

Heavy Higgs Analysis

Samuel Baxter

Impacts without smoothing (1 of 6)

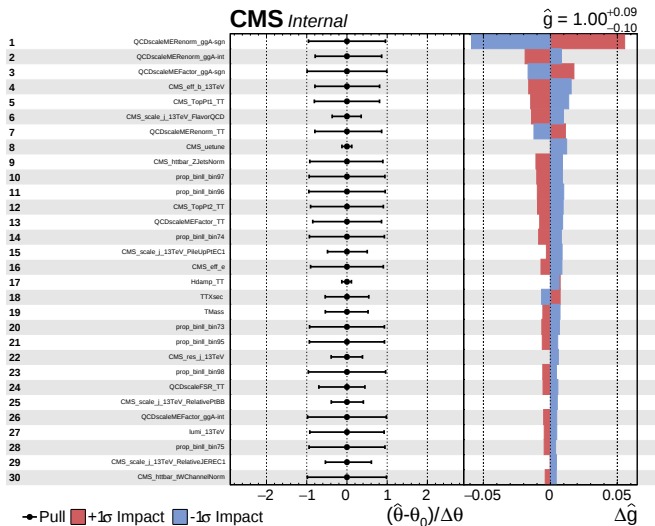


Figure: Impact from systematics on the expected limit.

Impacts without smoothing (2 of 6)

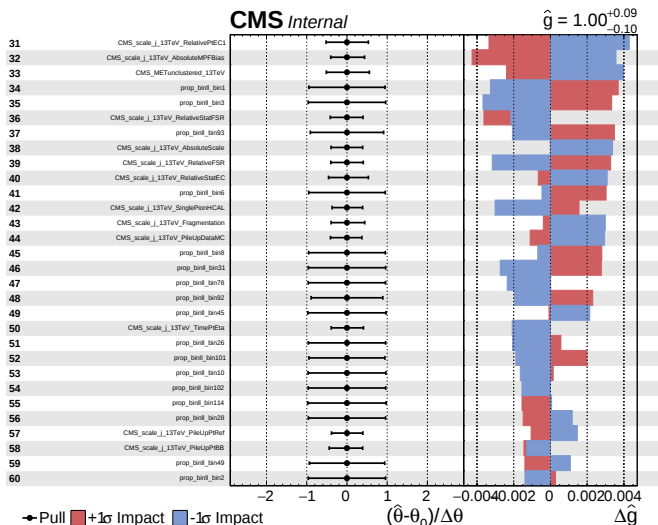


Figure: Impact from systematics on the expected limit.

Impacts without smoothing (3 of 6)

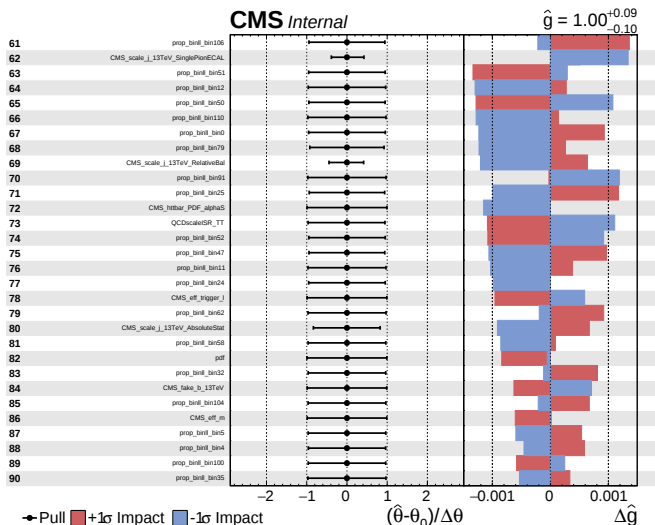


Figure: Impact from systematics on the expected limit.

Impacts without smoothing (4 of 6)

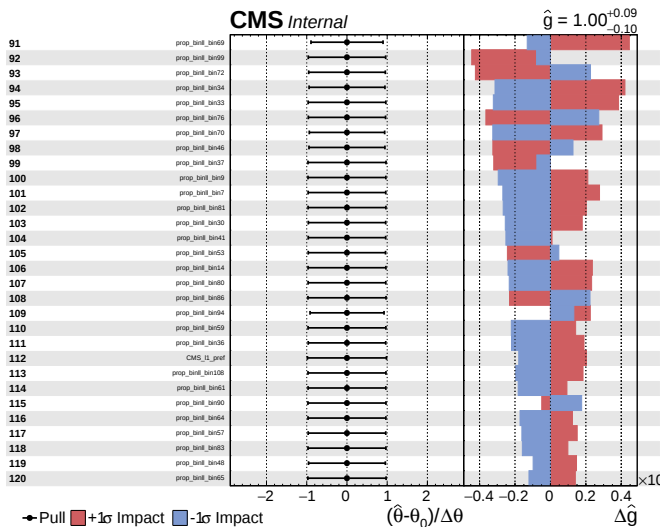


Figure: Impact from systematics on the expected limit.

