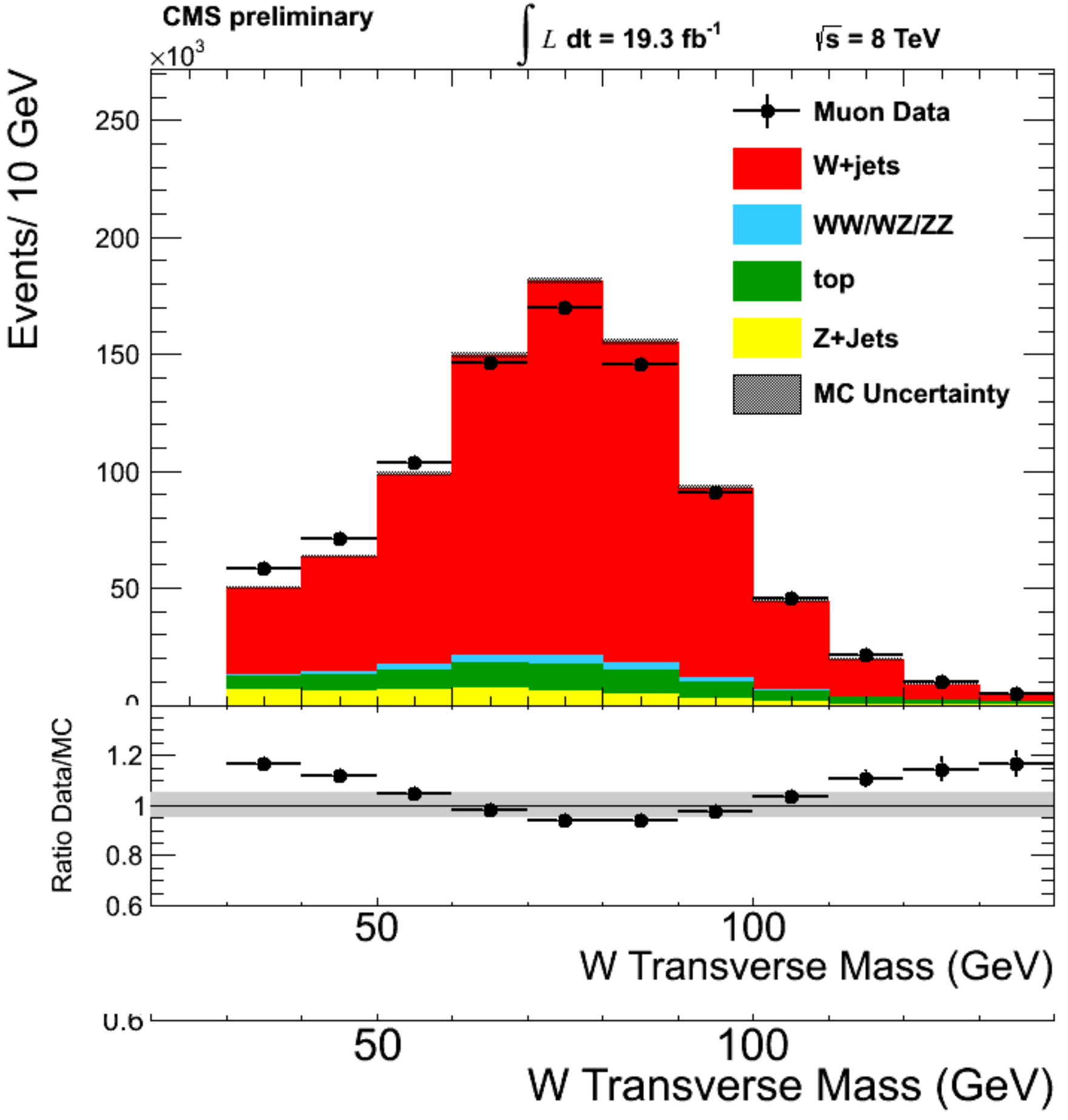
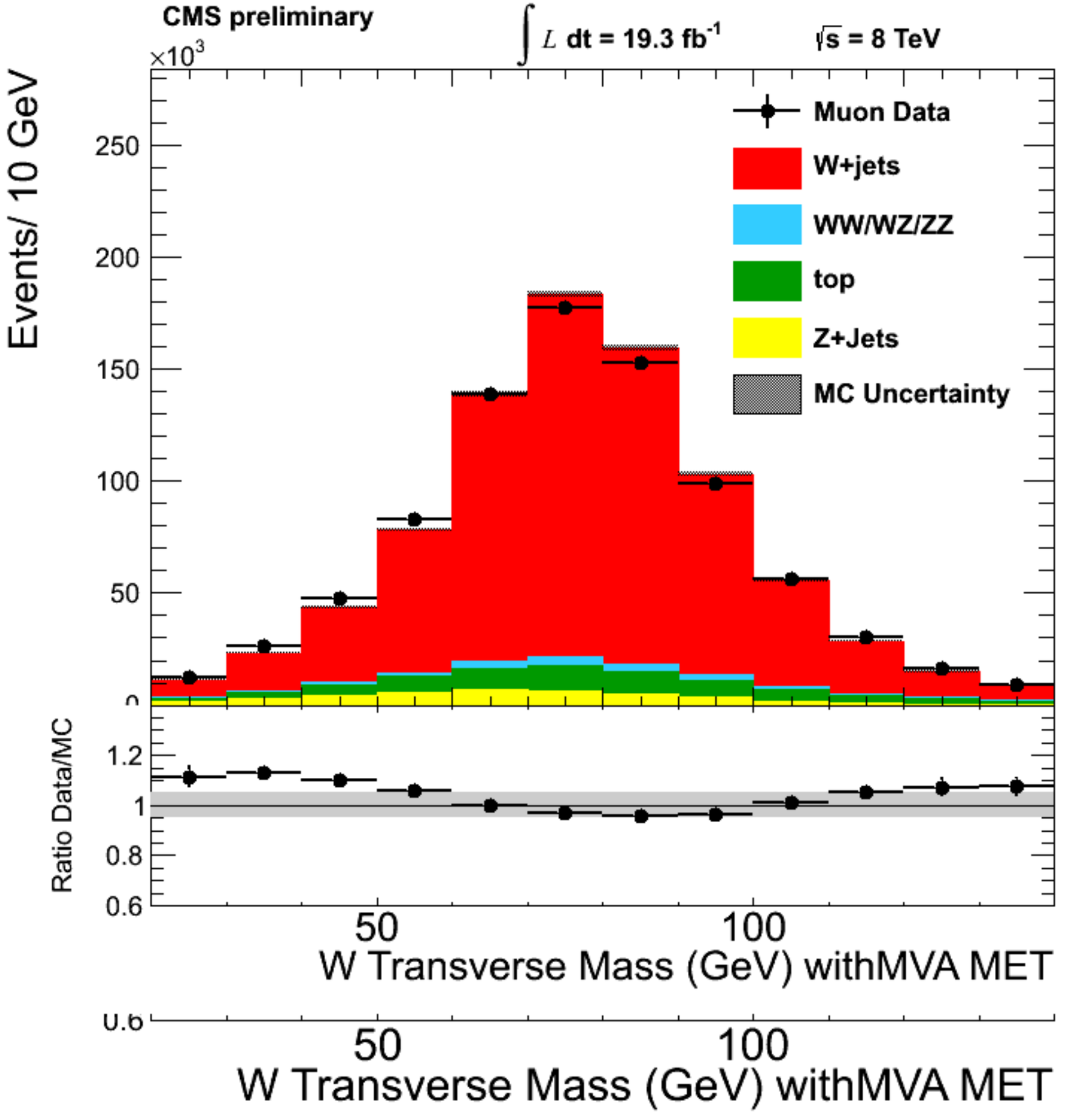
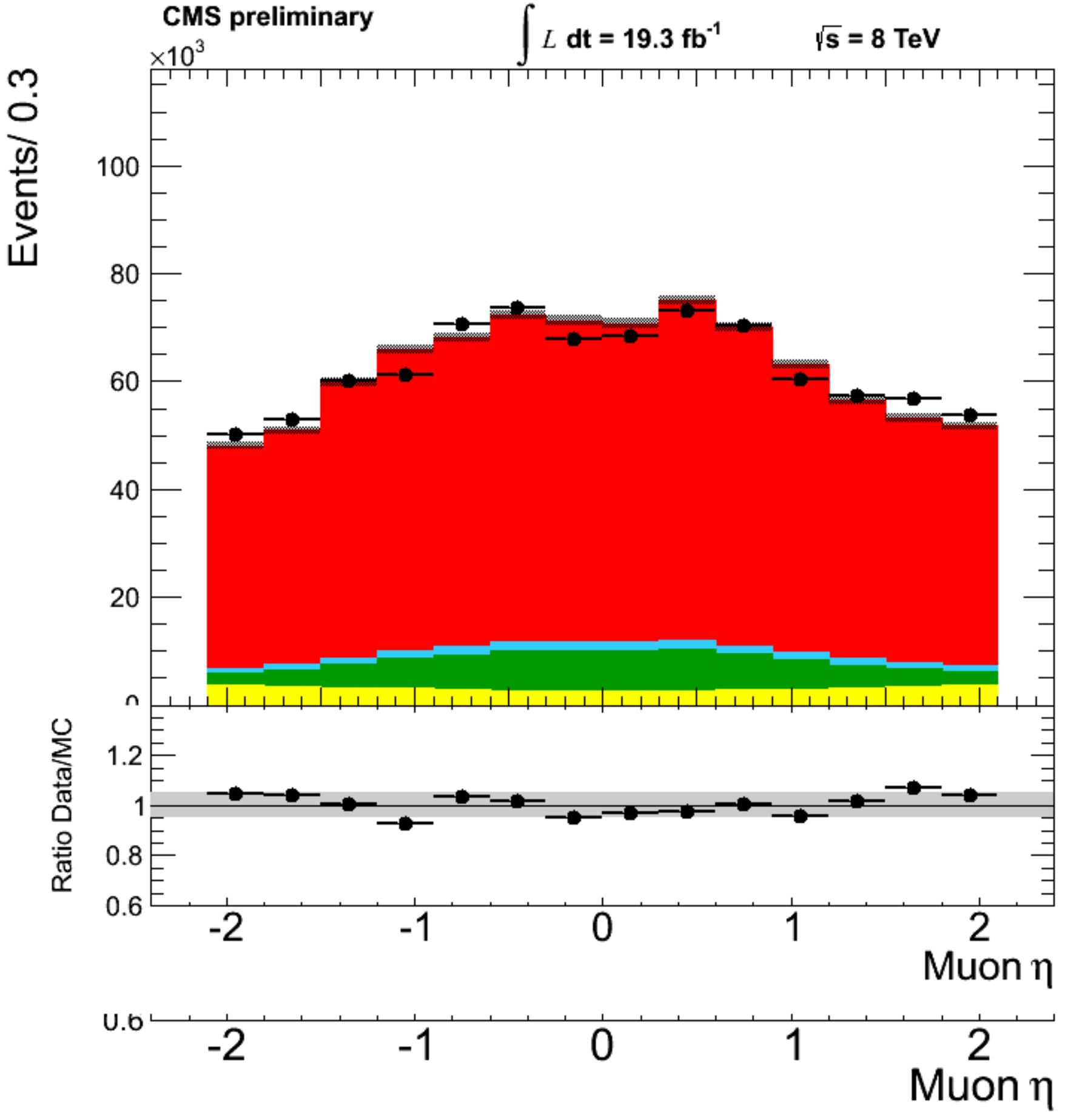
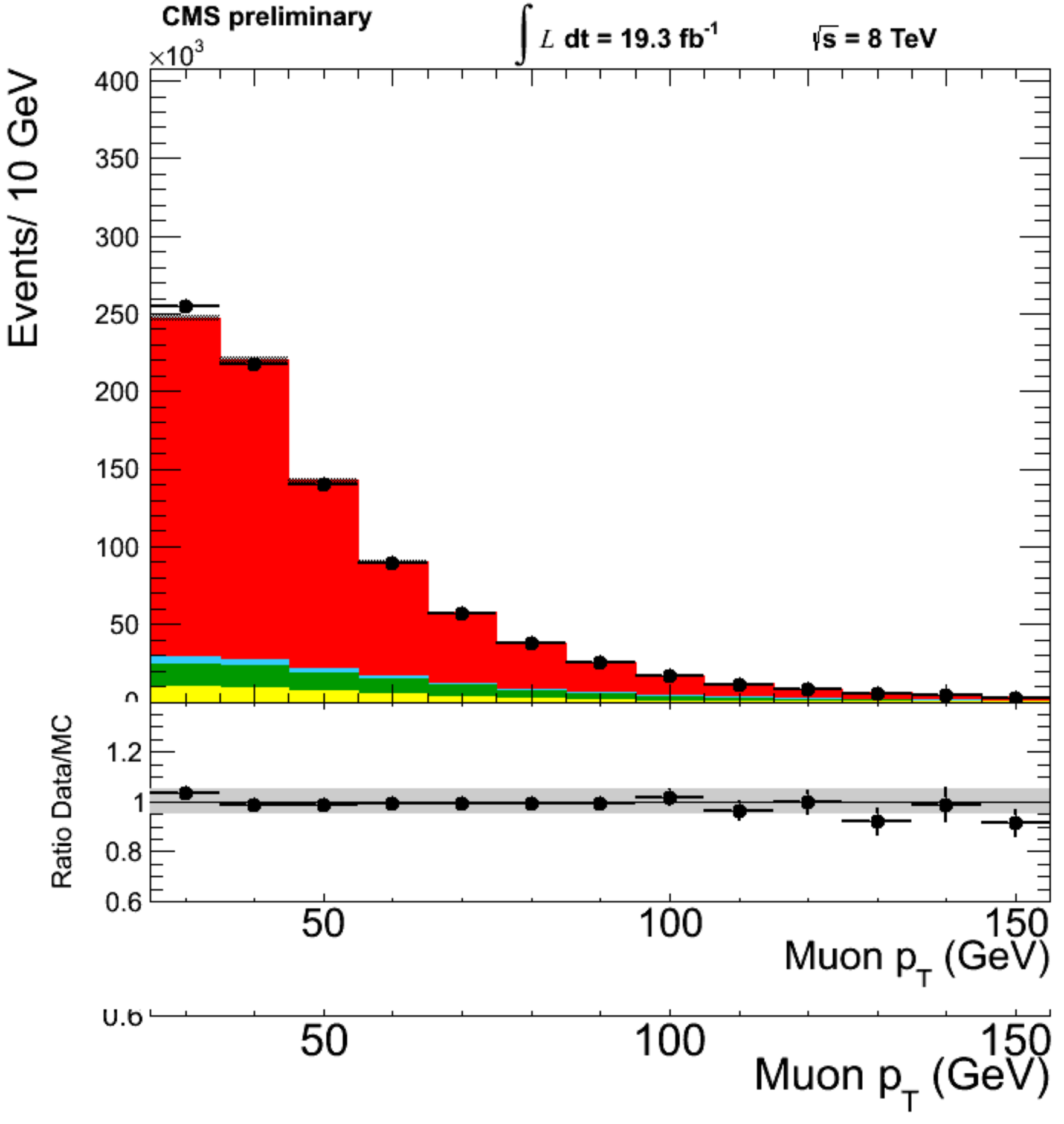
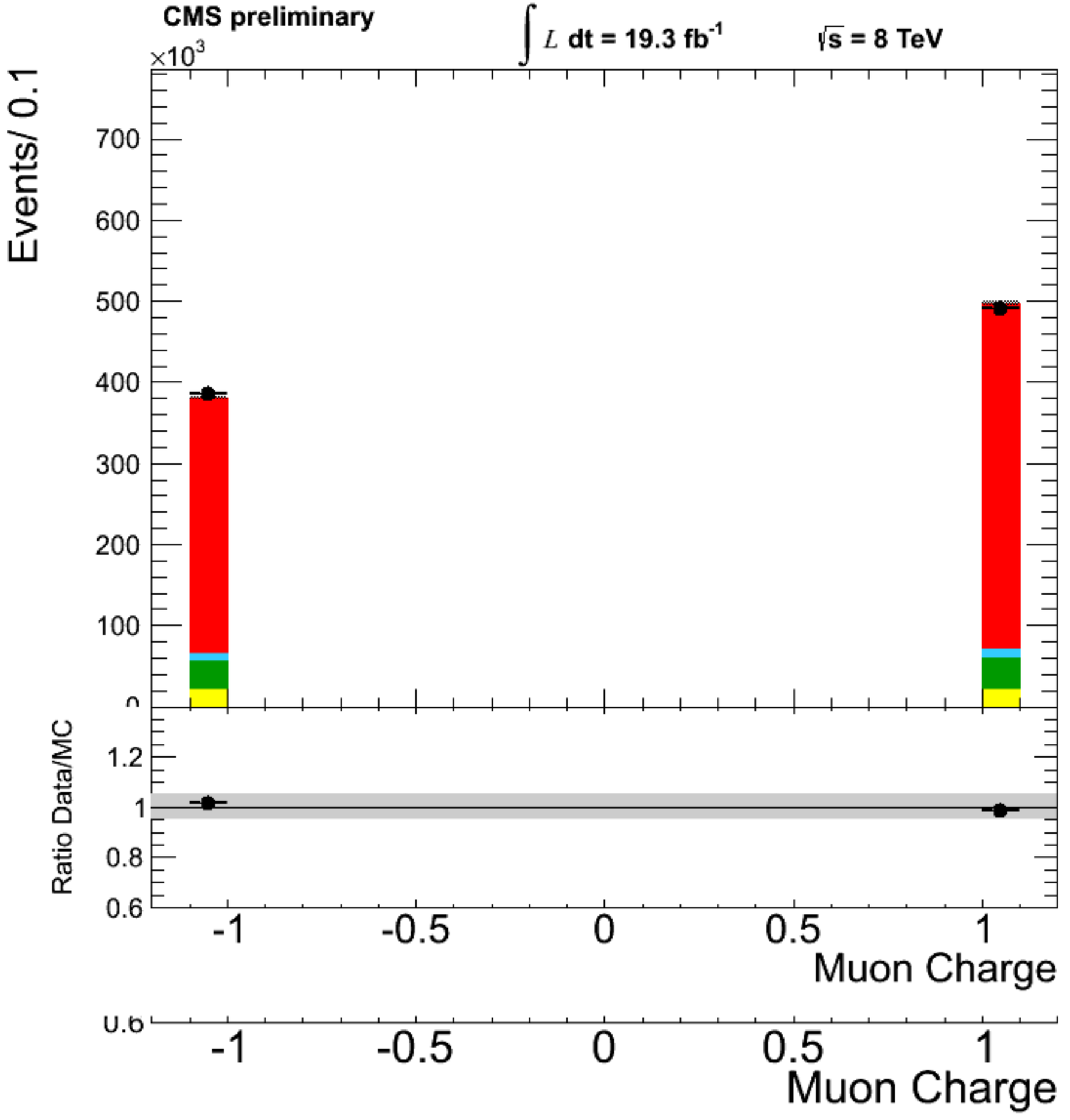
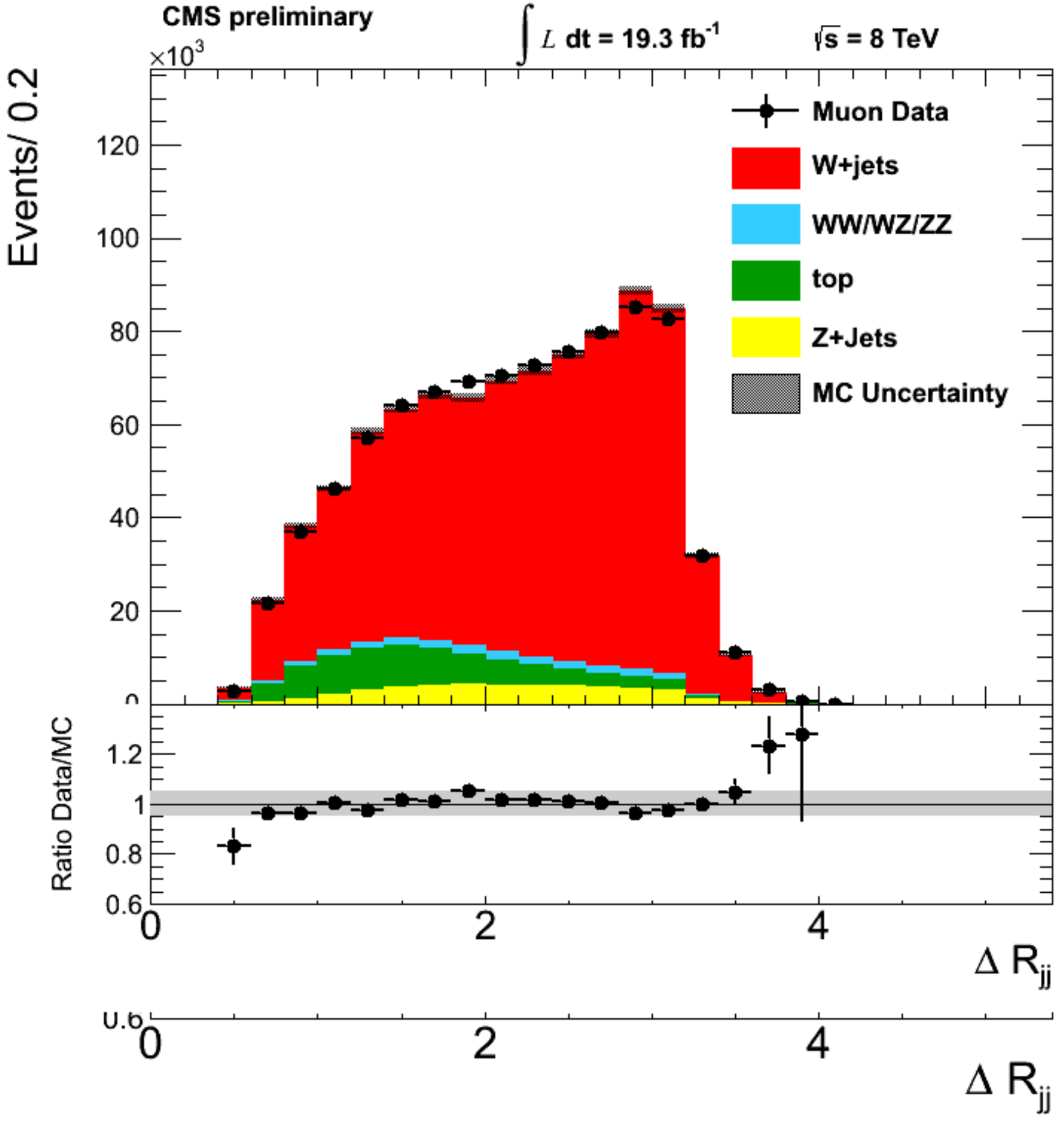

