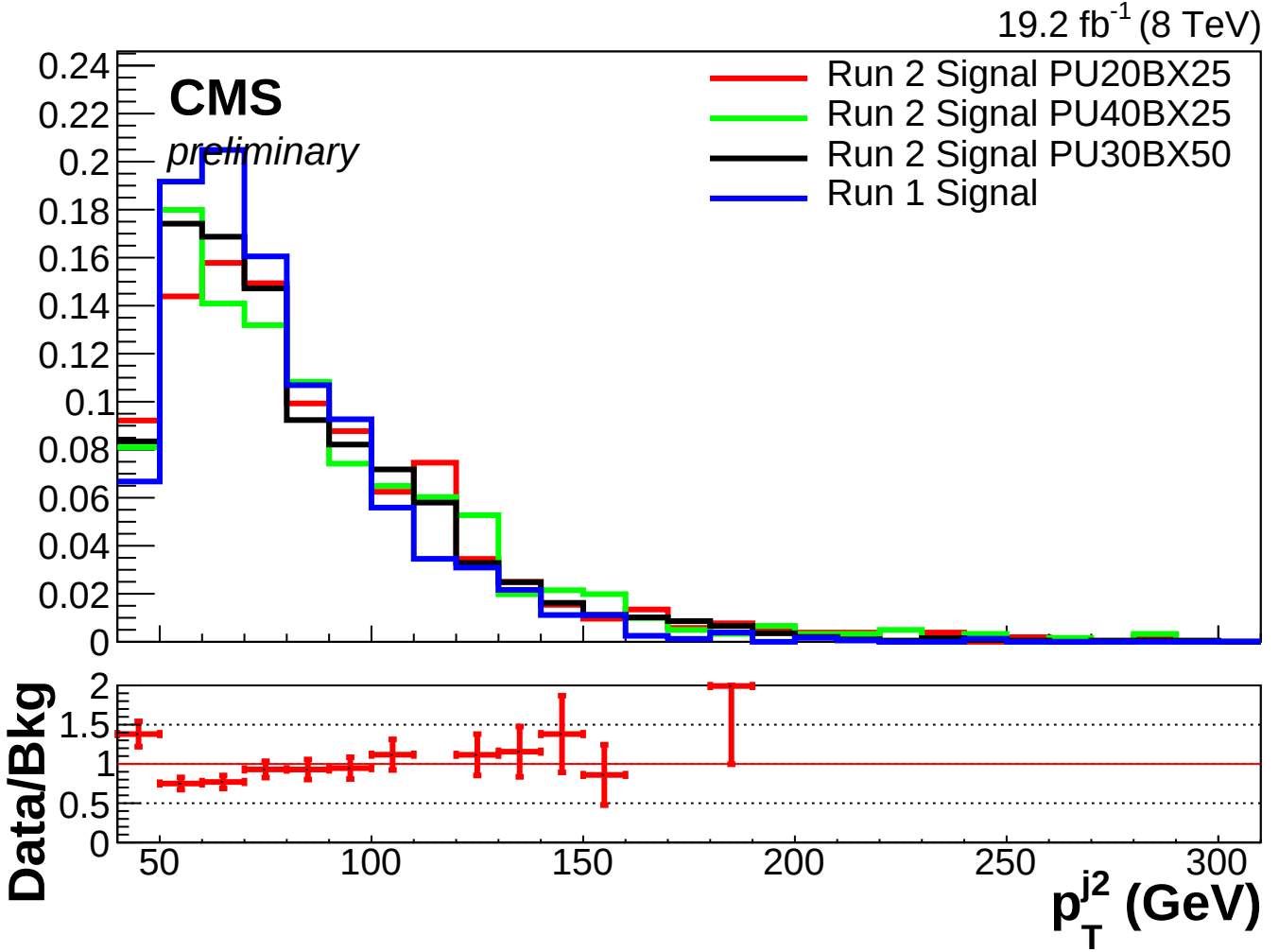
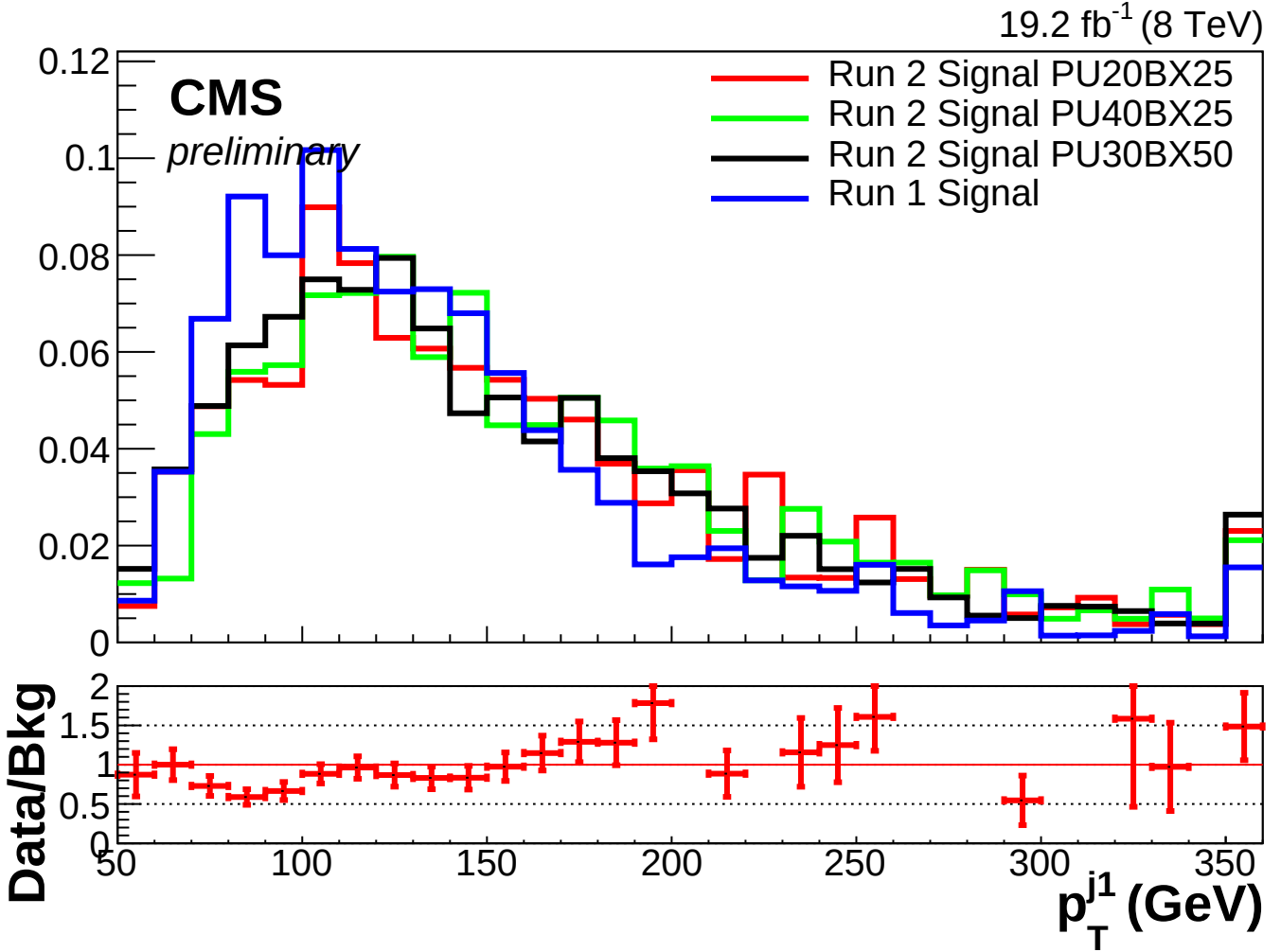
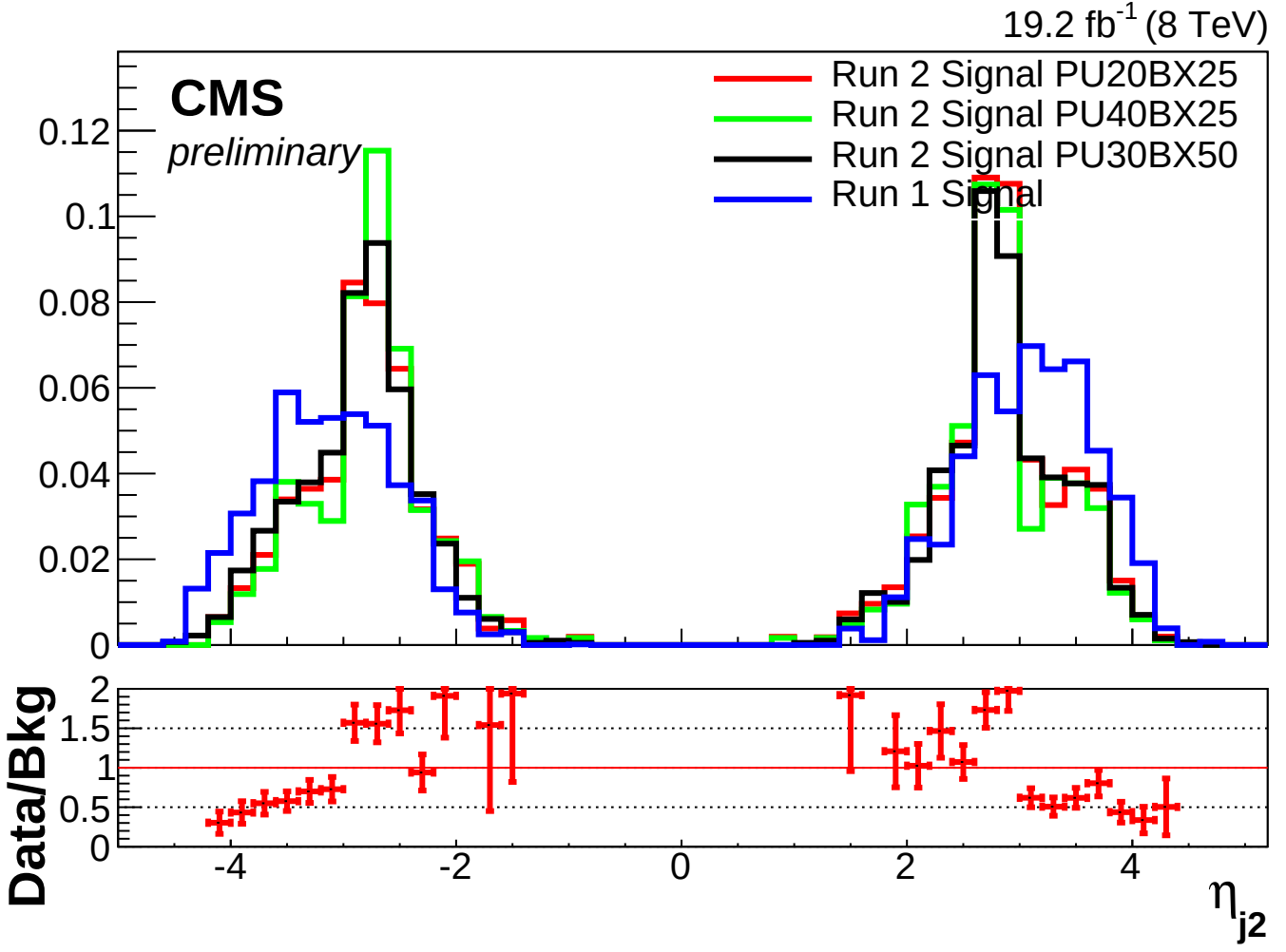
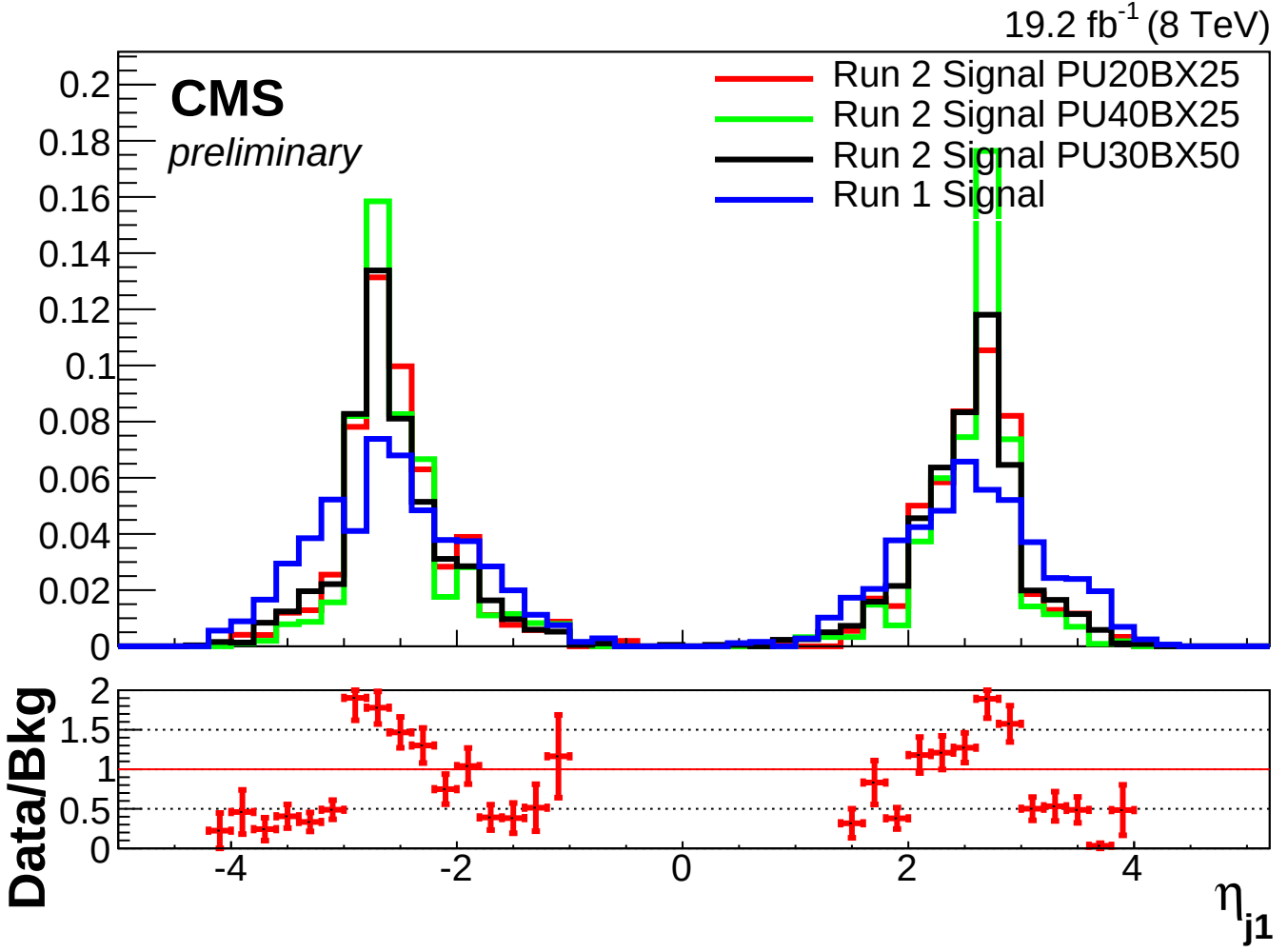
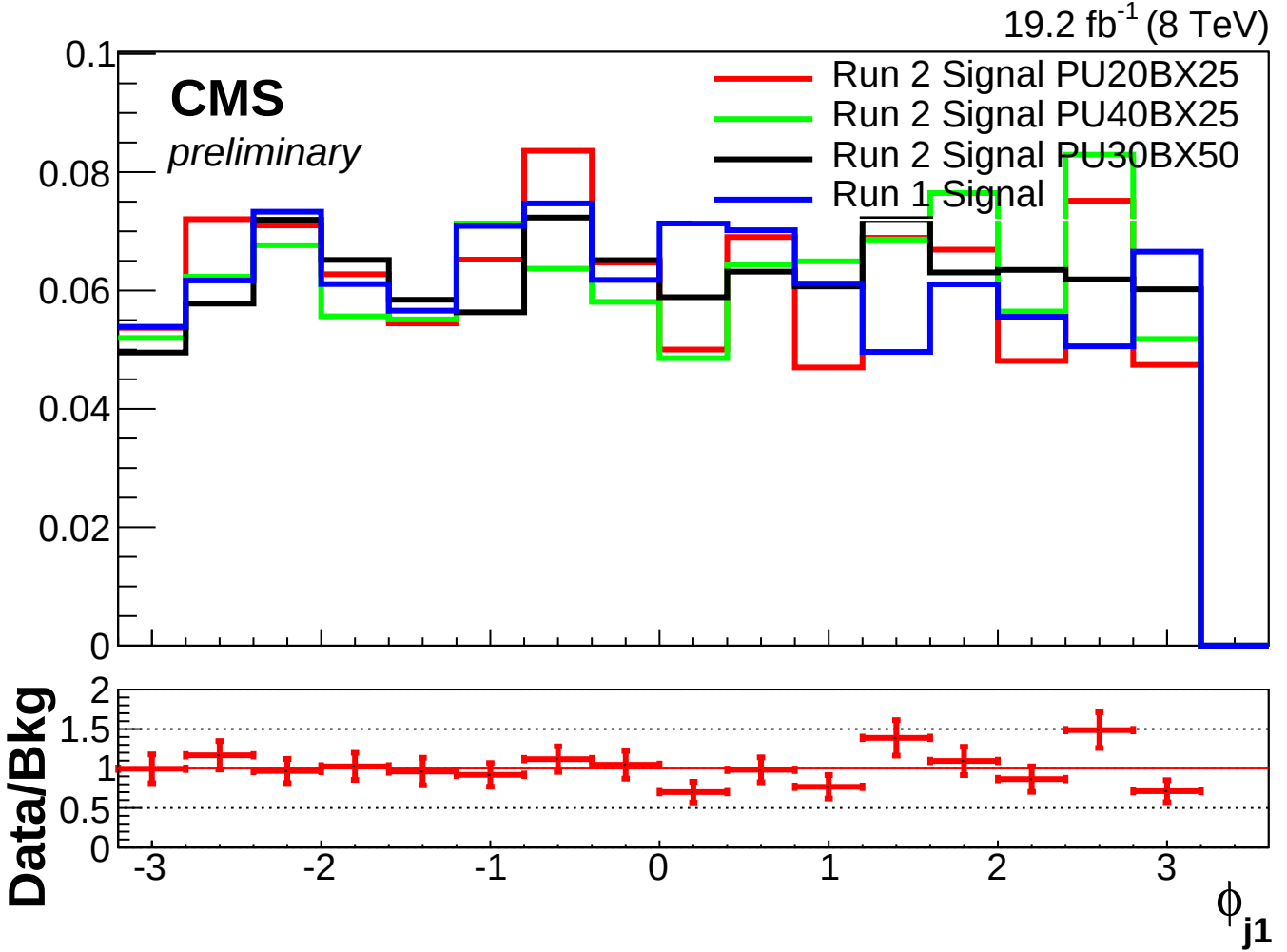
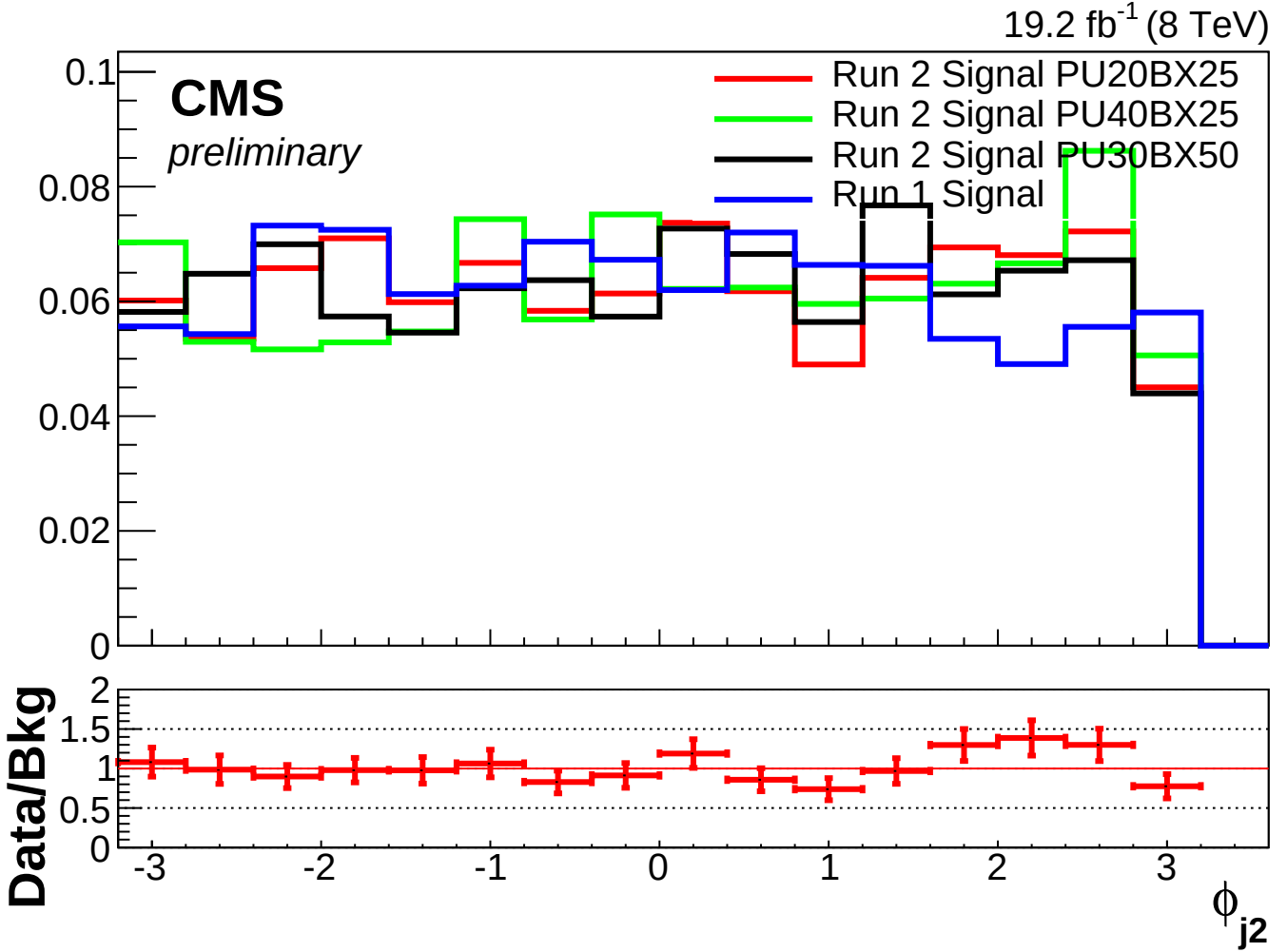