Impacts without smoothing (5 of 6)

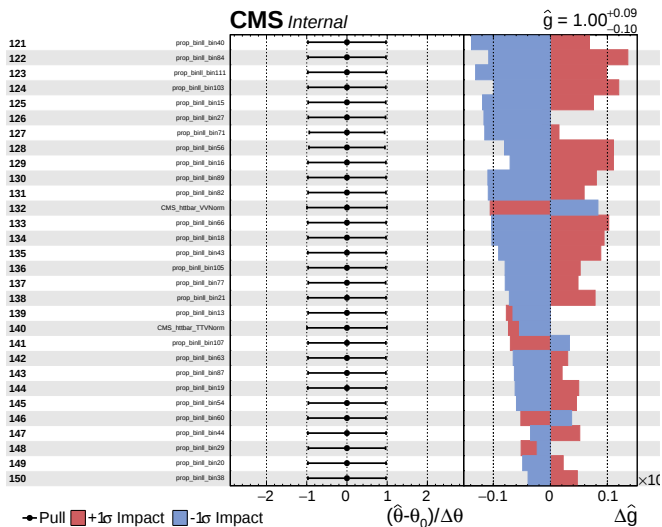


Figure: Impact from systematics on the expected limit.

Impacts without smoothing (6 of 6)

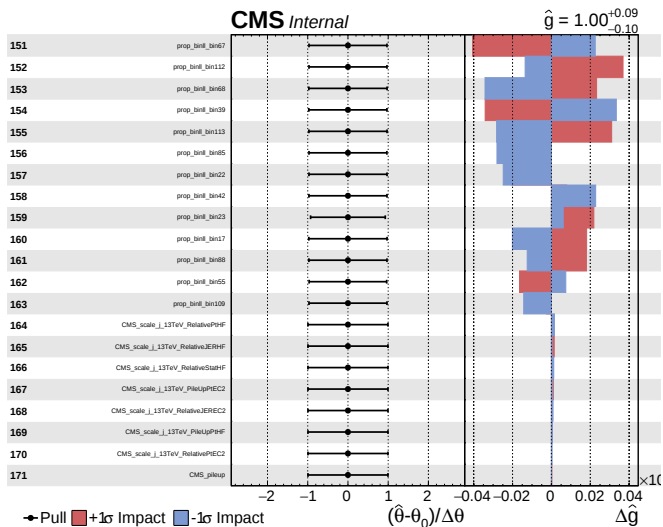


Figure: Impact from systematics on the expected limit.

Limit without smoothing

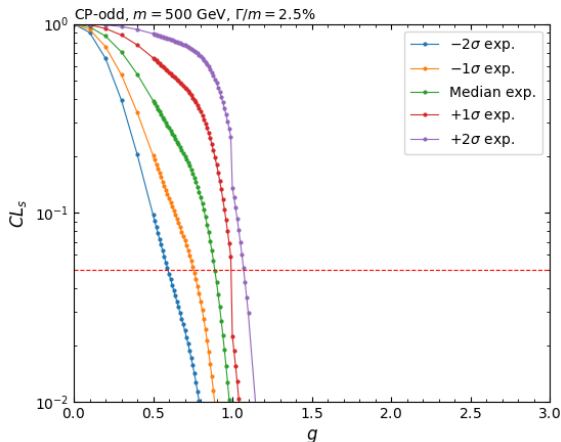


Figure: Limit for Pseudoscalar reference sample with mass of 500 GeV and width of 2.5 % of the mass, g is the scaling of the coupling between the Heavy Higgs and the top quarks, CL_s is the confidence level. The dashed line indicates the CL_s 95 exclusion level.

Impacts with smoothing (1 of 6)

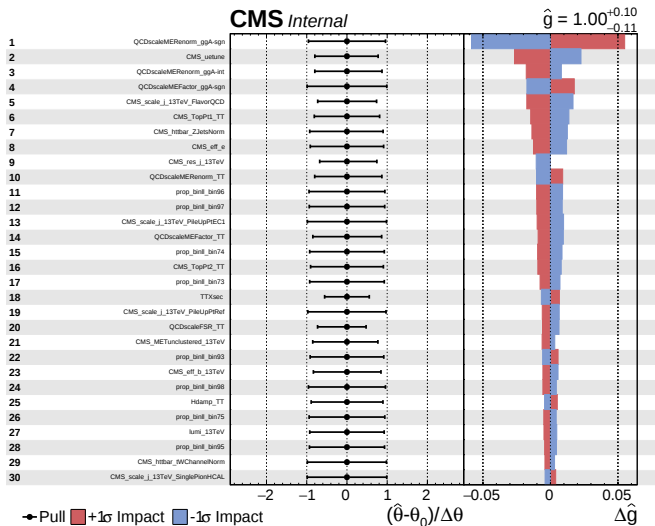


Figure: Impact from systematics on the expected limit.

Impacts with smoothing (2 of 6)

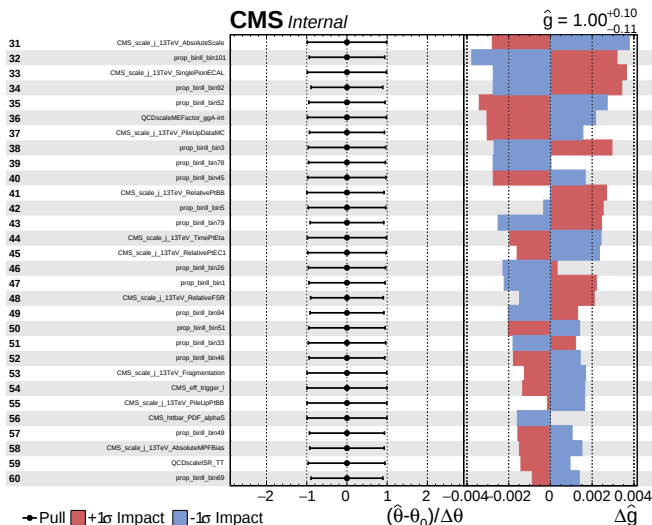


Figure: Impact from systematics on the expected limit.