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
W Transverse Mass (GeV)
W Transverse Mass (GeV)

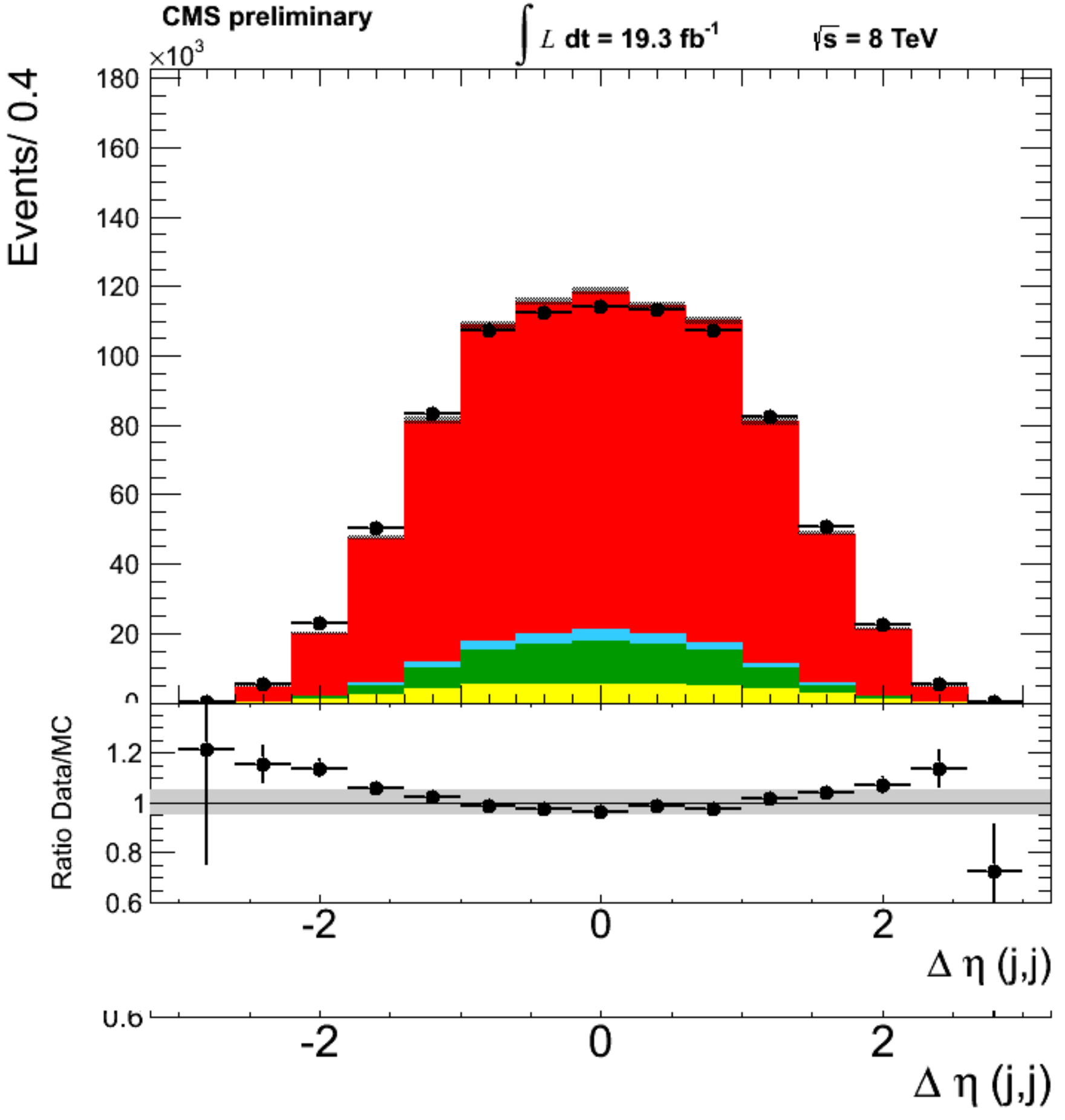

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
W Transverse Mass (GeV) withMVA MET
W Transverse Mass (GeV) withMVA MET

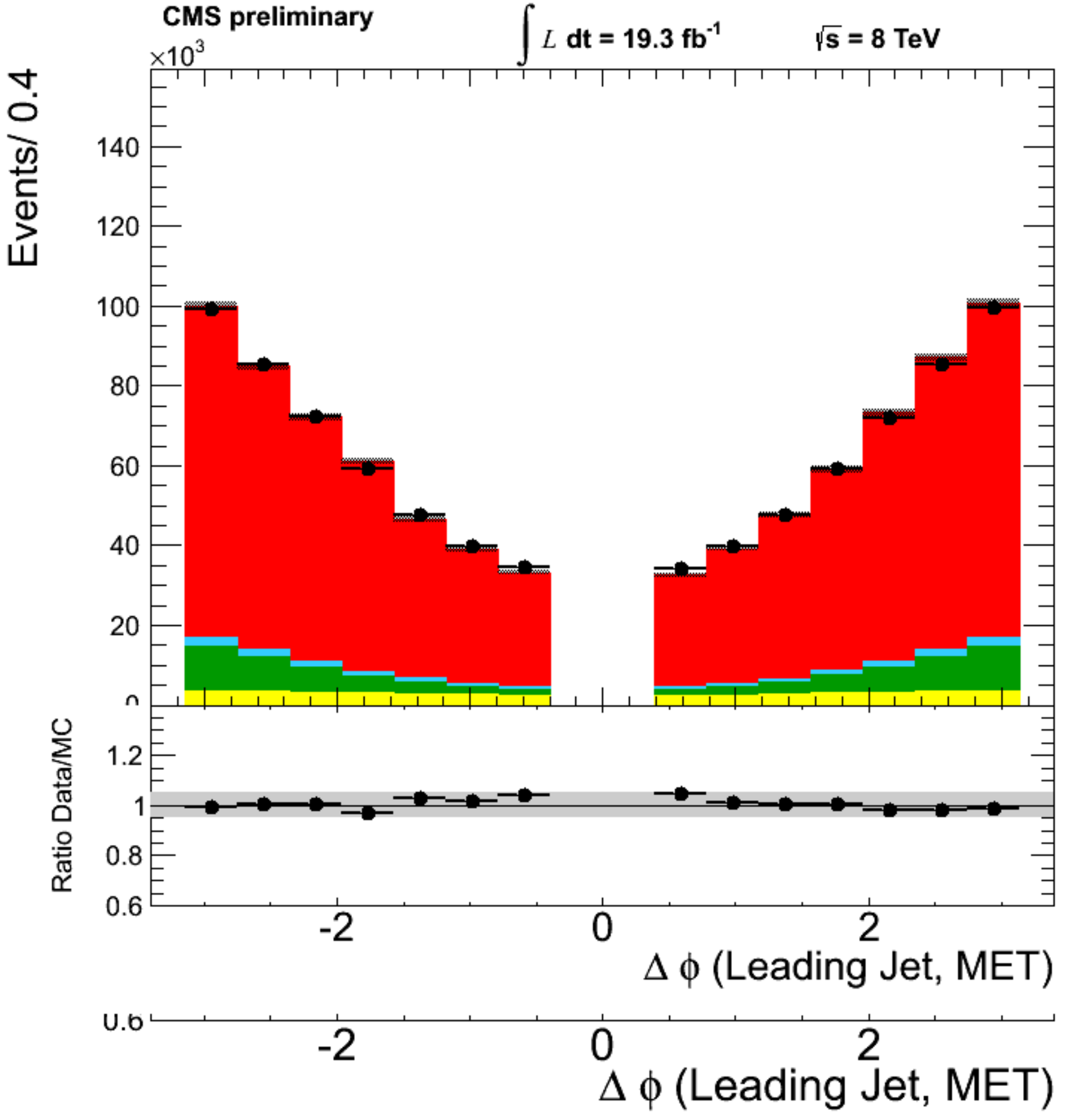

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.3
$\times 10^3$
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
-1
0
1
2
Muon η
0.6
-2
-1
0
1
2
Muon η

