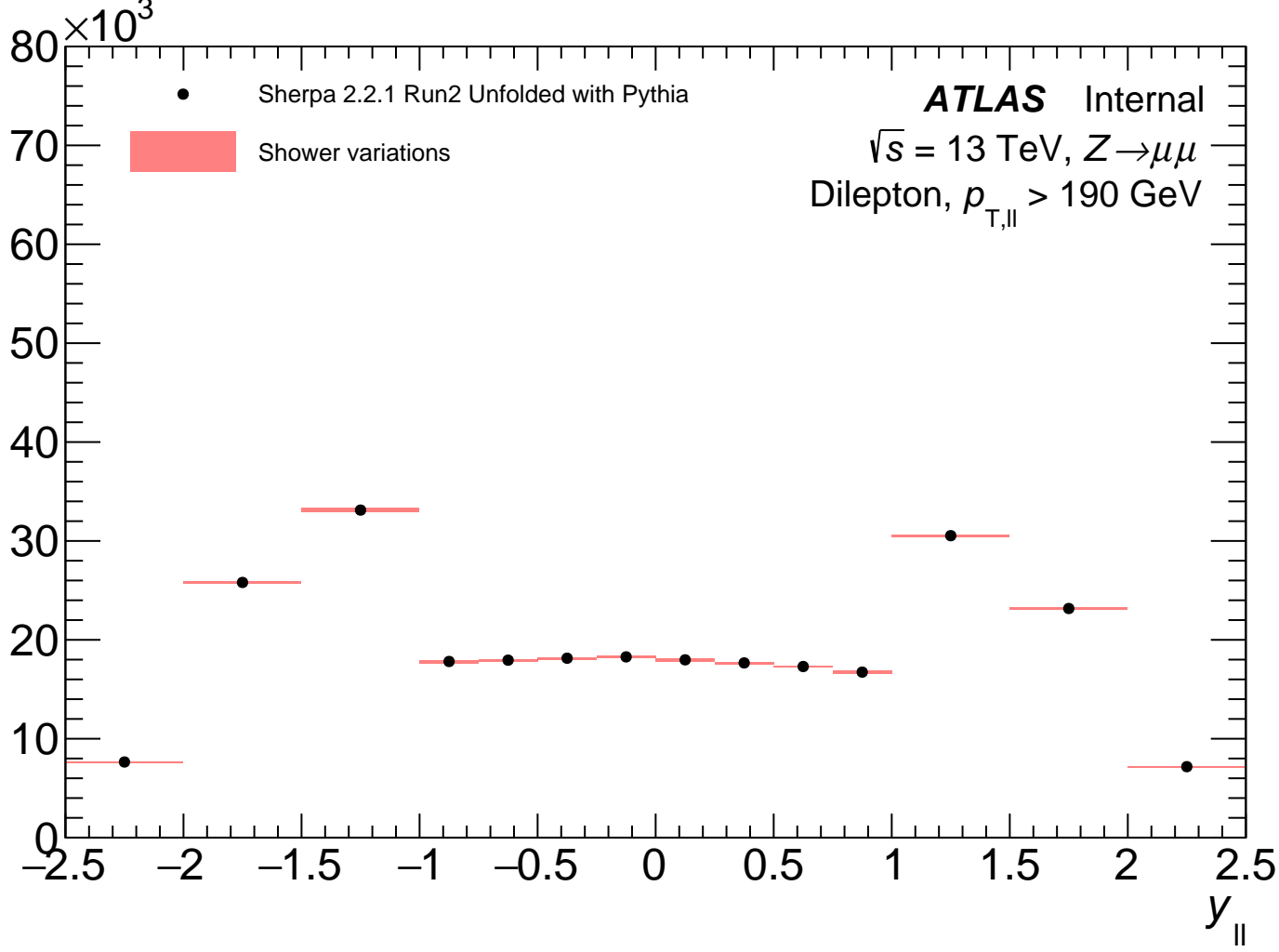
Events



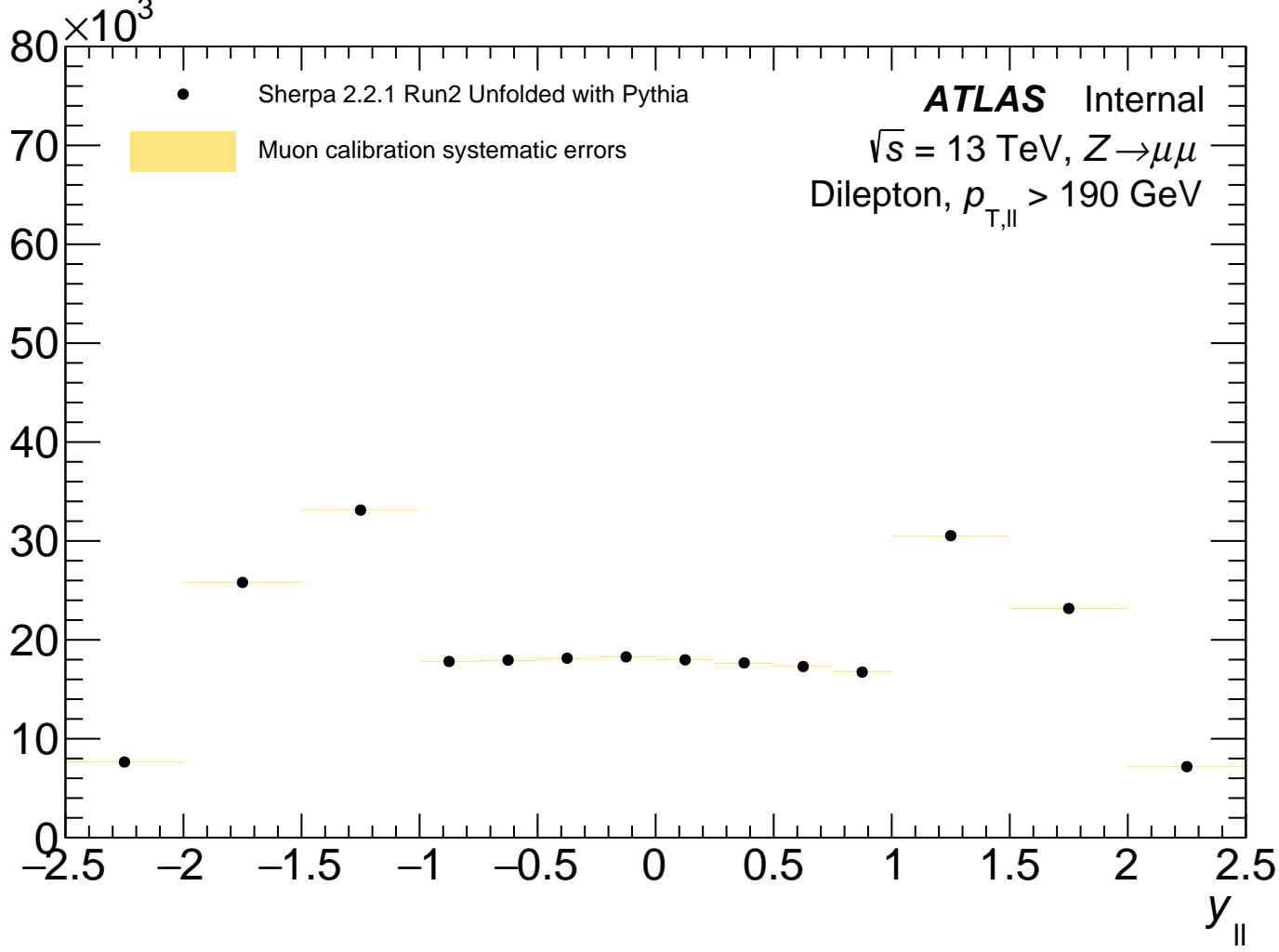
Events



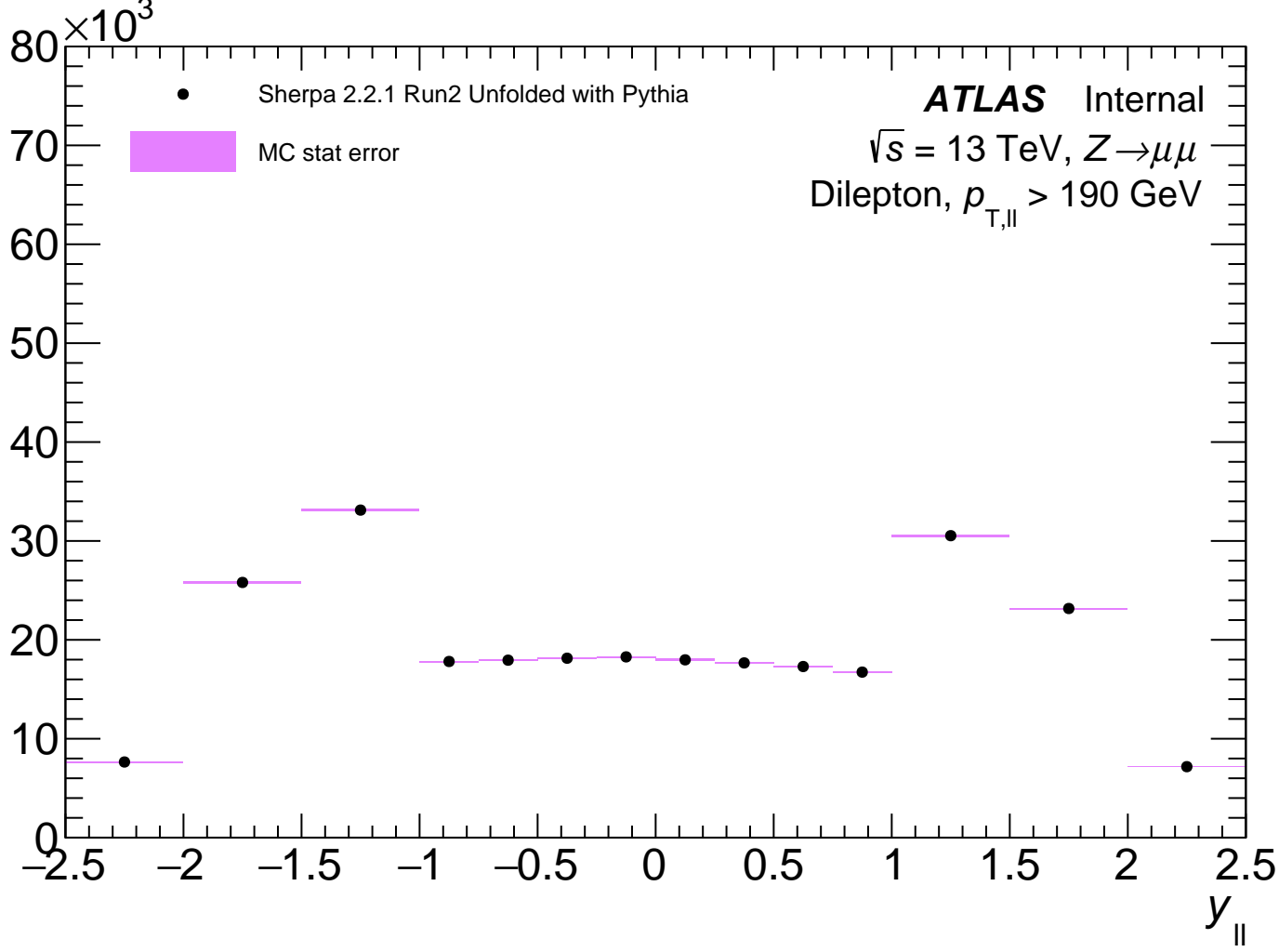
Events



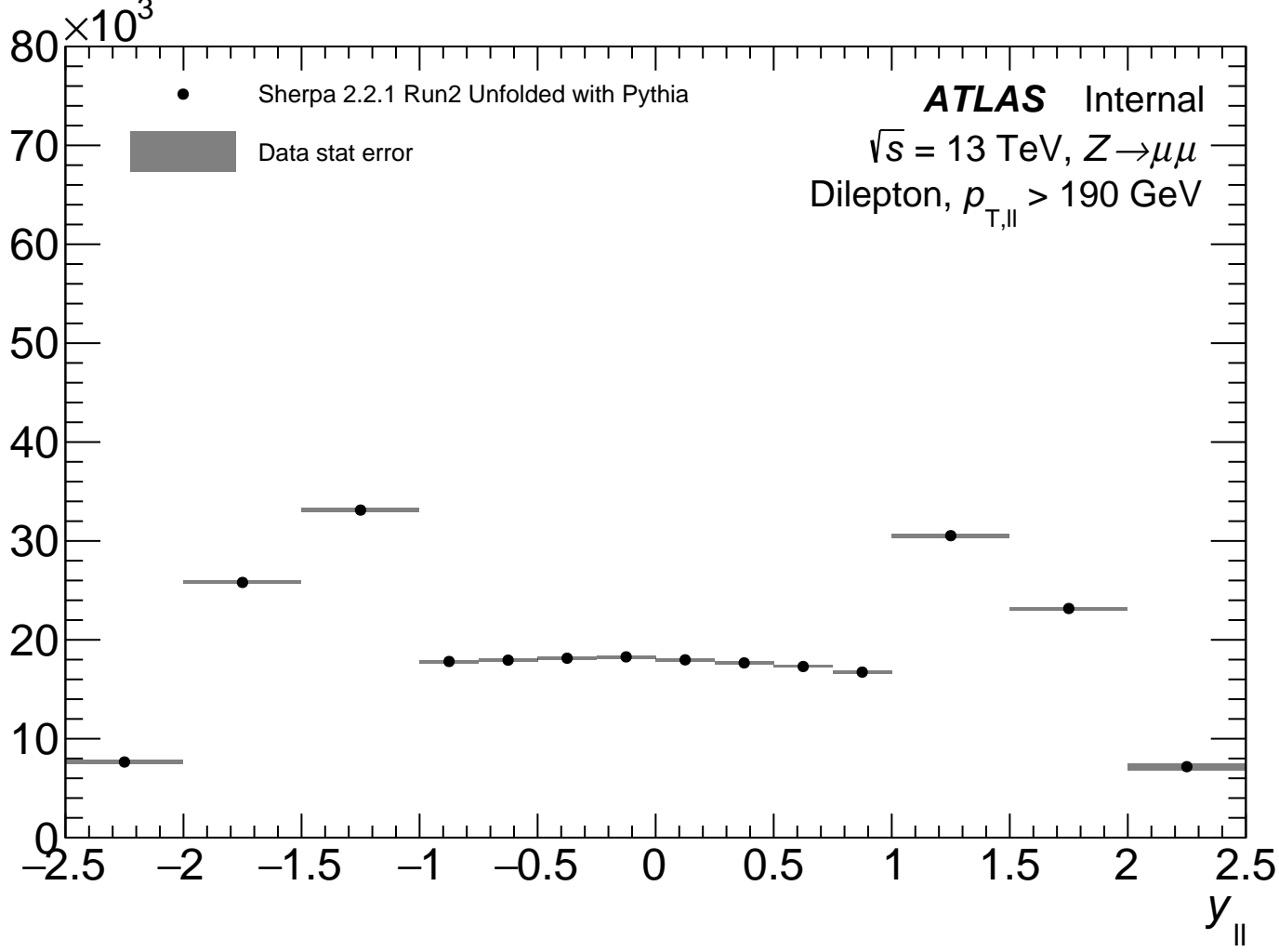
Events



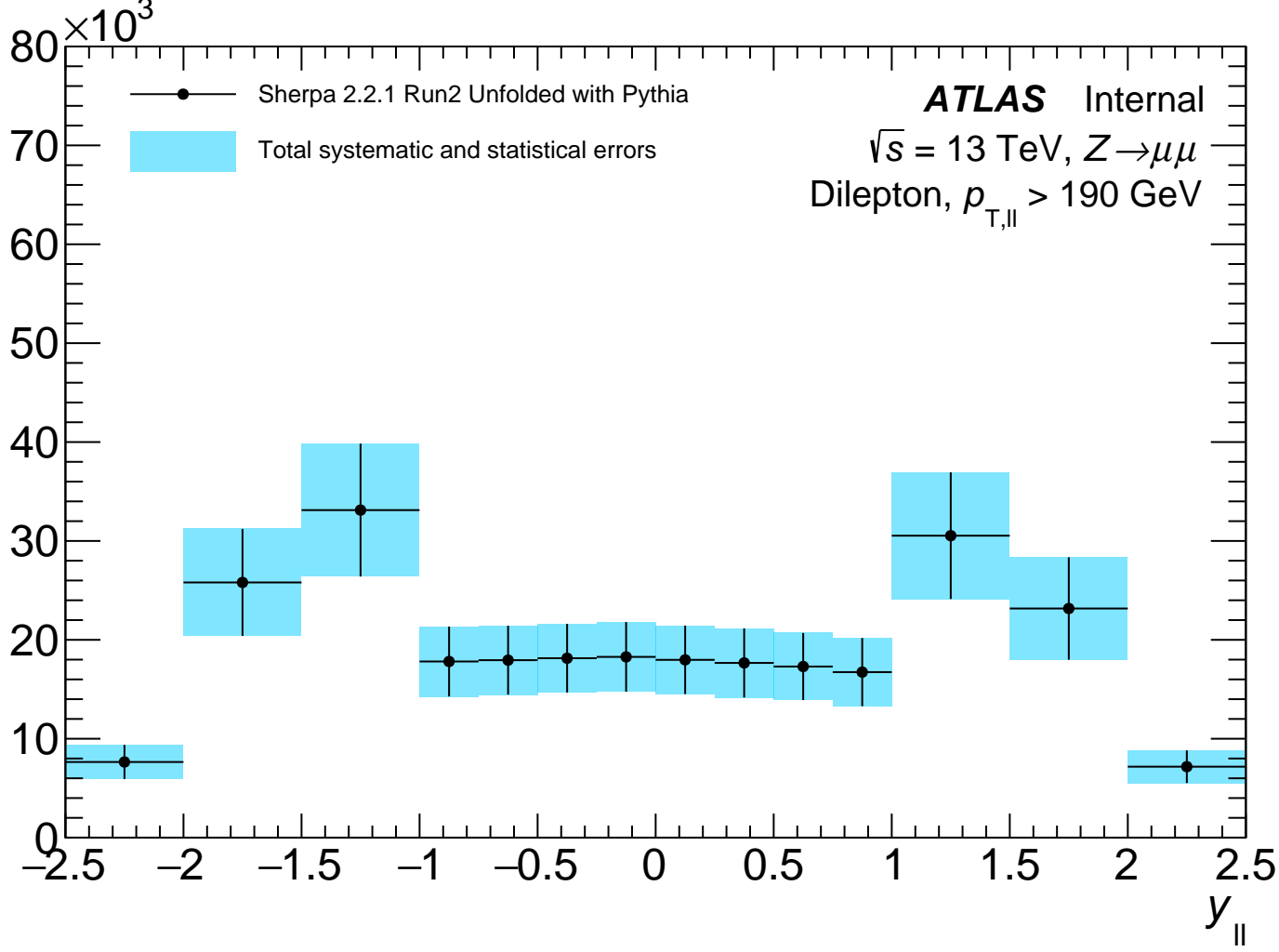
Events



Events



Events



Events

$\times 10^3$

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

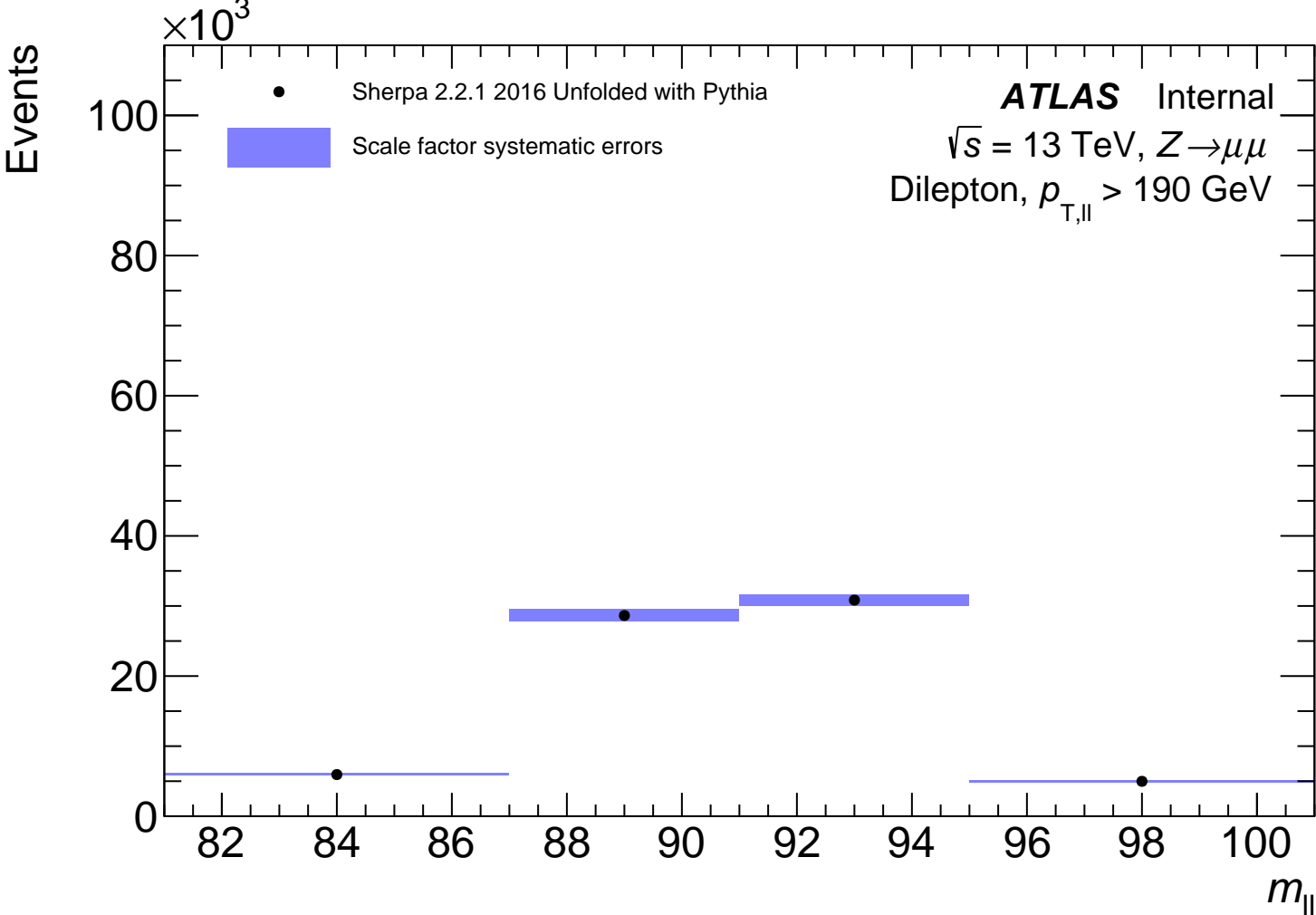
94

96

98

100

m_{ll}



Events

$\times 10^3$

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Scale variation systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

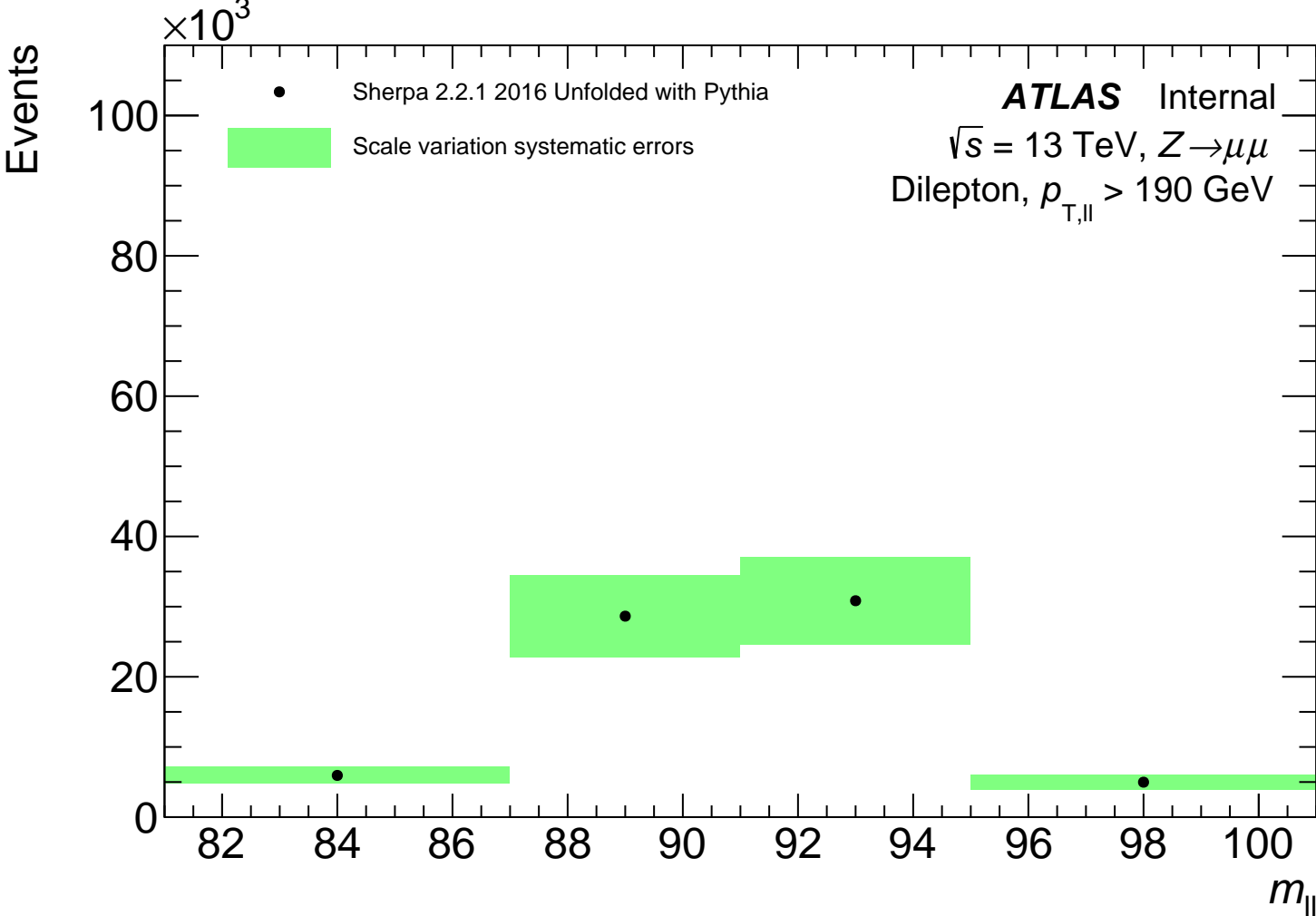
94

96

98

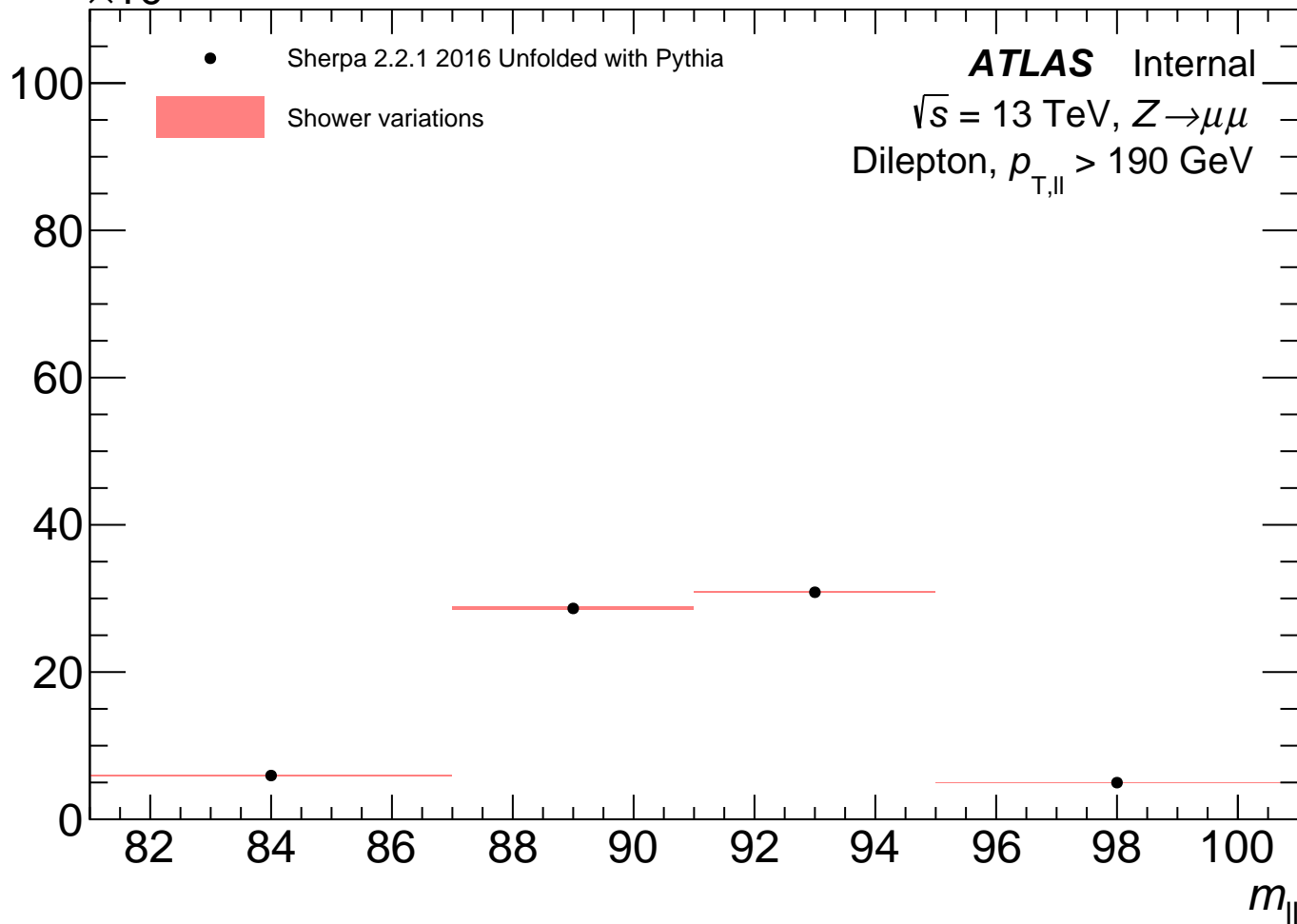
100

$m_{\ell\ell}$



Events

$\times 10^3$



Events

$\times 10^3$

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Muon calibration systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

94

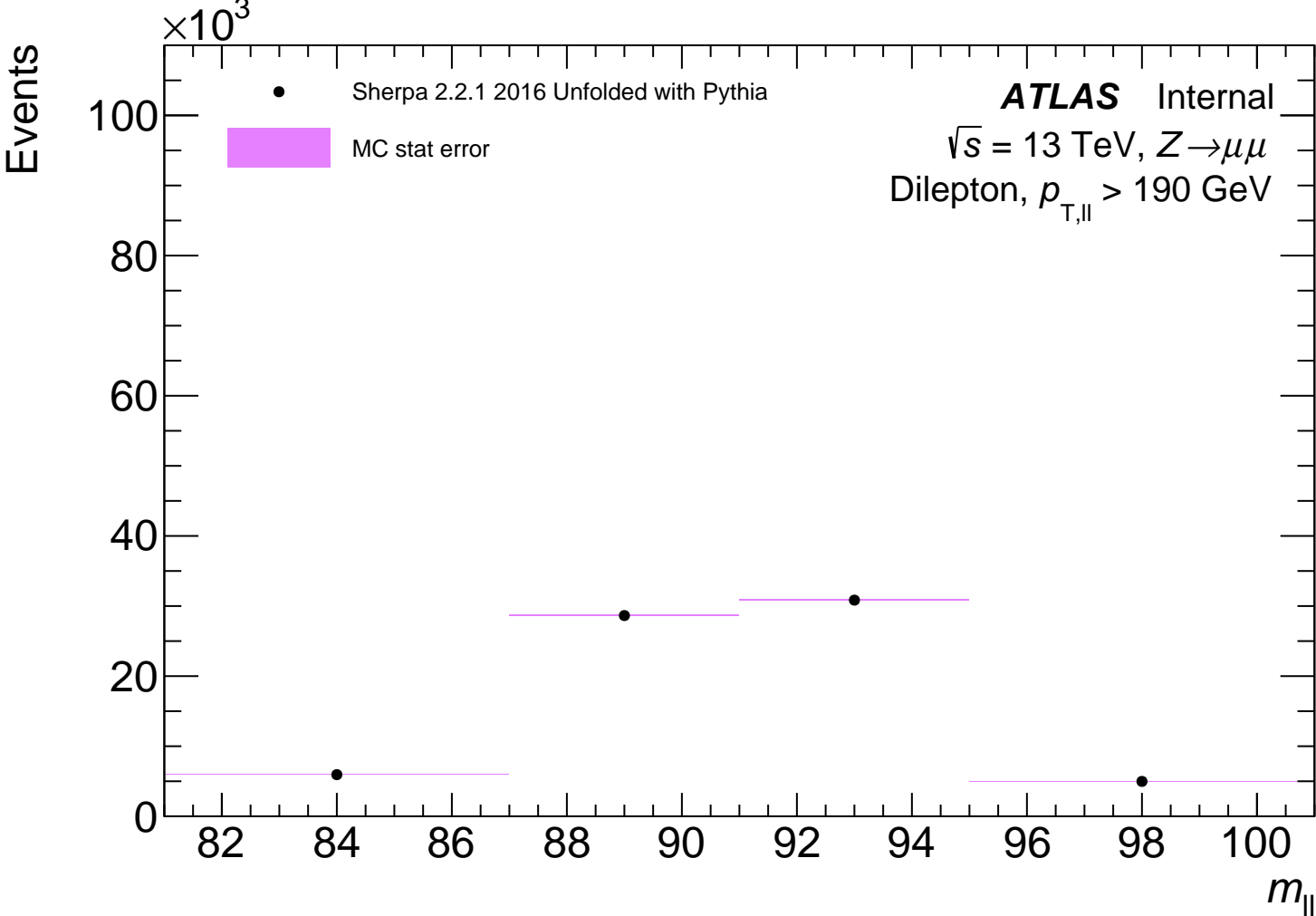
96

98

100

m_{ll}





Events

$\times 10^3$

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

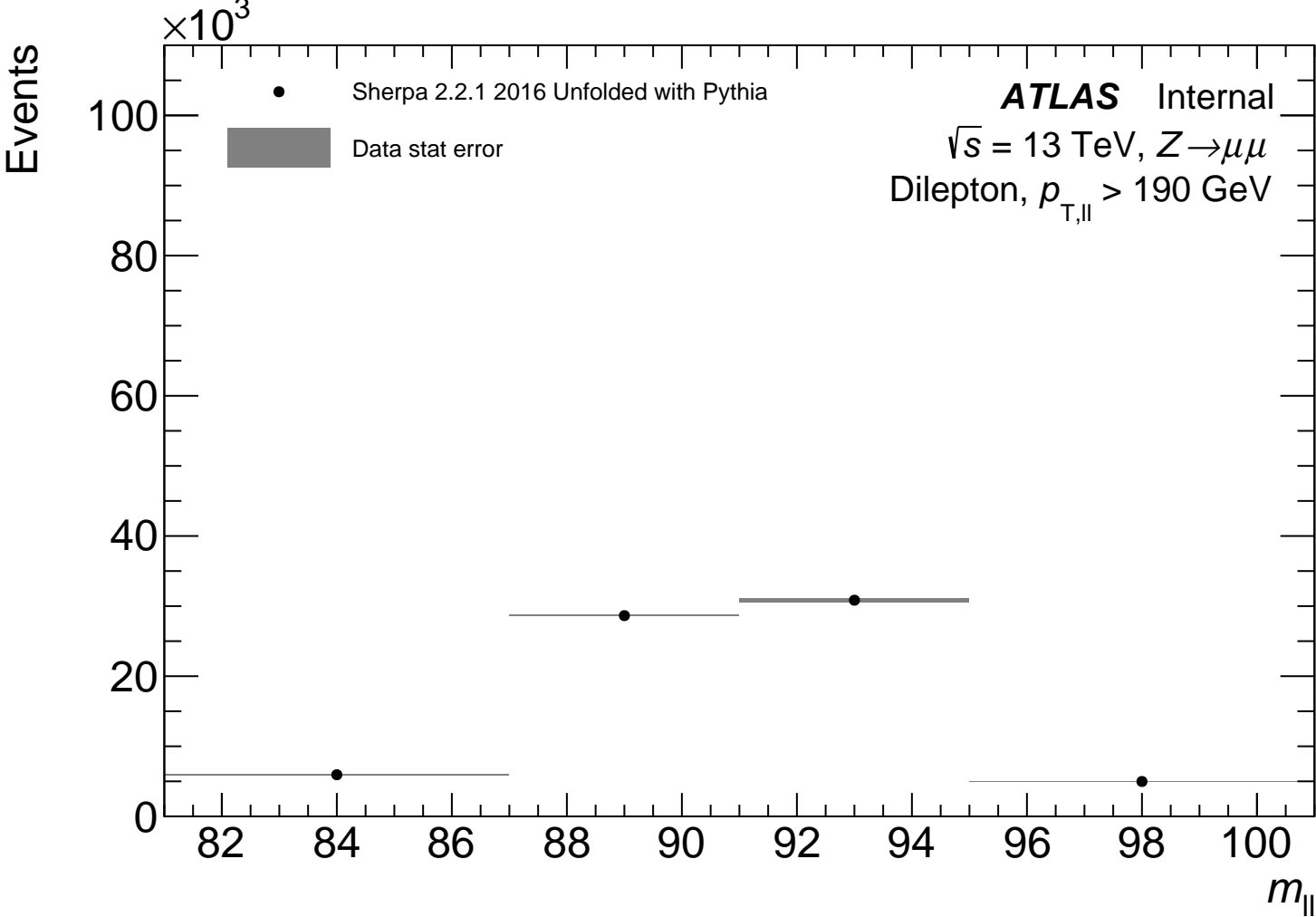
94

96

98

100

$m_{\ell\ell}$



Events

$\times 10^3$

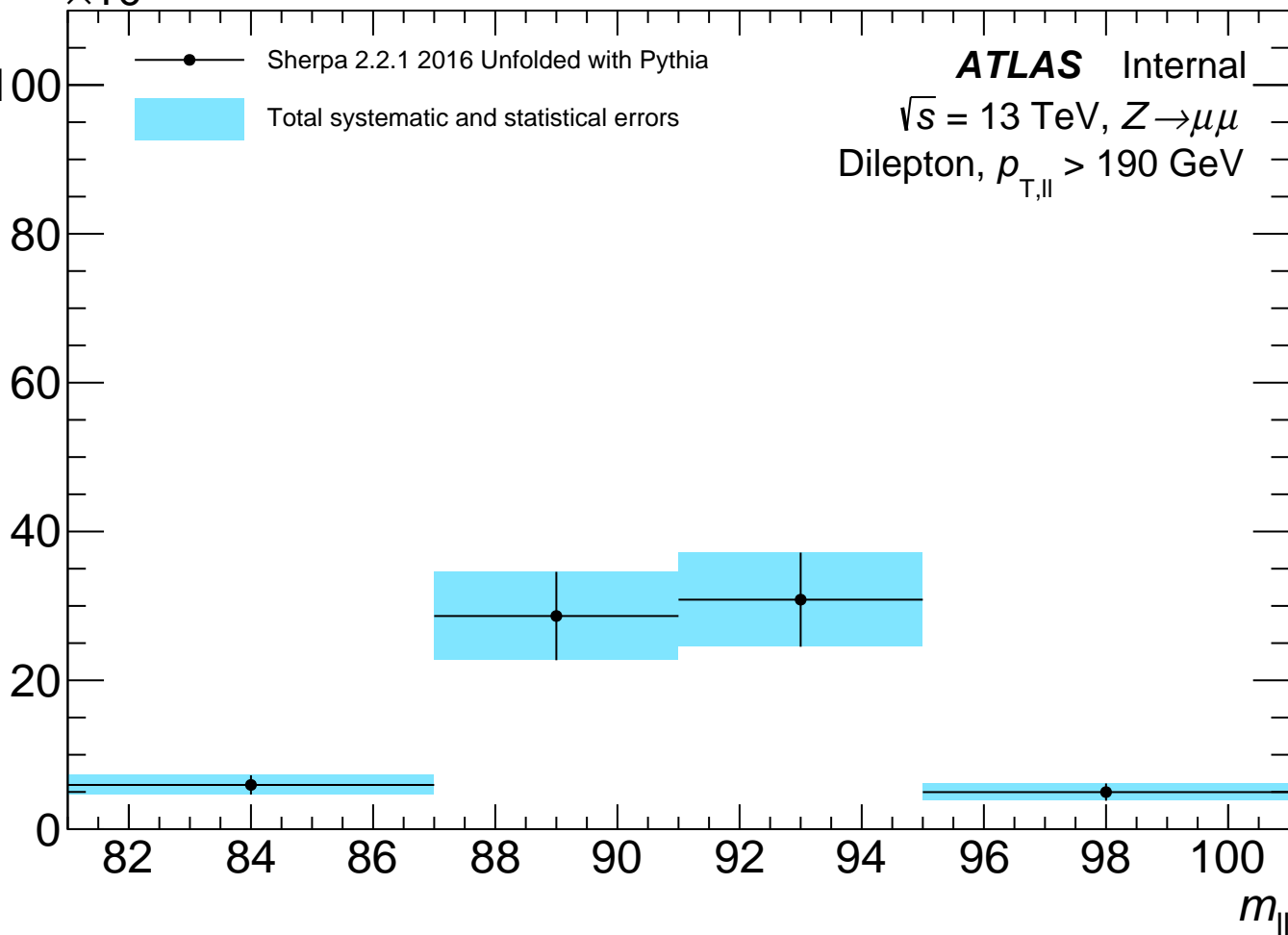
—●— Sherpa 2.2.1 2016 Unfolded with Pythia

■ Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$



Events

$\times 10^3$

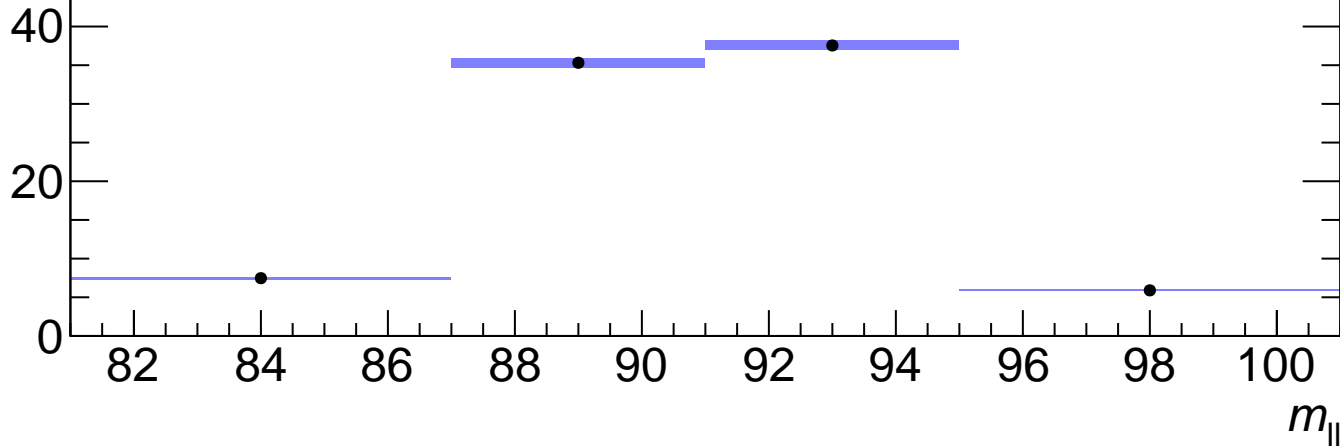
• Sherpa 2.2.1 2017 Unfolded with Pythia

■ Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



Events

$\times 10^3$

• Sherpa 2.2.1 2017 Unfolded with Pythia

■ Scale variation systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

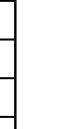
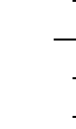
94

96

98

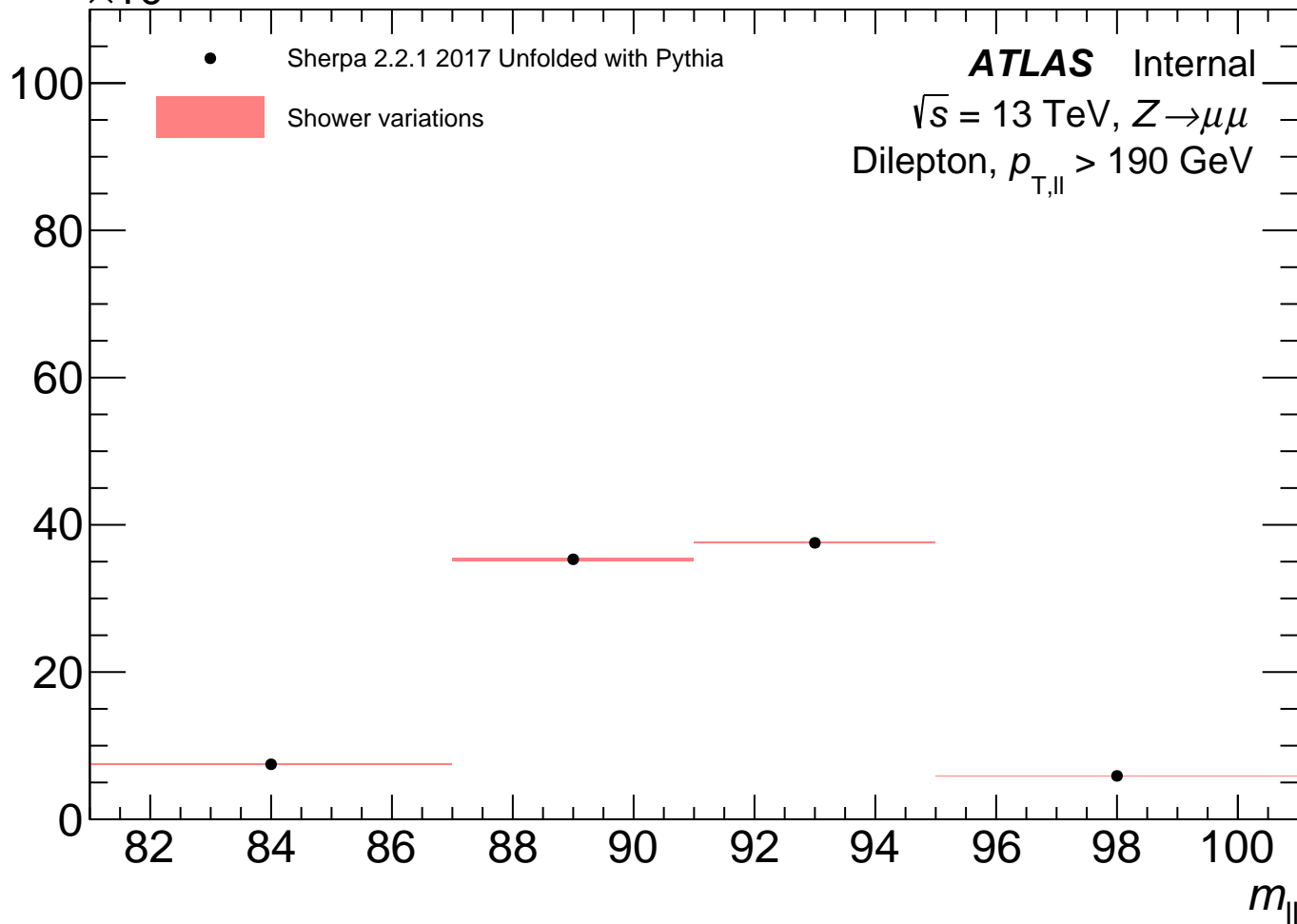
100

$m_{\ell\ell}$



Events

$\times 10^3$



Events

$\times 10^3$

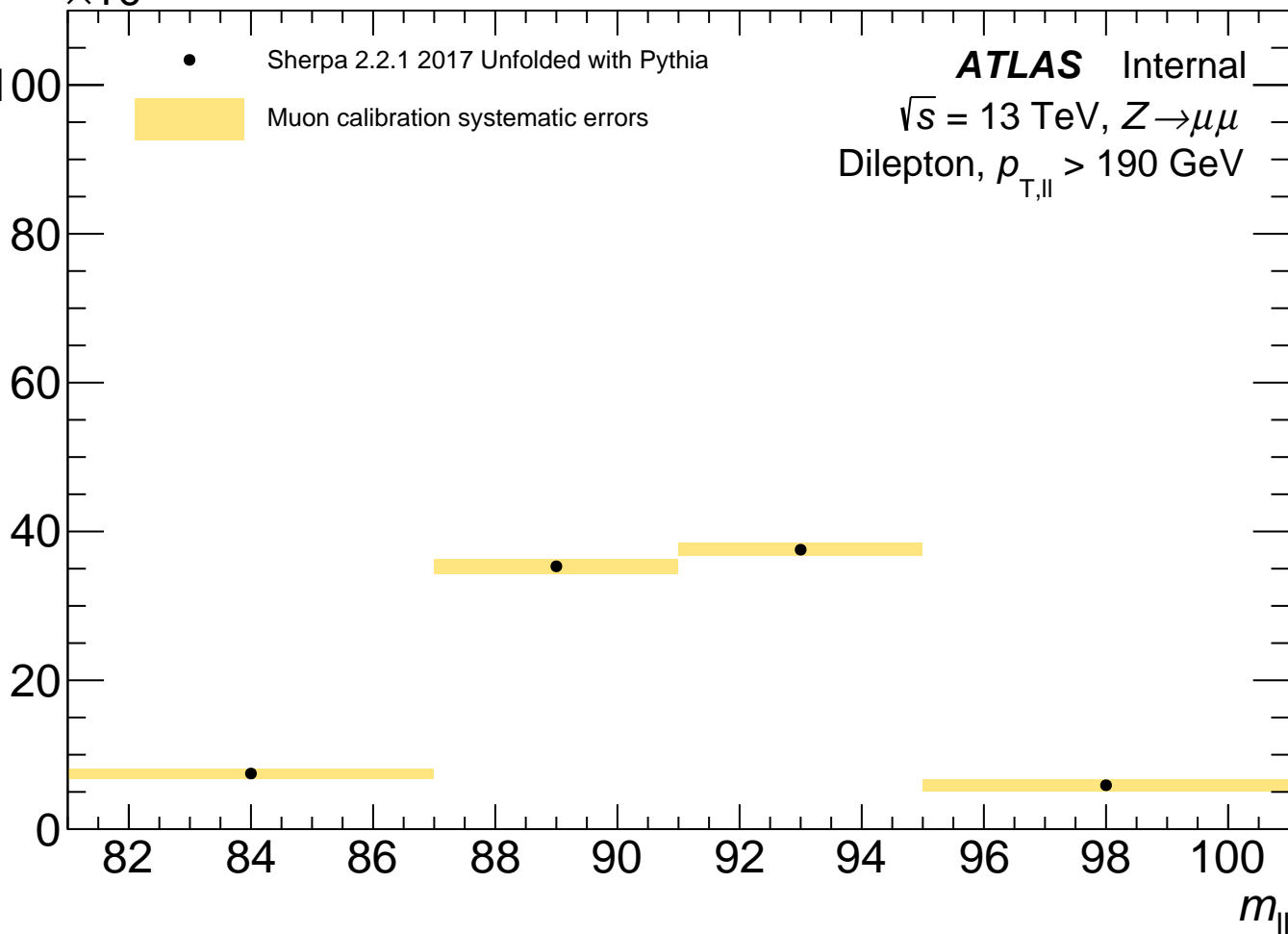
• Sherpa 2.2.1 2017 Unfolded with Pythia

■ Muon calibration systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



Events

$\times 10^3$

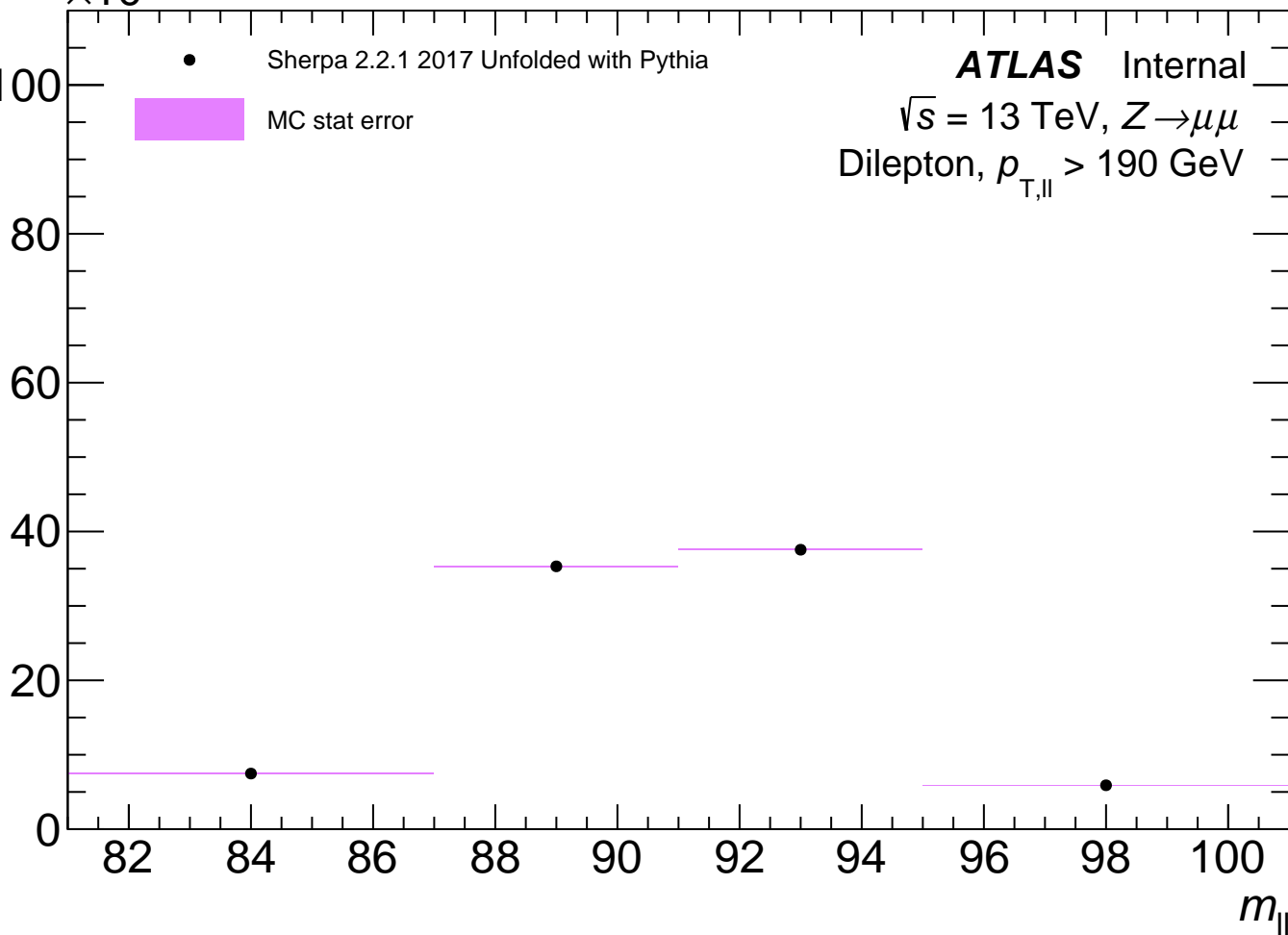
• Sherpa 2.2.1 2017 Unfolded with Pythia

MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



Events

$\times 10^3$

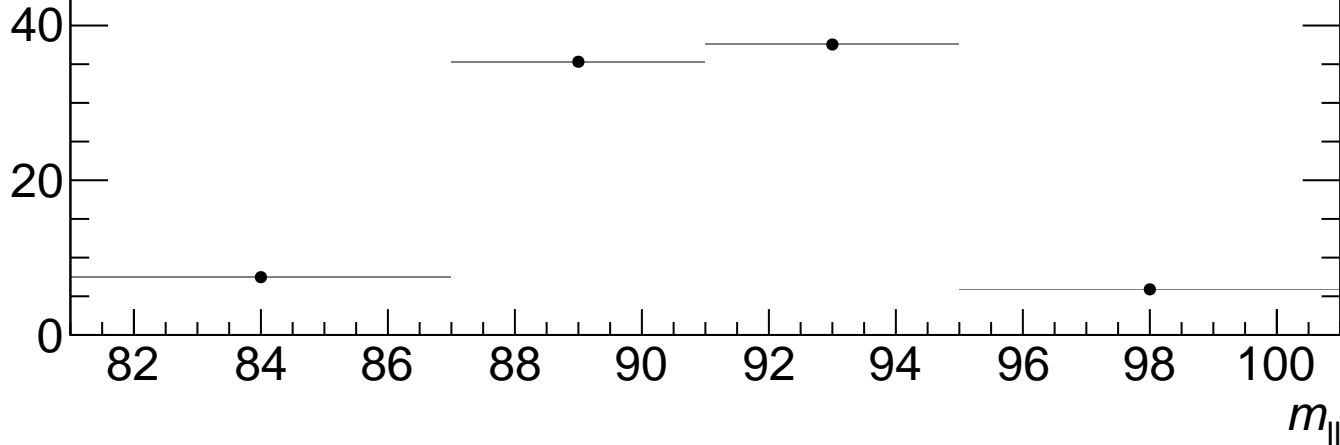
• Sherpa 2.2.1 2017 Unfolded with Pythia

■ Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



Events

$\times 10^3$

—●— Sherpa 2.2.1 2017 Unfolded with Pythia

■ Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

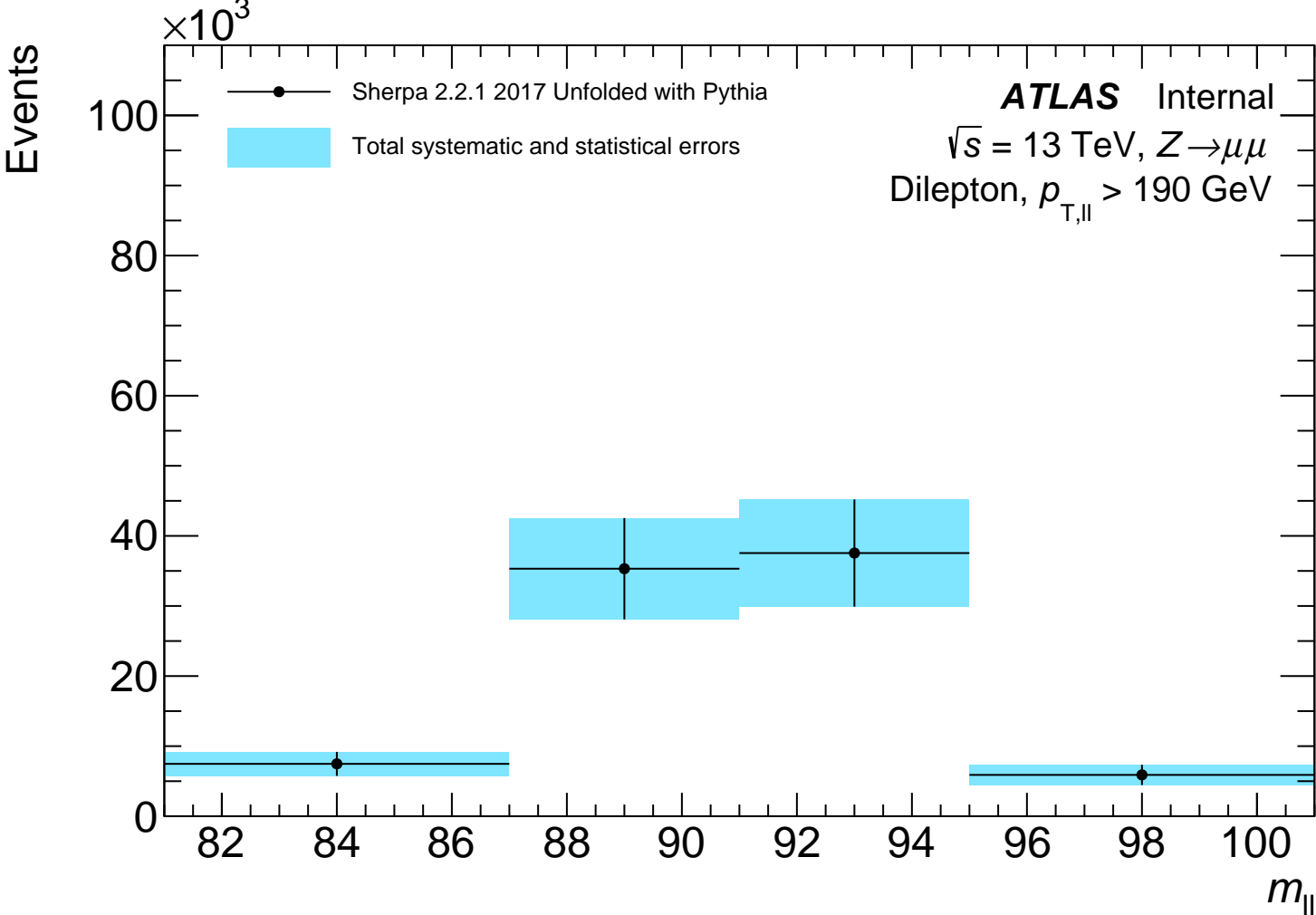
94

96

98

100

m_{ll}



Events

$\times 10^3$

• Sherpa 2.2.1 2018 Unfolded with Pythia

■ Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

100

80

60

40

20

0

82

84

86

88

90

92

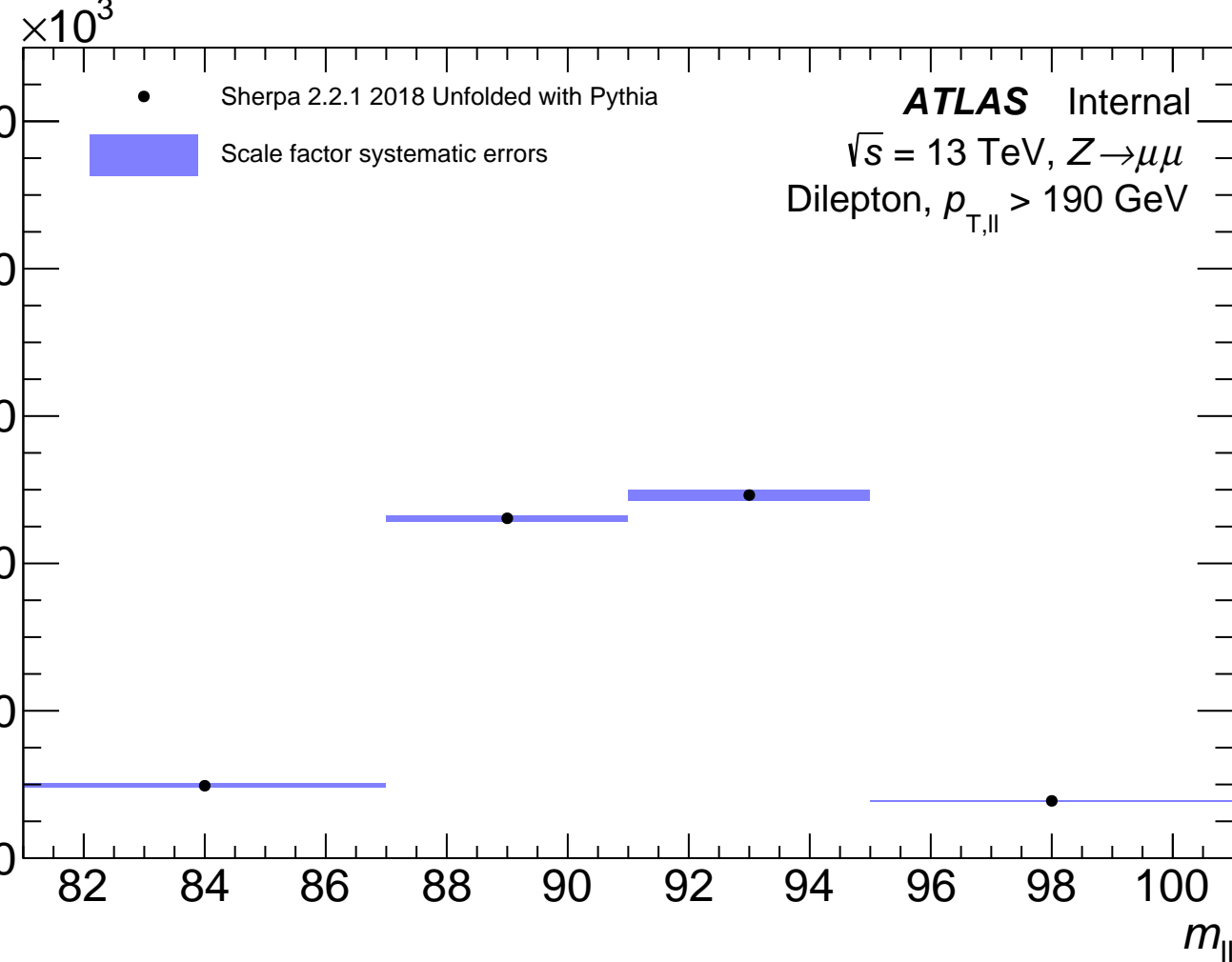
94

96

98

100

m_{ll}



Events

$\times 10^3$

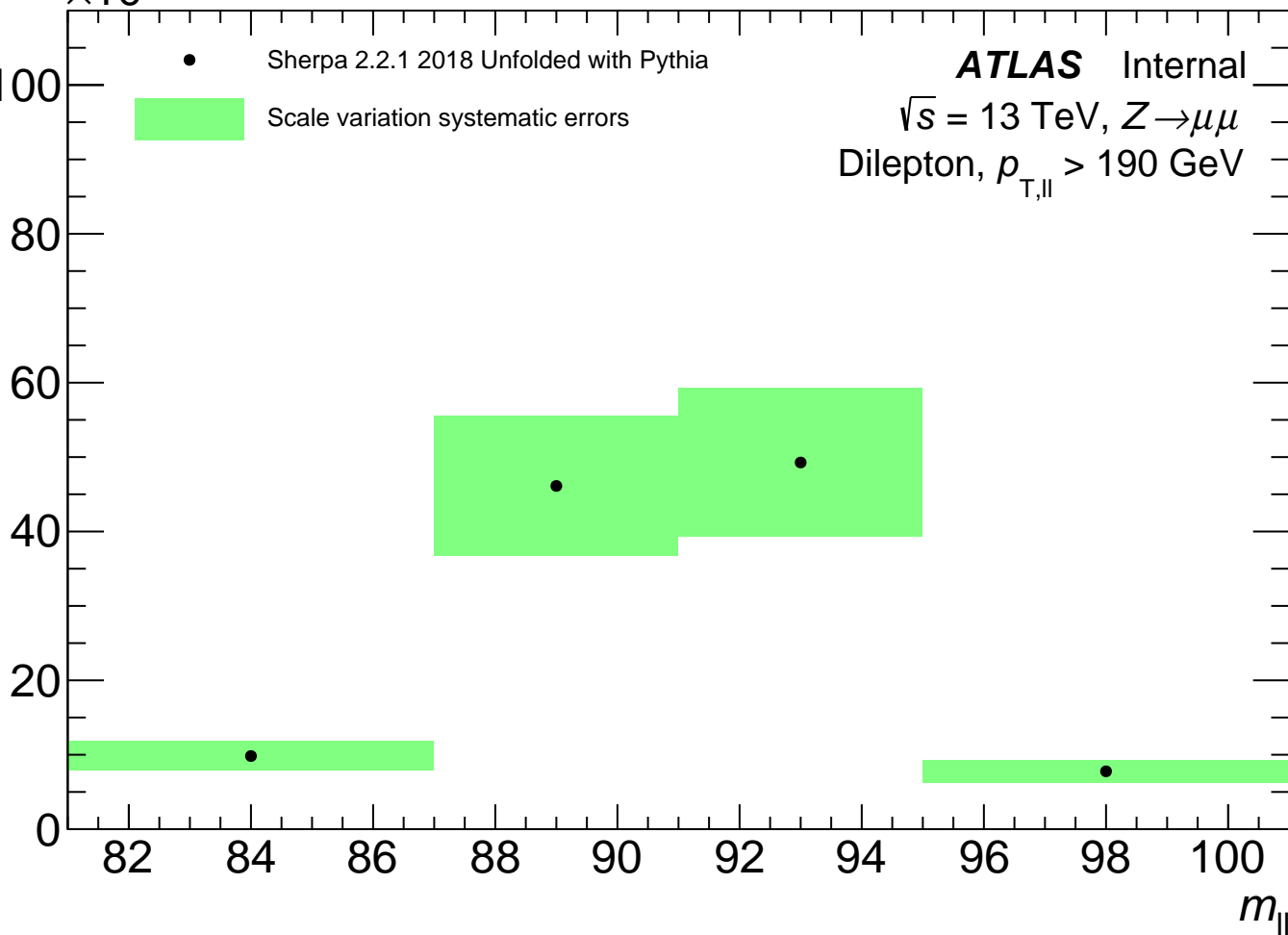
• Sherpa 2.2.1 2018 Unfolded with Pythia

■ Scale variation systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



Events

$\times 10^3$

•

Sherpa 2.2.1 2018 Unfolded with Pythia

Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

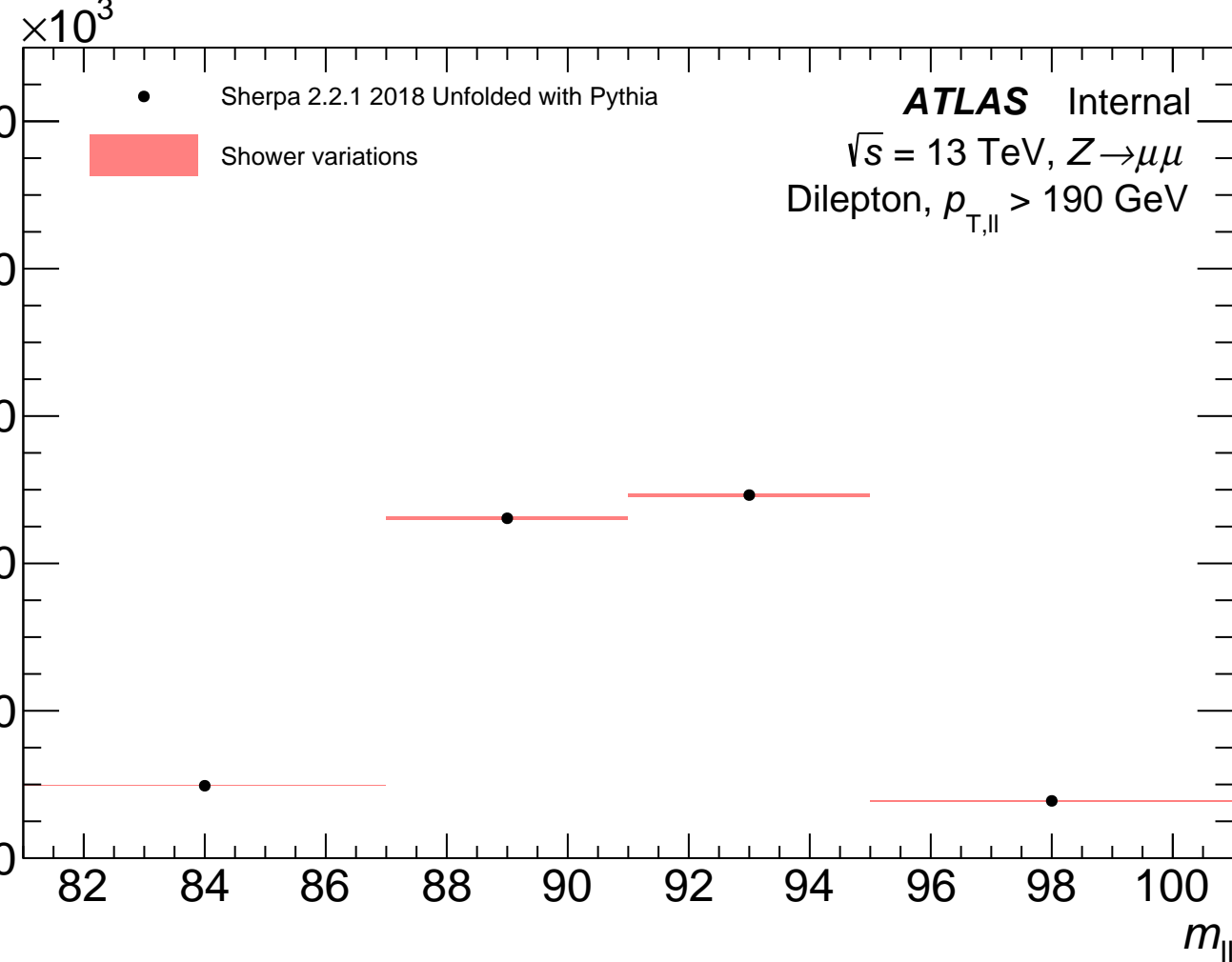
94

96

98

100

m_{ll}



Events

$\times 10^3$

• Sherpa 2.2.1 2018 Unfolded with Pythia

■ Muon calibration systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

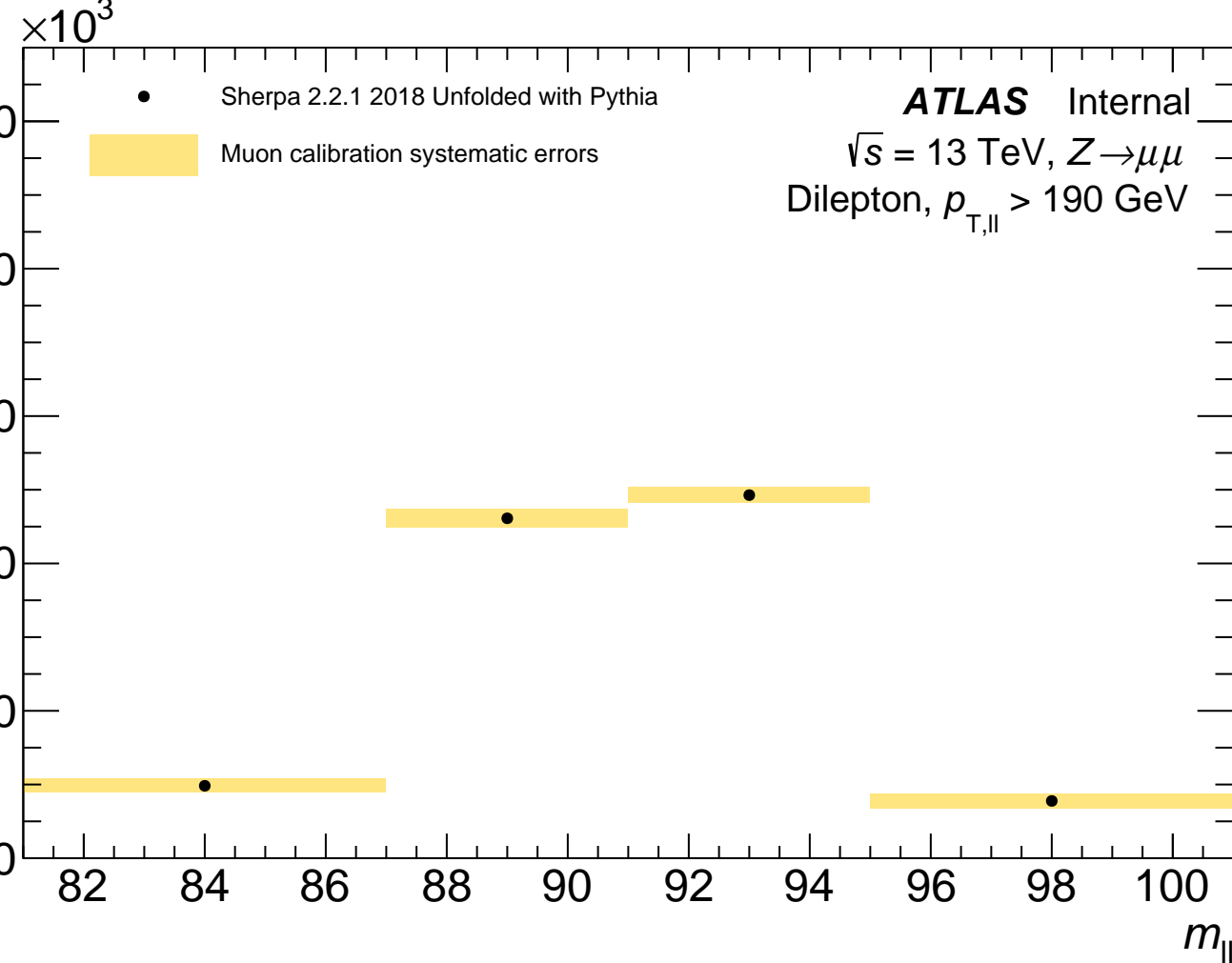
94

96

98

100

m_{ll}



Events

$\times 10^3$

• Sherpa 2.2.1 2018 Unfolded with Pythia

MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

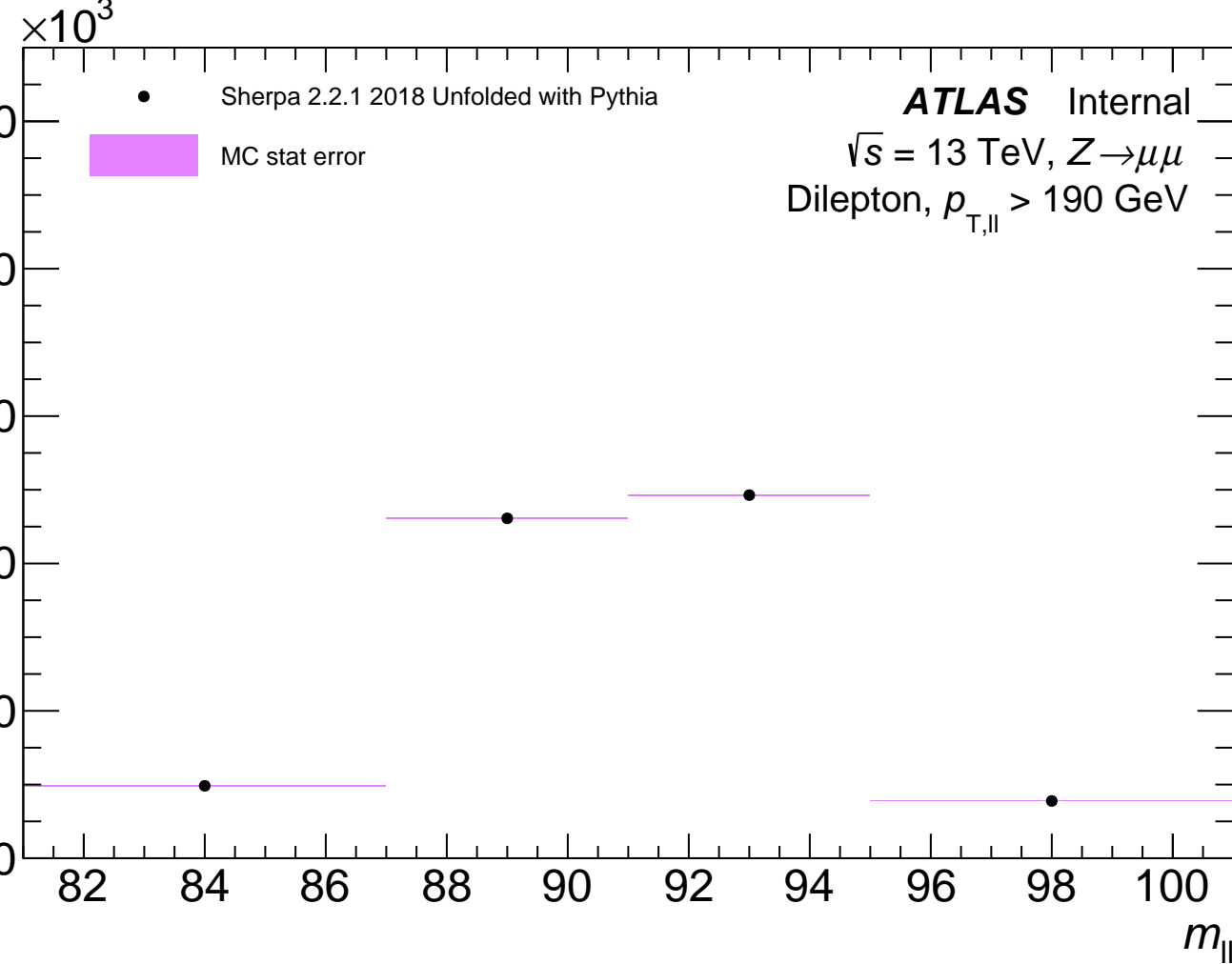
94

96

98

100

$m_{\ell\ell}$



Events

$\times 10^3$

• Sherpa 2.2.1 2018 Unfolded with Pythia

■ Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

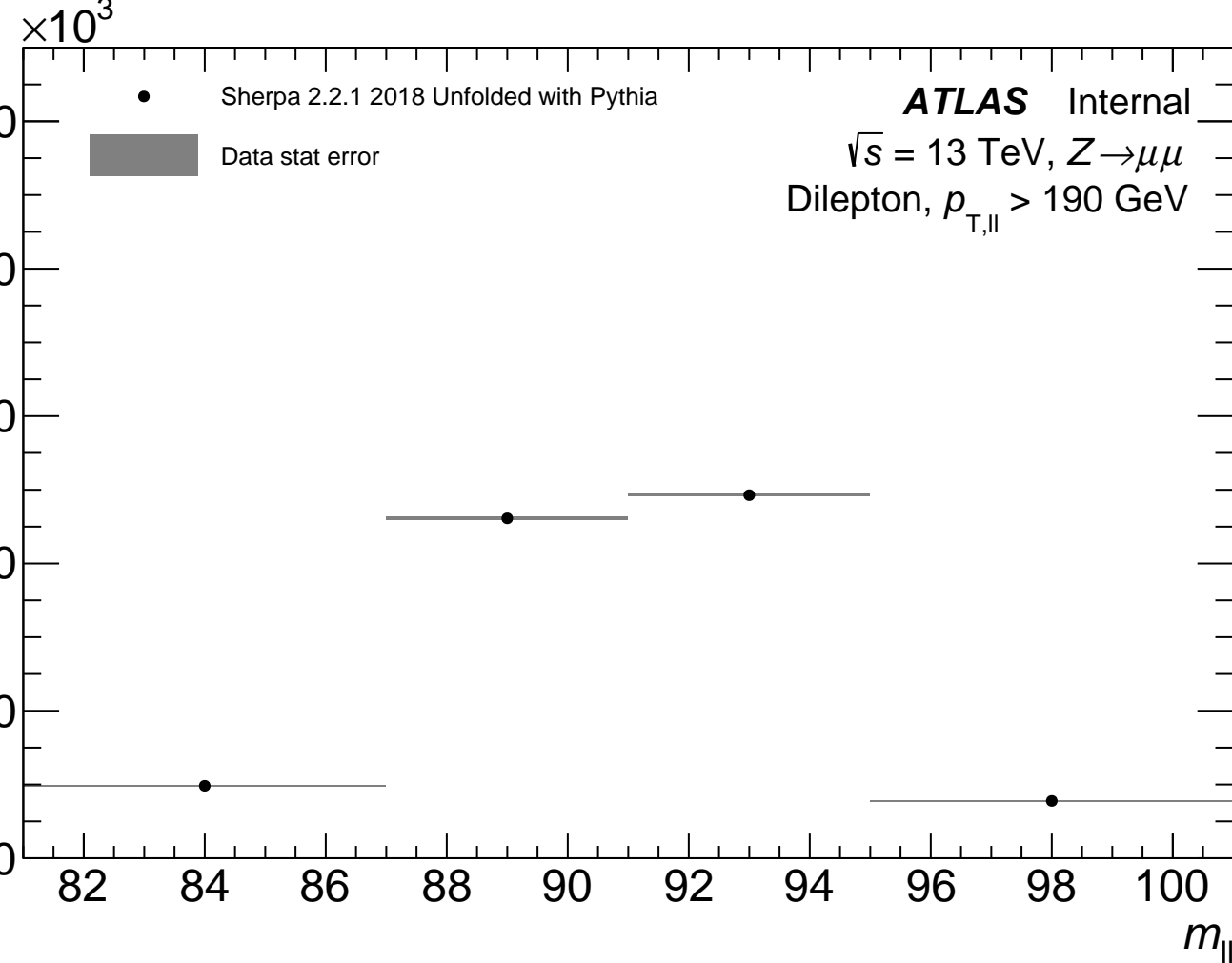
94

96

98

100

m_{ll}



Events

$\times 10^3$

—●— Sherpa 2.2.1 2018 Unfolded with Pythia

■ Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$

100

80

60

40

20

0

82

84

86

88

90

92

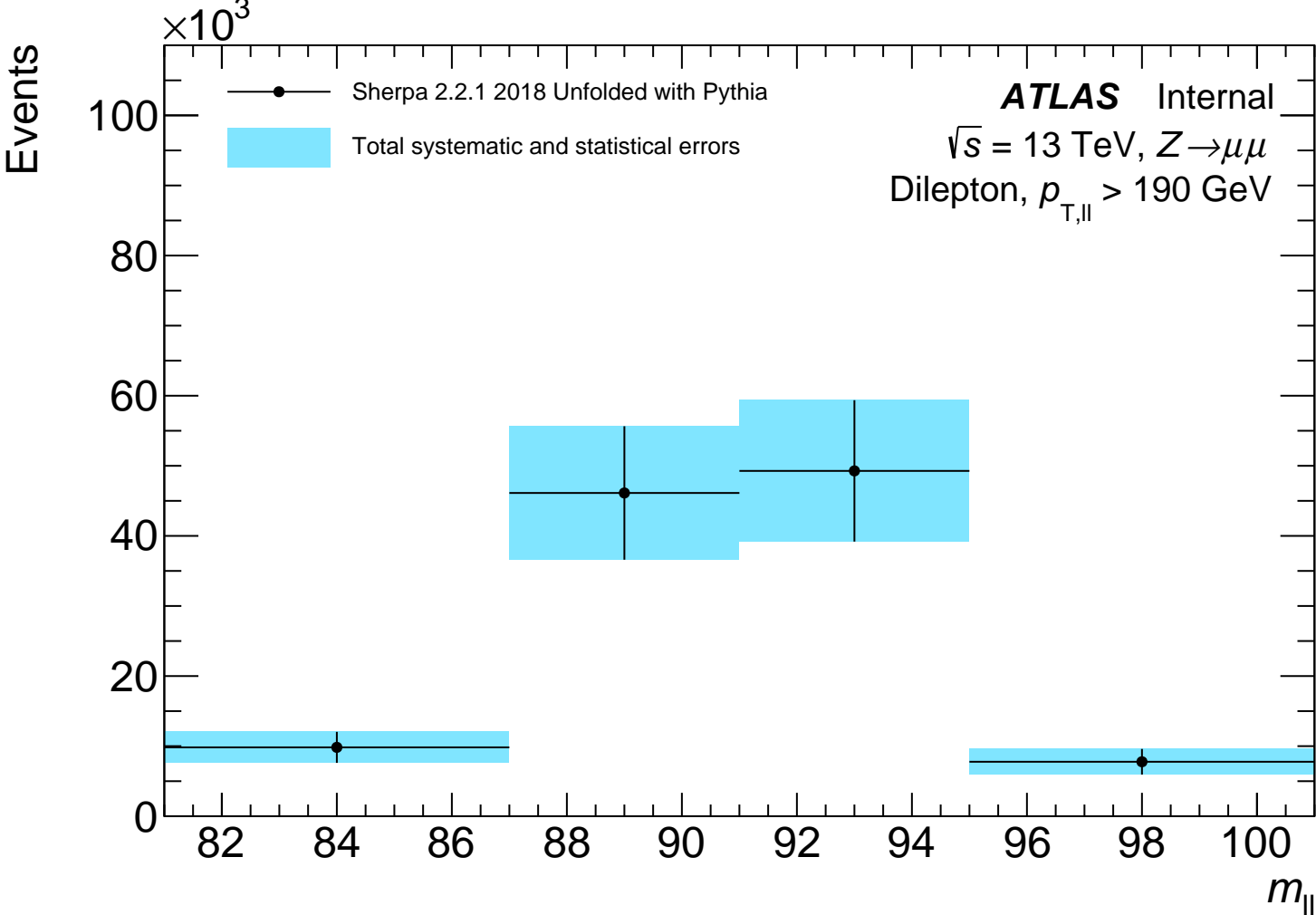
94

96

98

100

$m_{\ell\ell}$



Events

$\times 10^3$

• Sherpa 2.2.1 Run2 Unfolded with Pythia

Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

250

200

150

100

50

0

82

84

86

88

90

92

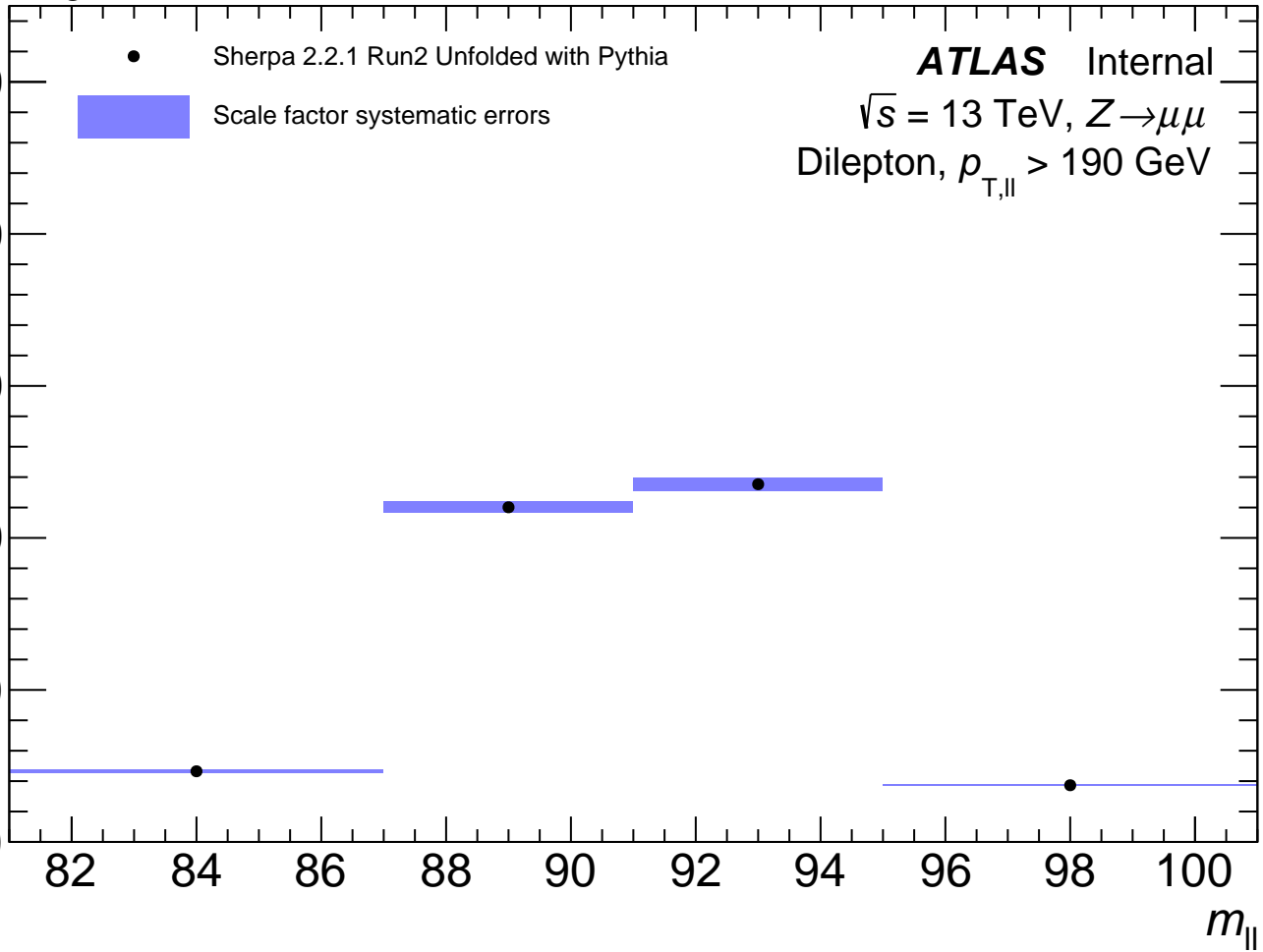
94

96

98

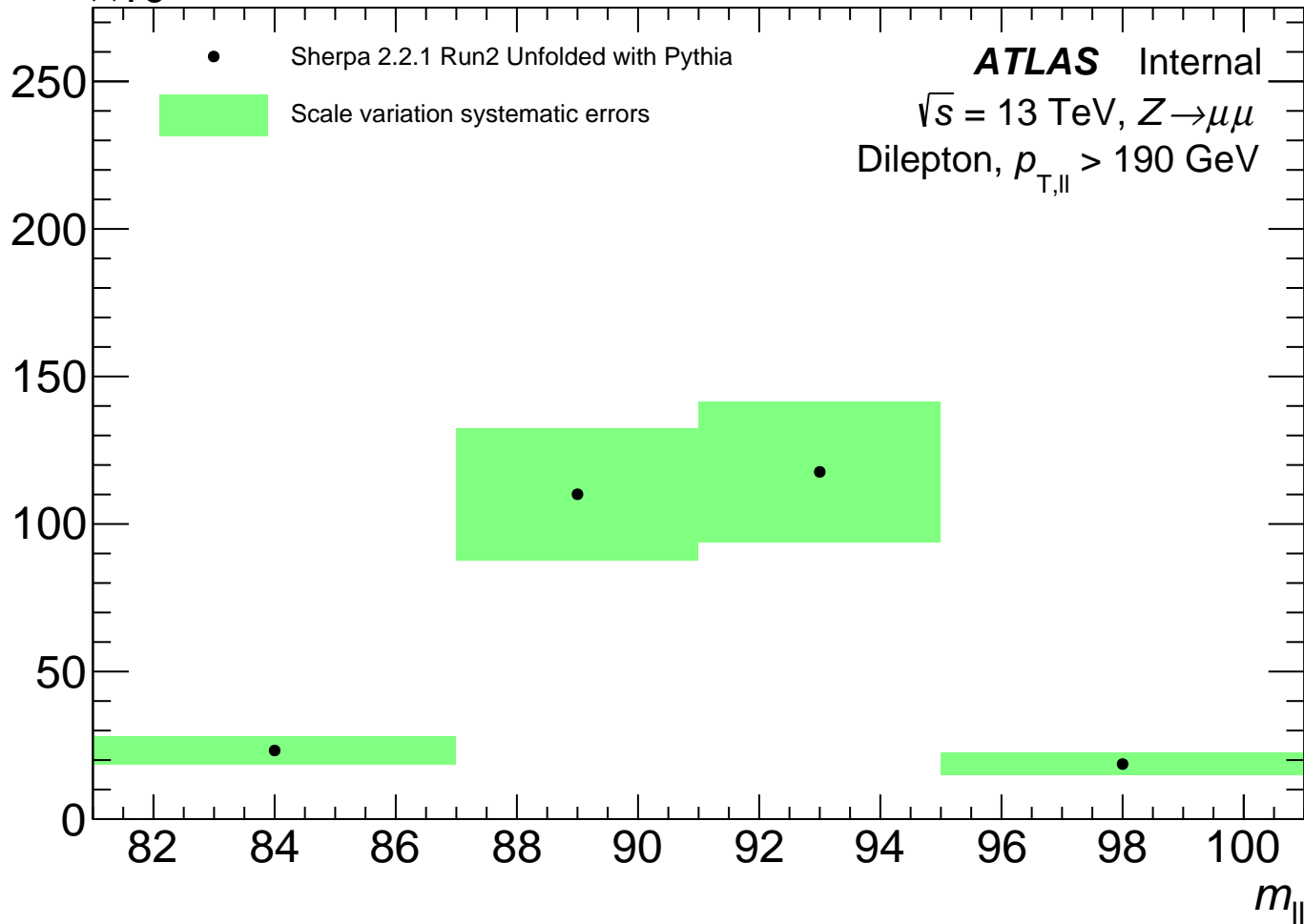
100

m_{ll}



Events

$\times 10^3$



Events

$\times 10^3$

•

Sherpa 2.2.1 Run2 Unfolded with Pythia

Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

250

200

150

100

50

0

82

84

86

88

90

92

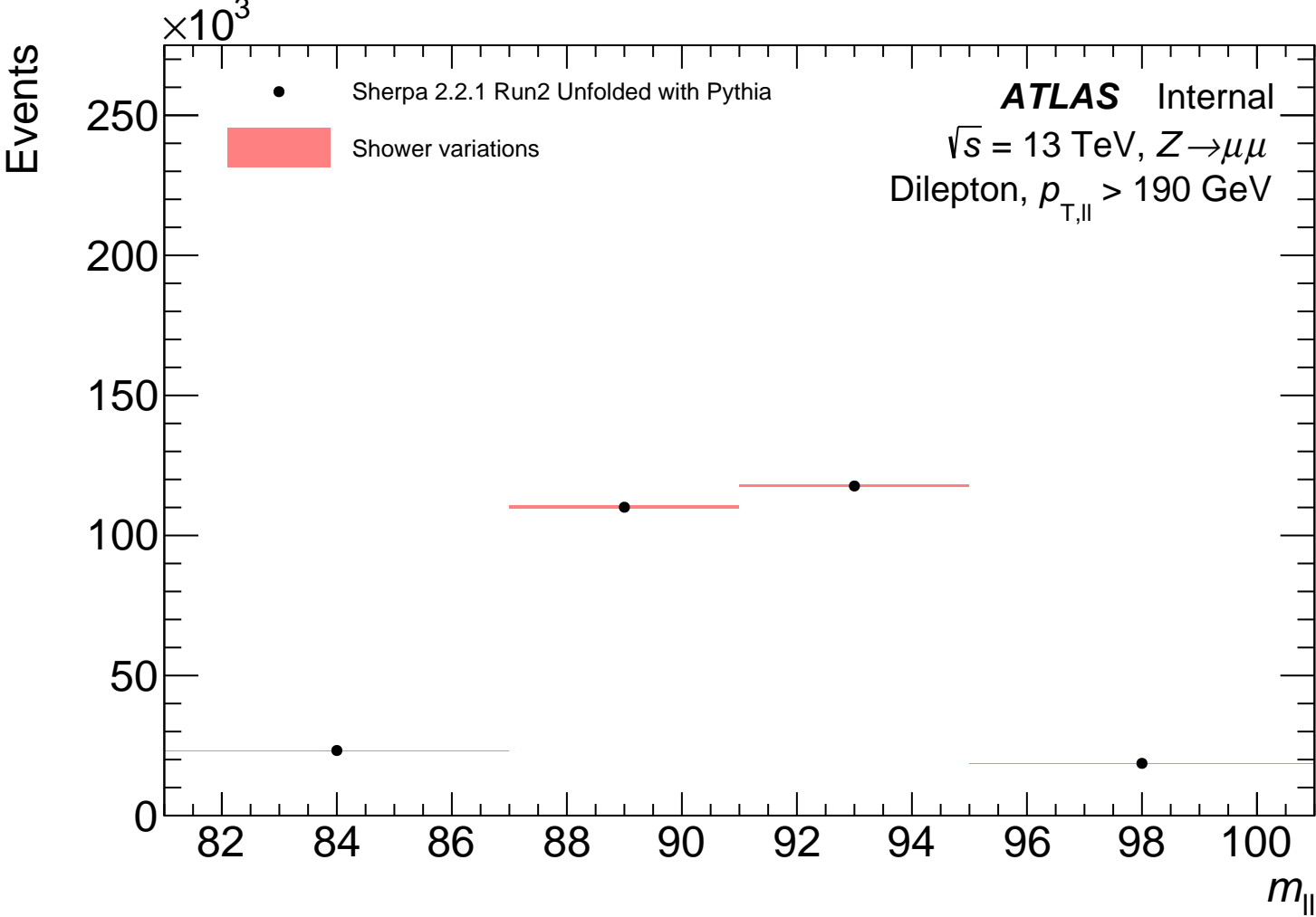
94

96

98

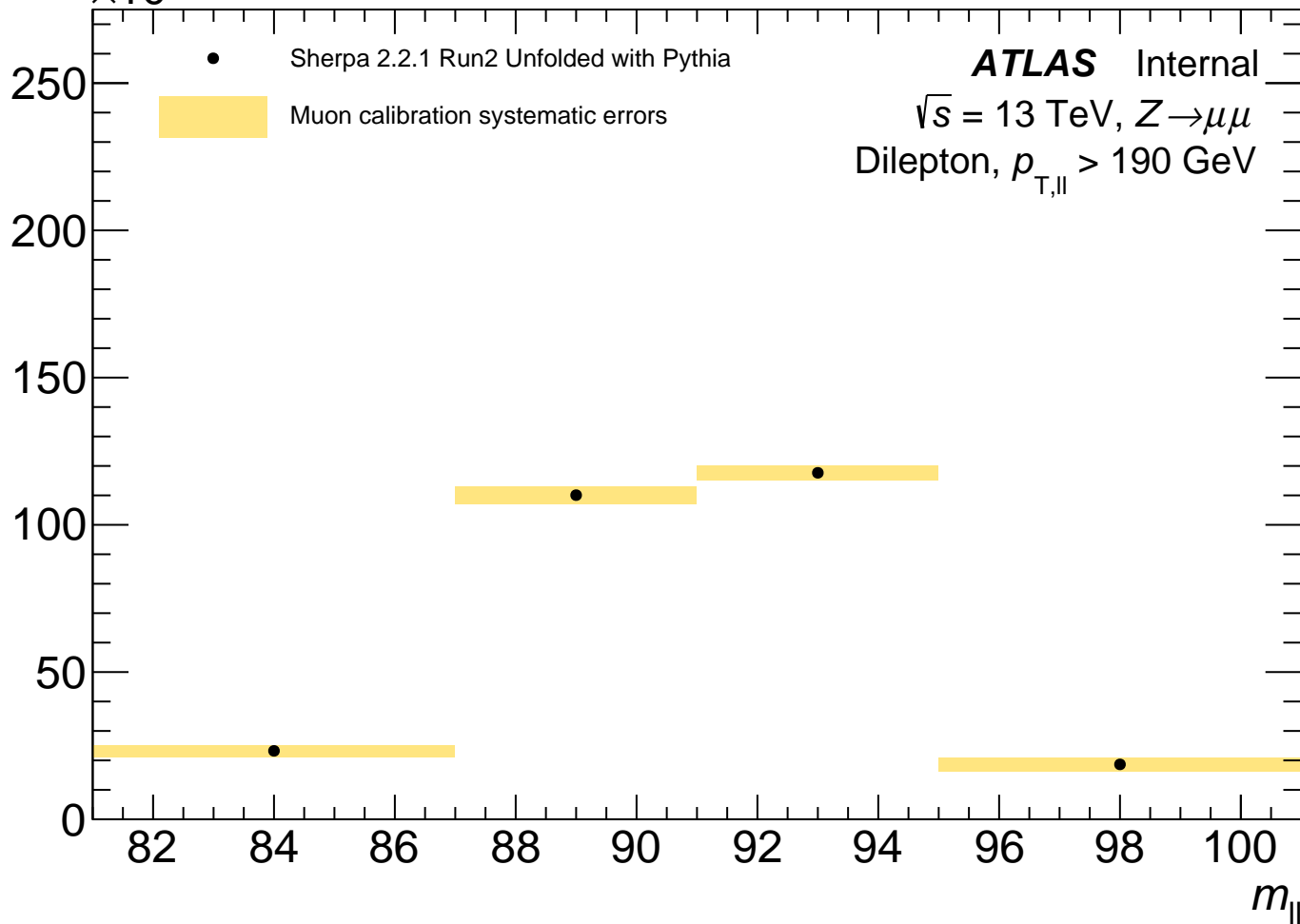
100

m_{ll}



Events

$\times 10^3$



Events

$\times 10^3$

•

Sherpa 2.2.1 Run2 Unfolded with Pythia

MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

250

200

150

100

50

0

82

84

86

88

90

92

94

96

98

100

m_{ll}

Sherpa 2.2.1 Run2 Unfolded with Pythia

MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

250

200

150

100

50

0

82

84

86

88

90

92

94

96

98

100

m_{ll}

Events

$\times 10^3$

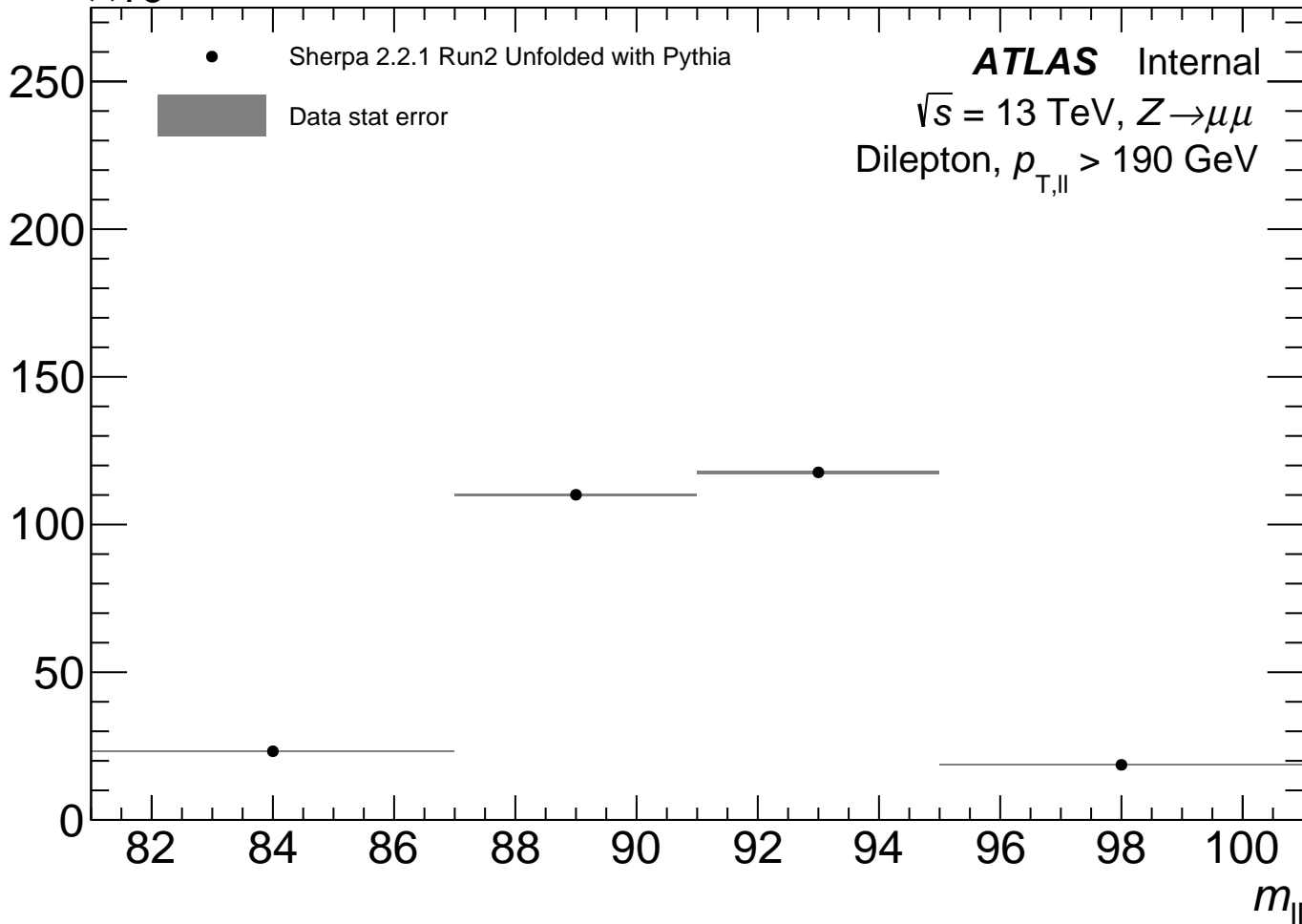
• Sherpa 2.2.1 Run2 Unfolded with Pythia

■ Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



Events

$\times 10^3$

—●— Sherpa 2.2.1 Run2 Unfolded with Pythia

■ Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell} > 190 \text{ GeV}$

250

200

150

100

50

0

82

84

86

88

90

92

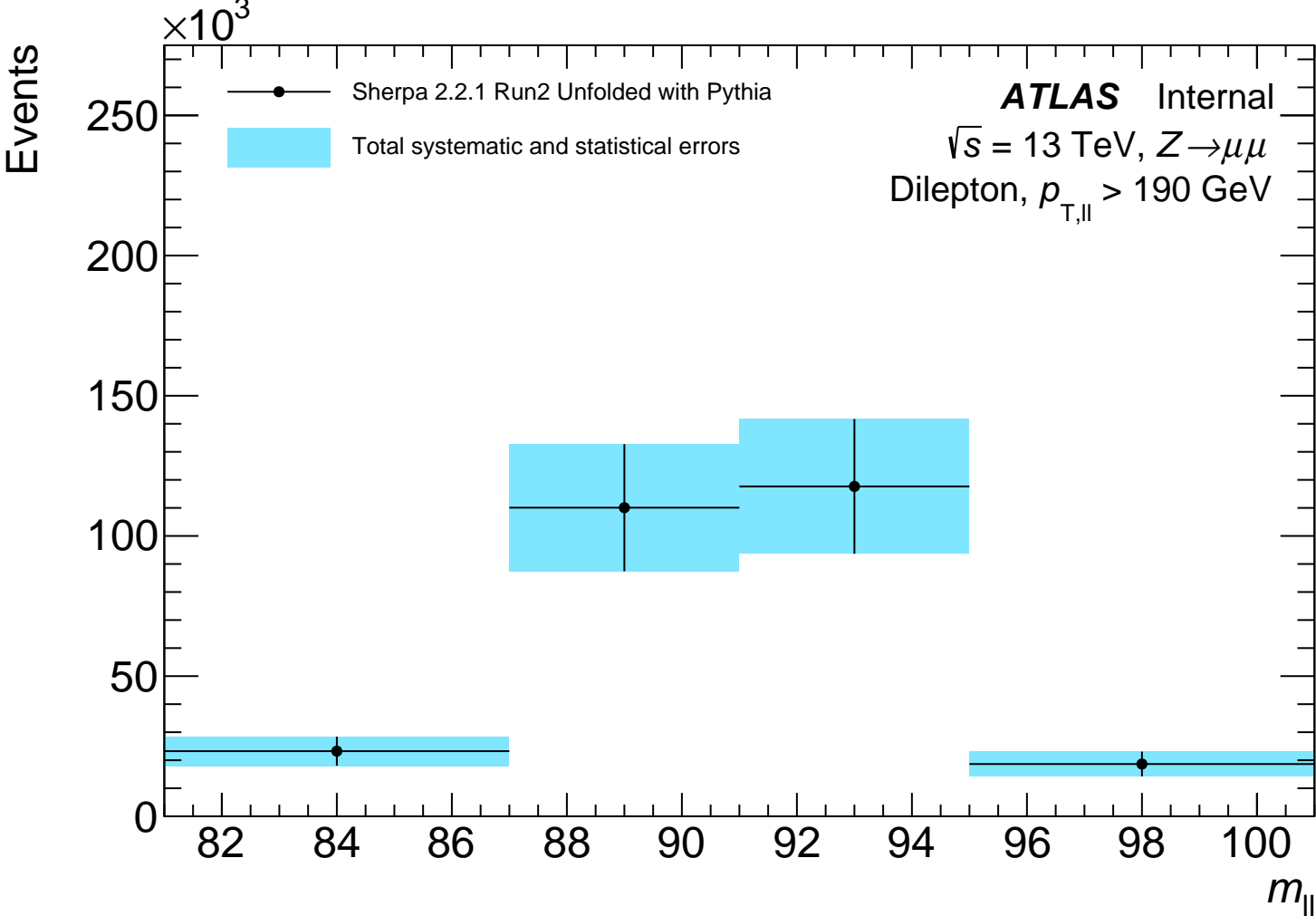
94

96

98

100

$m_{\ell\ell}$



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

•

Sherpa 2.2.1 2016 Unfolded with Pythia



Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\ell\ell} > 190 \text{ GeV}$

200

400

600

800

1000

1200

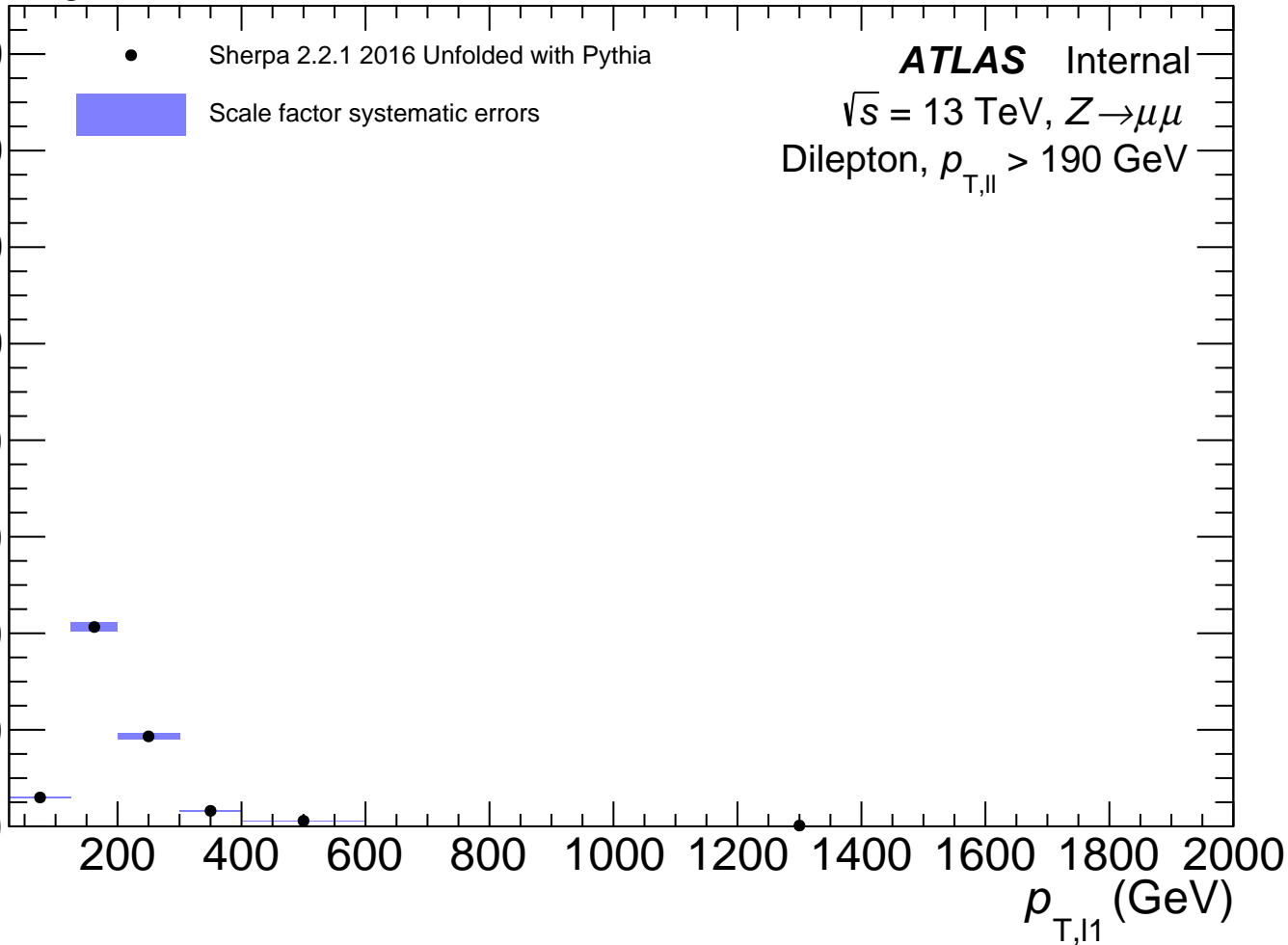
1400

1600

1800

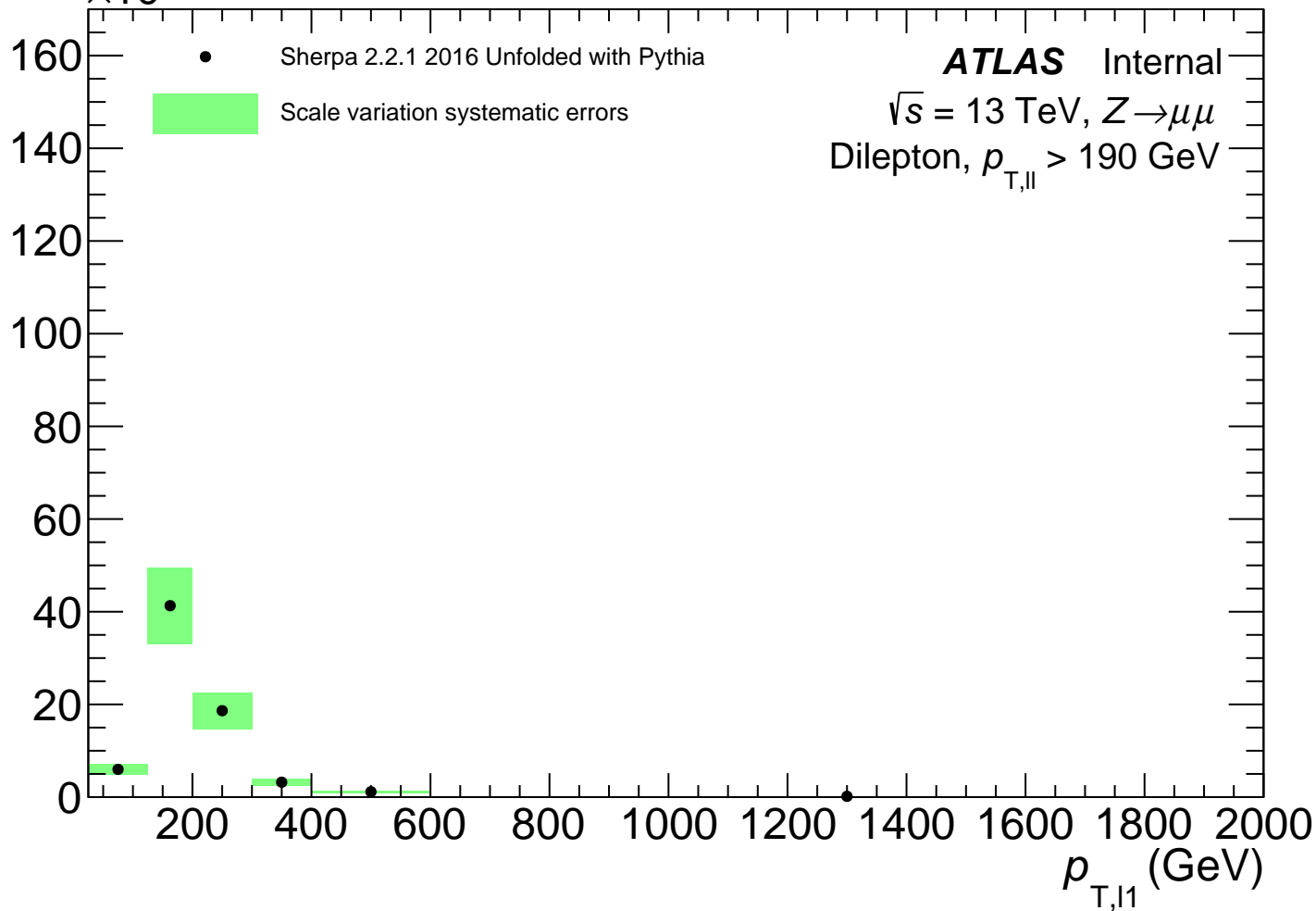
2000

$p_{T,\ell\ell} \text{ (GeV)}$



Events

$\times 10^3$



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

•

Sherpa 2.2.1 2016 Unfolded with Pythia



Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

200

400

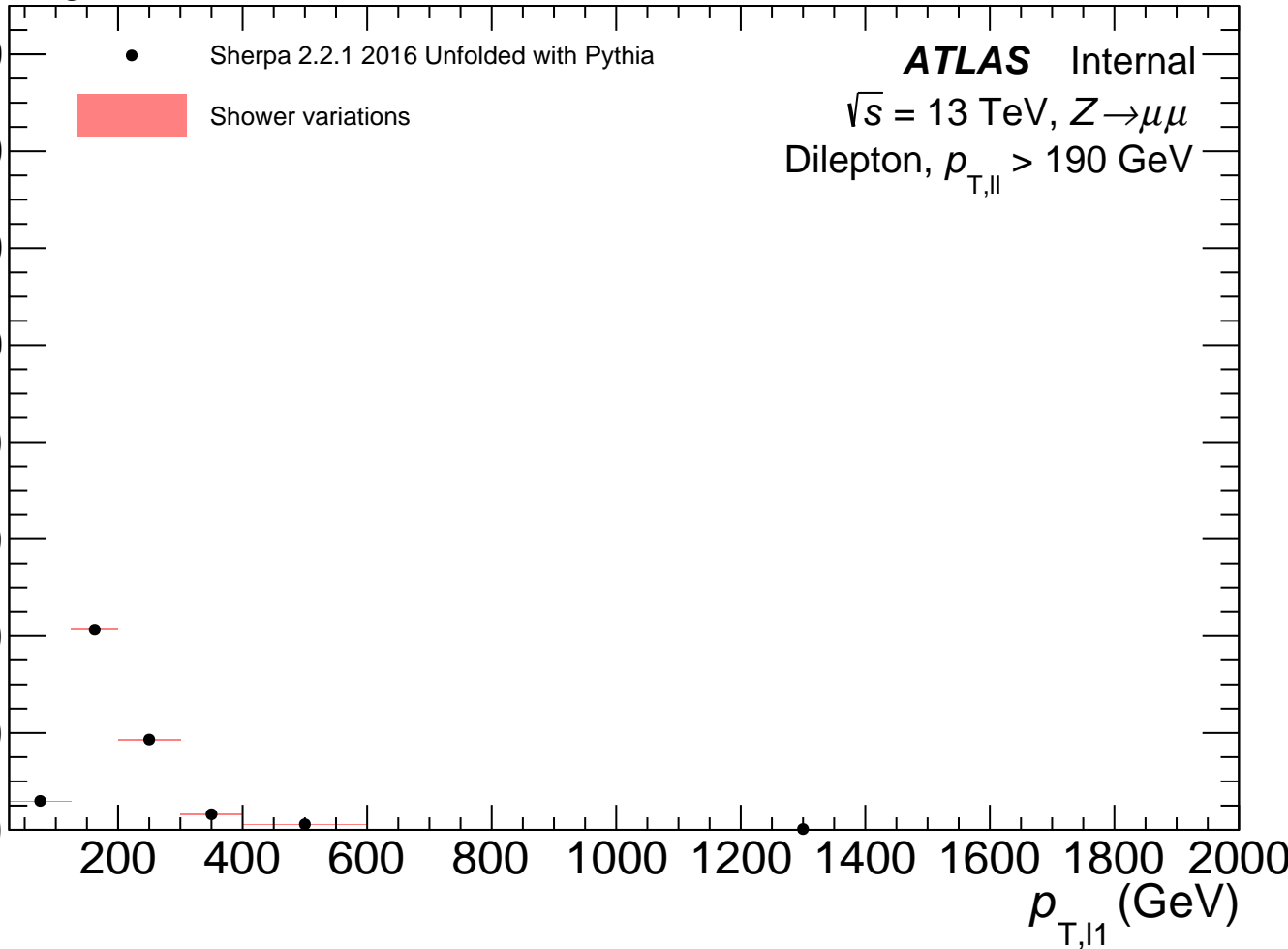
600

800

1000

1200

$p_{T,\text{ll}} \text{ (GeV)}$



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

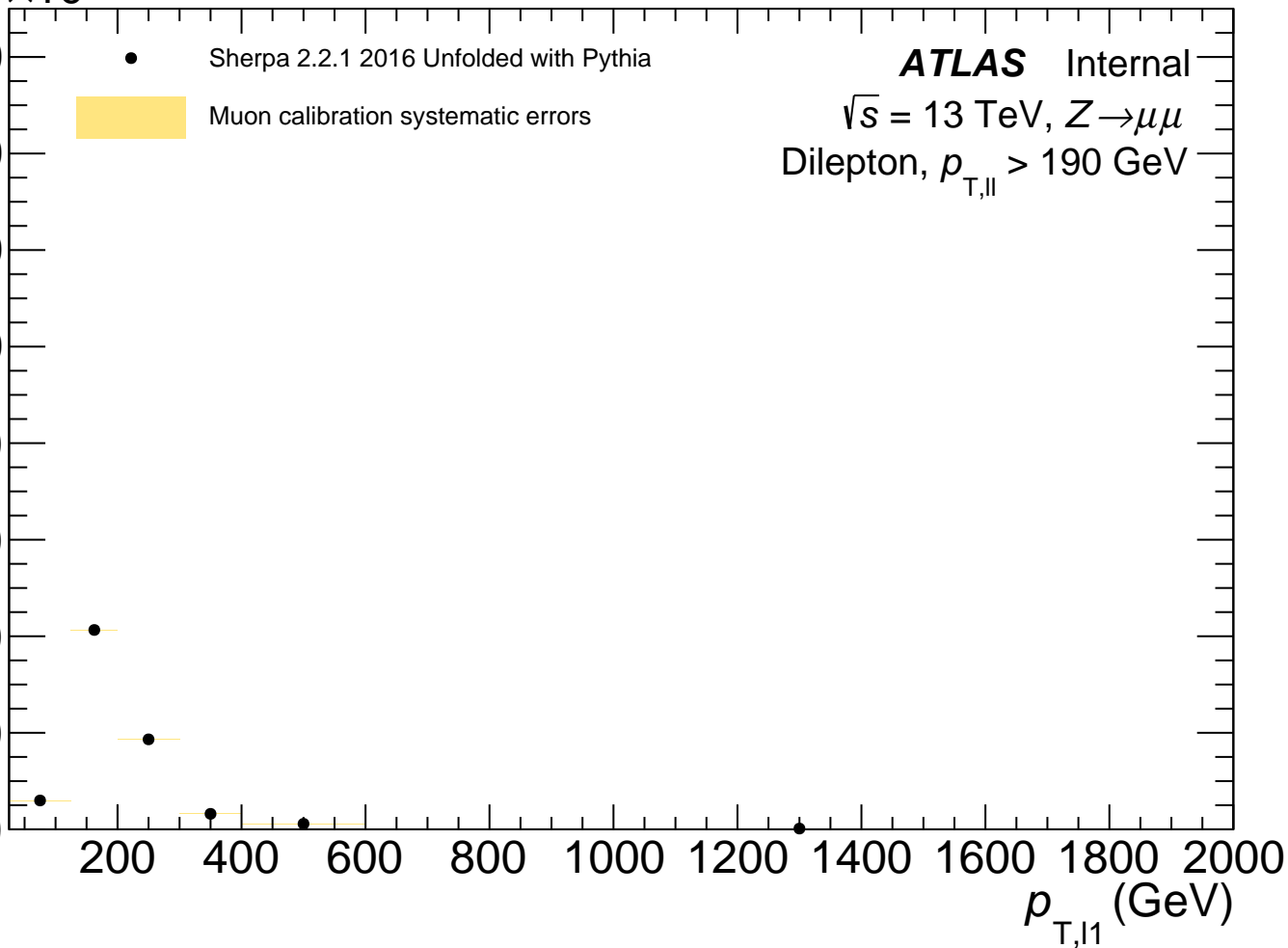
■ Muon calibration systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

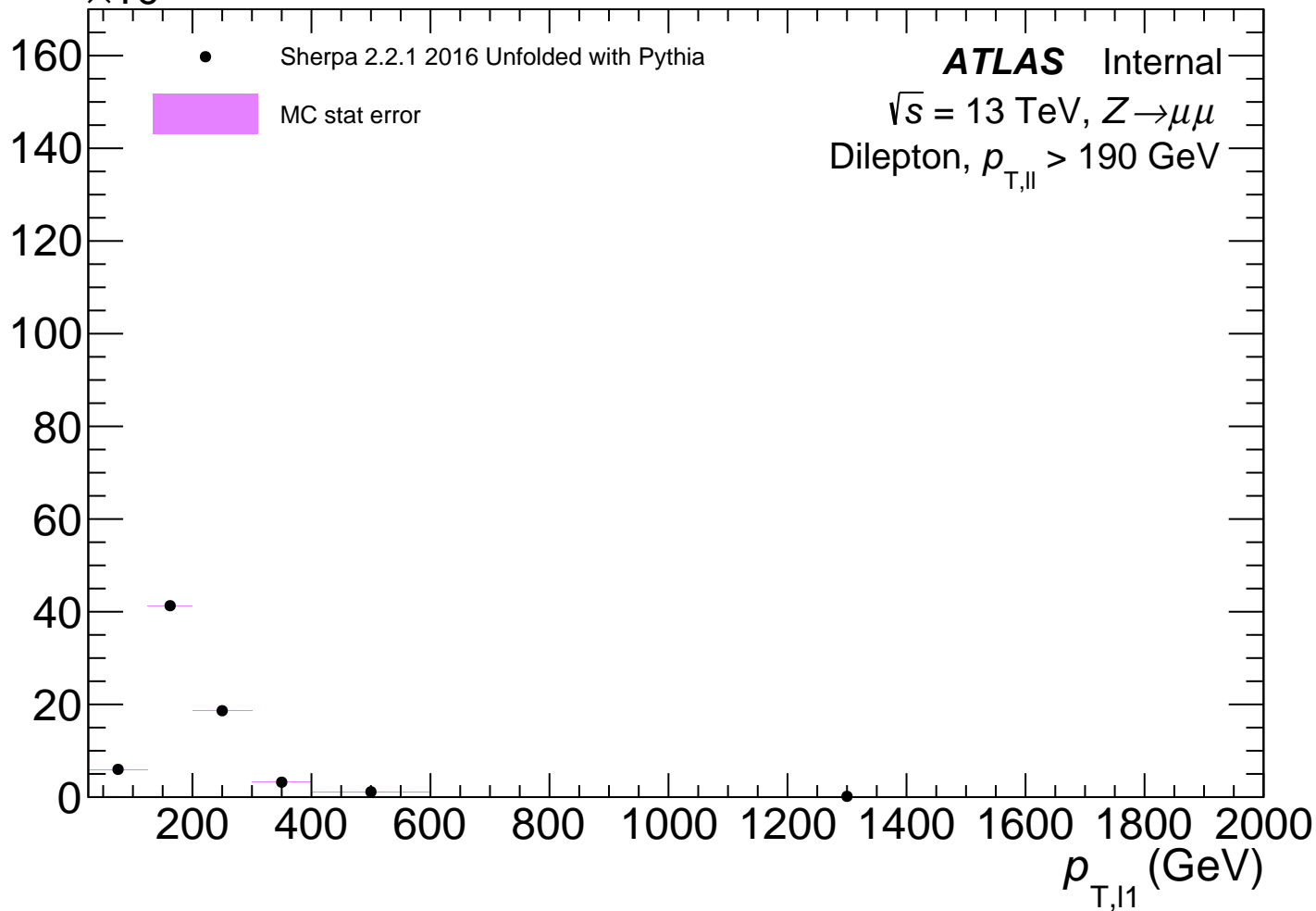
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

•

Sherpa 2.2.1 2016 Unfolded with Pythia

■

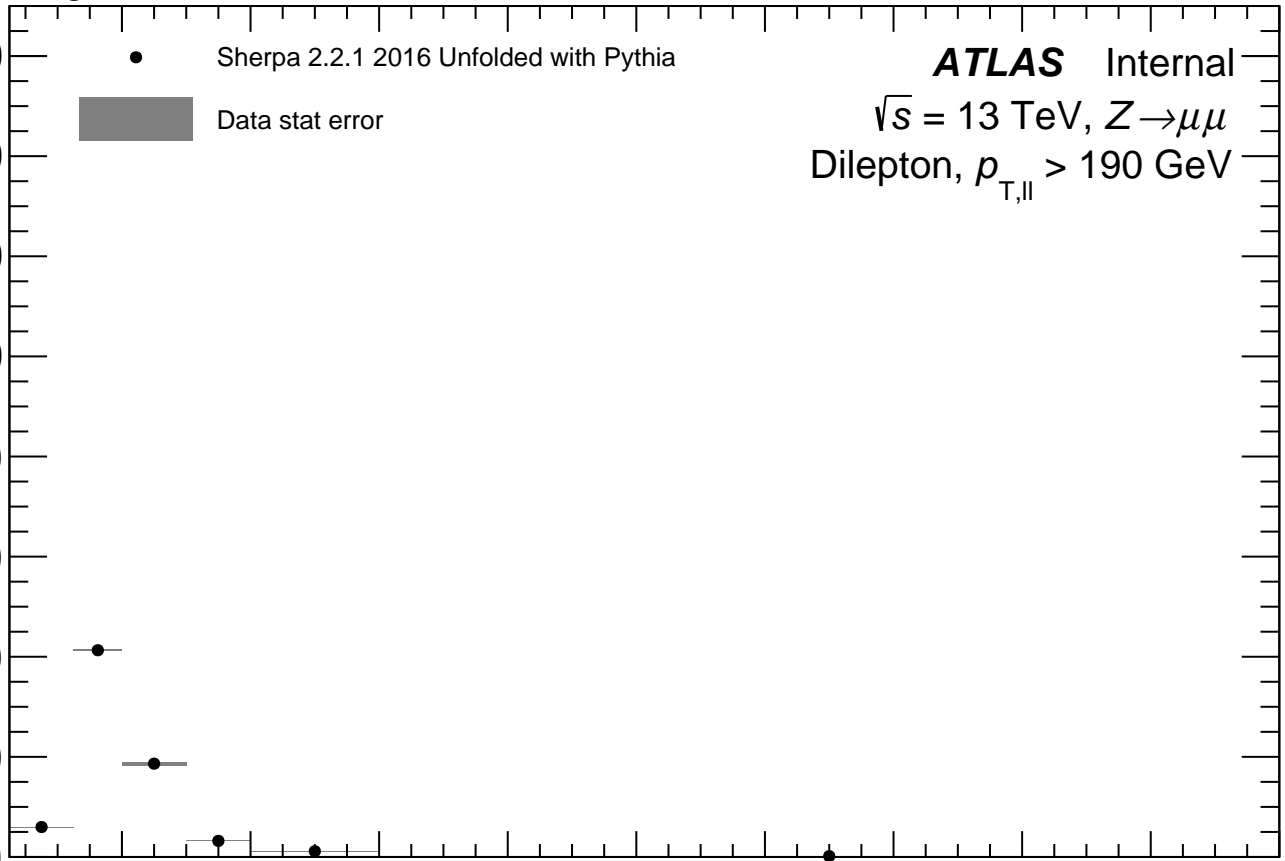
Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

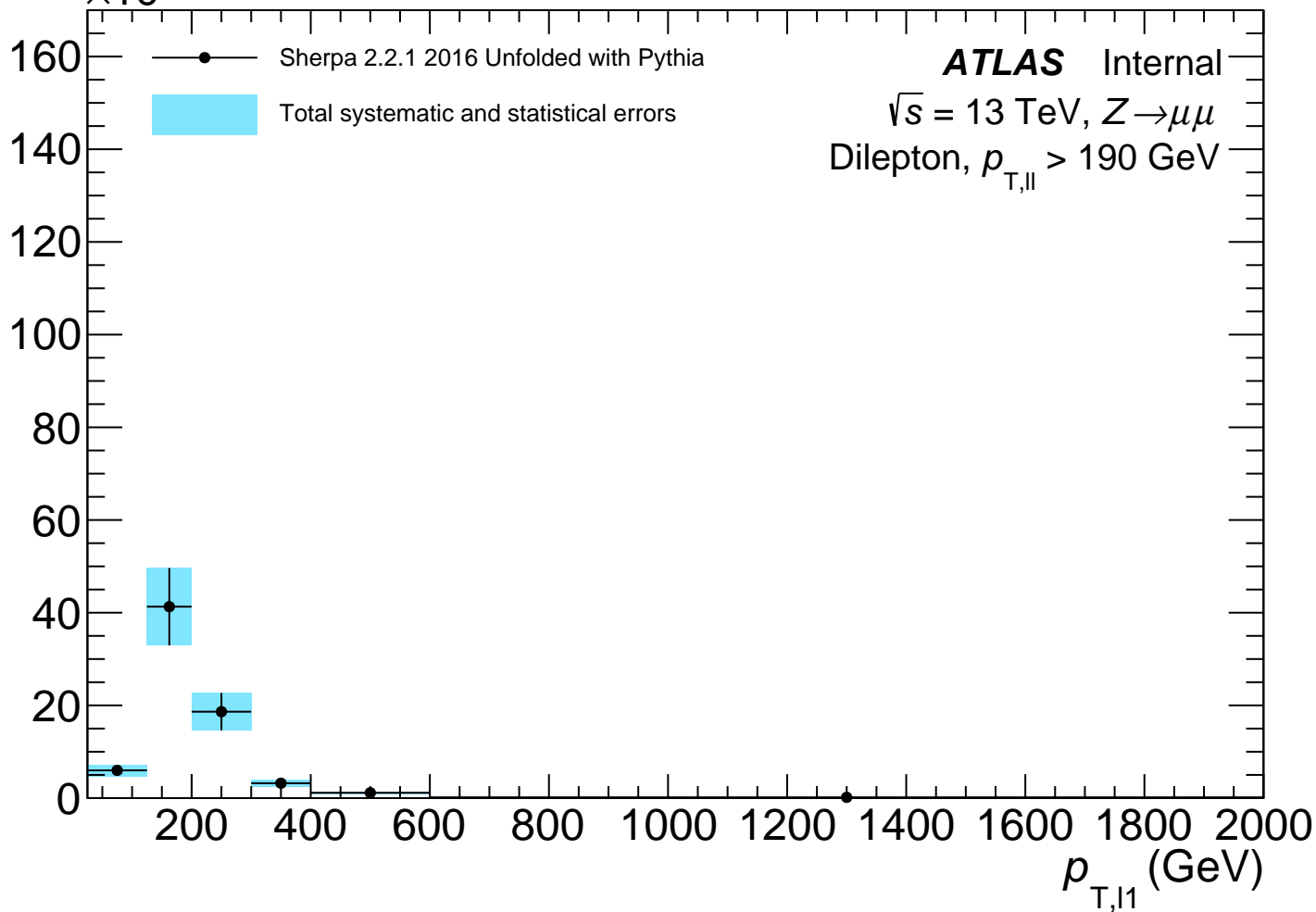
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

•

Sherpa 2.2.1 2017 Unfolded with Pythia

■

Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

200

300

400

500

600

800

1000

1200

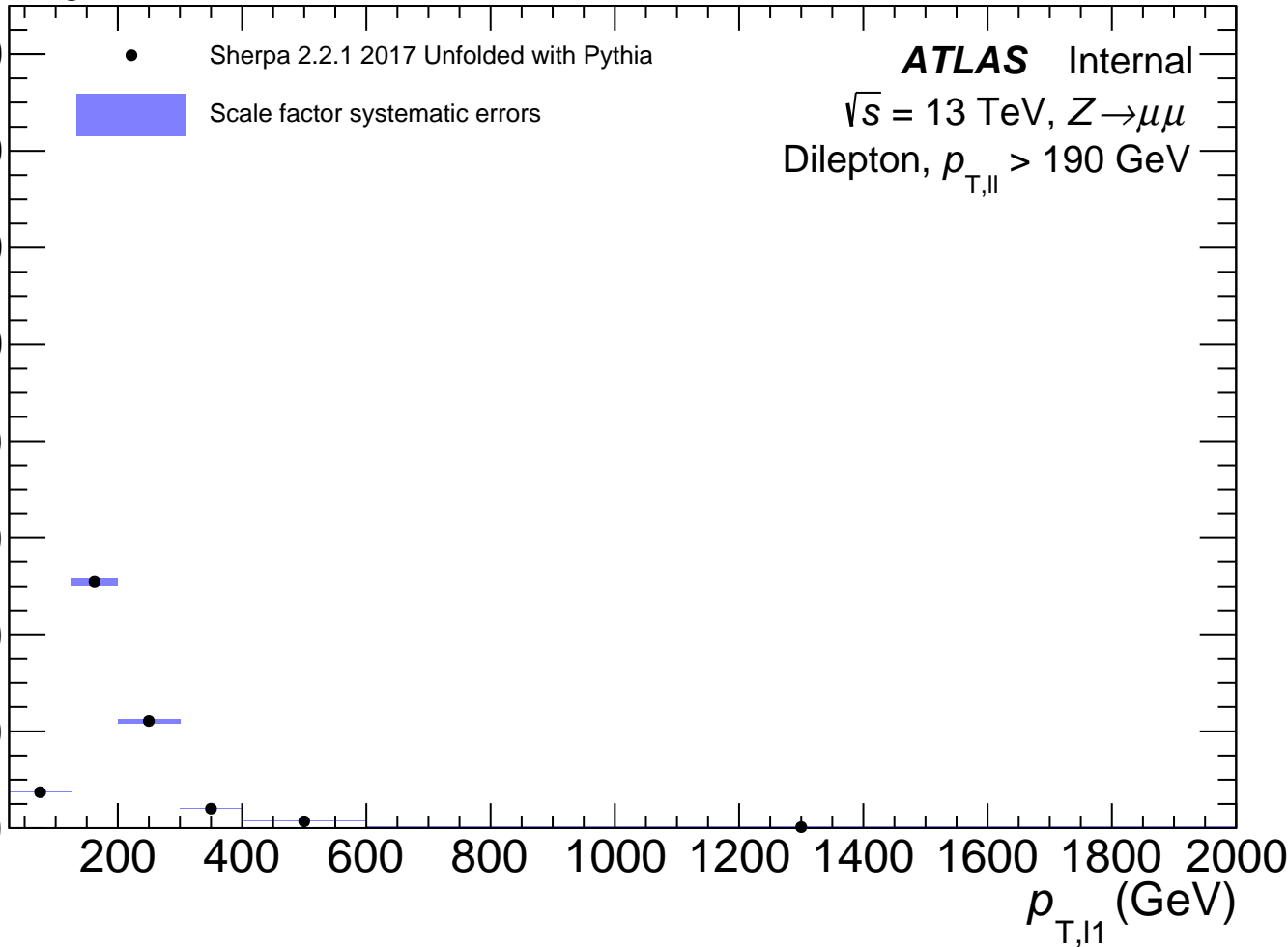
1400

1600

1800

2000

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

Sherpa 2.2.1 2017 Unfolded with Pythia

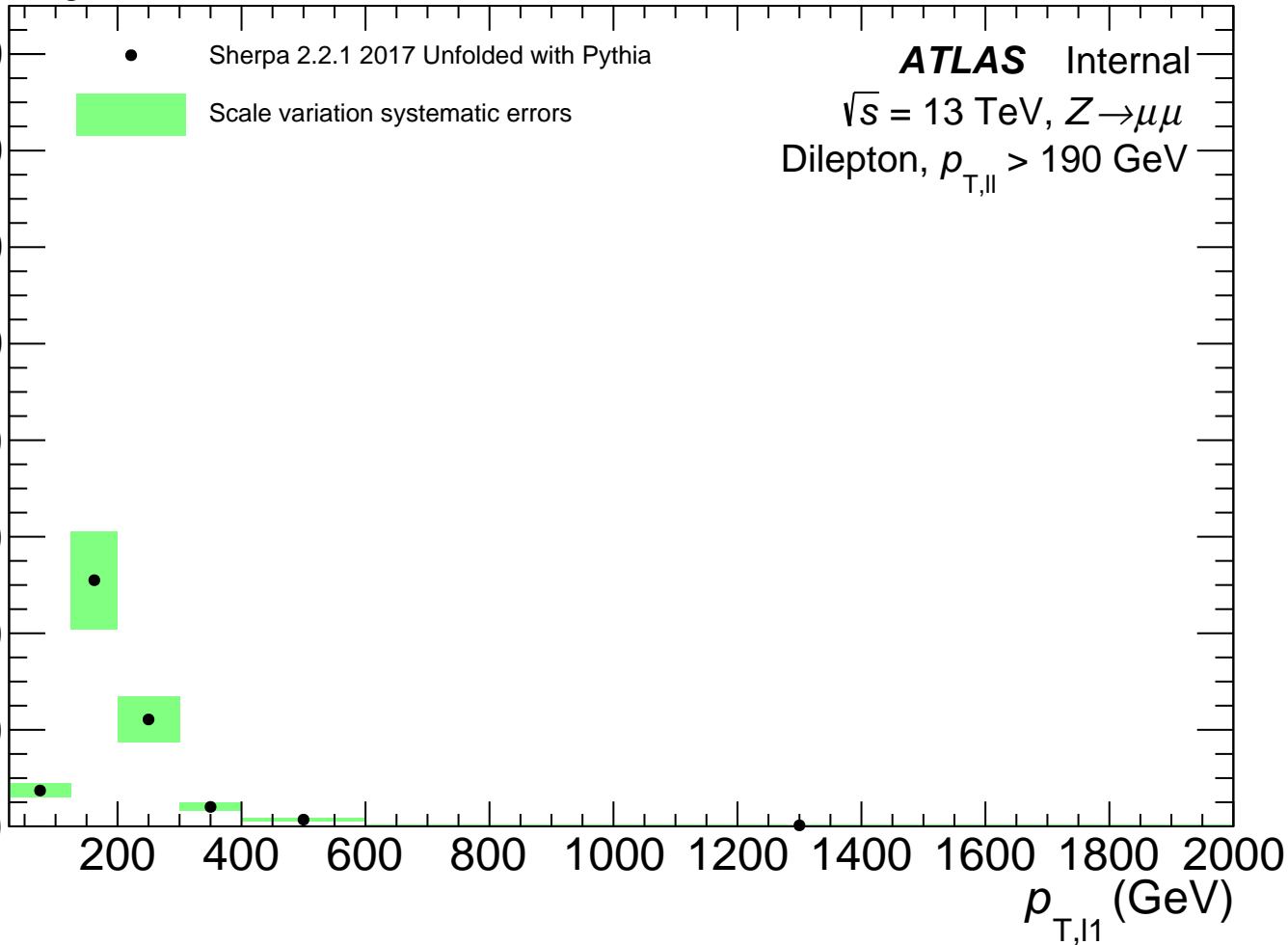
Scale variation systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

•

Sherpa 2.2.1 2017 Unfolded with Pythia

Shower variations

Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

200

400

600

800

1000

1200

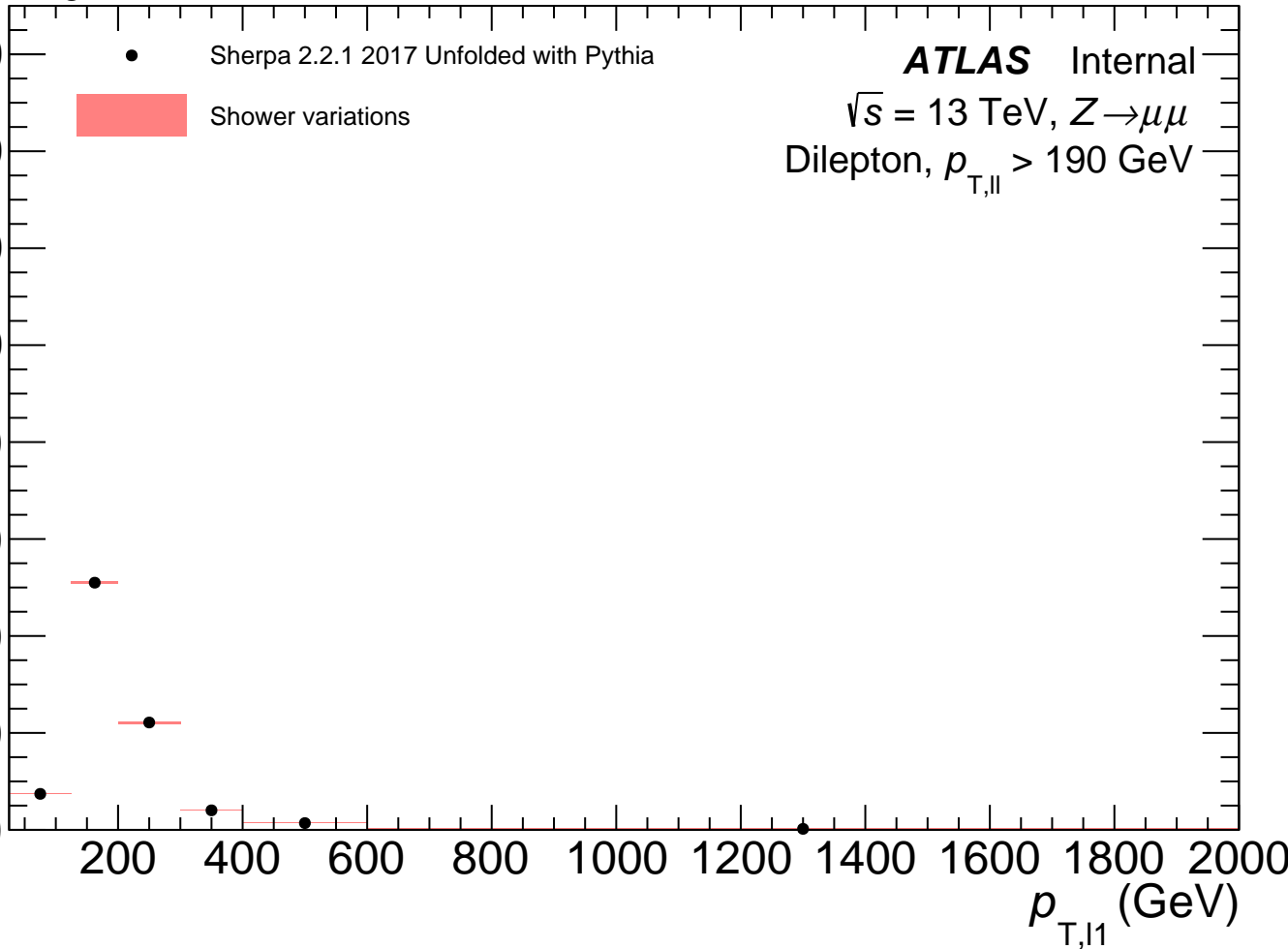
1400

1600

1800

2000

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

• Sherpa 2.2.1 2017 Unfolded with Pythia

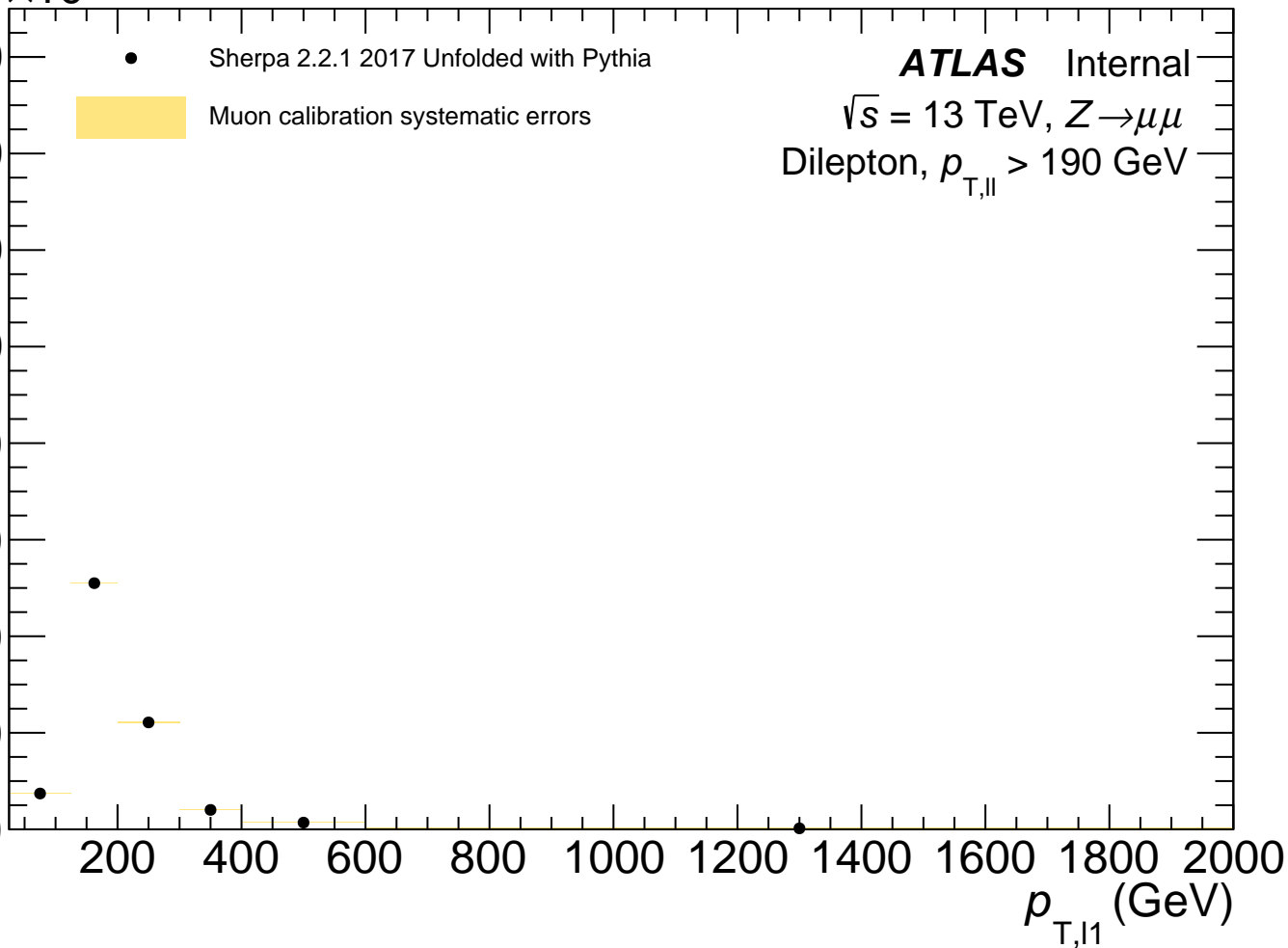
■ Muon calibration systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

• Sherpa 2.2.1 2017 Unfolded with Pythia

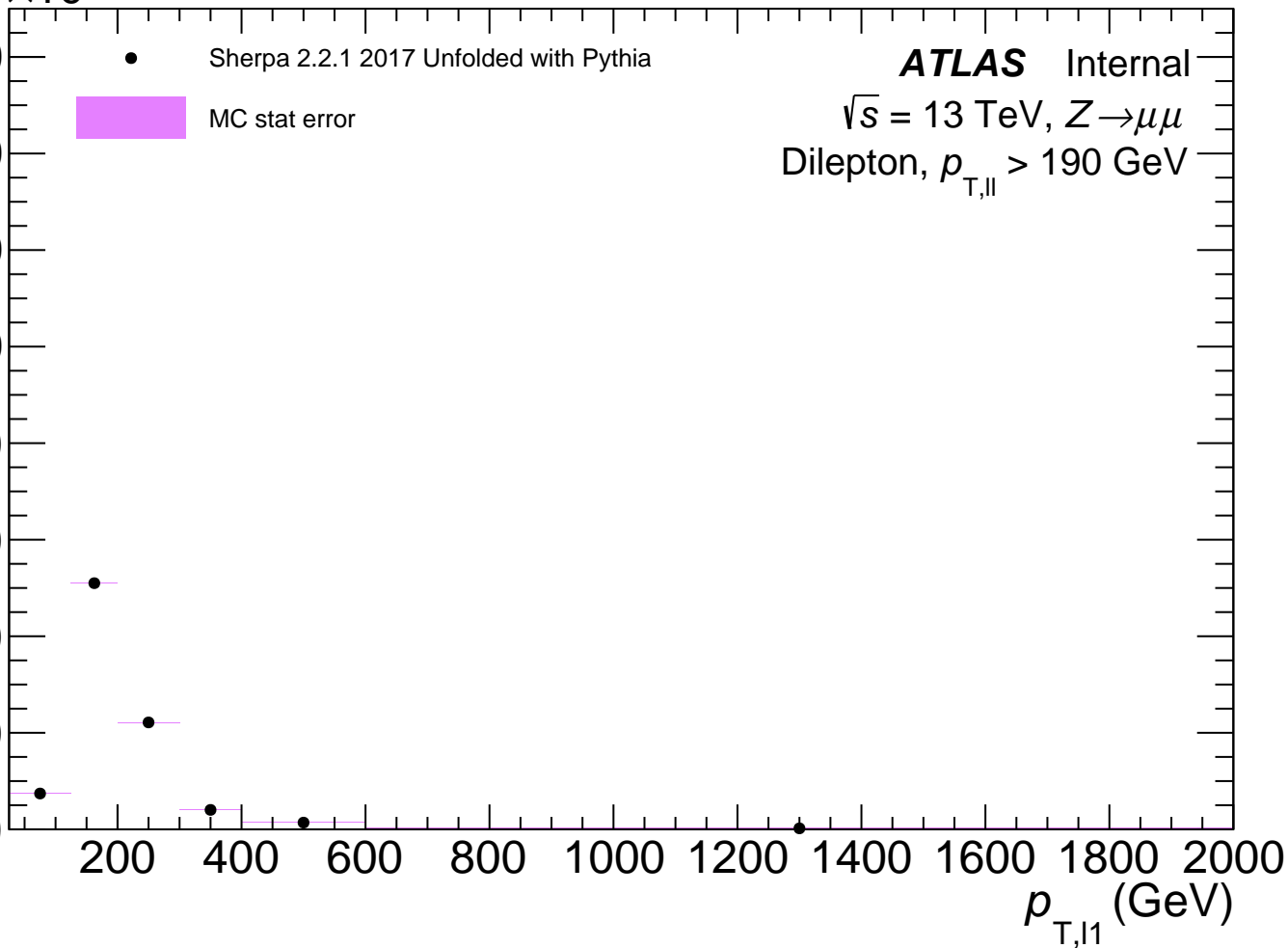
MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

•

Sherpa 2.2.1 2017 Unfolded with Pythia

■

Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

200

400

600

800

1000

1200

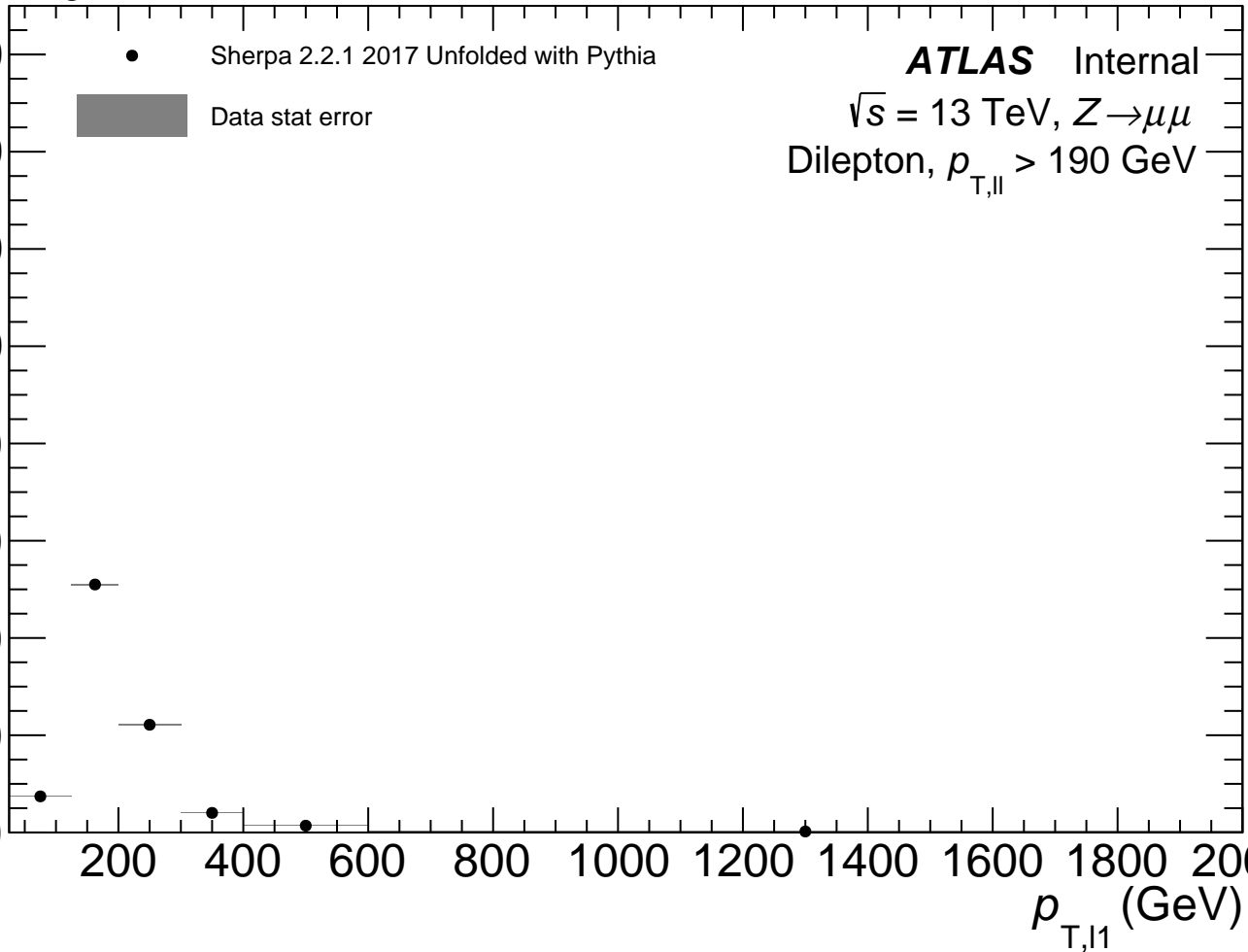
1400

1600

1800

2000

$p_{T,\text{ll}}$ (GeV)



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0



Sherpa 2.2.1 2017 Unfolded with Pythia



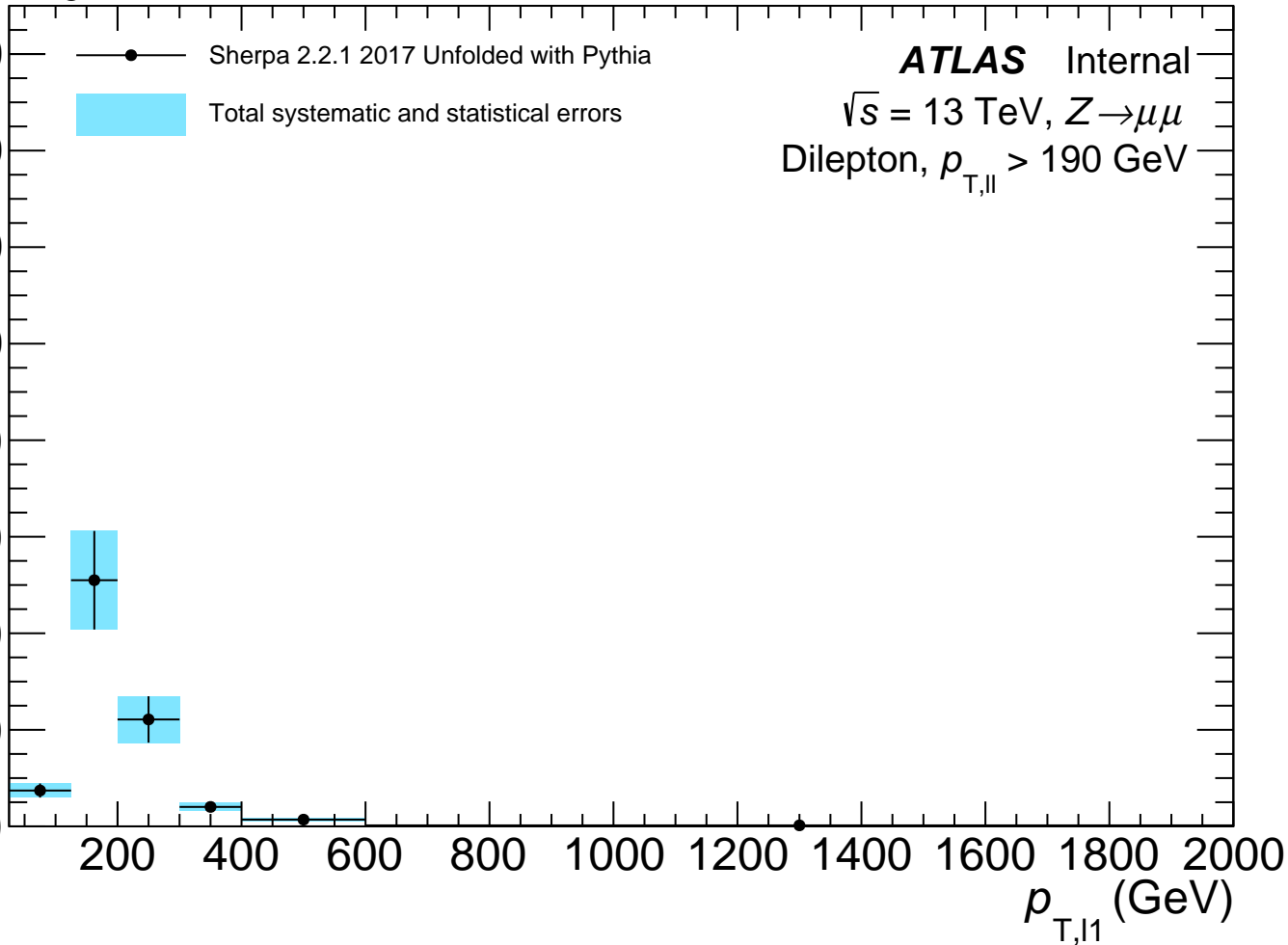
Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

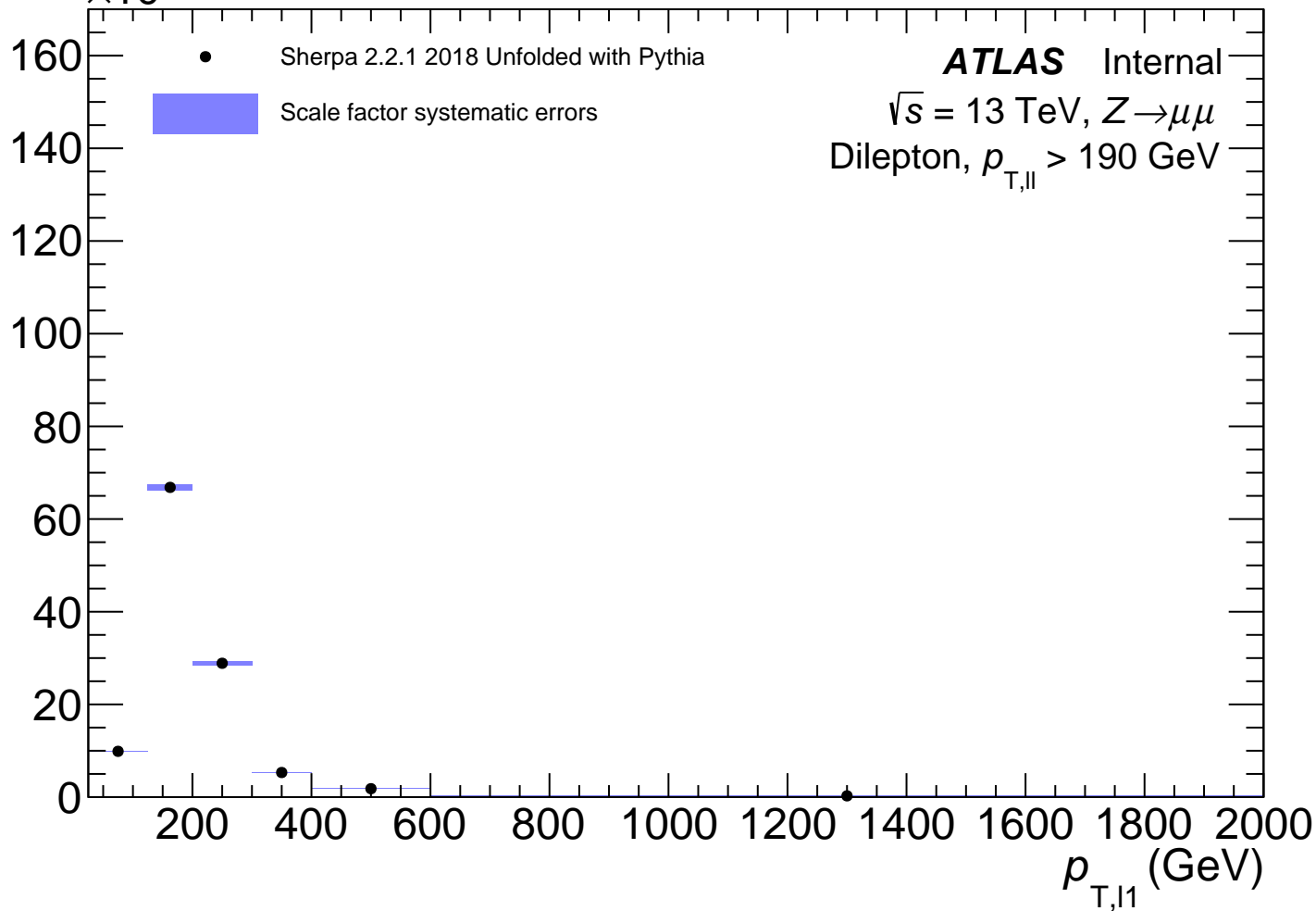
Dilepton, $p_{T,\ell\ell} > 190 \text{ GeV}$

$p_{T,\ell\ell} \text{ (GeV)}$



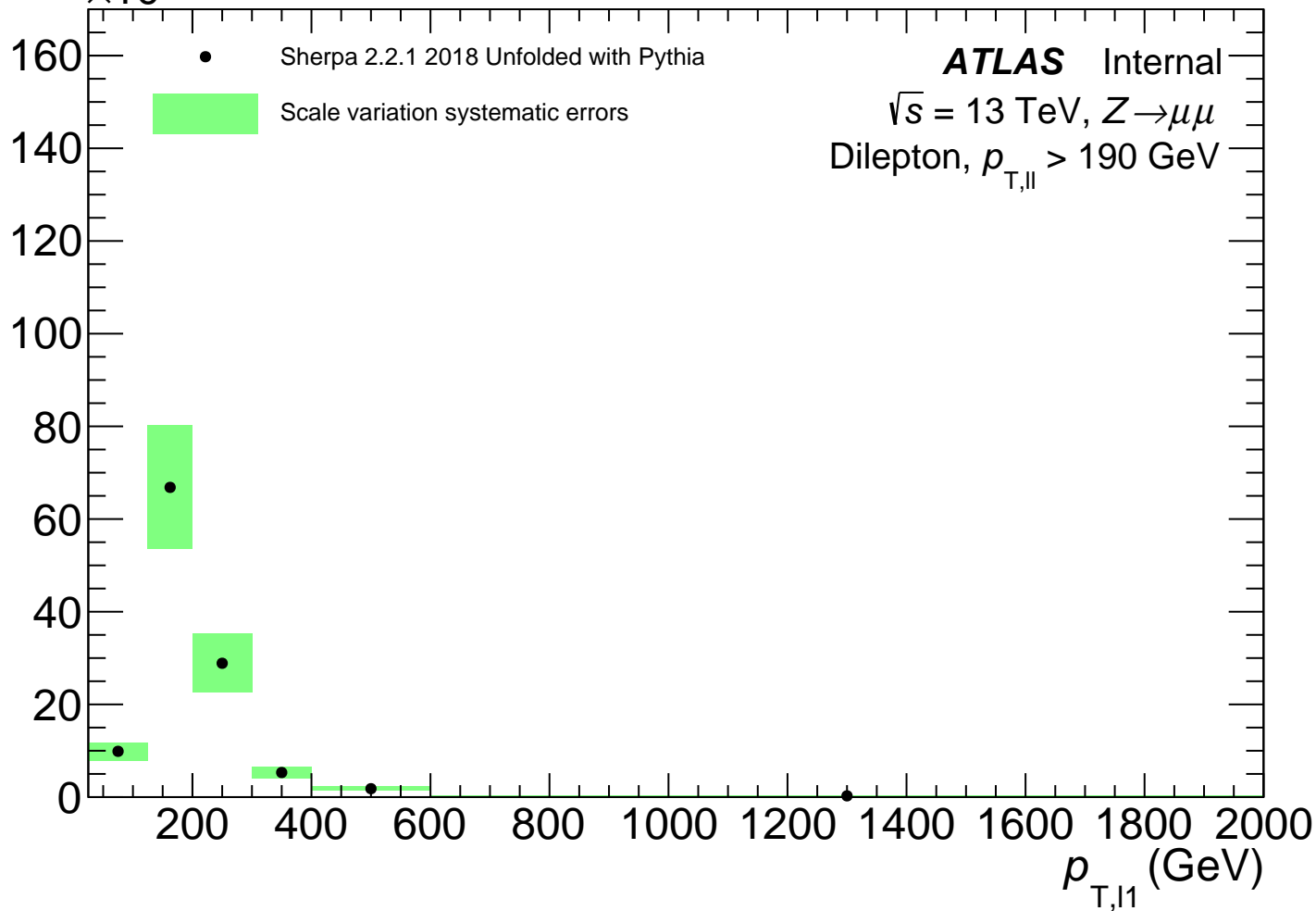
Events

$\times 10^3$



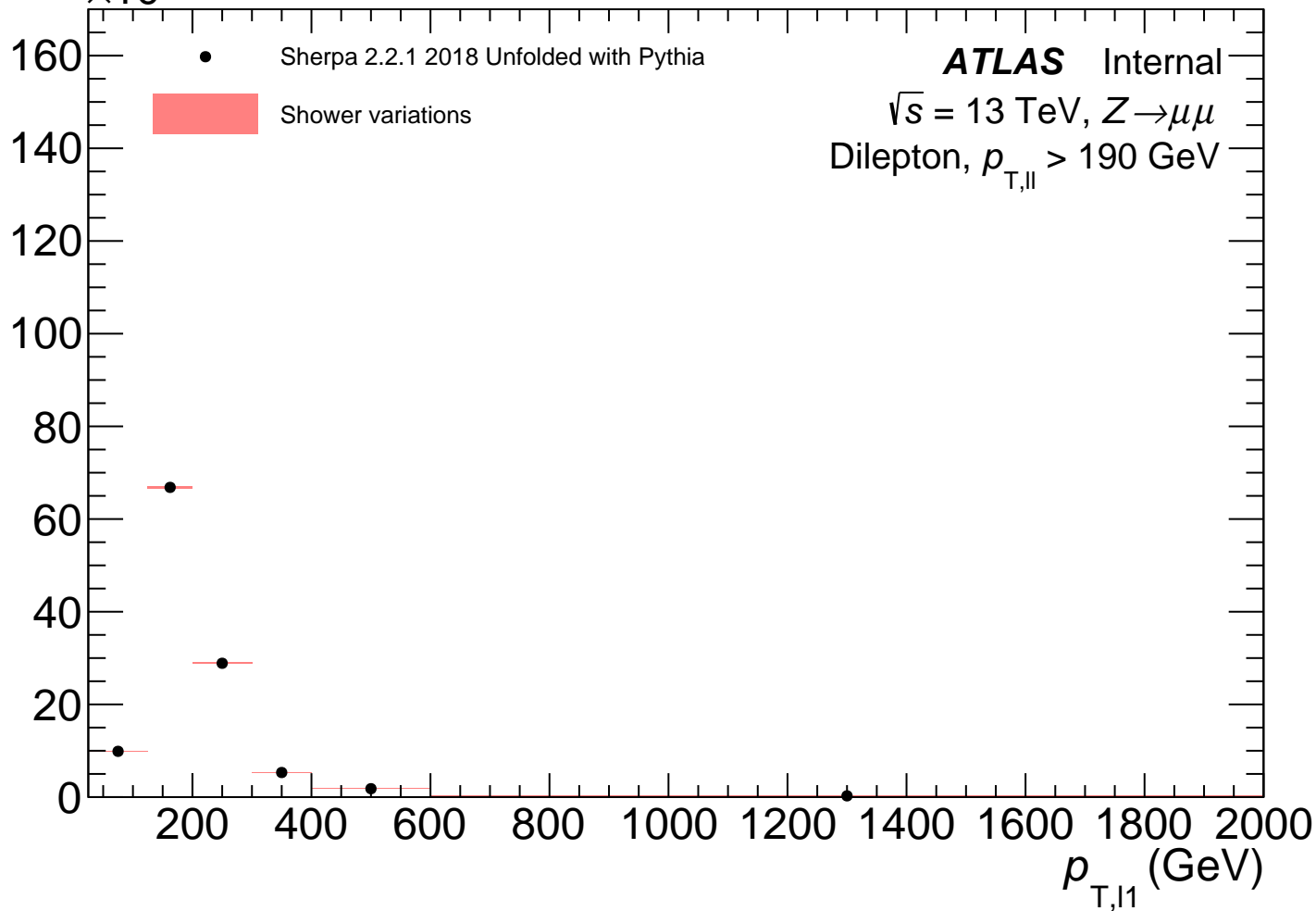
Events

$\times 10^3$



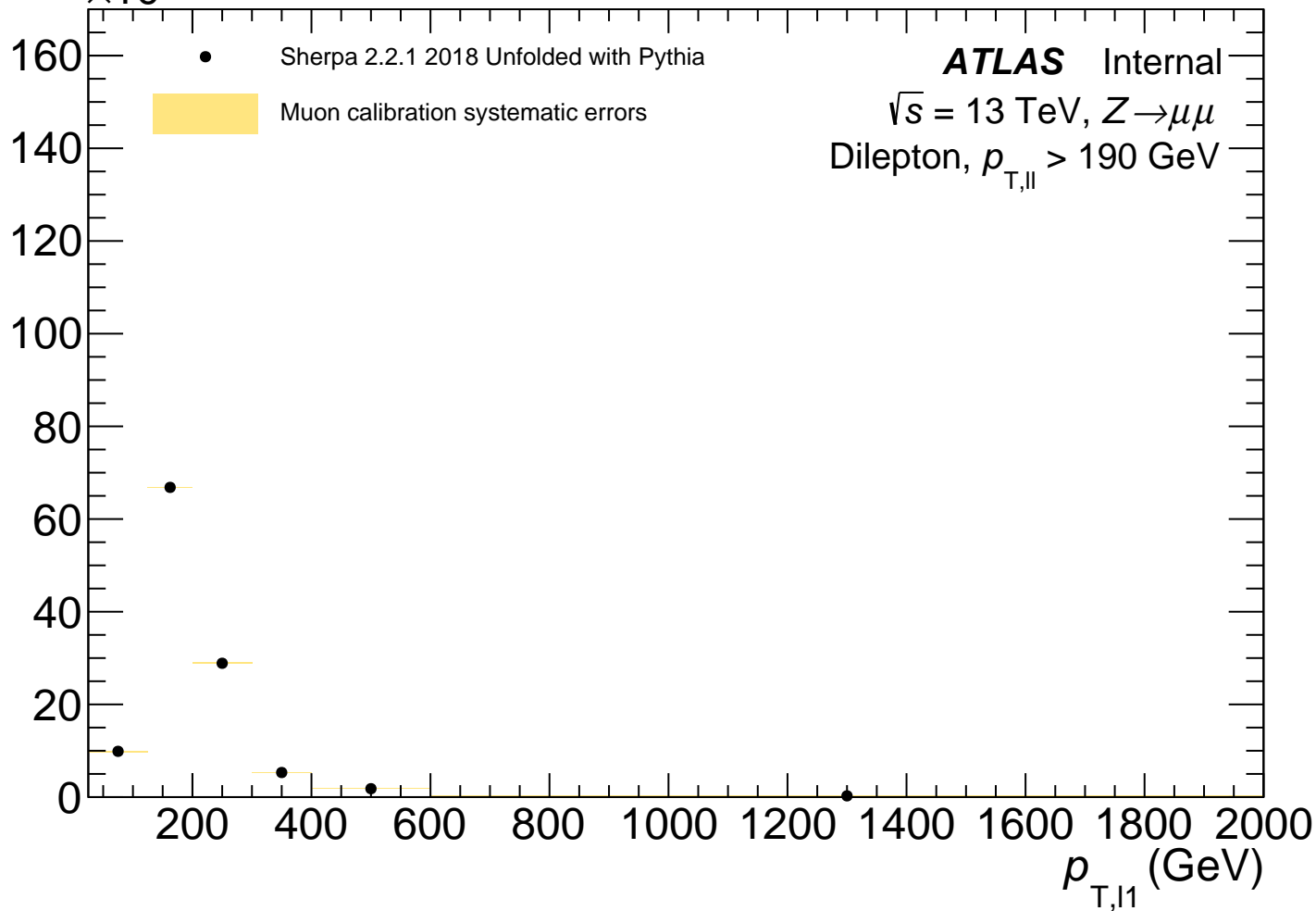
Events

$\times 10^3$



Events

$\times 10^3$



Events

$\times 10^3$

160

140

120

100

80

60

40

20

0

Sherpa 2.2.1 2018 Unfolded with Pythia

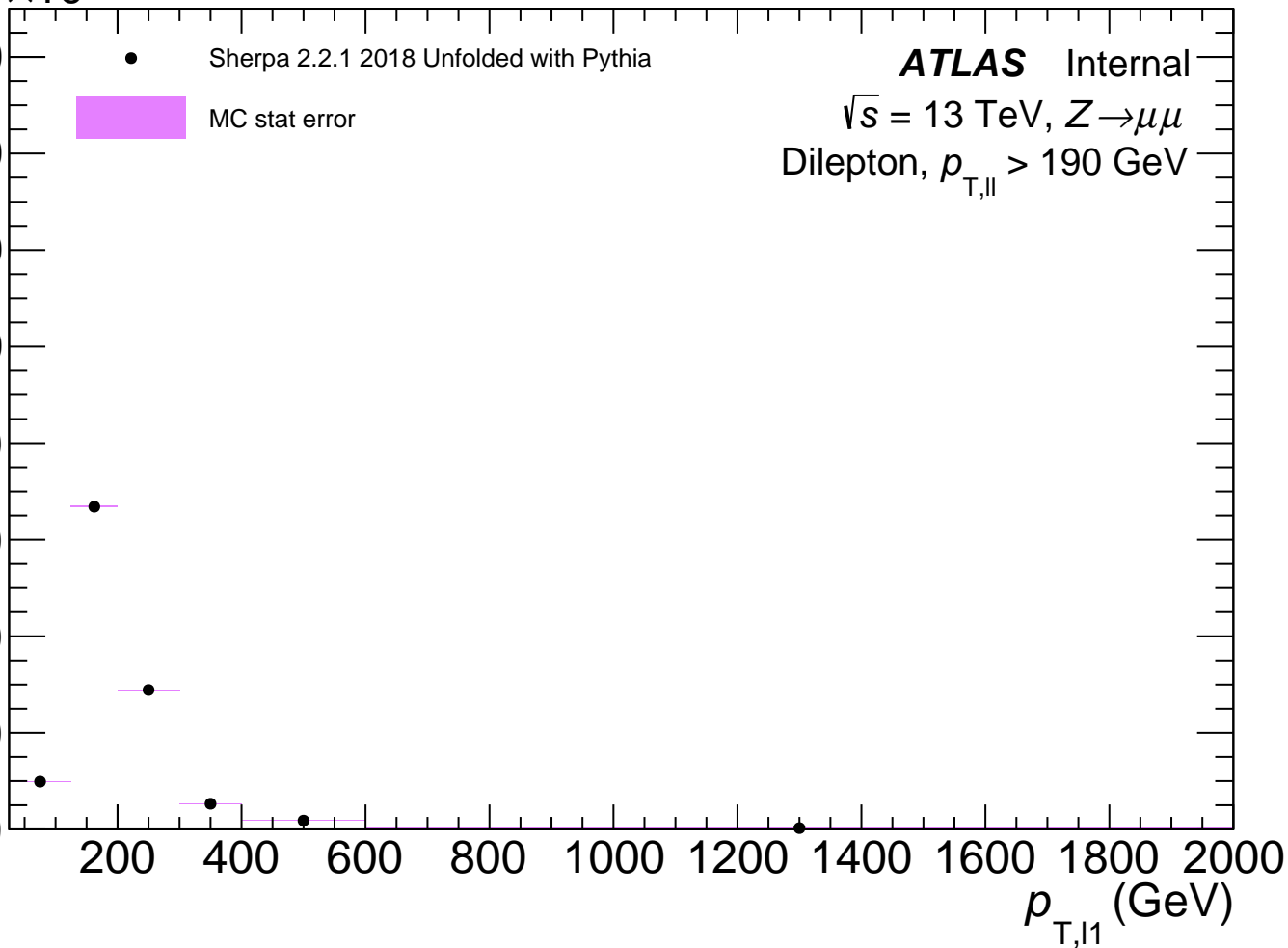
MC stat error

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

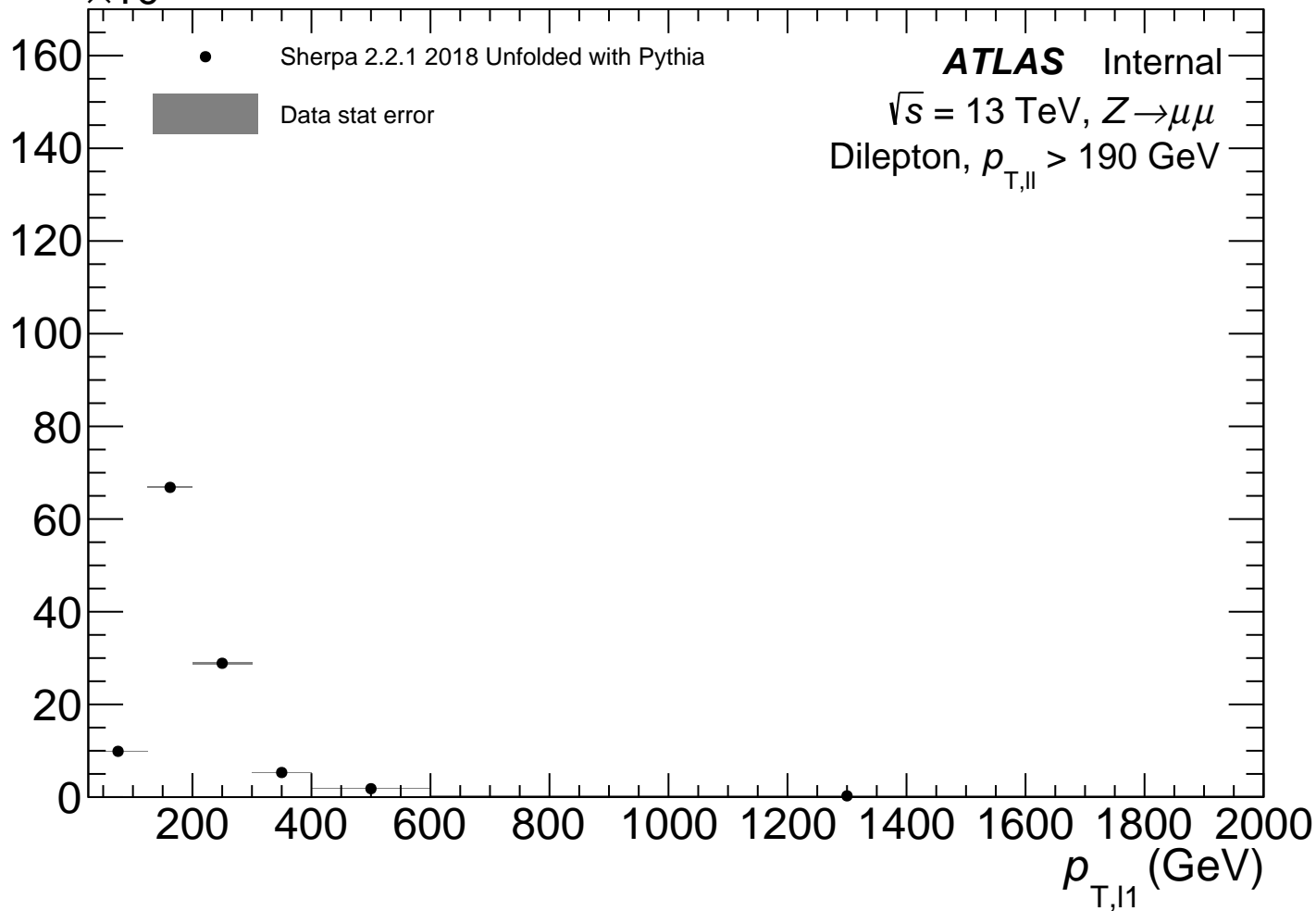
Dilepton, $p_{T,\text{ll}} > 190$ GeV

$p_{T,\text{ll}}$ (GeV)



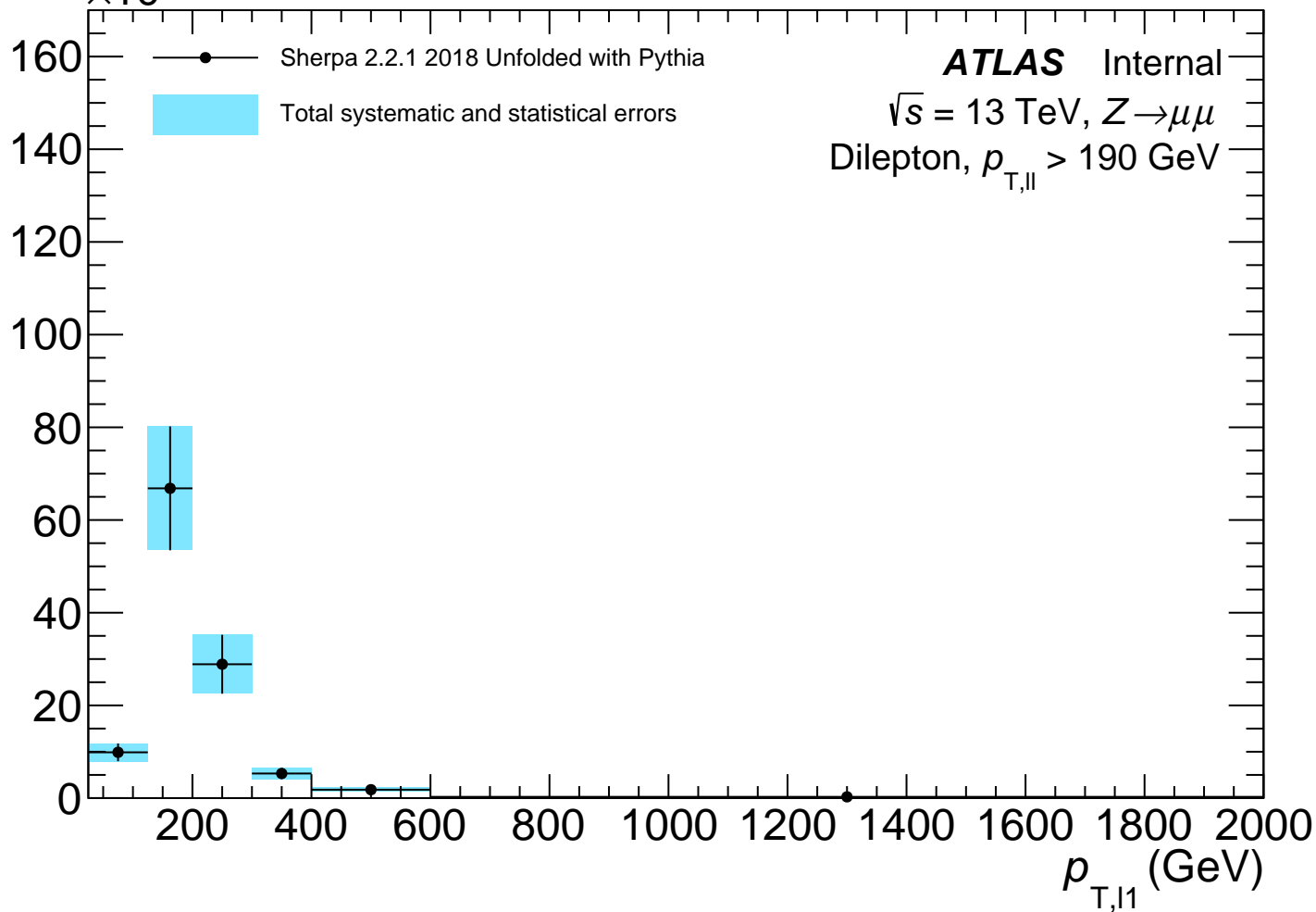
Events

$\times 10^3$



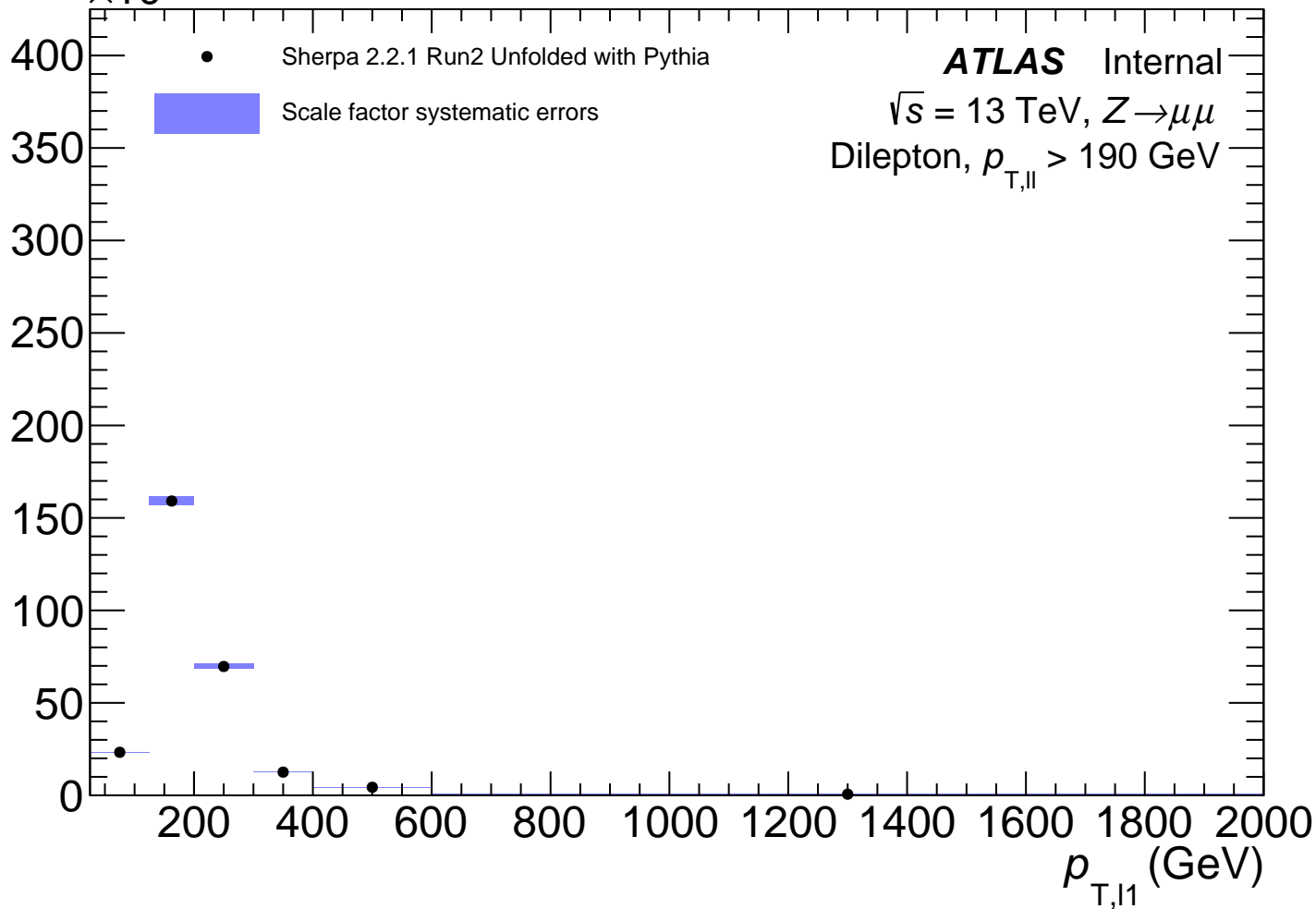
Events

$\times 10^3$



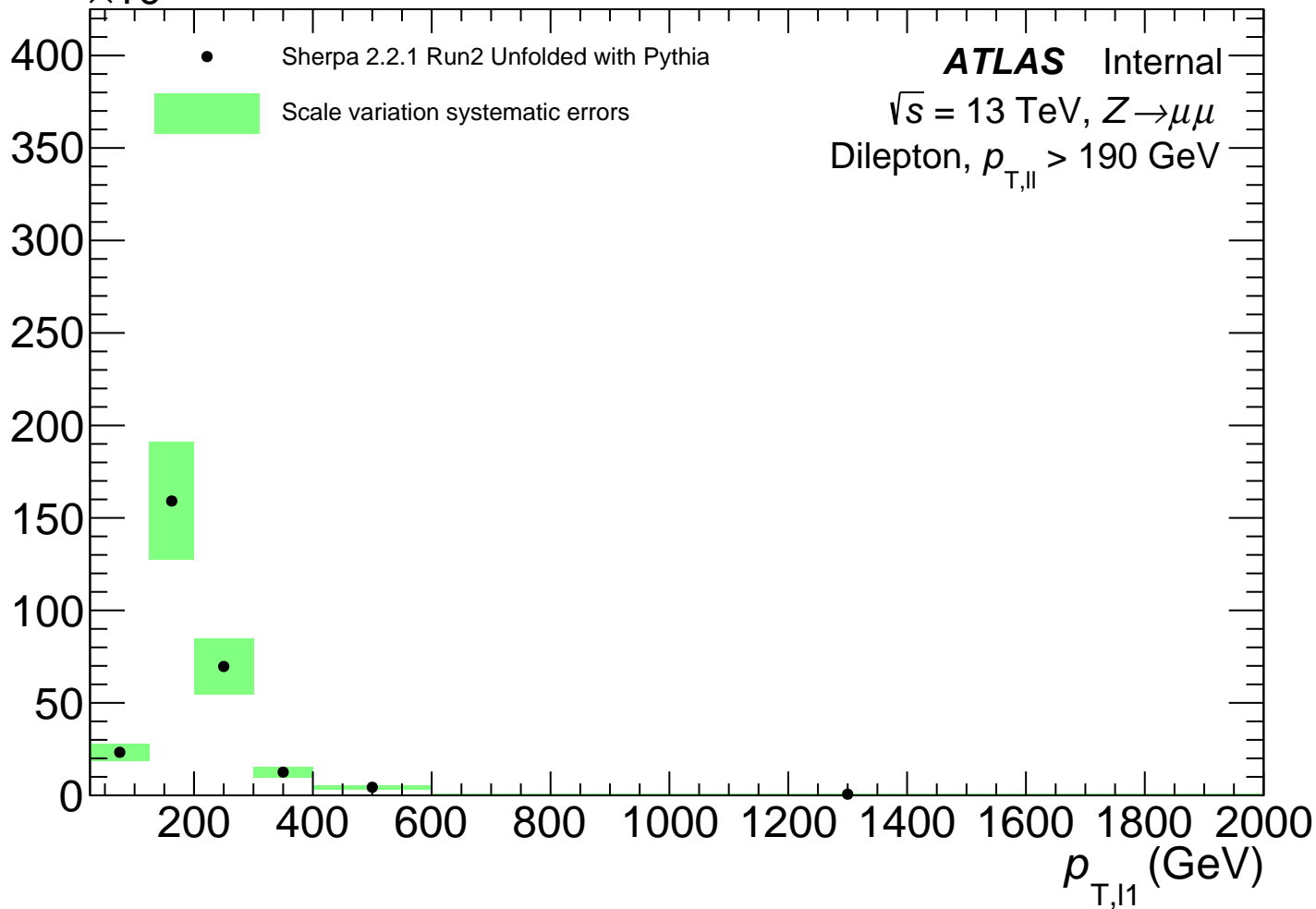
Events

$\times 10^3$



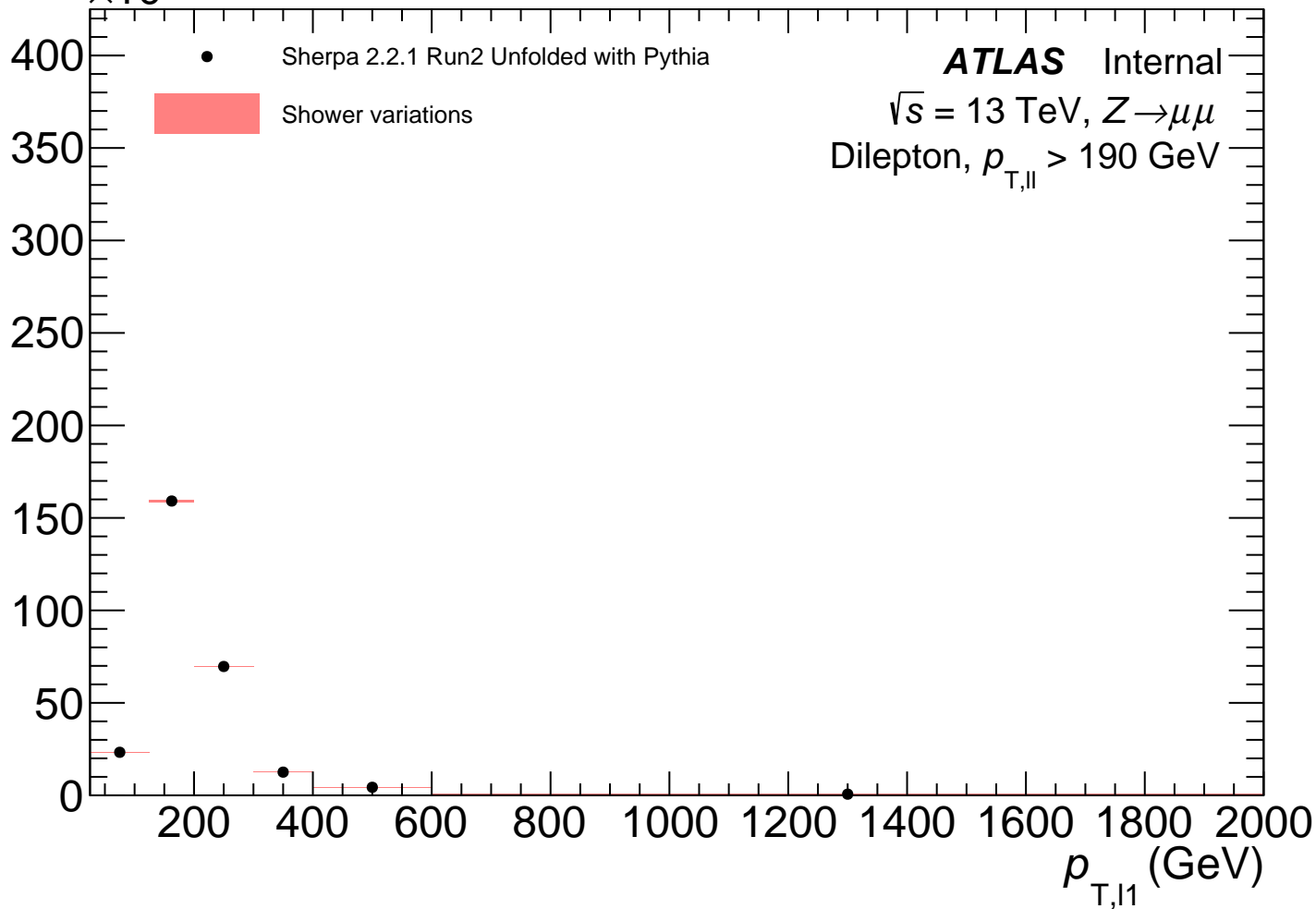
Events

$\times 10^3$



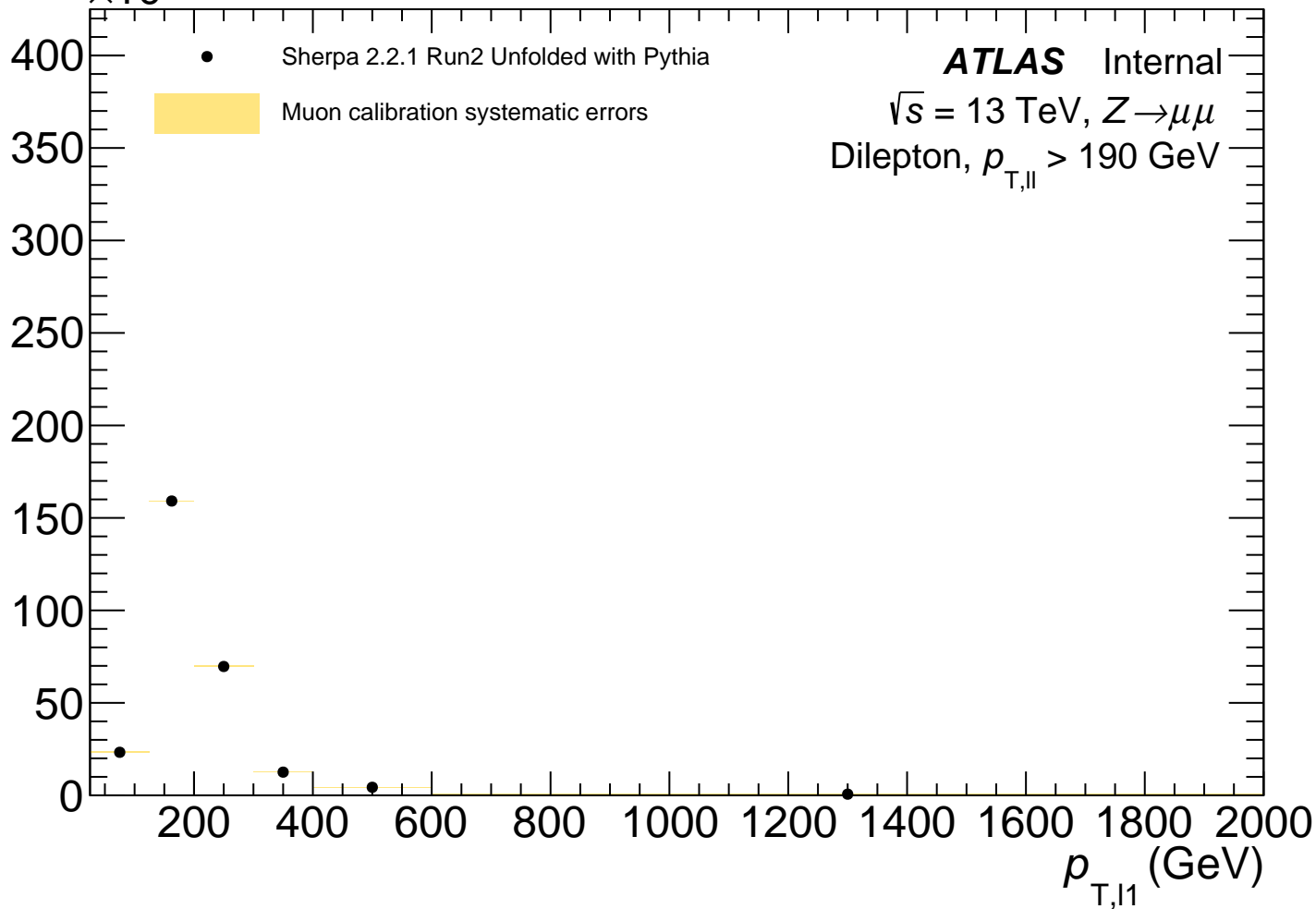
Events

$\times 10^3$



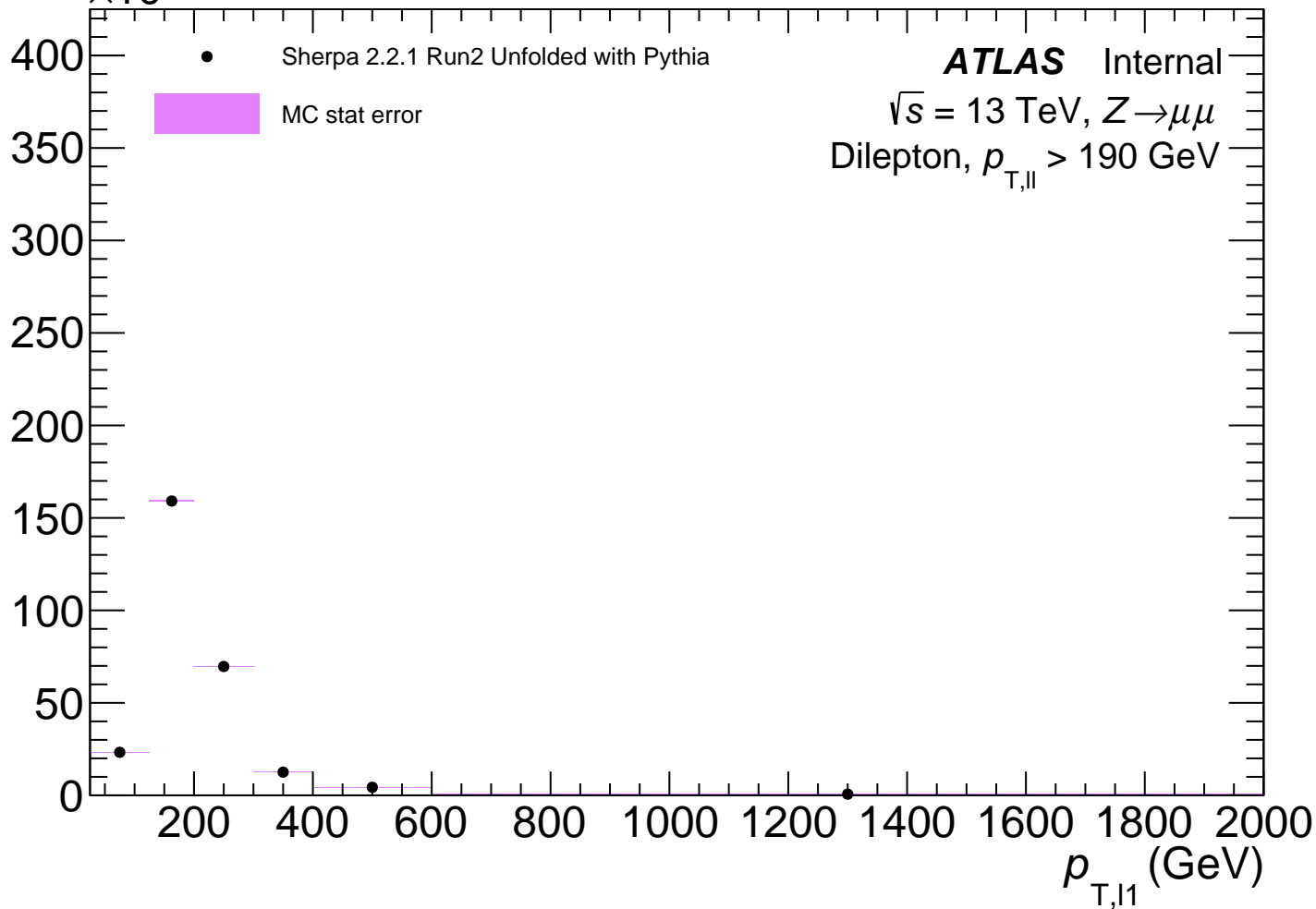
Events

$\times 10^3$



Events

$\times 10^3$



Events

$\times 10^3$

400

350

300

250

200

150

100

50

0

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



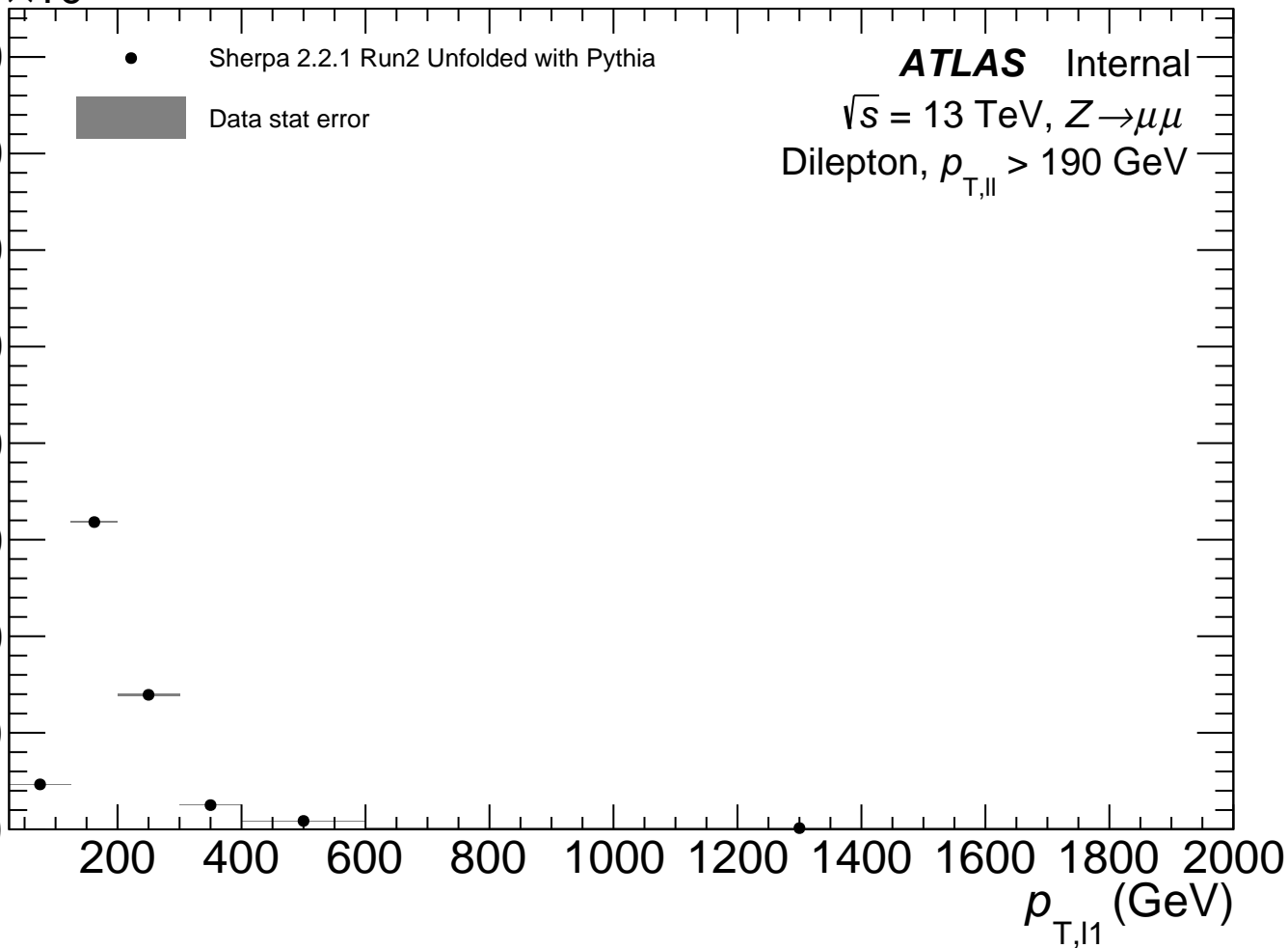
Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

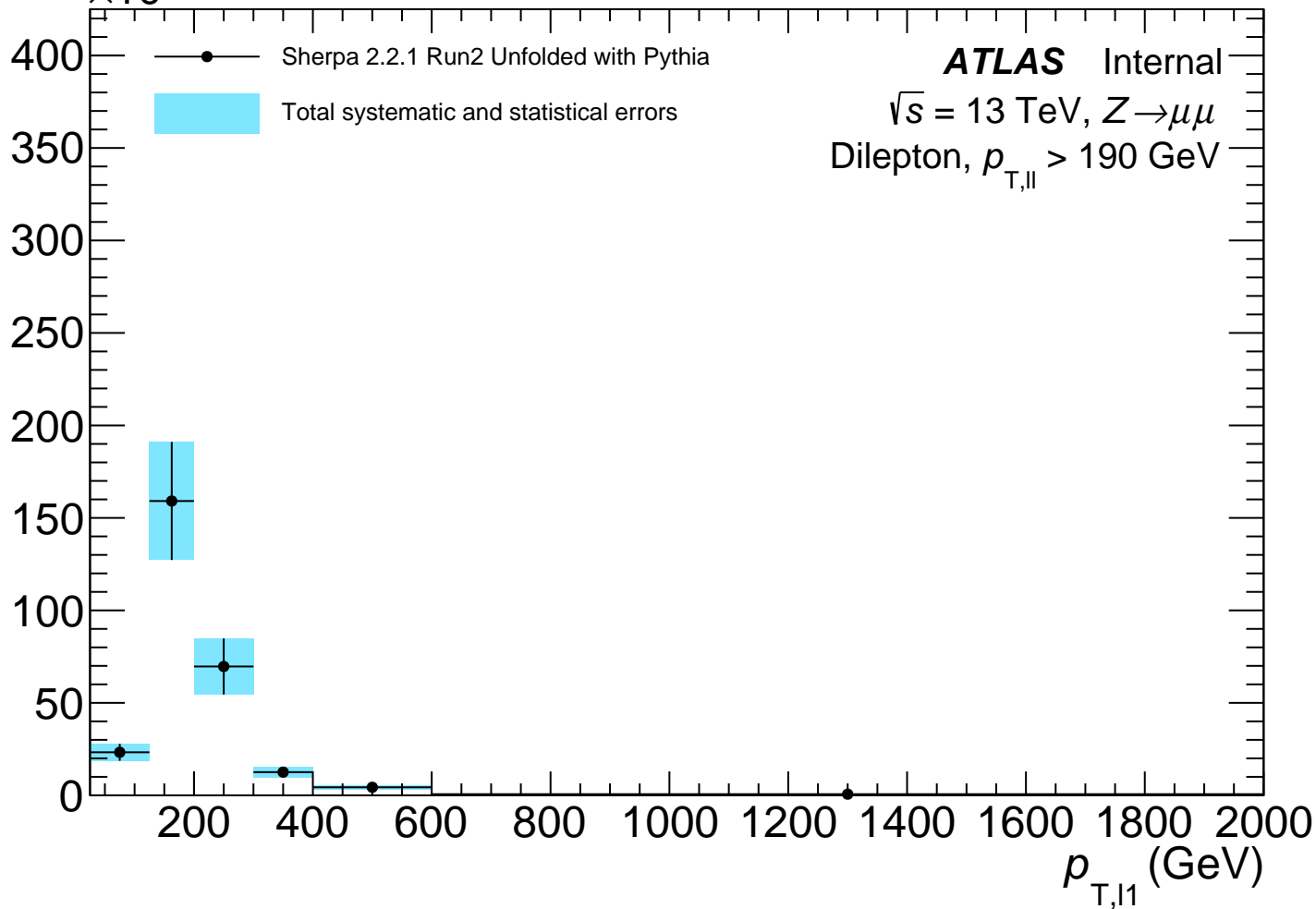
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

$p_{T,\text{ll}}$ (GeV)