Impacts with smoothing (3 of 6)

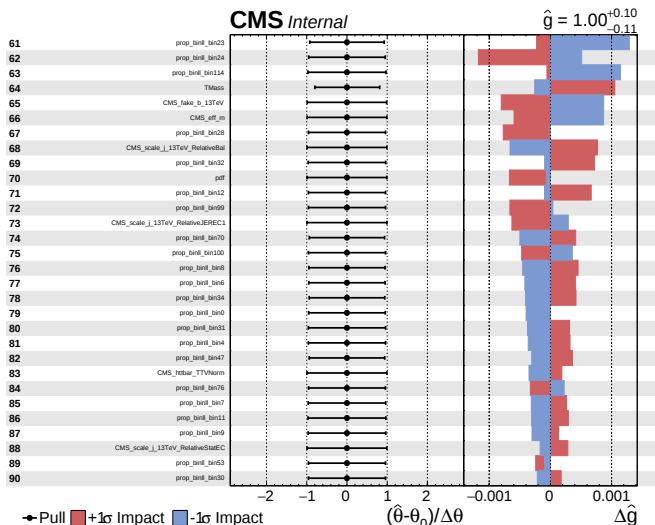


Figure: Impact from systematics on the expected limit.

Impacts with smoothing (4 of 6)

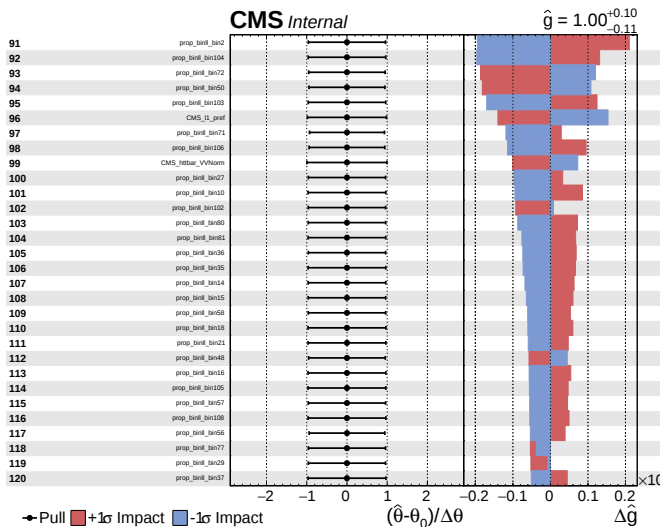


Figure: Impact from systematics on the expected limit.

Impacts with smoothing (5 of 6)

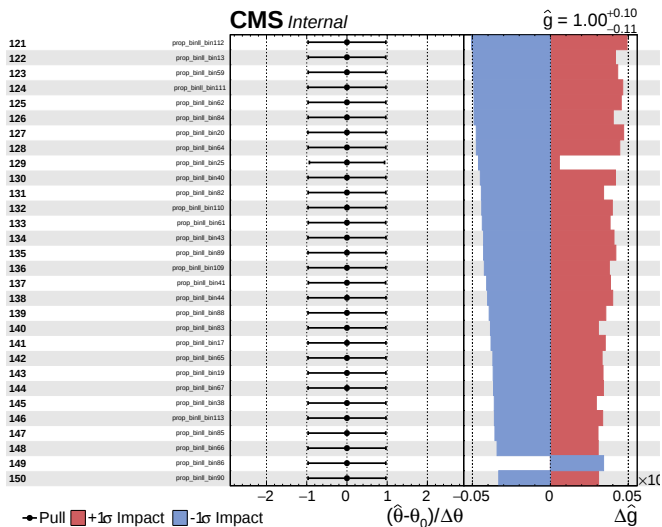


Figure: Impact from systematics on the expected limit.

Impacts with smoothing (6 of 6)

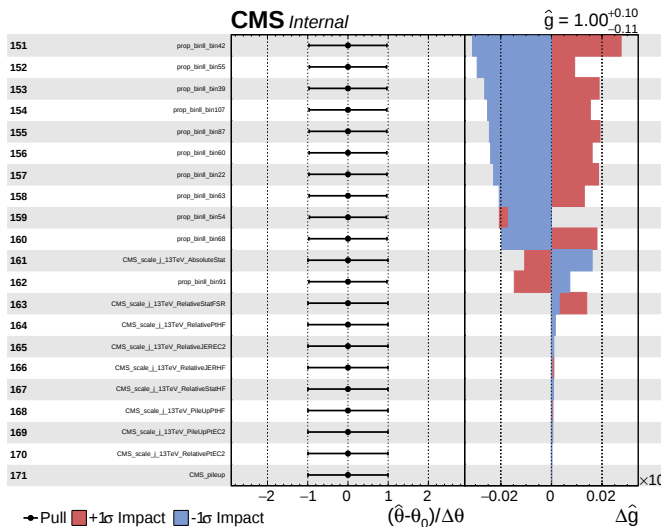


Figure: Impact from systematics on the expected limit.