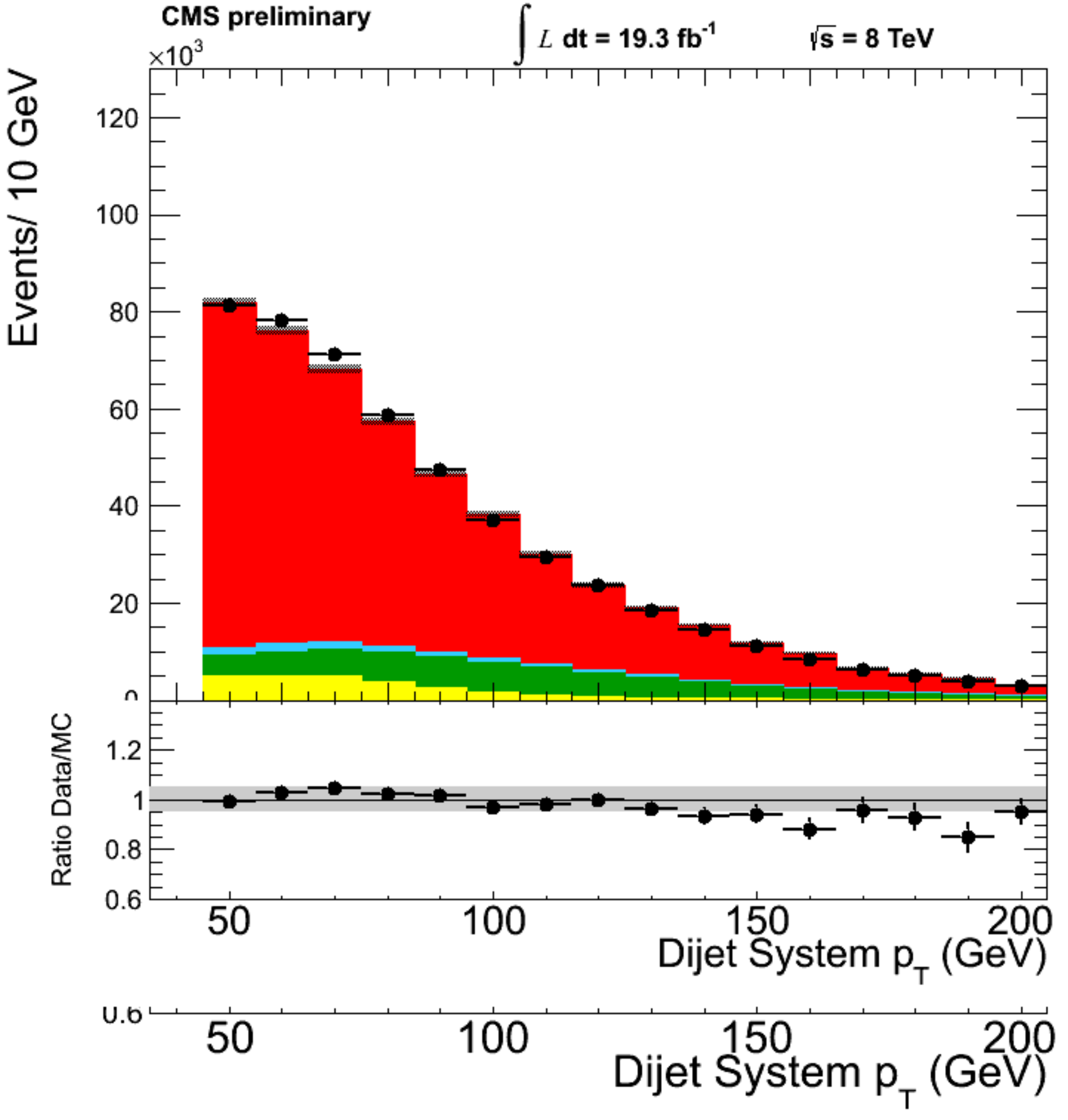

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
400
350
300
250
200
150
100
50
0
Ratio Data/MC
1.2
1
0.8
0.6
50
100
150
Muon p_T (GeV)
0.6
50
100
150
Muon p_T (GeV)

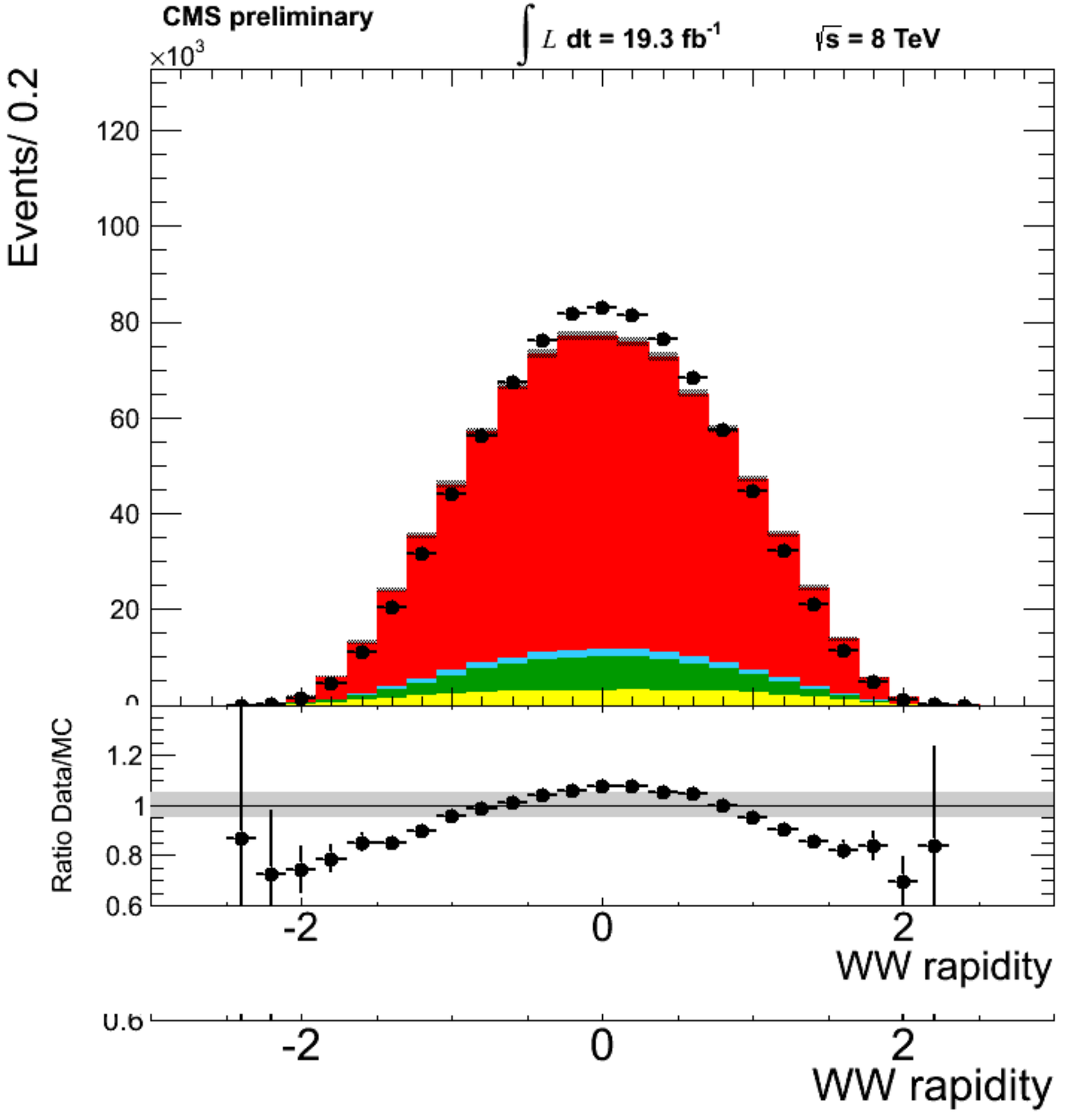

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.1
$\times 10^3$
700
600
500
400
300
200
100
Ratio Data/MC
1.2
1
0.8
0.6
-1
-0.5
0
0.5
1
Muon Charge
Muon Charge

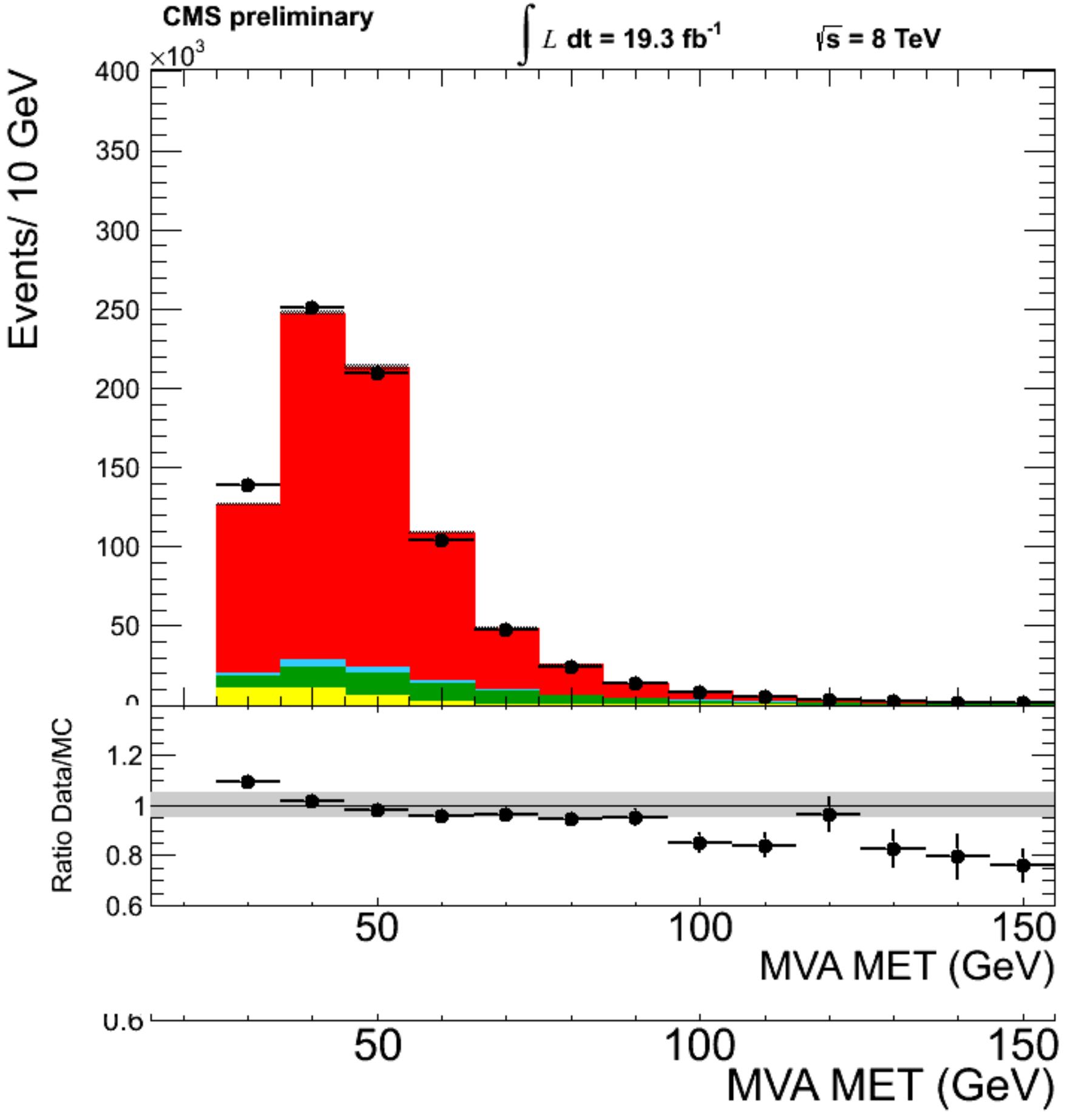

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.2
$\times 10^3$
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
ΔR_{jj}

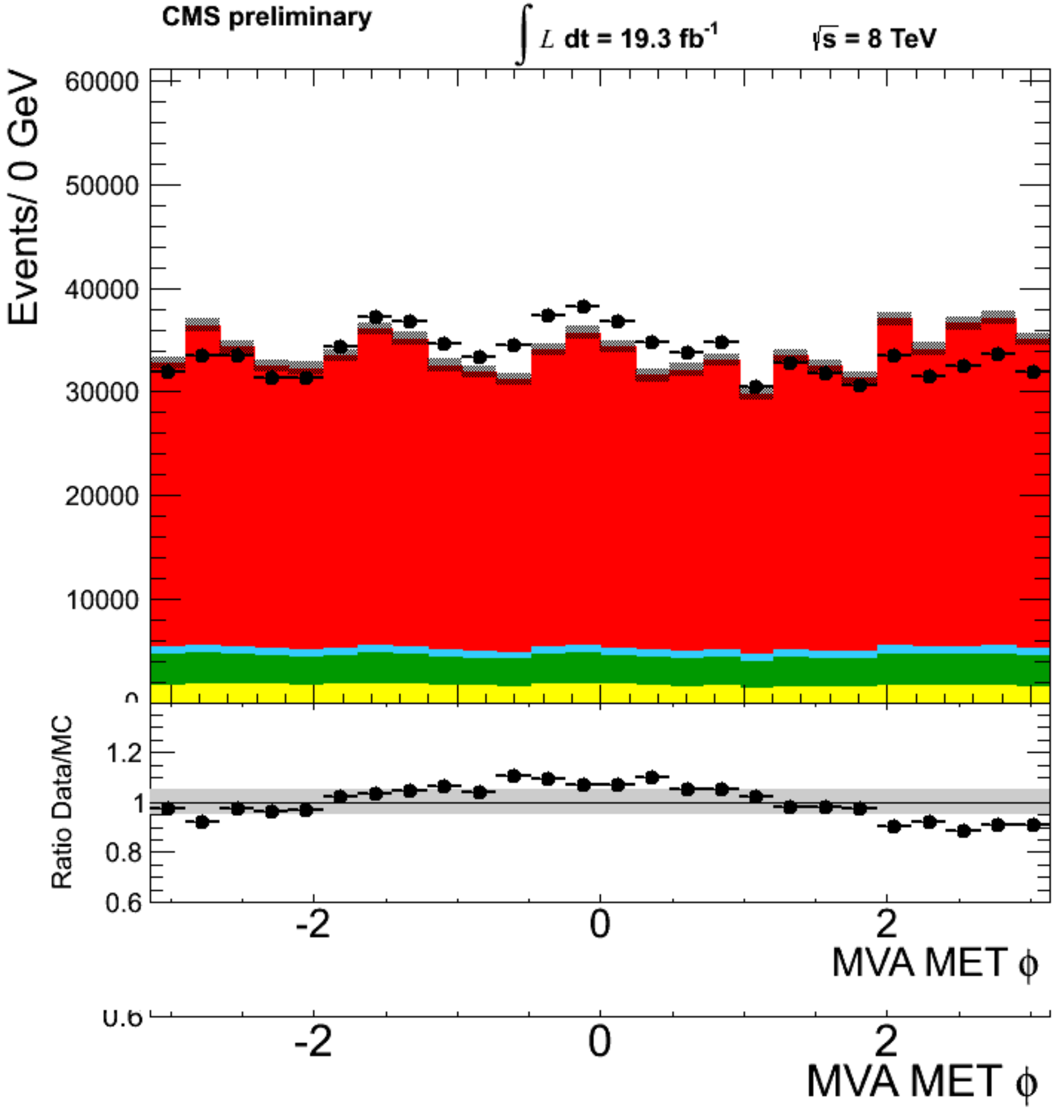

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.4
$\times 10^3$
180
160
140
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
$\Delta\eta$ (j,j)

