

Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

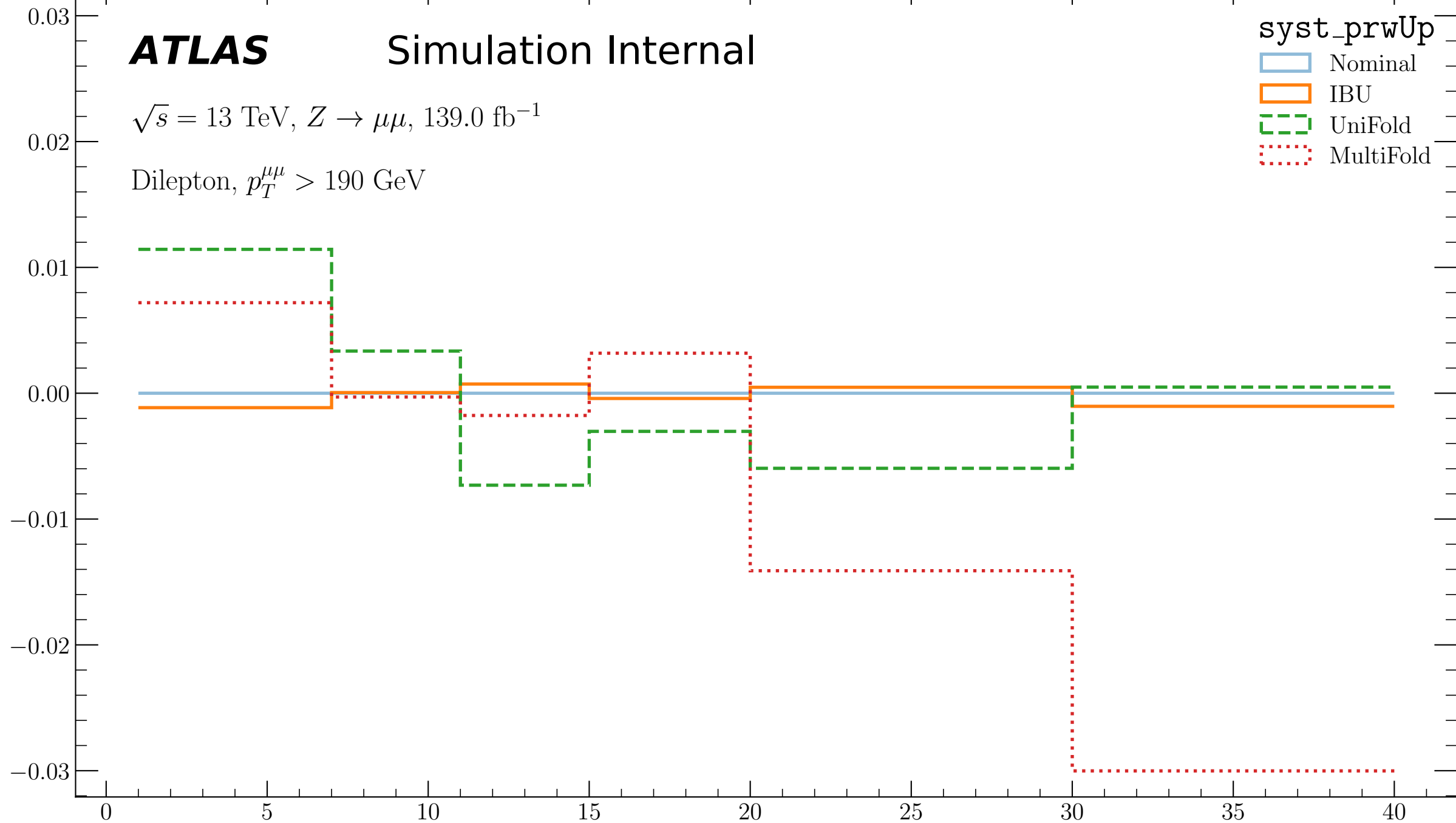
syst_prwUp

Nominal

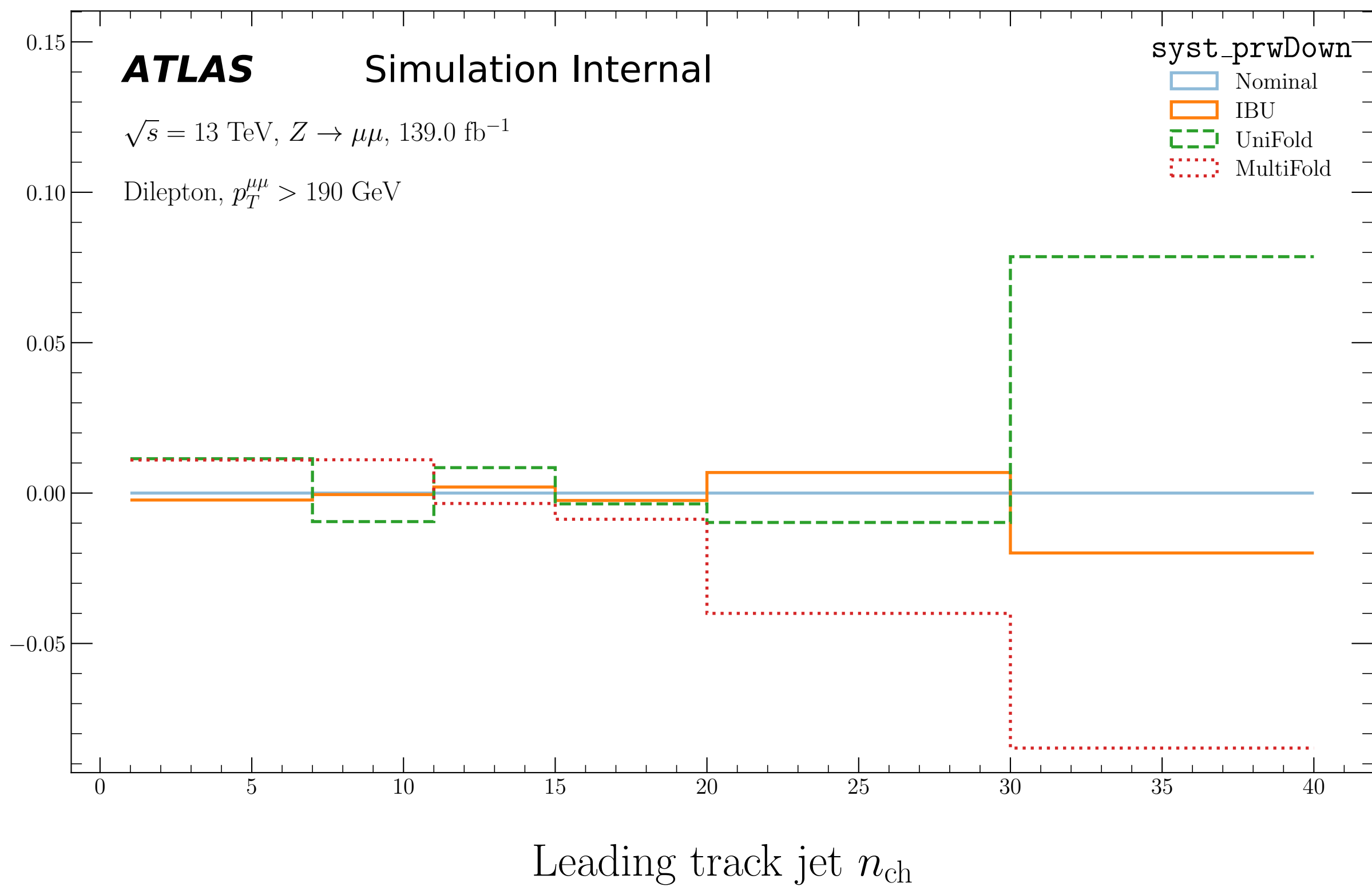
IBU

UniFold

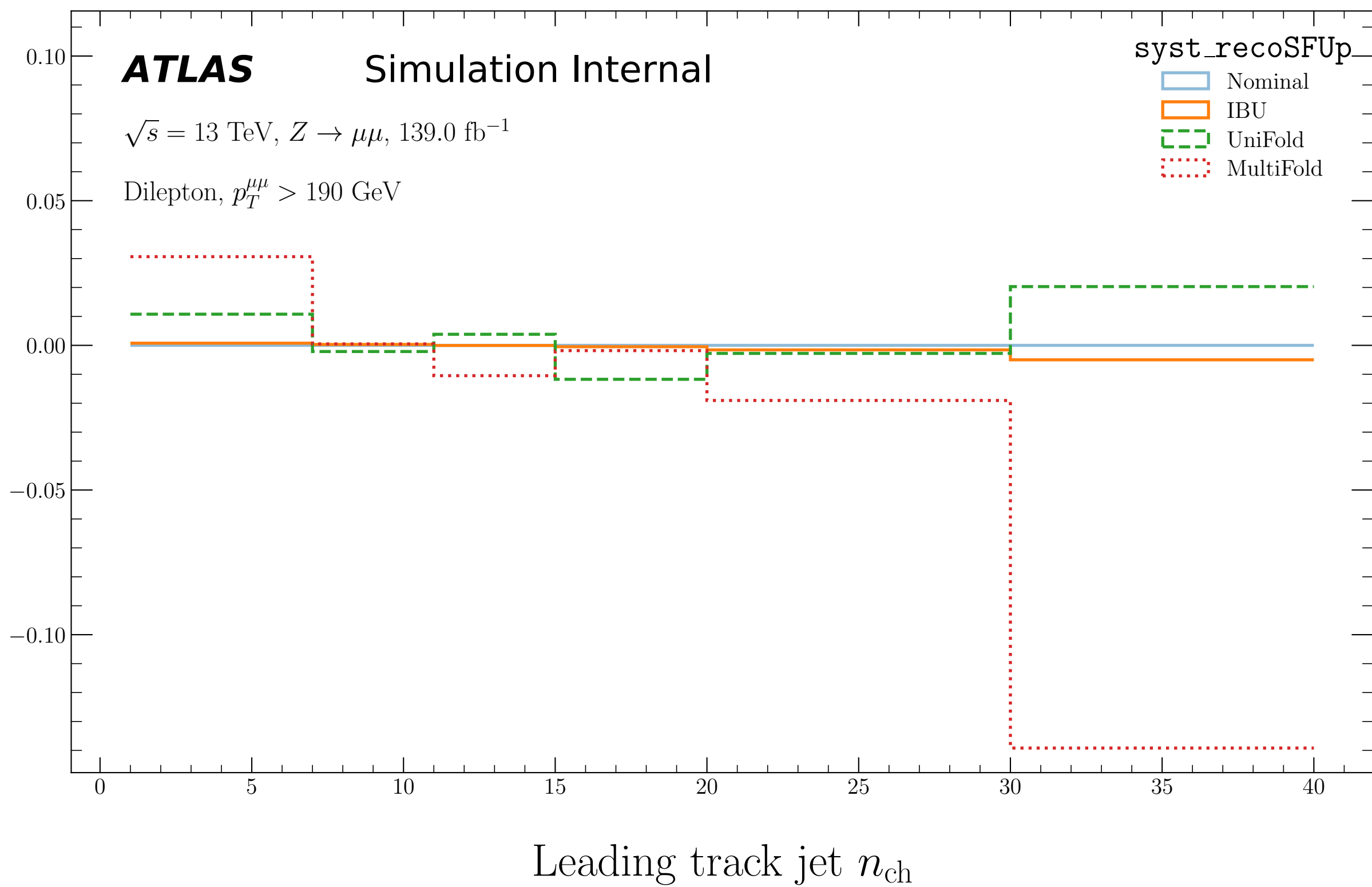
MultiFold

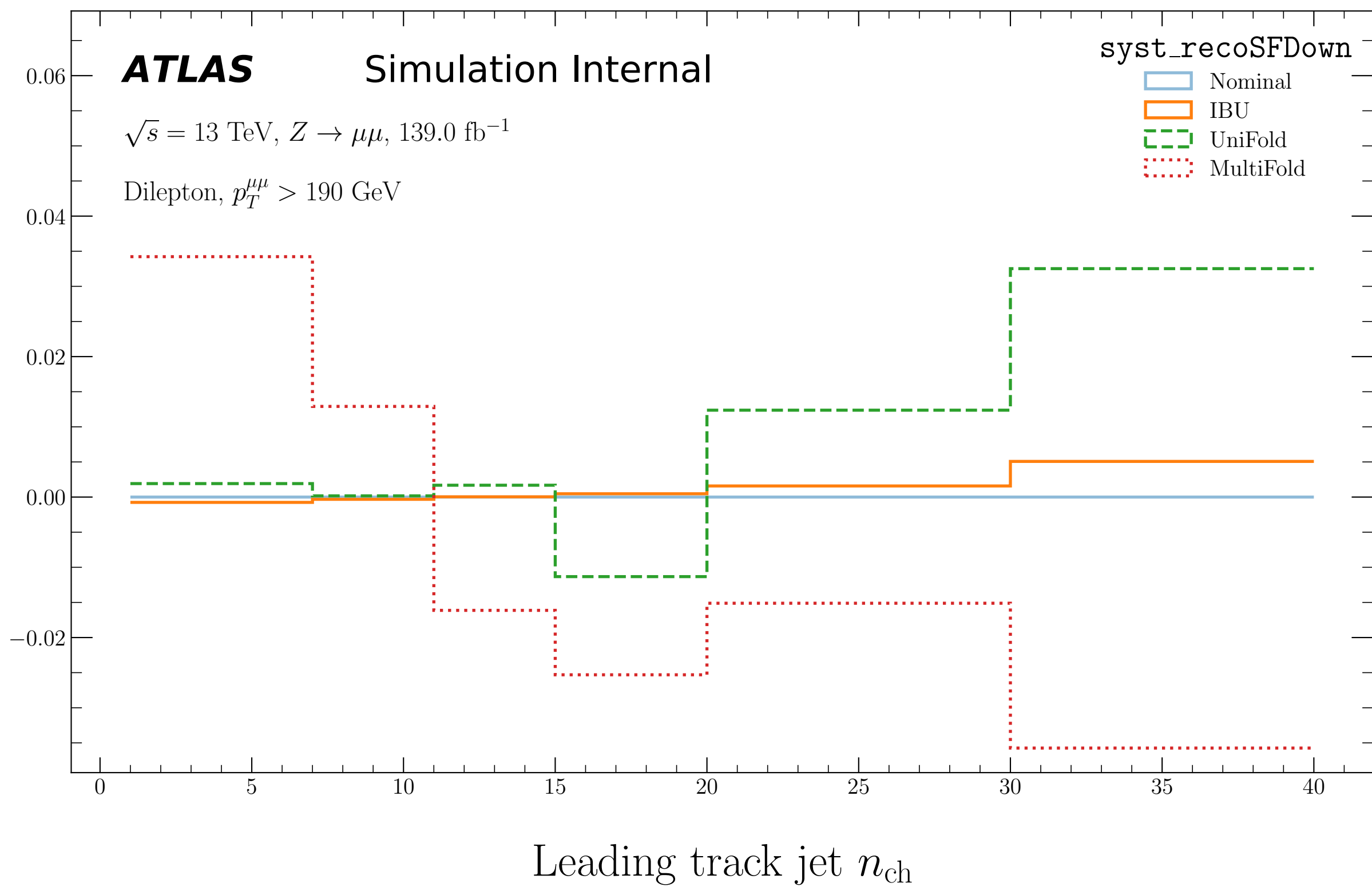


Leading track jet n_{ch}

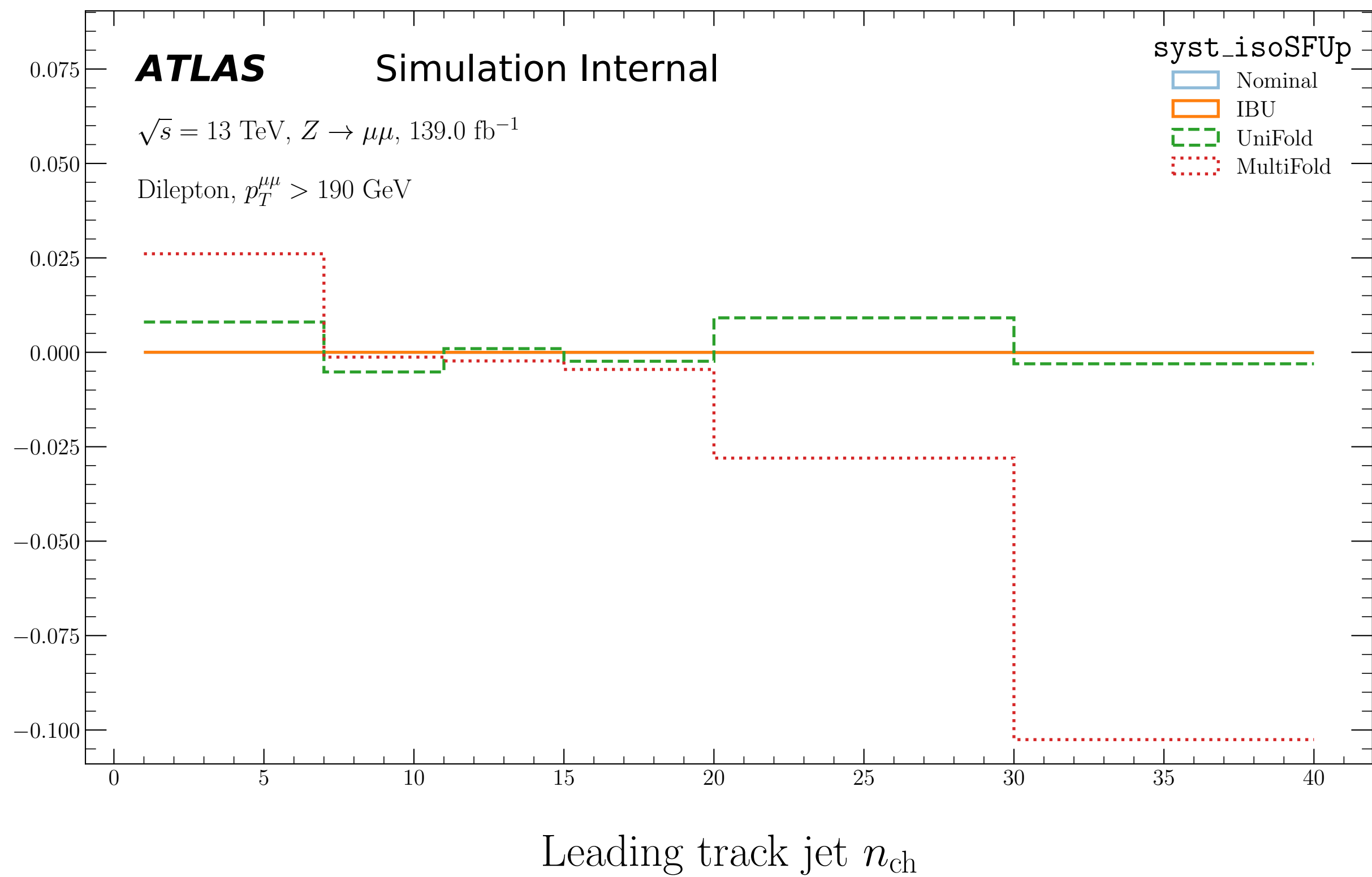


Relative Systematic Effect (MultiFold)





Relative Systematic Effect (MultiFold)



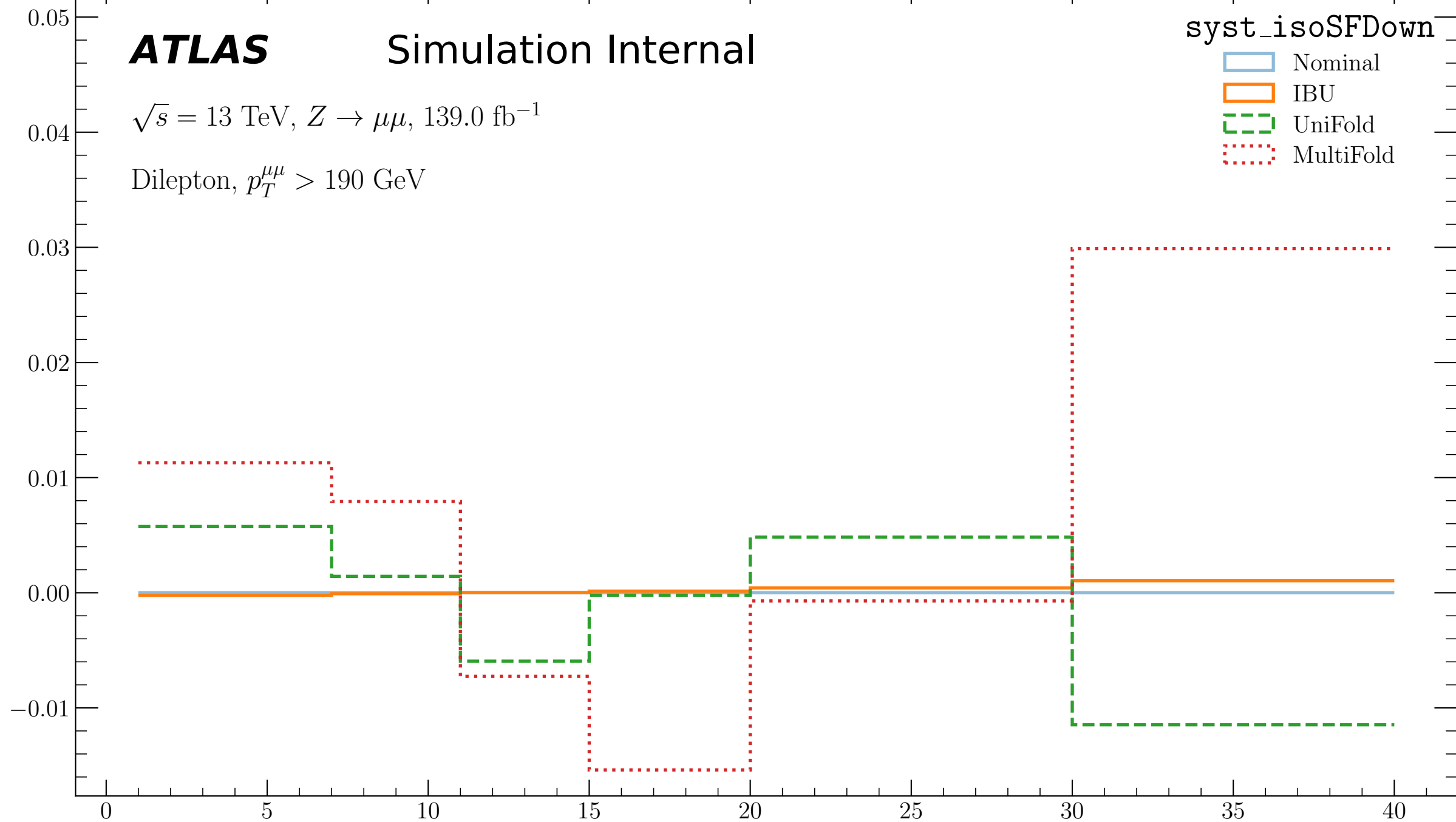
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet n_{ch}

Relative Systematic Effect (MultiFold)

ATLAS

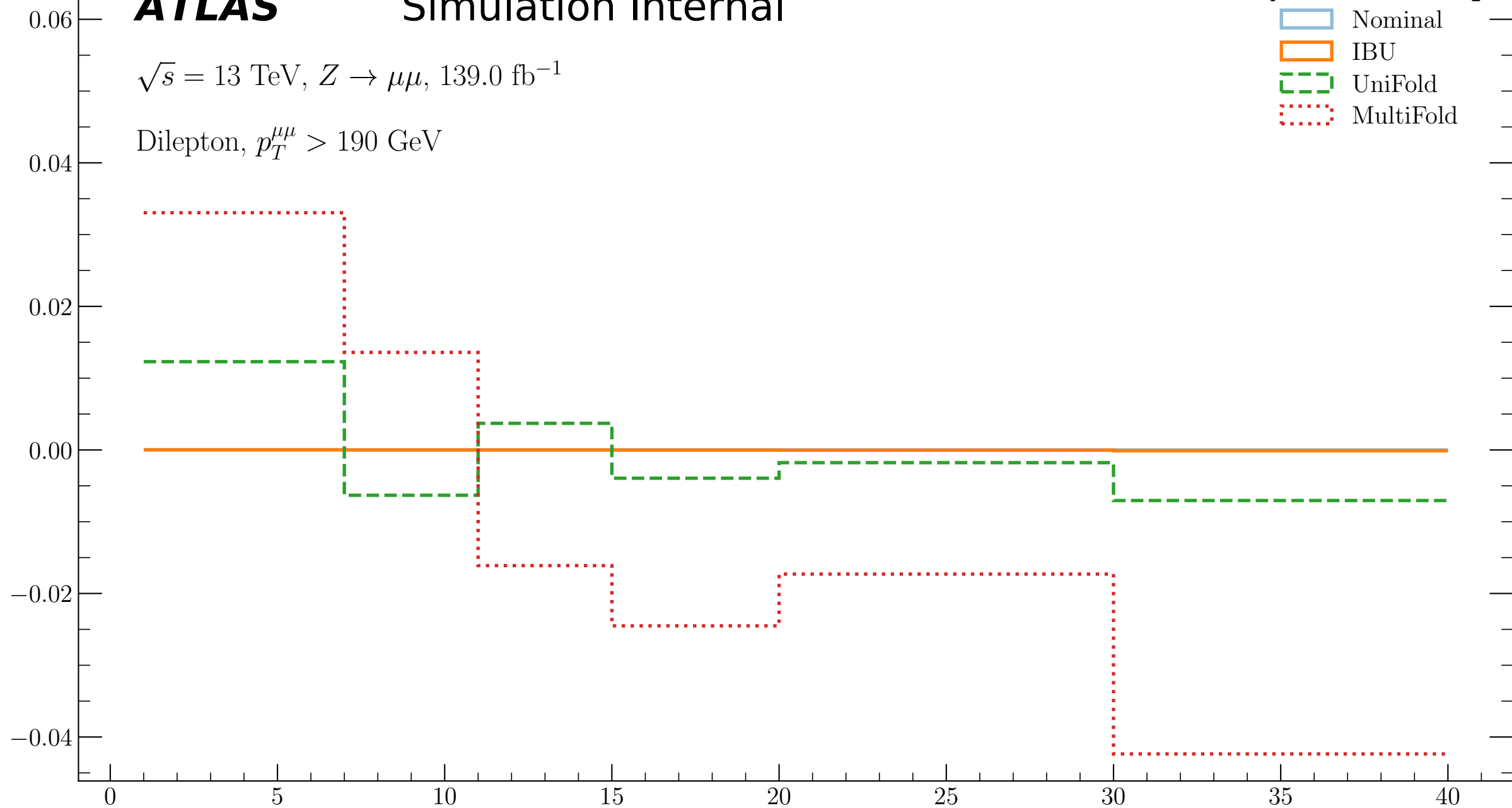
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

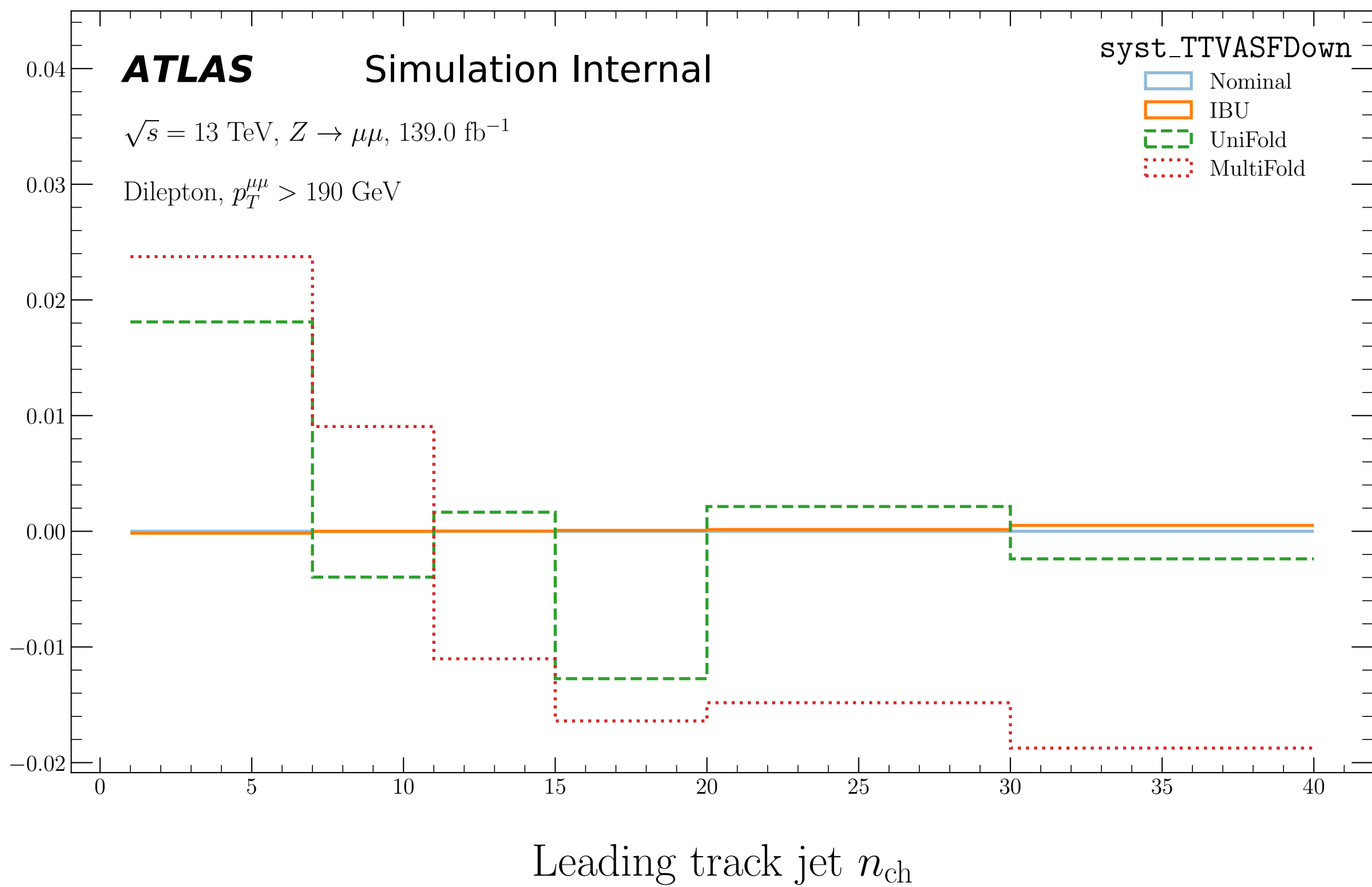
syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet n_{ch}

Relative Systematic Effect (MultiFold)



Relative Systematic Effect (MultiFold)

ATLAS

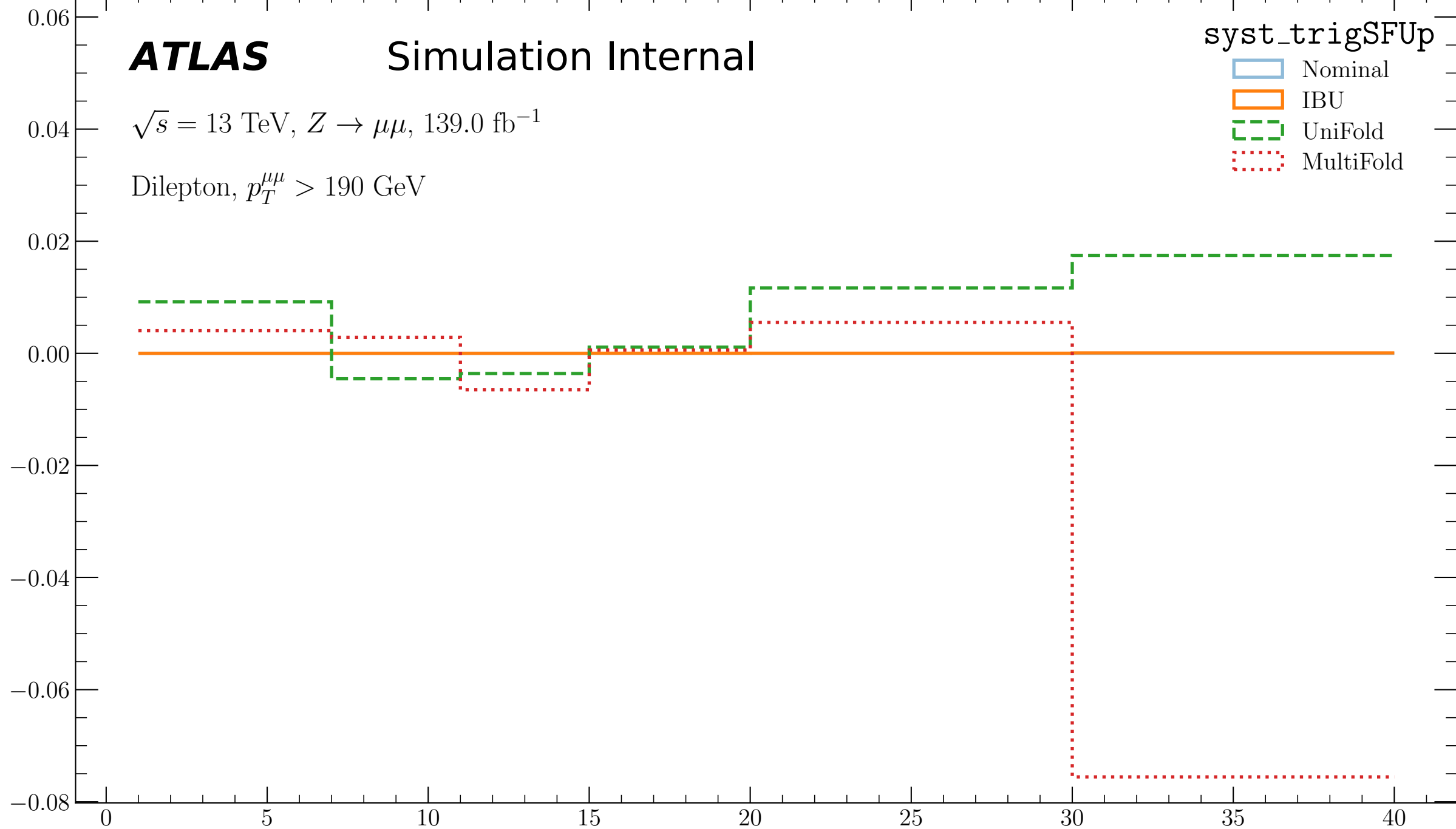
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet n_{ch}

Relative Systematic Effect (MultiFold)

ATLAS

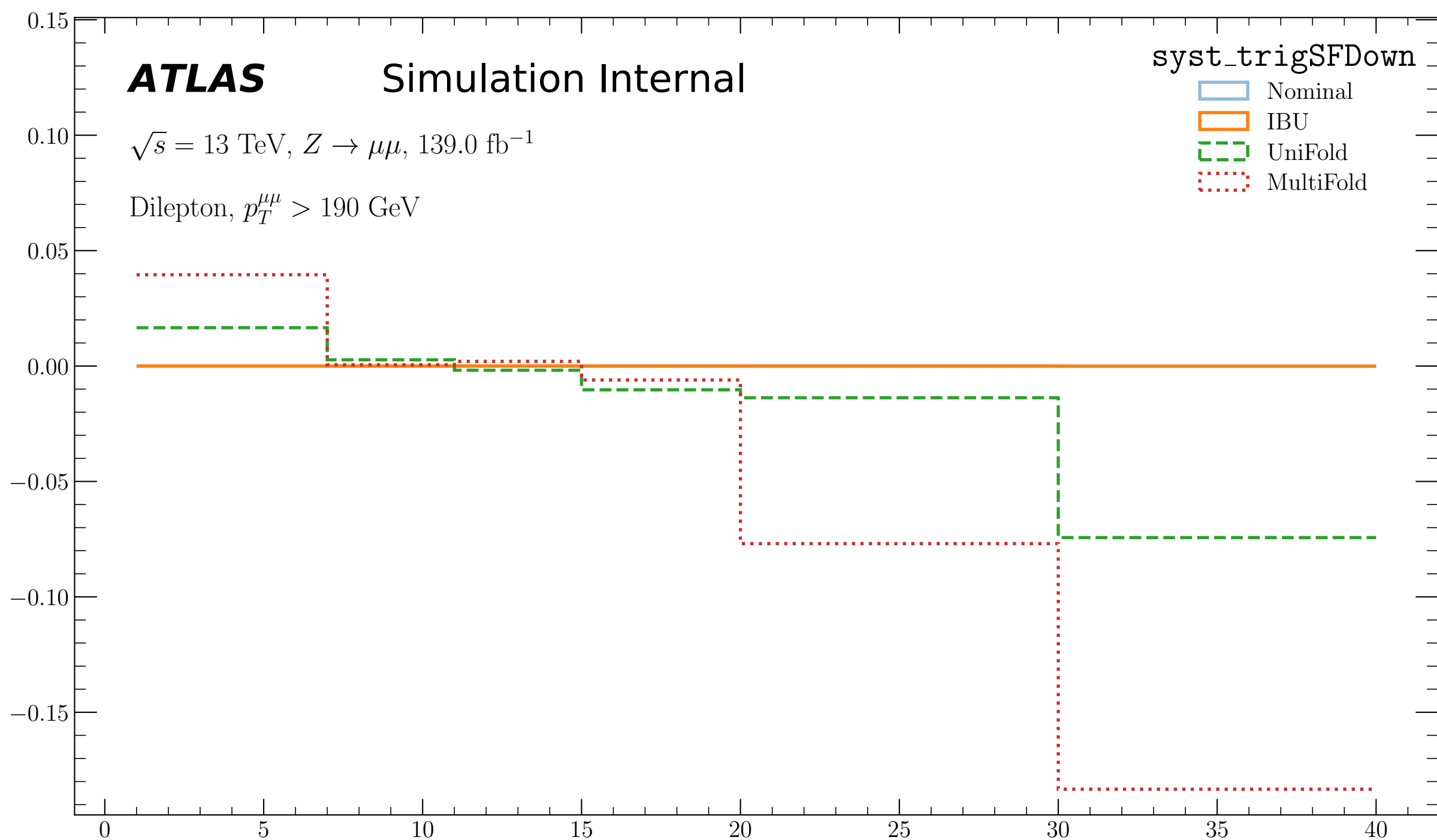
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFDown

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- UniFold
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Leading track jet n_{ch}

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwUp

Nominal

IBU

UniFold

MultiFold

0.15

0.10

0.05

0.00

-0.05

0

5

10

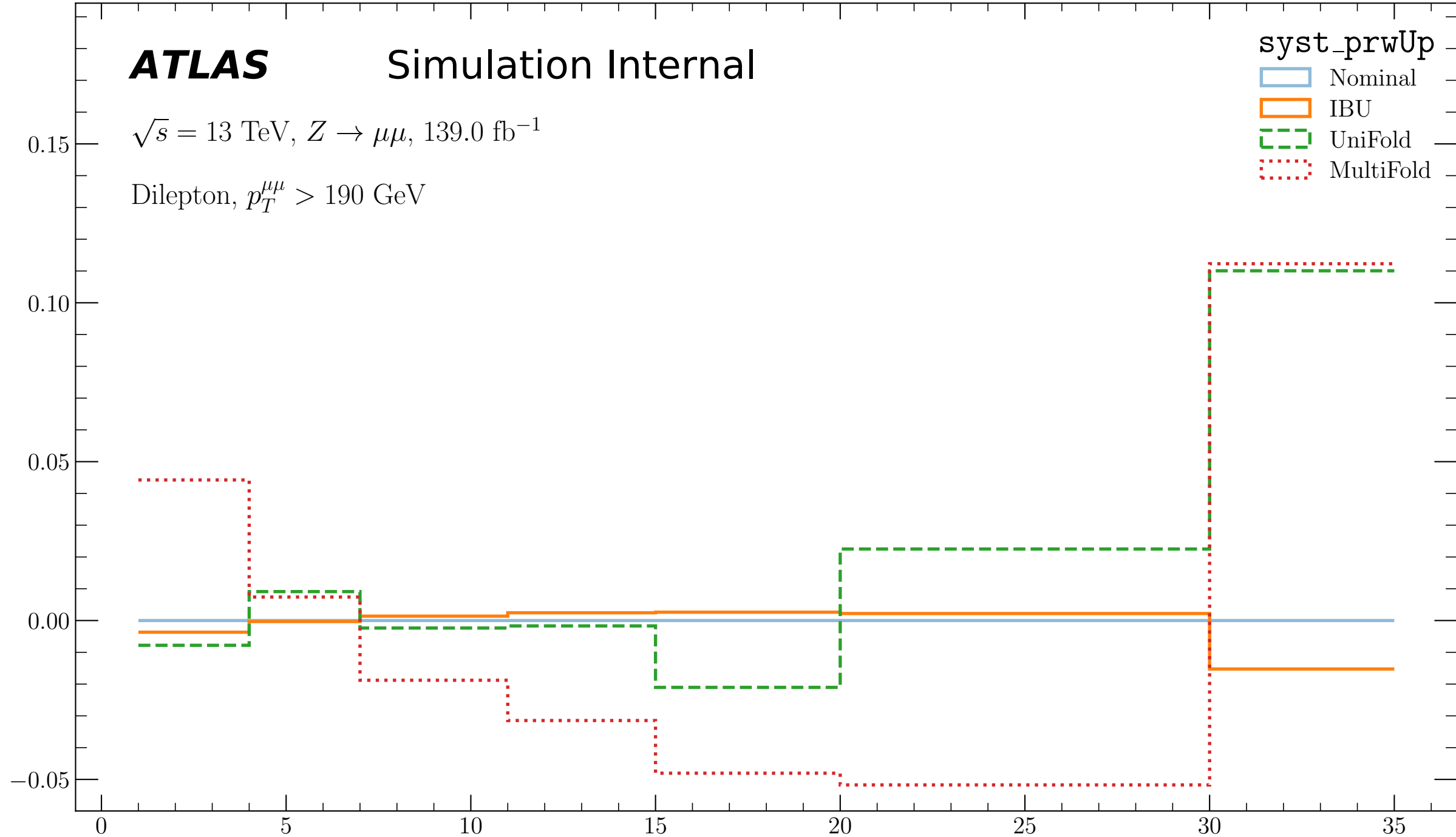
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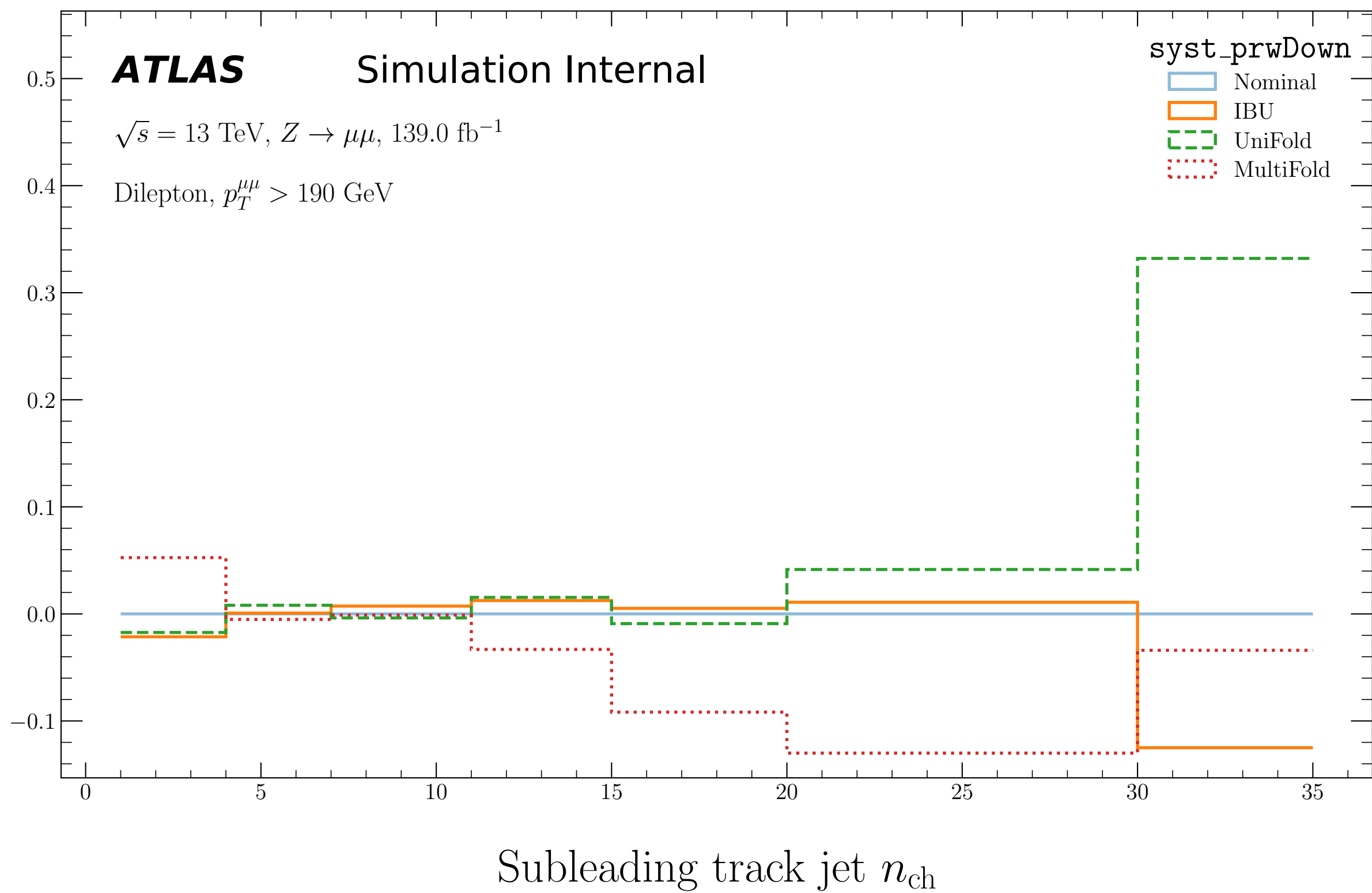
20

25

30

35

Subleading track jet n_{ch} 



Relative Systematic Effect (MultiFold)

ATLAS

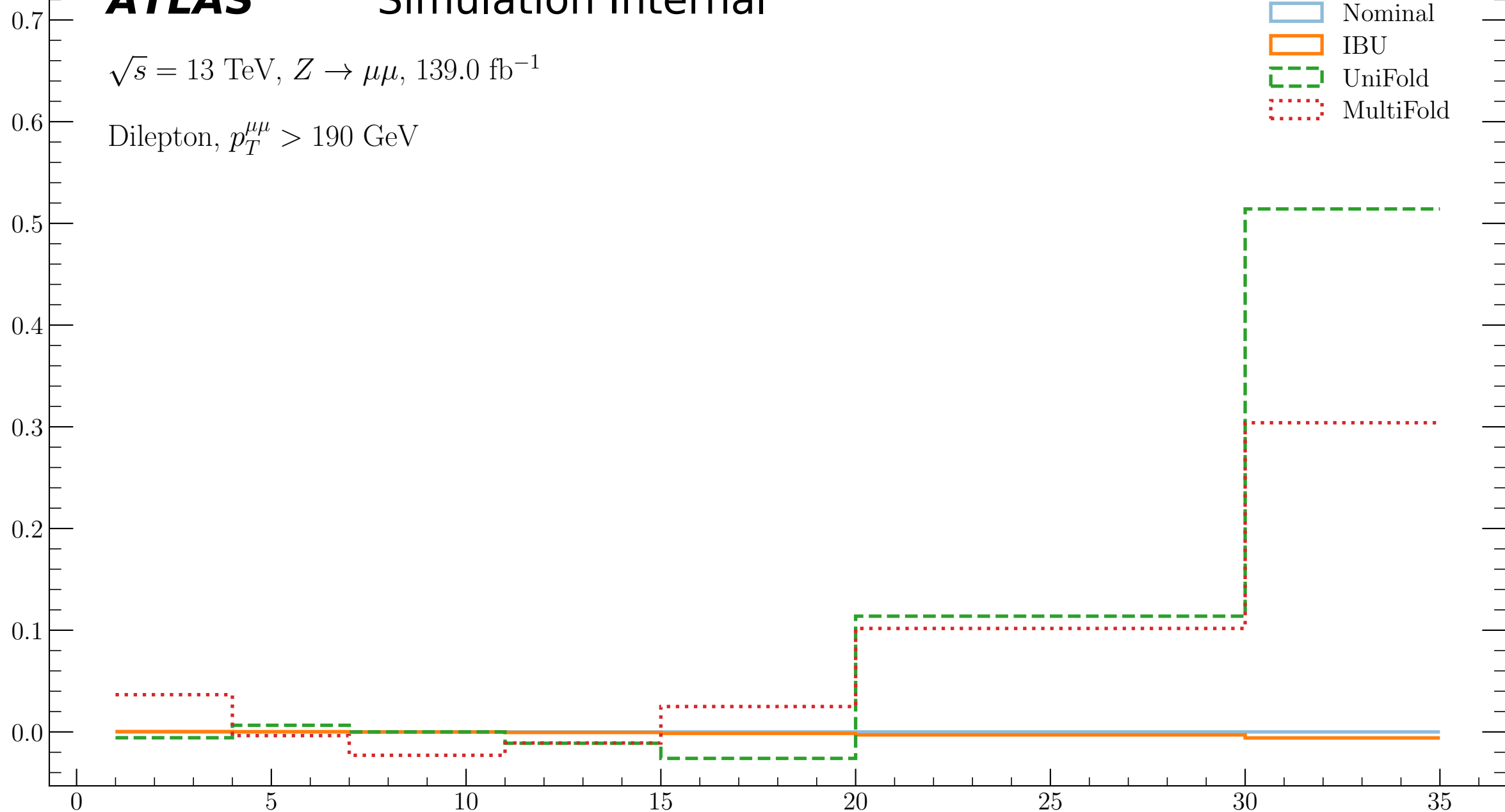
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

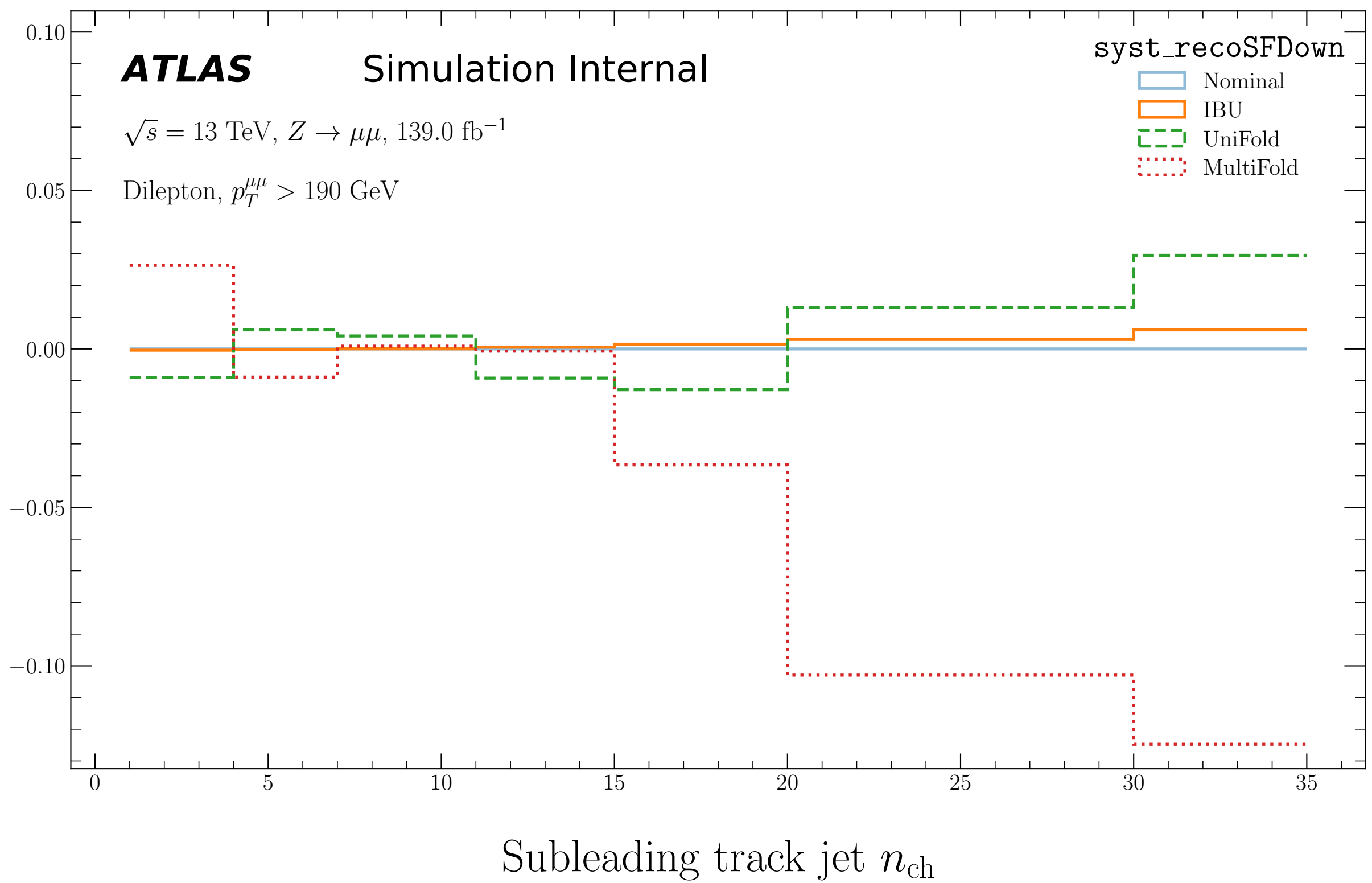
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

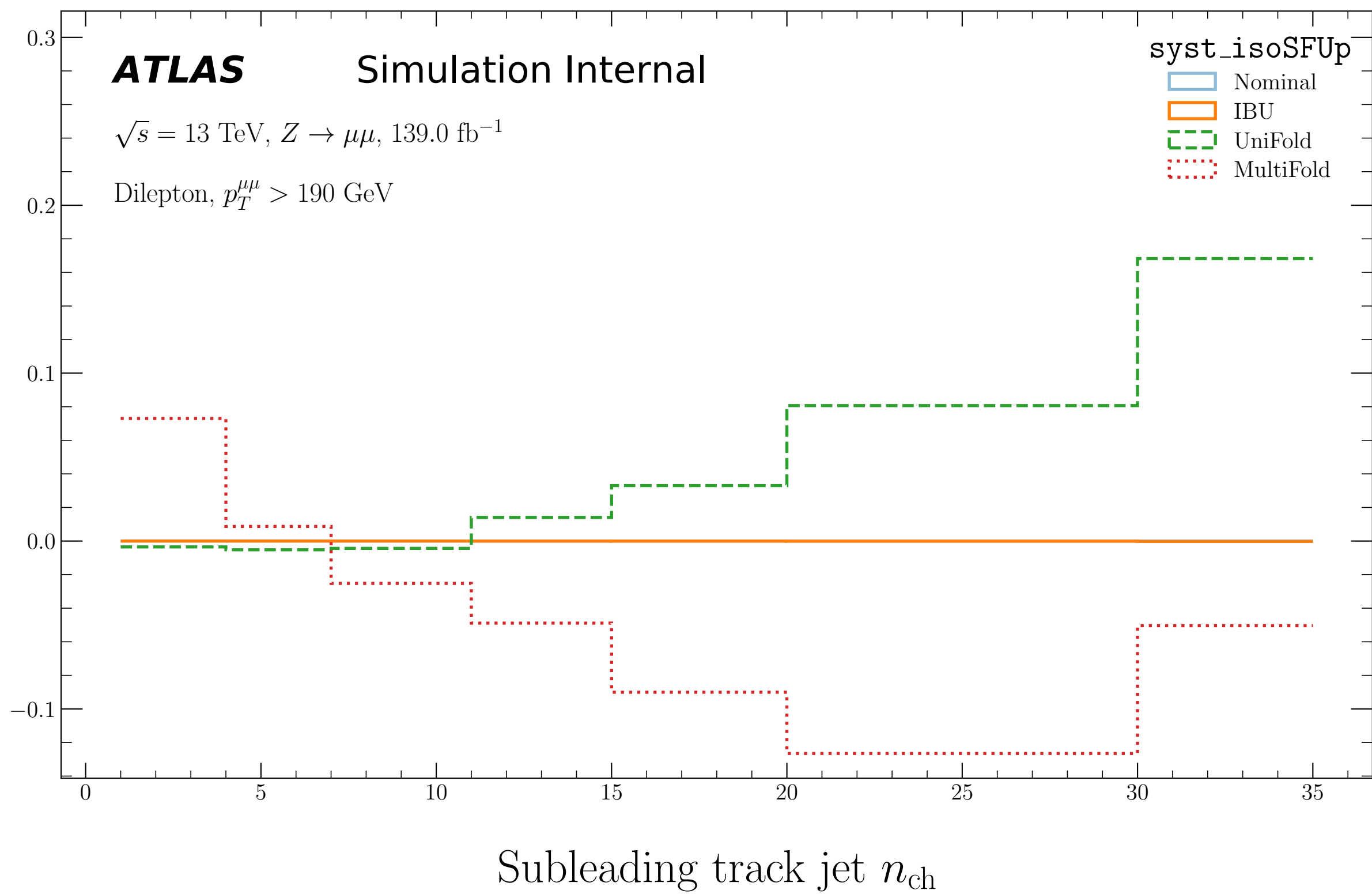
syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet n_{ch}





Relative Systematic Effect (MultiFold)

ATLAS

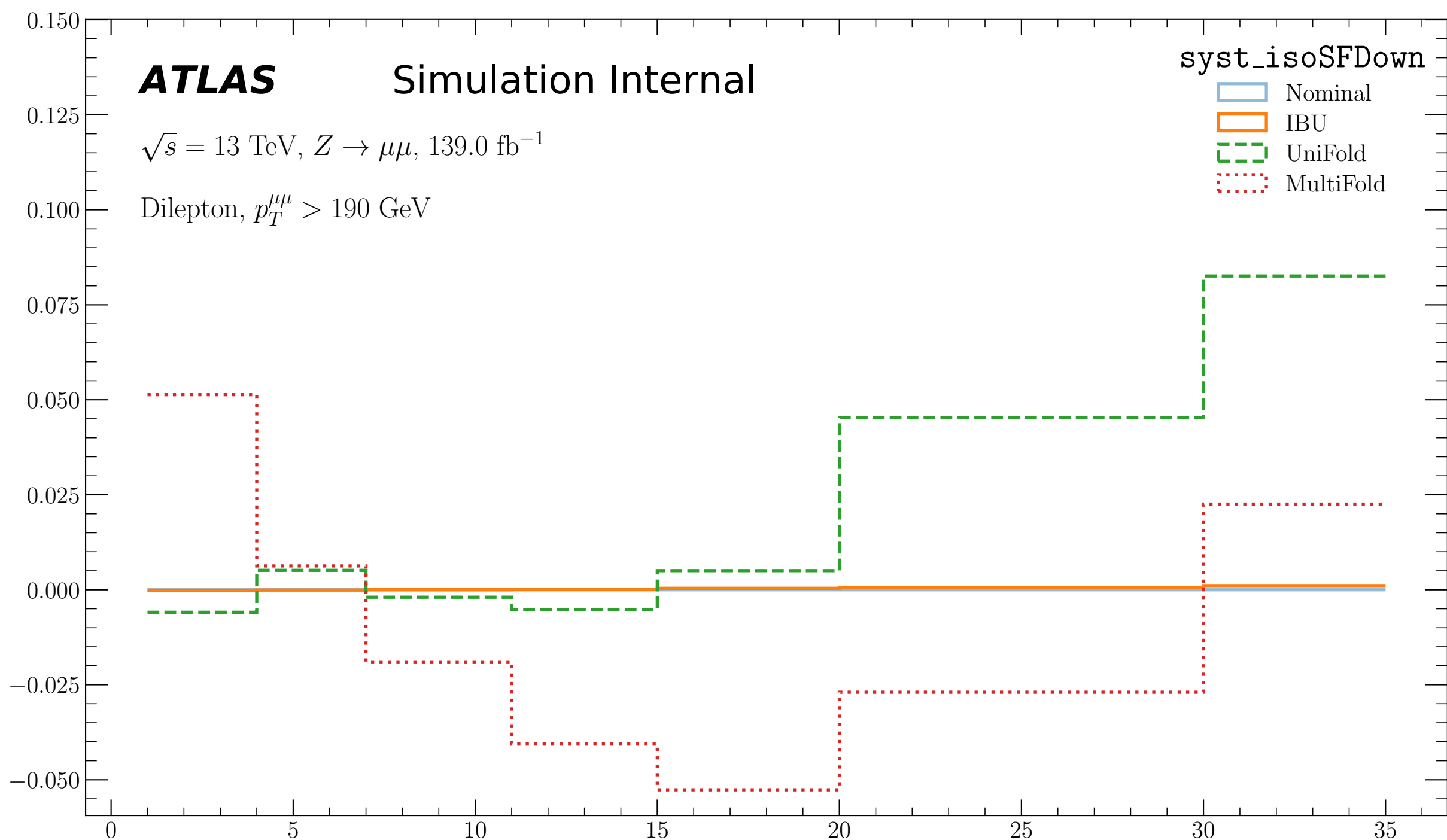
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

sys_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet n_{ch}

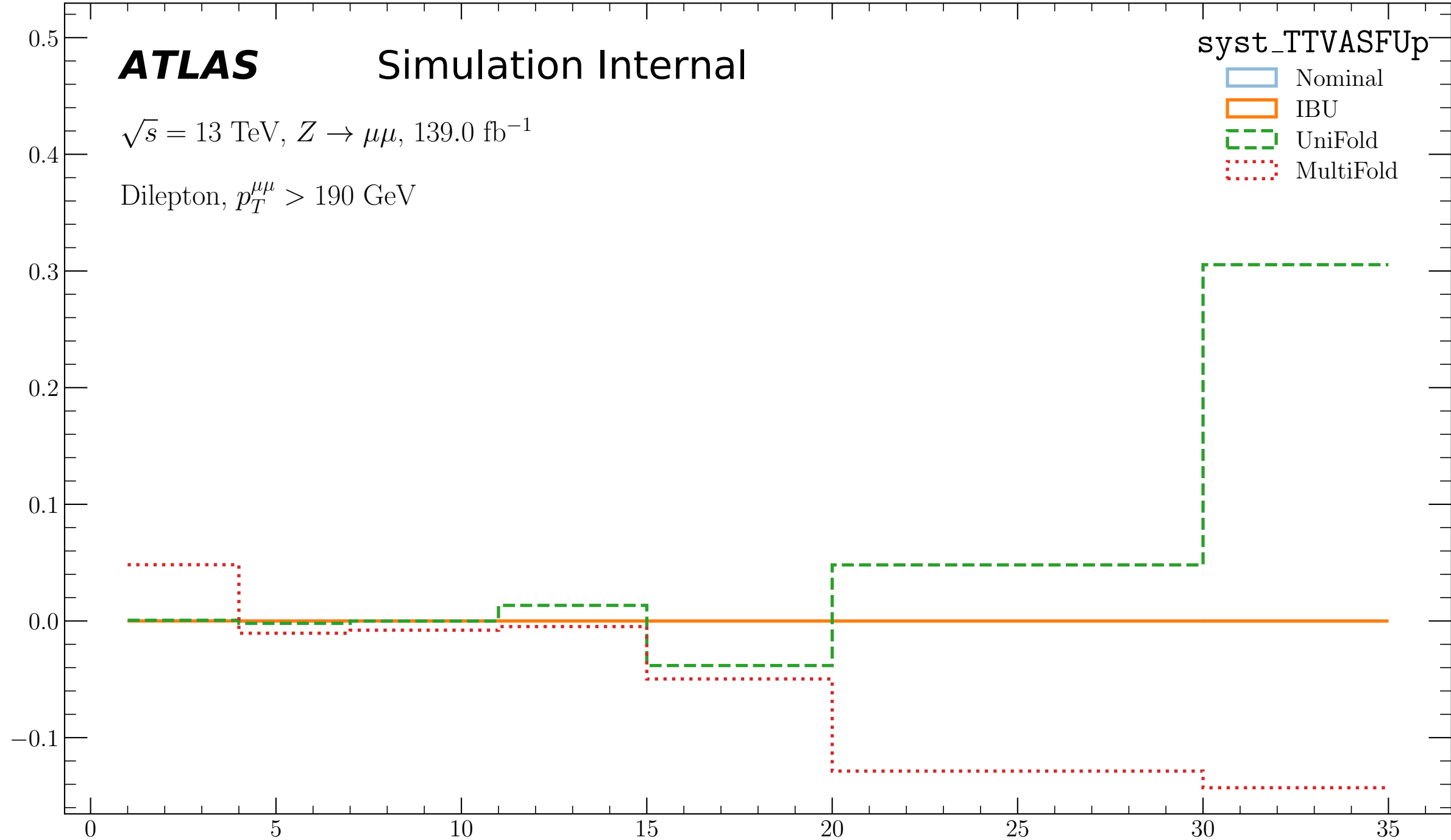
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

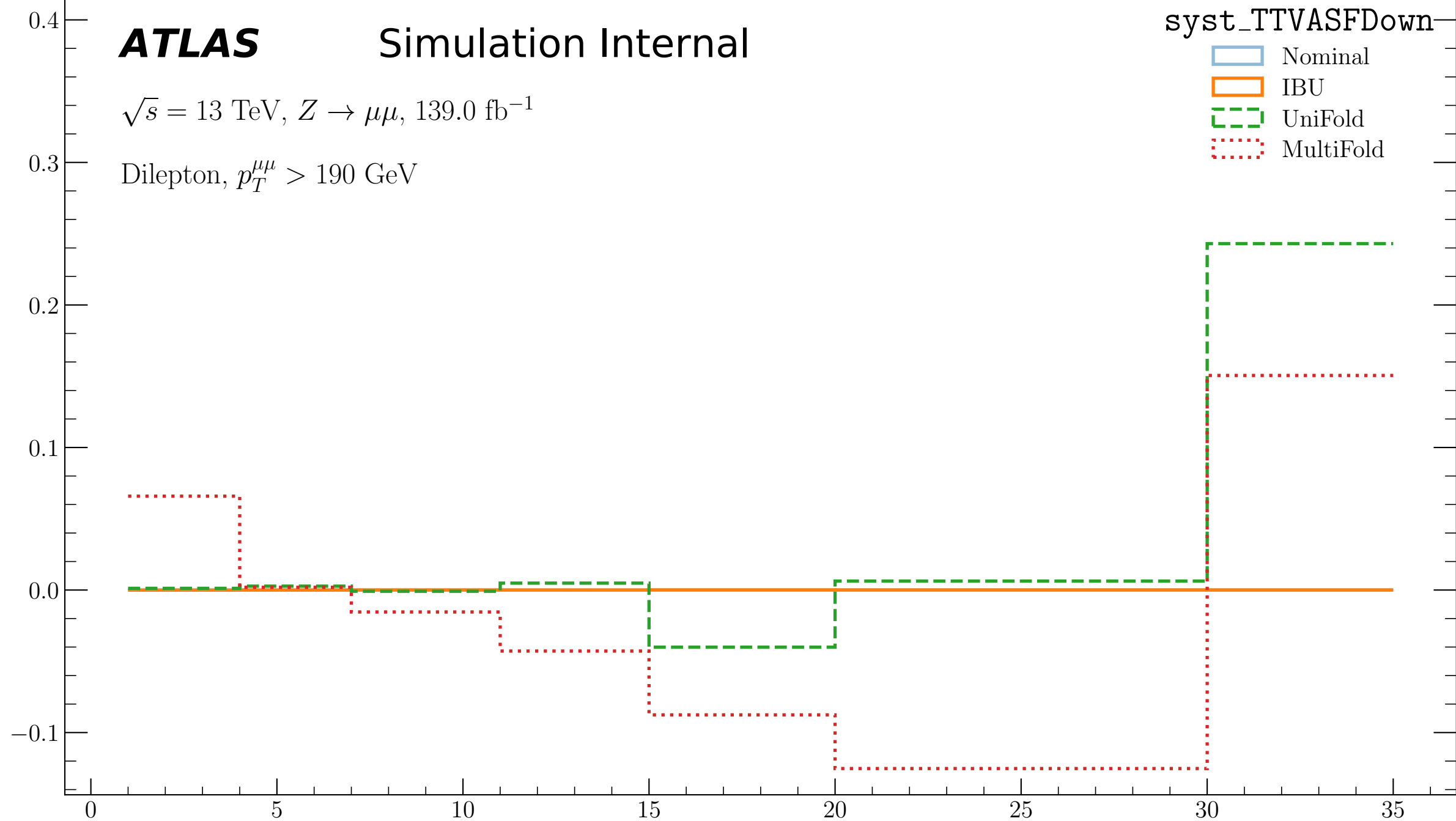
syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$ Subleading track jet n_{ch}

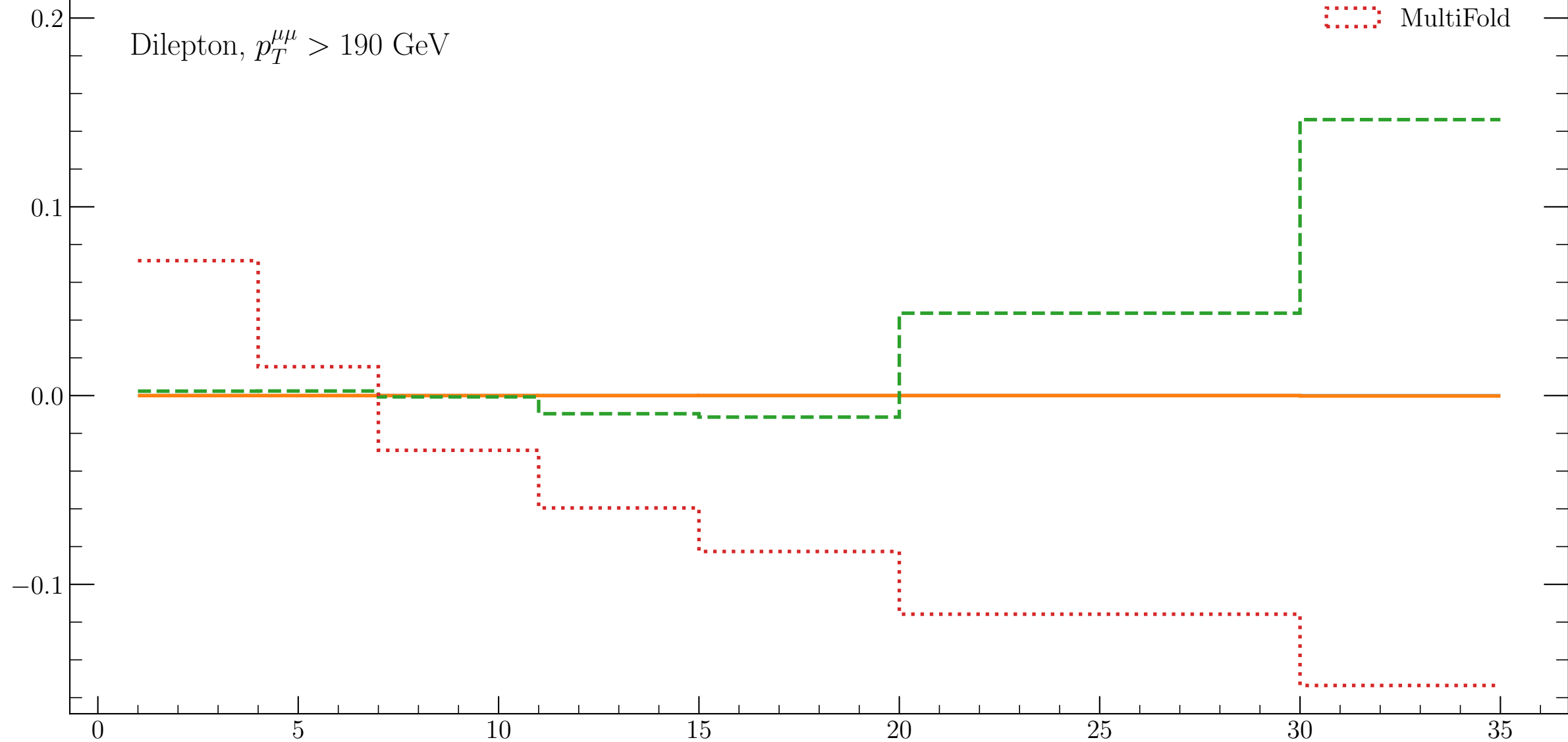
ATLAS

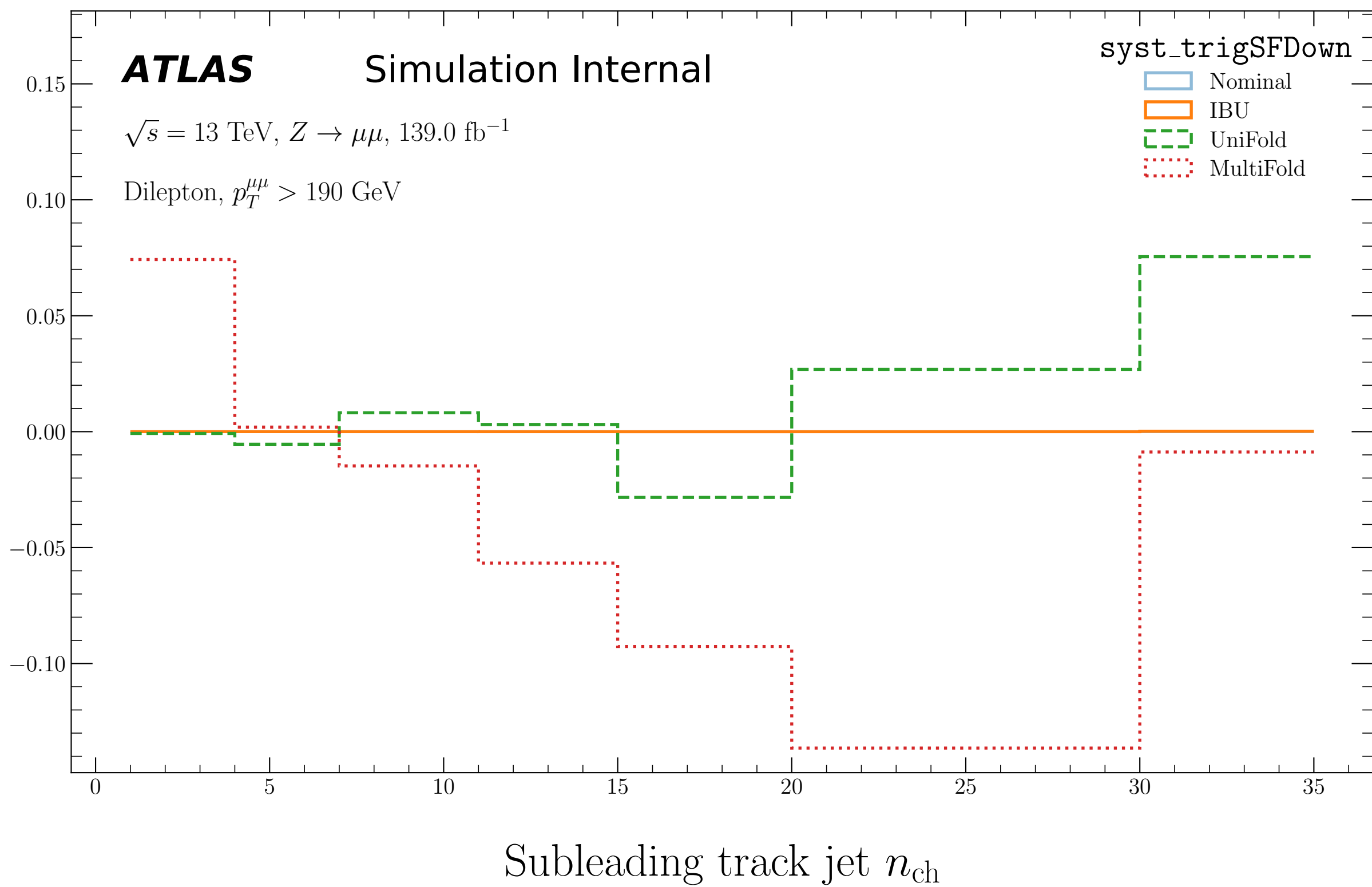
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
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Subleading track jet n_{ch}



Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

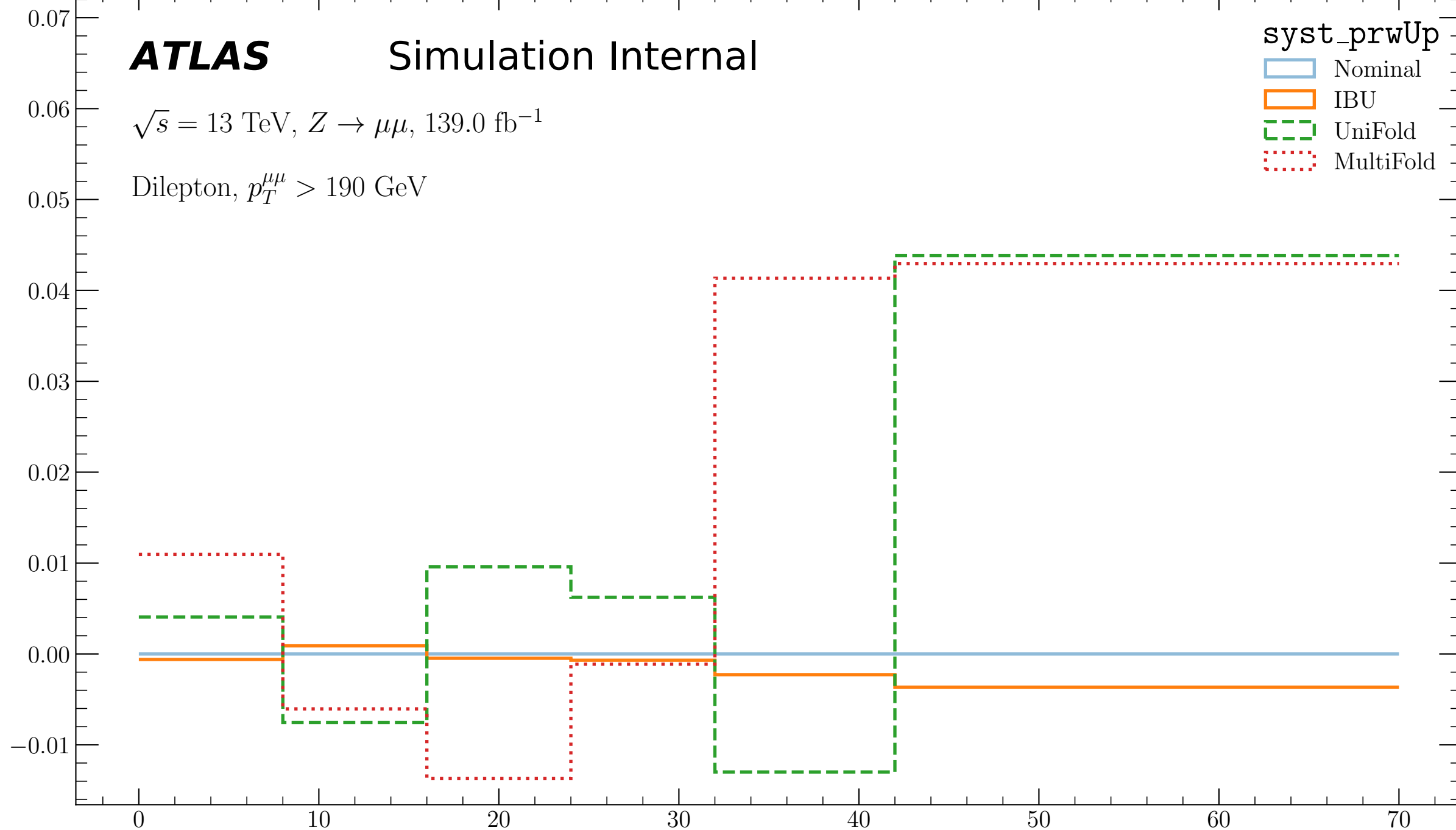
syst_prwUp

Nominal

IBU

UniFold

MultiFold



Leading track jet m [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

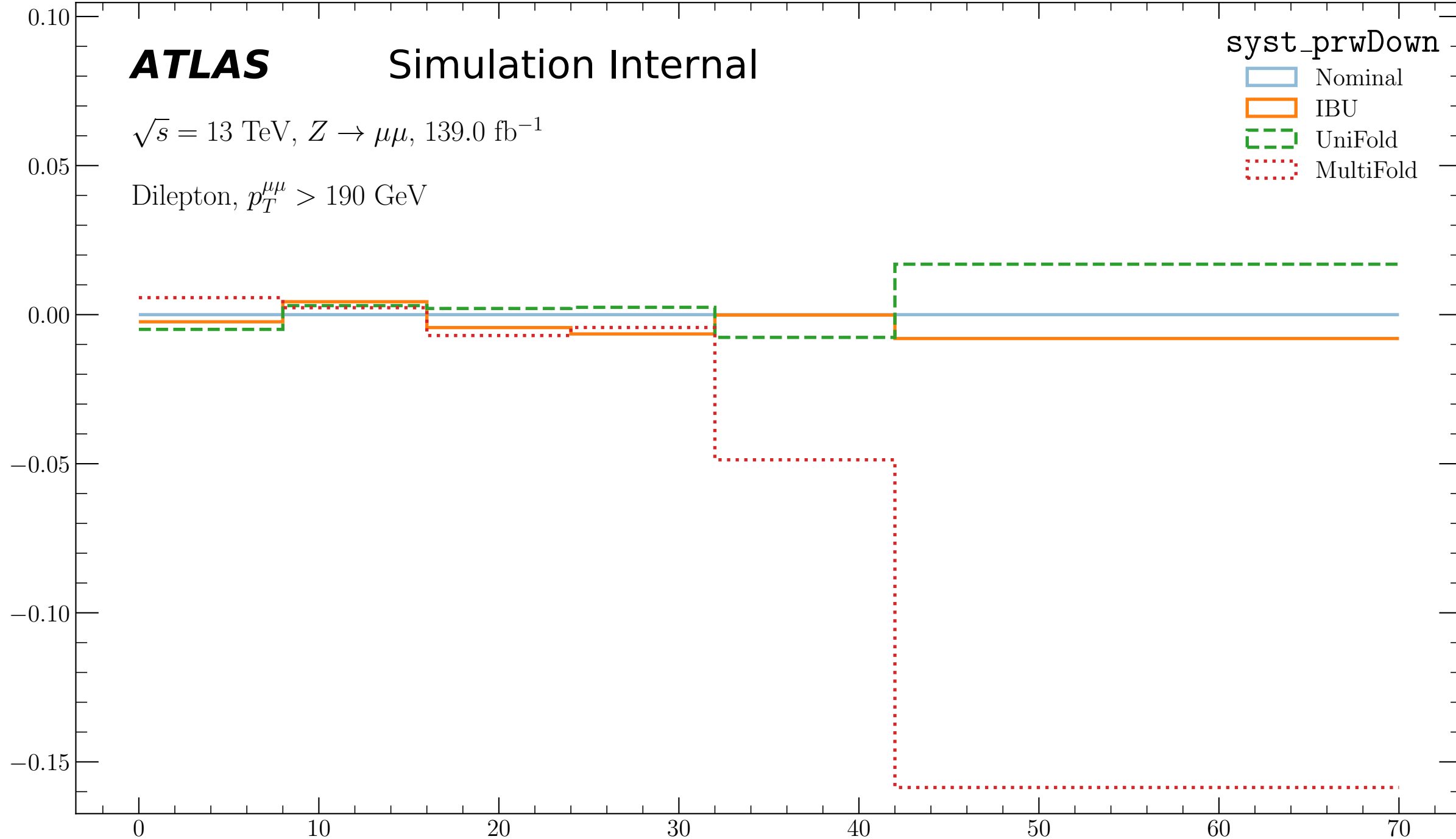
syst_prwDown

Nominal

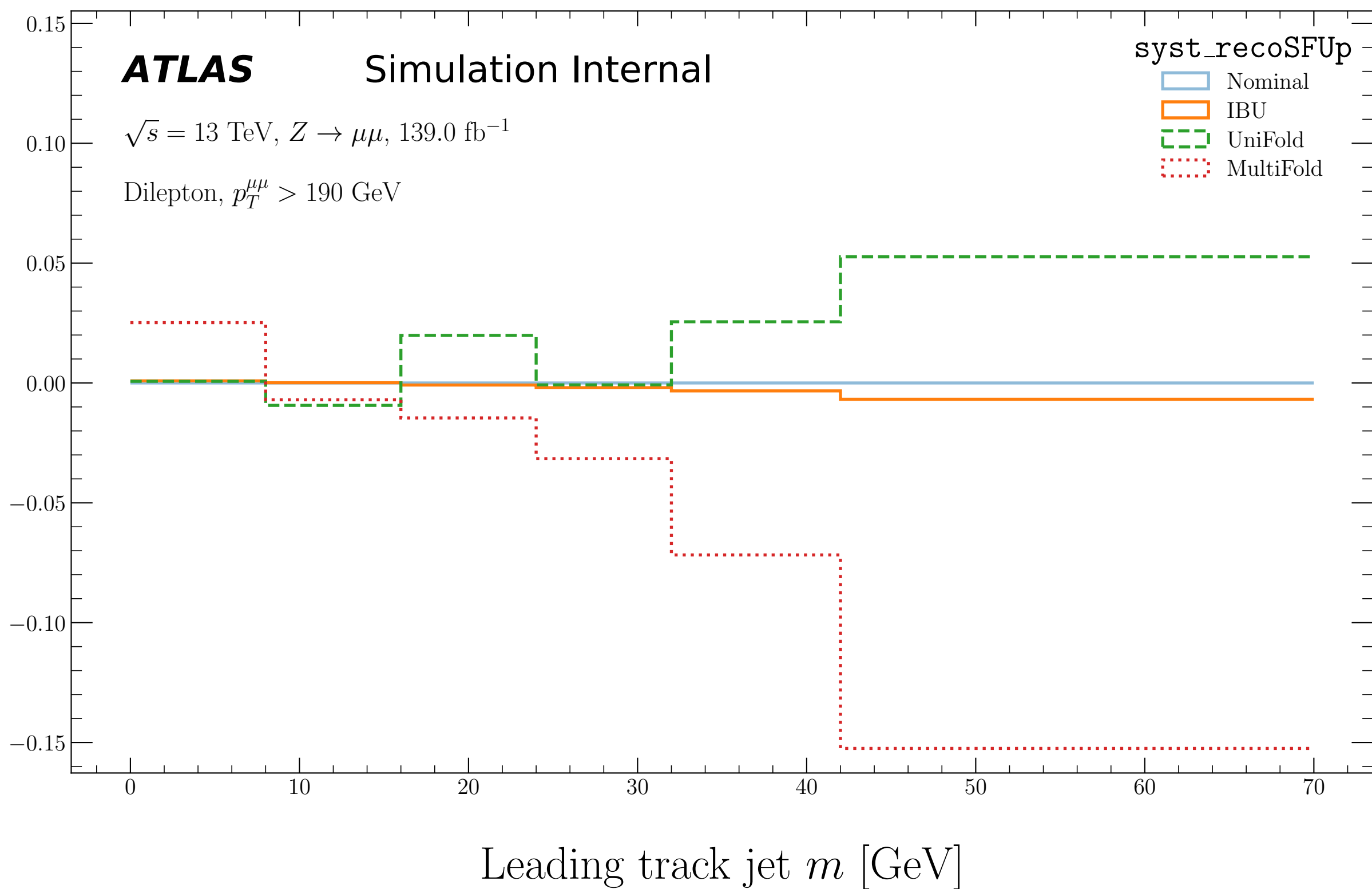
IBU

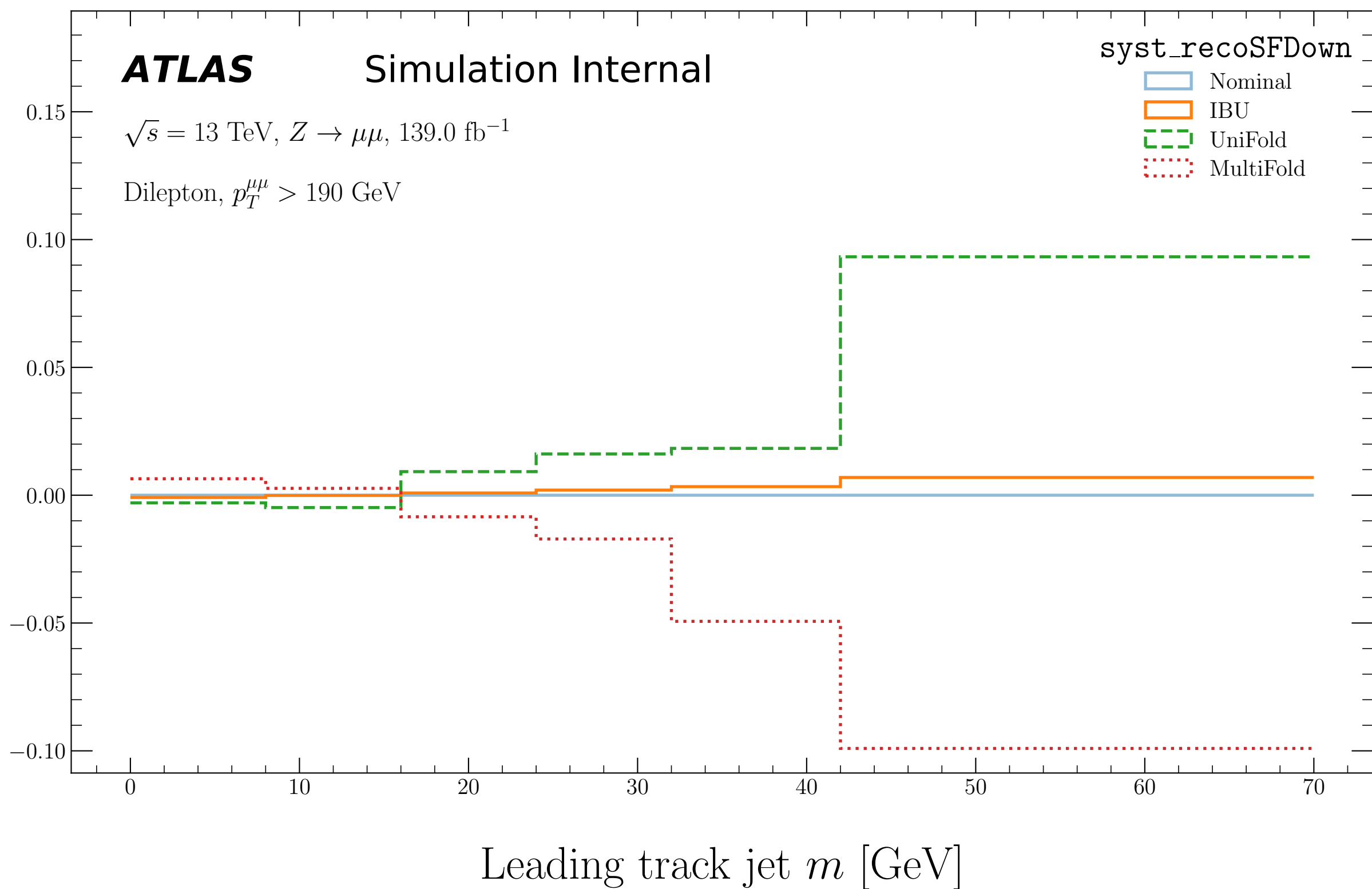
UniFold

MultiFold



Leading track jet m [GeV]





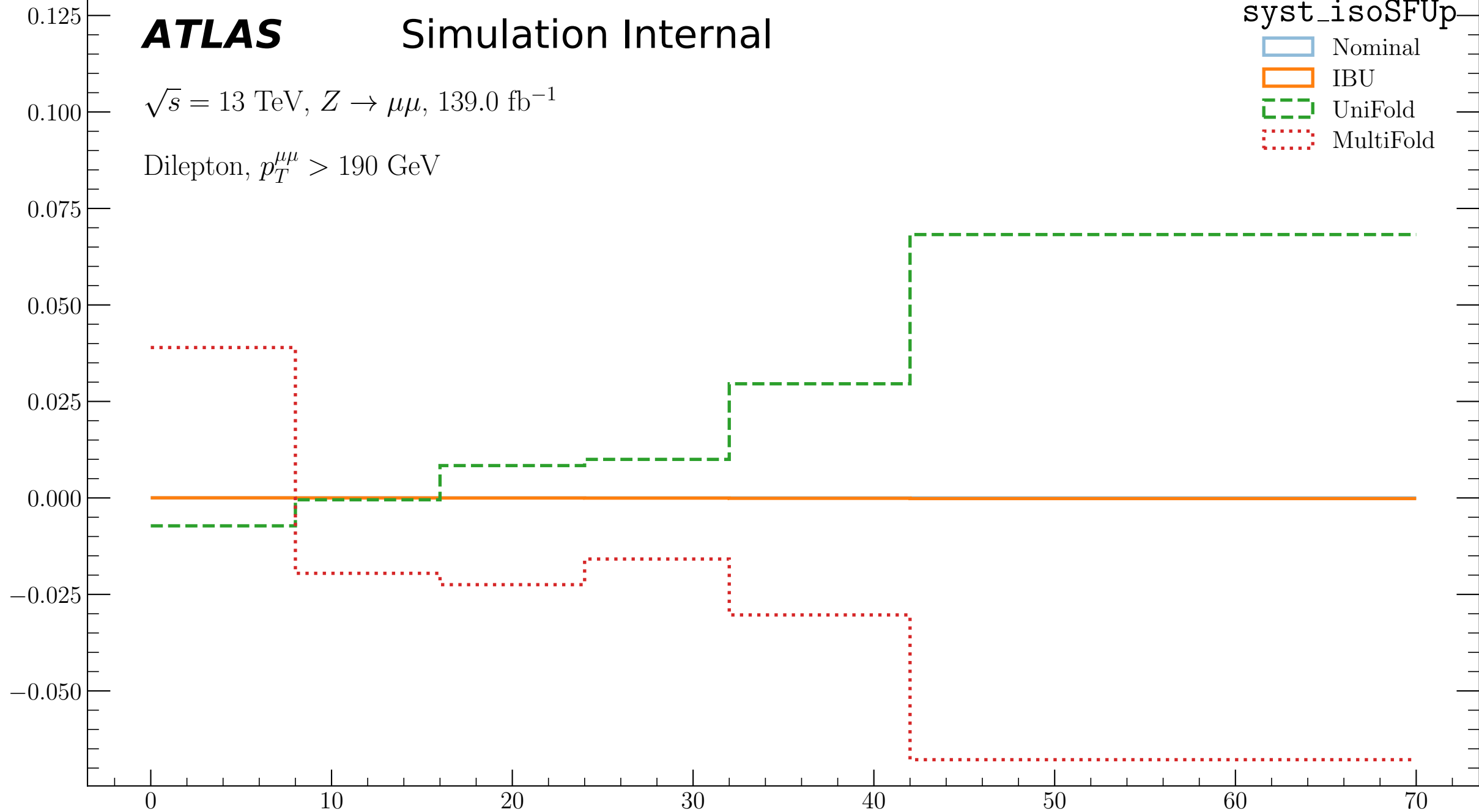
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet m [GeV]

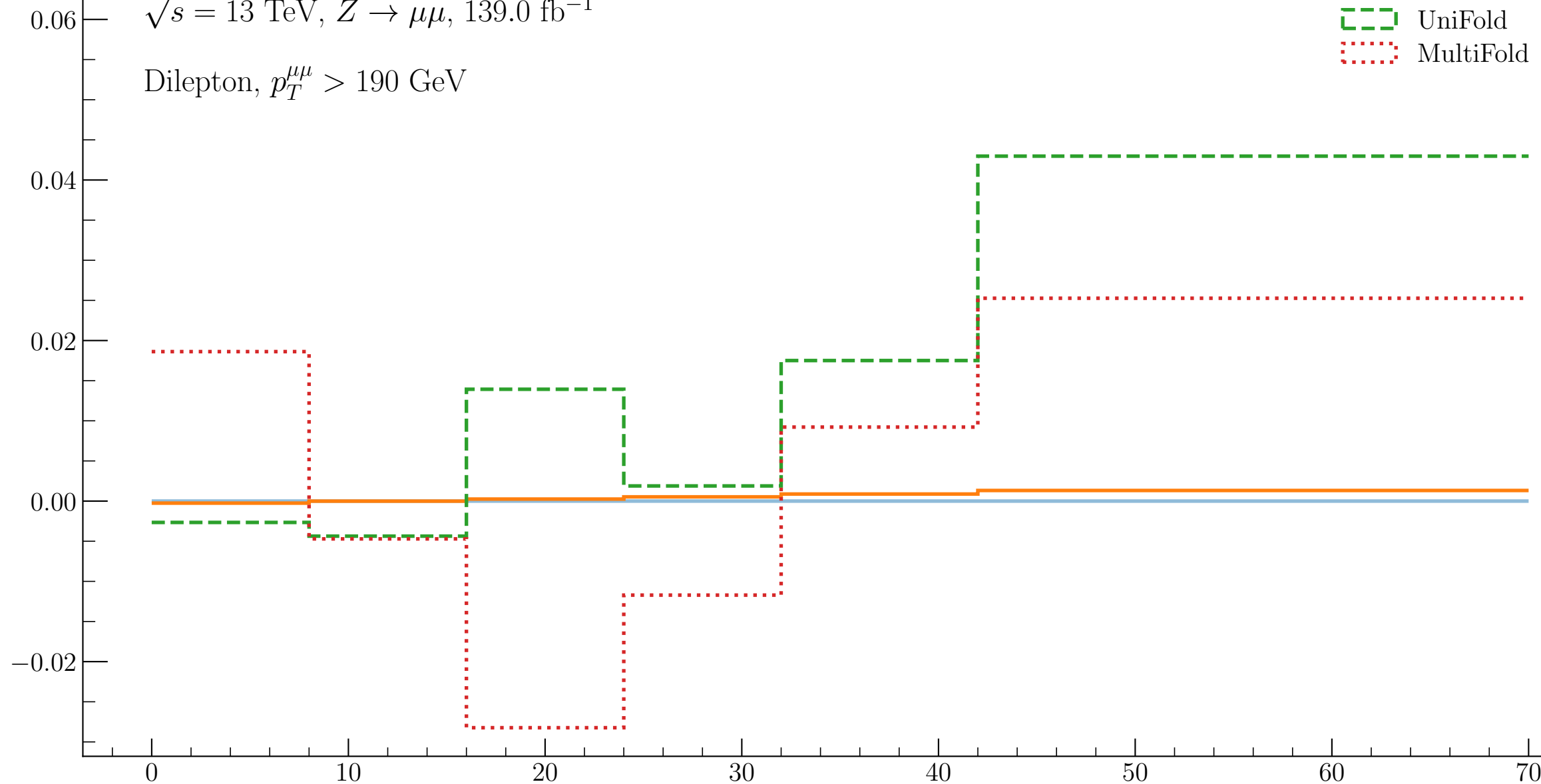
ATLAS

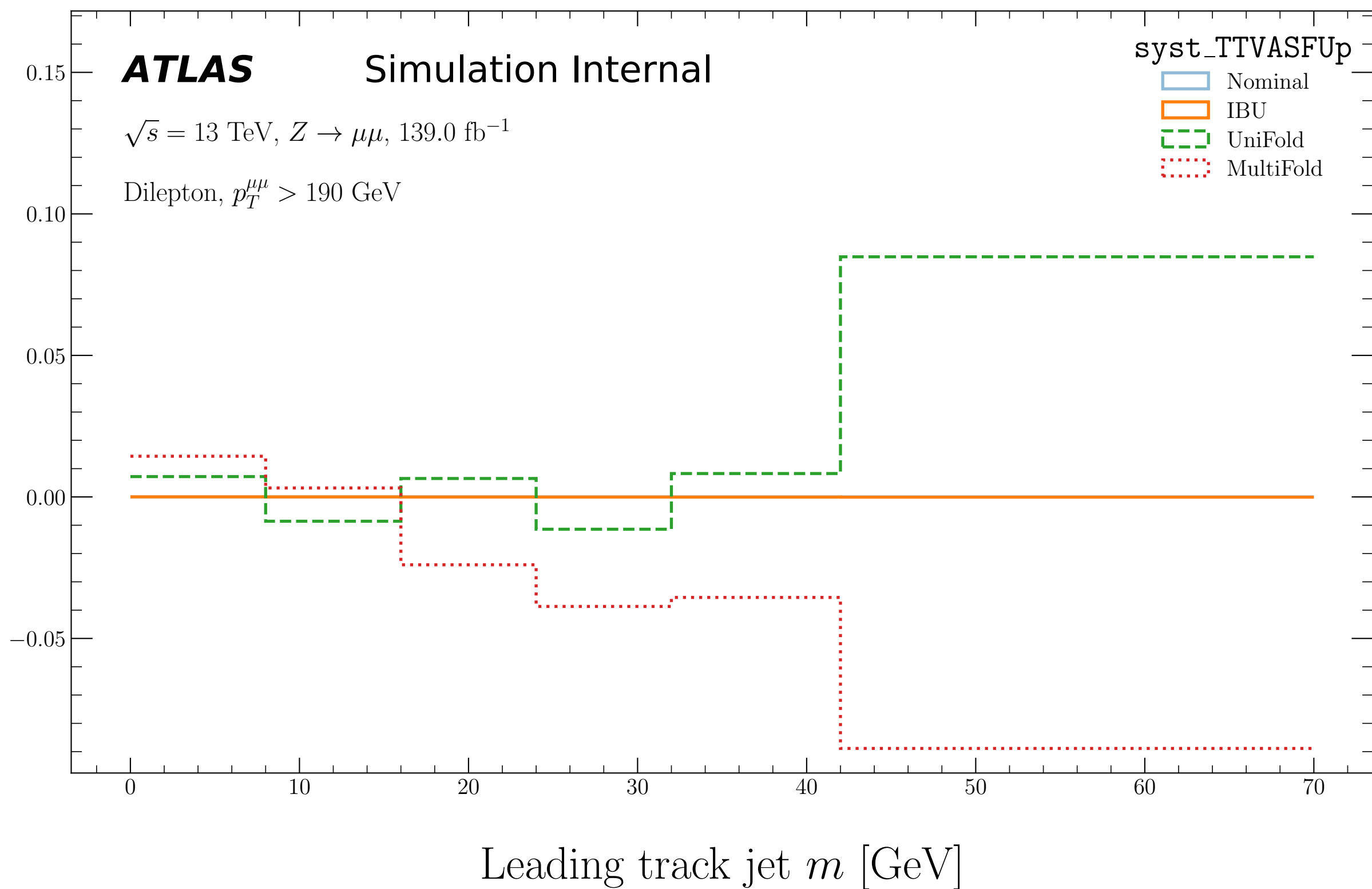
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet m [GeV]



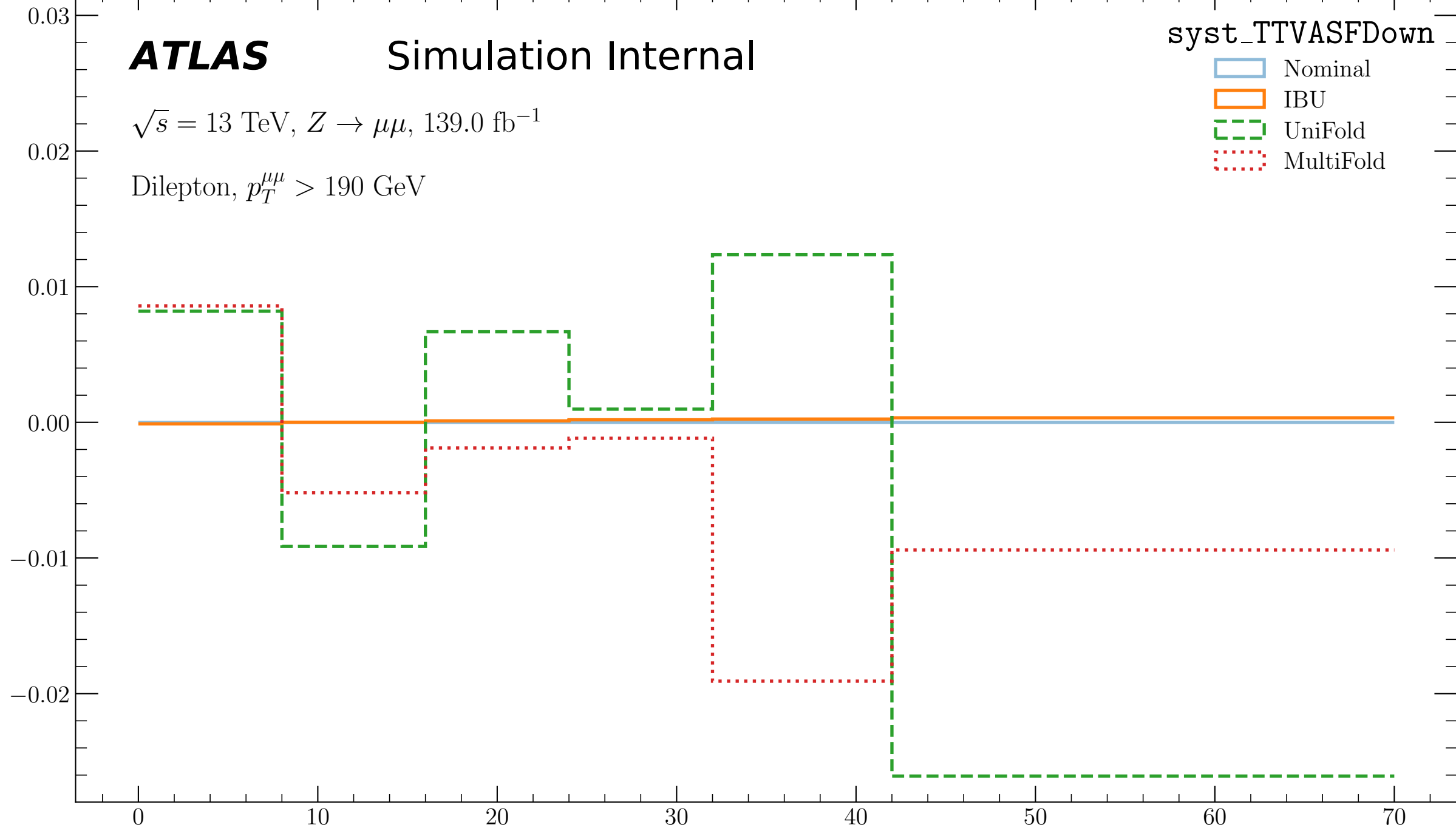
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet m [GeV]