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
50
100
150
200
250
300
pTj2 (GeV)

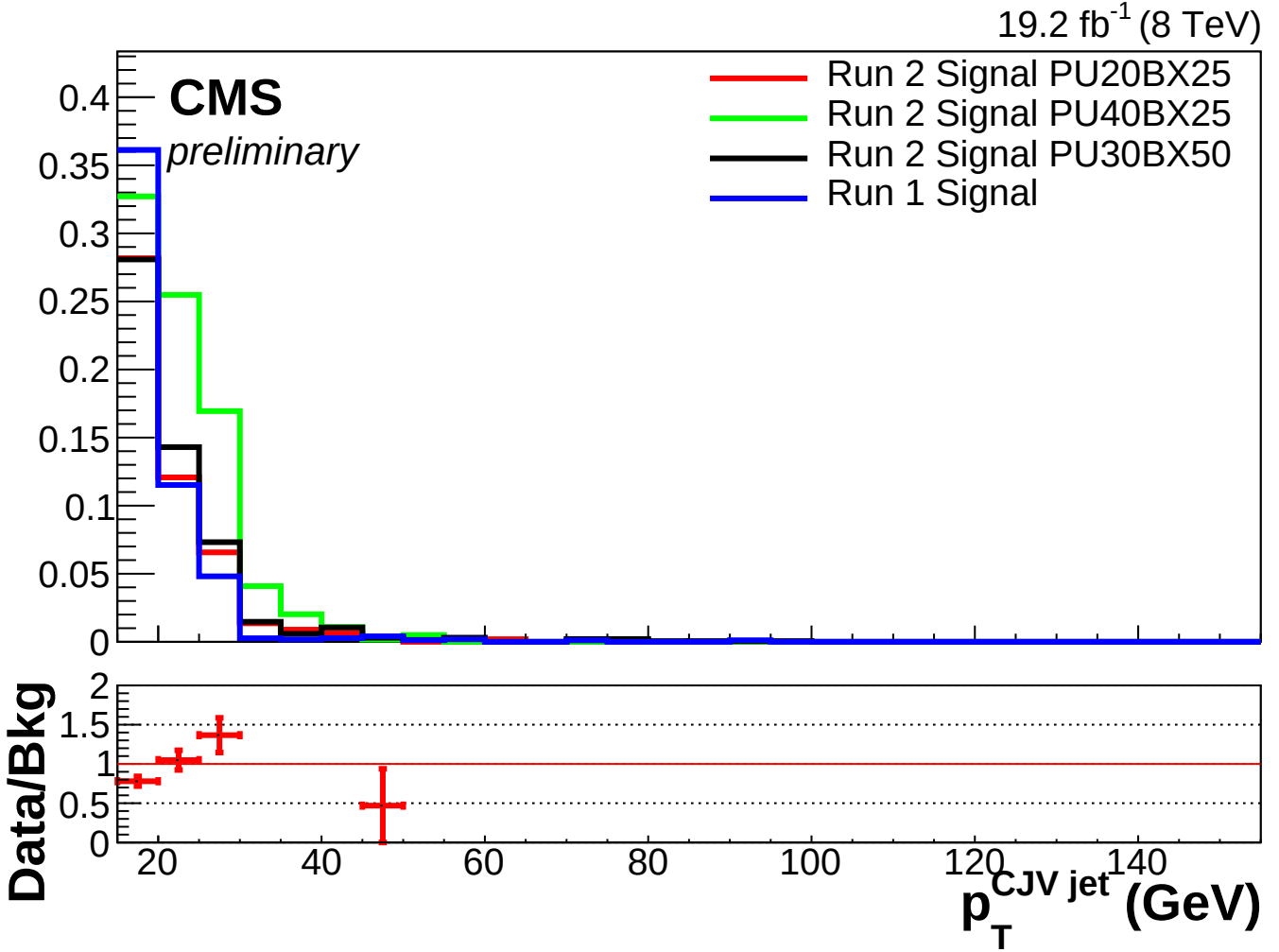

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
50
100
150
200
250
300
350
pT j1 (GeV)