Limit with smoothing

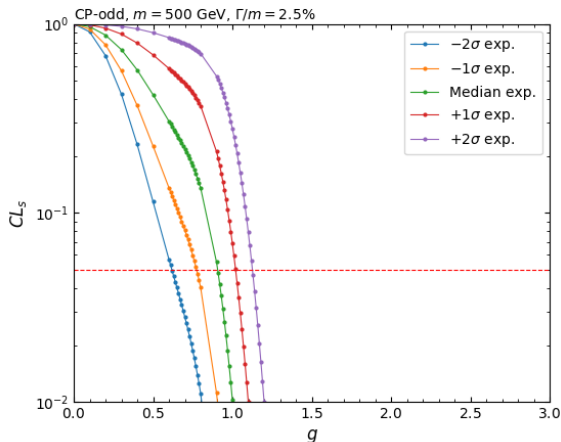


Figure: Limit for Pseudoscalar reference sample with mass of 500 GeV and width of 2.5 % of the mass, g is the scaling of the coupling between the Heavy Higgs and the top quarks, CL_s is the confidence level. The dashed line indicates the CL_s 95 exclusion level.

Search Region with systematics (prefit)

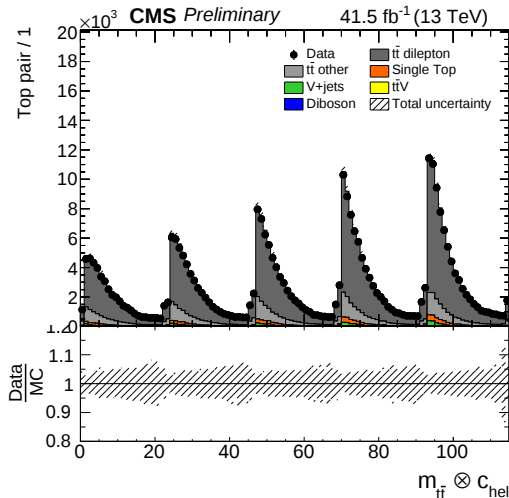


Figure: Unrolled plot for $m_{t\bar{t}}$ and c_{Hel} , where there are 5 c_{Hel} regions with 23 bins for $m_{t\bar{t}}$ in each ranging from 325 GeV to 1200 GeV.

Search Region with statistical errors only

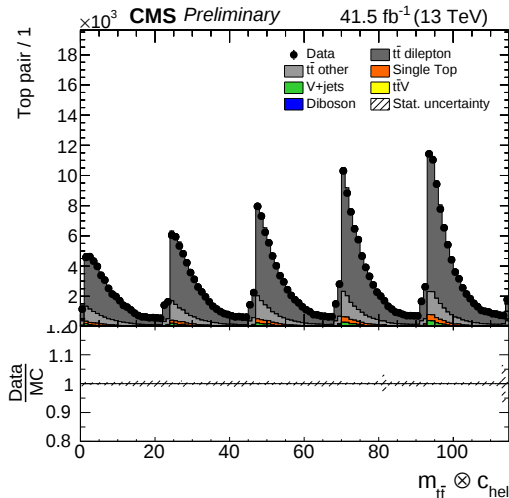
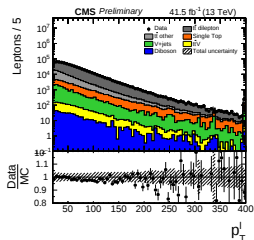
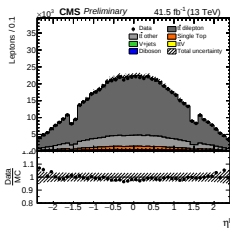


Figure: Unrolled plot for $m_{t\bar{t}}$ and c_{Hel} , where there are 5 c_{Hel} regions with 23 bins for $m_{t\bar{t}}$ in each ranging from 325 GeV to 1200 GeV.

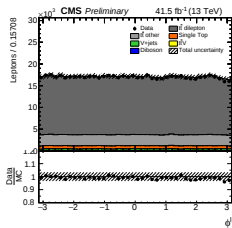
Control Plots with Combined Channels (1 of 43)



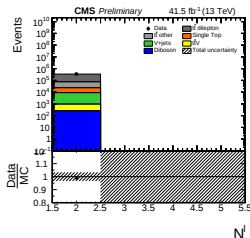
(a) Transverse momentum of leptons (step 7/8)



(b) Pseudorapidity of leptons (step 7/8)

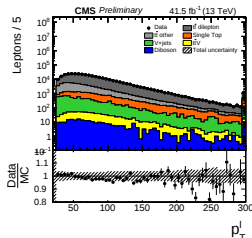


(c) Azimuthal angle of leptons (step 7/8)

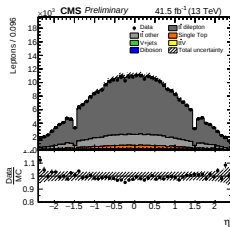


(d) Multiplicity of leptons (step 7/8)

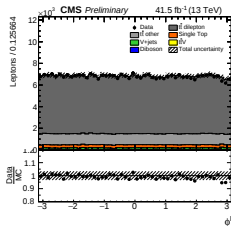
Control Plots with Combined Channels (2 of 43)



(a) Transverse momentum of leading leptons (step 7/8)

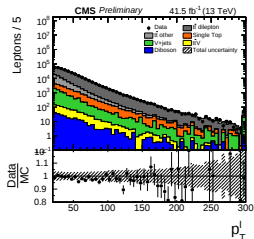


(b) Pseudorapidity of leading leptons (step 7/8)

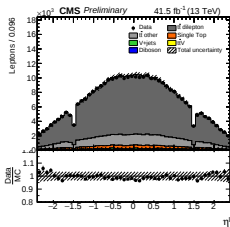


(c) Azimuthal angle of leading leptons (step 7/8)