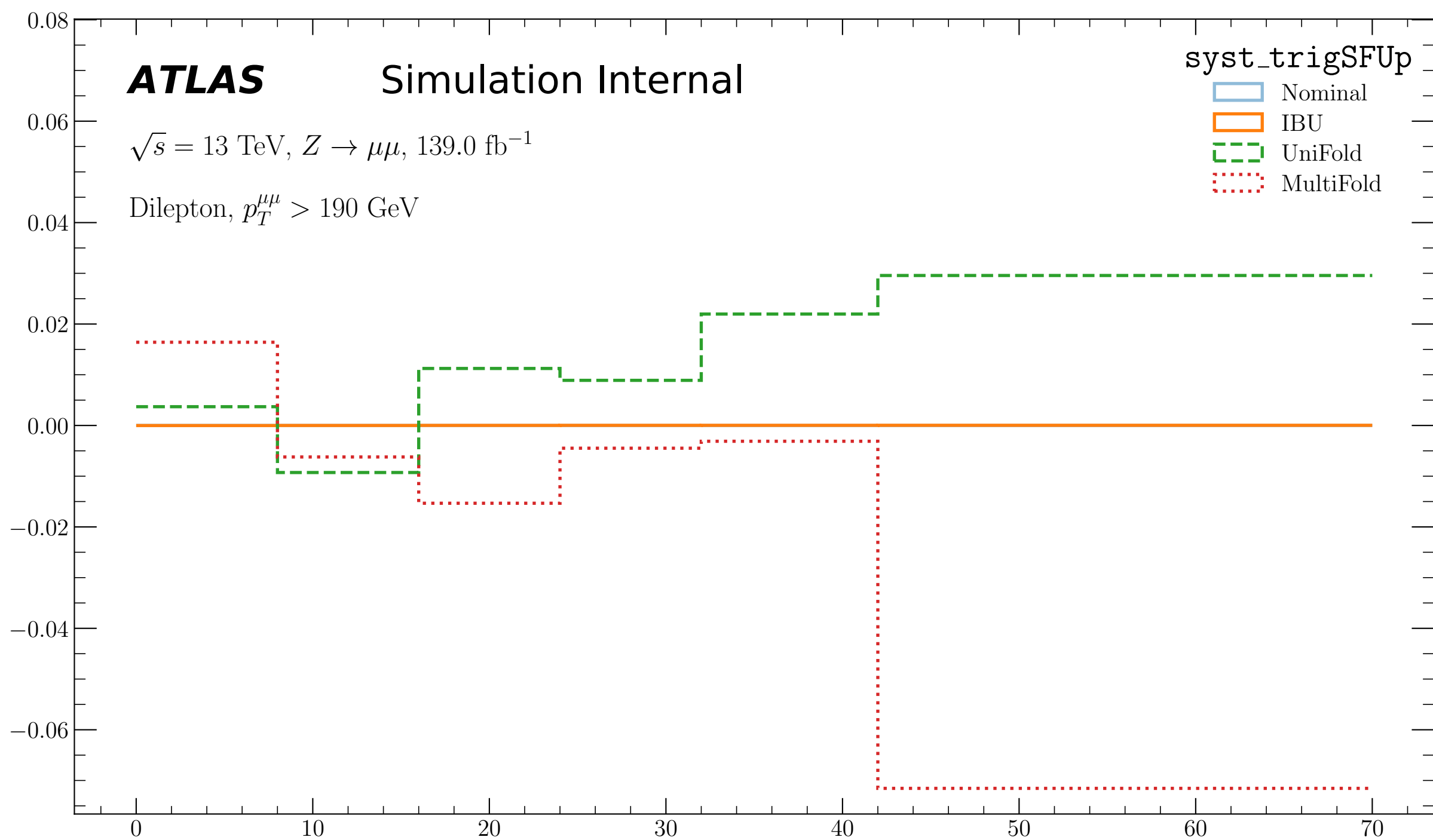
ATLAS

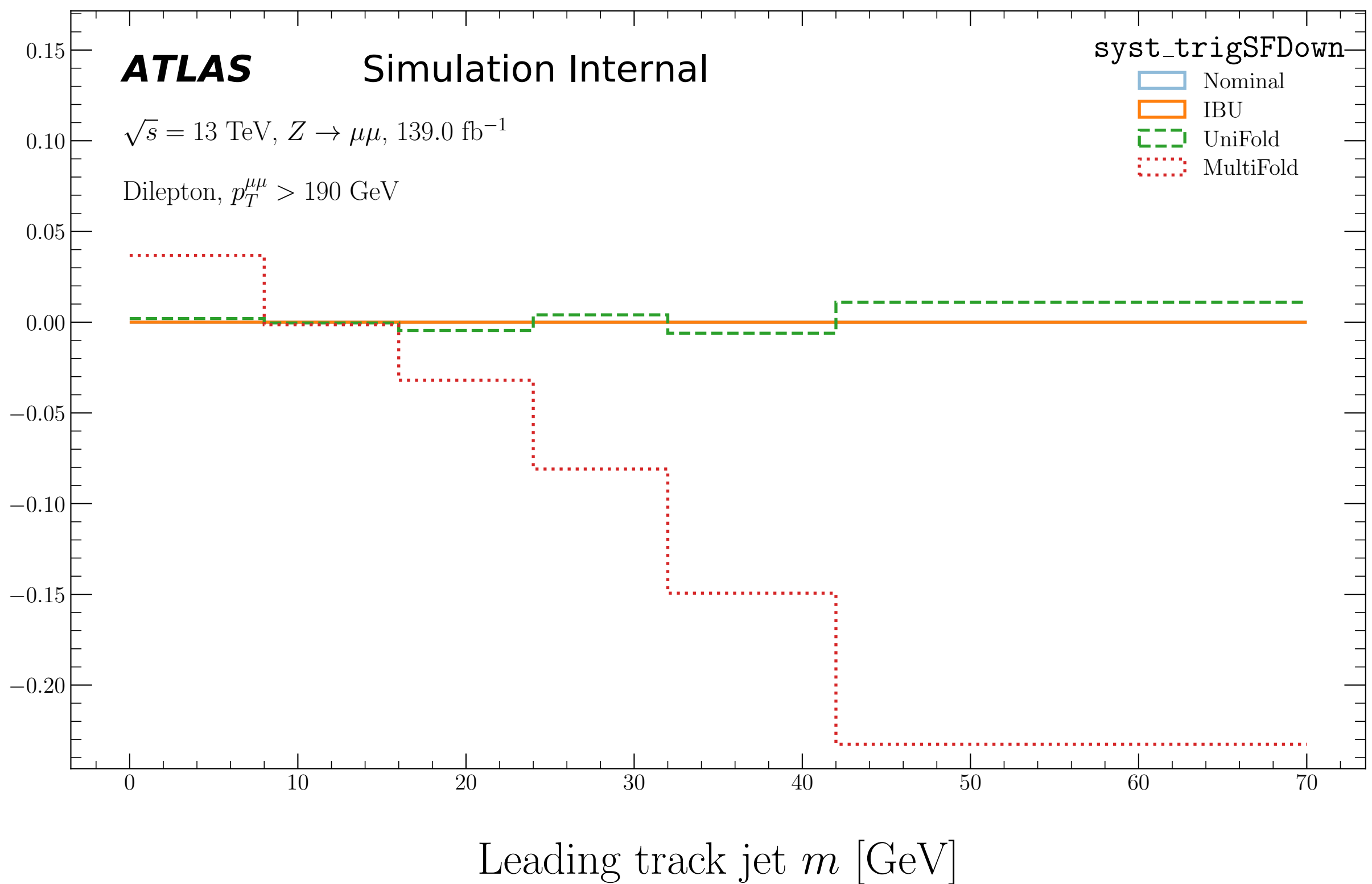
Simulation Internal

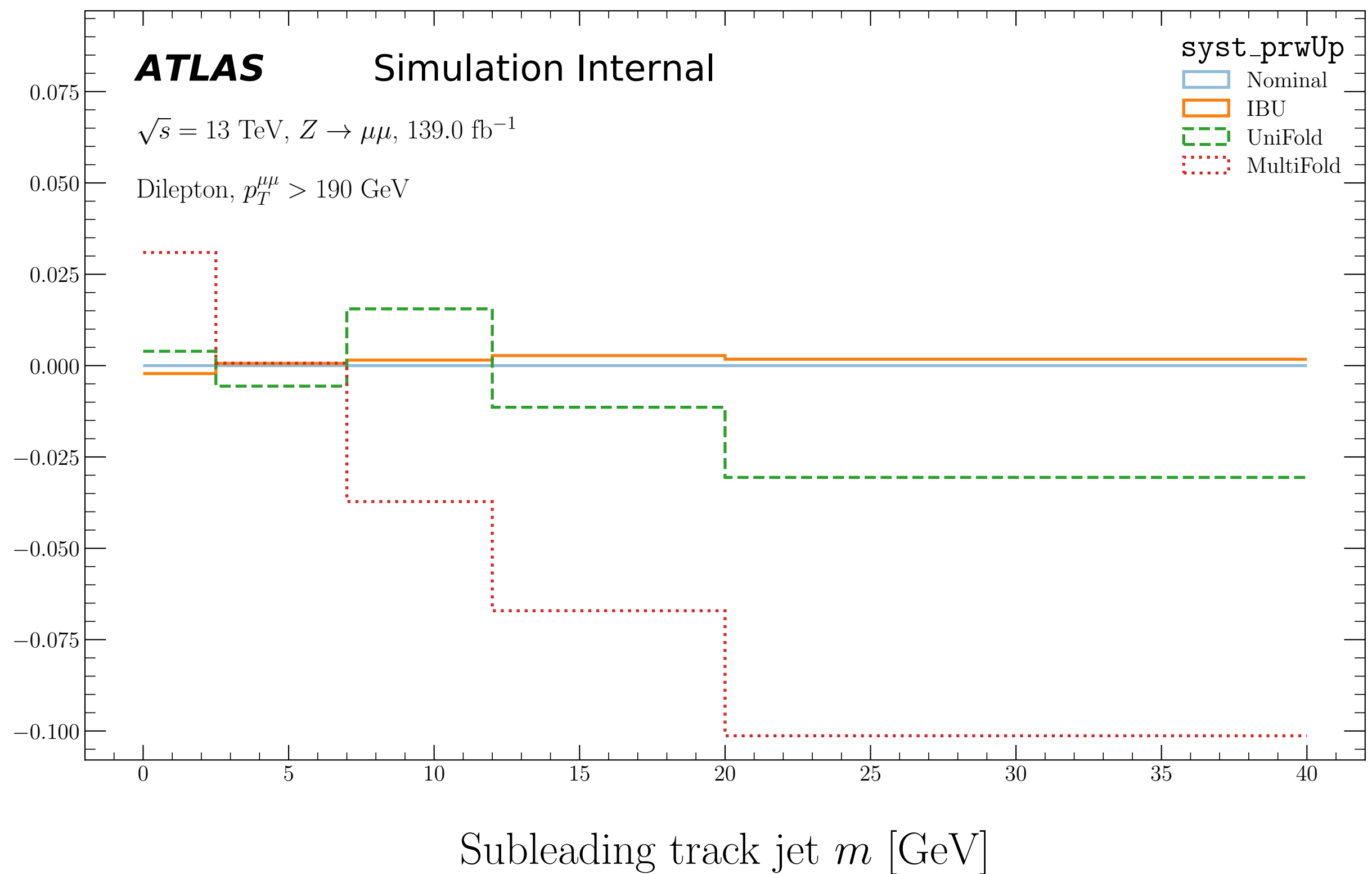
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

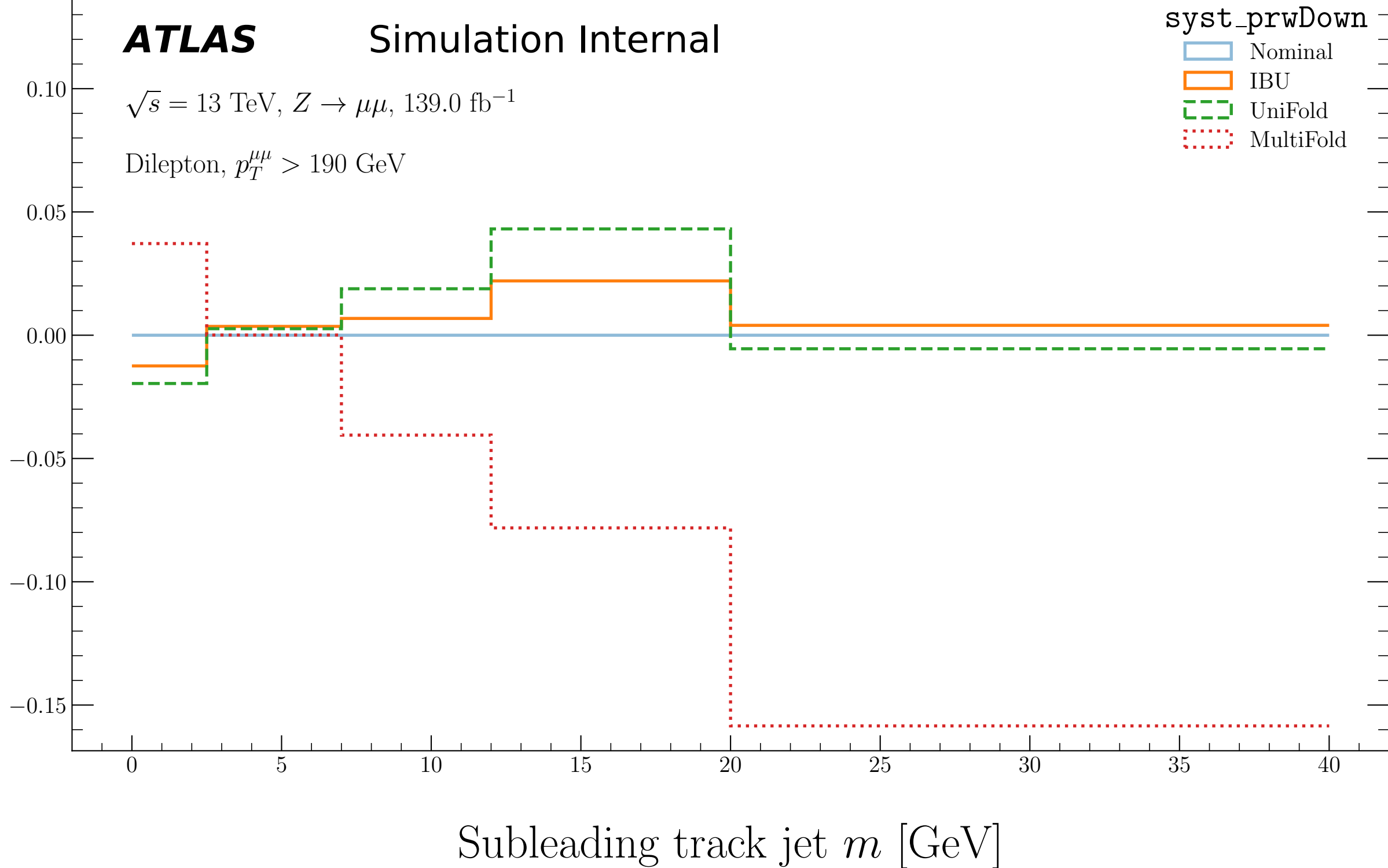
syst_trigSFUp

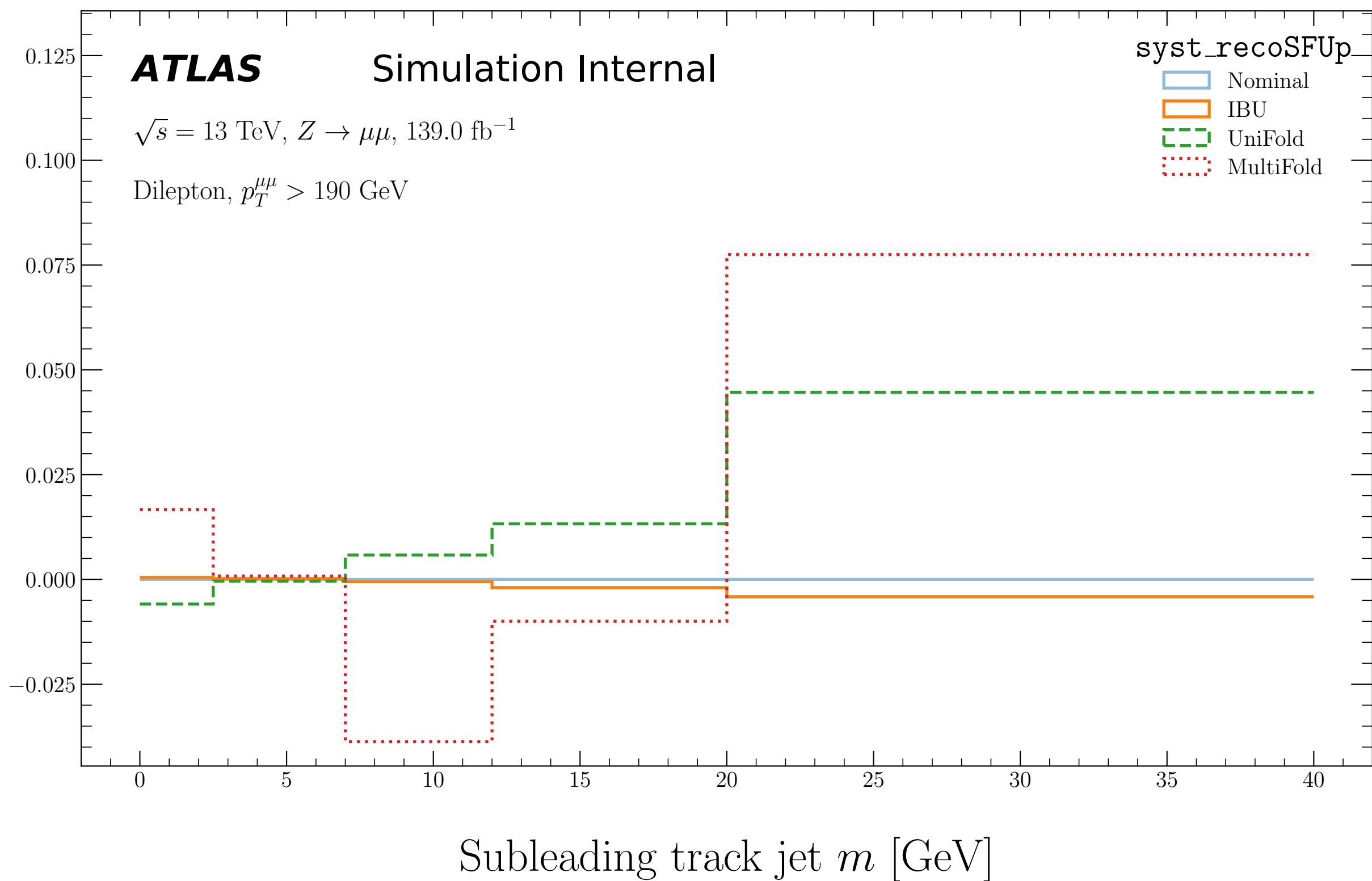
- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet m [GeV]









Relative Systematic Effect (MultiFold)

ATLAS

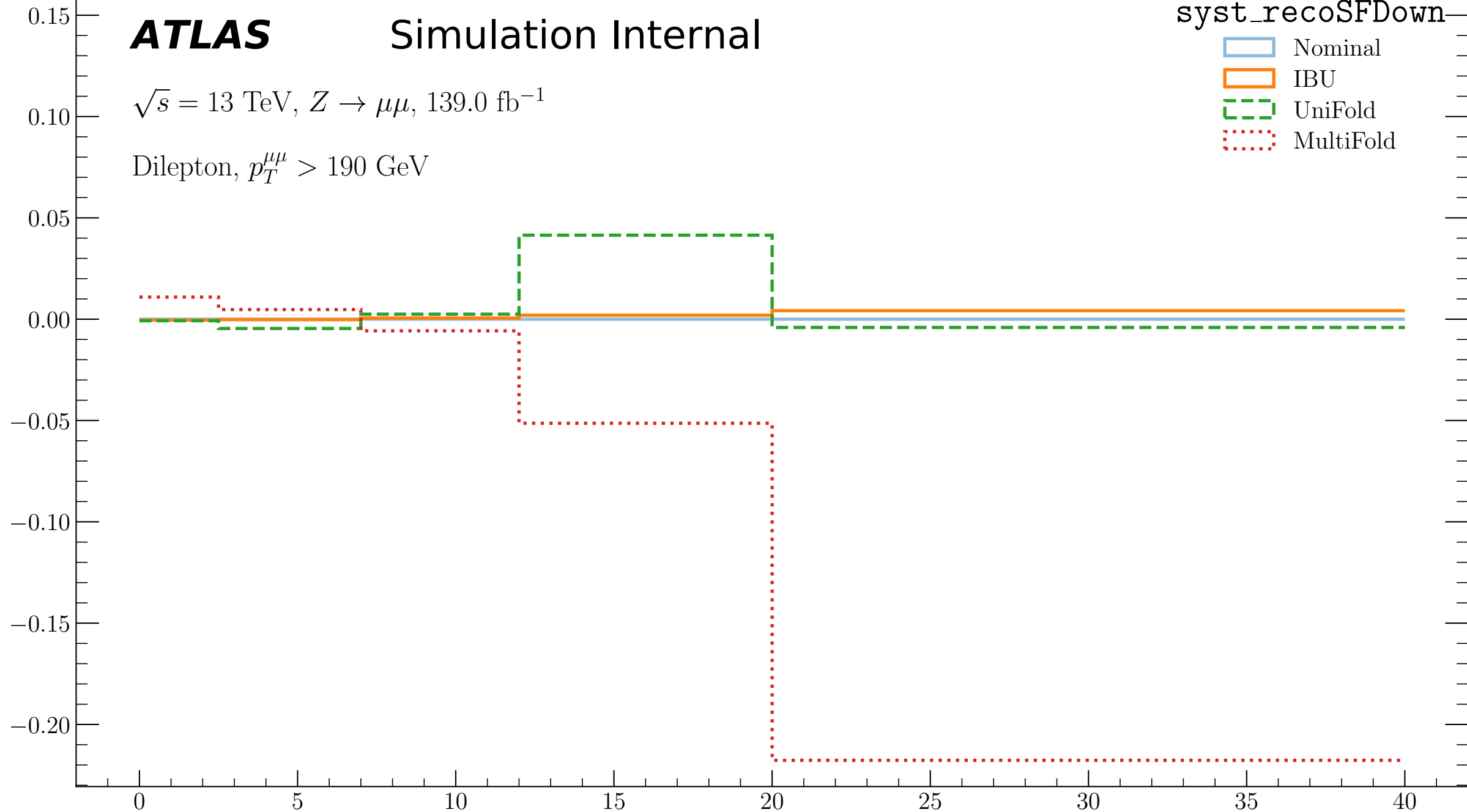
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet m [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

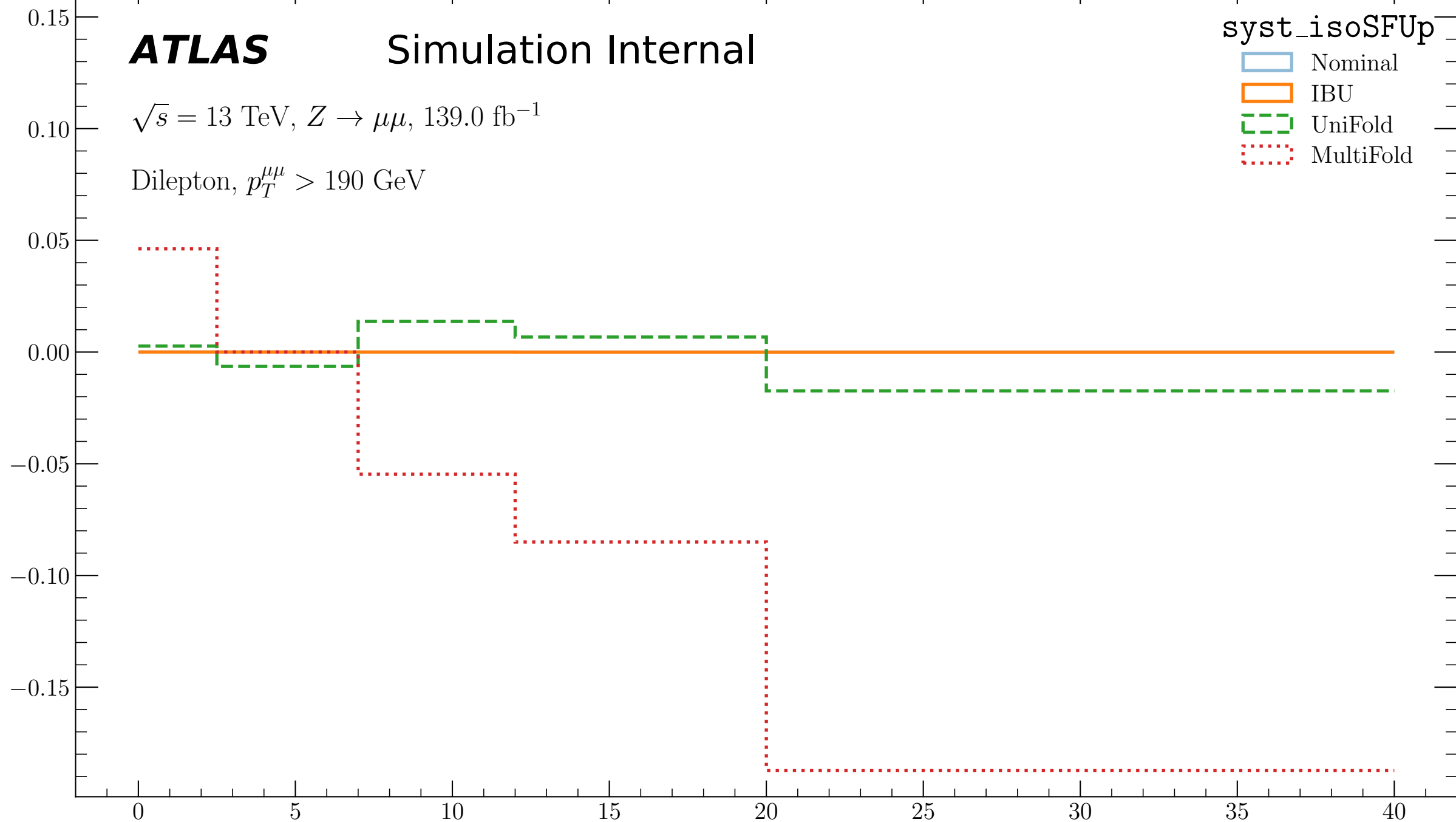
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet m [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

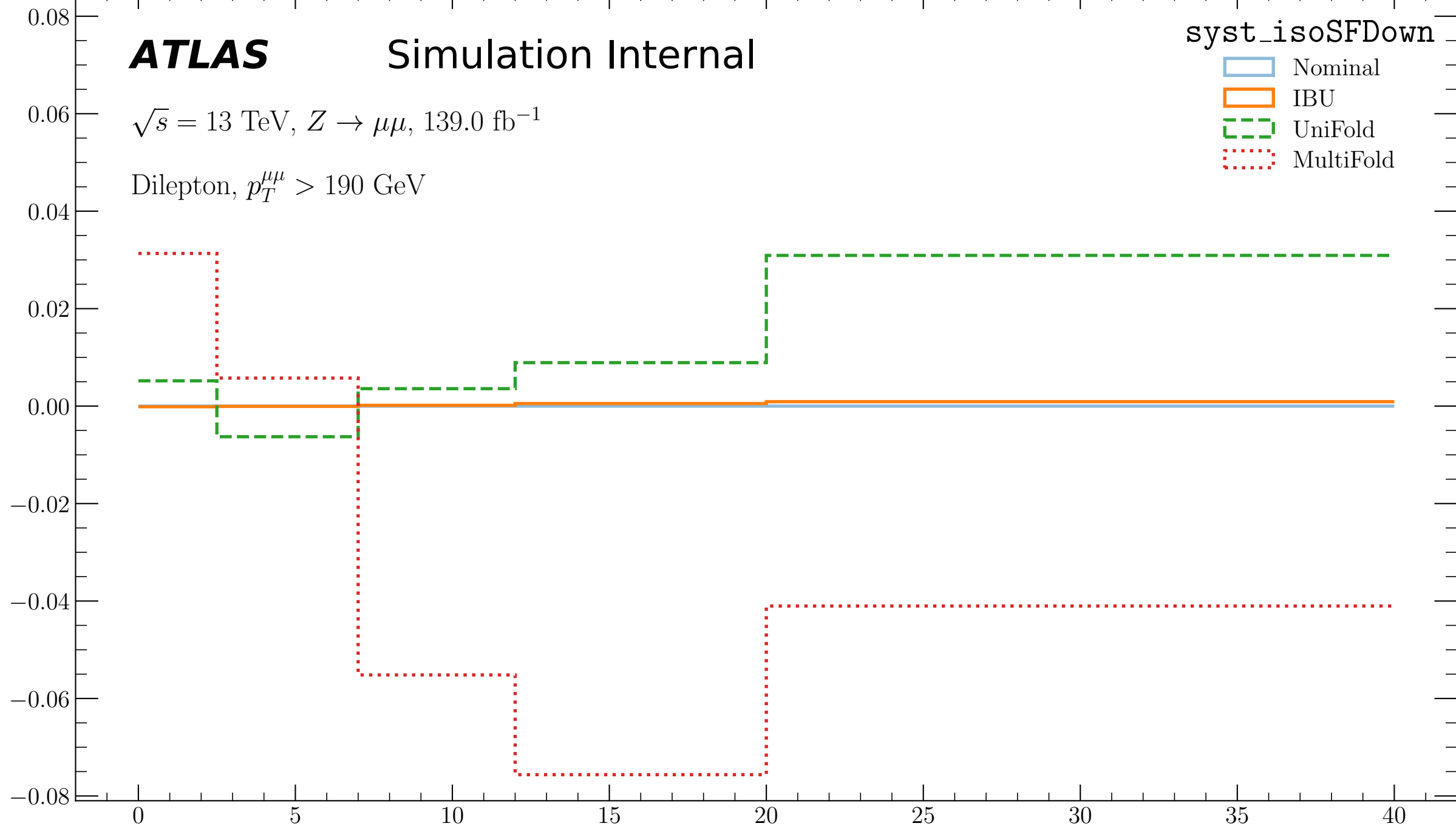
Simulation Internal

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Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

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Subleading track jet m [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

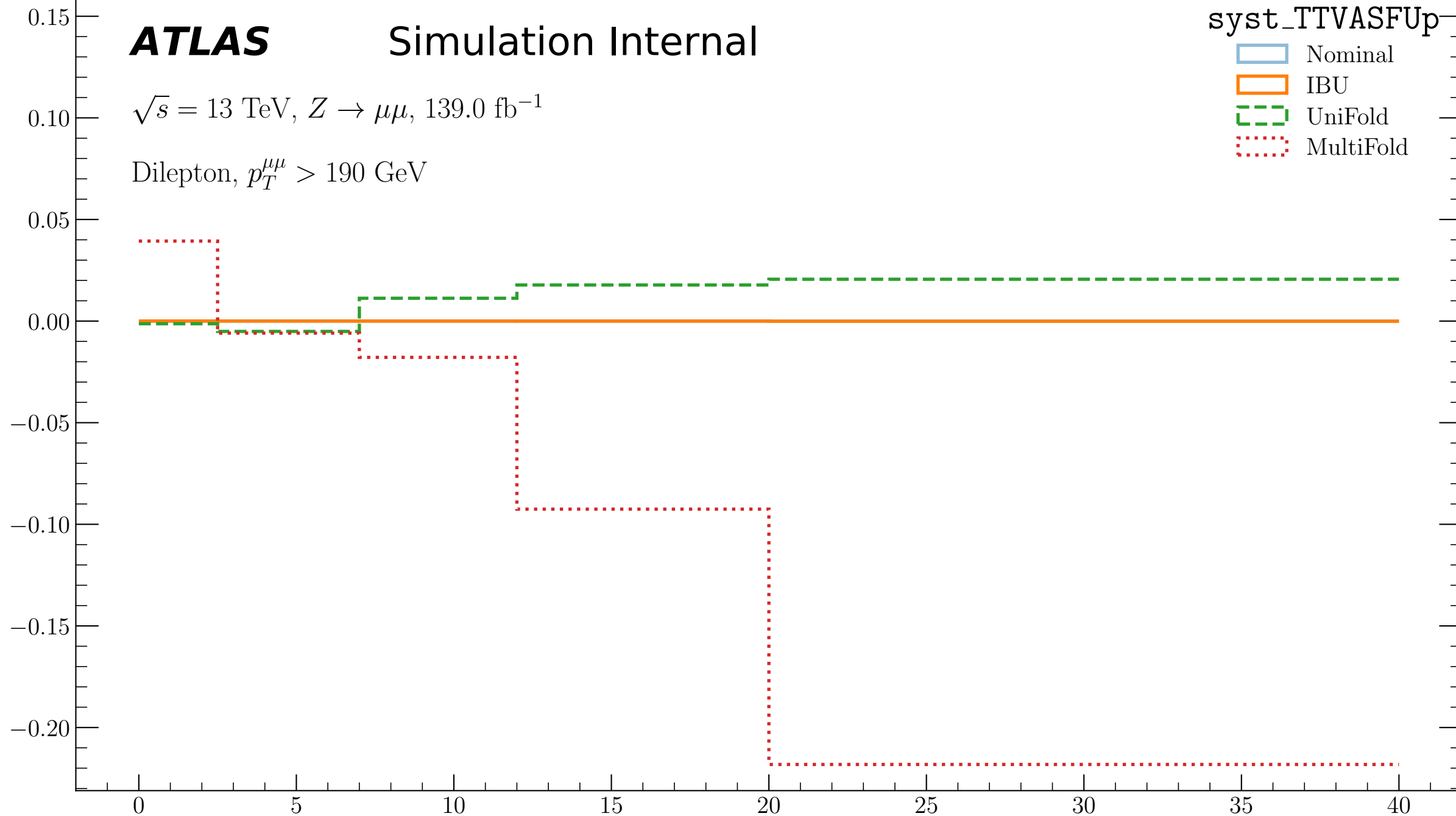
Simulation Internal

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Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

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Subleading track jet m [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

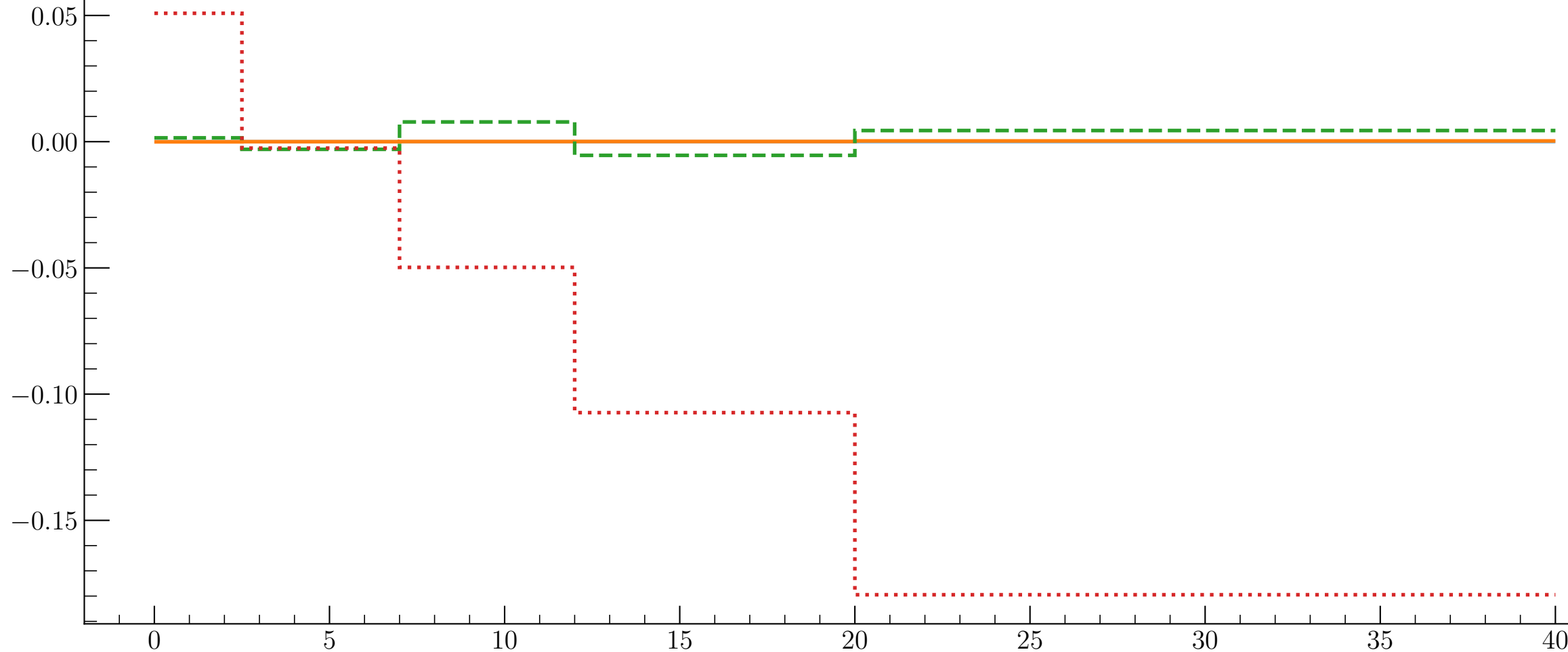
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

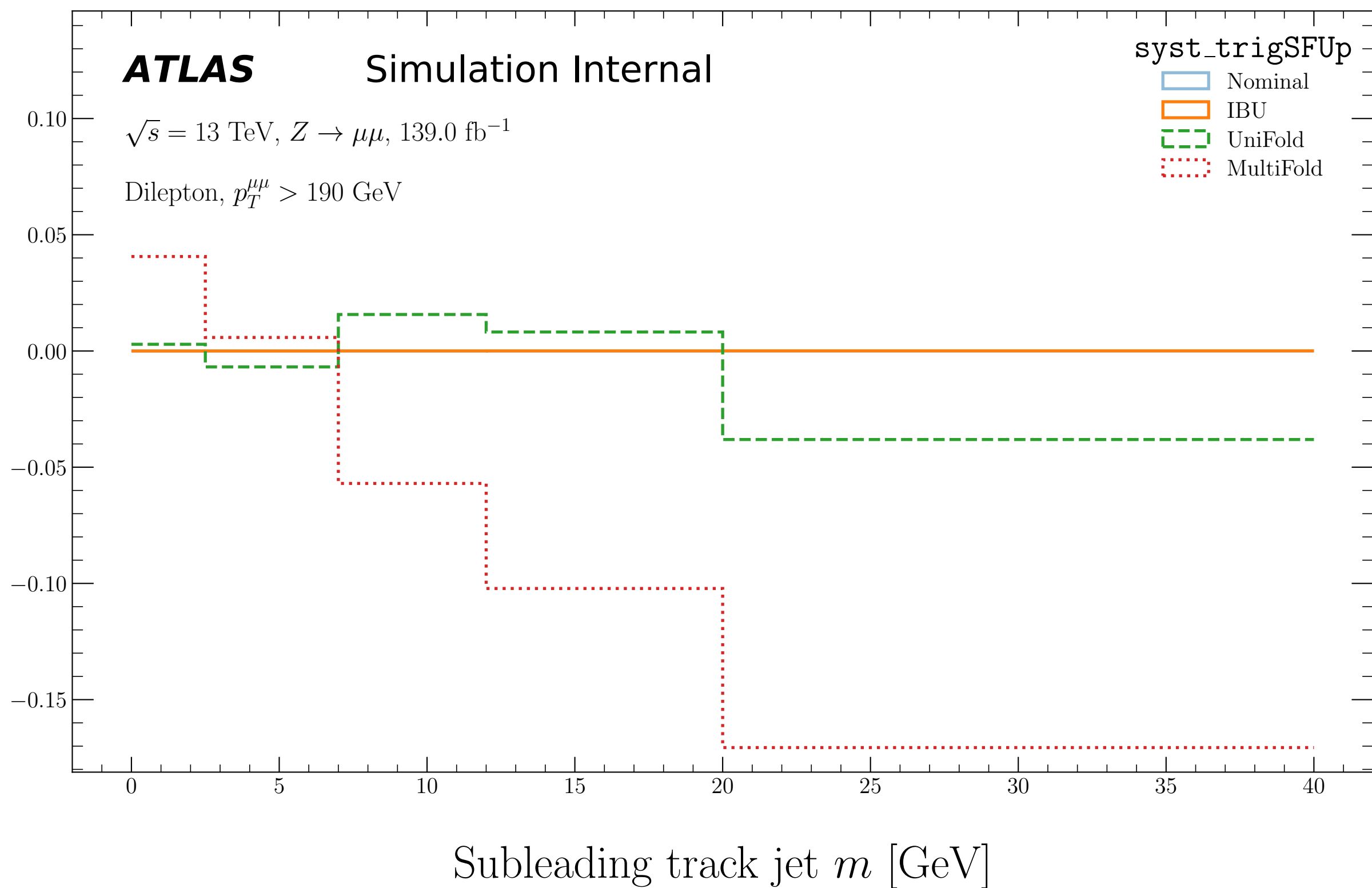
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

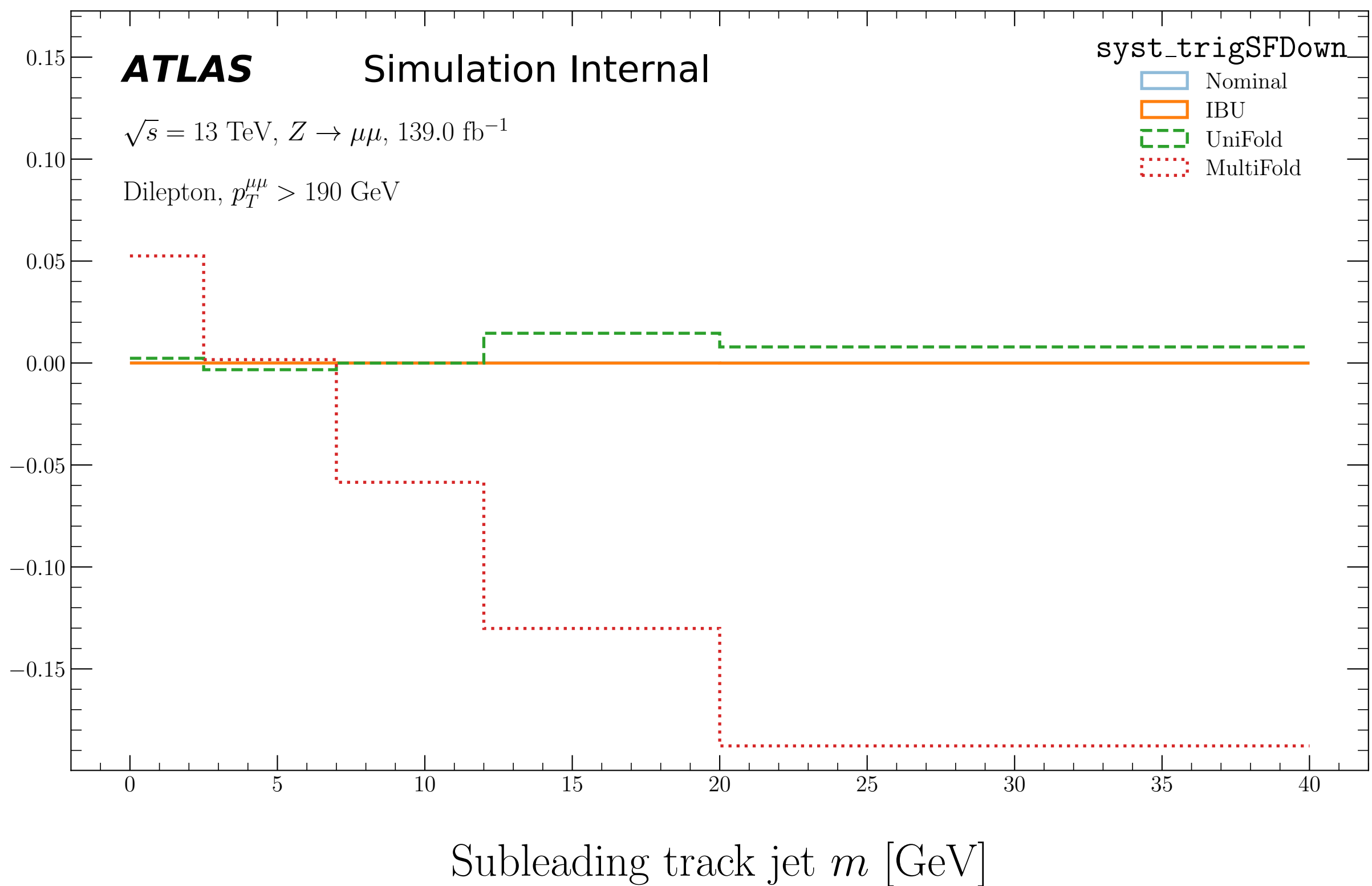
syst_TTVASFDown

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- UniFold
- MultiFold



Subleading track jet m [GeV]





Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

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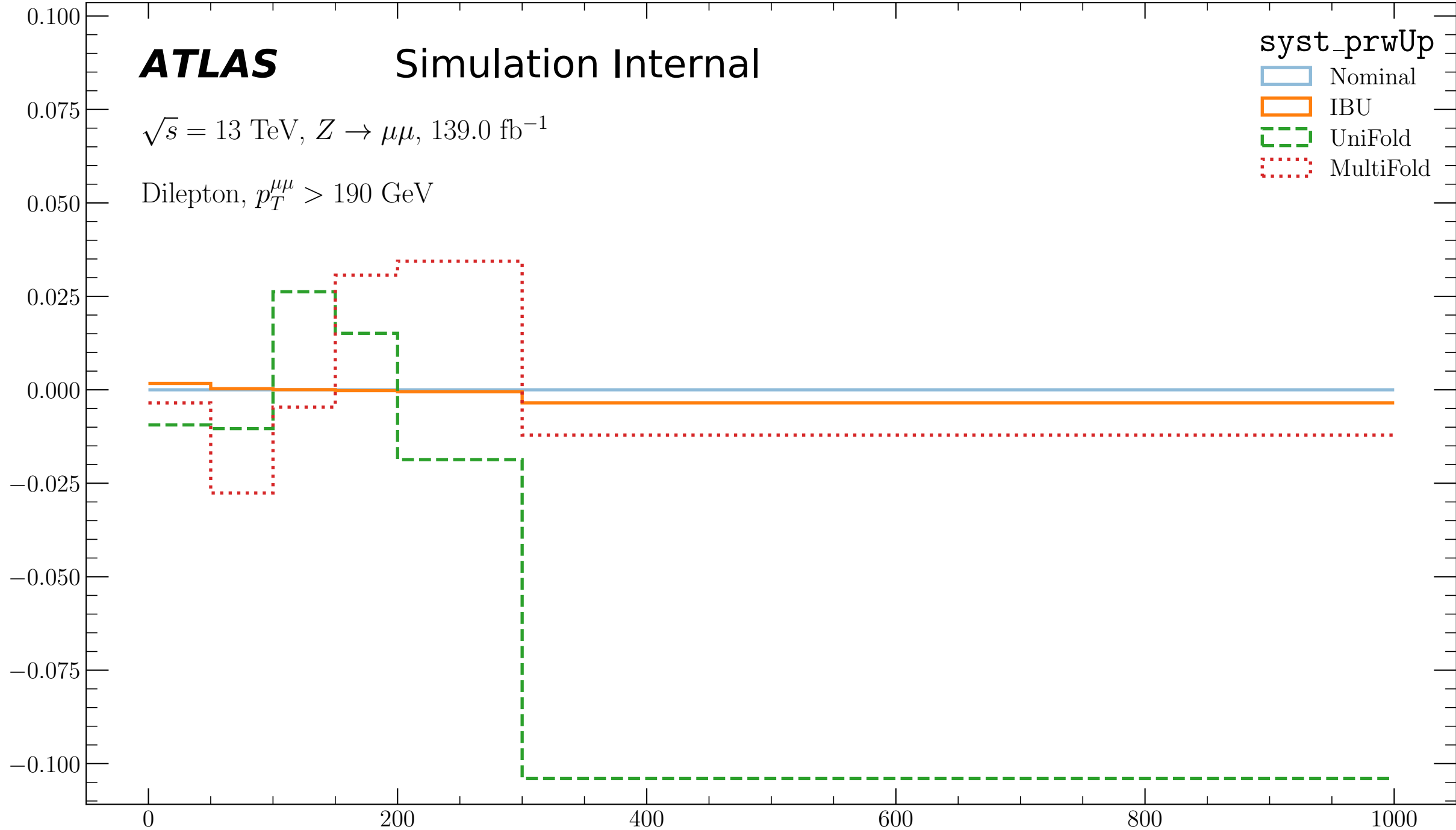
syst_prwUp

Nominal

IBU

UniFold

MultiFold



Leading track jet p_T [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

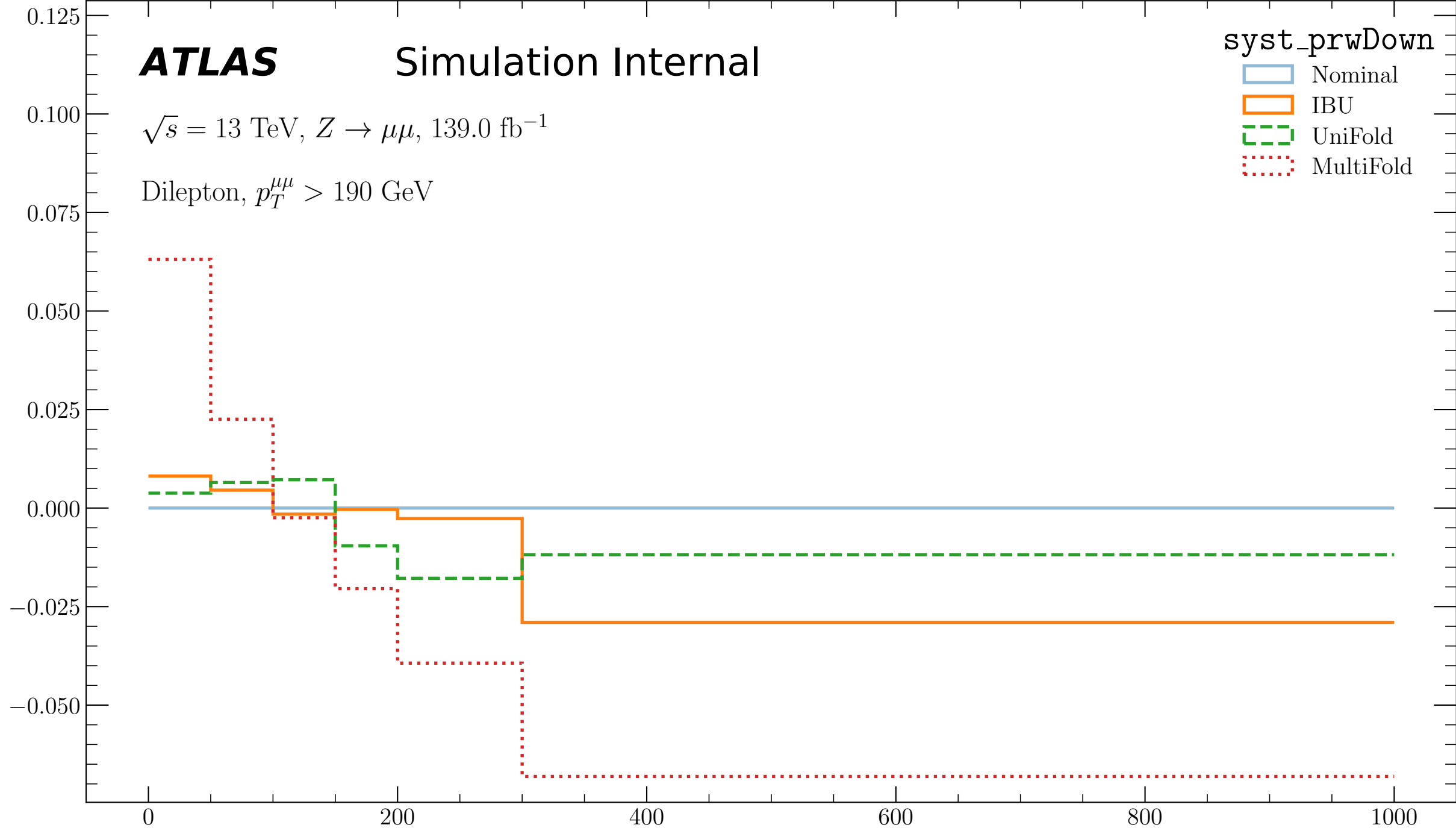
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

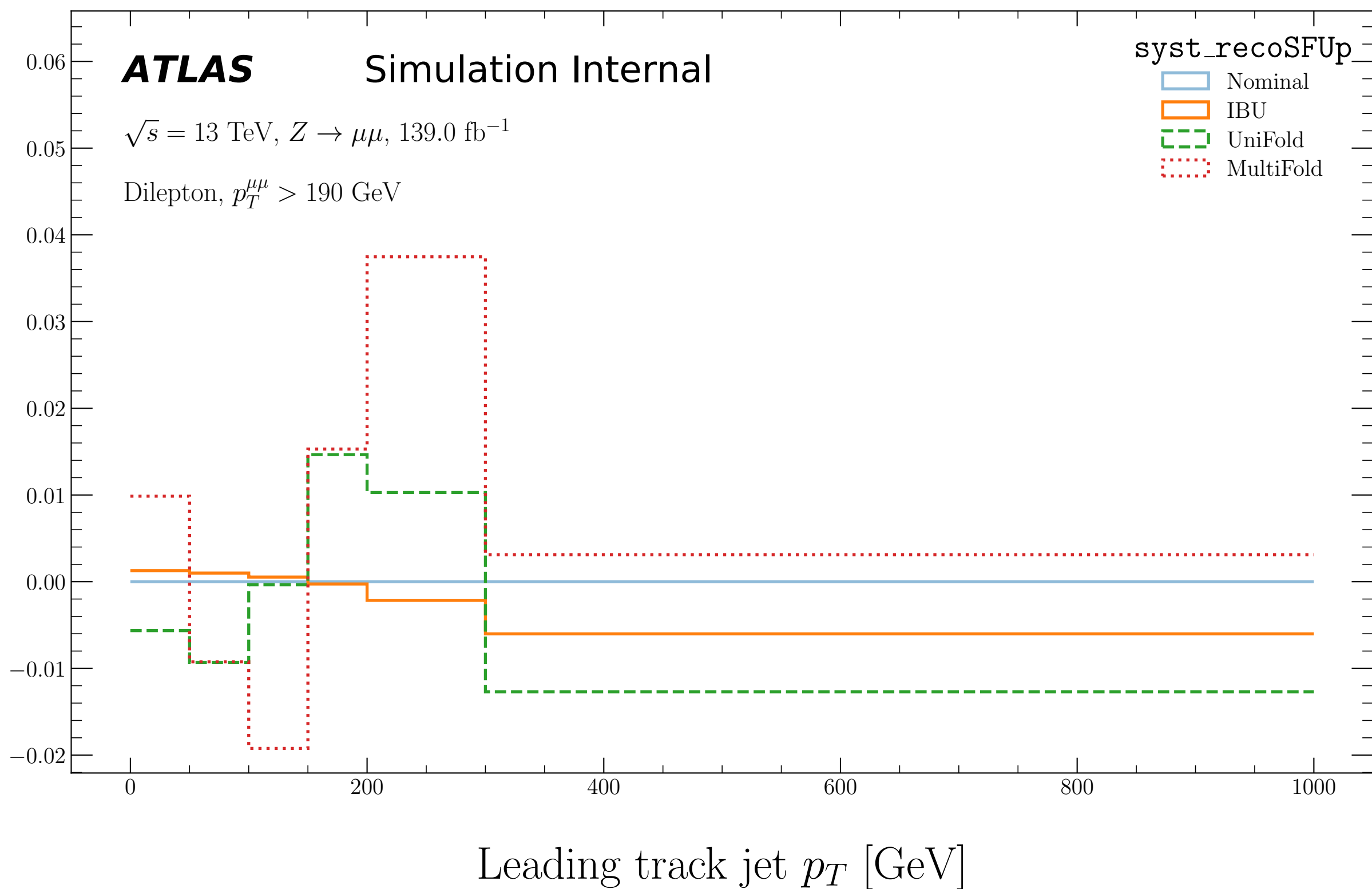
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

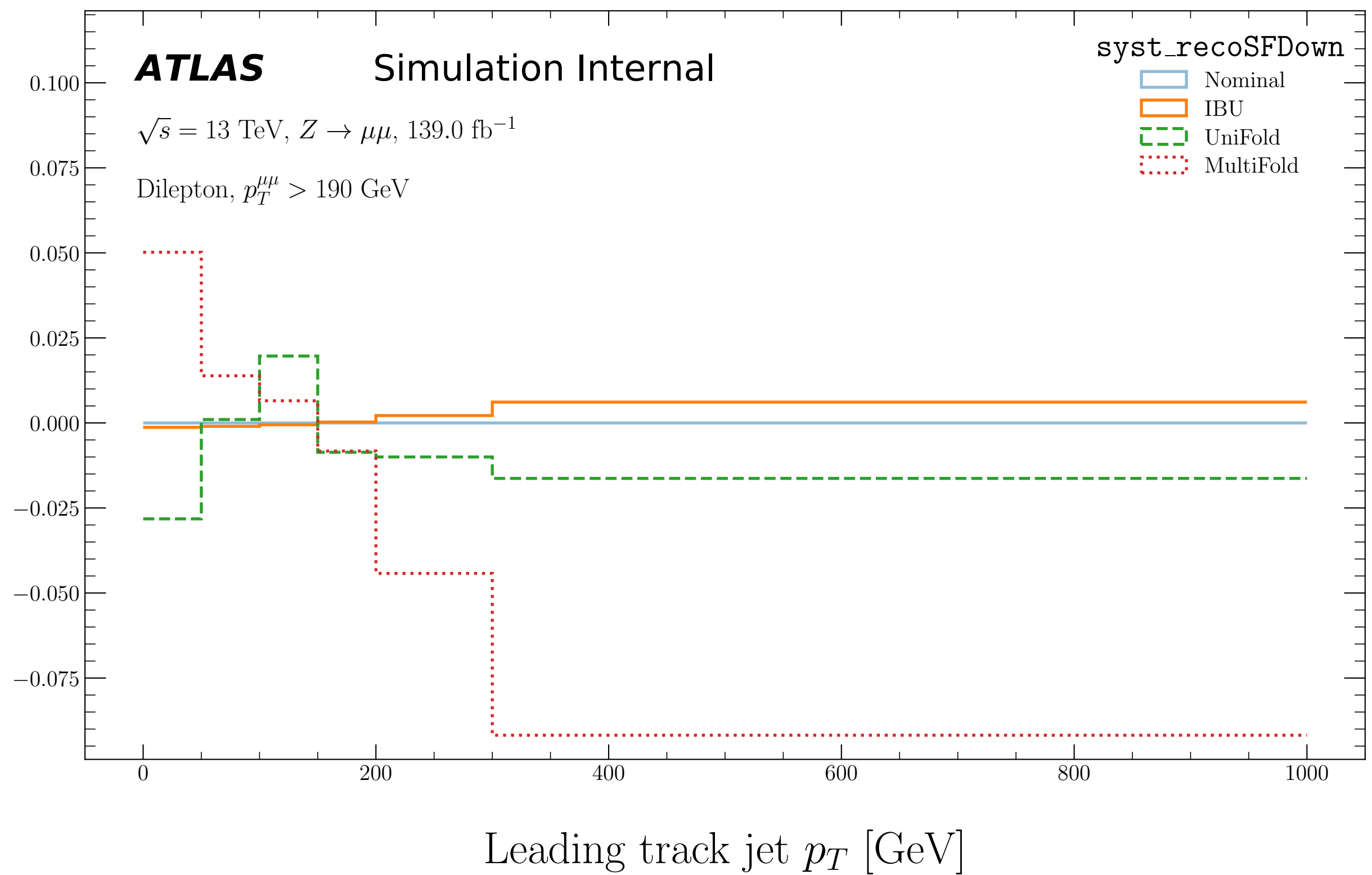
syst_prwDown

- Nominal
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Leading track jet p_T [GeV]





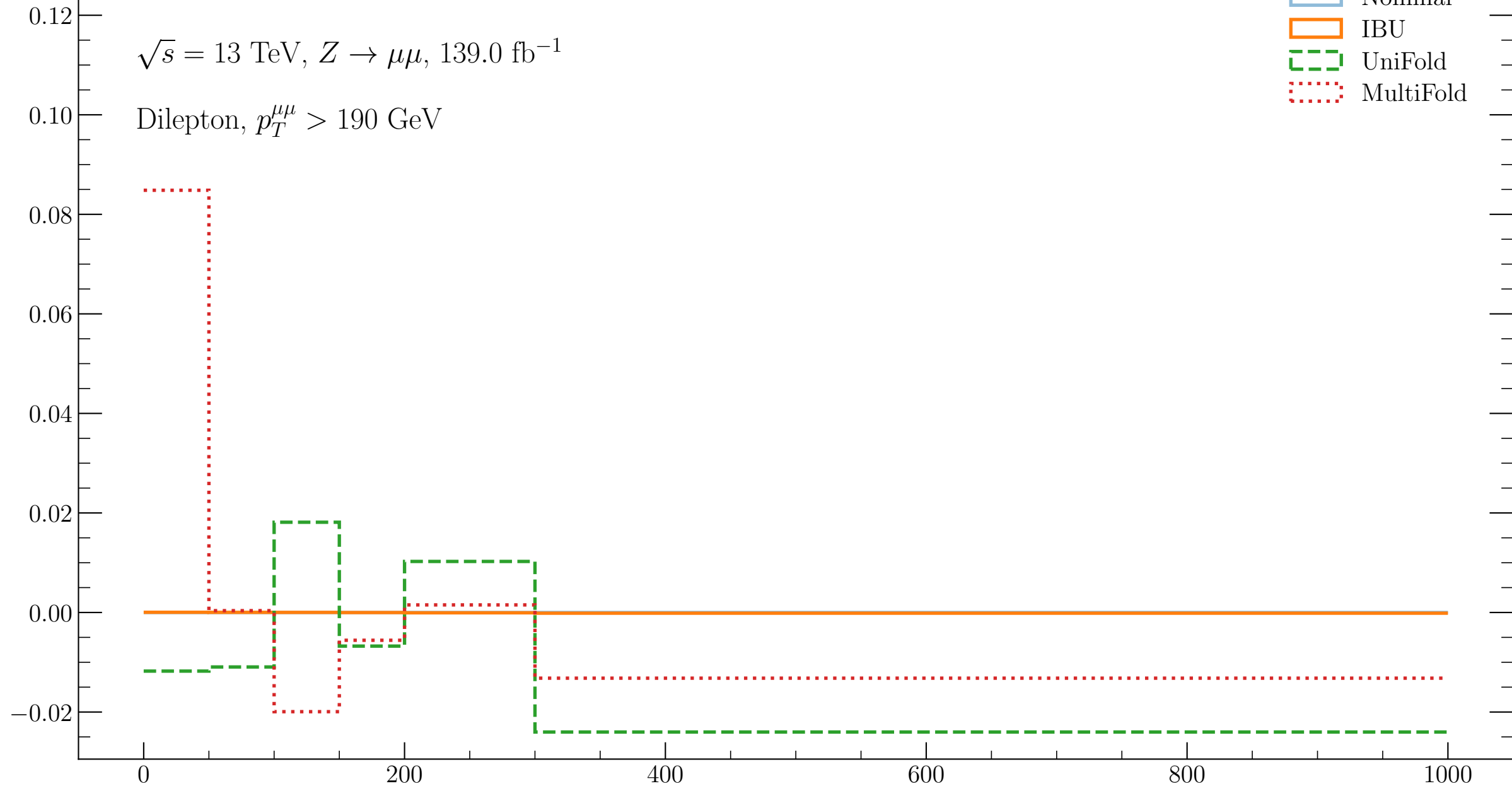
ATLAS

Simulation Internal

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syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



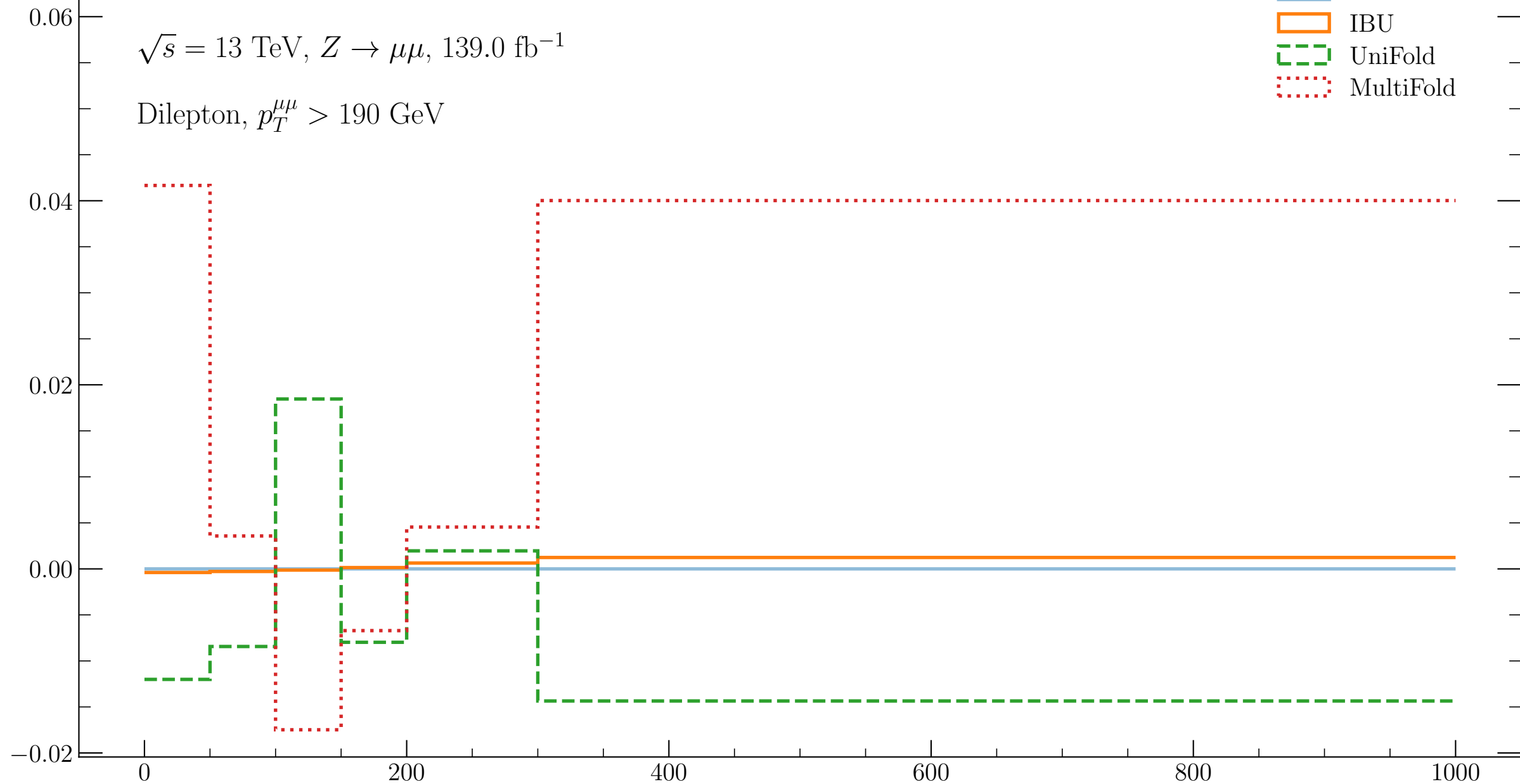
ATLAS

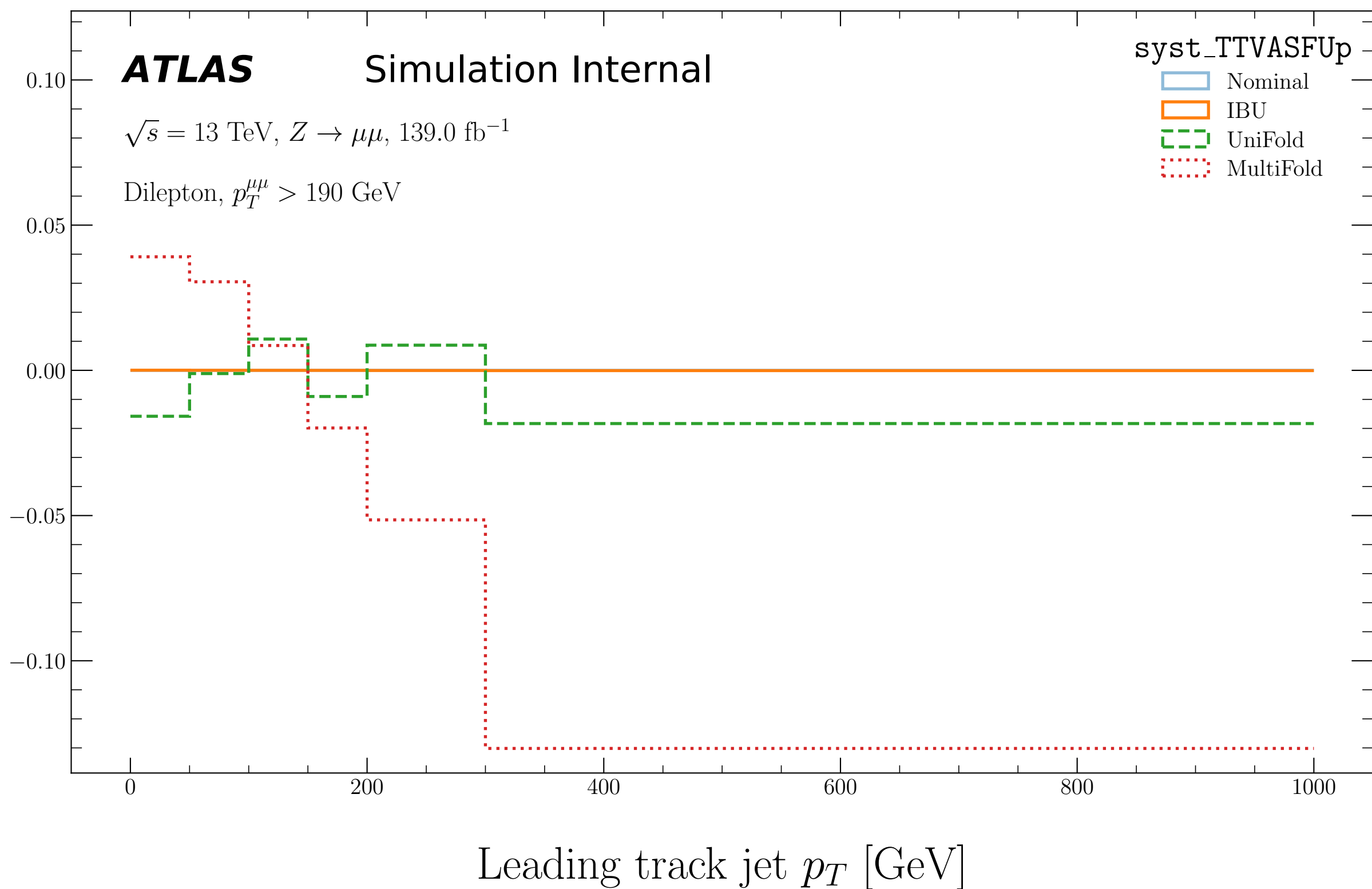
Simulation Internal

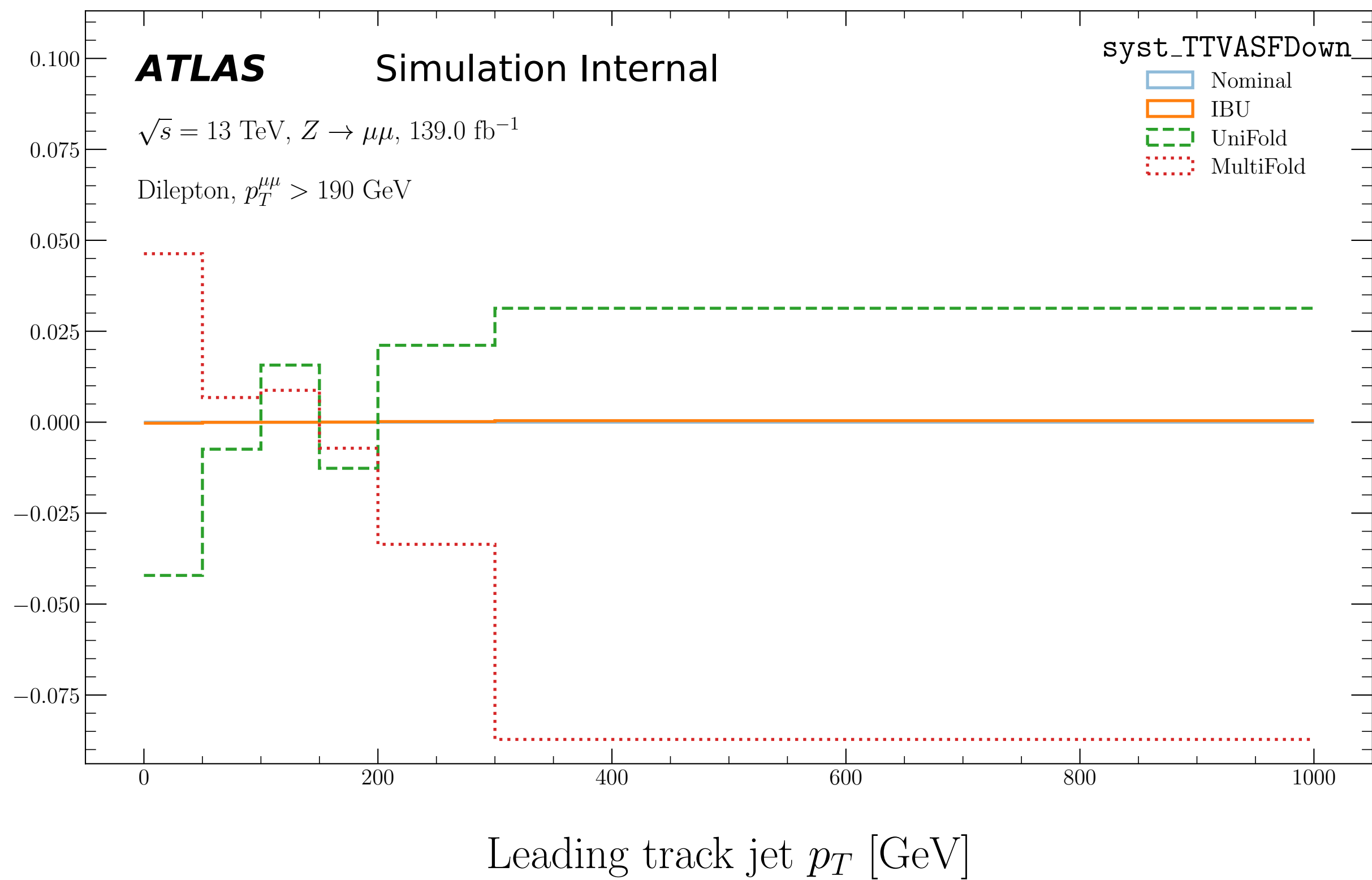
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

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Leading track jet p_T [GeV]





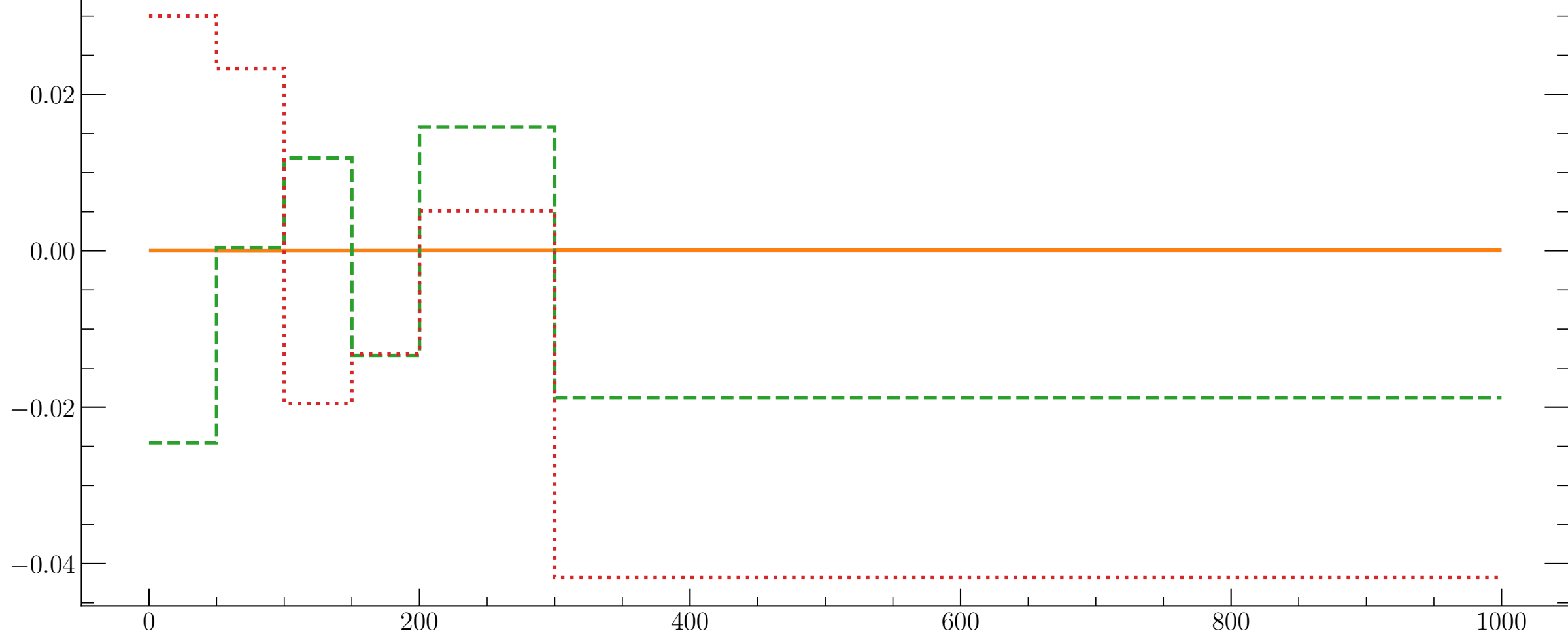
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
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- MultiFold

Leading track jet p_T [GeV]

ATLAS

Simulation Internal

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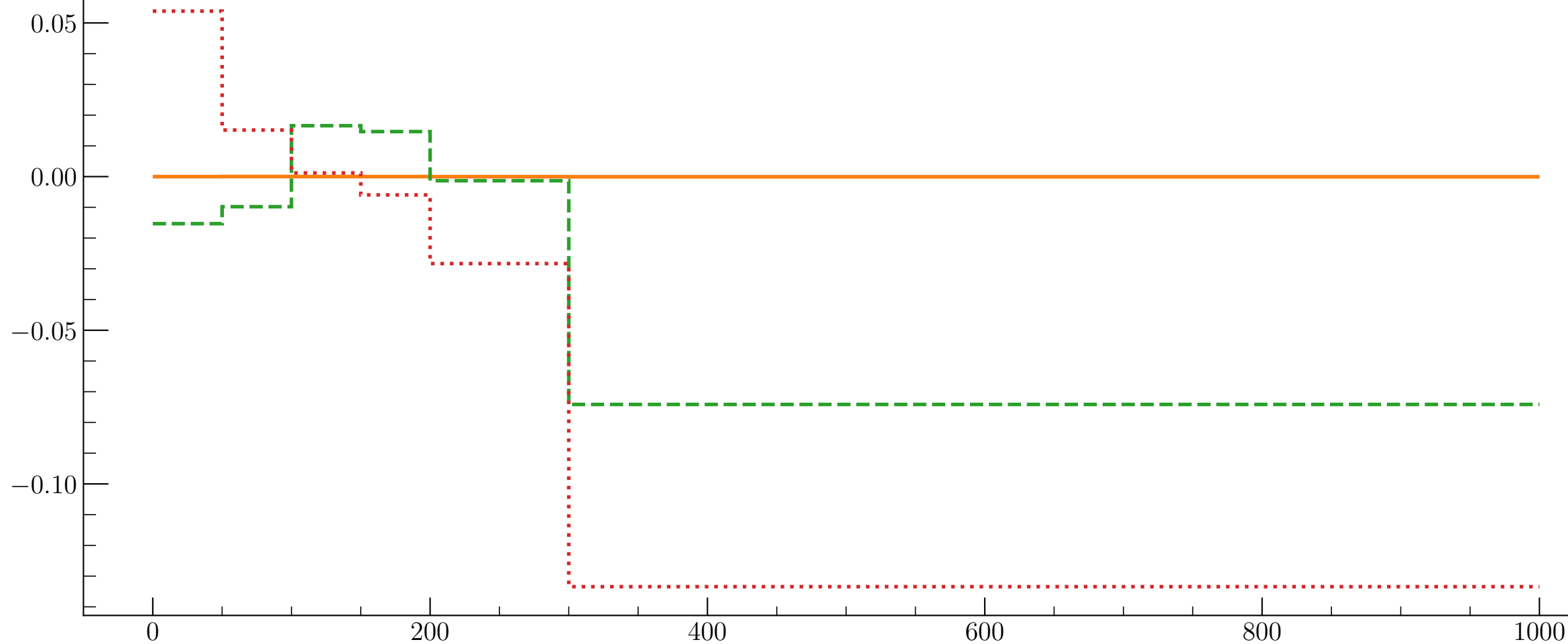
syst_trigSFDown

Nominal

IBU

UniFold

MultiFold

Leading track jet p_T [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

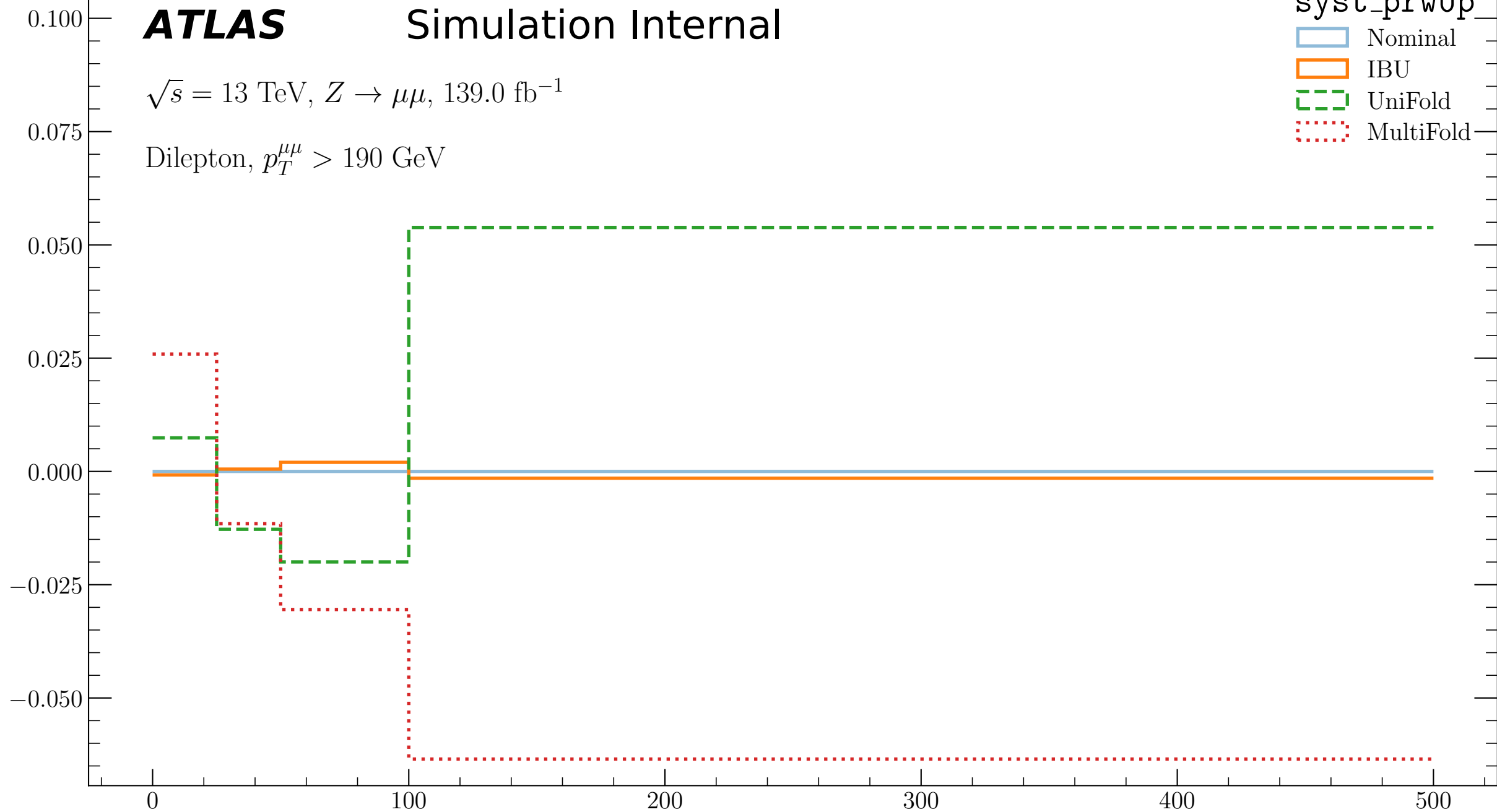
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}$, $Z \rightarrow \mu\mu$, 139.0 fb^{-1}

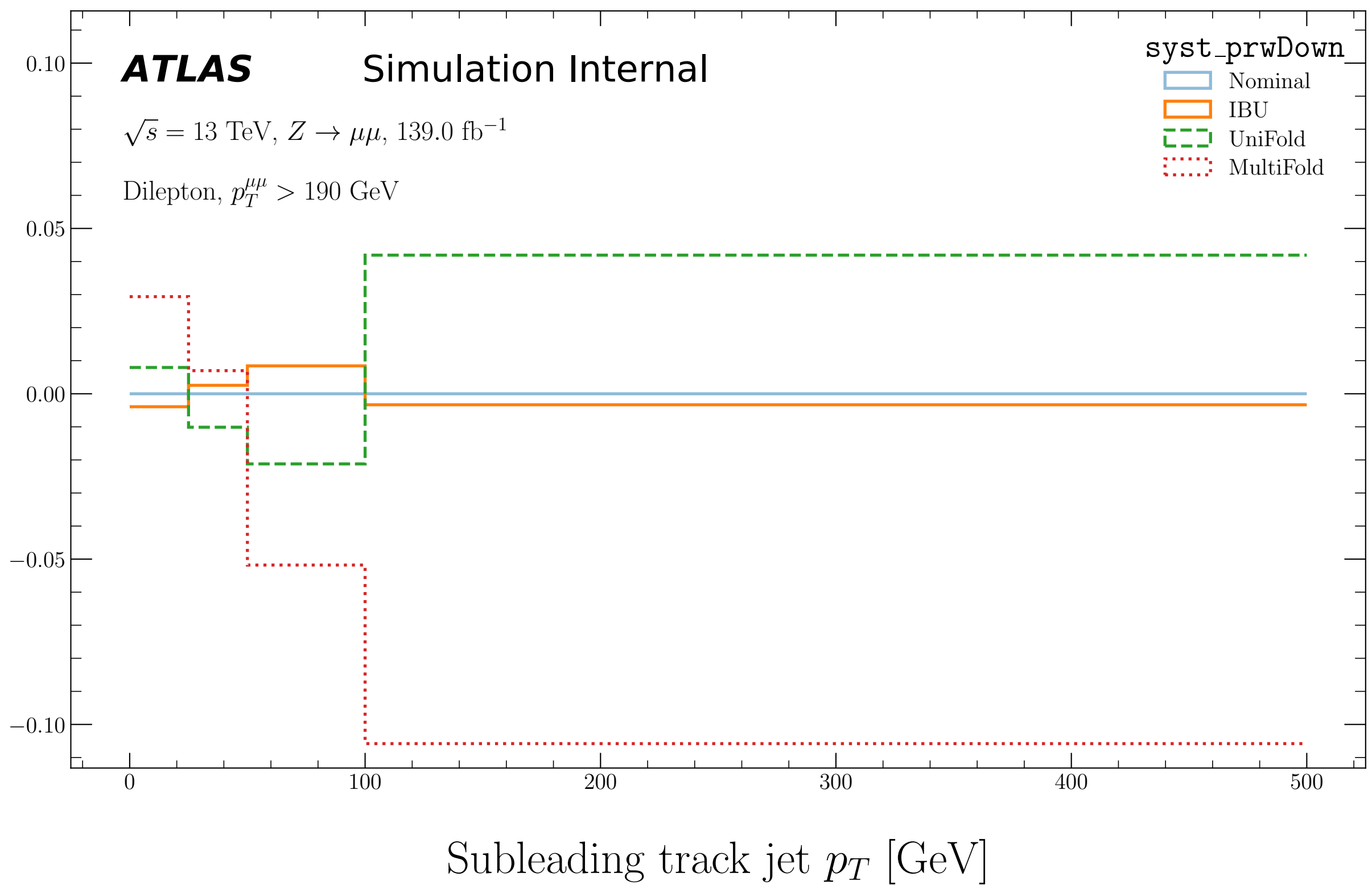
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet p_T [GeV]



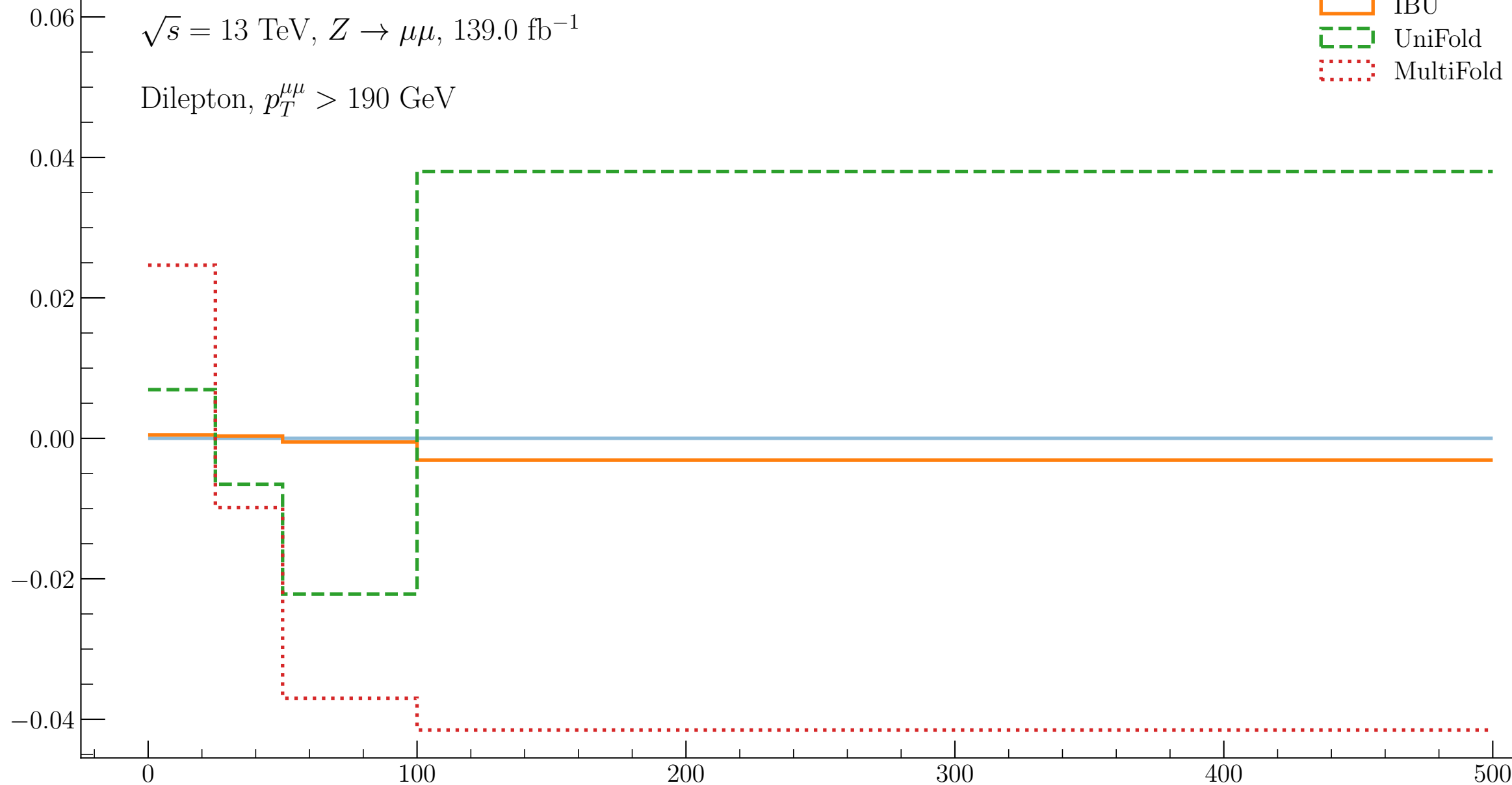
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet p_T [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

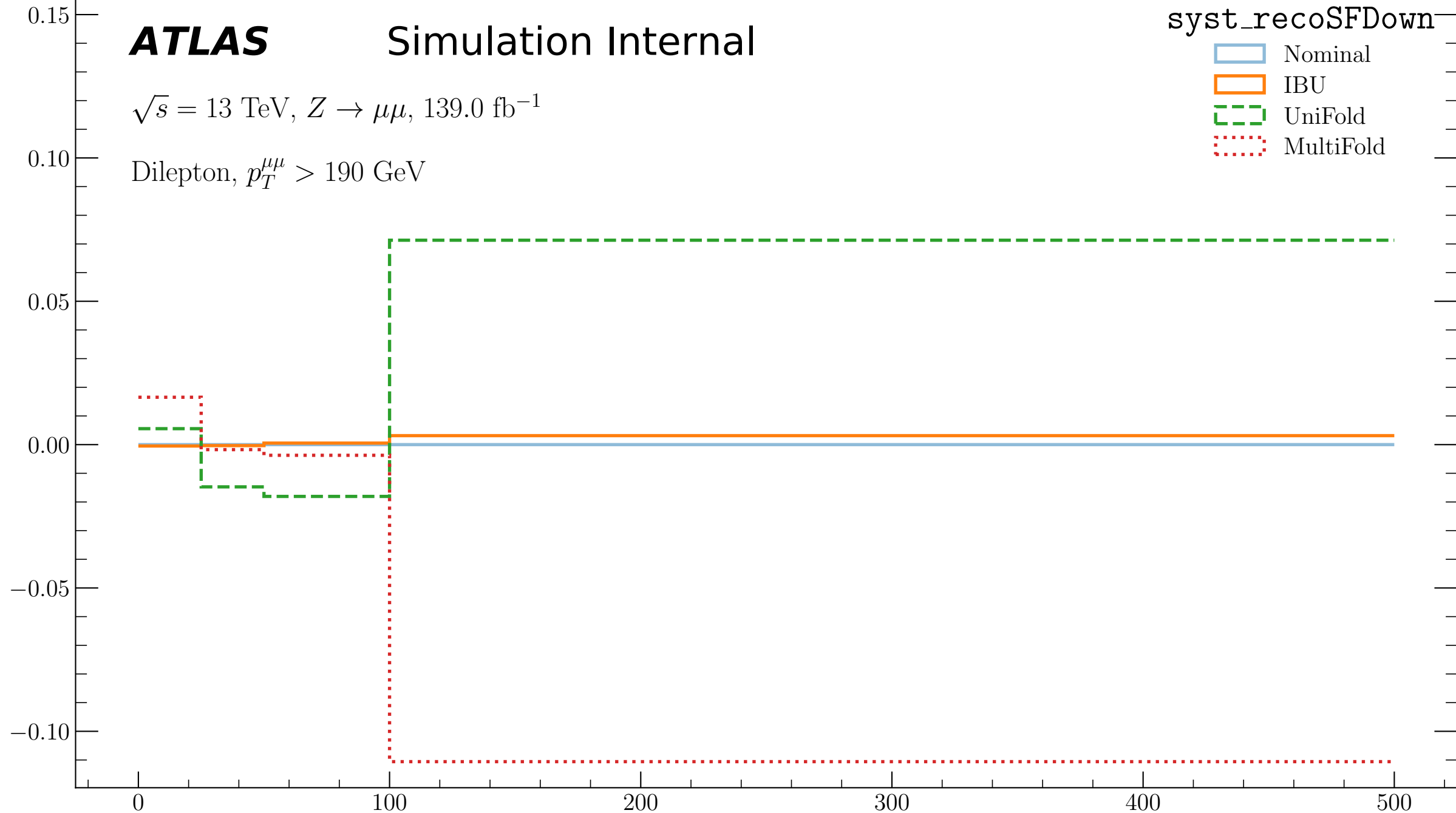
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}$, $Z \rightarrow \mu\mu$, 139.0 fb^{-1}

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet p_T [GeV]

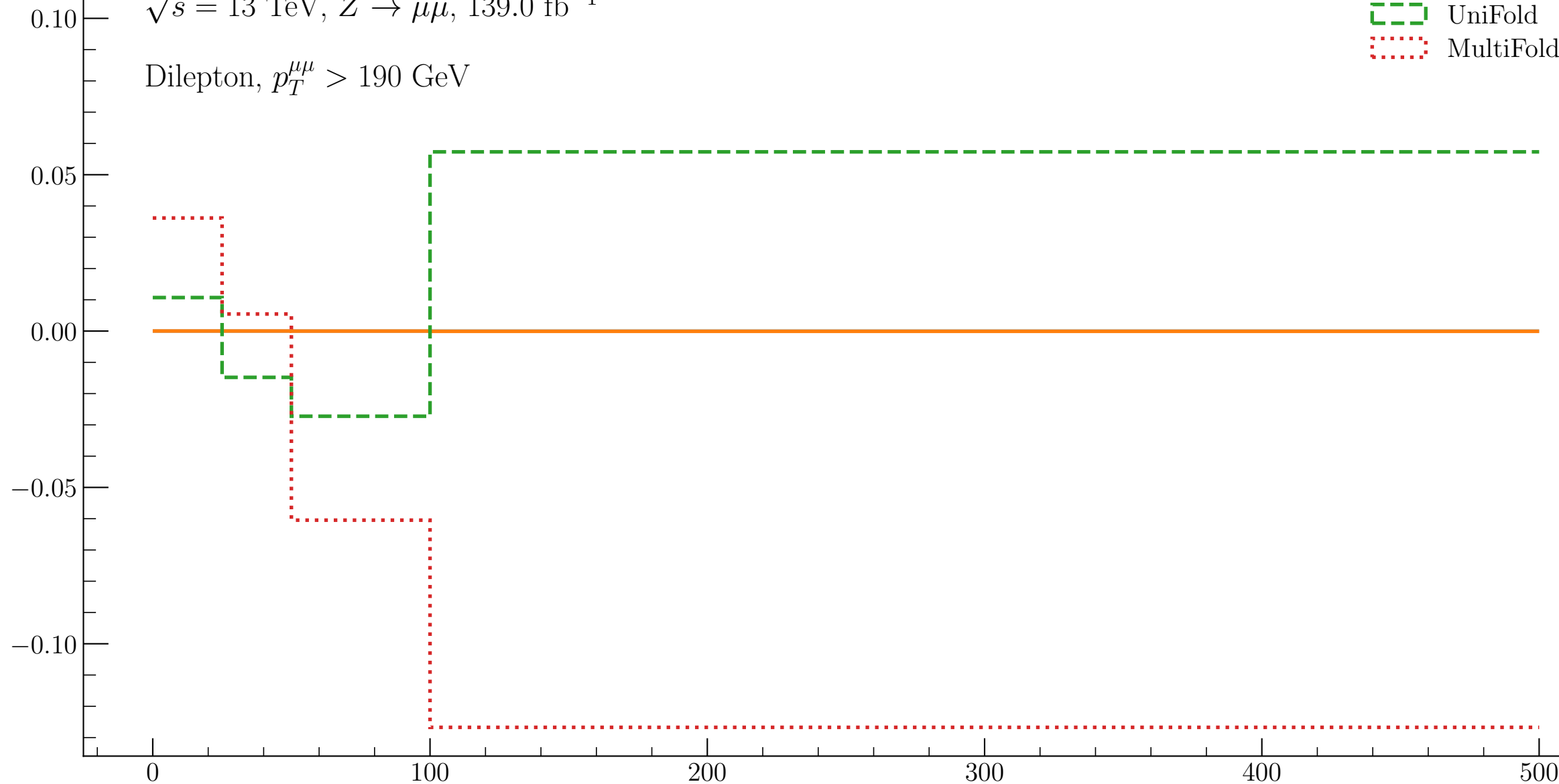
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
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Subleading track jet p_T [GeV]

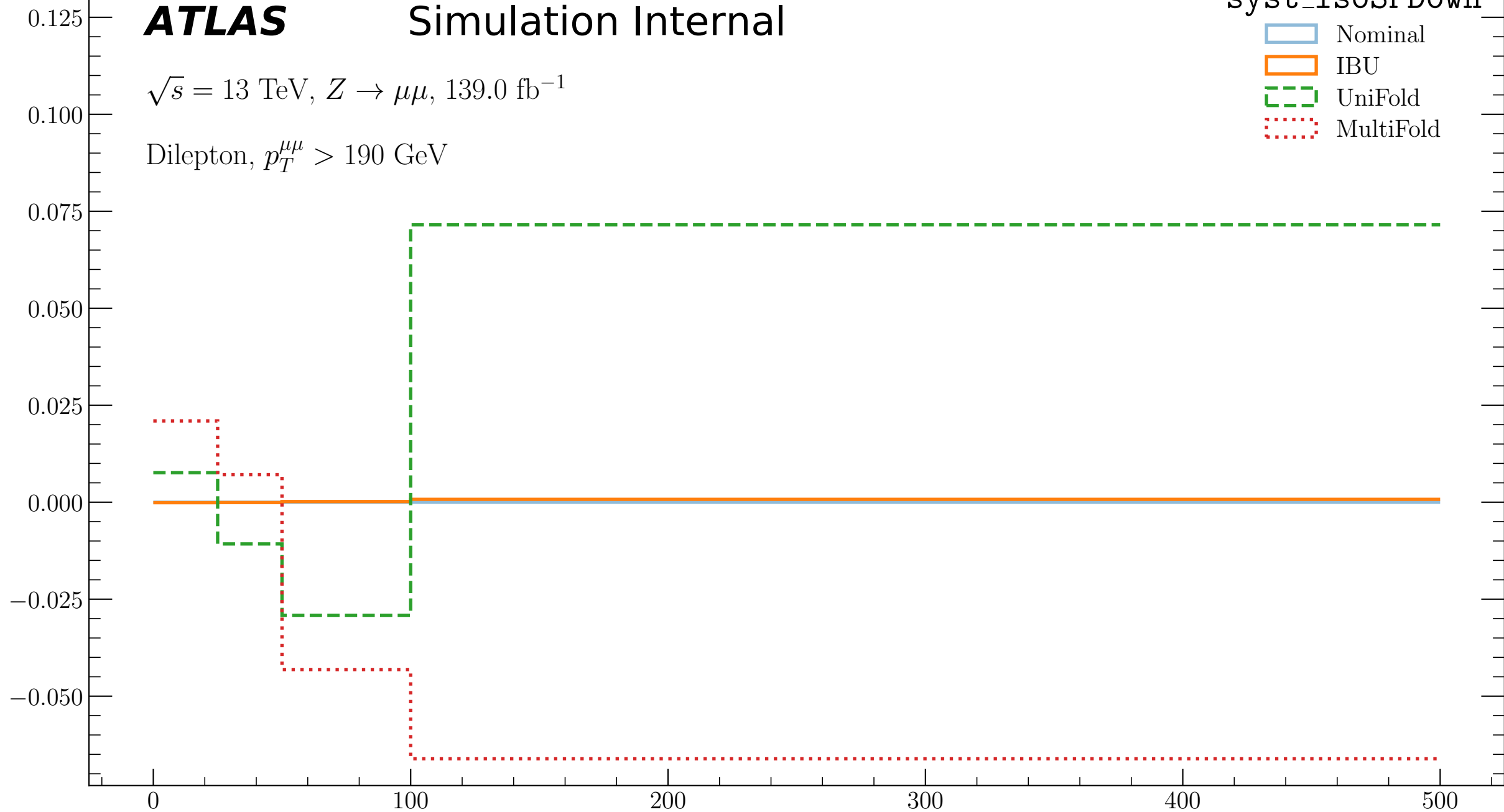
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet p_T [GeV]

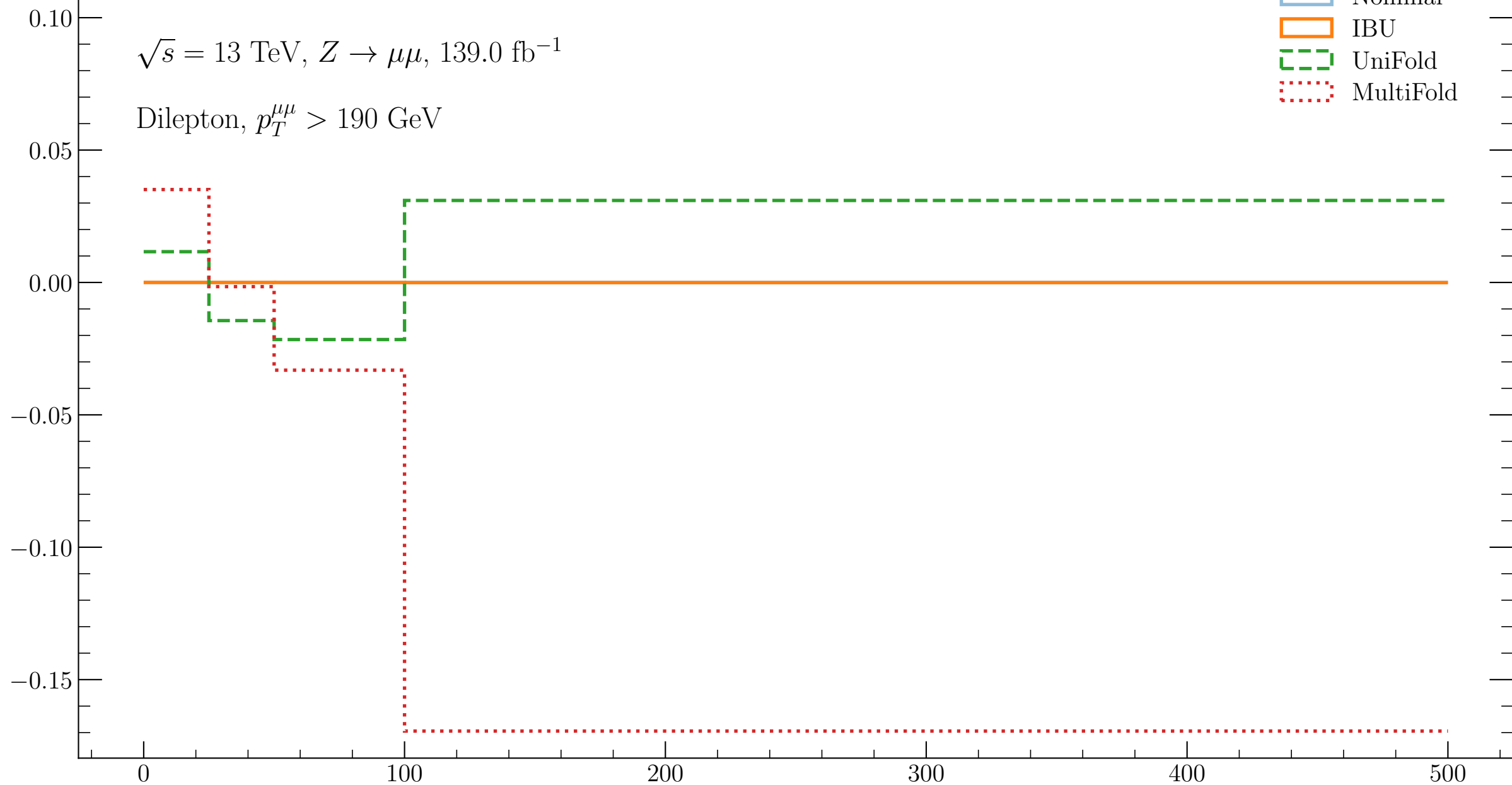
ATLAS

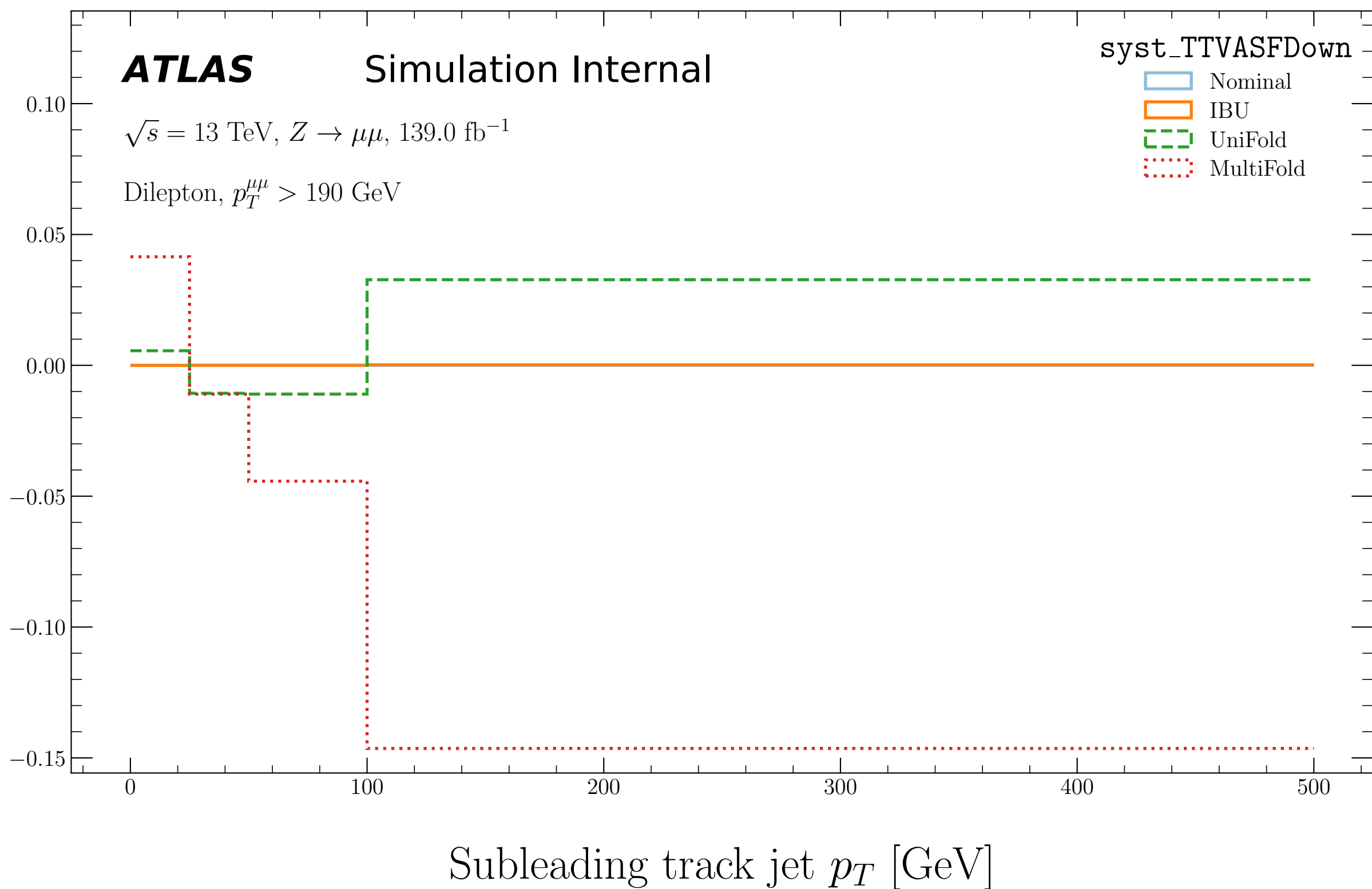
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet p_T [GeV]



Relative Systematic Effect (MultiFold)

ATLAS

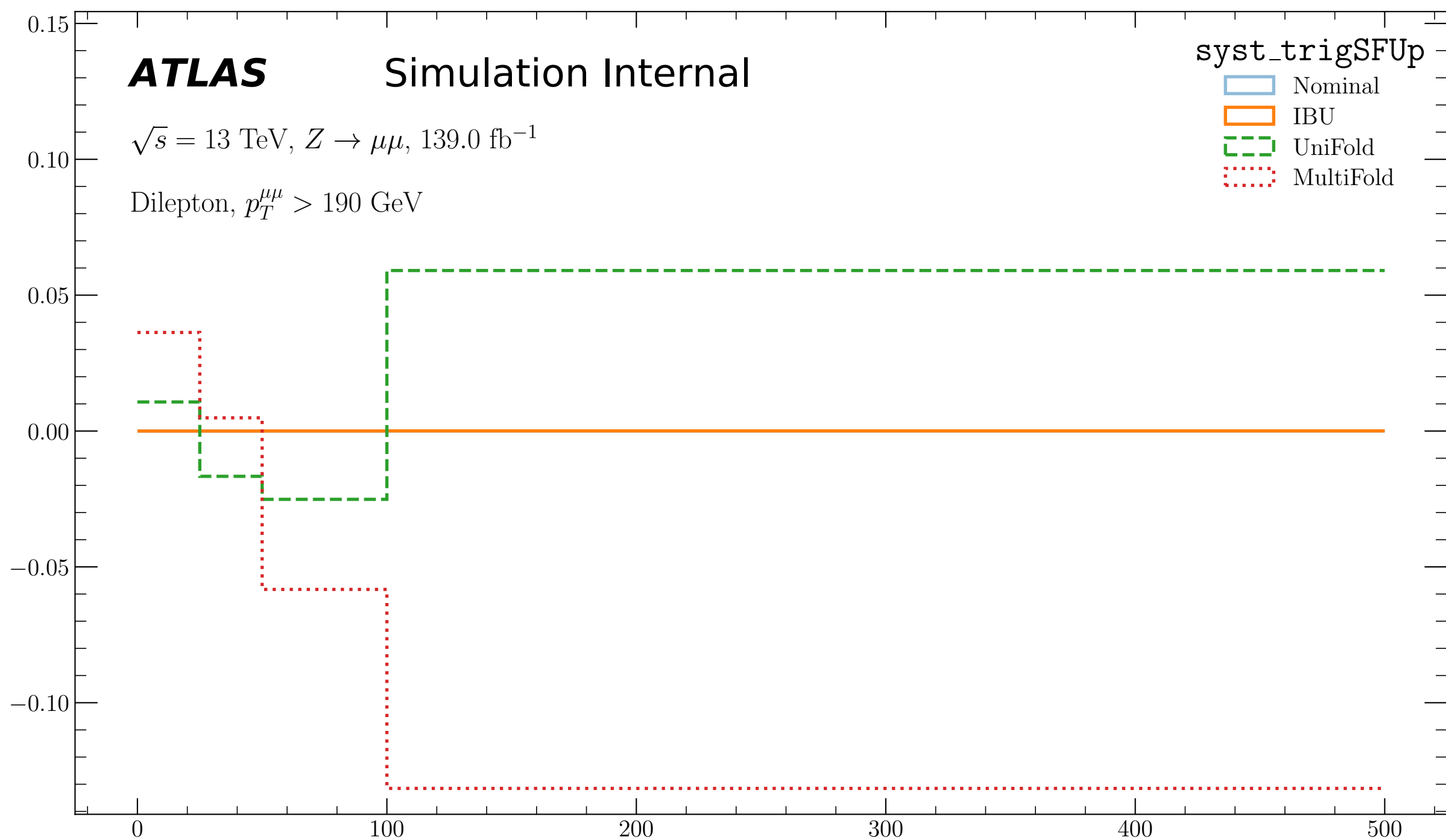
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}$, $Z \rightarrow \mu\mu$, 139.0 fb^{-1}