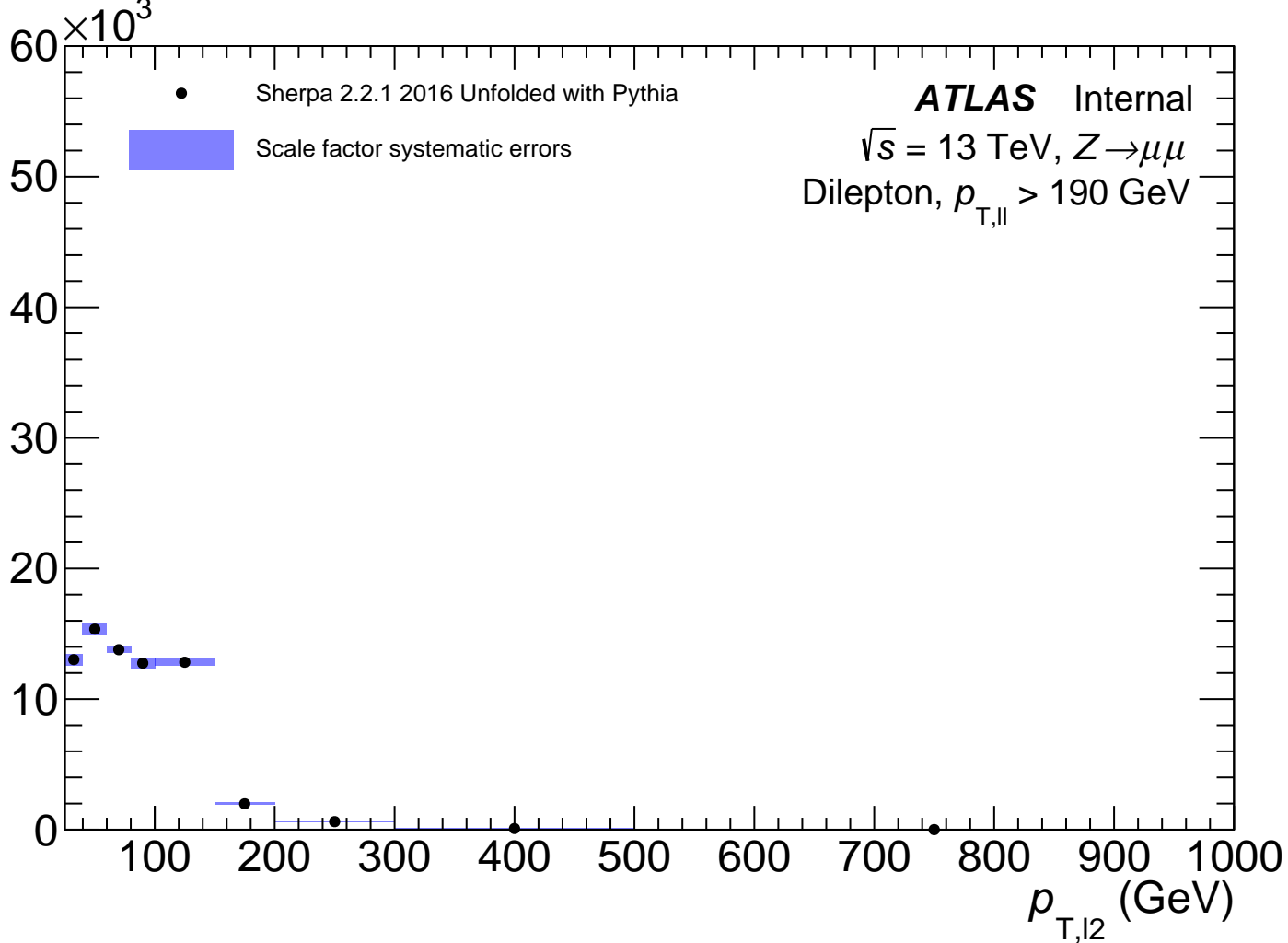


Events

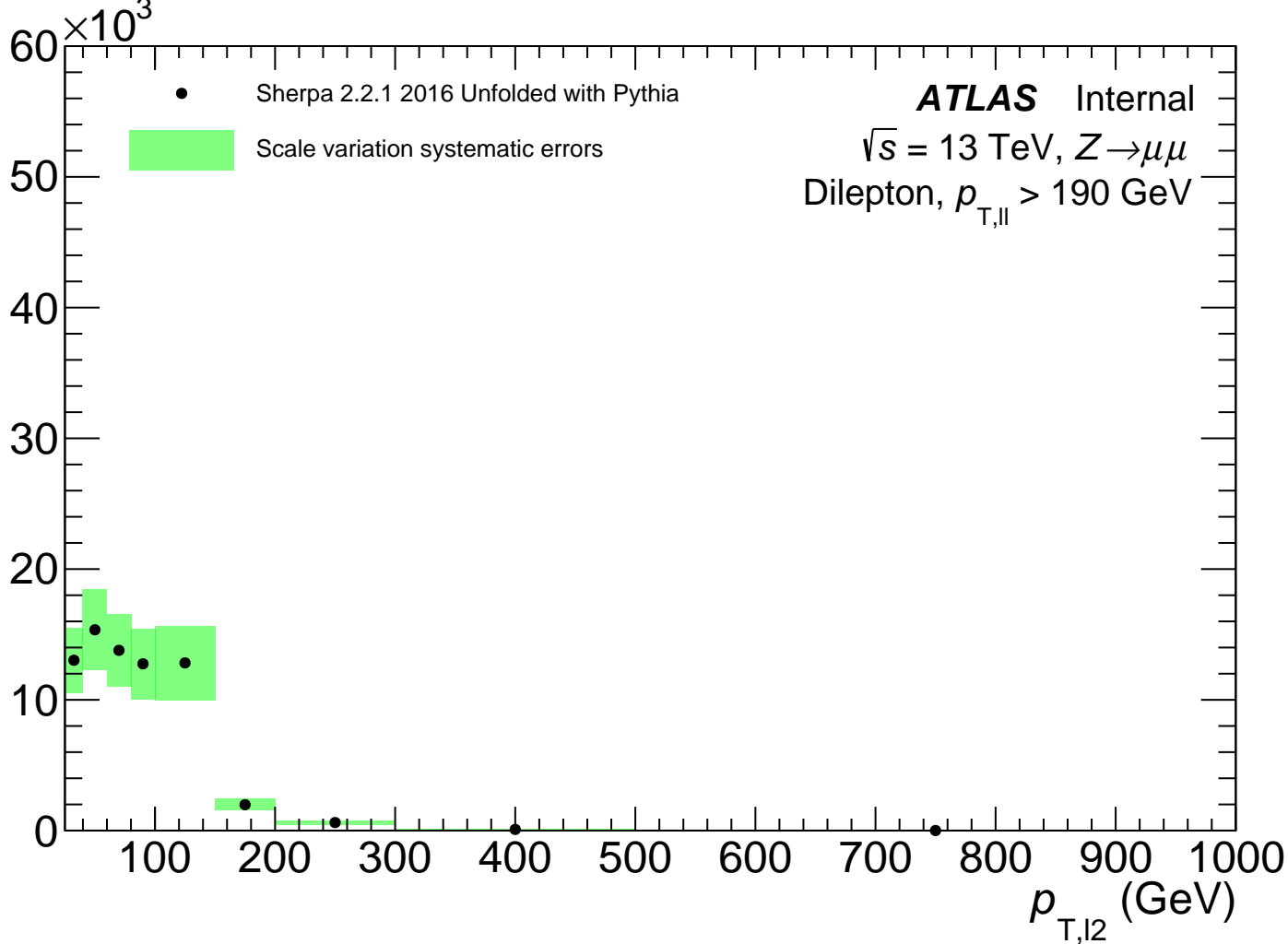
$\times 10^3$



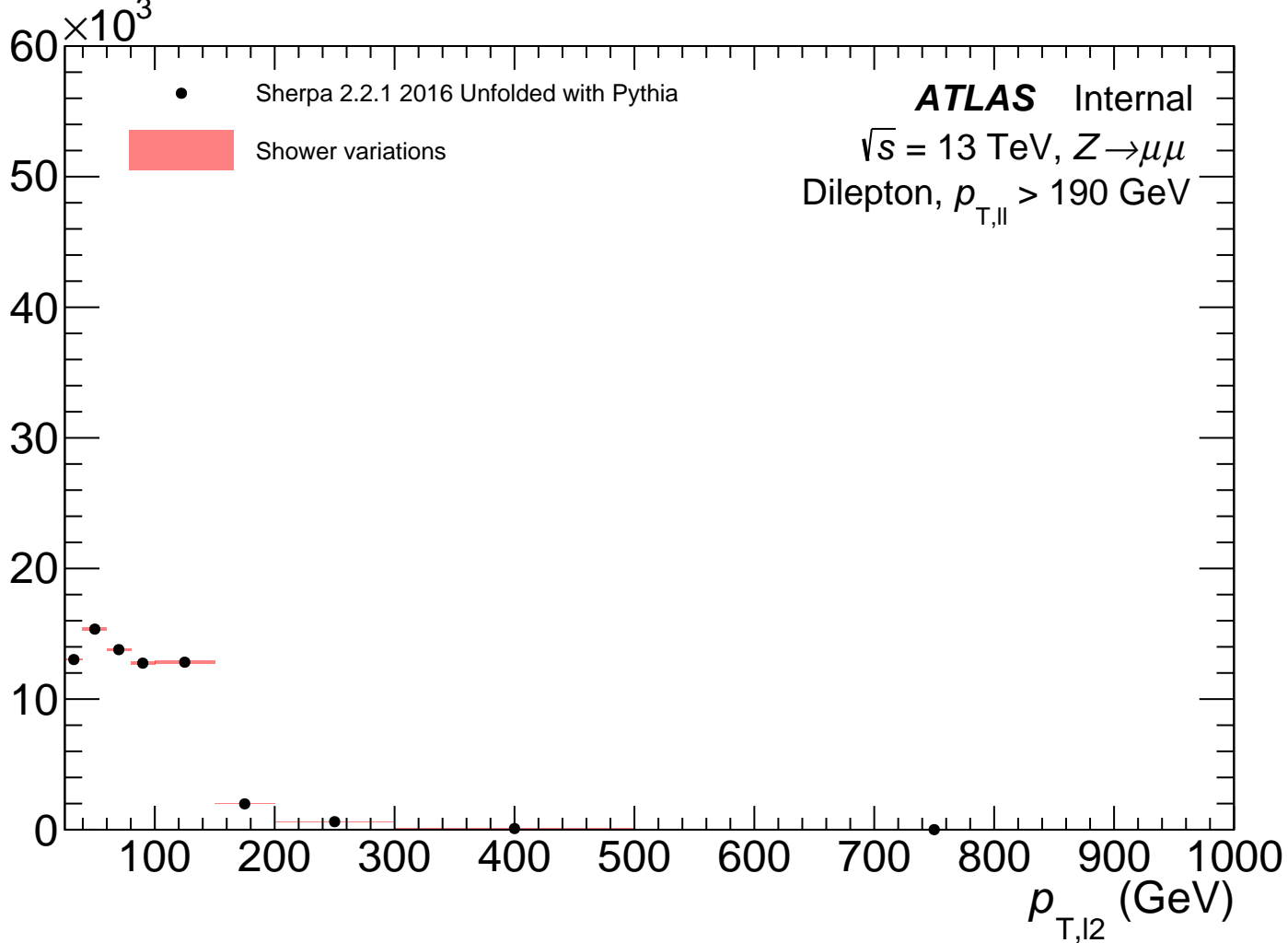
Events



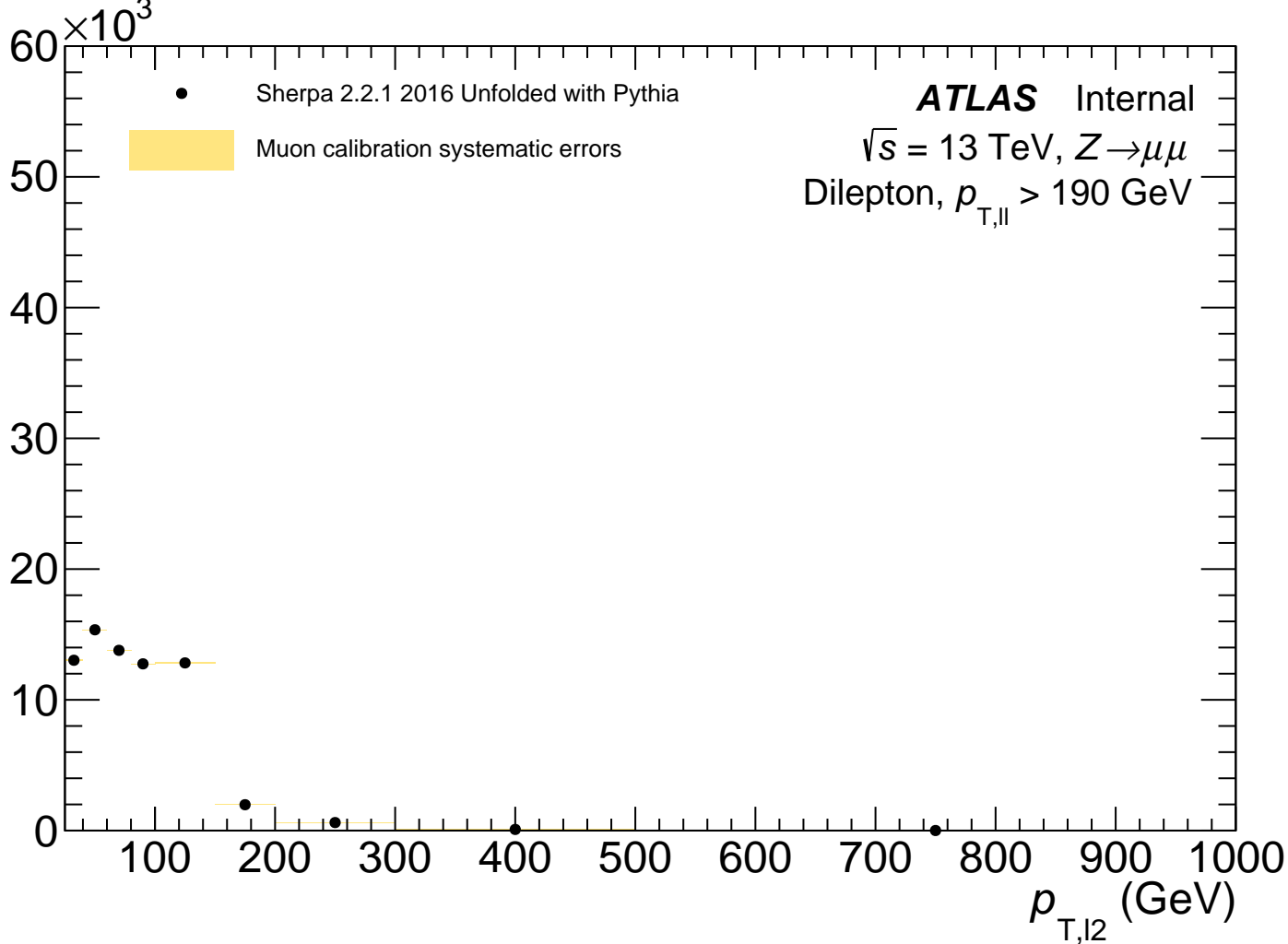
Events



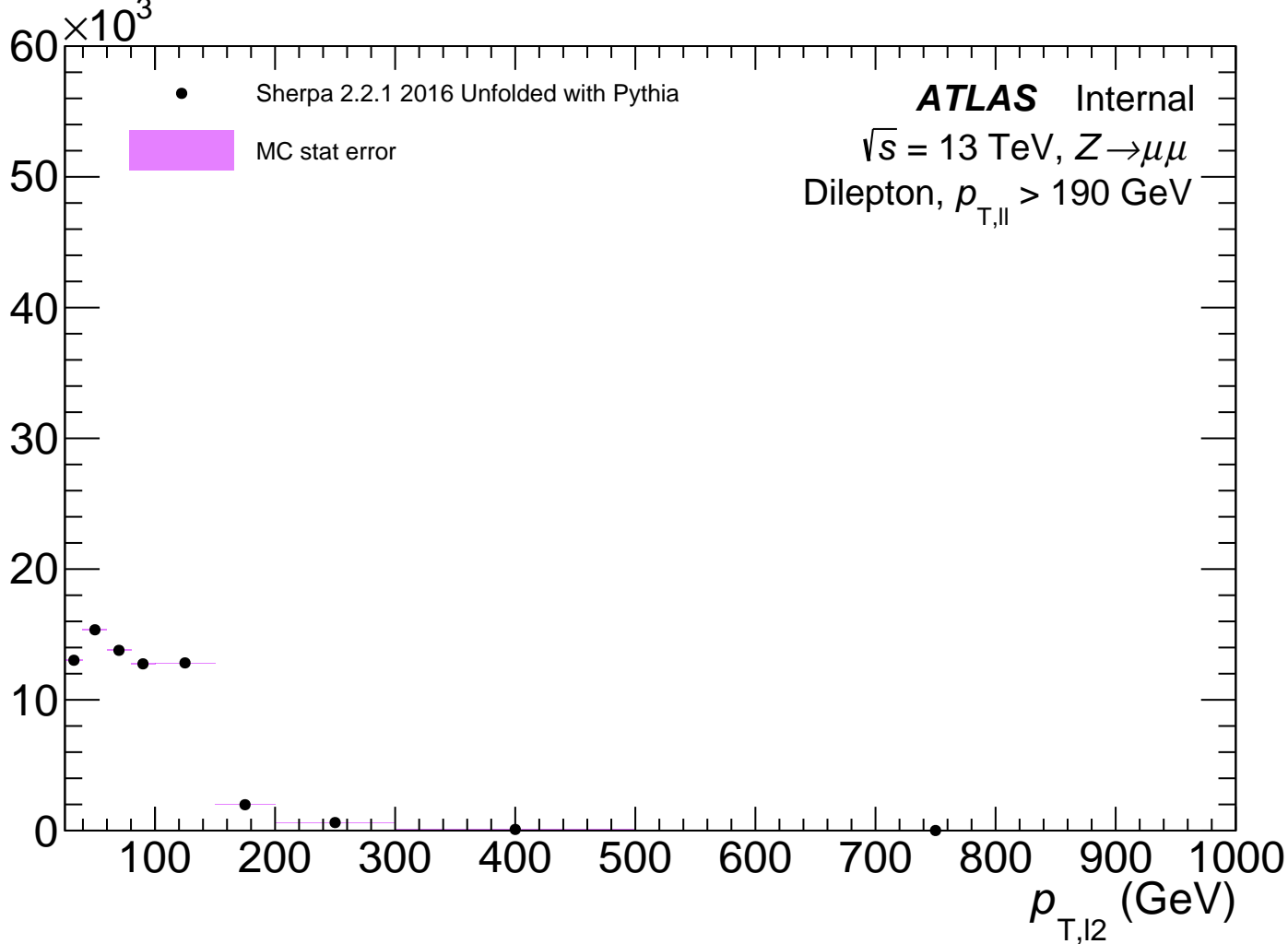
Events



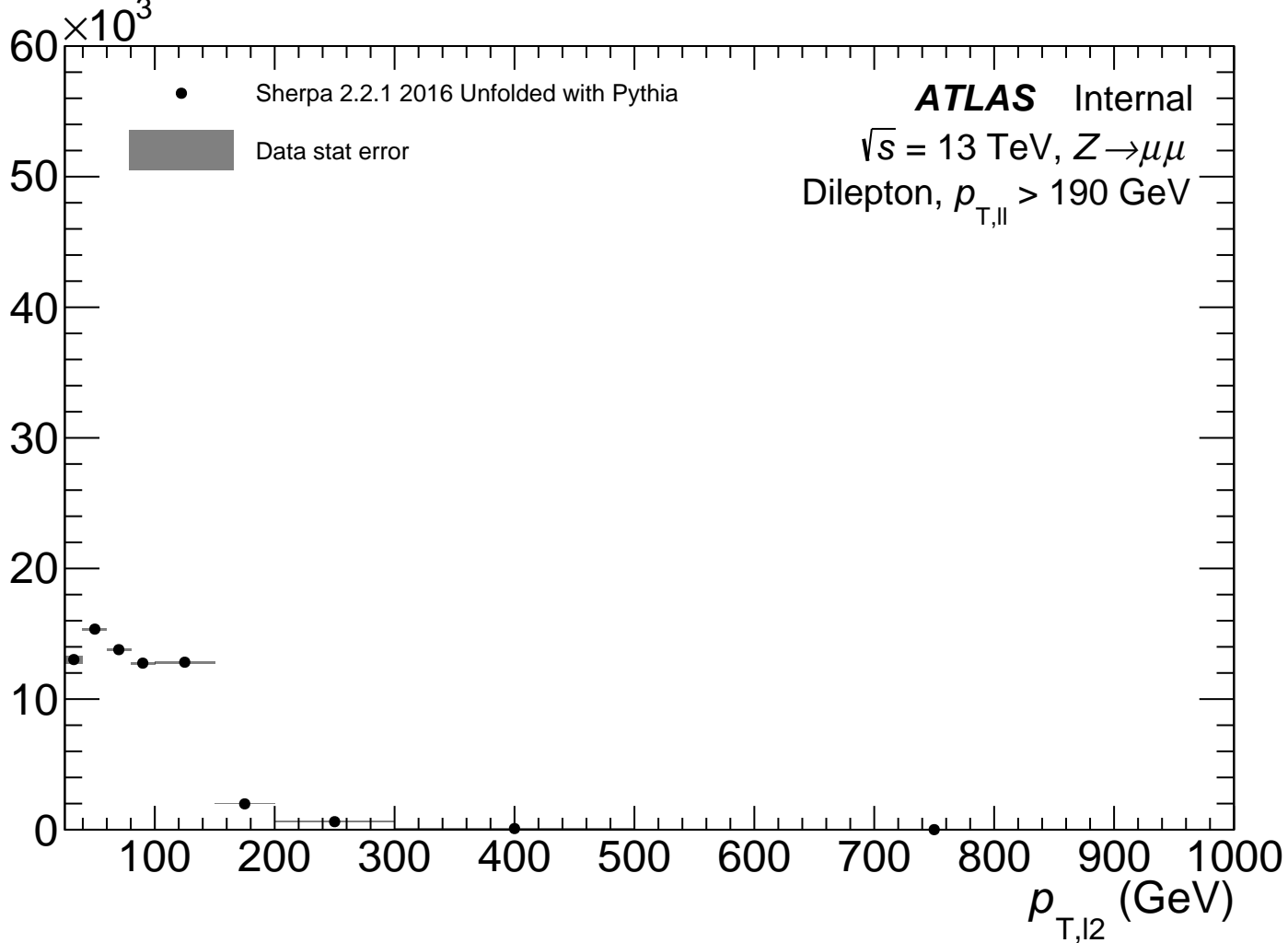
Events



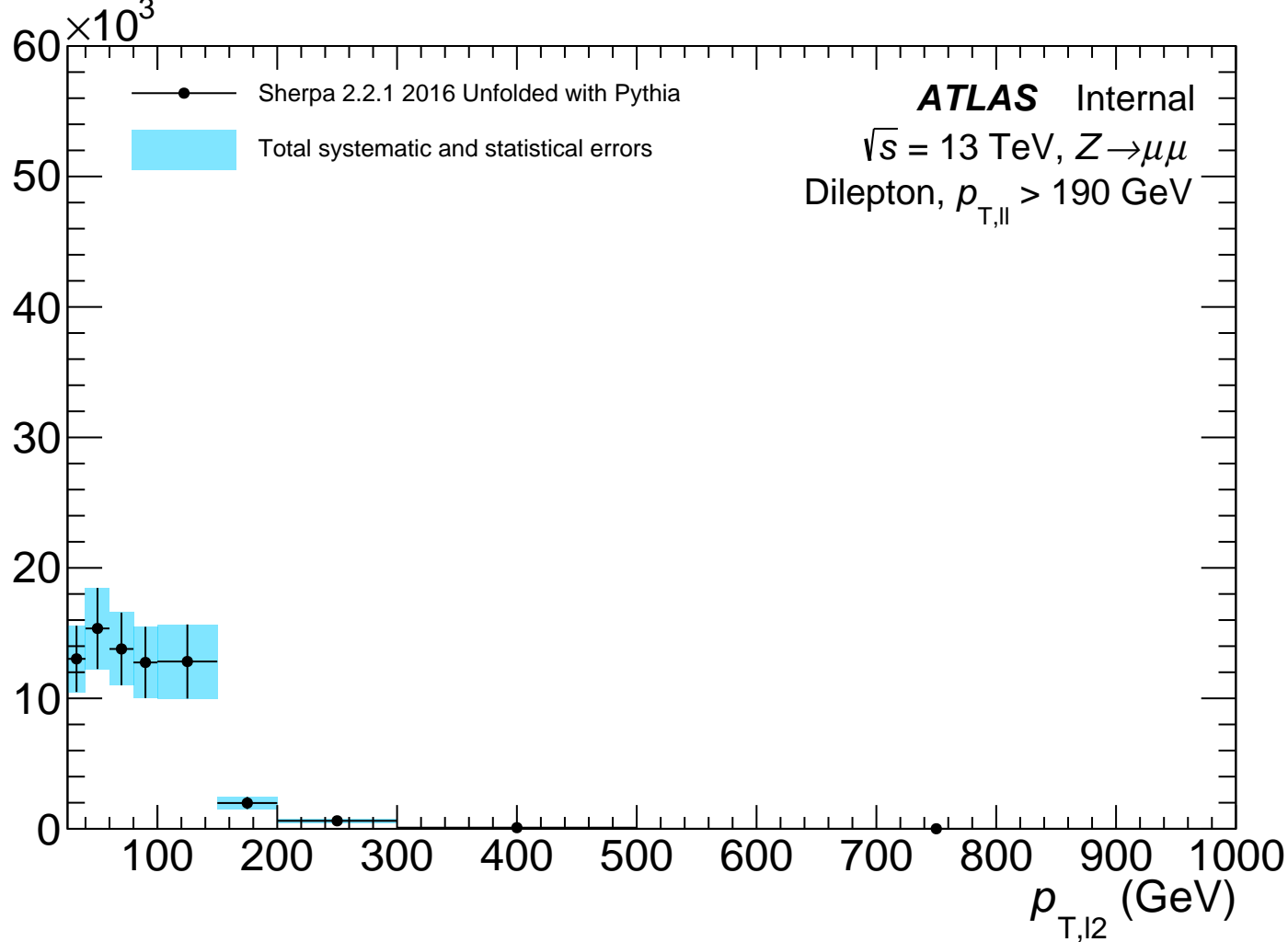
Events



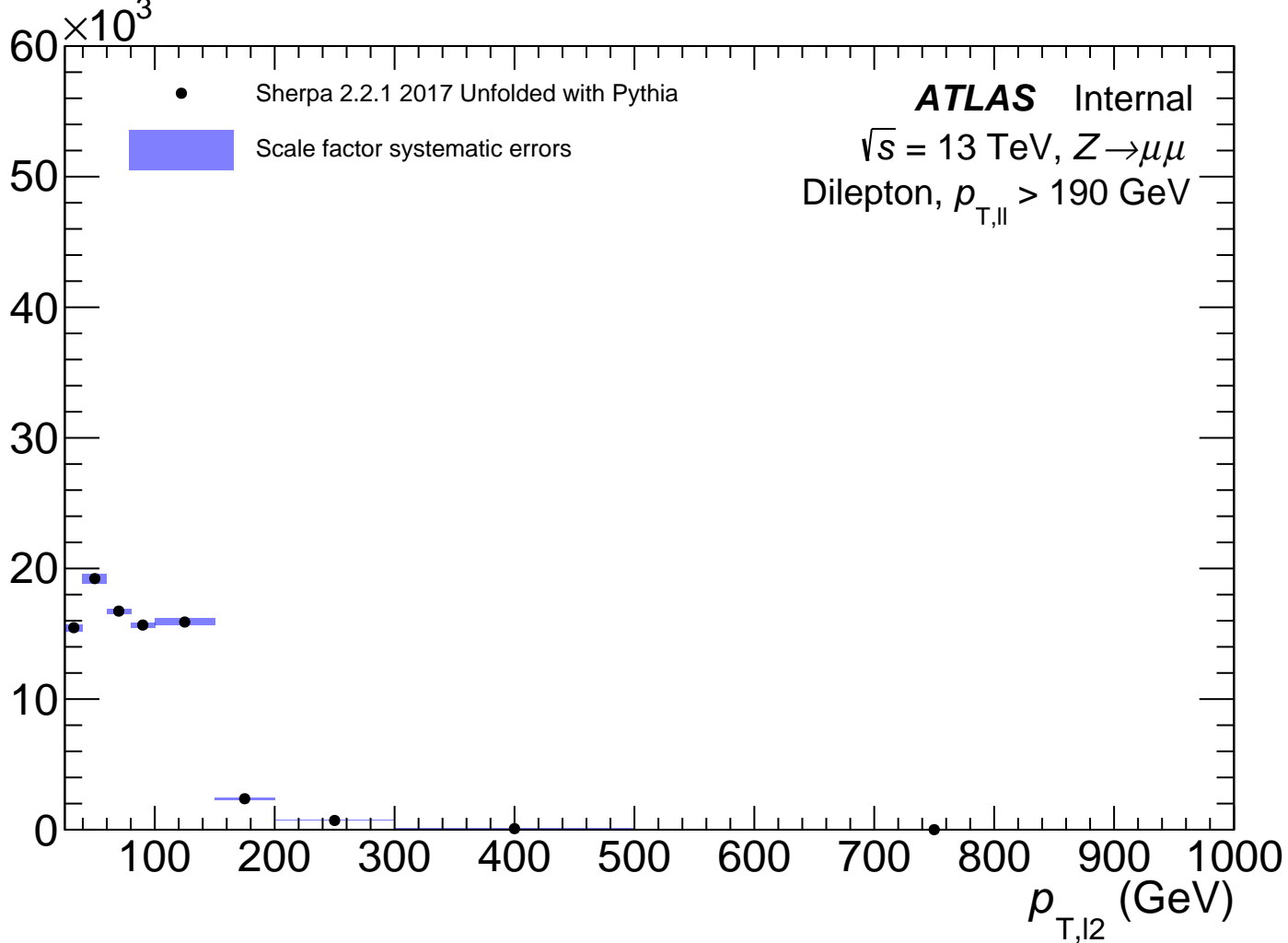
Events



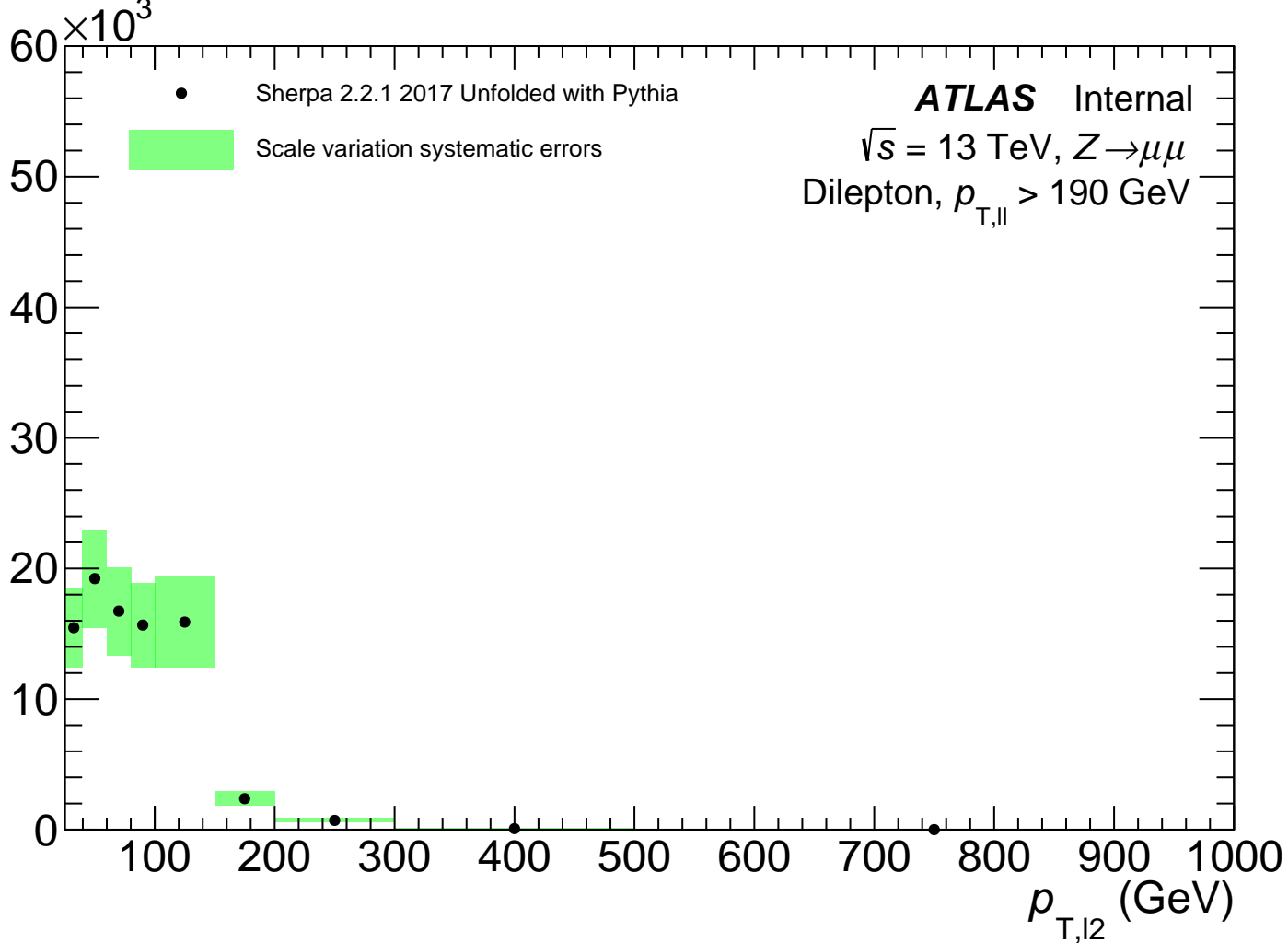
Events



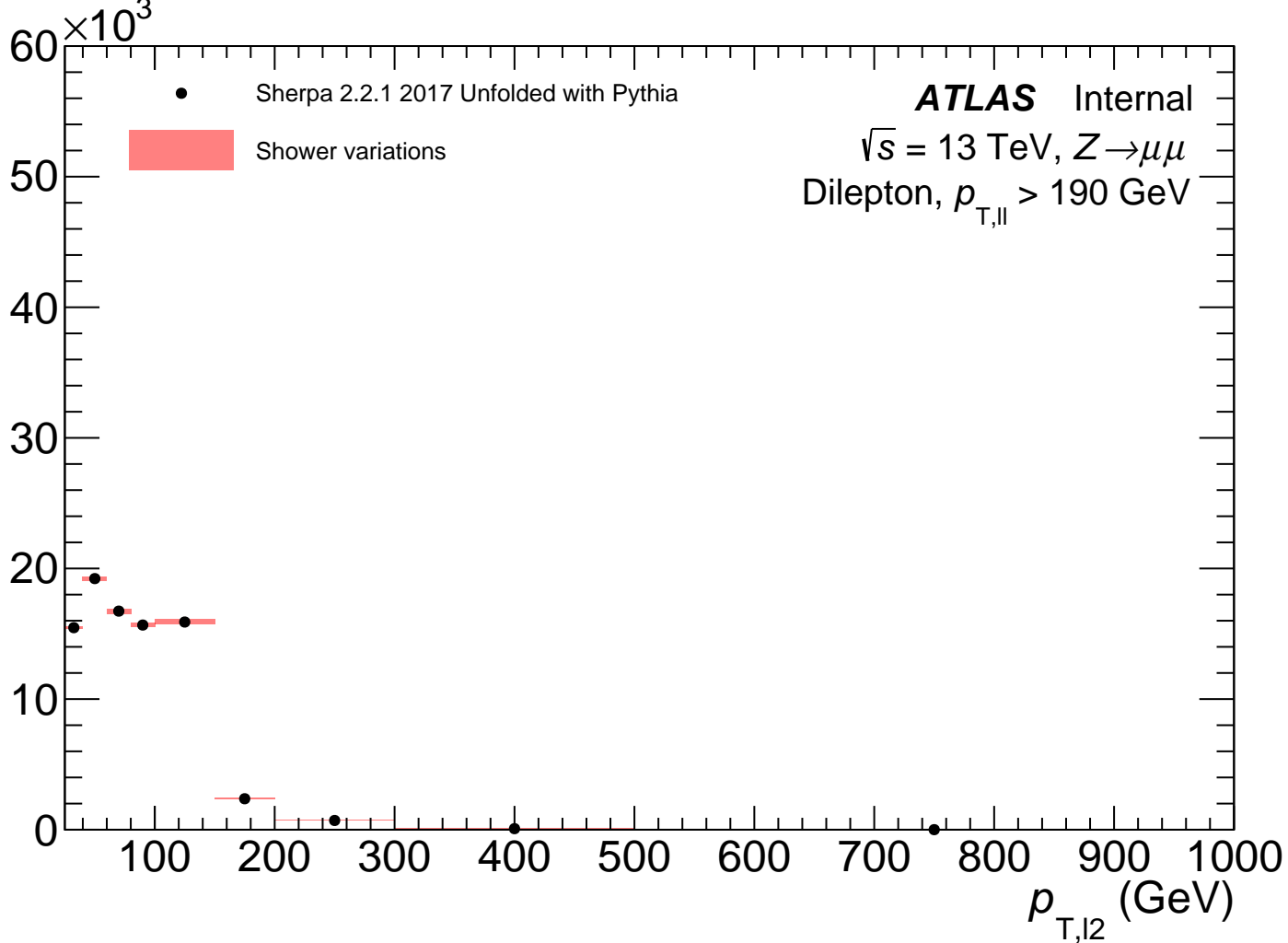
Events



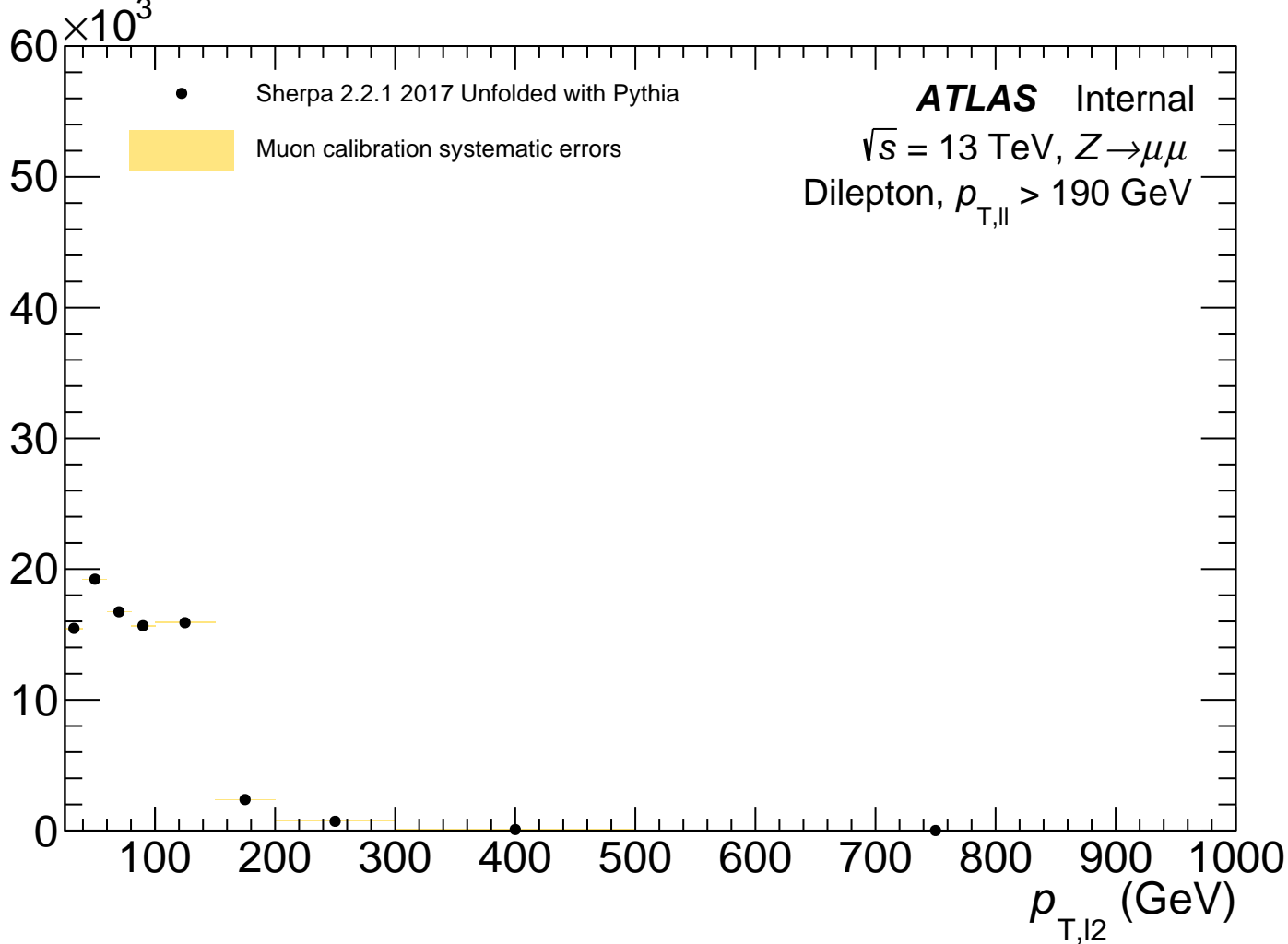
Events



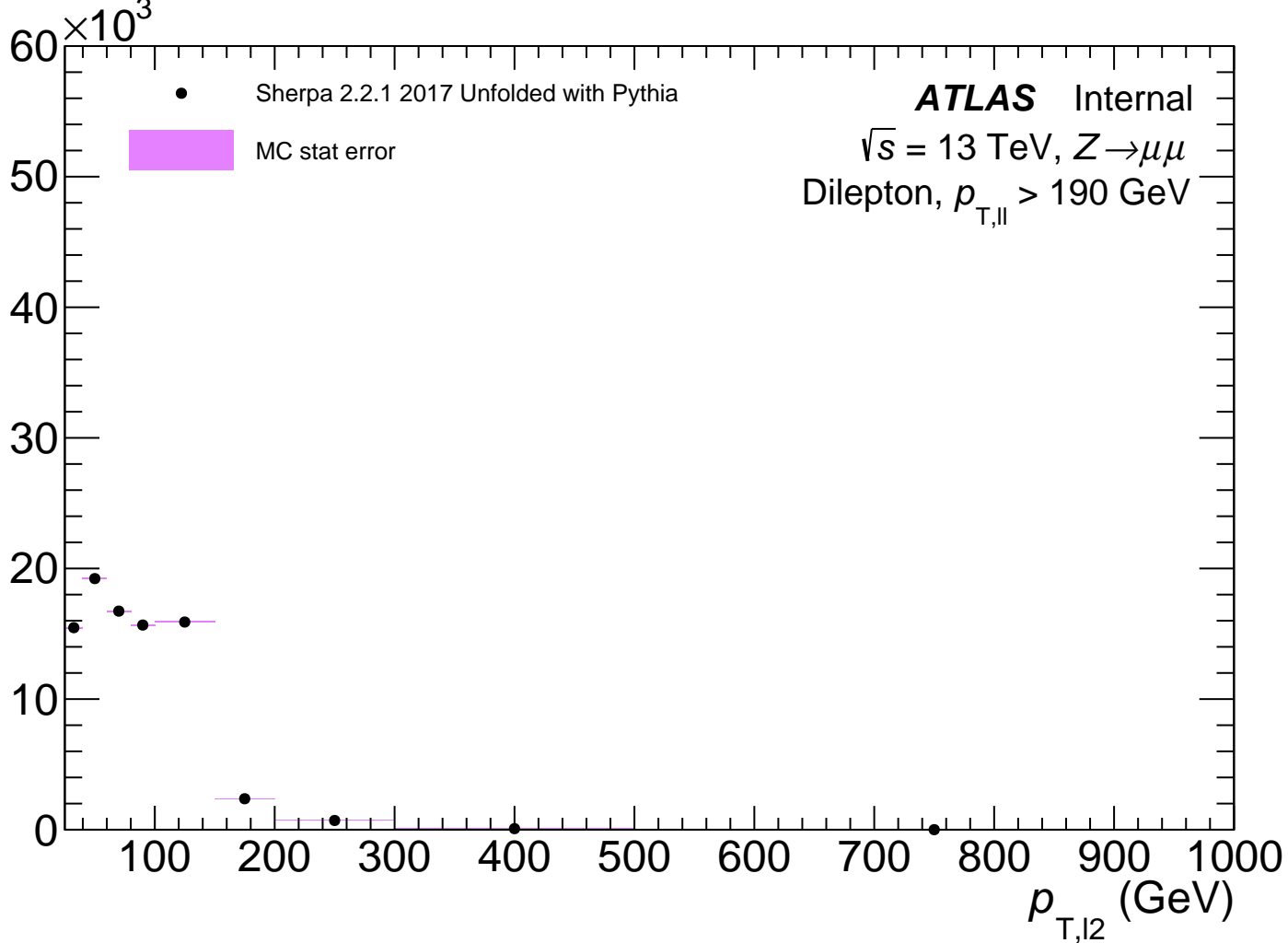
Events



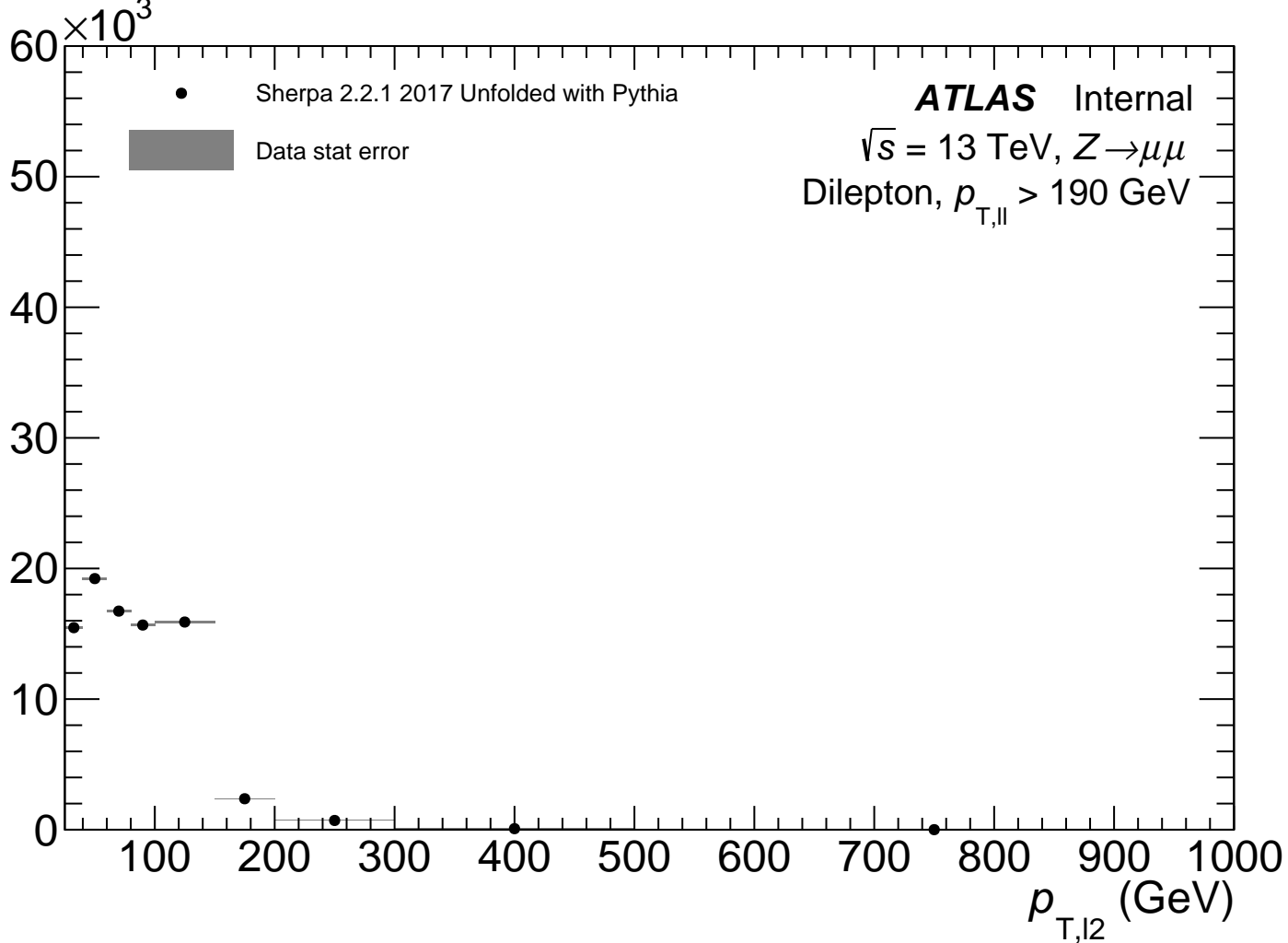
Events



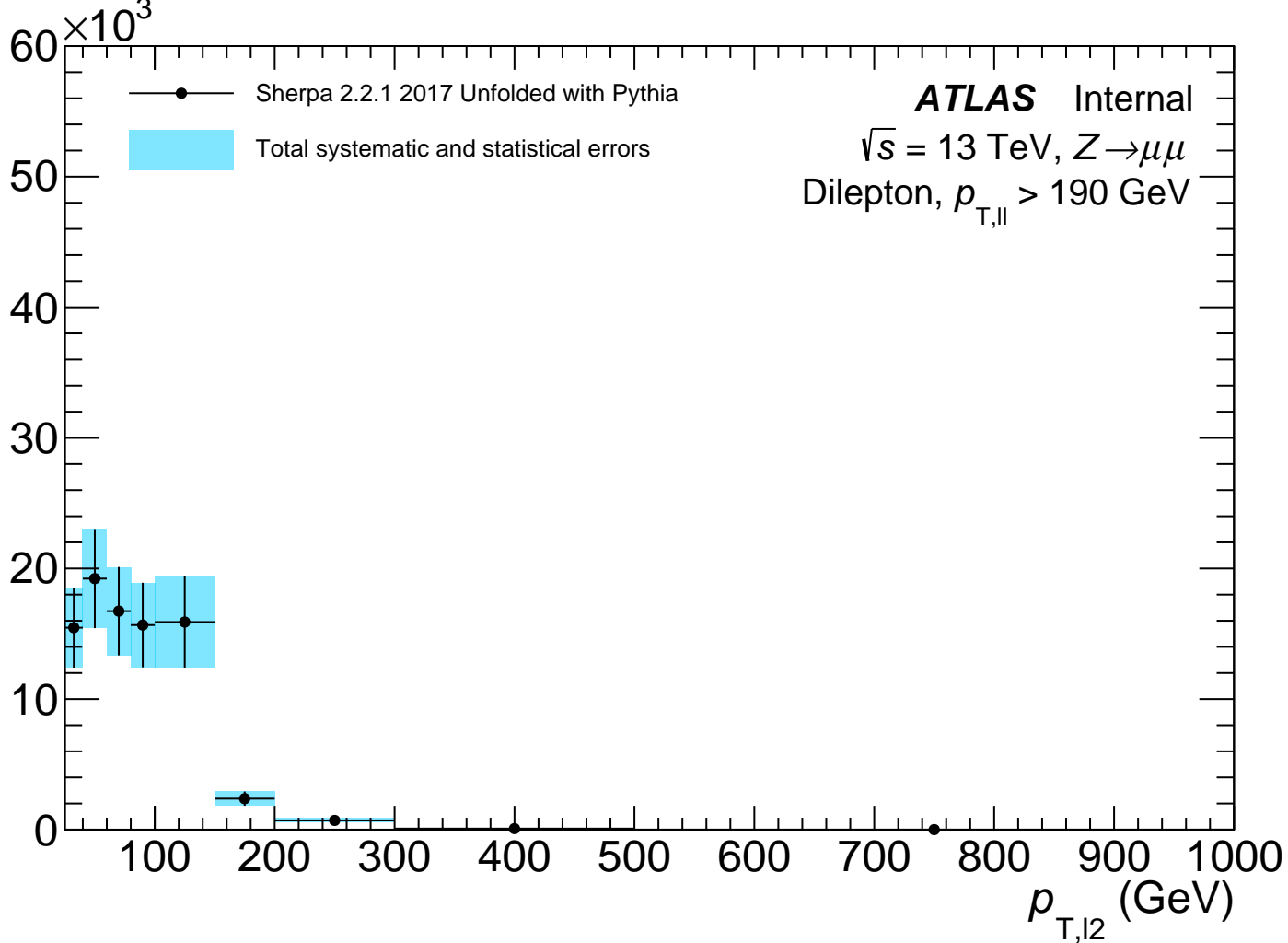
Events



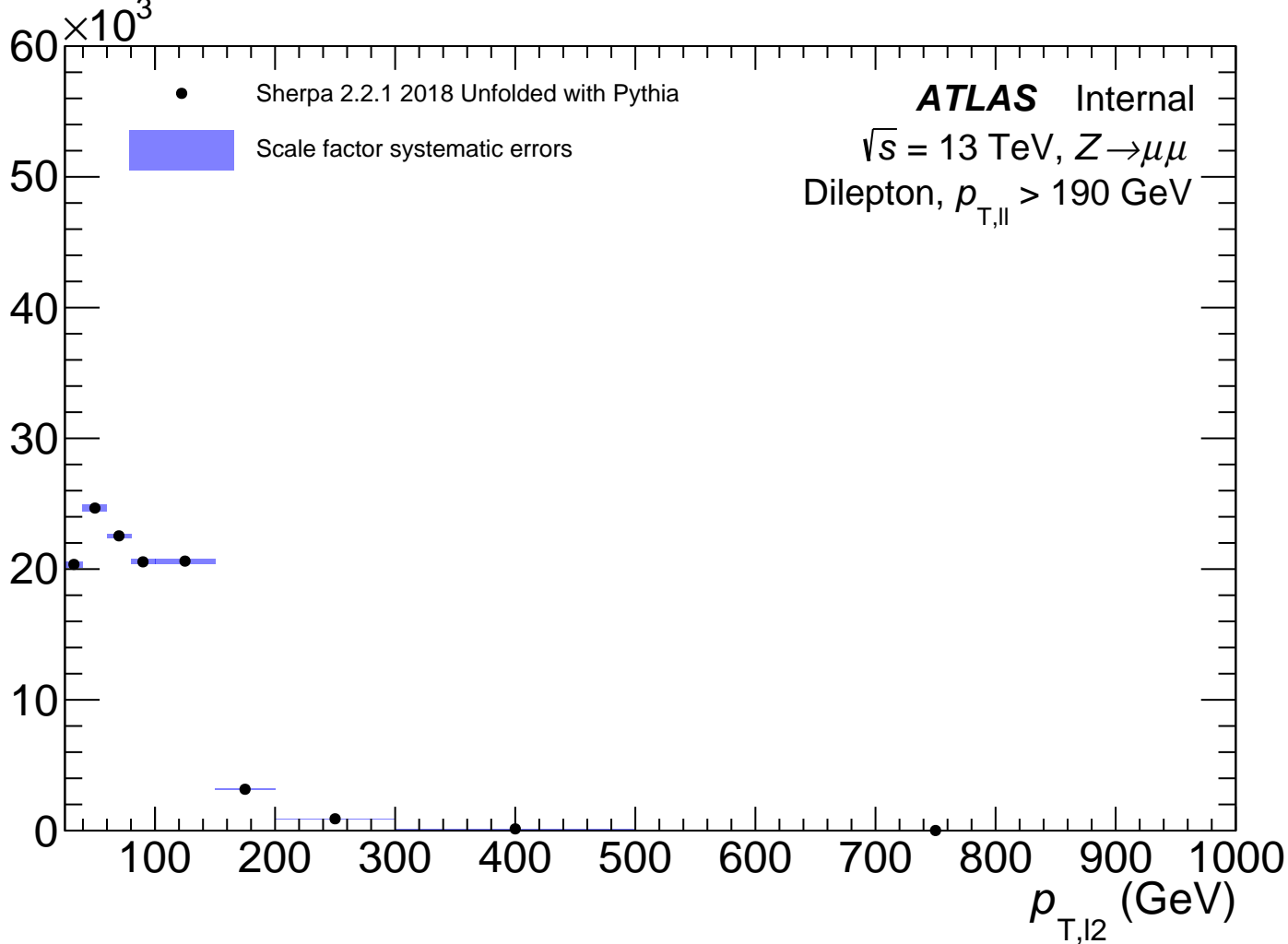
Events



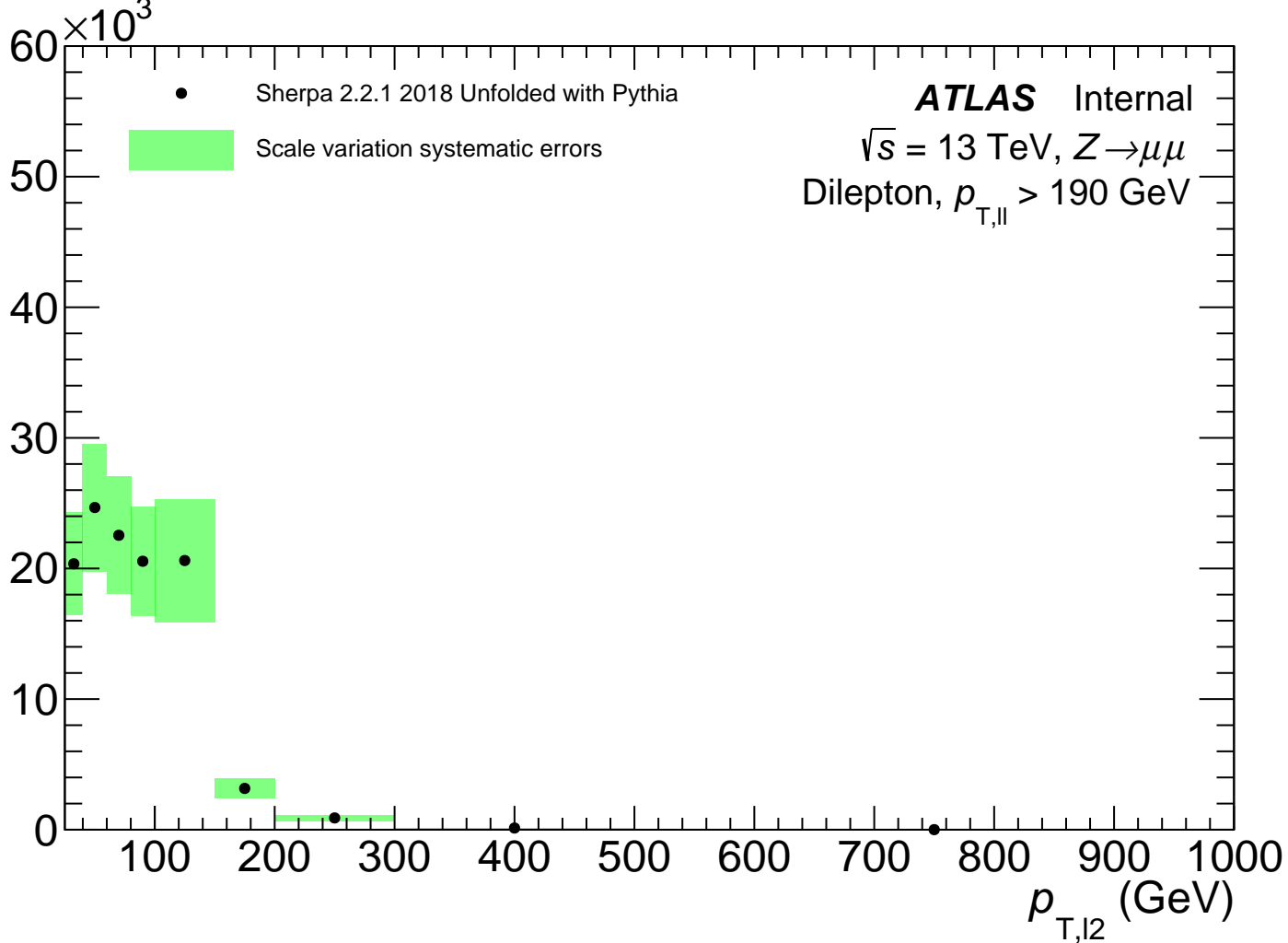
Events



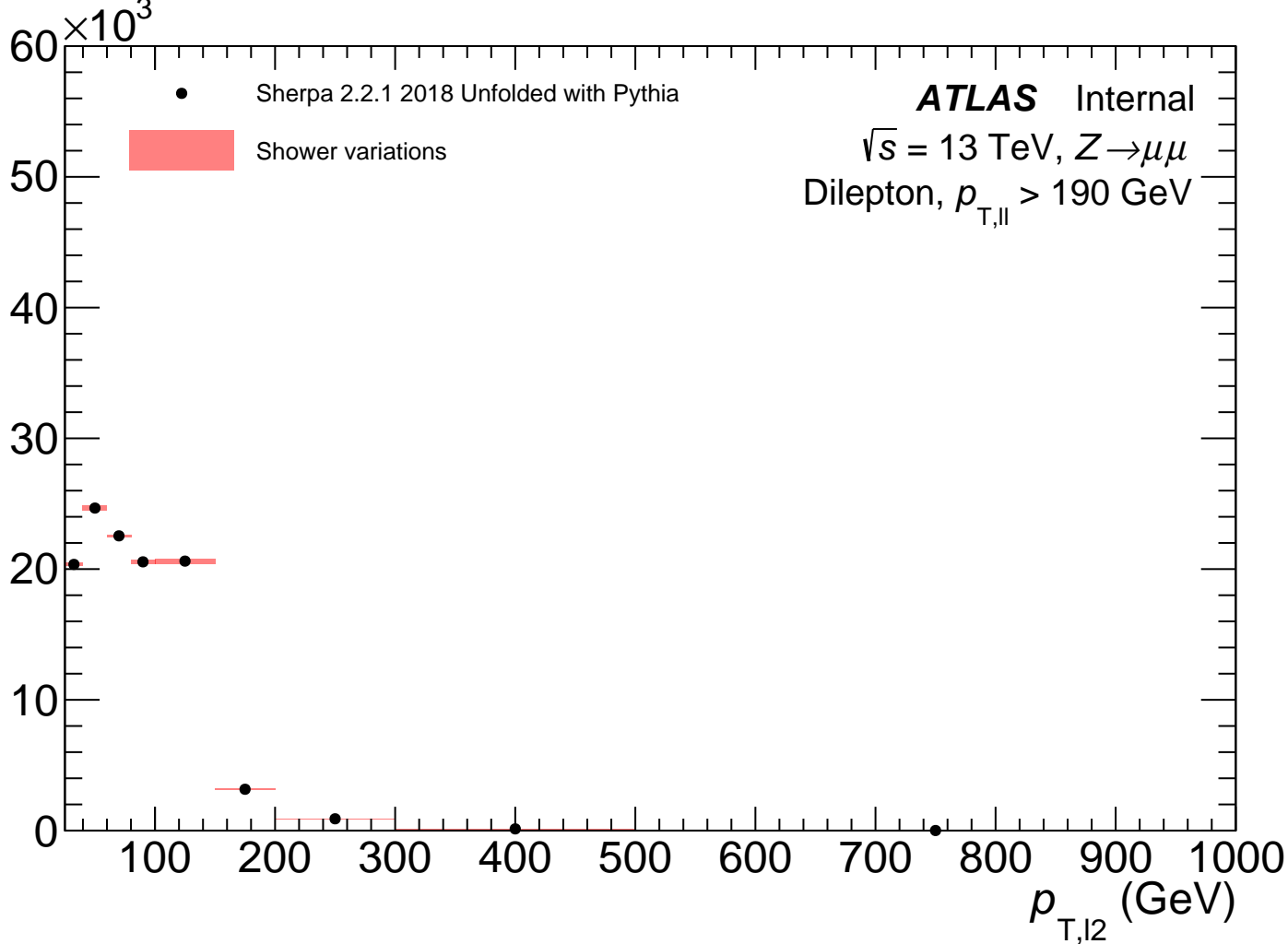
Events



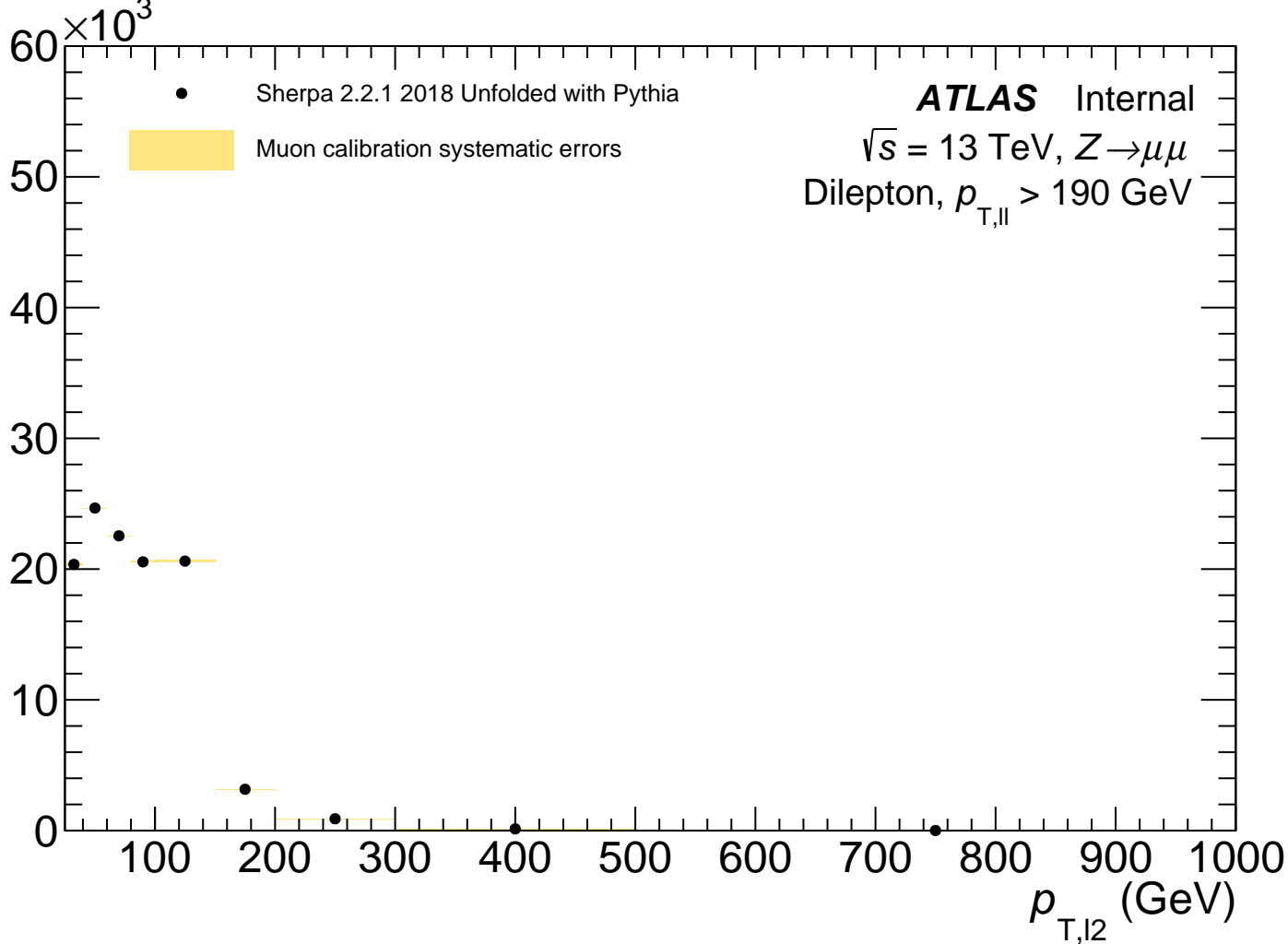
Events



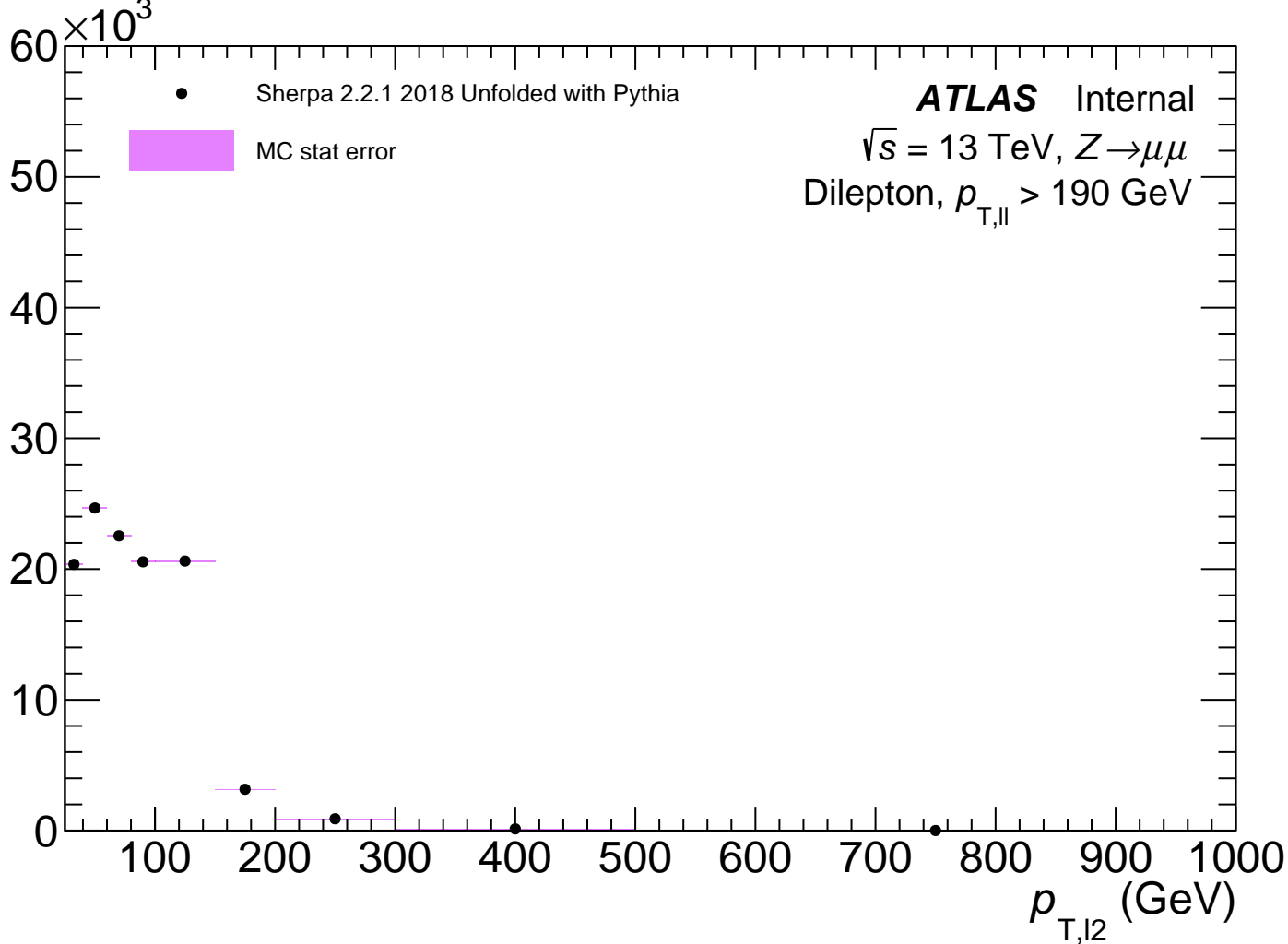
Events



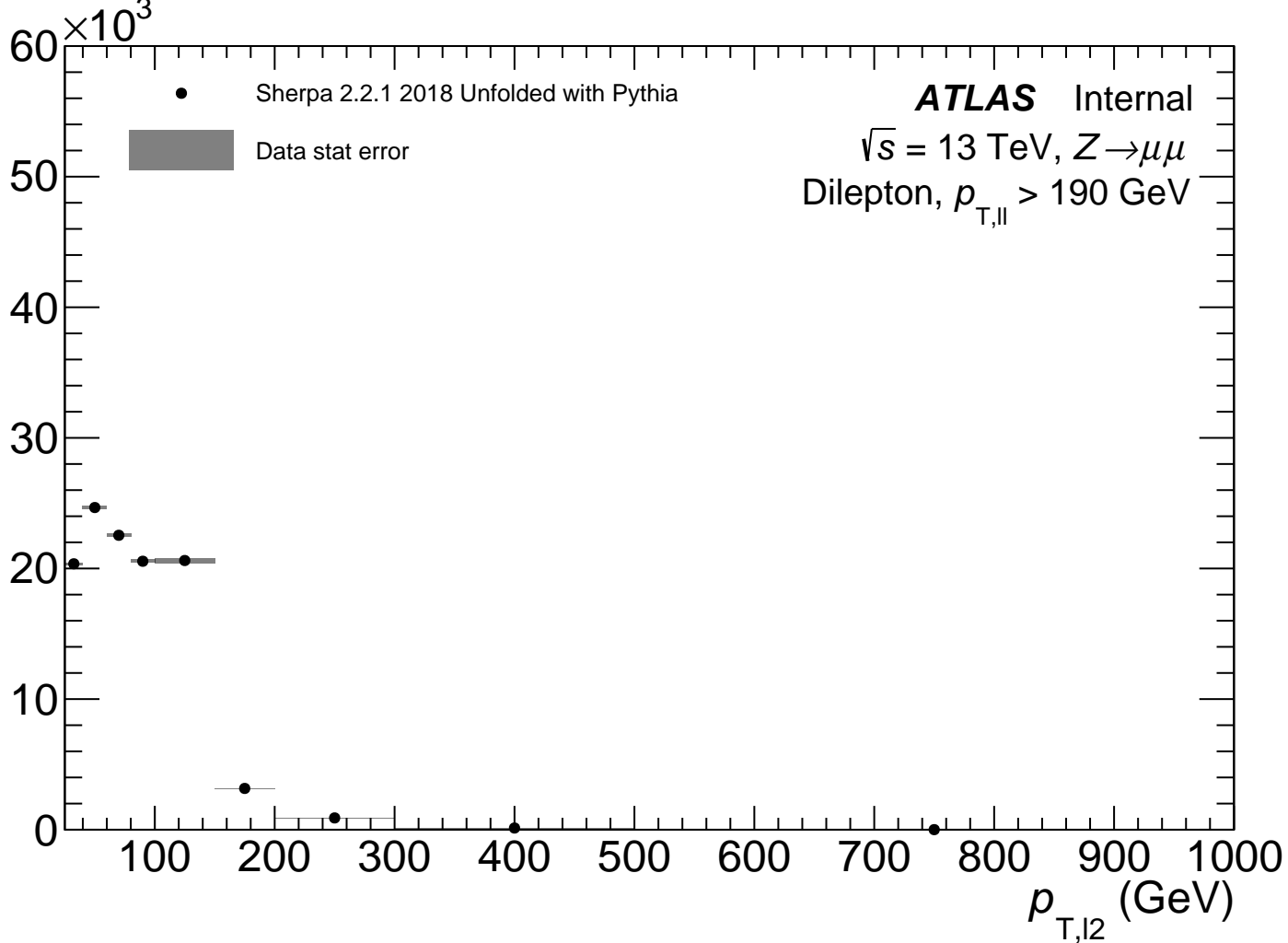
Events



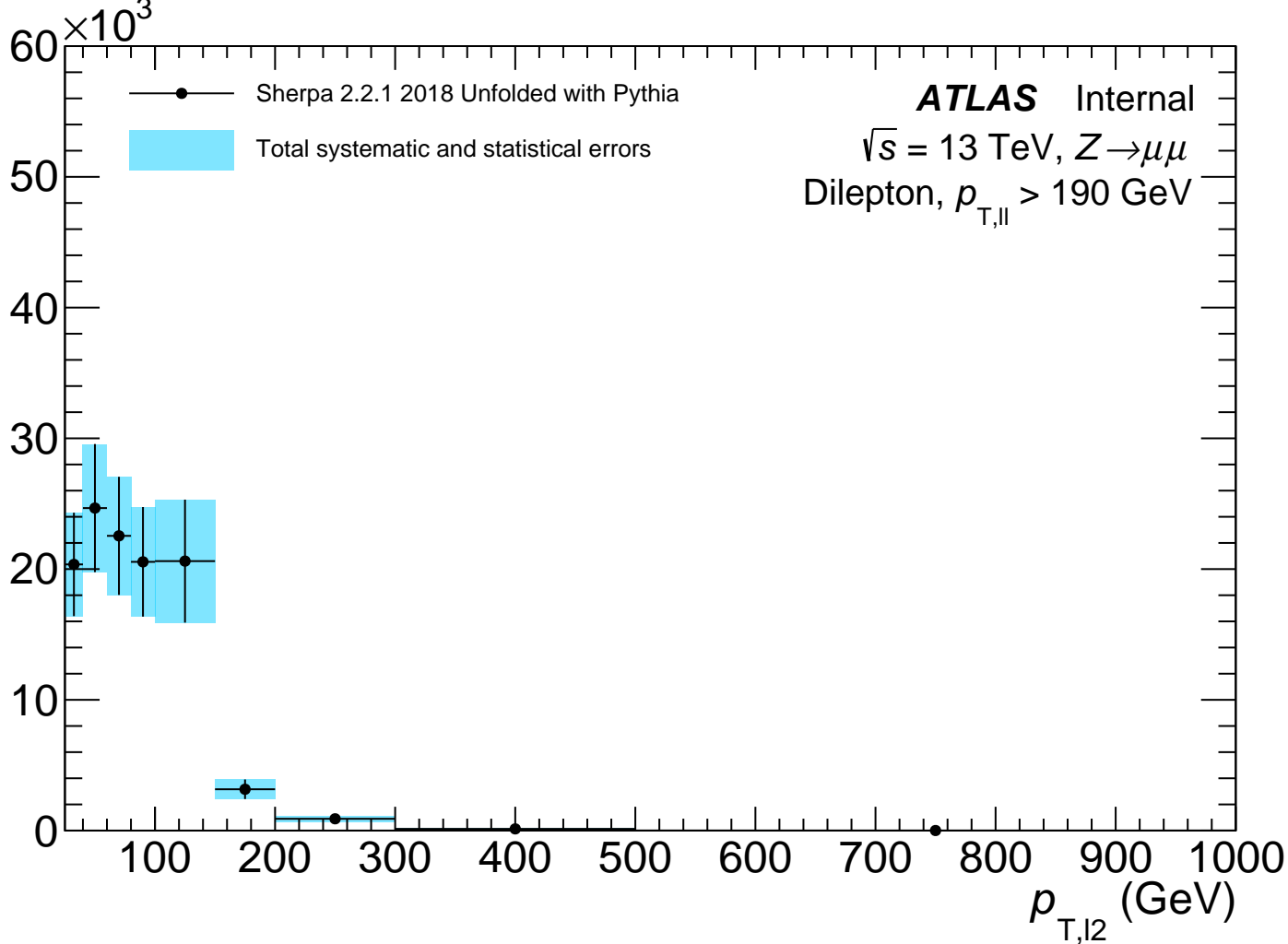
Events



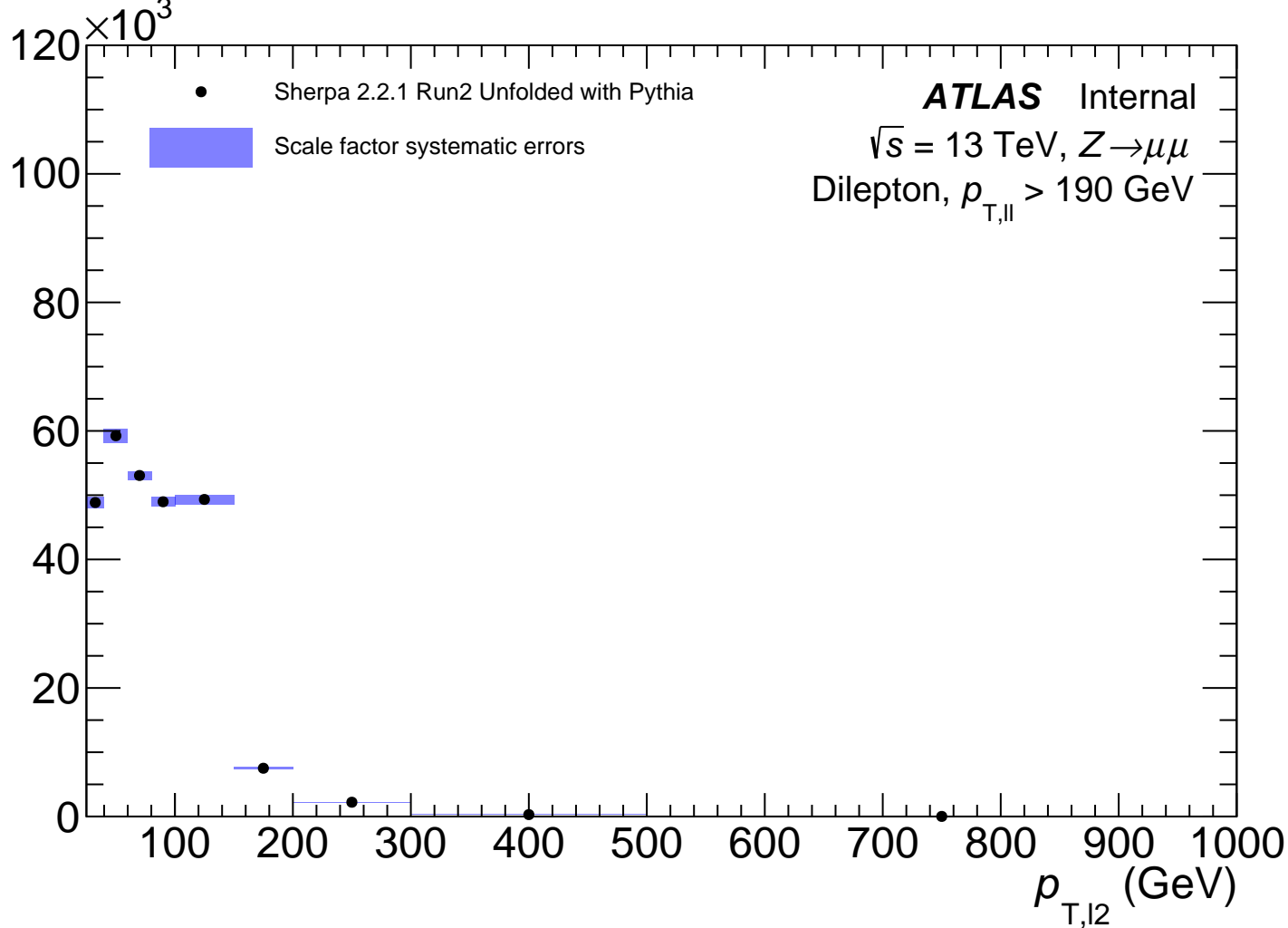
Events



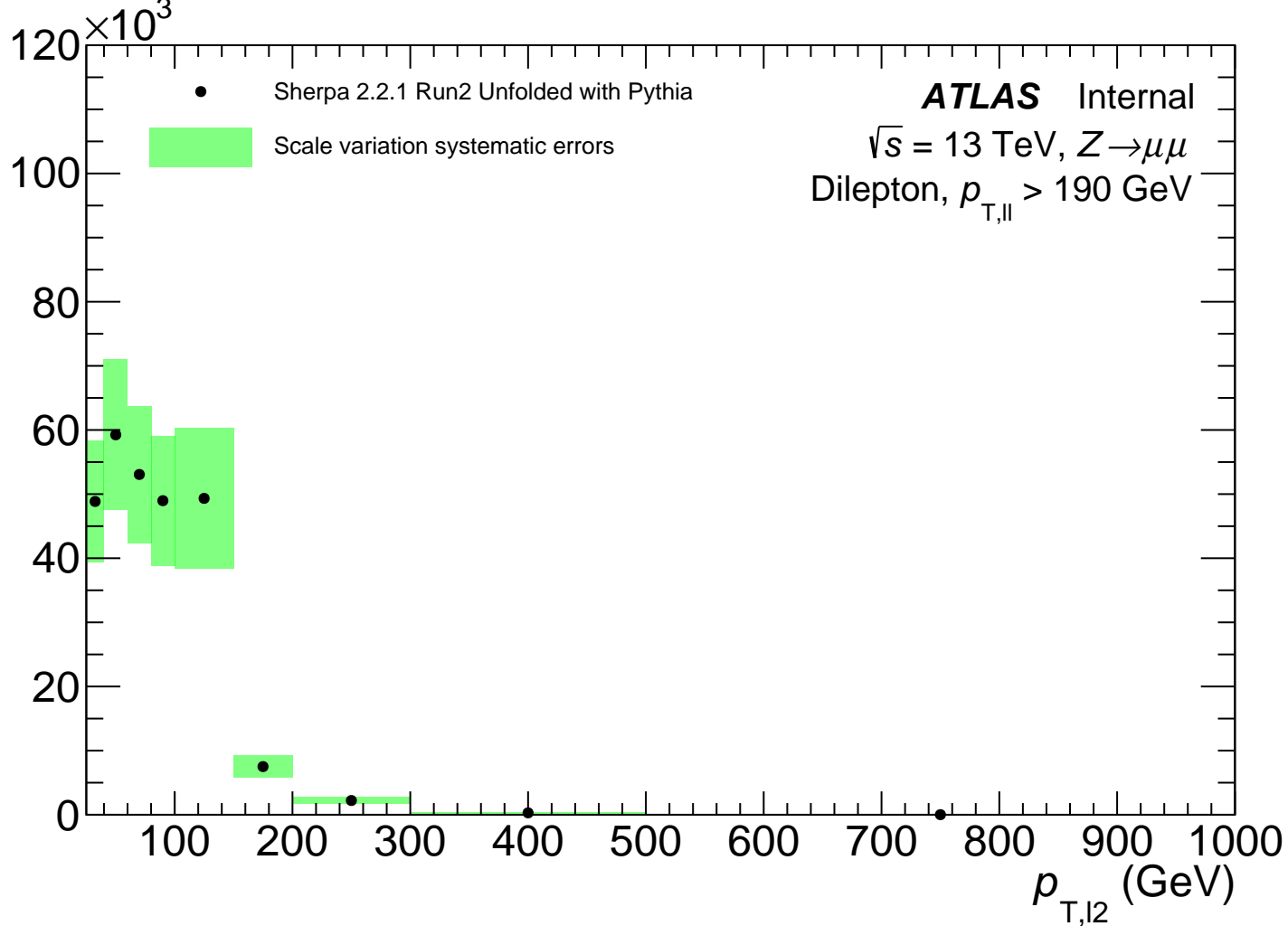
Events



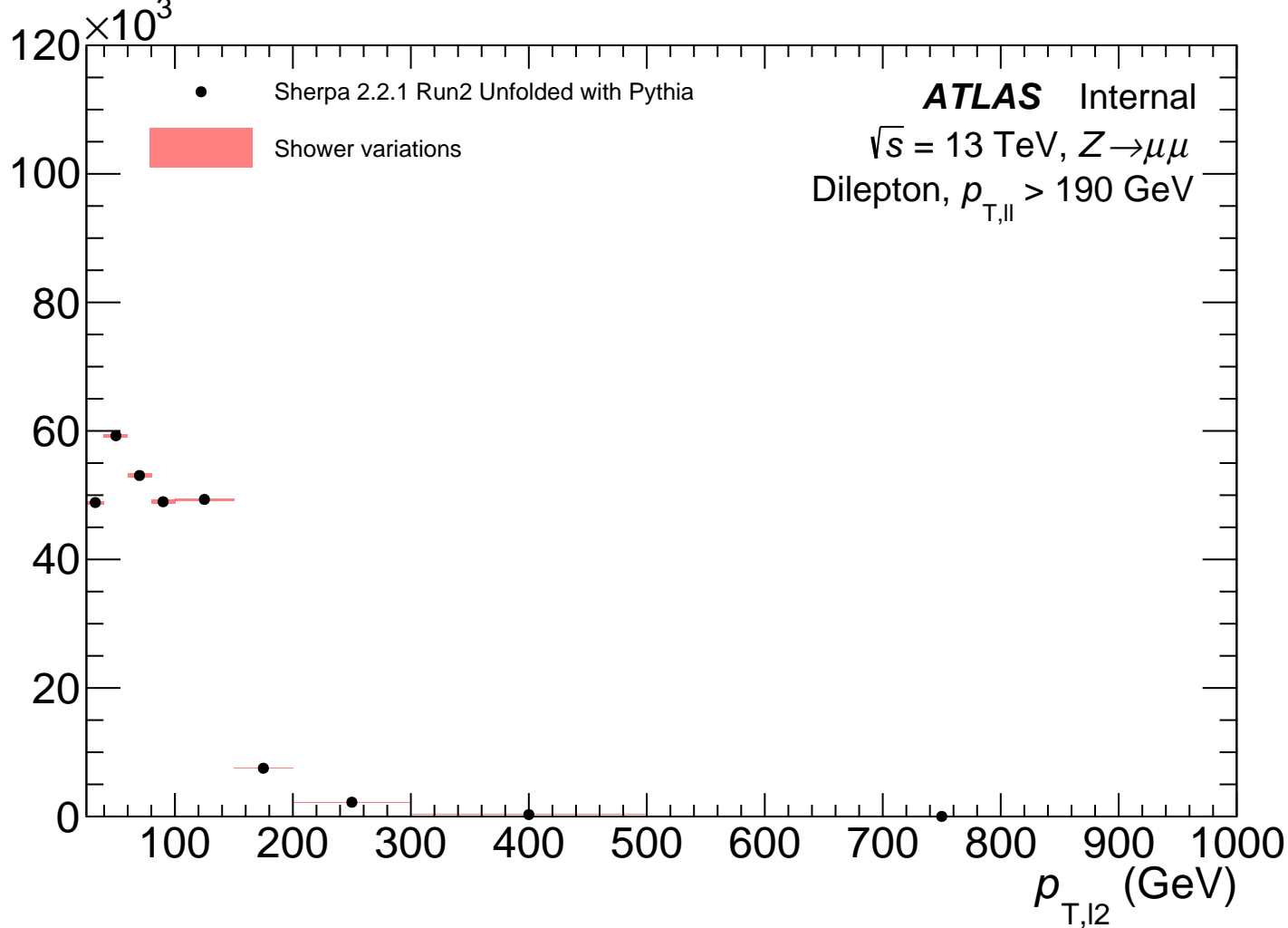
Events



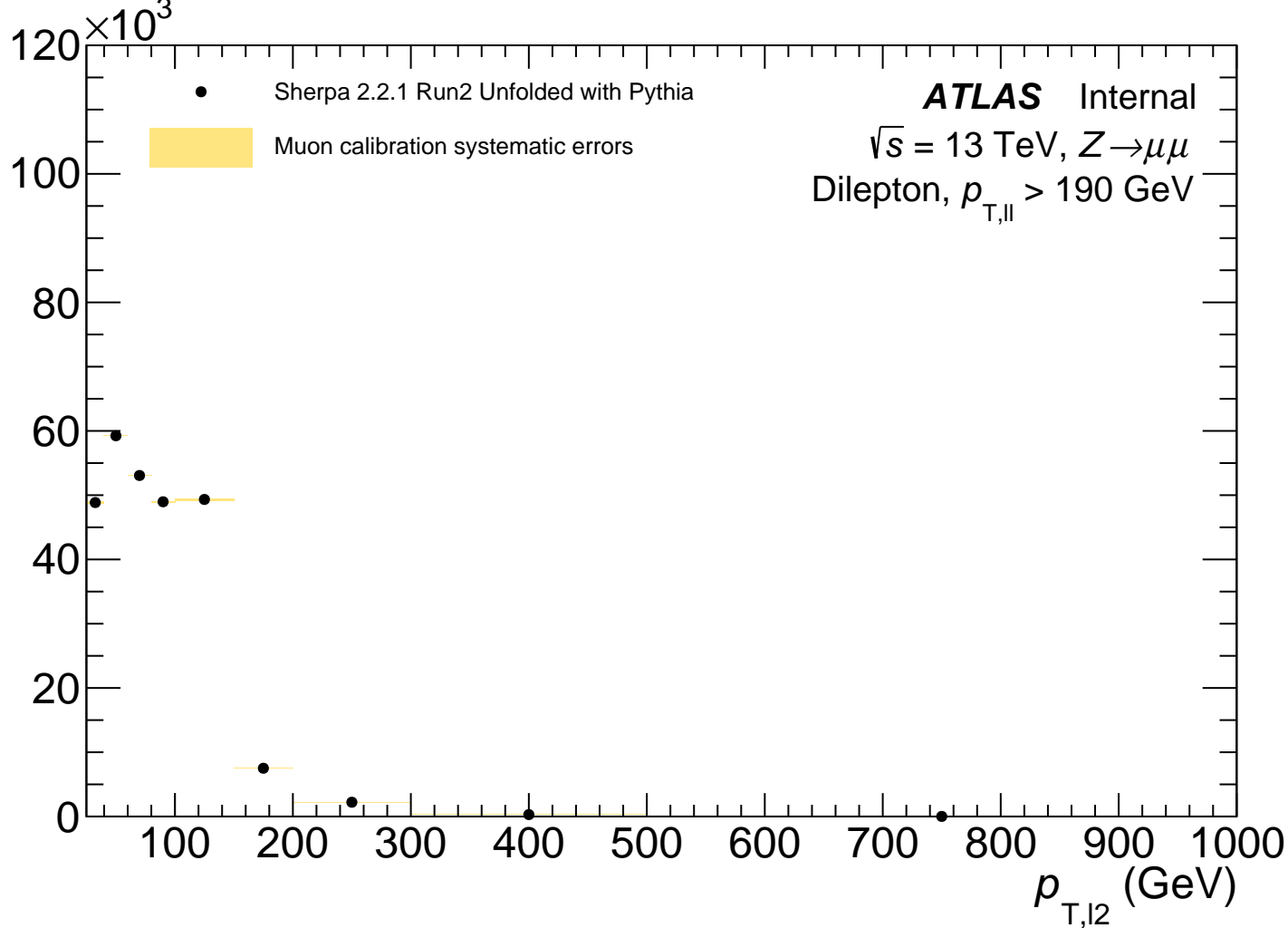
Events



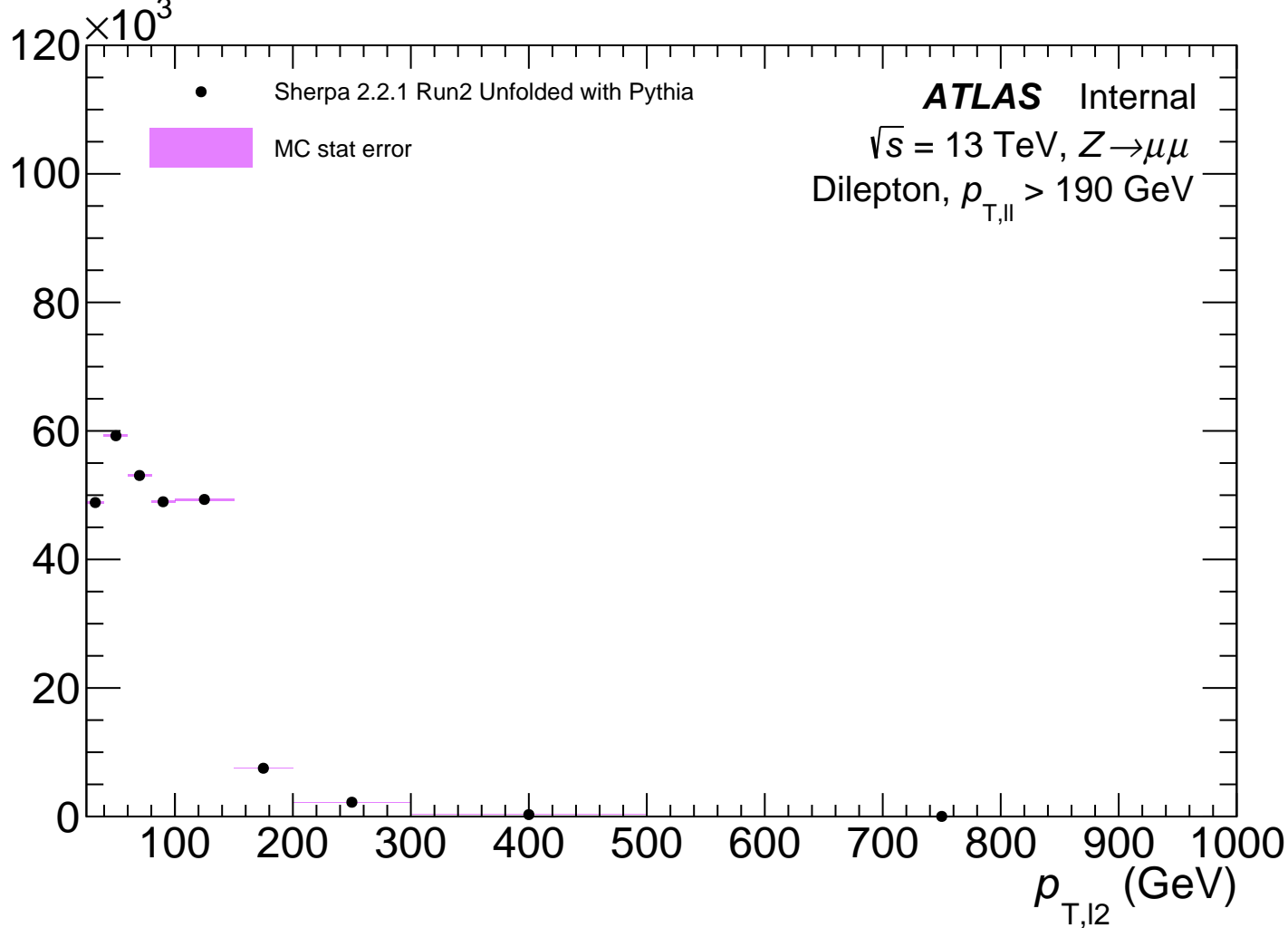
Events



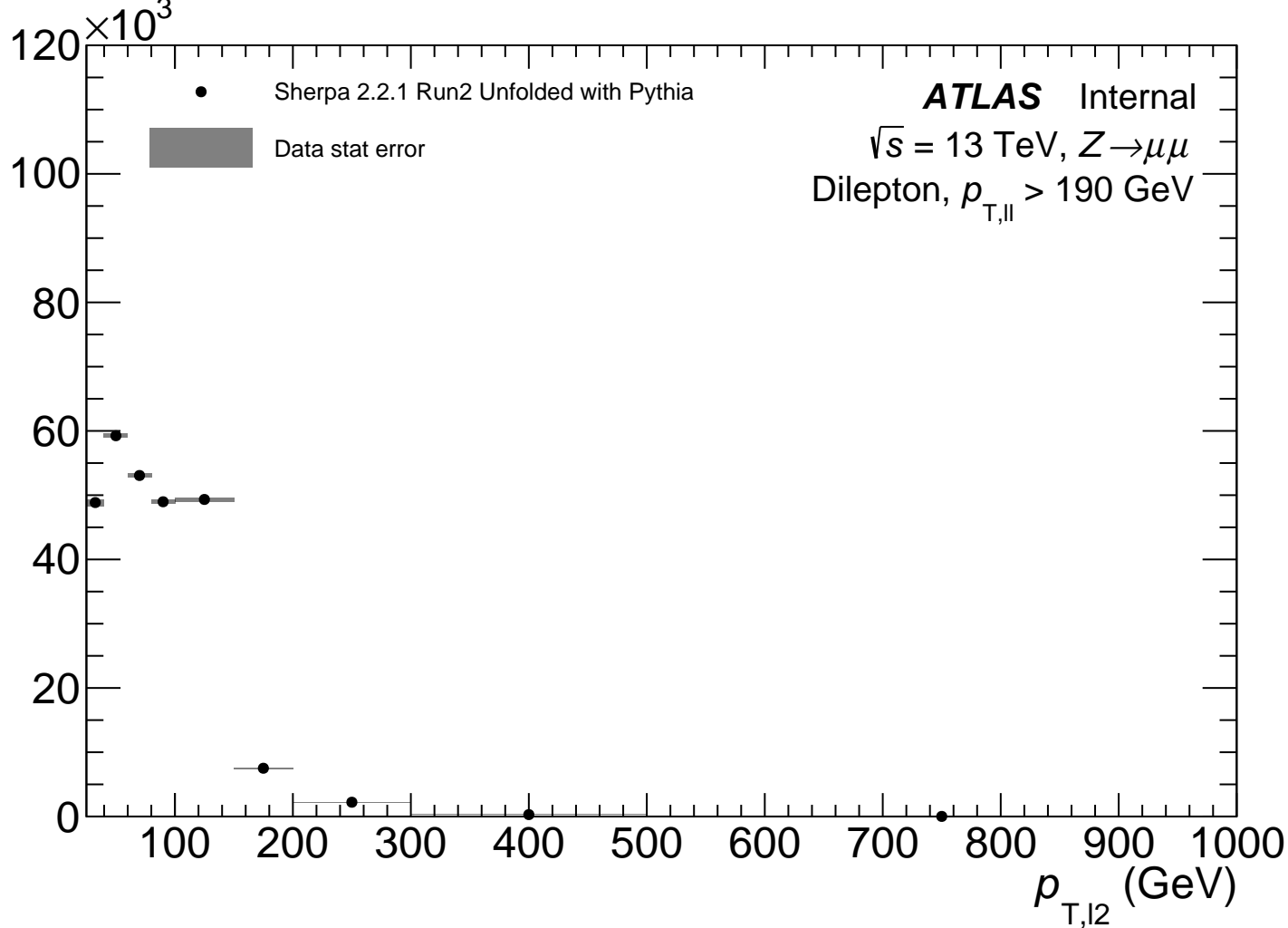
Events

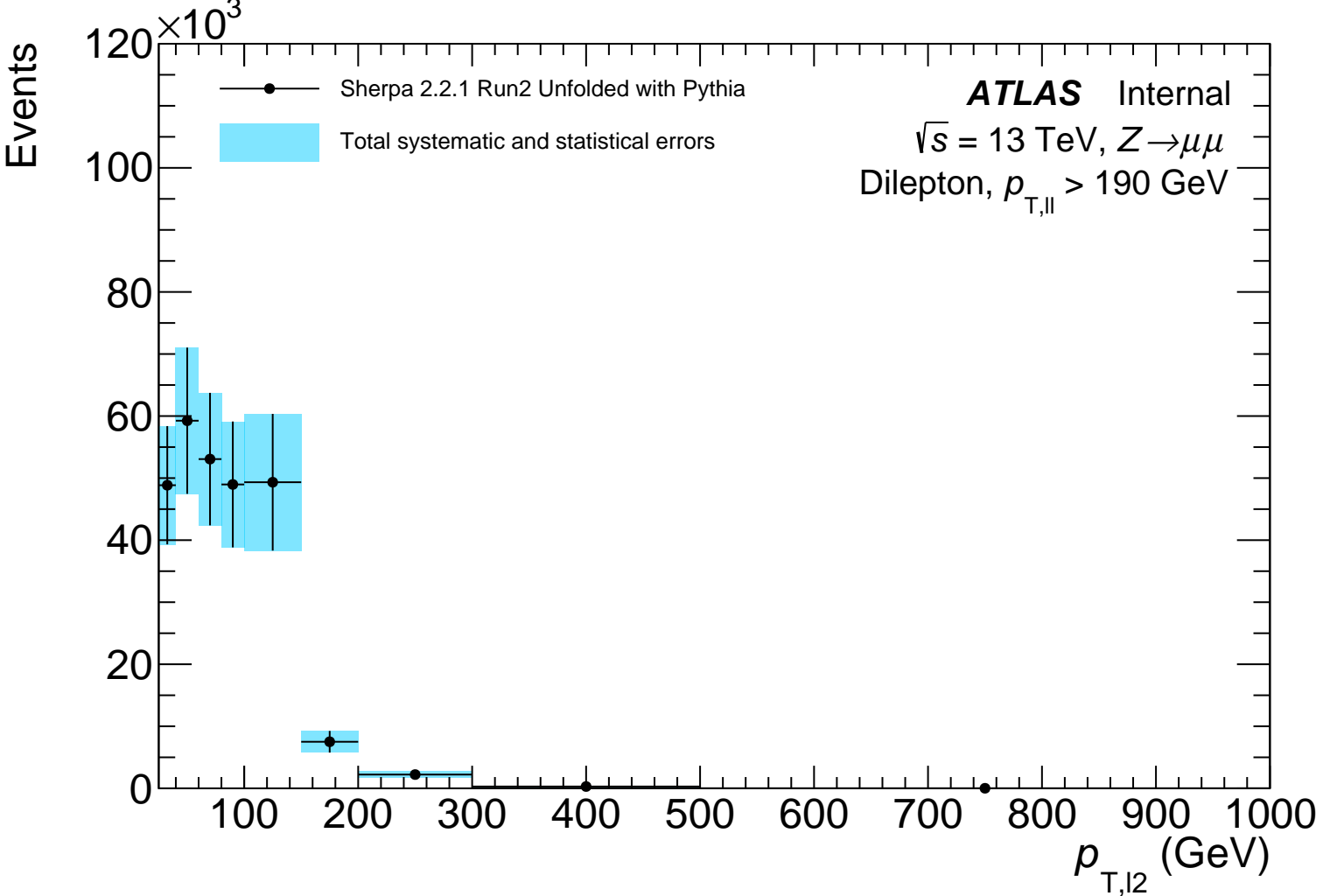


Events

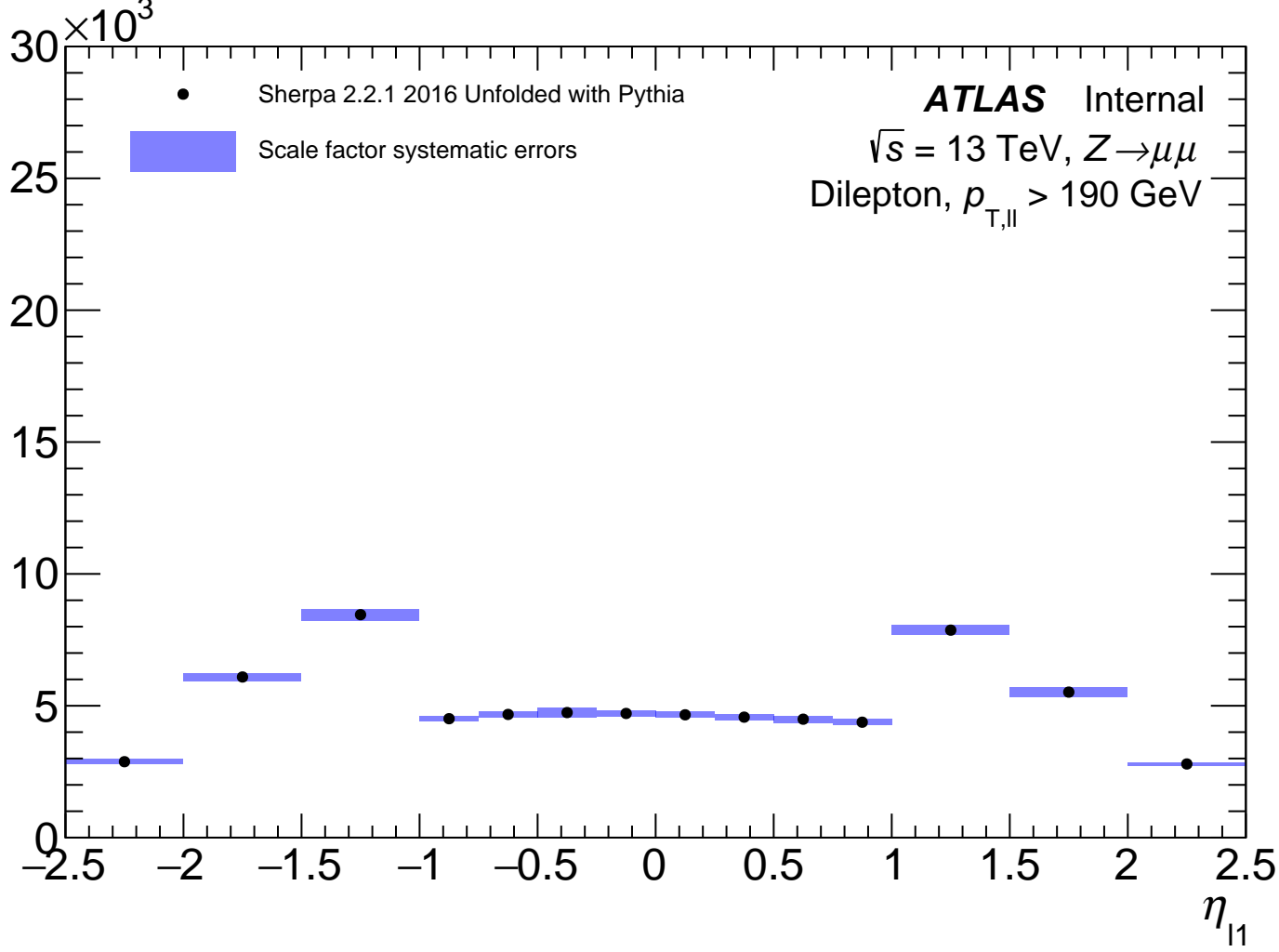


Events

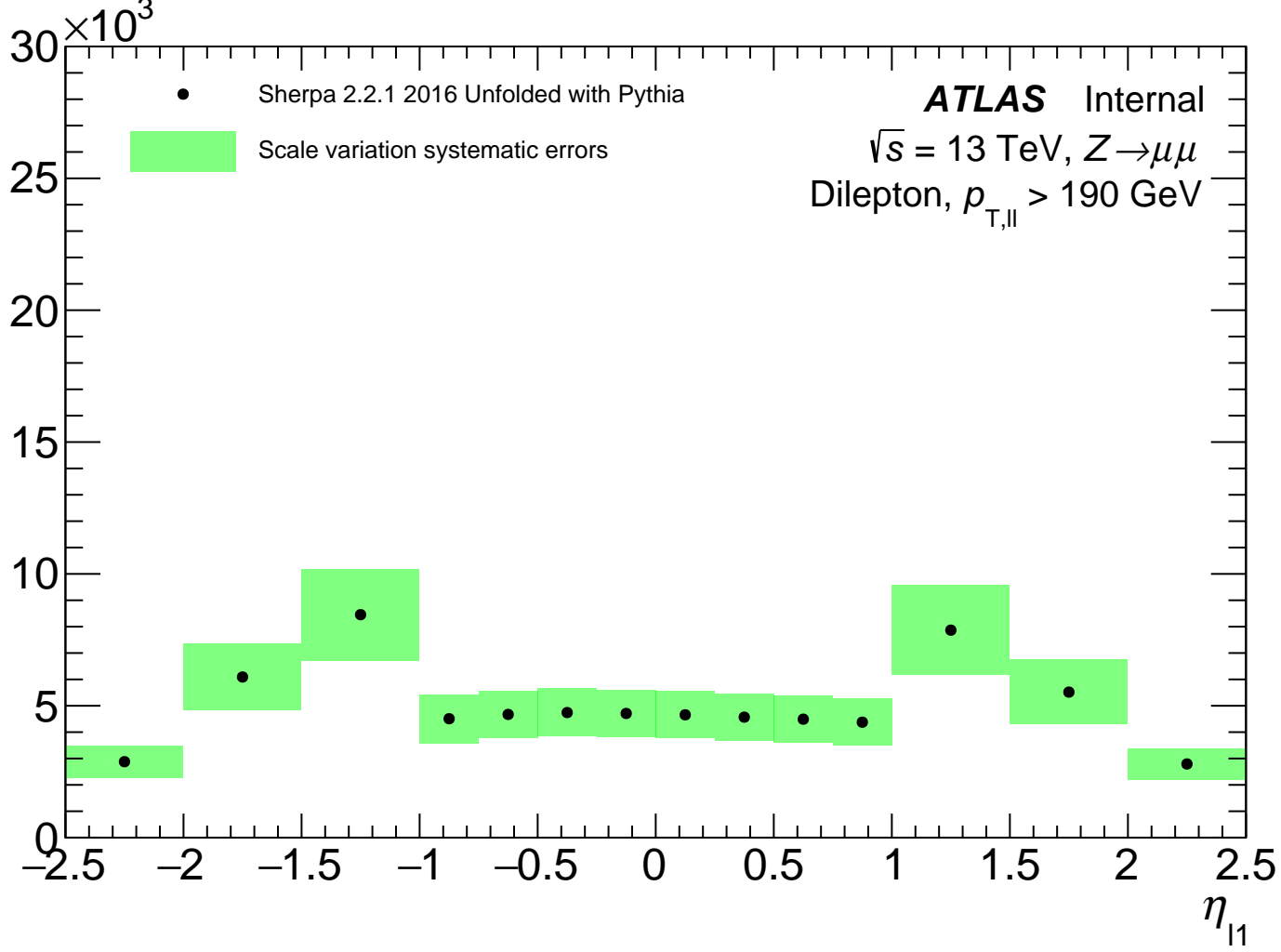




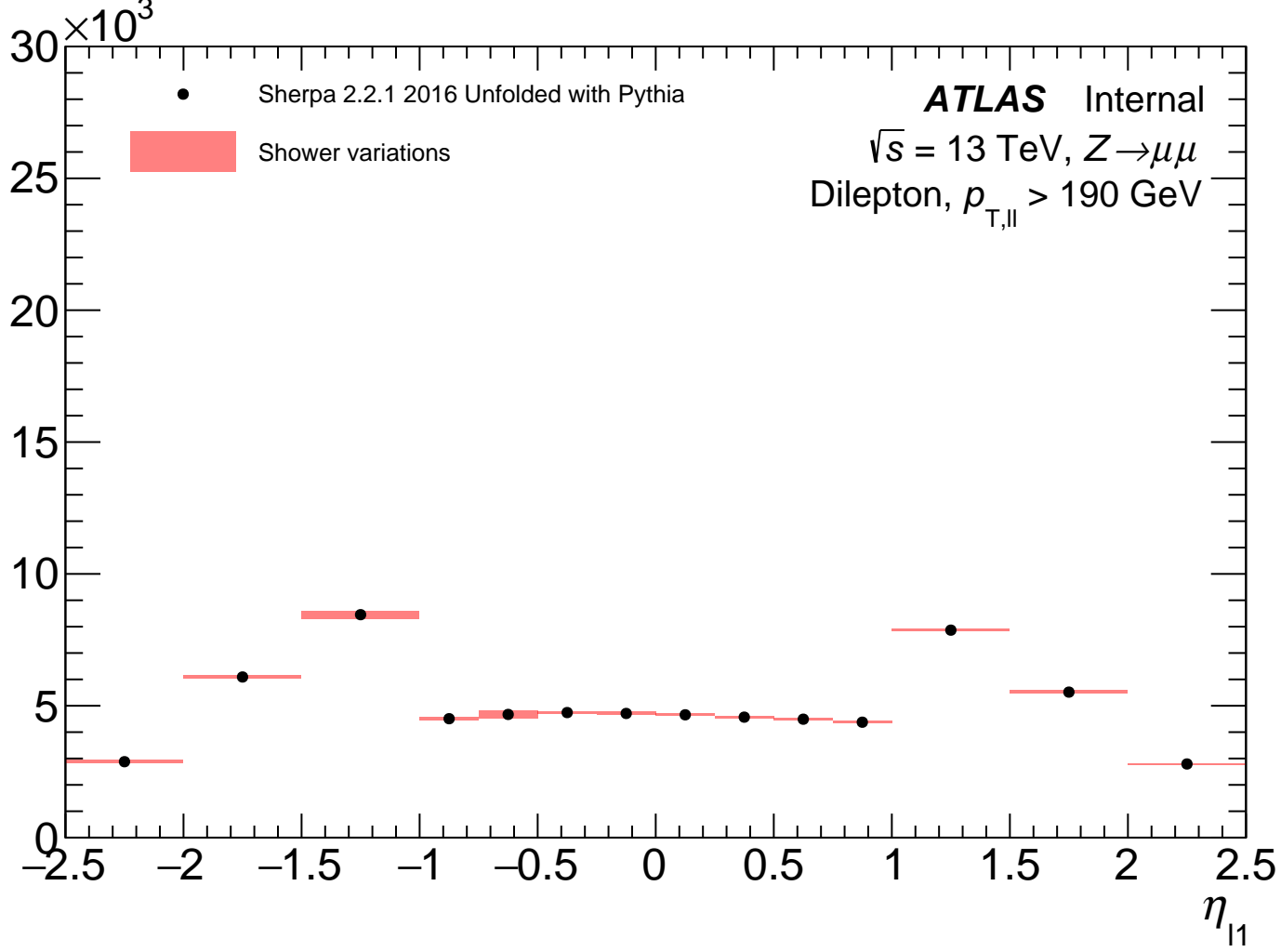
Events



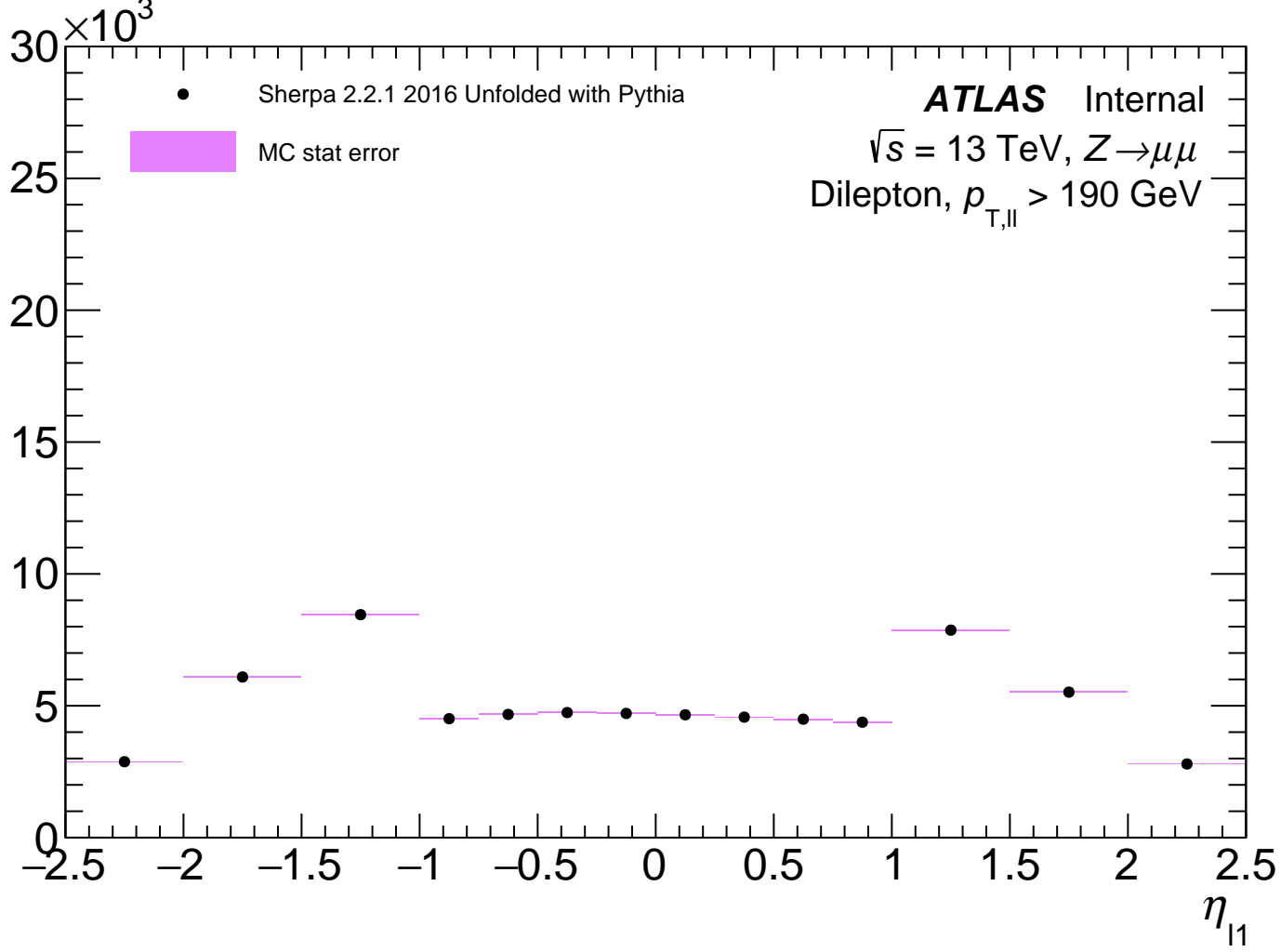
Events



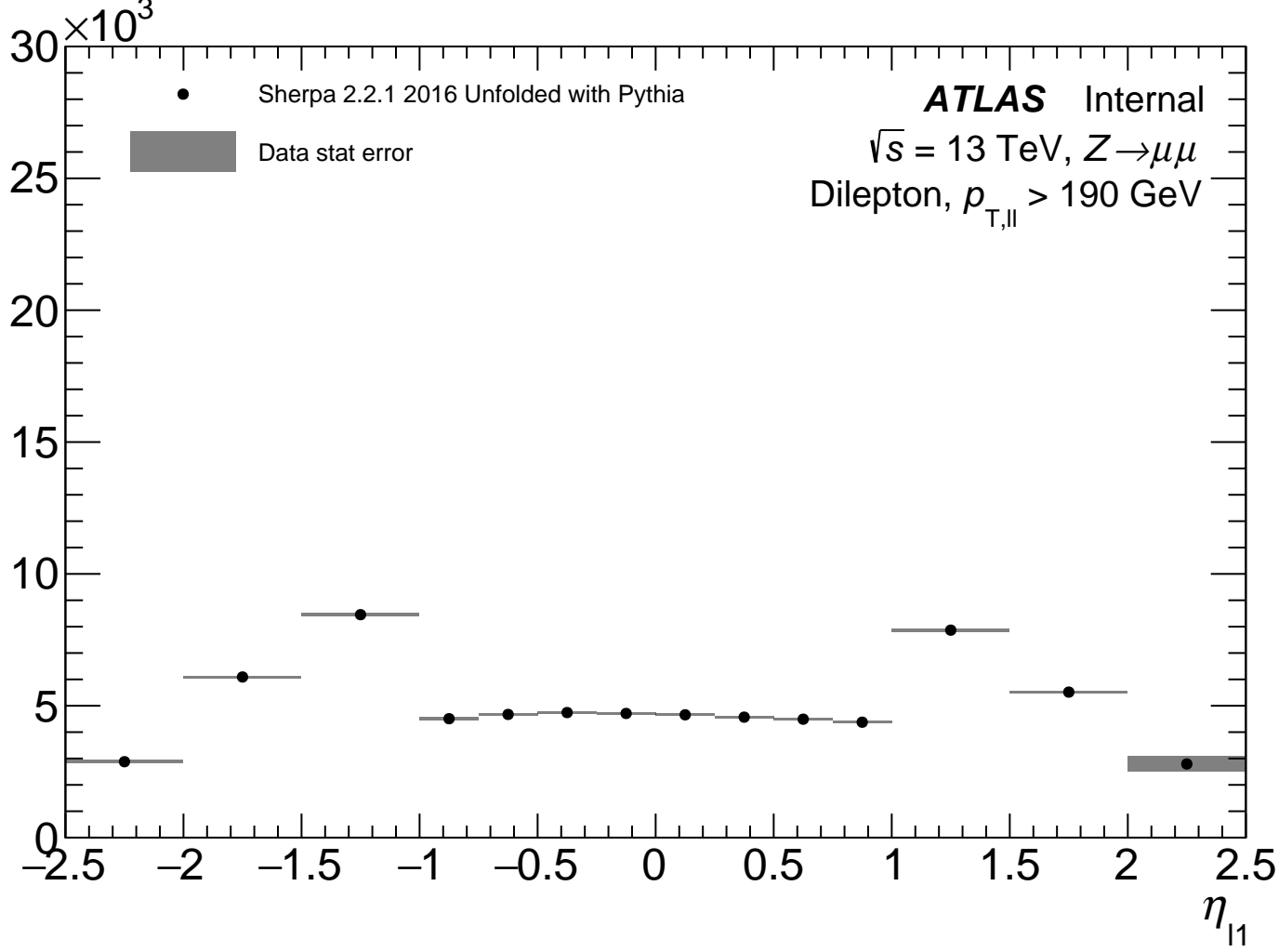
Events



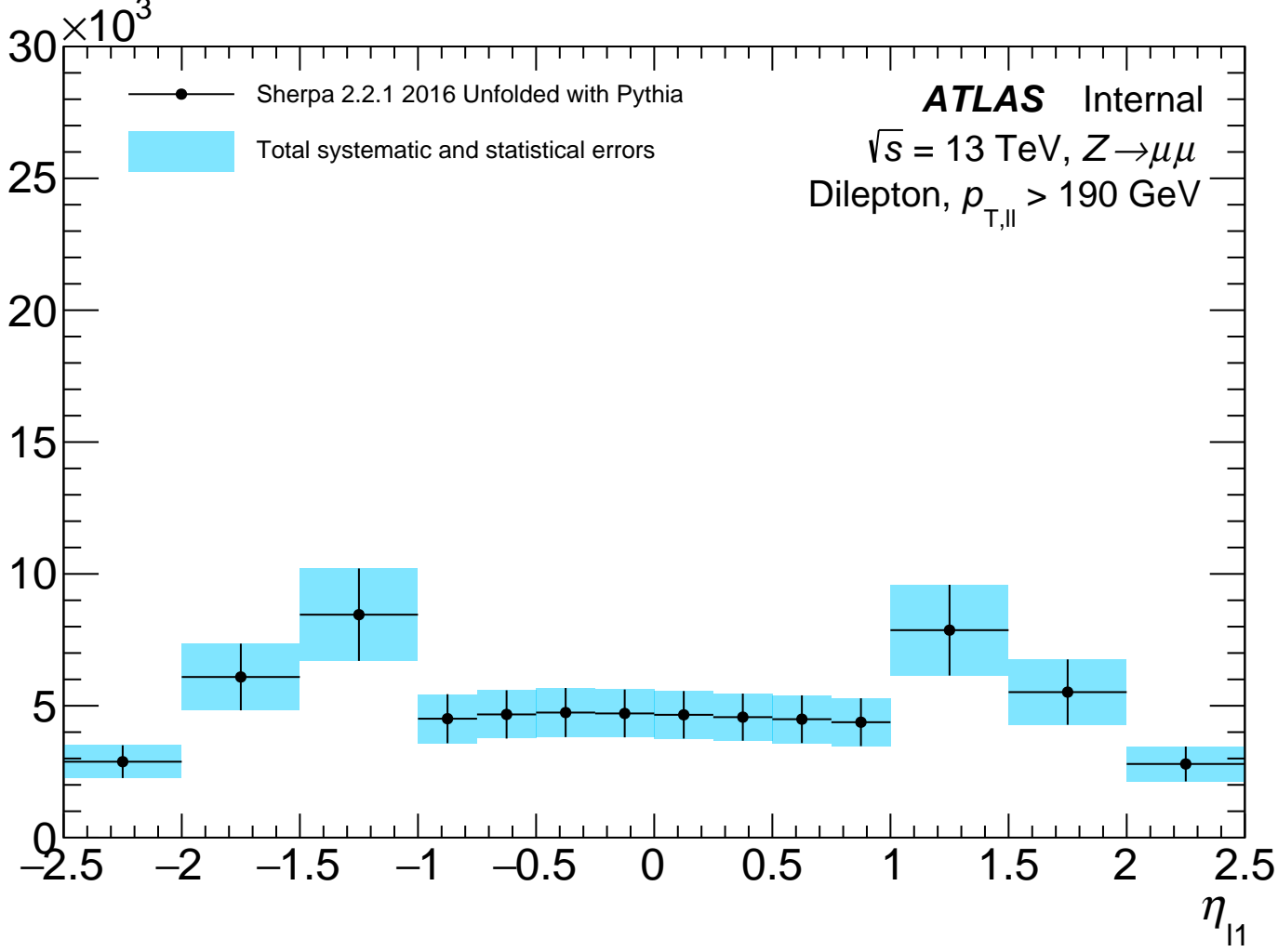
Events



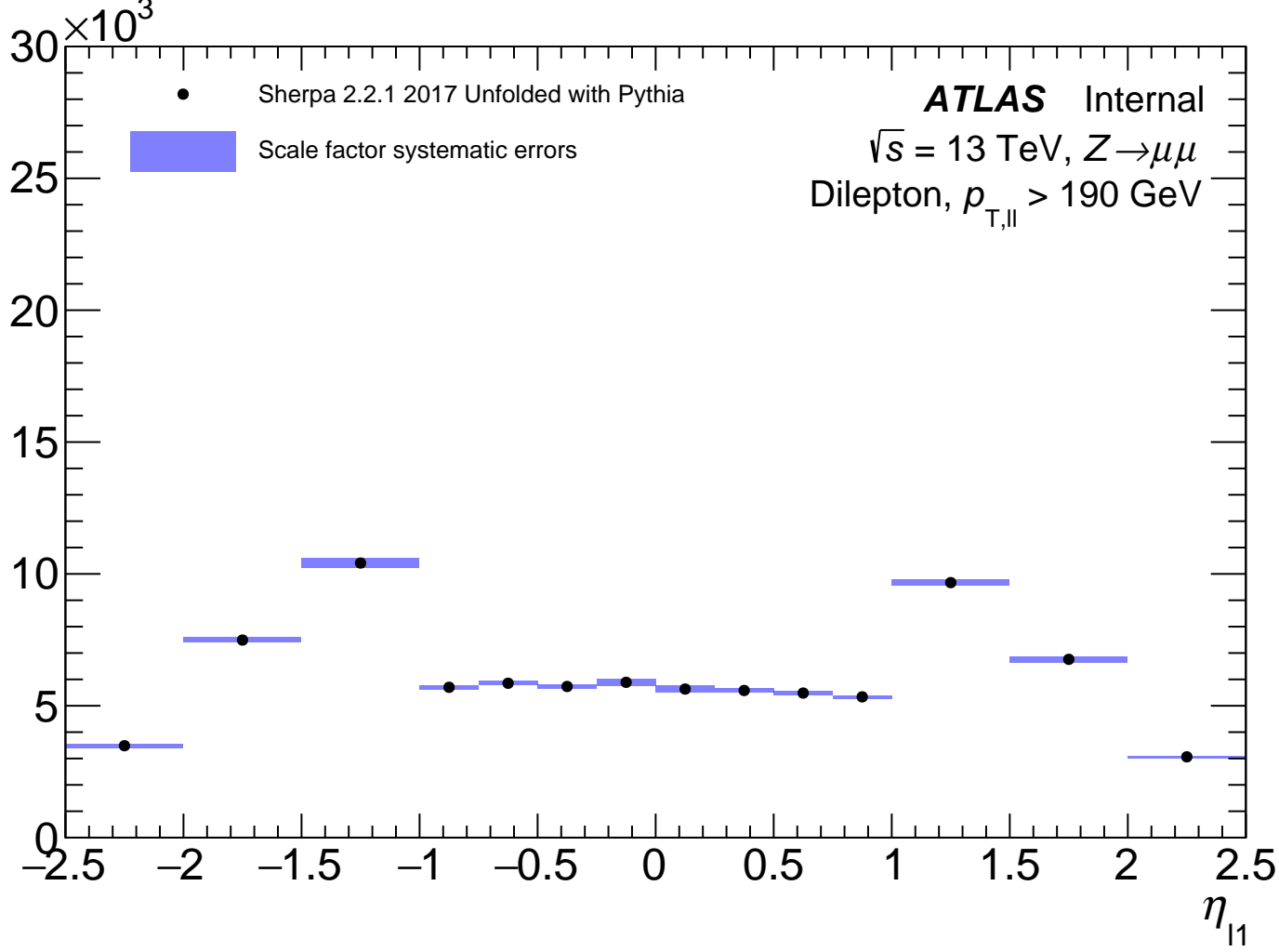
Events



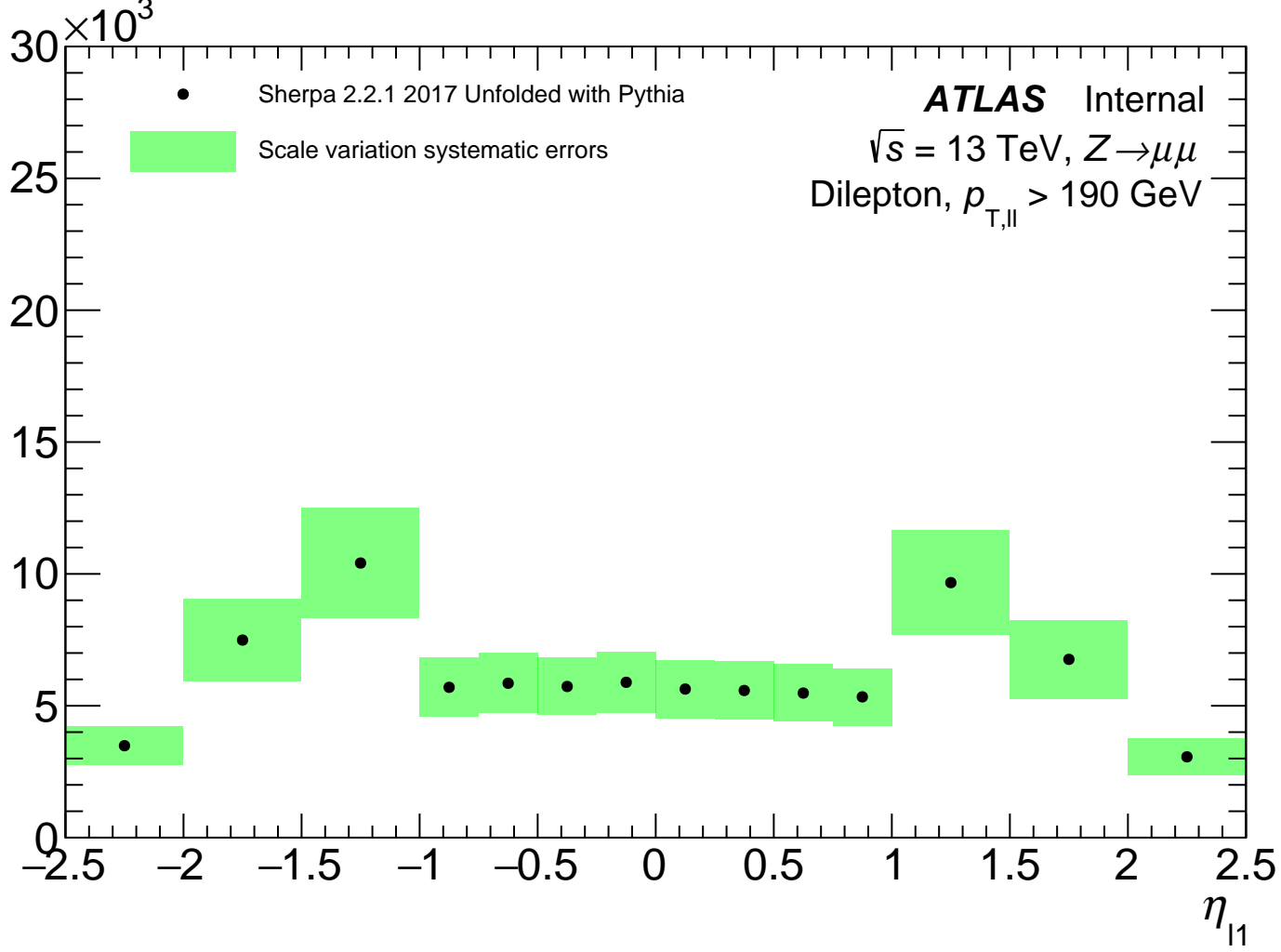
Events



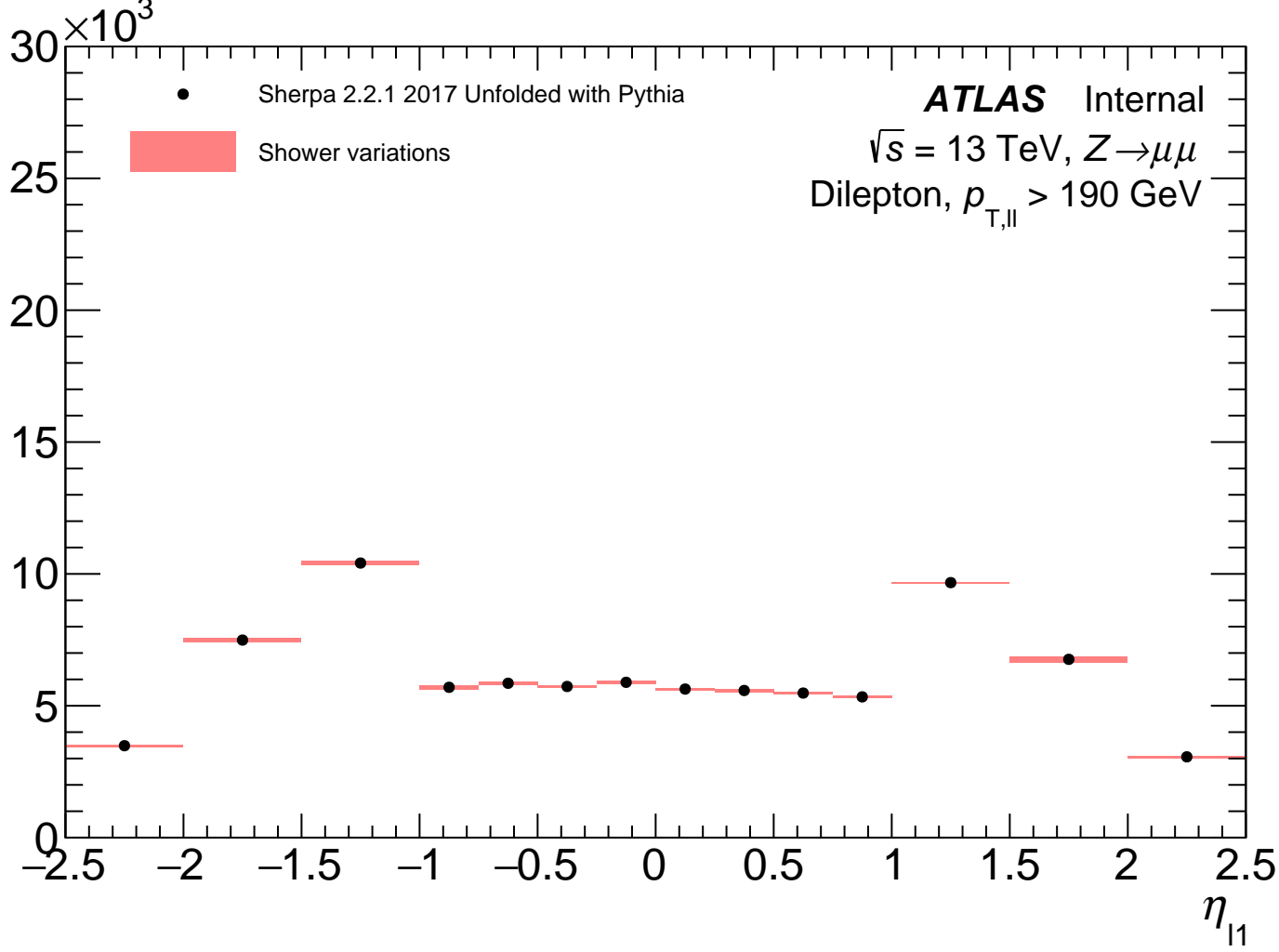
Events



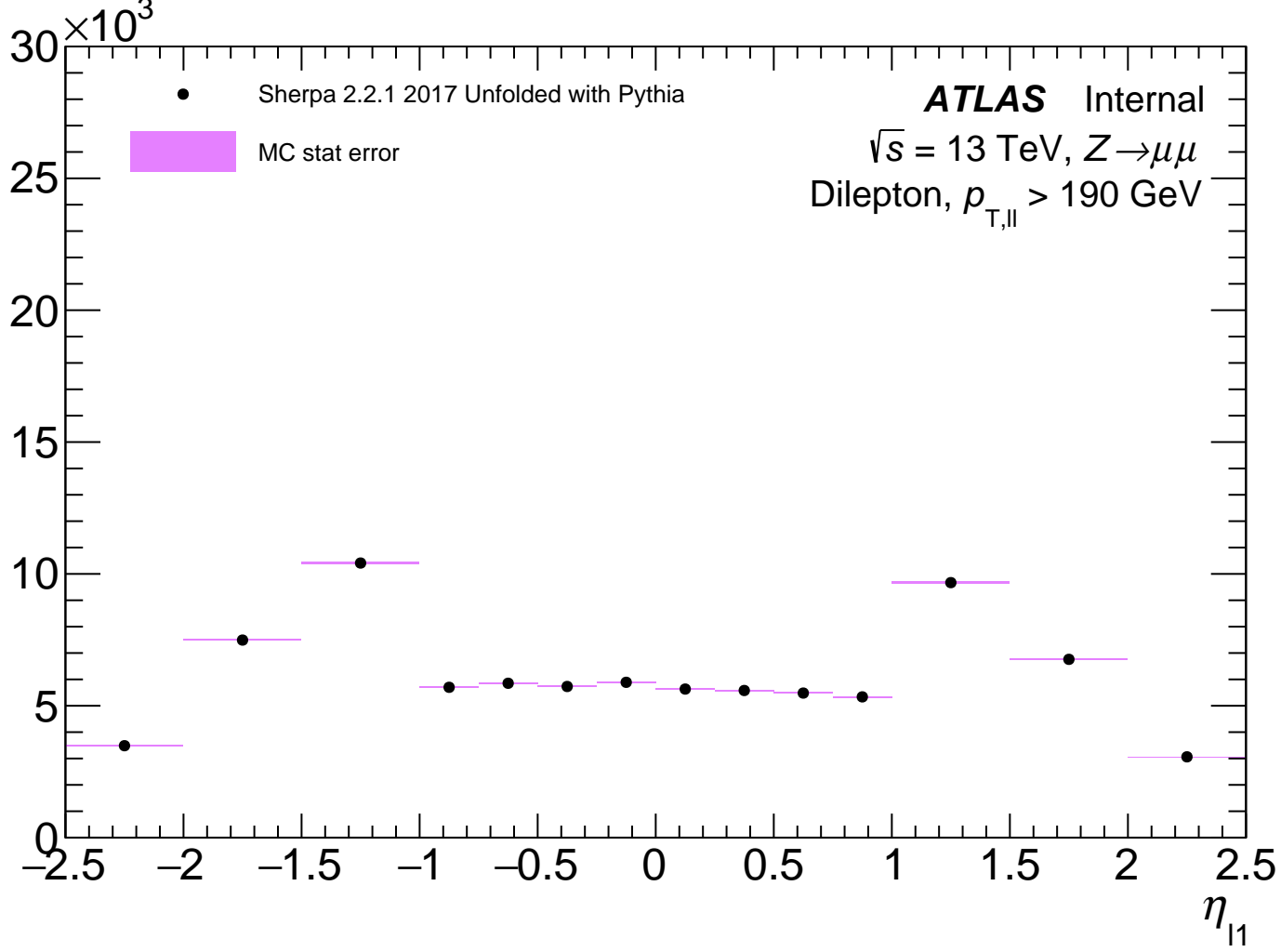
Events



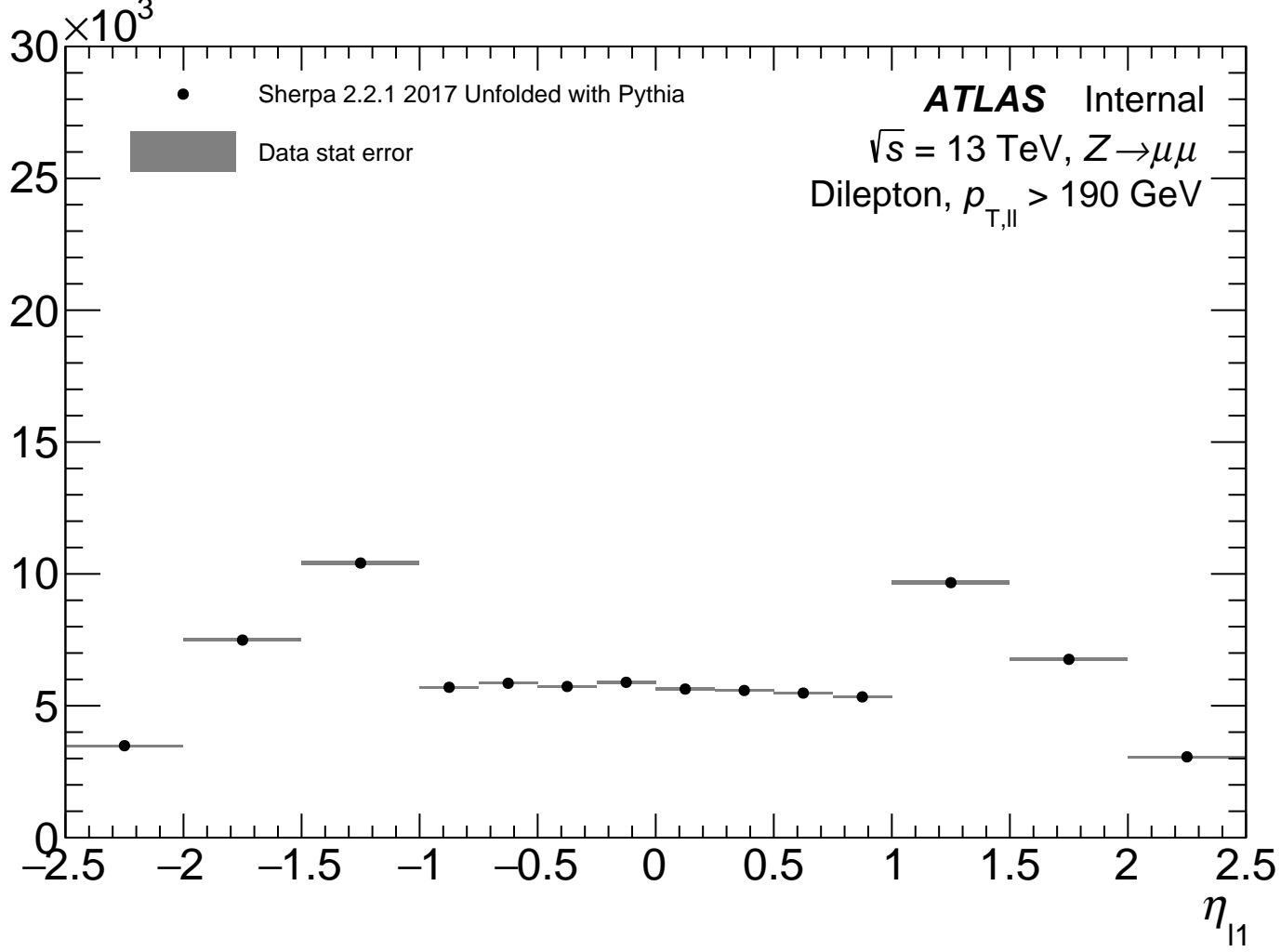
Events



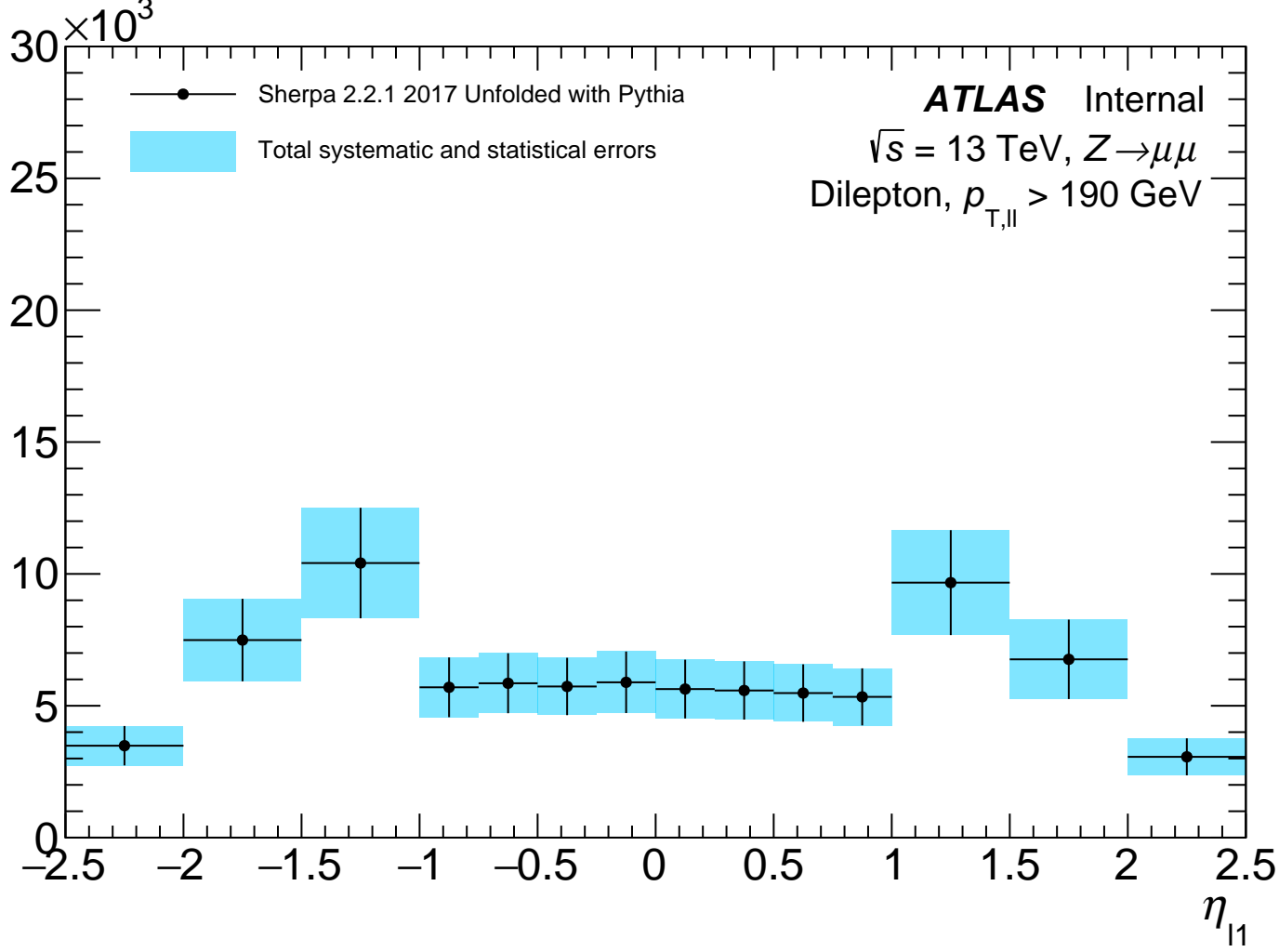
Events



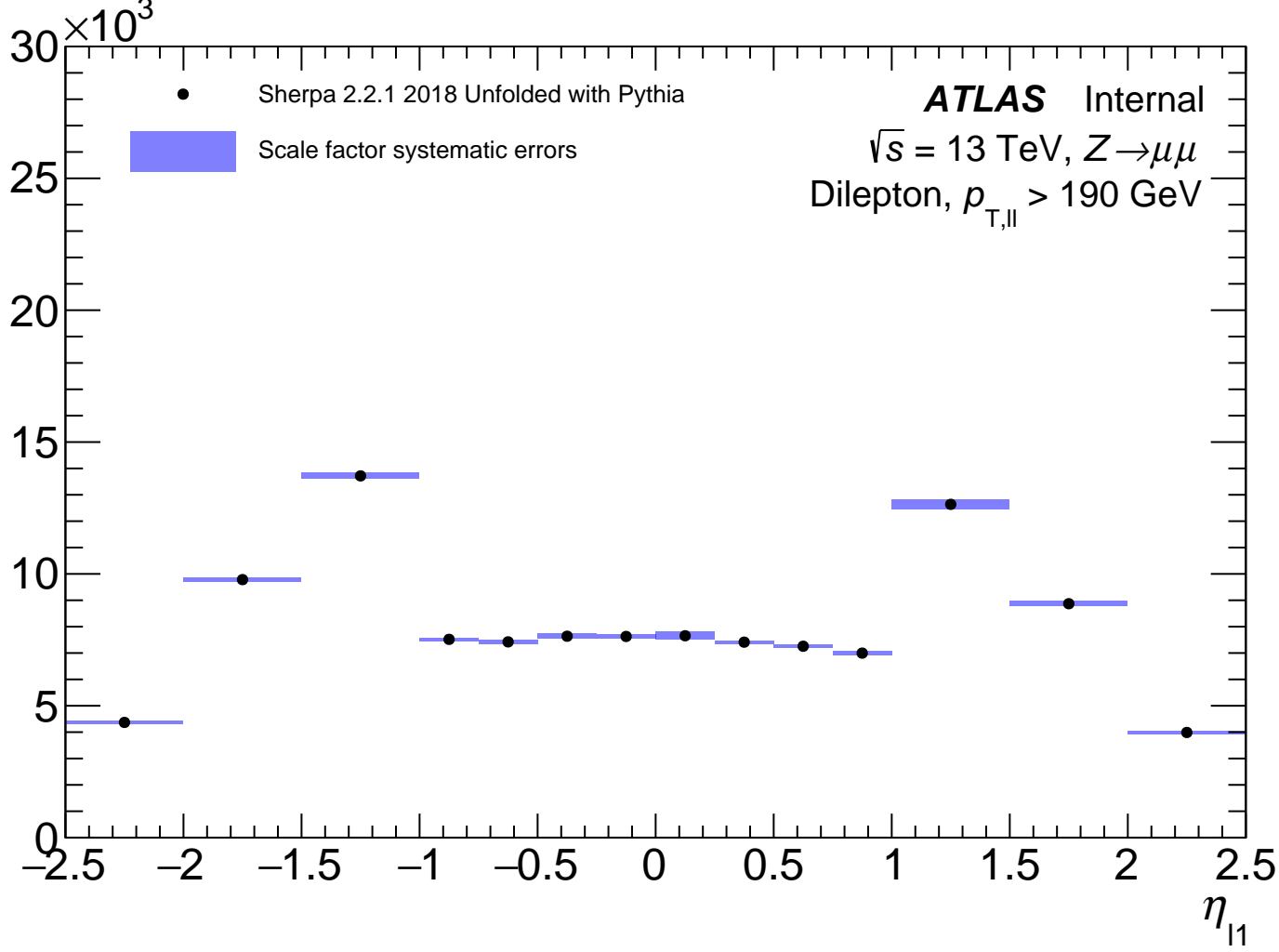
Events



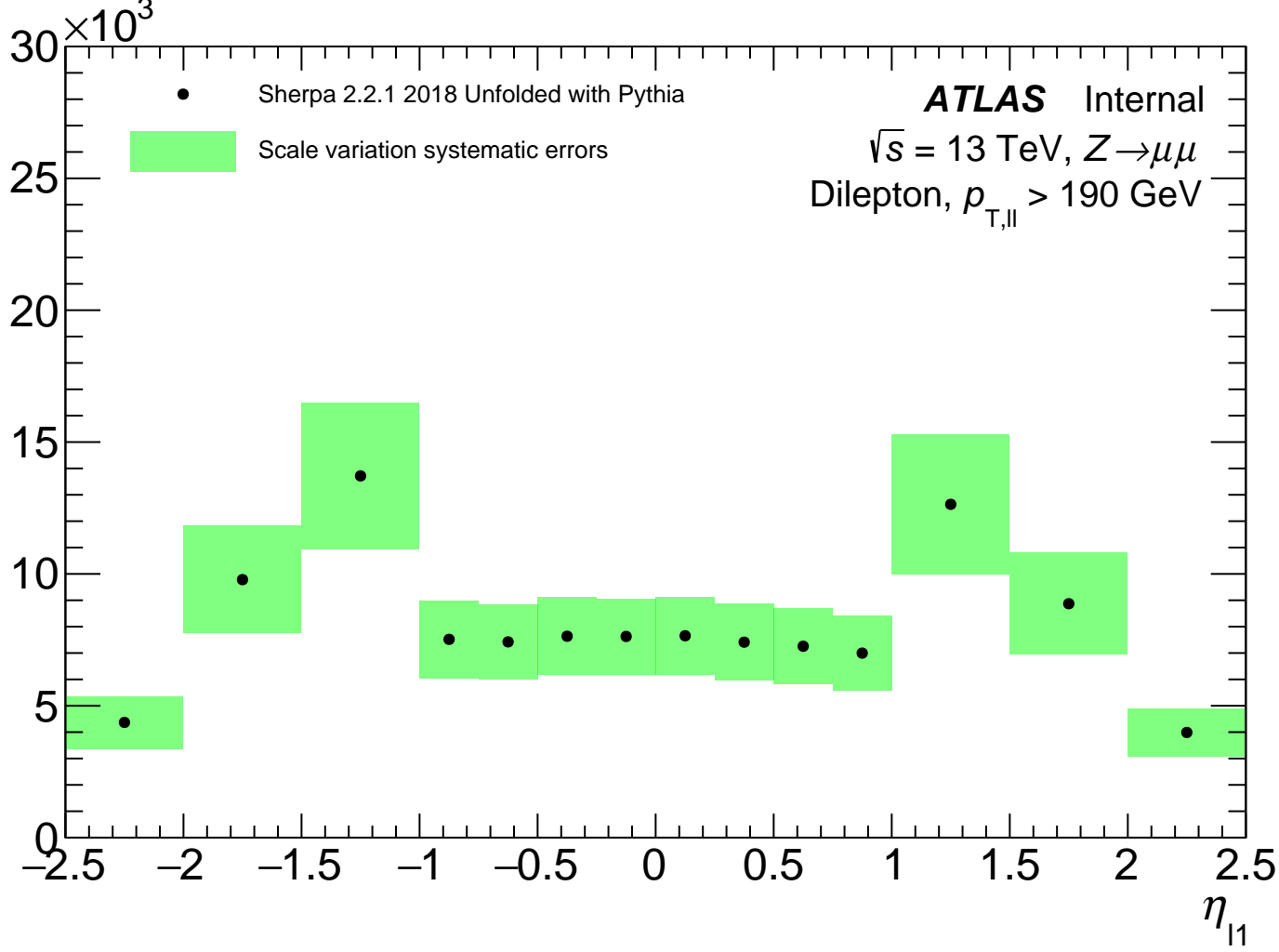
Events



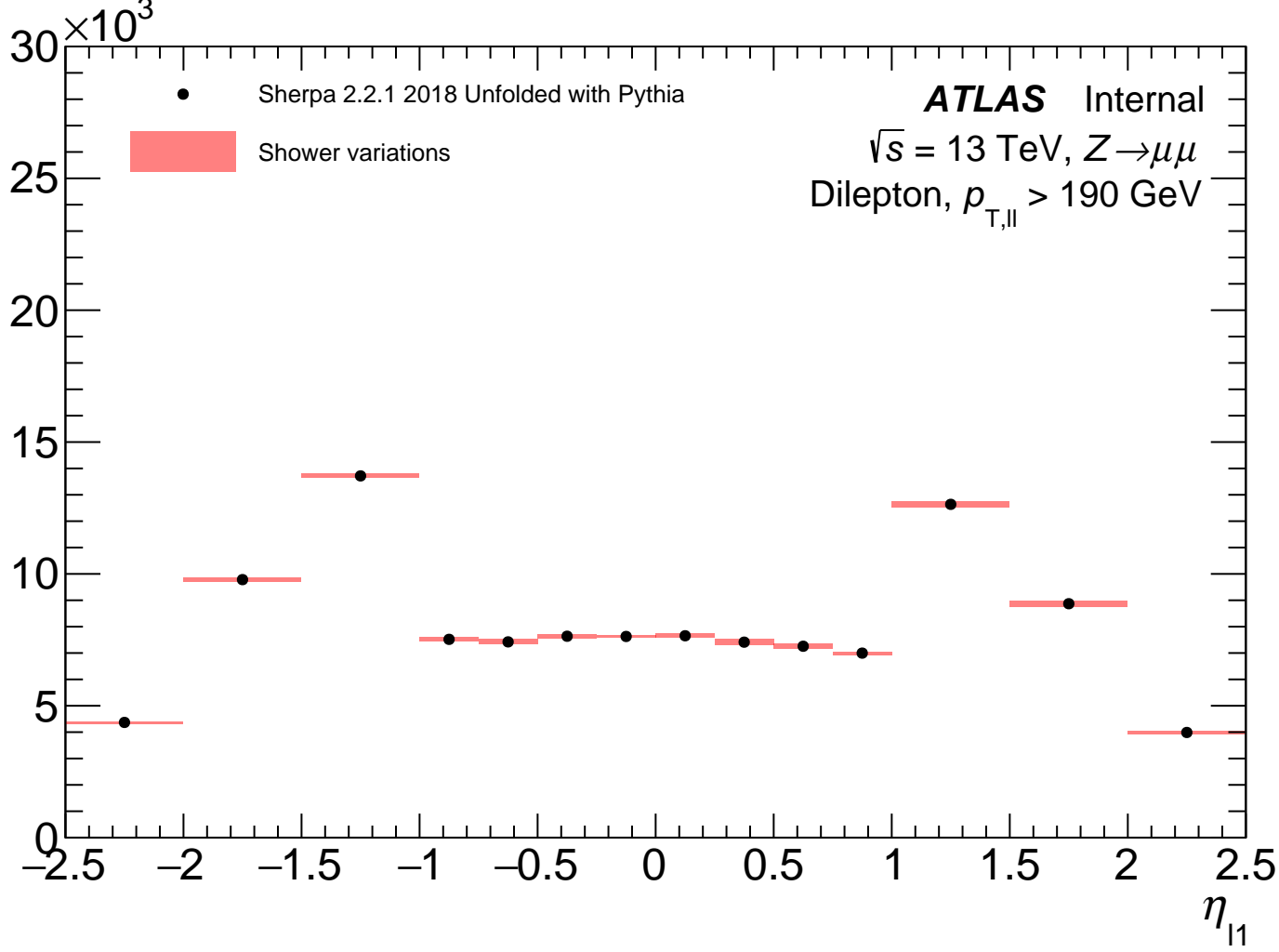
Events



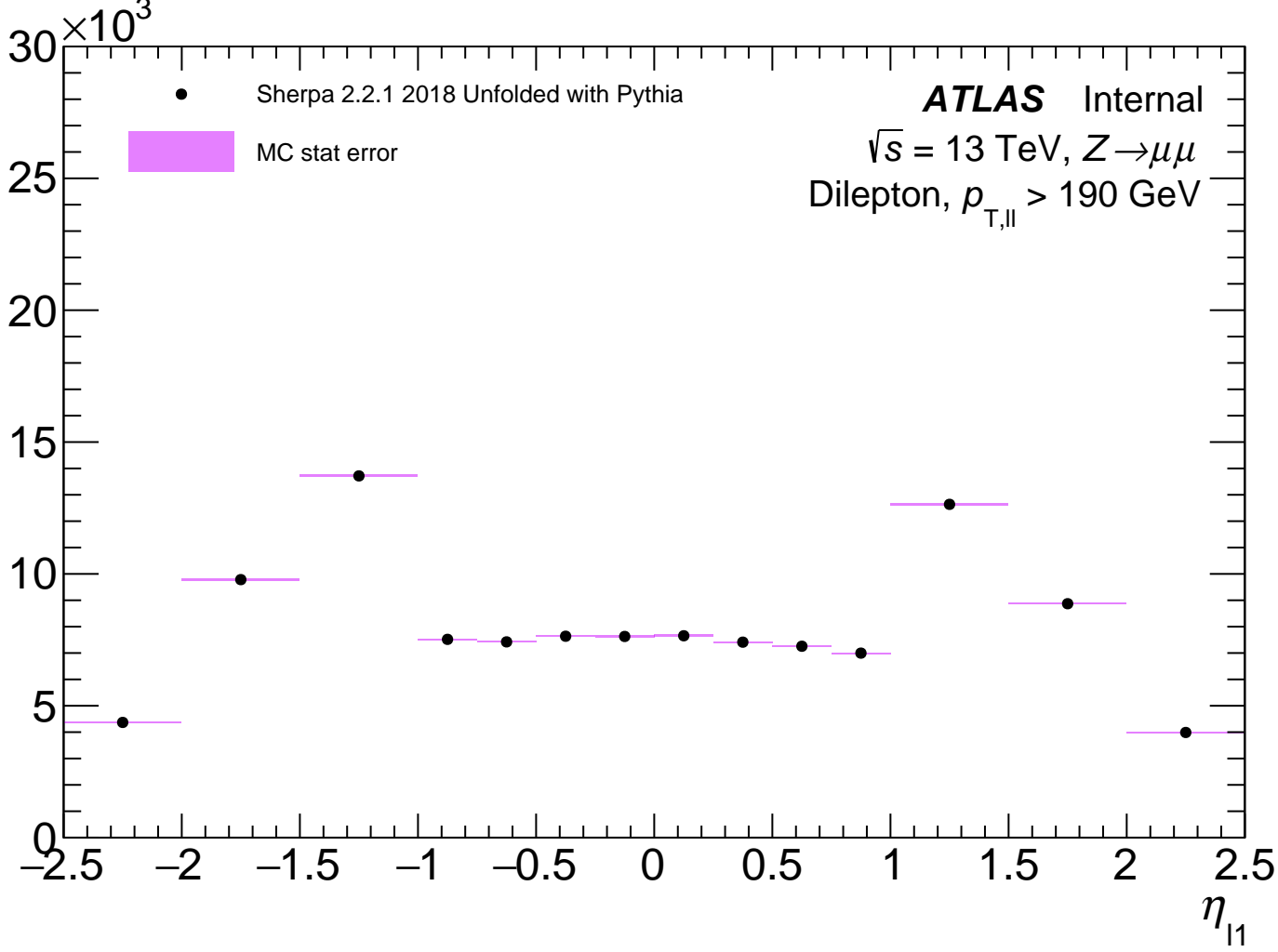
Events



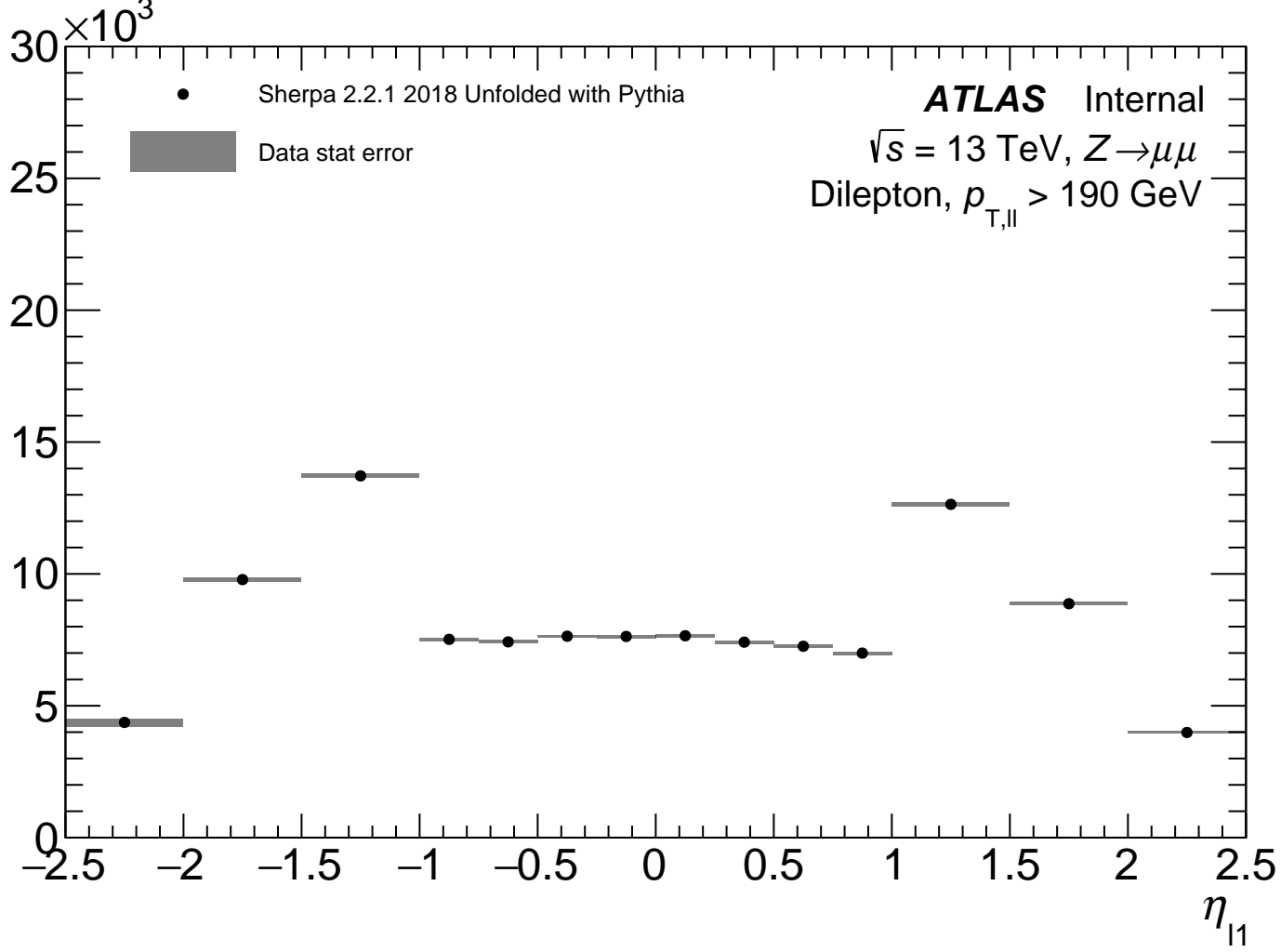
Events



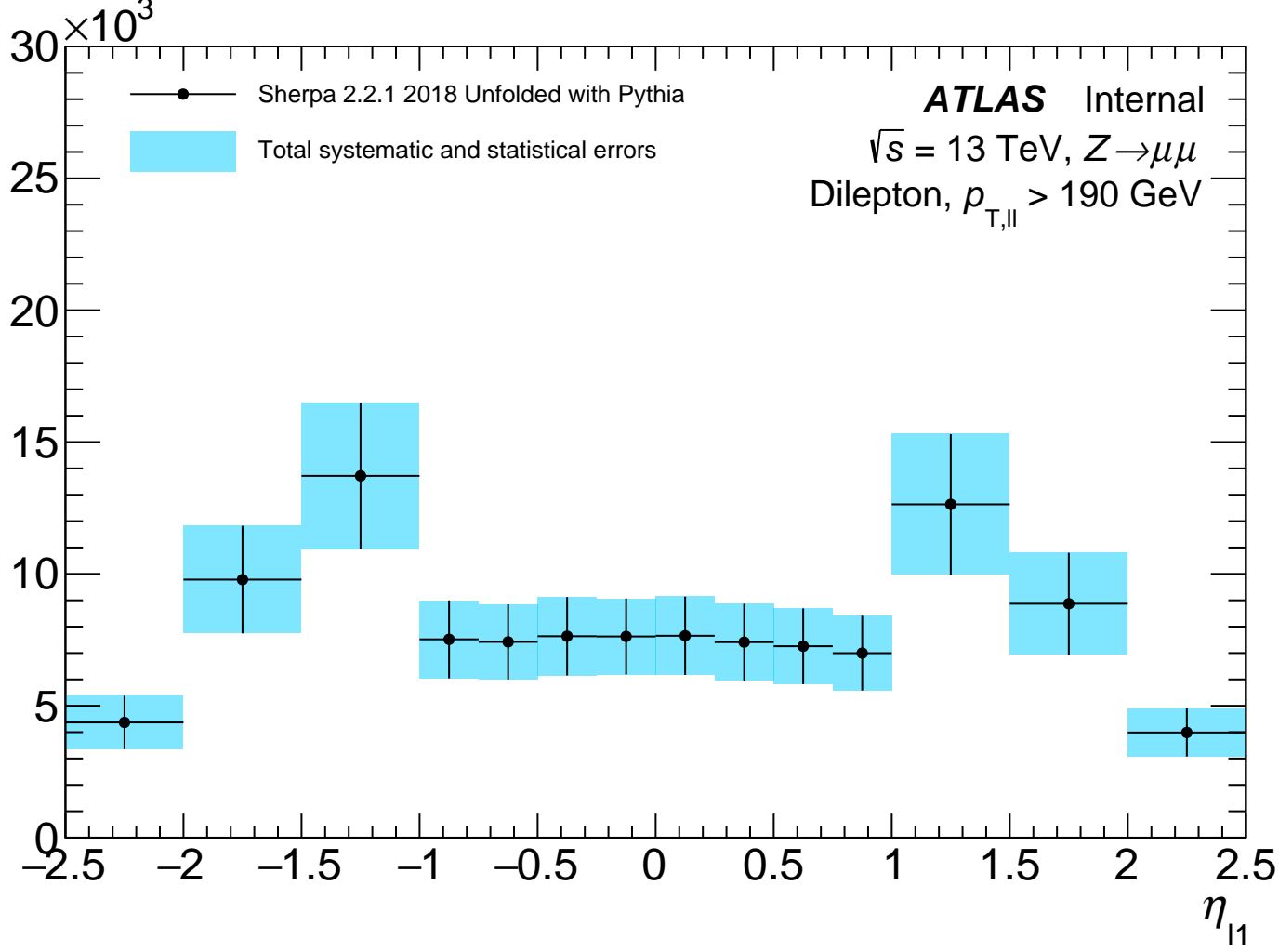
Events



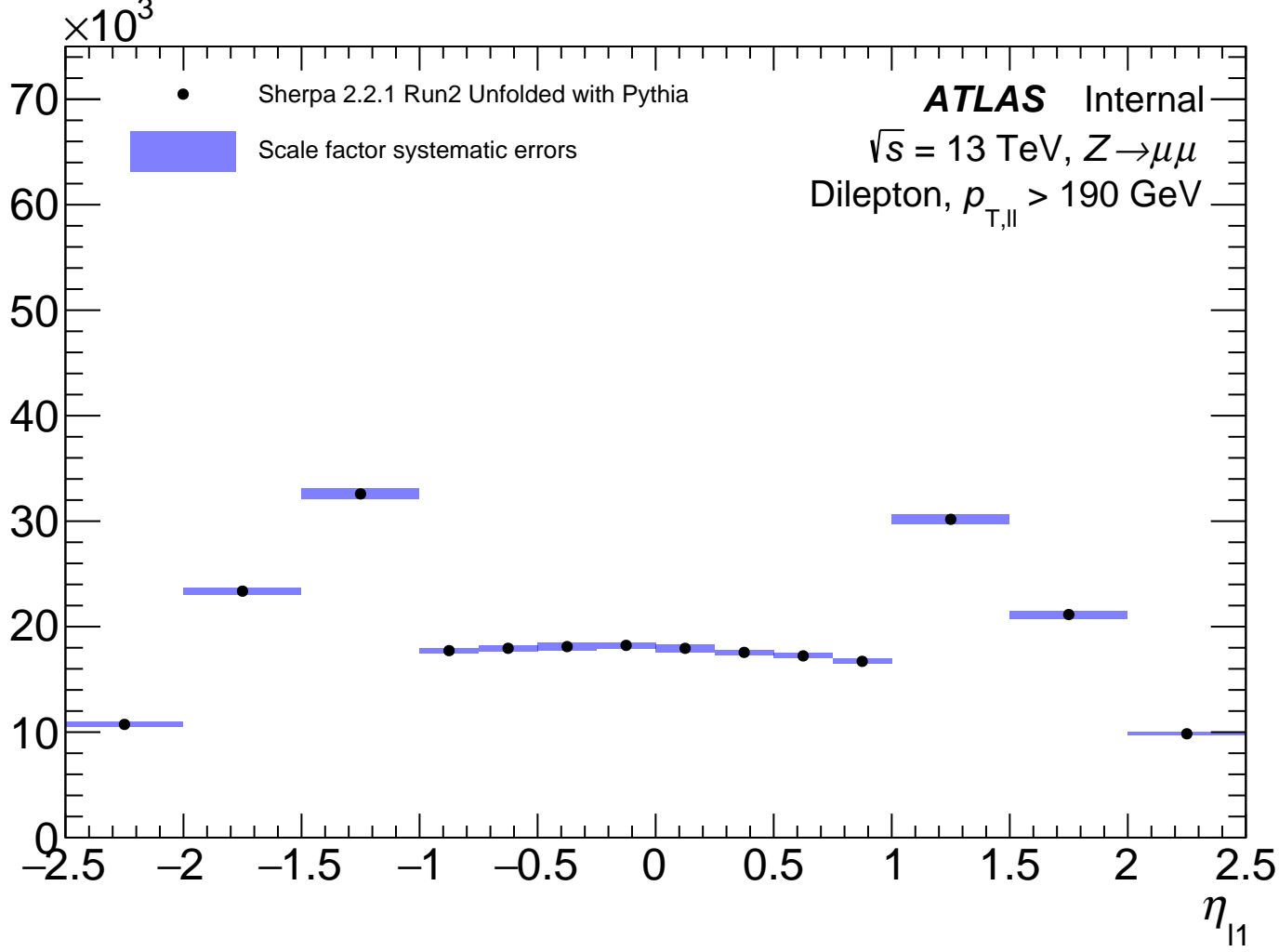
Events



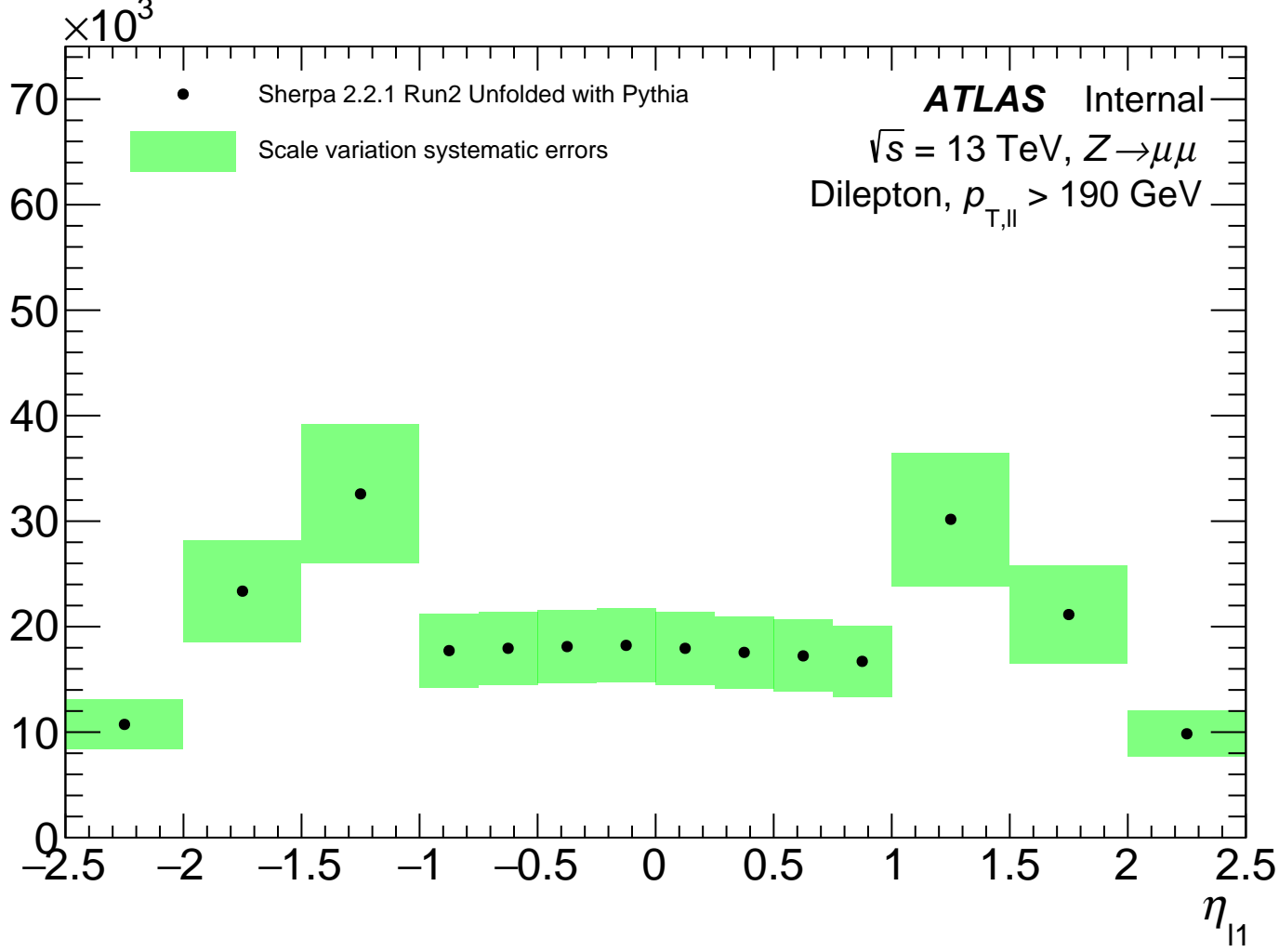
Events



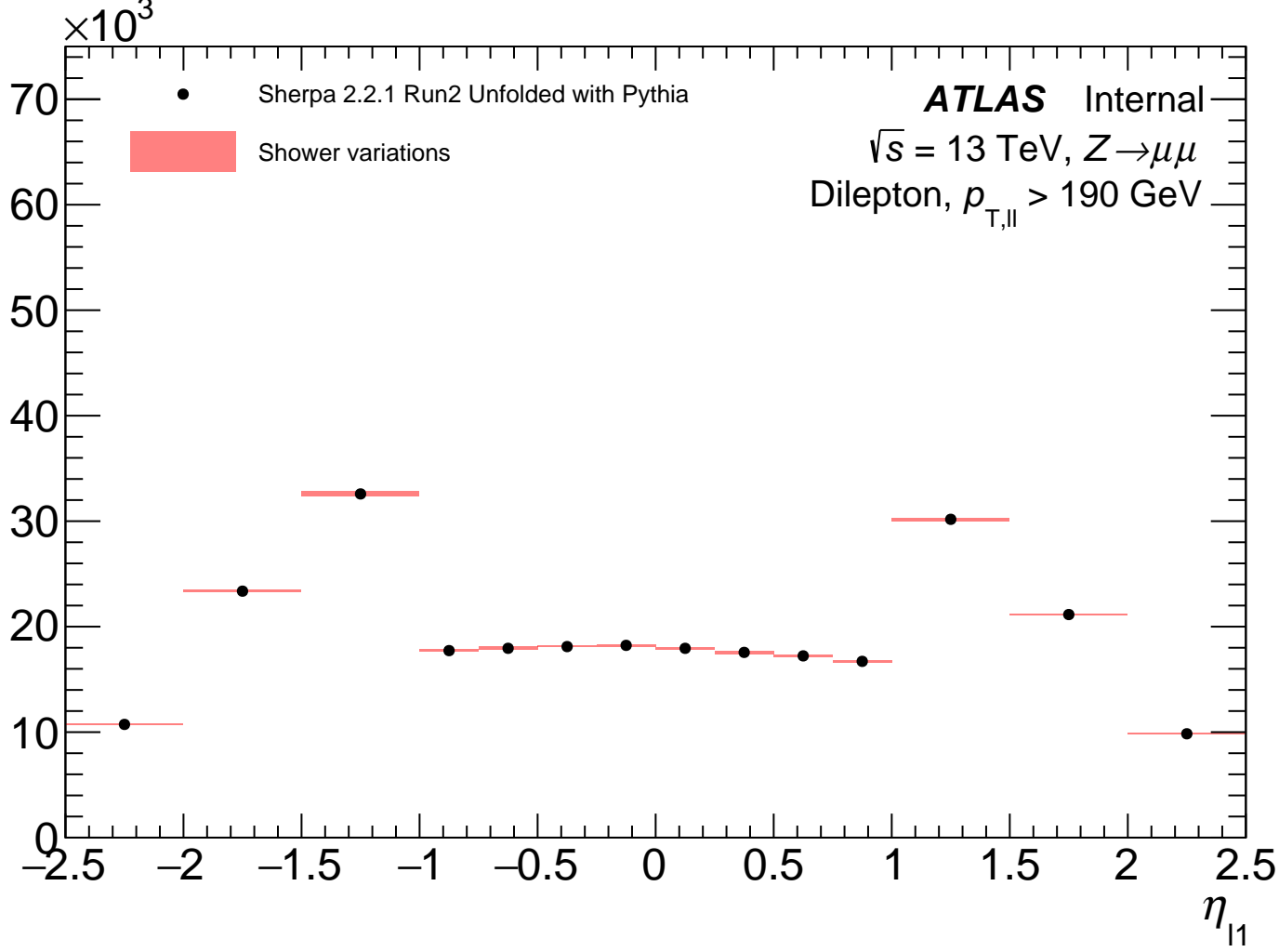
Events



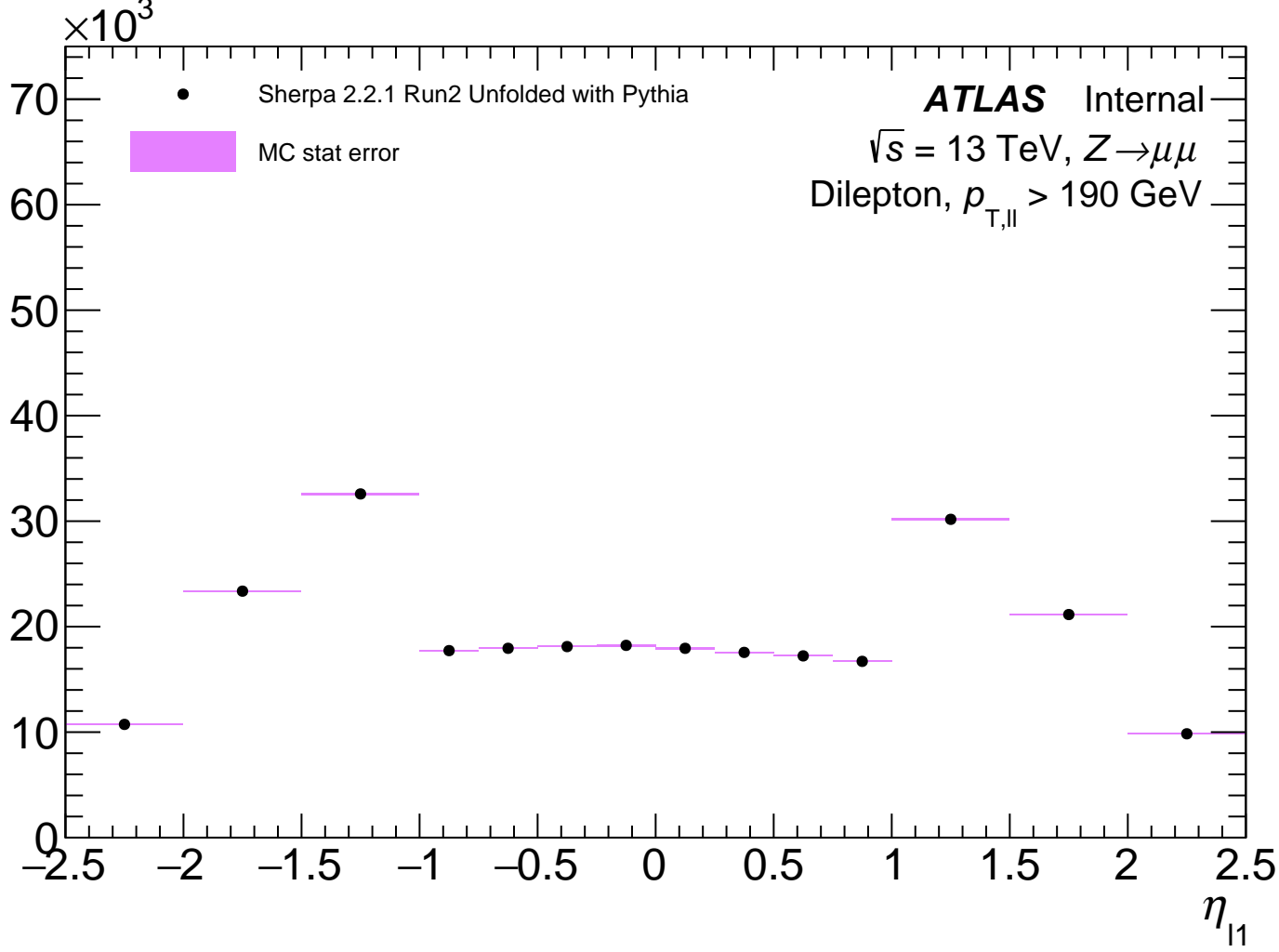
Events



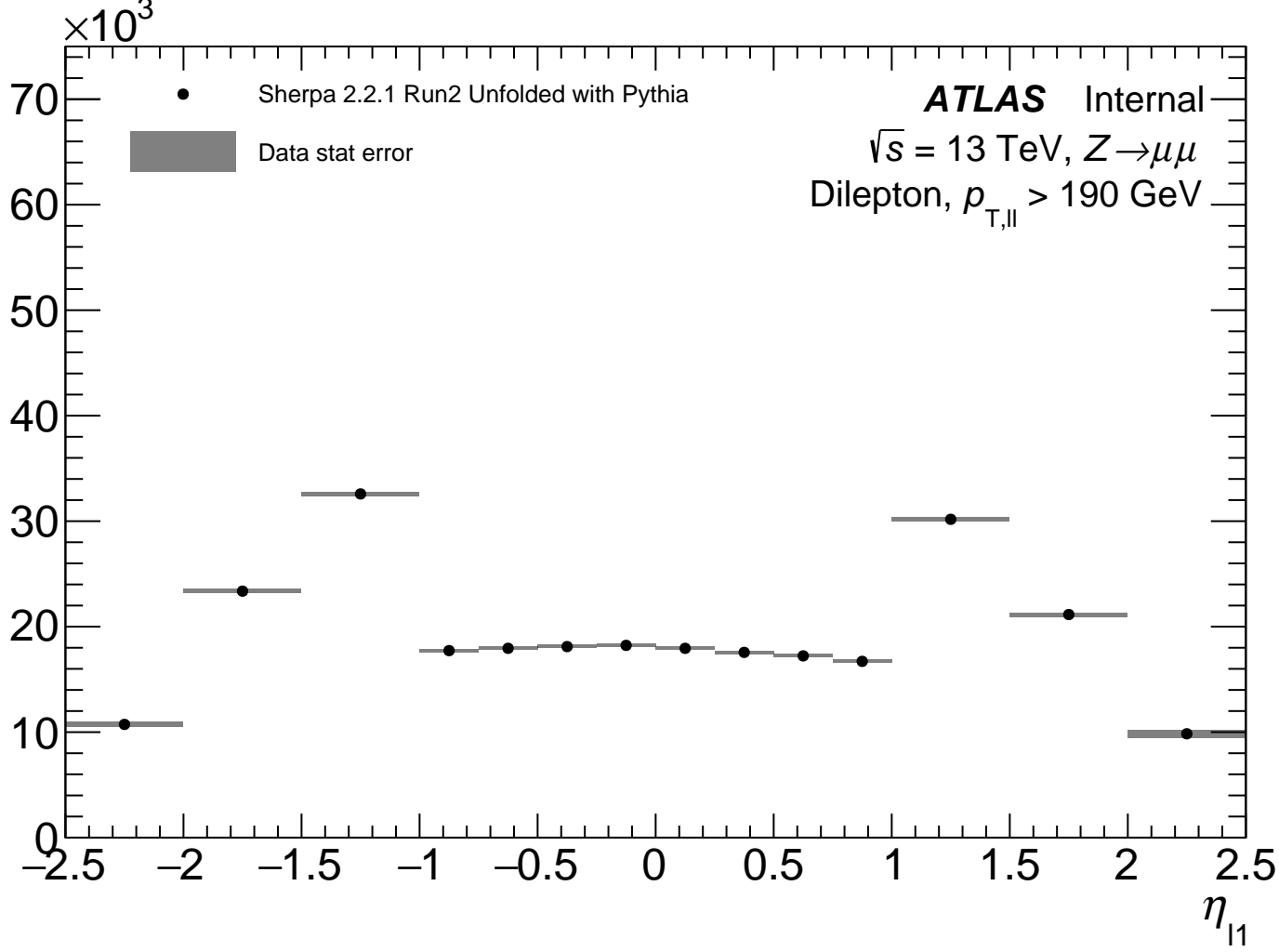
Events



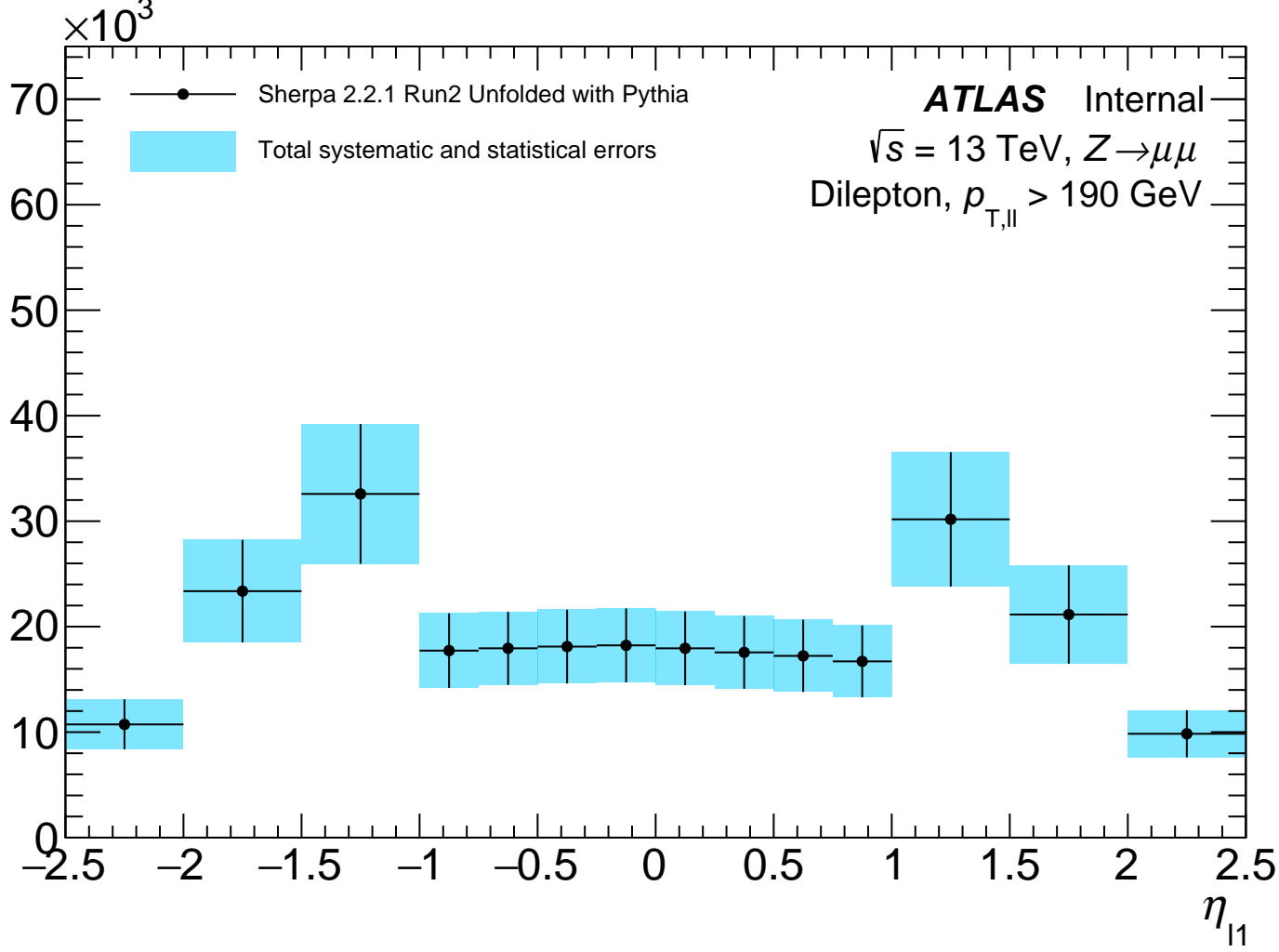
Events



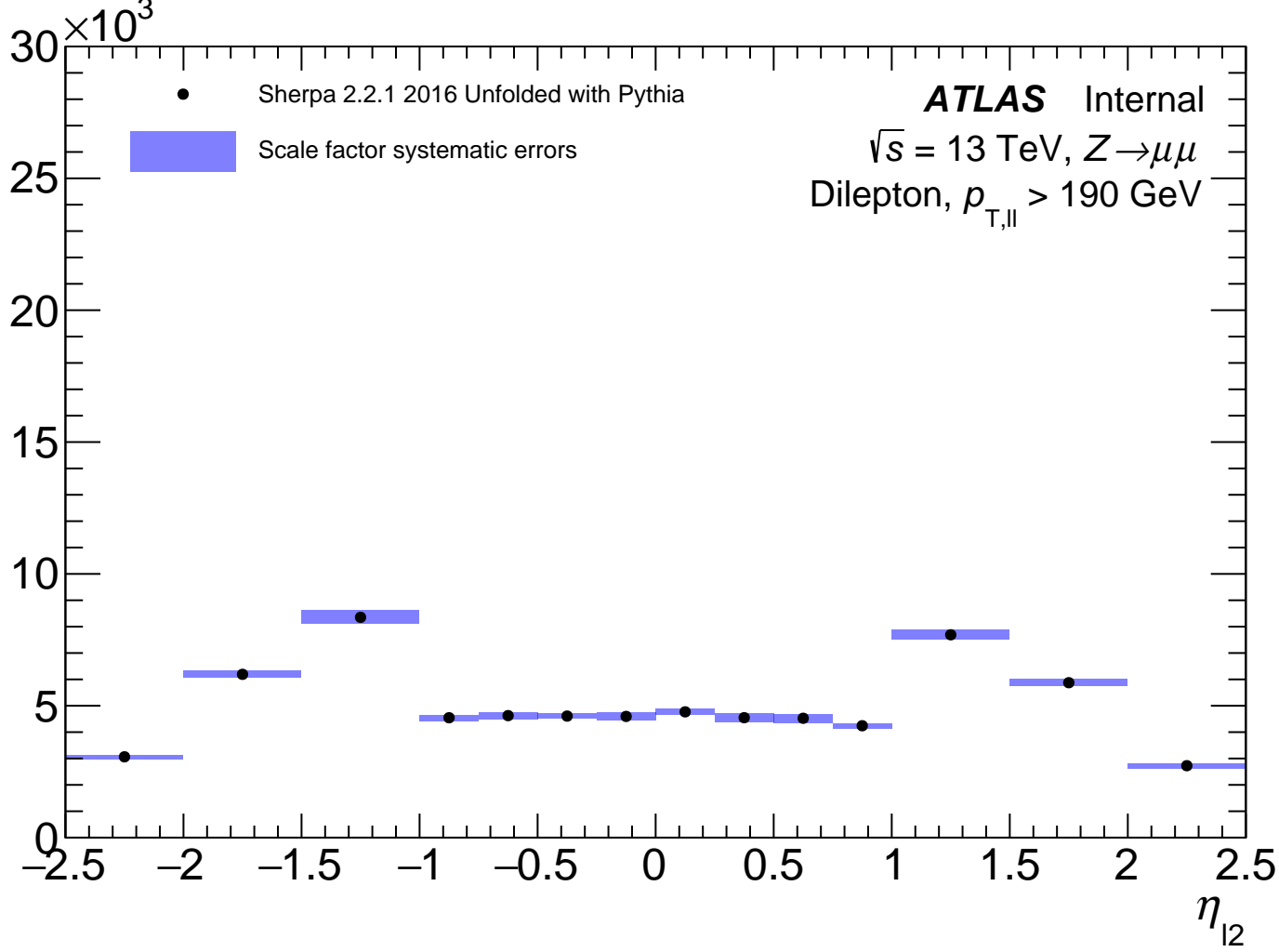
Events



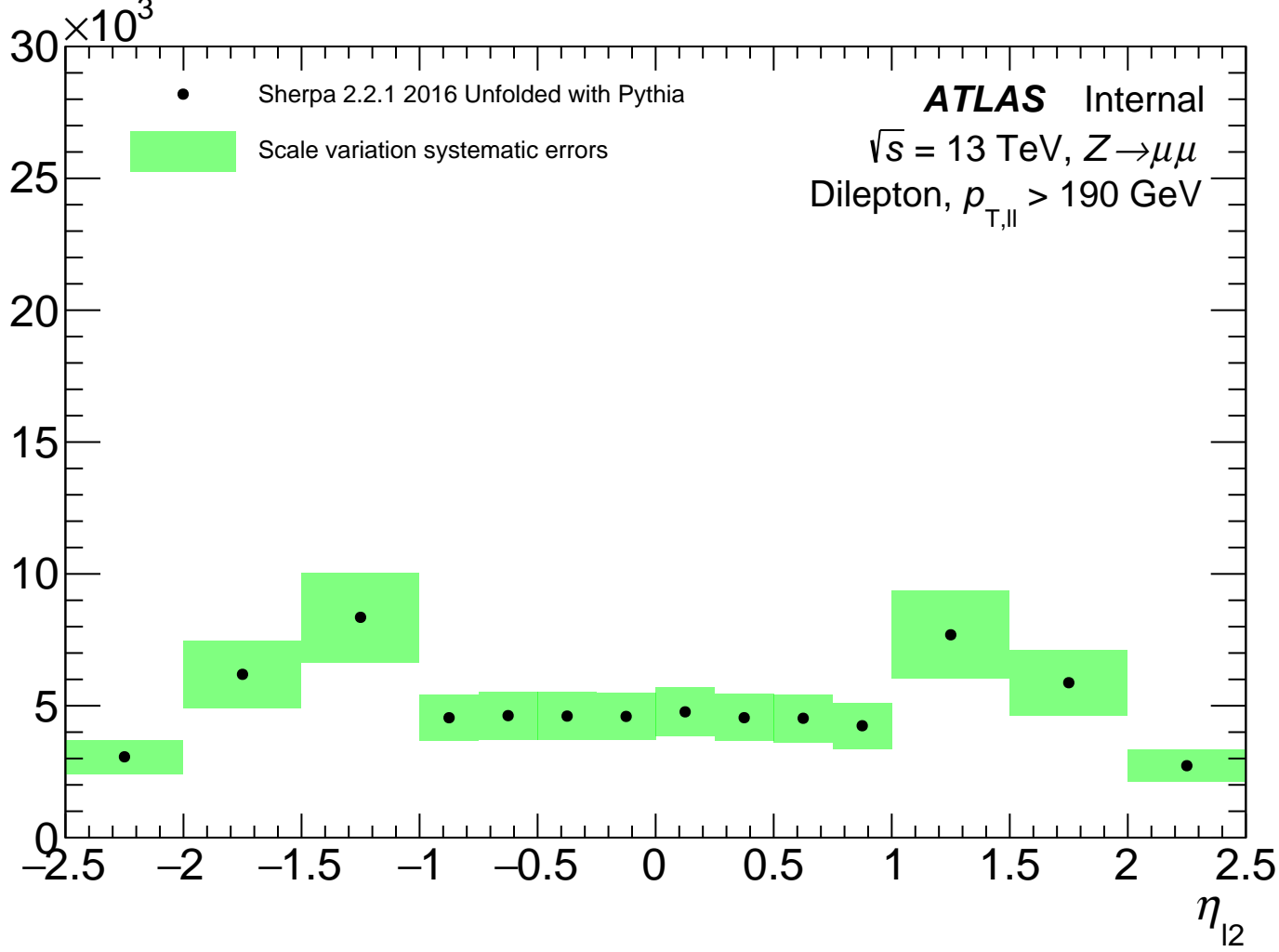
Events



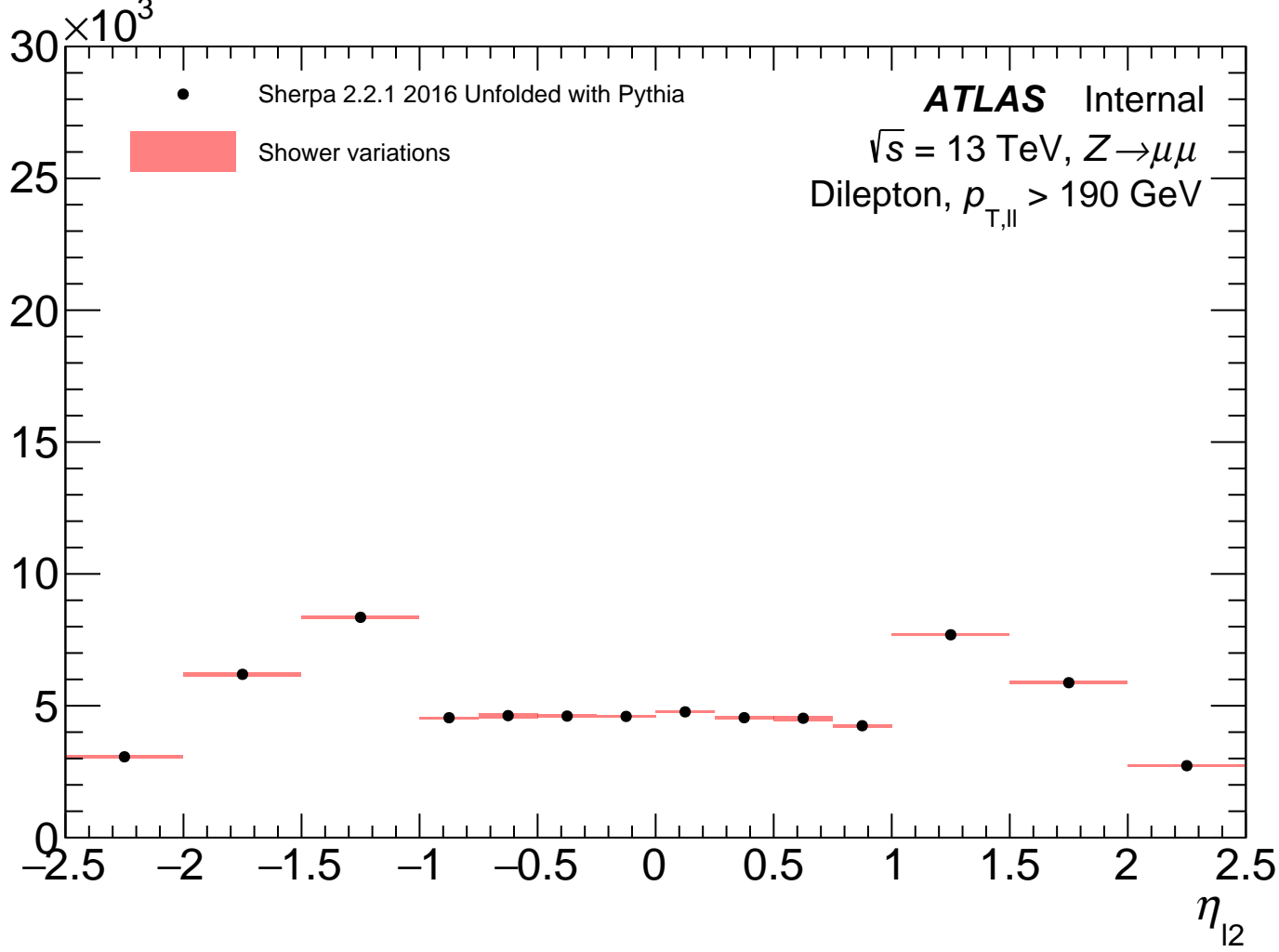
Events



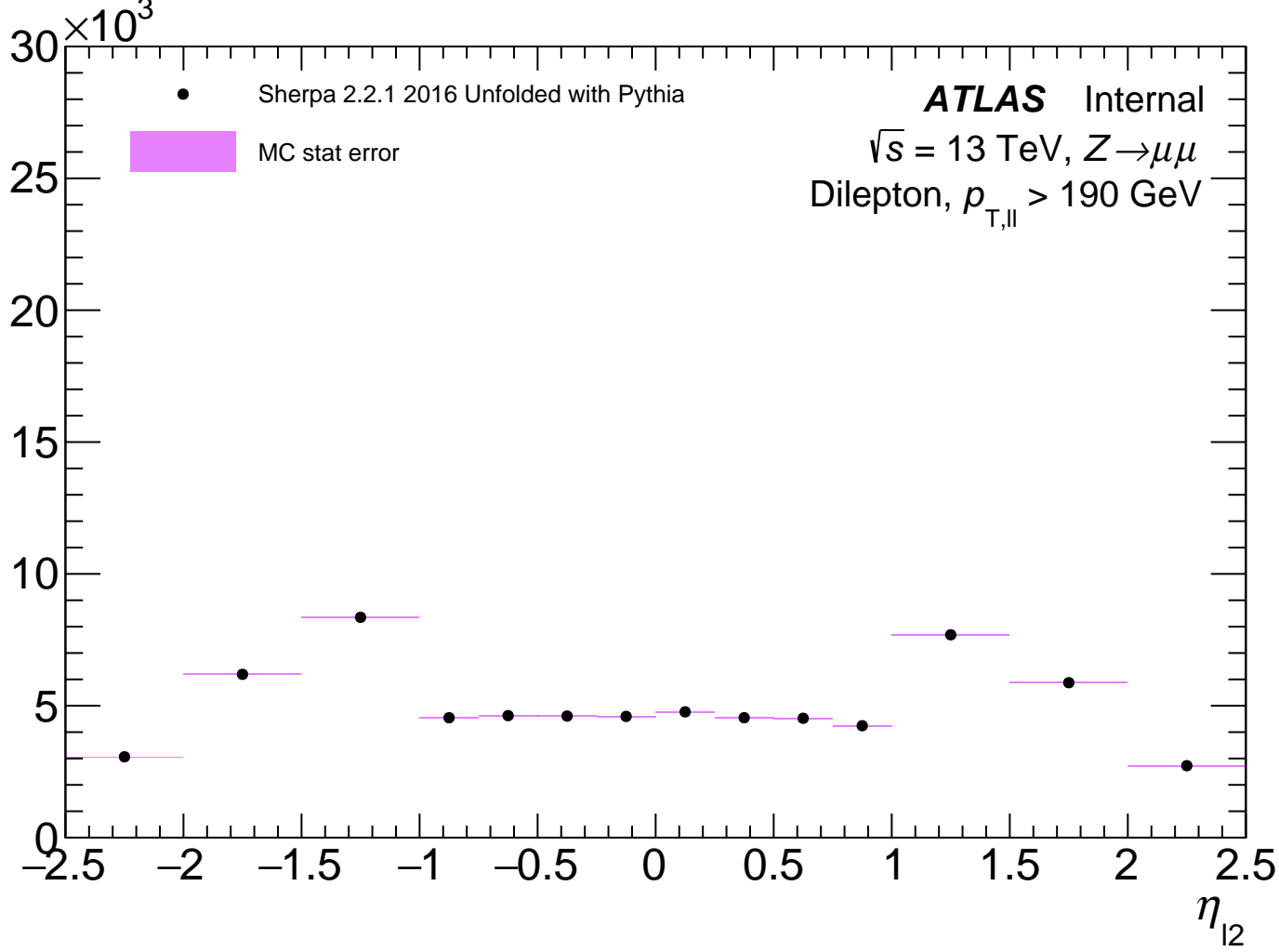
Events



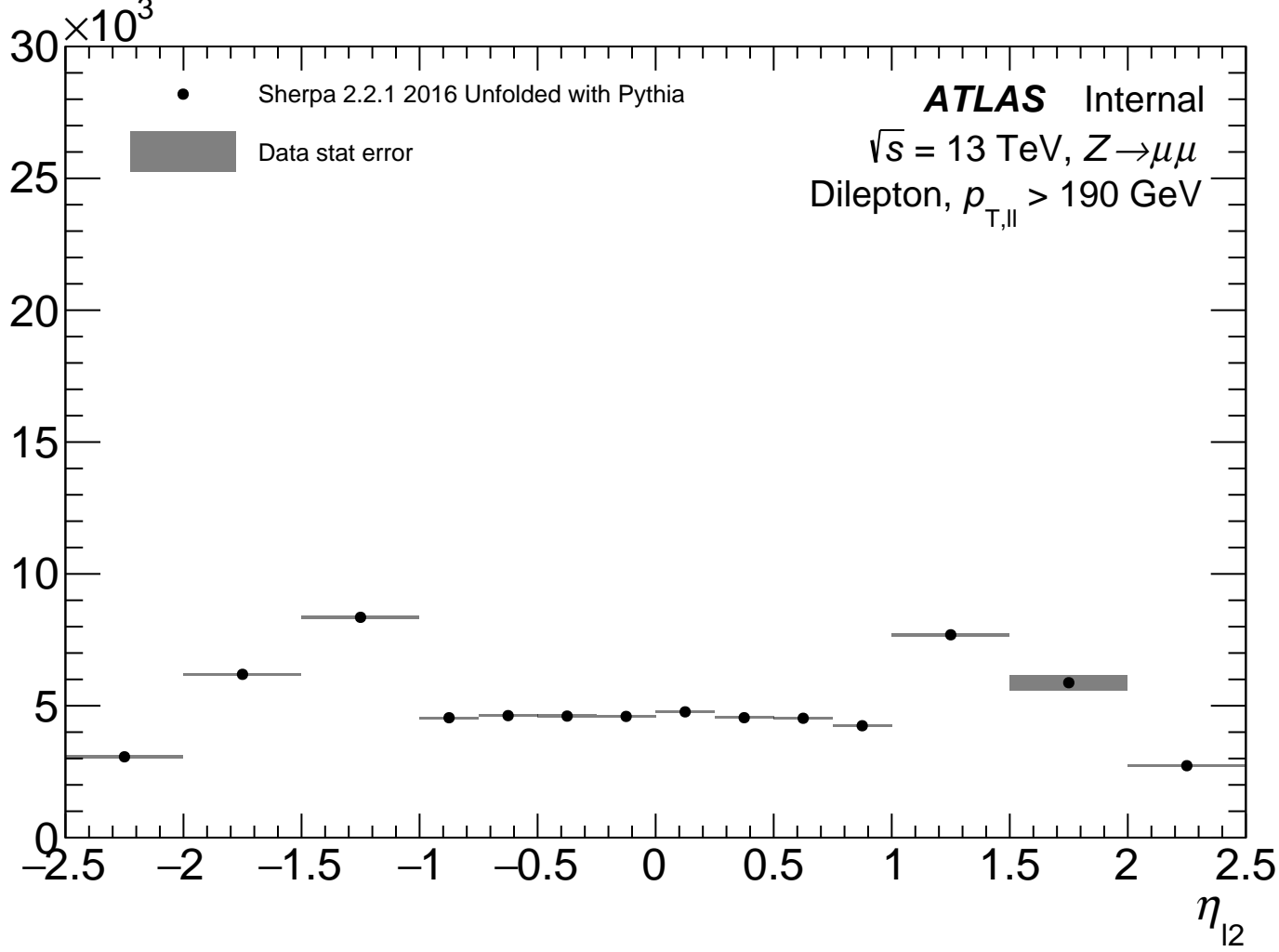
Events



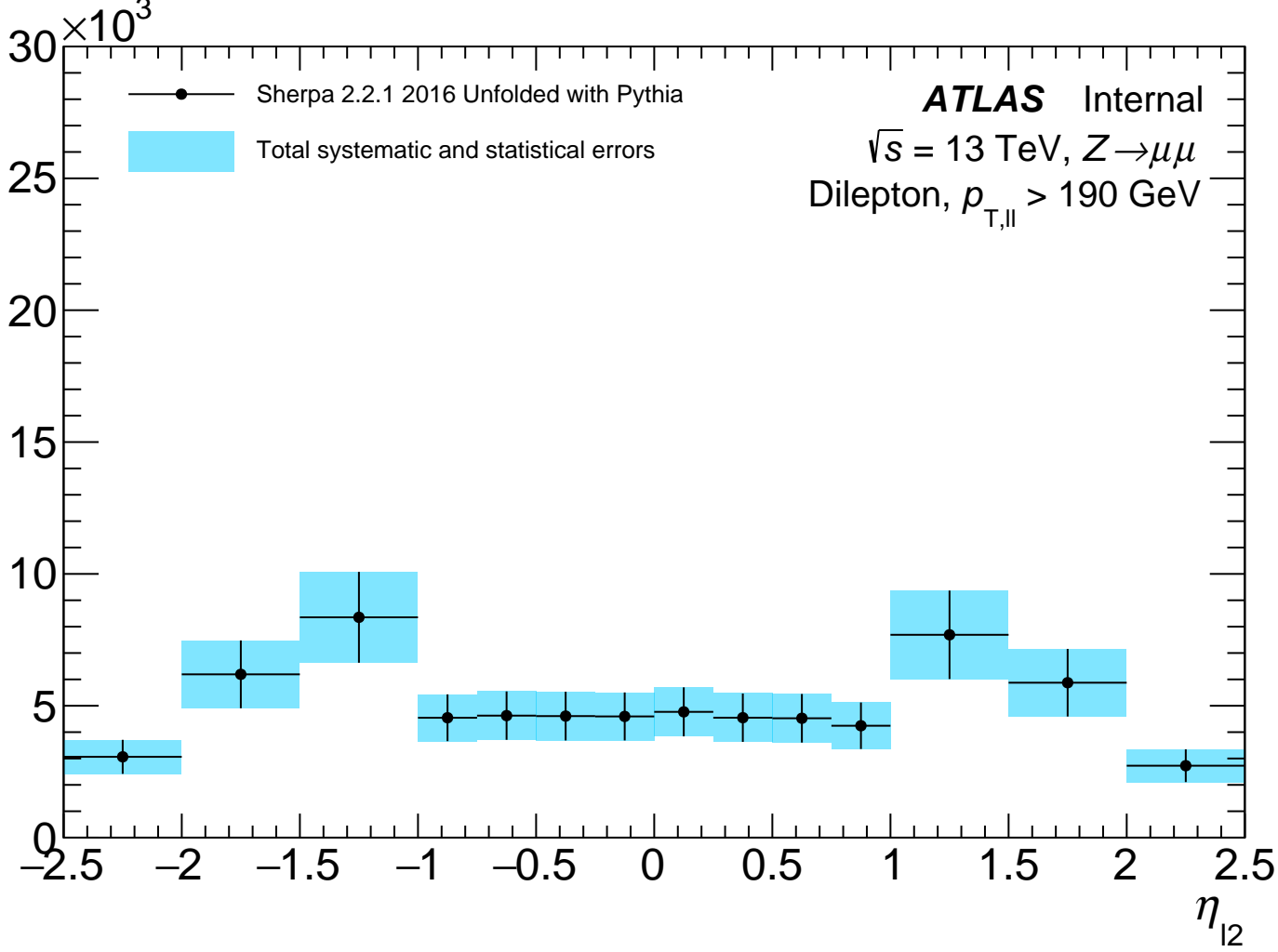
Events



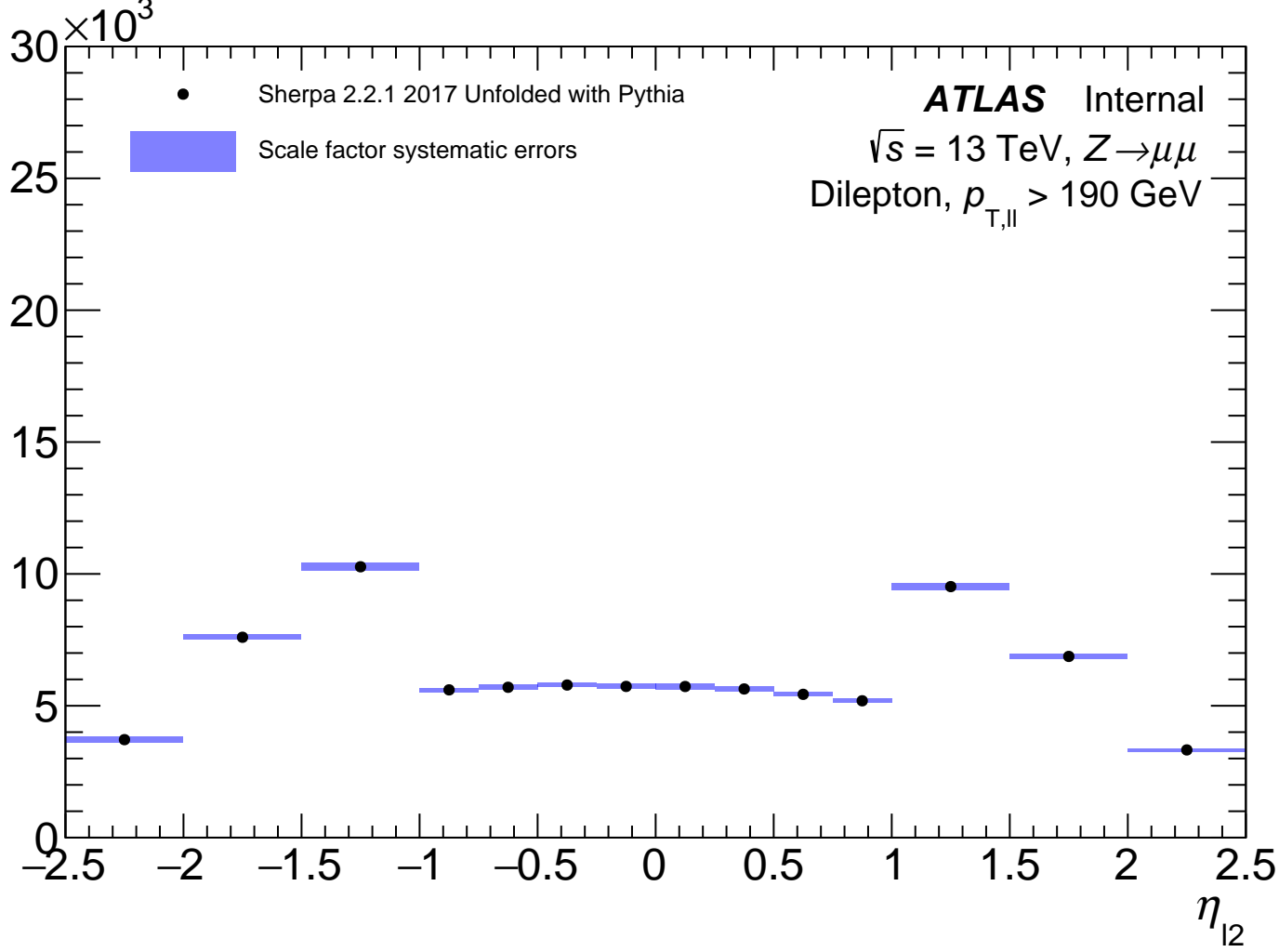
Events



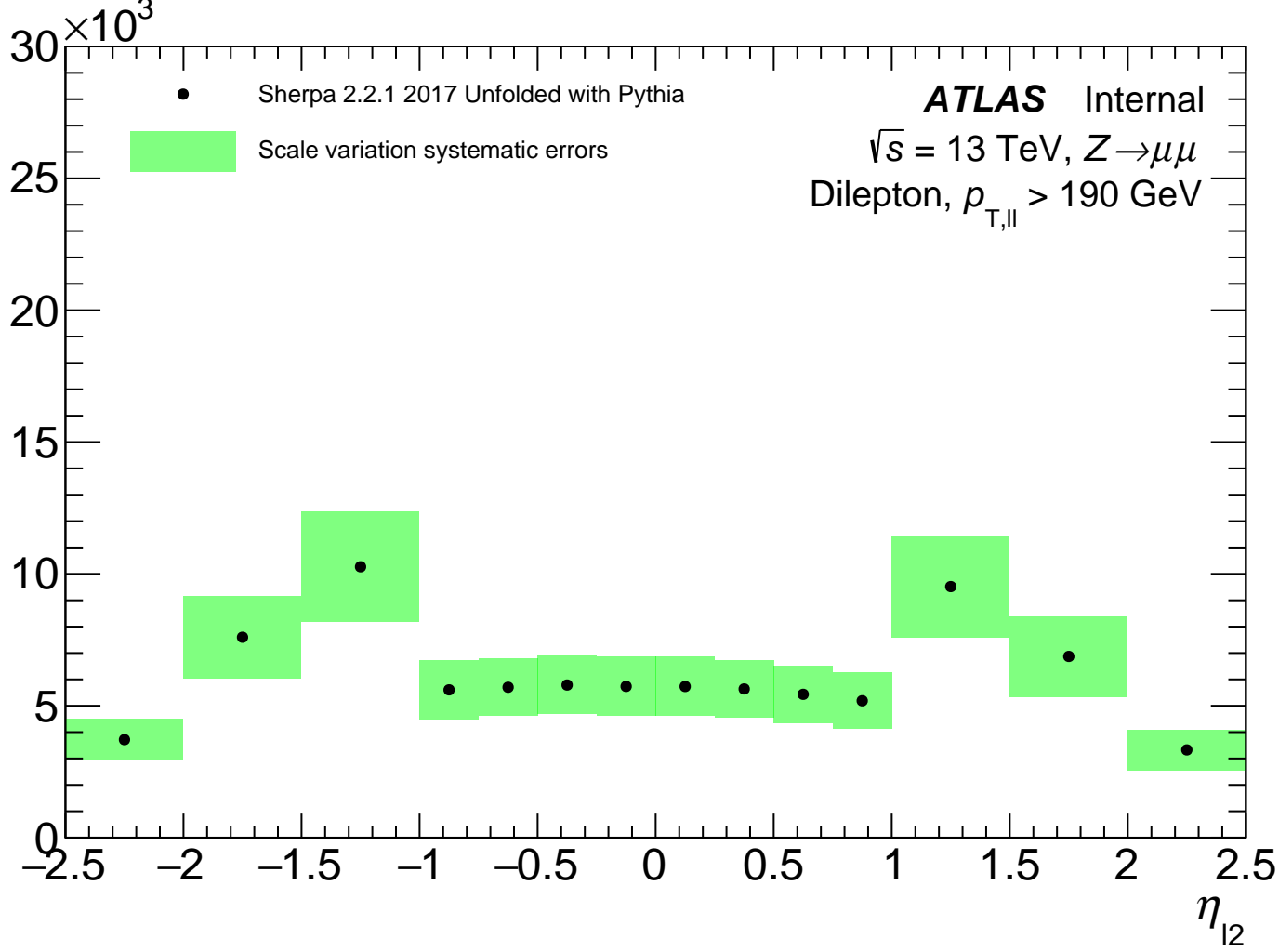
Events



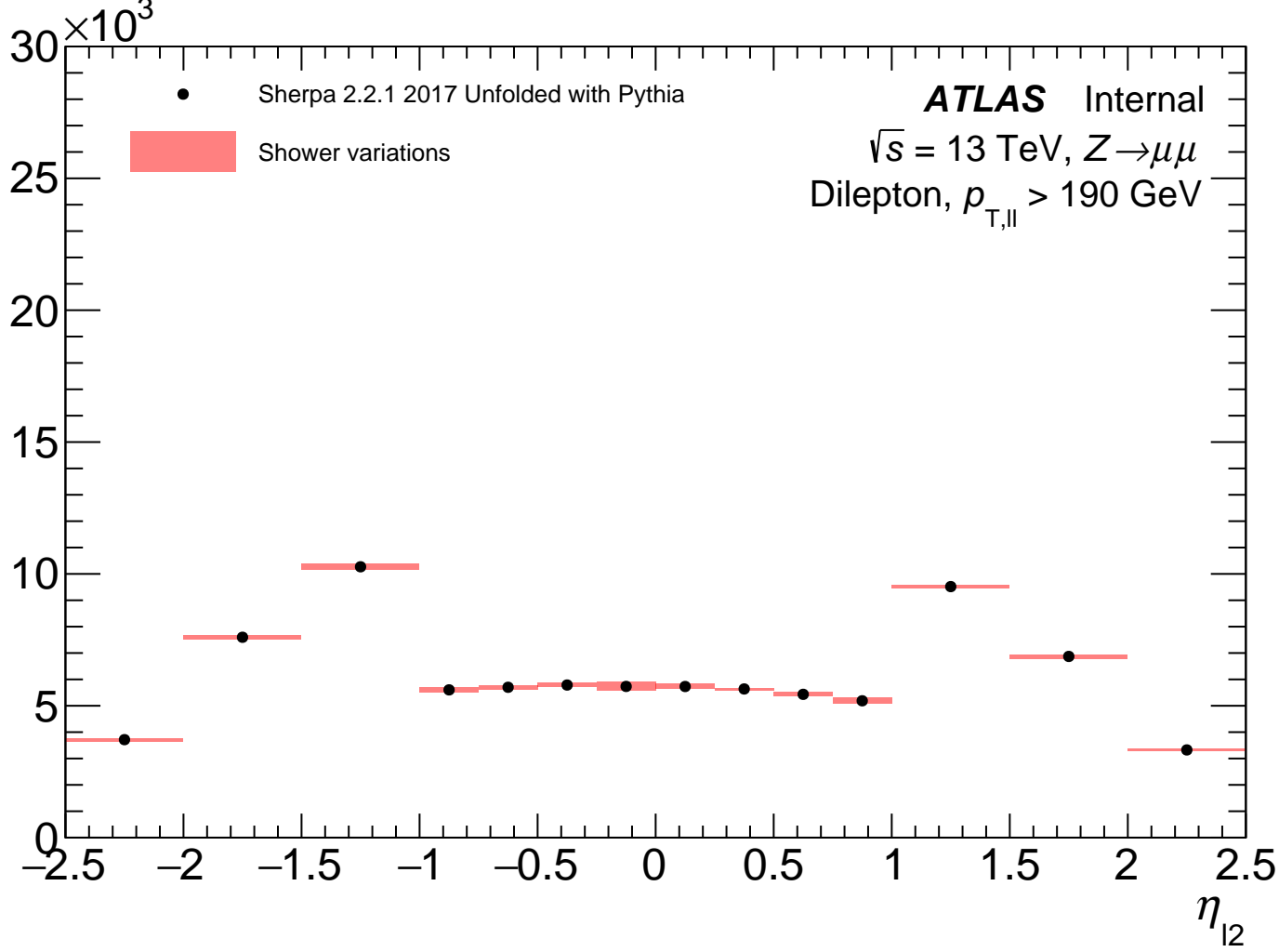
Events



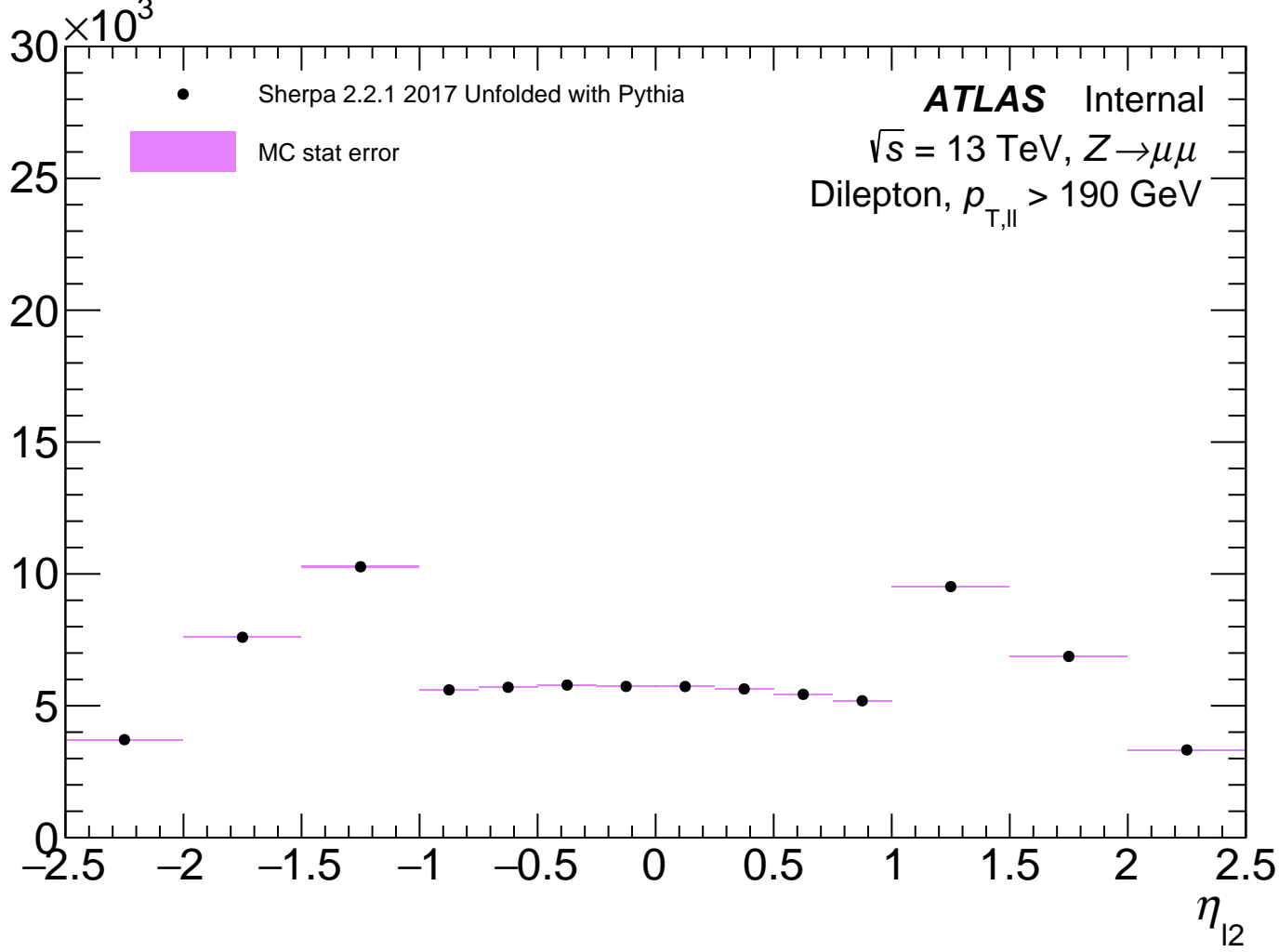
Events



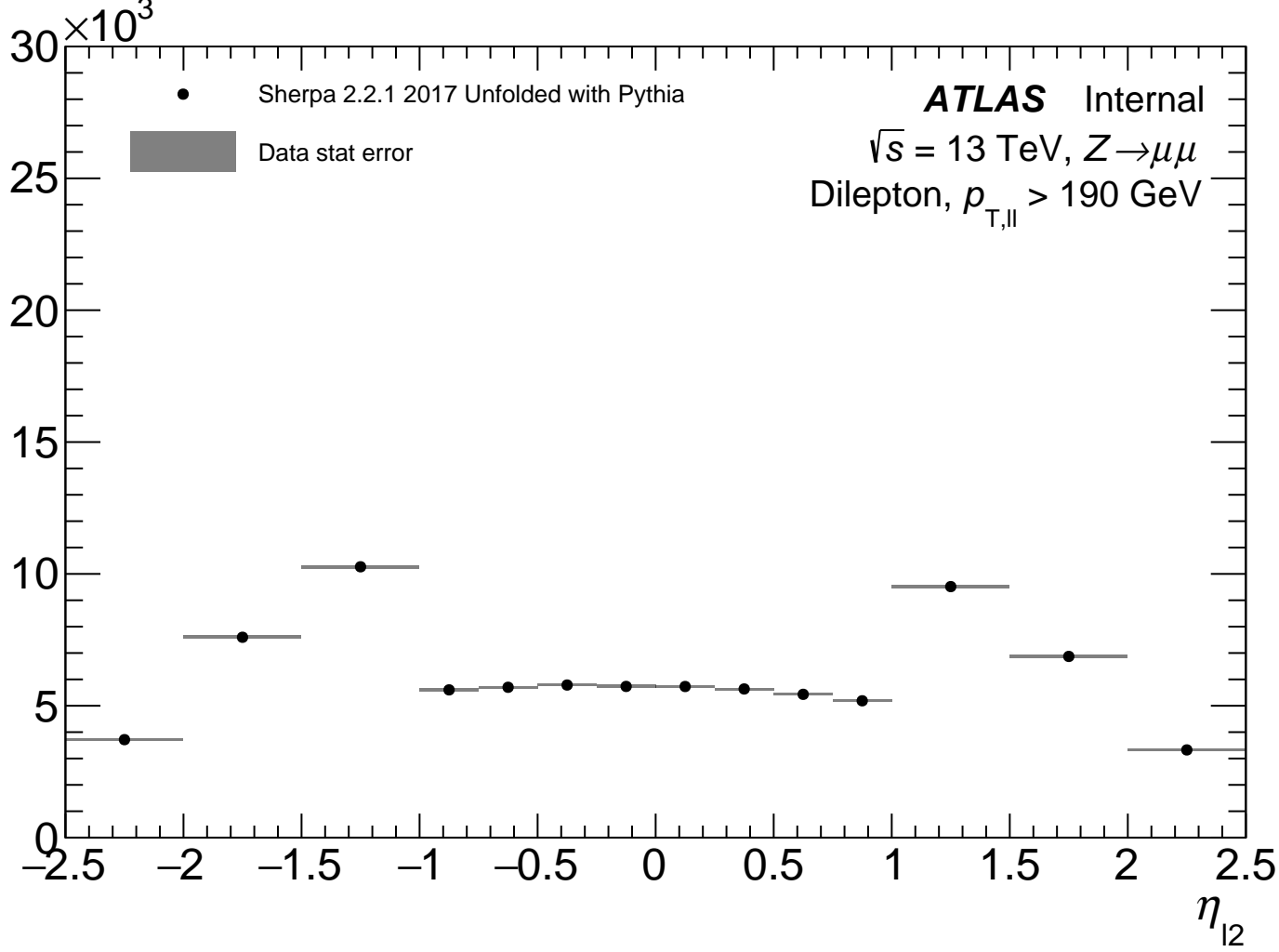
Events



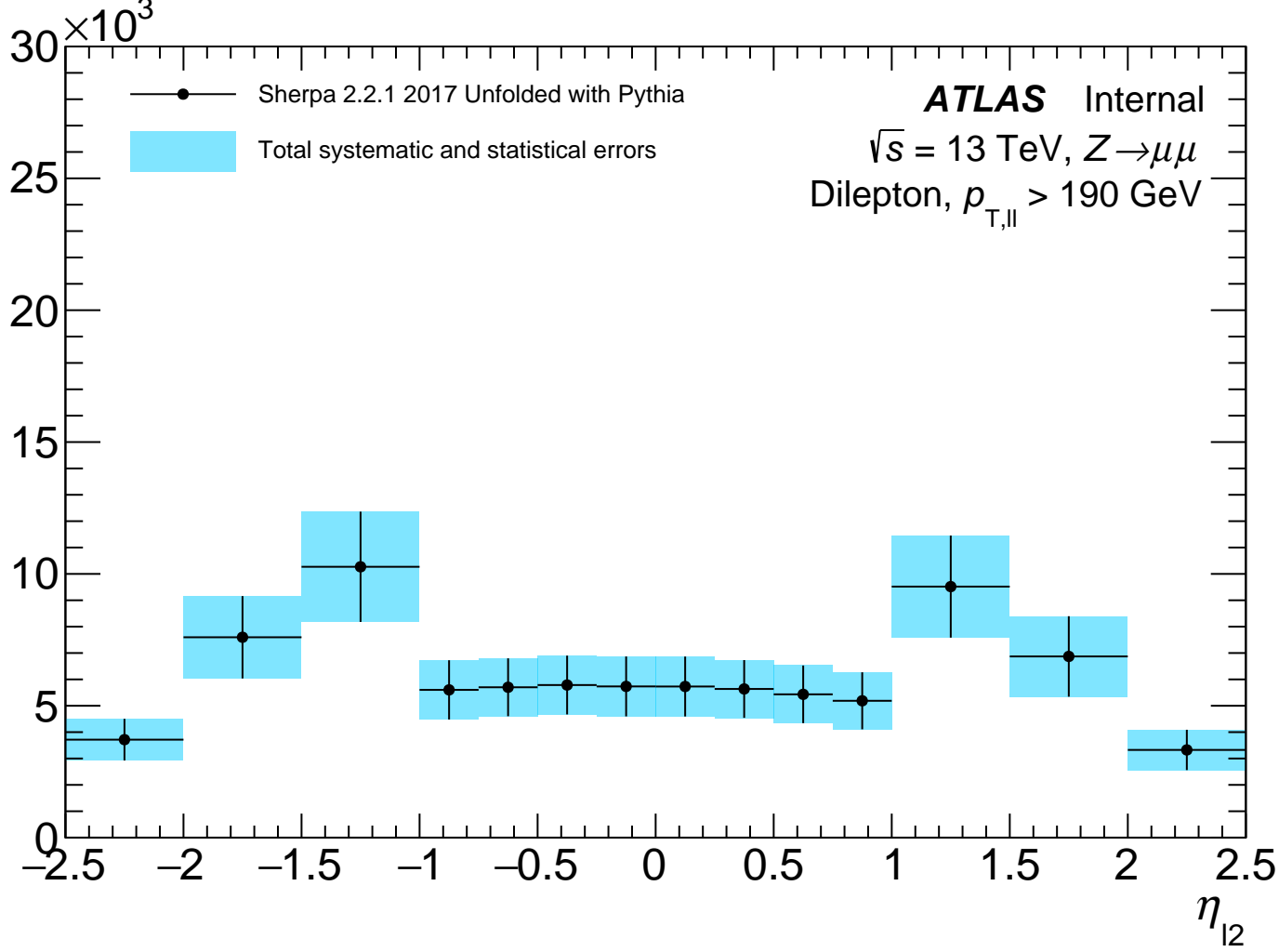
Events



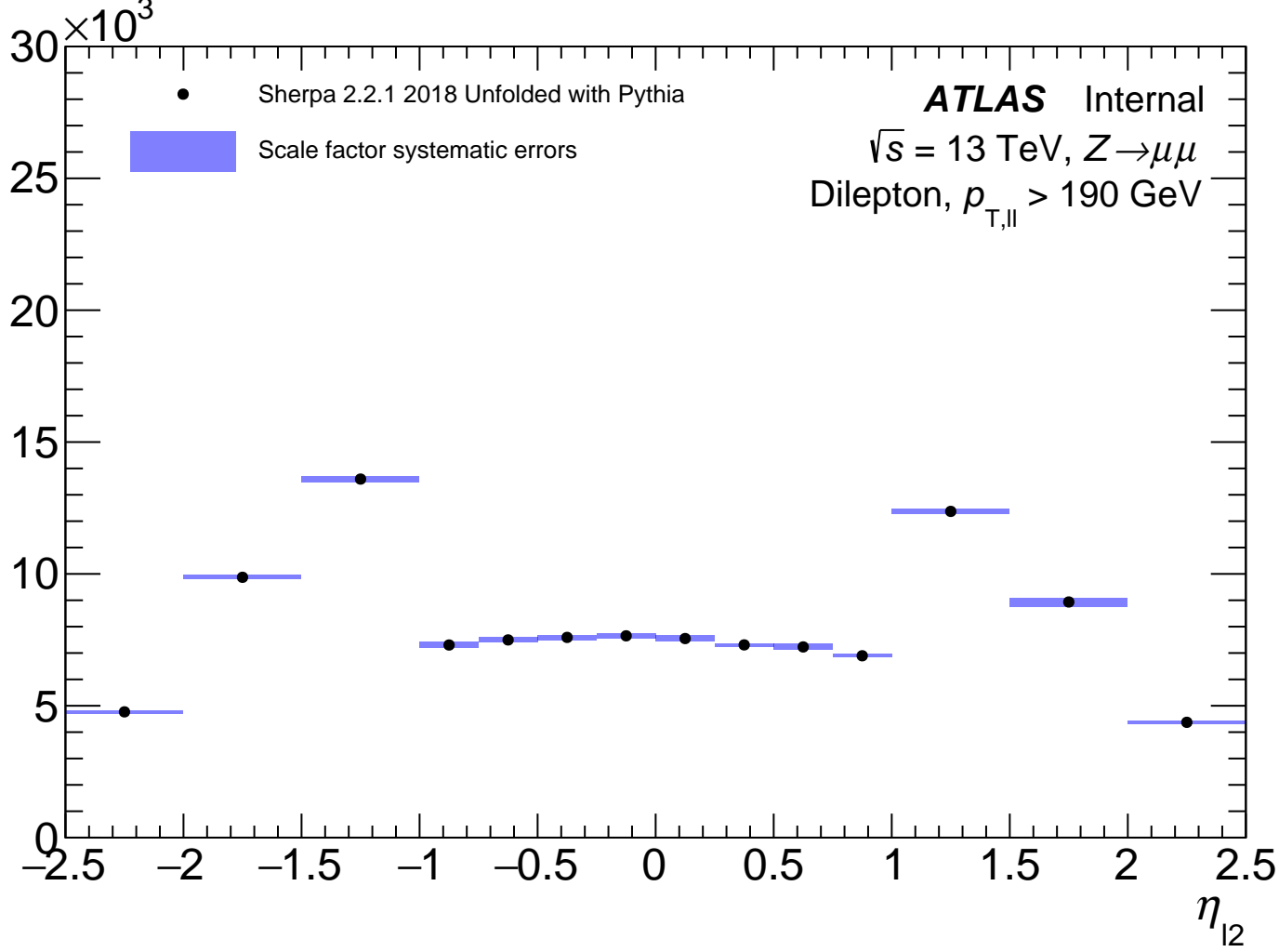
Events



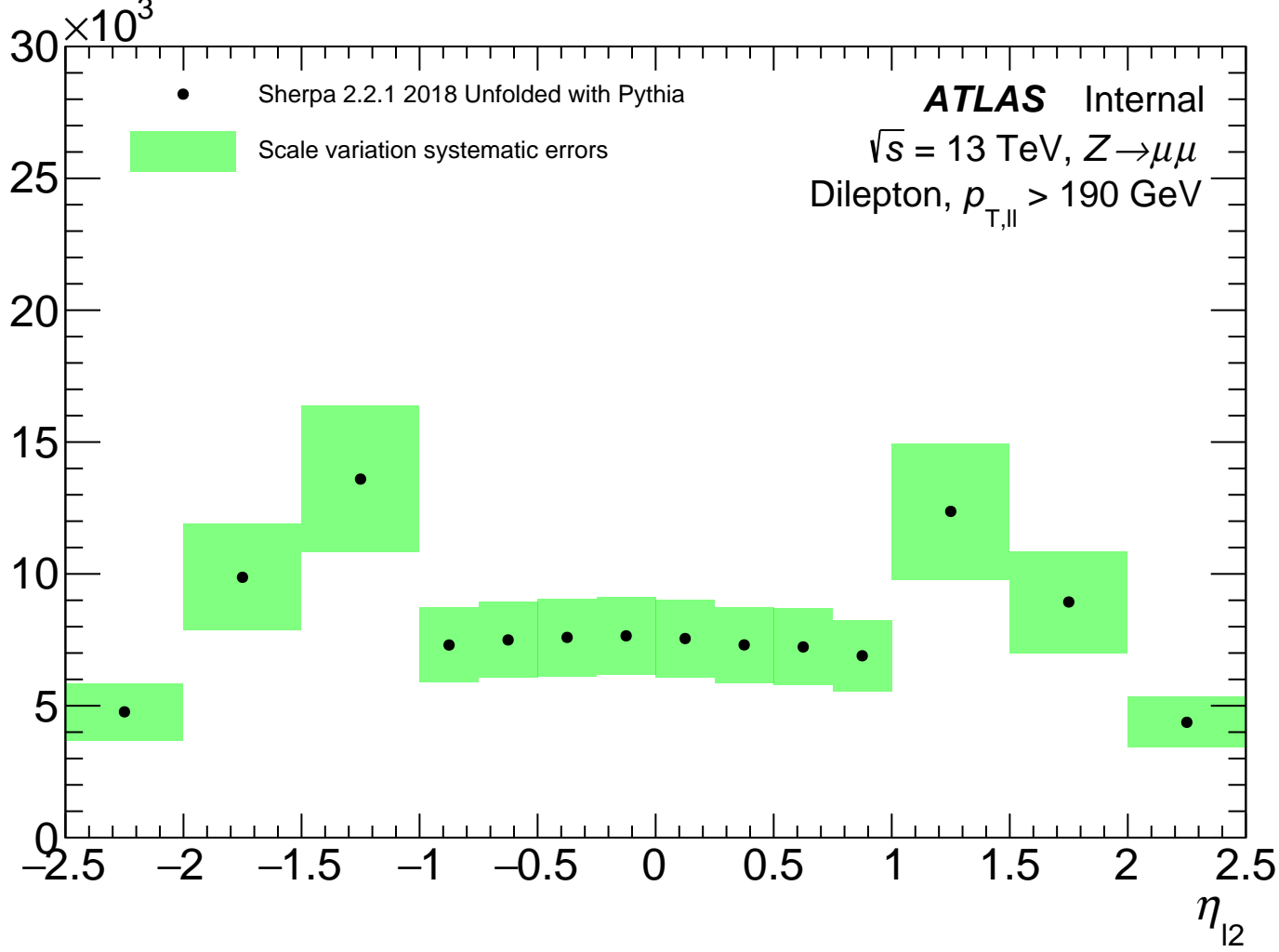
Events



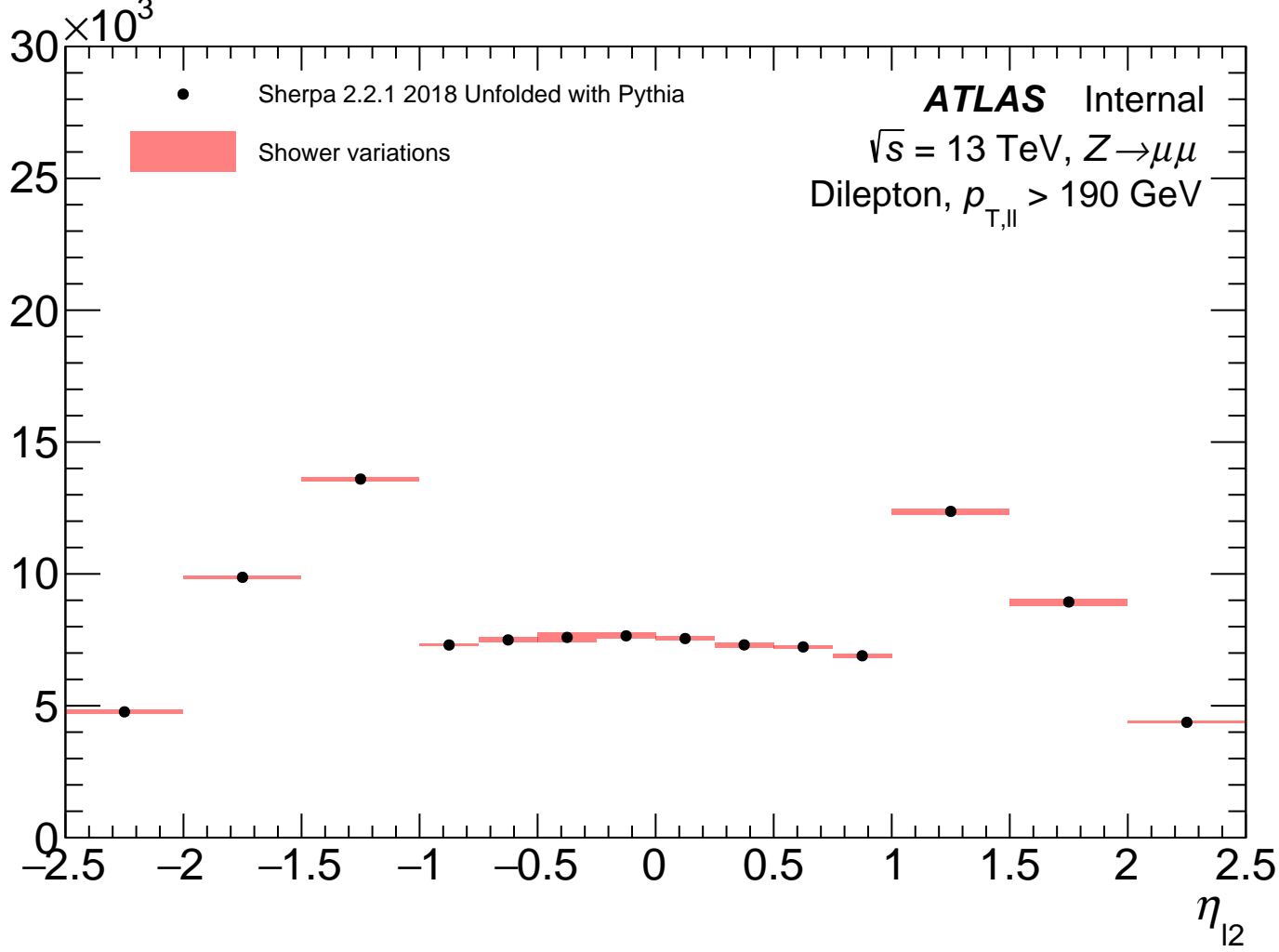
Events



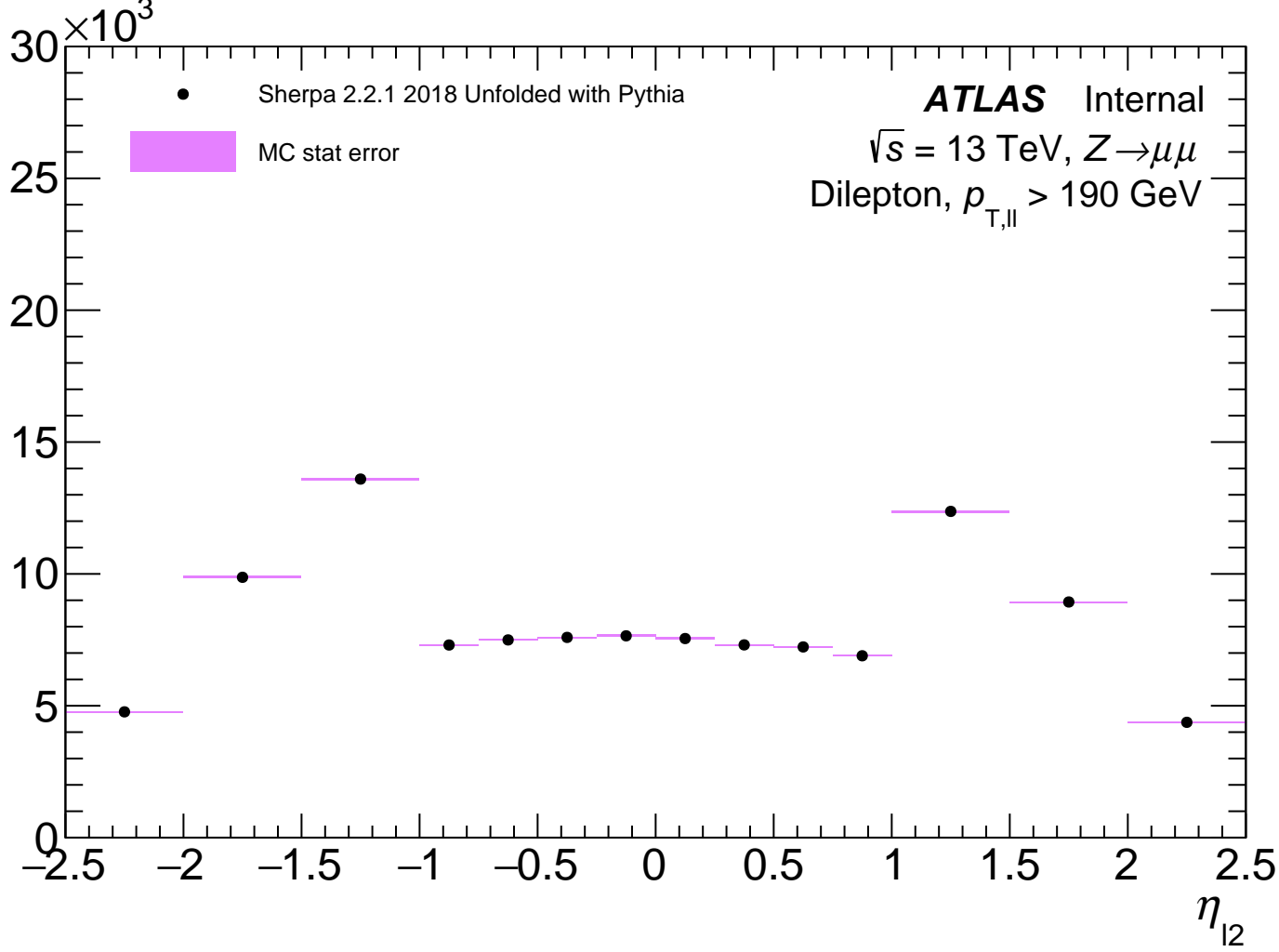
Events



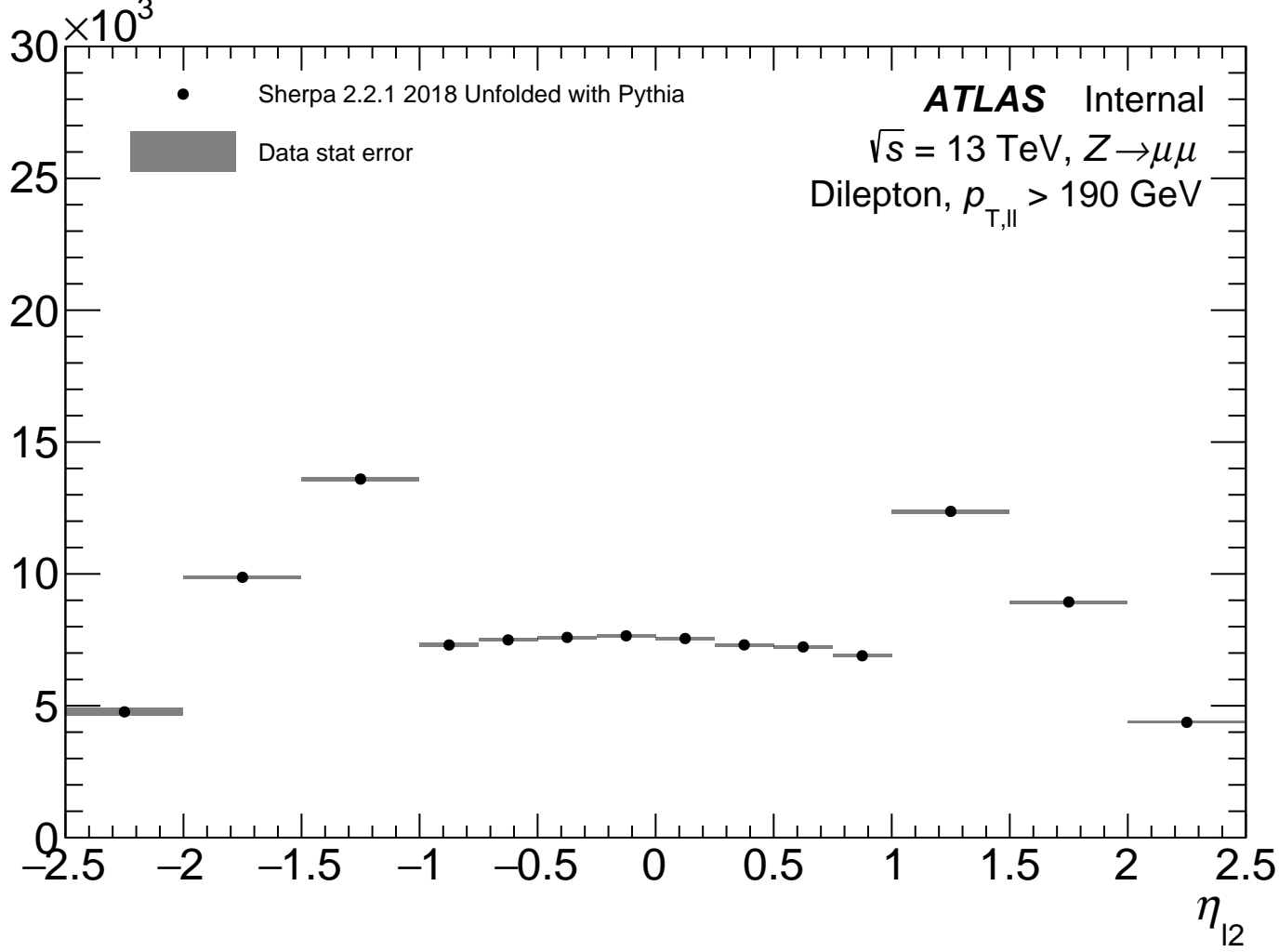
Events



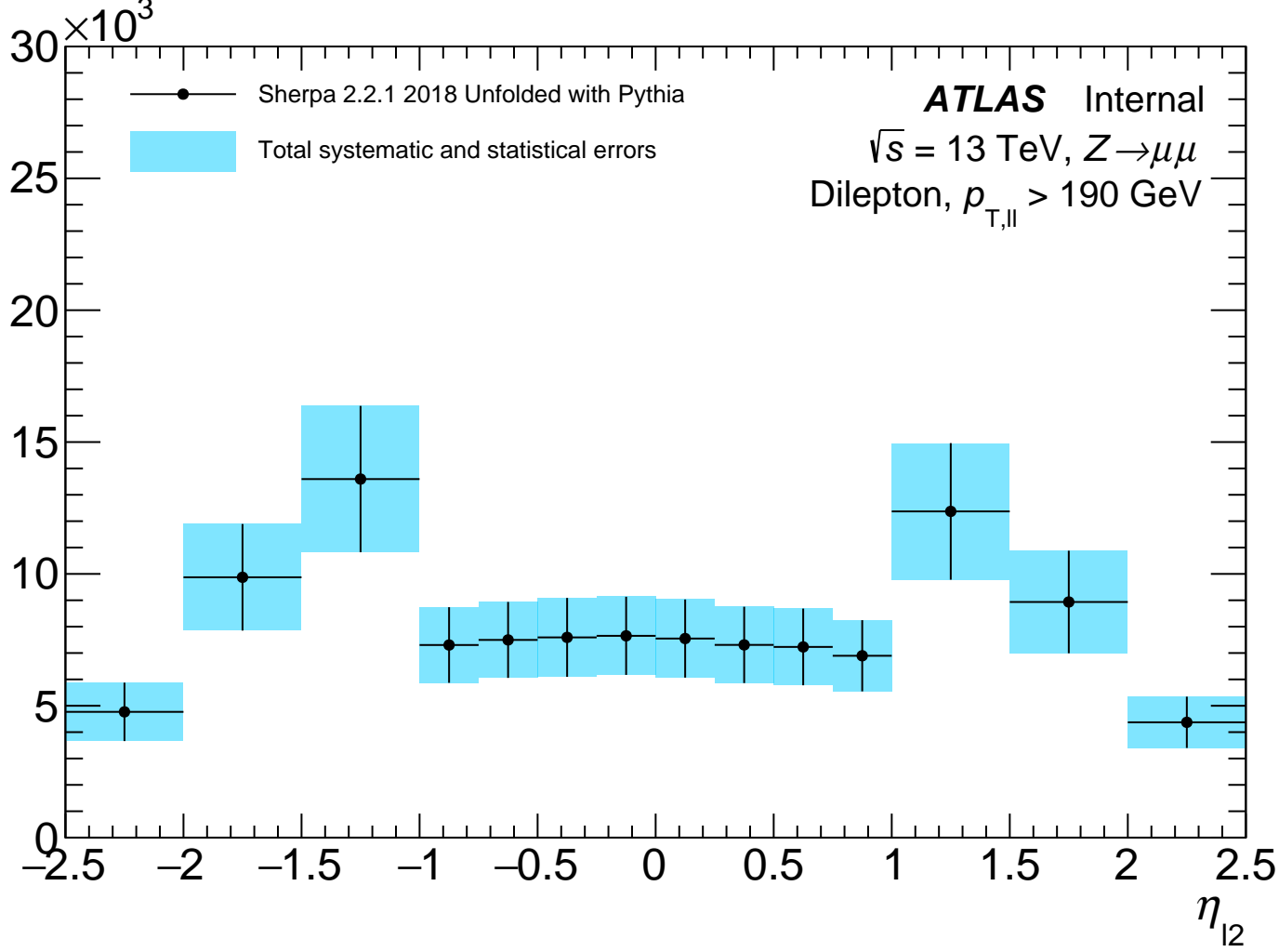
Events



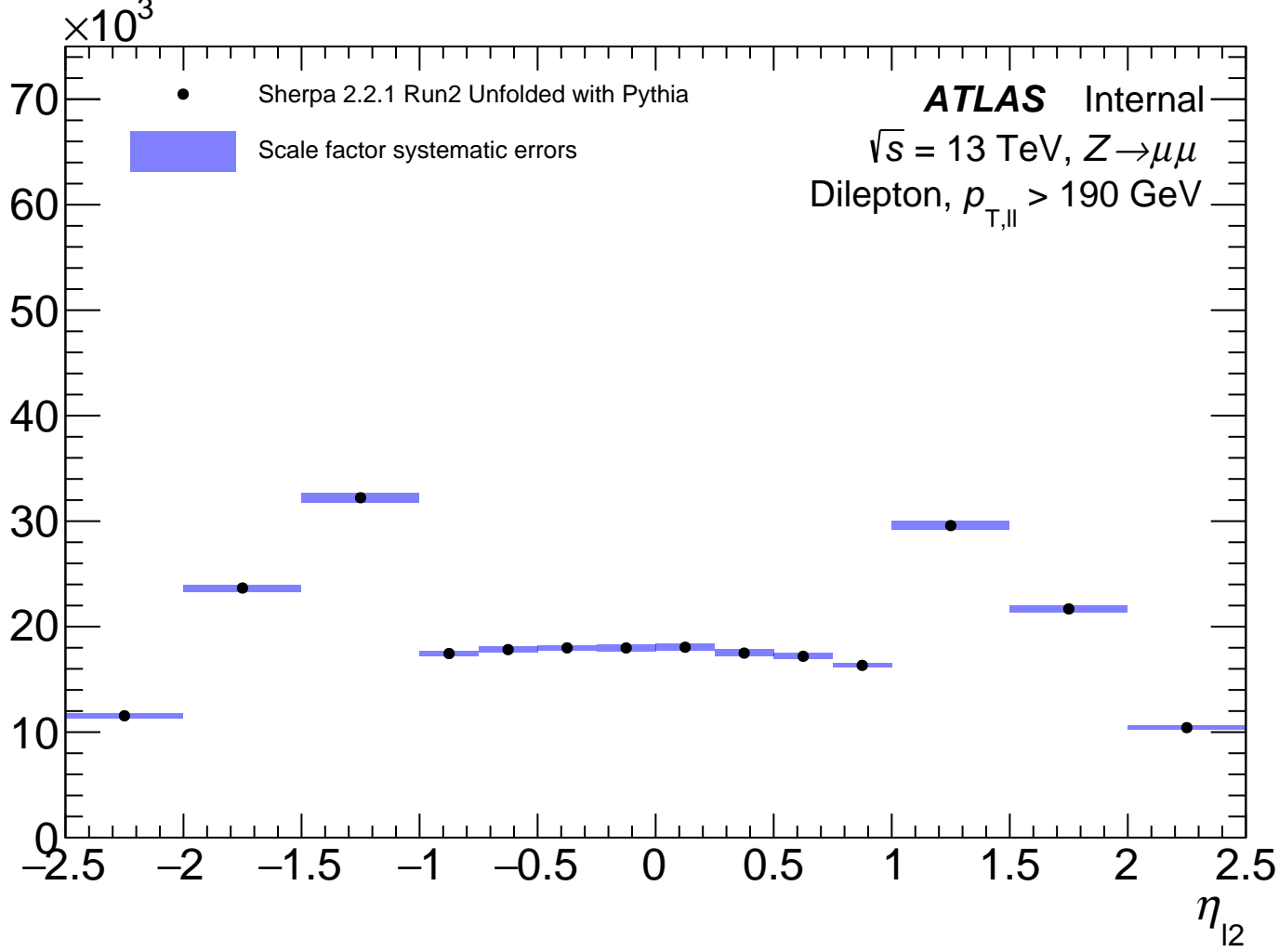
Events



Events



Events



Events

$\times 10^3$

70

60

50

40

30

20

10

0

• Sherpa 2.2.1 Run2 Unfolded with Pythia

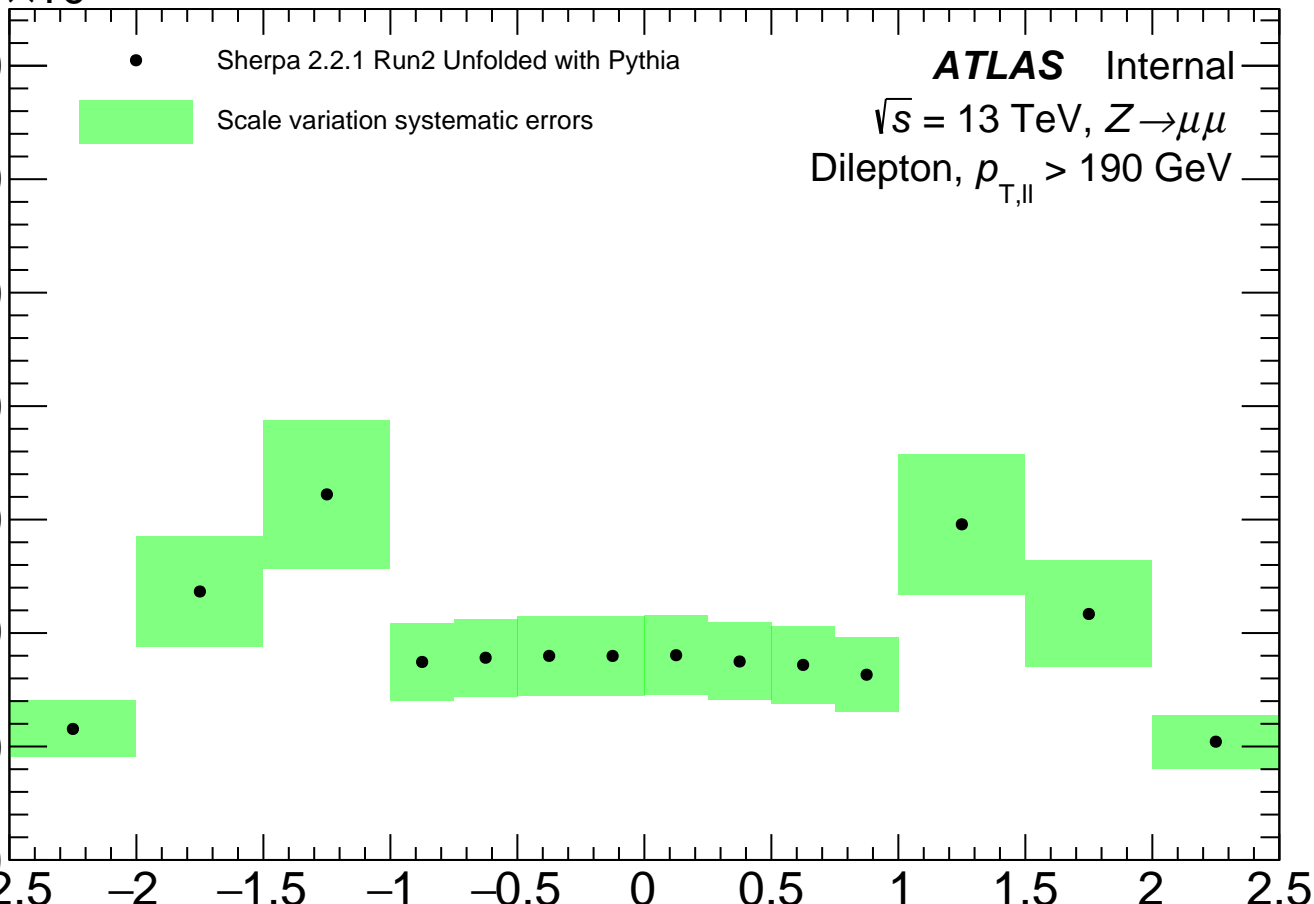
Scale variation systematic errors

ATLAS Internal

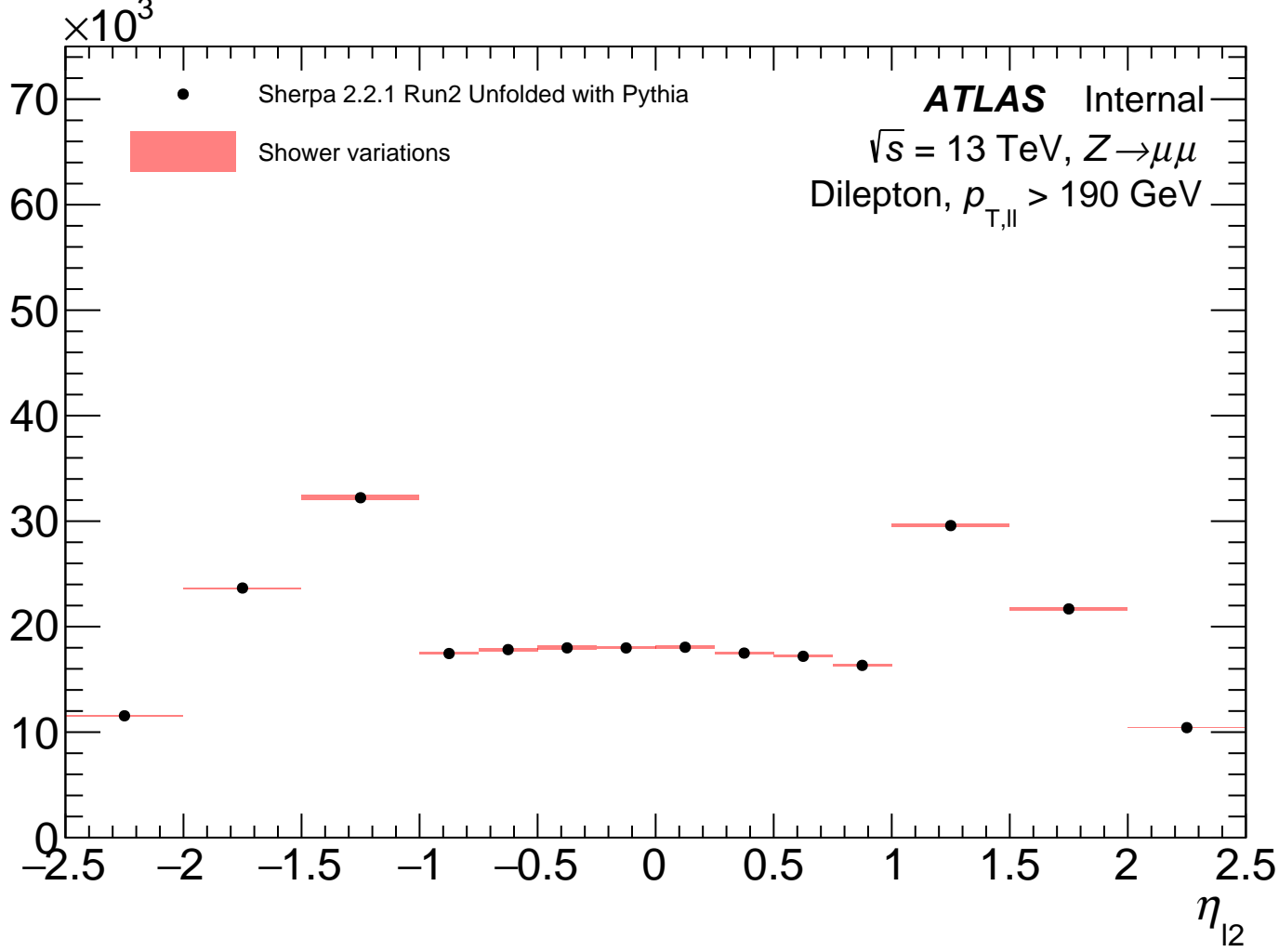
$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