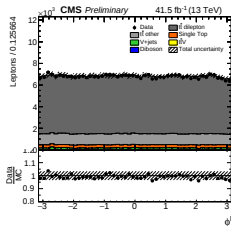
Control Plots with Combined Channels (3 of 43)



(a) Transverse momentum of 2nd leptons (step 7/8)

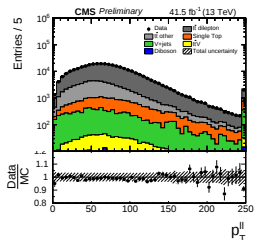


(b) Pseudorapidity of 2nd leptons (step 7/8)

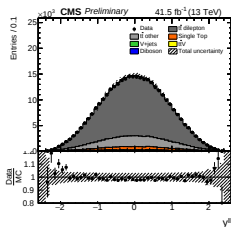


(c) Azimuthal angle of 2nd leptons (step 7/8)

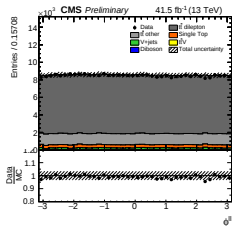
Control Plots with Combined Channels (4 of 43)



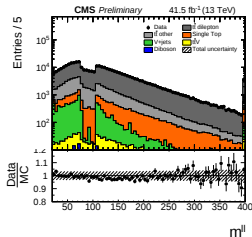
(a) Transverse momentum of di-leptons (step 7/8)



(b) Rapidity of di-leptons (step 7/8)

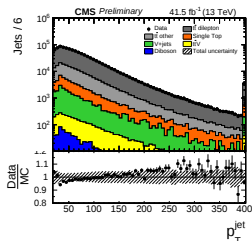


(c) Azimuthal angle of di-leptons (step 7/8)

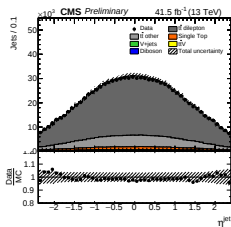


(d) Mass of di-leptons (step 7/8)

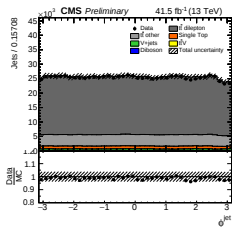
Control Plots with Combined Channels (5 of 43)



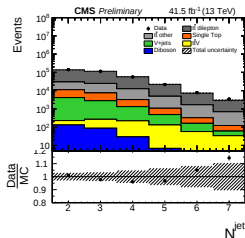
(a) Transverse momentum of jets (step 7/8)



(b) Pseudorapidity of jets (step 7/8)

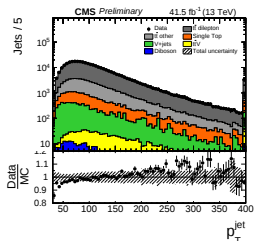


(c) Azimuthal angle of jets (step 7/8)

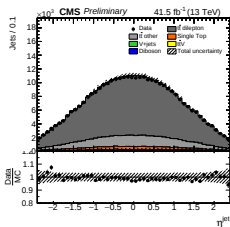


(d) Multiplicity of jets (step 7/8)

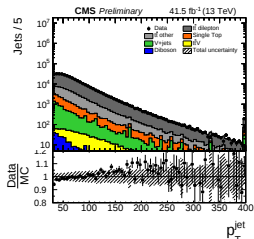
Control Plots with Combined Channels (6 of 43)



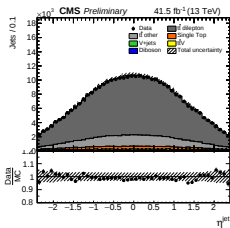
(a) Transverse momentum of leading jets (step 7/8)



(b) Pseudorapidity of leading jets (step 7/8)

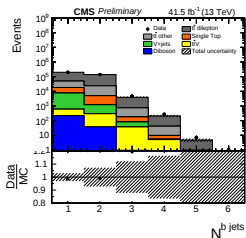


(c) Transverse momentum of subleading jets (step 7/8)

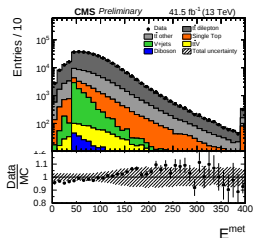


(d) Pseudorapidity of subleading jets (step 7/8)

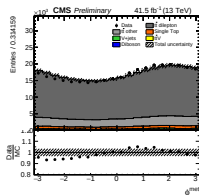
Control Plots with Combined Channels (7 of 43)



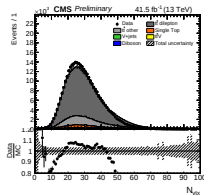
(a) Multiplicity of b-tagged jets (step 7/8)



(b) Missing transverse momentum (step 7/8)

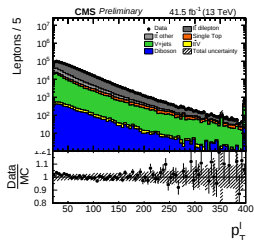


(c) Azimuthal angle of missing transverse momentum (step 7/8)

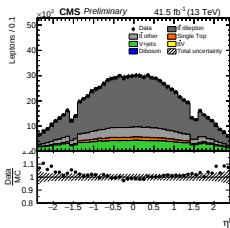


(d) Vertex multiplicity (pileup) (step 7/8)