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet p_T [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

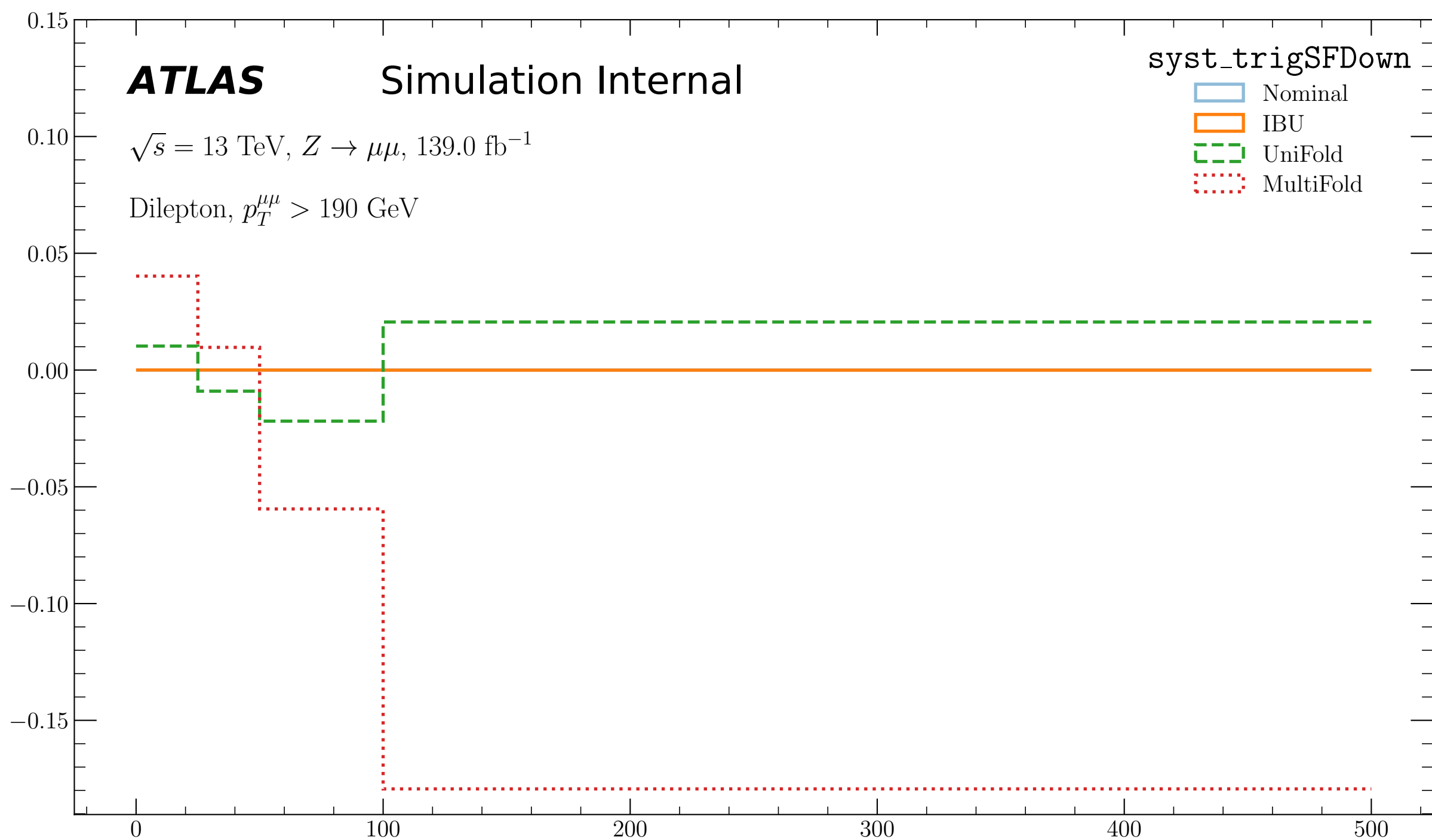
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

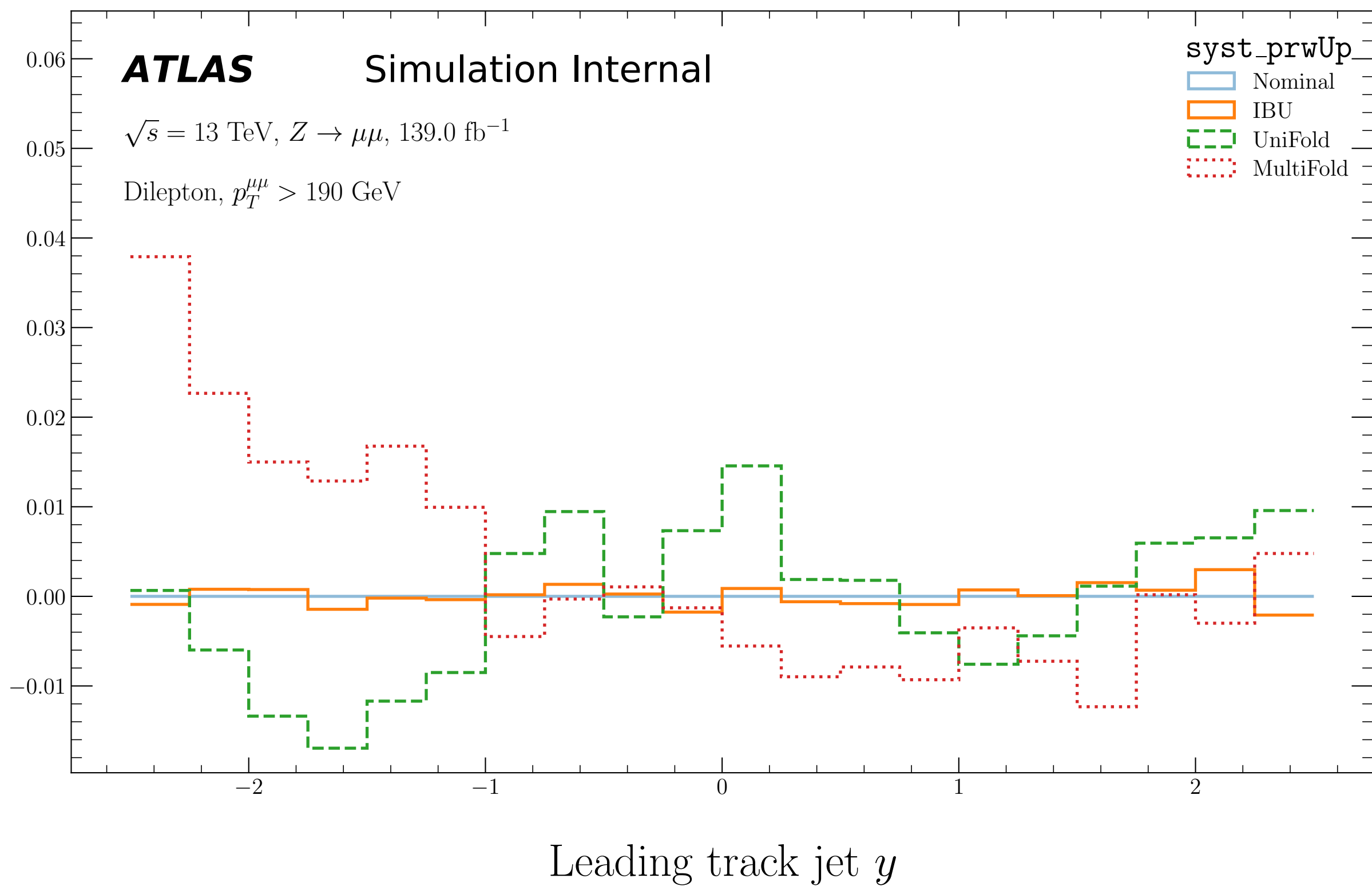
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

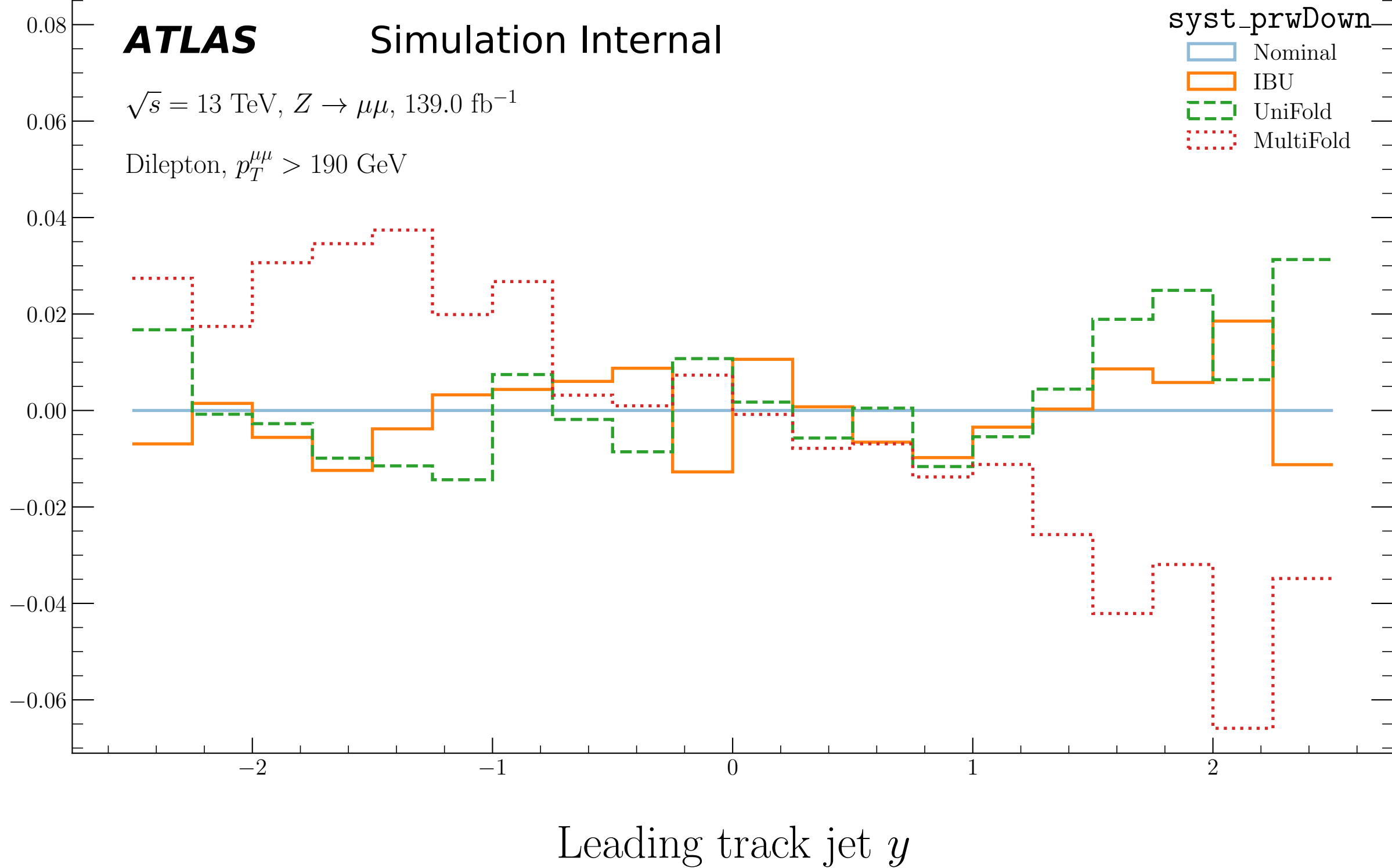
syst_trigSFDown

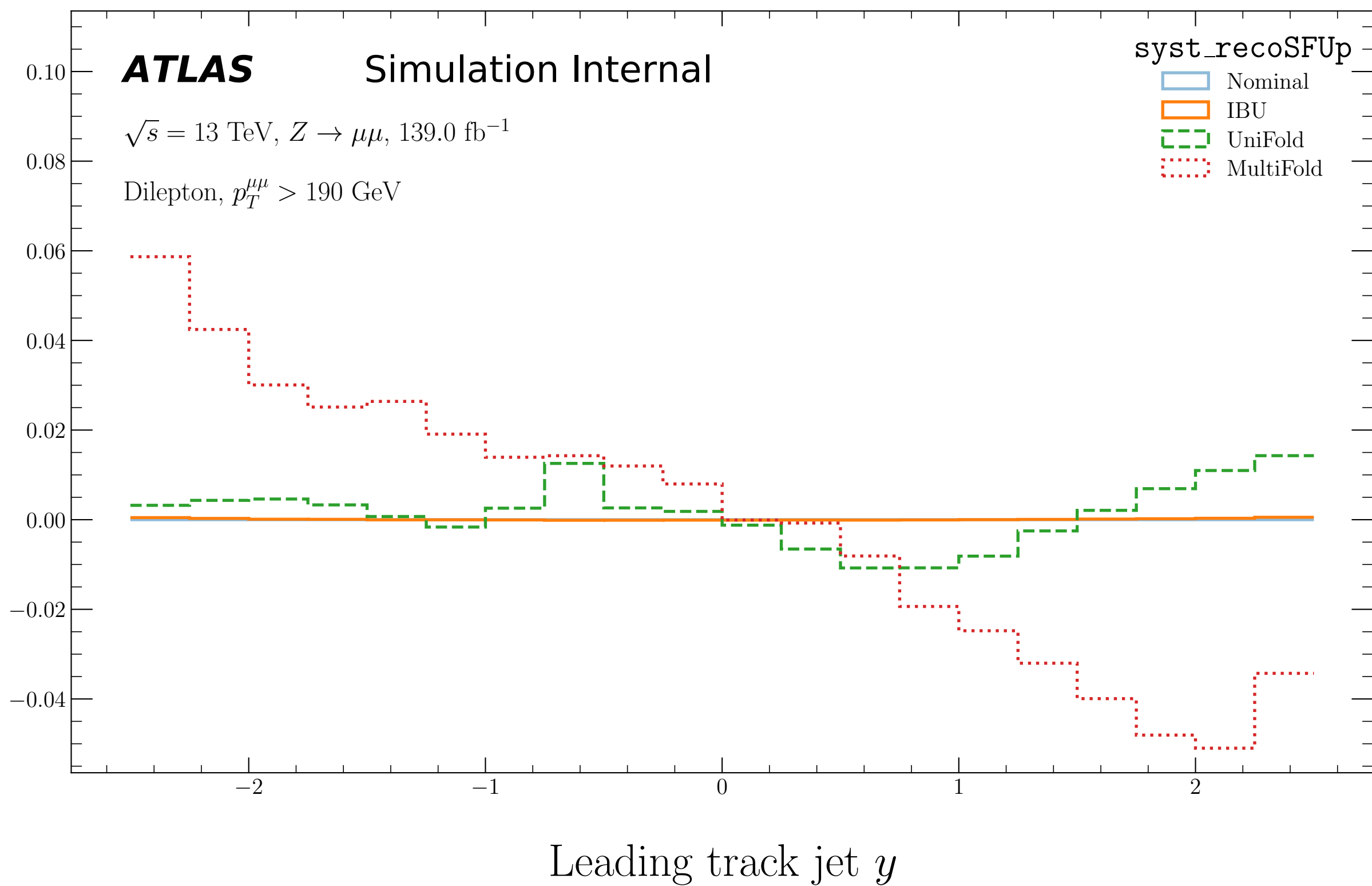
- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet p_T [GeV]







Relative Systematic Effect (MultiFold)

ATLAS

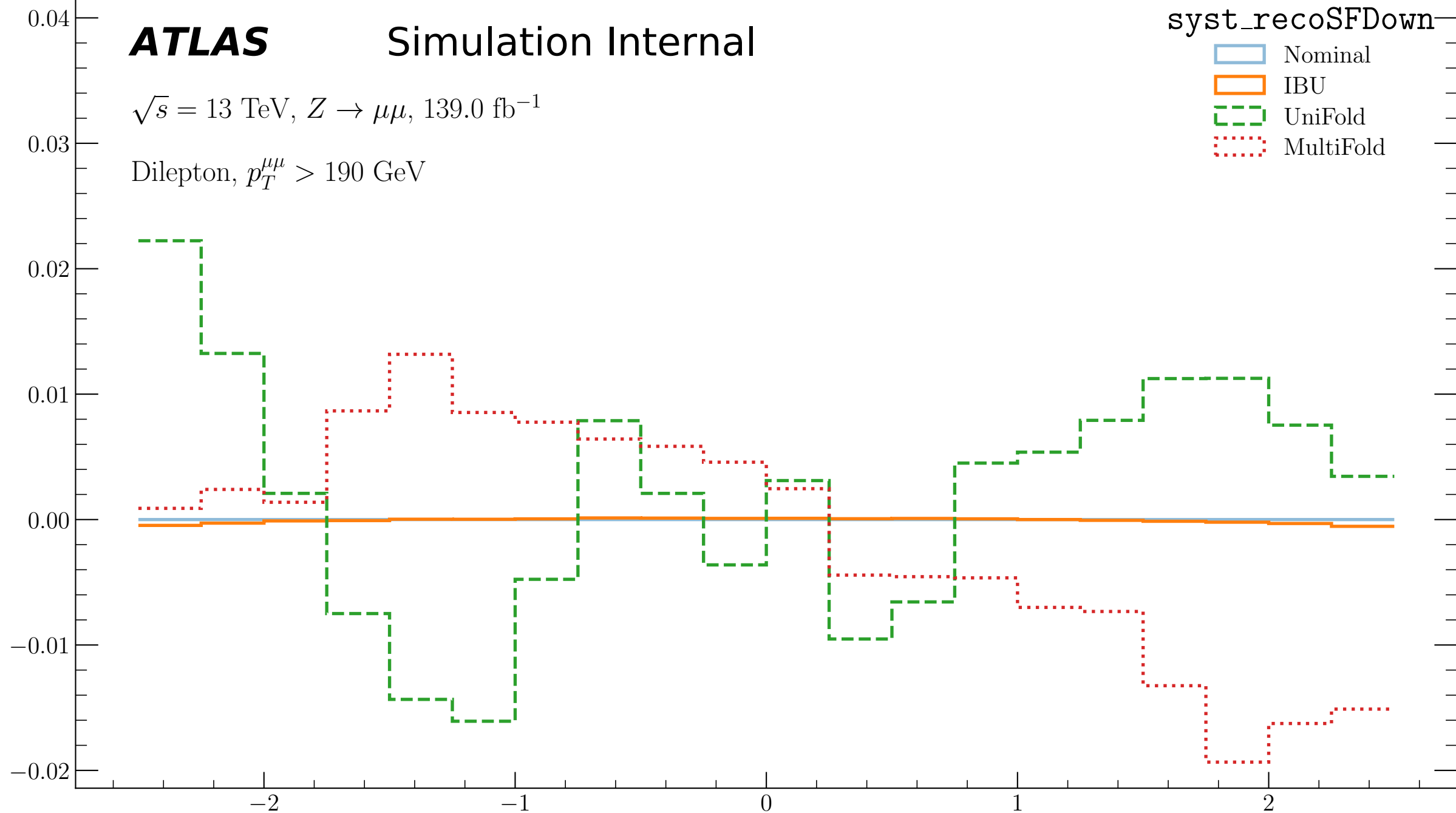
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

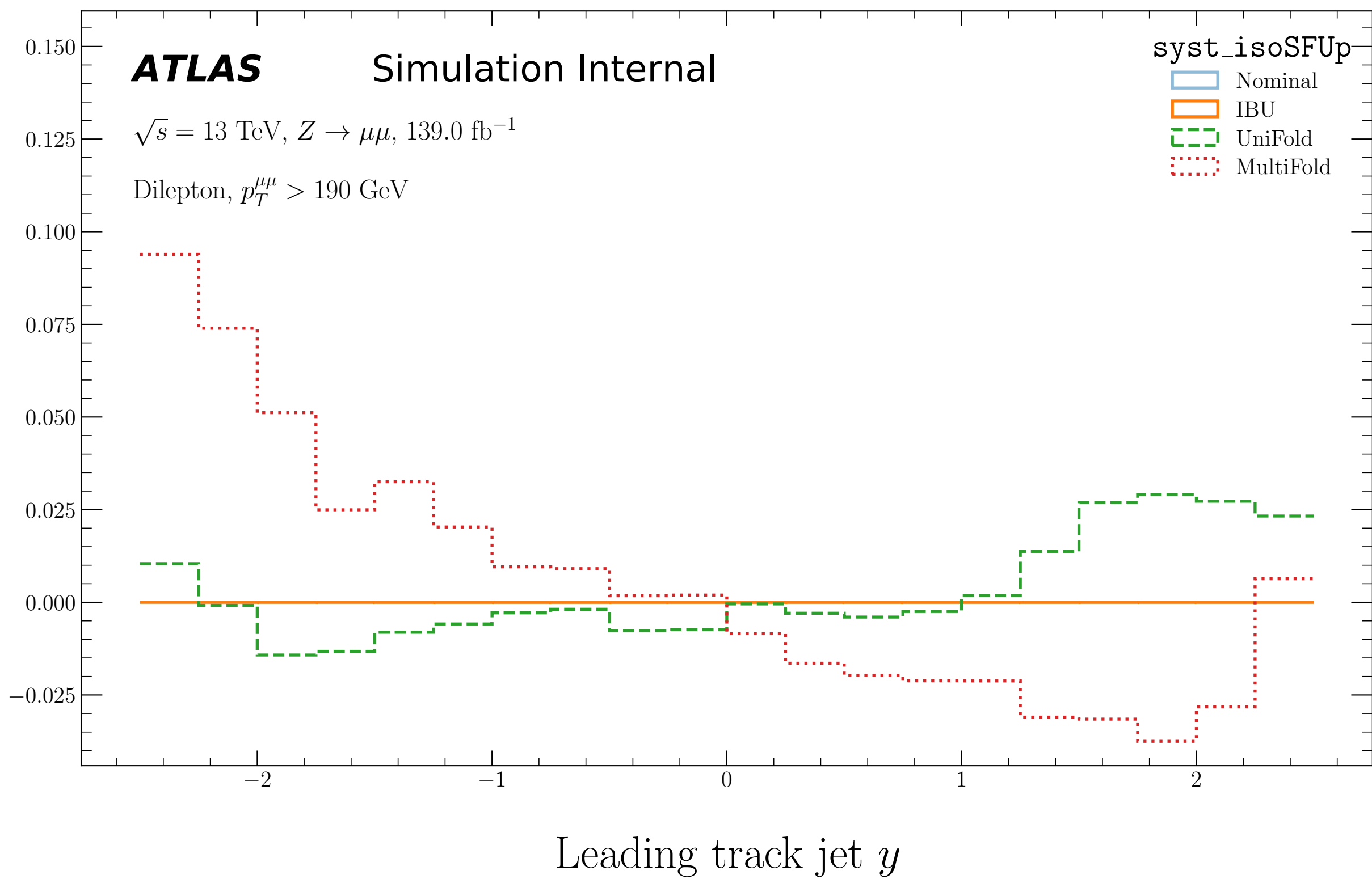
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet y



Relative Systematic Effect (MultiFold)

ATLAS

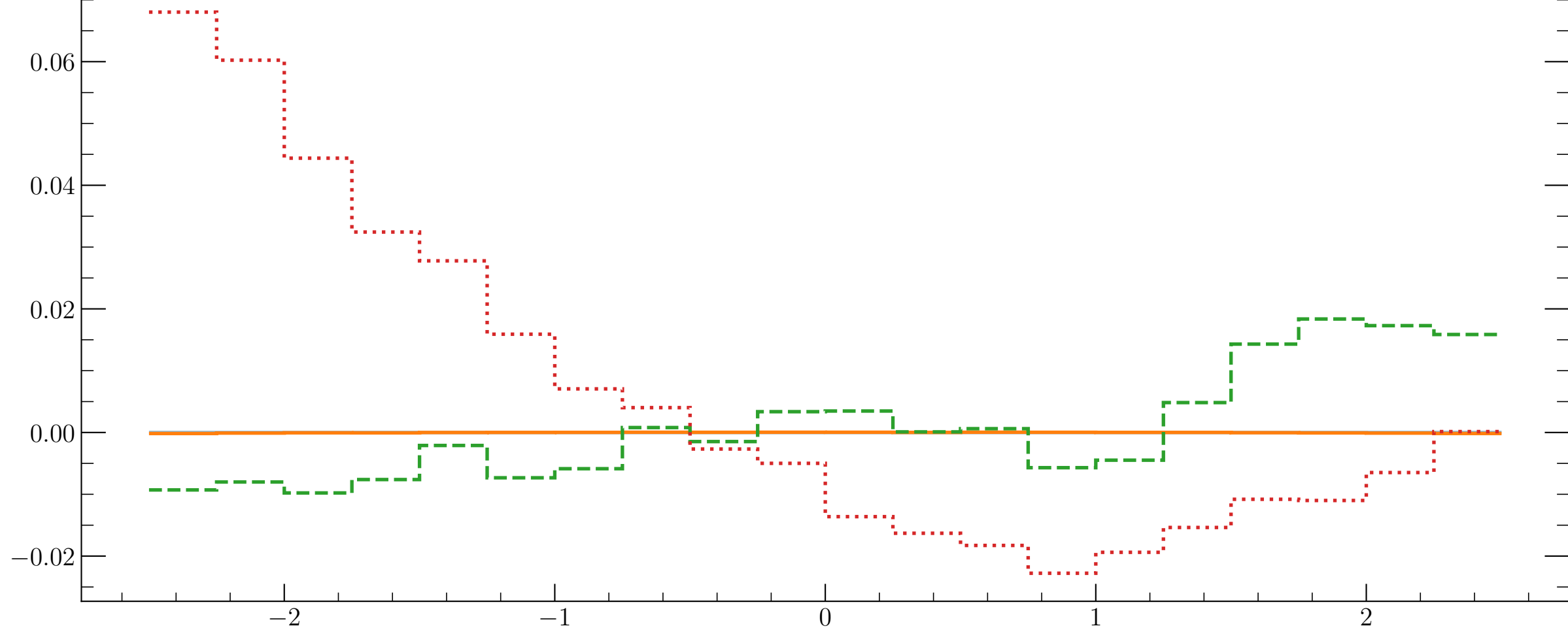
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet y

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFU

- Nominal
- IBU
- UniFold
- MultiFold

0.04
0.03
0.02
0.01
0.00
-0.01

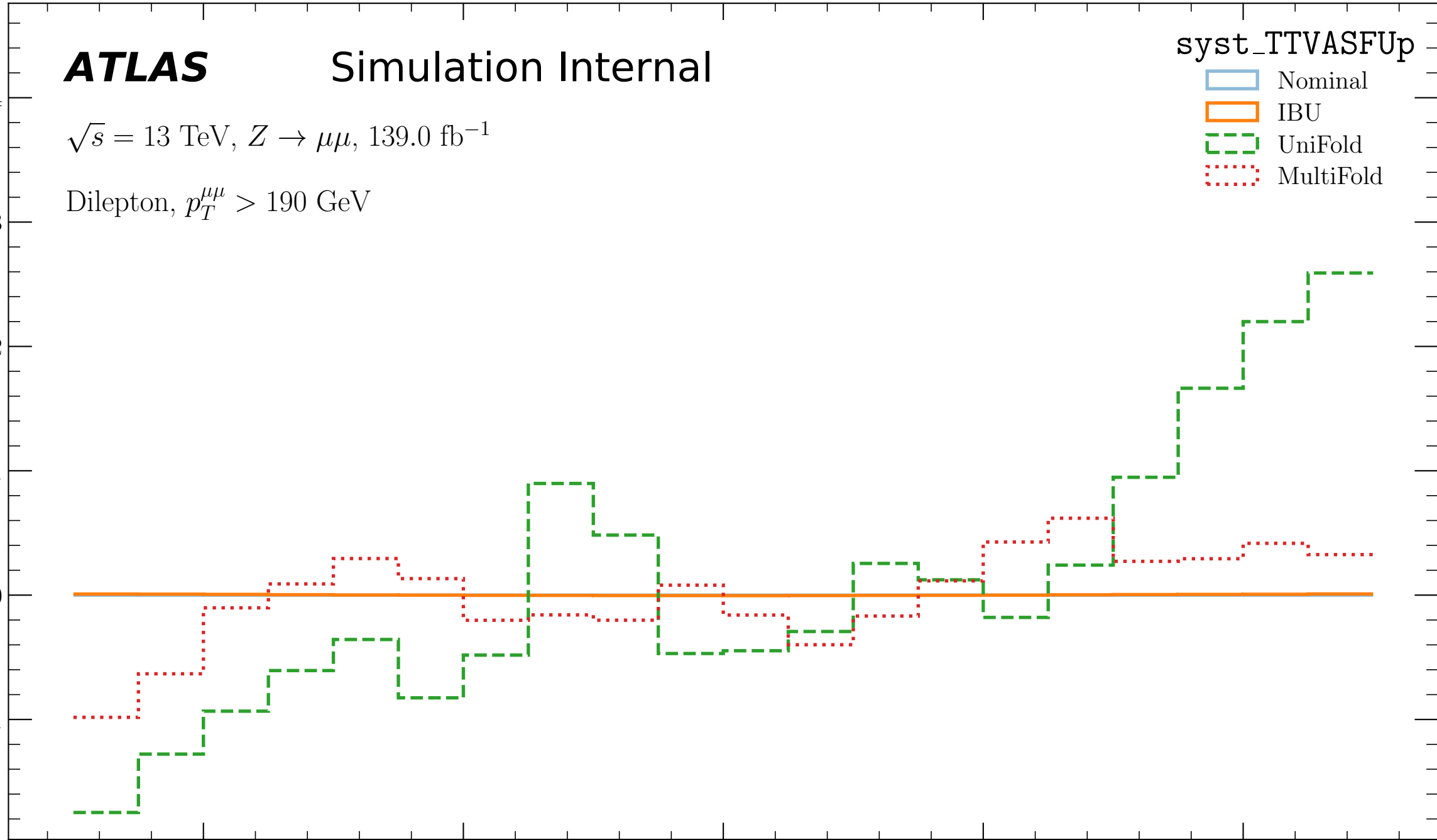
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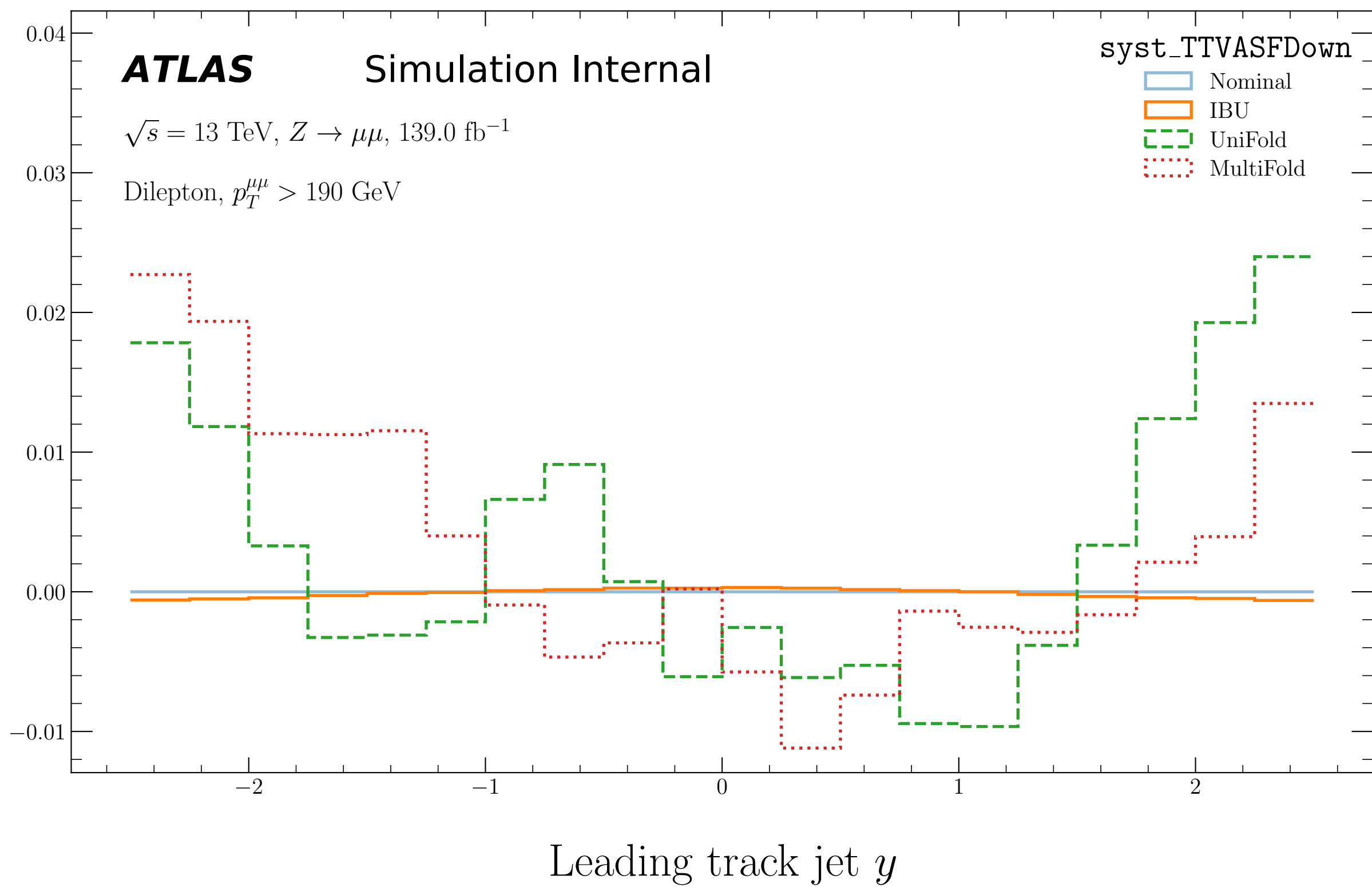
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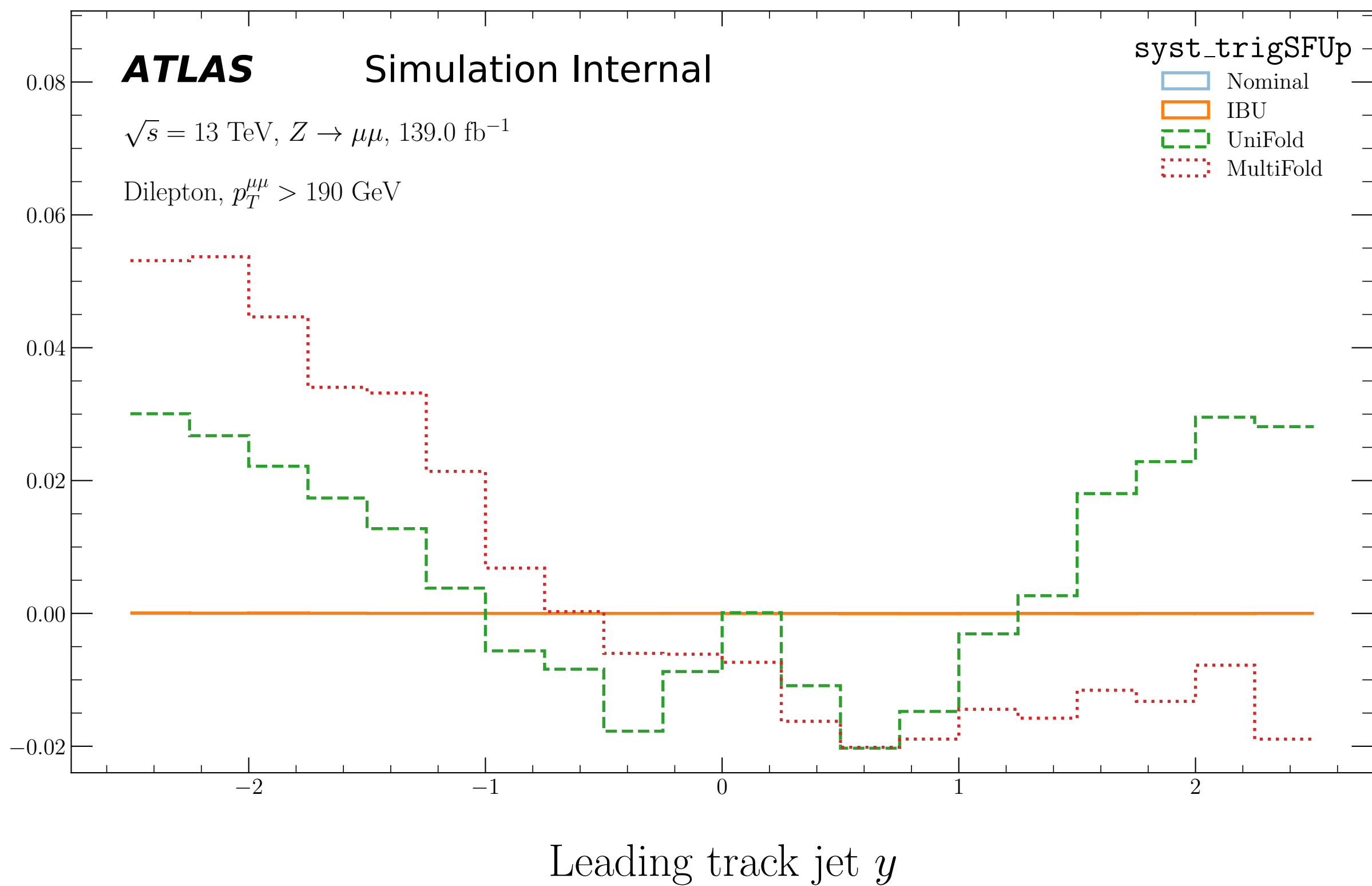
0

1

2

Leading track jet y 





Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

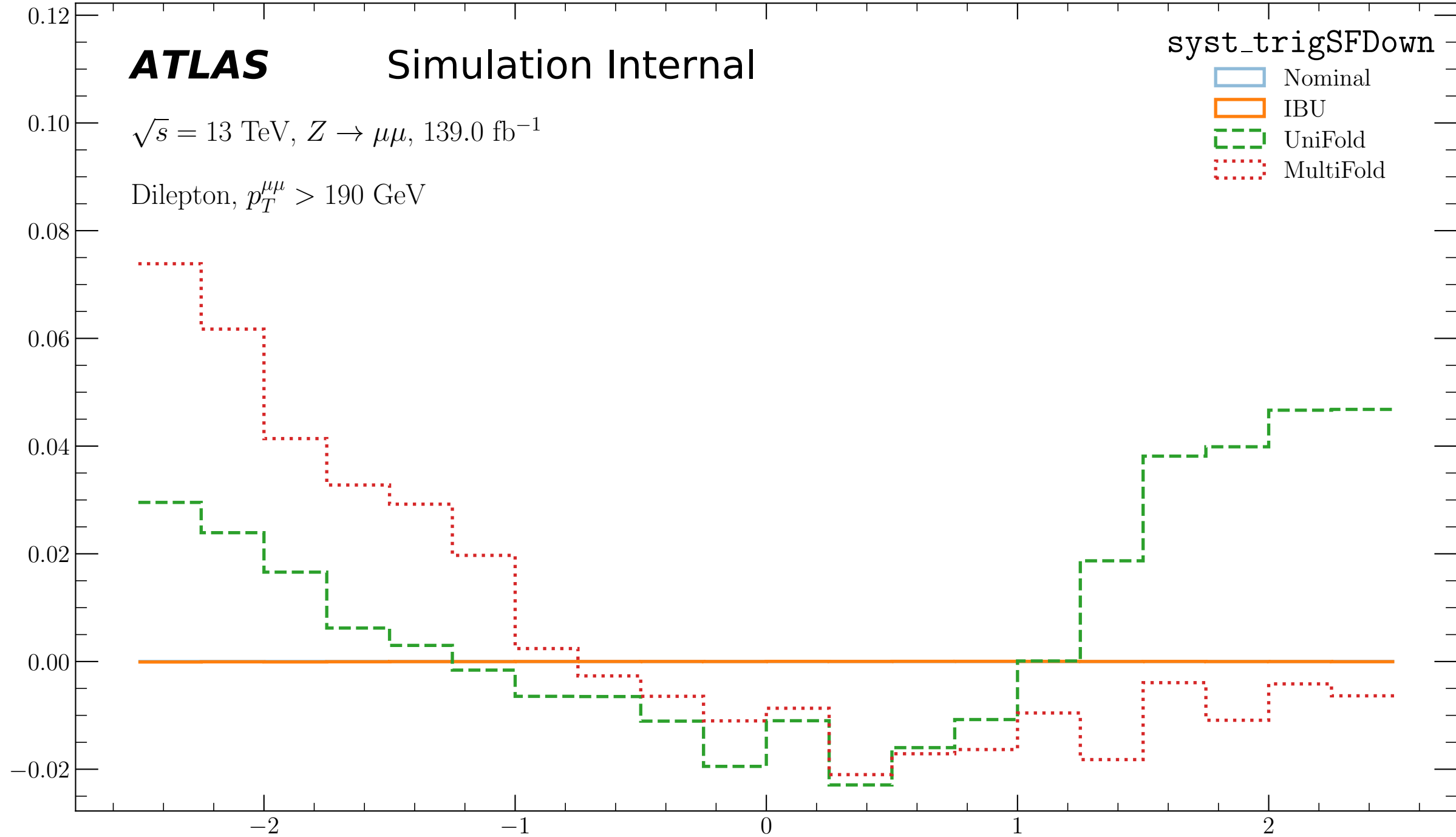
syst_trigSFDown

Nominal

IBU

UniFold

MultiFold



Leading track jet y

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwUp

Nominal

IBU

UniFold

MultiFold

0.06
0.04
0.02
0.00
-0.02

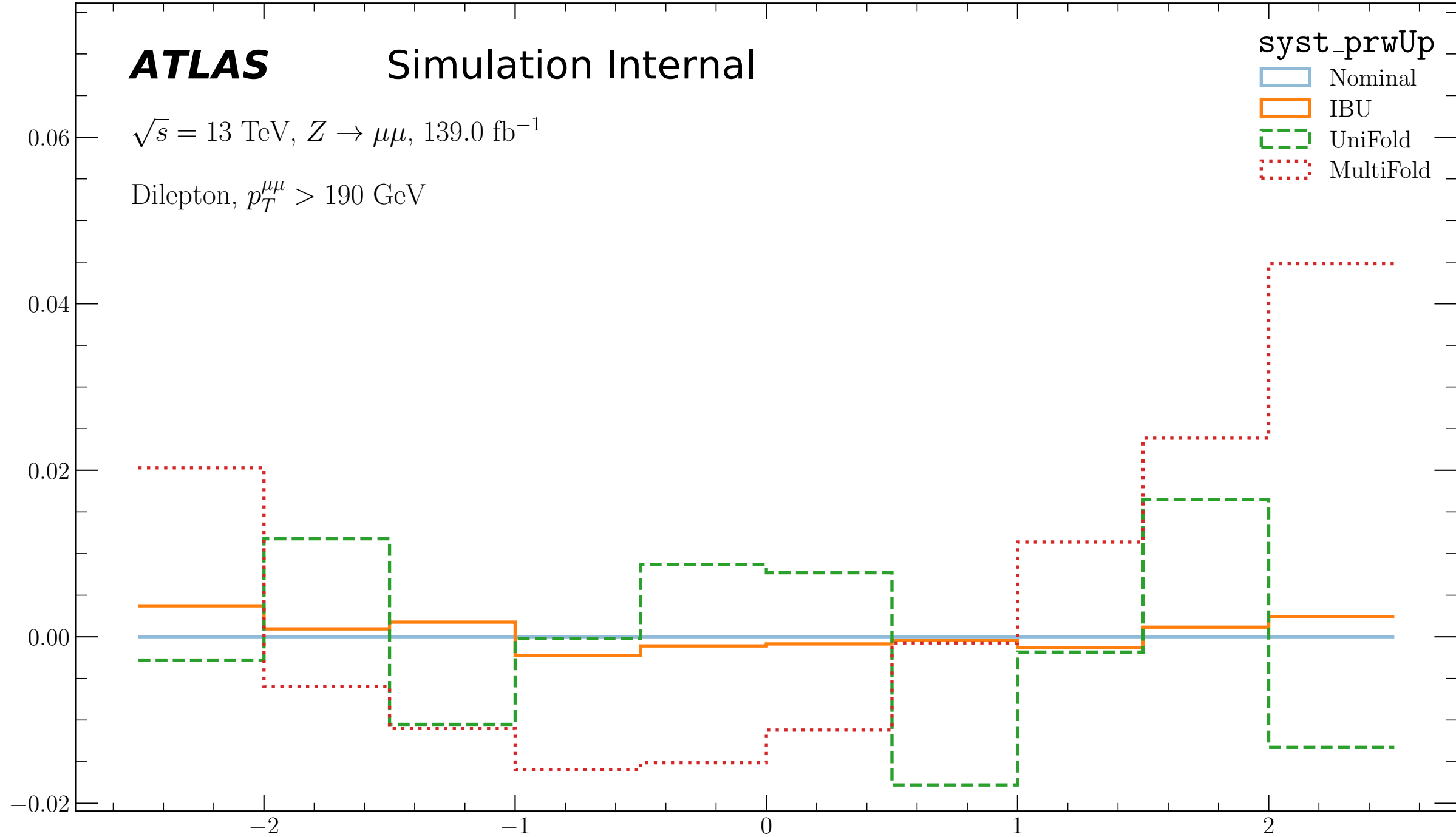
-2

-1

0

1

2

Subleading track jet y 

ATLAS

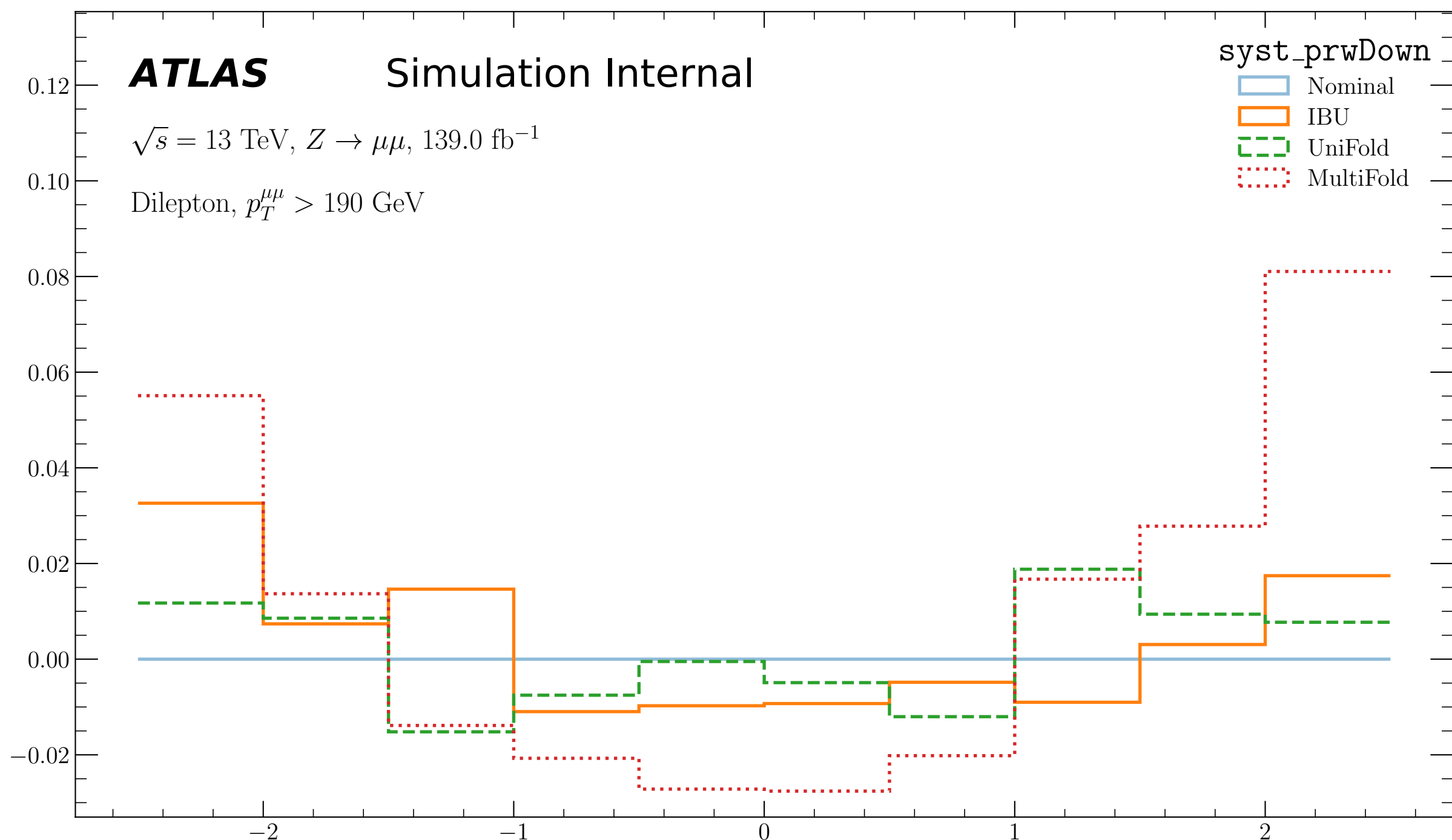
Simulation Internal

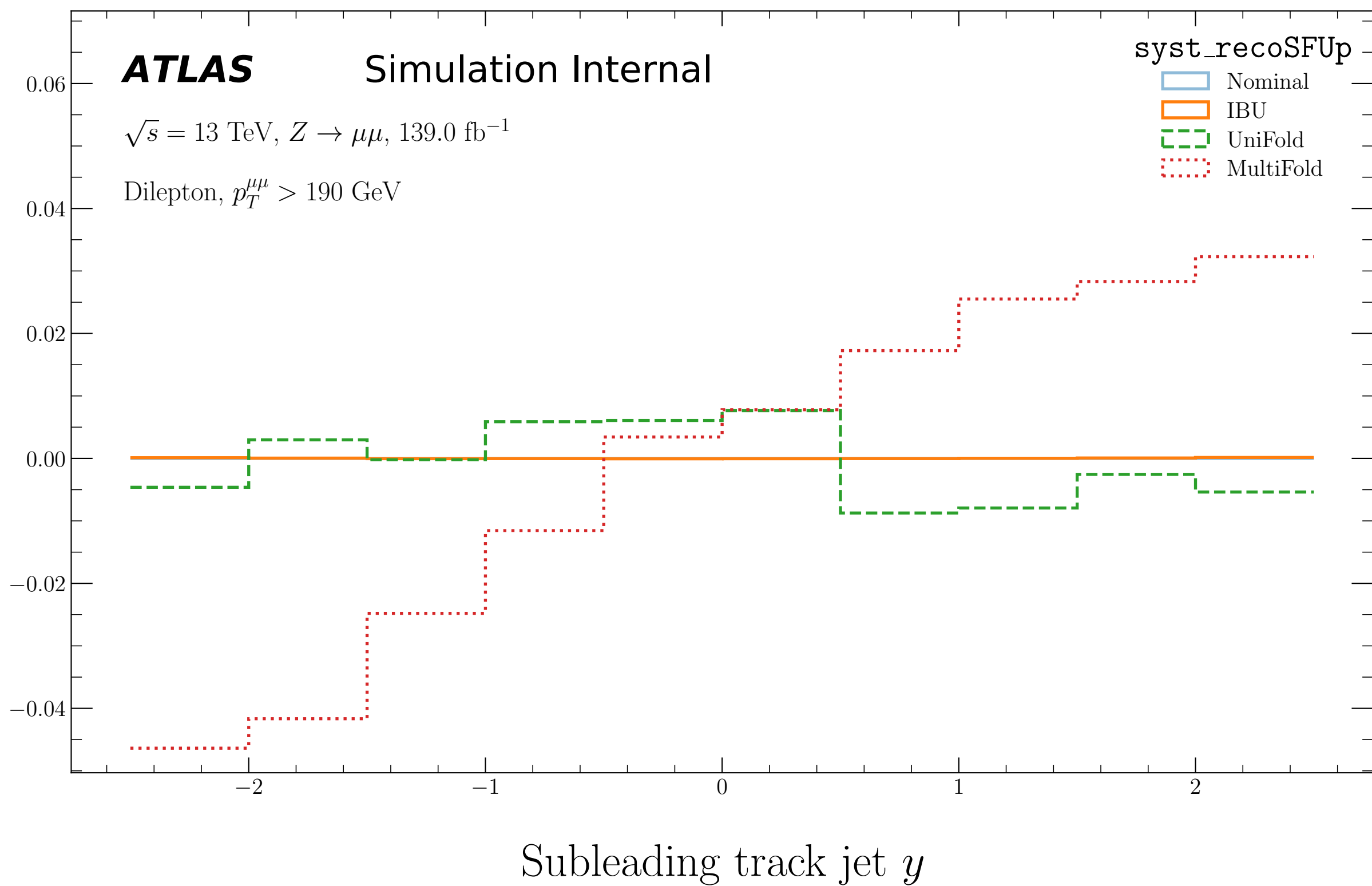
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

- Nominal
- IBU
- UniFold
- MultiFold

0.12
0.10
0.08
0.06
0.04
0.02
0.00
-0.02

Subleading track jet y 



Relative Systematic Effect (MultiFold)

ATLAS

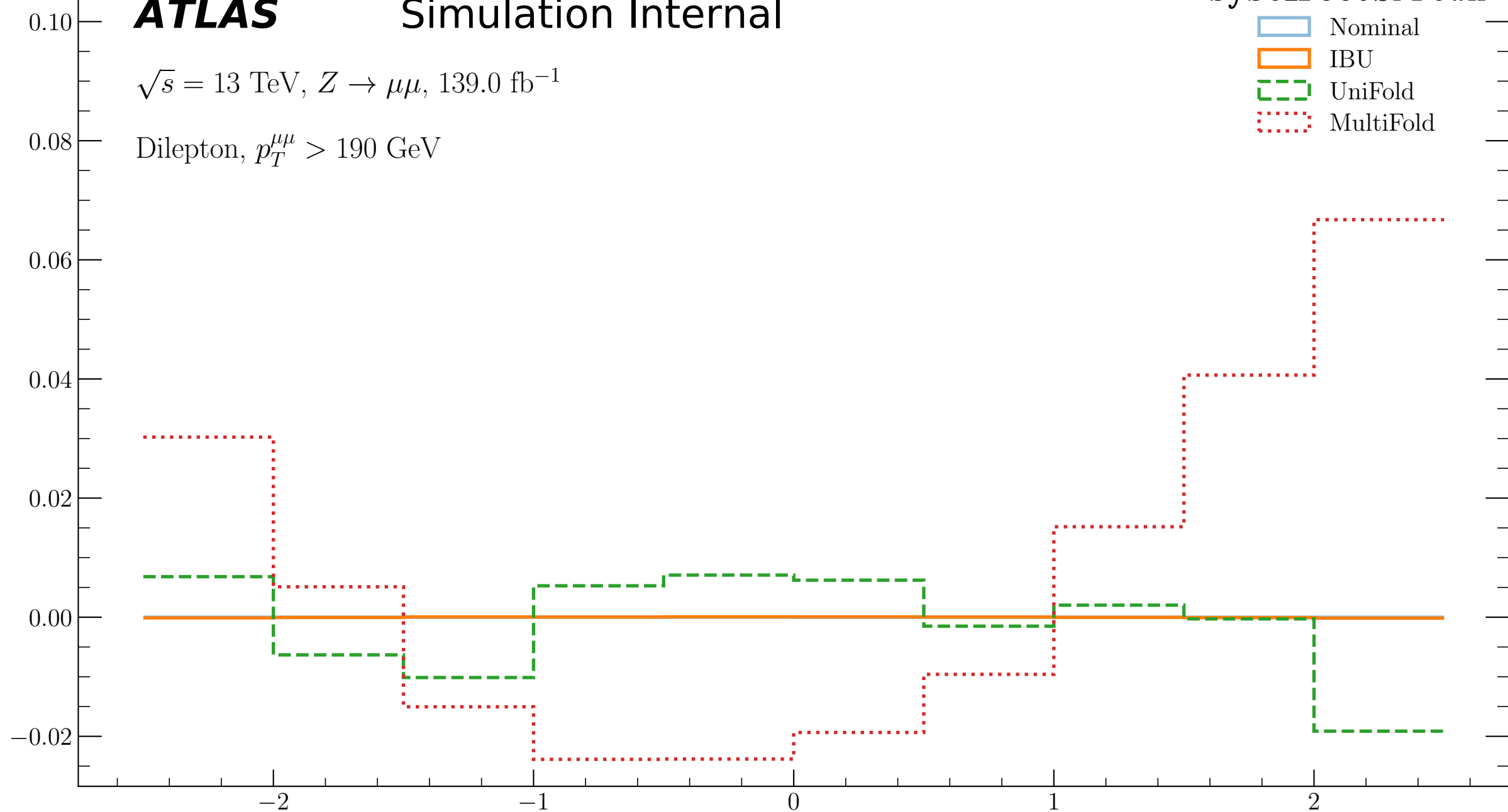
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

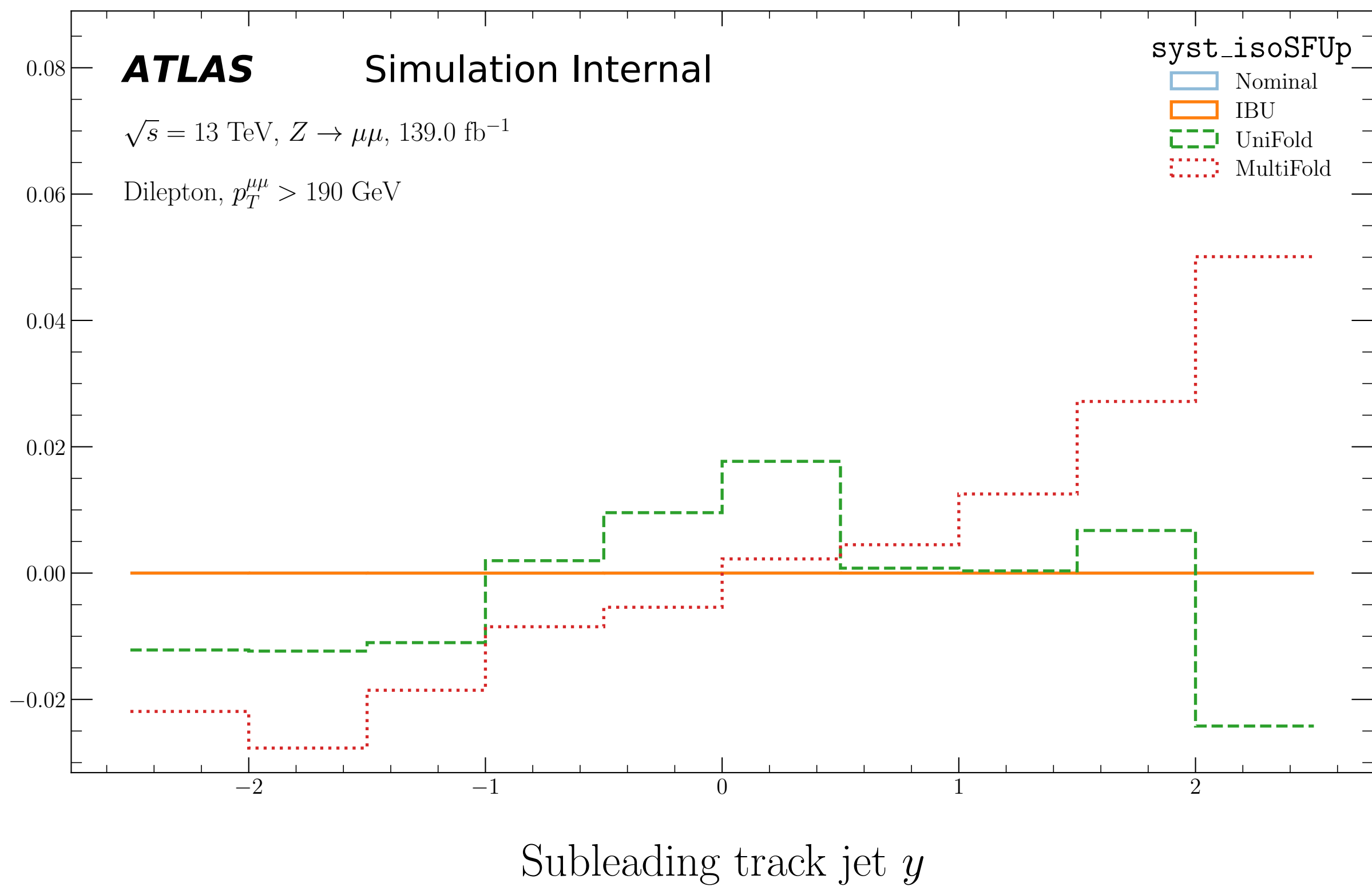
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet y



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

Nominal

IBU

UniFold

MultiFold

0.08
0.06
0.04
0.02
0.00
-0.02

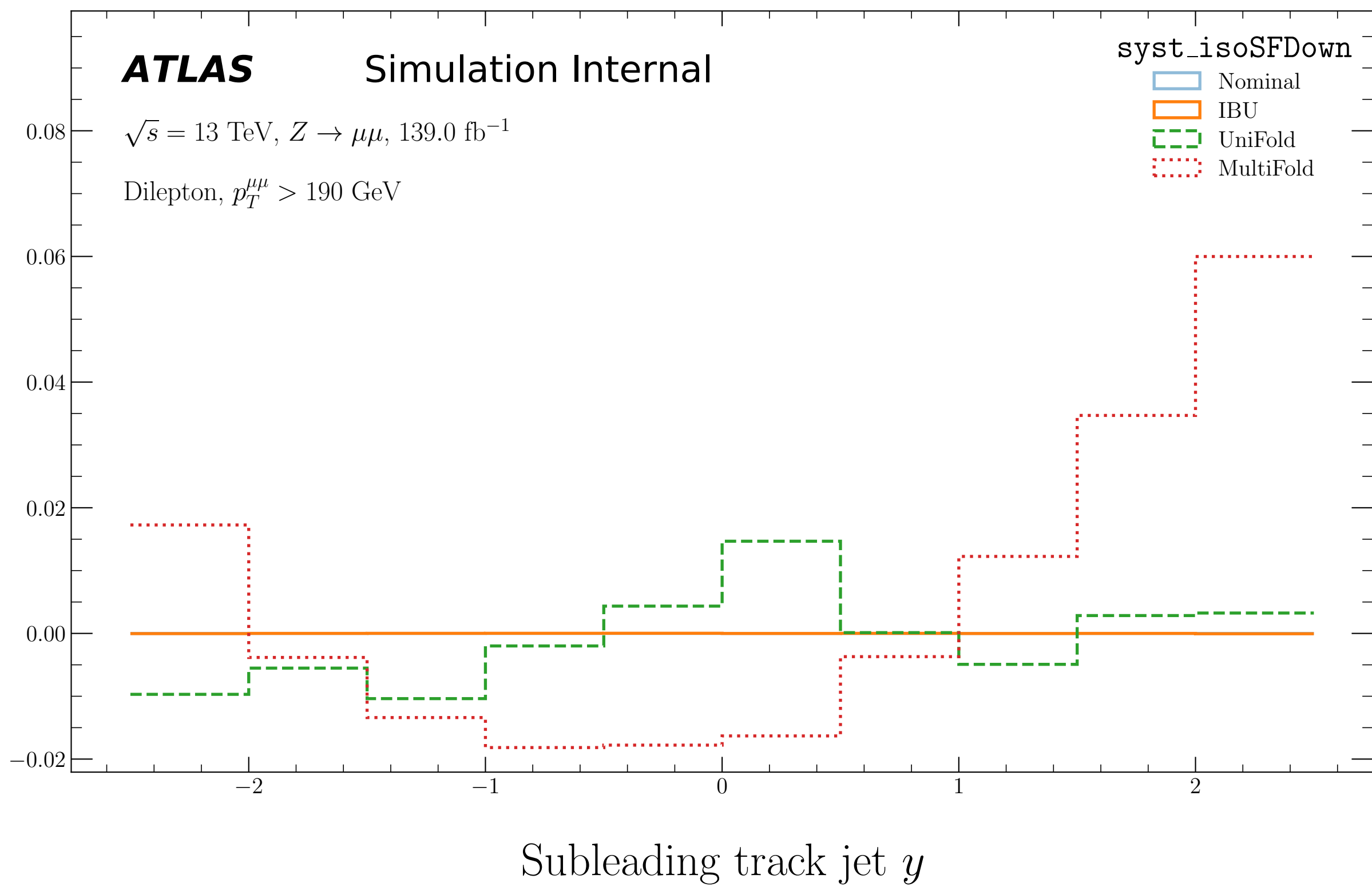
-2

-1

0

1

2

Subleading track jet y 

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUUp

- Nominal
- IBU
- UniFold
- MultiFold

0.08
0.06
0.04
0.02
0.00
-0.02Subleading track jet y

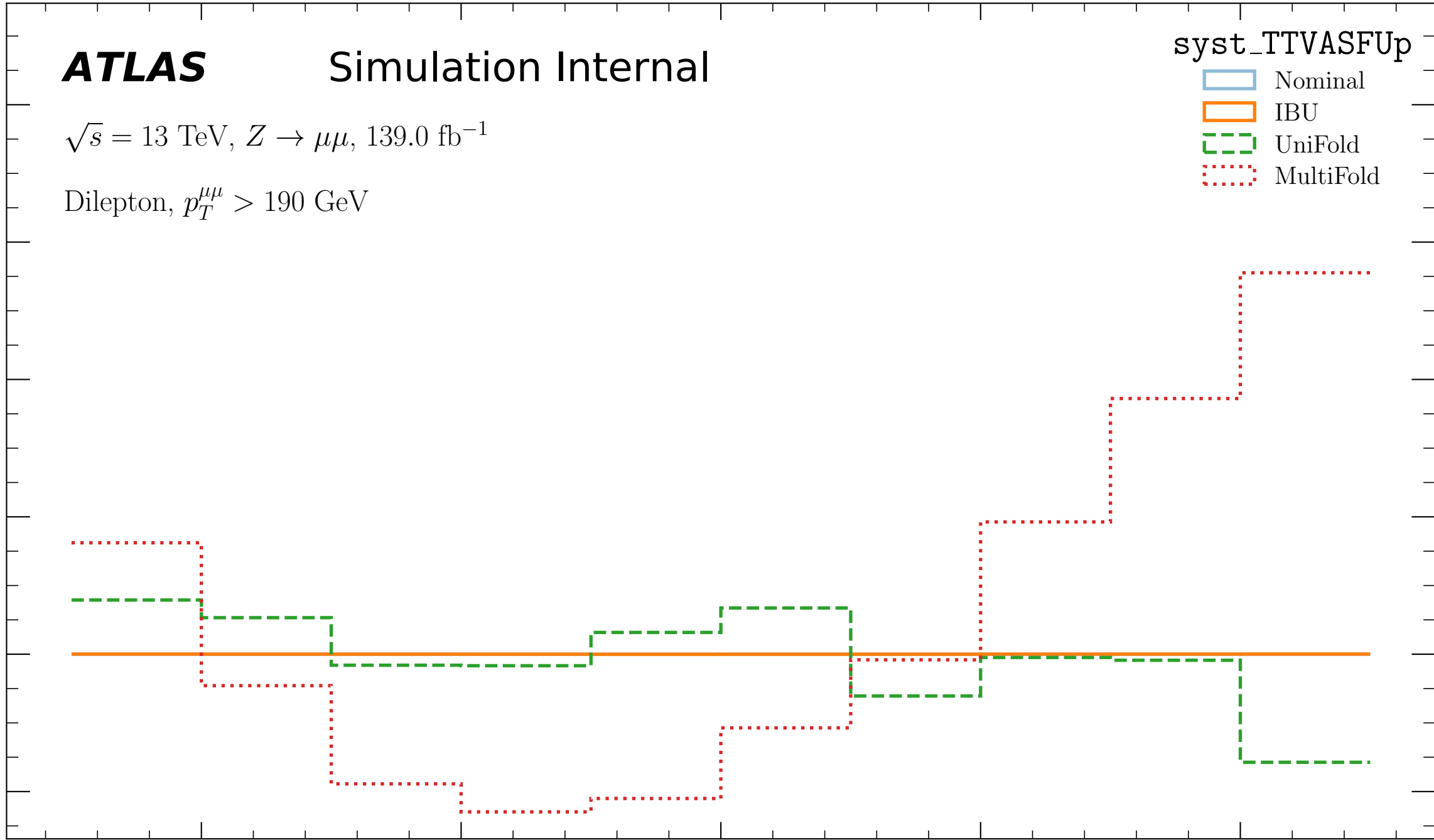
-2

-1

0

1

2



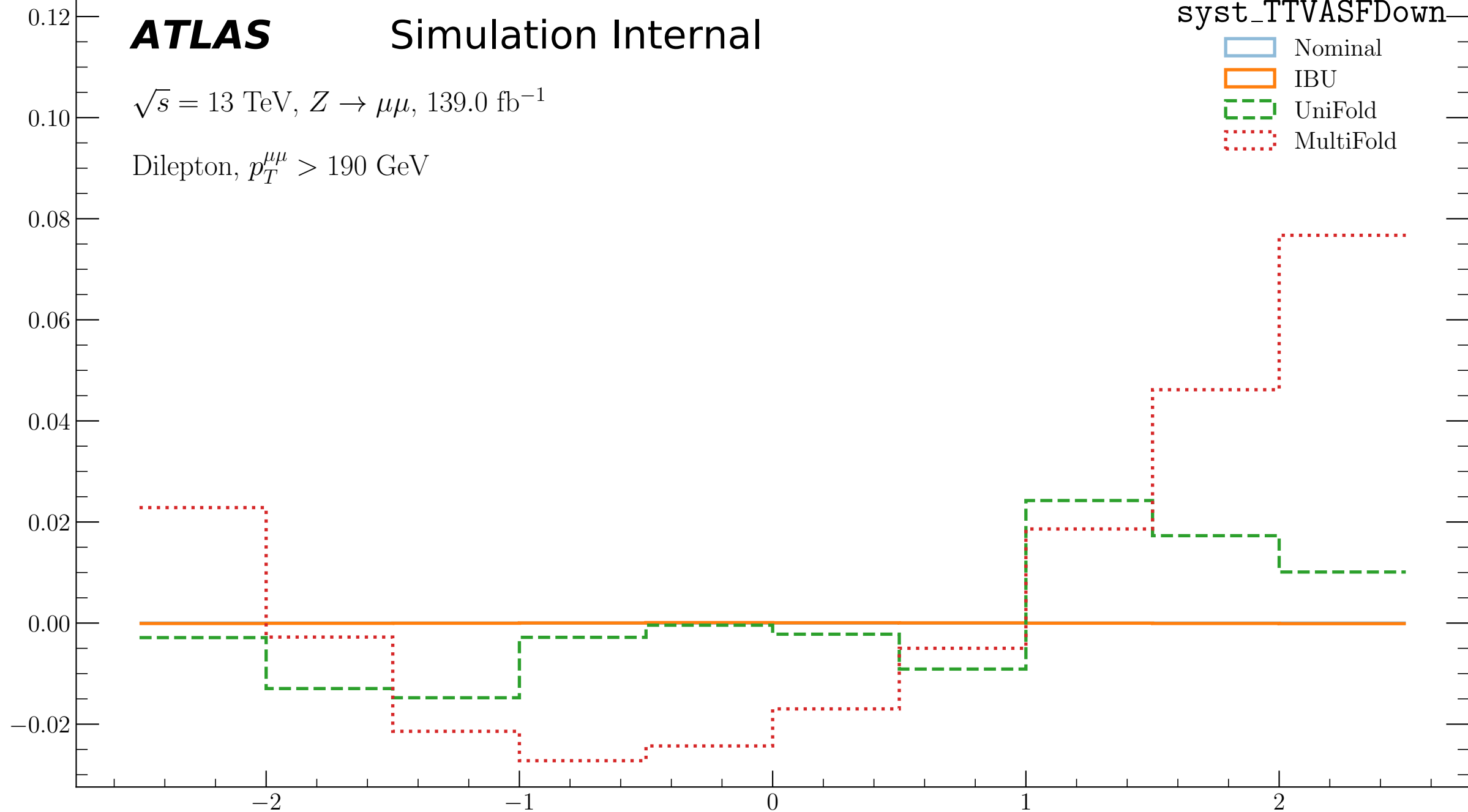
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold



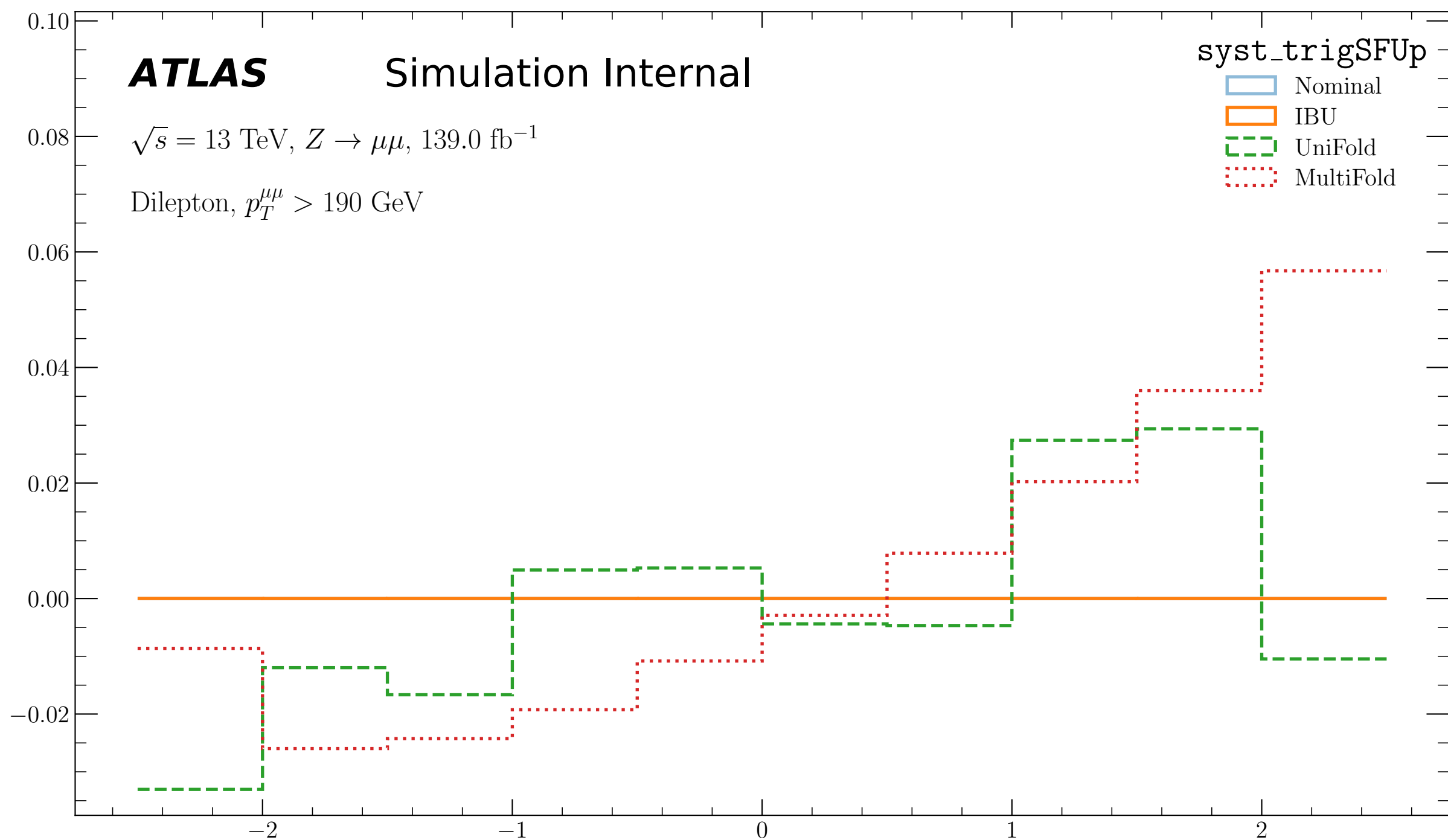
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet y

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFDown

Nominal

IBU

UniFold

MultiFold

0.06
0.04
0.02
0.00
-0.02

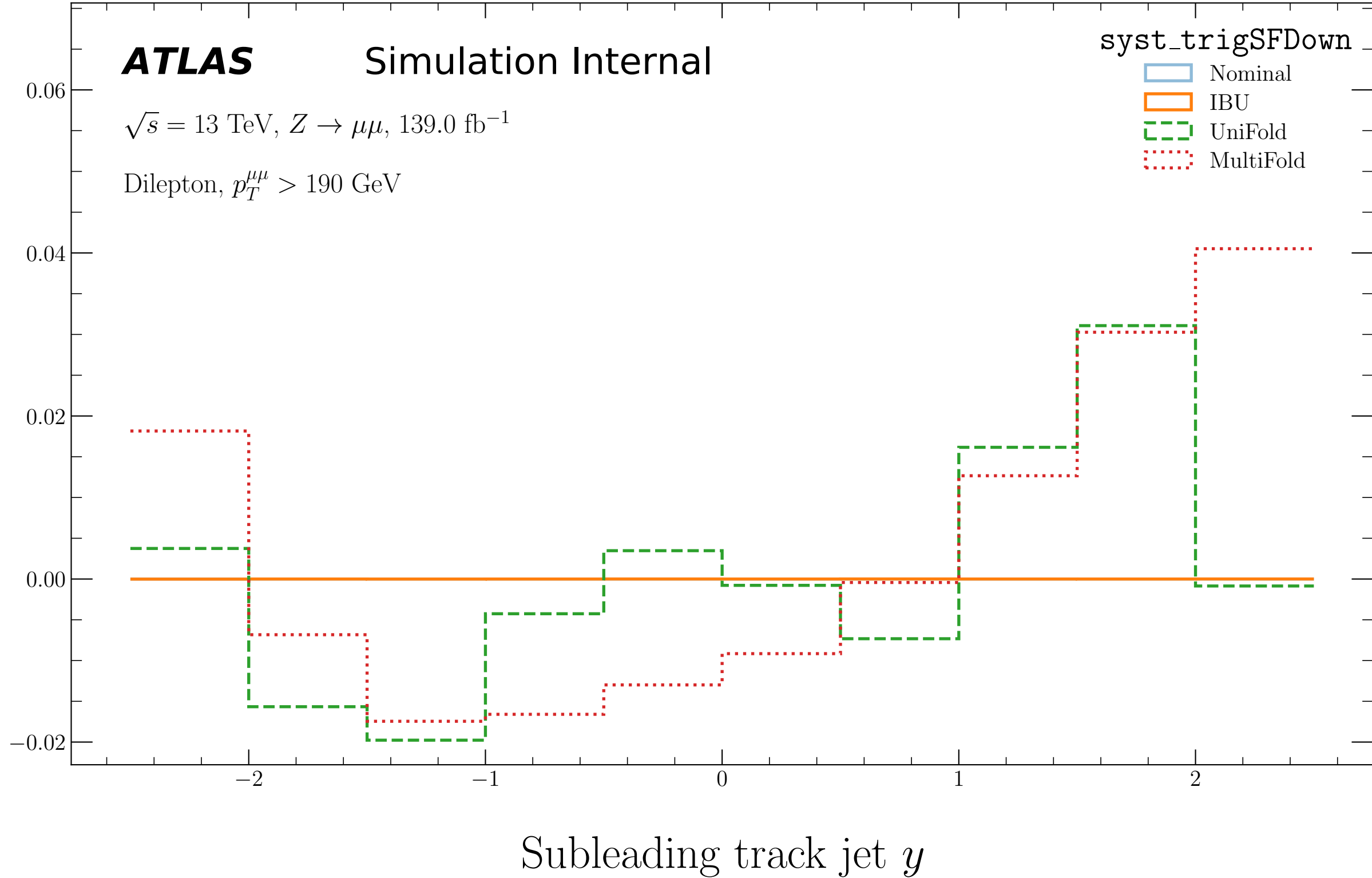
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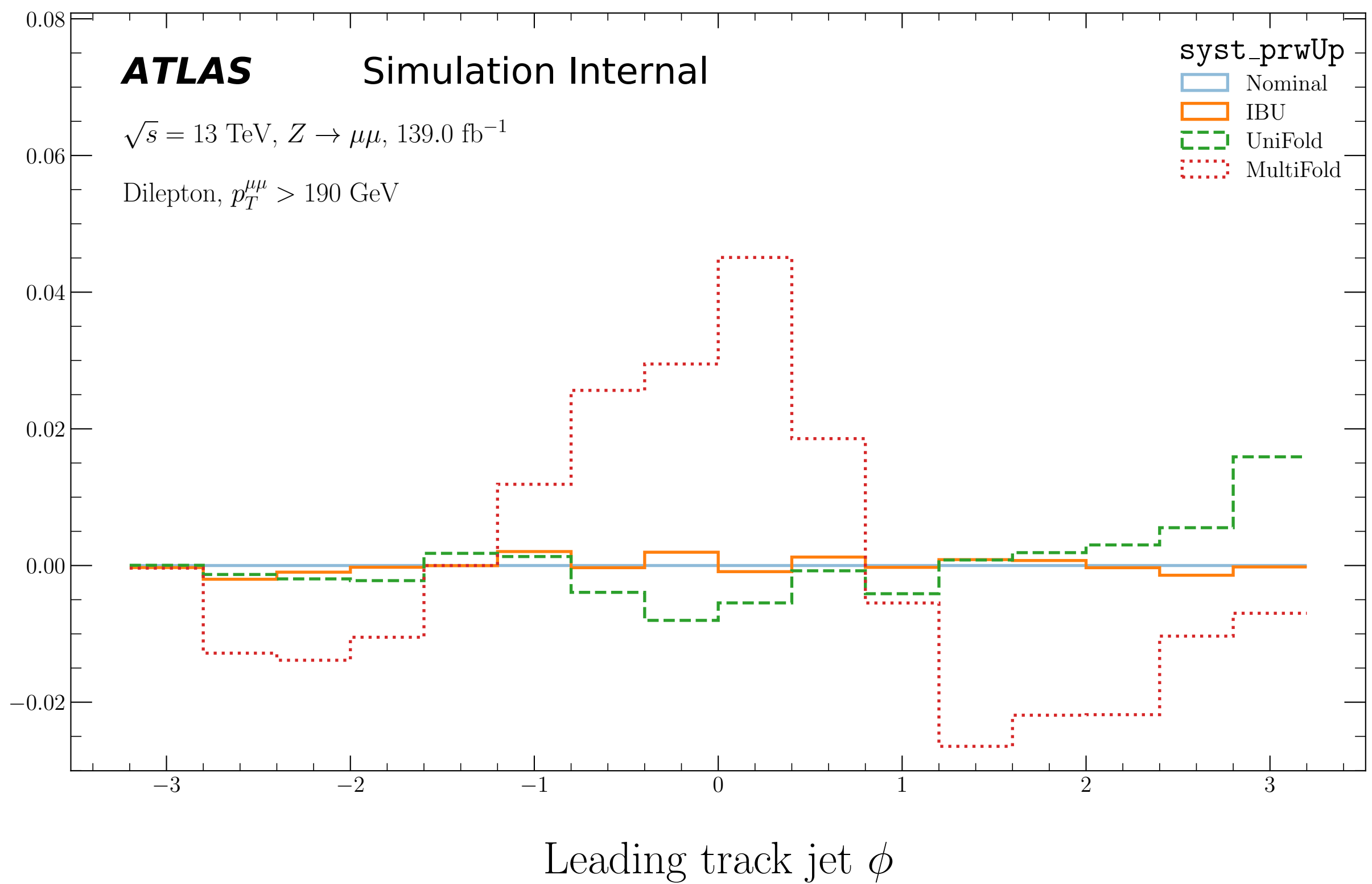
-1

0

1

2

Subleading track jet y 



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

Nominal

IBU

UniFold

MultiFold

0.06
0.04
0.02
0.00
-0.02

-3

-2

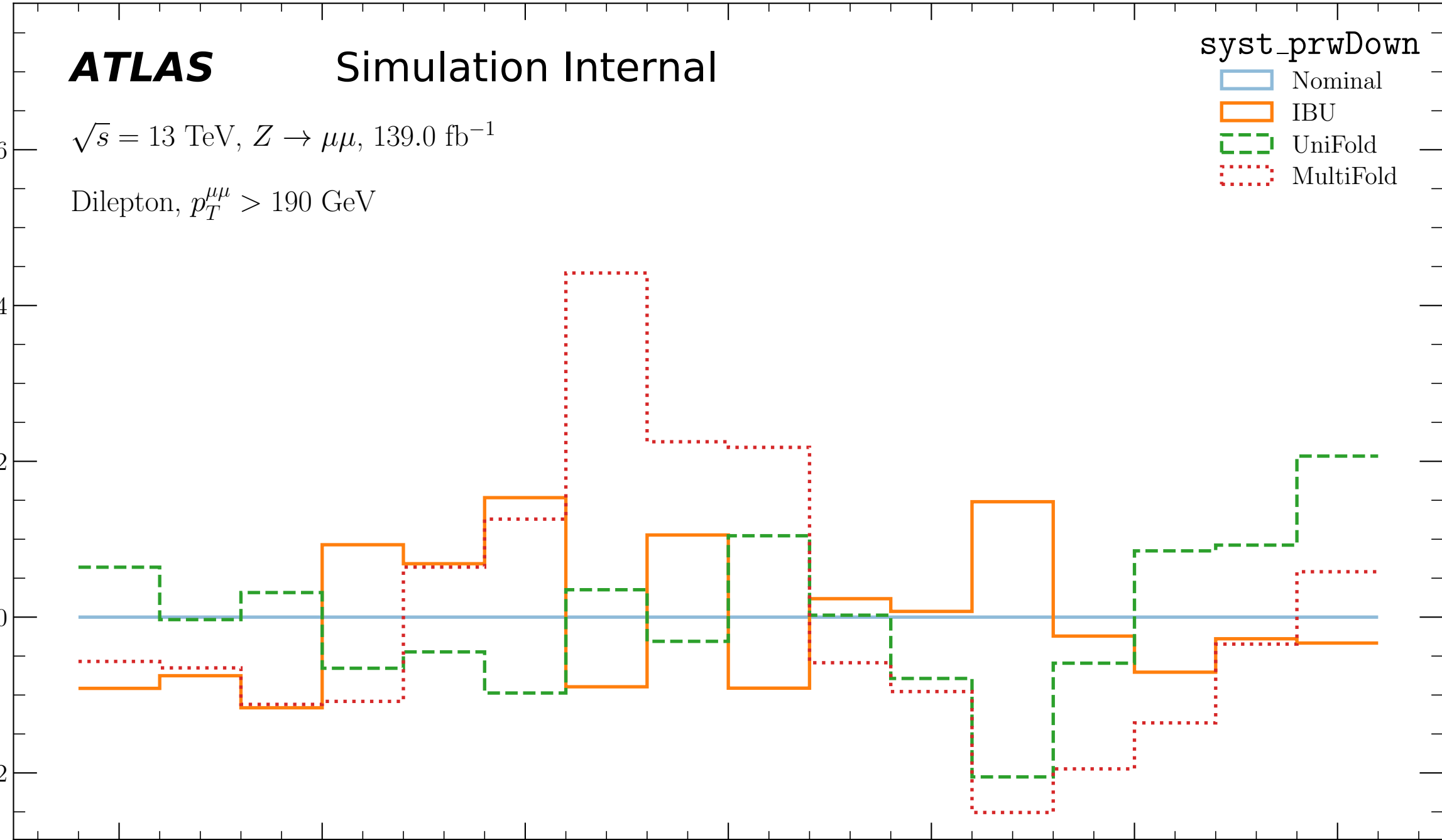
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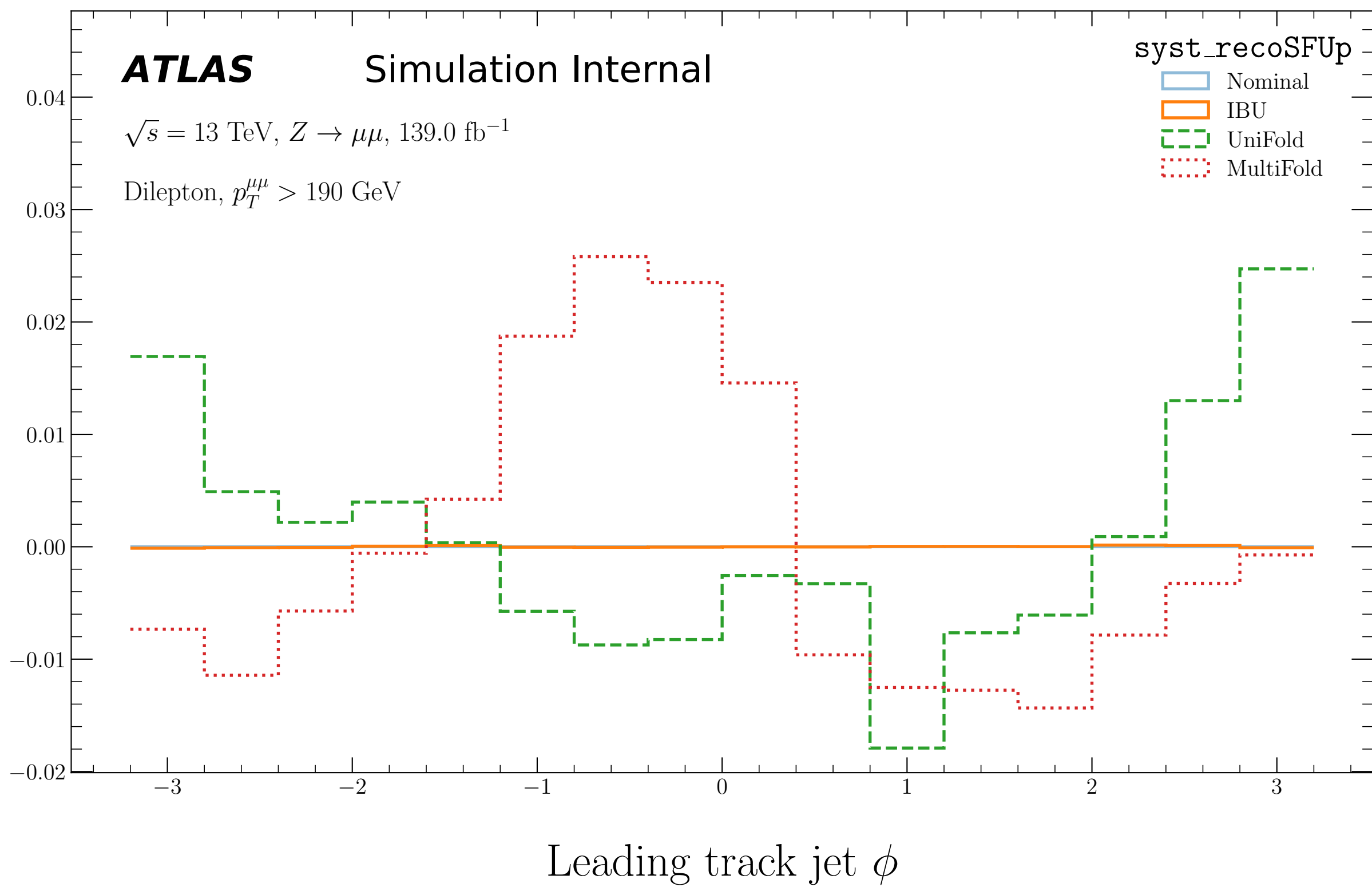
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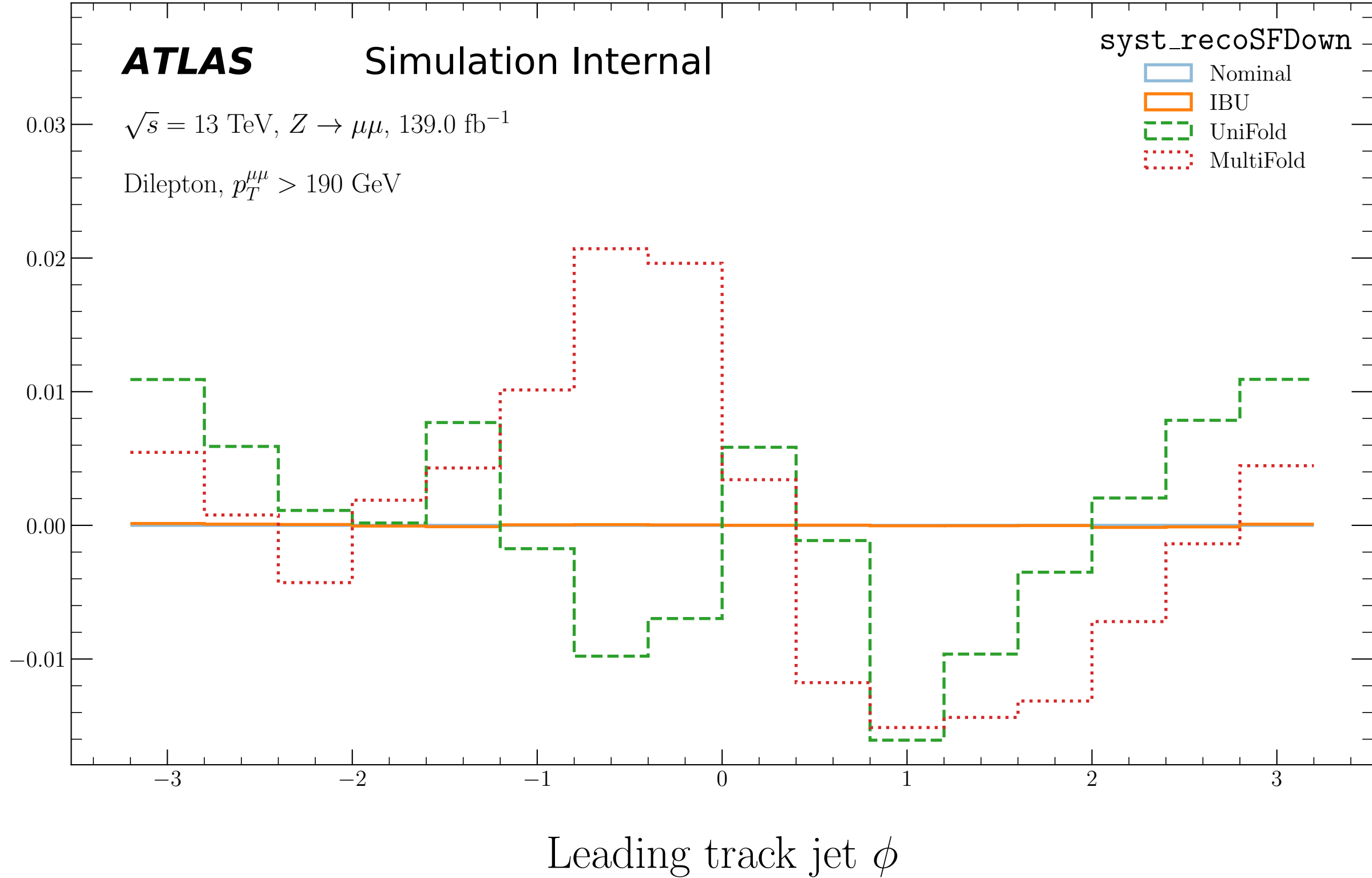
1

2

3

Leading track jet ϕ 





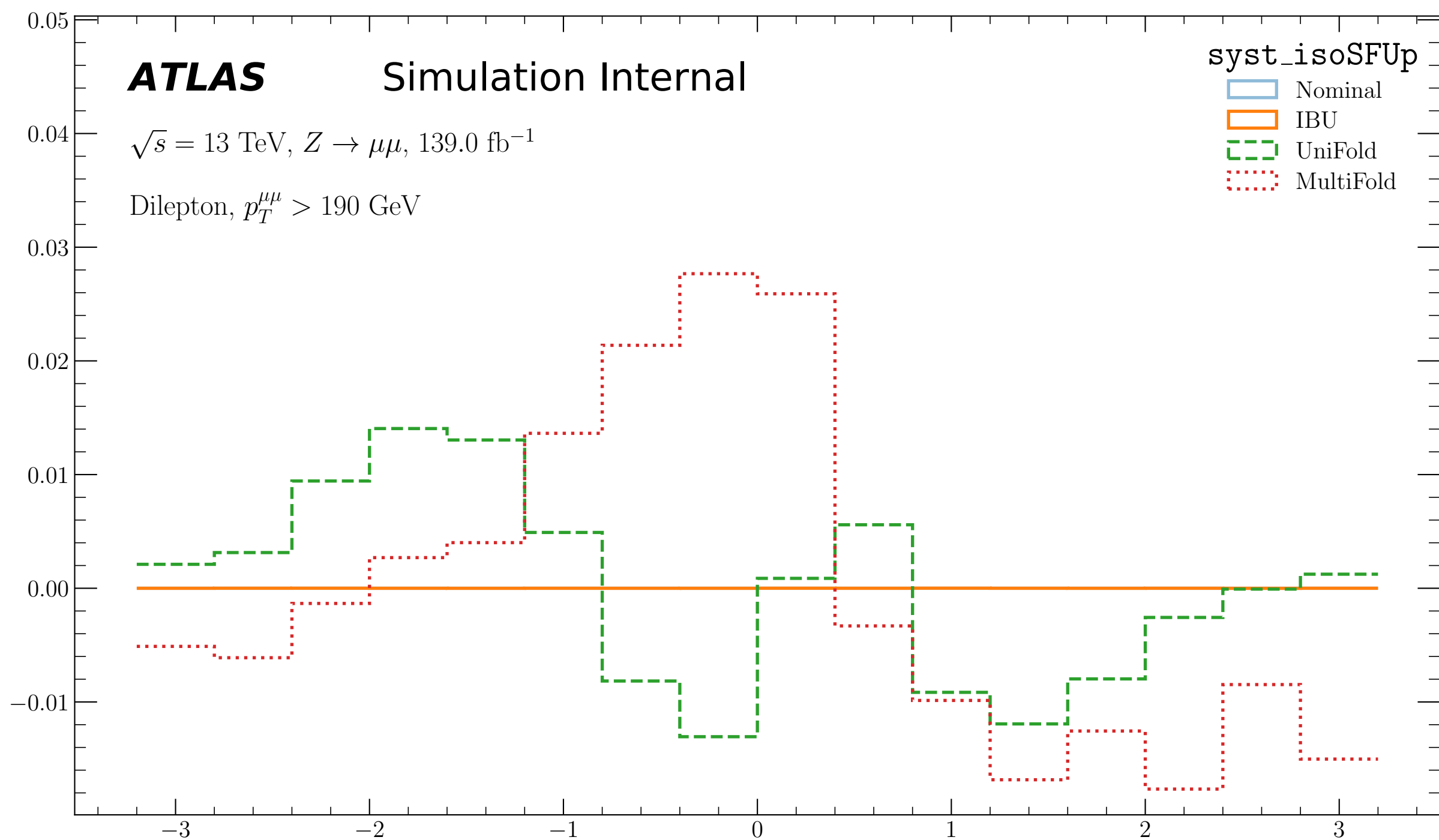
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet ϕ

Relative Systematic Effect (MultiFold)

ATLAS

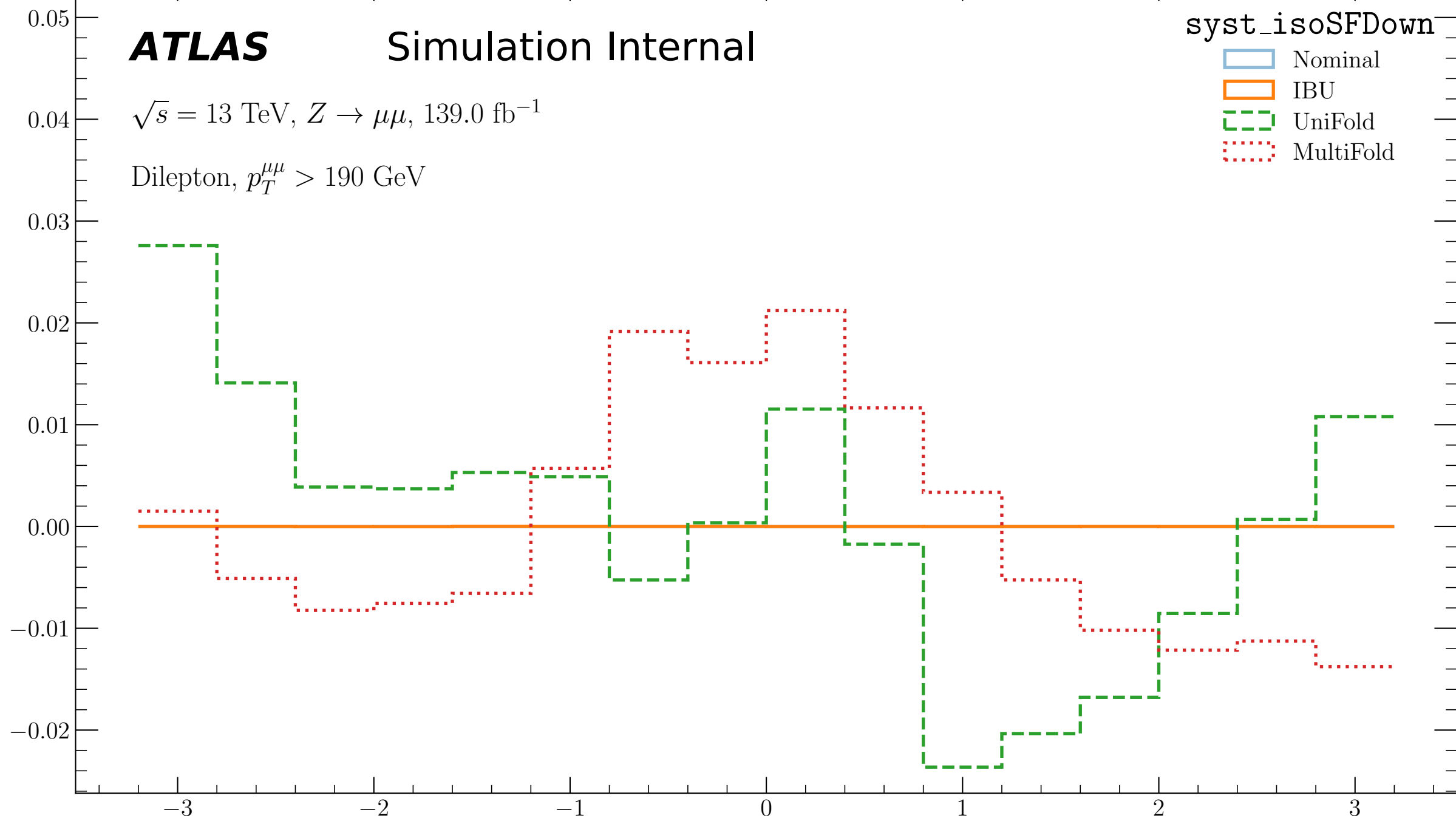
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet ϕ

Relative Systematic Effect (MultiFold)

ATLAS

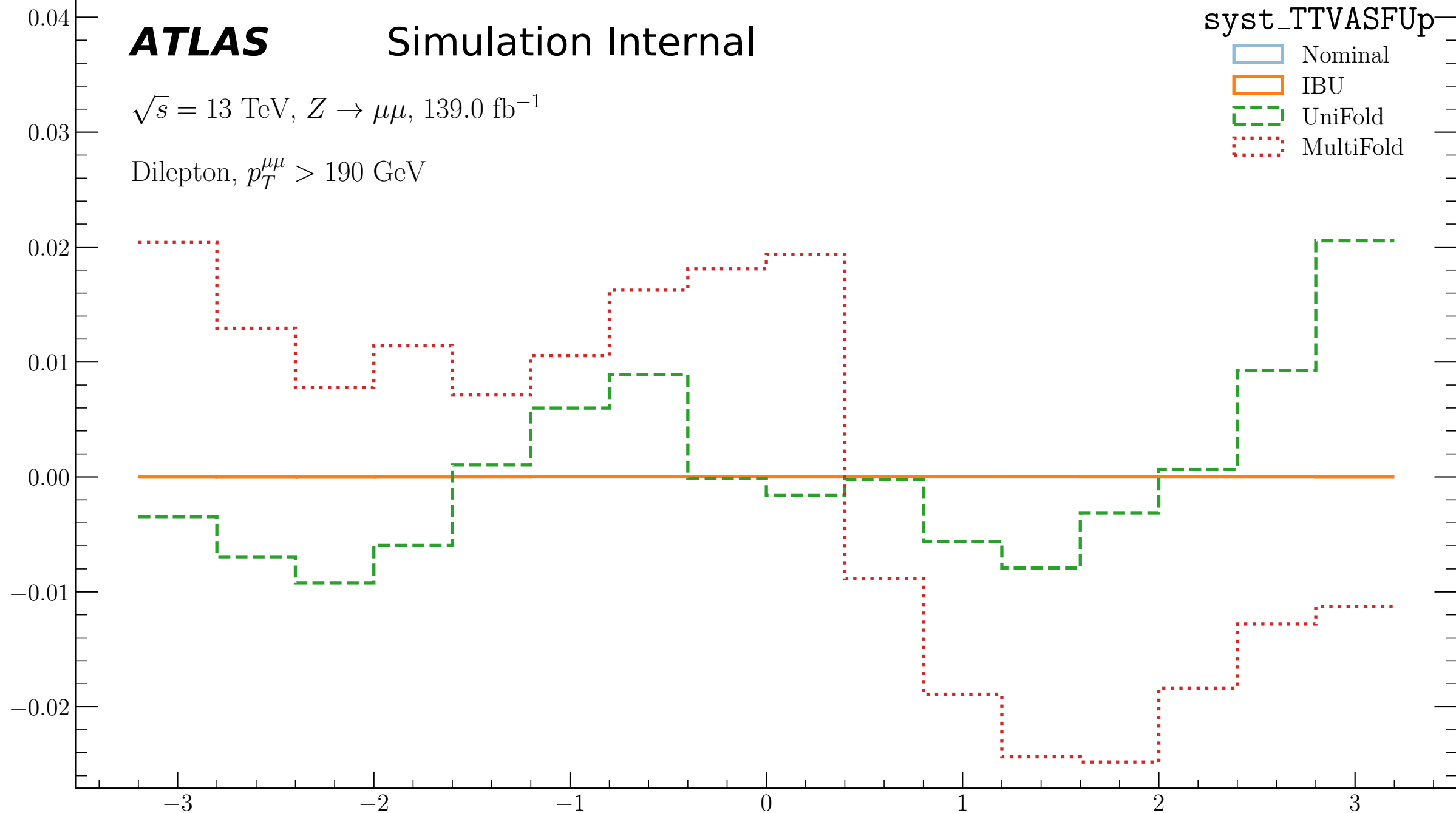
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

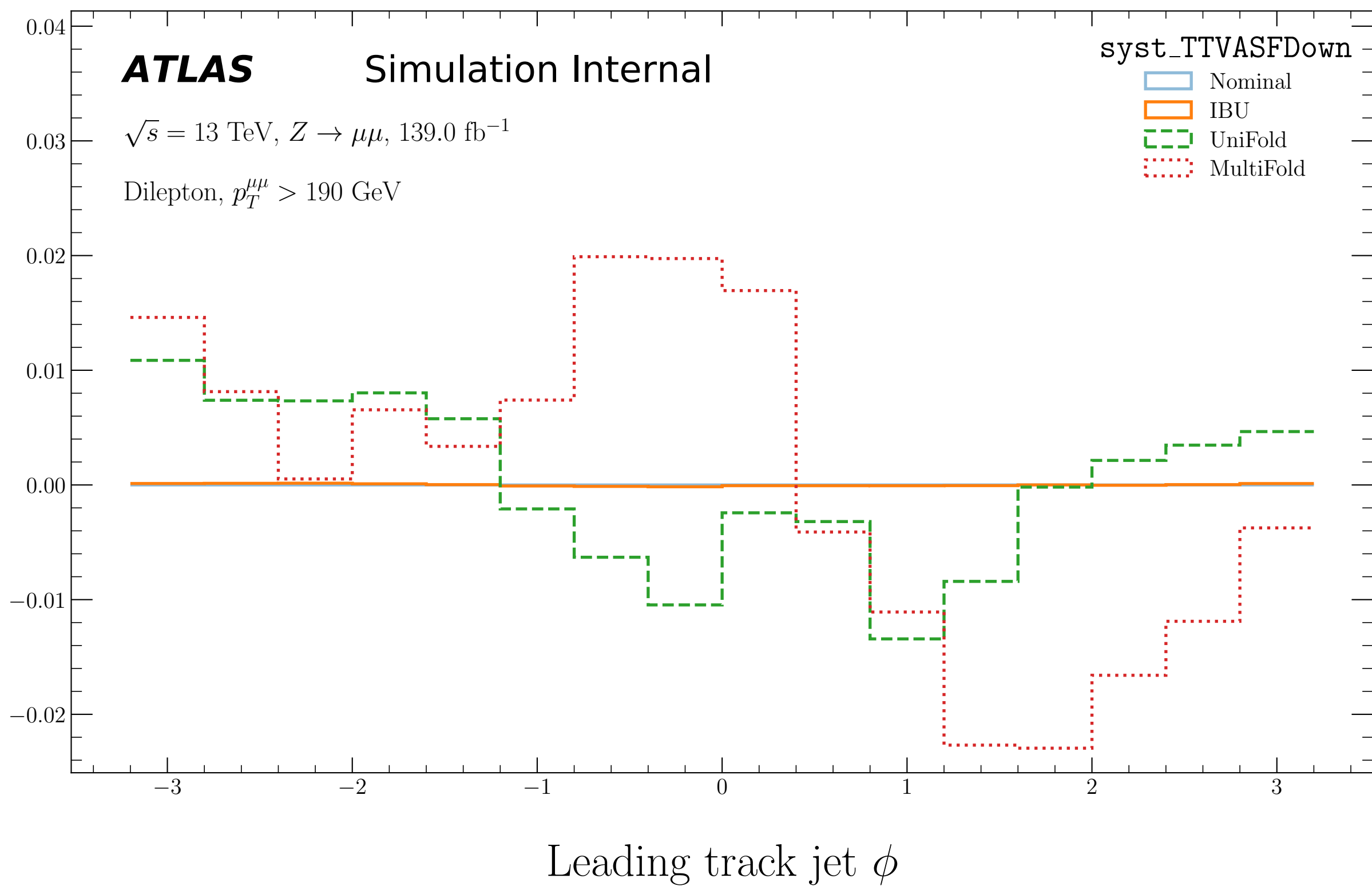
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