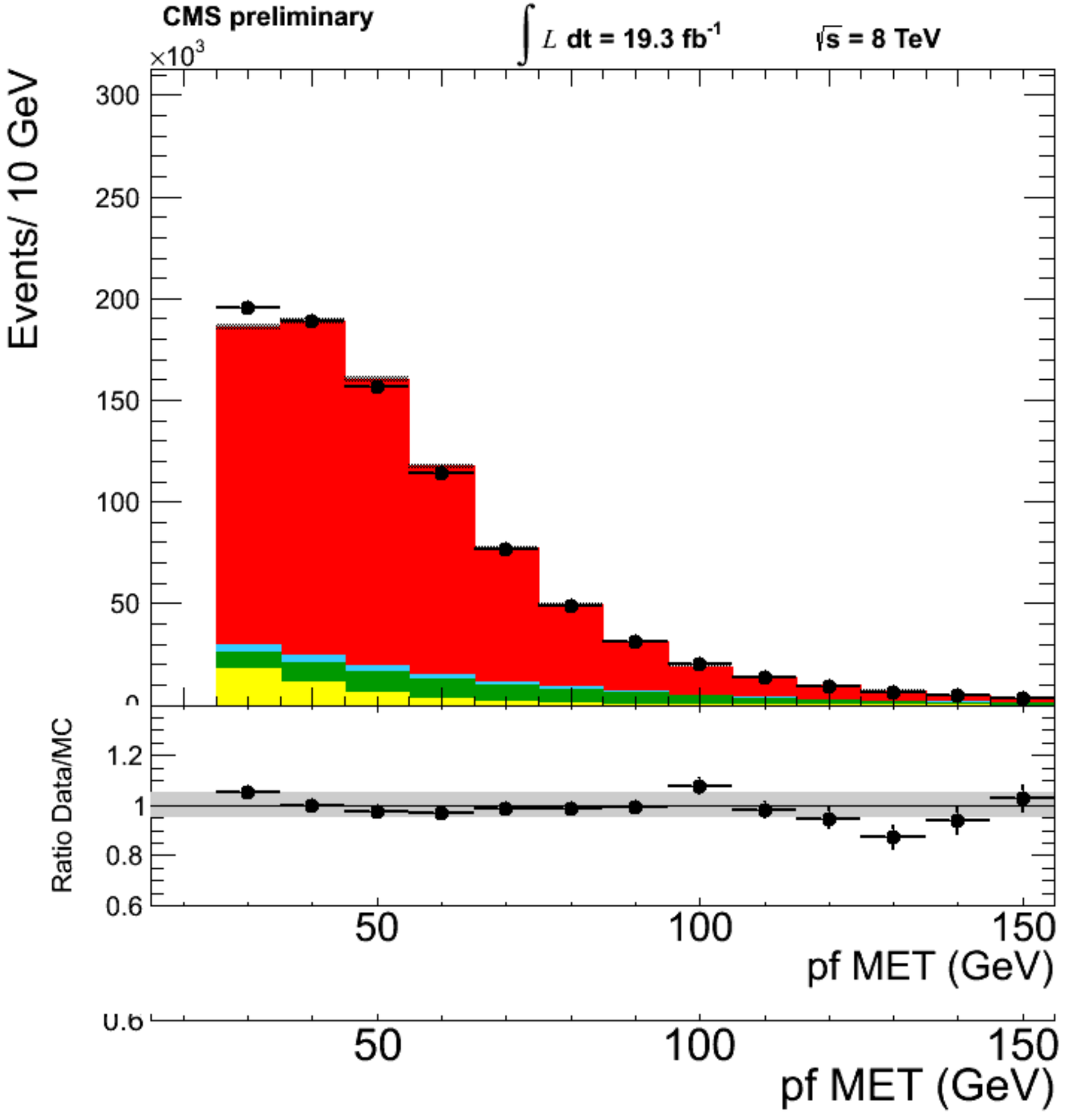

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 0.4
140
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
$\Delta\phi$ (Leading Jet, MET)
0.6
-2
0
2
$\Delta\phi$ (Leading Jet, MET)

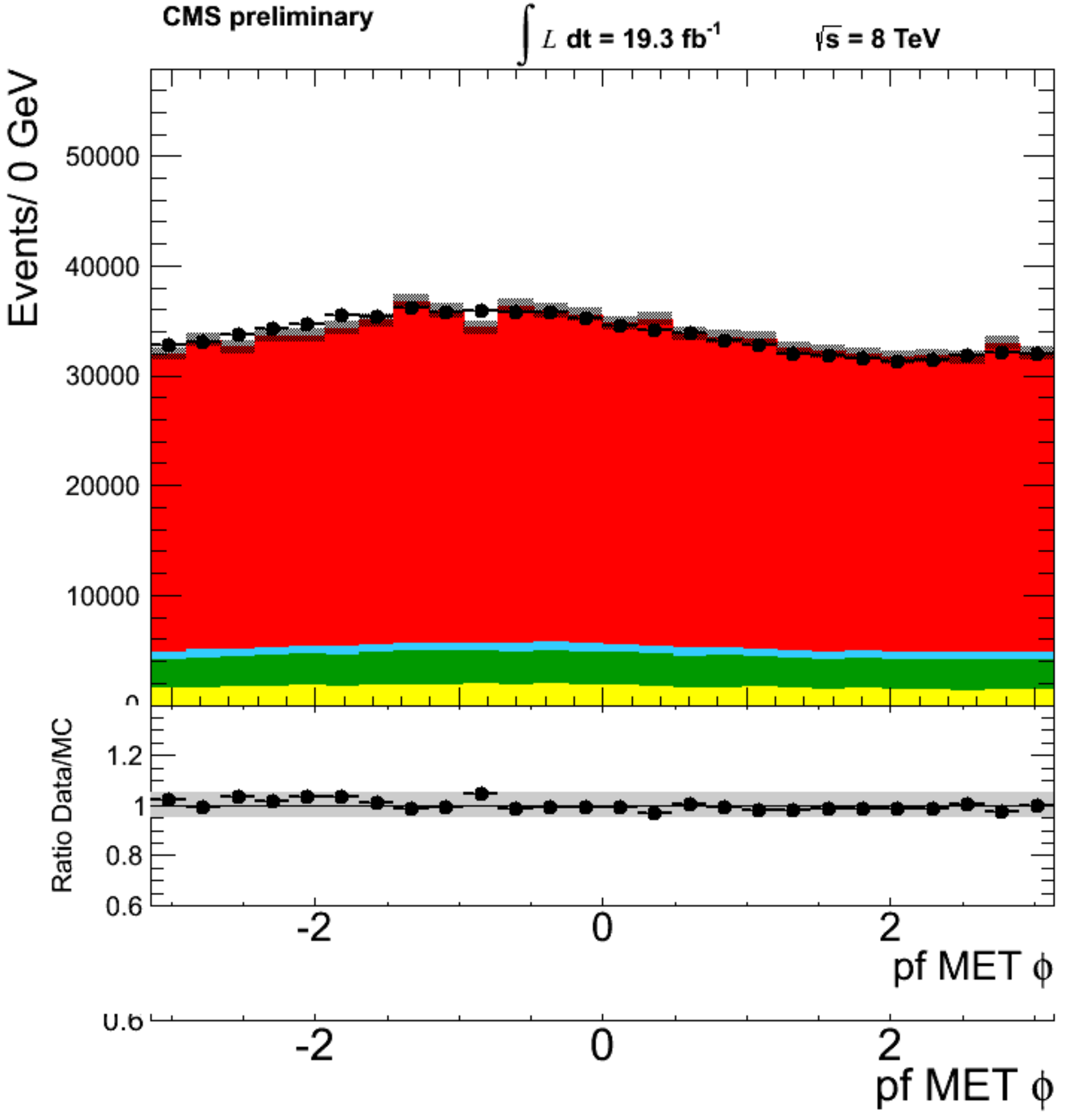

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
50
100
150
200
Dijet System p_T (GeV)
0.6
50
100
150
200
Dijet System p_T (GeV)

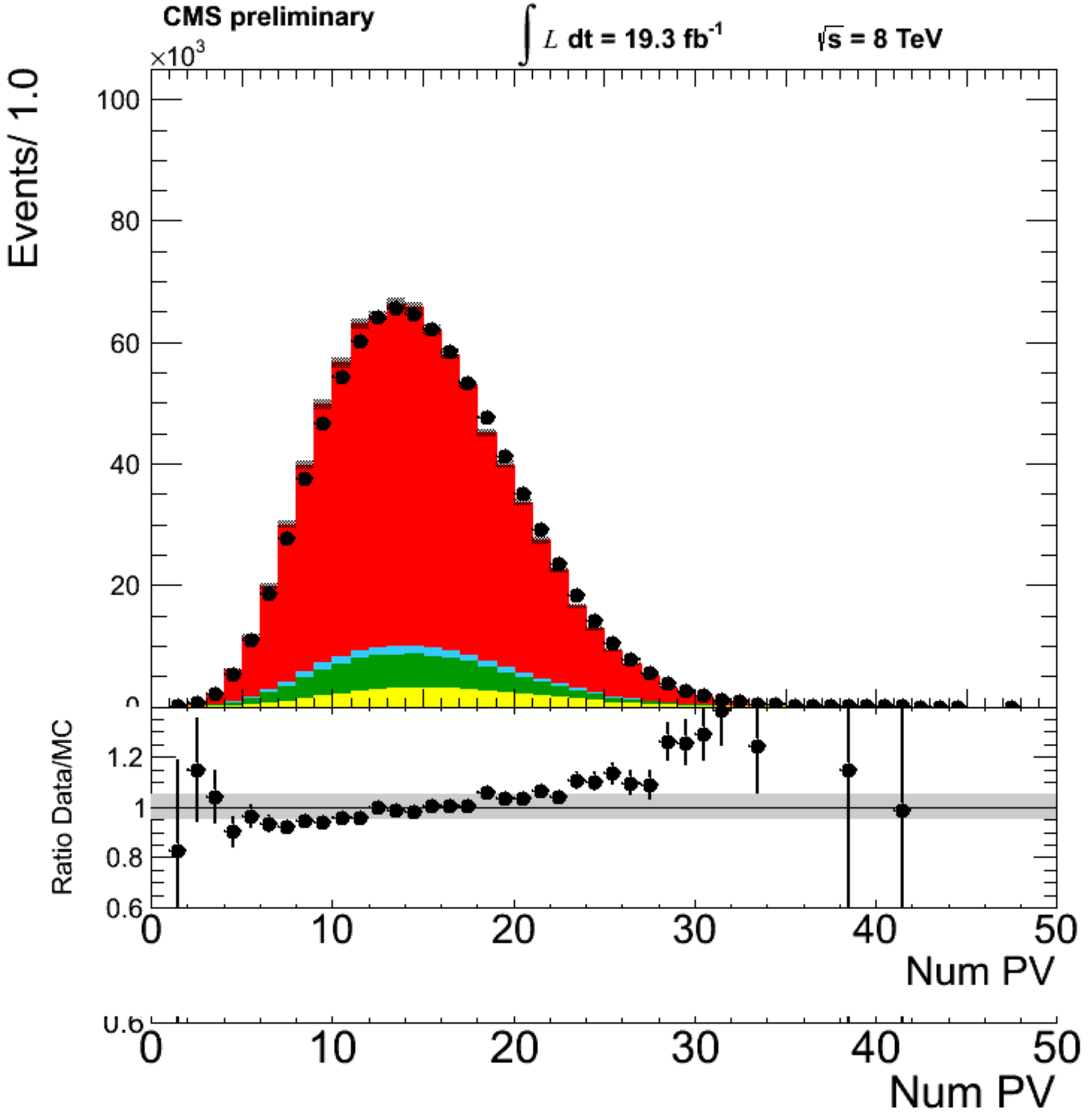

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 0.2
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
WW rapidity

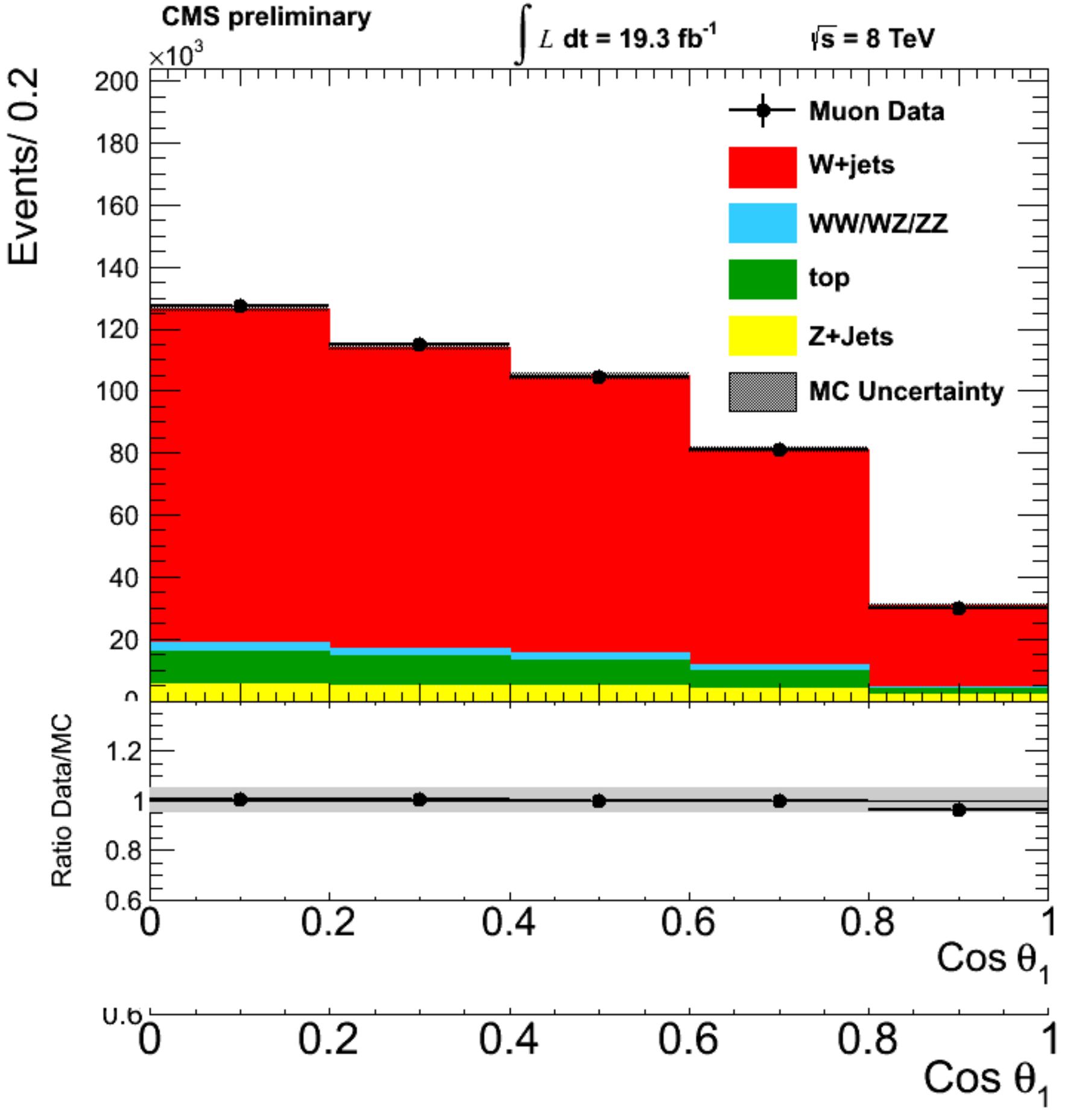

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 10 GeV
$\times 10^3$
400
350
300
250
200
150
100
50
0
Ratio Data/MC
1.2
1
0.8
0.6
50
100
150
MVA MET (GeV)
0.6
50
100
150
MVA MET (GeV)