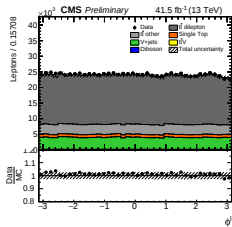
Control Plots with Combined Channels (8 of 43)



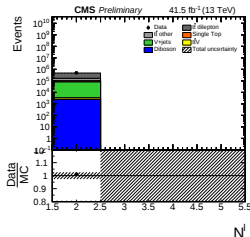
(a) Transverse momentum of leptons (step 6/8)



(b) Pseudorapidity of leptons (step 6/8)

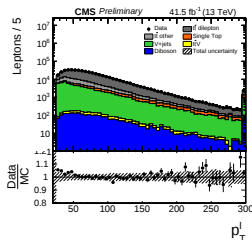


(c) Azimuthal angle of leptons (step 6/8)

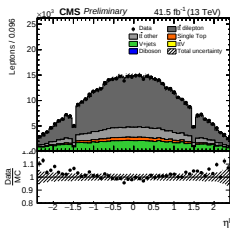


(d) Multiplicity of leptons (step 6/8)

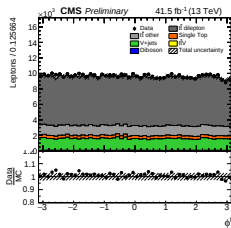
Control Plots with Combined Channels (9 of 43)



(a) Transverse momentum of leading leptons (step 6/8)

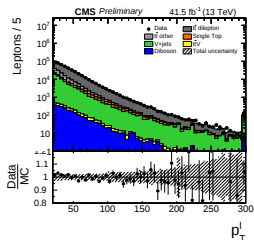


(b) Pseudorapidity of leading leptons (step 6/8)

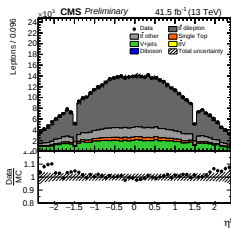


(c) Azimuthal angle of leading leptons (step 6/8)

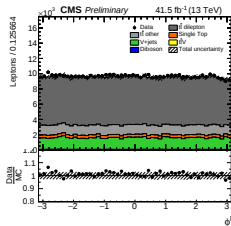
Control Plots with Combined Channels (10 of 43)



(a) Transverse momentum of 2nd leptons (step 6/8)

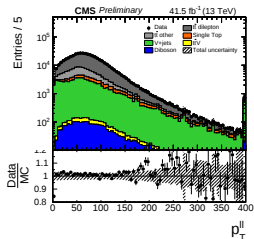


(b) Pseudorapidity of 2nd leptons (step 6/8)

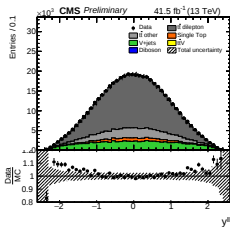


(c) Azimuthal angle of 2nd leptons (step 6/8)

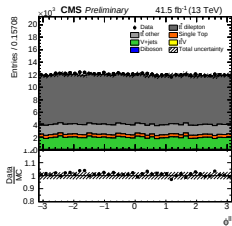
Control Plots with Combined Channels (11 of 43)



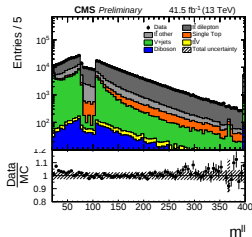
(a) Transverse momentum of di-leptons (step 6/8)



(b) Rapidity of di-leptons (step 6/8)

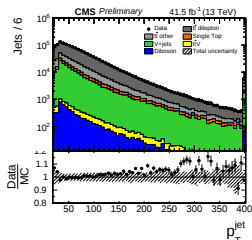


(c) Azimuthal angle of di-leptons (step 6/8)

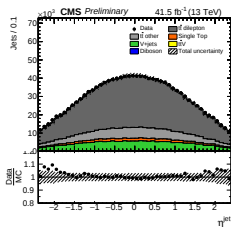


(d) Mass of di-leptons (step 6/8)

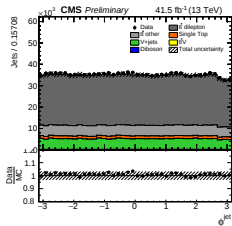
Control Plots with Combined Channels (12 of 43)



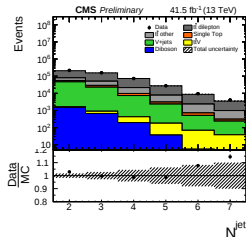
(a) Transverse momentum of jets (step 6/8)



(b) Pseudorapidity of jets (step 6/8)

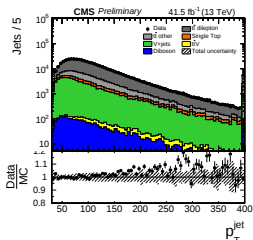


(c) Azimuthal angle of jets (step 6/8)

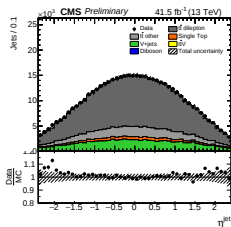


(d) Multiplicity of jets (step 6/8)

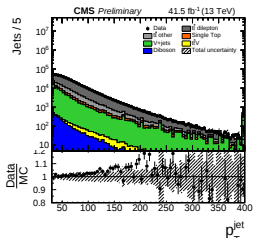
Control Plots with Combined Channels (13 of 43)