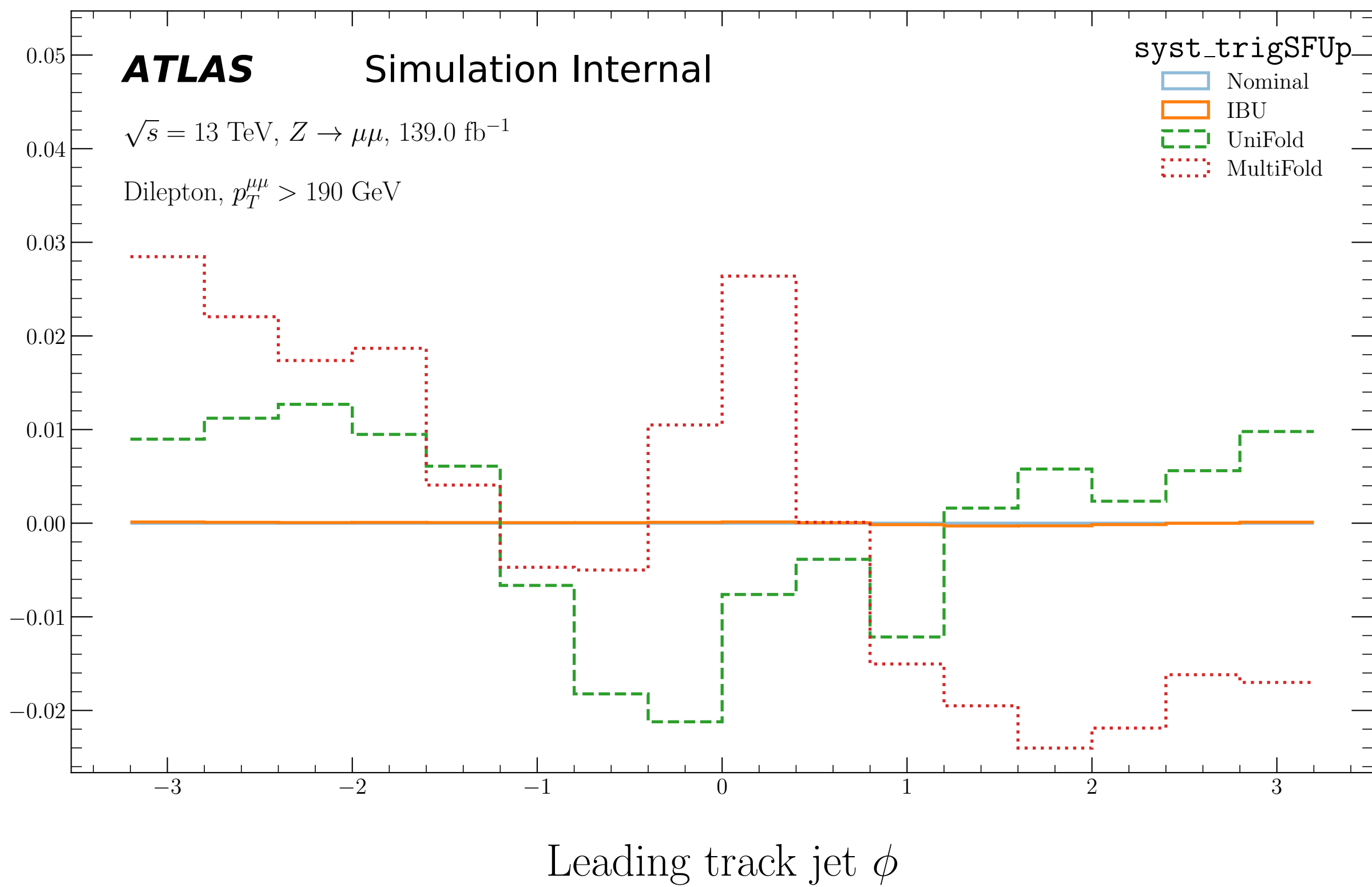
syst_TTVASFUp

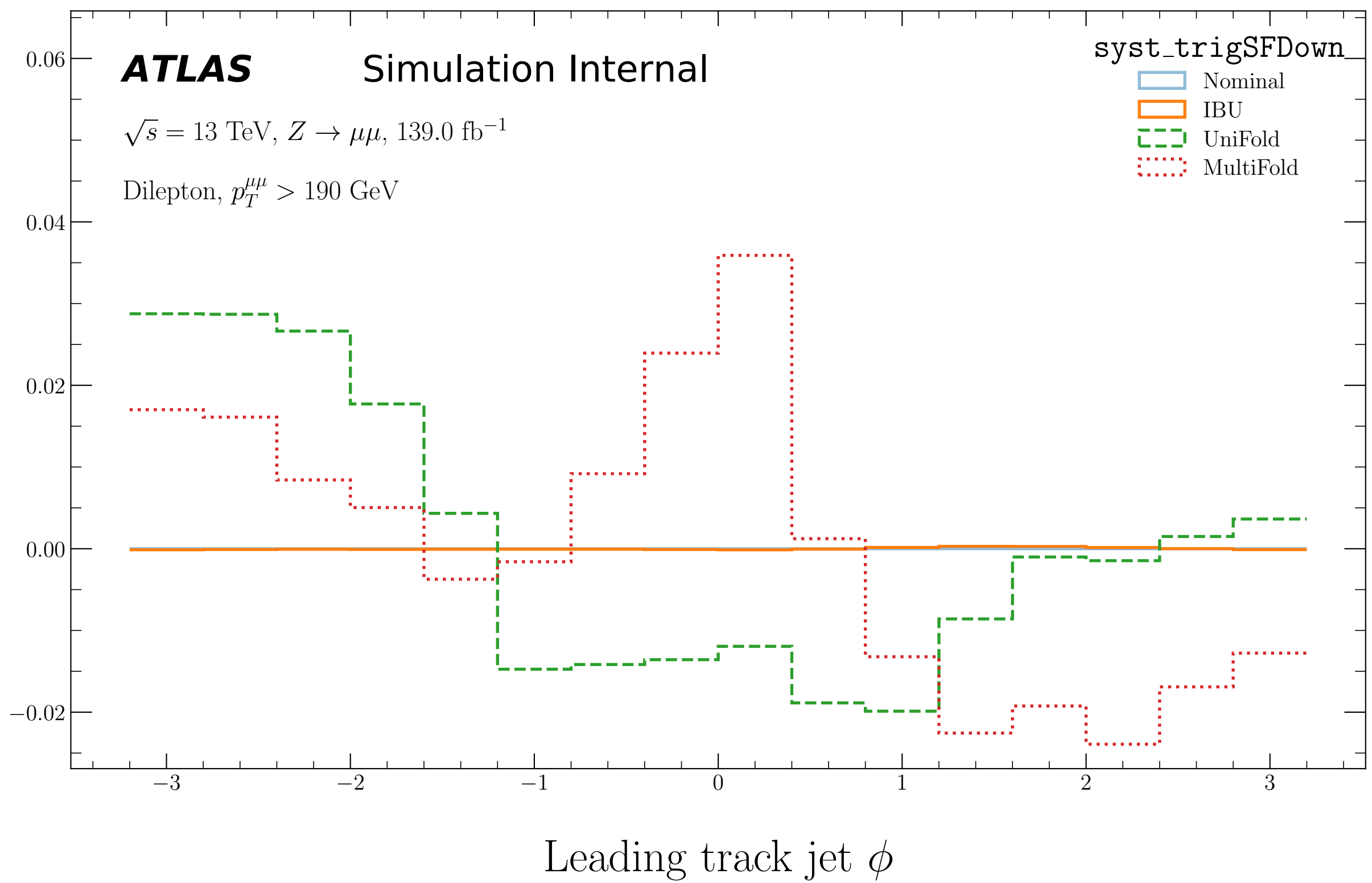
- Nominal
- IBU
- UniFold
- MultiFold

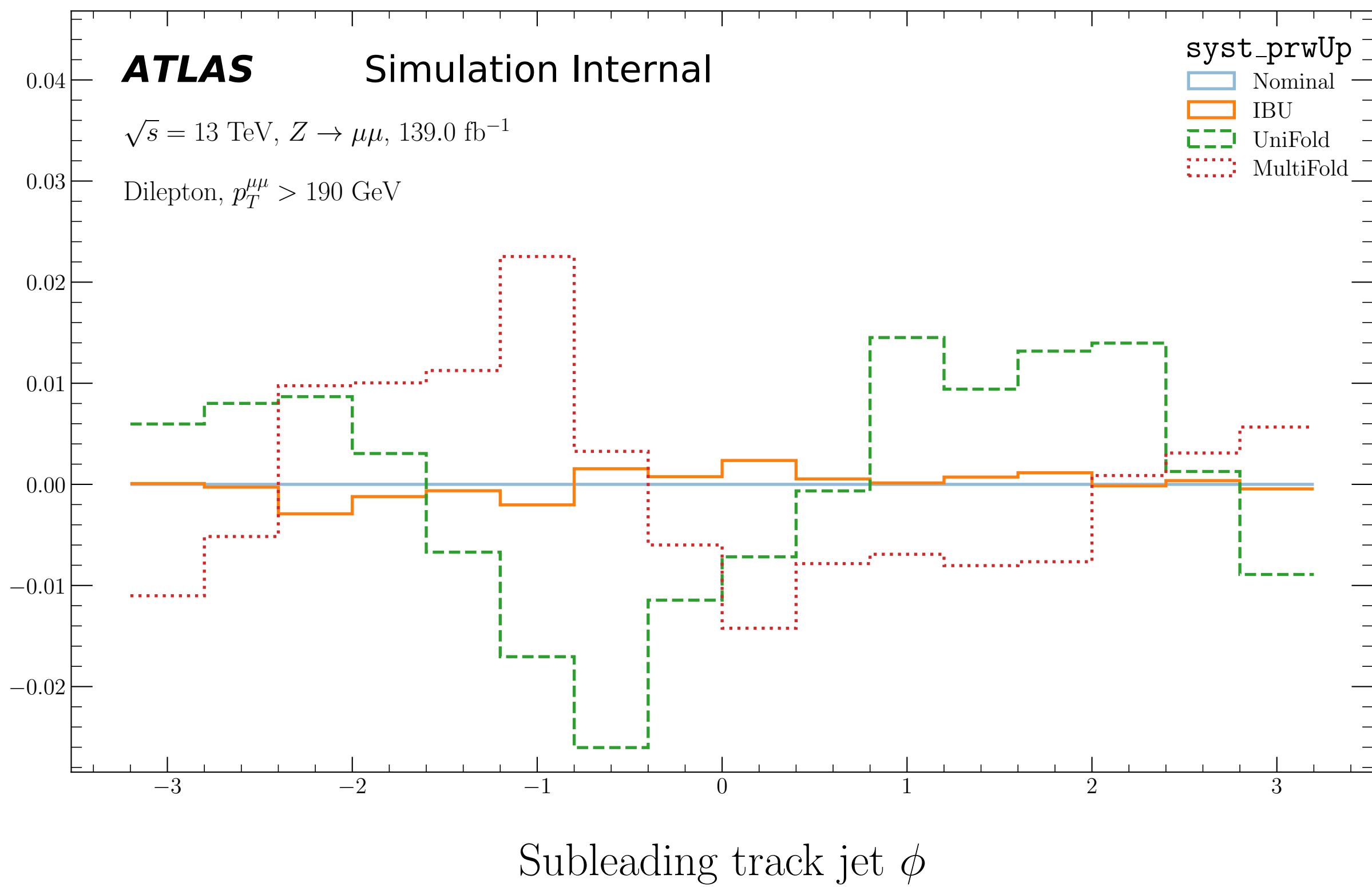


Leading track jet ϕ









ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

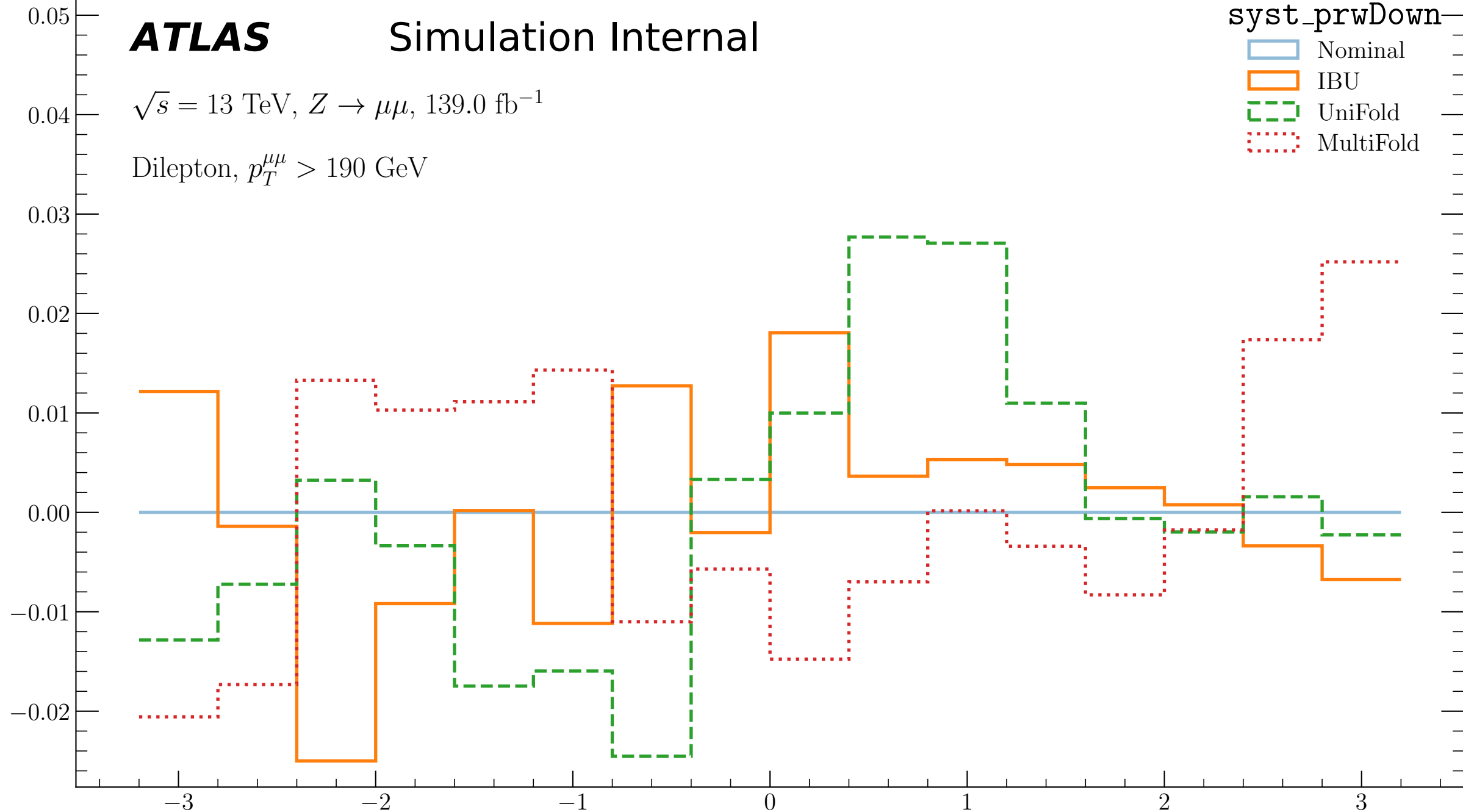
syst_prwDown

Nominal

IBU

UniFold

MultiFold

Subleading track jet ϕ

Relative Systematic Effect (MultiFold)

ATLAS

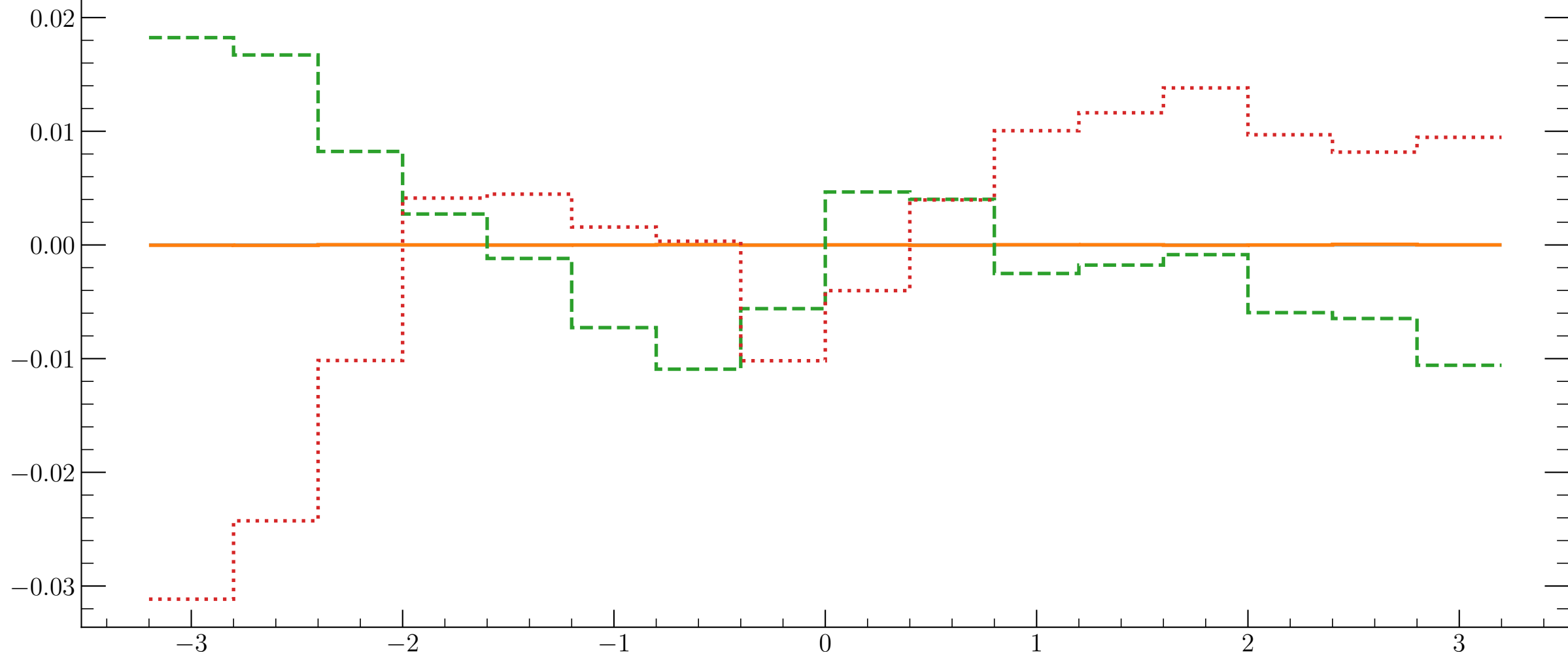
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet ϕ

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.05
0.04
0.03
0.02
0.01
0.00
-0.01
-0.02

-3

-2

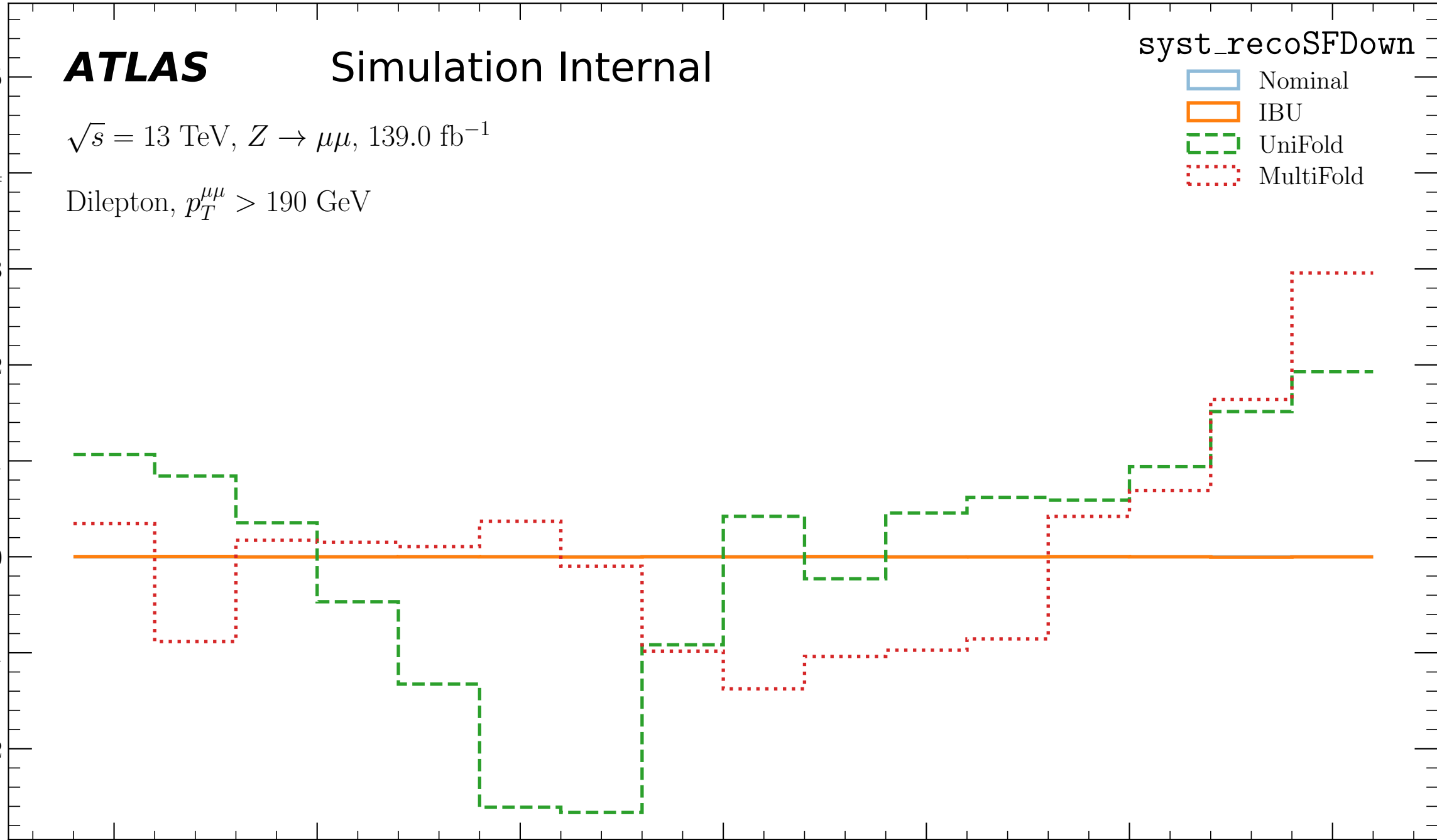
-1

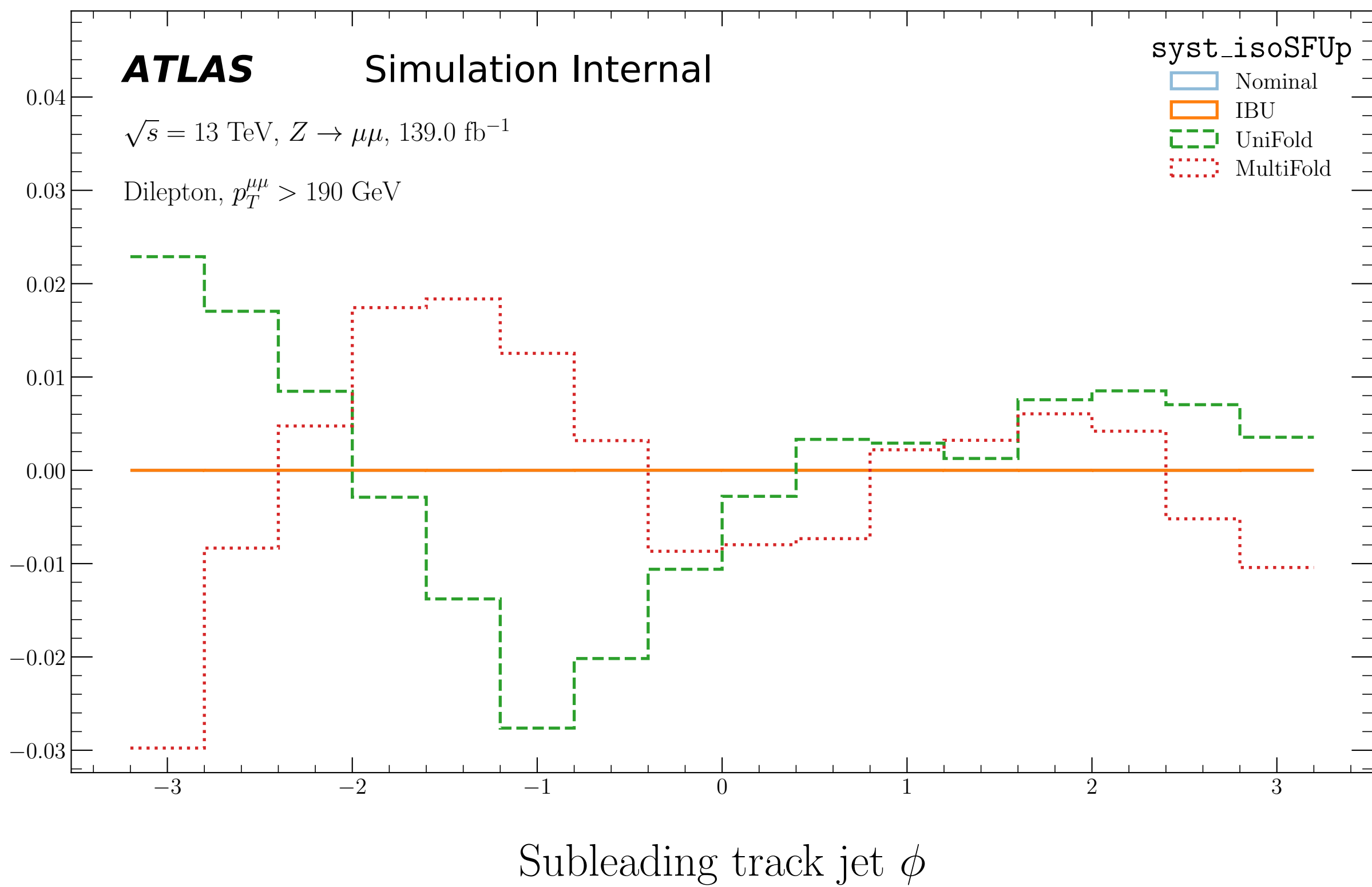
0

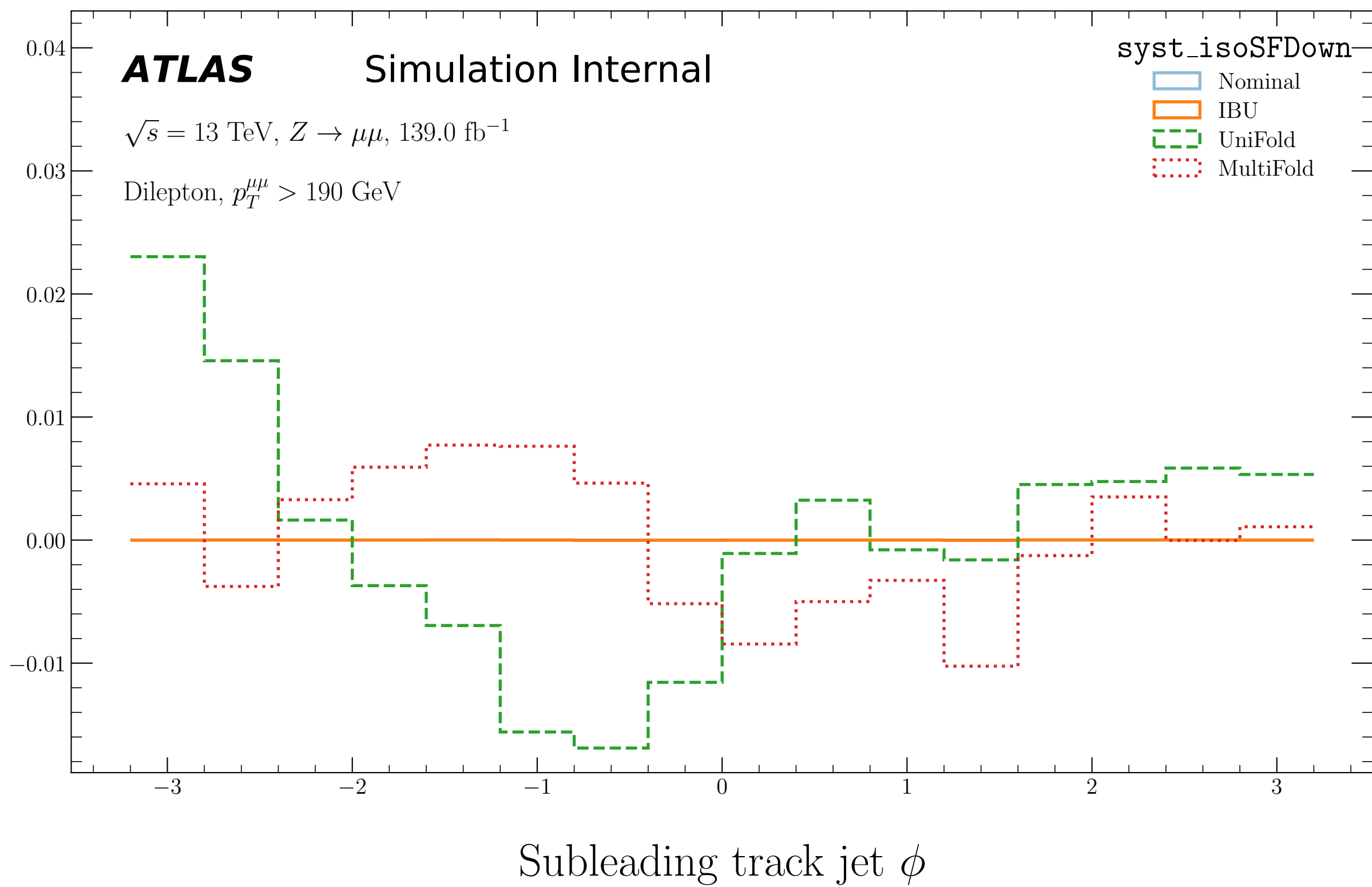
1

2

3

Subleading track jet ϕ 





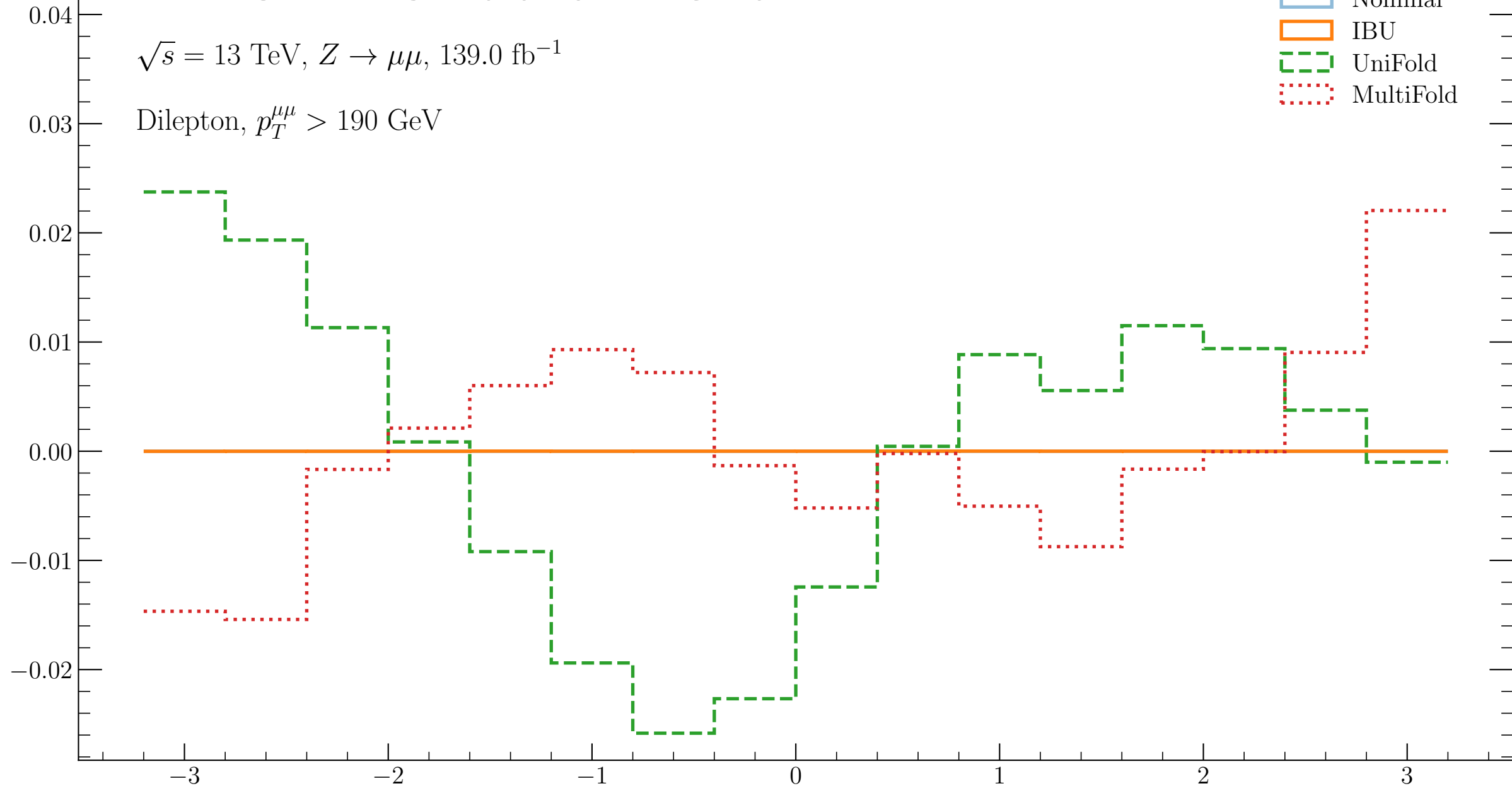
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet ϕ

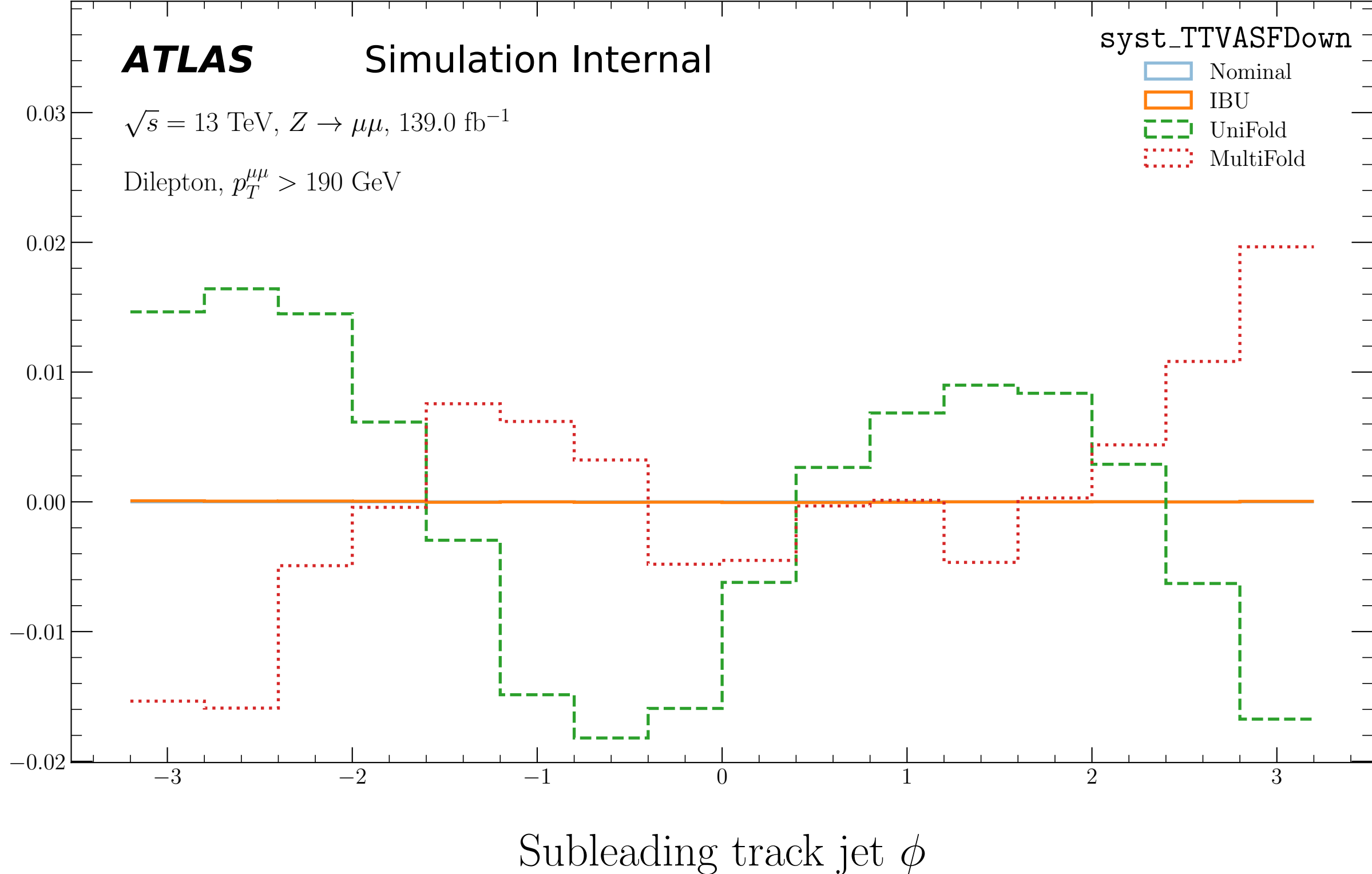
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.03
0.02
0.01
0.00
-0.01
-0.02Subleading track jet ϕ -3
-2
-1
0
1
2
3

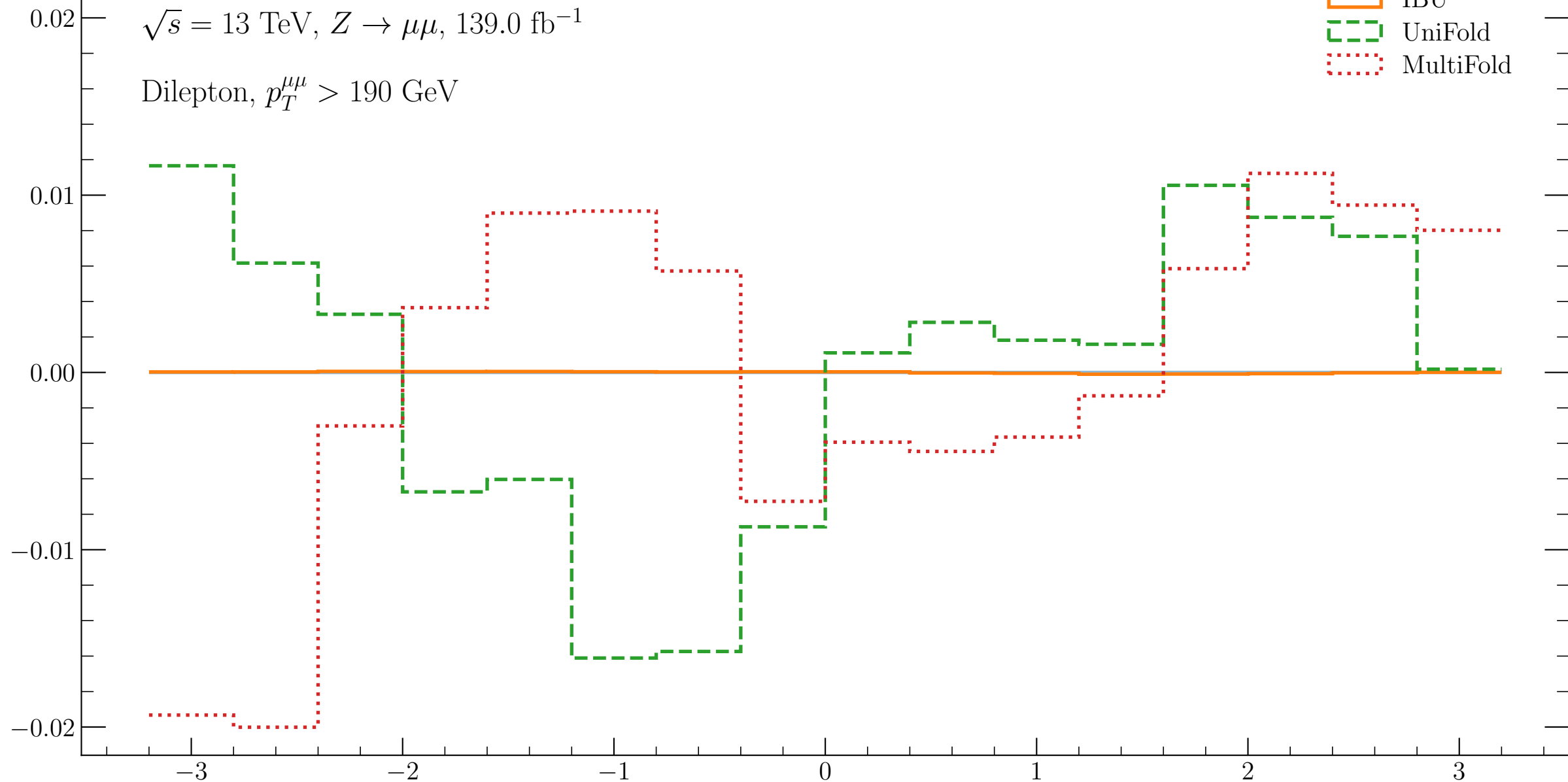
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet ϕ

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFDown

Nominal

IBU

UniFold

MultiFold

0.02
0.01
0.00
-0.01
-0.02

-3

-2

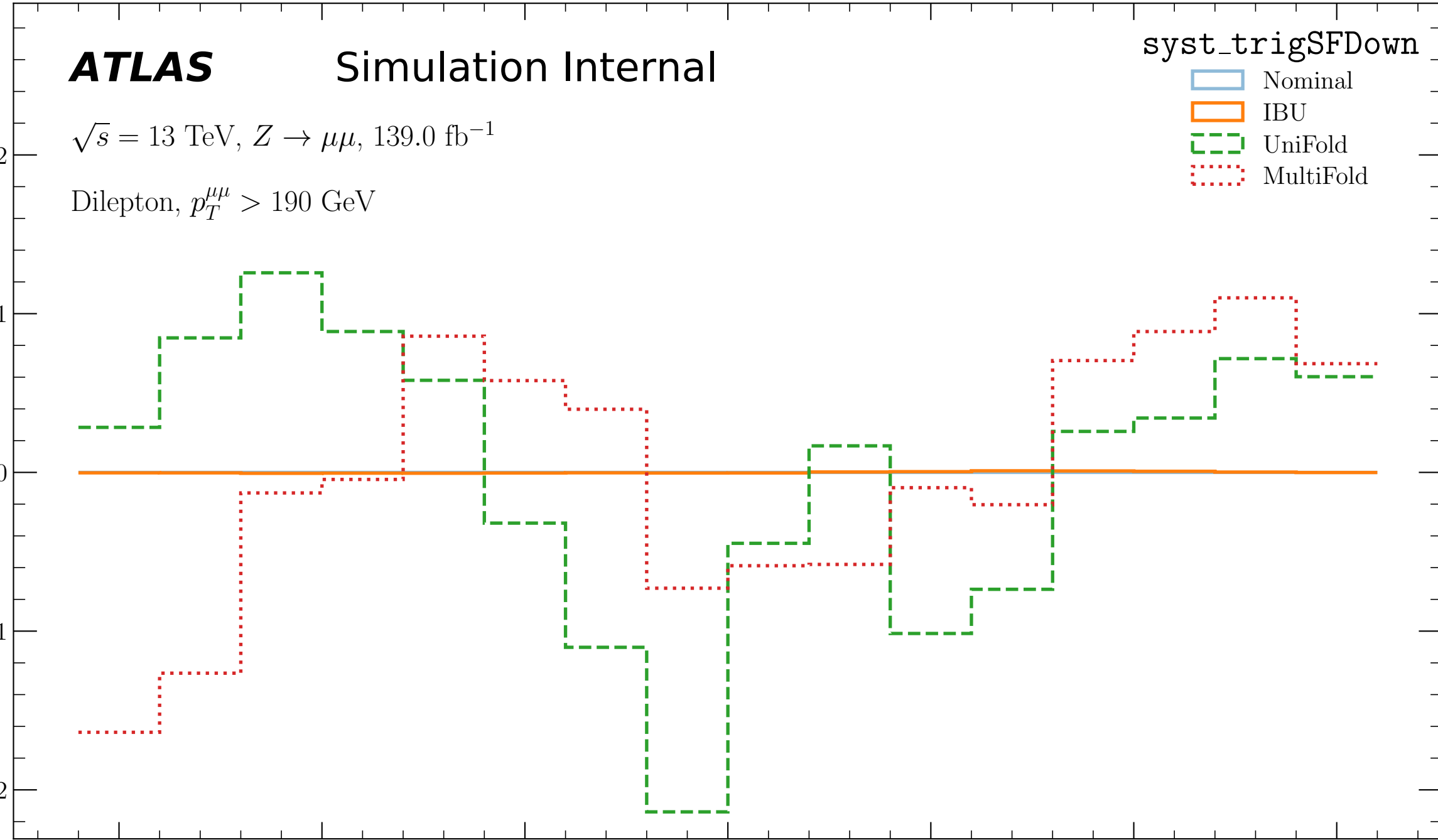
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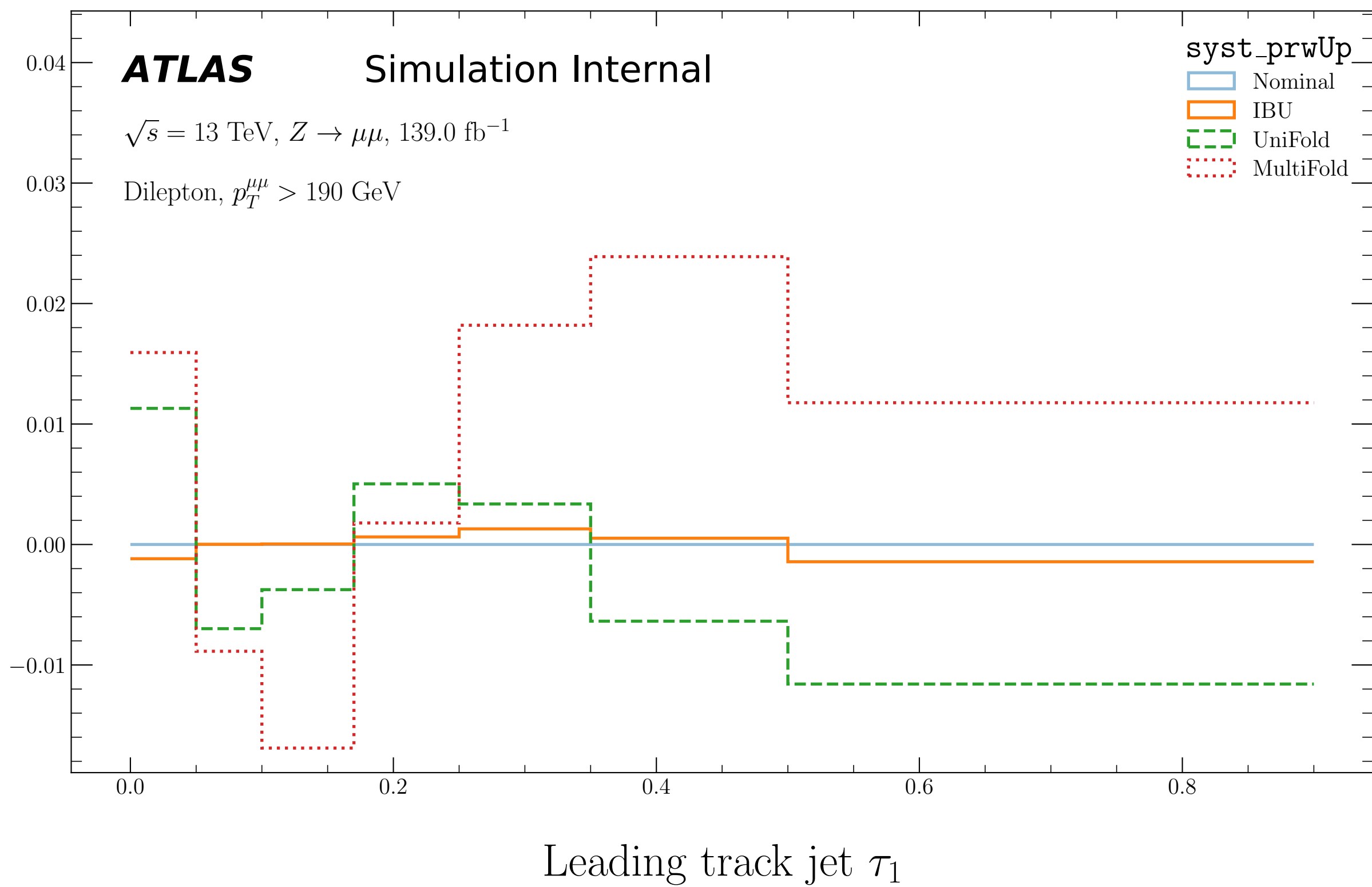
0

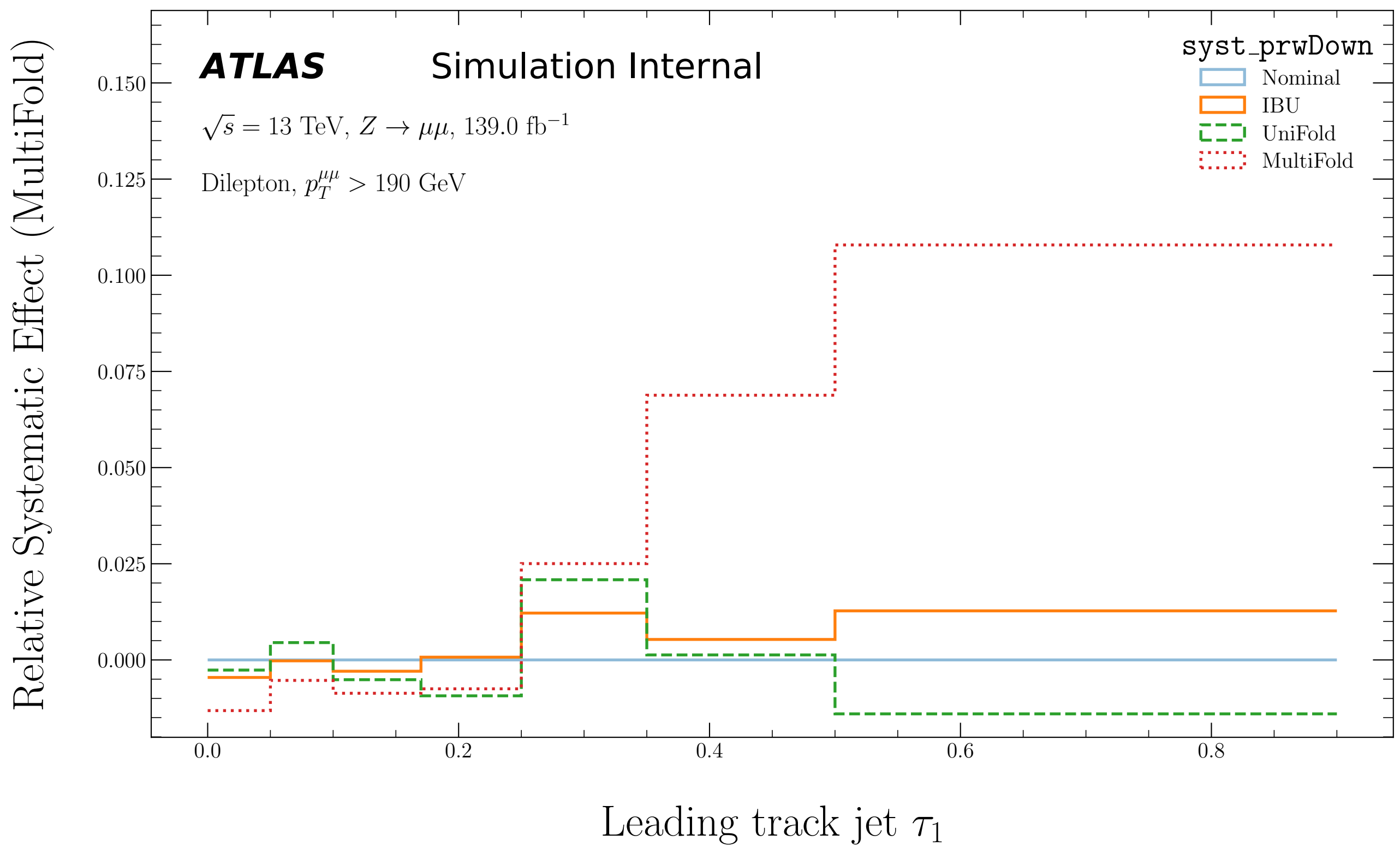
1

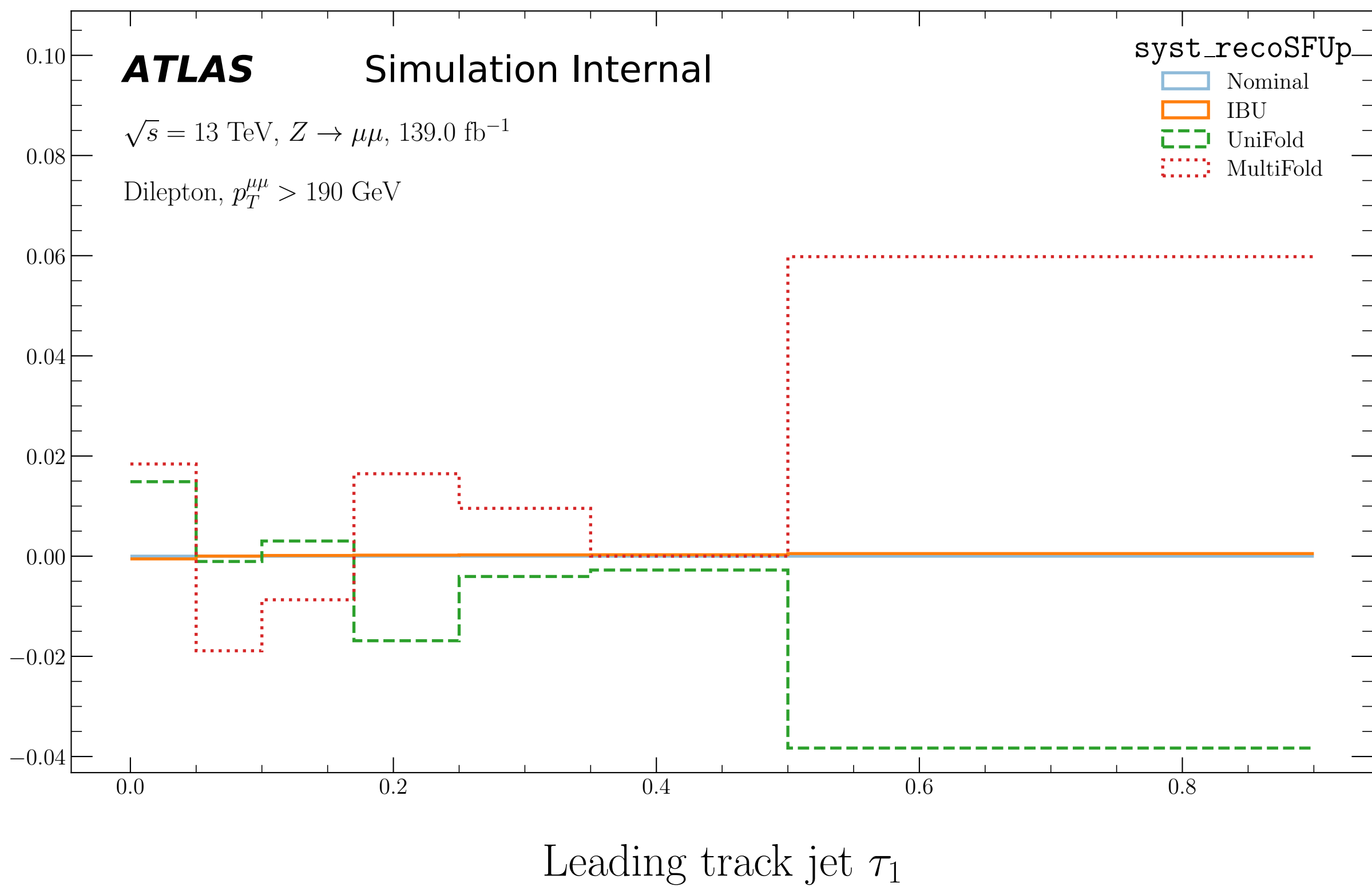
2

3

Subleading track jet ϕ 







Relative Systematic Effect (MultiFold)

ATLAS

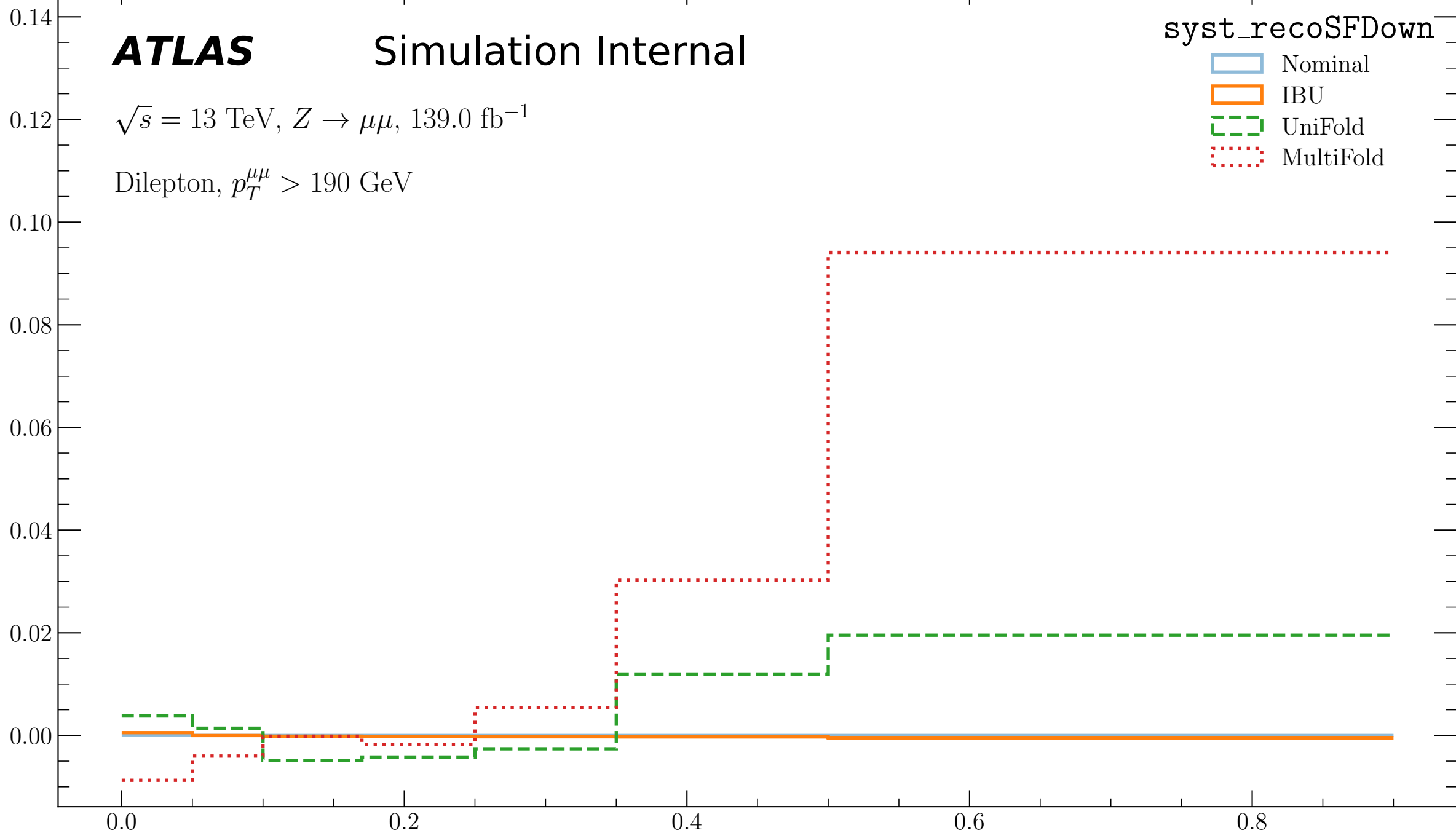
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

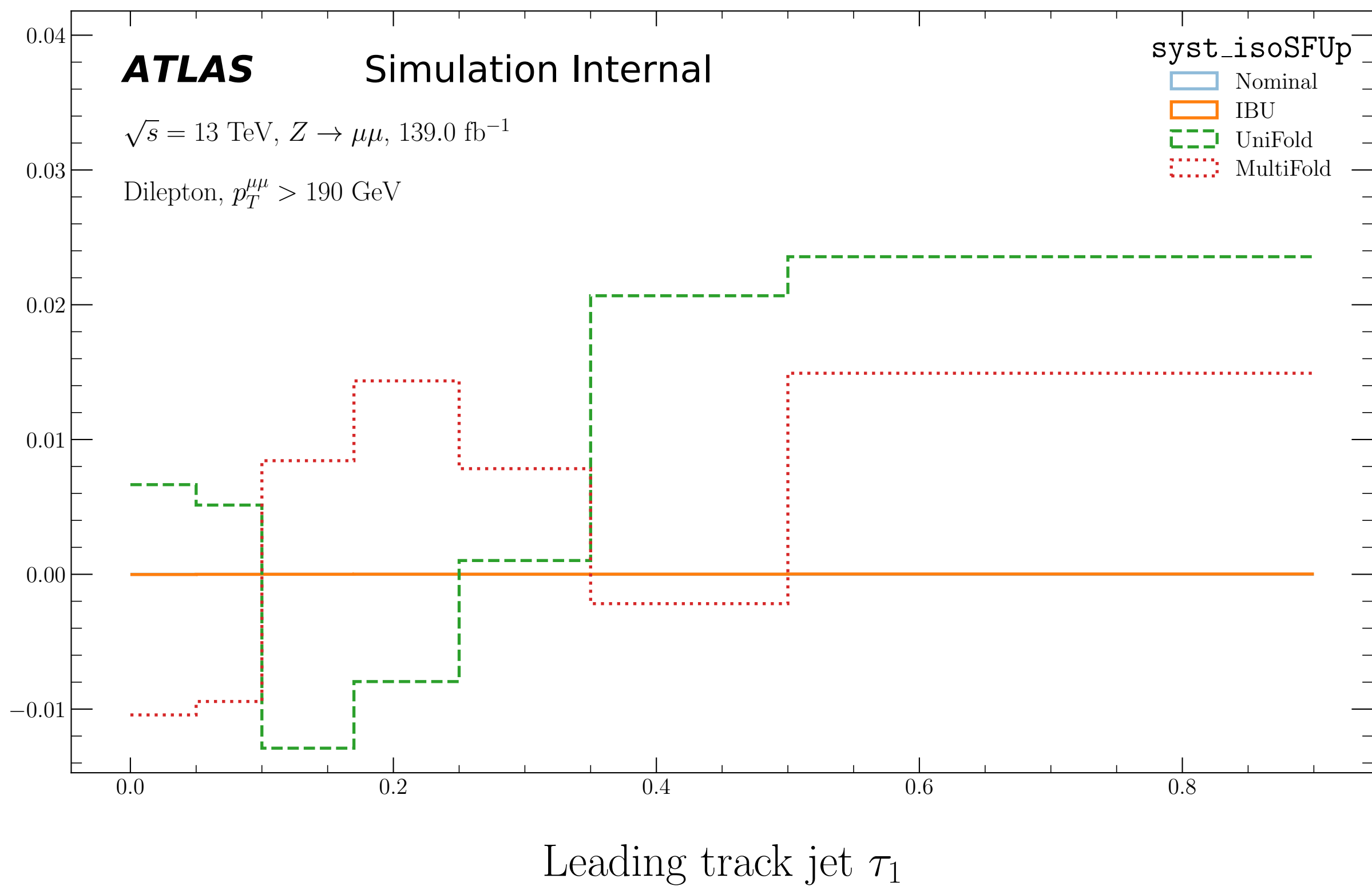
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

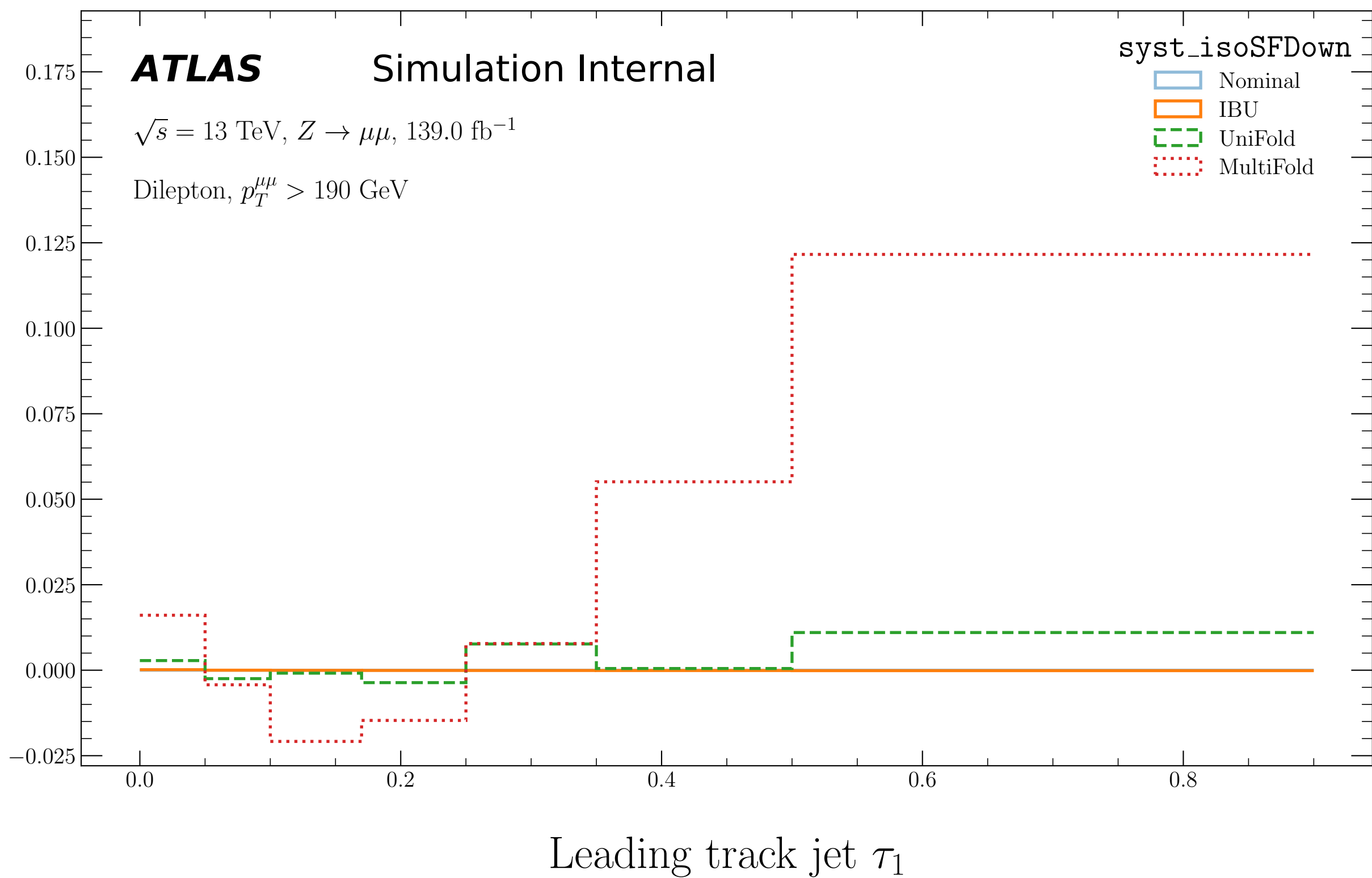
syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_1





ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFU

- Nominal
- IBU
- UniFold
- MultiFold

0.12
0.10
0.08
0.06
0.04
0.02
0.00

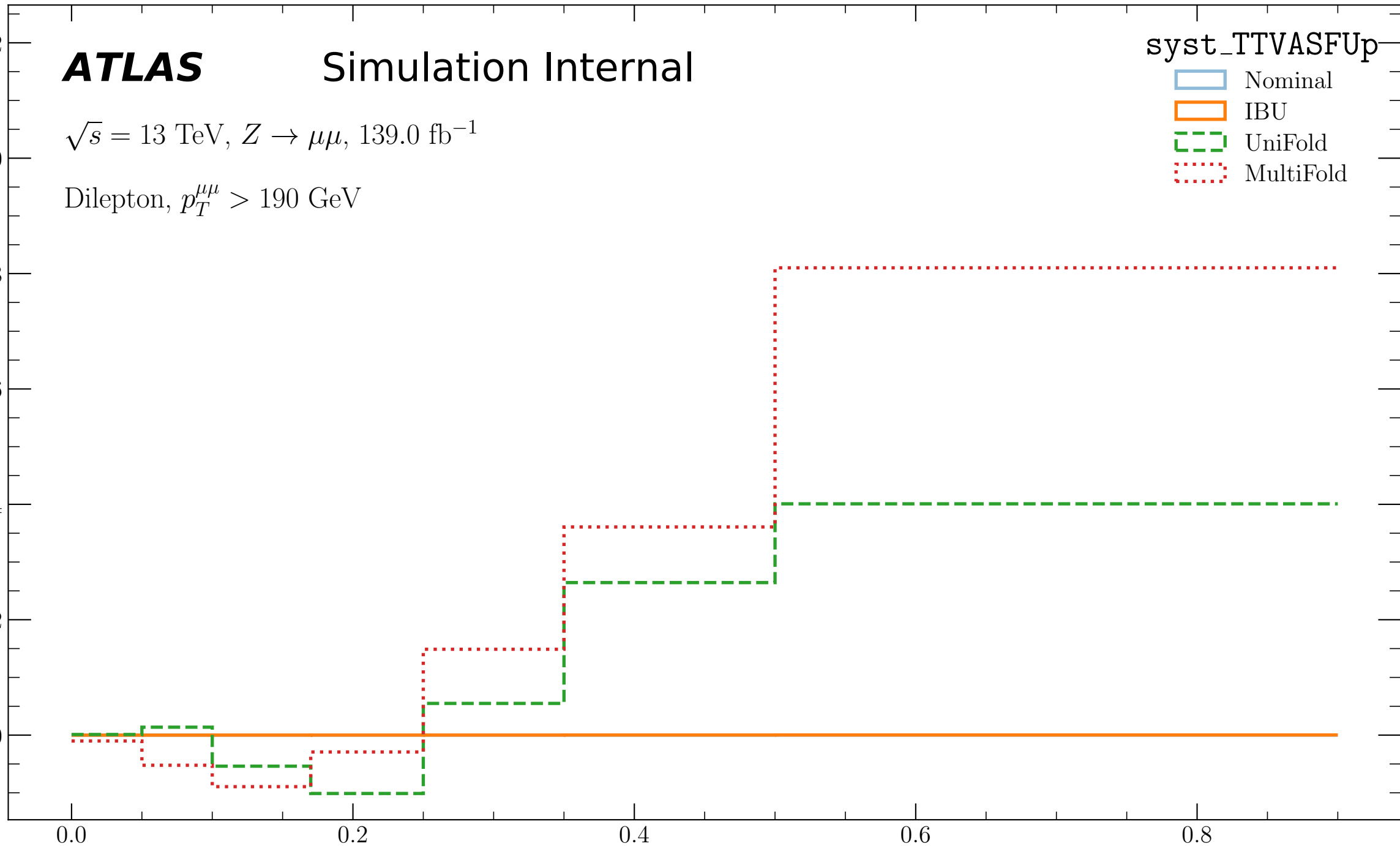
0.0

0.2

0.4

0.6

0.8

Leading track jet τ_1 

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

Nominal

IBU

UniFold

MultiFold

0.150
0.125
0.100
0.075
0.050
0.025
0.000

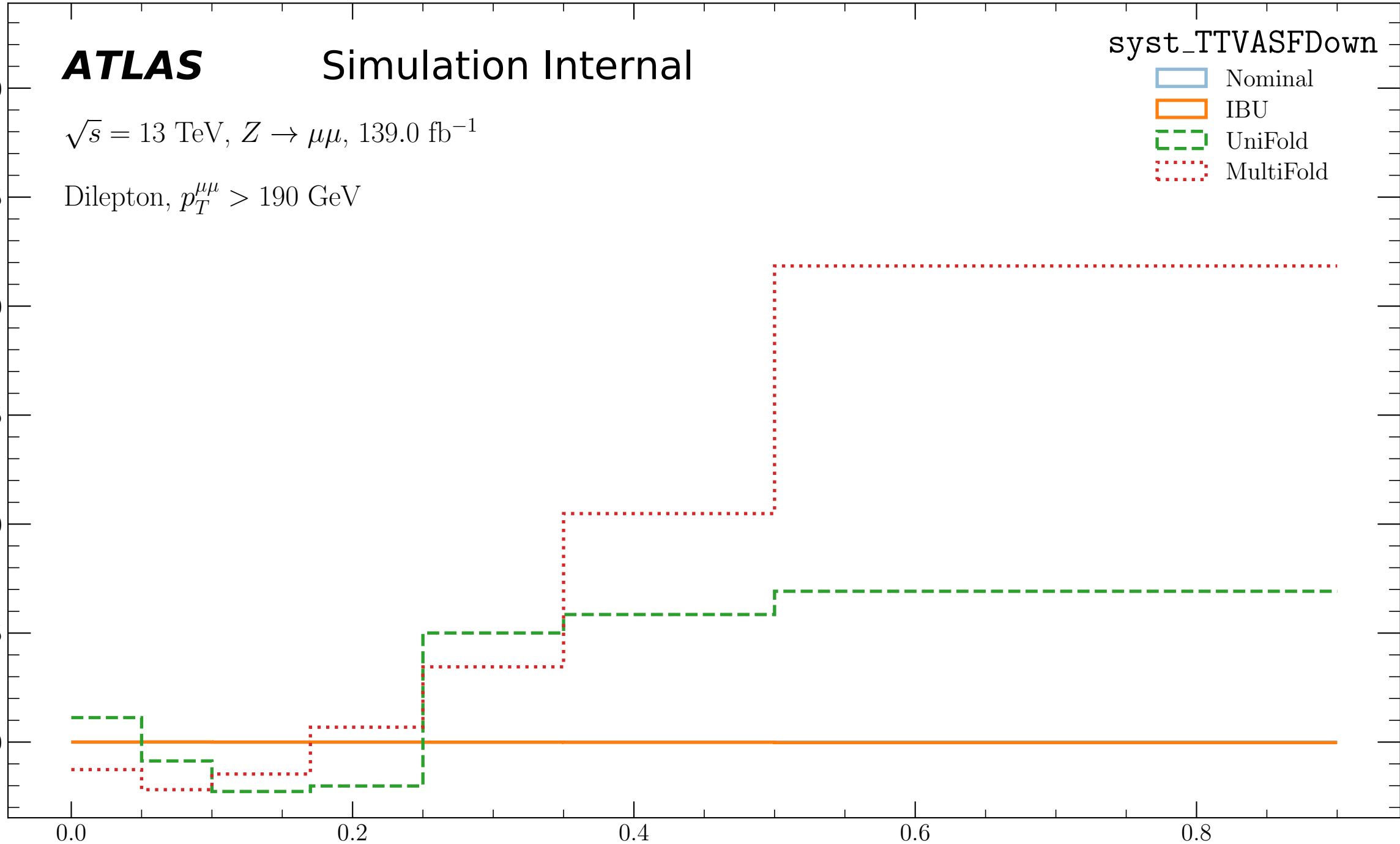
0.0

0.2

0.4

0.6

0.8

Leading track jet τ_1 

Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00

0.0

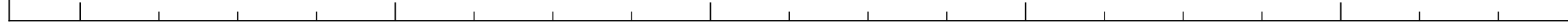
0.2

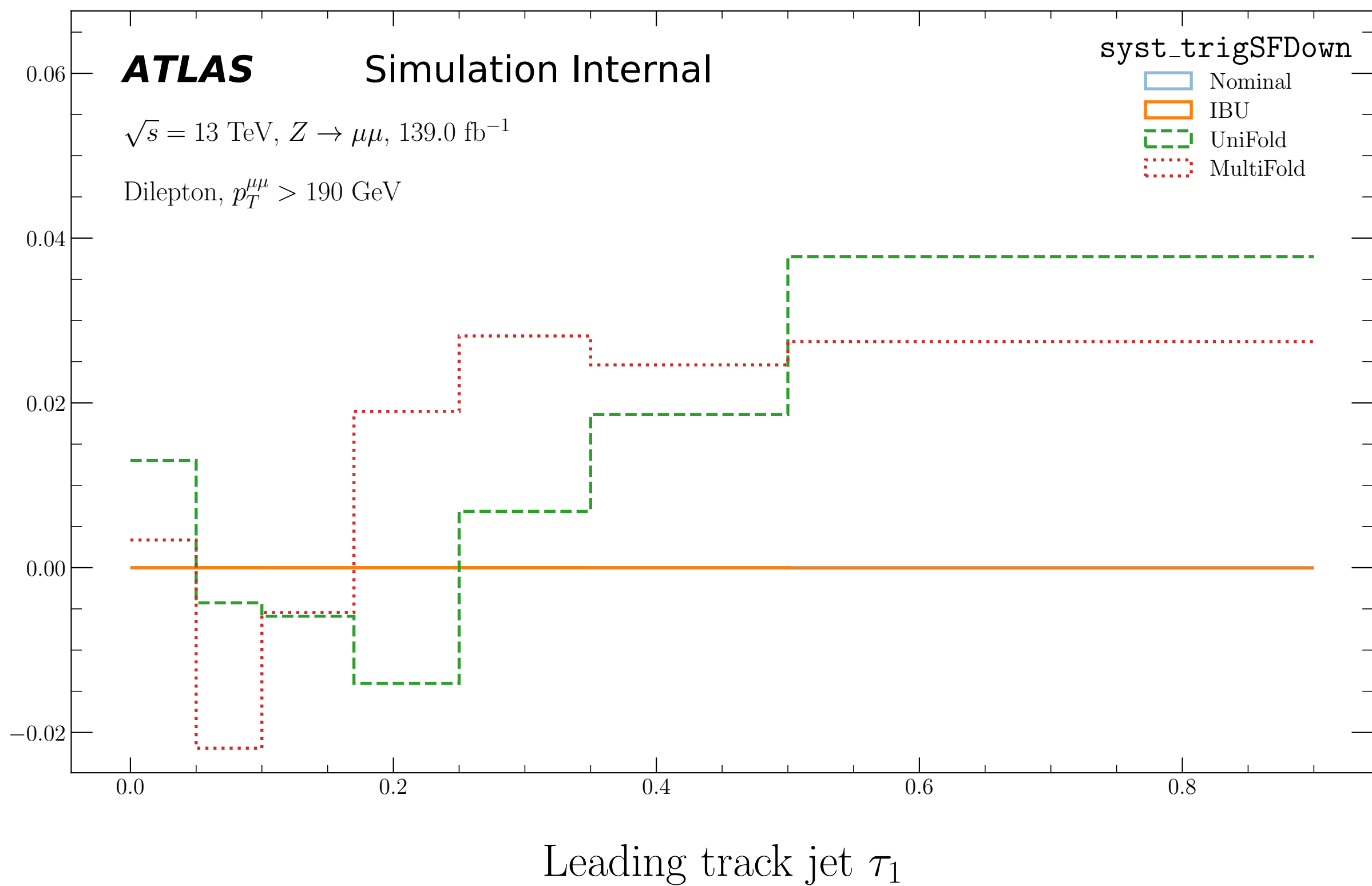
0.4

0.6

0.8

Leading track jet τ_1





Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

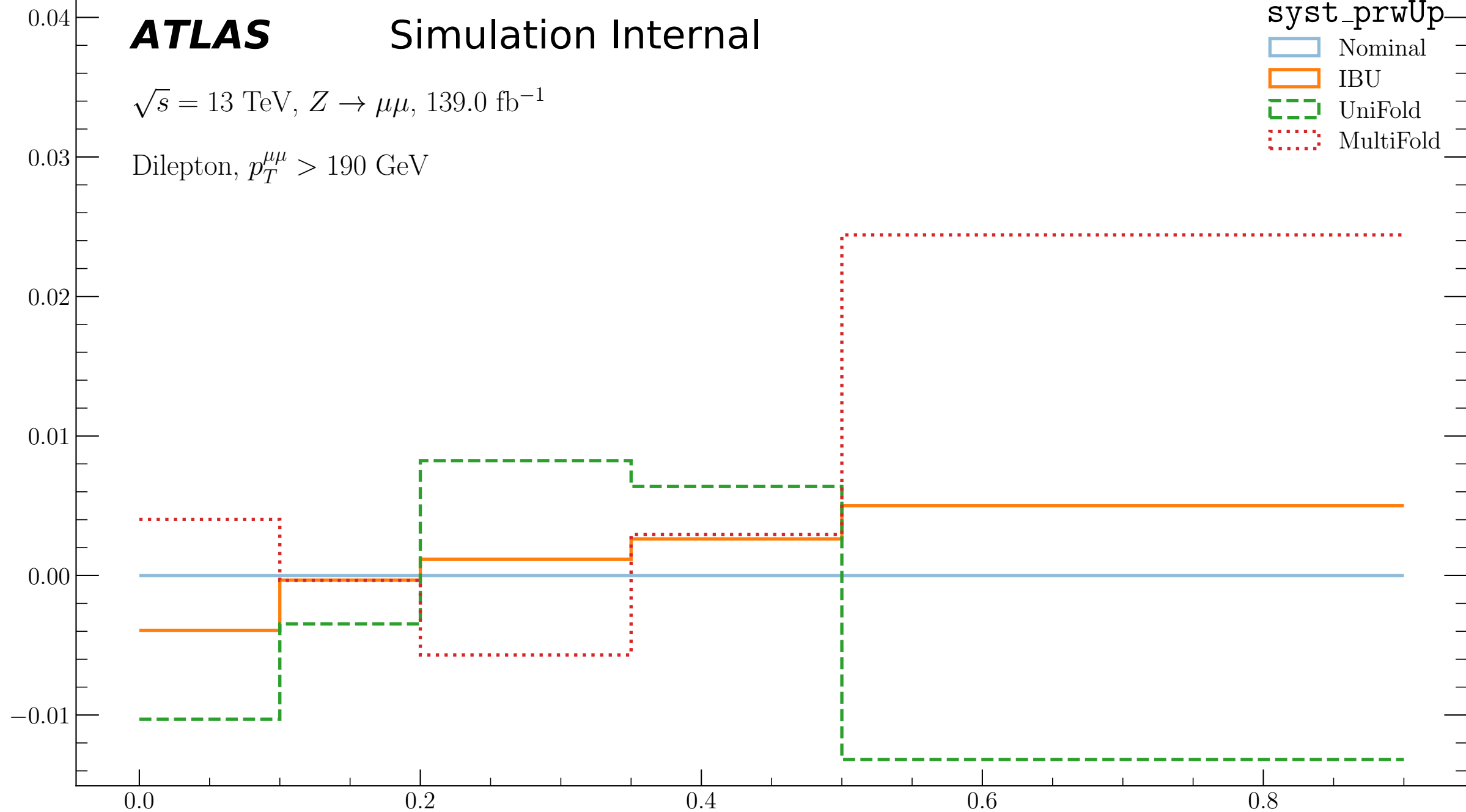
syst_prwUp

Nominal

IBU

UniFold

MultiFold



Subleading track jet τ_1

Relative Systematic Effect (MultiFold)

ATLAS

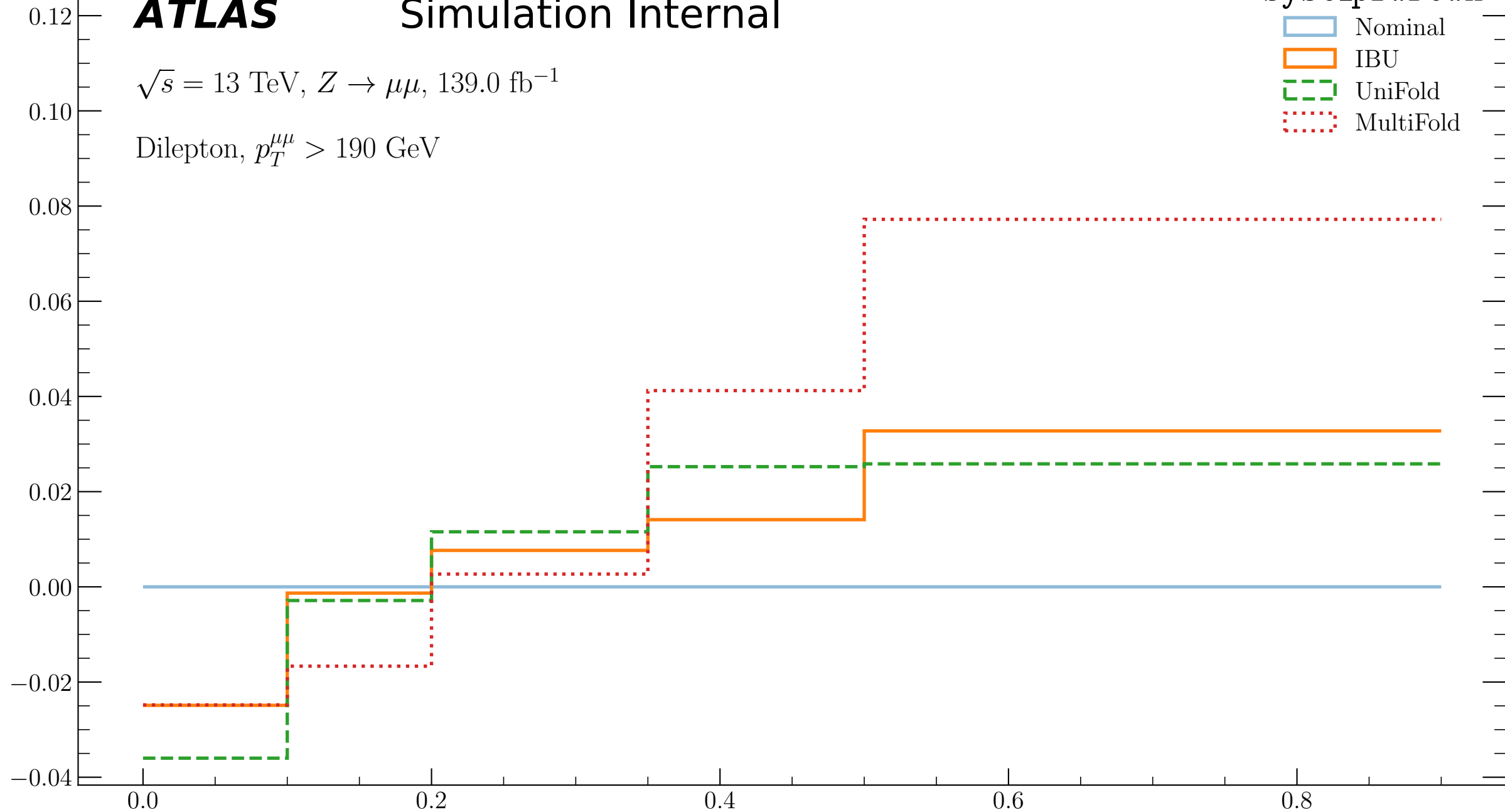
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_1

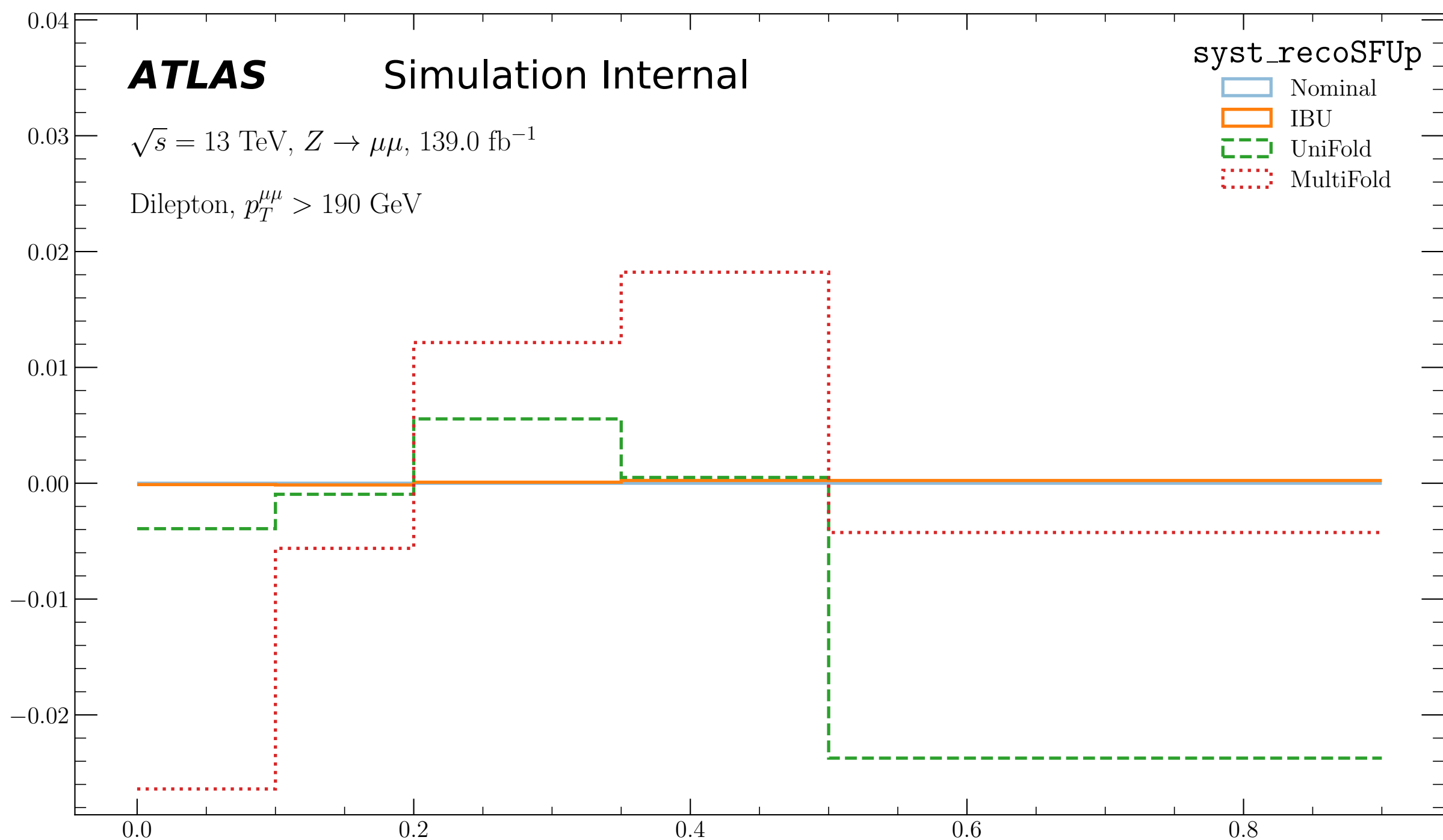
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet τ_1

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

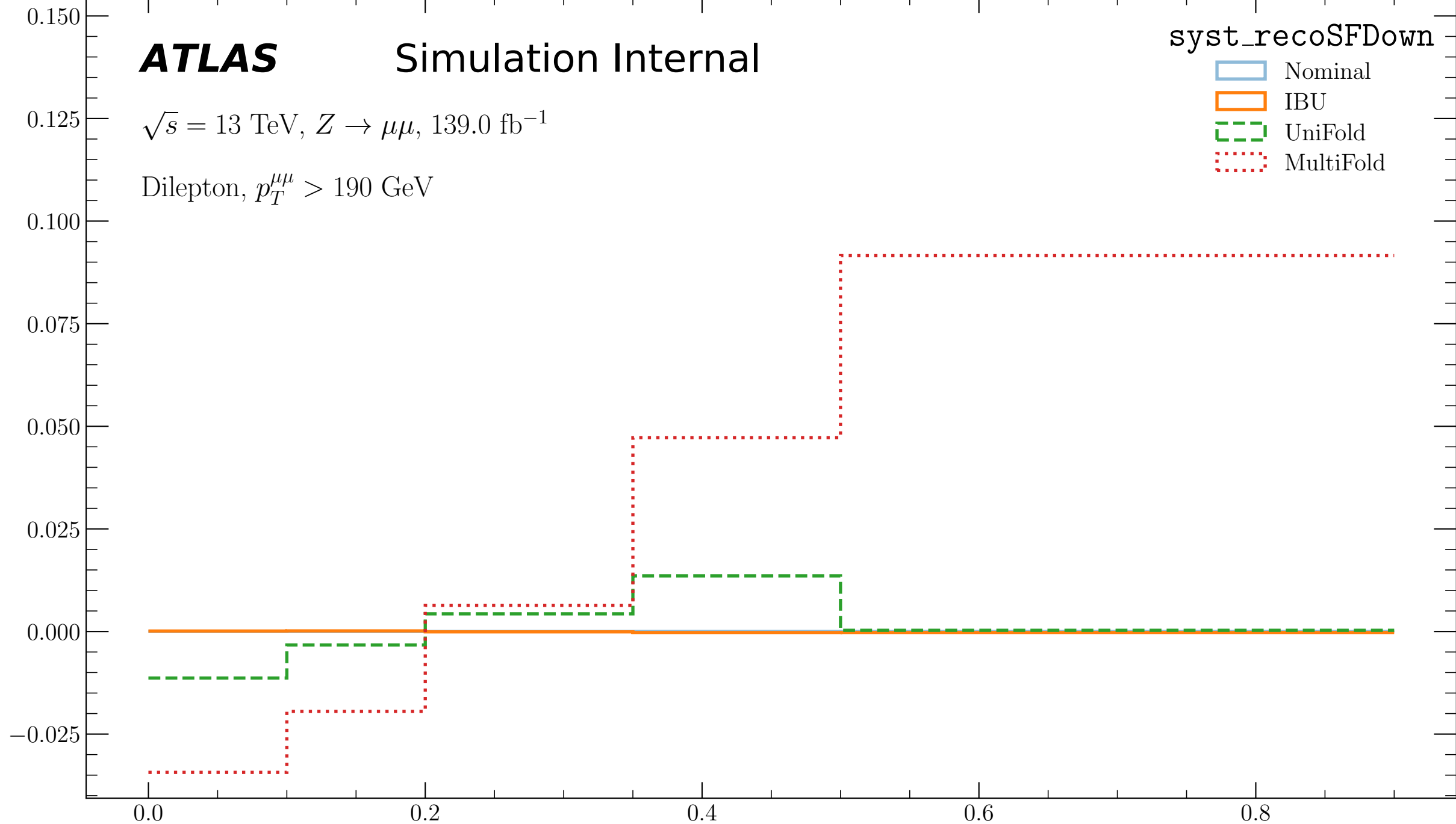
syst_recoSFDown

Nominal

IBU

UniFold

MultiFold

Subleading track jet τ_1

Relative Systematic Effect (MultiFold)

ATLAS

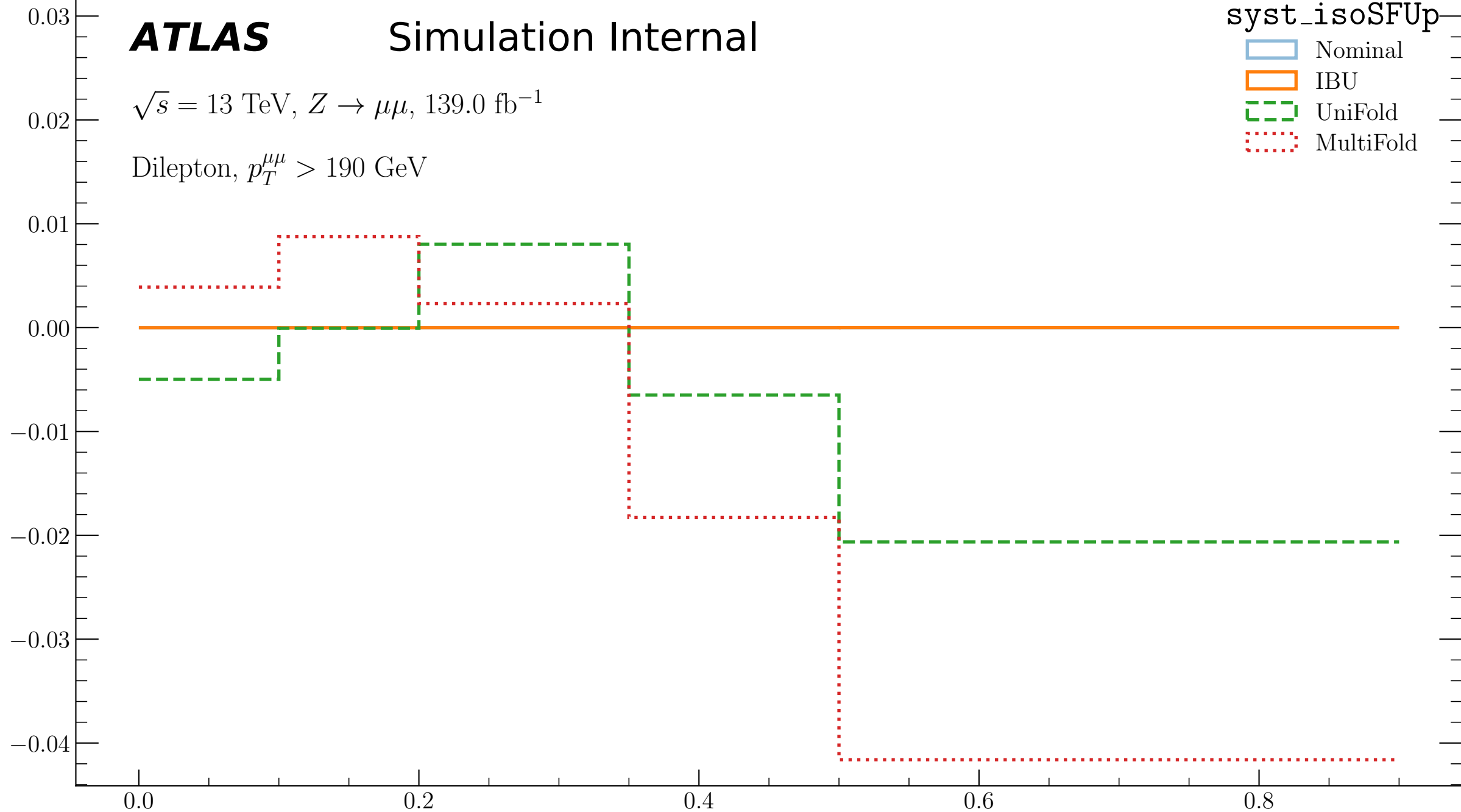
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_1

Relative Systematic Effect (MultiFold)

ATLAS

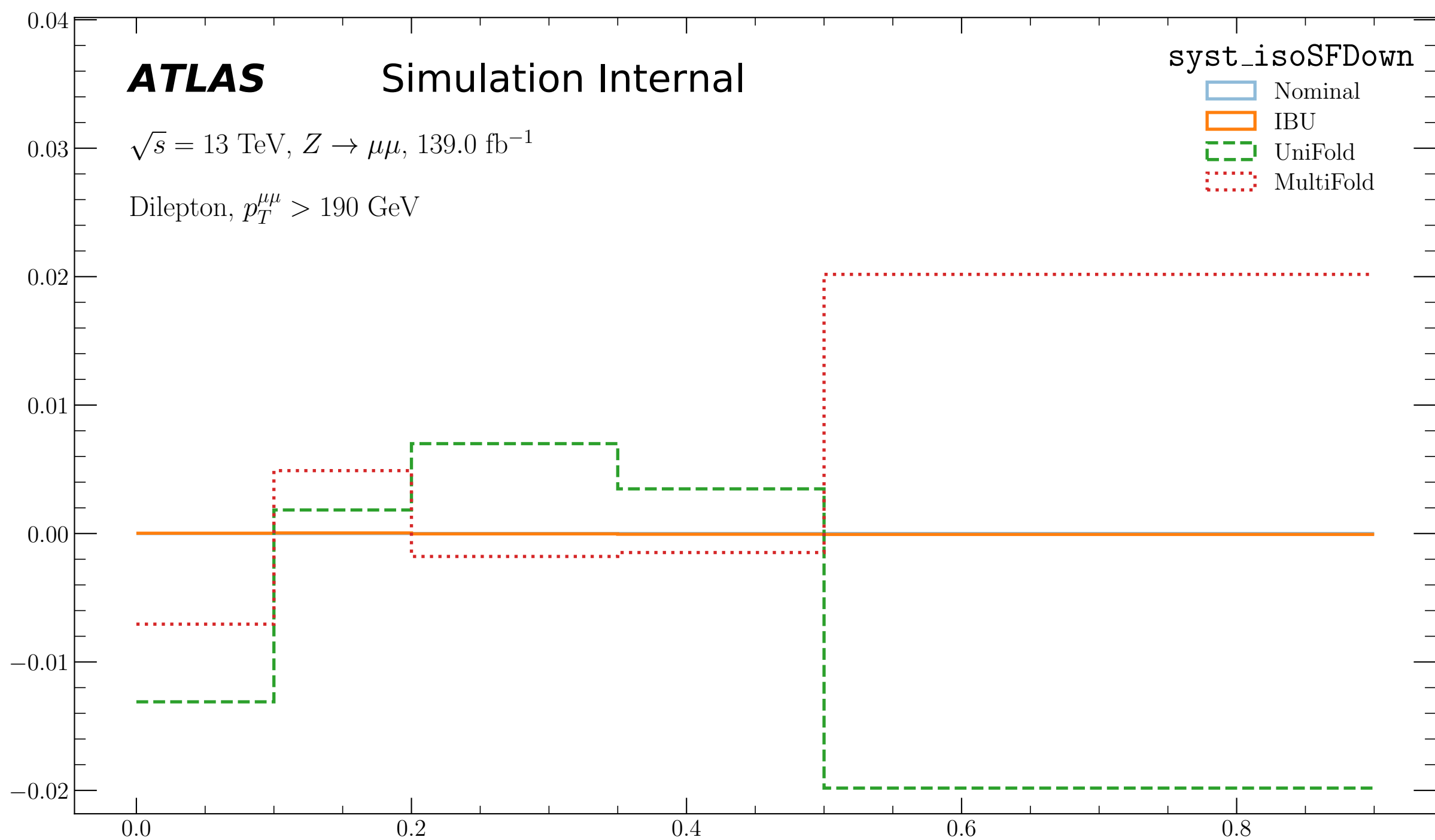
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_1

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASUp

- Nominal
- IBU
- UniFold
- MultiFold

0.20
0.15
0.10
0.05
0.00
-0.05

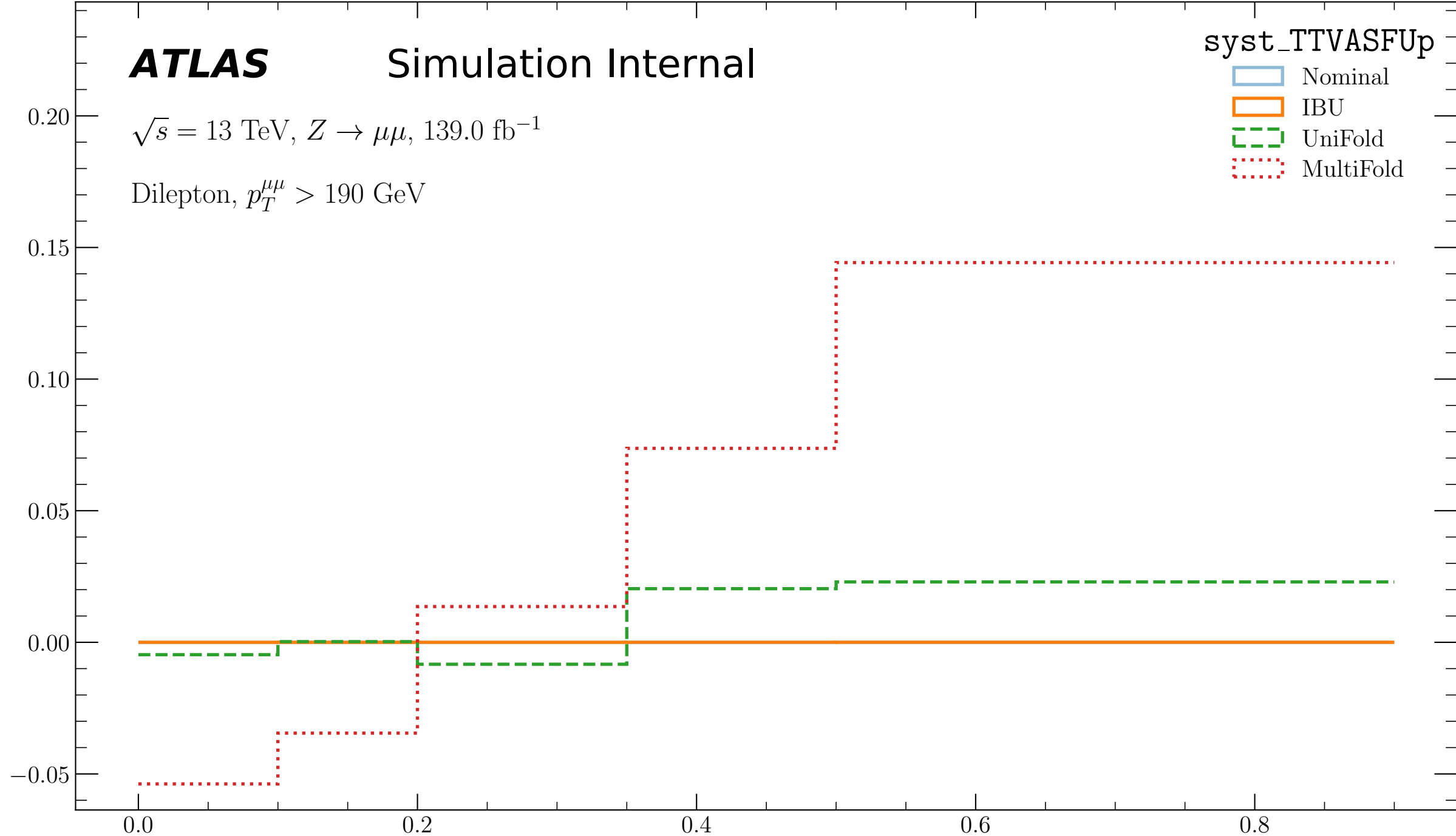
0.0

0.2

0.4

0.6

0.8

Subleading track jet τ_1 

Relative Systematic Effect (MultiFold)

ATLAS

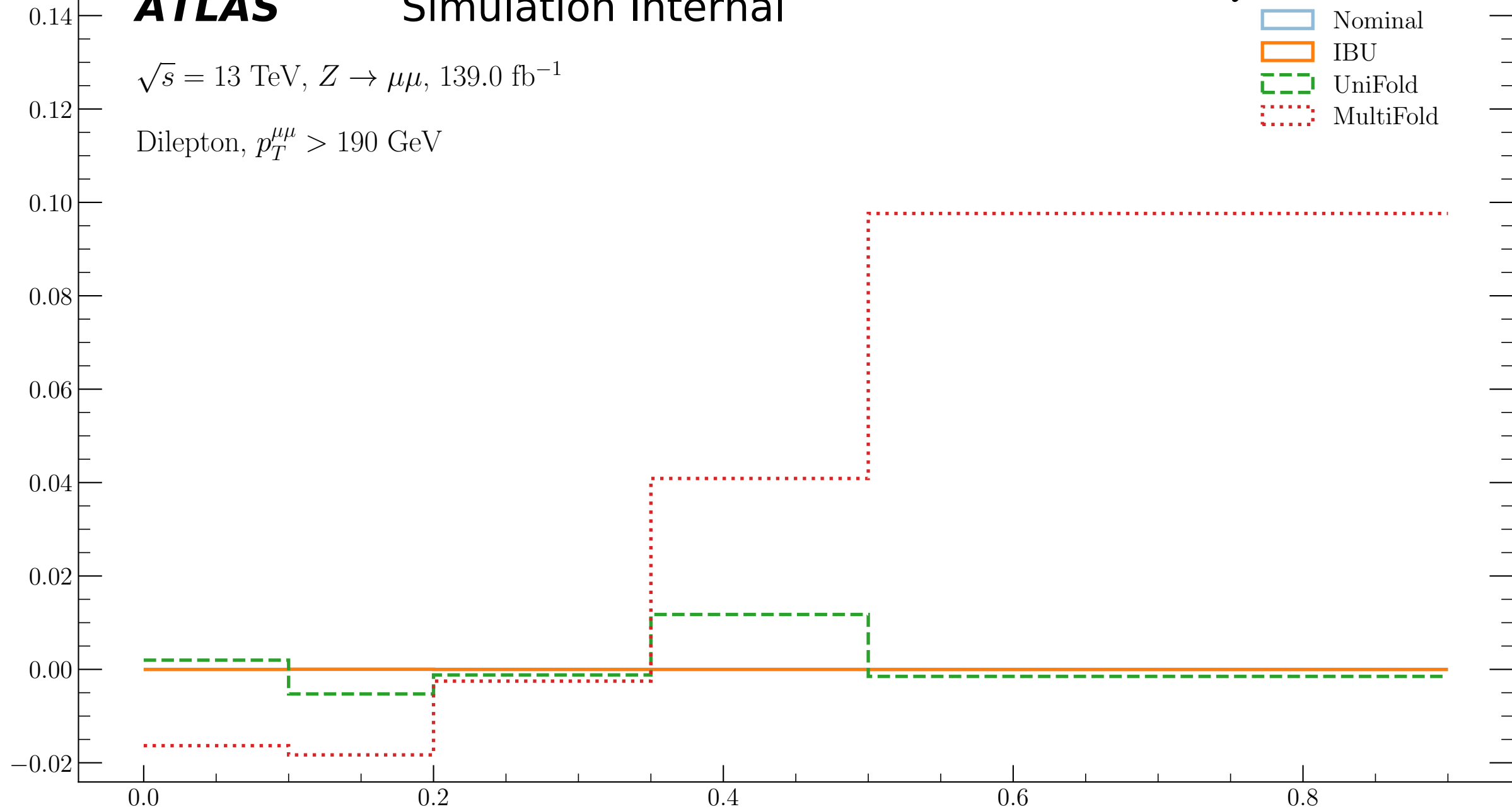
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