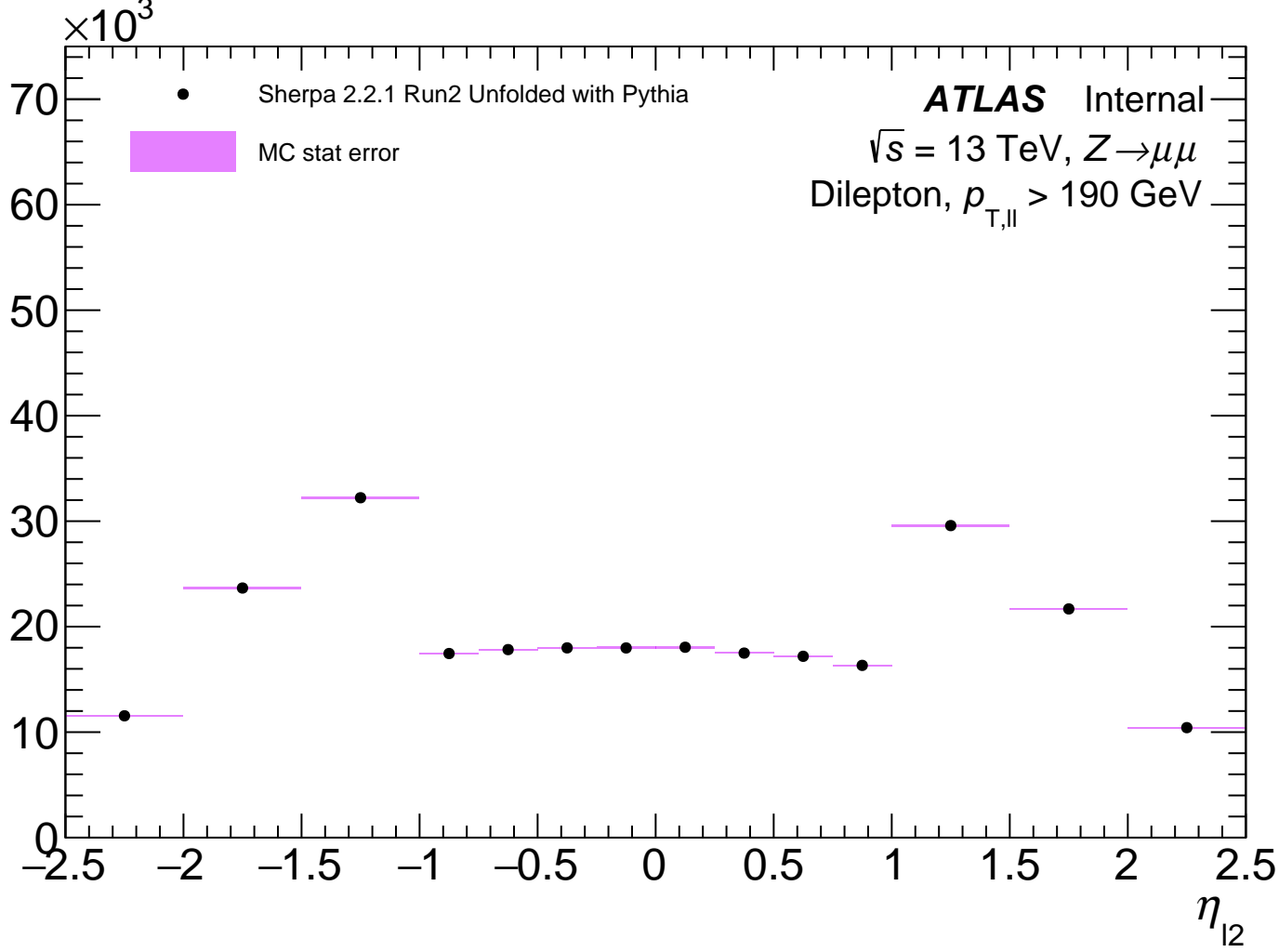
η_{l2}



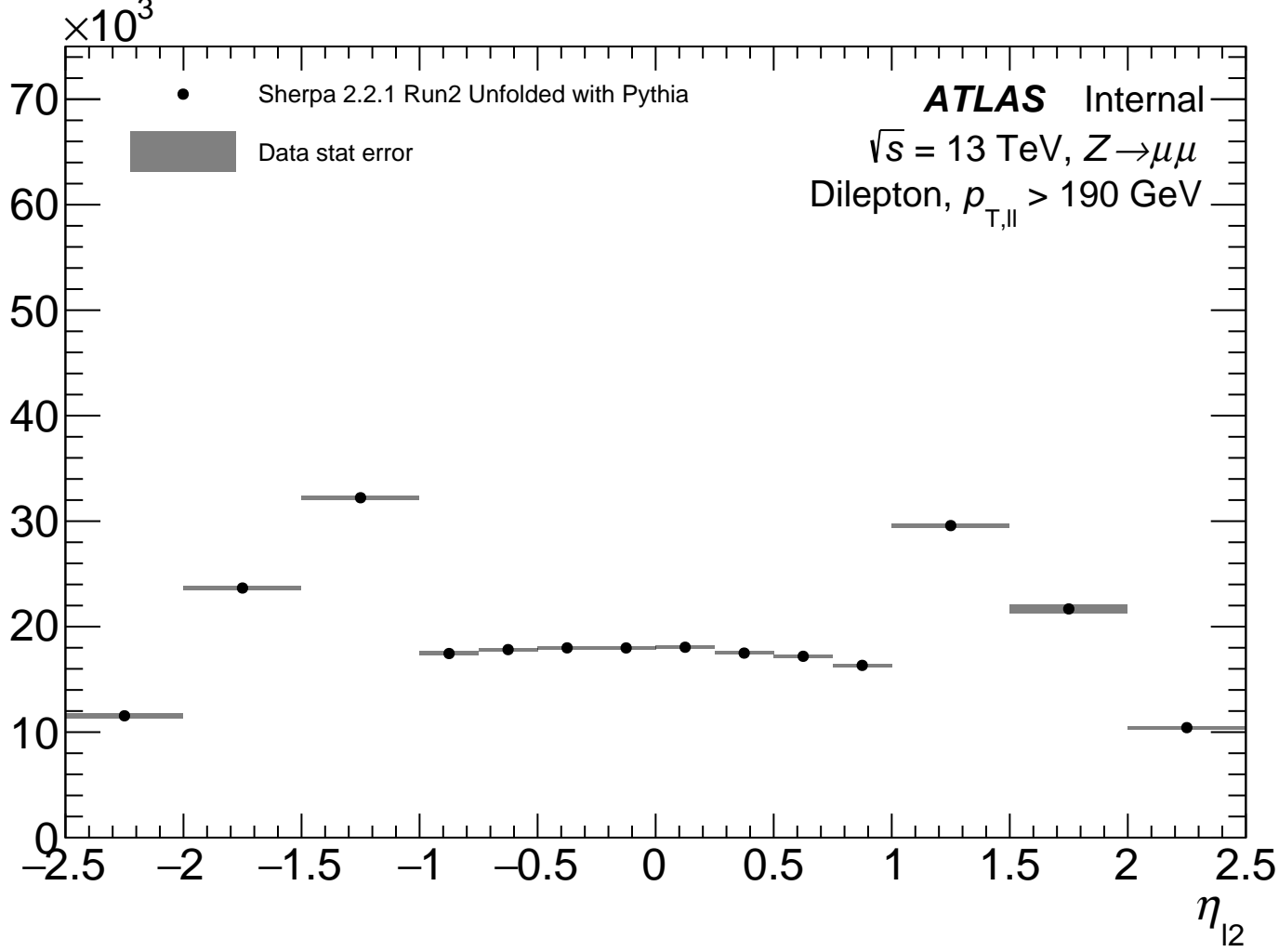
Events



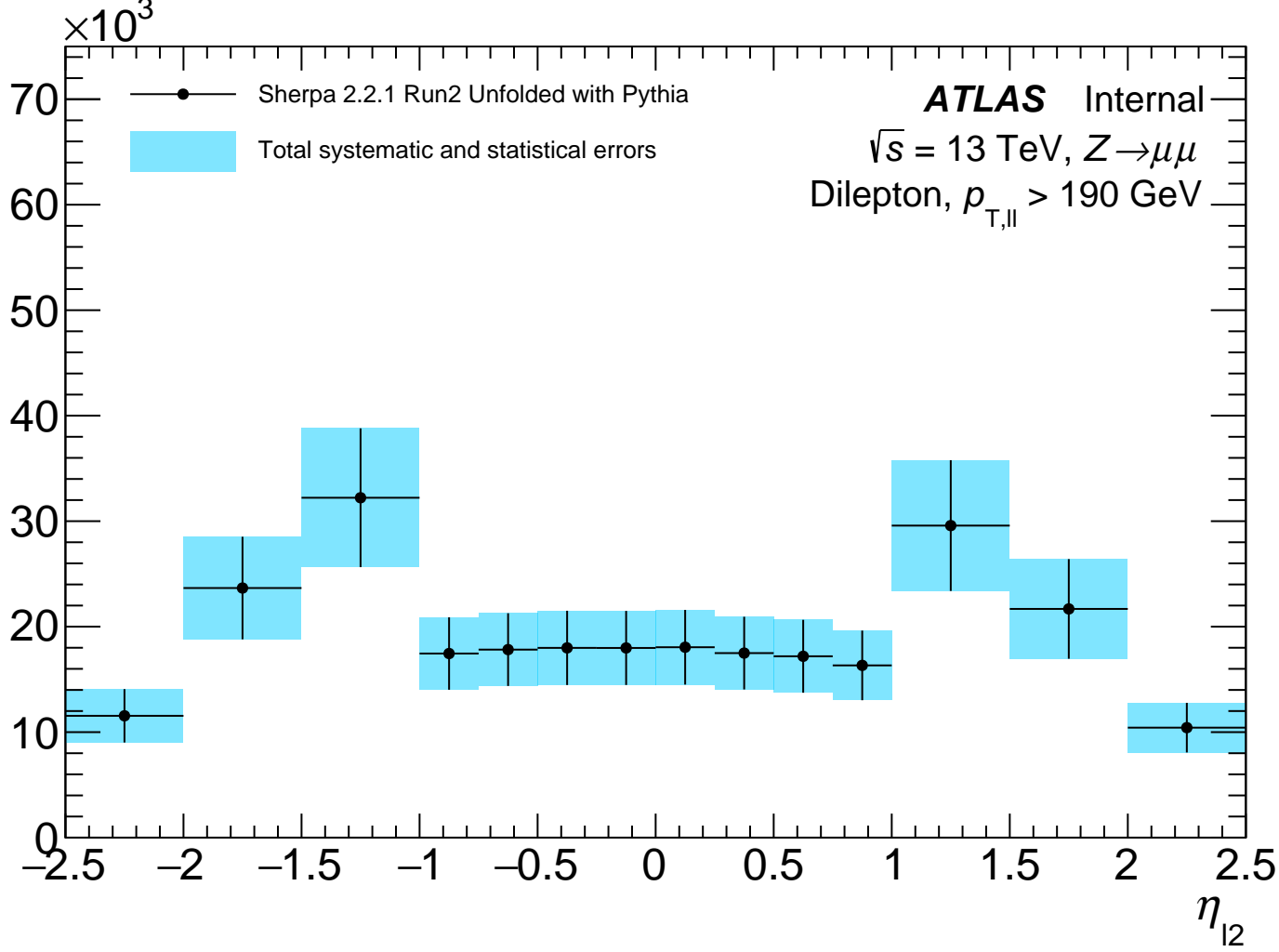
Events



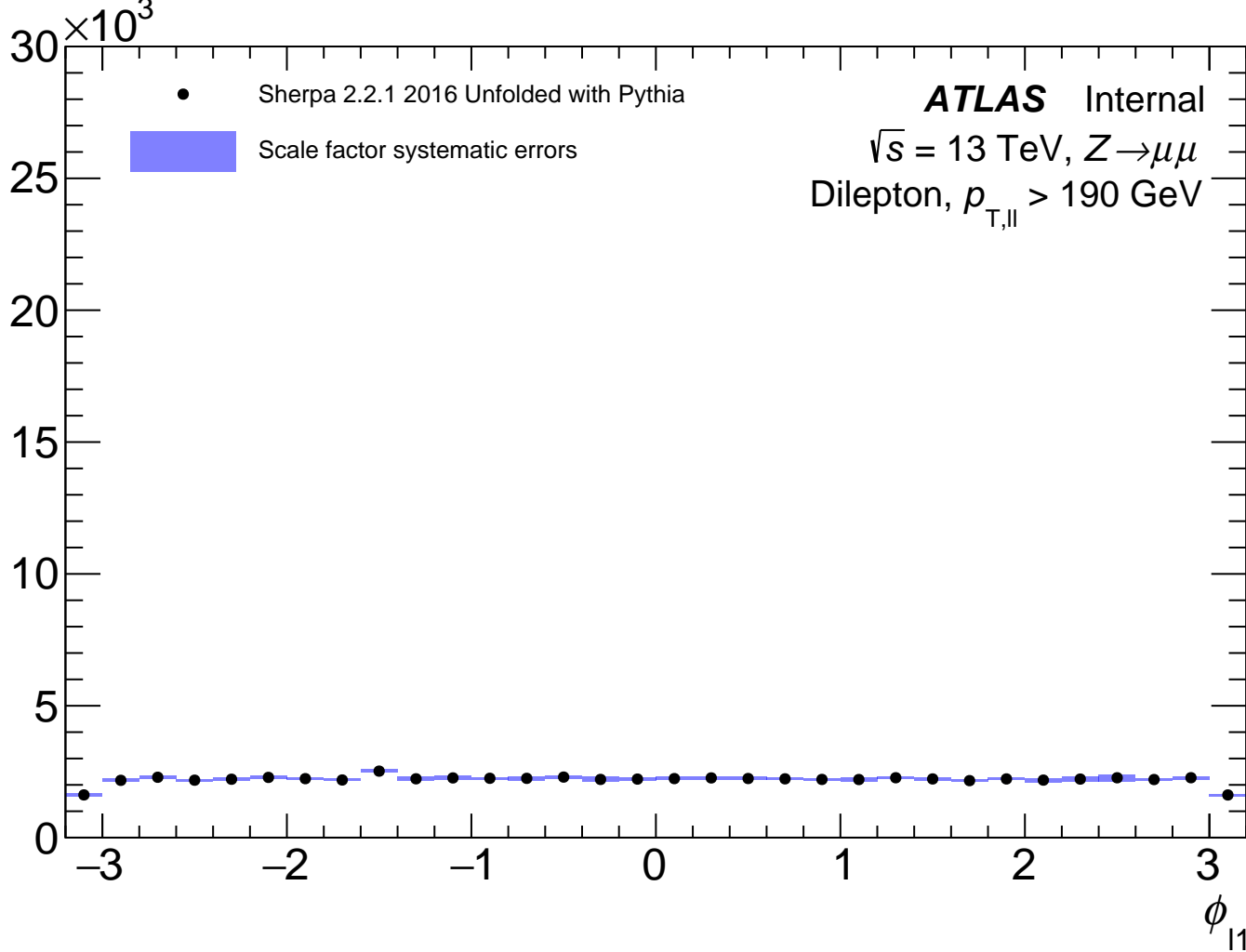
Events



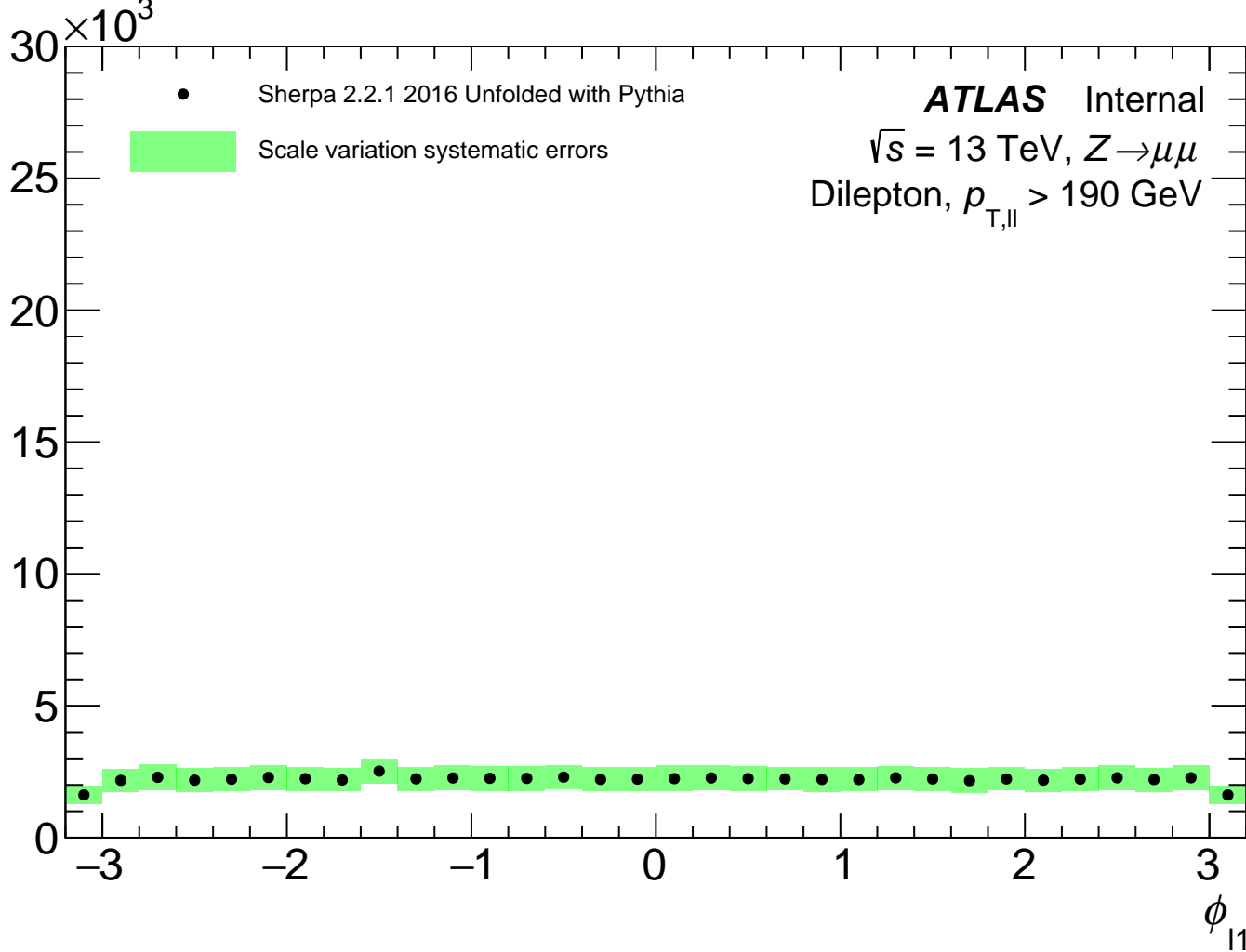
Events



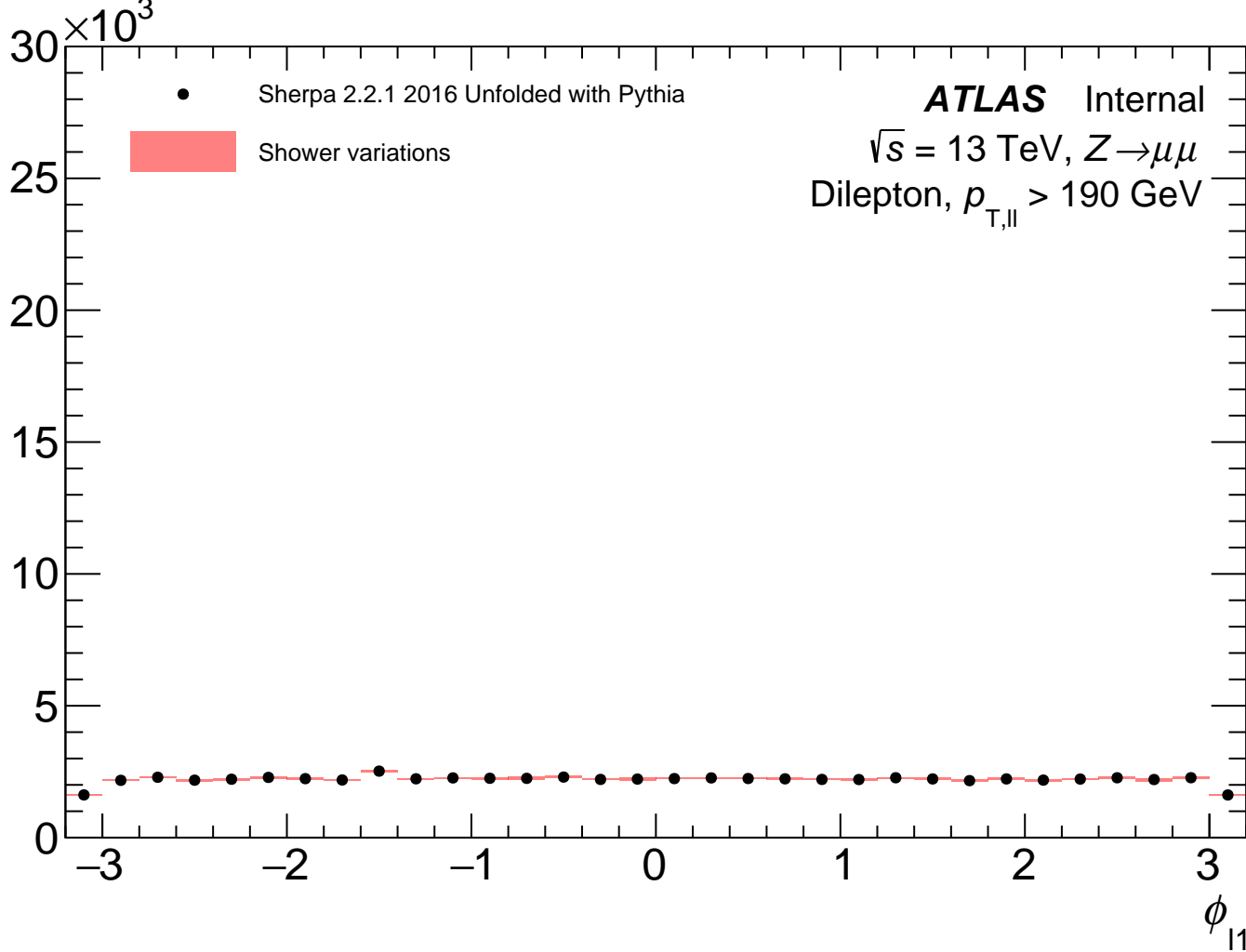
Events



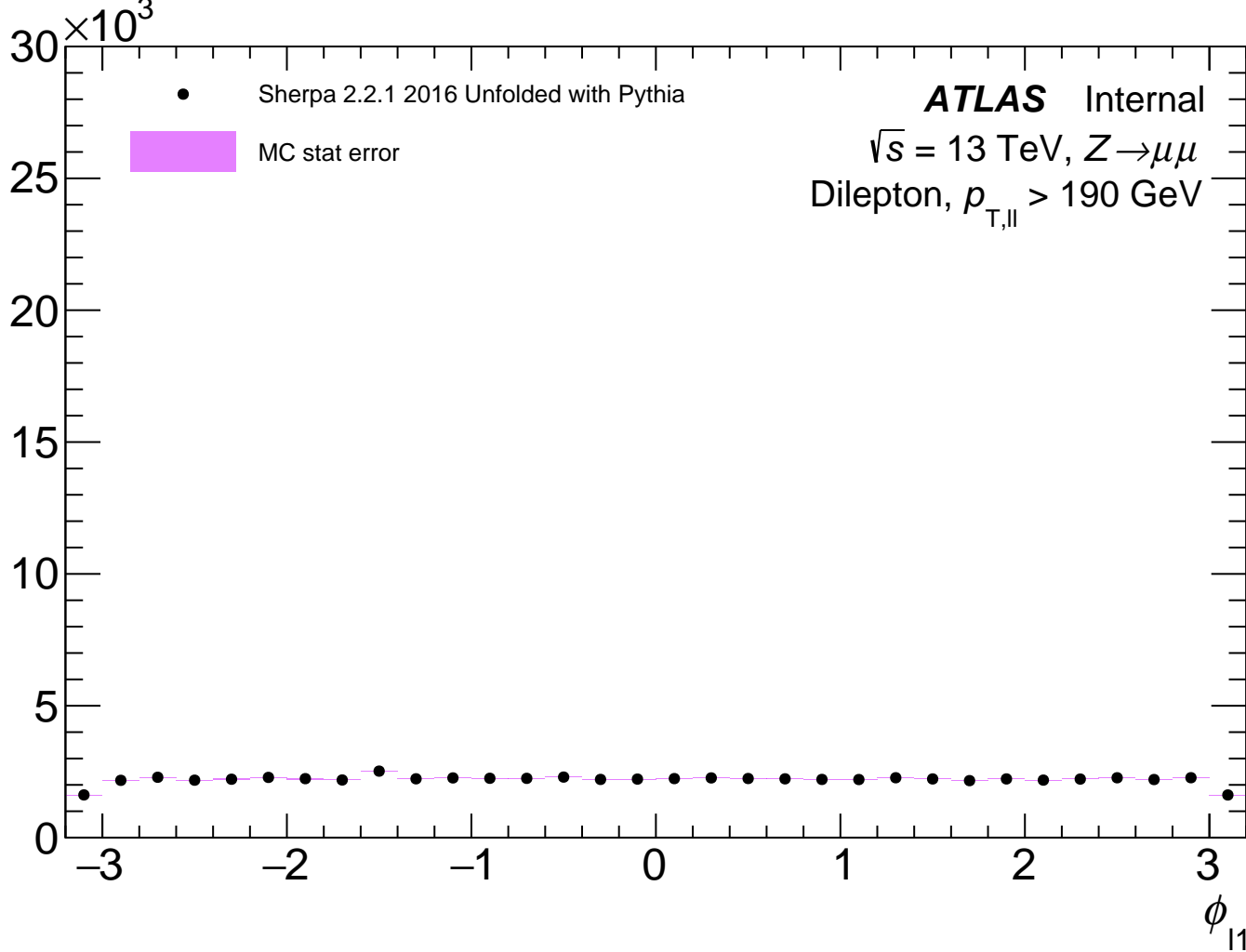
Events



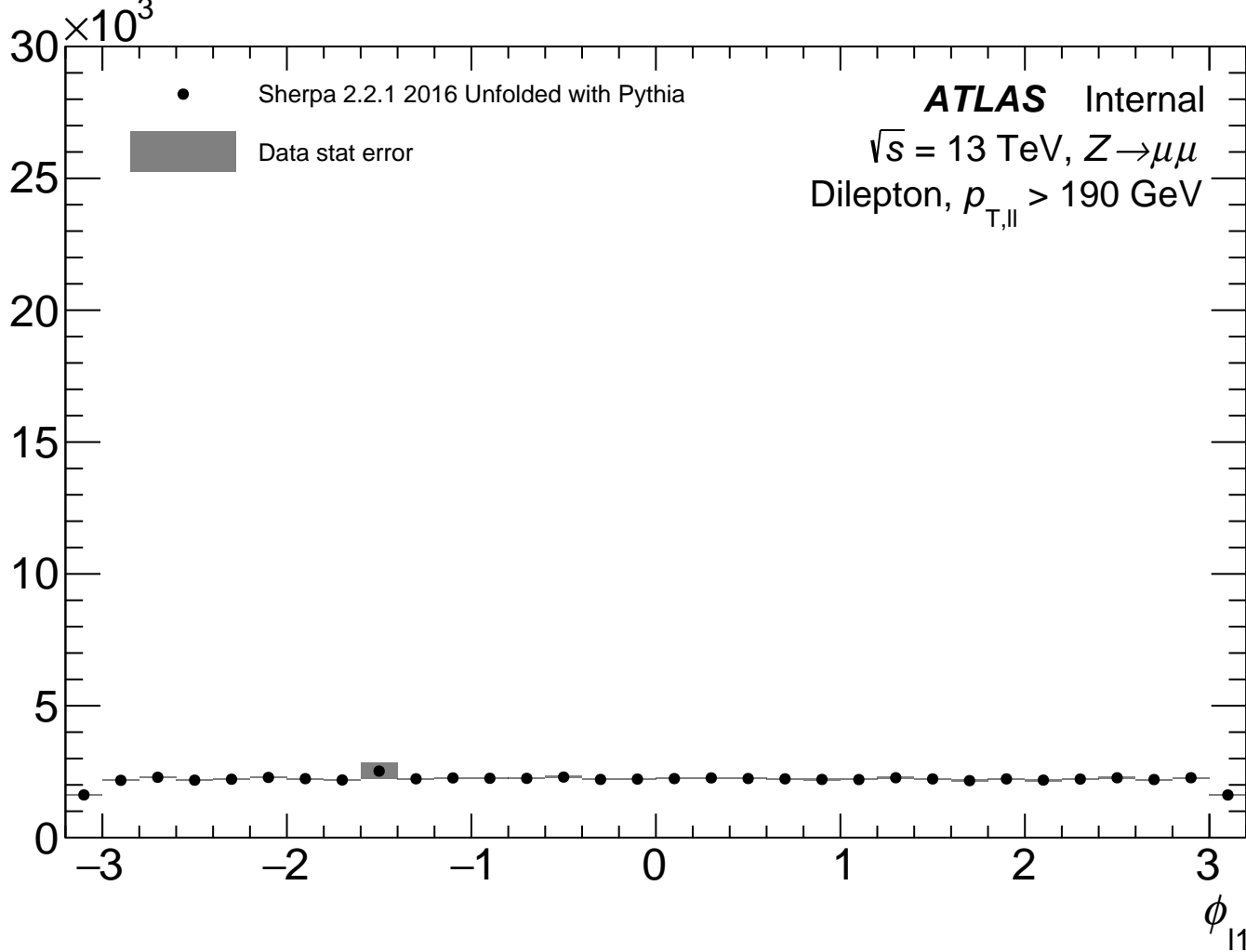
Events



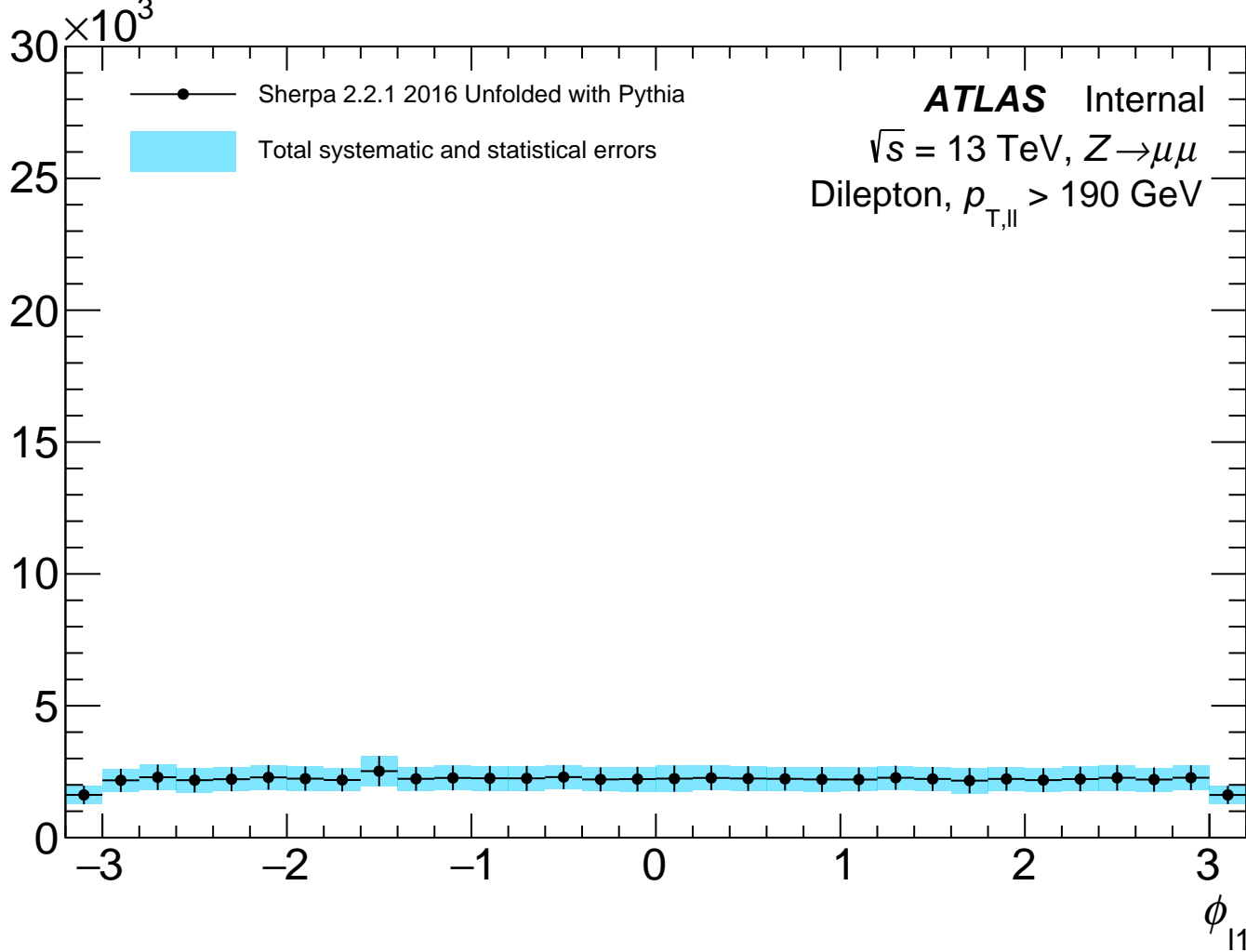
Events



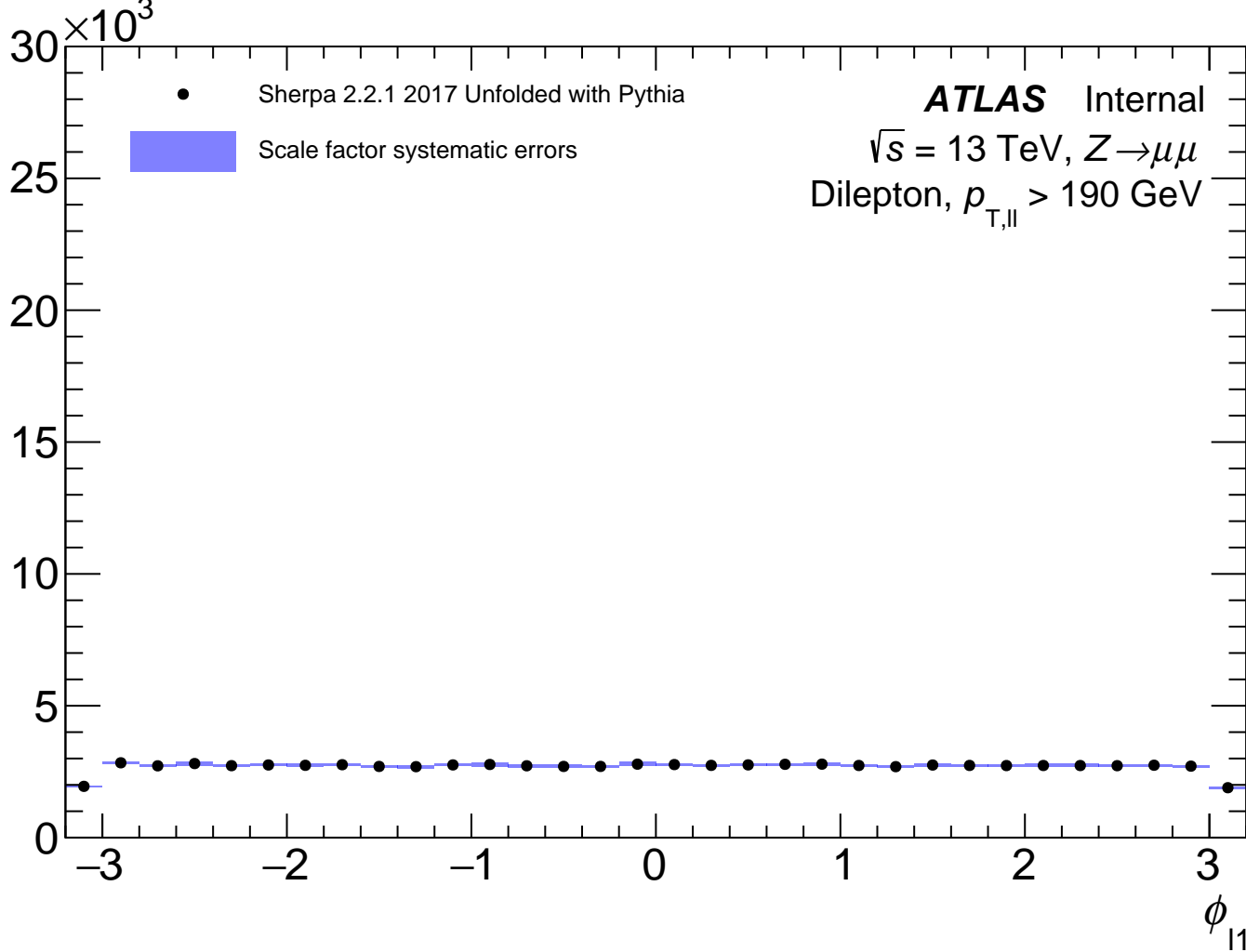
Events



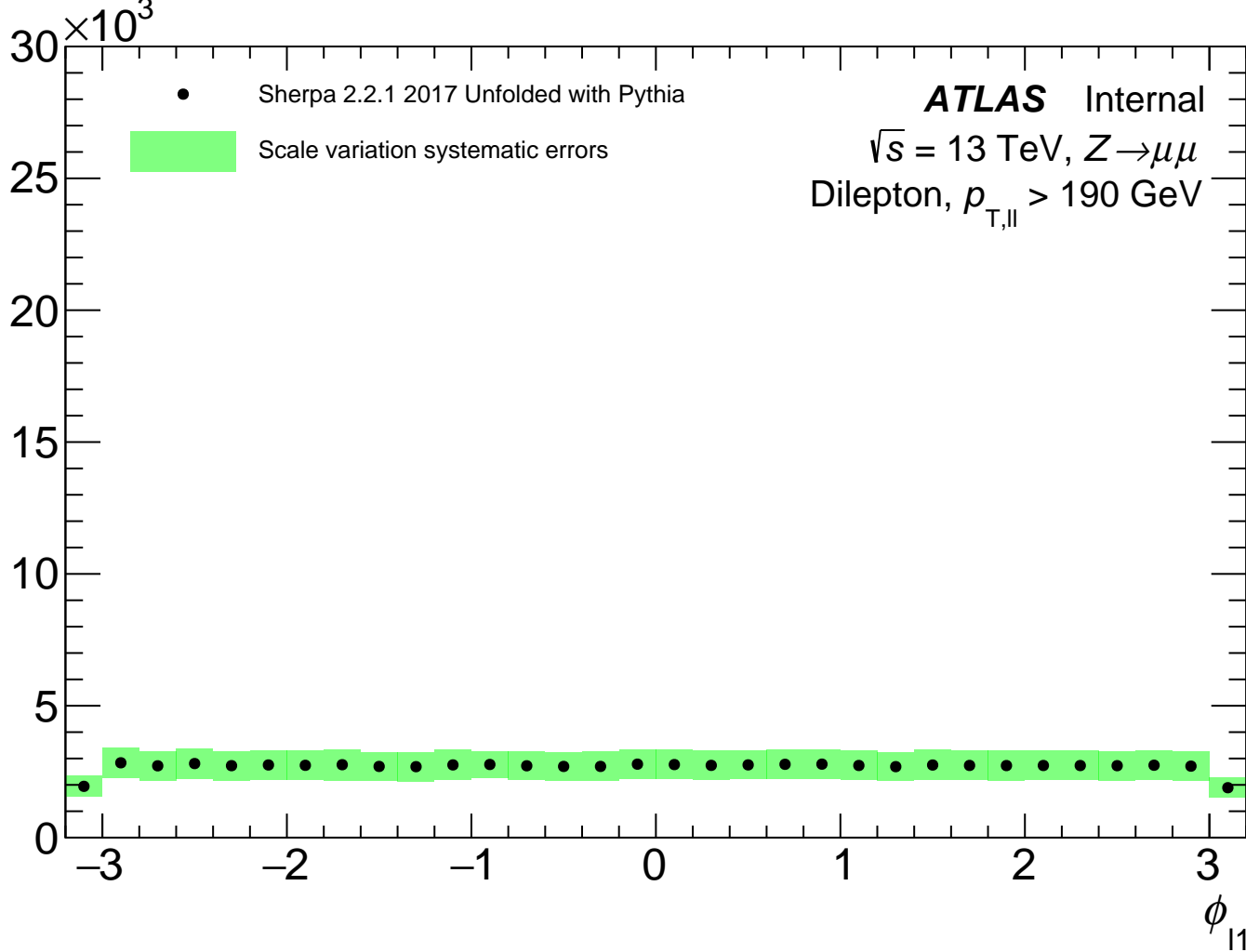
Events



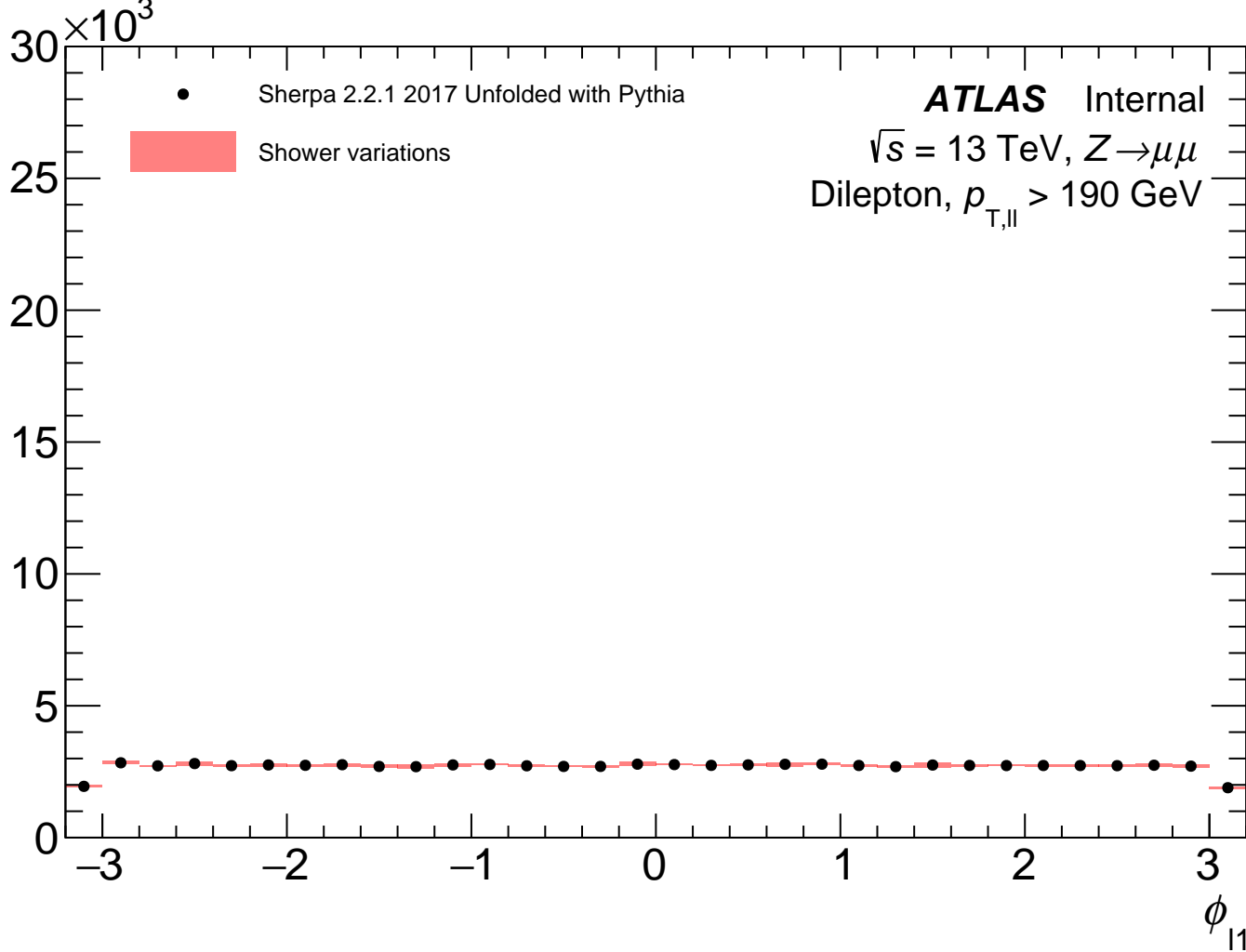
Events



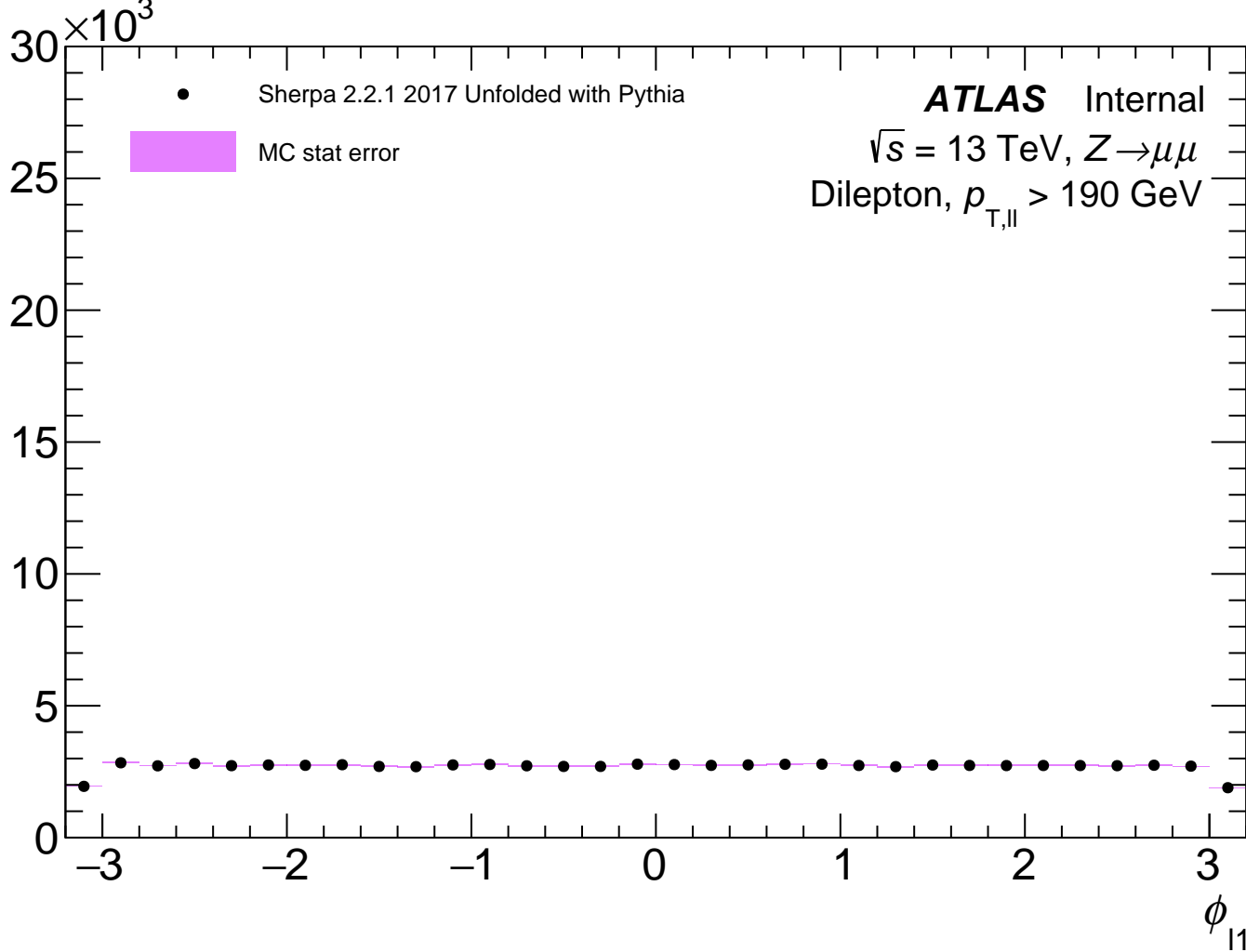
Events



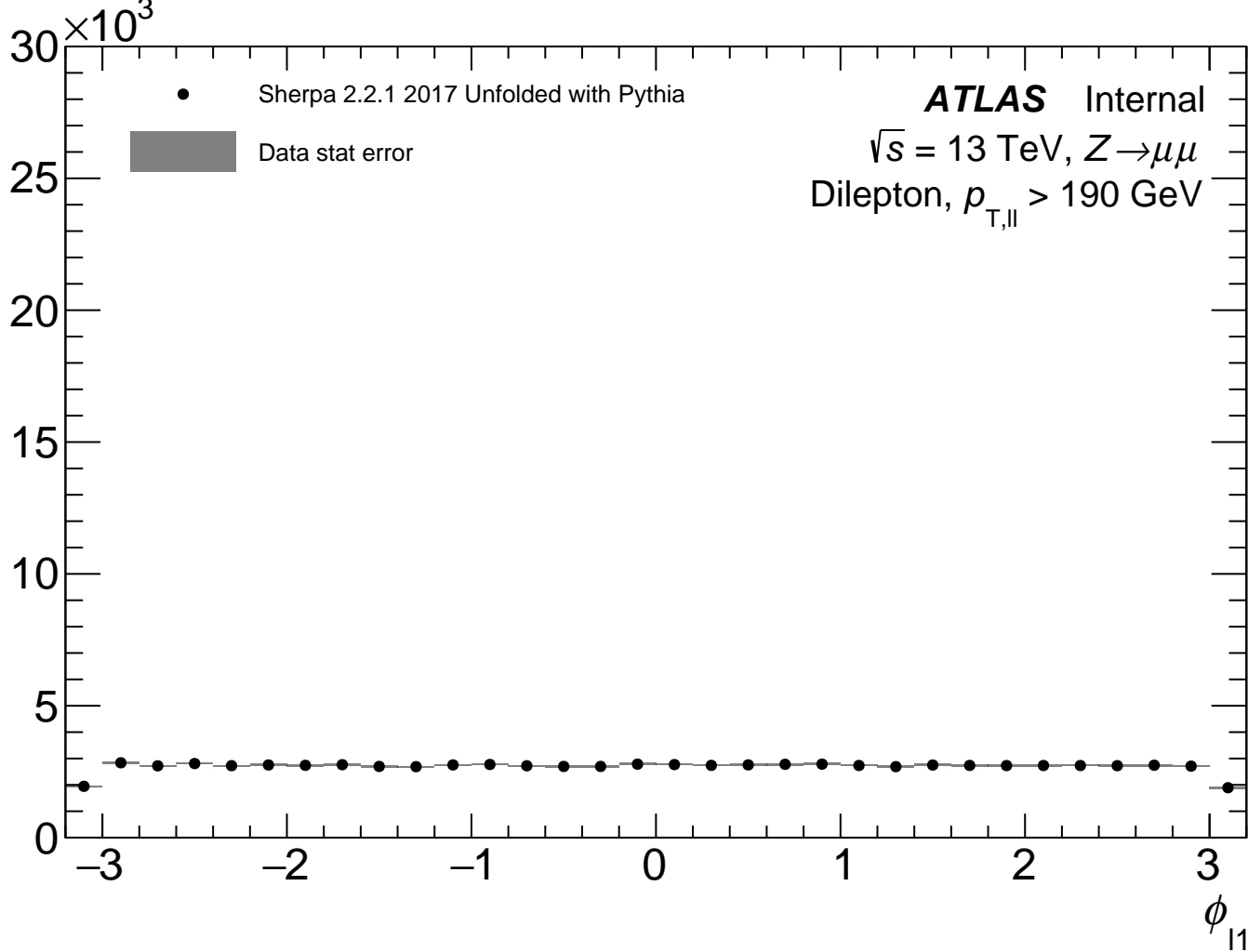
Events



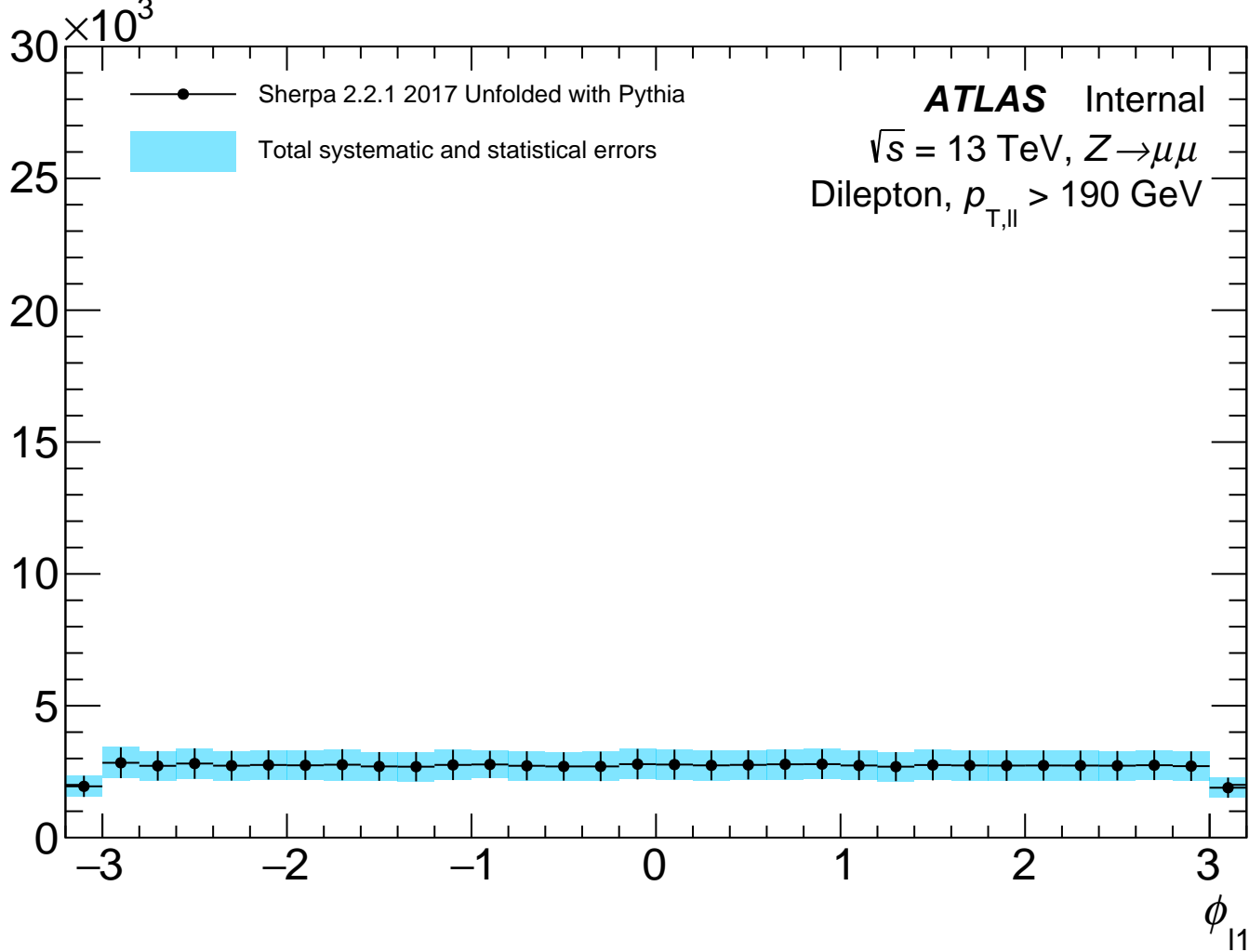
Events



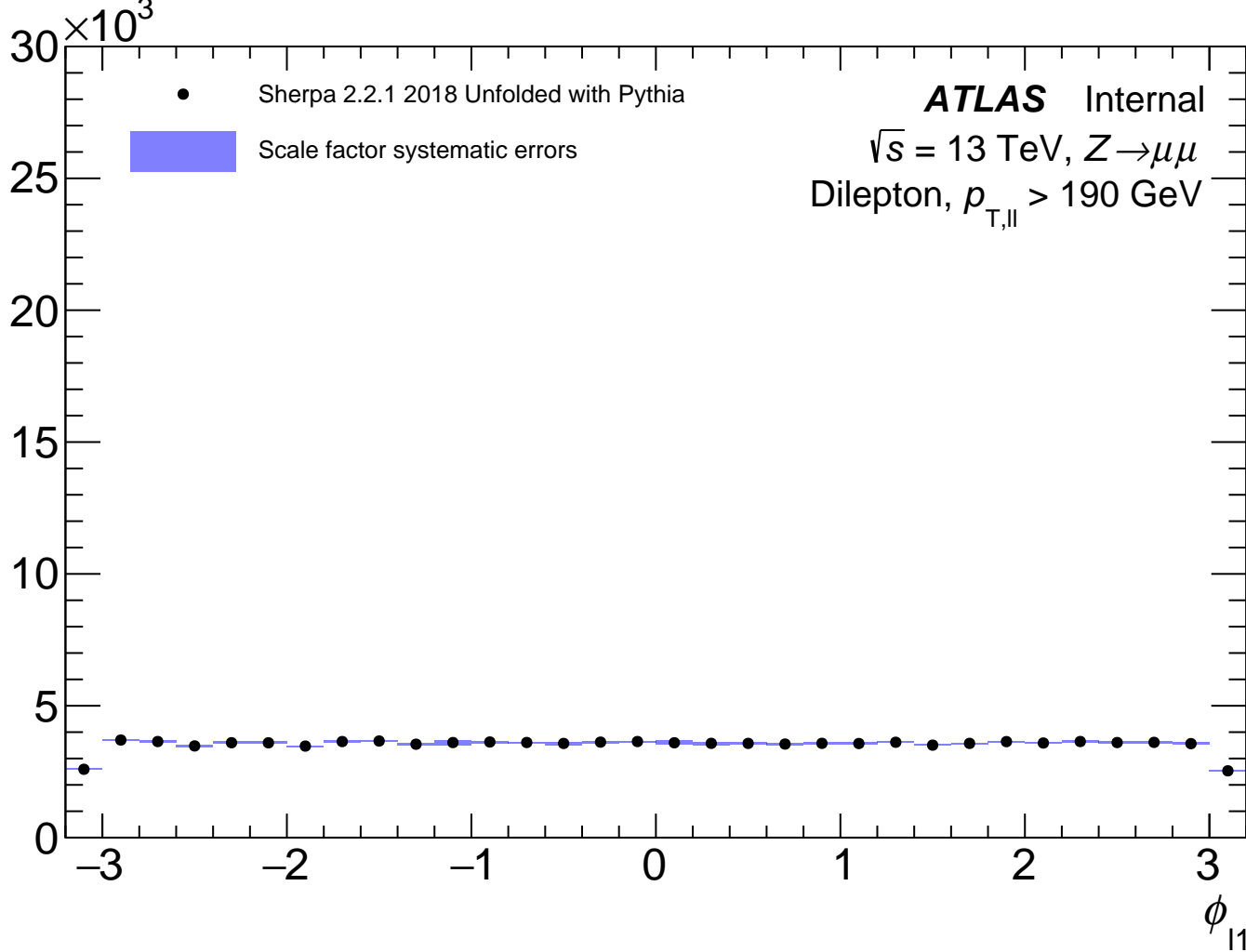
Events



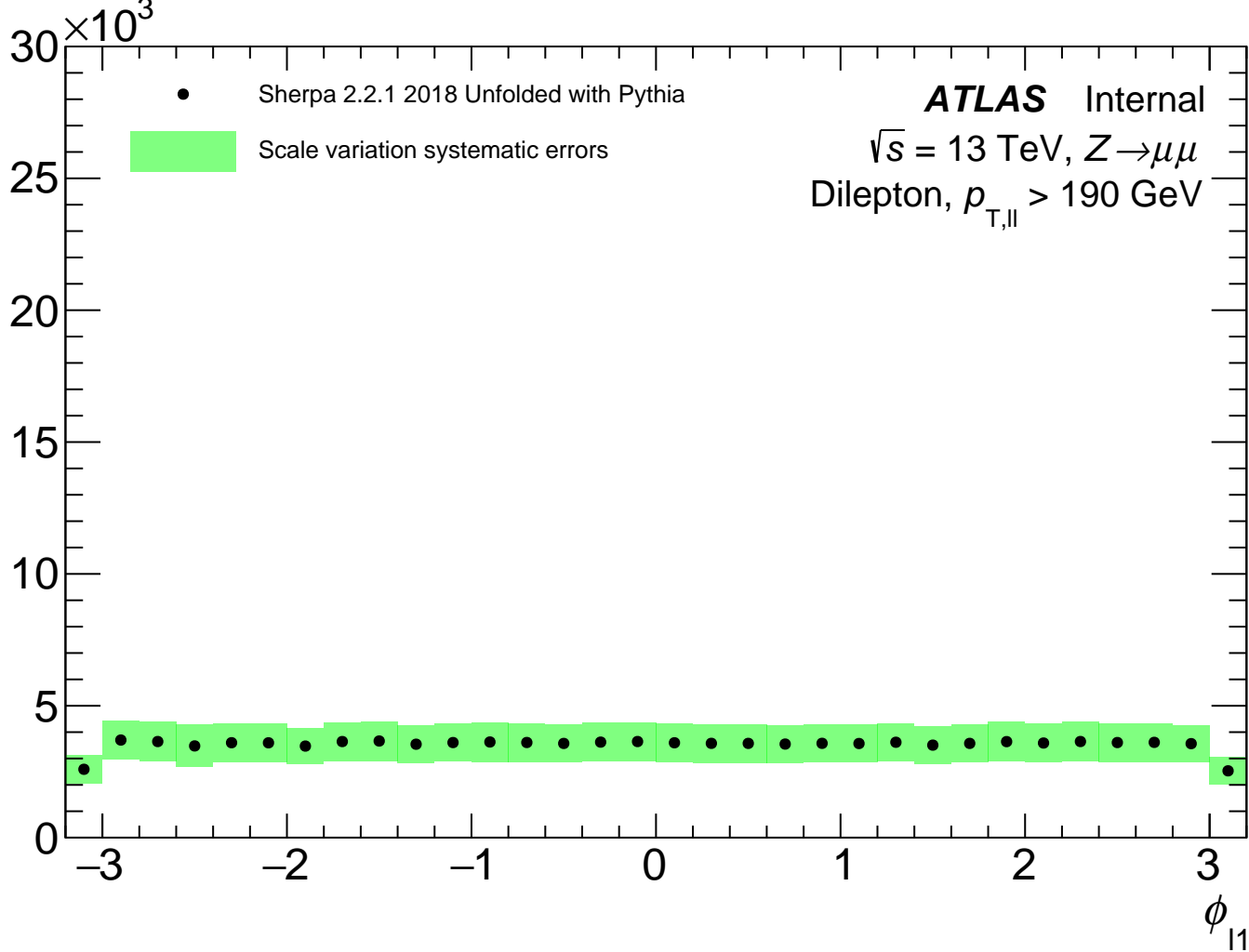
Events



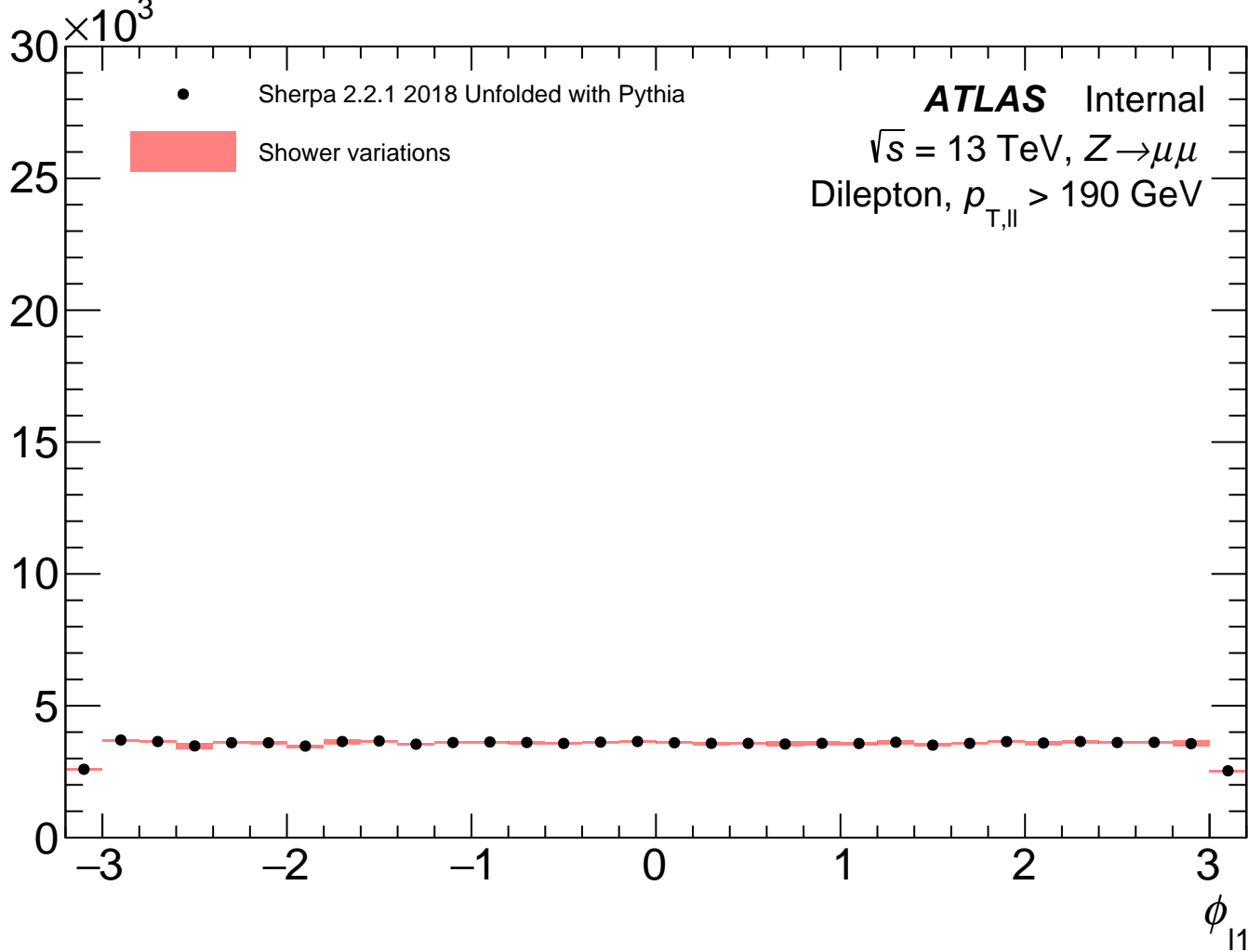
Events



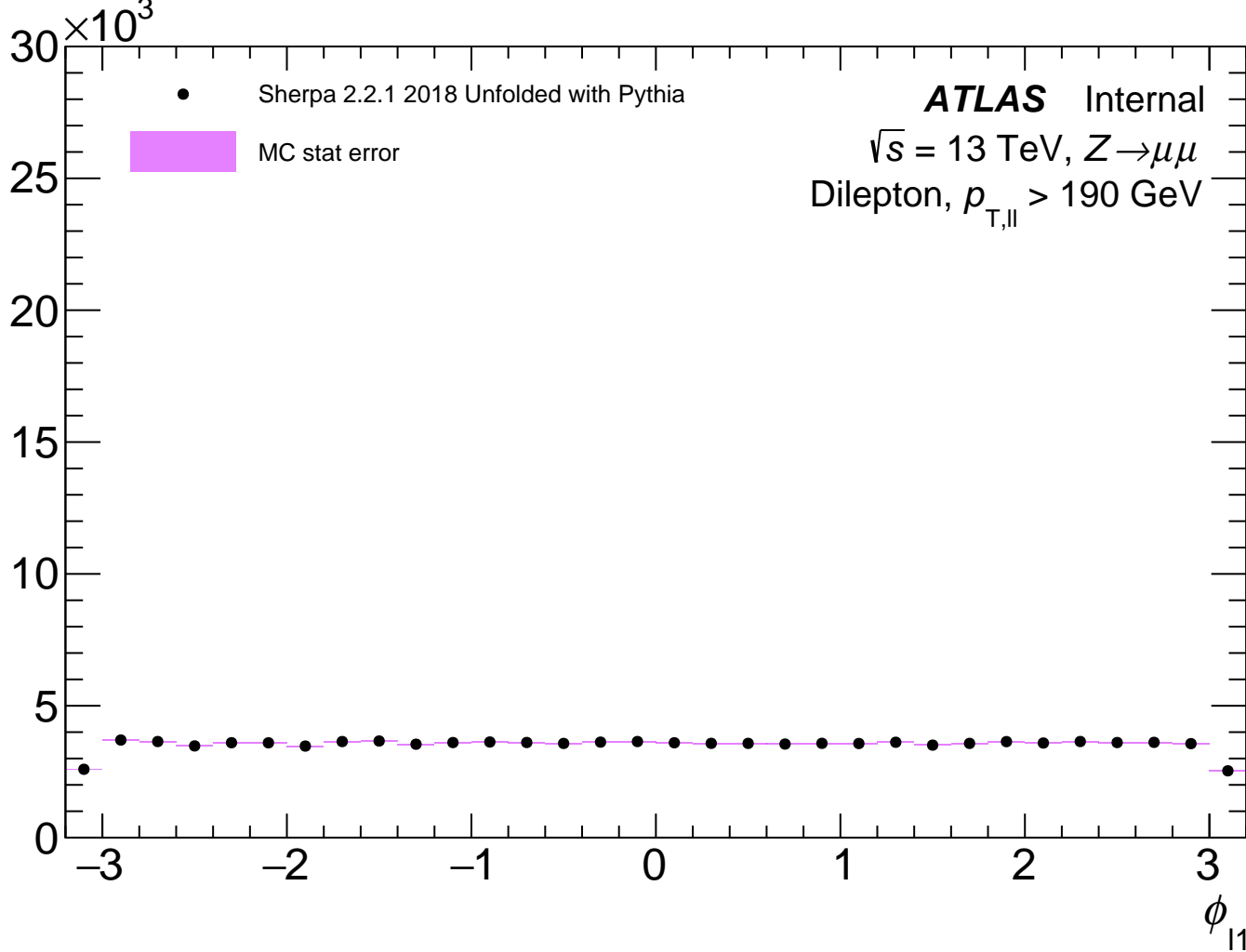
Events



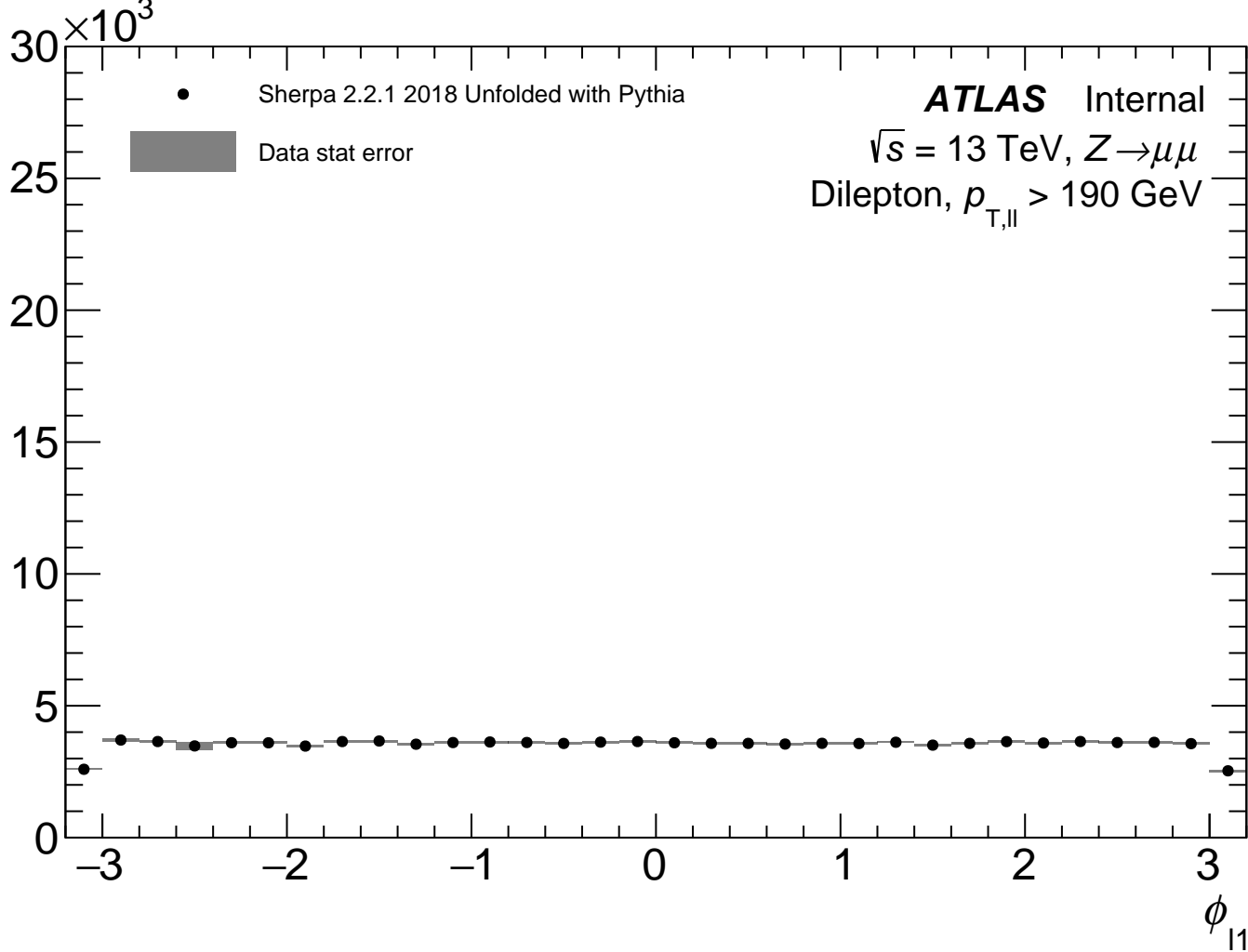
Events



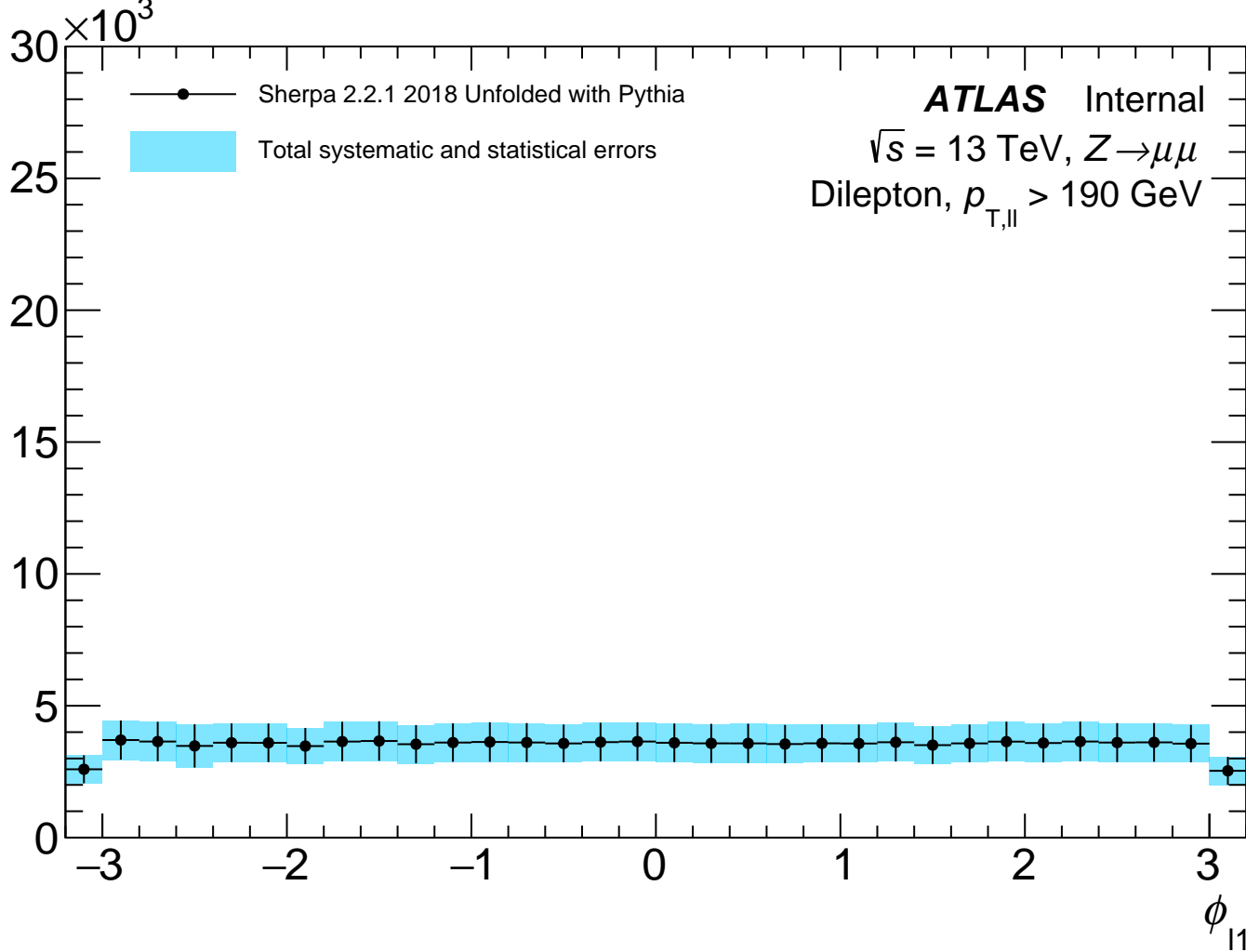
Events



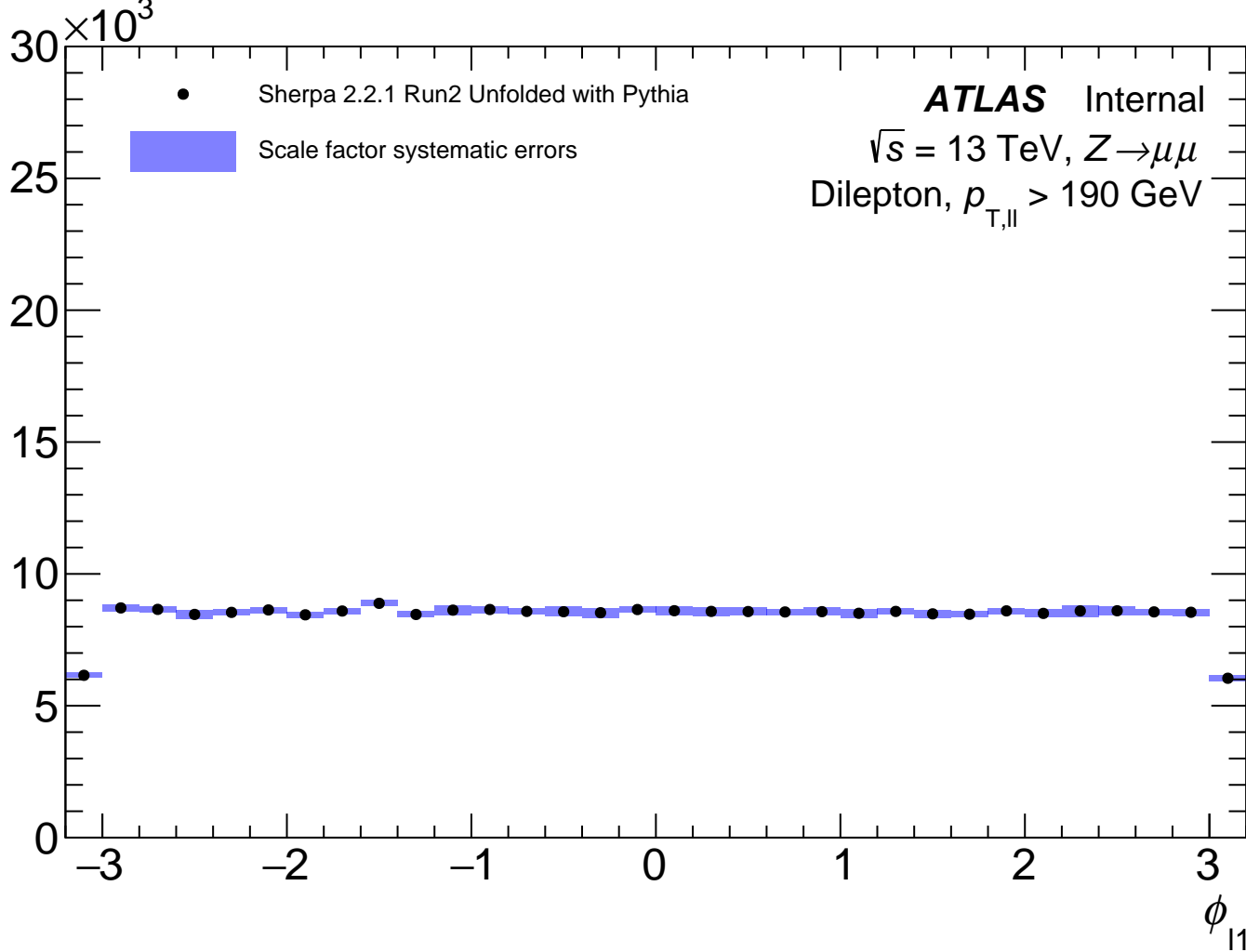
Events



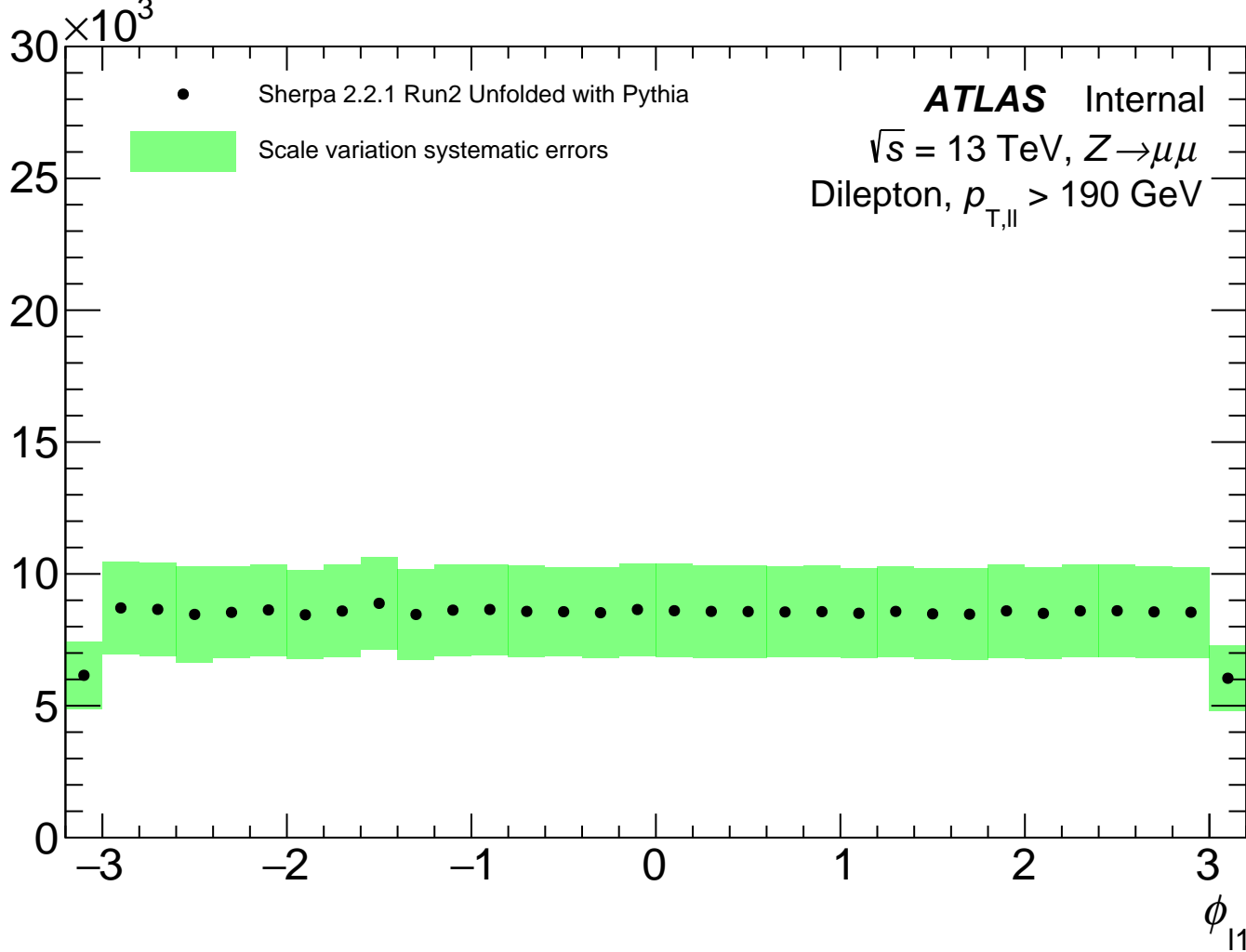
Events



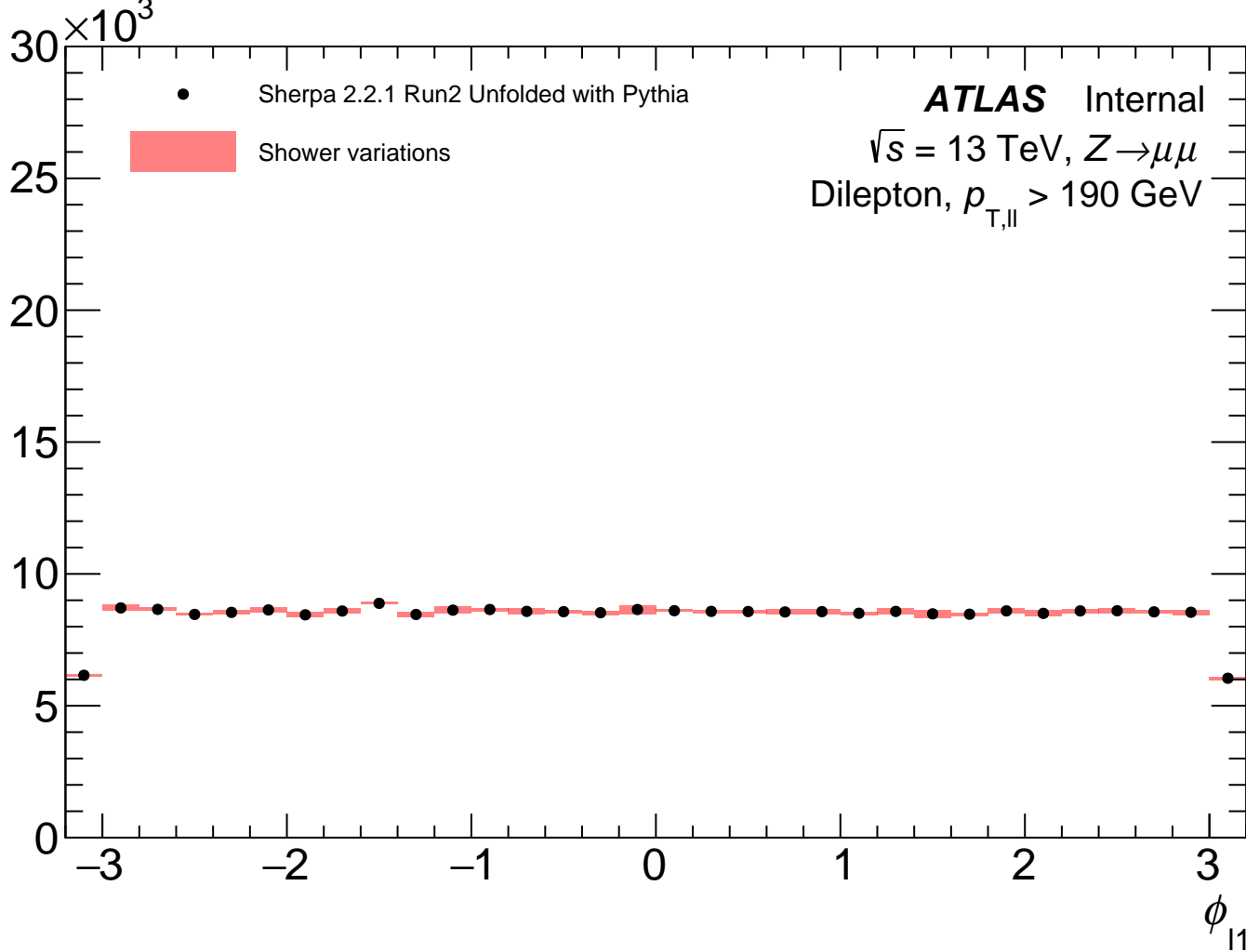
Events



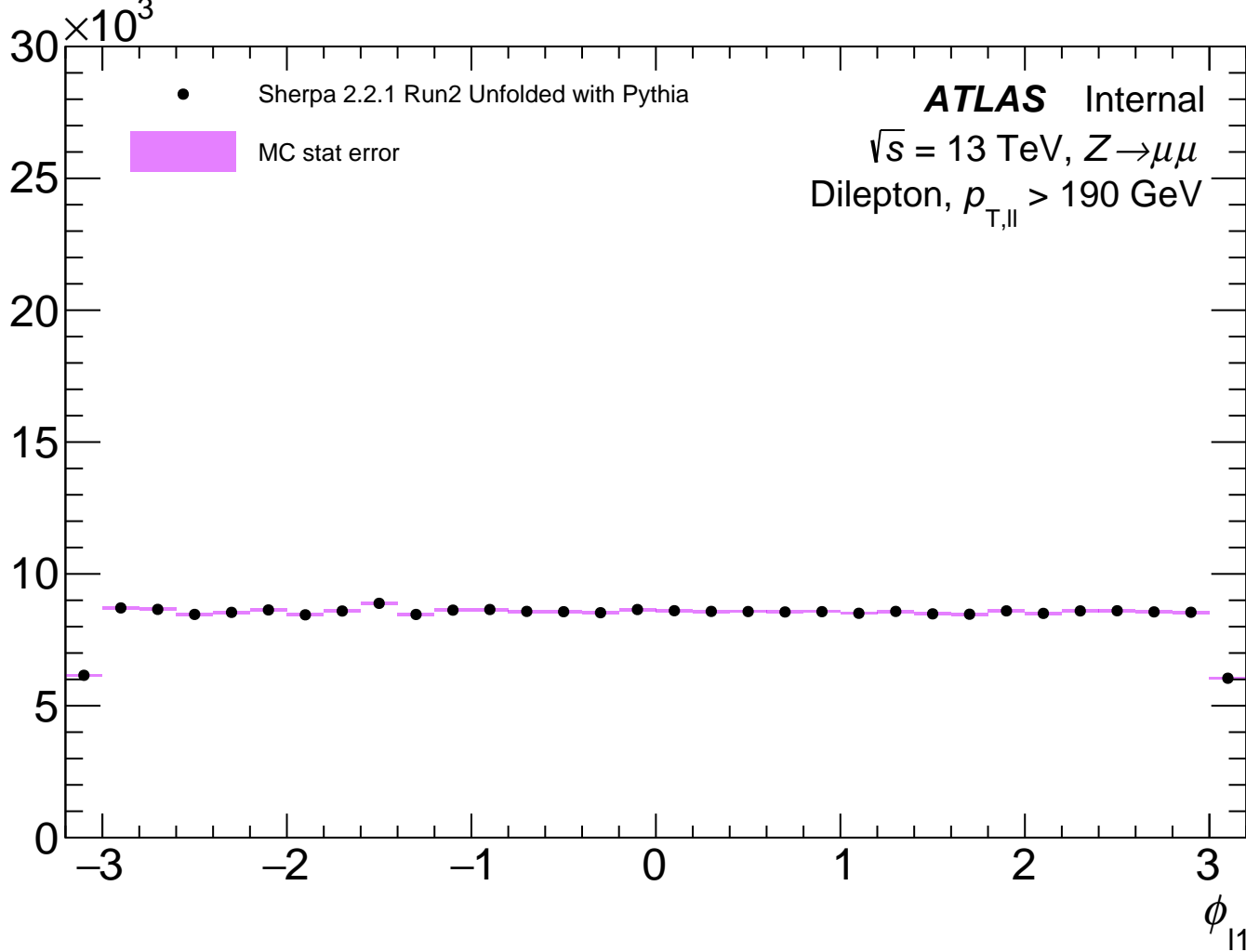
Events



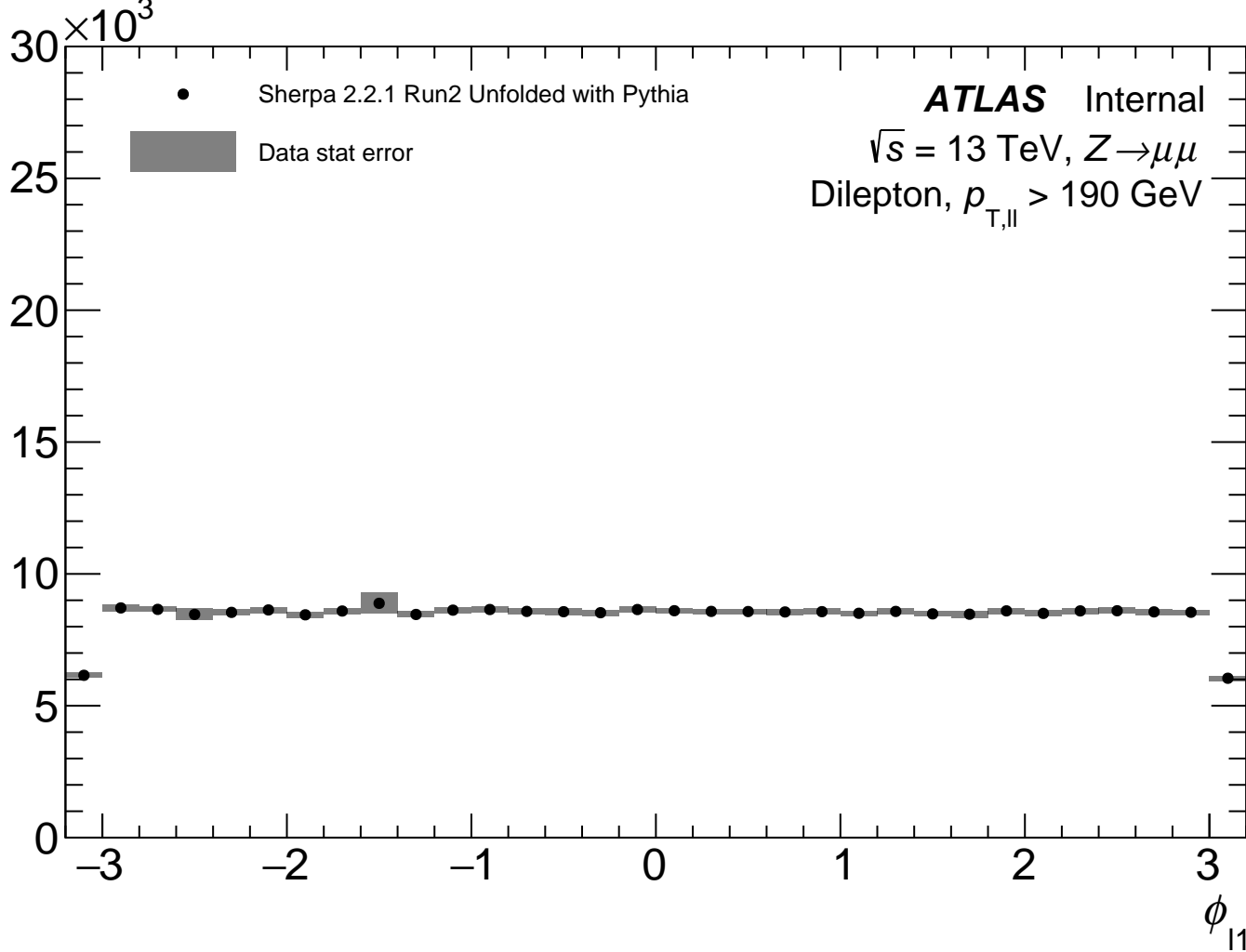
Events



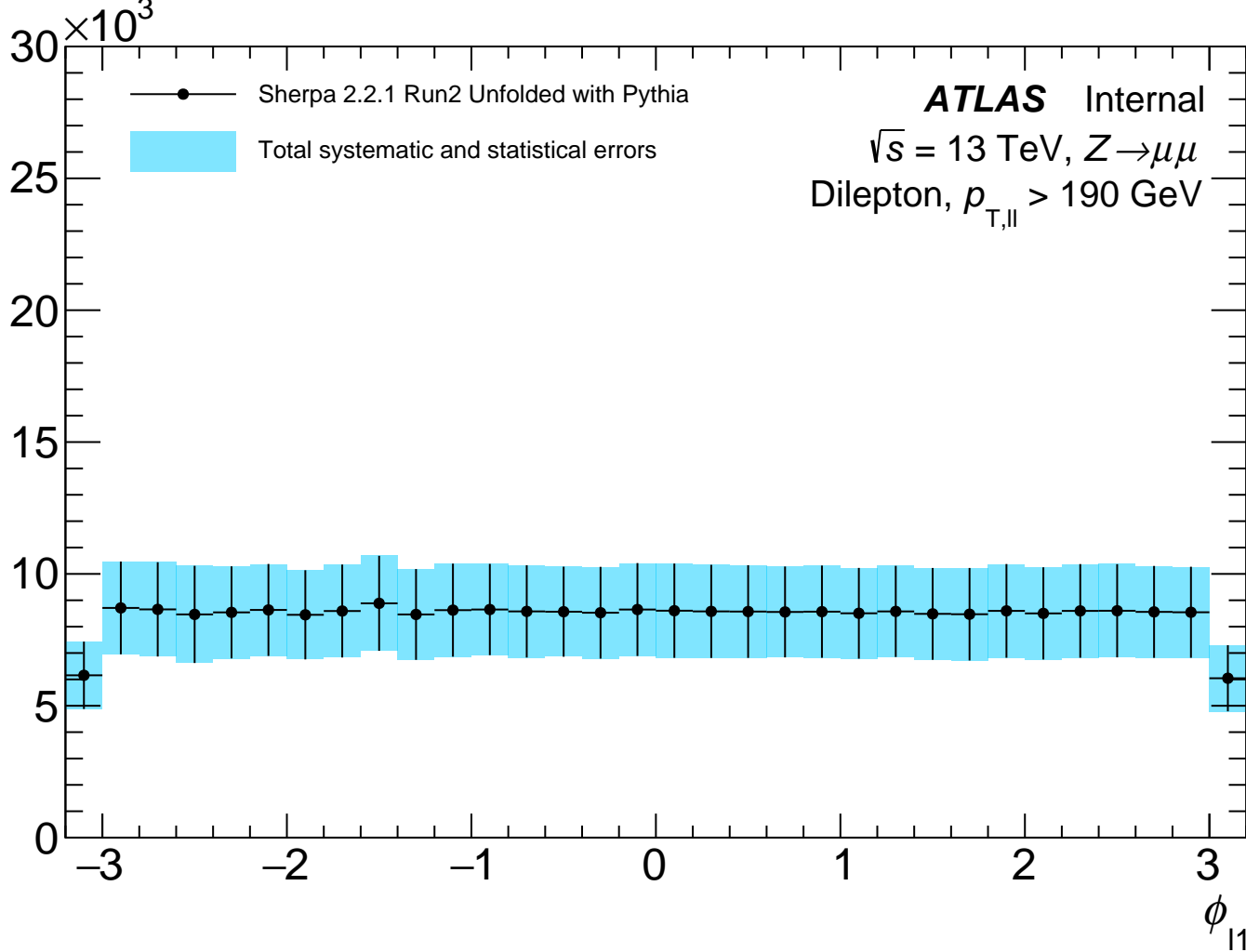
Events



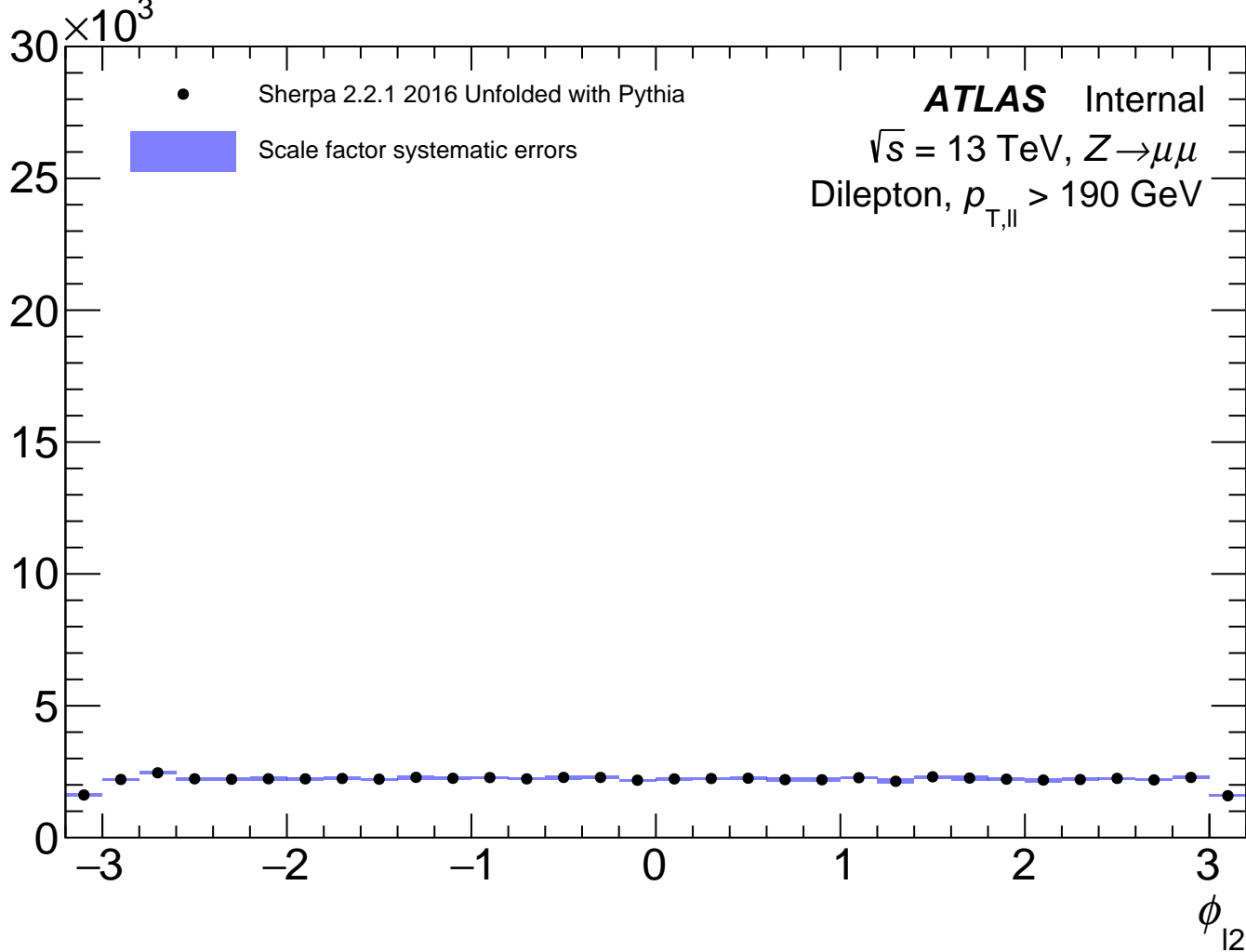
Events



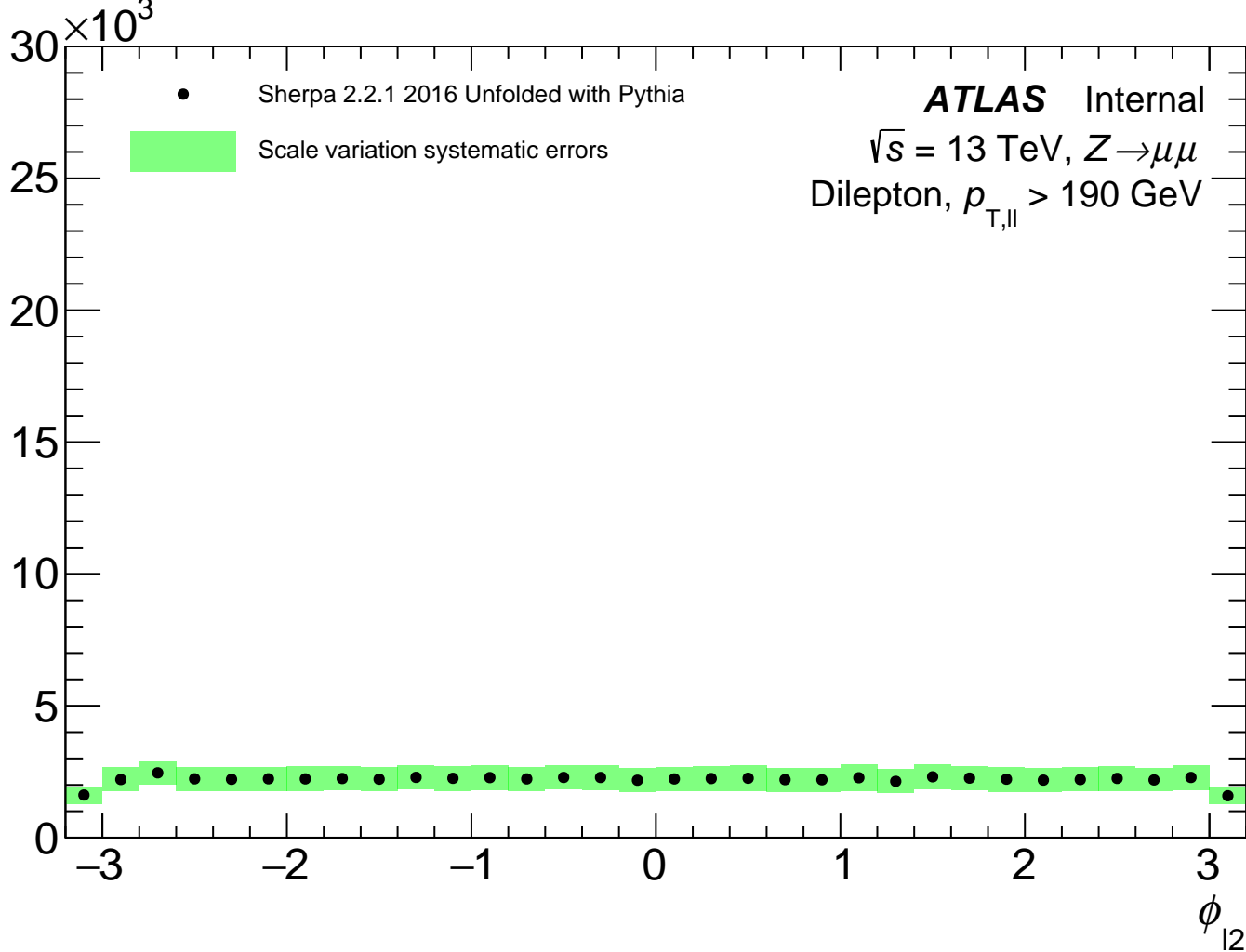
Events



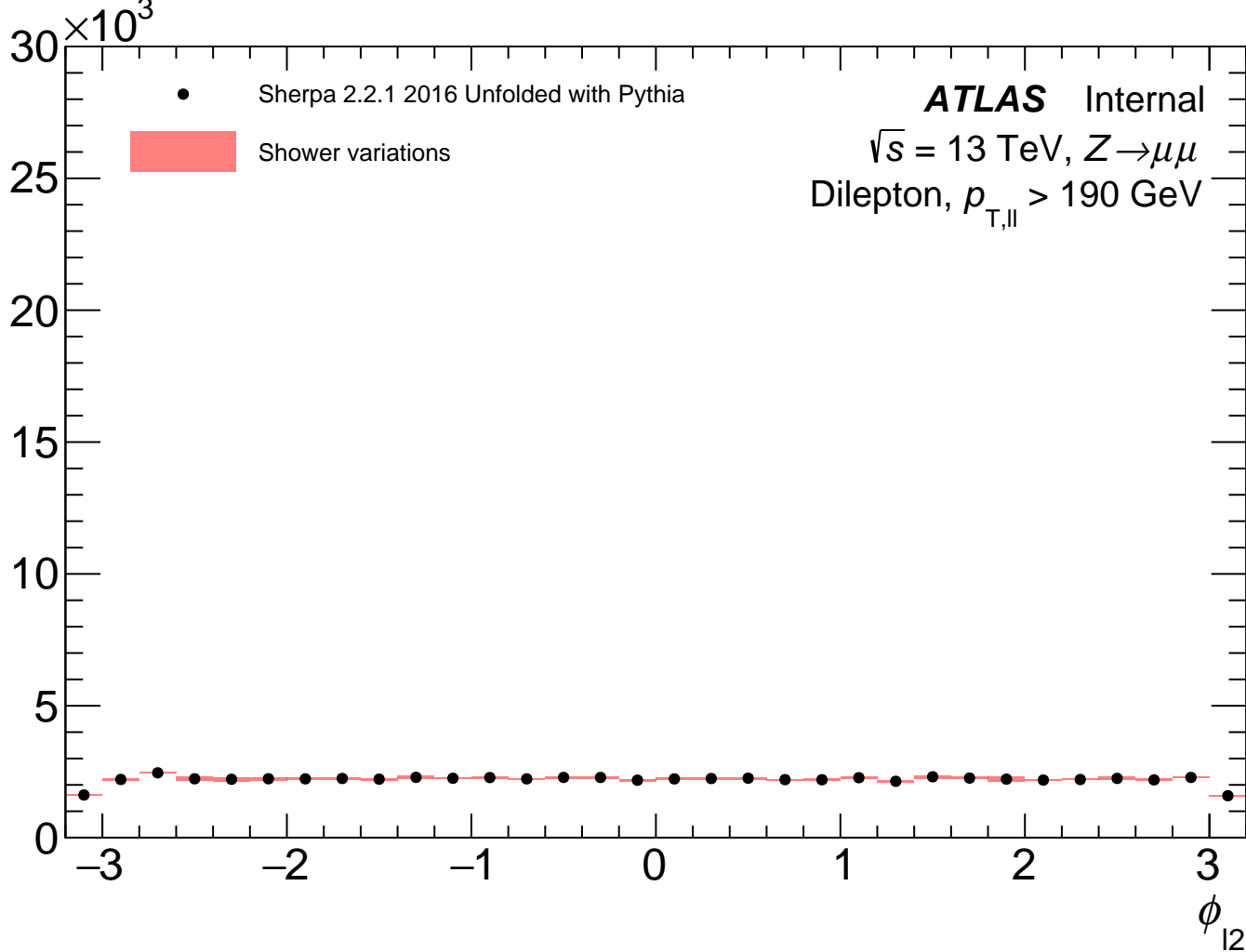
Events



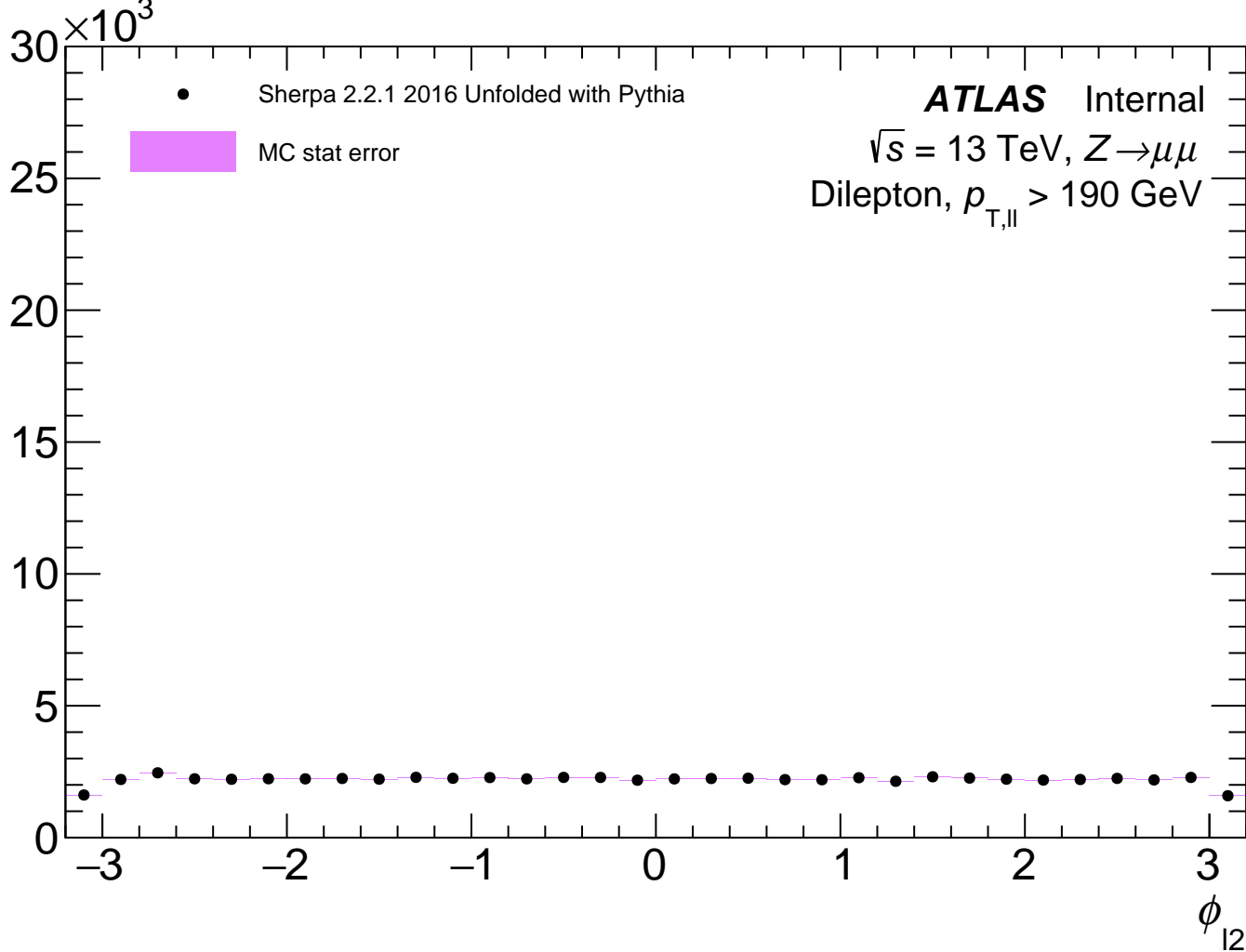
Events



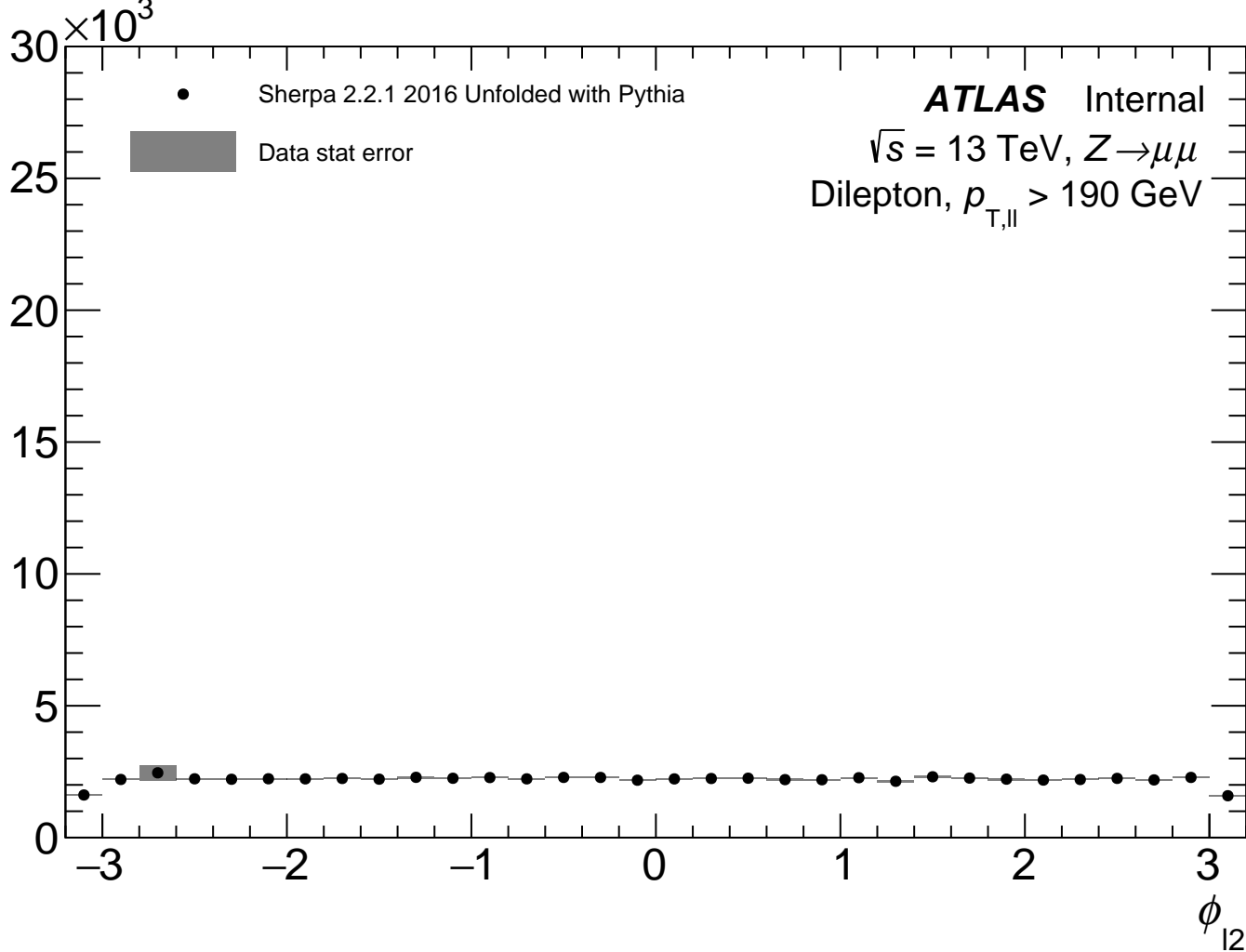
Events



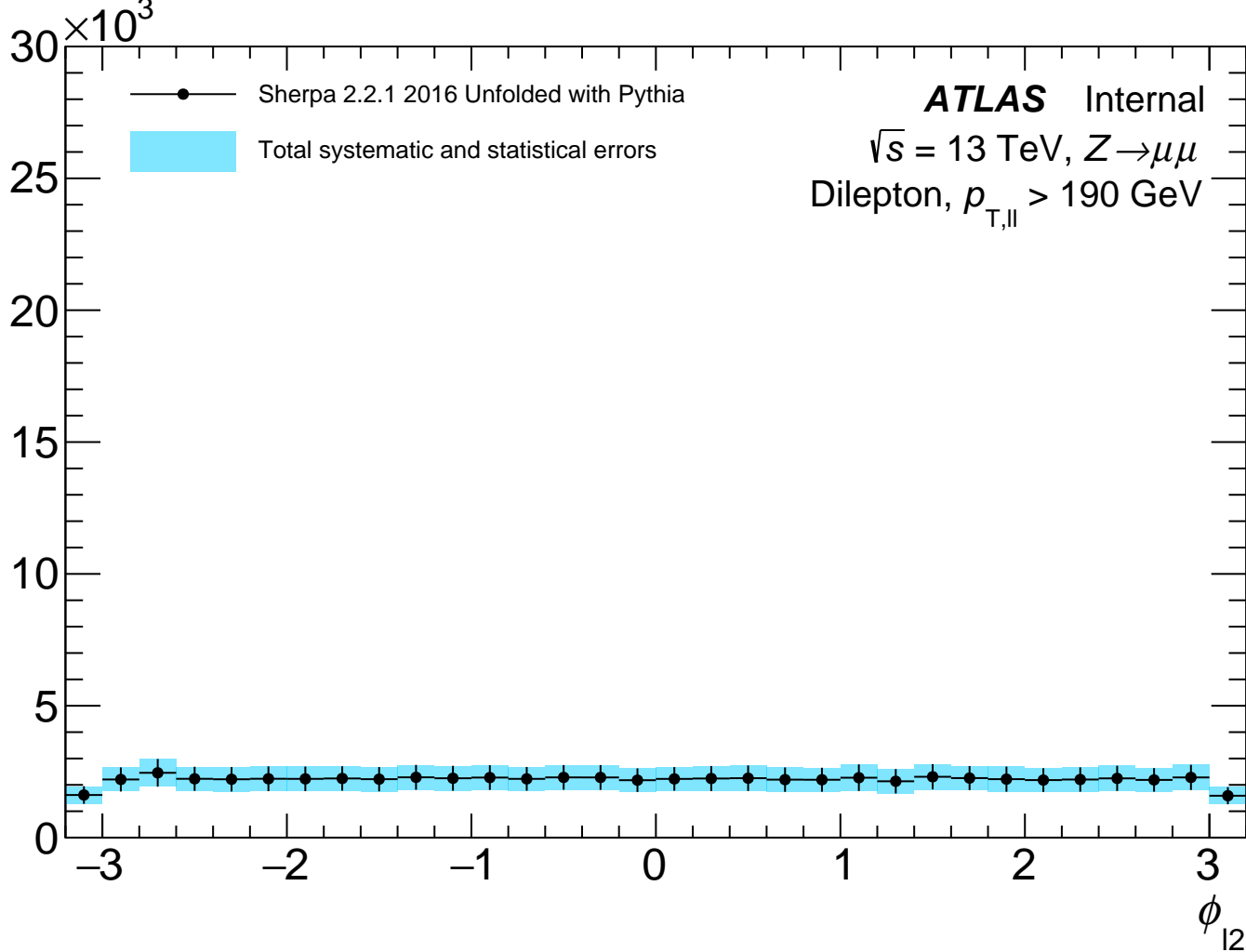
Events



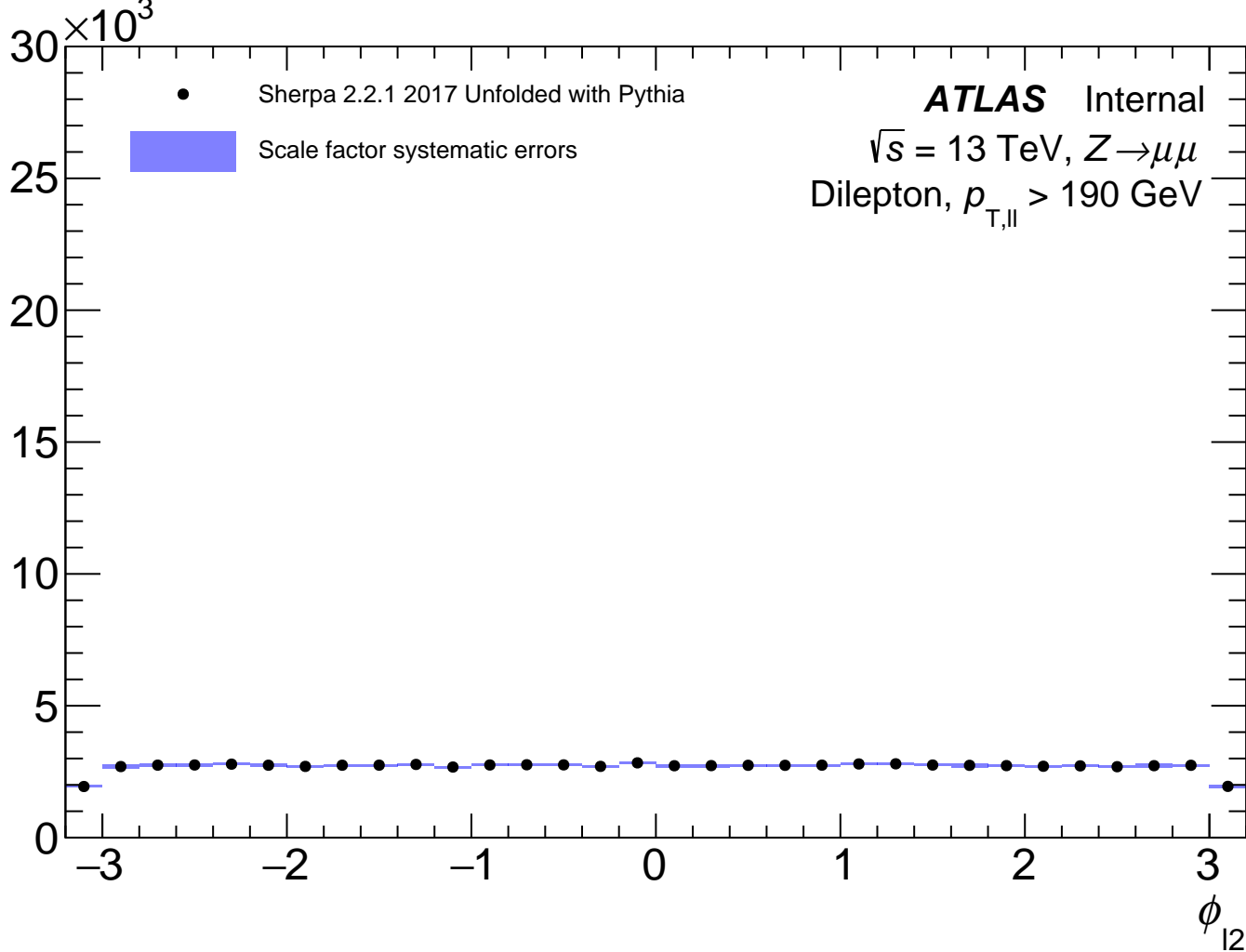
Events



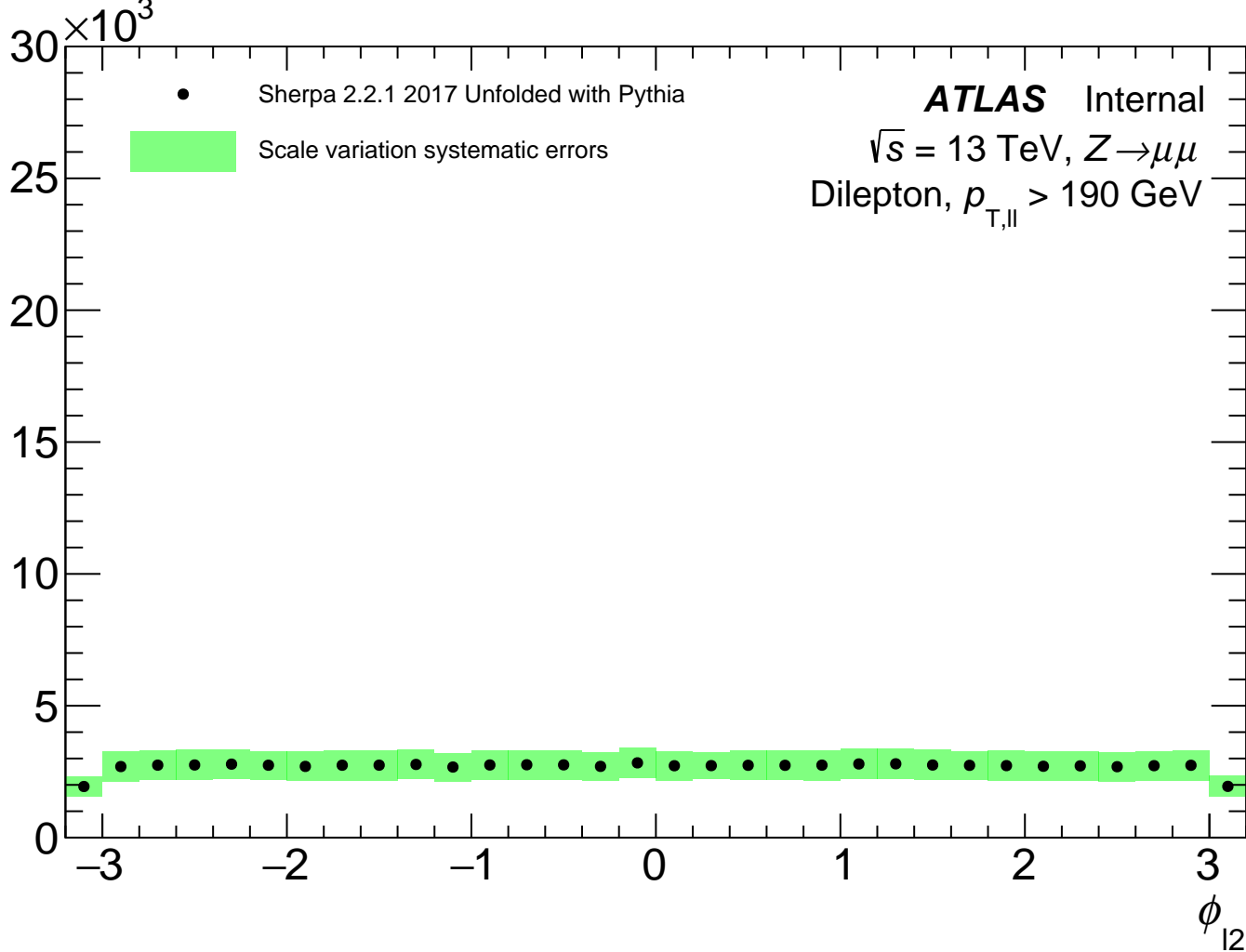
Events



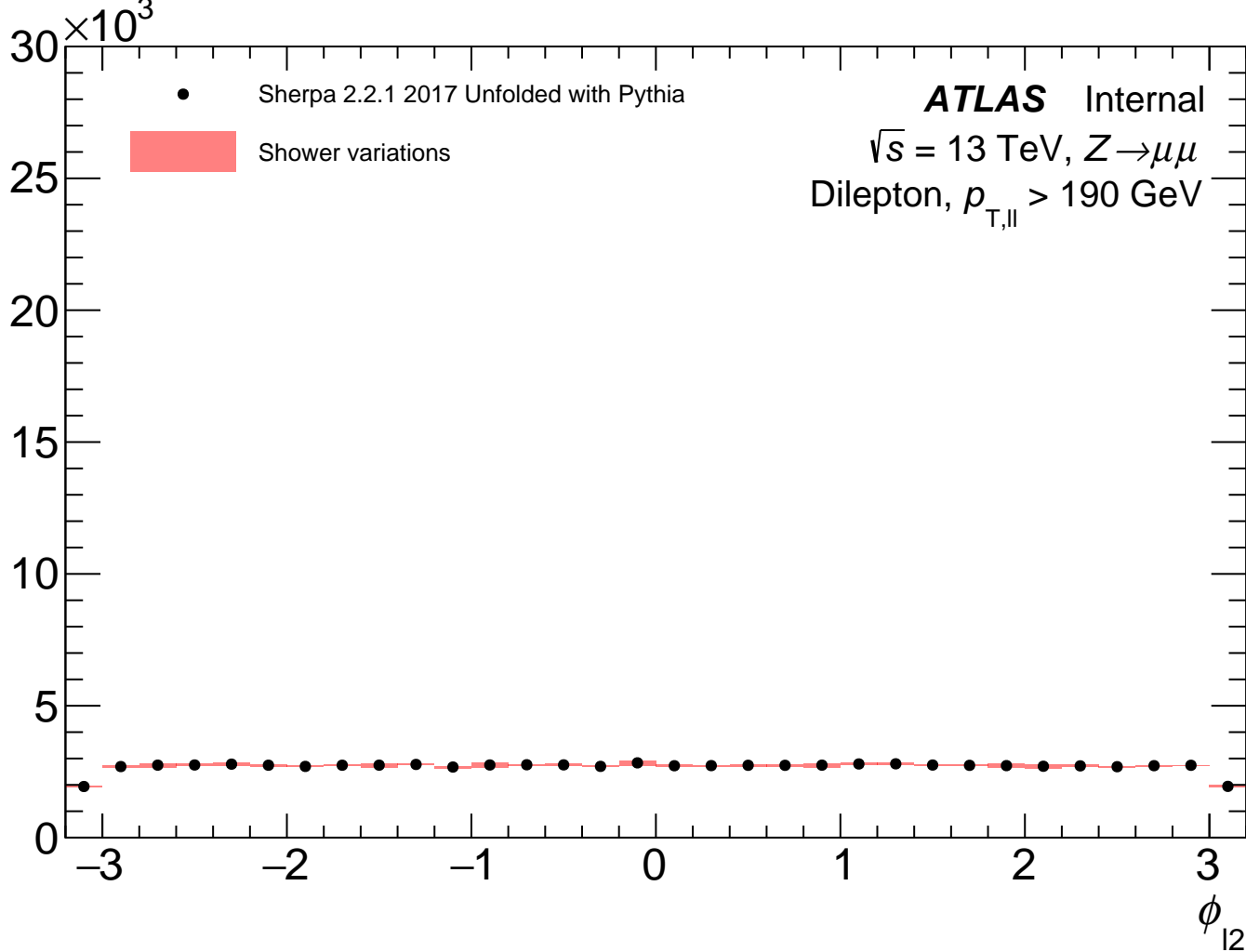
Events



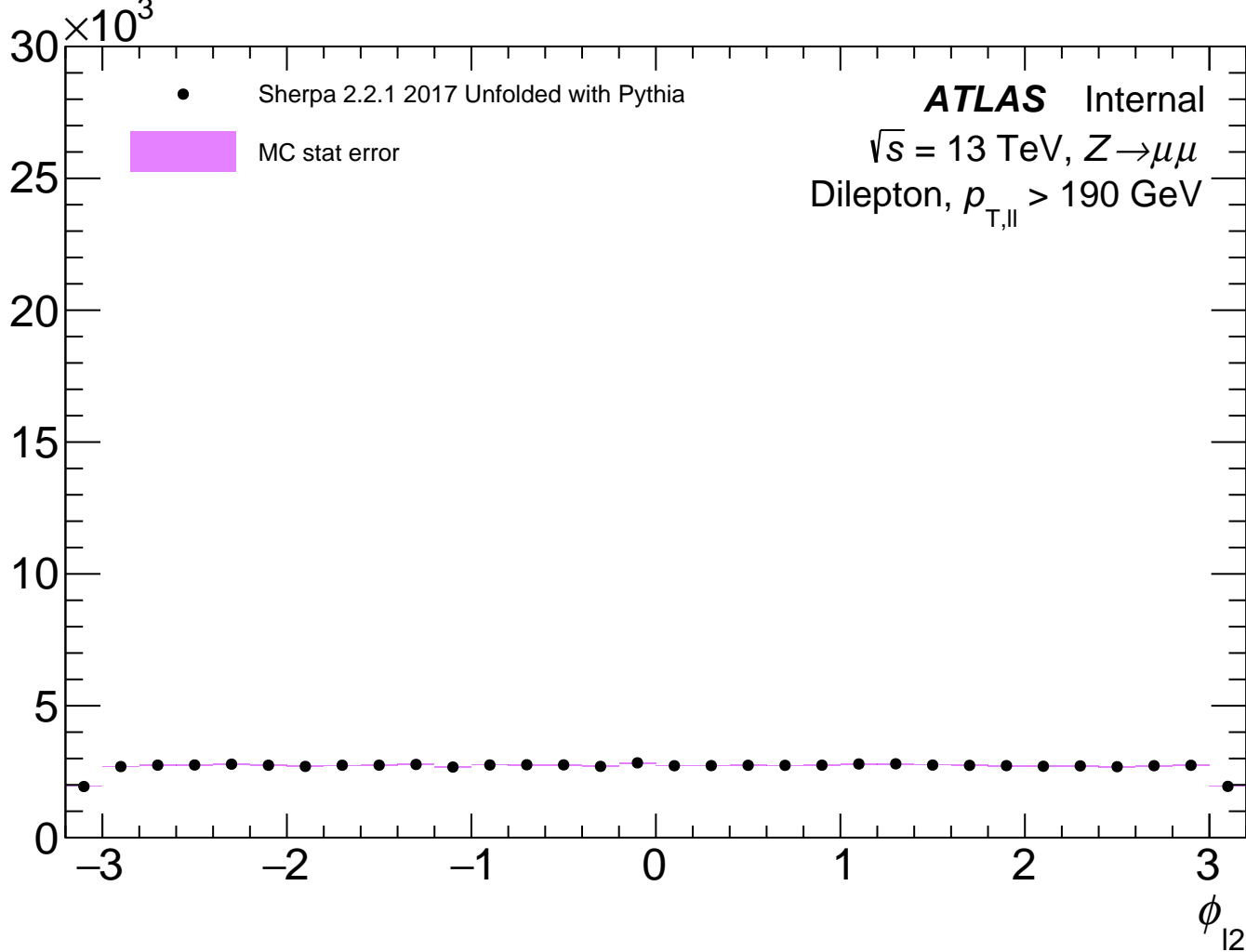
Events



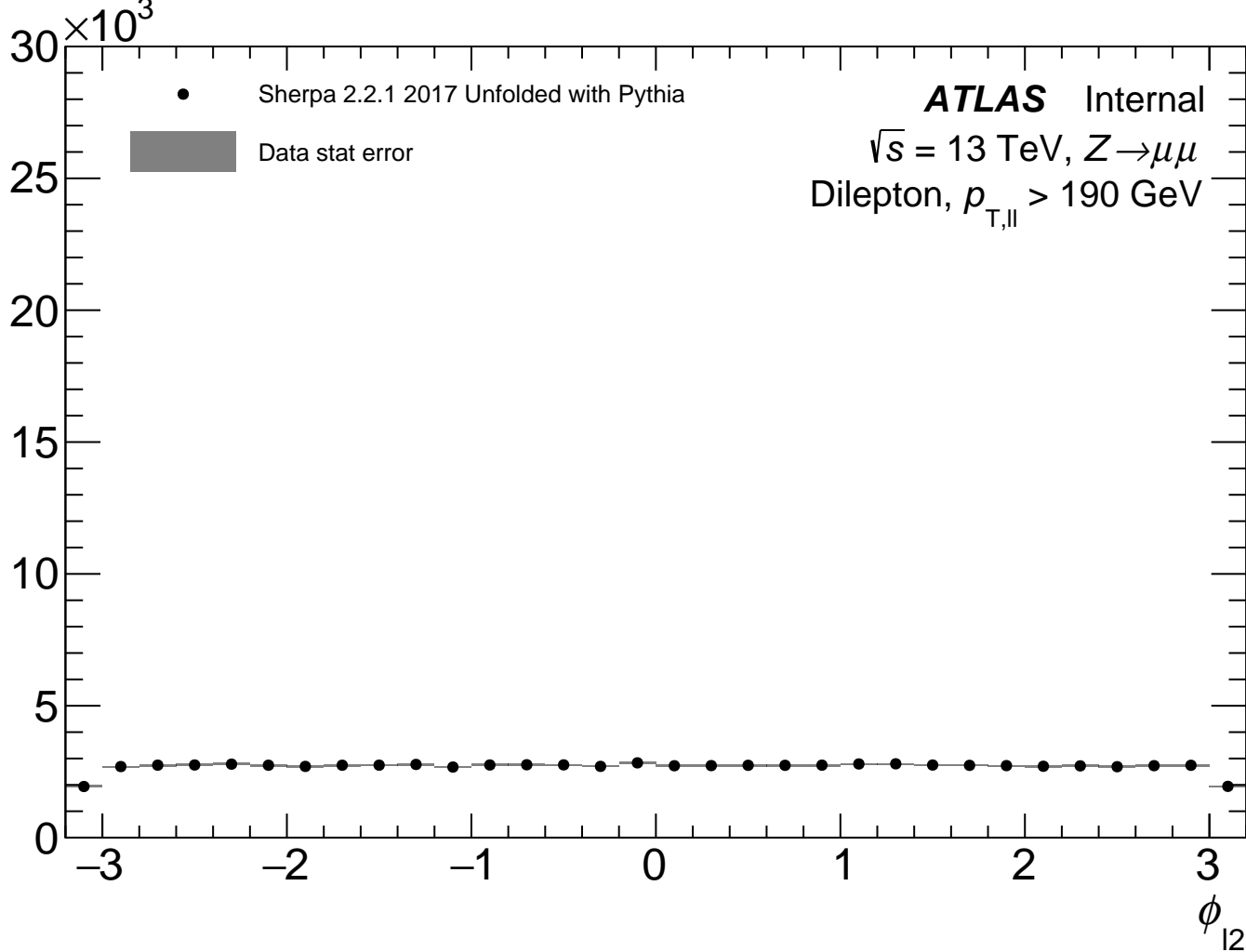
Events



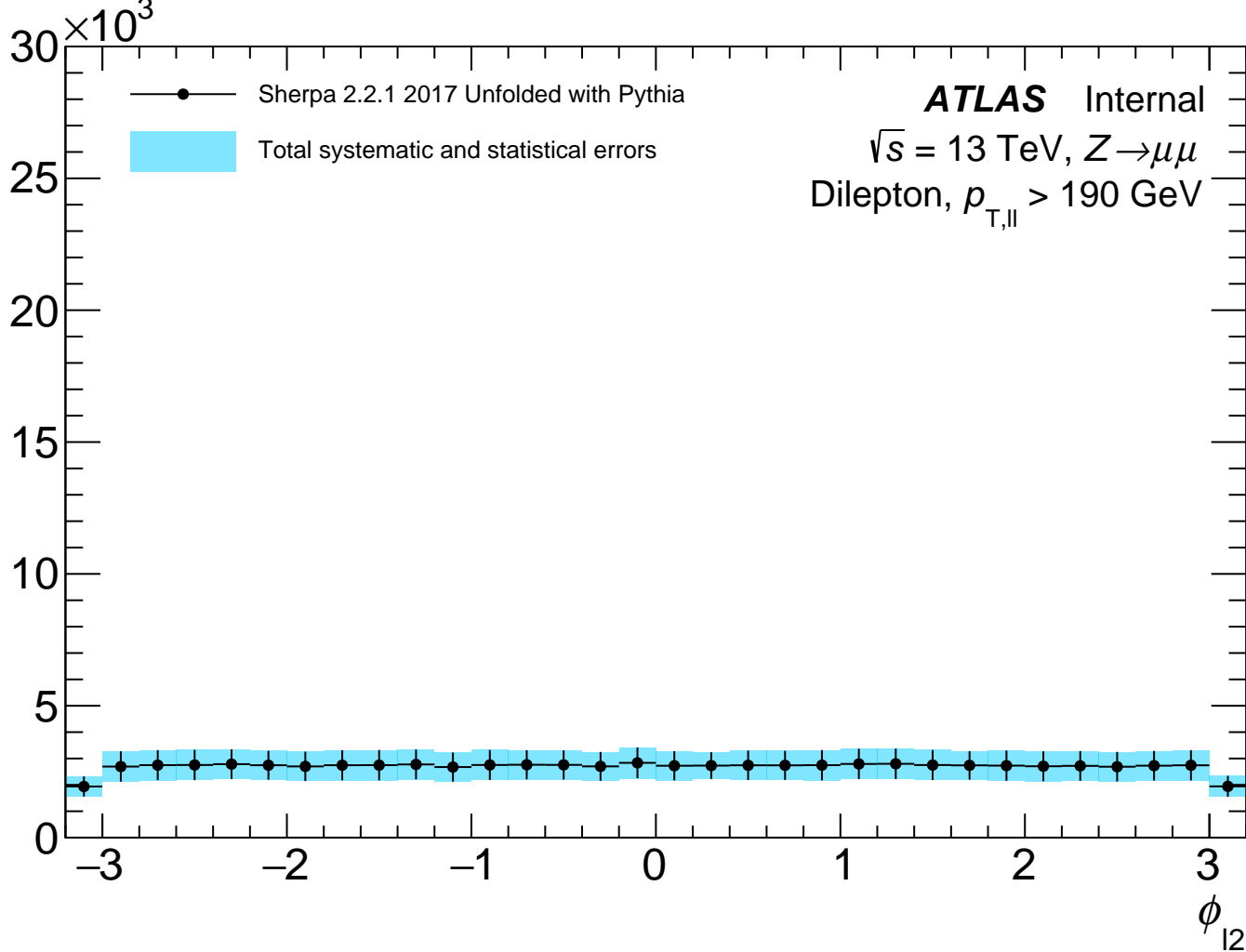
Events



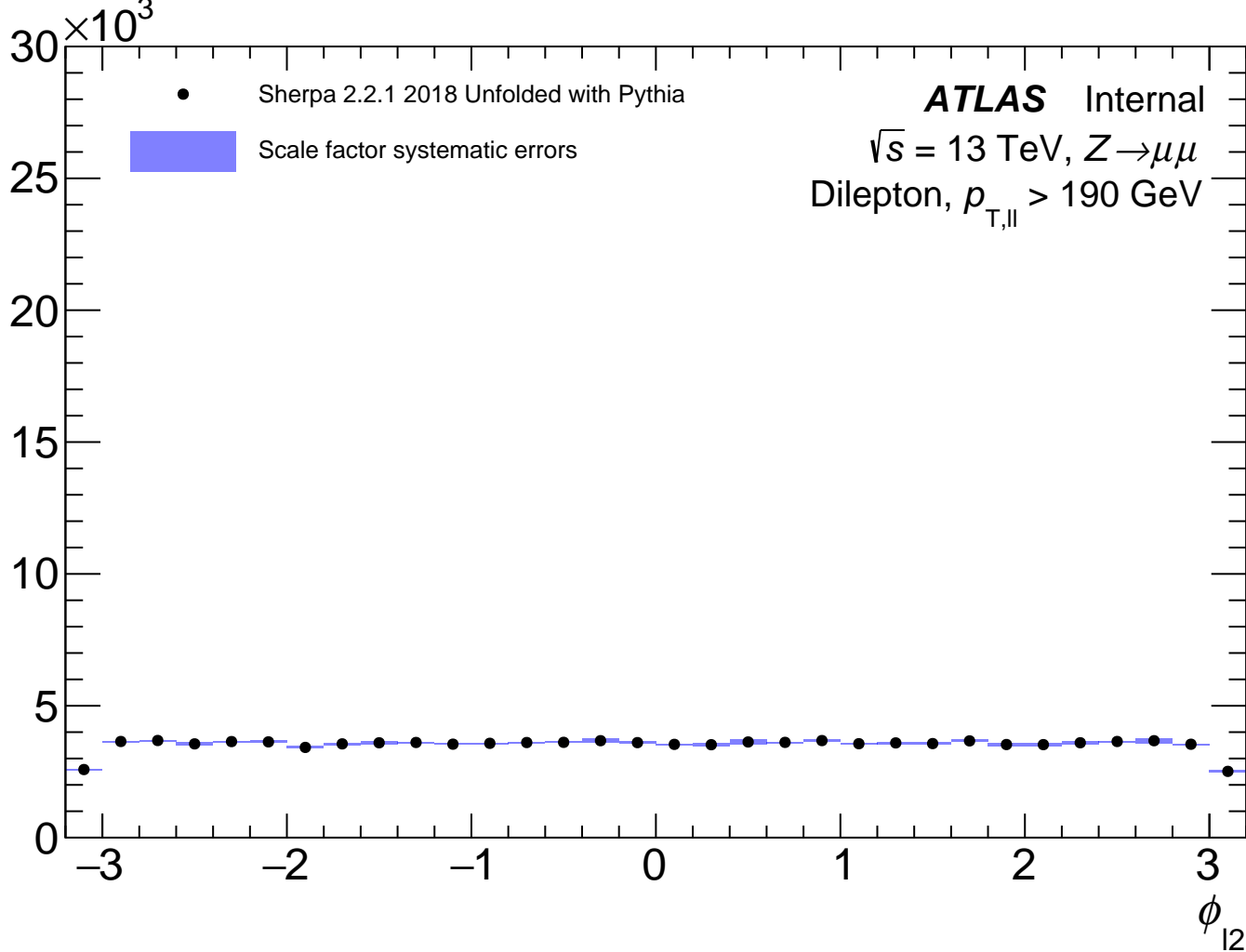
Events



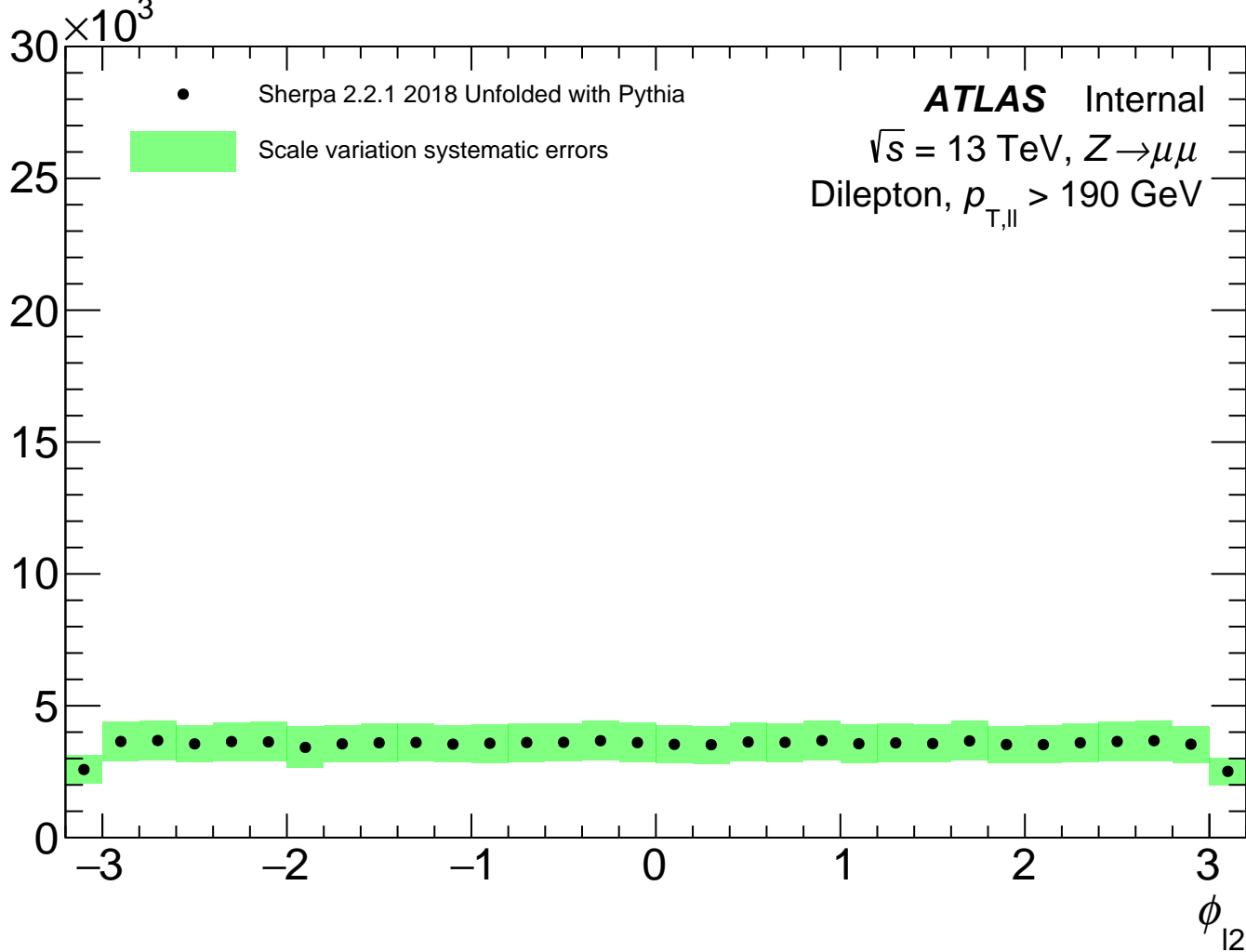
Events



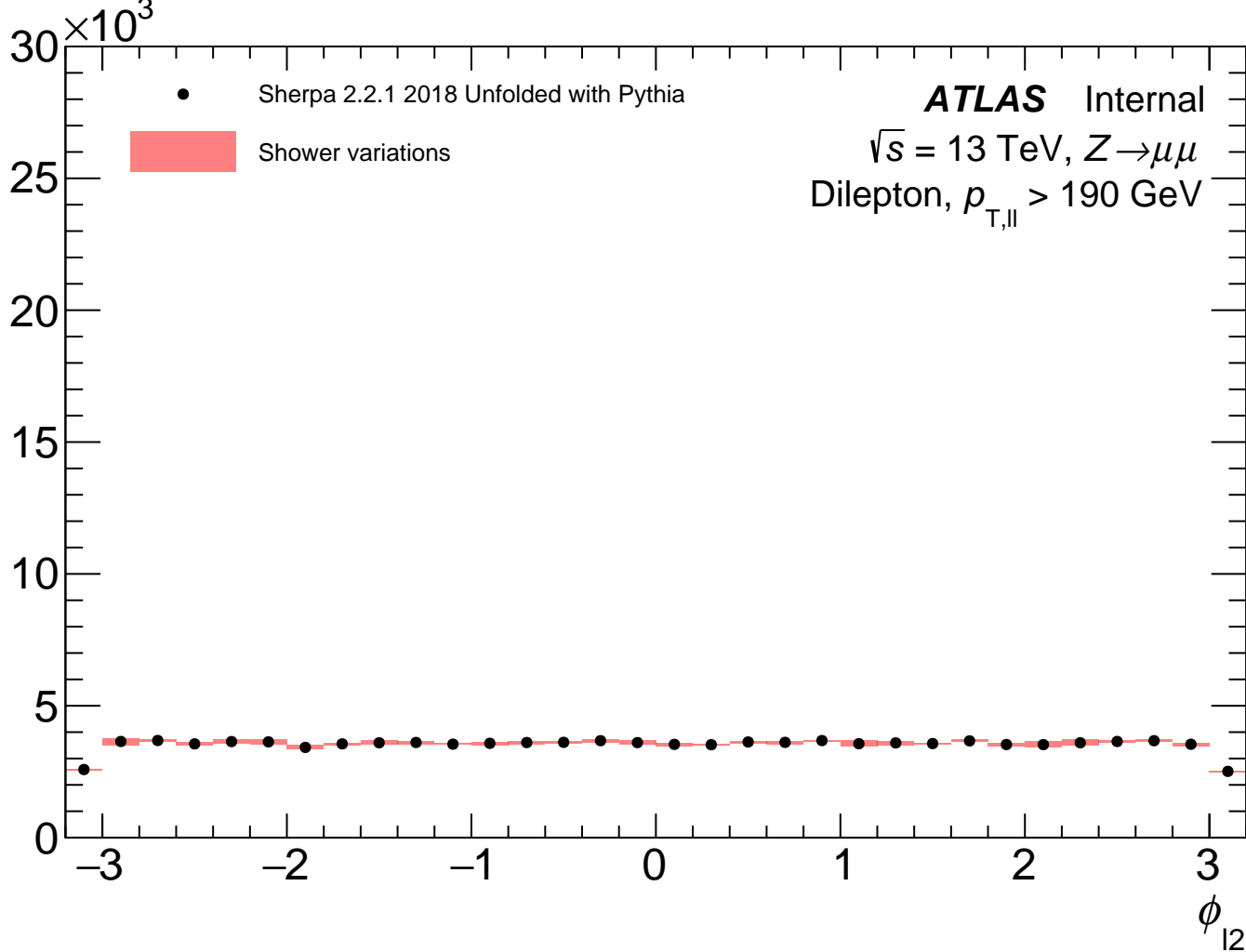
Events



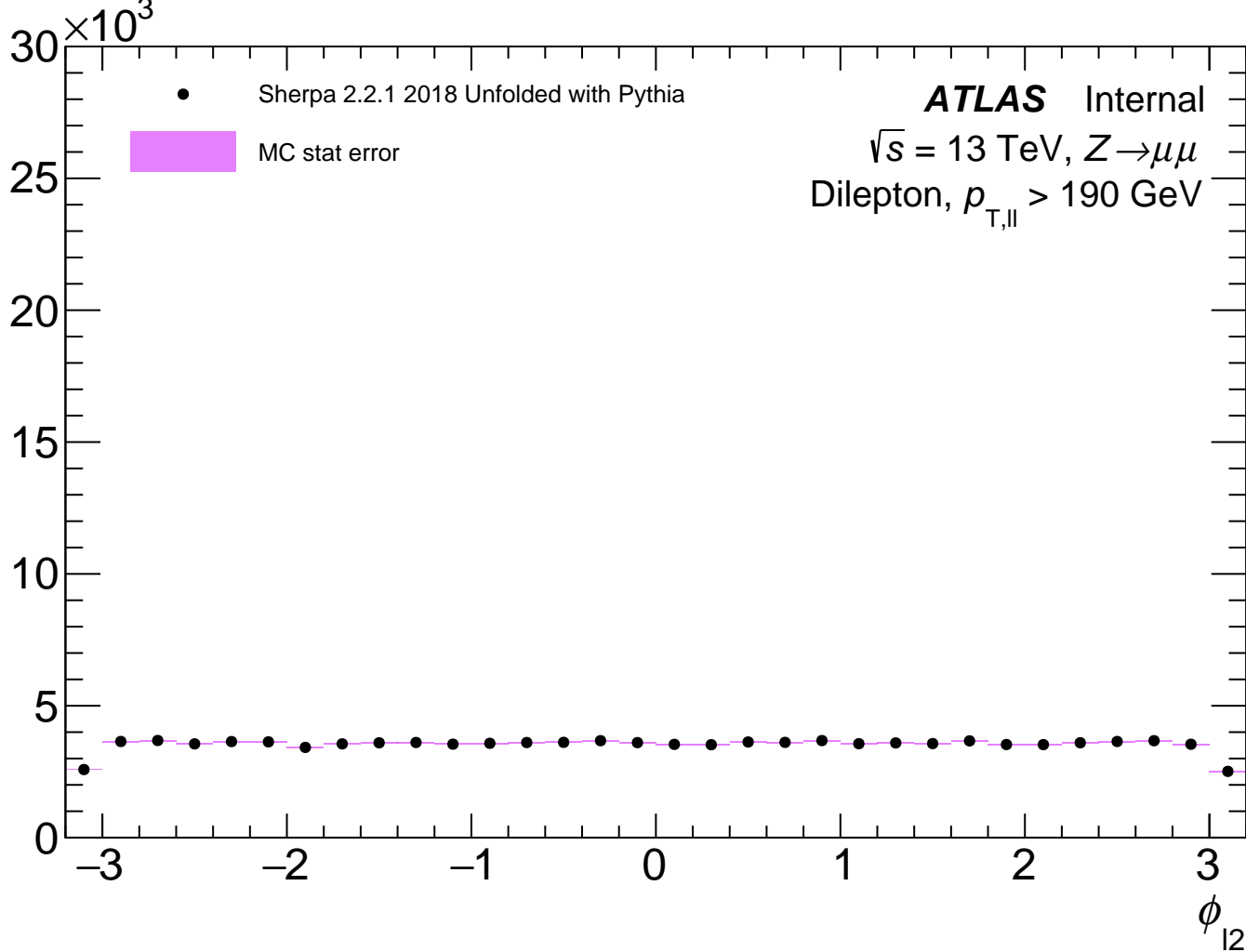
Events



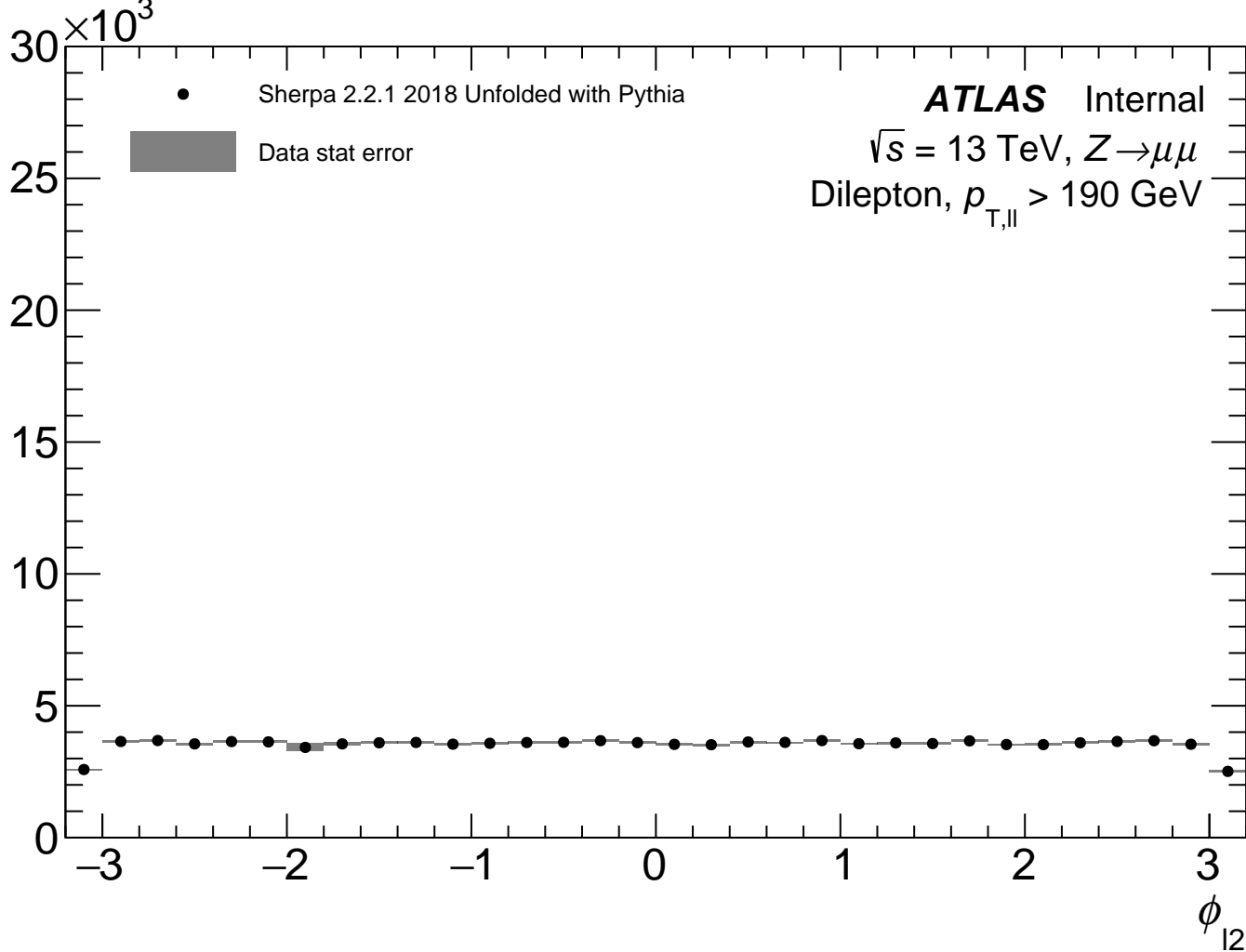
Events



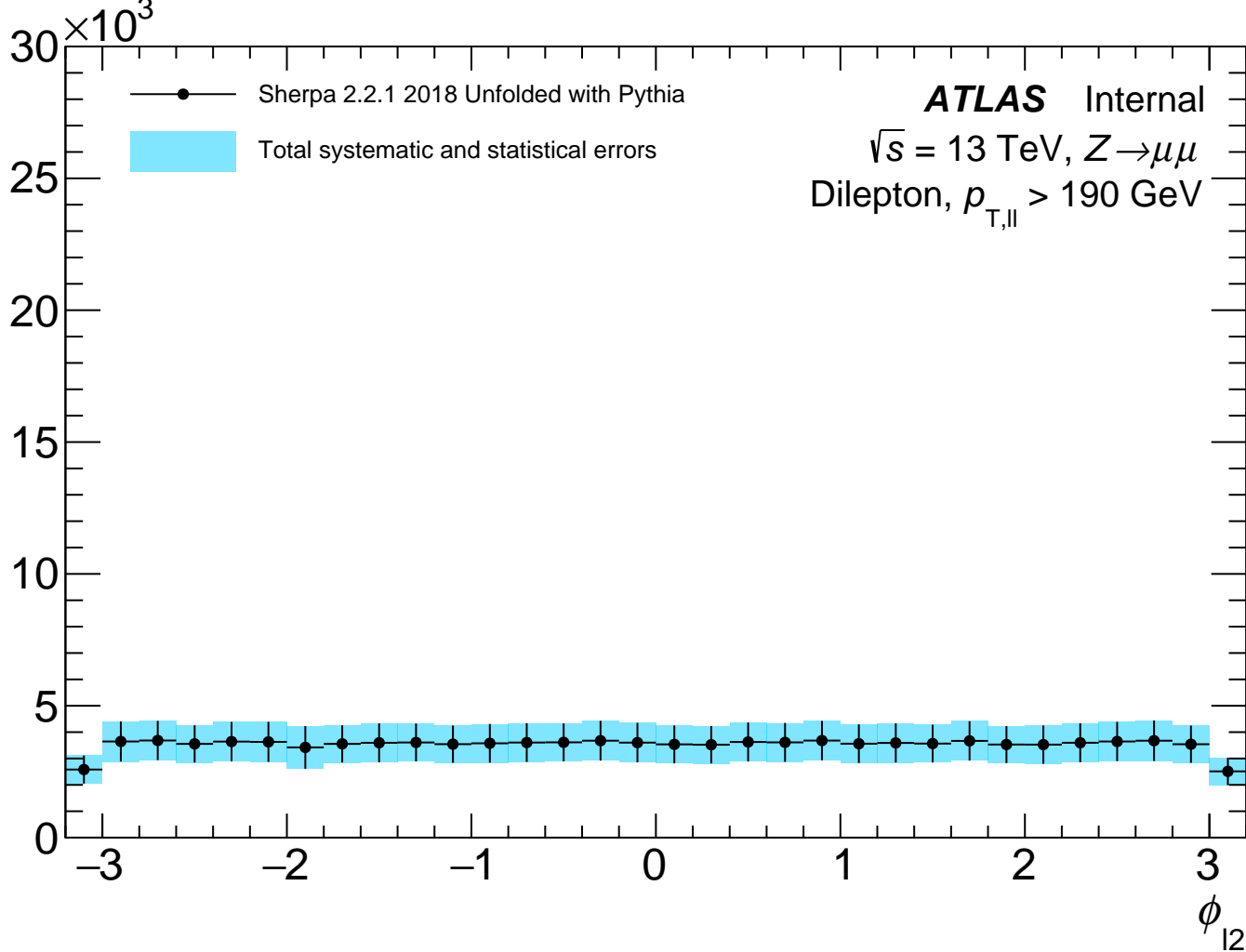
Events



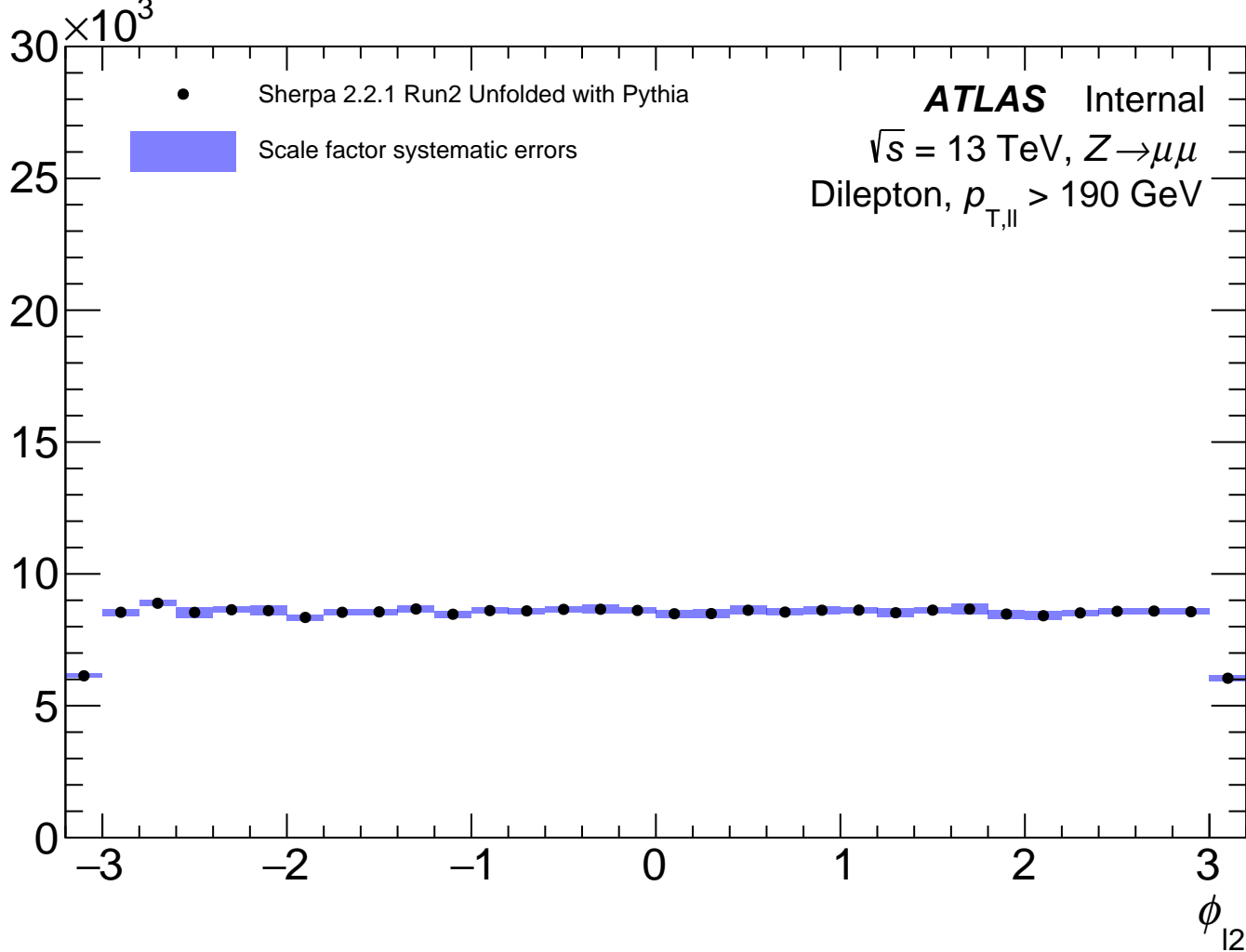
Events



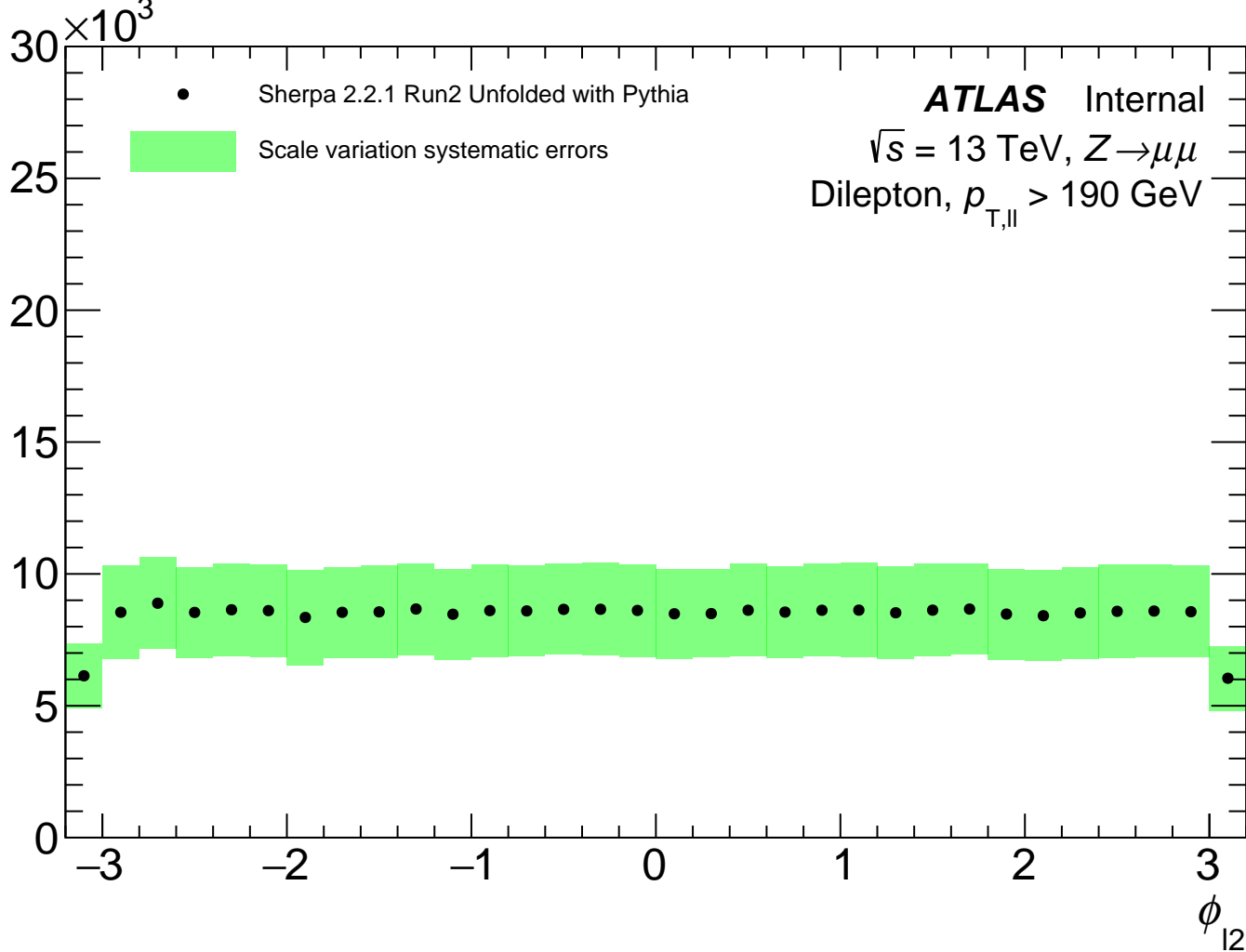
Events



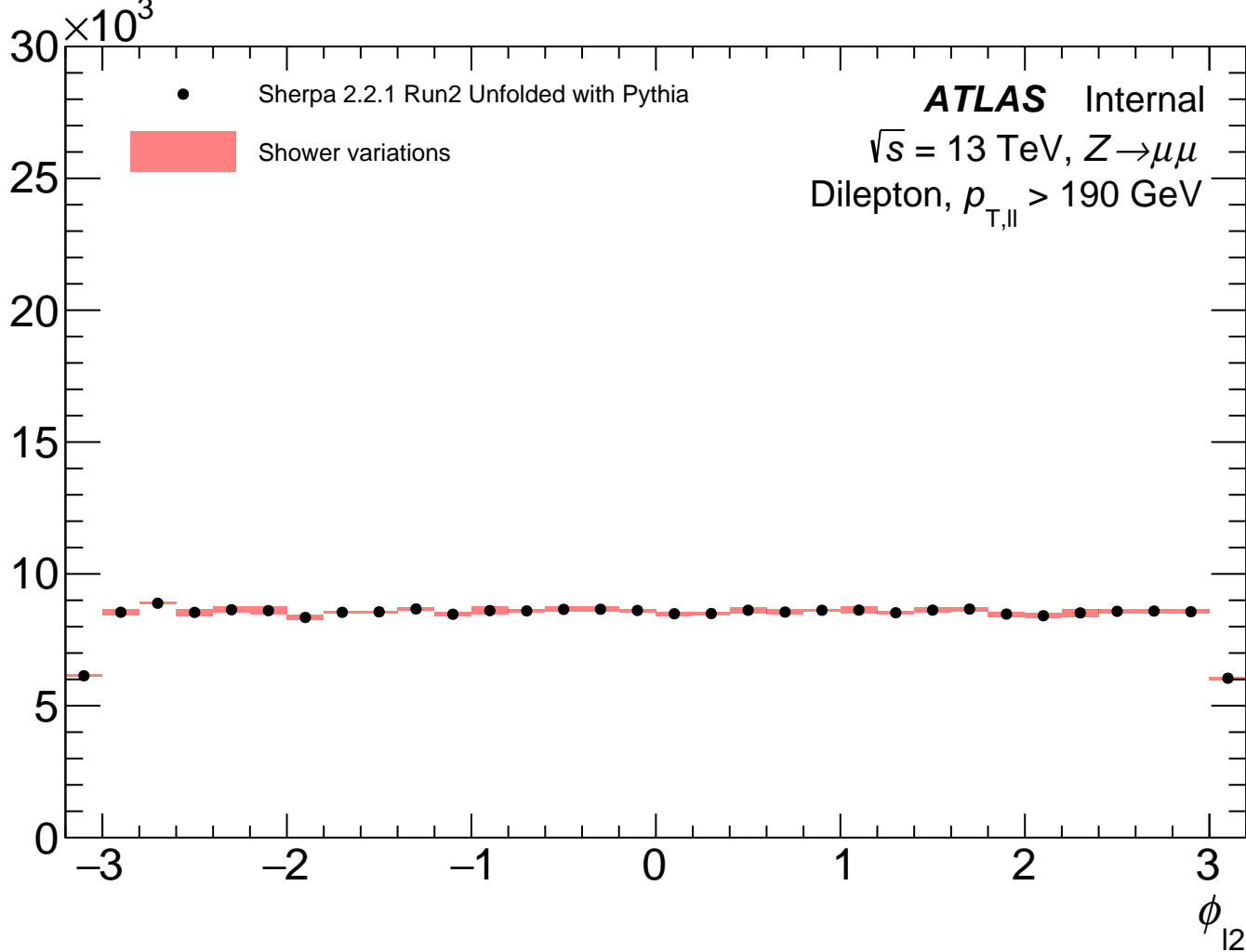
Events



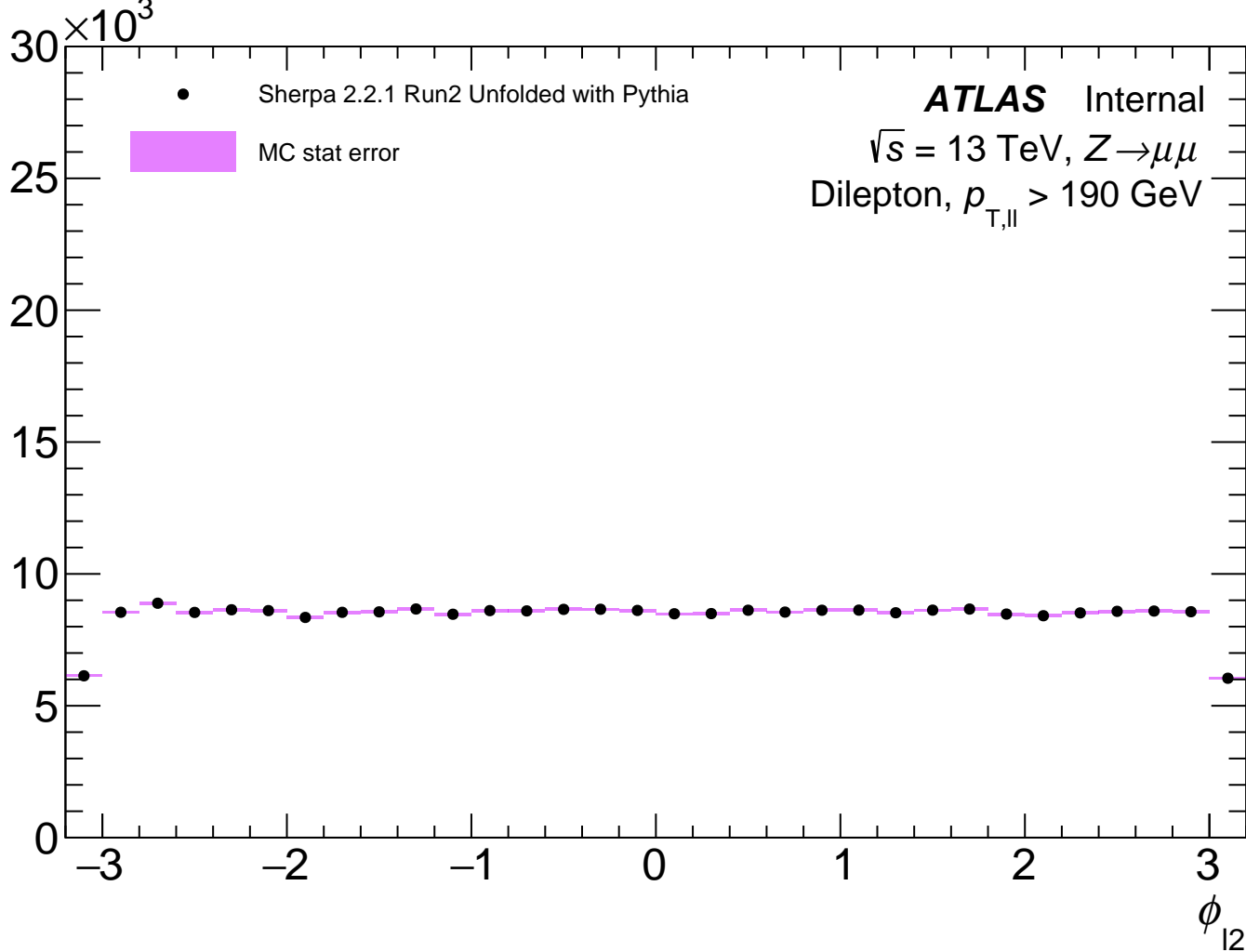
Events



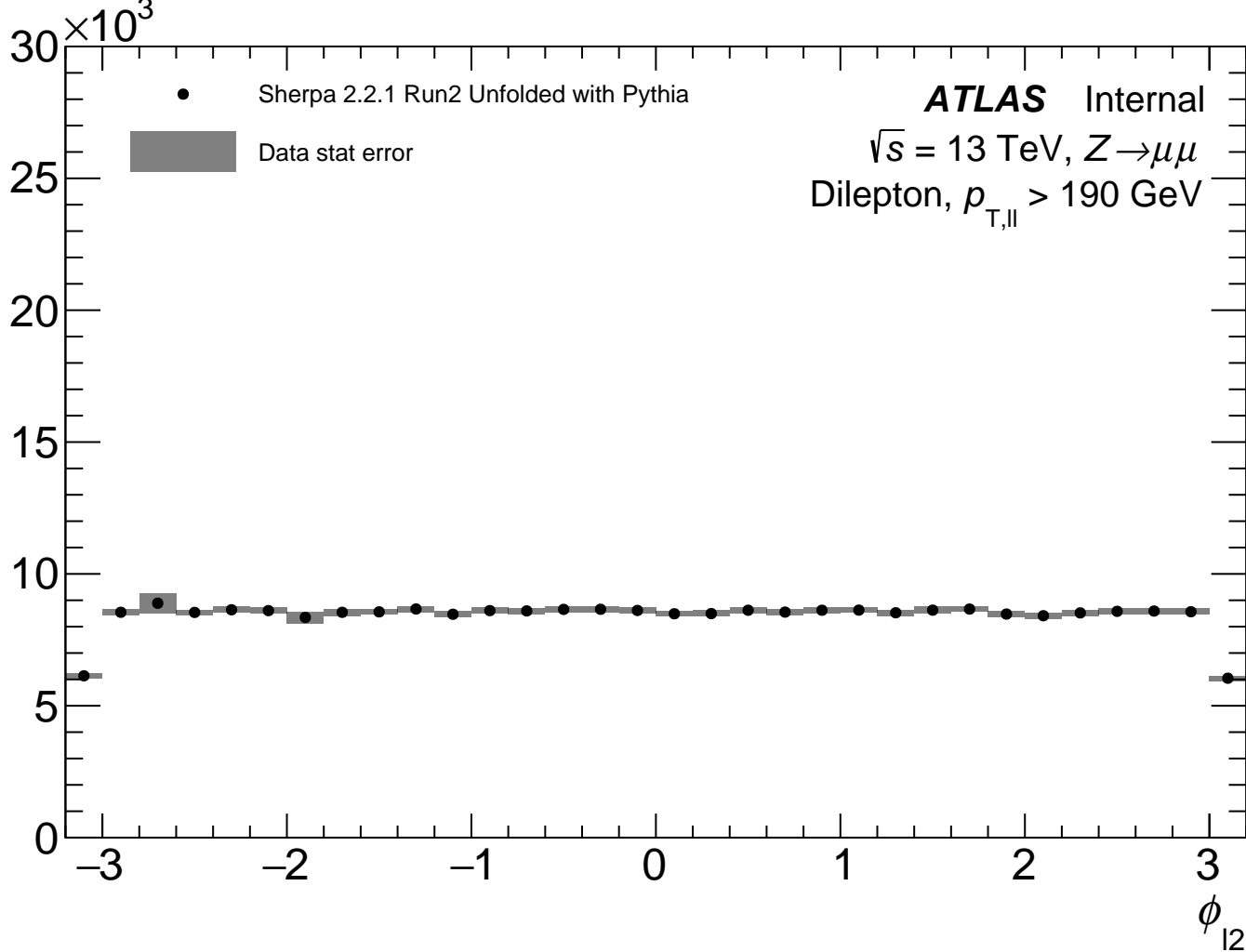
Events



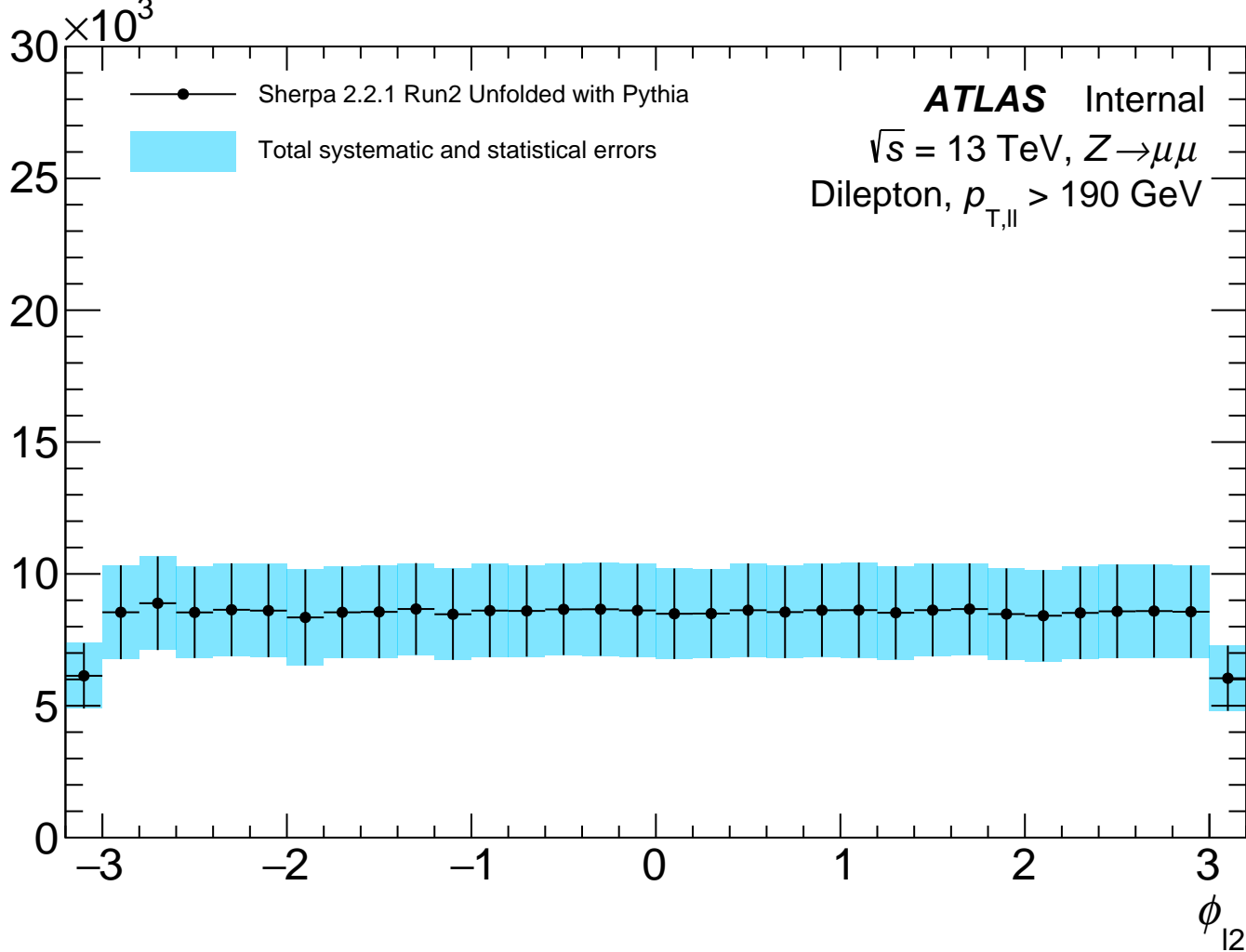
Events



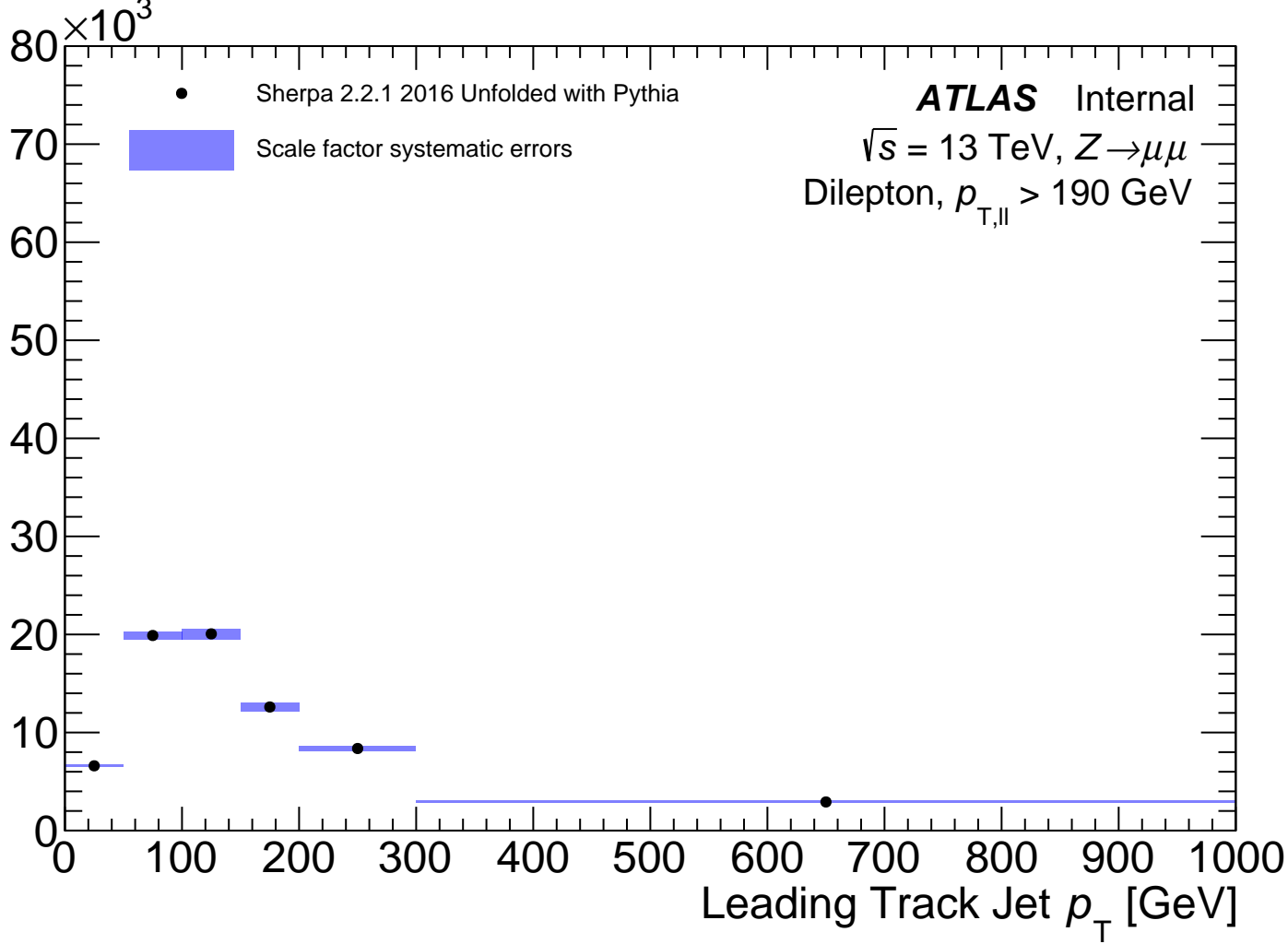
Events



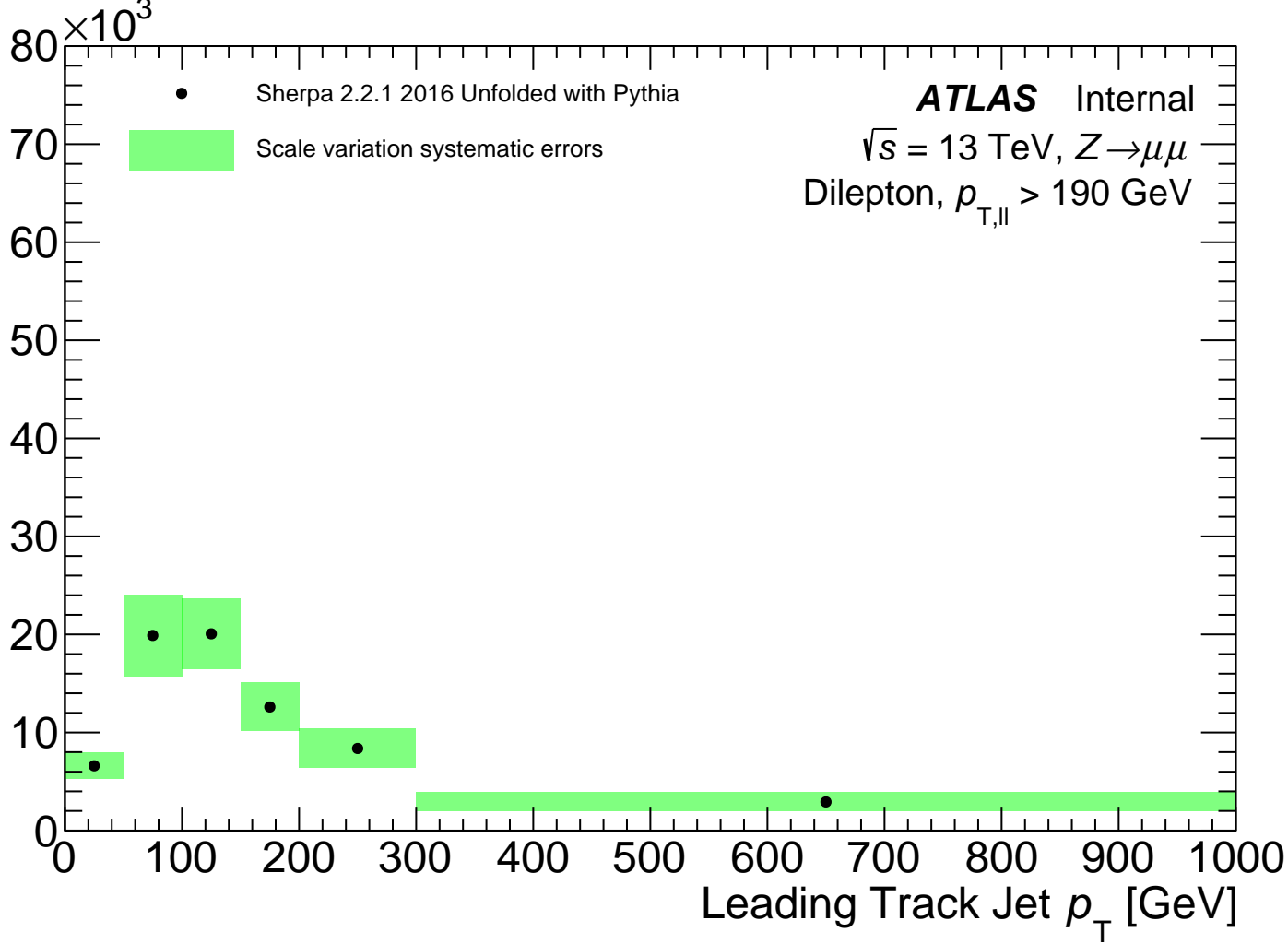
Events



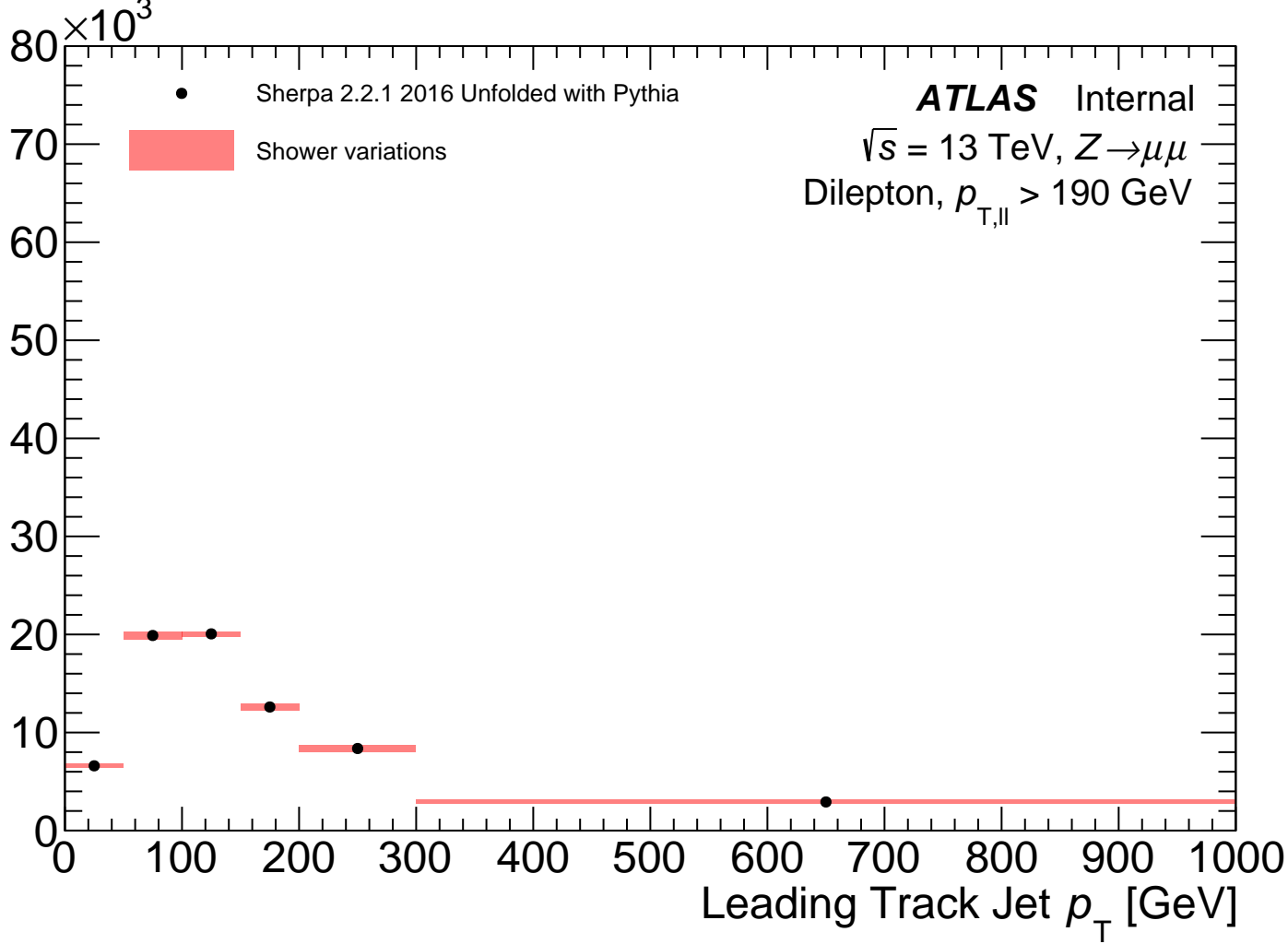
Events



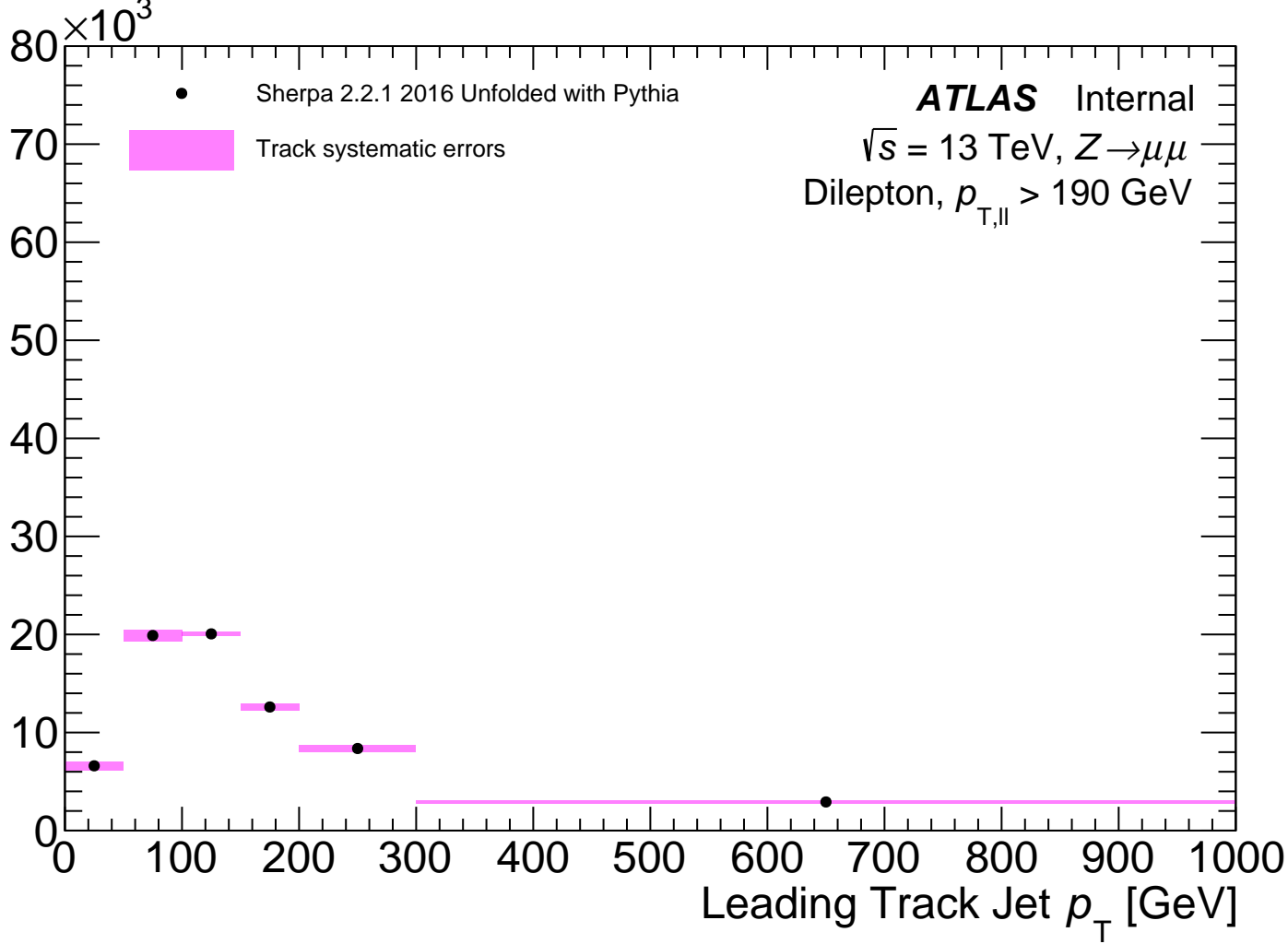
Events



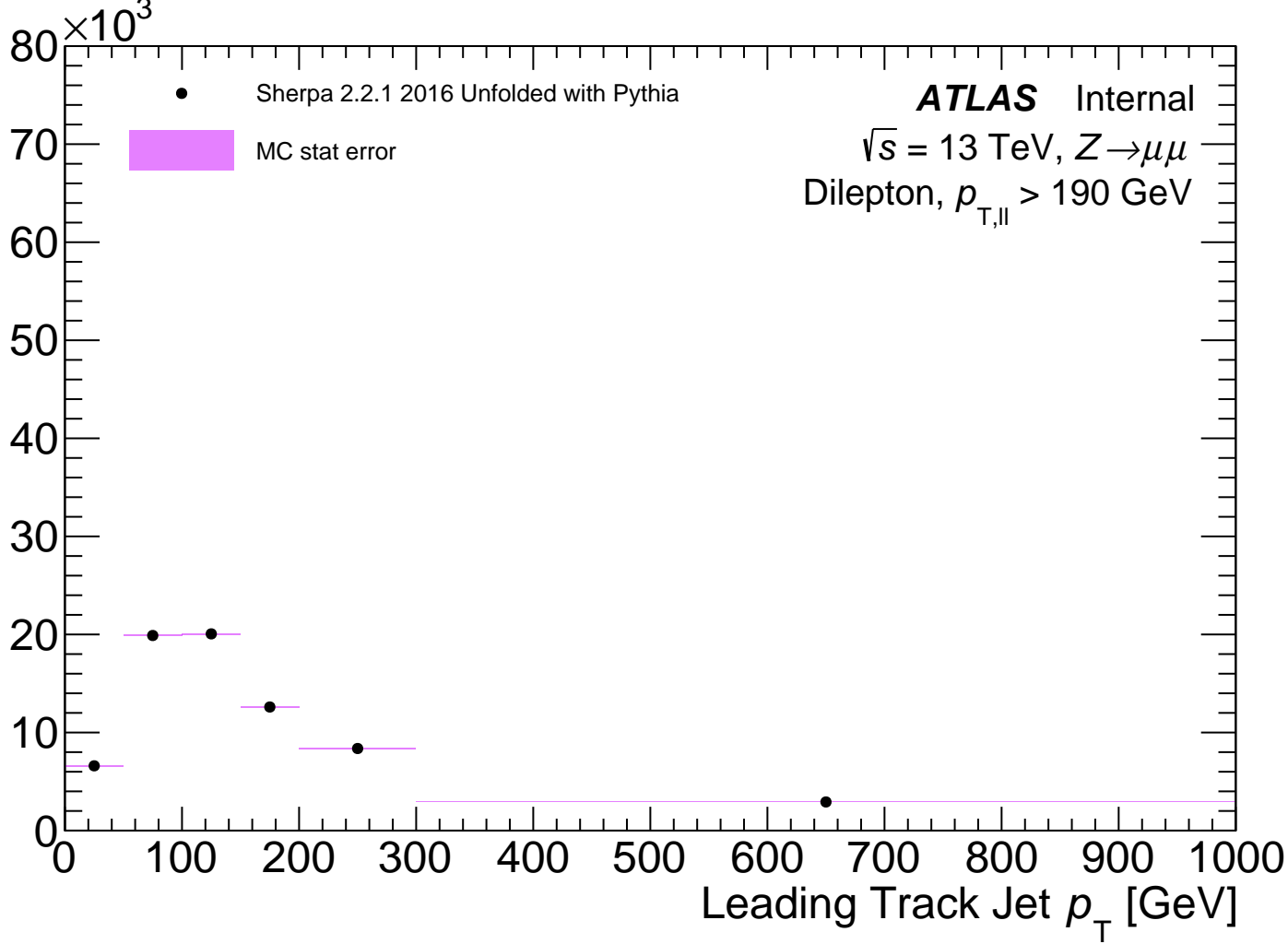
Events



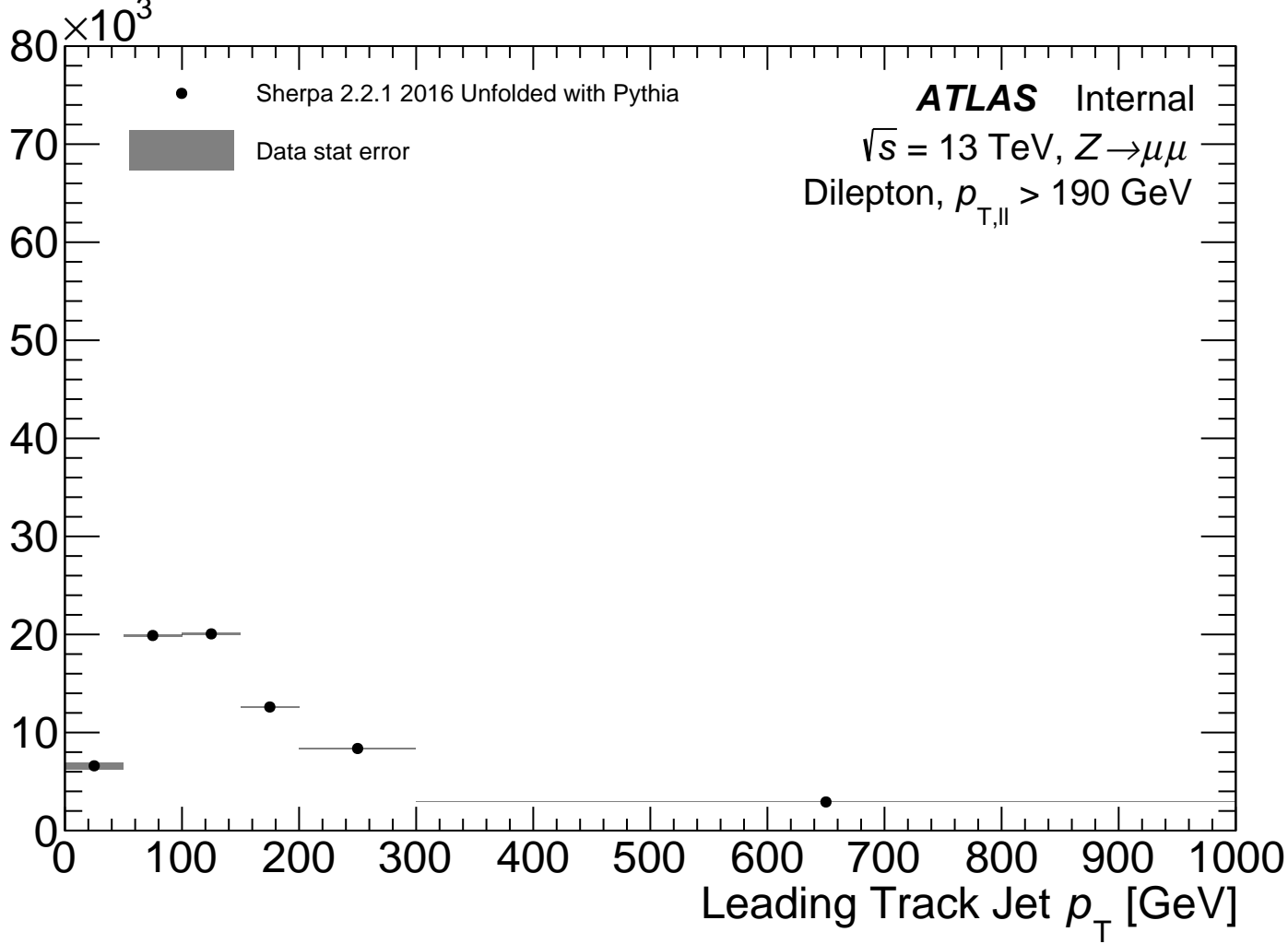
Events



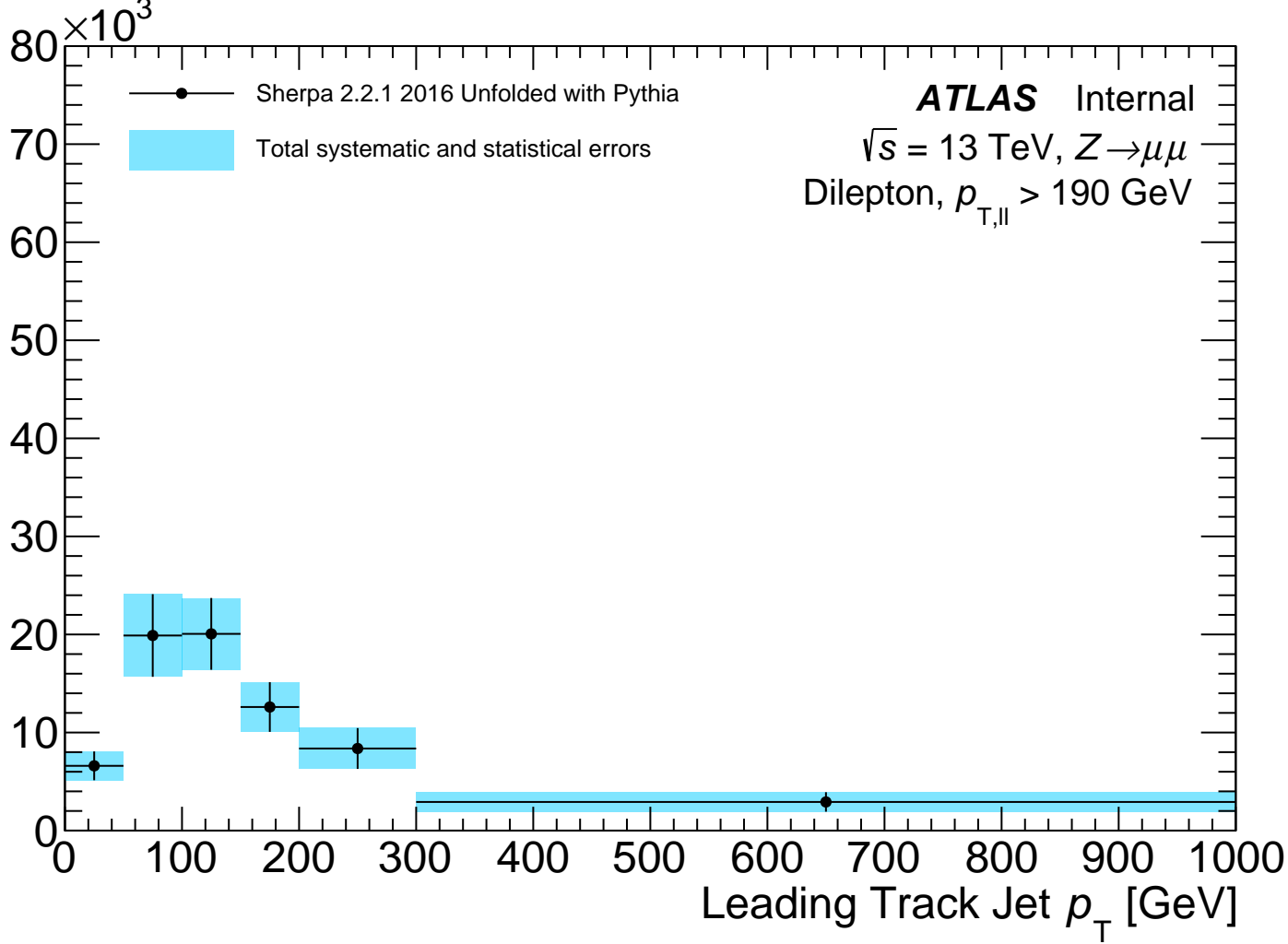
Events



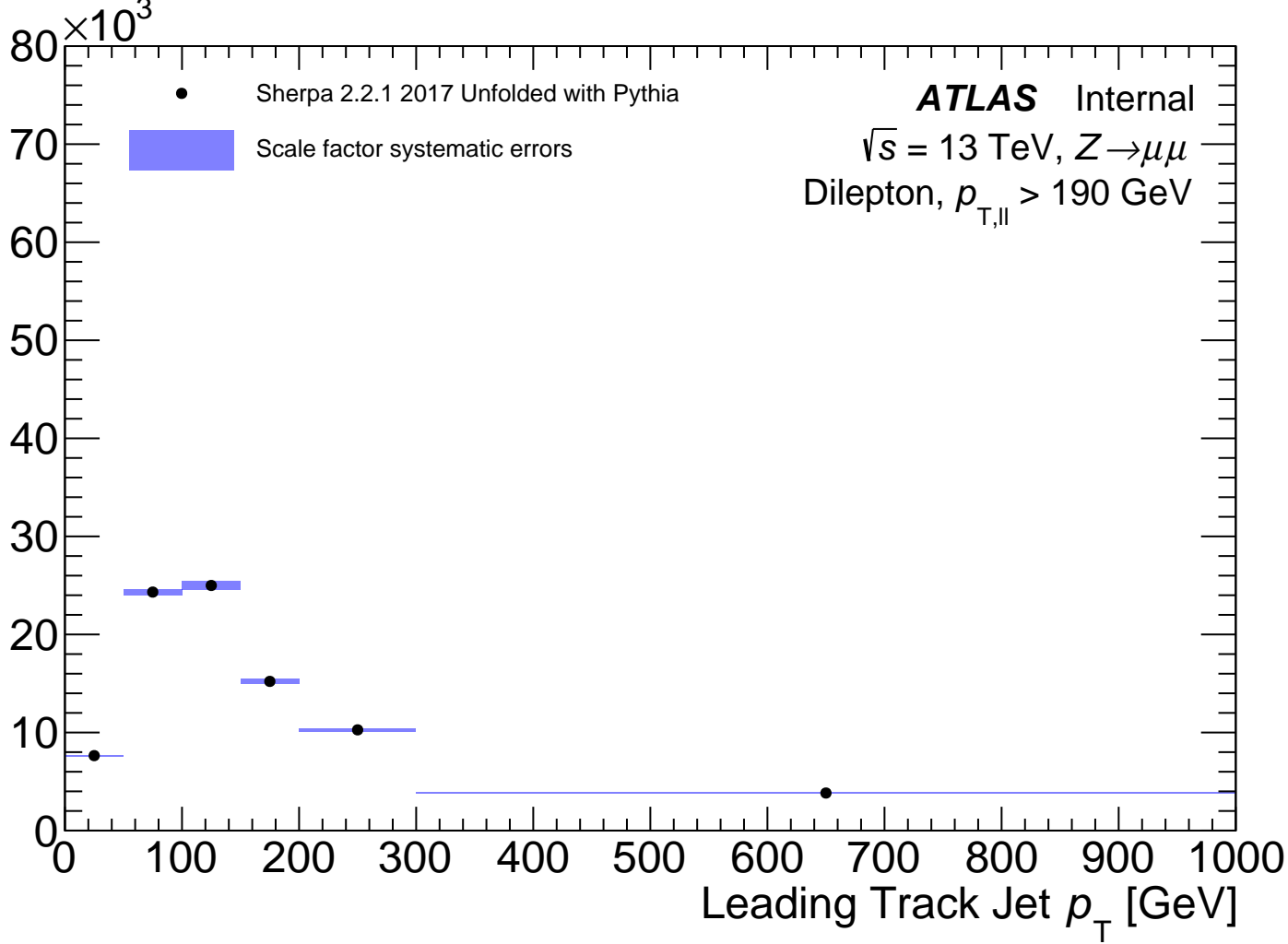
Events



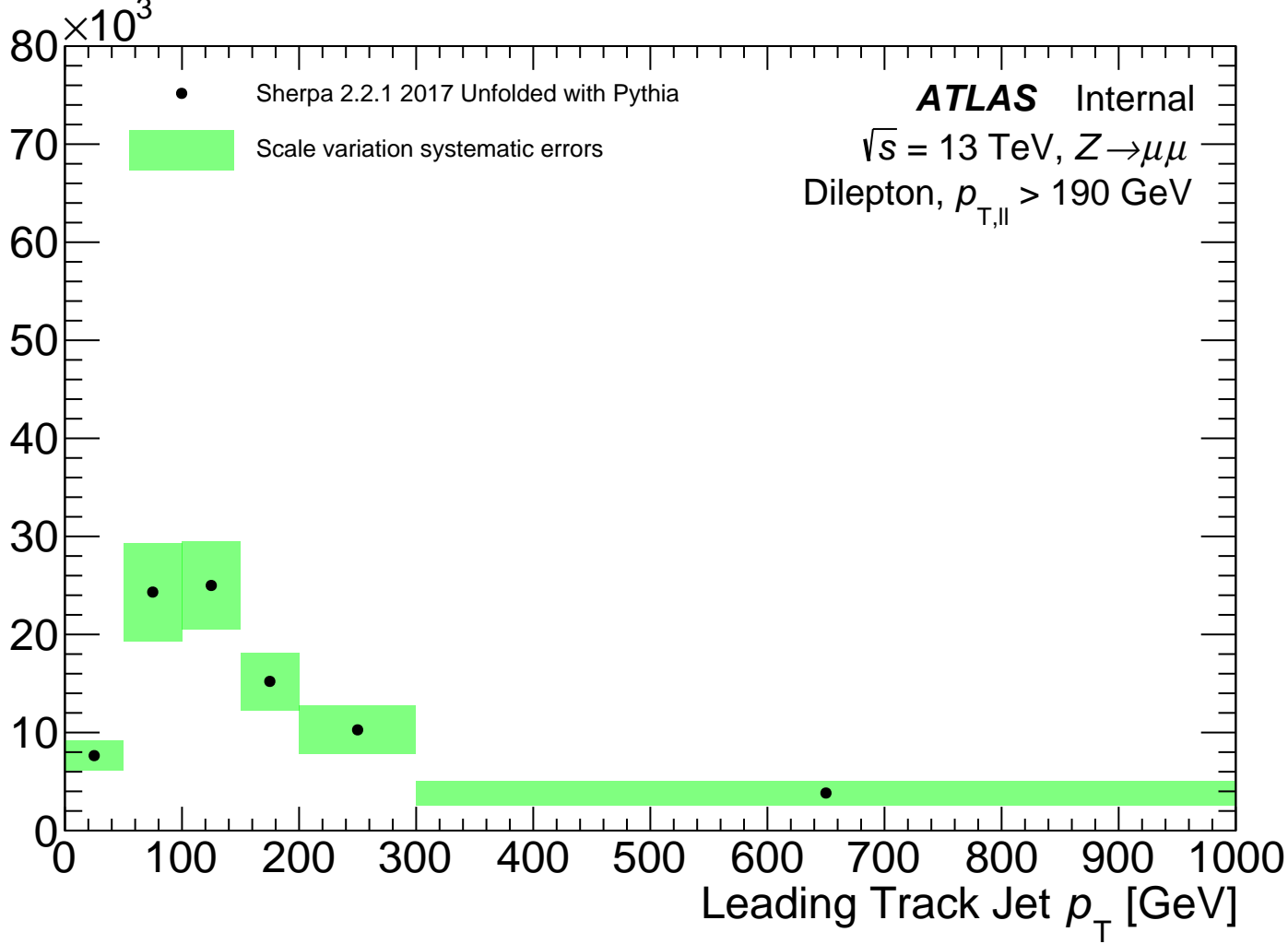
Events



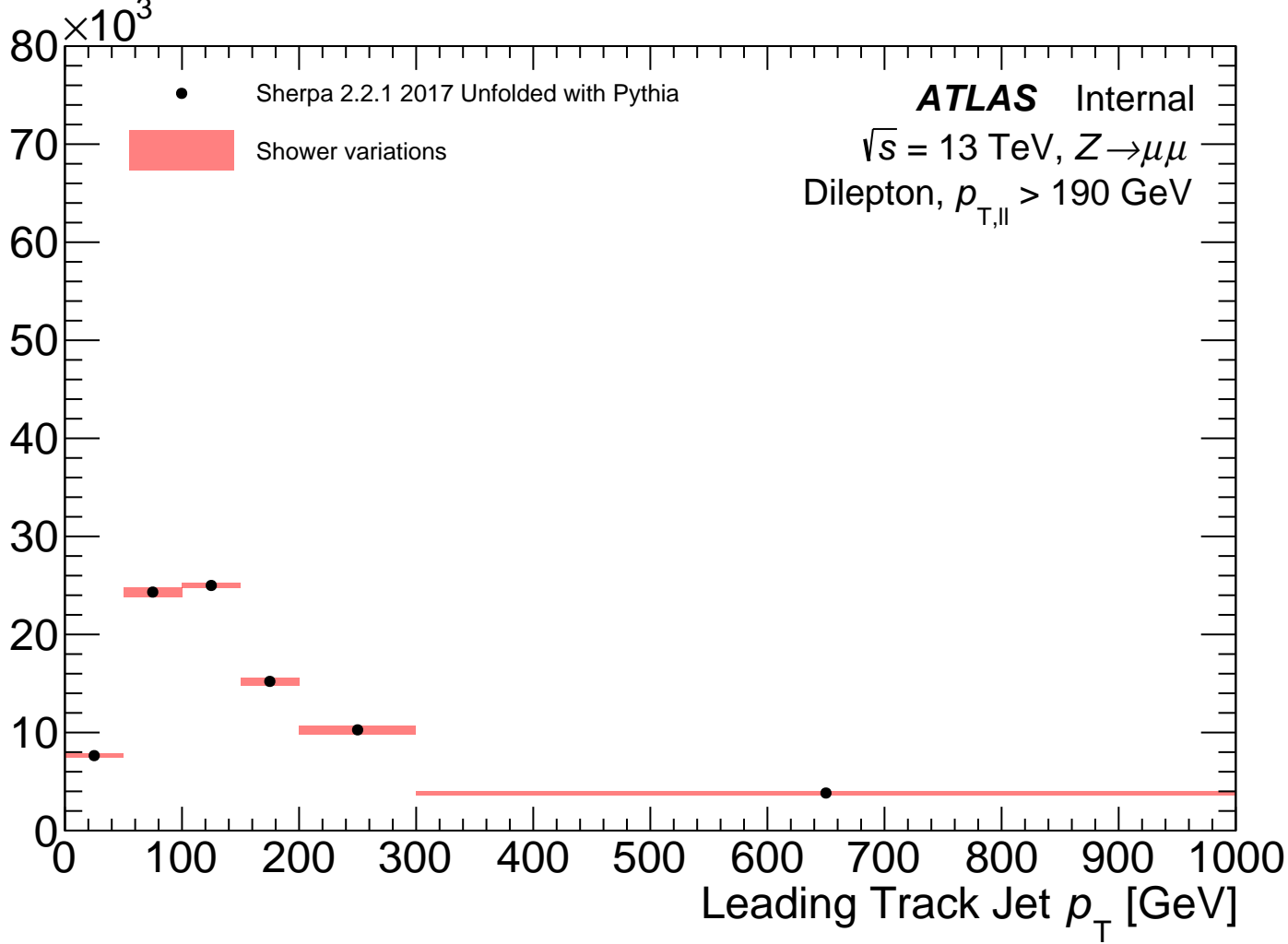
Events



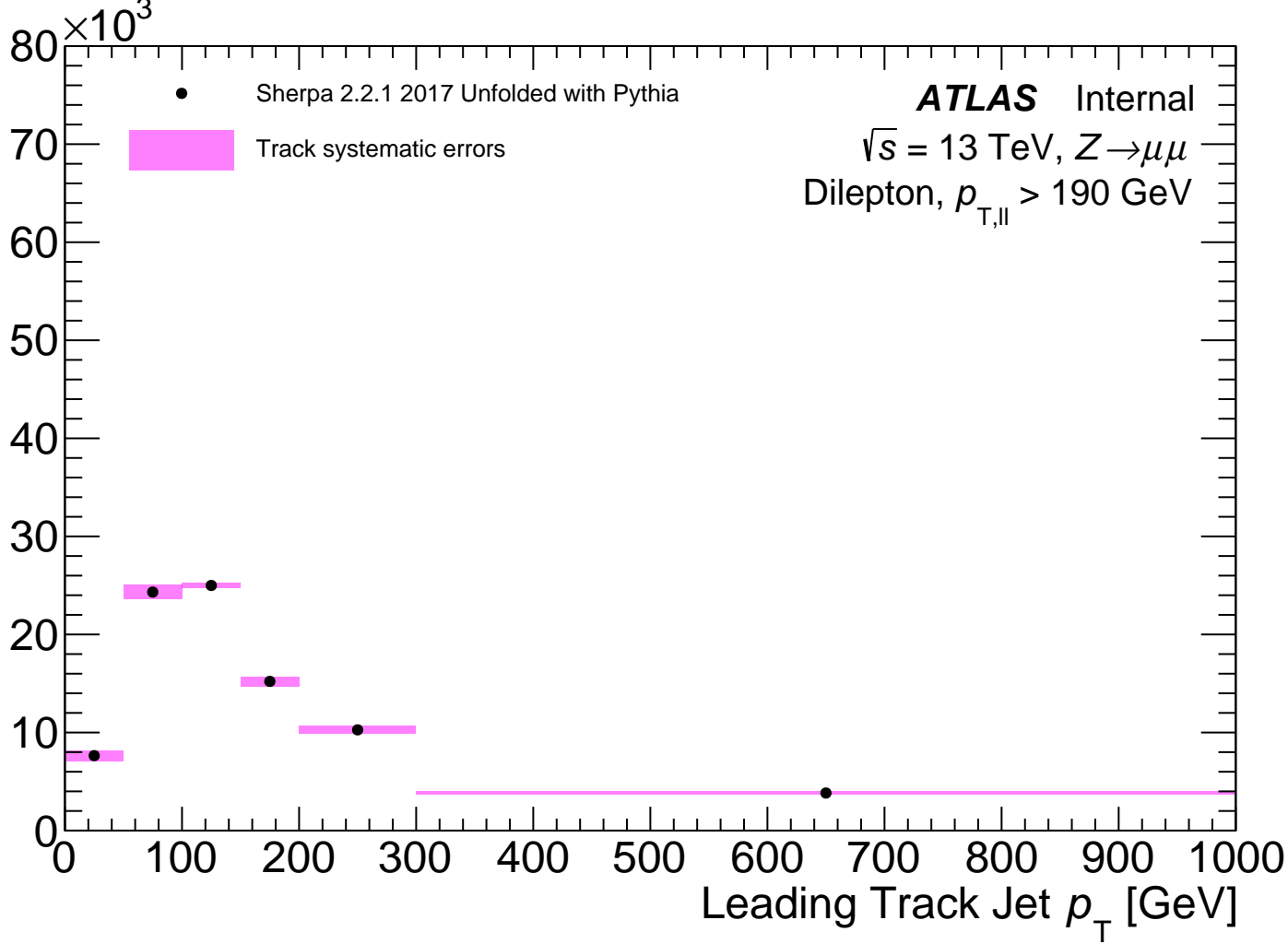
Events



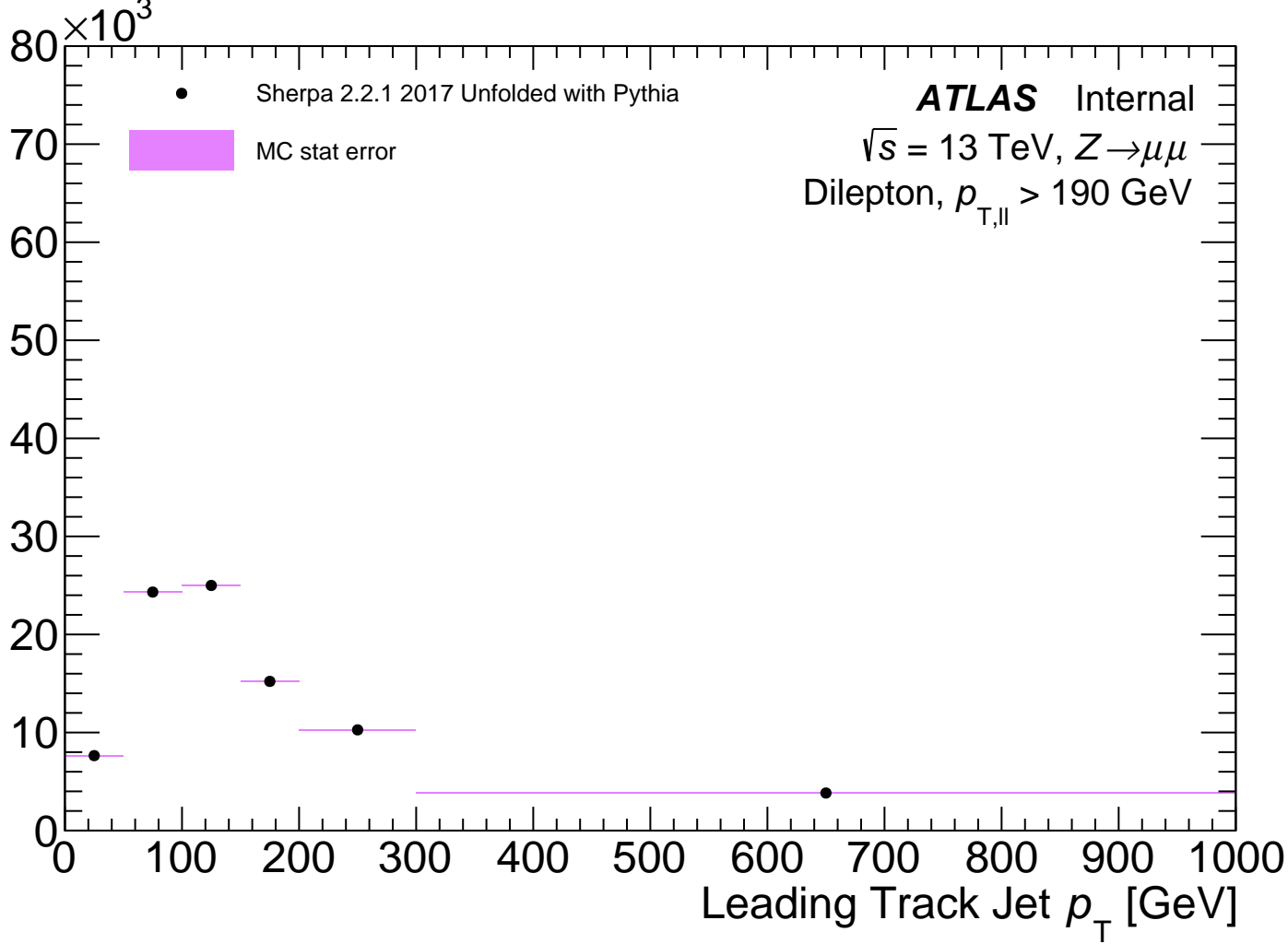
Events



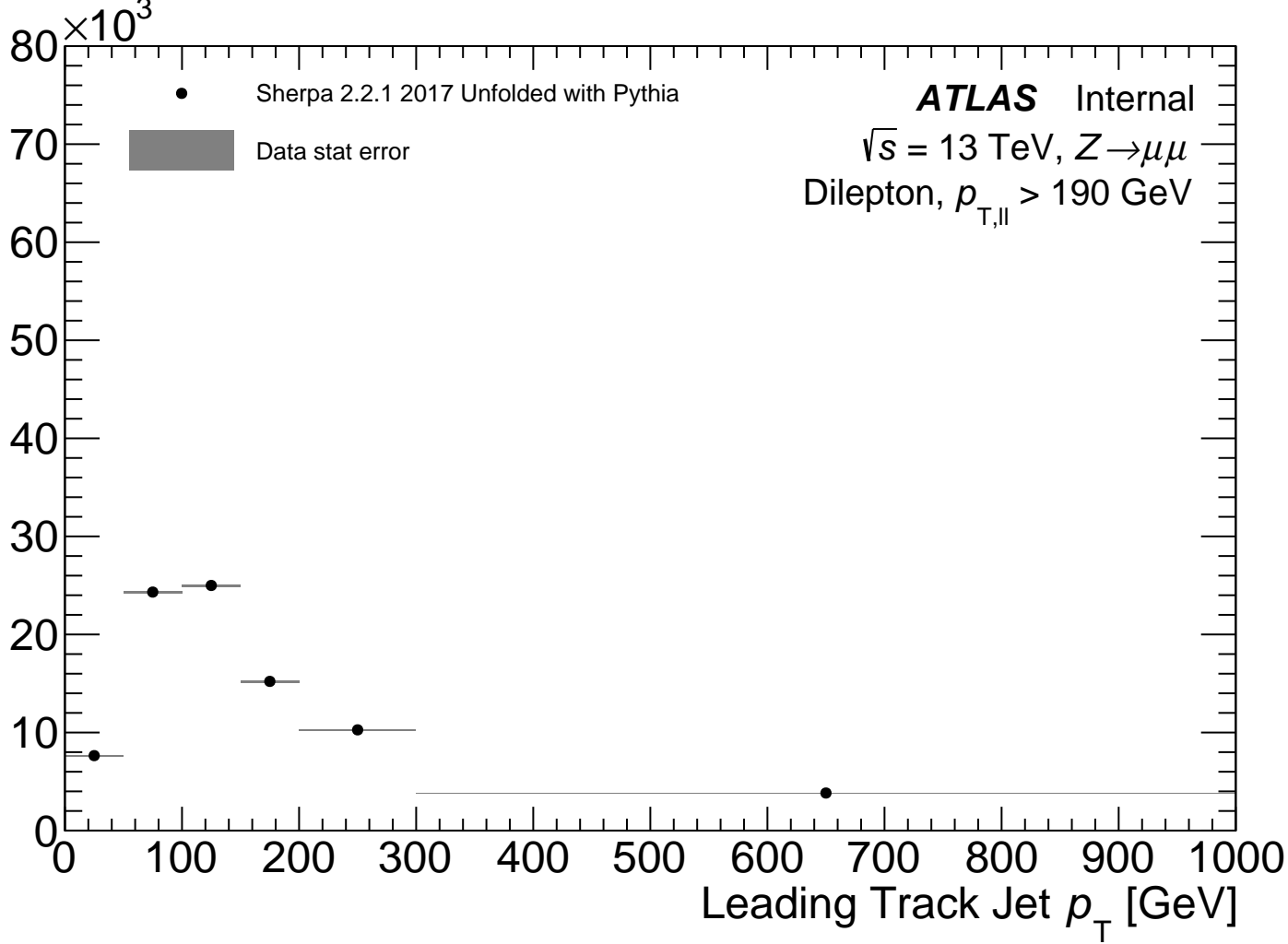
Events



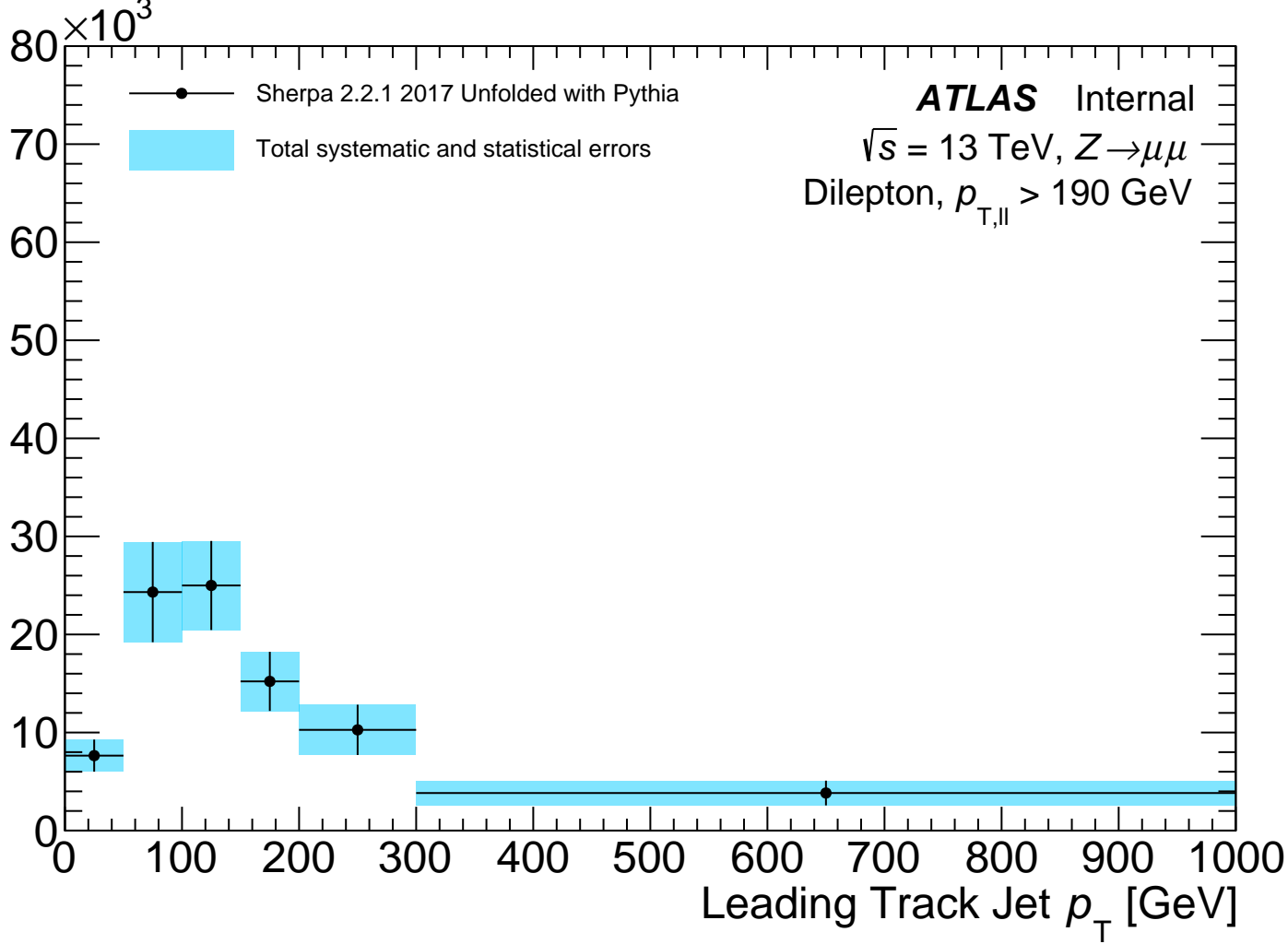
Events



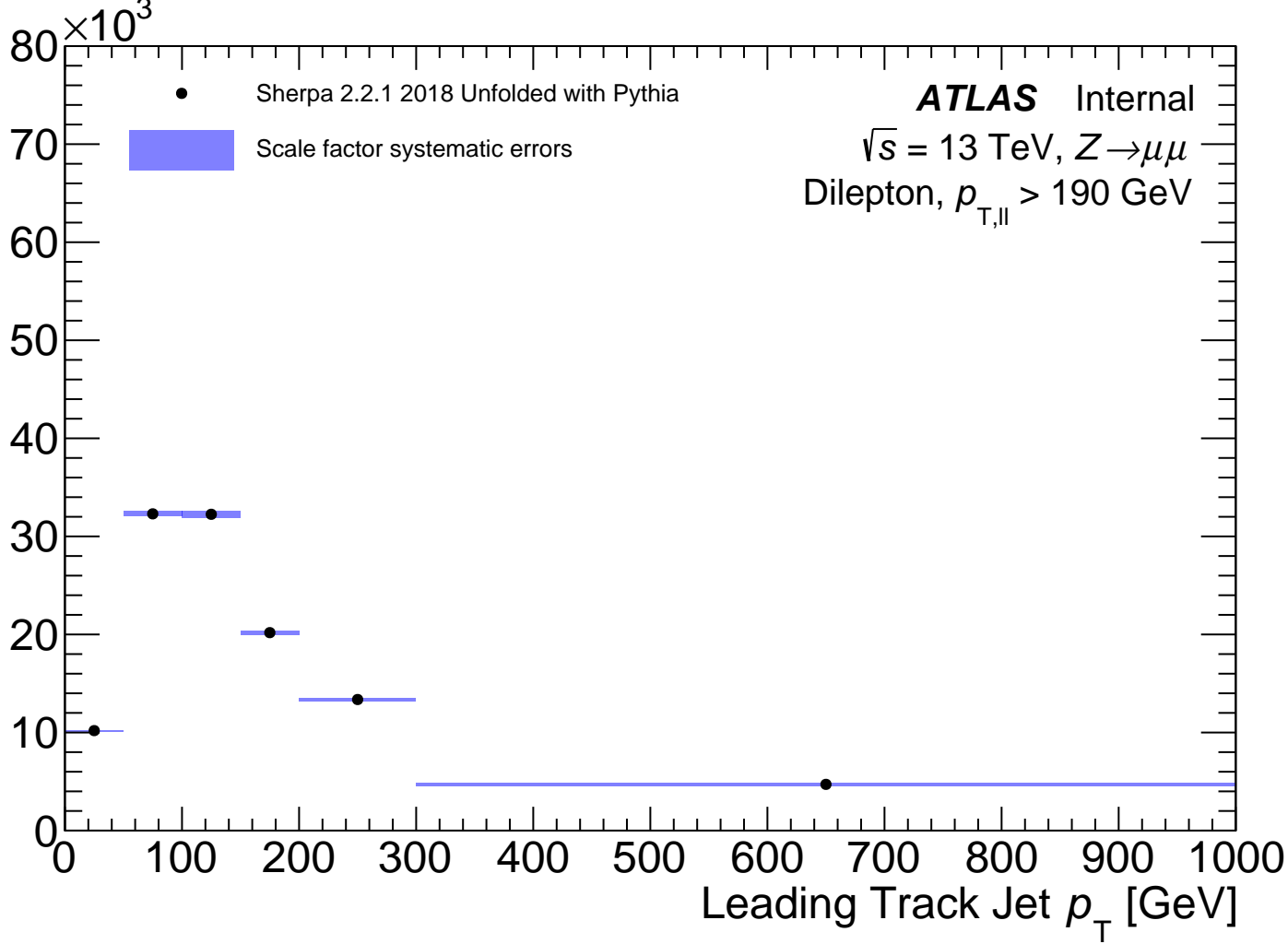
Events



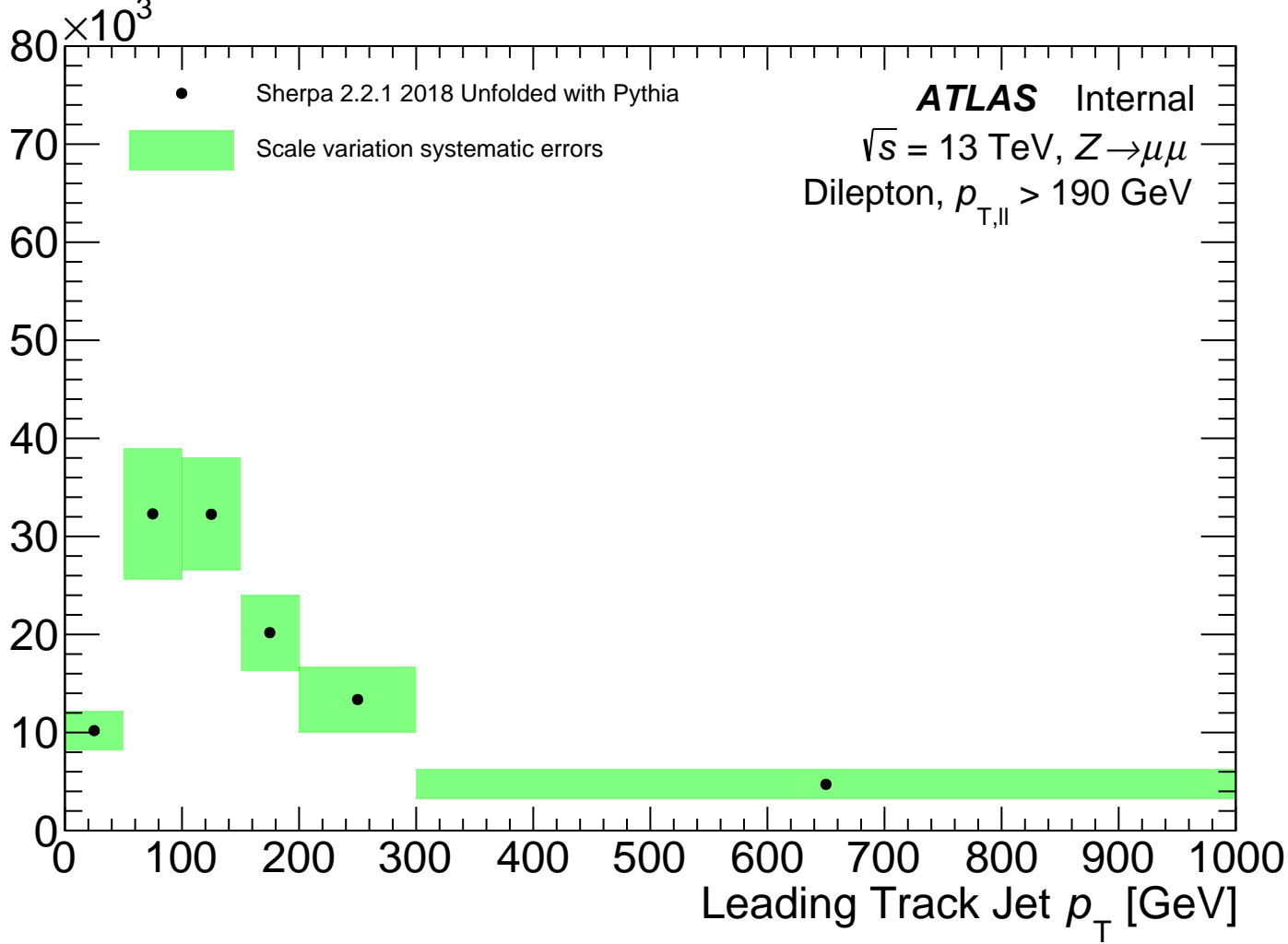
Events



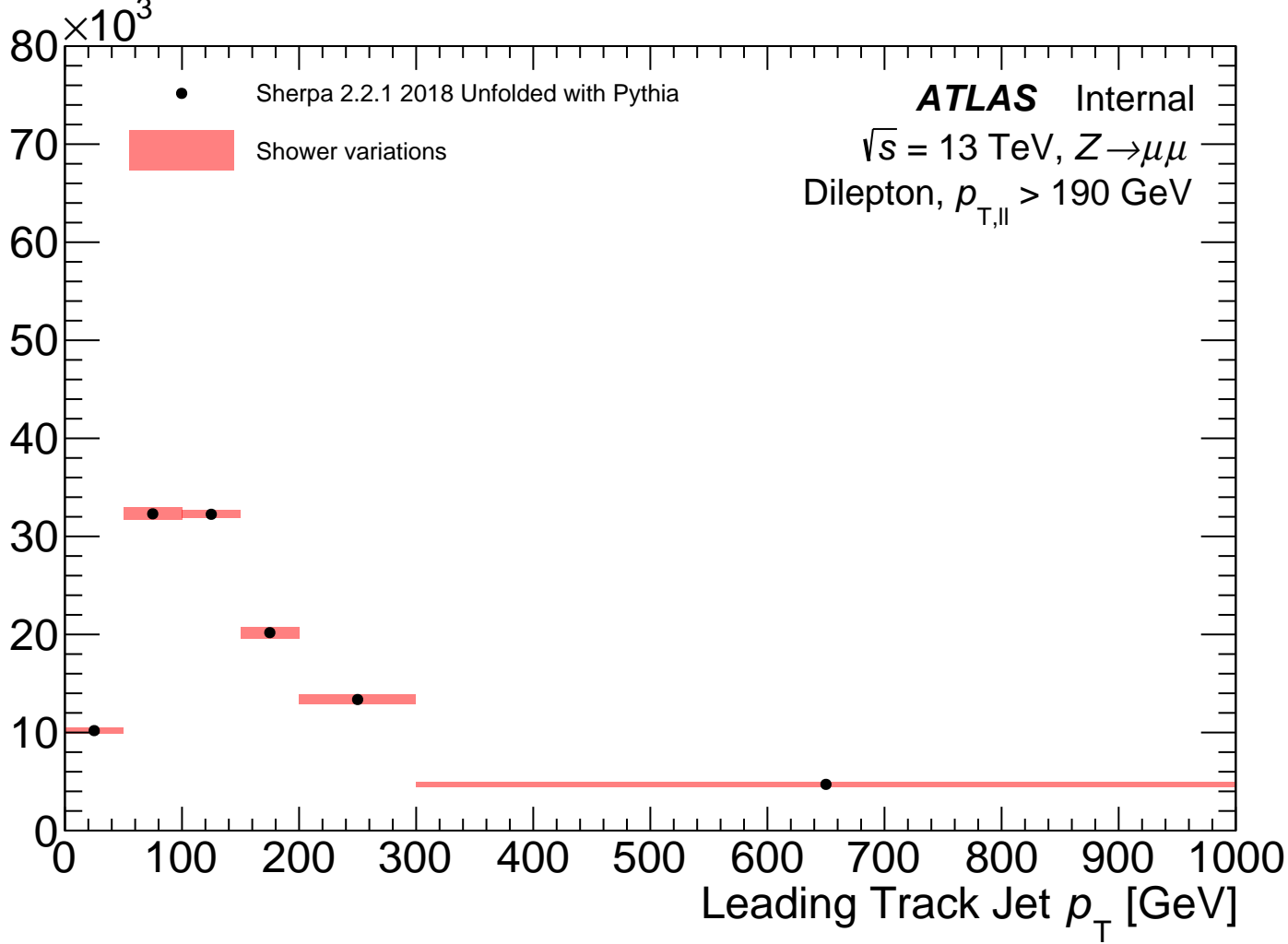
Events



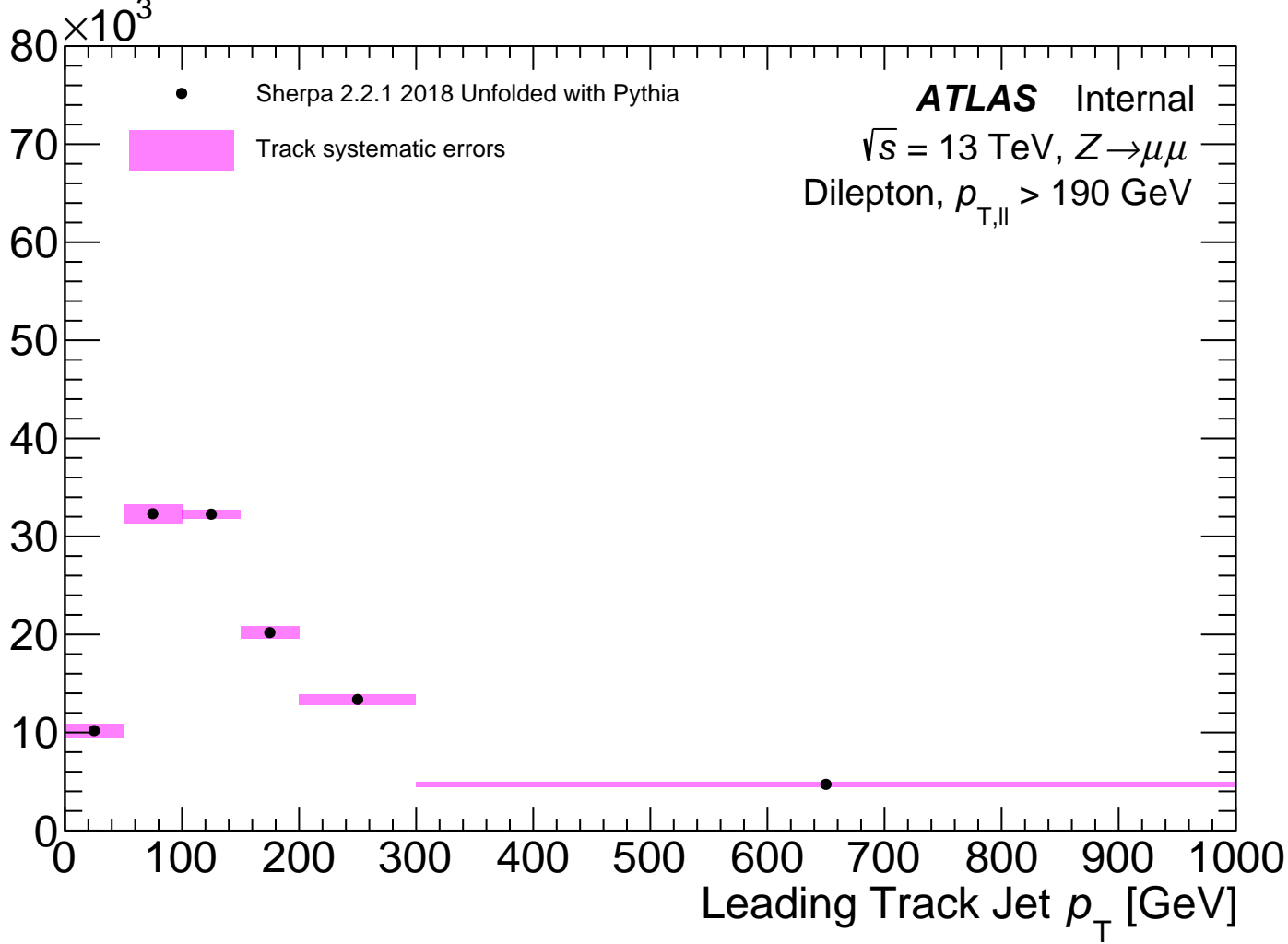
Events



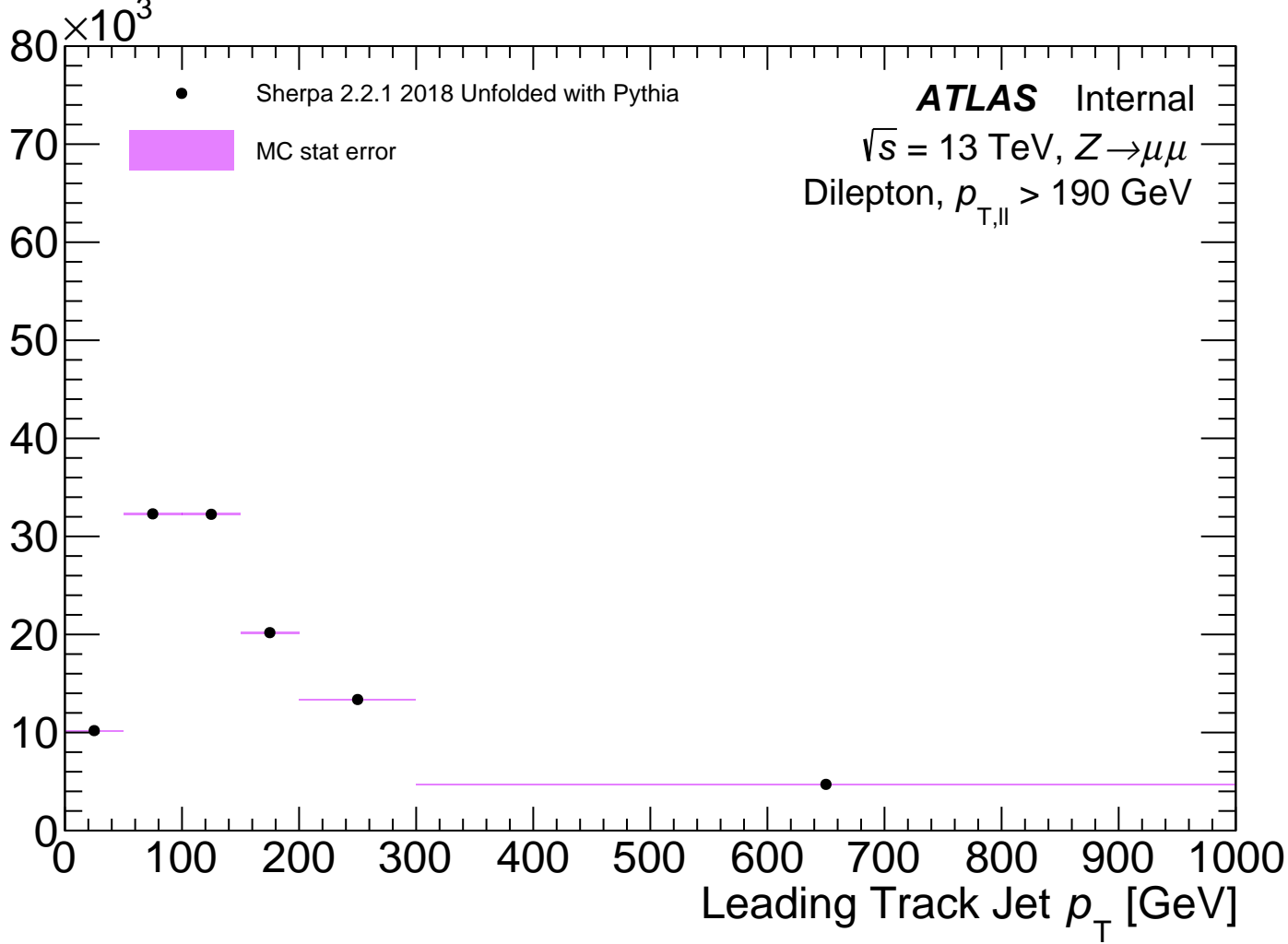
Events



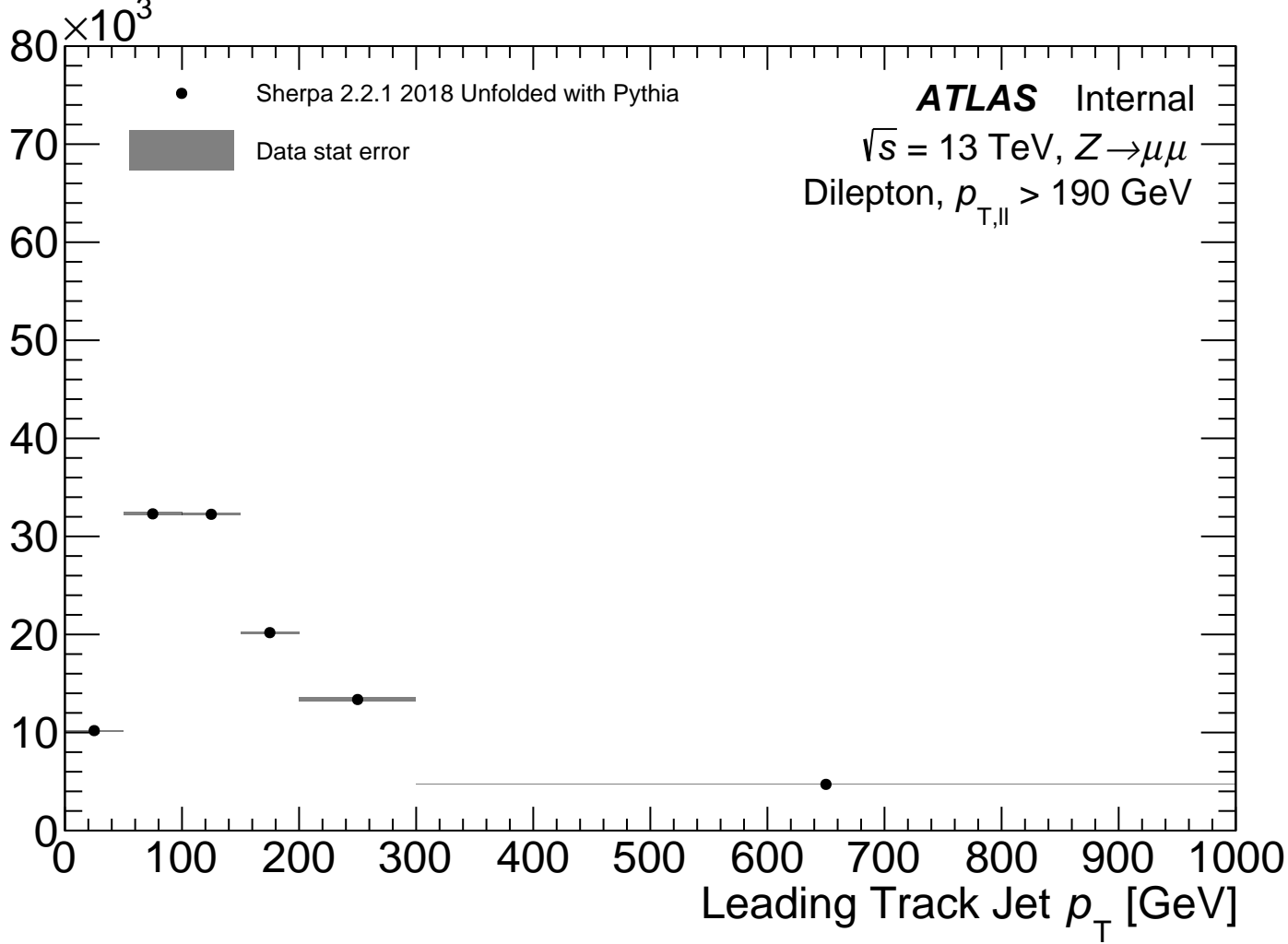
Events



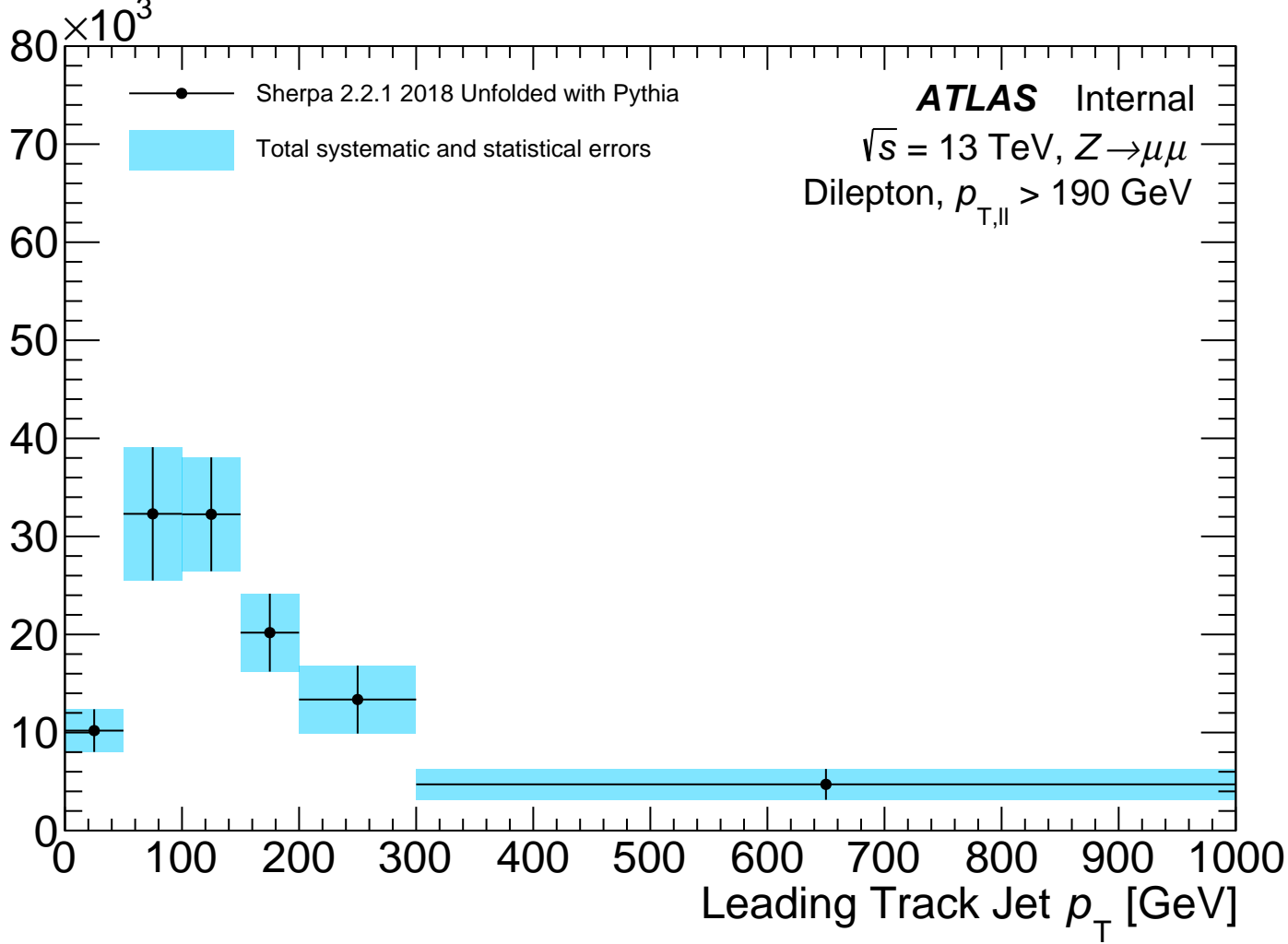
Events



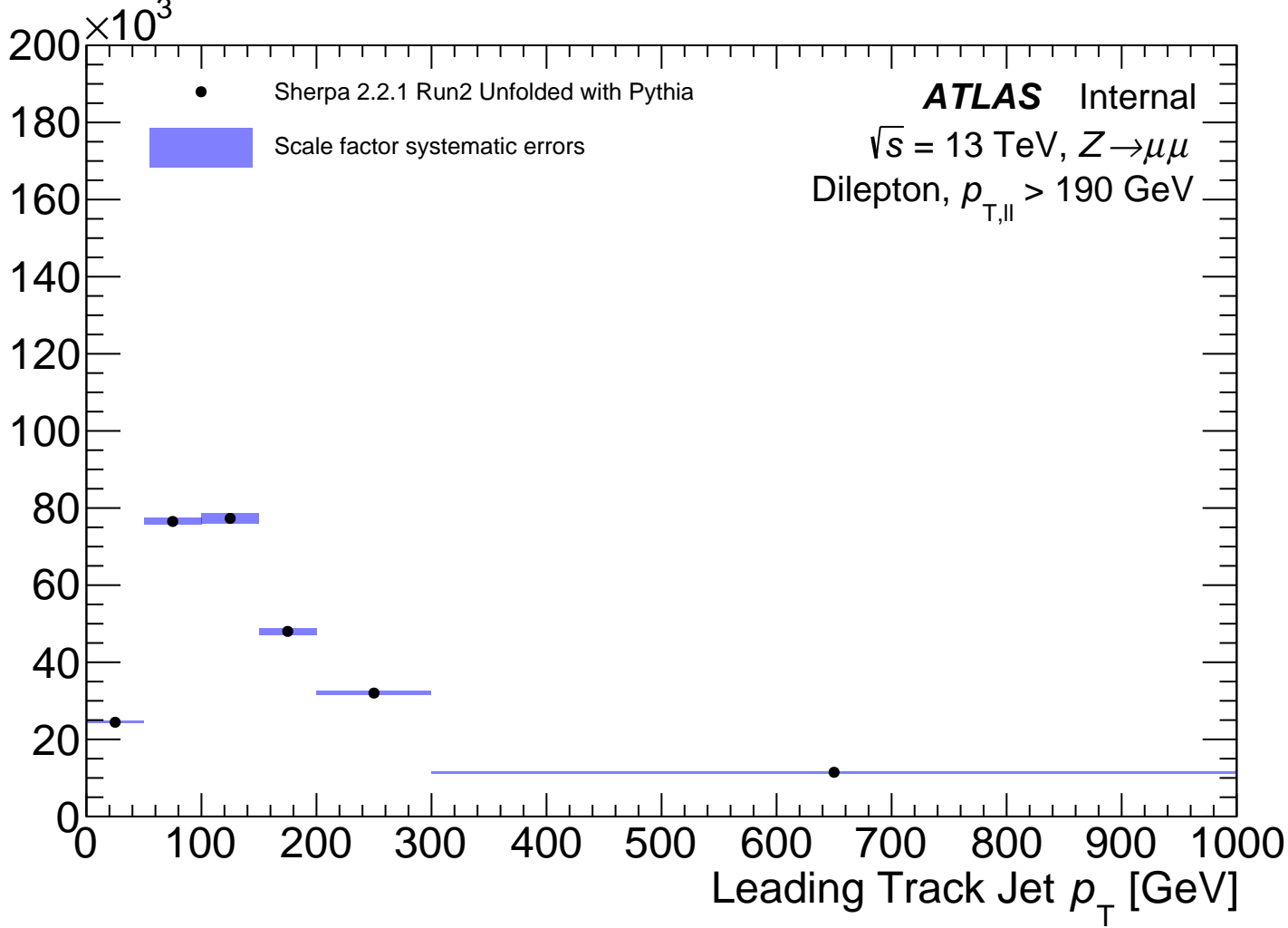
Events

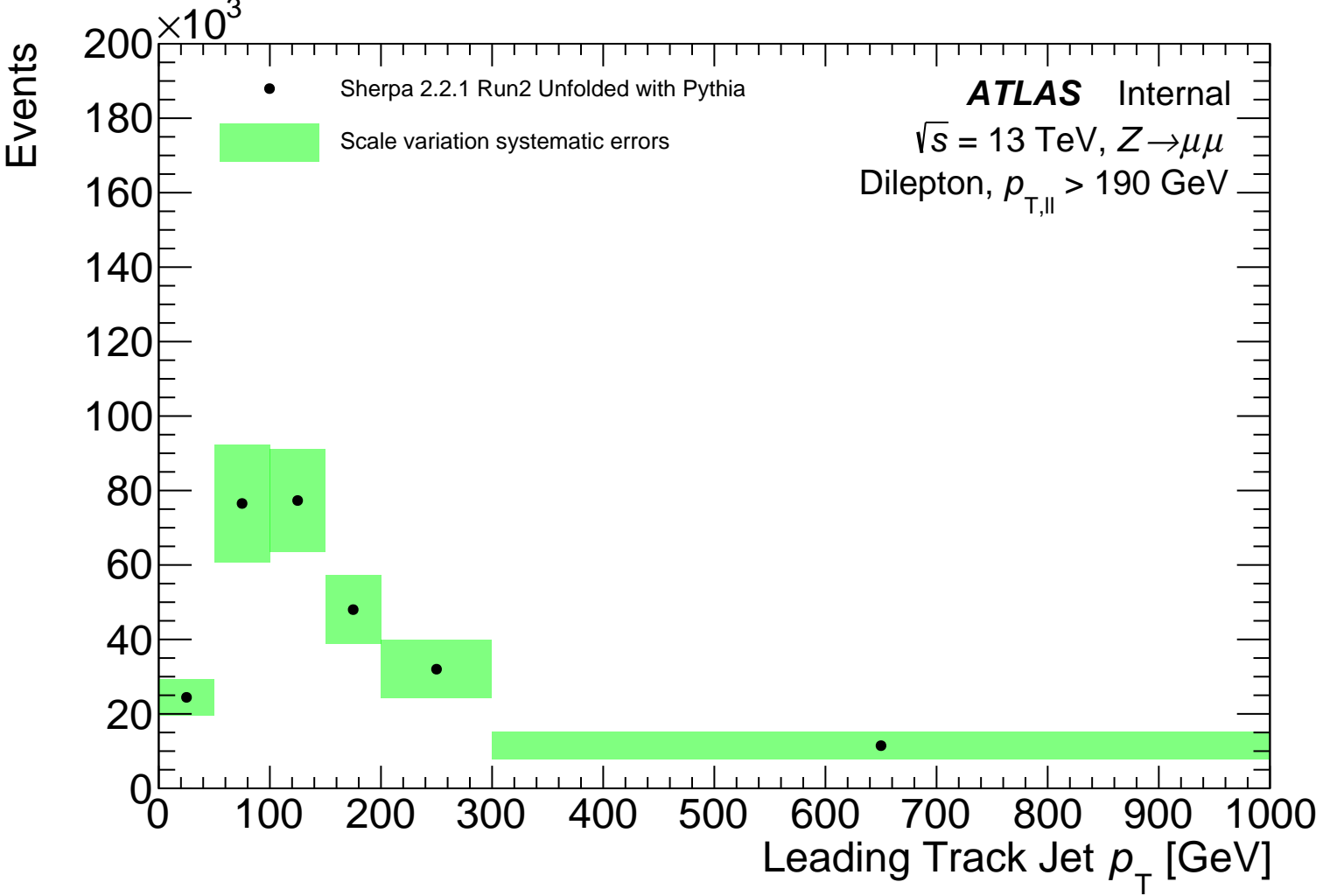


Events

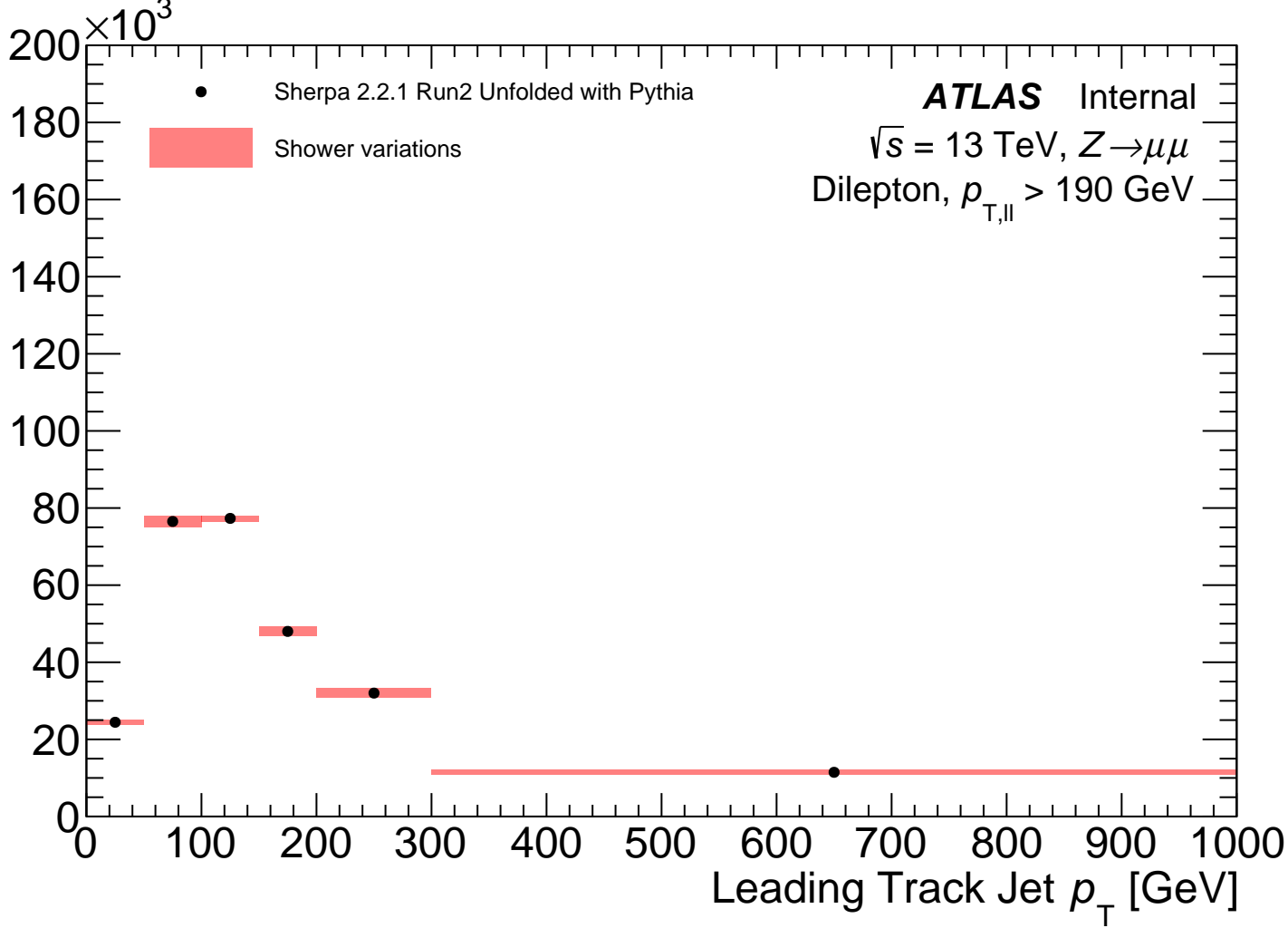


Events

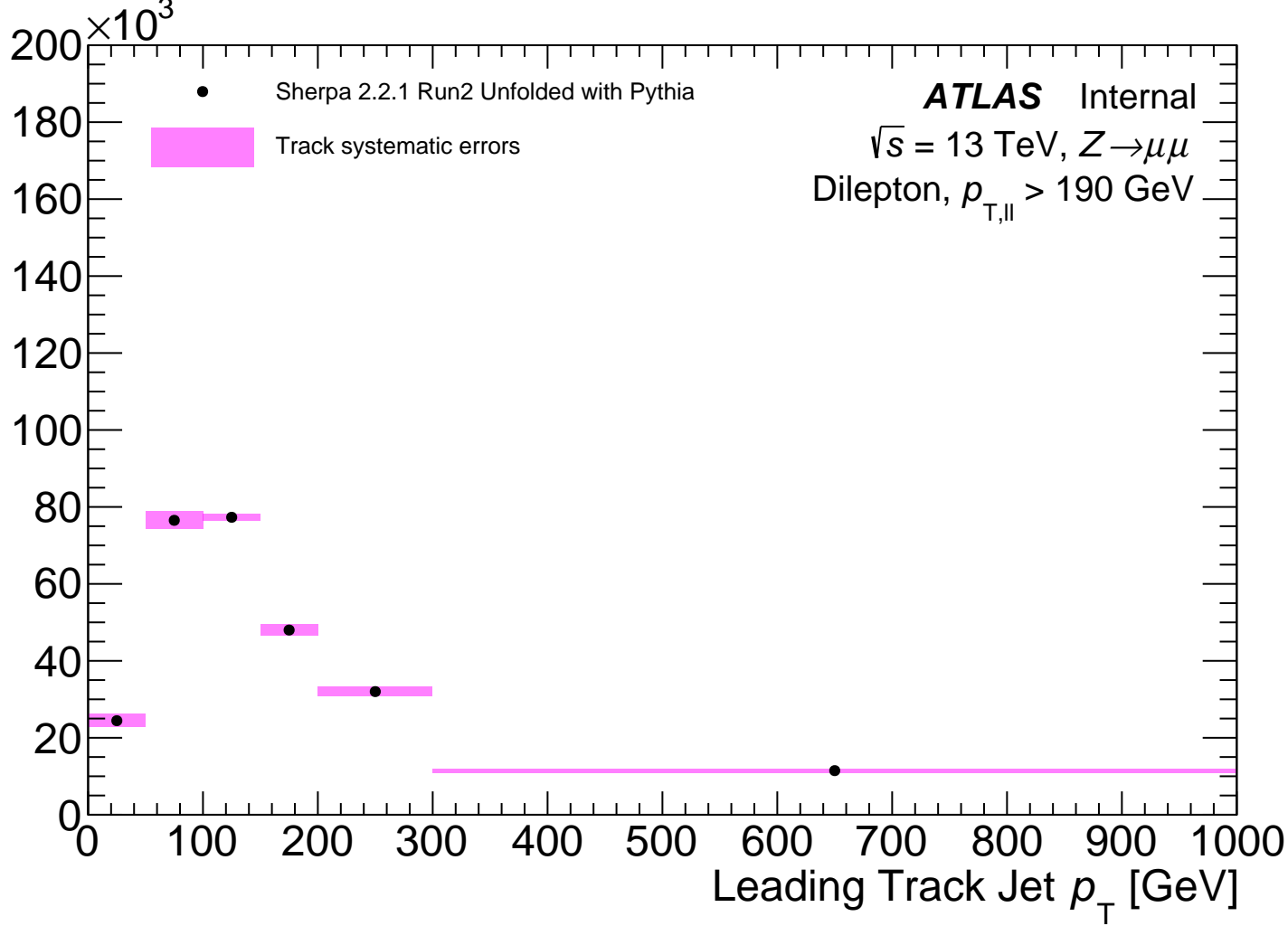




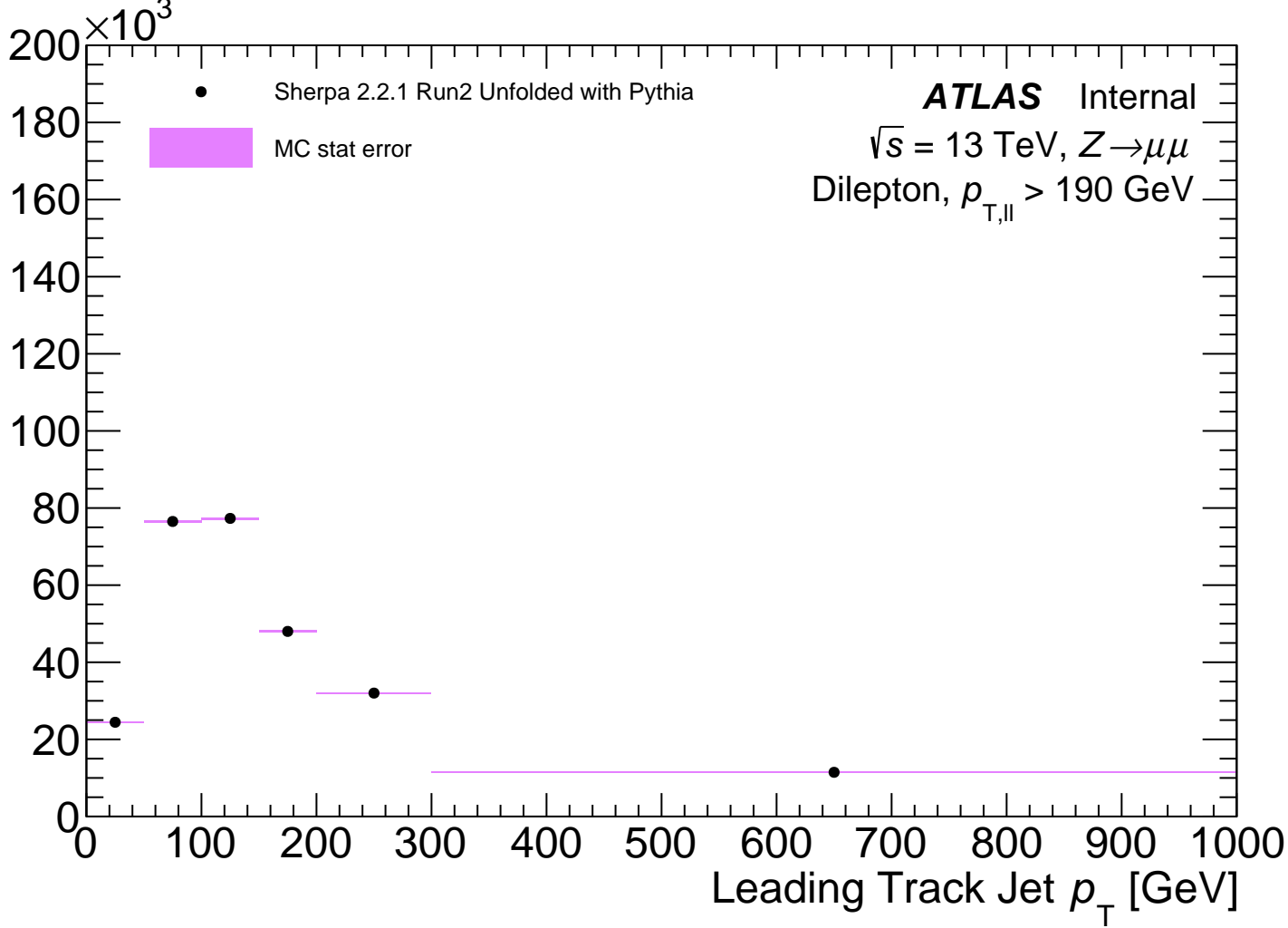
Events



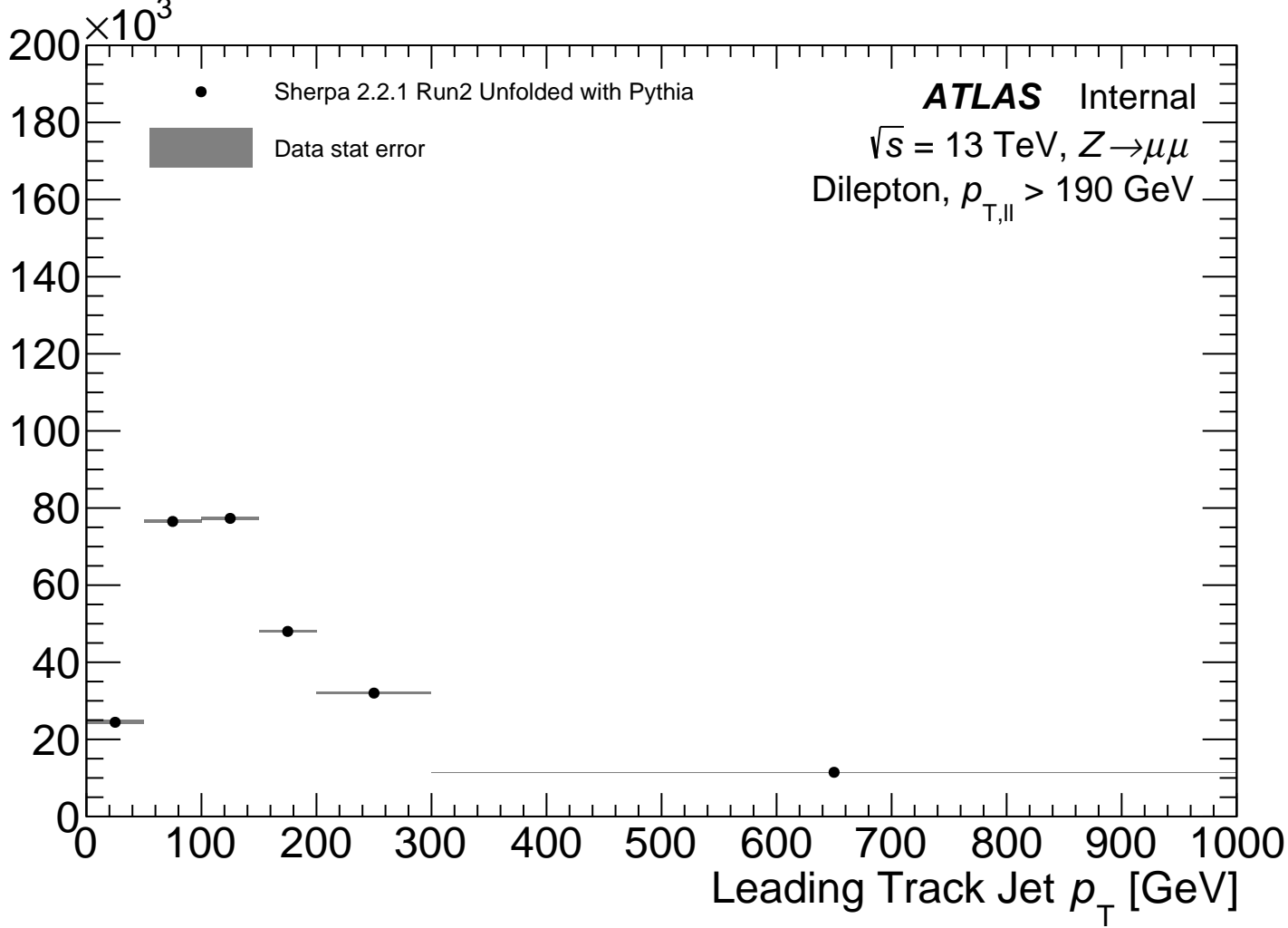
Events



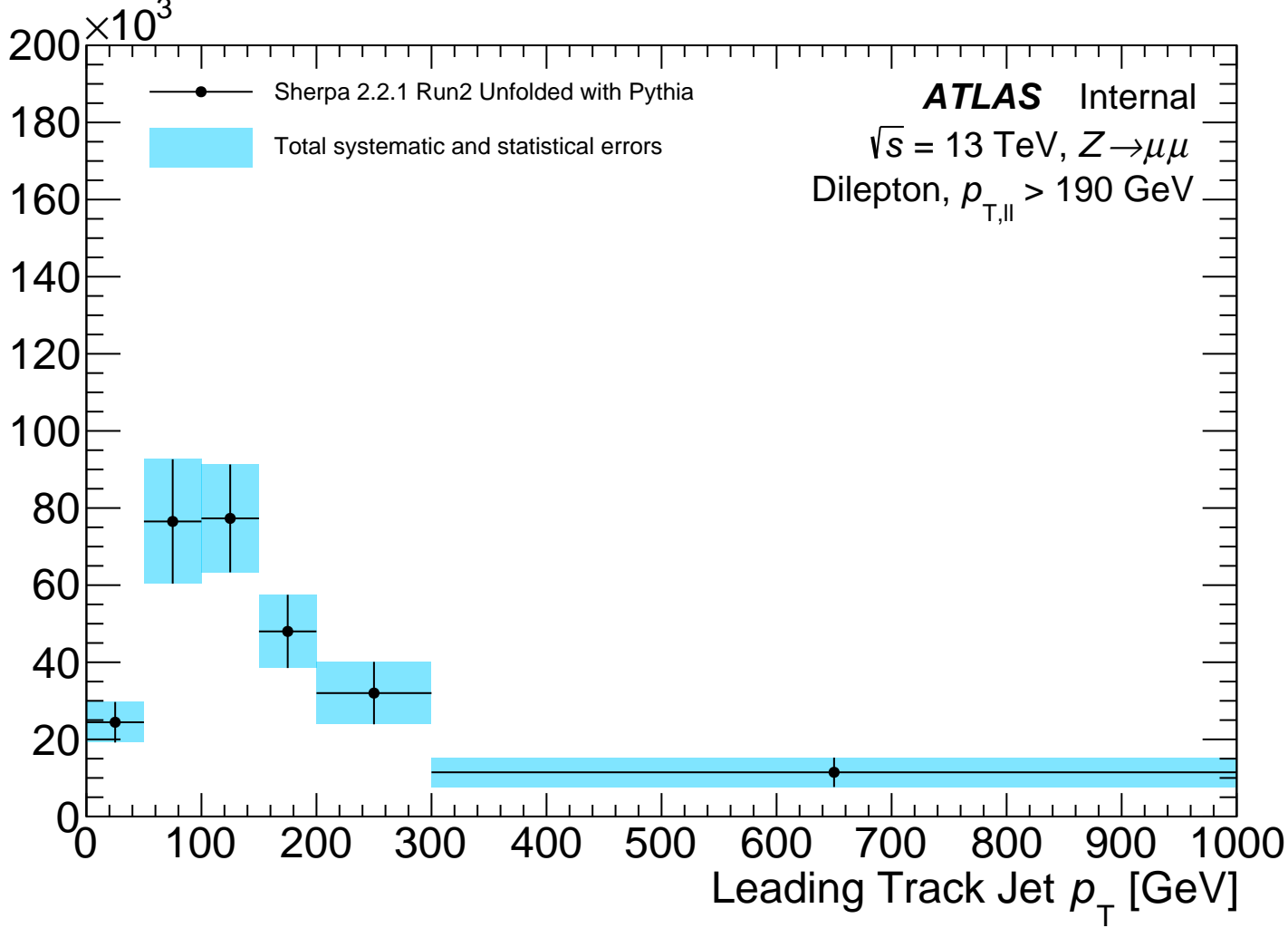
Events



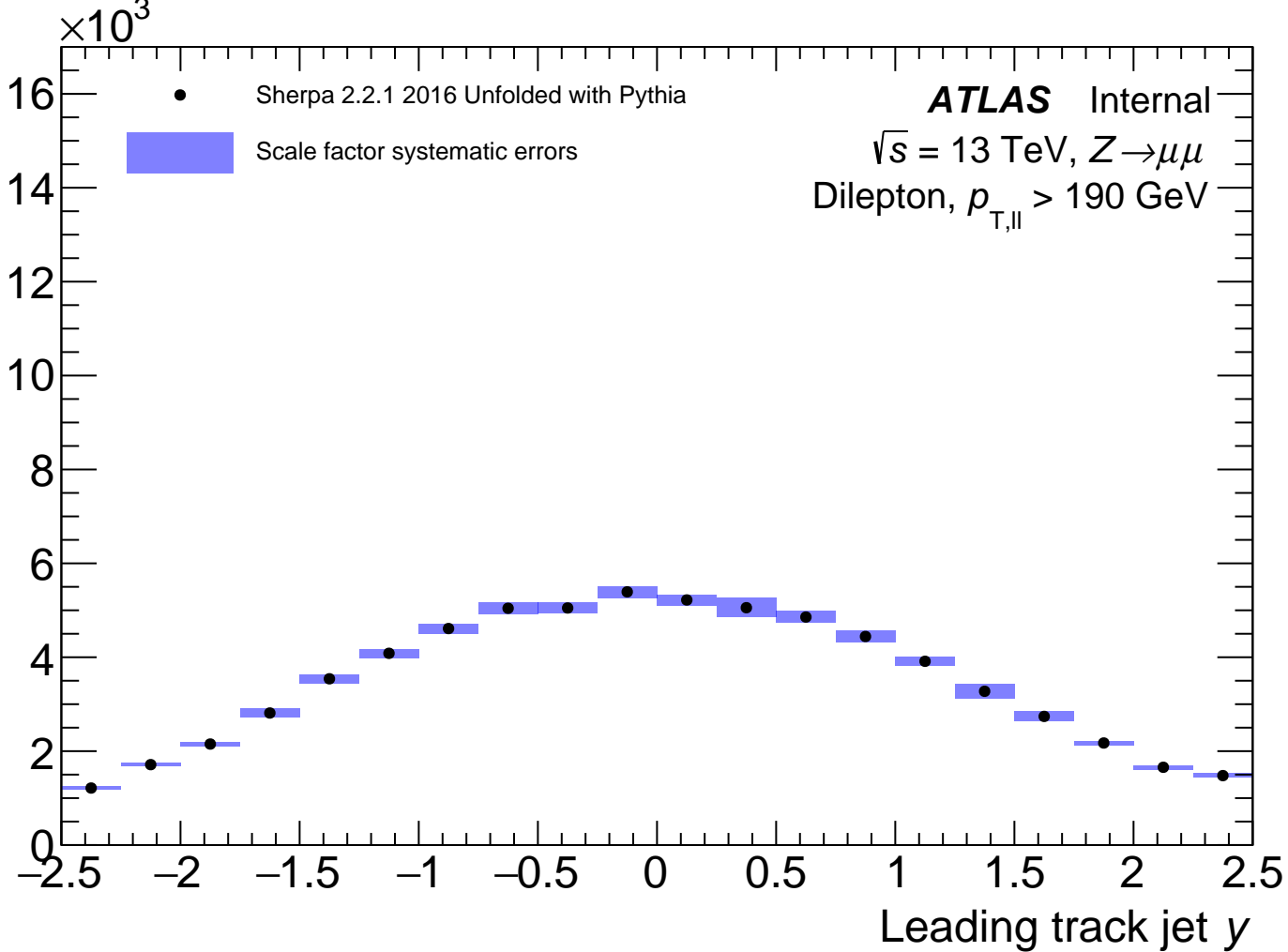
Events



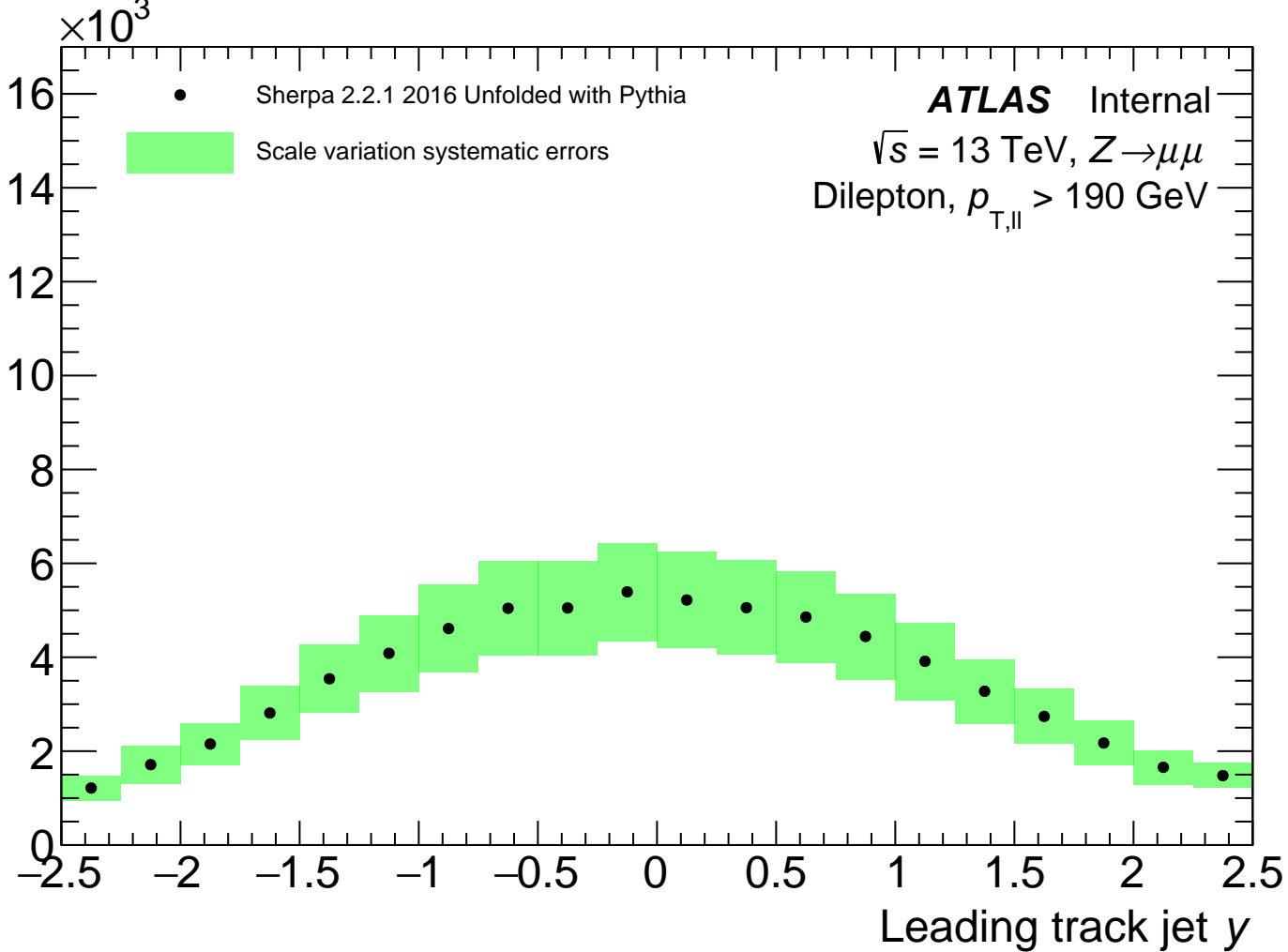
Events



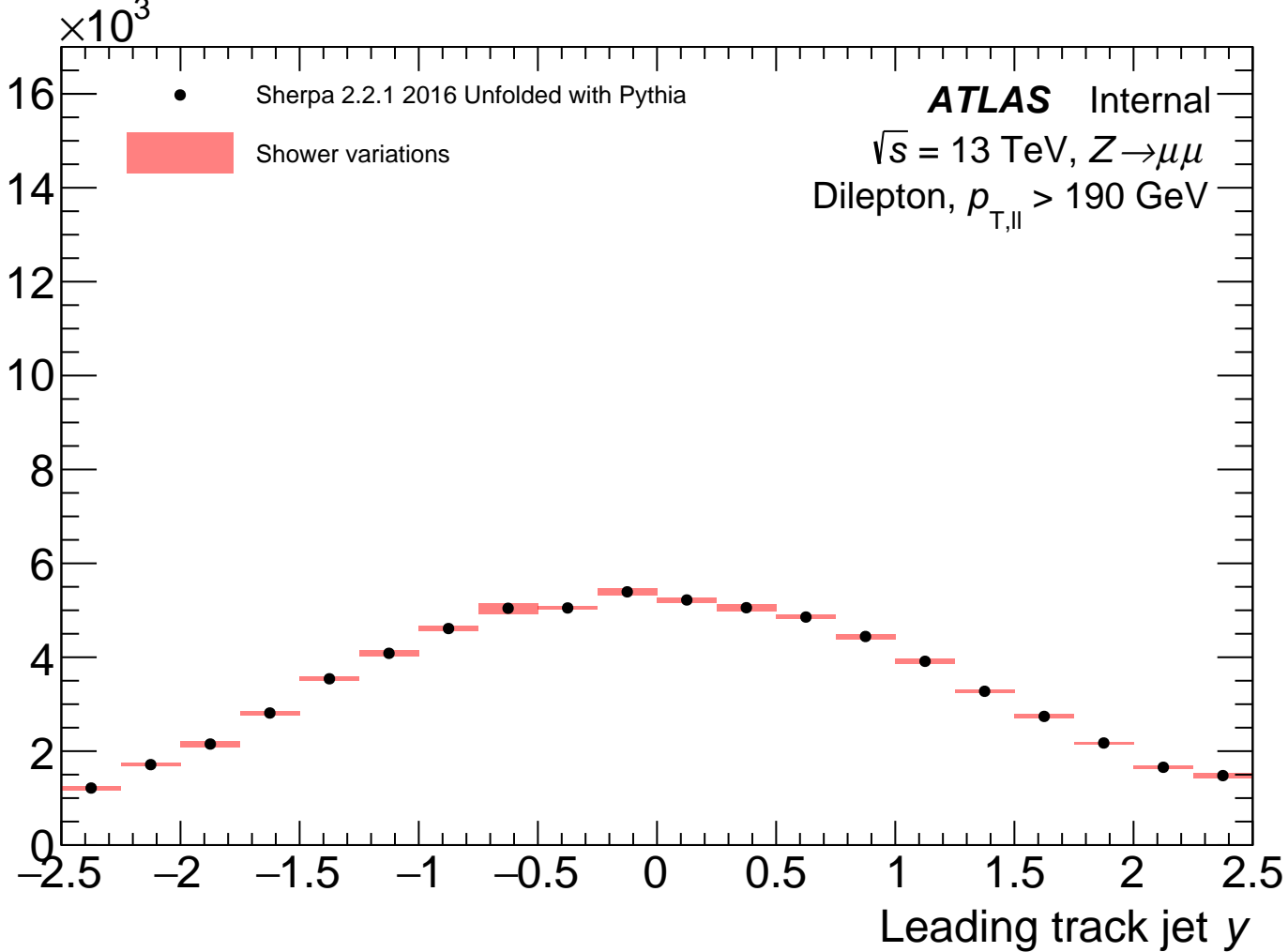
Events



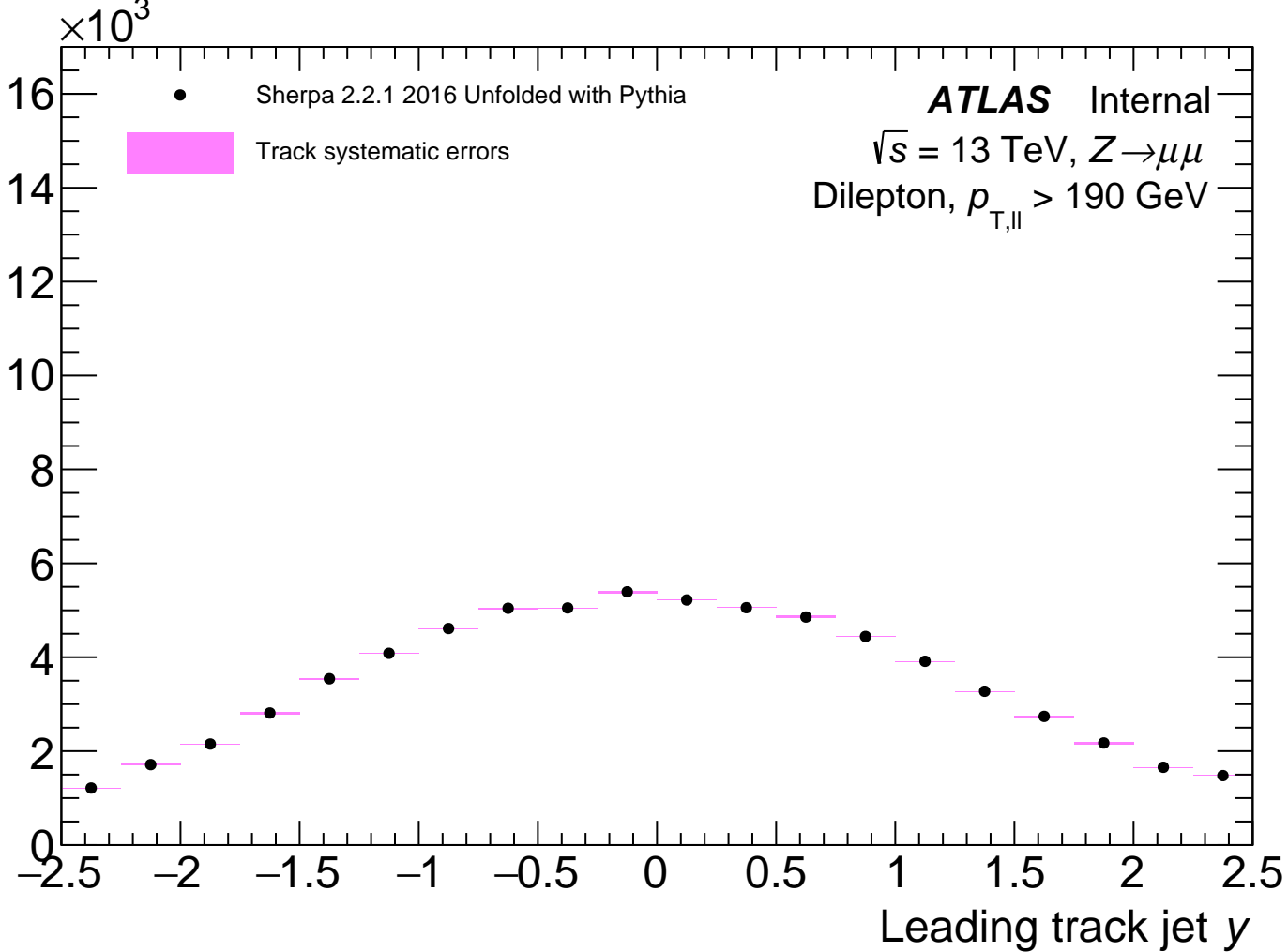
Events



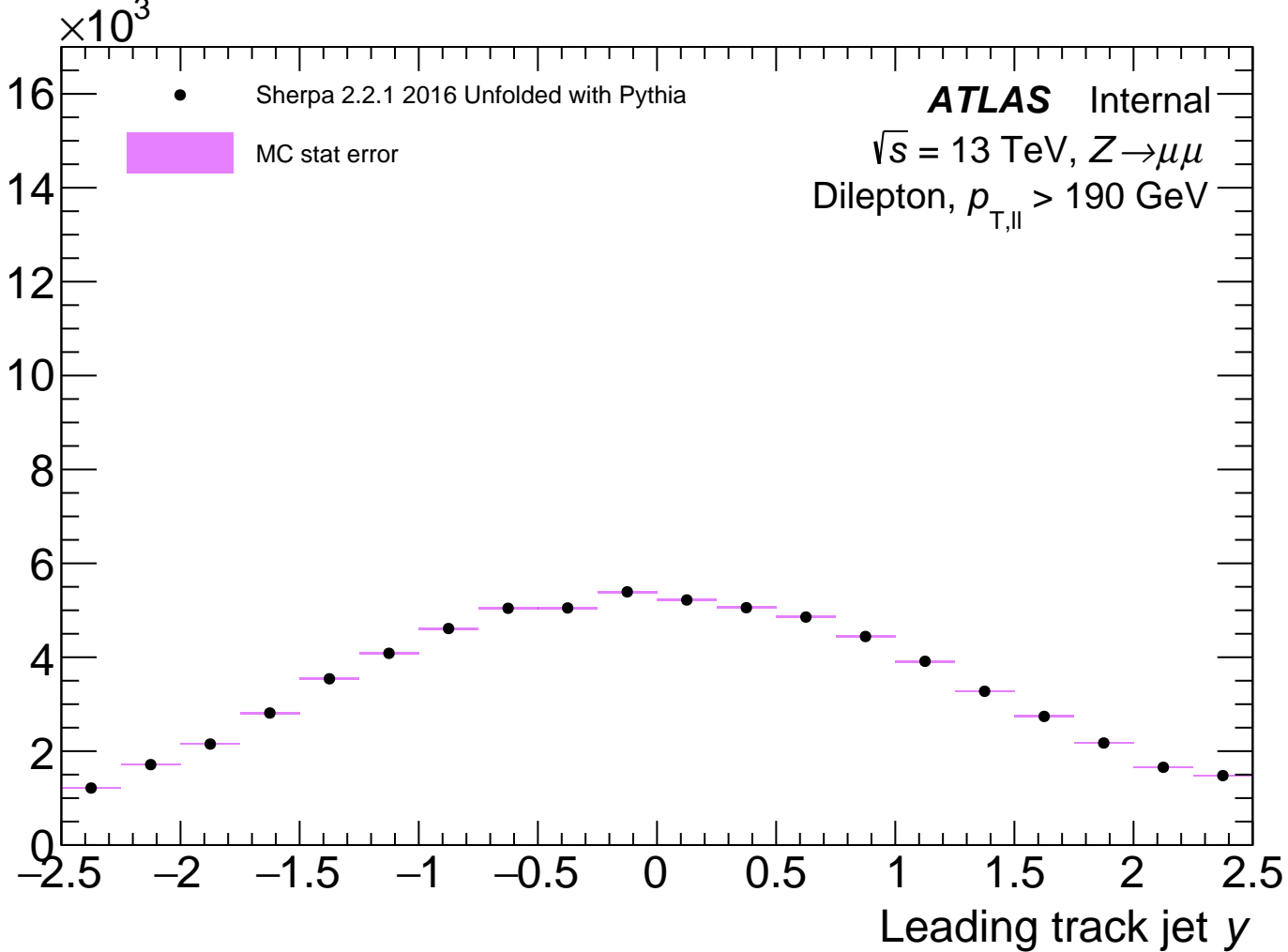
Events



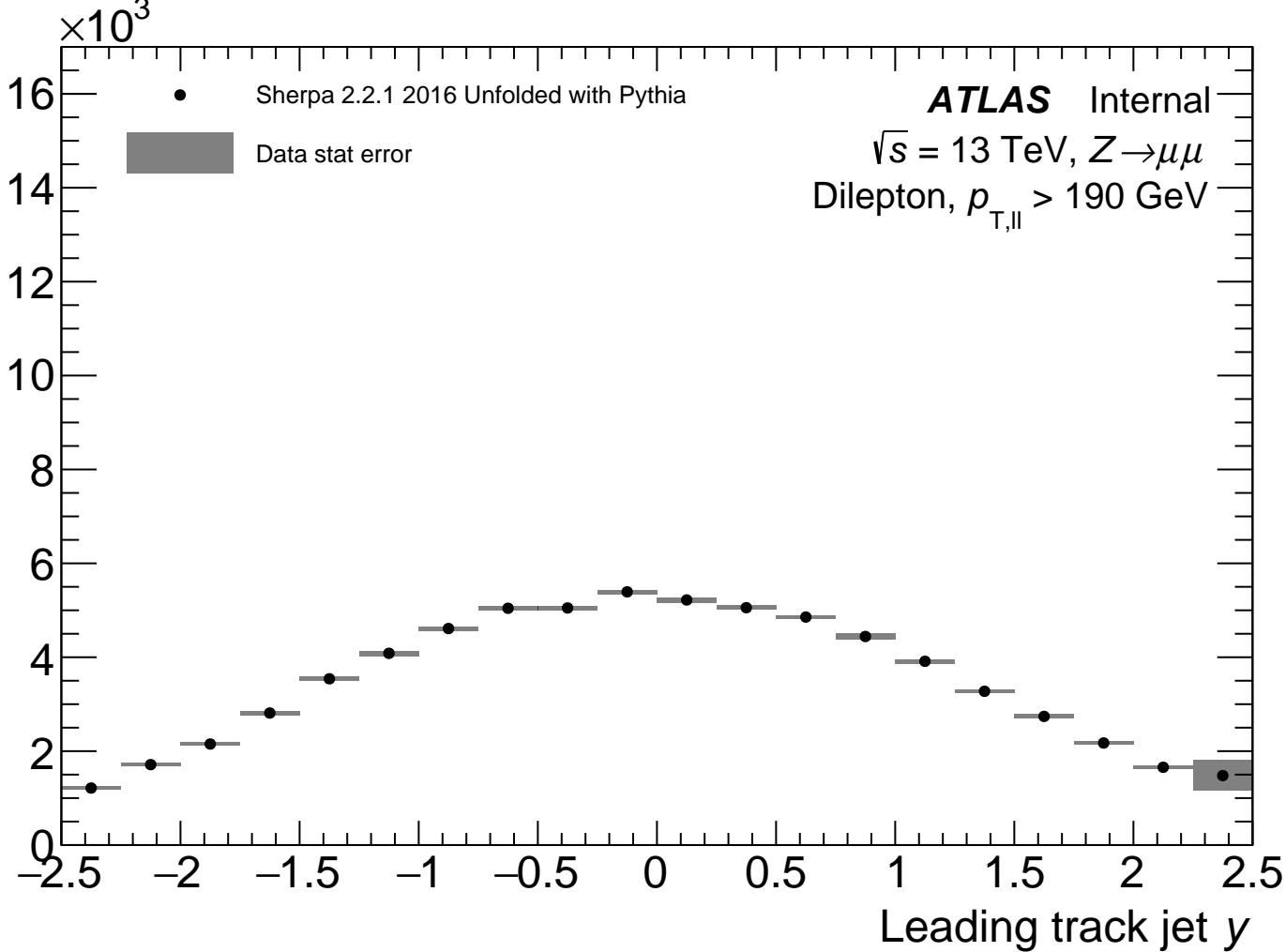
Events



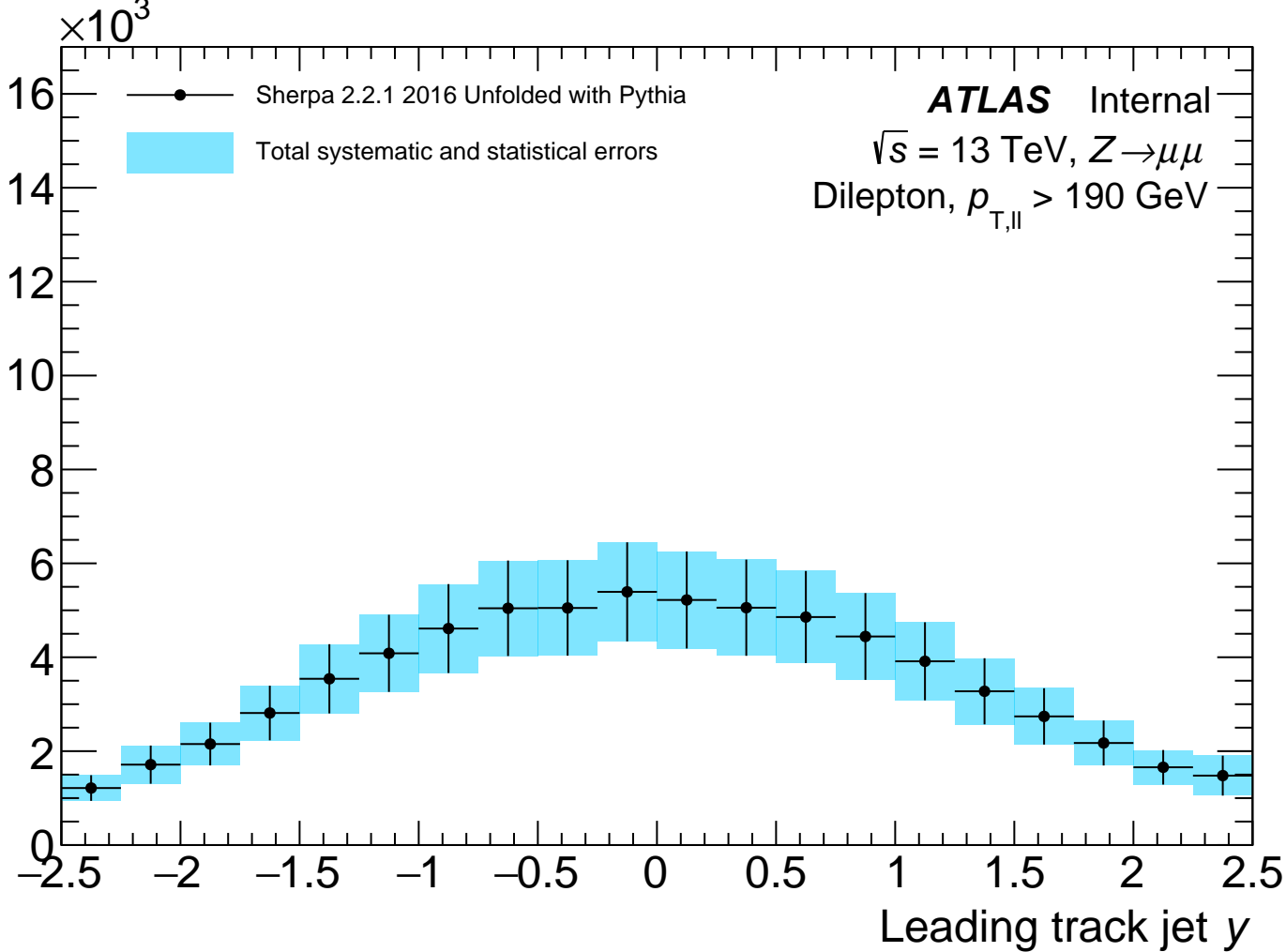
Events



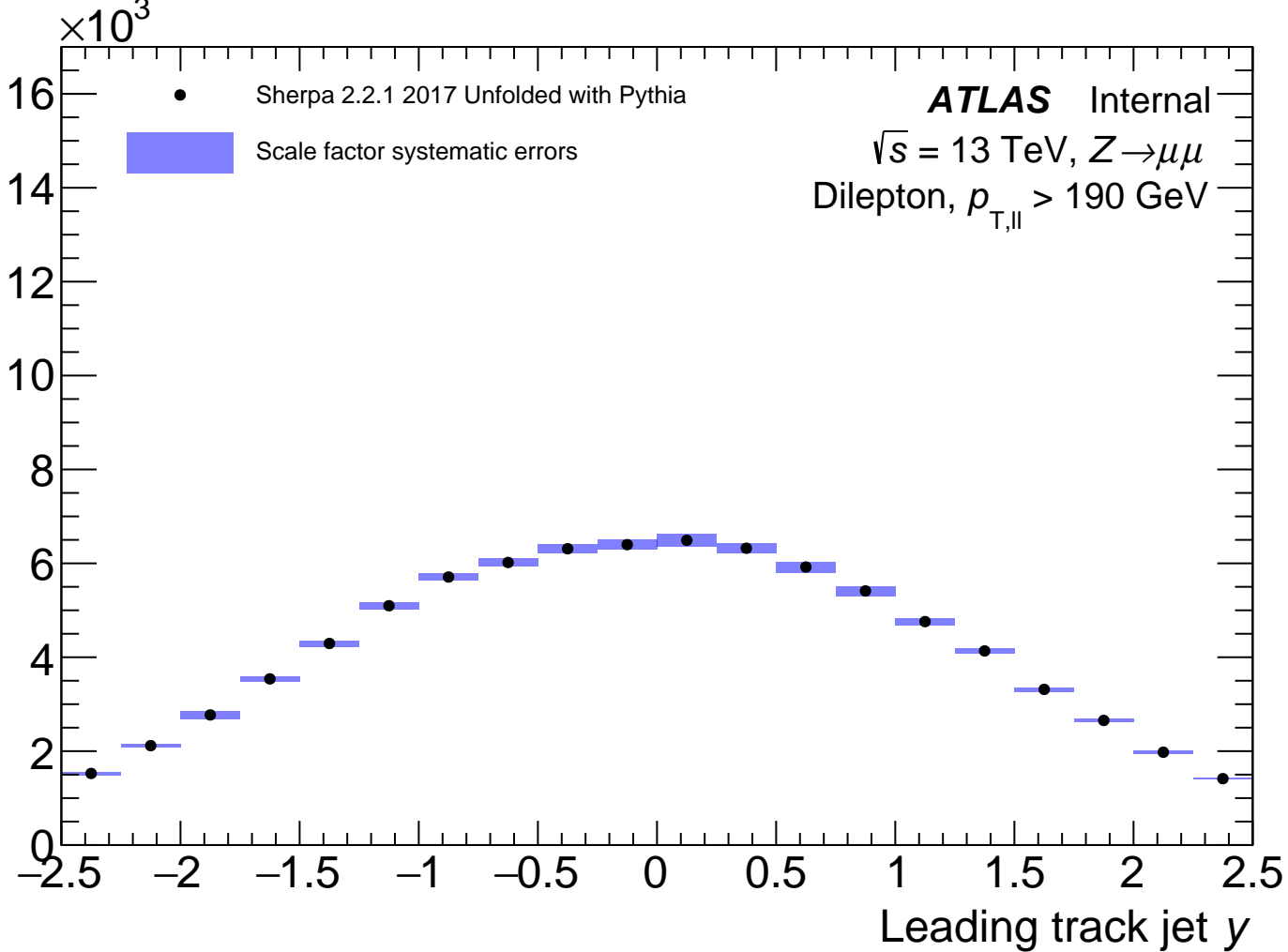
Events



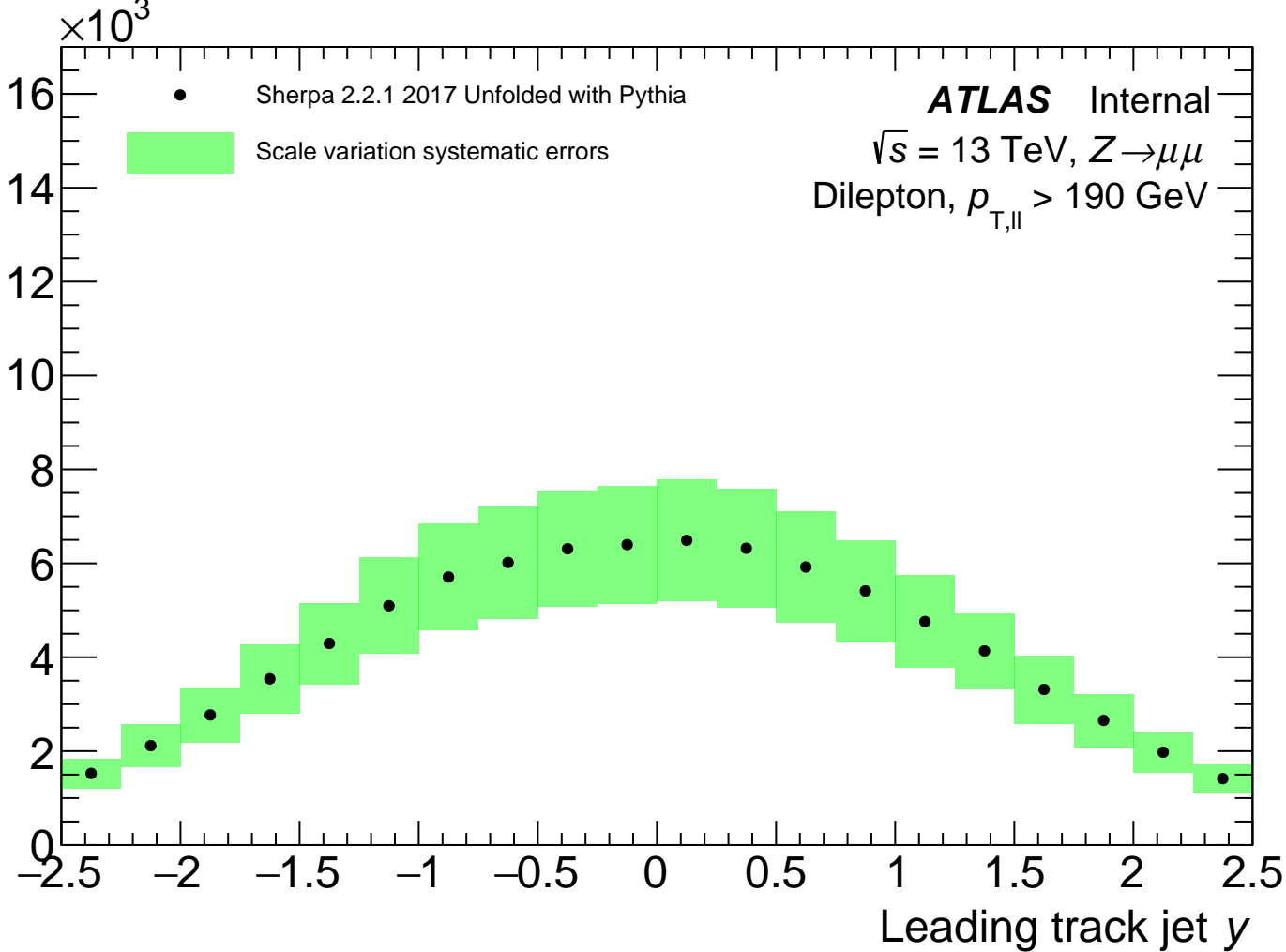
Events



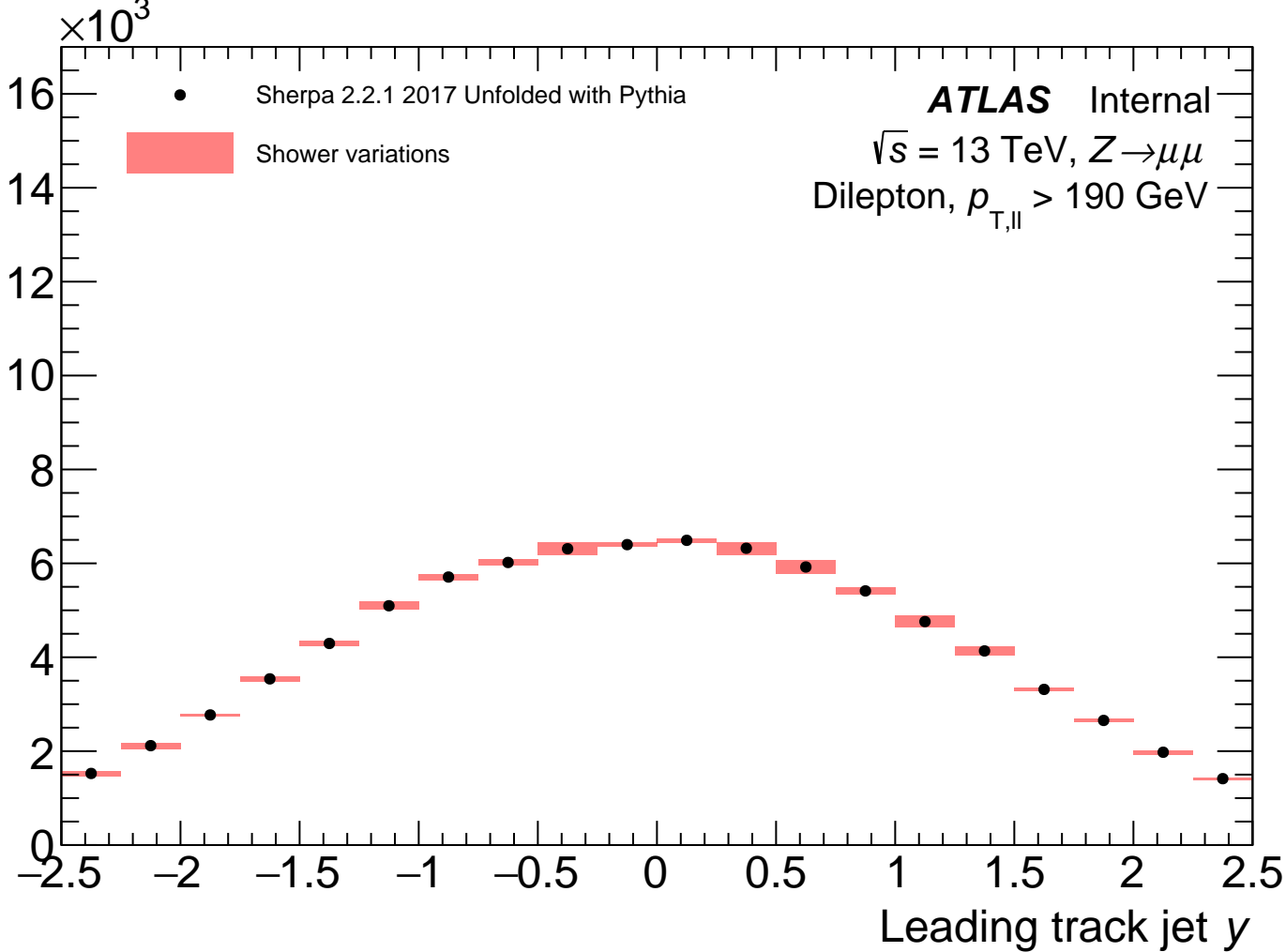
Events



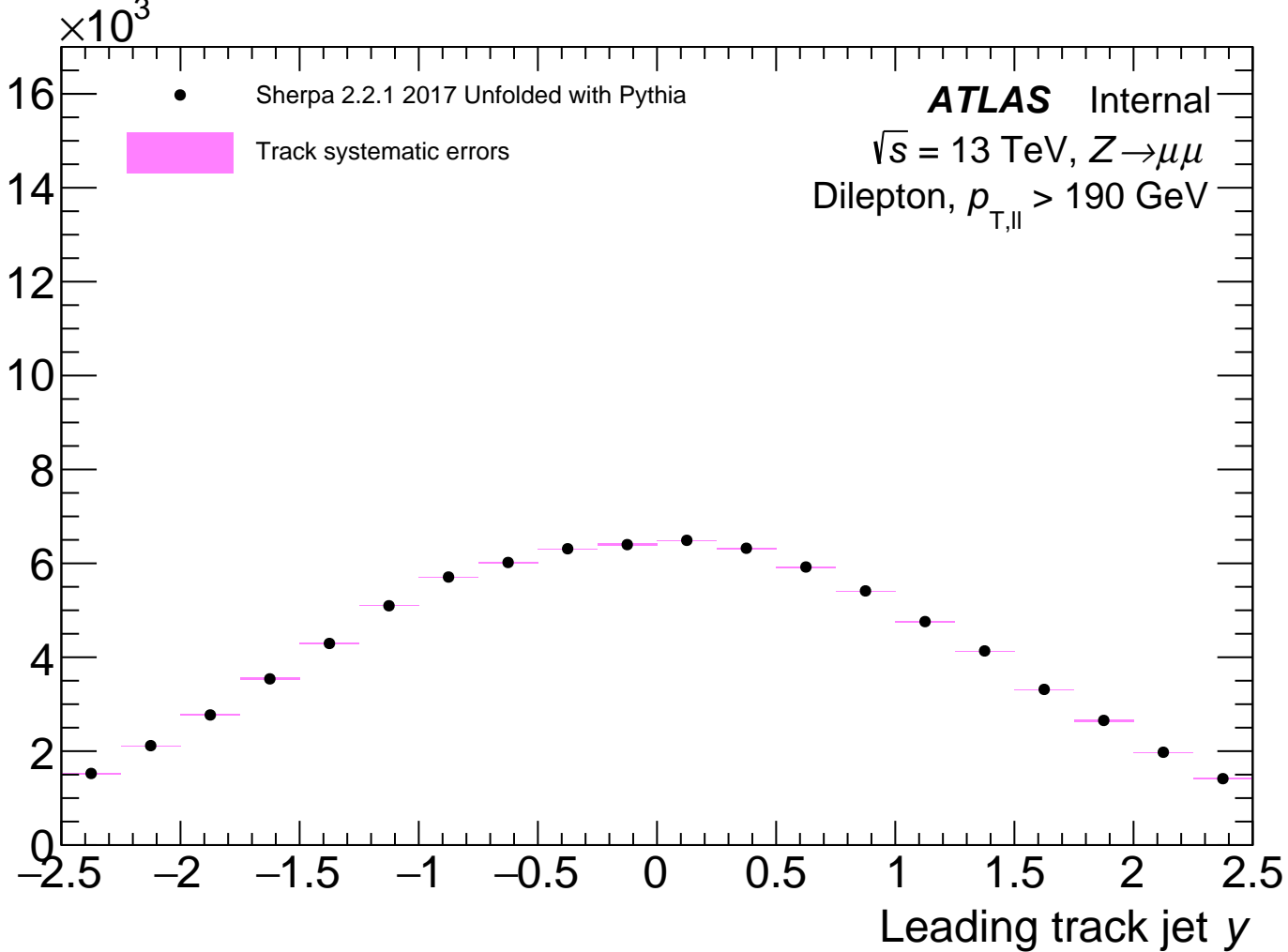
Events



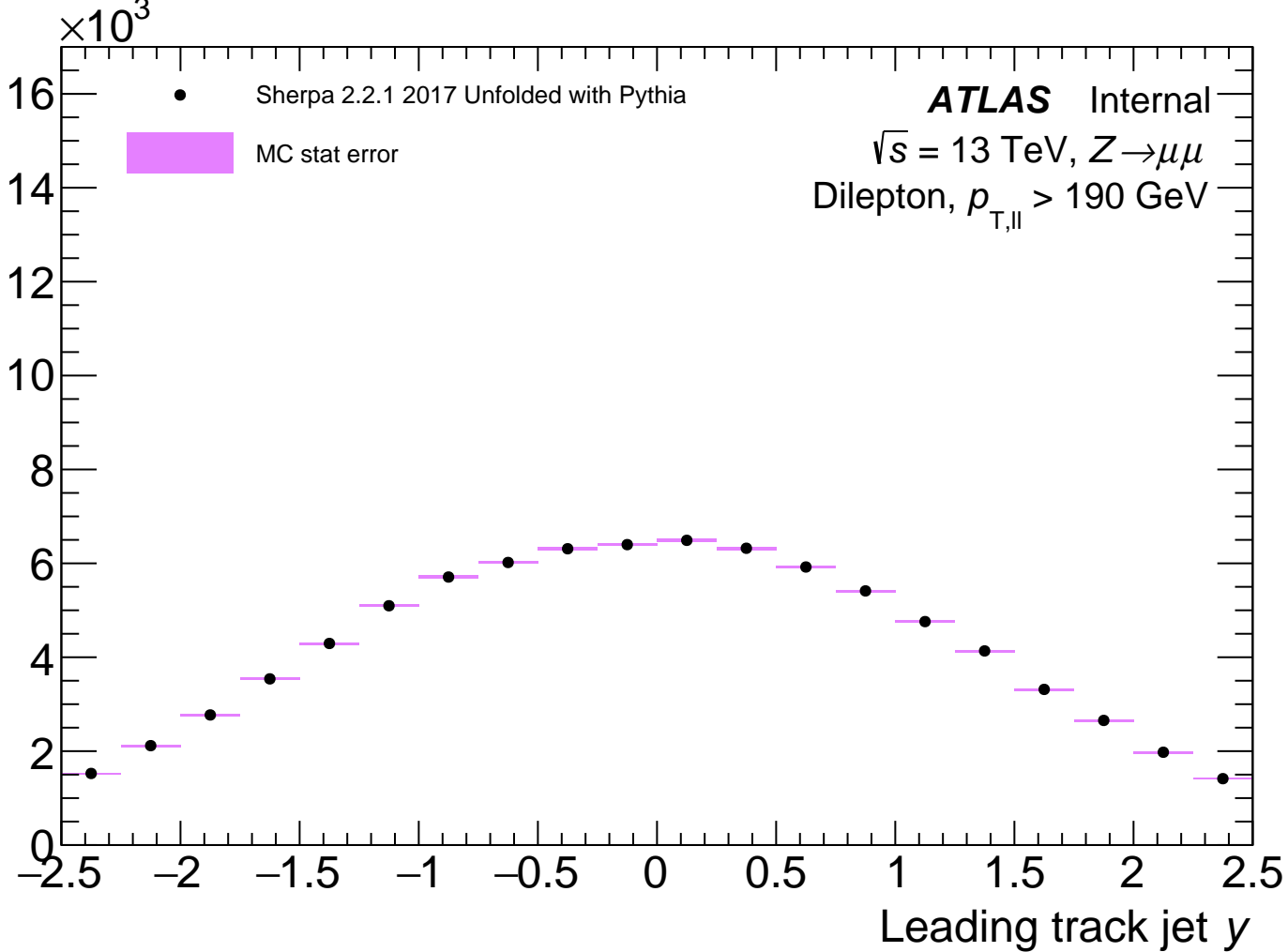
Events



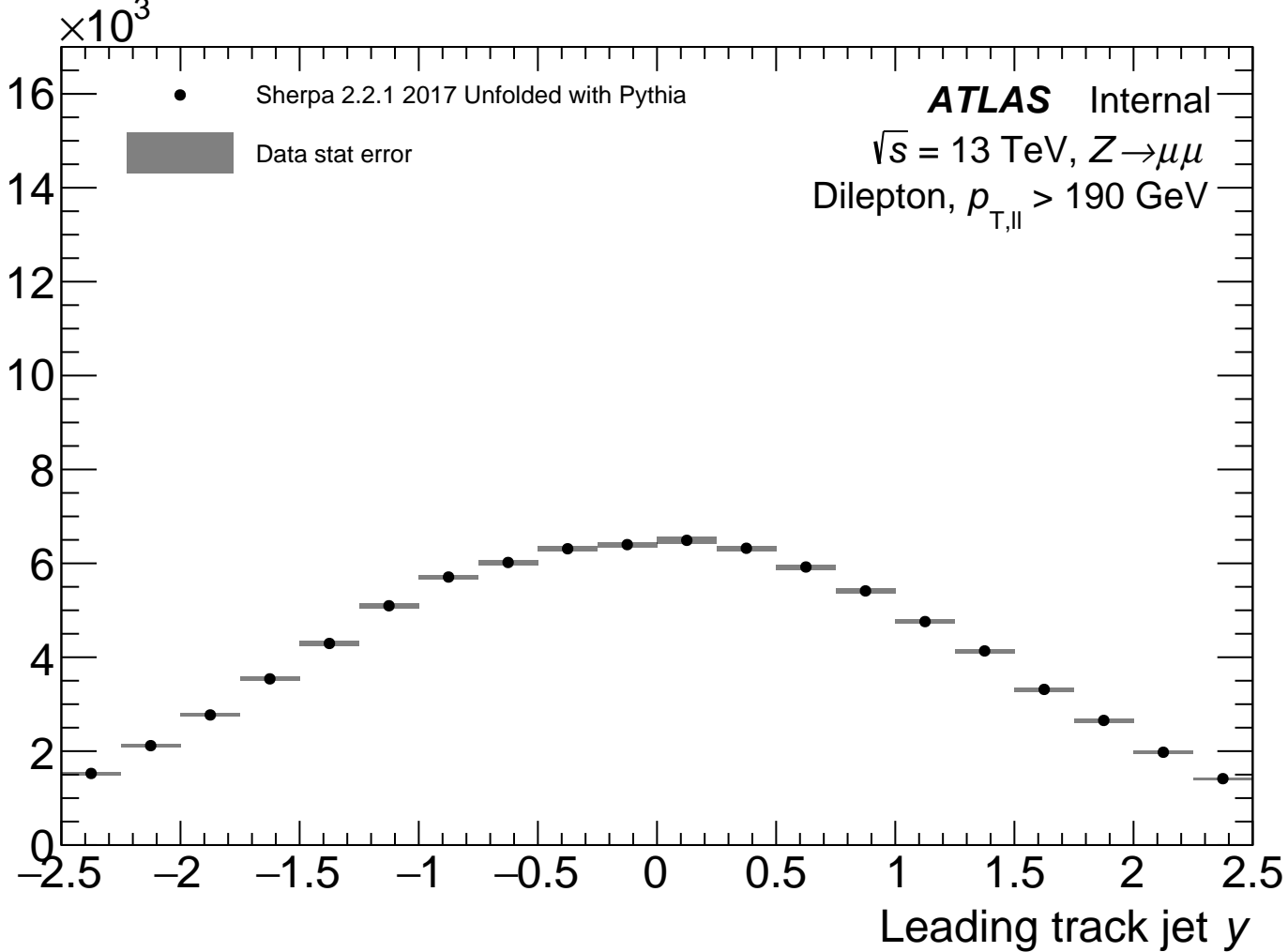
Events



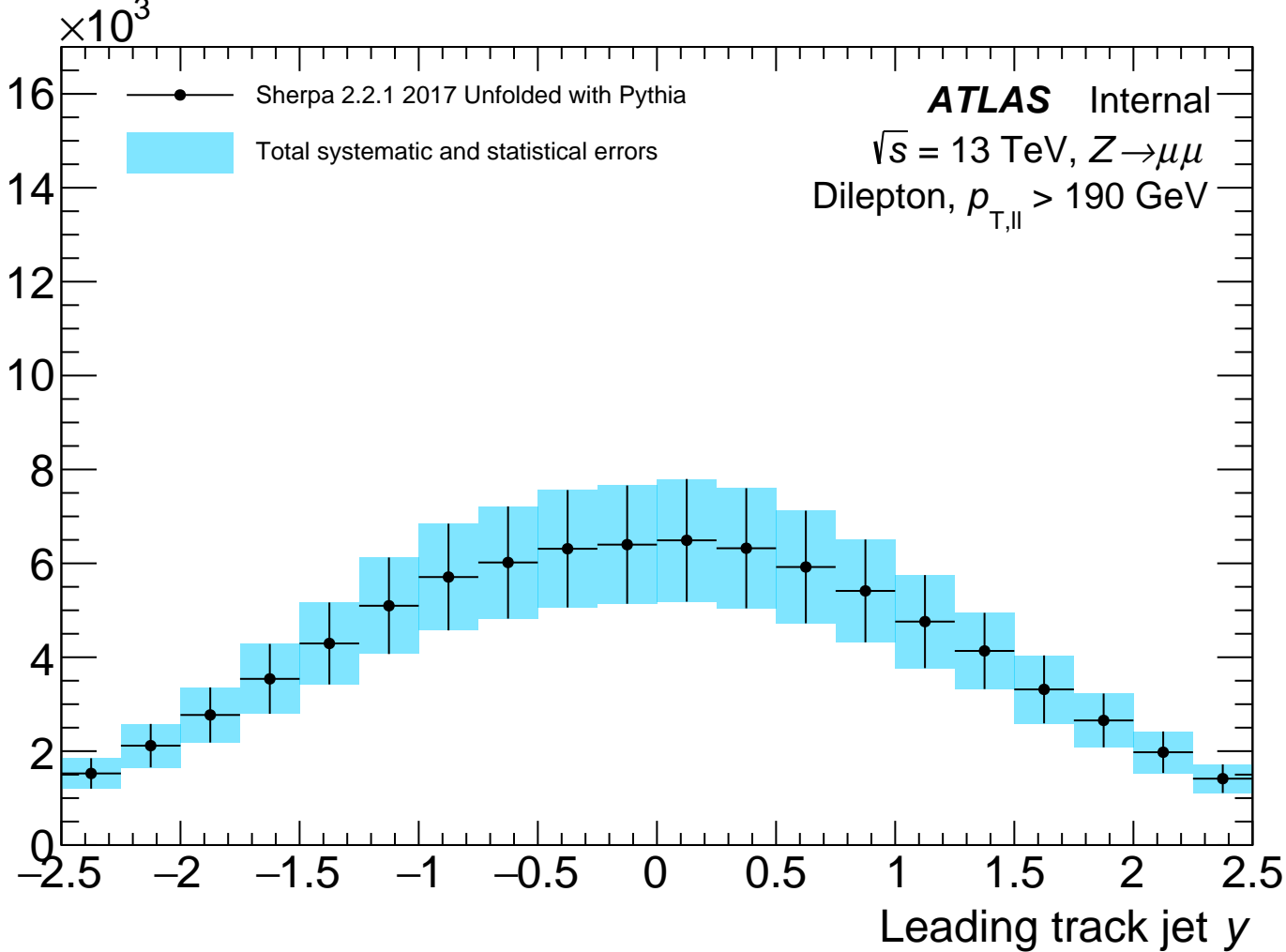
Events



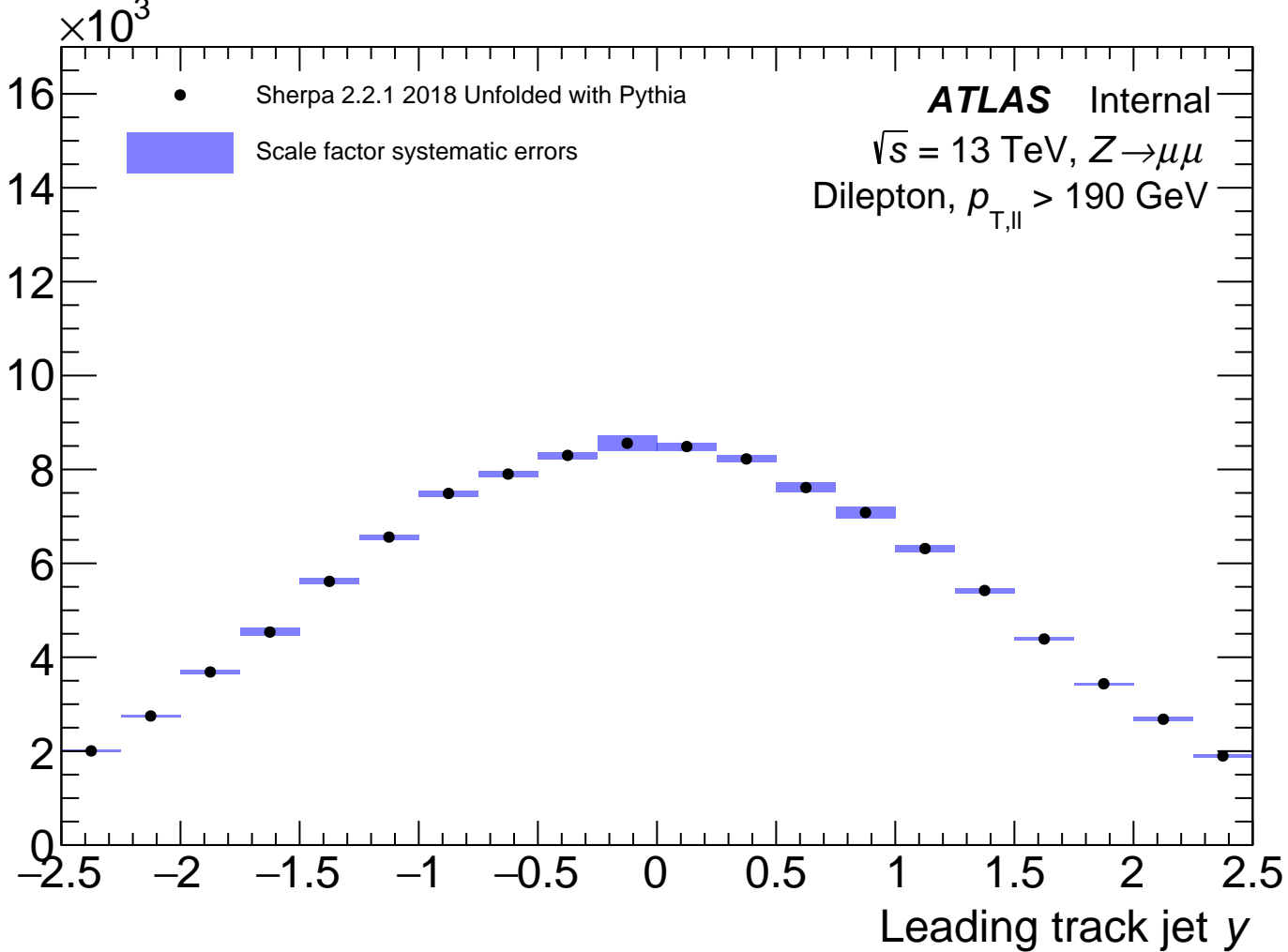
Events



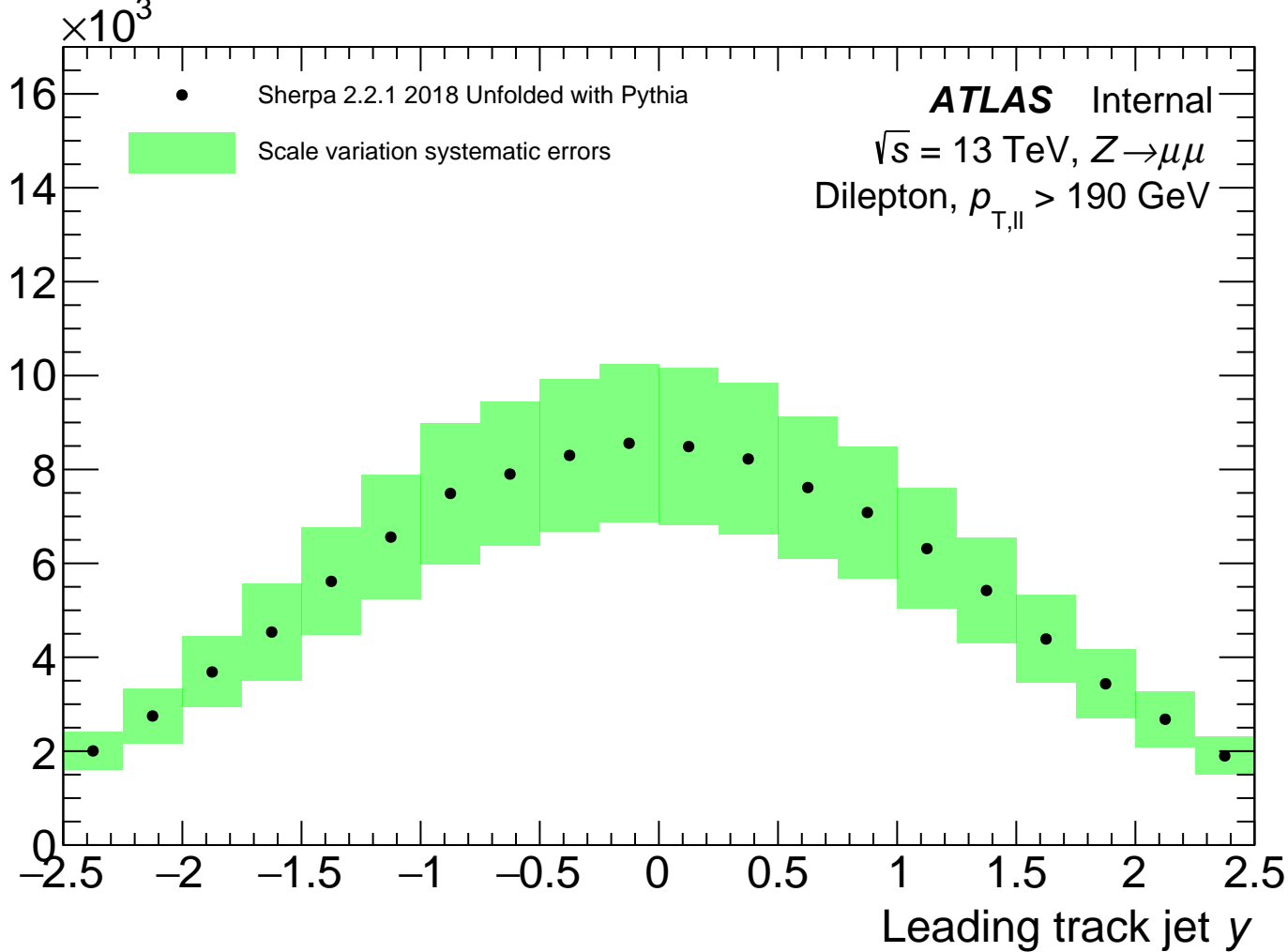
Events



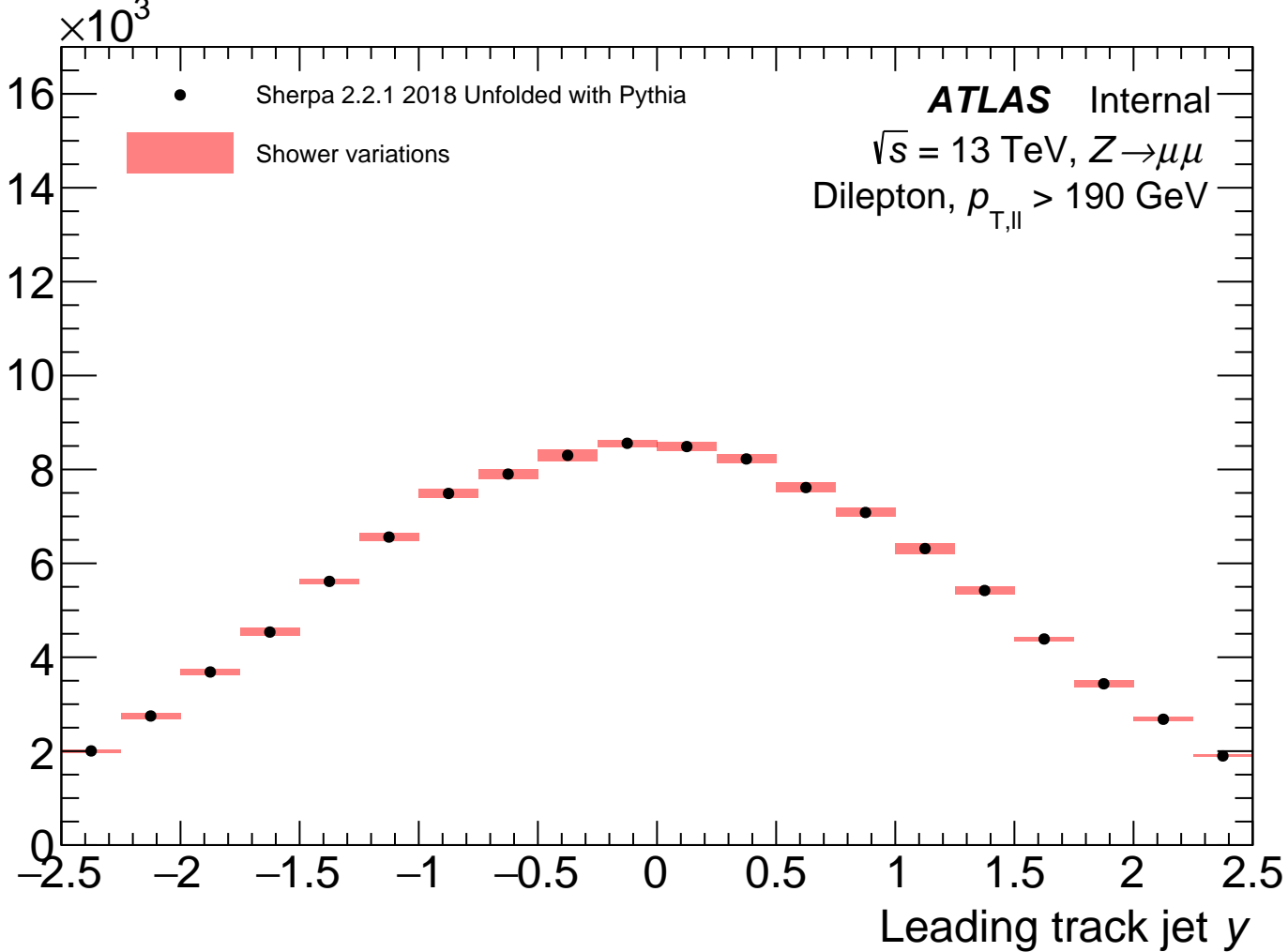
Events



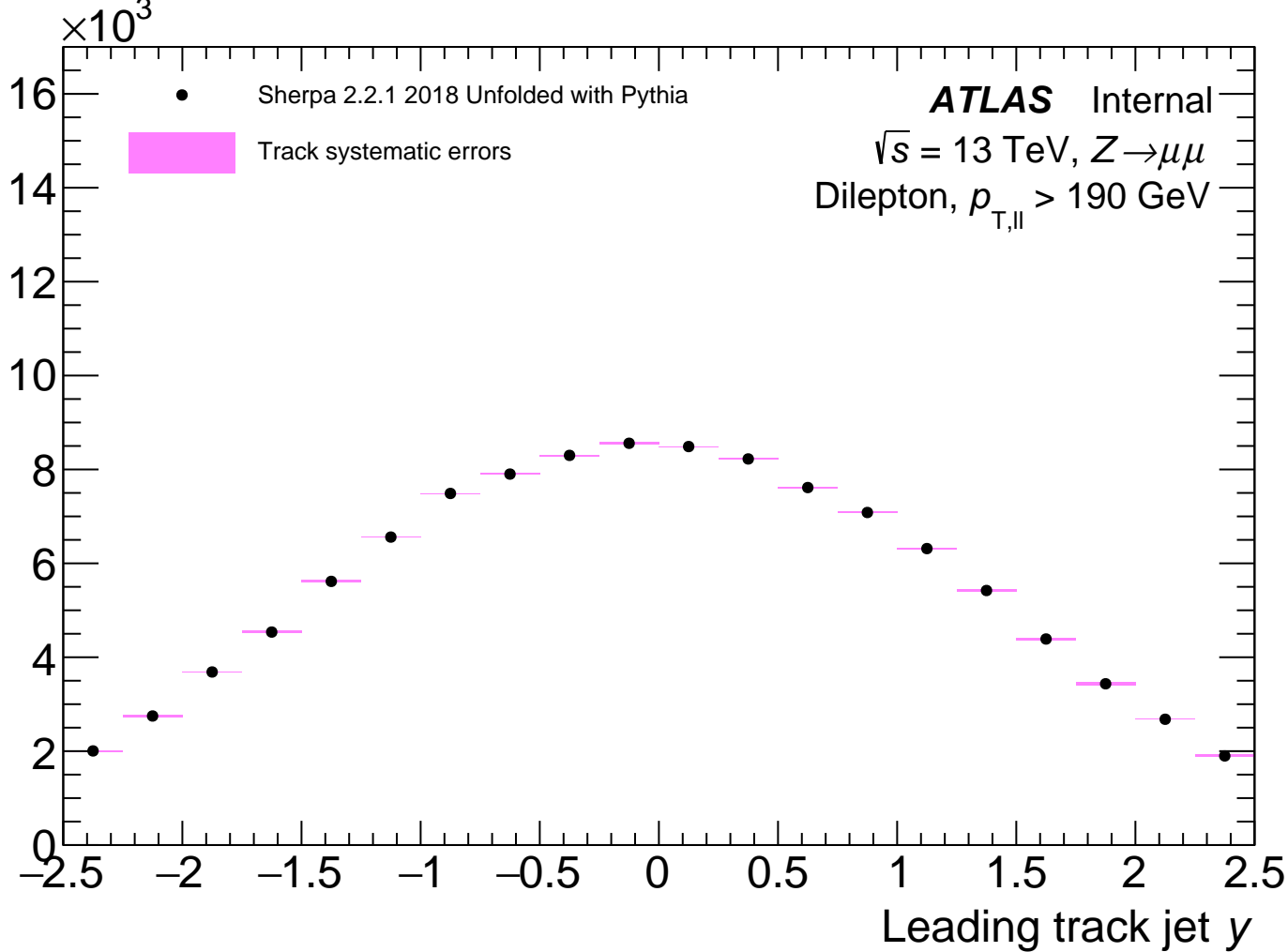
Events



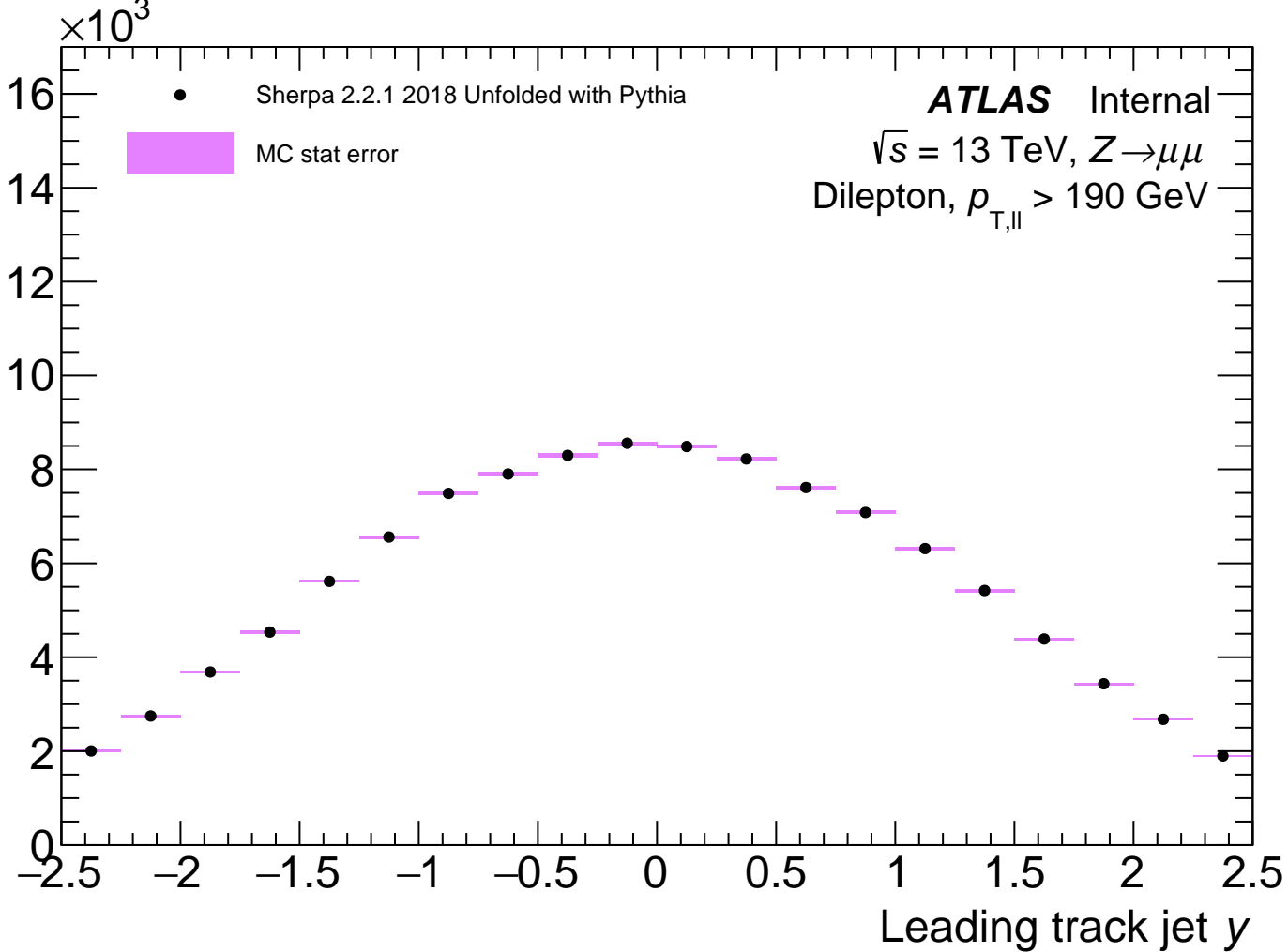
Events



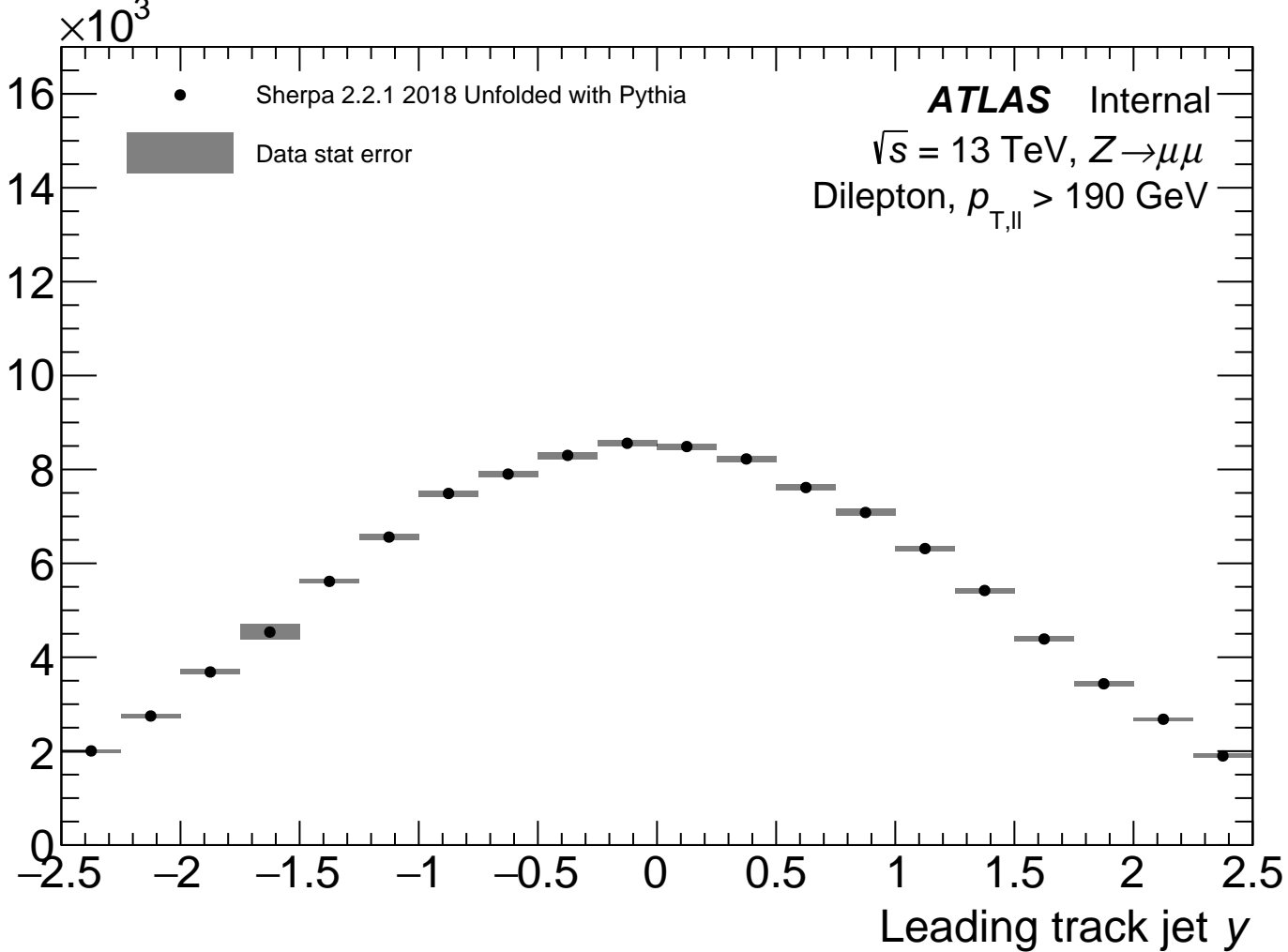
Events



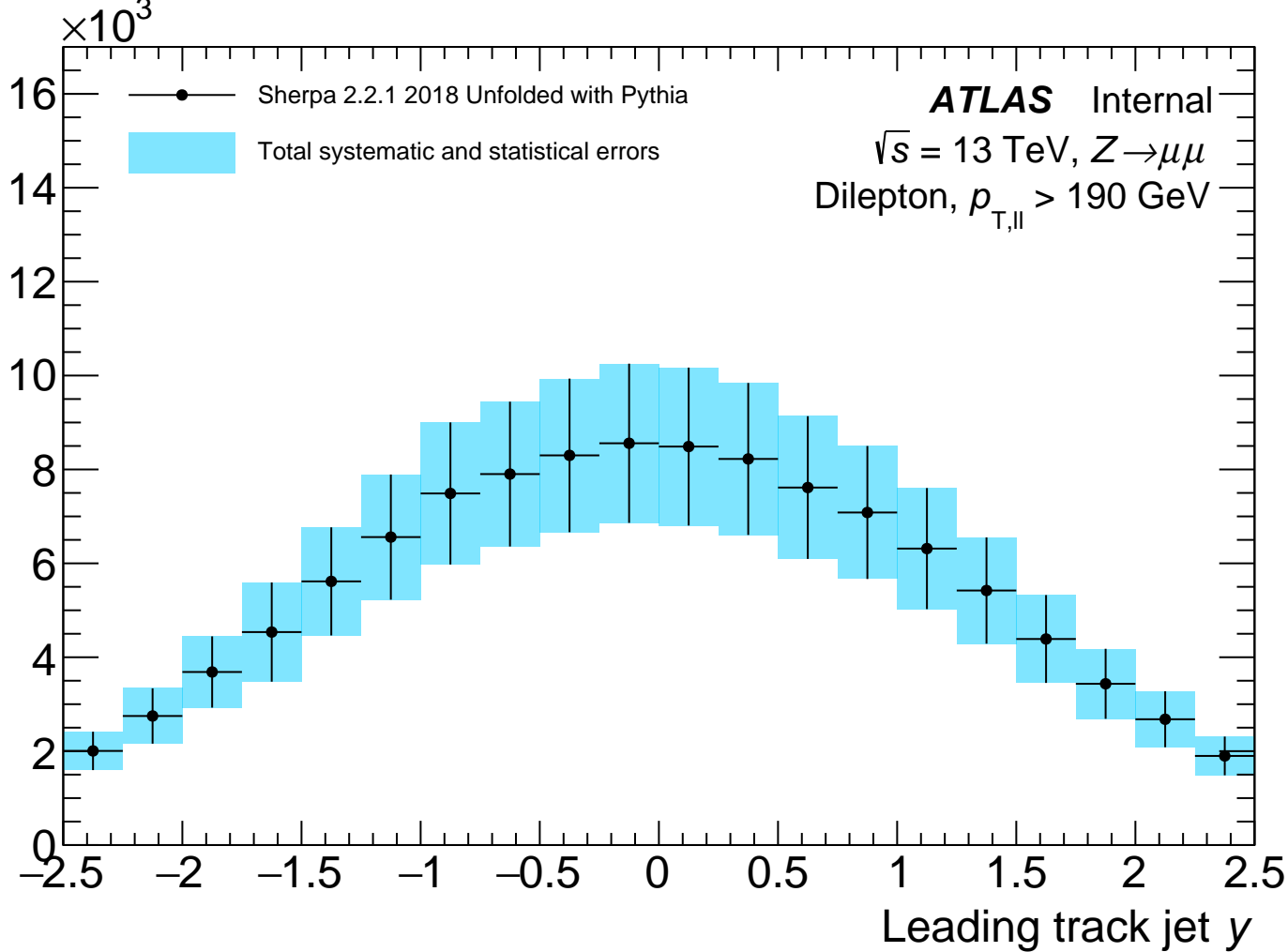
Events



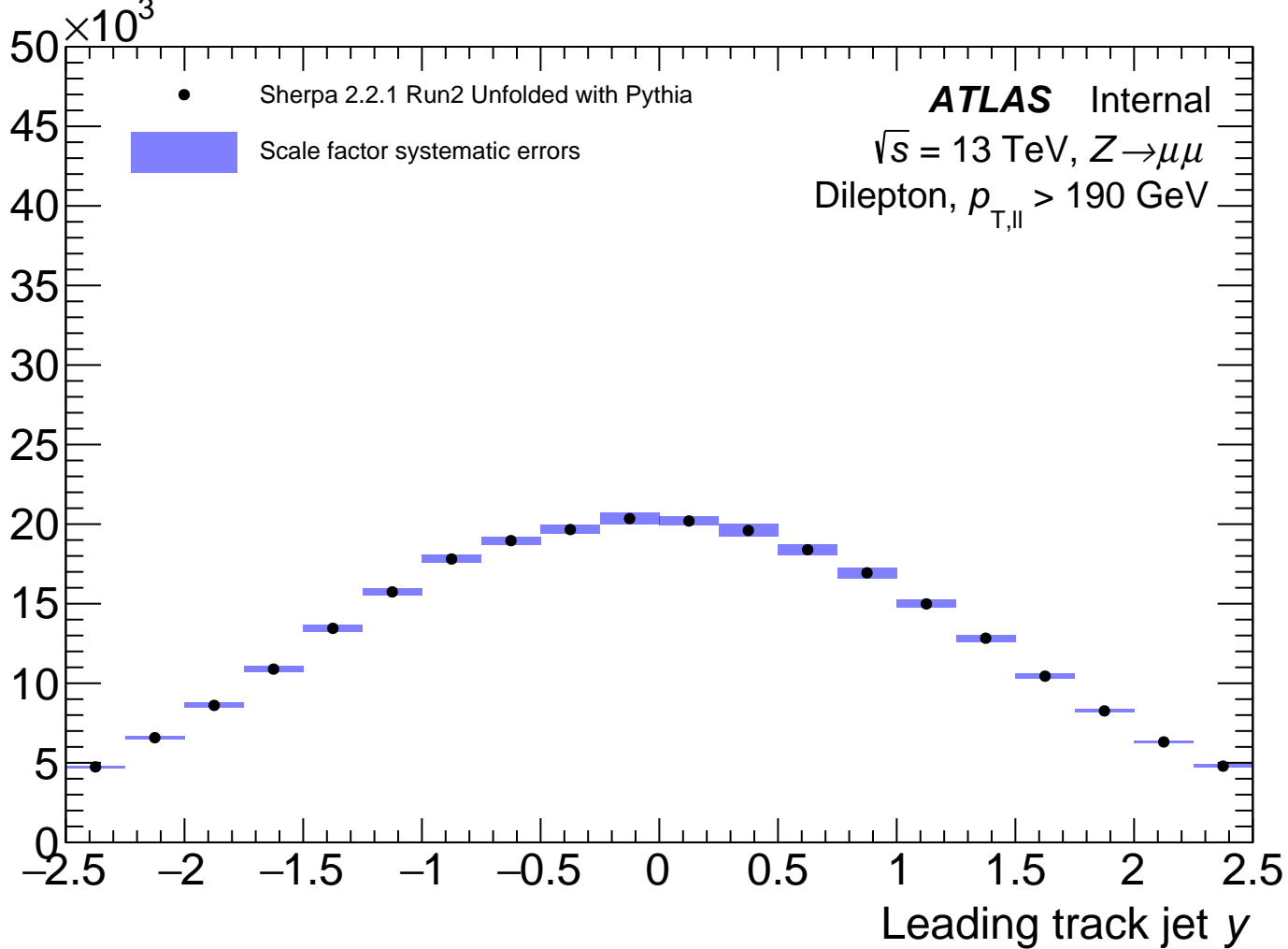
Events



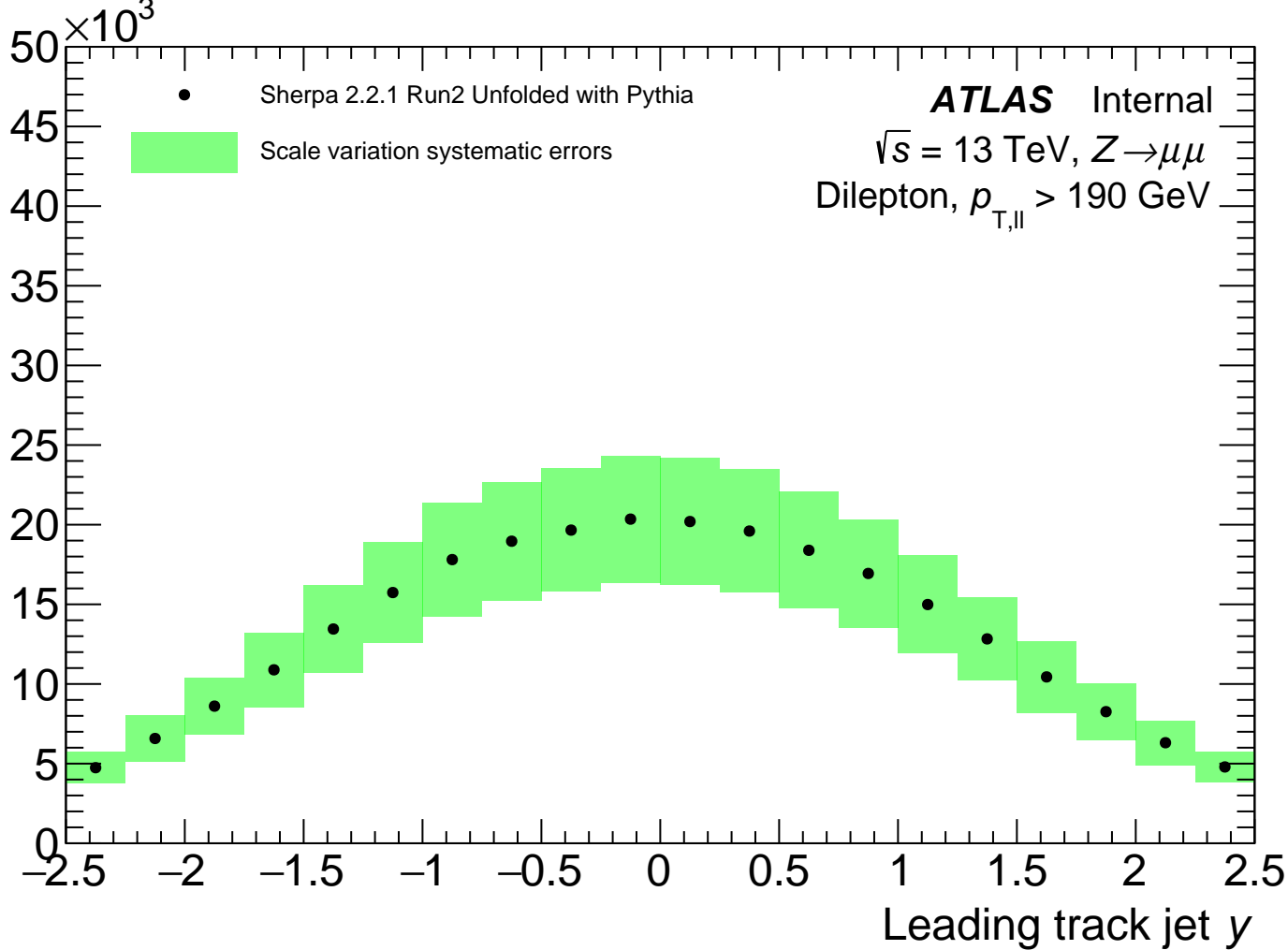
Events