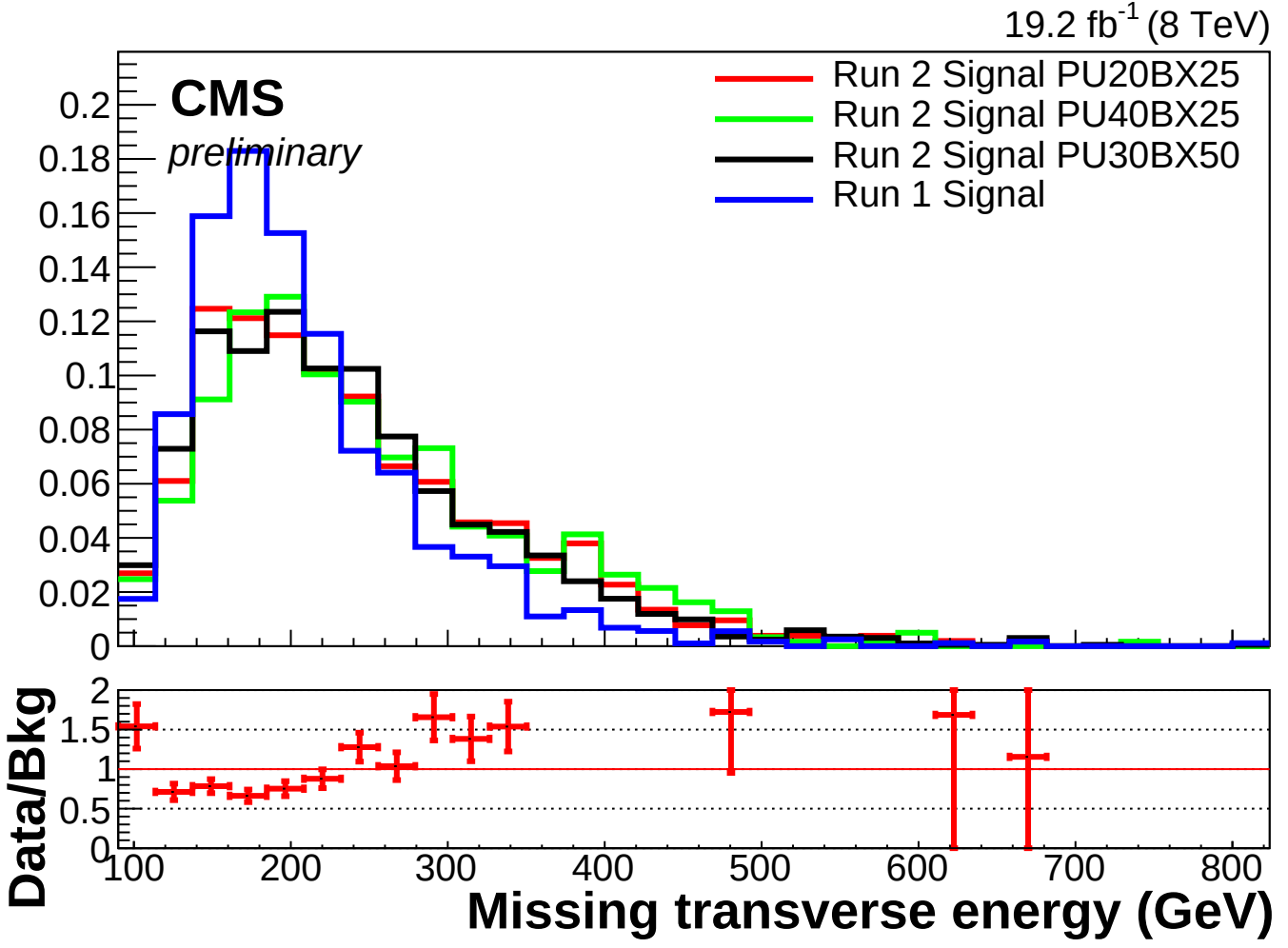

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
-4
-2
0
2
4
ηj2

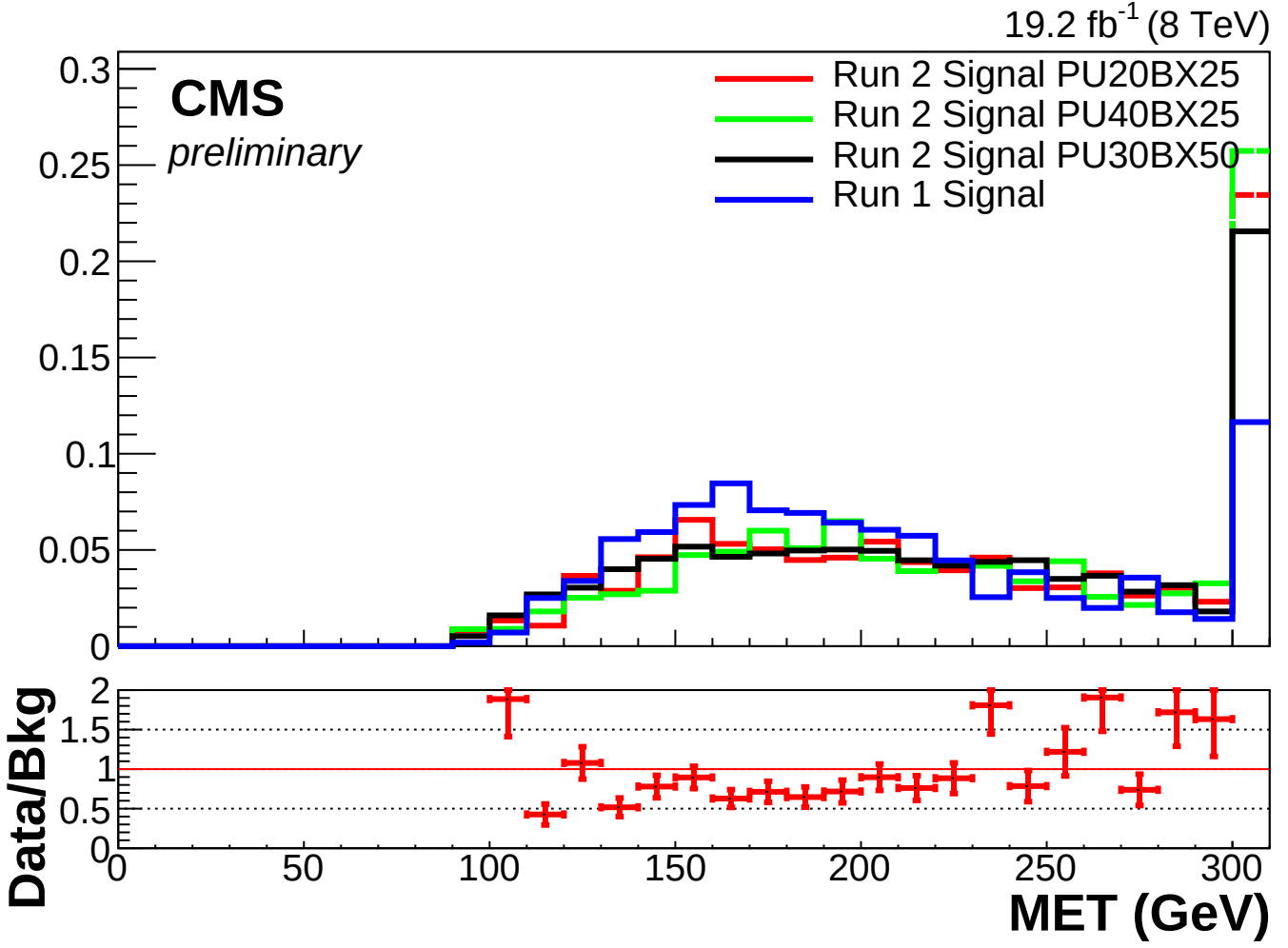

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
-4
-2
0
2
4
ηj1

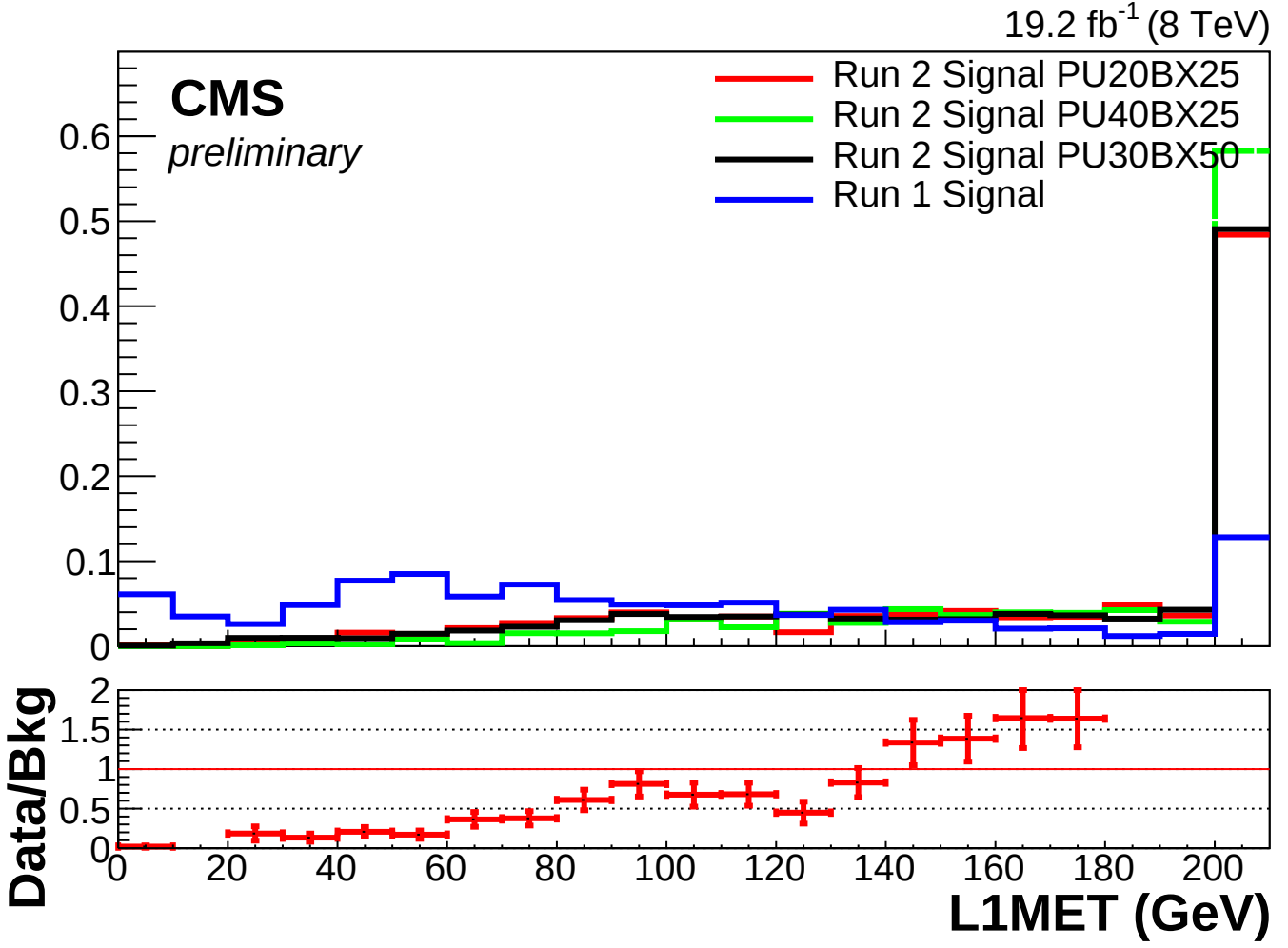

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
-3
-2
-1
0
1
2
3
ϕj1

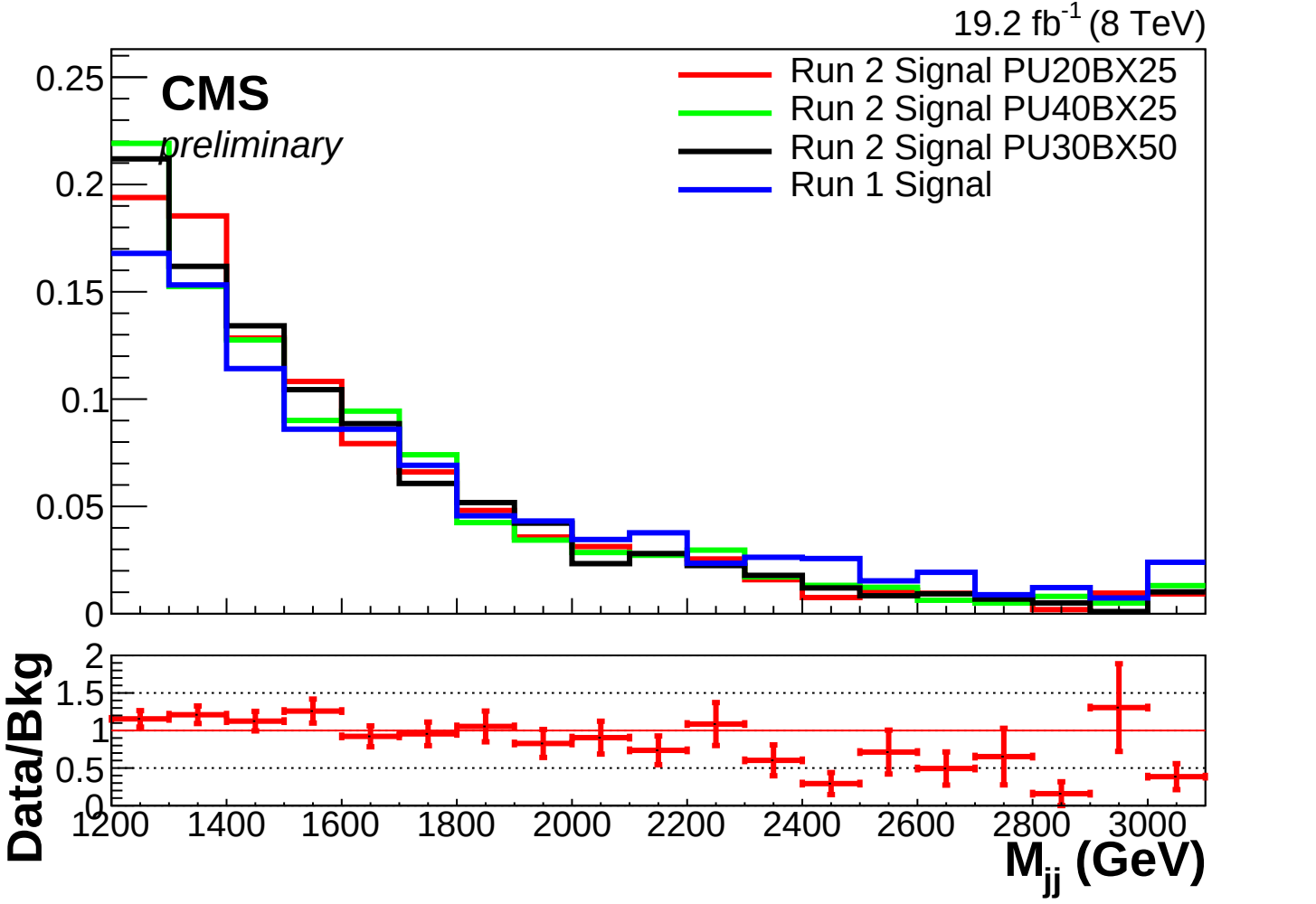

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
-3
-2
-1
0
1
2
3
ϕj2

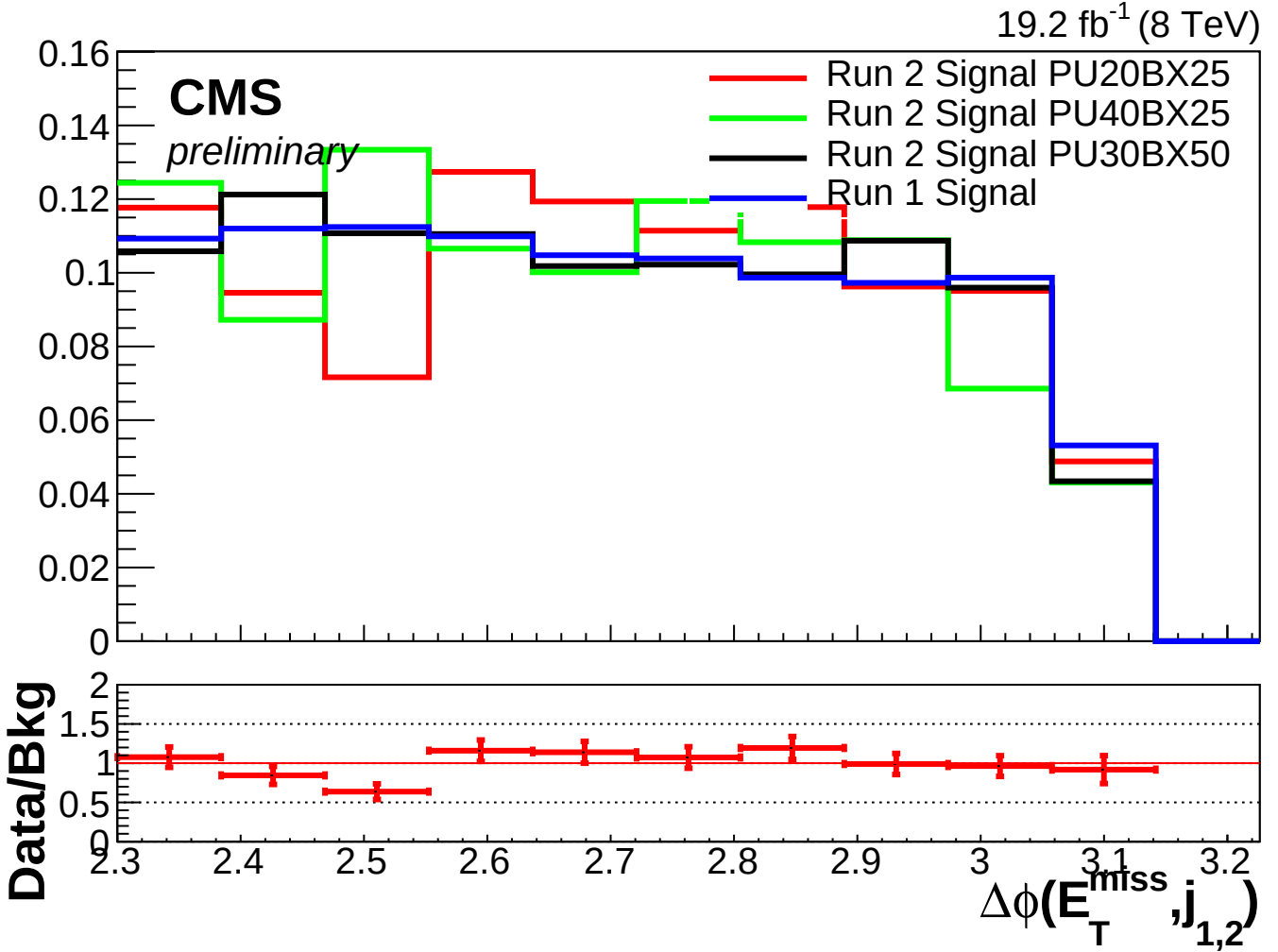

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
20
40
60
80
100
120
140
p_T^CJV jet (GeV)

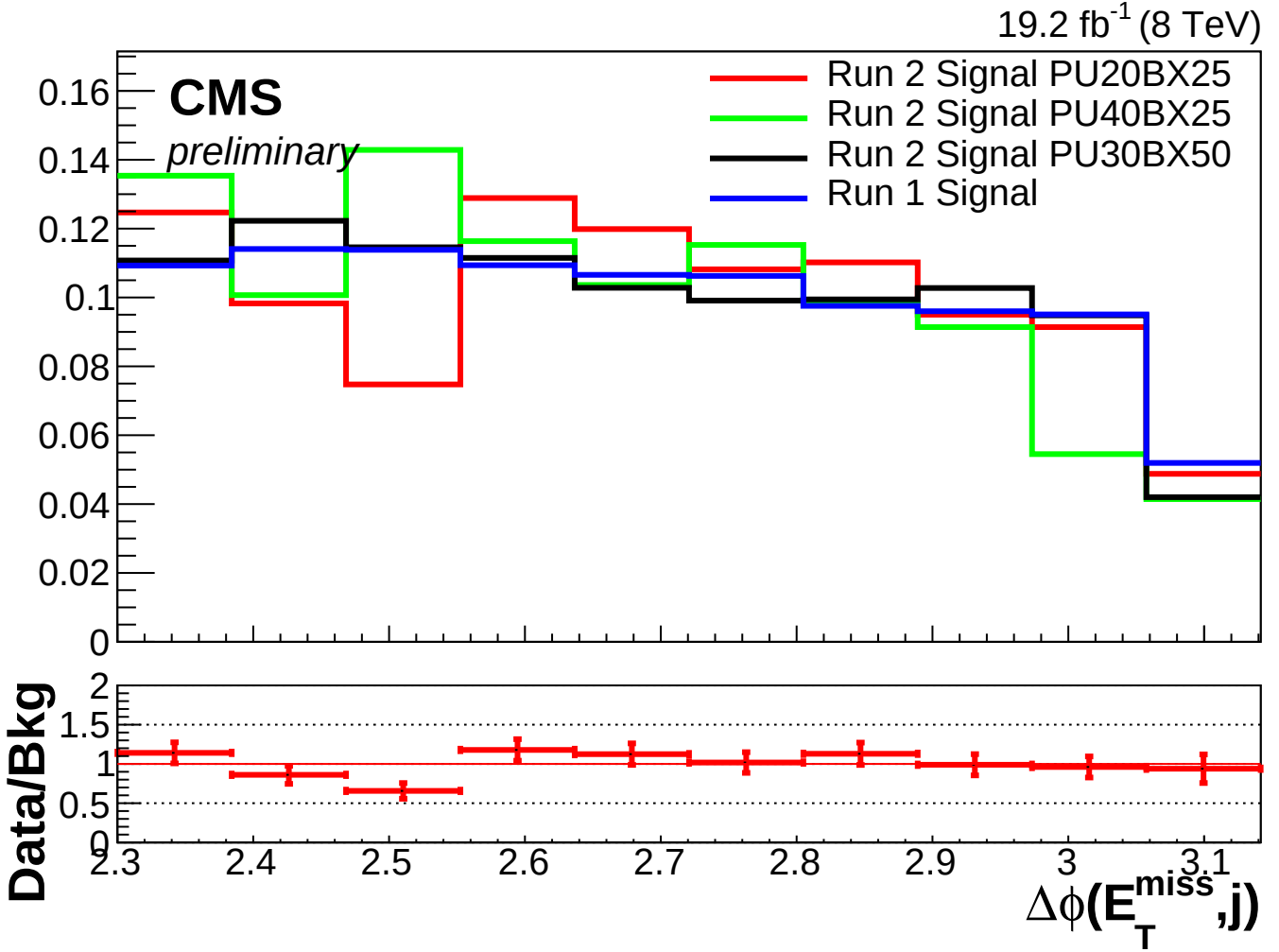

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
100
200
300
400
500
600
700
800
Missing transverse energy (GeV)