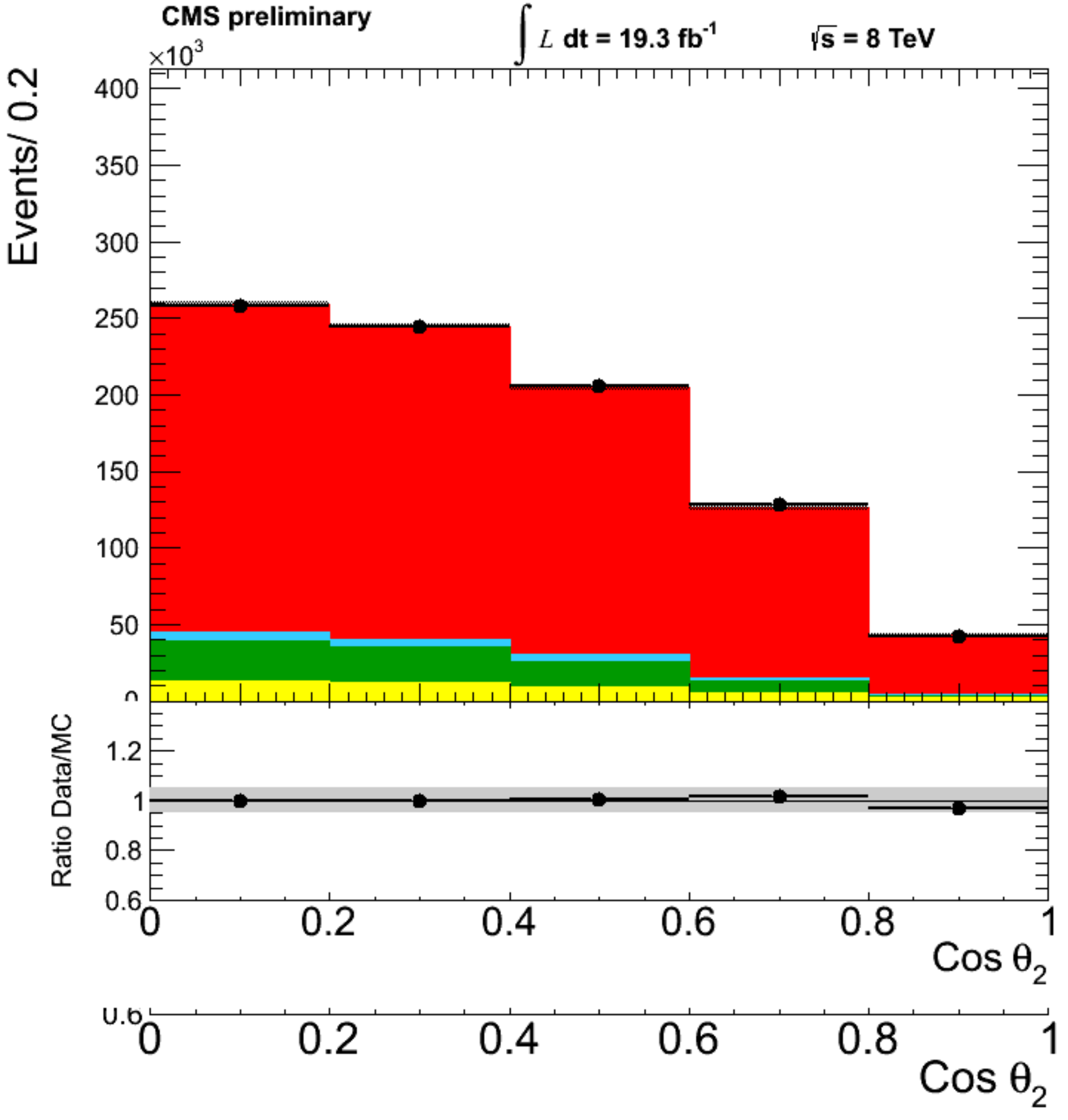

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0 GeV
60000
50000
40000
30000
20000
10000
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
MVA MET ϕ
0.6
-2
0
2
MVA MET ϕ

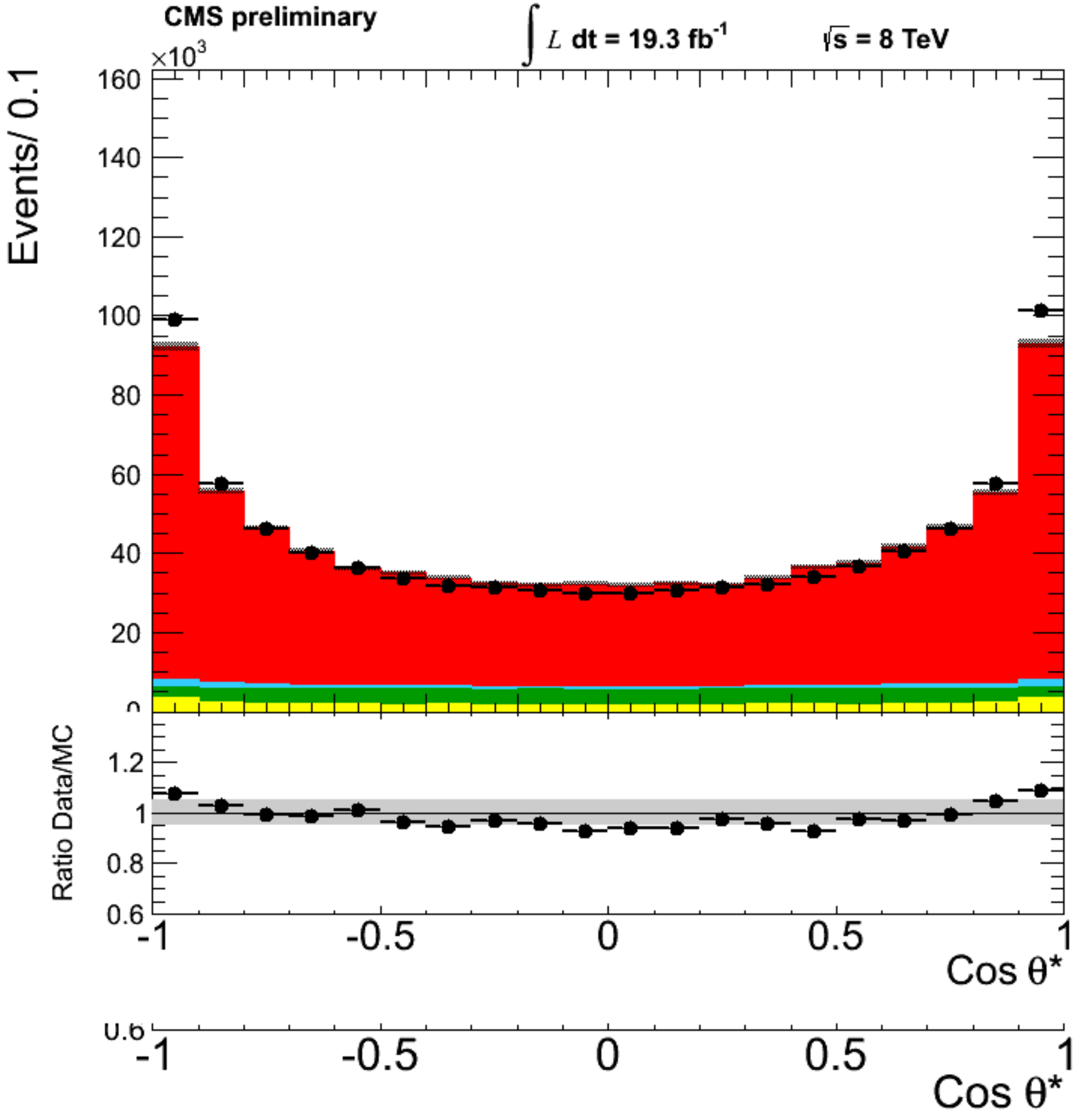

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
300
250
200
150
100
50
Ratio Data/MC
1.2
1
0.8
0.6
50
100
150
pf MET (GeV)
0.6
50
100
150
pf MET (GeV)

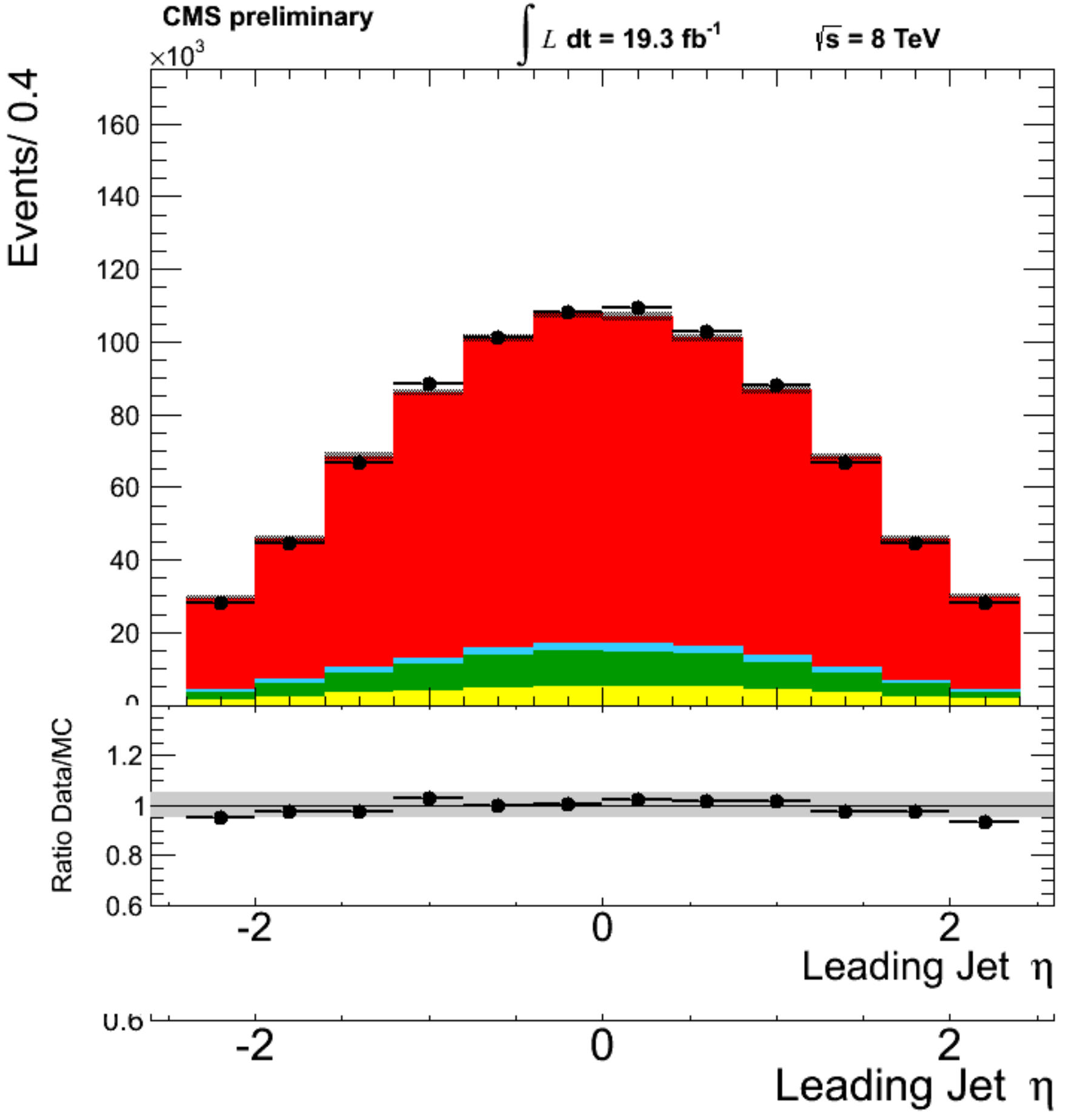

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0 GeV
50000
40000
30000
20000
10000
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
pf MET ϕ

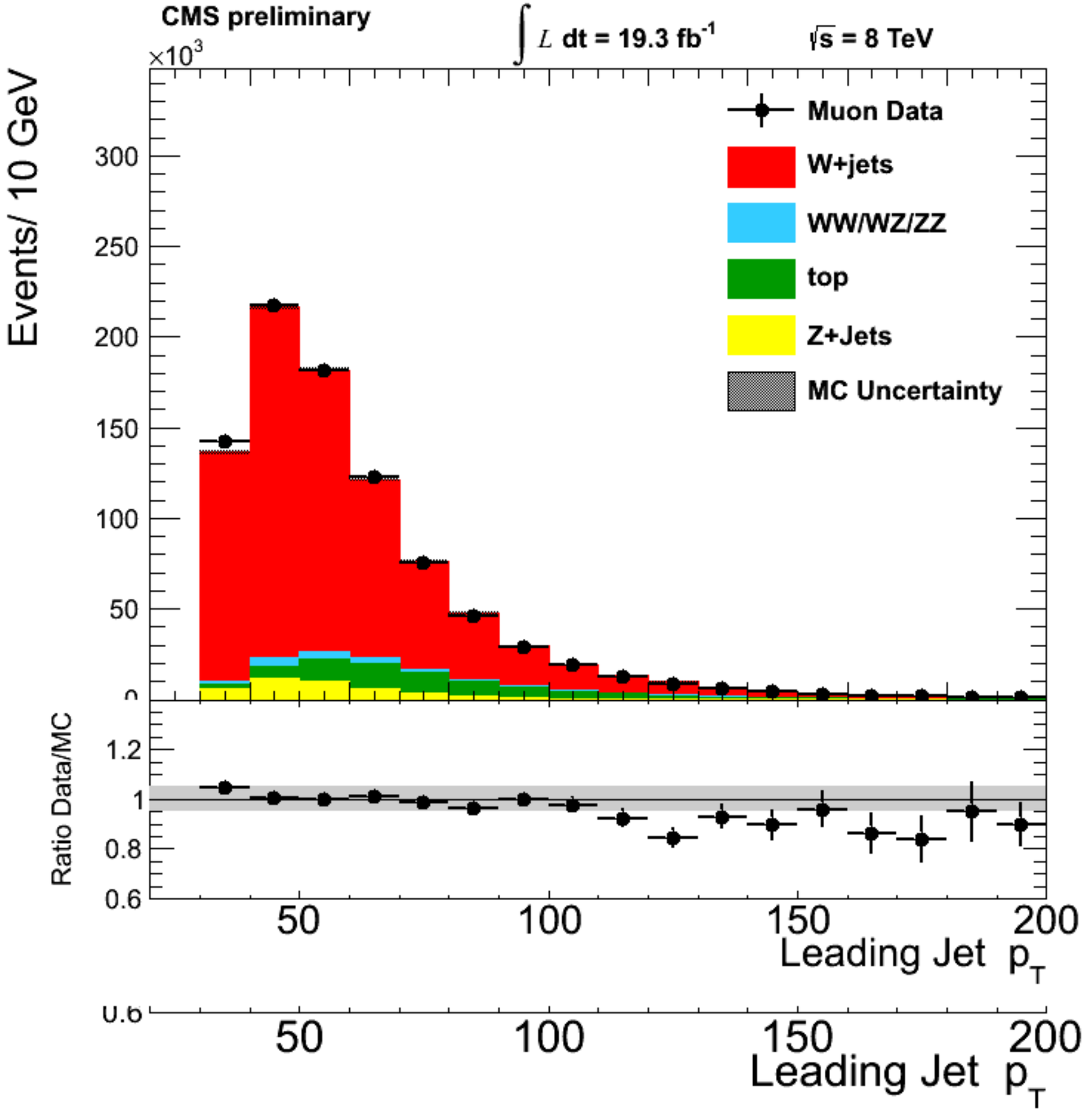

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 1.0
$\times 10^3$
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
0
10
20
30
40
50
Num PV