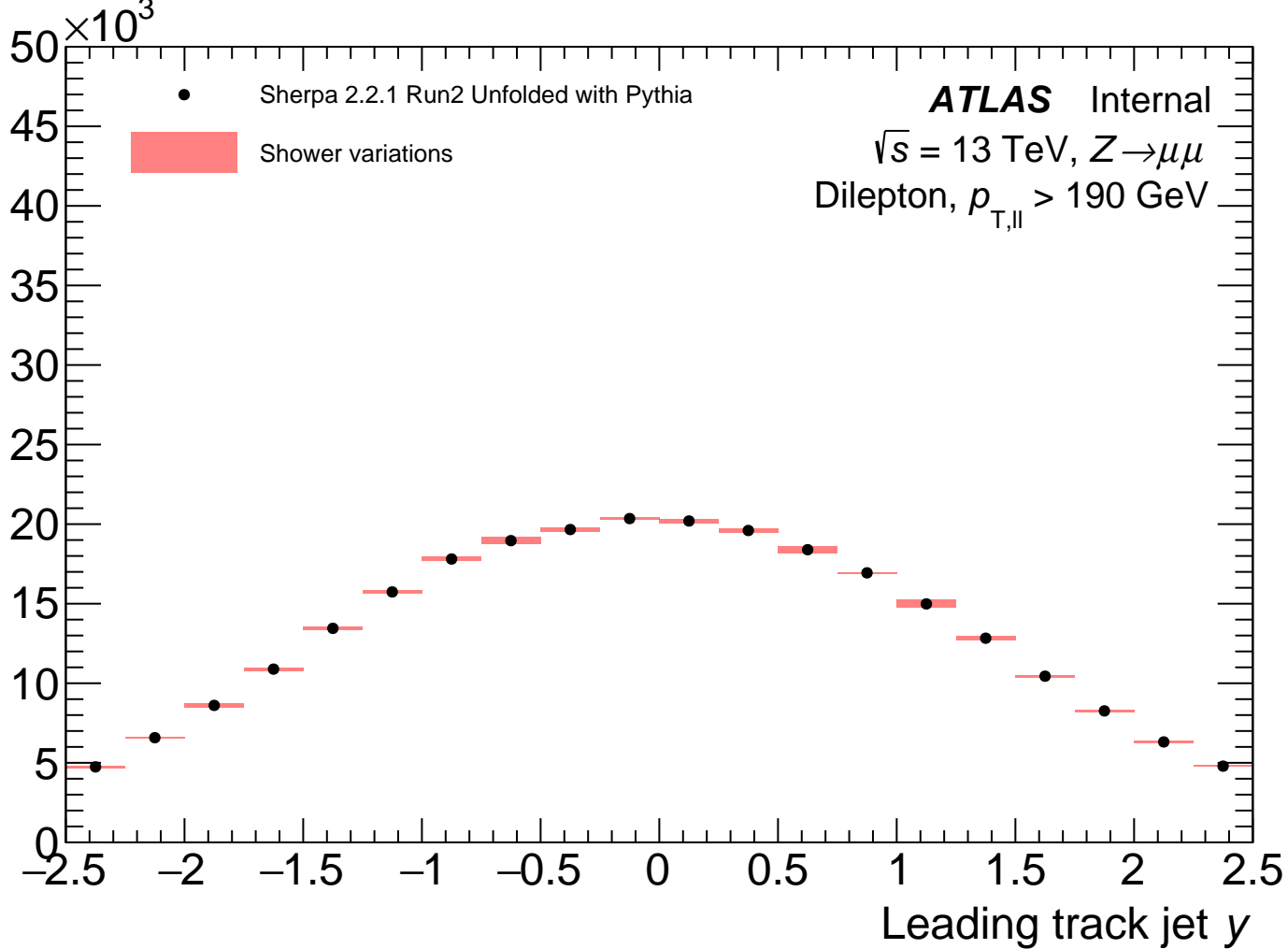
Events



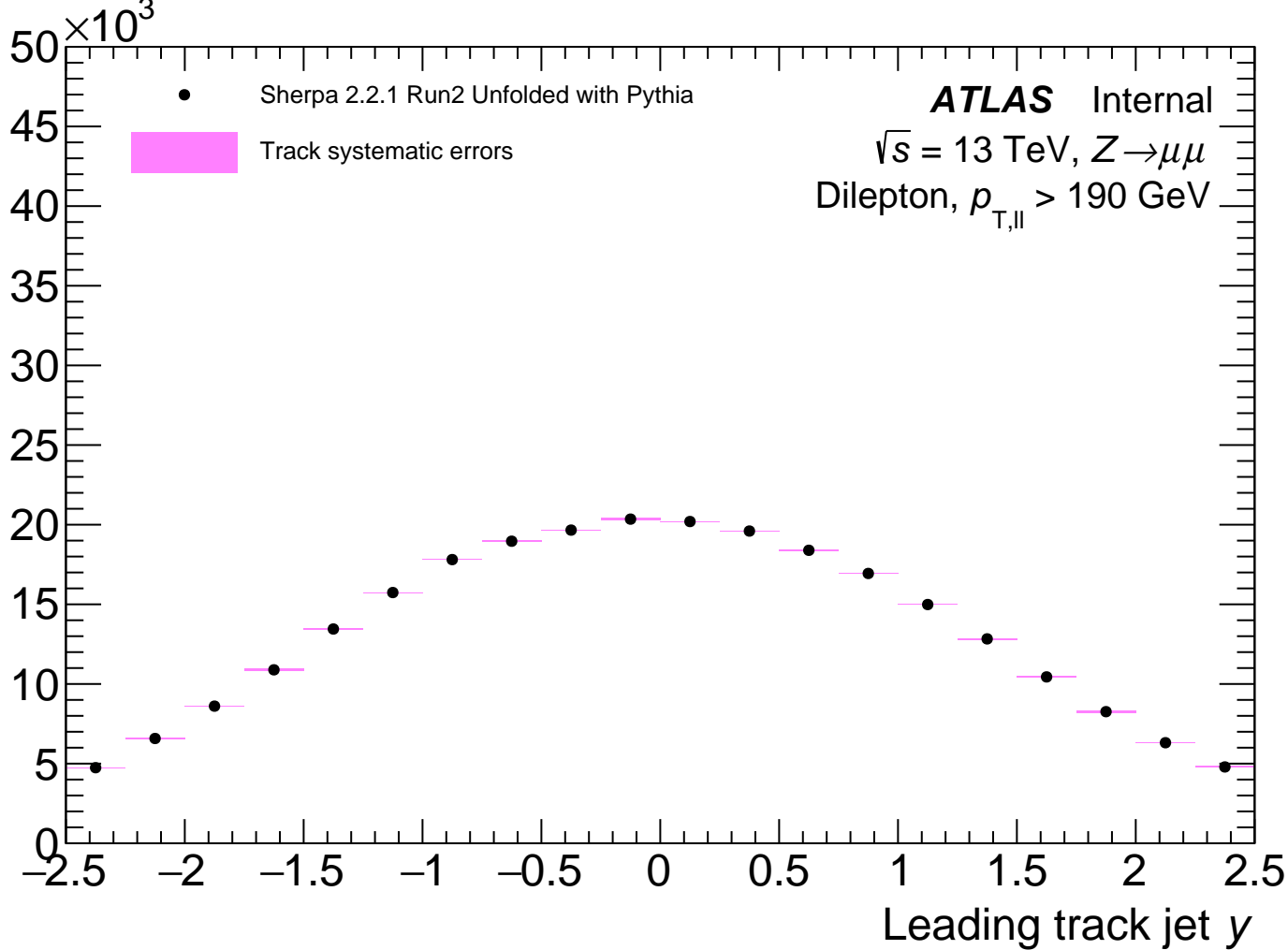
Events



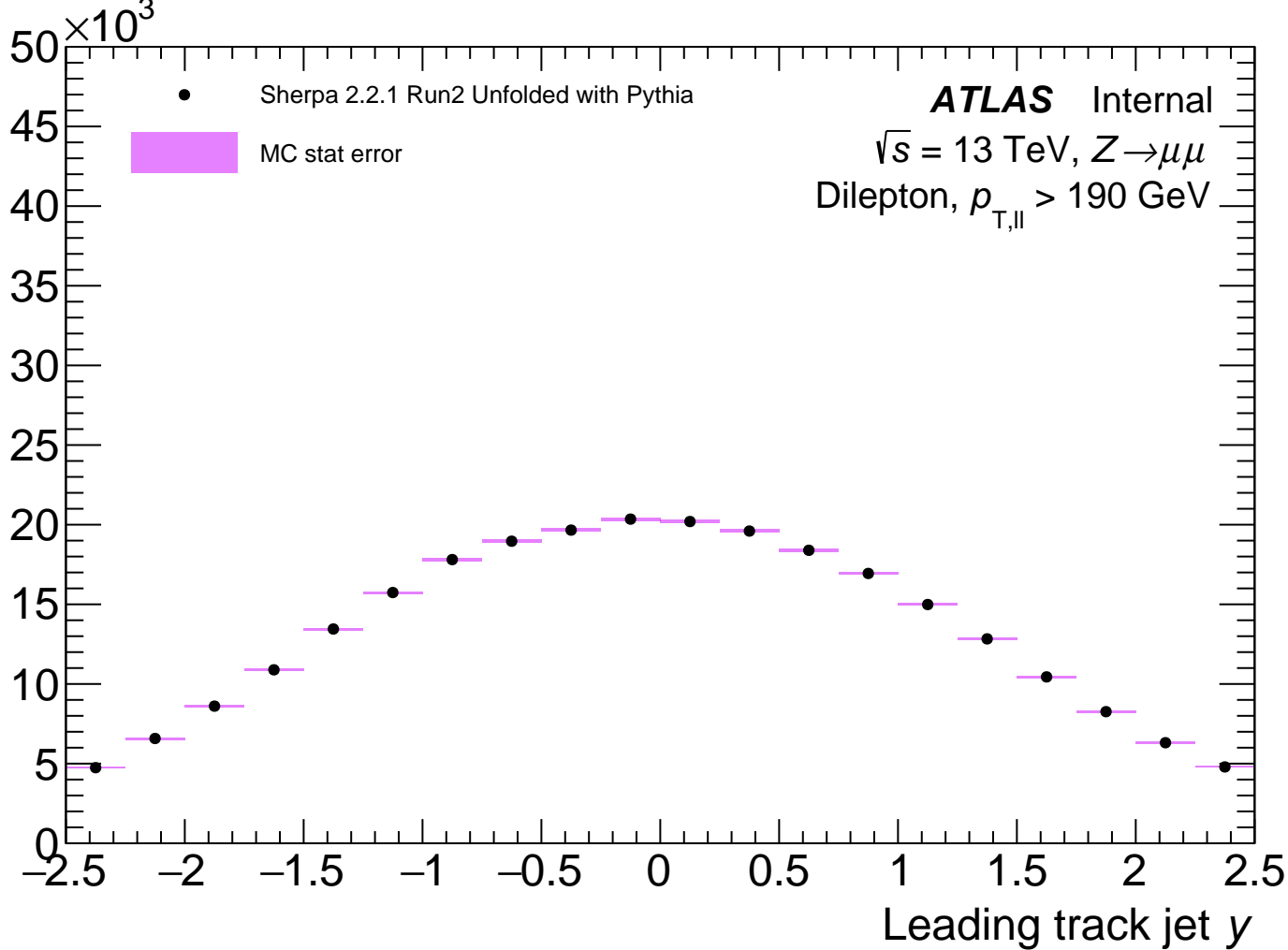
Events



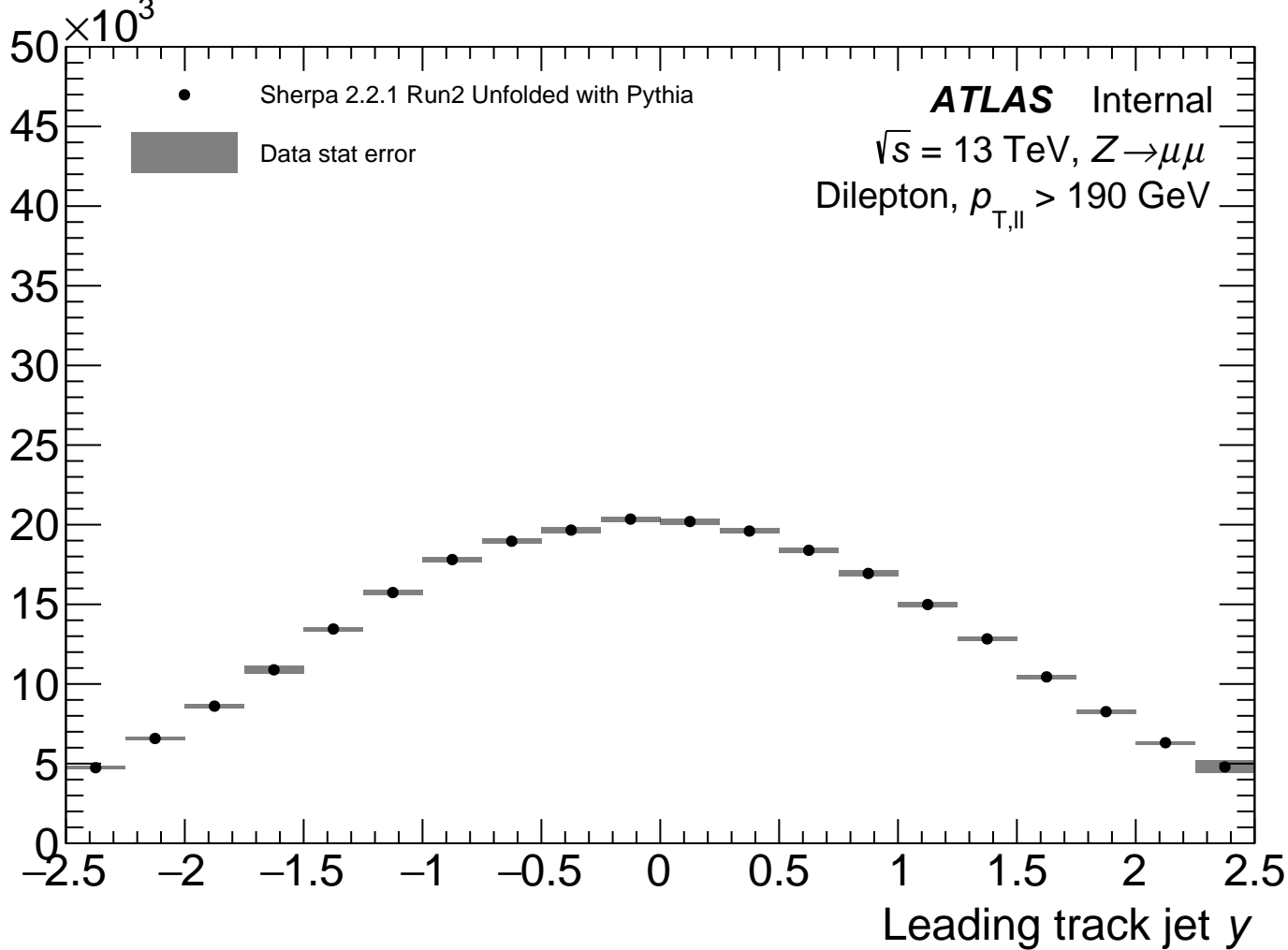
Events



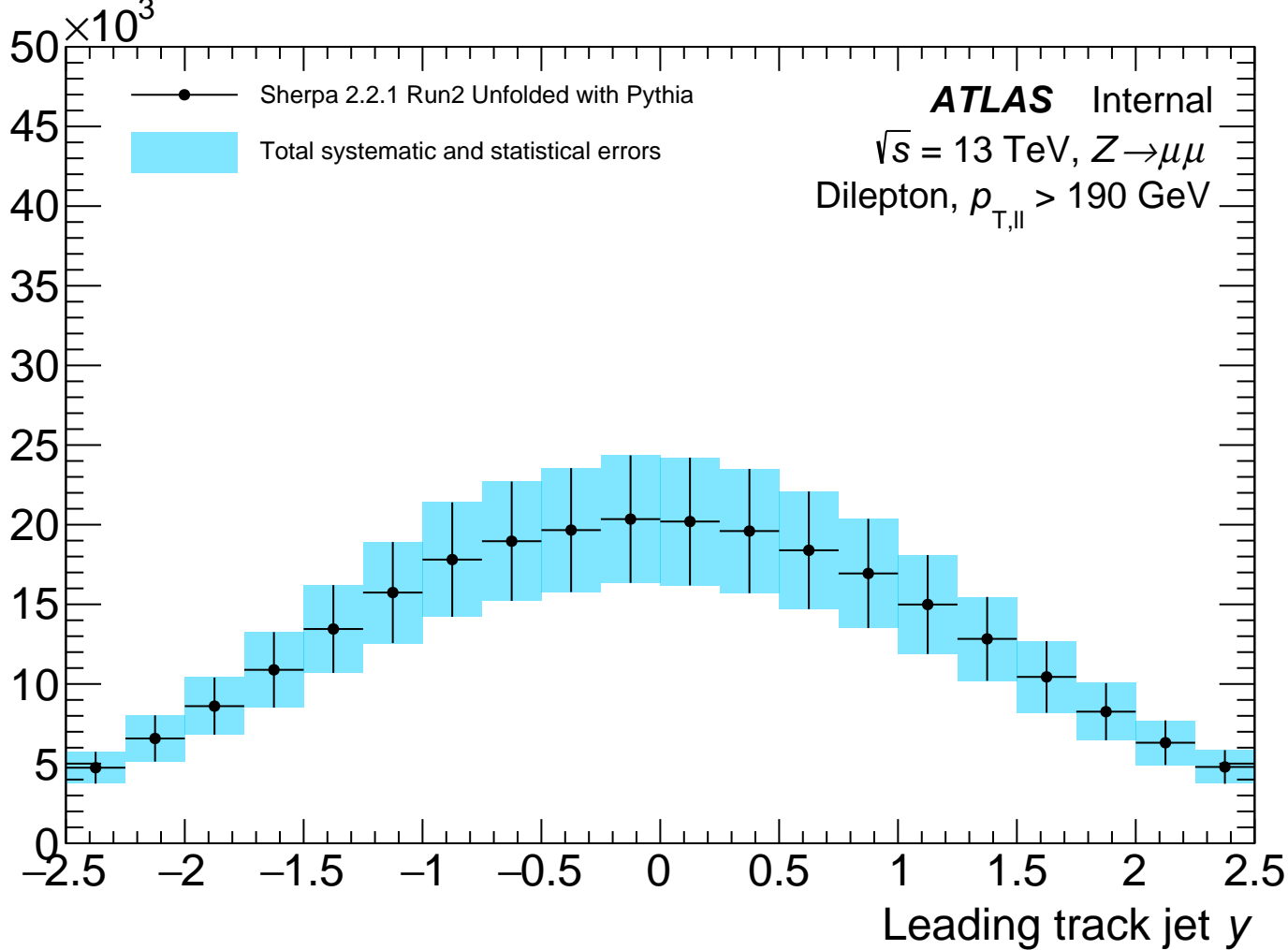
Events

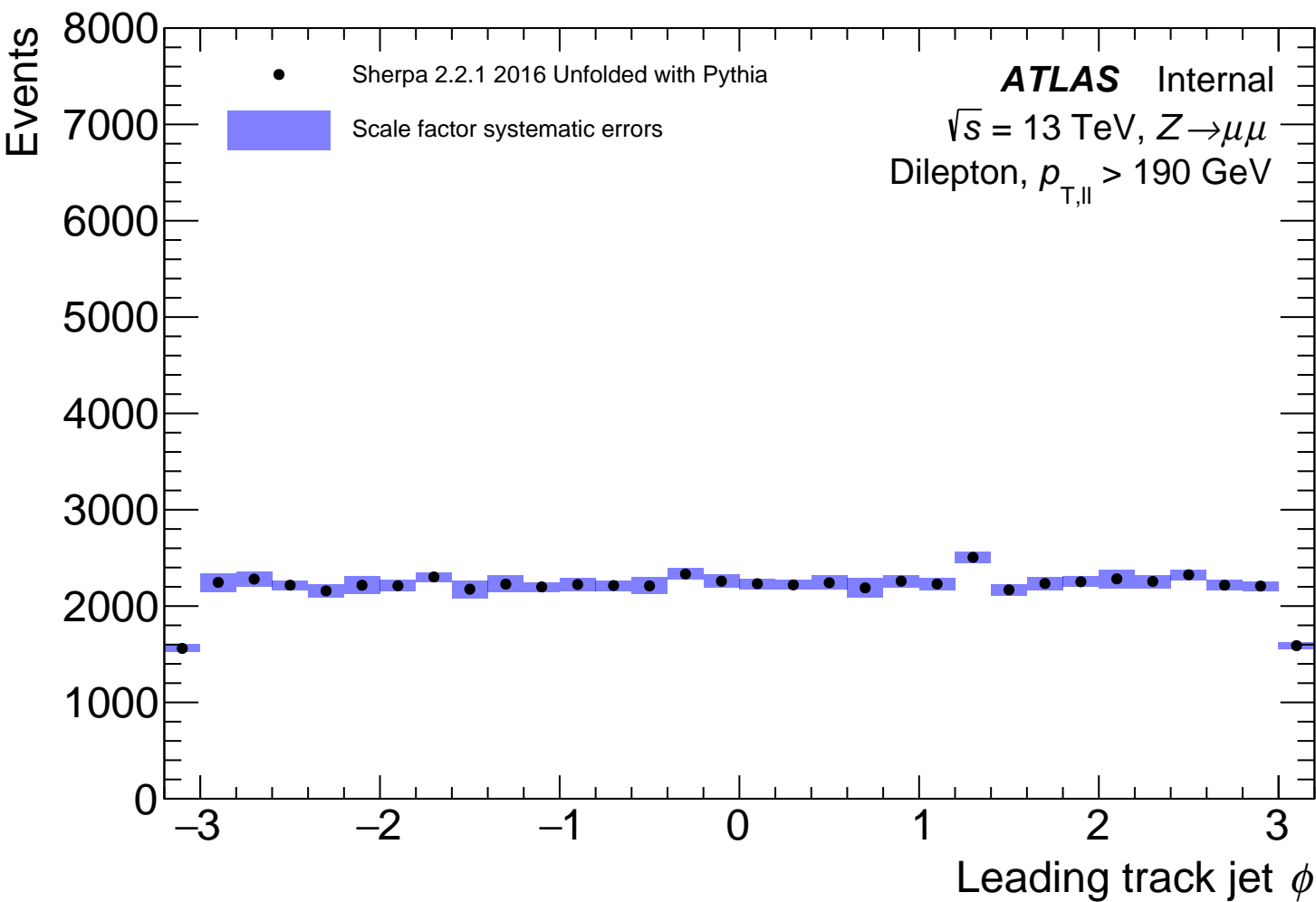


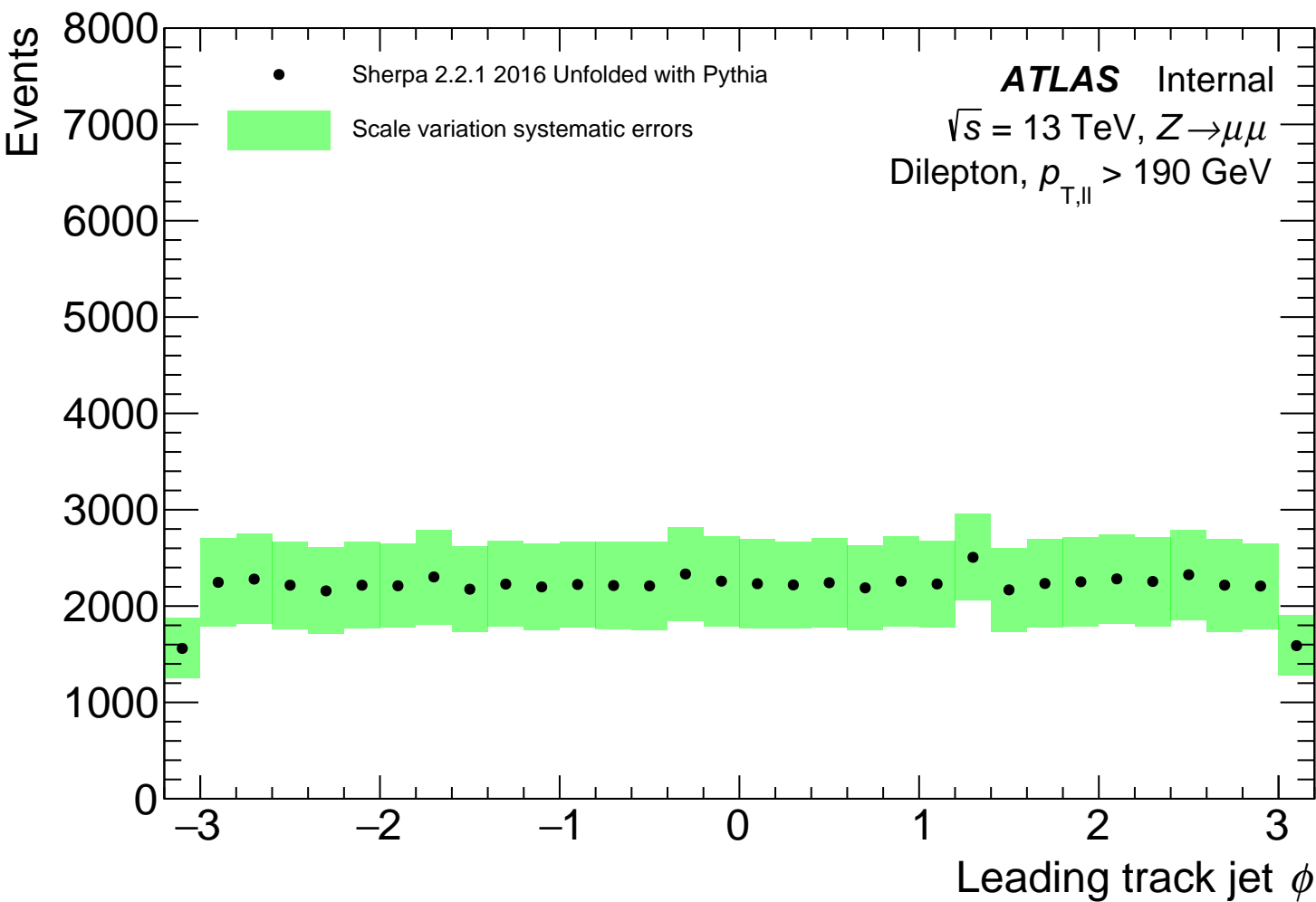
Events

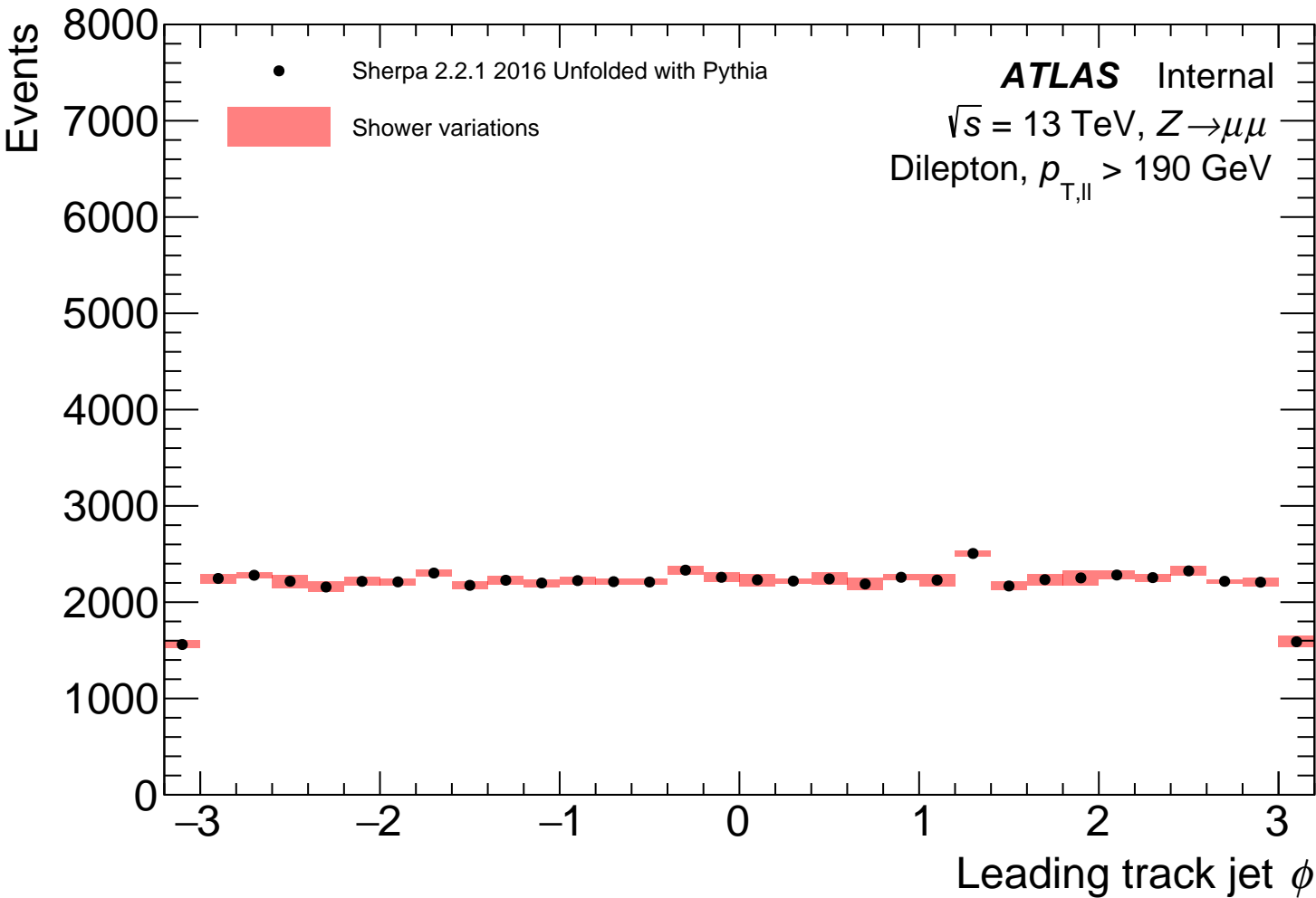


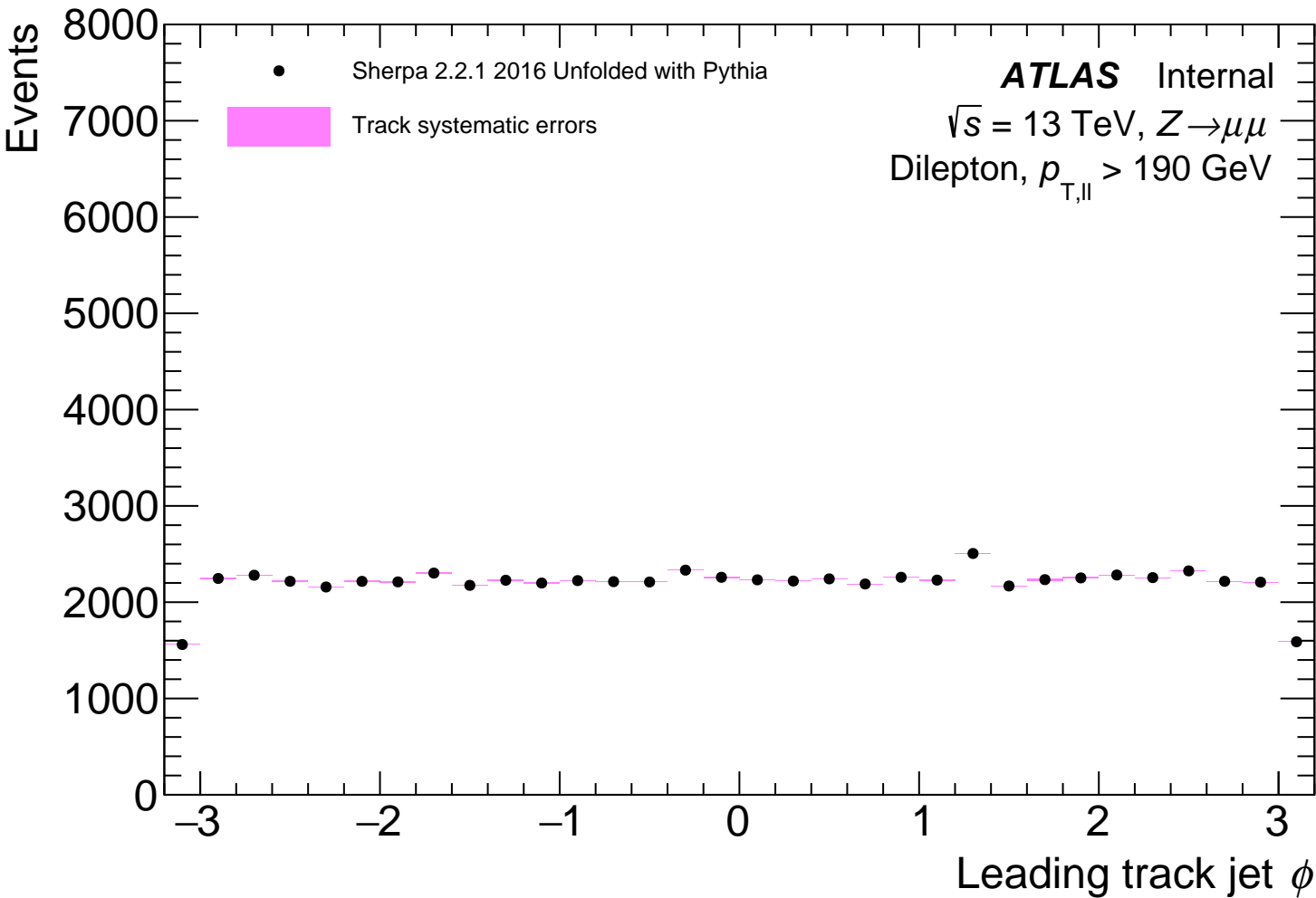
Events

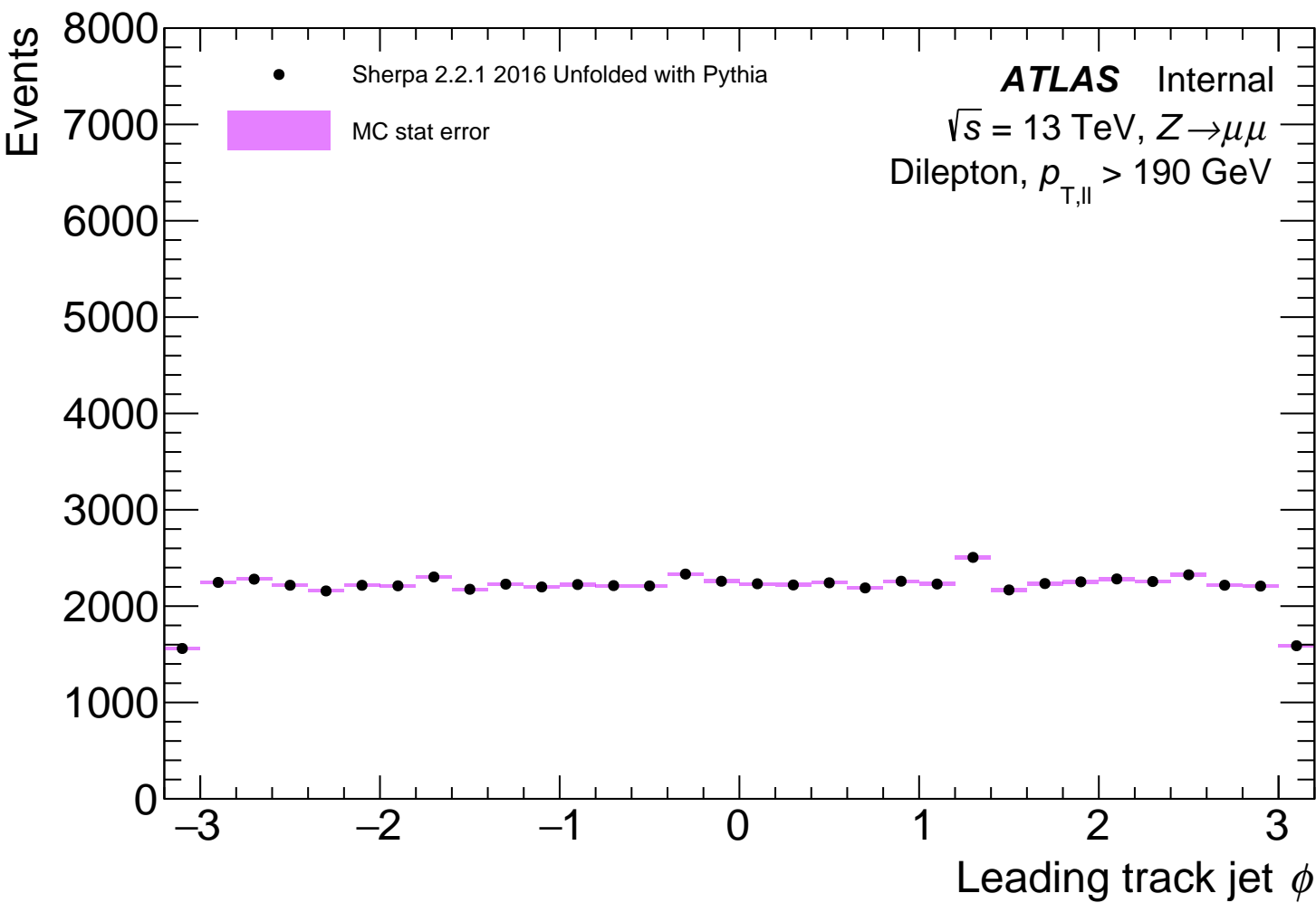


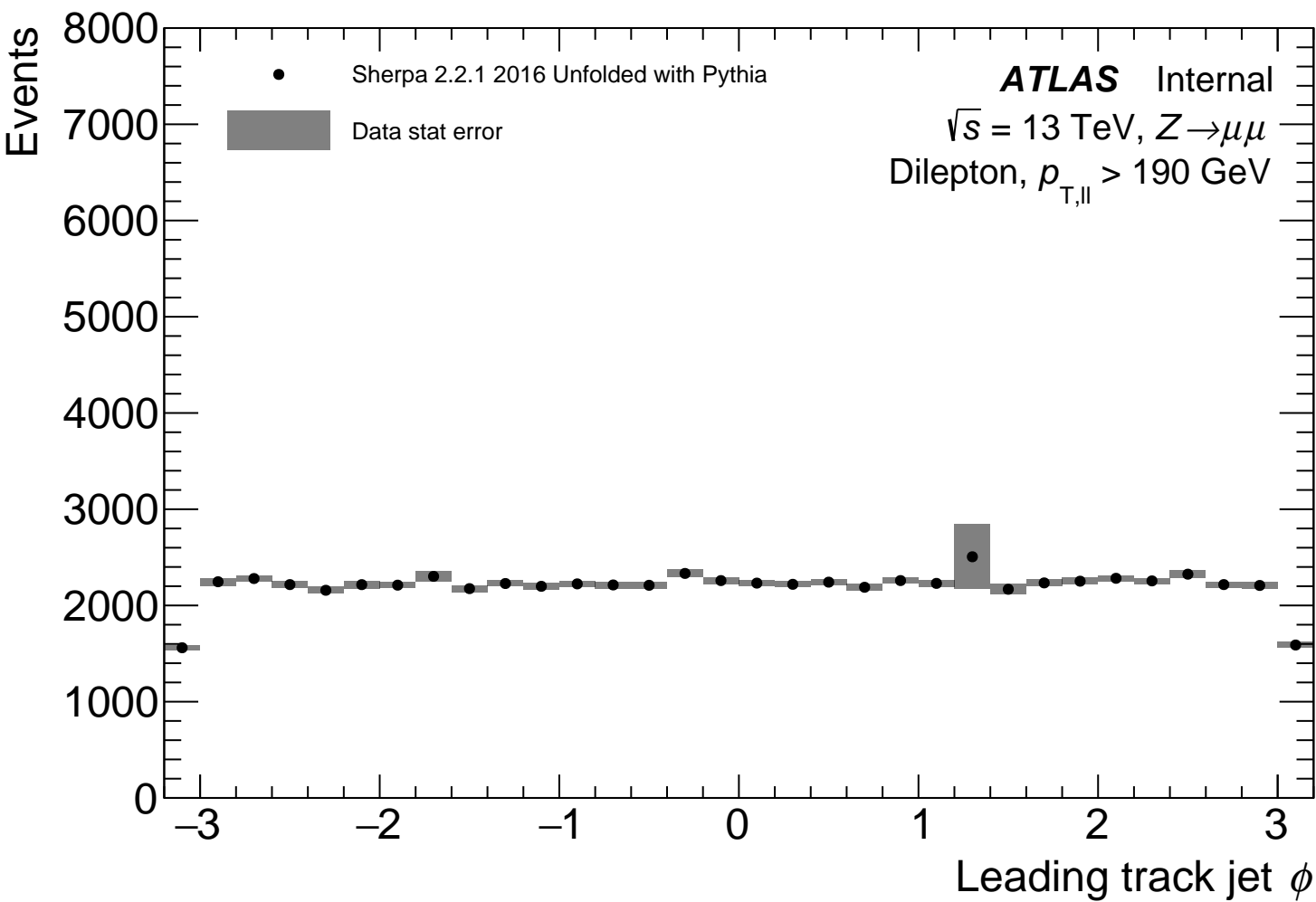


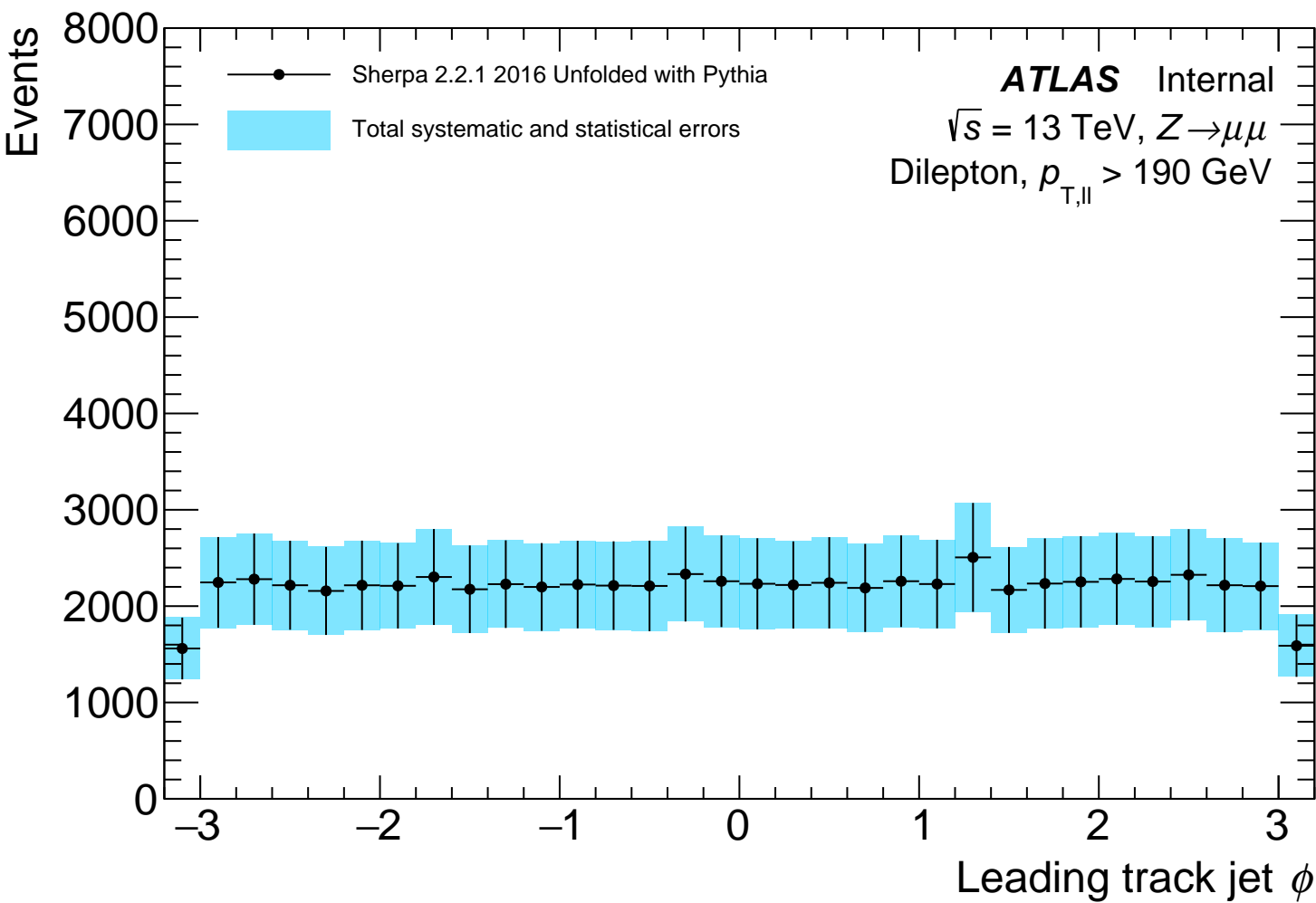


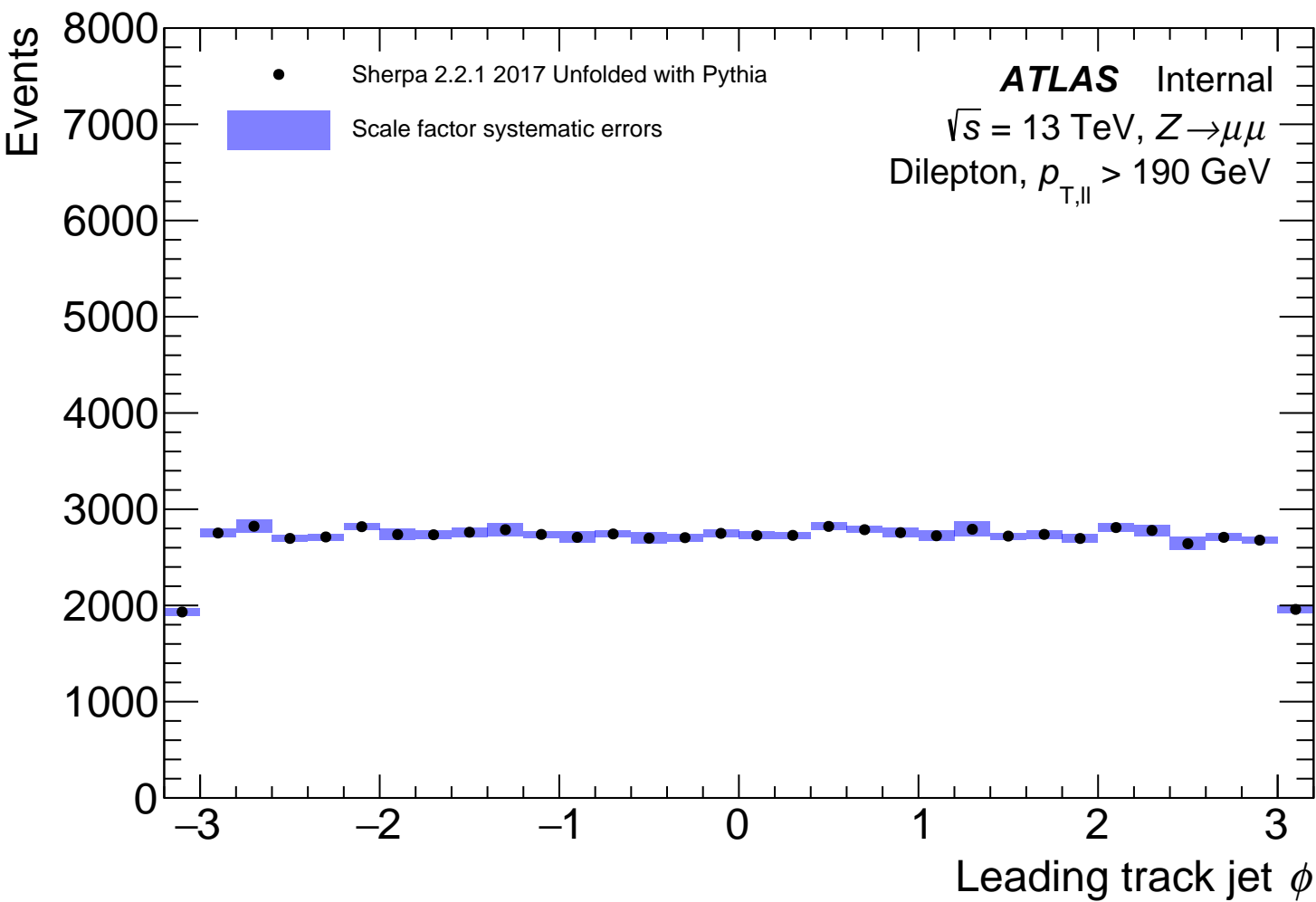


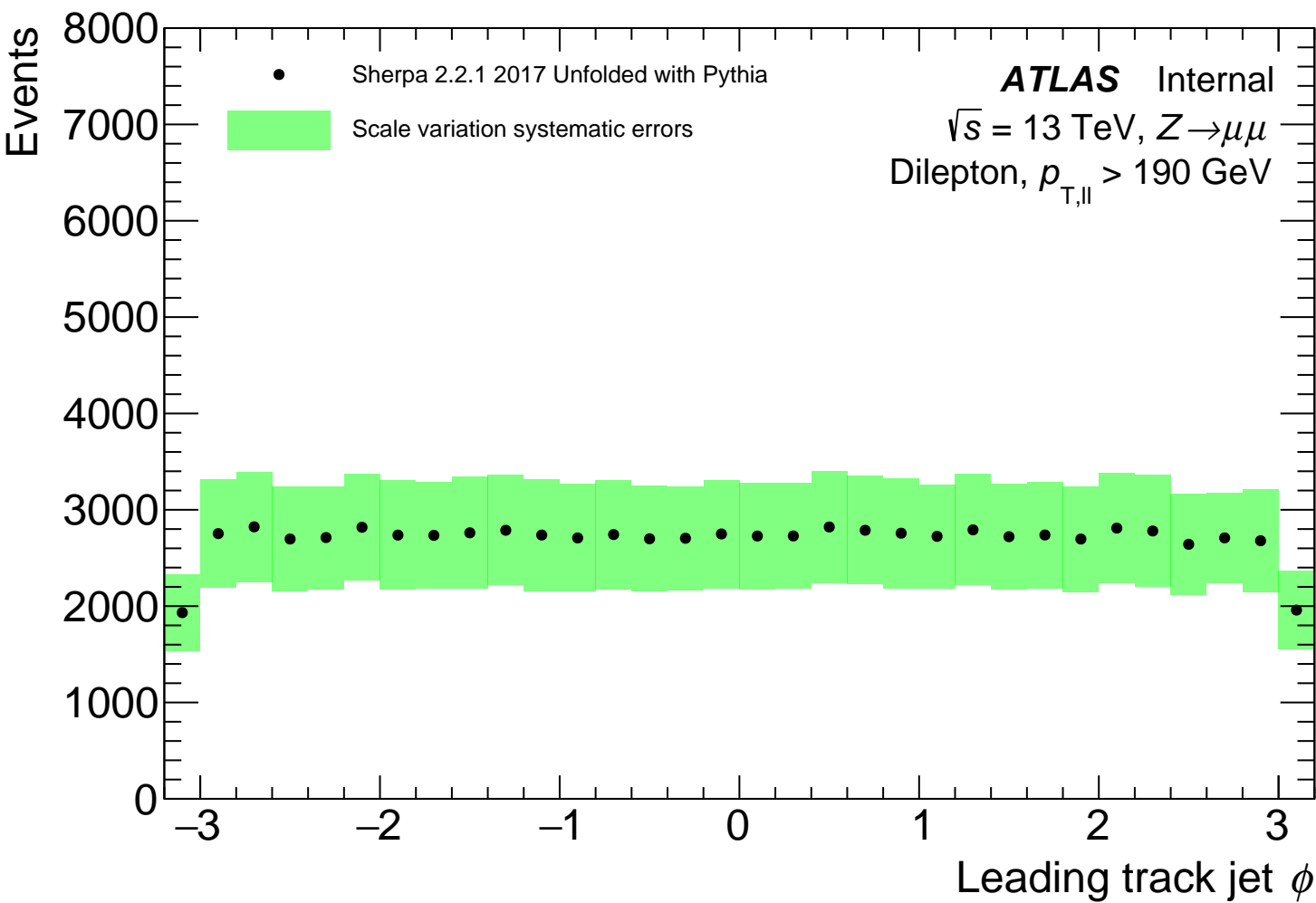


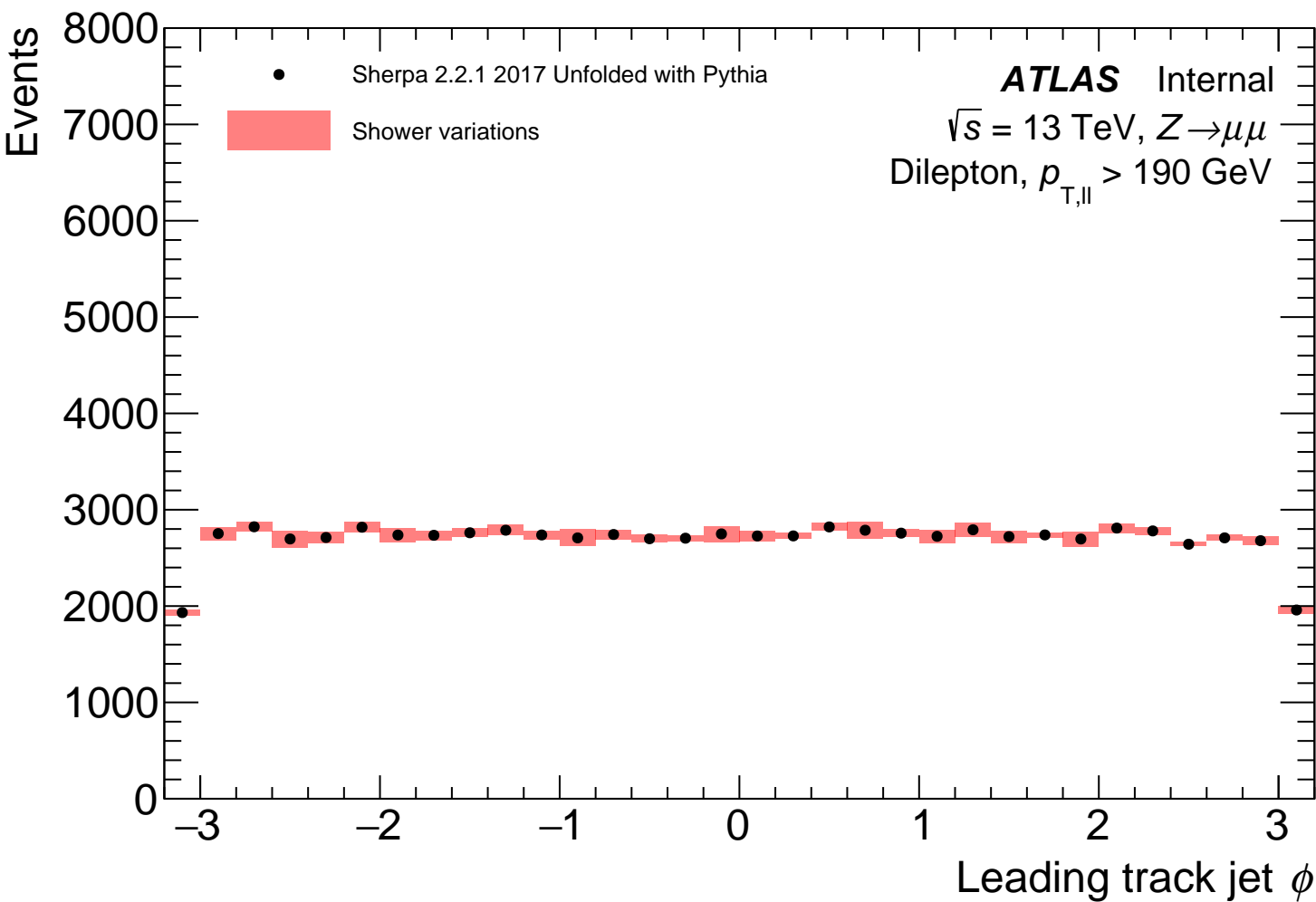


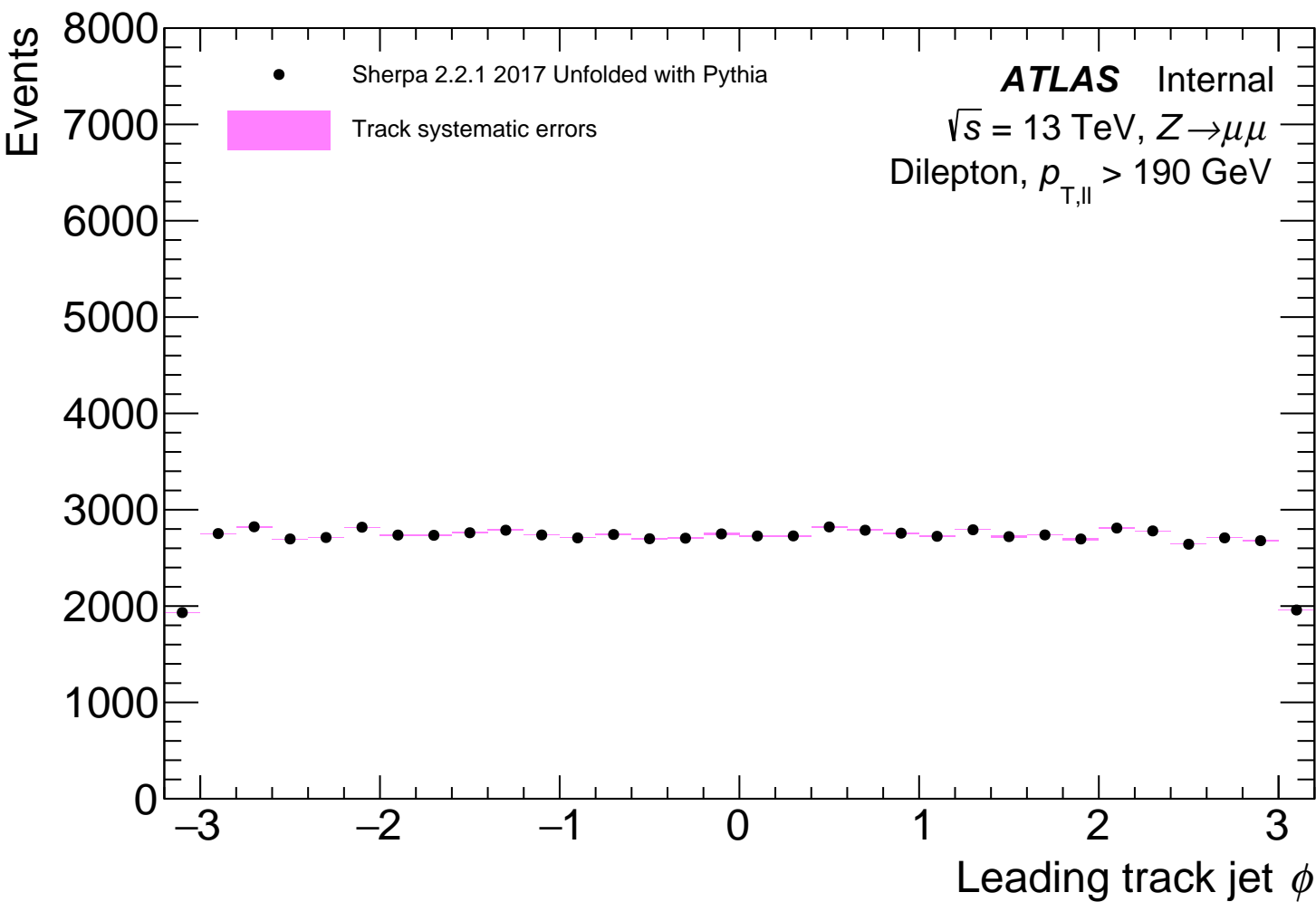












Events

8000

7000

6000

5000

4000

3000

2000

1000

0

-3

-2

-1

0

1

2

3

•

Sherpa 2.2.1 2017 Unfolded with Pythia



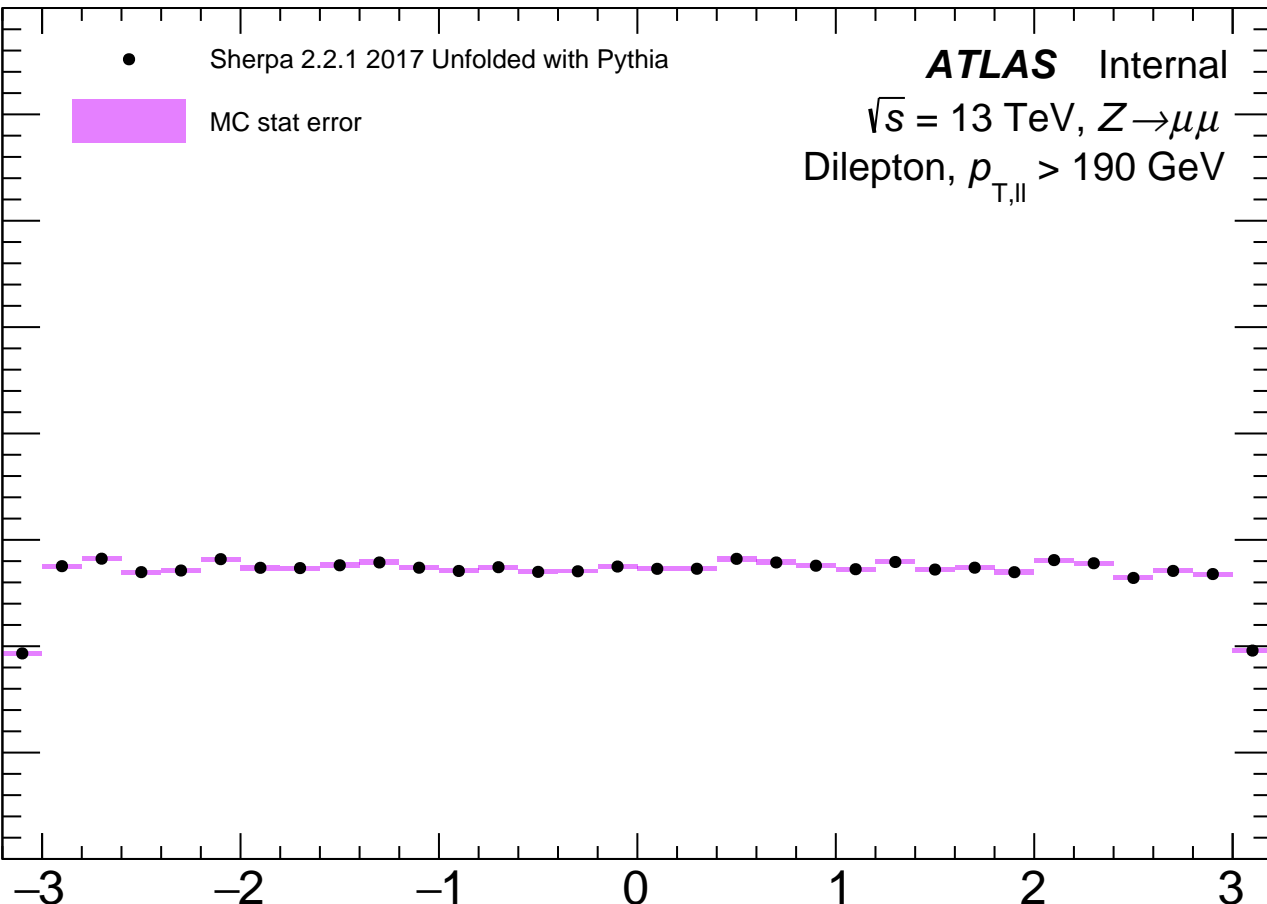
MC stat error

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Leading track jet ϕ



Events

8000

7000

6000

5000

4000

3000

2000

1000

0

-3

-2

-1

0

1

2

3

•

Sherpa 2.2.1 2017 Unfolded with Pythia



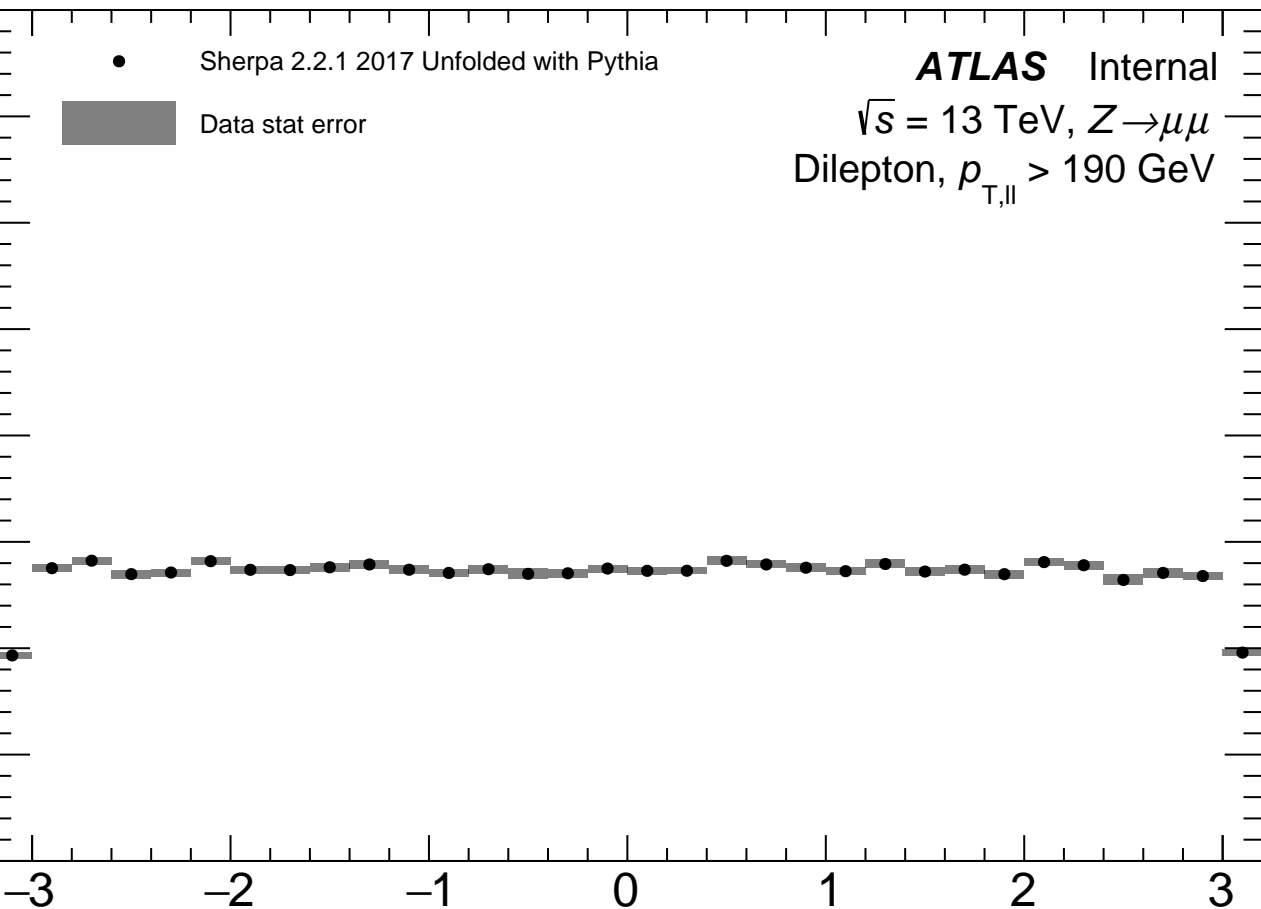
Data stat error

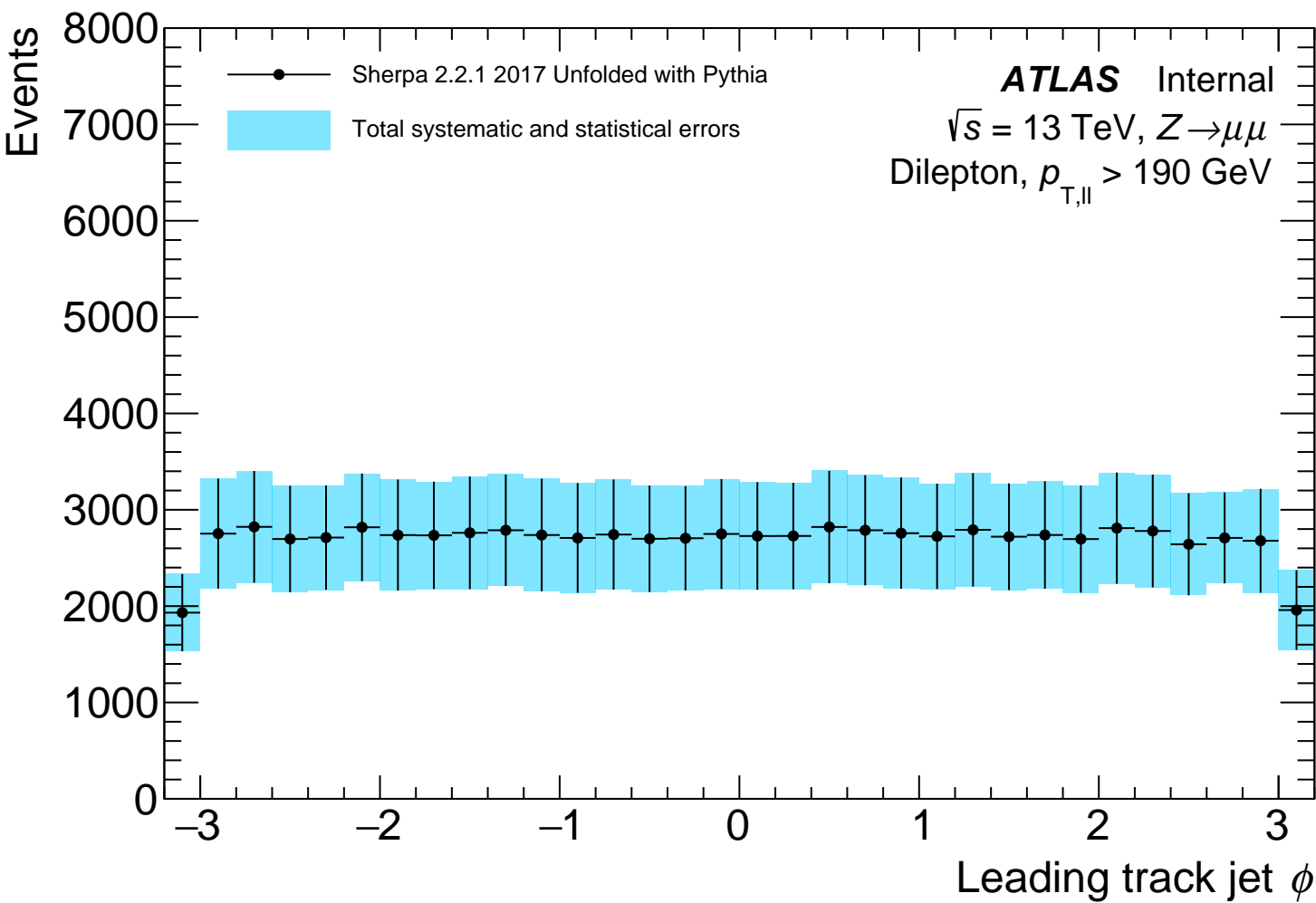
ATLAS Internal

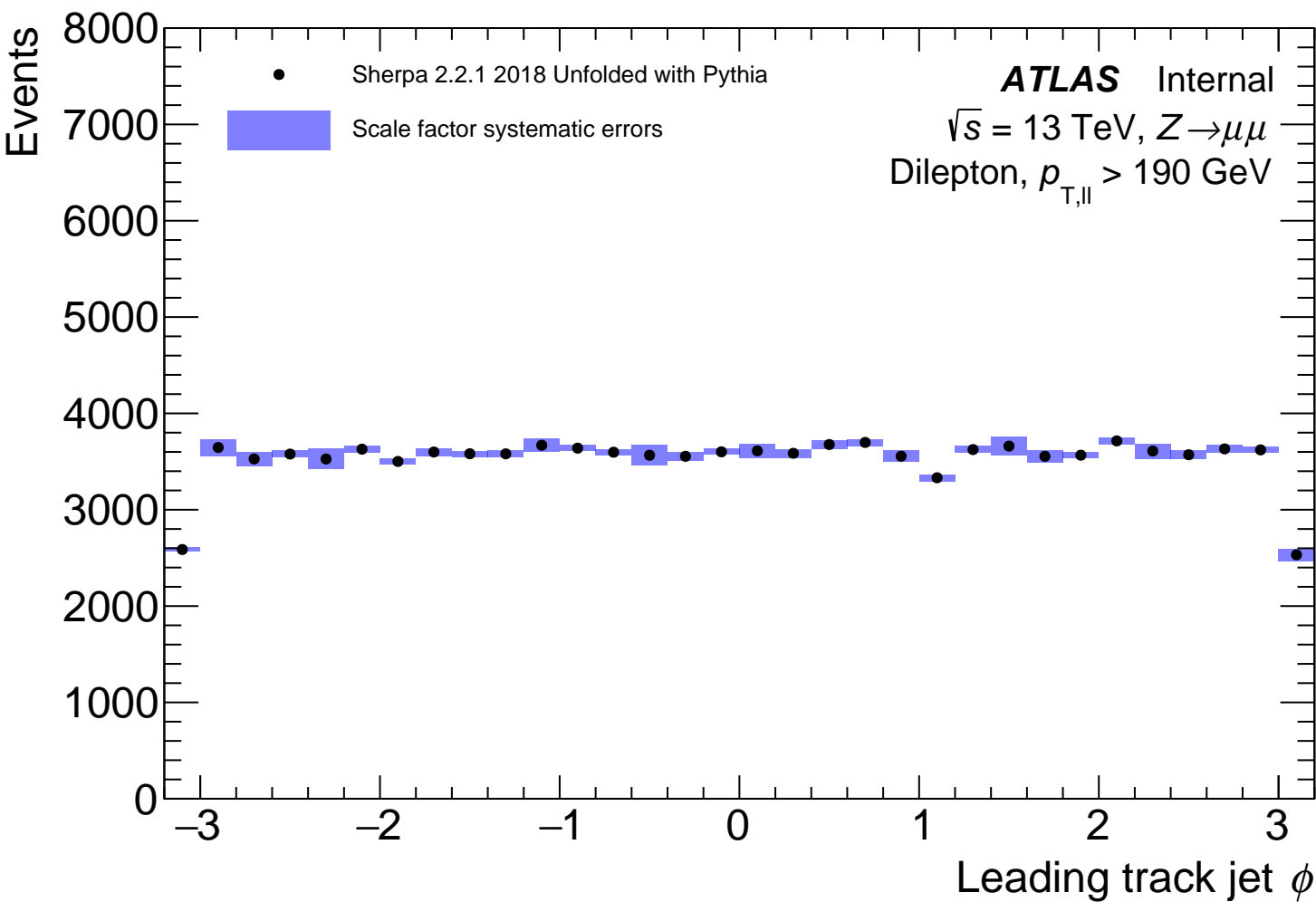
$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

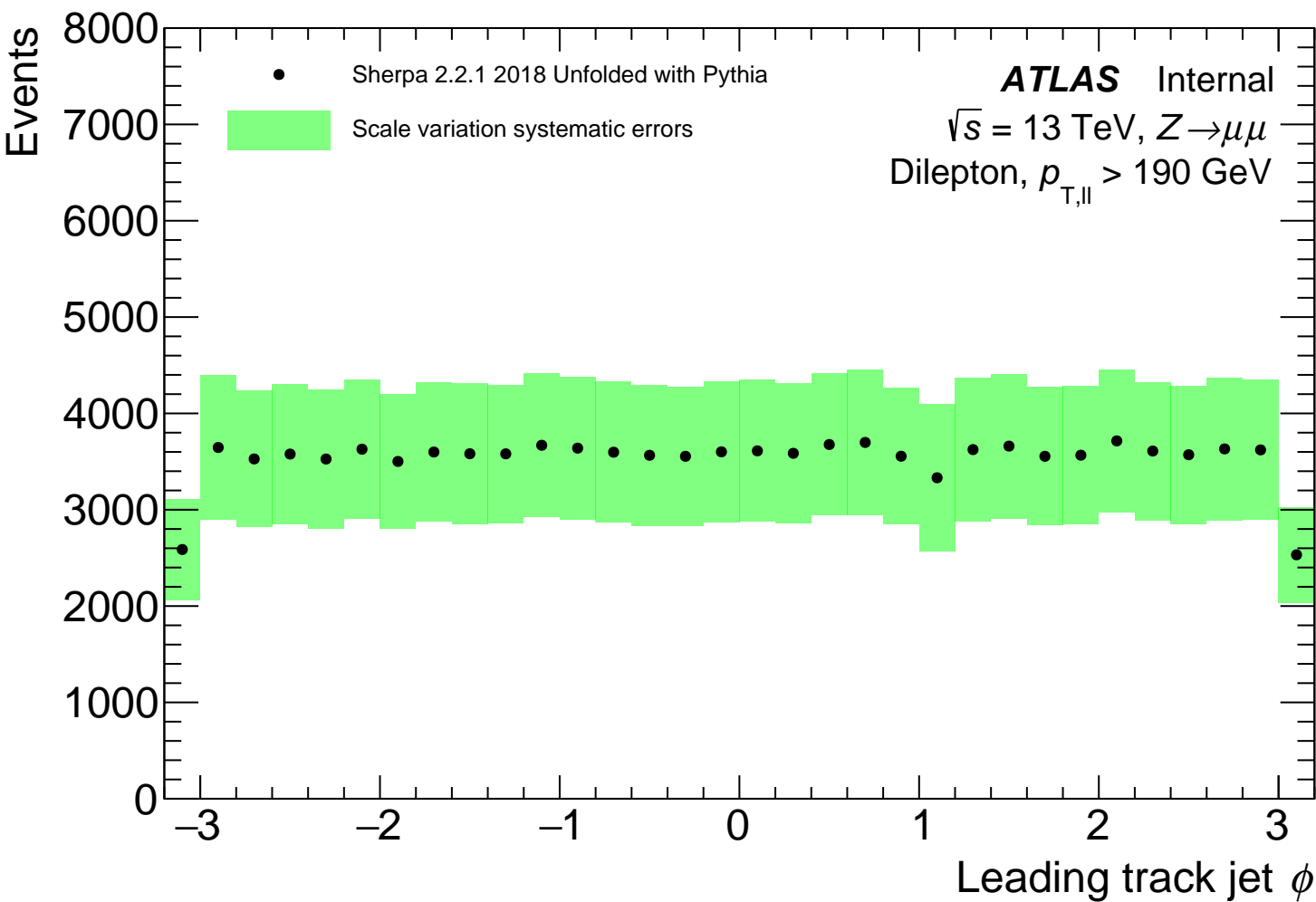
Dilepton, $p_{T,\text{ll}} > 190$ GeV

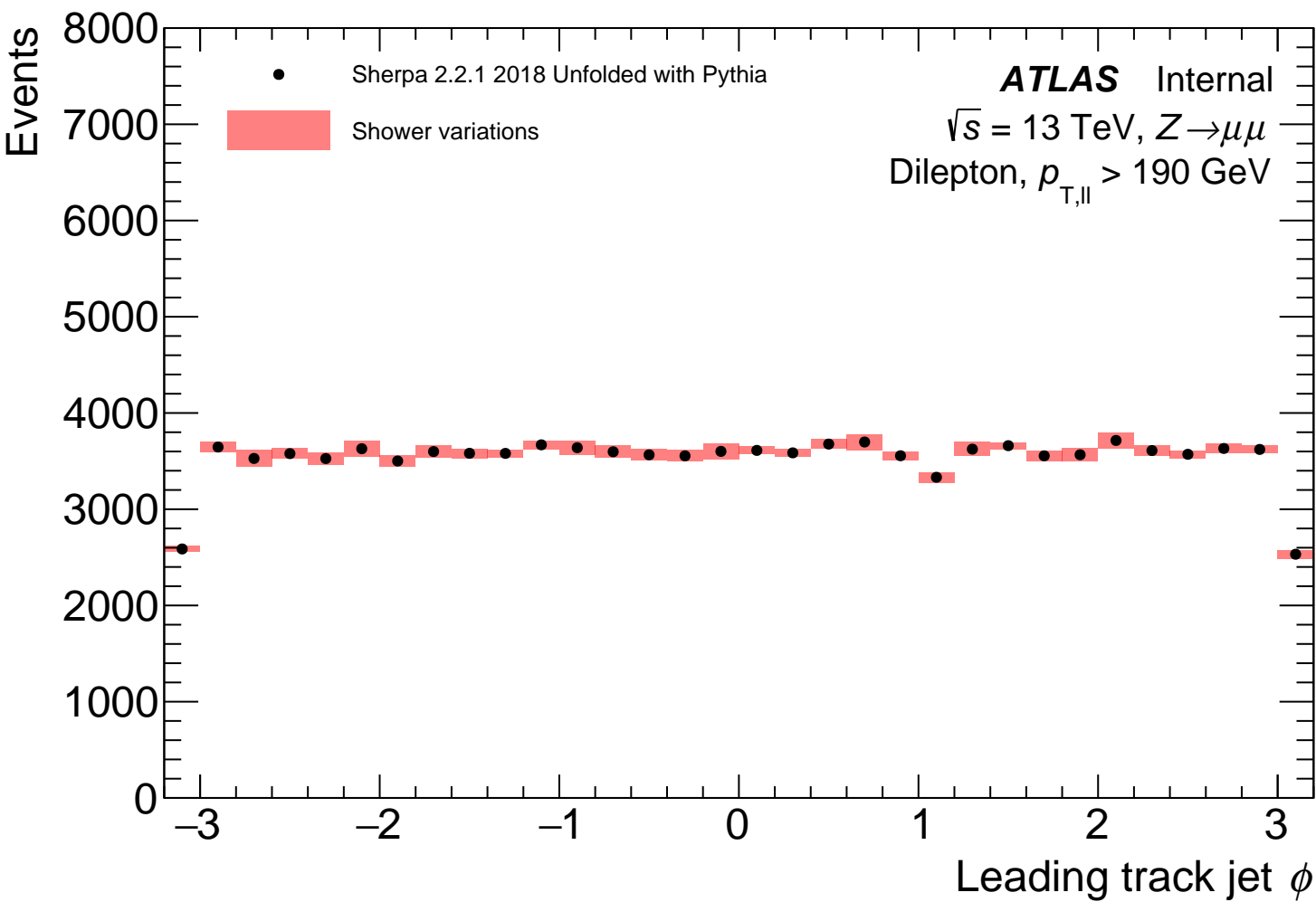
Leading track jet ϕ

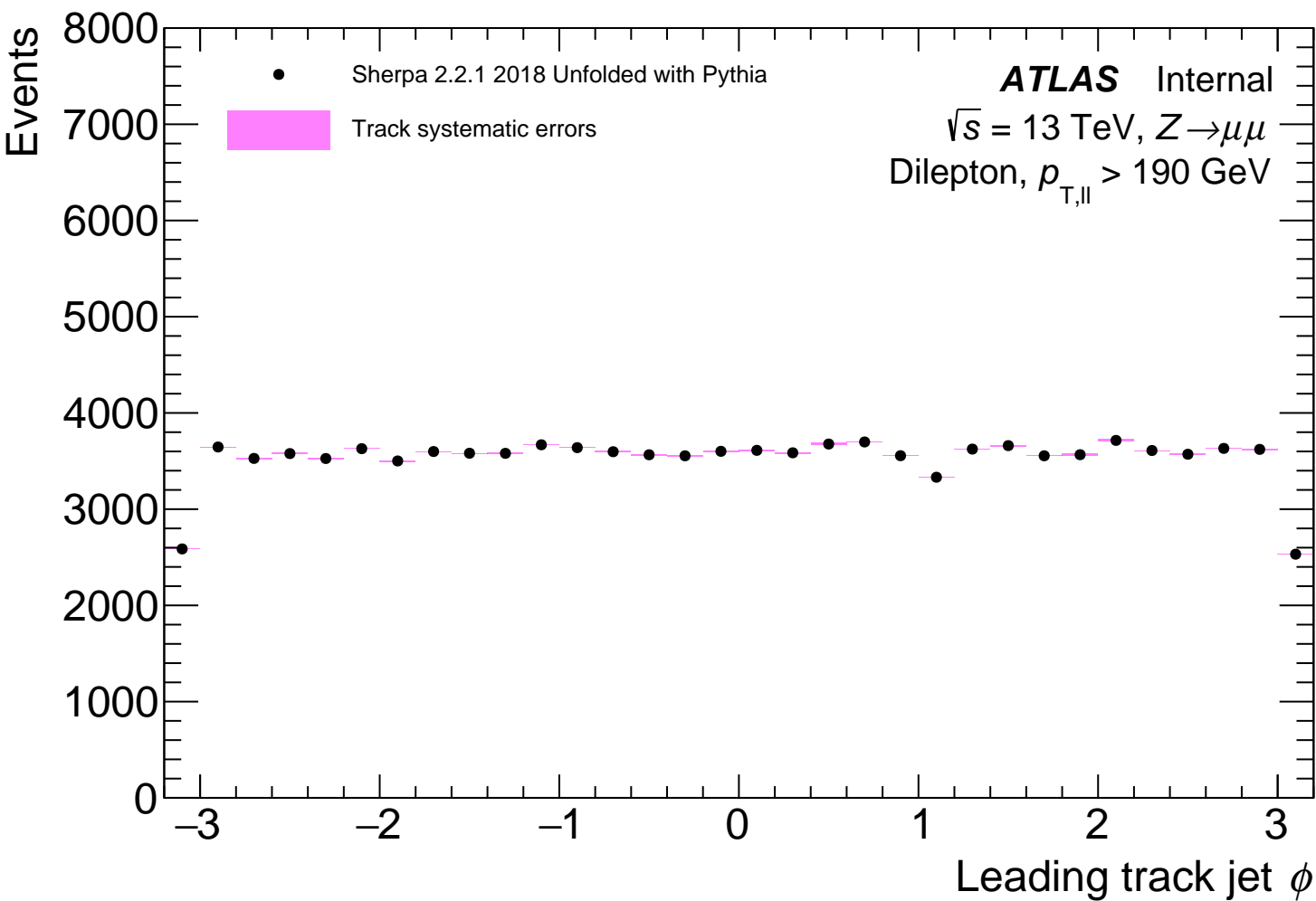


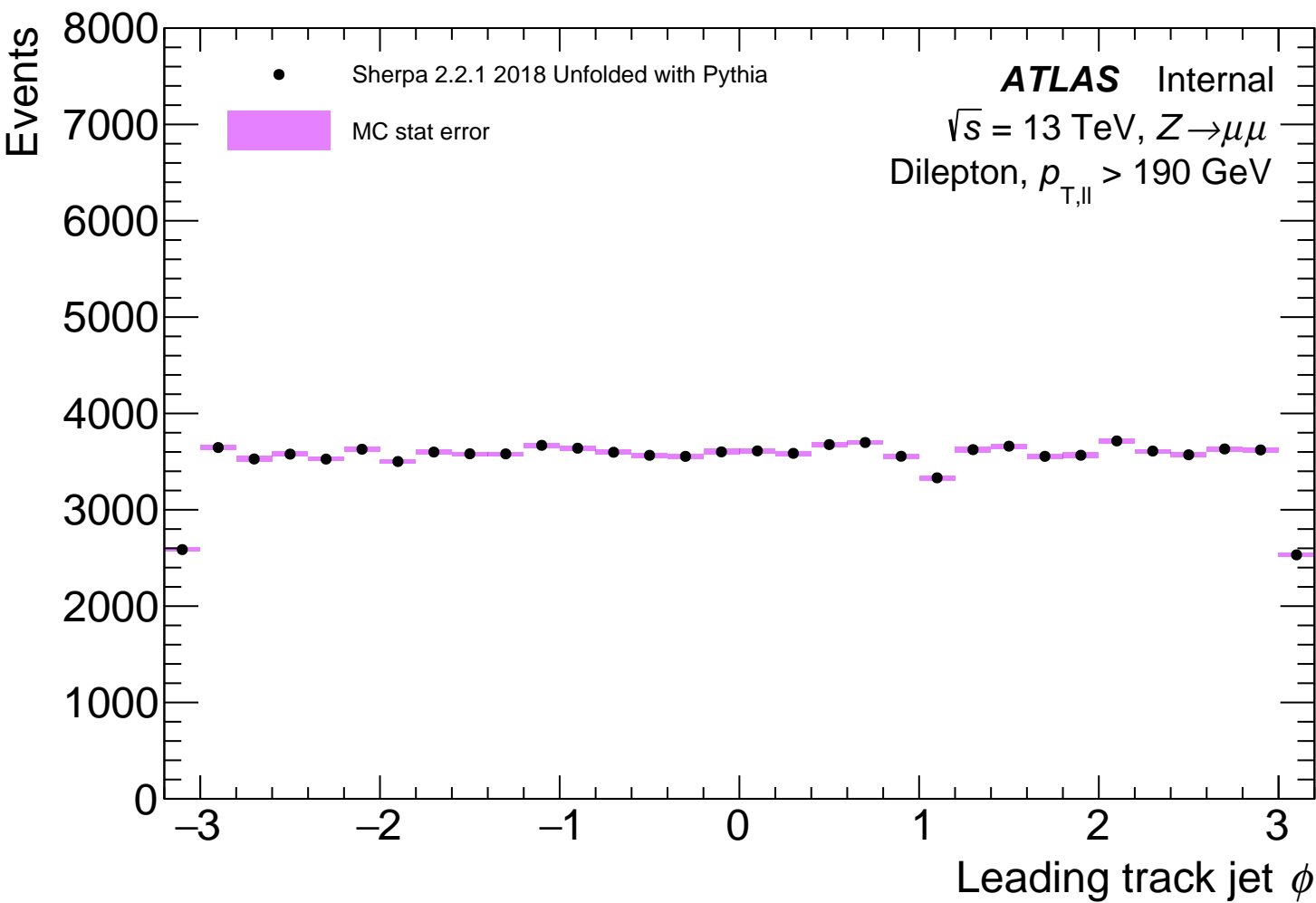












Events

8000

7000

6000

5000

4000

3000

2000

1000

0

-3

-2

-1

0

1

2

3

•

Sherpa 2.2.1 2018 Unfolded with Pythia



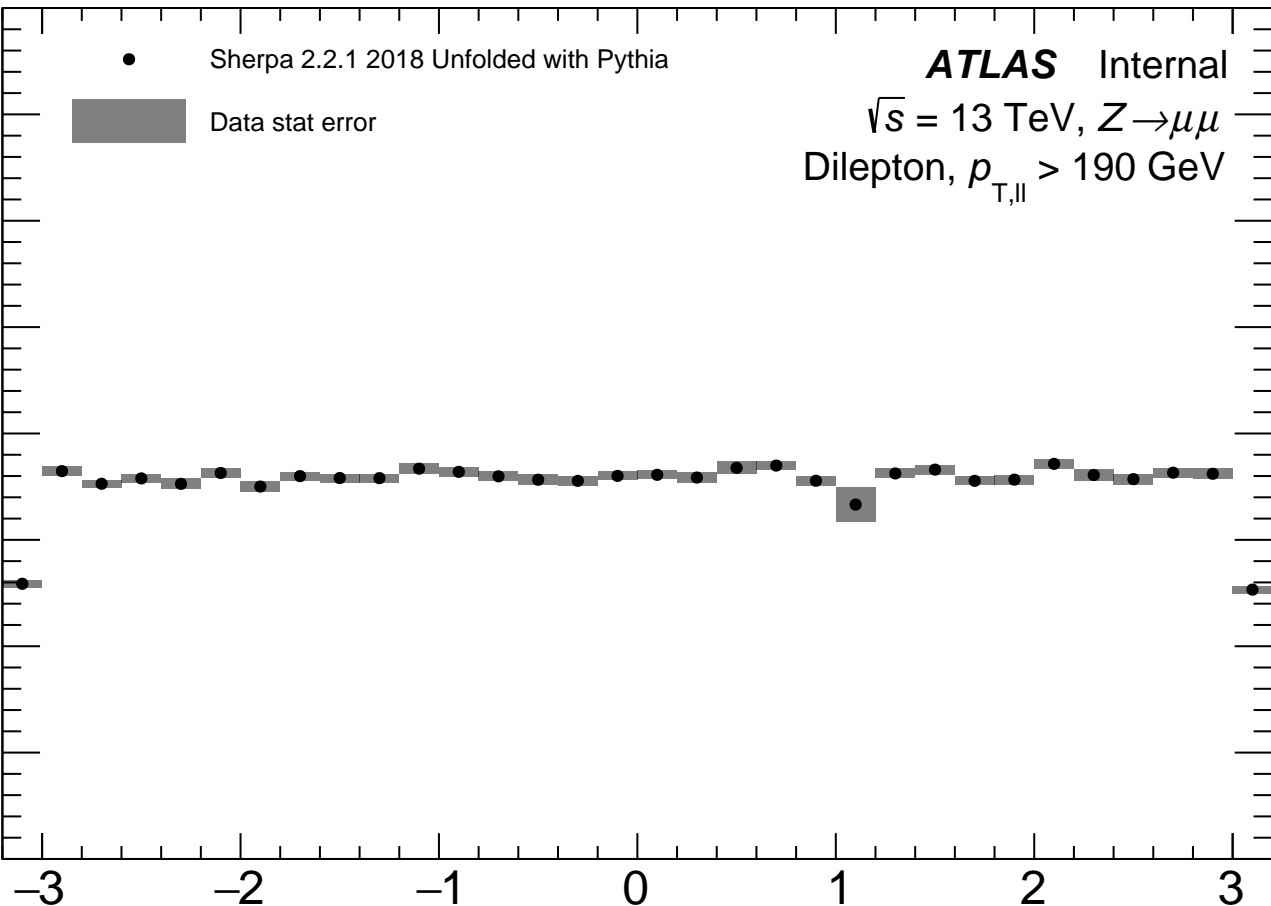
Data stat error

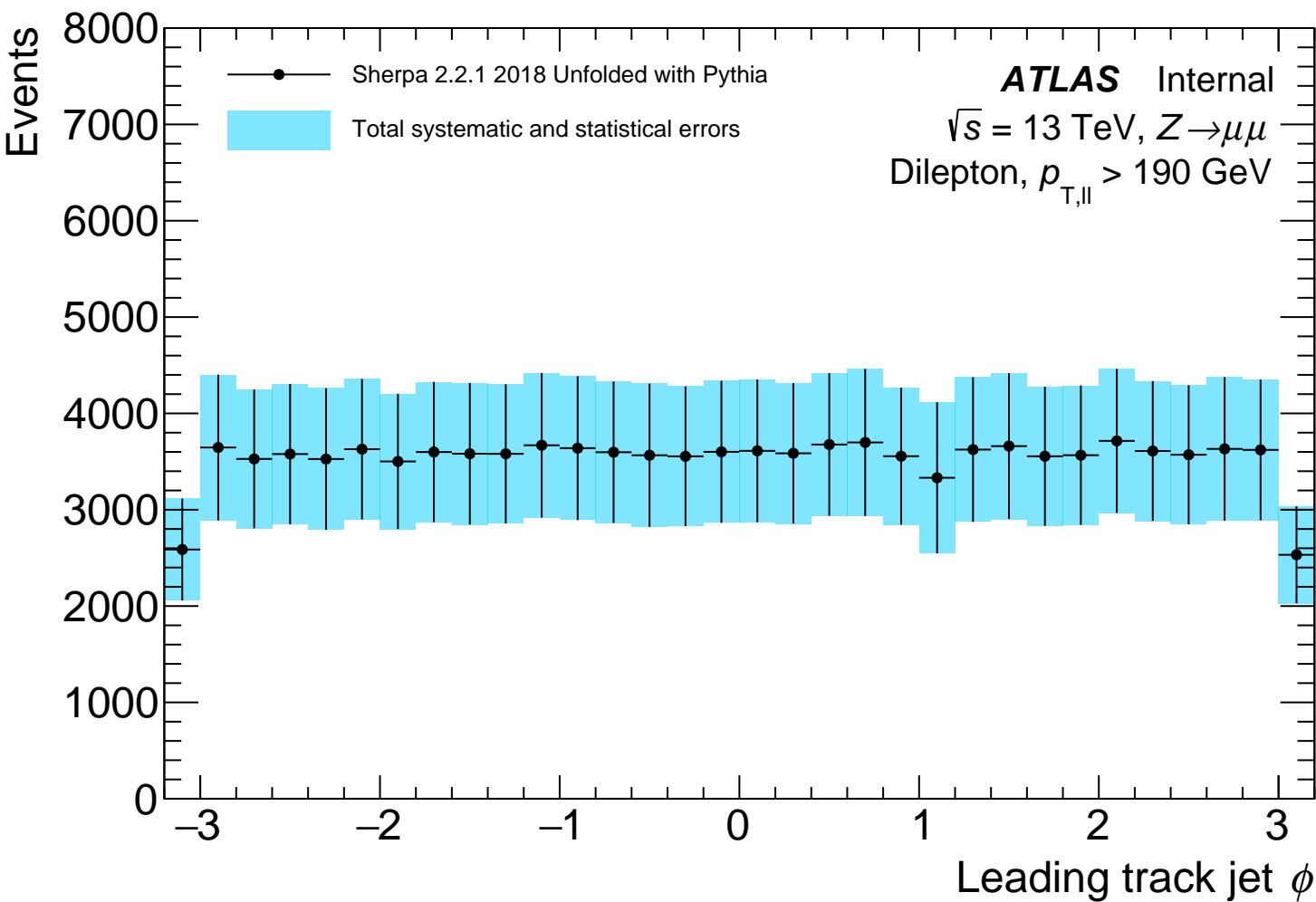
ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

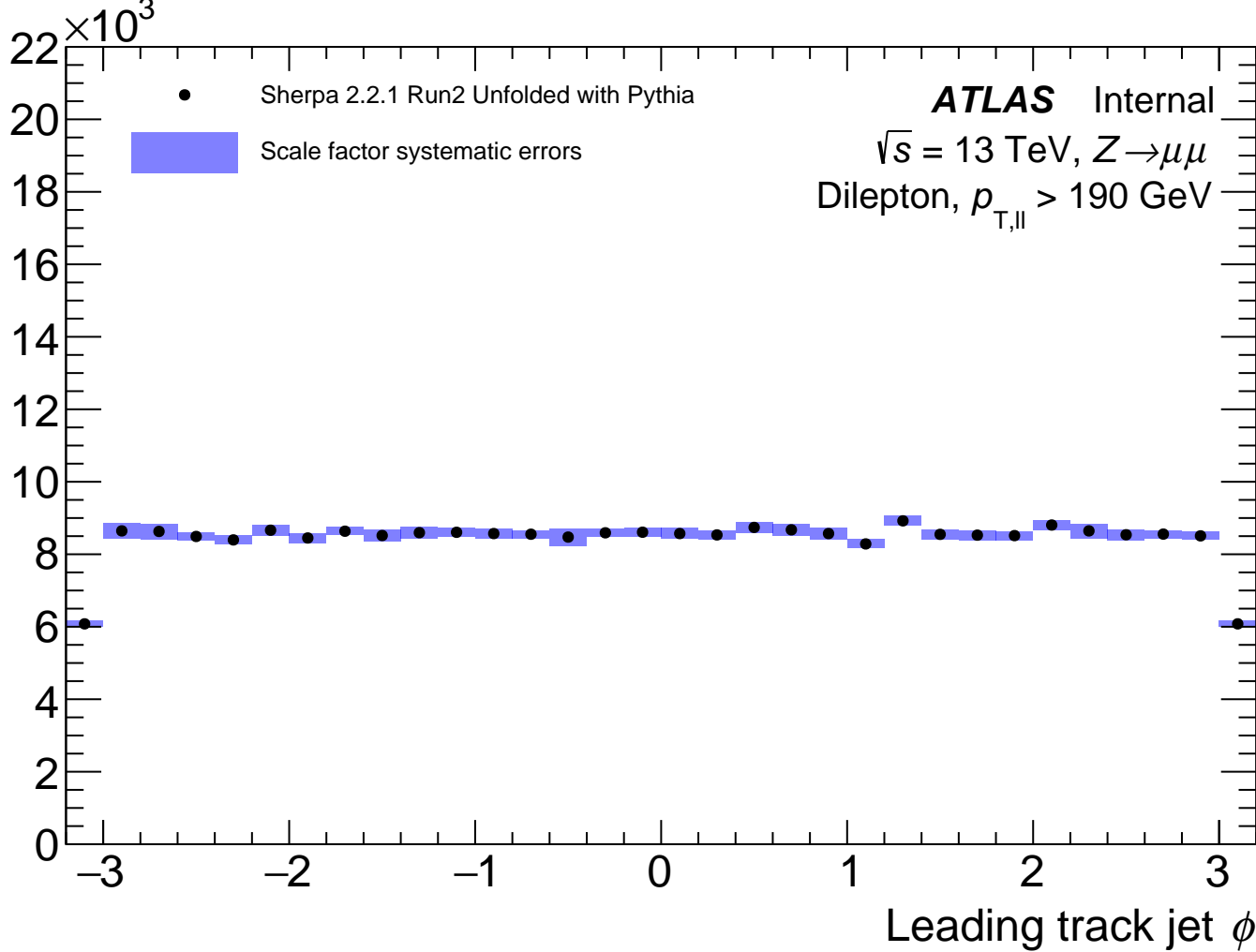
Dilepton, $p_{T,\text{ll}} > 190$ GeV

Leading track jet ϕ

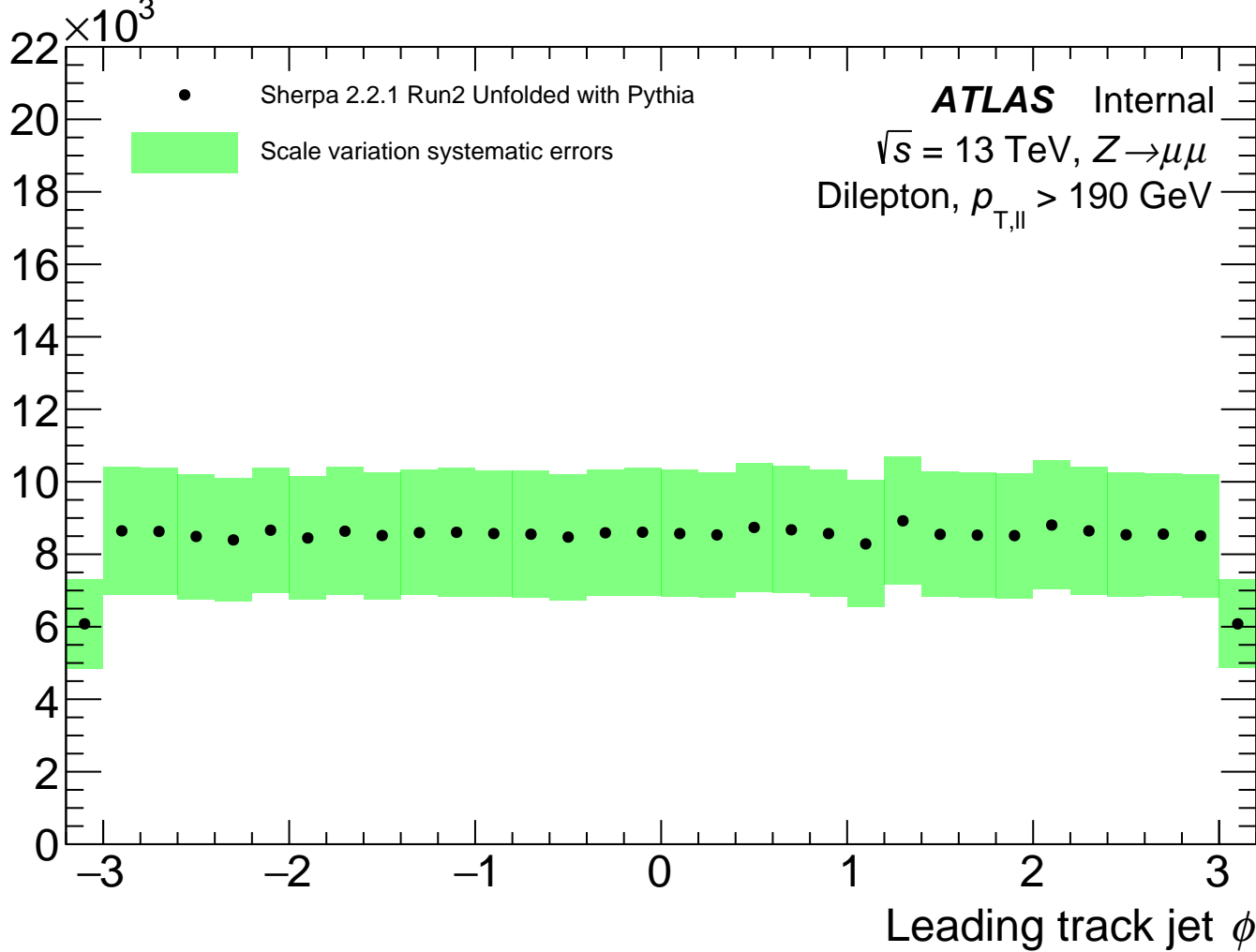




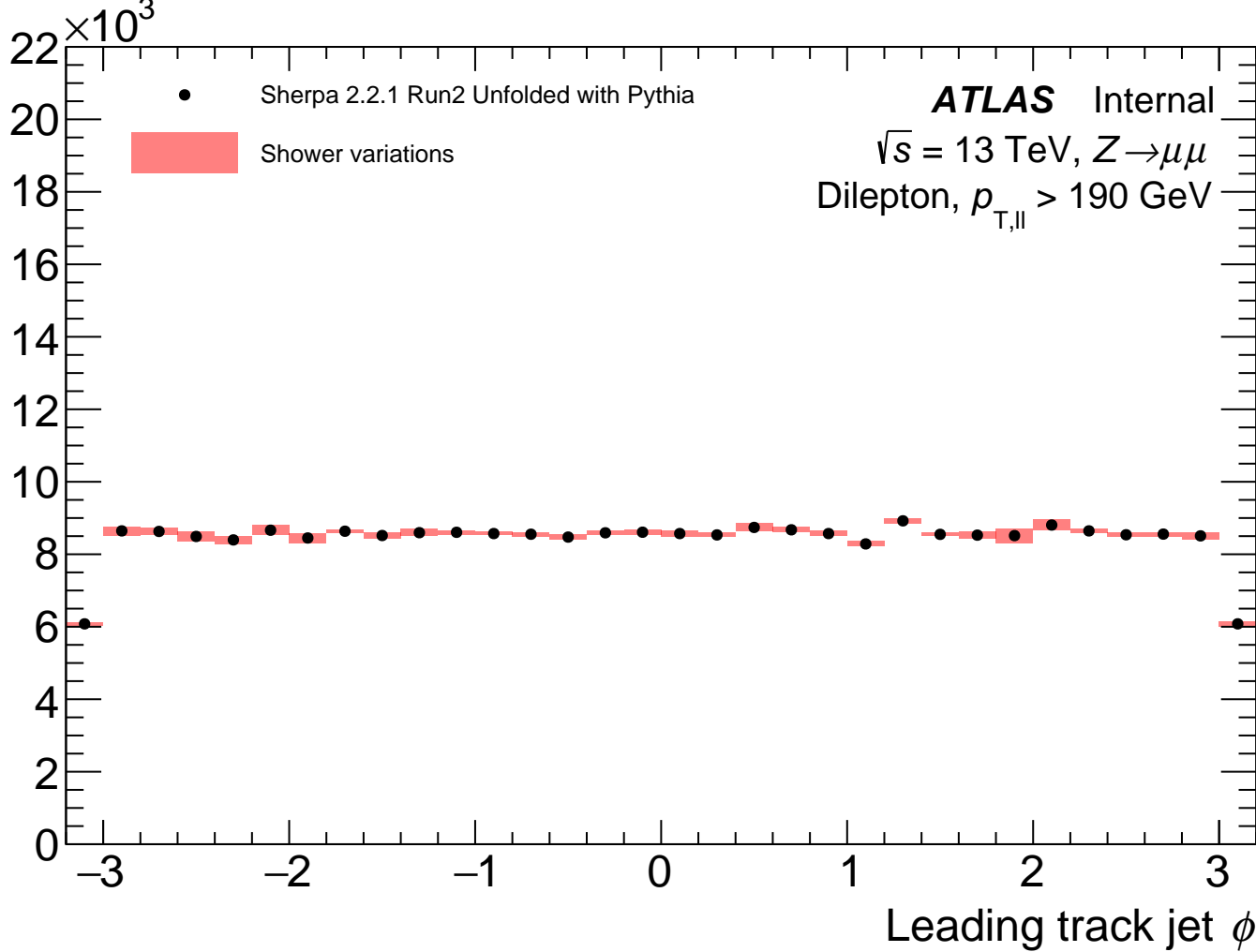
Events



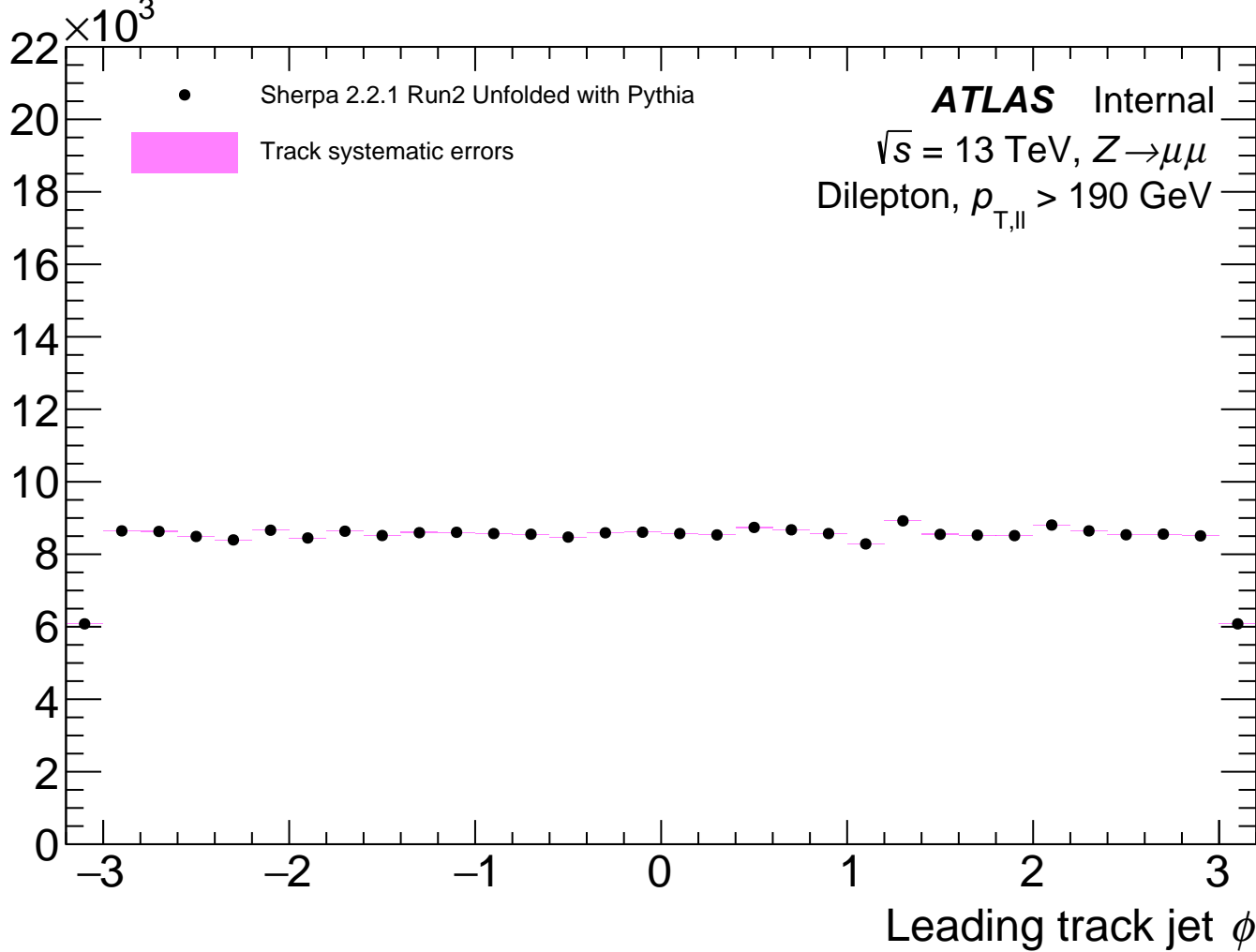
Events



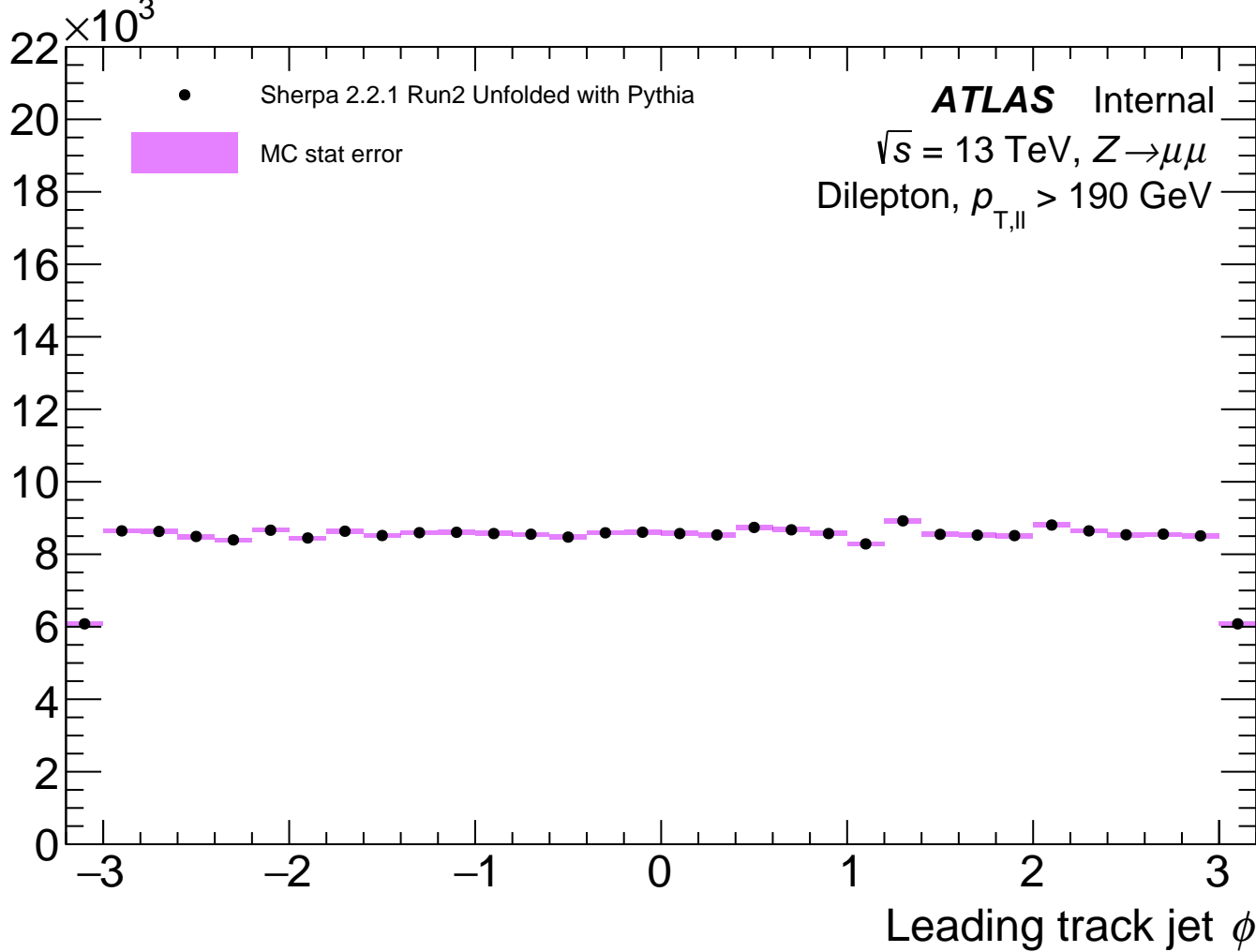
Events



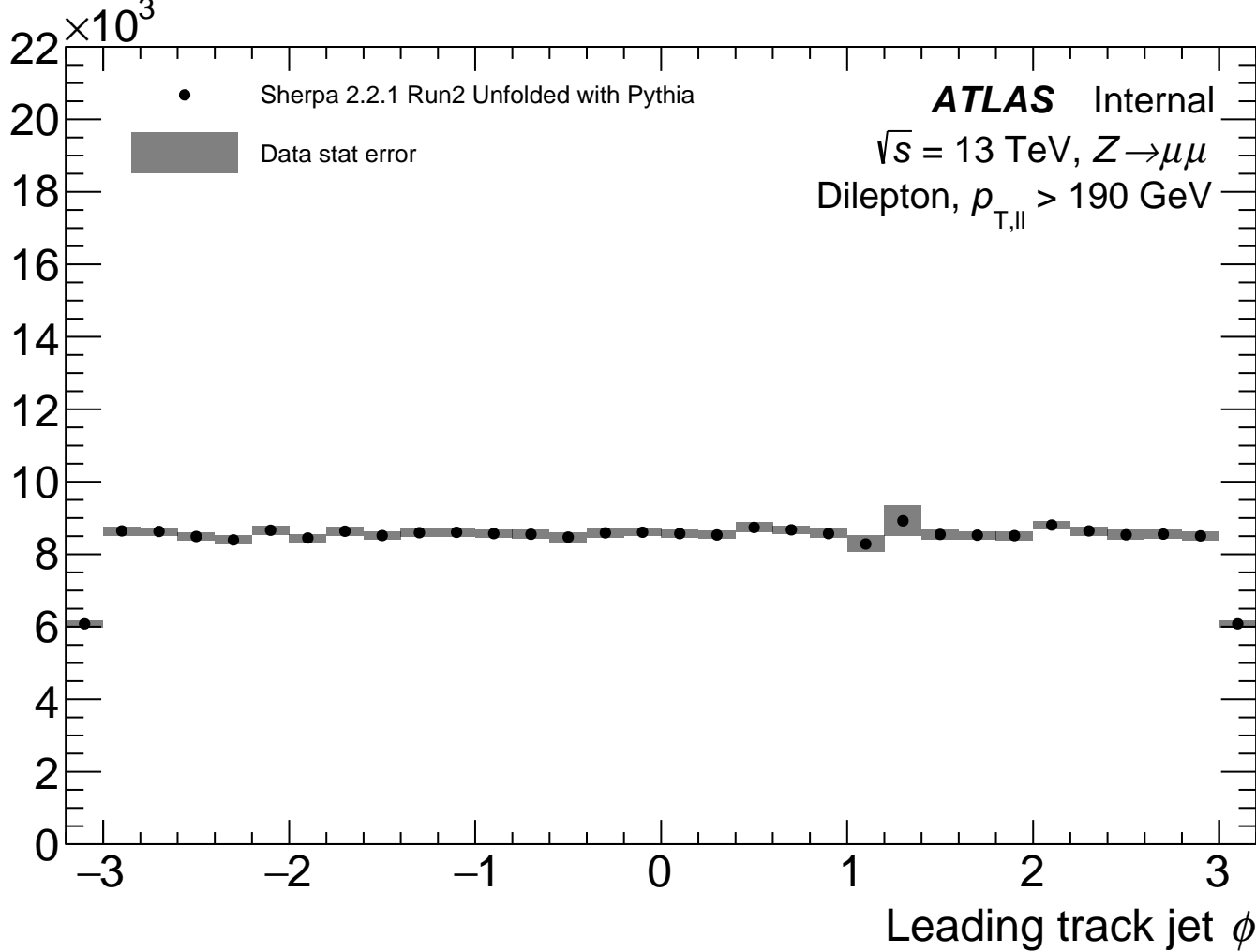
Events



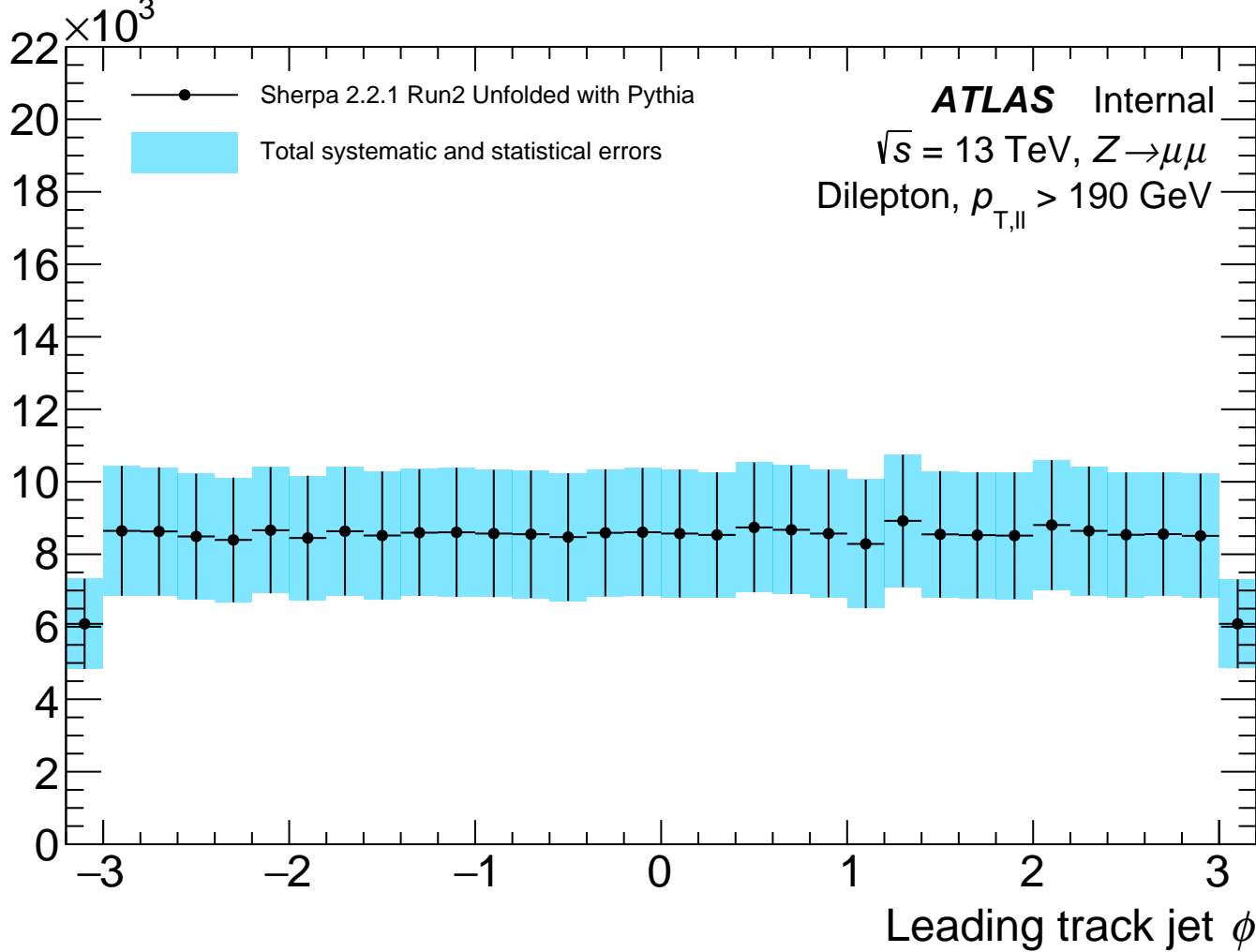
Events



Events

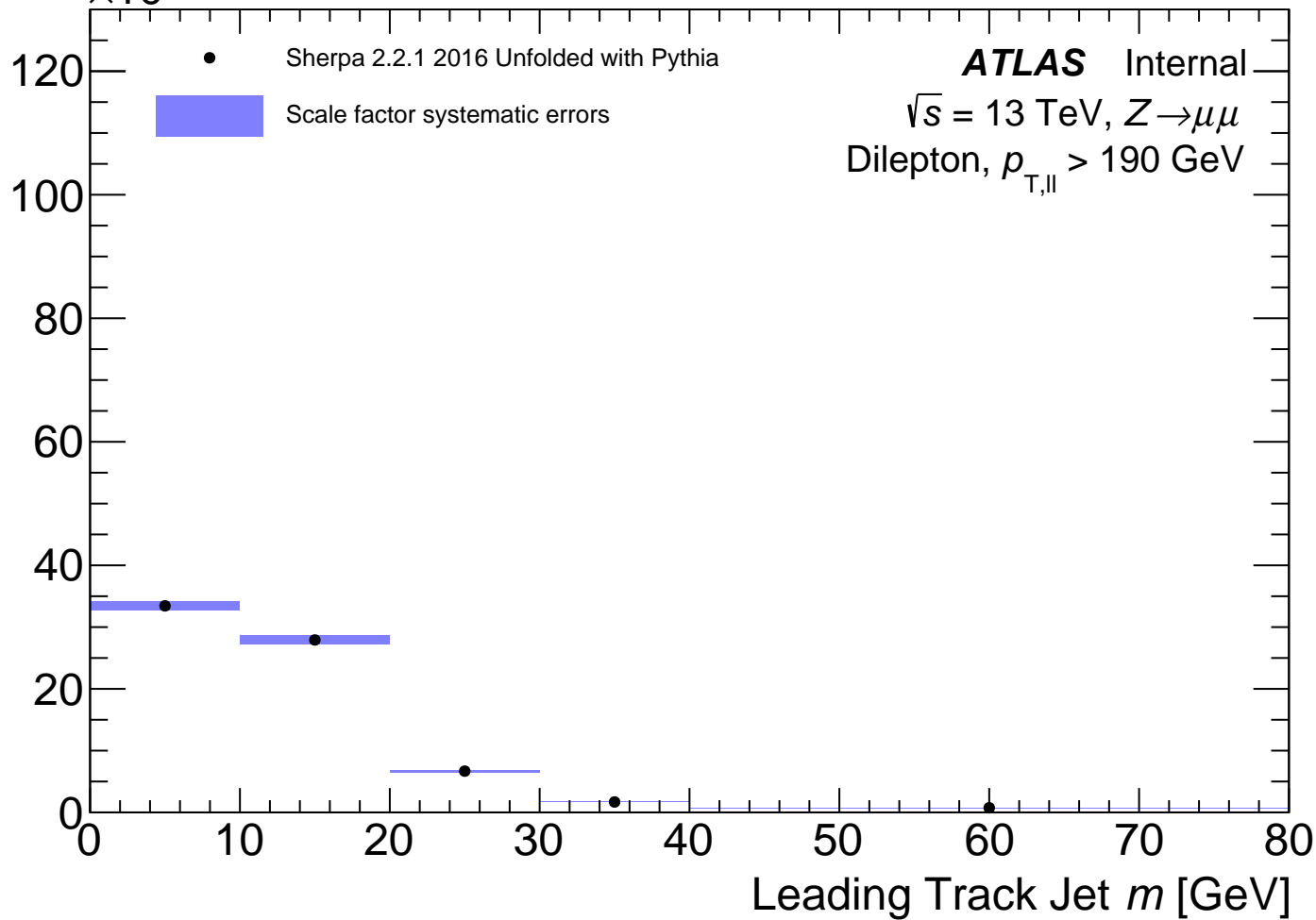


Events



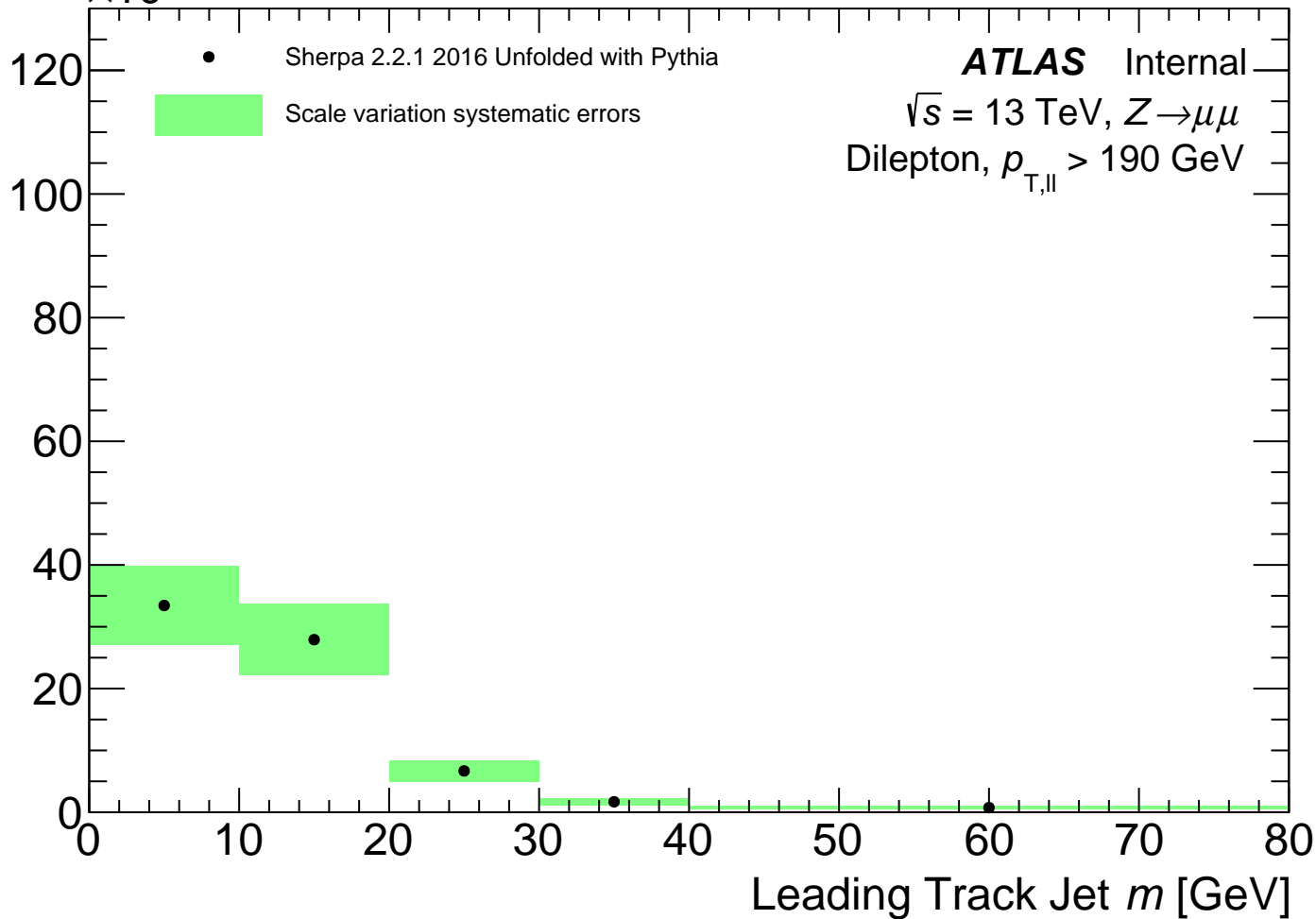
Events

$\times 10^3$



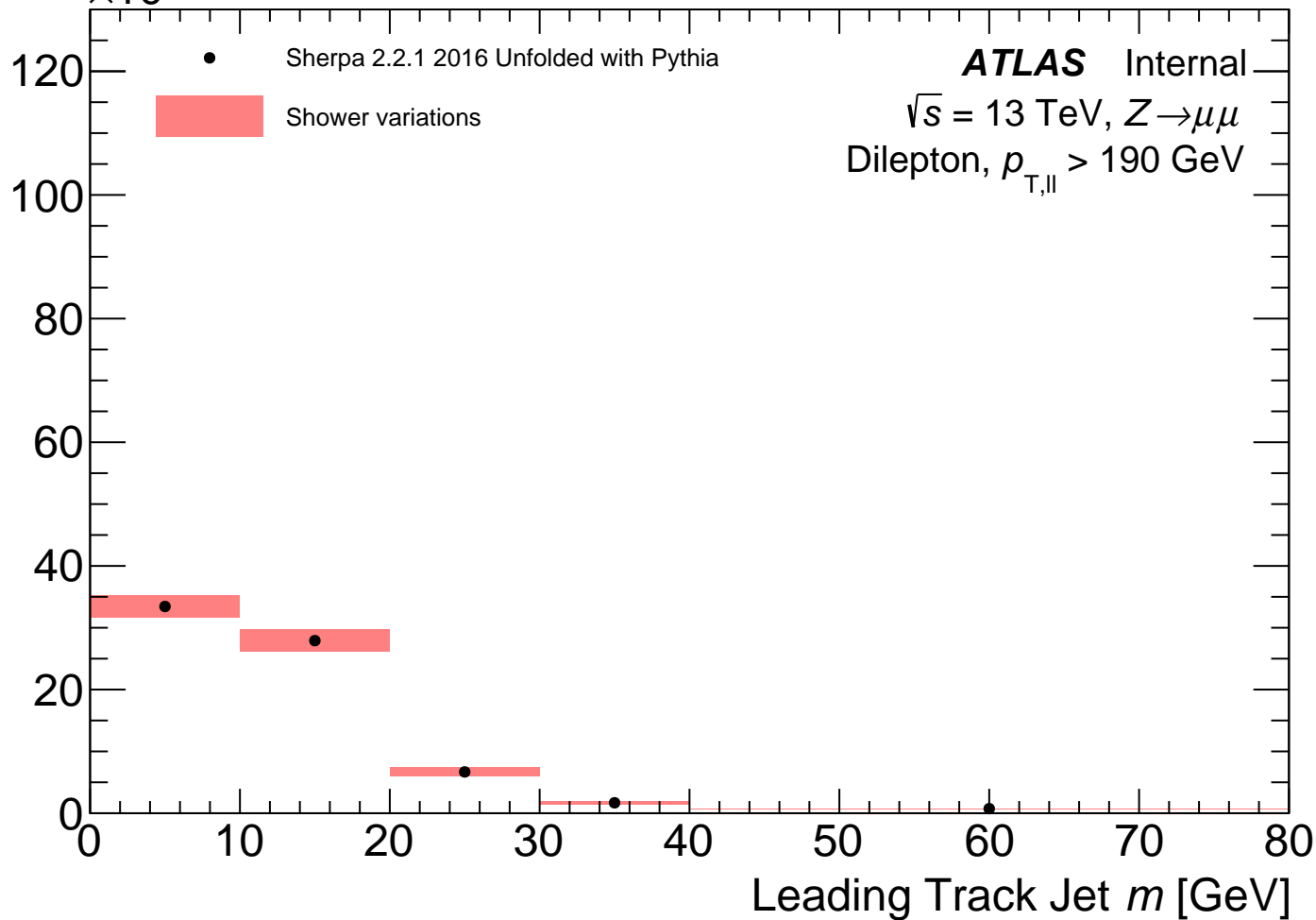
Events

$\times 10^3$



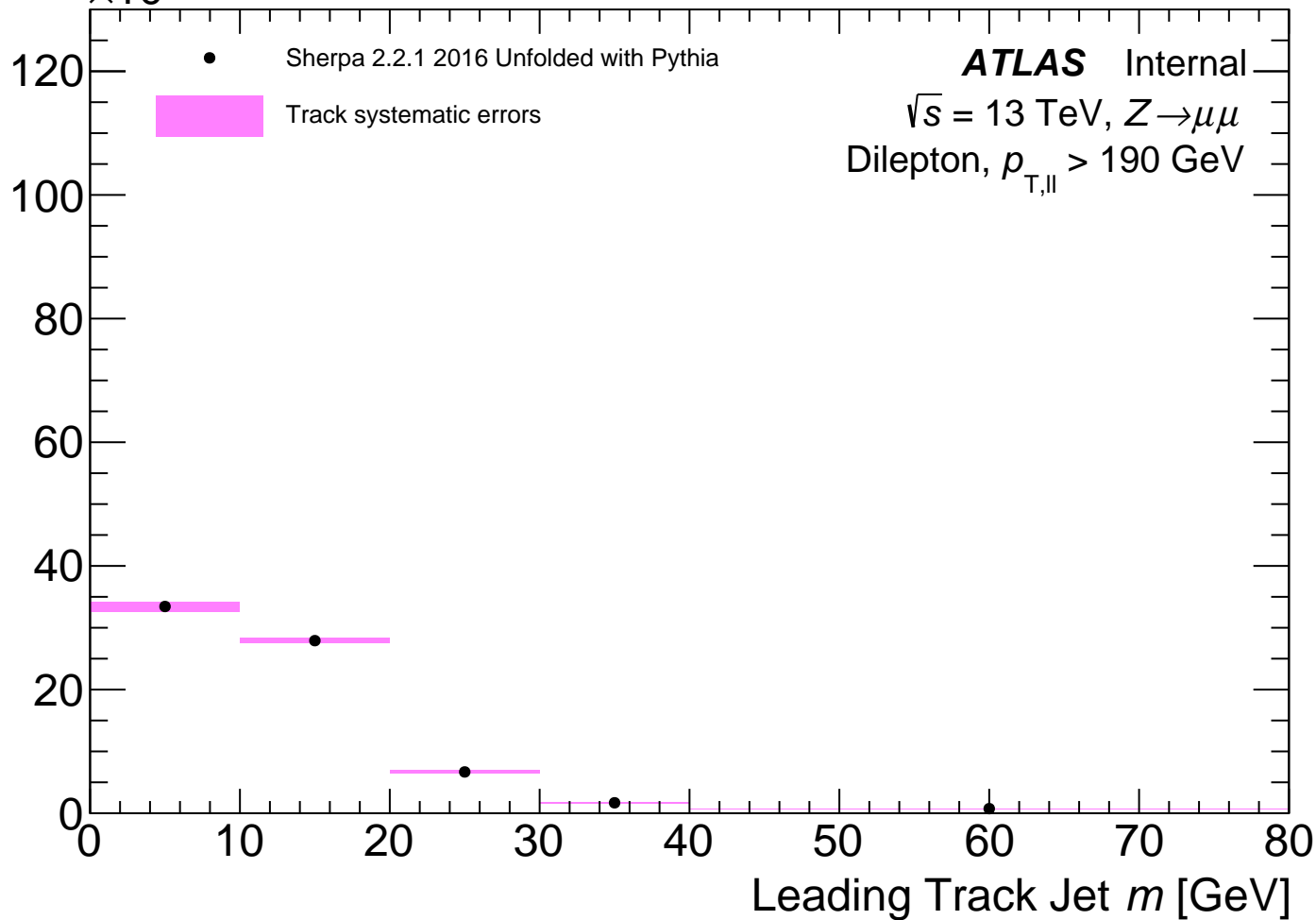
Events

$\times 10^3$



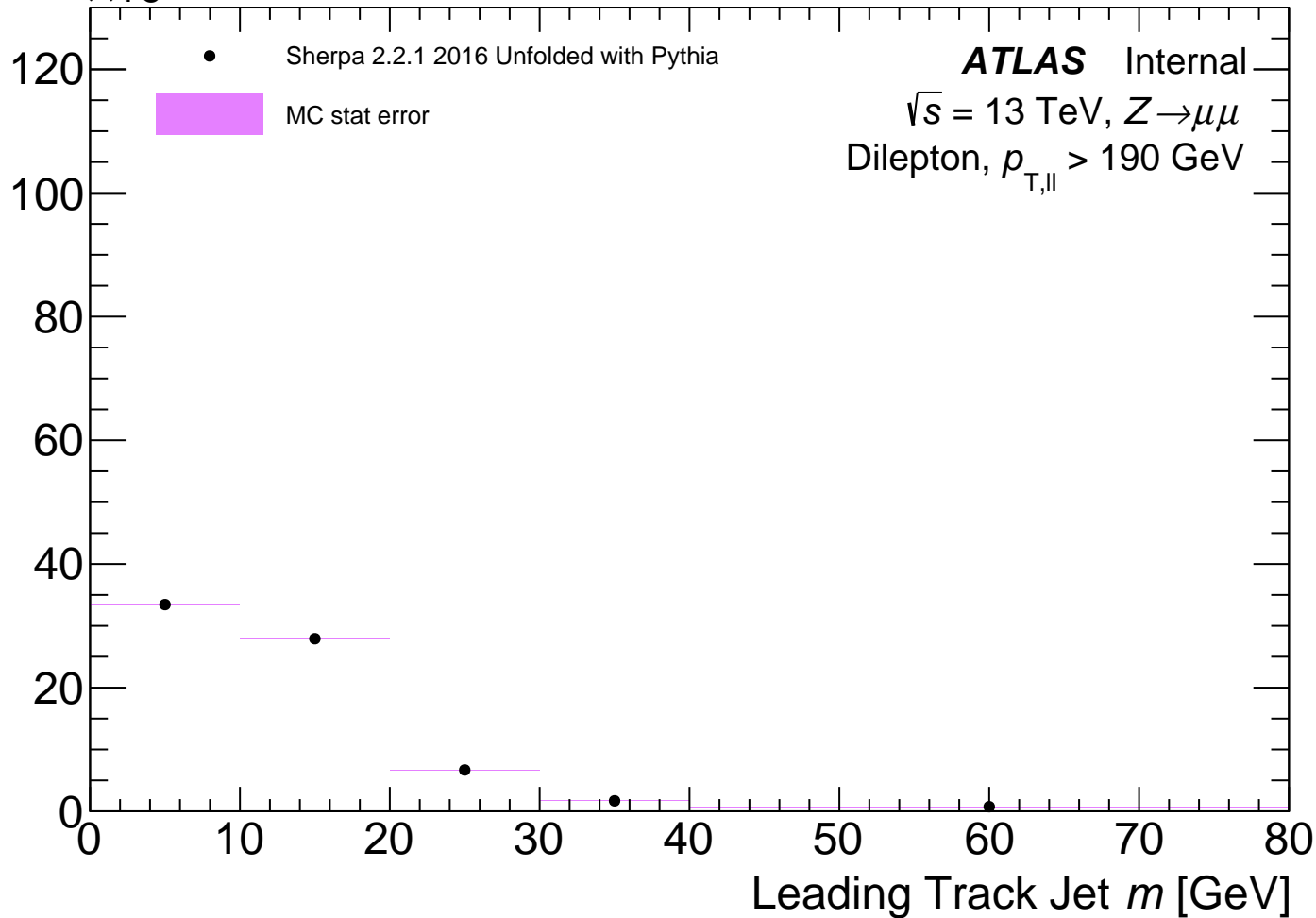
Events

$\times 10^3$



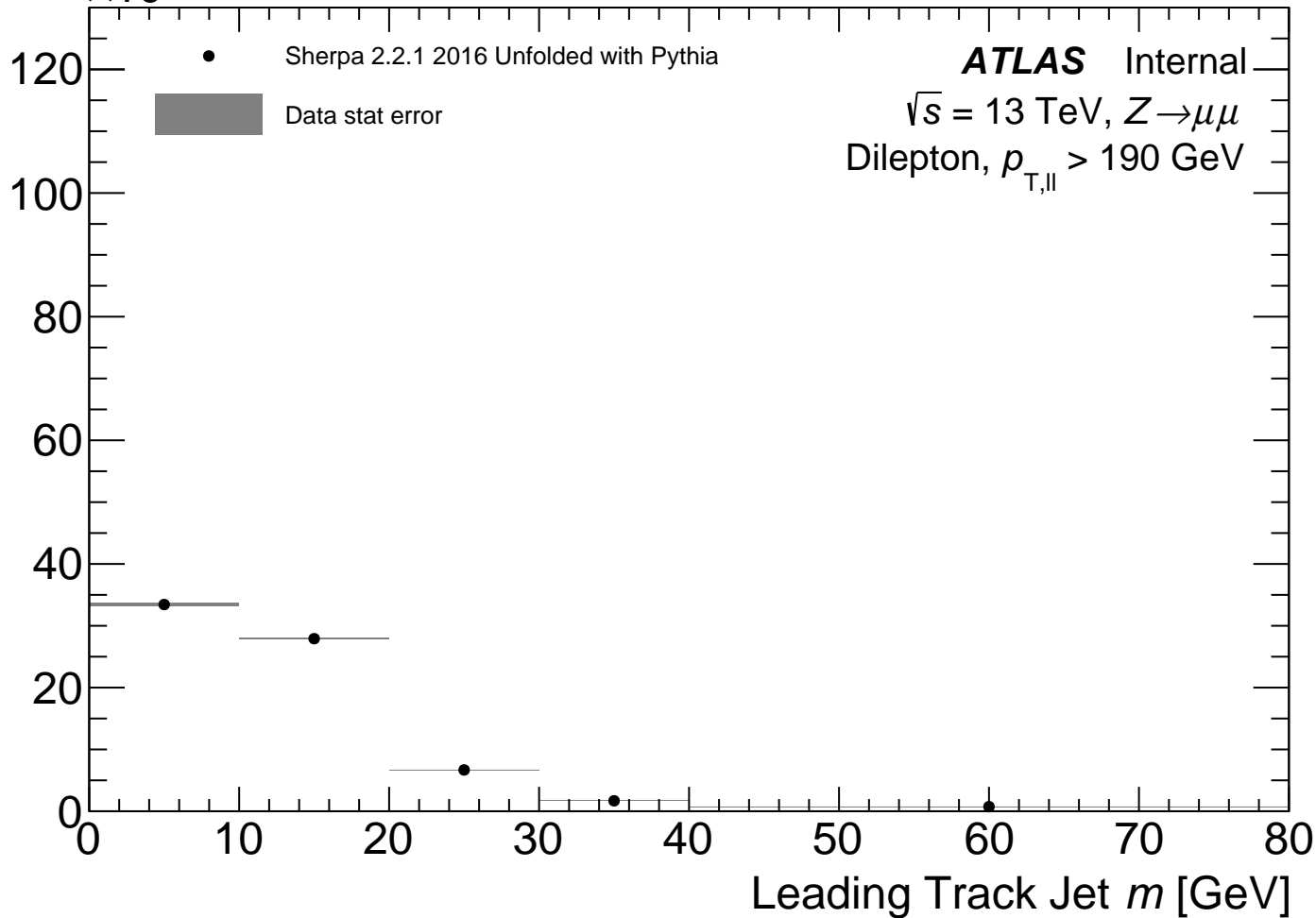
Events

$\times 10^3$



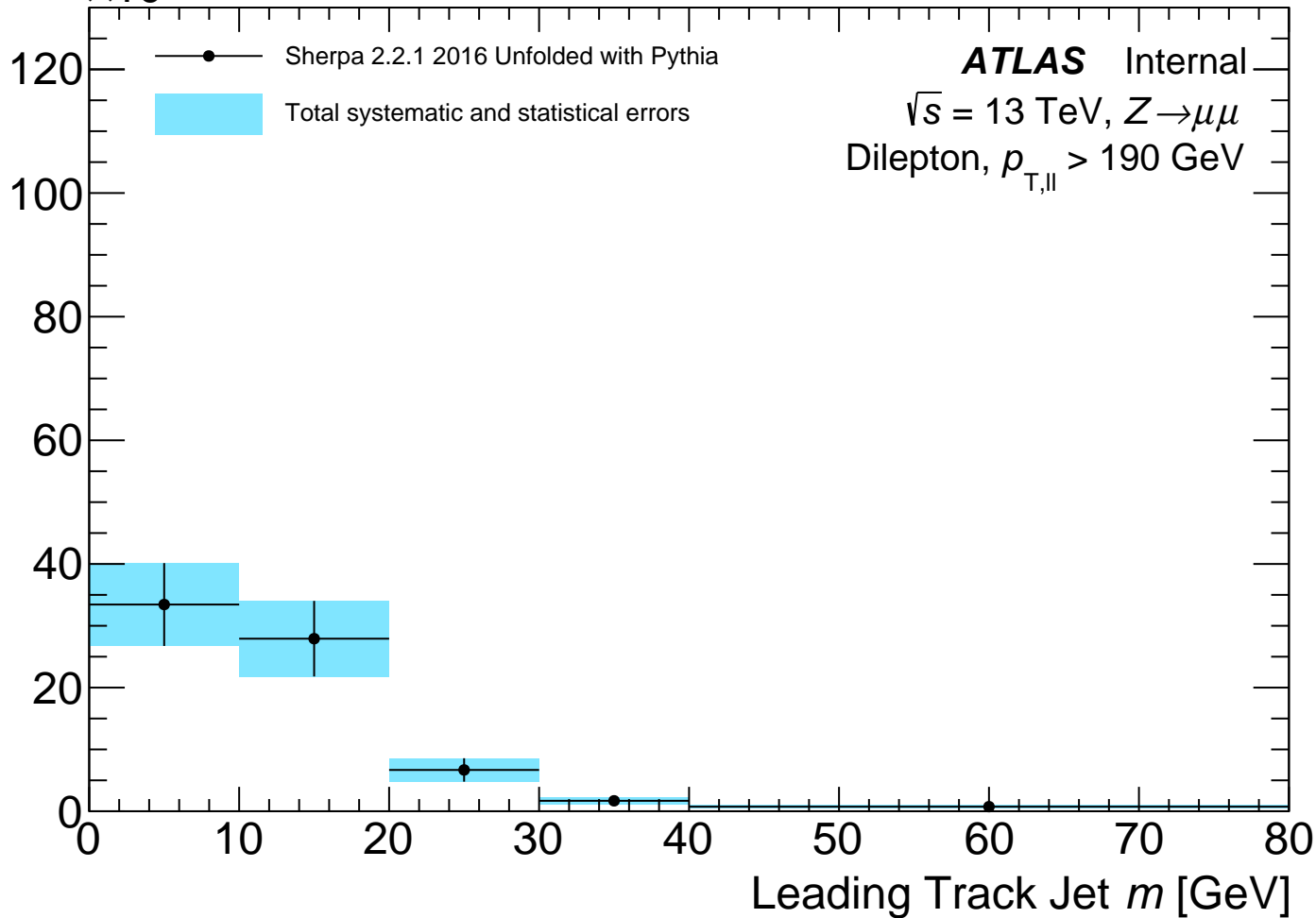
Events

$\times 10^3$



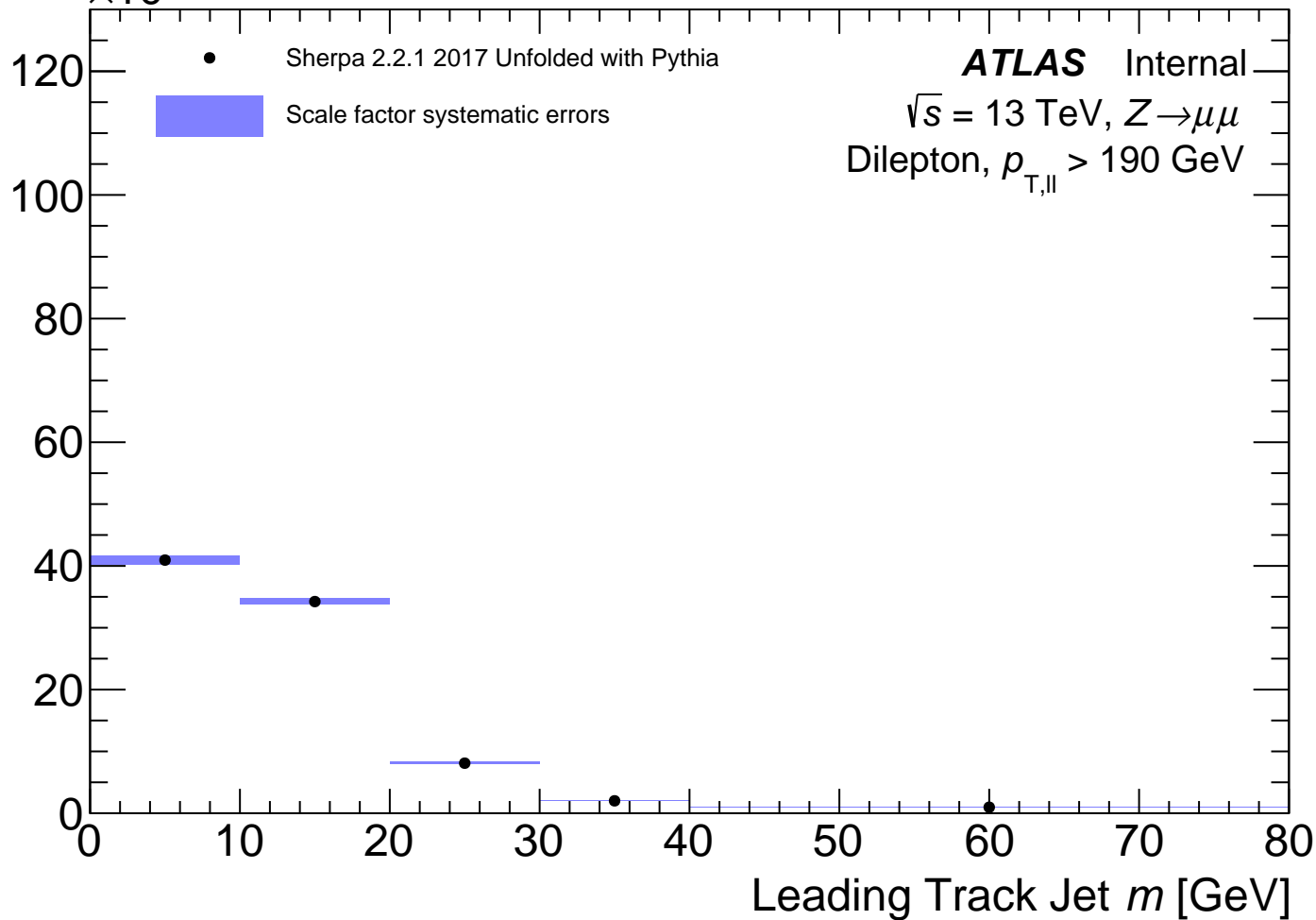
Events

$\times 10^3$



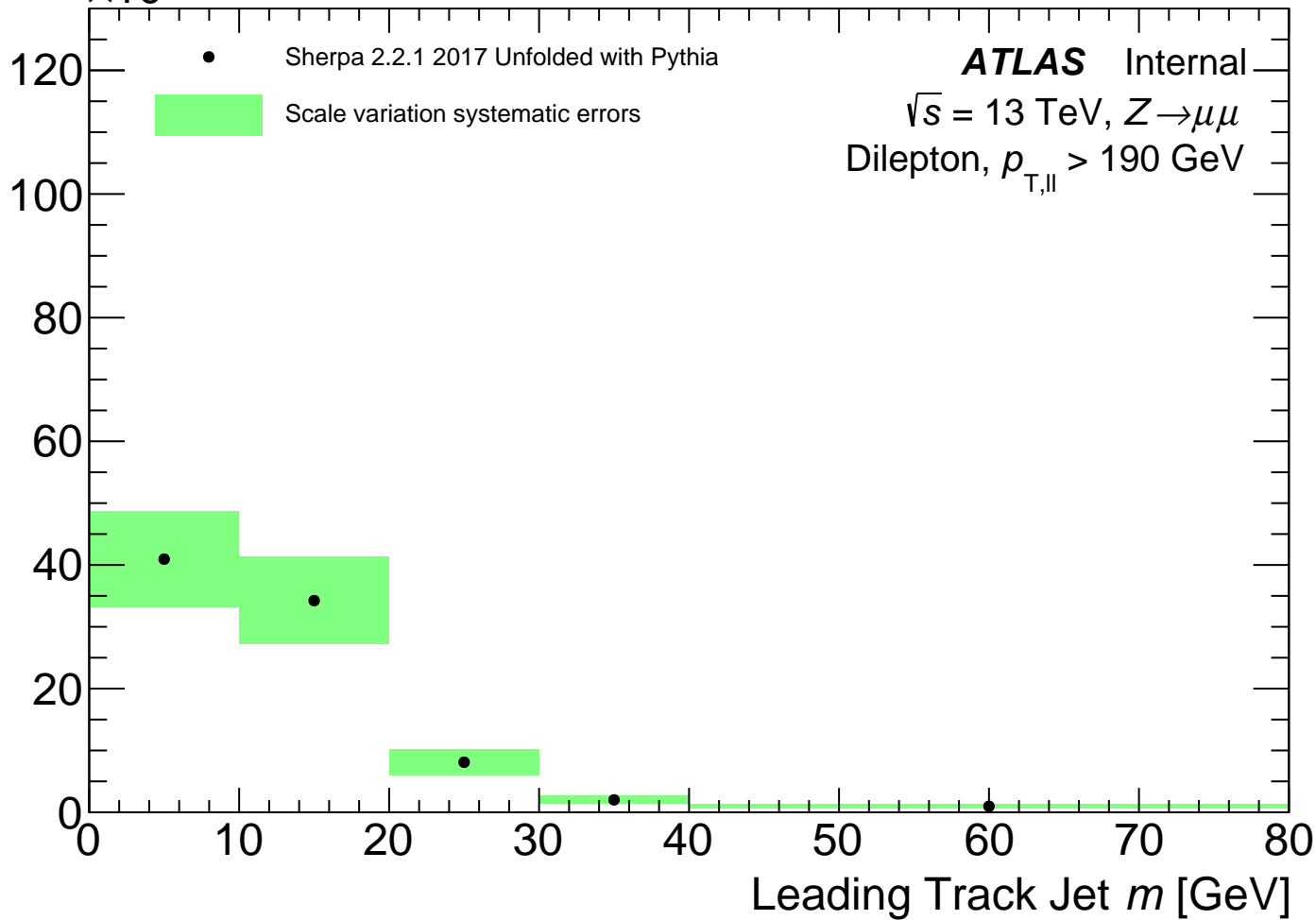
Events

$\times 10^3$



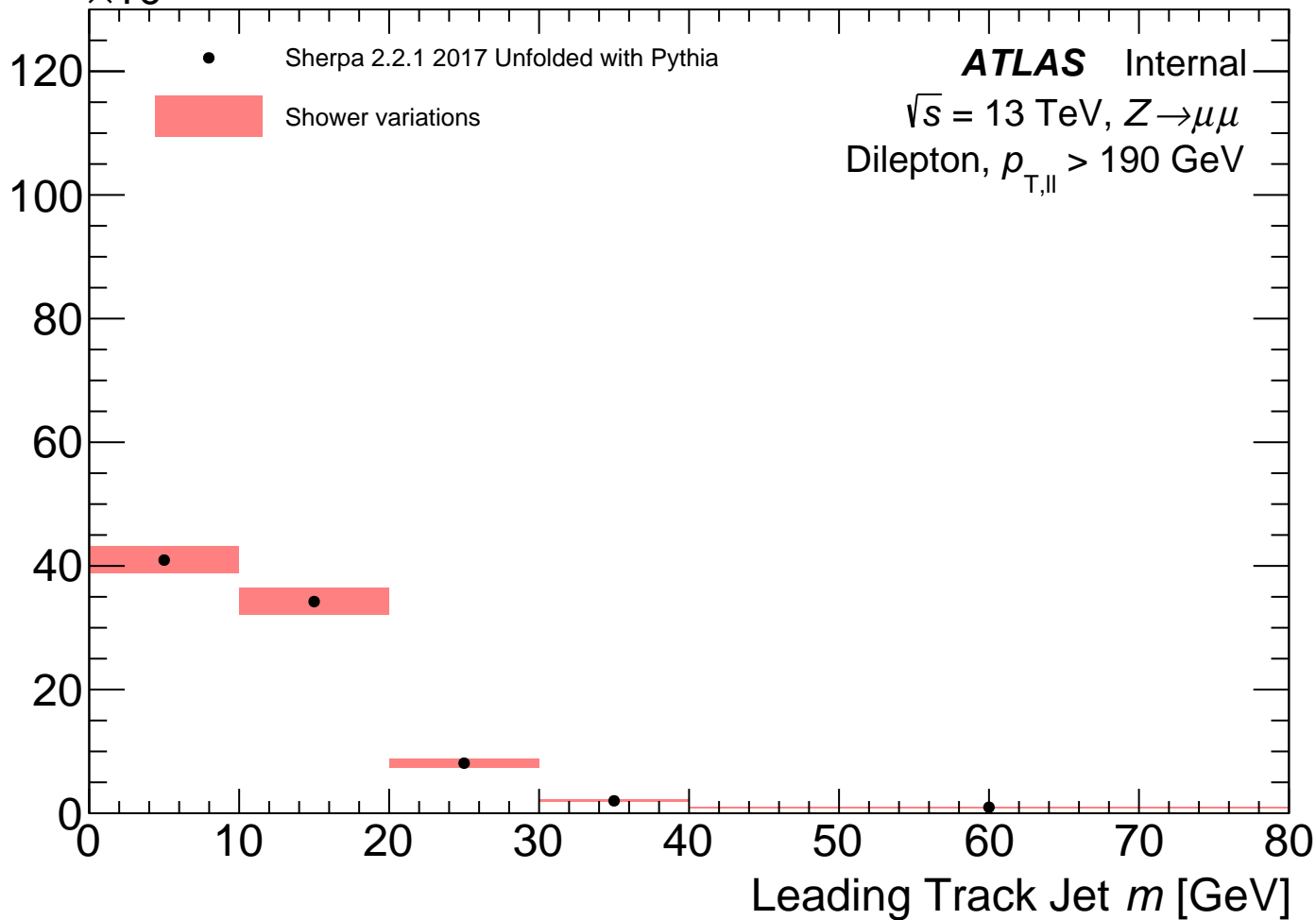
Events

$\times 10^3$



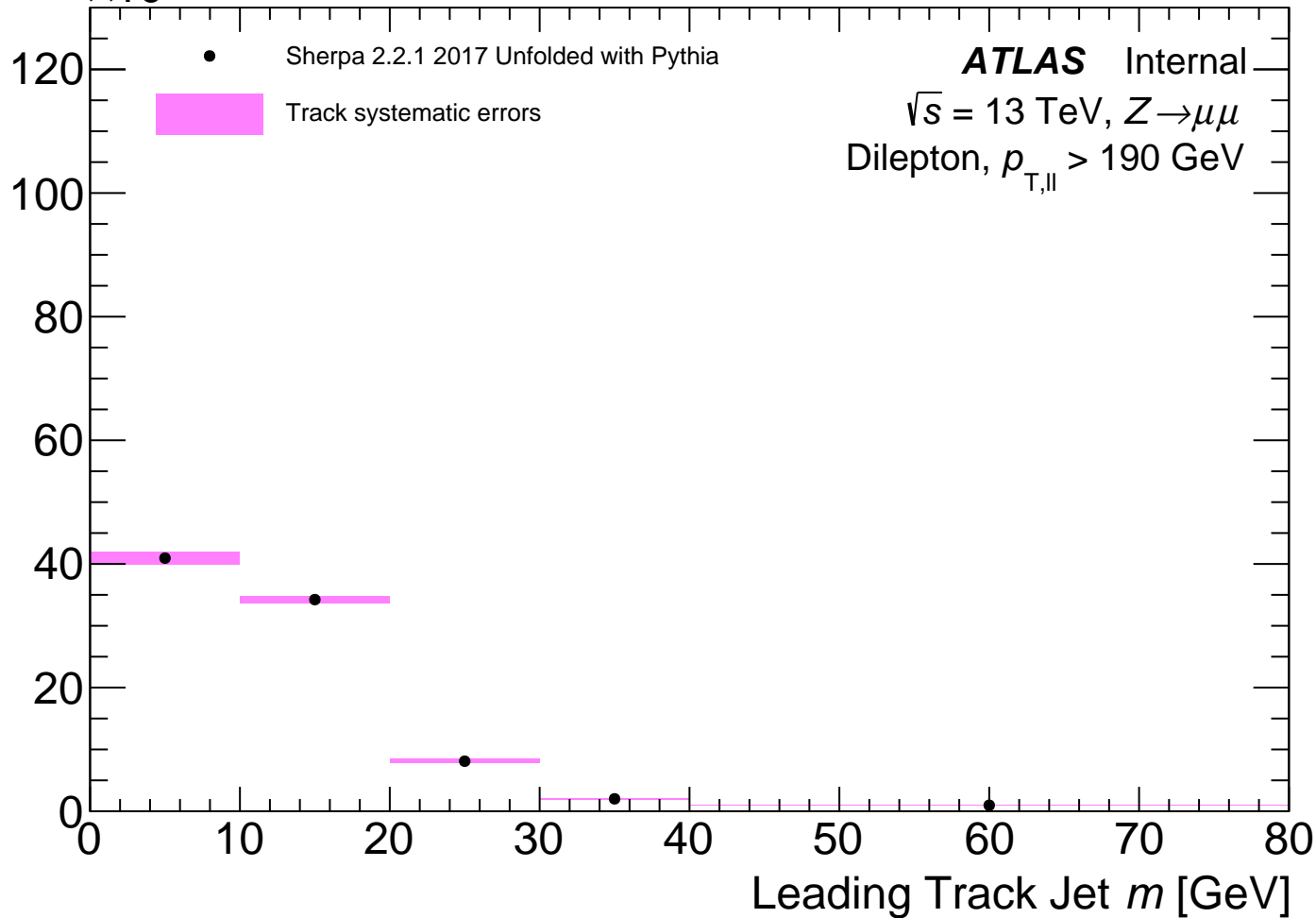
Events

$\times 10^3$



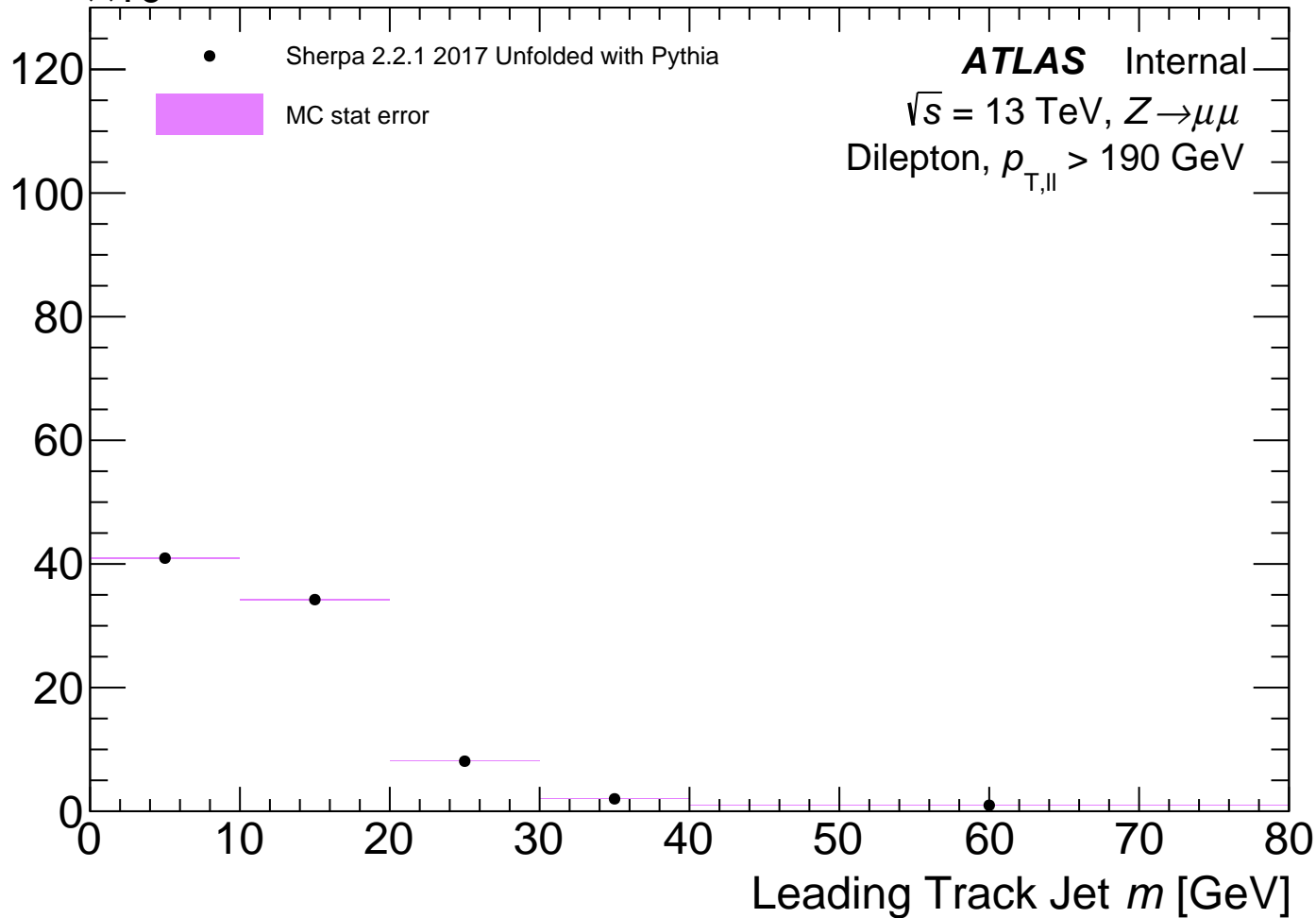
Events

$\times 10^3$



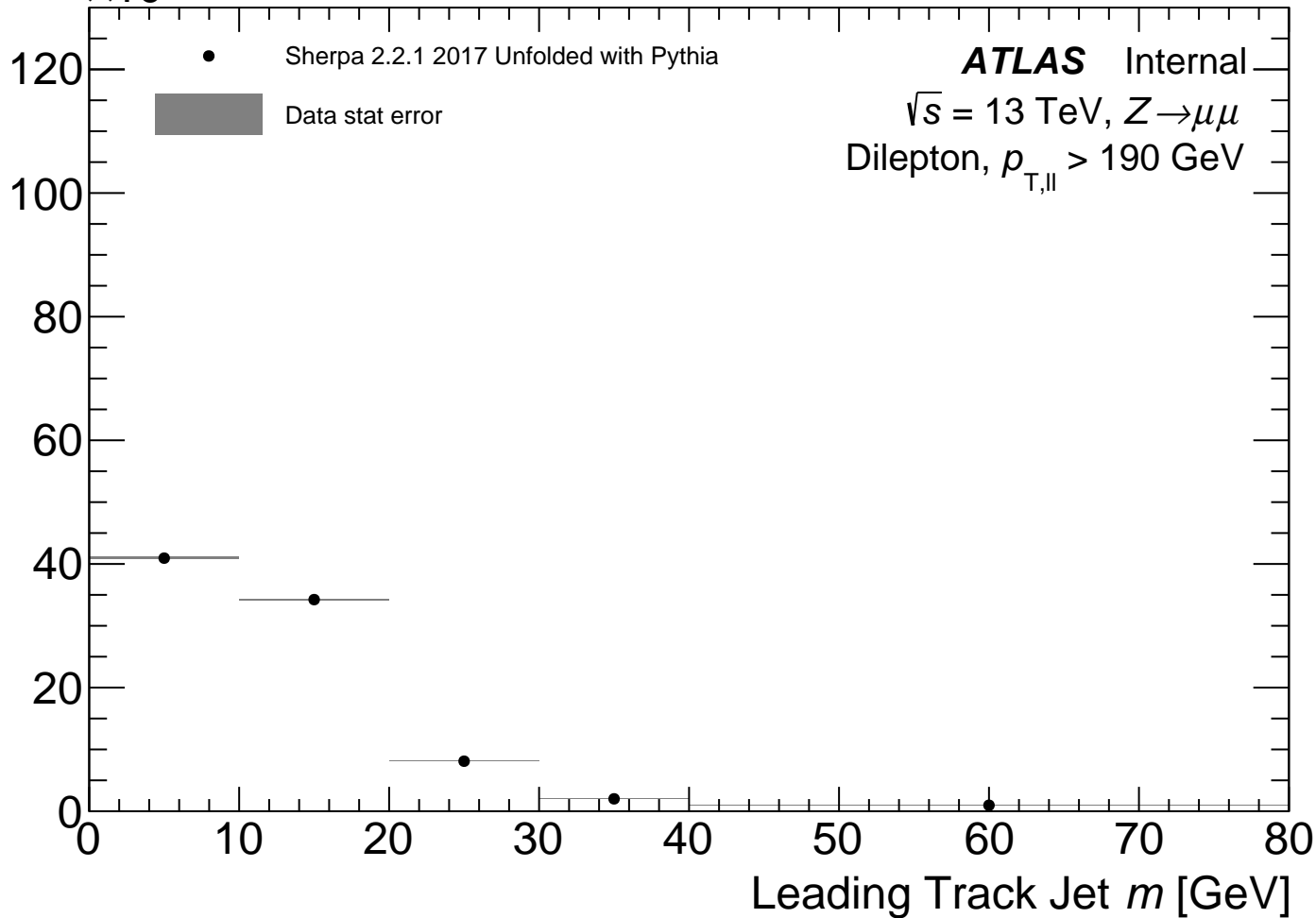
Events

$\times 10^3$



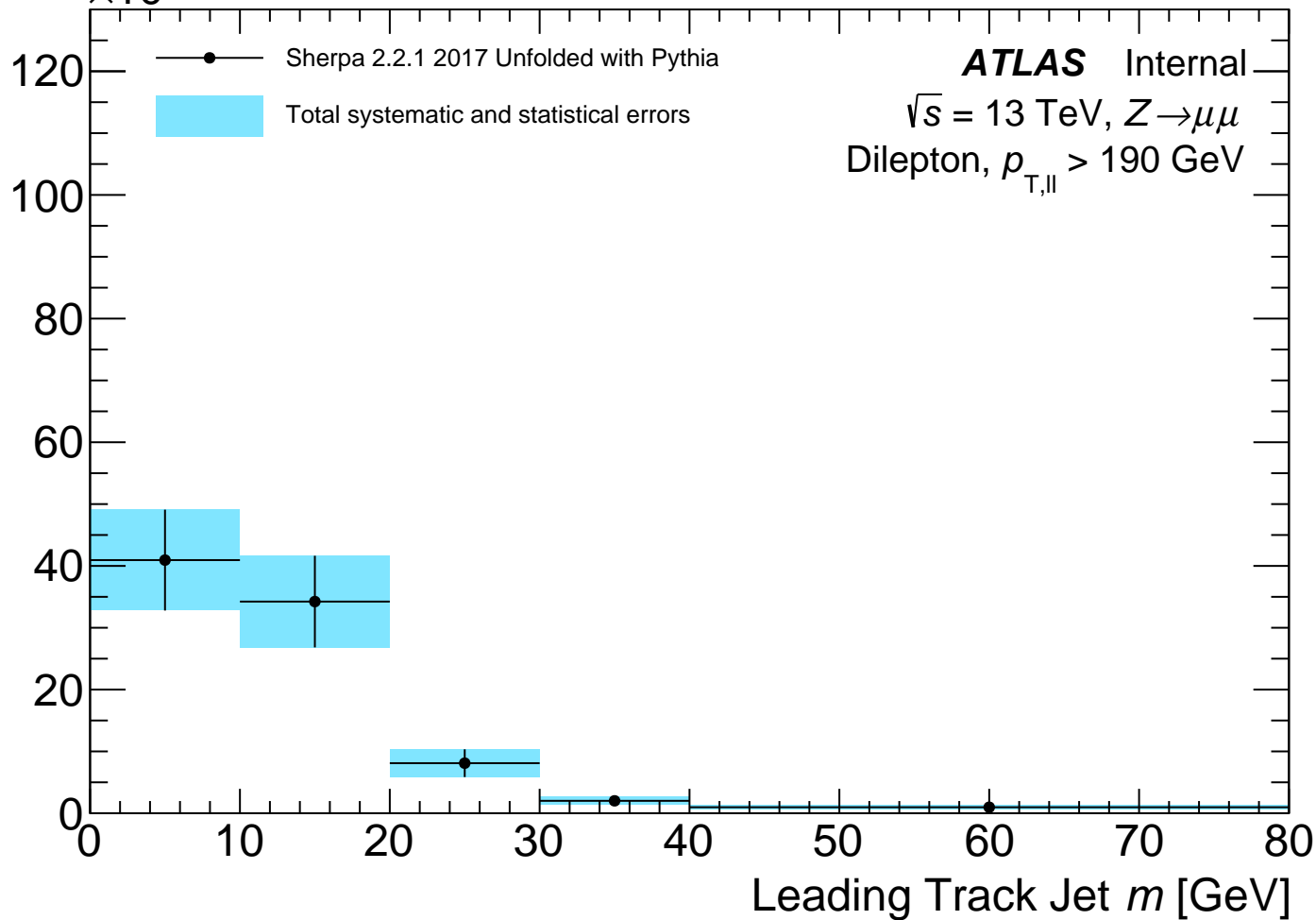
Events

$\times 10^3$



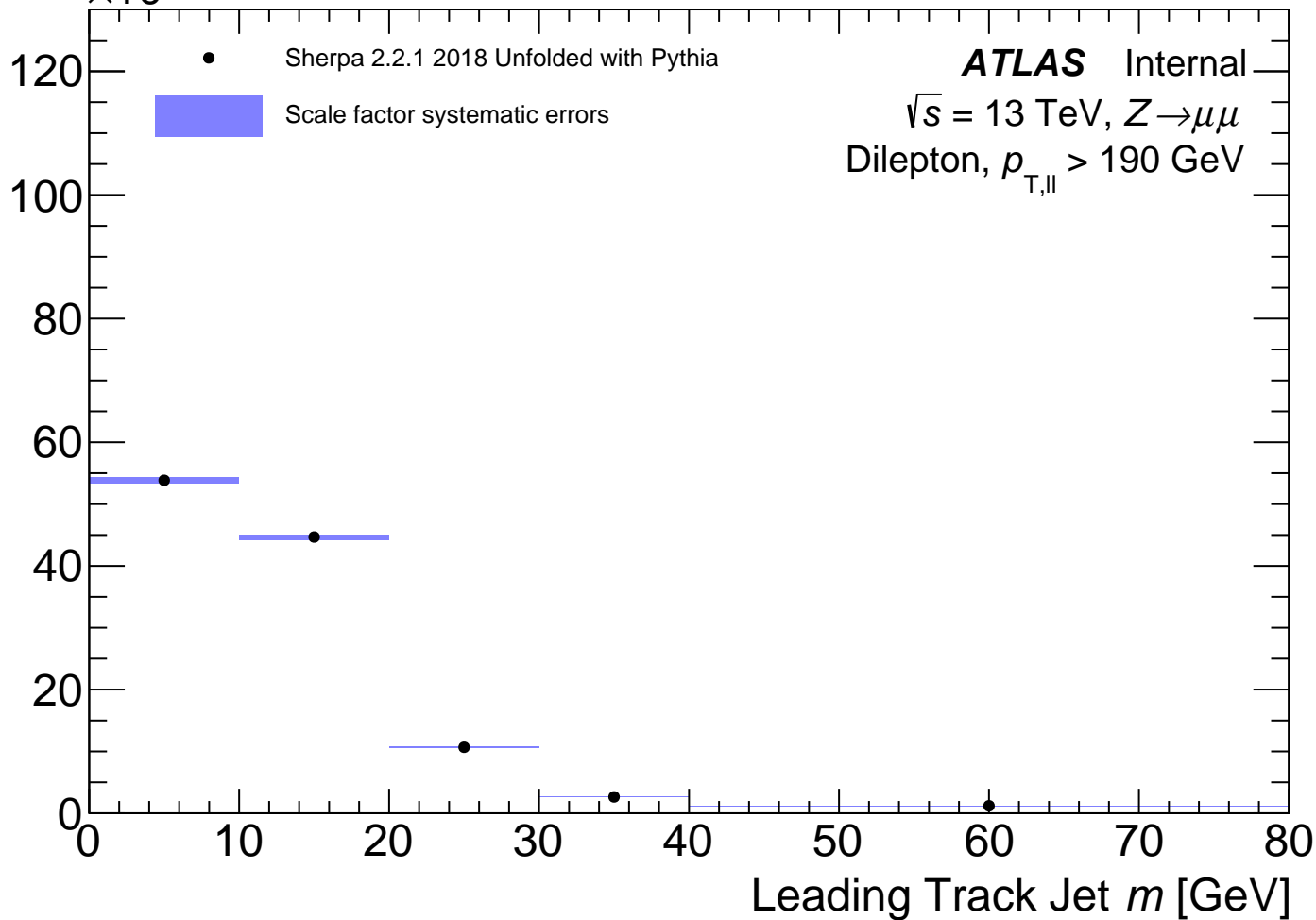
Events

$\times 10^3$



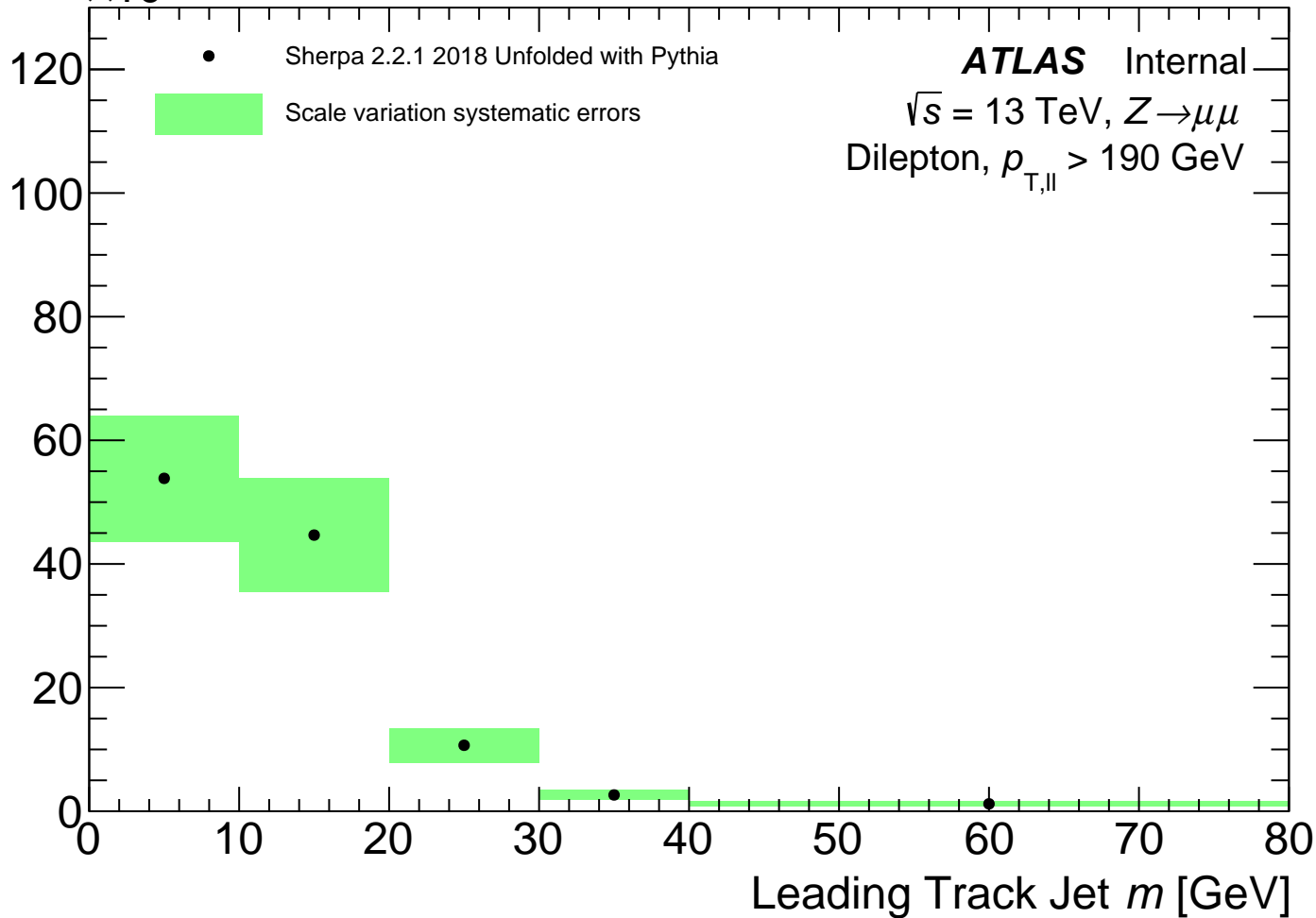
Events

$\times 10^3$



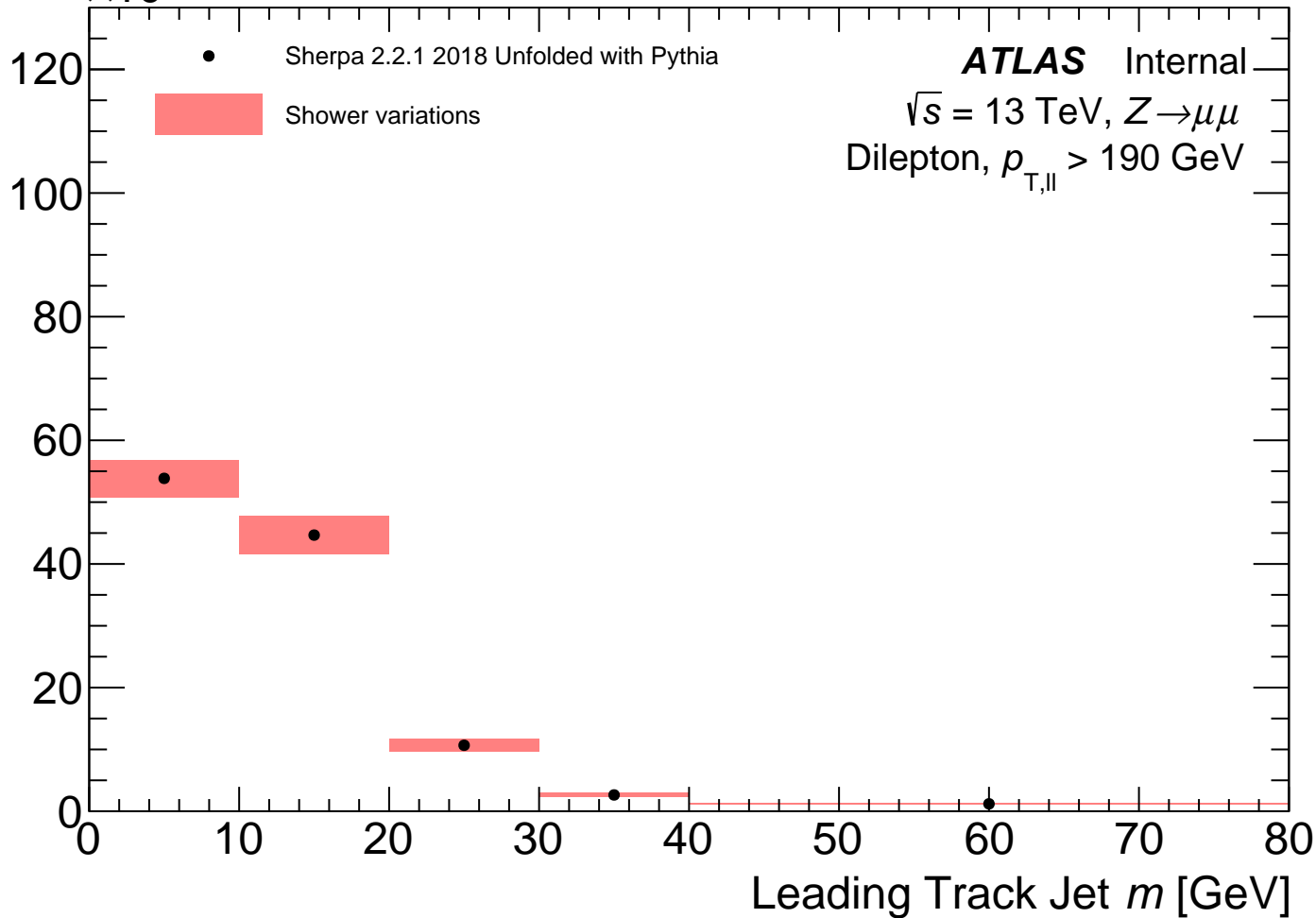
Events

$\times 10^3$



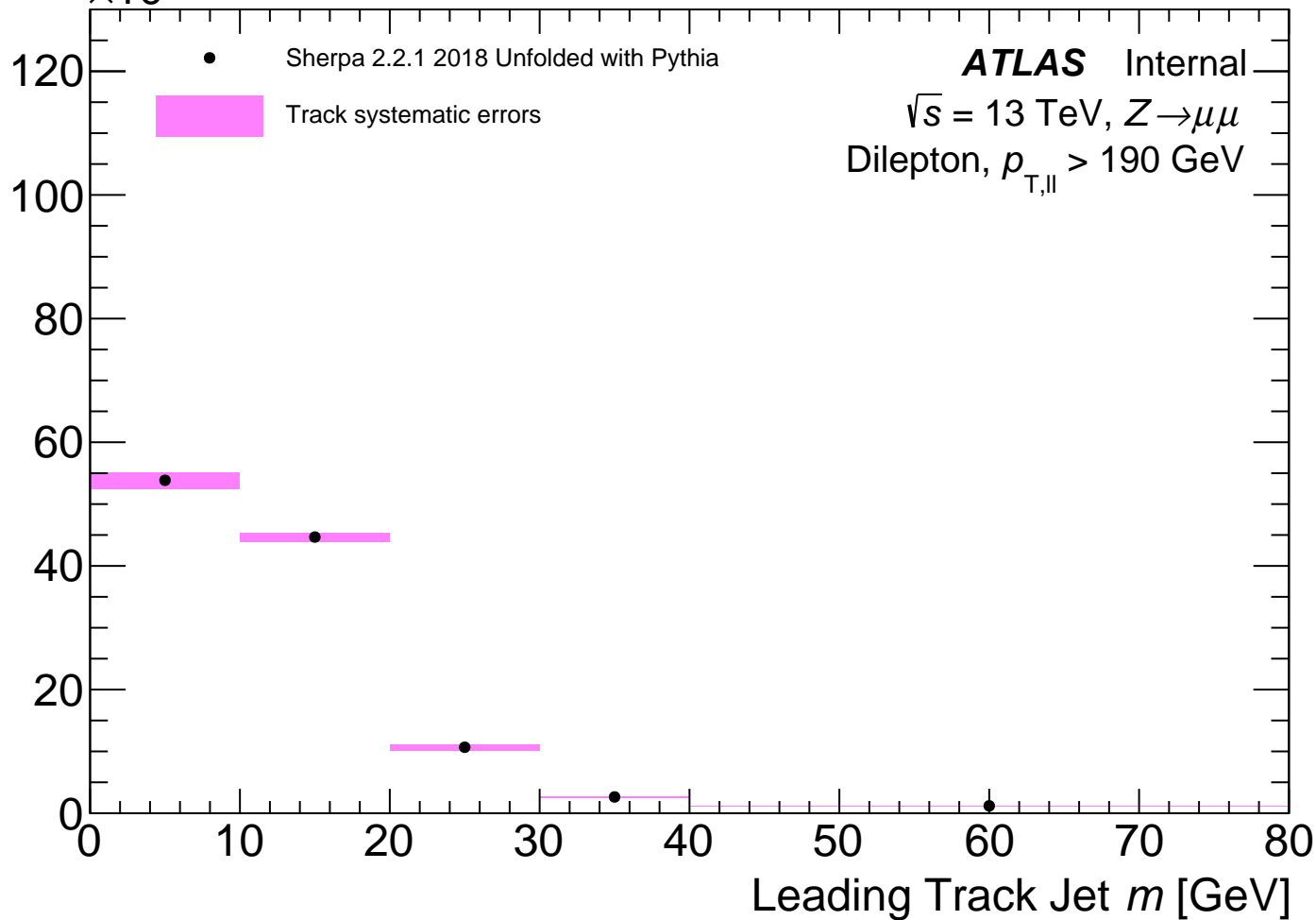
Events

$\times 10^3$



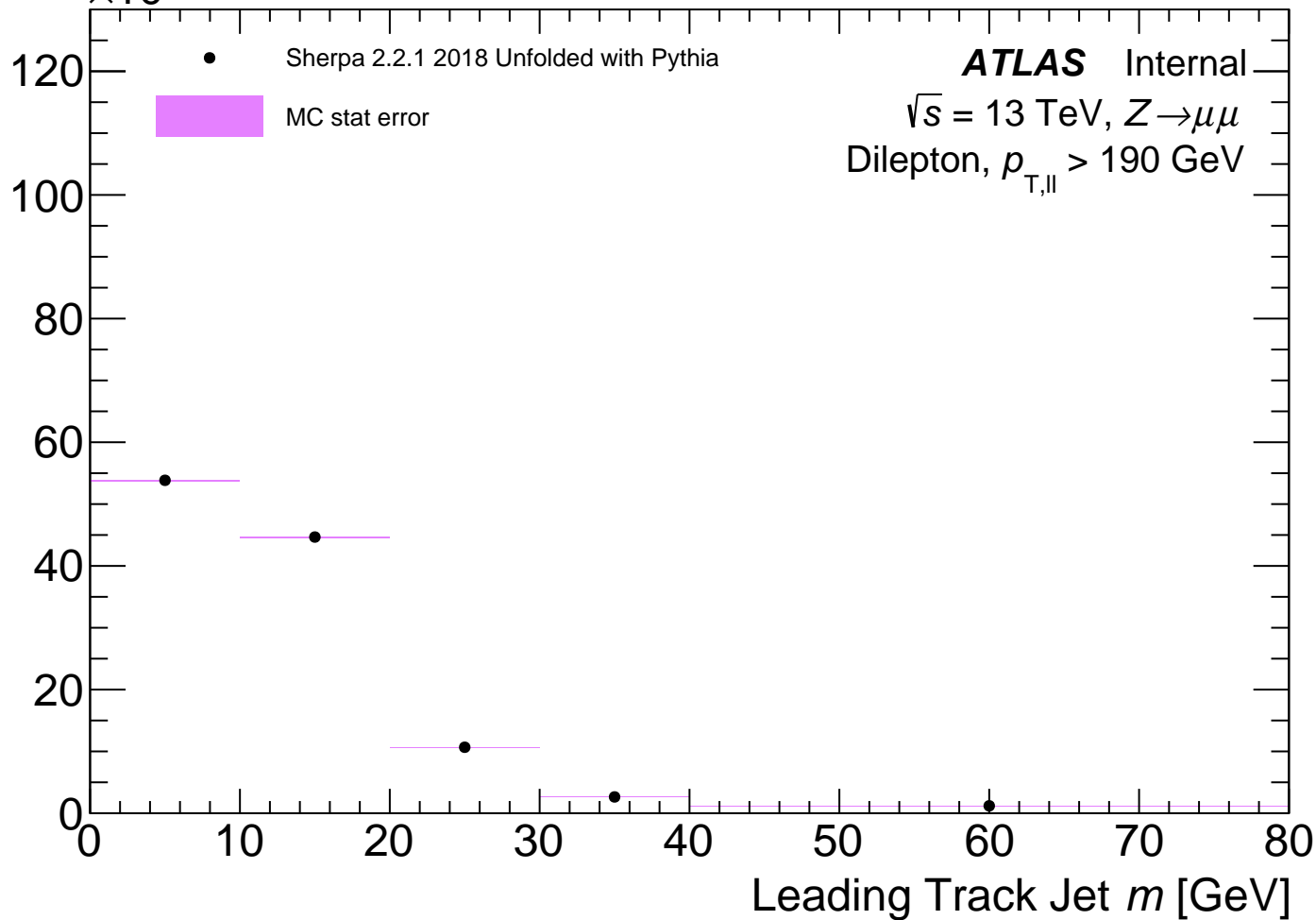
Events

$\times 10^3$



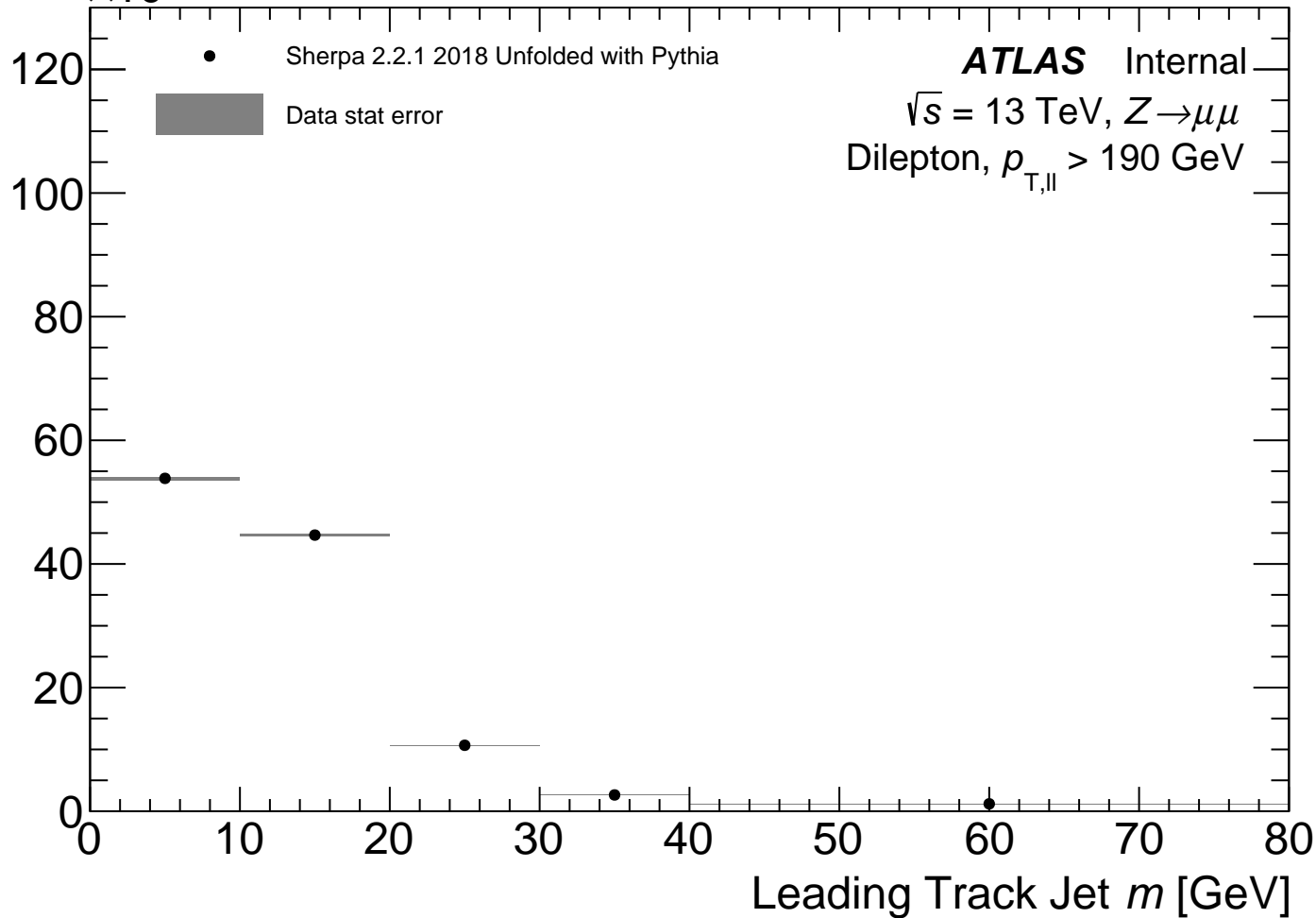
Events

$\times 10^3$



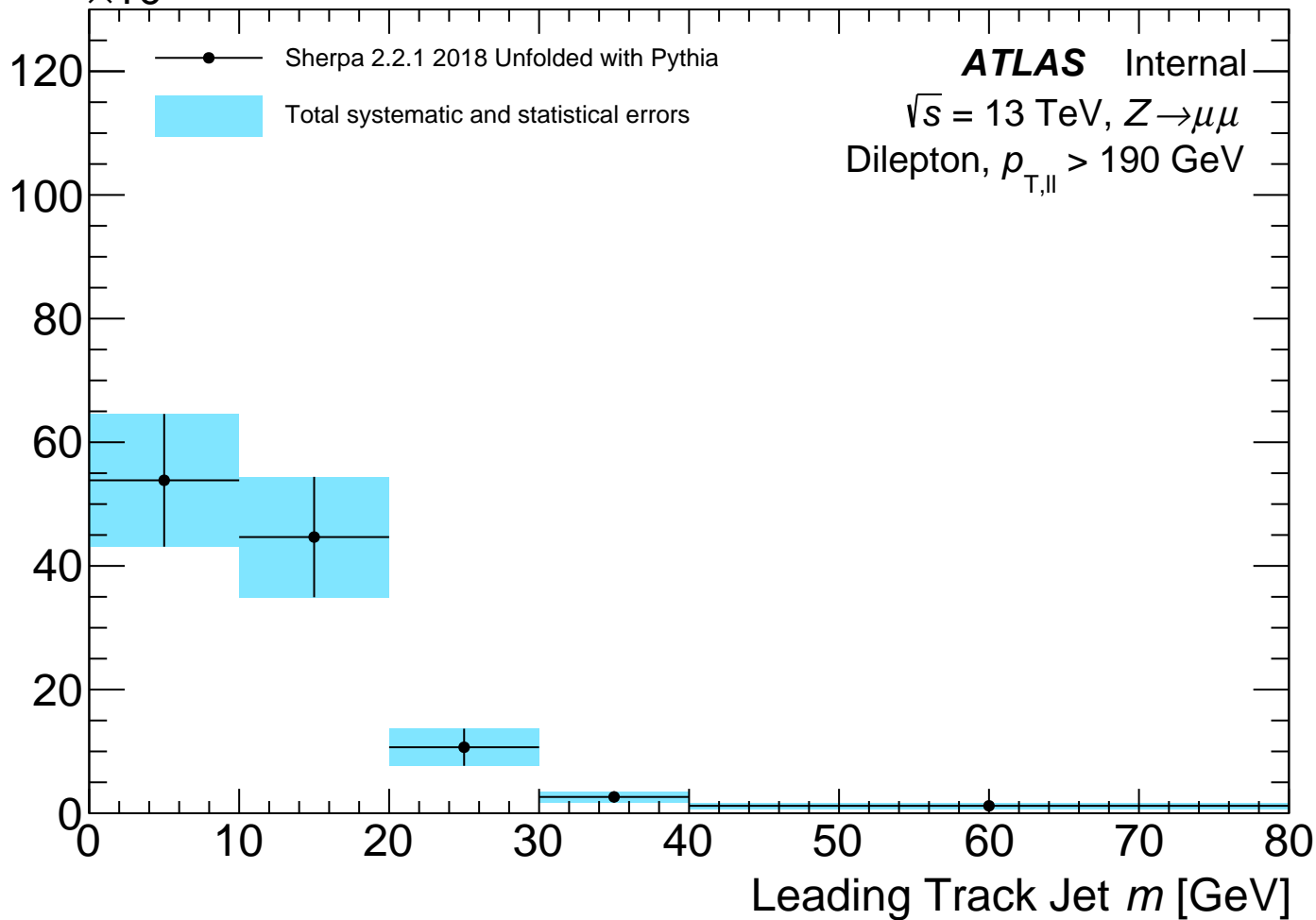
Events

$\times 10^3$



Events

$\times 10^3$



Events

$\times 10^3$

300

250

200

150

100

50

0

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Leading Track Jet m [GeV]

80

70

60

50

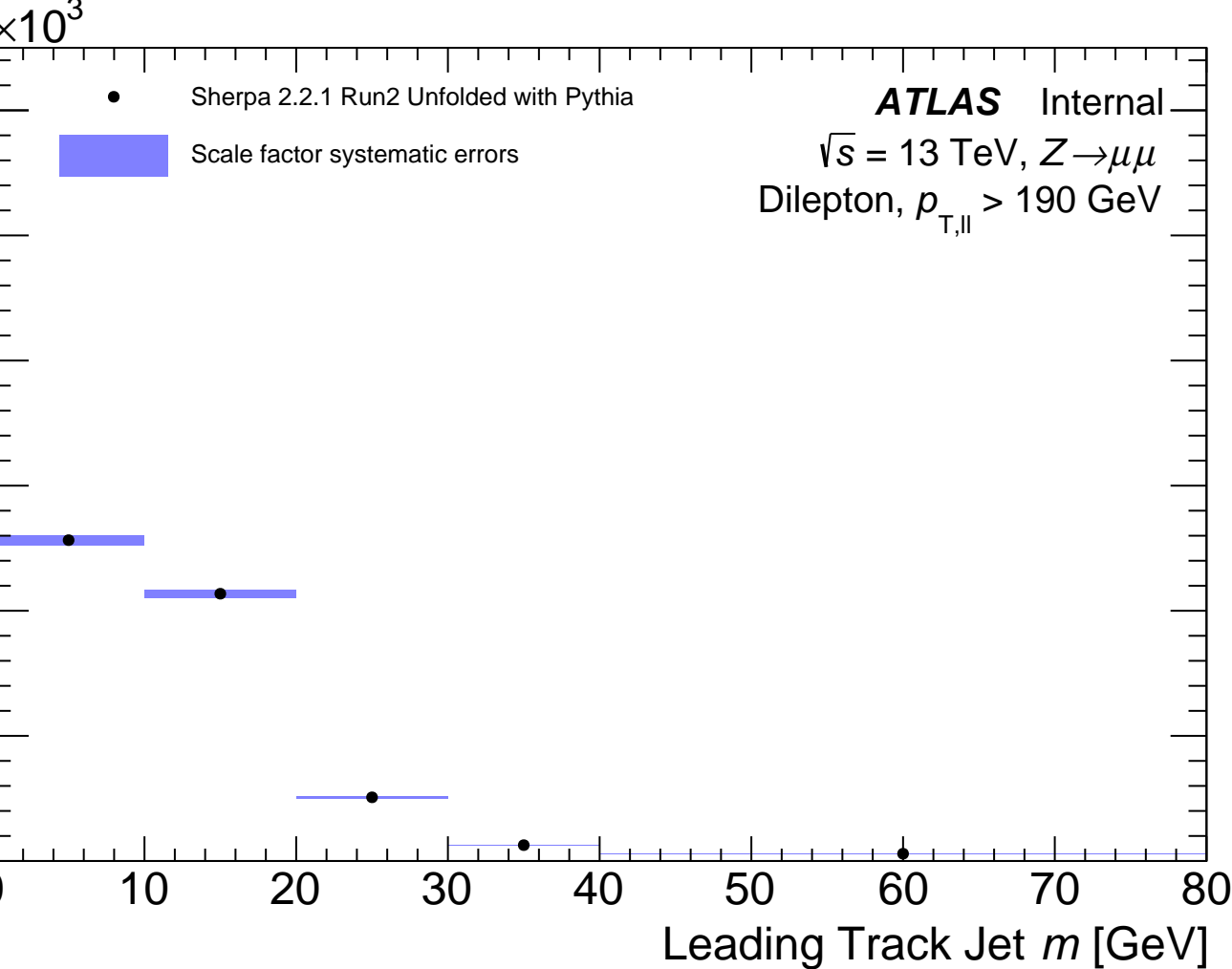
40

30

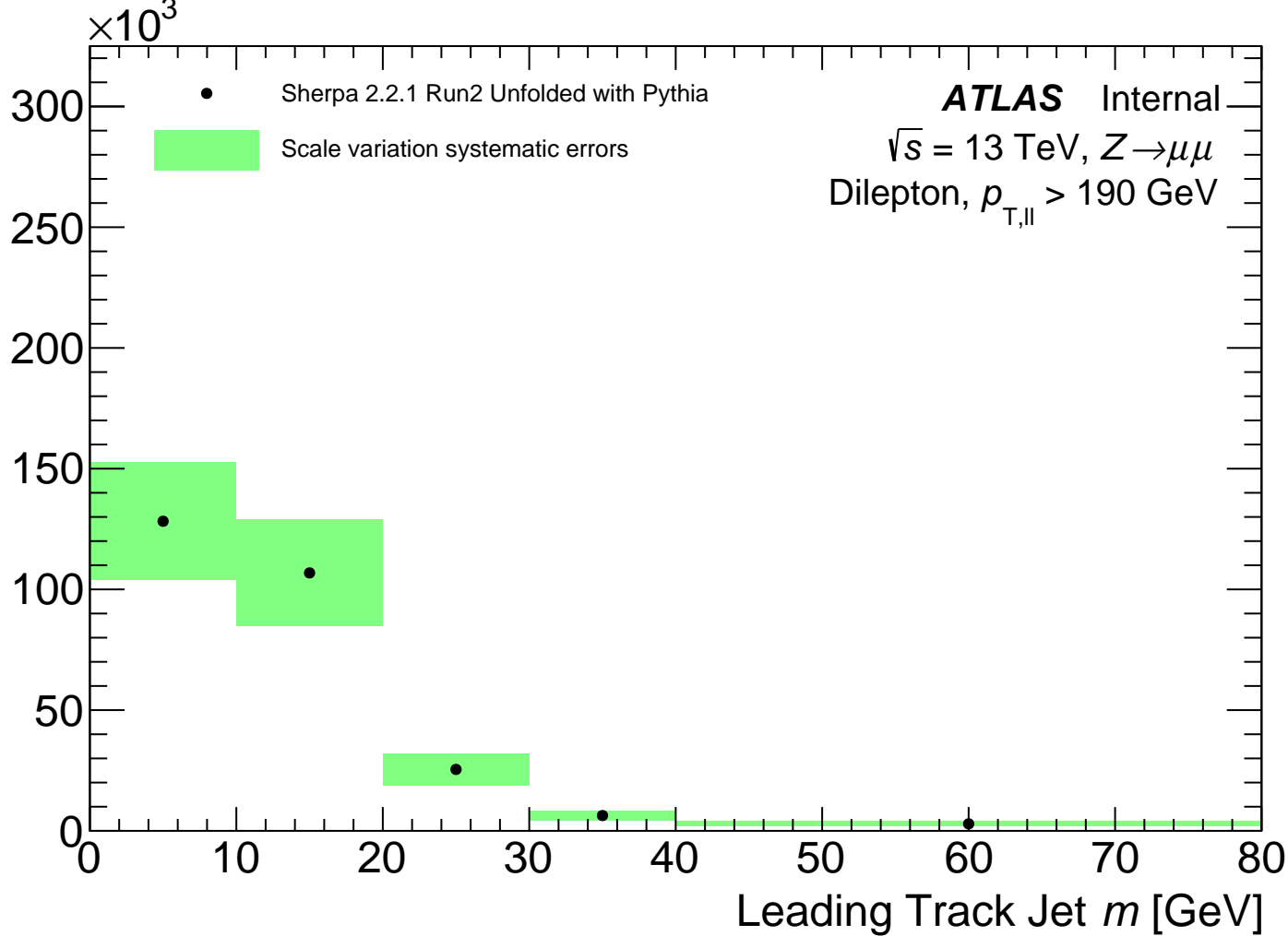
20

10

0



Events



Events

$\times 10^3$

300

250

200

150

100

50

0

0

10

20

30

40

50

60

70

80

• Sherpa 2.2.1 Run2 Unfolded with Pythia

Shower variations

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Leading Track Jet m [GeV]



Events

$\times 10^3$

300

250

200

150

100

50

0

• Sherpa 2.2.1 Run2 Unfolded with Pythia

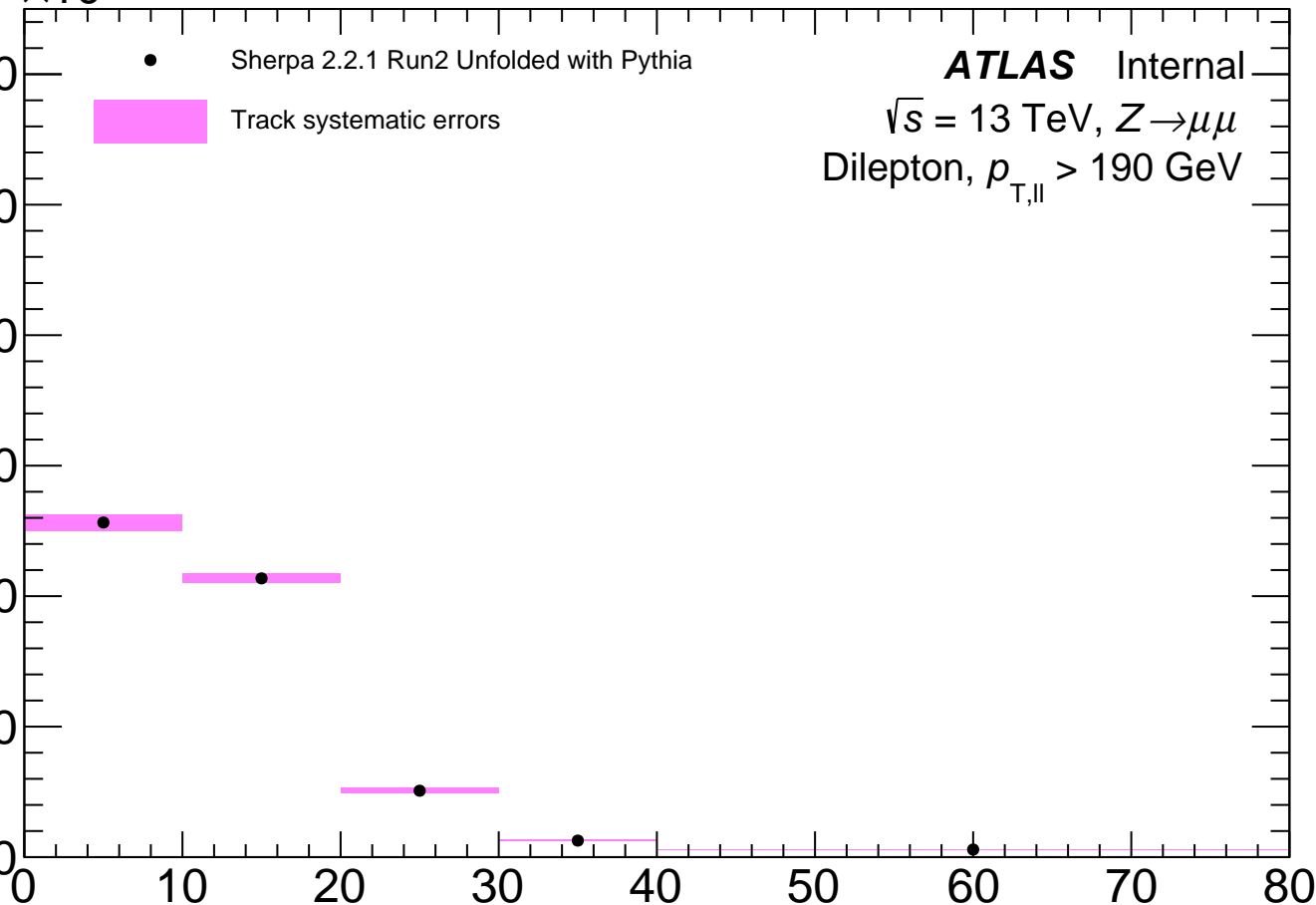
Track systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Leading Track Jet m [GeV]



Events

$\times 10^3$

300

250

200

150

100

50

0

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Leading Track Jet m [GeV]

80

70

60

50

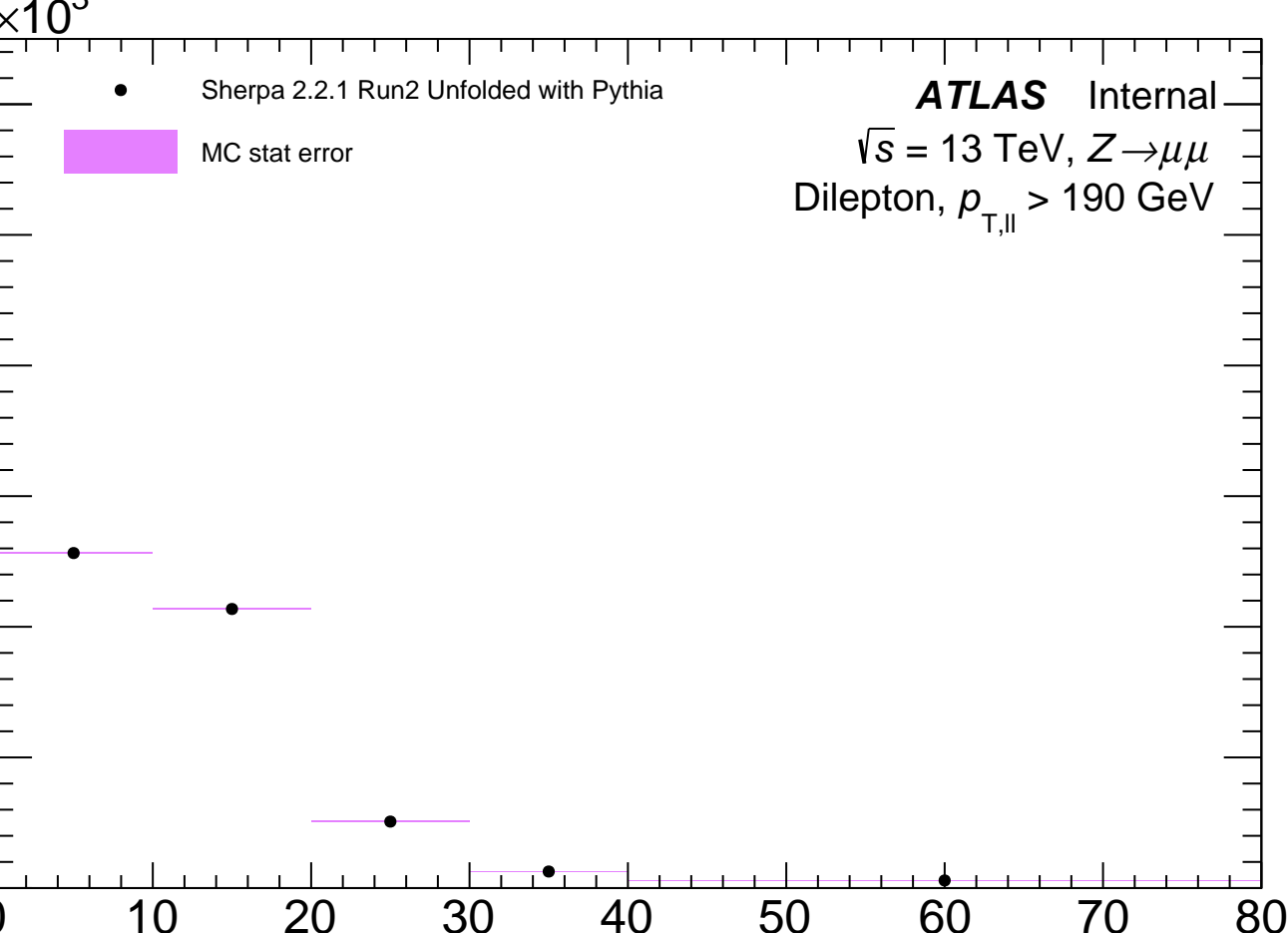
40

30

20

10

0



Events

$\times 10^3$

300

250

200

150

100

50

0

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



Data stat error

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Leading Track Jet m [GeV]

0

10

20

30

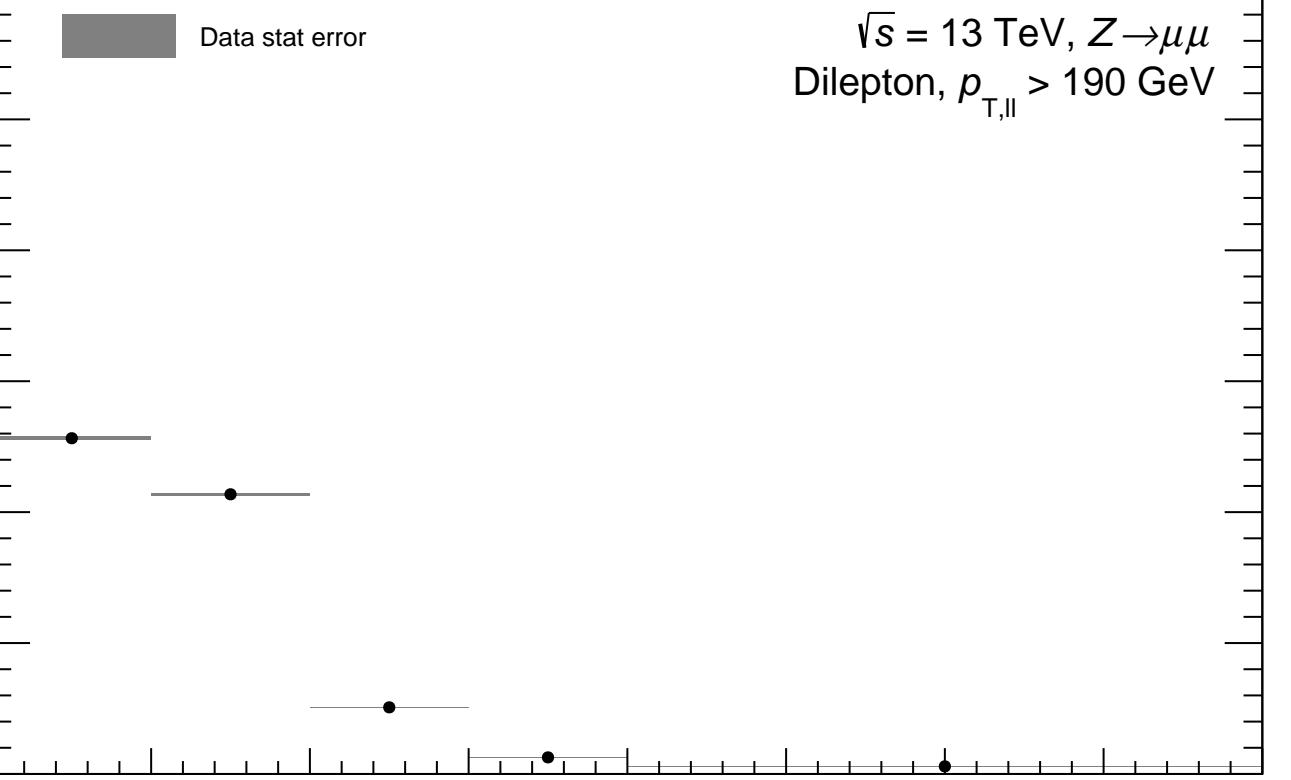
40

50

60

70

80



Events

$\times 10^3$

300

250

200

150

100

50

0



Sherpa 2.2.1 Run2 Unfolded with Pythia



Total systematic and statistical errors

ATLAS Internal

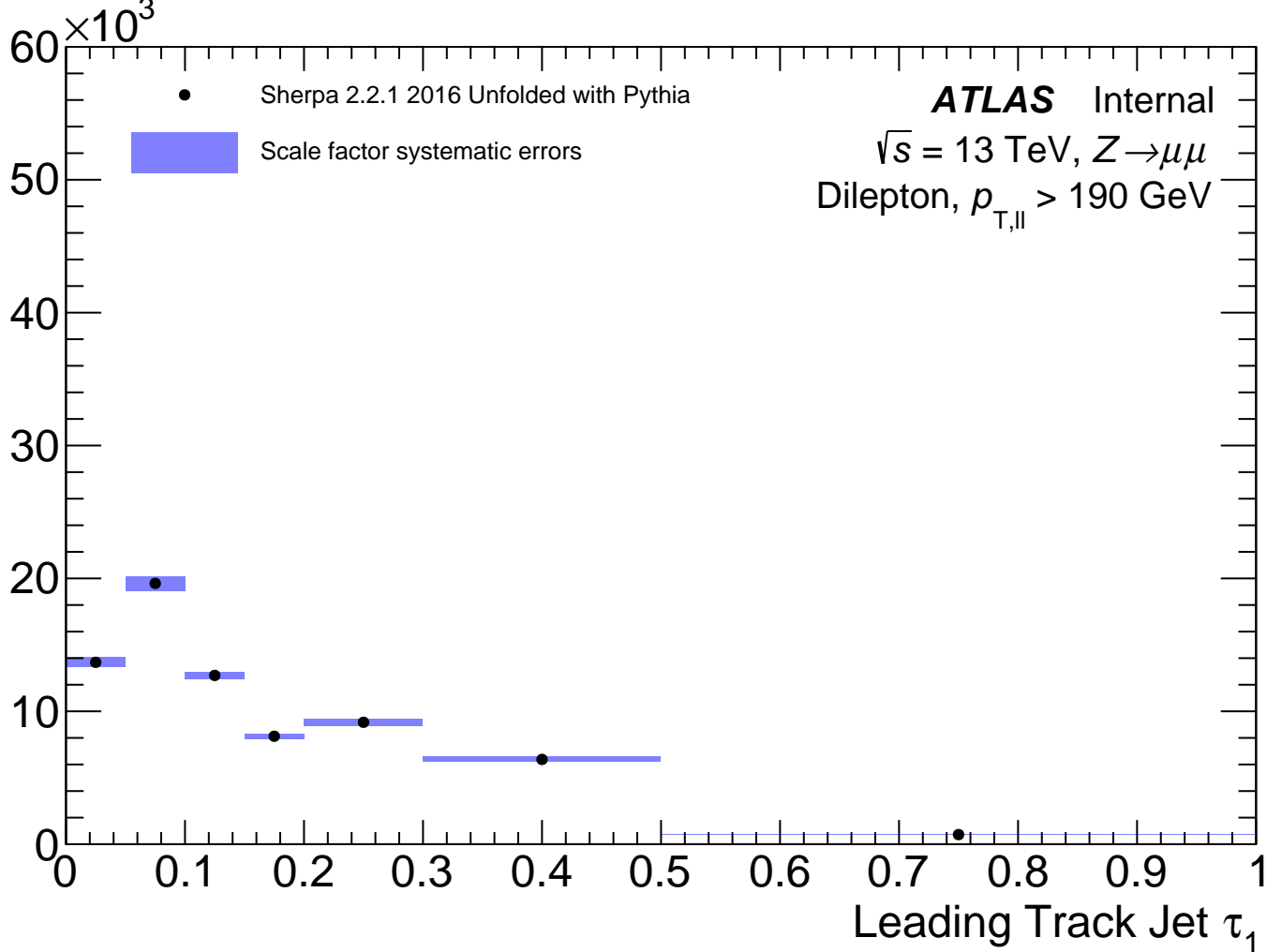
$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

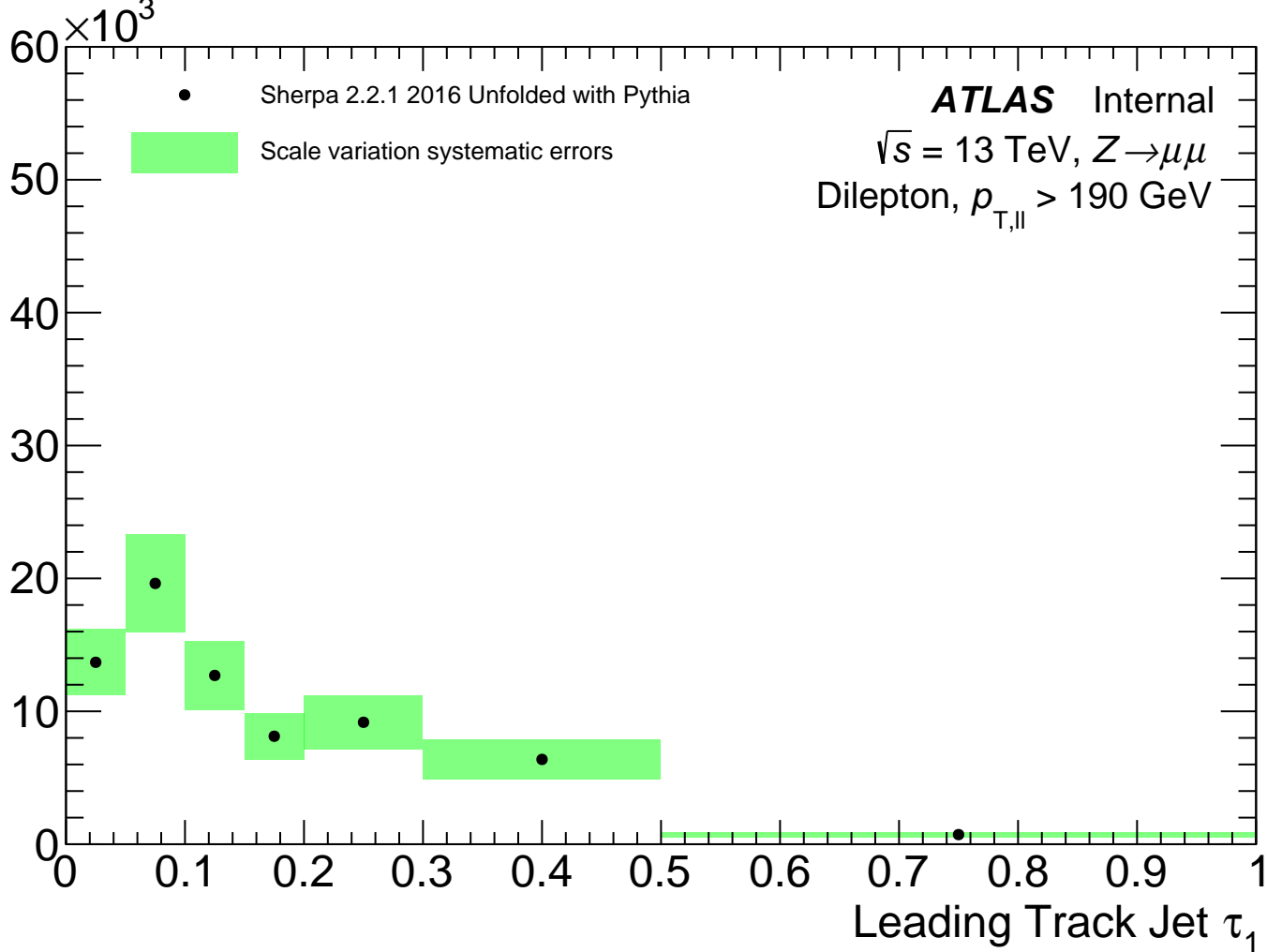


Leading Track Jet m [GeV]