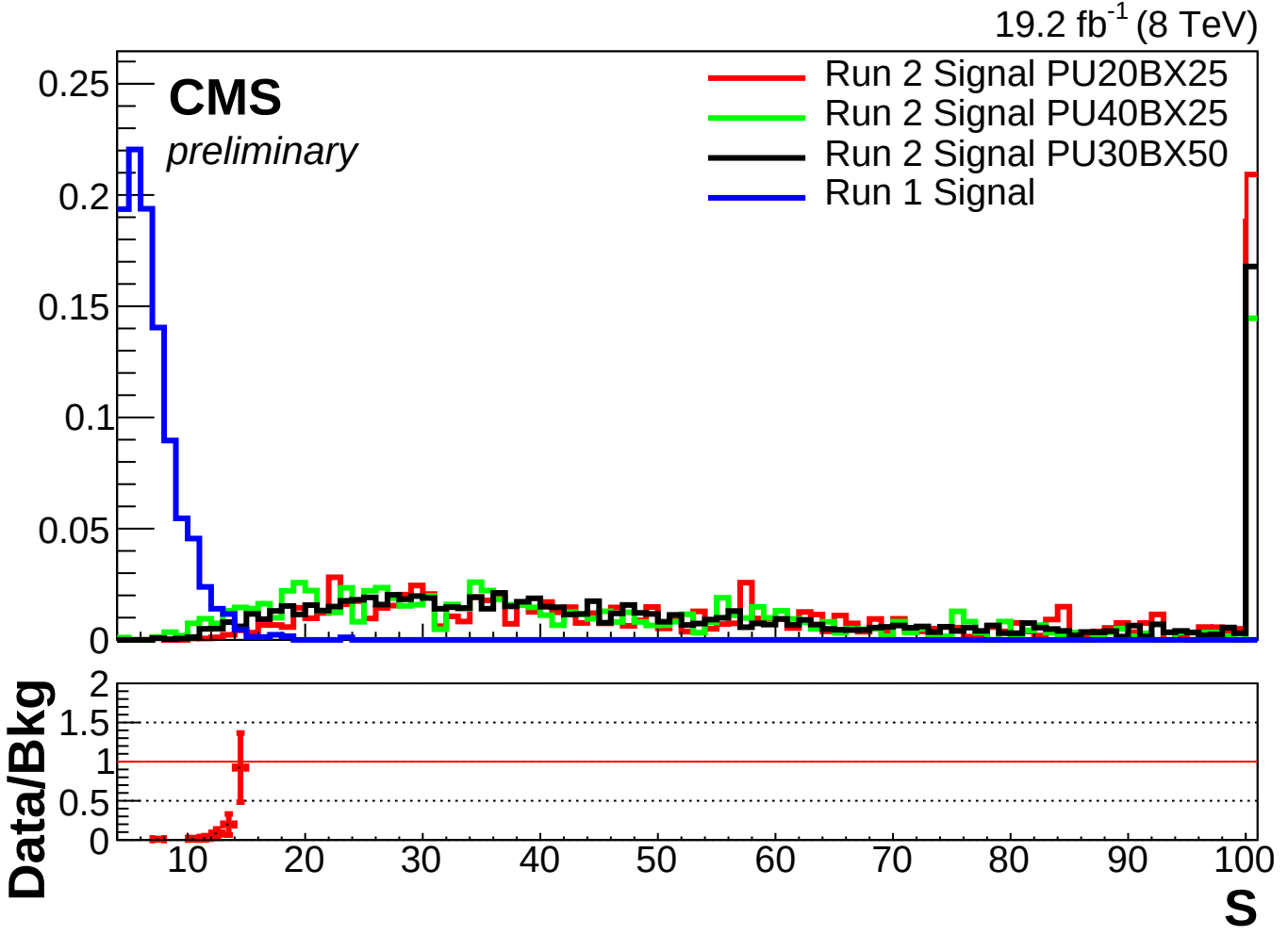

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.3
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
0
50
100
150
200
250
300
MET (GeV)

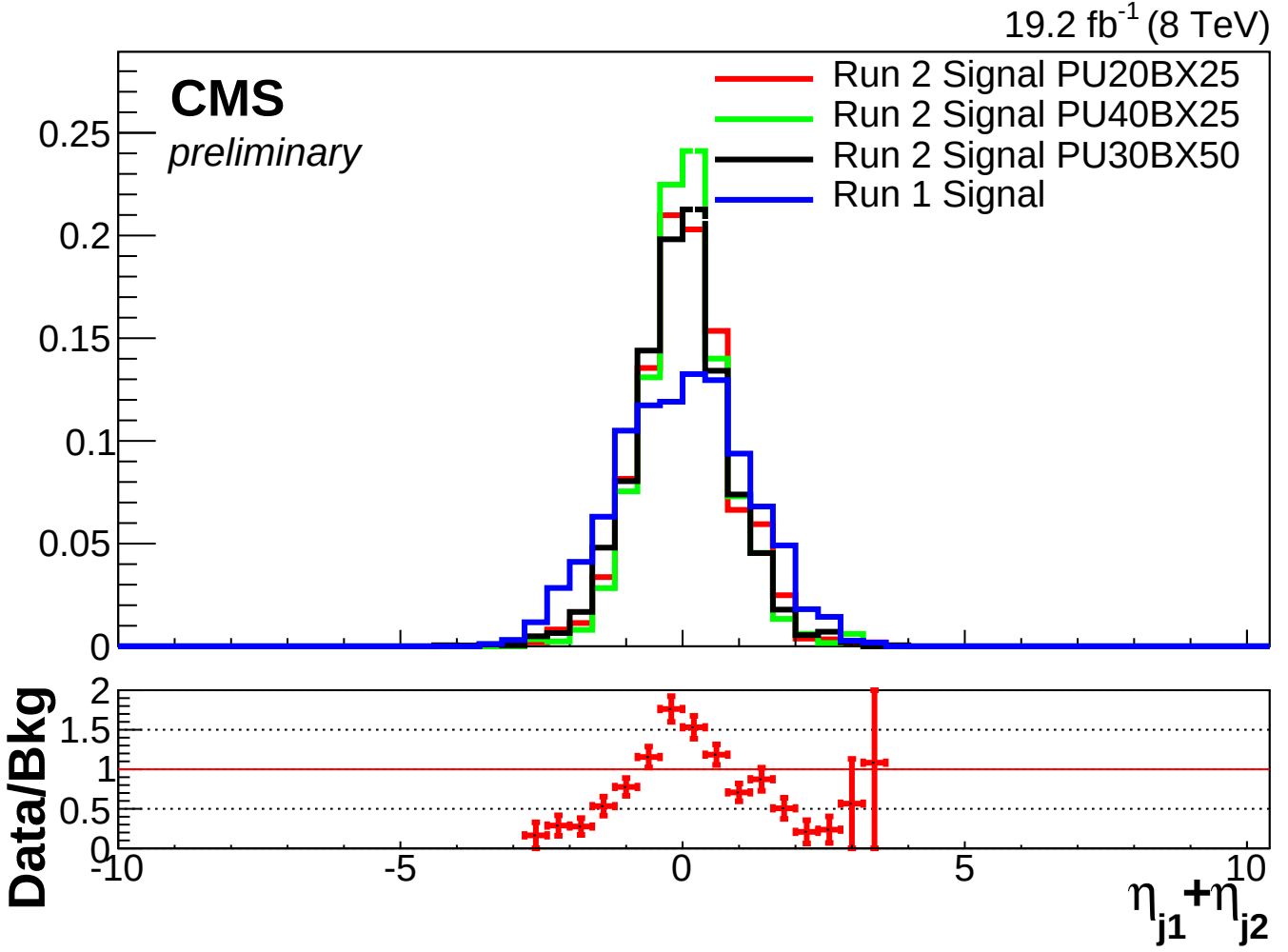

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.6
0.5
0.4
0.3
0.2
0.1
0
Data/Bkg
2
1.5
1
0.5
0
0
20
40
60
80
100
120
140
160
180
200
L1MET (GeV)

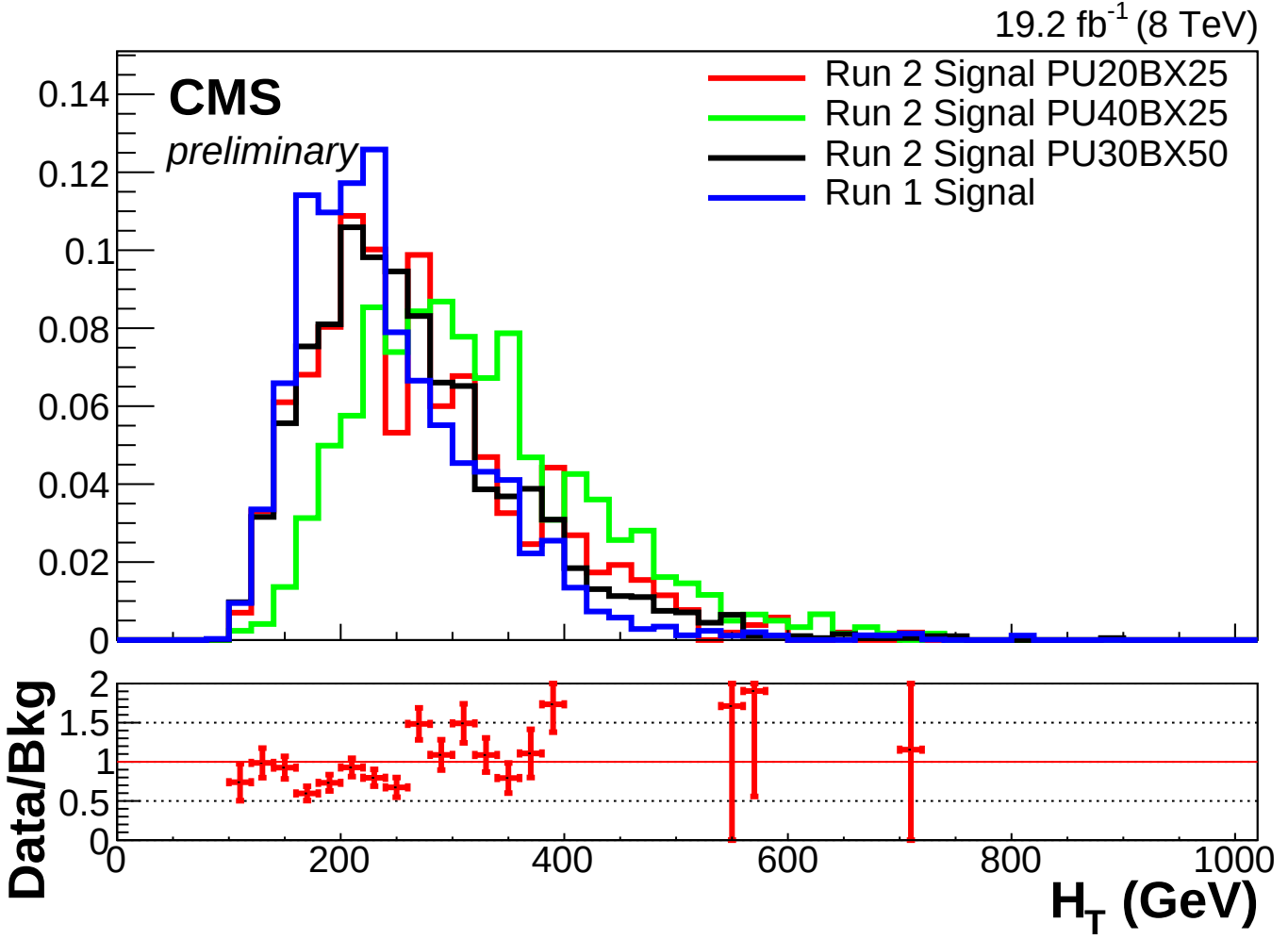

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
Mjj (GeV)

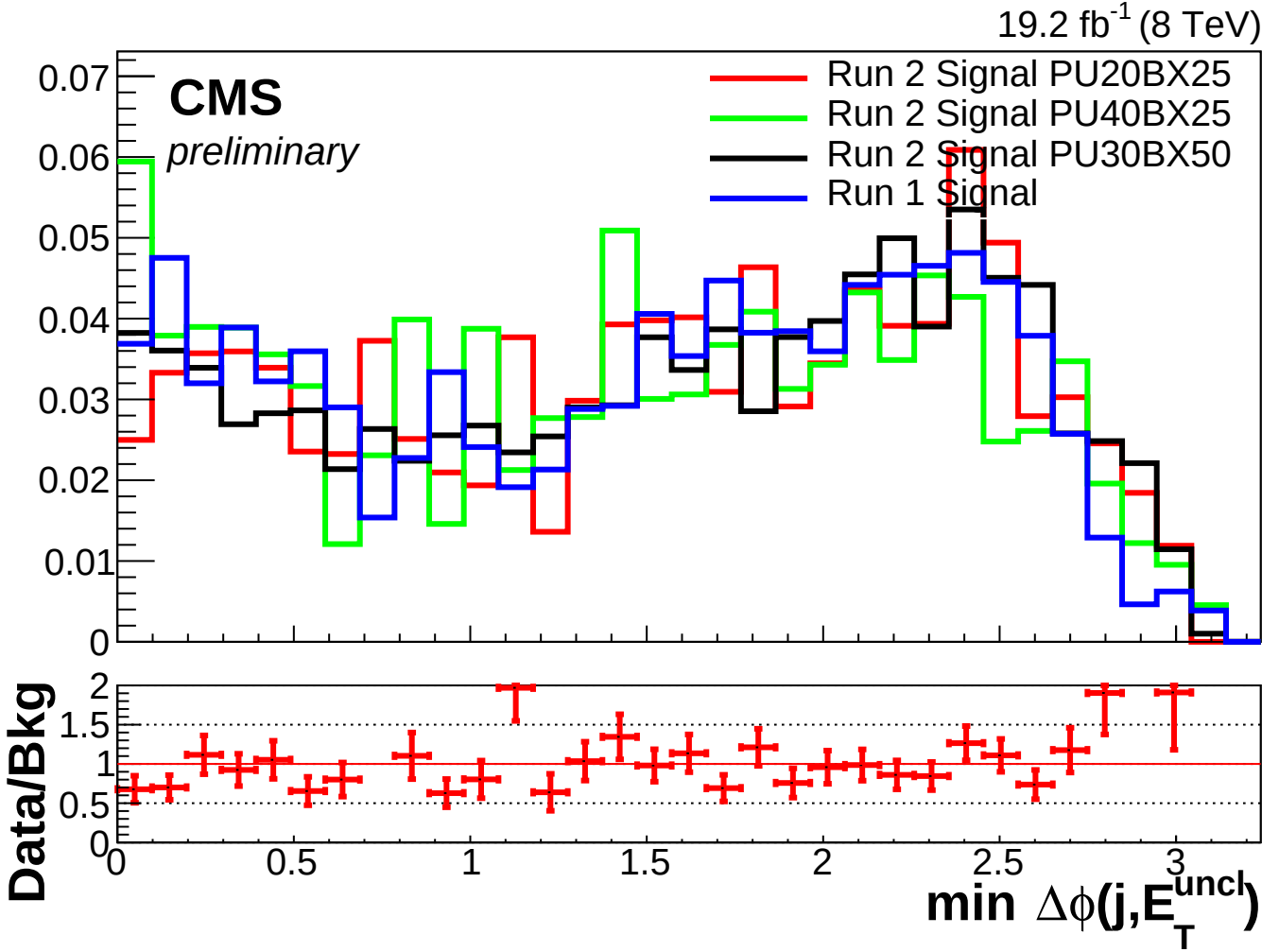

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
Δφ(E_T^miss, j_1,2)