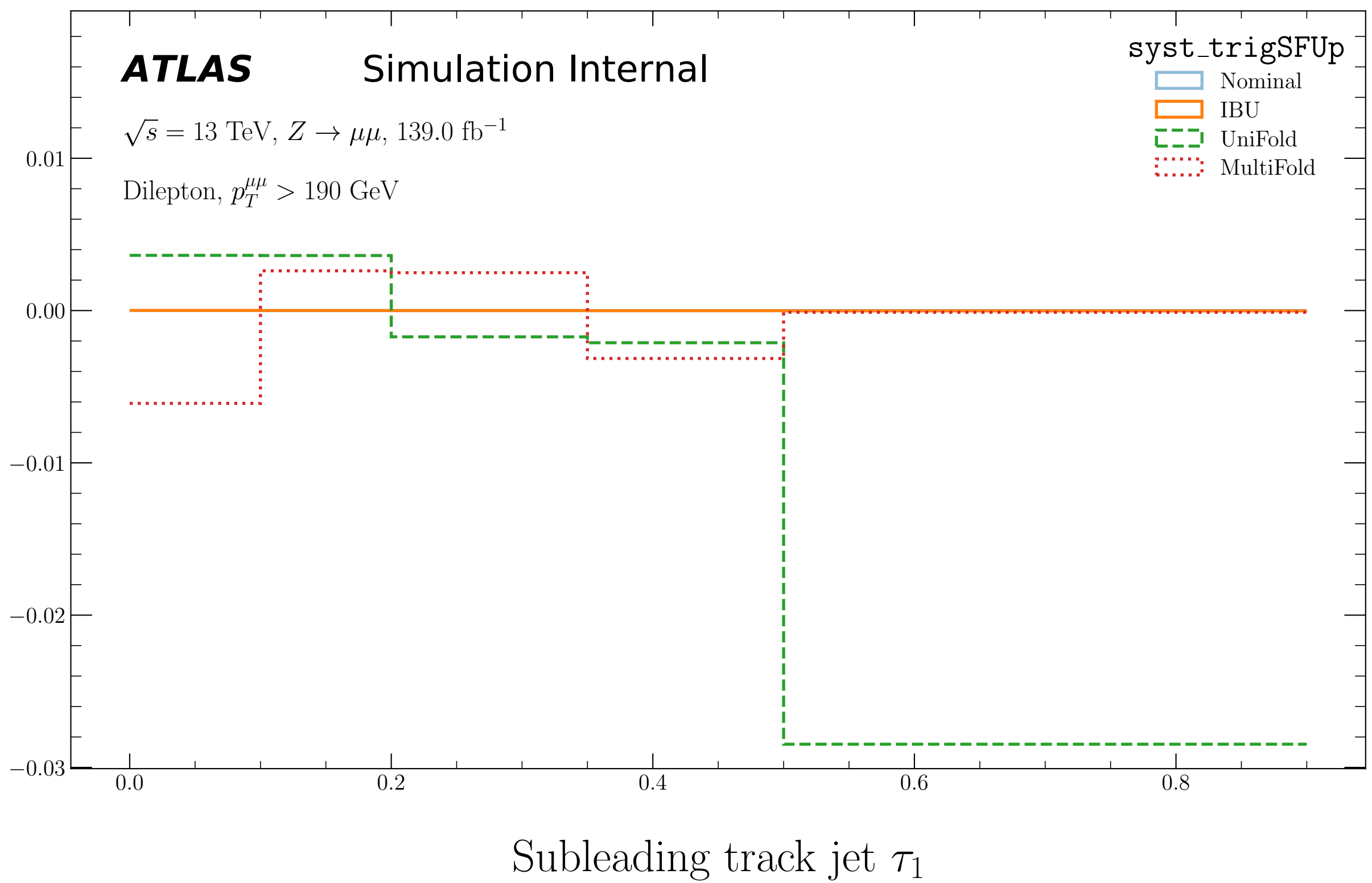
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_1



Relative Systematic Effect (MultiFold)

ATLAS

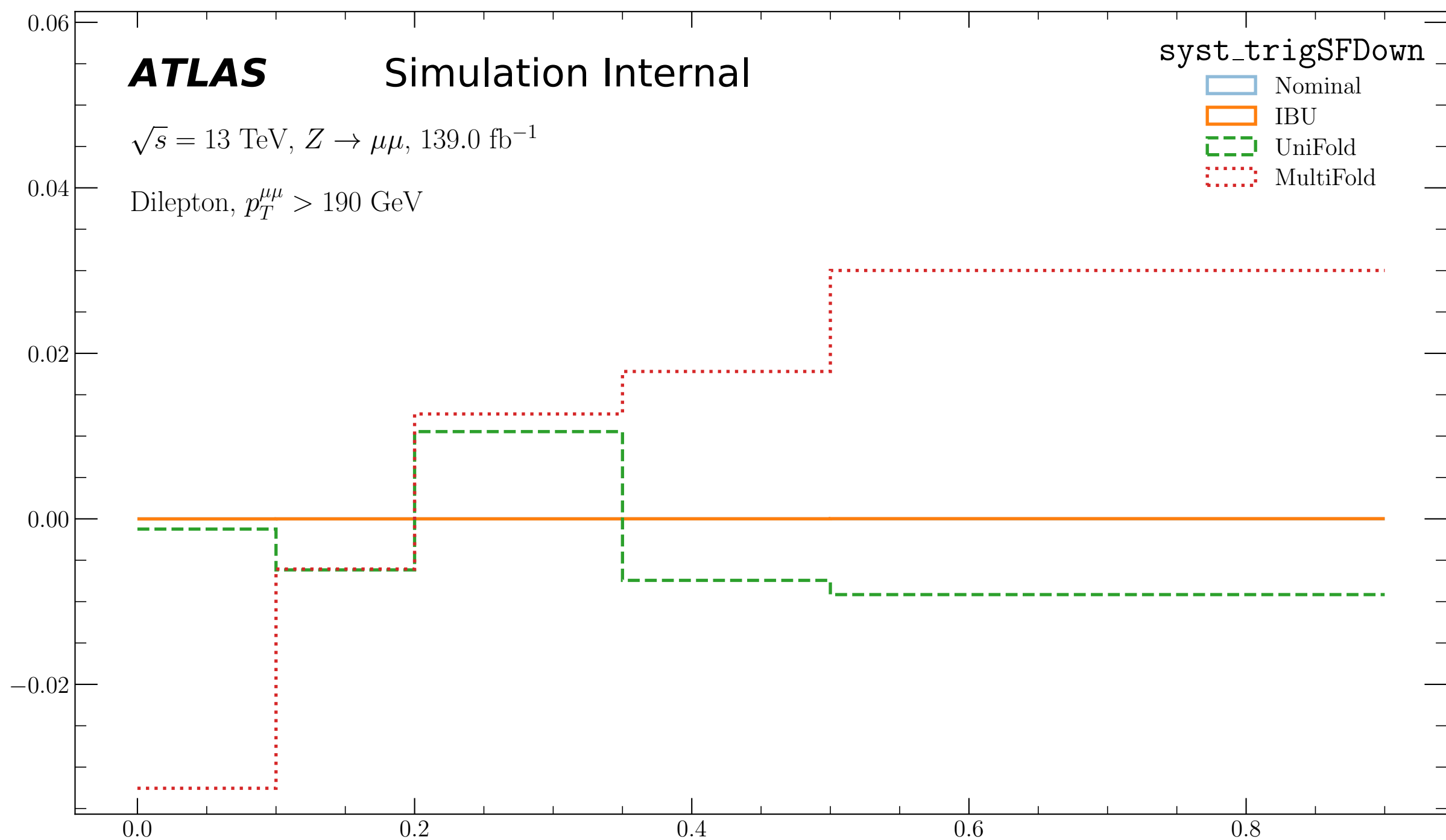
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

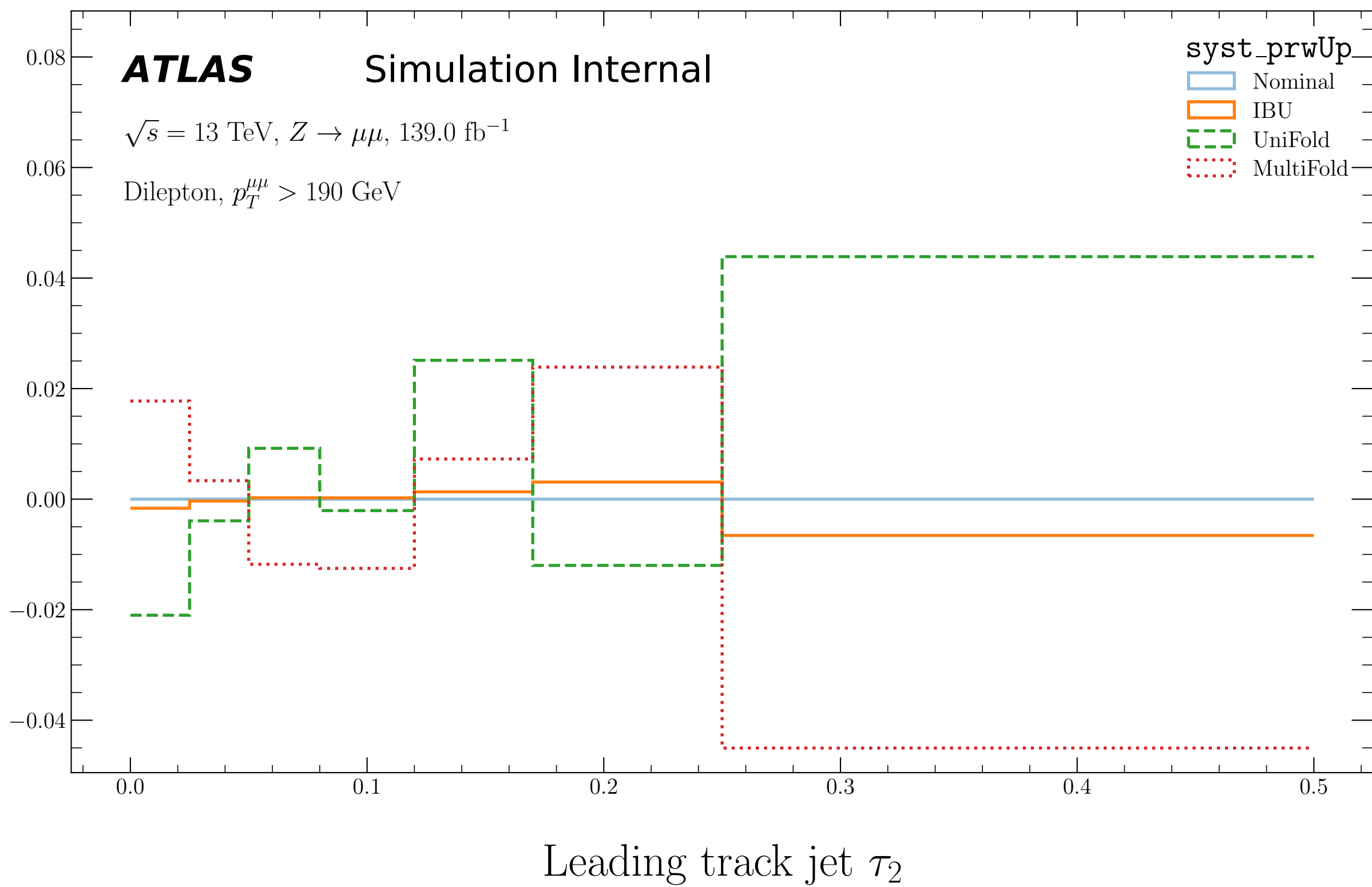
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

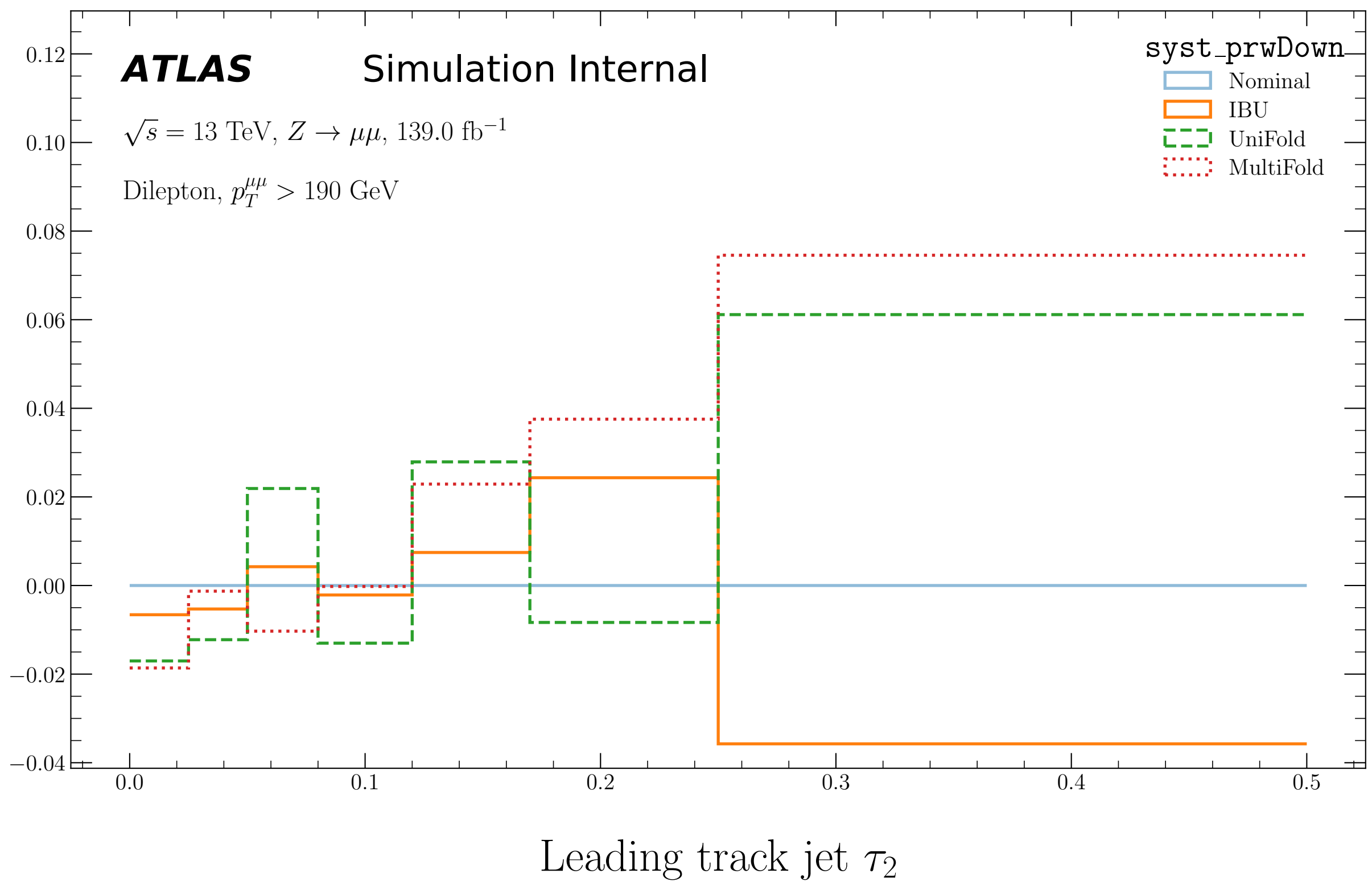
syst_trigSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_1





Relative Systematic Effect (MultiFold)

ATLAS

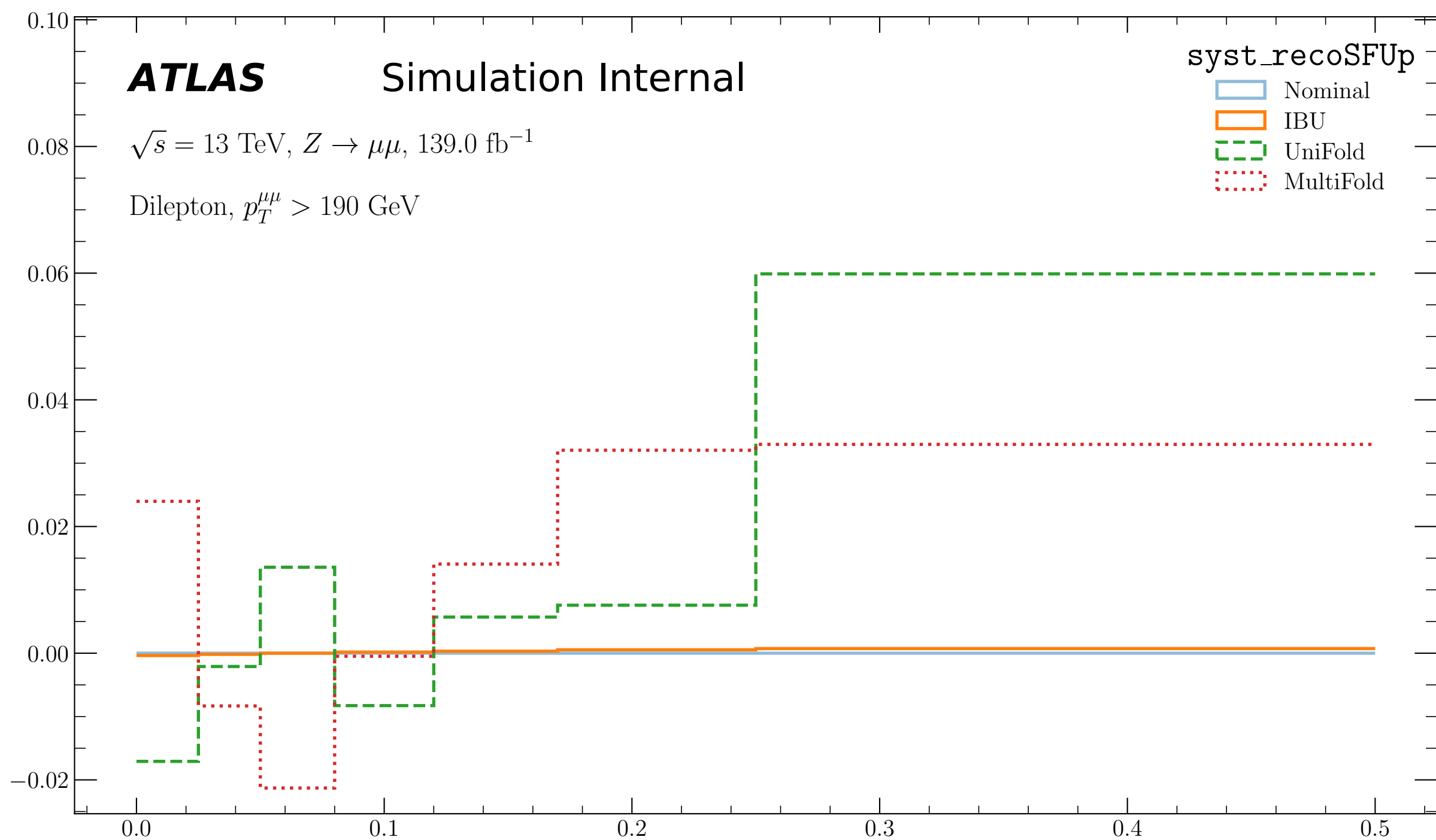
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_2

Relative Systematic Effect (MultiFold)

ATLAS

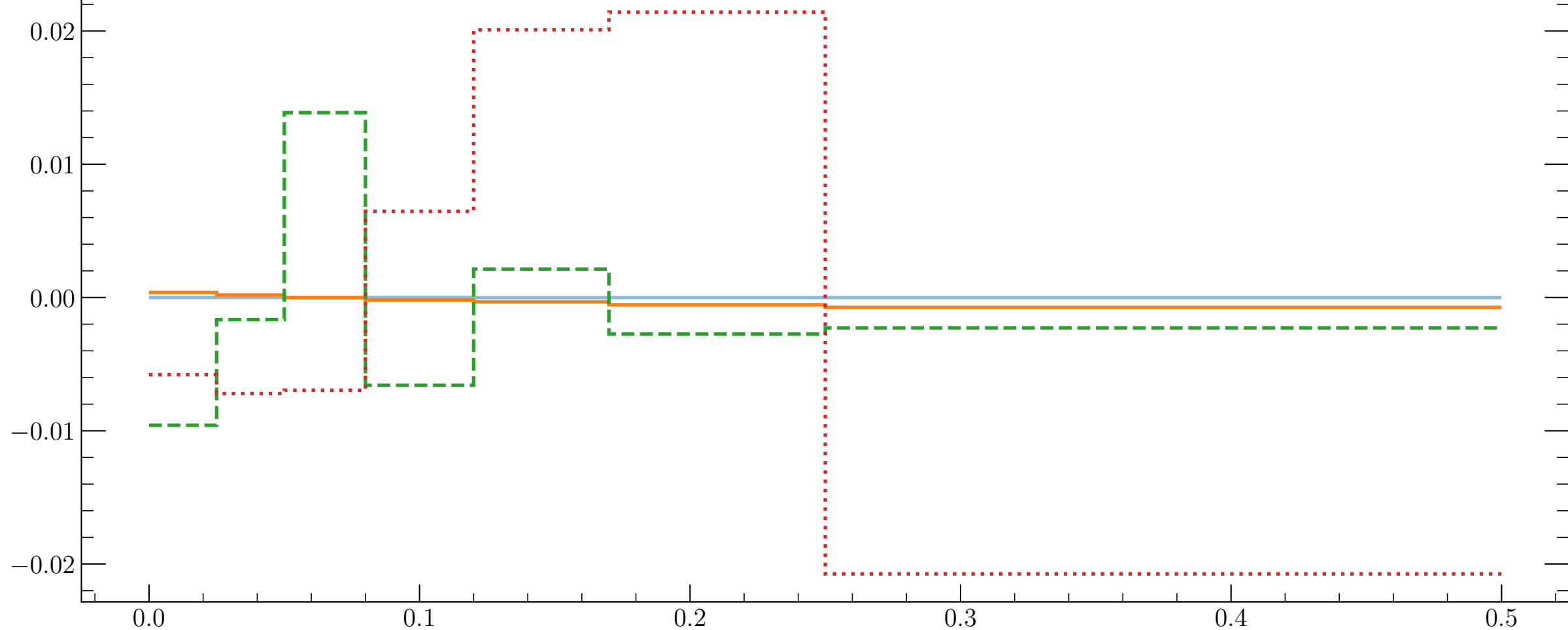
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_2

Relative Systematic Effect (MultiFold)

ATLAS

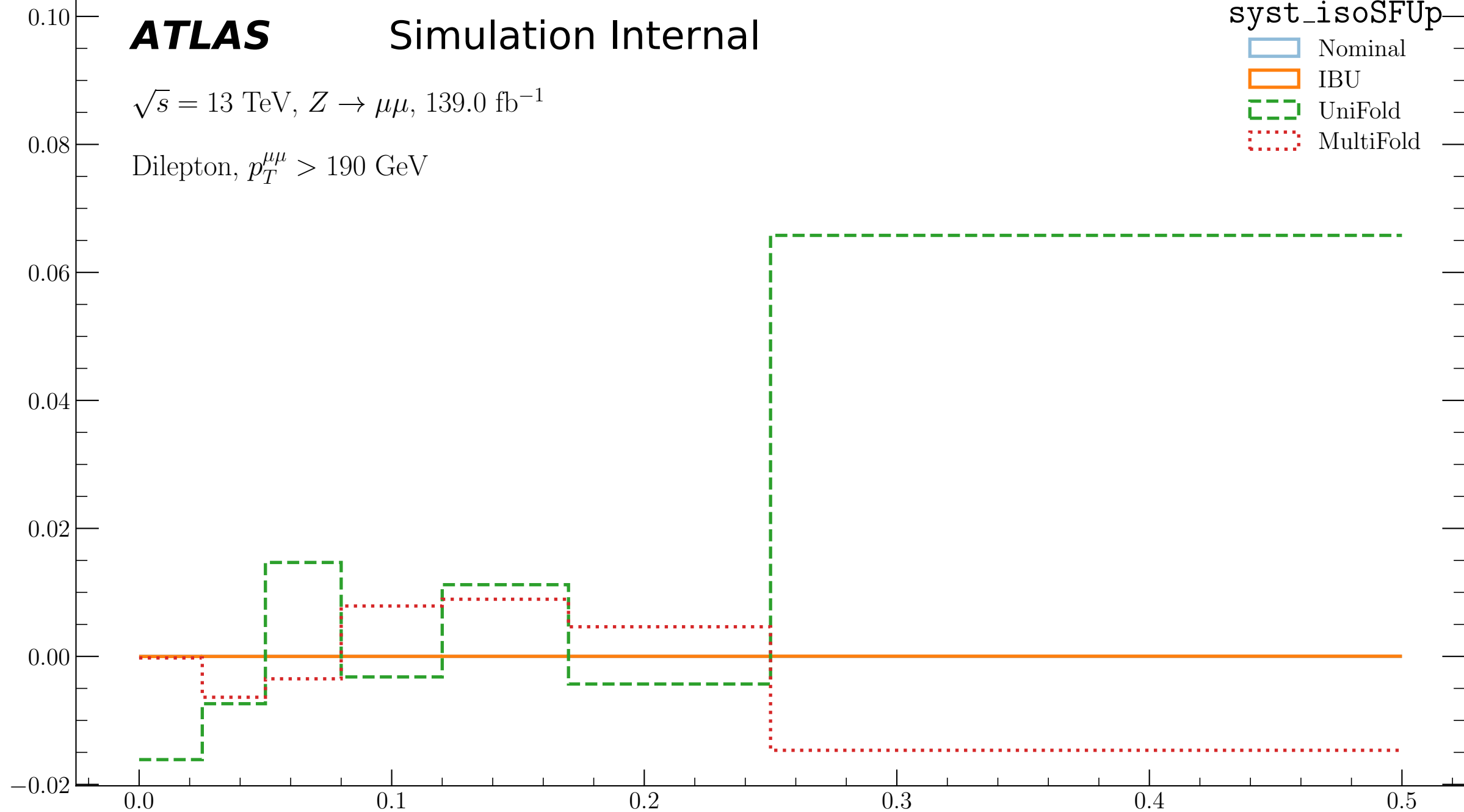
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_2

Relative Systematic Effect (MultiFold)

ATLAS

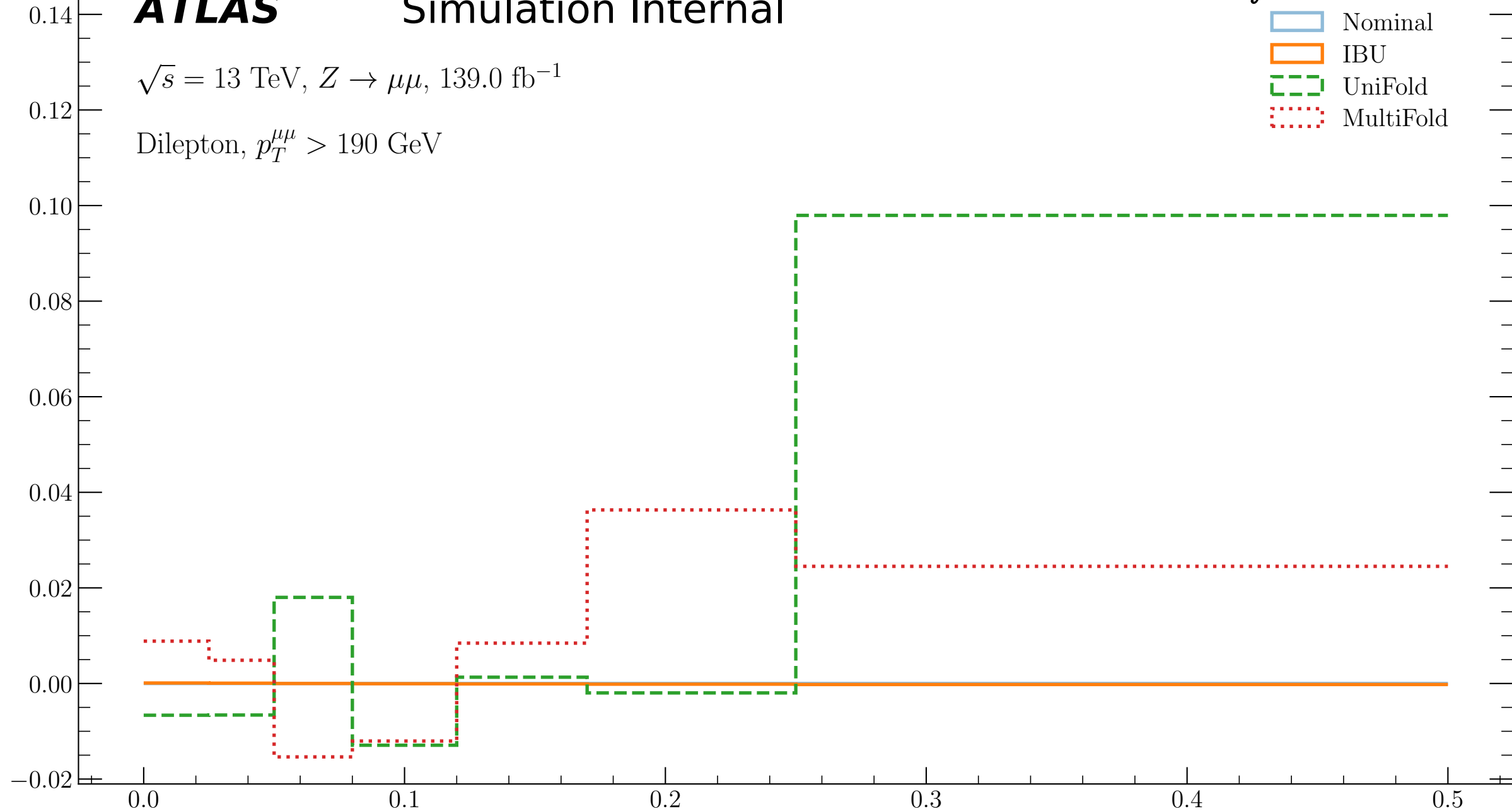
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

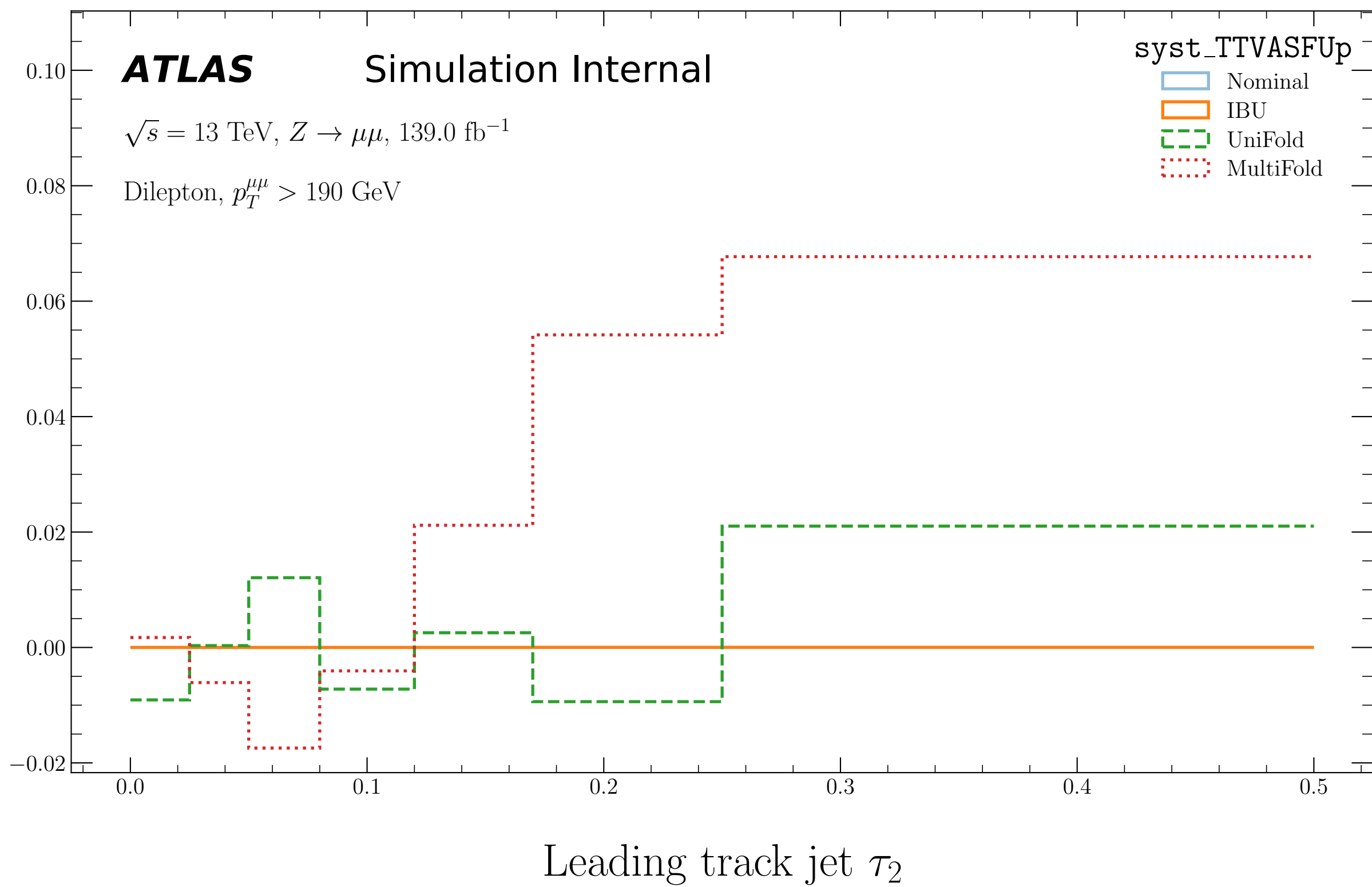
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_2



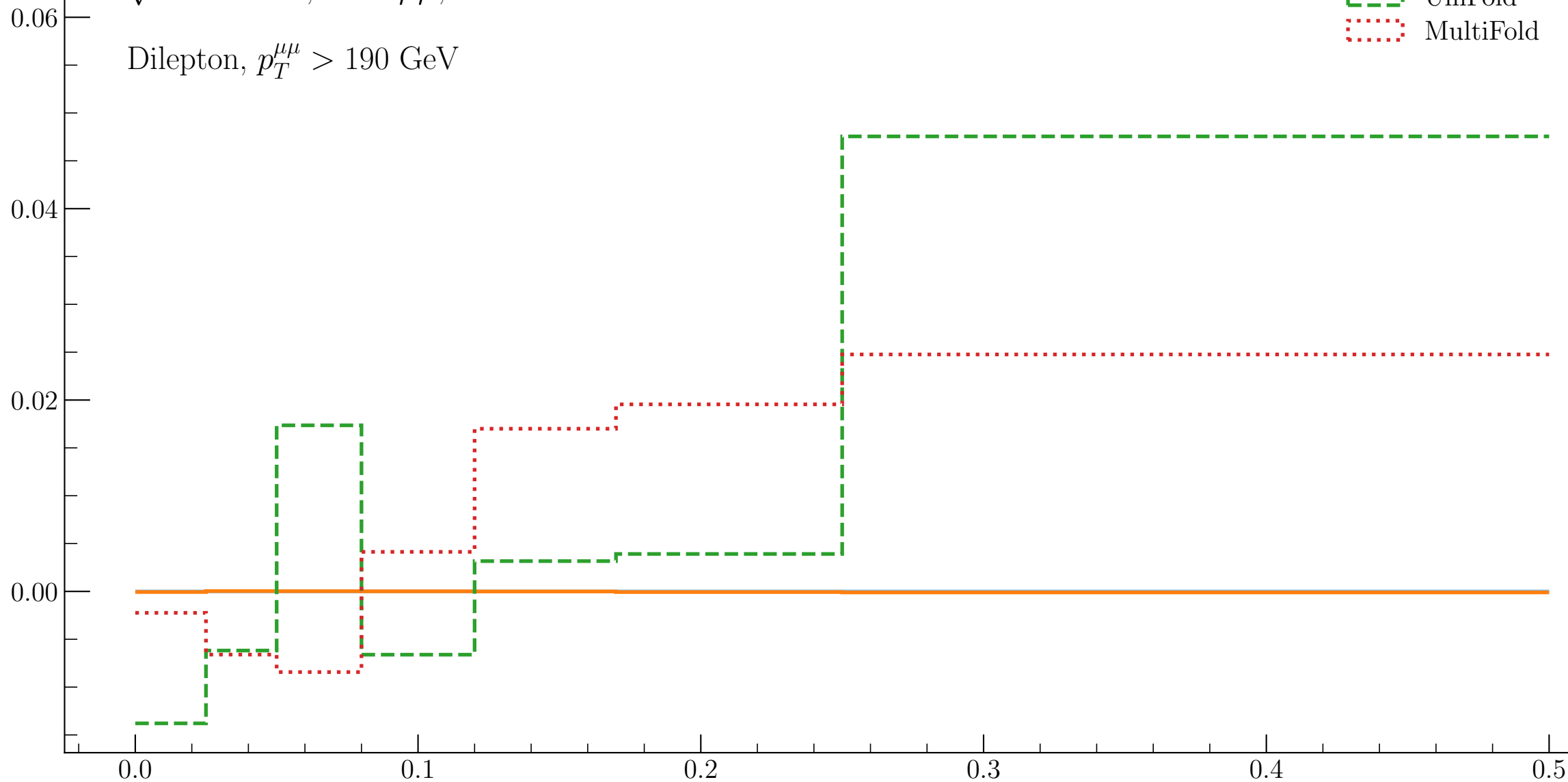
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet τ_2

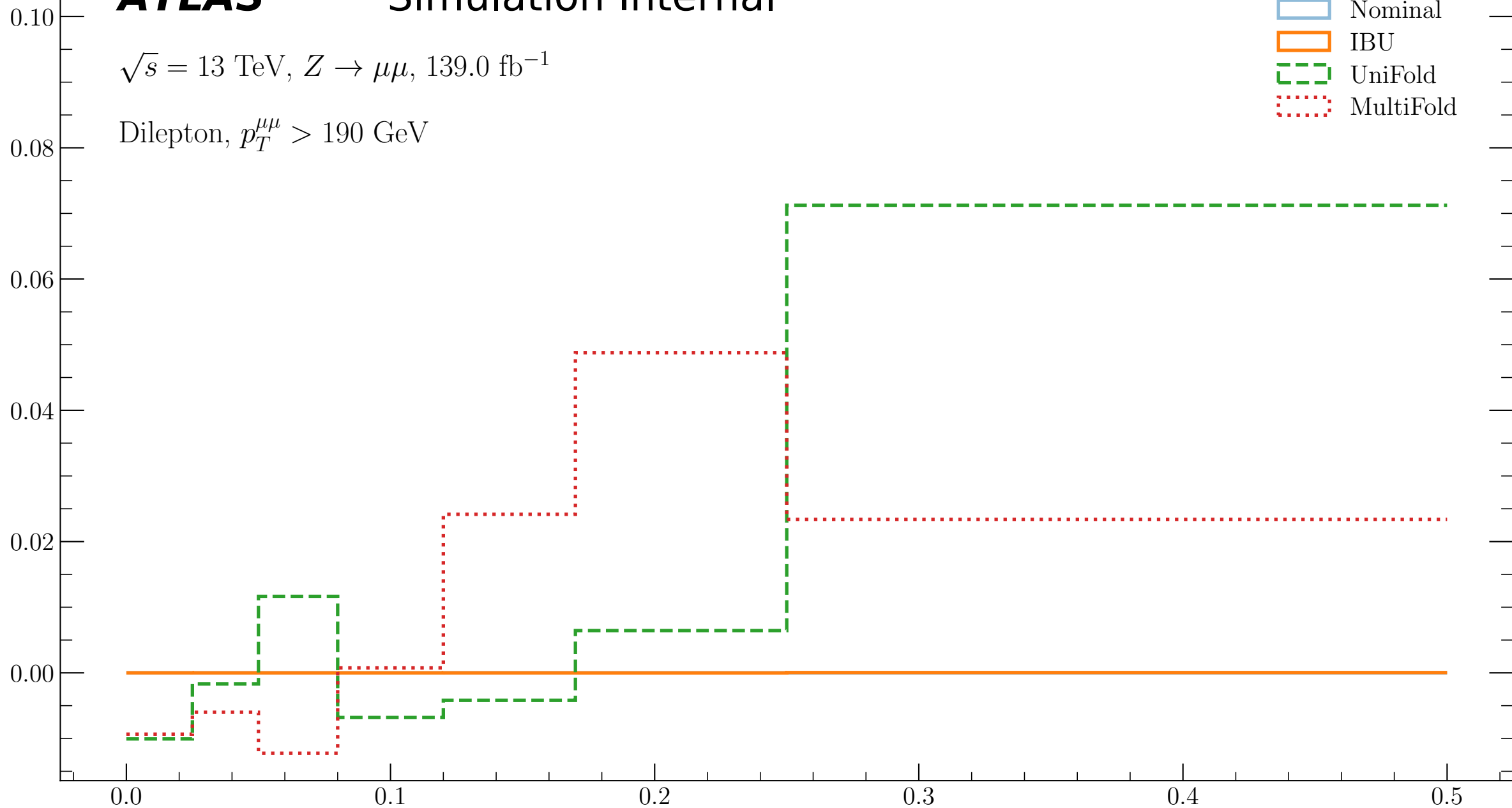
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet τ_2

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

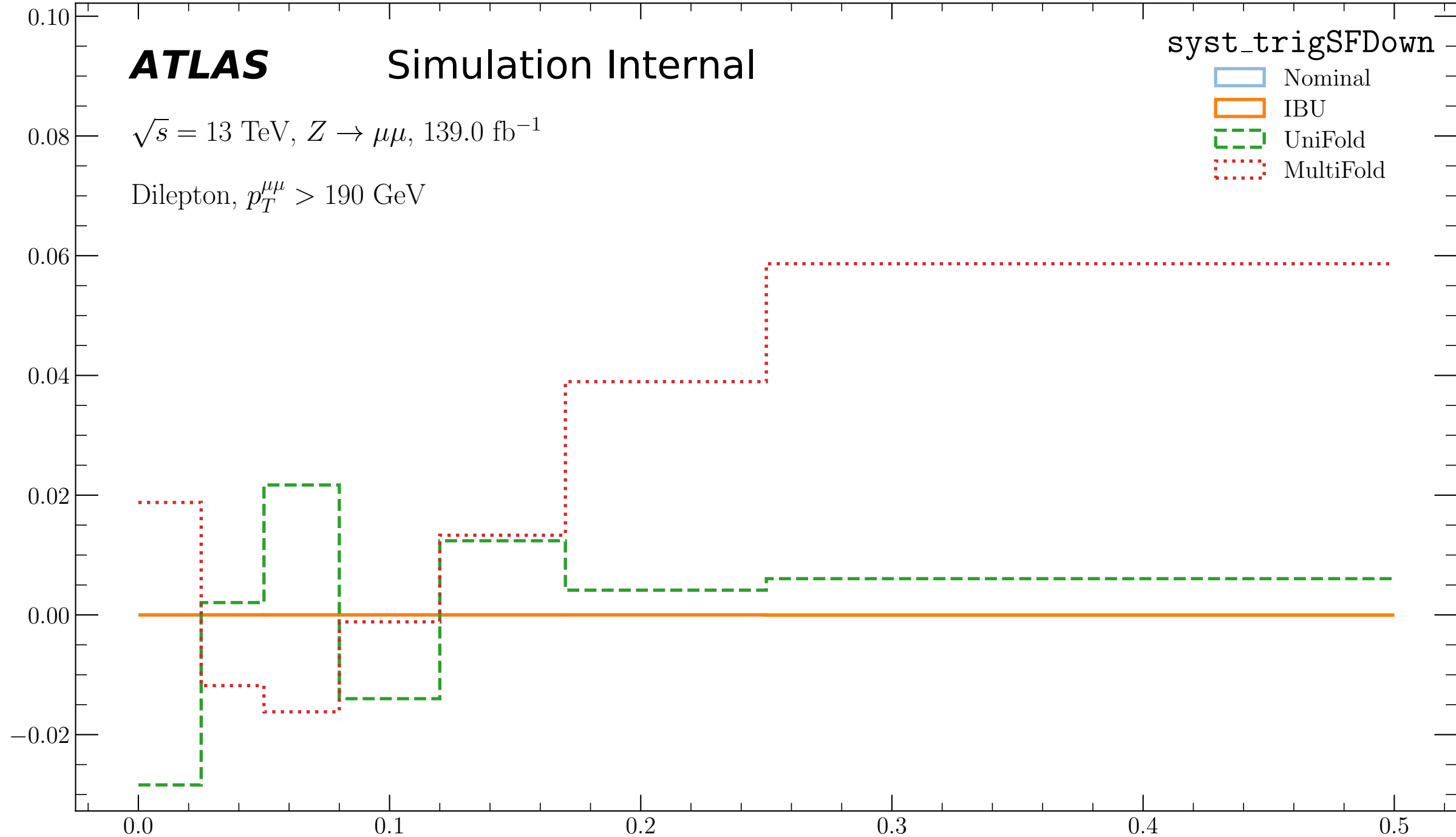
syst_trigSFDown

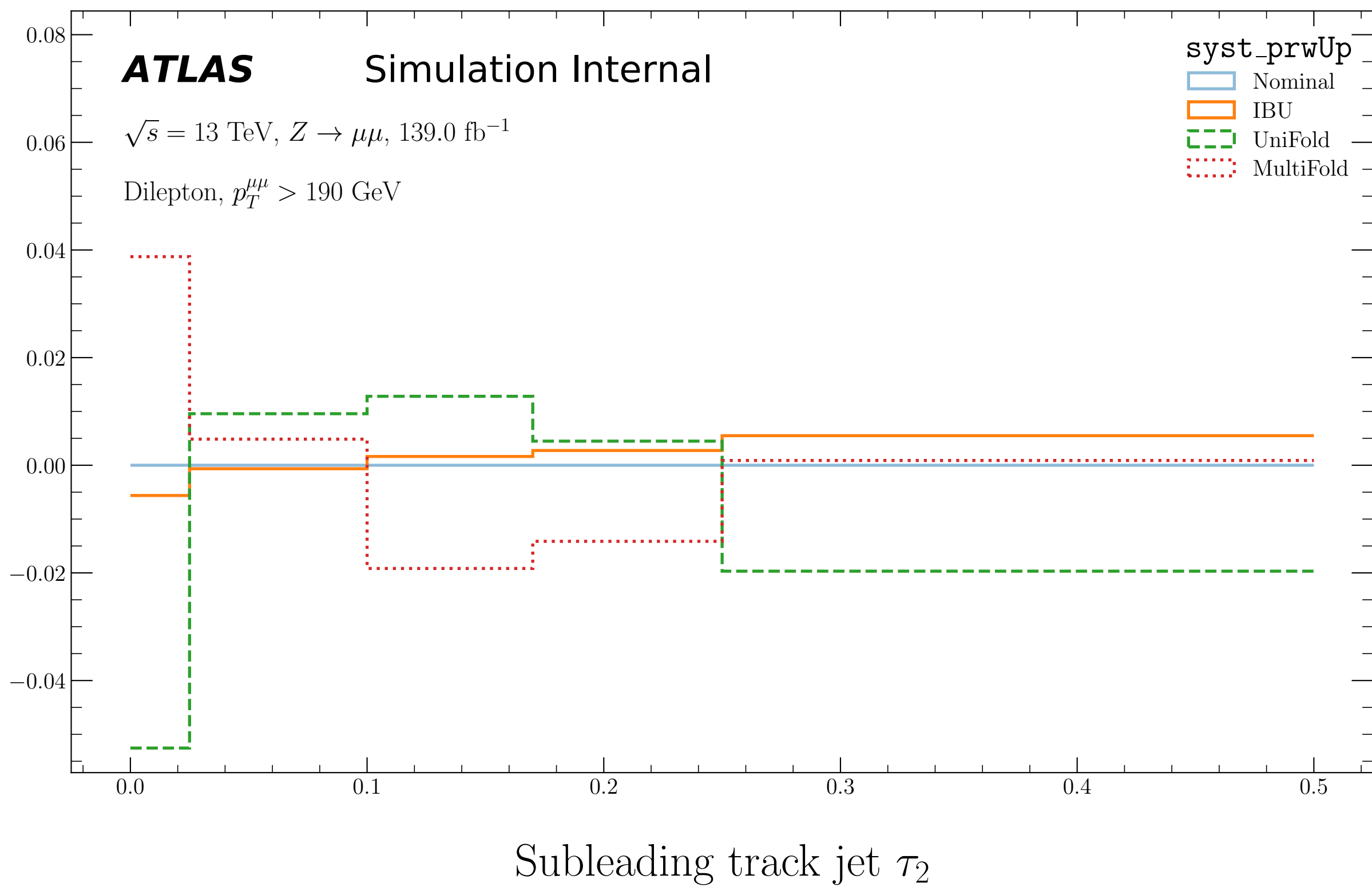
Nominal

IBU

UniFold

MultiFold

Leading track jet τ_2



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

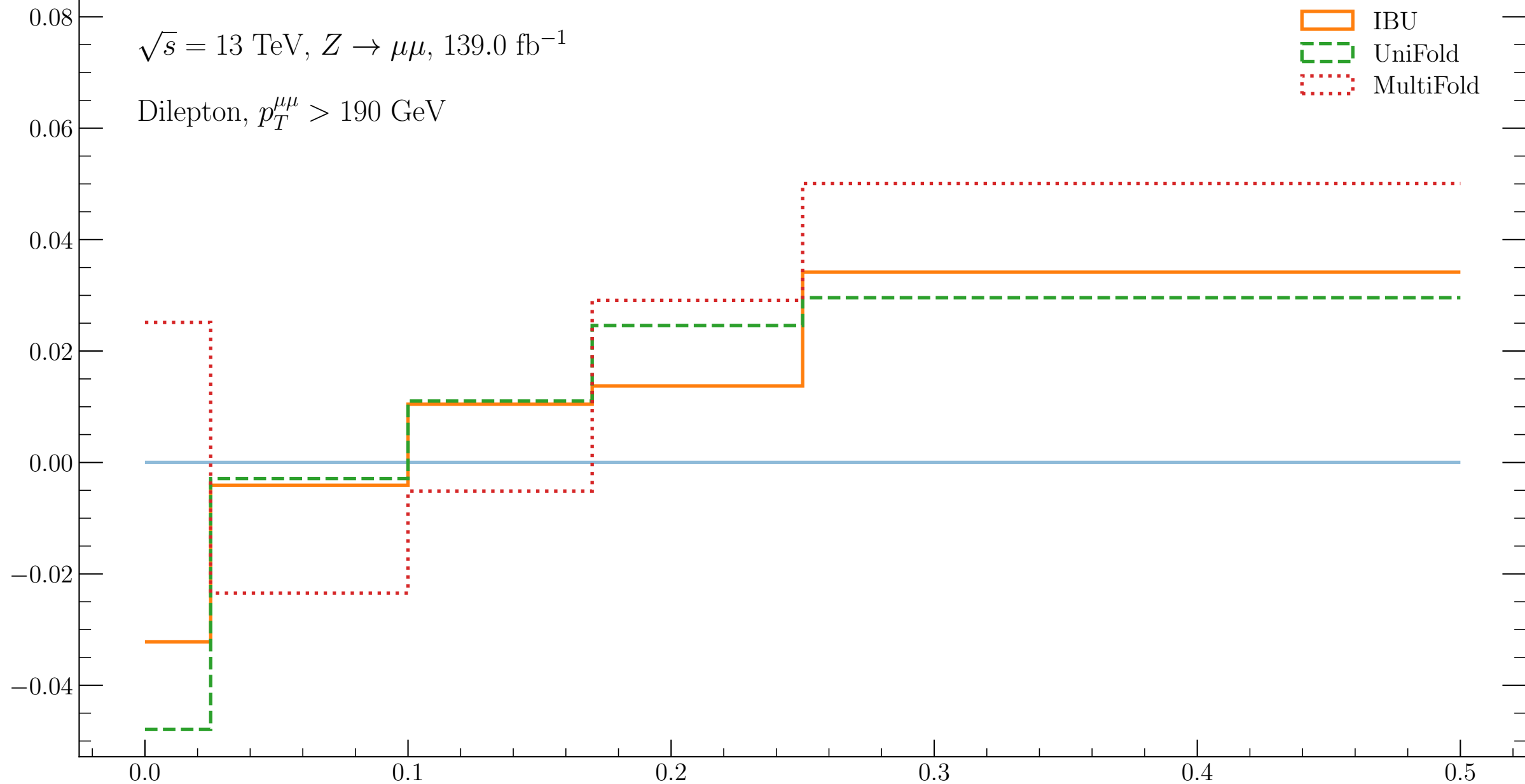
syst_prwDown

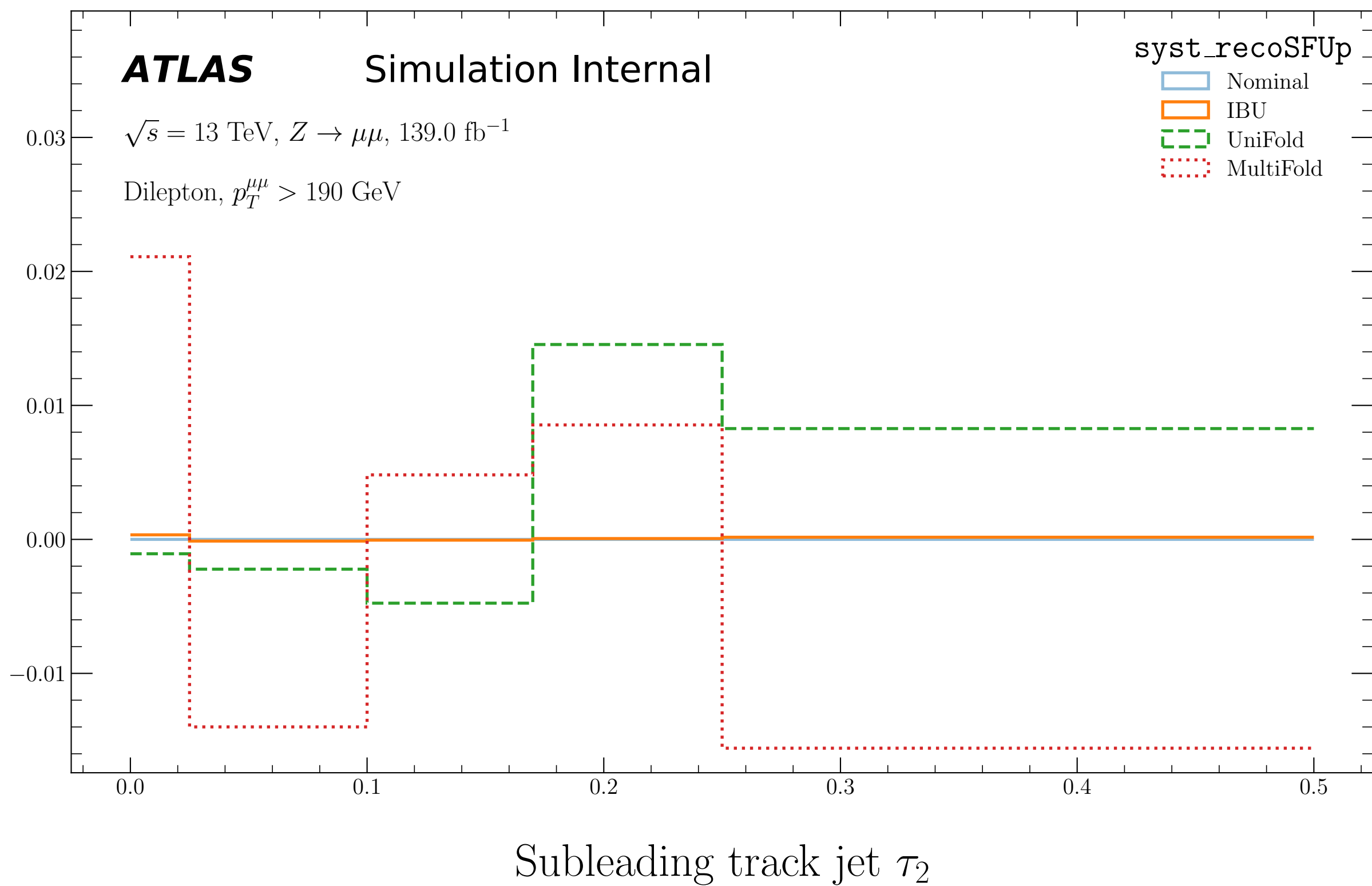
Nominal

IBU

UniFold

MultiFold

Subleading track jet τ_2



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.15

0.10

0.05

0.00

0.0

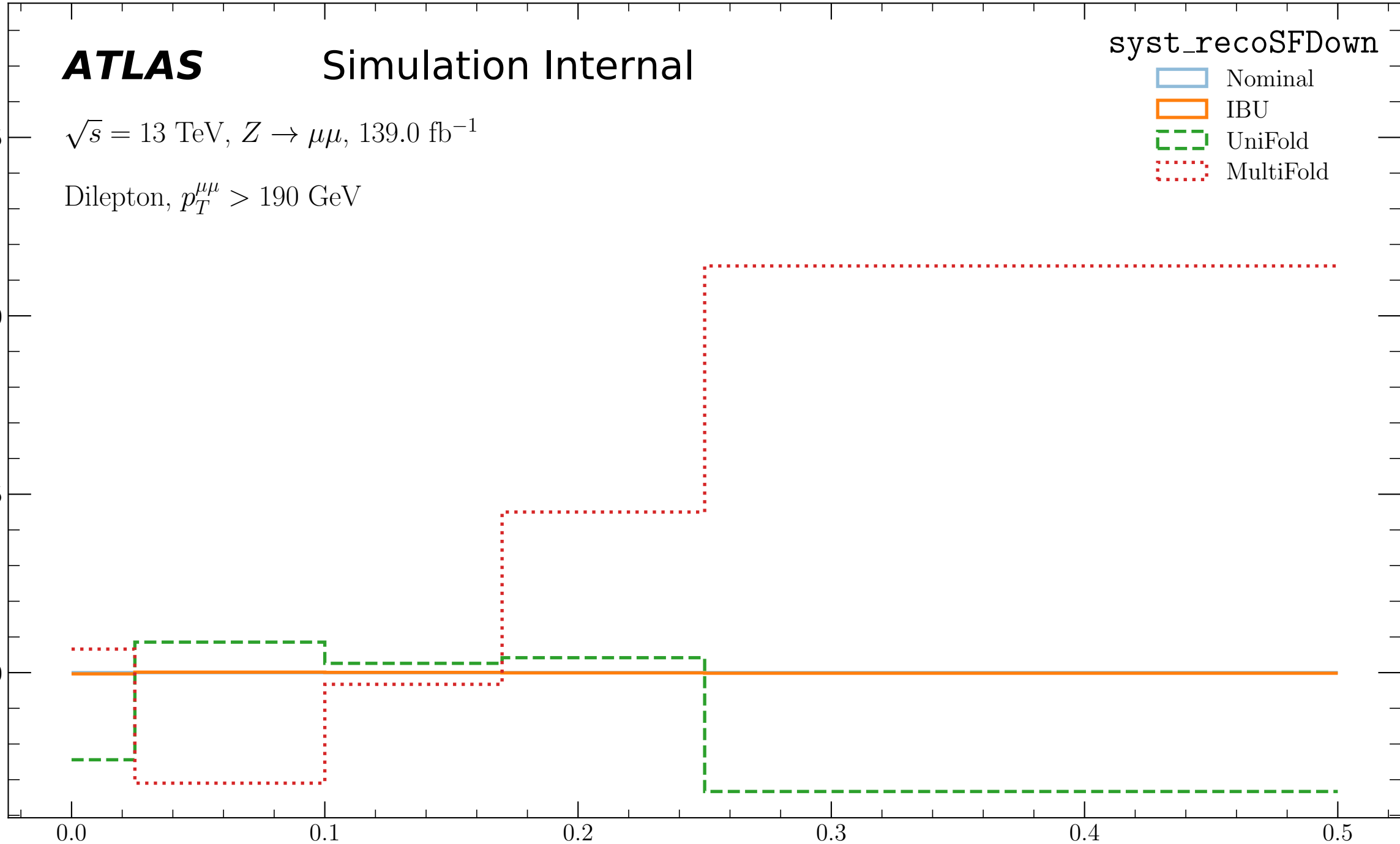
0.1

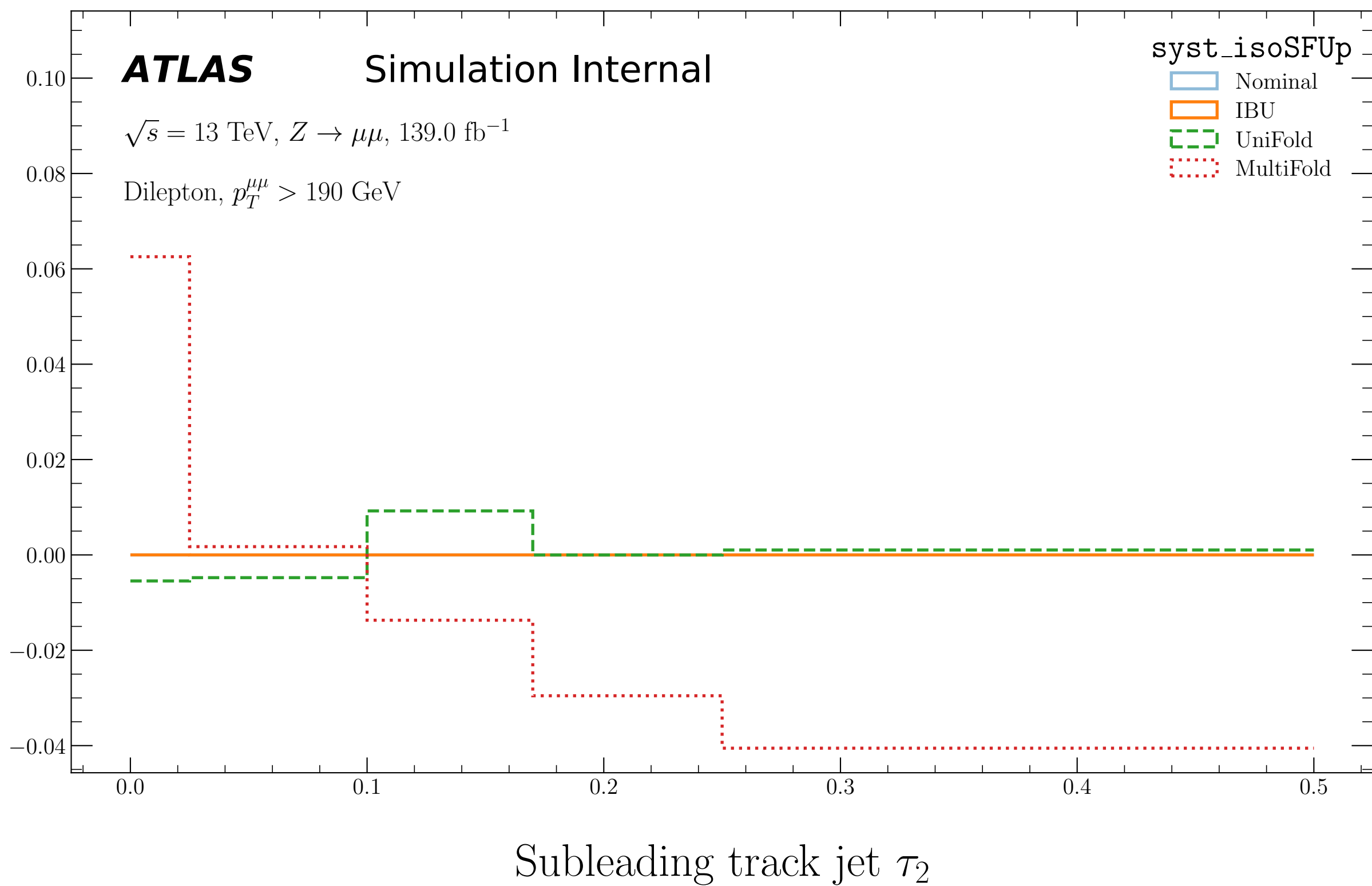
0.2

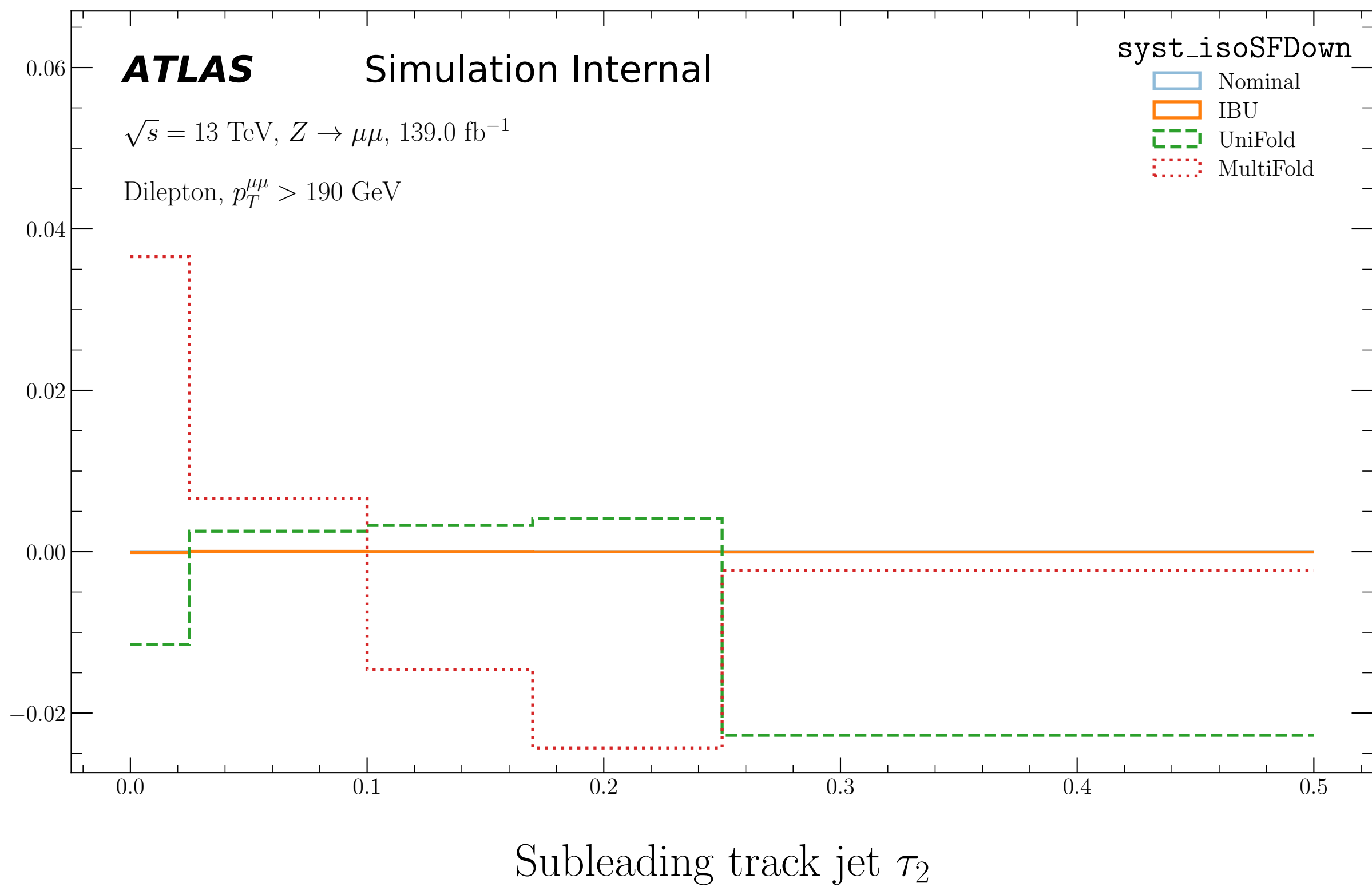
0.3

0.4

0.5

Subleading track jet τ_2 





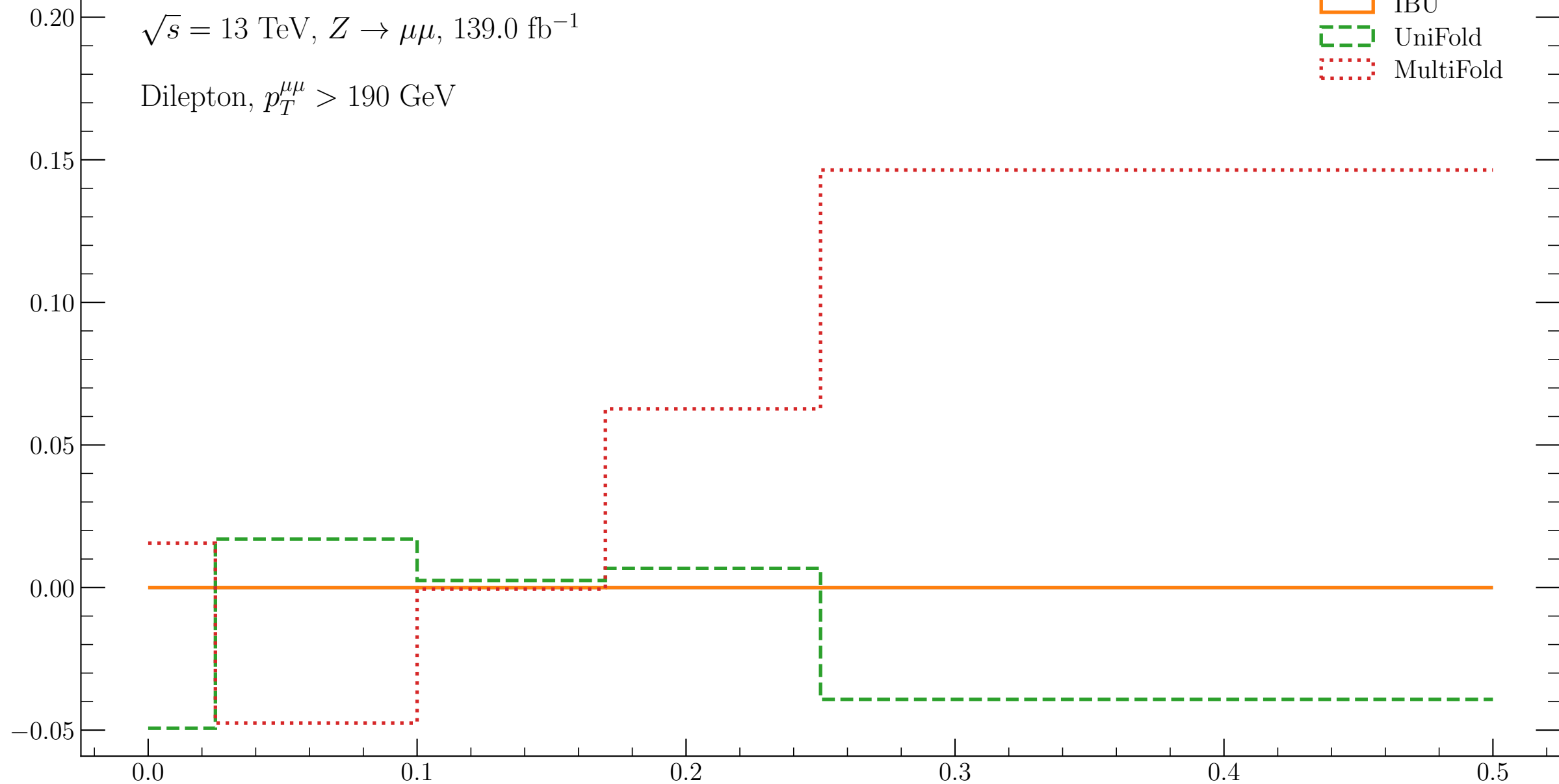
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASUp

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet τ_2

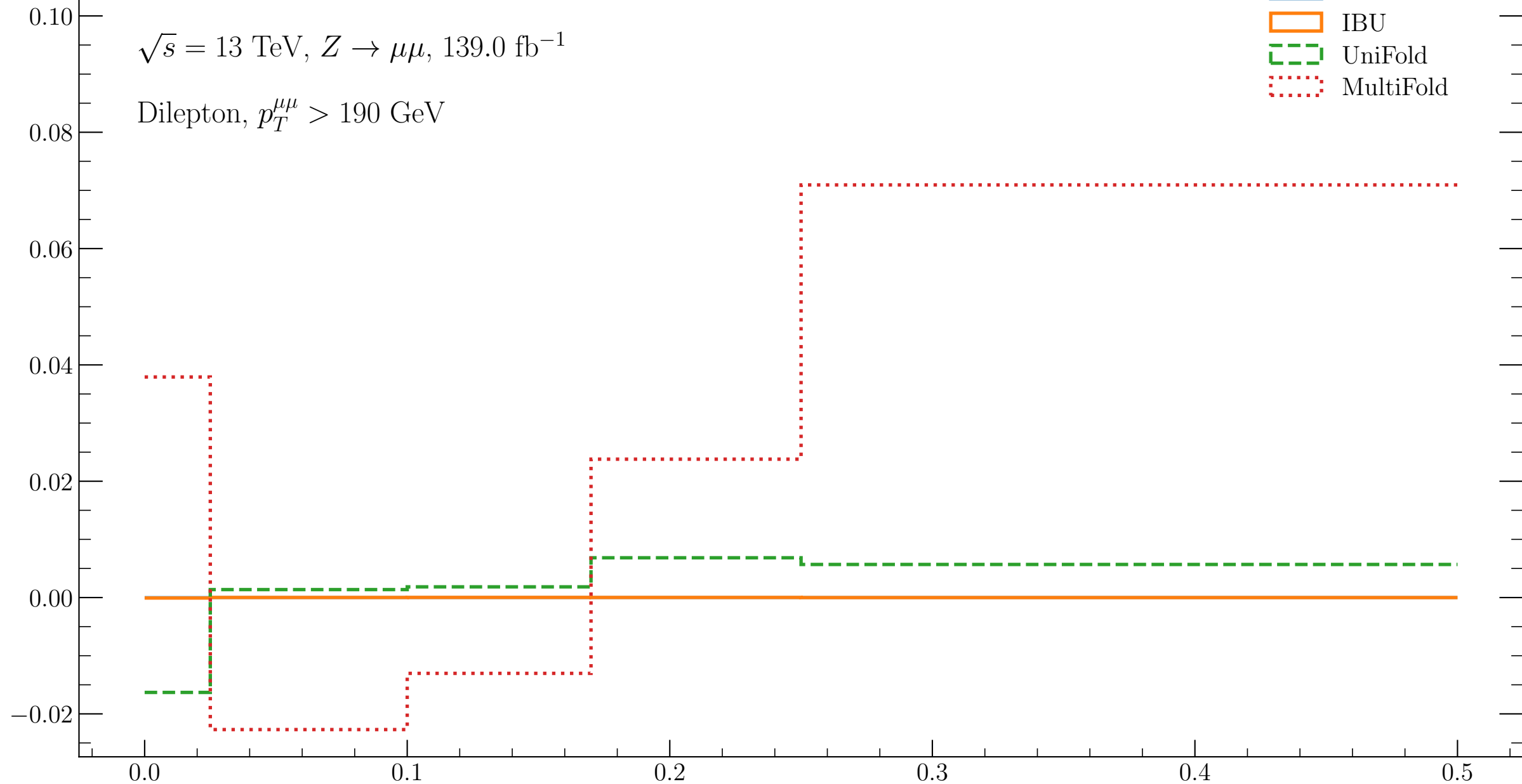
ATLAS

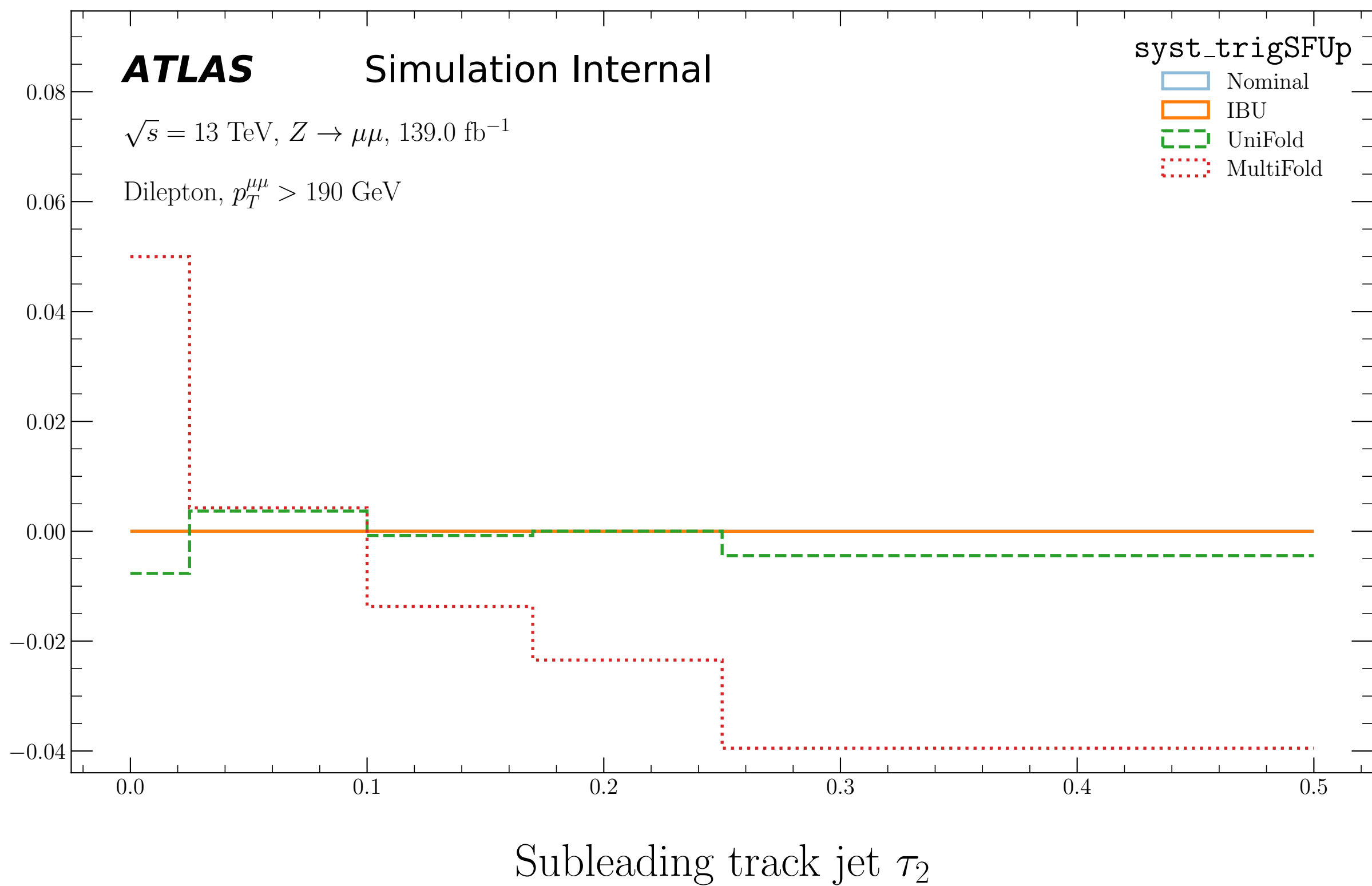
Simulation Internal

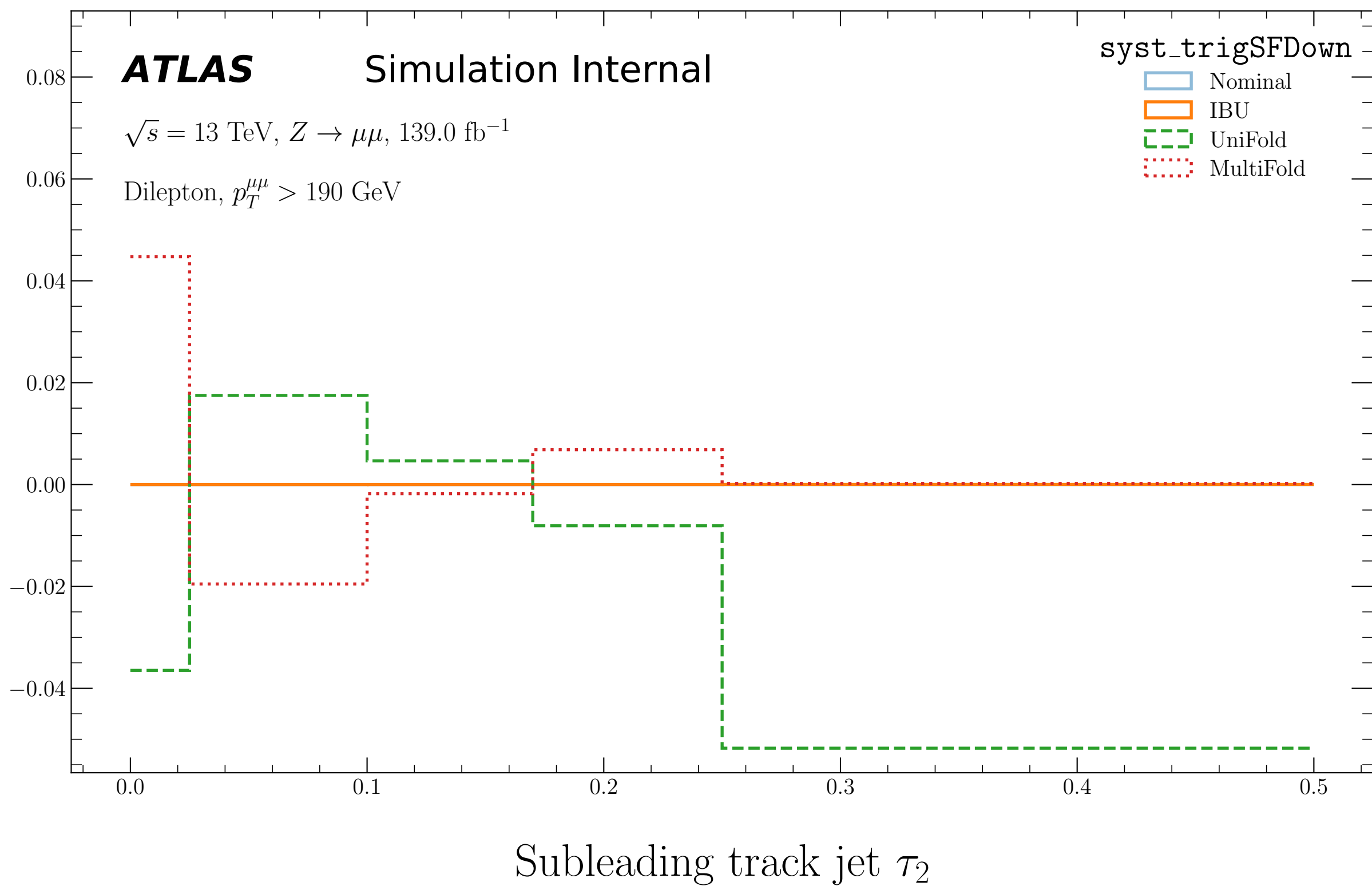
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

Subleading track jet τ_2





Relative Systematic Effect (MultiFold)

ATLAS

Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

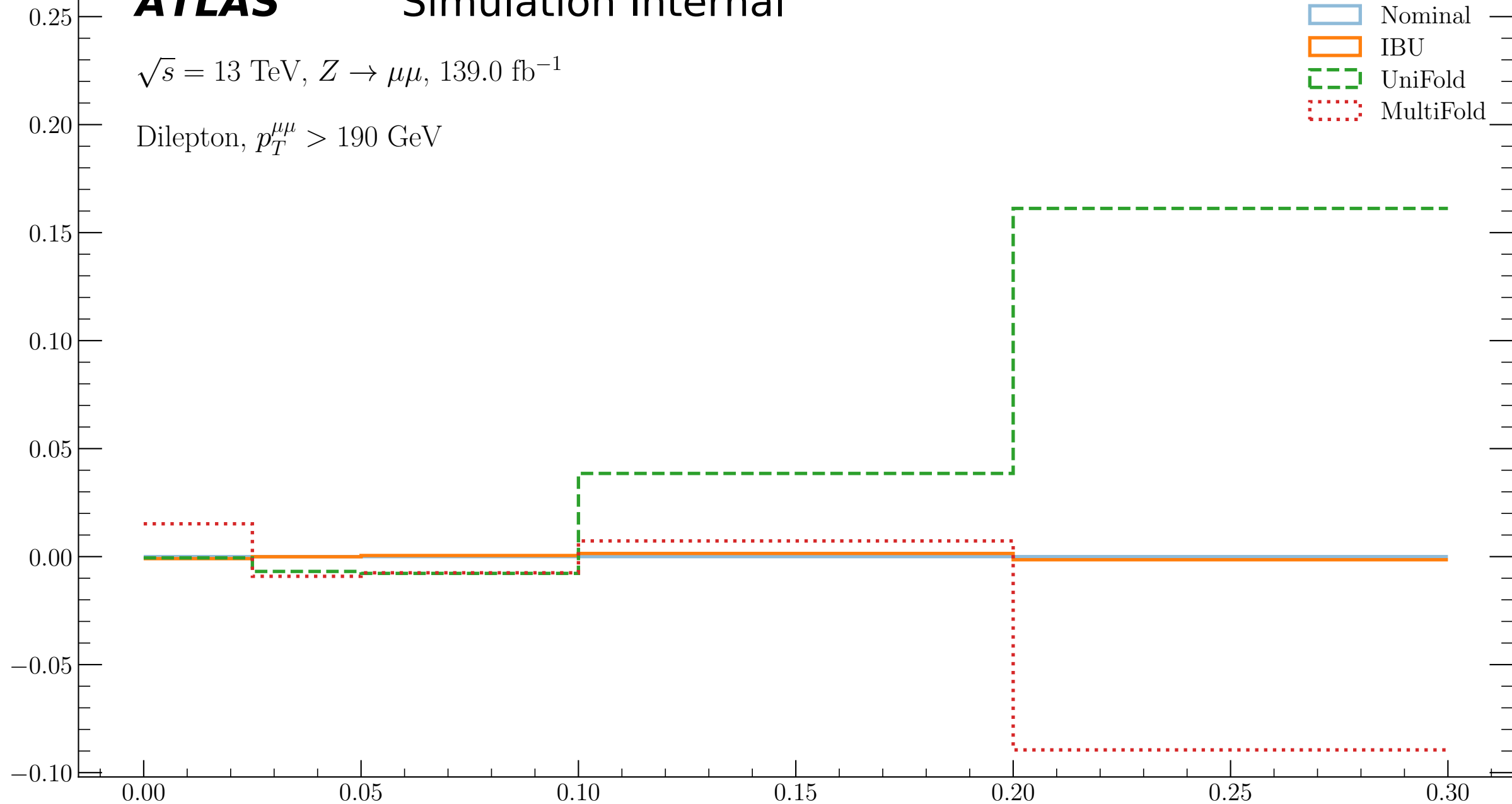
syst_prwUp

Nominal

IBU

UniFold

MultiFold



Leading track jet τ_3

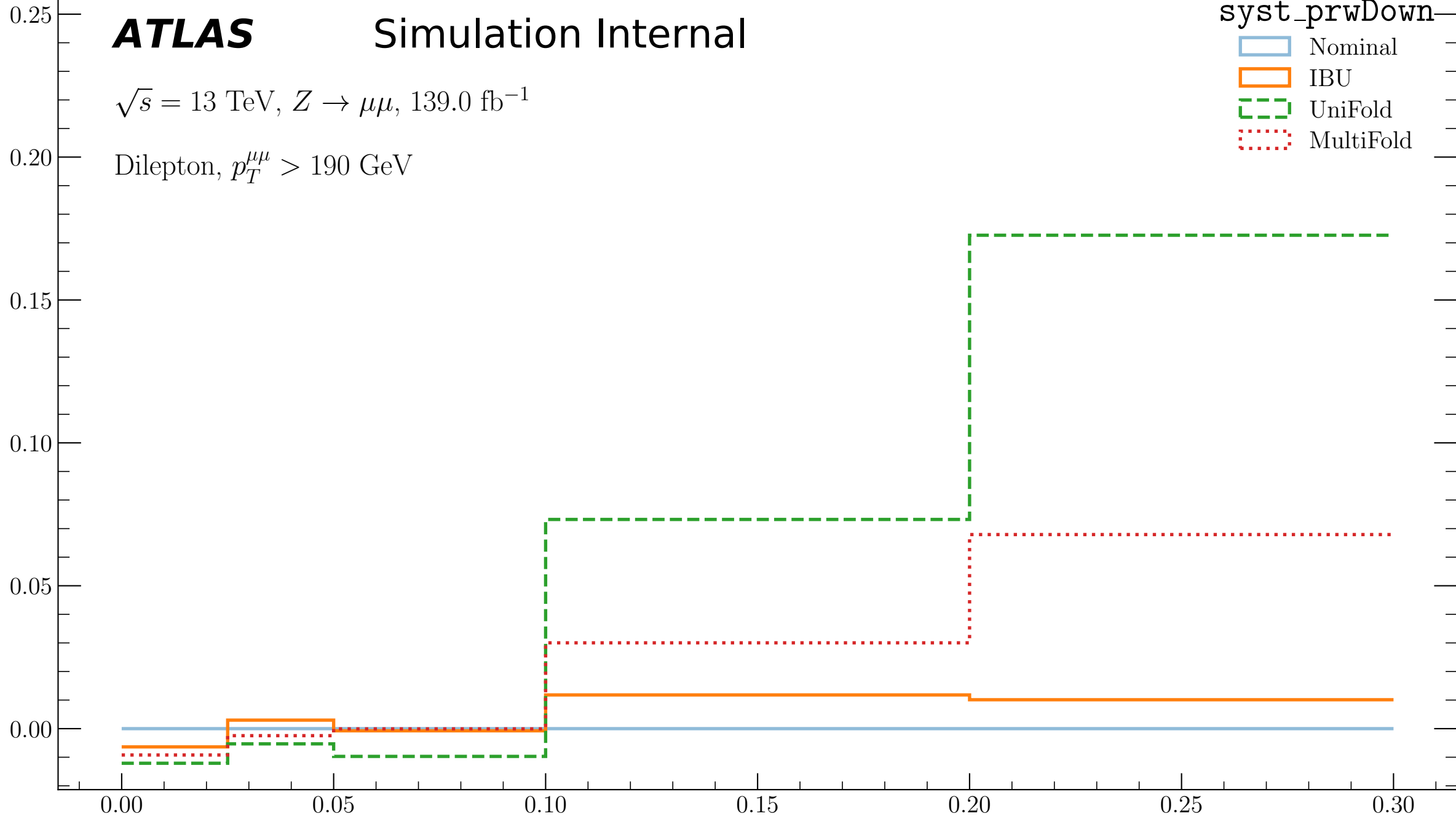
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

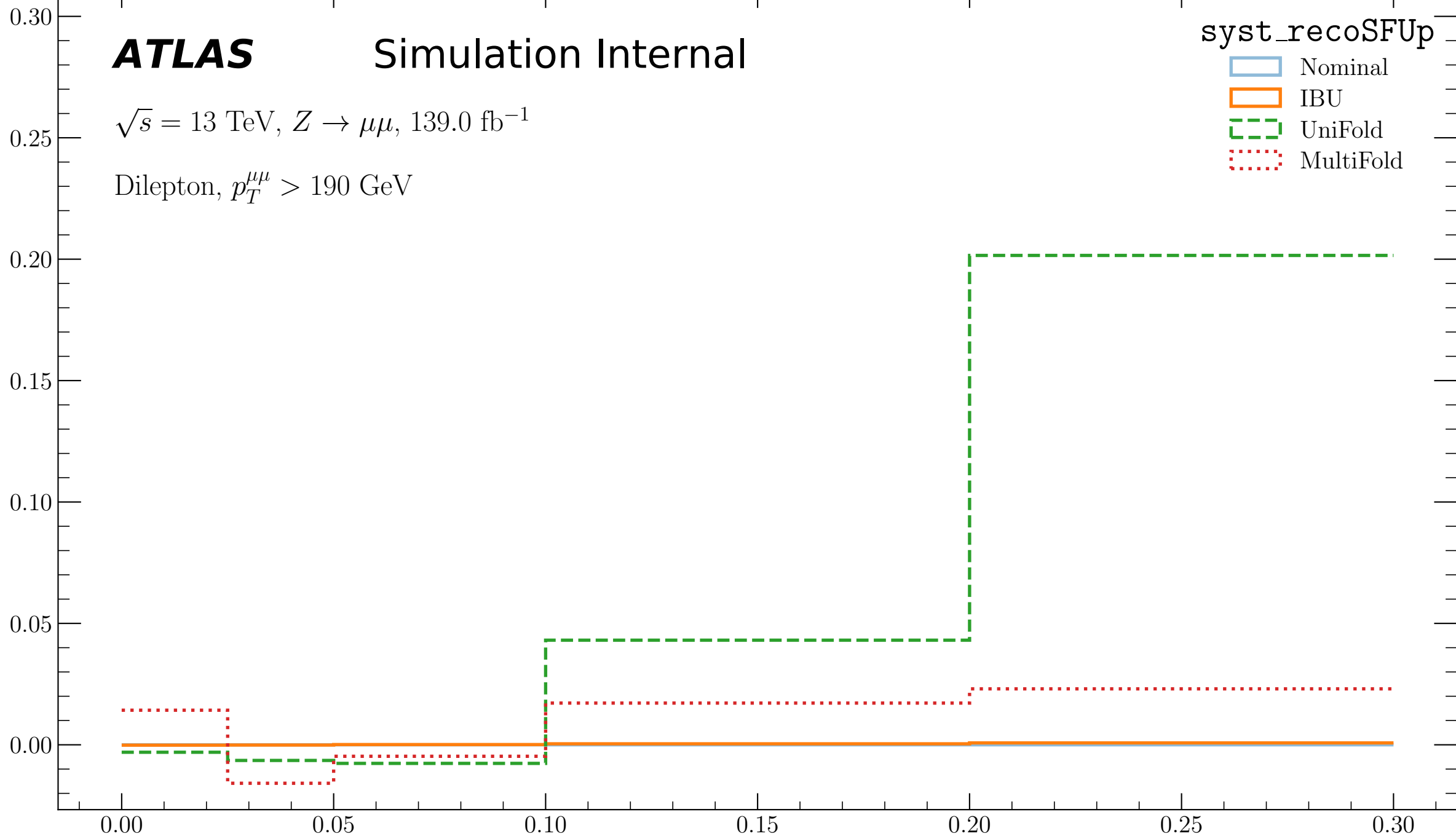
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

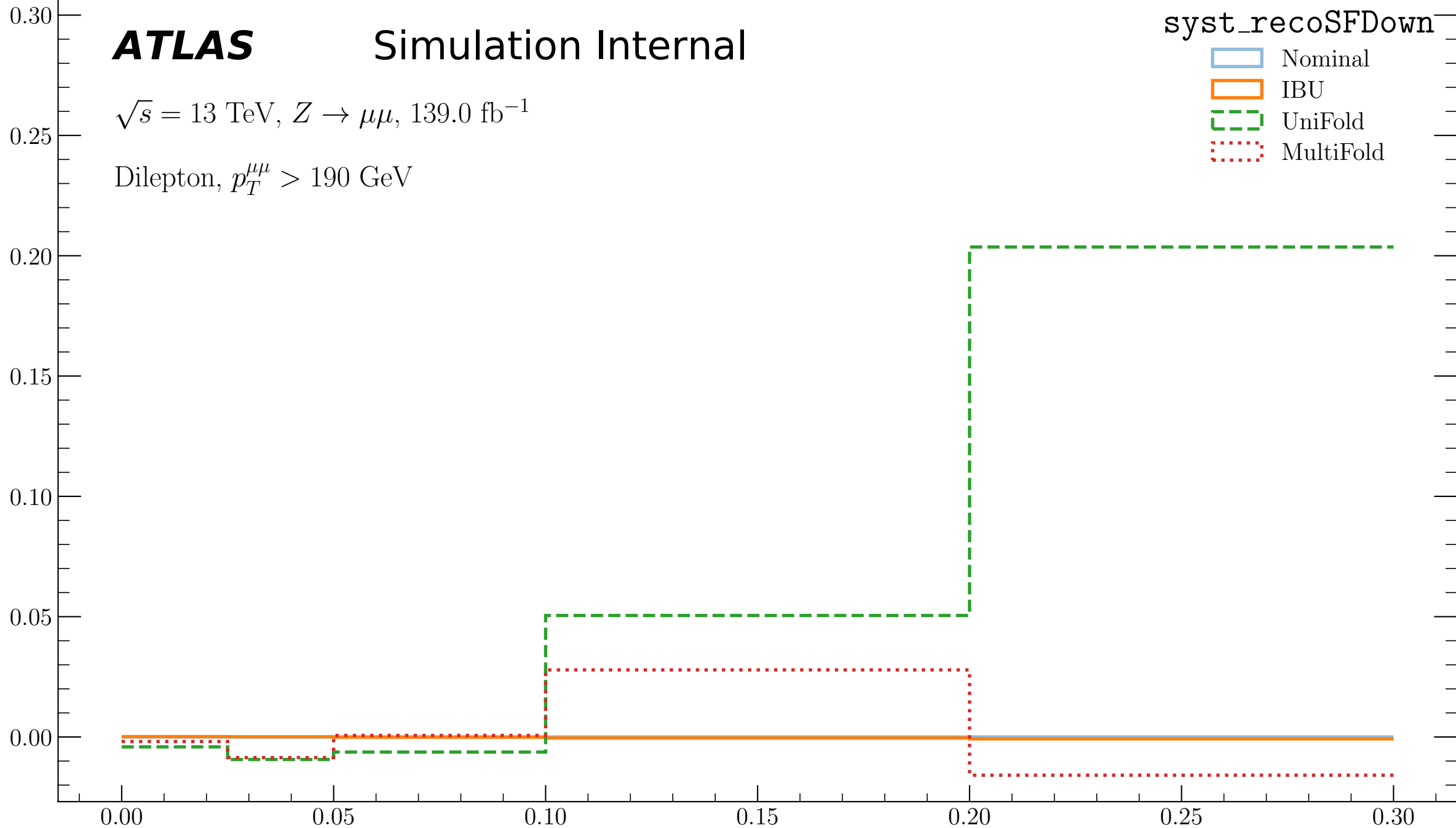
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

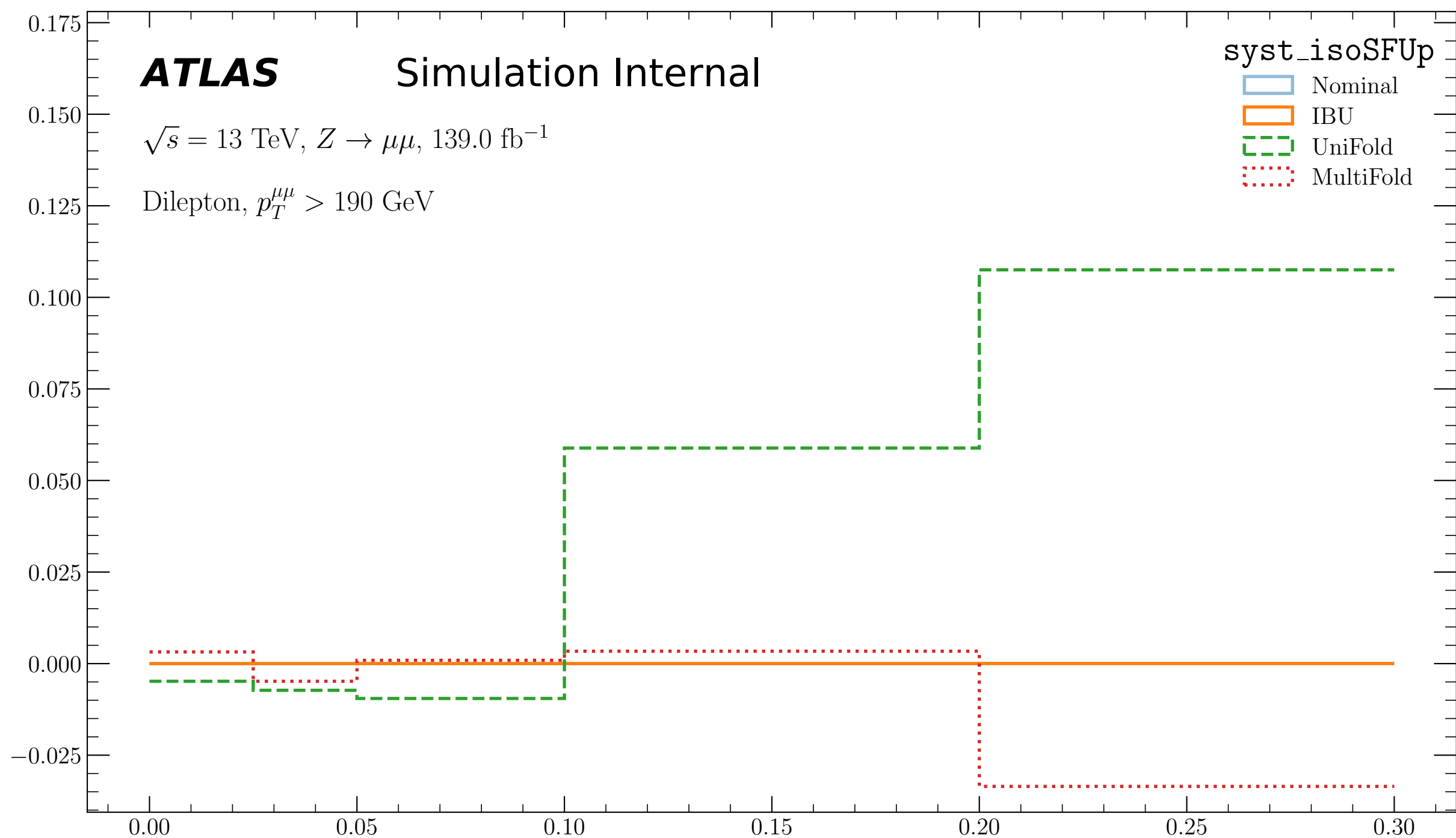
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

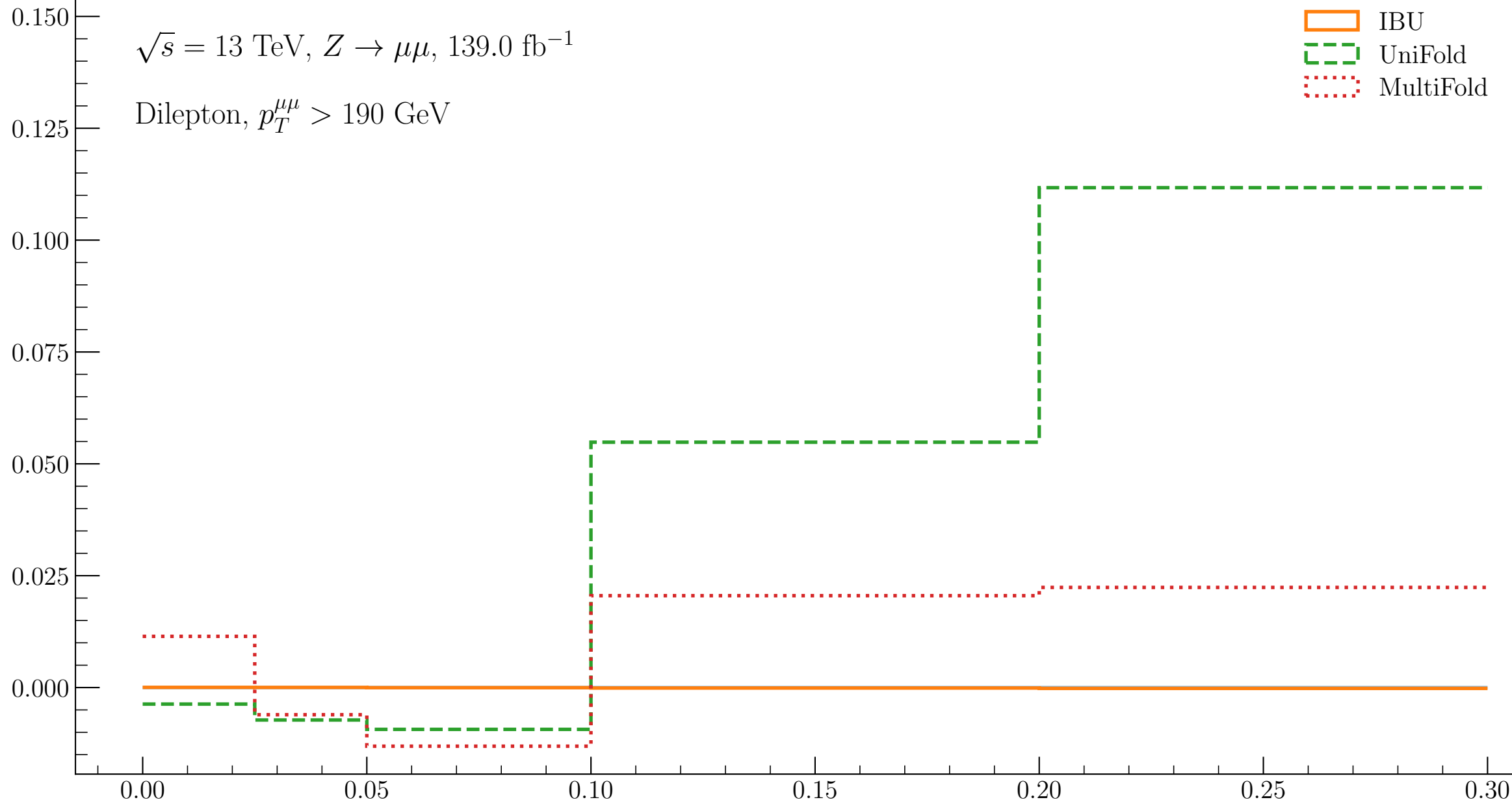
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

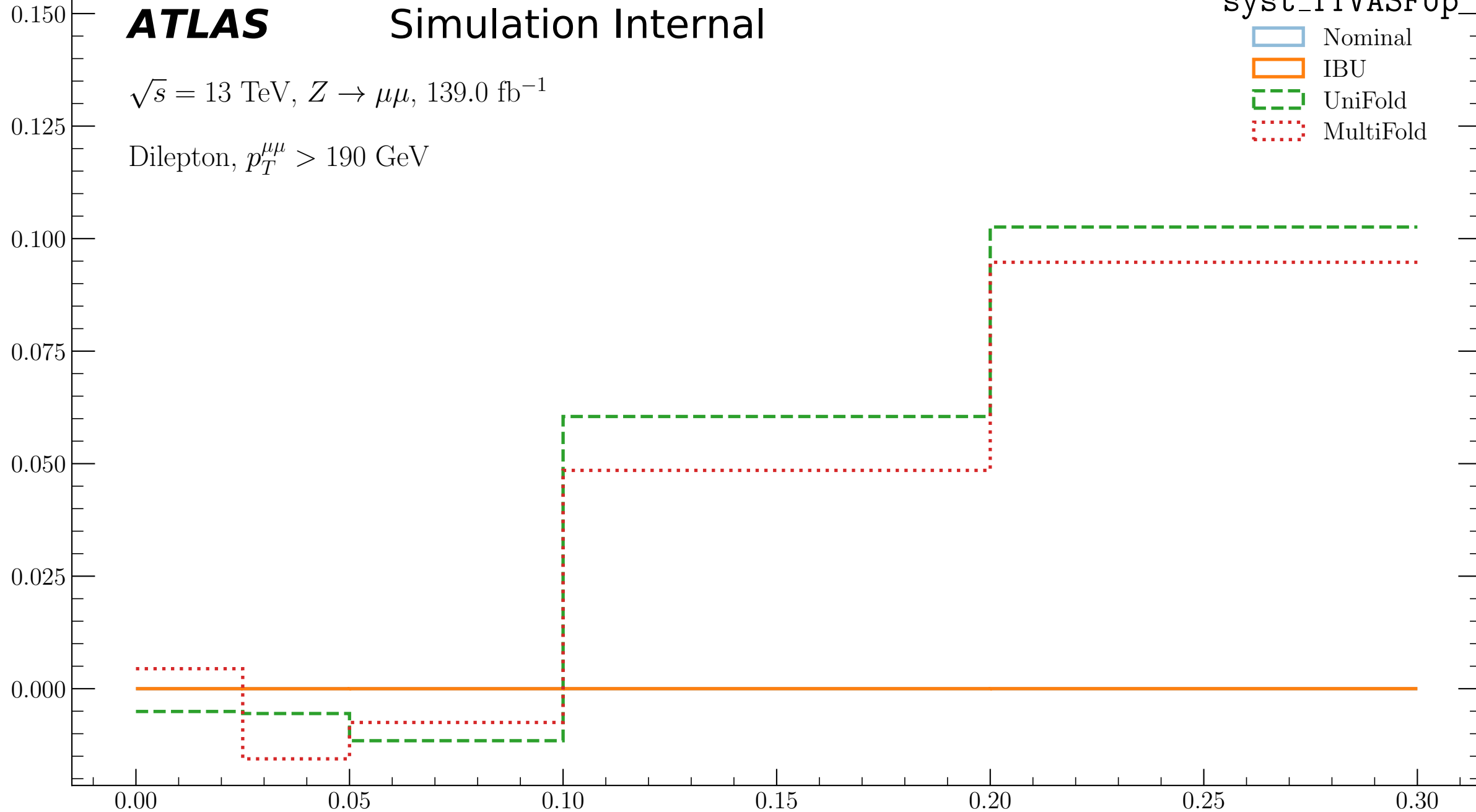
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold