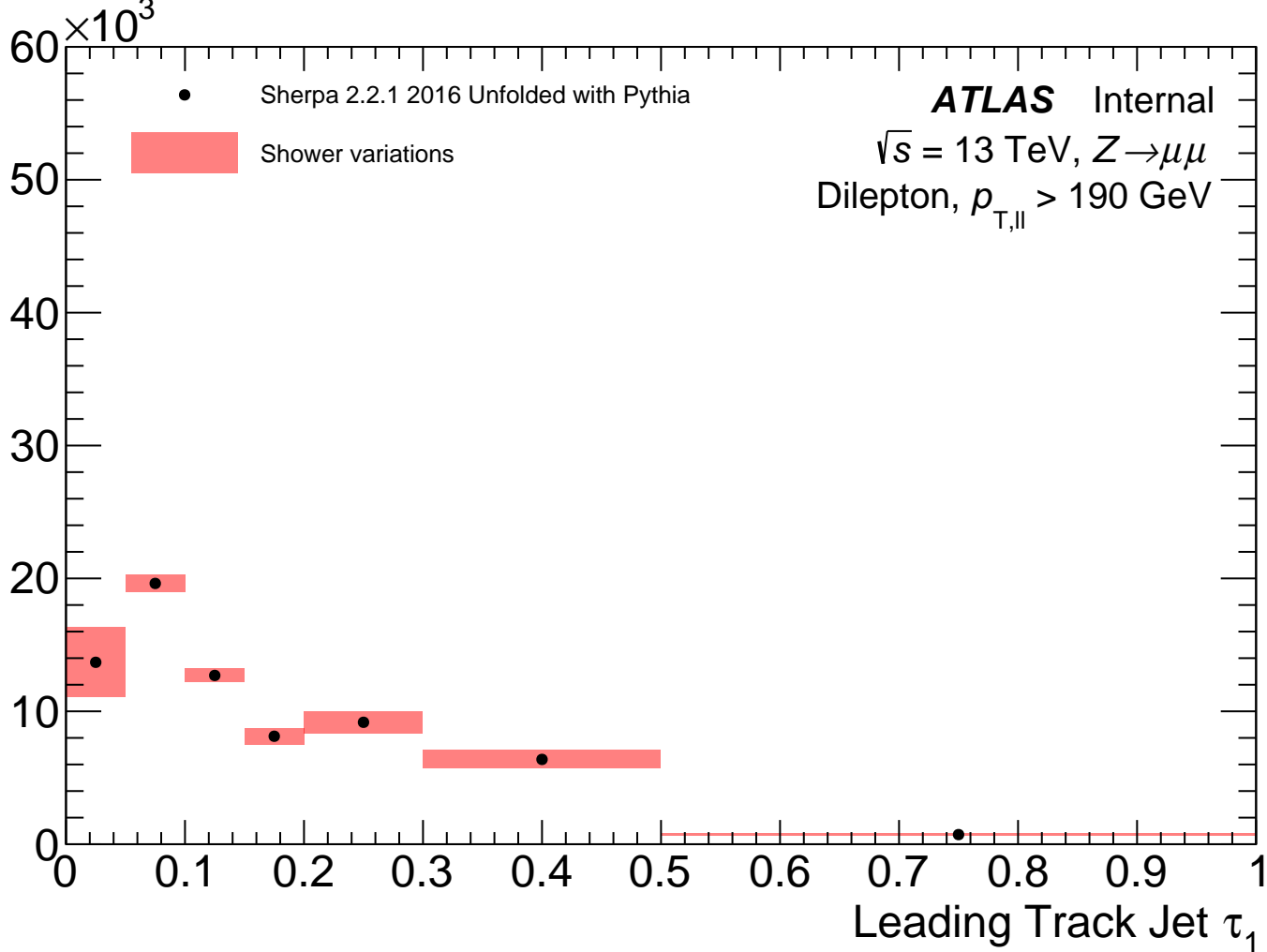
Events



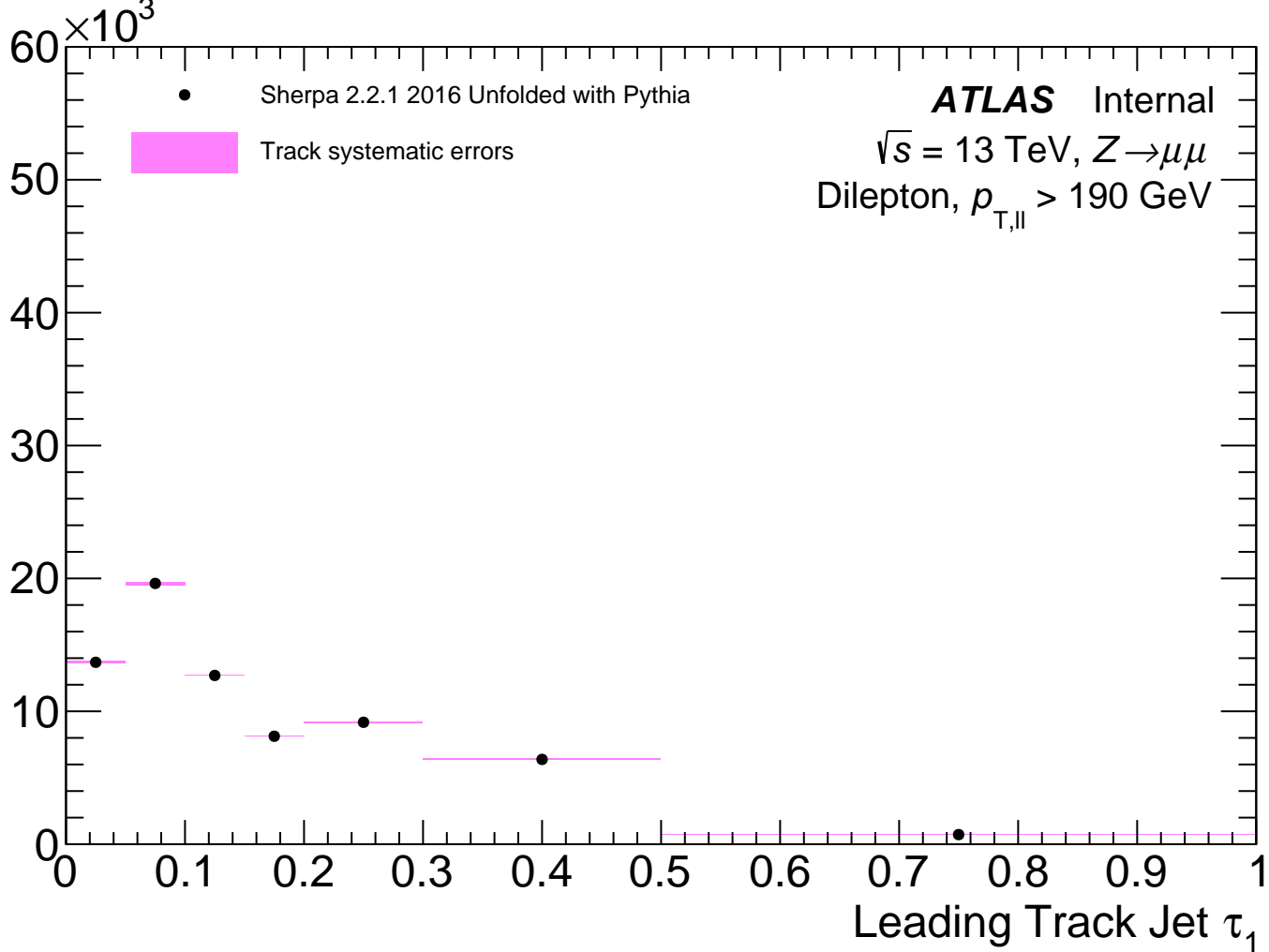
Events



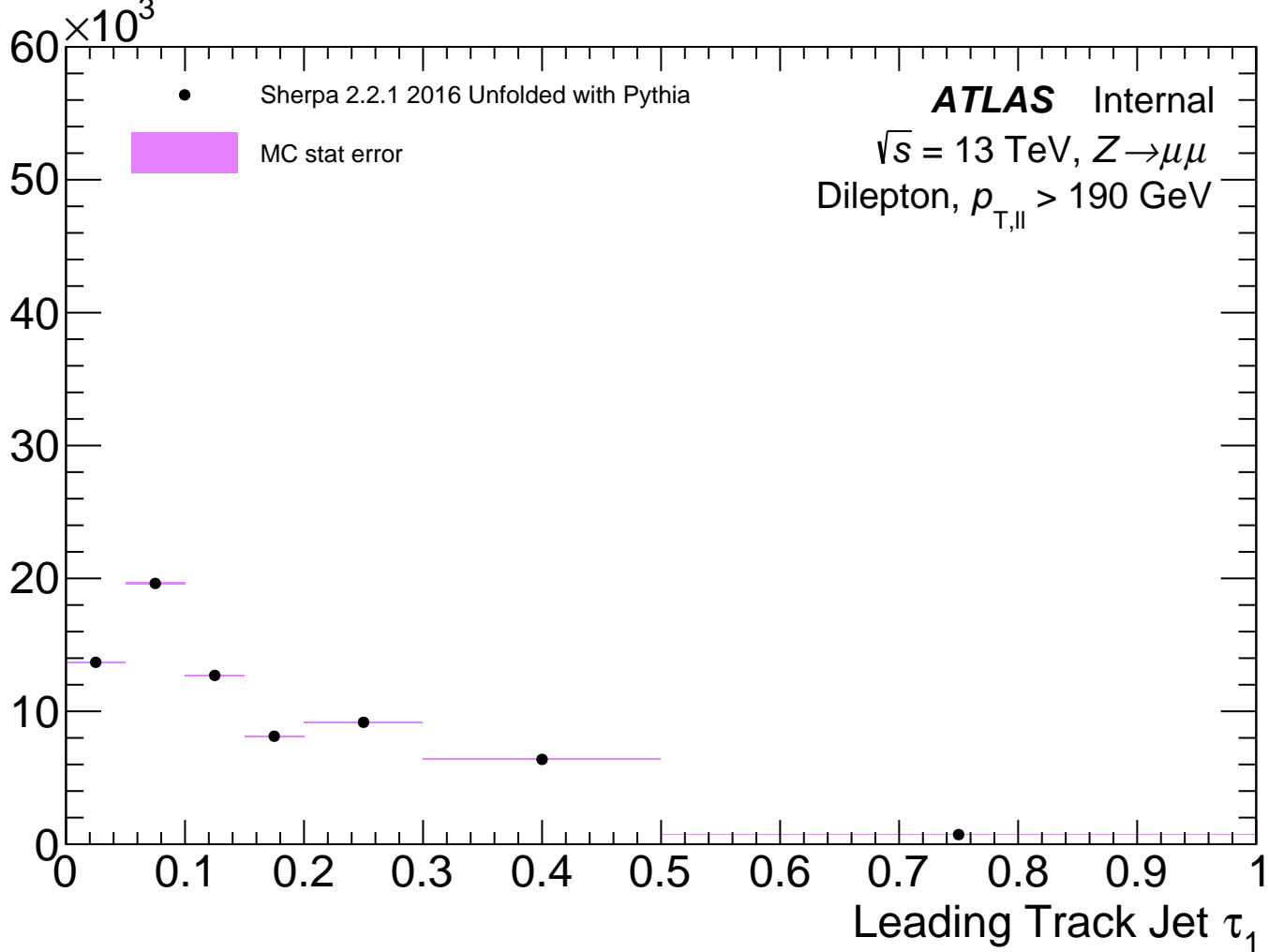
Events



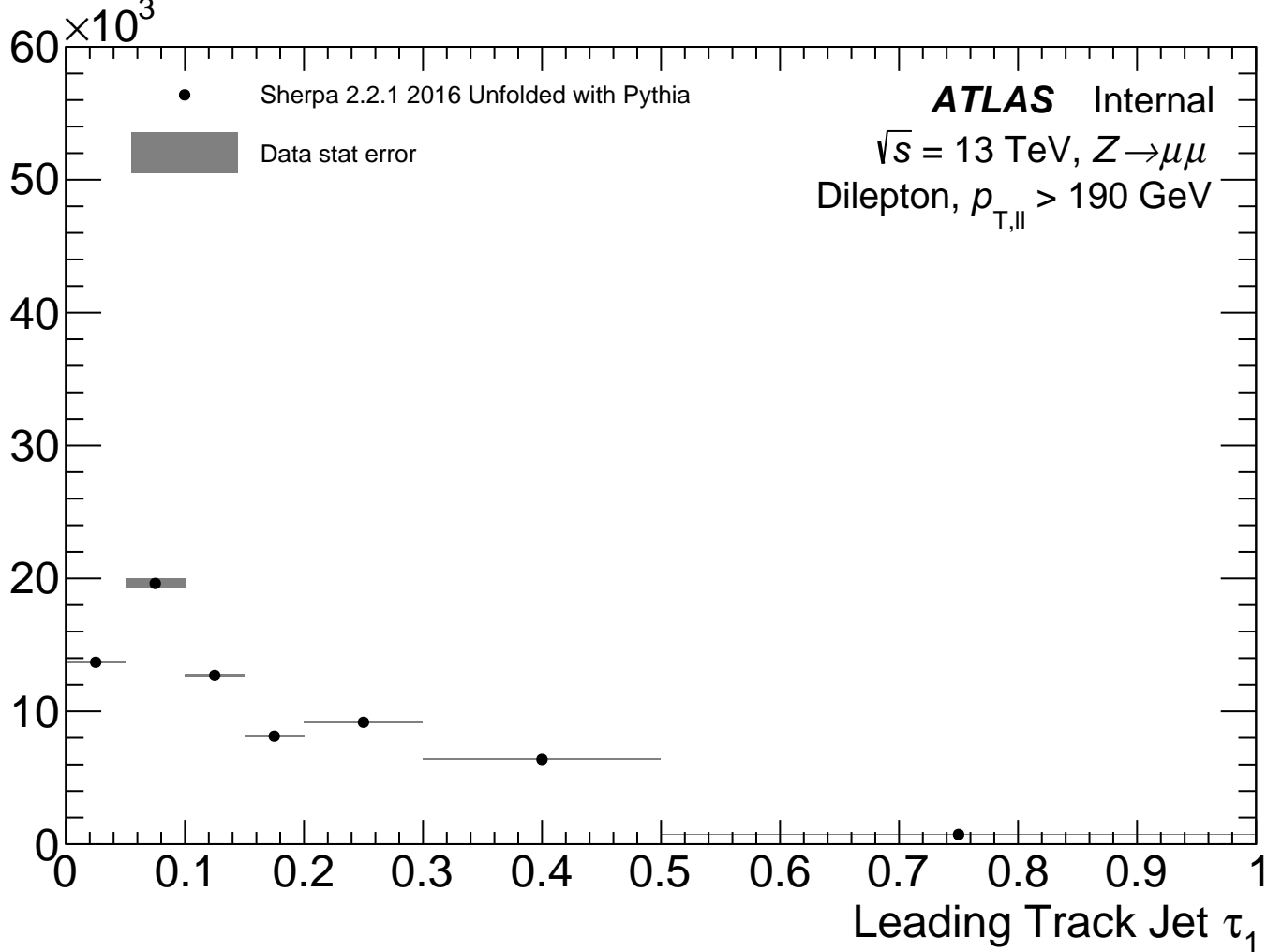
Events



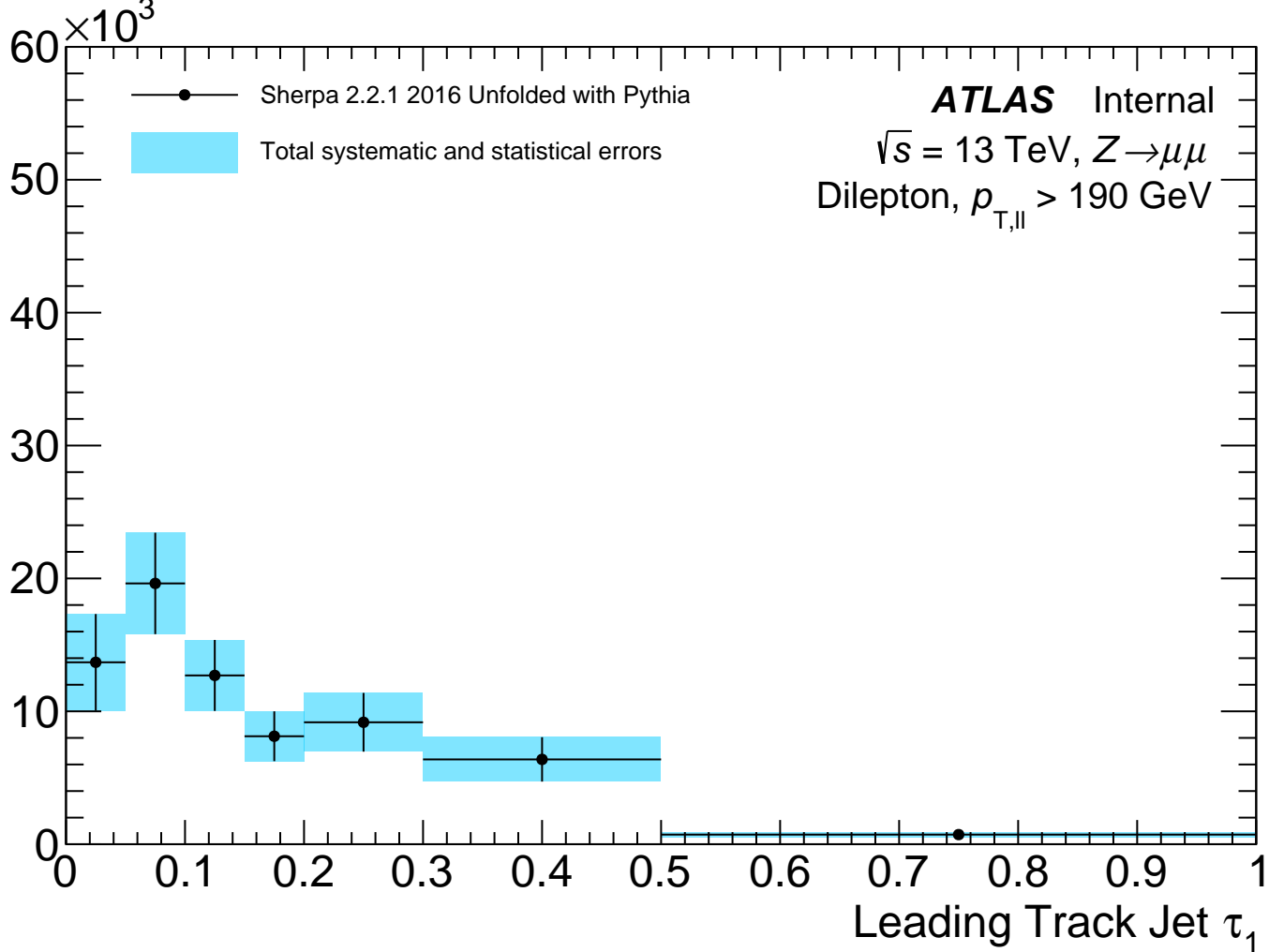
Events



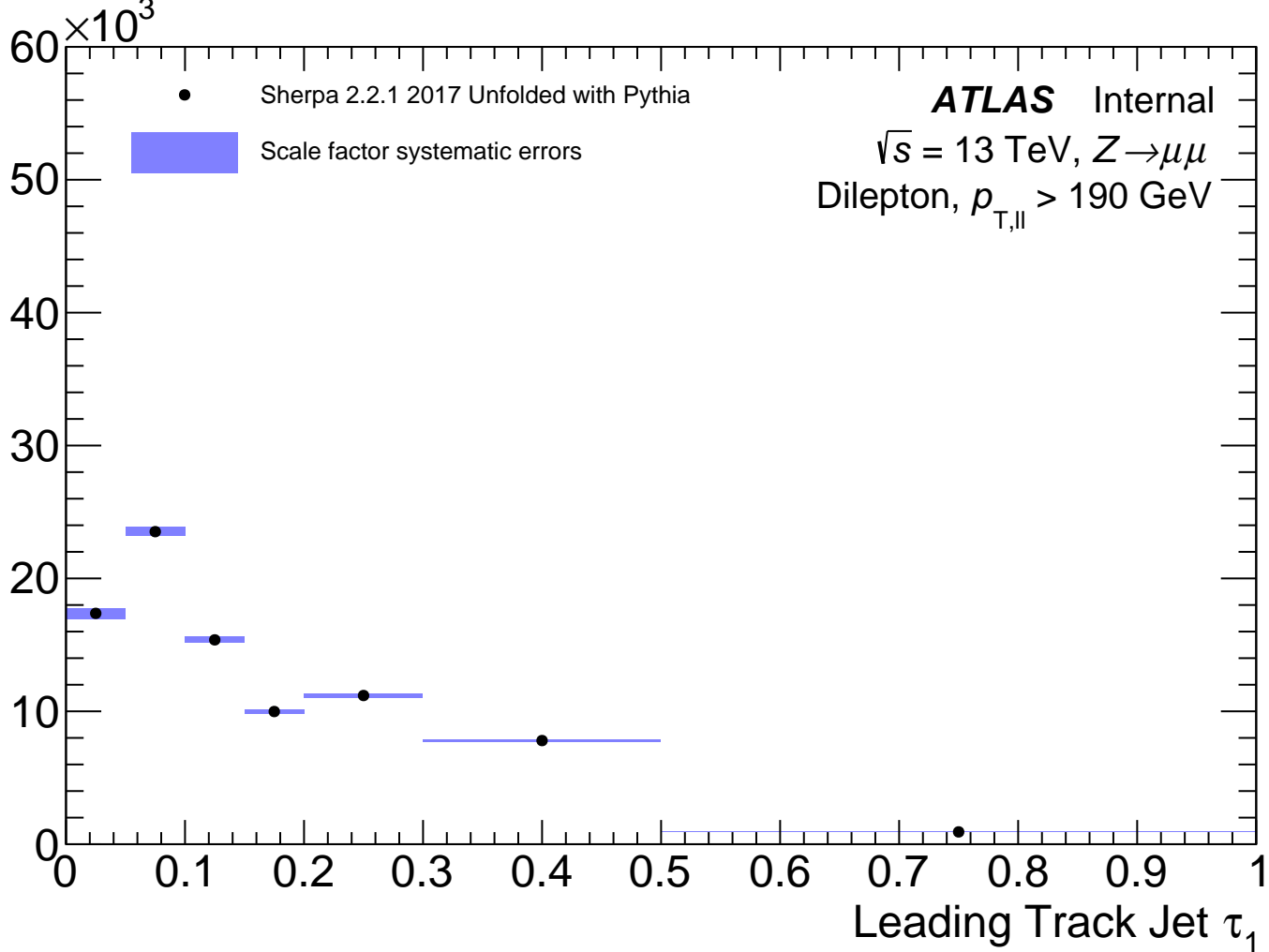
Events



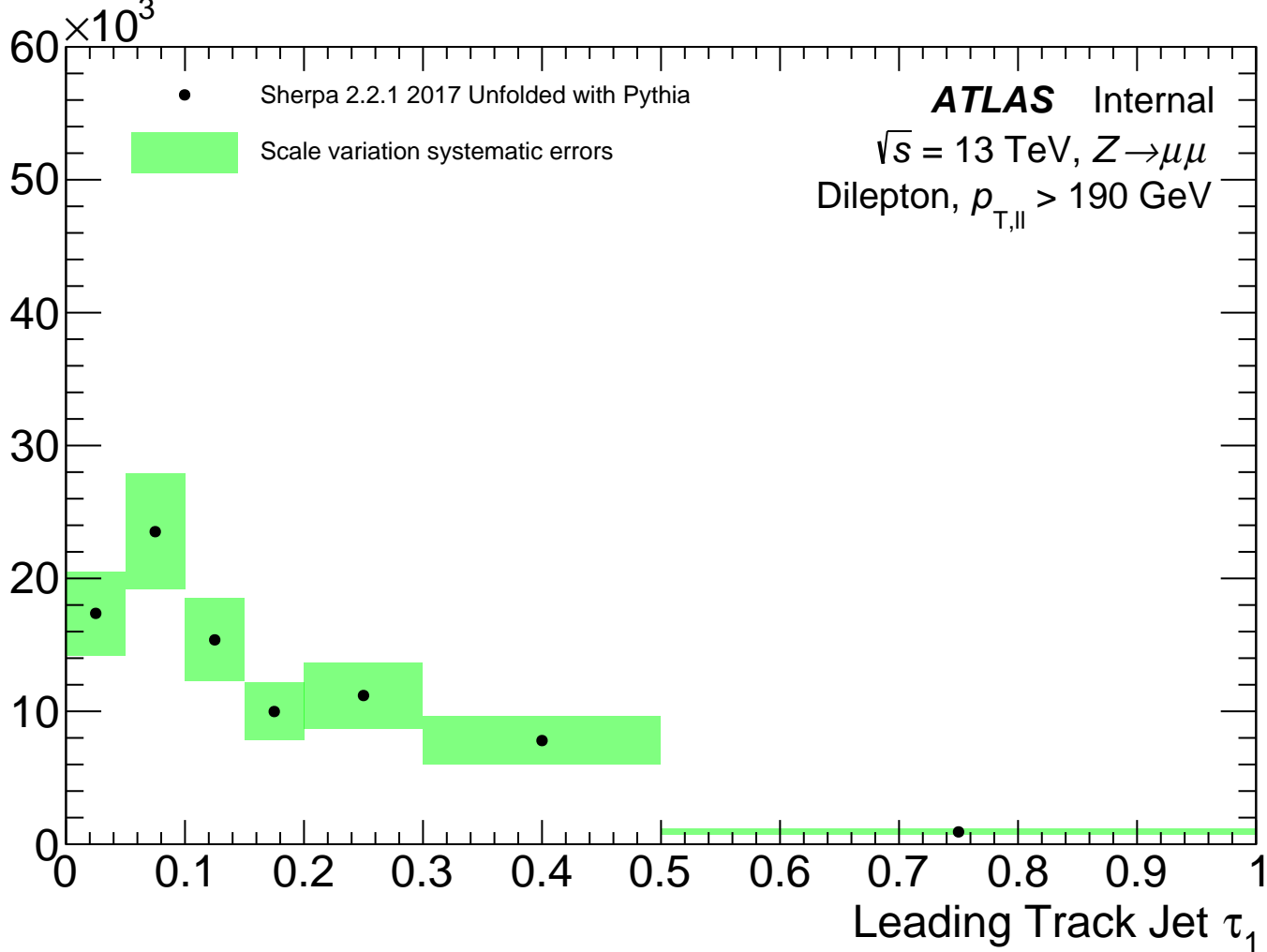
Events



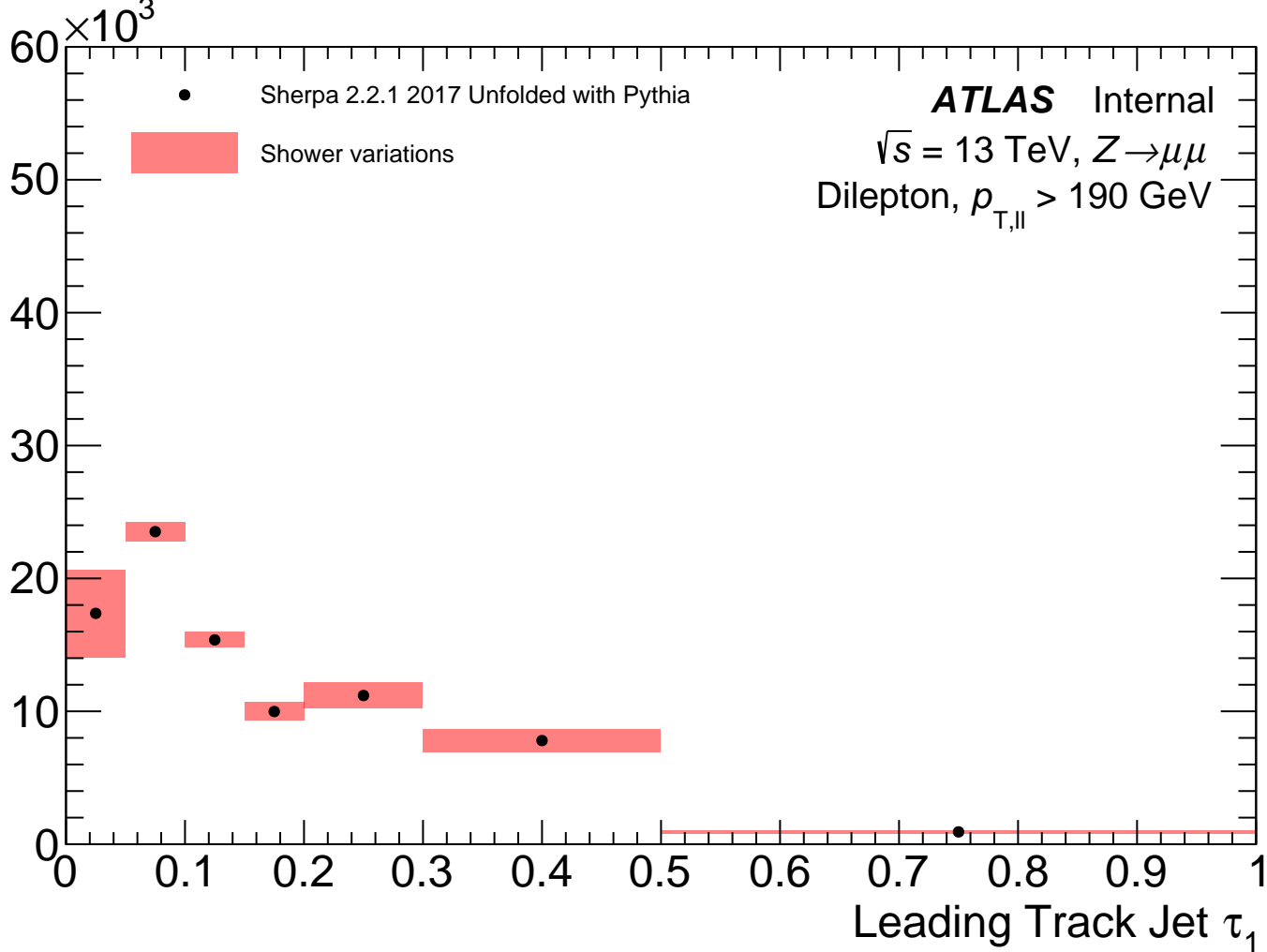
Events



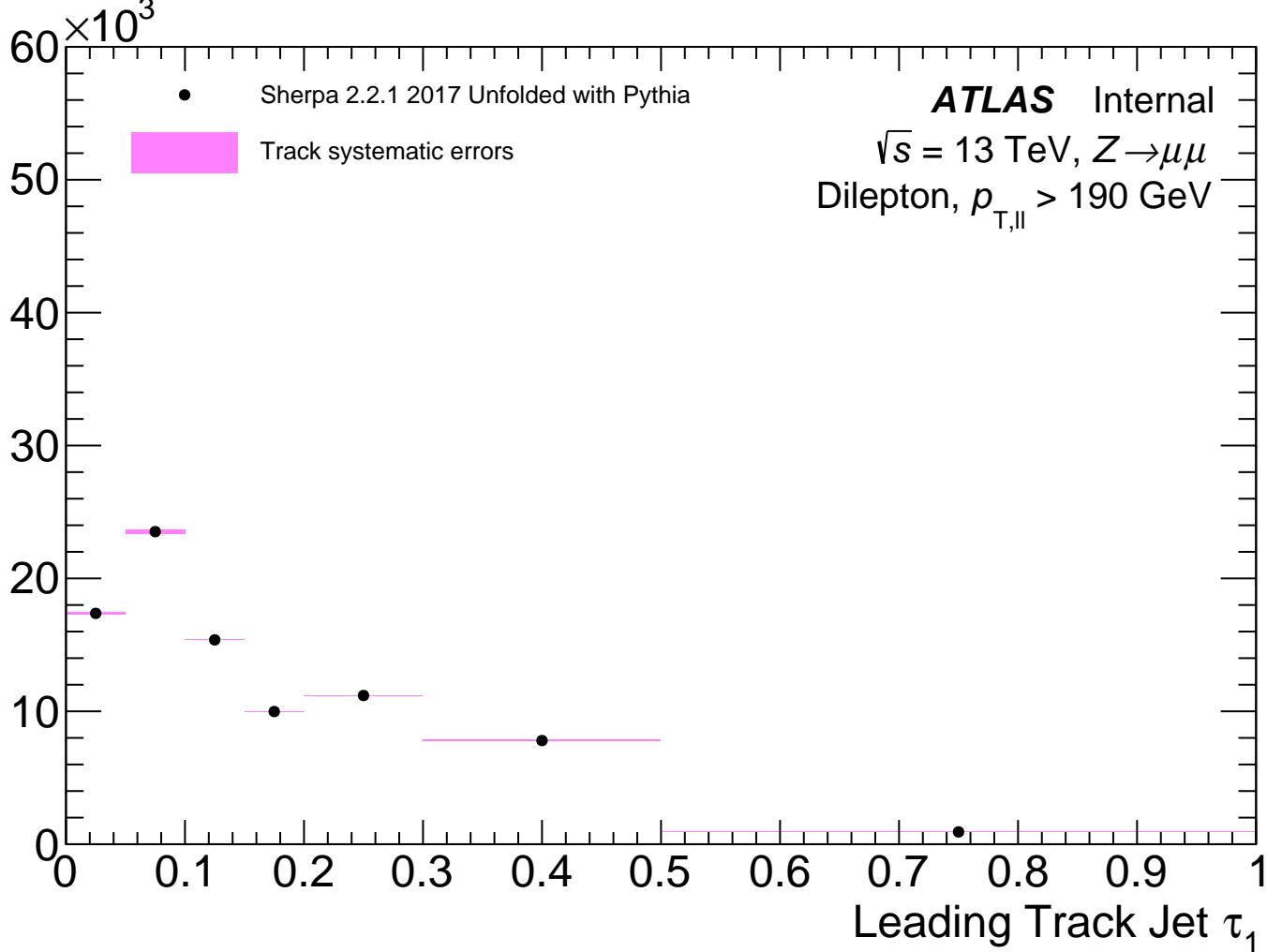
Events



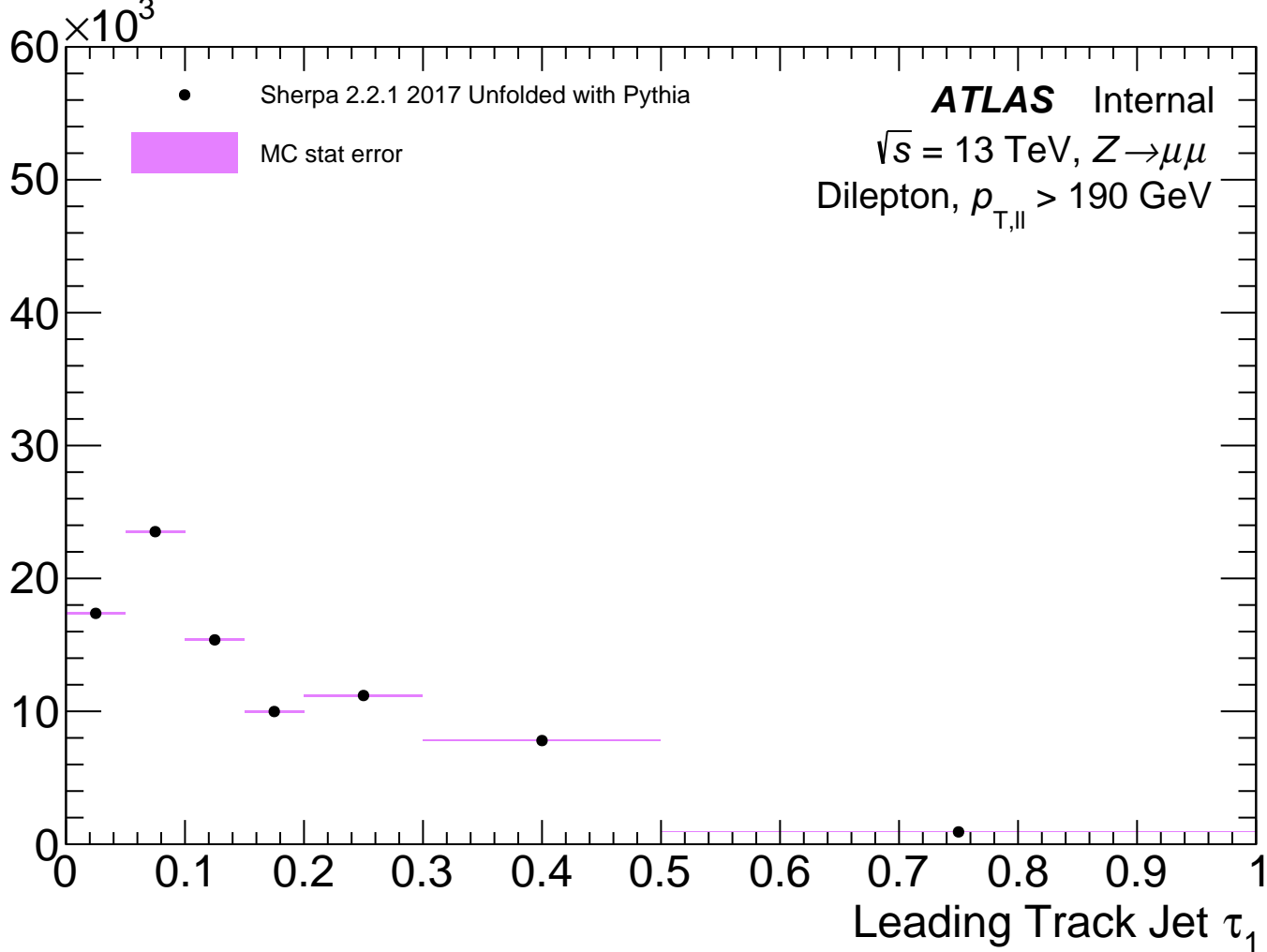
Events



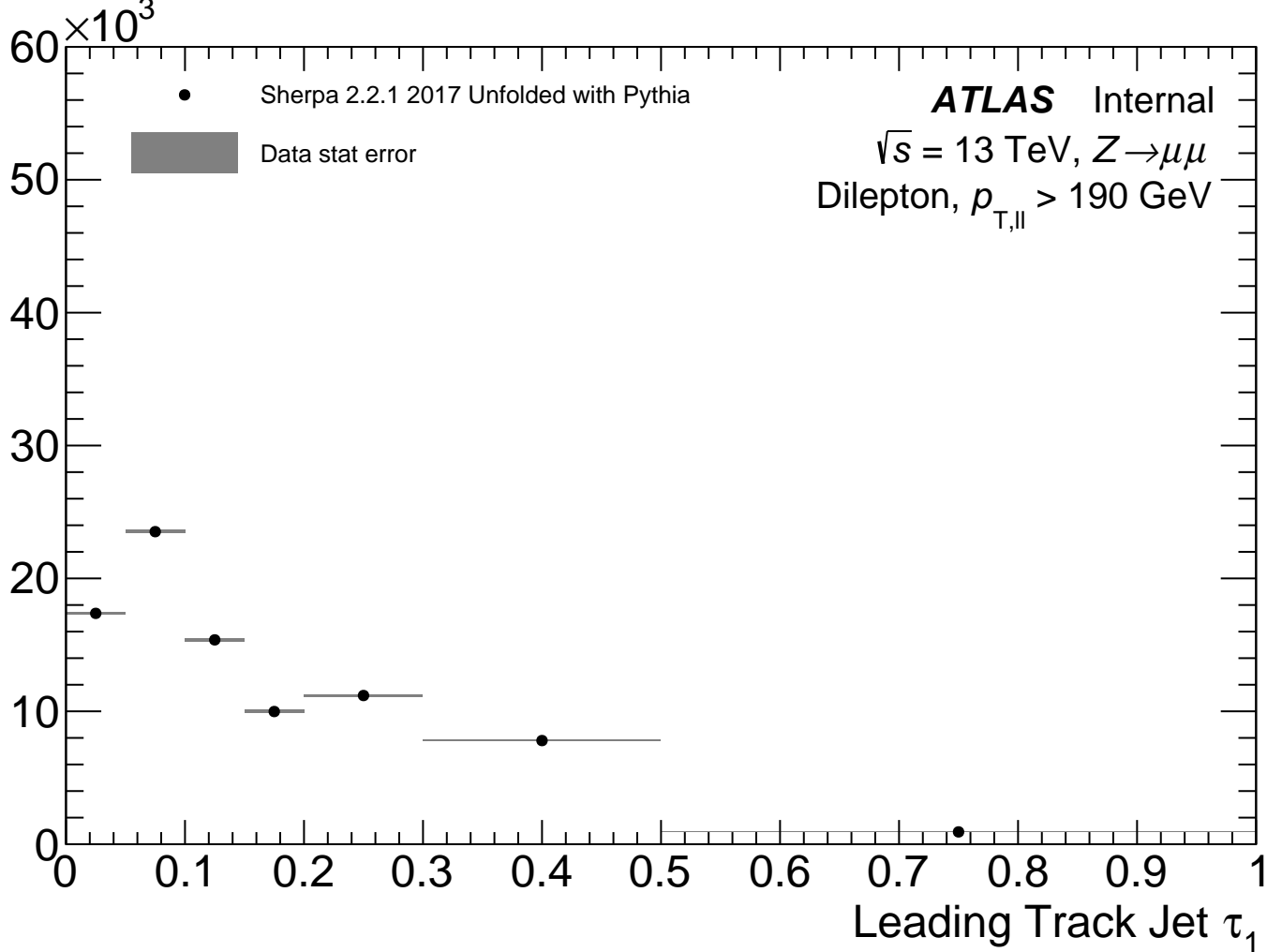
Events



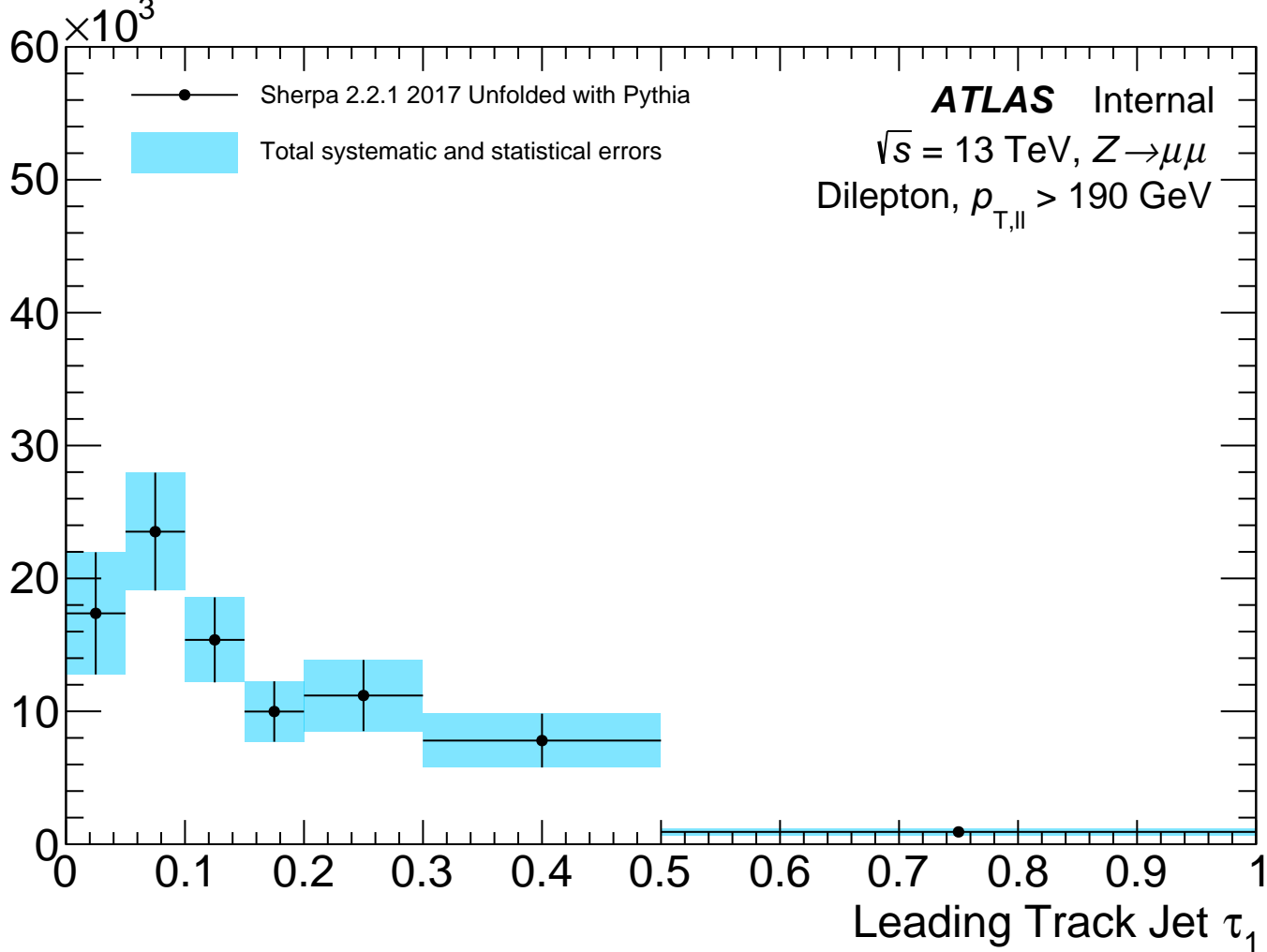
Events



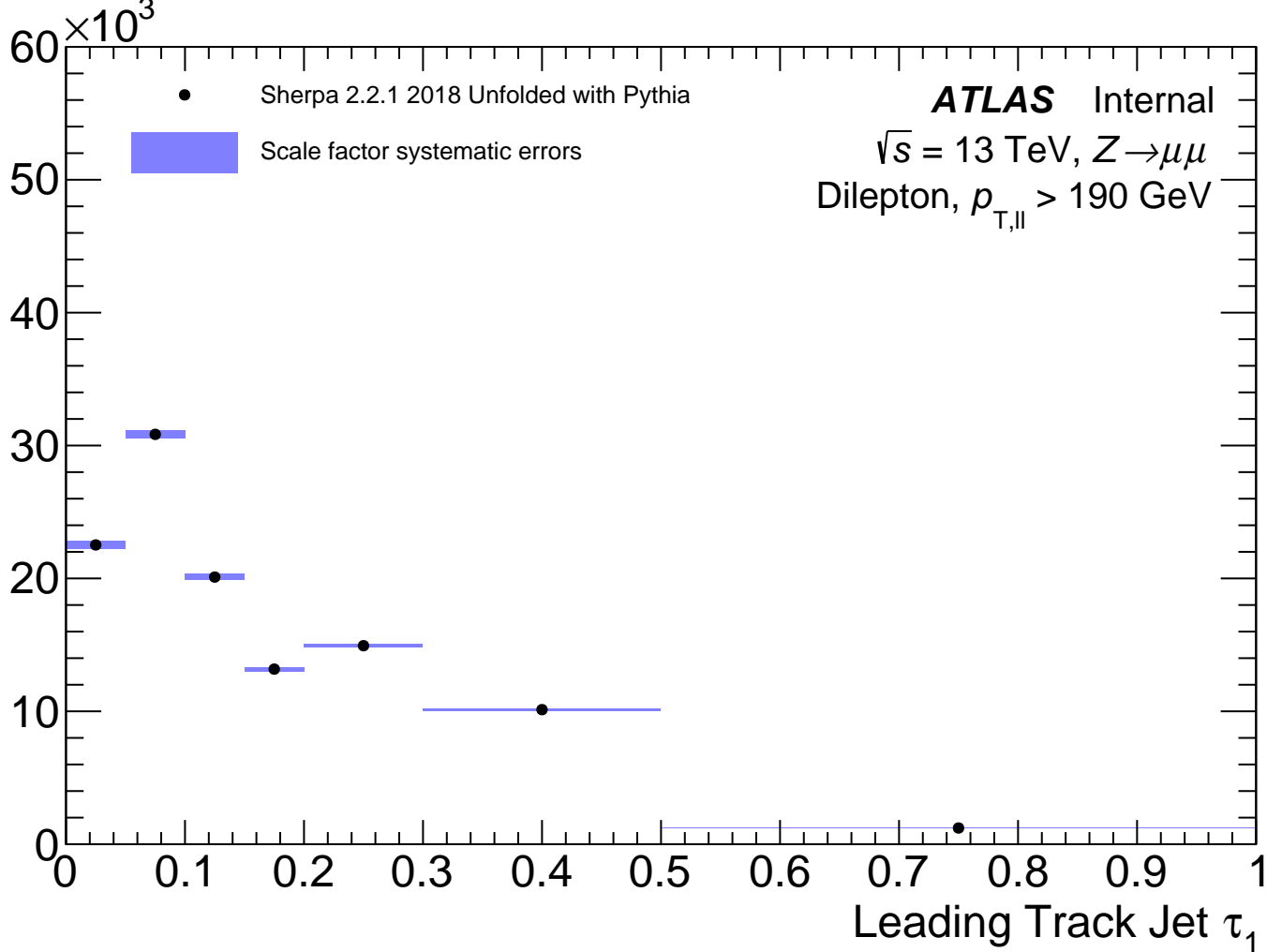
Events



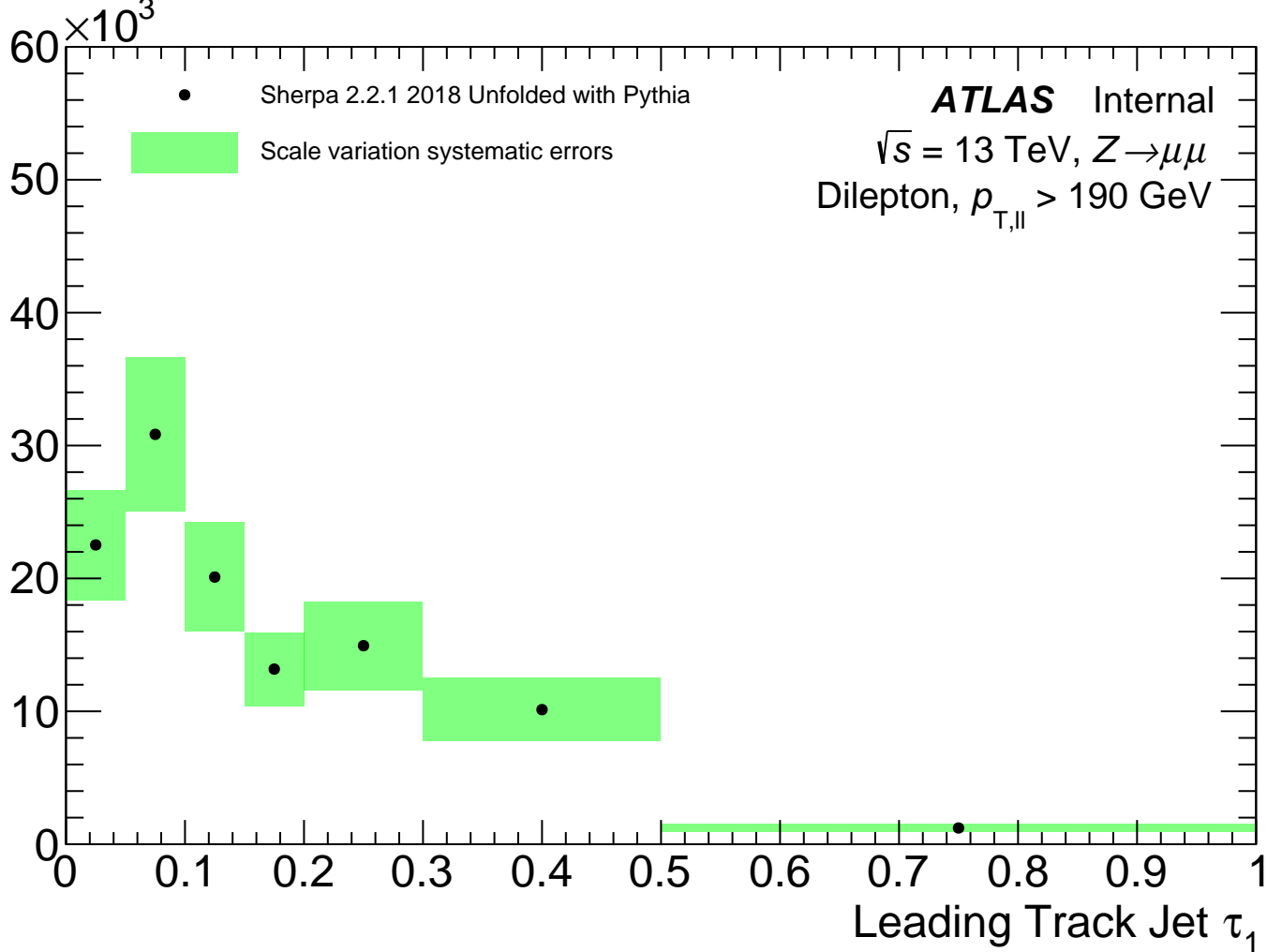
Events



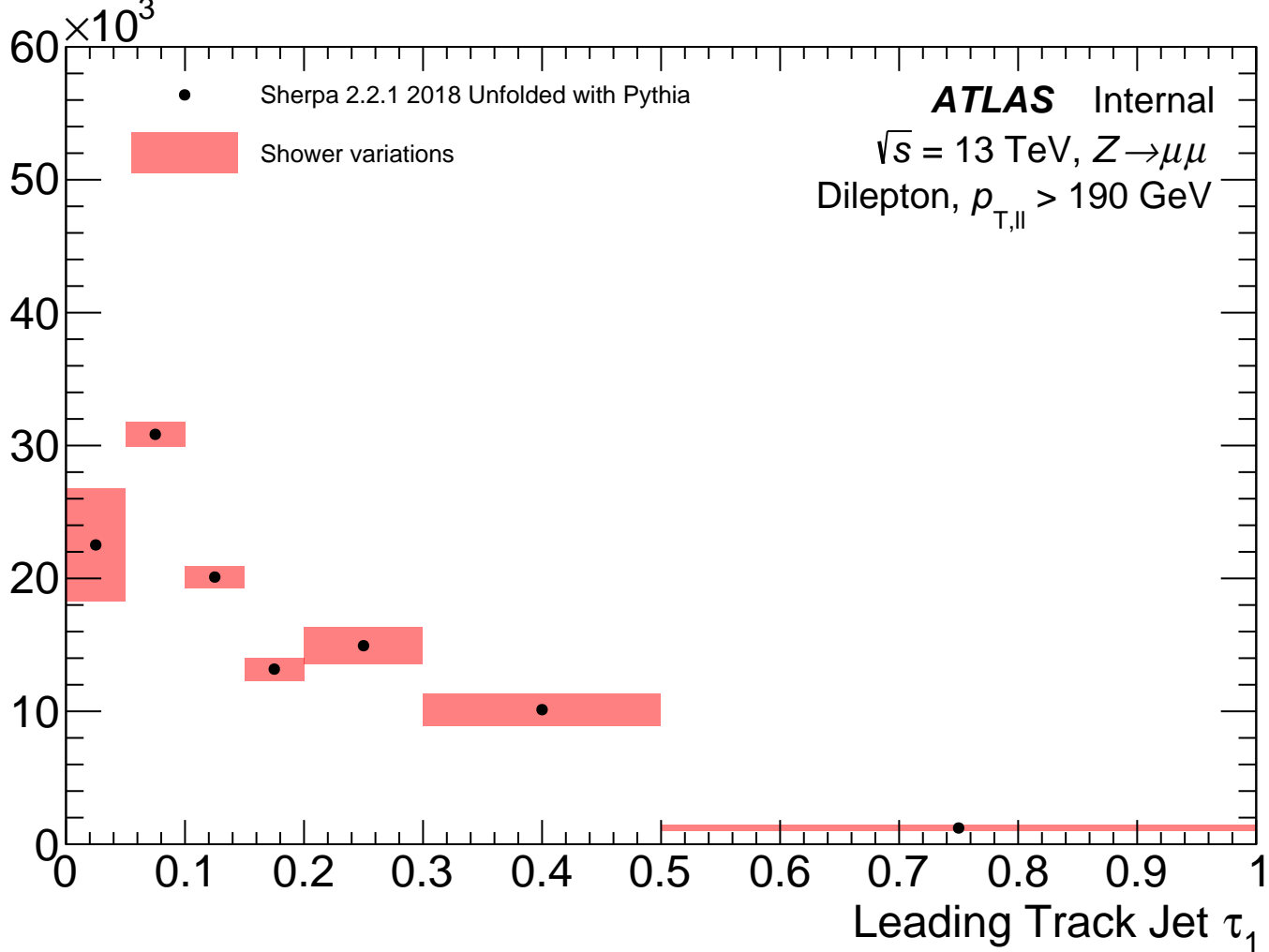
Events



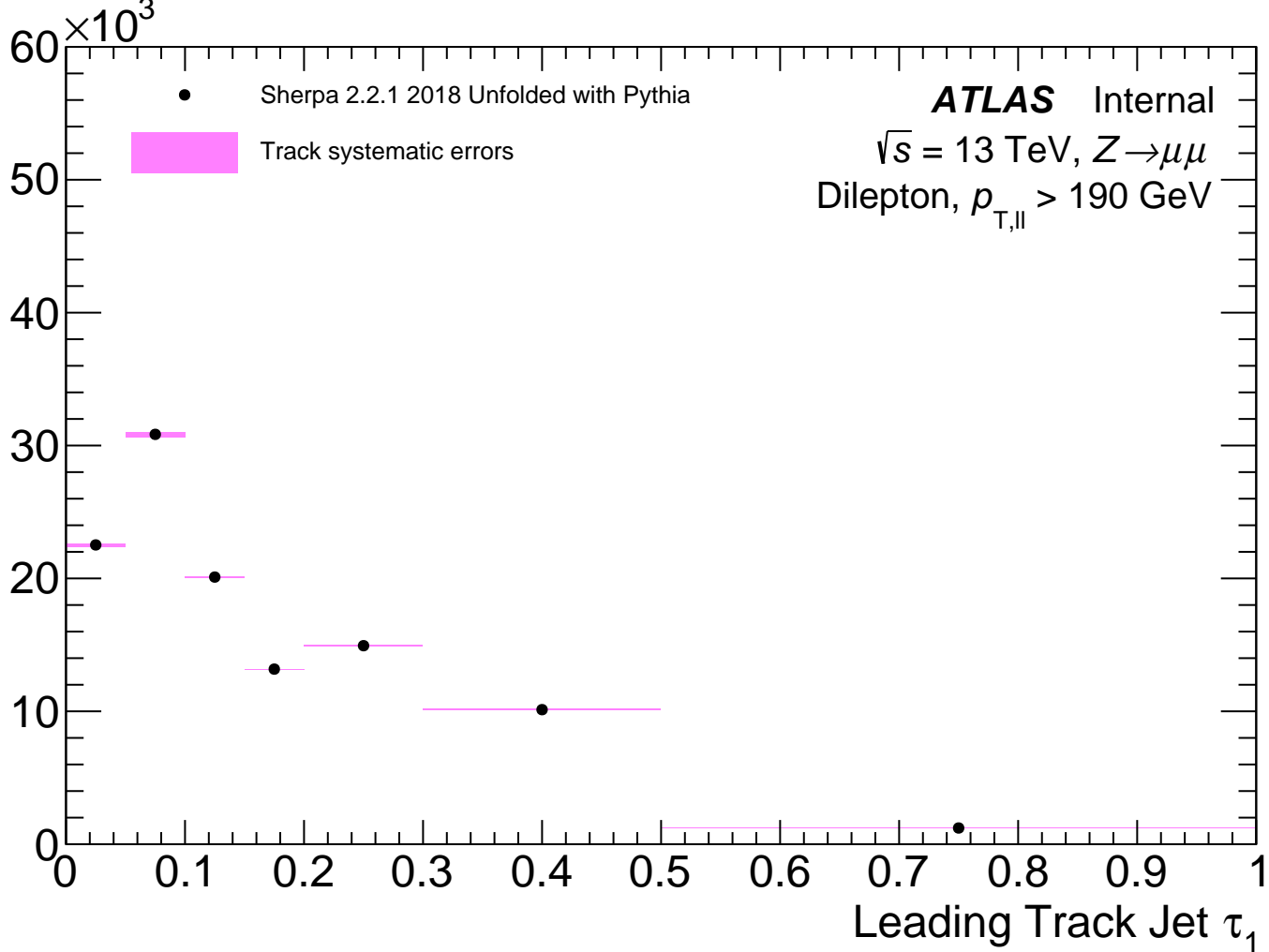
Events



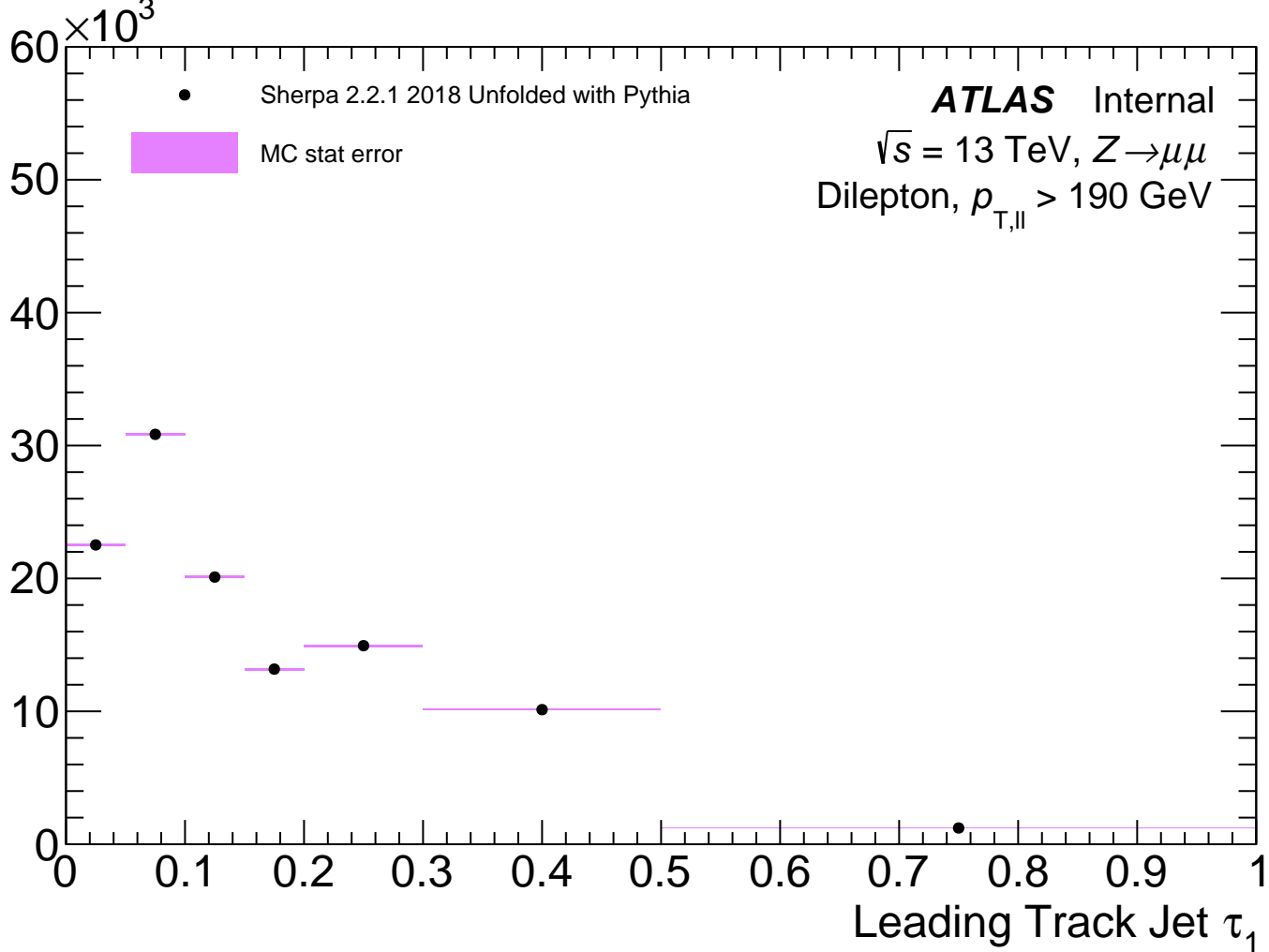
Events



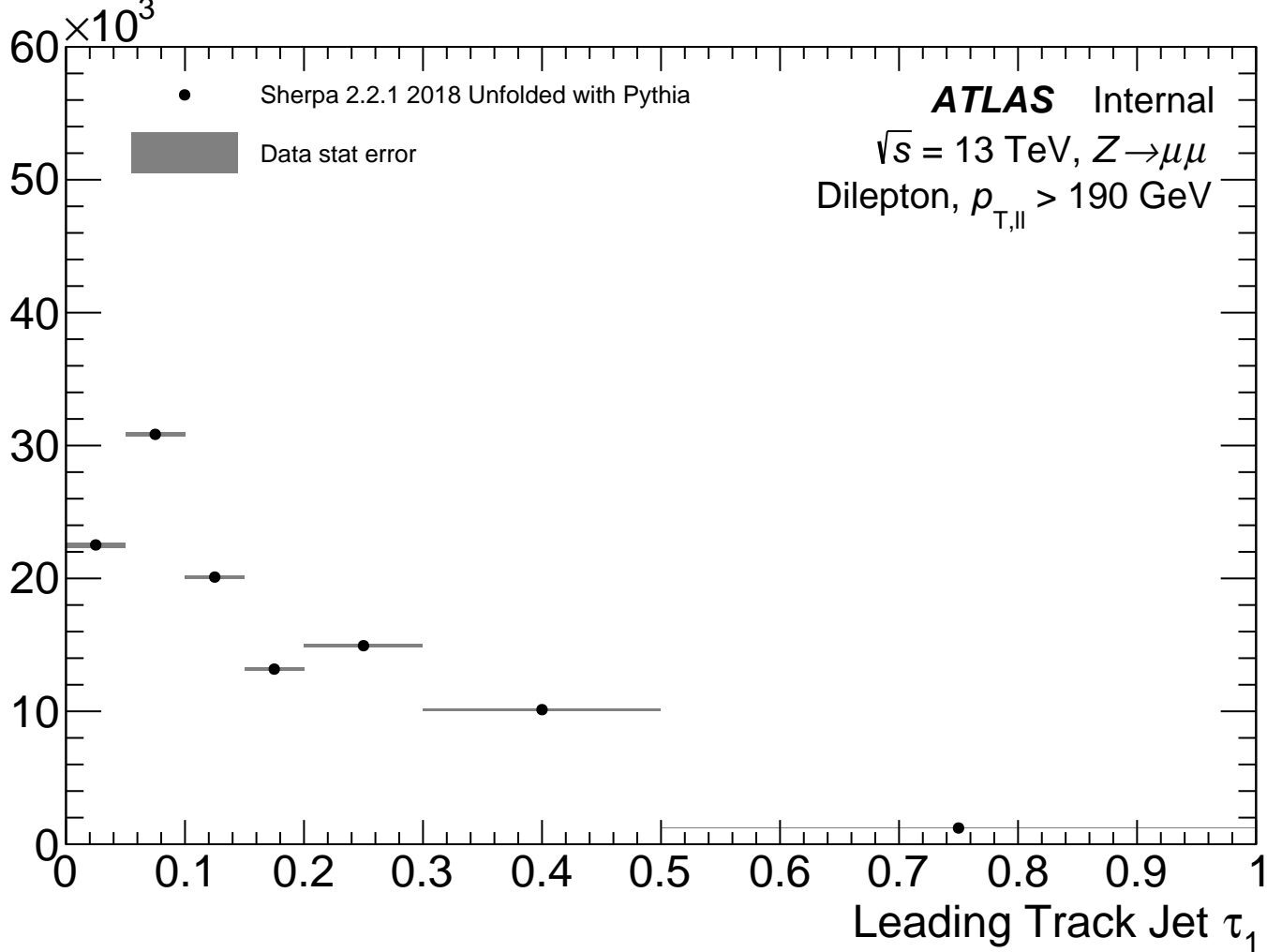
Events



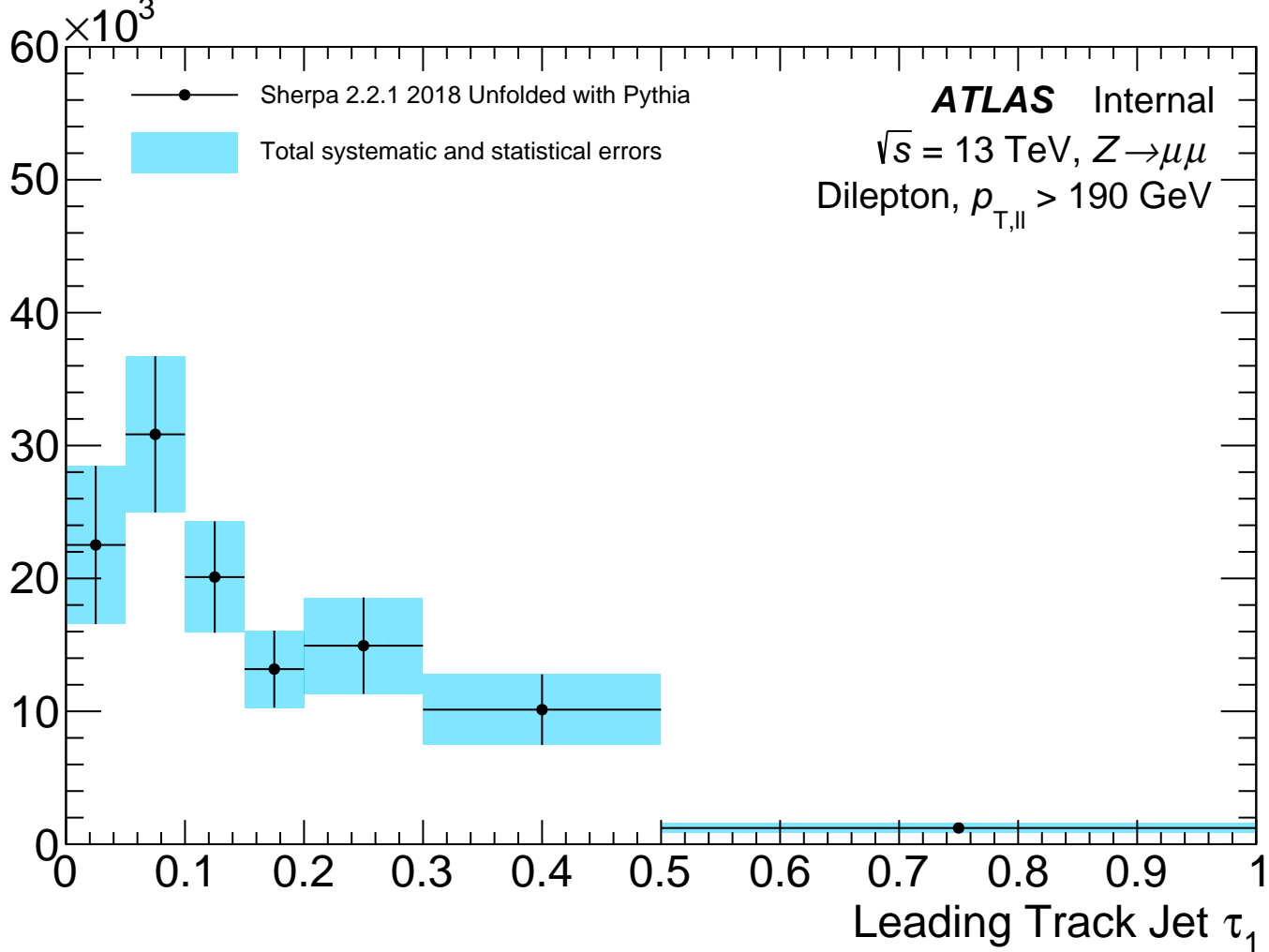
Events

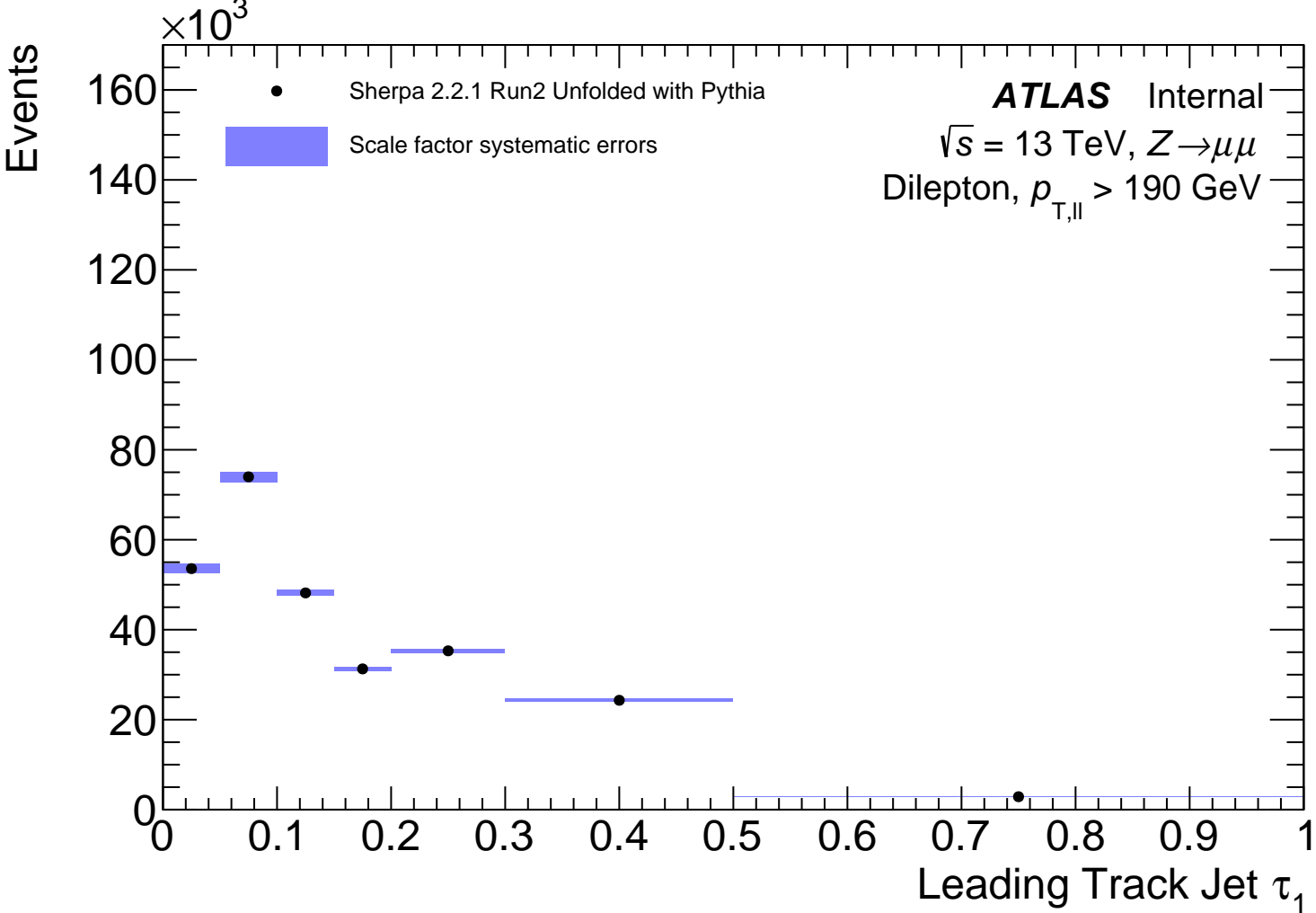


Events



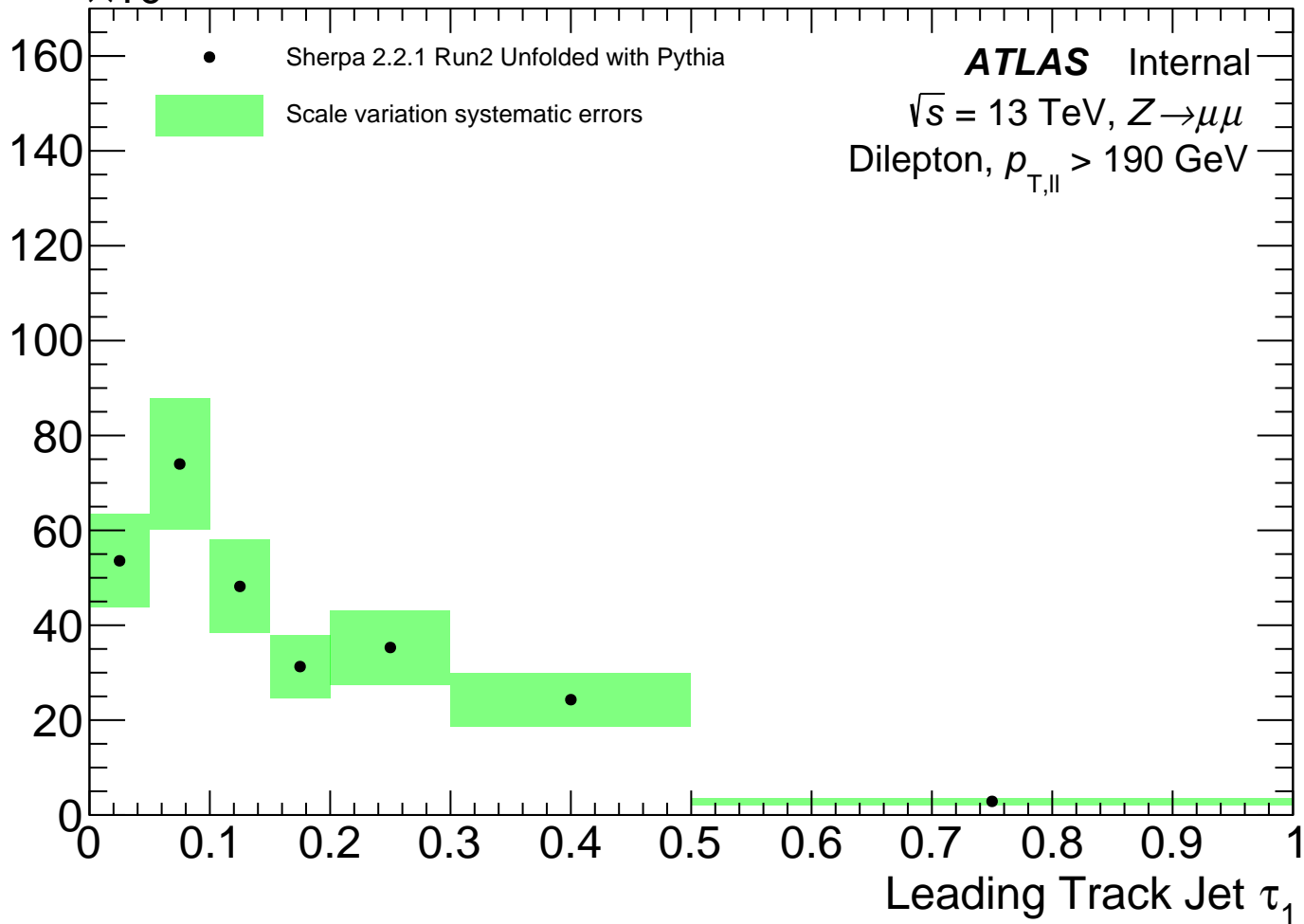
Events





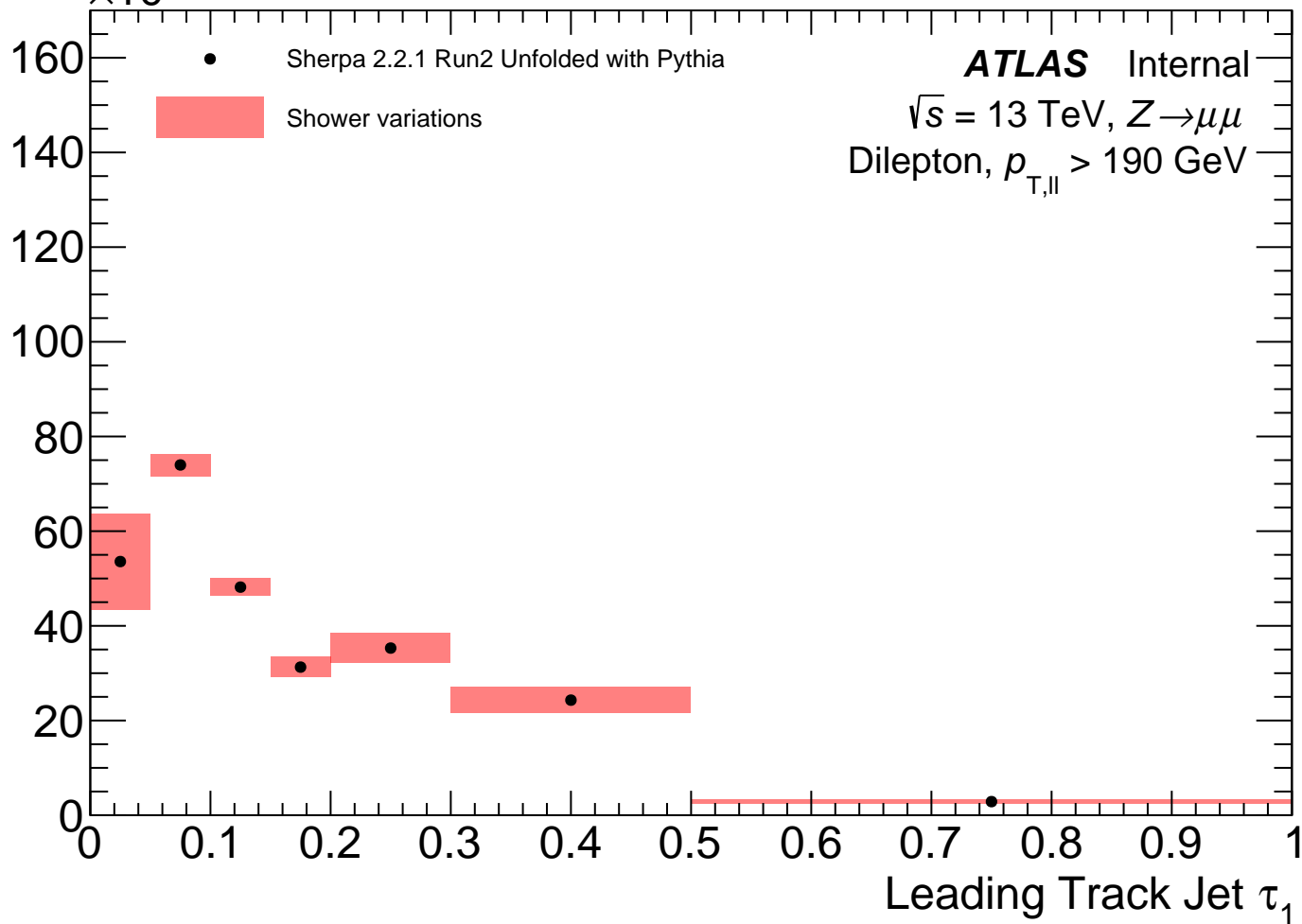
Events

$\times 10^3$



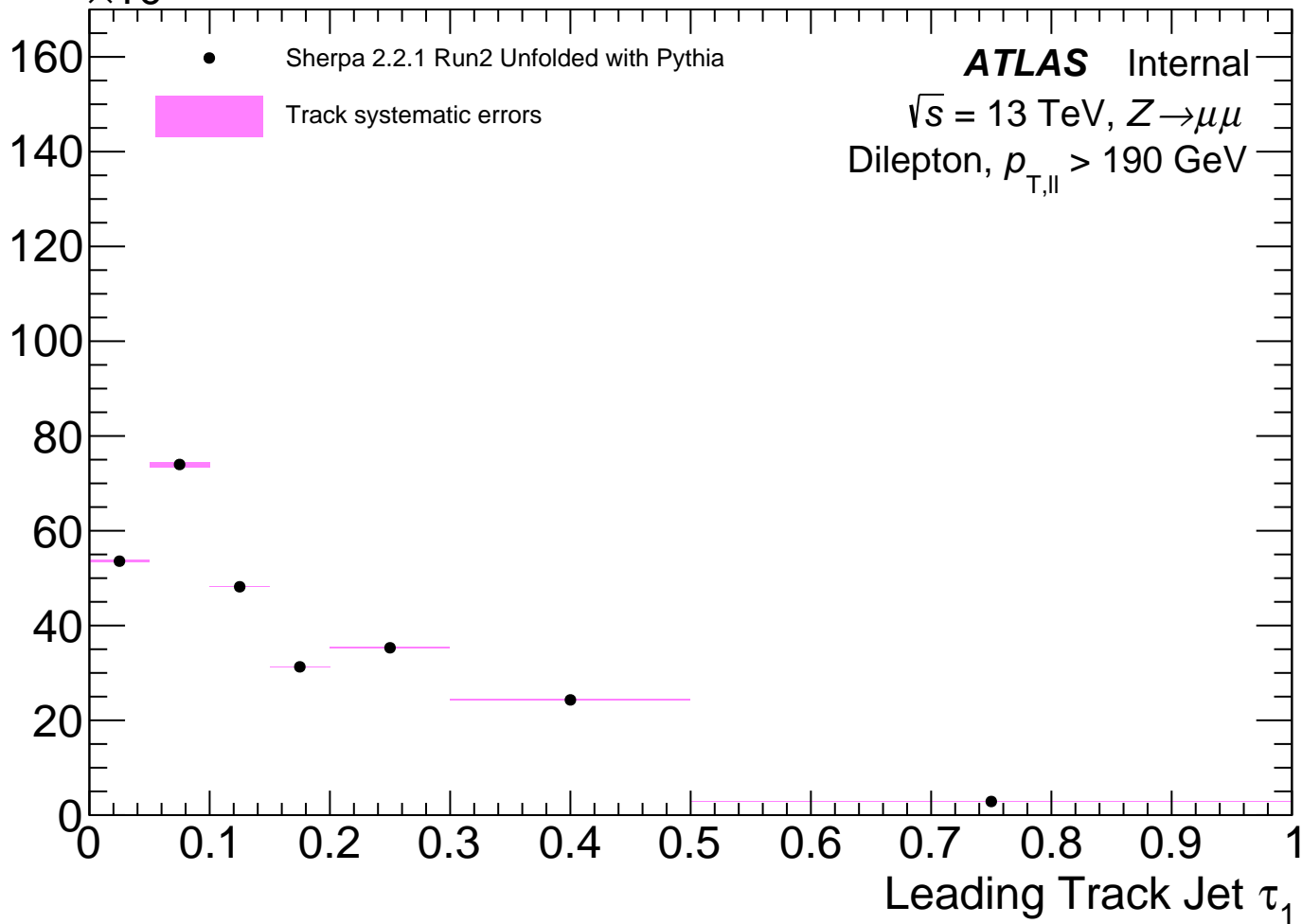
Events

$\times 10^3$



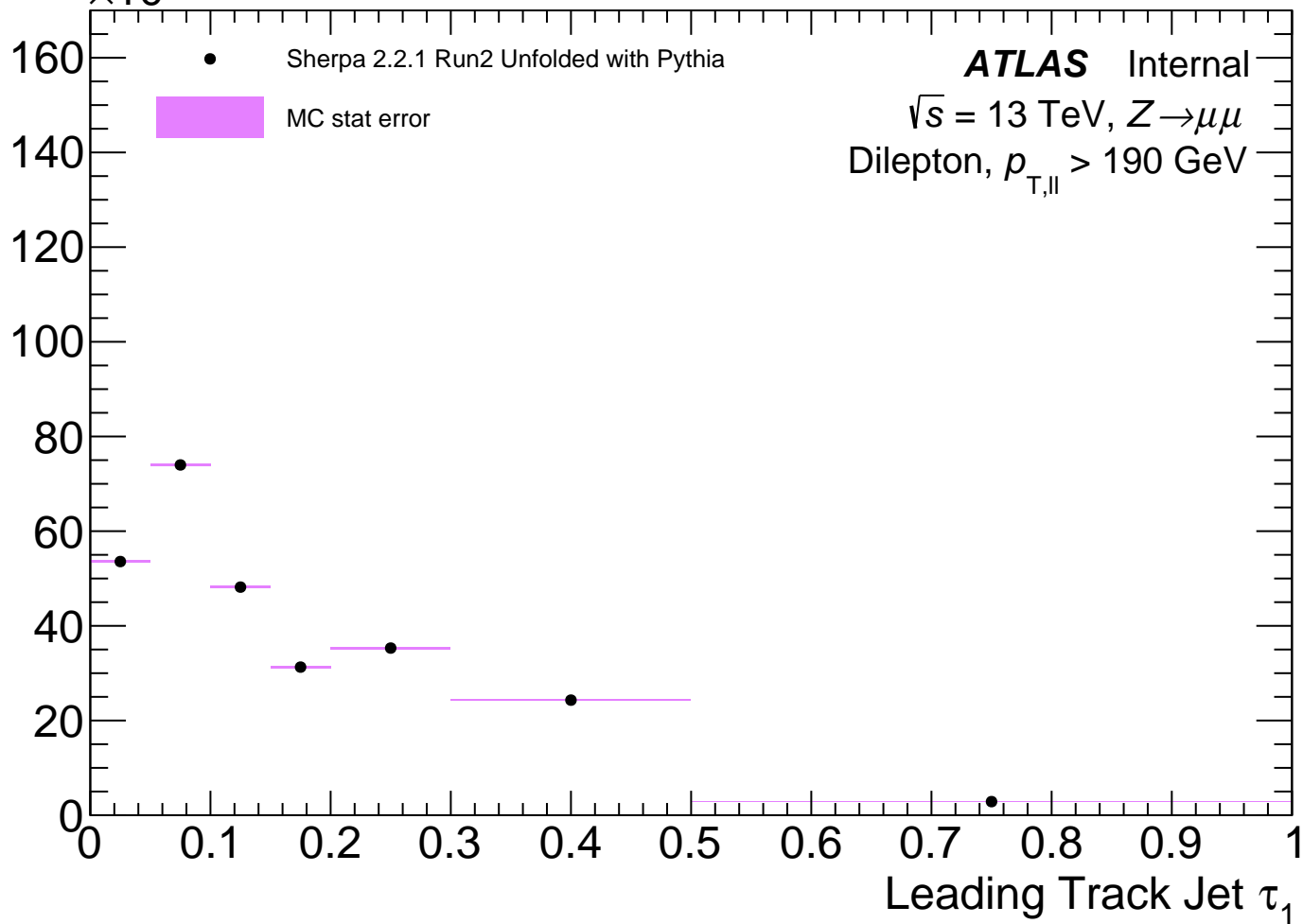
Events

$\times 10^3$



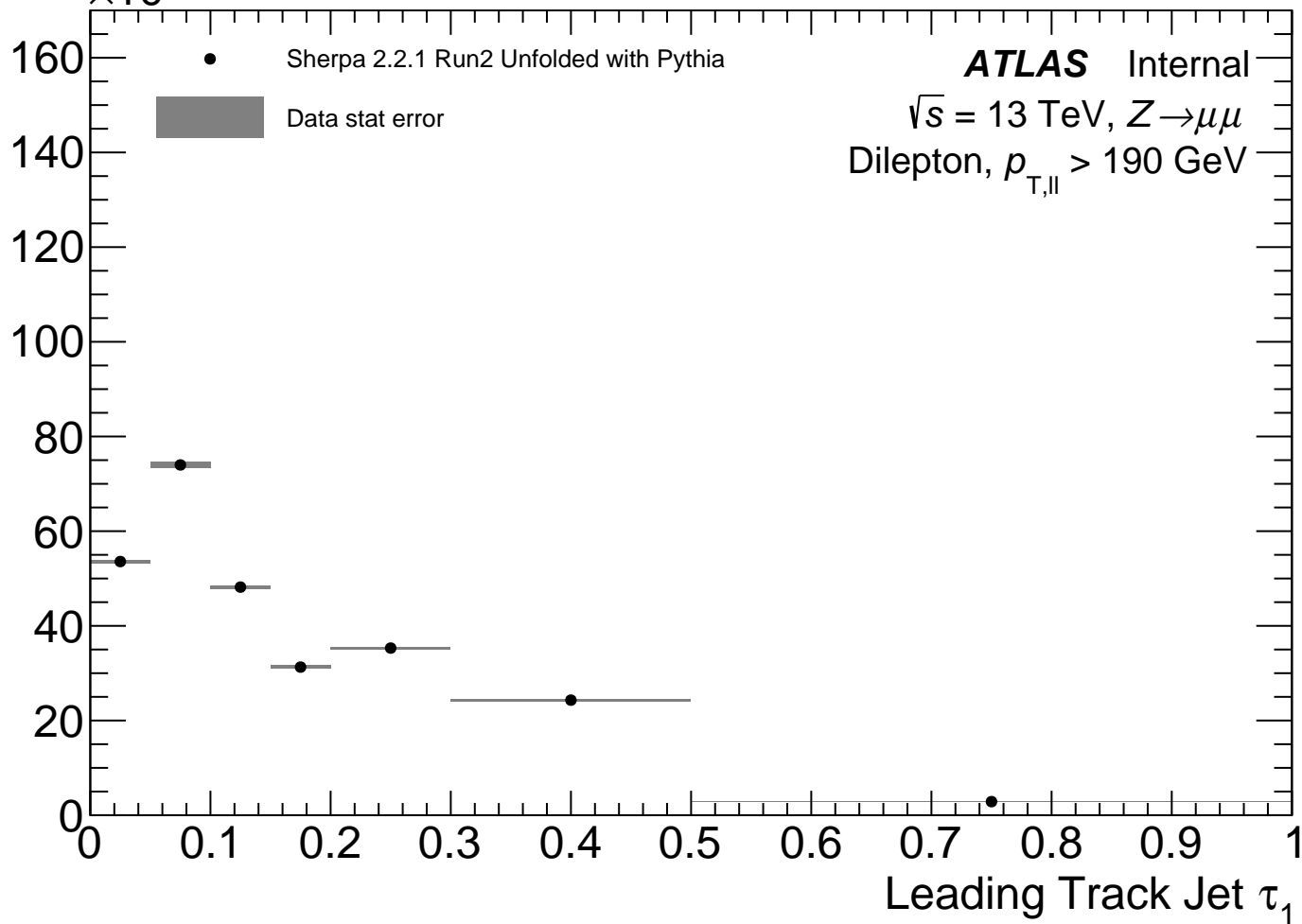
Events

$\times 10^3$



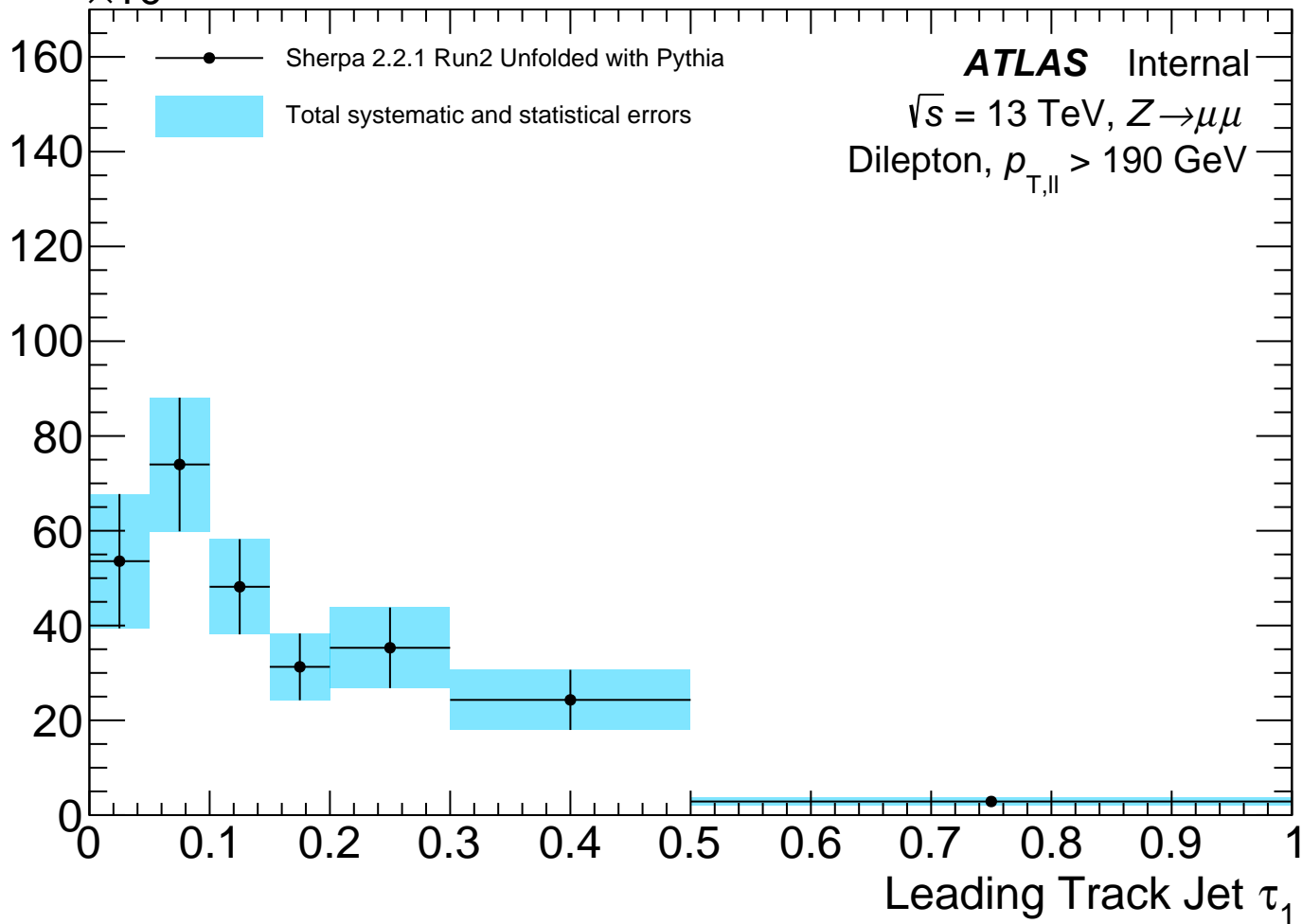
Events

$\times 10^3$

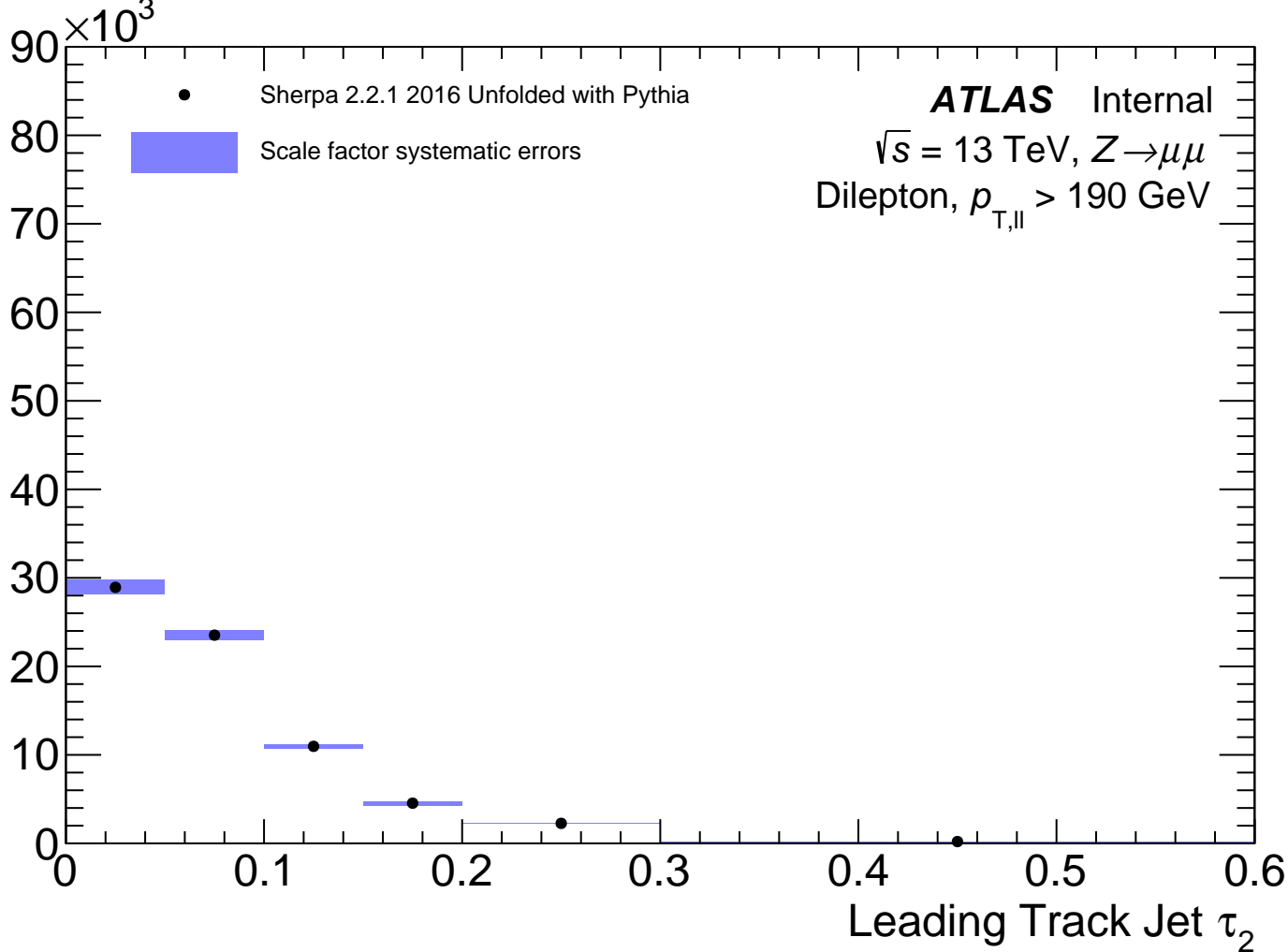


Events

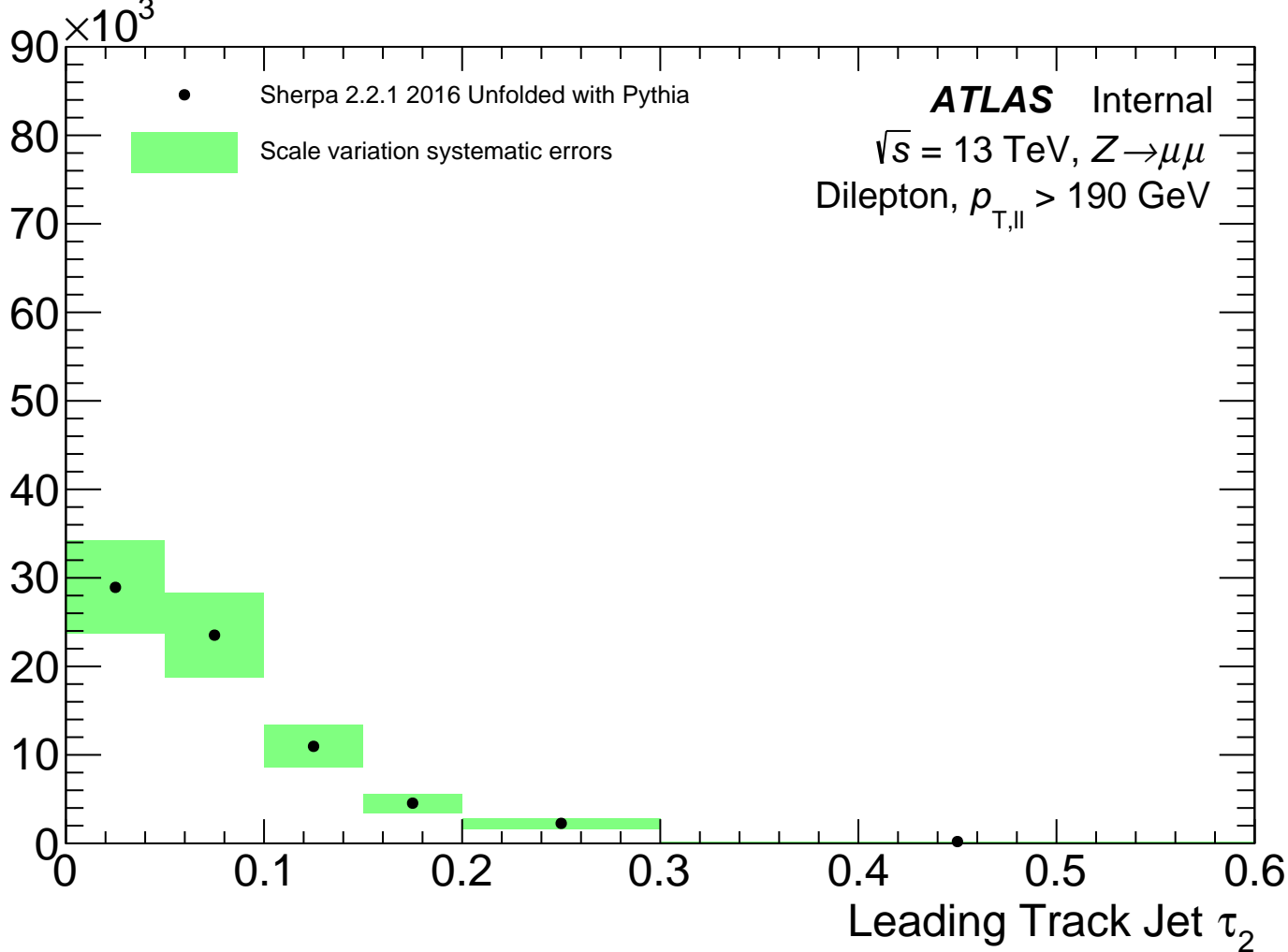
$\times 10^3$



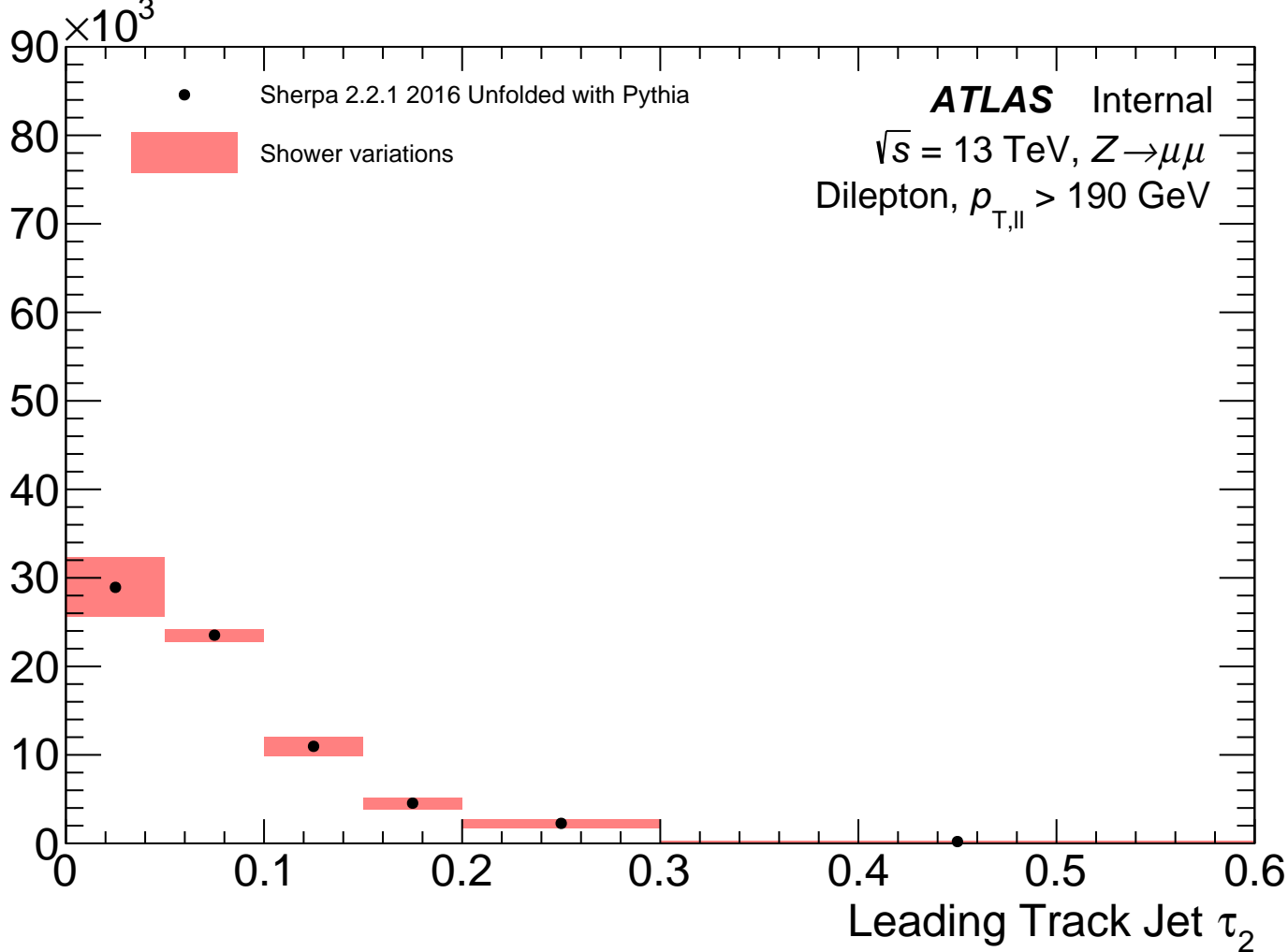
Events



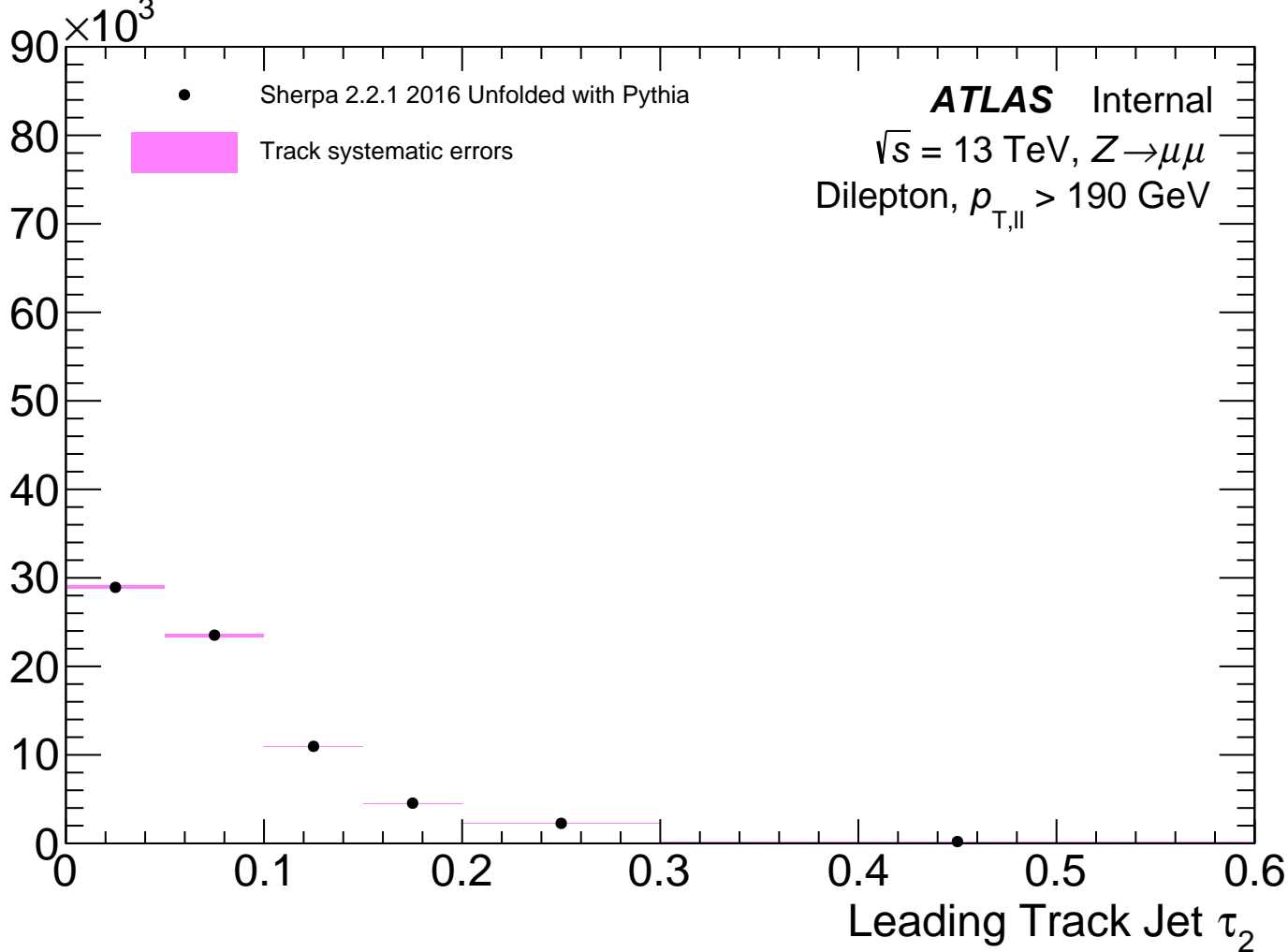
Events



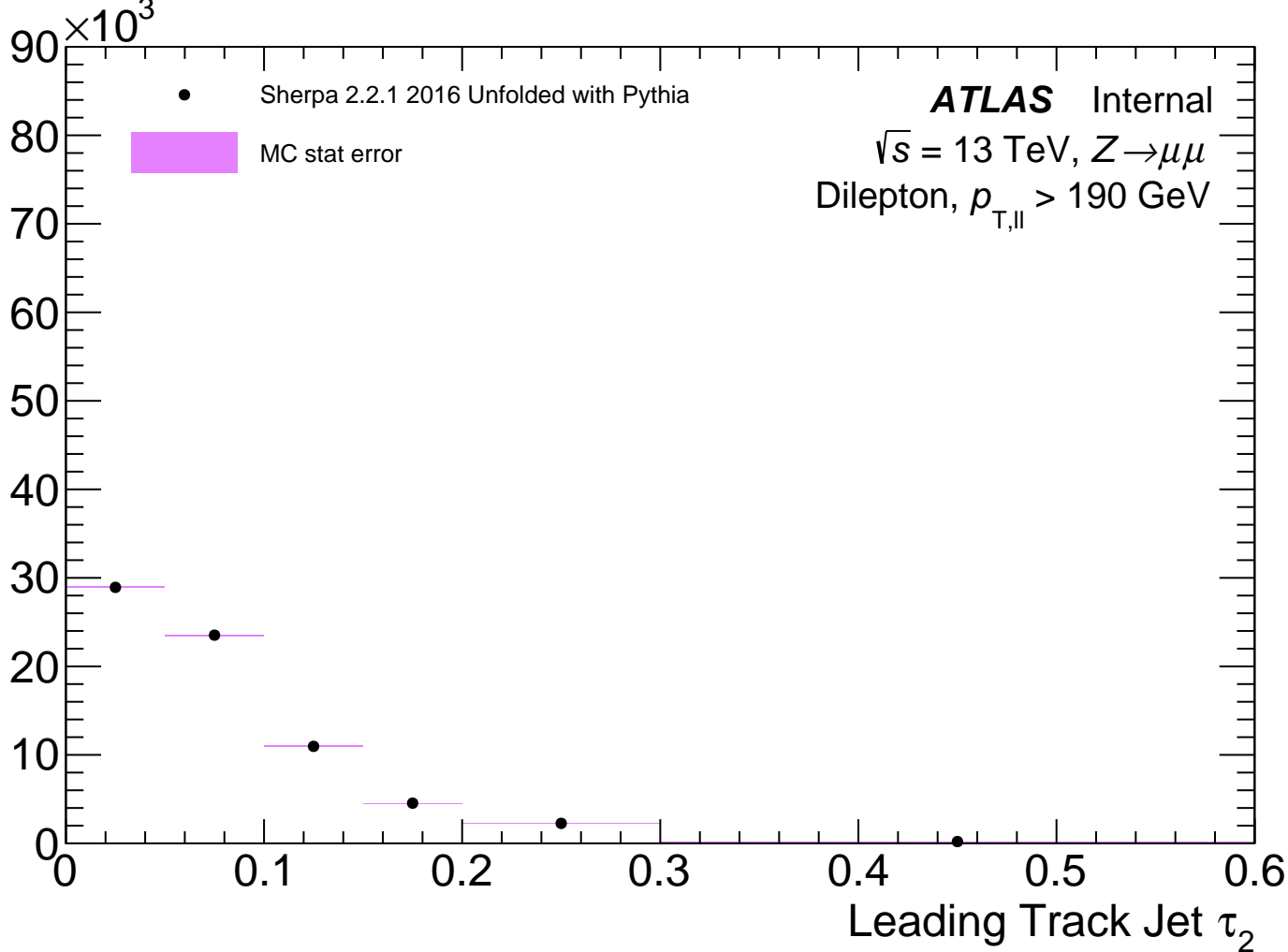
Events



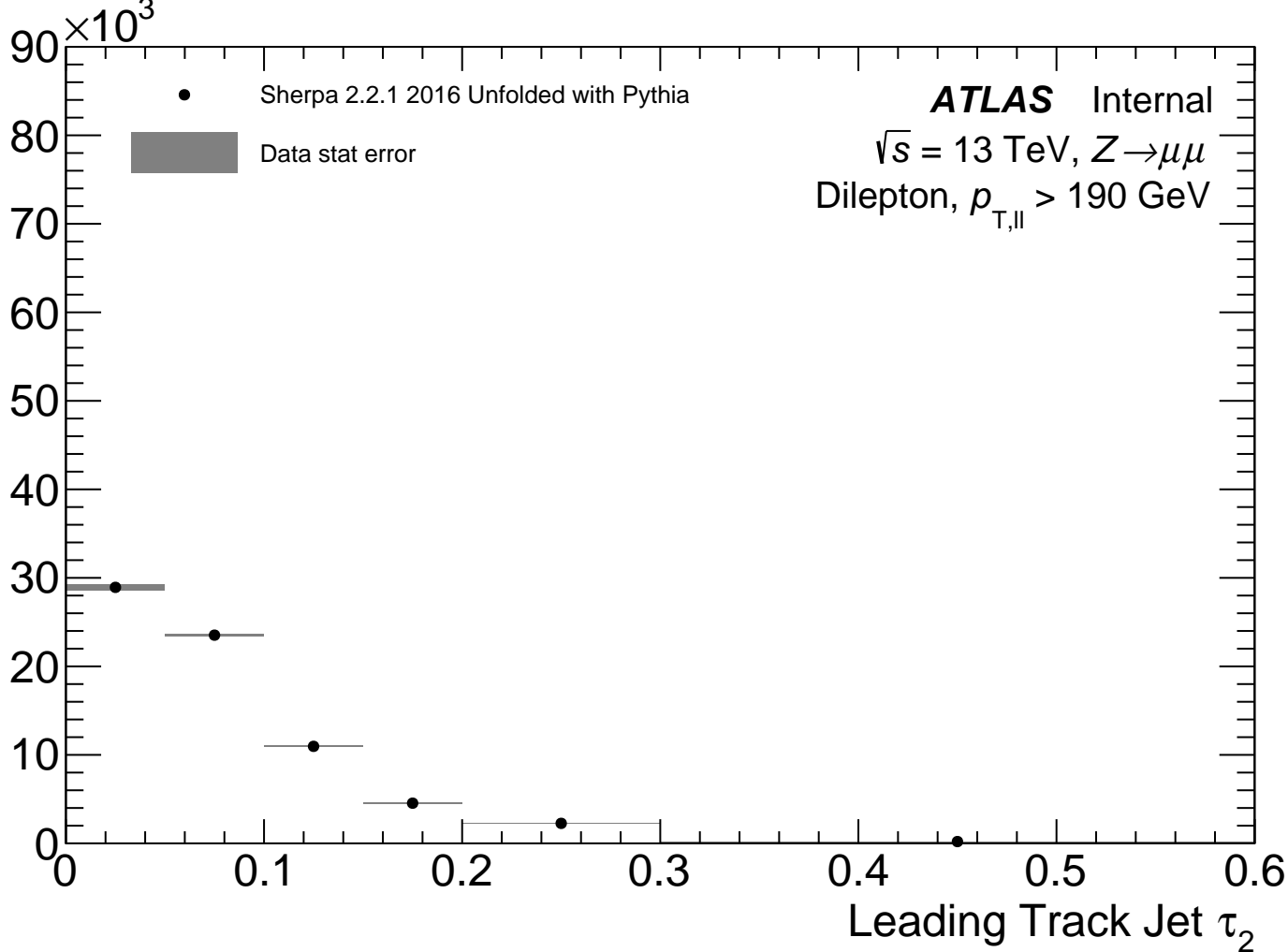
Events



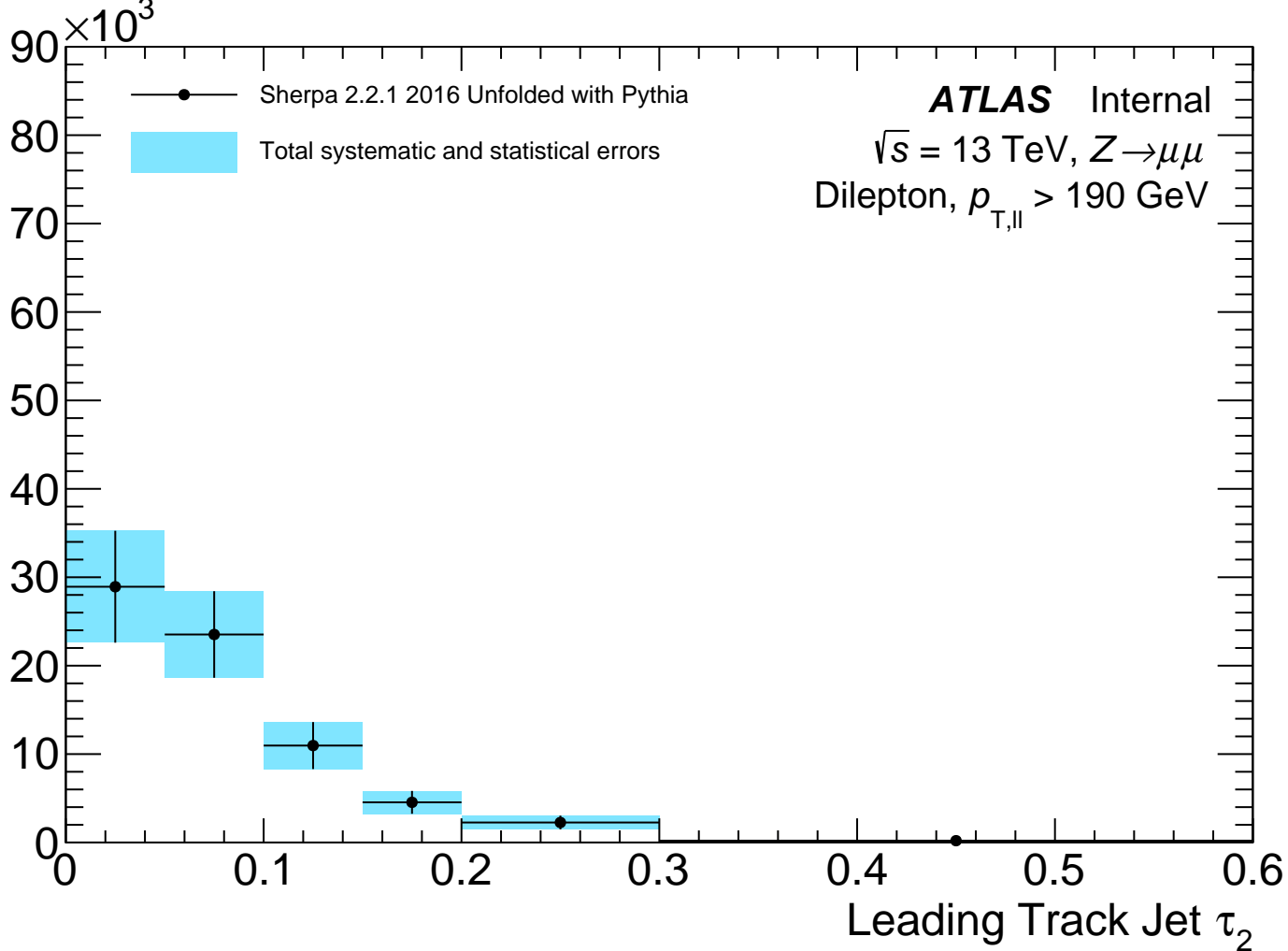
Events



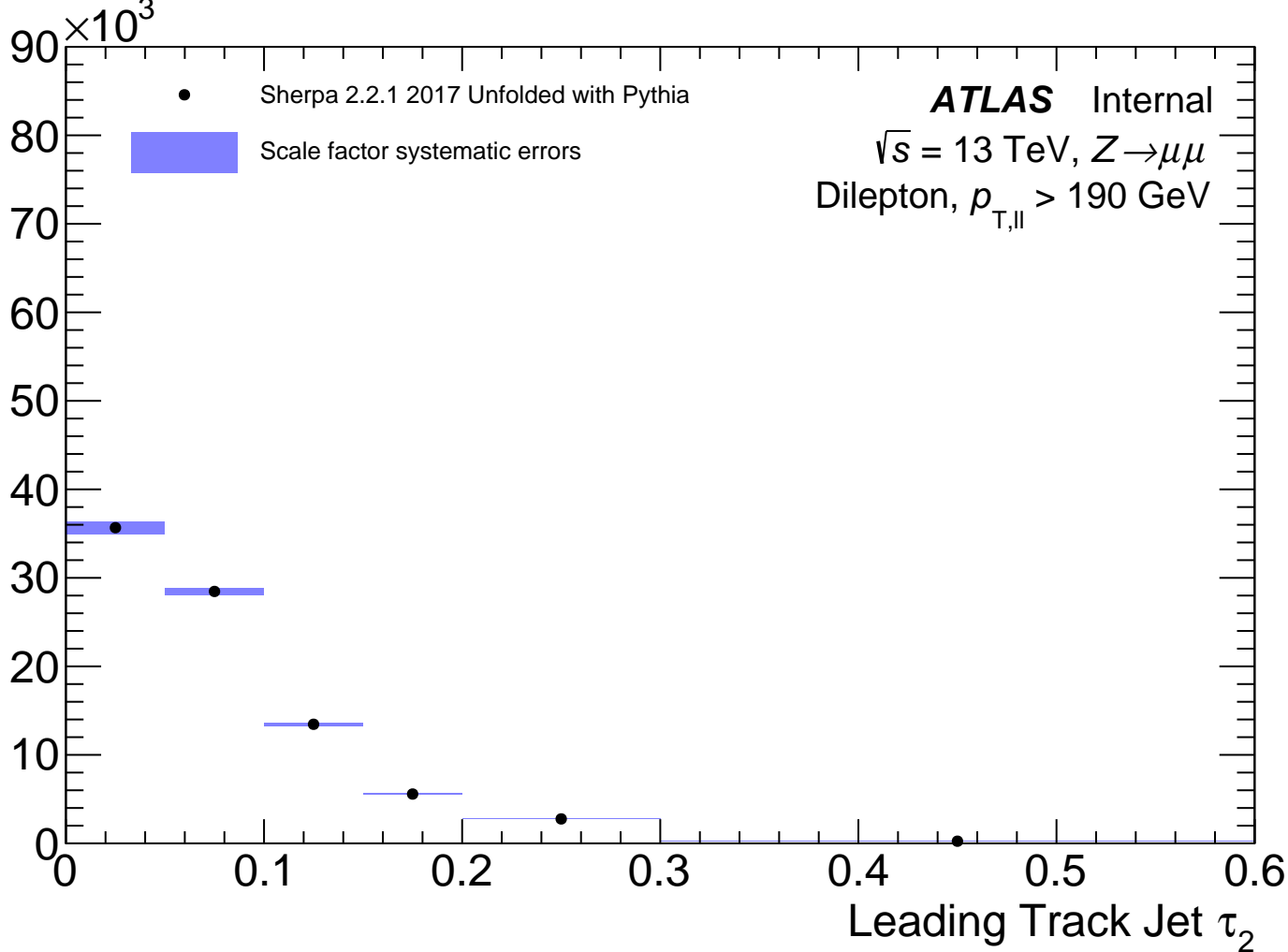
Events



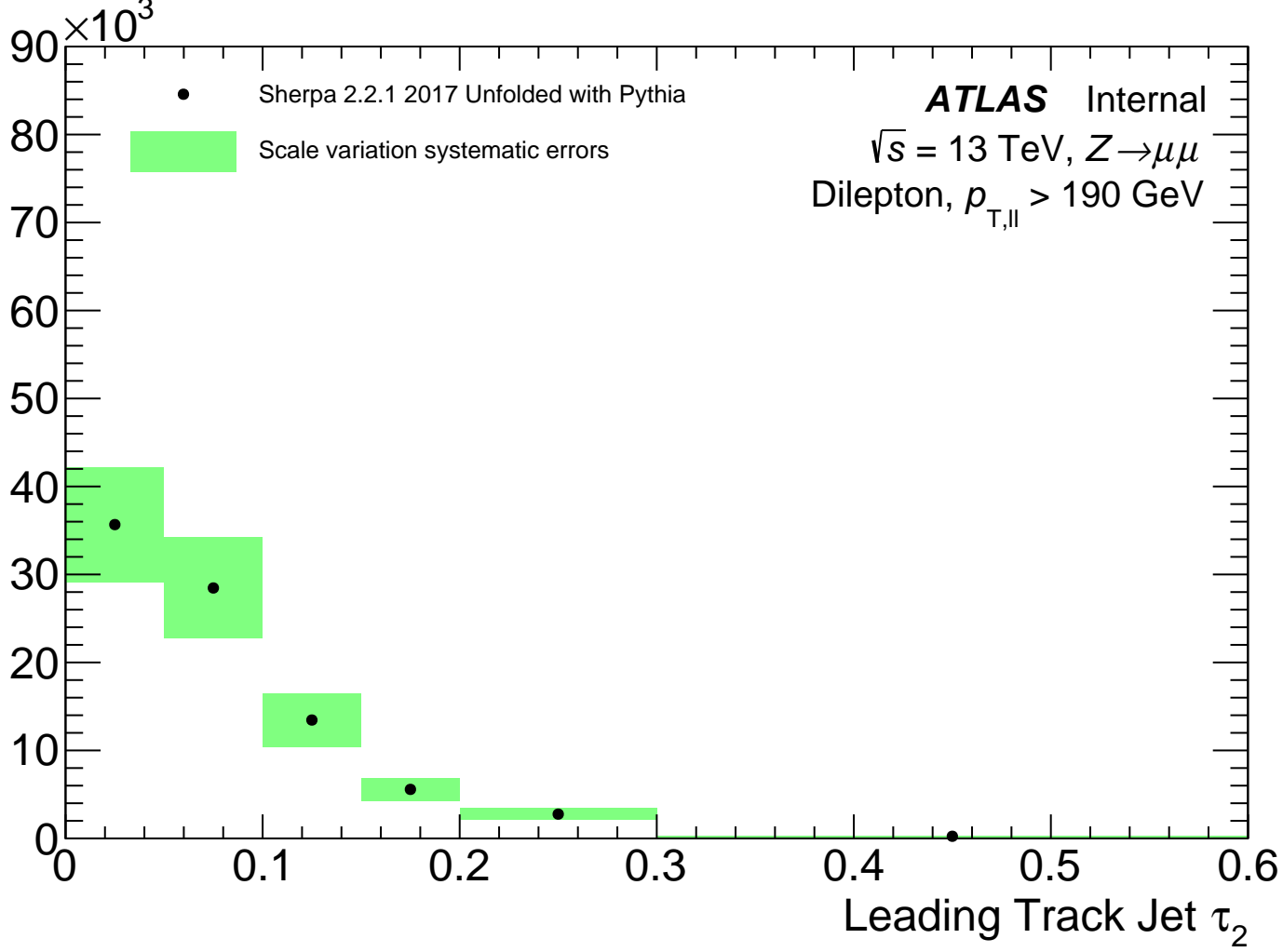
Events



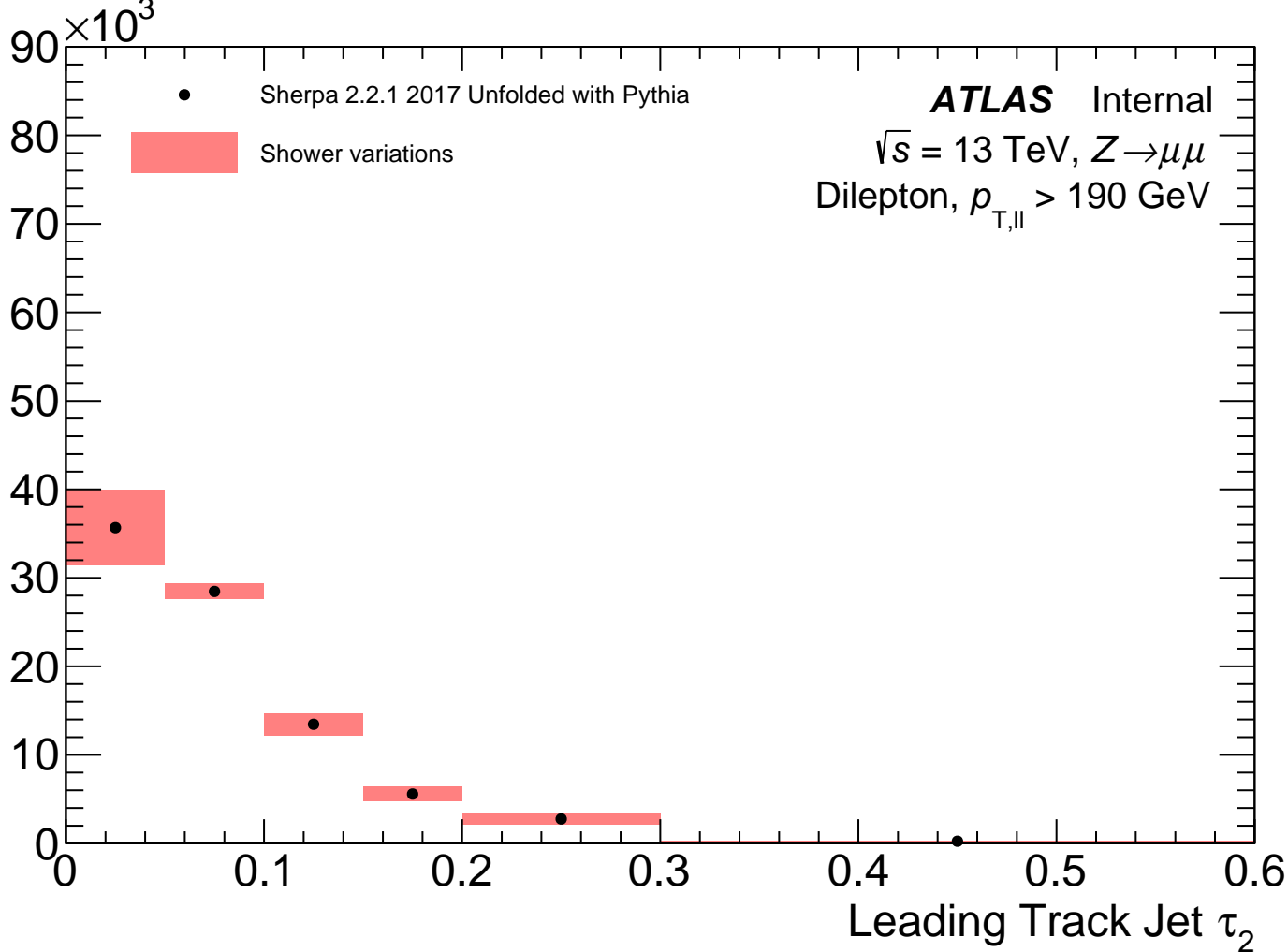
Events



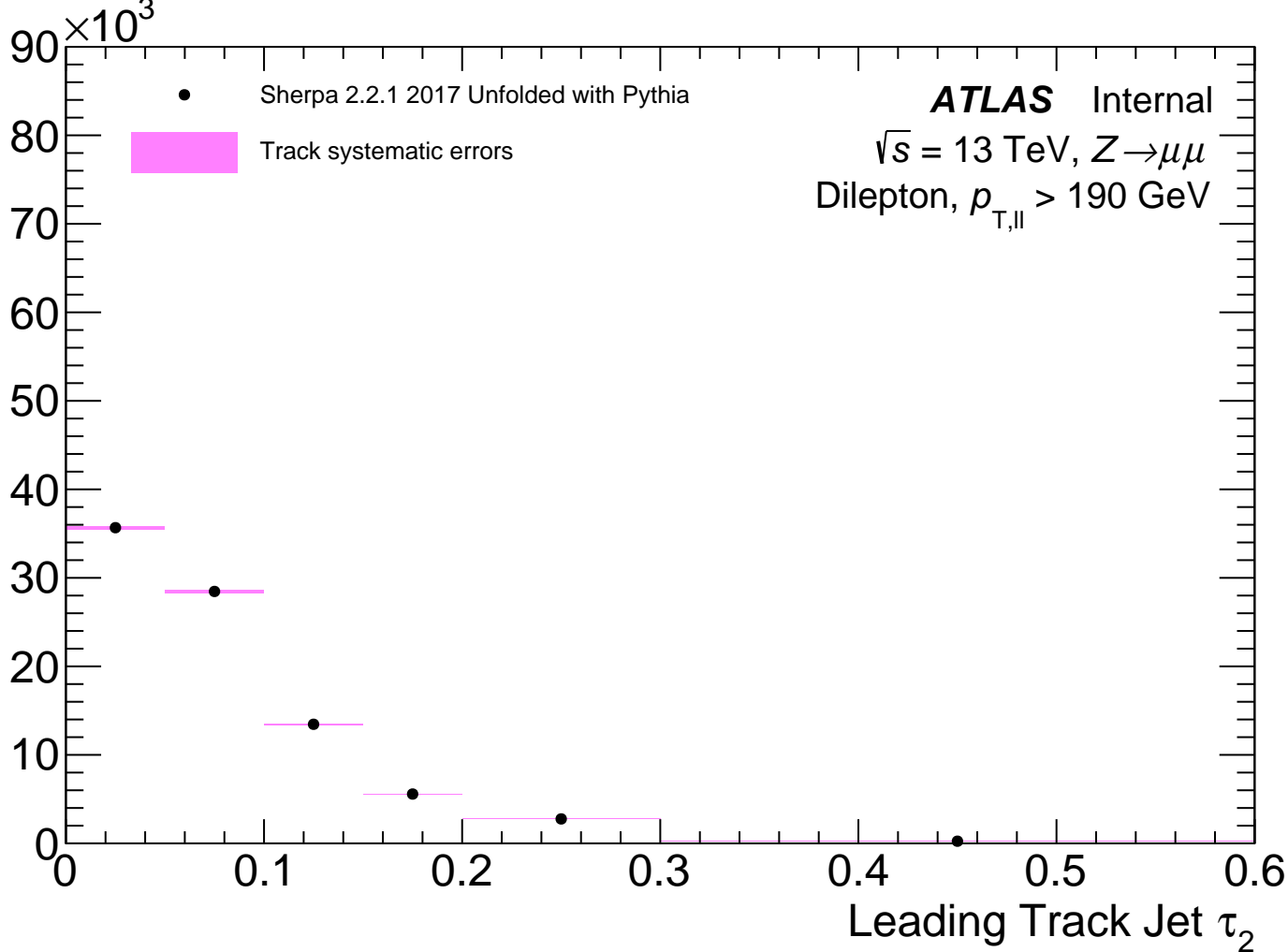
Events



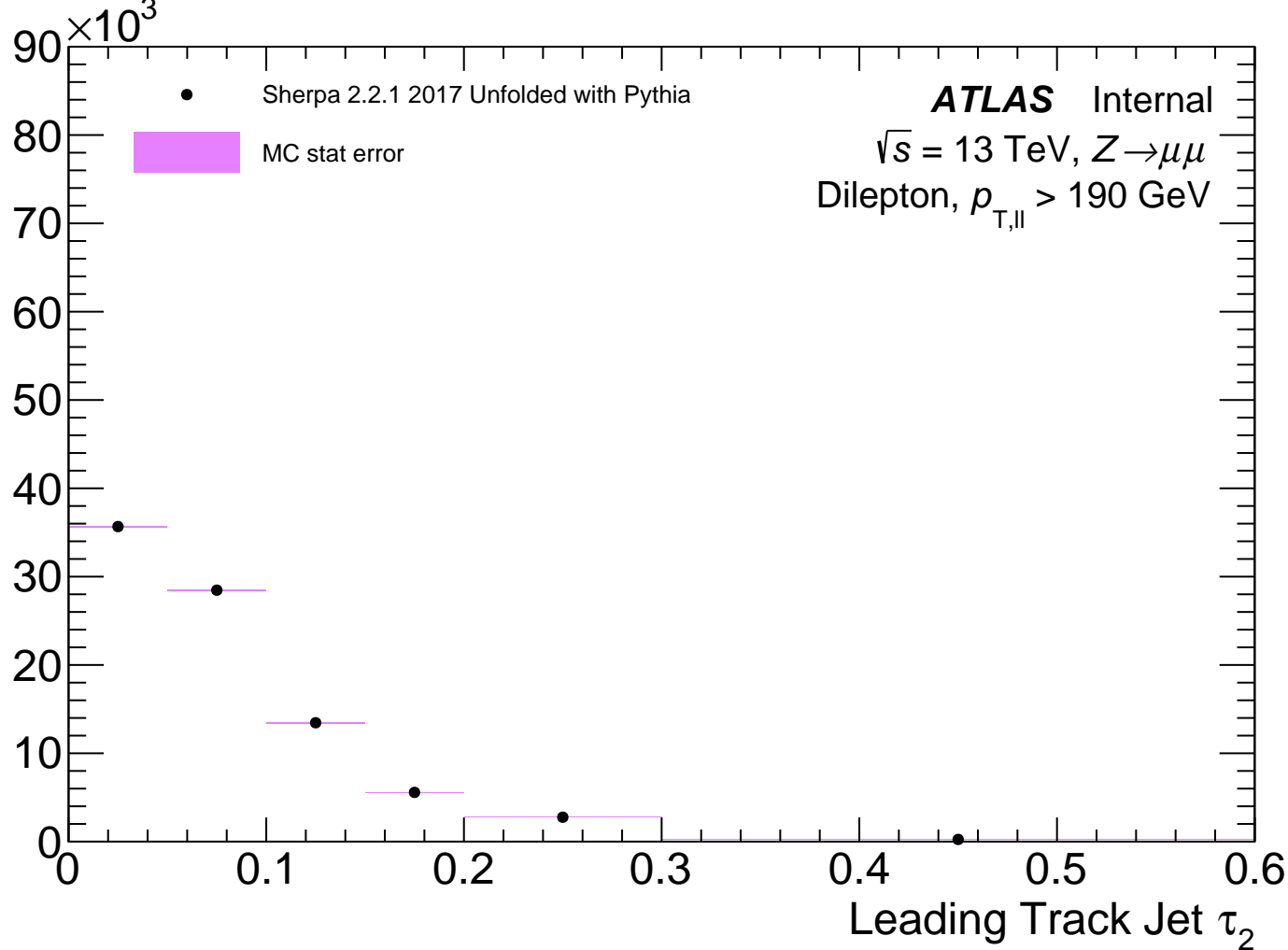
Events



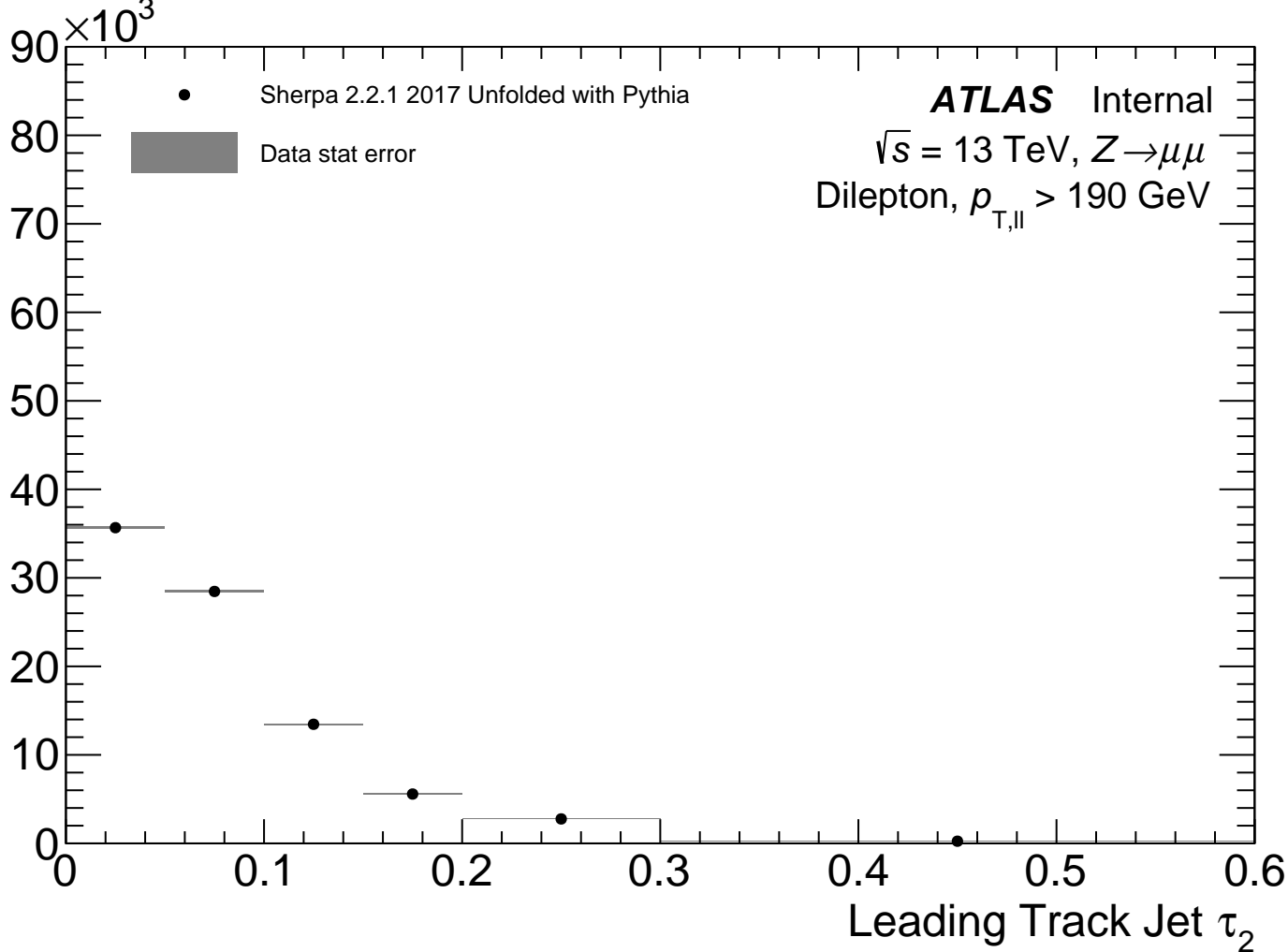
Events



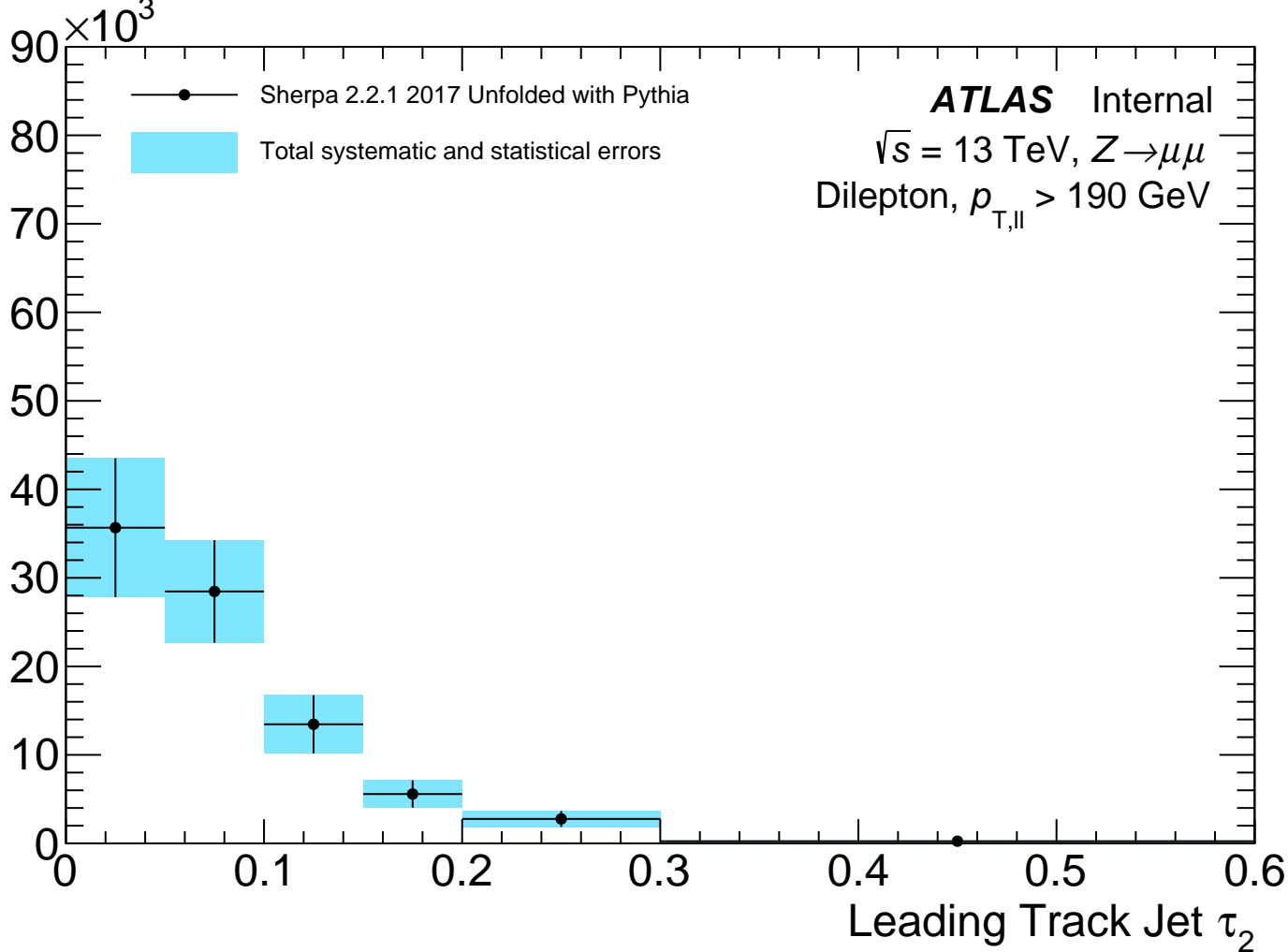
Events



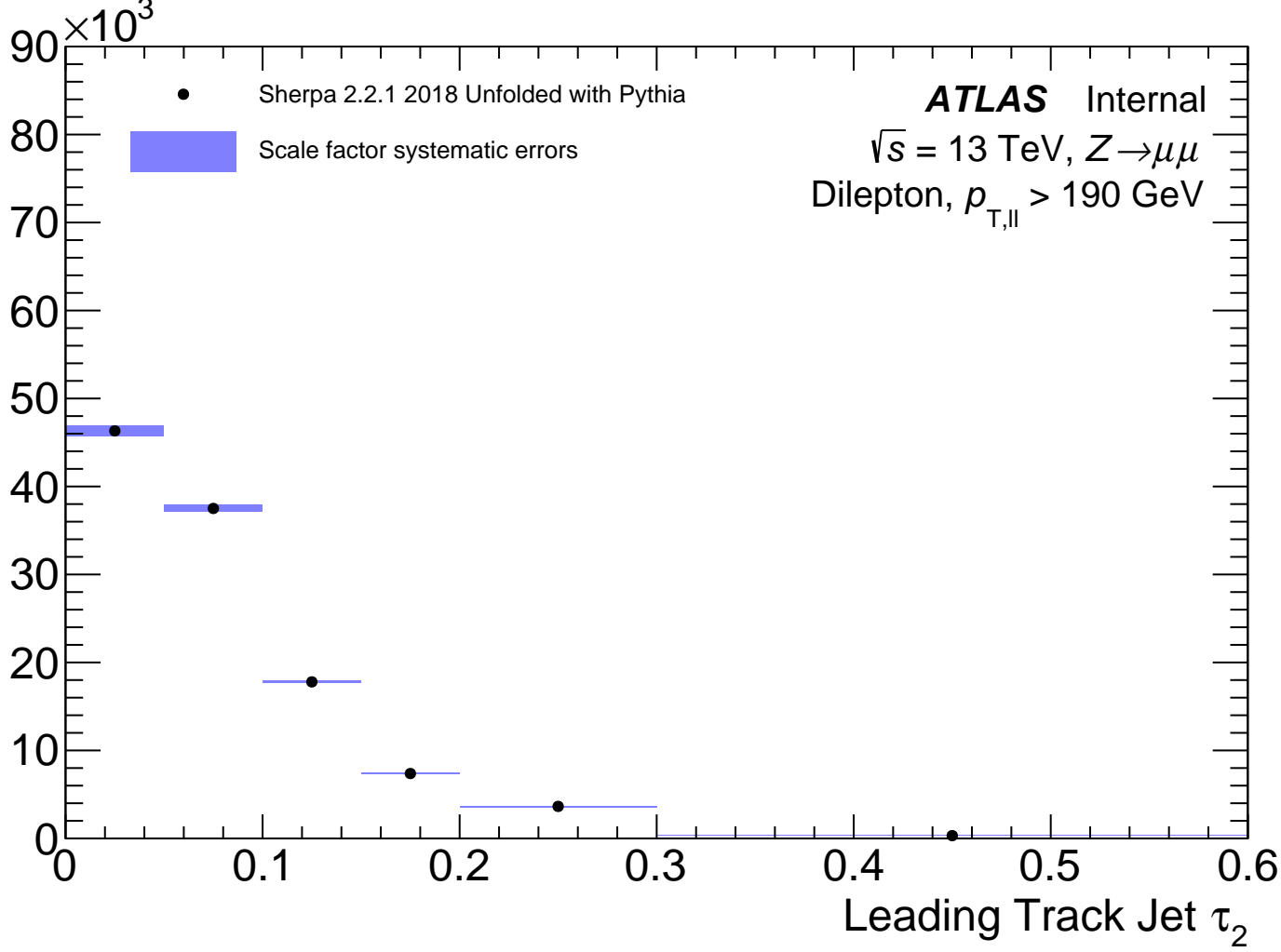
Events



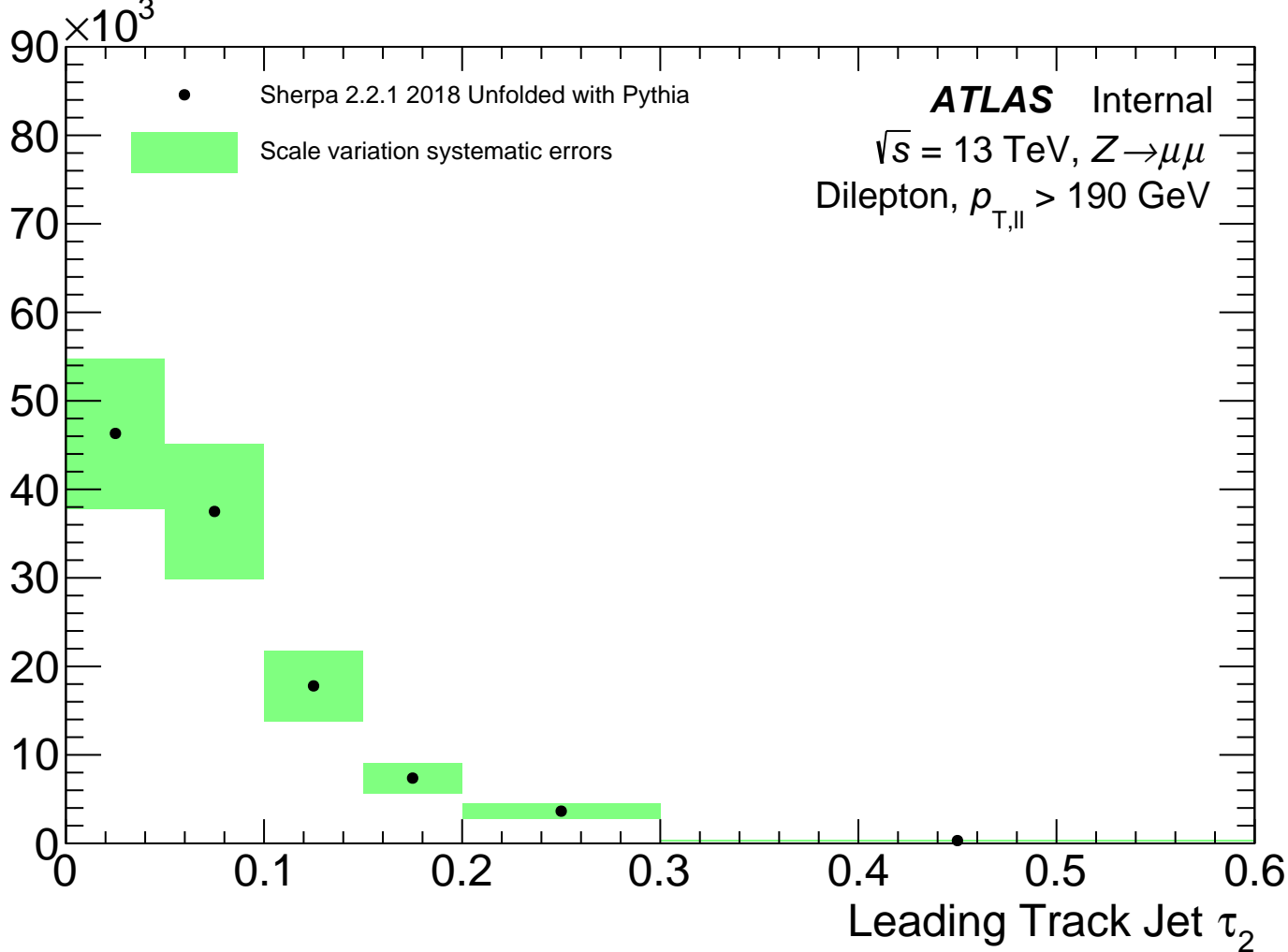
Events



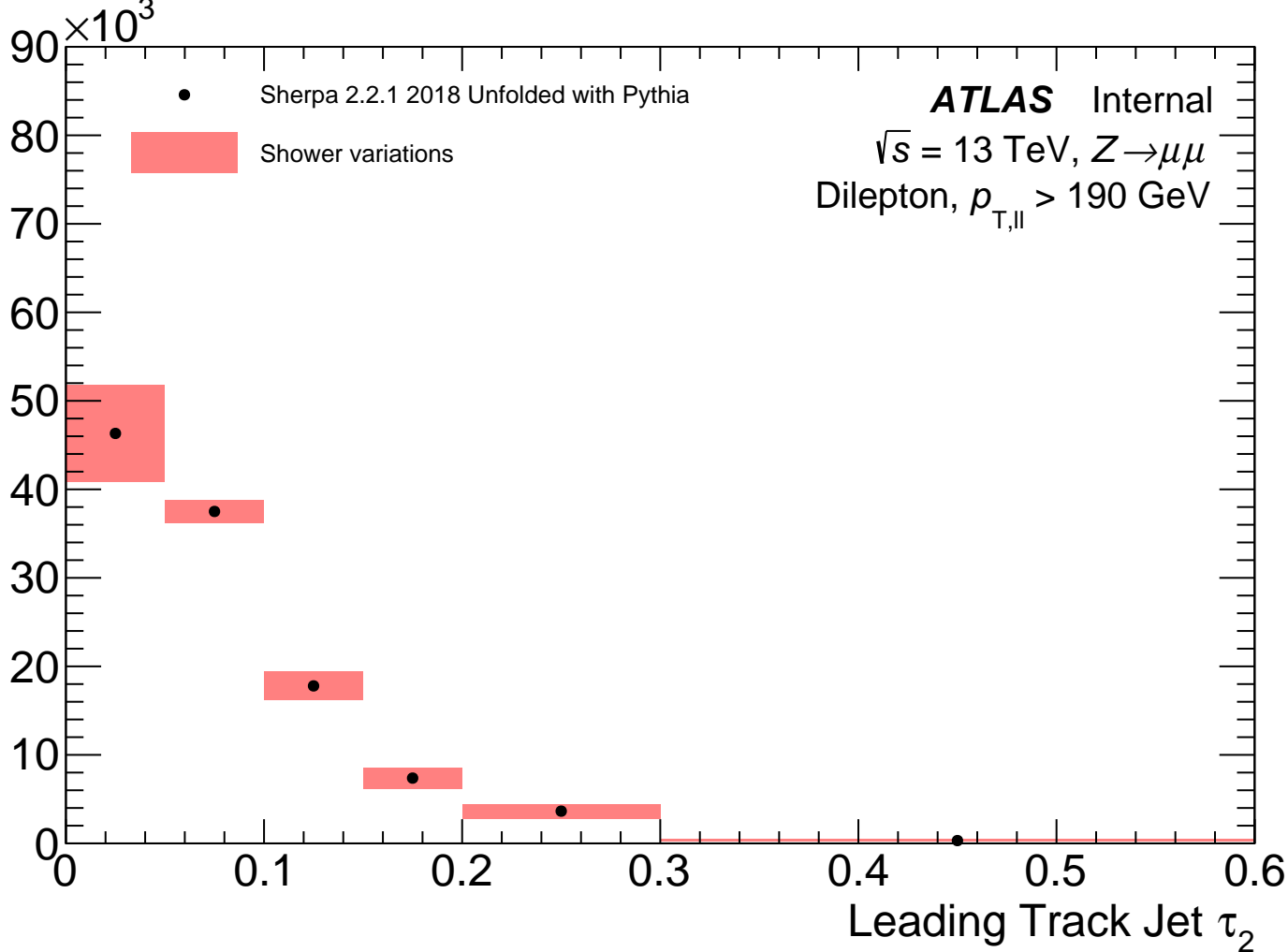
Events



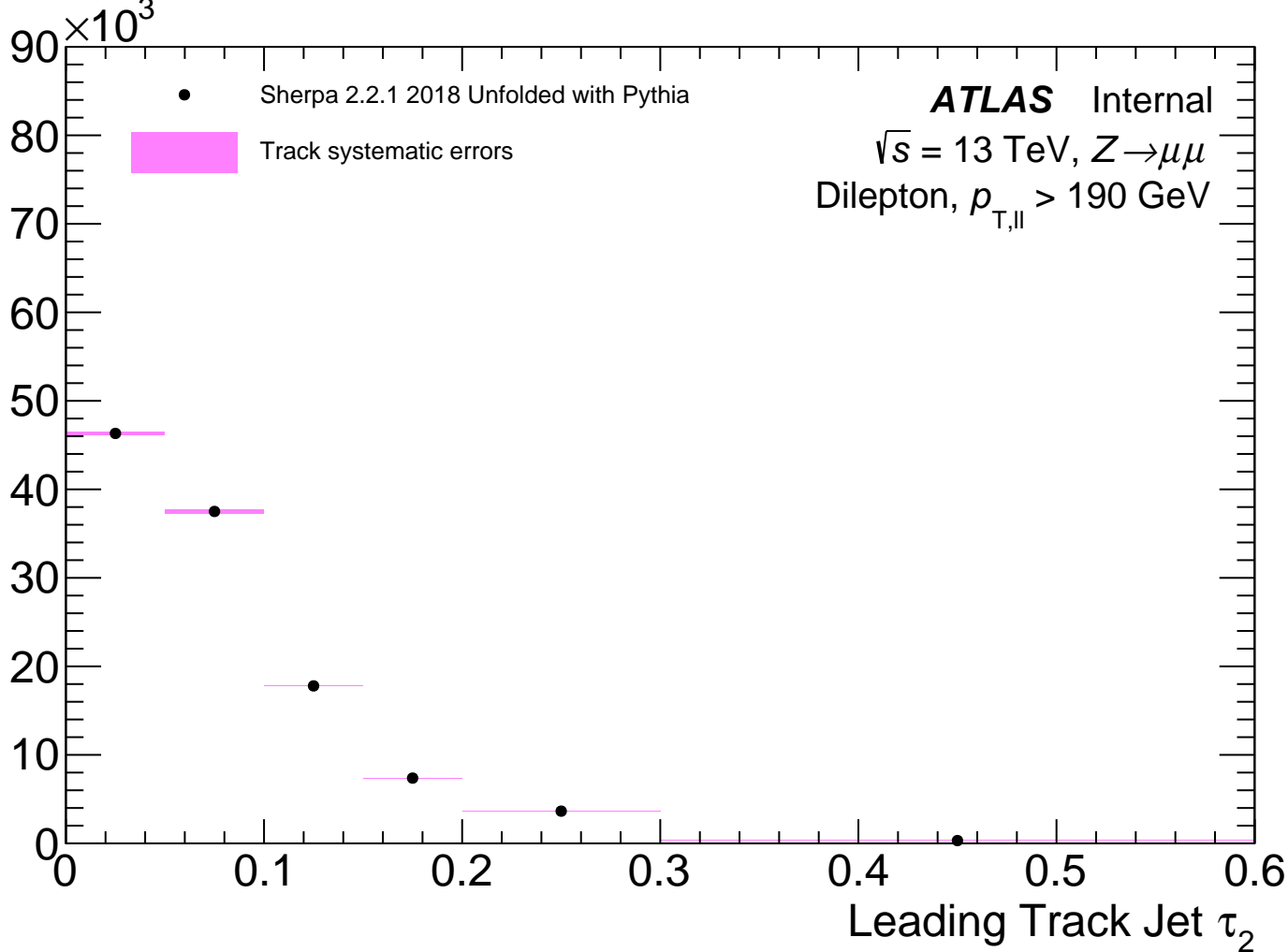
Events



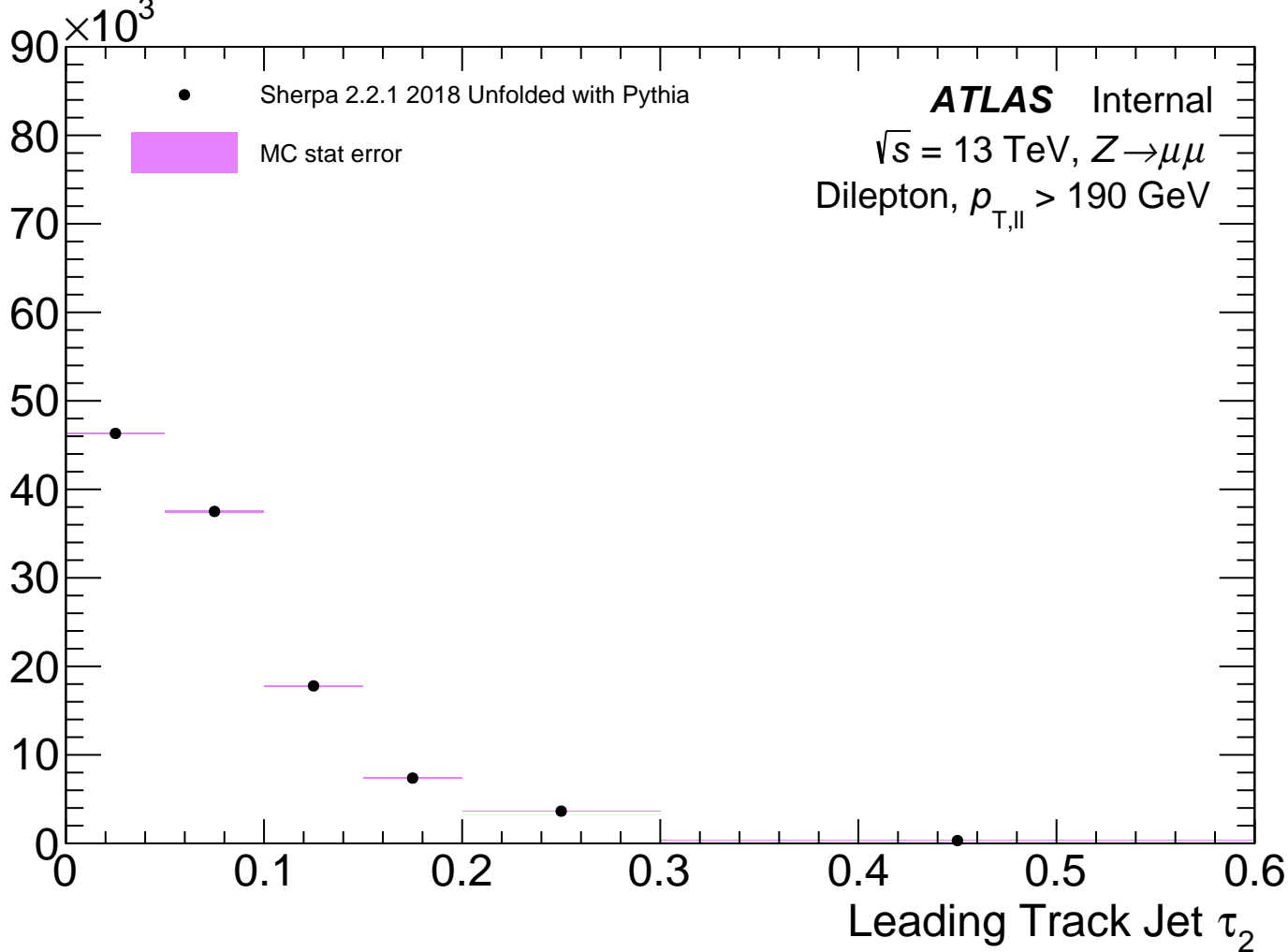
Events



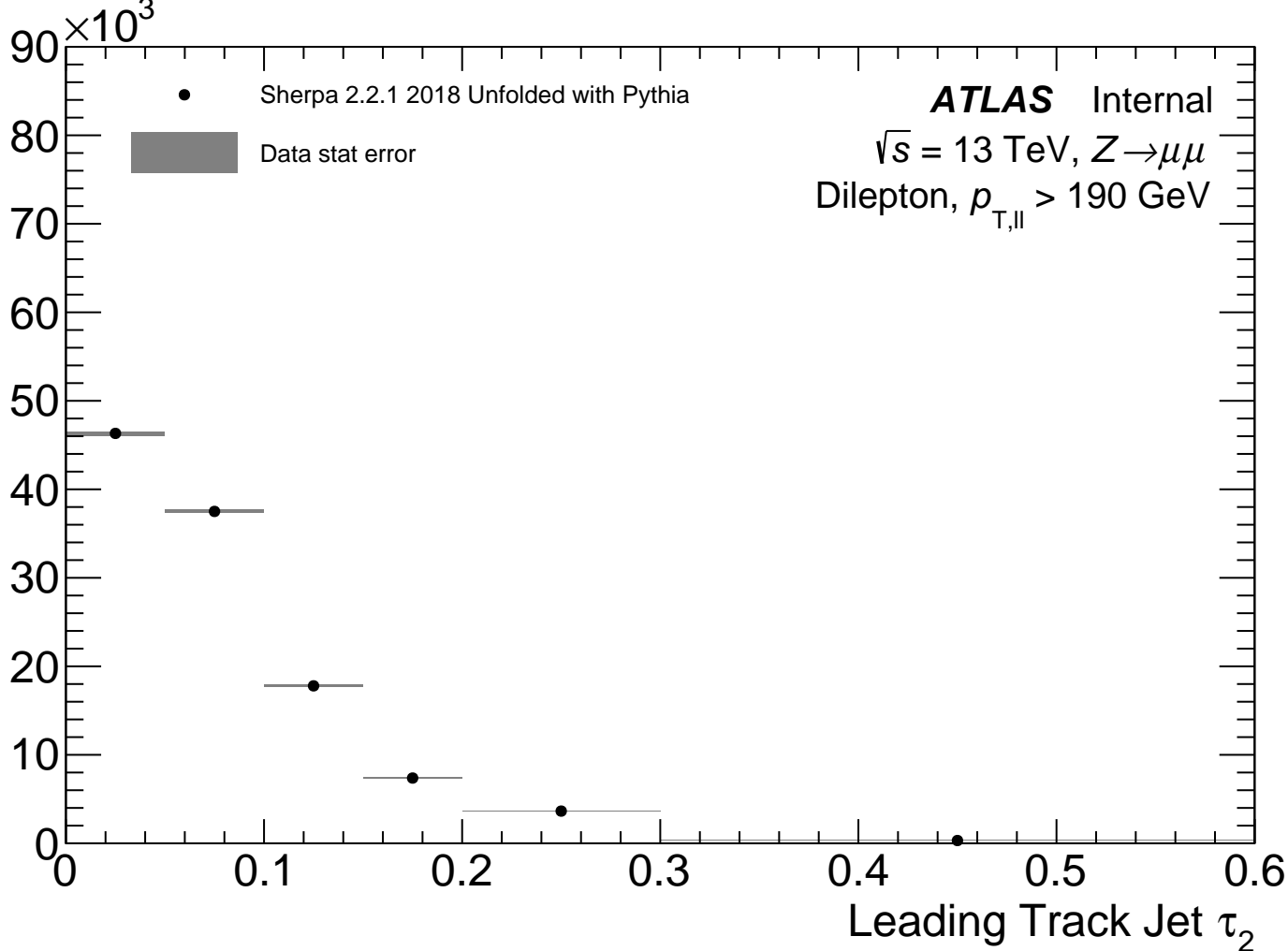
Events



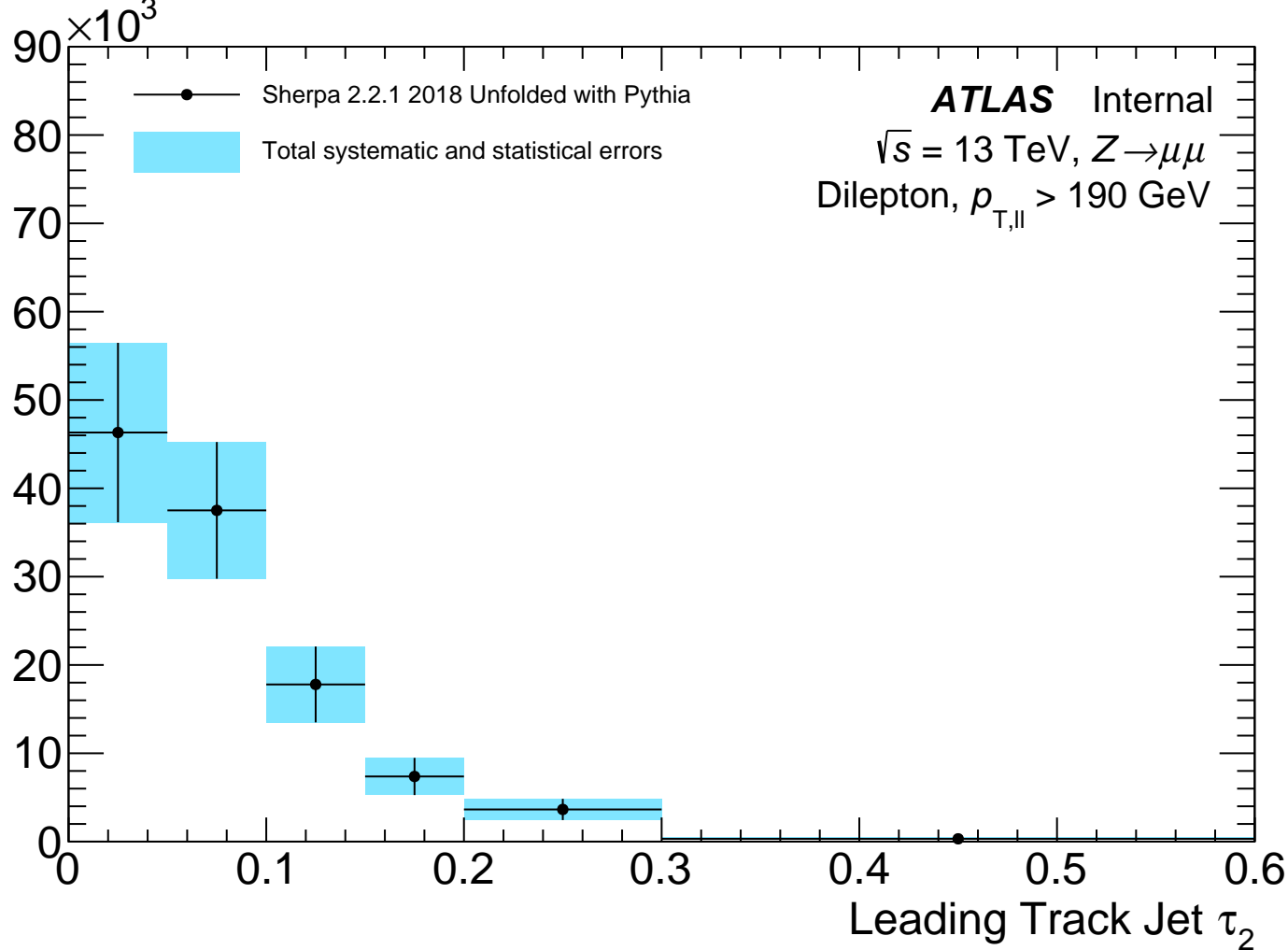
Events

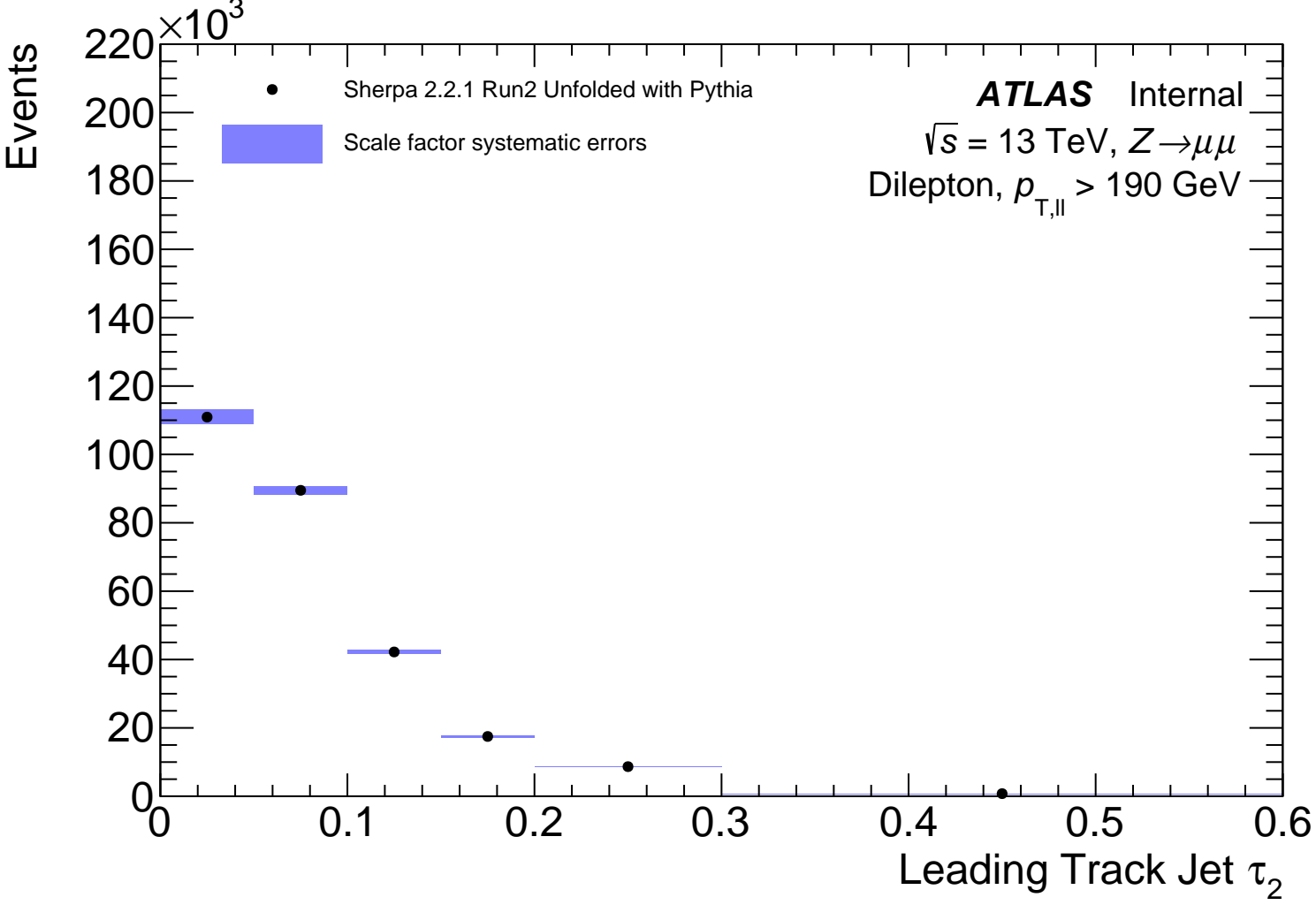


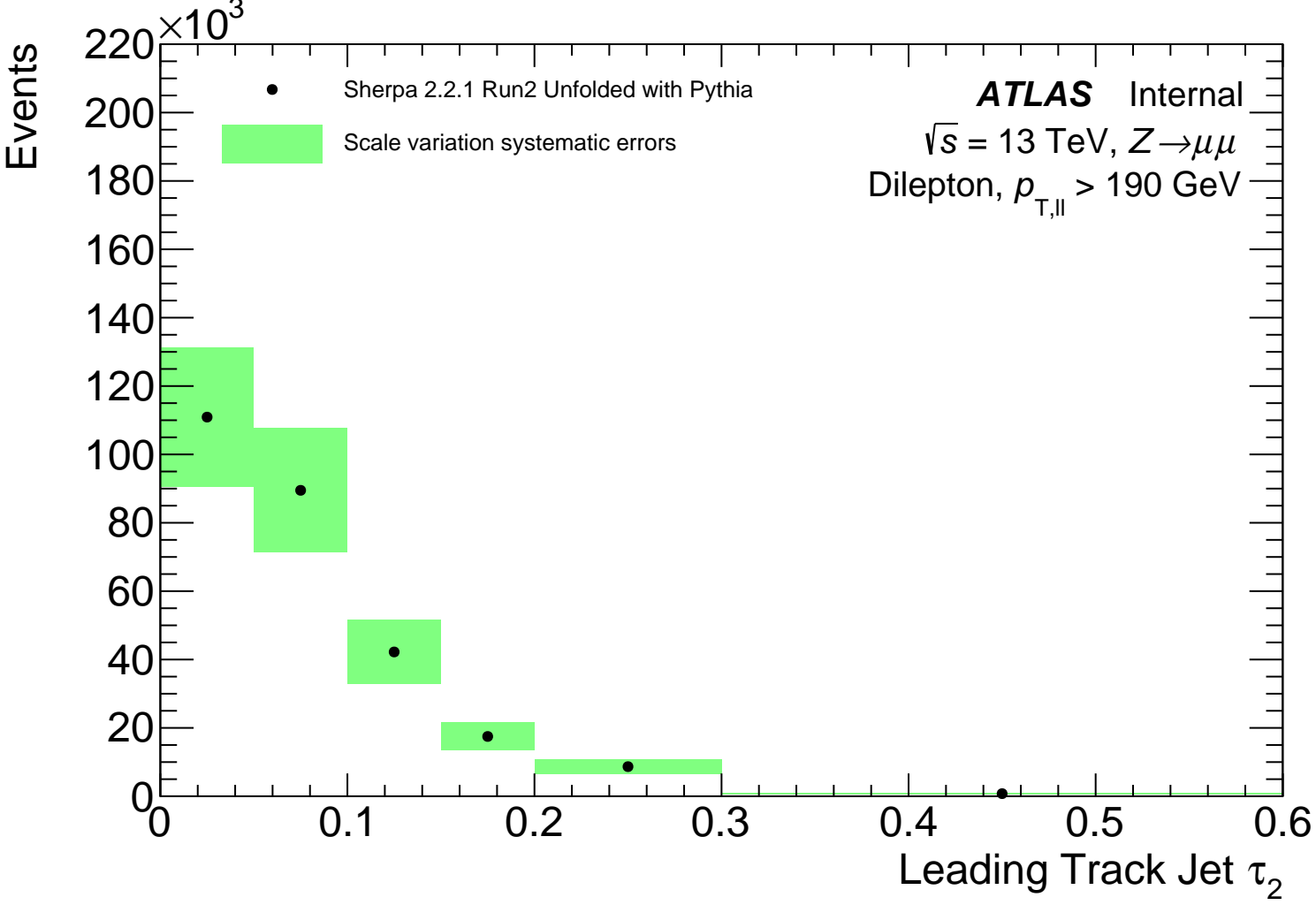
Events

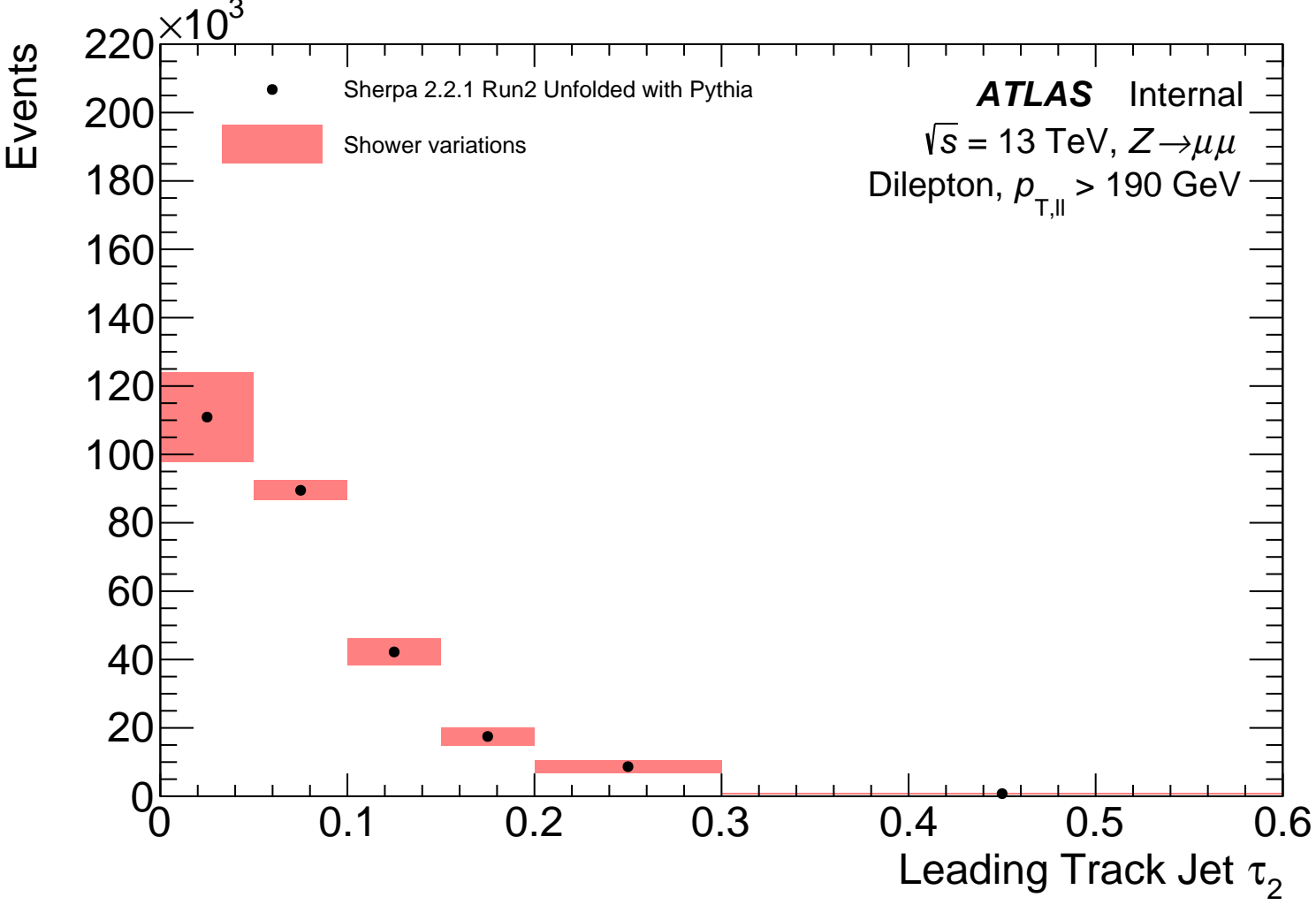


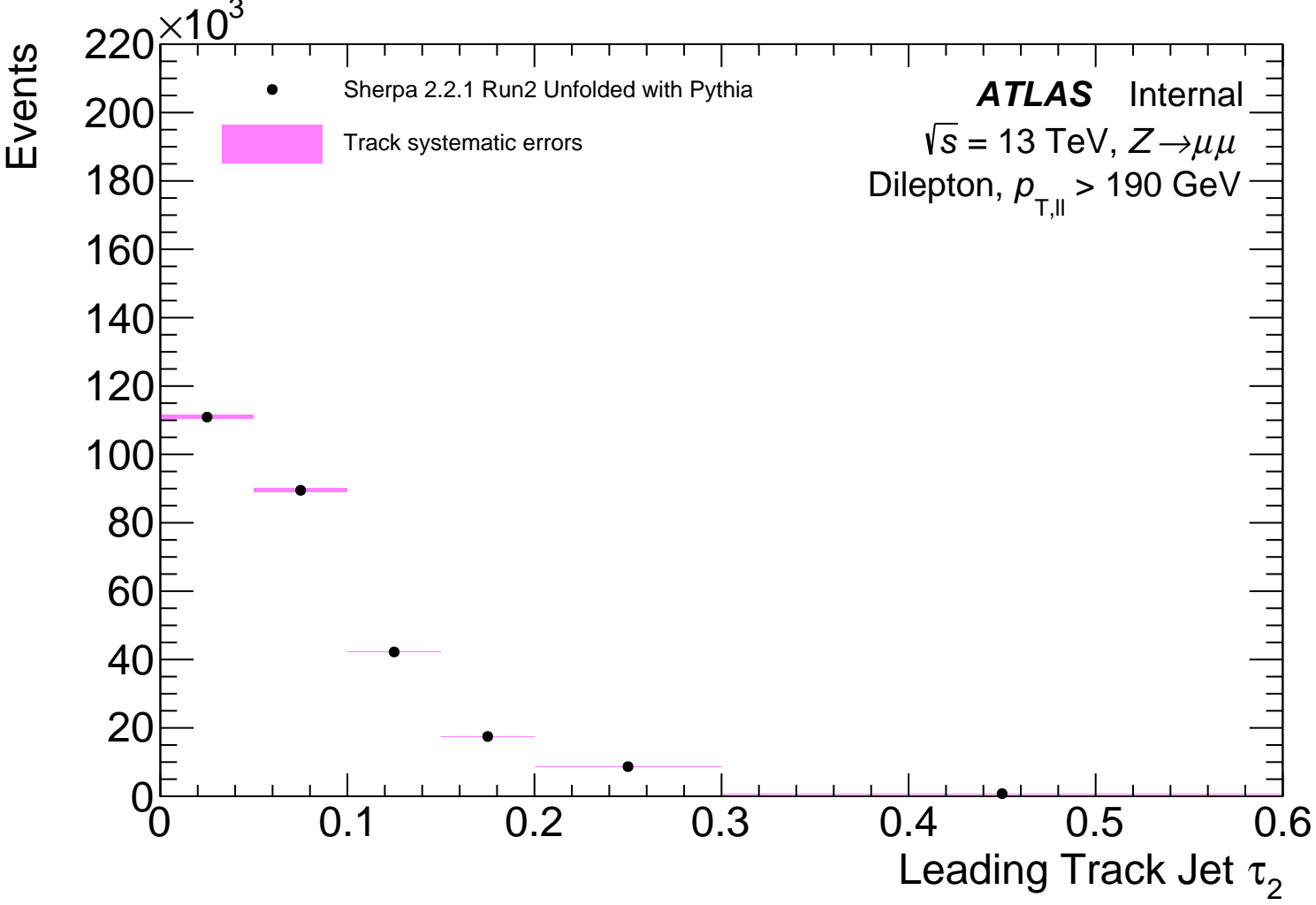
Events

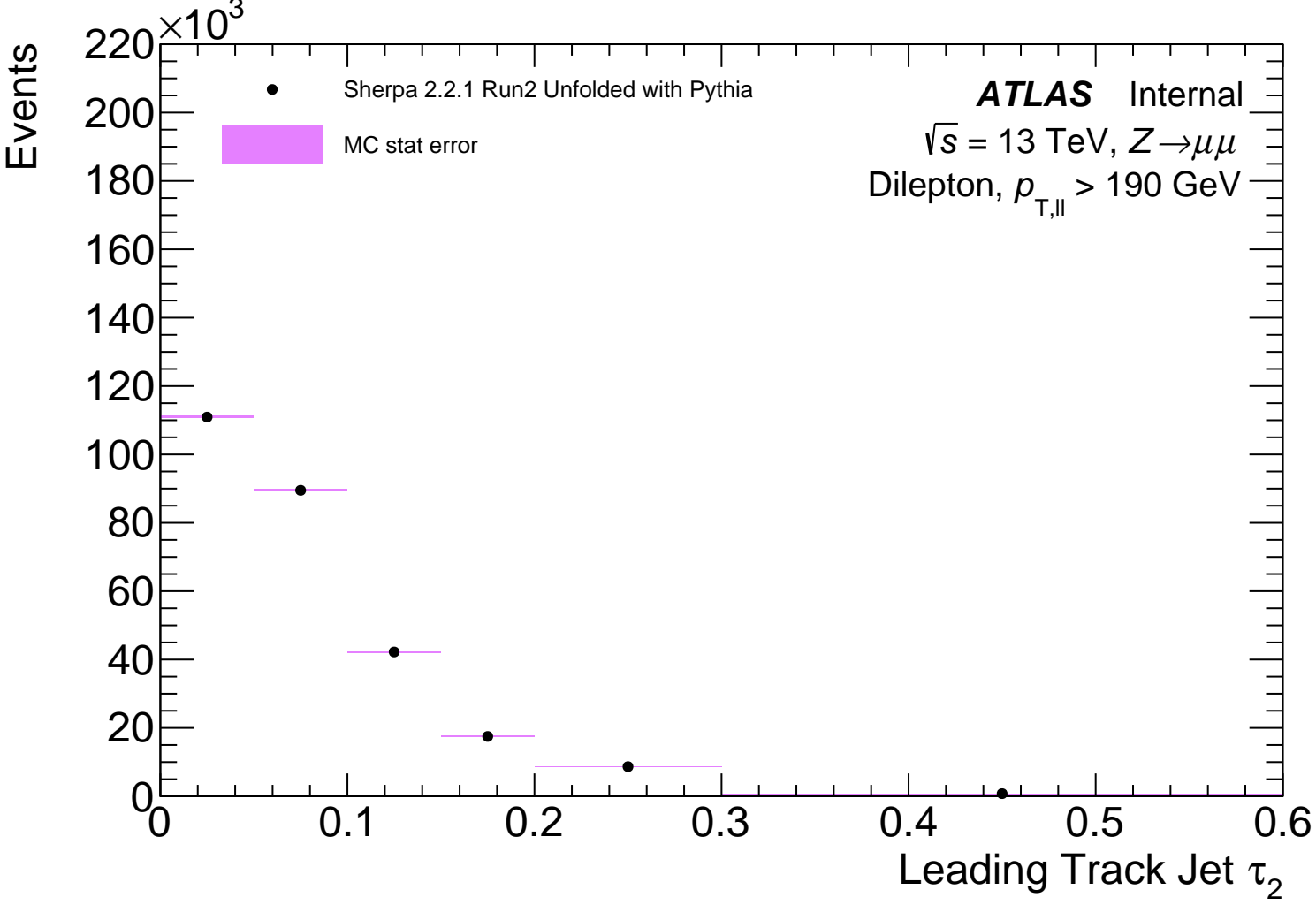


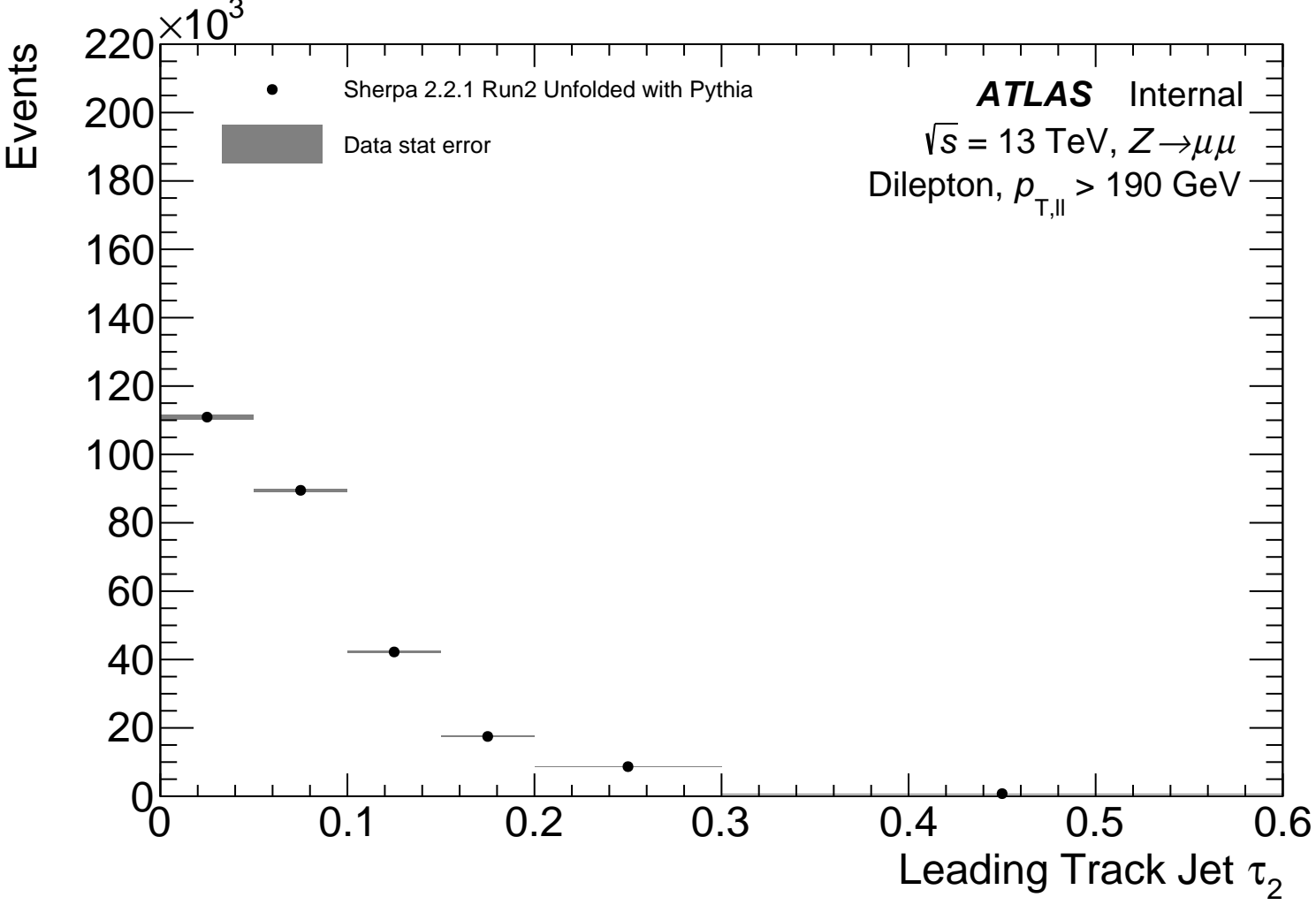


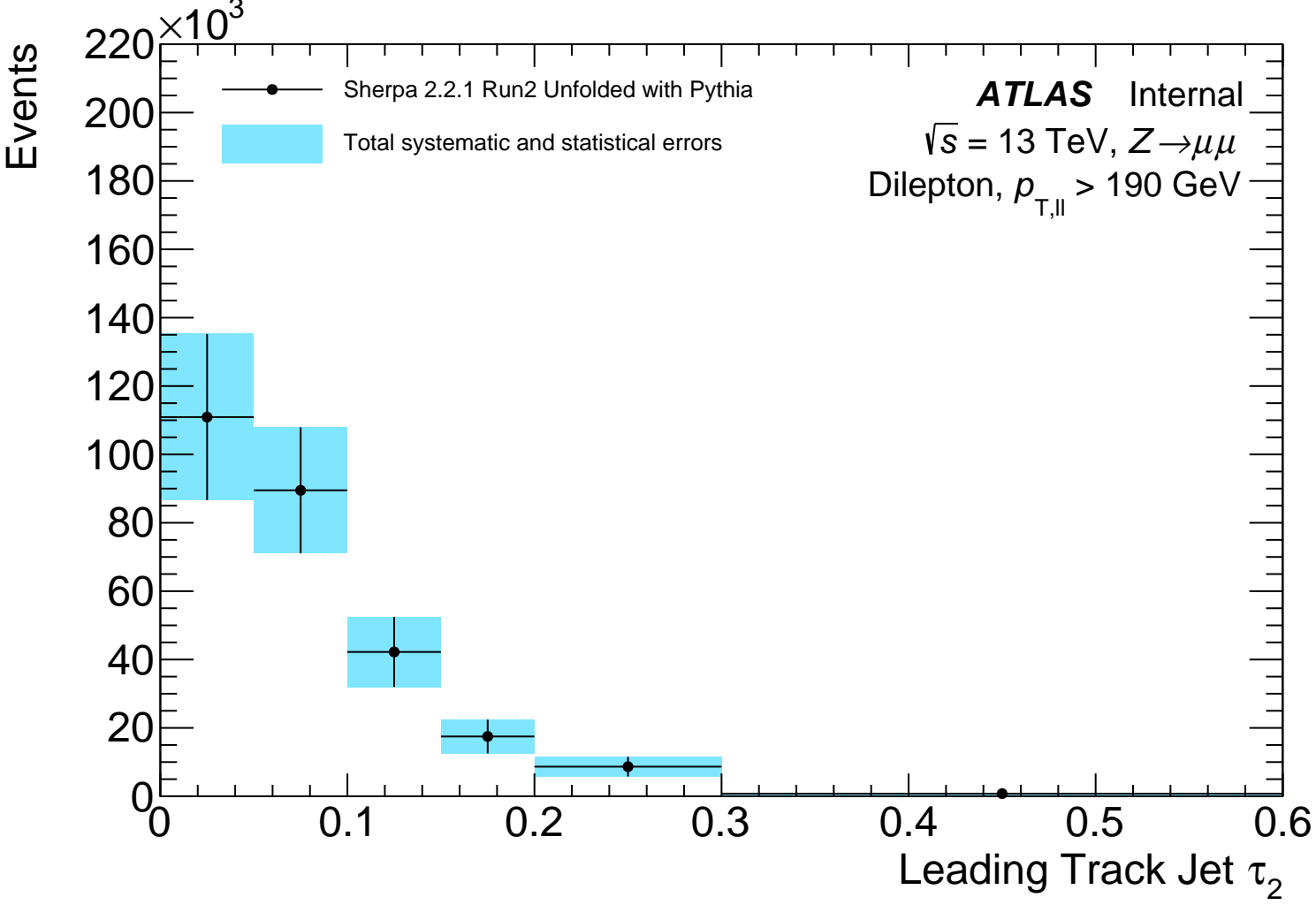




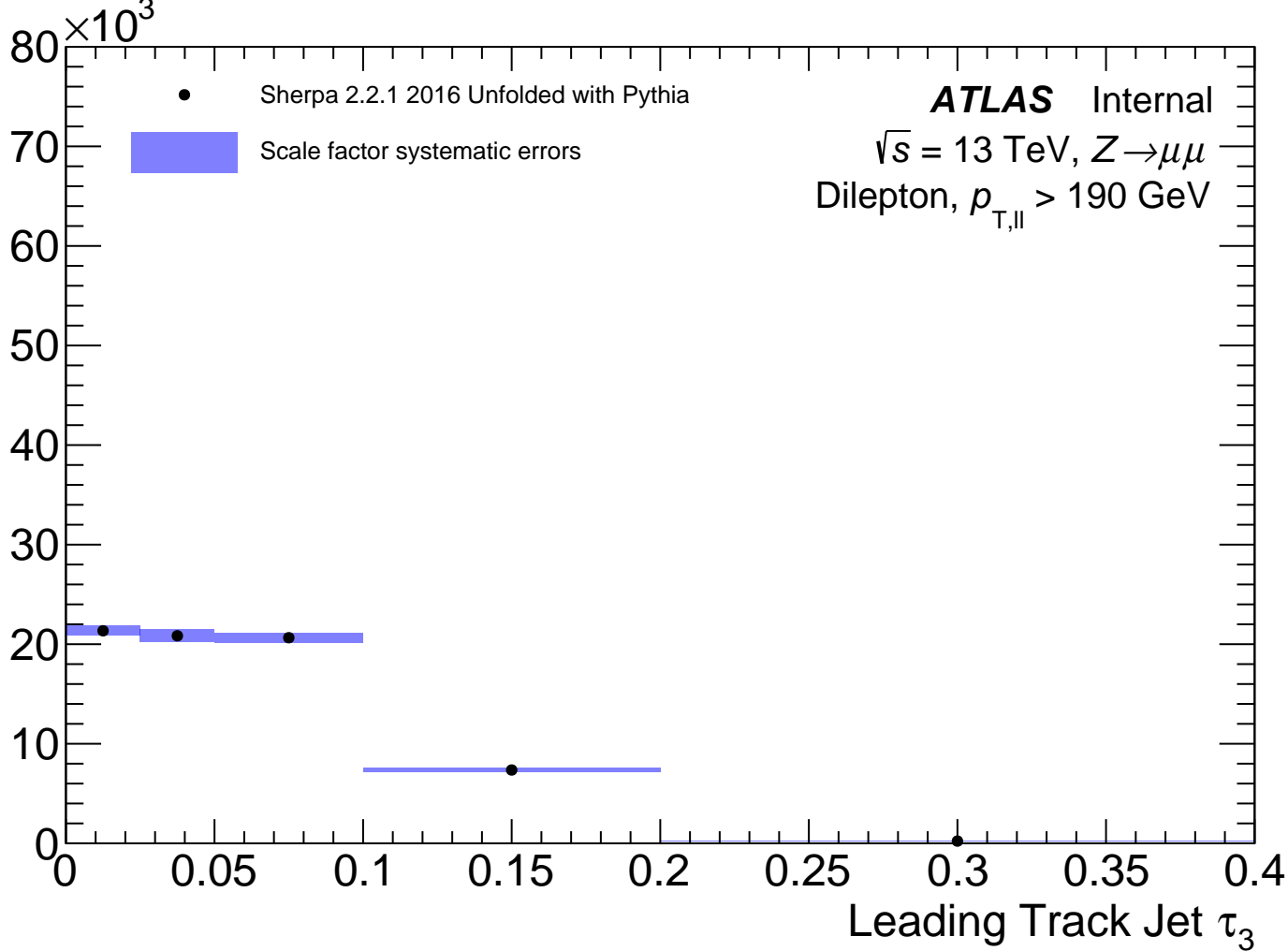




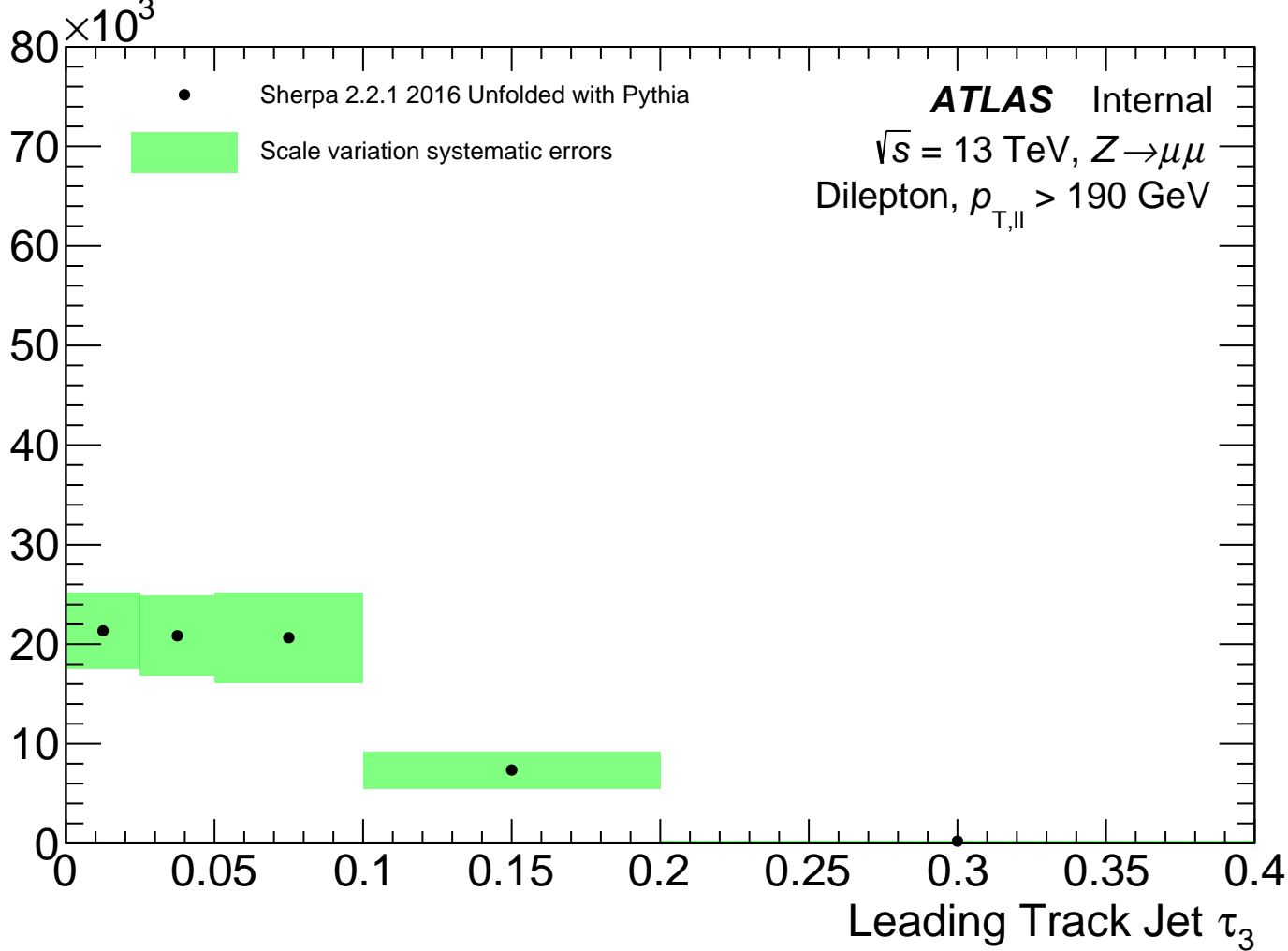




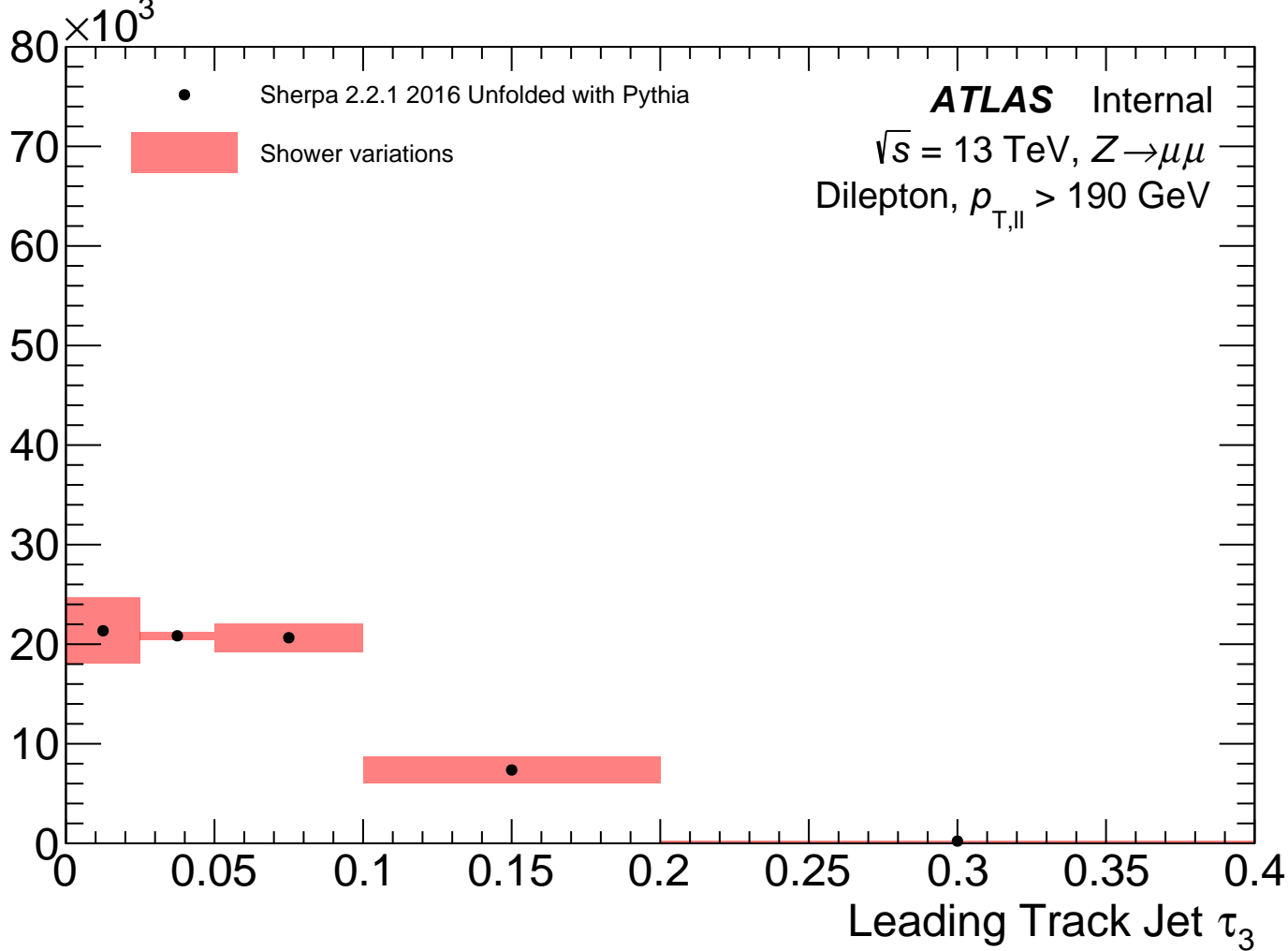
Events



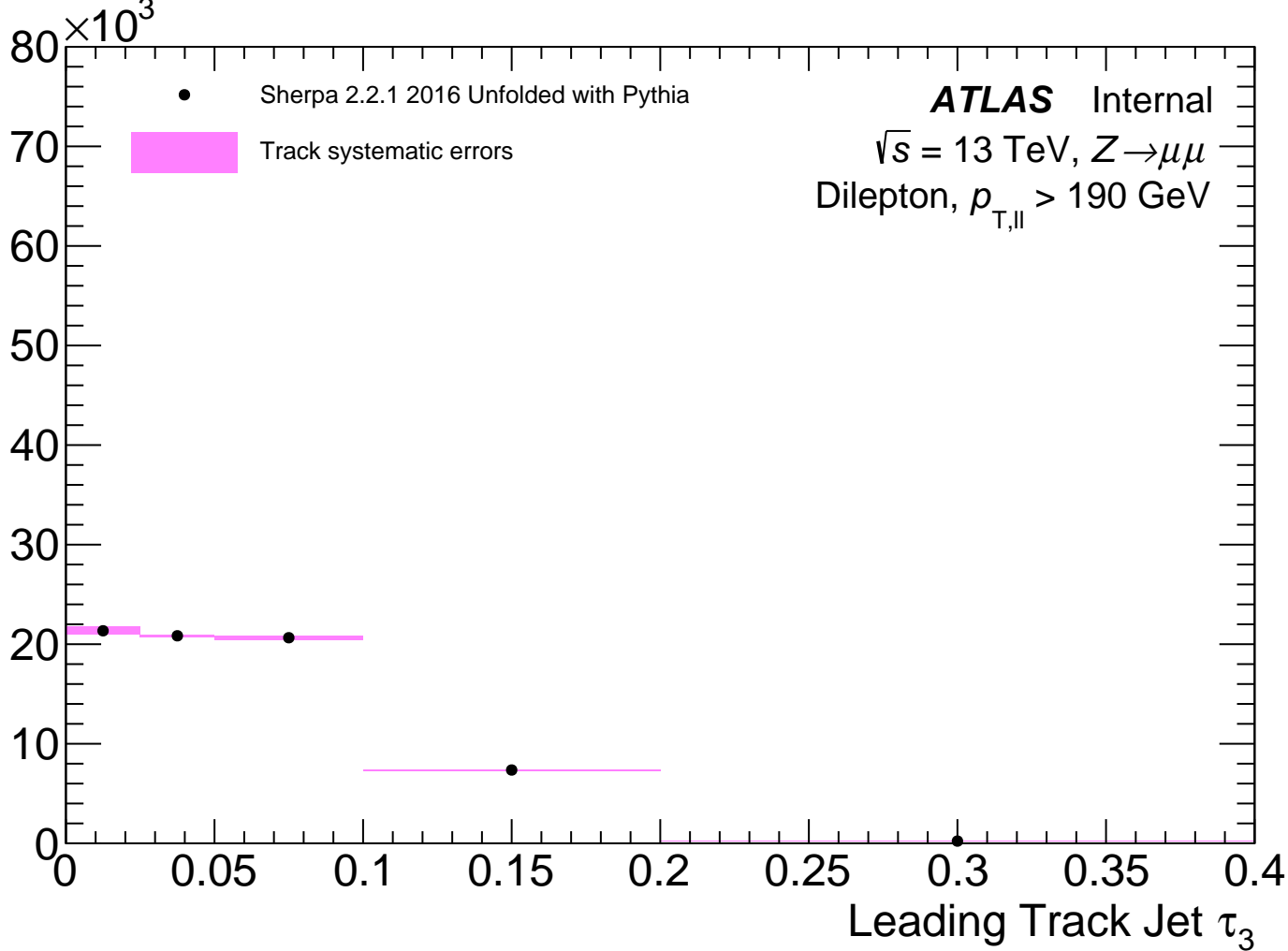
Events



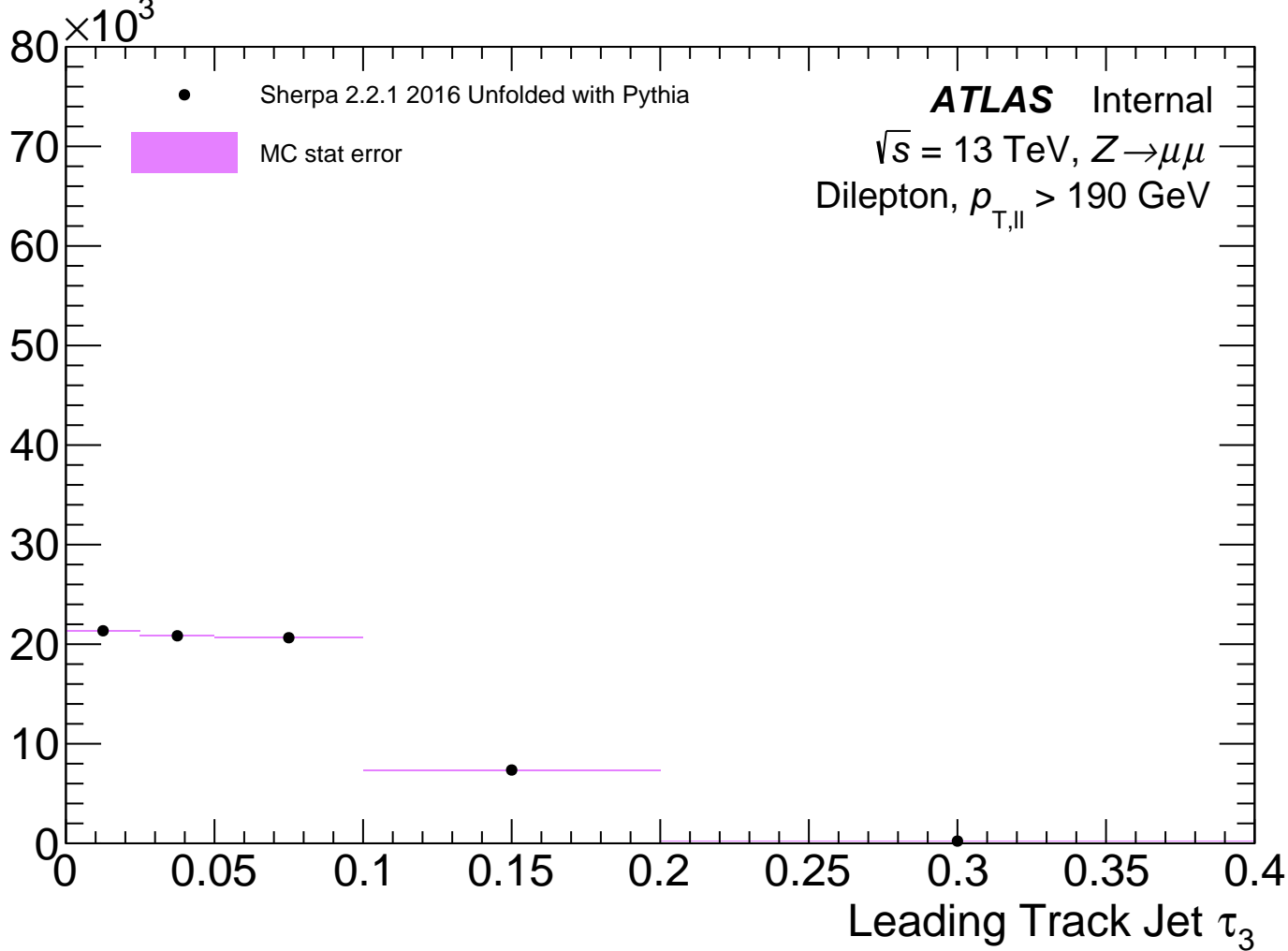
Events



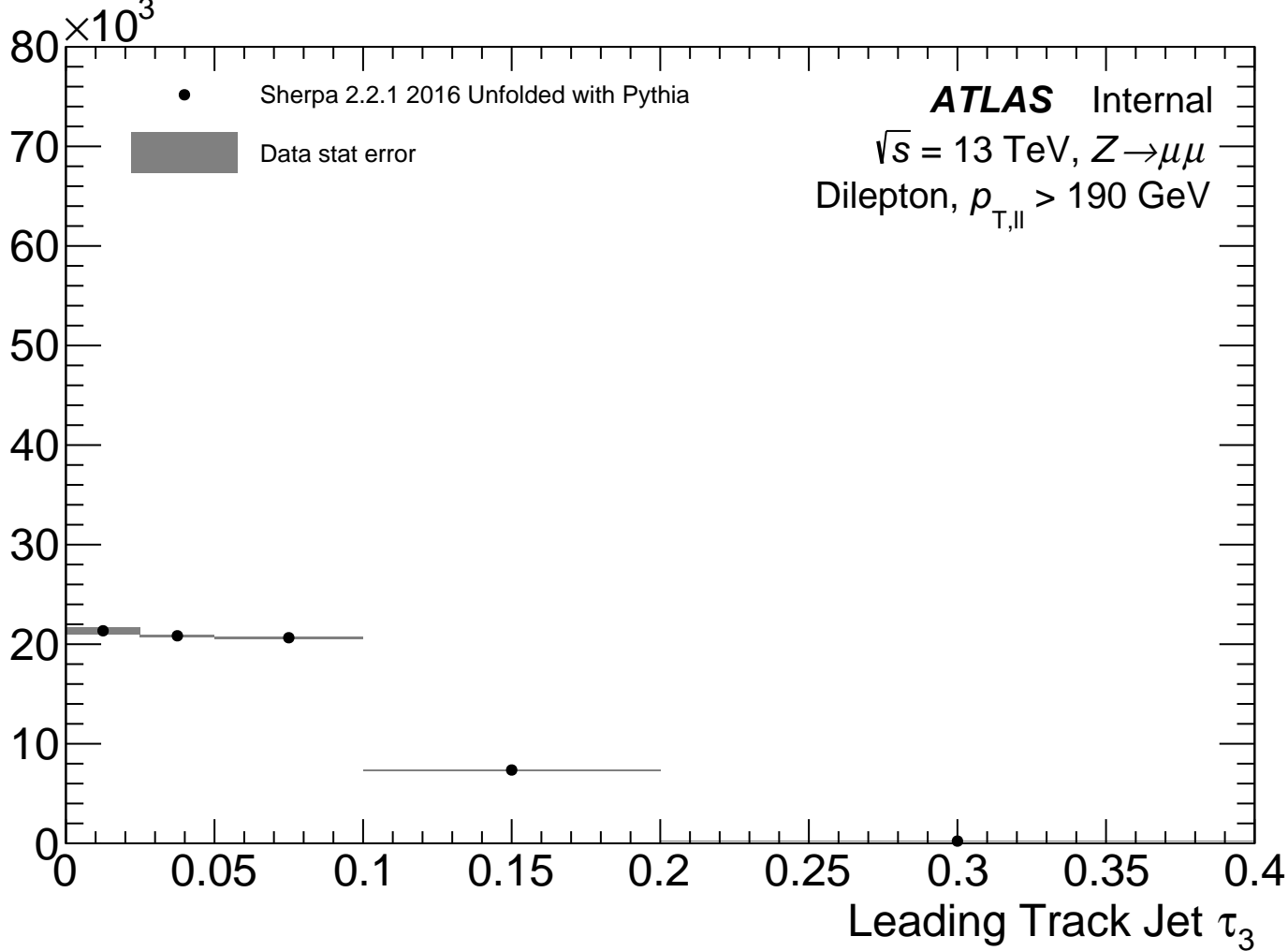
Events



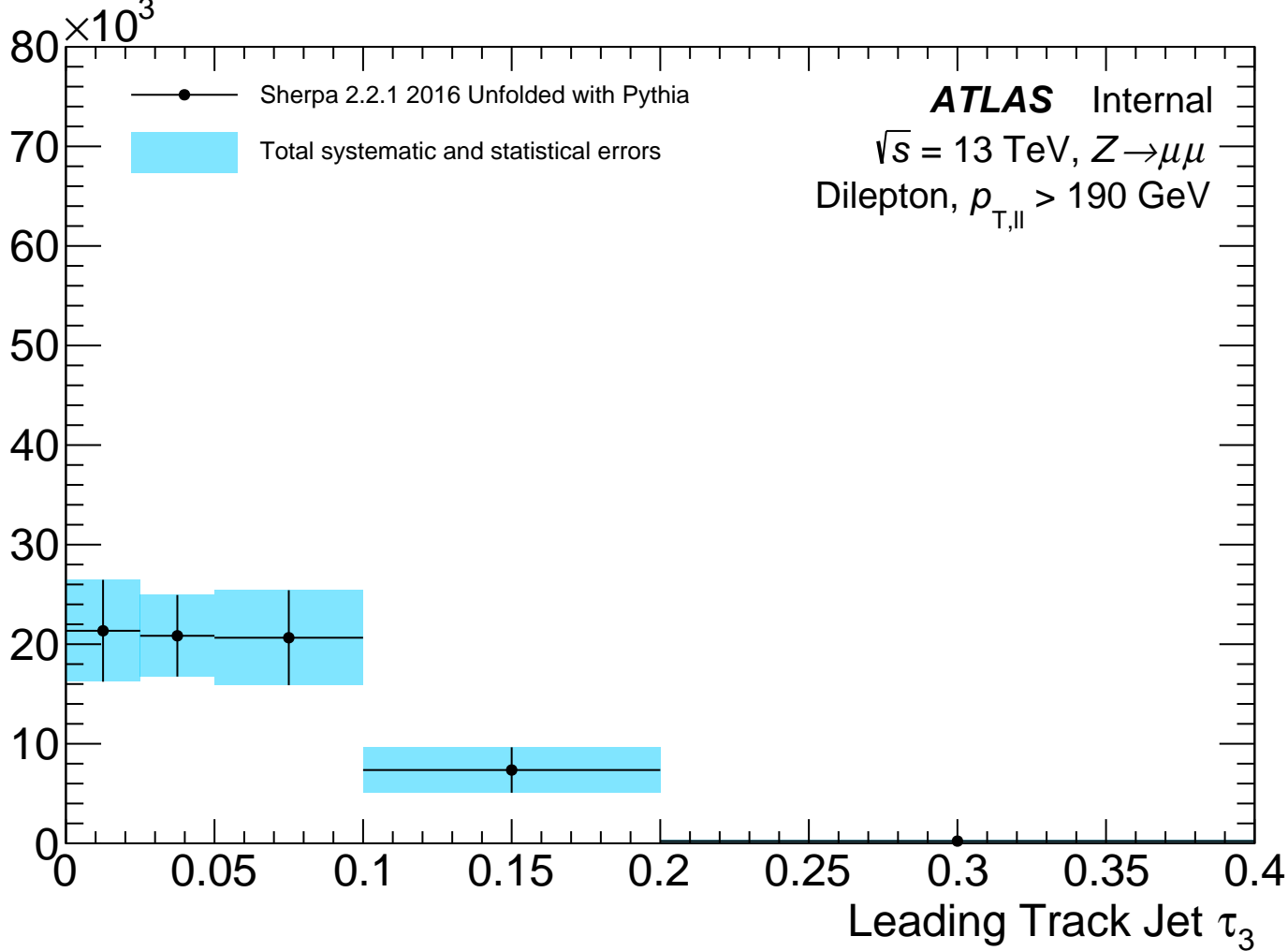
Events



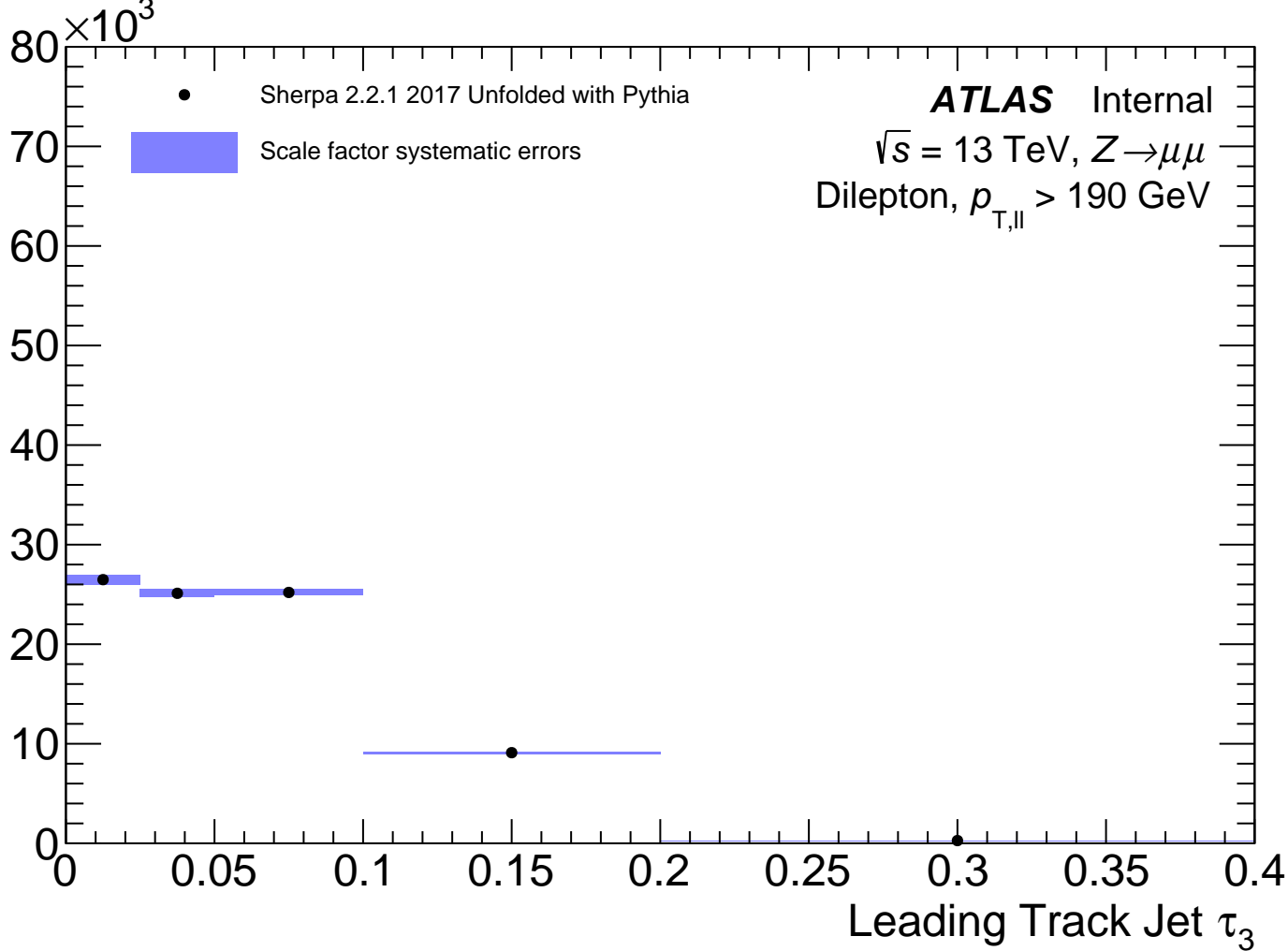
Events



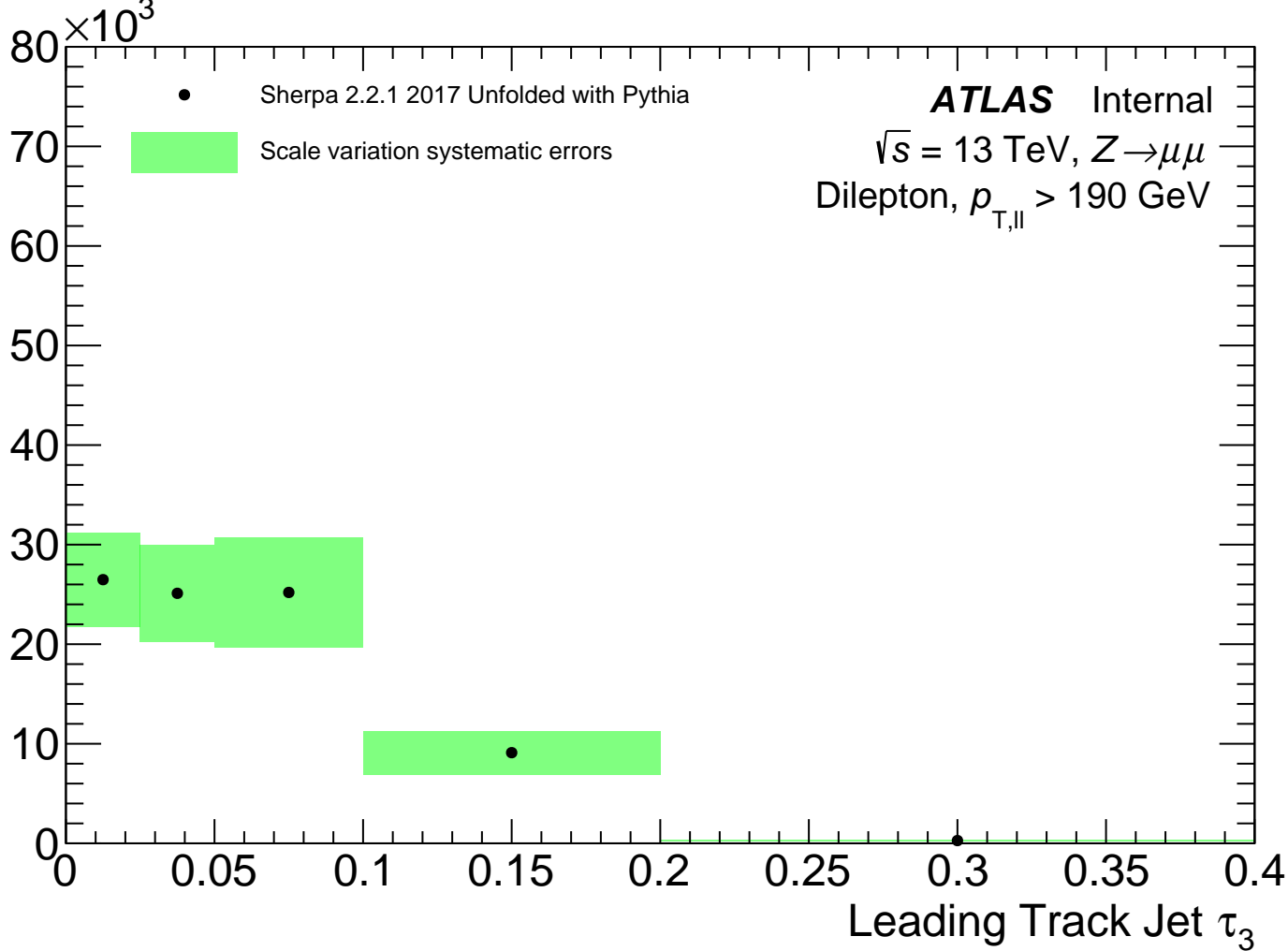
Events



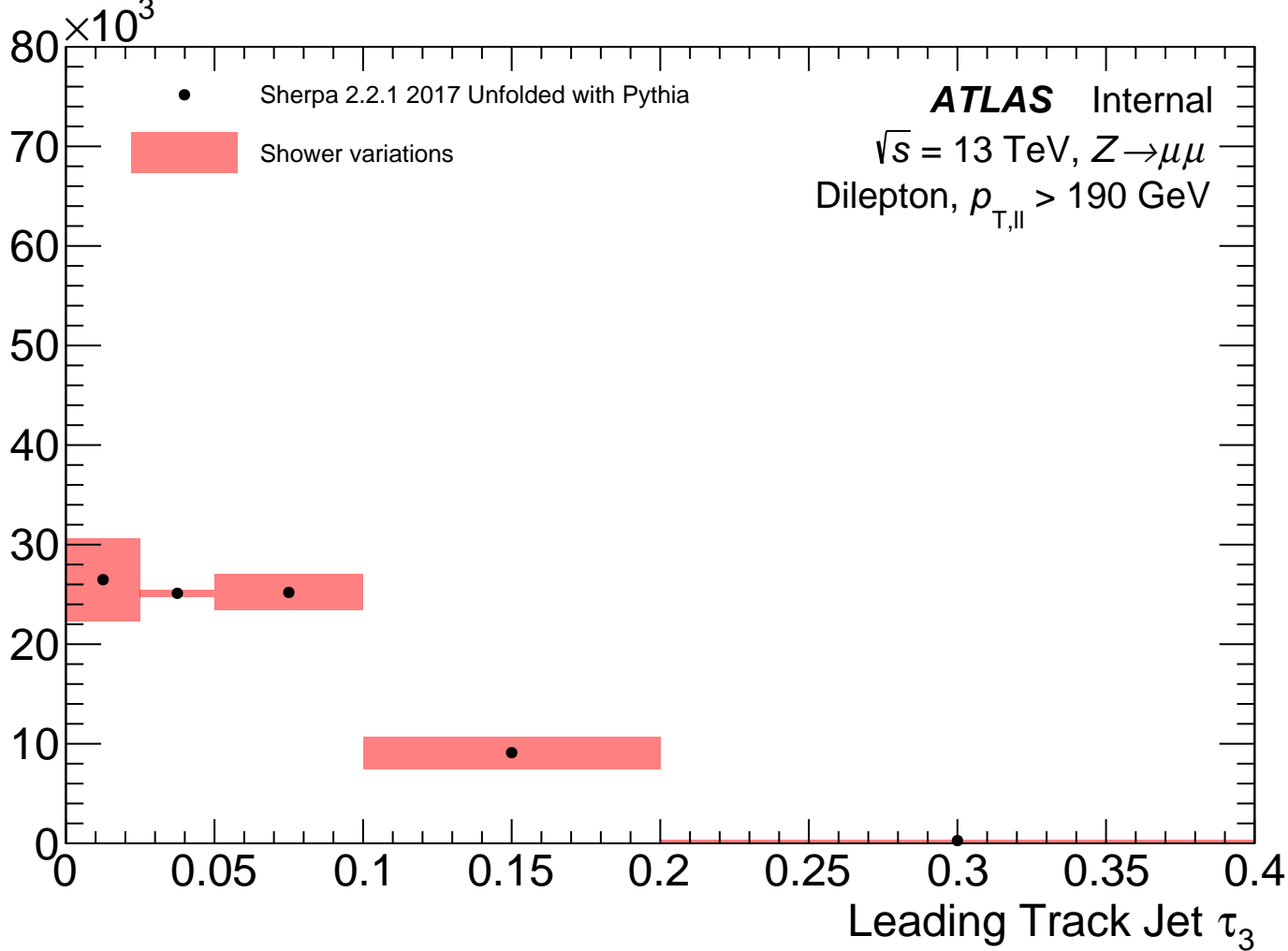
Events



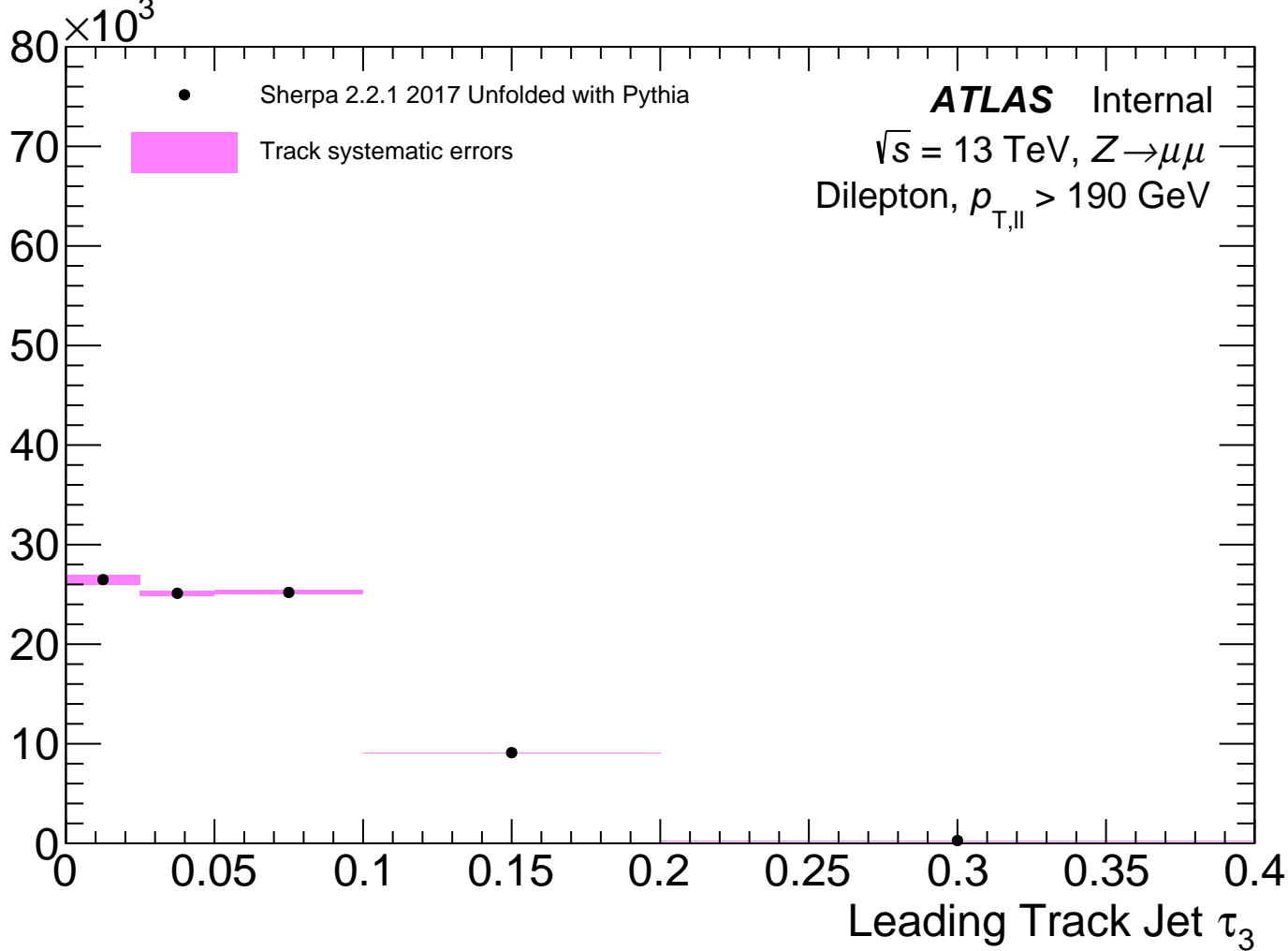
Events



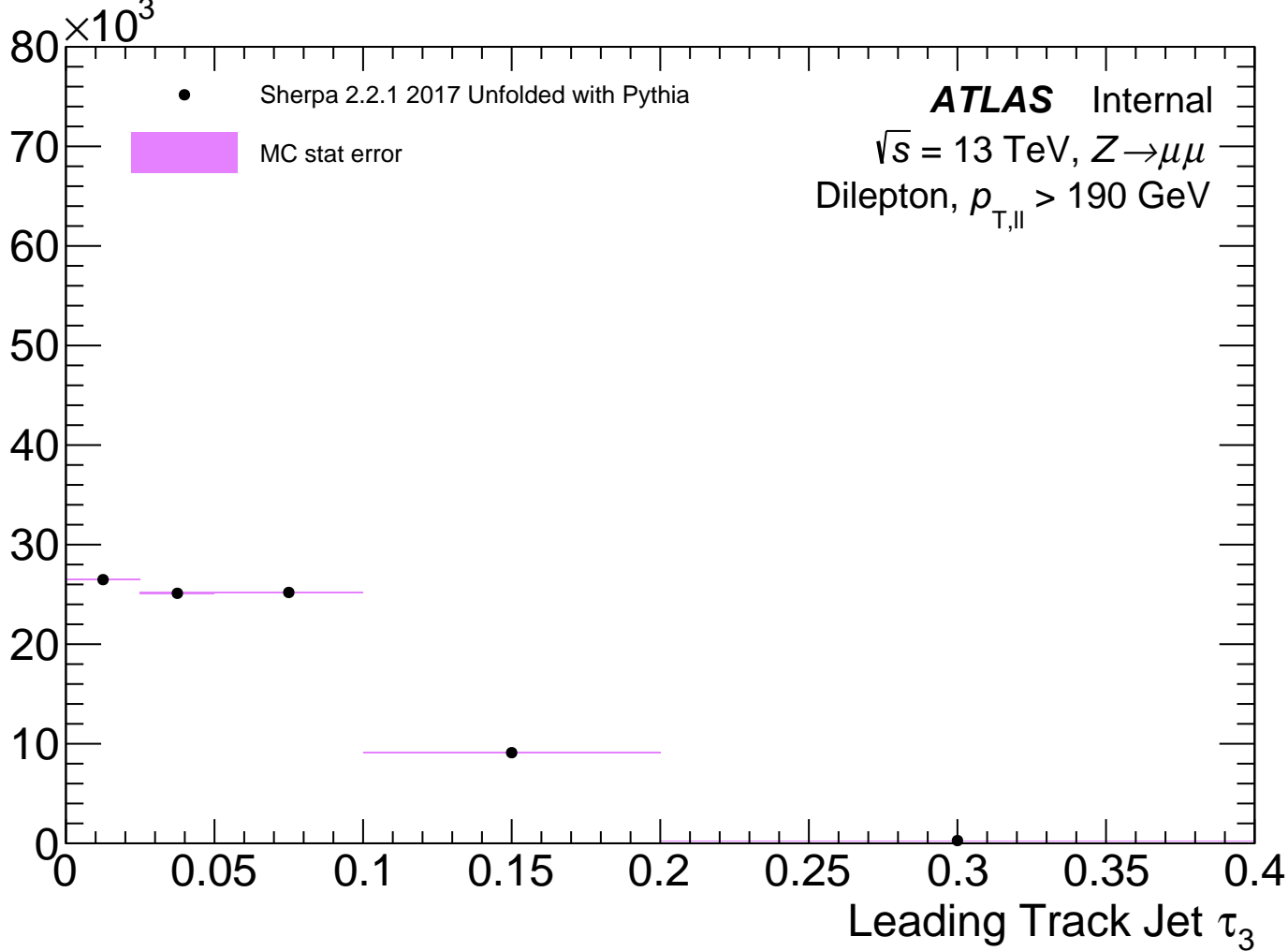
Events



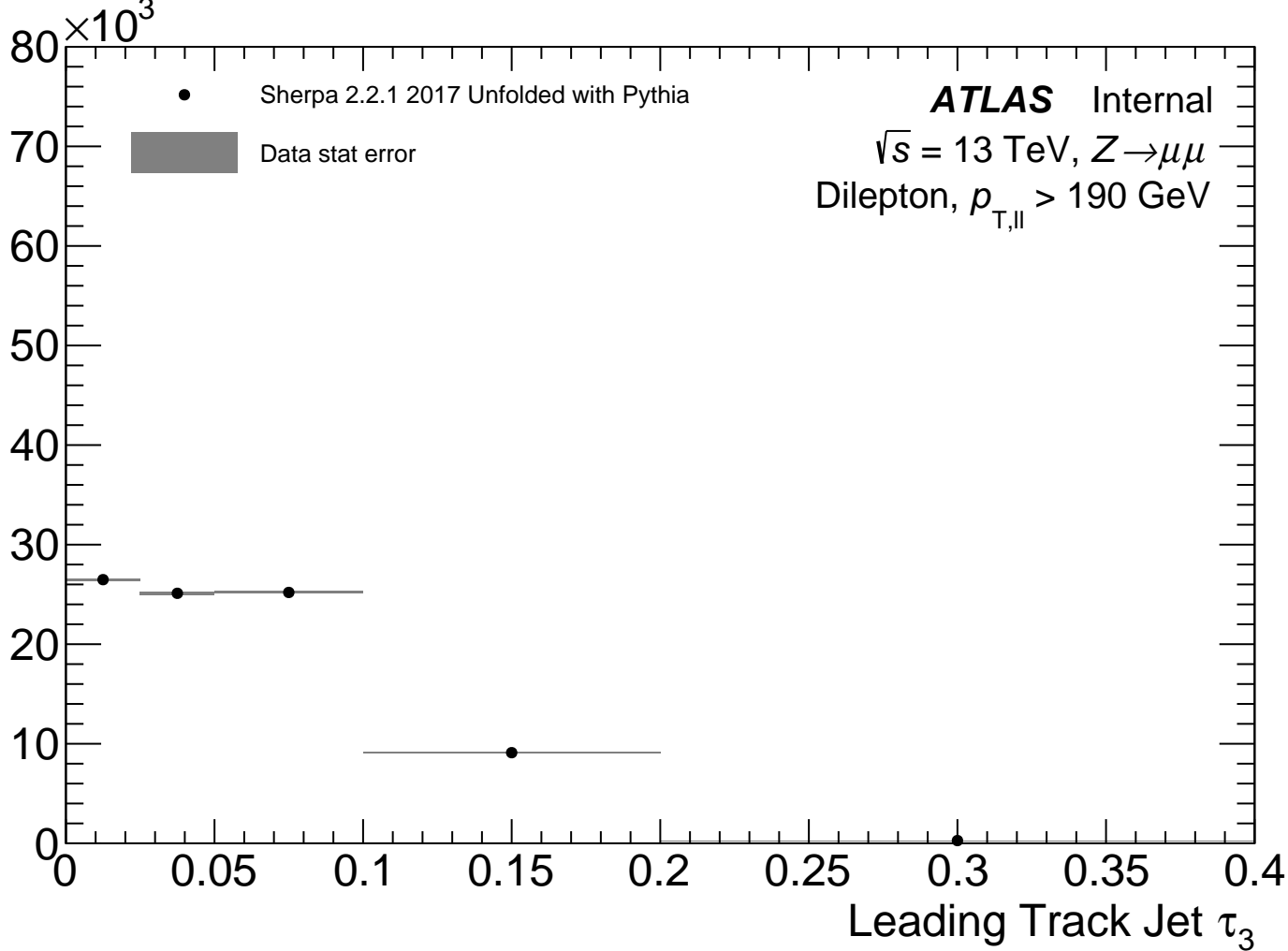
Events



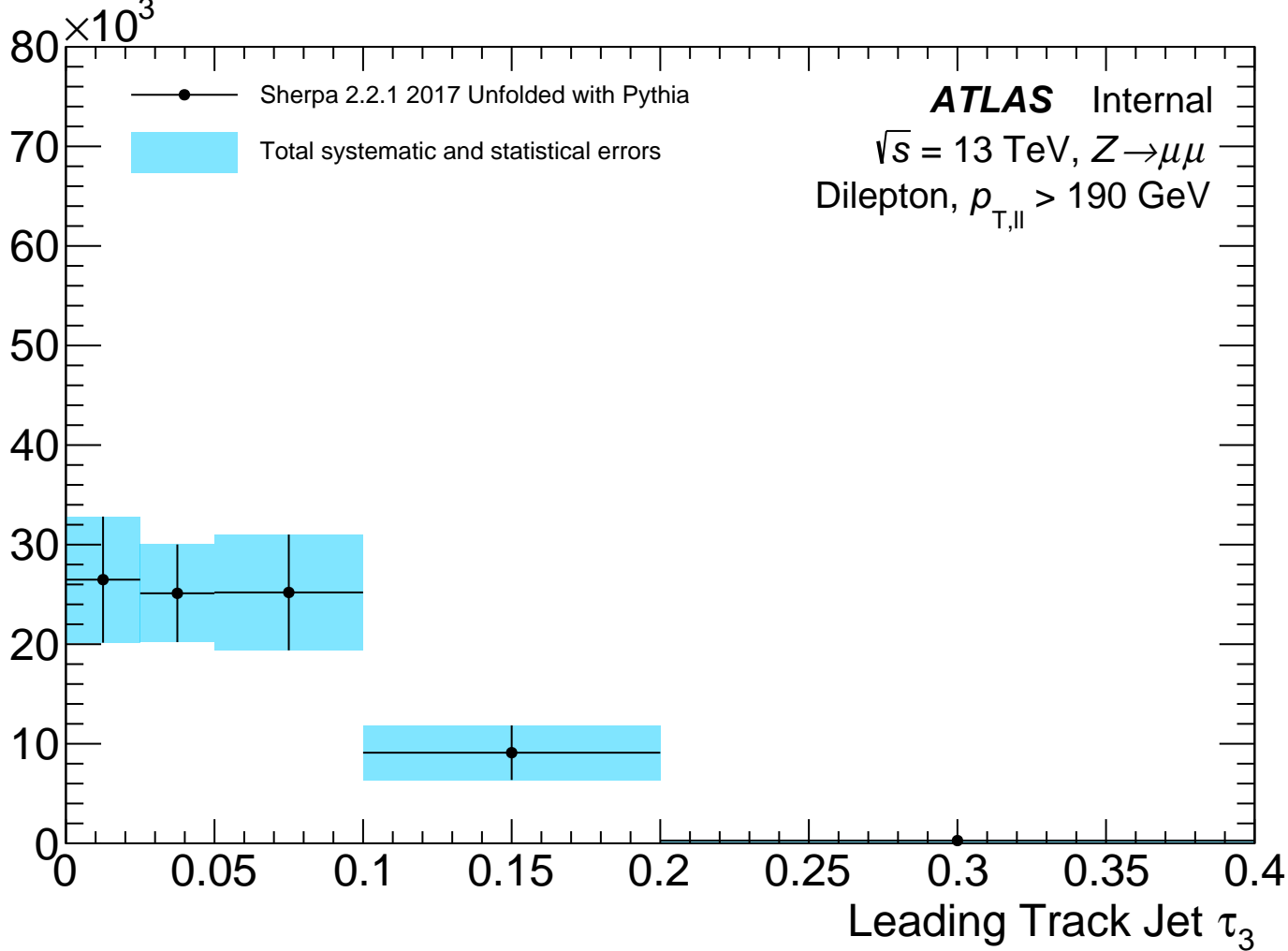
Events



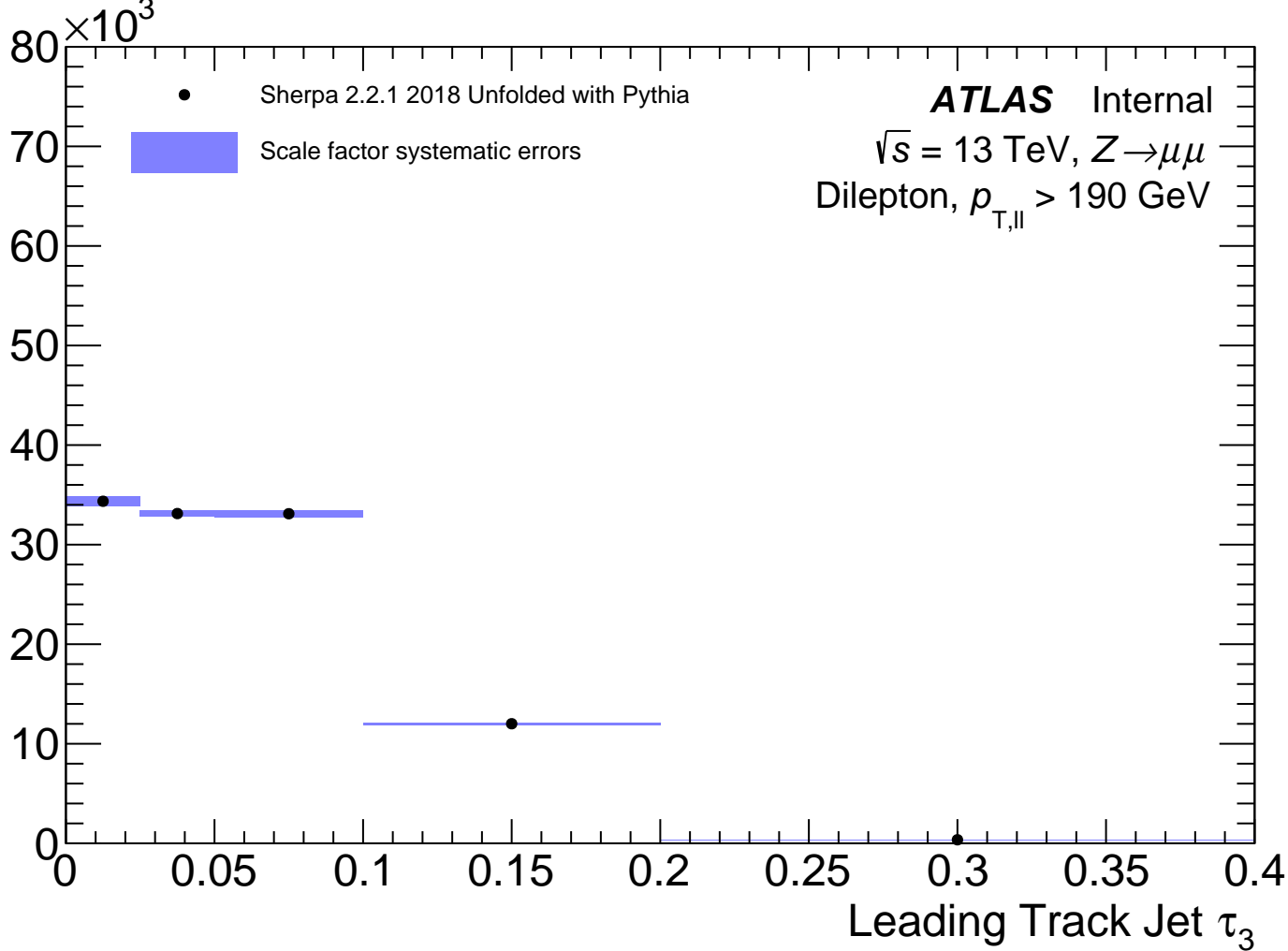
Events



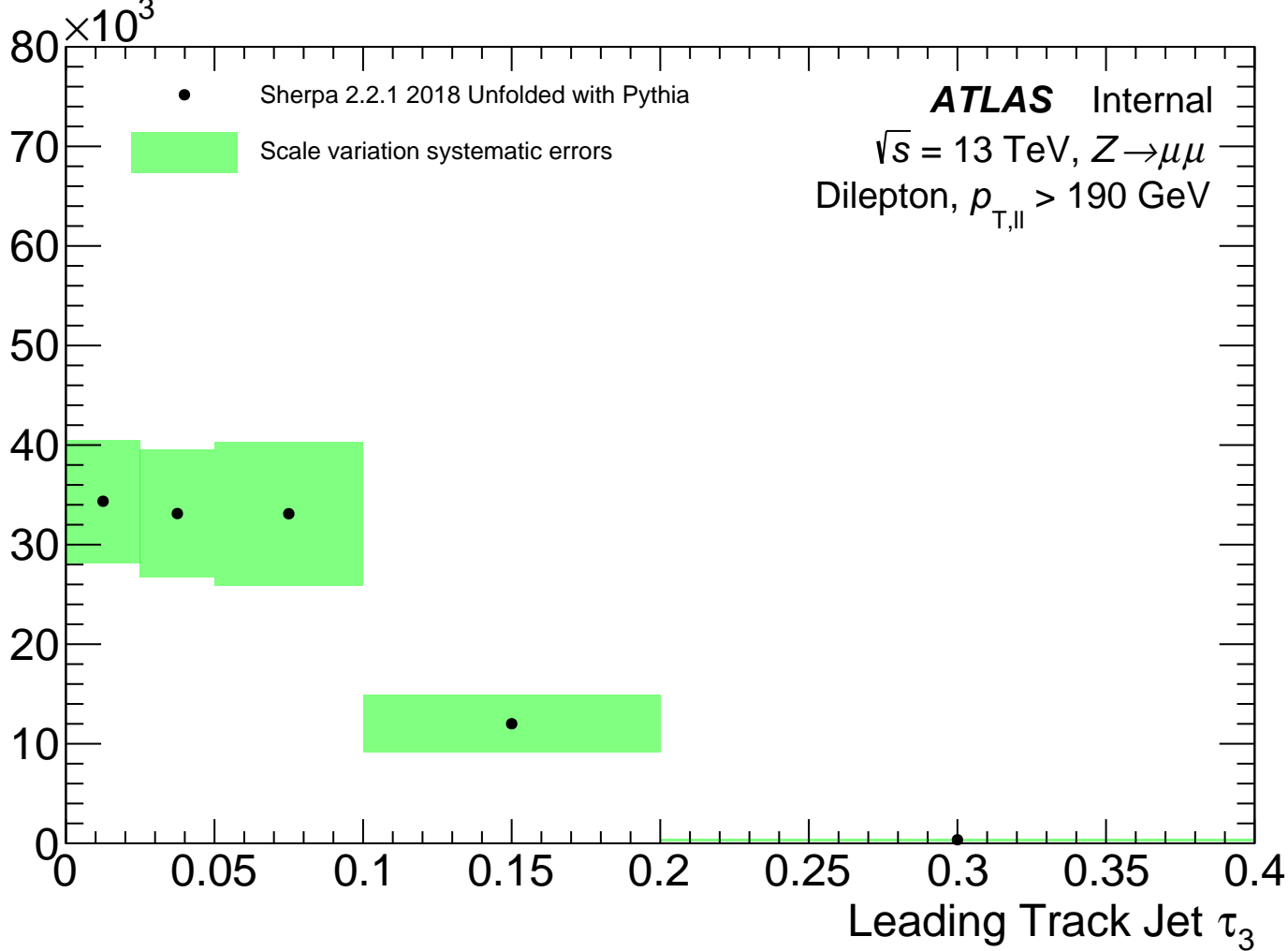
Events



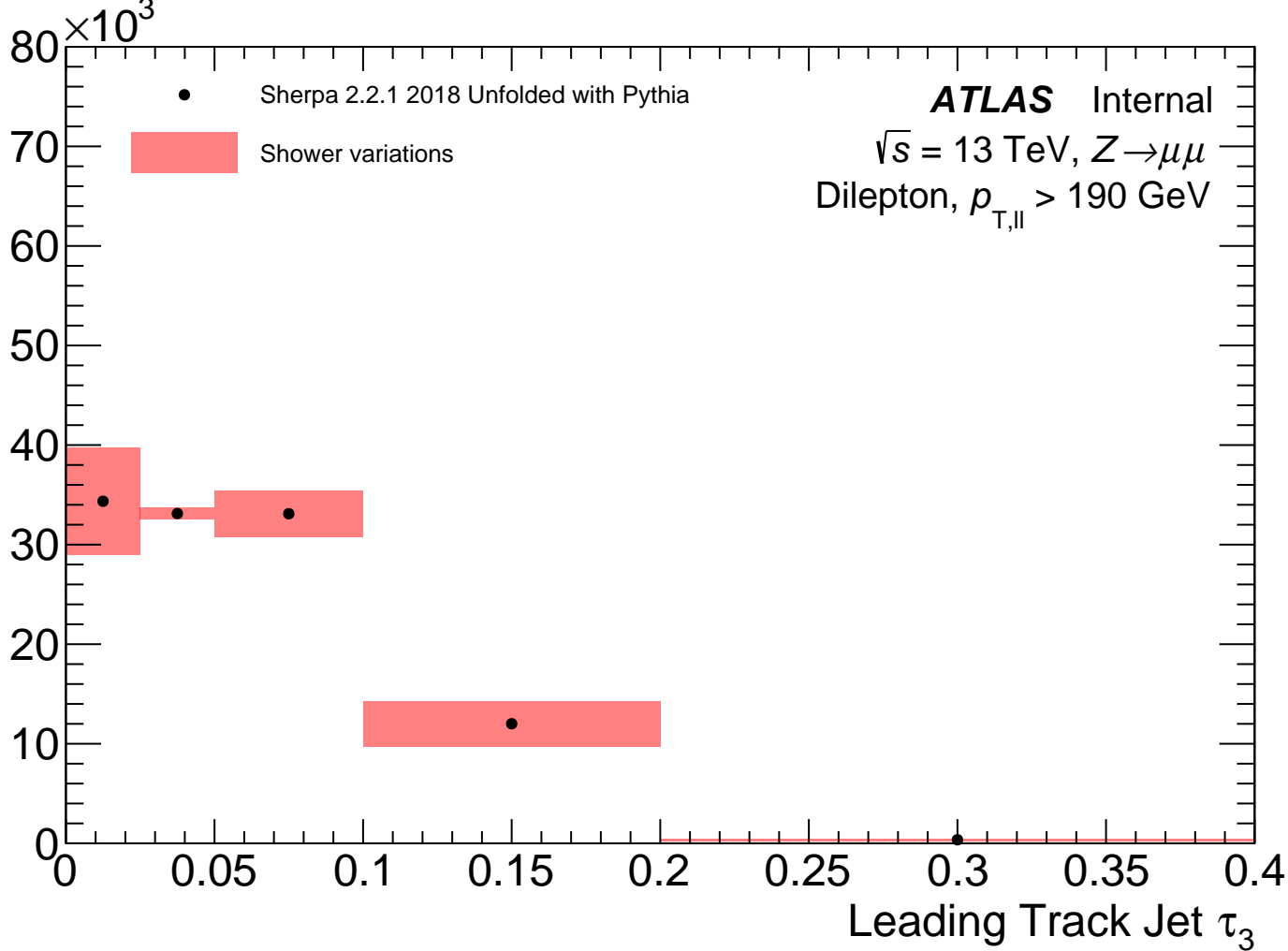
Events



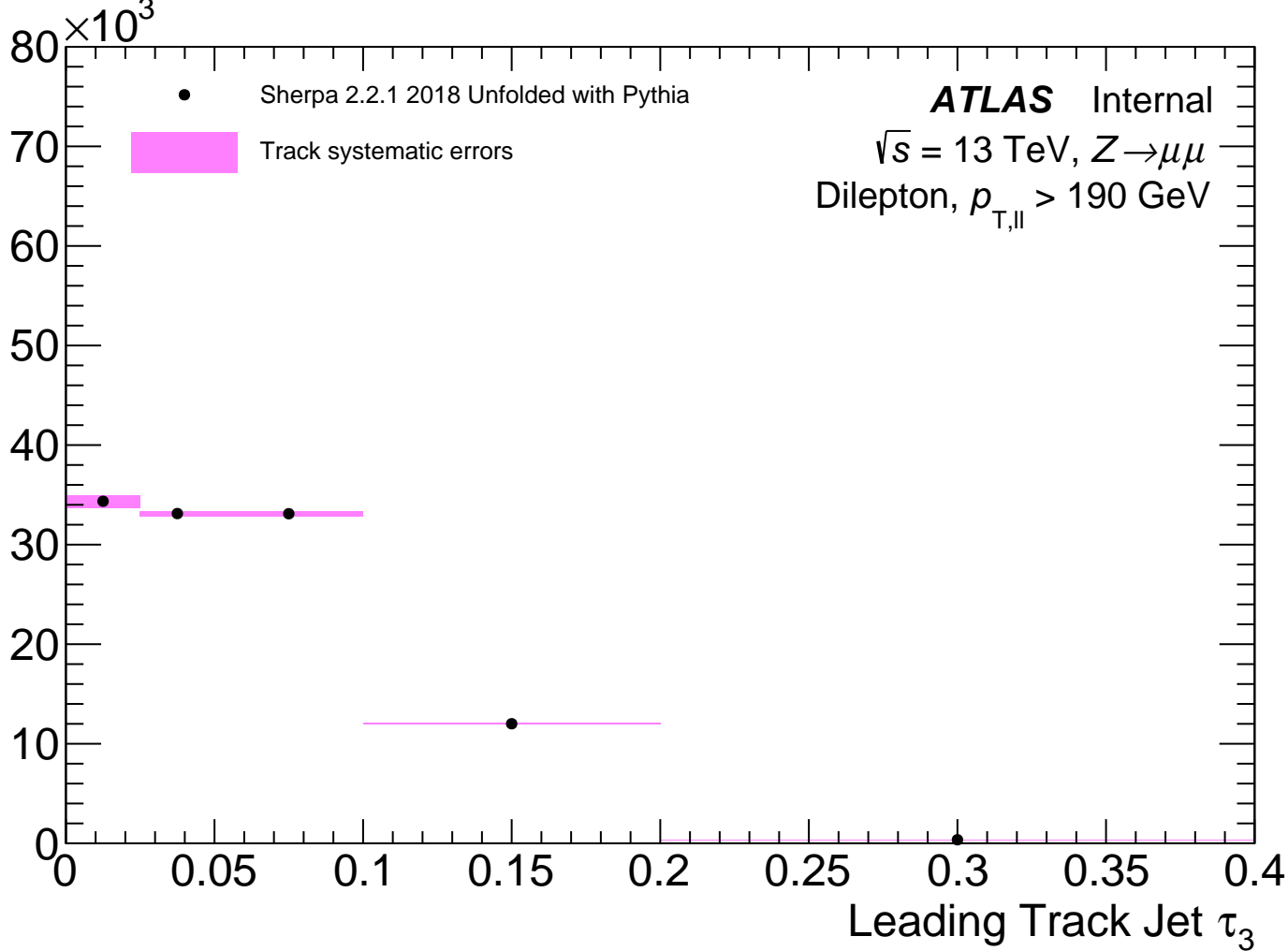
Events



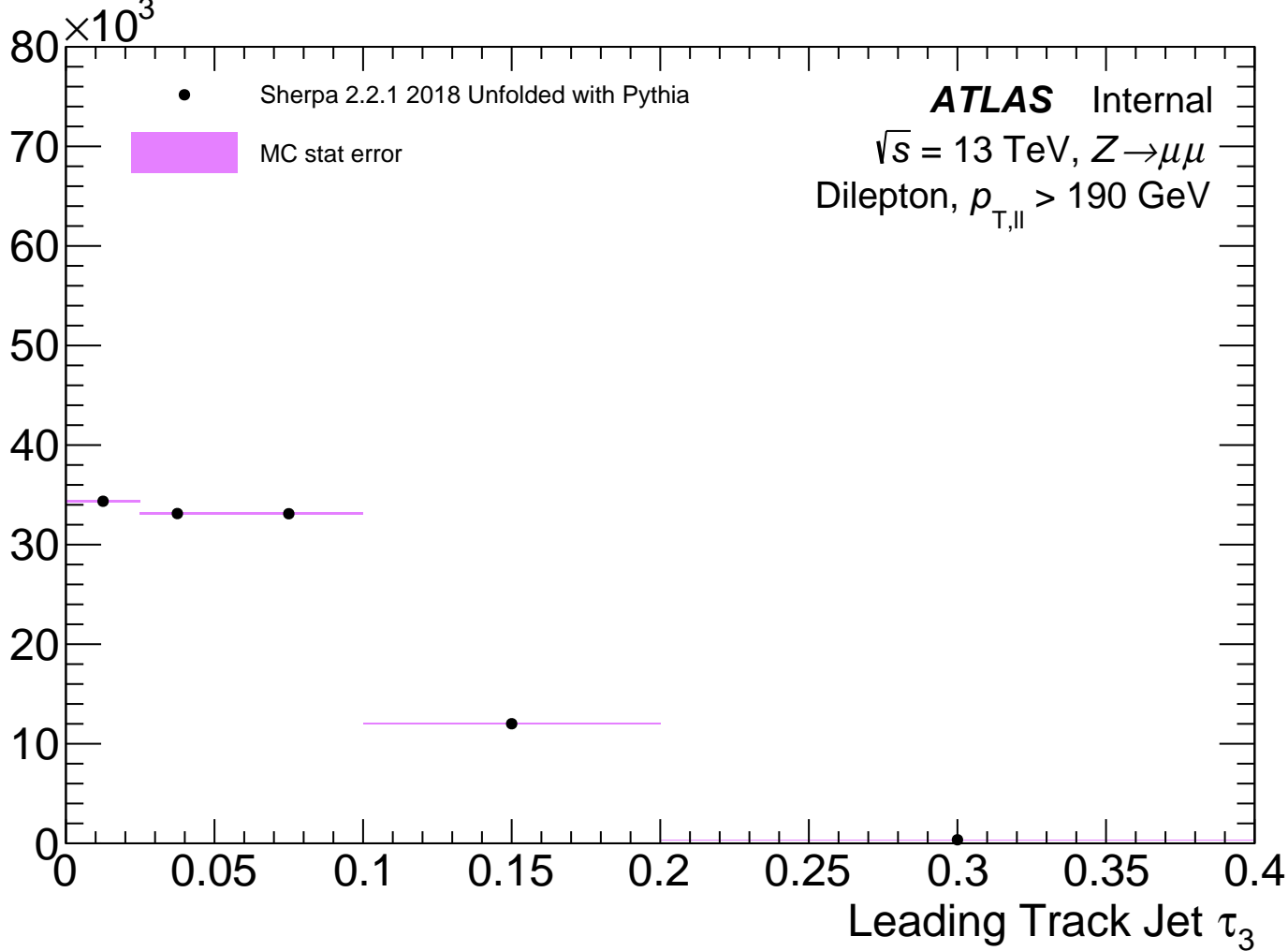
Events



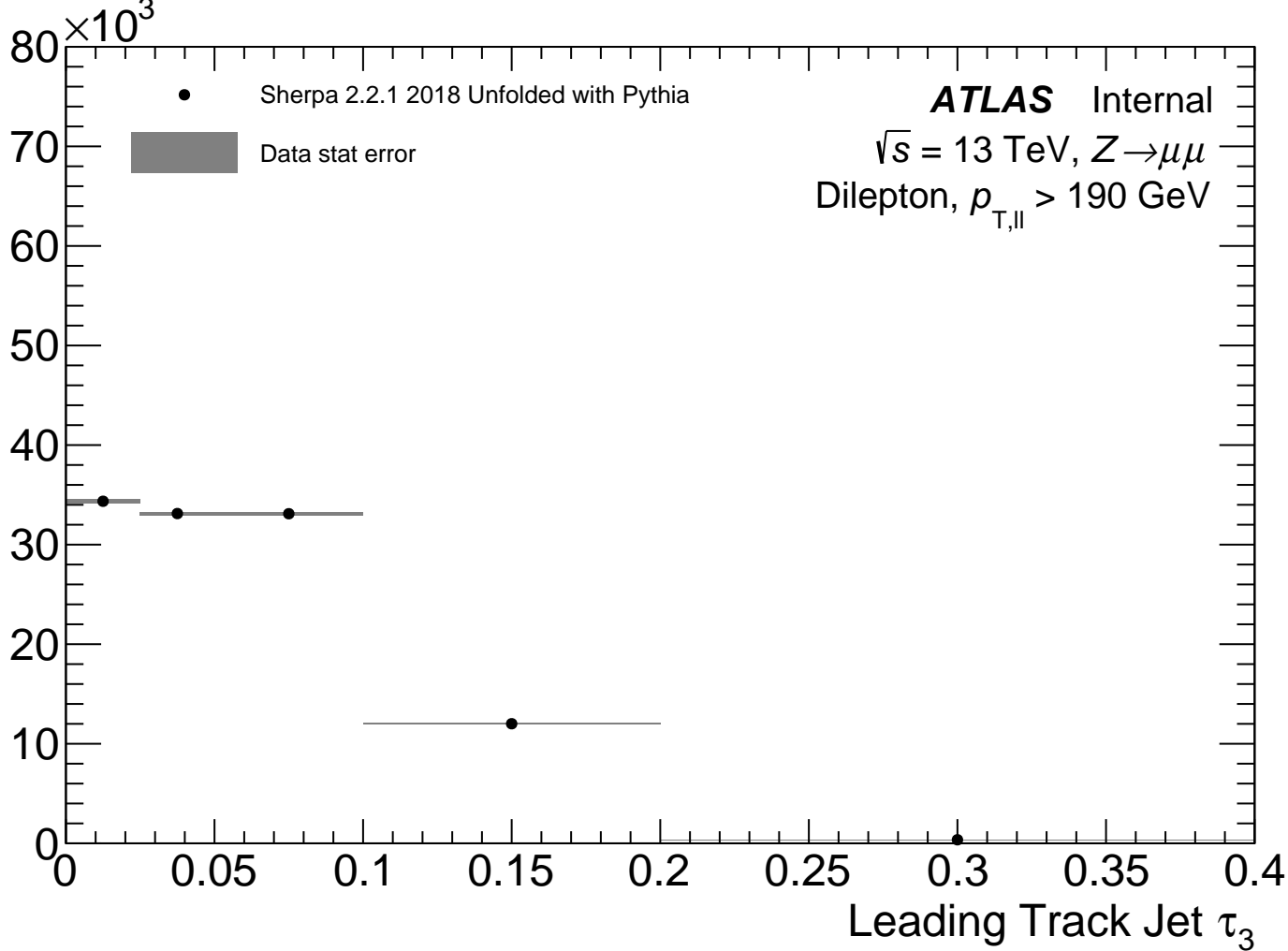
Events



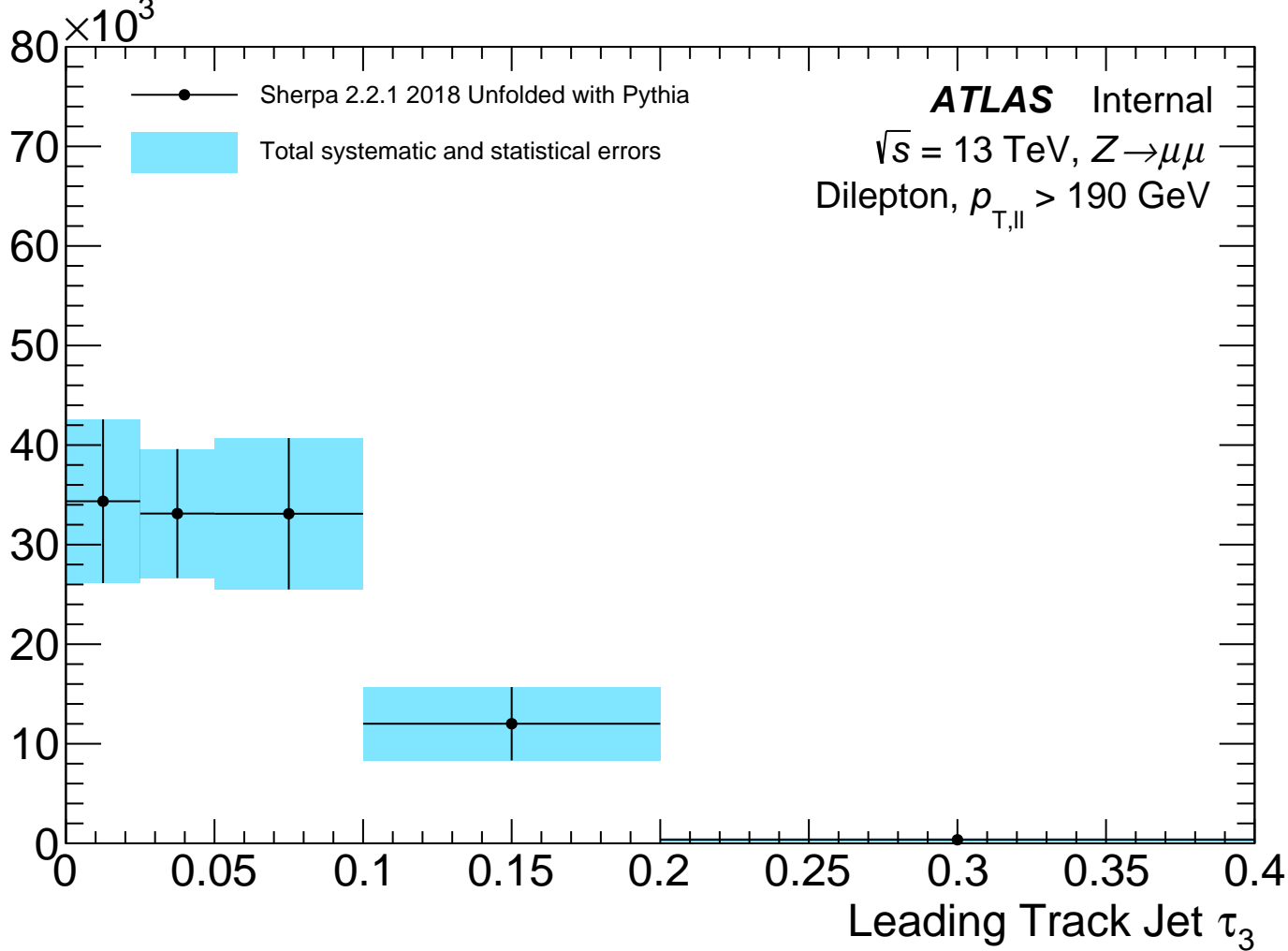
Events



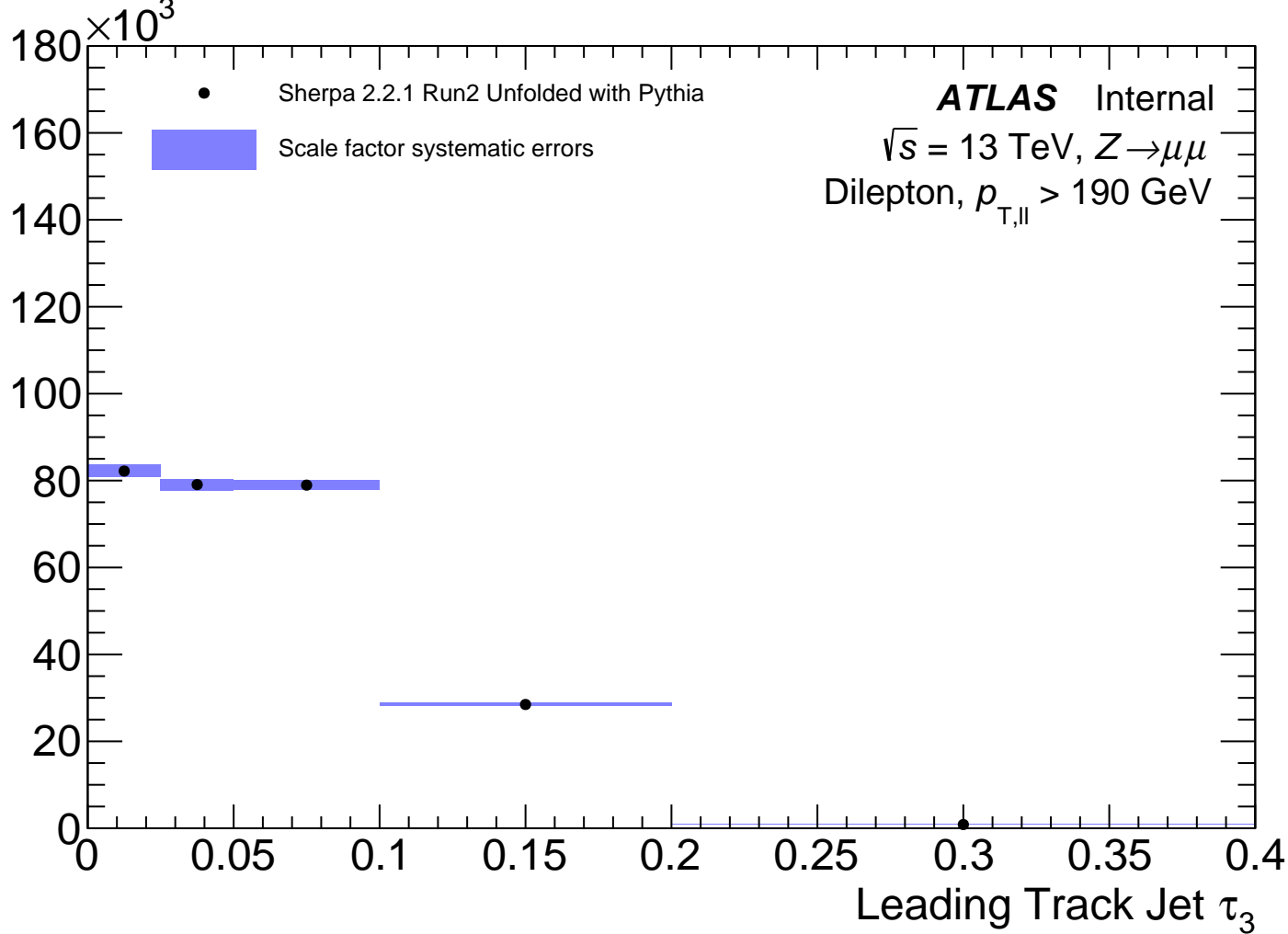
Events

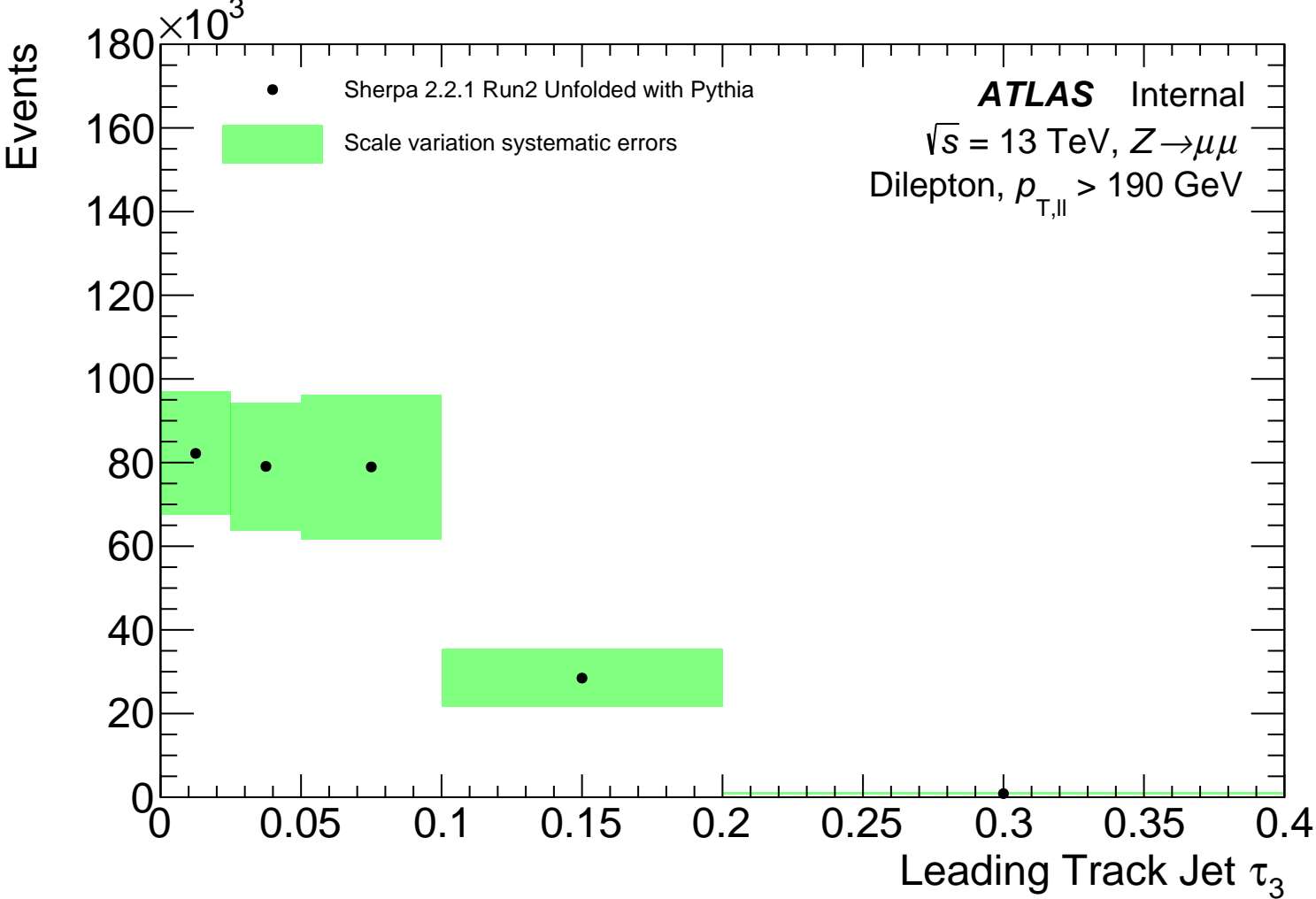


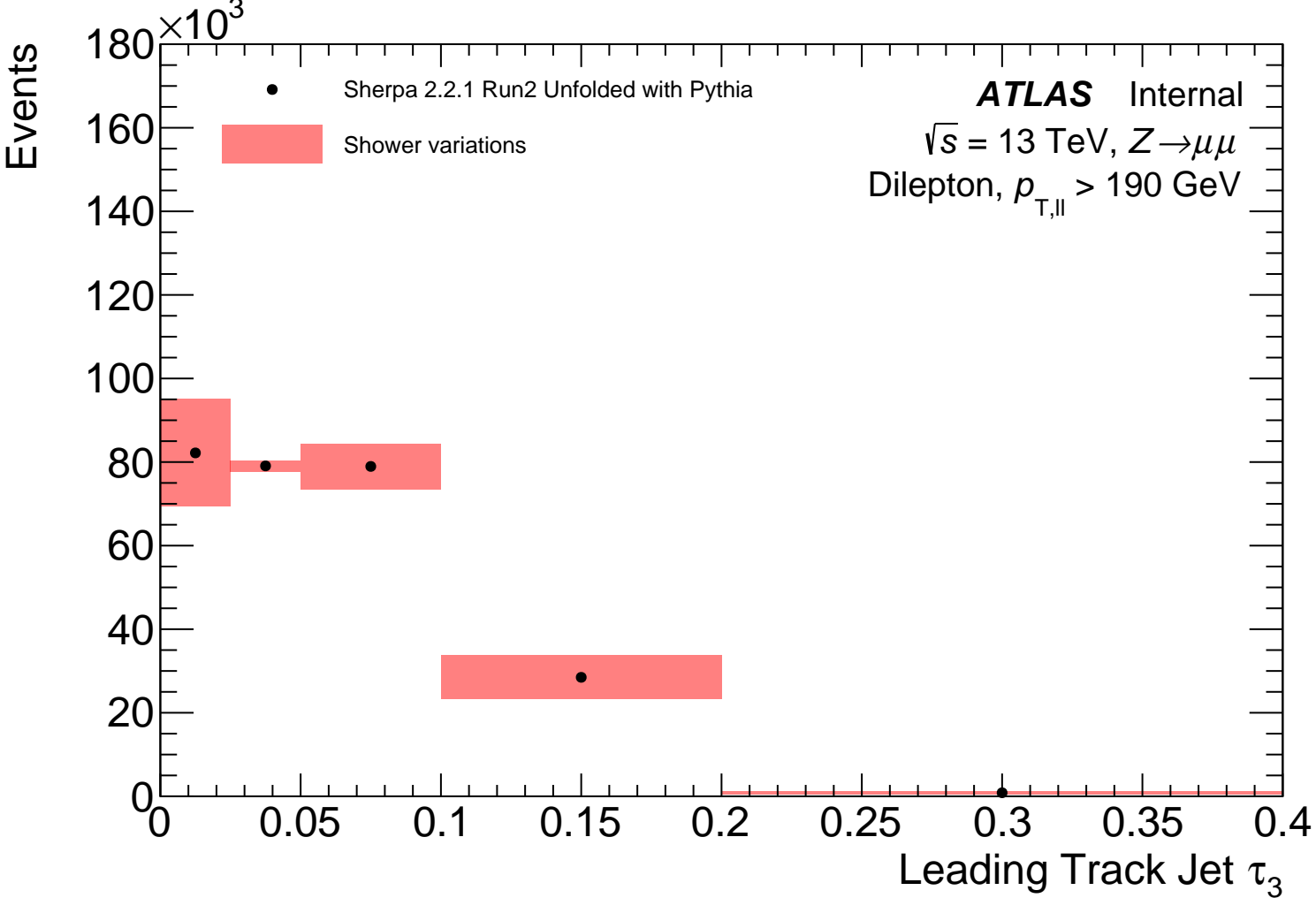
Events



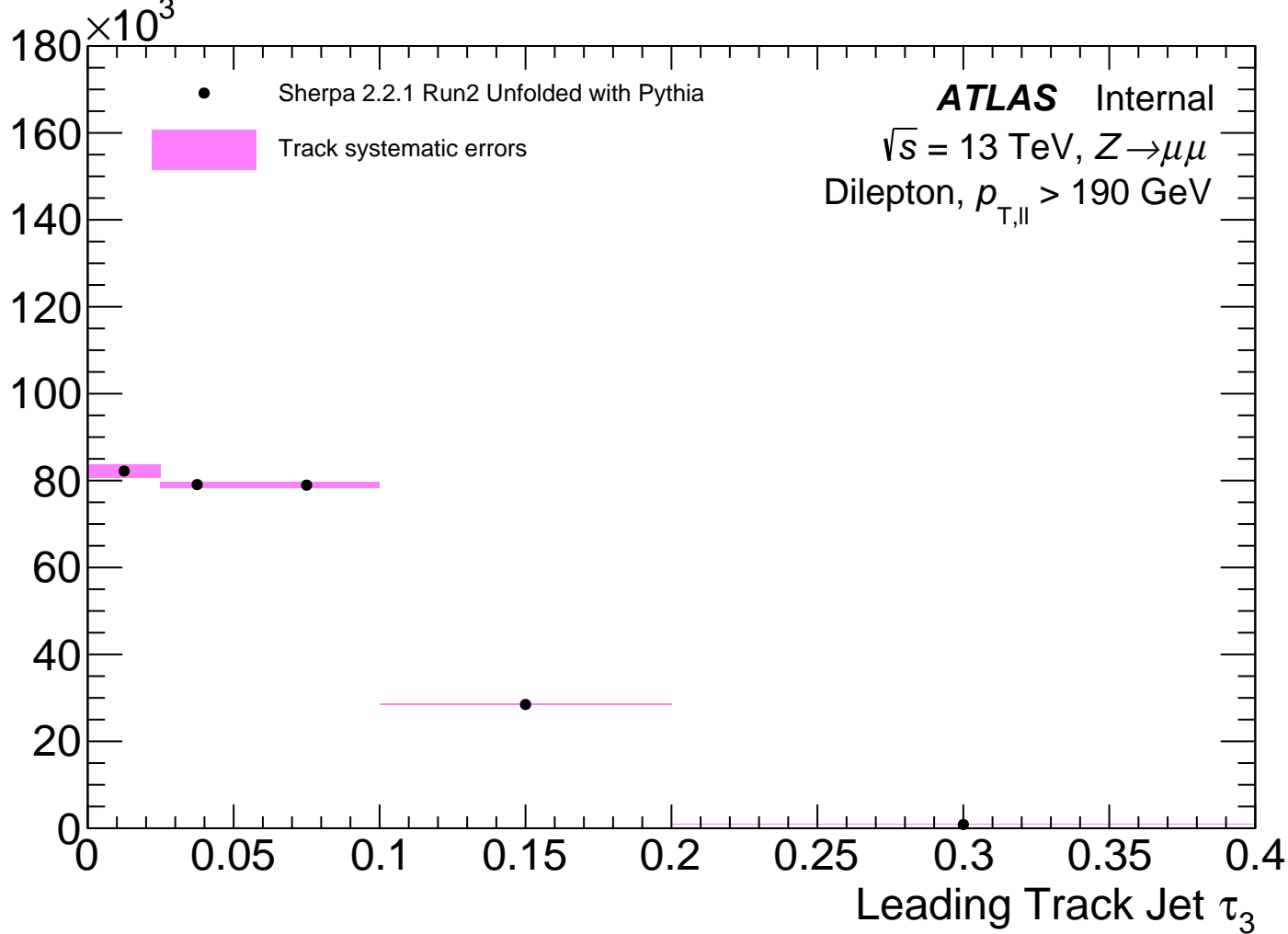
Events

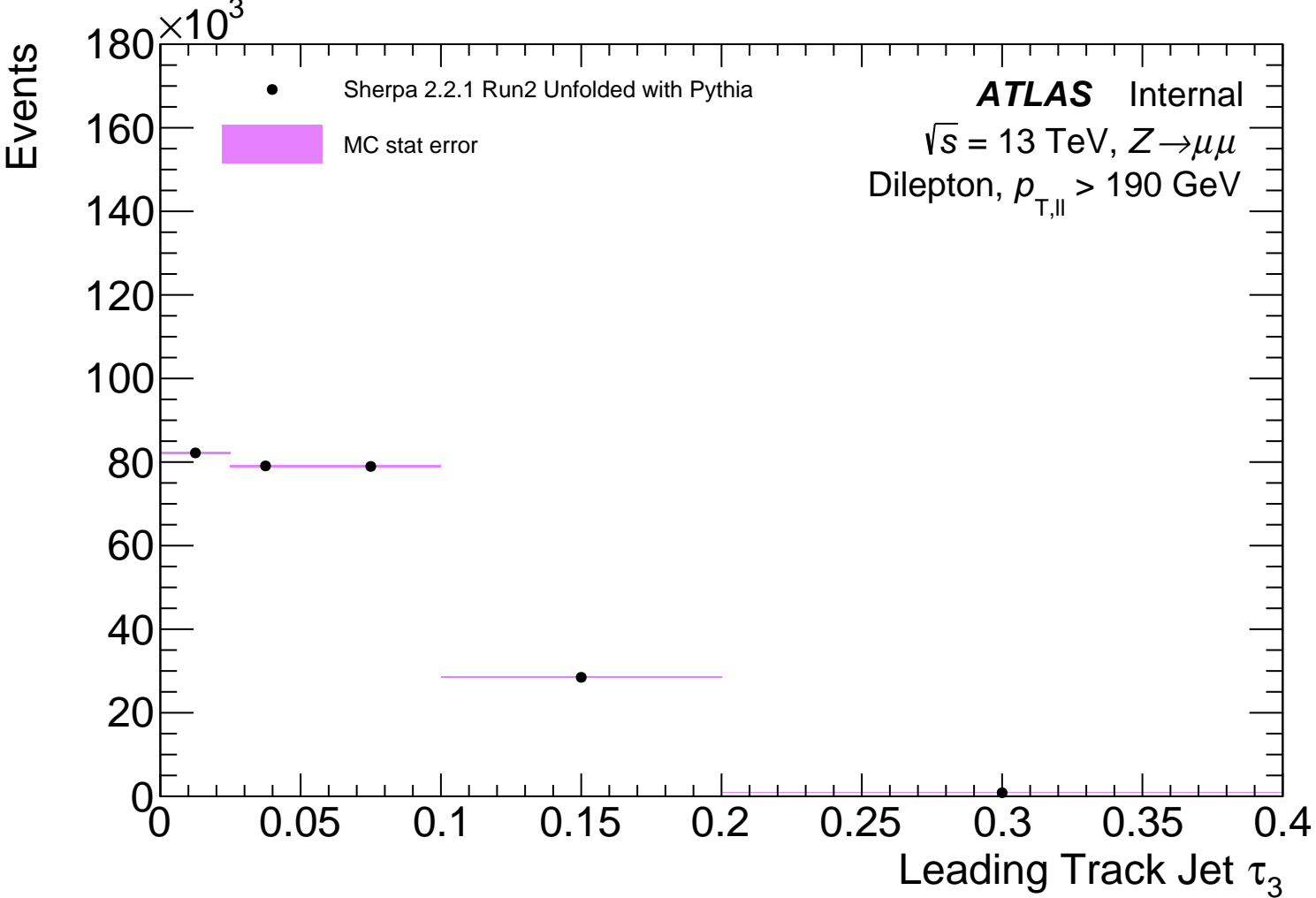


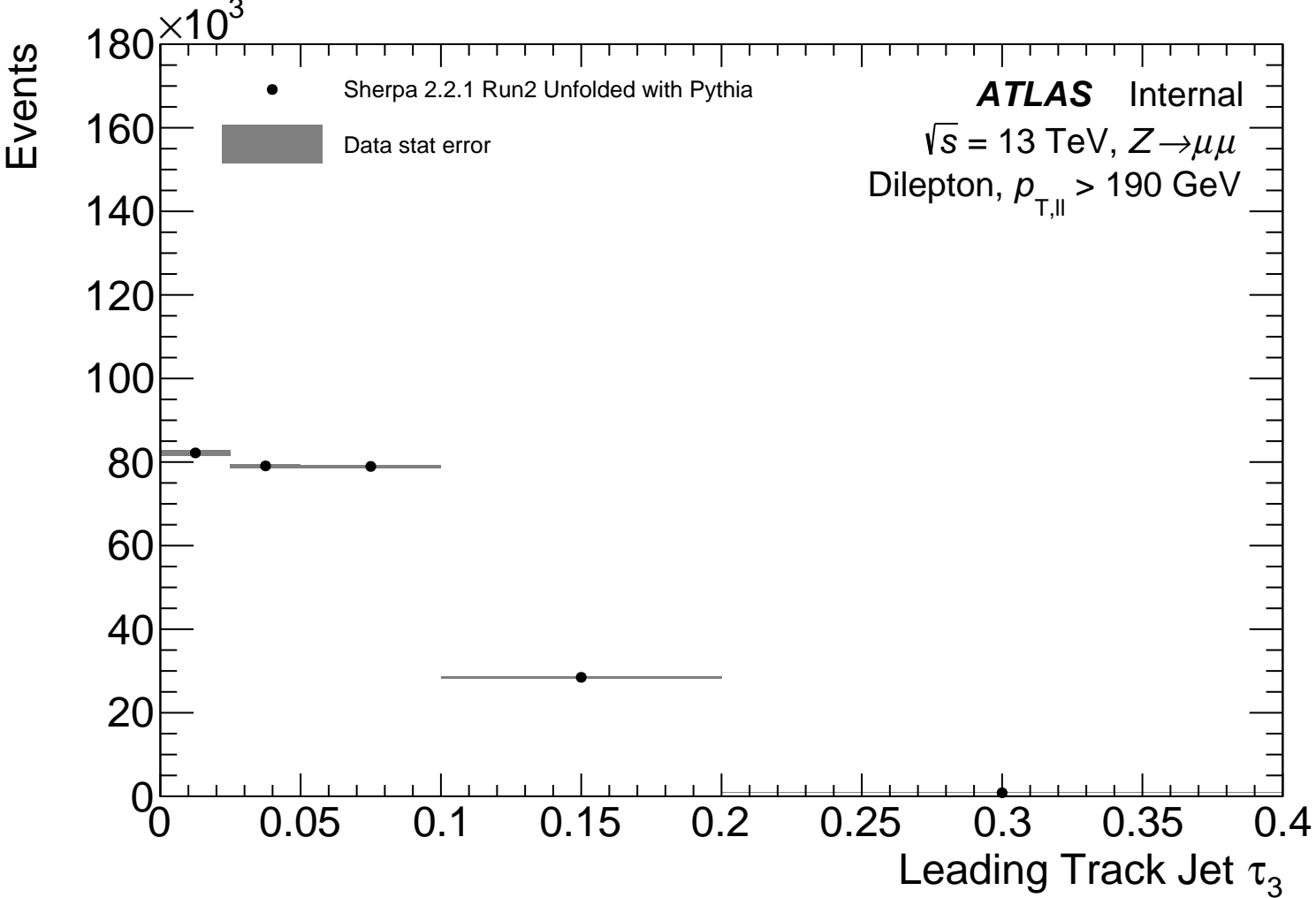


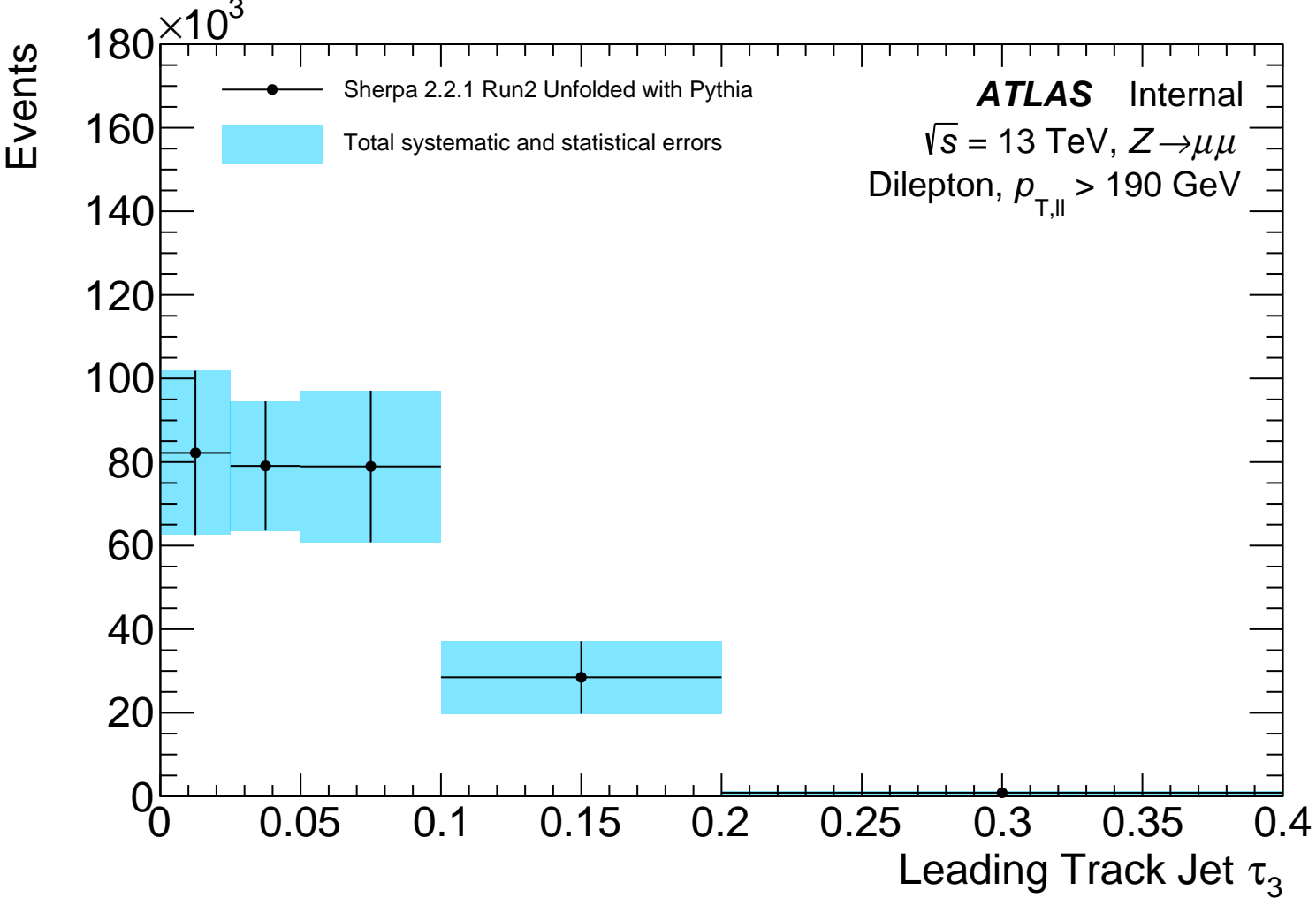


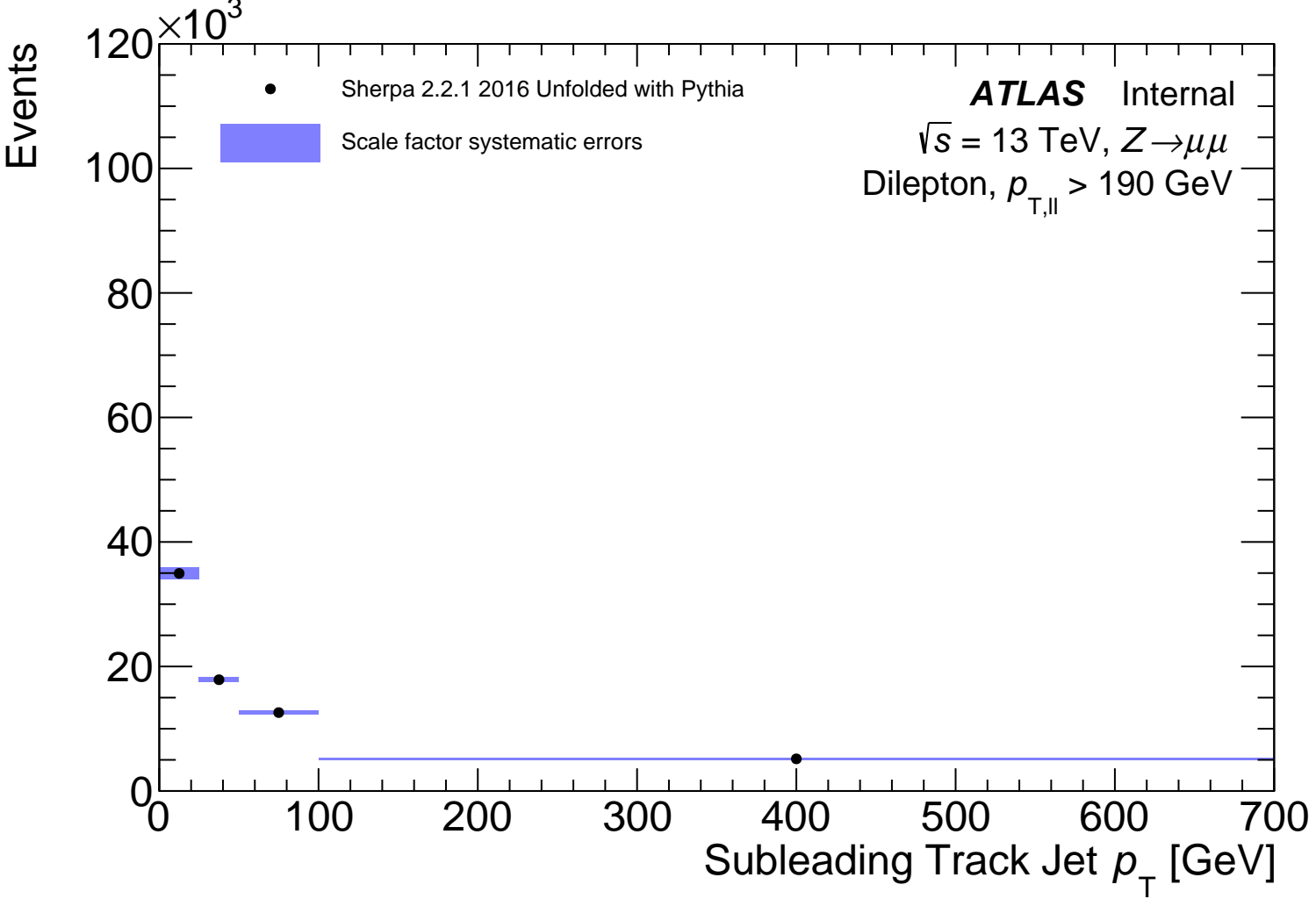
Events

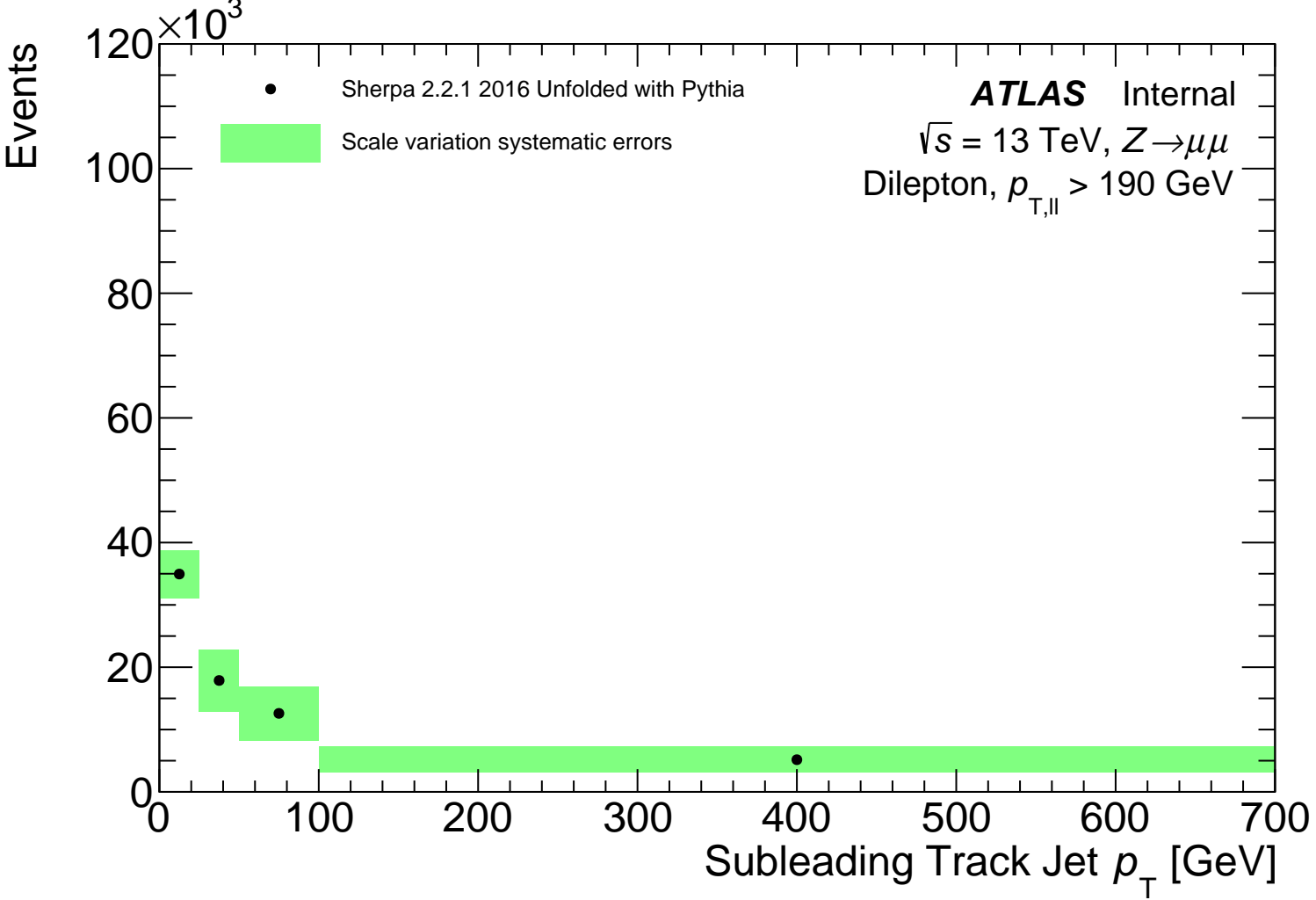


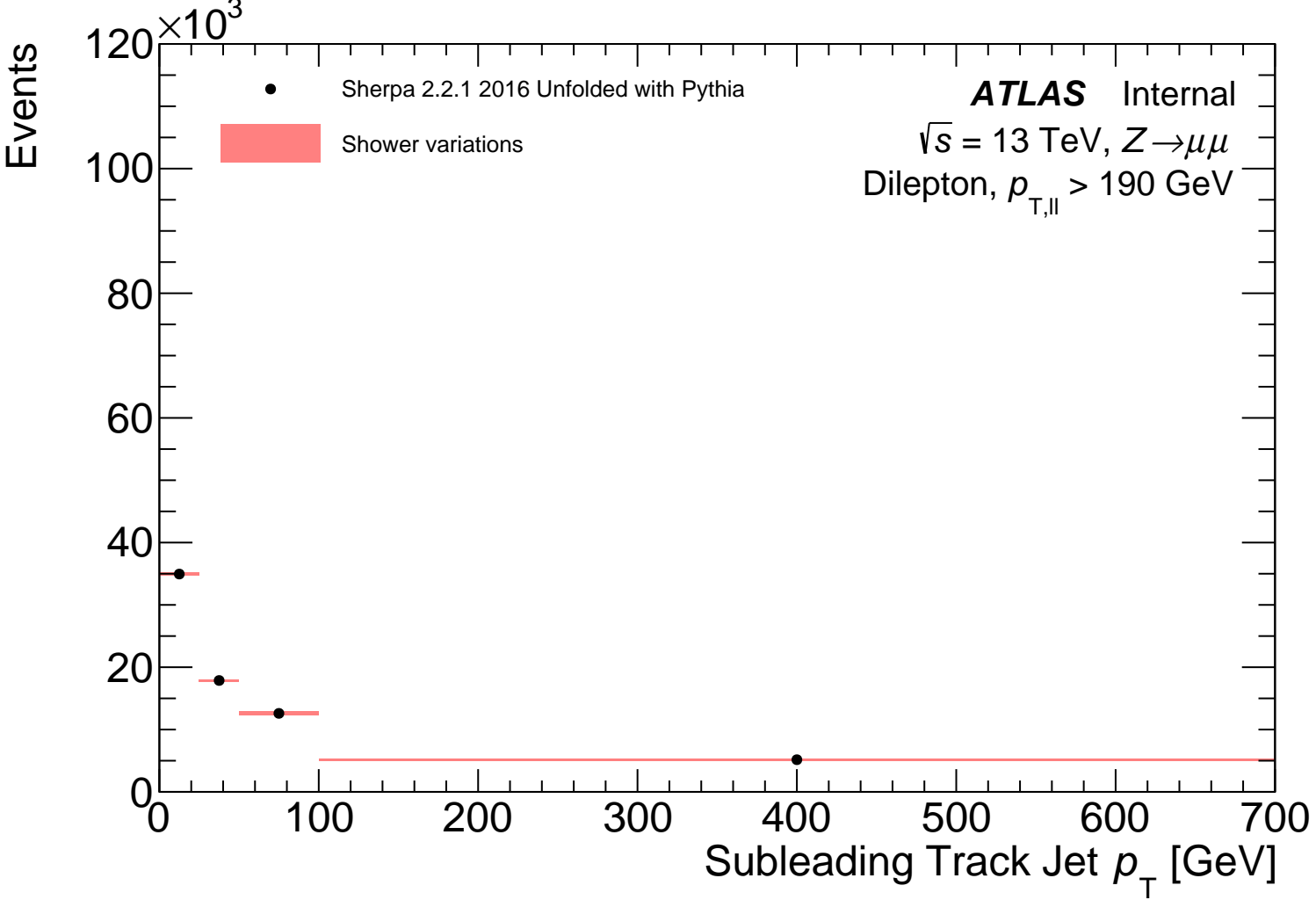


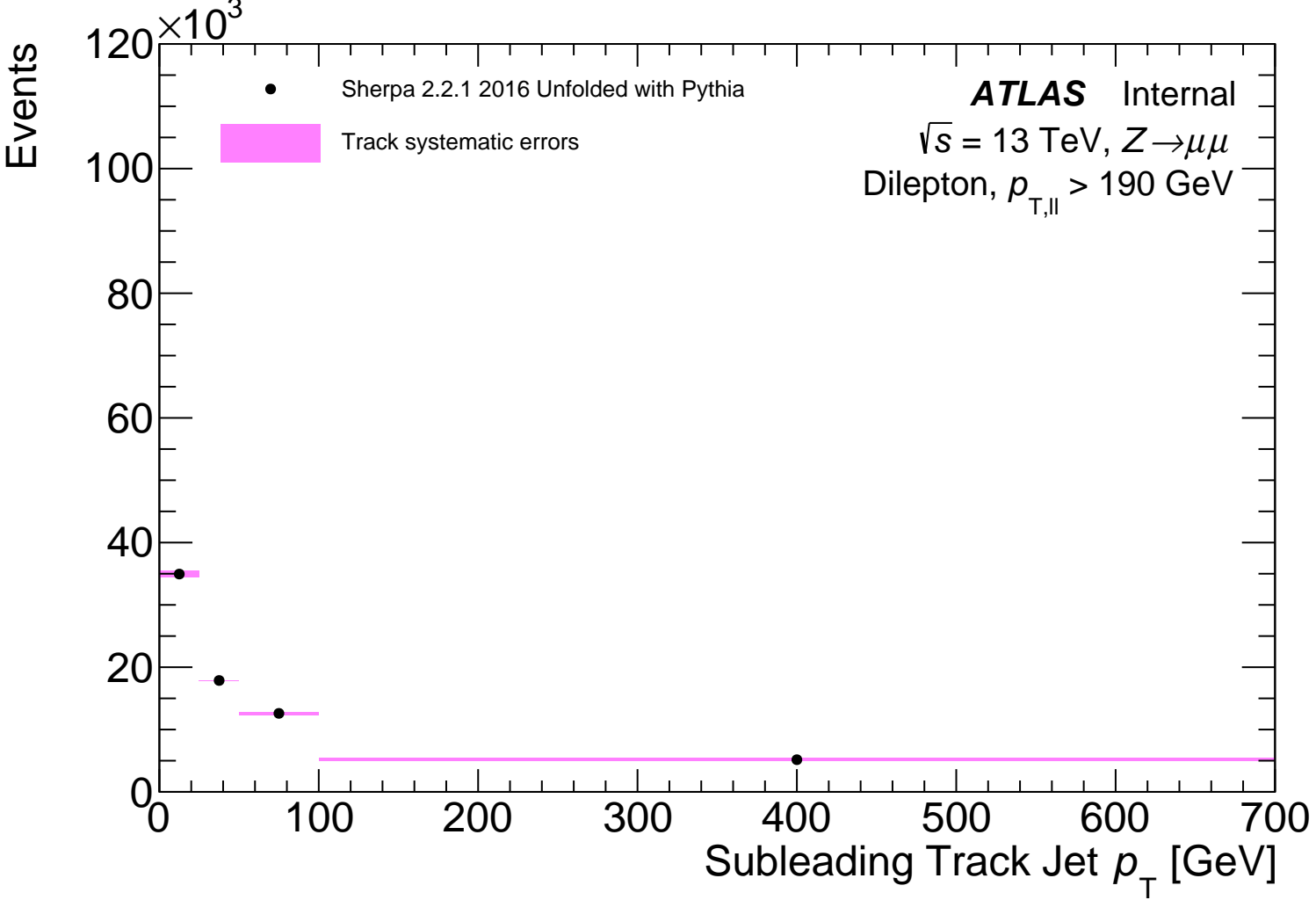