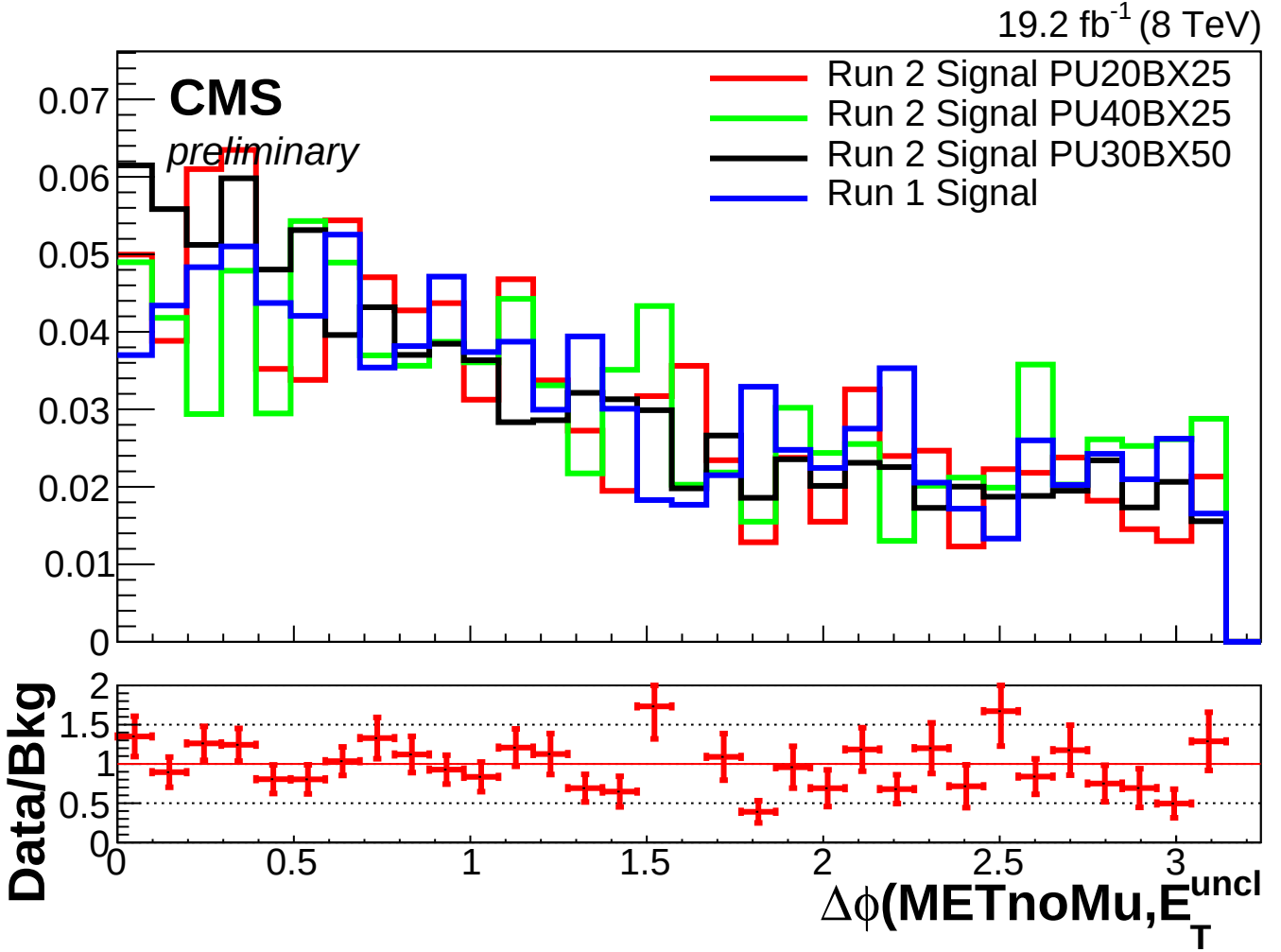

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
Δφ(E_T^miss,j)

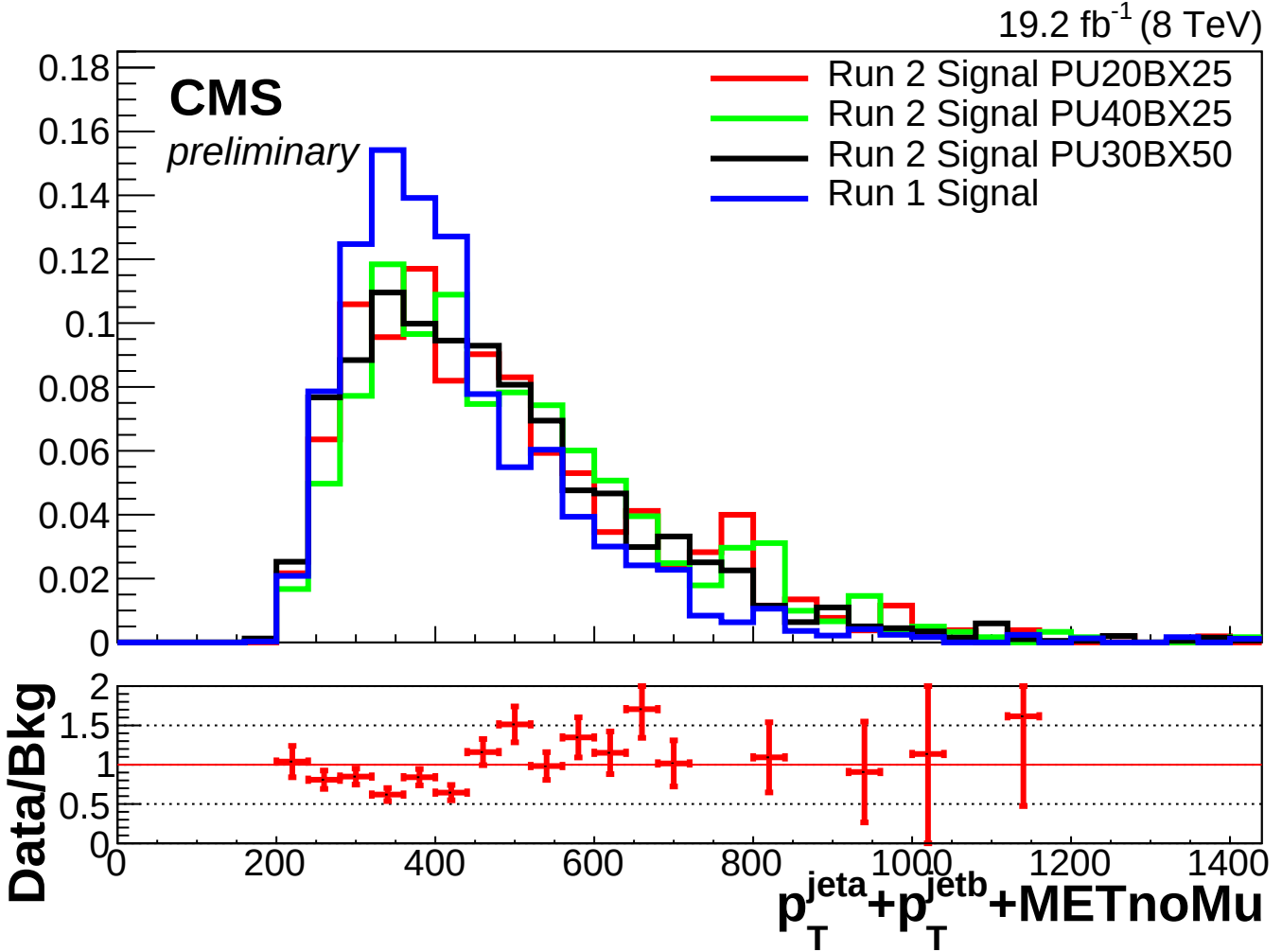

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
10
20
30
40
50
60
70
80
90
100
S

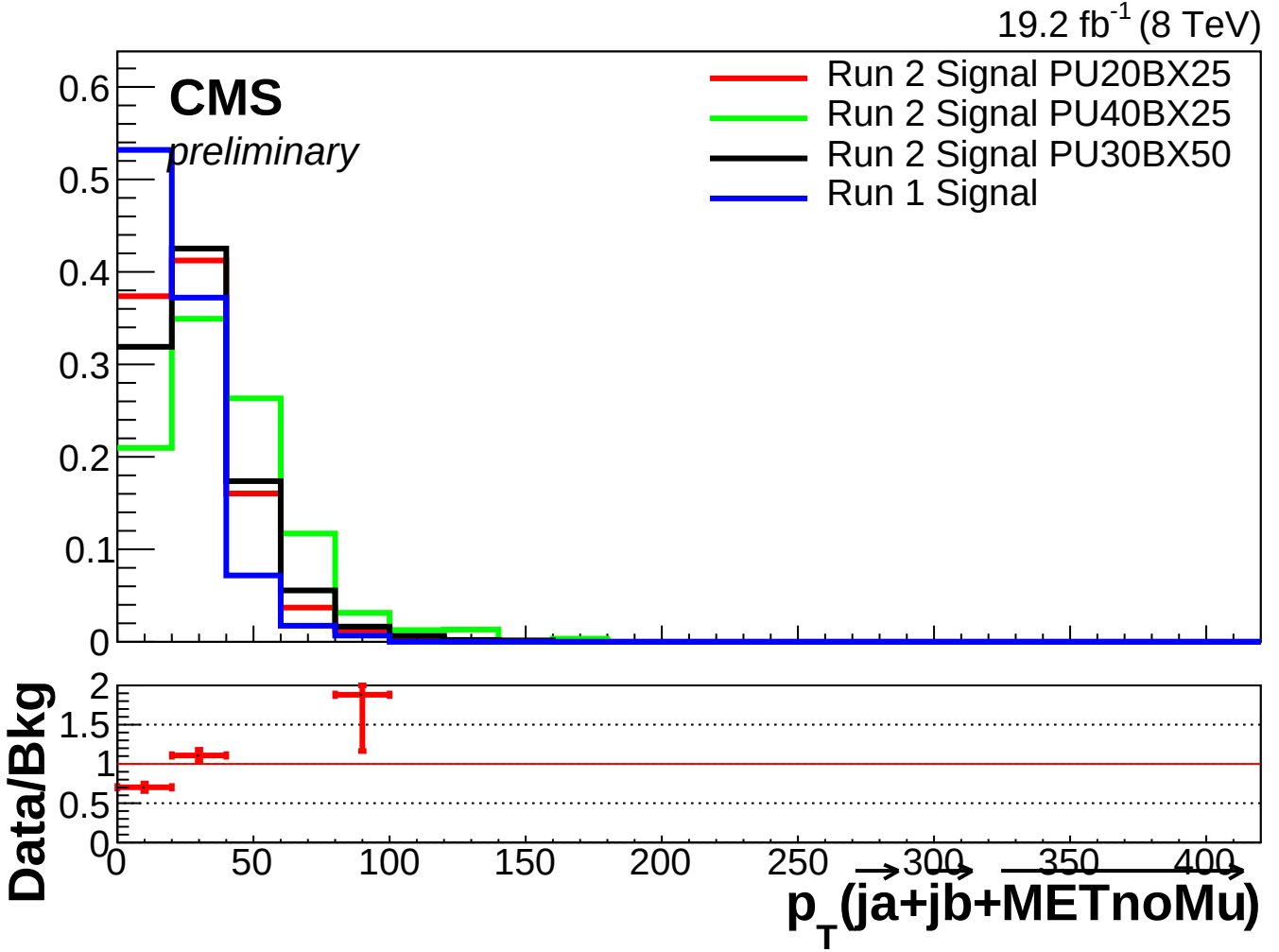

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
-10
-5
0
5
10
ηj1+ηj2

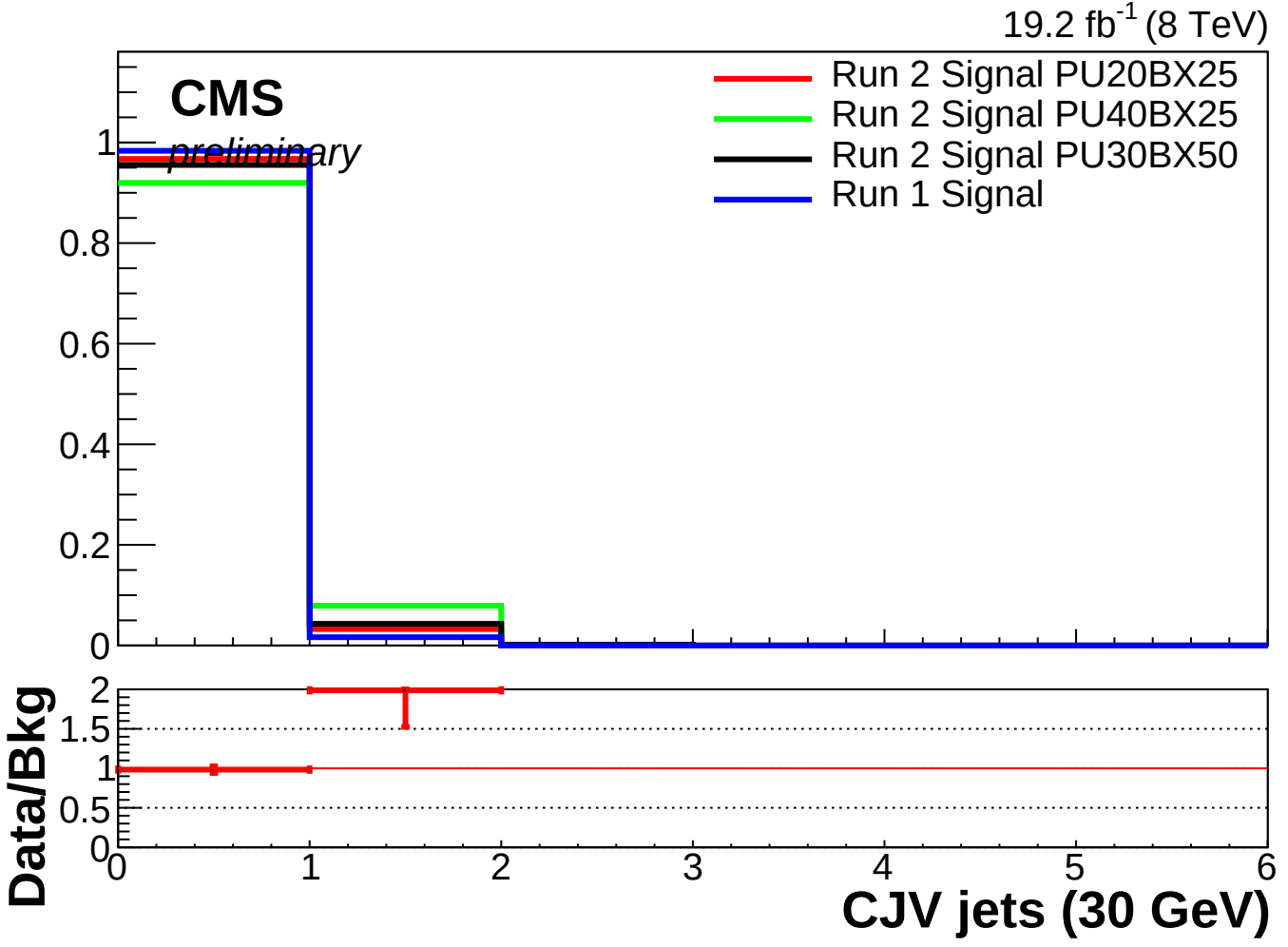

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
0
200
400
600
800
1000
HT (GeV)