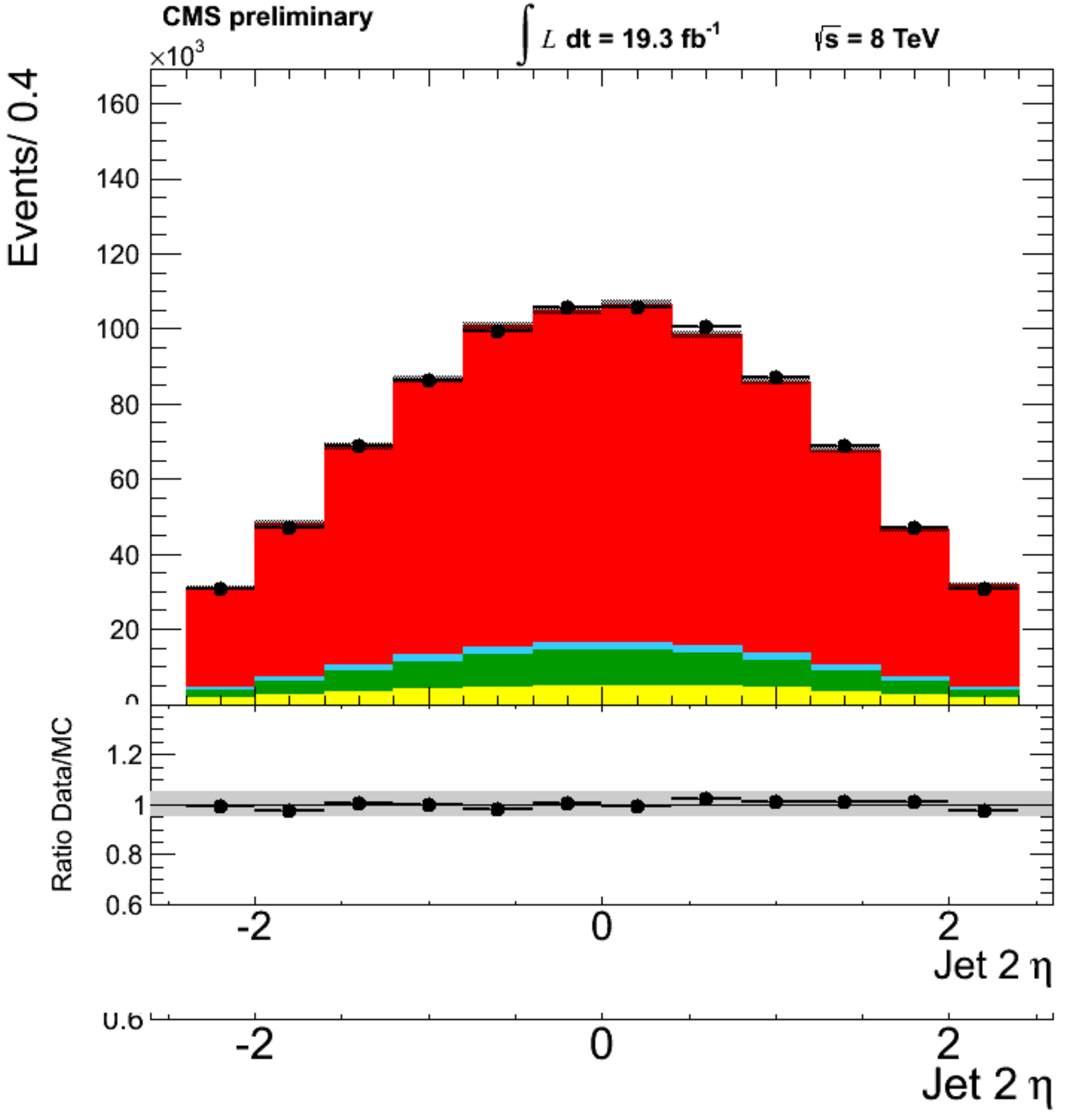

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s}$ = 8 TeV
Events/ 0.2
×10^3
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
Cos θ1
Cos θ1

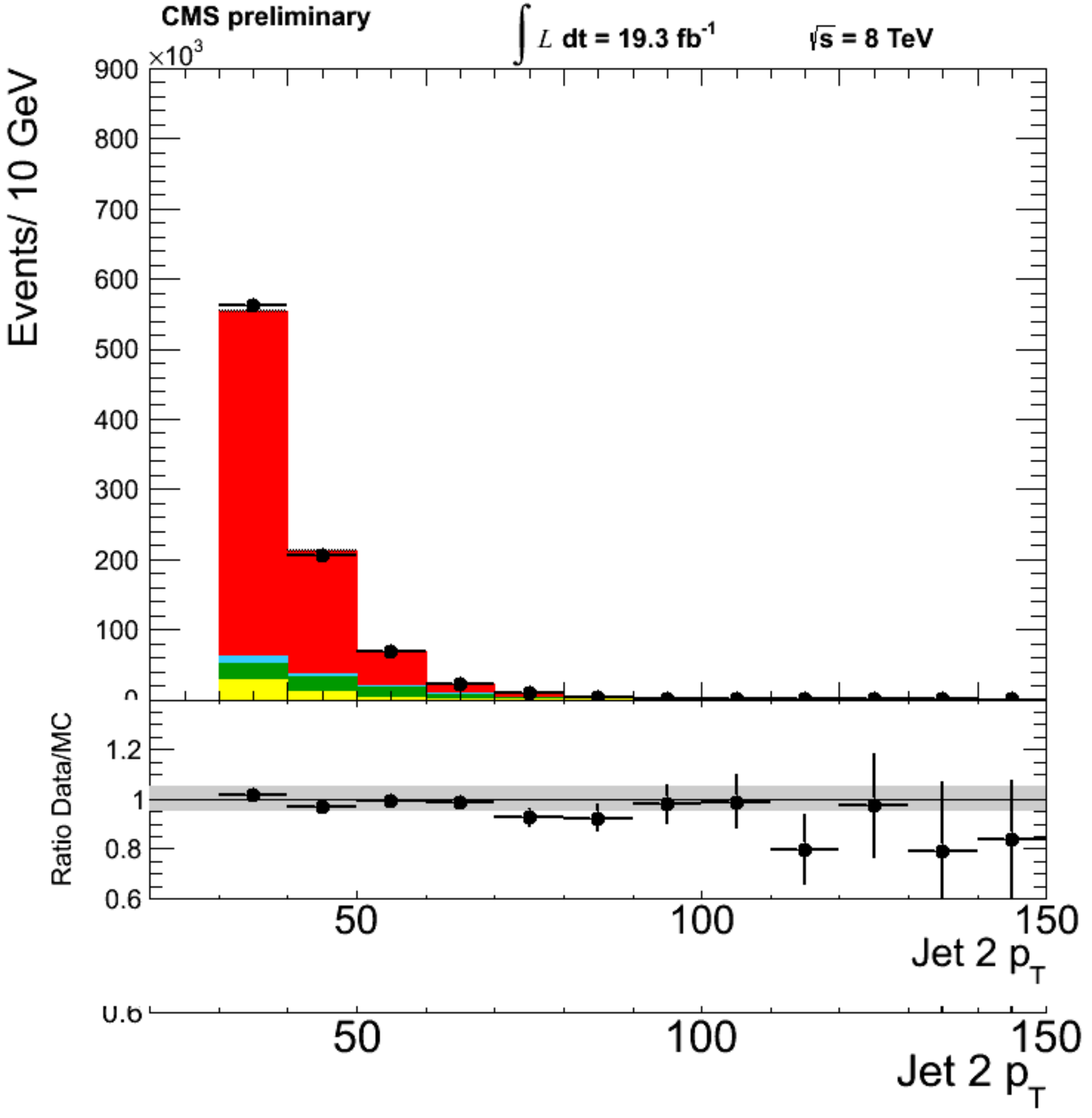

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 0.2
400
350
300
250
200
150
100
50
0
Ratio Data/MC
1.2
1
0.8
0.6
0
0.2
0.4
0.6
0.8
1
Cos θ_2

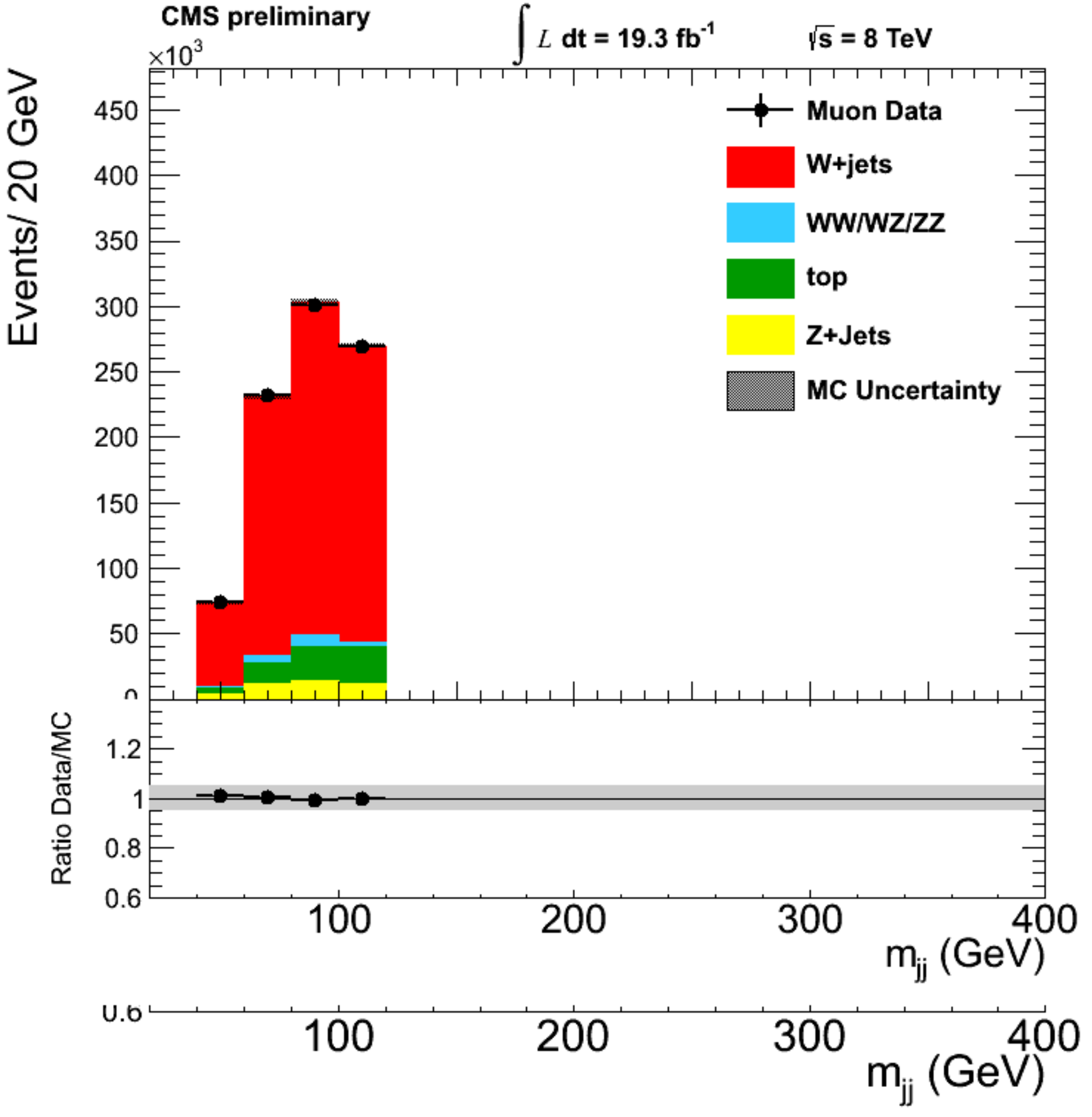

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.1
$\times 10^3$
160
140
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-1
-0.5
0
0.5
1
Cos θ*