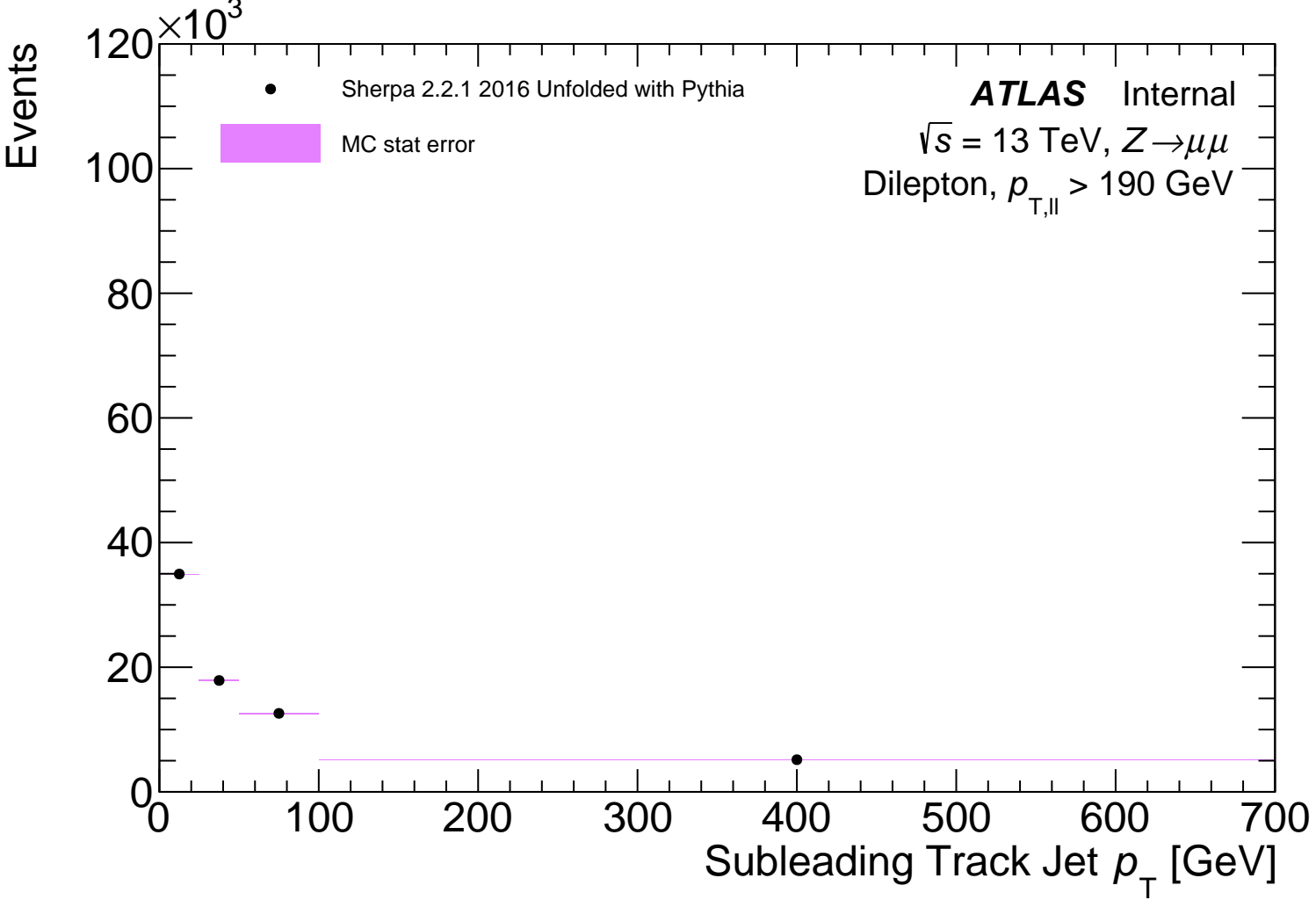


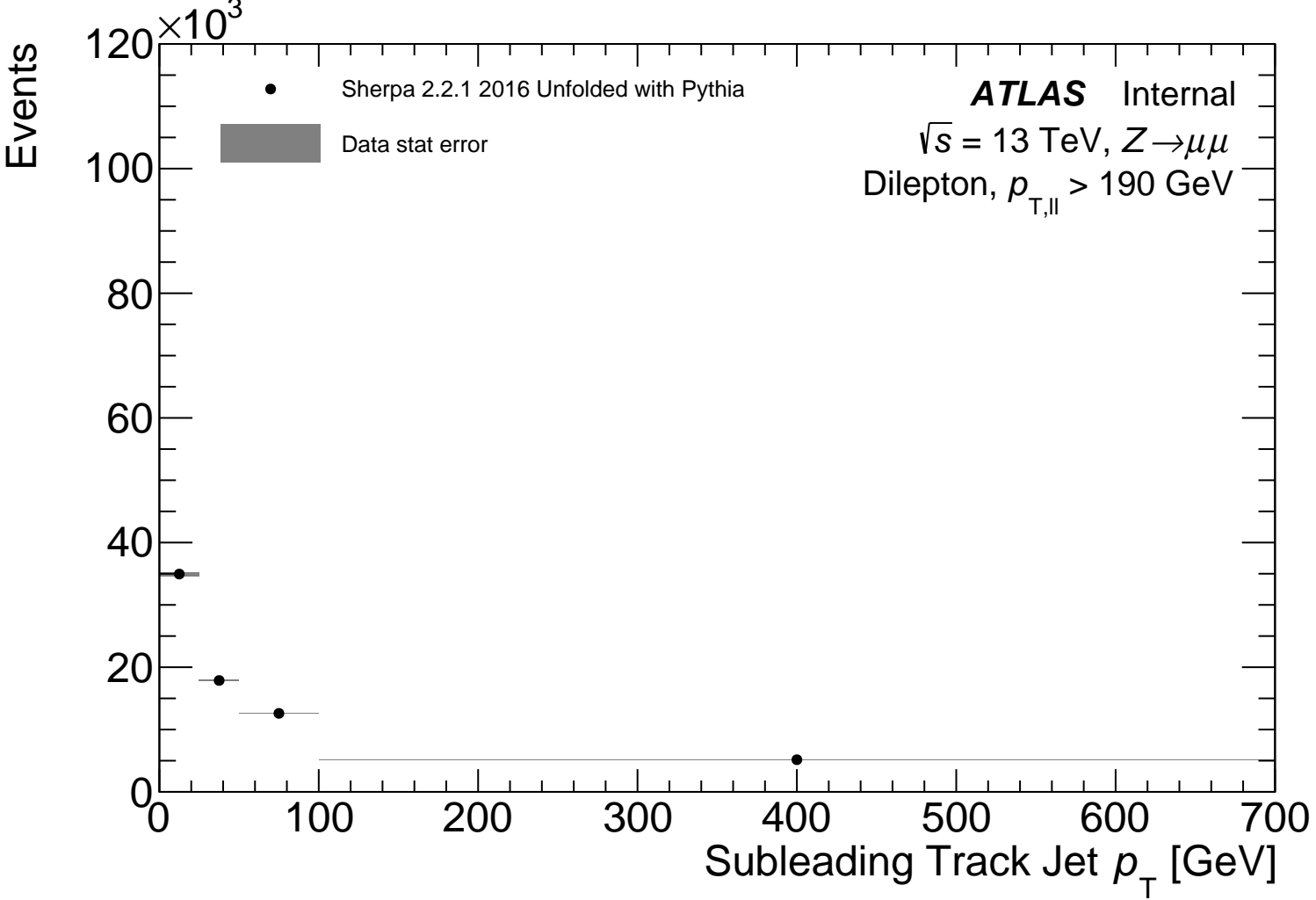


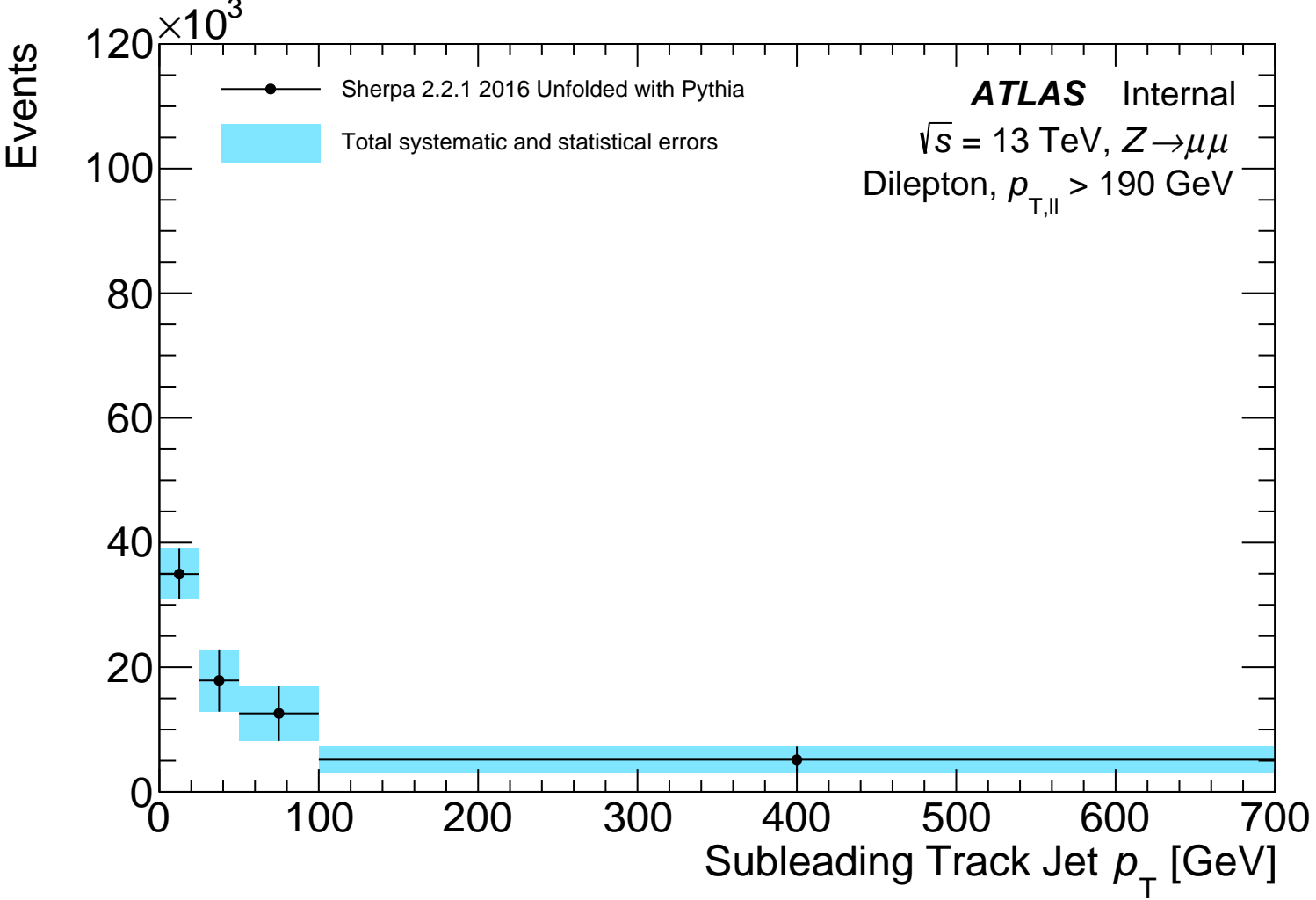




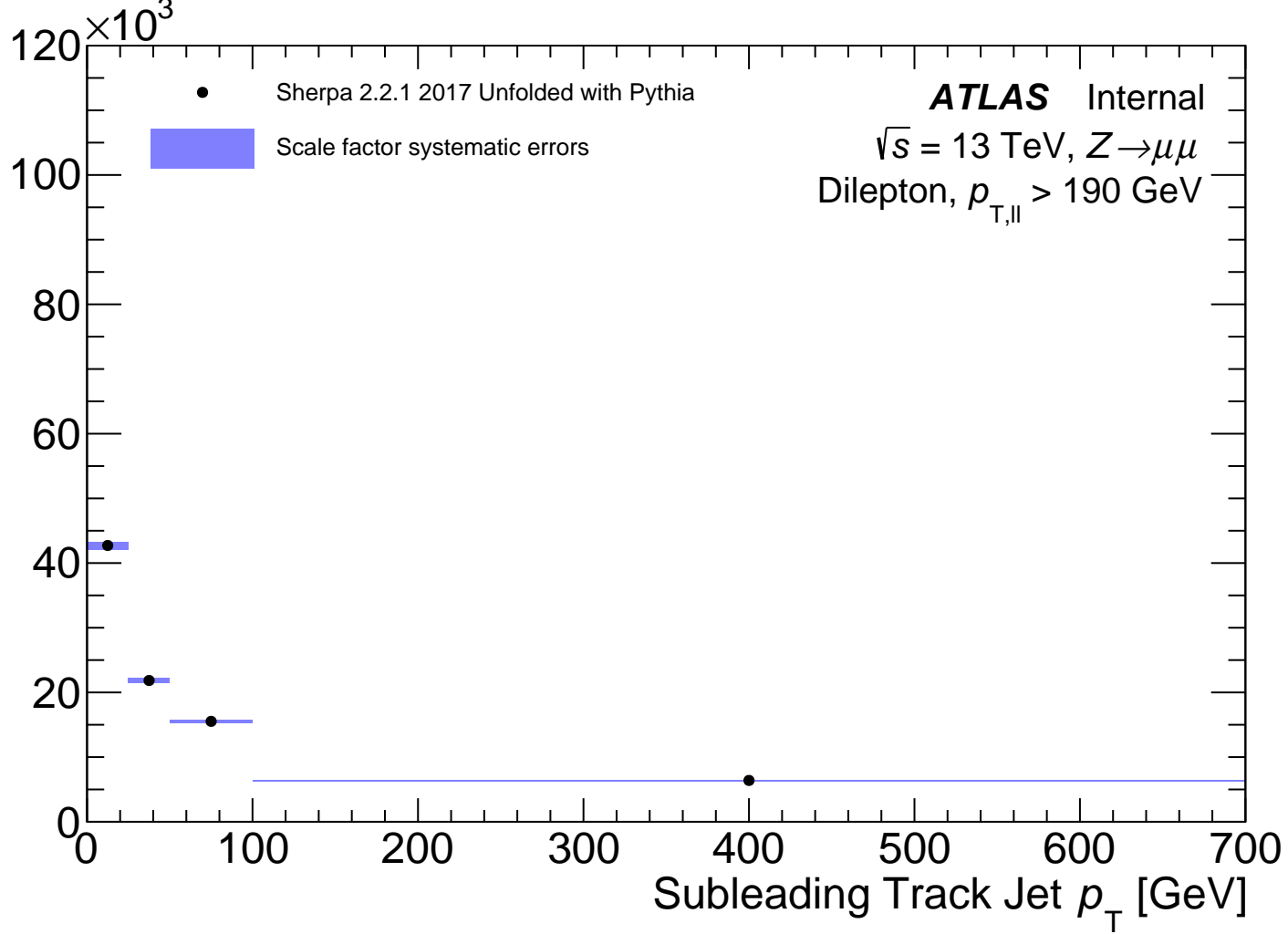


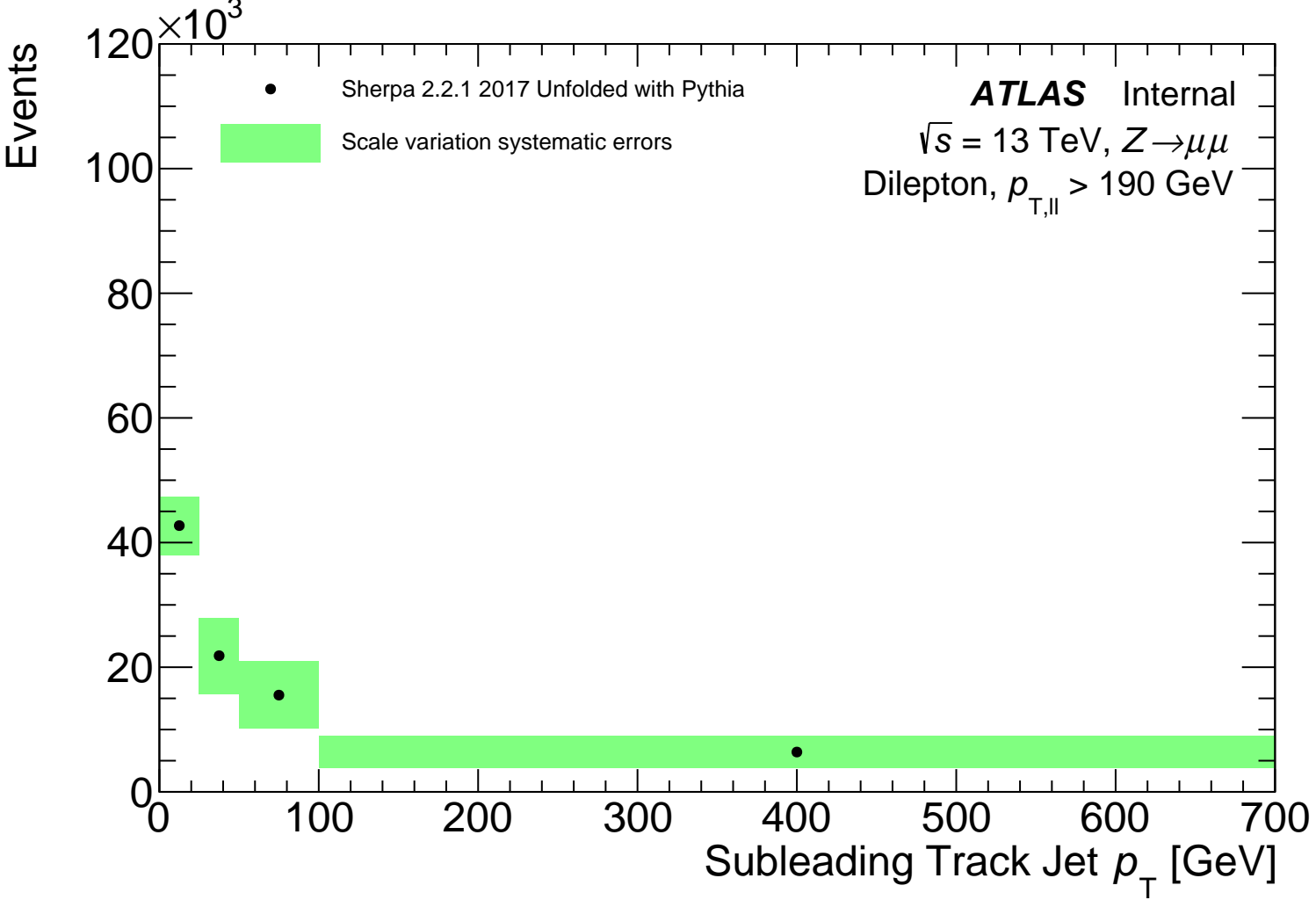


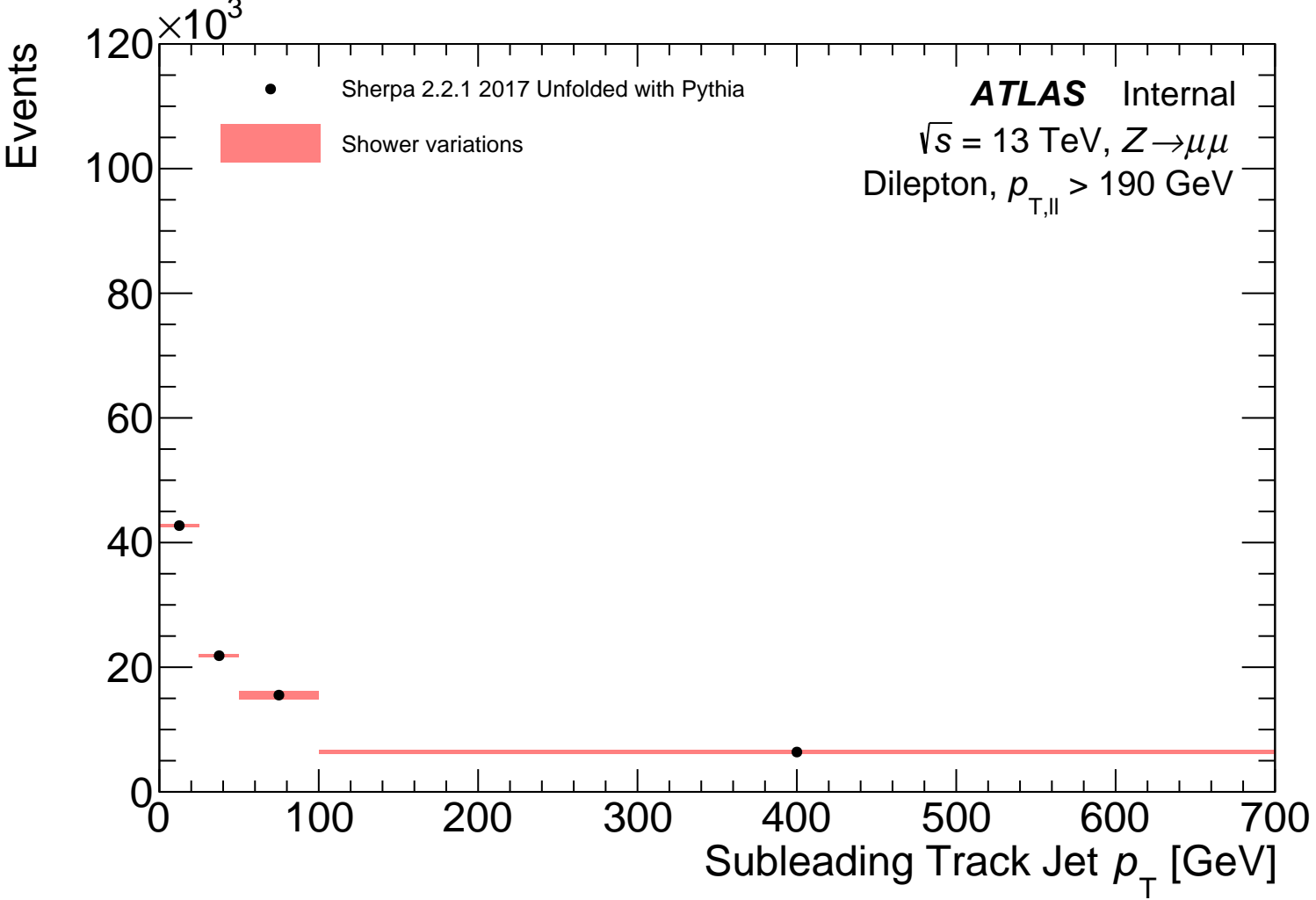


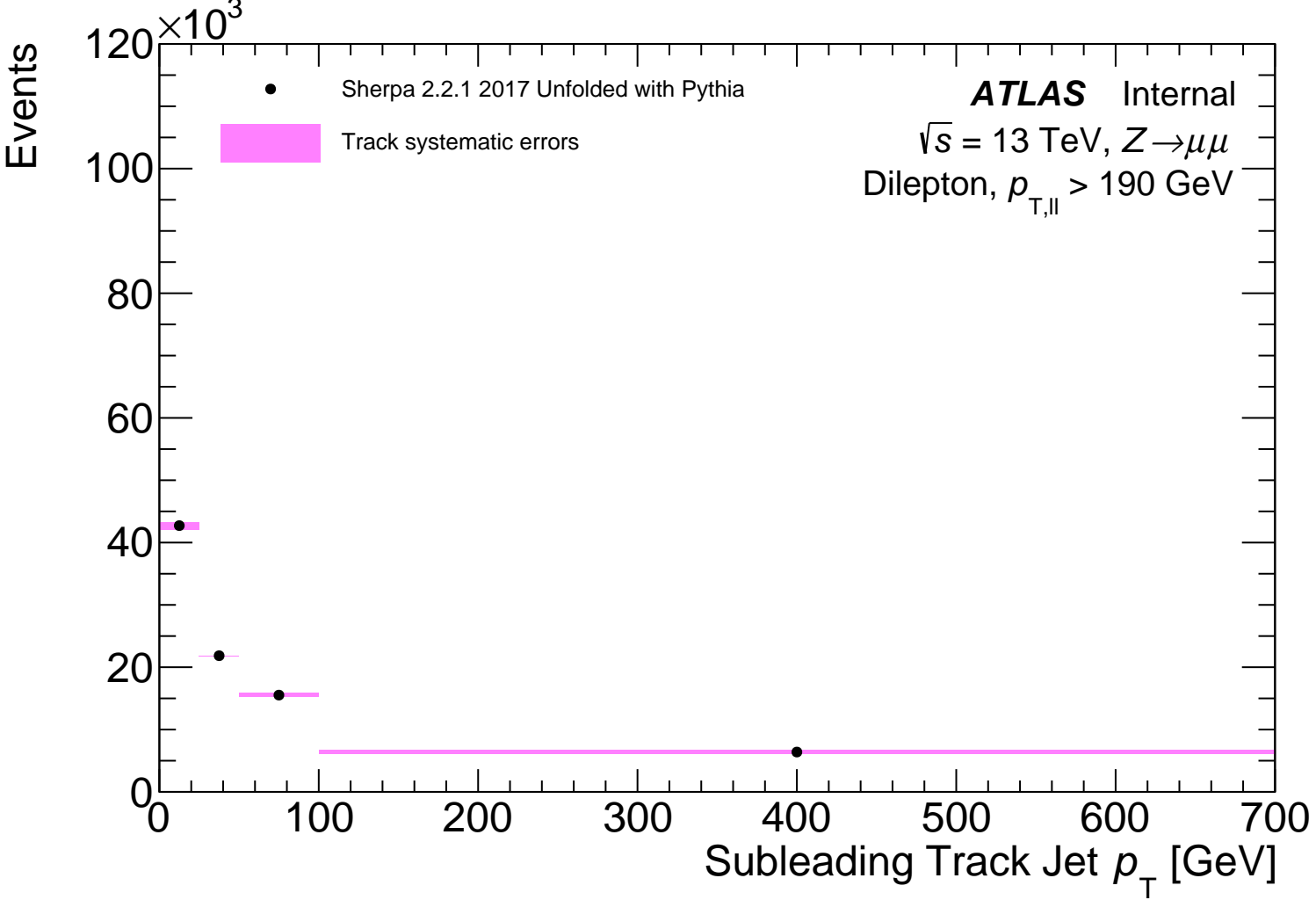


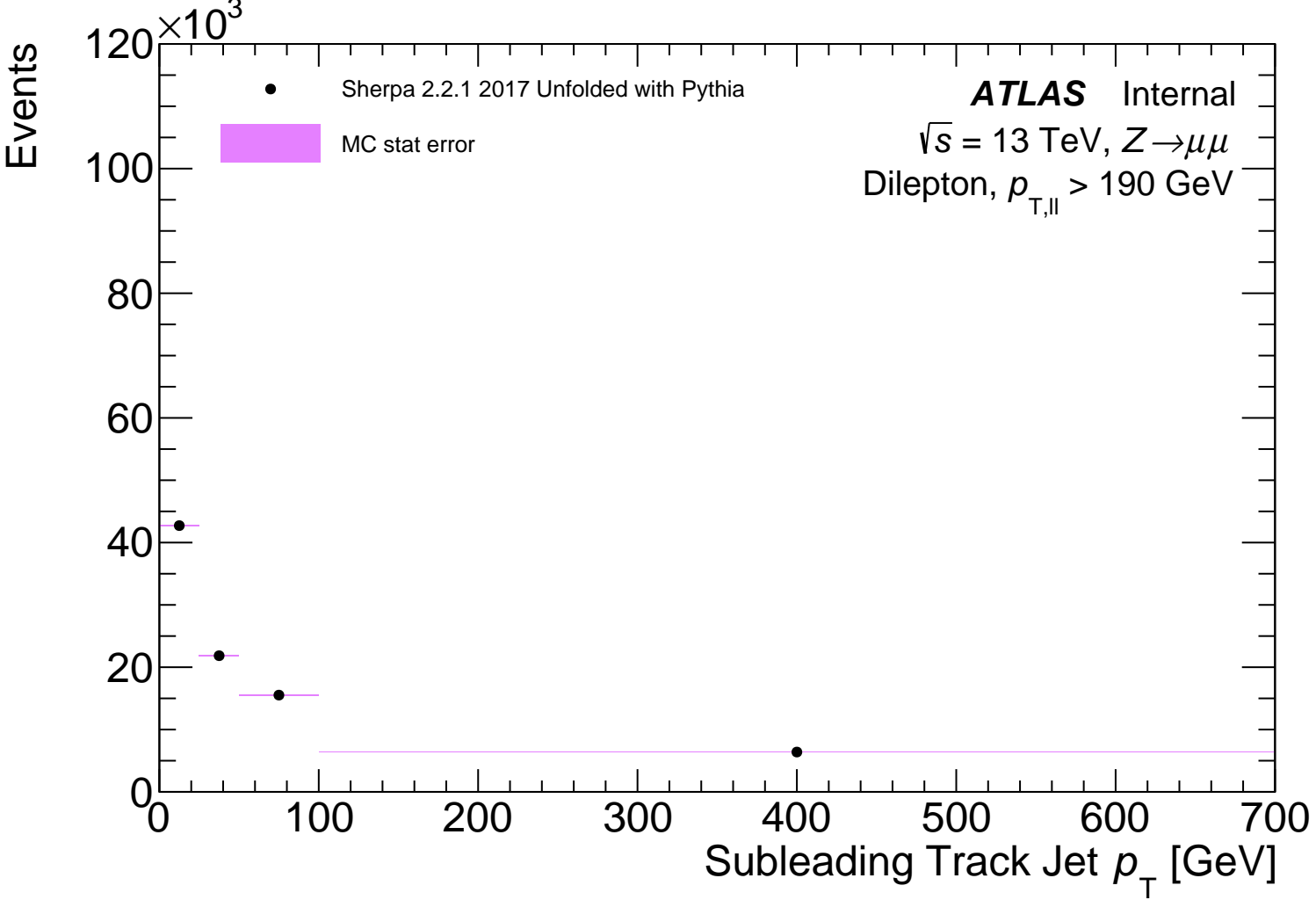
Events

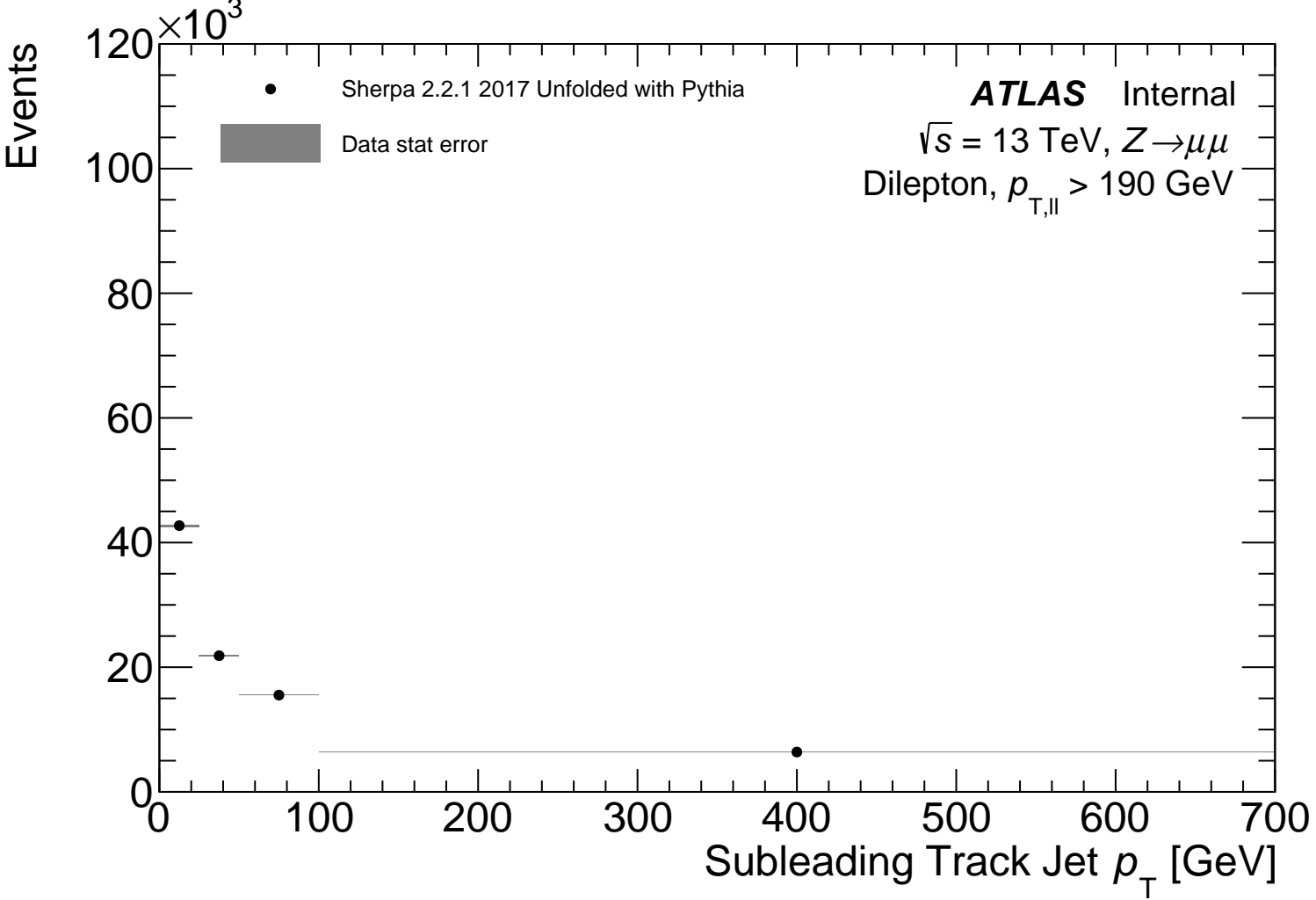


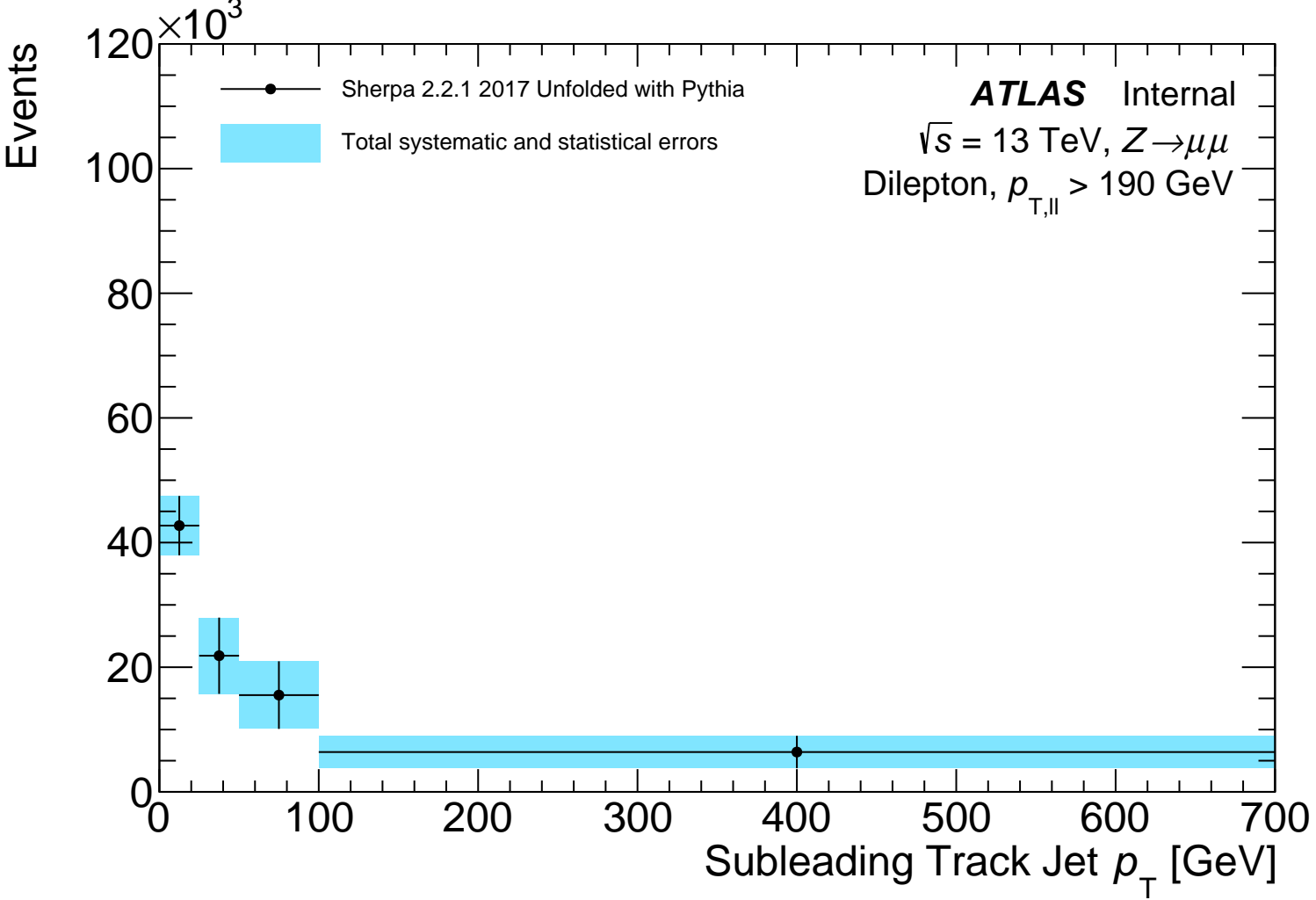


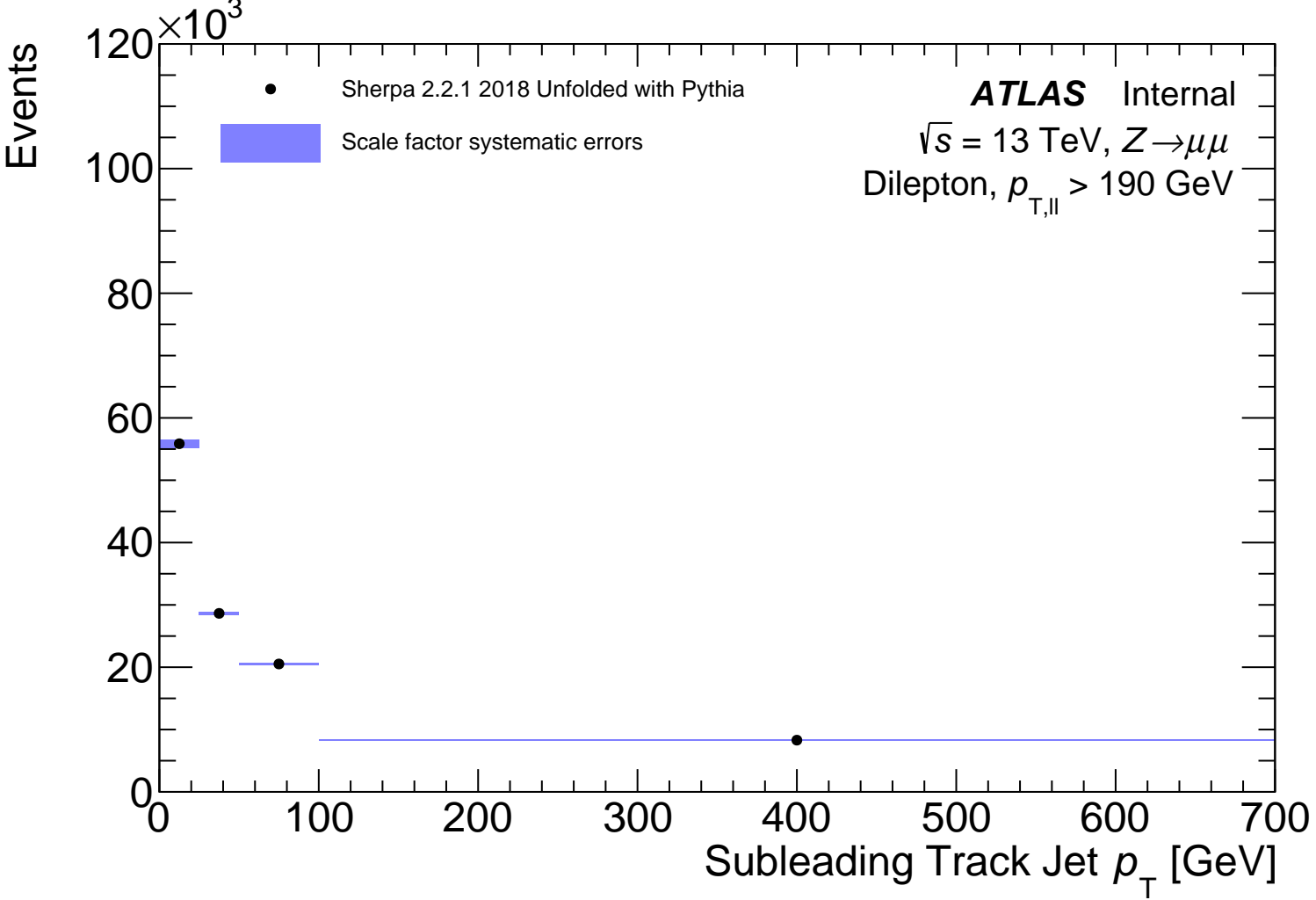


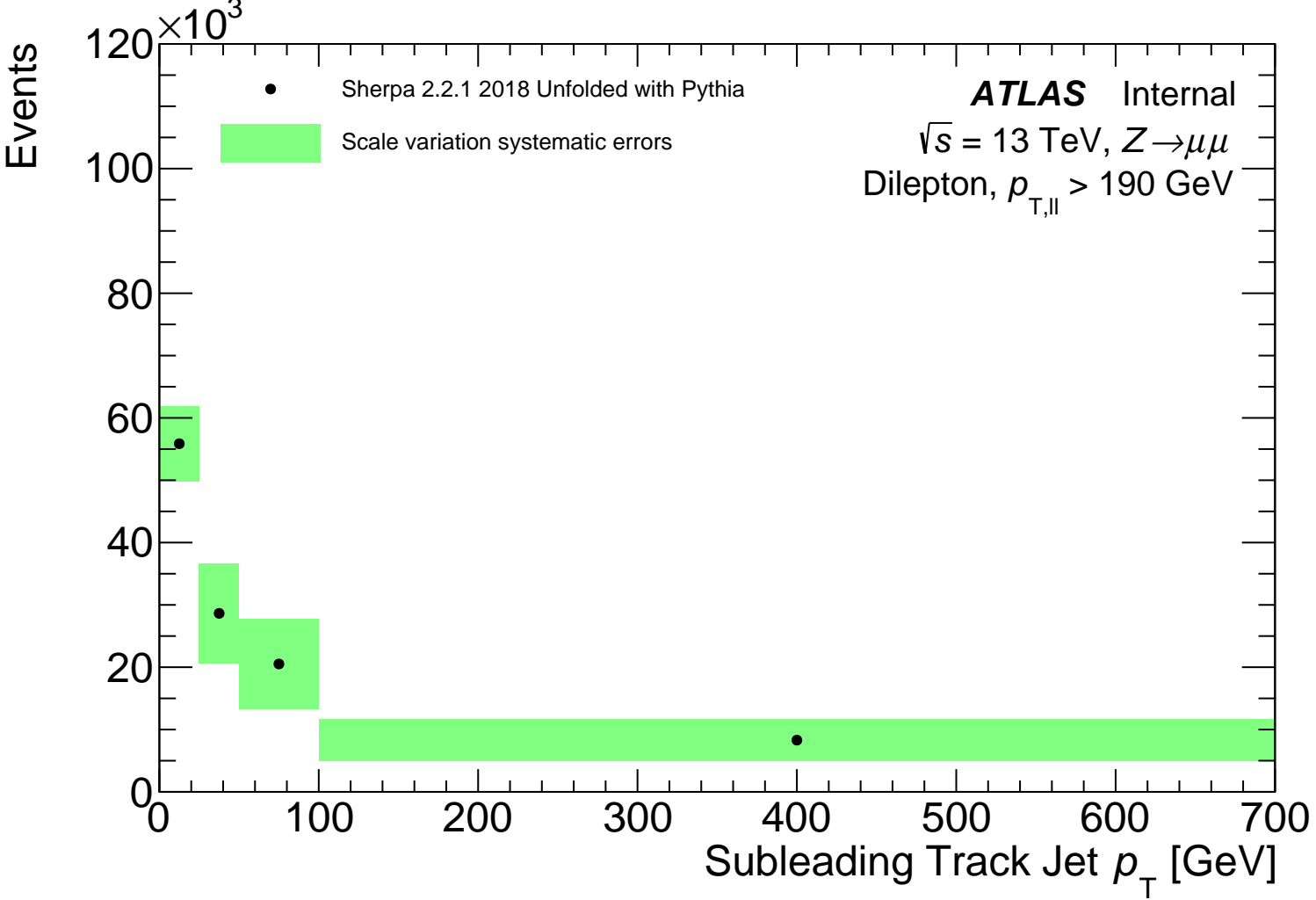


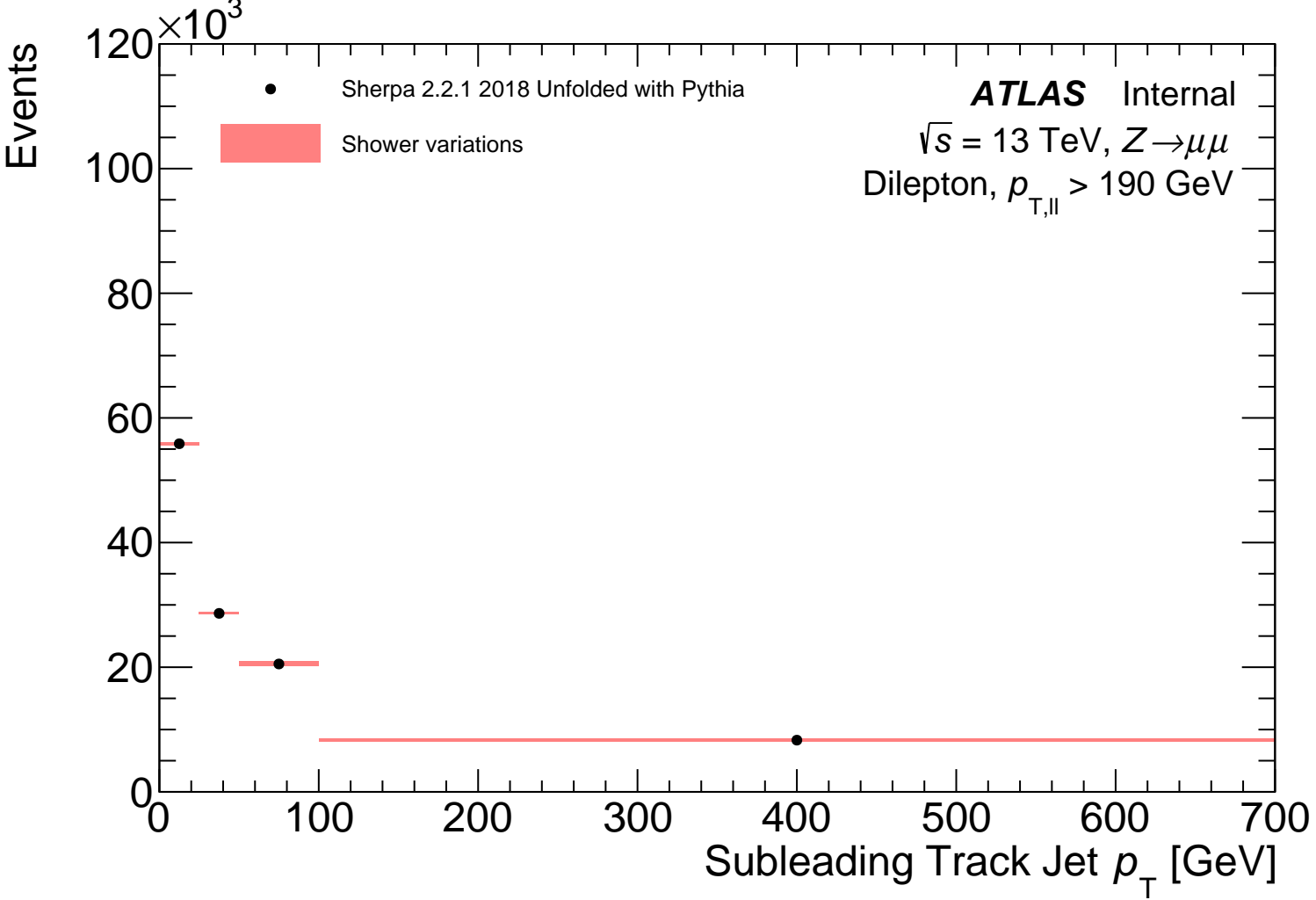


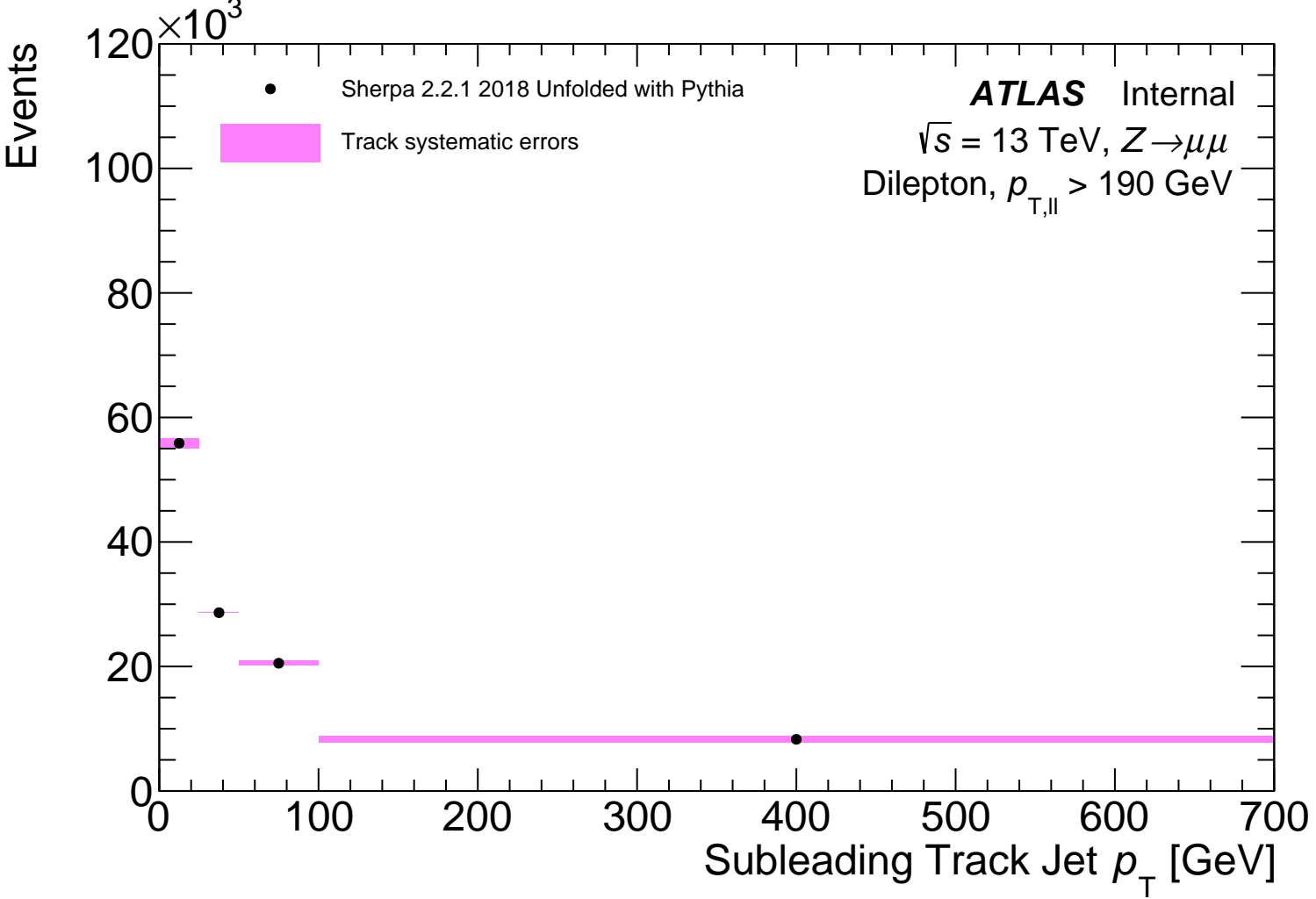


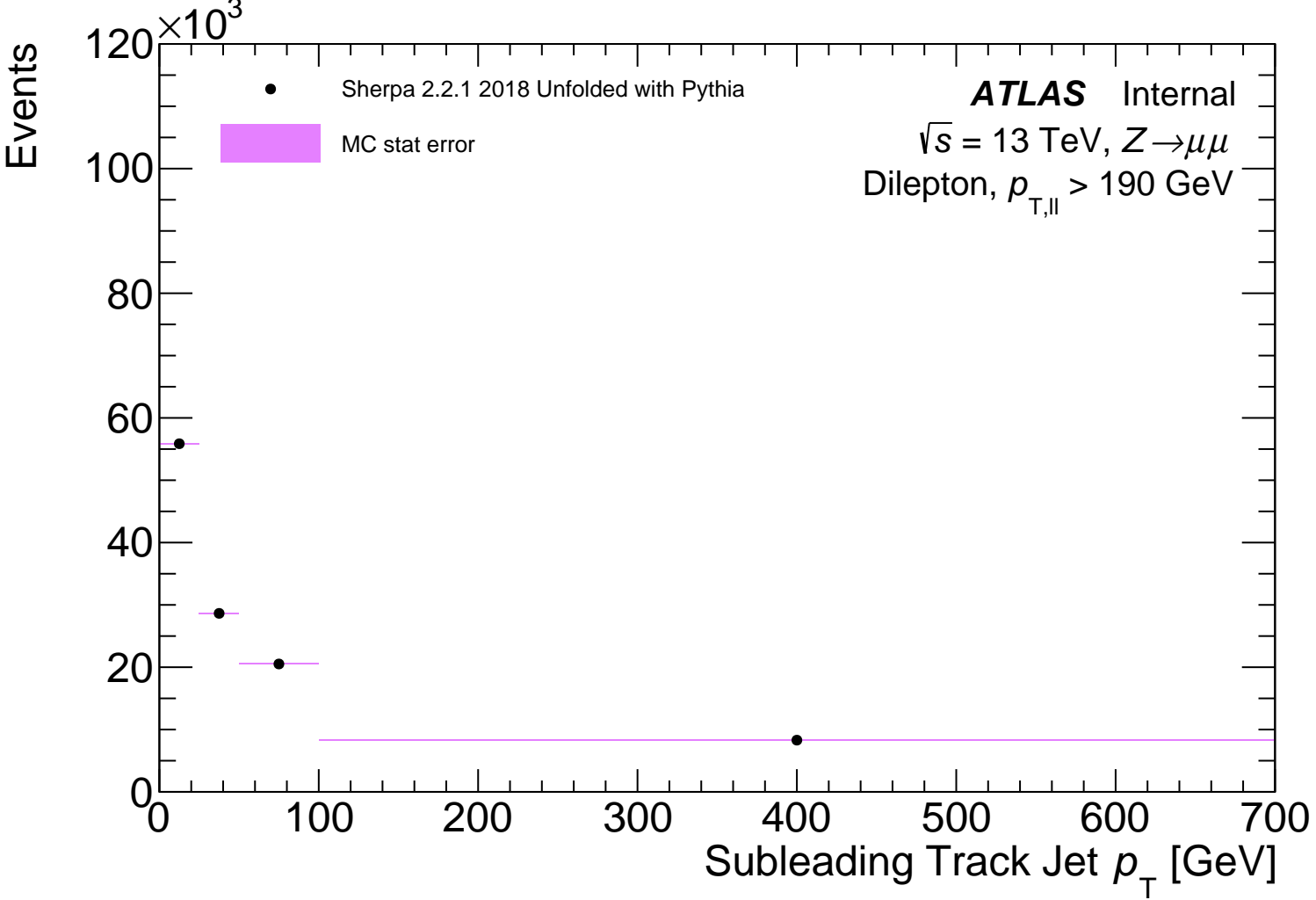


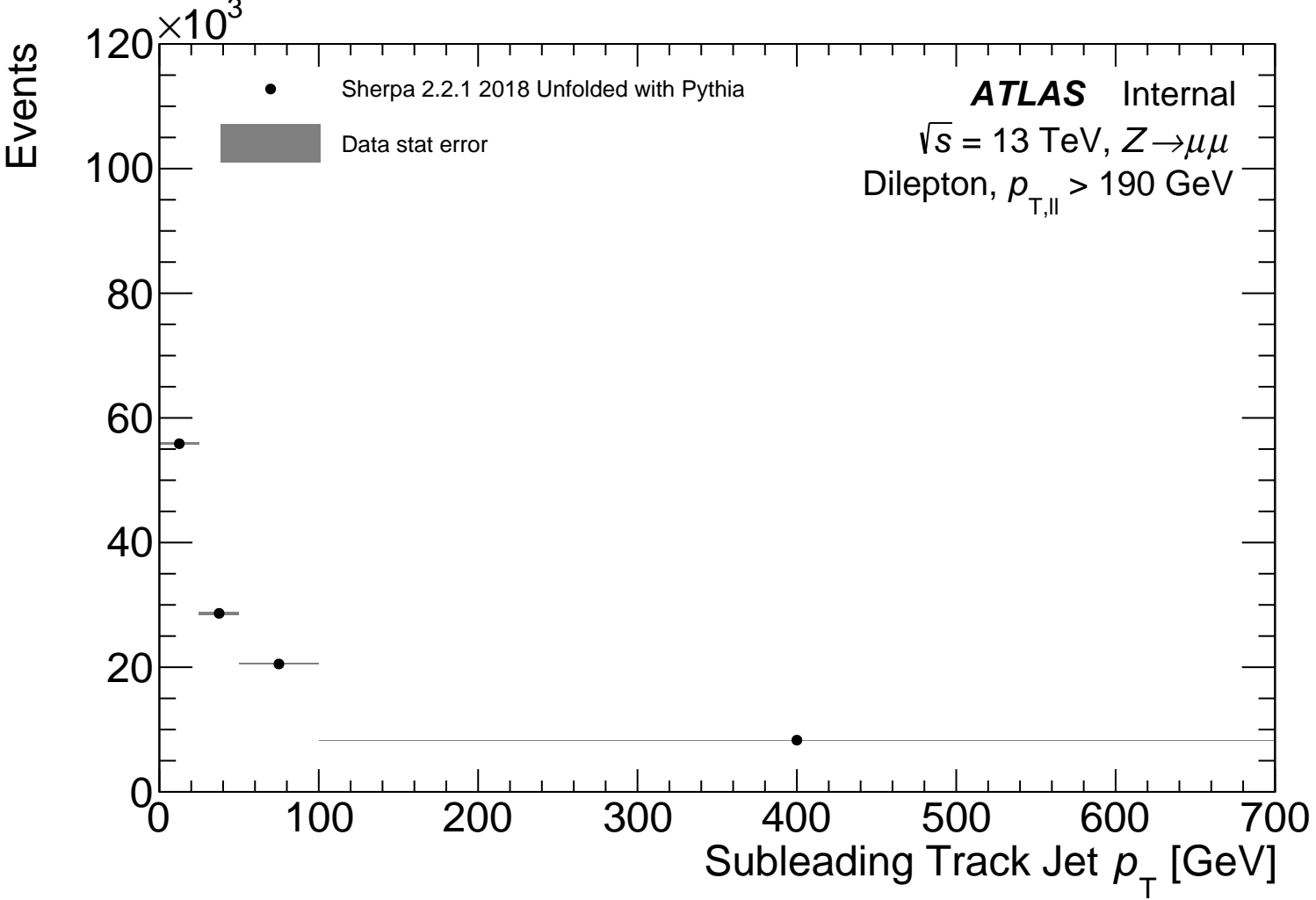


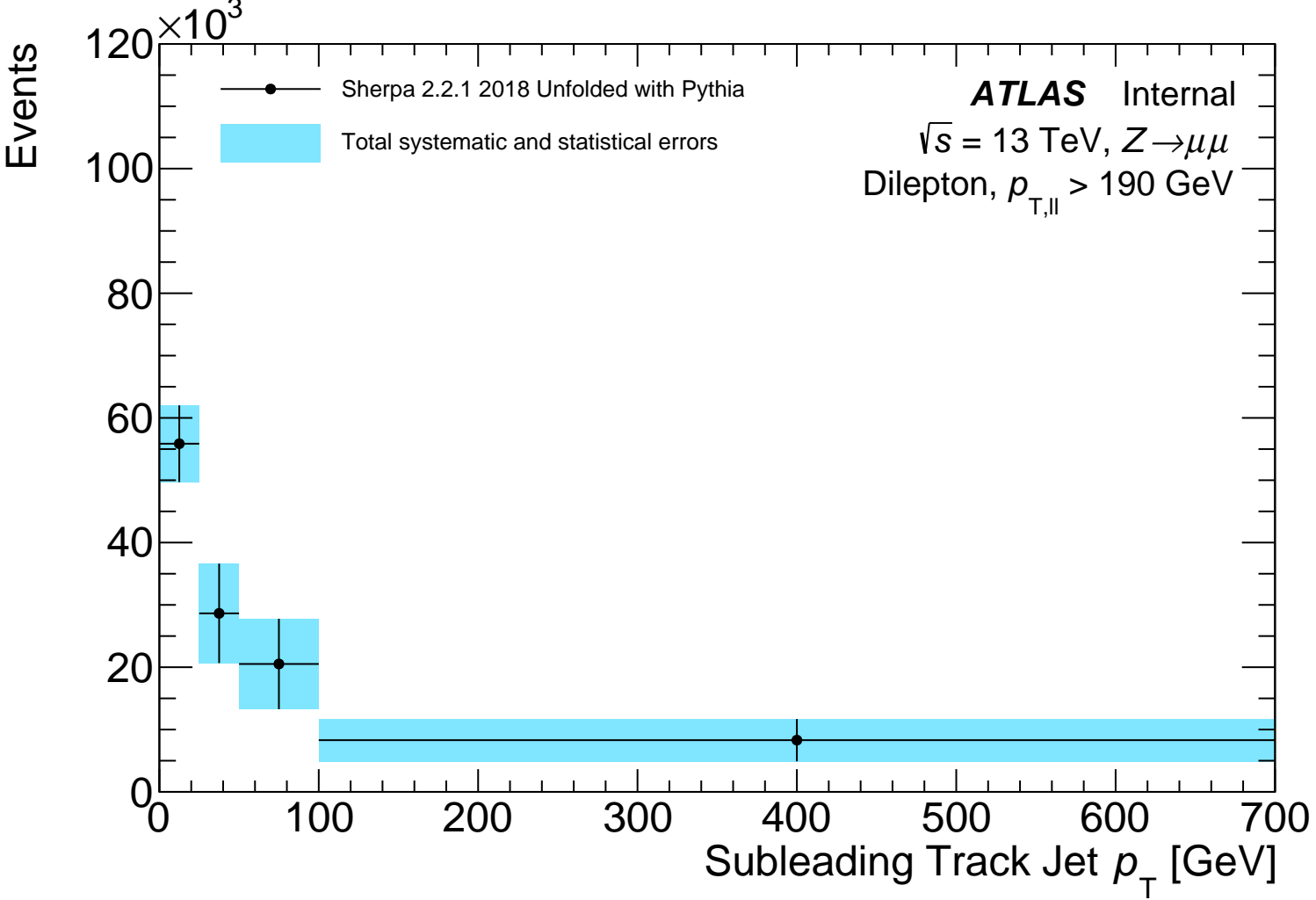


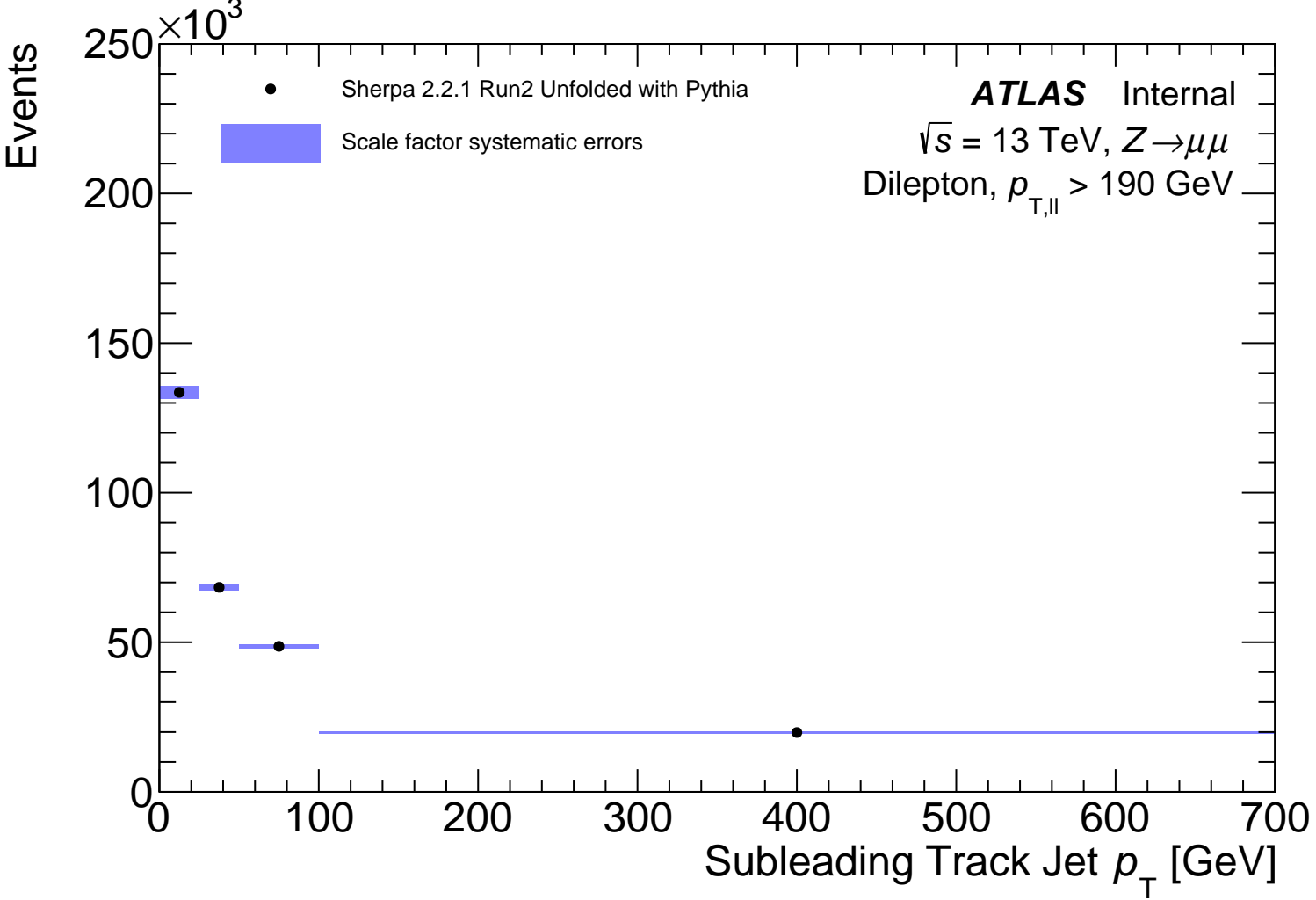


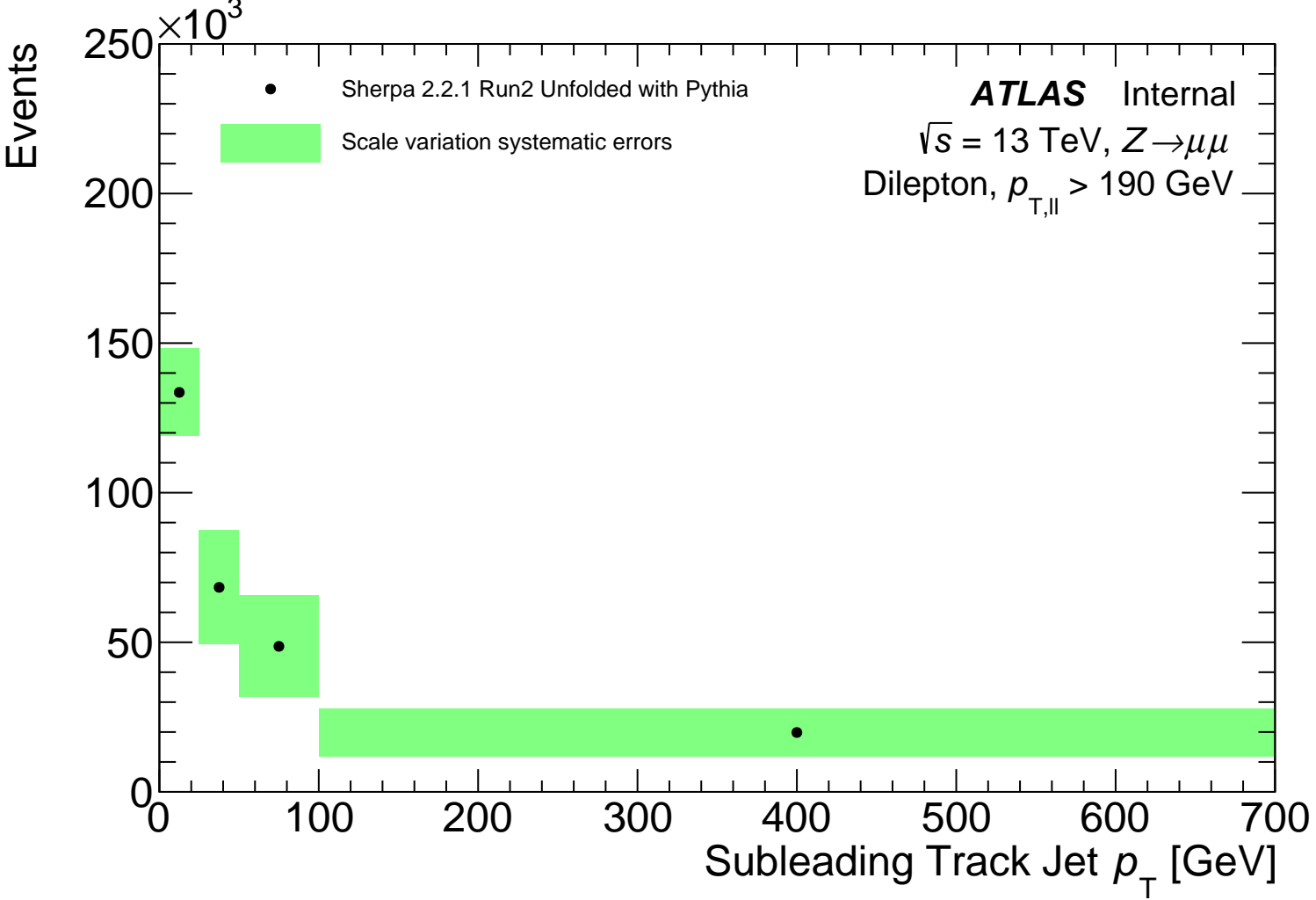


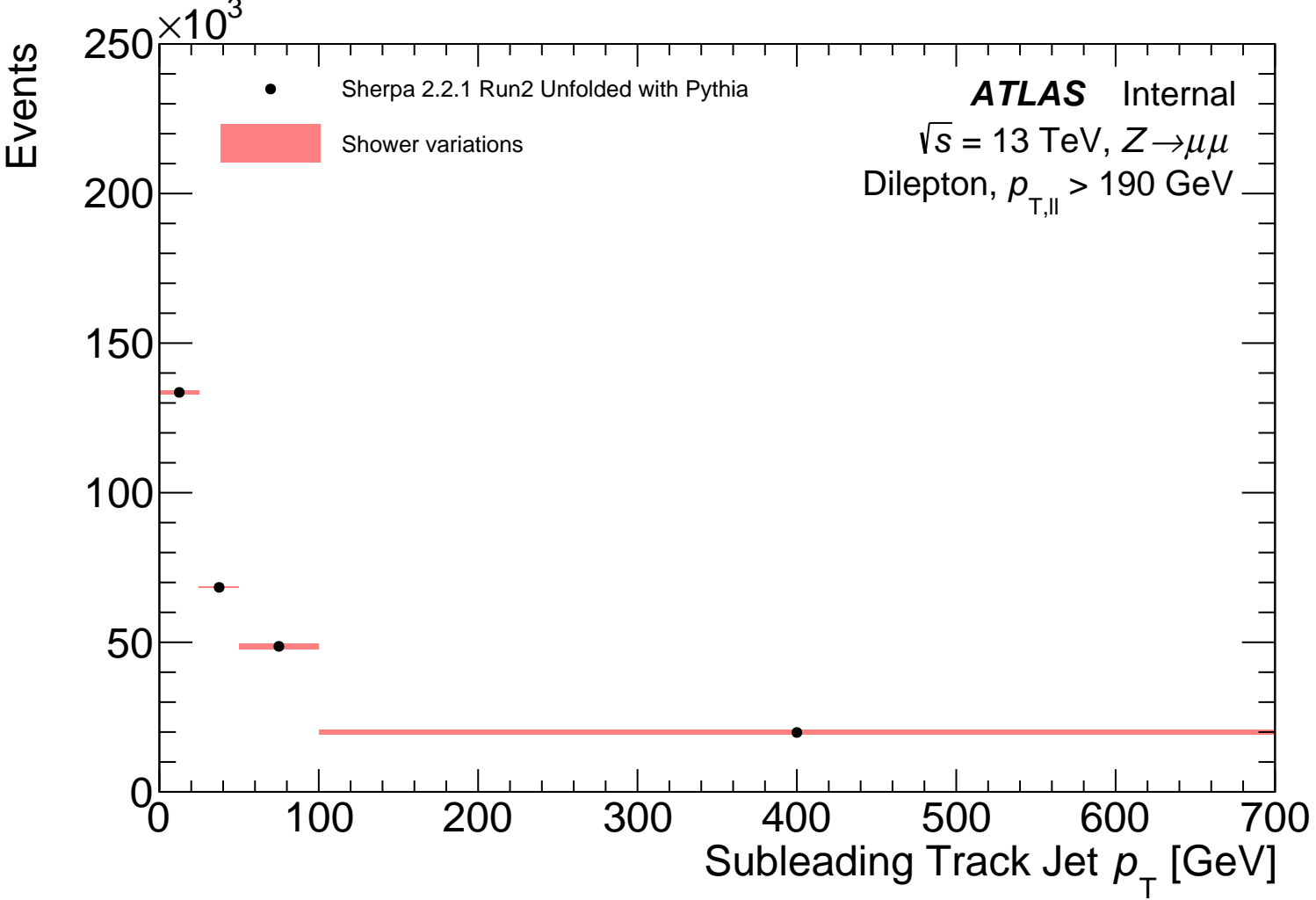


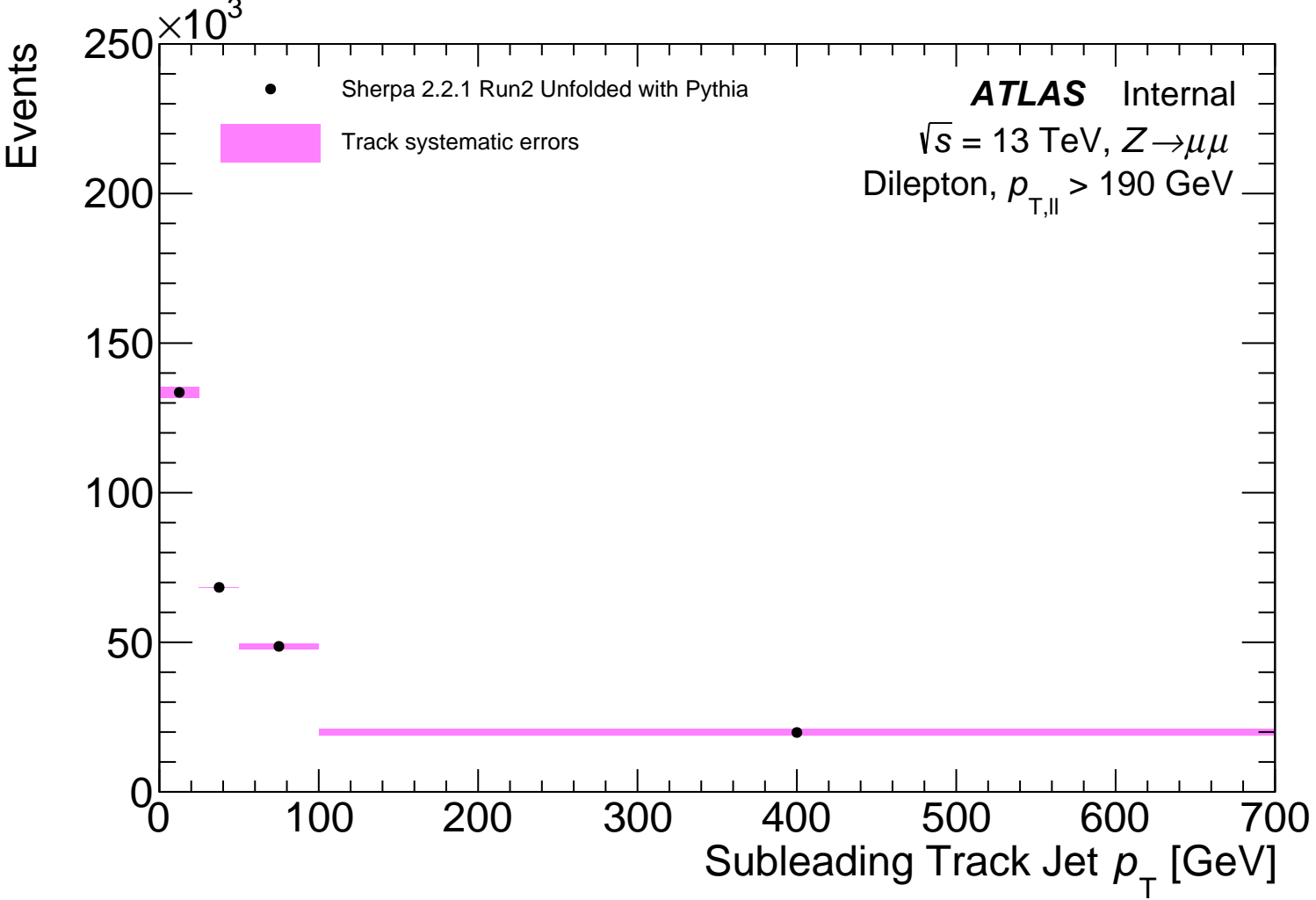


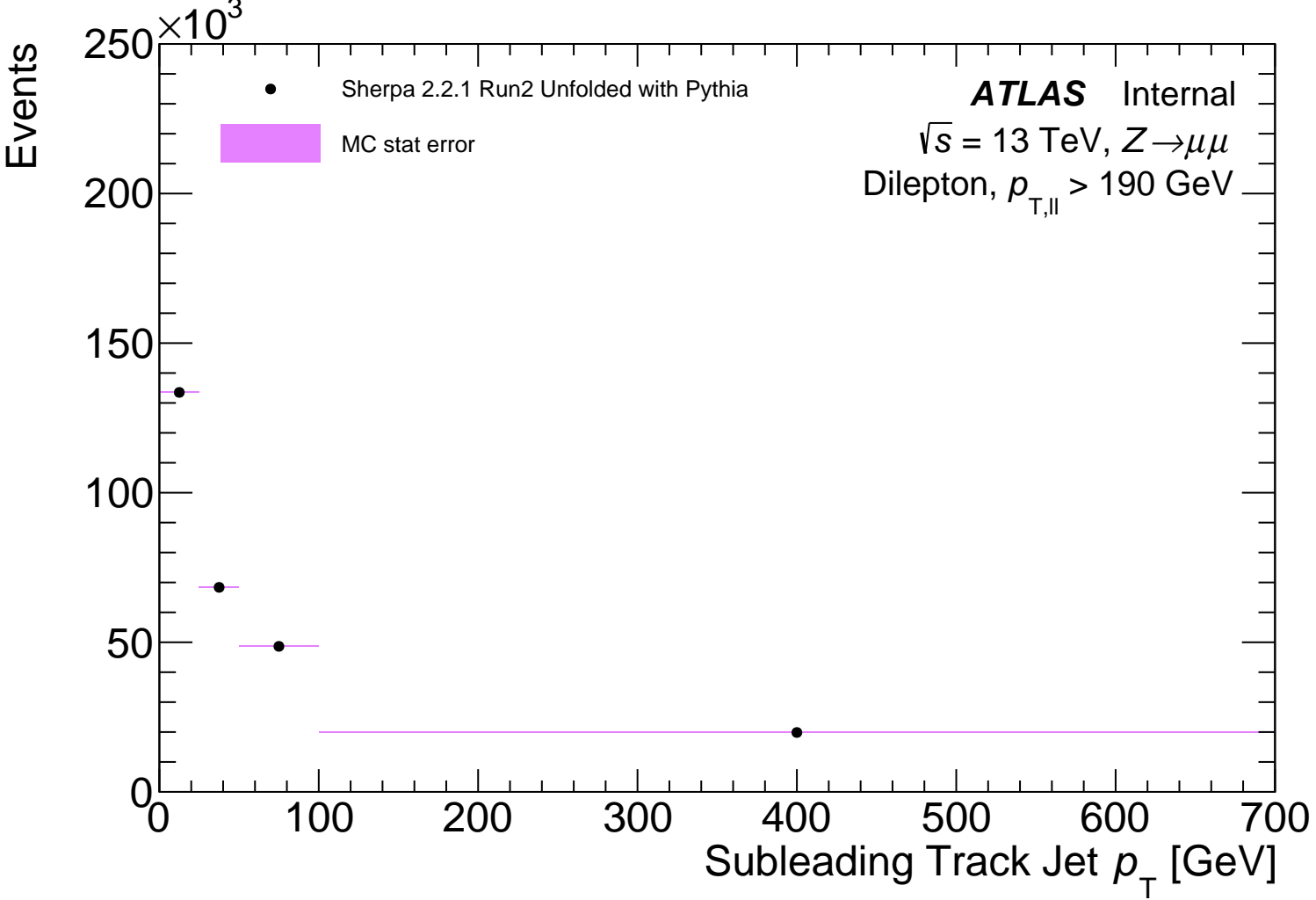


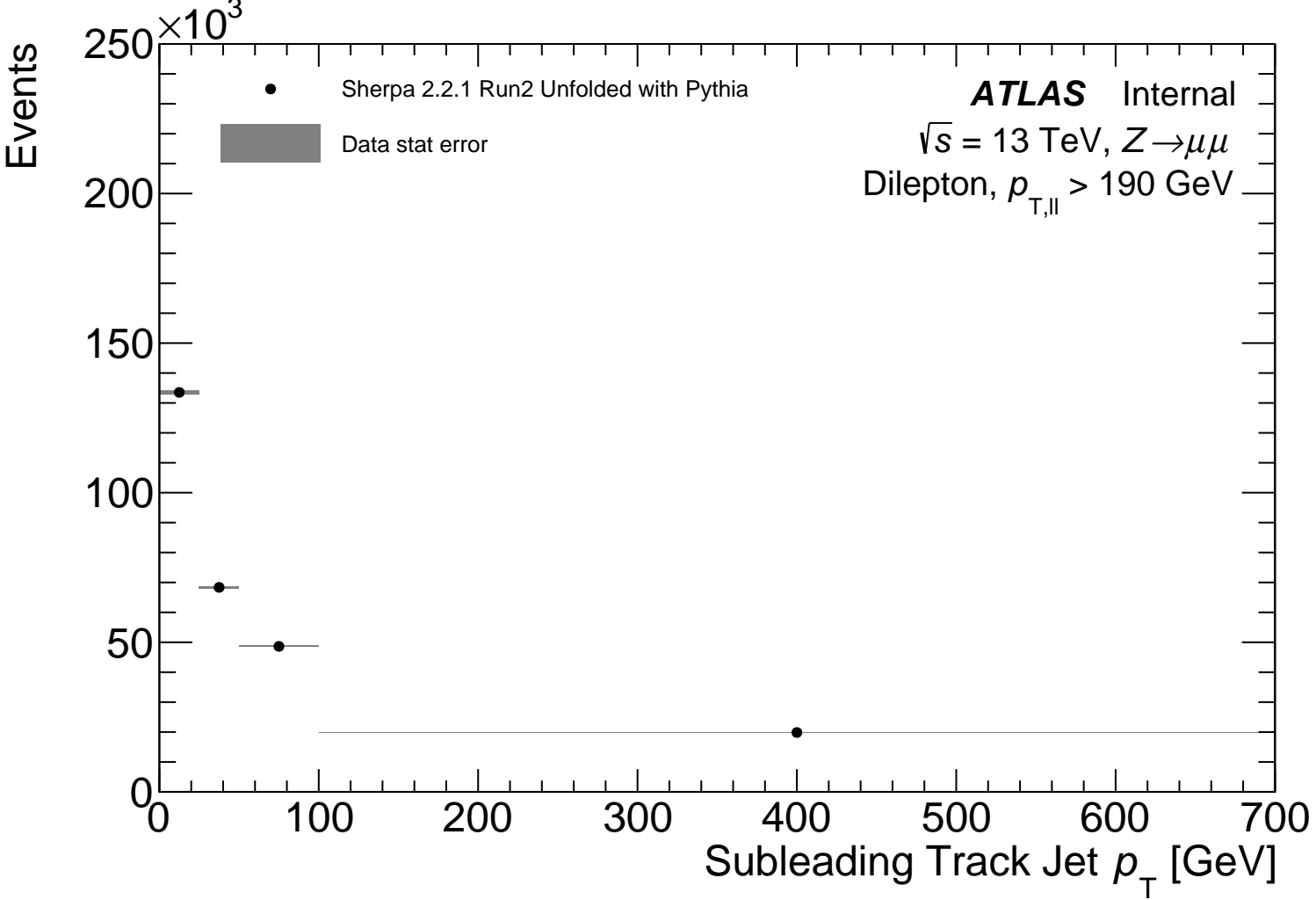


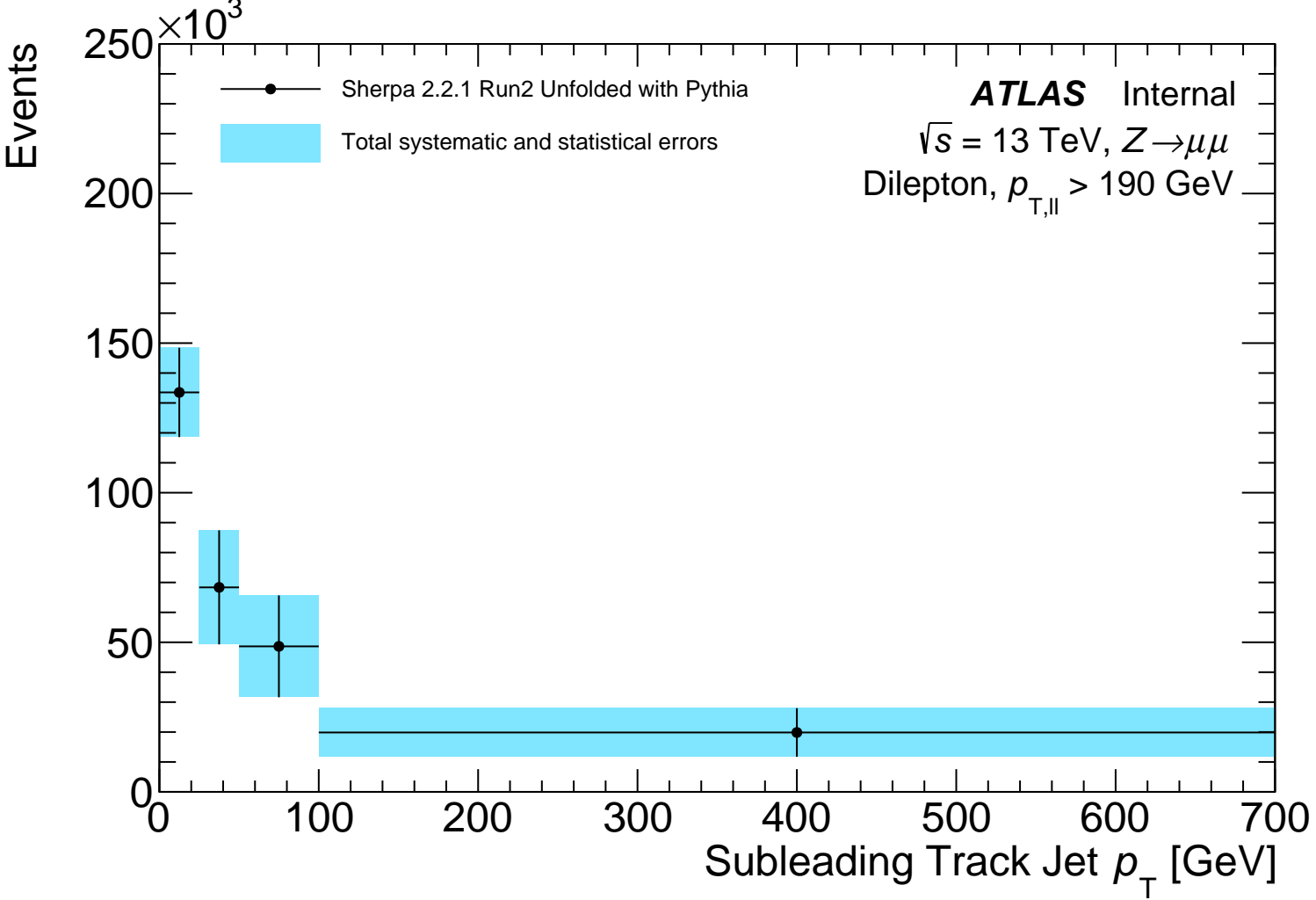




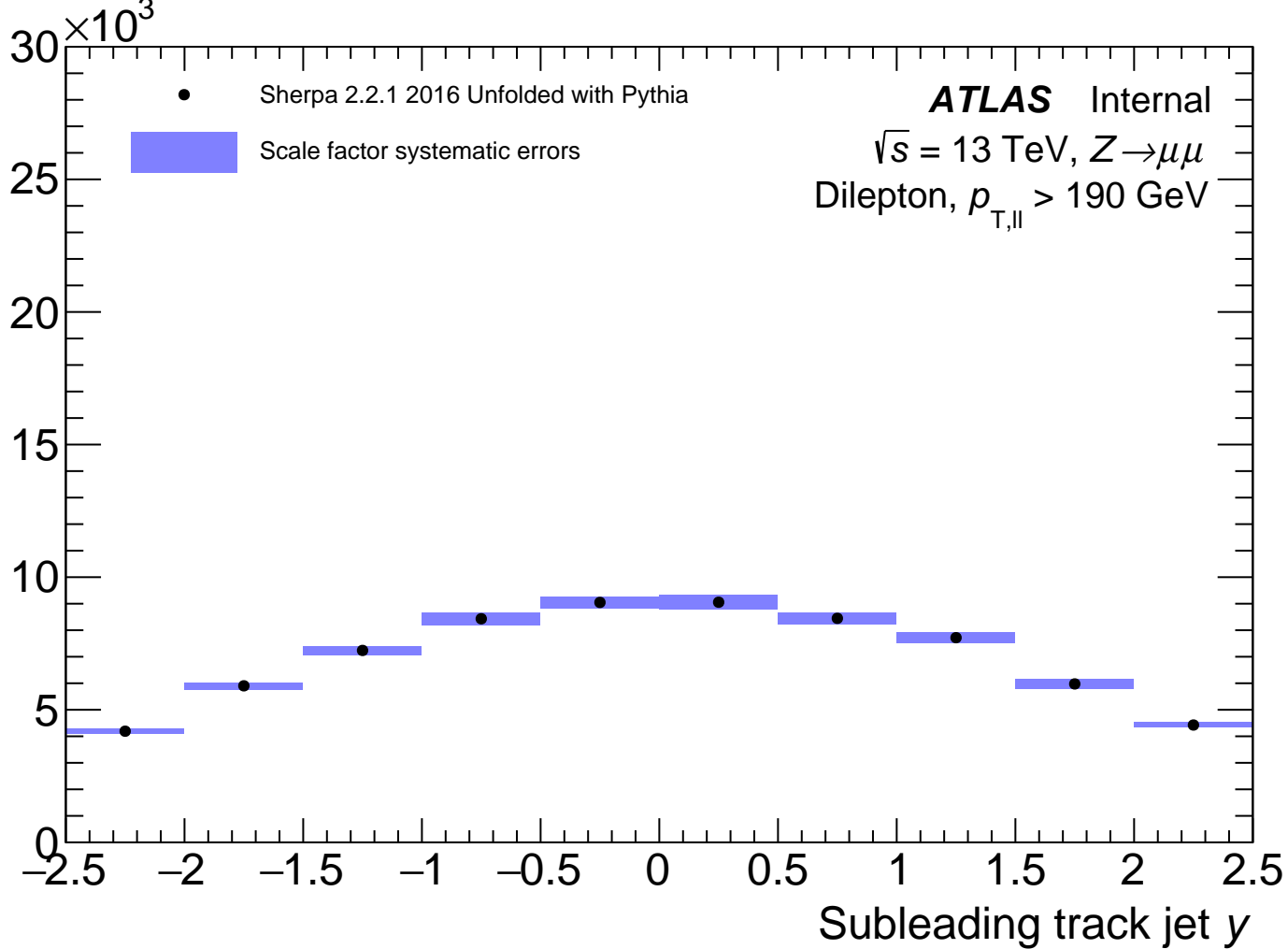




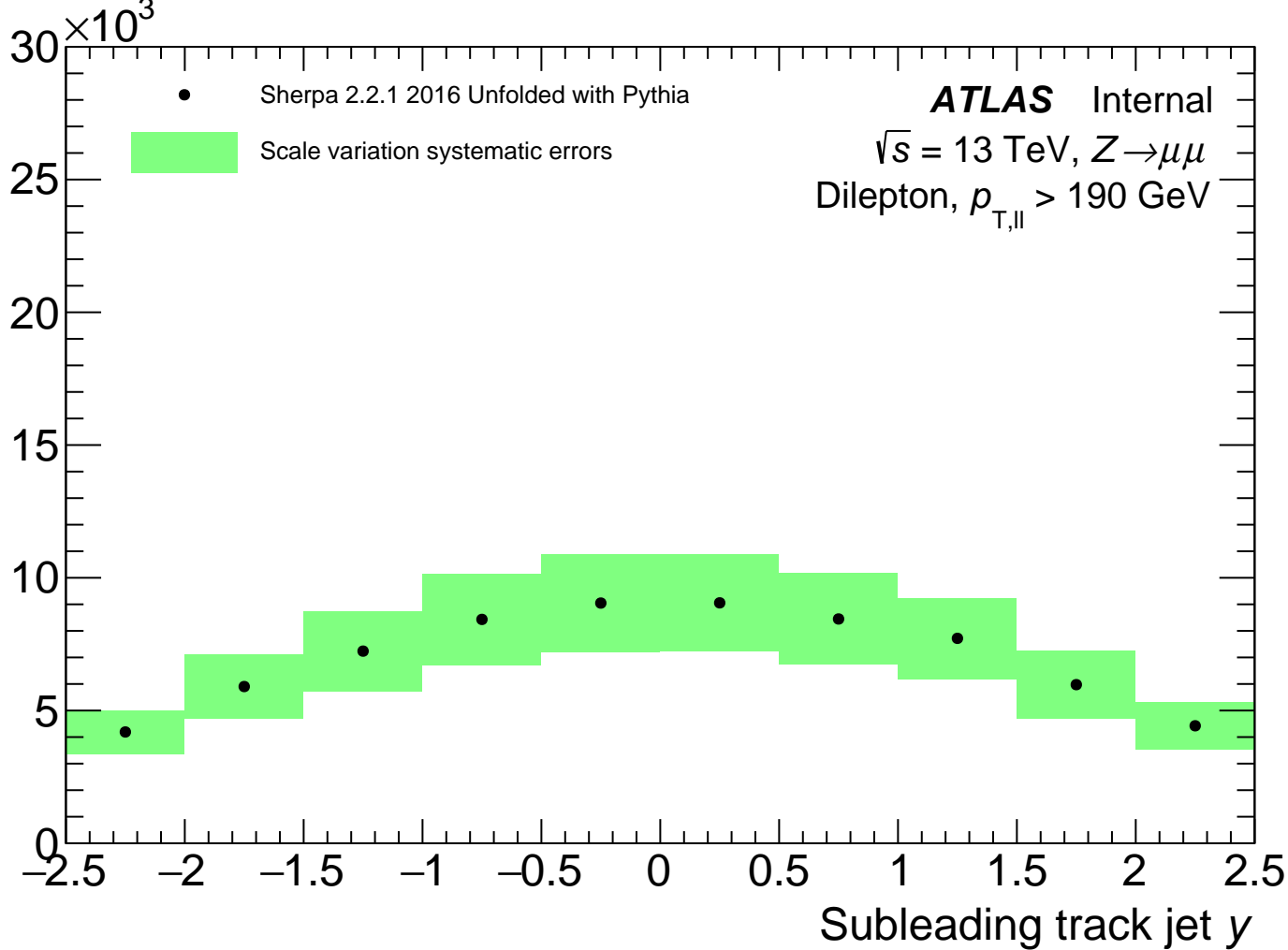




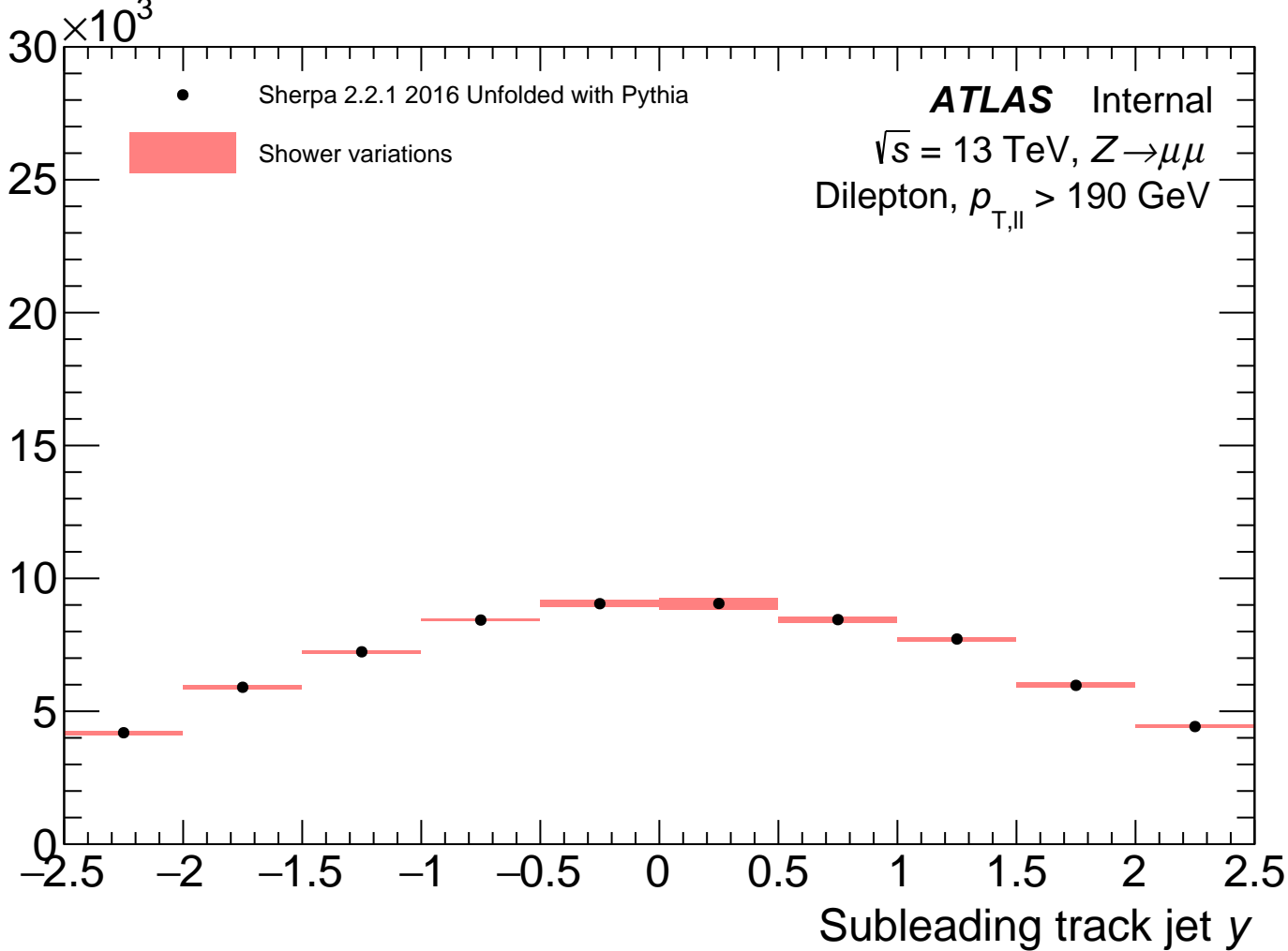
Events



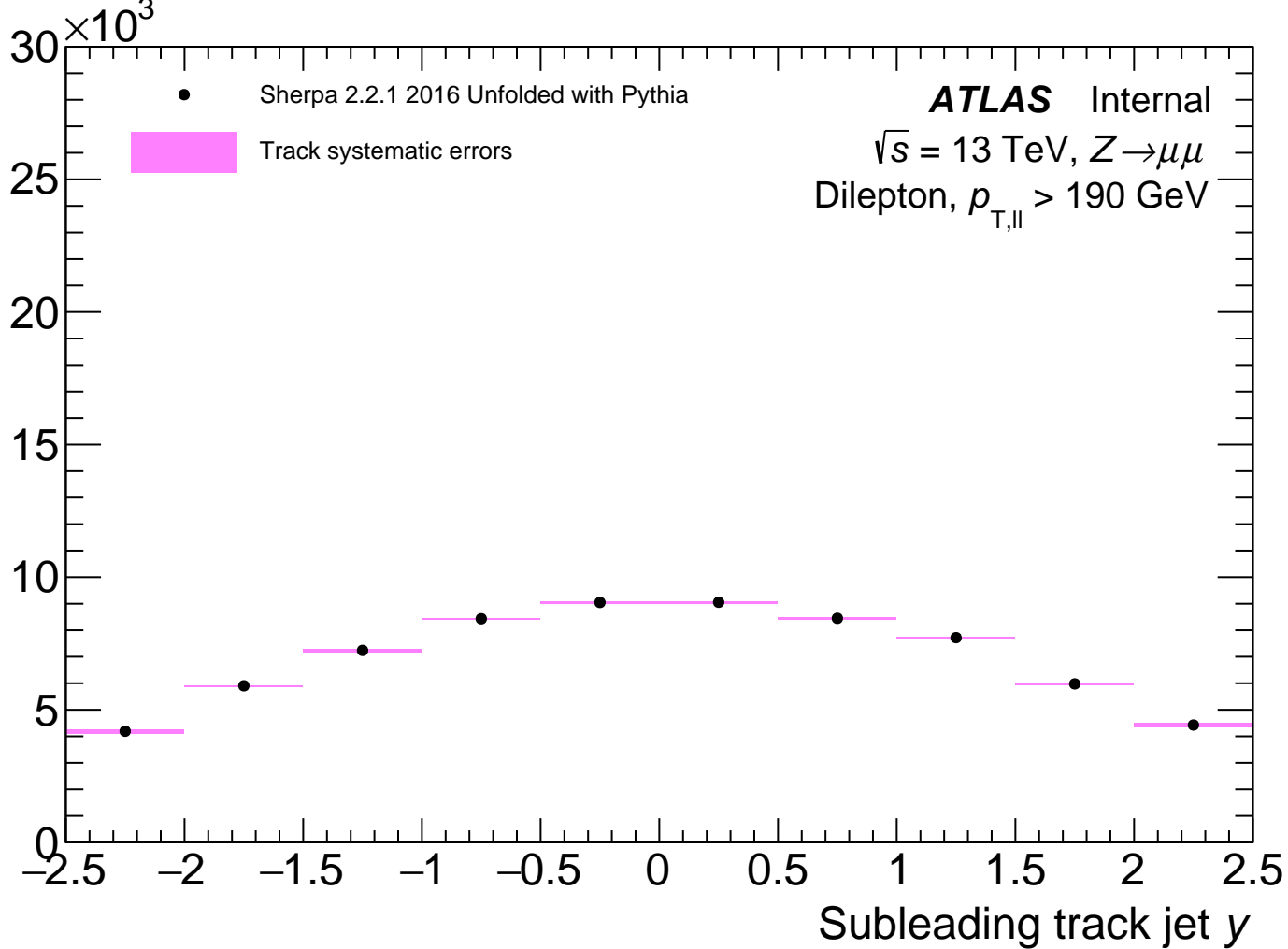
Events



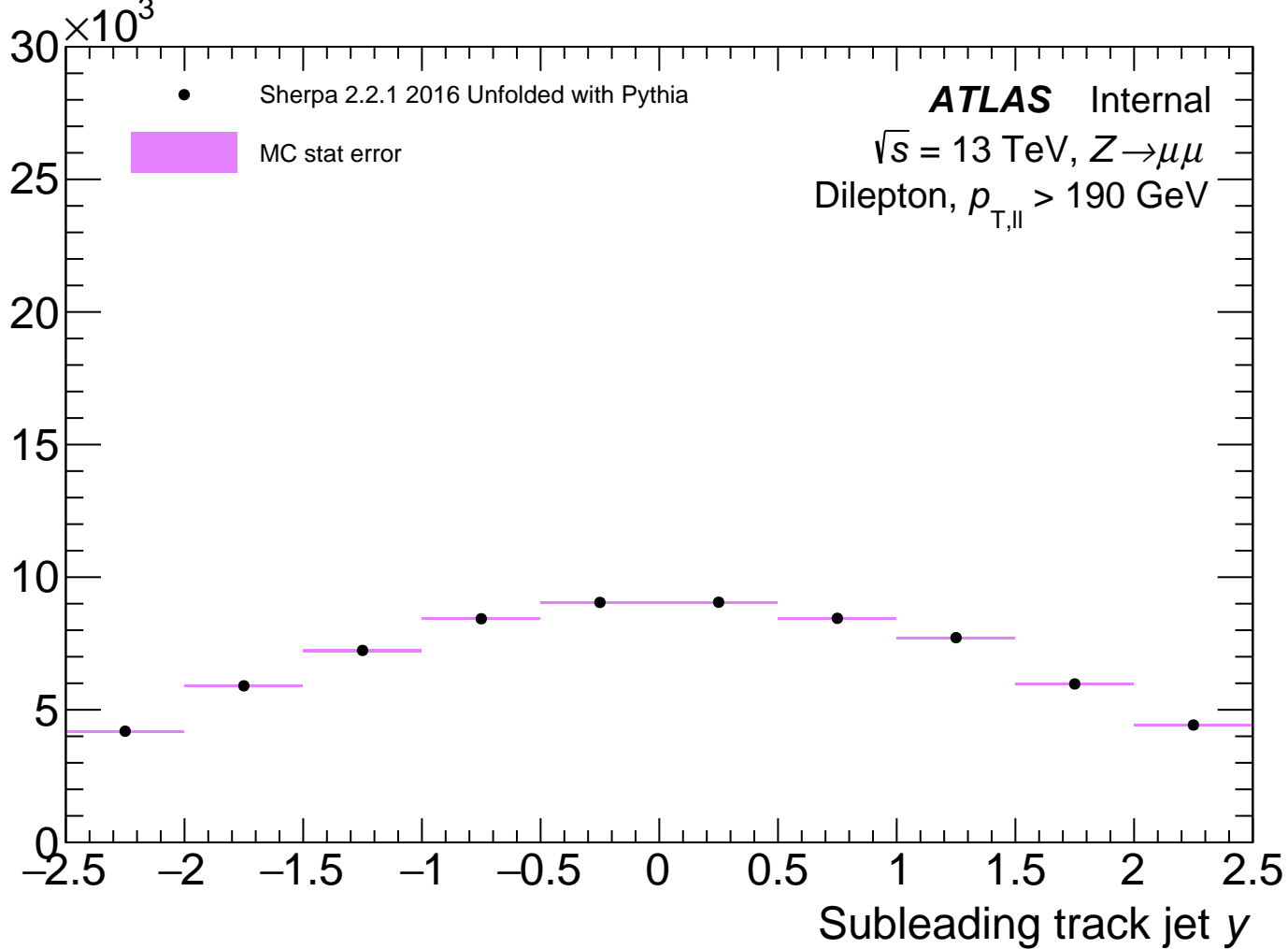
Events



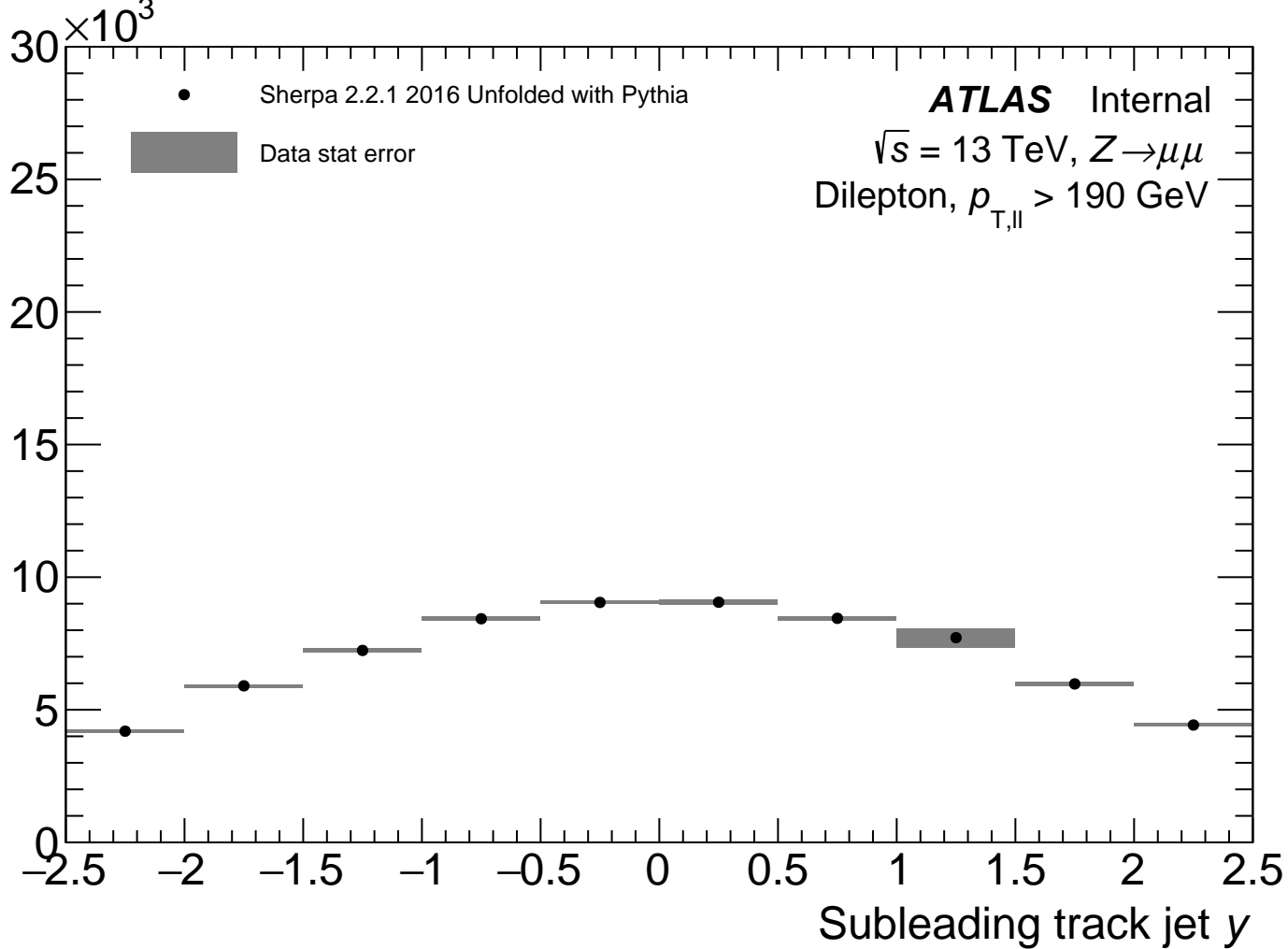
Events



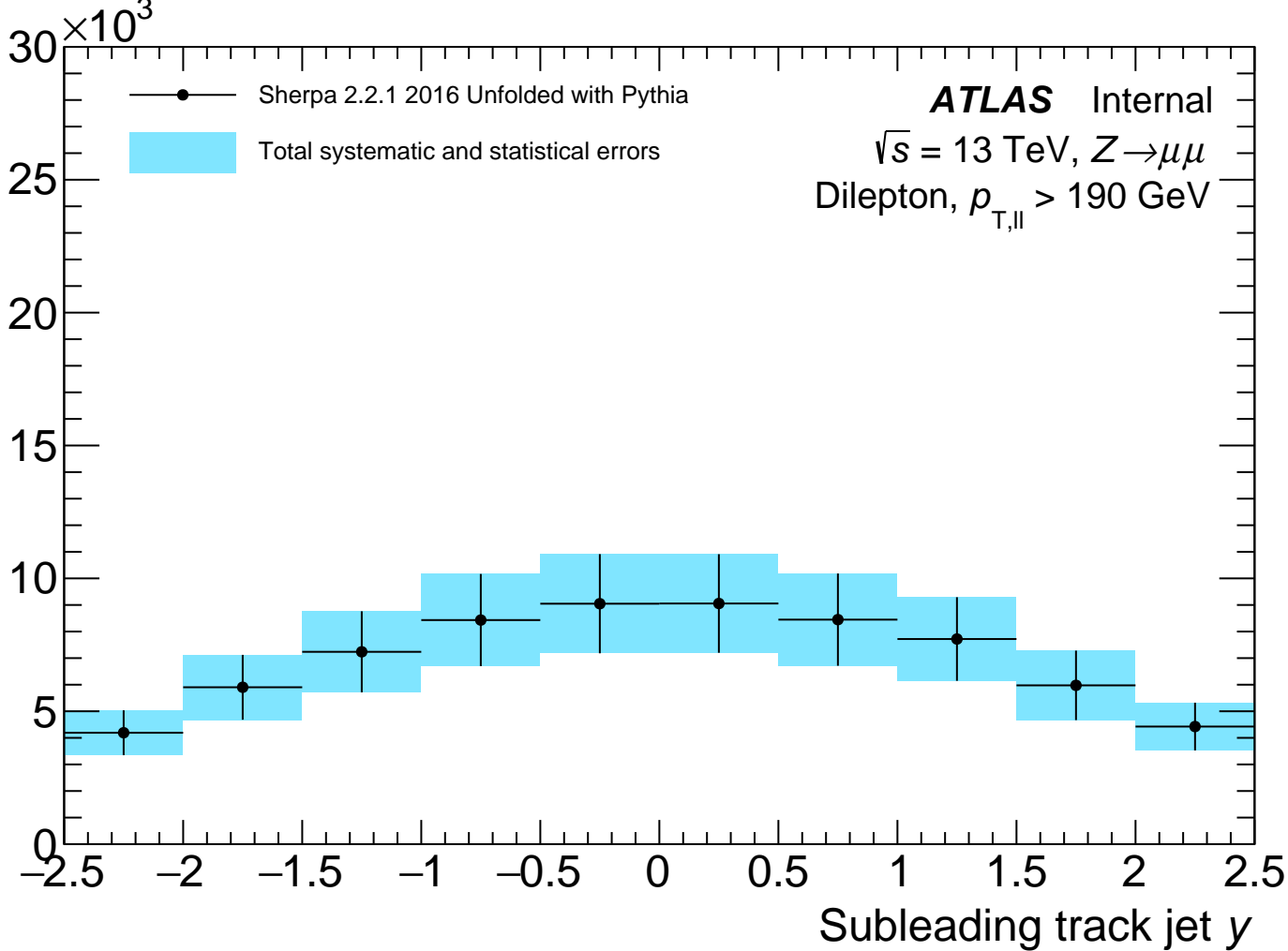
Events



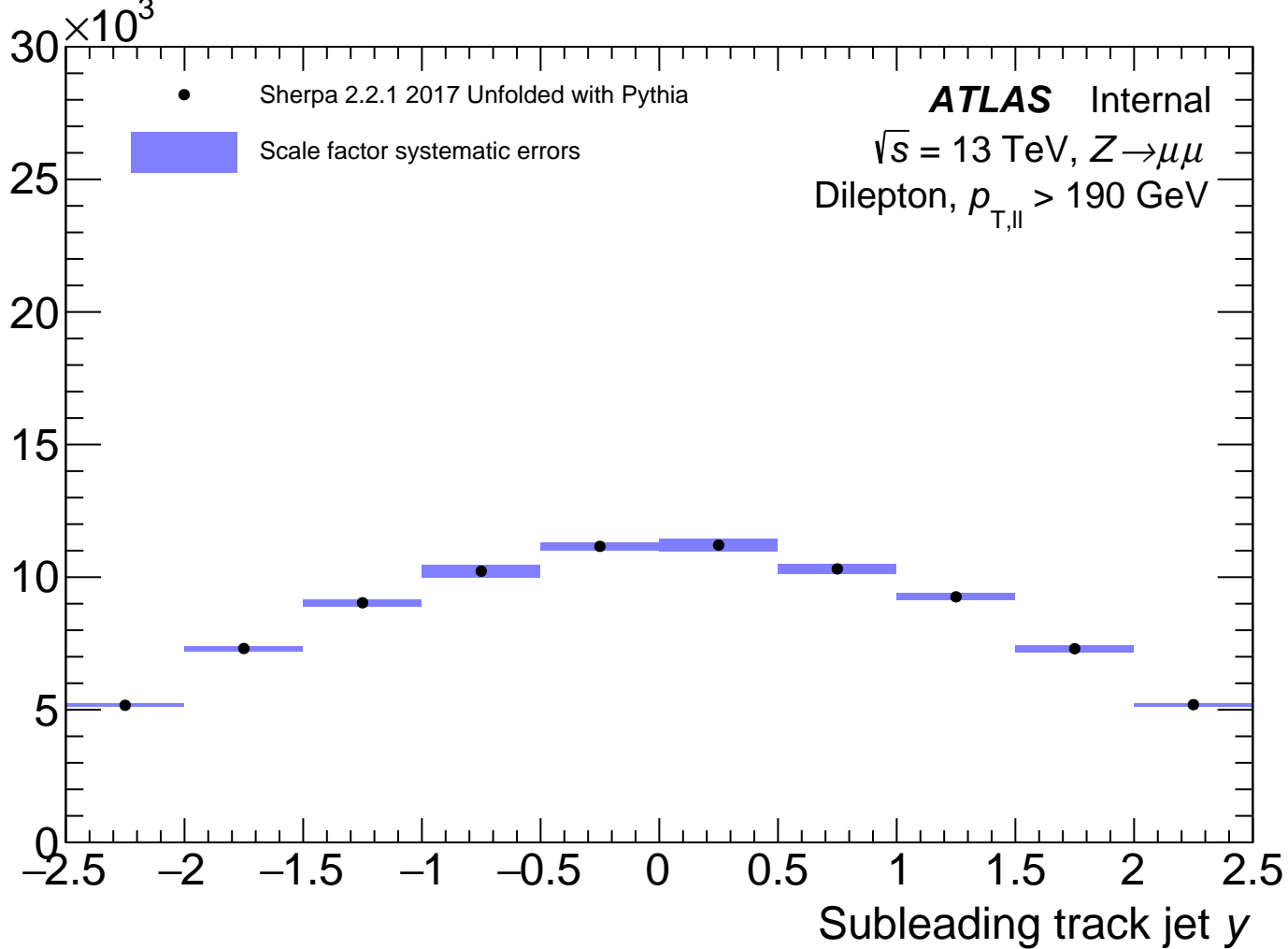
Events



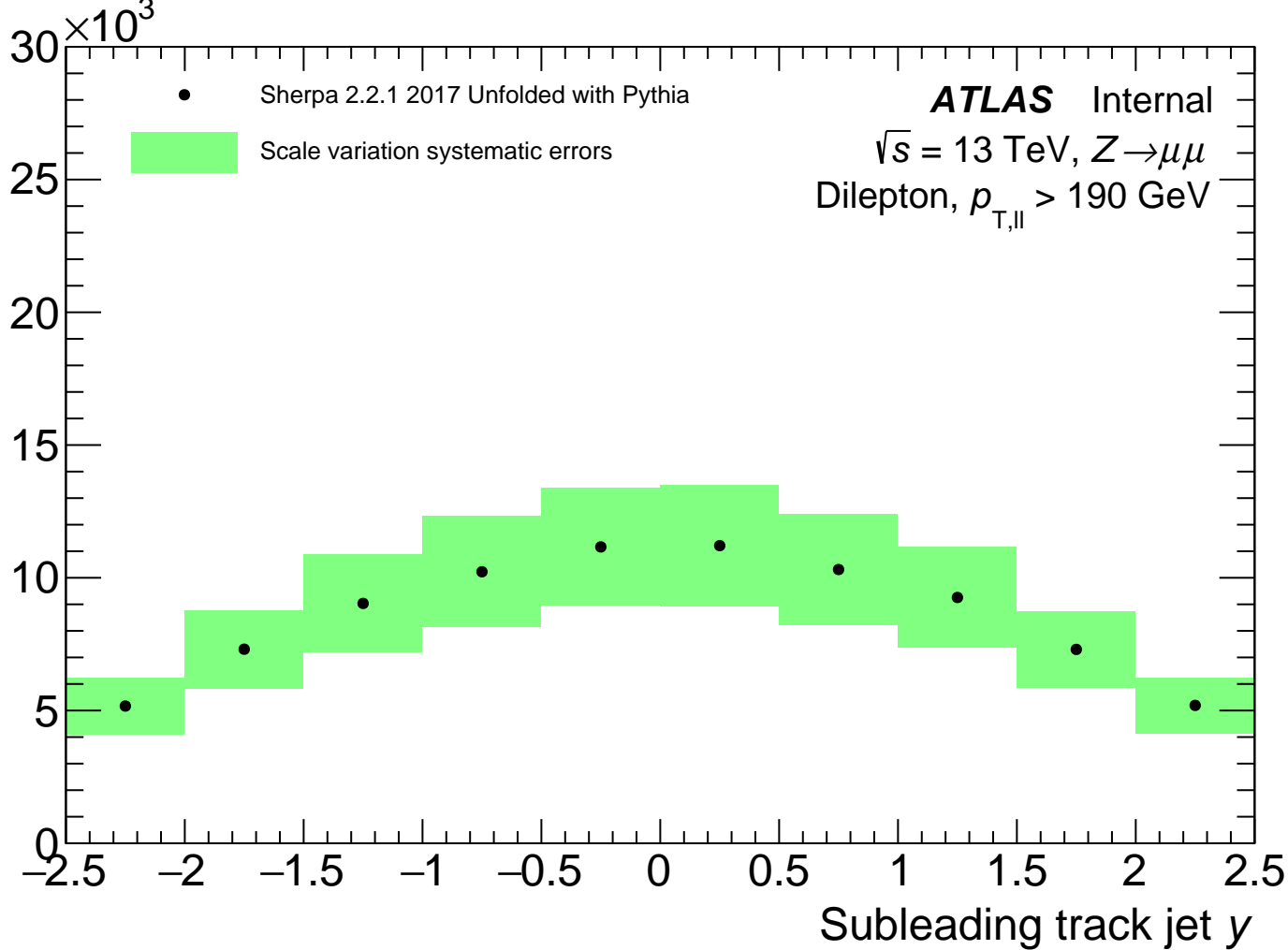
Events



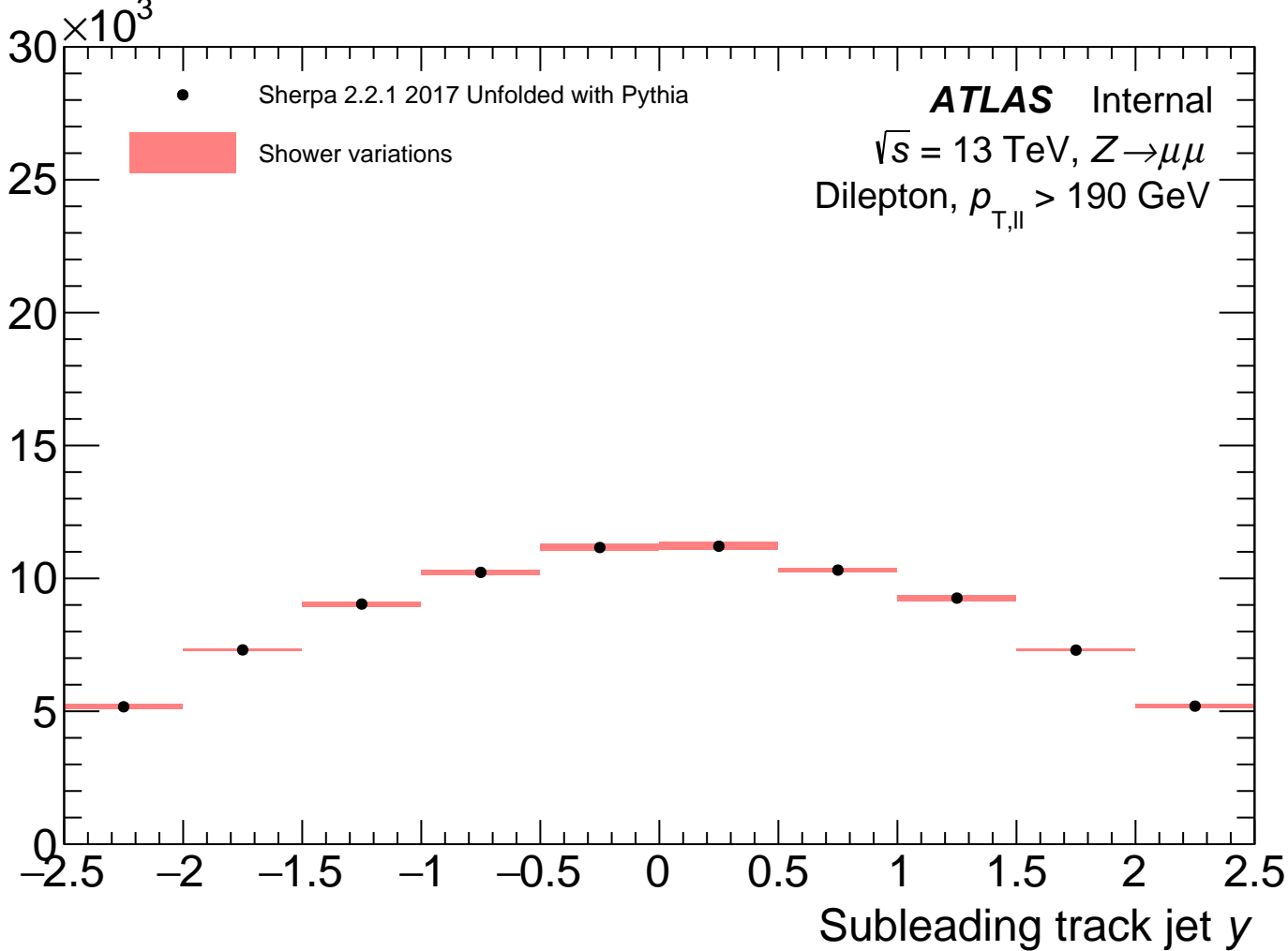
Events



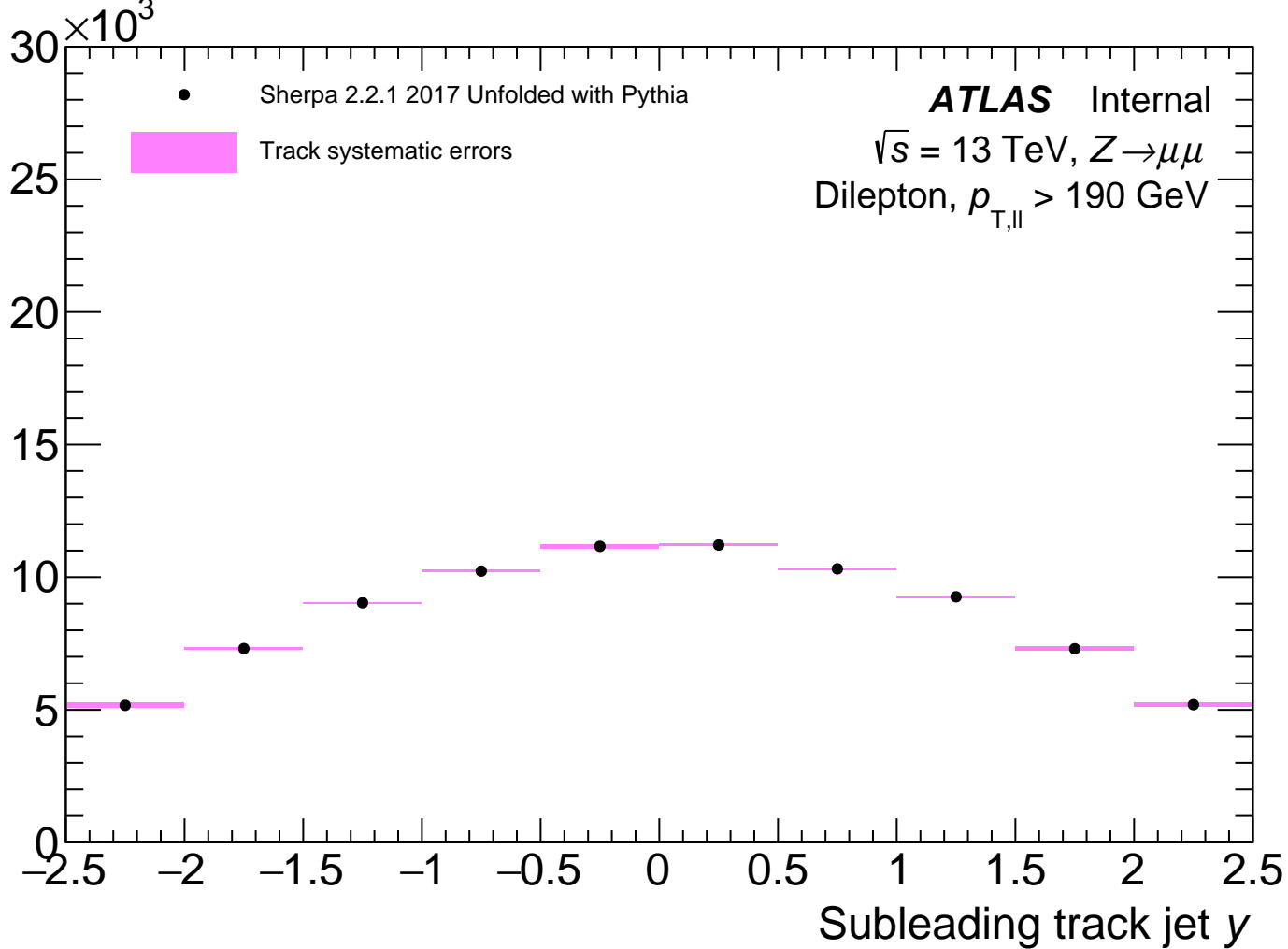
Events



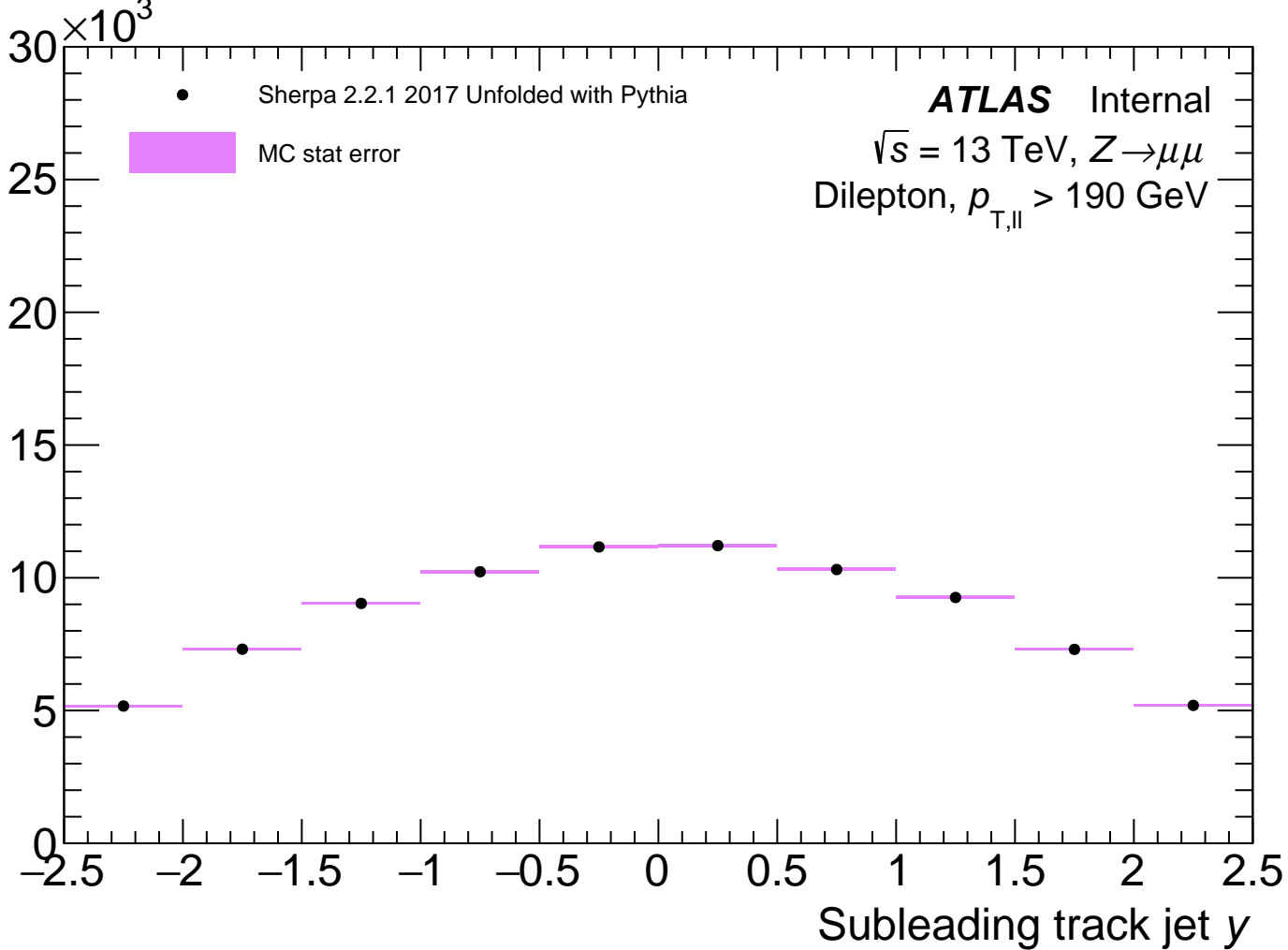
Events



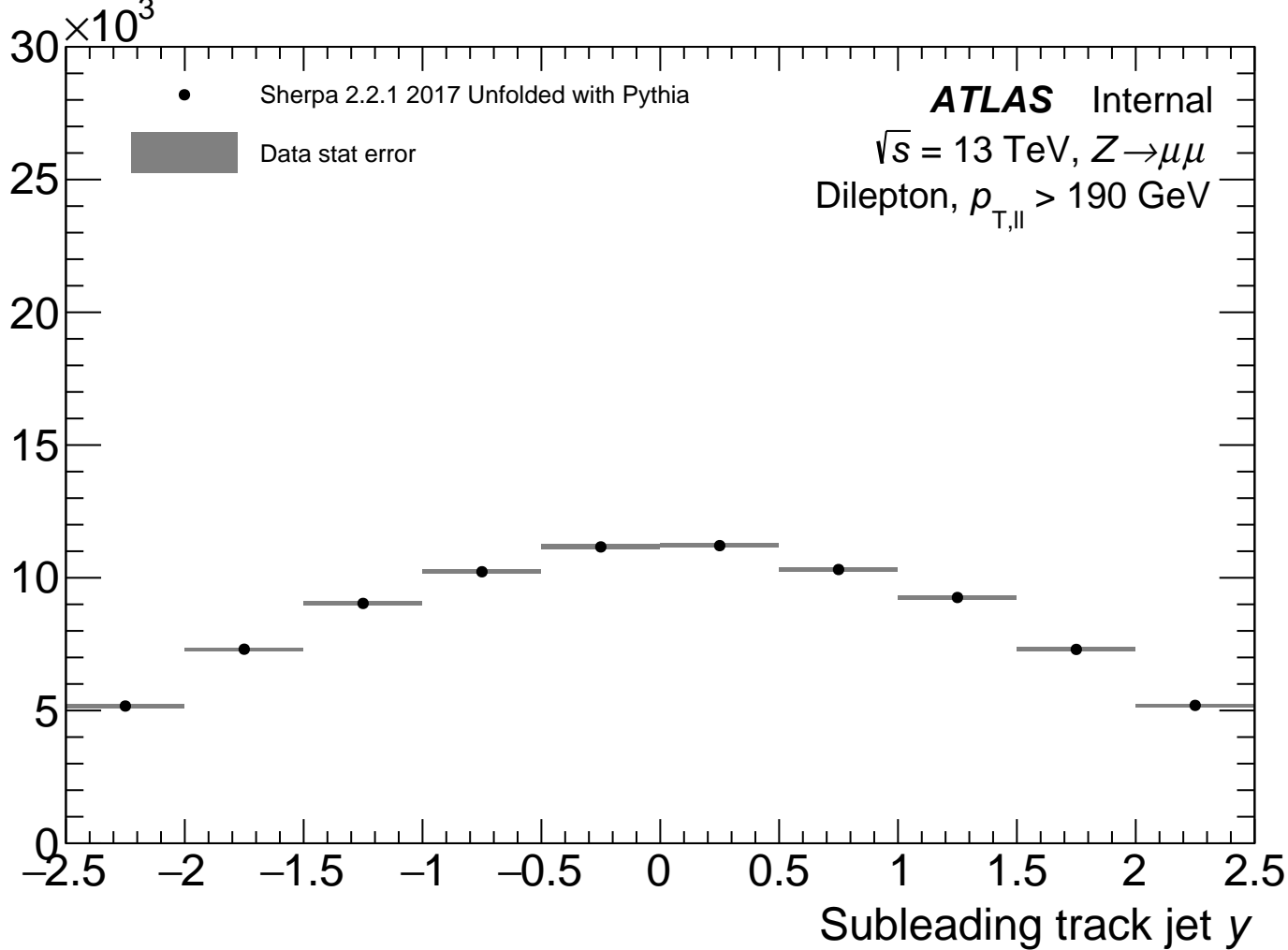
Events



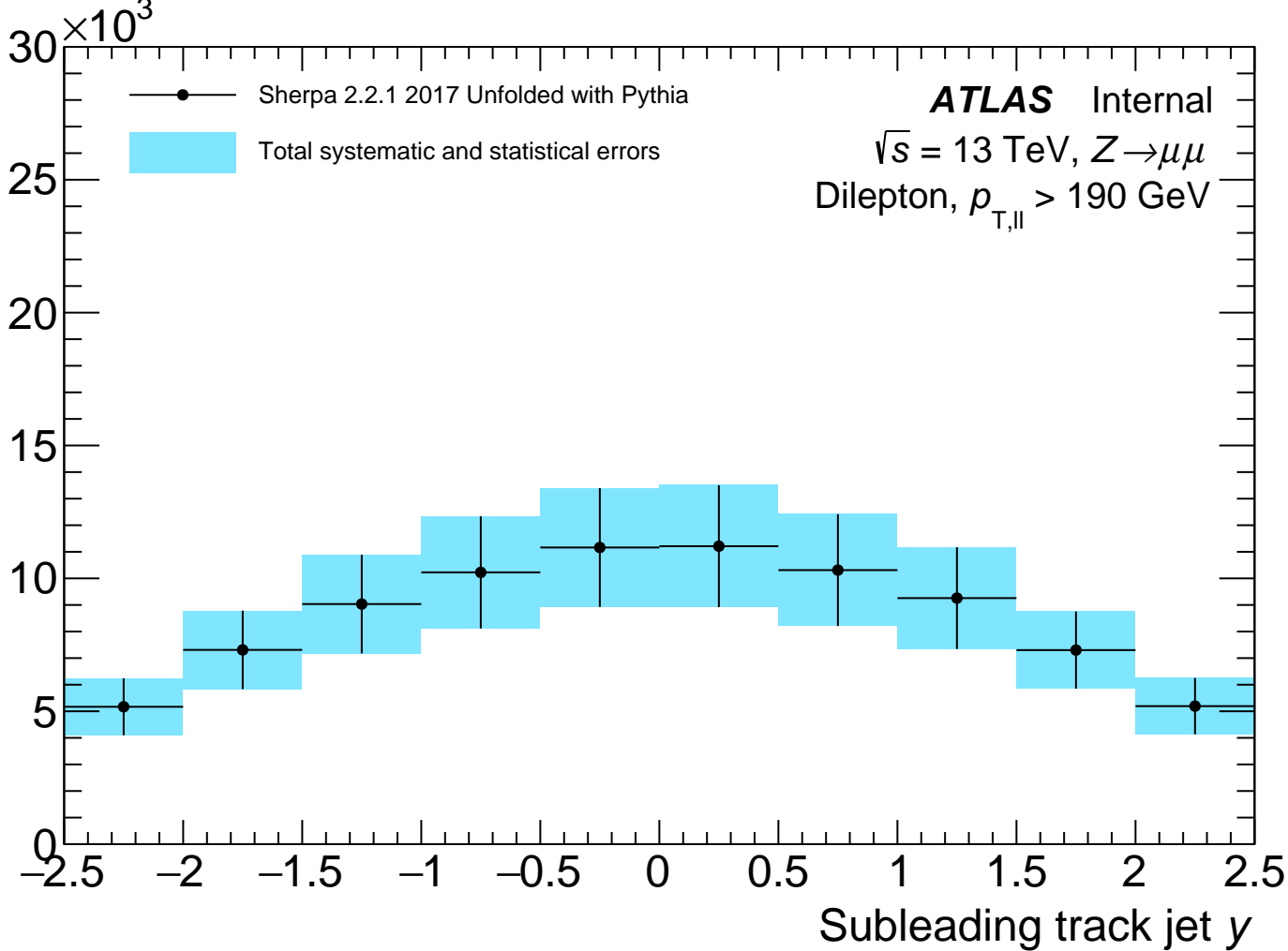
Events



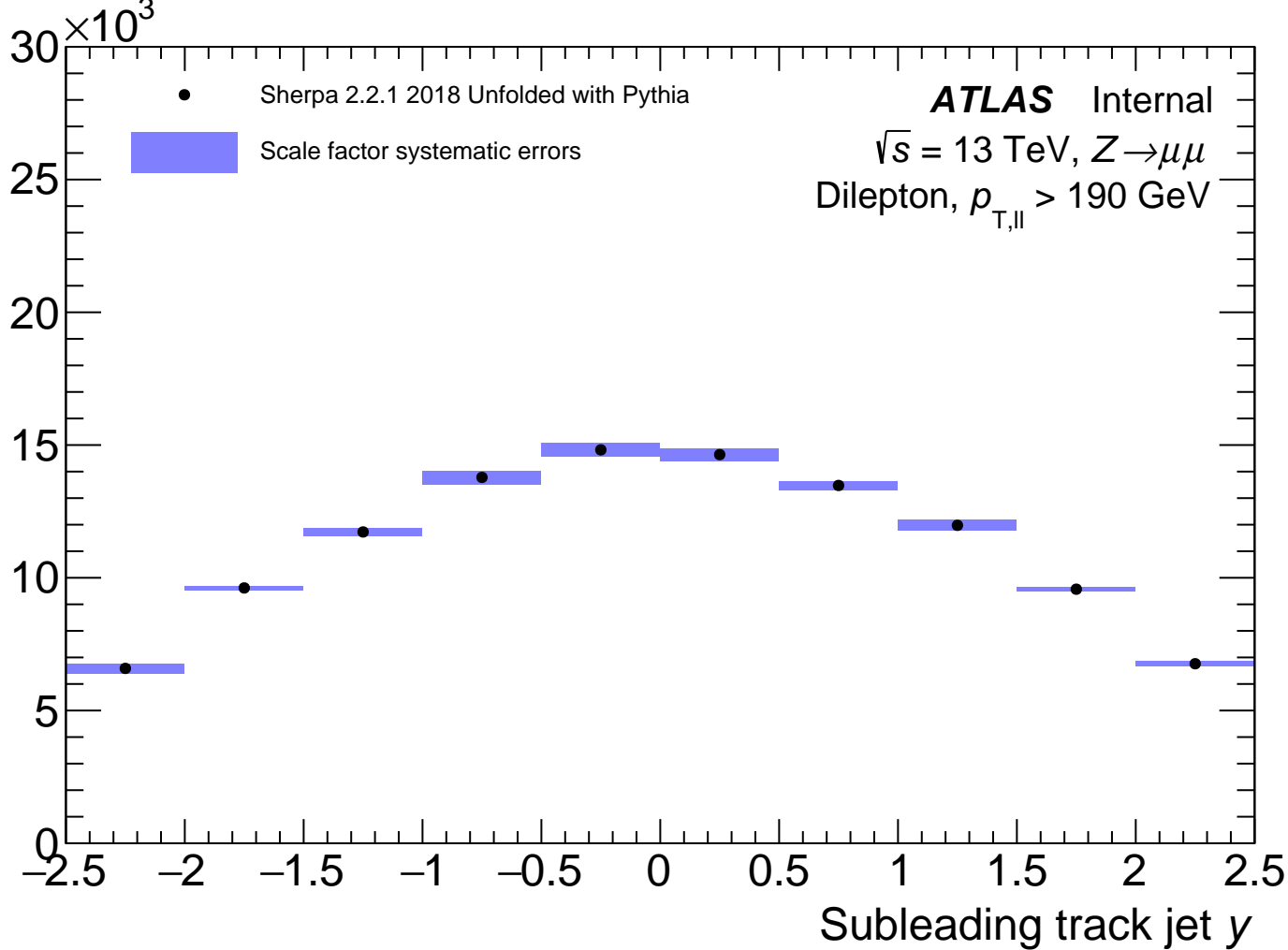
Events



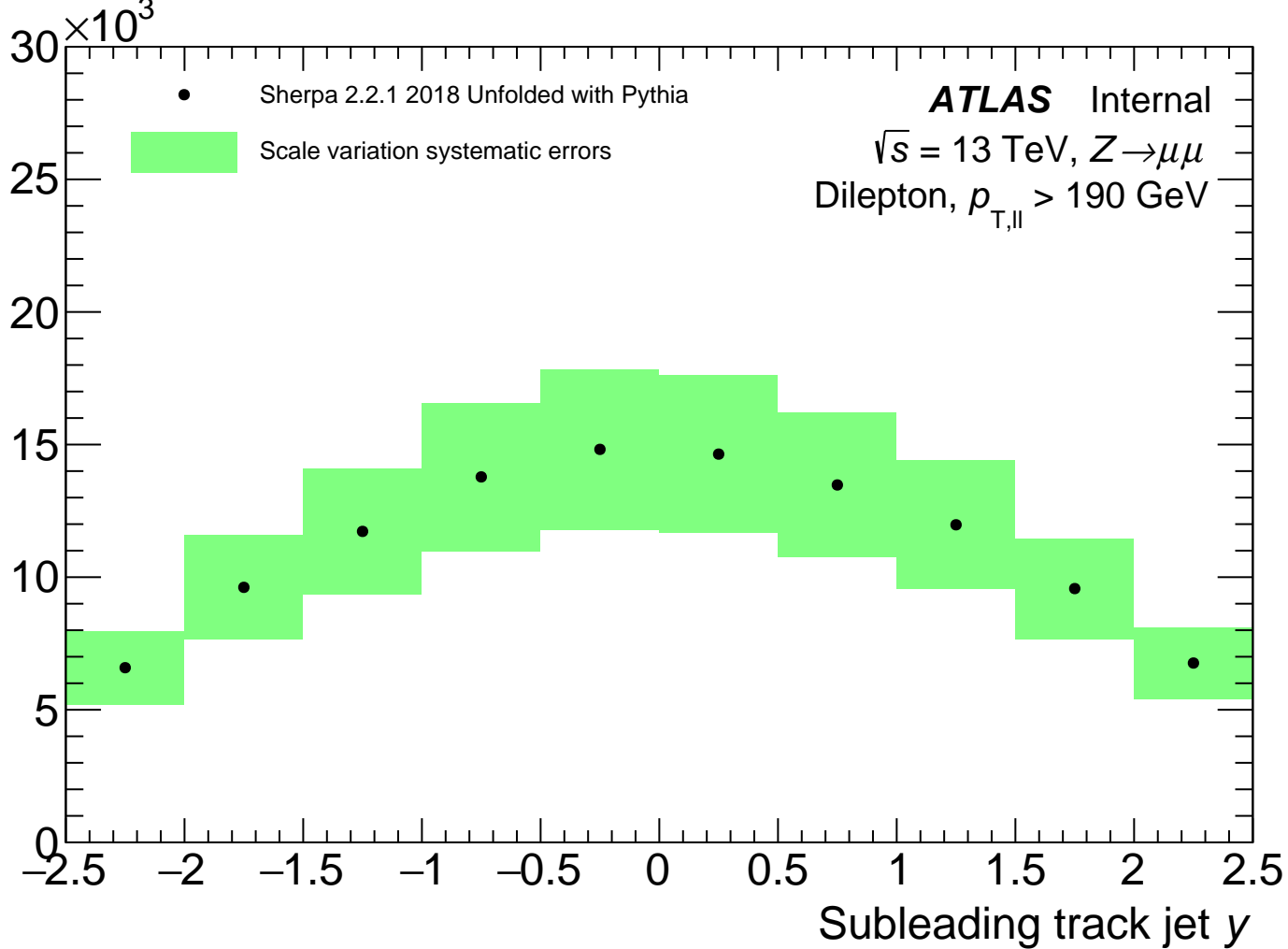
Events



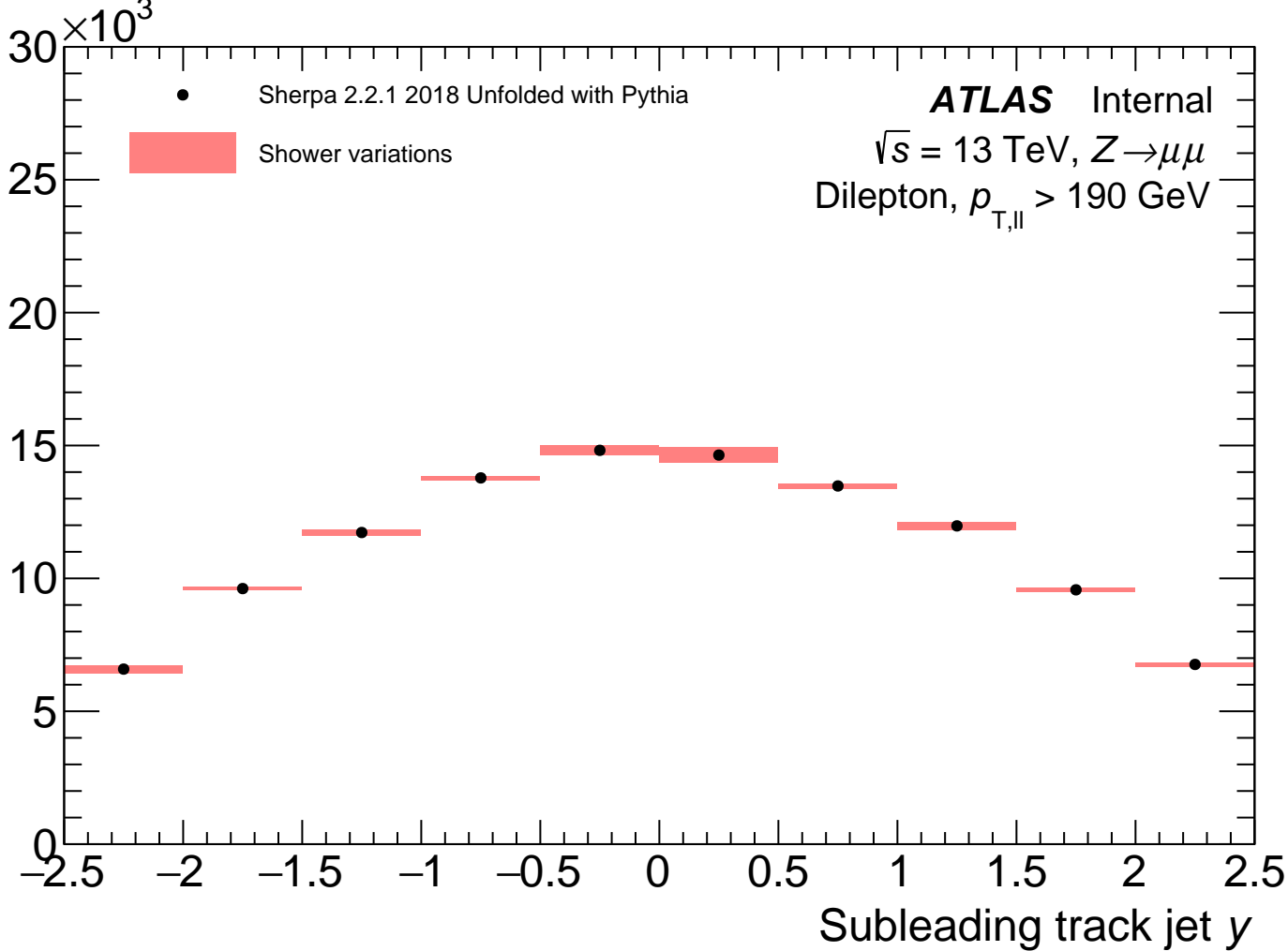
Events



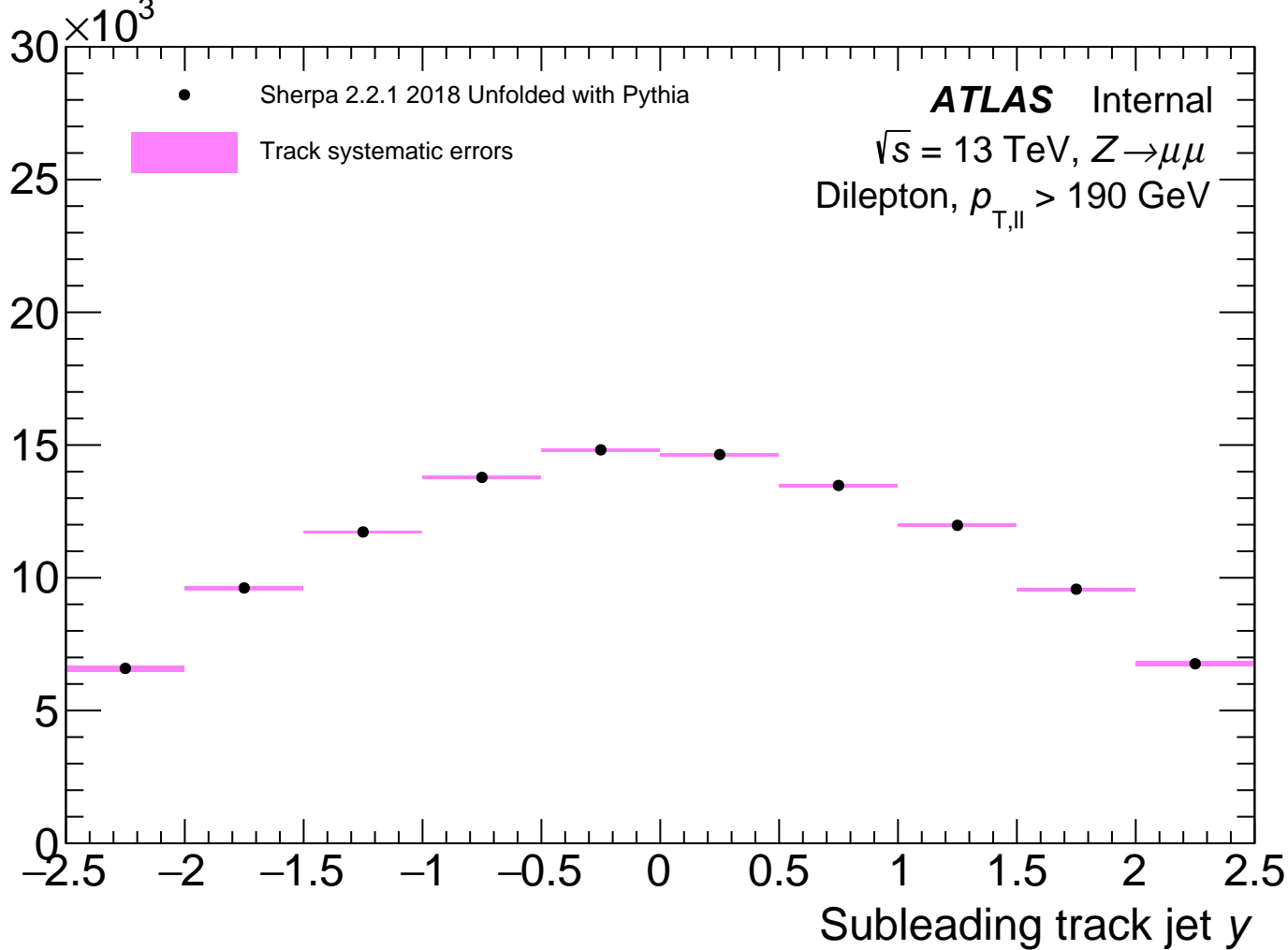
Events



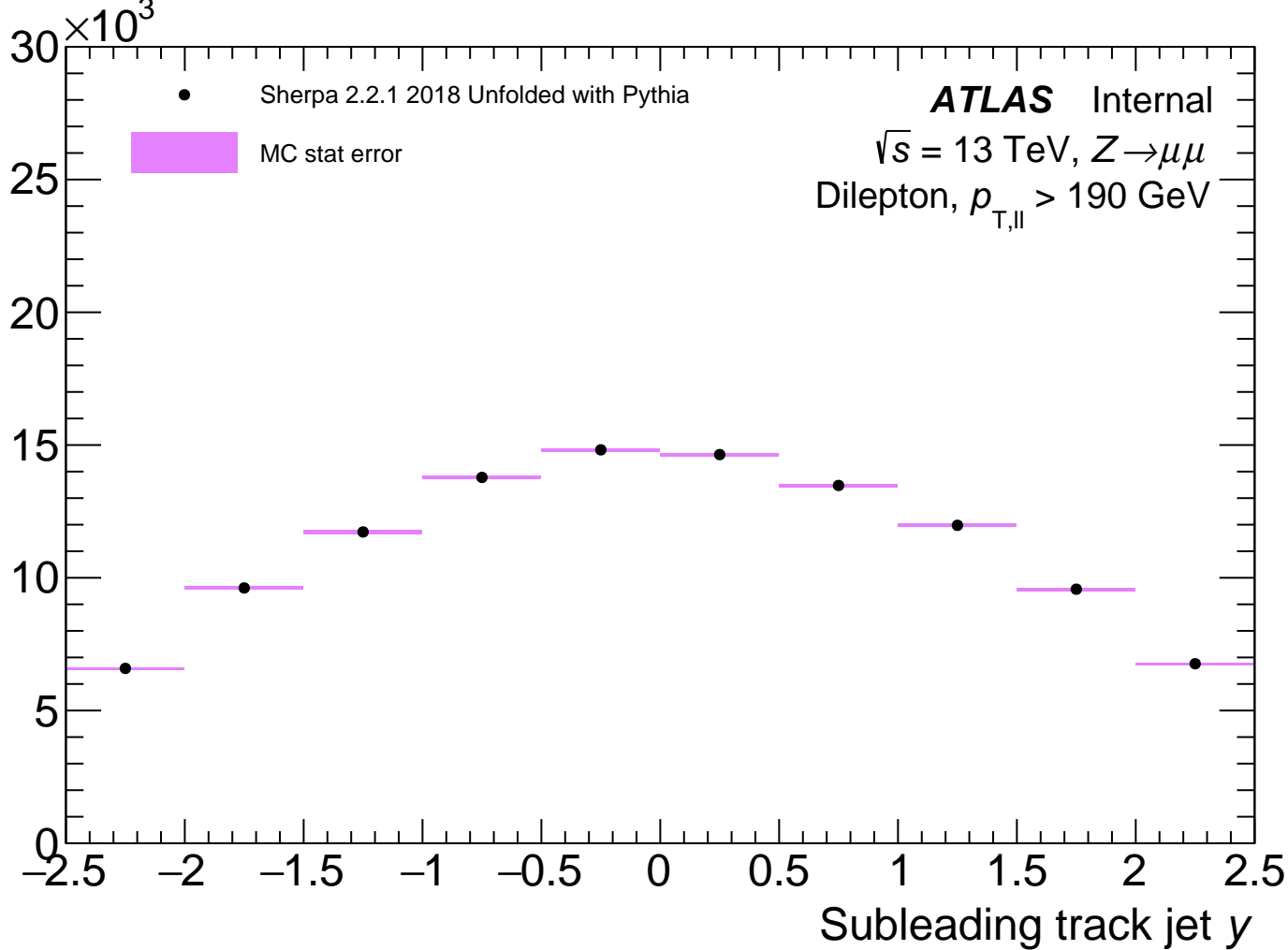
Events



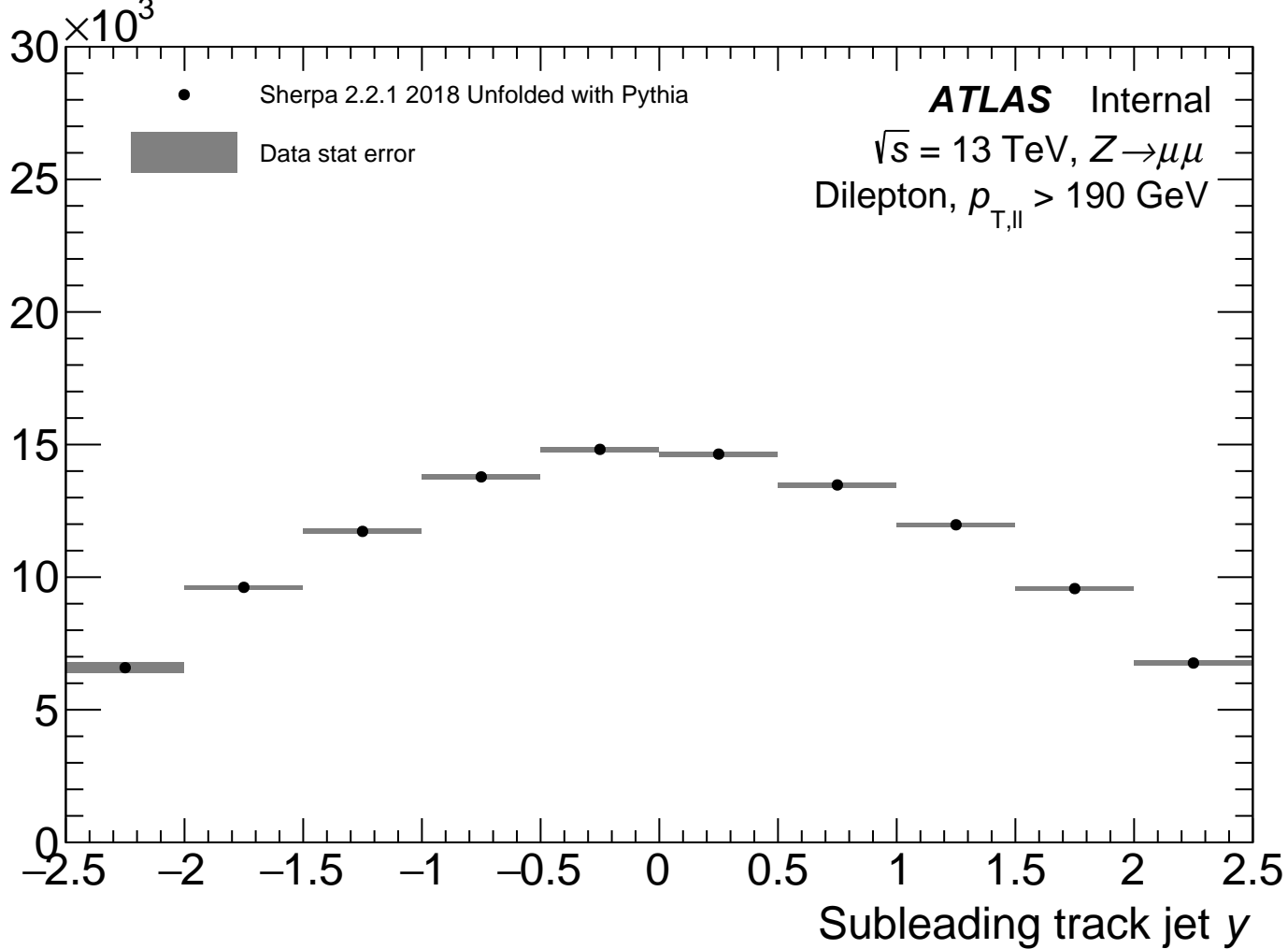
Events



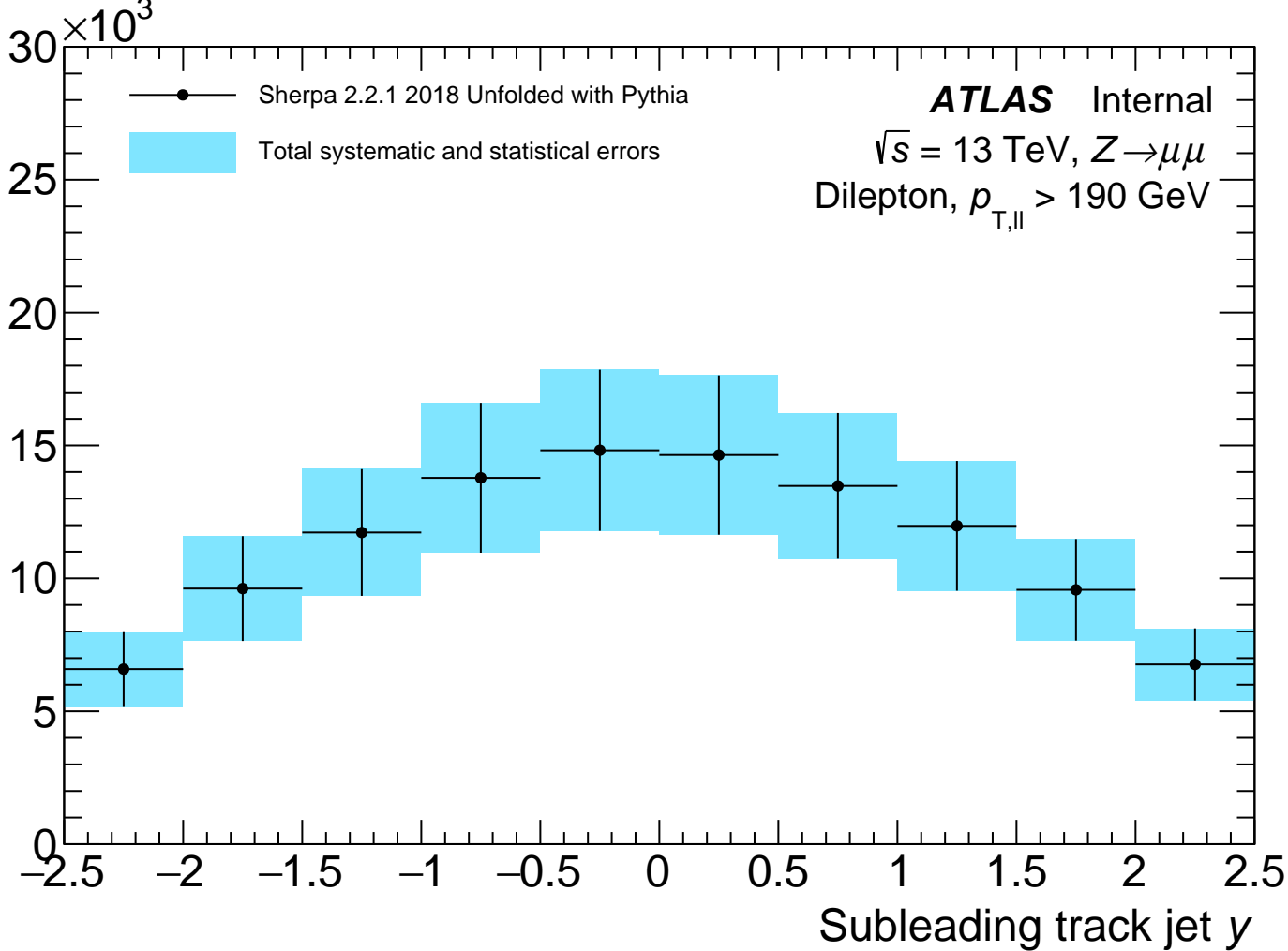
Events



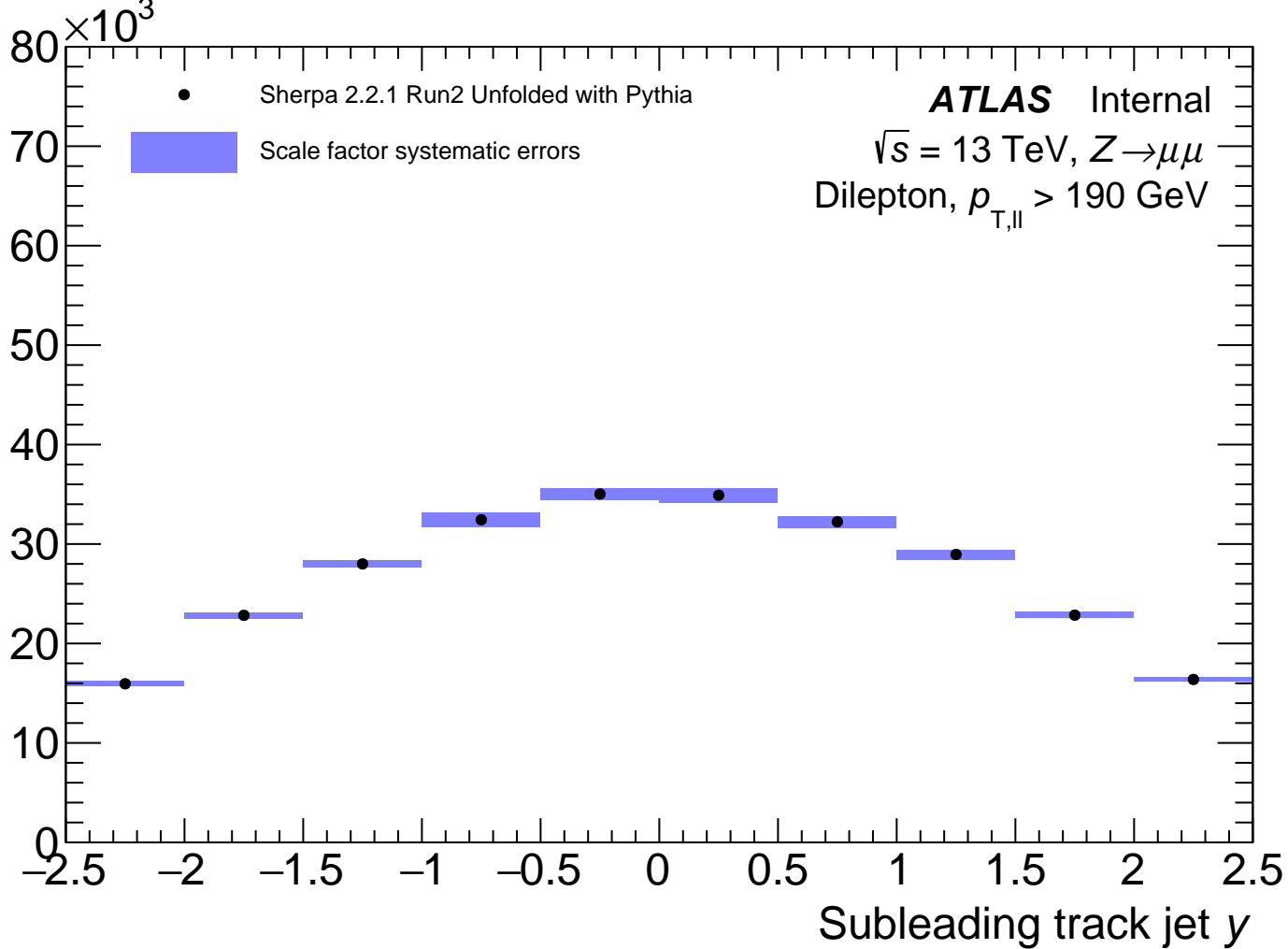
Events



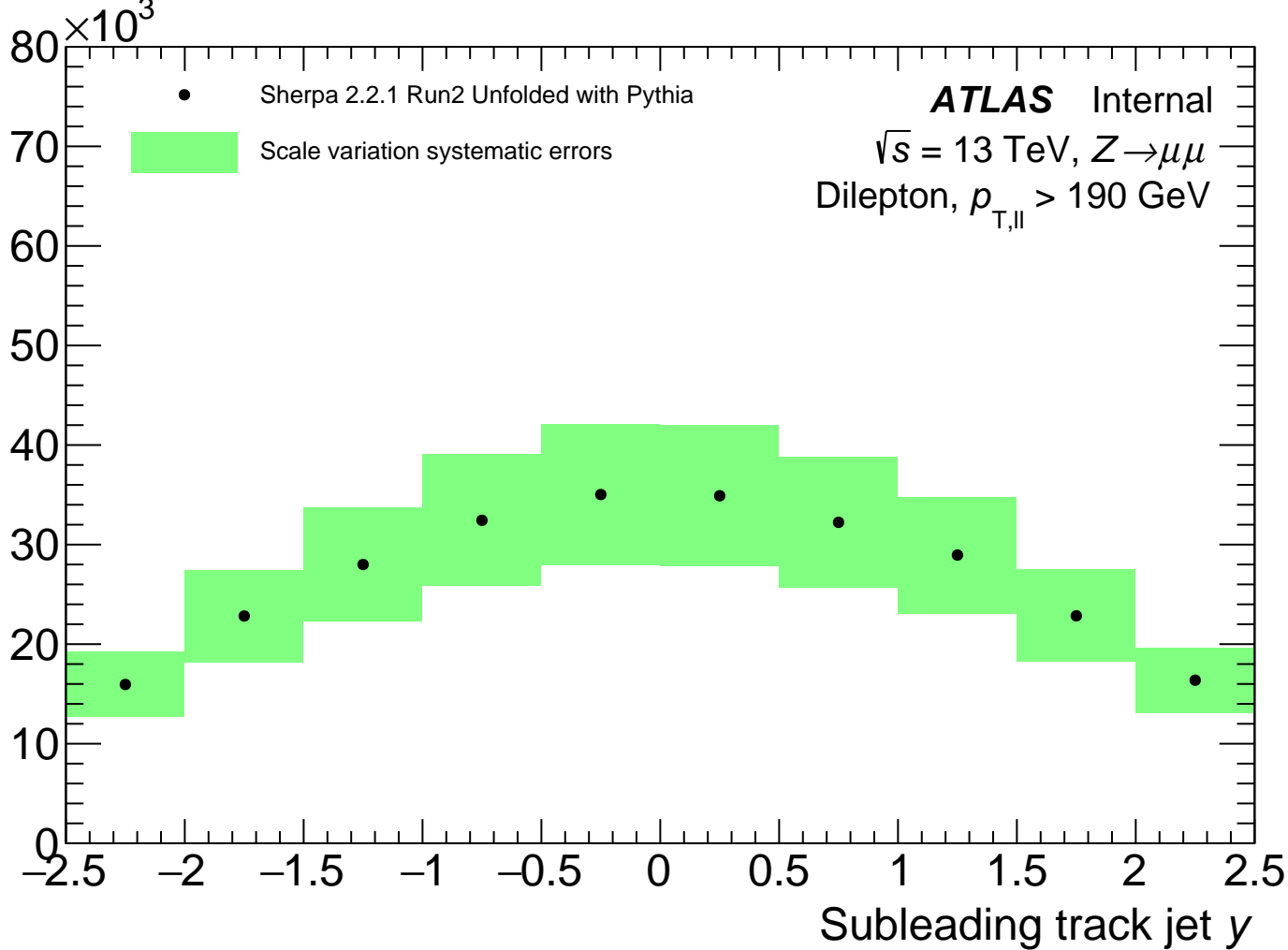
Events



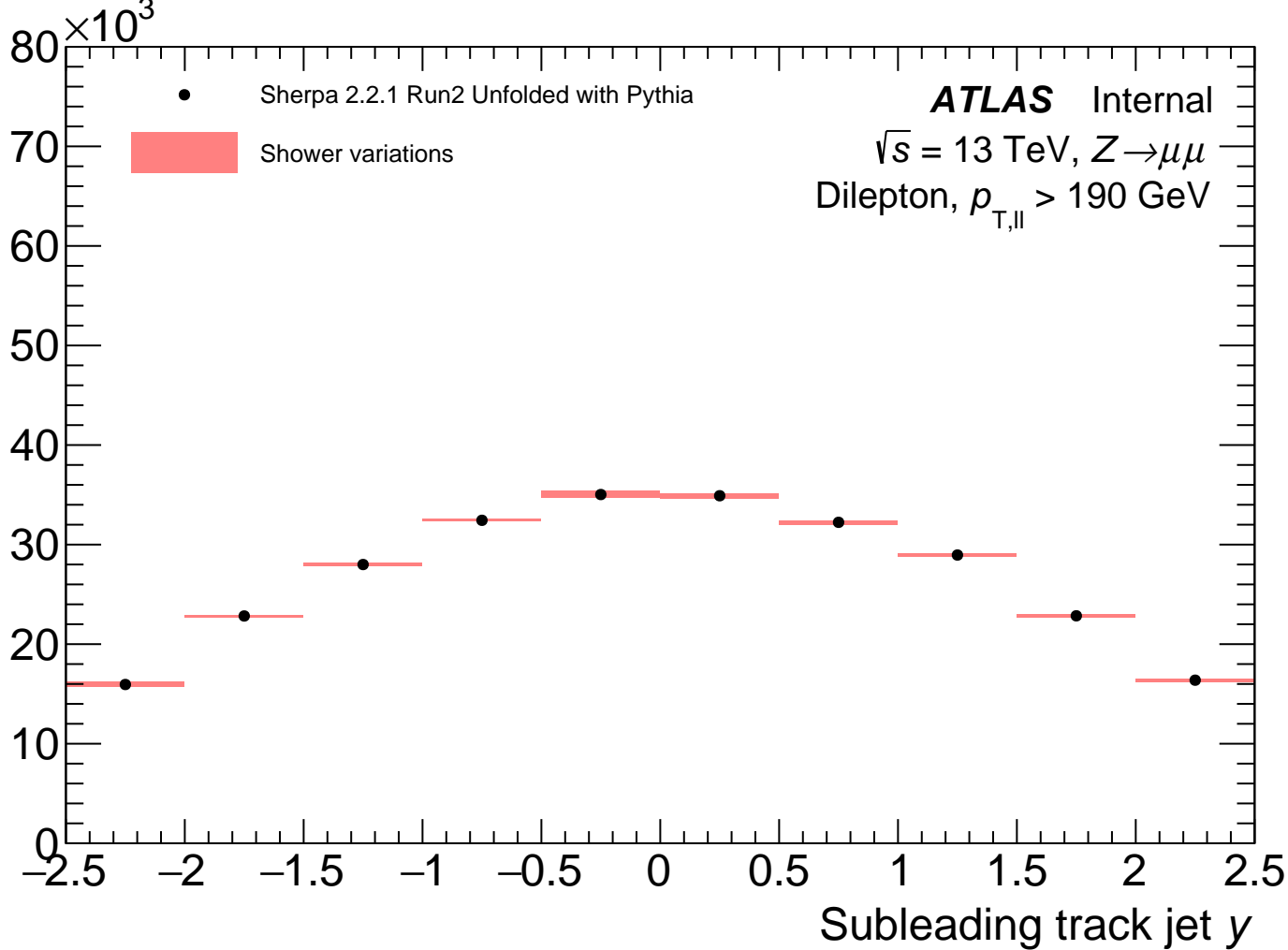
Events



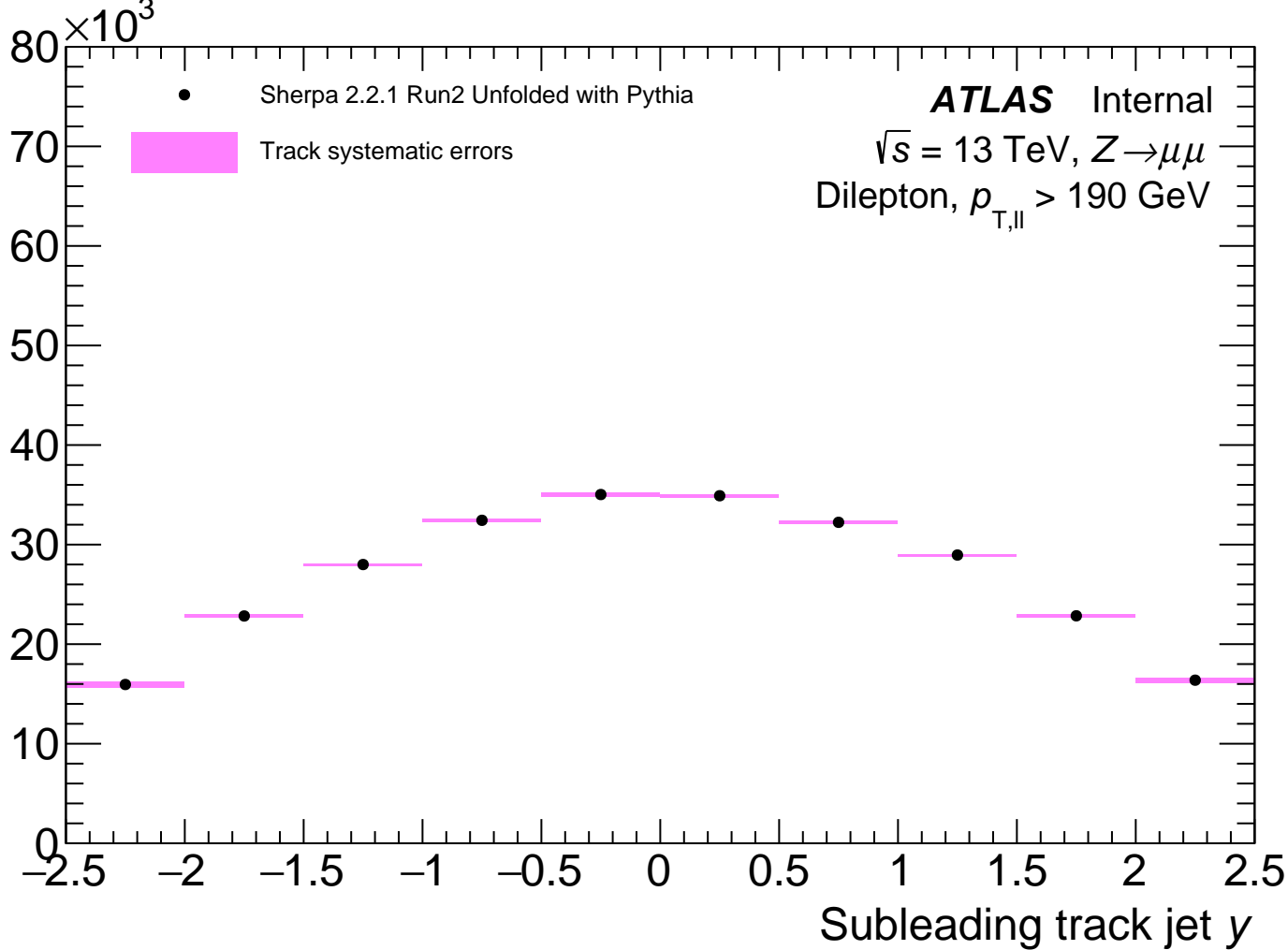
Events



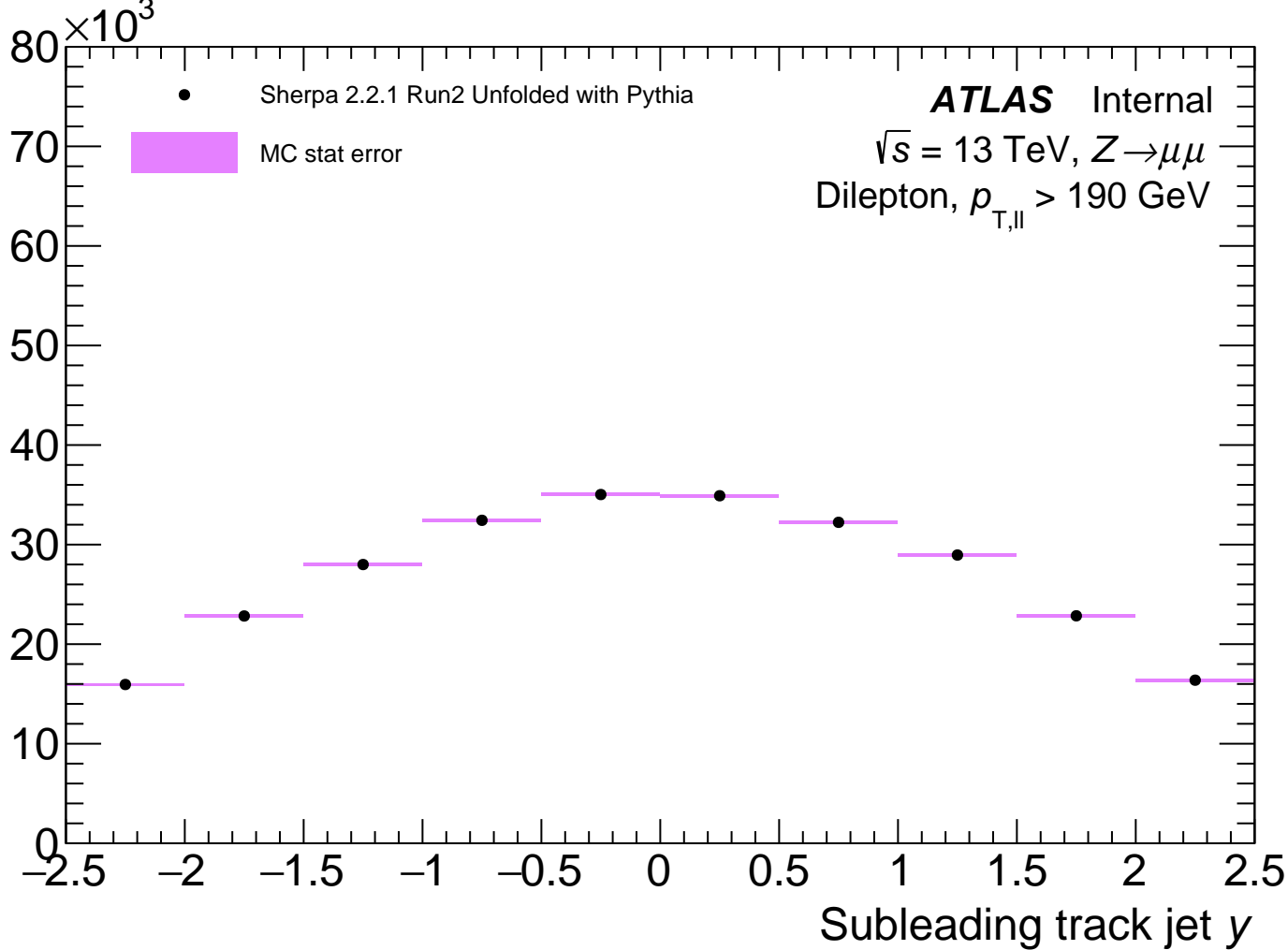
Events



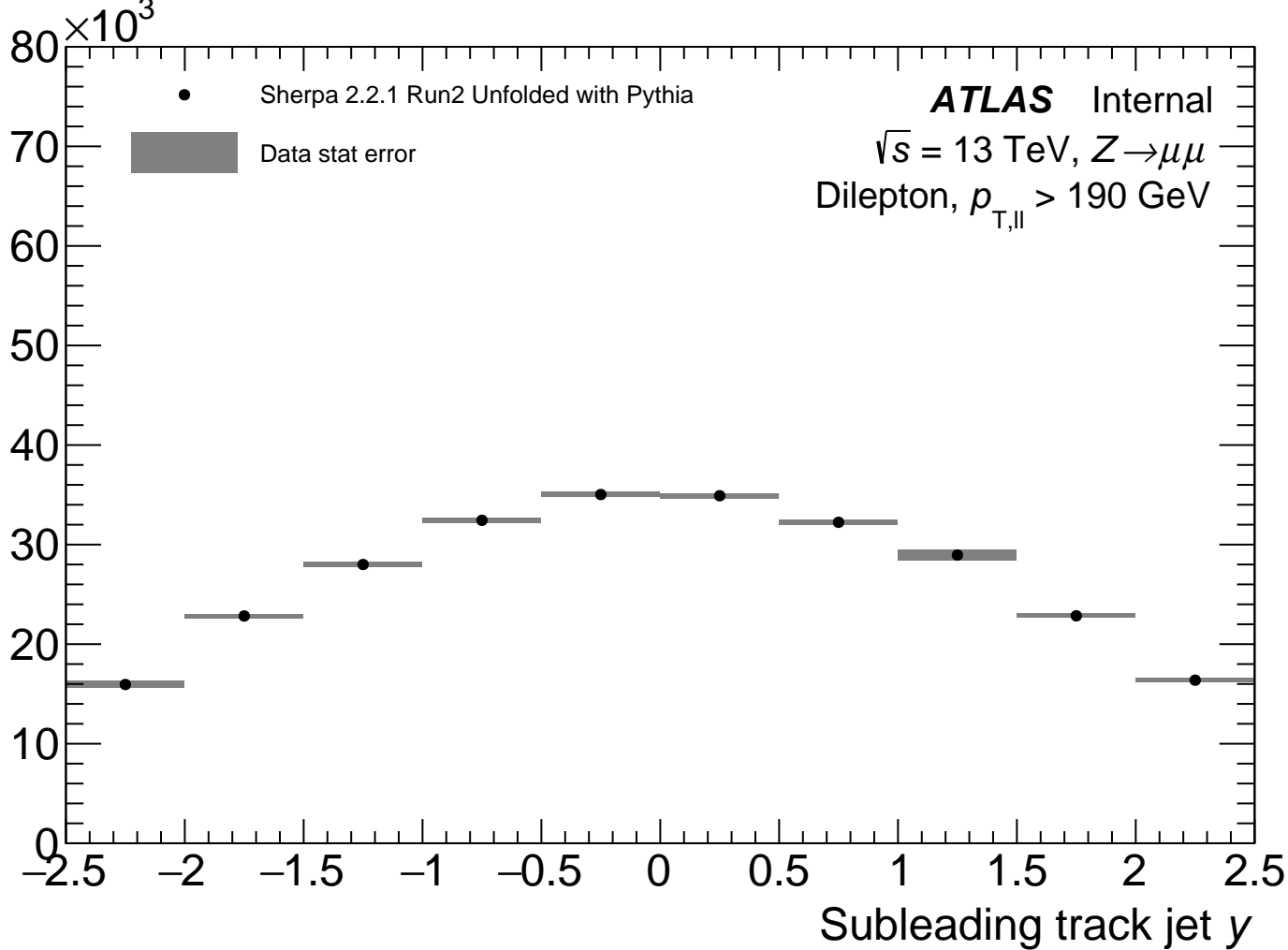
Events



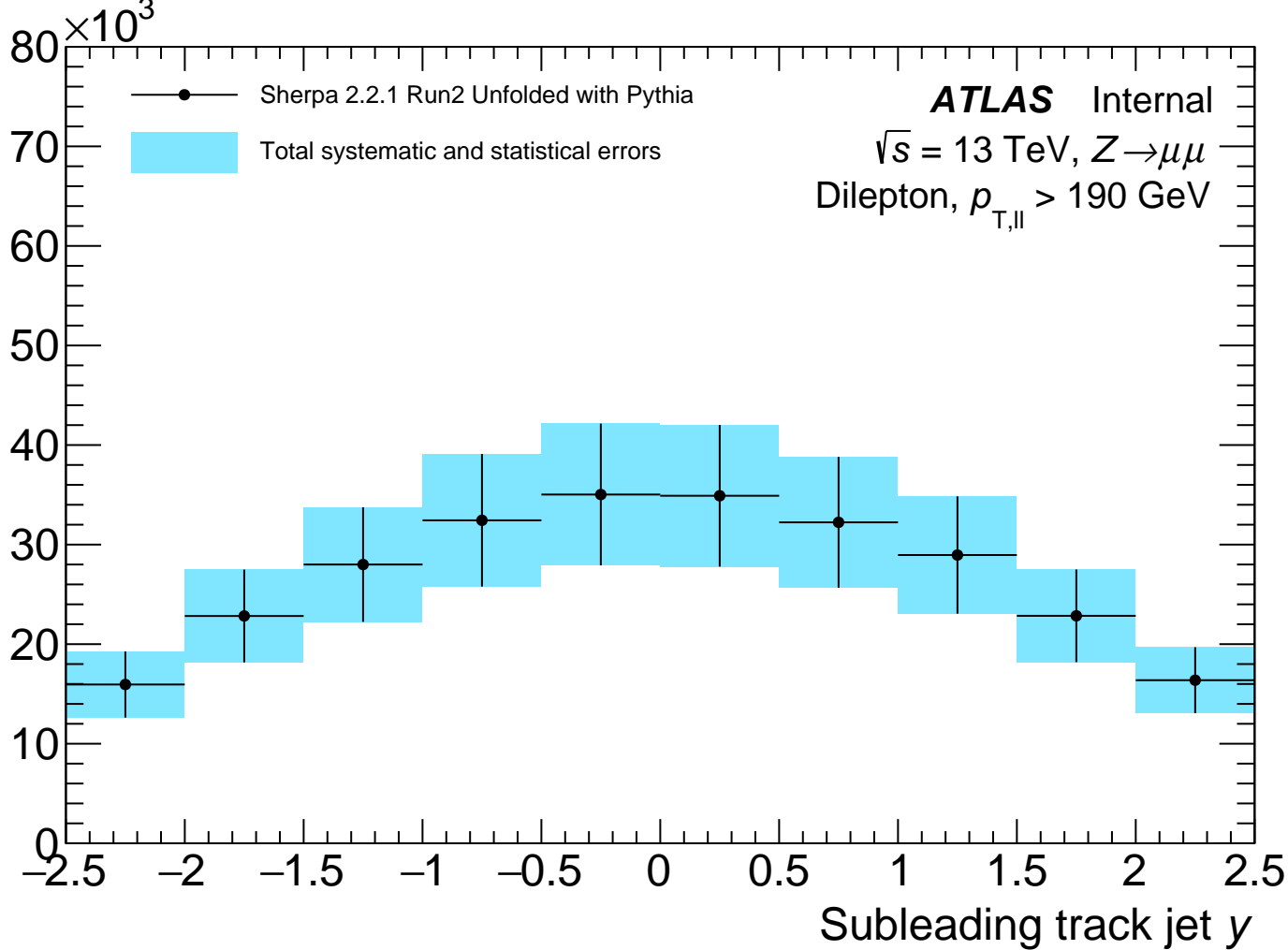
Events



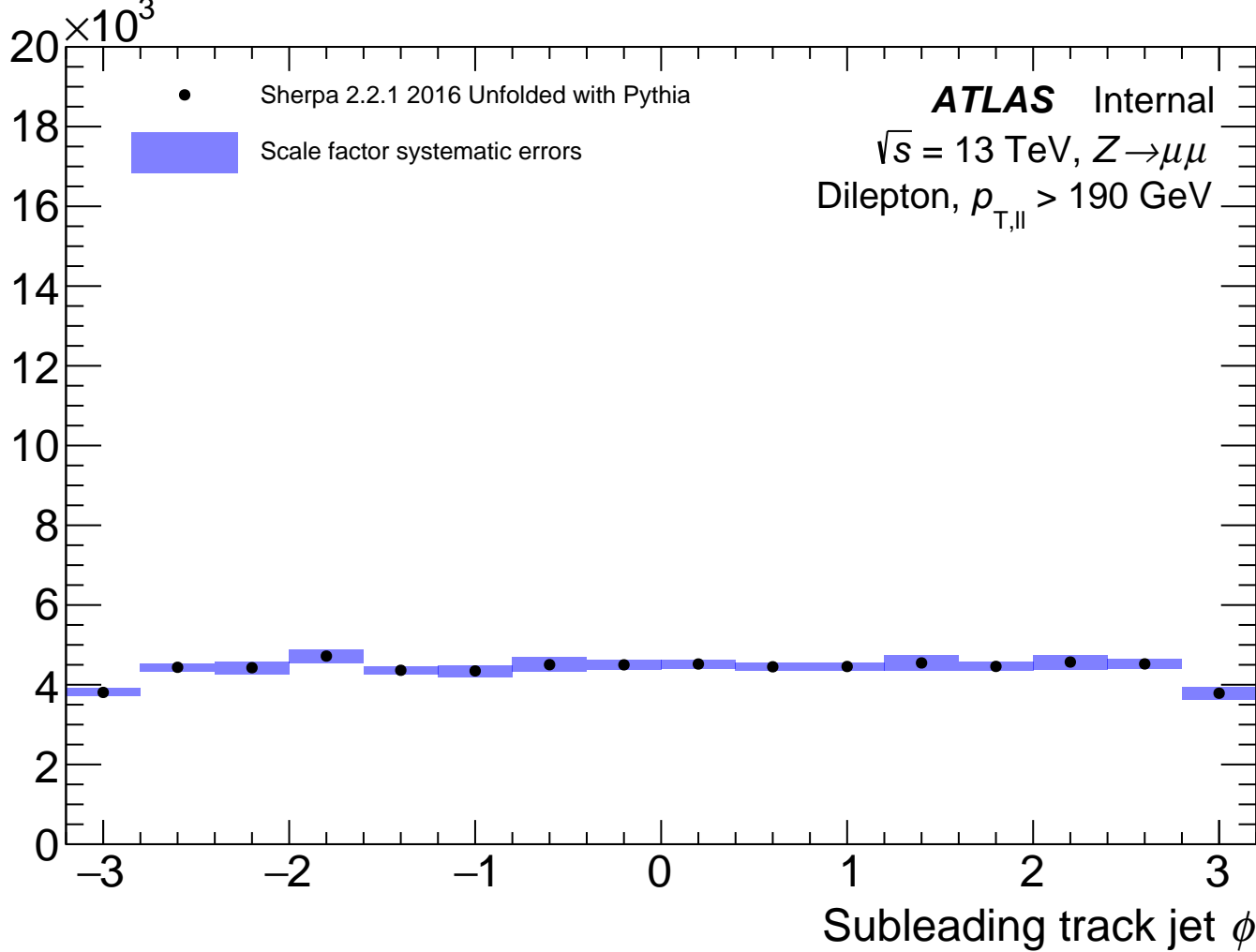
Events



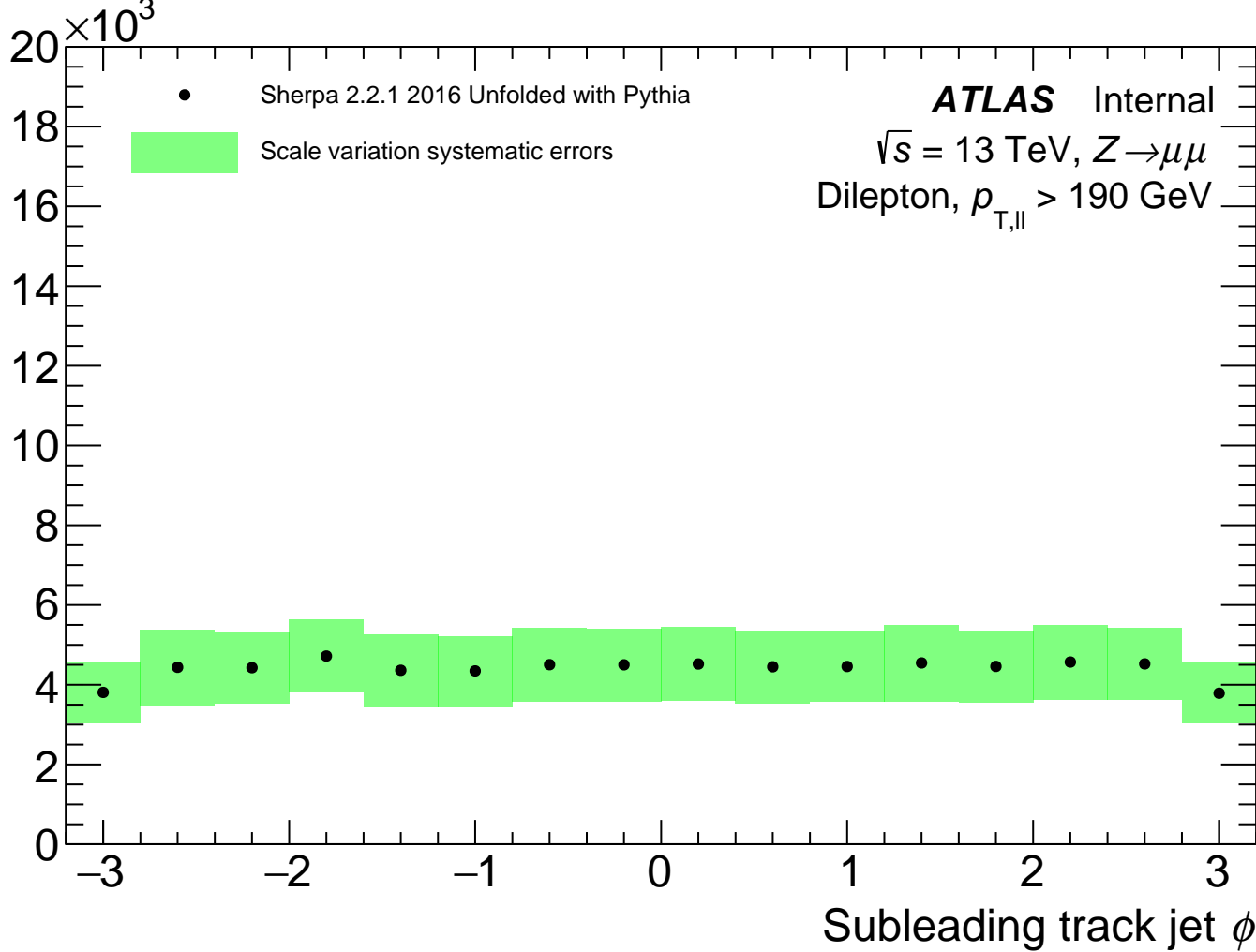
Events



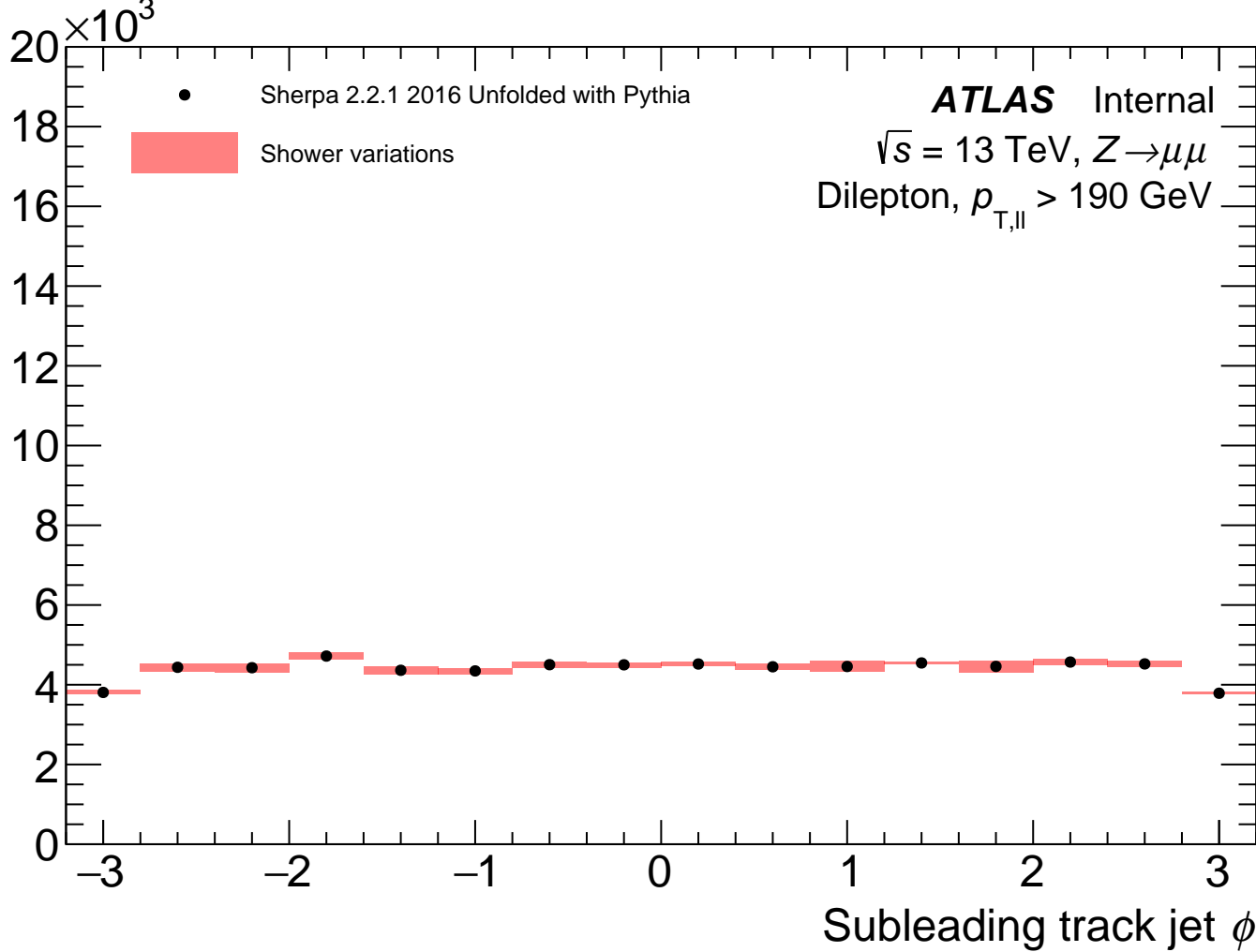
Events



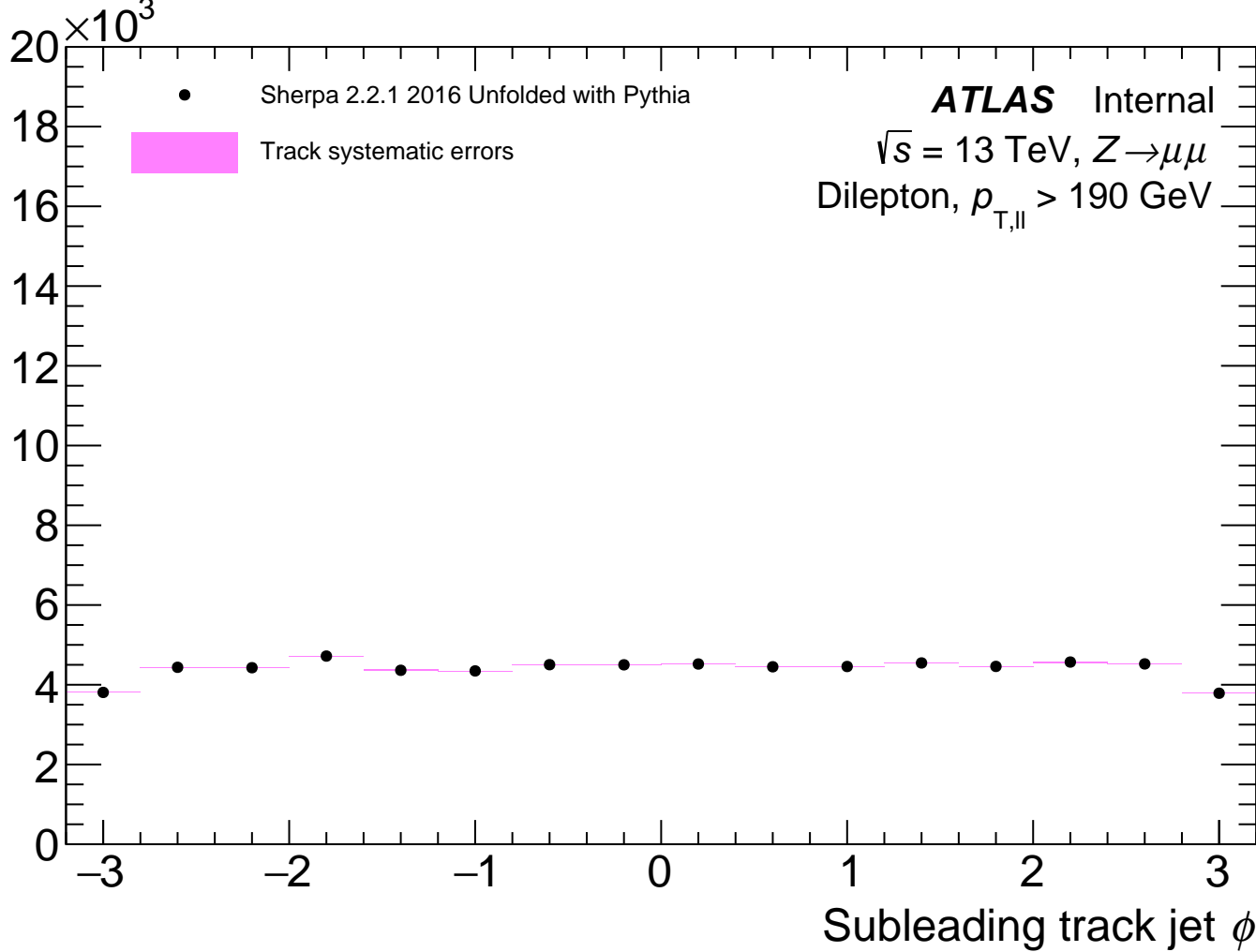
Events



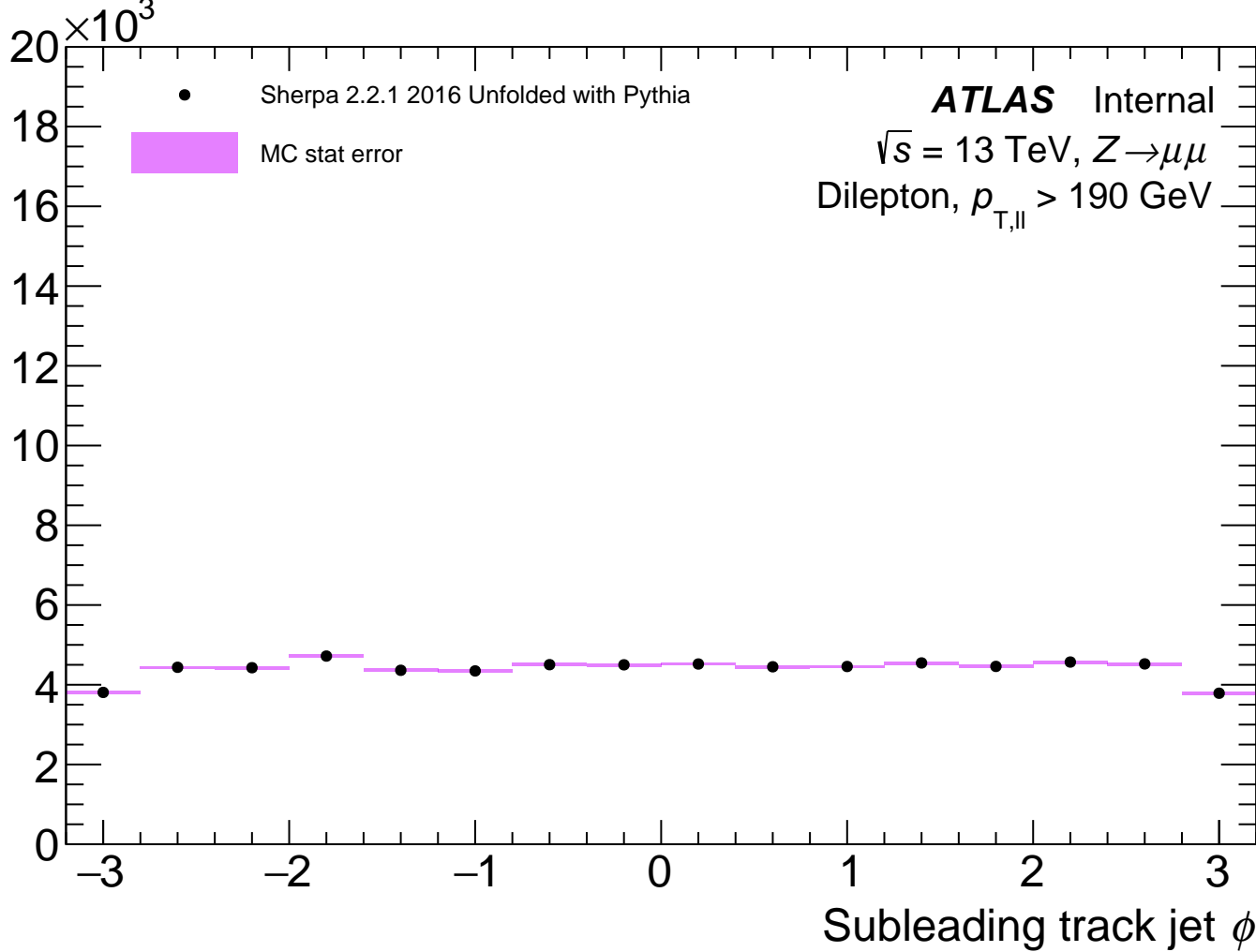
Events



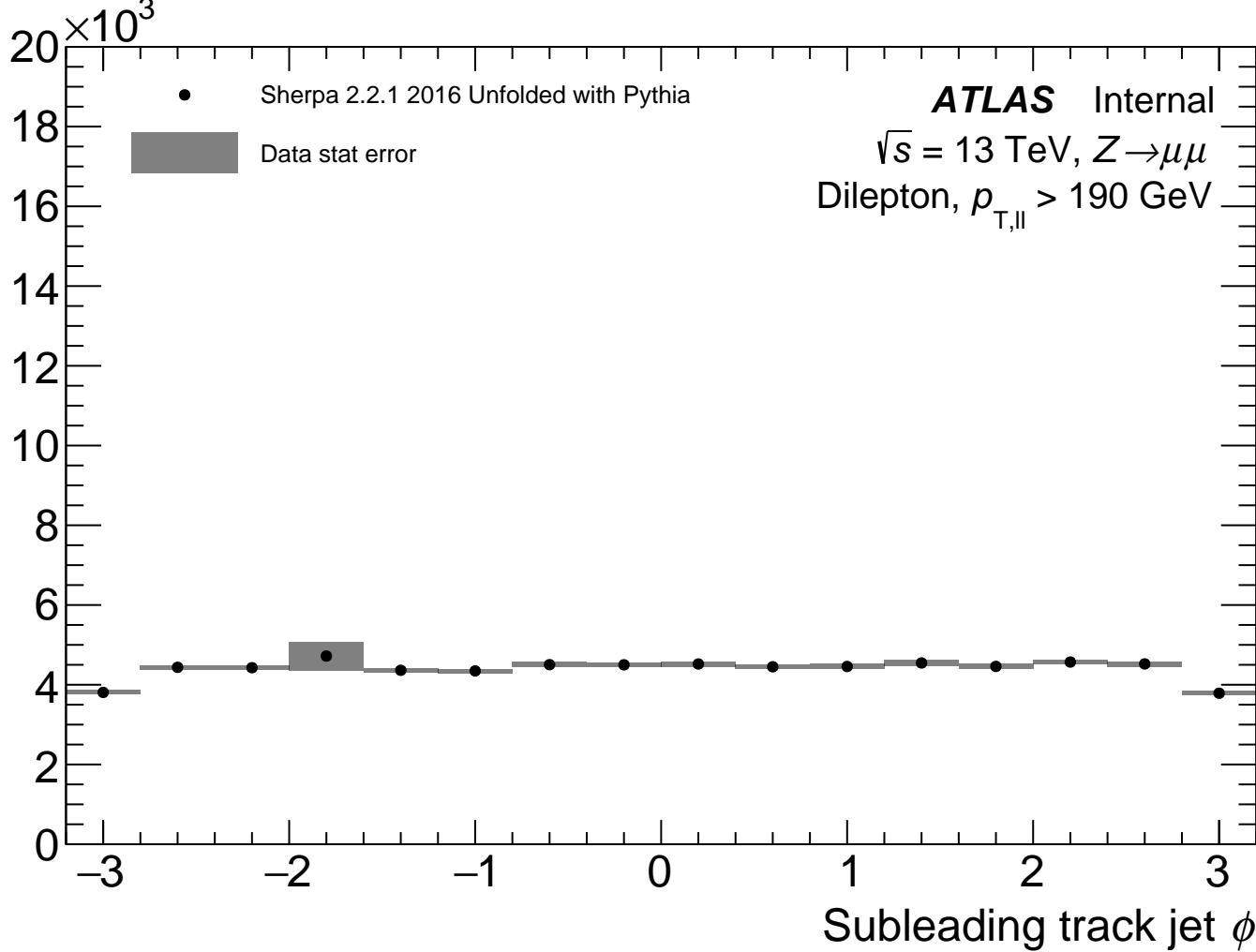
Events



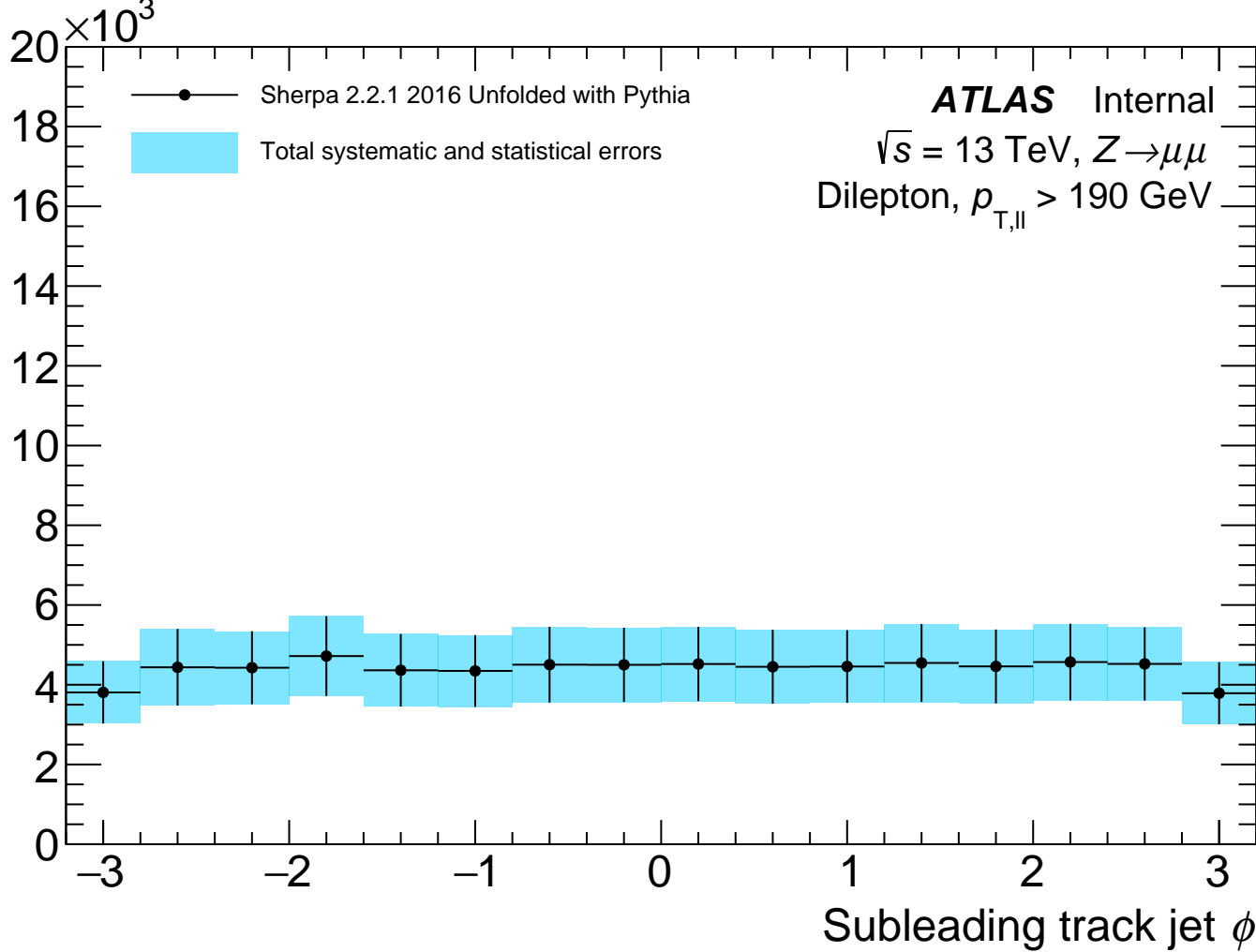
Events



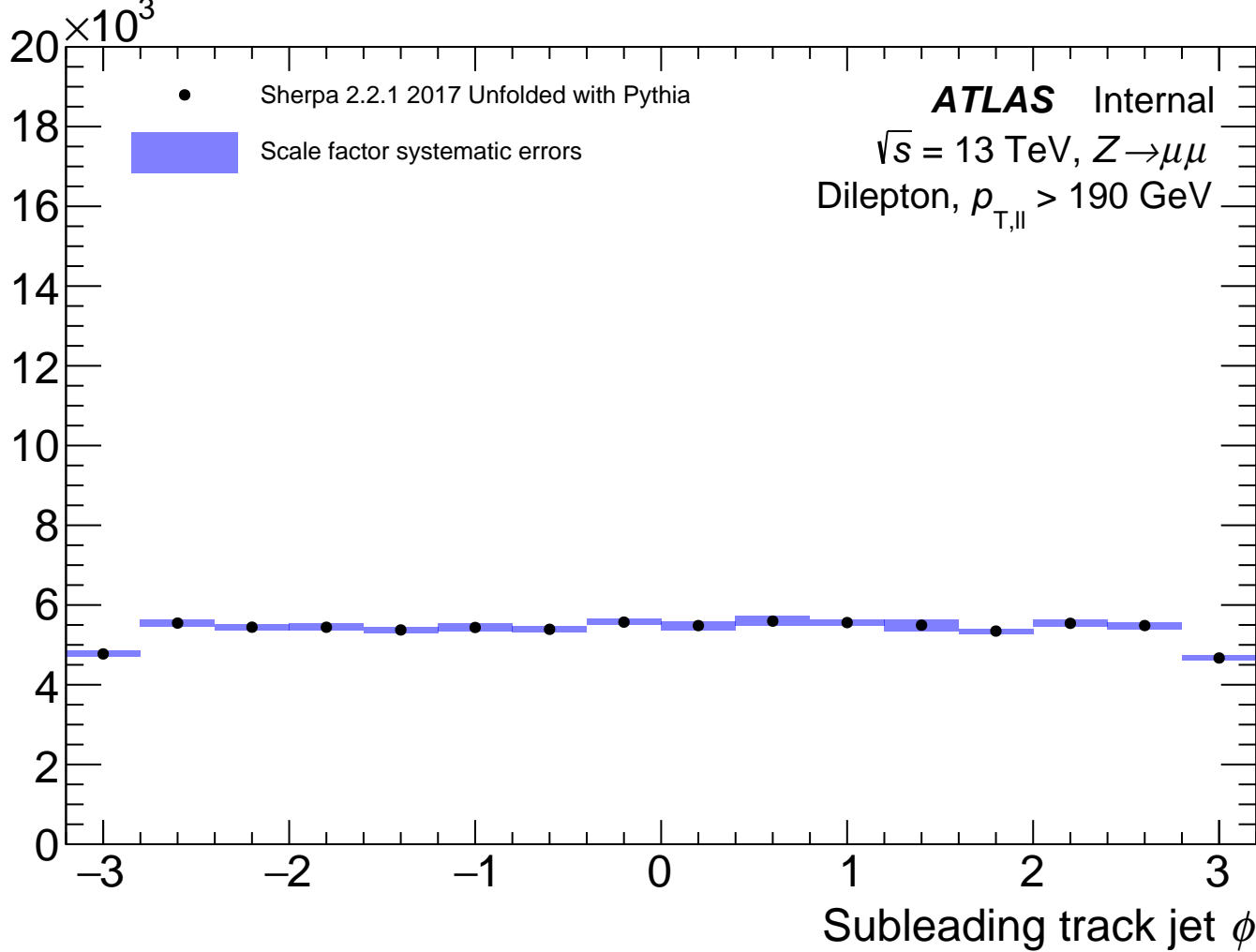
Events



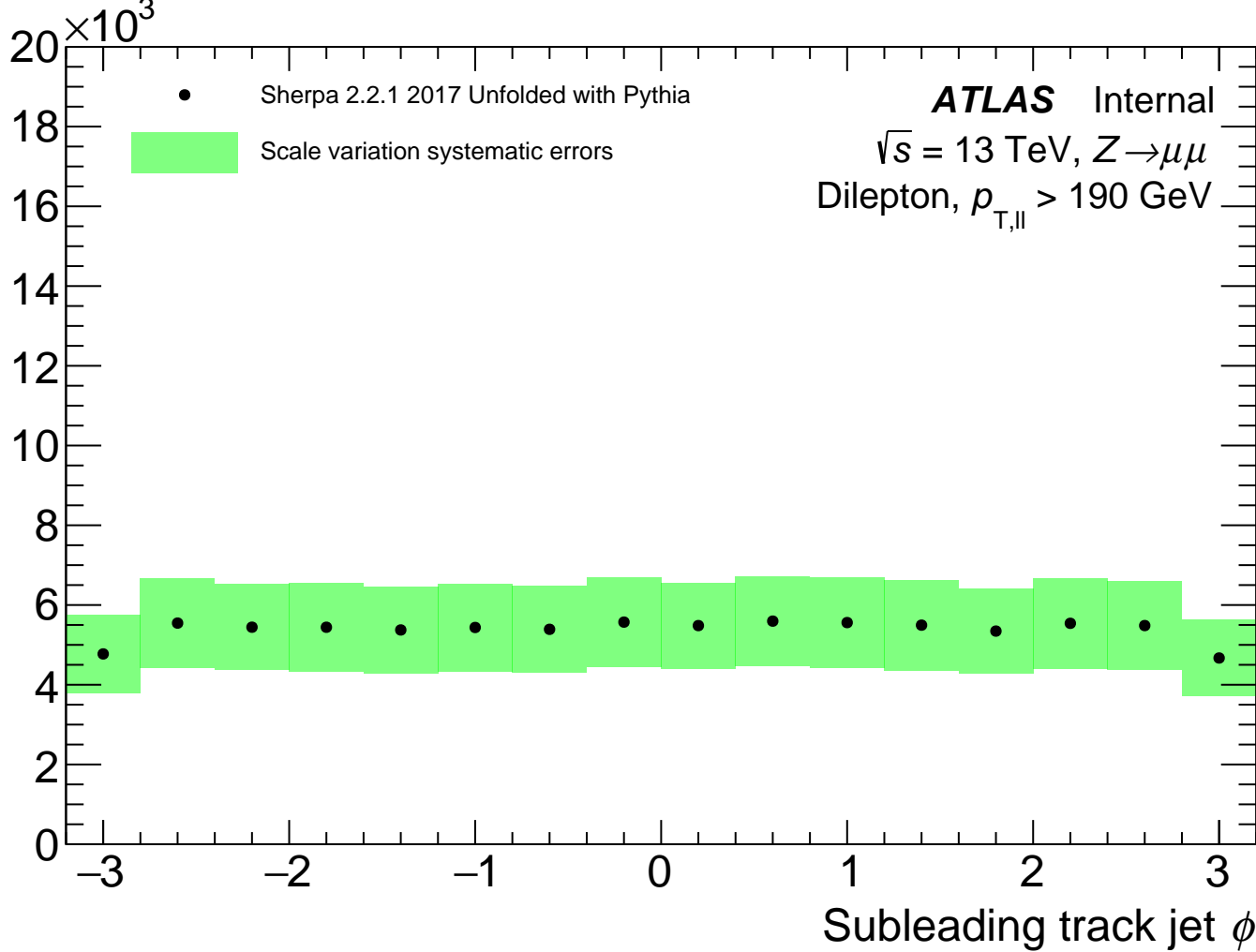
Events



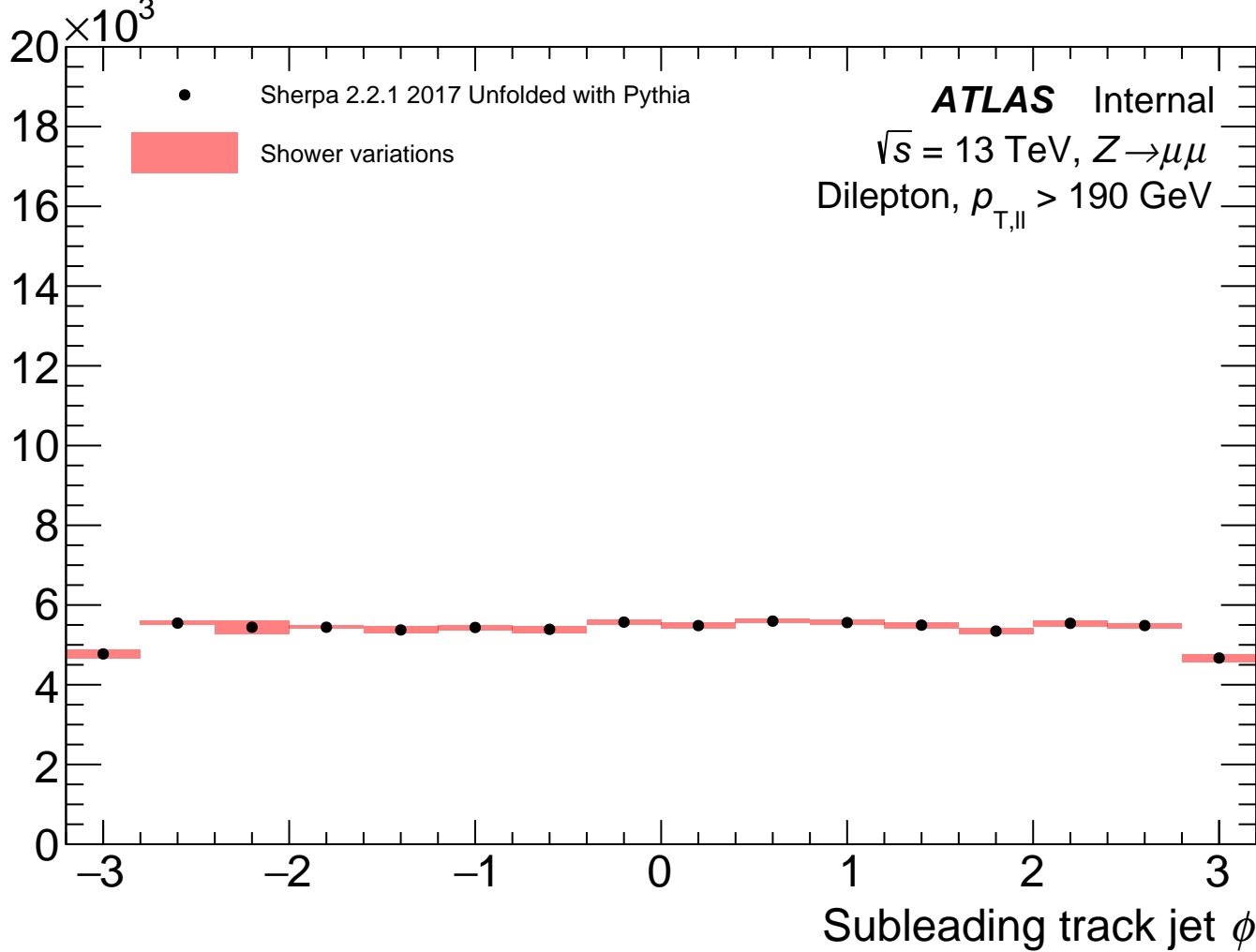
Events



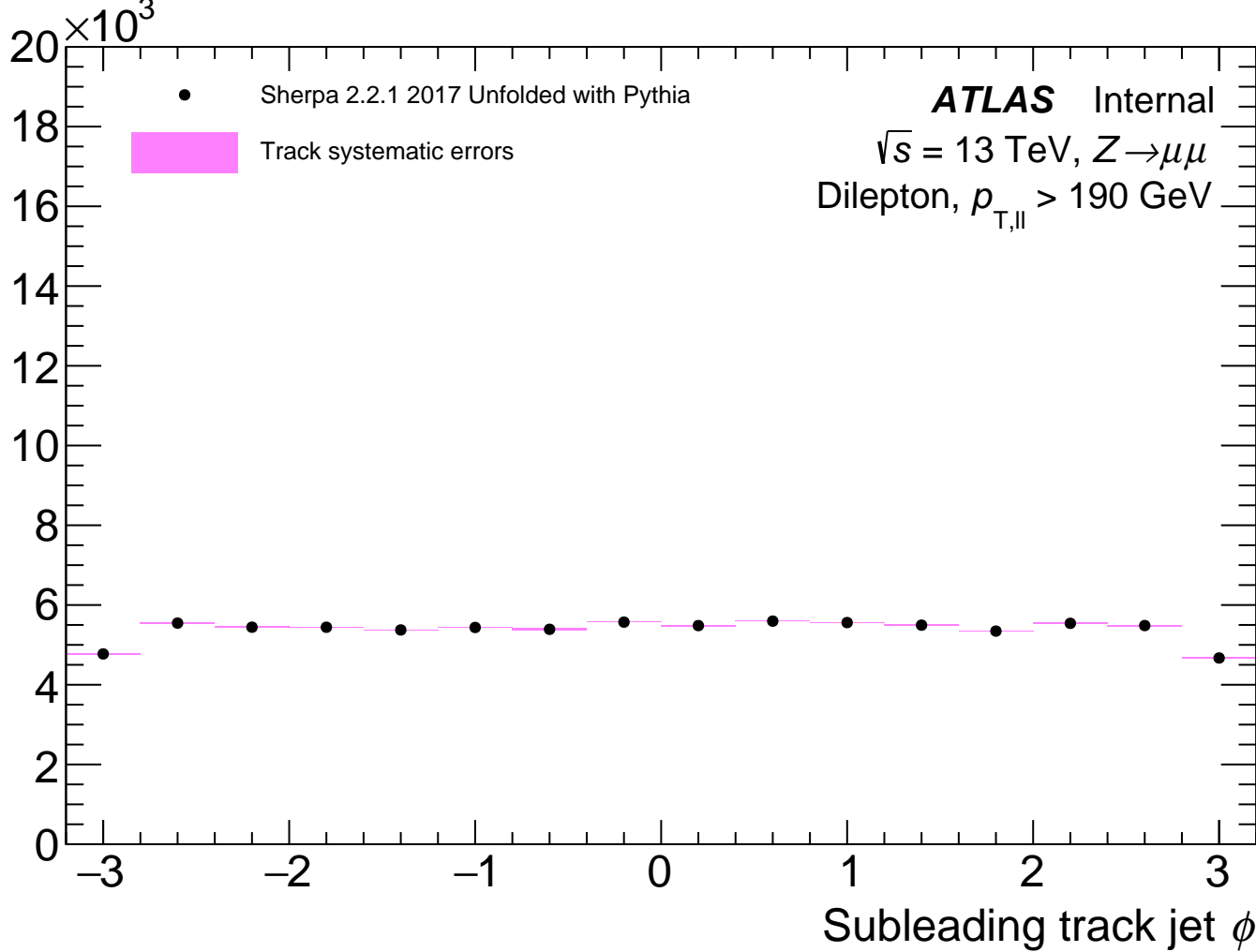
Events



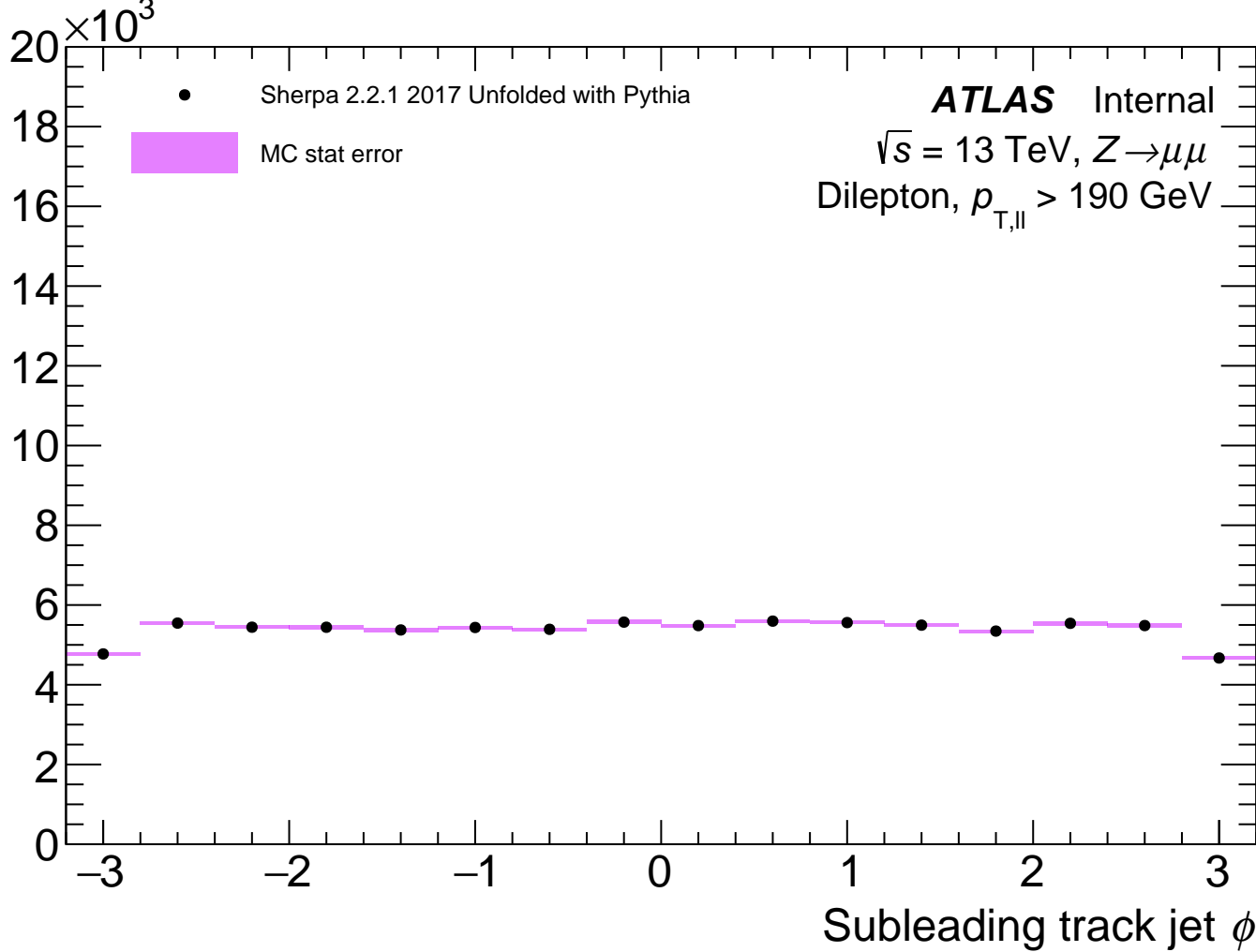
Events



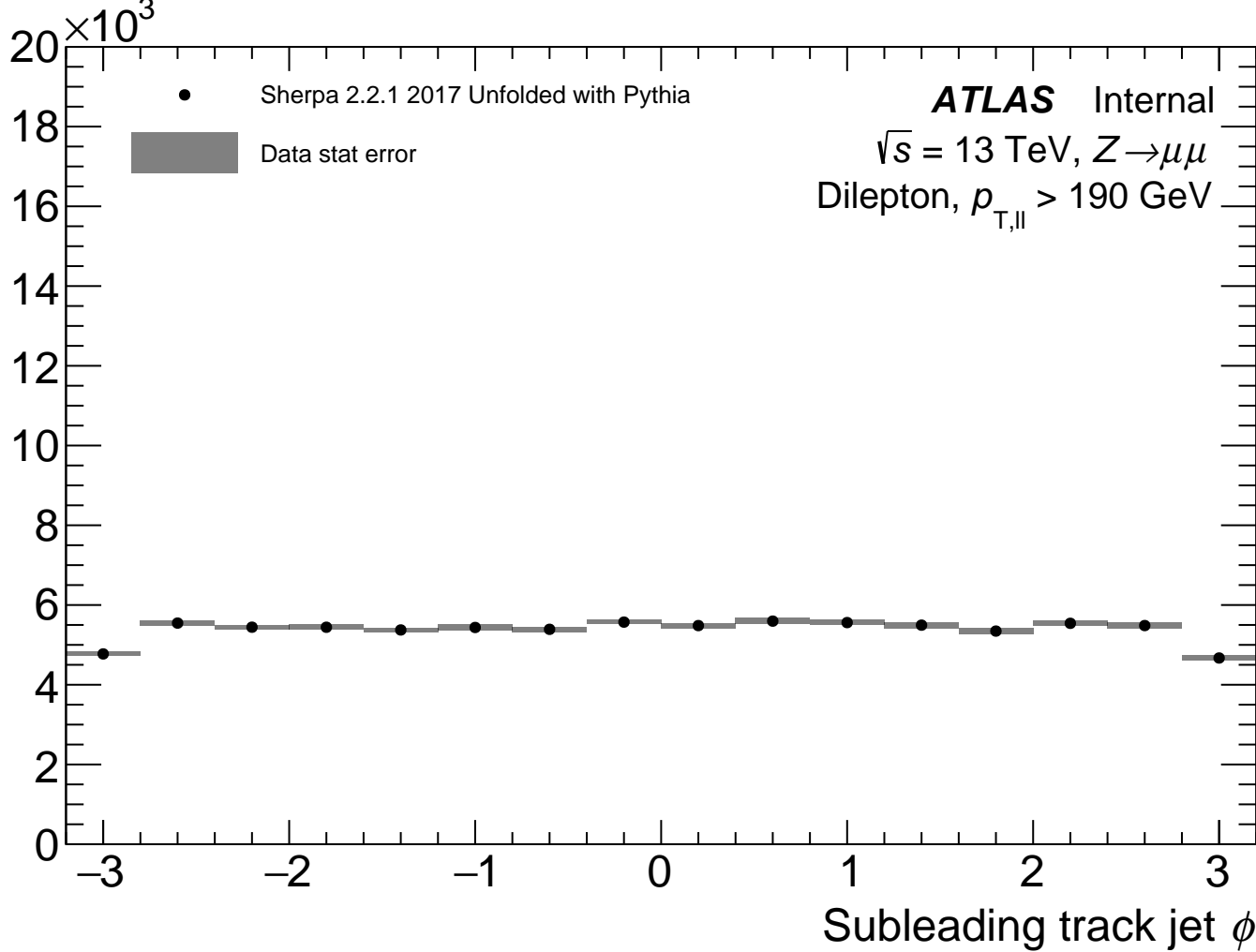
Events



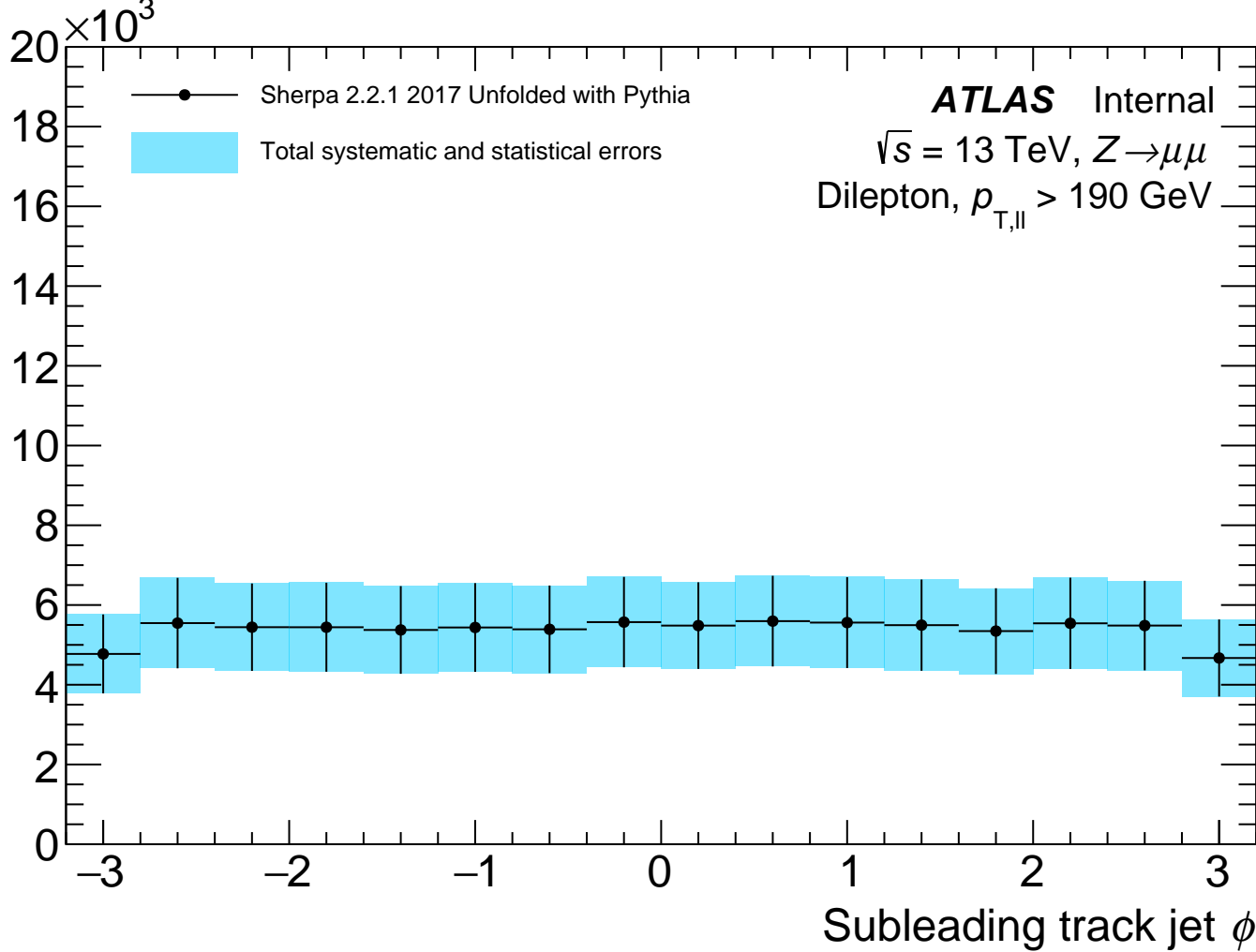
Events



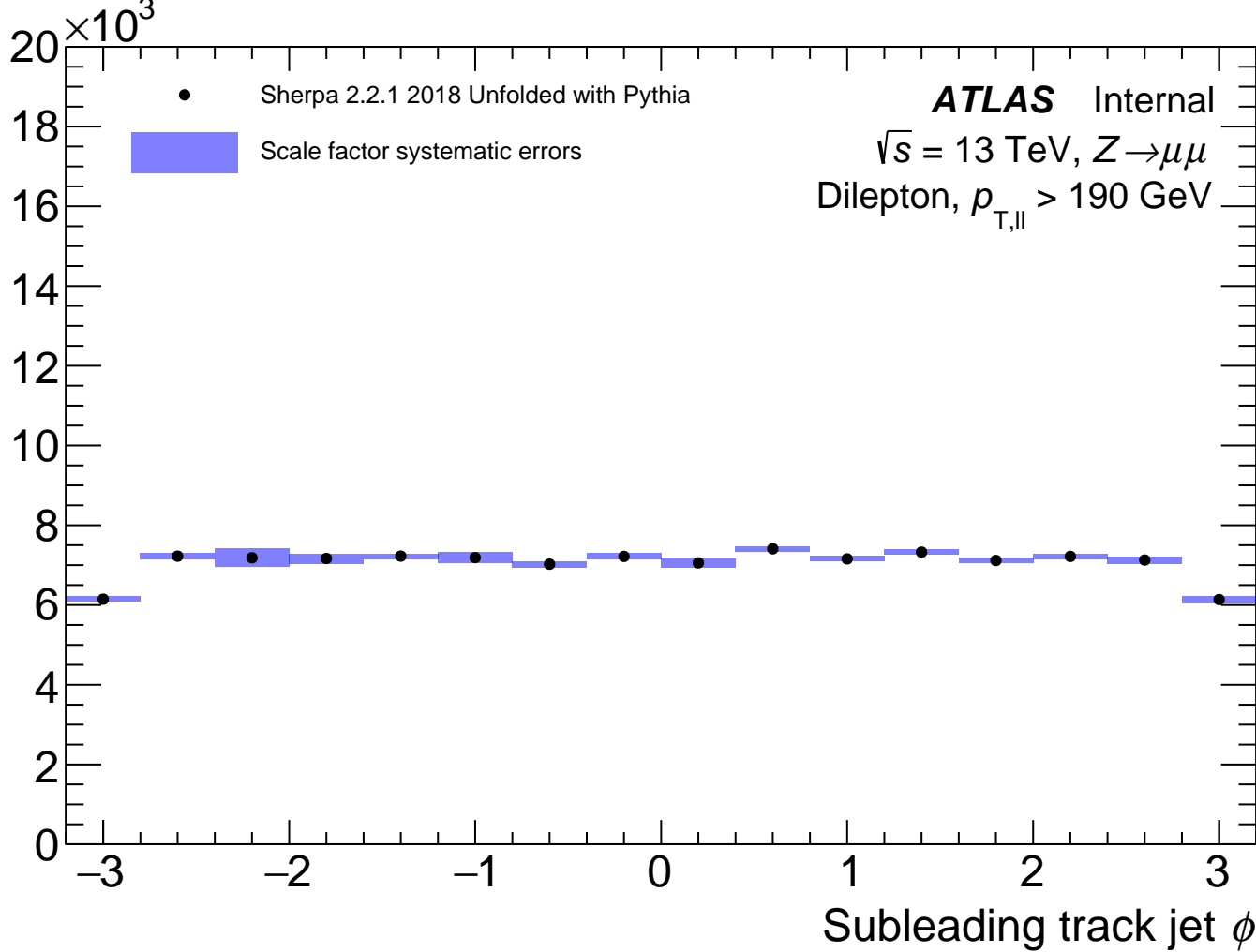
Events



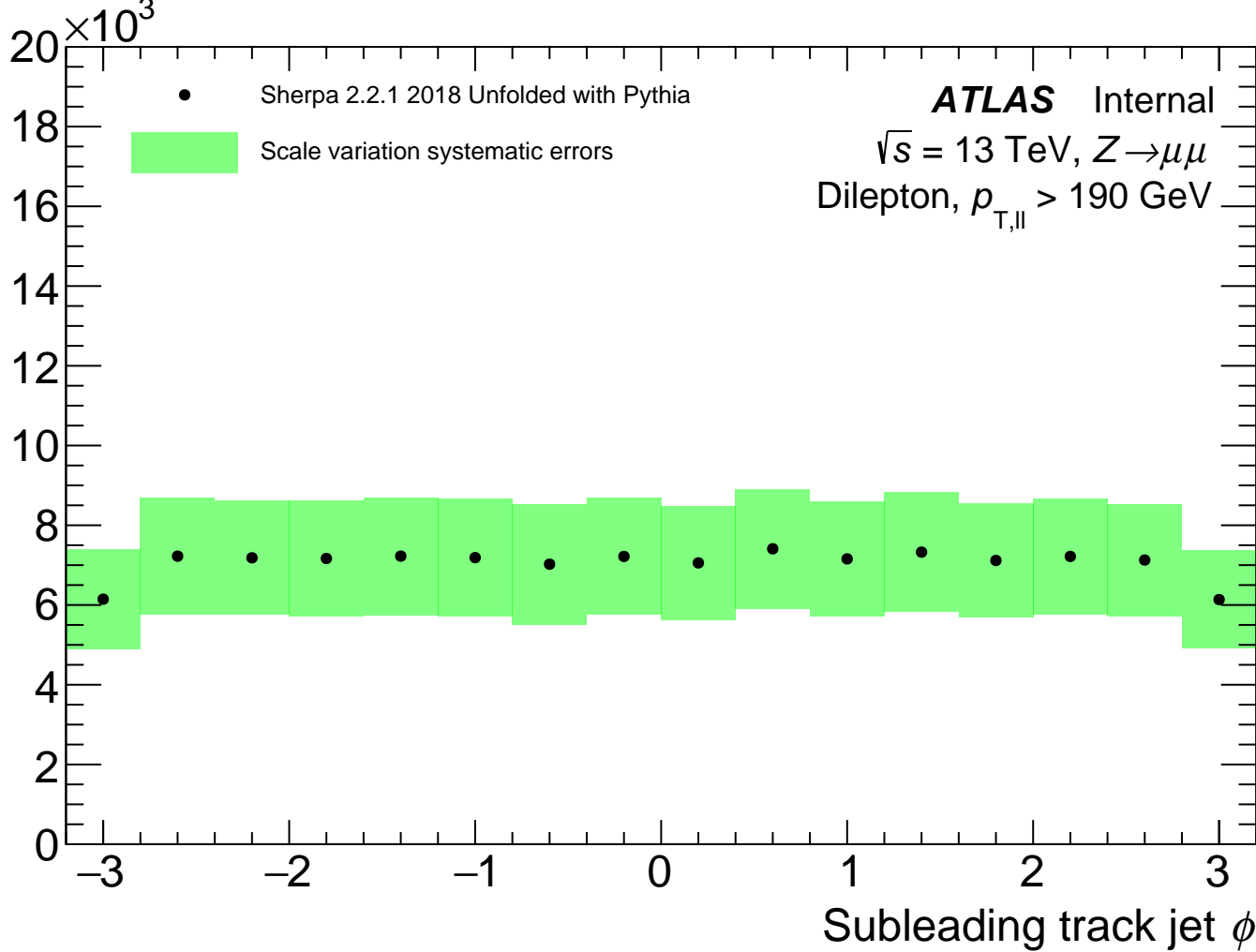
Events



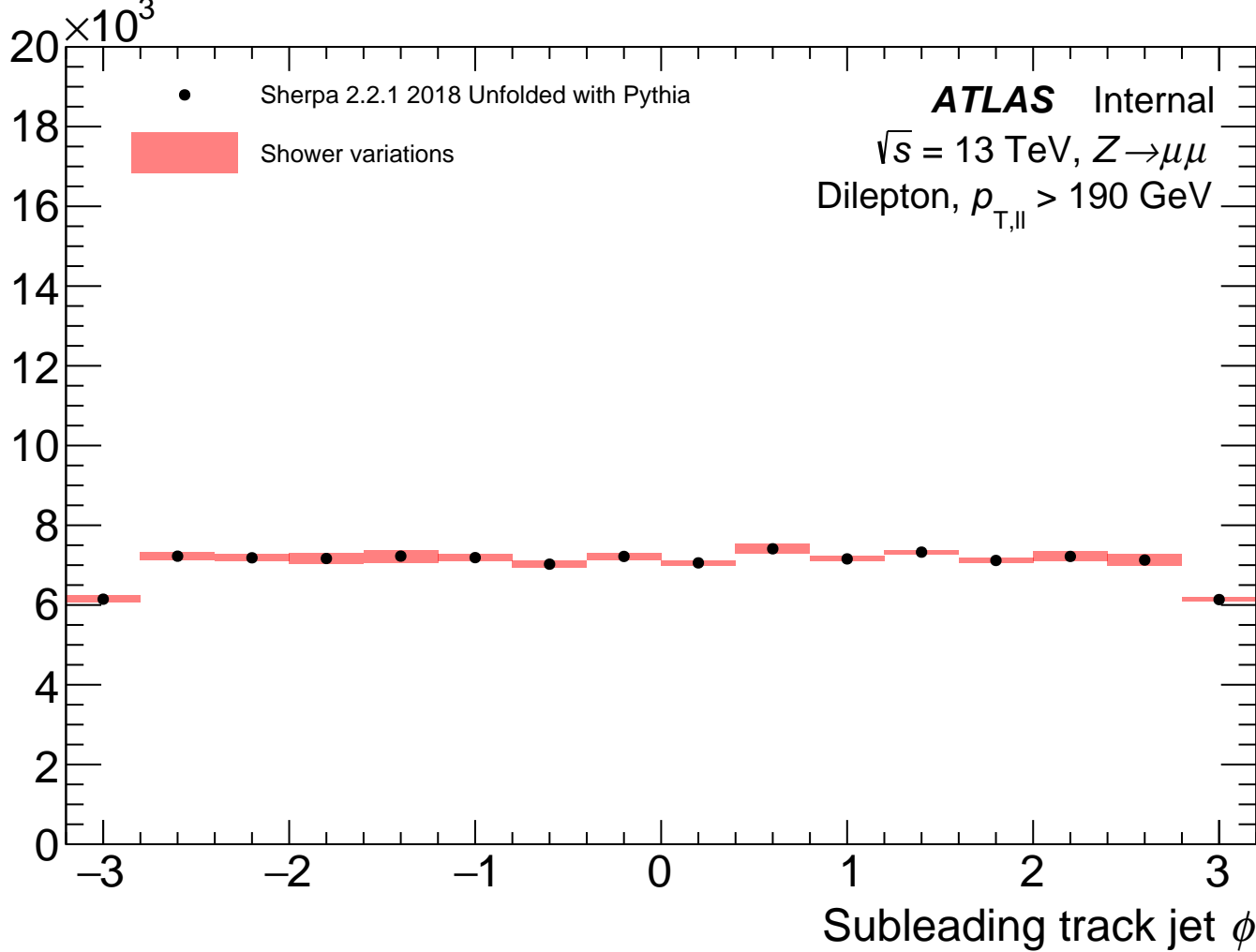
Events



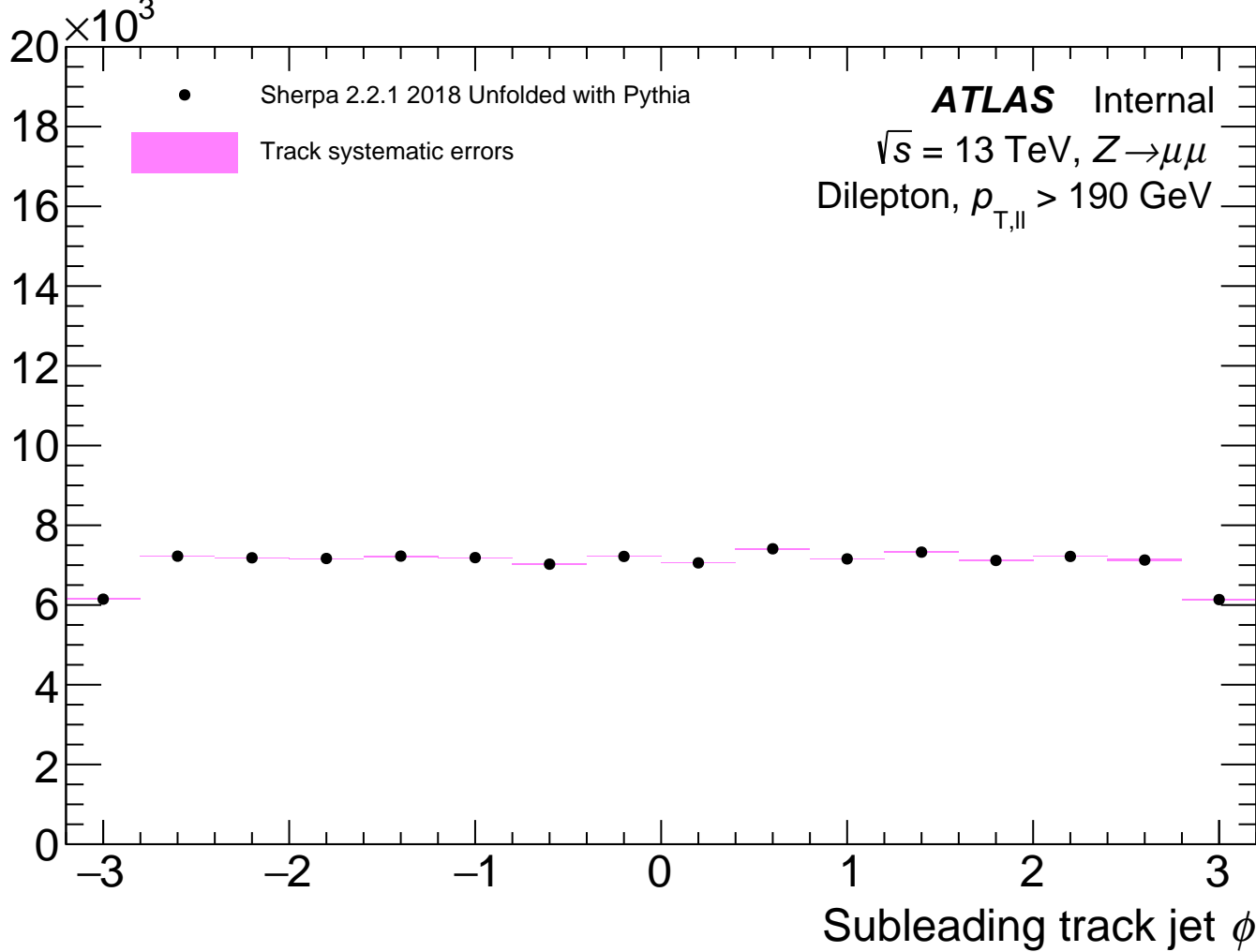
Events



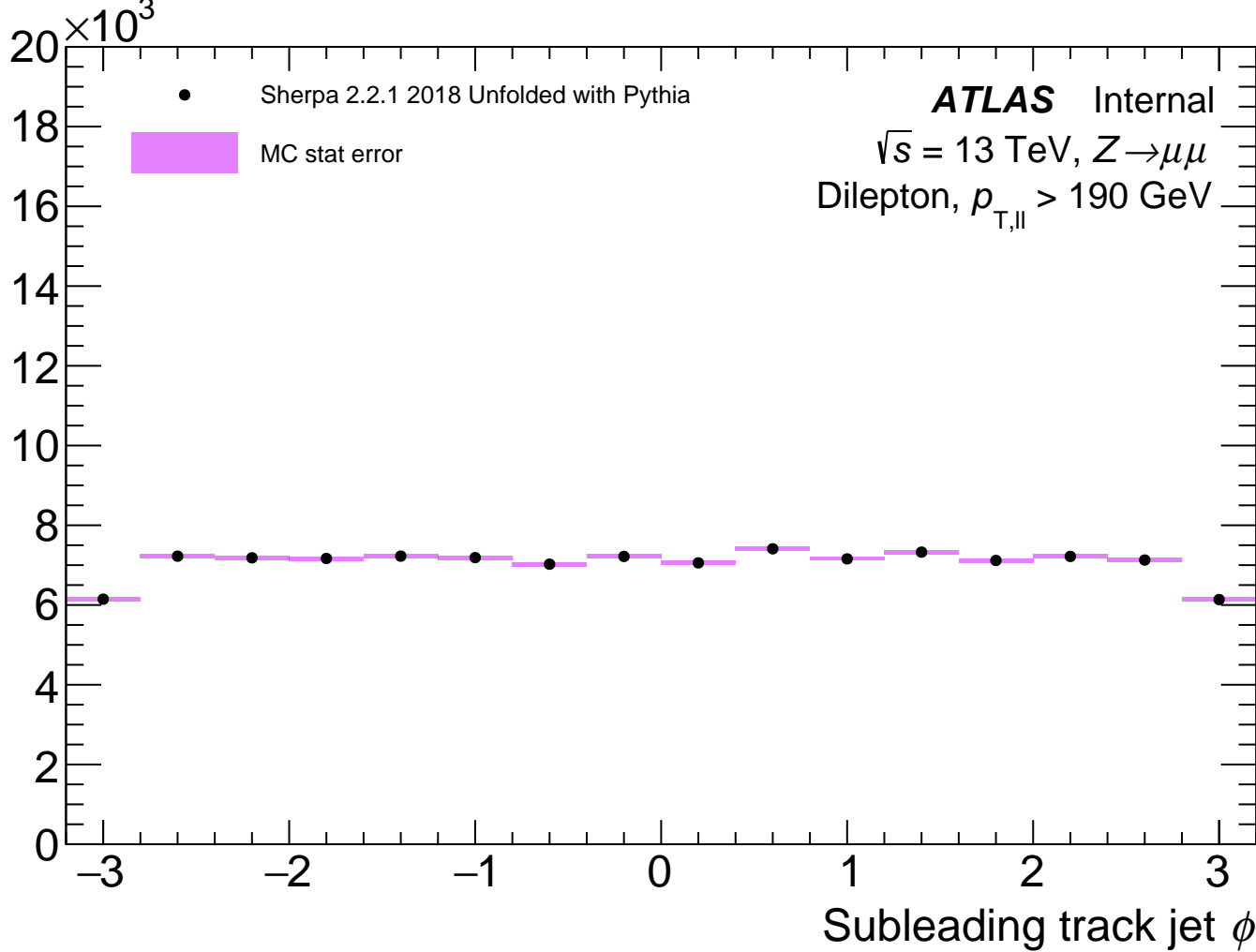
Events



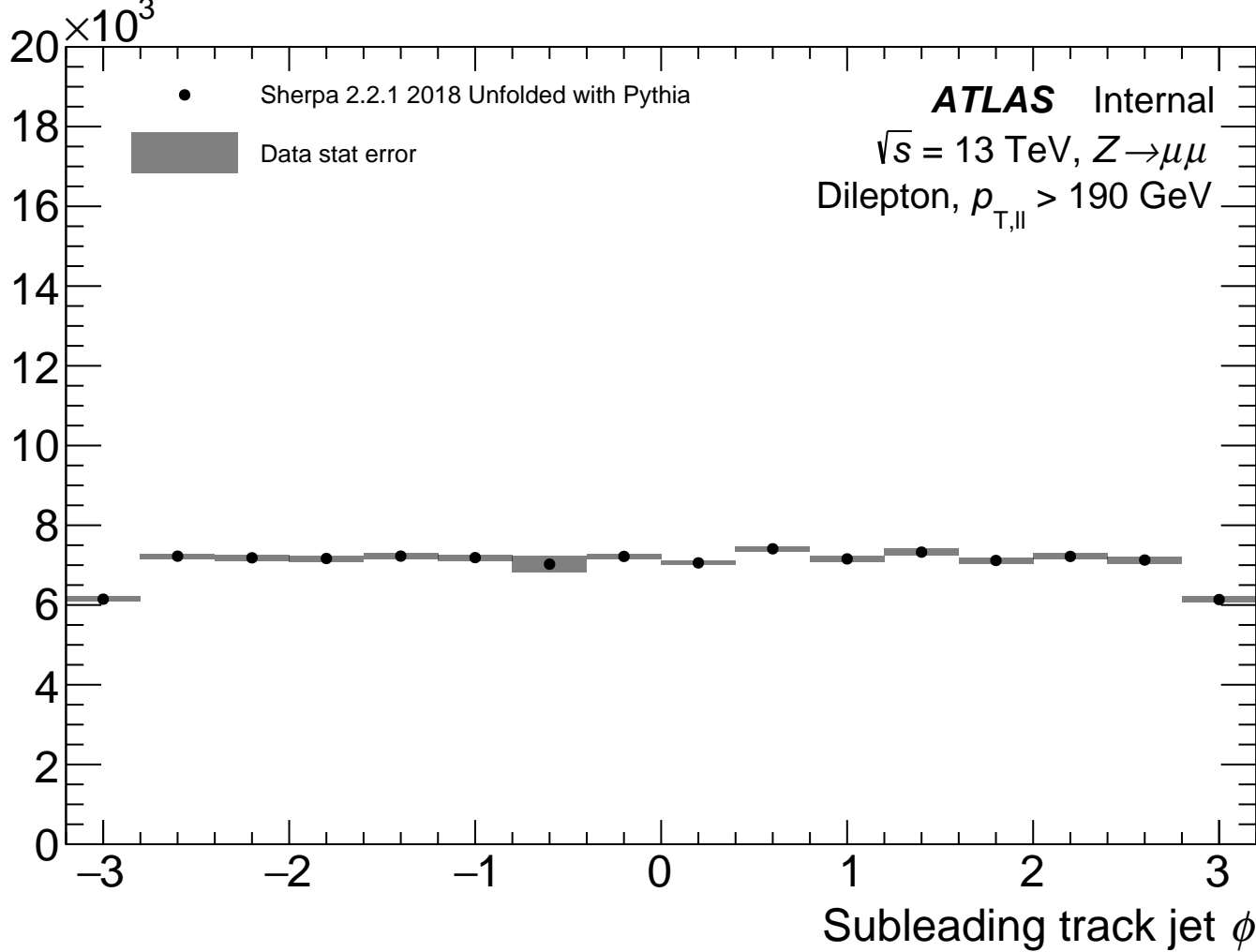
Events



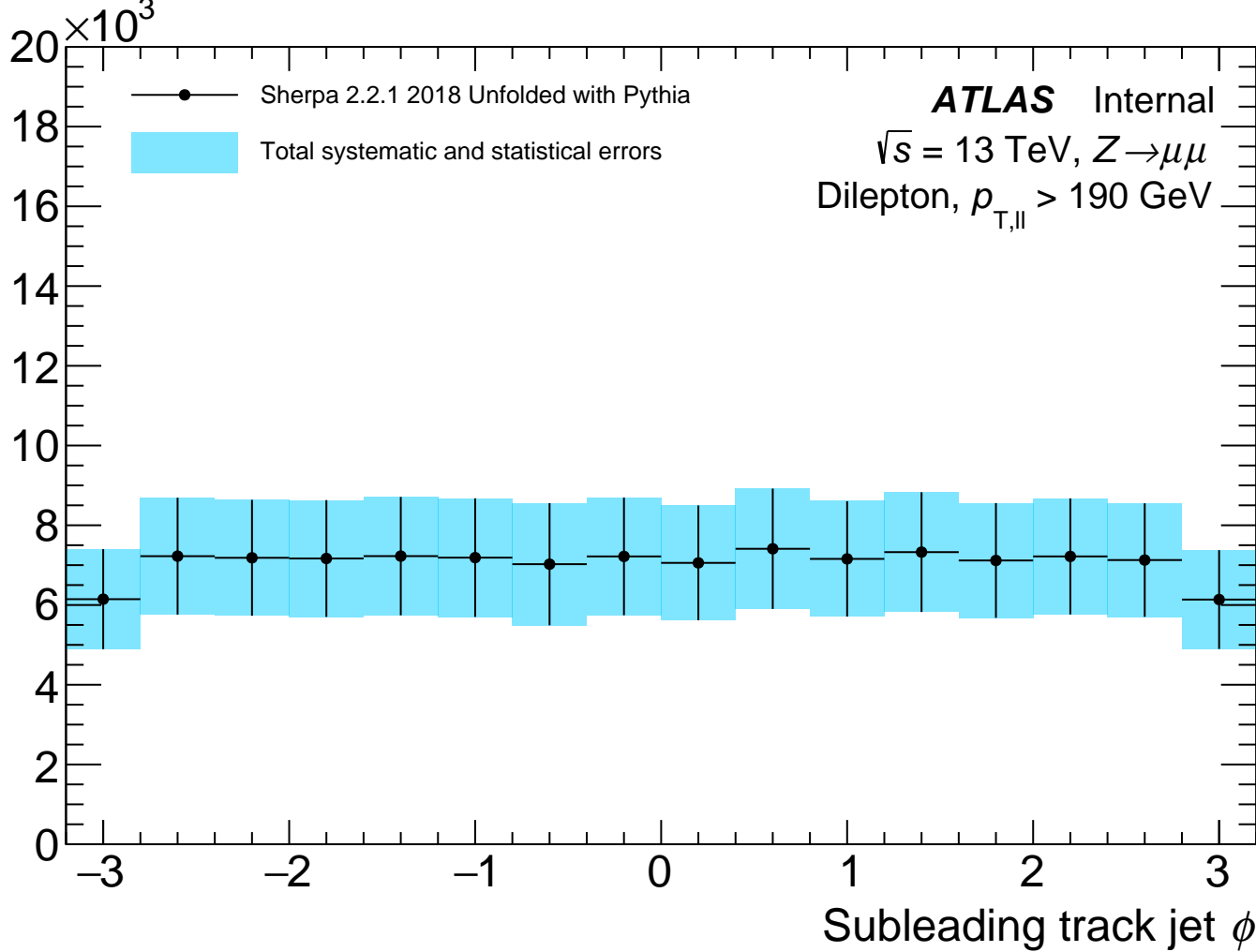
Events



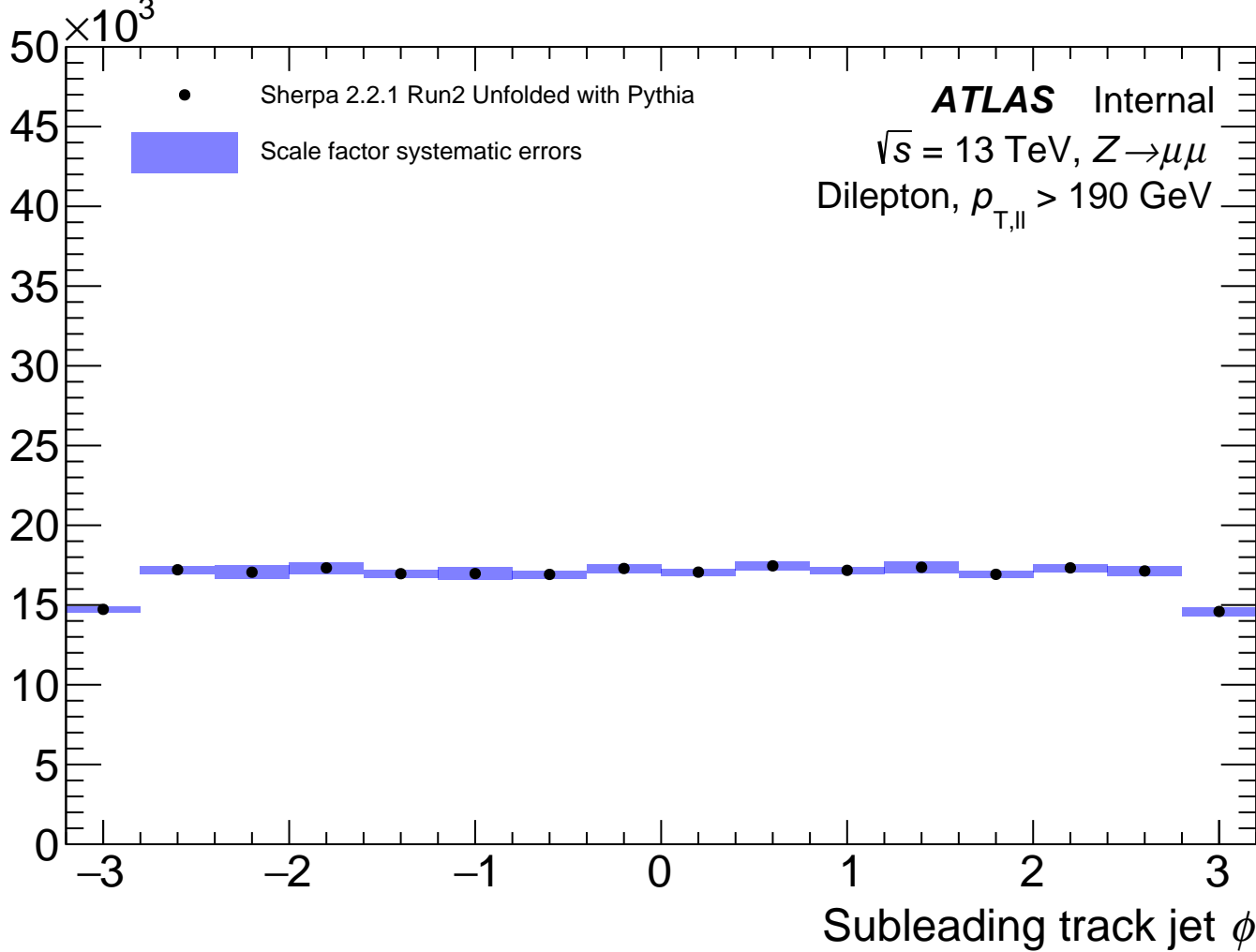
Events



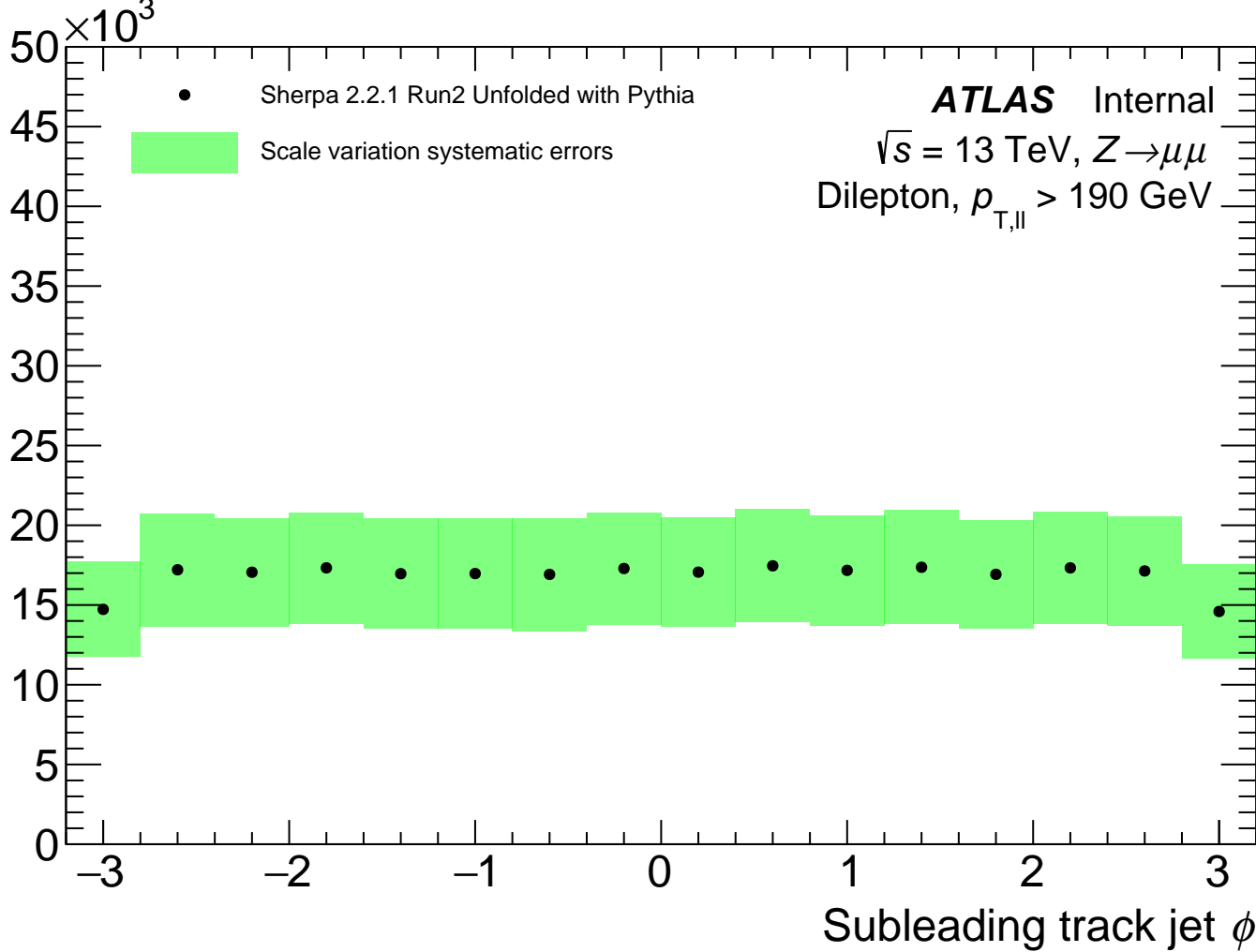
Events



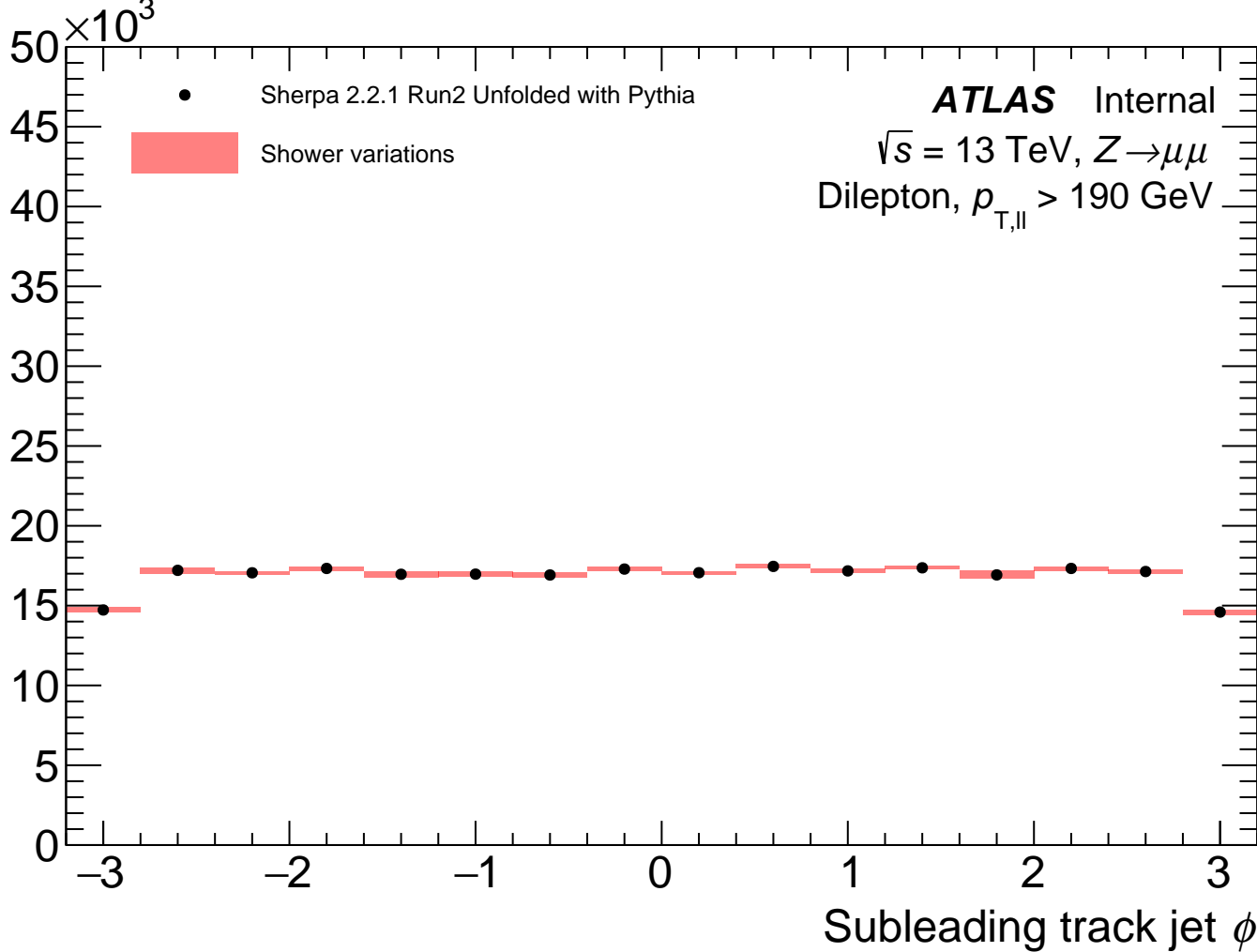
Events



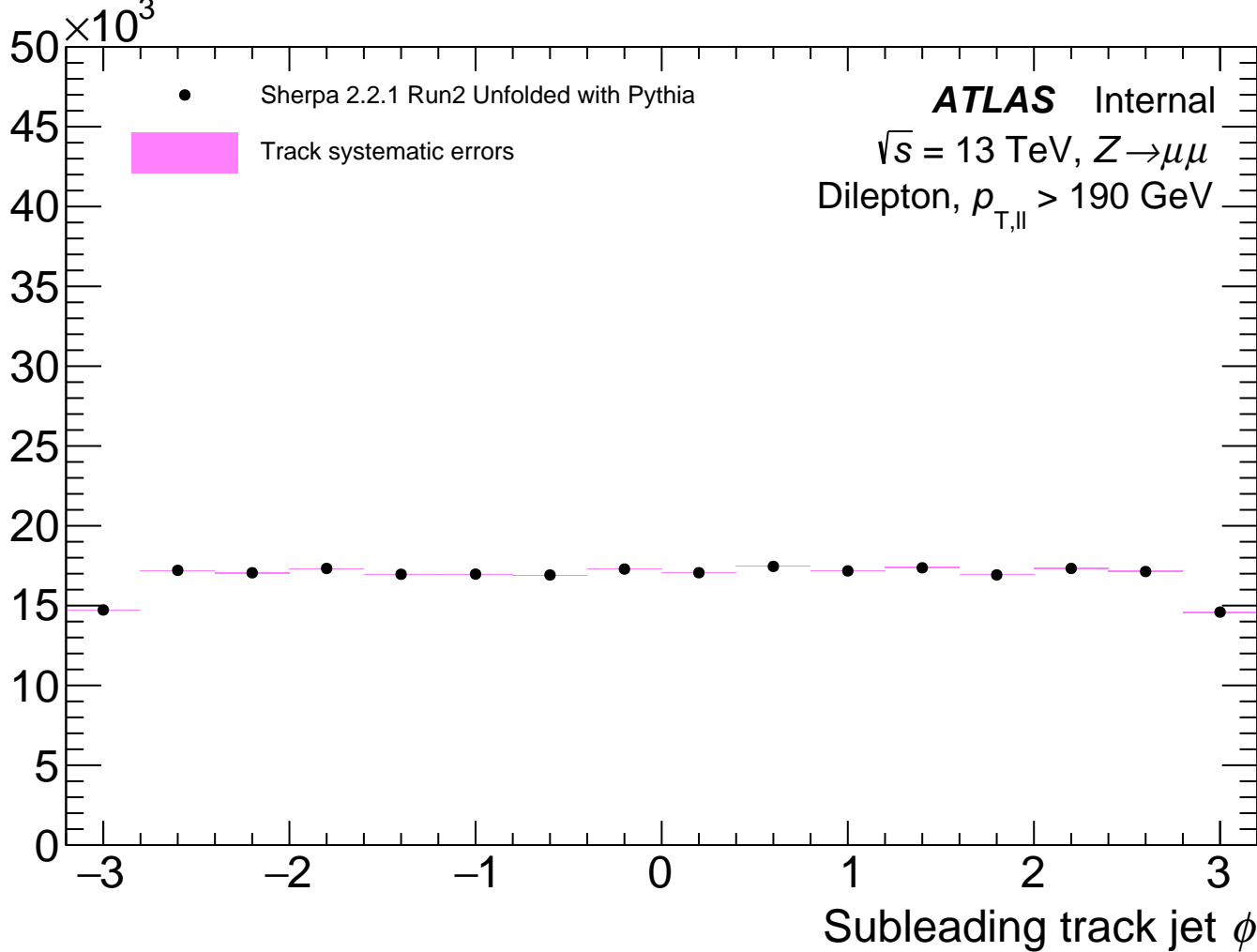
Events



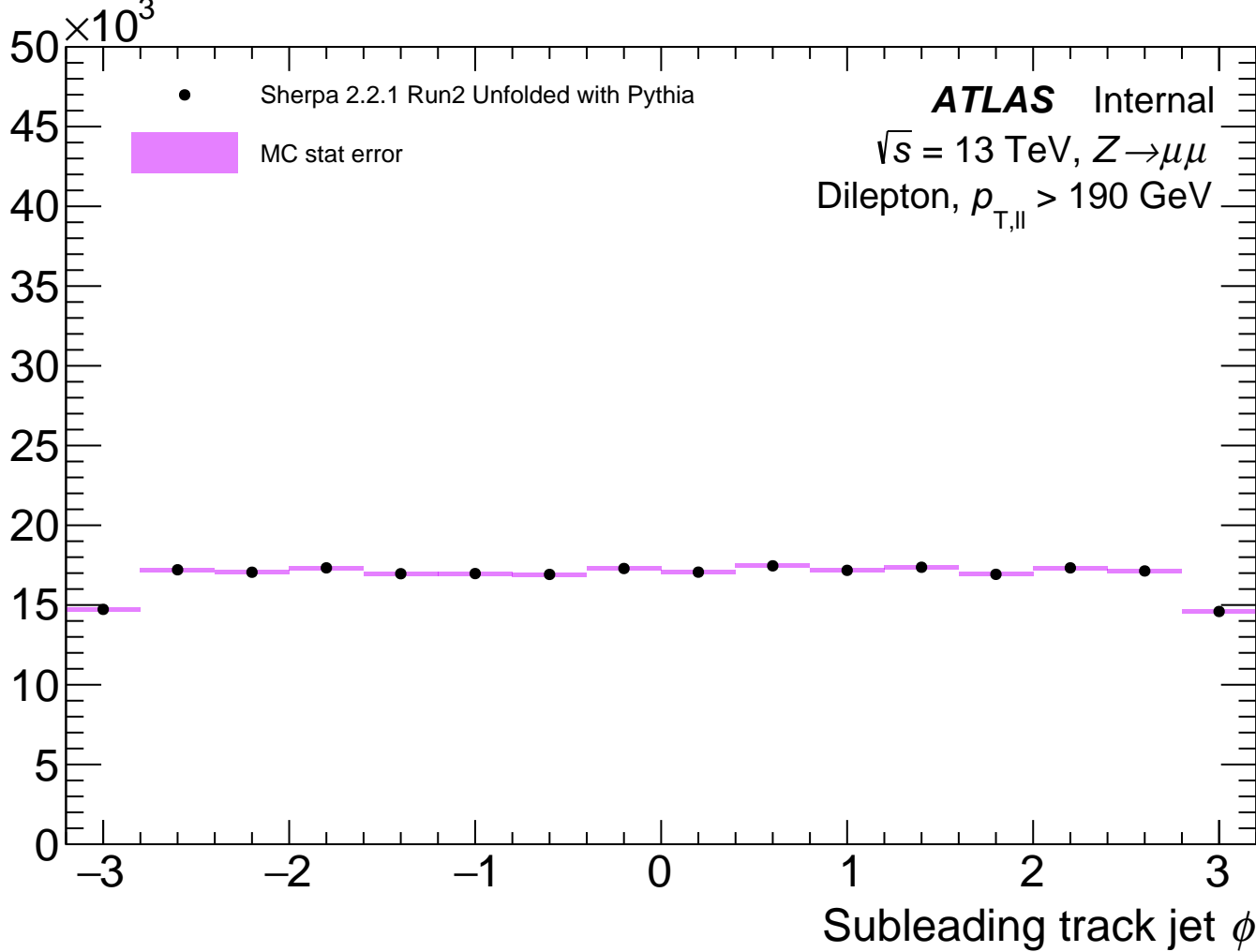
Events



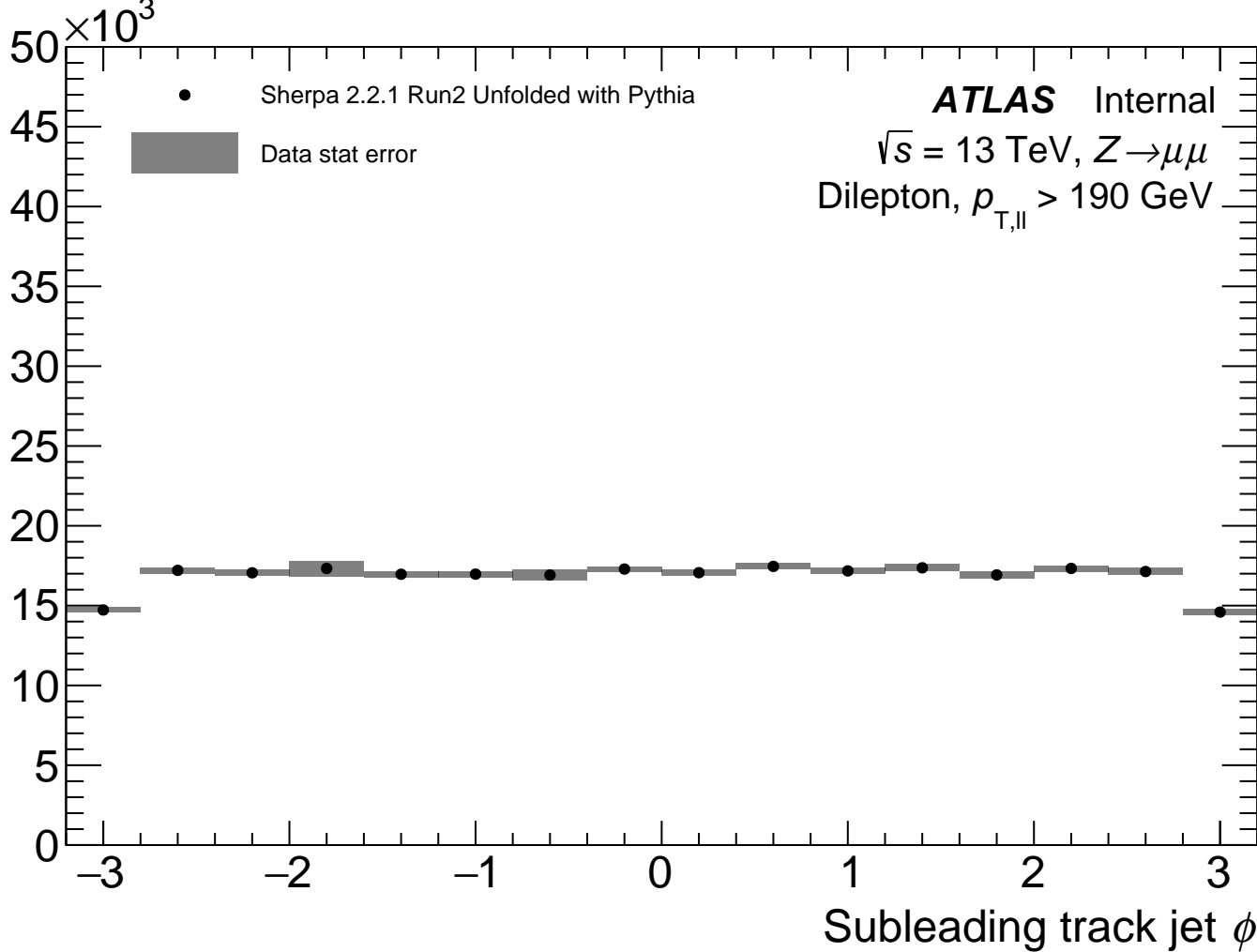
Events



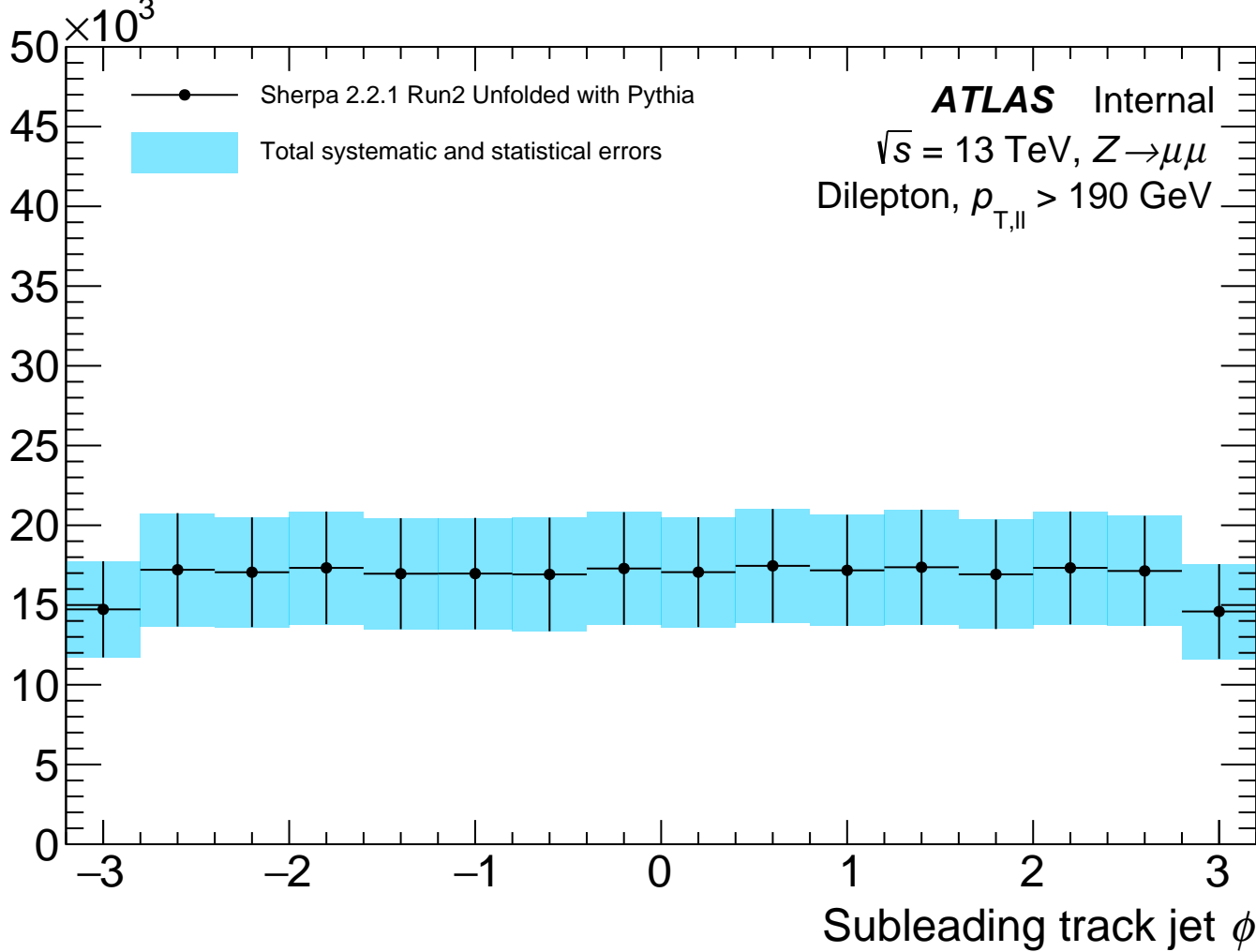
Events



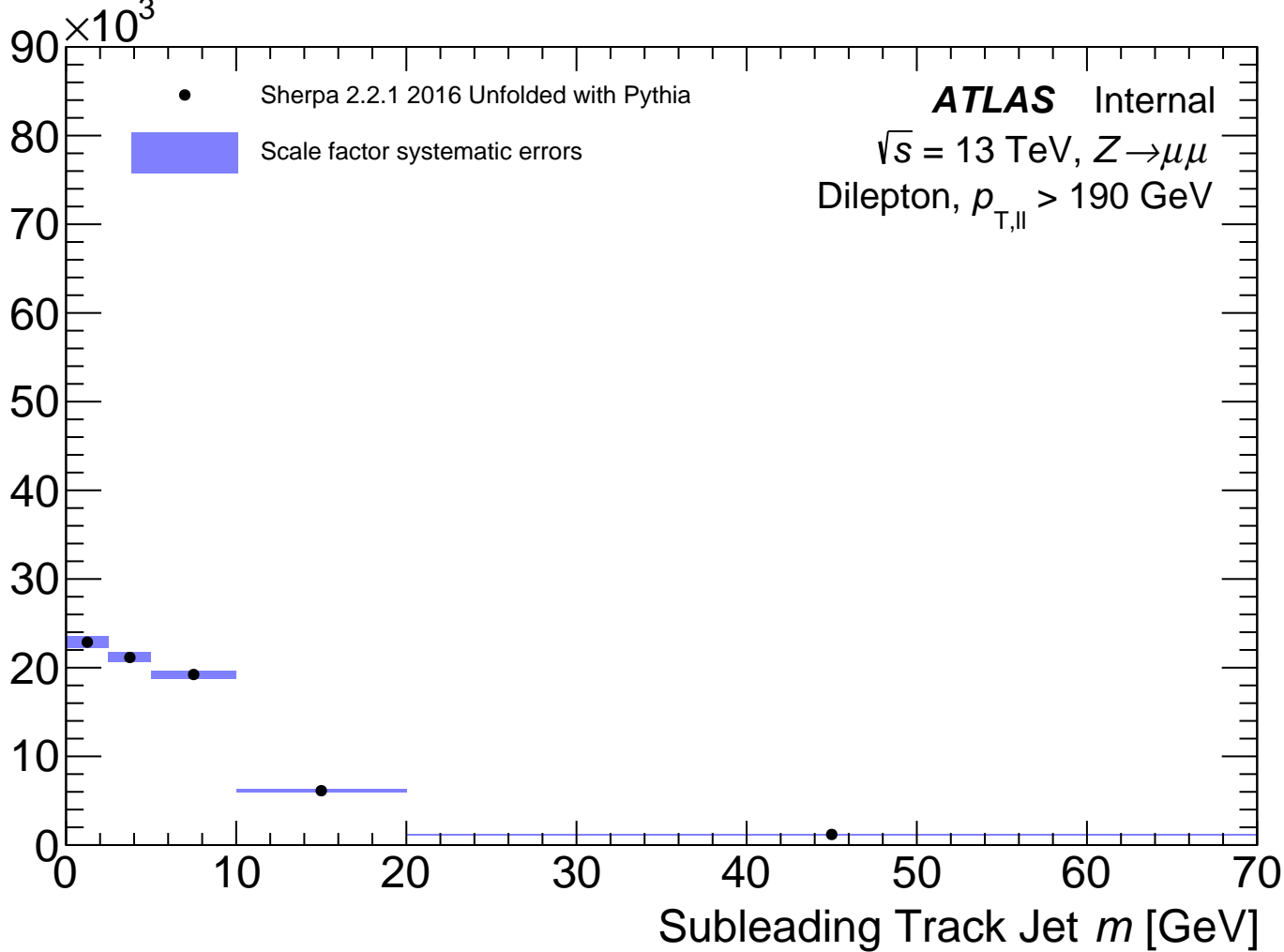
Events



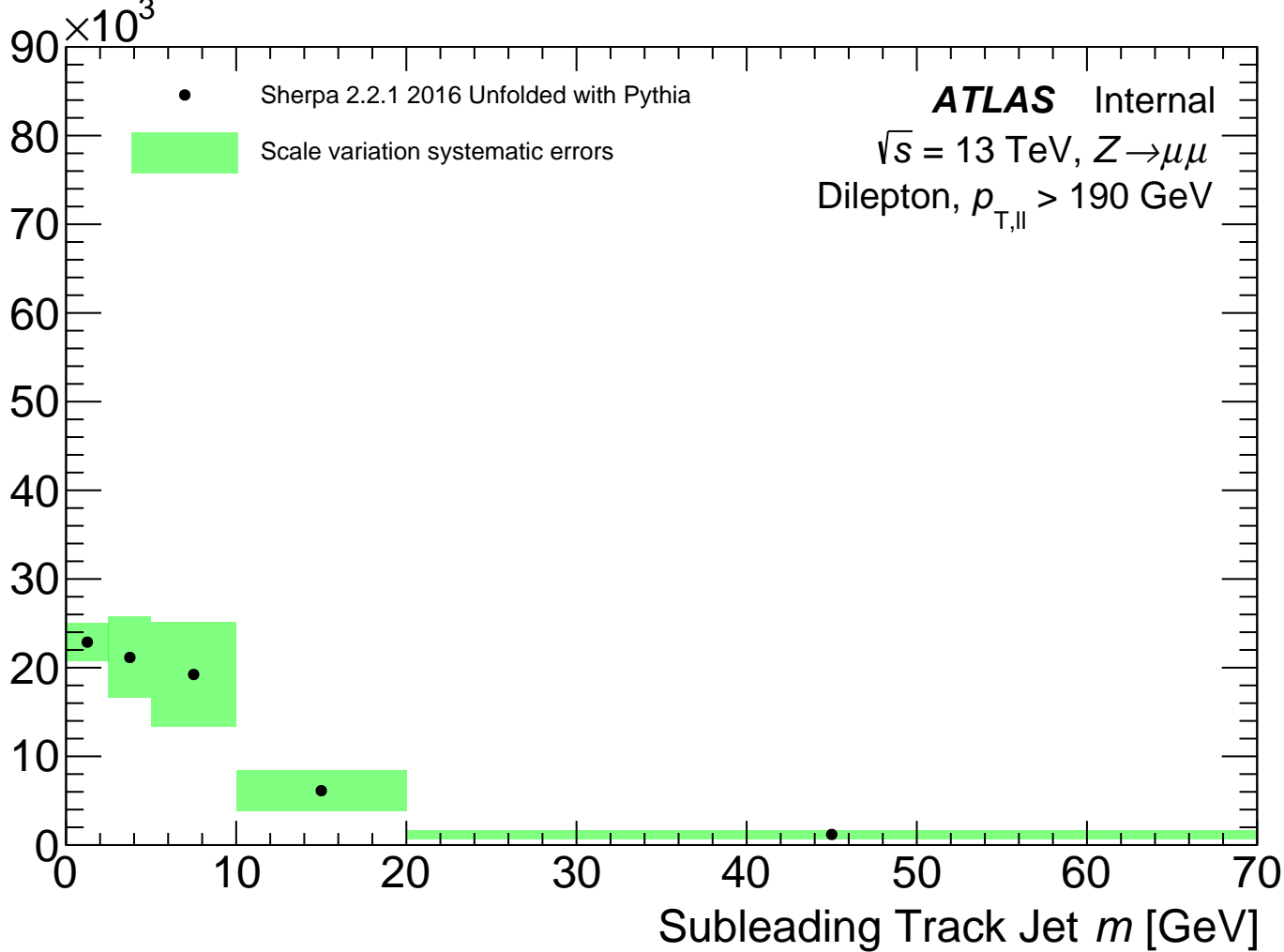
Events



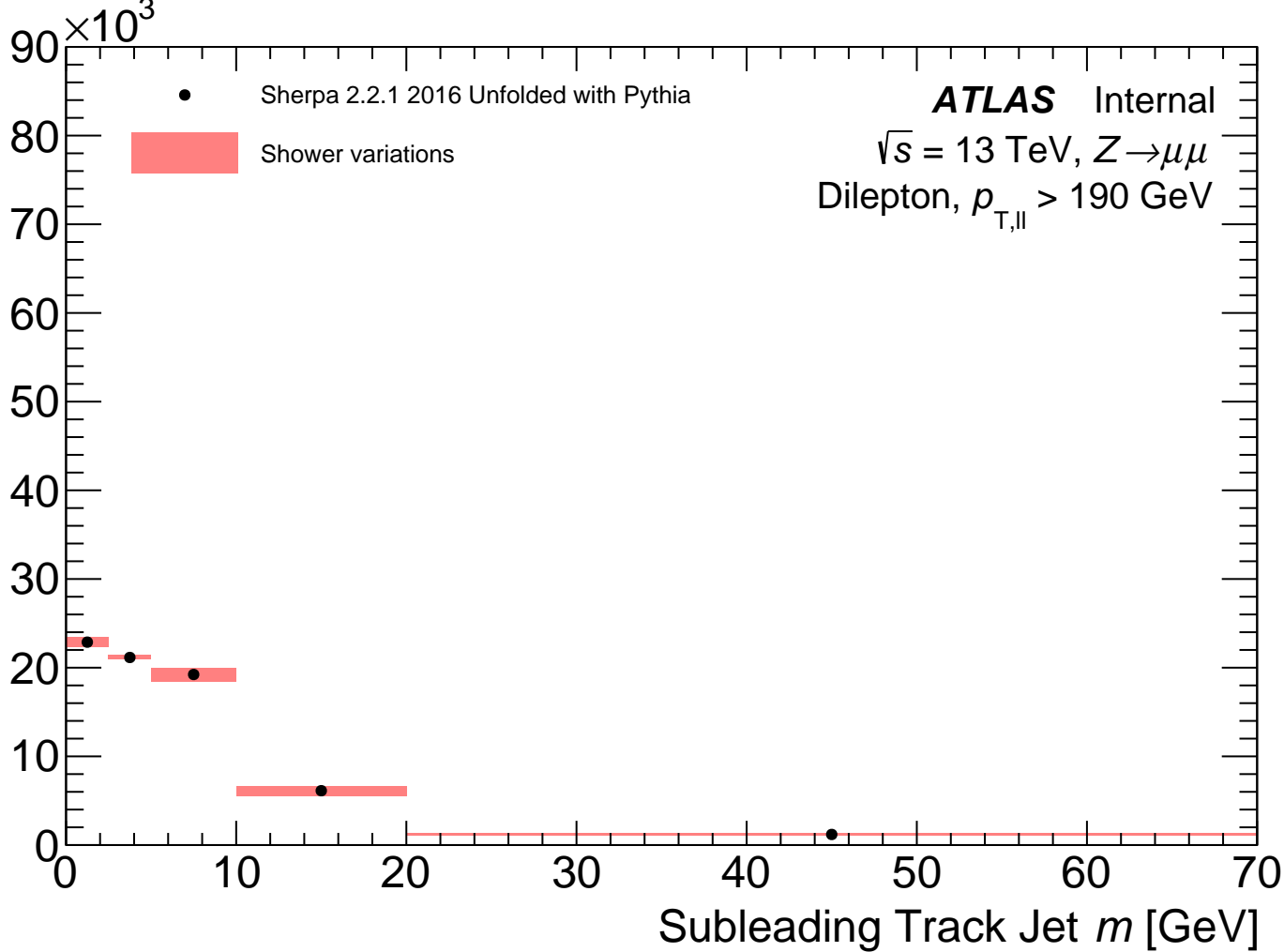
Events



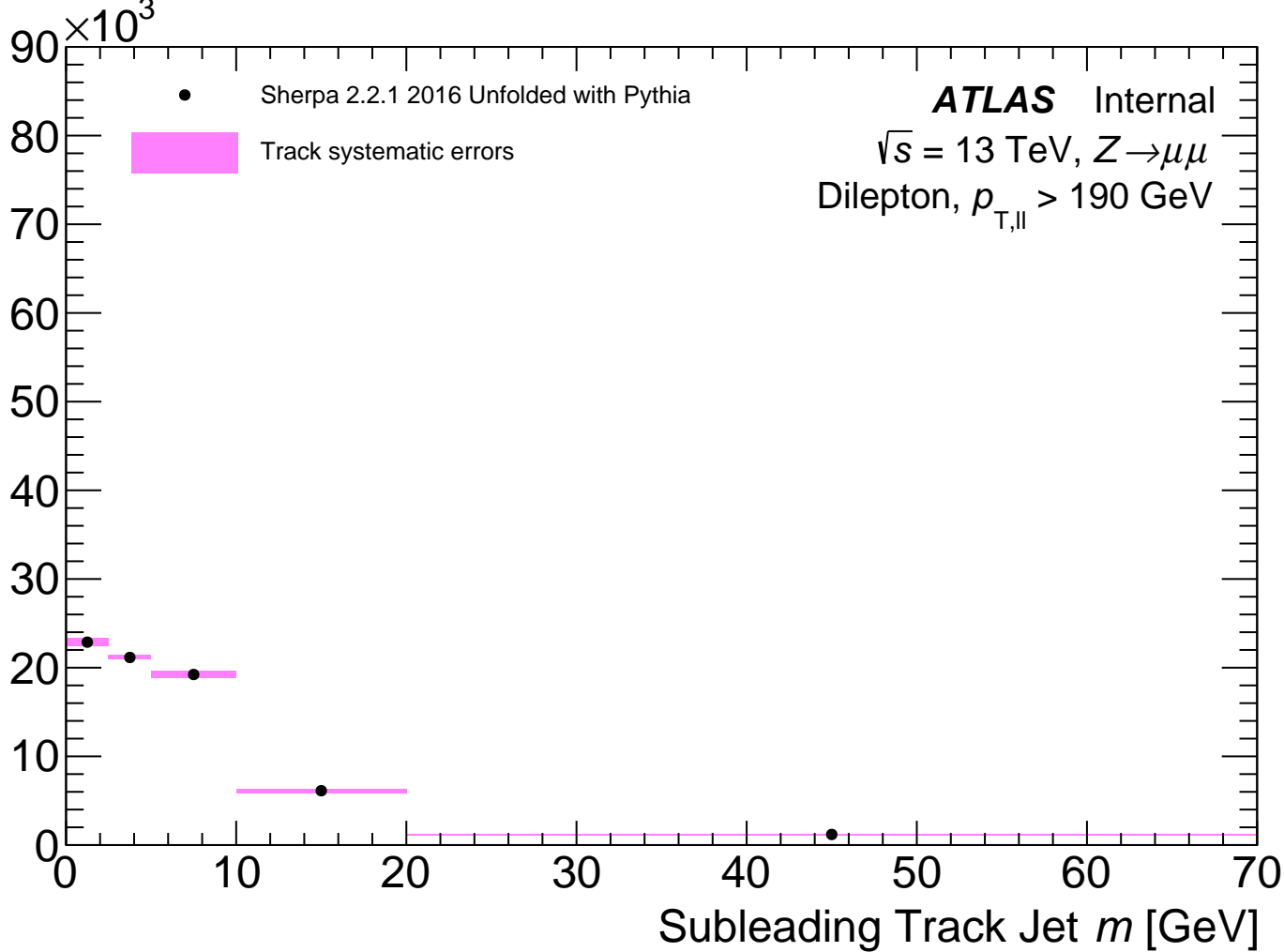
Events



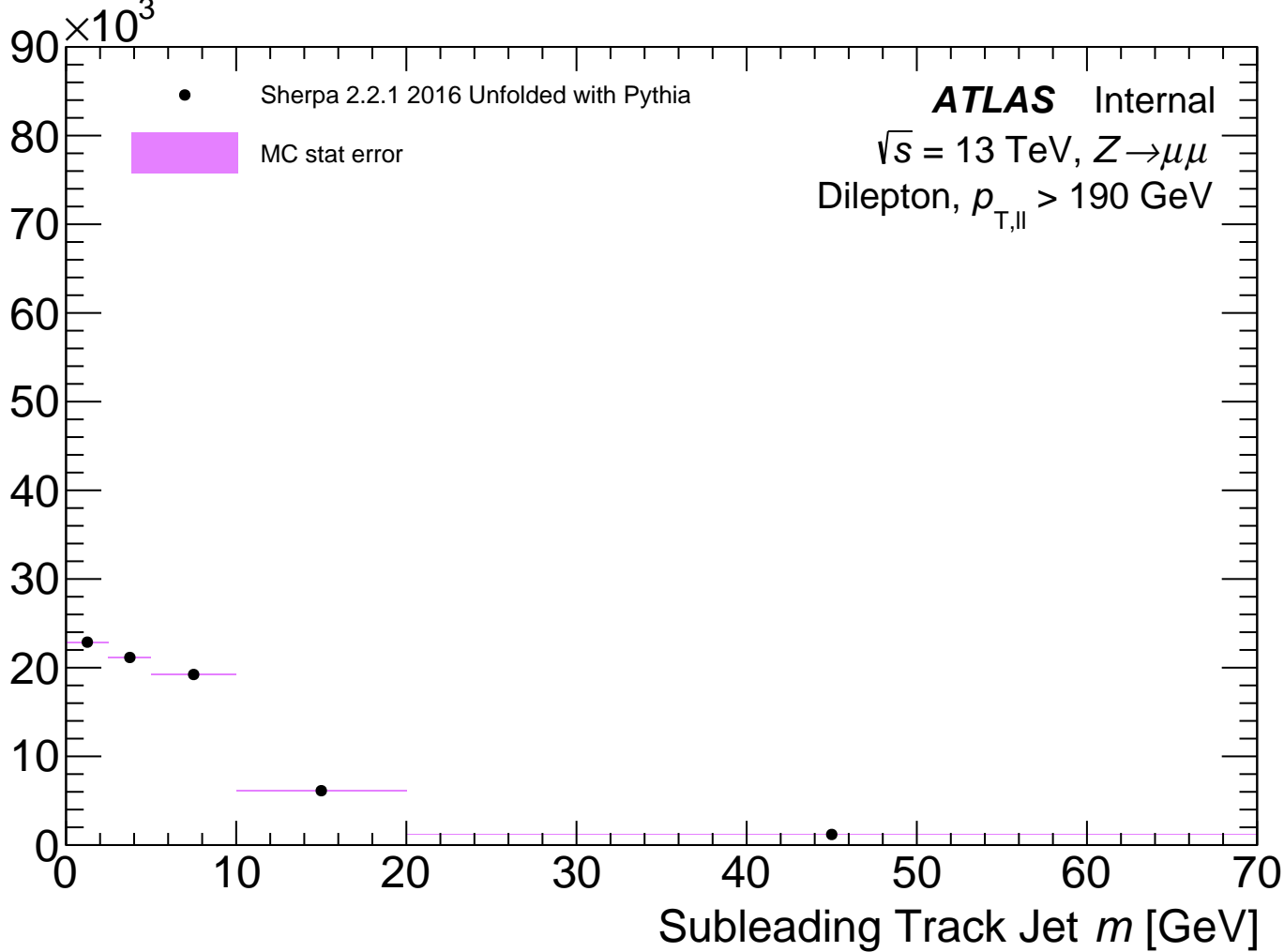
Events



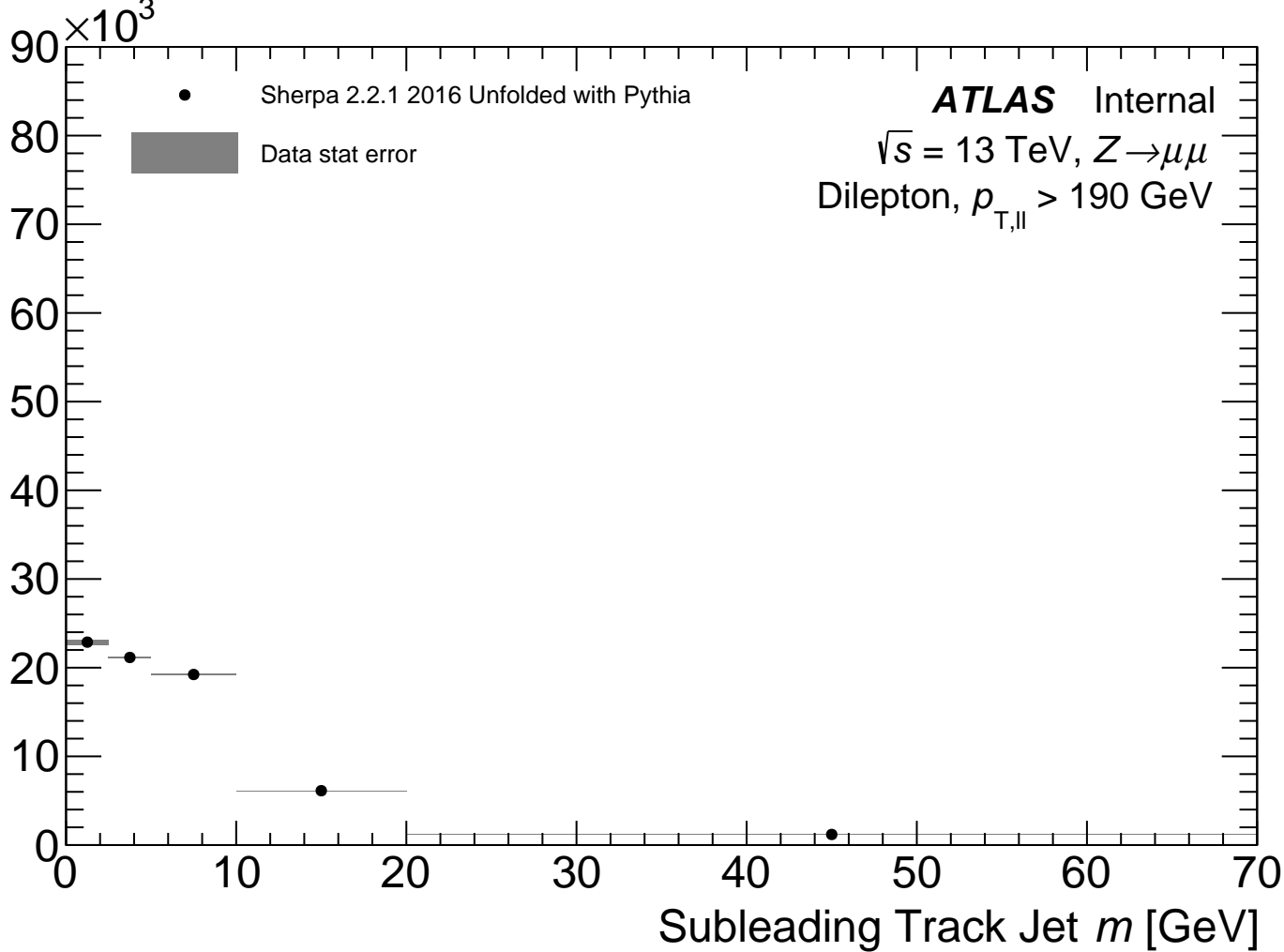
Events



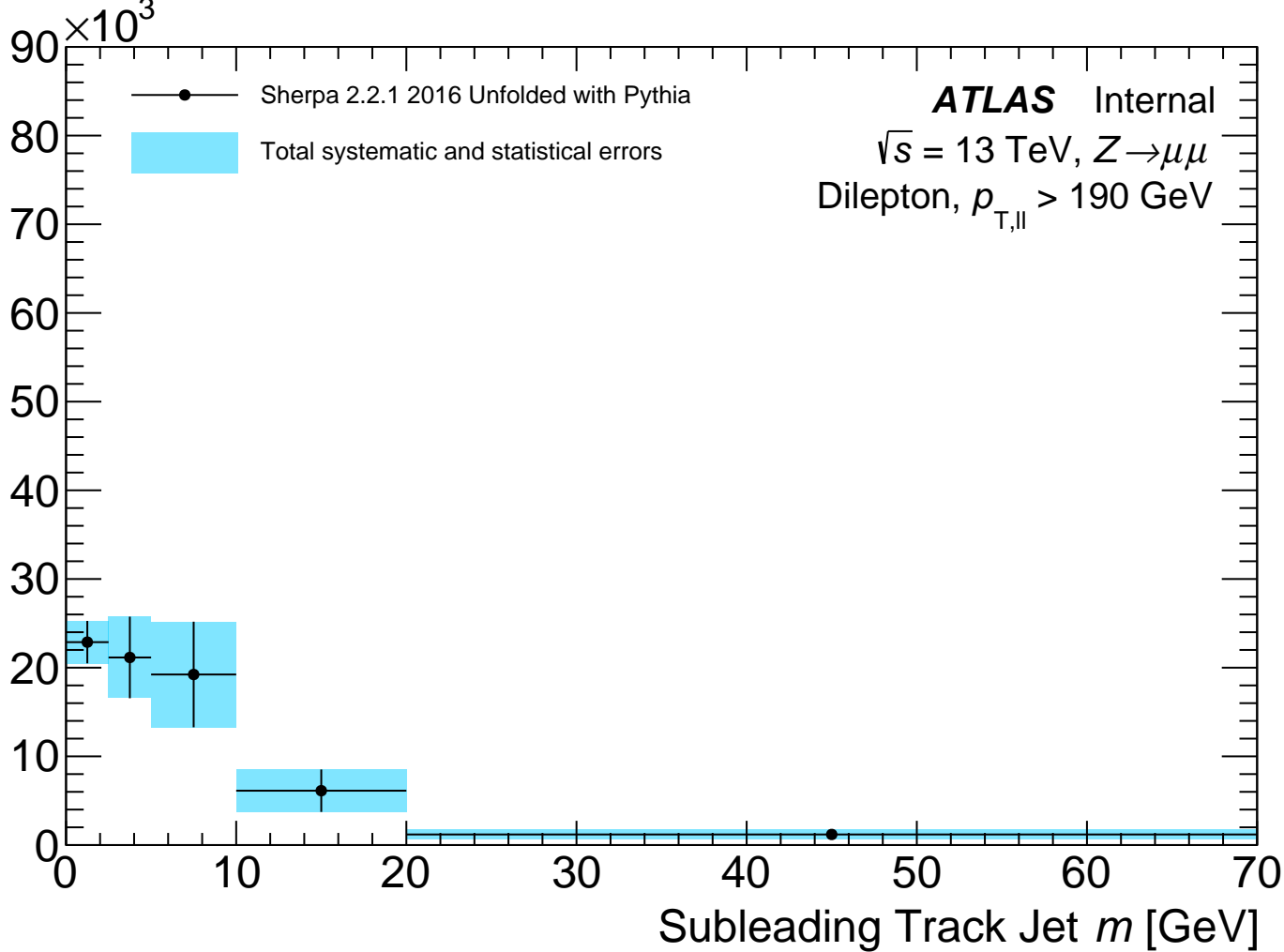
Events



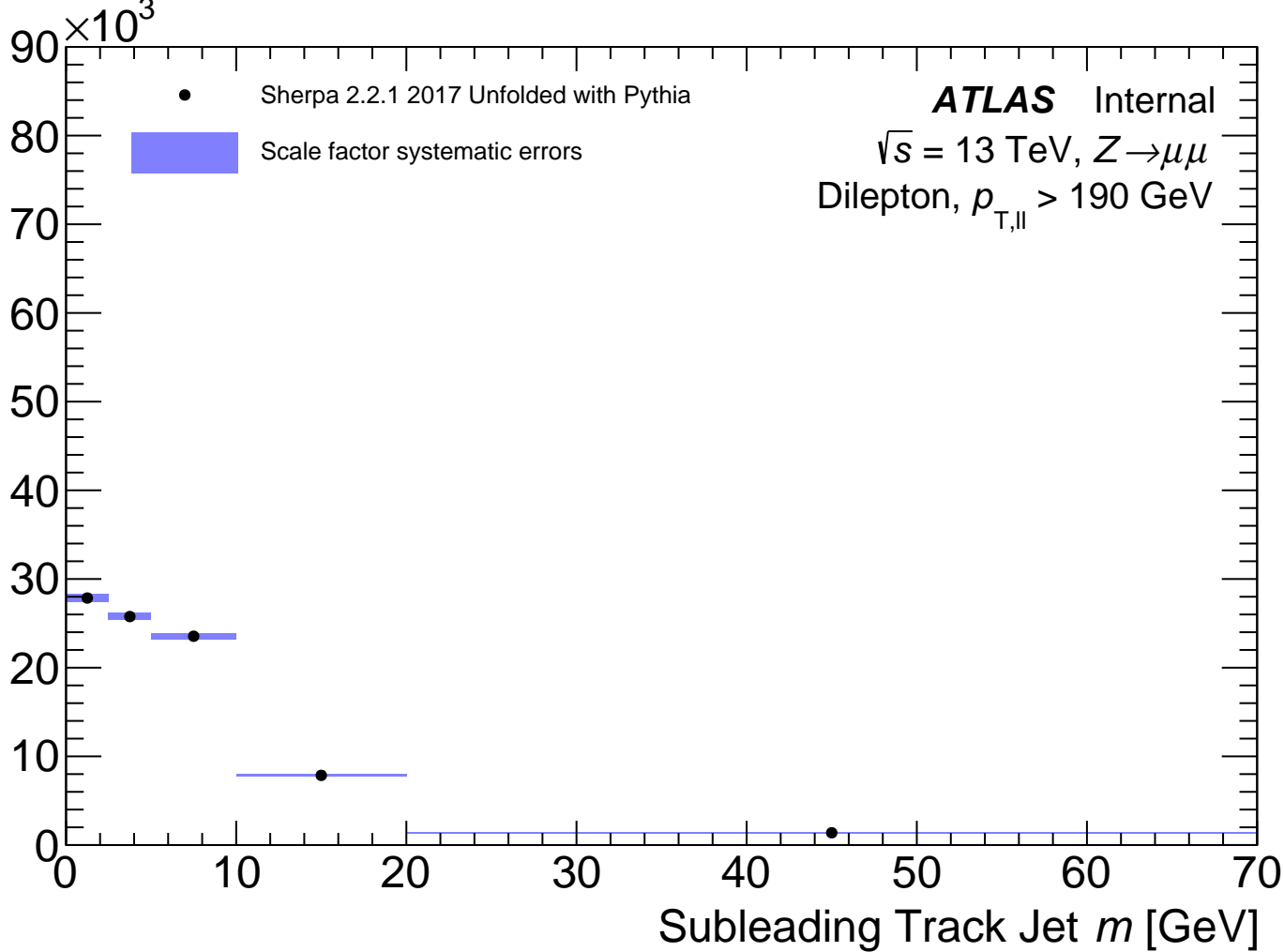
Events



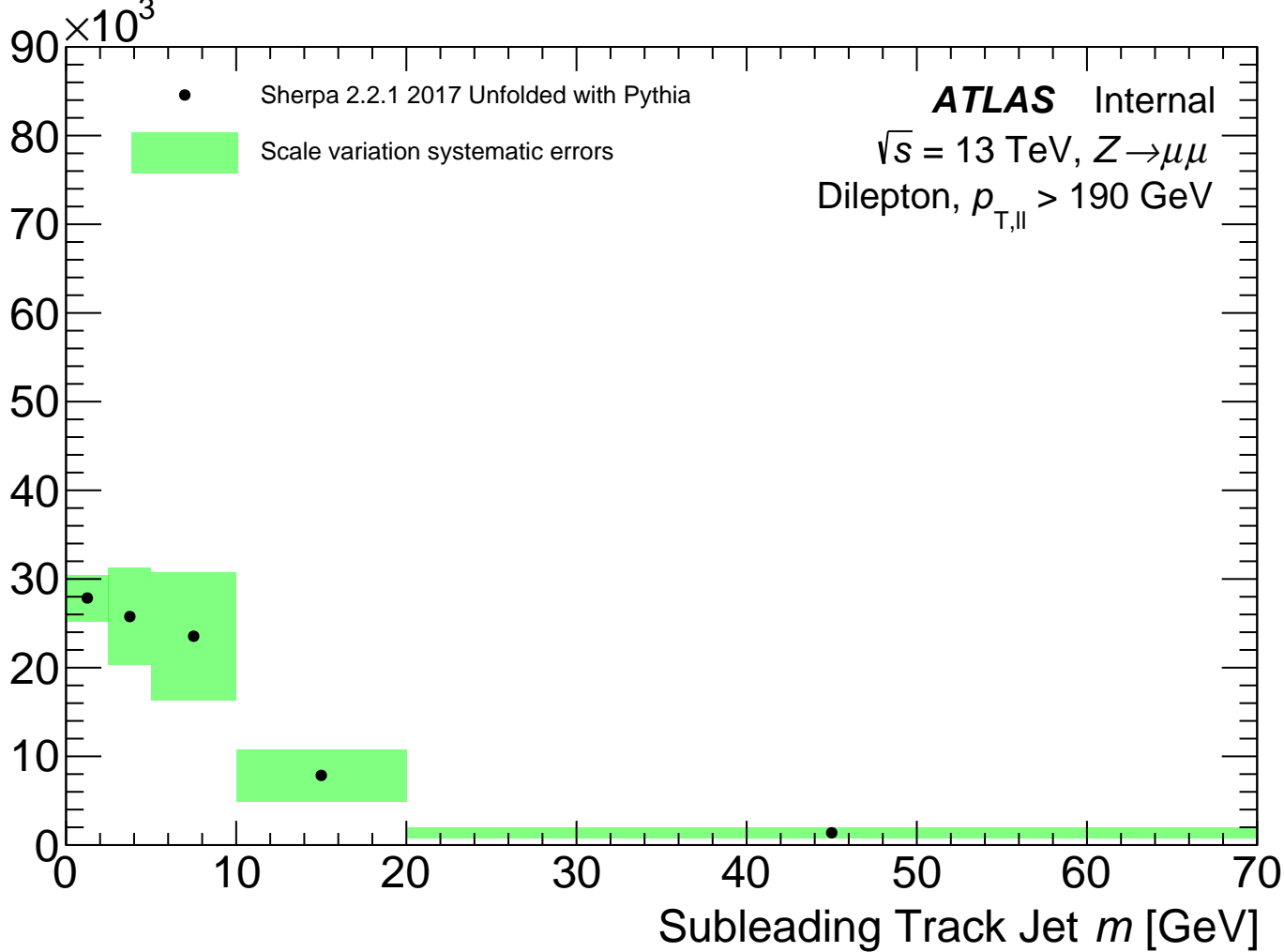
Events