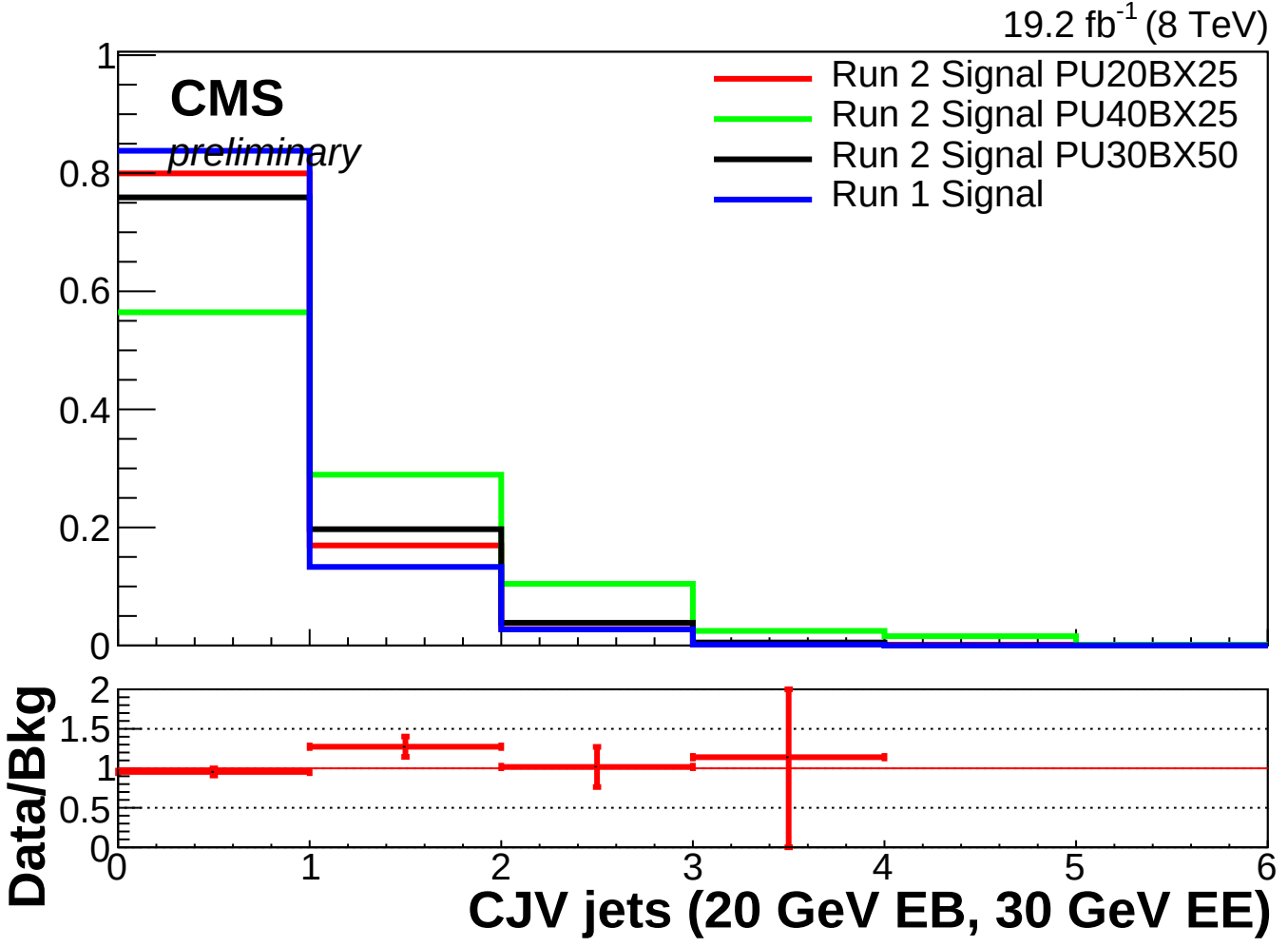

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Data/Bkg
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
min Δφ(j,E_T^uncl)

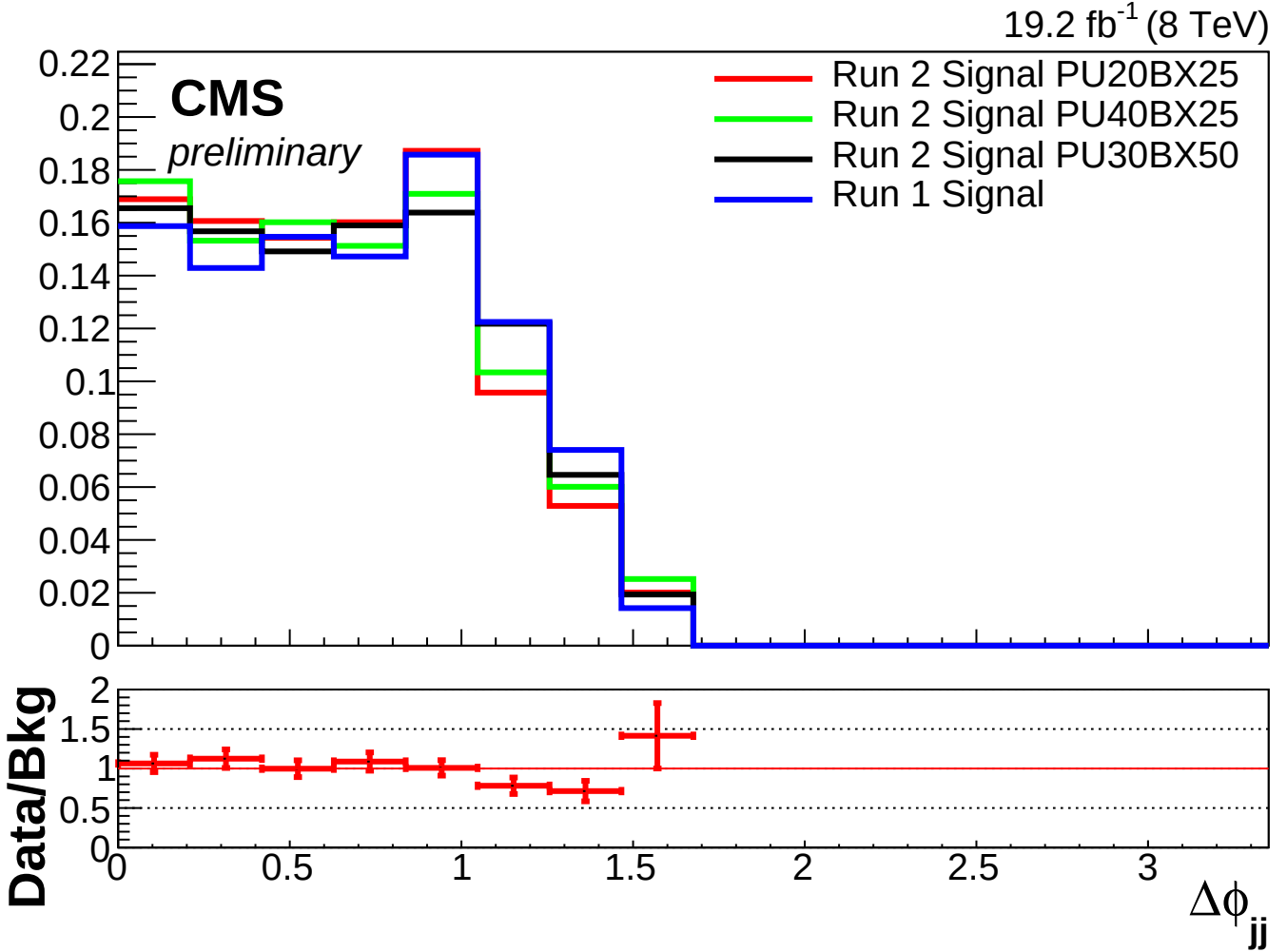

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Data/Bkg
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
Δφ(METnoMu,E Tuncl

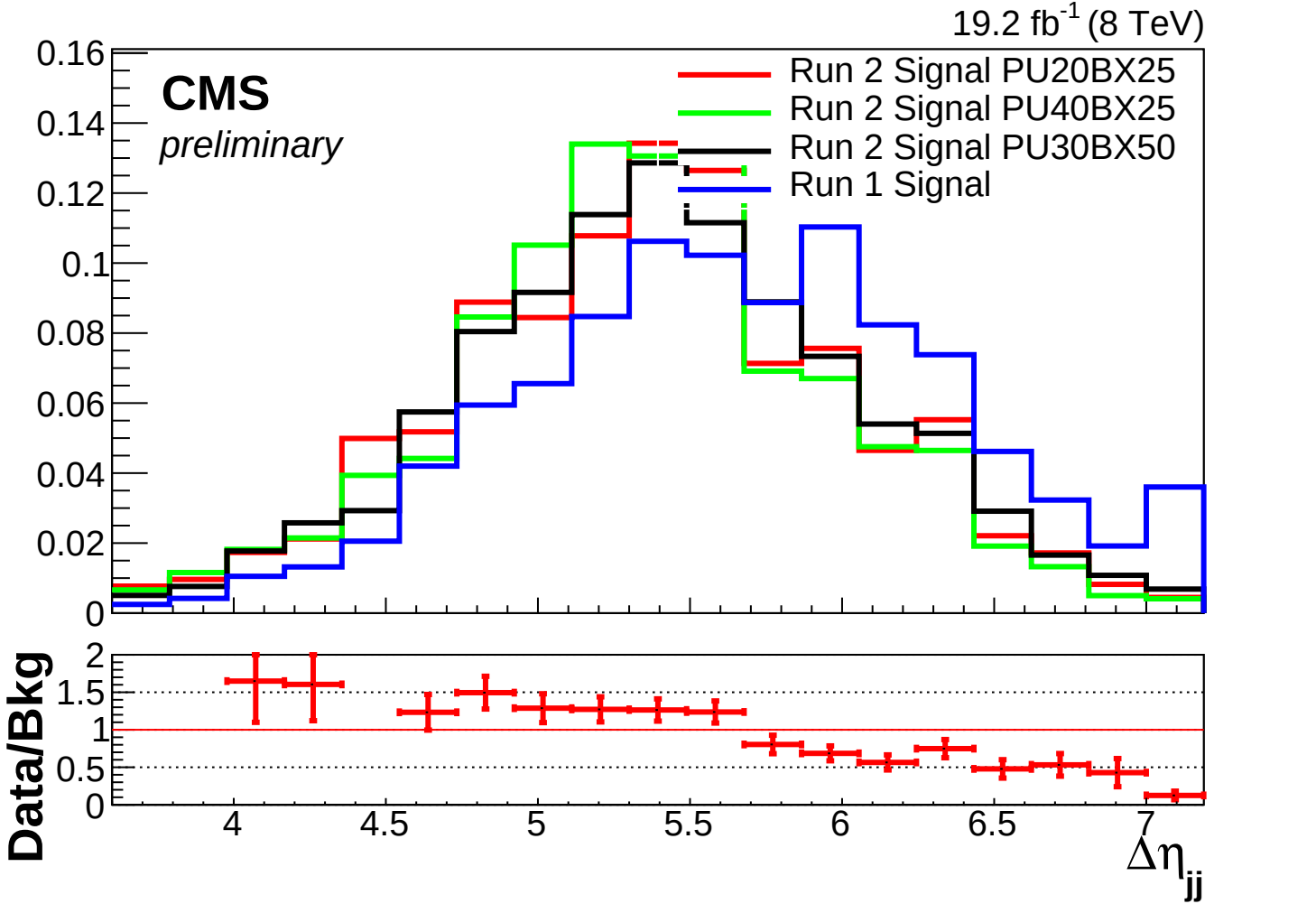

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
0
200
400
600
800
1000
1200
1400
p_T^jeta+p_T^jetb+METnoMu

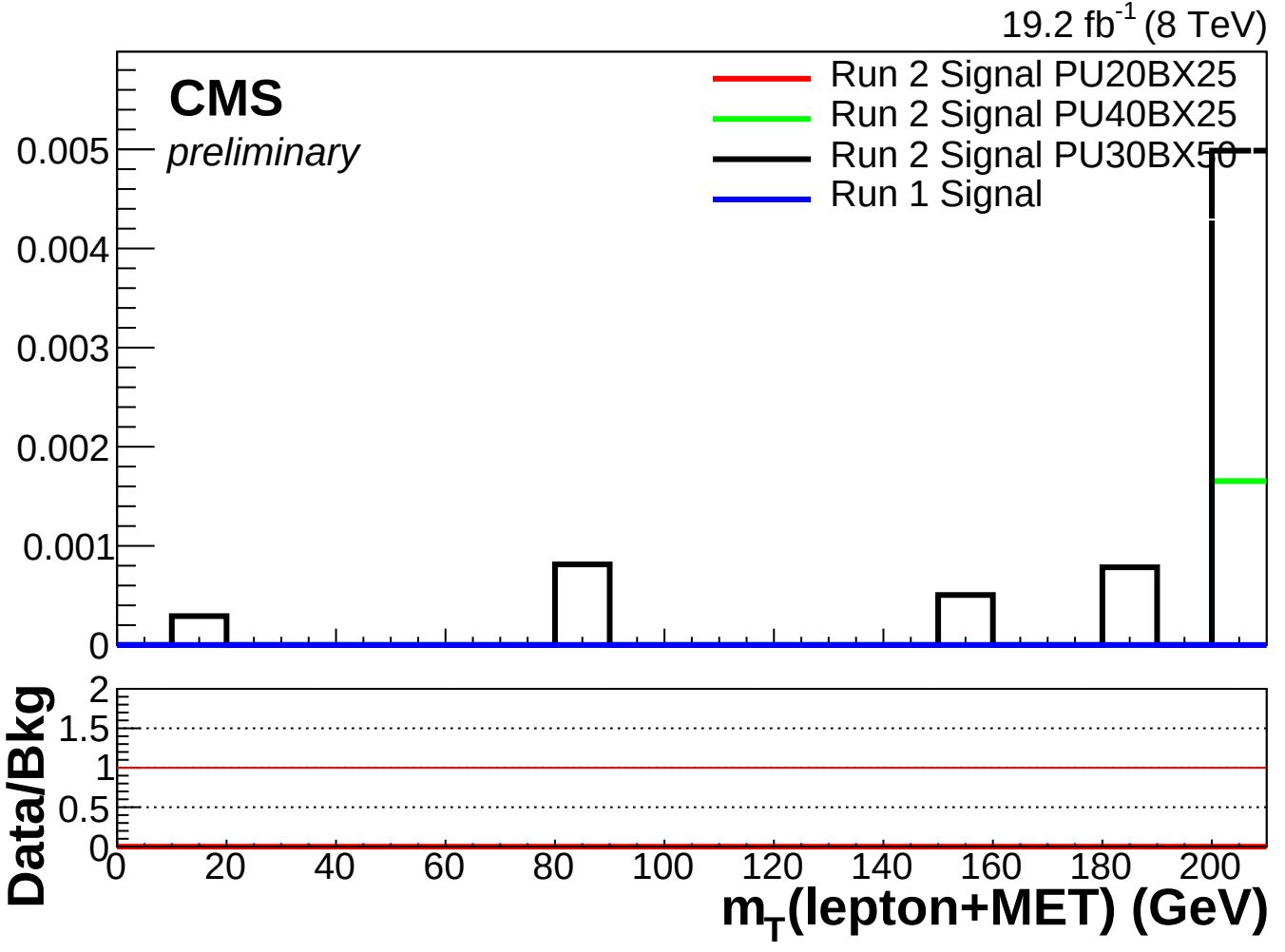

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.6
0.5
0.4
0.3
0.2
0.1
0
Data/Bkg
2
1.5
1
0.5
0
0
50
100
150
200
250
300
350
400
pT(ja+jb+METnoMu)