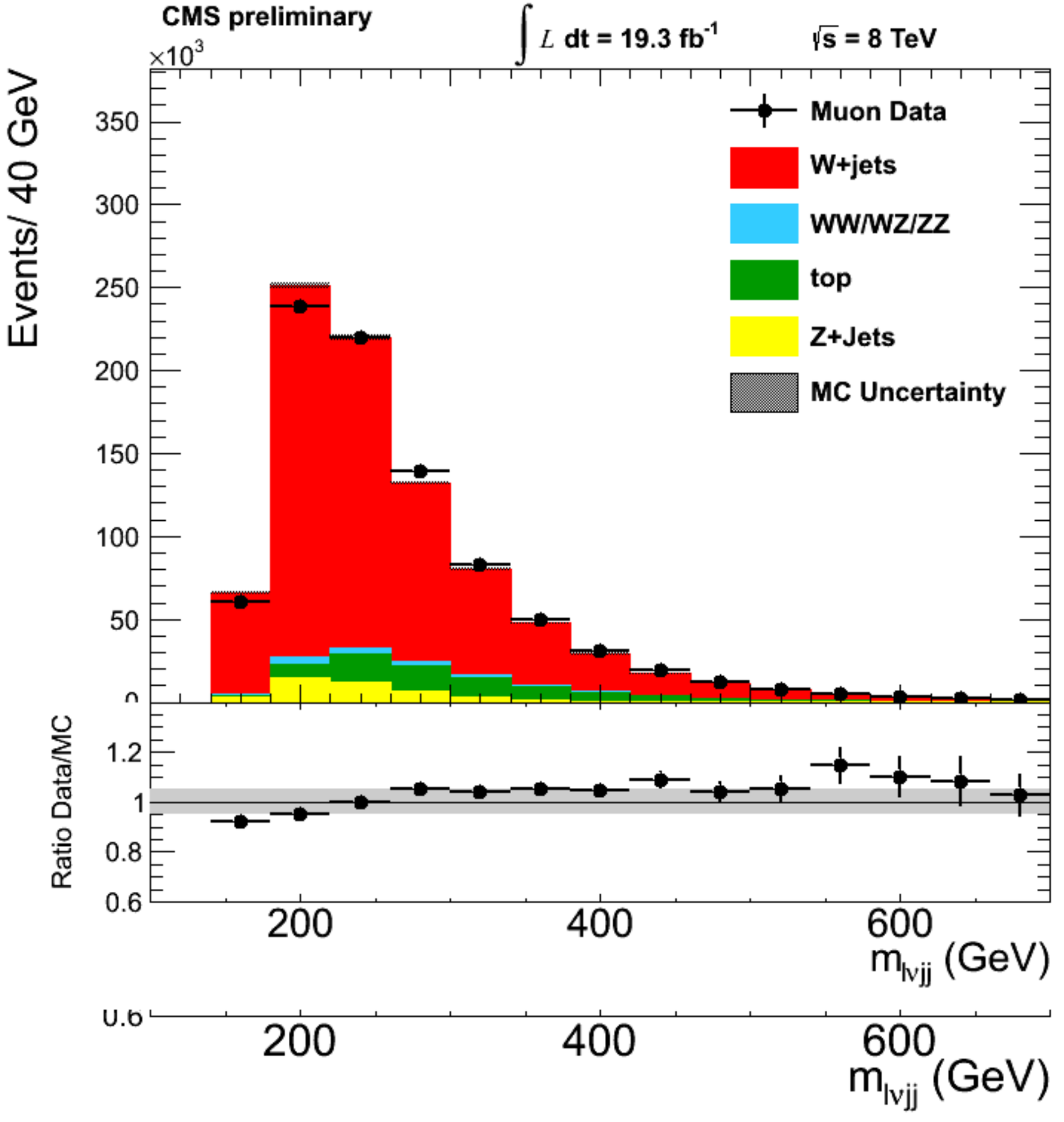

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 0.4
160
140
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
Leading Jet η
0.6
-2
0
2
Leading Jet η

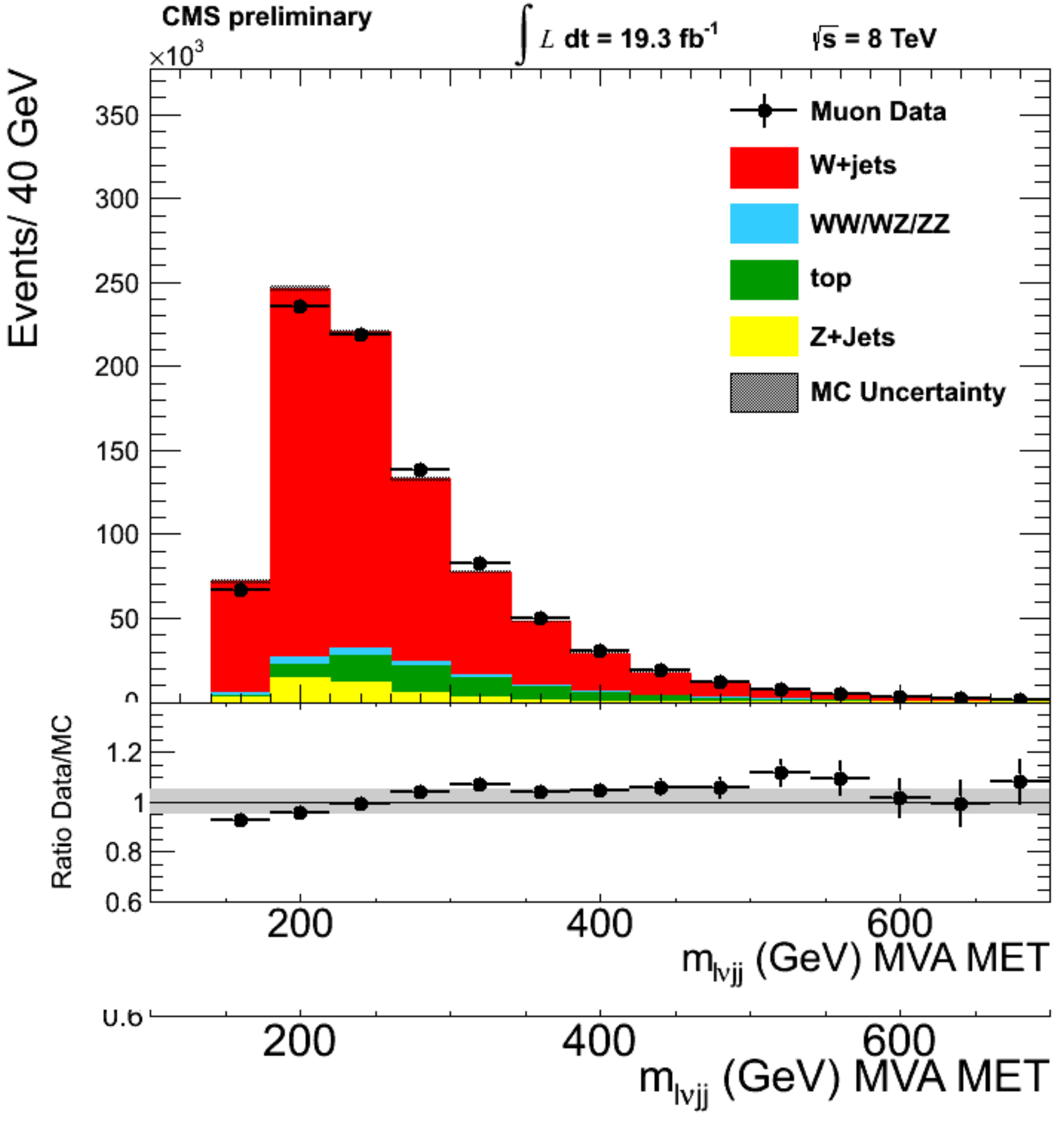

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
Leading Jet p_T
Leading Jet p_T

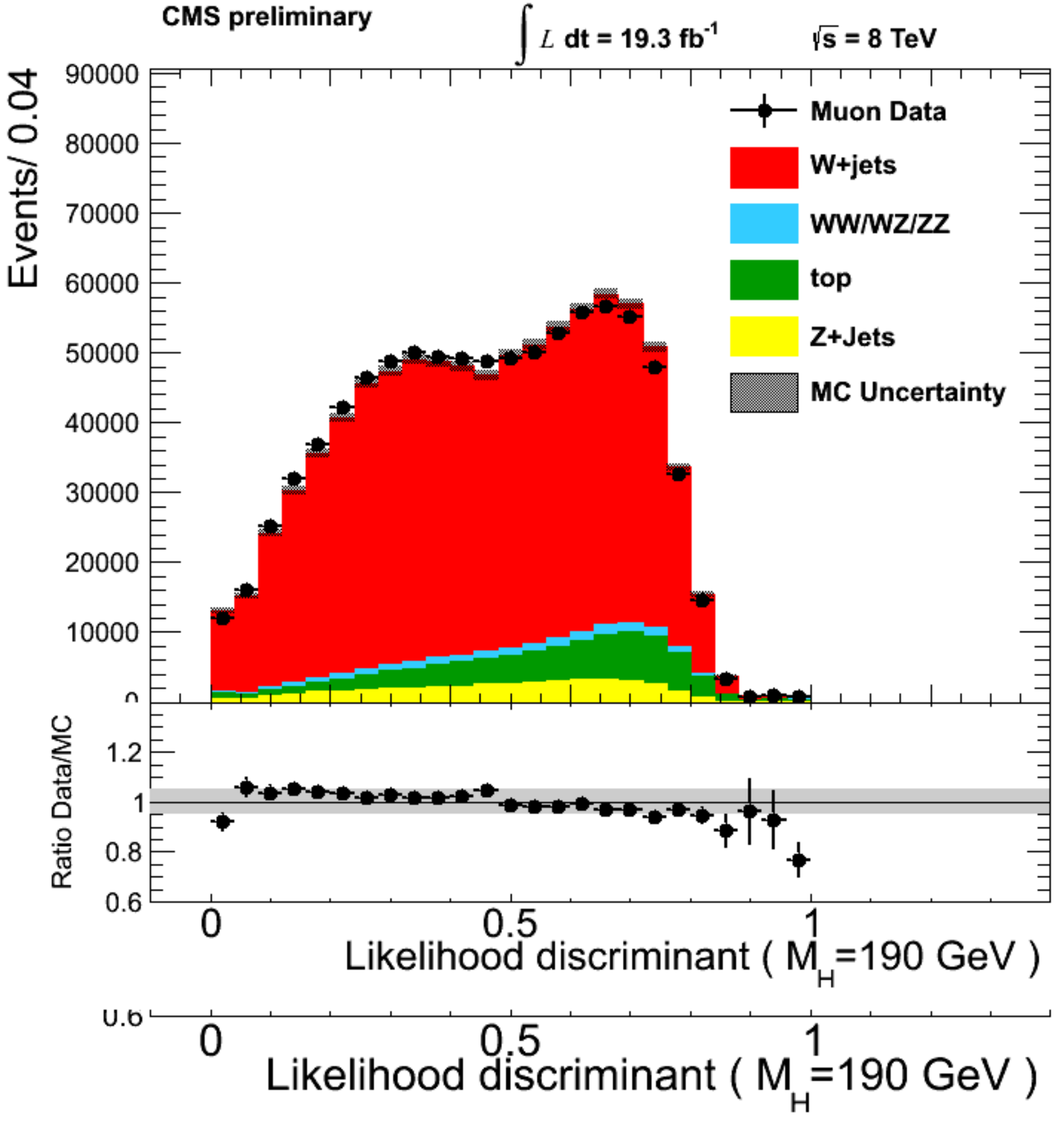

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 0.4
160
140
120
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
Jet 2 η
0.6
-2
0
2
Jet 2 η

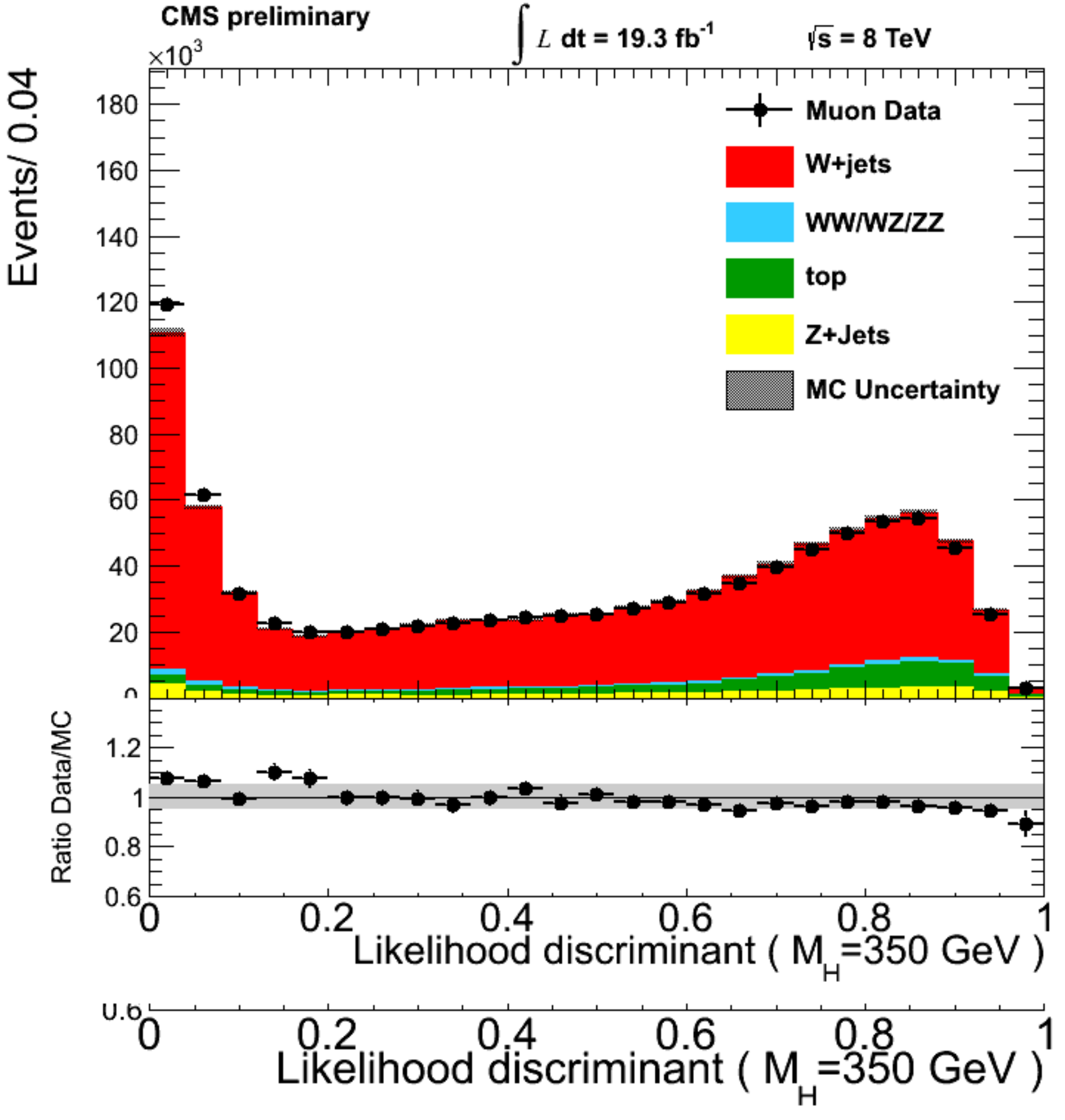

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 10 GeV
$\times 10^3$
900
800
700
600
500
400
300
200
100
0
Ratio Data/MC
1.2
1
0.8
0.6
50
100
150
Jet 2 p_T
0.6
50
100
150
Jet 2 p_T