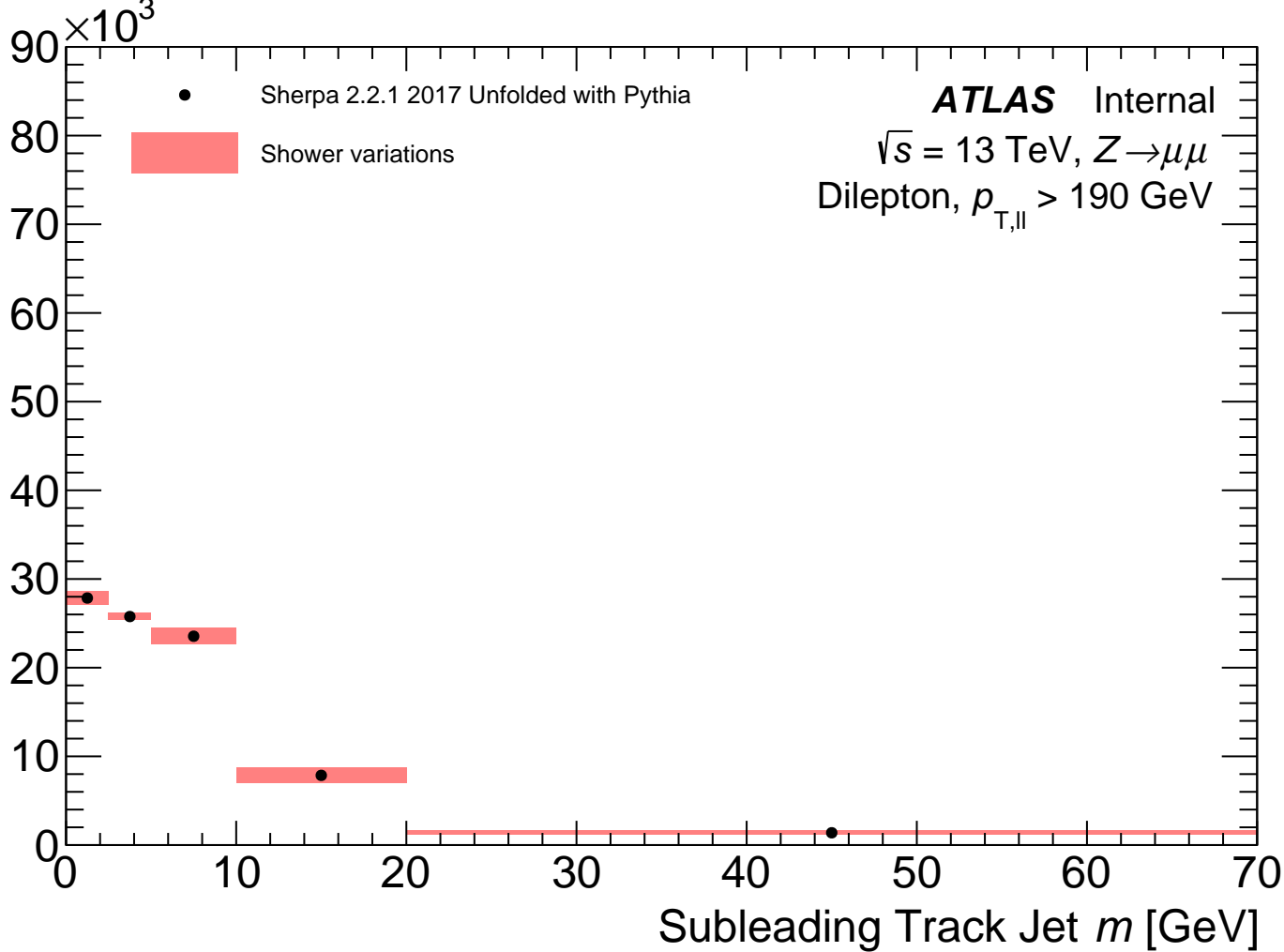
Events



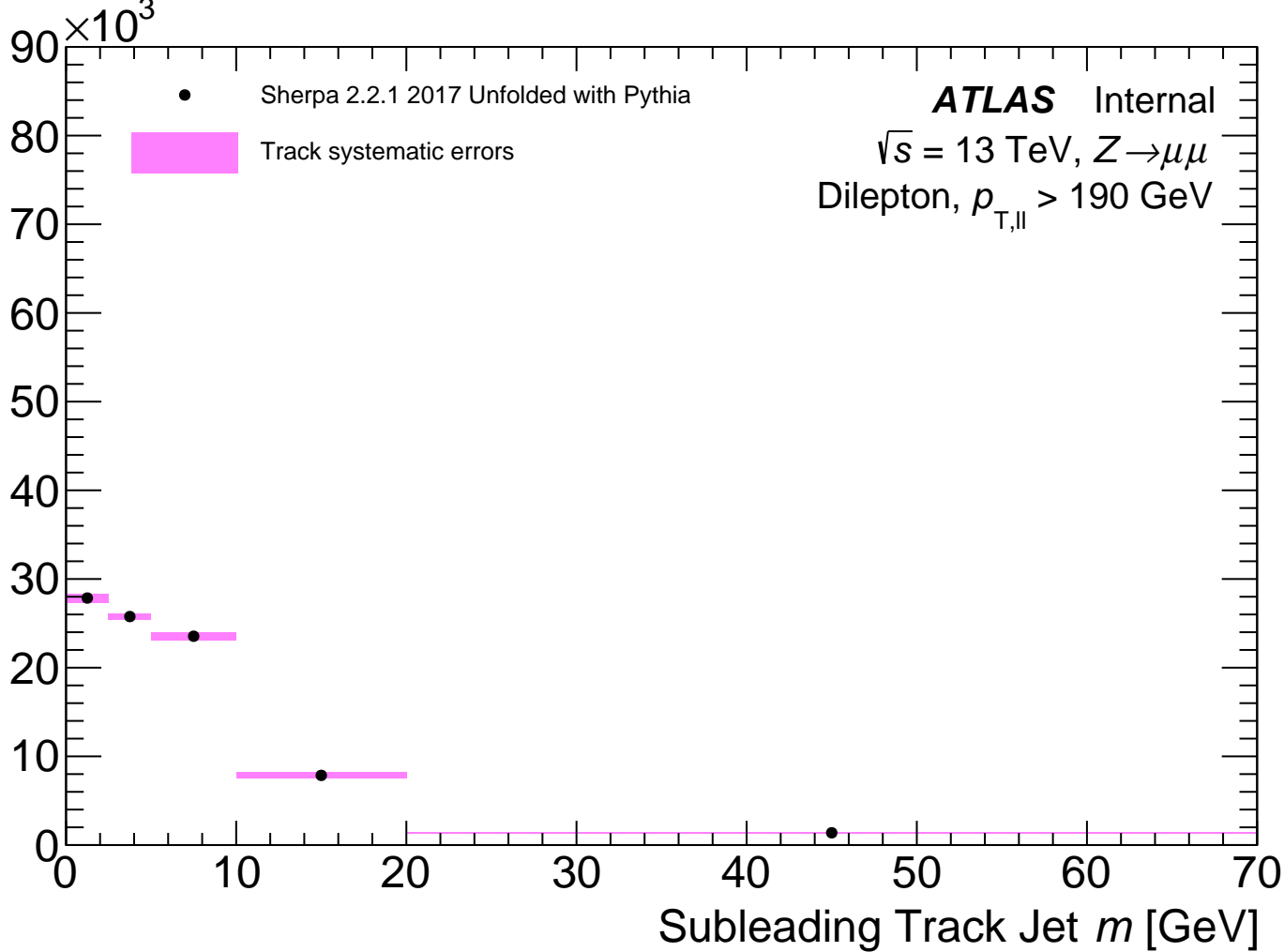
Events



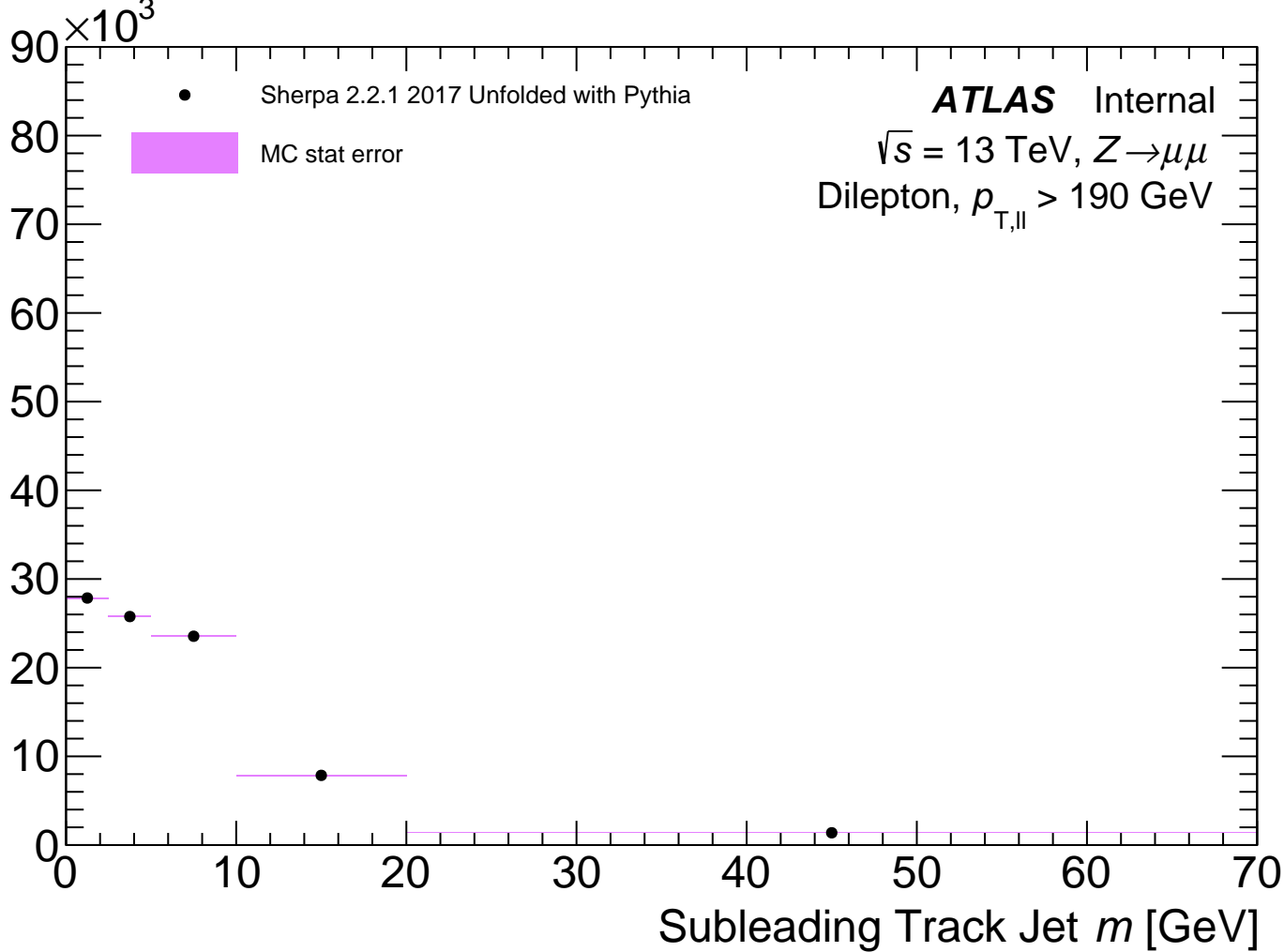
Events



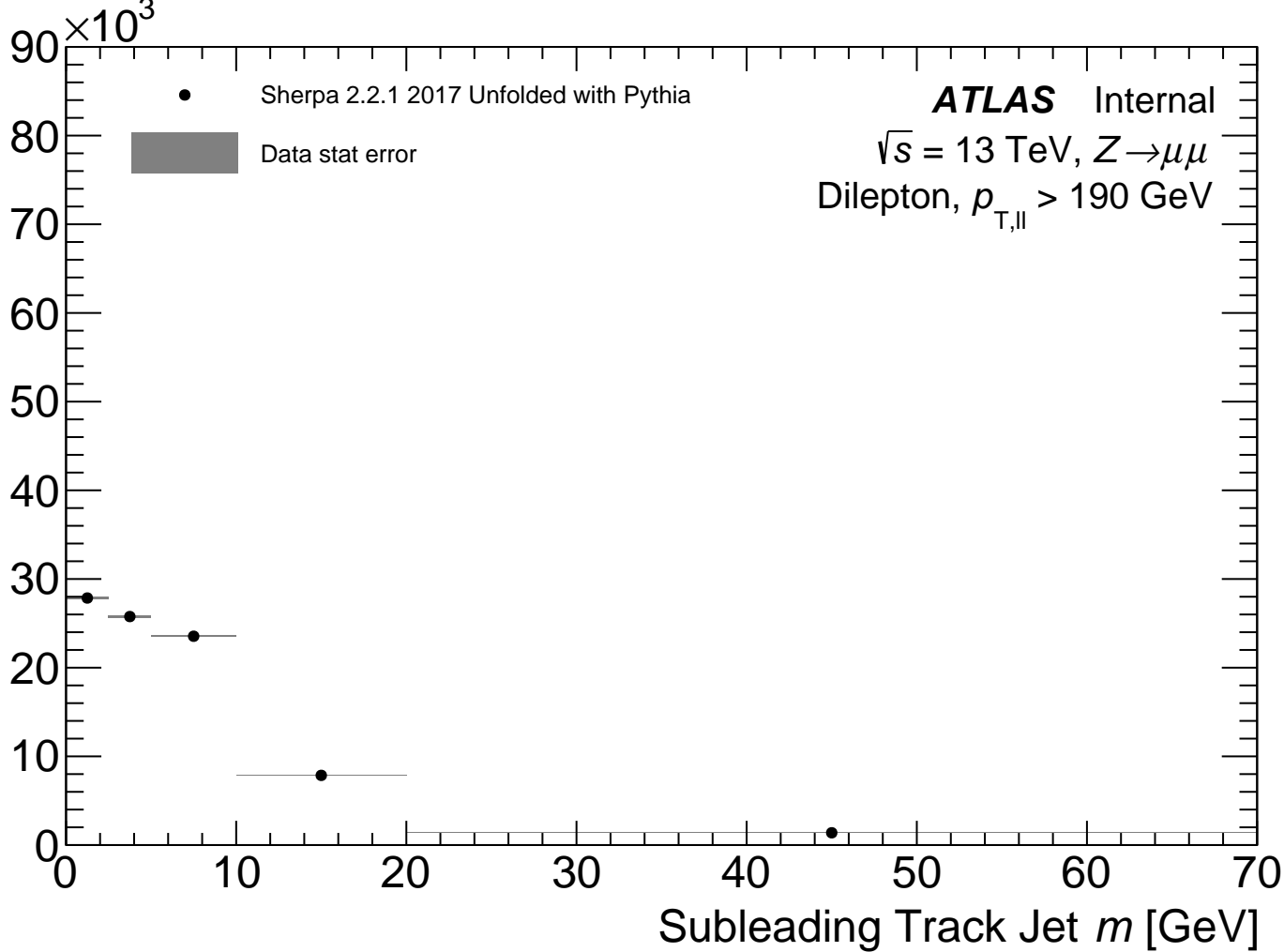
Events



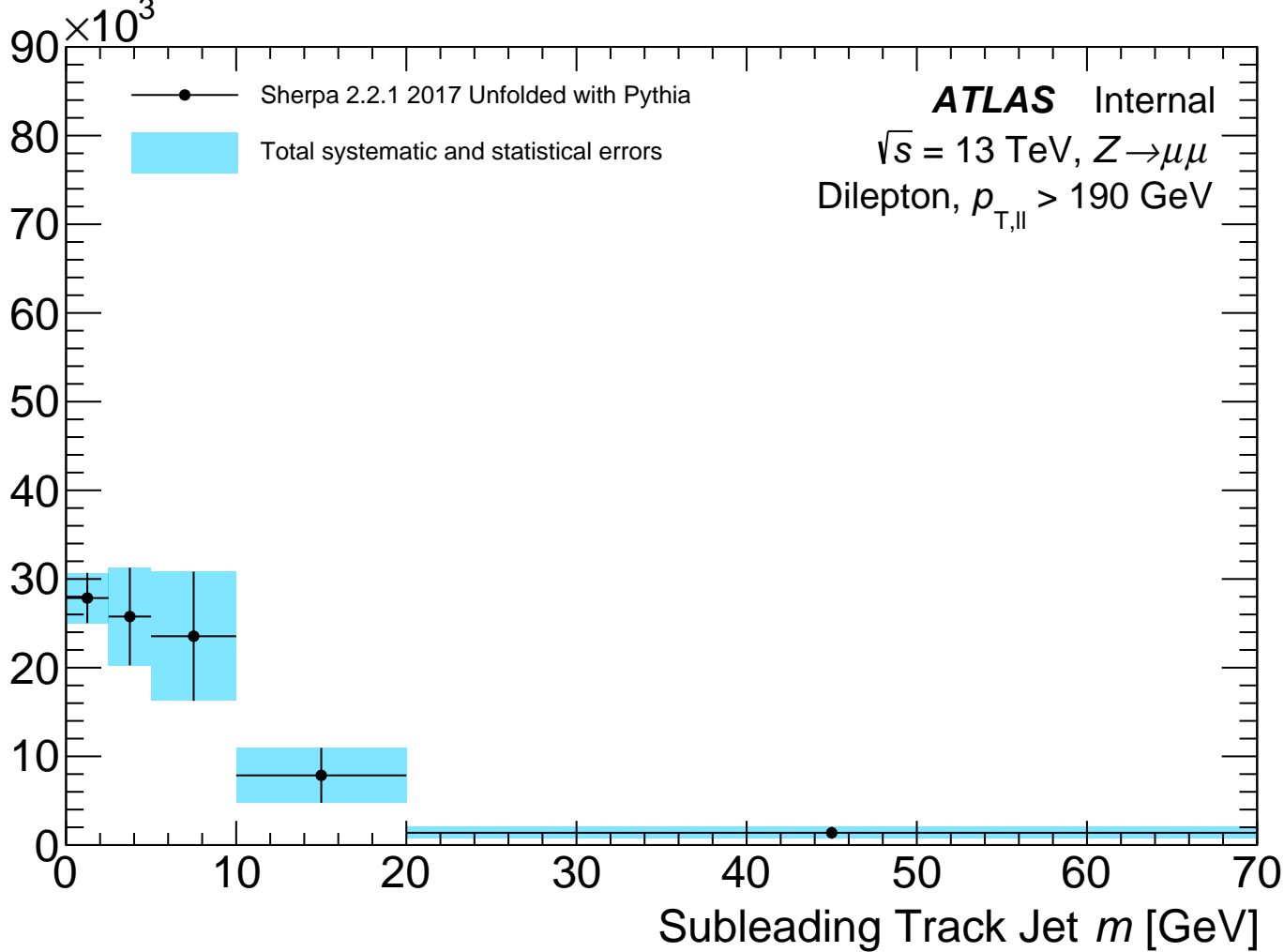
Events



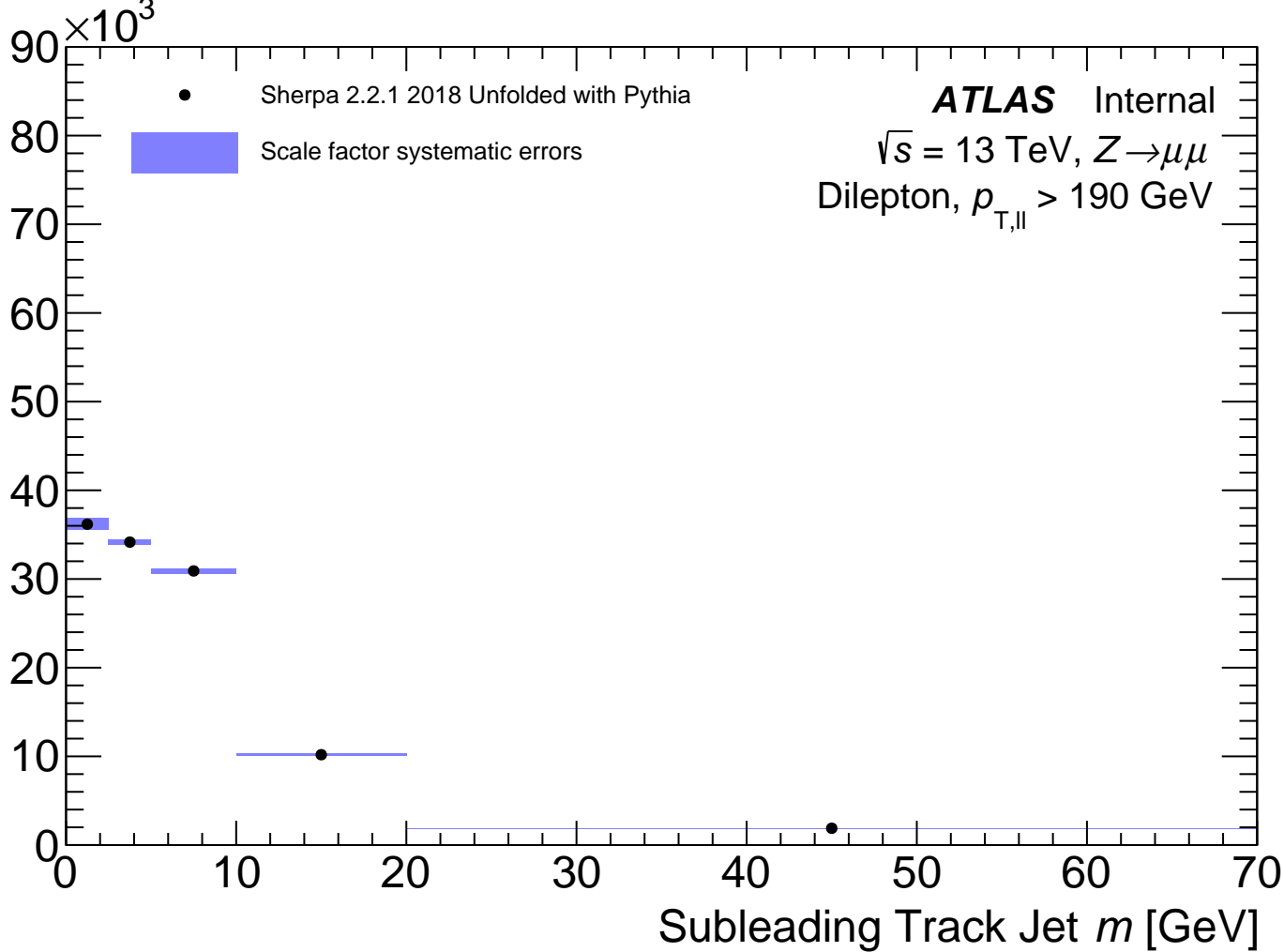
Events



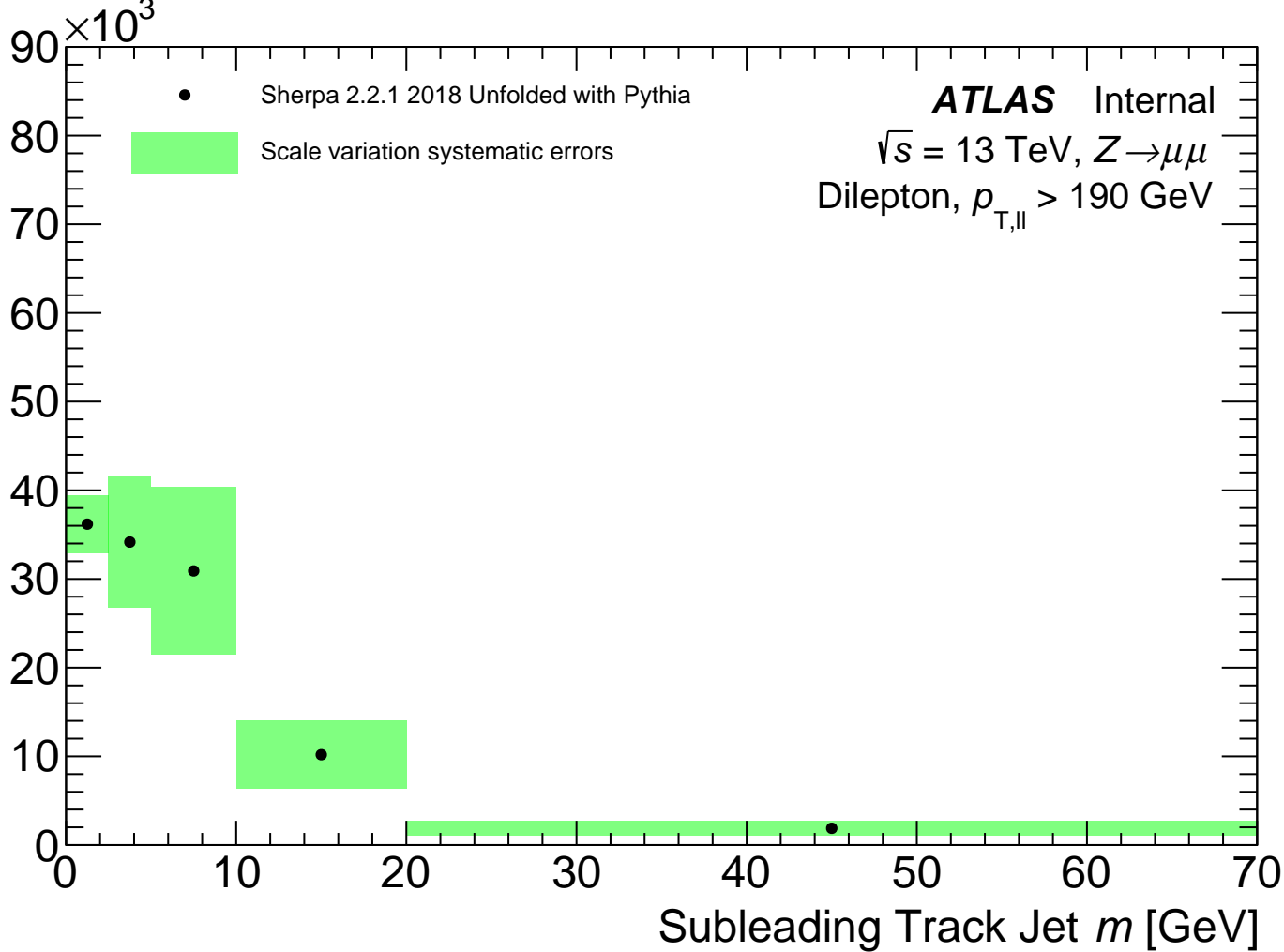
Events



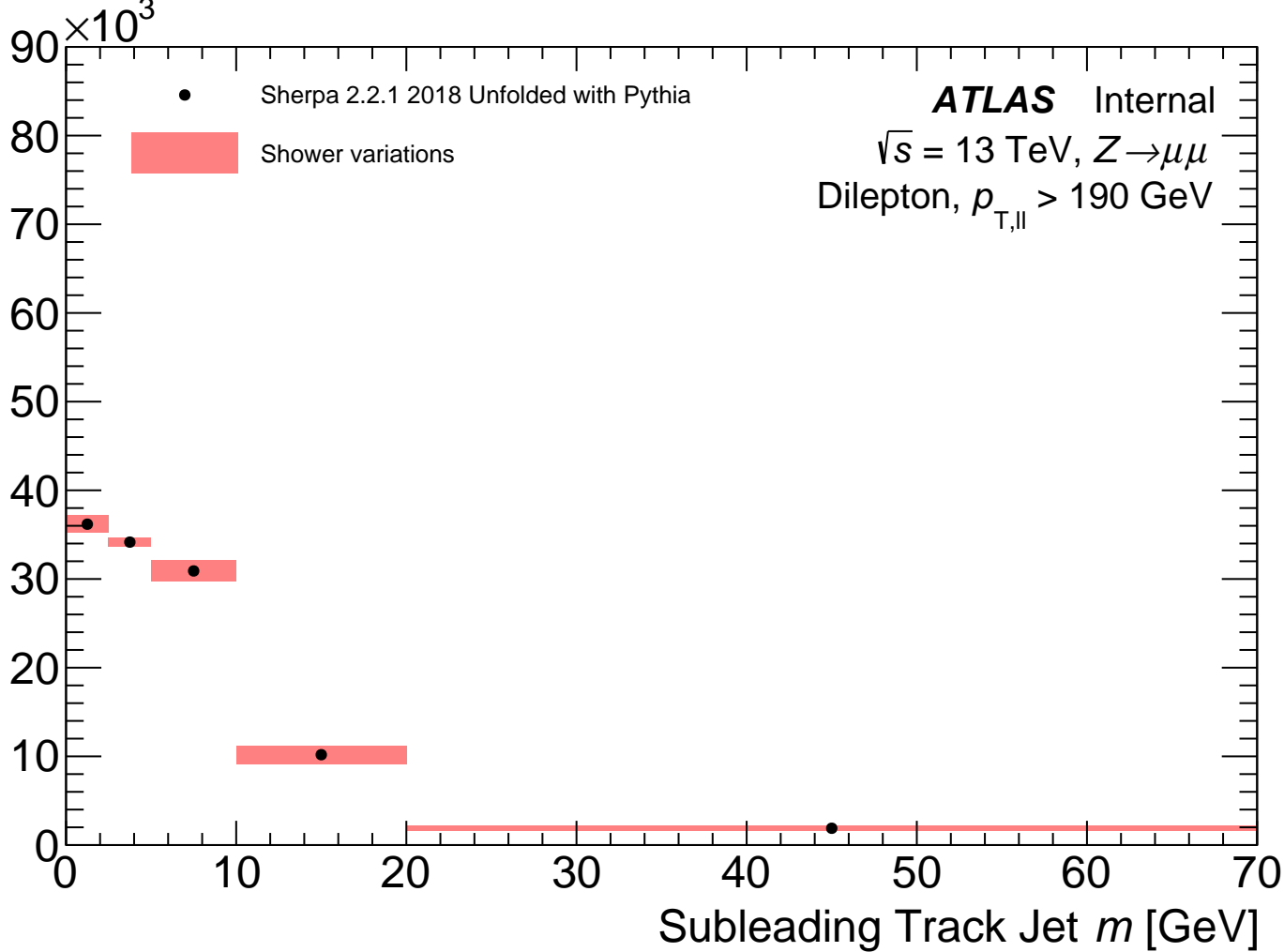
Events



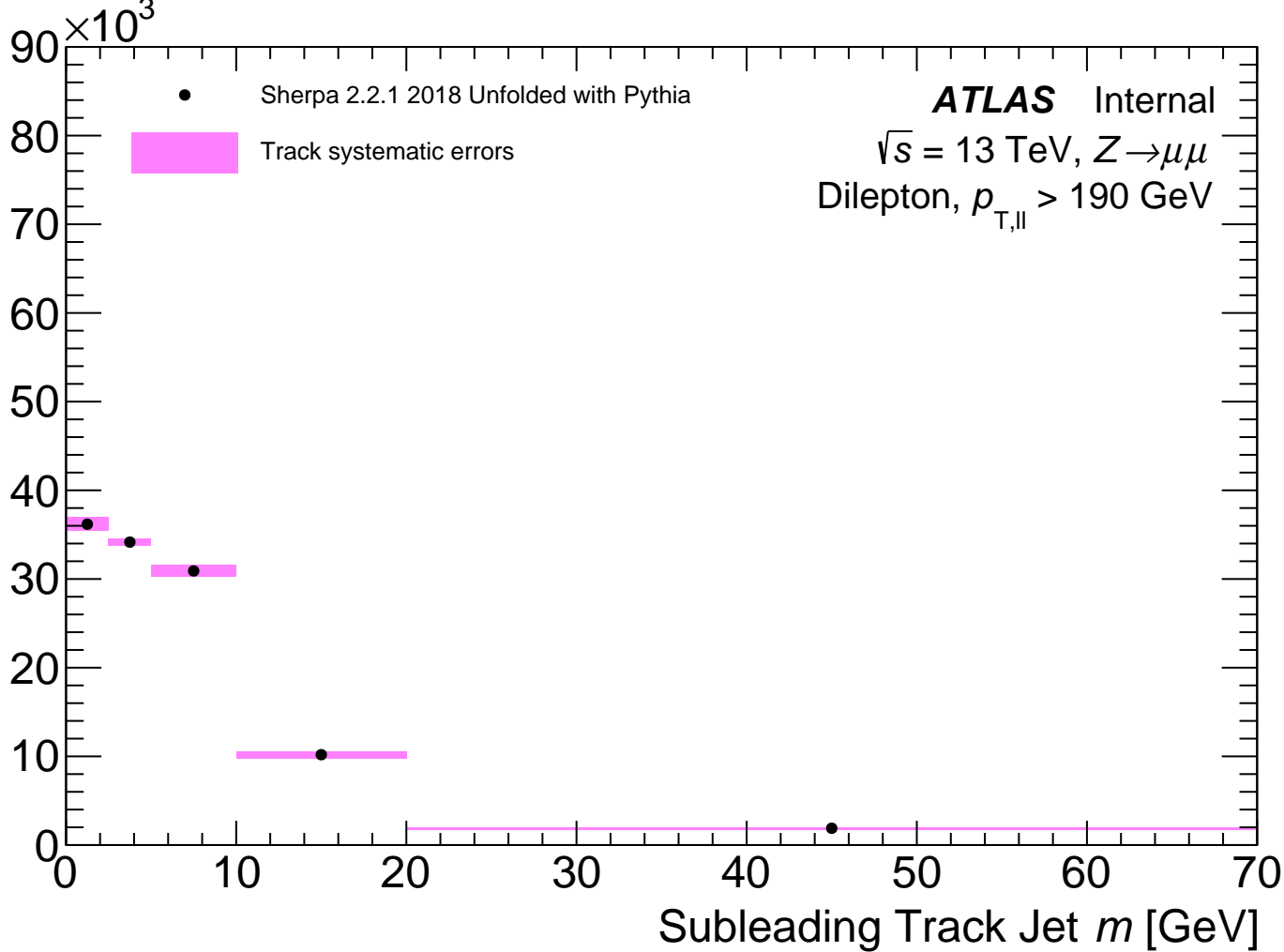
Events



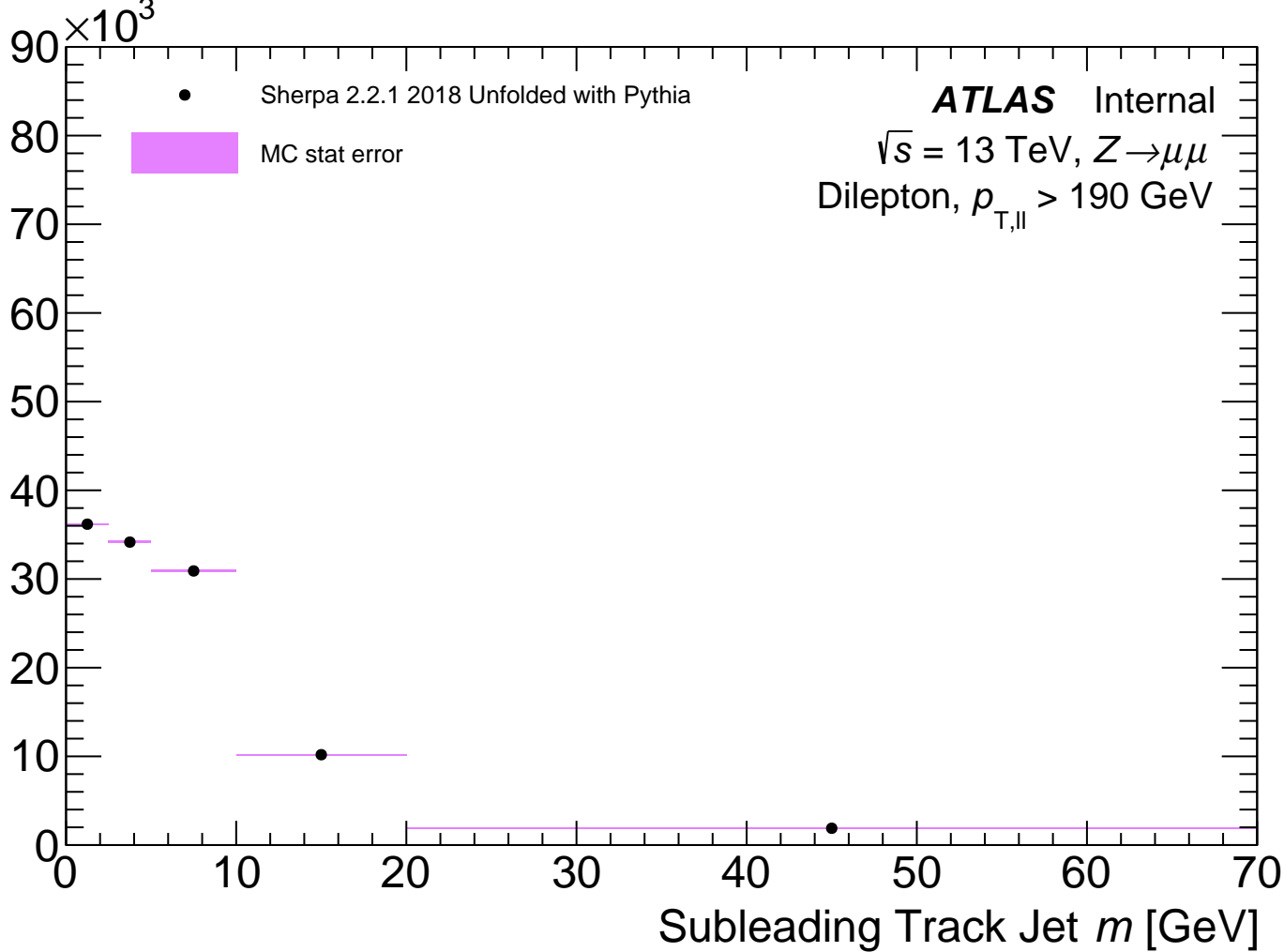
Events



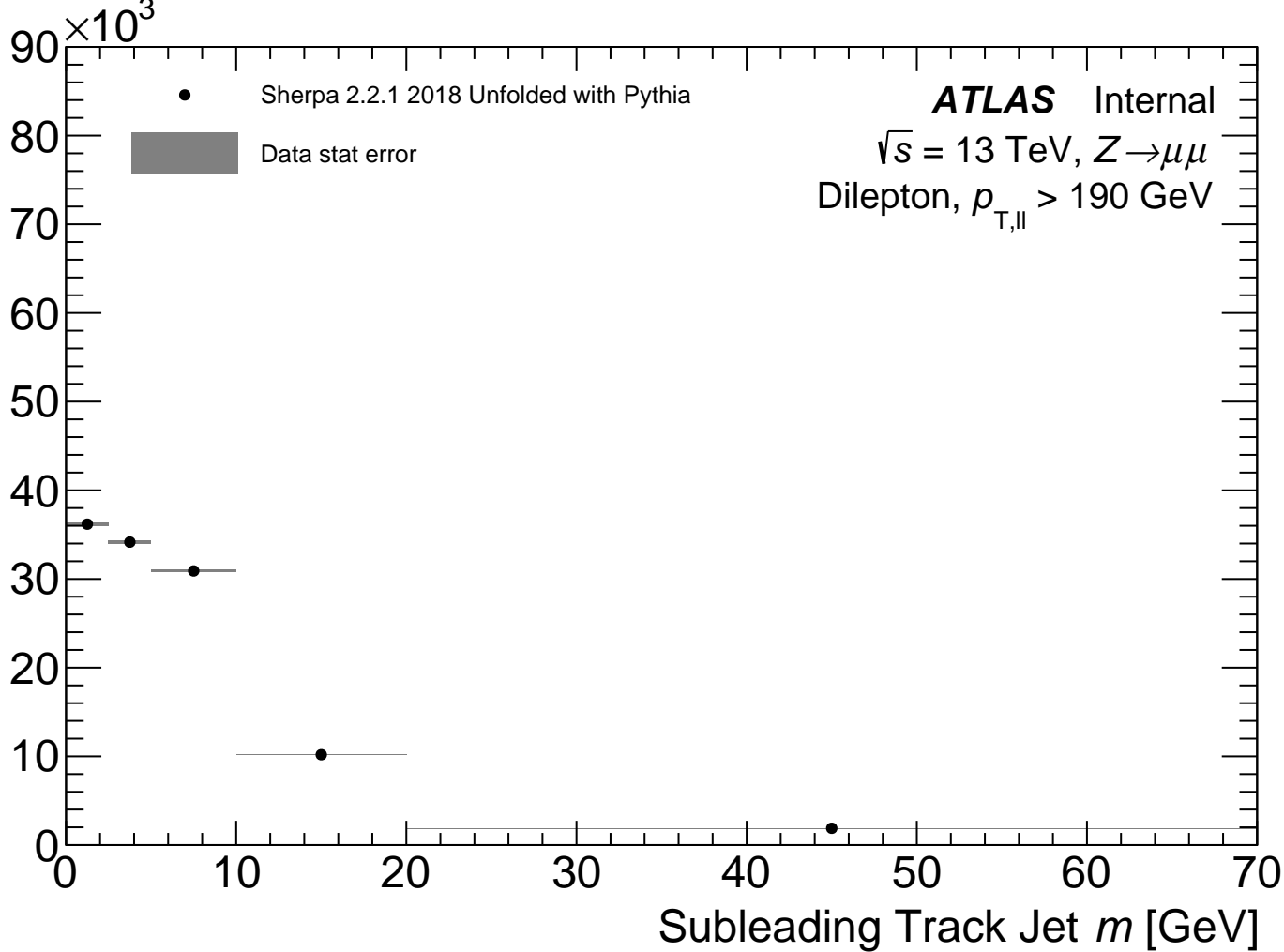
Events



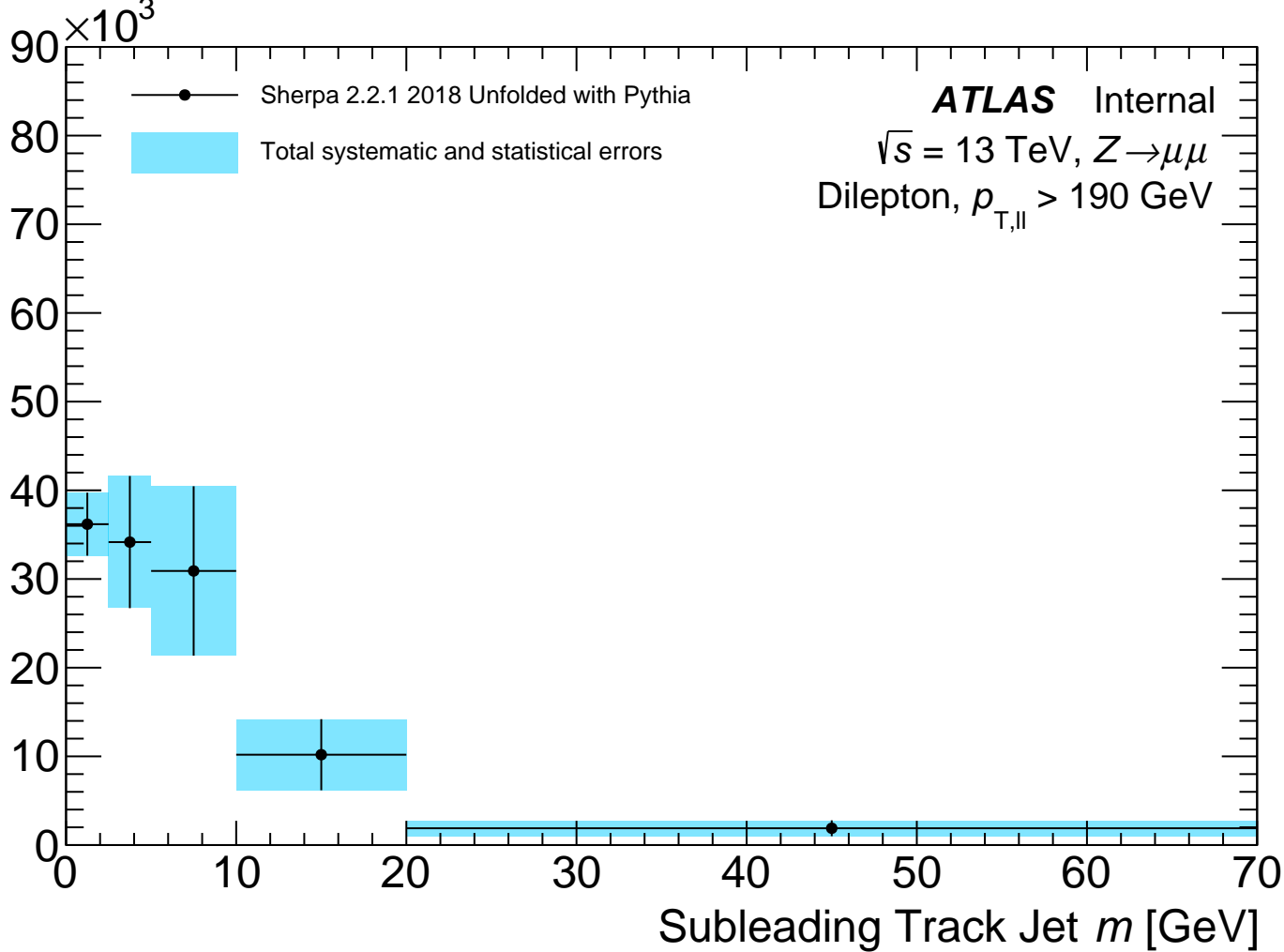
Events



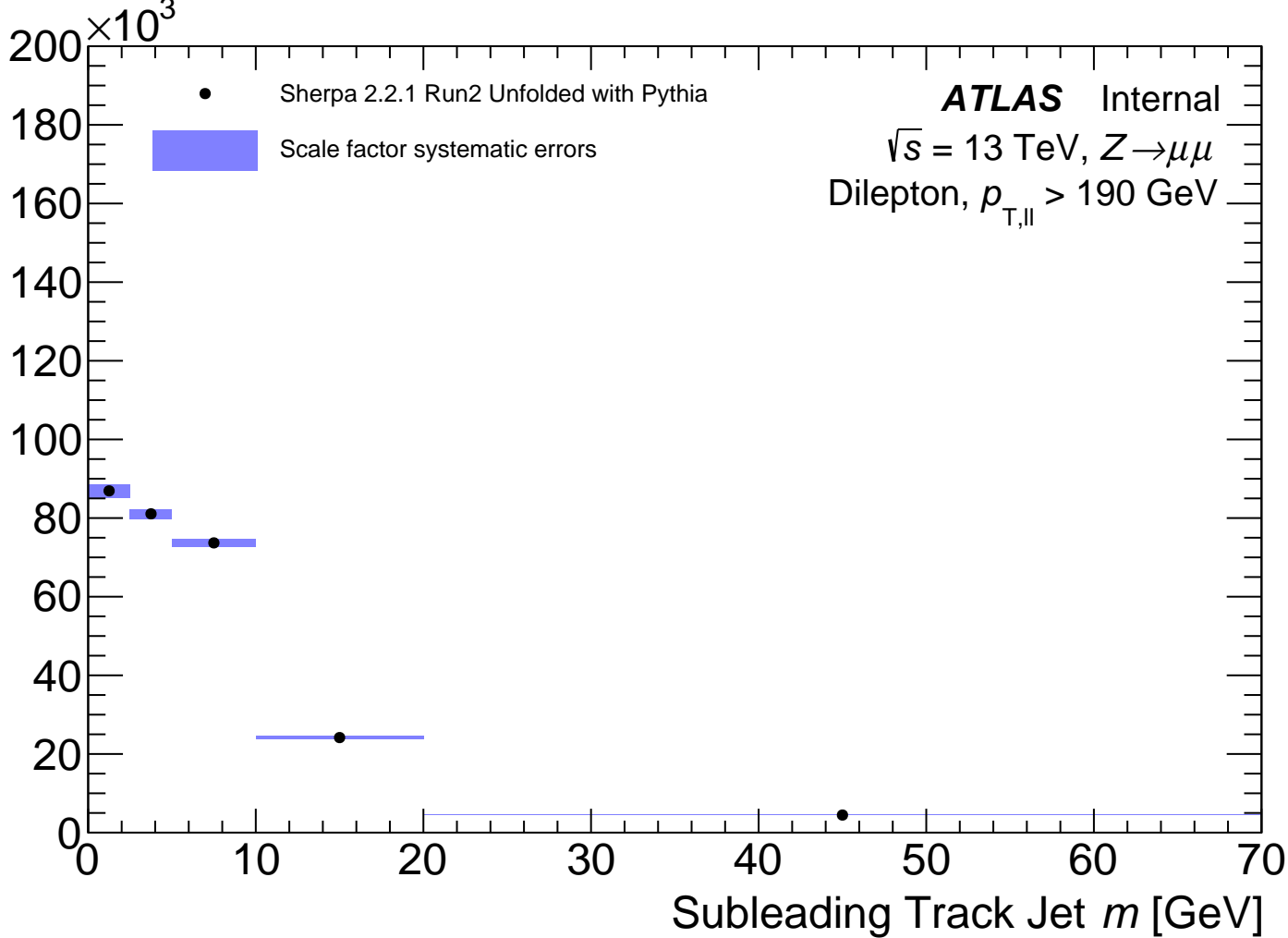
Events



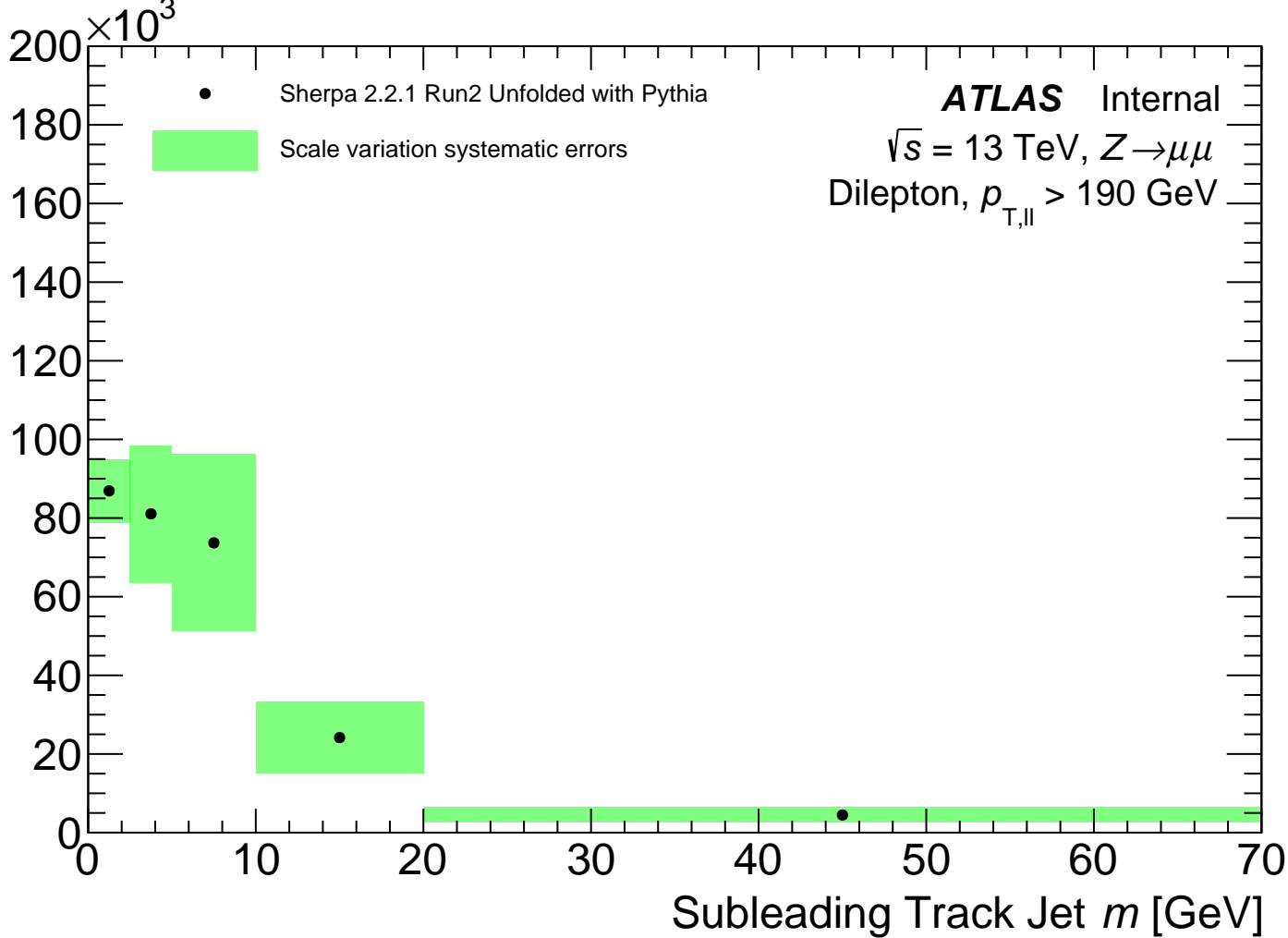
Events



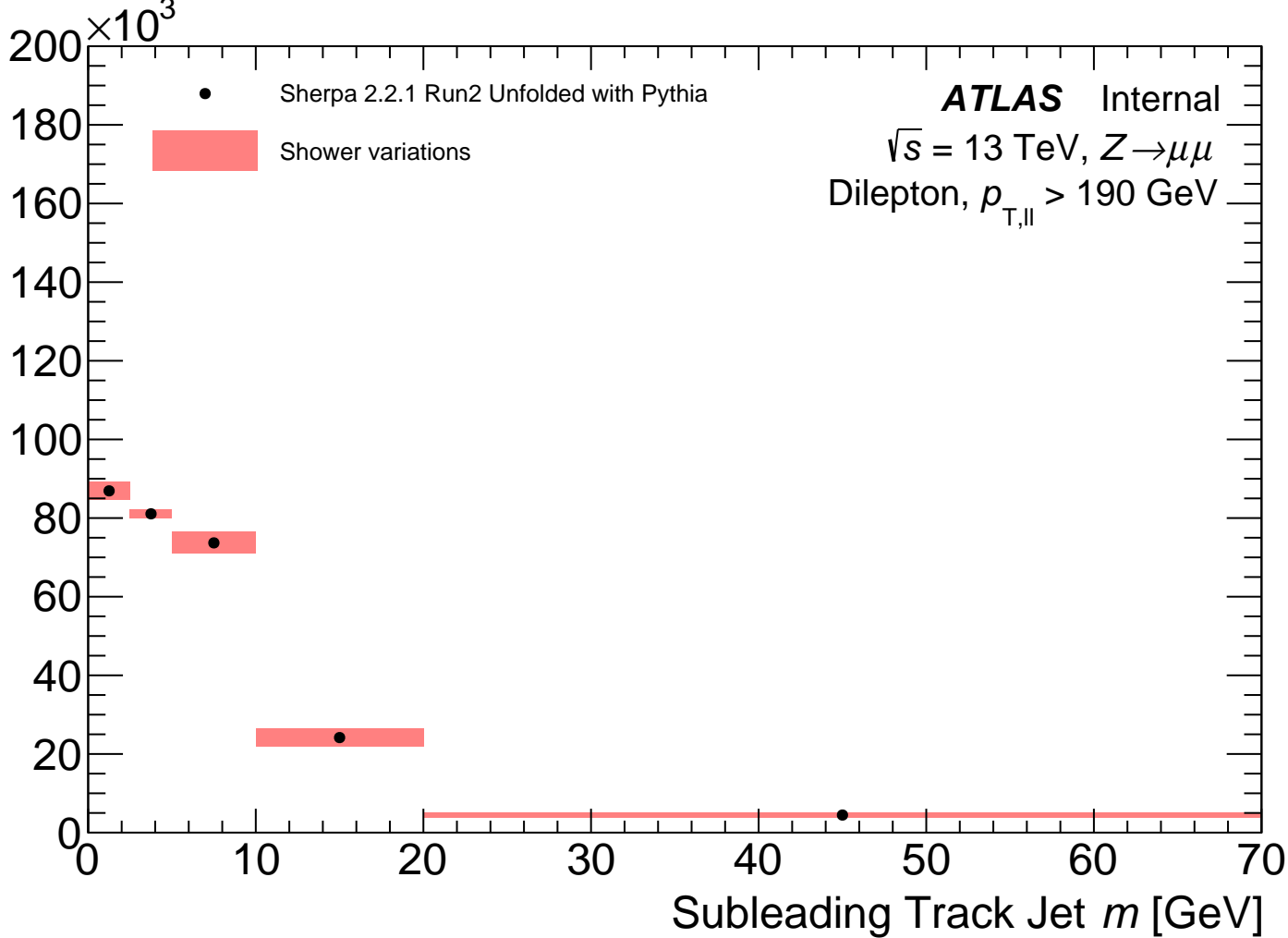
Events



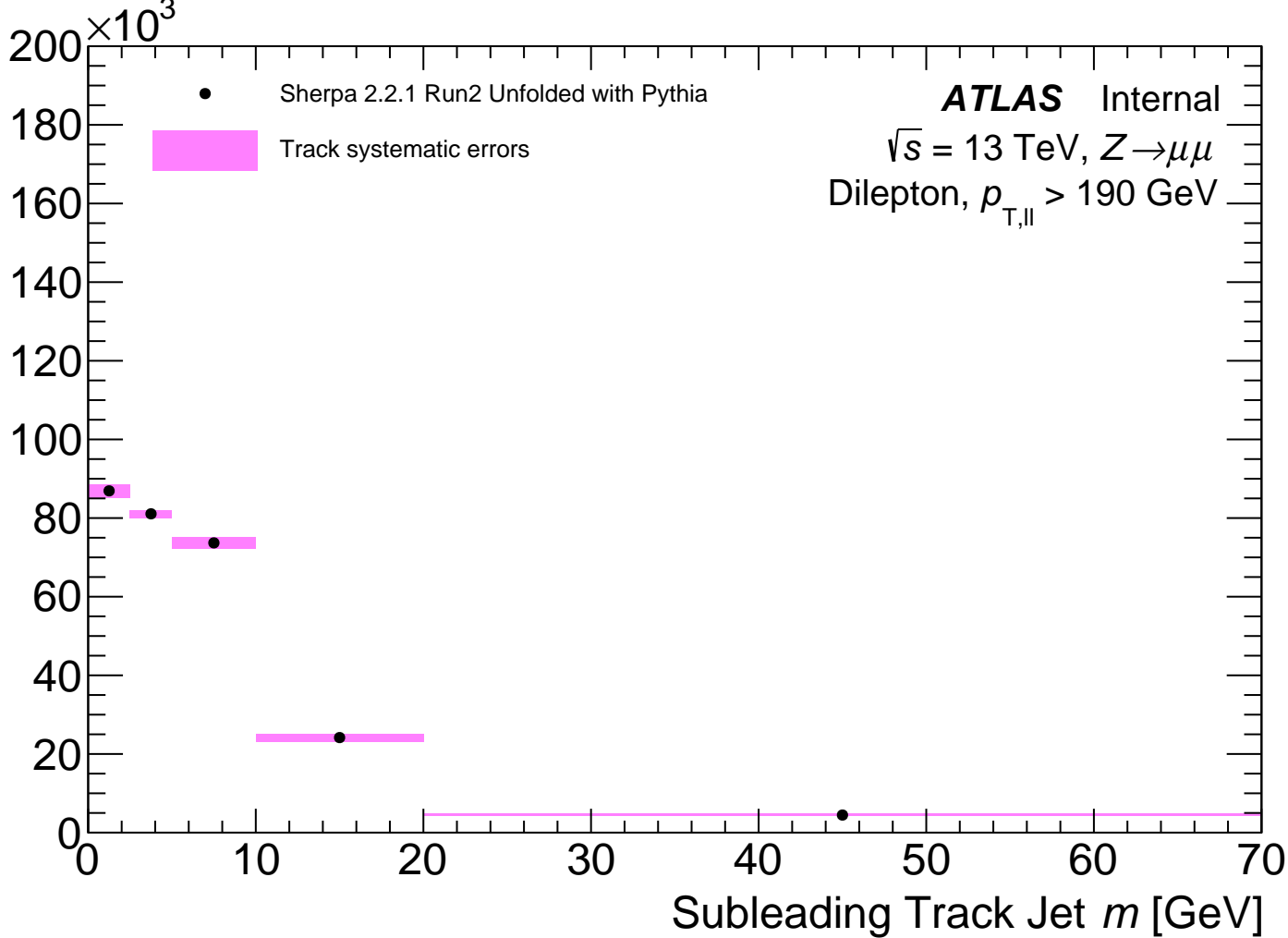
Events



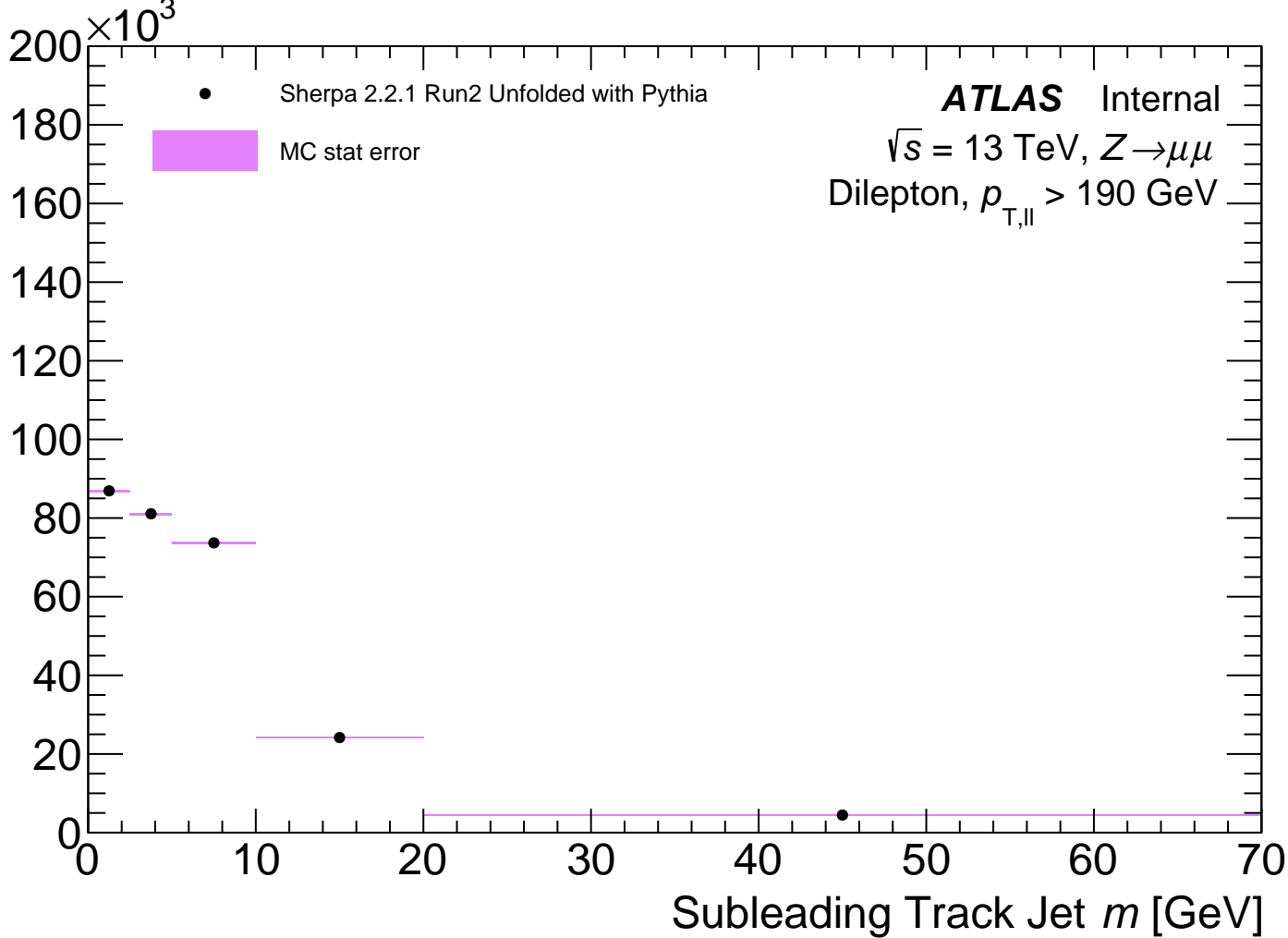
Events

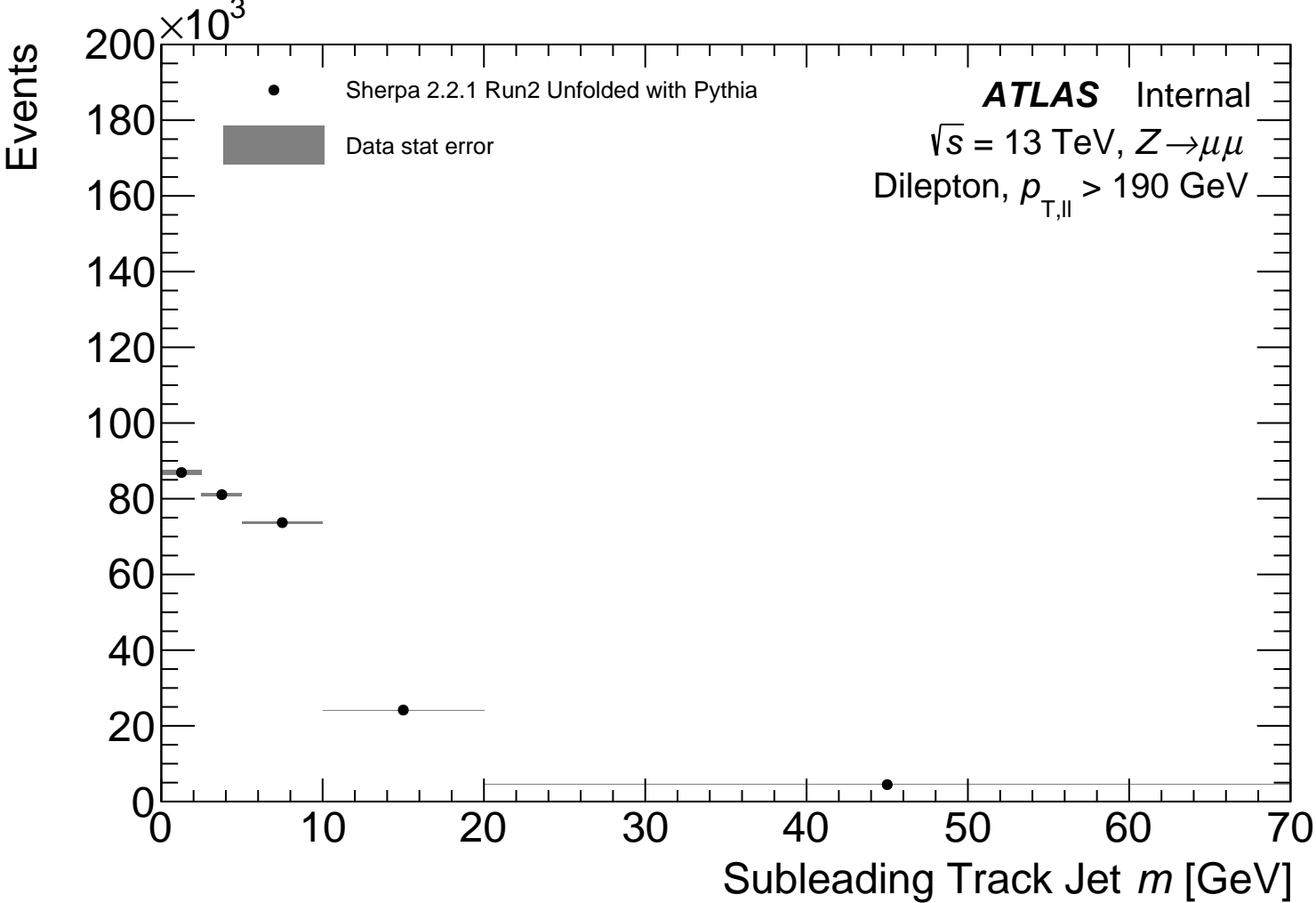


Events

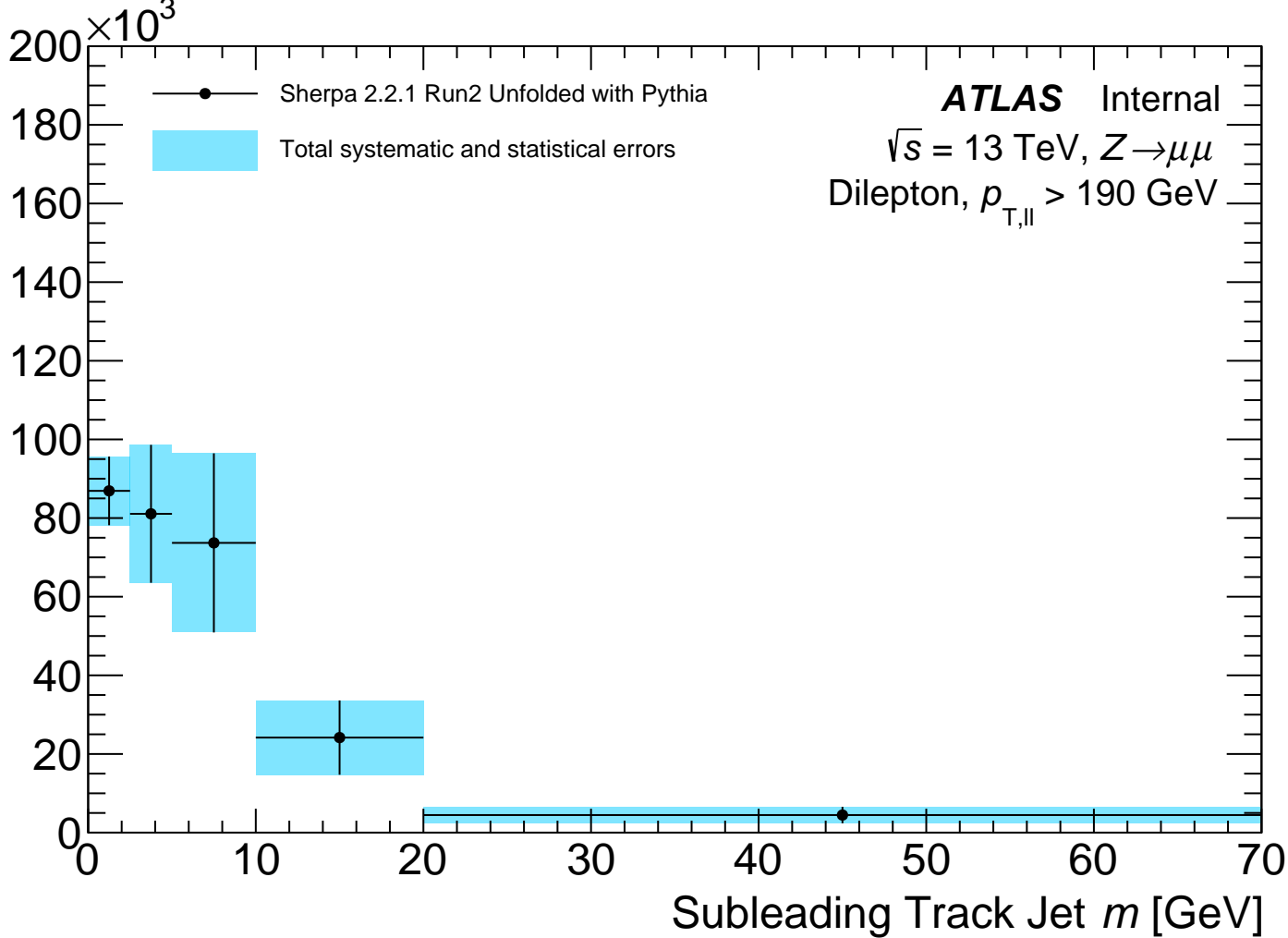


Events





Events



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

0

0.1

0.2

0.3

0.4

0.5

0.6

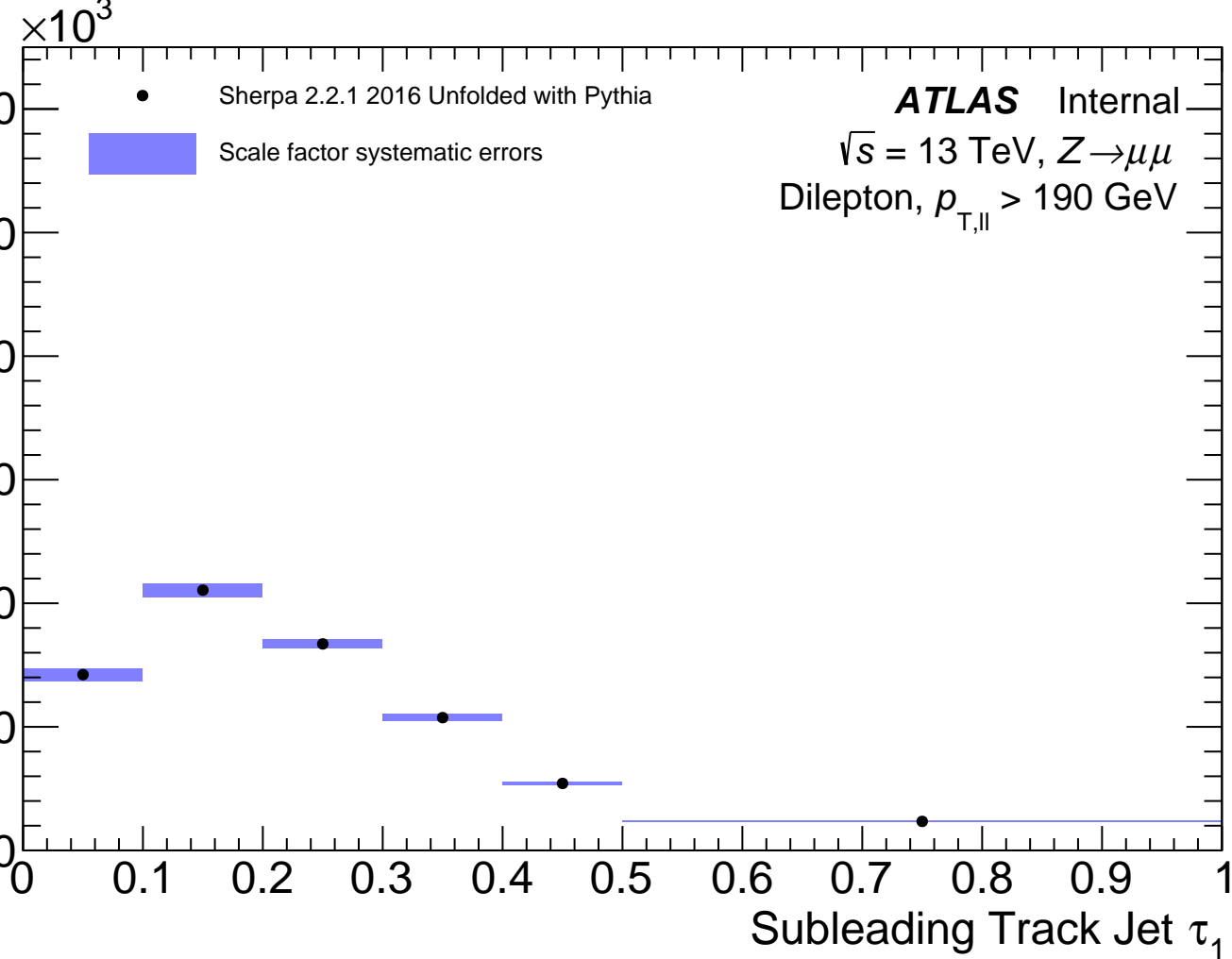
0.7

0.8

0.9

1

Subleading Track Jet τ_1



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Scale variation systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

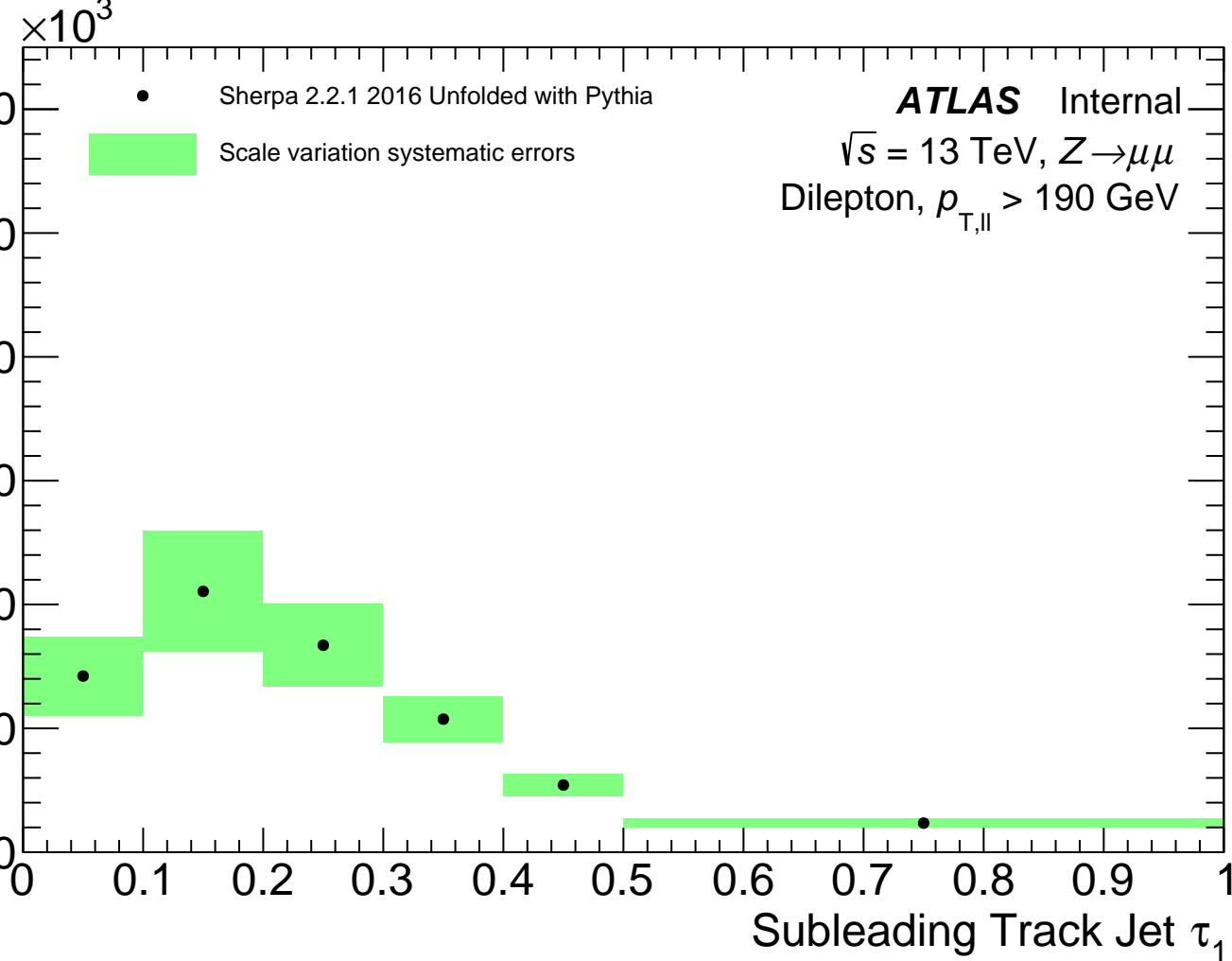
0.7

0.8

0.9

1

Subleading Track Jet τ_1



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

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



Shower variations

• Sherpa 2.2.1 2016 Unfolded with Pythia

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

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

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

Track systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

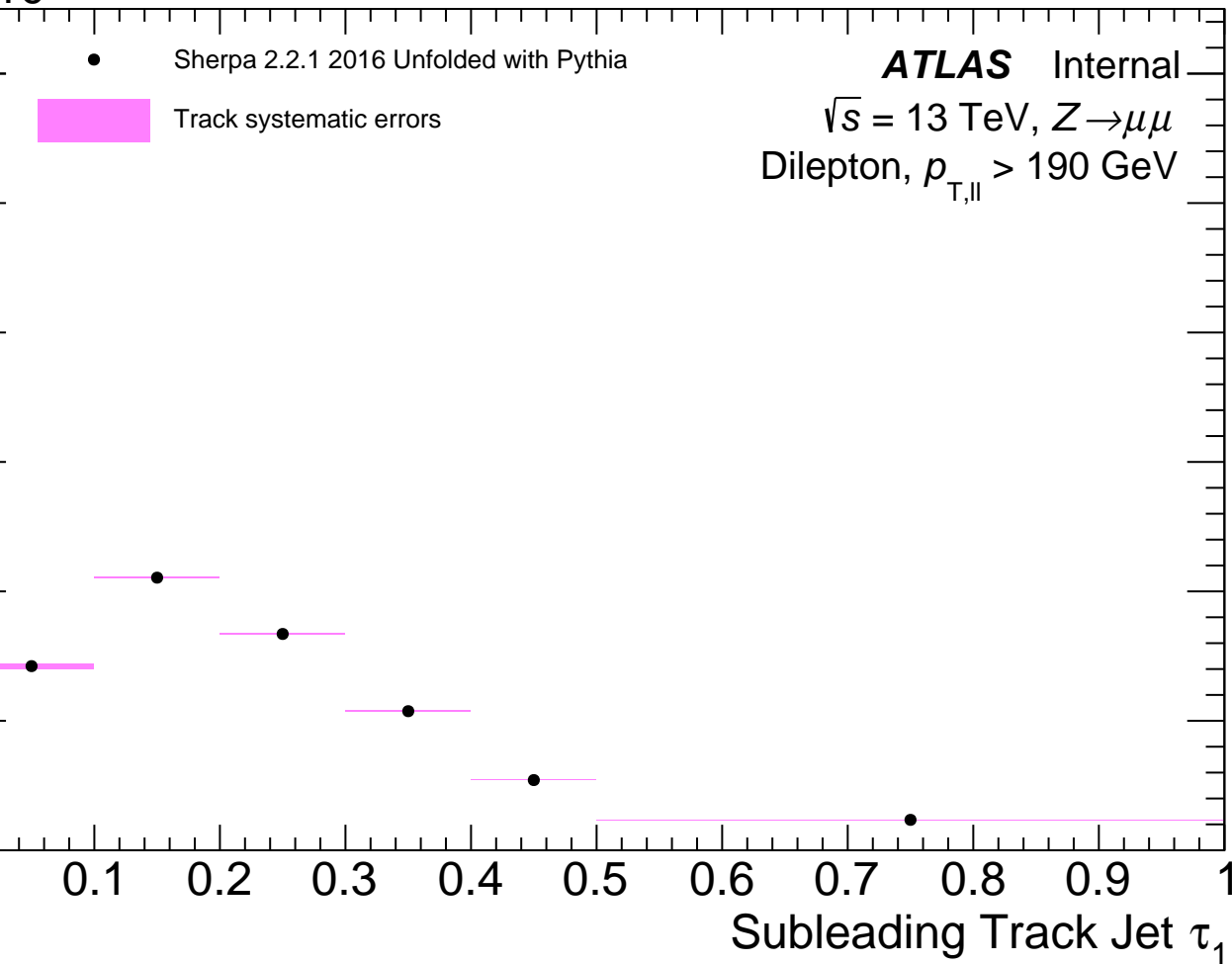
0.7

0.8

0.9

1

Subleading Track Jet τ_1



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

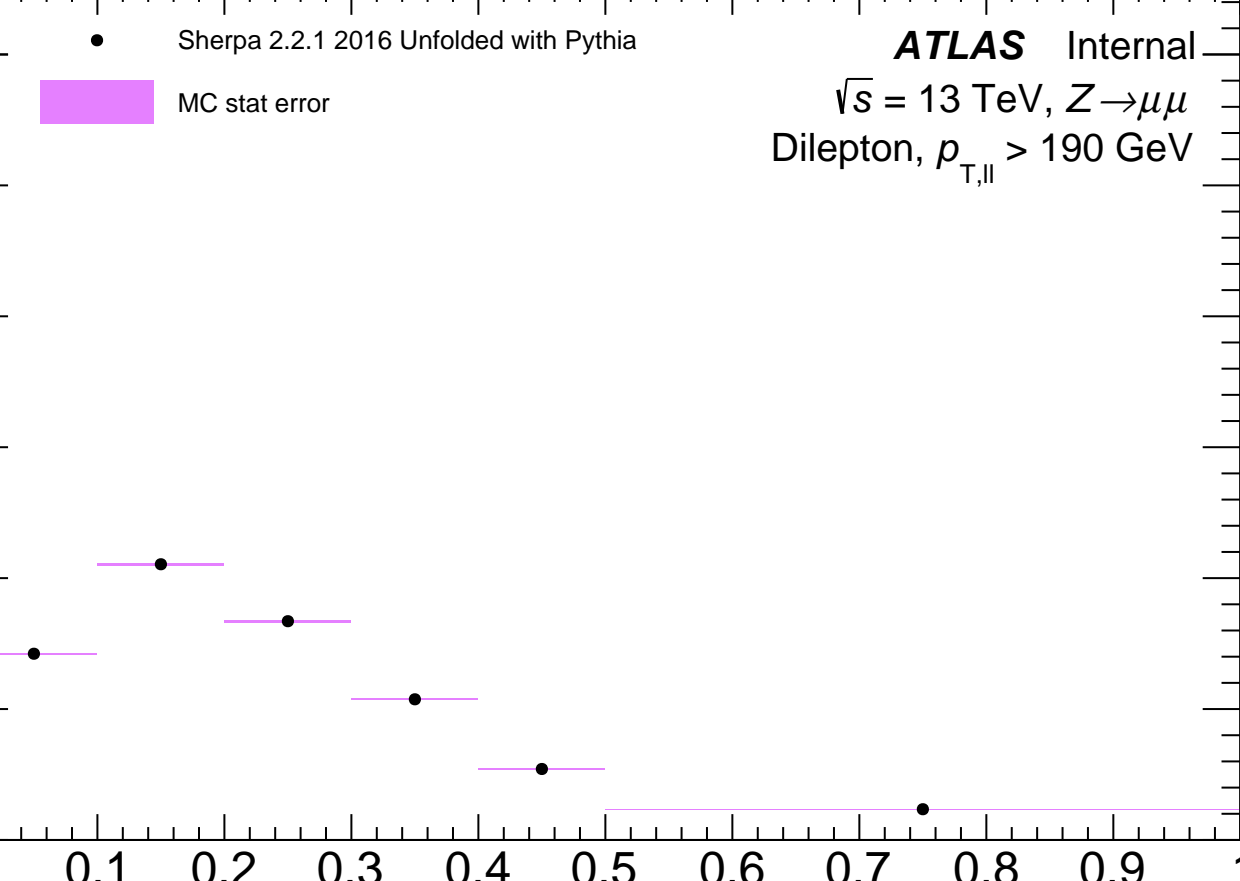
0.7

0.8

0.9

1

Subleading Track Jet τ_1



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2016 Unfolded with Pythia

■ Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

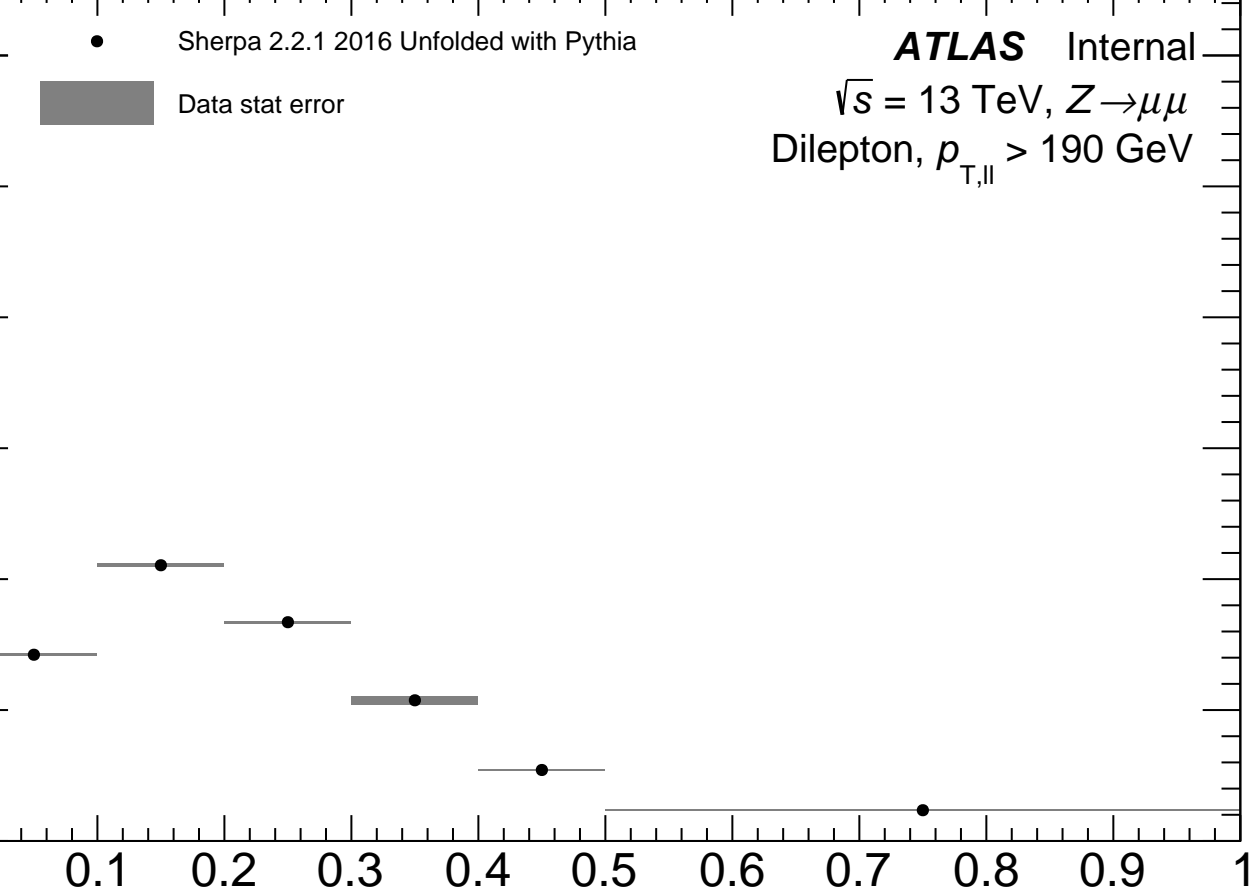
0.7

0.8

0.9

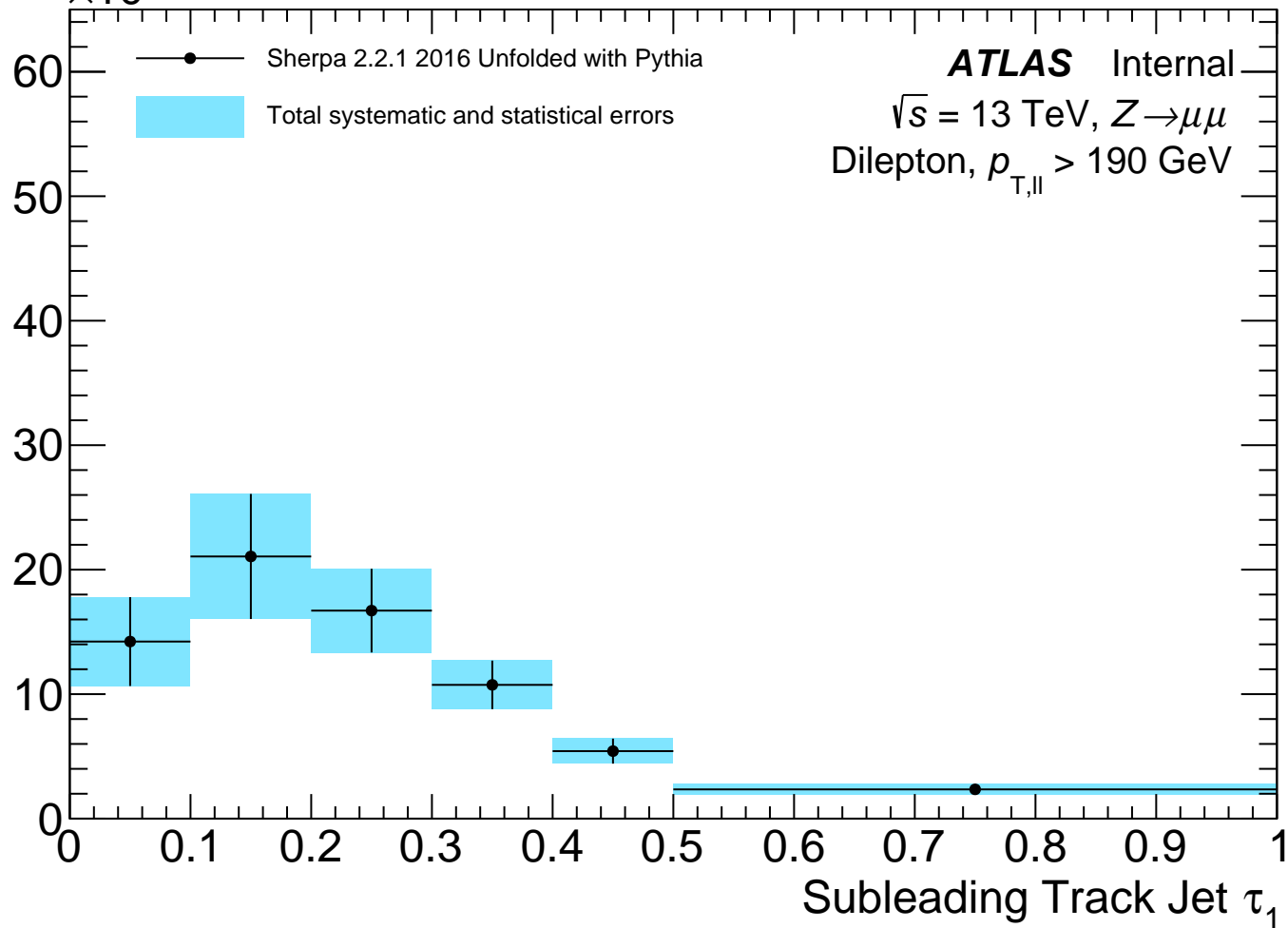
1

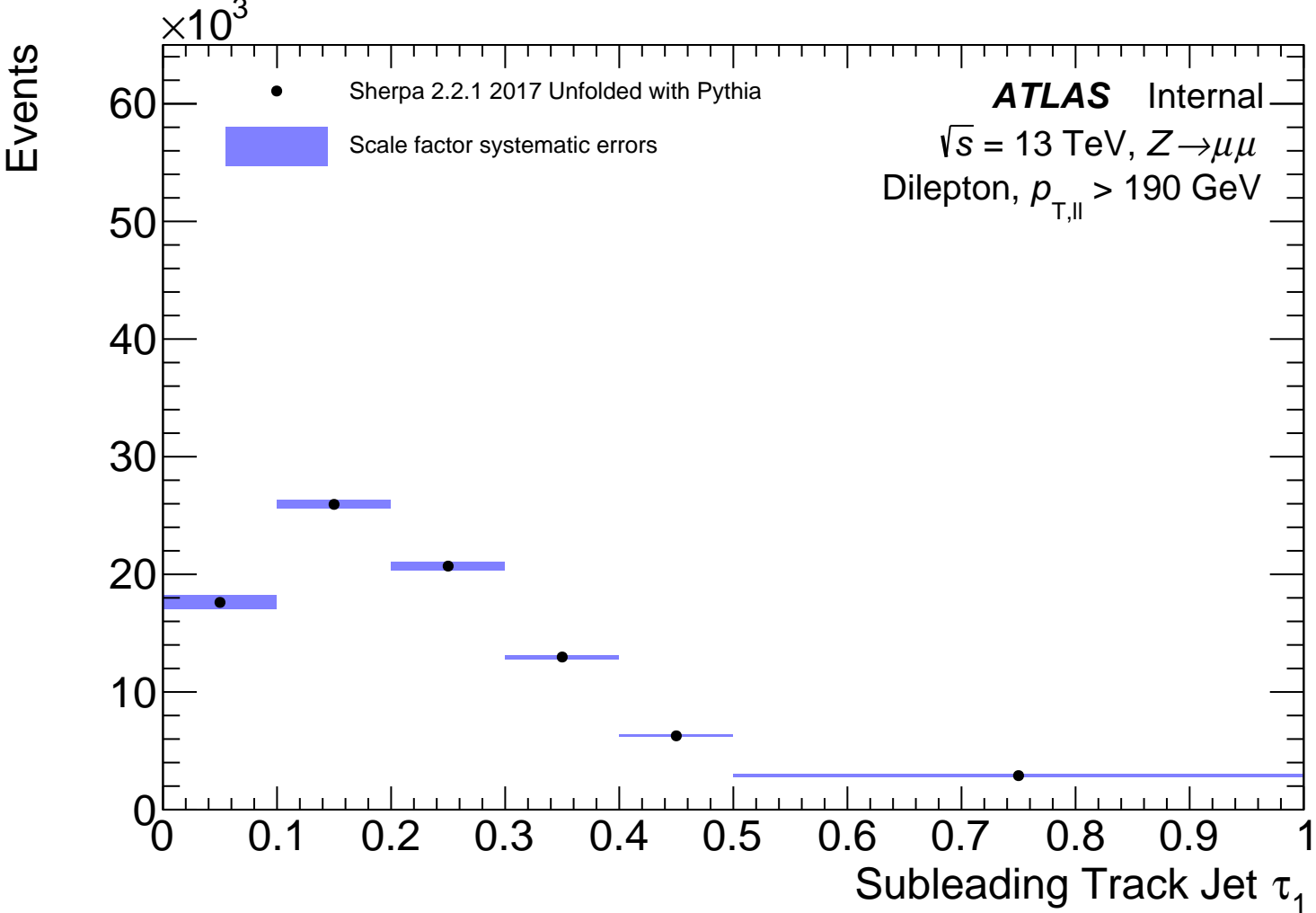
Subleading Track Jet τ_1



Events

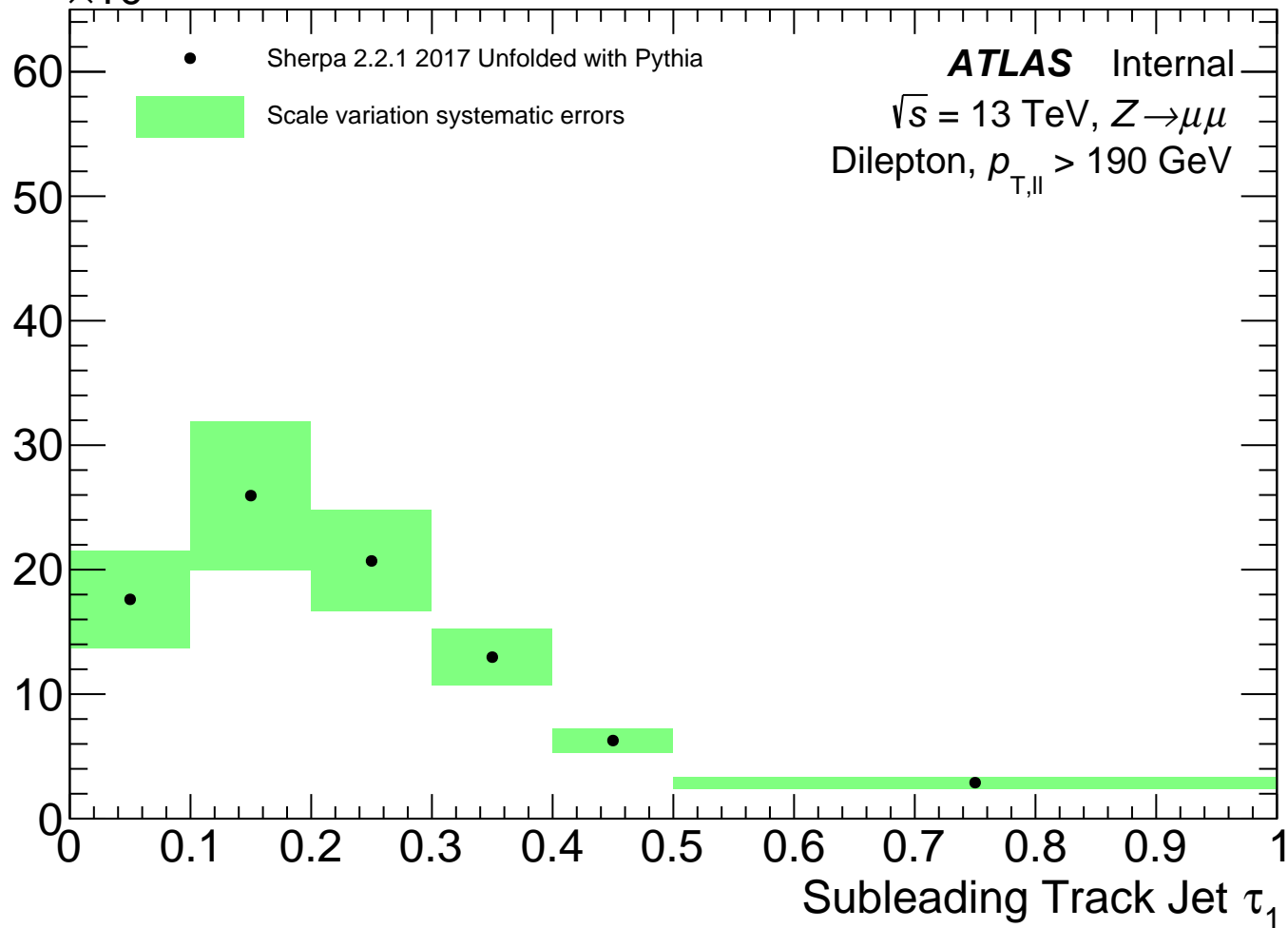
$\times 10^3$





Events

$\times 10^3$



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2017 Unfolded with Pythia

Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

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

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2017 Unfolded with Pythia

Track systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

0.7

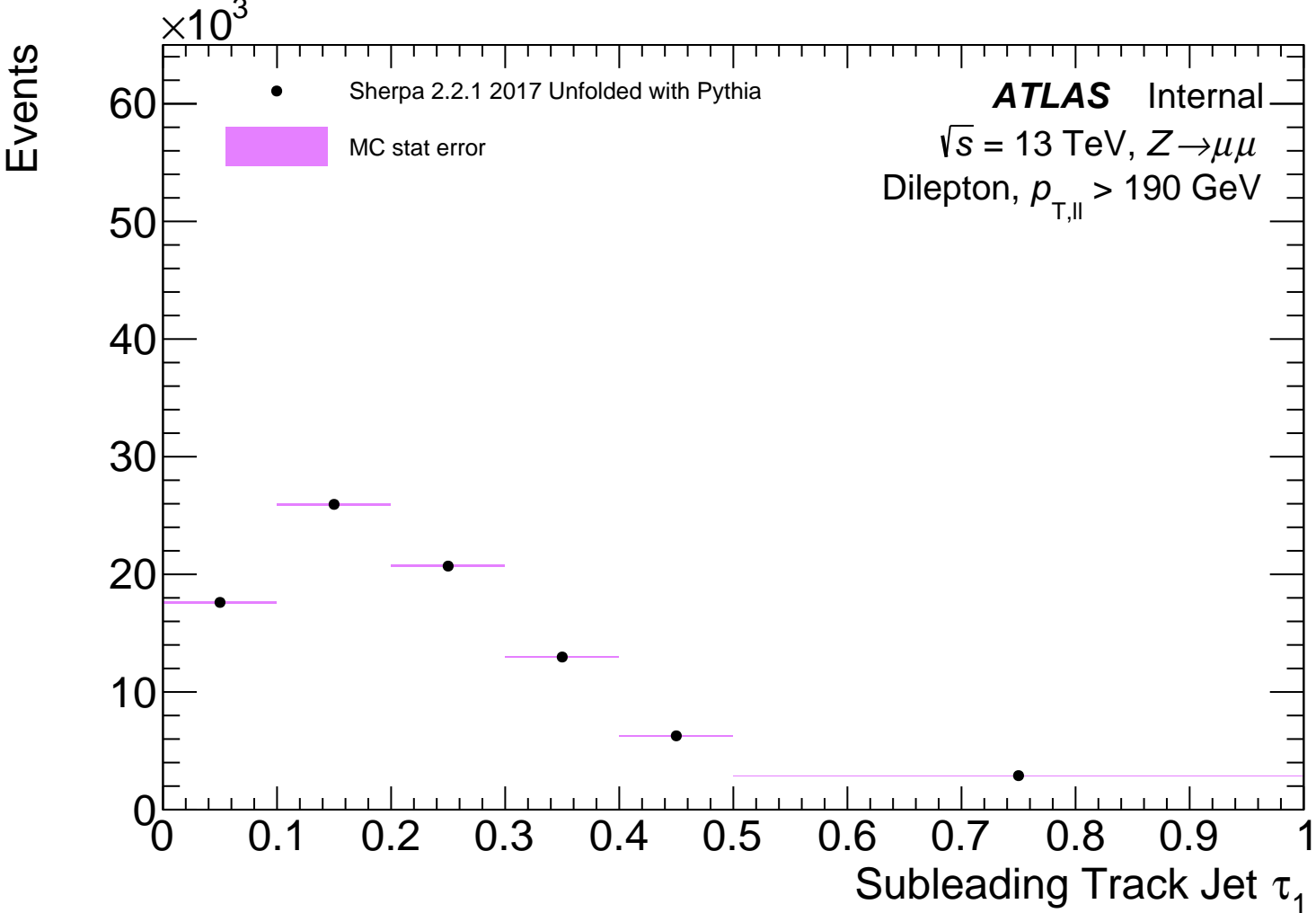
0.8

0.9

1

Subleading Track Jet τ_1





Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2017 Unfolded with Pythia

■ Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

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

$\times 10^3$

60

50

40

30

20

10

0



Sherpa 2.2.1 2017 Unfolded with Pythia



Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

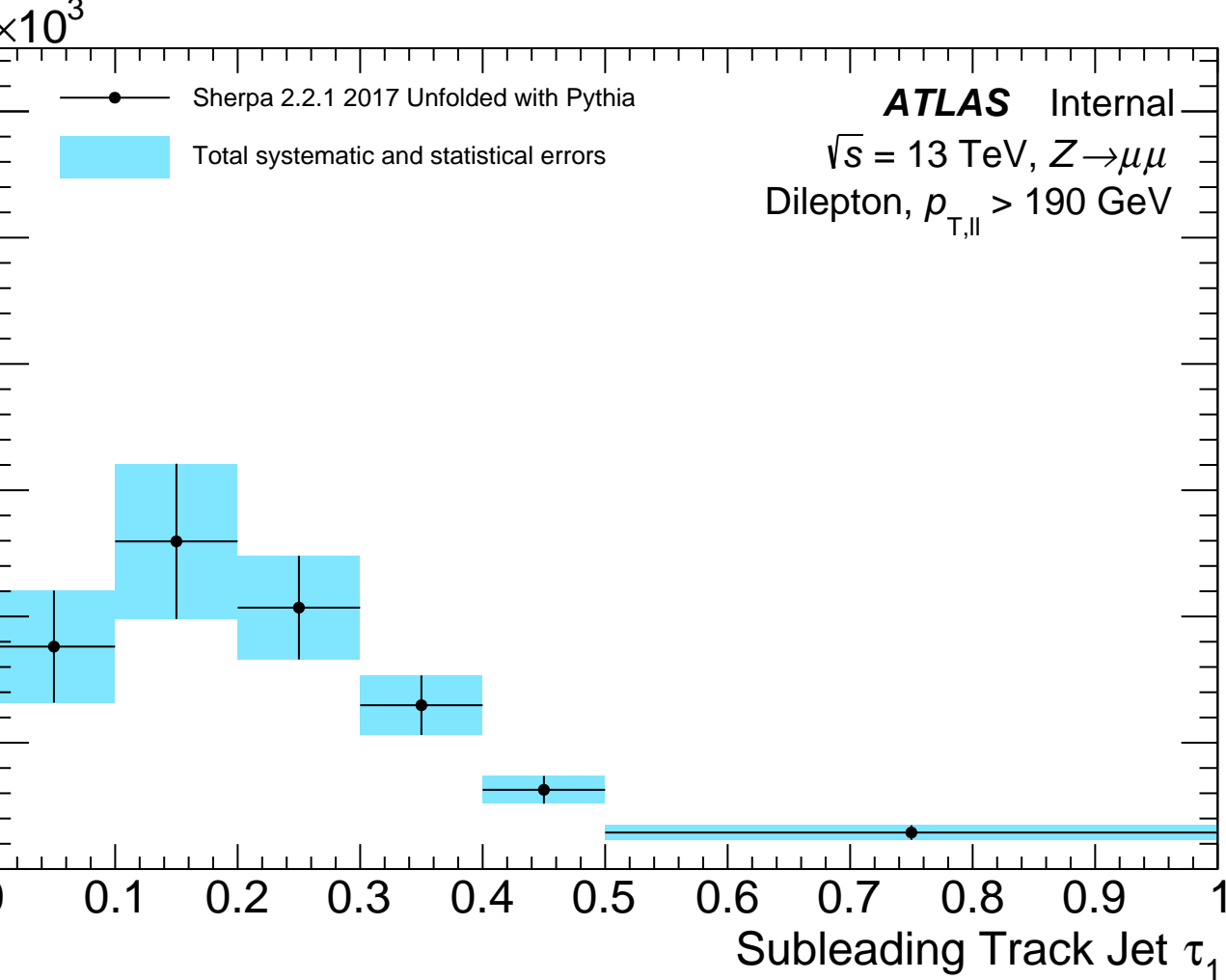
0.7

0.8

0.9

1

Subleading Track Jet τ_1



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2018 Unfolded with Pythia

■ Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

0

0.1

0.2

0.3

0.4

0.5

0.6

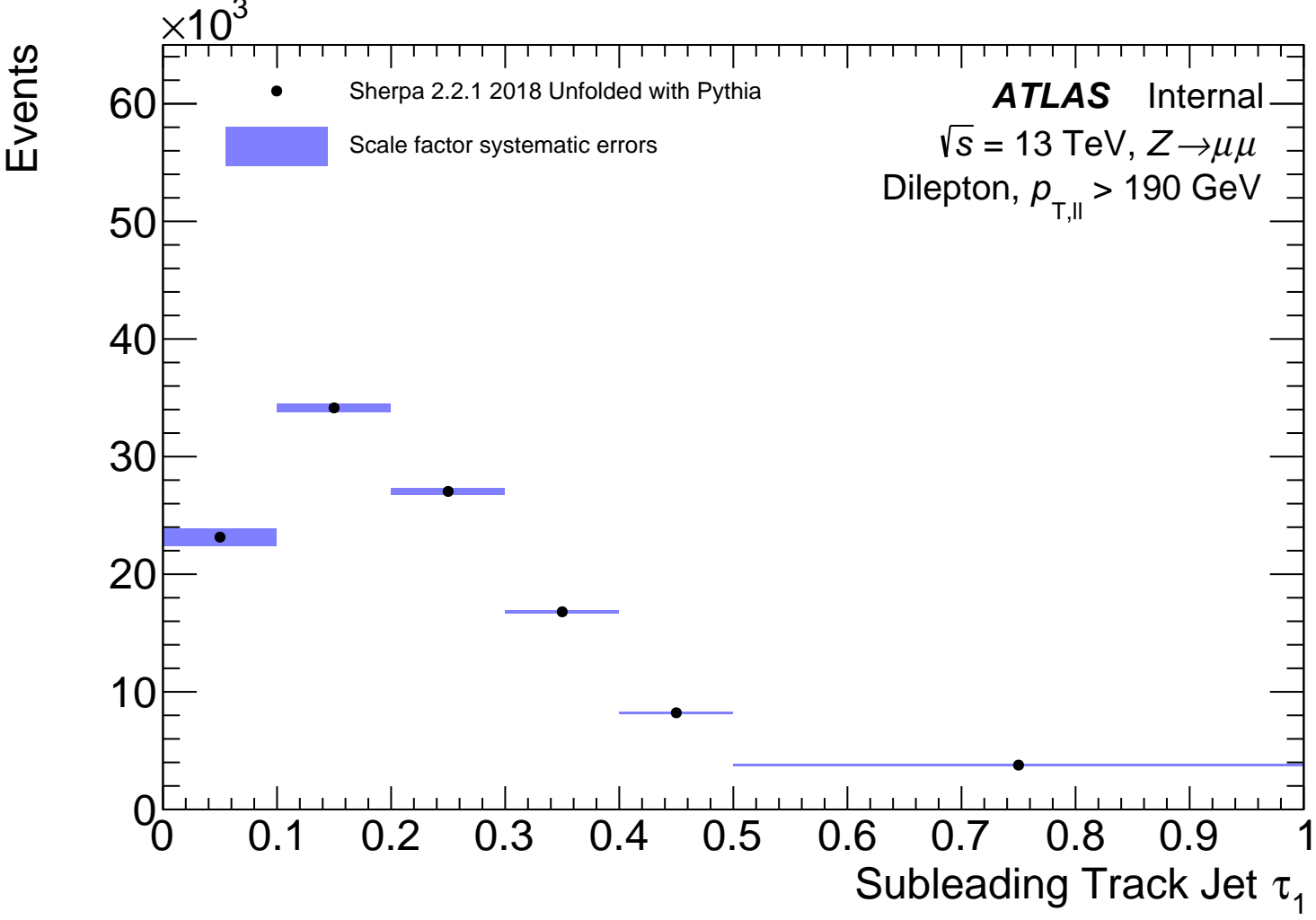
0.7

0.8

0.9

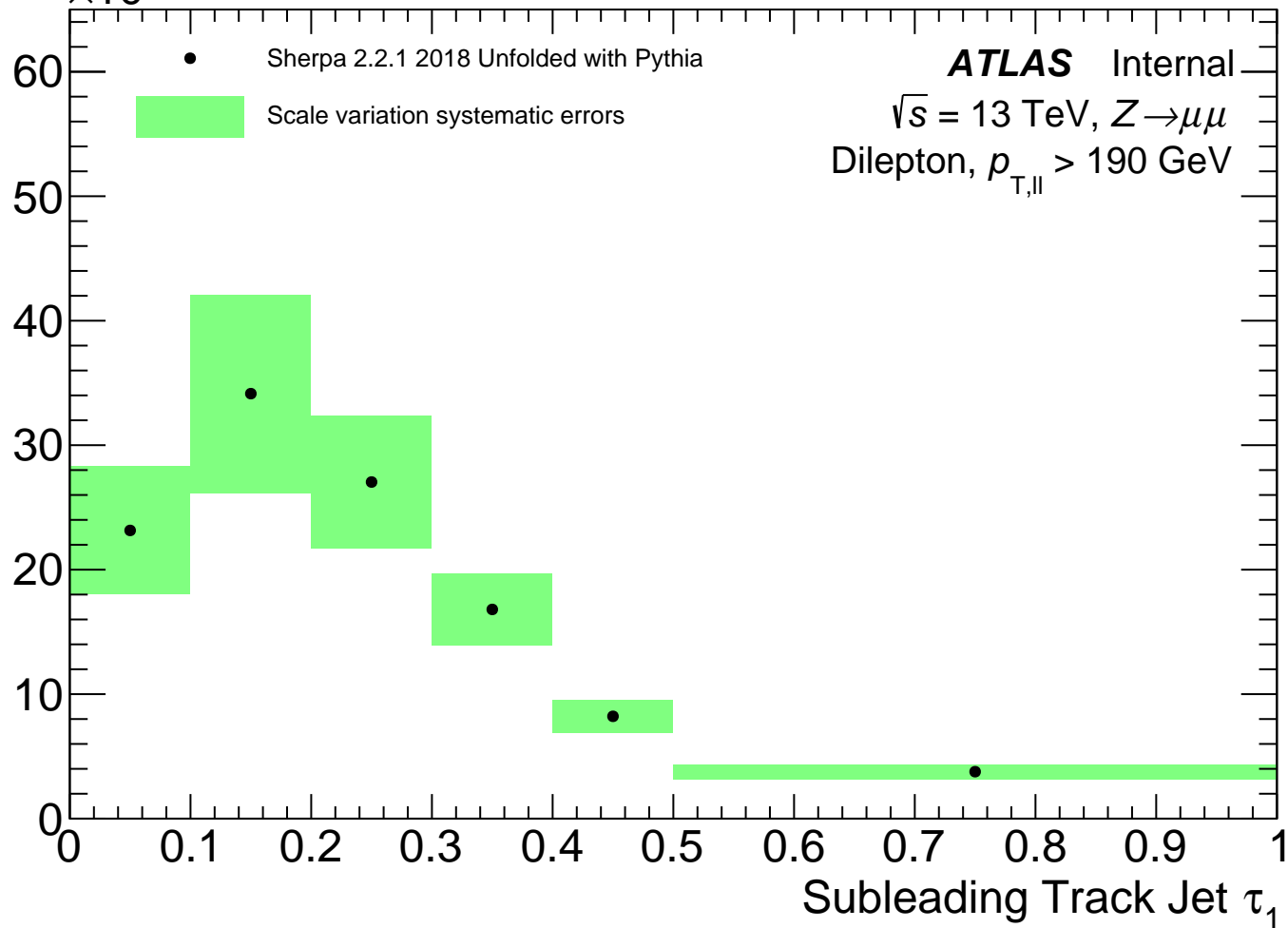
1

Subleading Track Jet τ_1



Events

$\times 10^3$



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, $p_{T,\text{ll}} > 190$ GeV

Subleading Track Jet τ_1



Events

$\times 10^3$

60

50

40

30

20

10

0

• Sherpa 2.2.1 2018 Unfolded with Pythia

■ Track systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

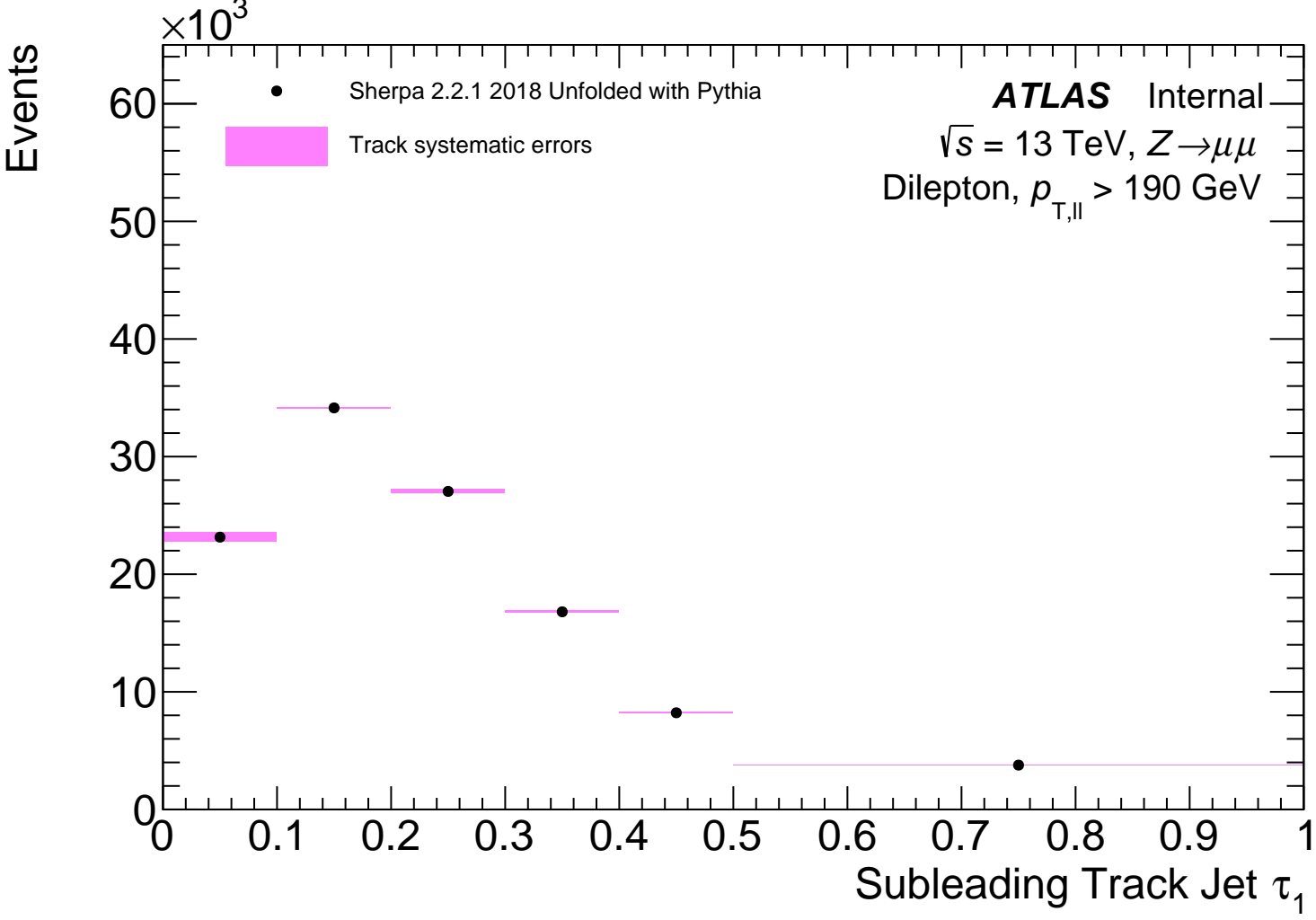
0.7

0.8

0.9

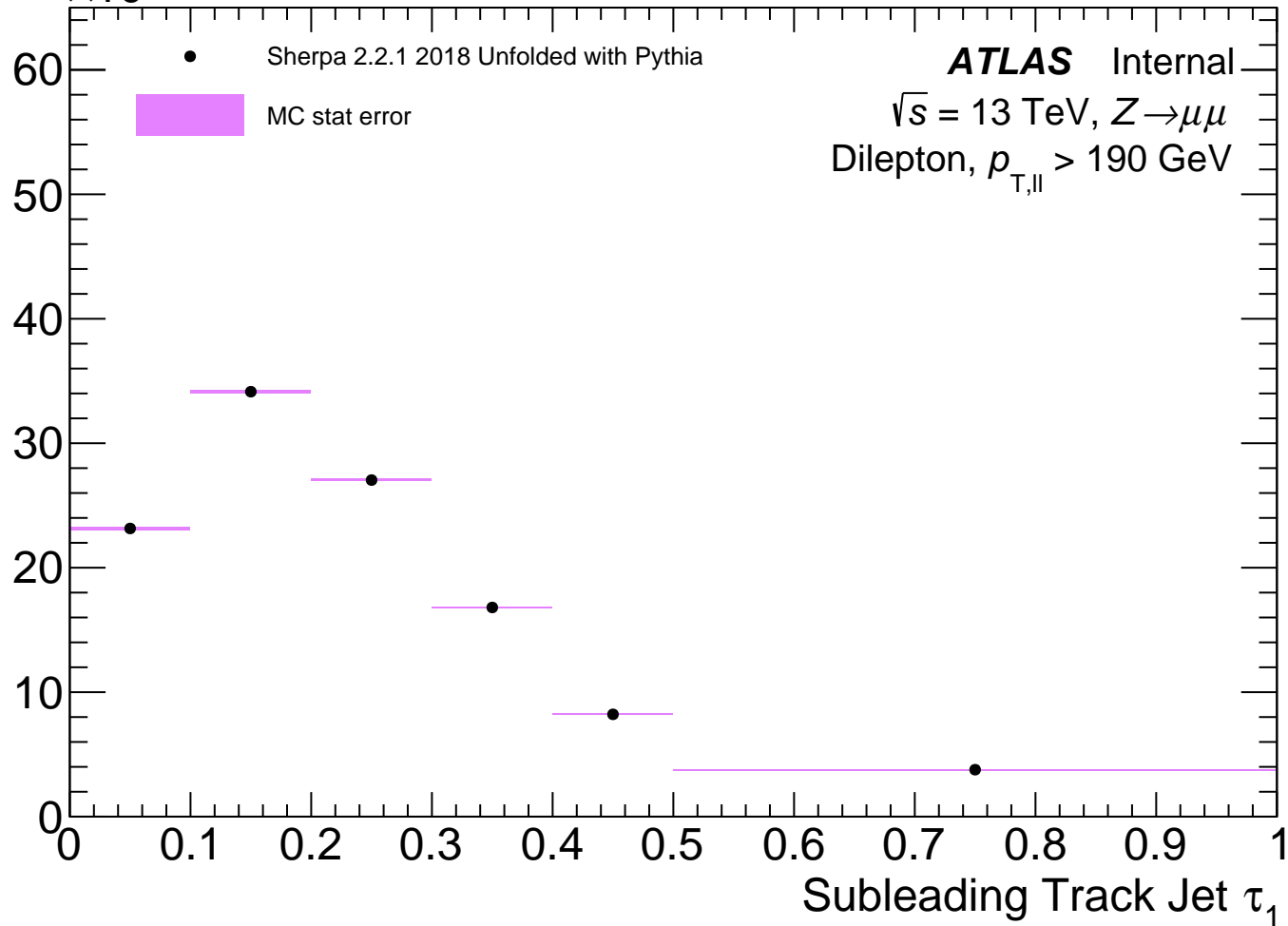
1

Subleading Track Jet τ_1



Events

$\times 10^3$



Events

$\times 10^3$

60

50

40

30

20

10

0

•

Sherpa 2.2.1 2018 Unfolded with Pythia



Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

0.1

0.2

0.3

0.4

0.5

0.6

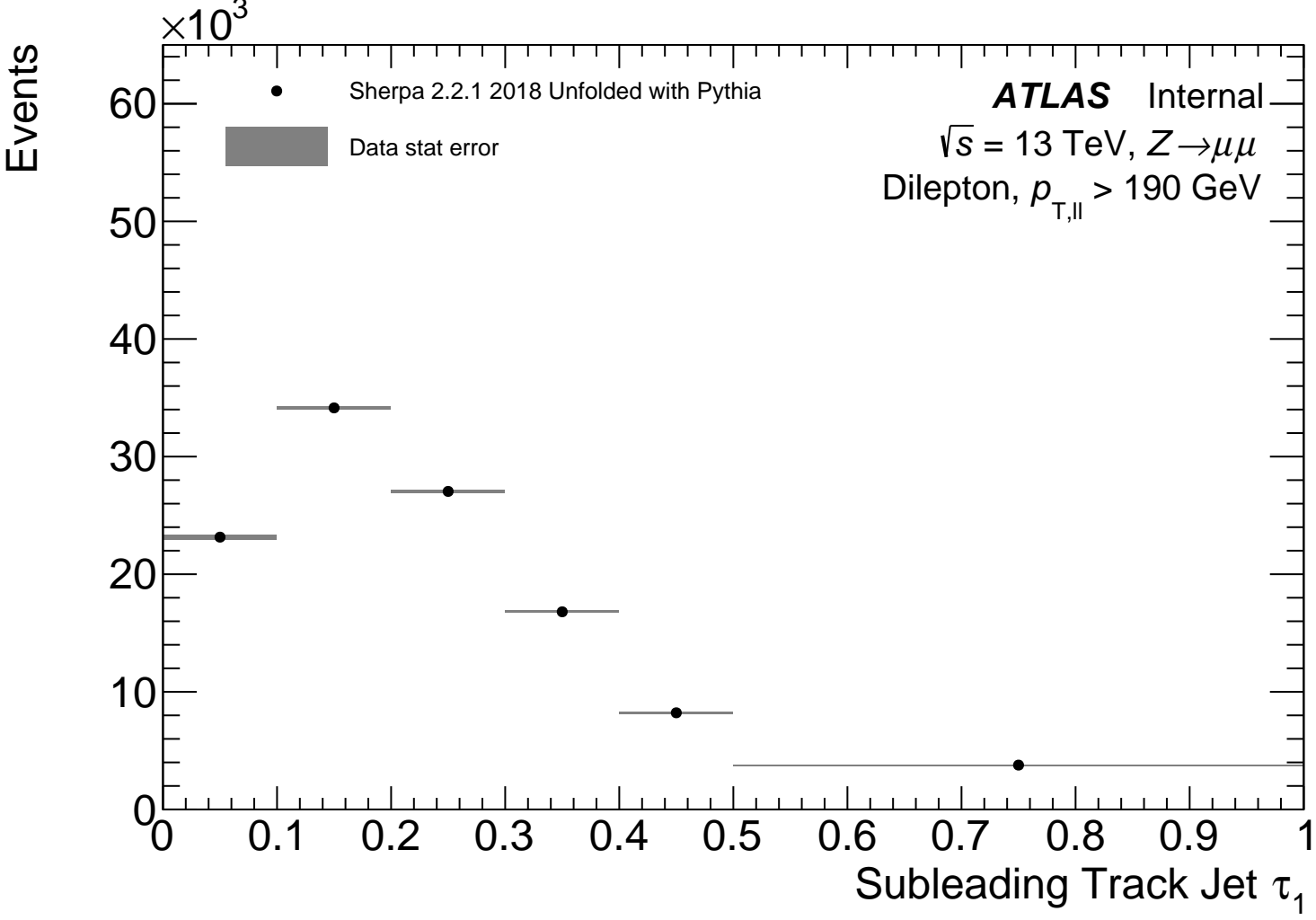
0.7

0.8

0.9

1

Subleading Track Jet τ_1



Events

$\times 10^3$

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, $p_{T,\text{ll}} > 190$ GeV