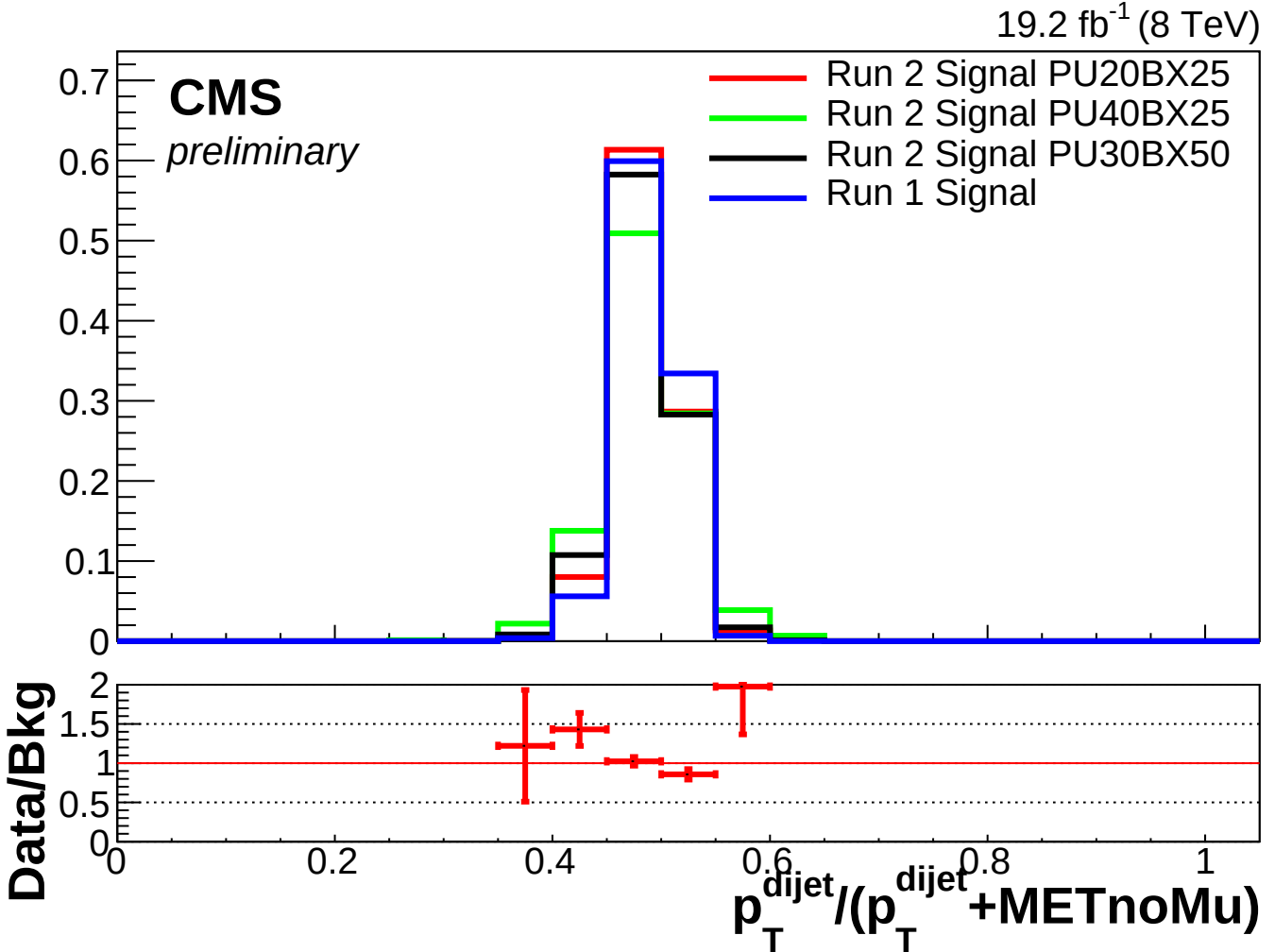

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
1
0.8
0.6
0.4
0.2
0
Data/Bkg
2
1.5
1
0.5
0
0
1
2
3
4
5
6
CJV jets (30 GeV)

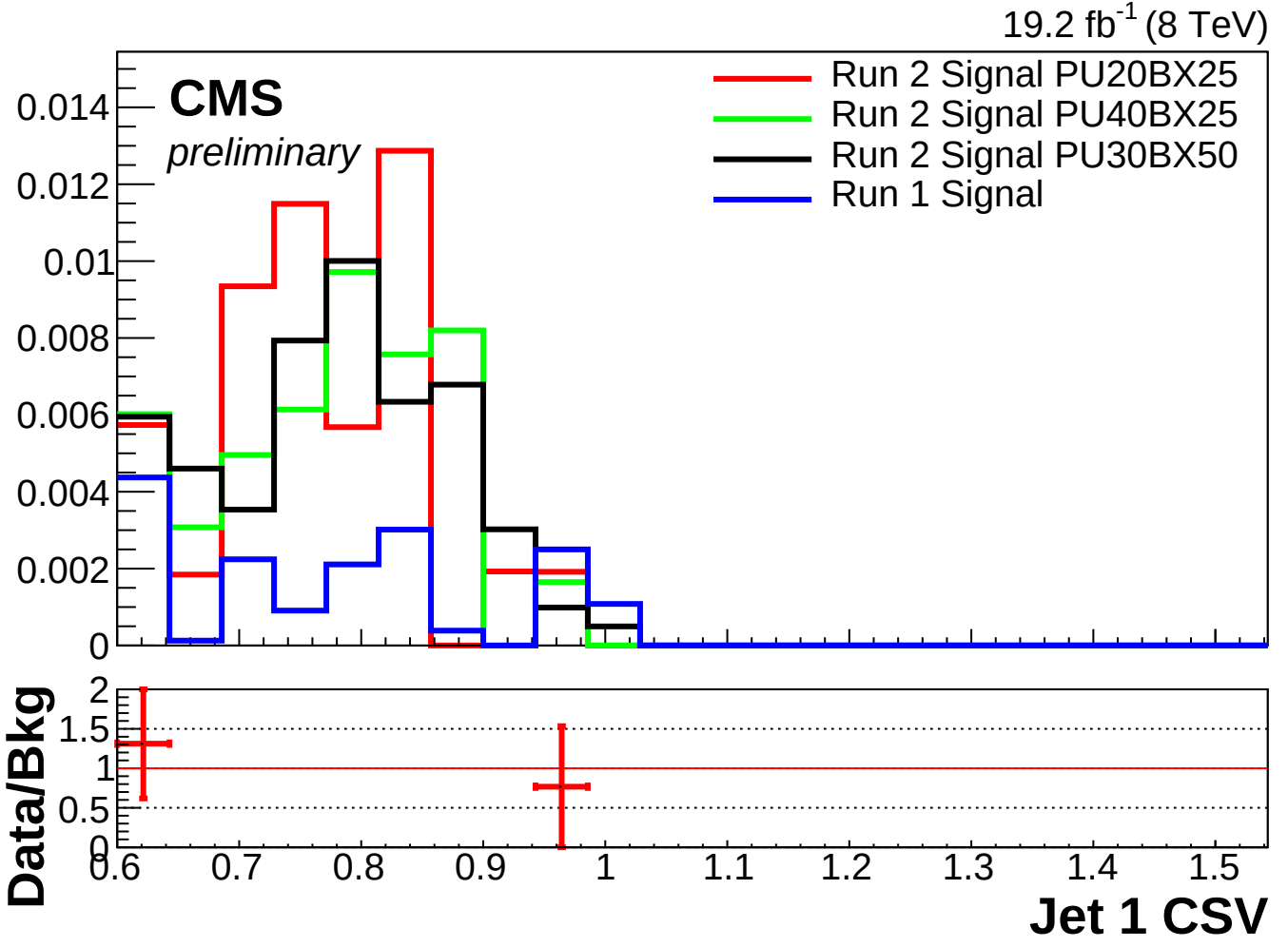

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
Data/Bkg
CJV jets (20 GeV EB, 30 GeV EE)