Leading track jet τ_3

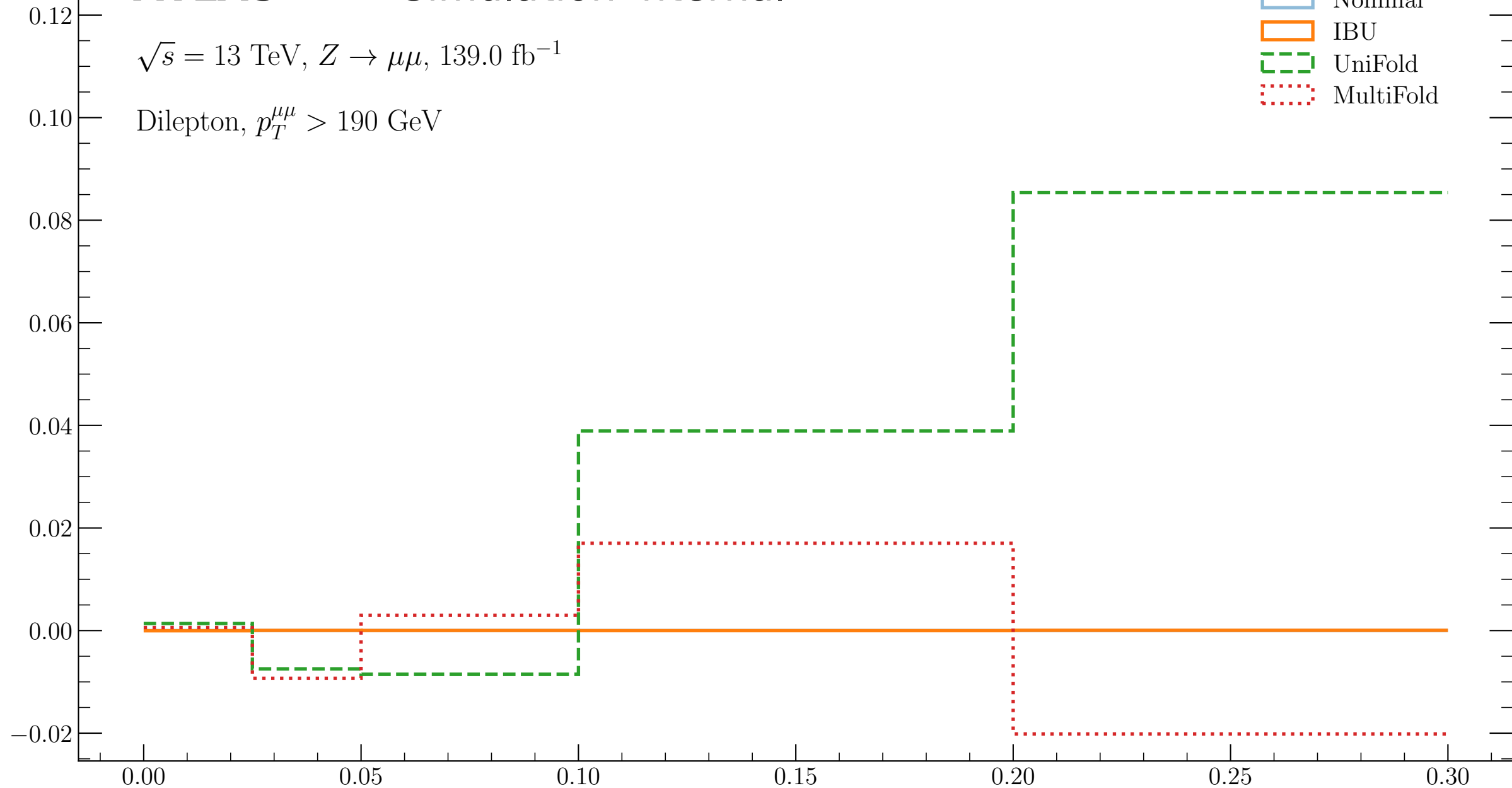
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet τ_3

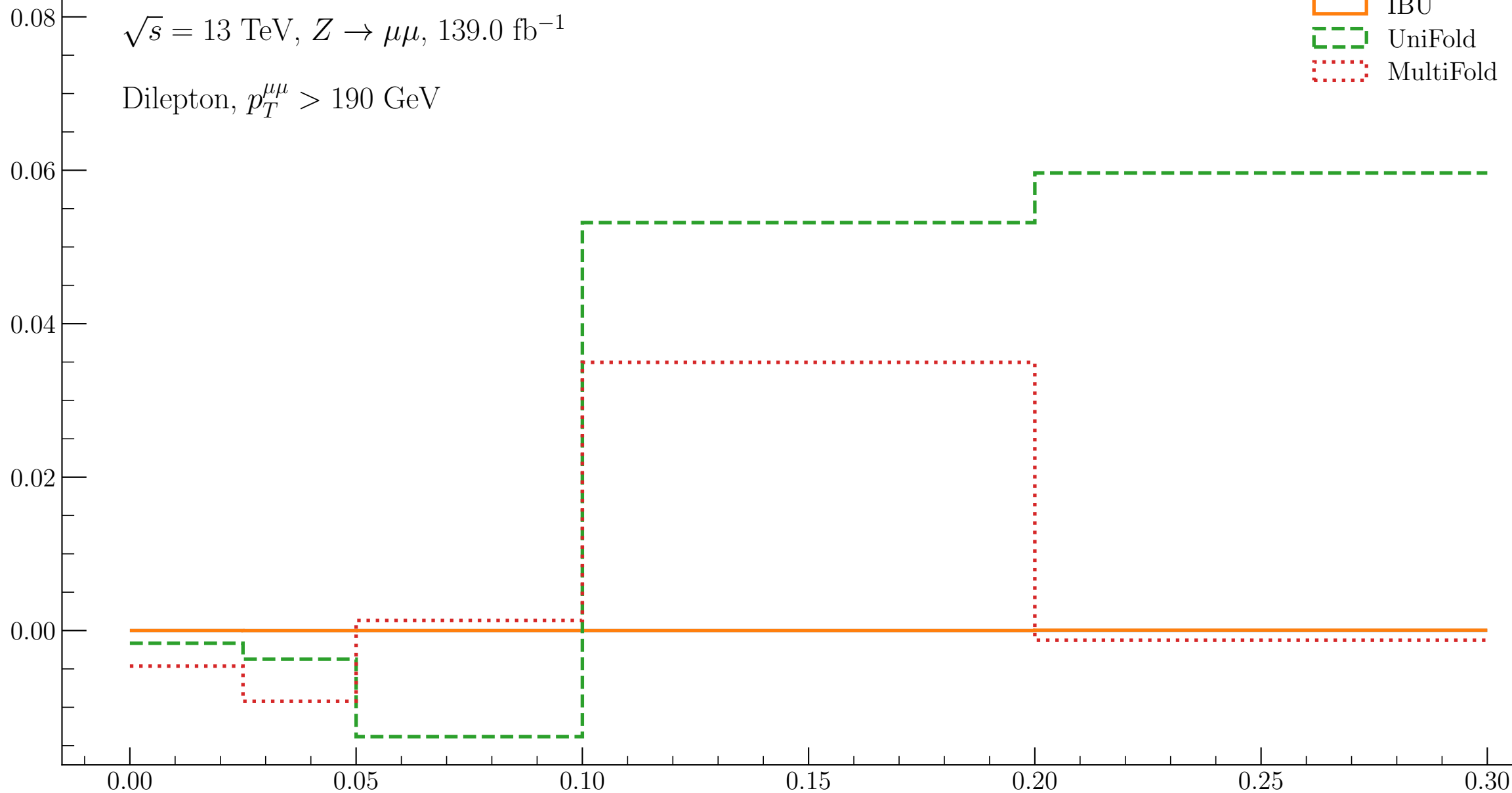
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet τ_3

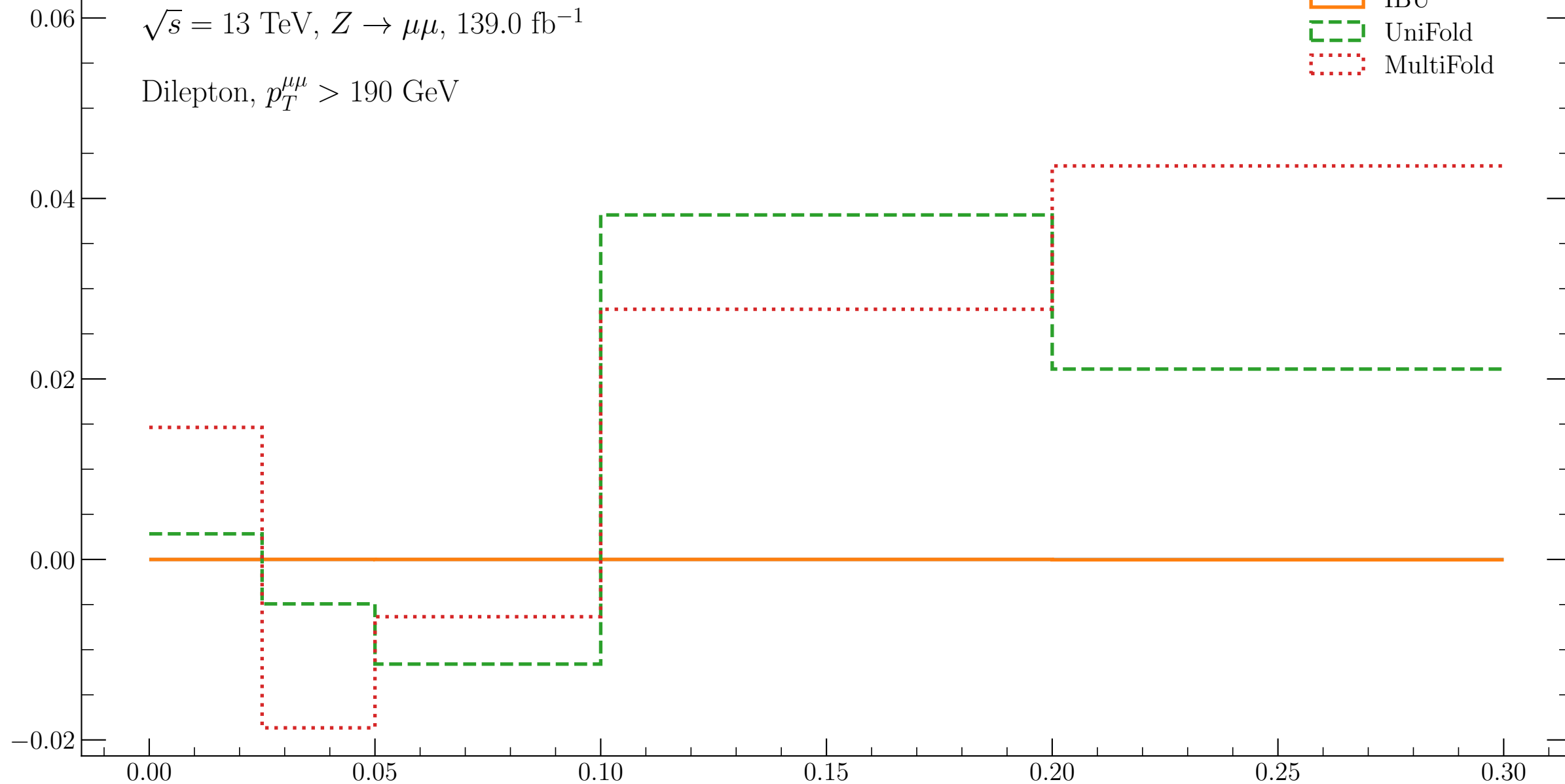
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFDown

- Nominal
- IBU
- UniFold
- MultiFold

Leading track jet τ_3

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

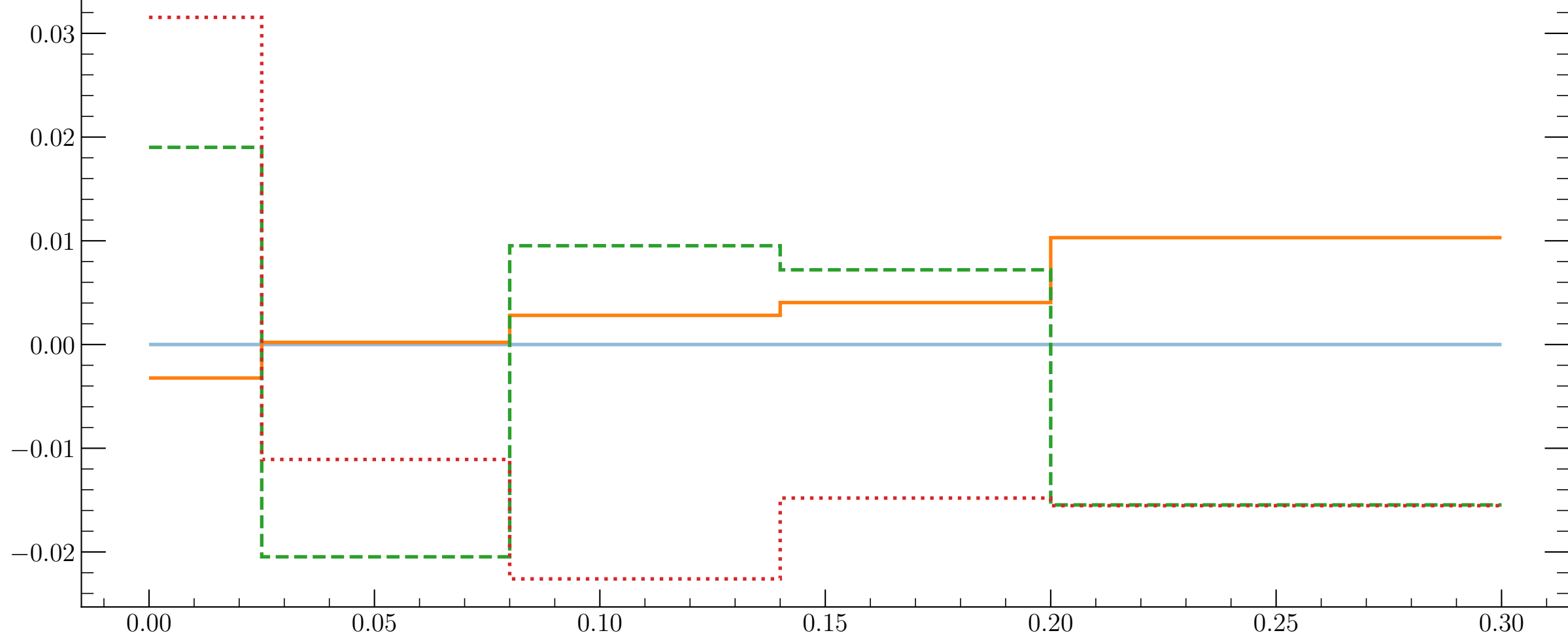
syst_prwUp

Nominal

IBU

UniFold

MultiFold

Subleading track jet τ_3

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

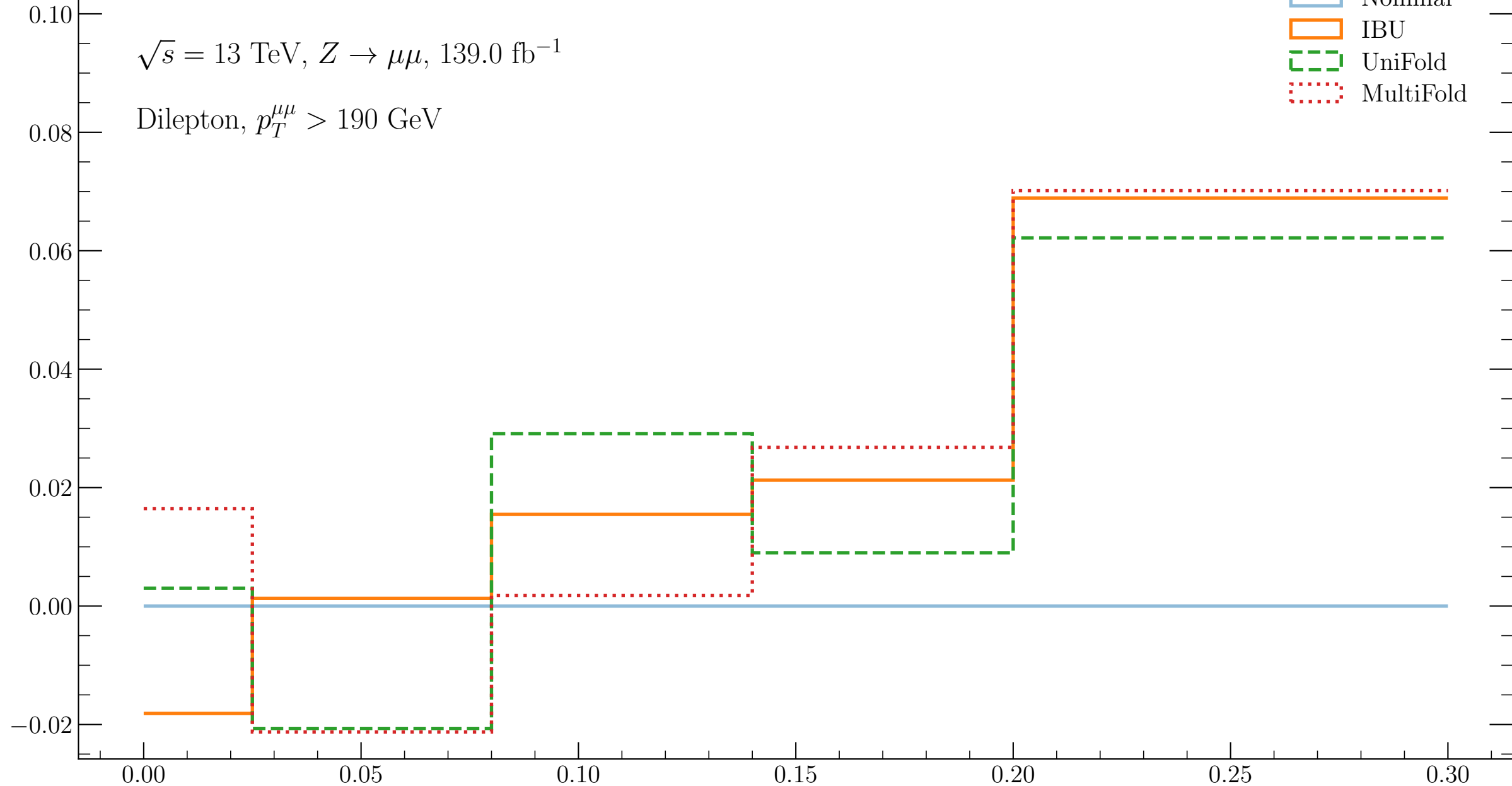
syst_prwDown

Nominal

IBU

UniFold

MultiFold

Subleading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

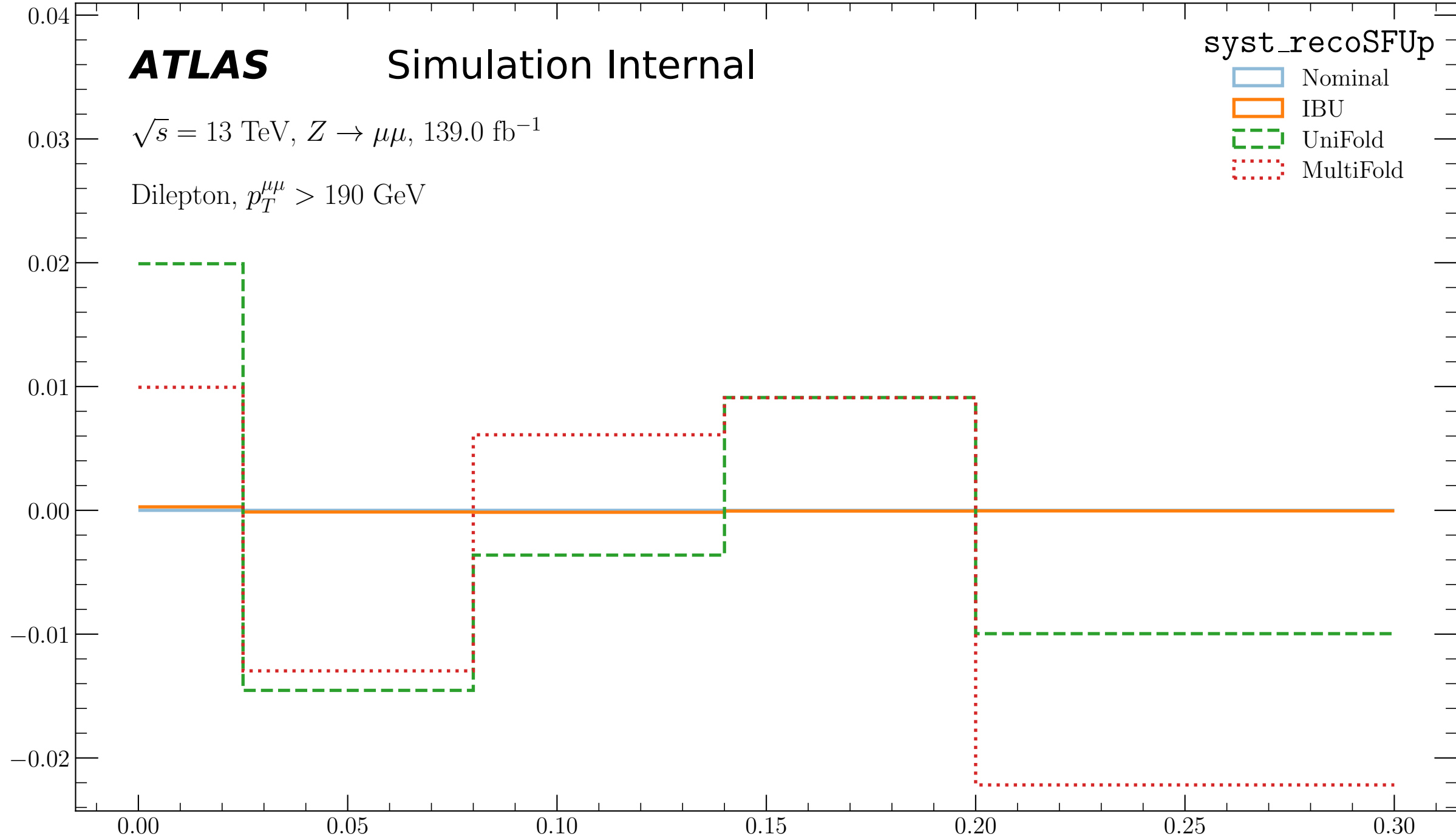
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

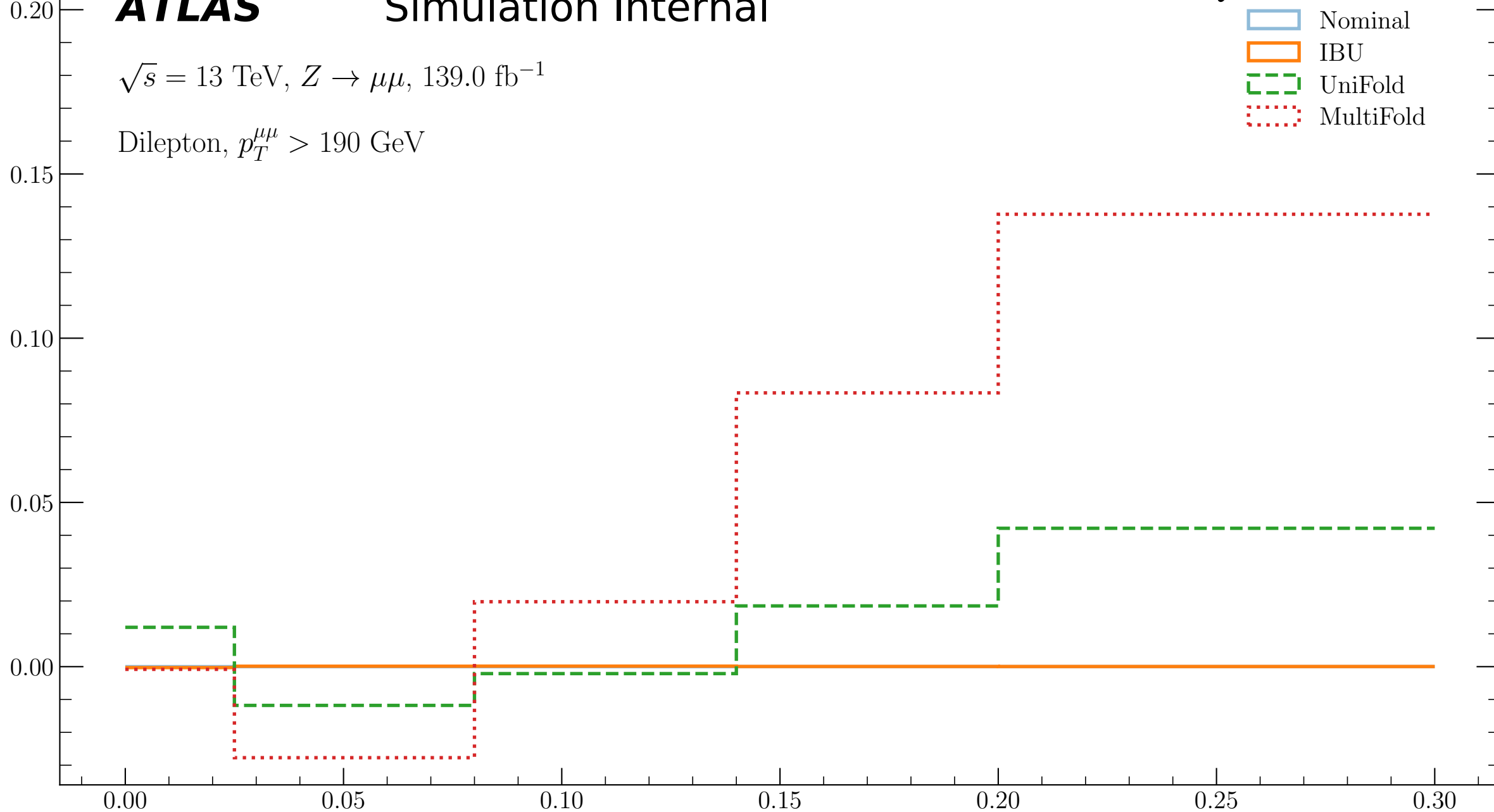
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

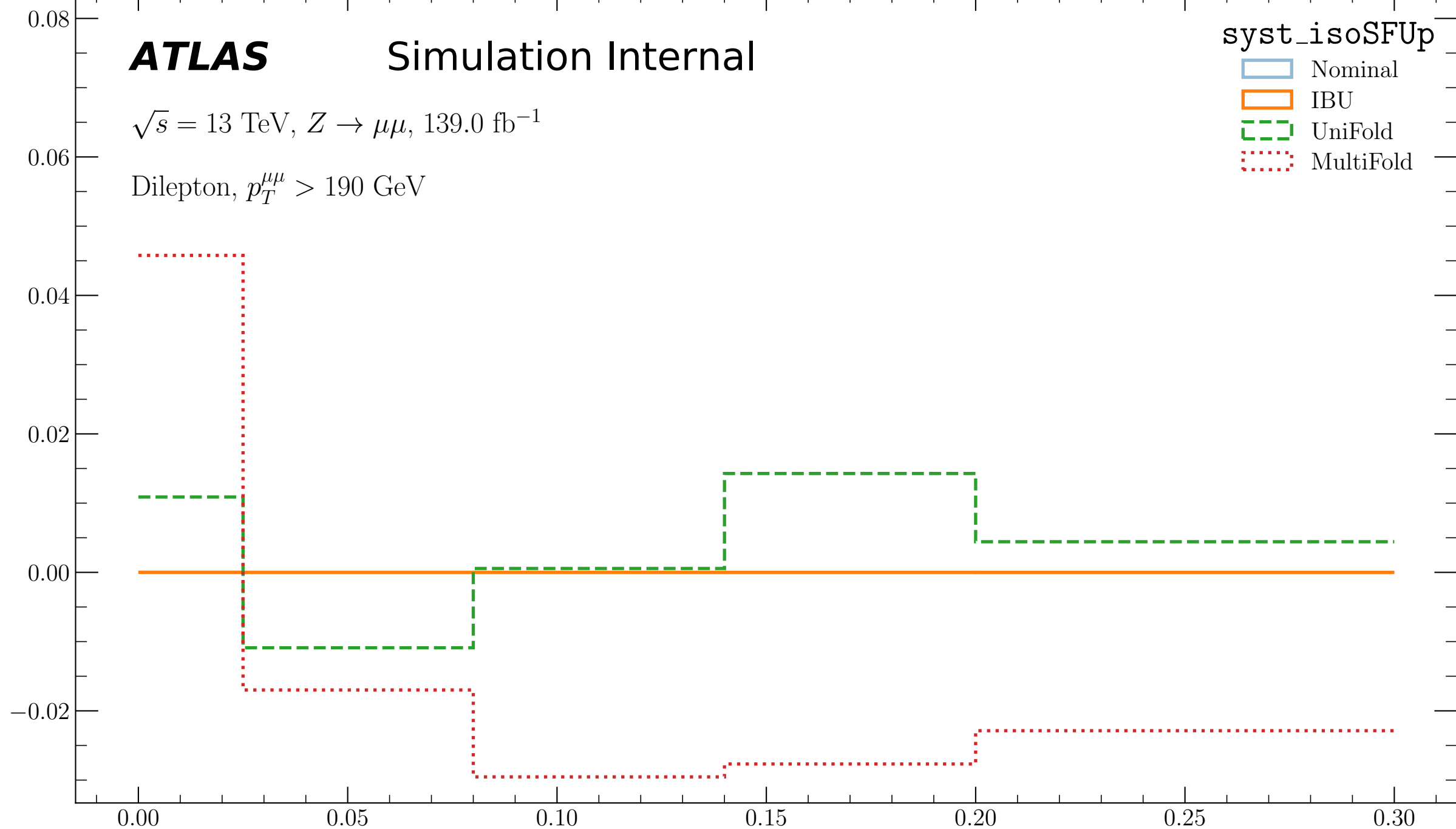
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

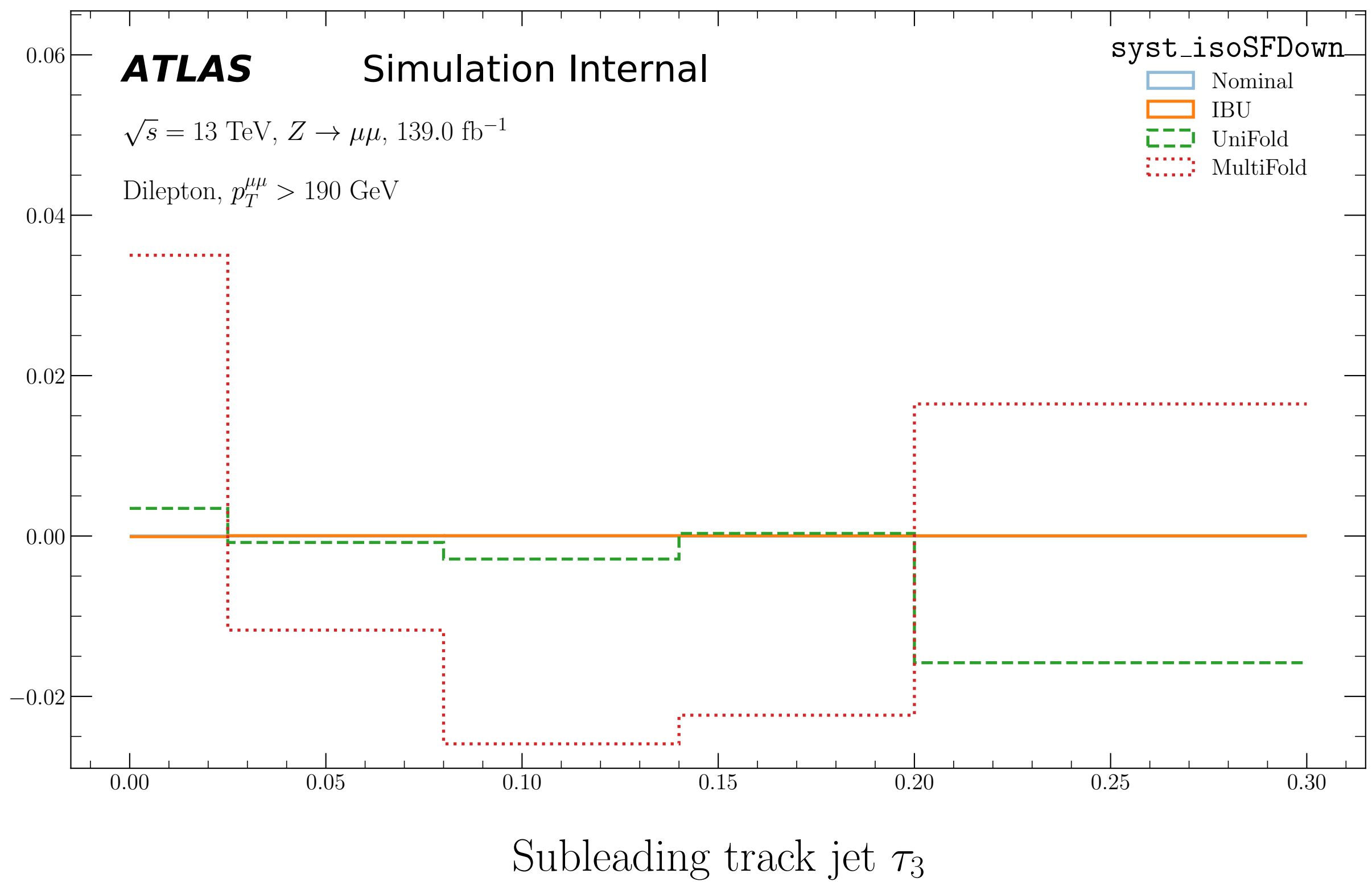
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_3



Relative Systematic Effect (MultiFold)

ATLAS

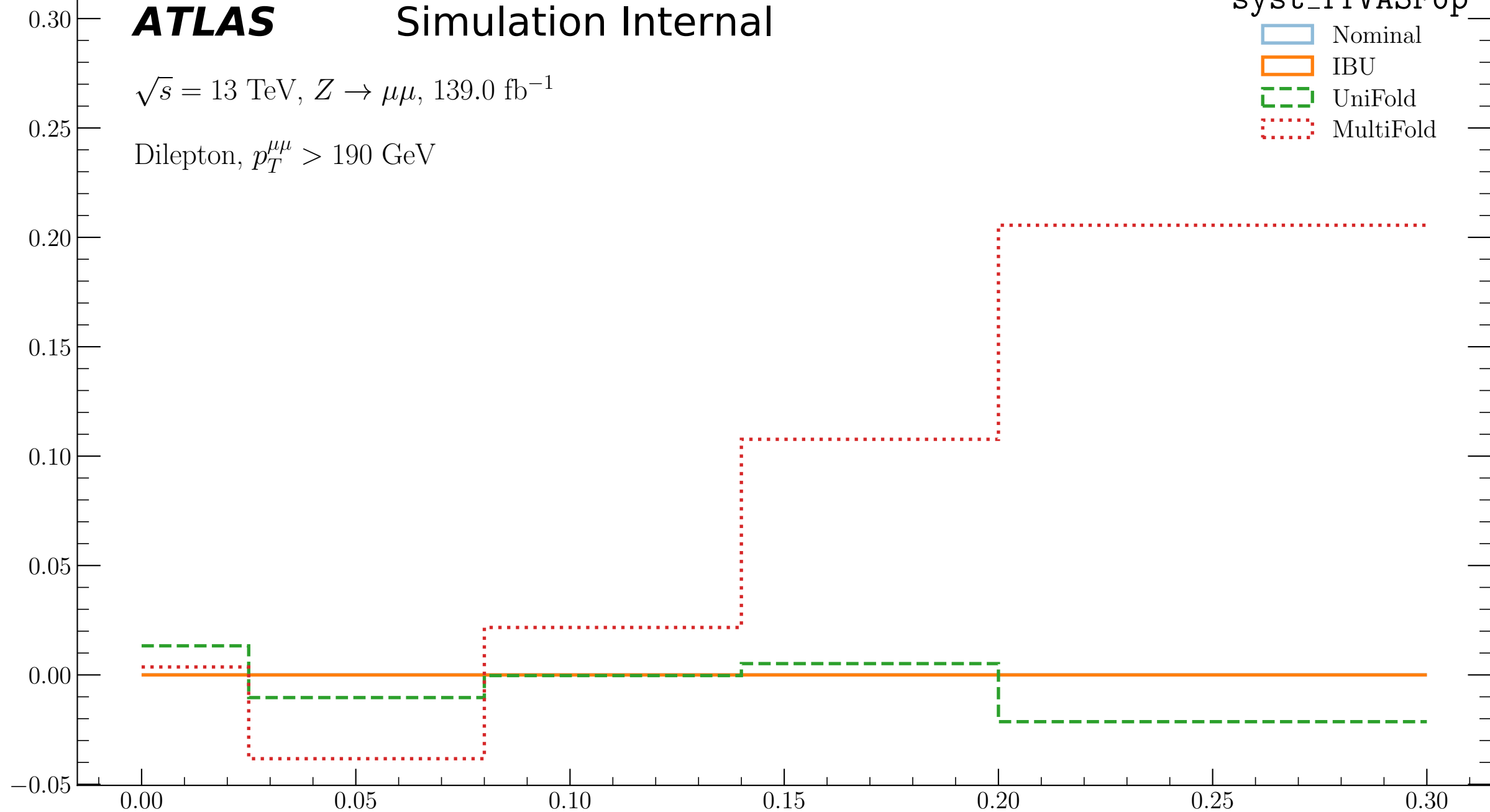
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASUp

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_3

Relative Systematic Effect (MultiFold)

ATLAS

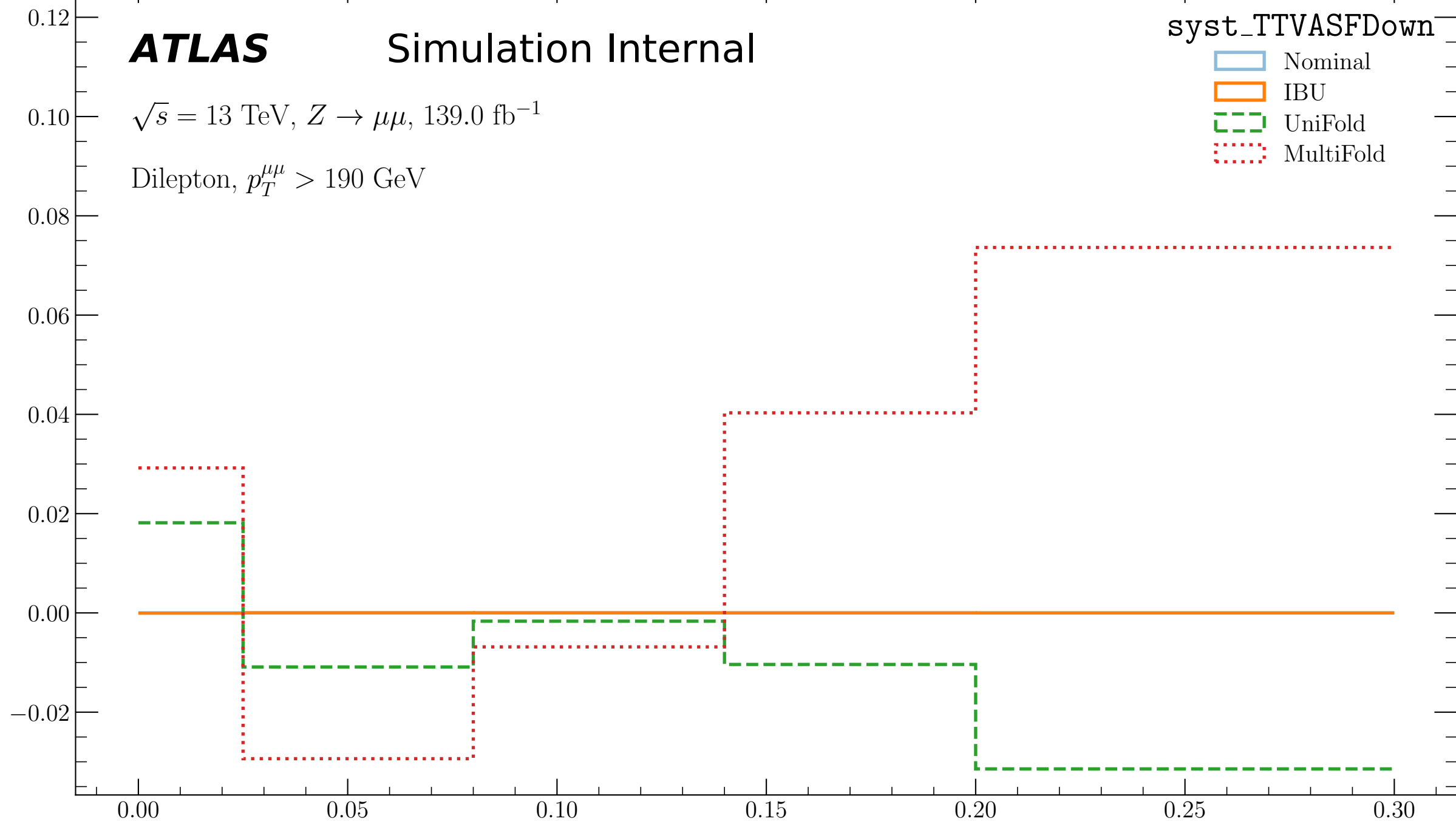
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

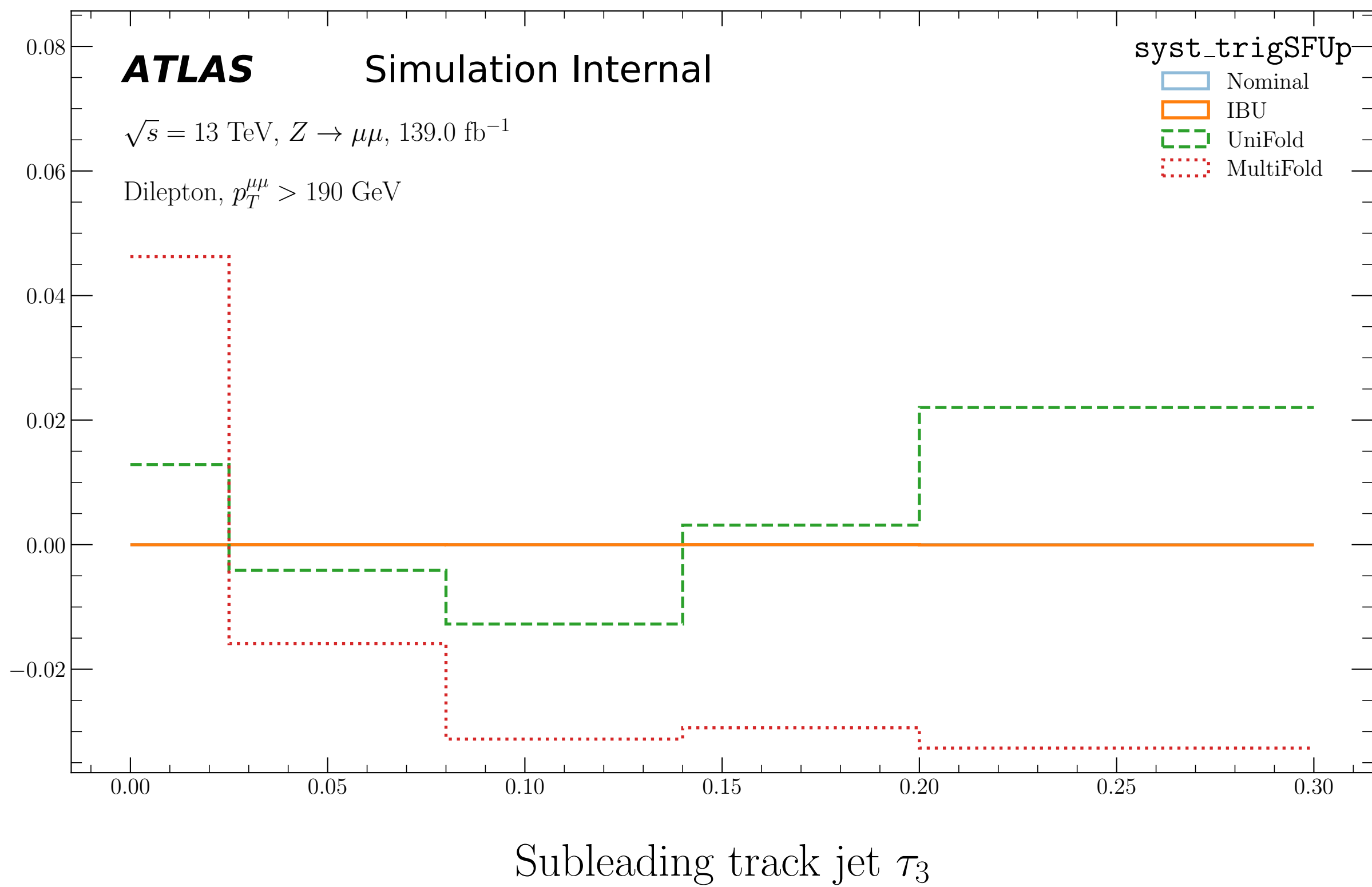
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

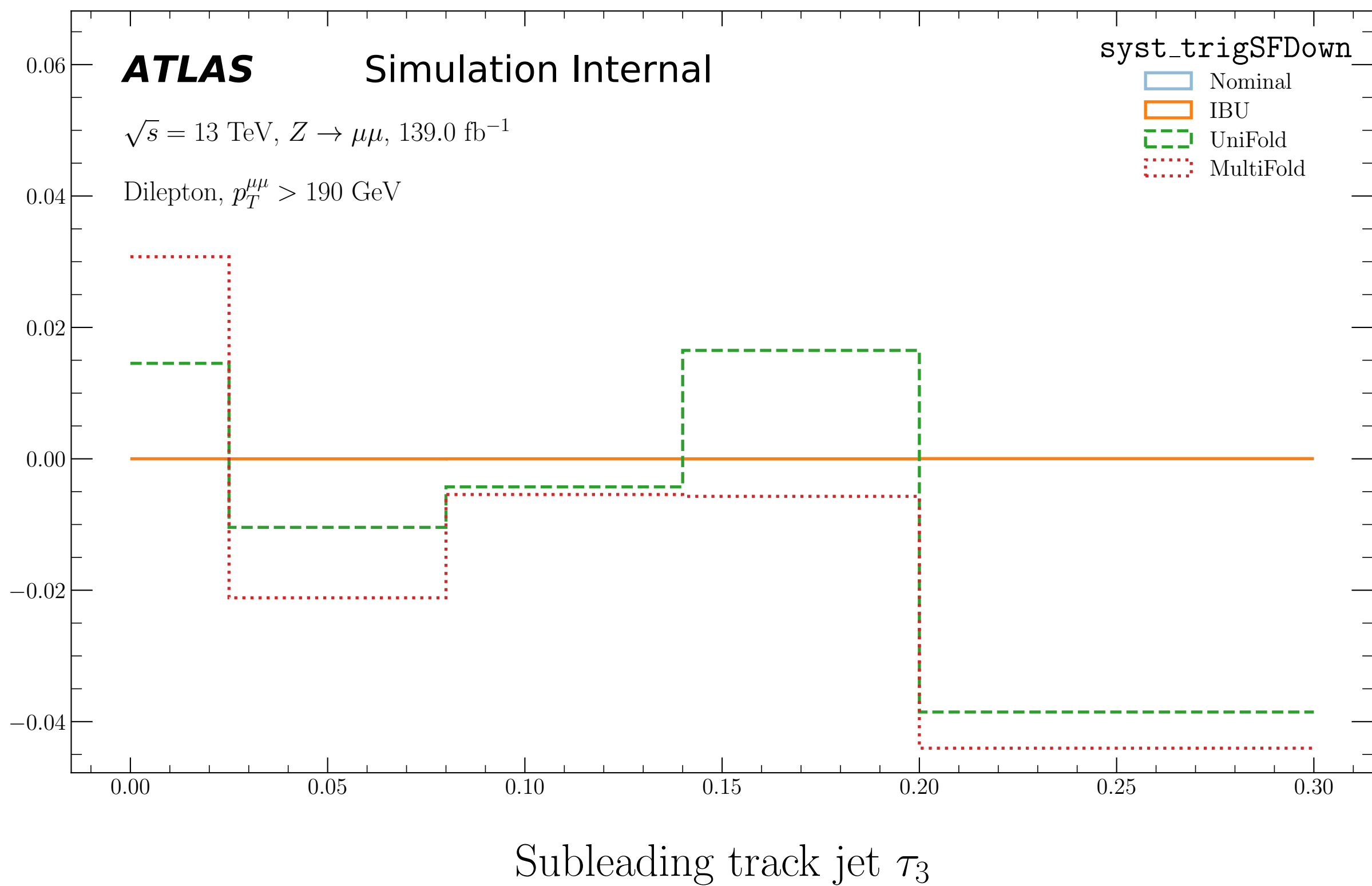
syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold



Subleading track jet τ_3





ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

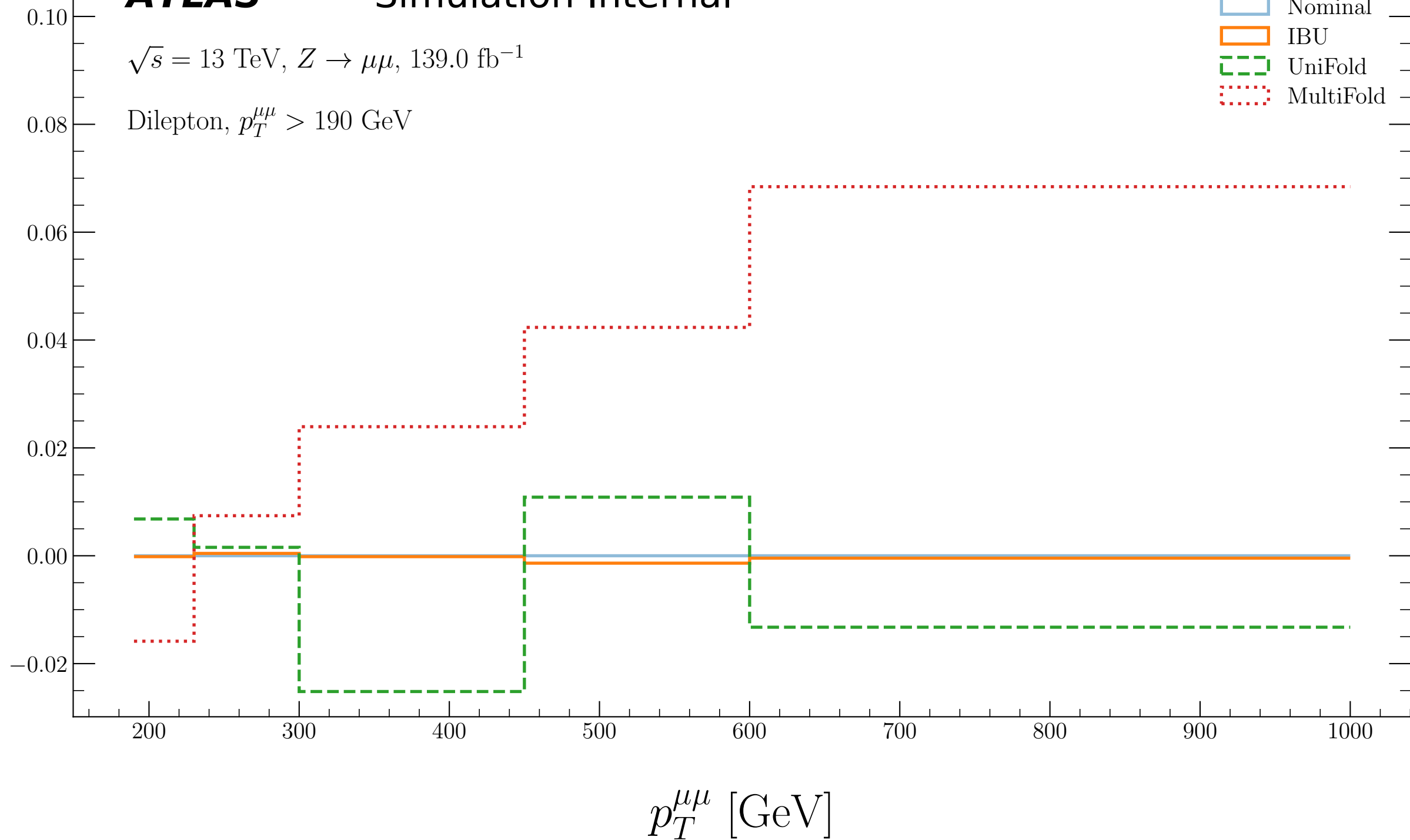
syst_prwUp

Nominal

IBU

UniFold

MultiFold



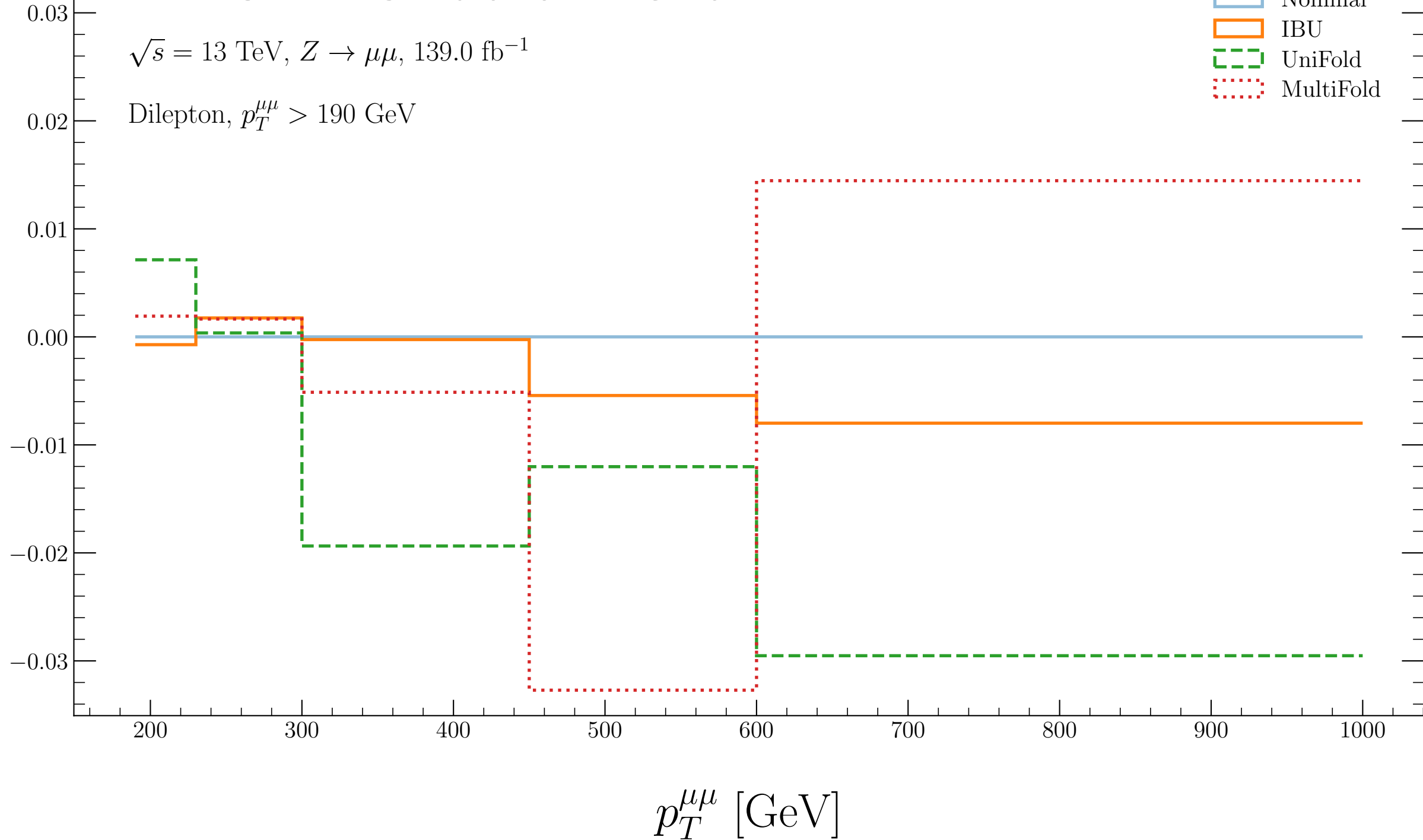
ATLAS

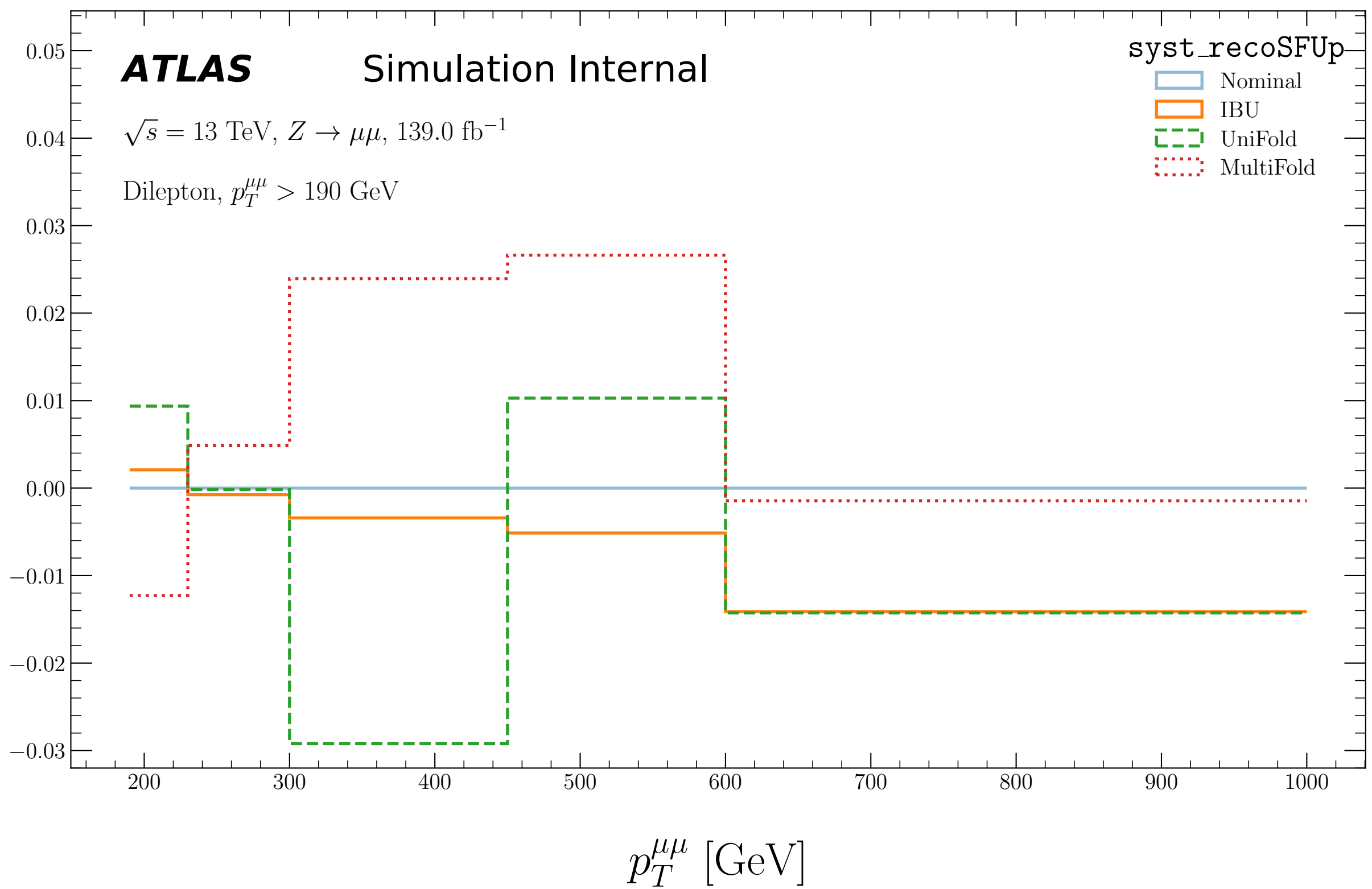
Simulation Internal

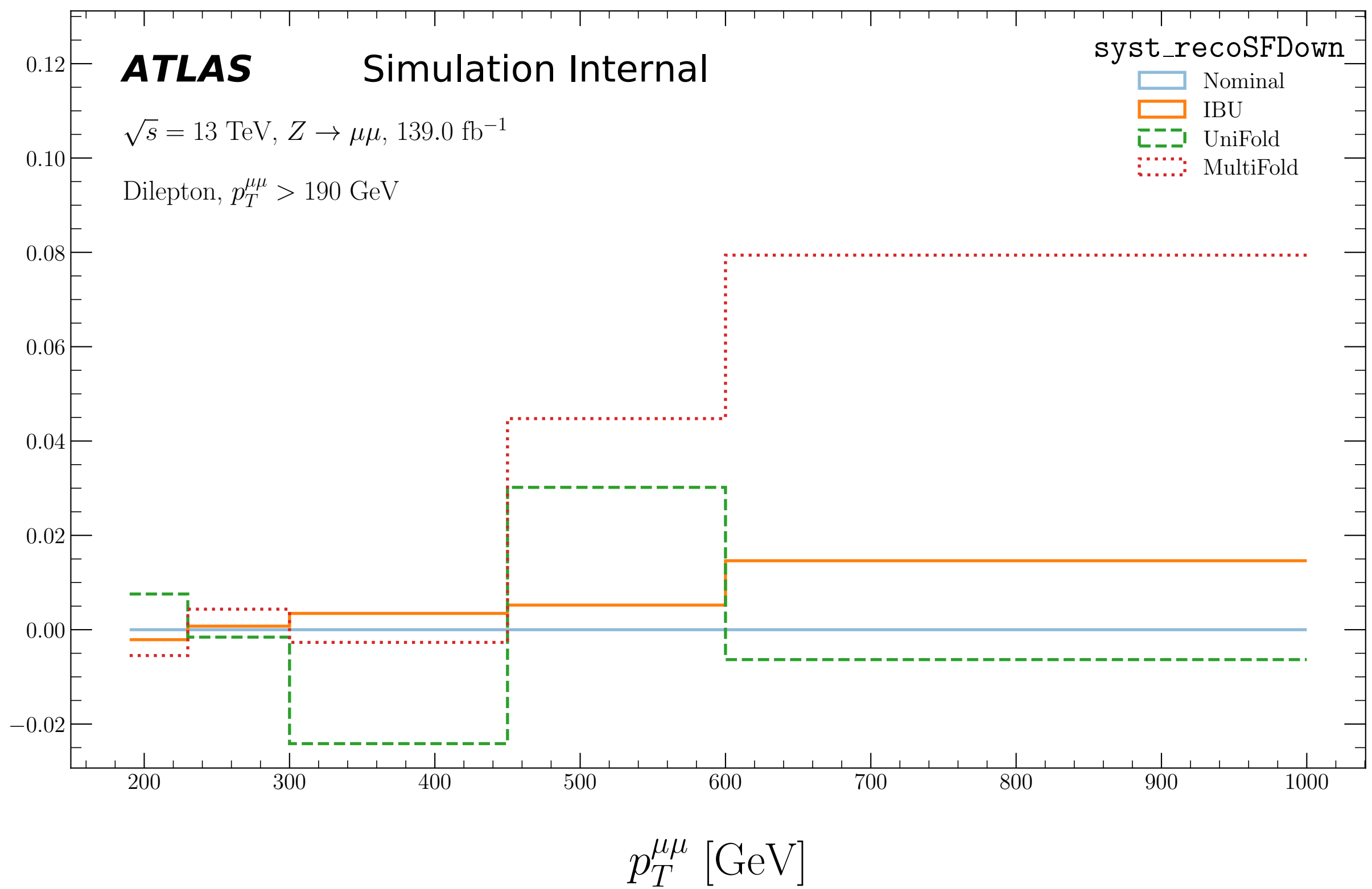
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

- Nominal
- IBU
- UniFold
- MultiFold







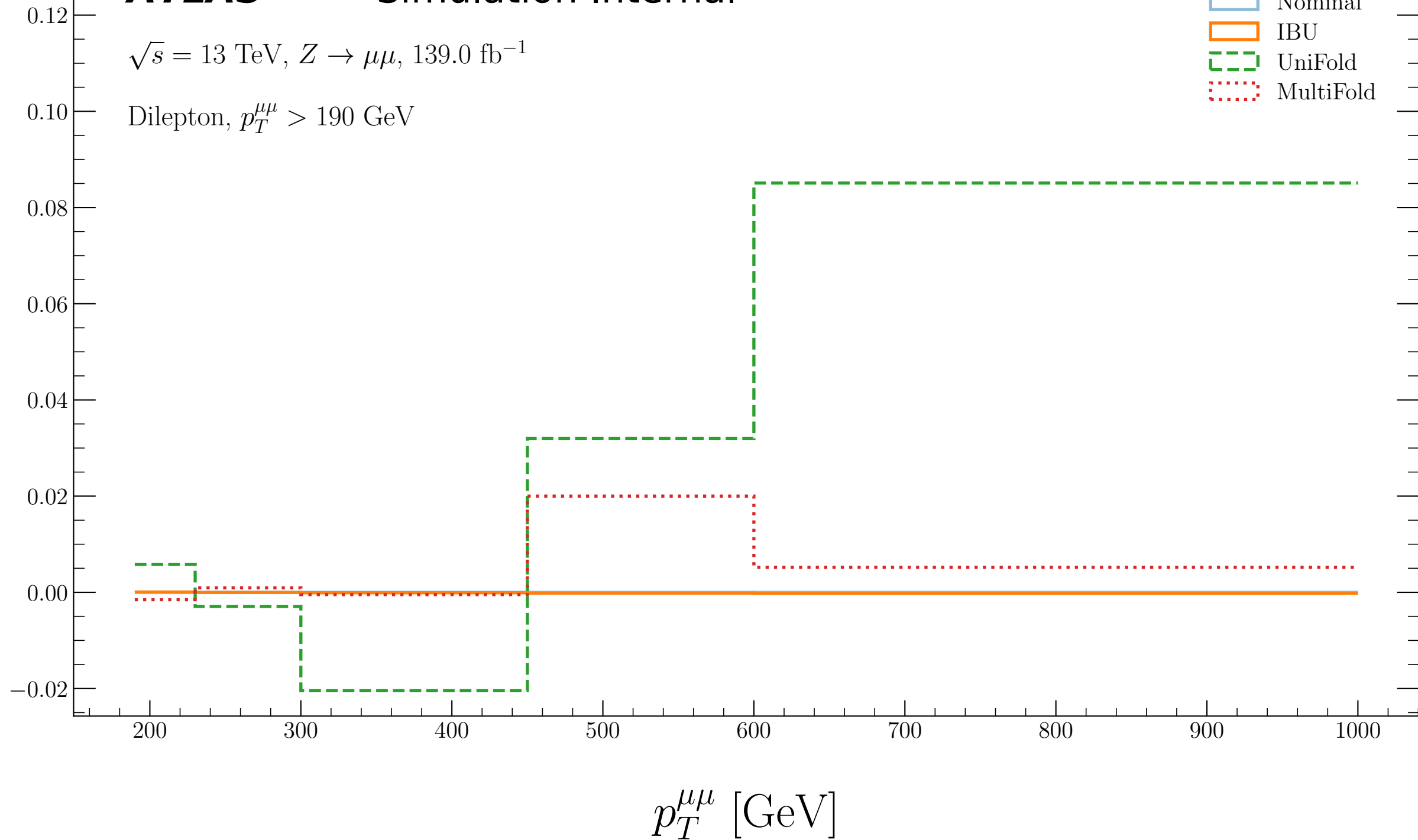
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



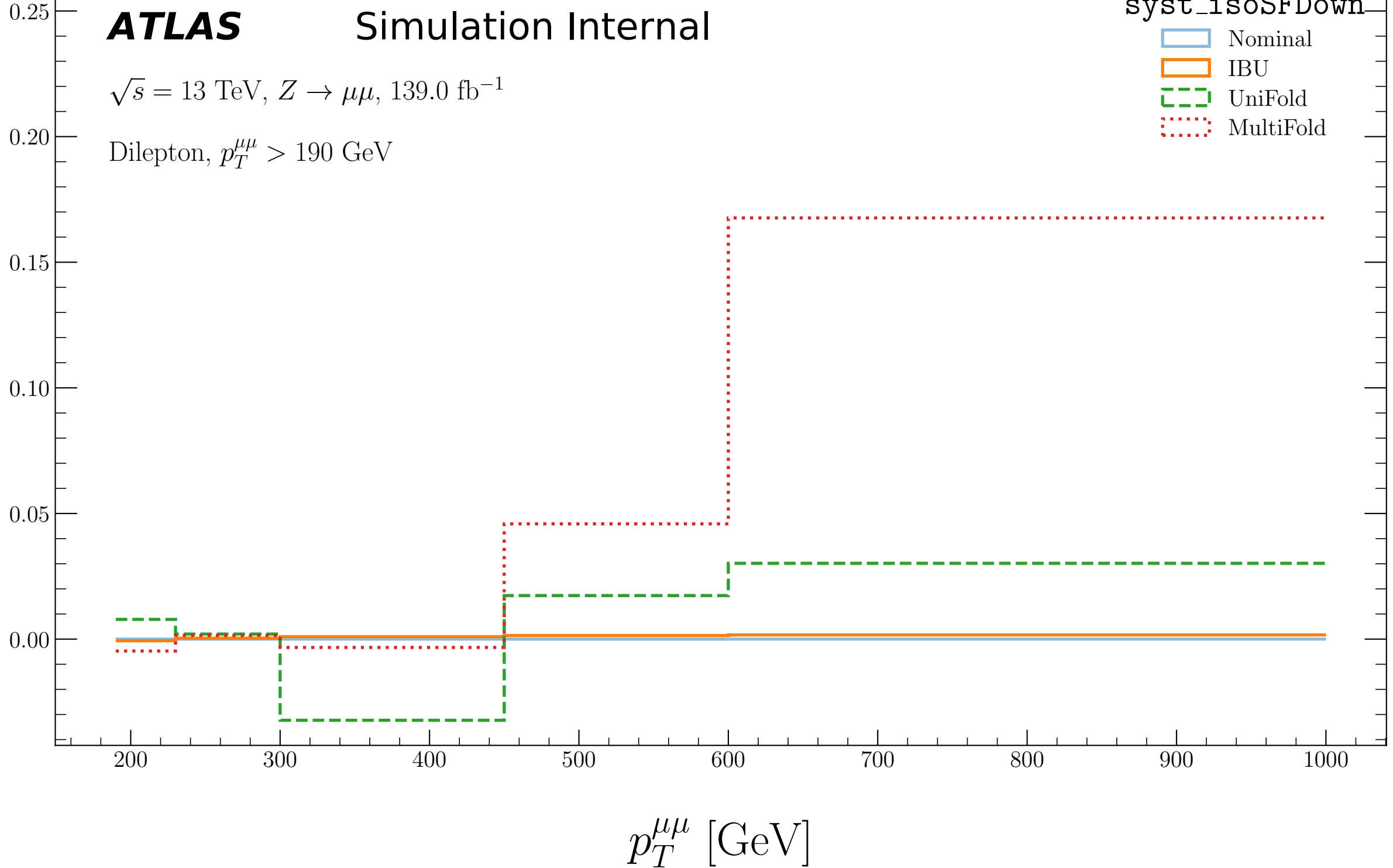
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



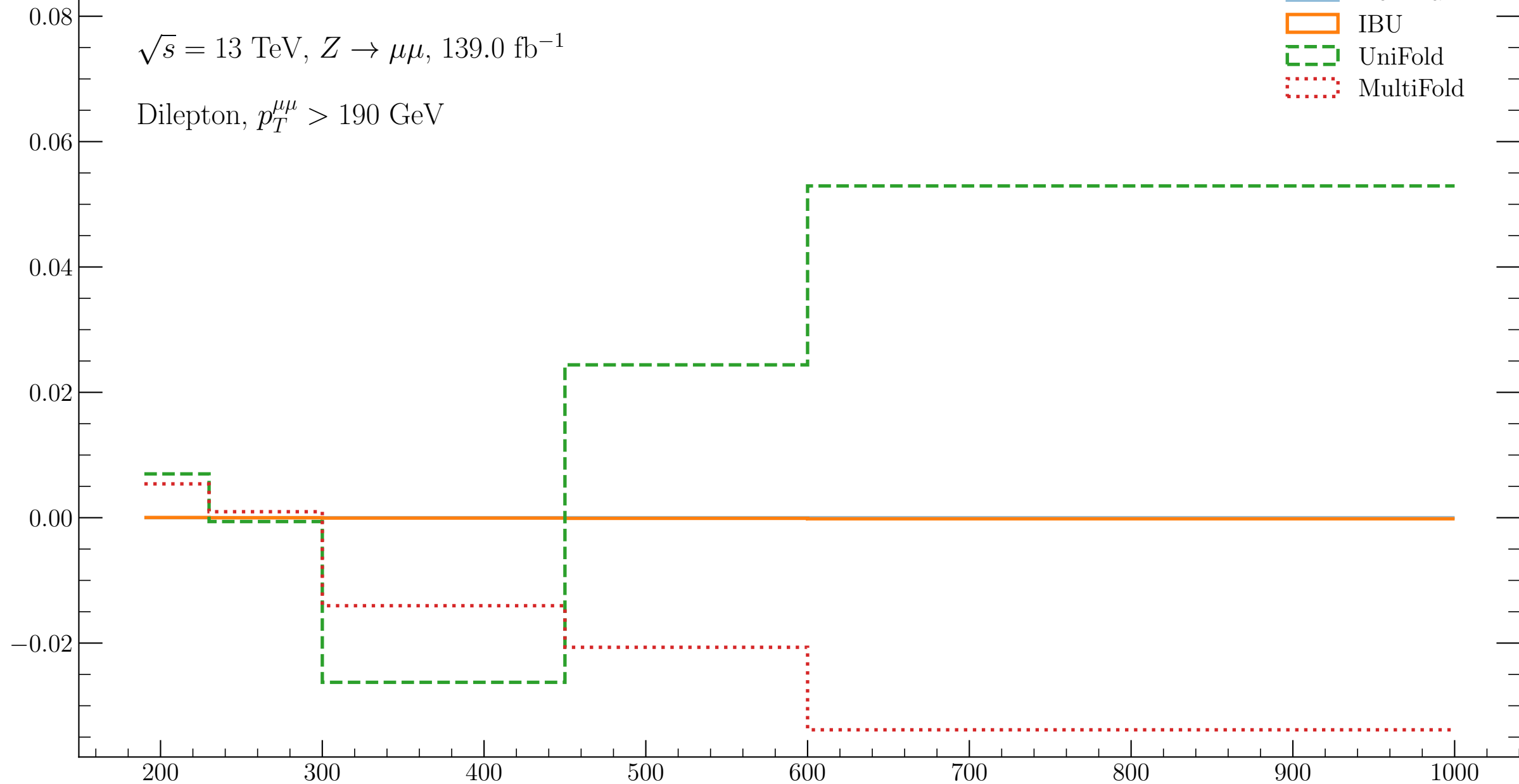
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold

 $p_T^{\mu\mu}$ [GeV]

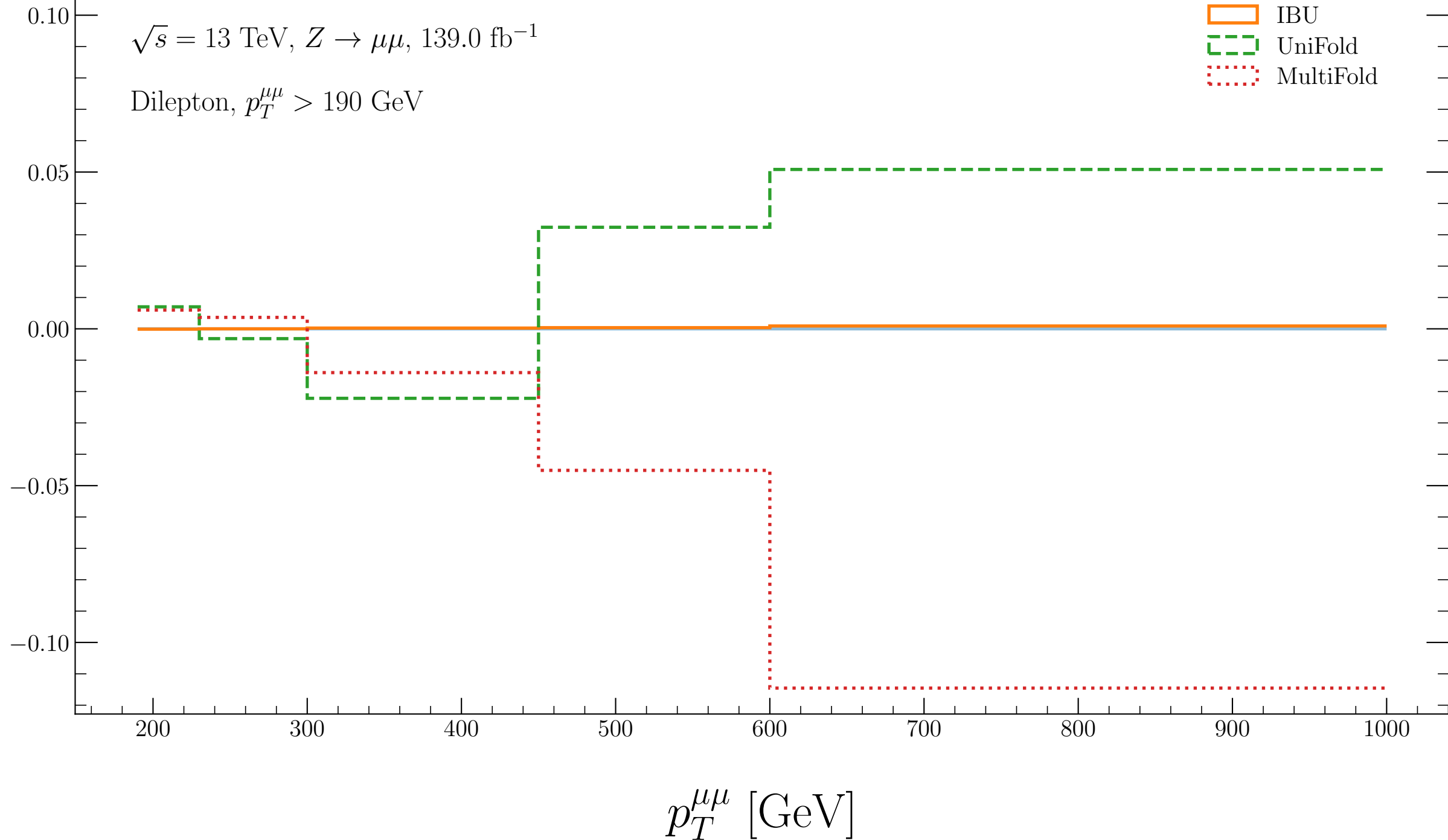
ATLAS

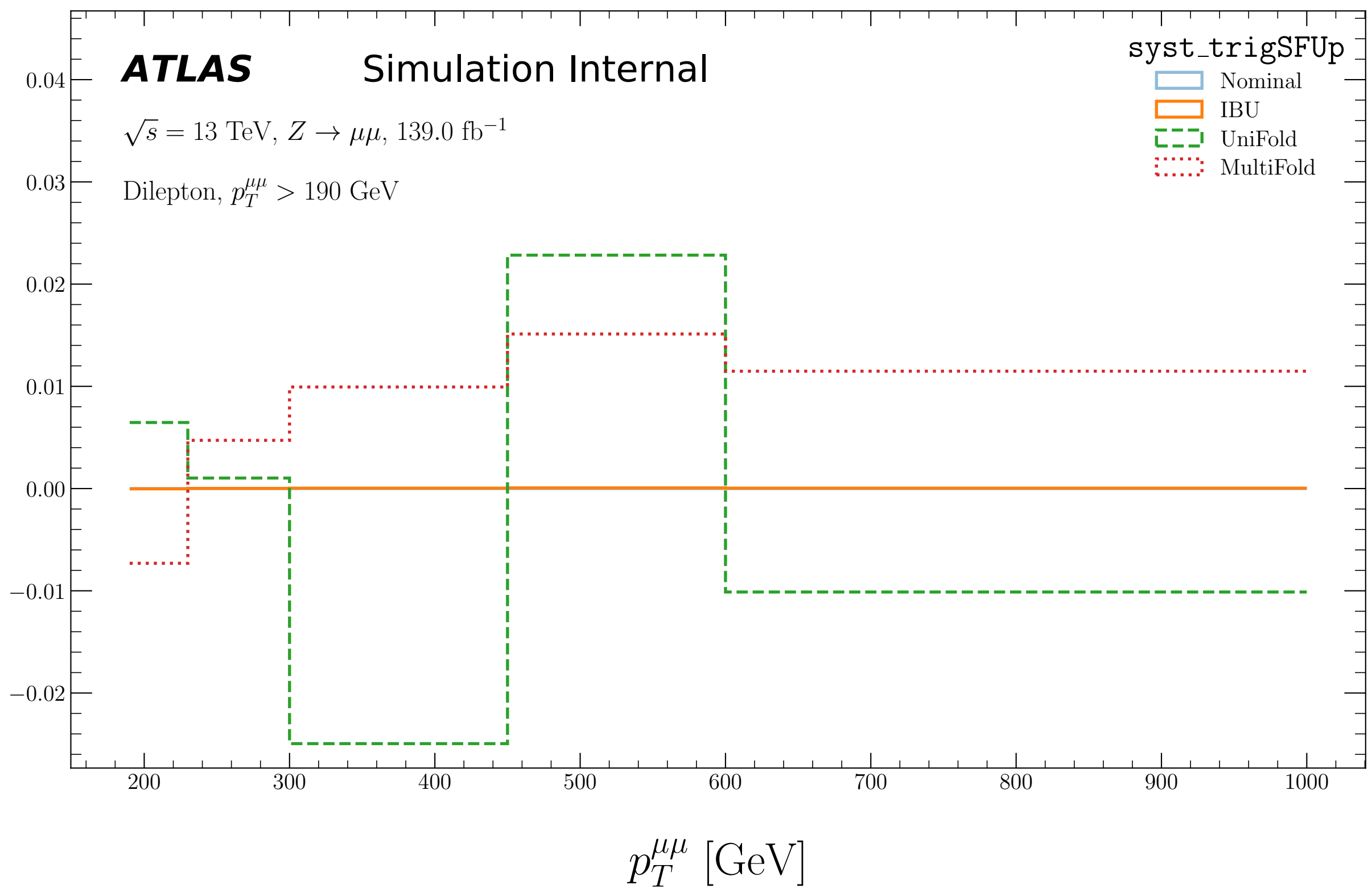
Simulation Internal

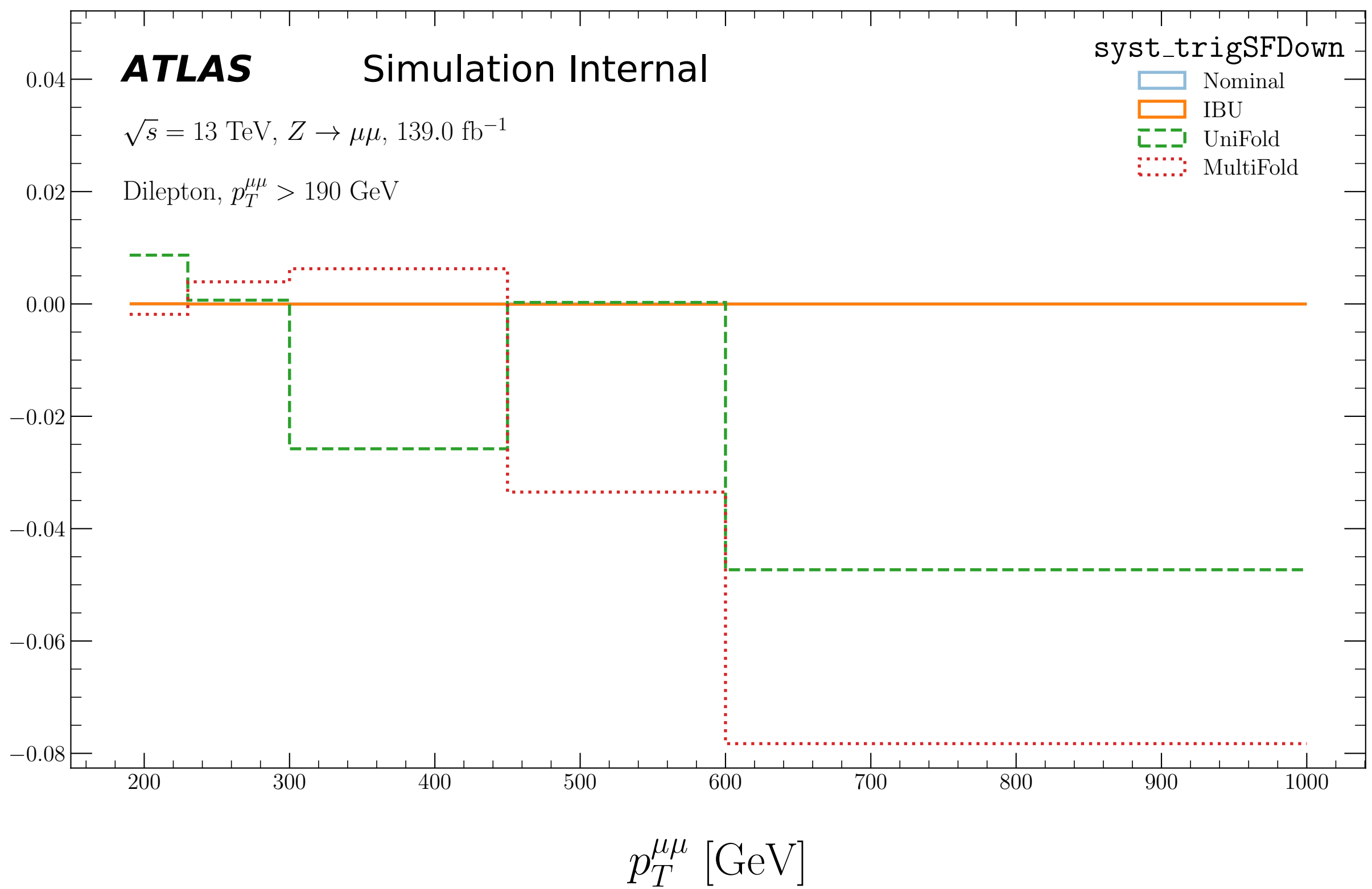
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

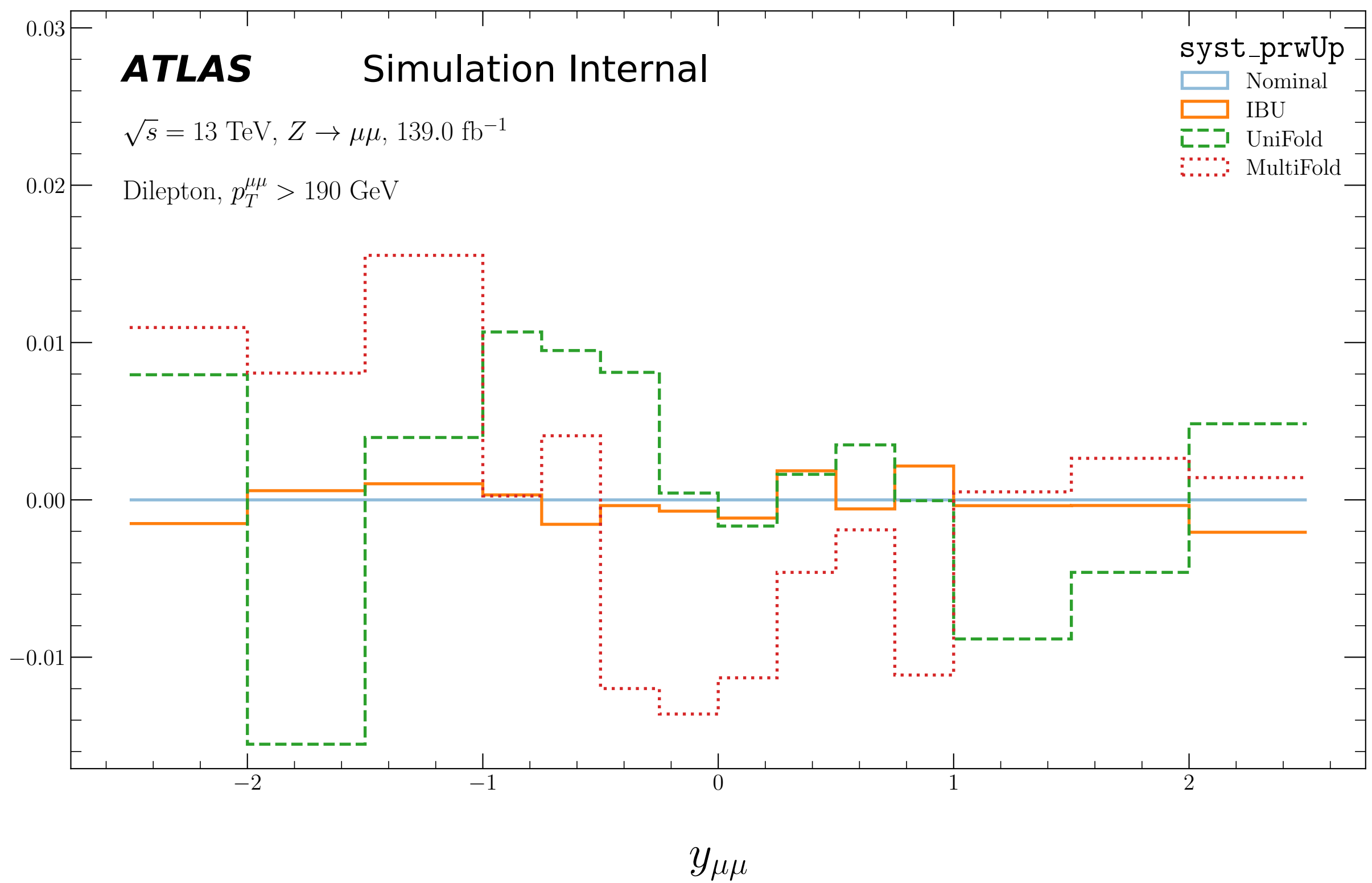
syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold









ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

Nominal

IBU

UniFold

MultiFold

0.06
0.04
0.02
0.00
-0.02

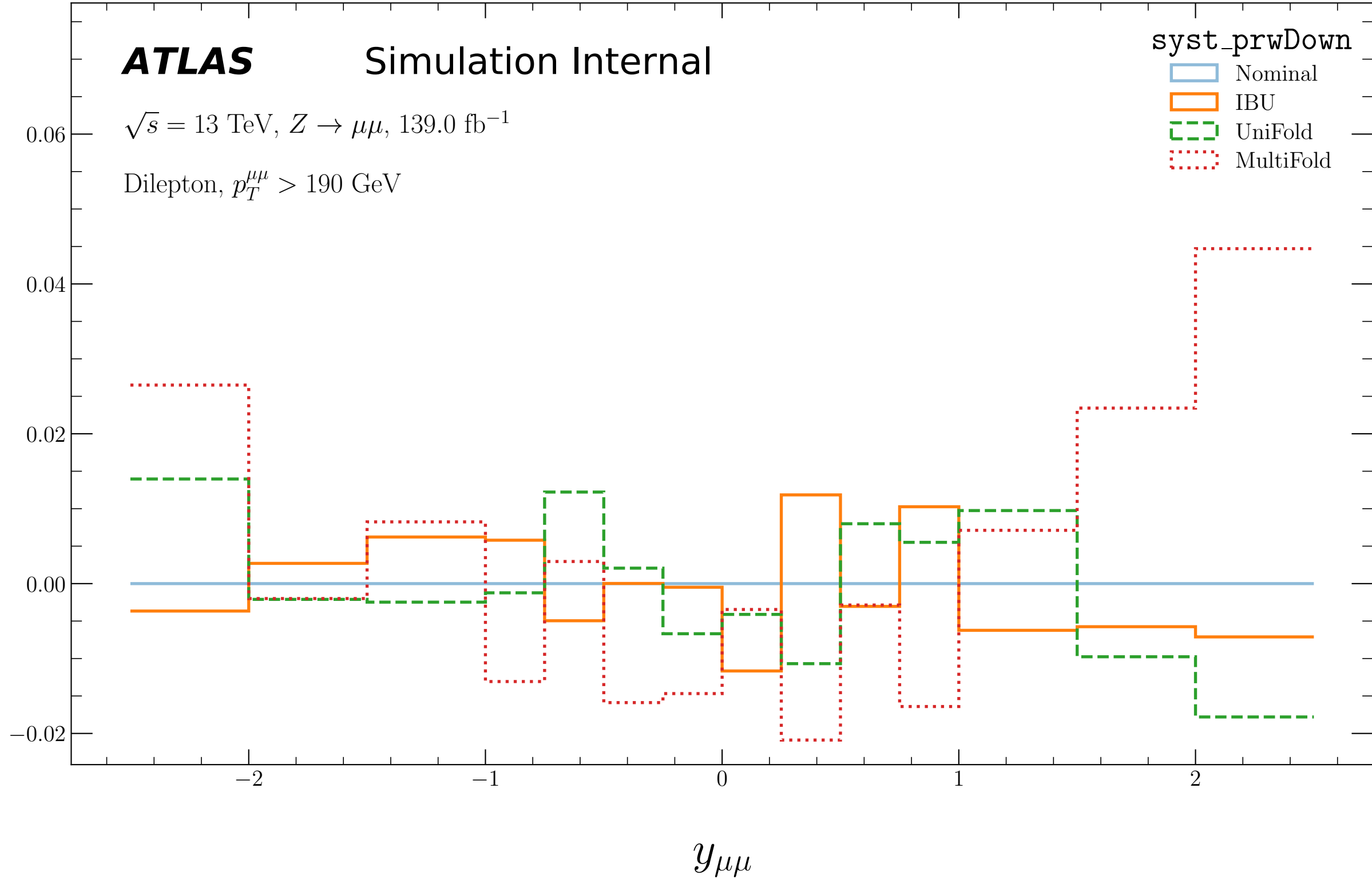
-2

-1

0

1

2

 $y_{\mu\mu}$ 

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

0.04

0.02

0.00

-0.02

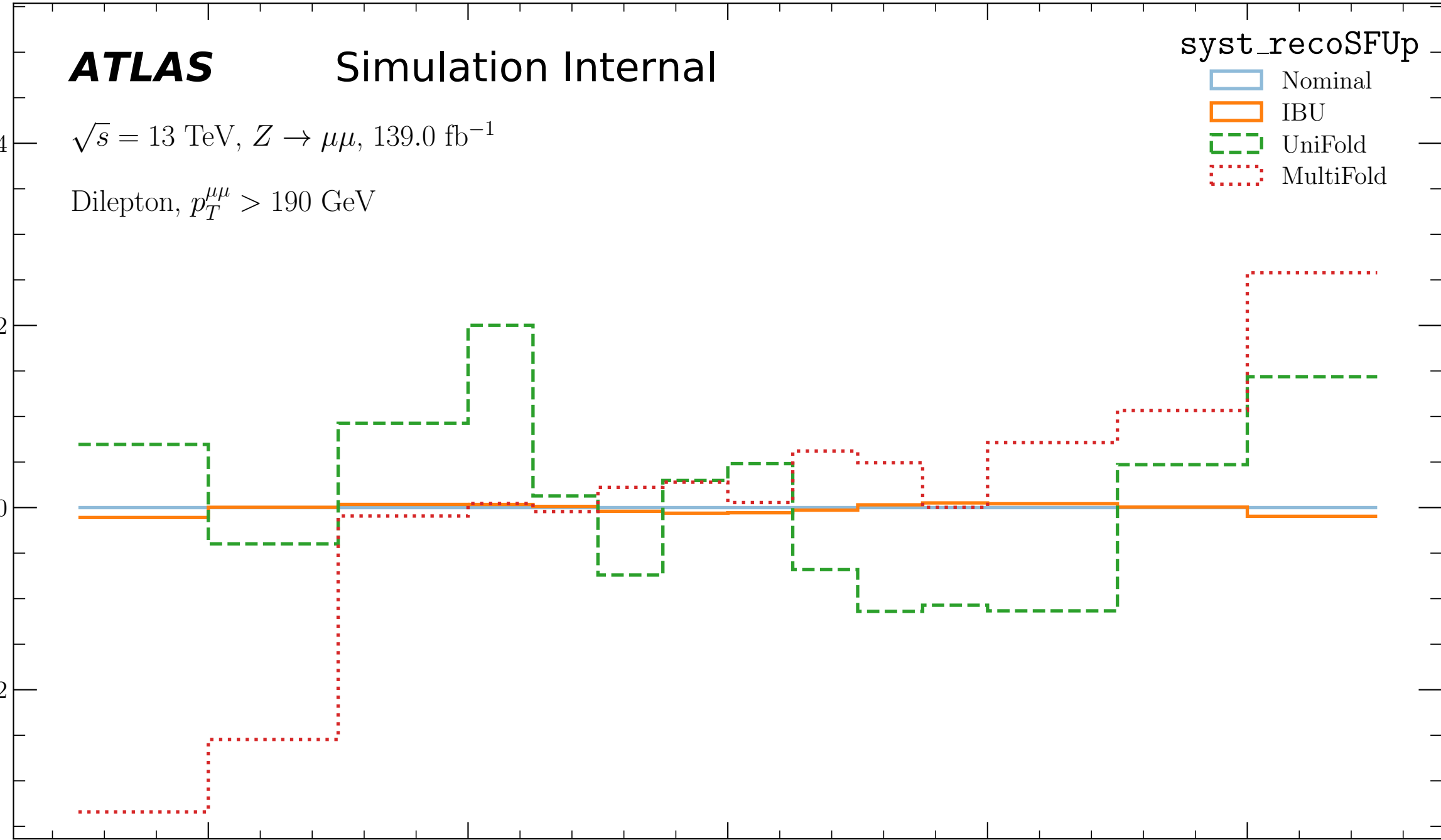
-2

-1

0

1

2

 $y_{\mu\mu}$ 

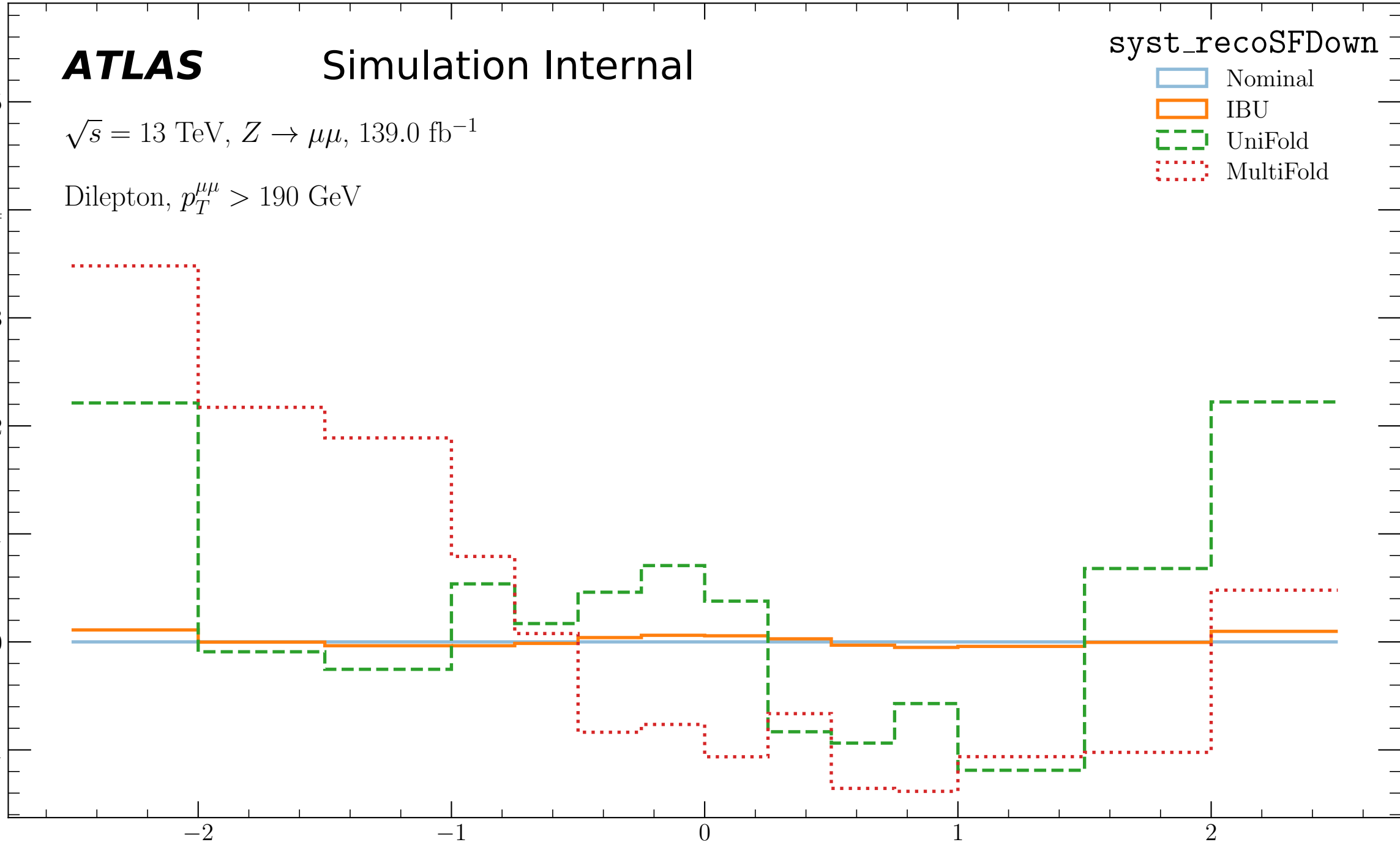
ATLAS

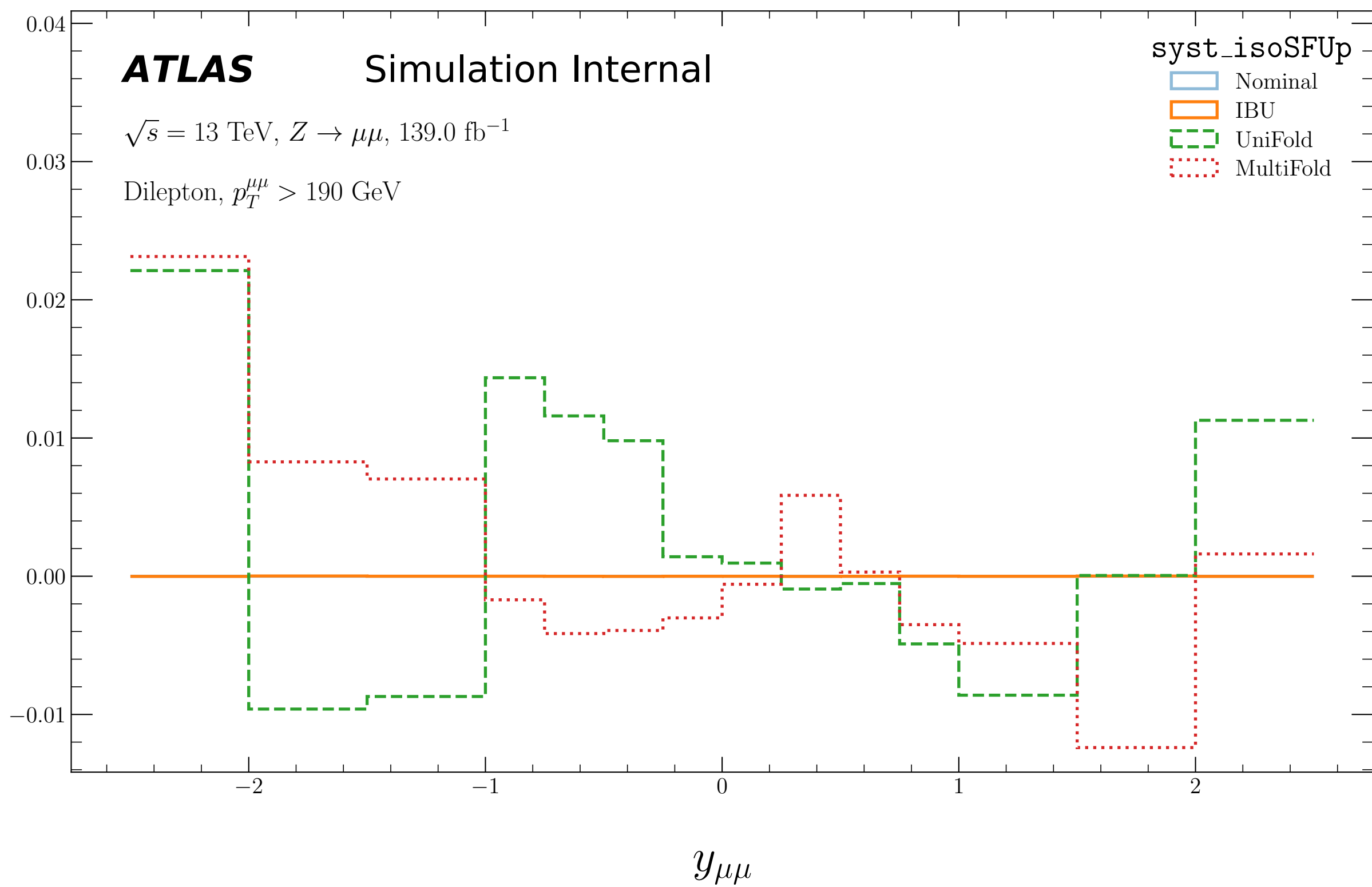
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.05
0.04
0.03
0.02
0.01
0.00
-0.01 $y_{\mu\mu}$



ATLAS

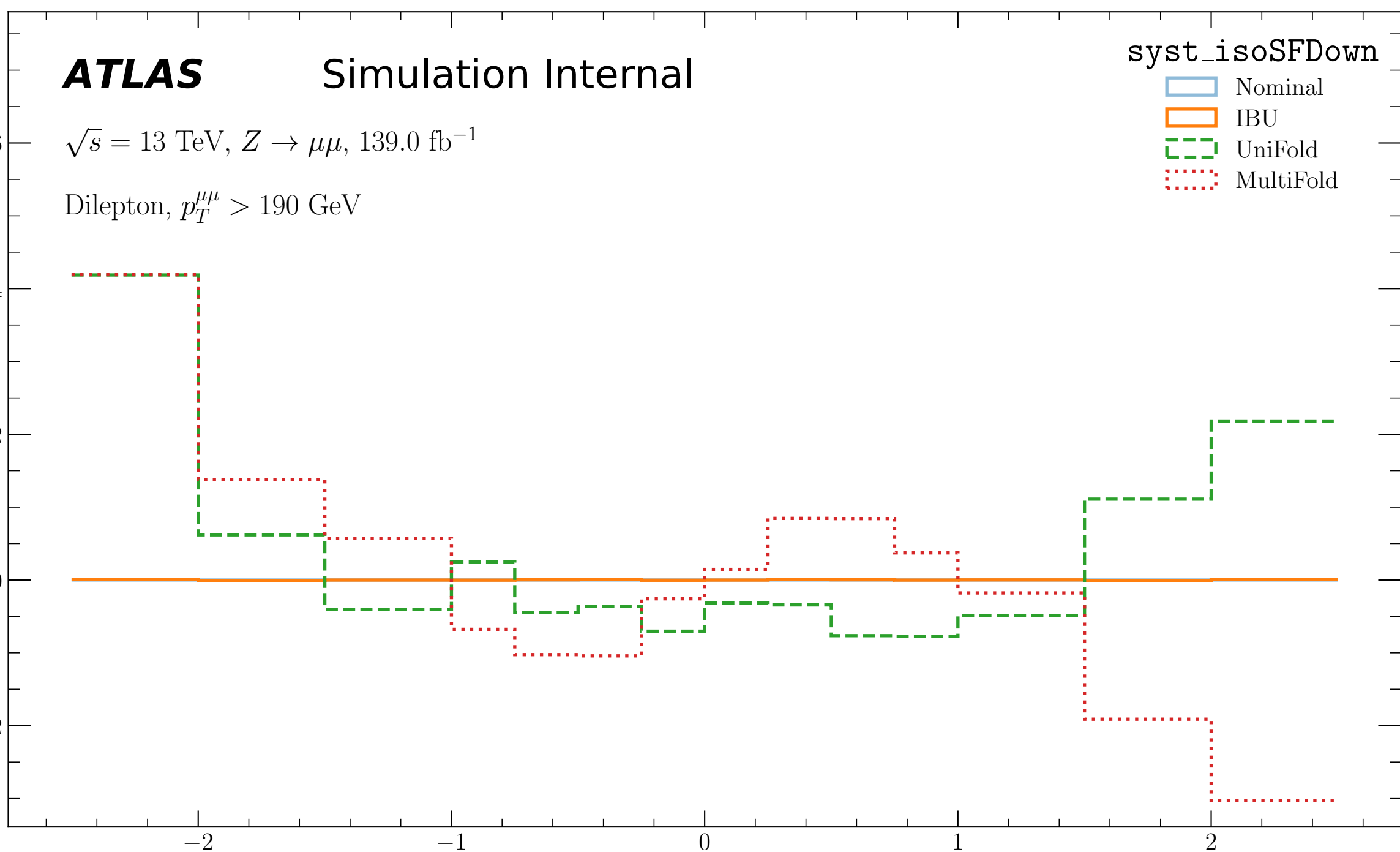
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.06
0.04
0.02
0.00
-0.02