0

0.1

0.2

0.3

0.4

0.5

0.6

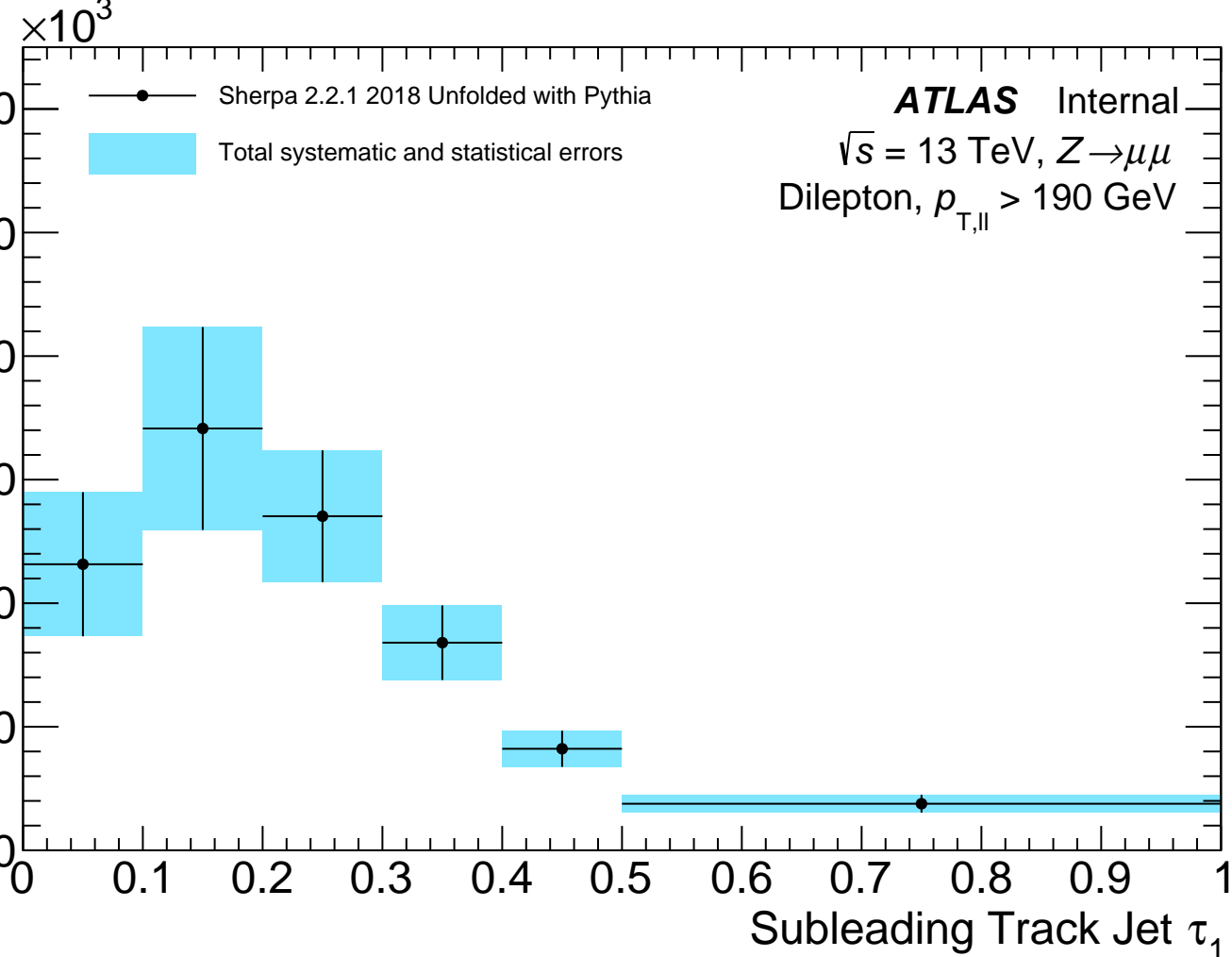
0.7

0.8

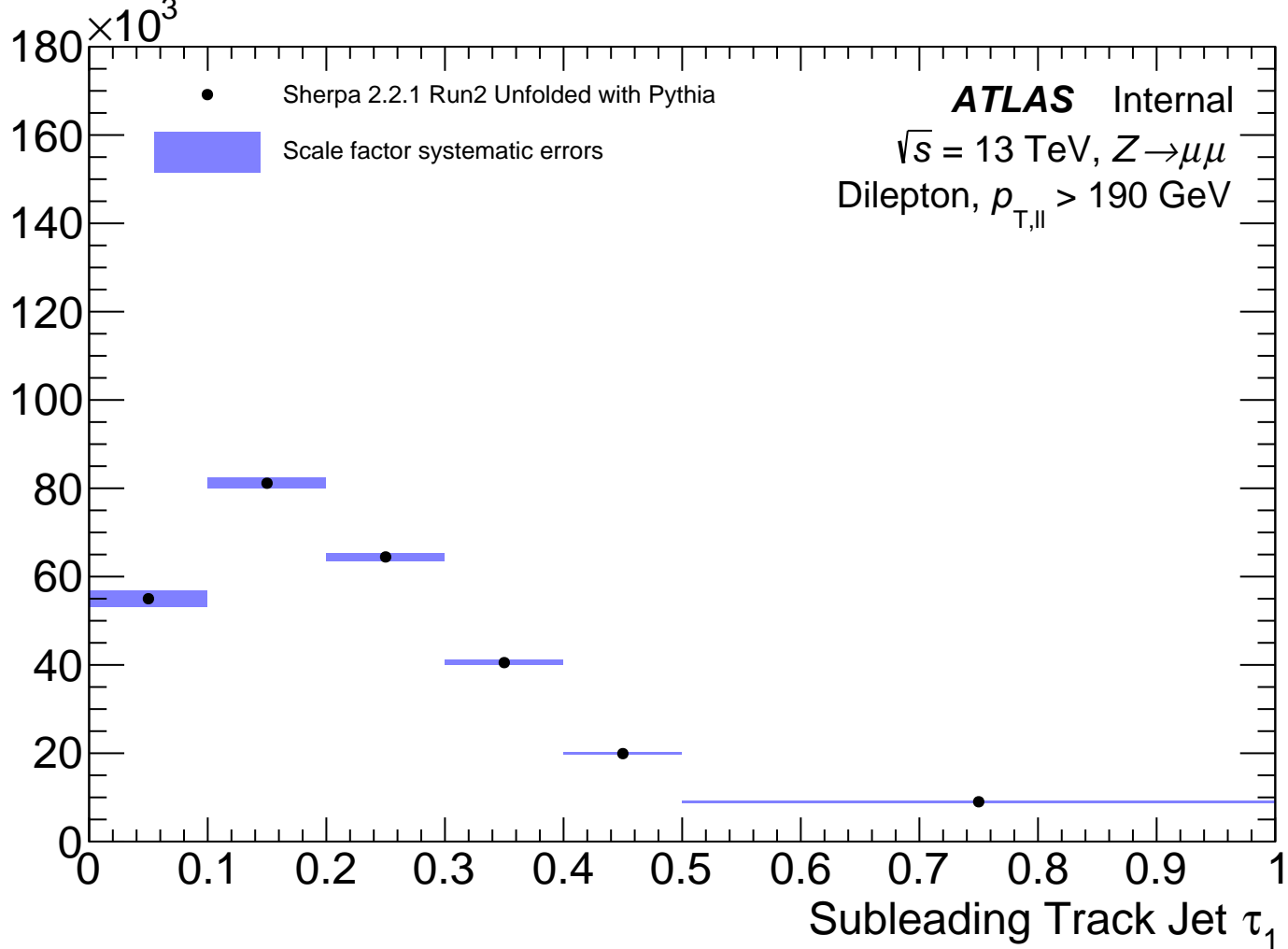
0.9

1

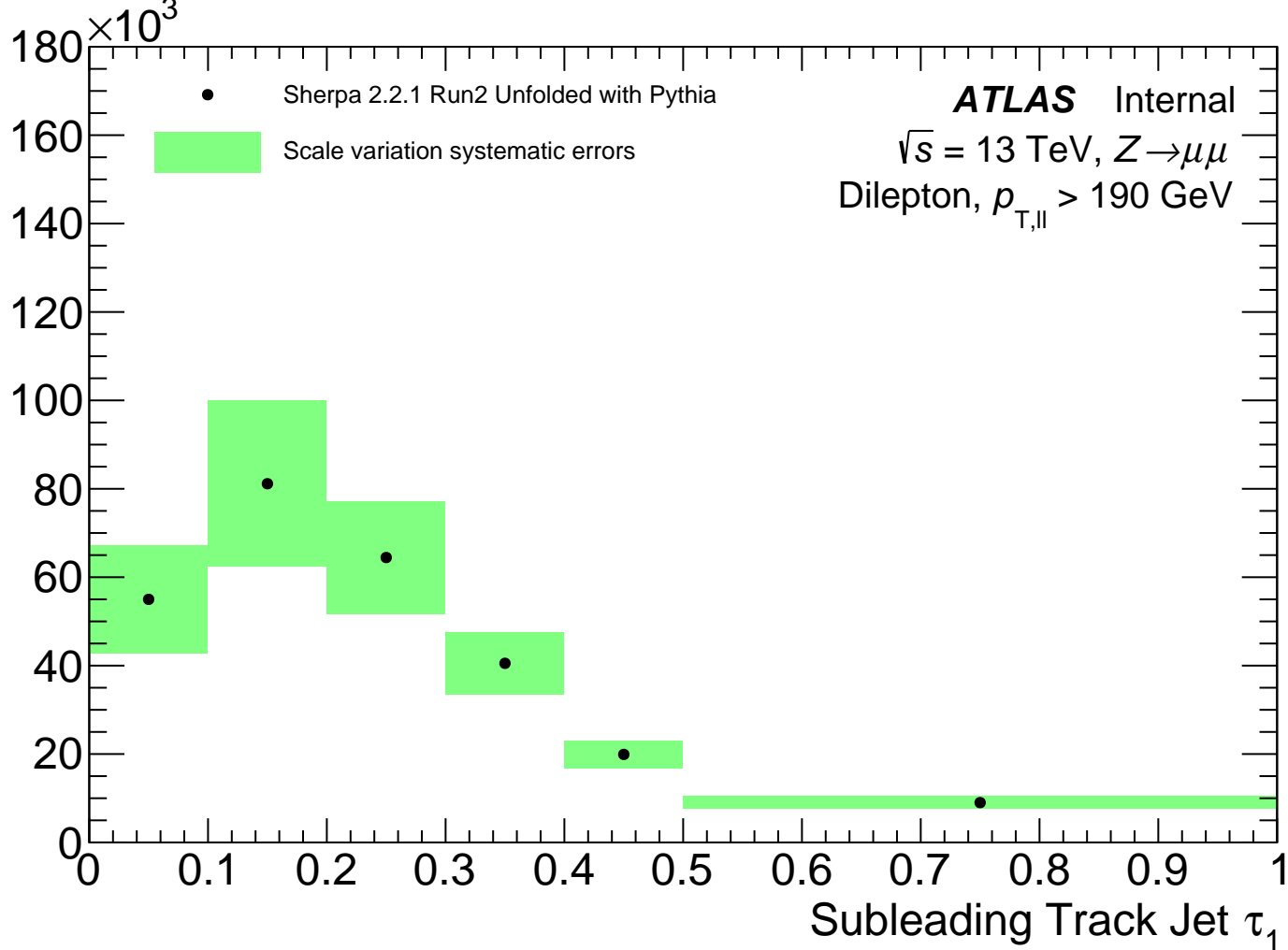
Subleading Track Jet τ_1

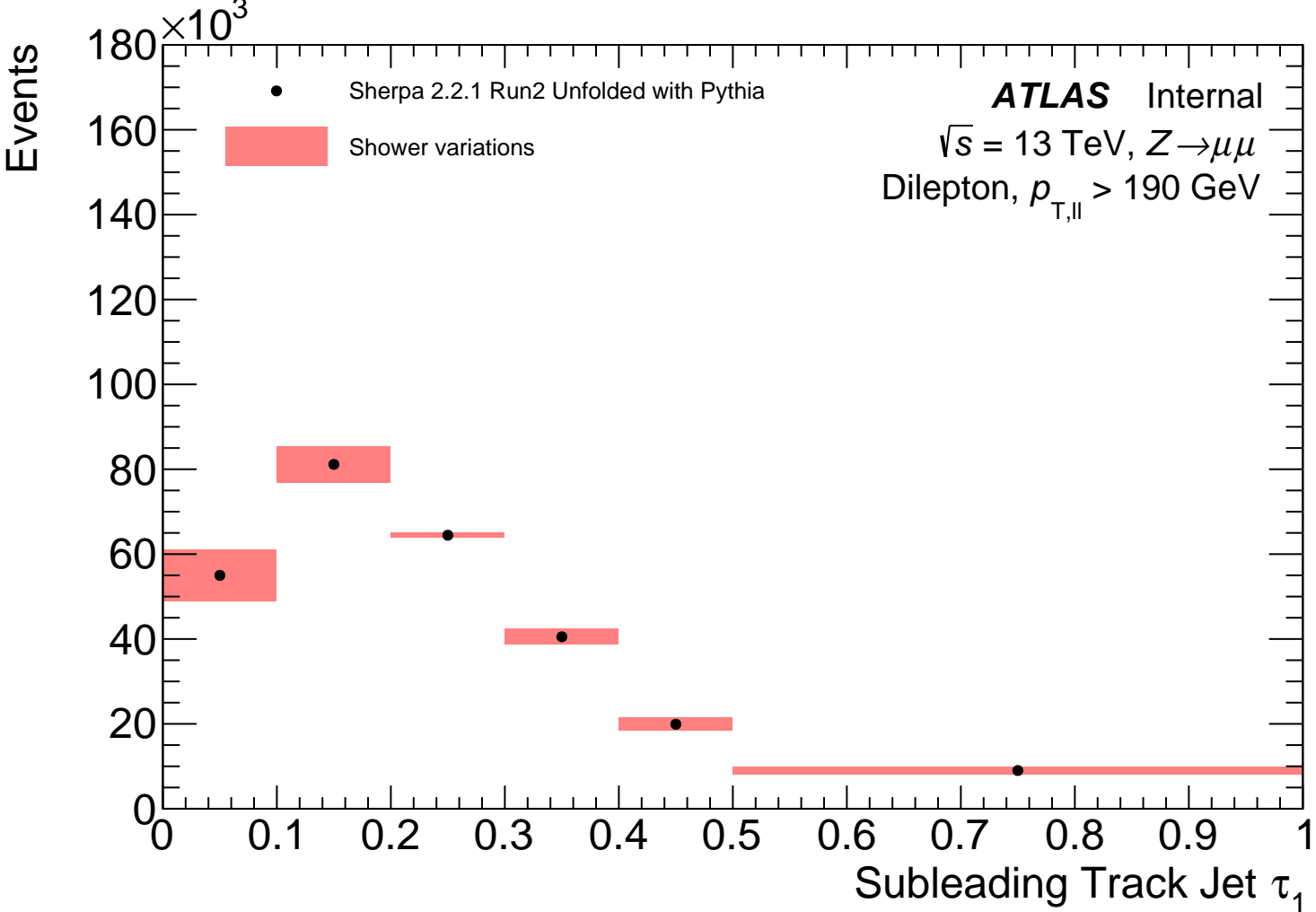


Events

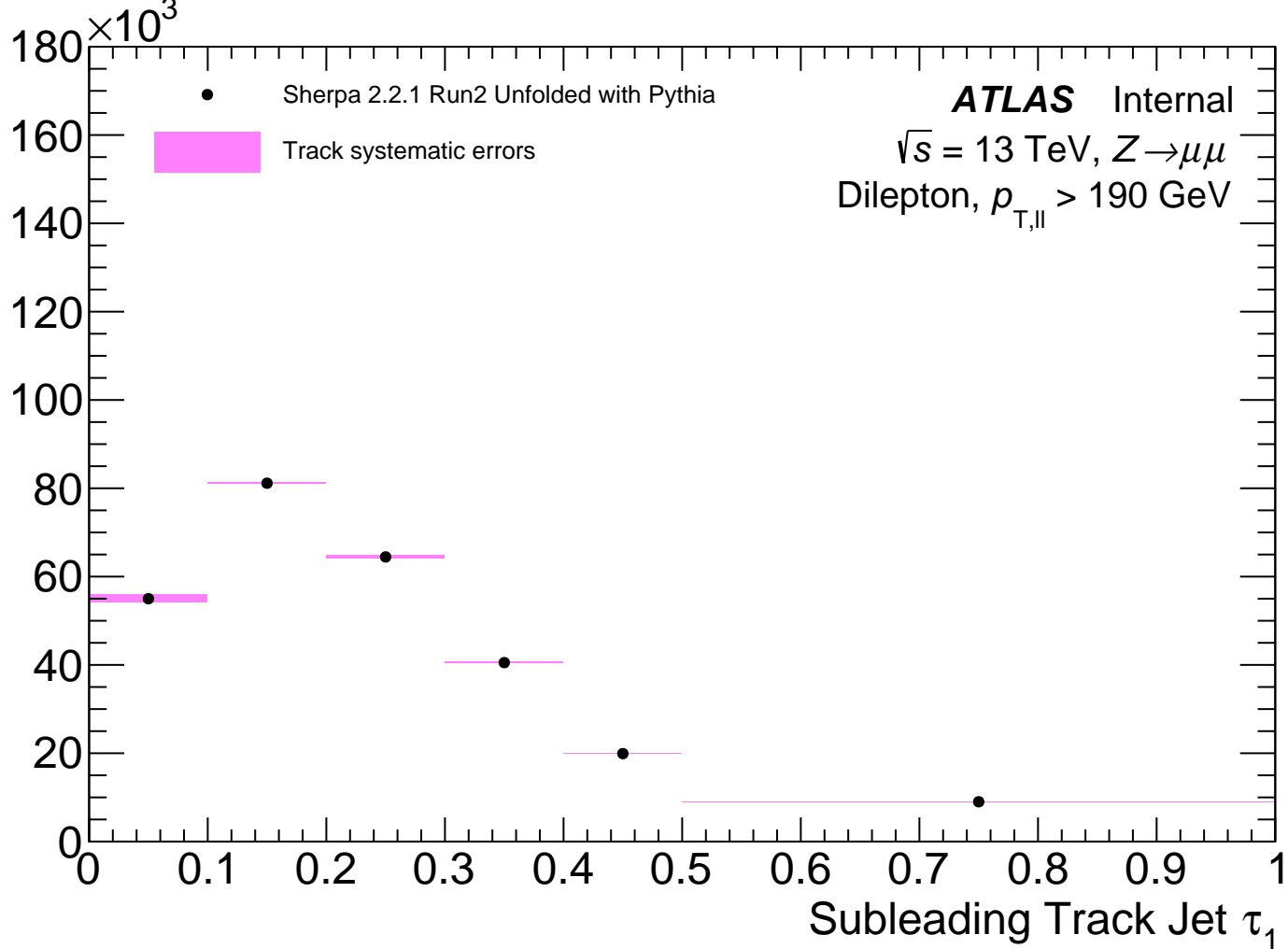


Events

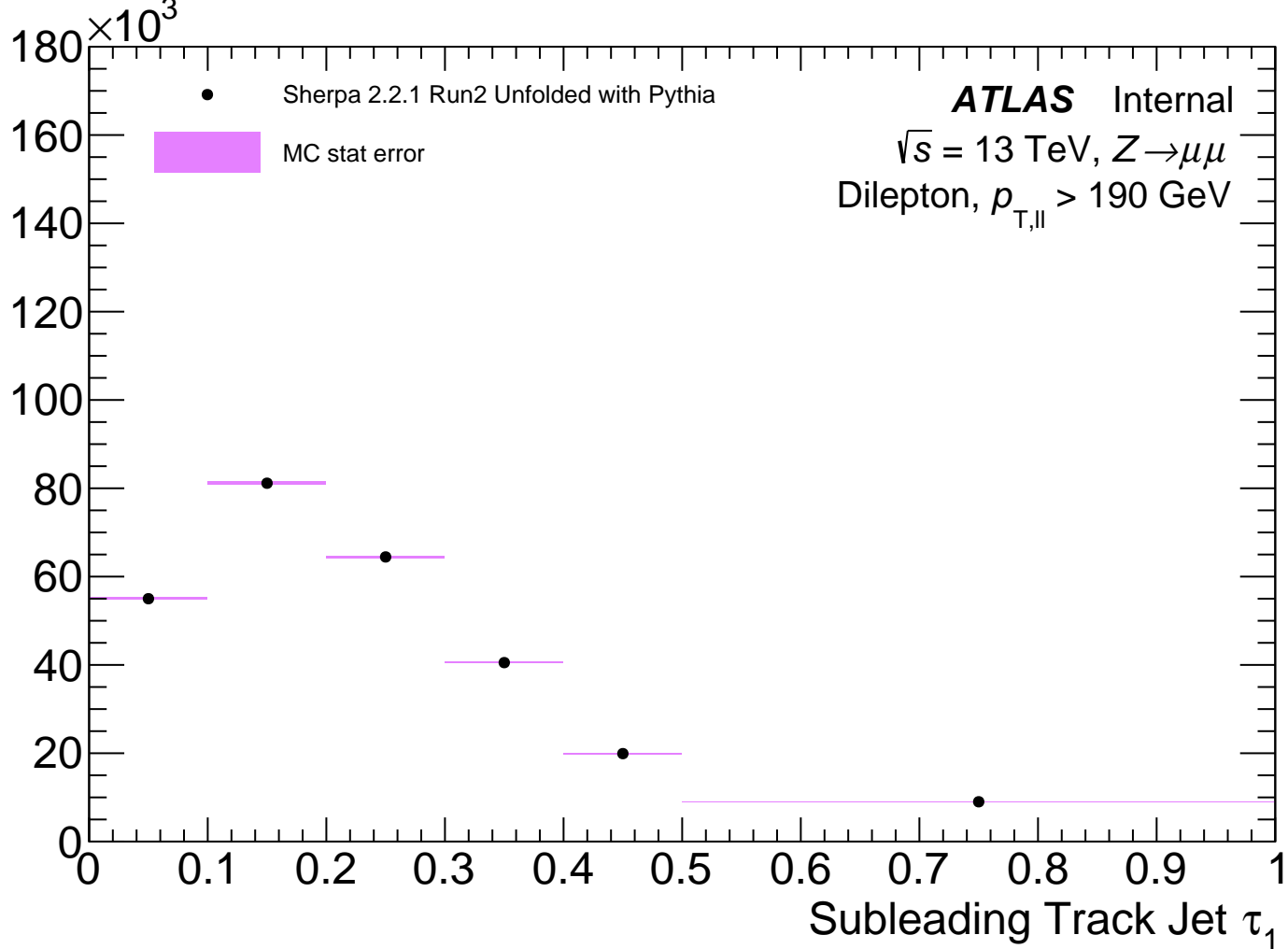




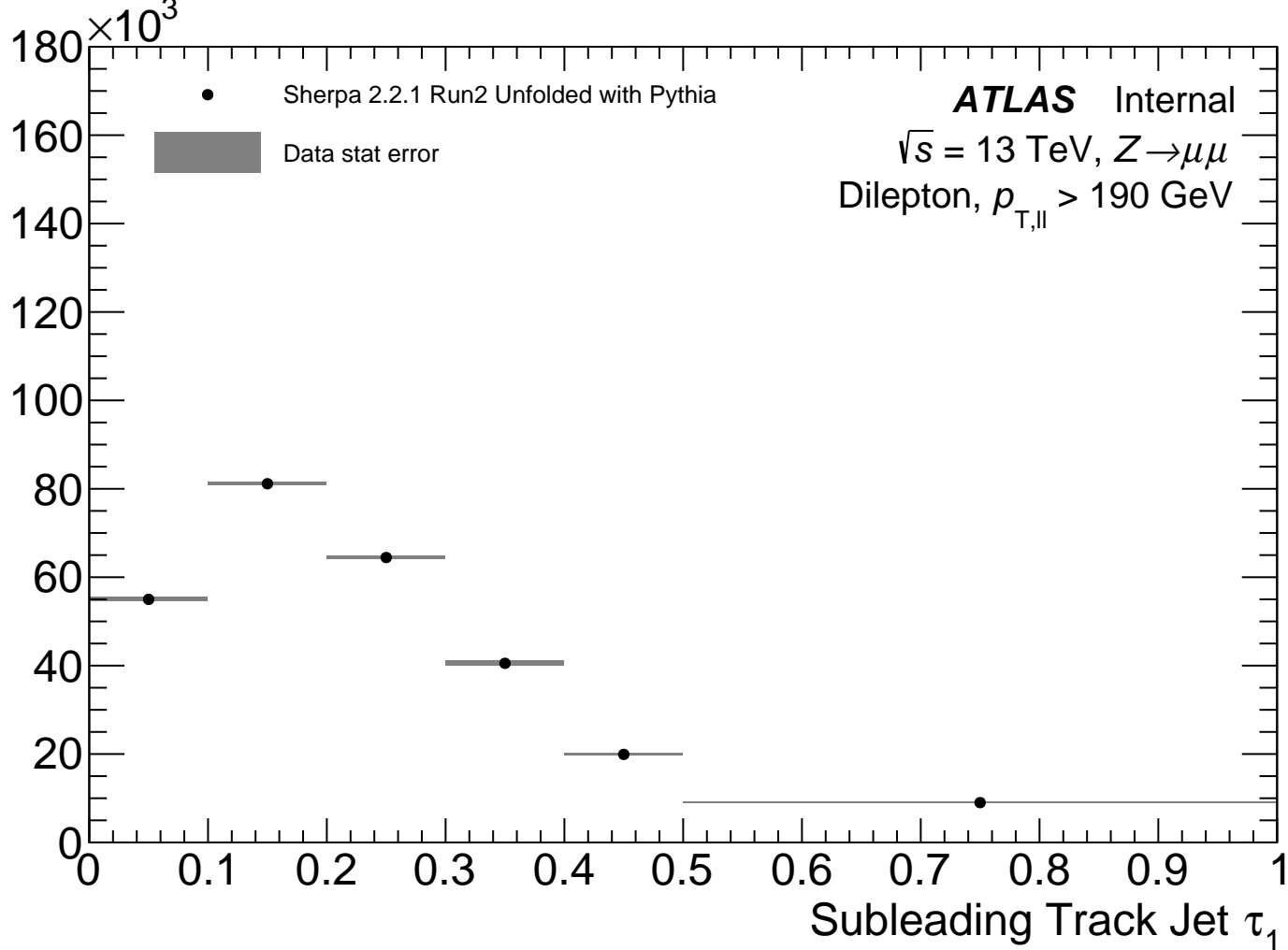
Events



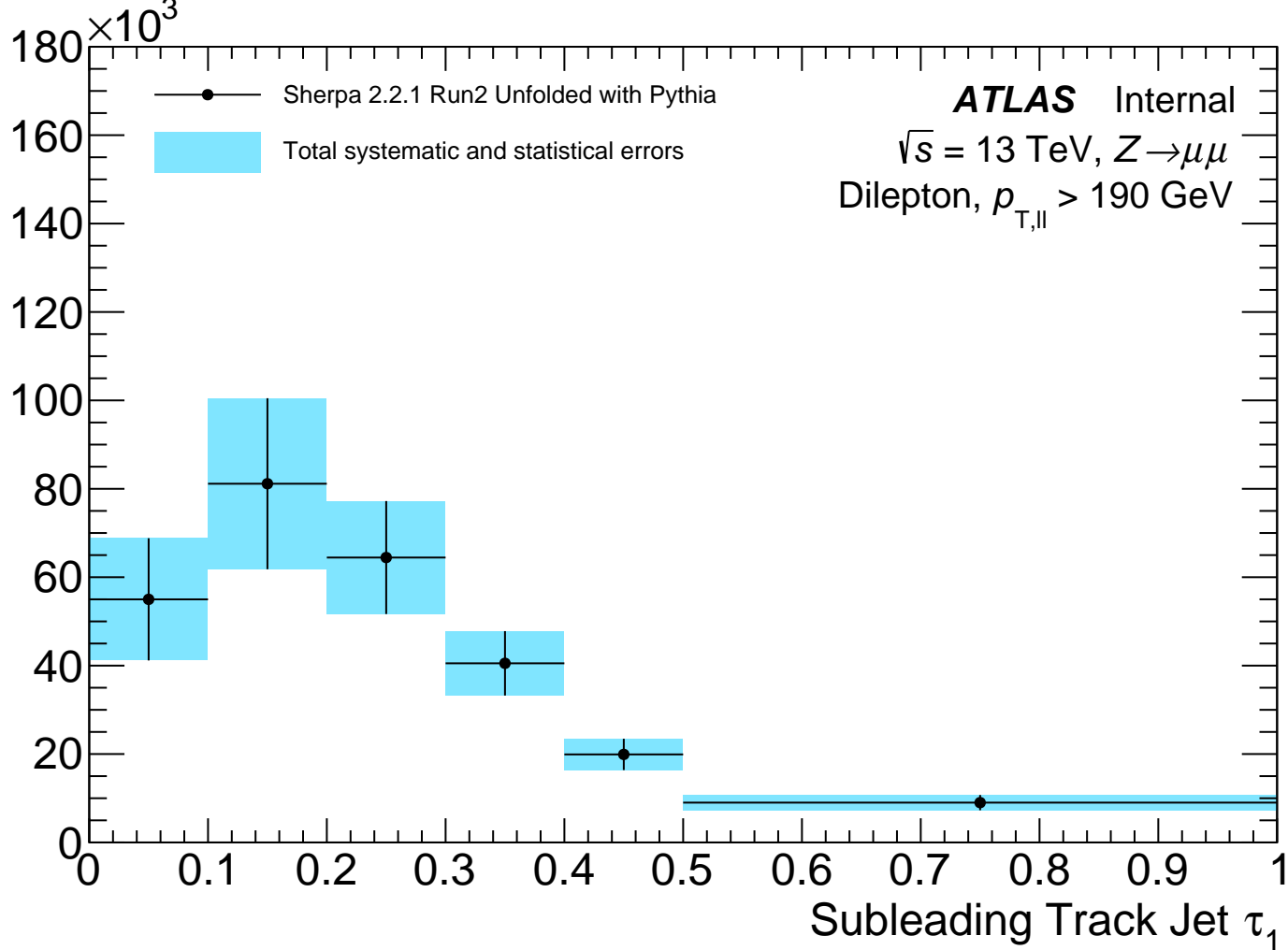
Events



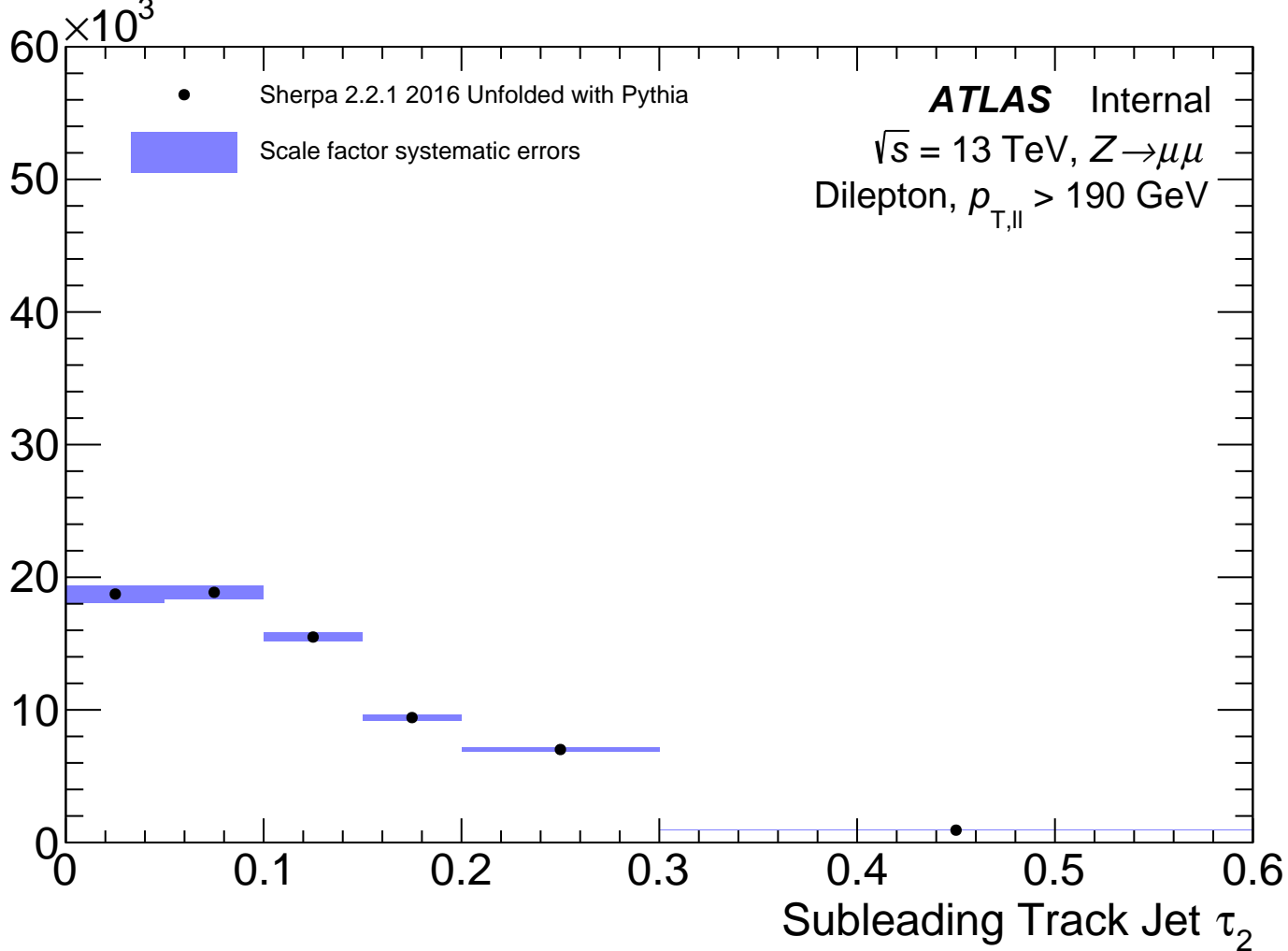
Events



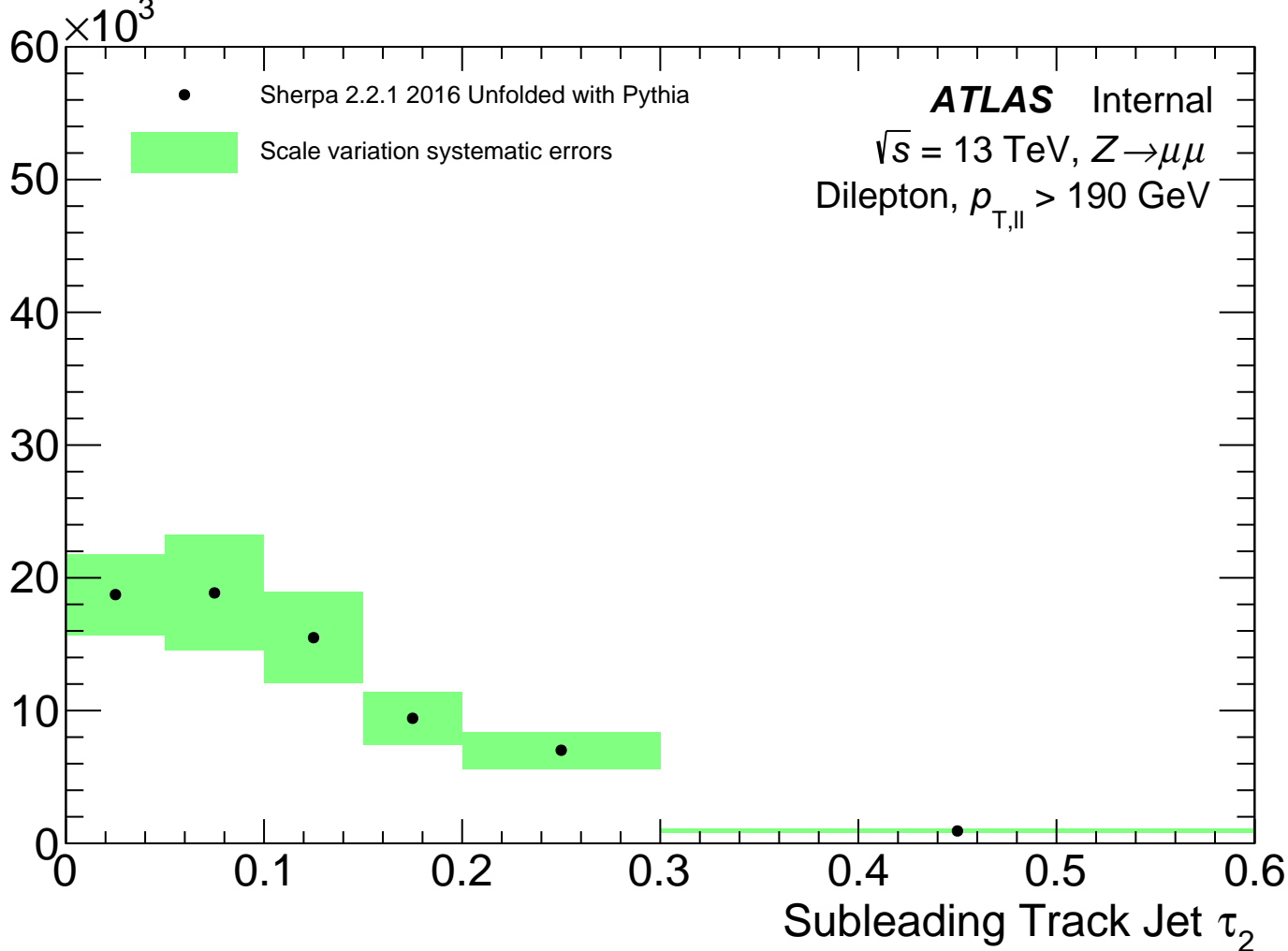
Events



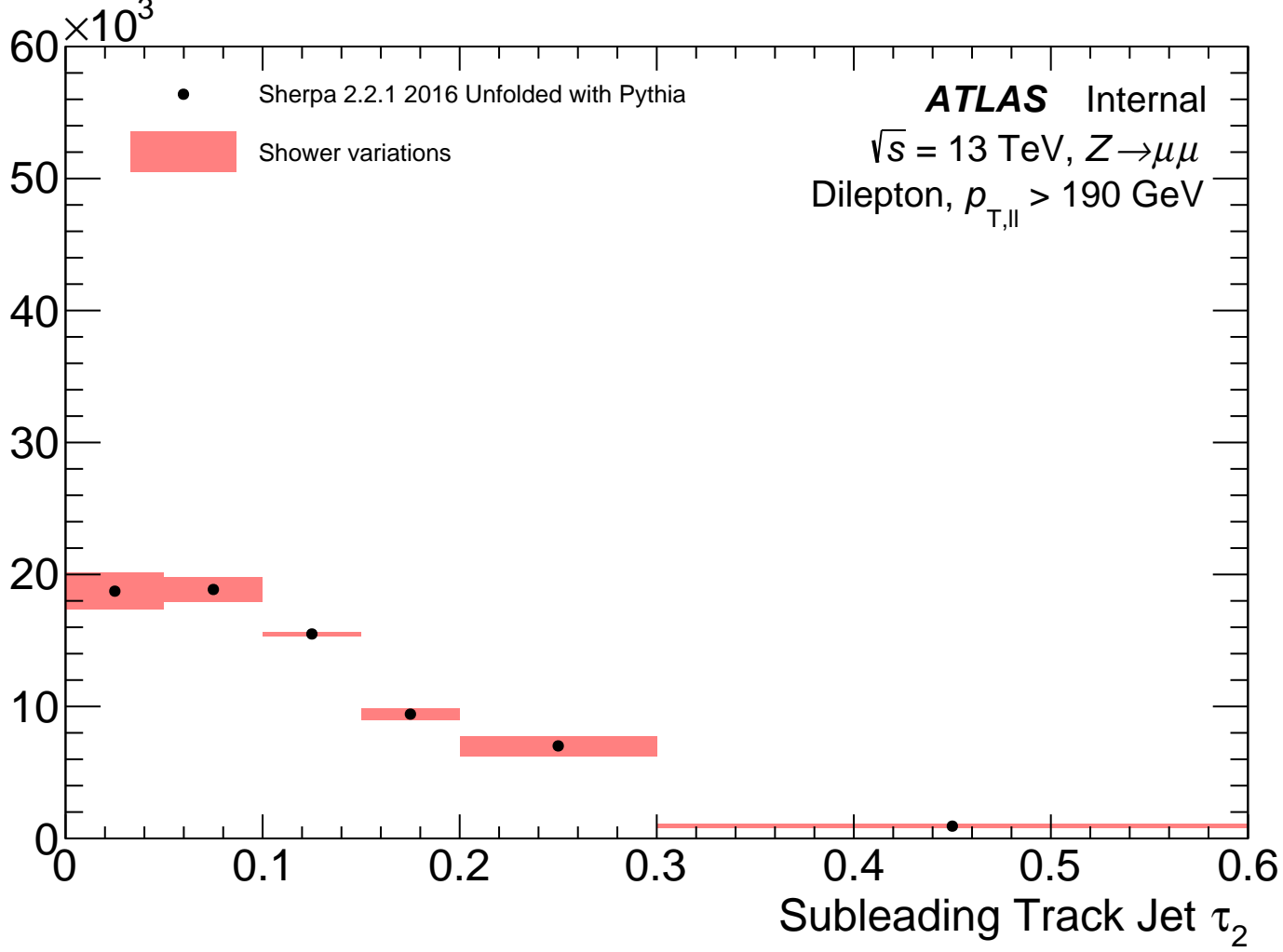
Events



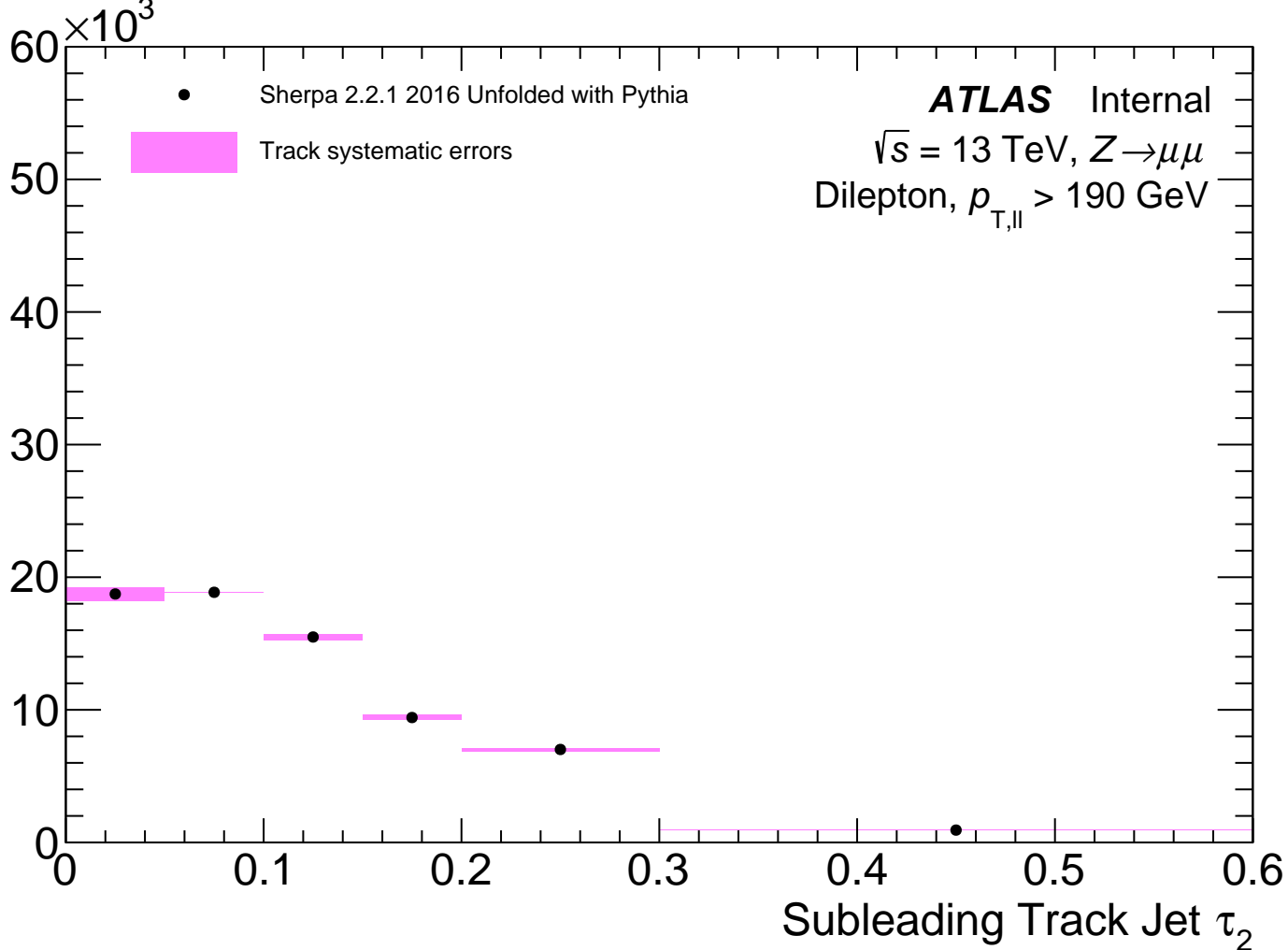
Events



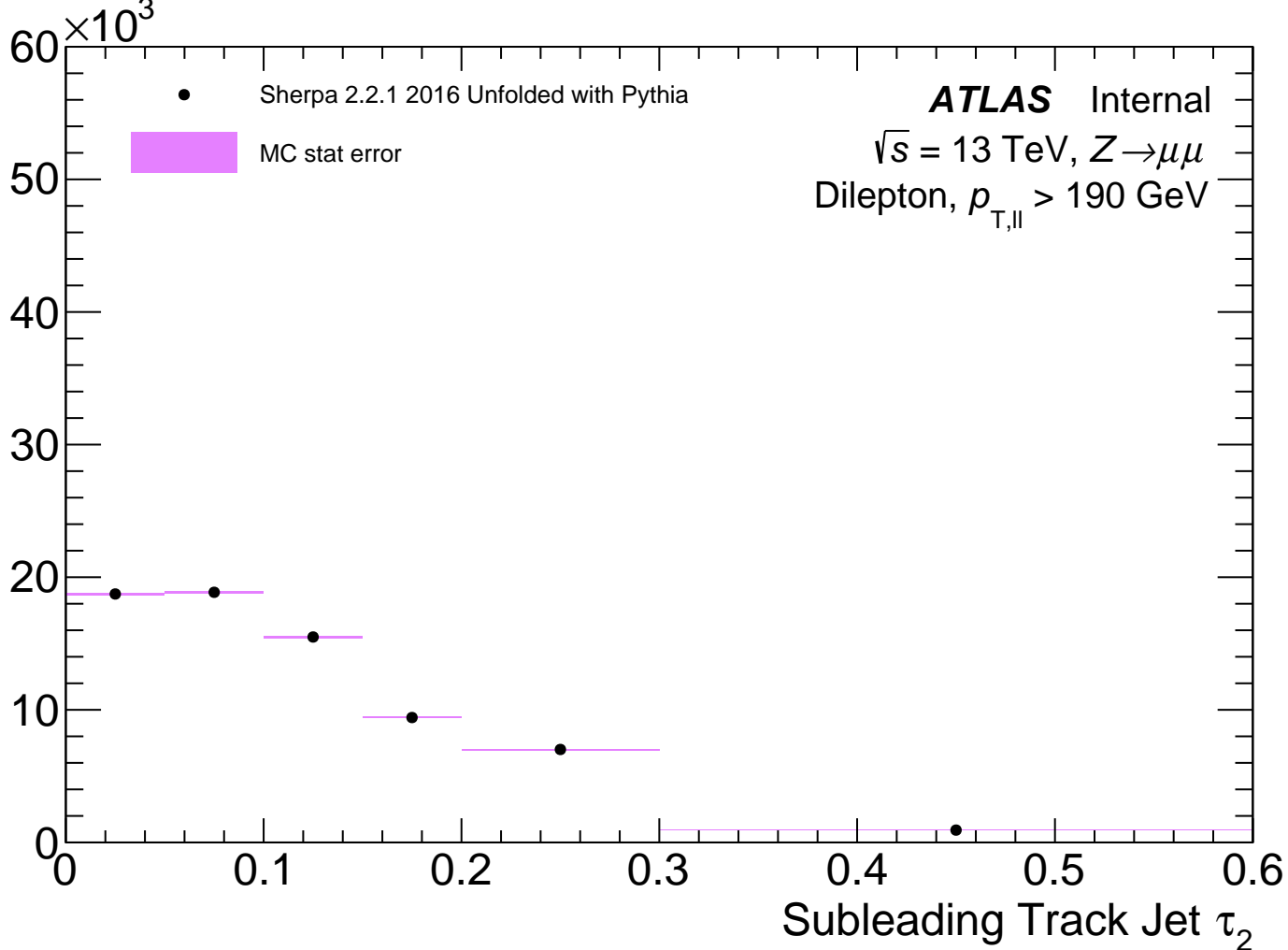
Events



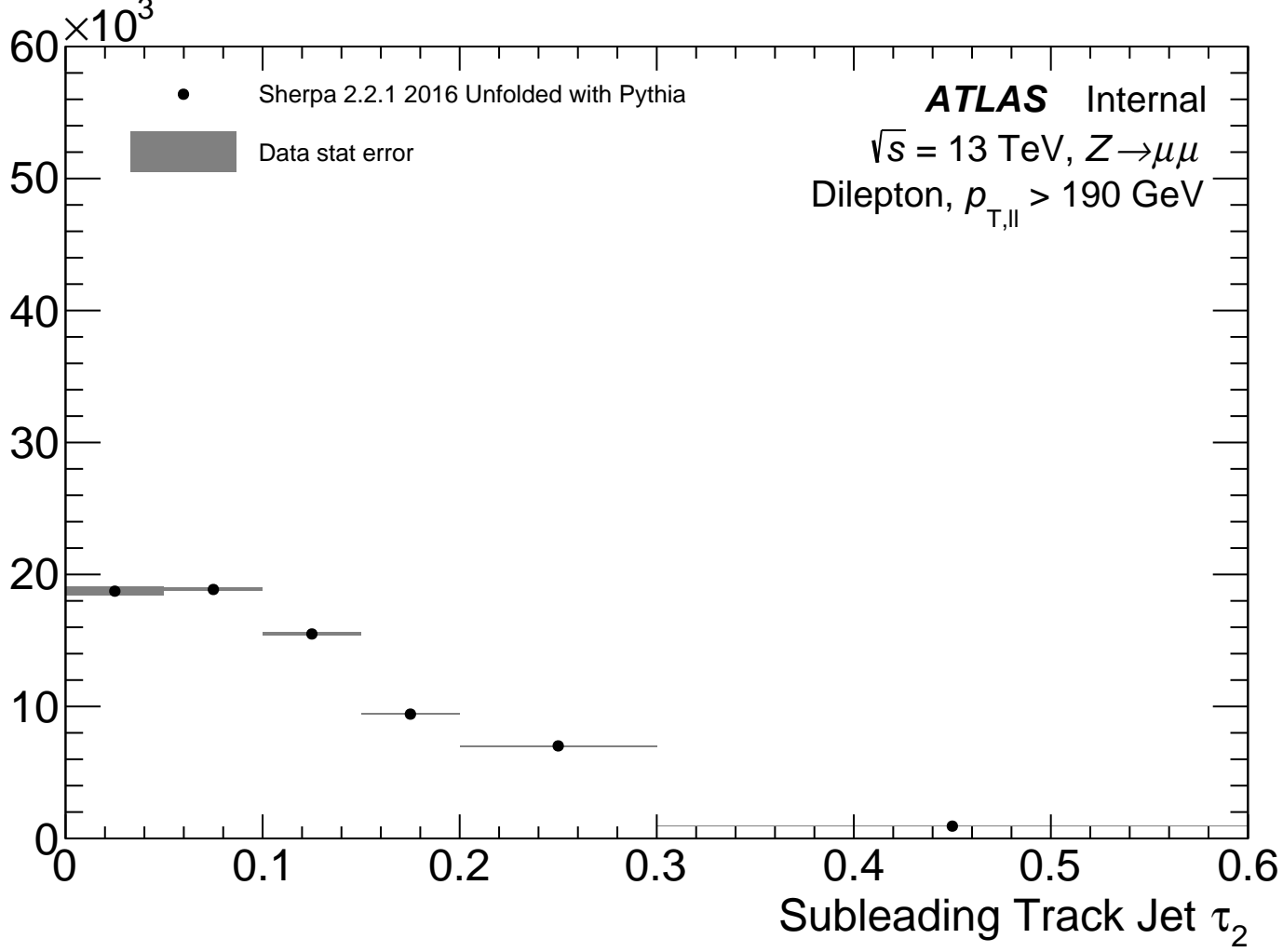
Events



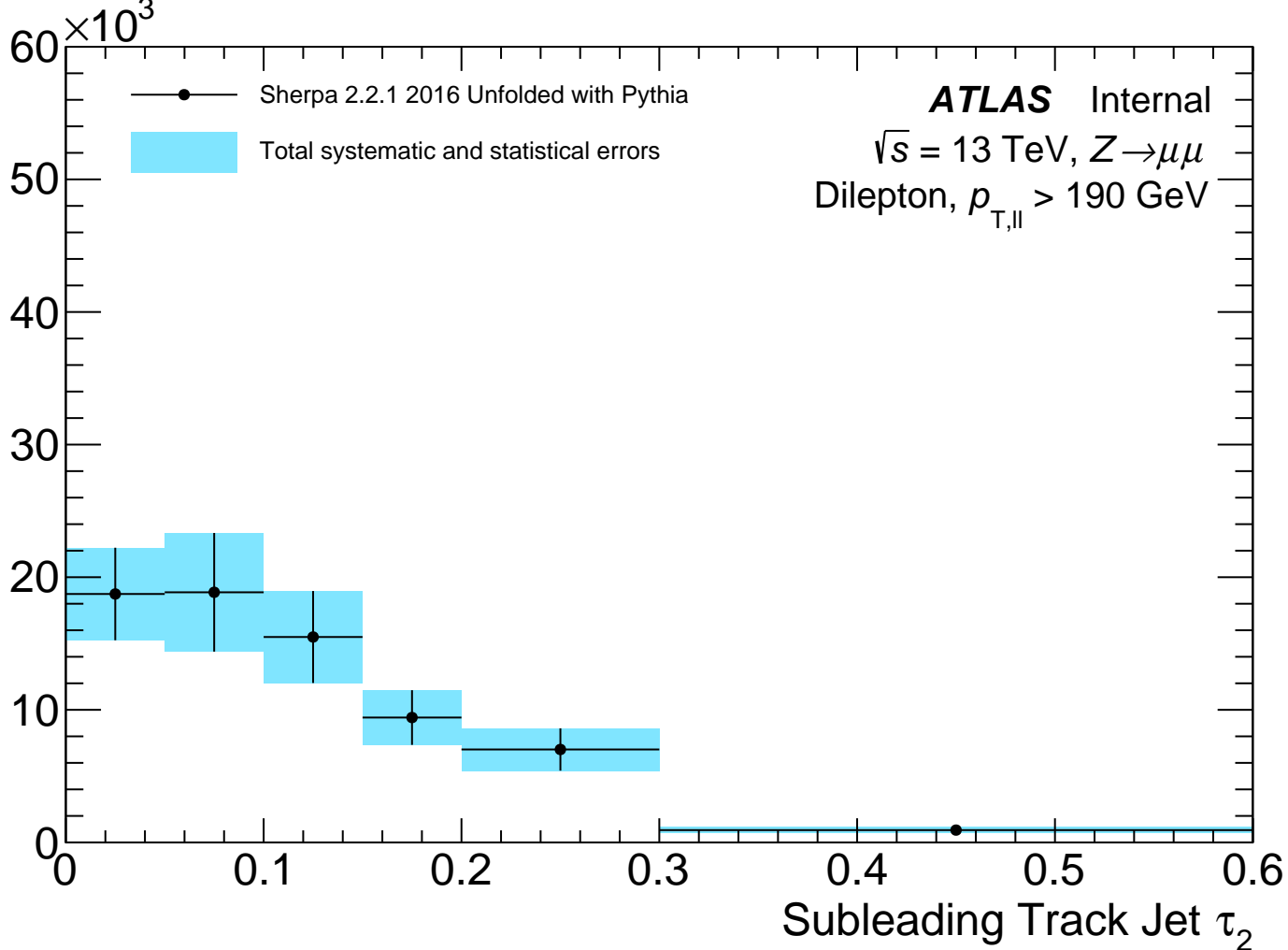
Events



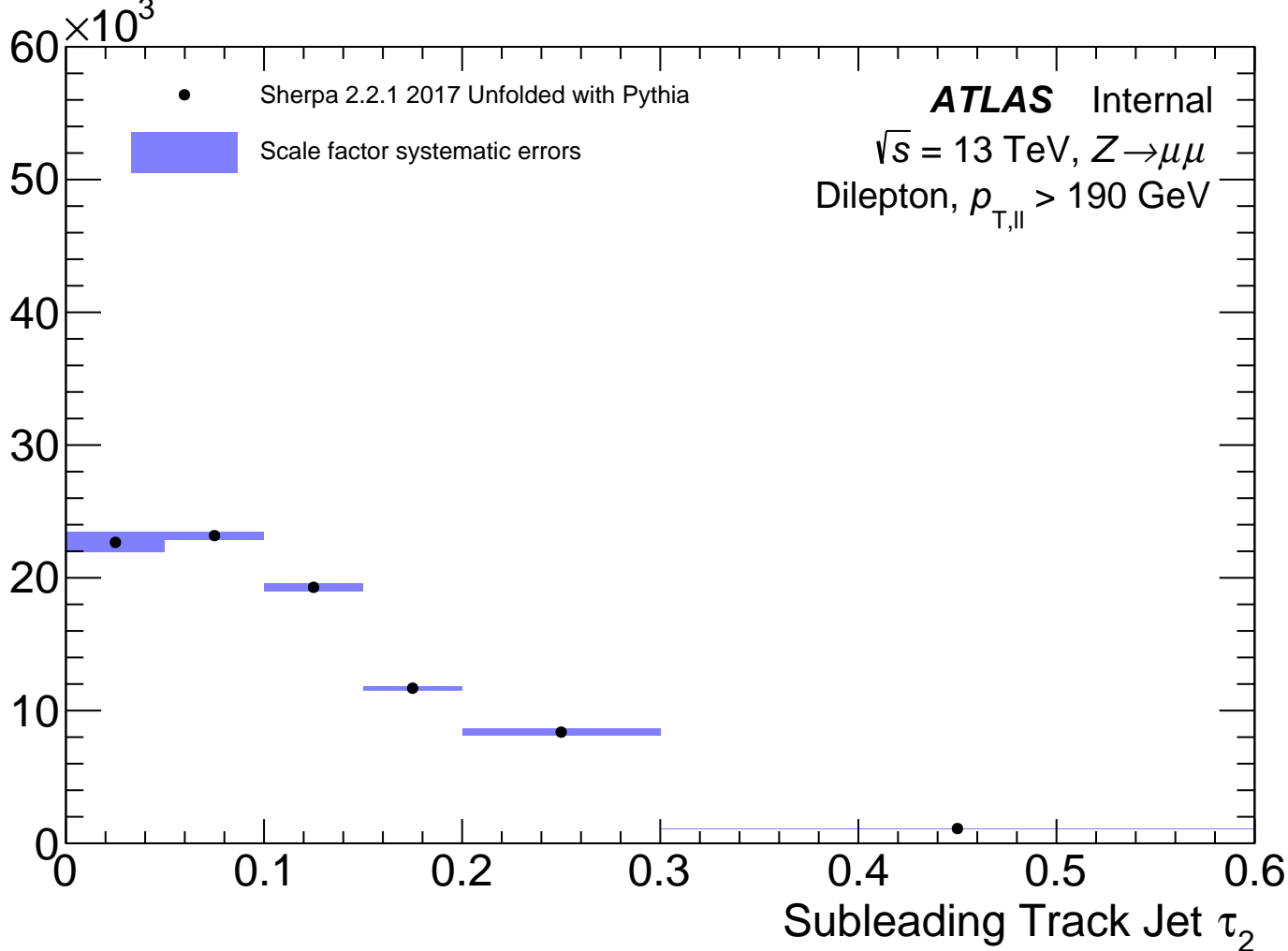
Events



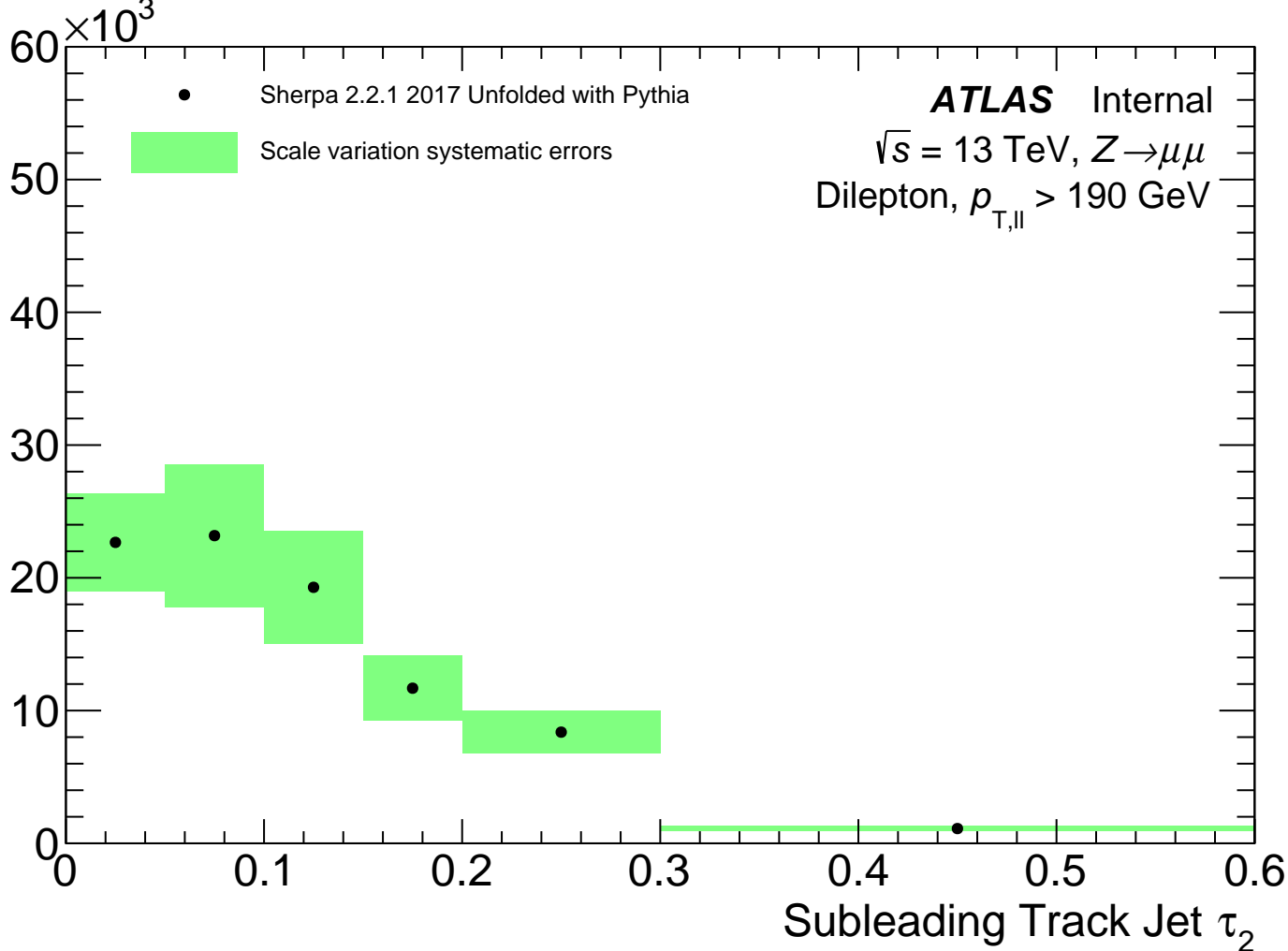
Events



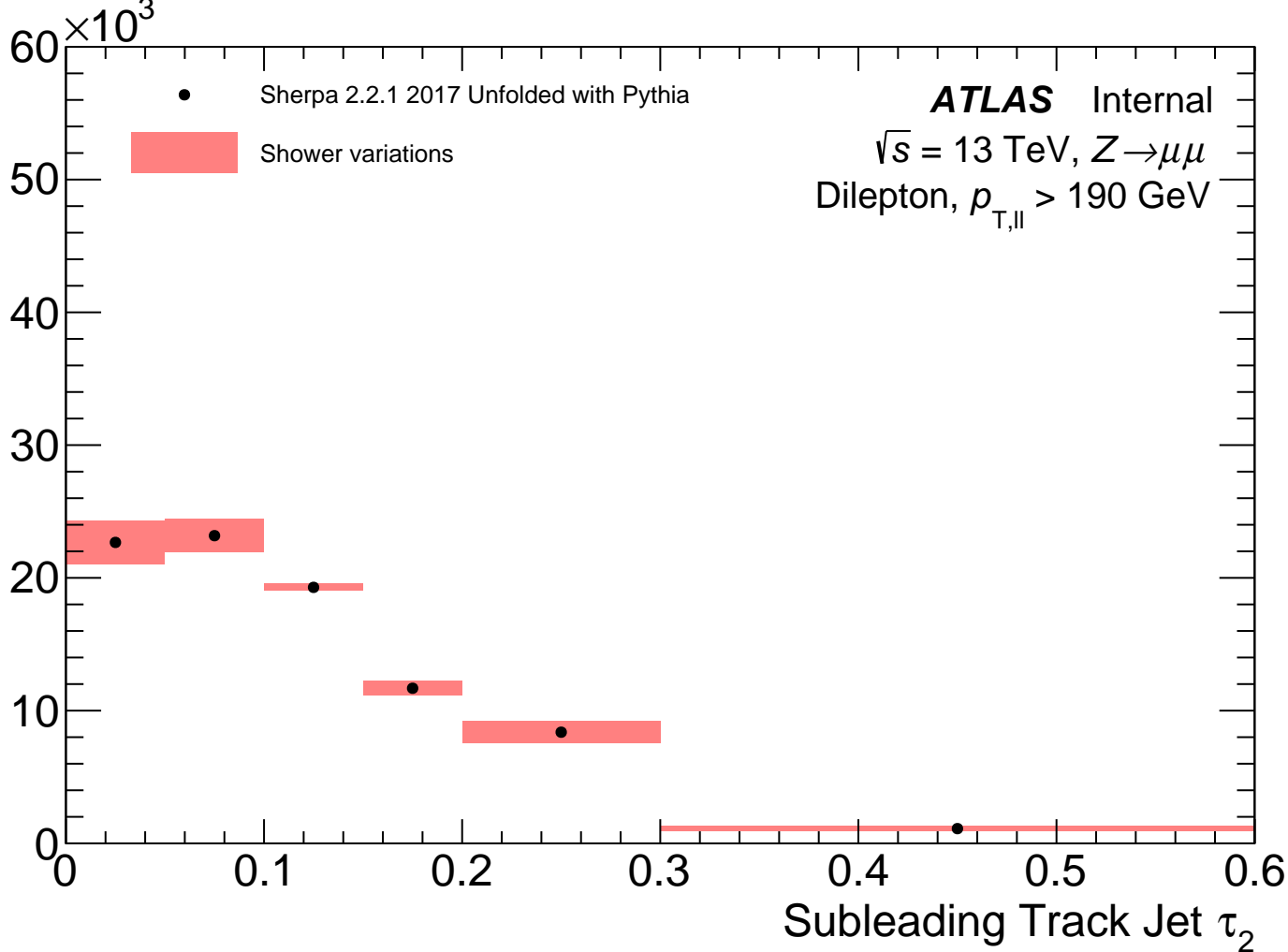
Events



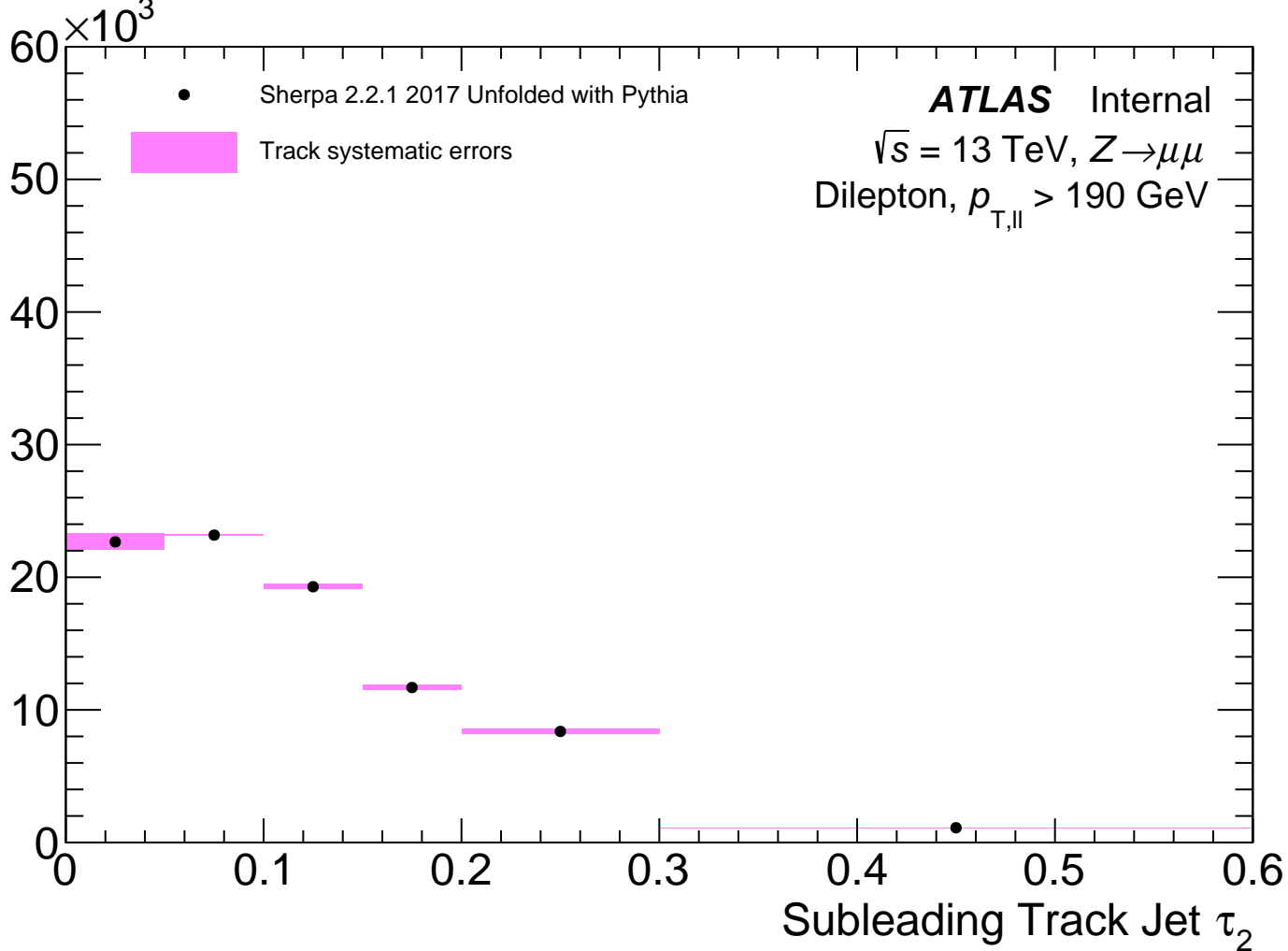
Events



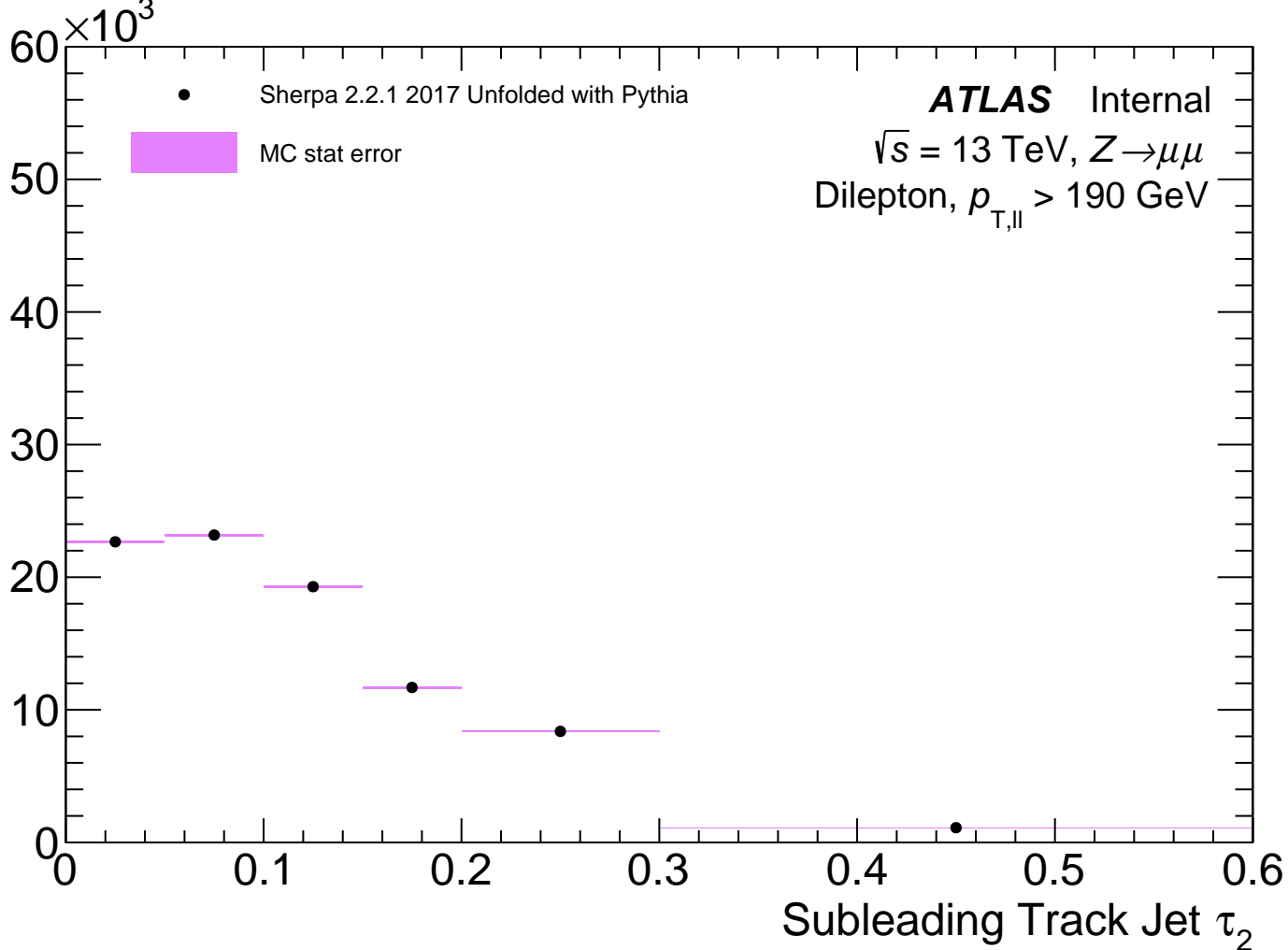
Events

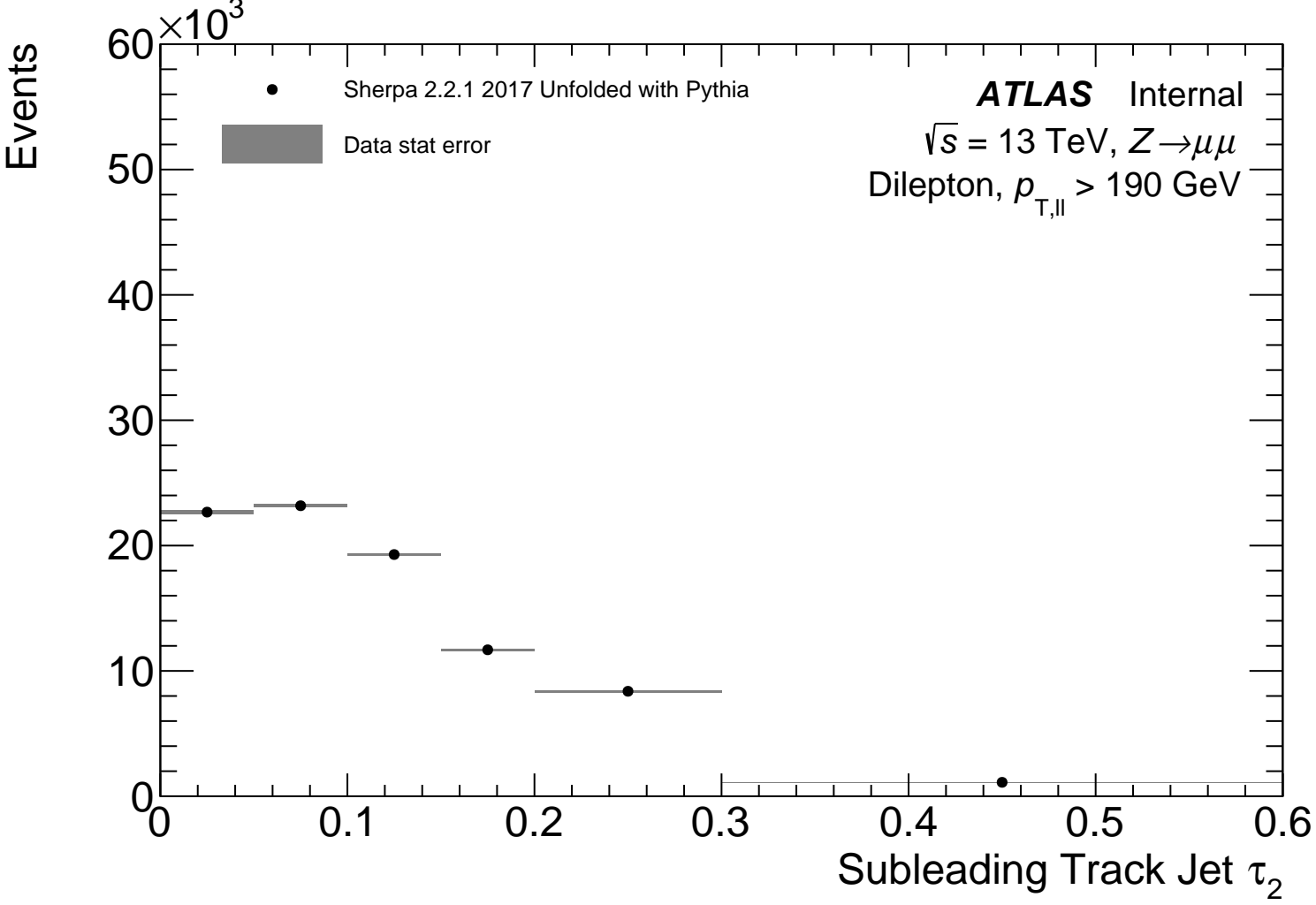


Events

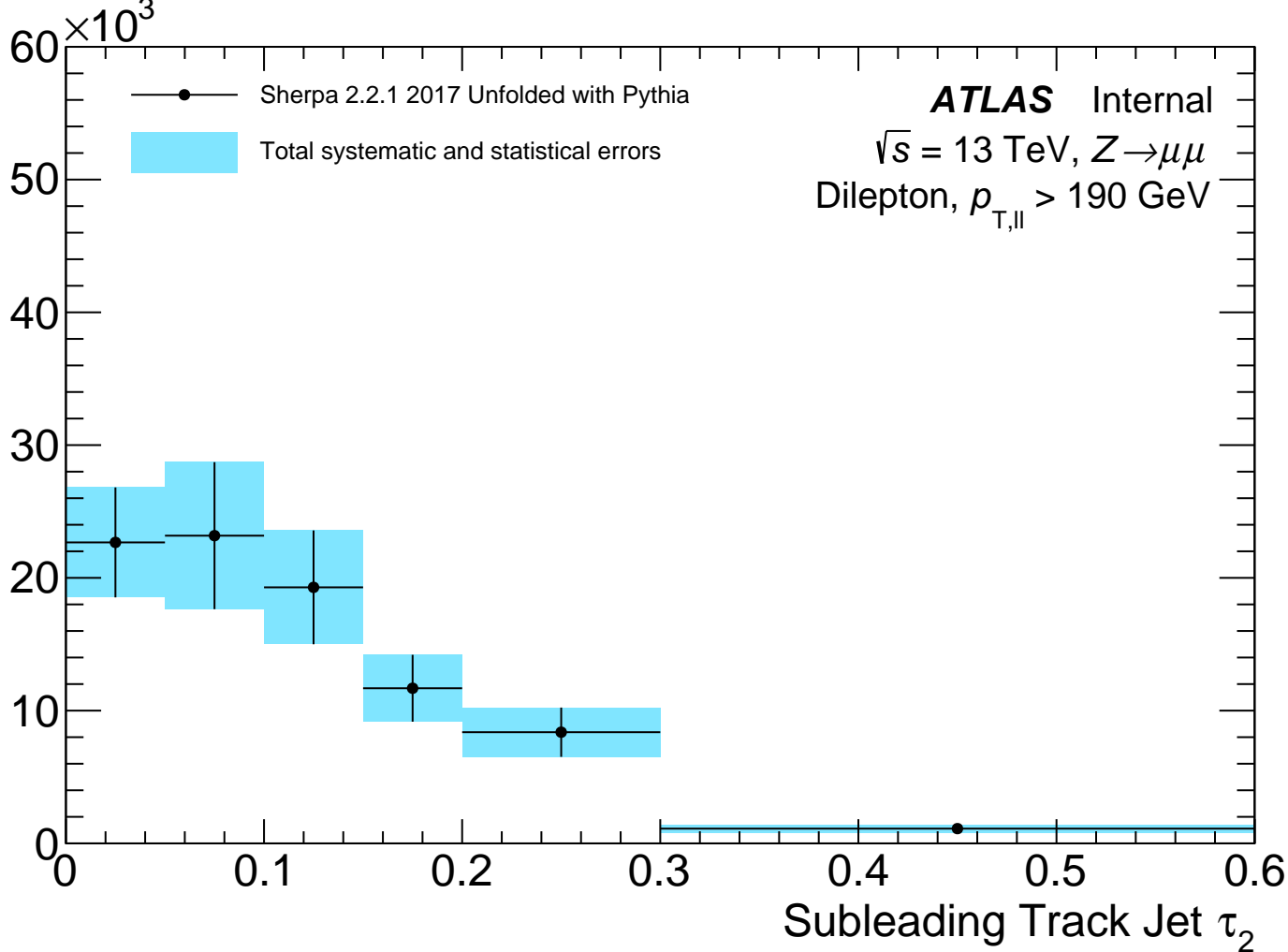


Events

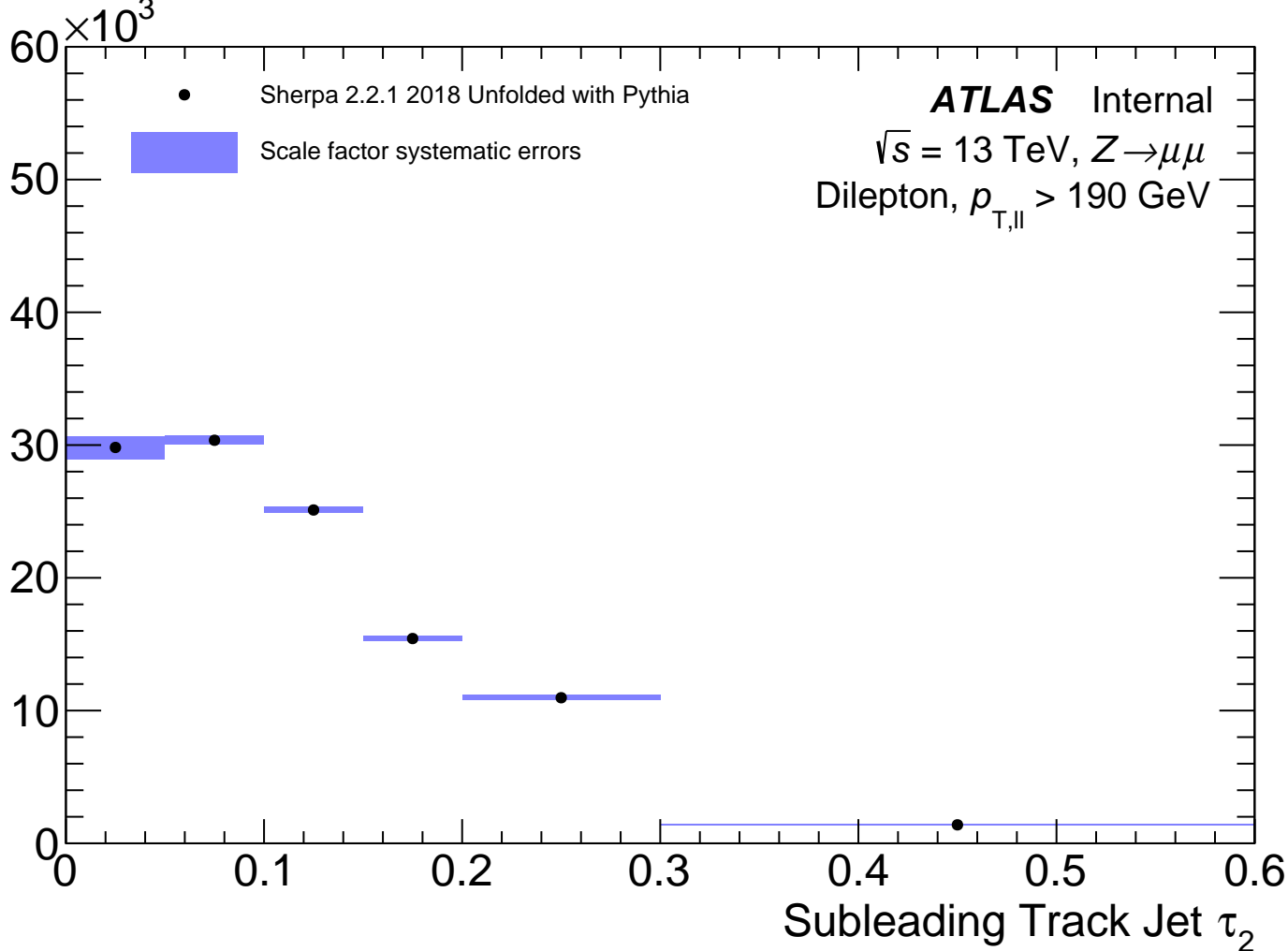




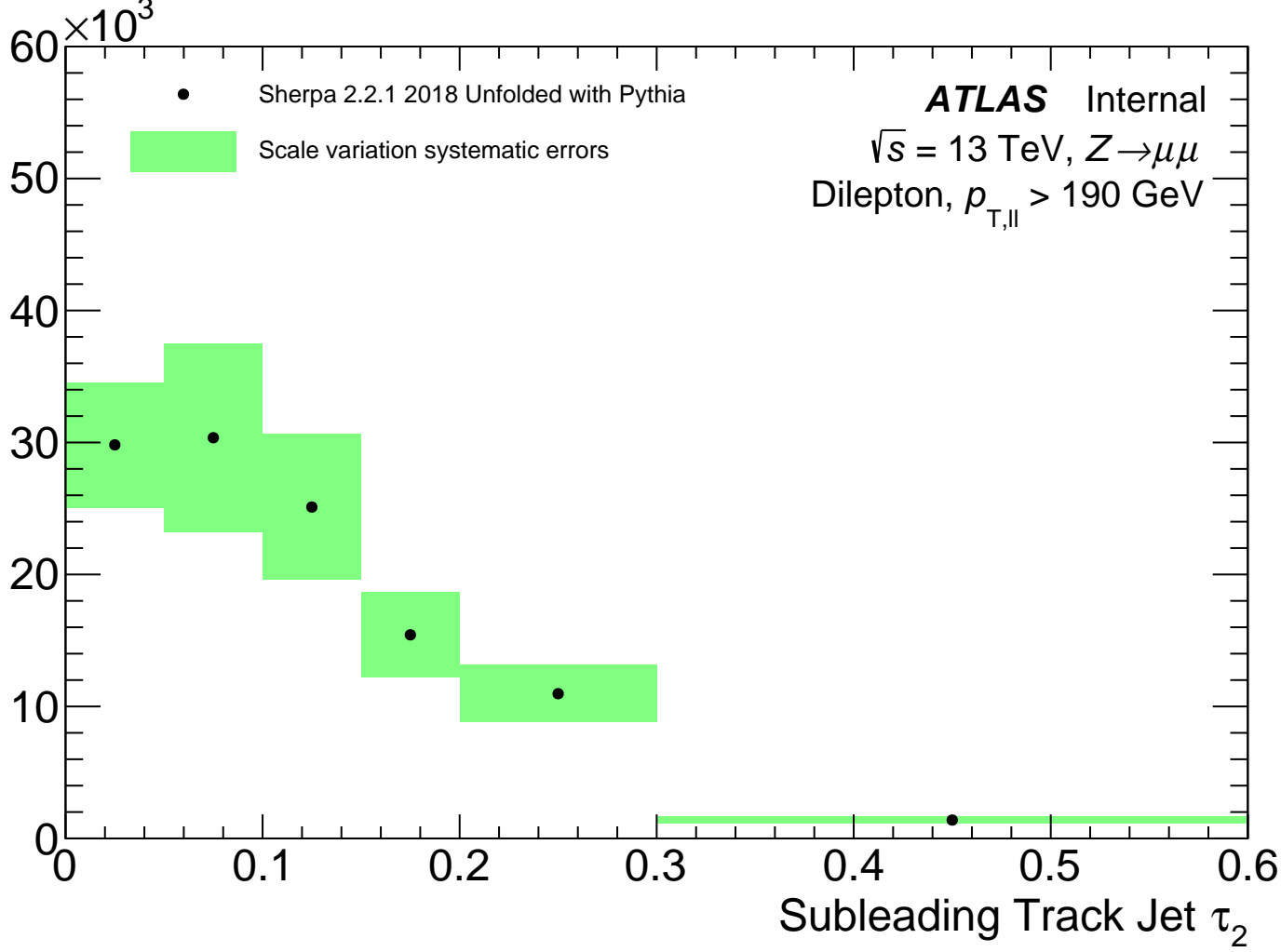
Events



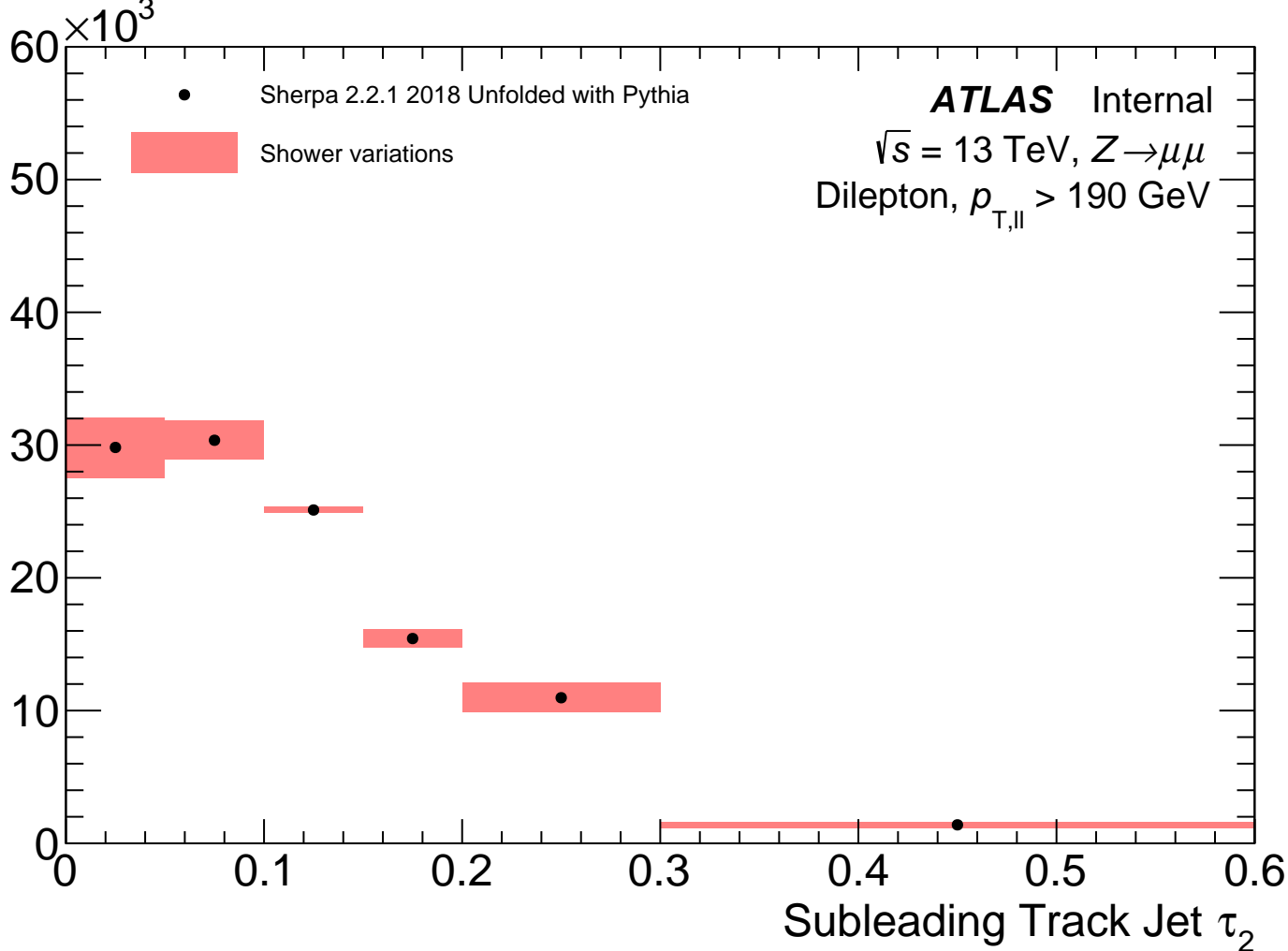
Events



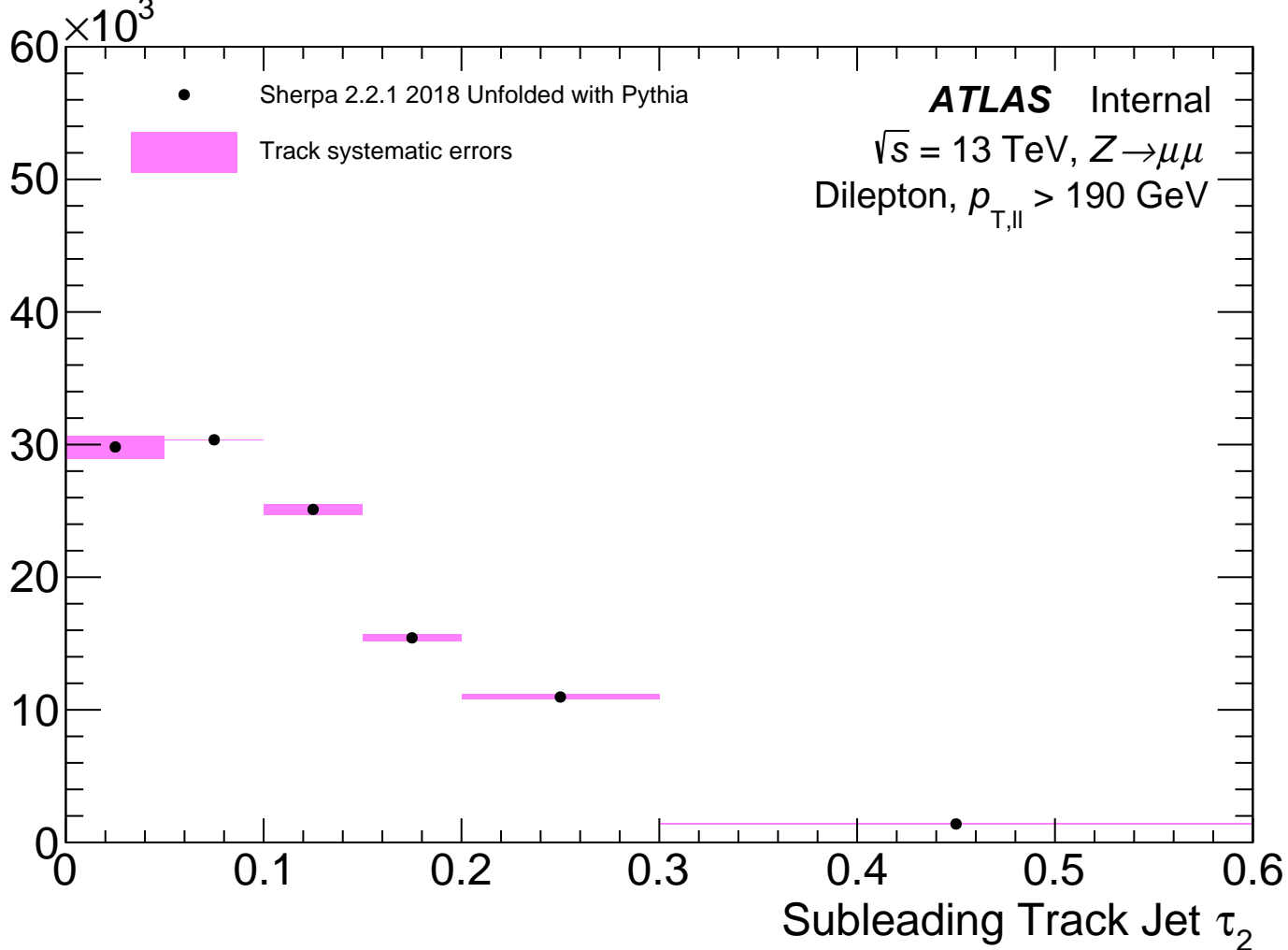
Events



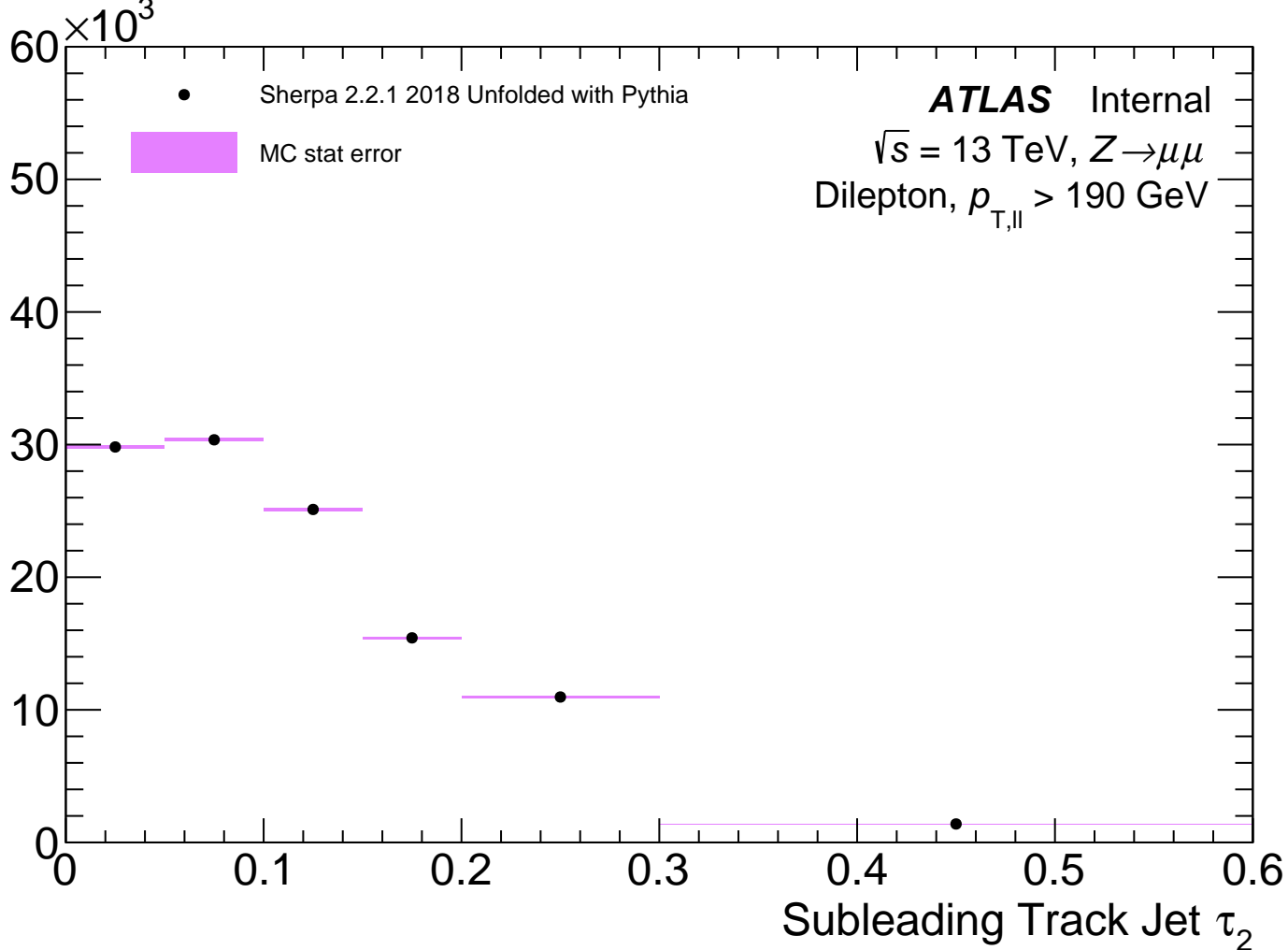
Events



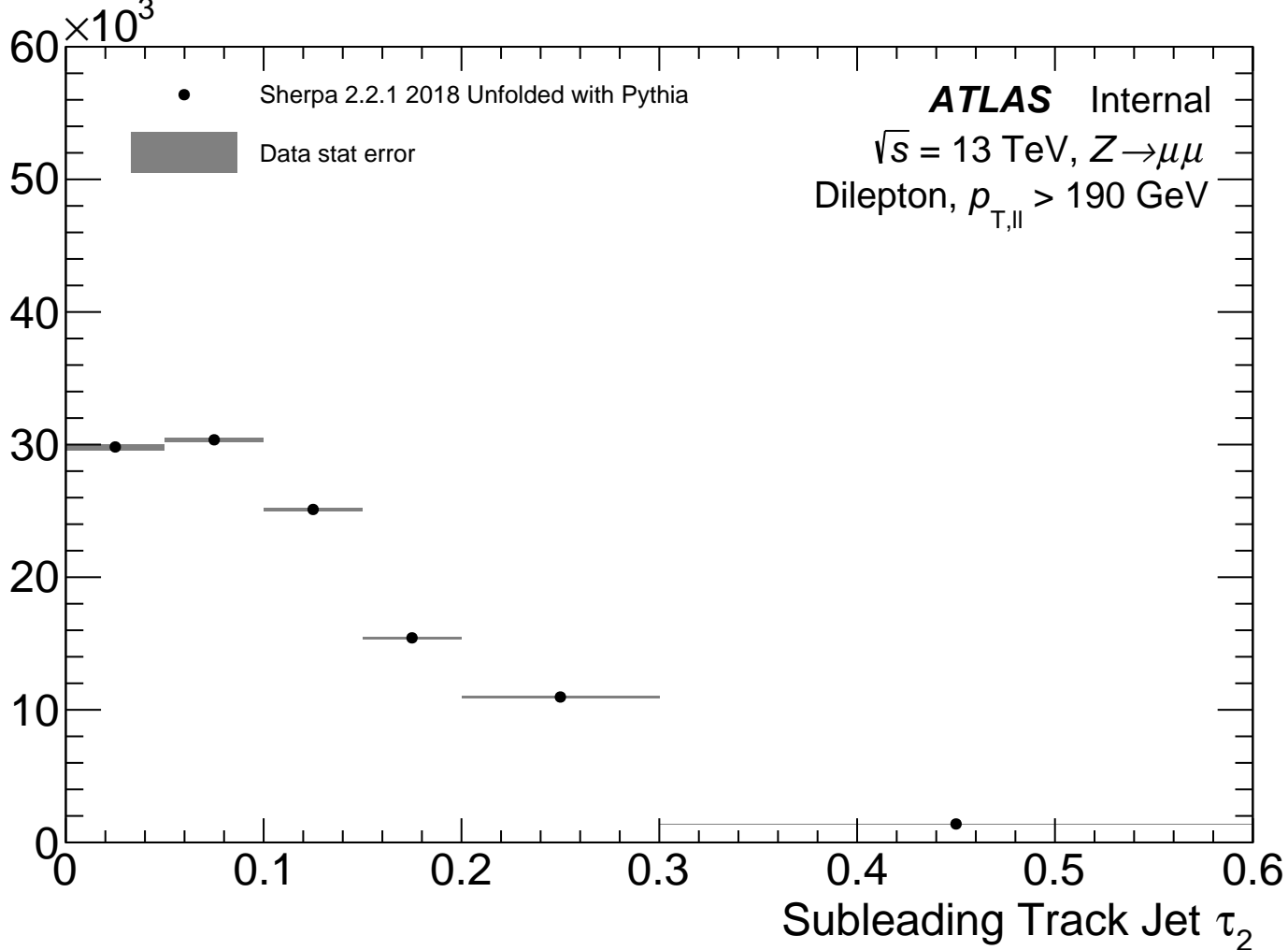
Events



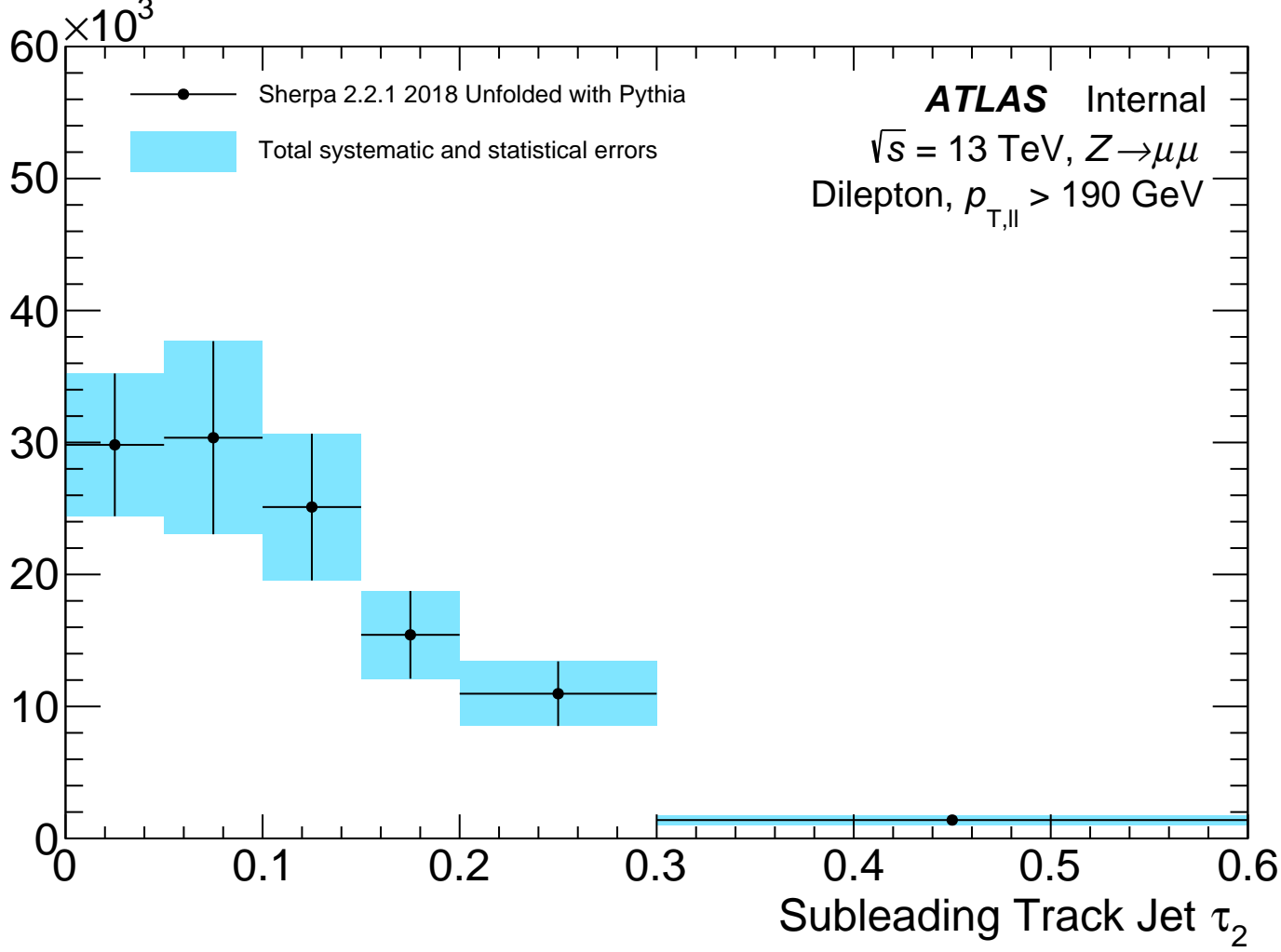
Events



Events



Events



Events

$\times 10^3$

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

140

120

100

80

60

40

20

0

0

0.1

0.2

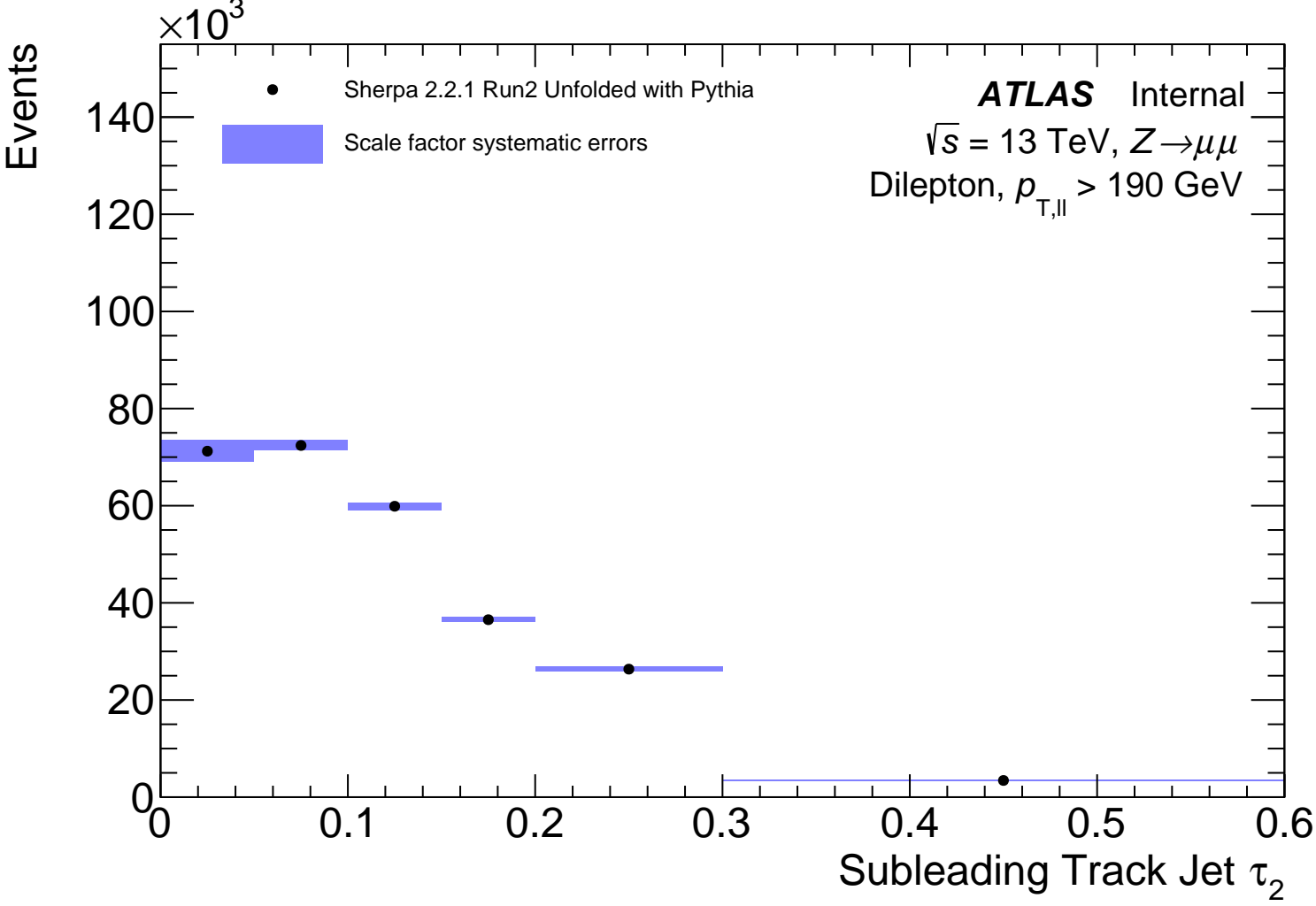
0.3

0.4

0.5

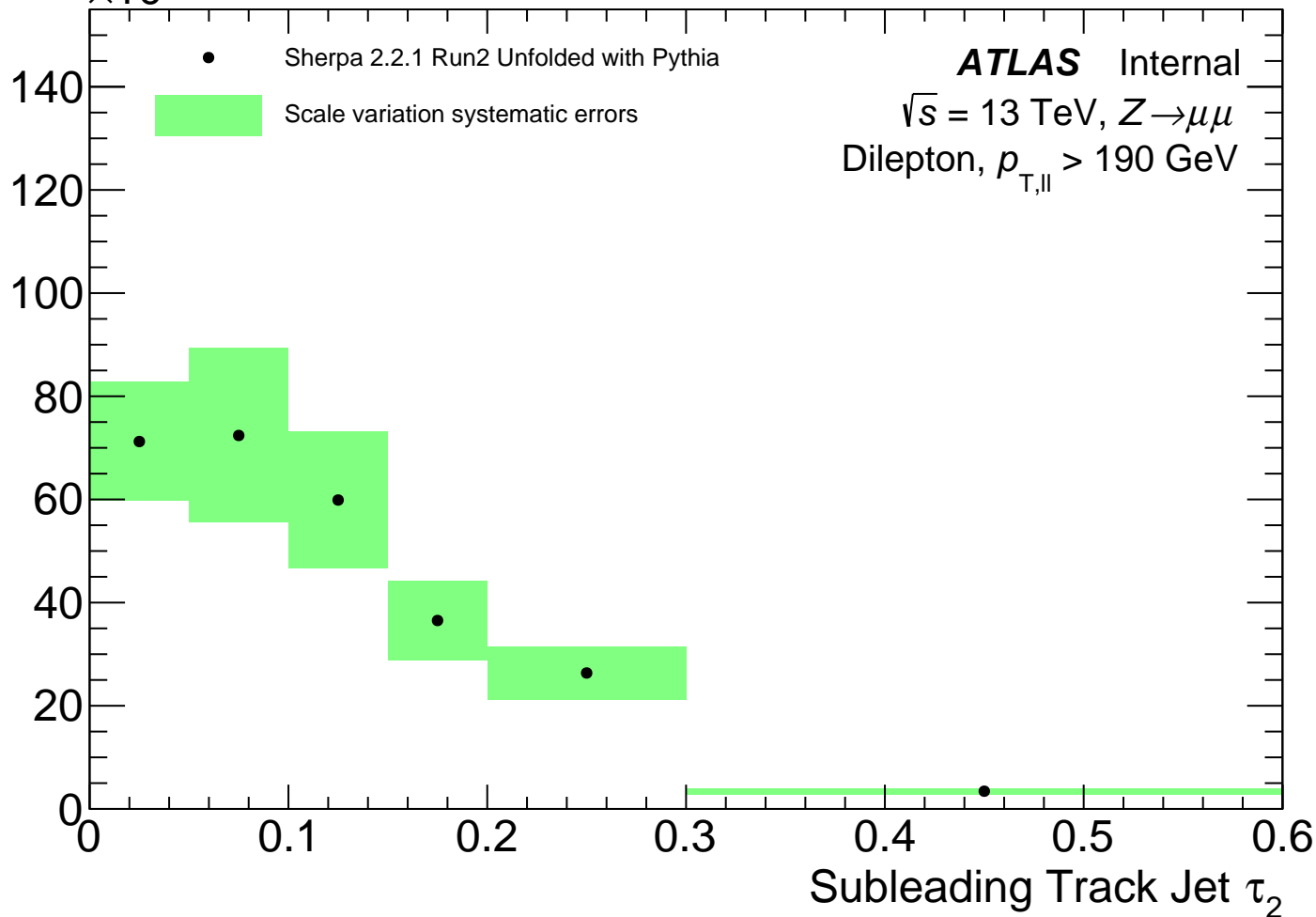
0.6

Subleading Track Jet τ_2



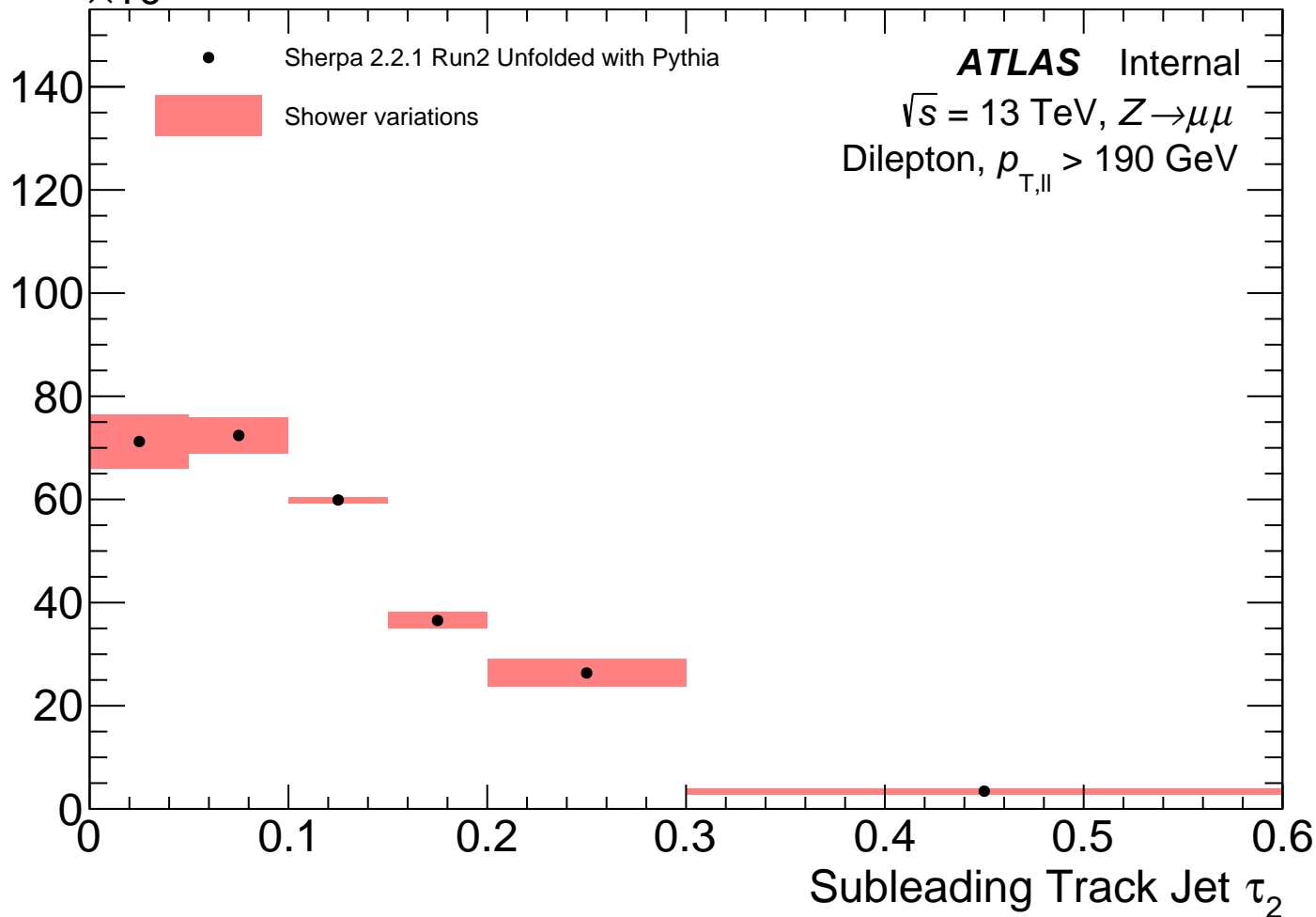
Events

$\times 10^3$



Events

$\times 10^3$



Events

$\times 10^3$

• Sherpa 2.2.1 Run2 Unfolded with Pythia

Track systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

140

120

100

80

60

40

20

0

0.1

0.2

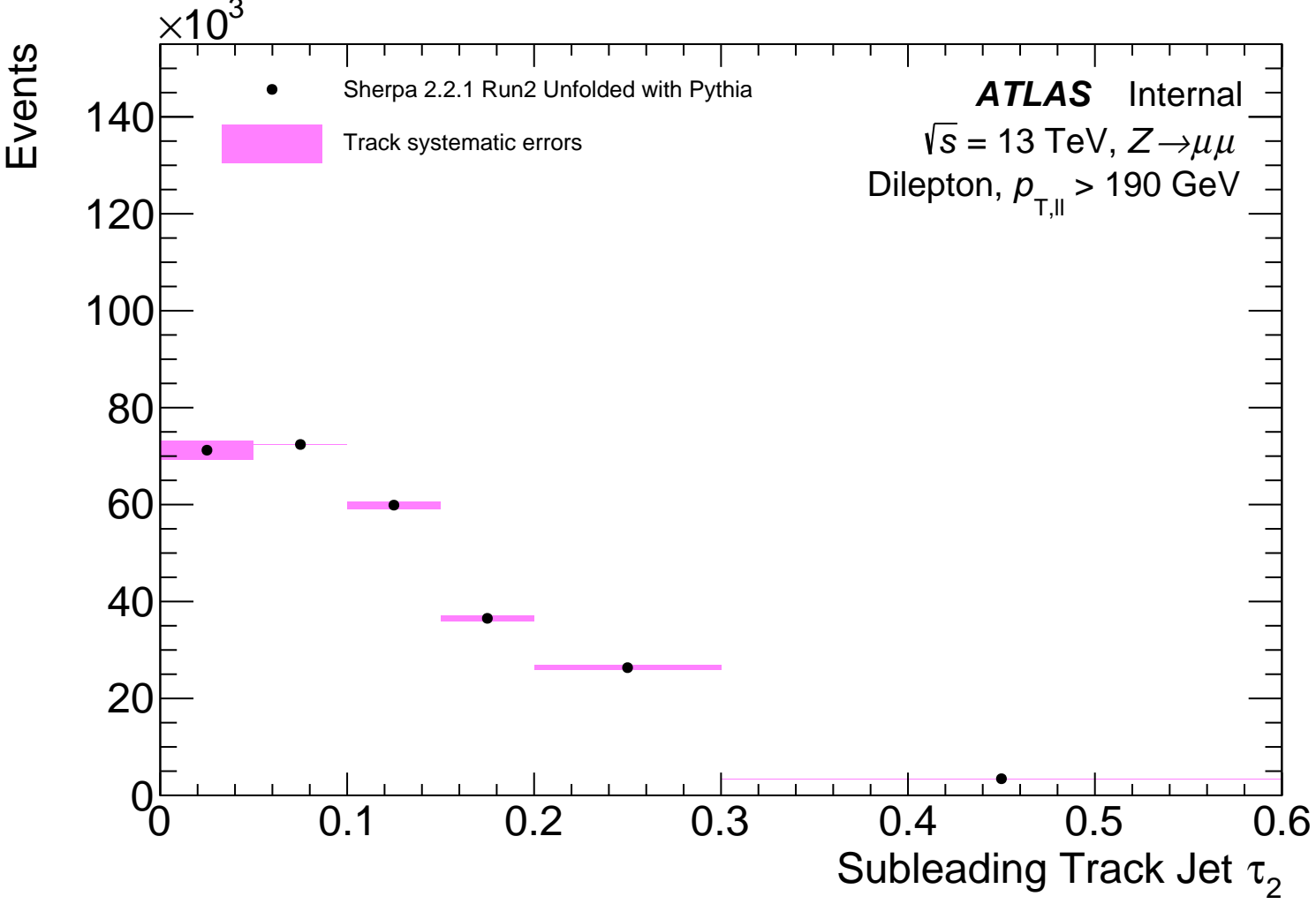
0.3

0.4

0.5

0.6

Subleading Track Jet τ_2



Events

$\times 10^3$

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

140

120

100

80

60

40

20

0

0.1

0.2

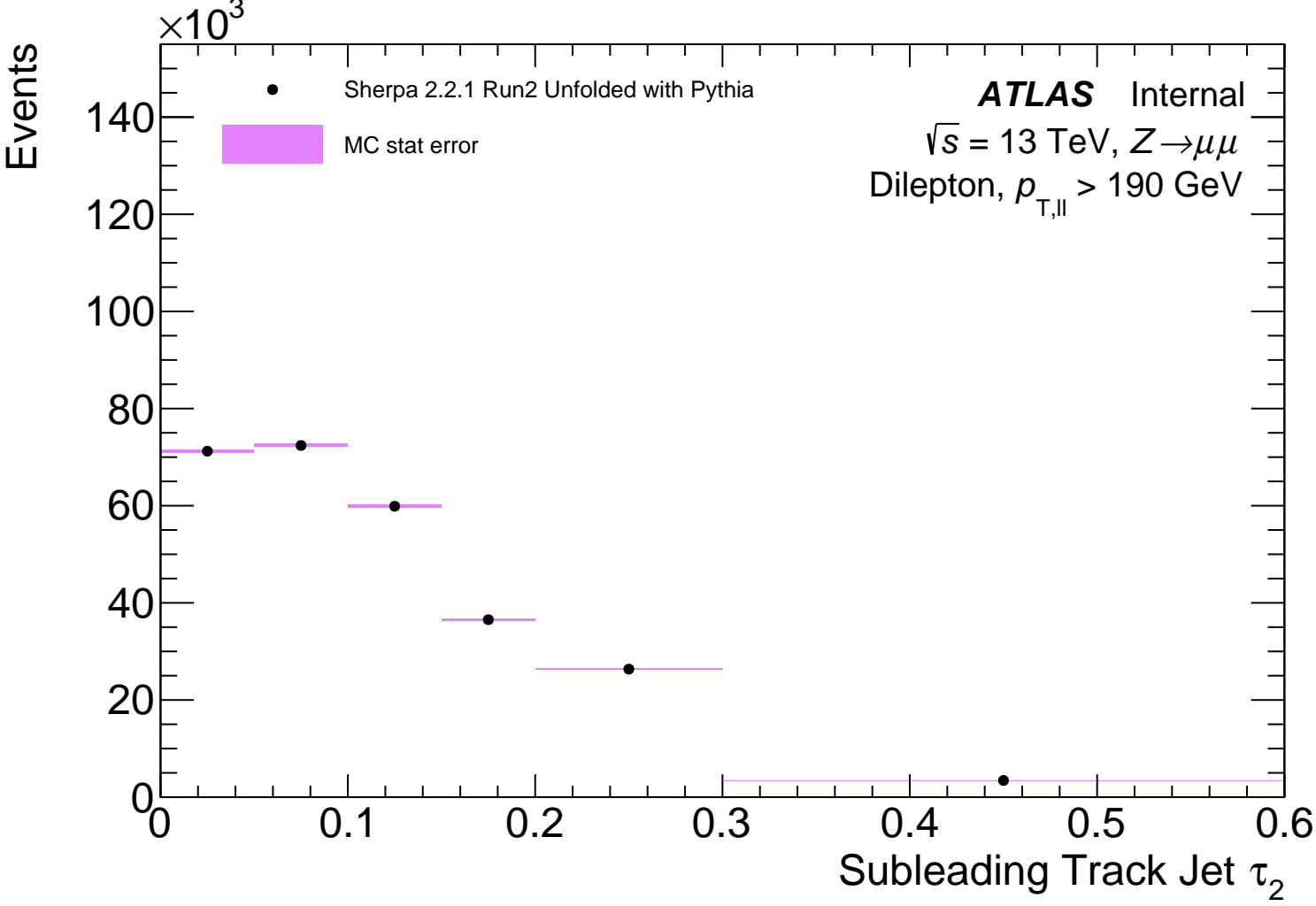
0.3

0.4

0.5

0.6

Subleading Track Jet τ_2



Events

$\times 10^3$

•

Sherpa 2.2.1 Run2 Unfolded with Pythia



Data stat error

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

140

120

100

80

60

40

20

0

0.1

0.2

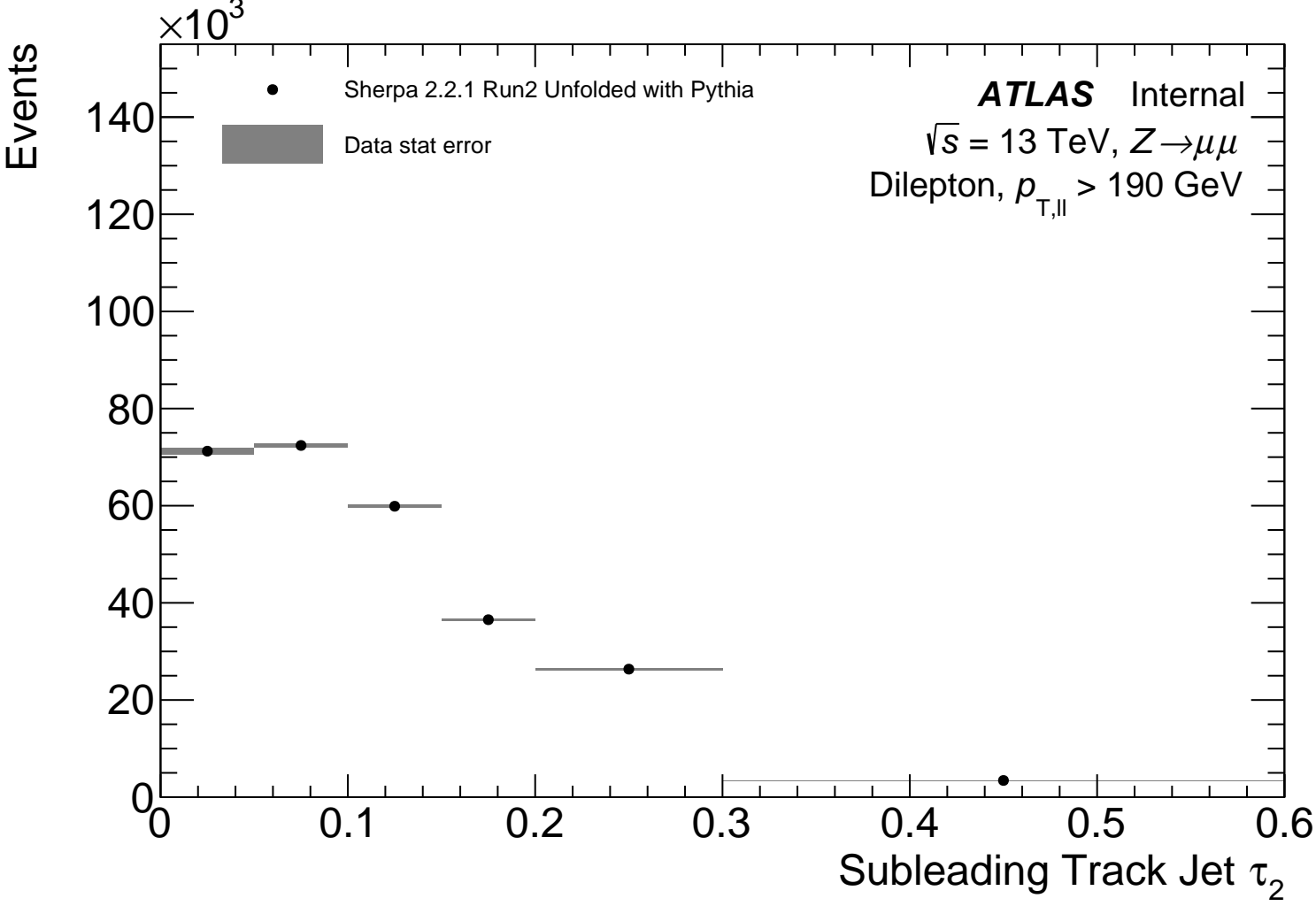
0.3

0.4

0.5

0.6

Subleading Track Jet τ_2



Events

$\times 10^3$

—●— Sherpa 2.2.1 Run2 Unfolded with Pythia

■ Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

140

120

100

80

60

40

20

0

0.1

0.2

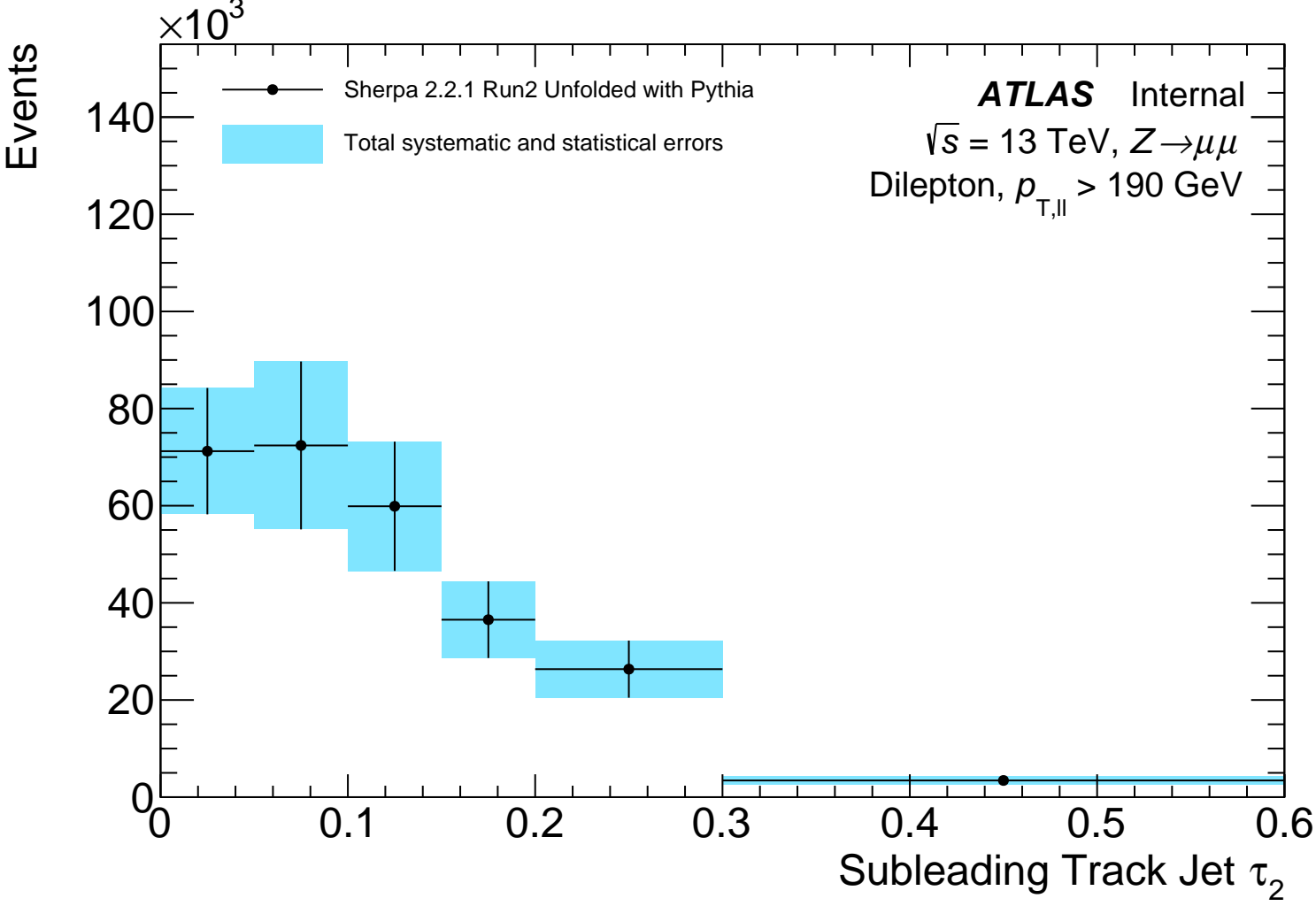
0.3

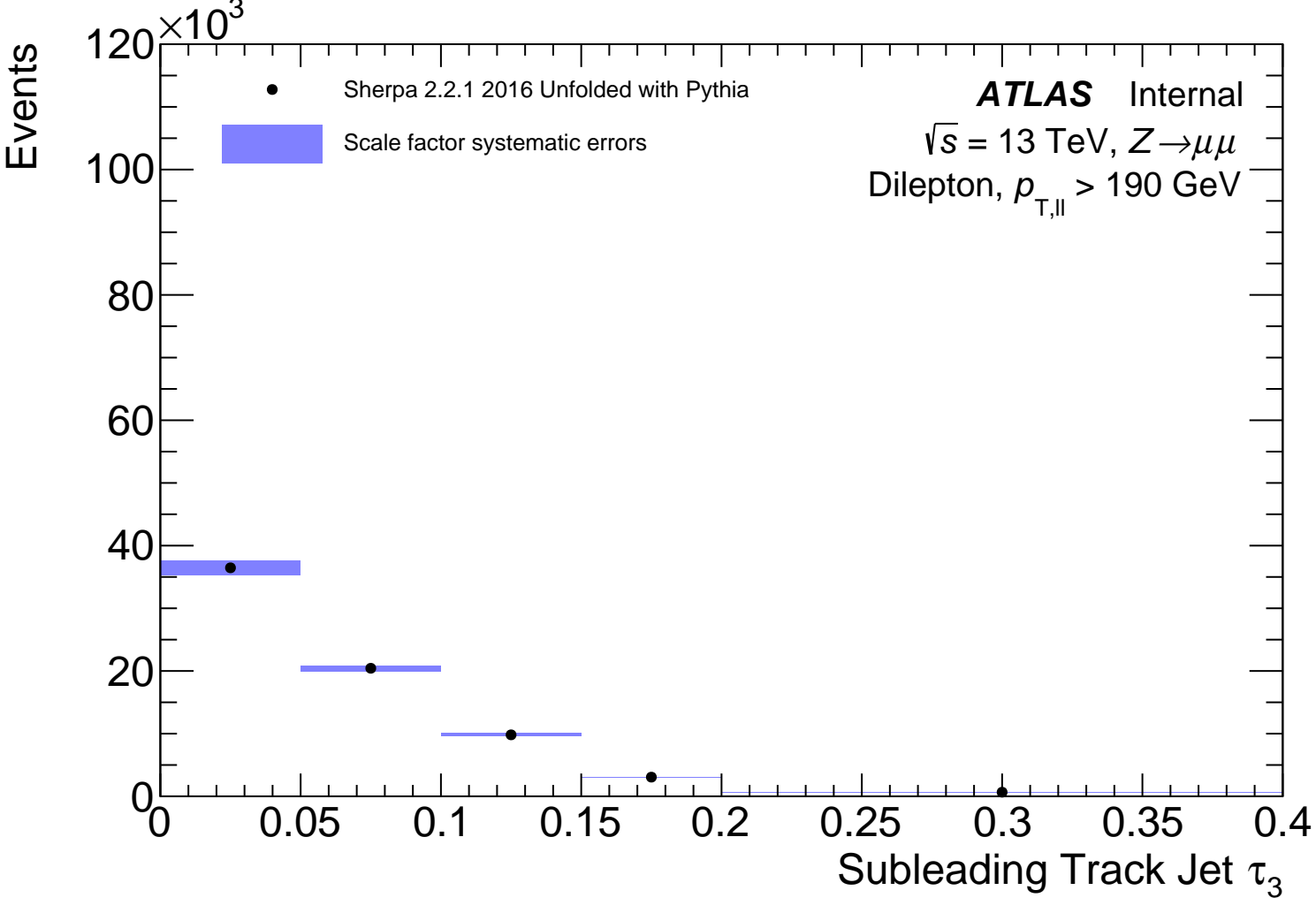
0.4

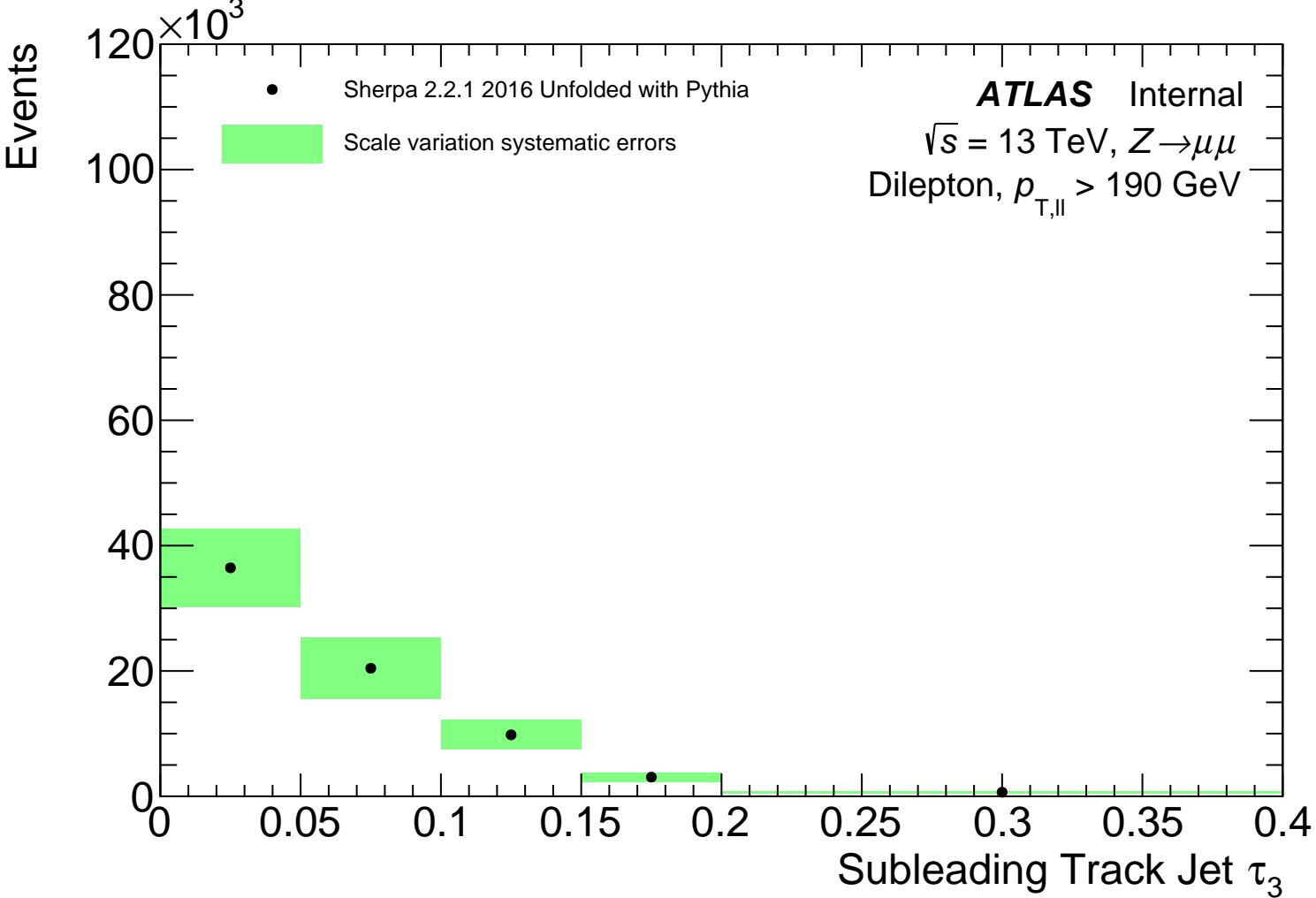
0.5

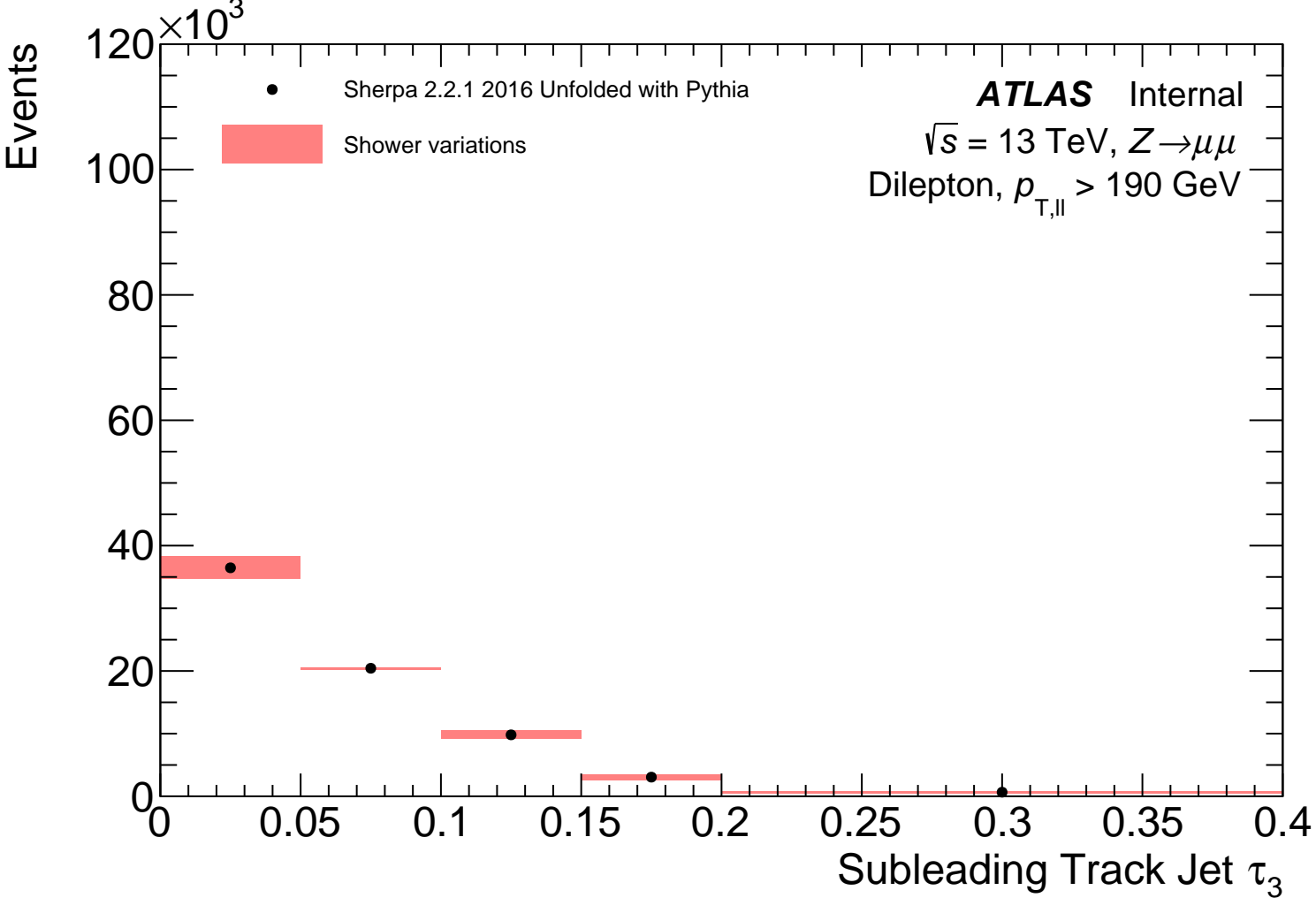
0.6

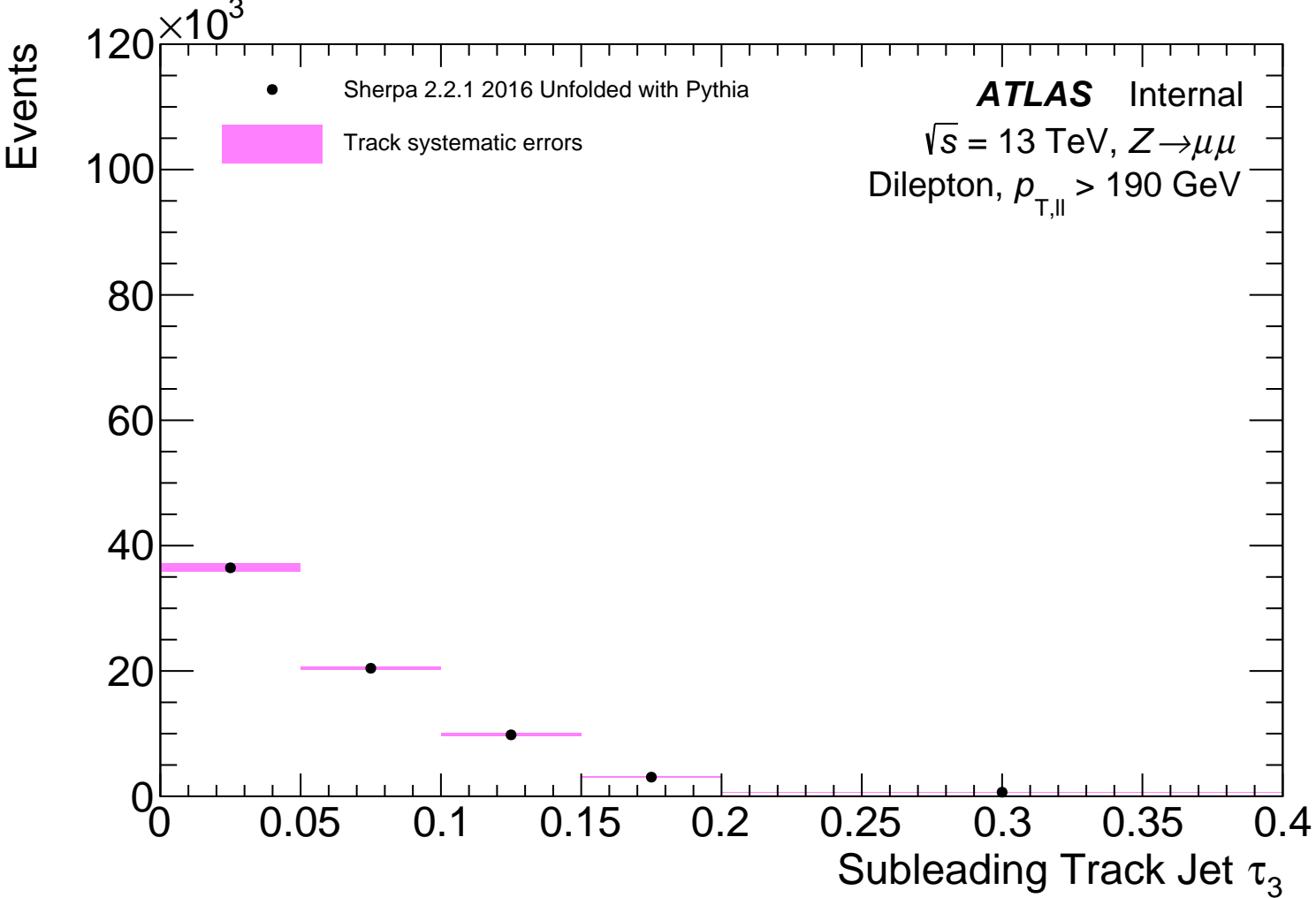
Subleading Track Jet τ_2

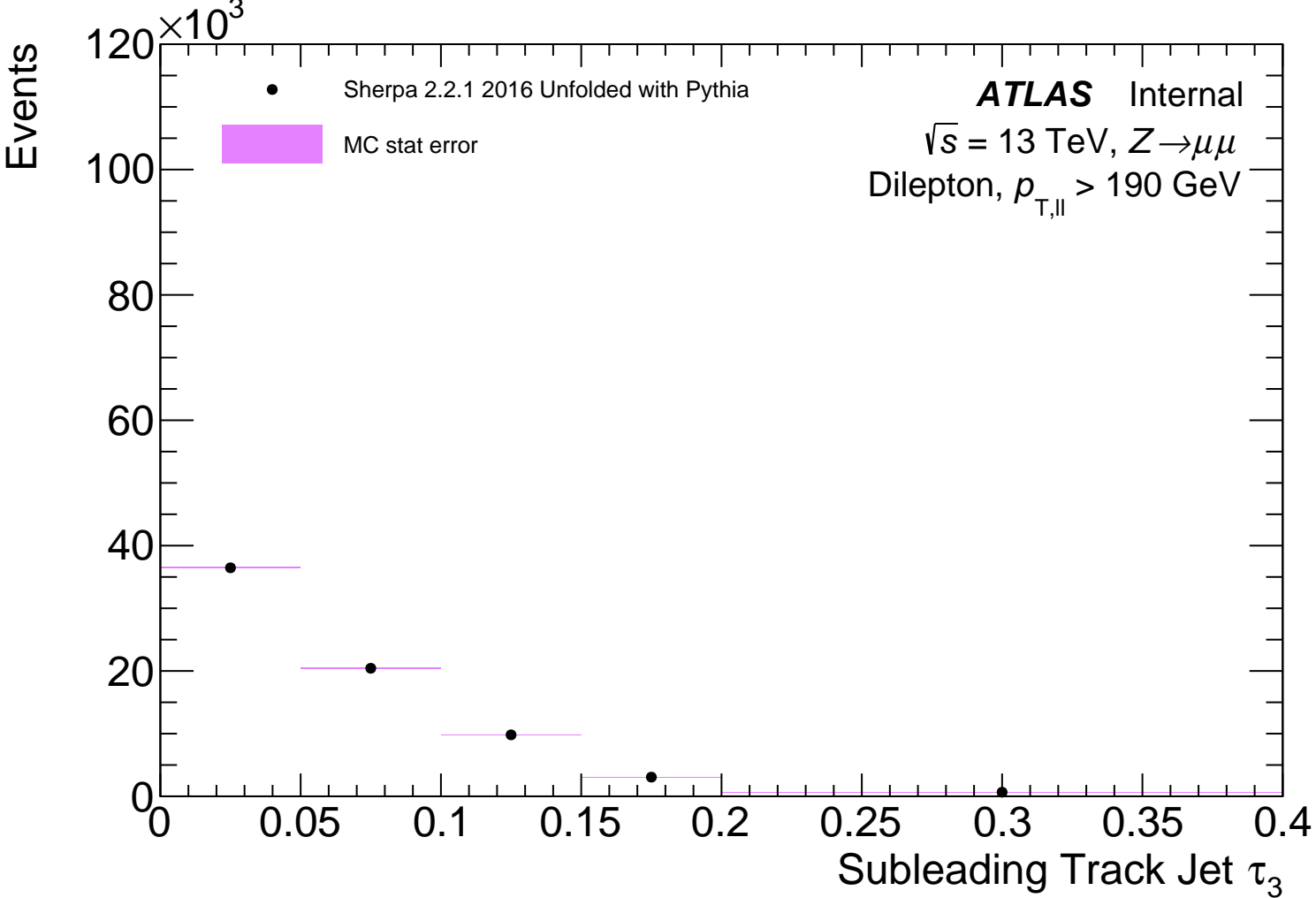


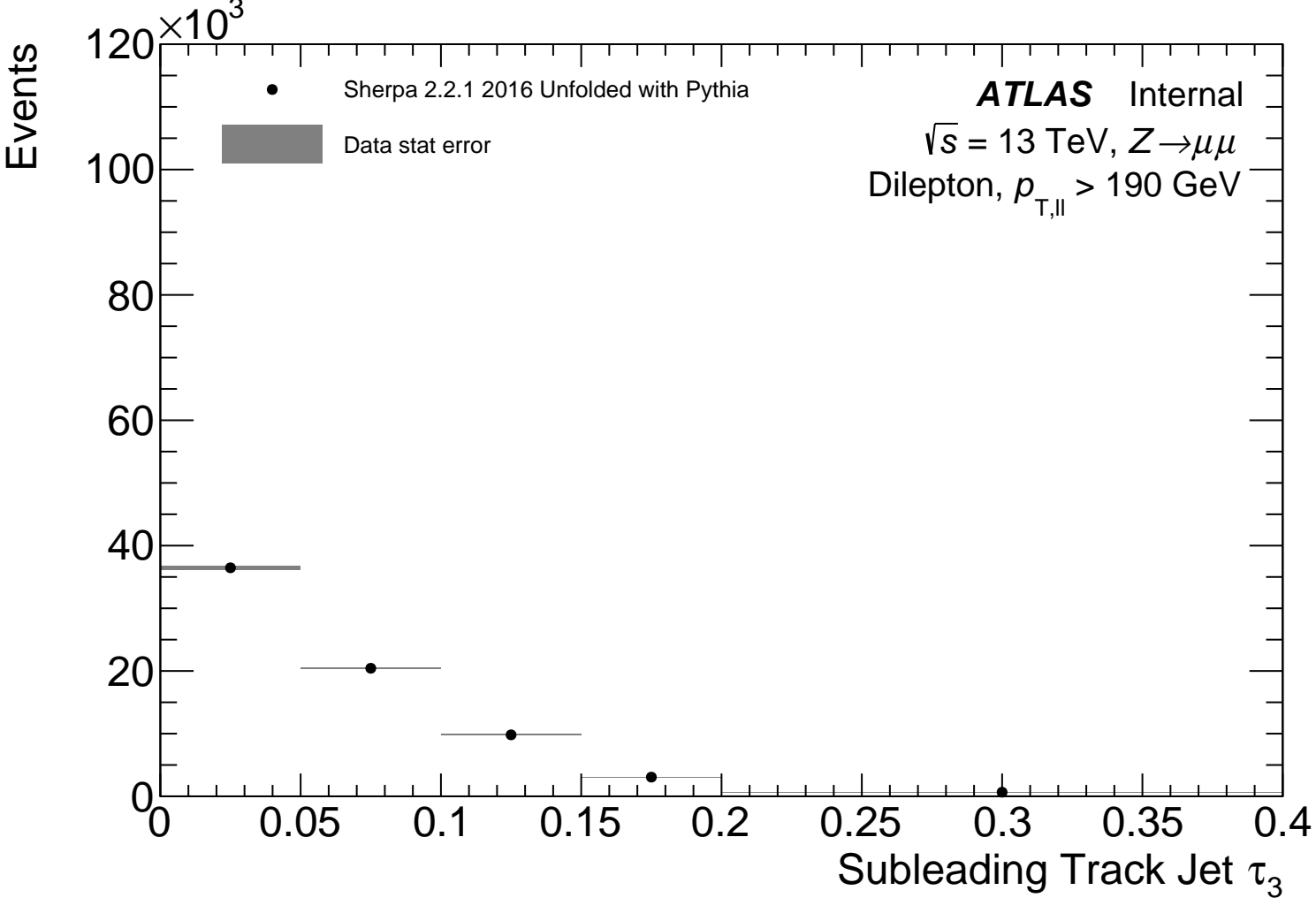


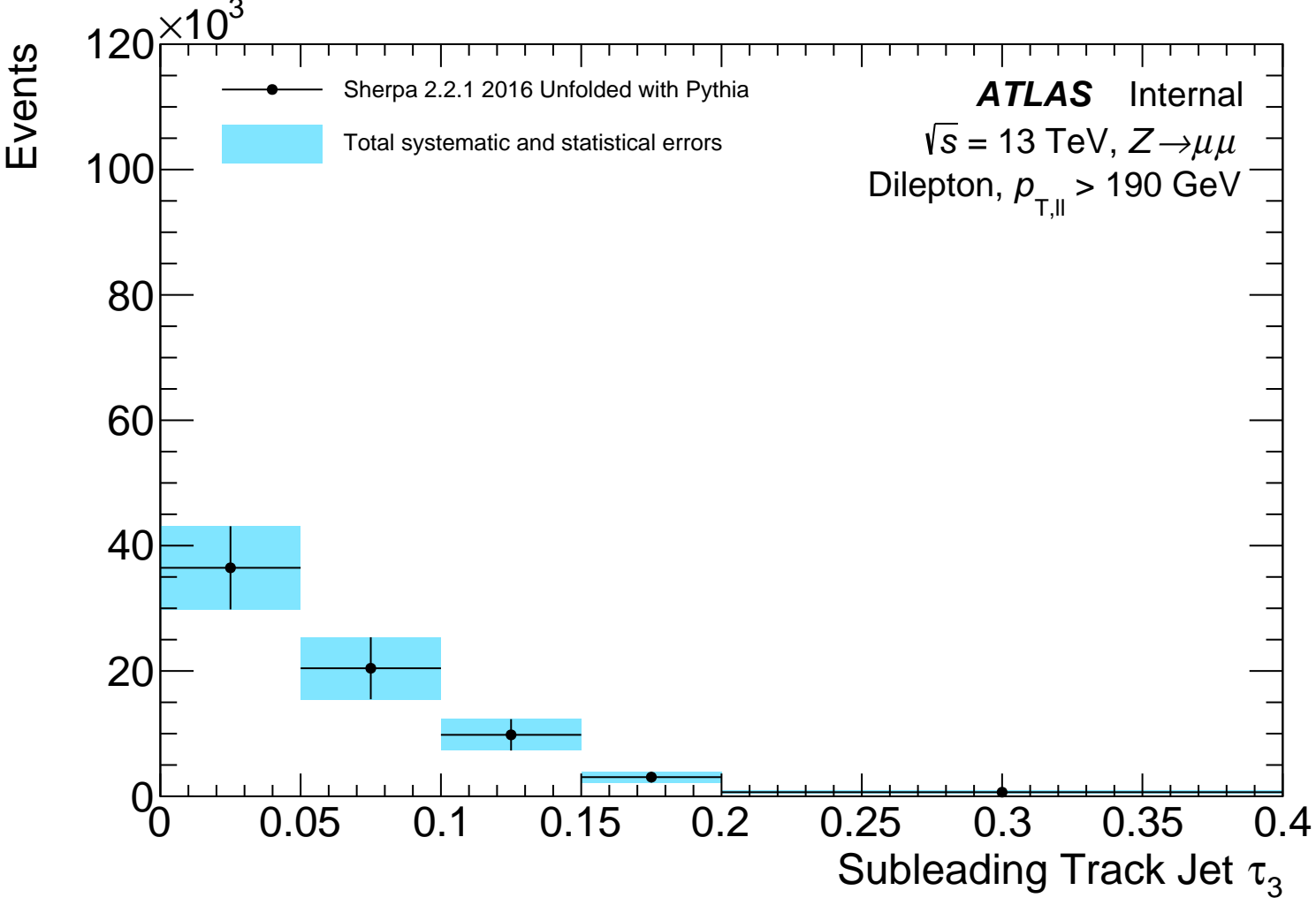


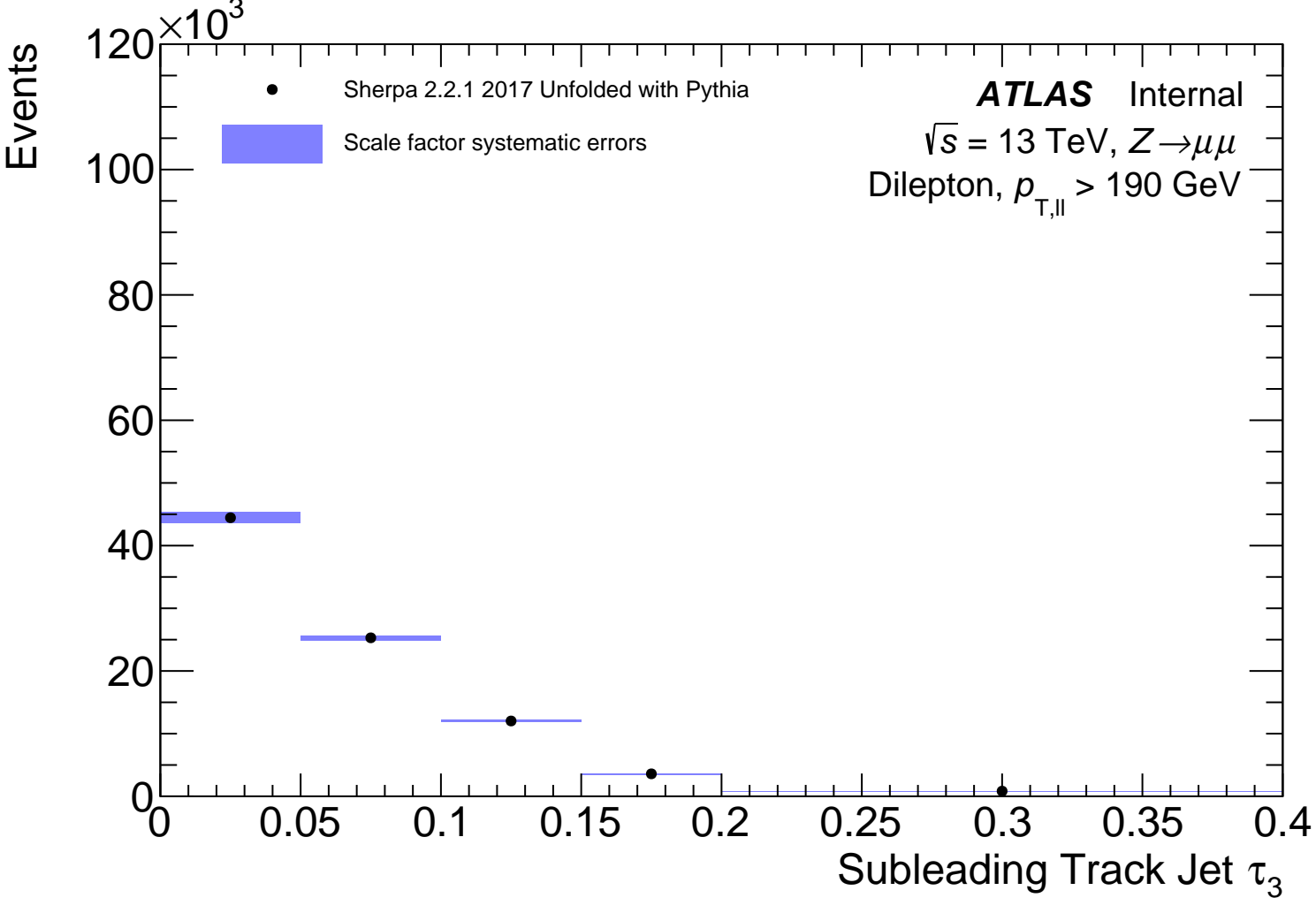


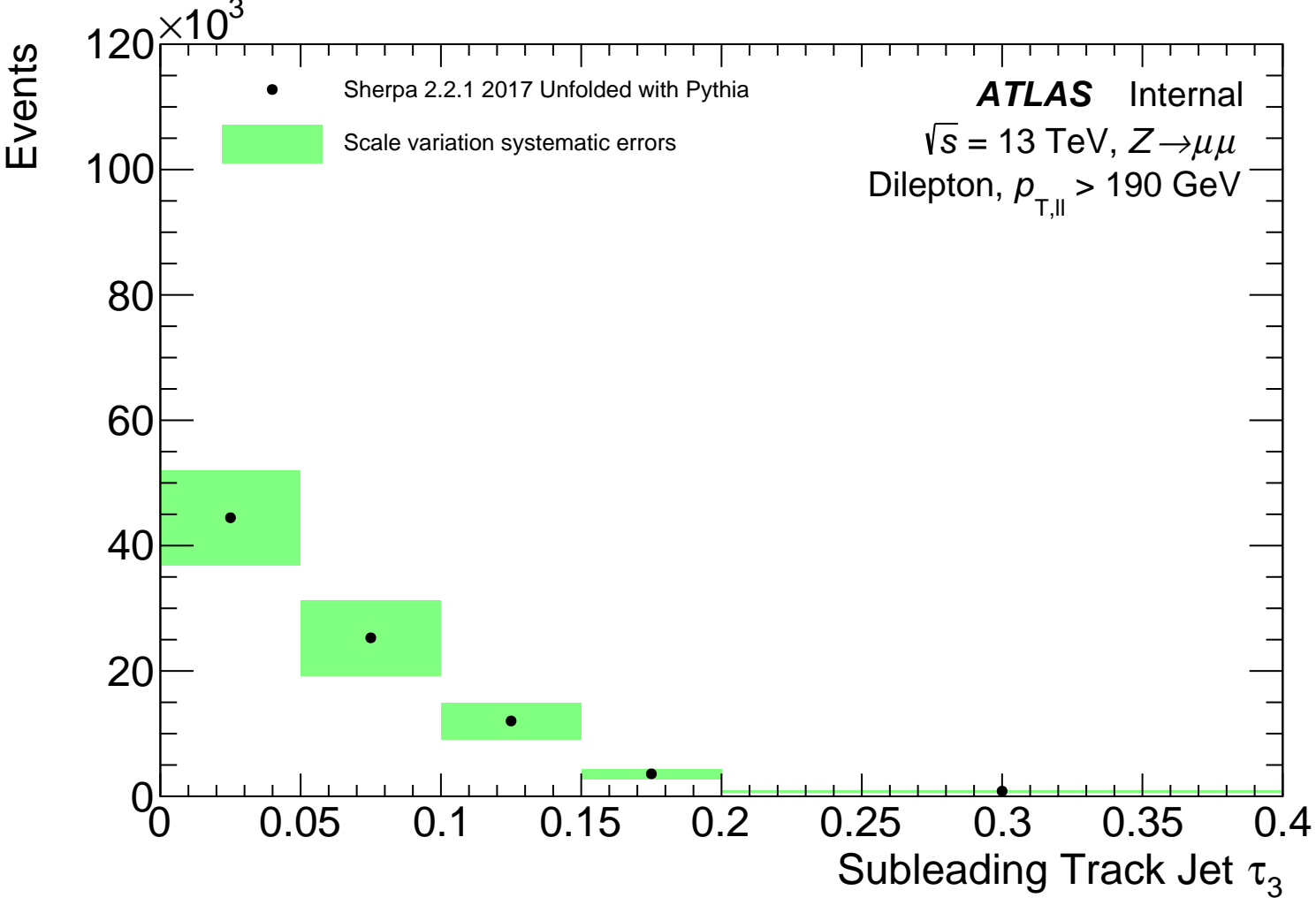


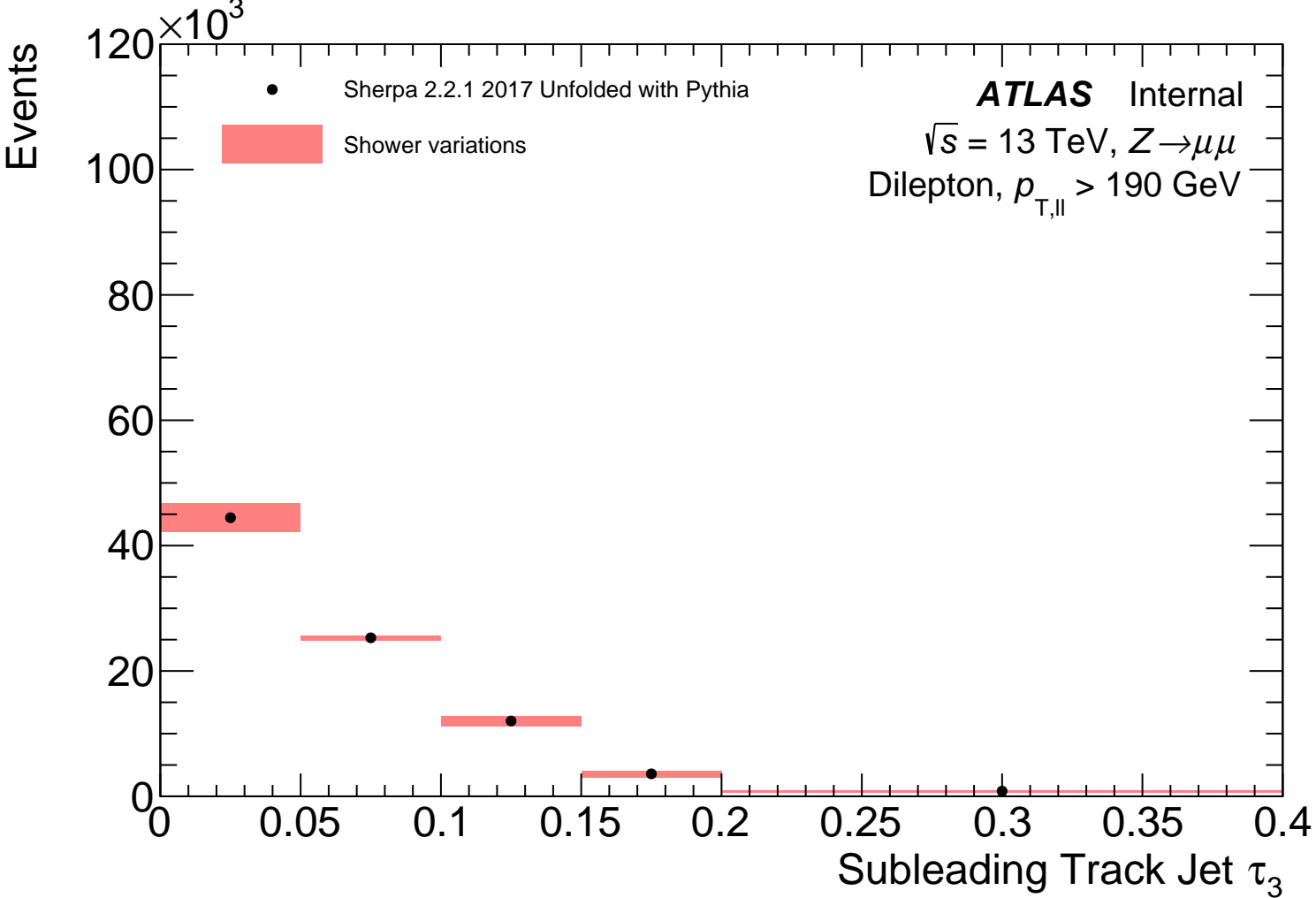


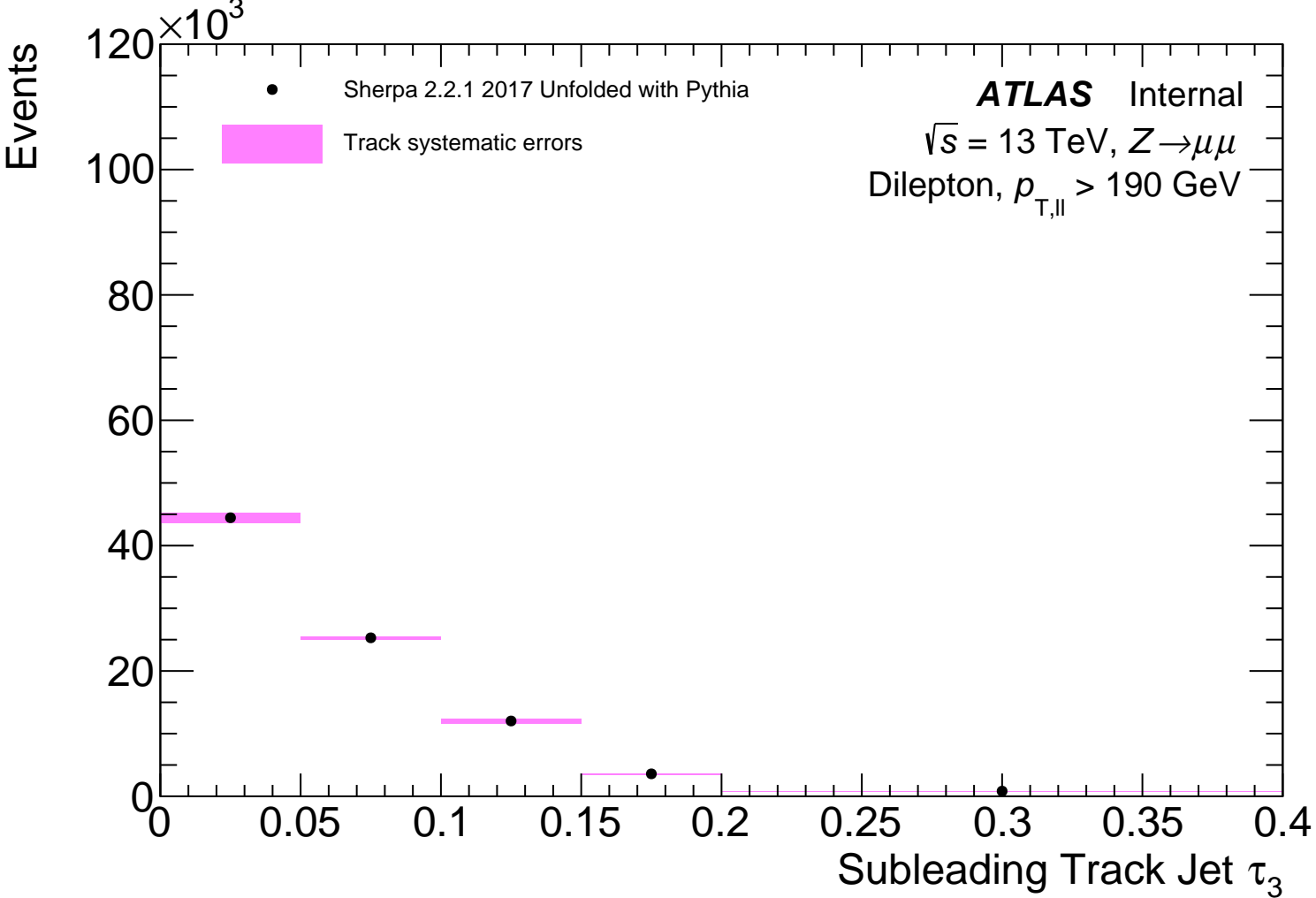


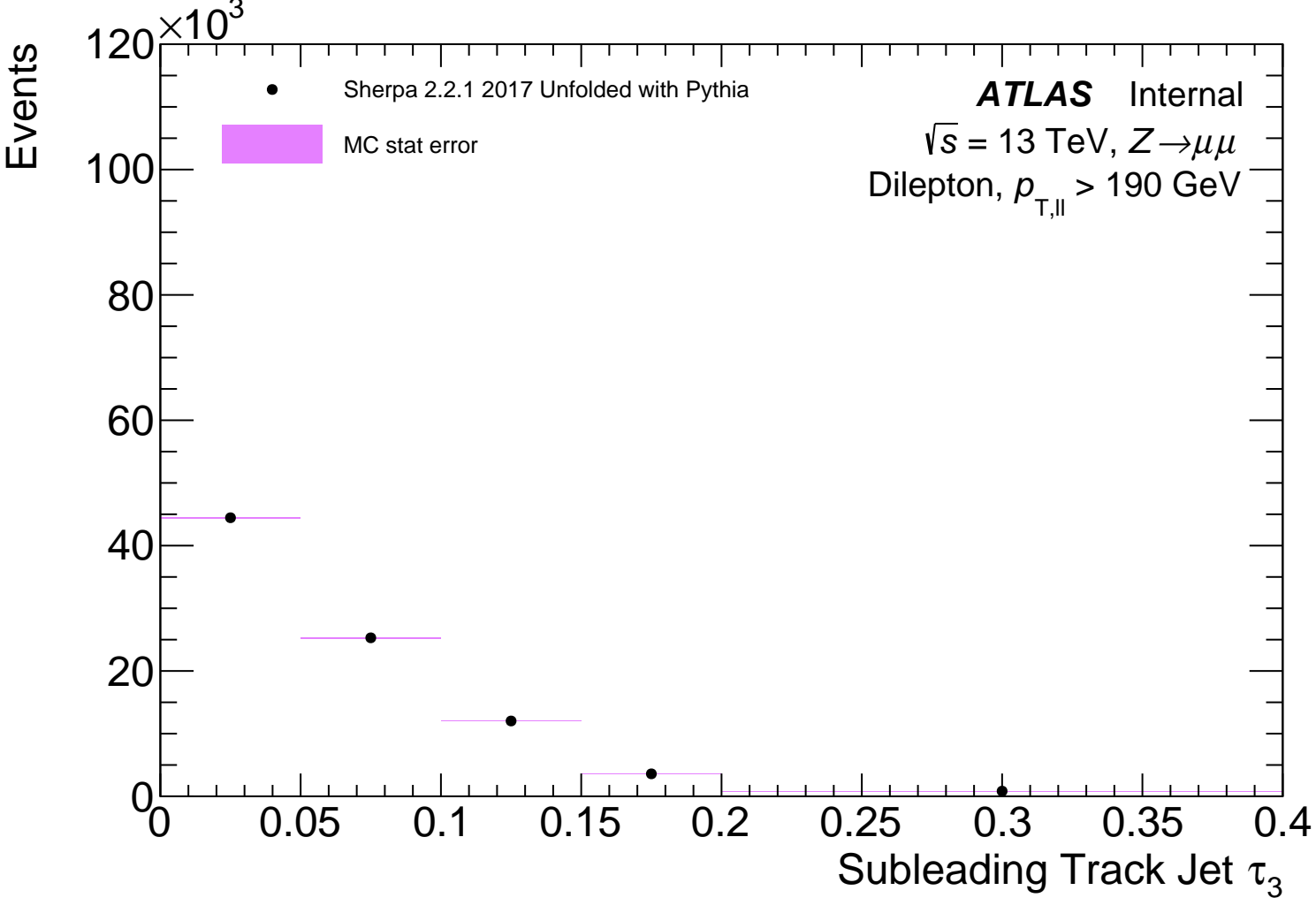


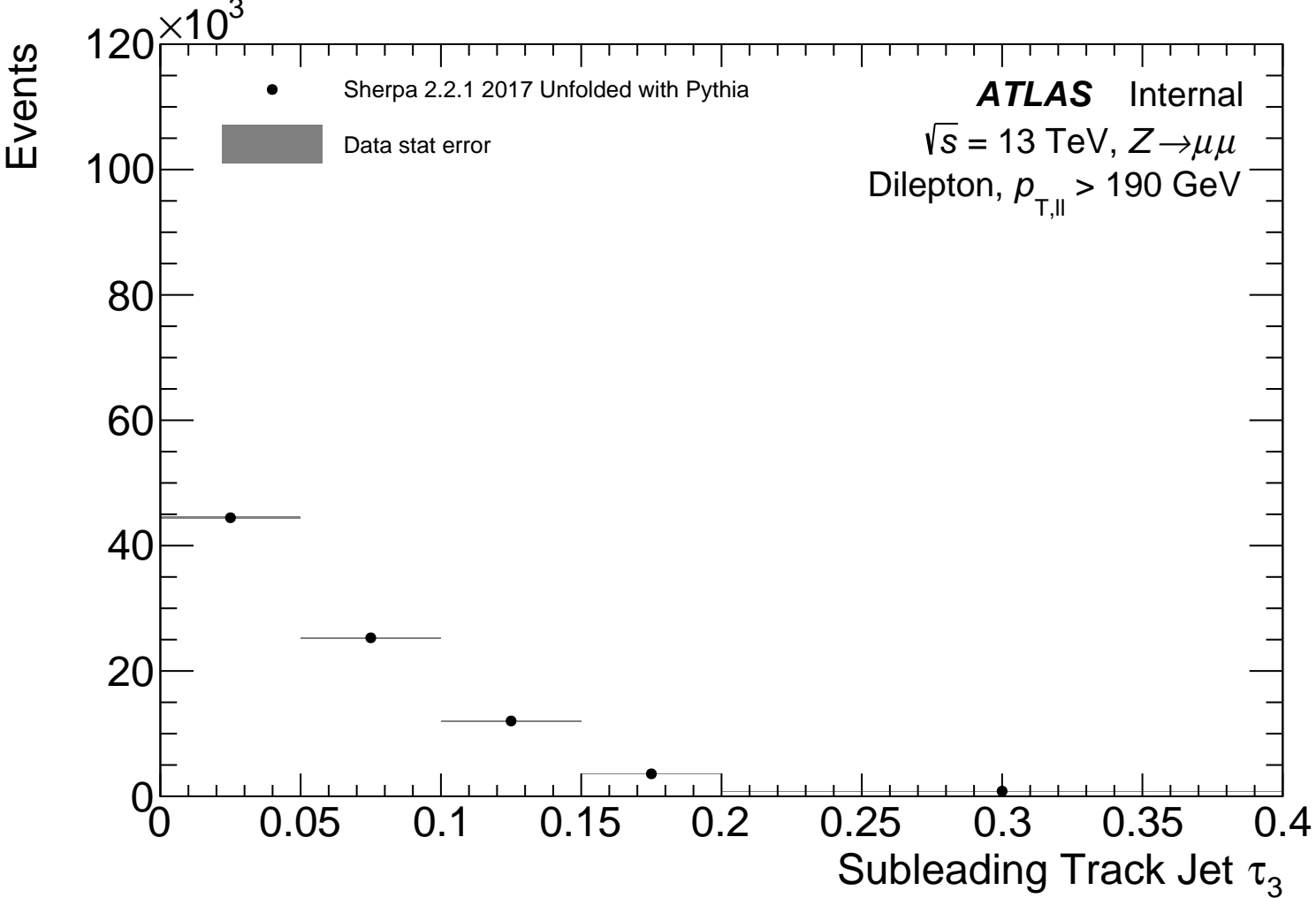


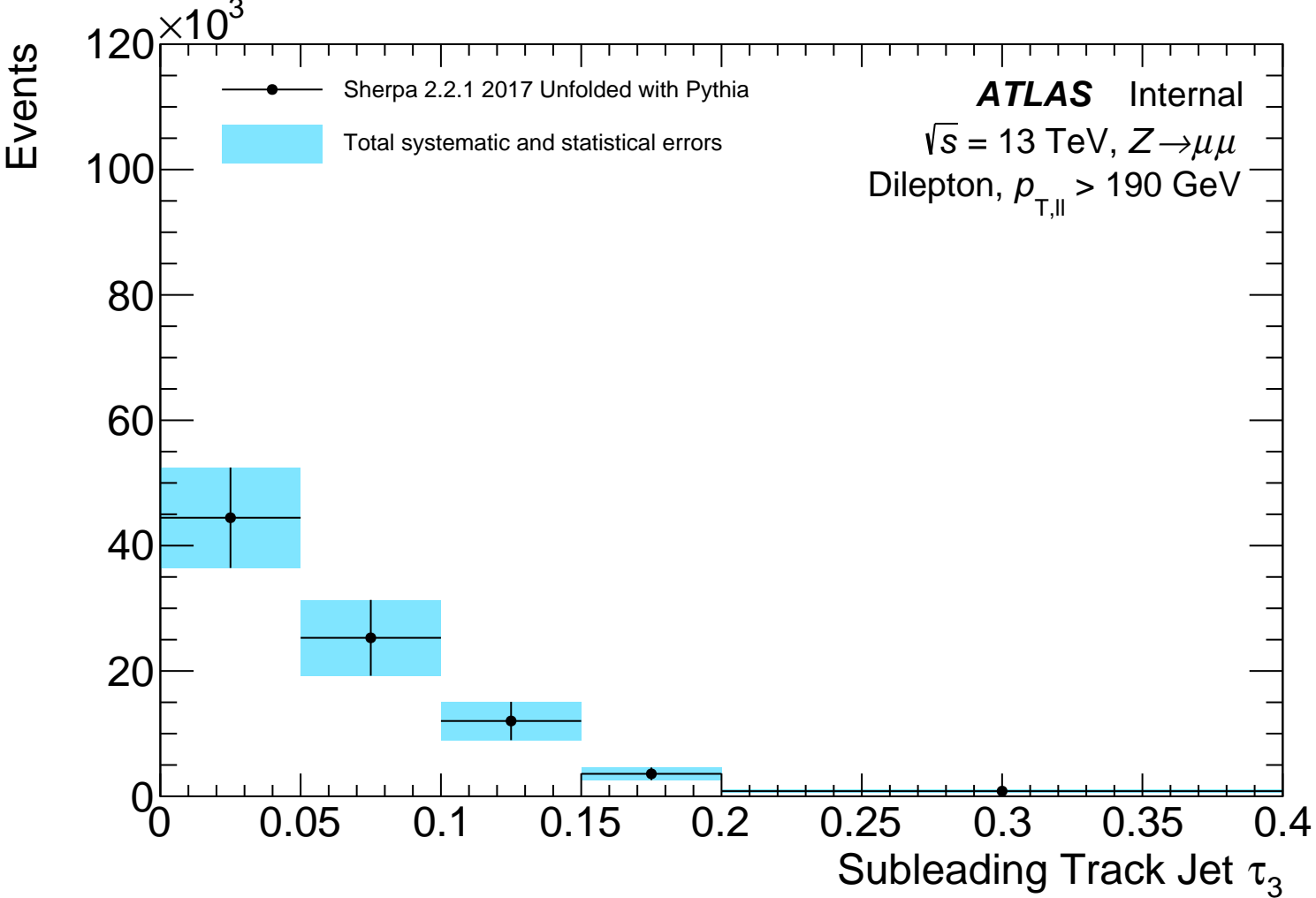


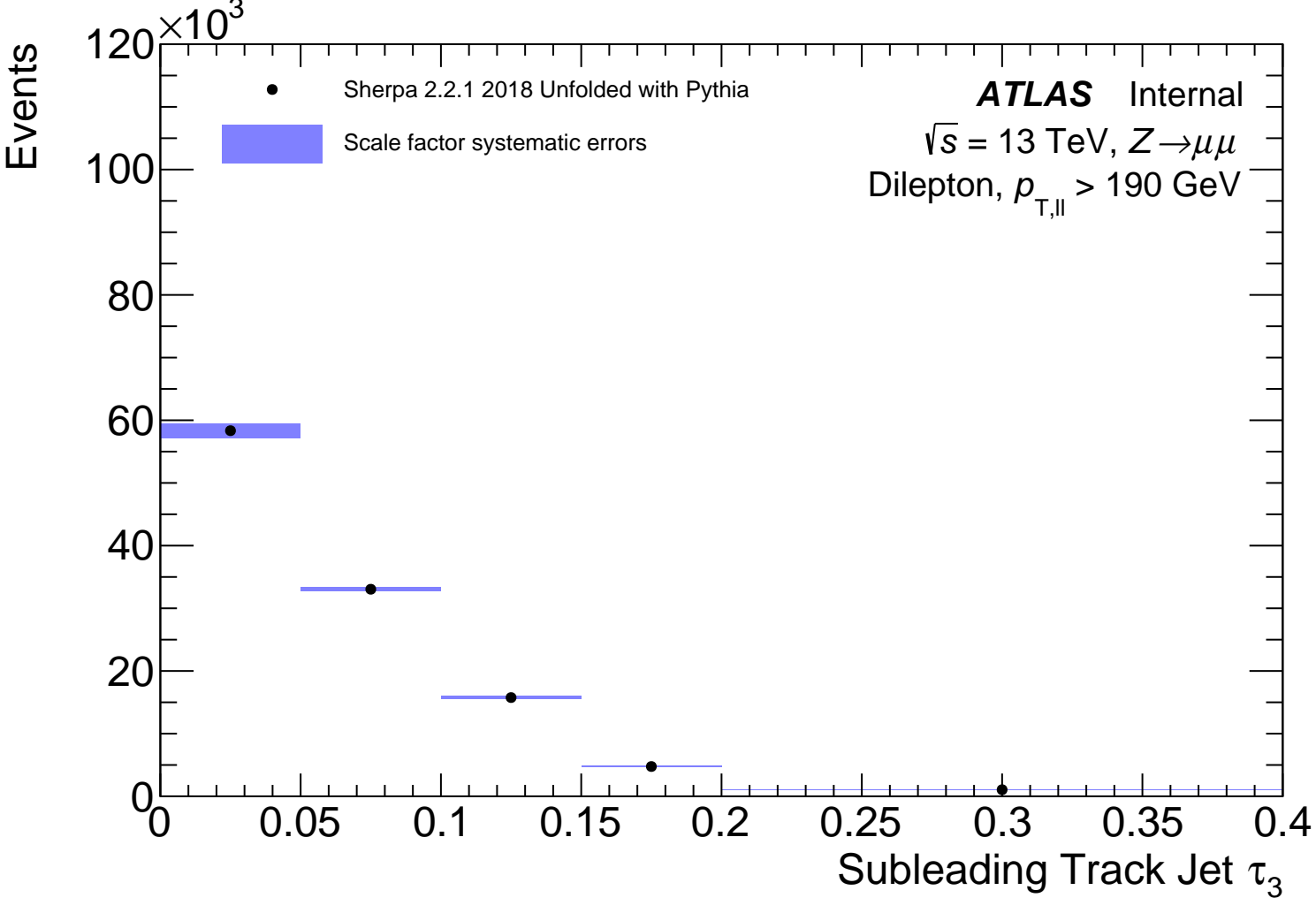


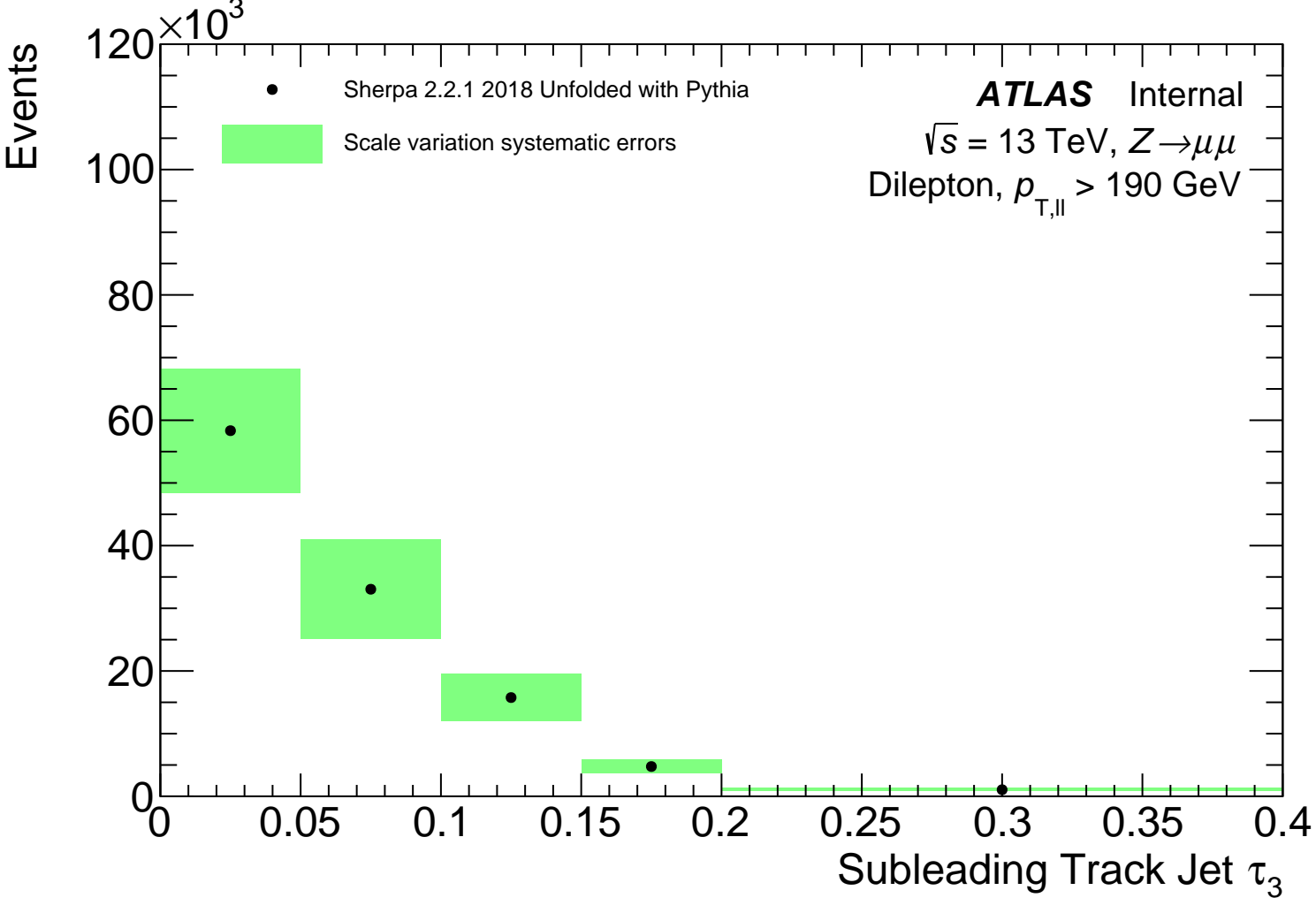


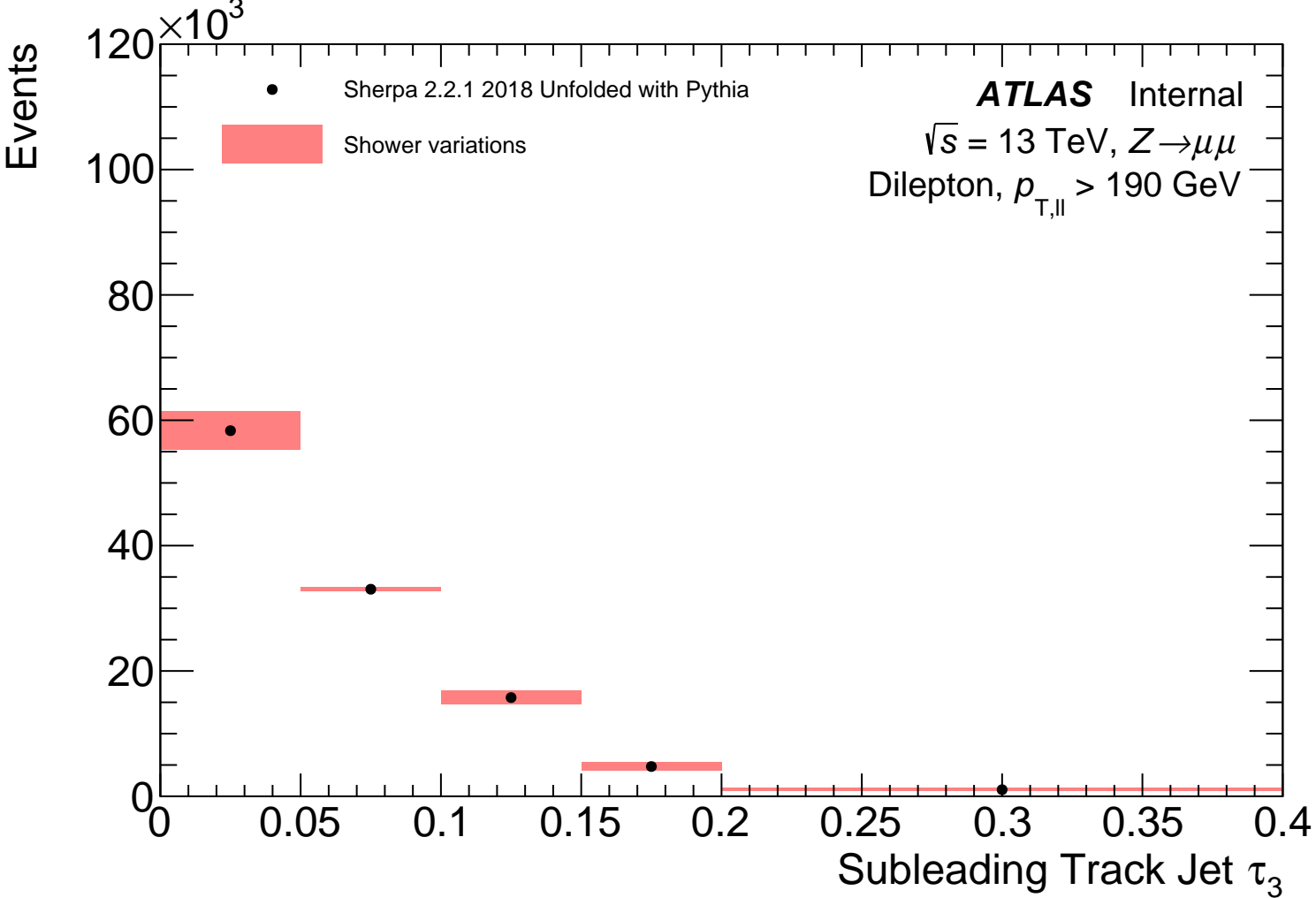


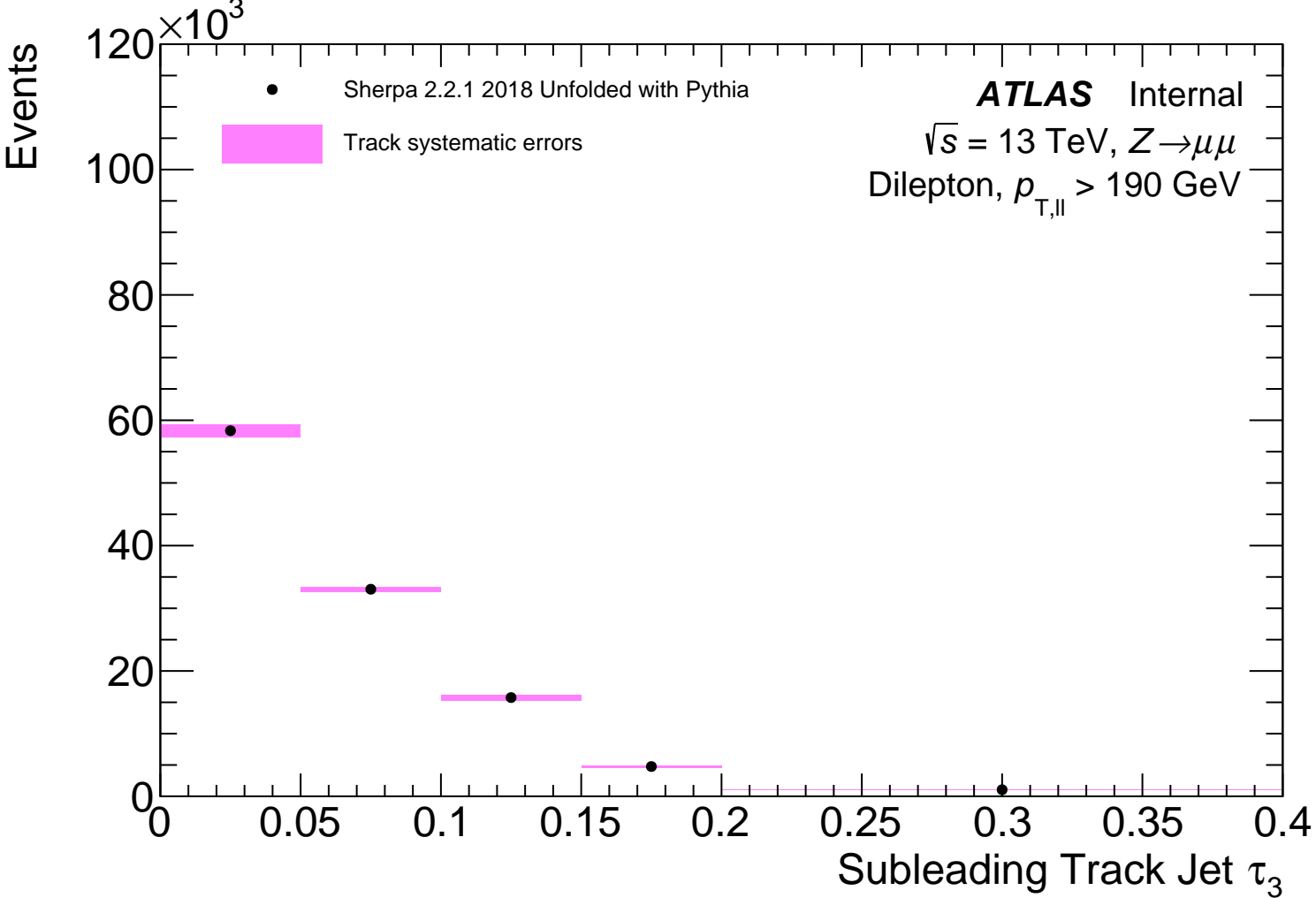


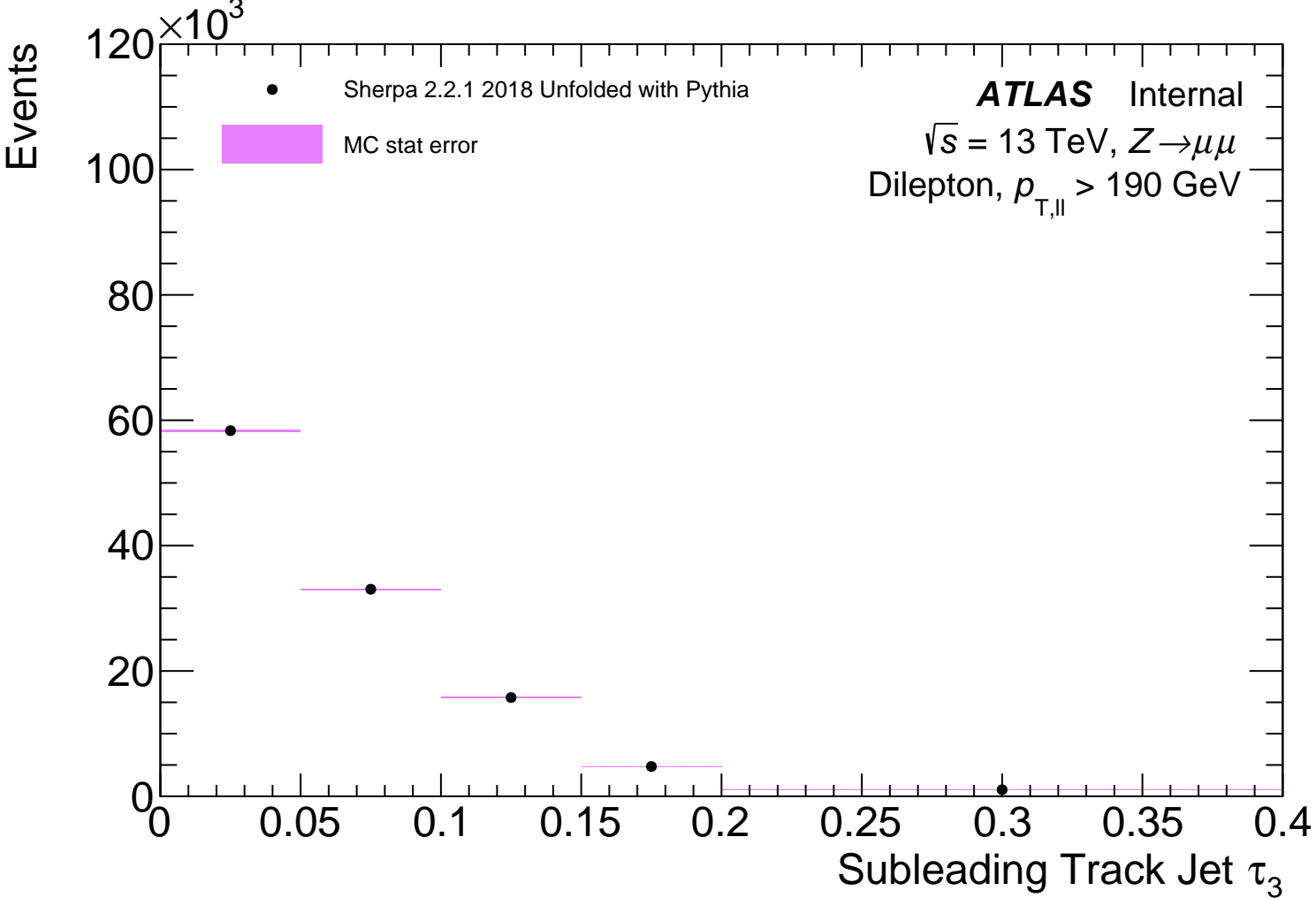


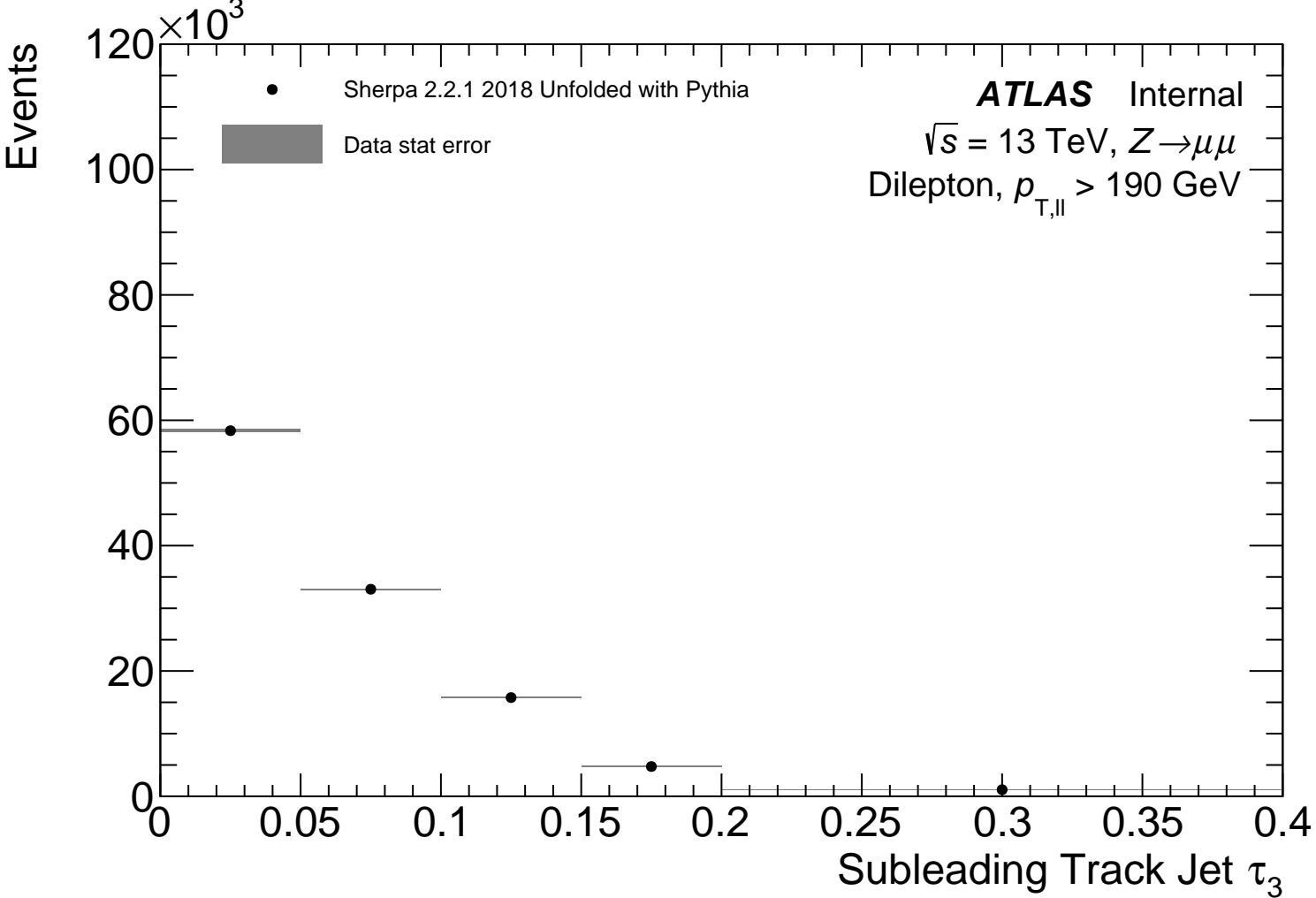


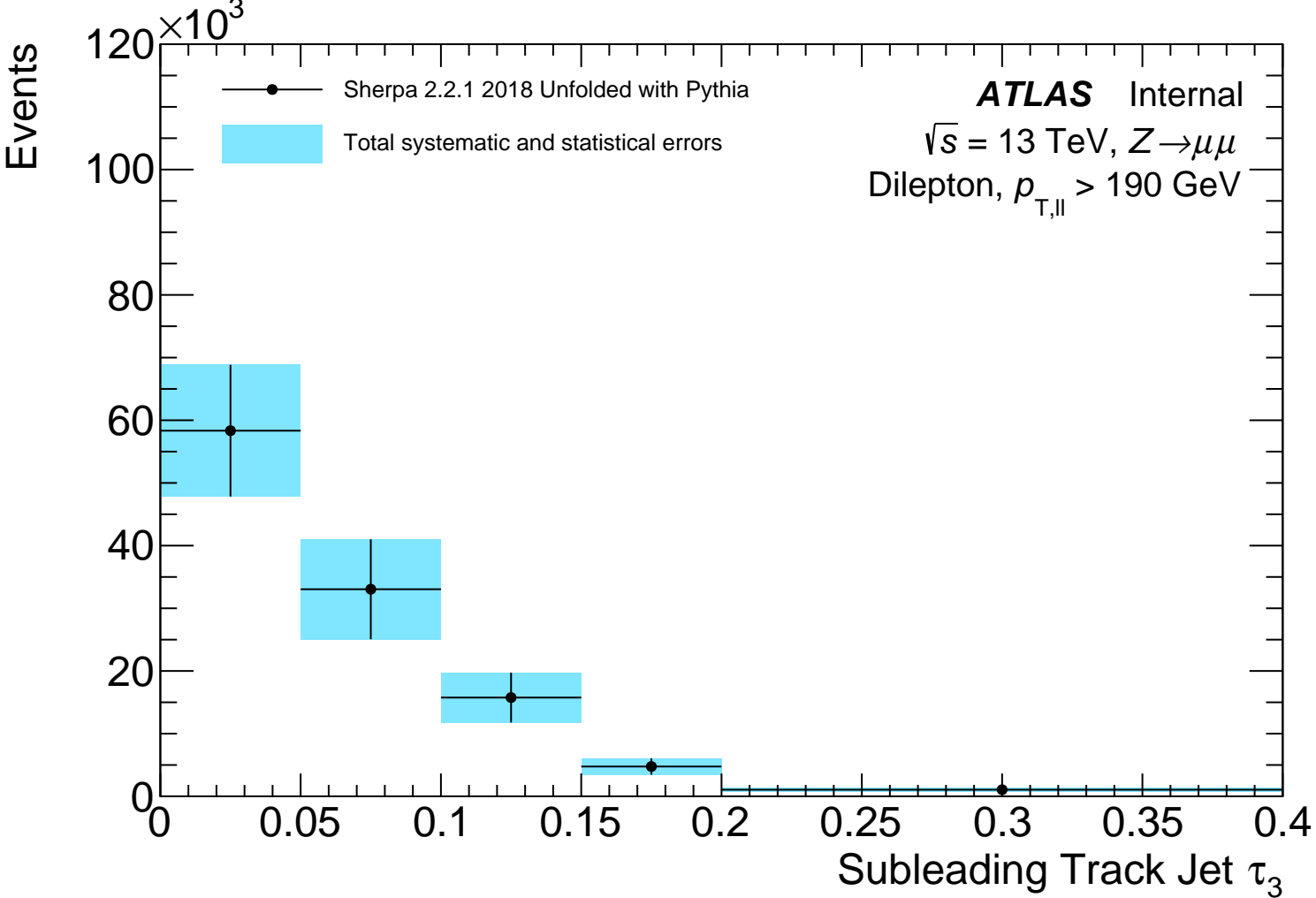


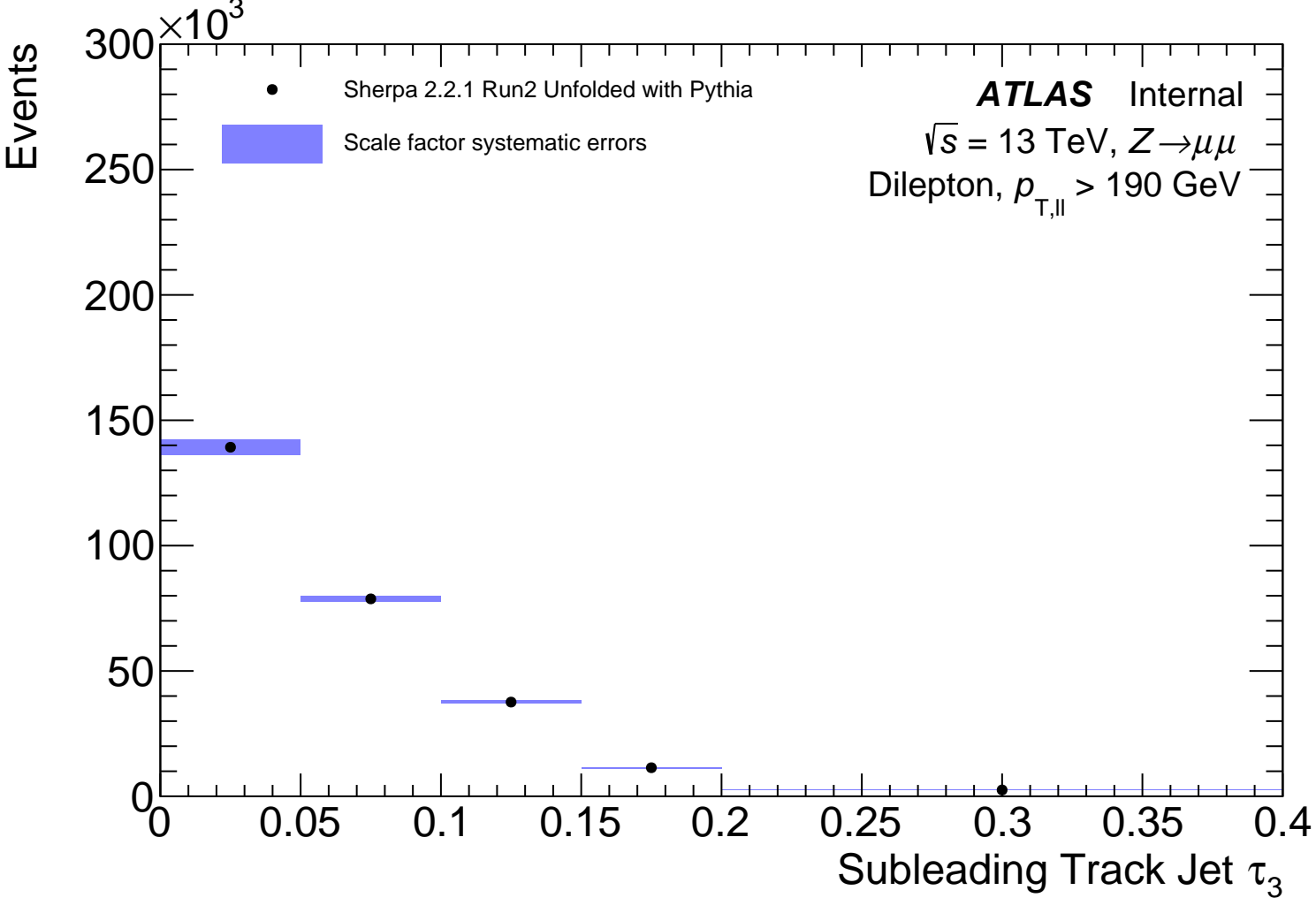


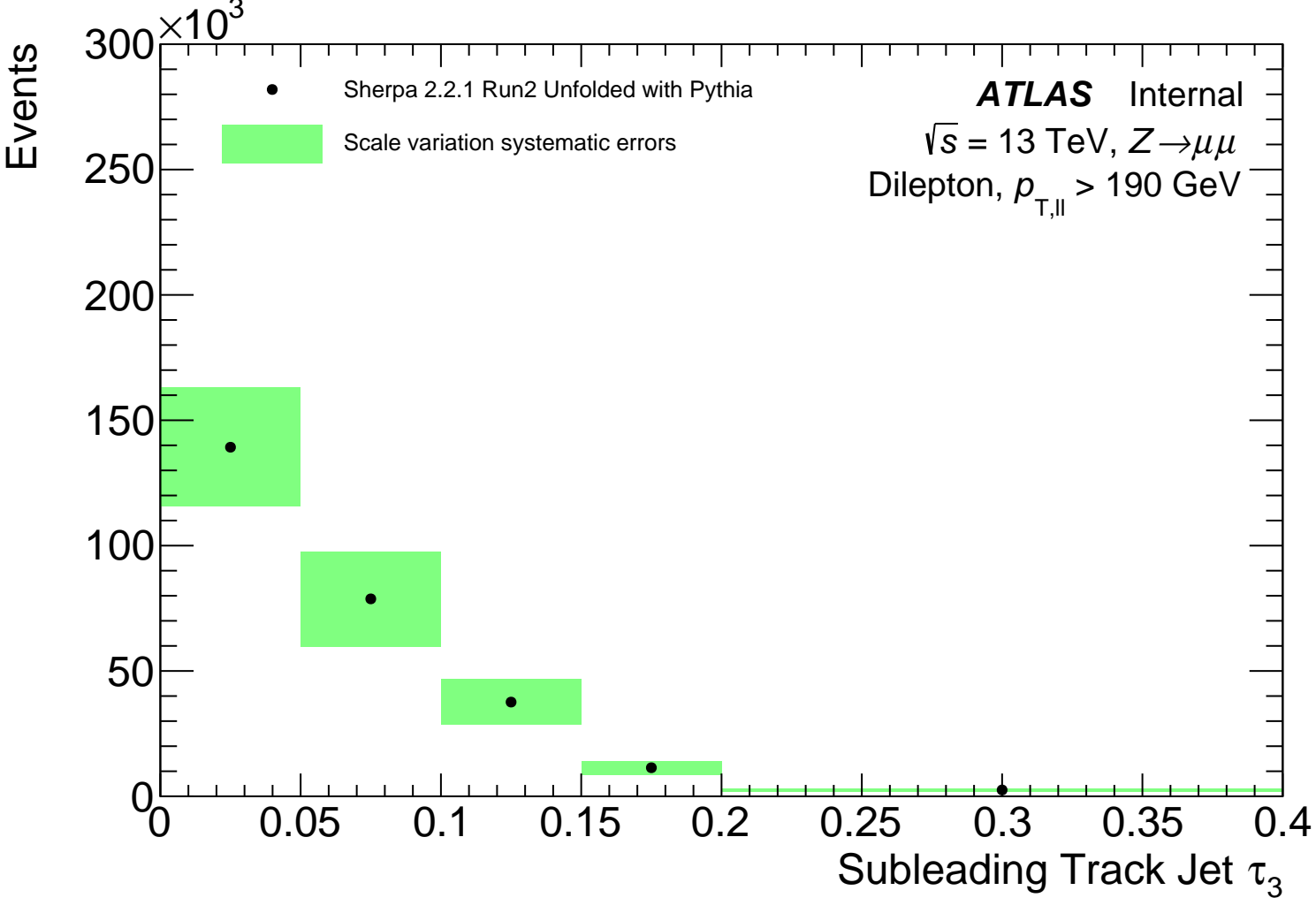


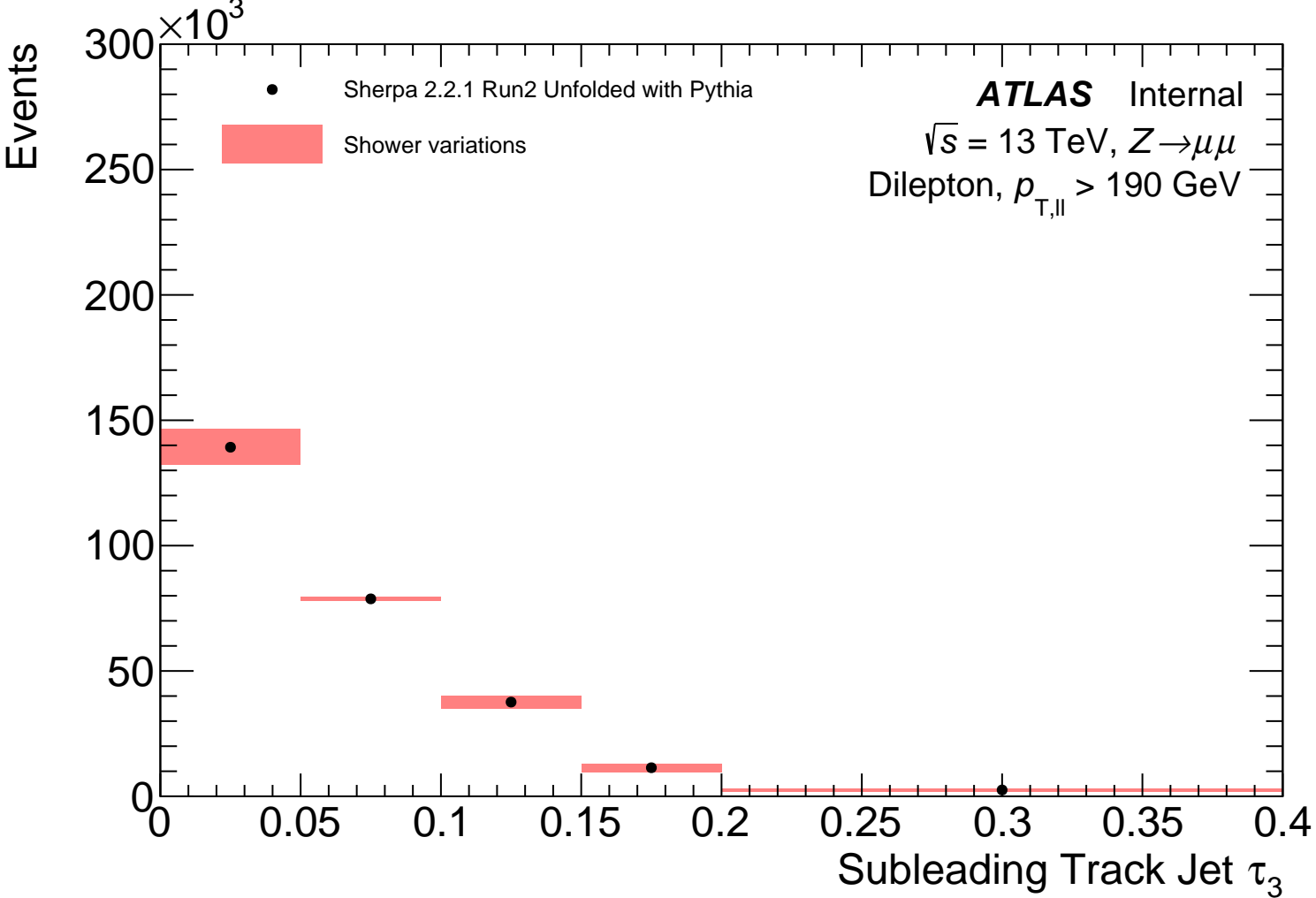


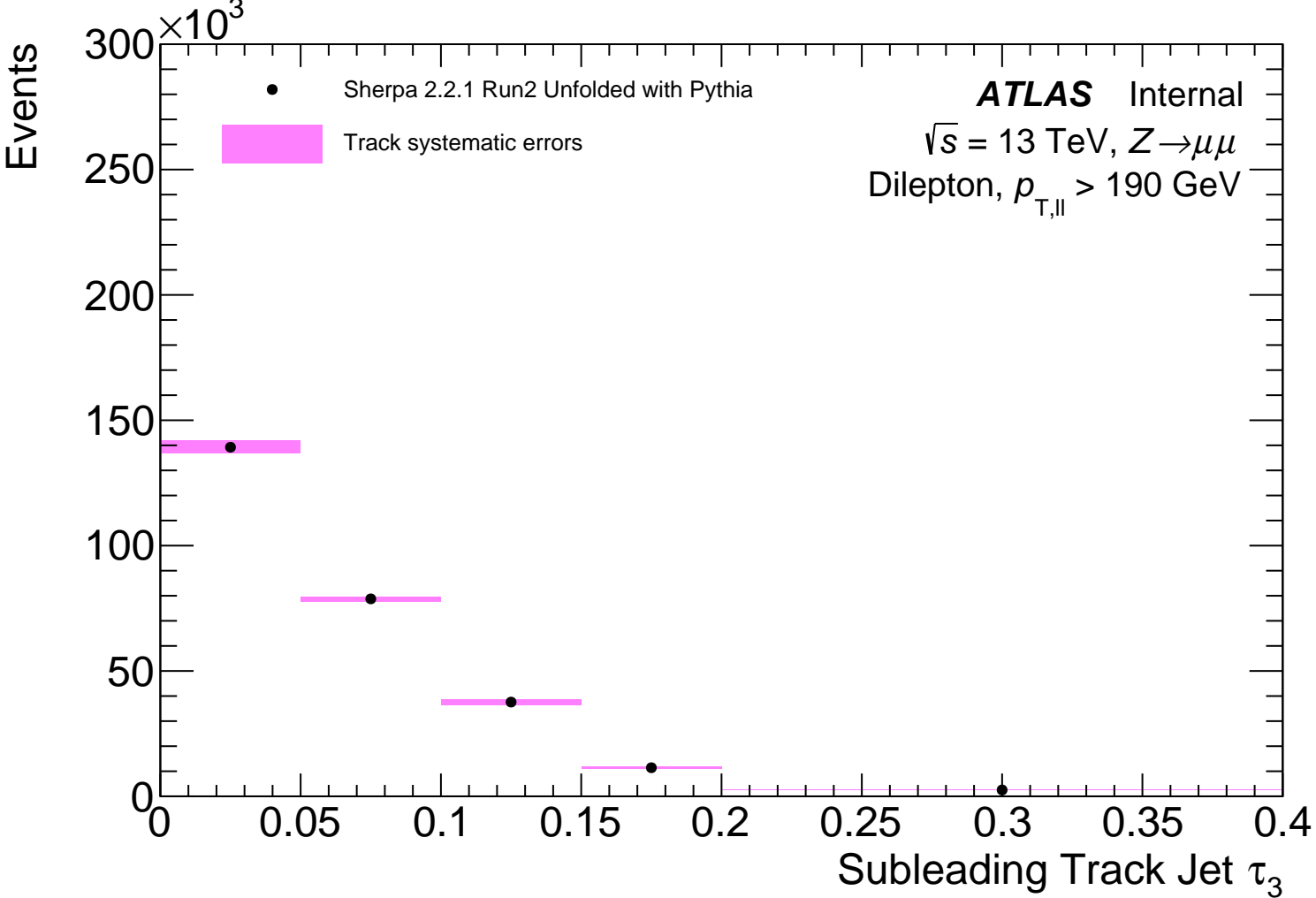


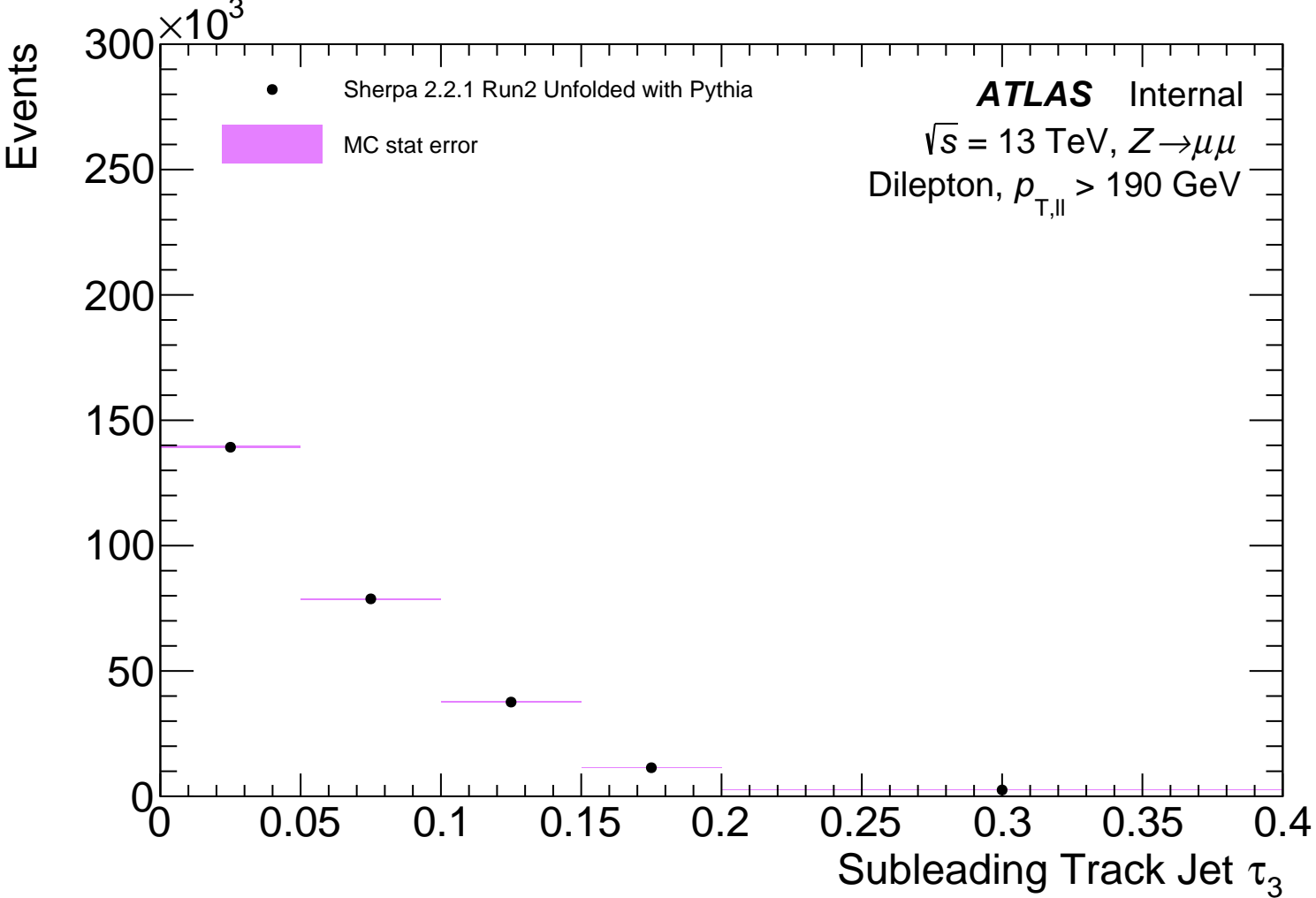


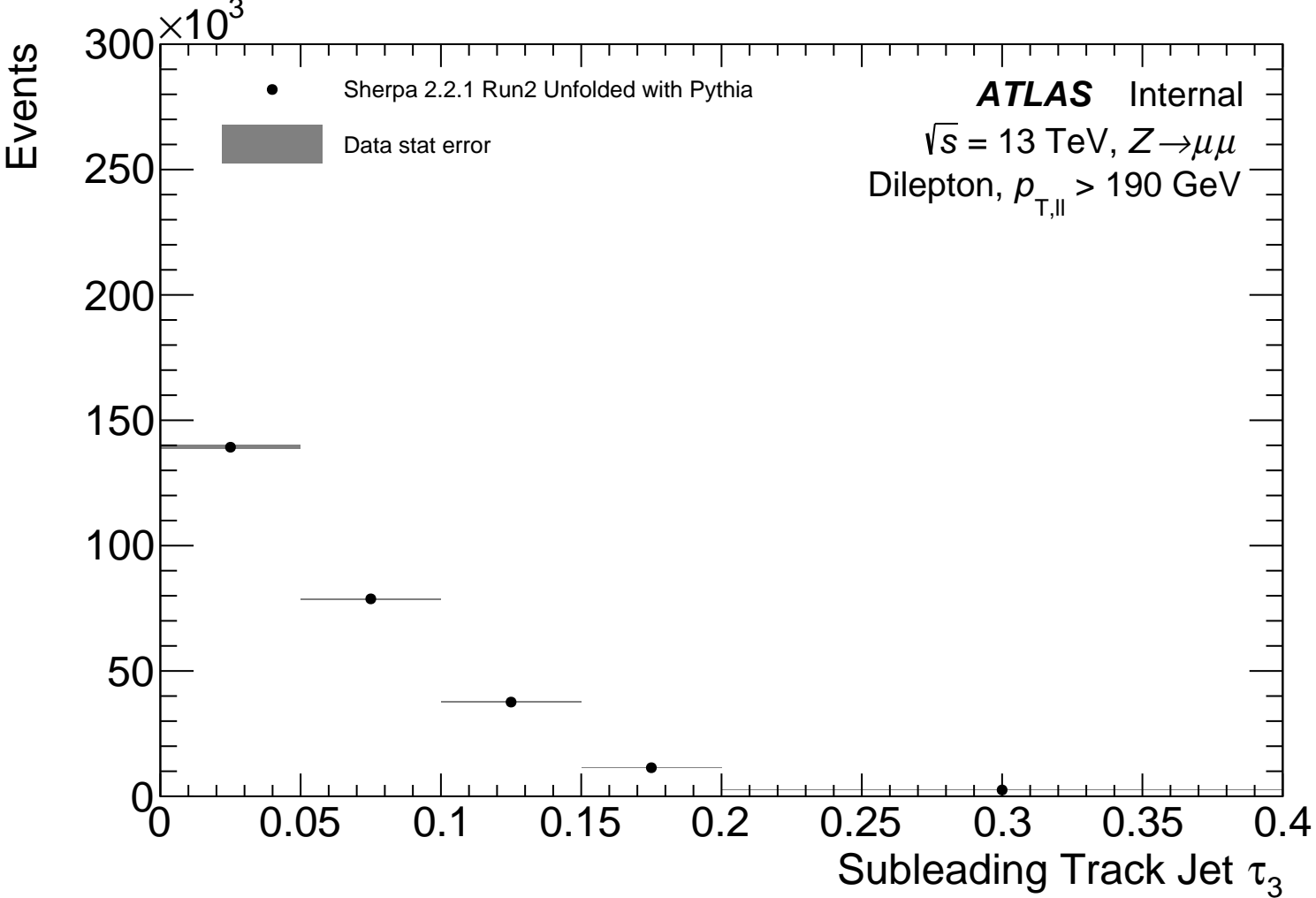


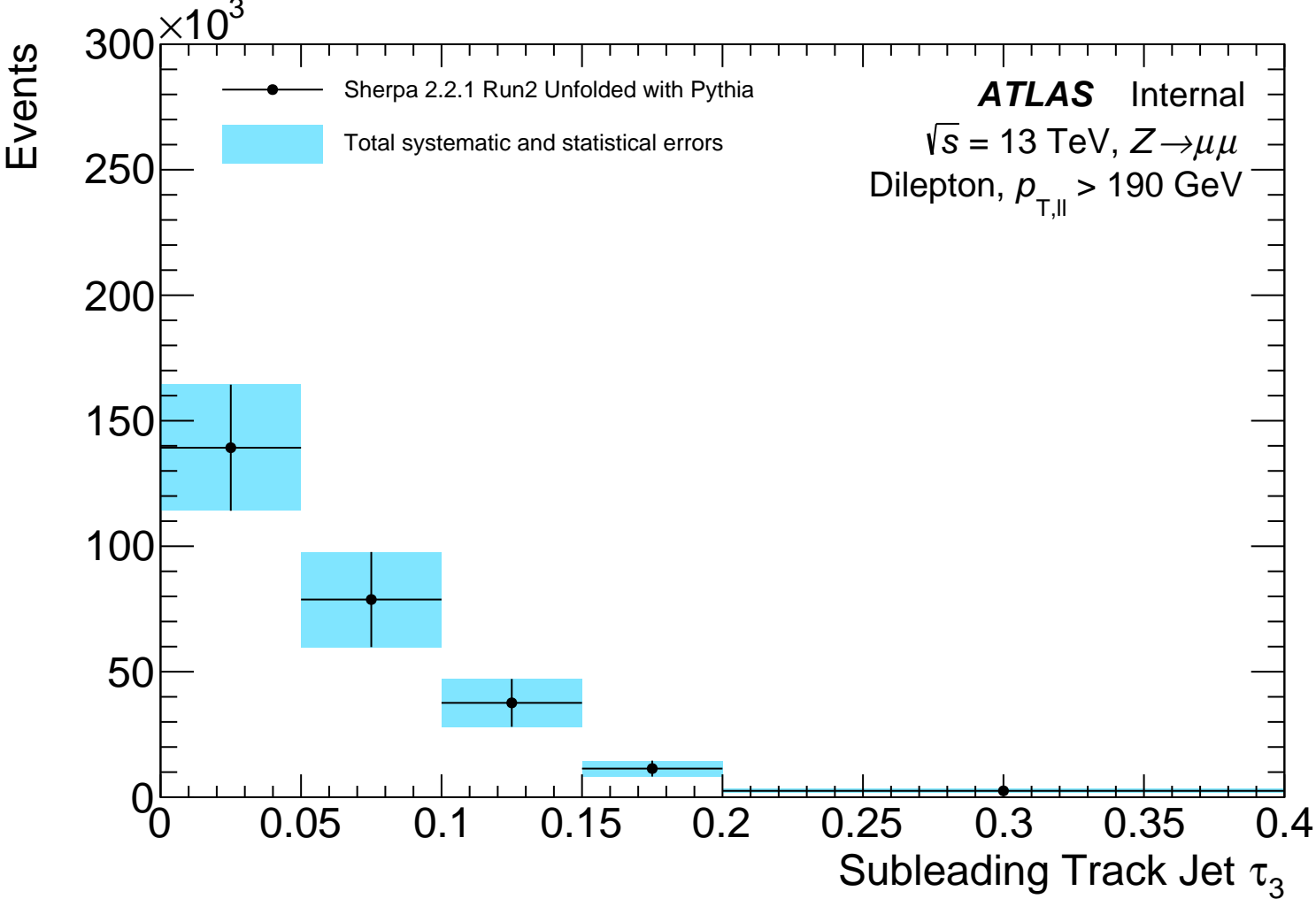




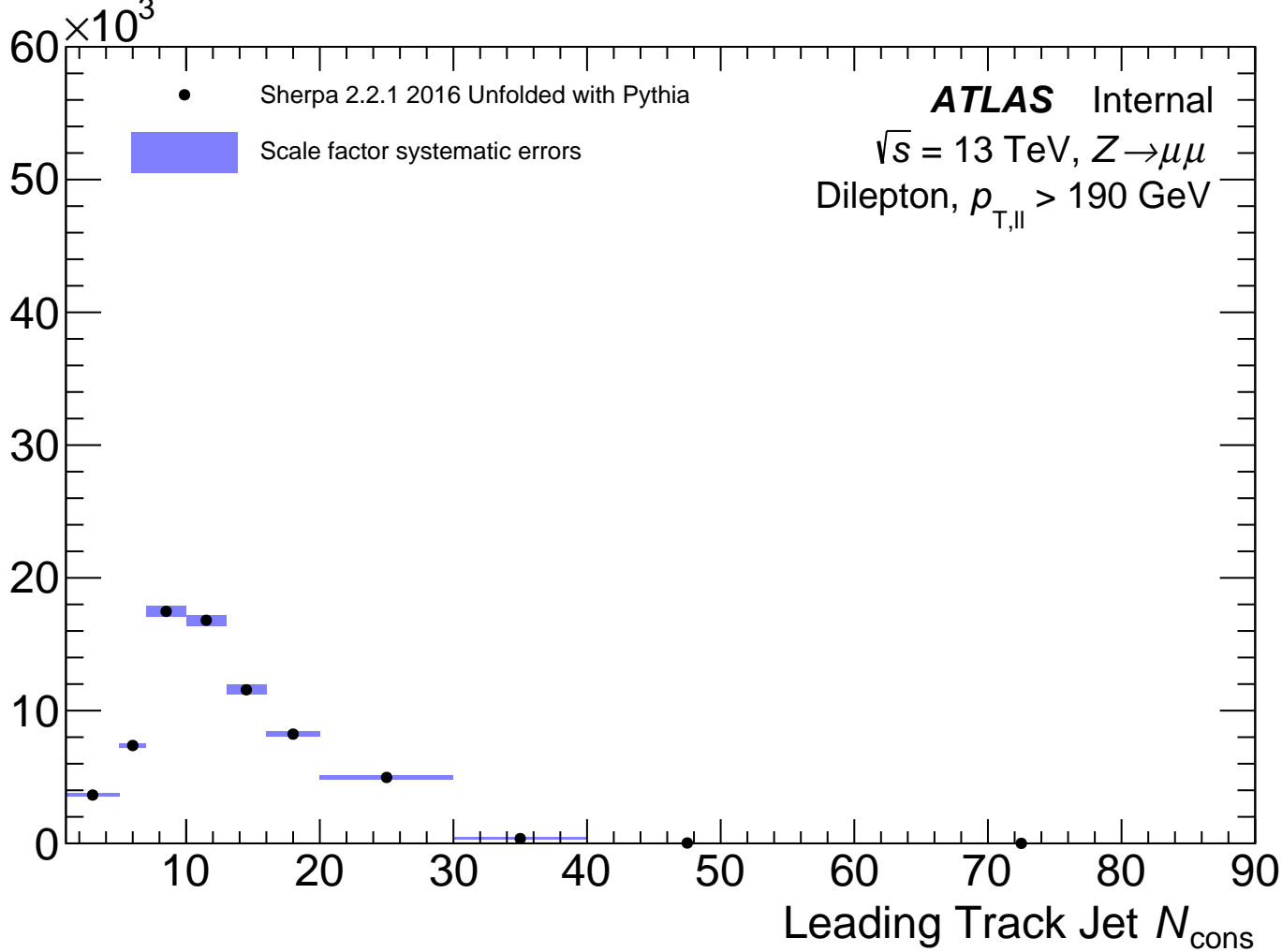




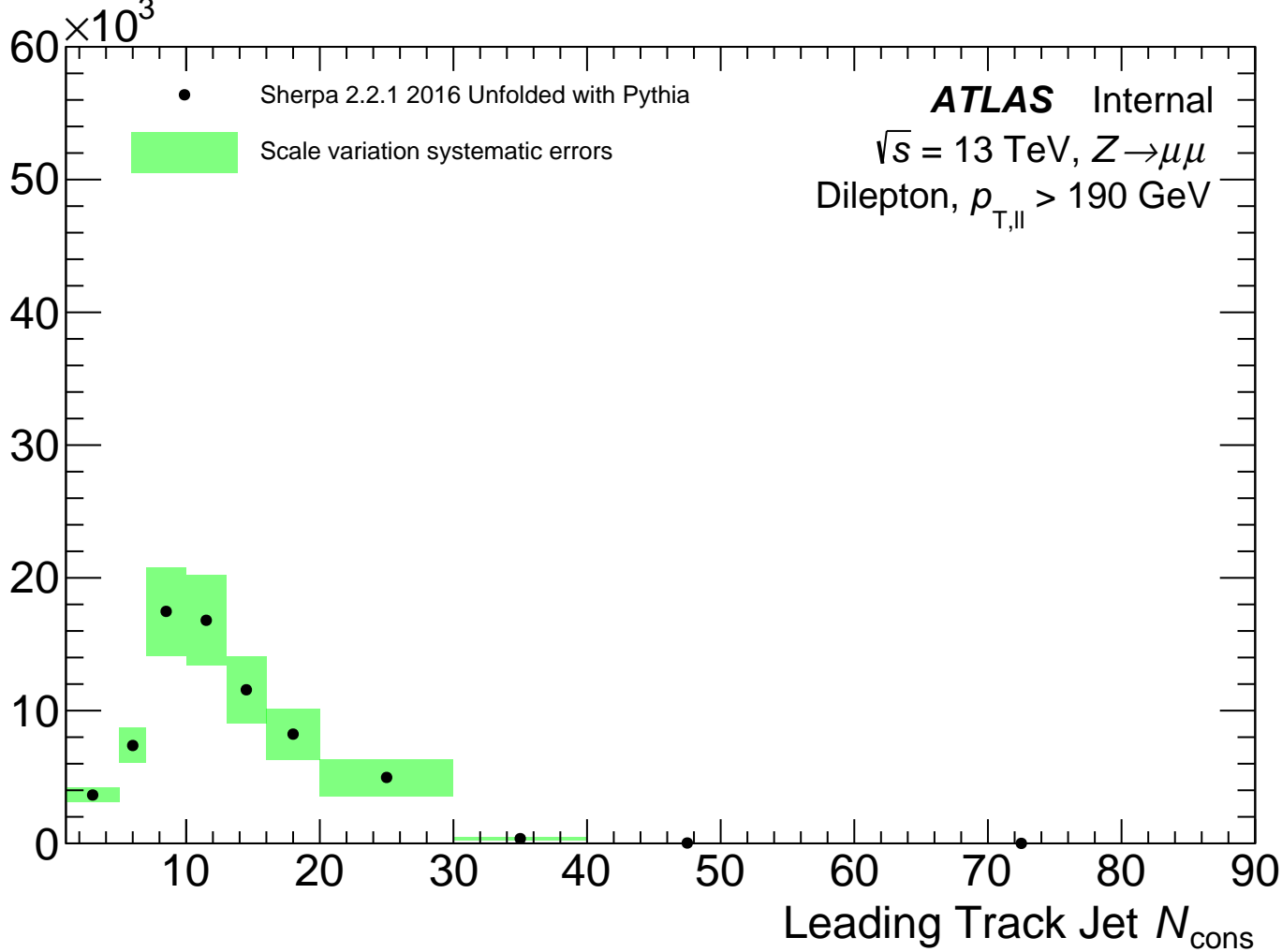




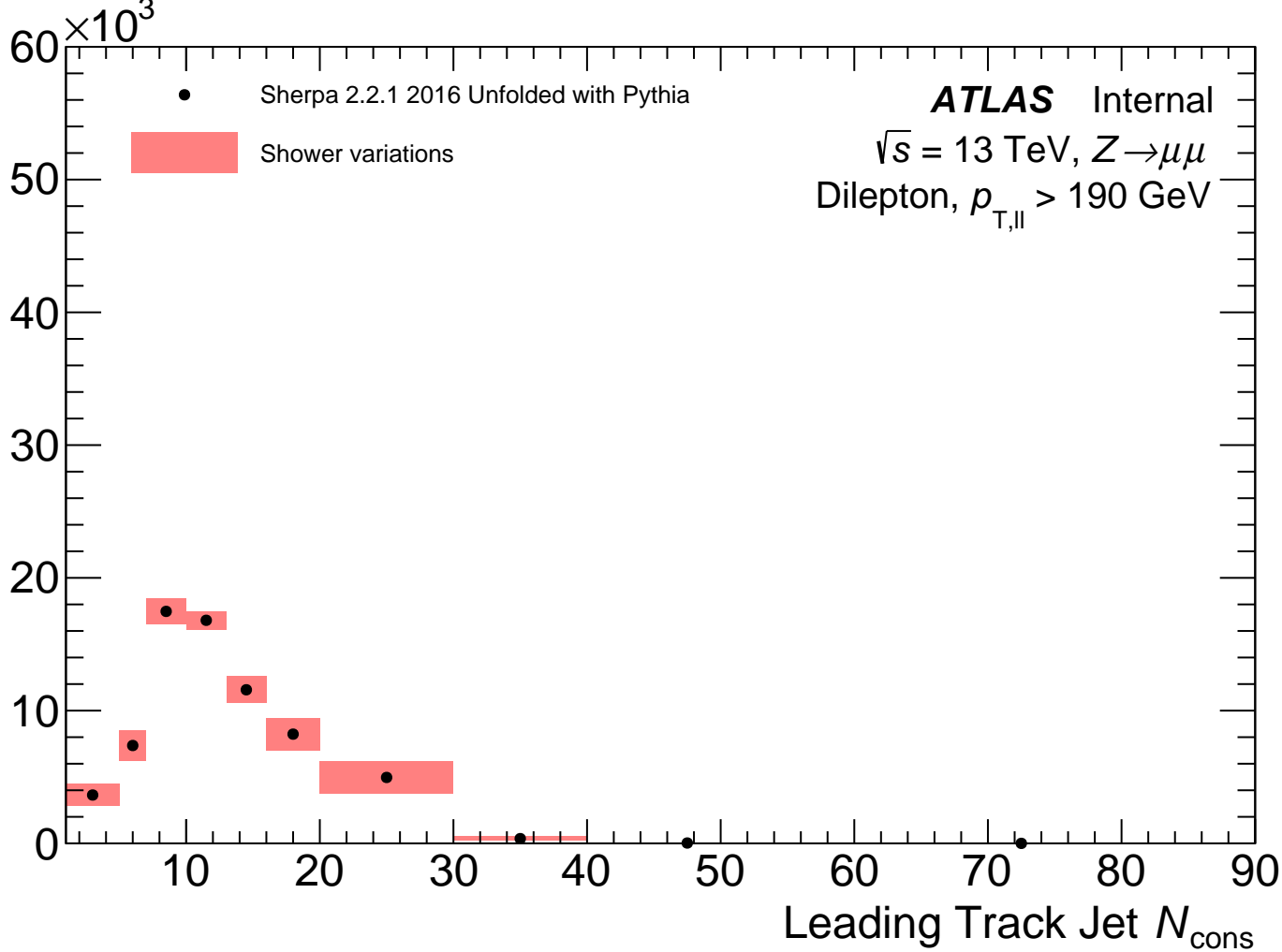
Events



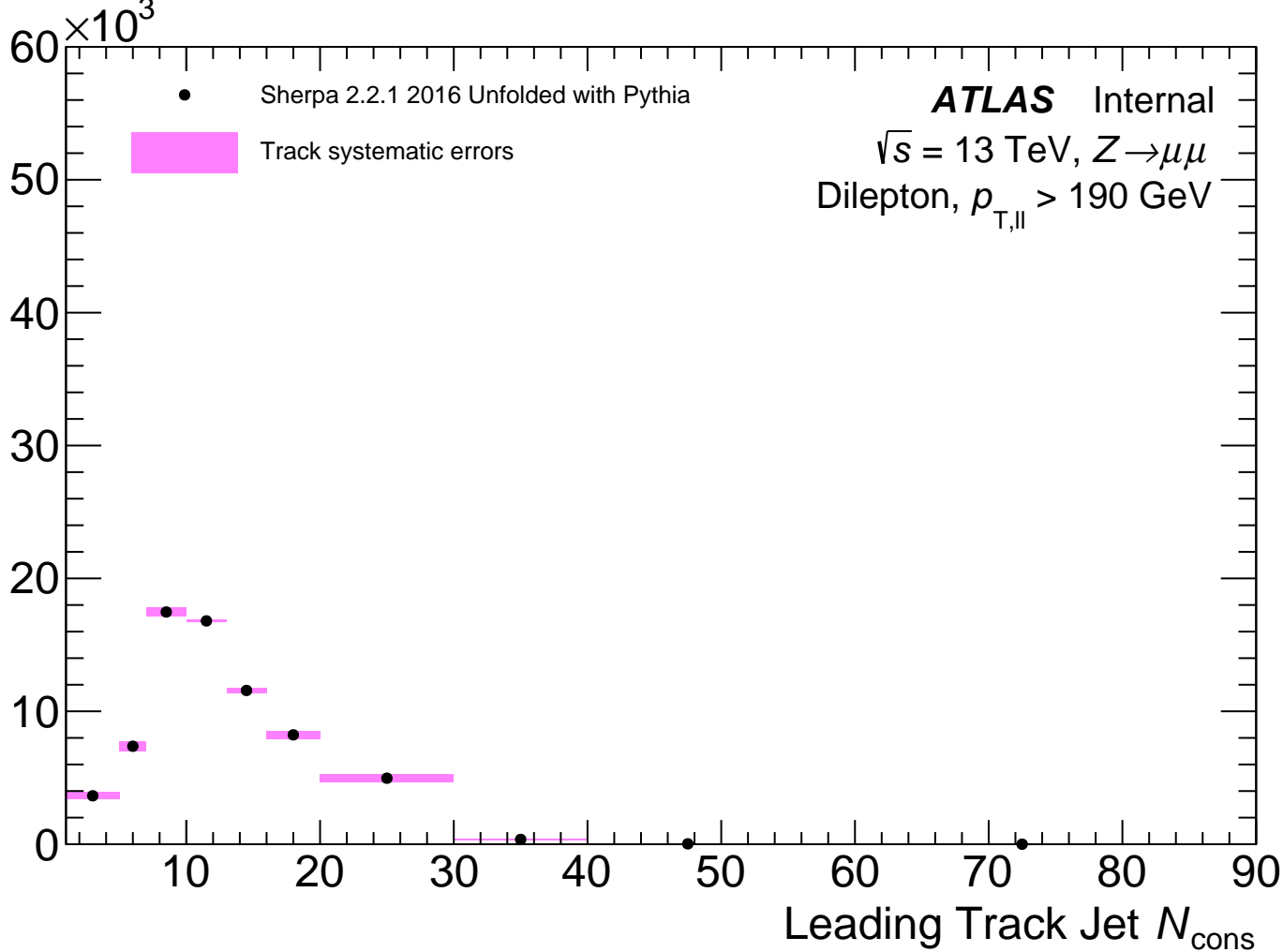
Events



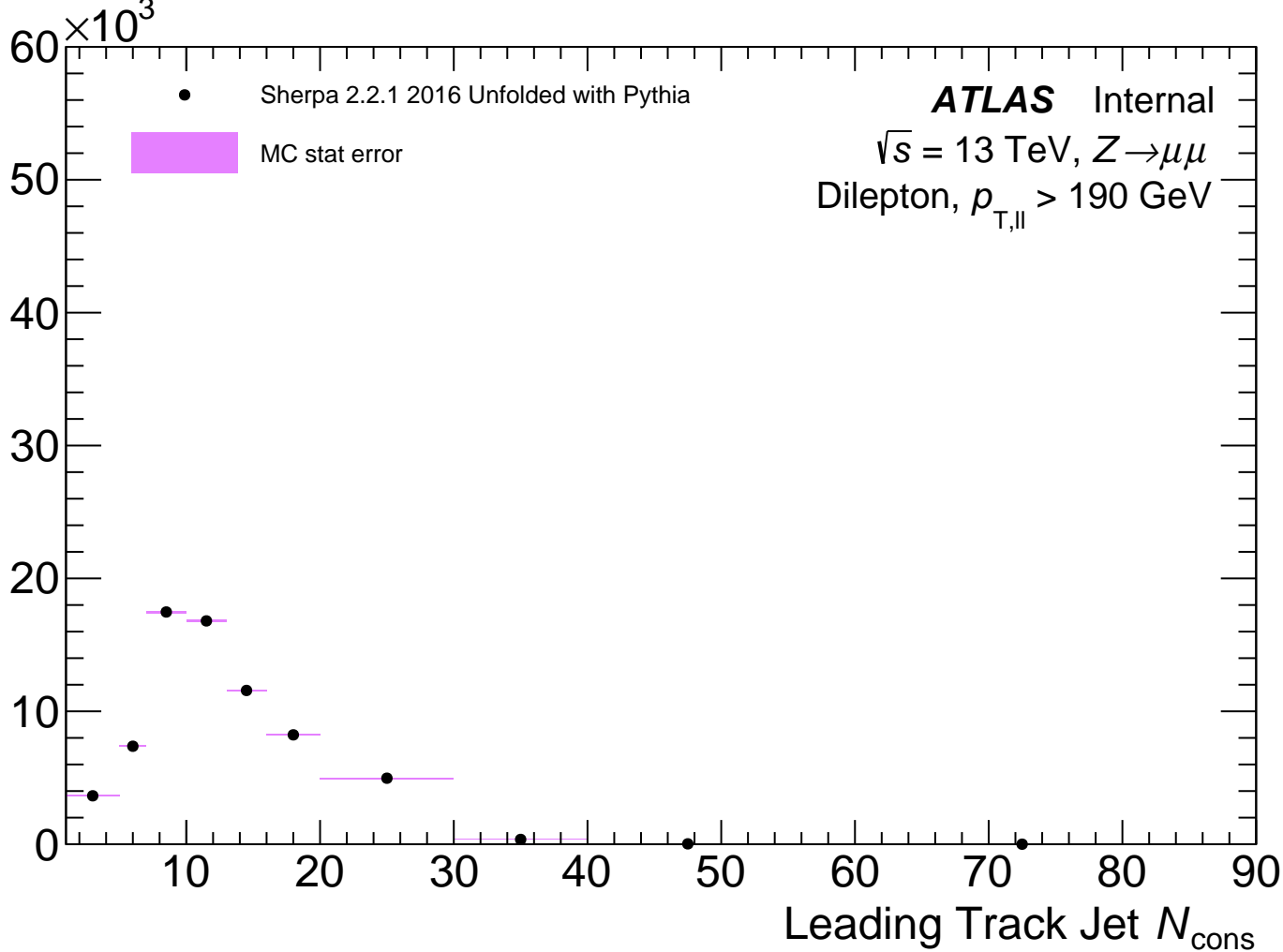
Events



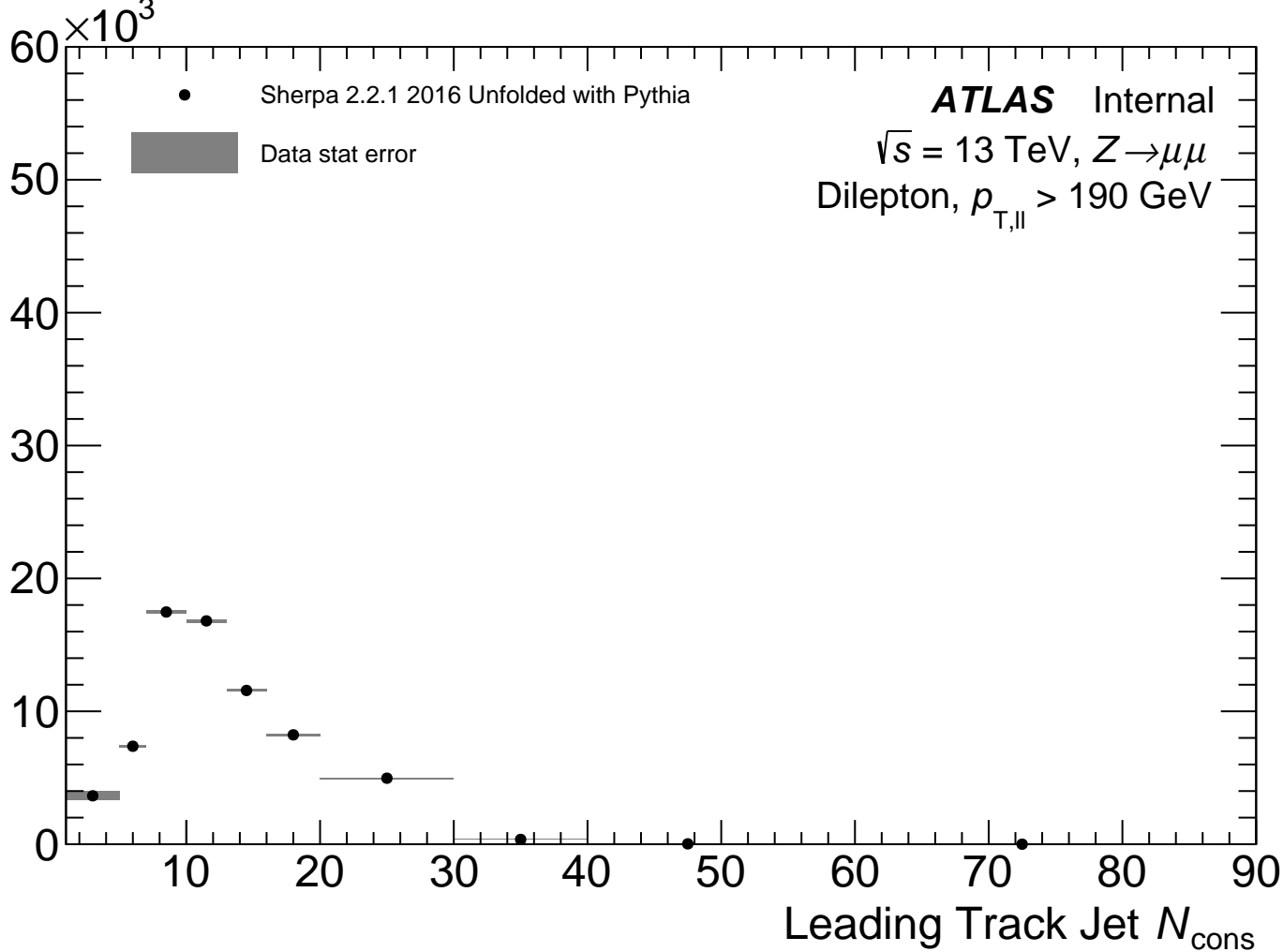
Events



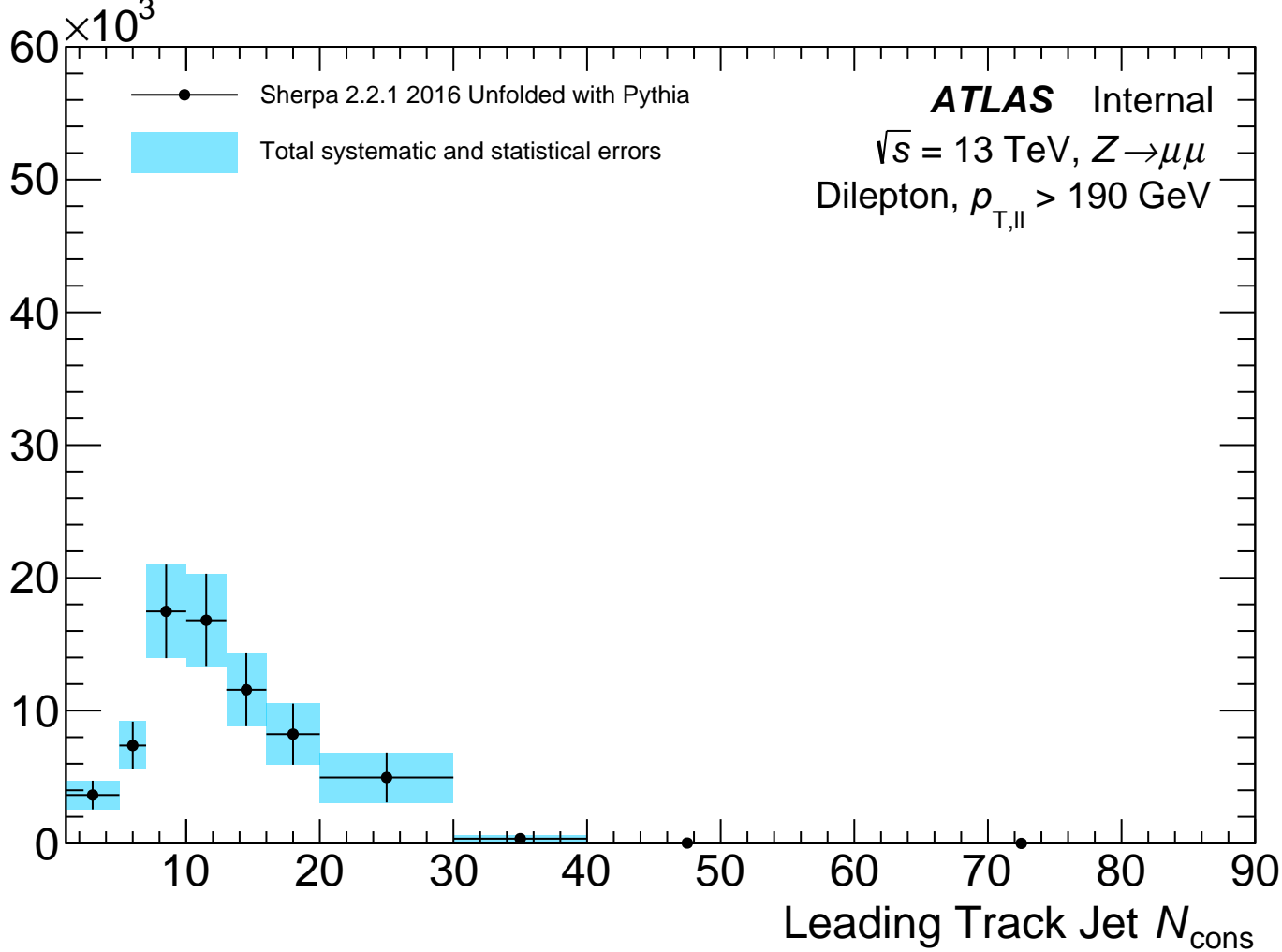
Events



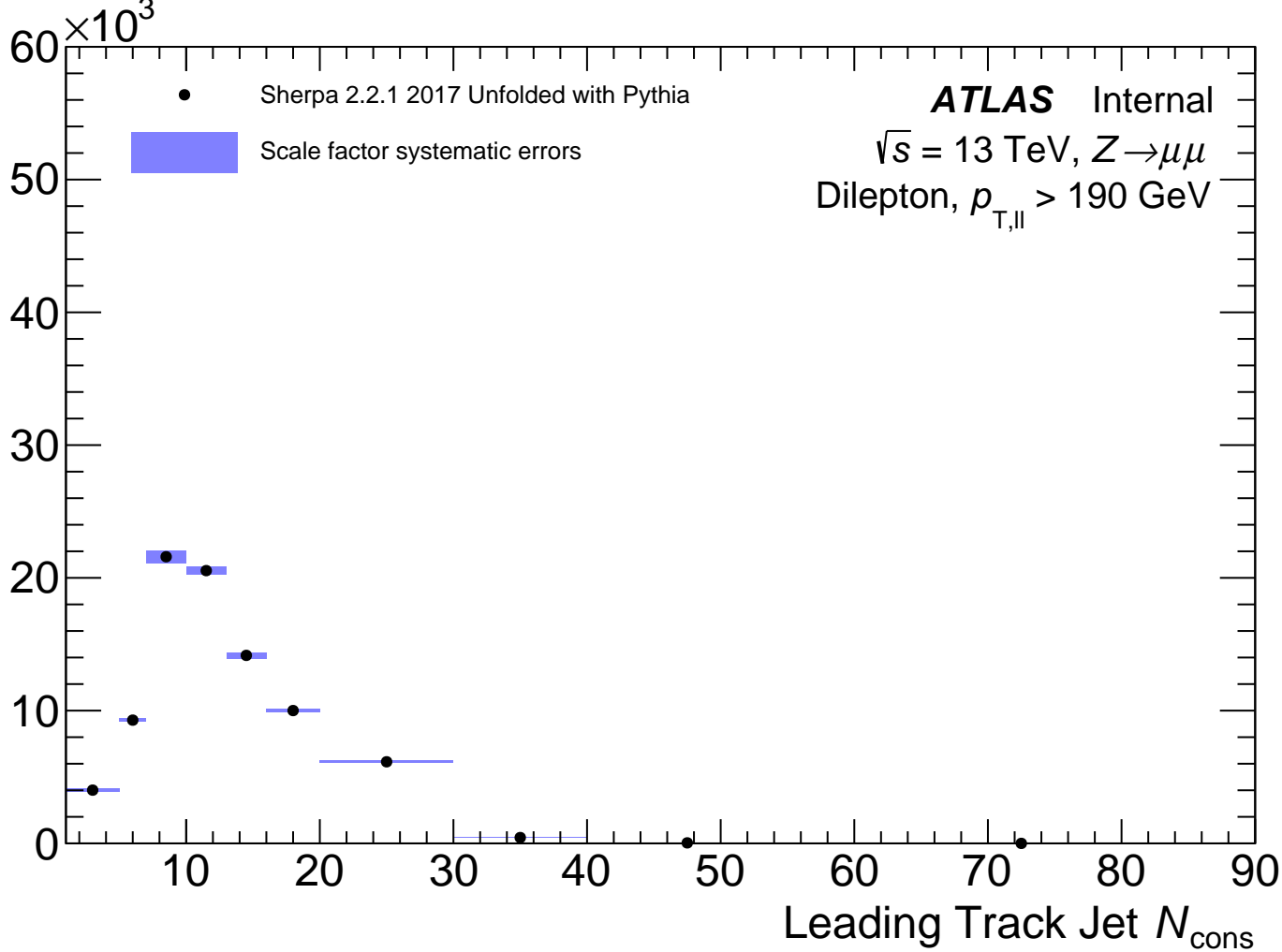
Events



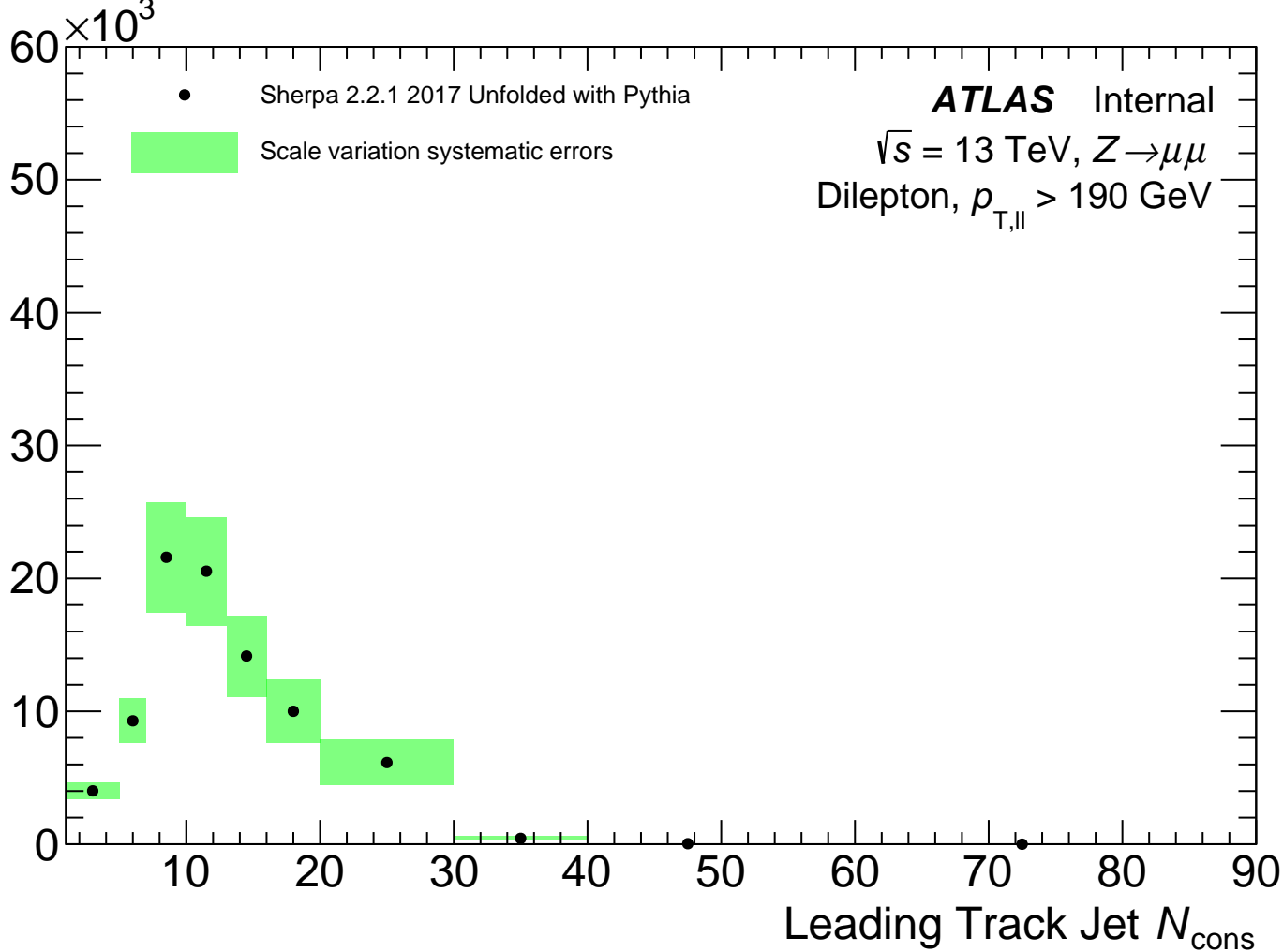
Events



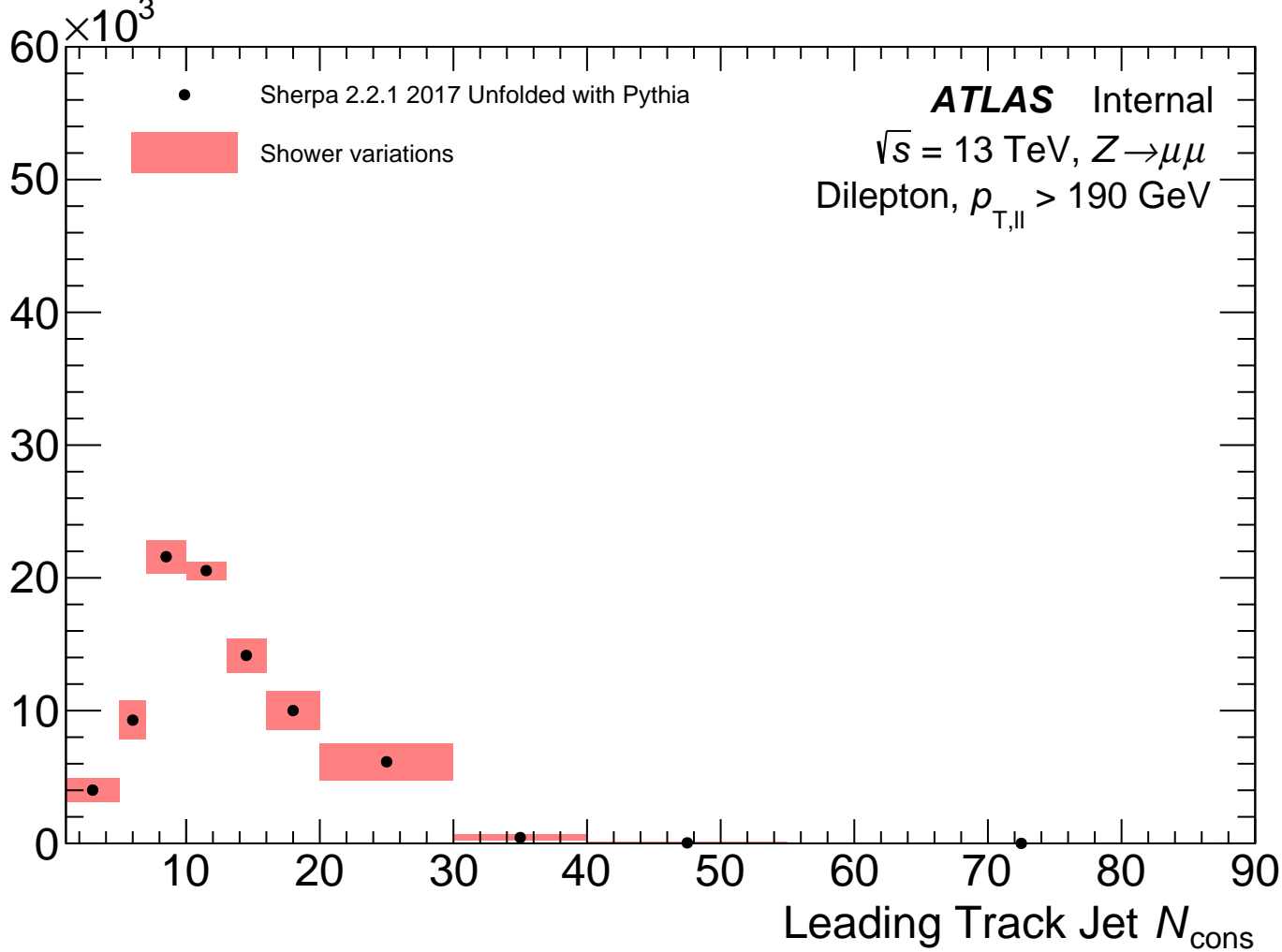
Events



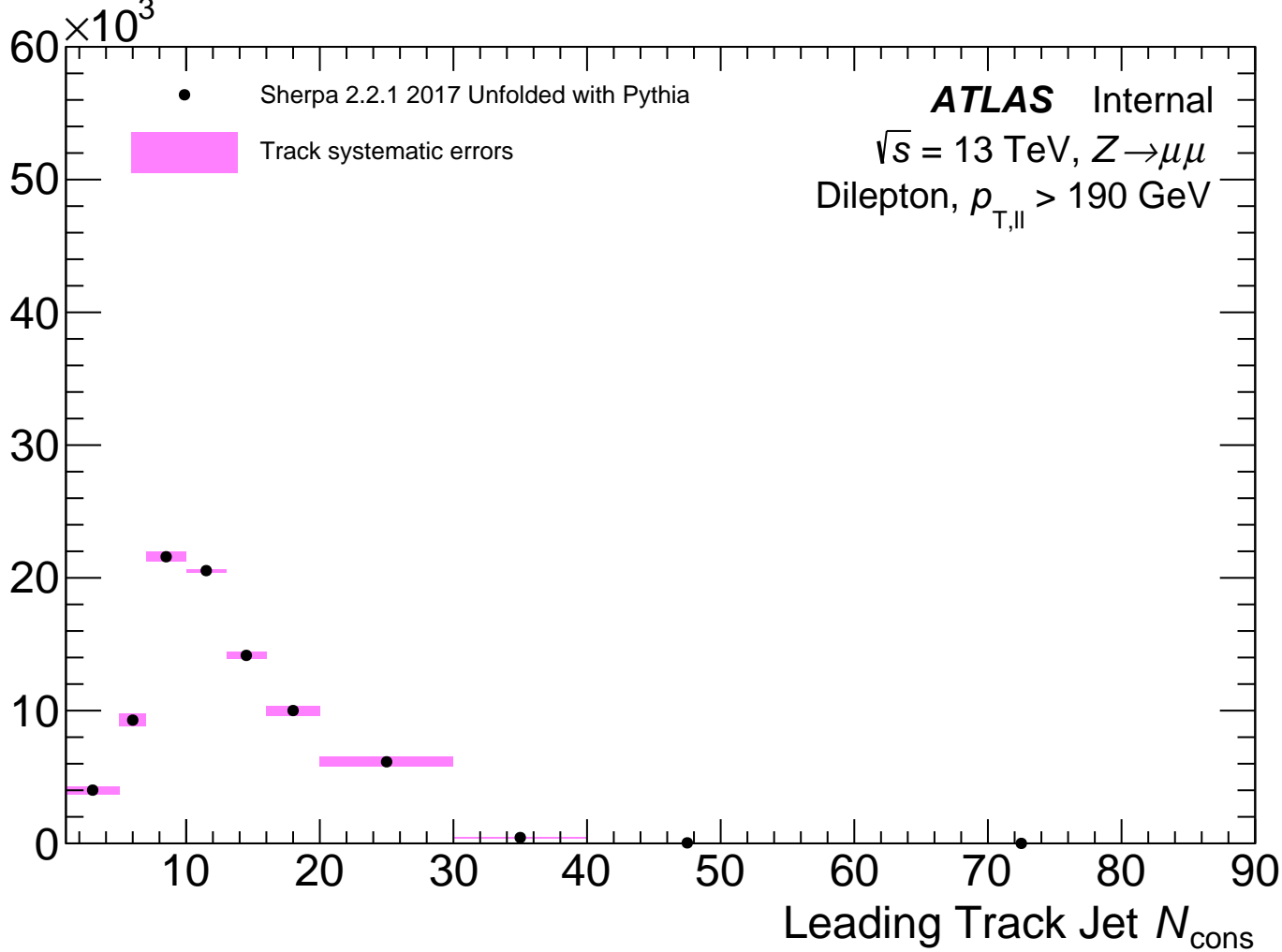
Events



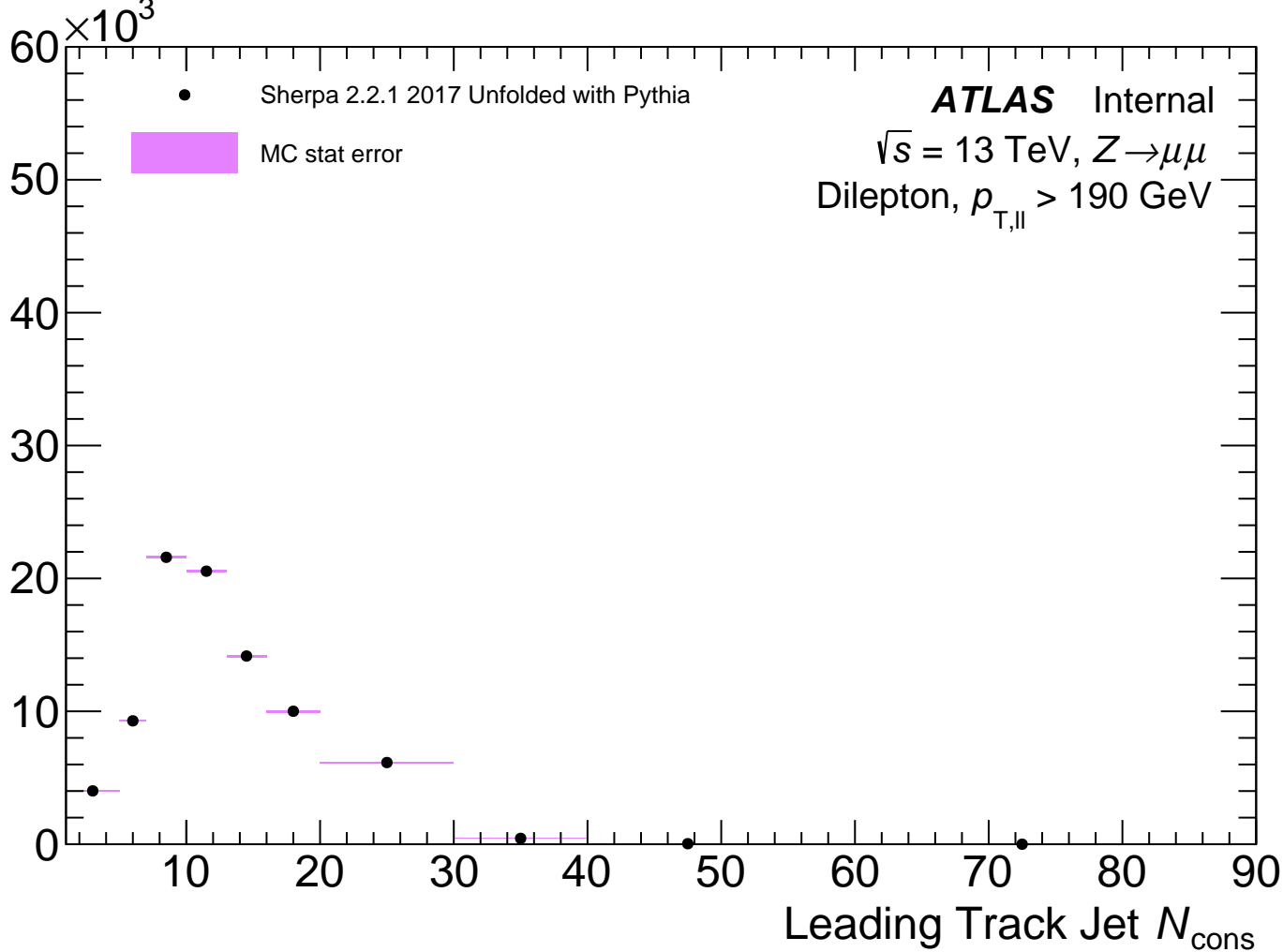
Events



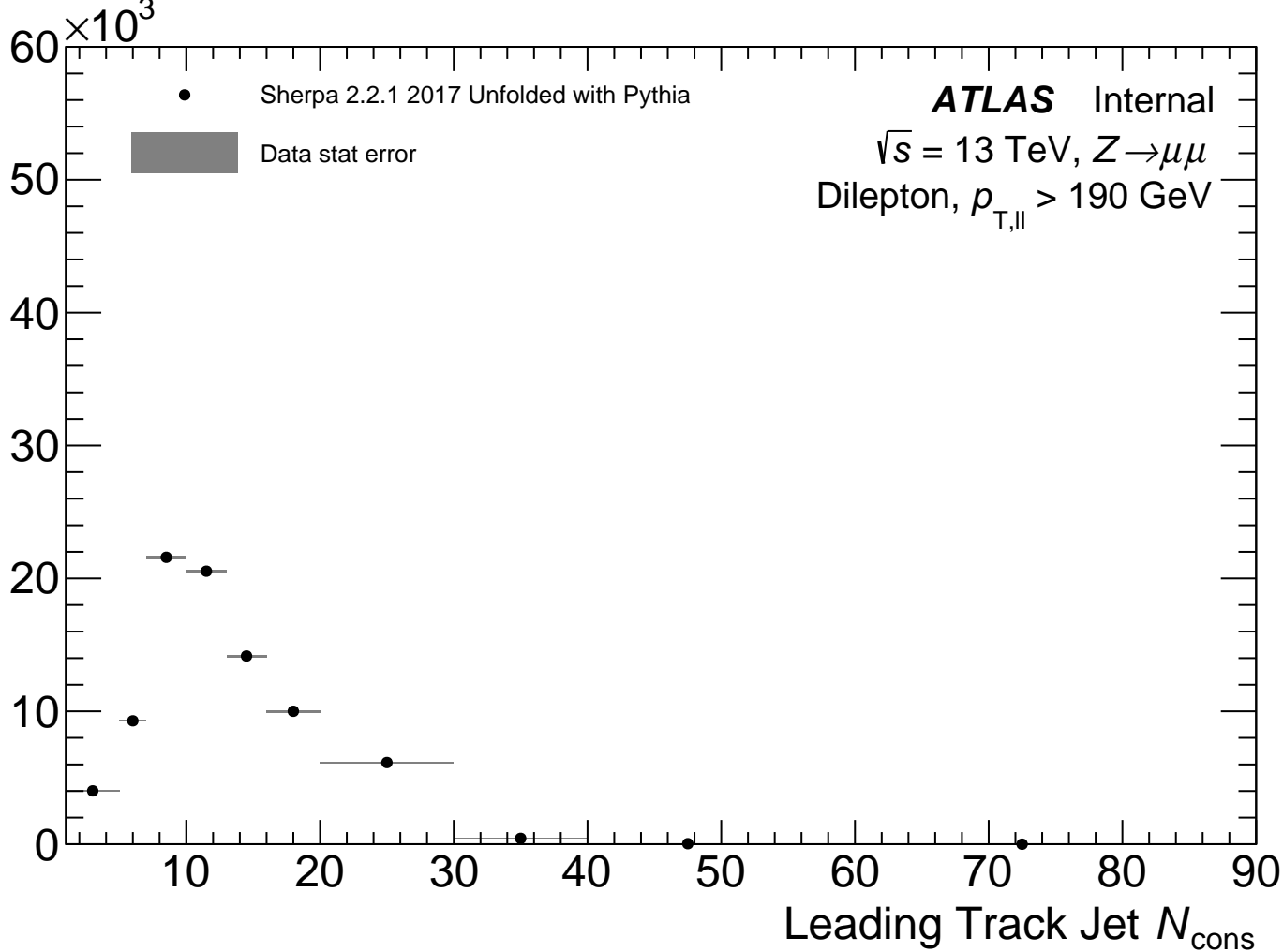
Events



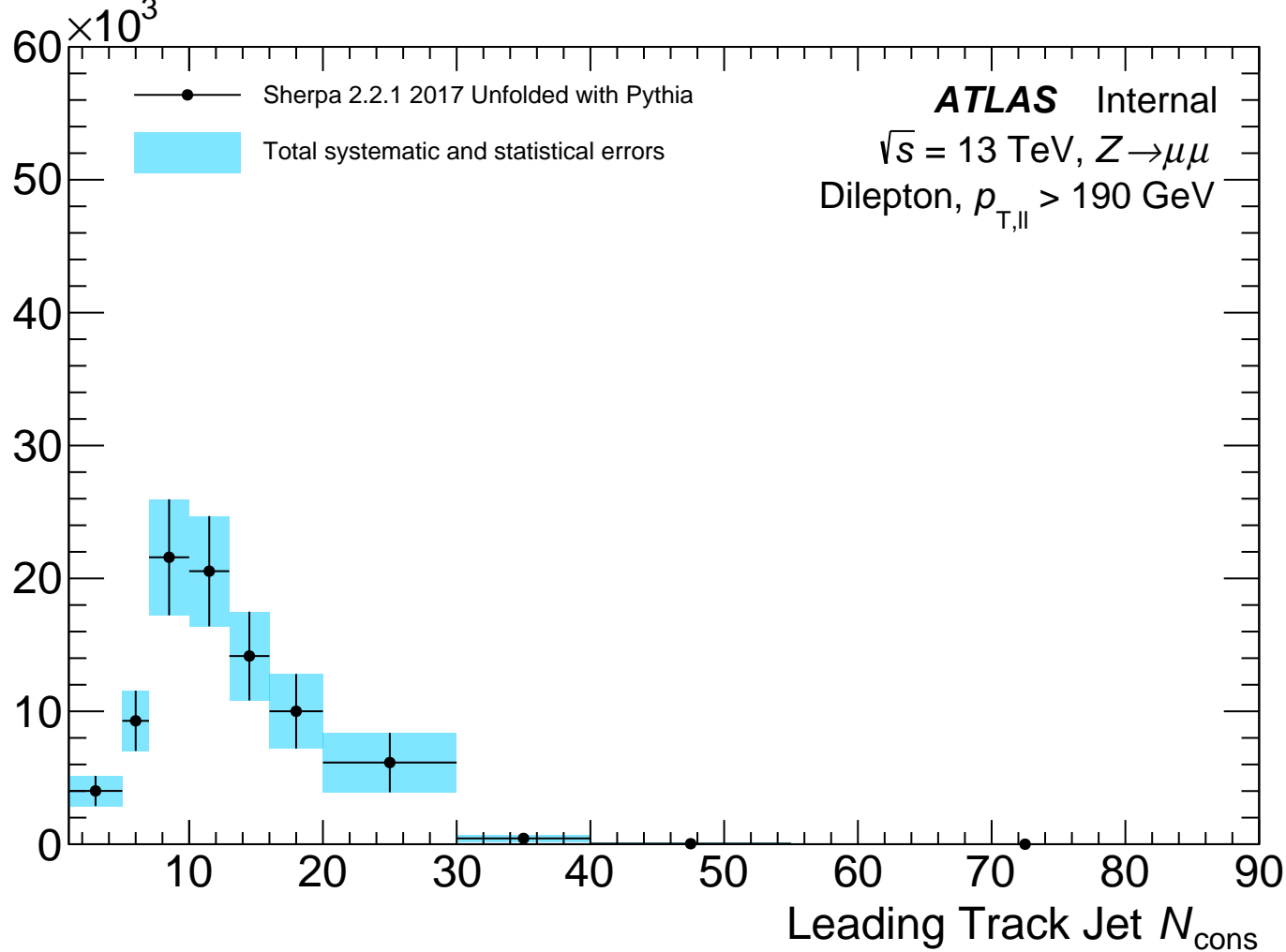
Events



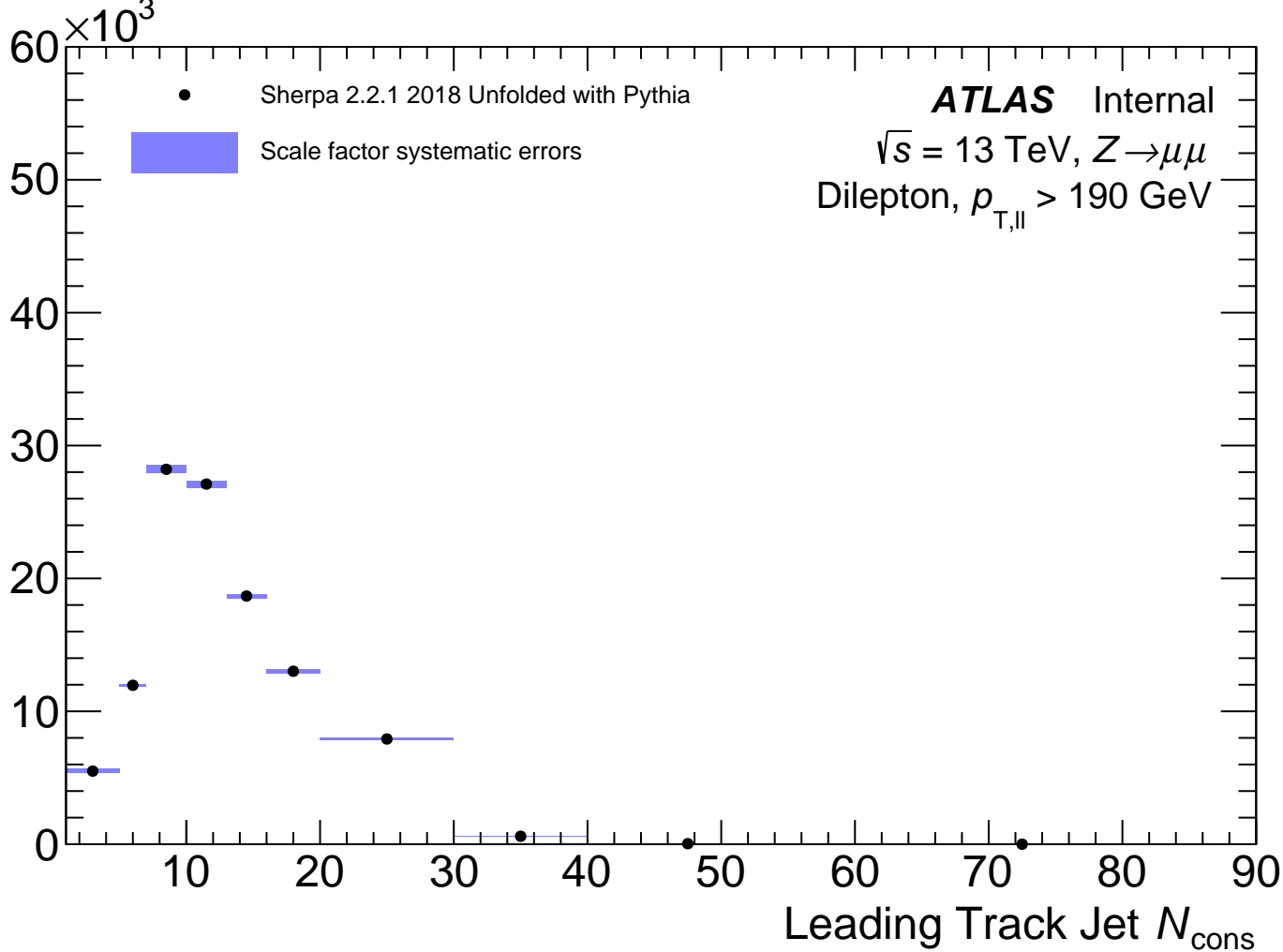
Events



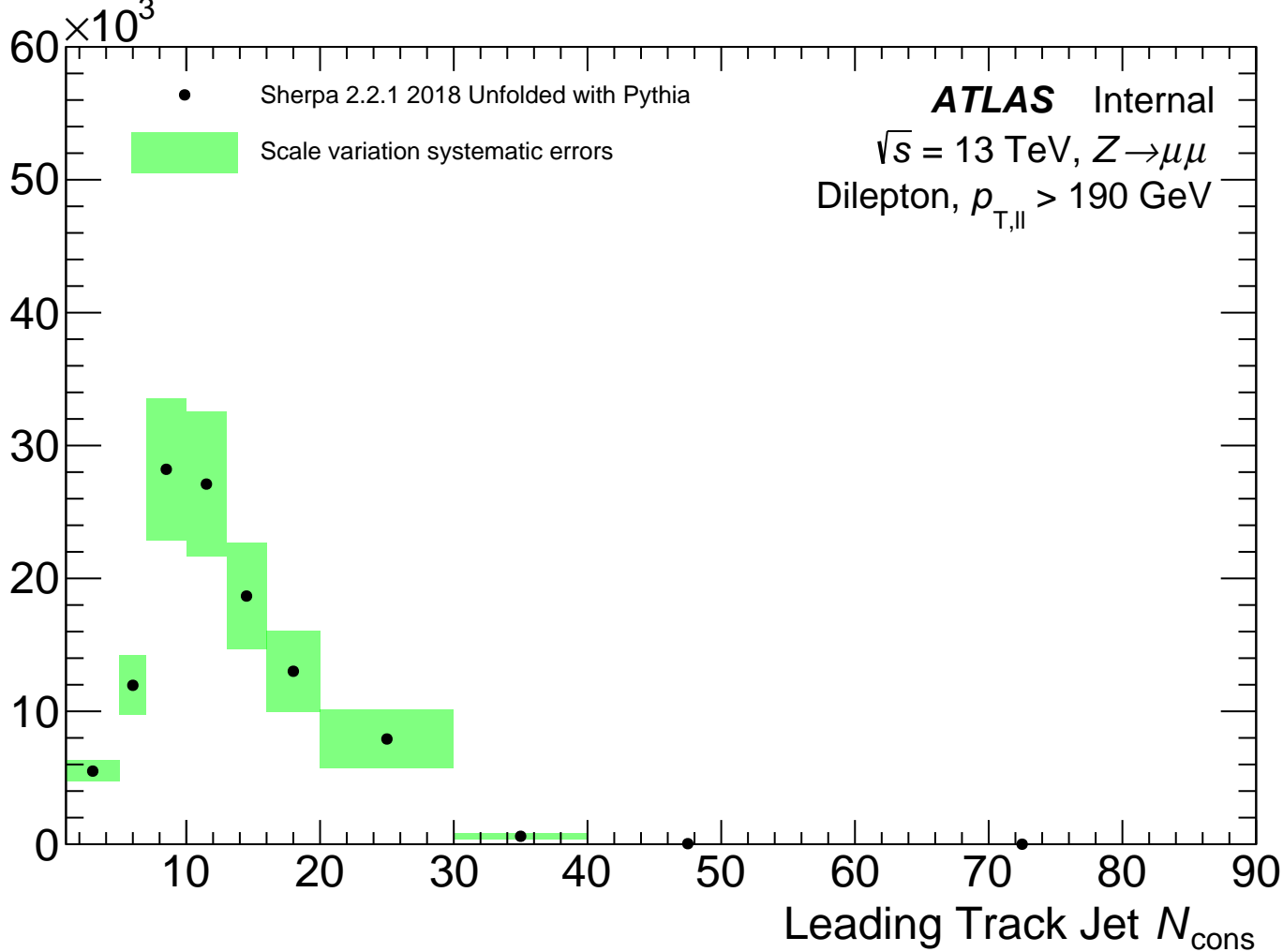
Events



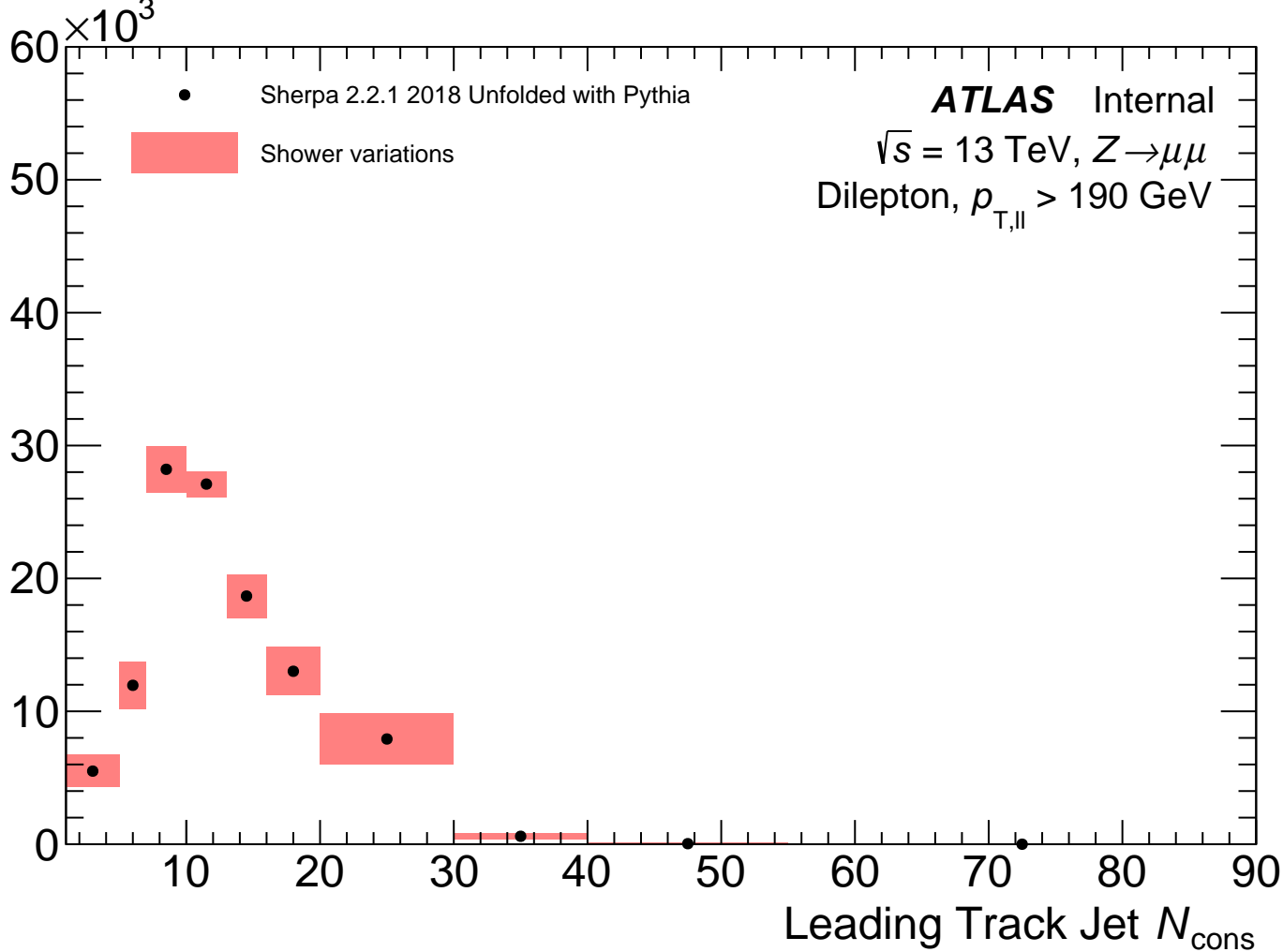
Events



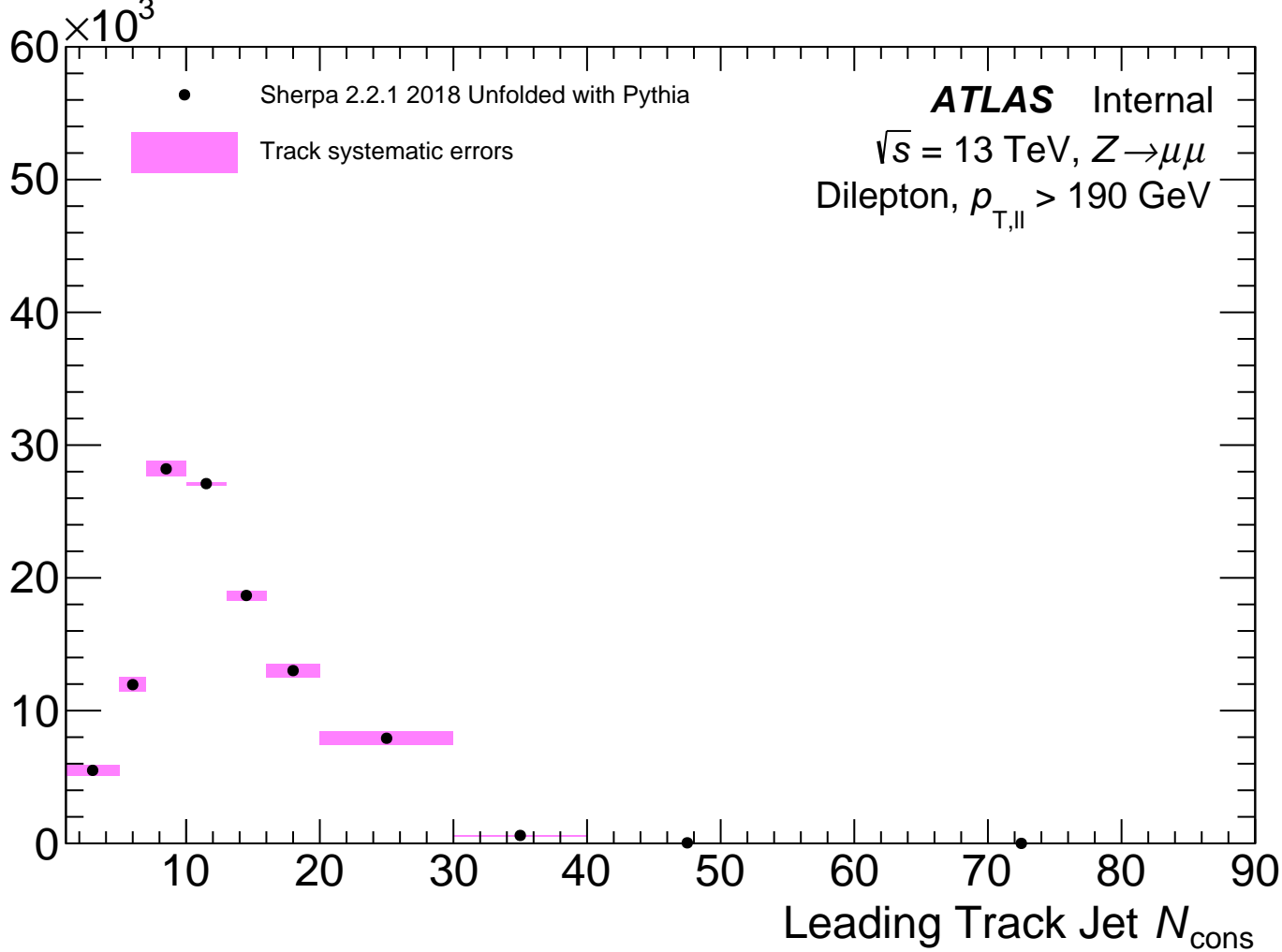
Events



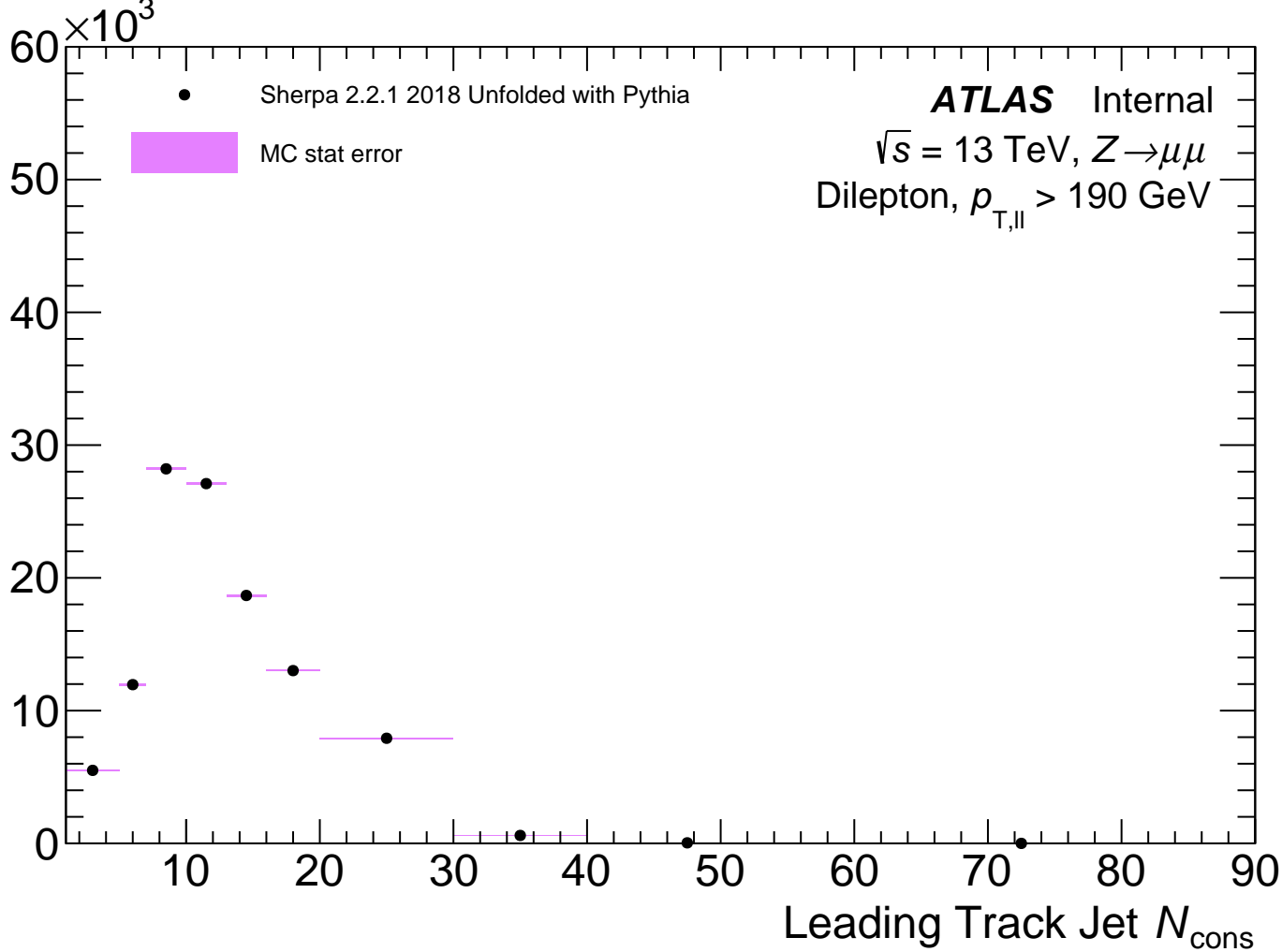
Events



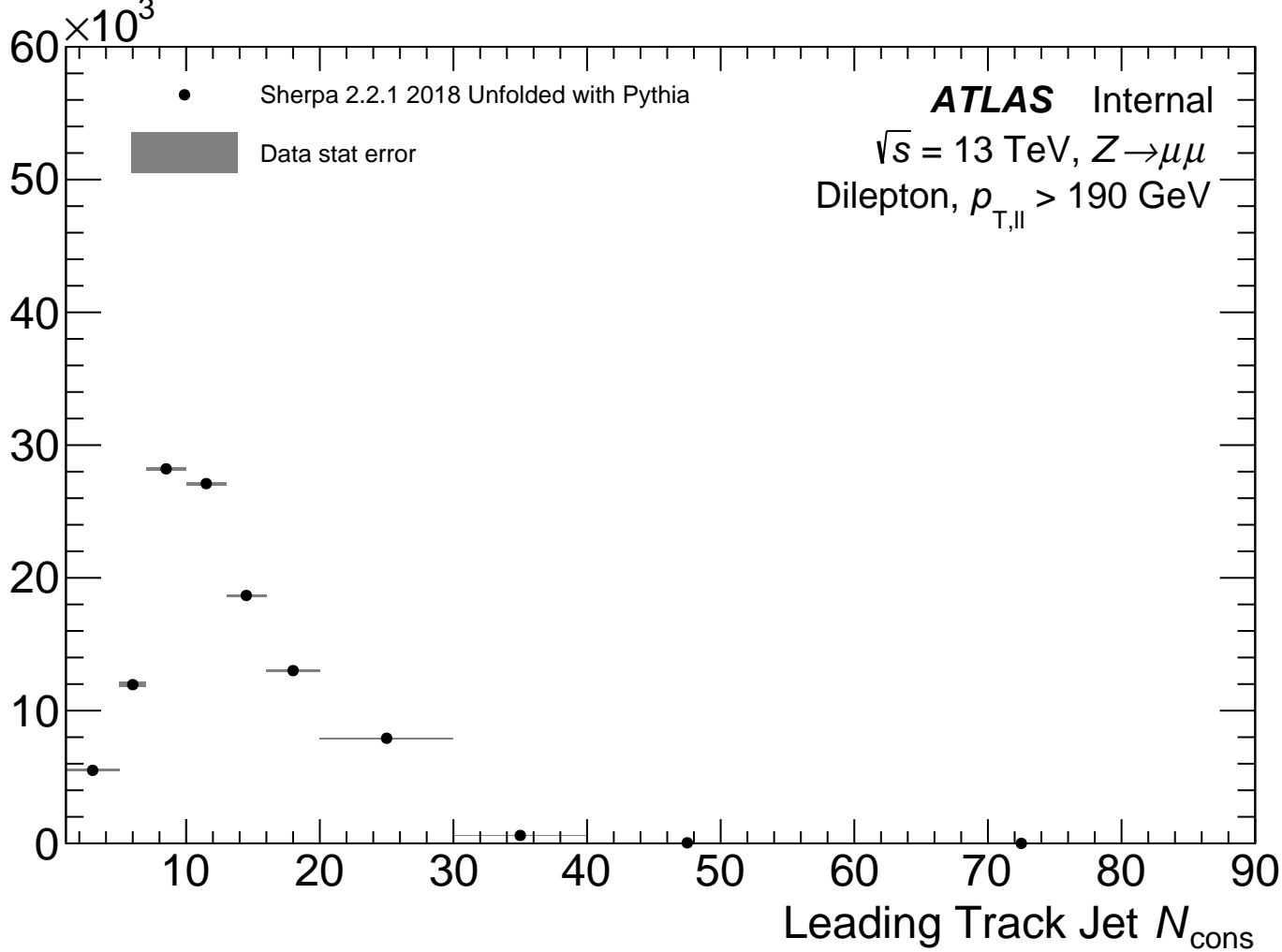
Events



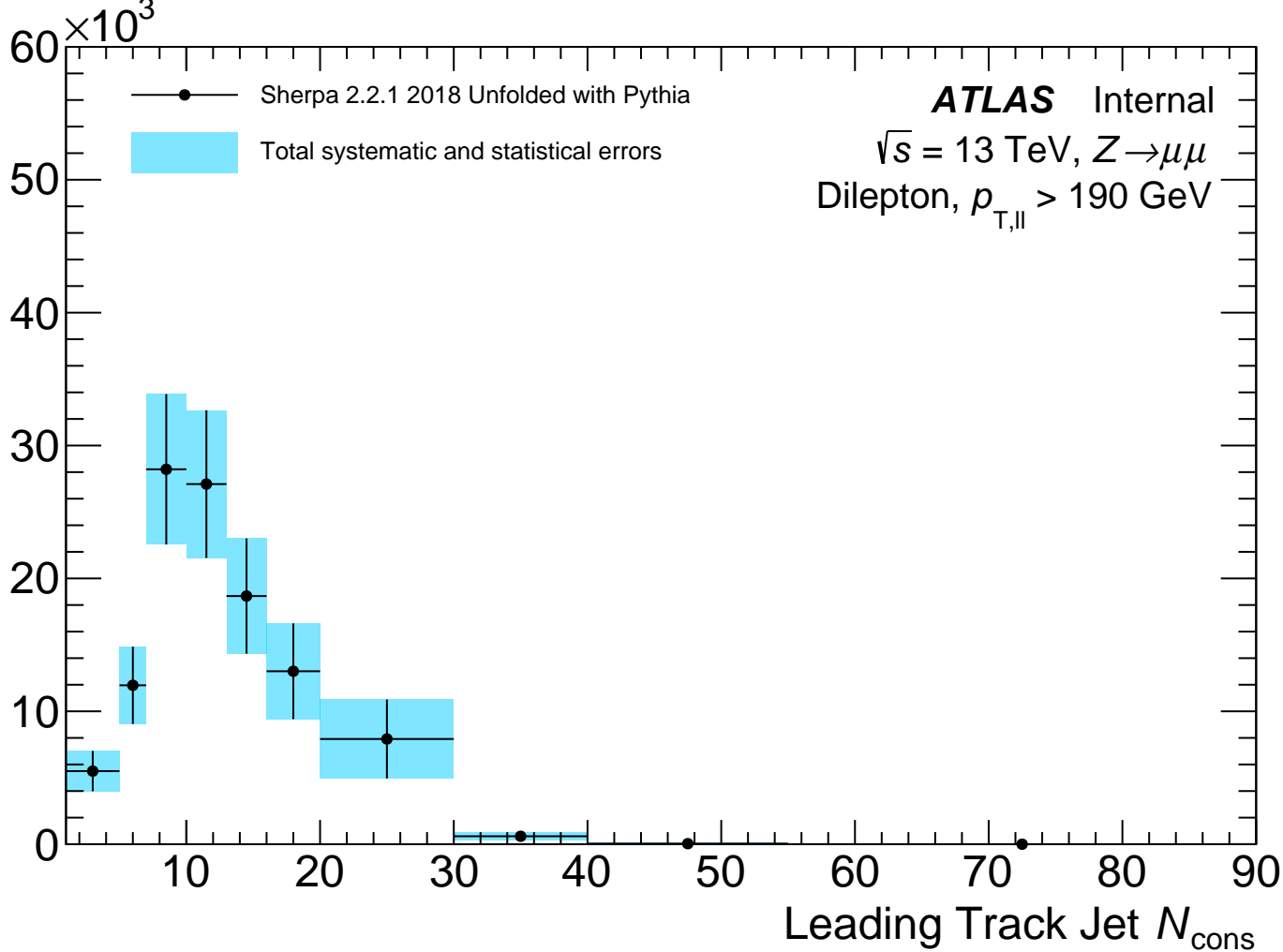
Events



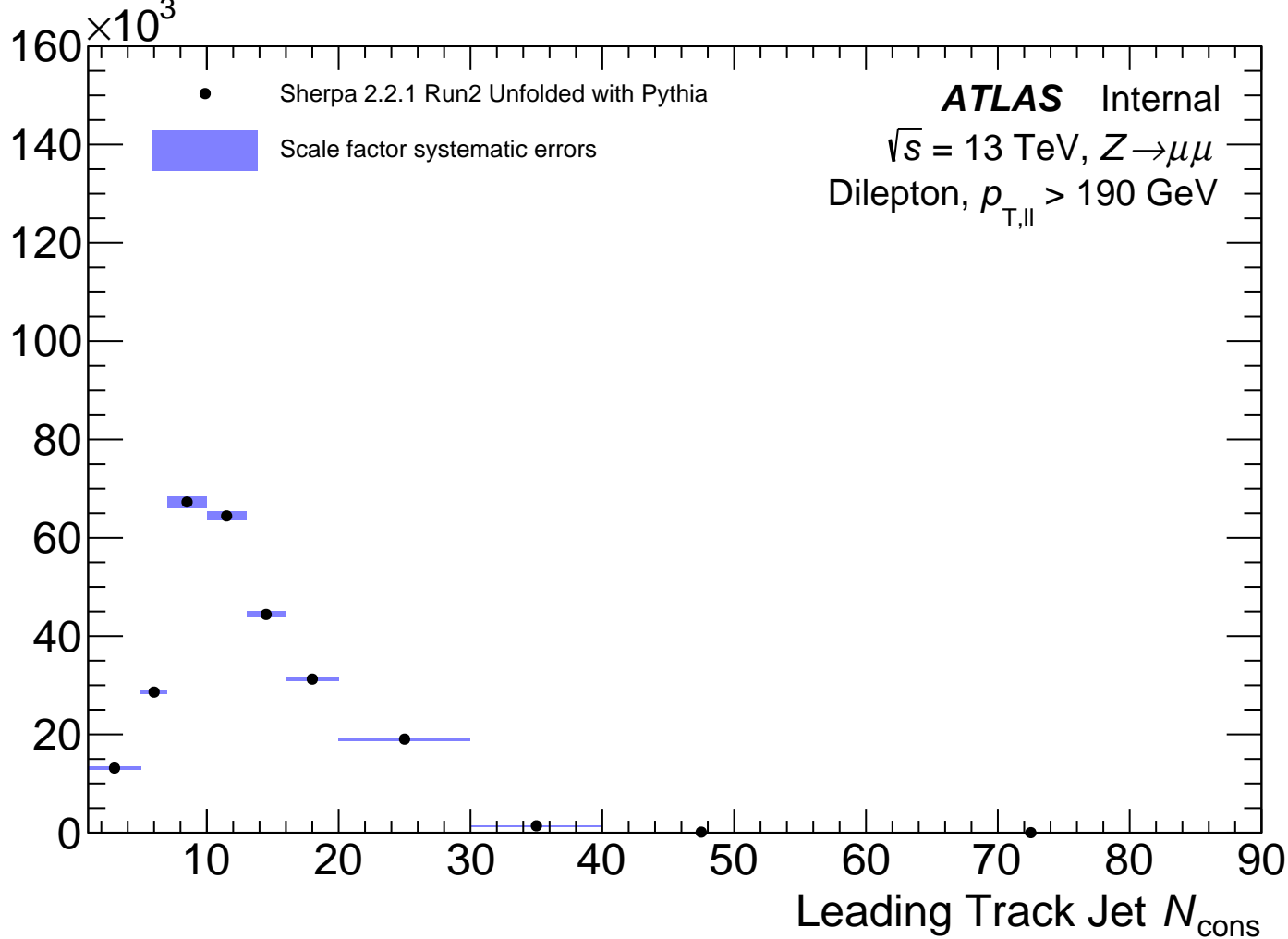
Events



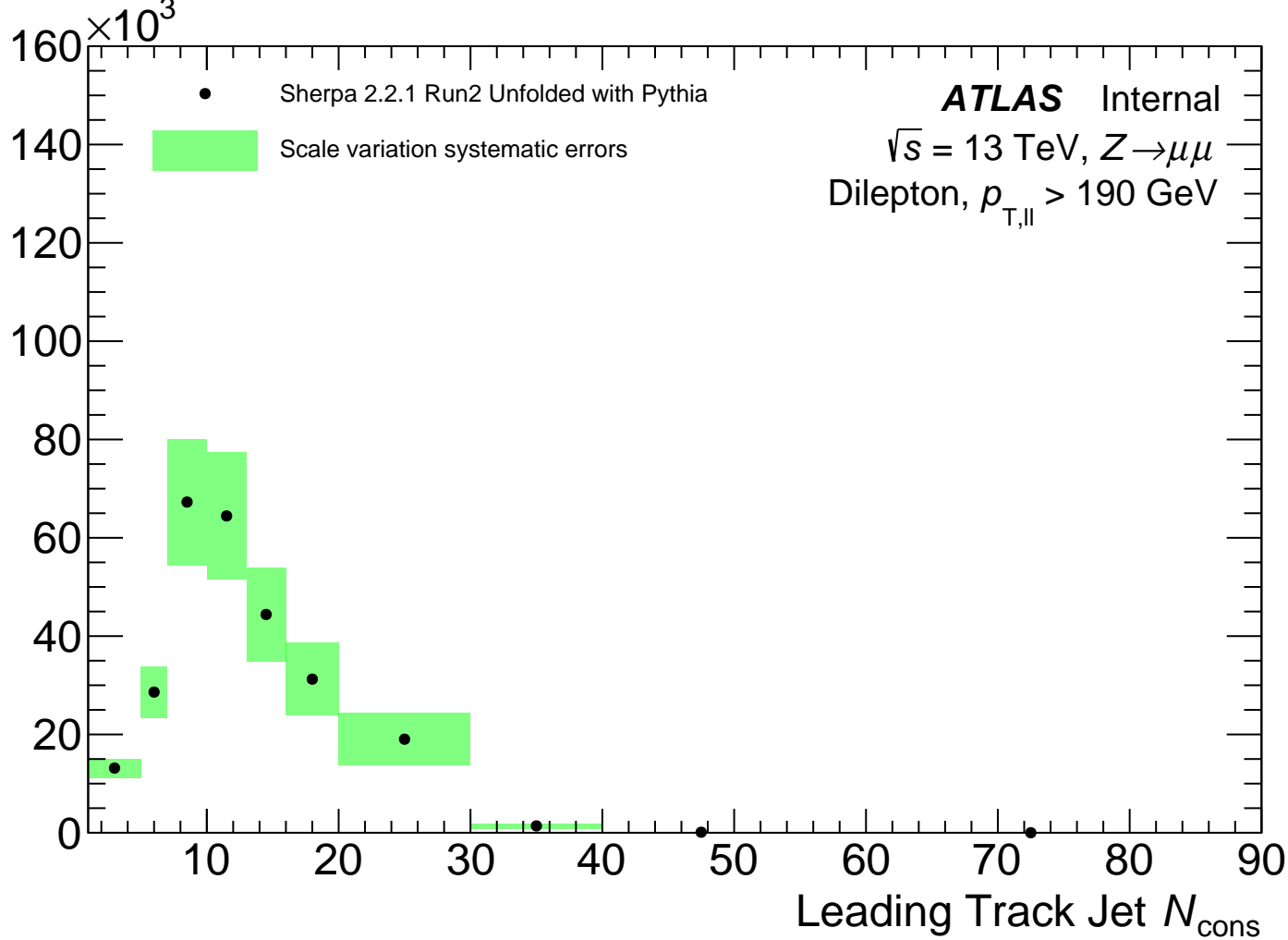
Events



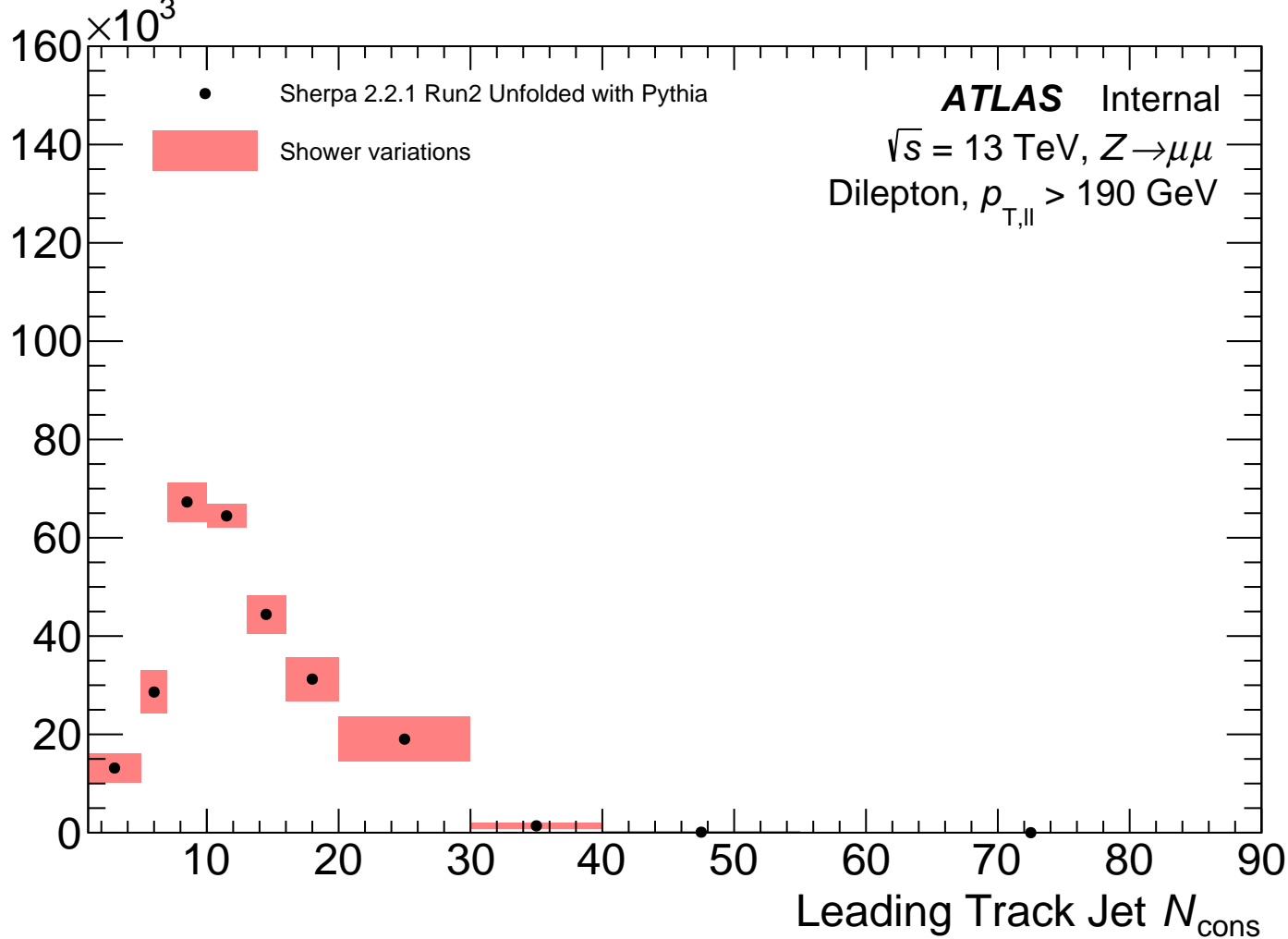
Events



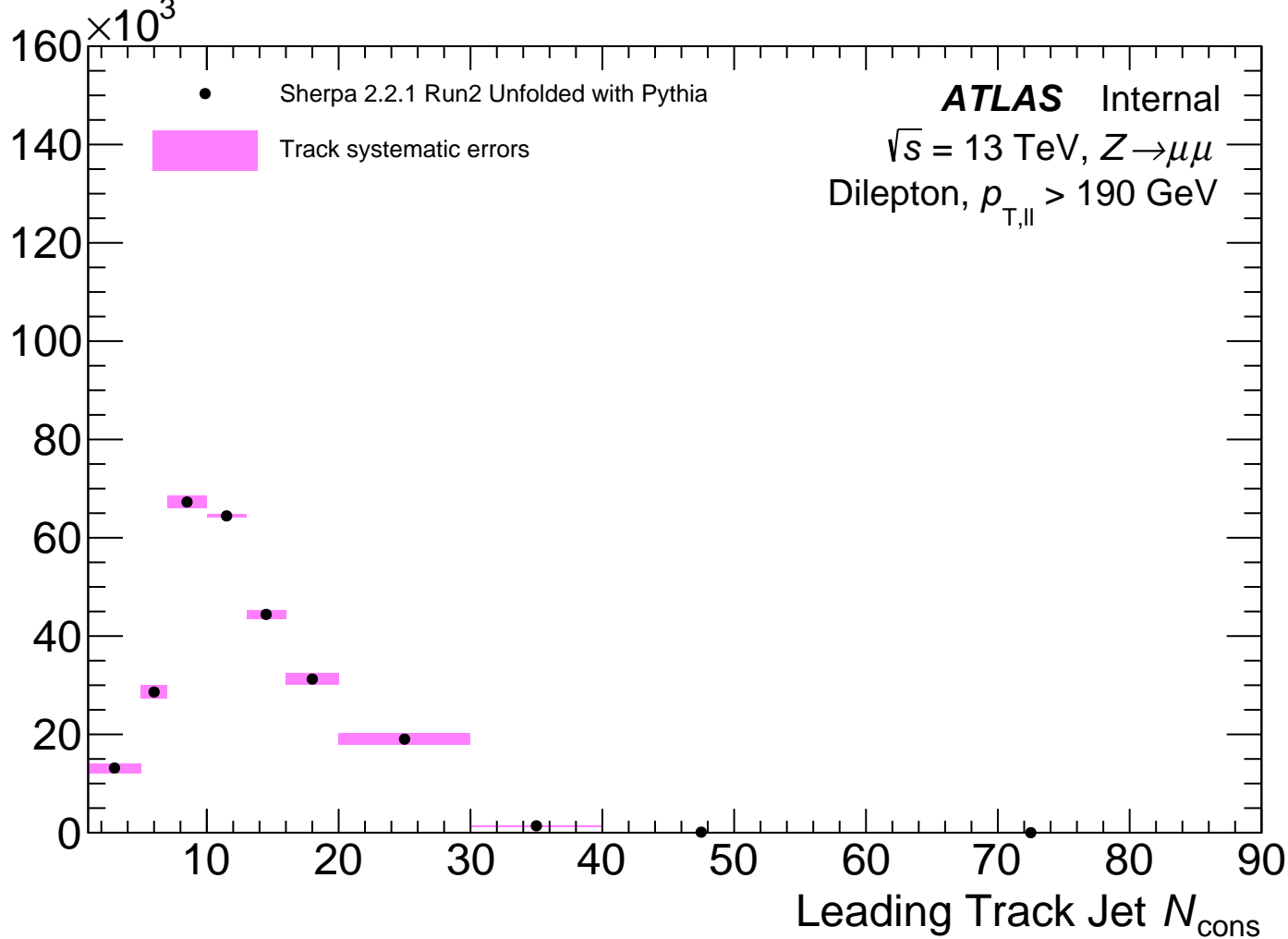
Events



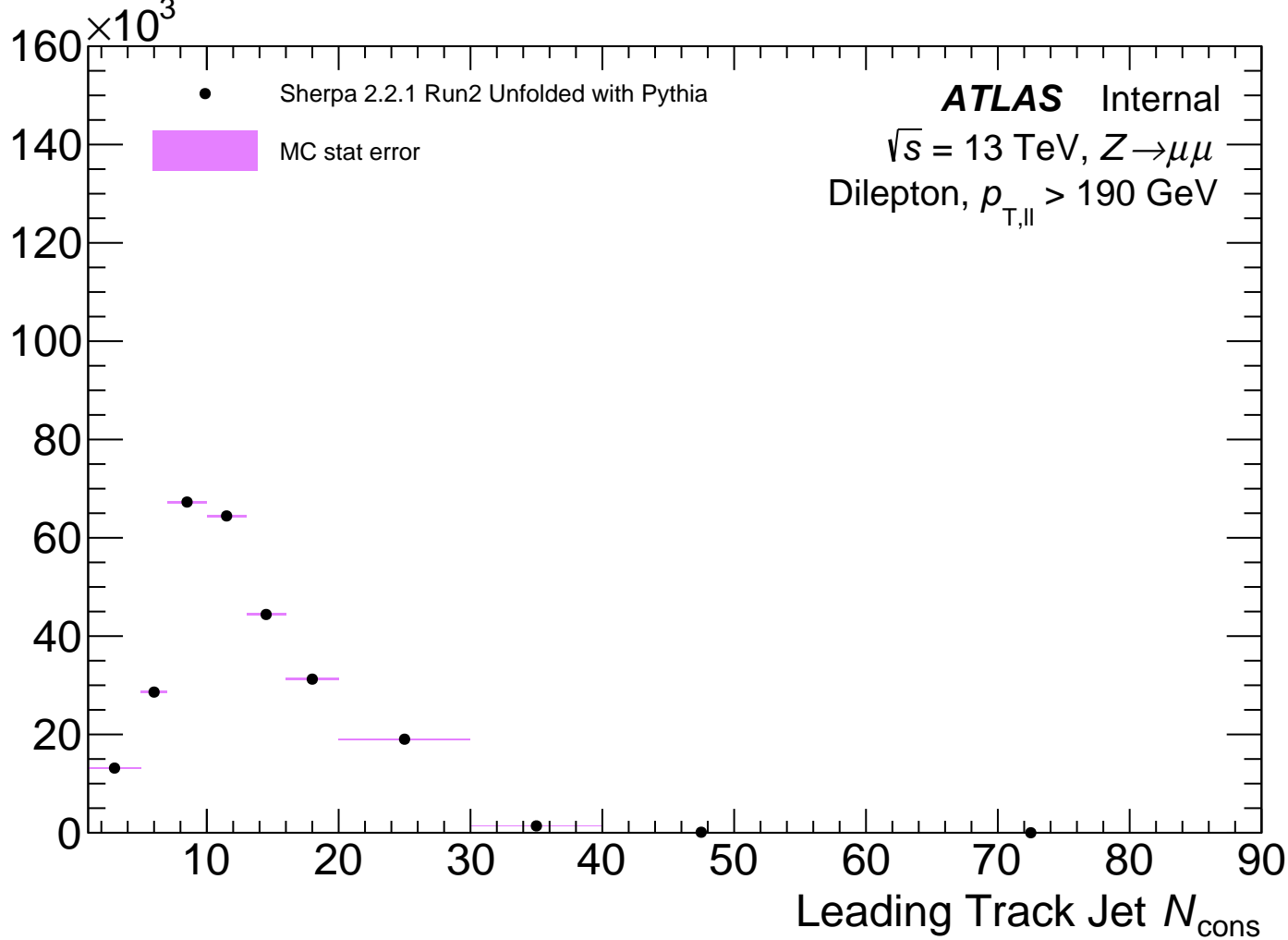
Events



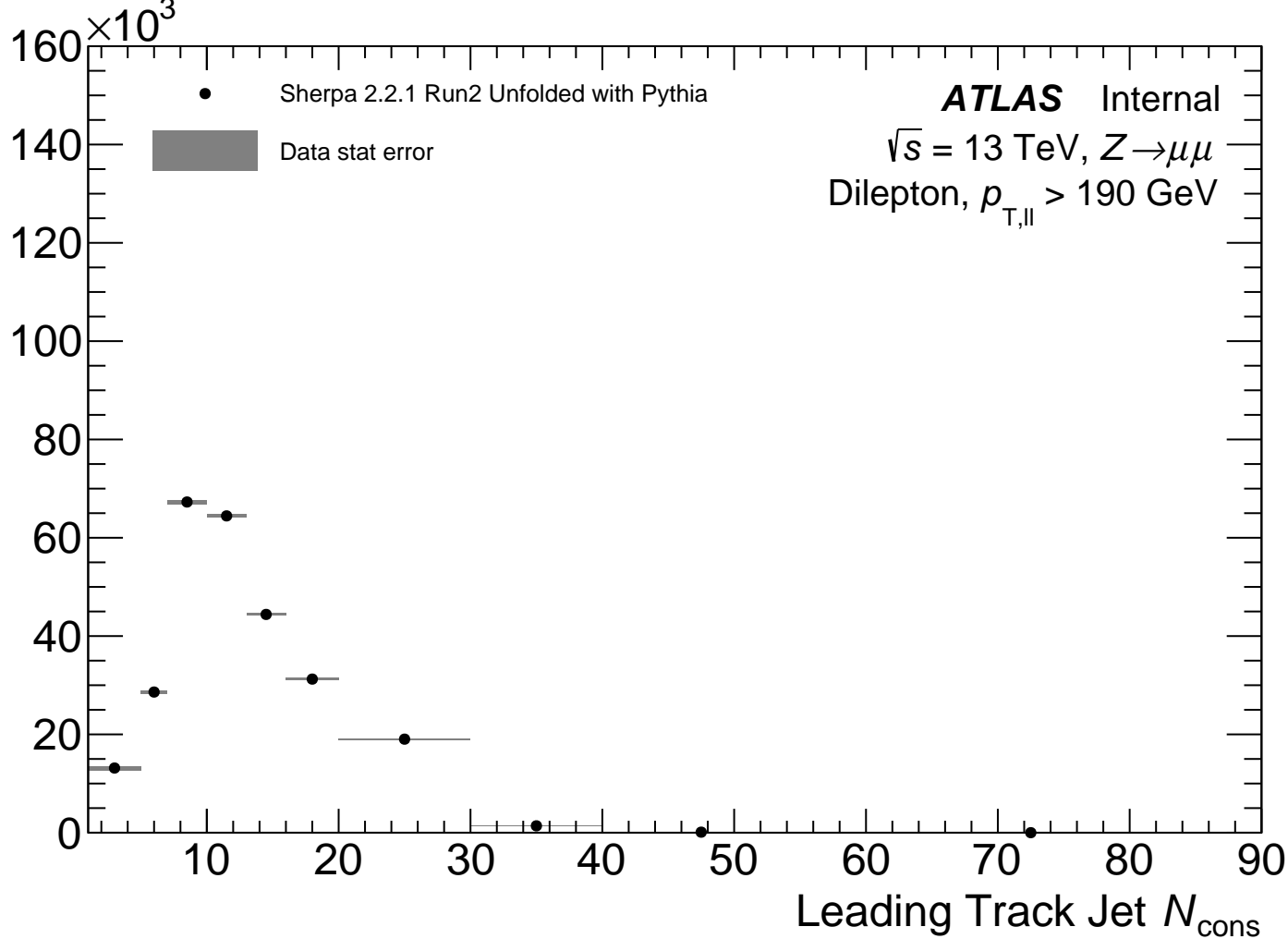
Events



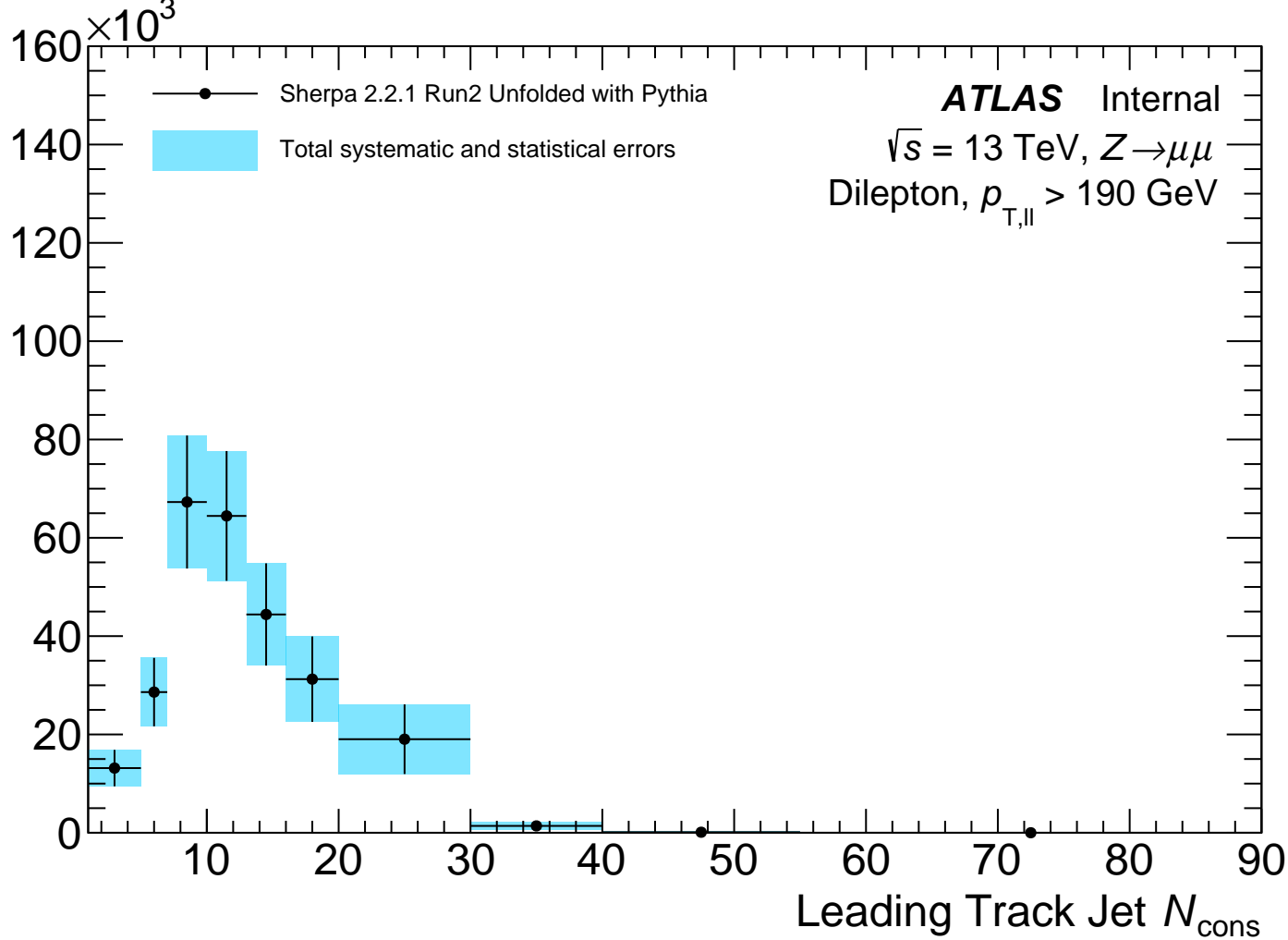
Events



Events



Events



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2016 Unfolded with Pythia

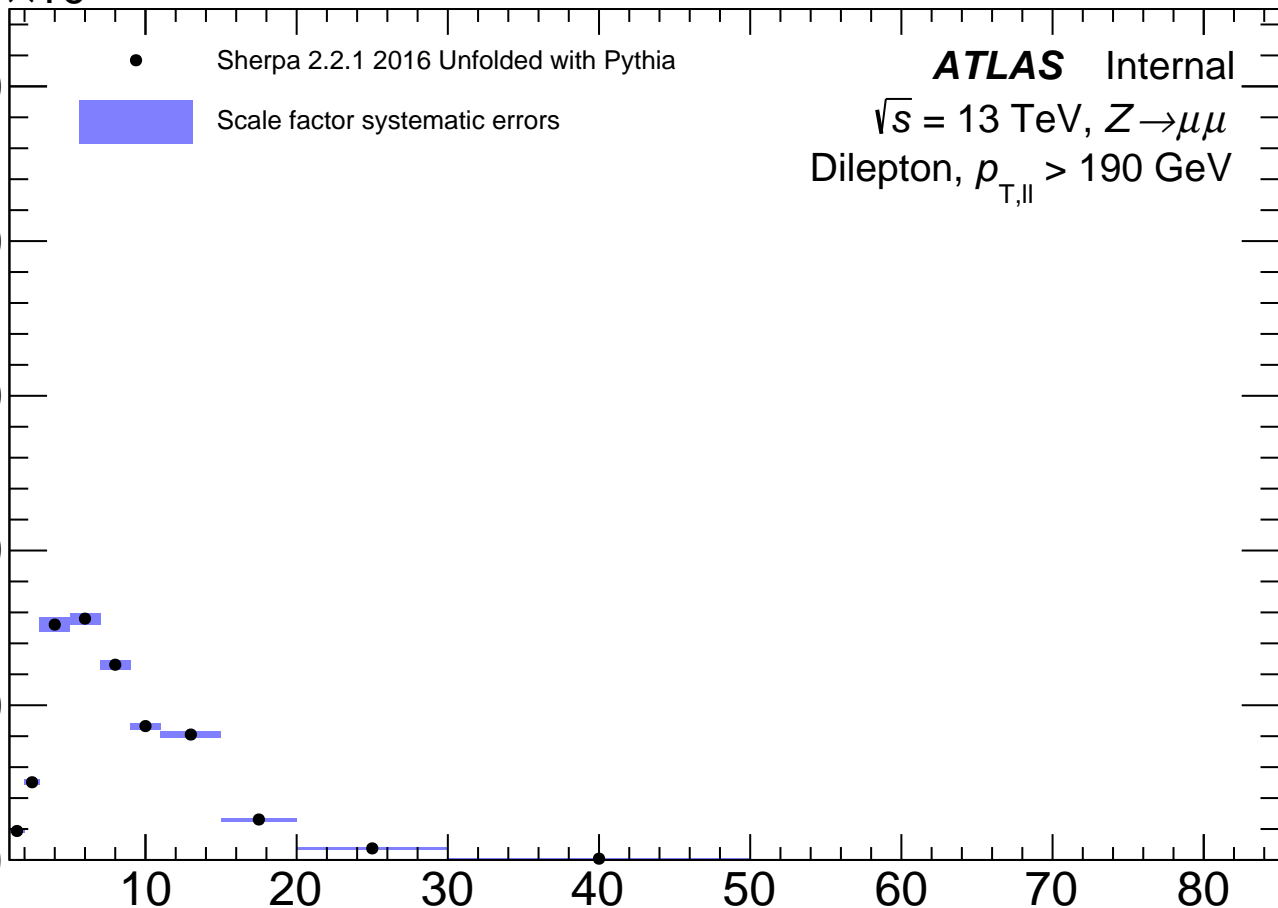
Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2016 Unfolded with Pythia

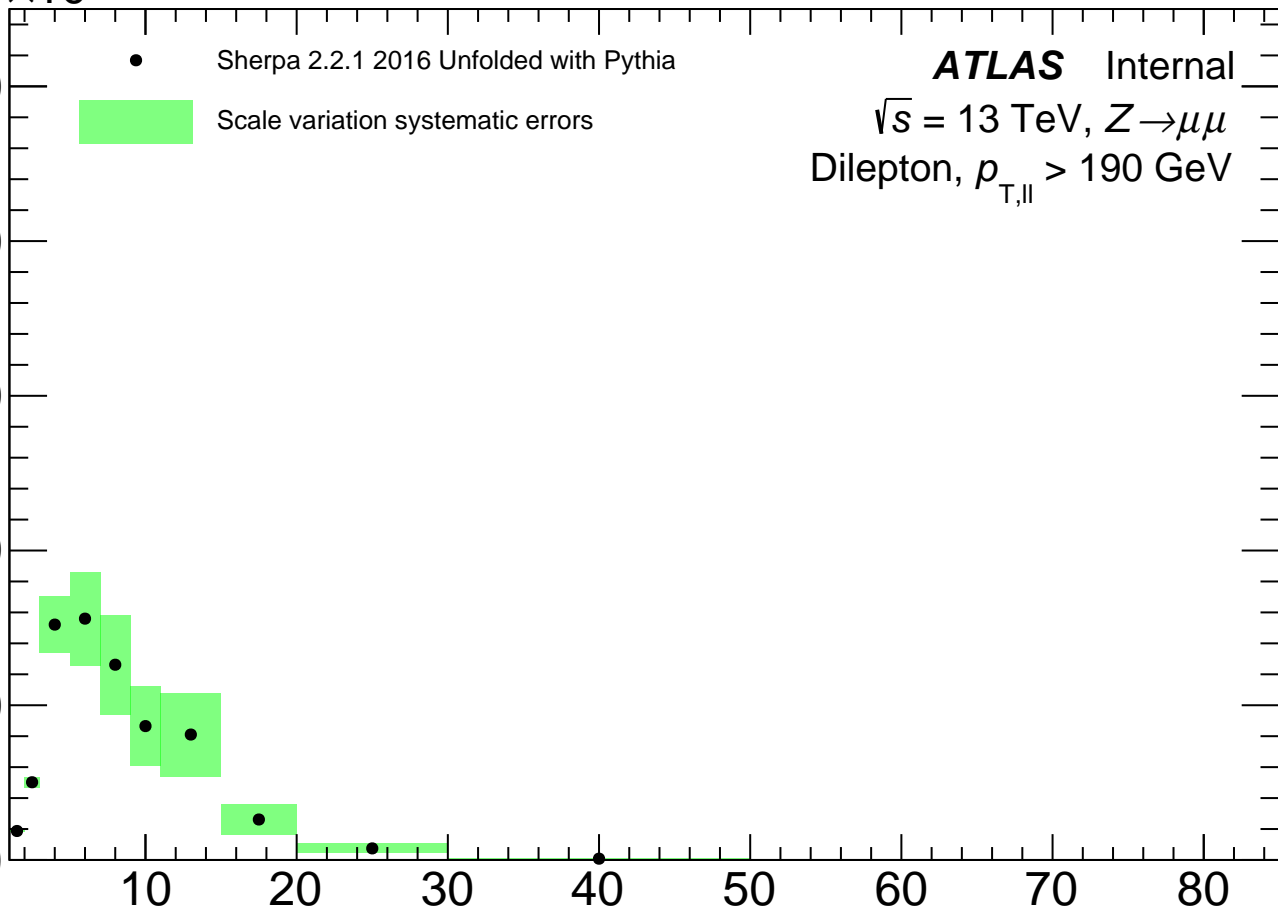
Scale variation systematic errors

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2016 Unfolded with Pythia

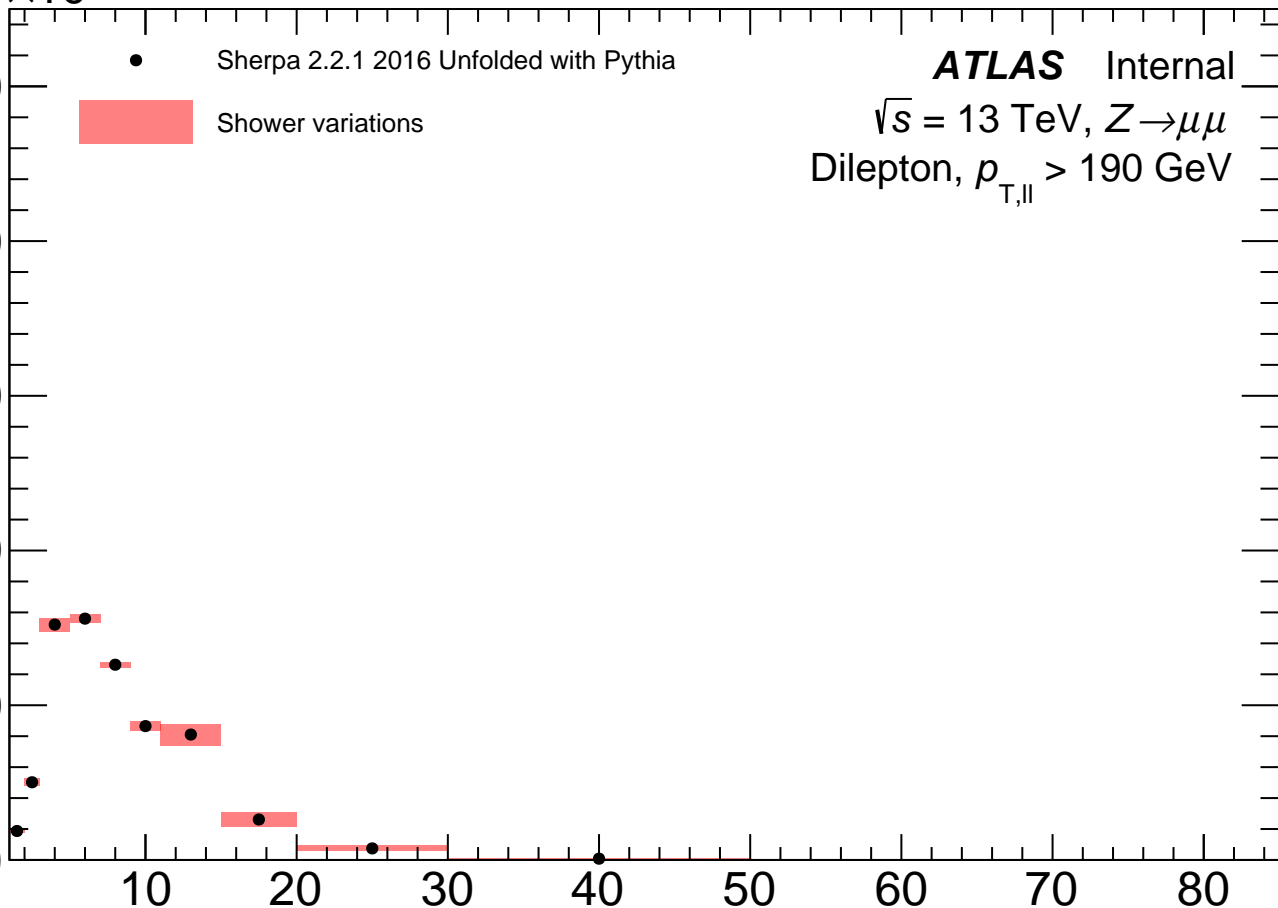
Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2016 Unfolded with Pythia

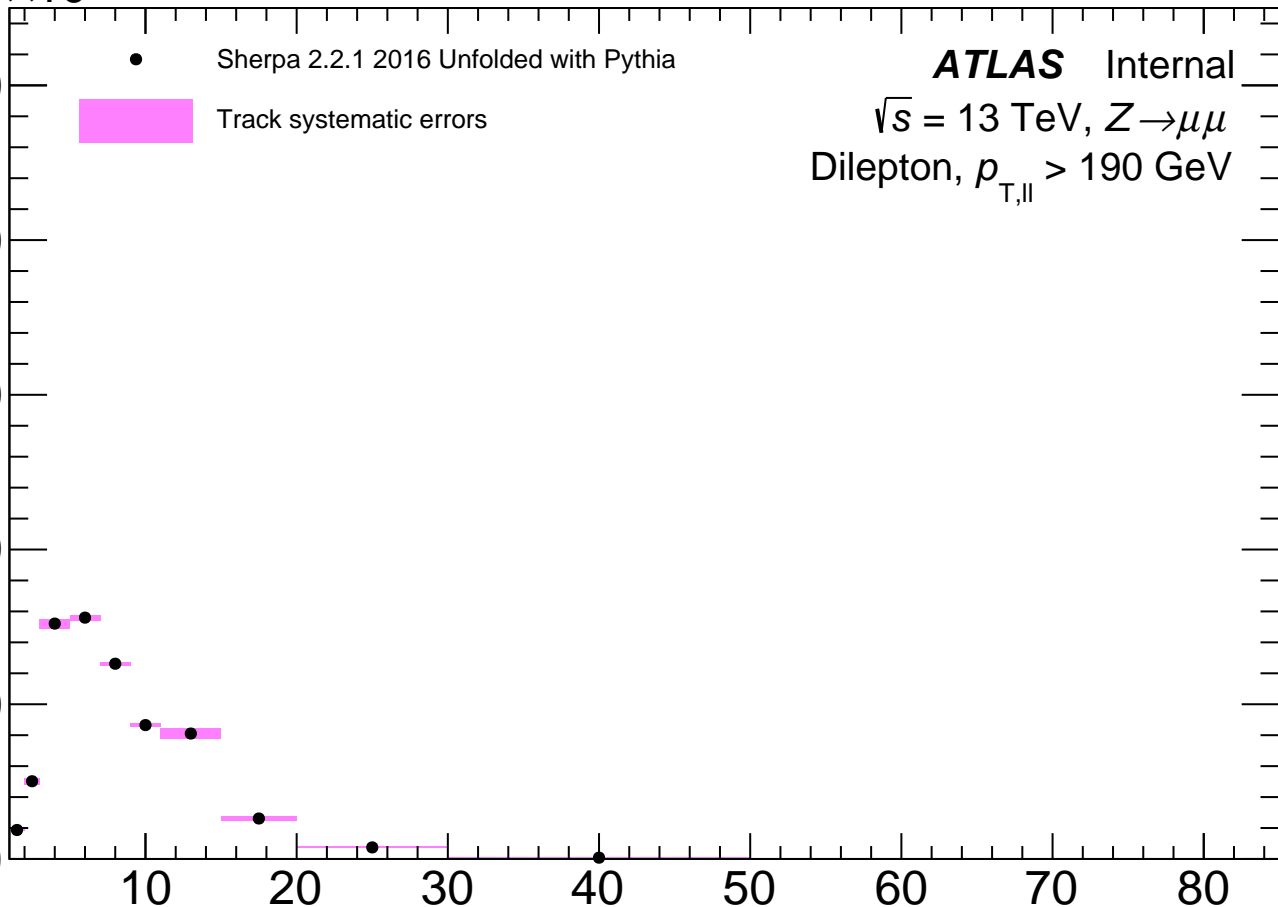
Track systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2016 Unfolded with Pythia

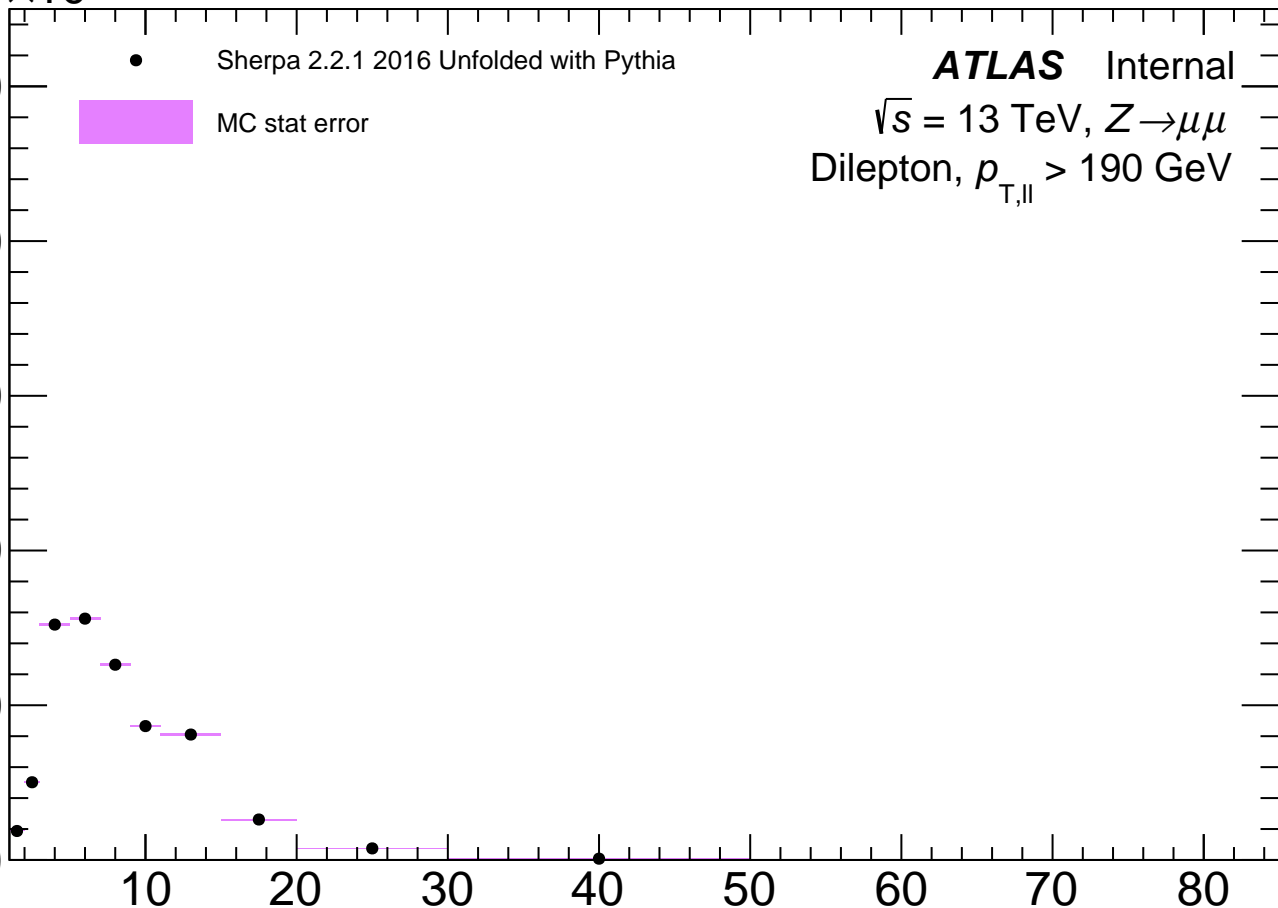
MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2016 Unfolded with Pythia

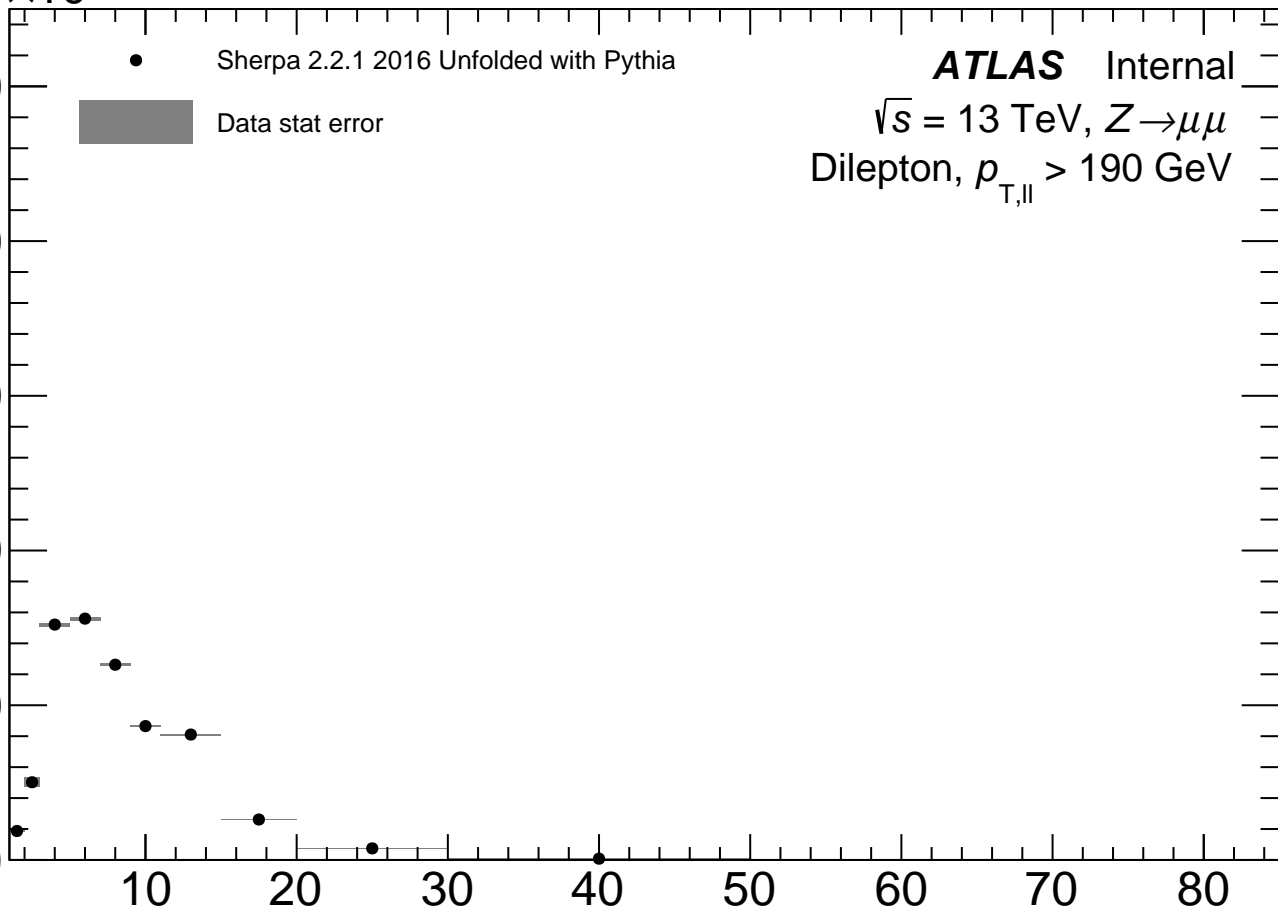
Data stat error

ATLAS Internal

$\sqrt{s} = 13$ TeV, $Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190$ GeV

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0



Sherpa 2.2.1 2016 Unfolded with Pythia



Total systematic and statistical errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

0

10

20

30

40

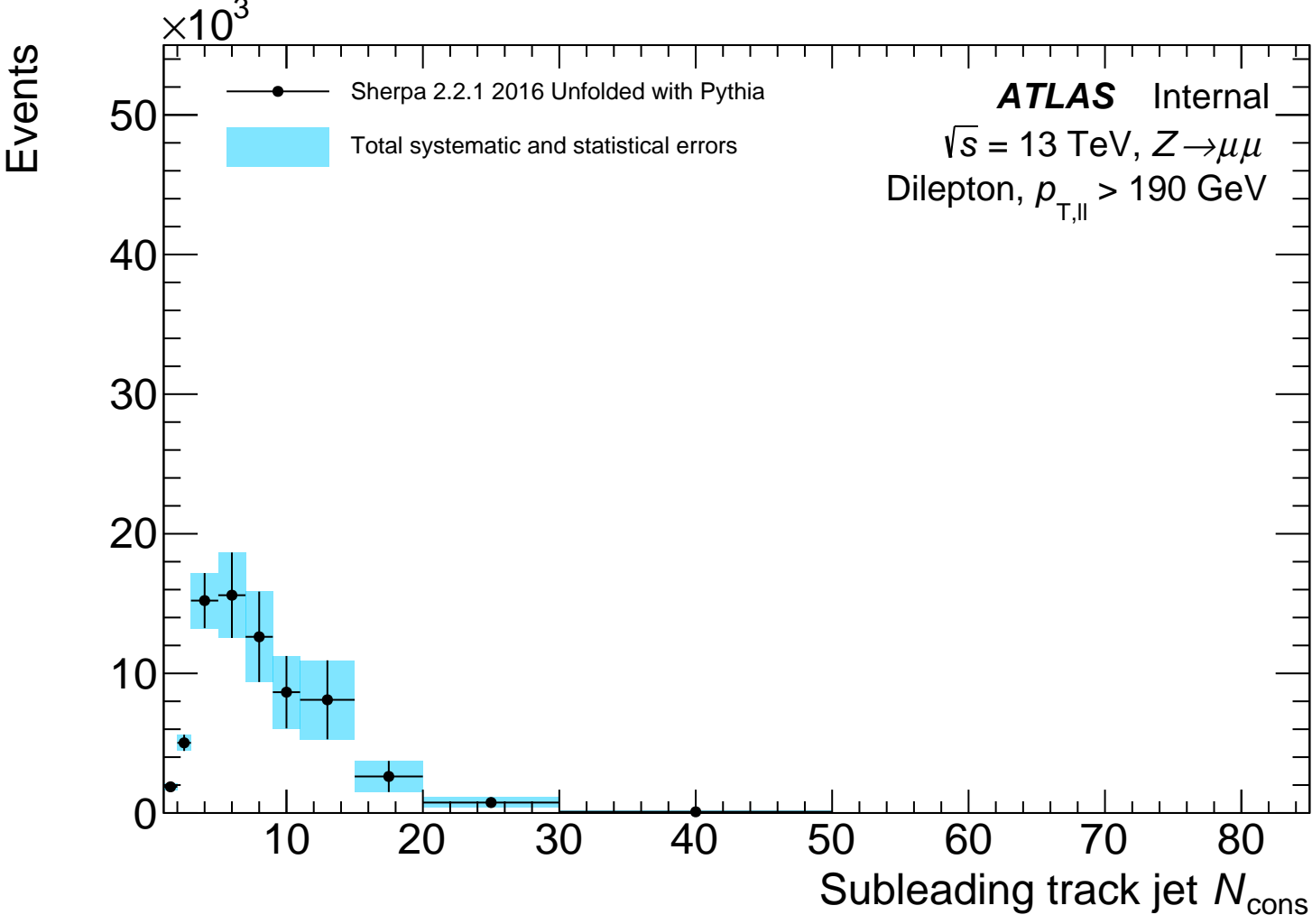
50

60

70

80

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2017 Unfolded with Pythia

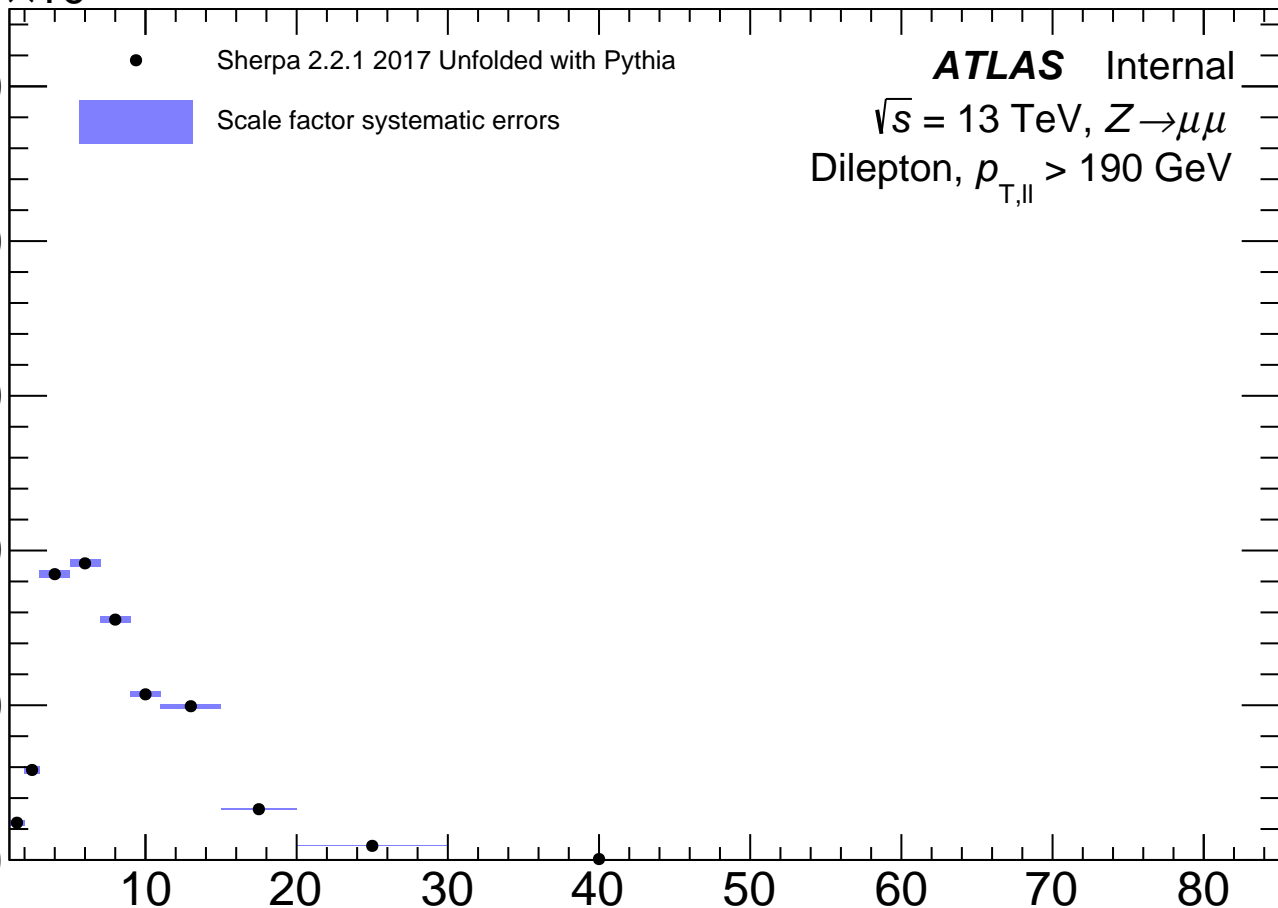
Scale factor systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

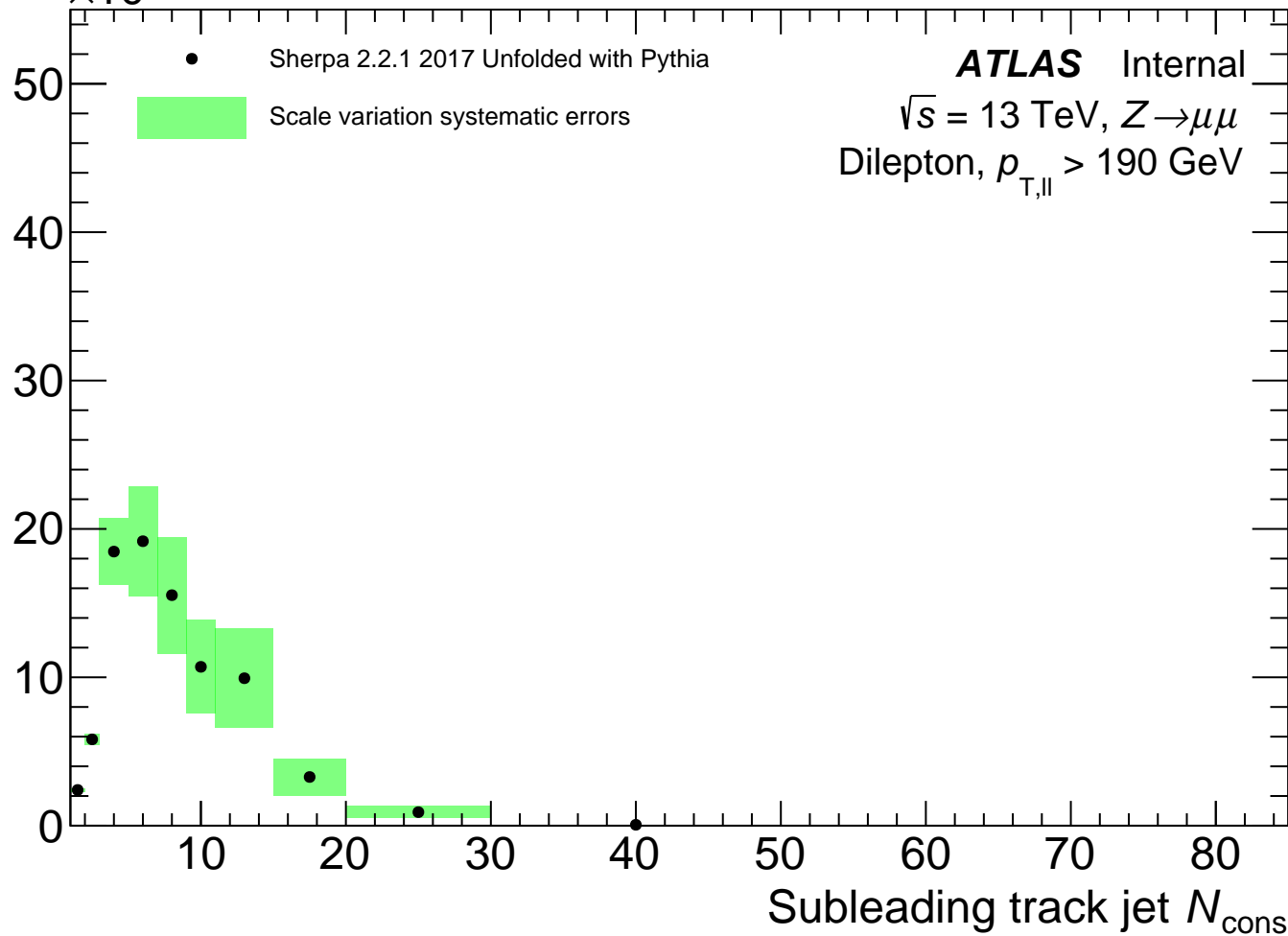
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2017 Unfolded with Pythia

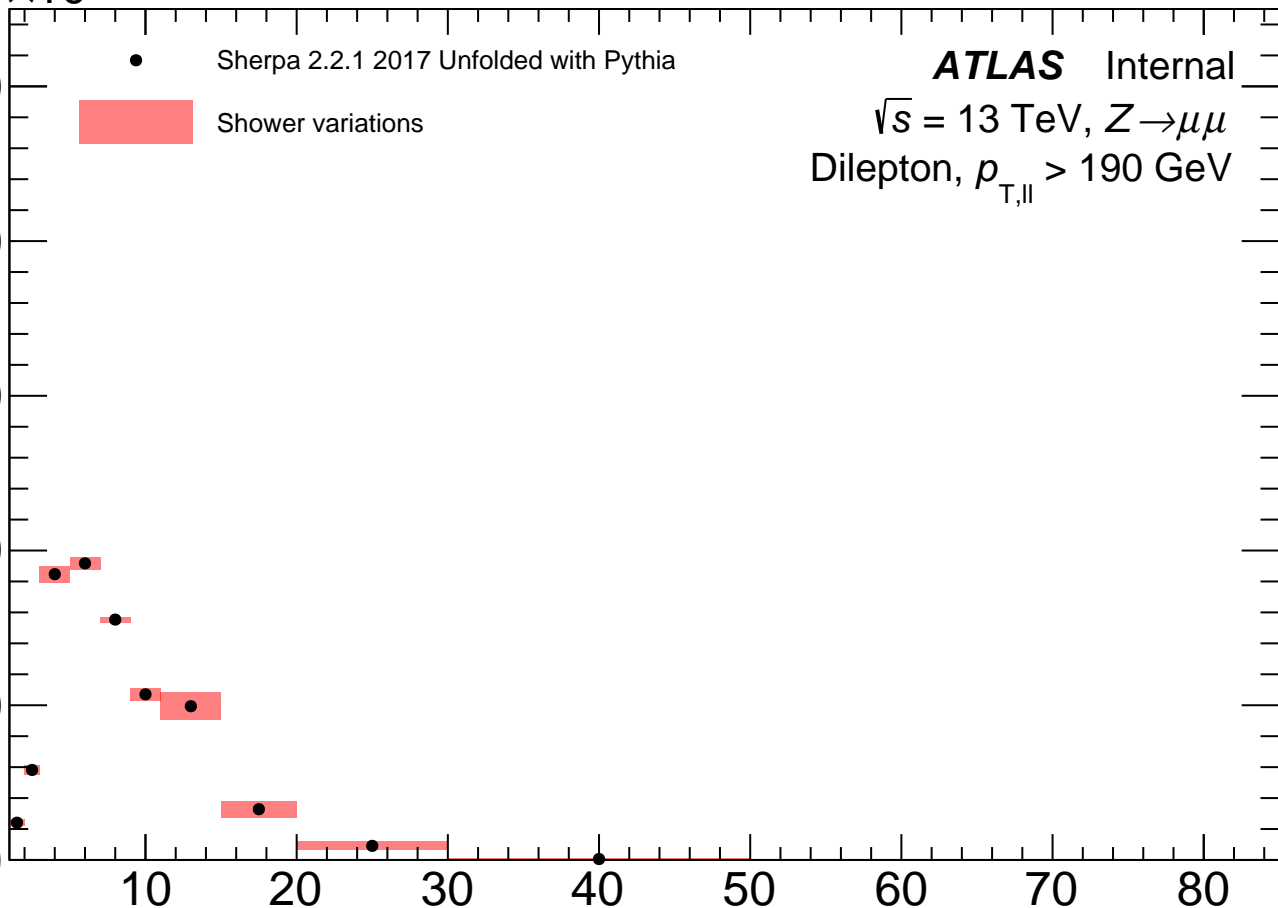
Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2017 Unfolded with Pythia

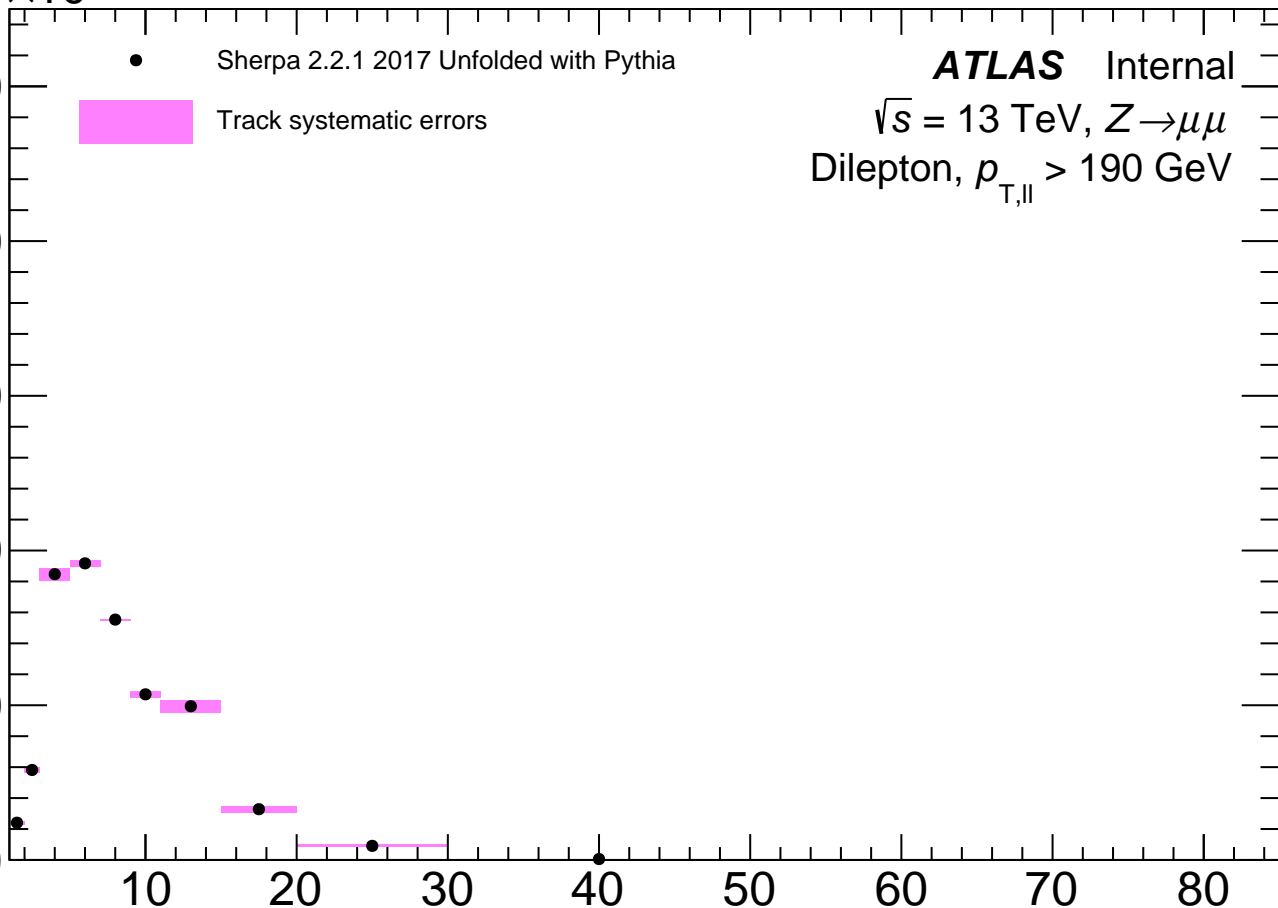
Track systematic errors

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

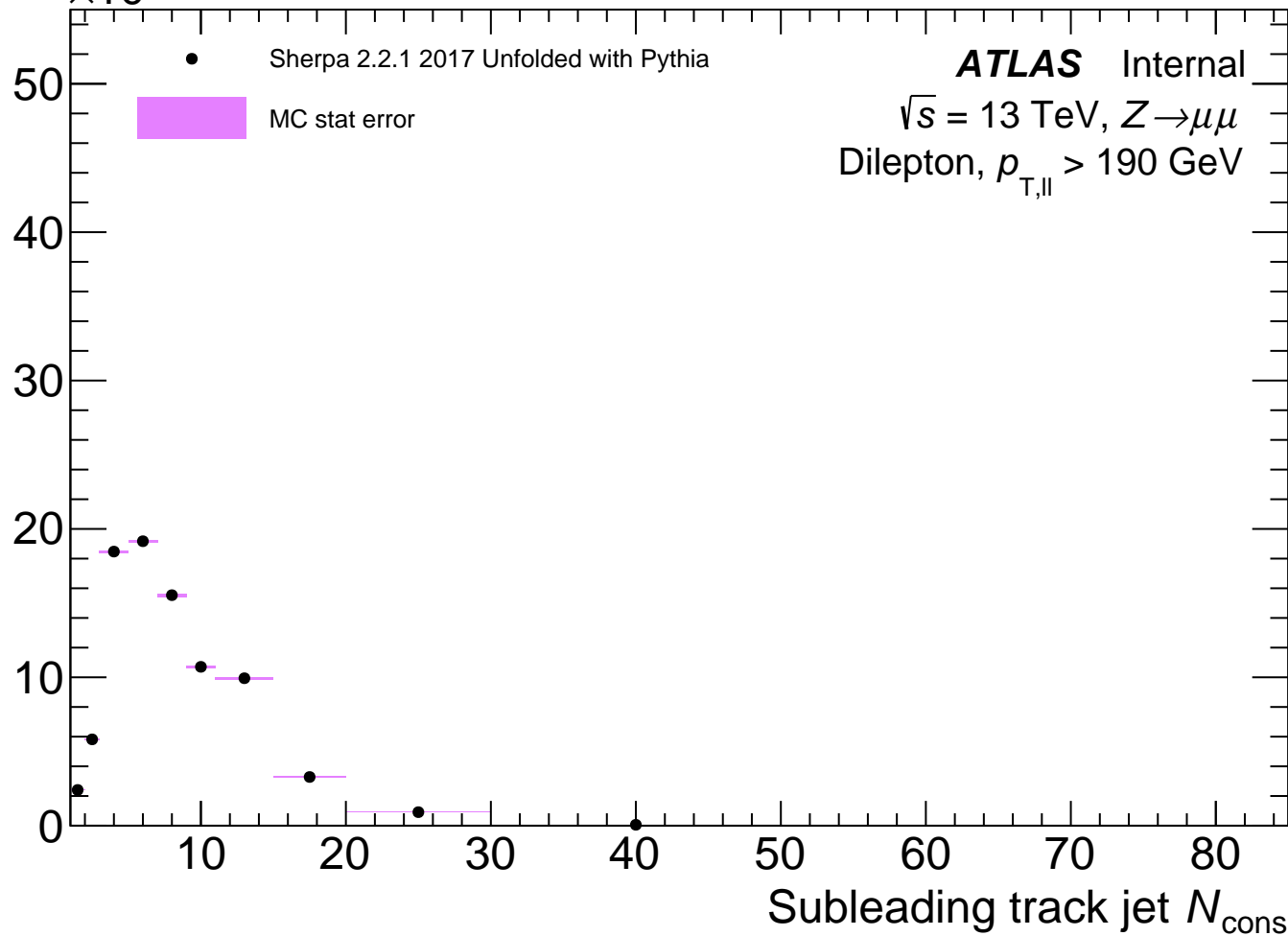
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2017 Unfolded with Pythia

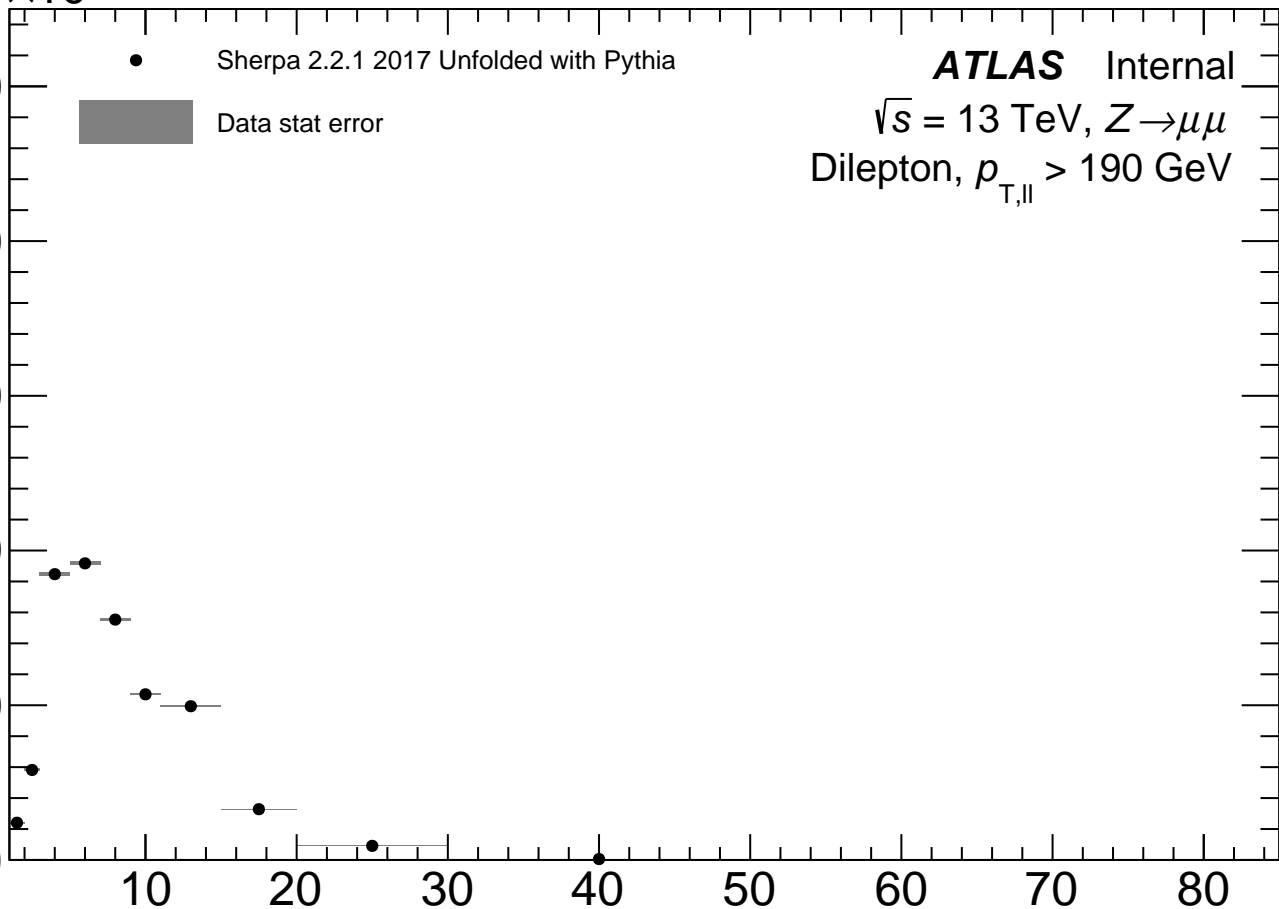
Data stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$

50

40

30

20

10

0



Sherpa 2.2.1 2017 Unfolded with Pythia

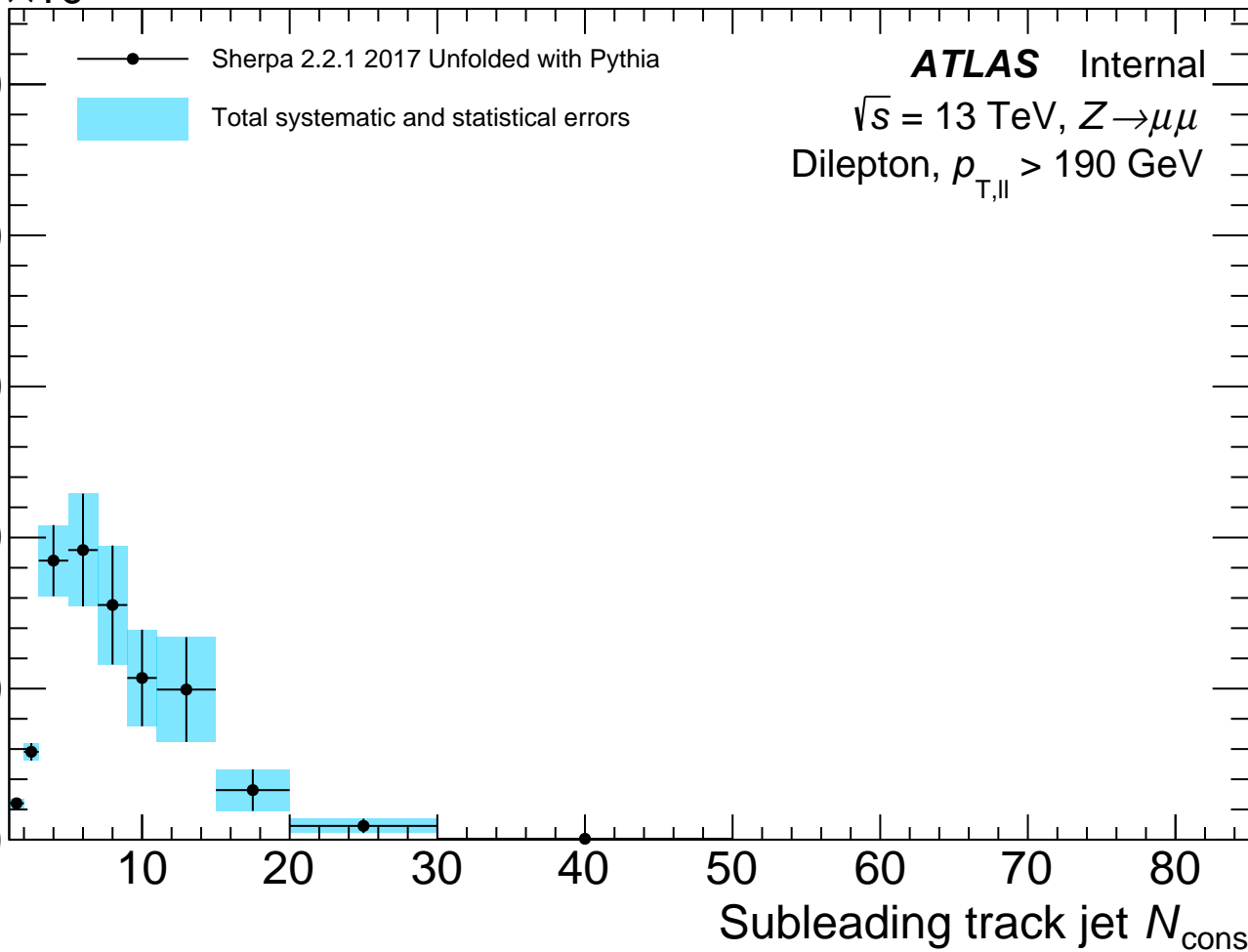


Total systematic and statistical errors

ATLAS Internal

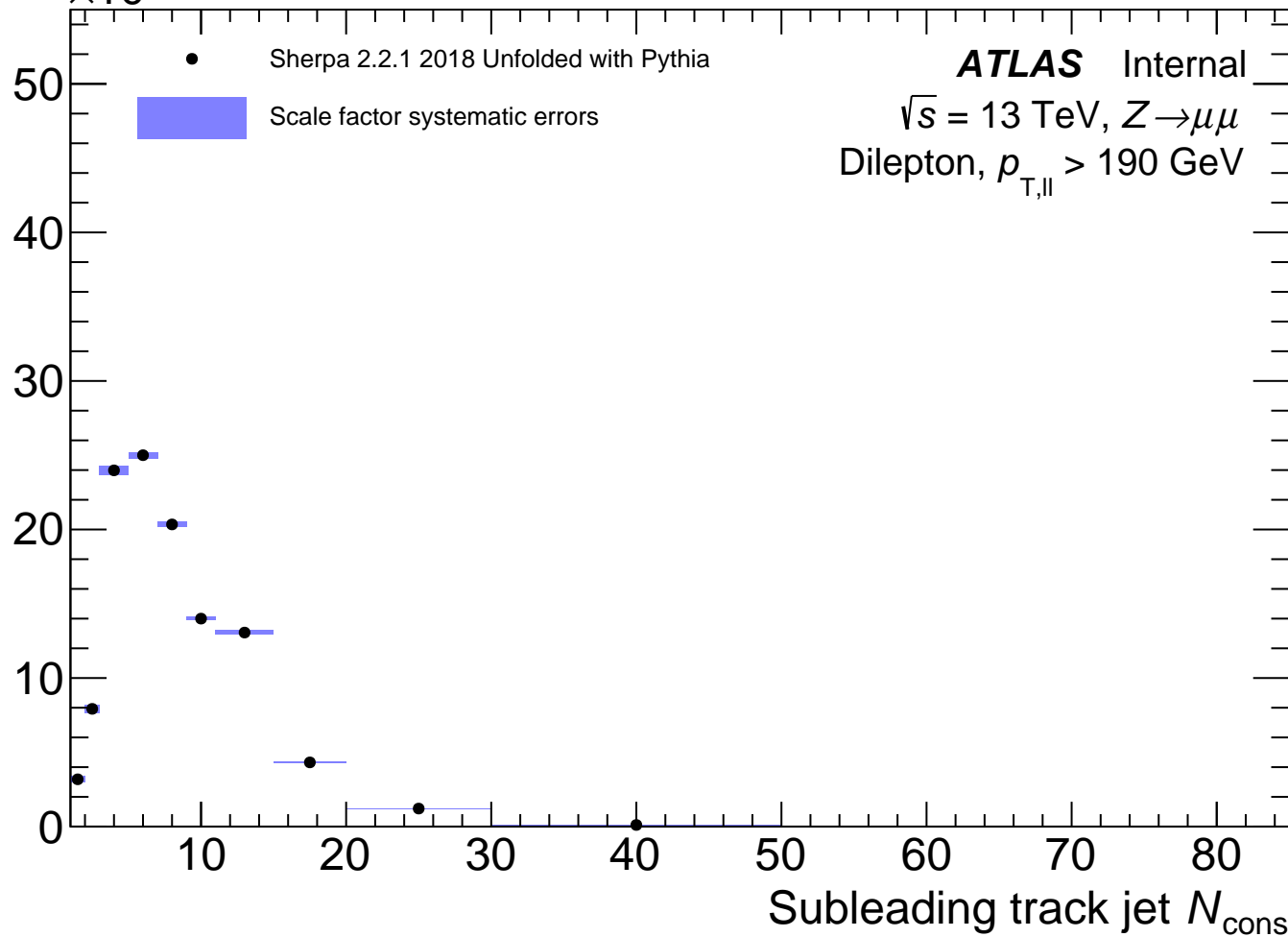
$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



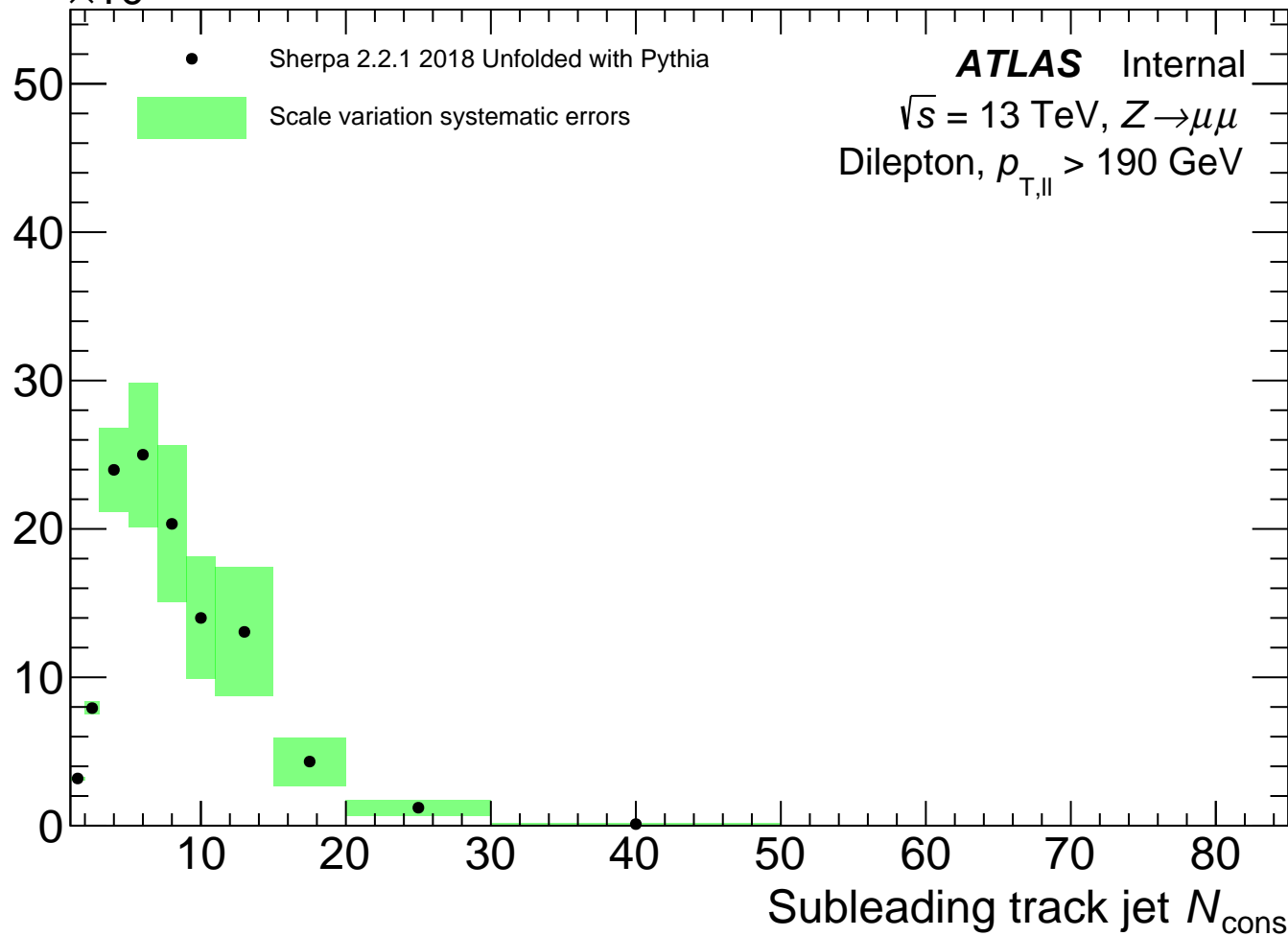
Events

$\times 10^3$



Events

$\times 10^3$



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2018 Unfolded with Pythia

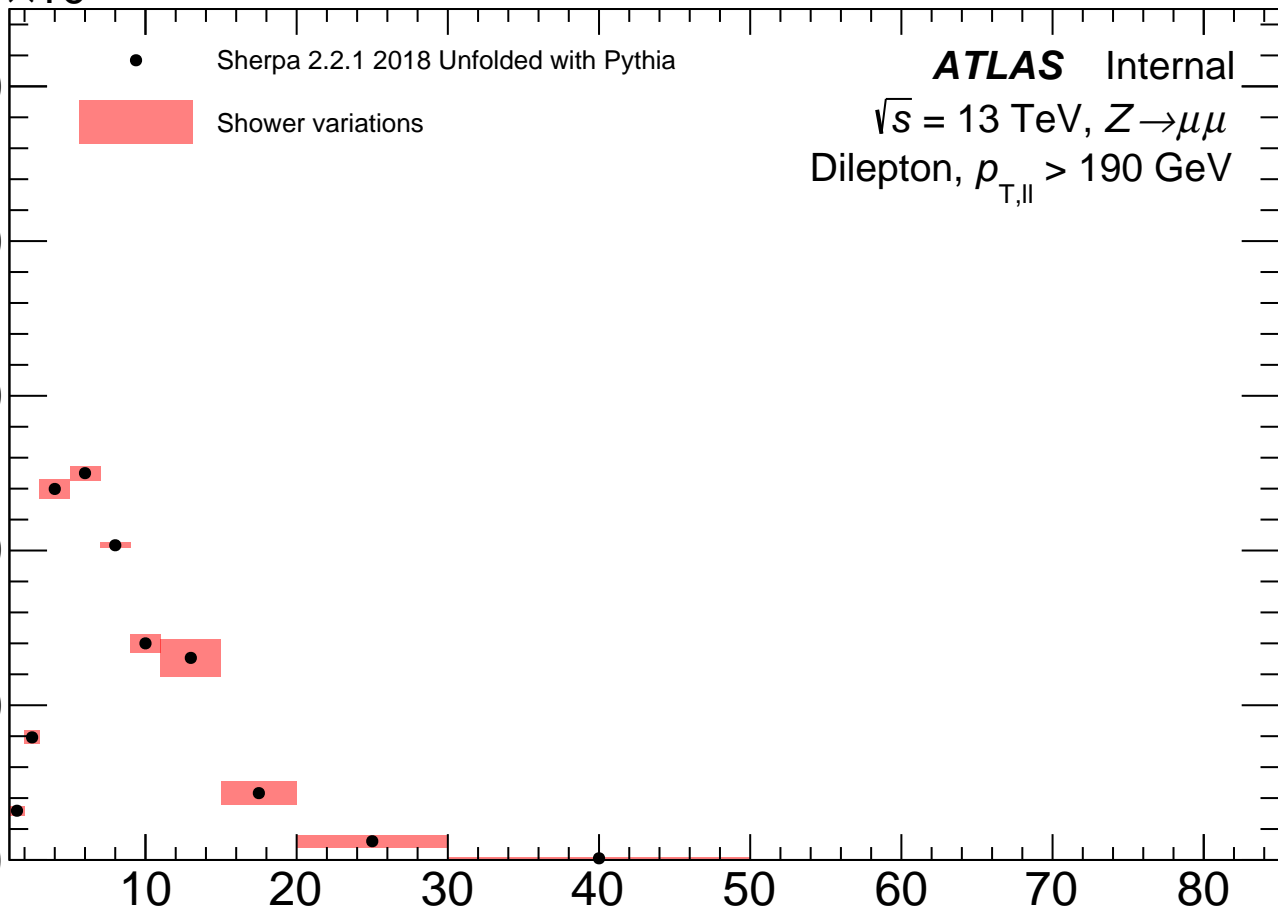
Shower variations

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

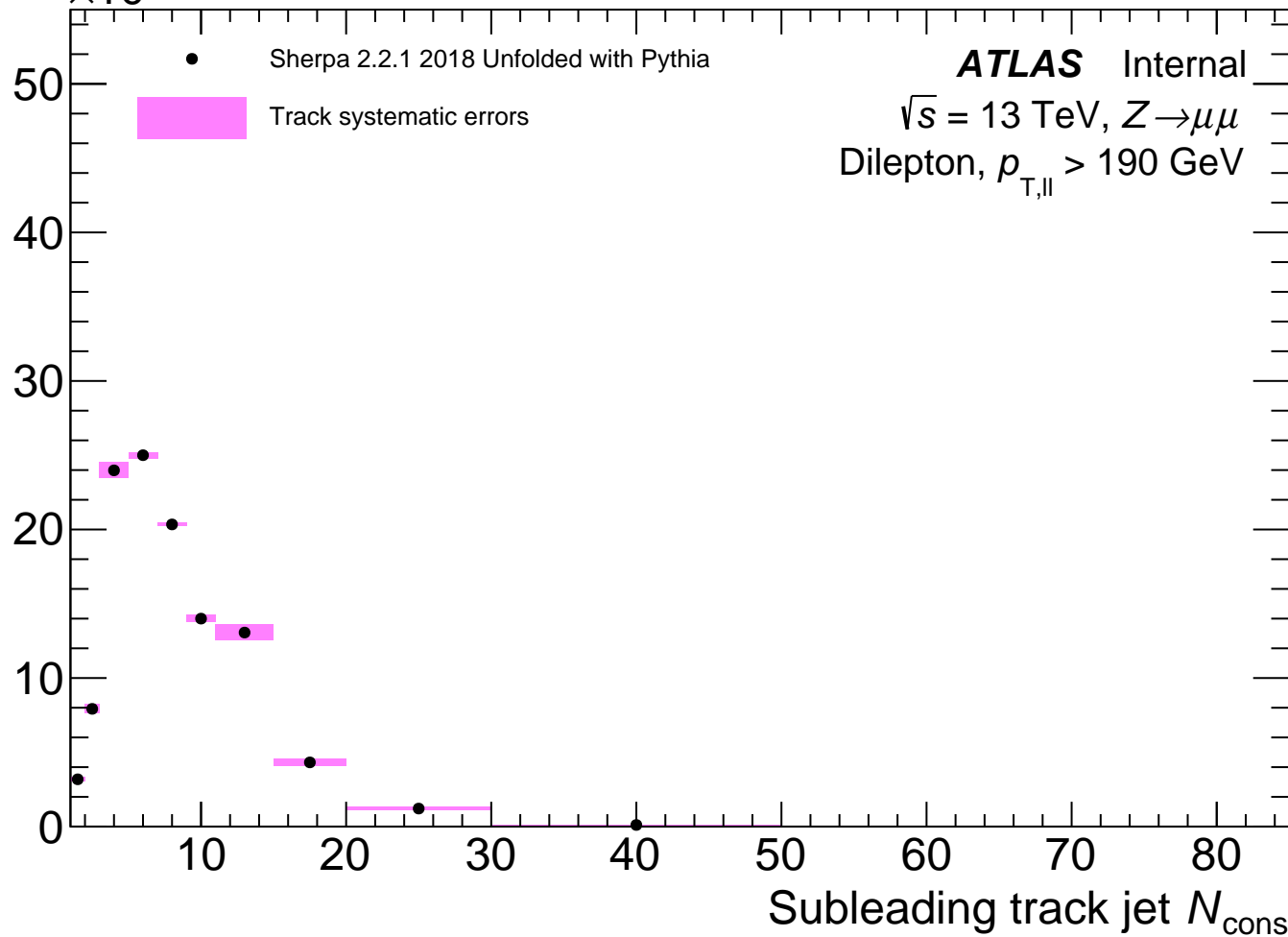
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$



Events

$\times 10^3$

50

40

30

20

10

0

Sherpa 2.2.1 2018 Unfolded with Pythia

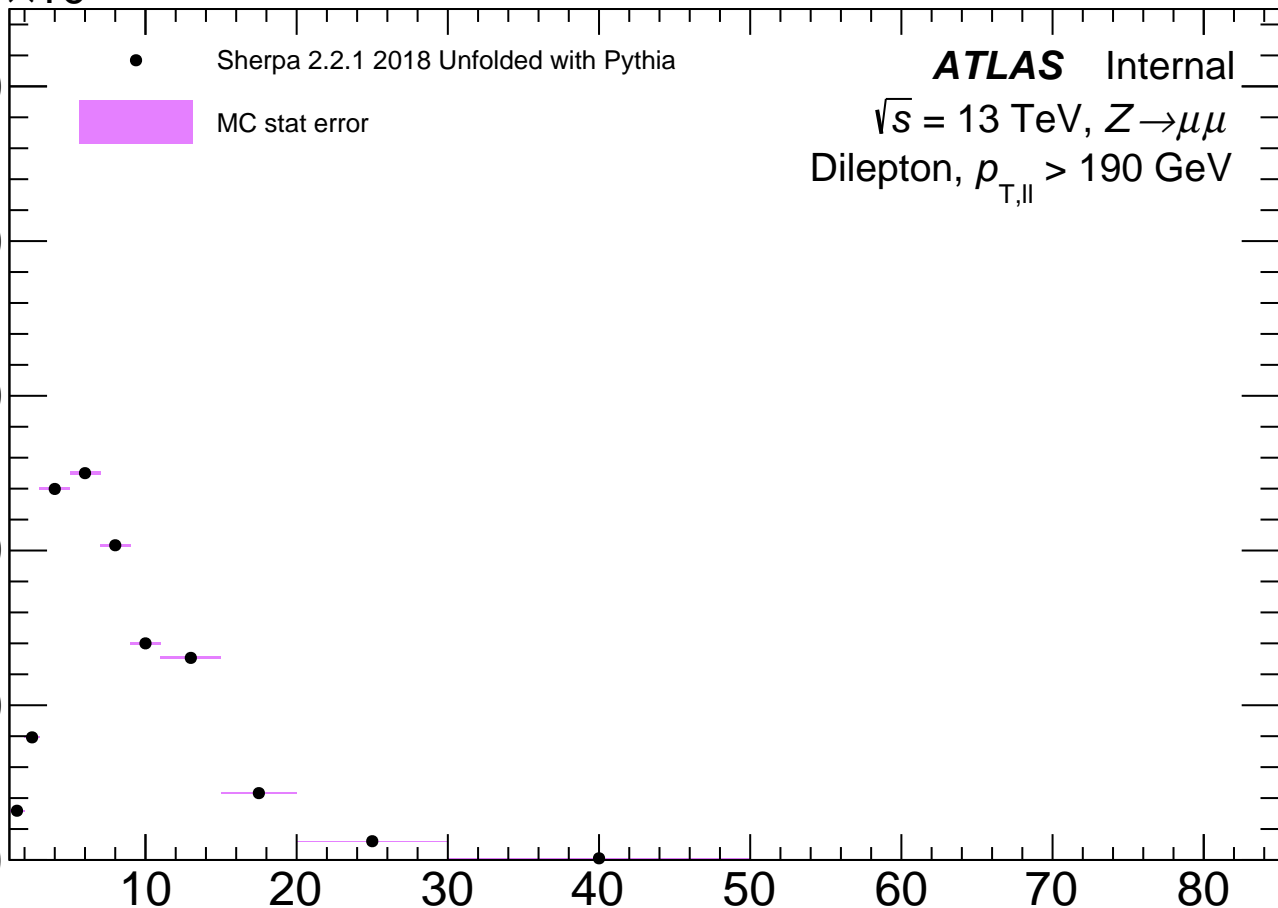
MC stat error

ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

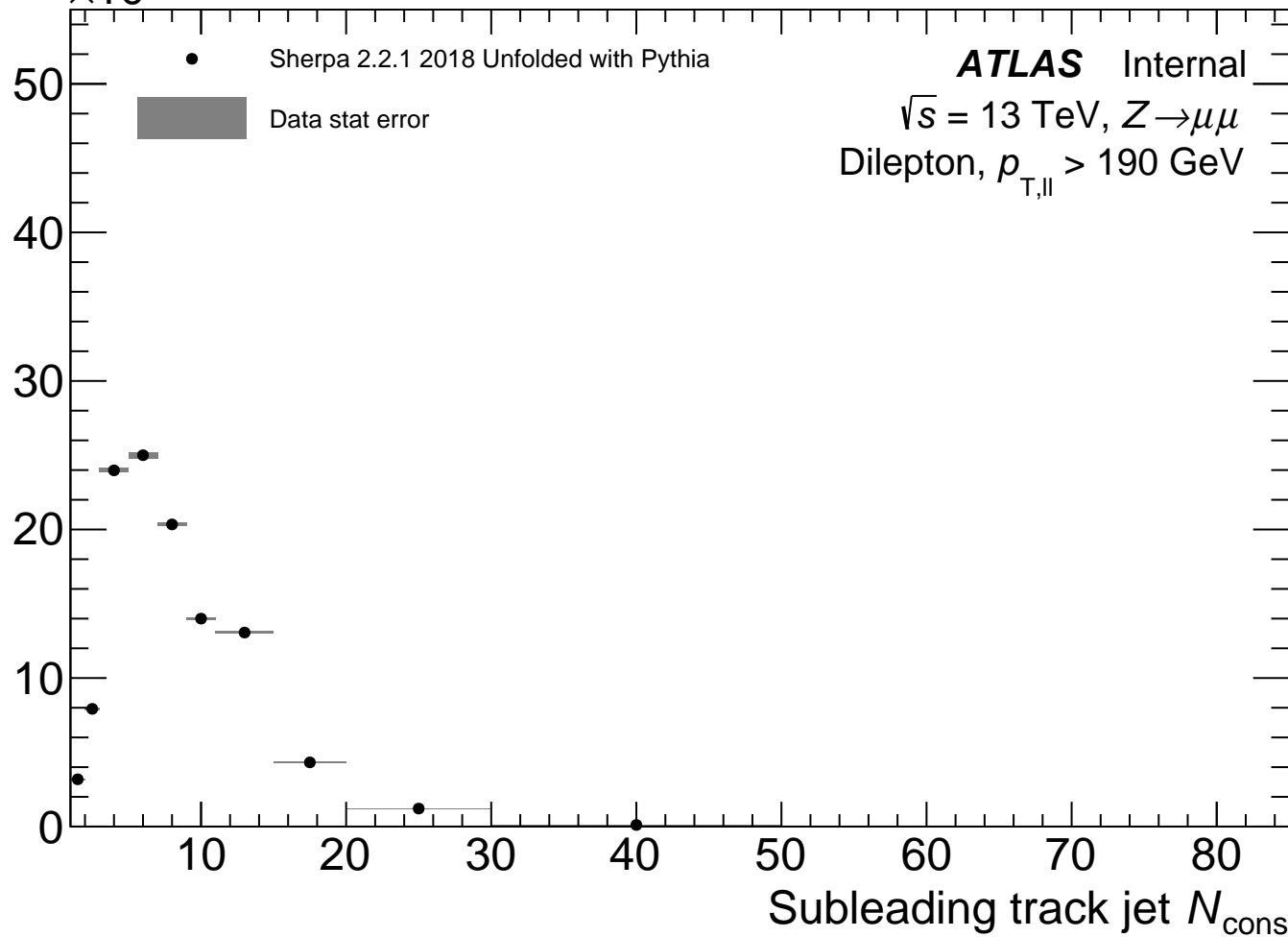
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$

Subleading track jet N_{cons}



Events

$\times 10^3$



Events

$\times 10^3$

50

40

30

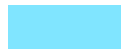
20

10

0



Sherpa 2.2.1 2018 Unfolded with Pythia



Total systematic and statistical errors

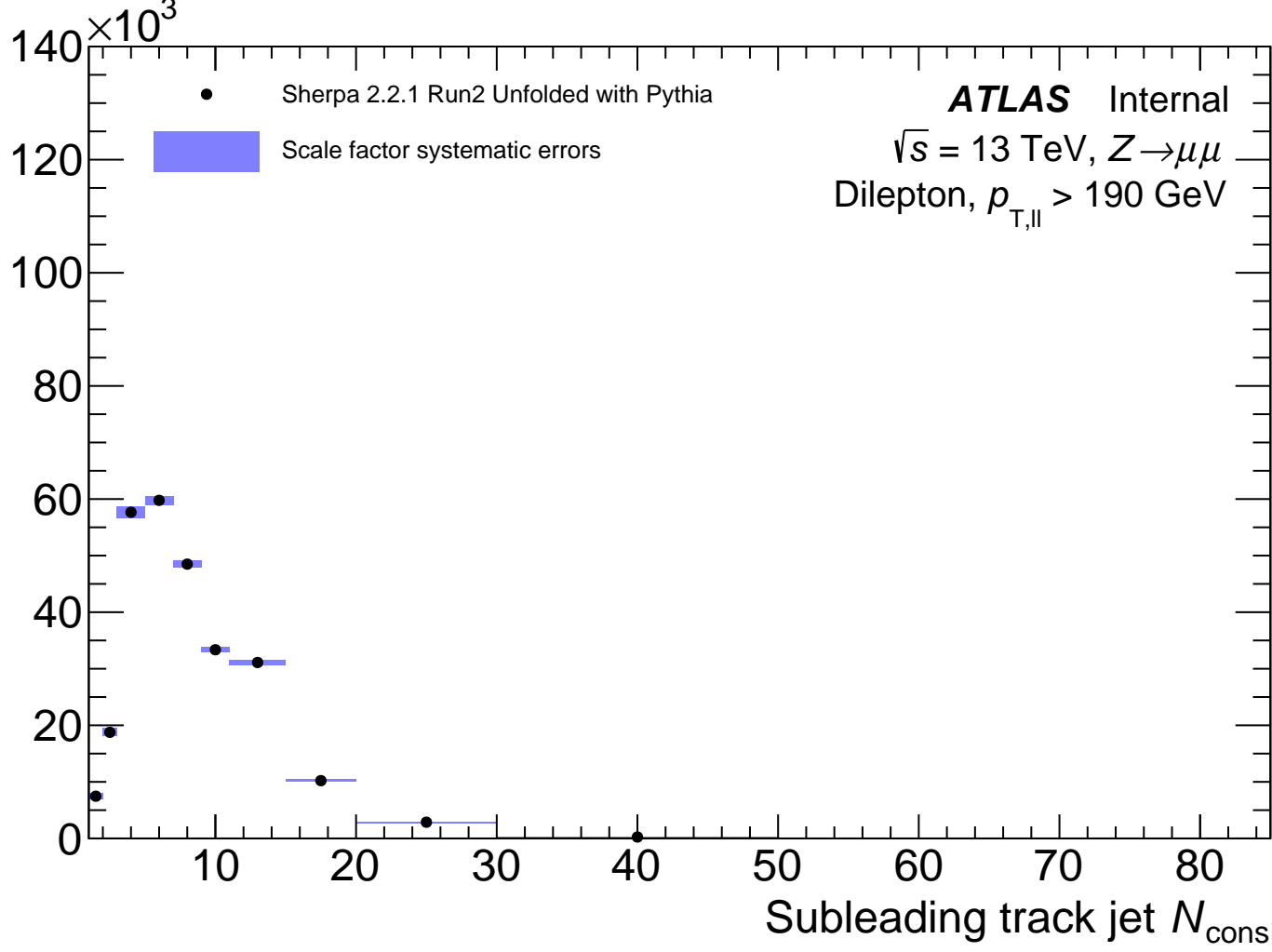
ATLAS Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu$

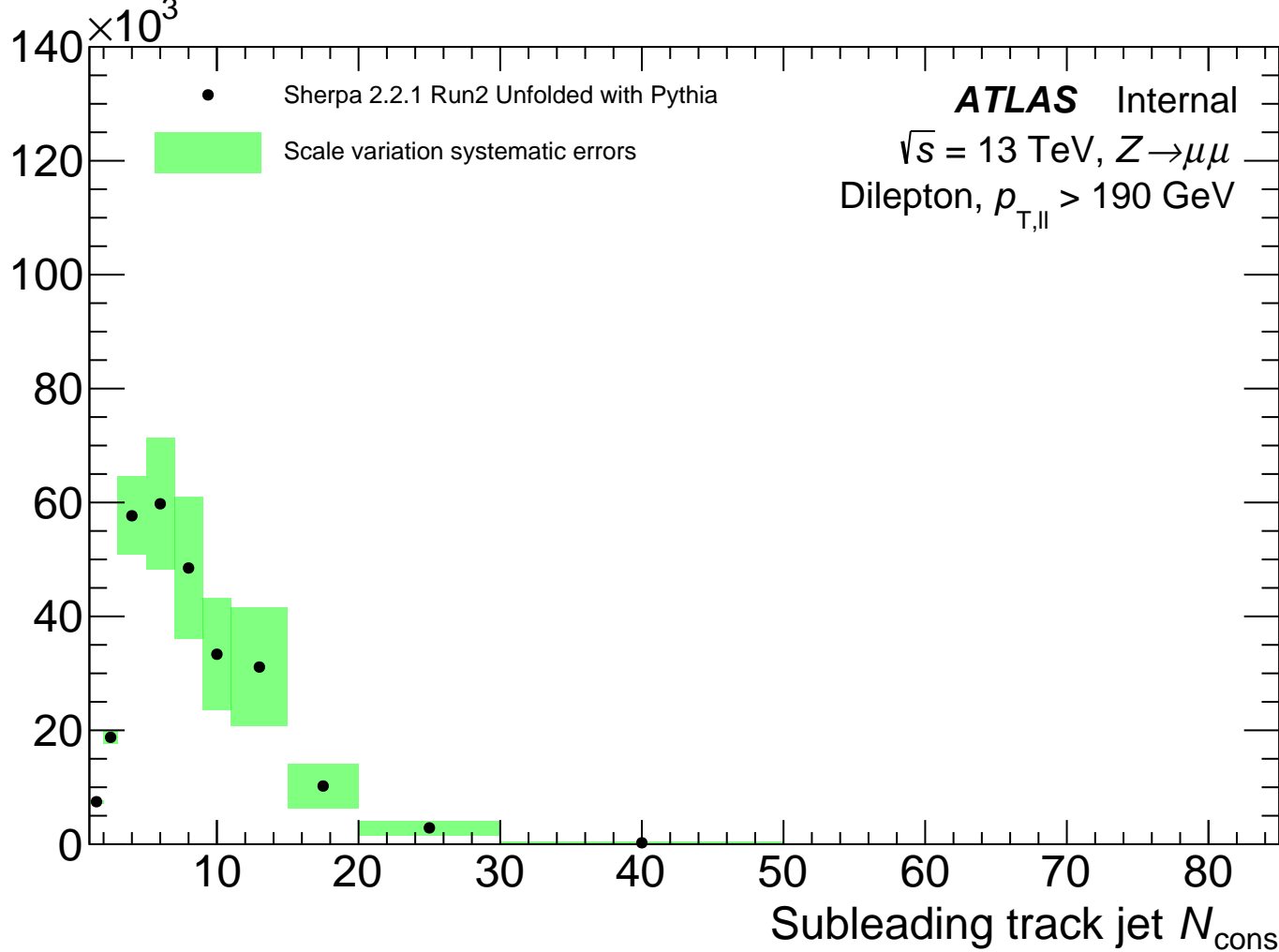
Dilepton, $p_{T,\text{ll}} > 190 \text{ GeV}$



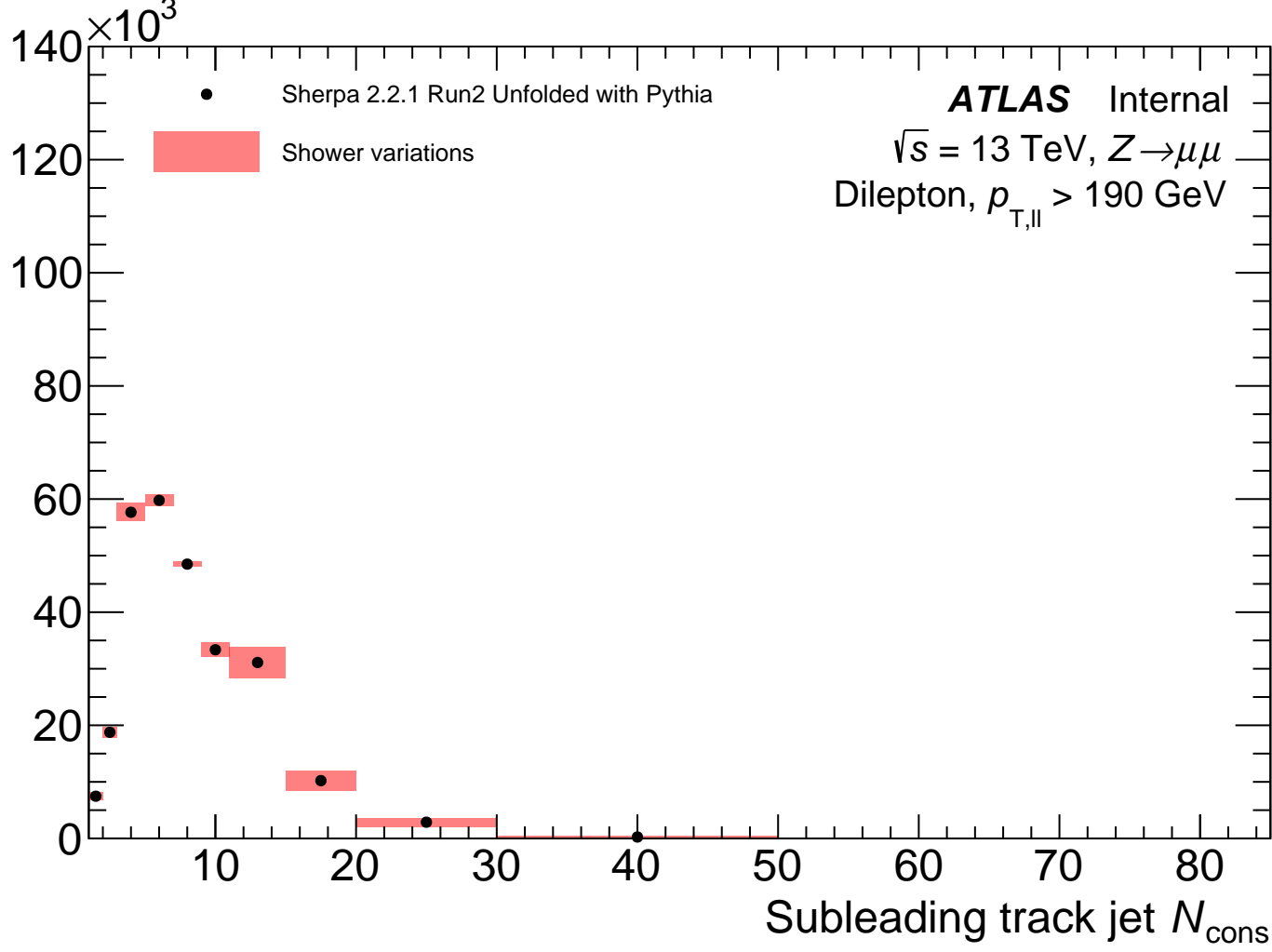
Events



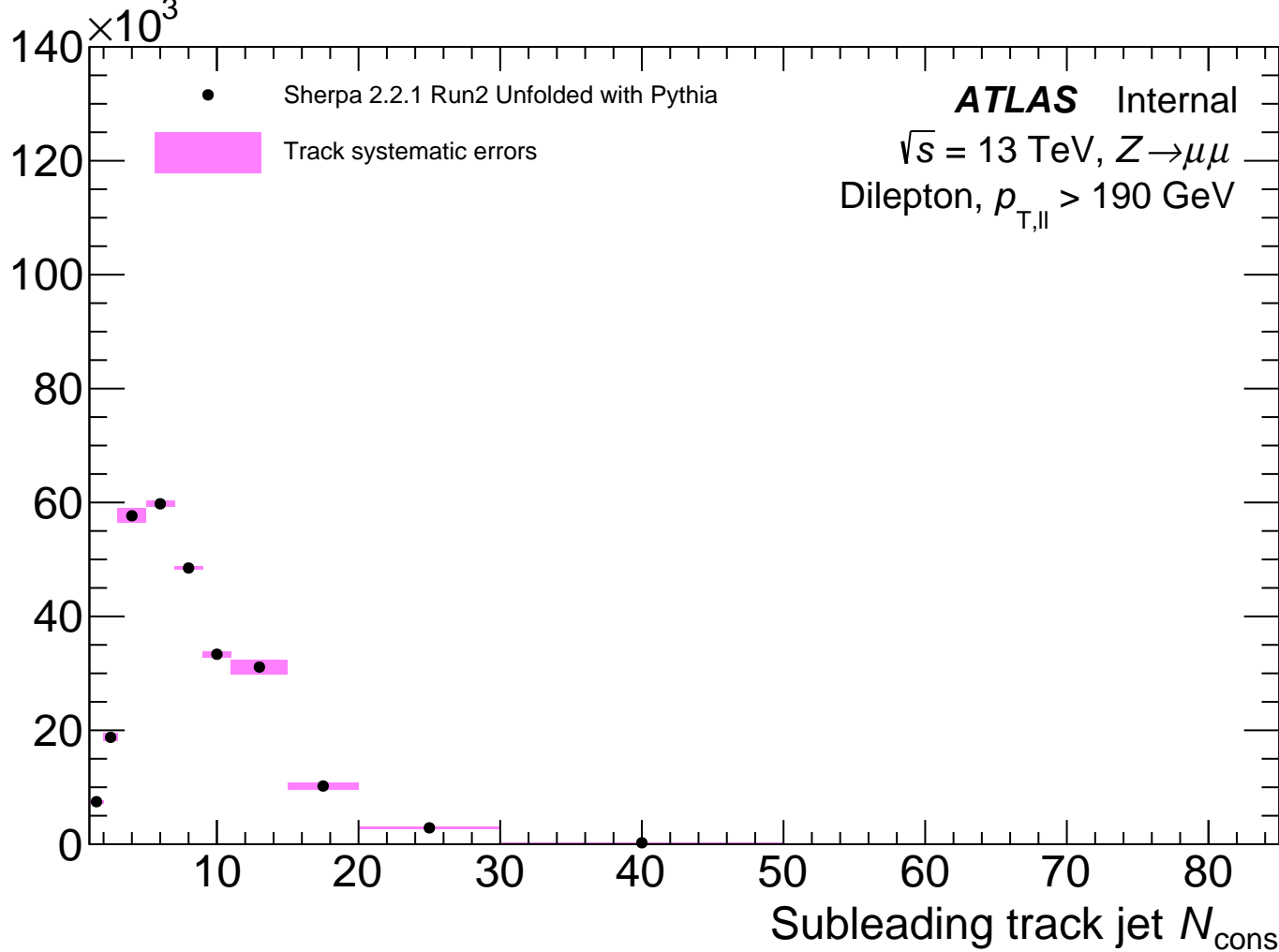
Events



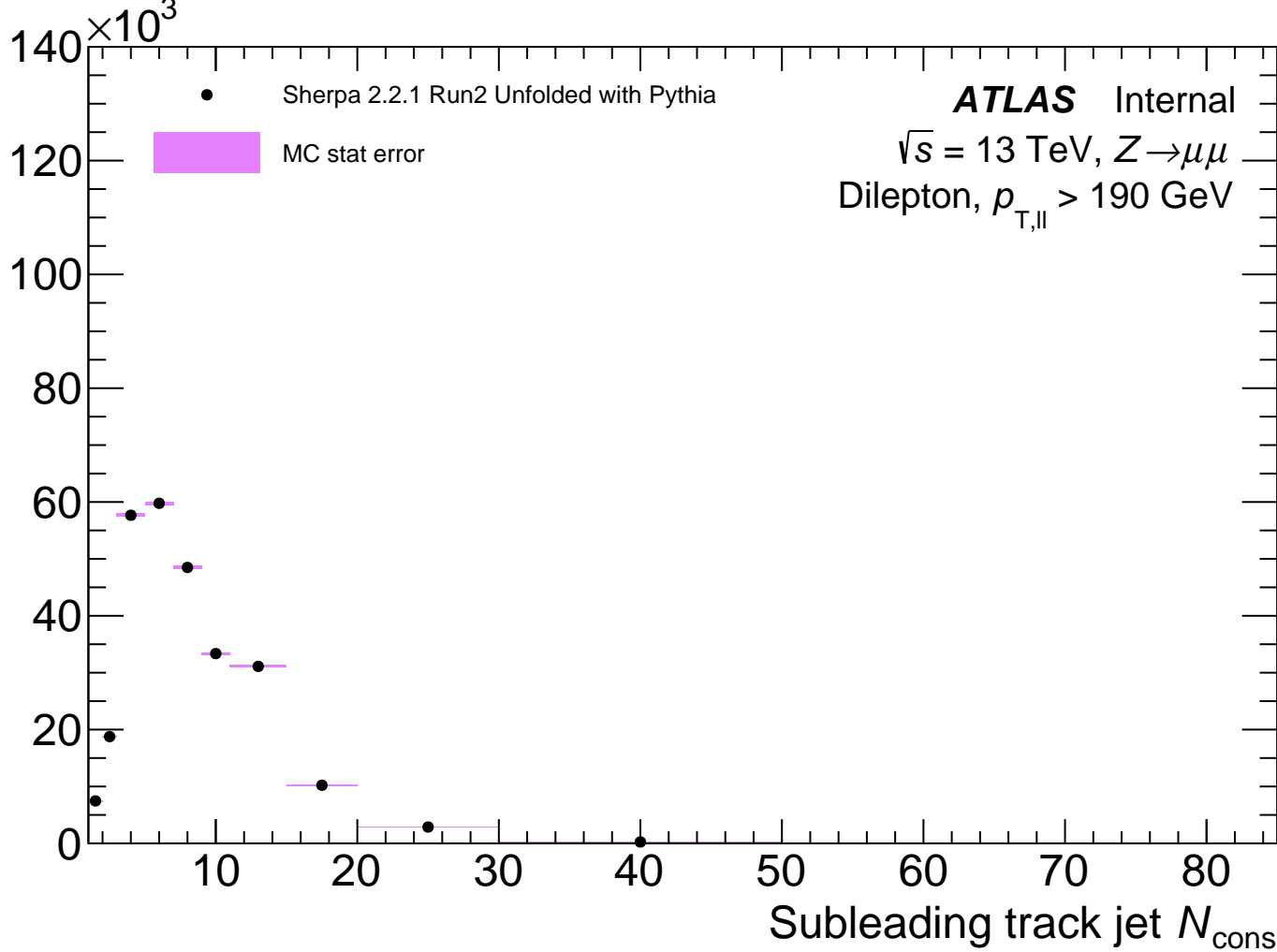
Events



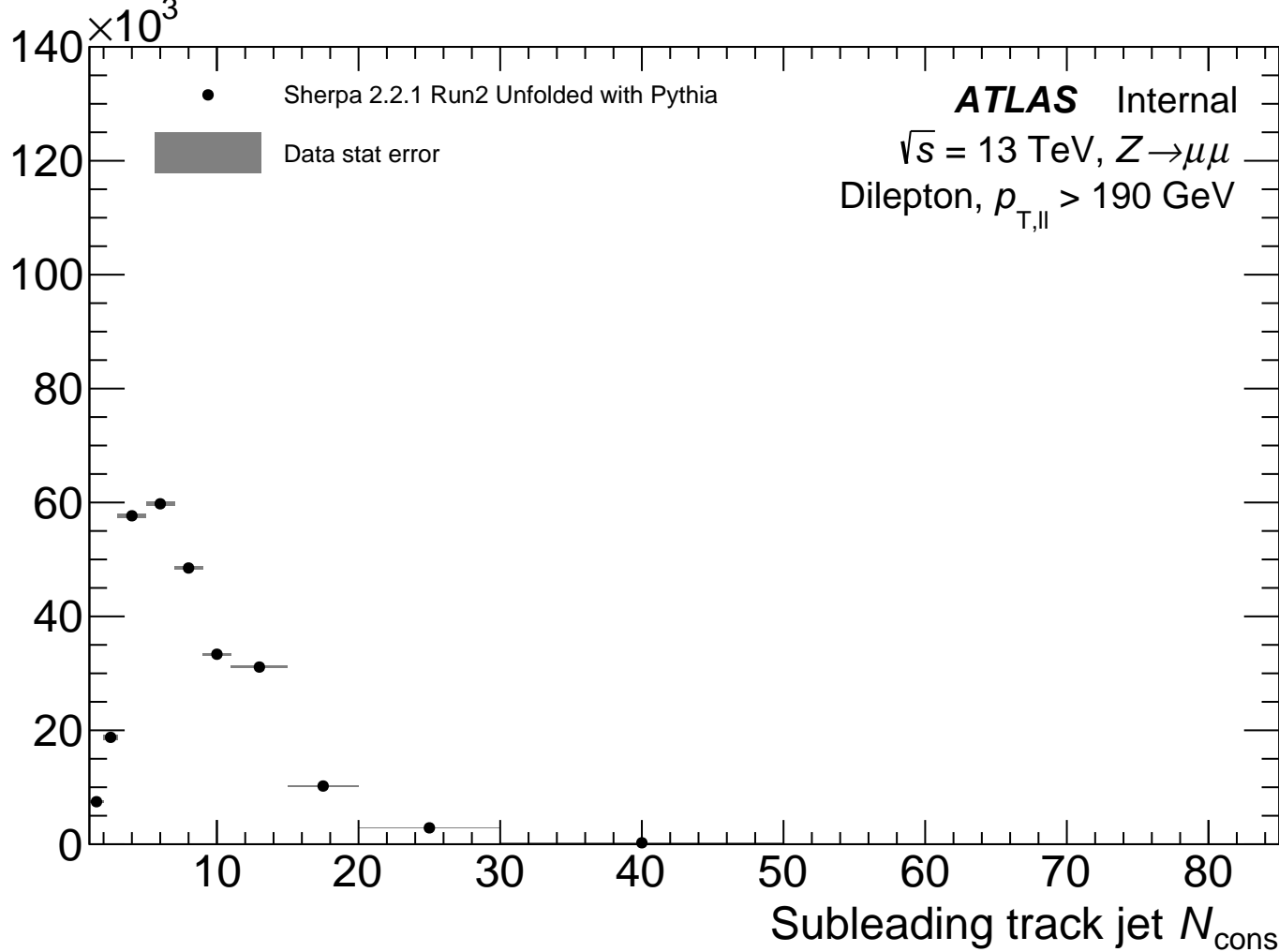
Events



Events



Events



Events