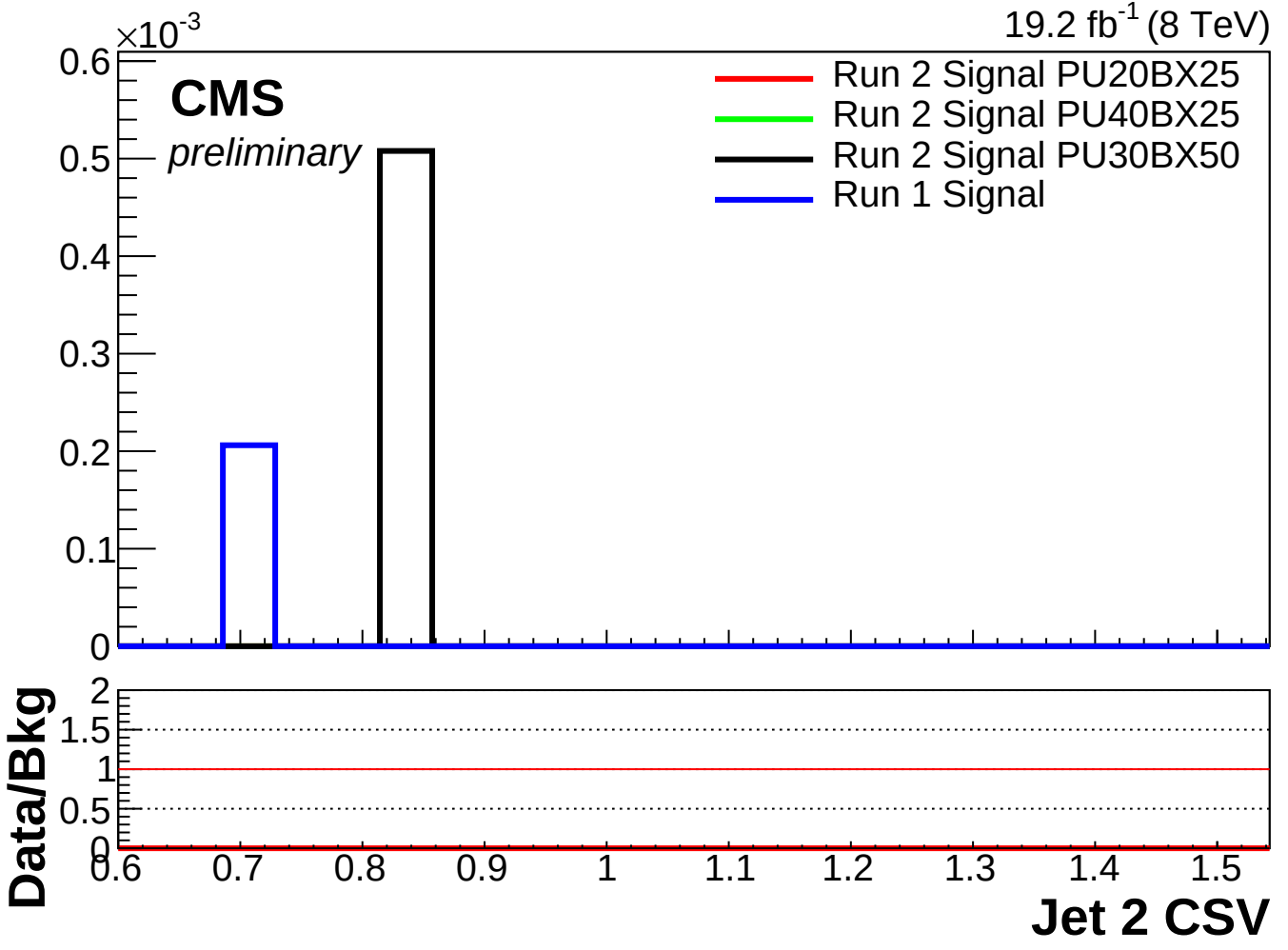

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
Δφjj

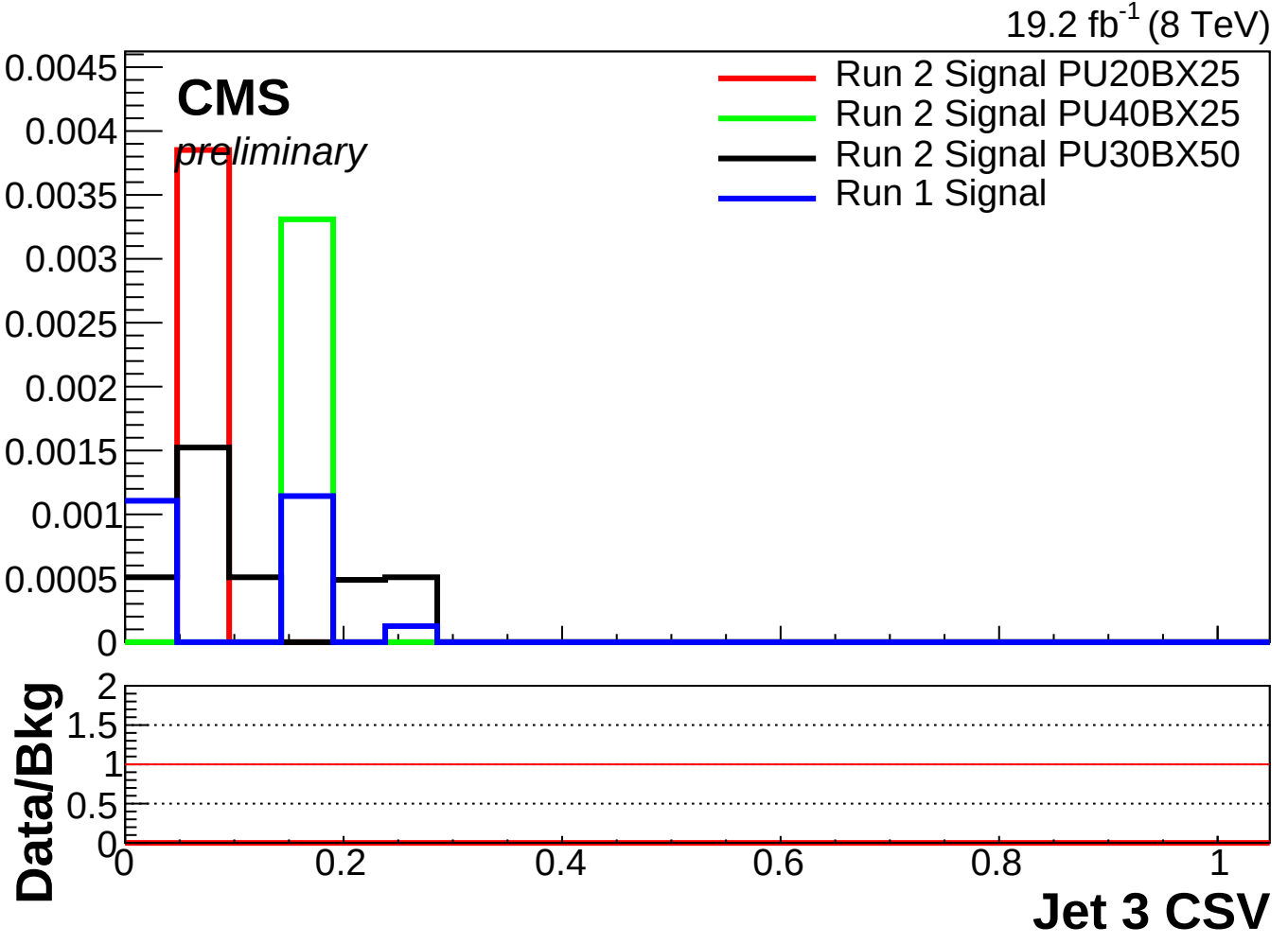

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
4
4.5
5
5.5
6
6.5
7
Δηjj

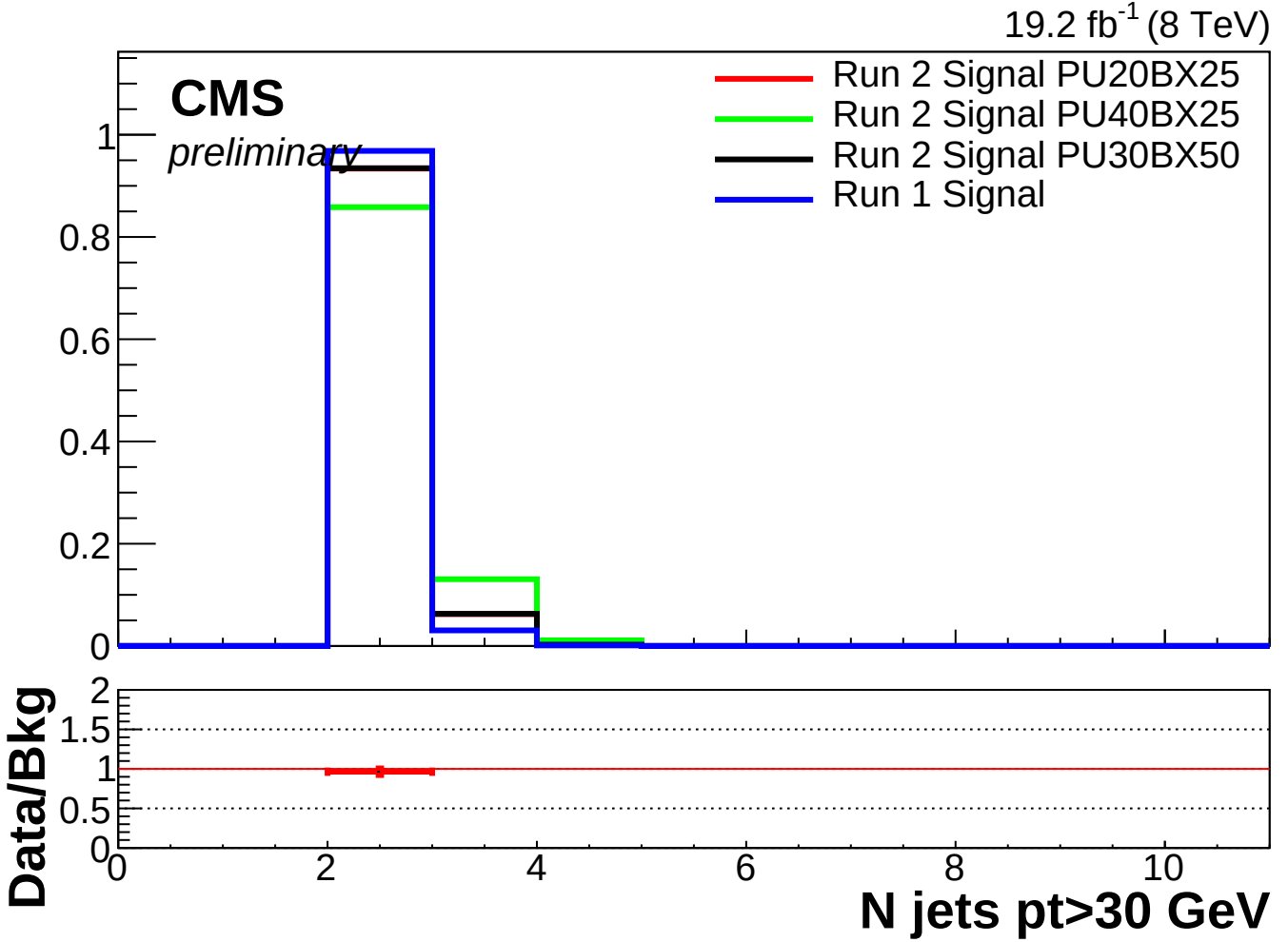

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.005
0.004
0.003
0.002
0.001
0
Data/Bkg
2
1.5
1
0.5
0
0
20
40
60
80
100
120
140
160
180
200
mT(lepton+MET) (GeV)

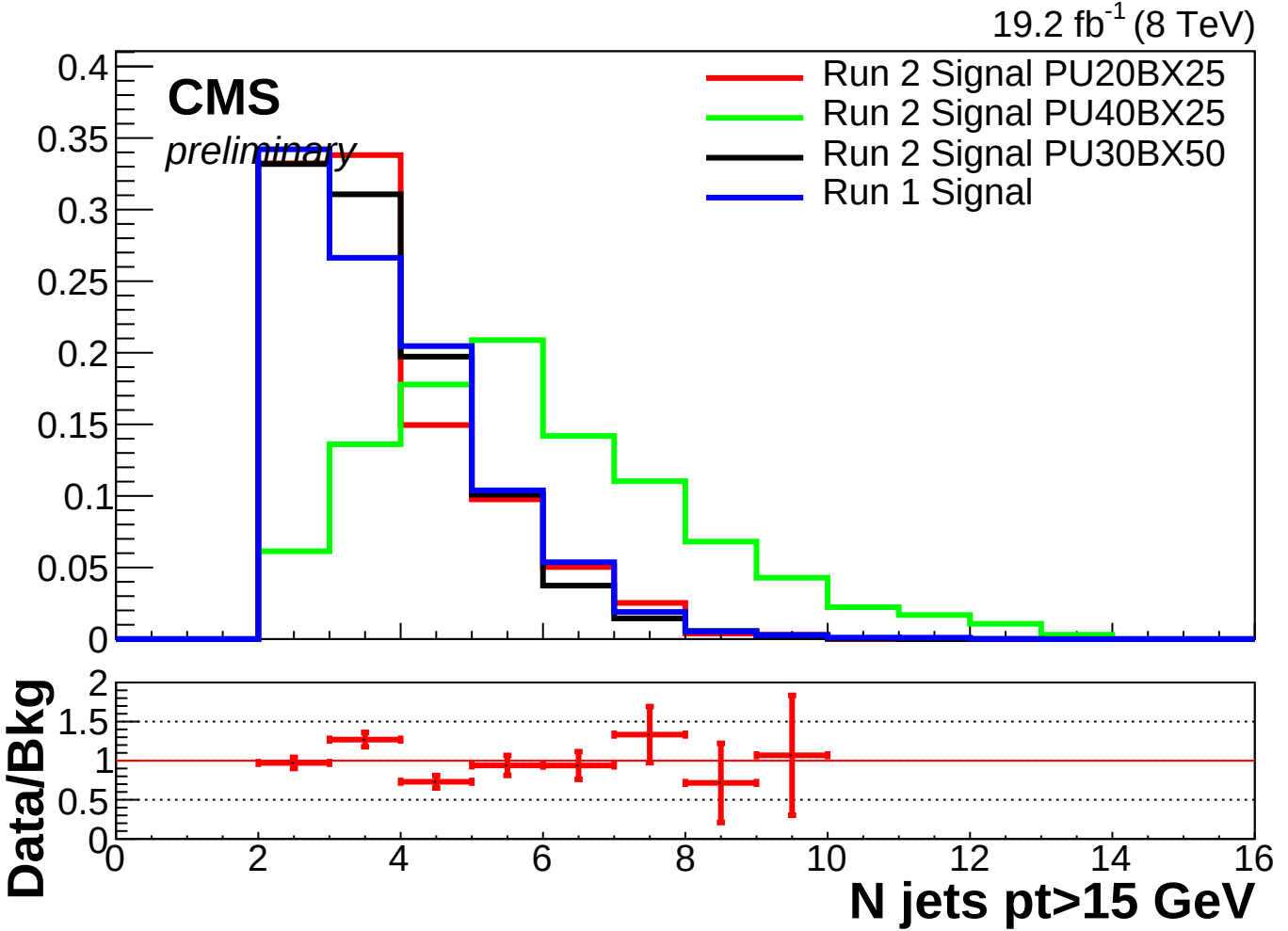

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Data/Bkg
2
1.5
1
0.5
0
0
0.2
0.4
0.6
0.8
1
p_T^dijet/(p_T^dijet+METnoMu)

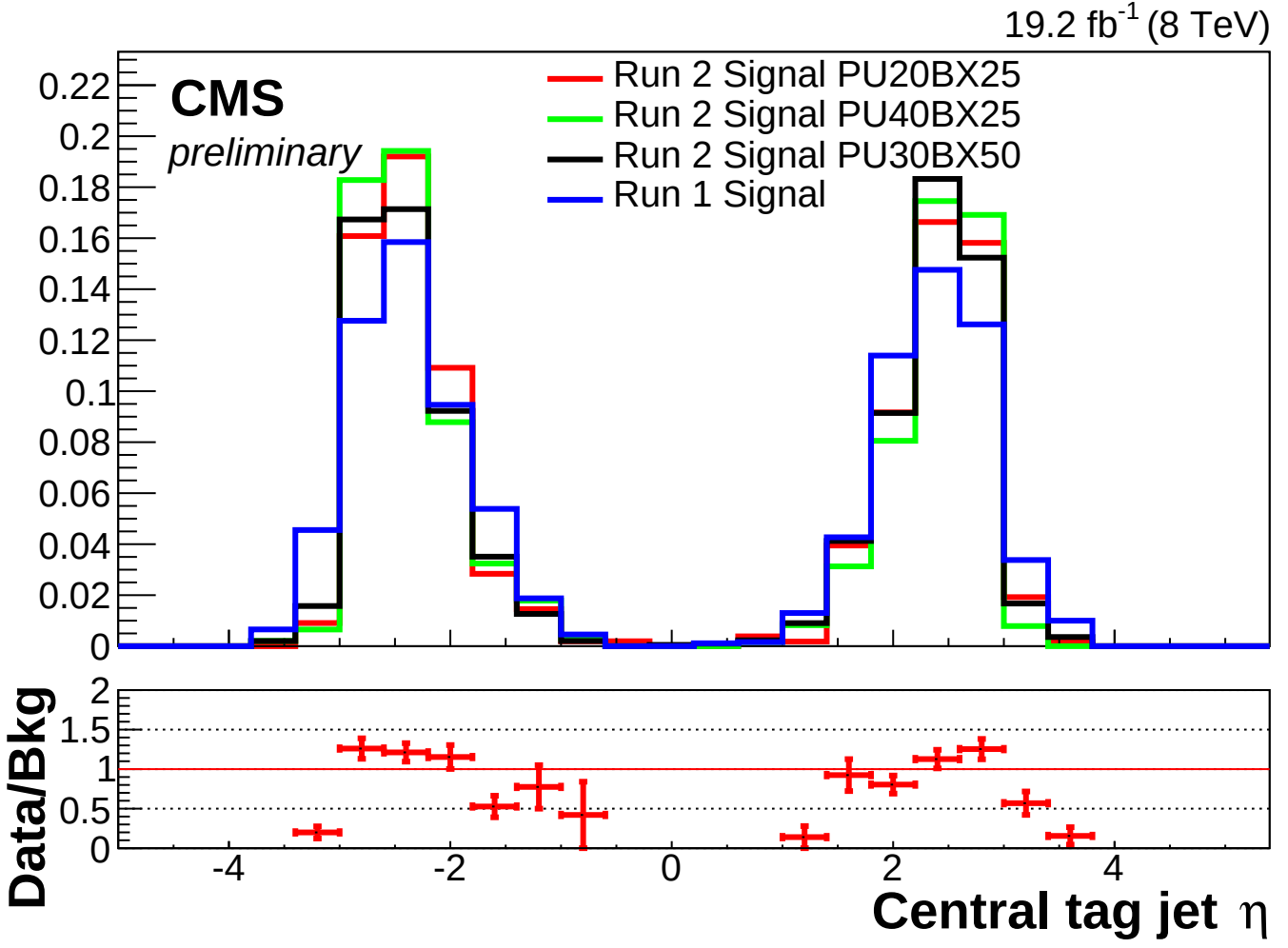

19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Data/Bkg
2
1.5
1
0.5
0
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
Jet 1 CSV

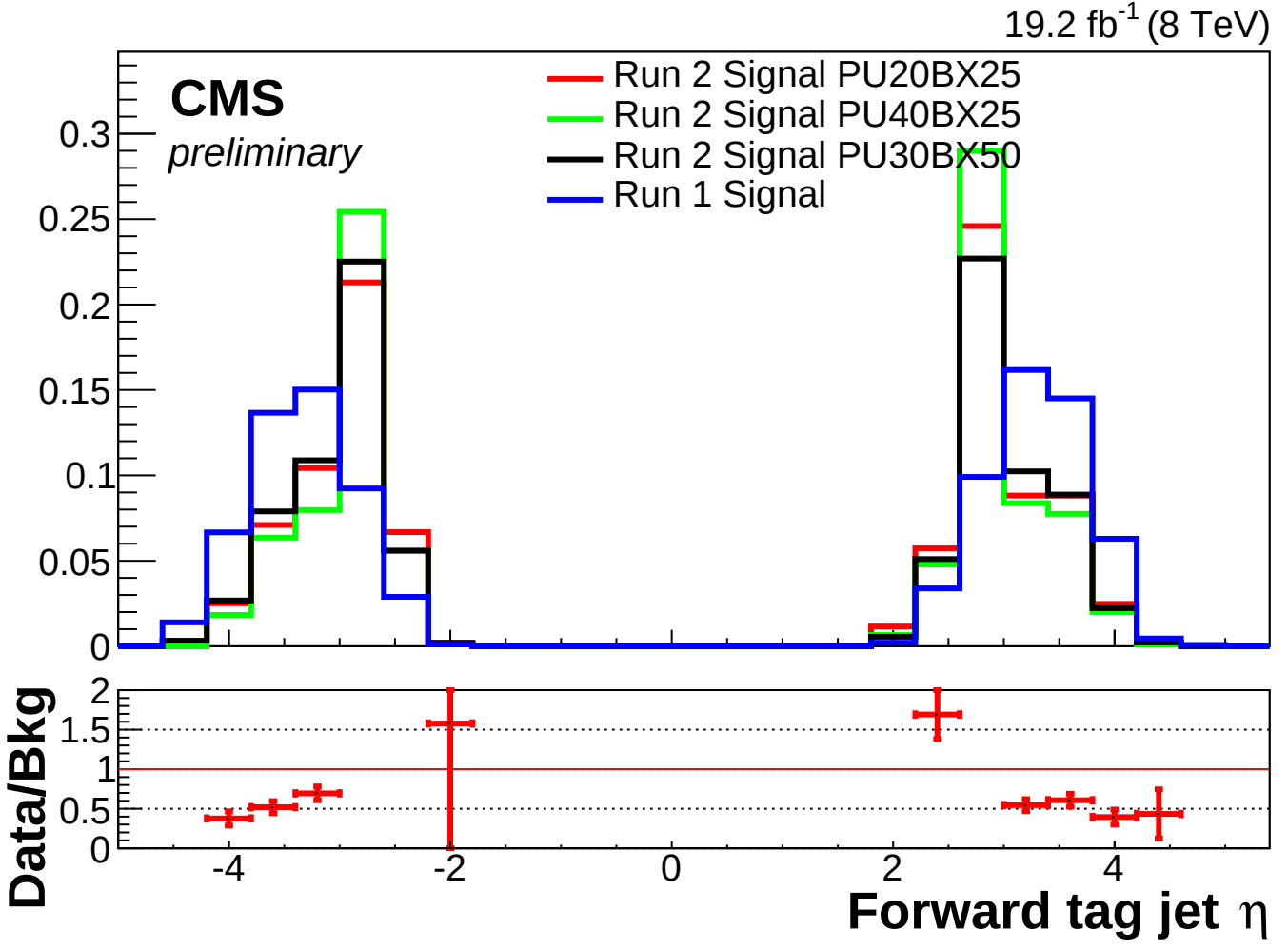

19.2 fb-1 (8 TeV)
×10-3
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.6
0.5
0.4
0.3
0.2
0.1
0
Data/Bkg
2
1.5
1
0.5
0
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
Jet 2 CSV


19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Data/Bkg
2
1.5
1
0.5
0
0
0.2
0.4
0.6
0.8
1
Jet 3 CSV


19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
1
0.8
0.6
0.4
0.2
0
Data/Bkg
2
1.5
1
0.5
0
0
2
4
6
8
10
N jets pt>30 GeV


19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
0
2
4
6
8
10
12
14
16
N jets pt>15 GeV


19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Data/Bkg
2
1.5
1
0.5
0
-4
-2
0
2
4
Central tag jet η


19.2 fb-1 (8 TeV)
CMS
preliminary
Run 2 Signal PU20BX25
Run 2 Signal PU40BX25
Run 2 Signal PU30BX50
Run 1 Signal
0.3
0.25
0.2
0.15
0.1
0.05
0
Data/Bkg
2
1.5
1
0.5
0
-4
-2
0
2
4
Forward tag jet η