 $y_{\mu\mu}$

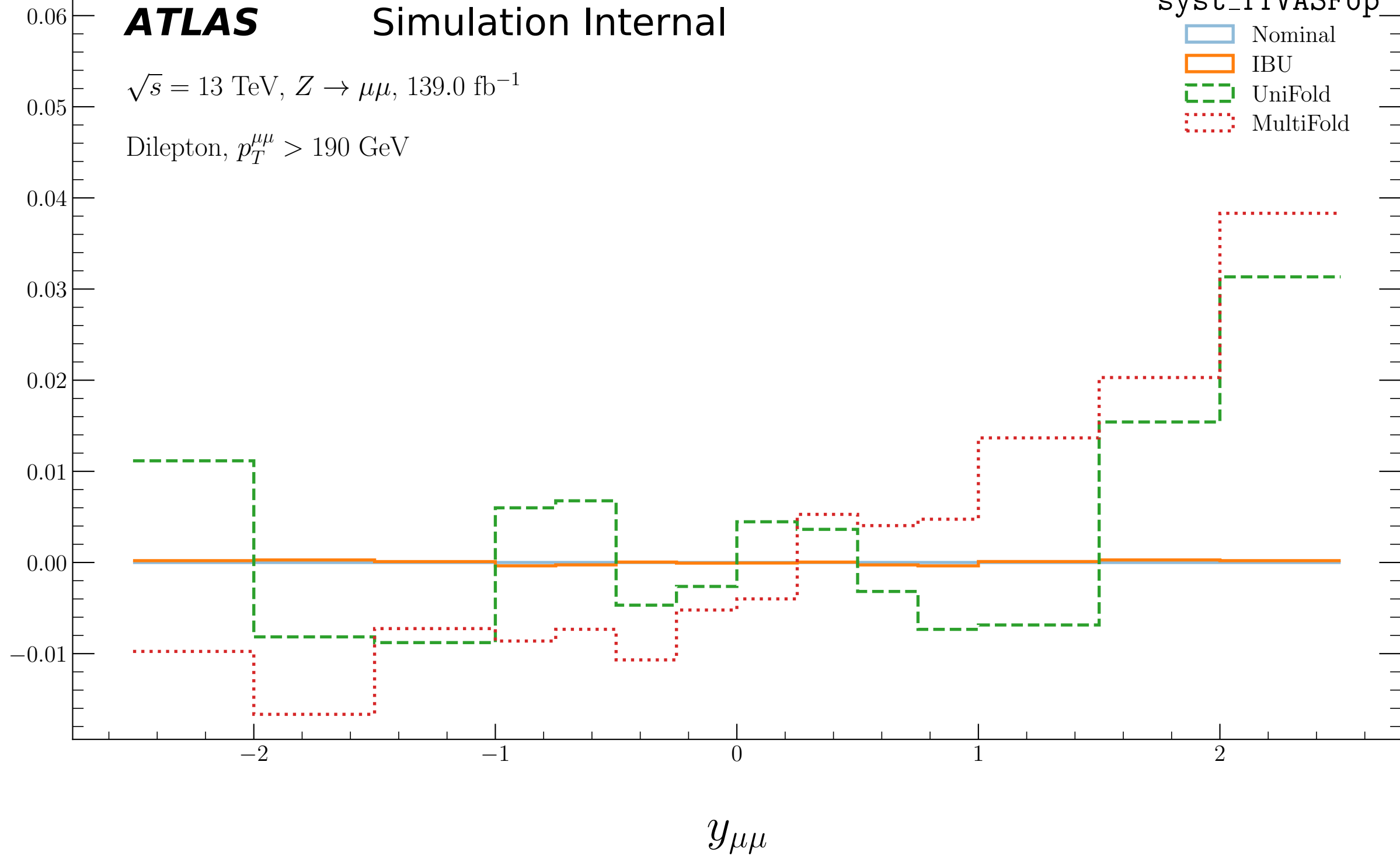
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold



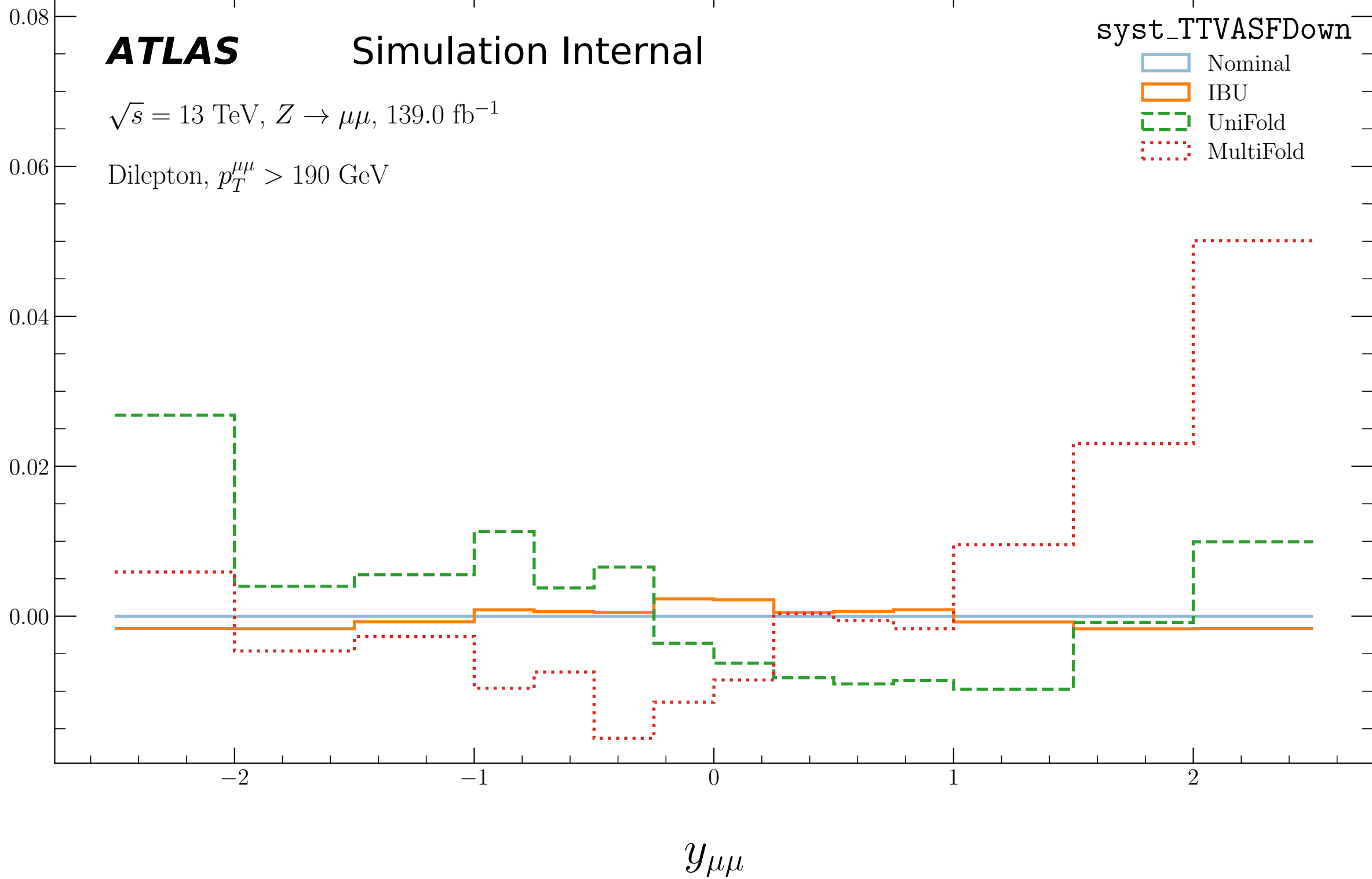
ATLAS

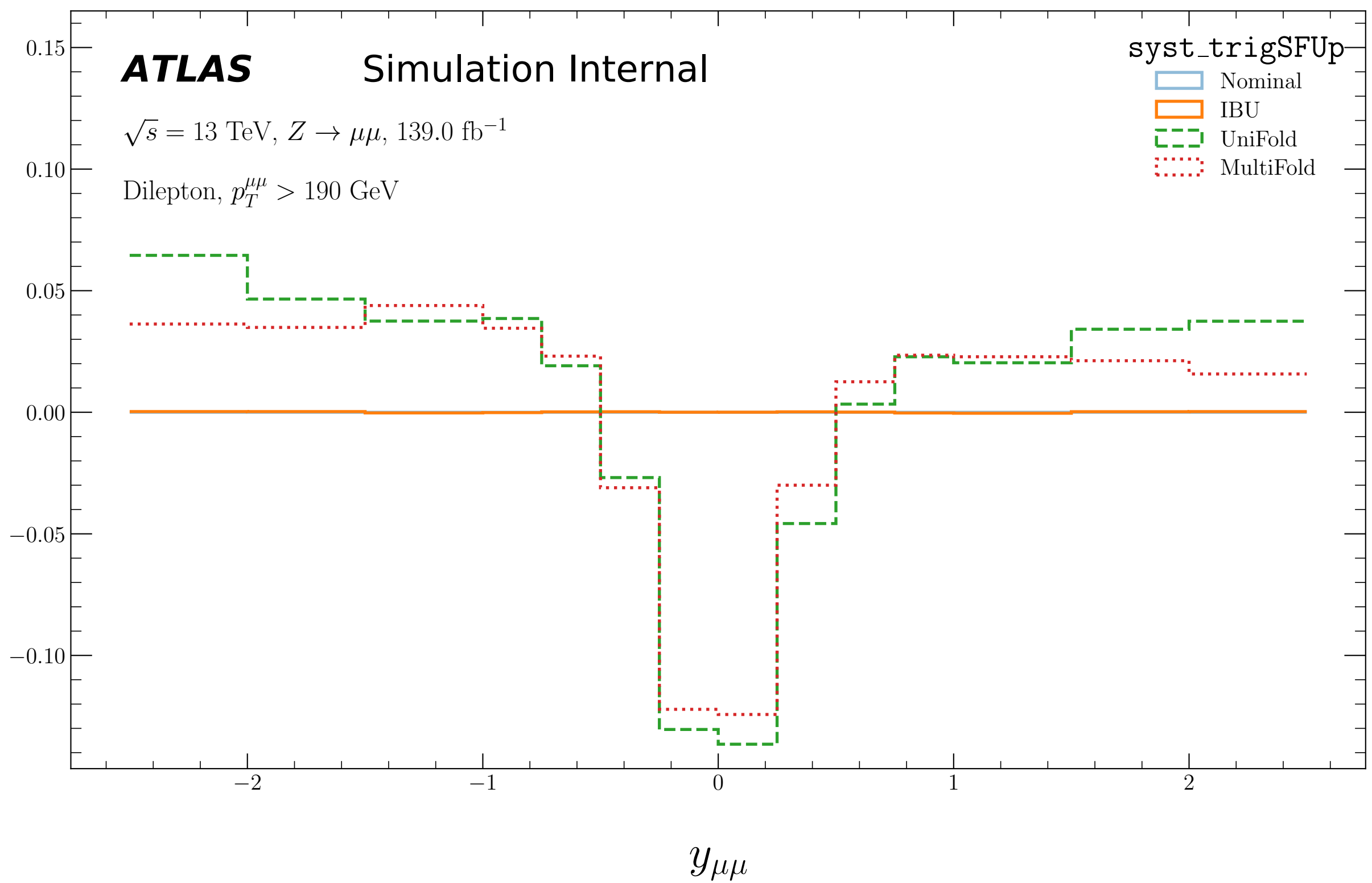
Simulation Internal

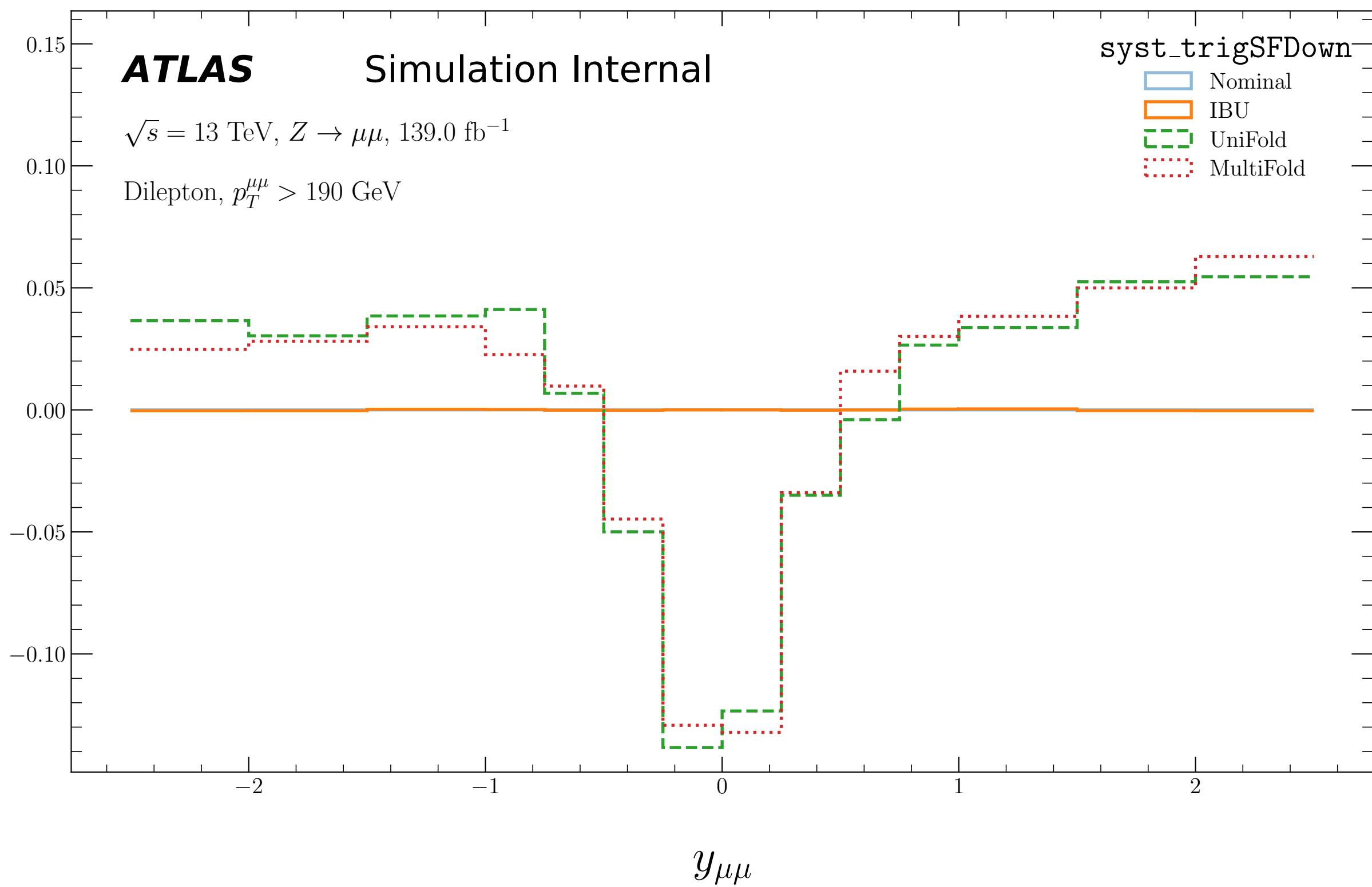
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

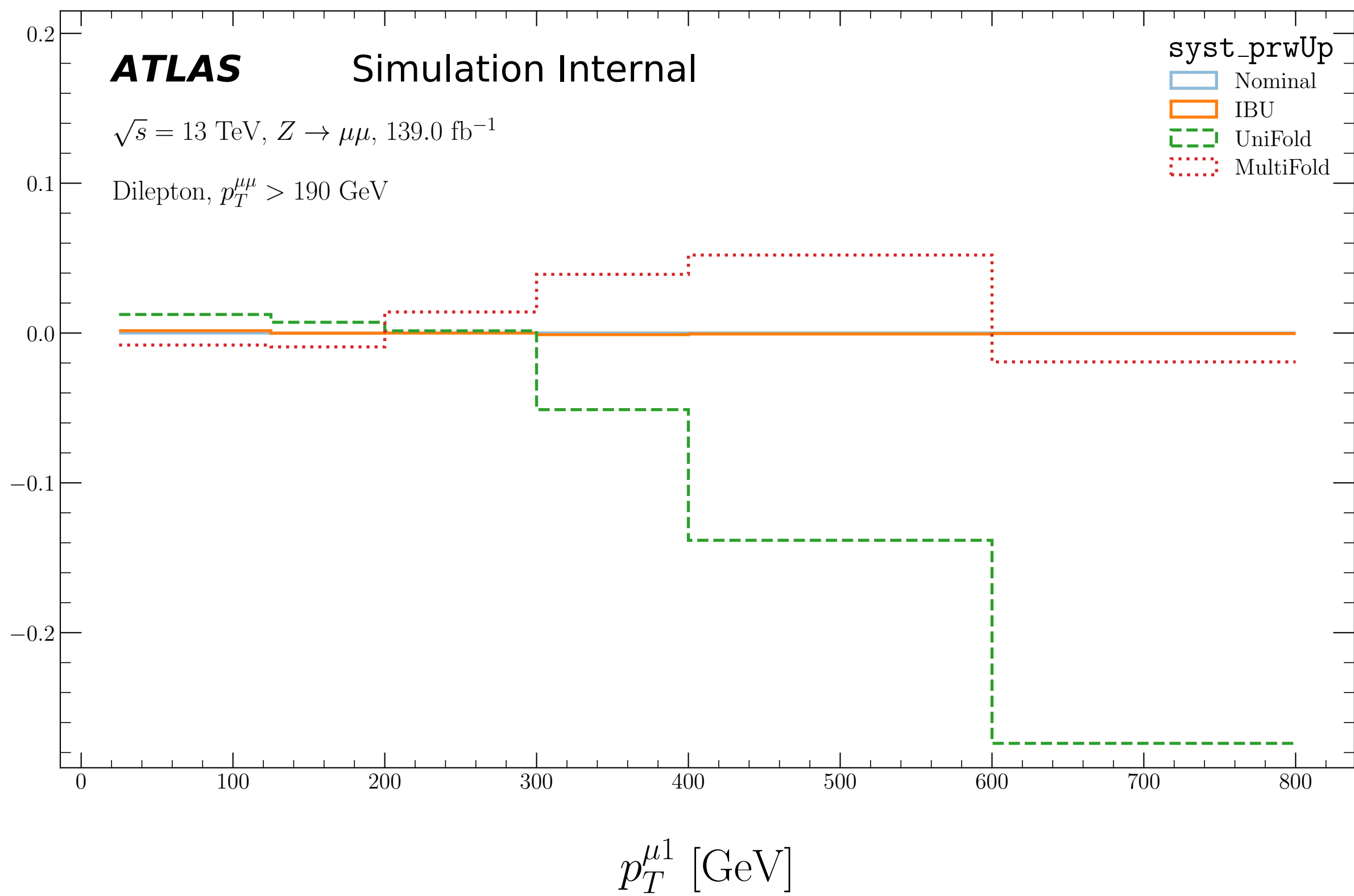
syst_TTVASFDown

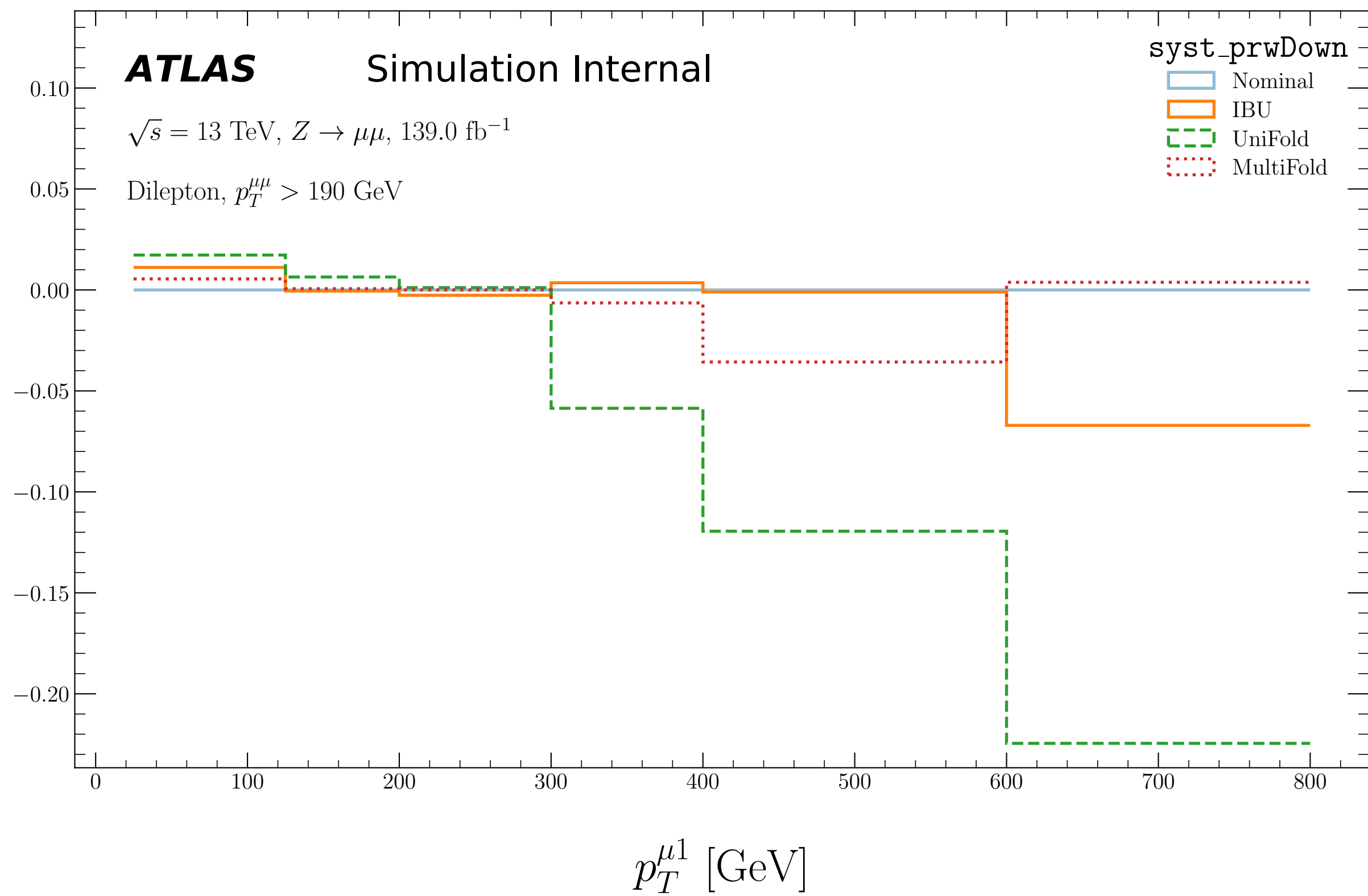
- Nominal
- IBU
- UniFold
- MultiFold

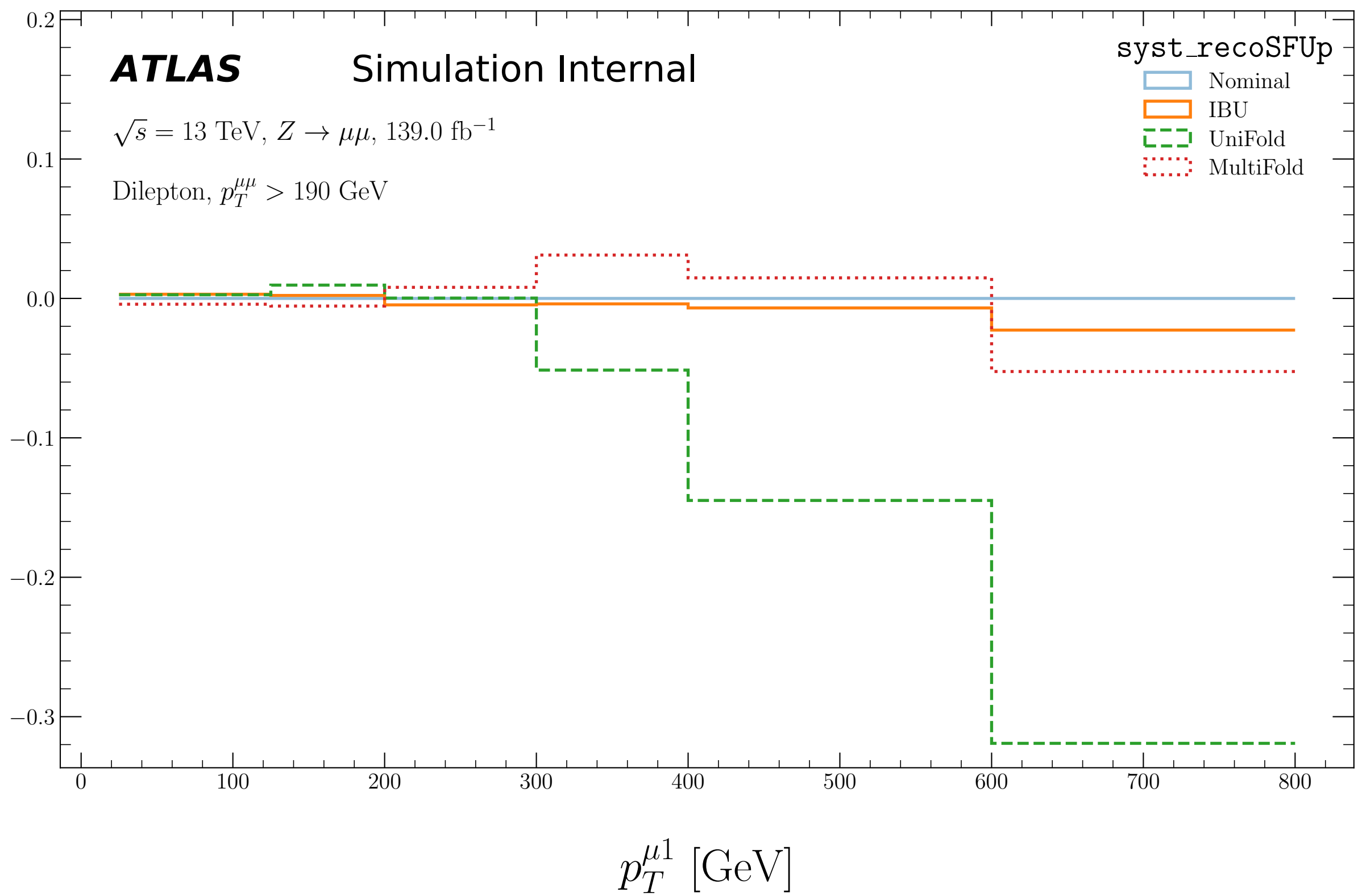


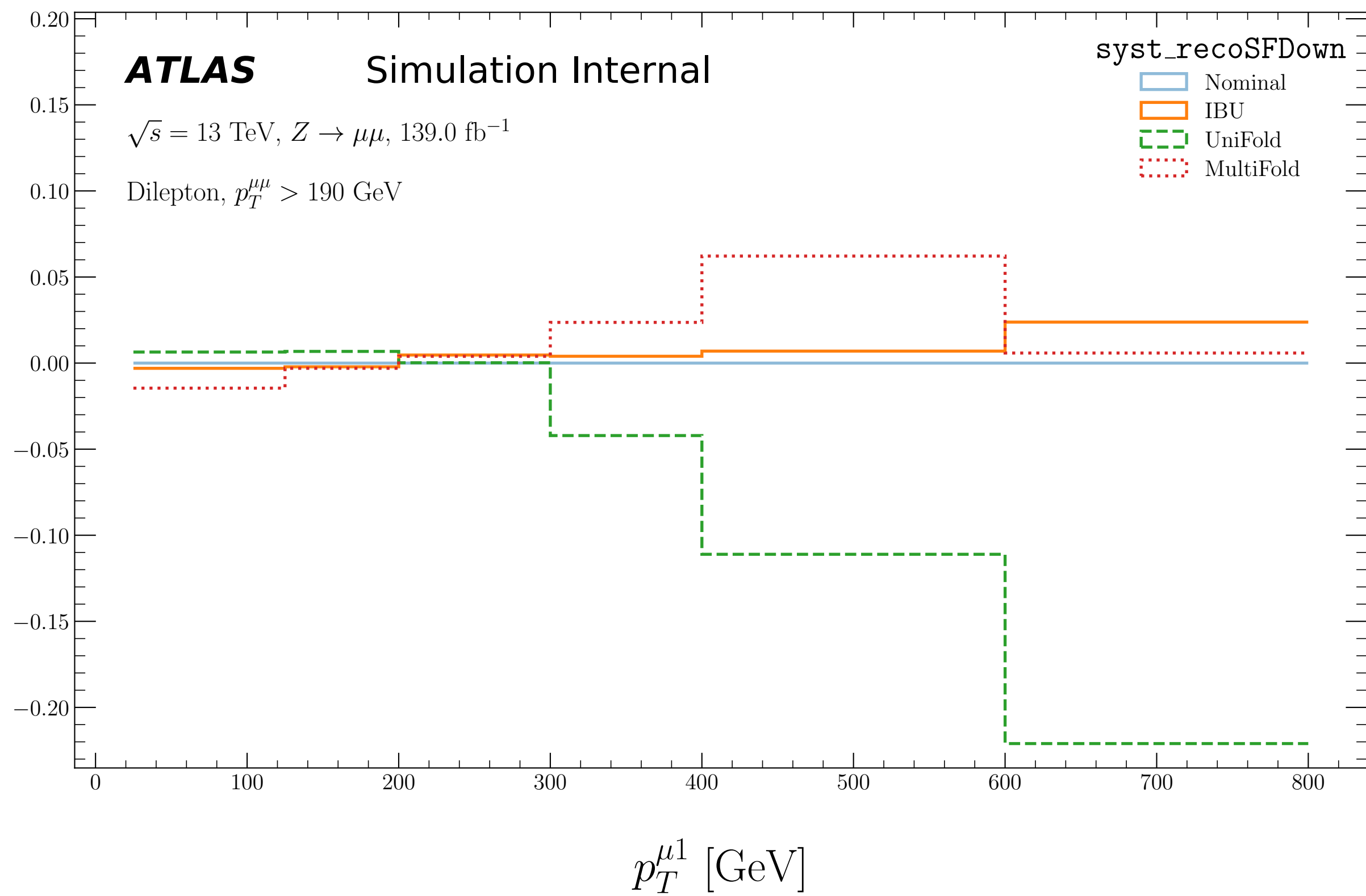












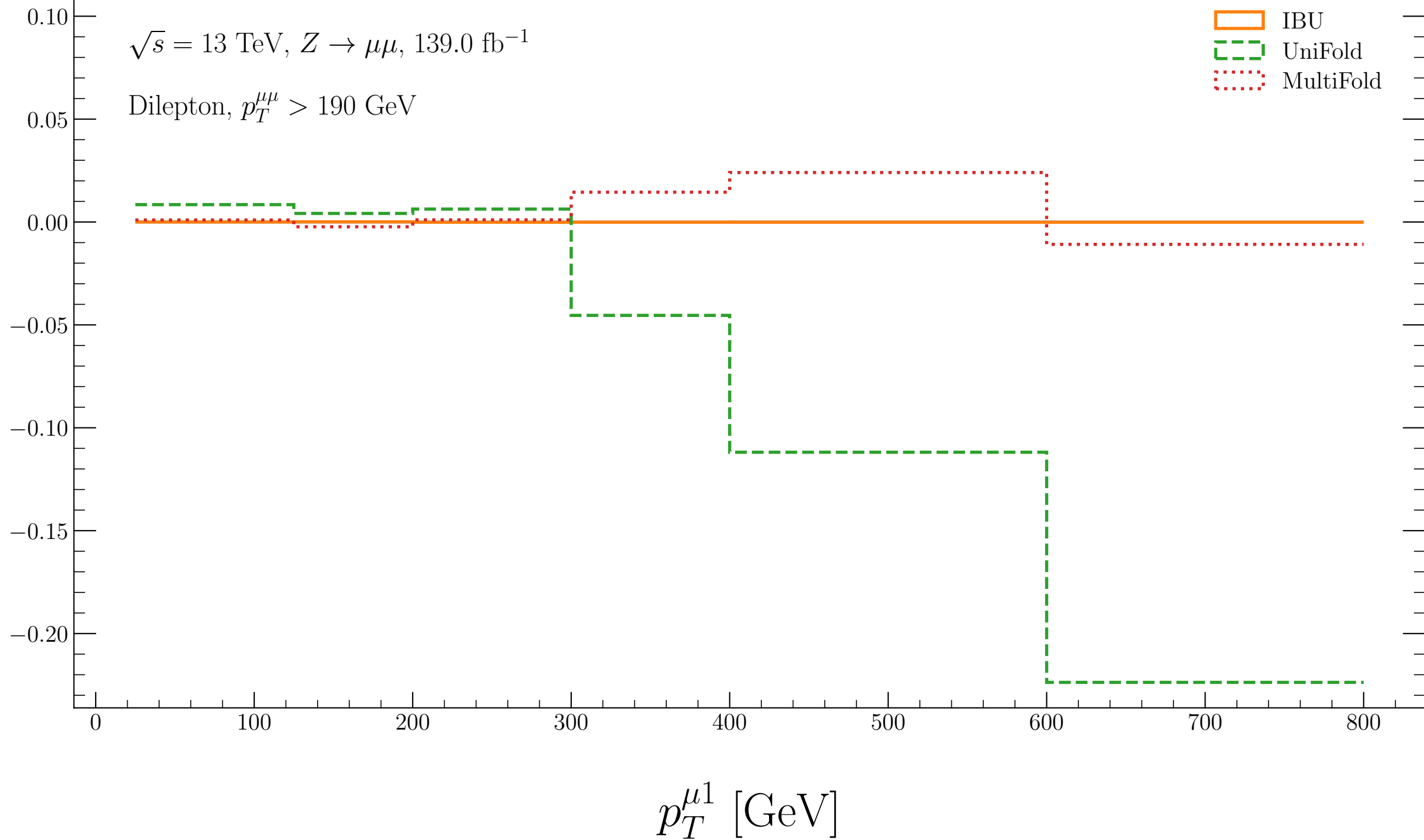
ATLAS

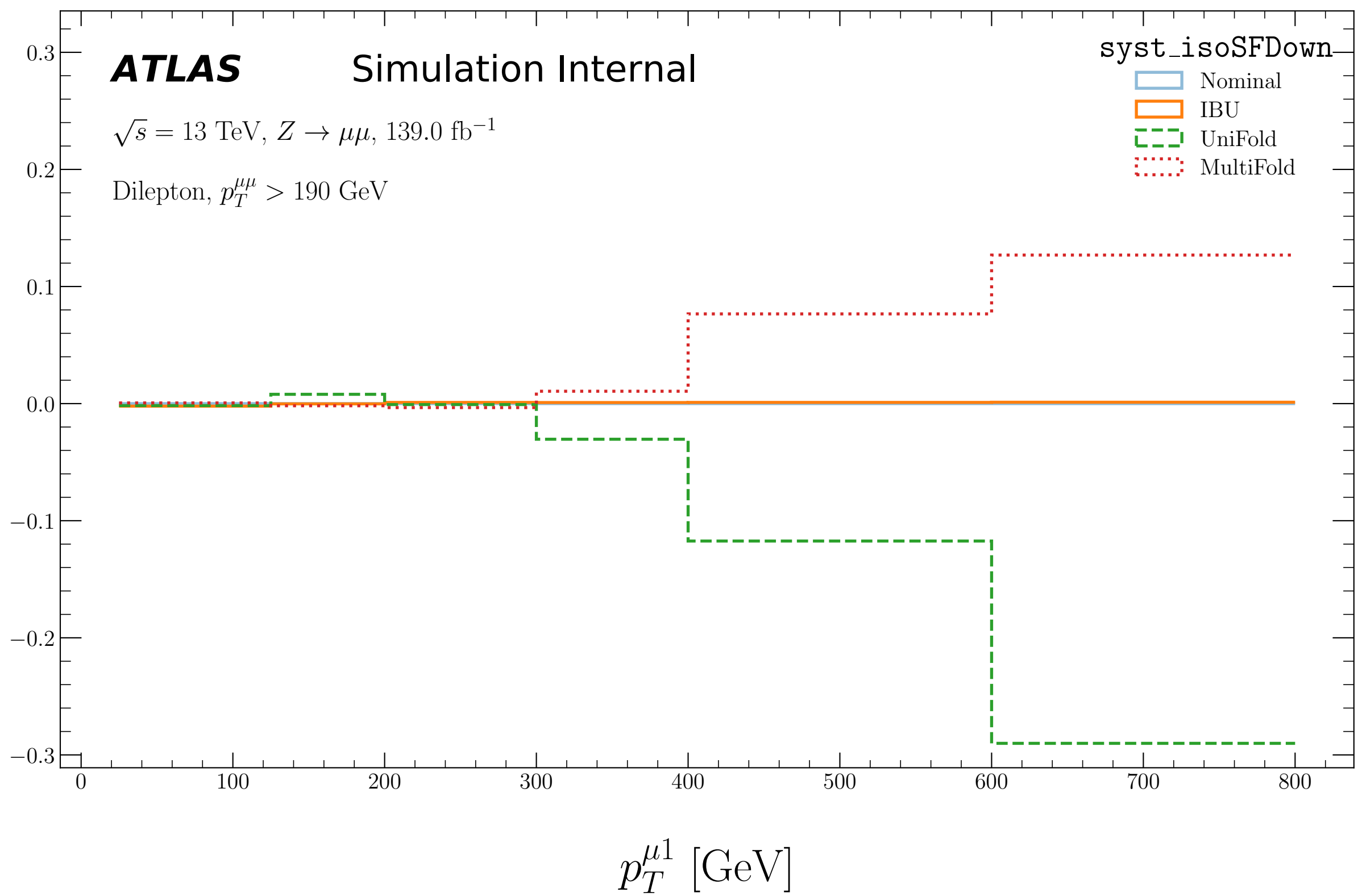
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold





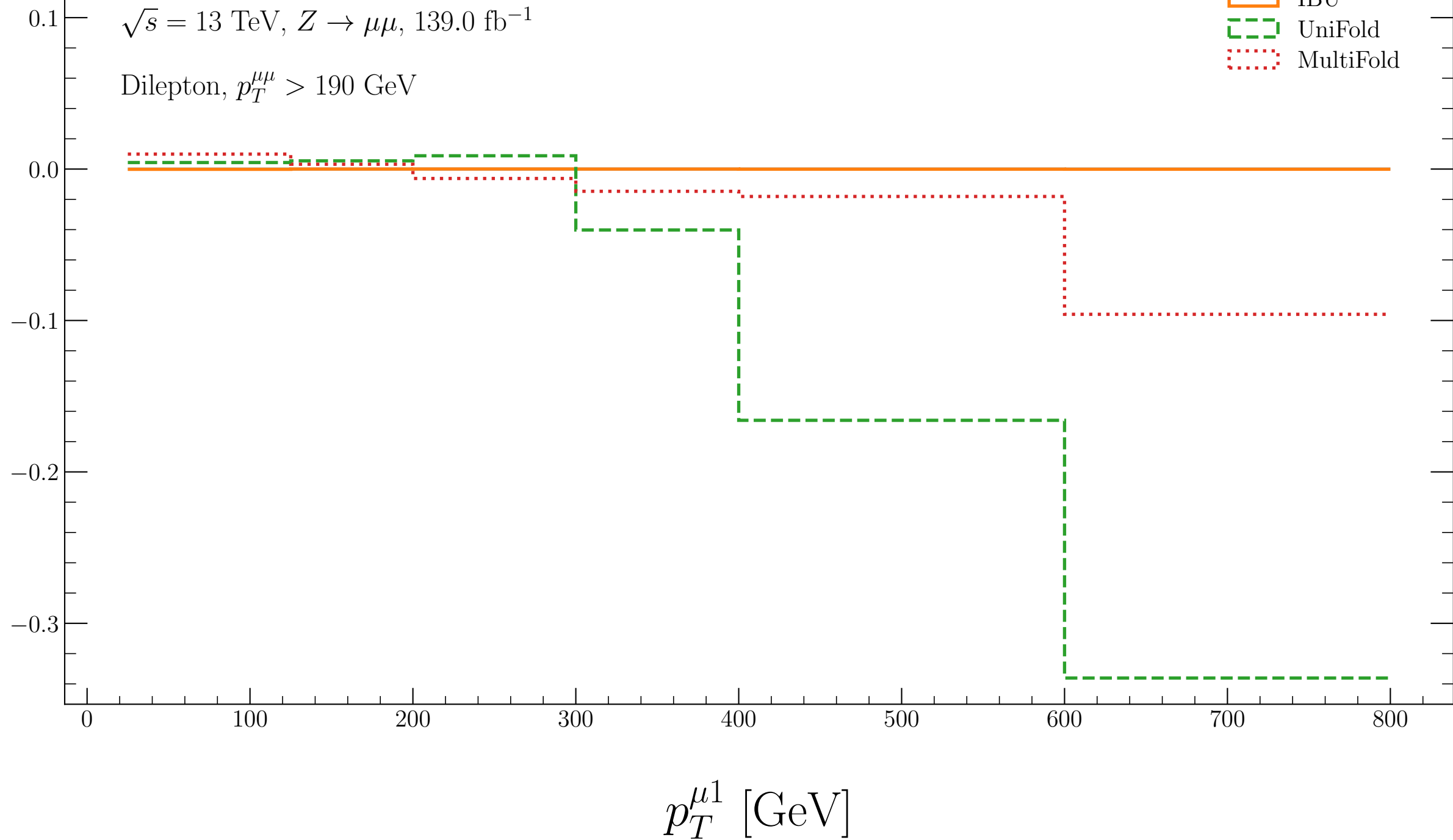
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold



Relative Systematic Effect (MultiFold)

ATLAS

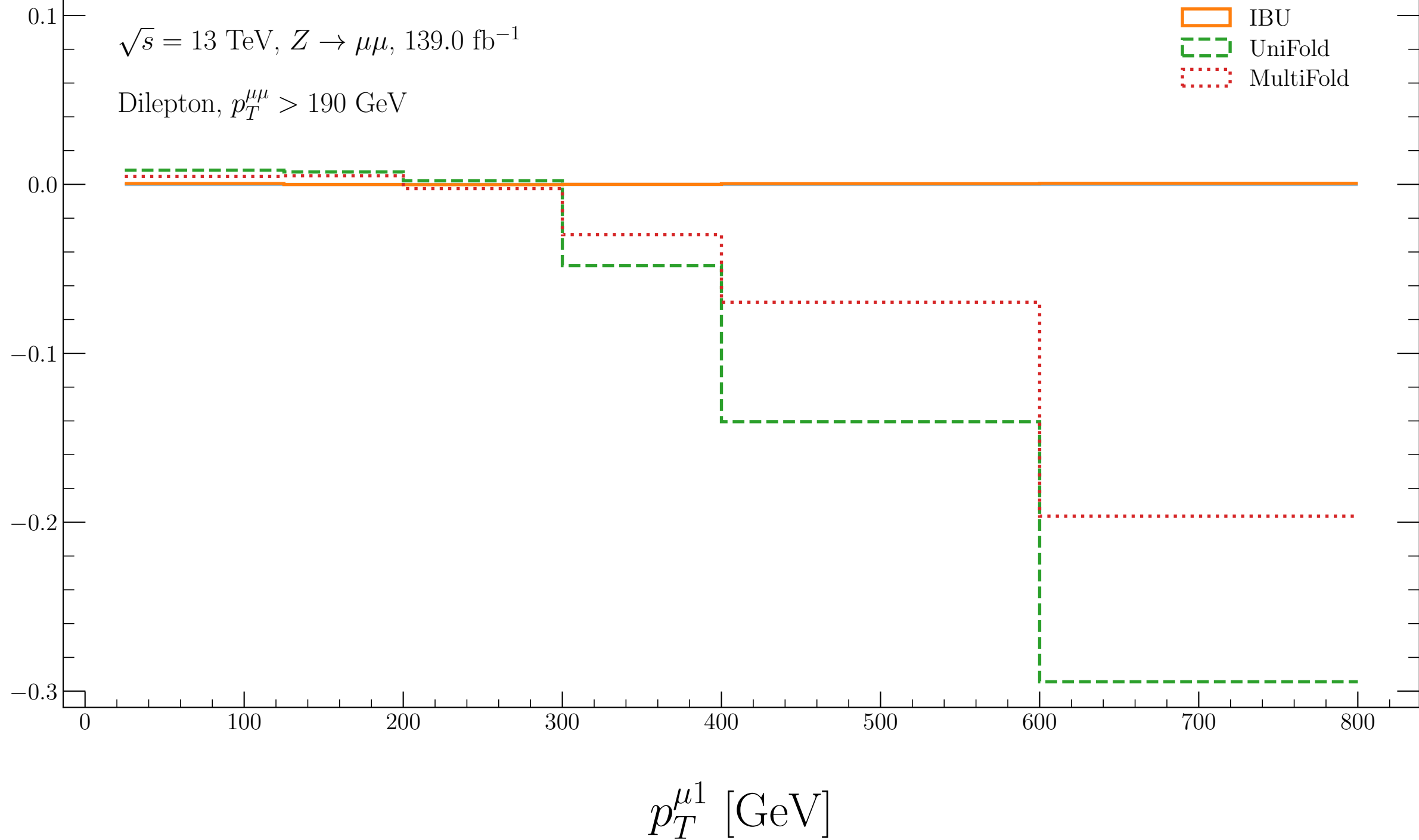
Simulation Internal

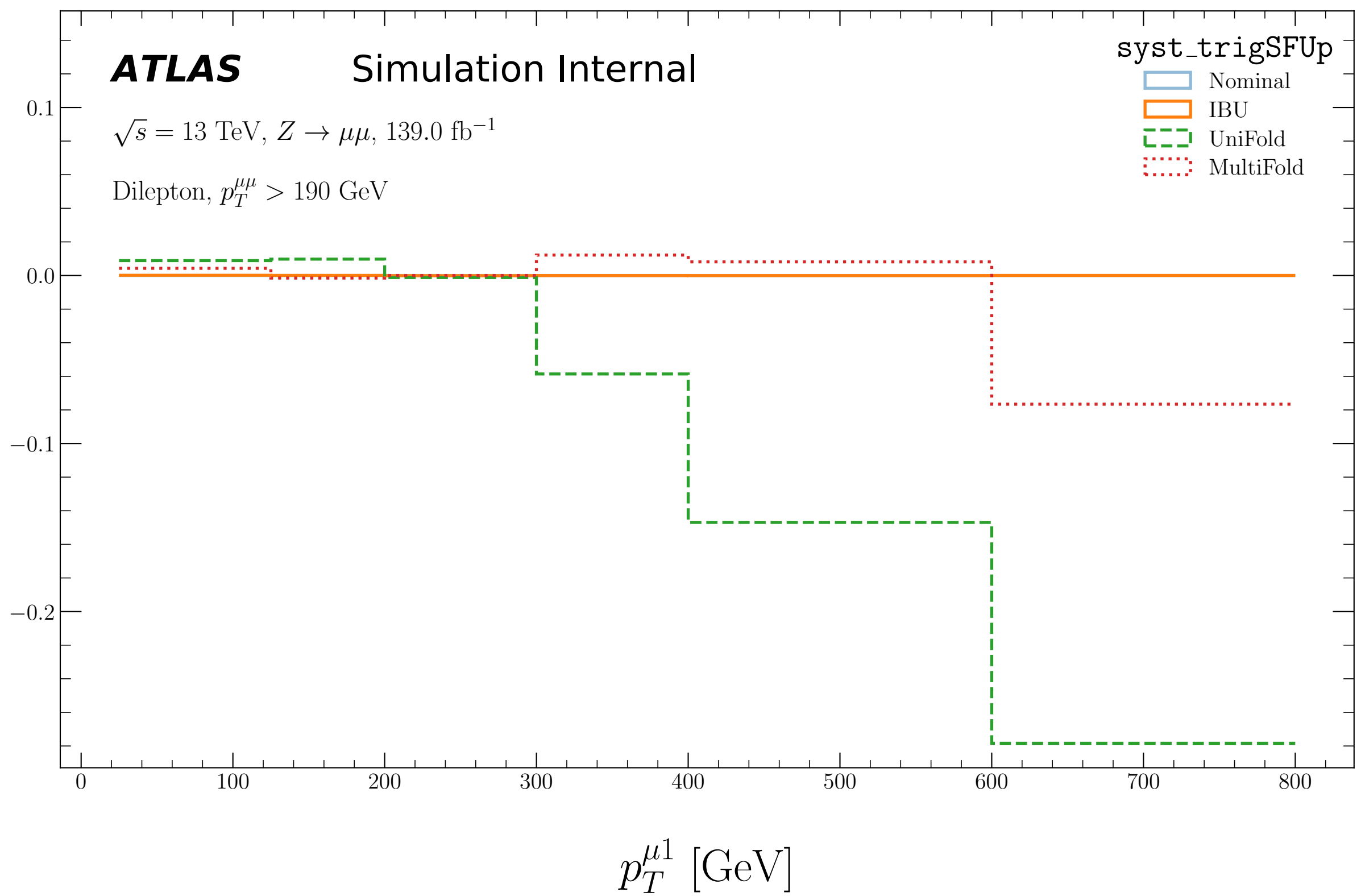
$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

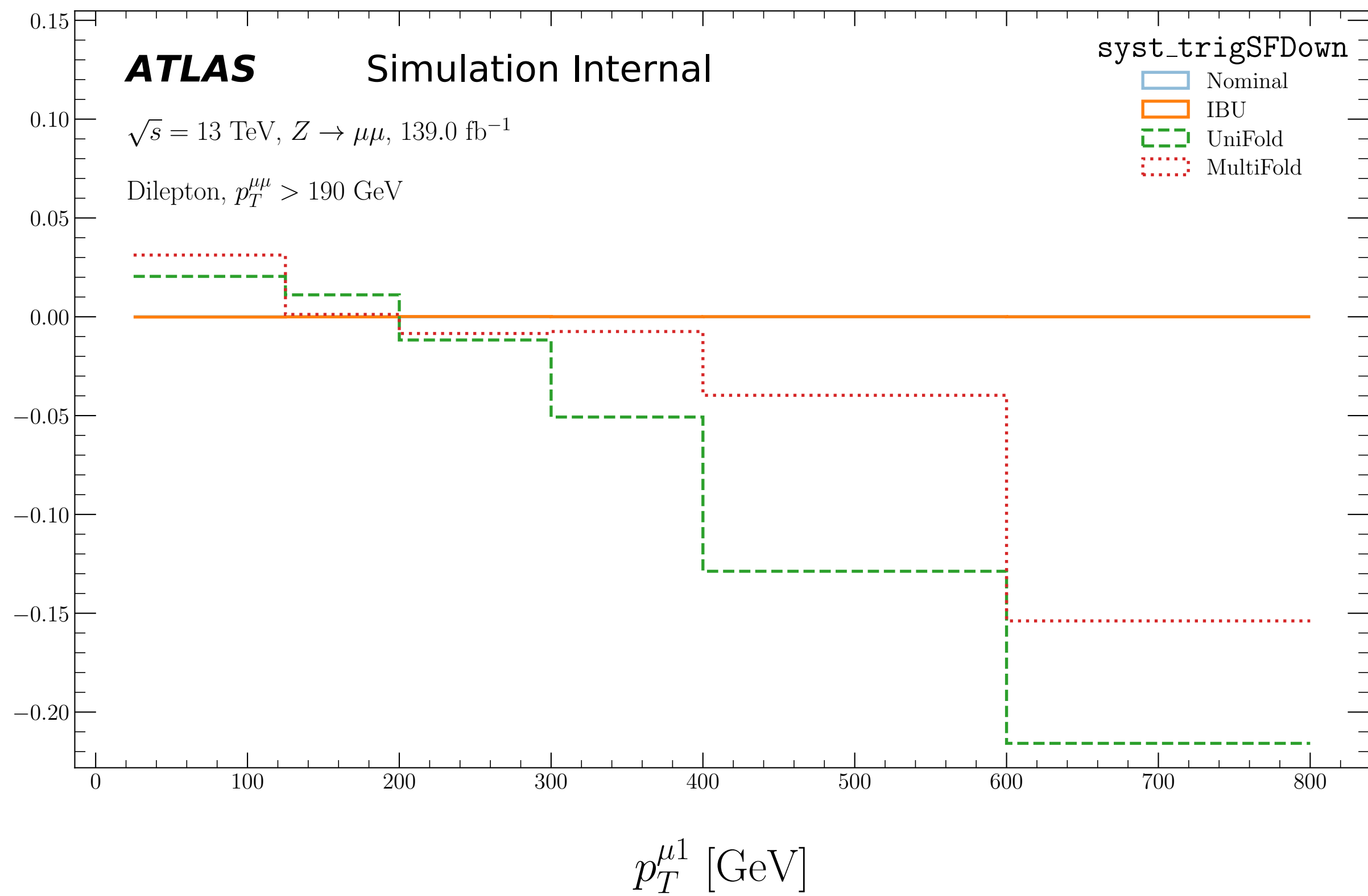
Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold







ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwUp

Nominal

IBU

UniFold

MultiFold

0.4

0.3

0.2

0.1

0.0

50

100

150

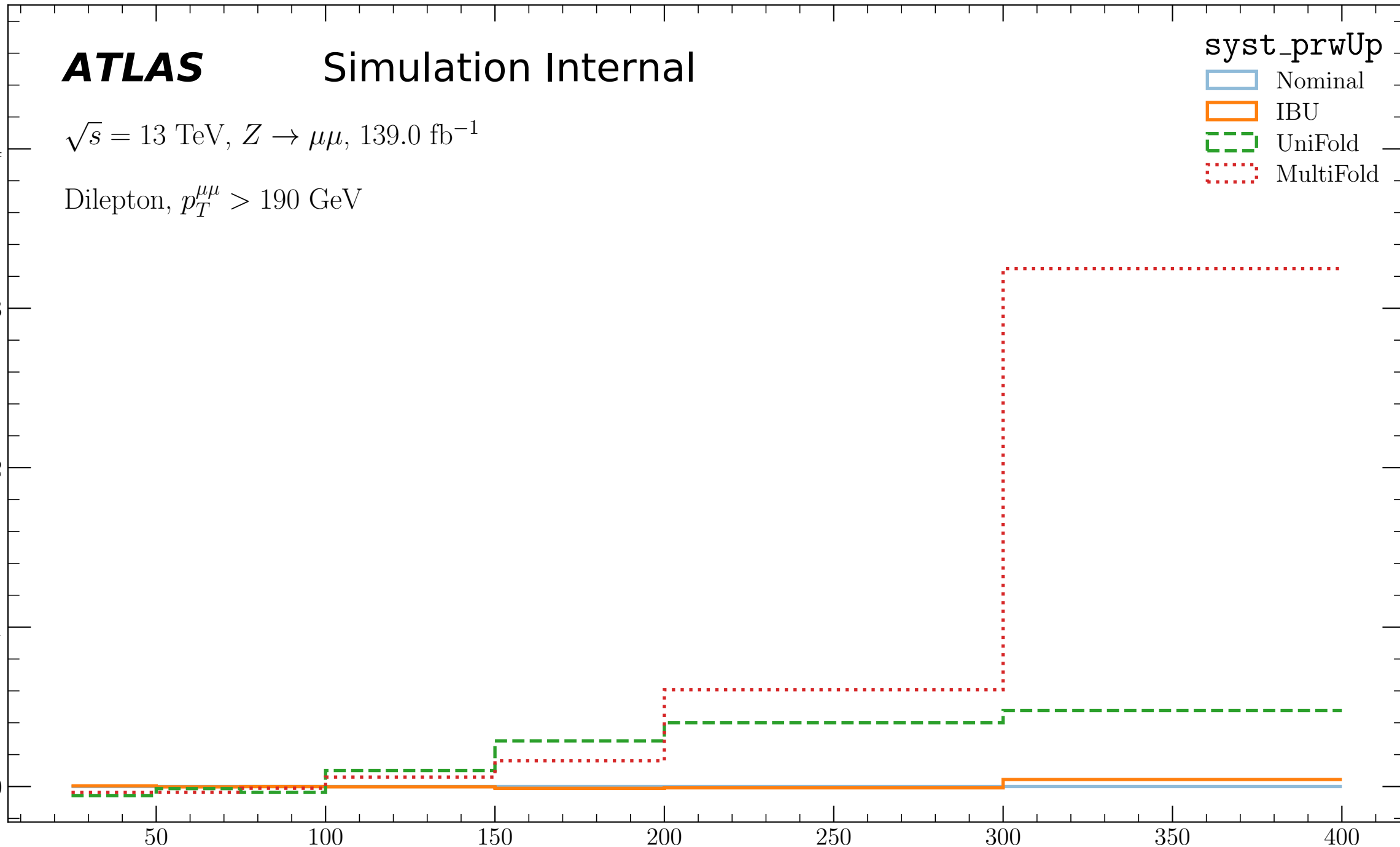
200

250

300

350

400

 $p_T^{\mu\mu} [\text{GeV}]$ 

Relative Systematic Effect (MultiFold)

ATLAS

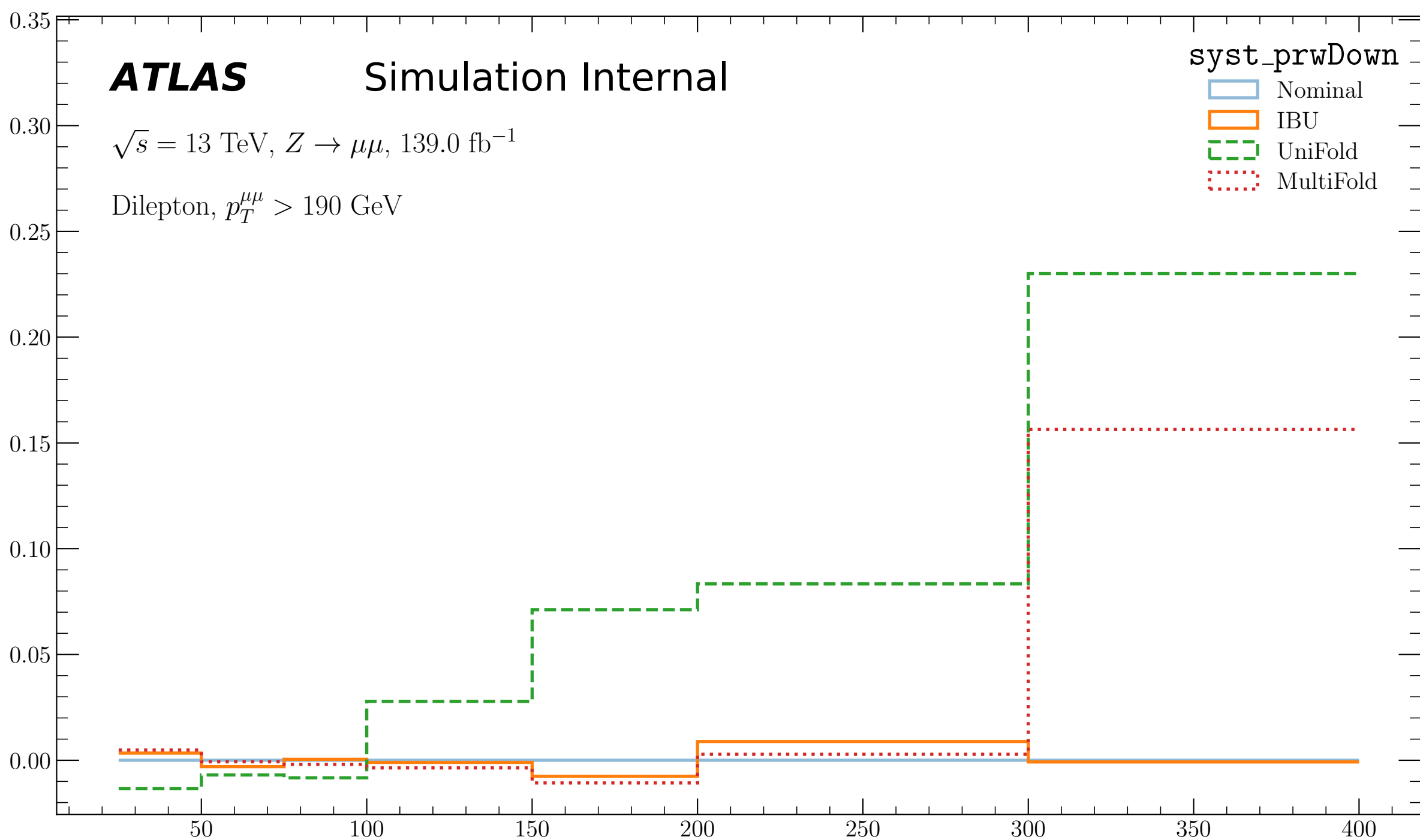
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}$, $Z \rightarrow \mu\mu$, 139.0 fb^{-1}

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

- Nominal
- IBU
- UniFold
- MultiFold



$p_T^{\mu 2}$ [GeV]

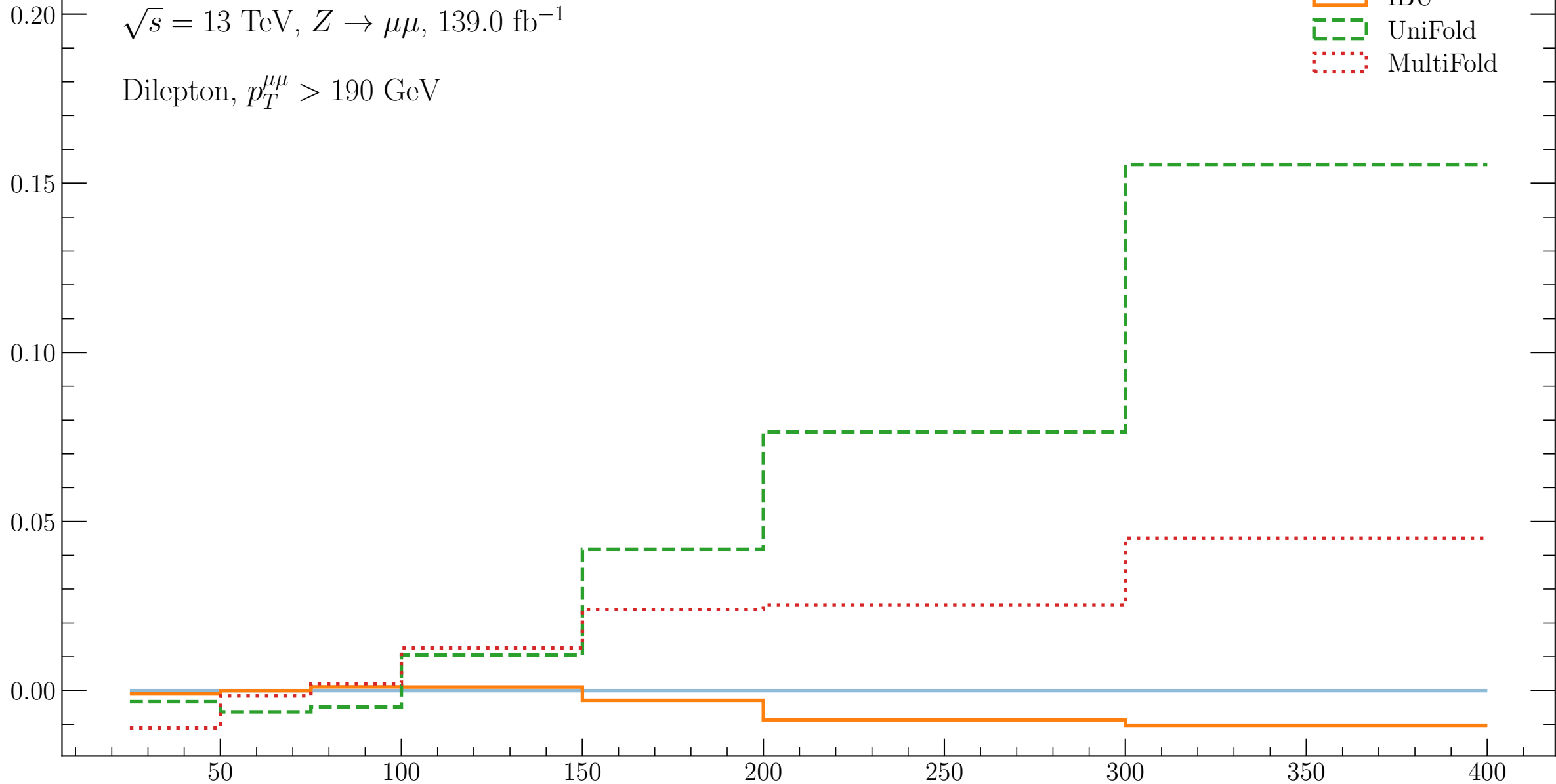
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

 $p_T^{\mu\mu}$ [GeV]

Relative Systematic Effect (MultiFold)

ATLAS

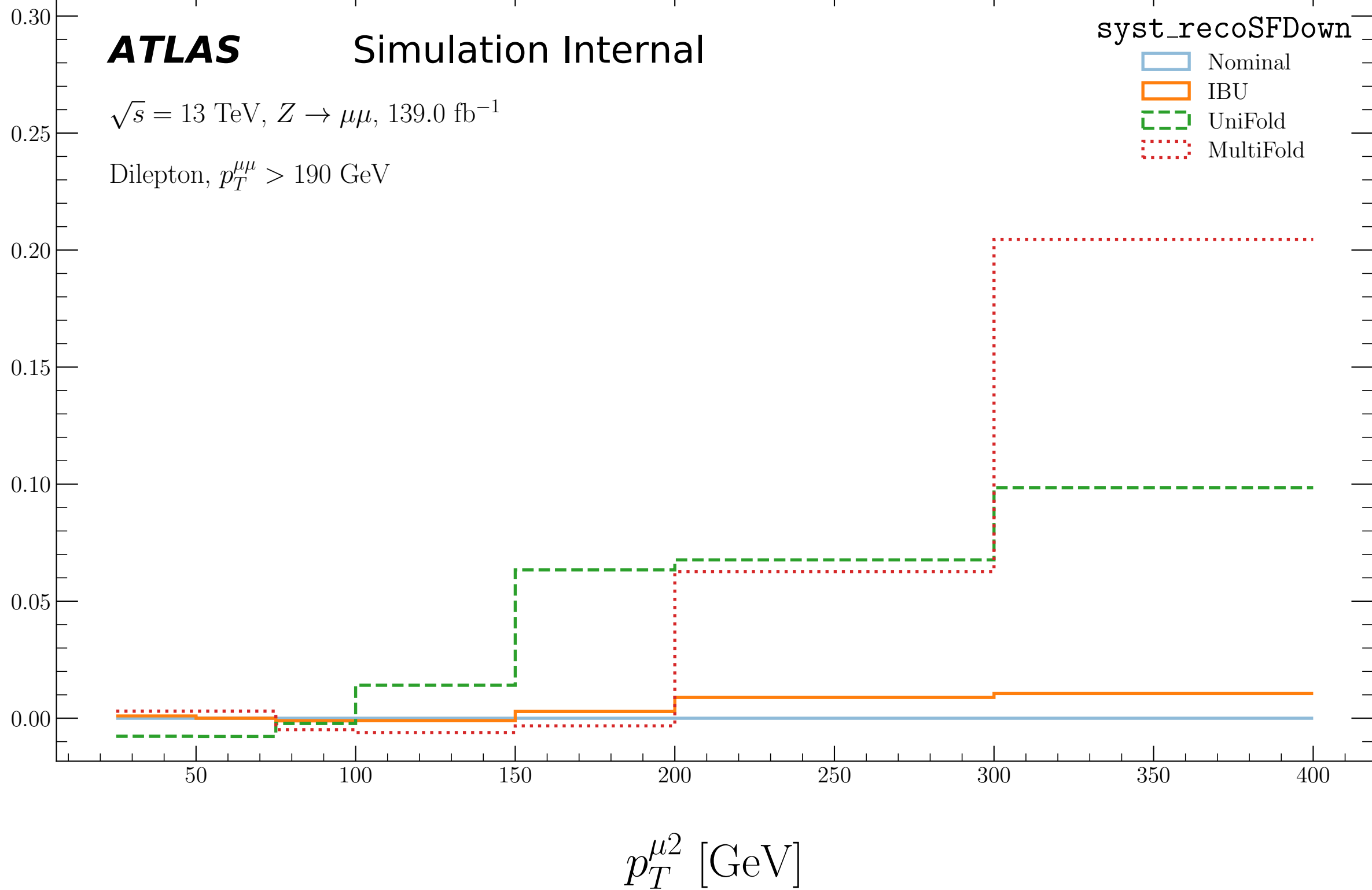
Simulation Internal

$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$

Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



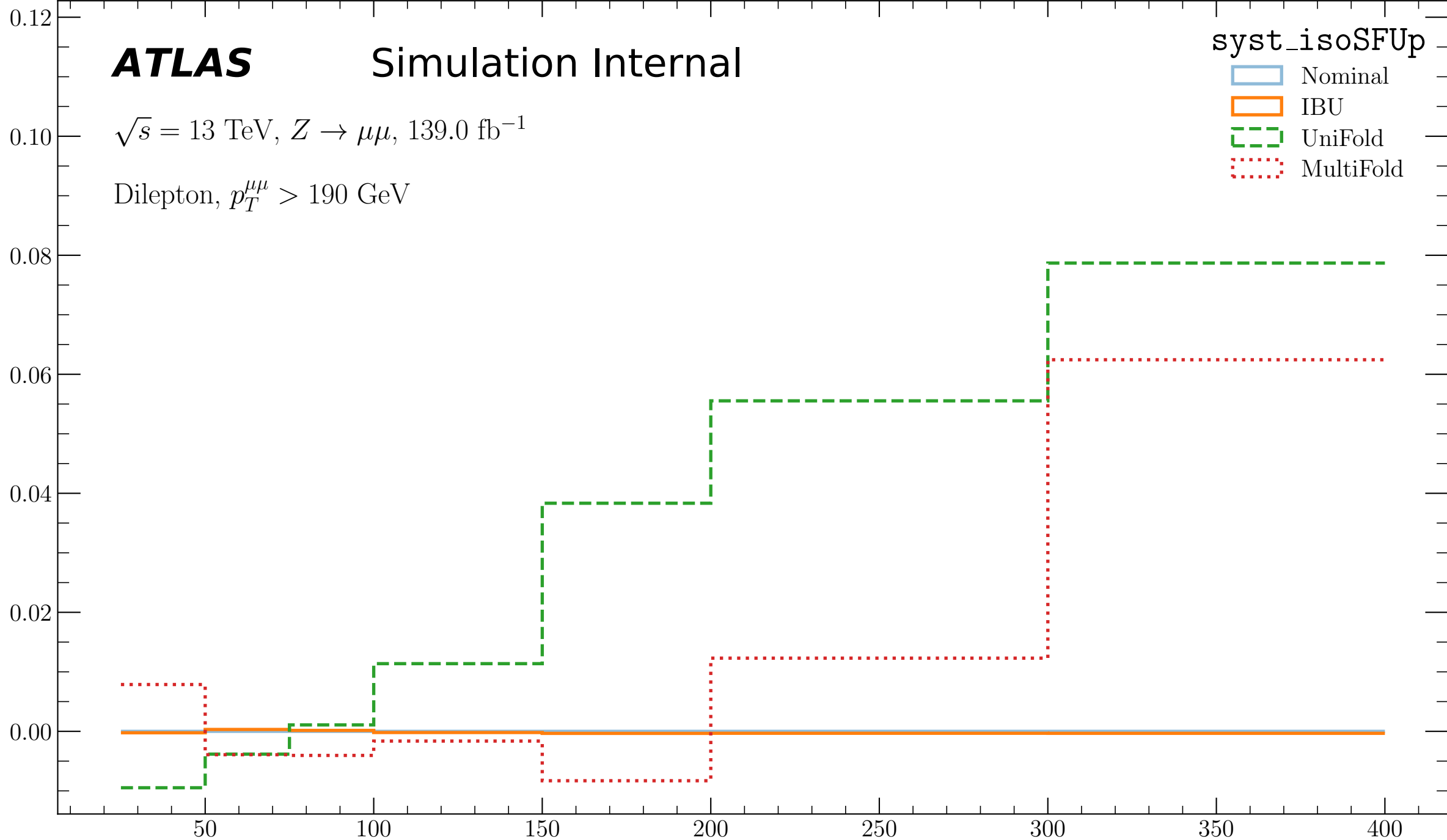
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

 $p_T^{\mu\mu}$ [GeV]

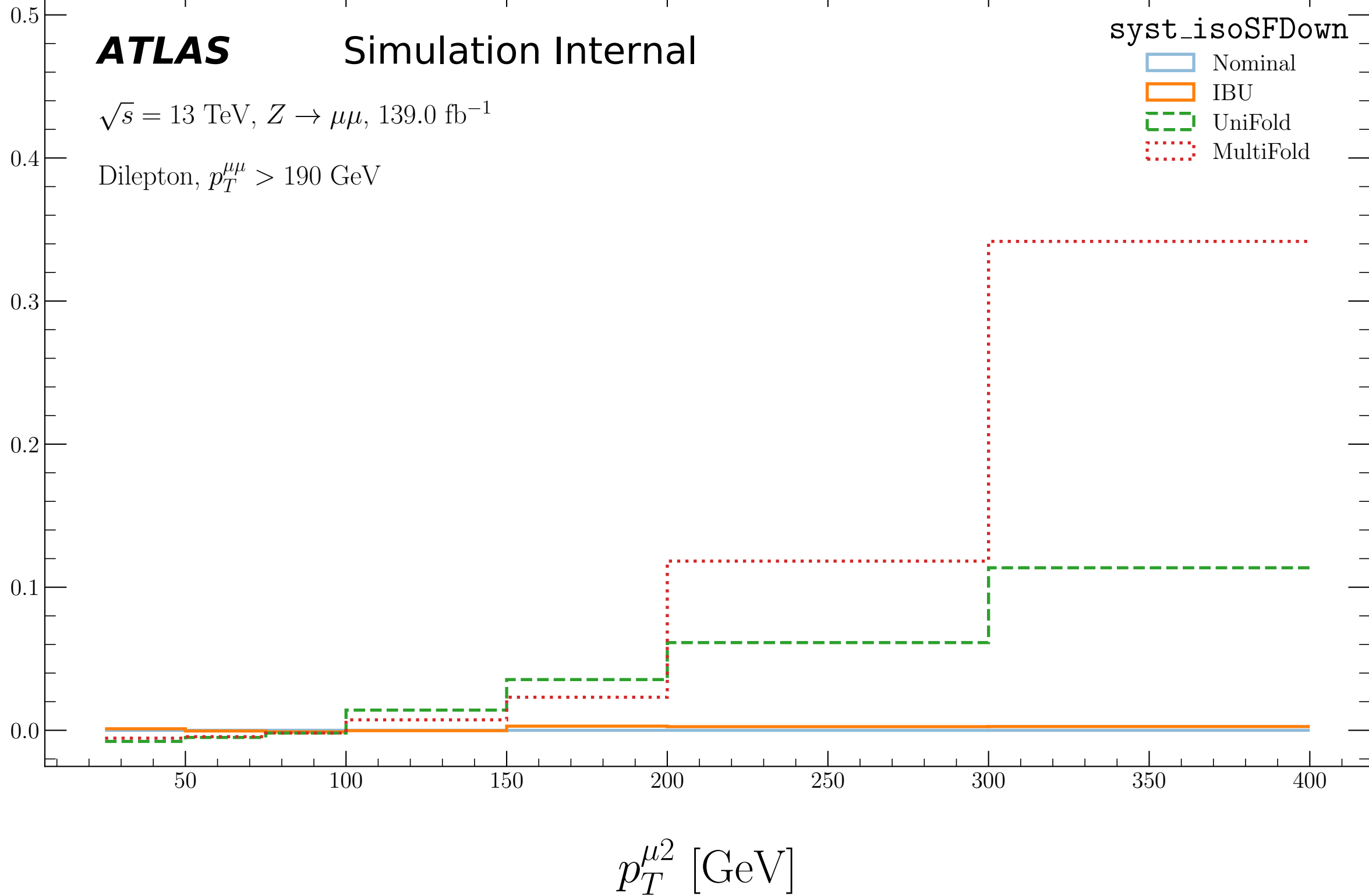
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold



Relative Systematic Effect (MultiFold)

ATLAS

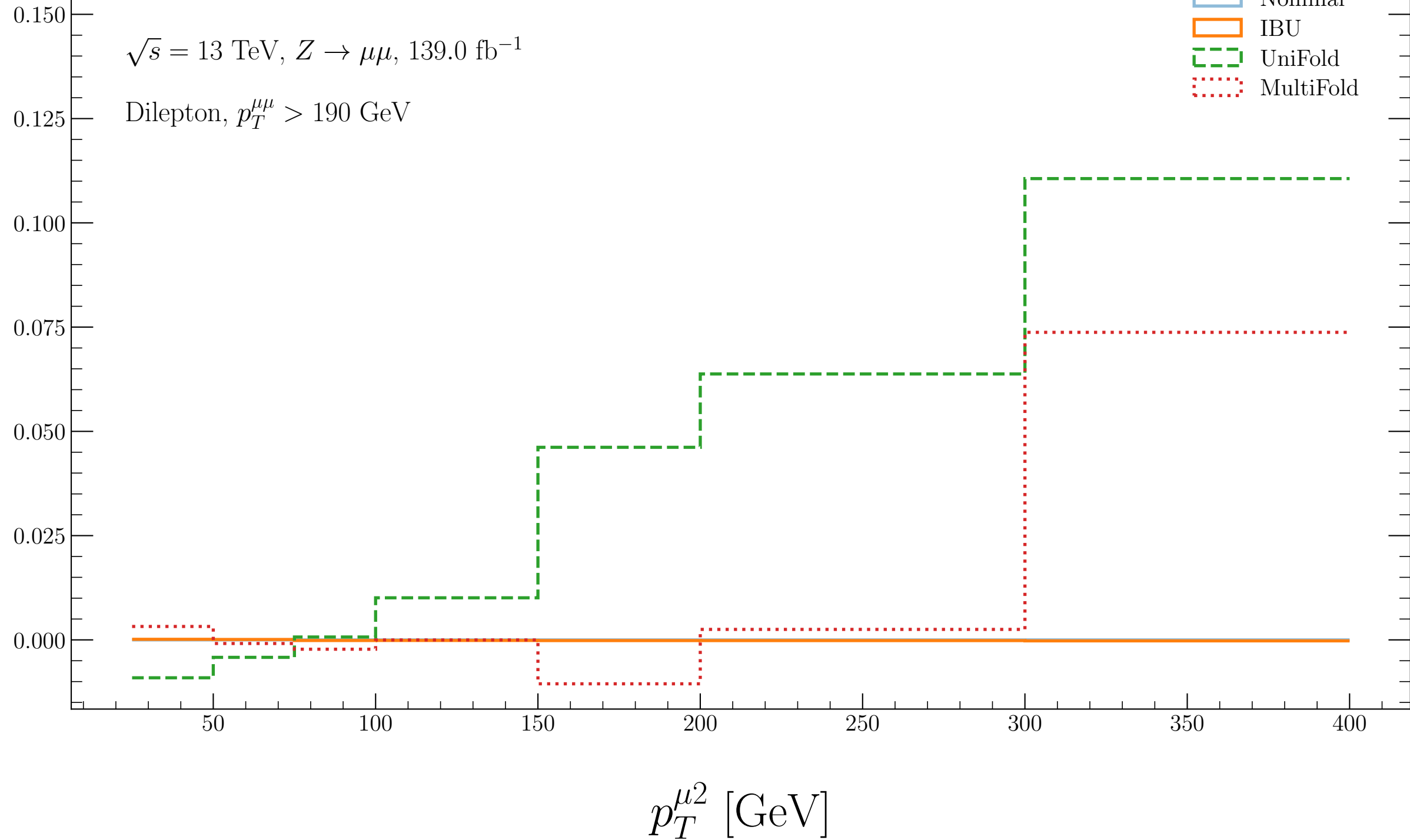
Simulation Internal

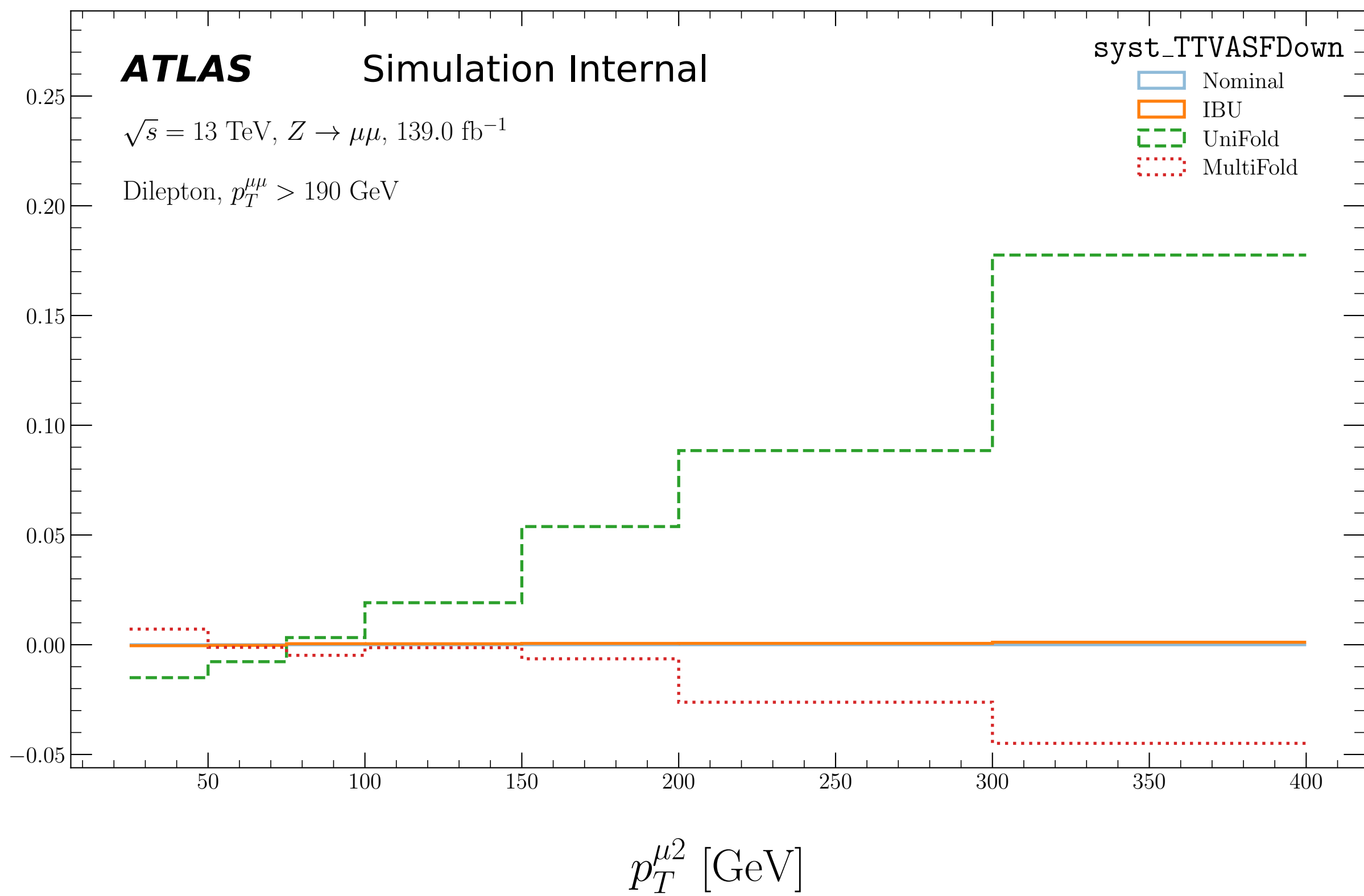
$$\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$$

Dilepton, $p_T^{\mu\mu} > 190$ GeV

sys_TTVASFUp

 Nominal

 UniFold MultiFold



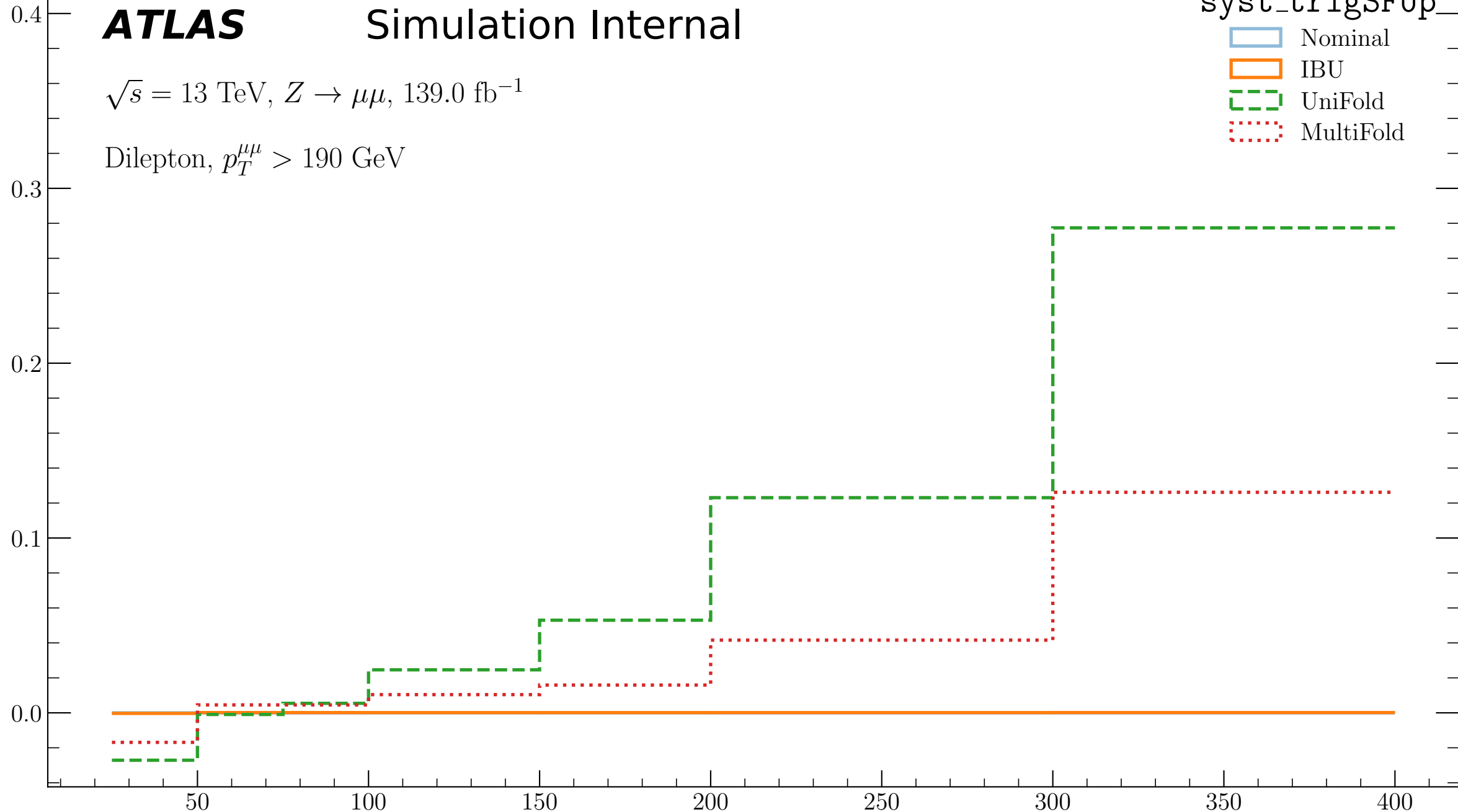
ATLAS

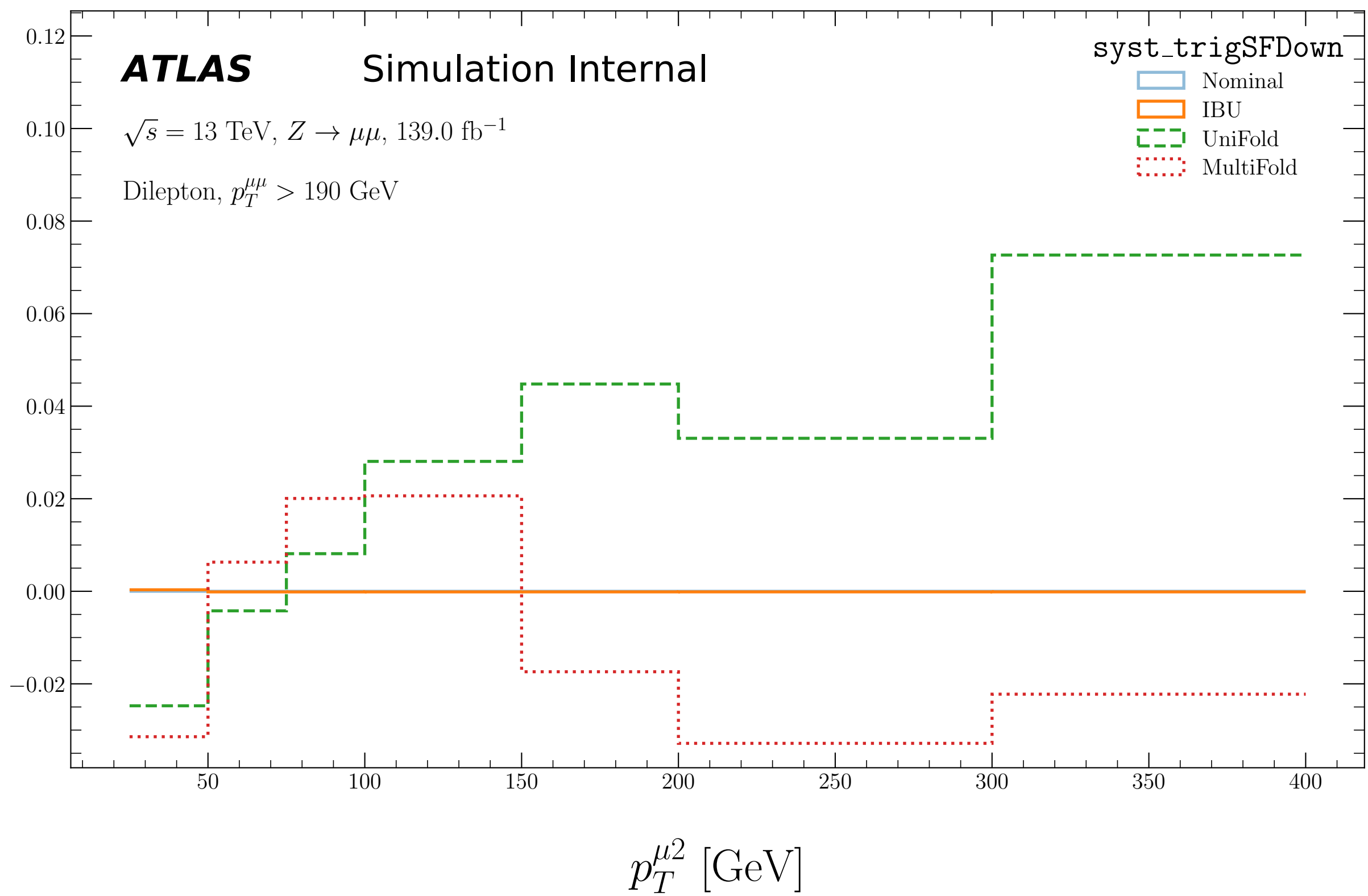
Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

 $p_T^{\mu\mu}$ [GeV]



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwUp

Nominal

IBU

UniFold

MultiFold

0.03
0.02
0.01
0.00
-0.01
-0.02
-0.03

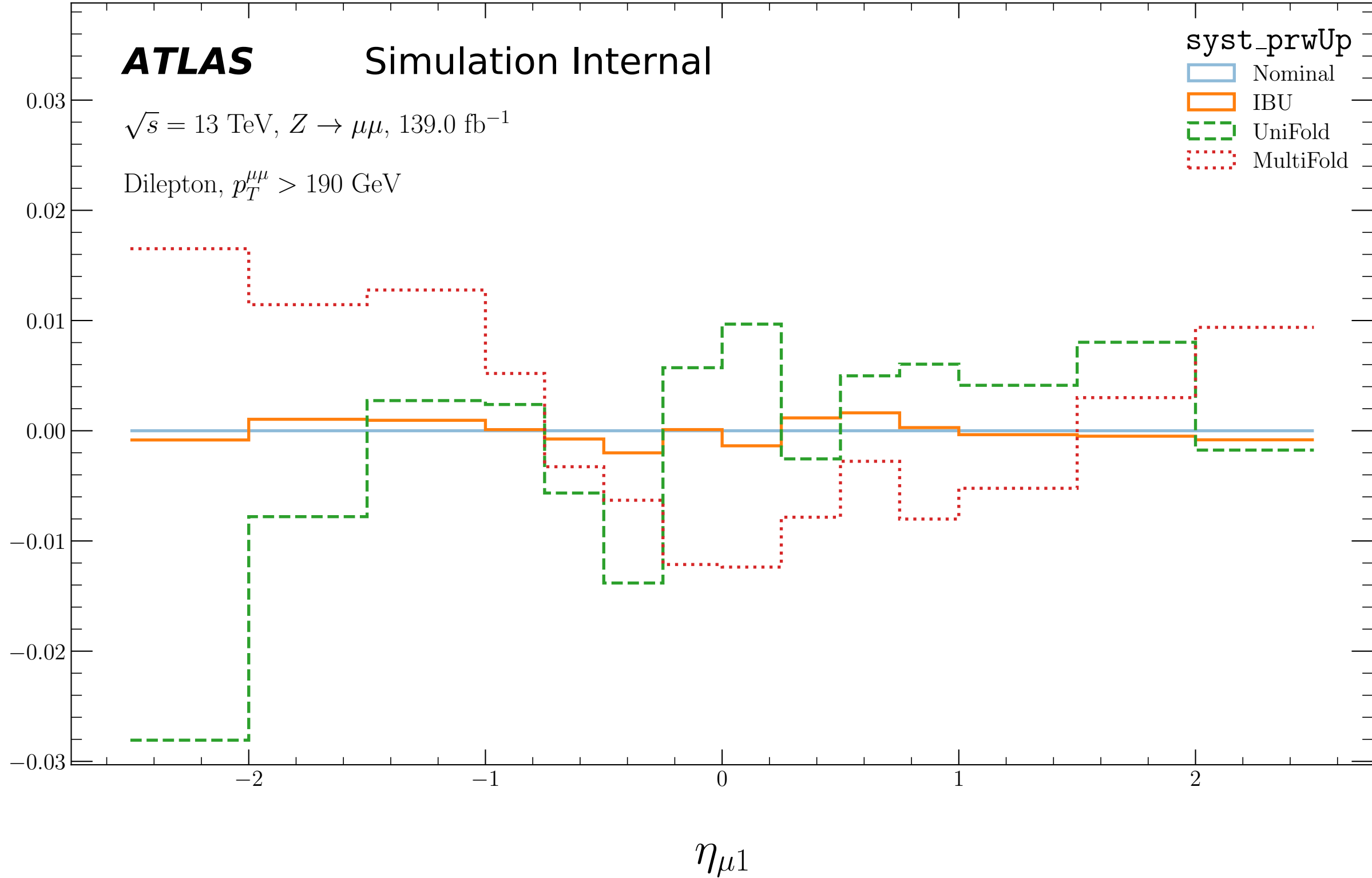
-2

-1

0

1

2

 $\eta_{\mu 1}$ 

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

Nominal

IBU

UniFold

MultiFold

0.06
0.04
0.02
0.00
-0.02 $\eta_{\mu 1}$

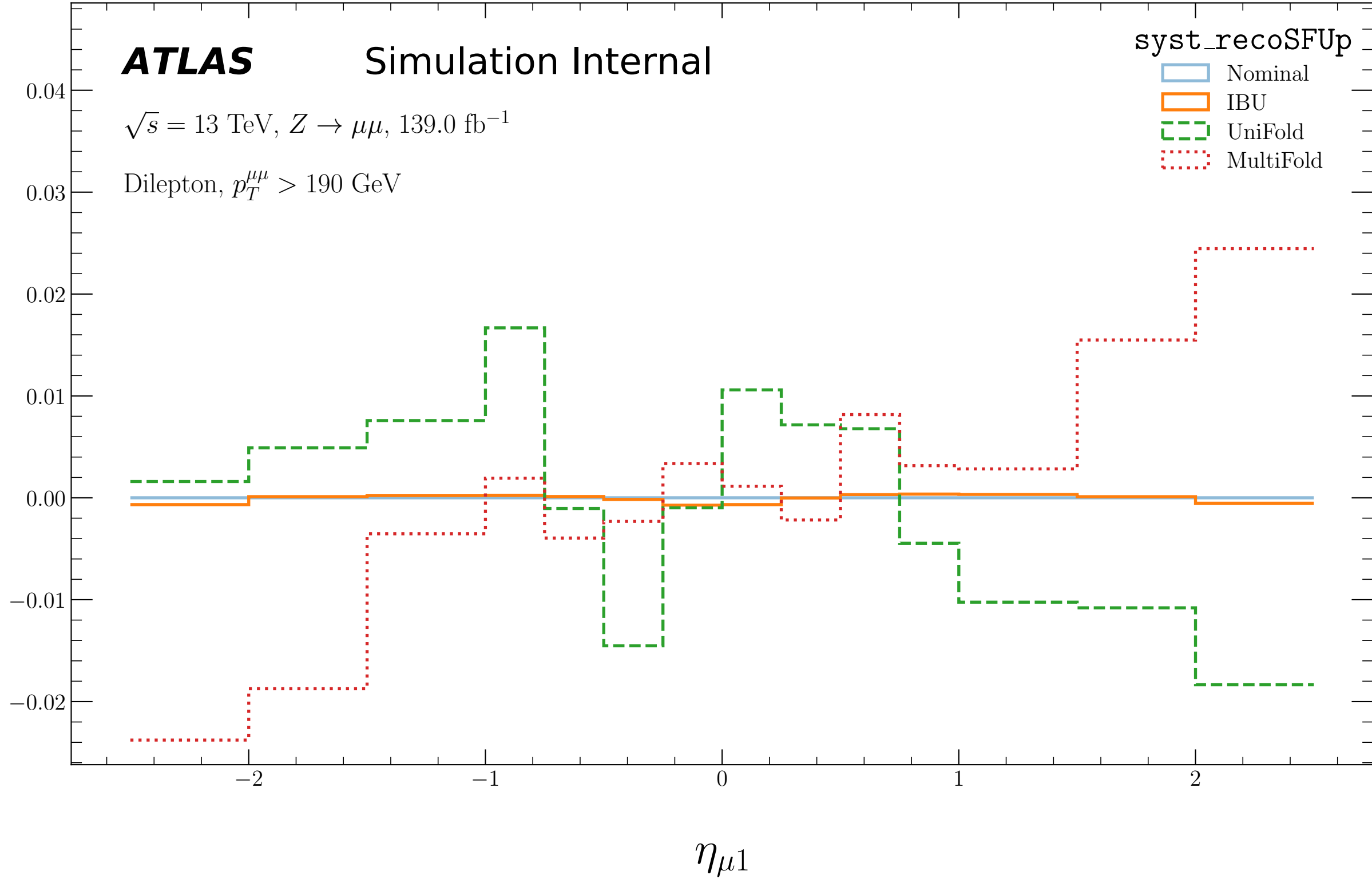
-2

-1

0

1

2



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

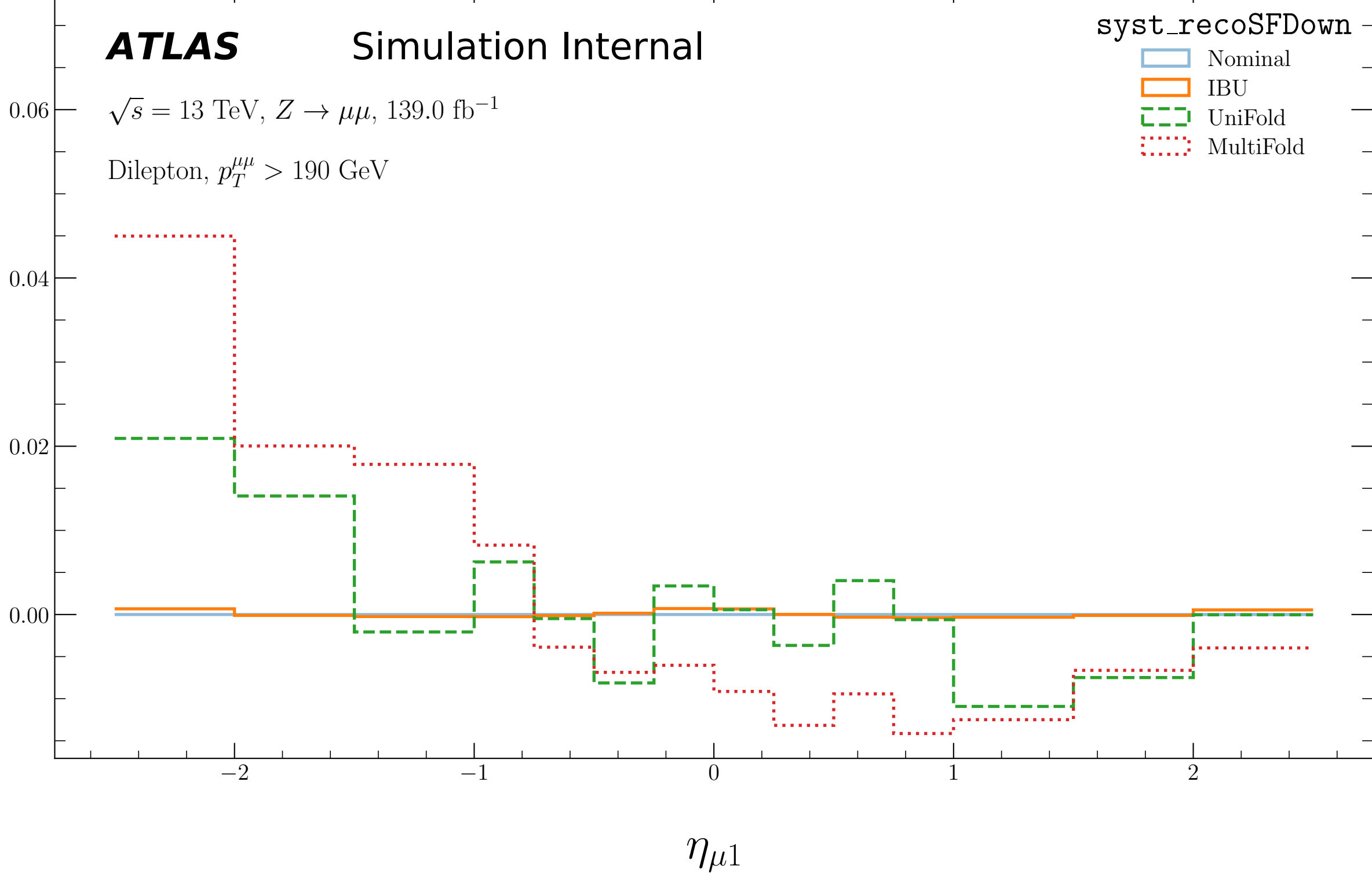
syst_recoSFDown

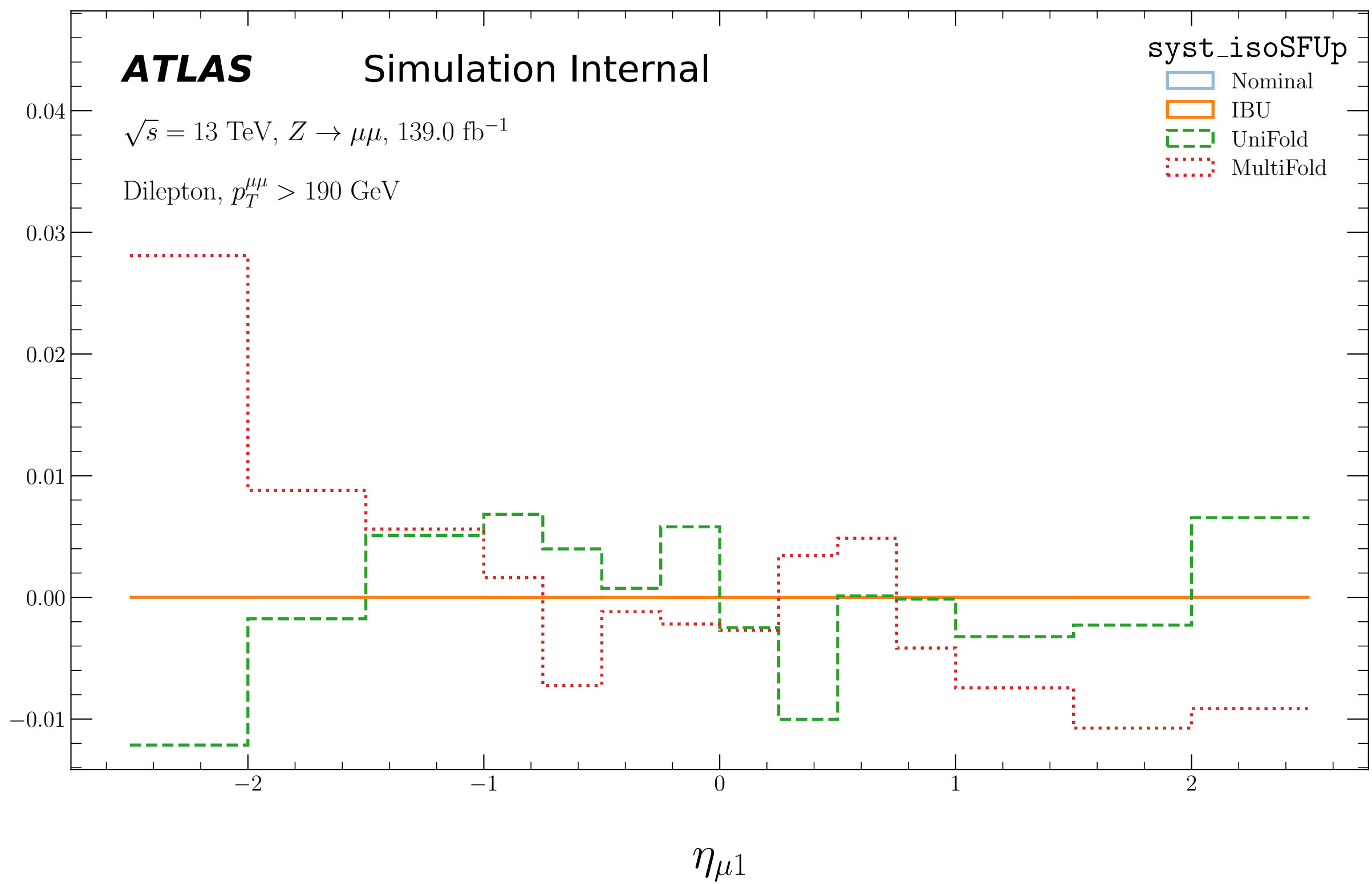
Nominal

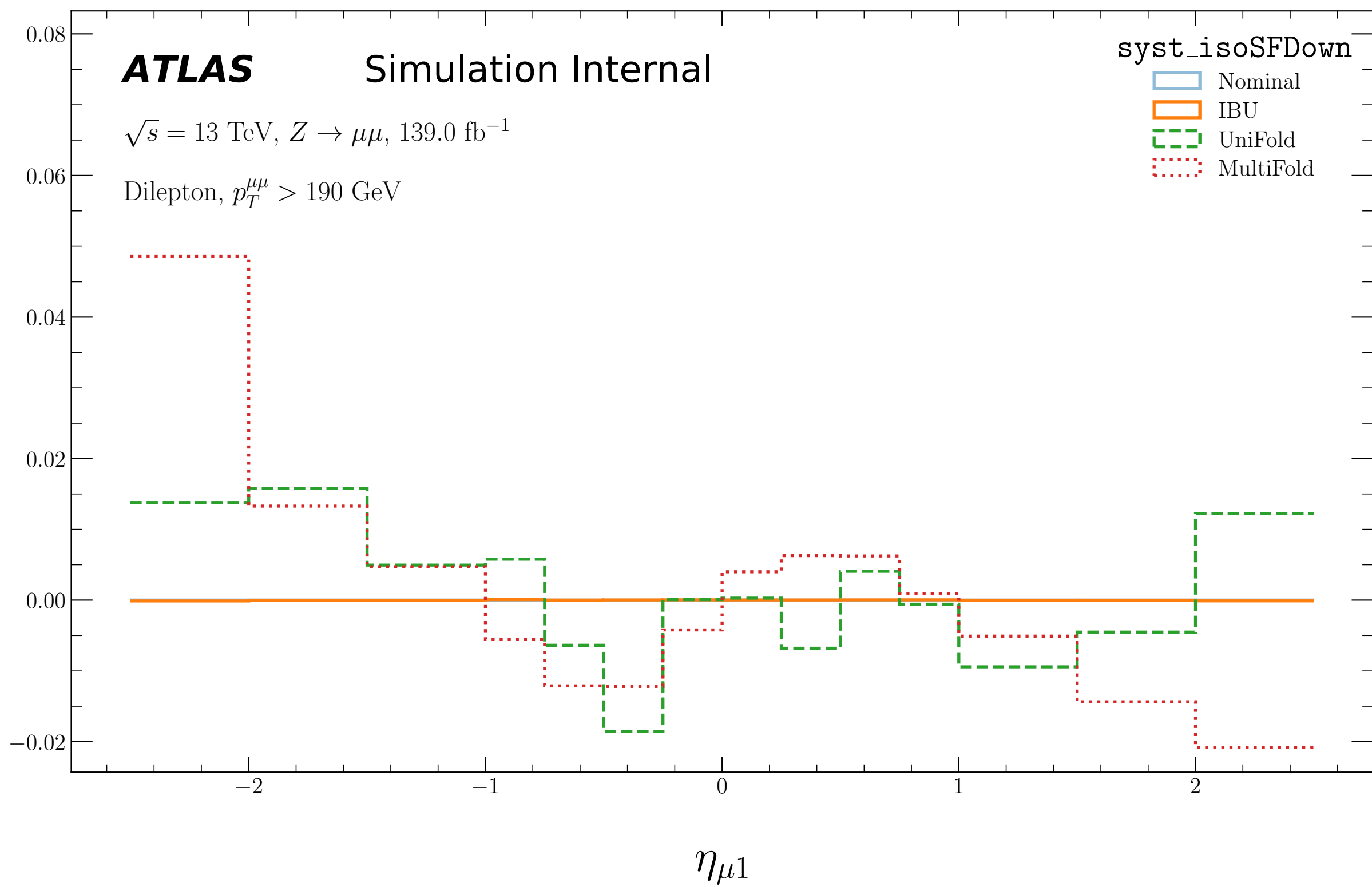
IBU

UniFold

MultiFold







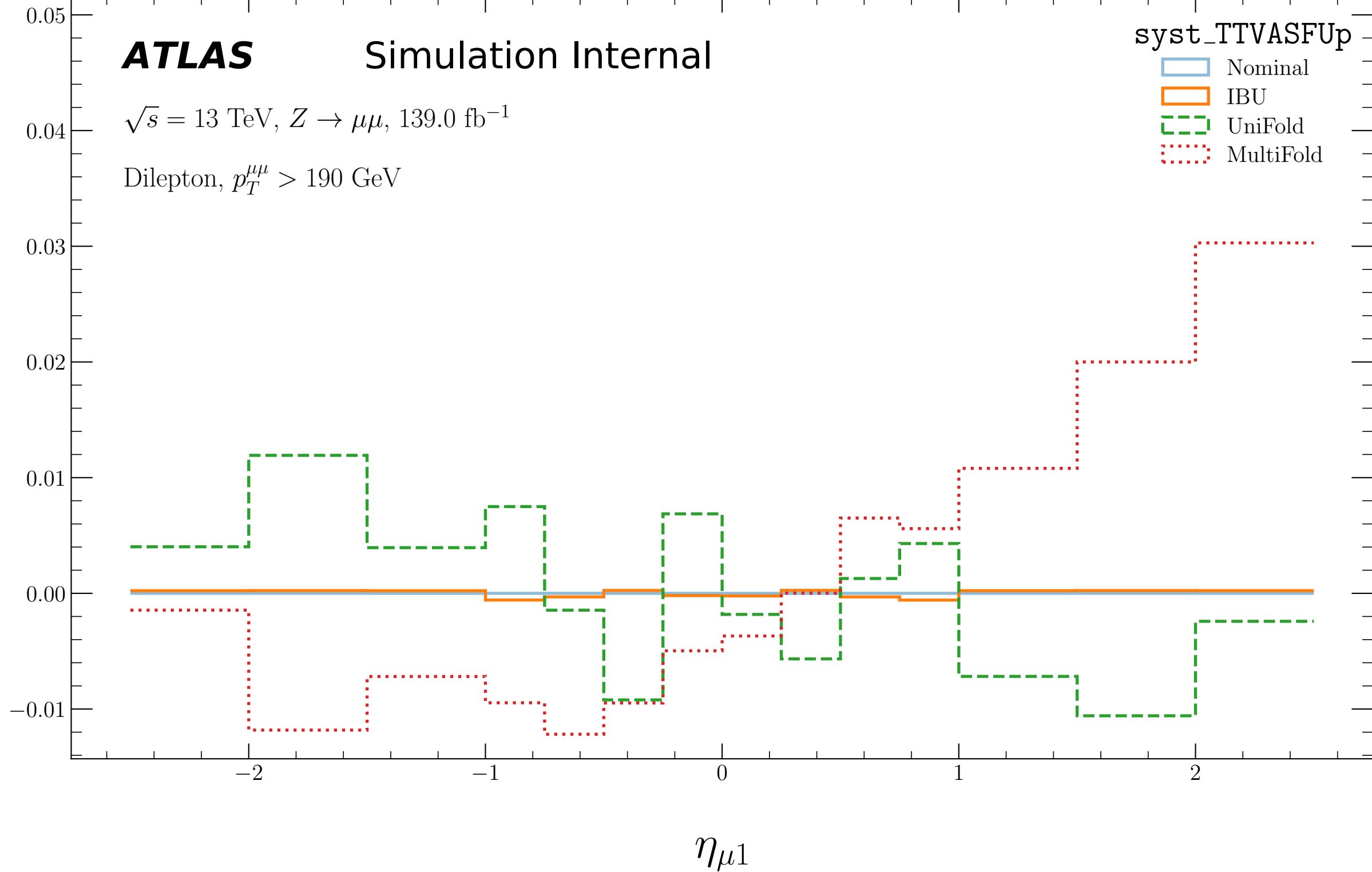
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold