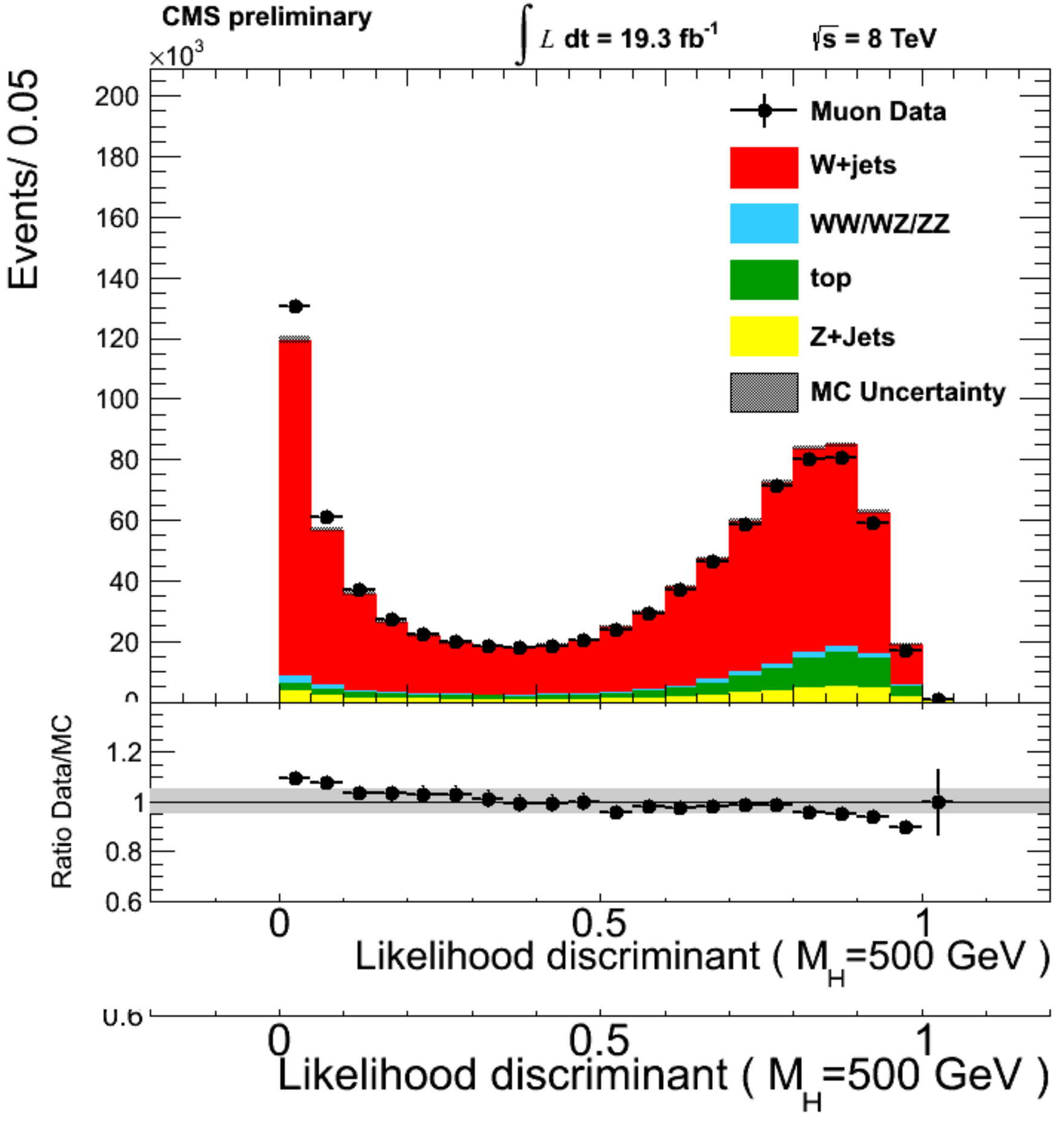

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 20 GeV
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
m_{jj} (GeV)

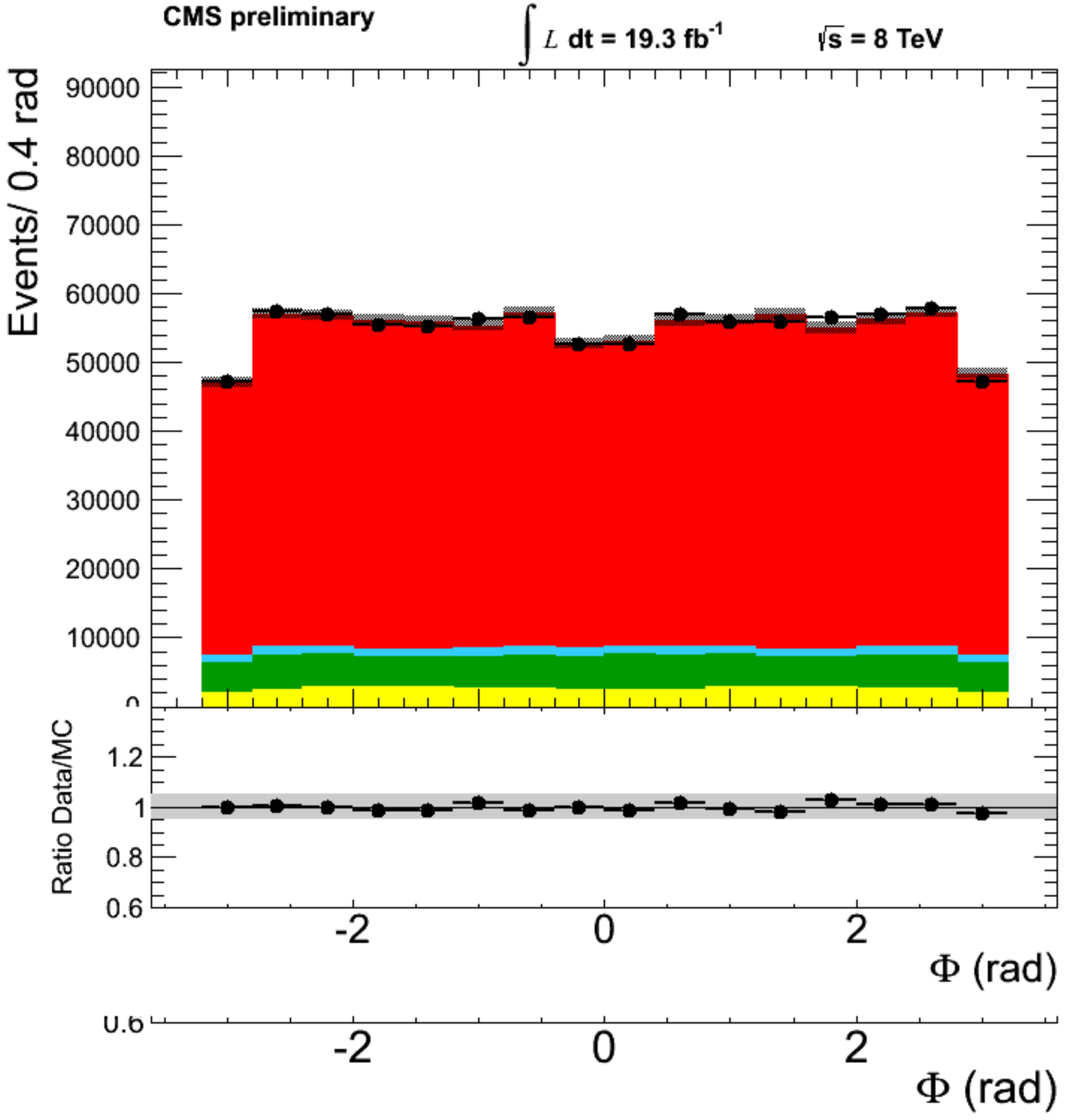

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 40 GeV
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
$m_{l\nu jj}$ (GeV)

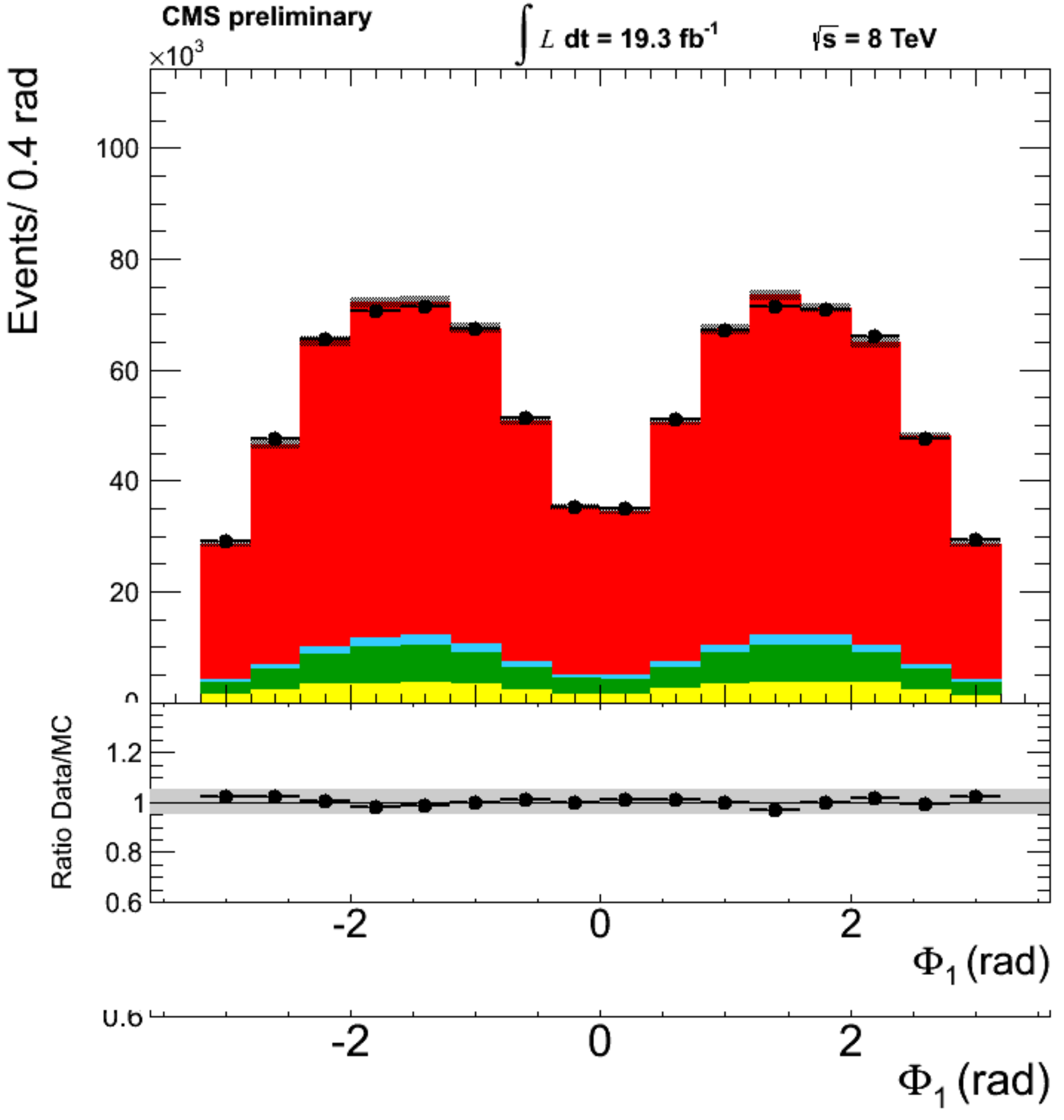

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s}$ = 8 TeV
Events/ 40 GeV
×10^3
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
$m_{l\nu jj}$ (GeV) MVA MET

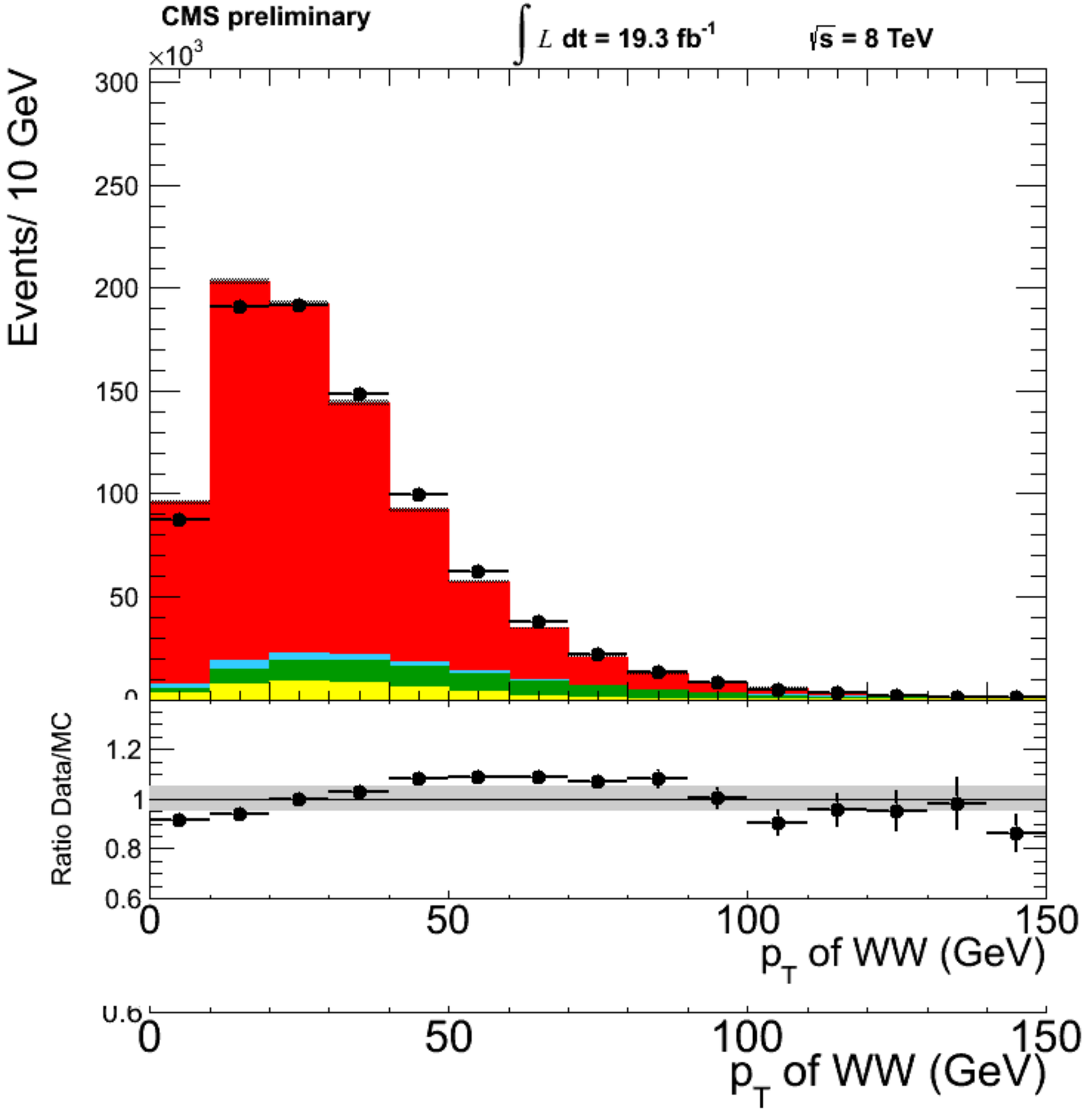

CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.04
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
Likelihood discriminant (M_H=190 GeV)


CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.04
$\times 10^3$
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
Likelihood discriminant (M_H=350 GeV)
Likelihood discriminant (M_H=350 GeV)


CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s}$ = 8 TeV
Events/ 0.05
×10³
Muon Data
W+jets
WW/WZ/ZZ
top
Z+Jets
MC Uncertainty
Ratio Data/MC
Likelihood discriminant (M_H=500 GeV)


CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
Events/ 0.4 rad
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
Φ (rad)
0.6
-2
0
2
Φ (rad)


CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 0.4 rad
100
80
60
40
20
0
Ratio Data/MC
1.2
1
0.8
0.6
-2
0
2
Φ_1 (rad)
0.6
-2
0
2
Φ_1 (rad)


CMS preliminary
$\int L\,dt = 19.3\ fb^{-1}$
$\sqrt{s} = 8$ TeV
$\times 10^3$
Events/ 10 GeV
300
250
200
150
100
50
0
Ratio Data/MC
1.2
1
0.8
0.6
0
50
100
150
p_T of WW (GeV)
0.6
0
50
100
150
p_T of WW (GeV)