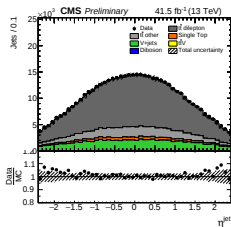
(a) Transverse momentum of leading jets (step 6/8)



(b) Pseudorapidity of leading jets (step 6/8)

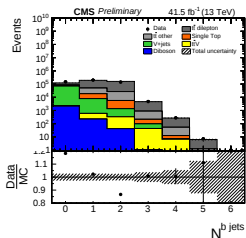


(c) Transverse momentum of subleading jets (step 6/8)

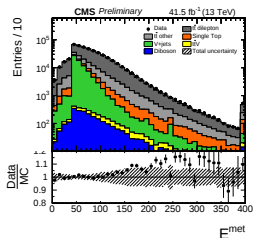


(d) Pseudorapidity of subleading jets (step 6/8)

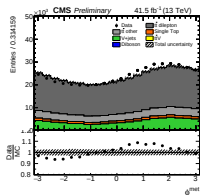
Control Plots with Combined Channels (14 of 43)



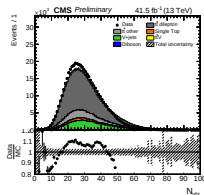
(a) Multiplicity of b-tagged jets (step 6/8)



(b) Missing transverse momentum (step 6/8)

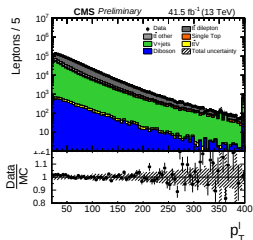


(c) Azimuthal angle of missing transverse momentum (step 6/8)

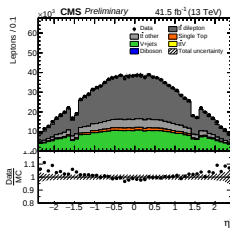


(d) Vertex multiplicity (pileup) (step 6/8)

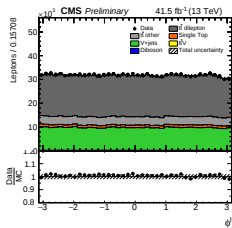
Control Plots with Combined Channels (15 of 43)



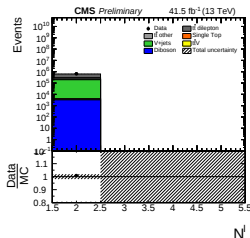
(a) Transverse momentum of leptons (step 5/8)



(b) Pseudorapidity of leptons (step 5/8)

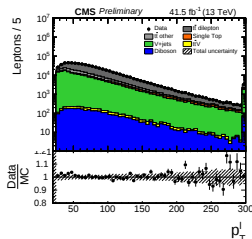


(c) Azimuthal angle of leptons (step 5/8)

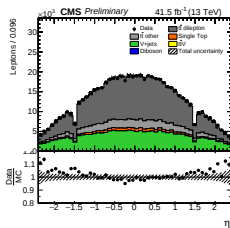


(d) Multiplicity of leptons (step 5/8)

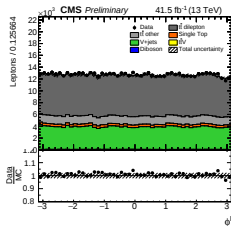
Control Plots with Combined Channels (16 of 43)



(a) Transverse momentum of leading leptons (step 5/8)

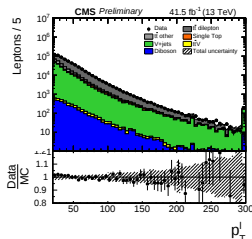


(b) Pseudorapidity of leading leptons (step 5/8)

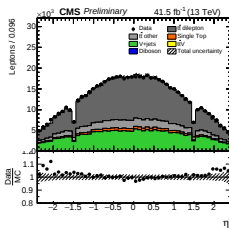


(c) Azimuthal angle of leading leptons (step 5/8)

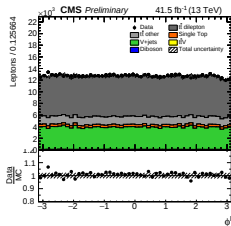
Control Plots with Combined Channels (17 of 43)



(a) Transverse momentum of 2nd leptons (step 5/8)

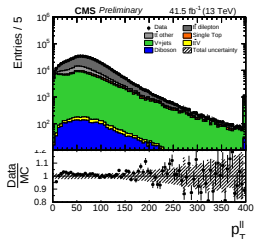


(b) Pseudorapidity of 2nd leptons (step 5/8)

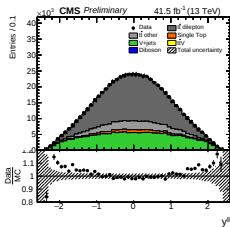


(c) Azimuthal angle of 2nd leptons (step 5/8)

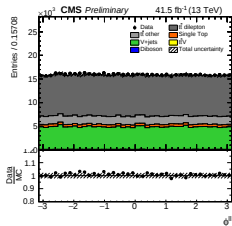
Control Plots with Combined Channels (18 of 43)



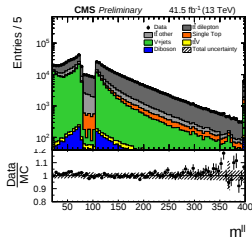
(a) Transverse momentum of di-leptons (step 5/8)



(b) Rapidity of di-leptons (step 5/8)