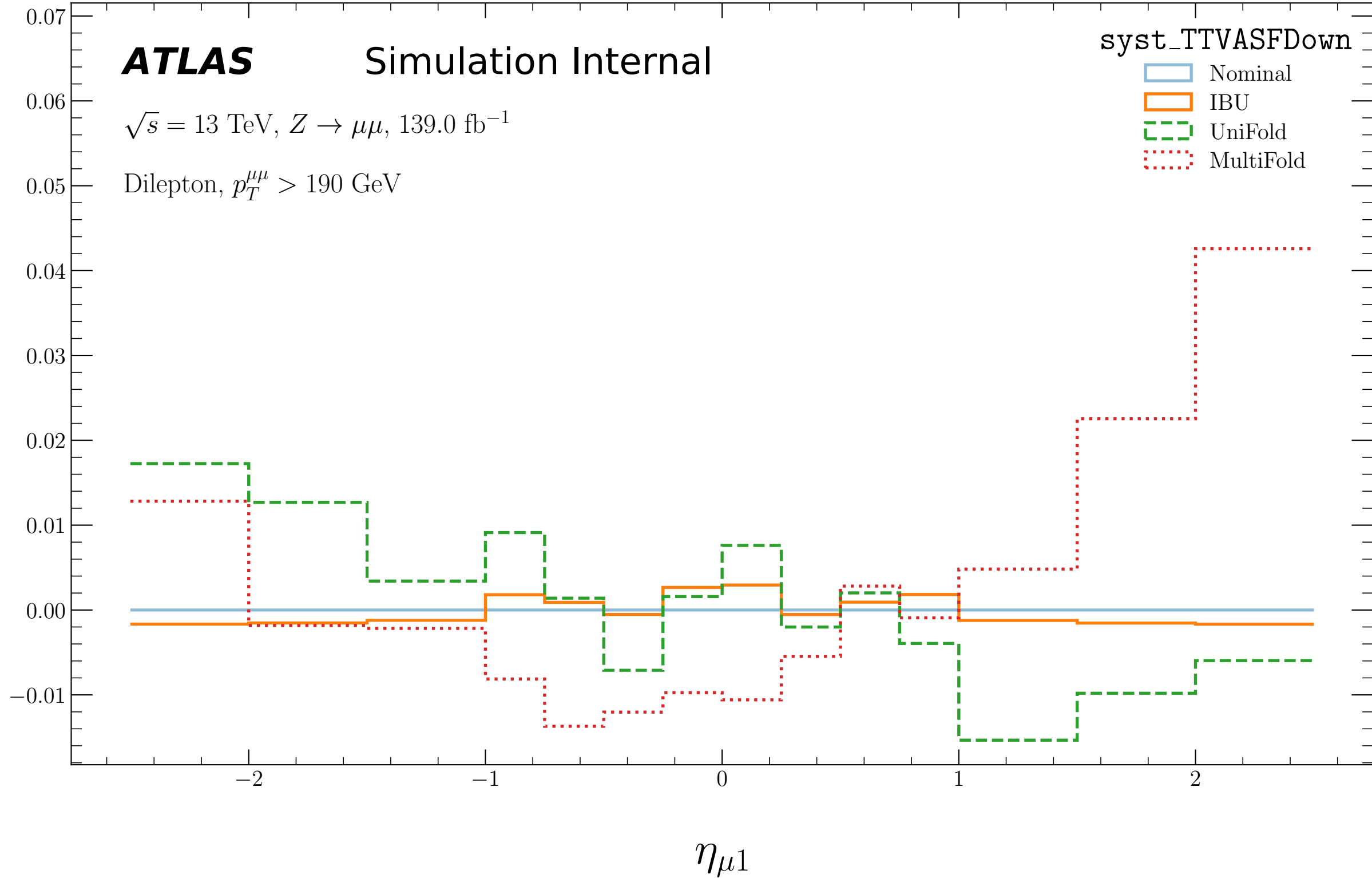
ATLAS

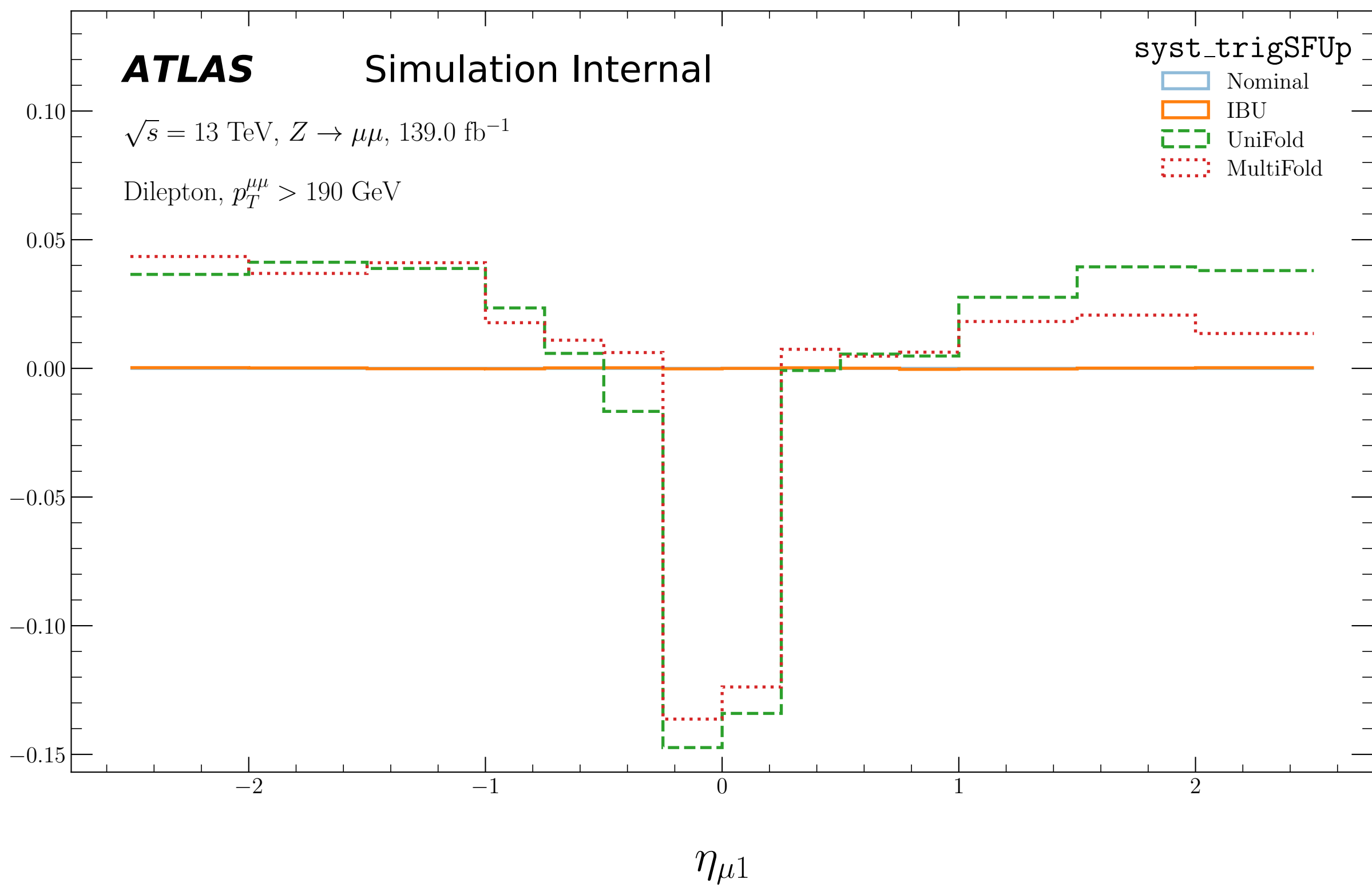
Simulation Internal

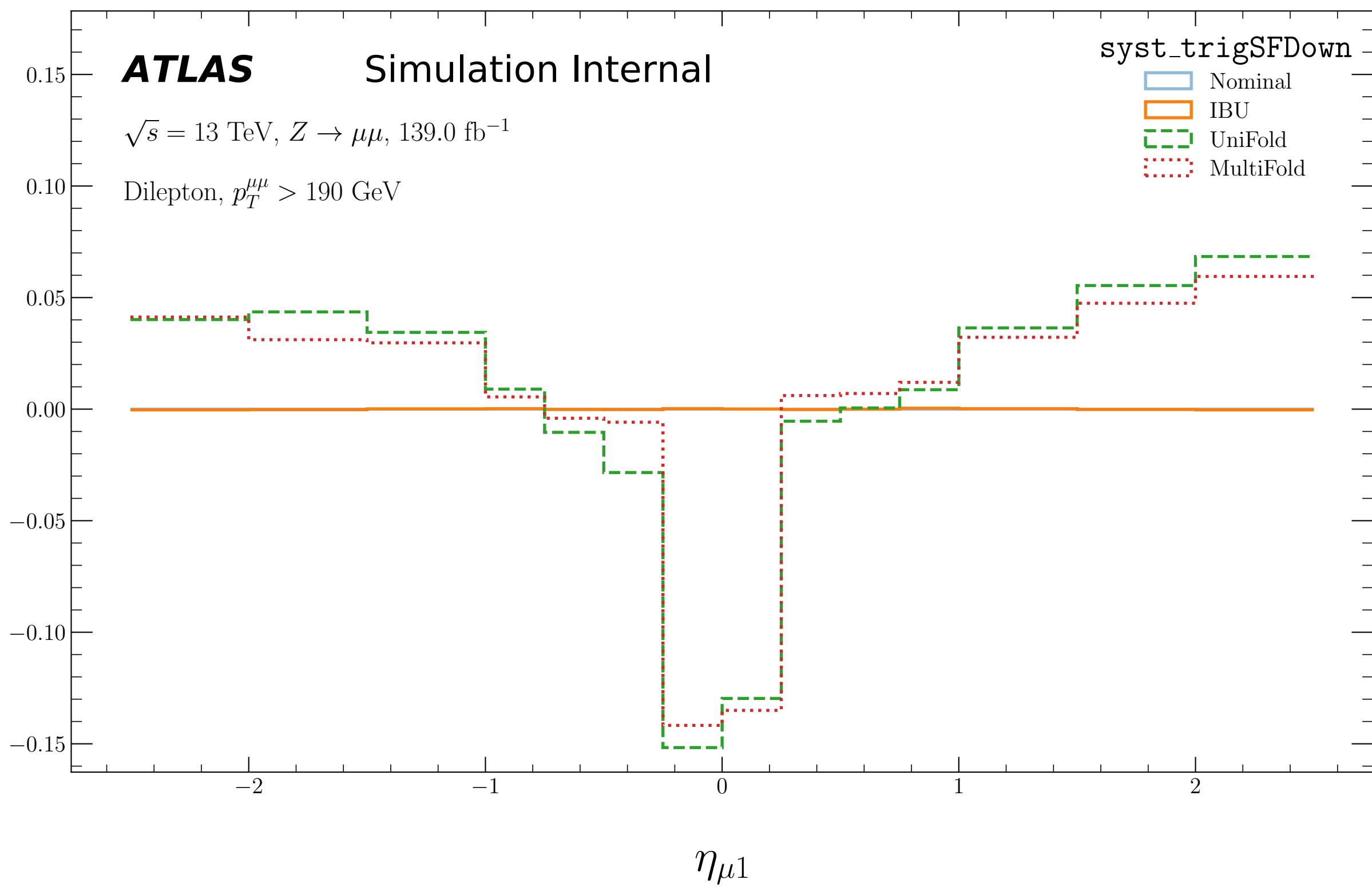
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

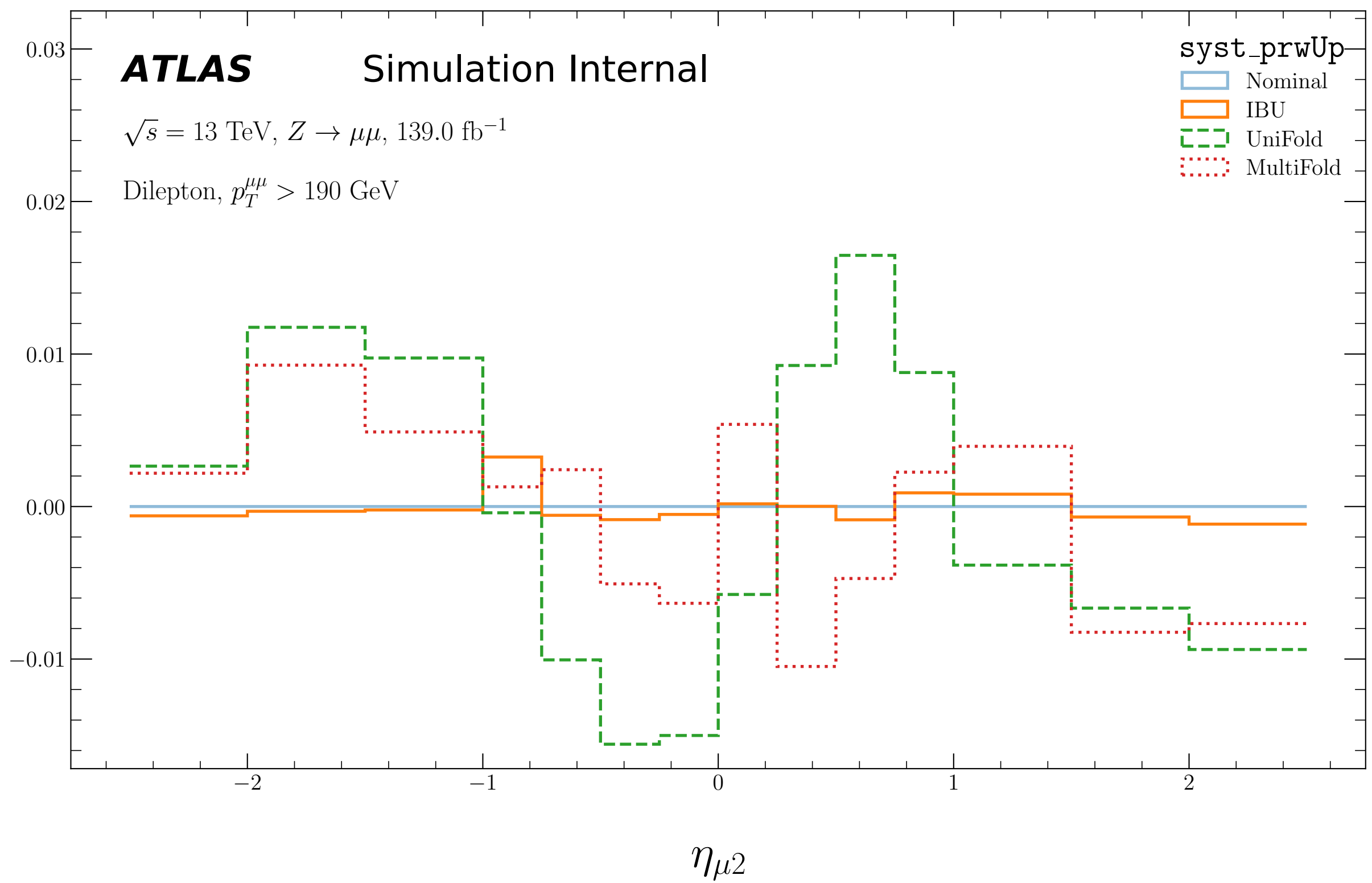
syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold









ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_prwDown

Nominal

IBU

UniFold

MultiFold

0.06
0.04
0.02
0.00
-0.02

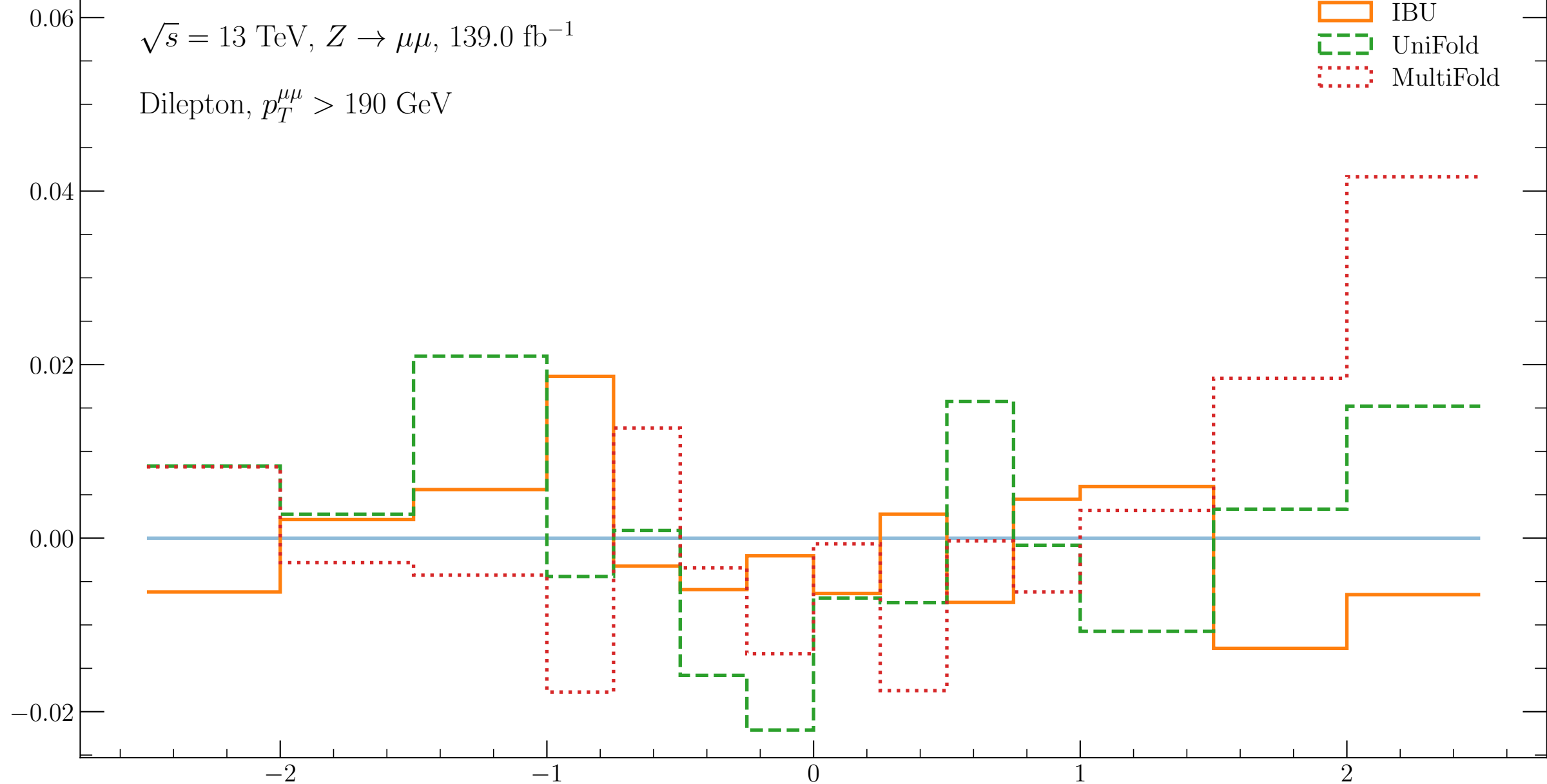
-2

-1

0

1

2

 $\eta_{\mu 2}$ 

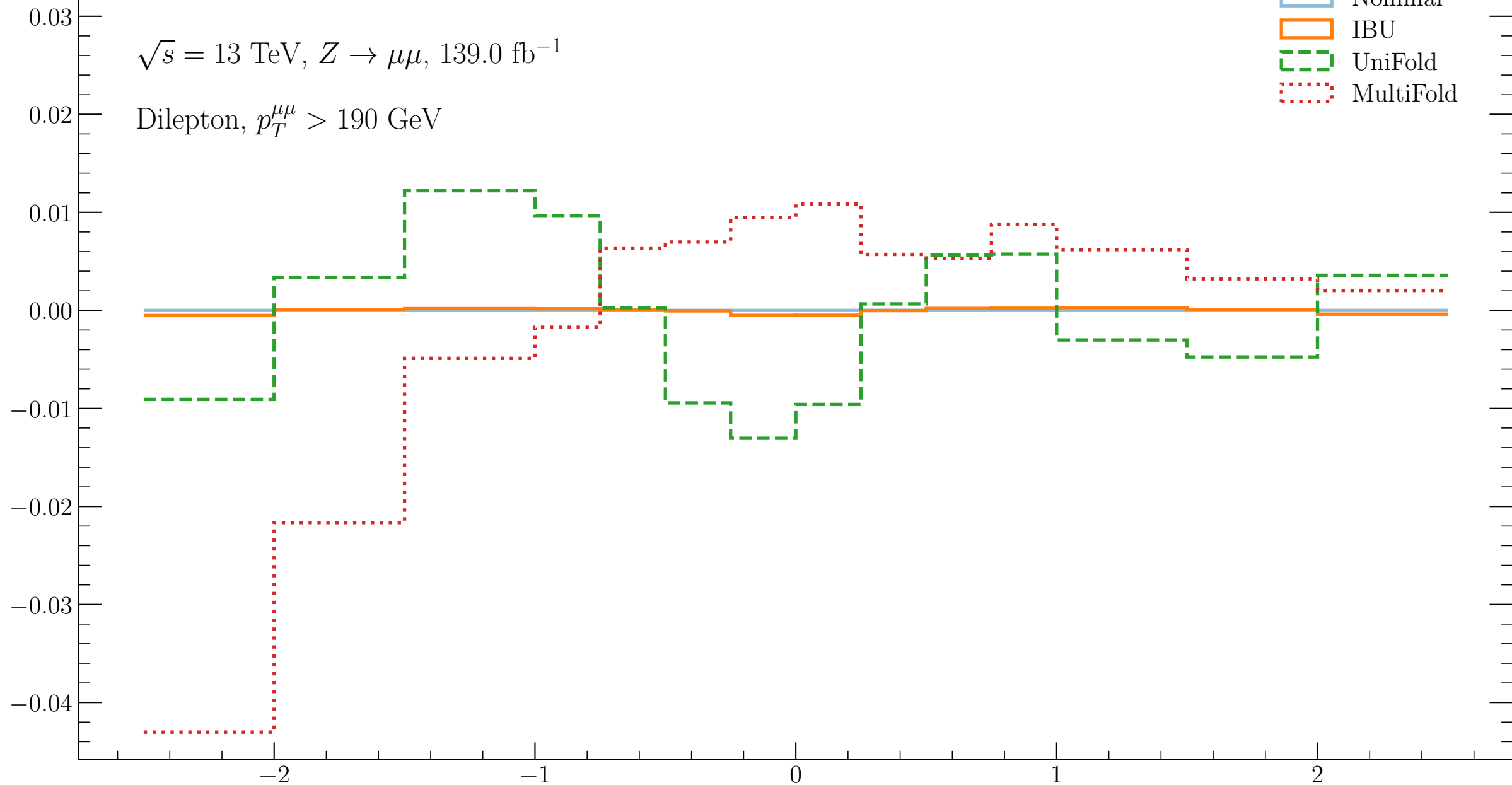
ATLAS

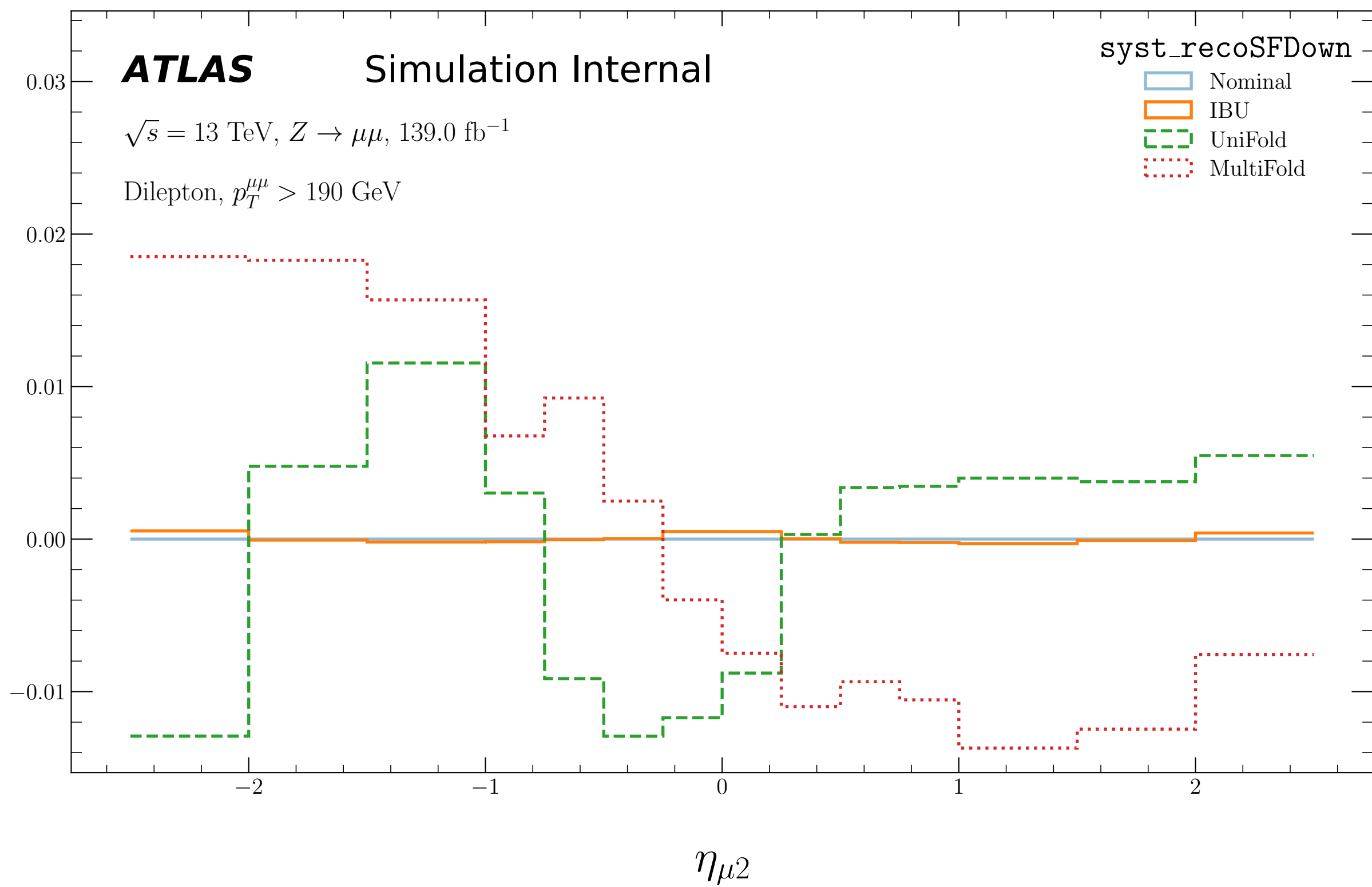
Simulation Internal

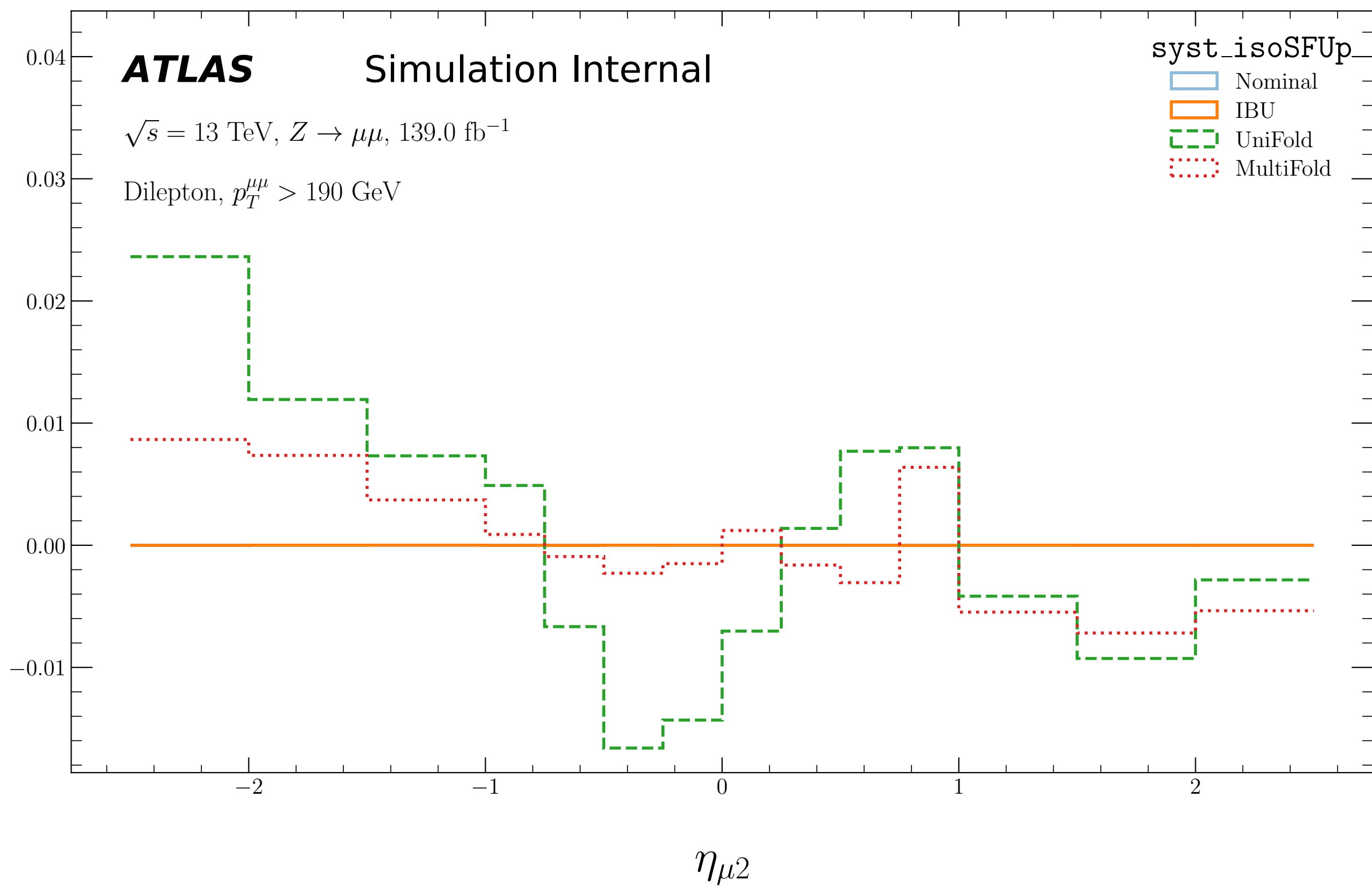
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

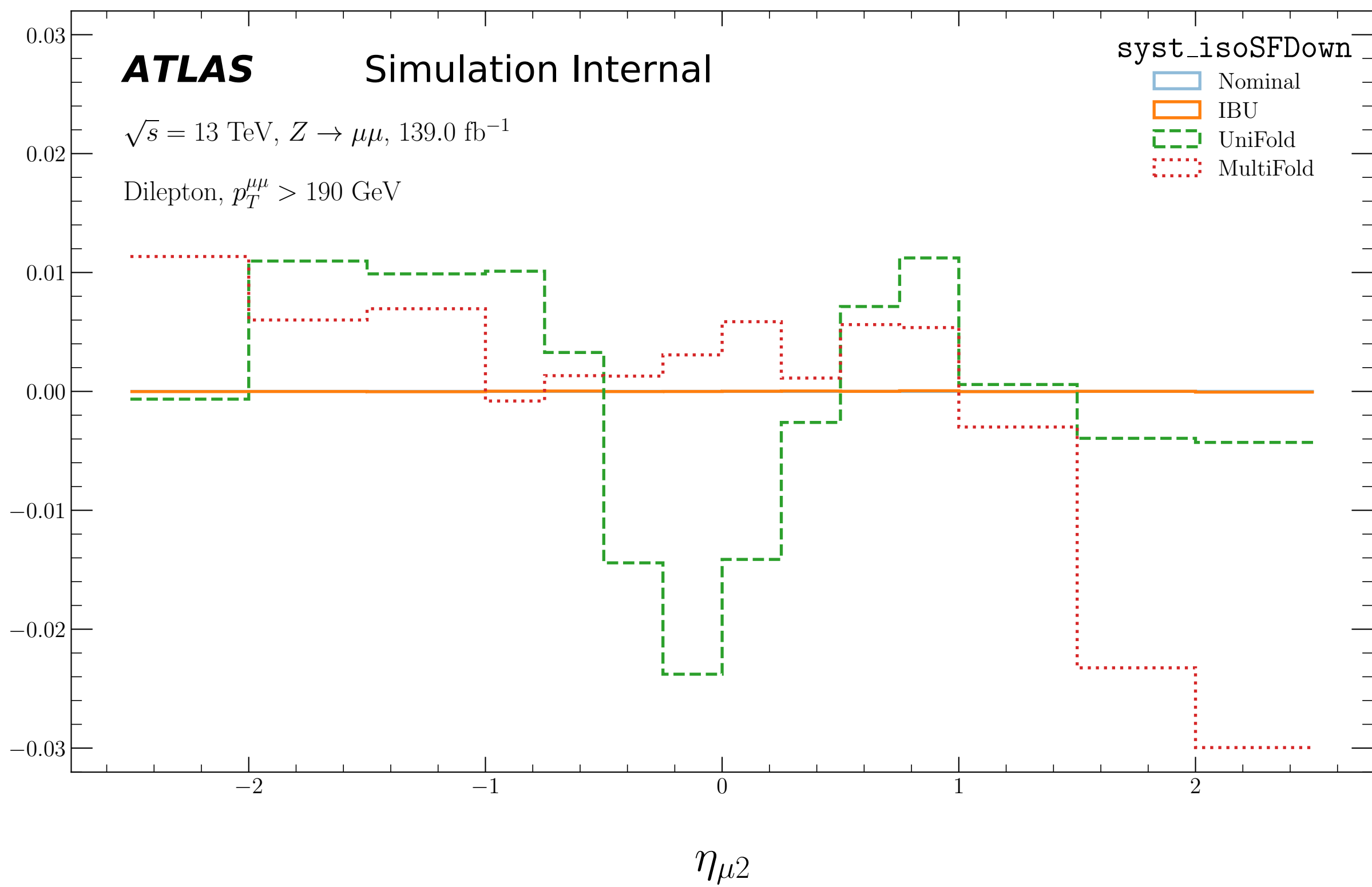
syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold

 $\eta_{\mu 2}$







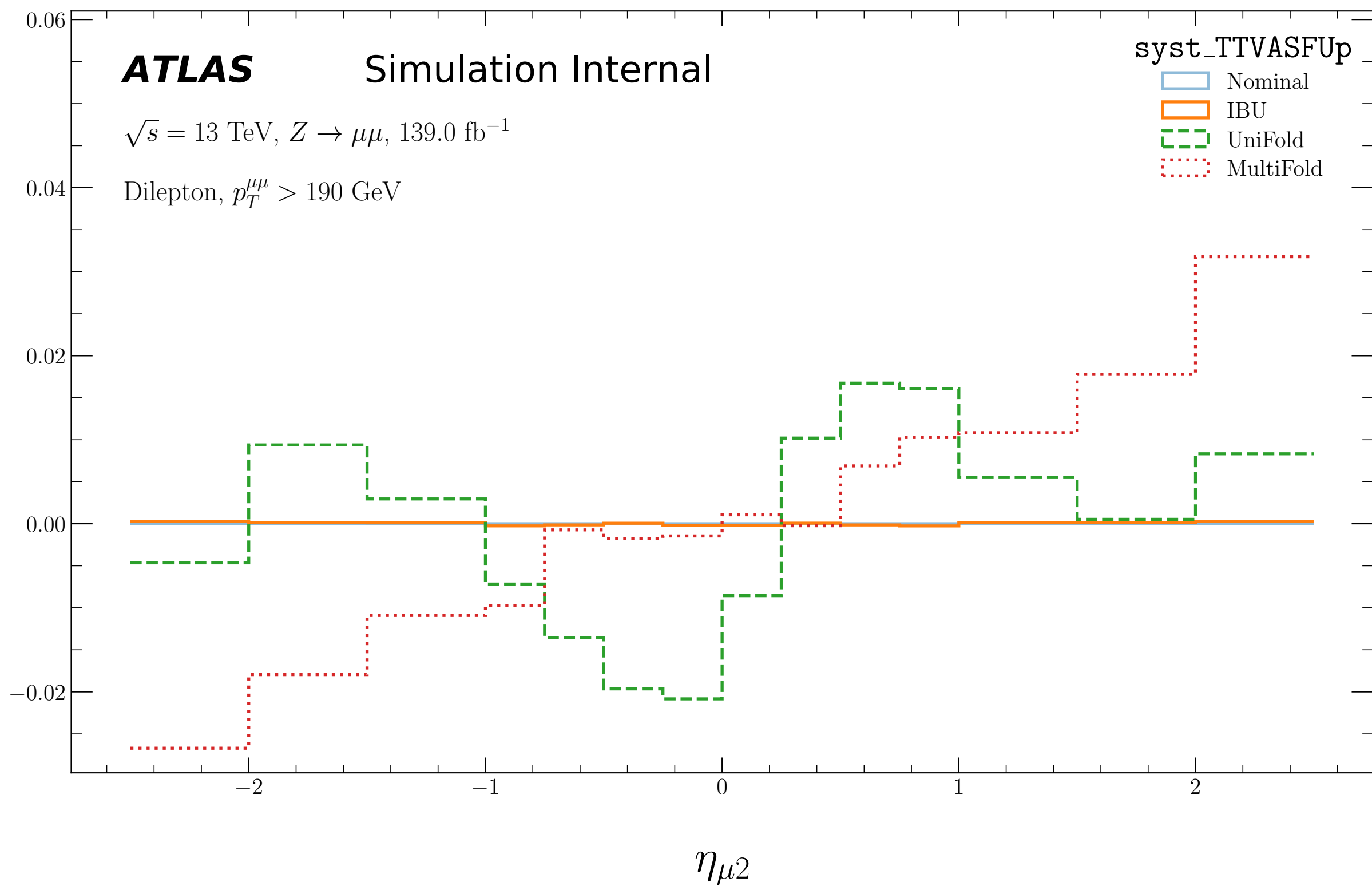
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASUp

- Nominal
- IBU
- UniFold
- MultiFold



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

 $\eta_{\mu 2}$

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_trigSFUp

- Nominal
- IBU
- UniFold
- MultiFold

0.10
0.05
0.00
-0.05
-0.10
-0.15

 $\eta_{\mu 2}$

-2

-1

0

1

2

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

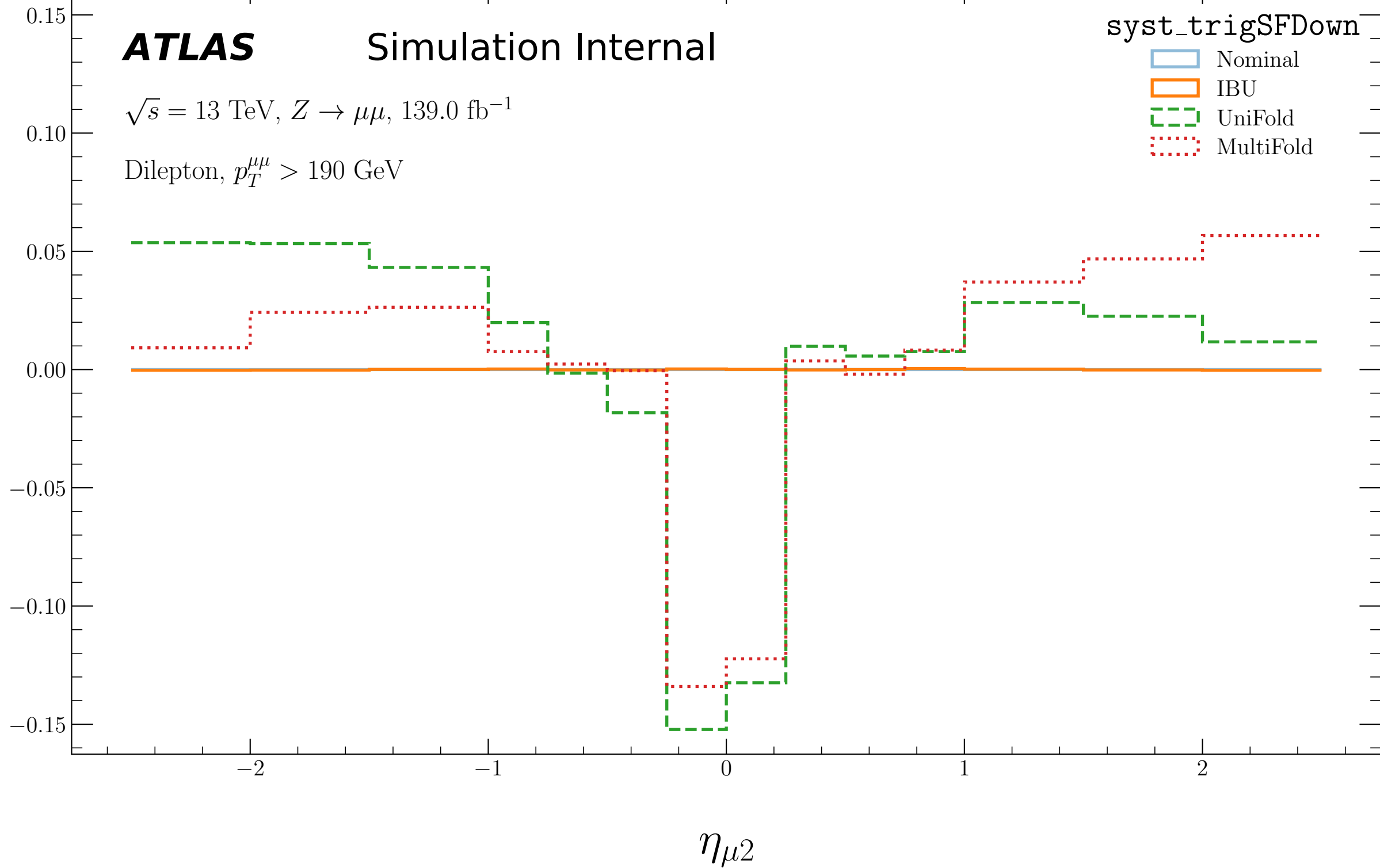
syst_trigSFDown

Nominal

IBU

UniFold

MultiFold



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

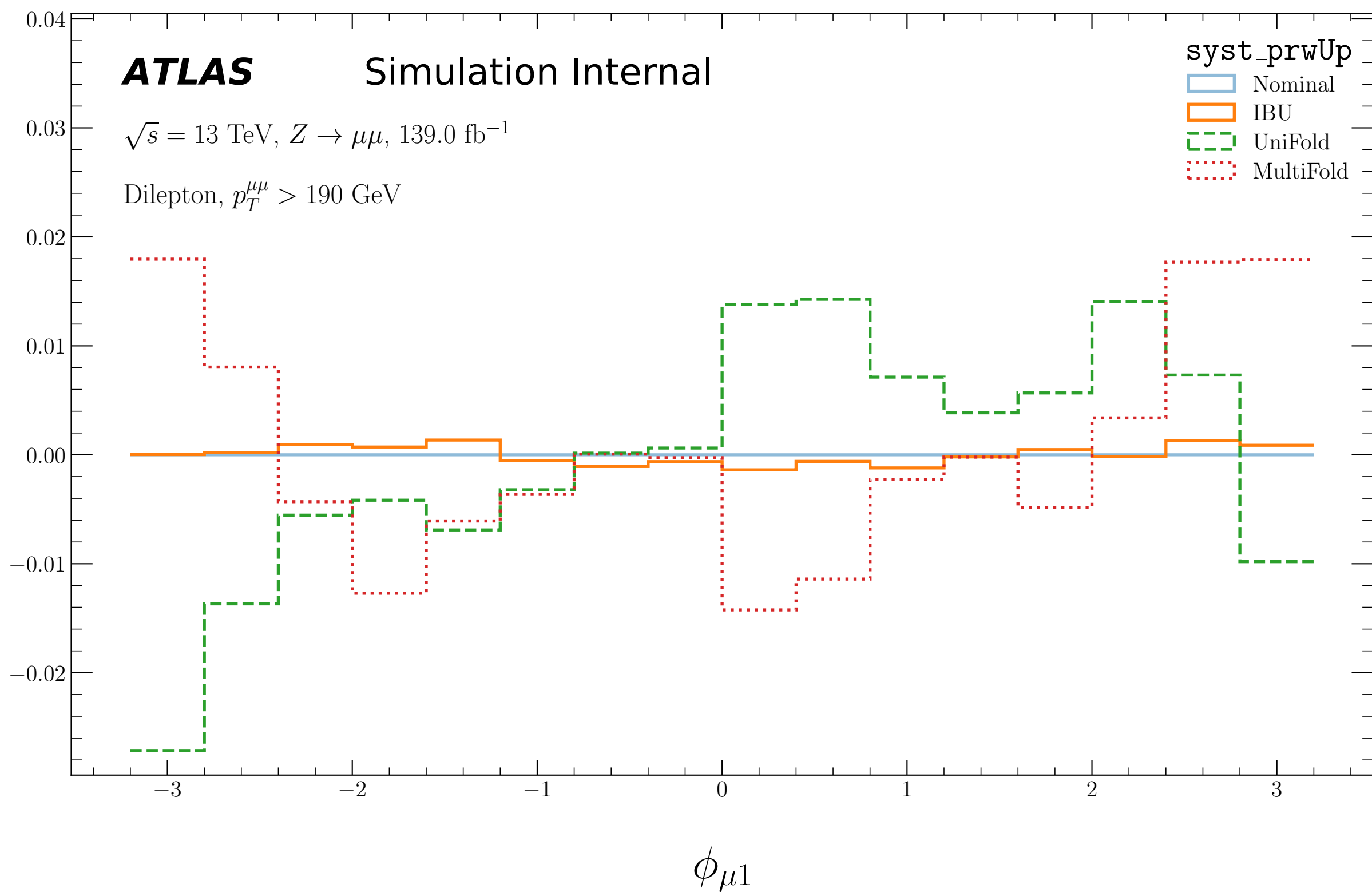
syst_prwUp

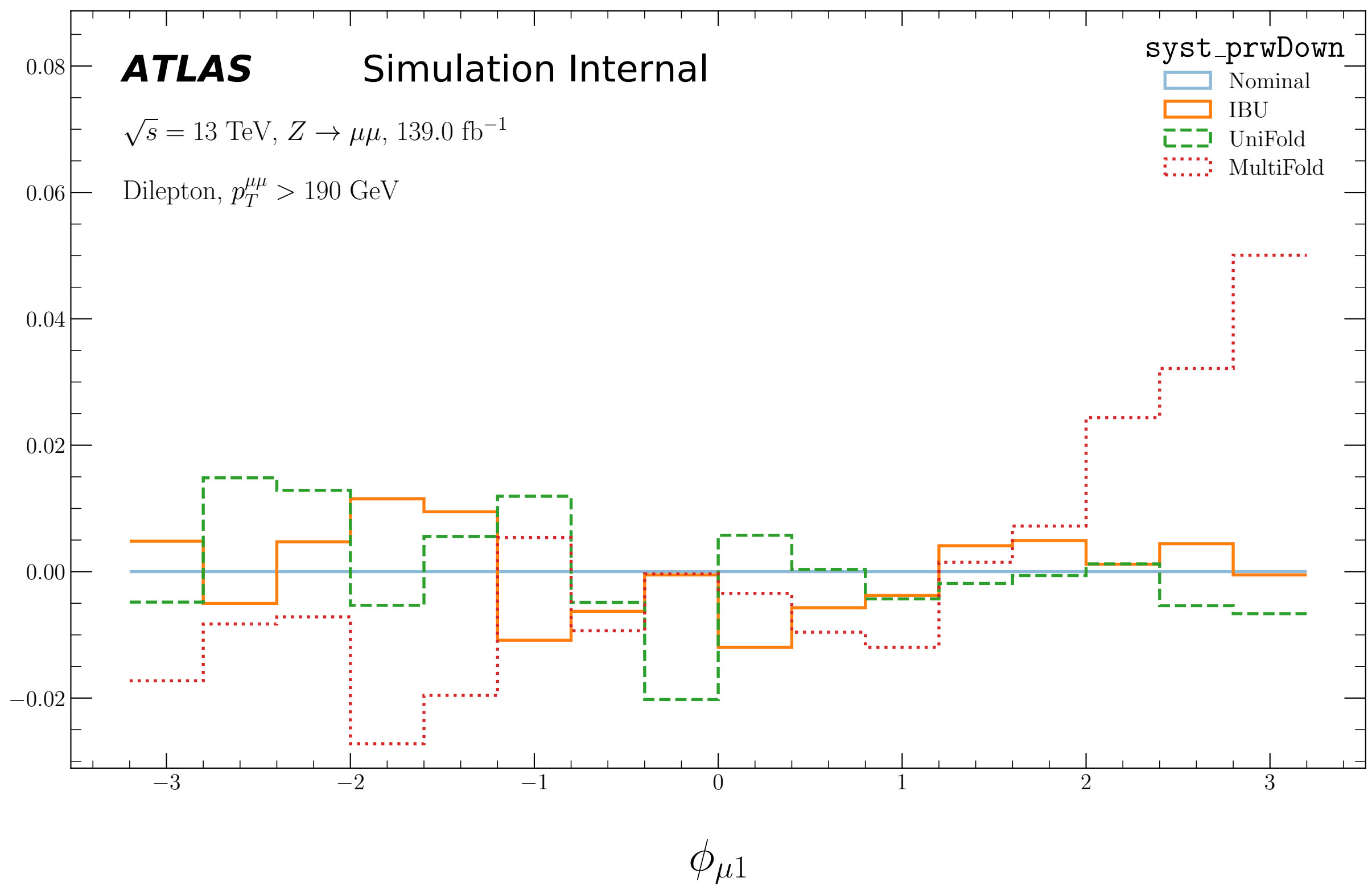
Nominal

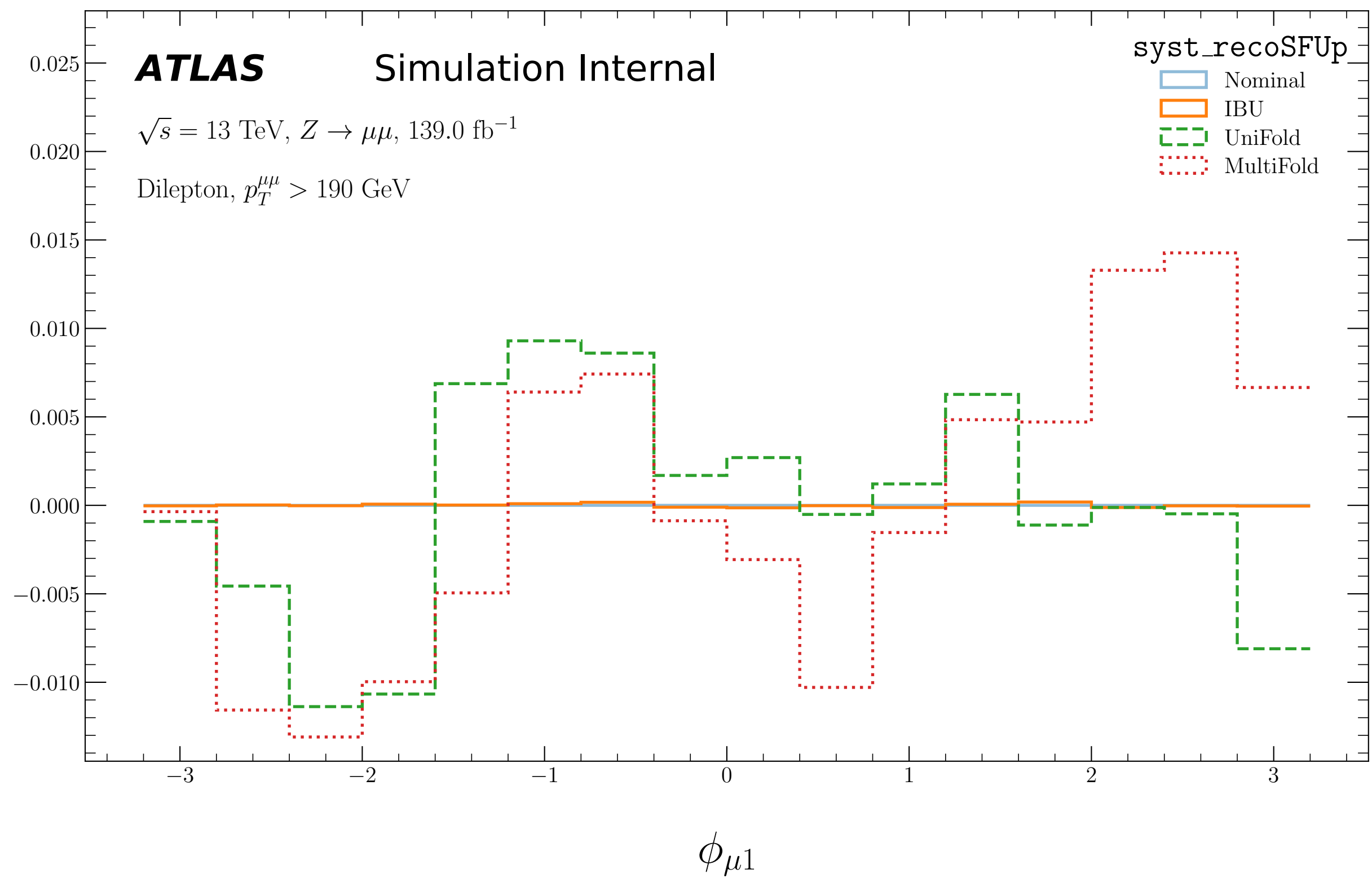
IBU

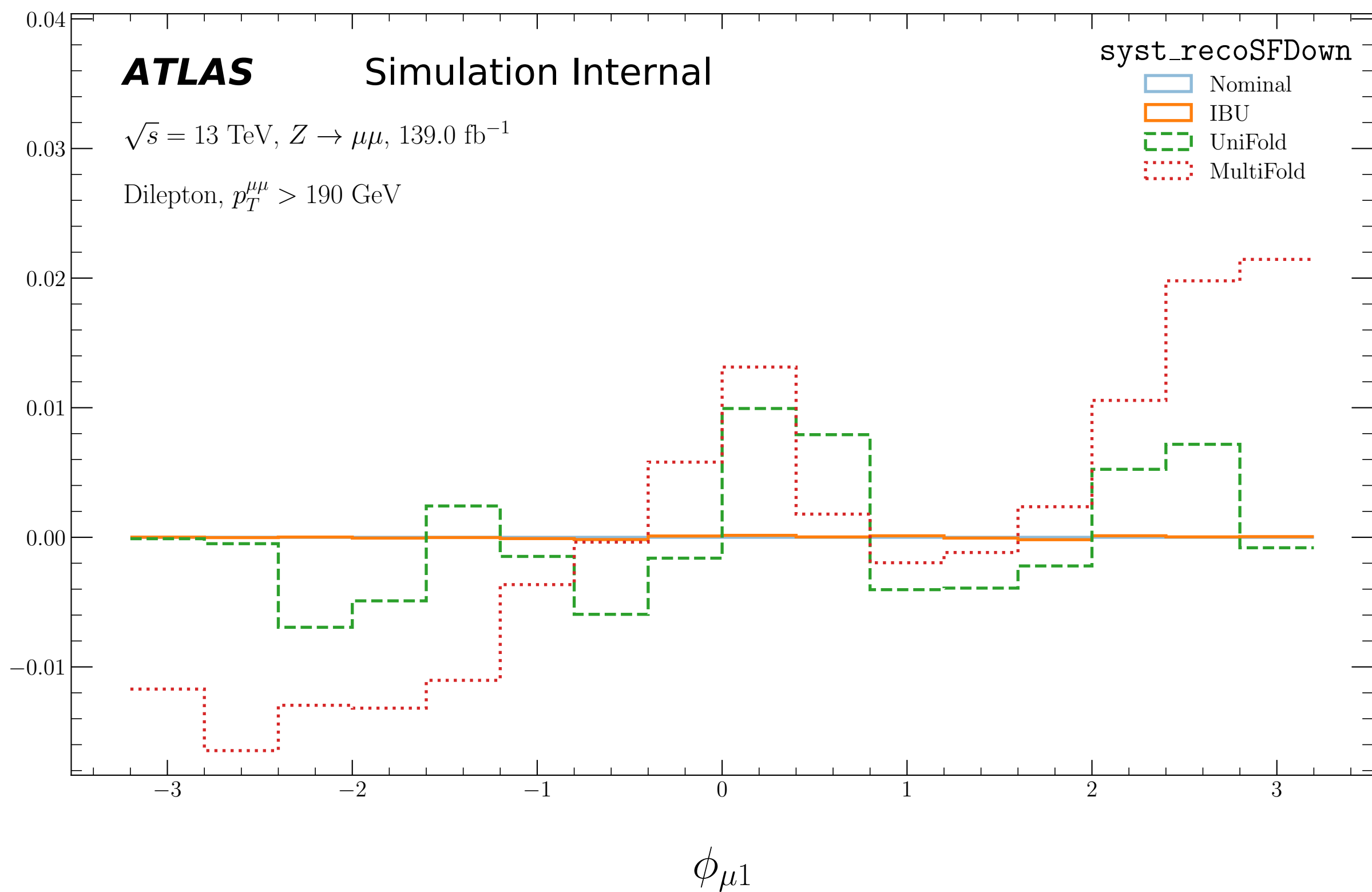
UniFold

MultiFold









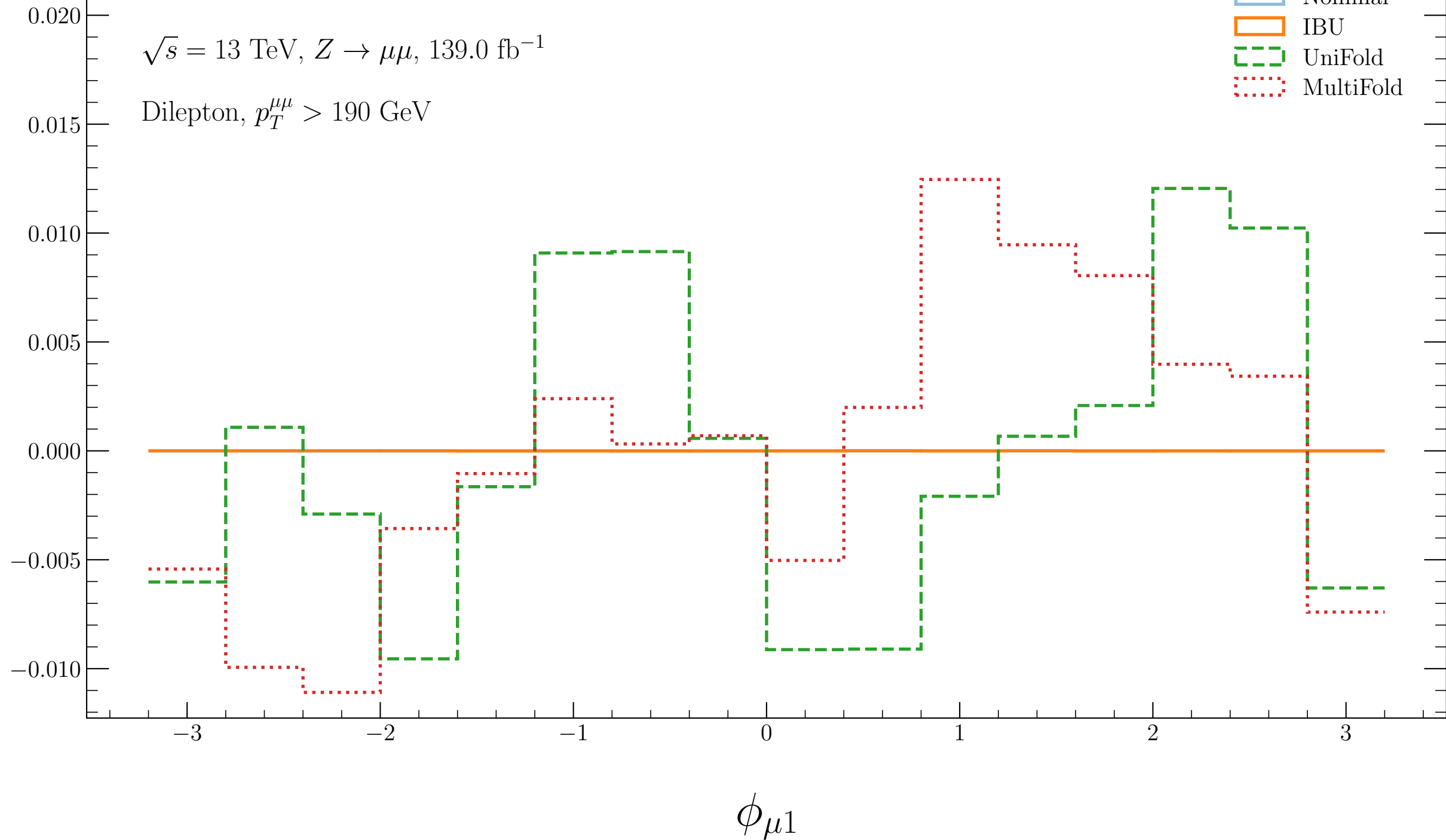
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

Nominal

IBU

UniFold

MultiFold

0.03
0.02
0.01
0.00
-0.01

-3

-2

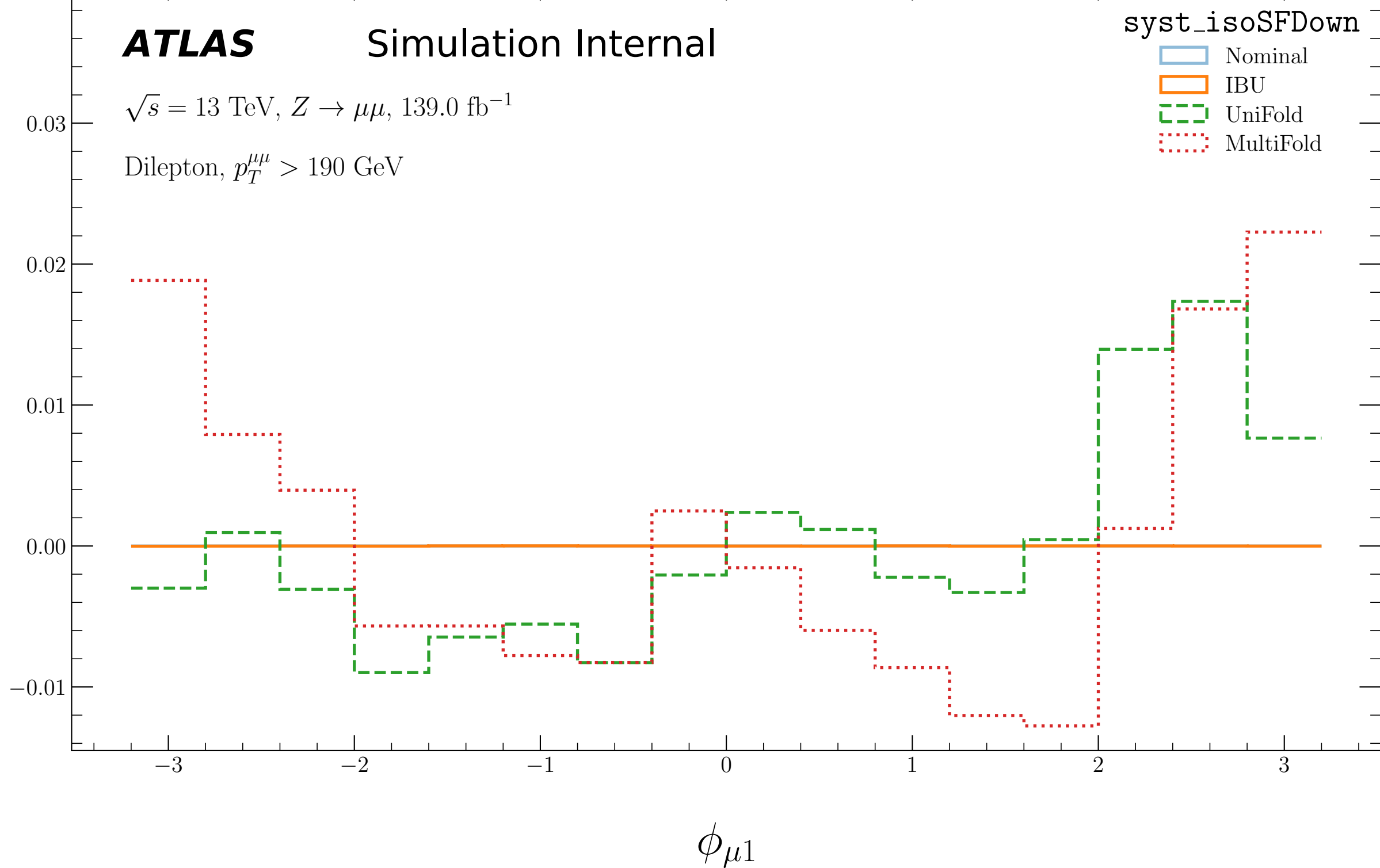
-1

0

1

2

3

 $\phi_{\mu 1}$ 

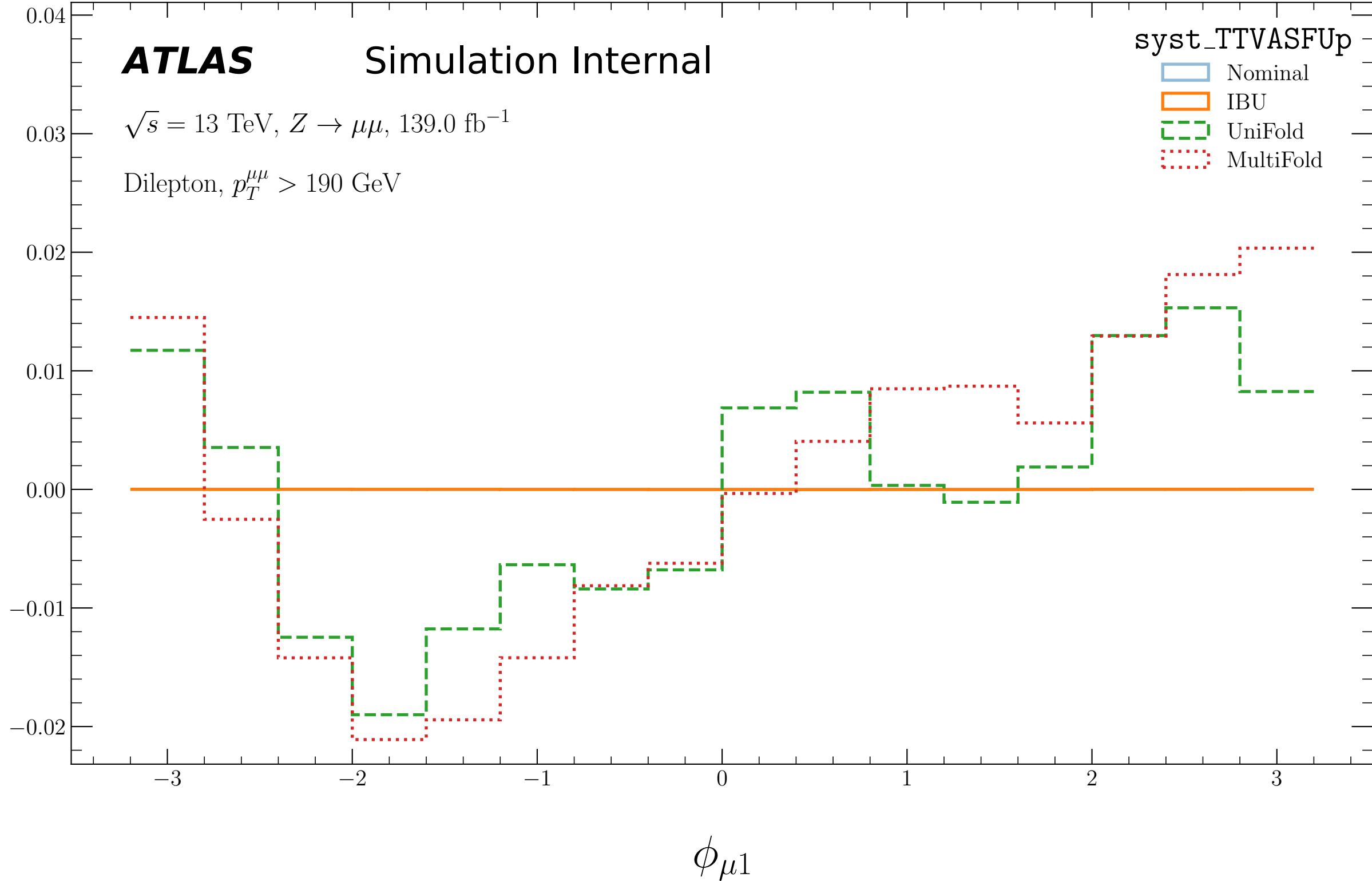
ATLAS

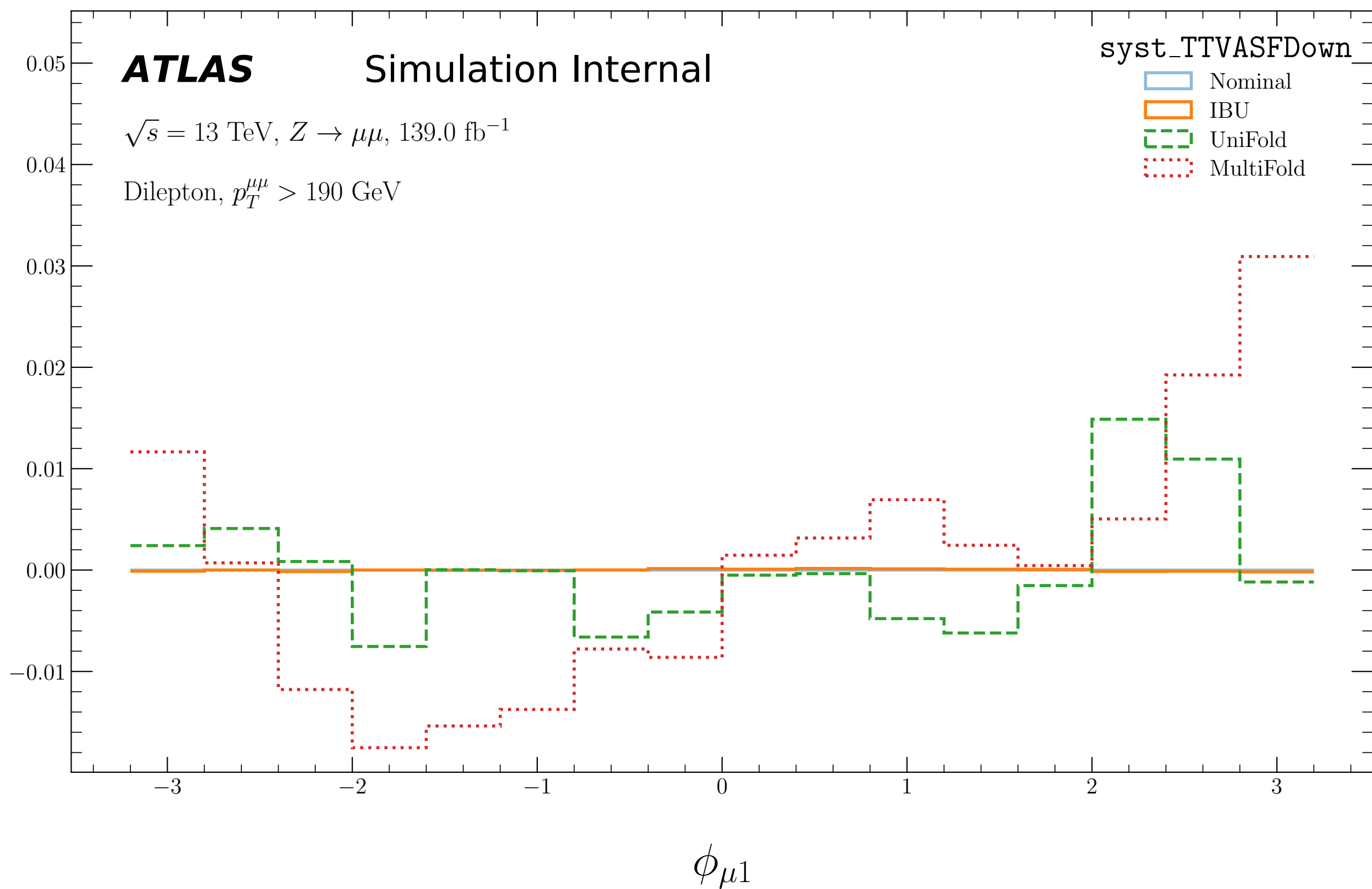
Simulation Internal

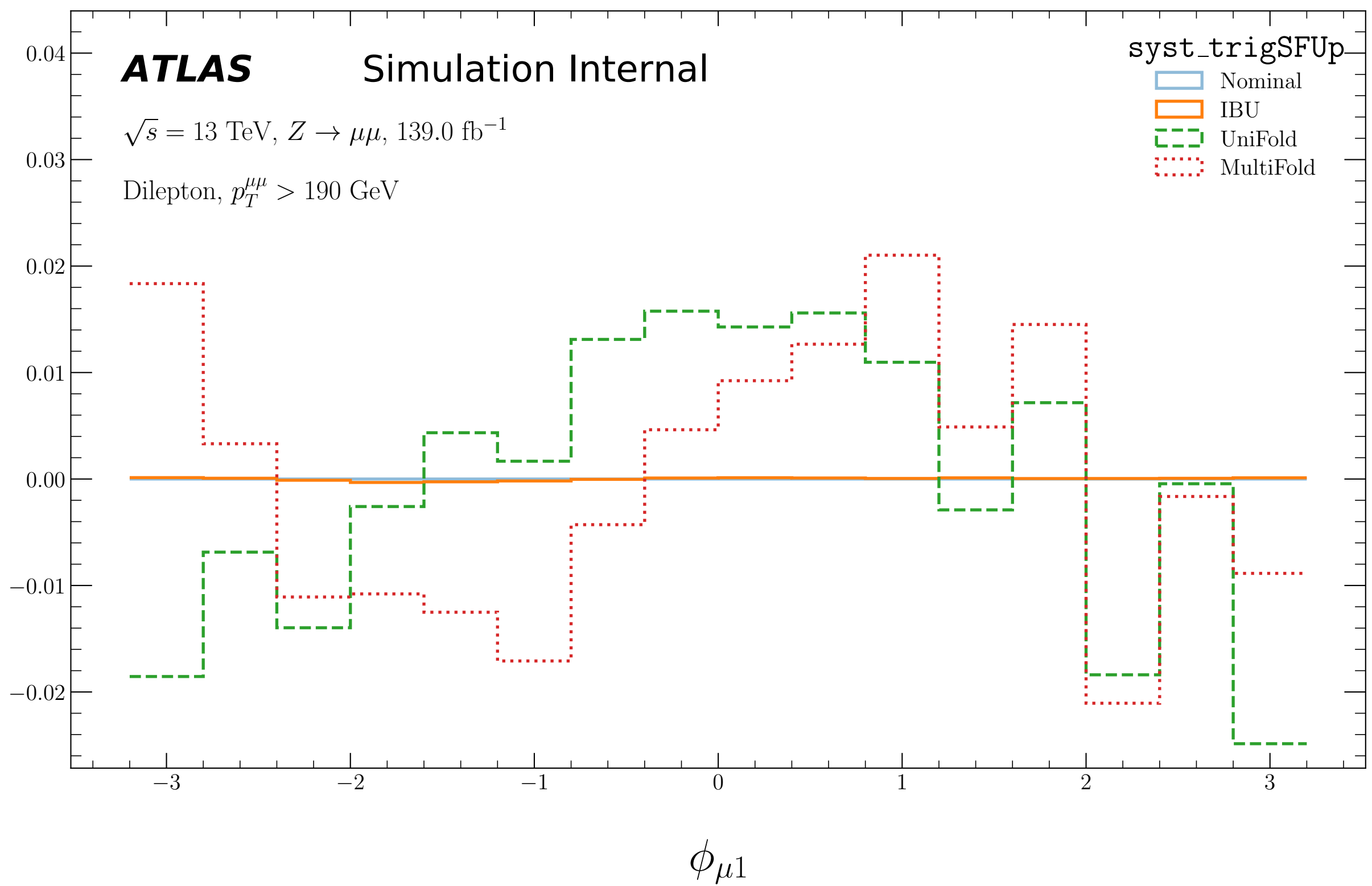
 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

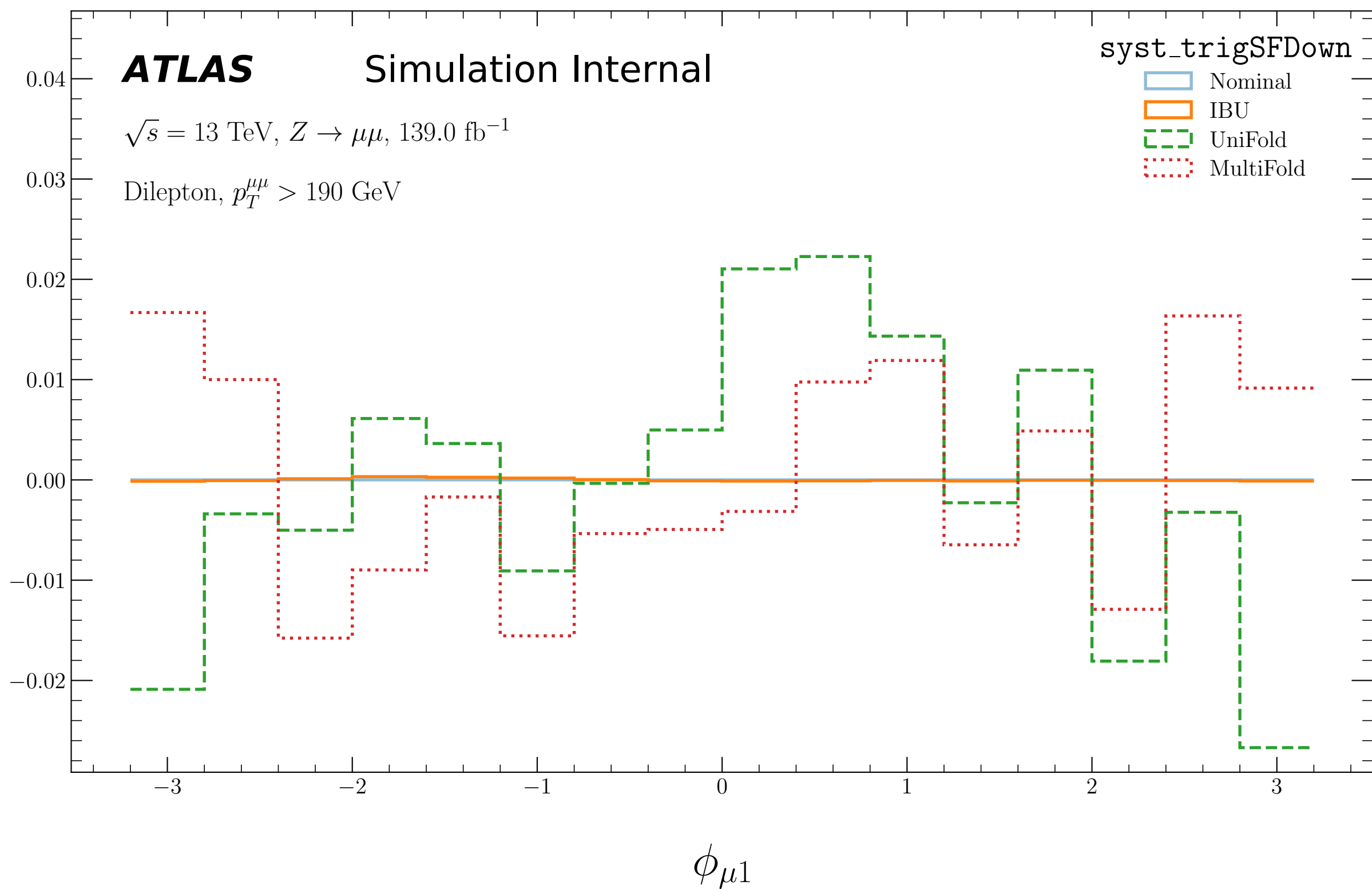
syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold









ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

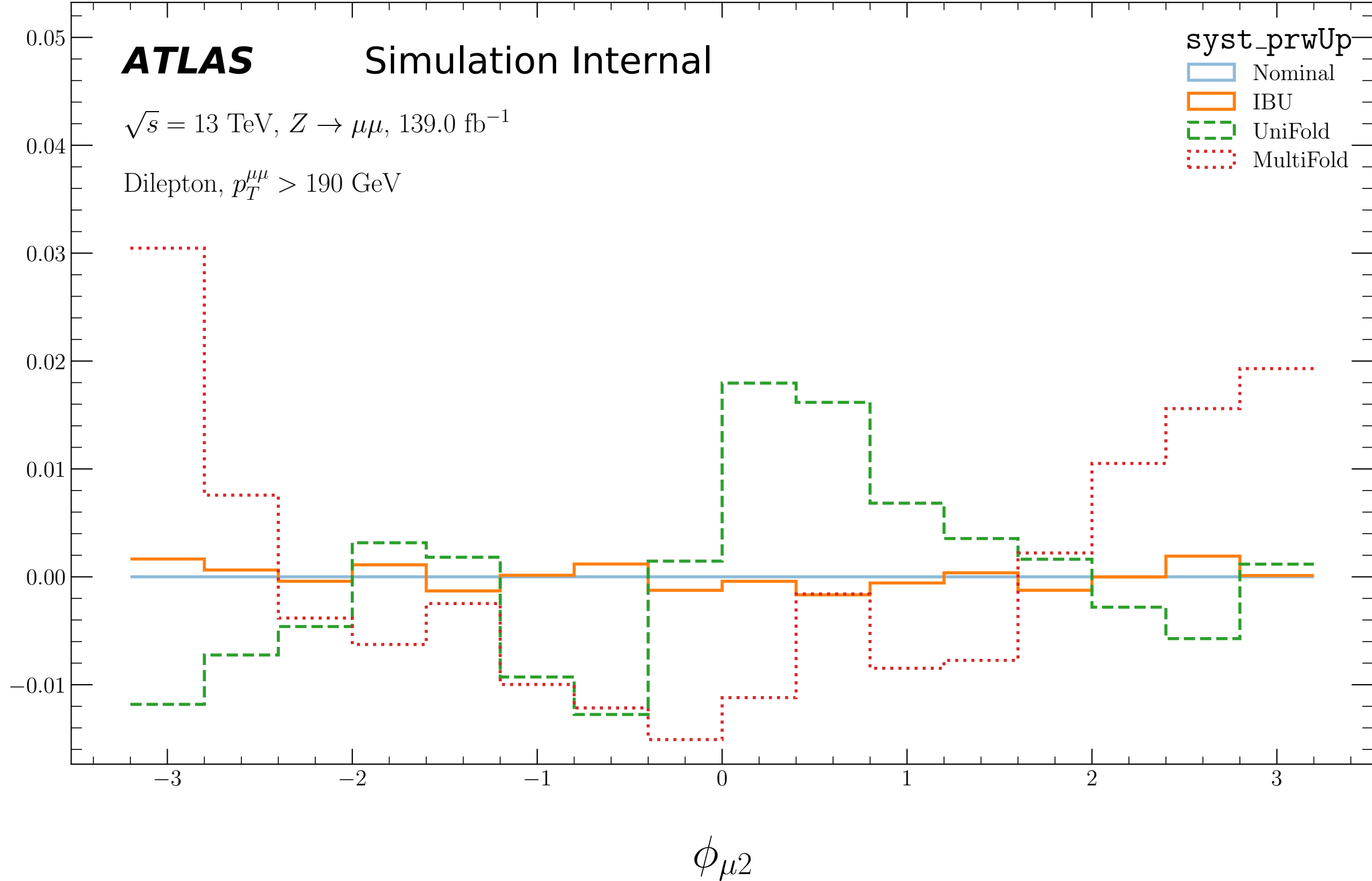
syst_prwUp

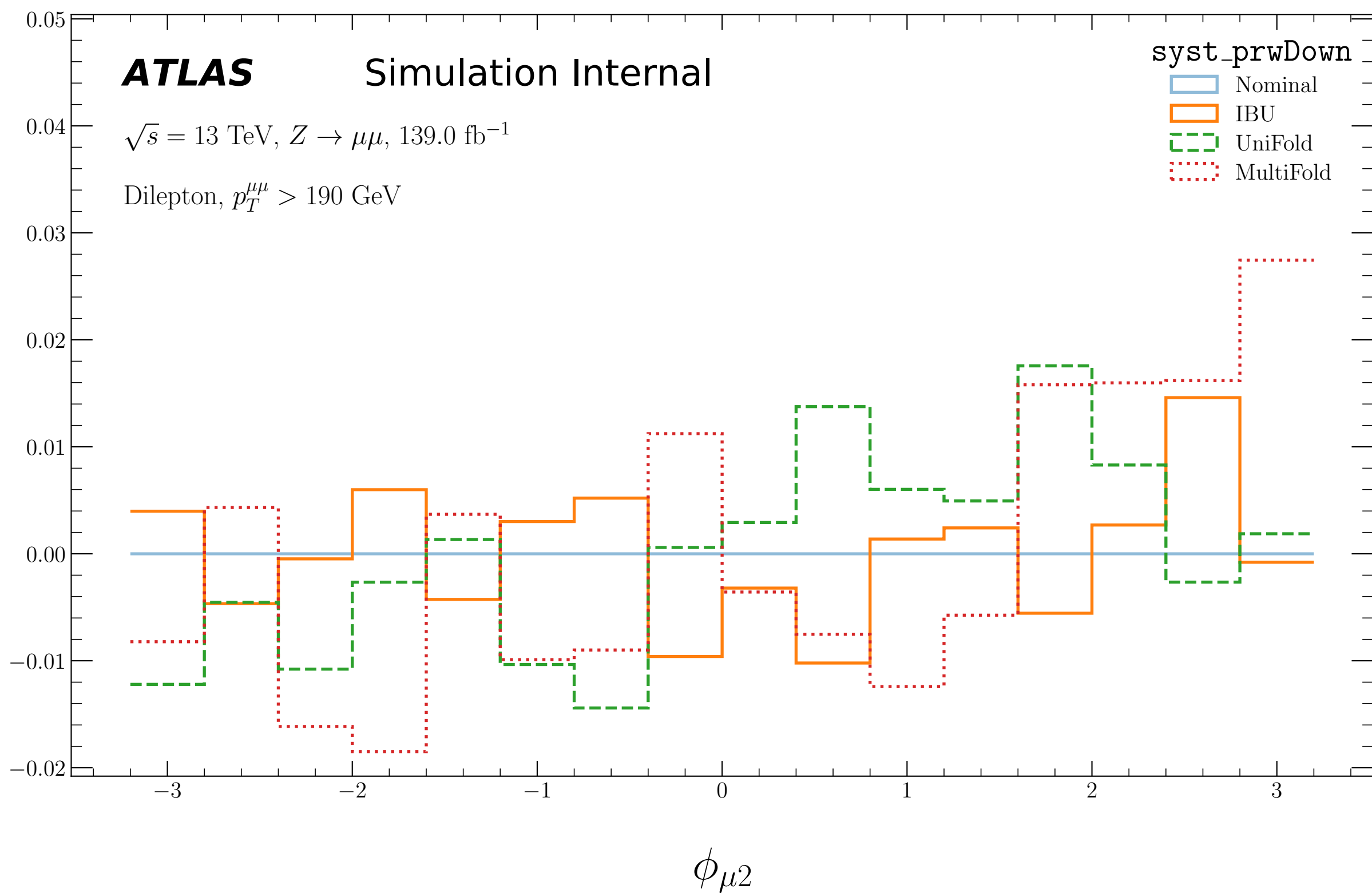
Nominal

IBU

UniFold

MultiFold





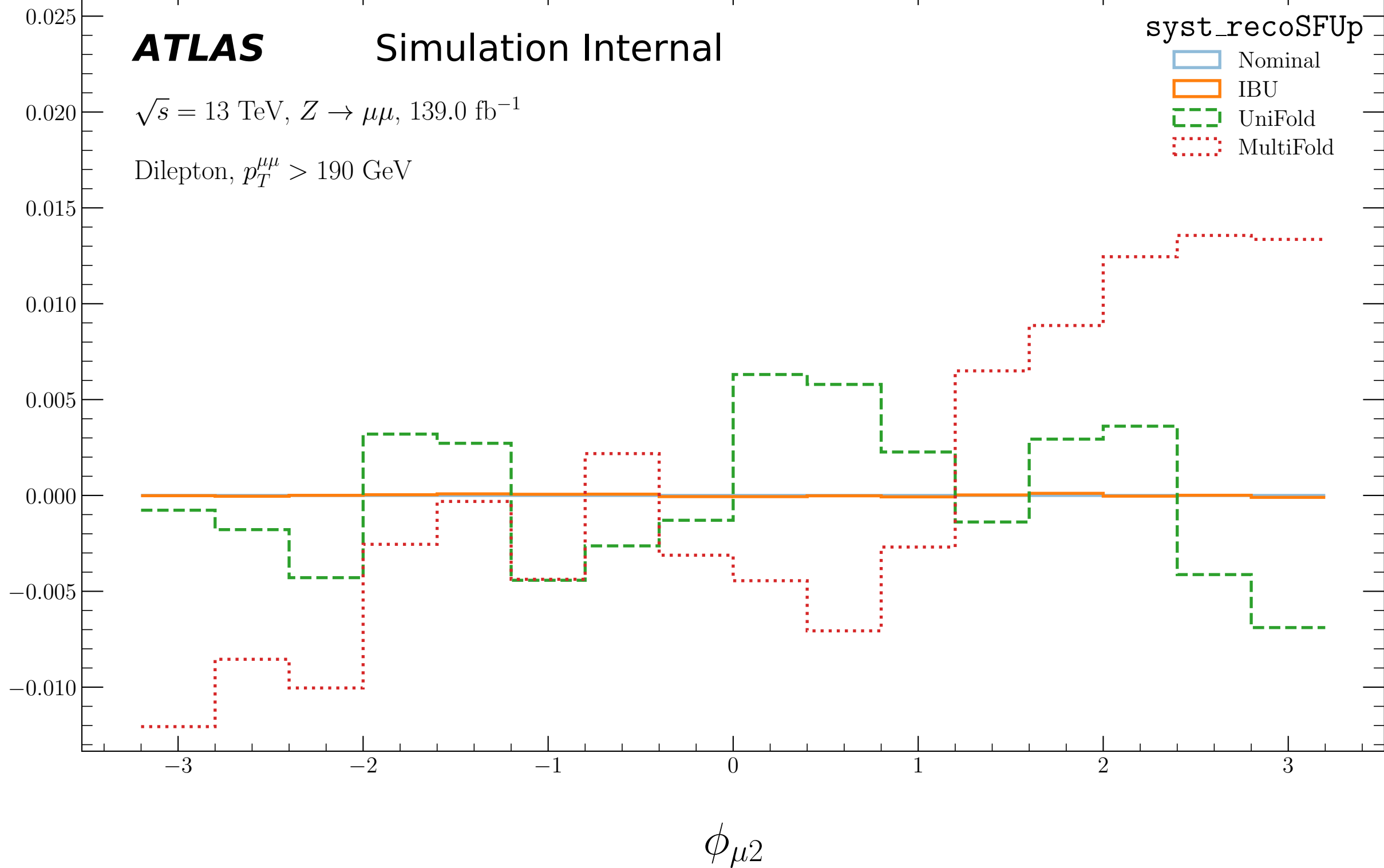
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_recoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.02
0.01
0.00
-0.01

-3

-2

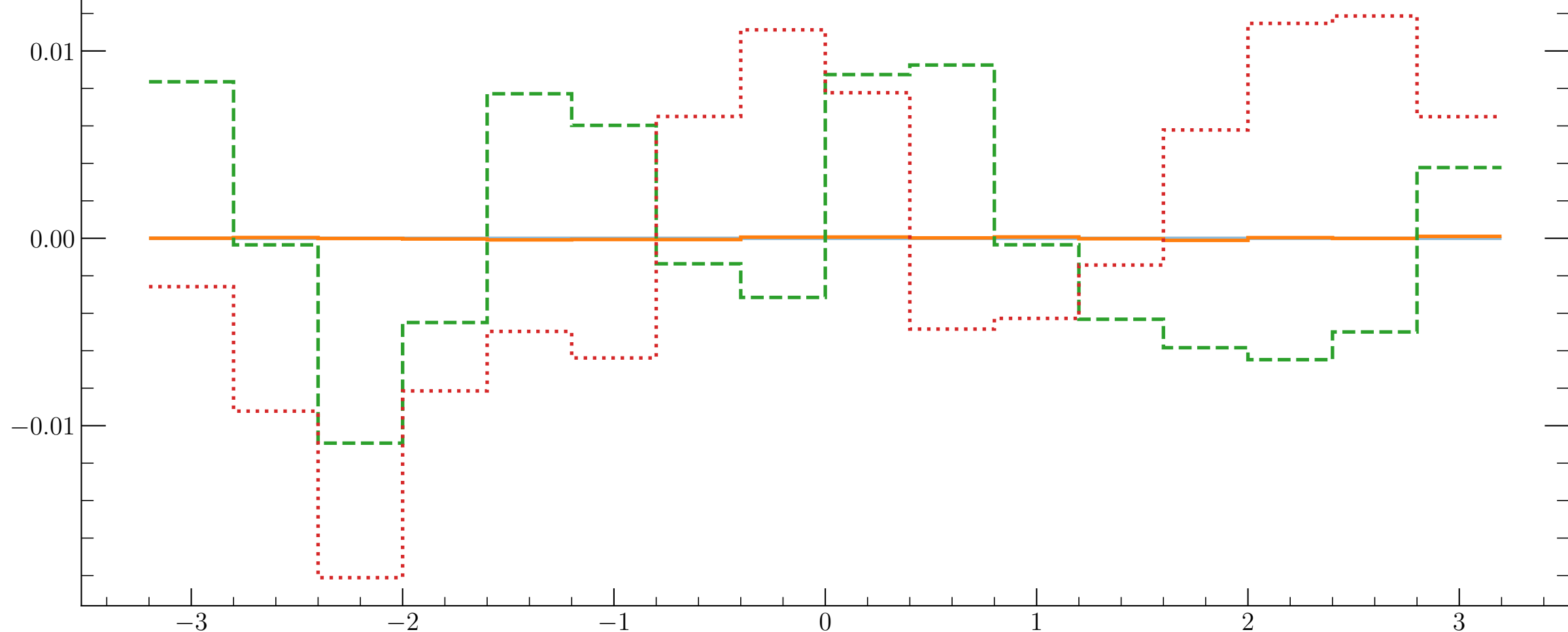
-1

0

1

2

3

 $\phi_{\mu 2}$ 

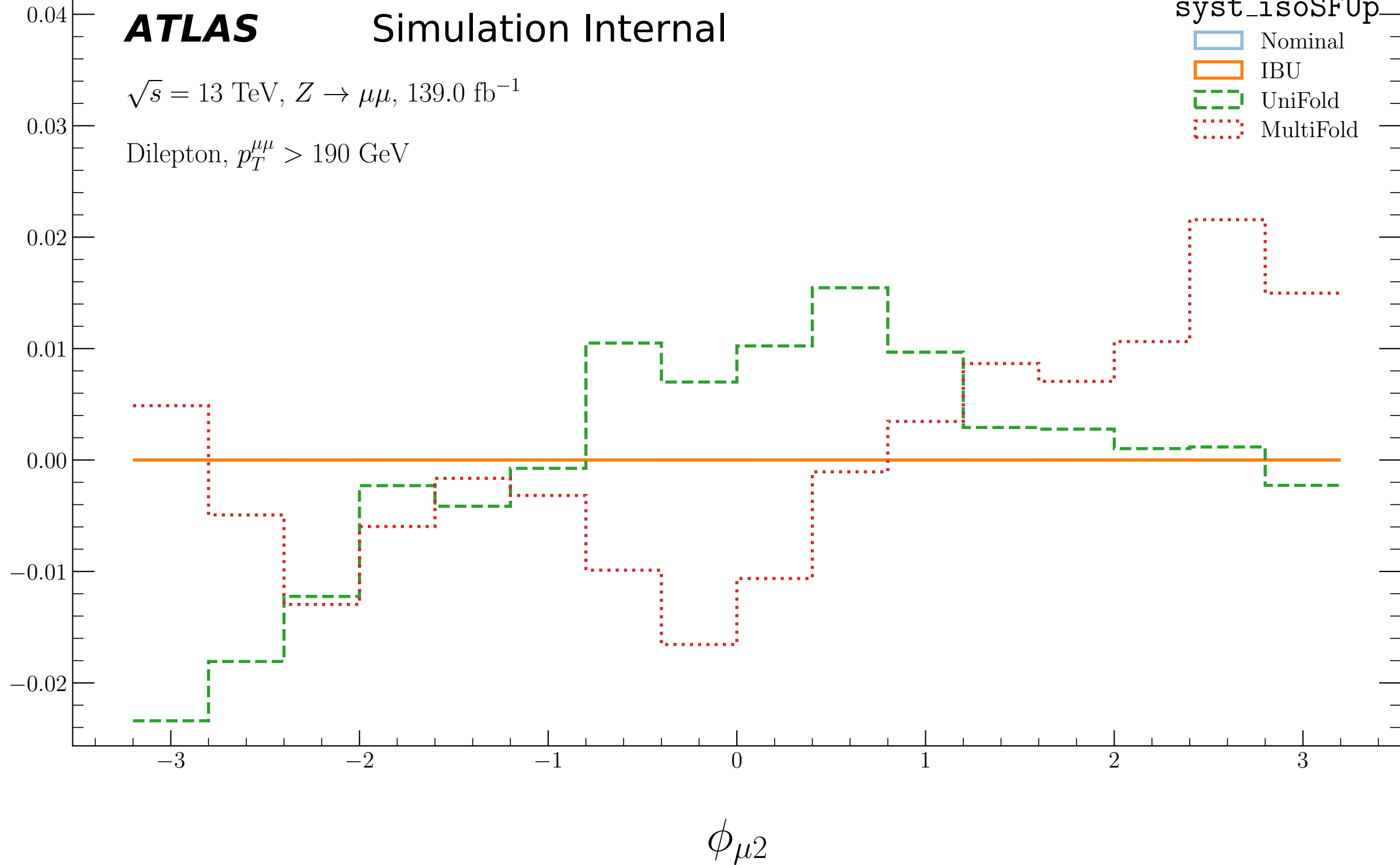
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFUp

- Nominal
- IBU
- UniFold
- MultiFold



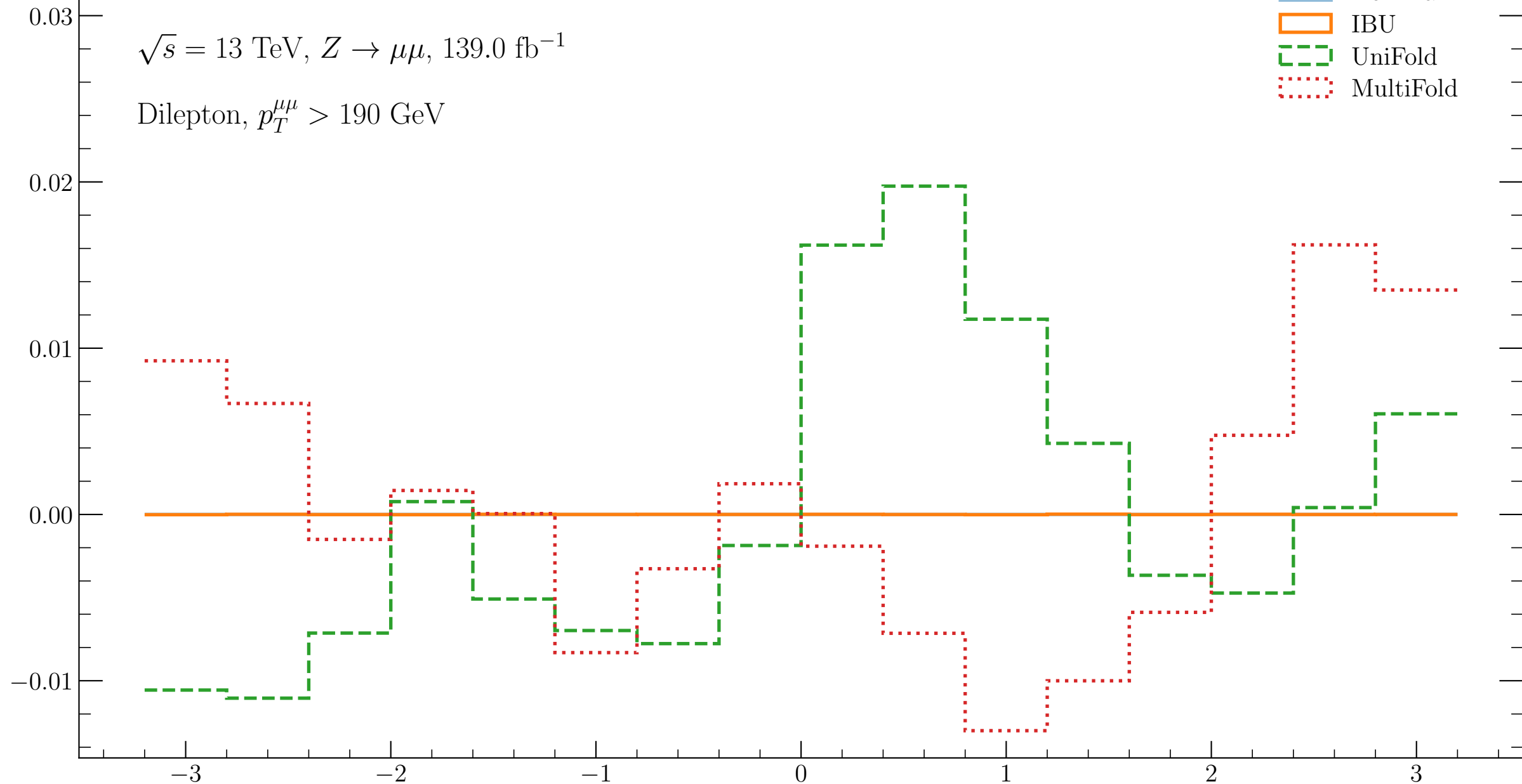
ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_isoSFDown

- Nominal
- IBU
- UniFold
- MultiFold

 $\phi_{\mu 2}$

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFUp

- Nominal
- IBU
- UniFold
- MultiFold

0.02
0.01
0.00
-0.01

-3

-2

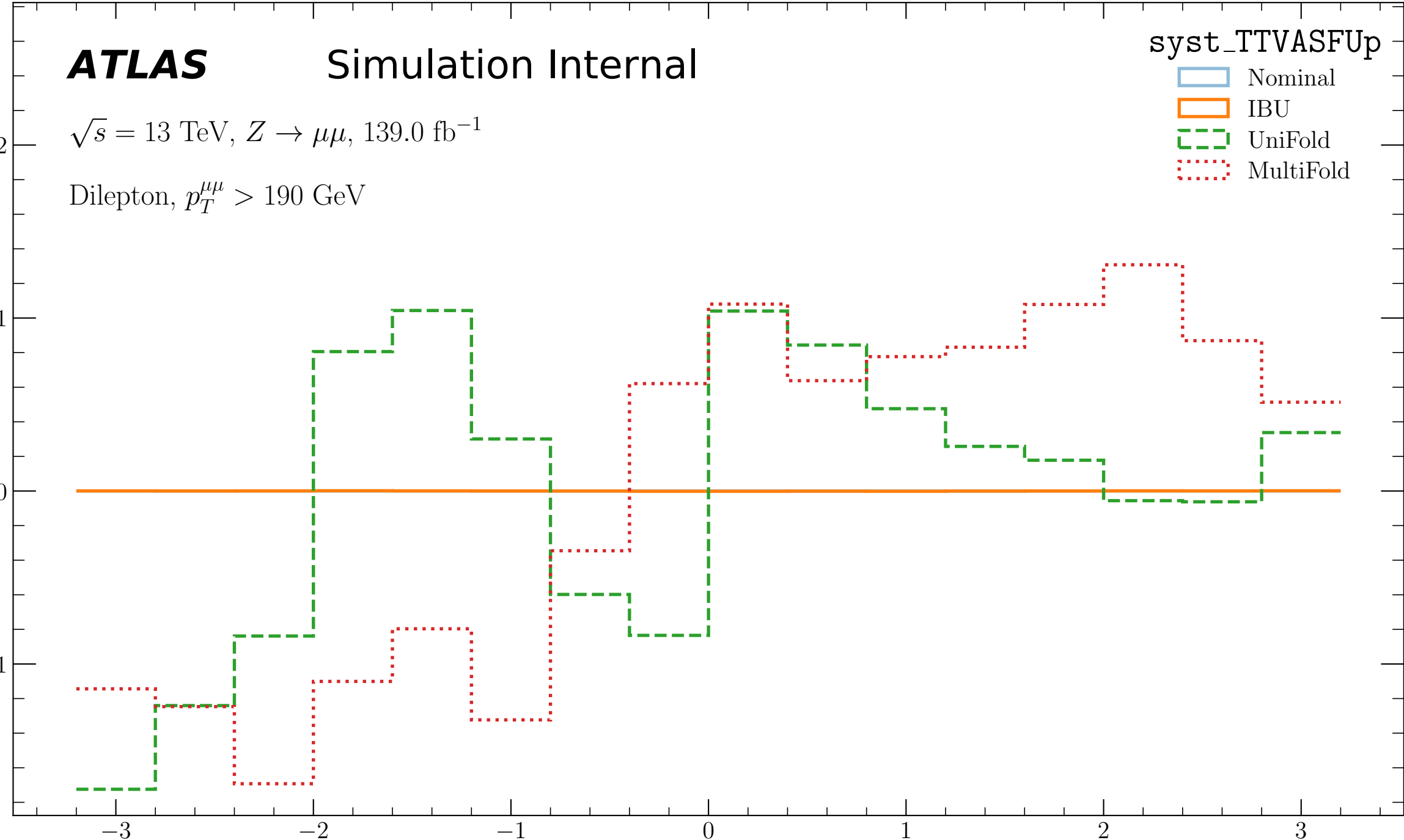
-1

0

1

2

3

 $\phi_{\mu 2}$ 

ATLAS

Simulation Internal

 $\sqrt{s} = 13 \text{ TeV}, Z \rightarrow \mu\mu, 139.0 \text{ fb}^{-1}$ Dilepton, $p_T^{\mu\mu} > 190 \text{ GeV}$

syst_TTVASFDown

- Nominal
- IBU
- UniFold
- MultiFold

0.02
0.01
0.00
-0.01
-0.02

-3

-2

-1

0

1

2

3

 $\phi_{\mu 2}$ 