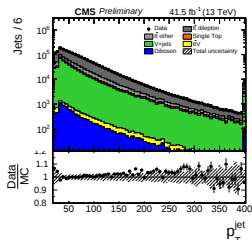


(c) Azimuthal angle of di-leptons (step 5/8)

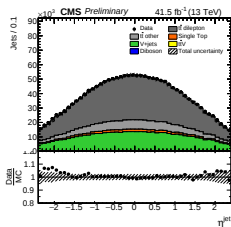


(d) Mass of di-leptons (step 5/8)

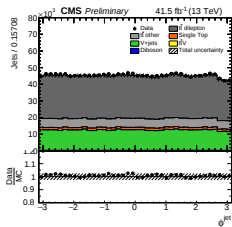
Control Plots with Combined Channels (19 of 43)



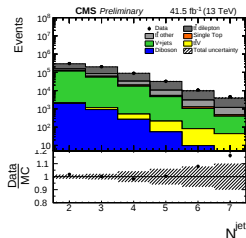
(a) Transverse momentum of jets (step 5/8)



(b) Pseudorapidity of jets (step 5/8)

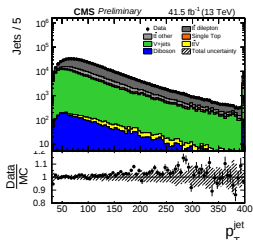


(c) Azimuthal angle of jets (step 5/8)

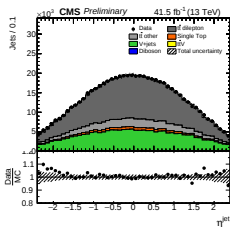


(d) Multiplicity of jets (step 5/8)

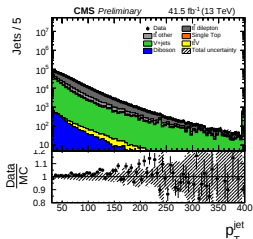
Control Plots with Combined Channels (20 of 43)



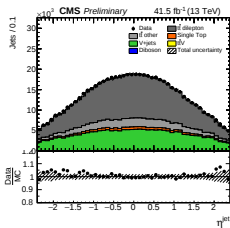
(a) Transverse momentum of leading jets (step 5/8)



(b) Pseudorapidity of leading jets (step 5/8)

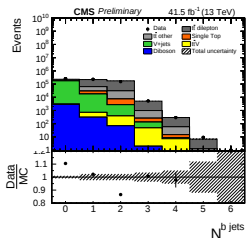


(c) Transverse momentum of subleading jets (step 5/8)

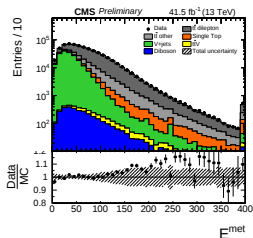


(d) Pseudorapidity of subleading jets (step 5/8)

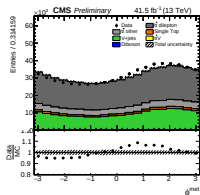
Control Plots with Combined Channels (21 of 43)



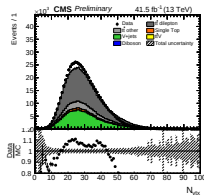
(a) Multiplicity of b-tagged jets (step 5/8)



(b) Missing transverse momentum (step 5/8)

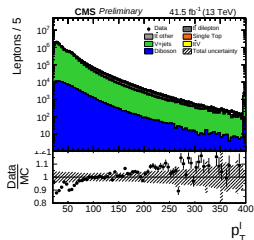


(c) Azimuthal angle of missing transverse momentum (step 5/8)

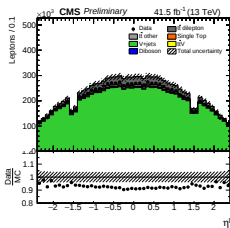


(d) Vertex multiplicity (pileup) (step 5/8)

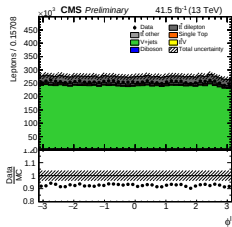
Control Plots with Combined Channels (22 of 43)



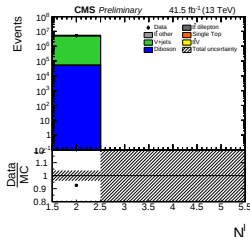
(a) Transverse momentum of leptons (step 4/8)



(b) Pseudorapidity of leptons (step 4/8)

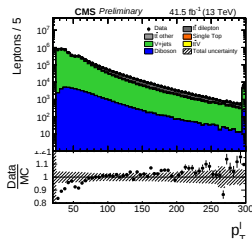


(c) Azimuthal angle of leptons (step 4/8)

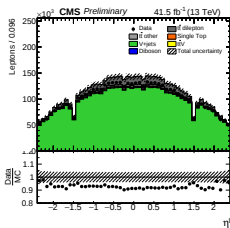


(d) Multiplicity of leptons (step 4/8)

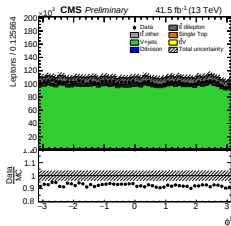
Control Plots with Combined Channels (23 of 43)



(a) Transverse momentum of leading leptons (step 4/8)

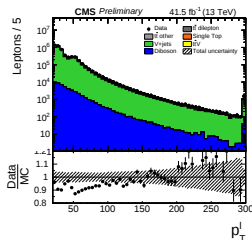


(b) Pseudorapidity of leading leptons (step 4/8)

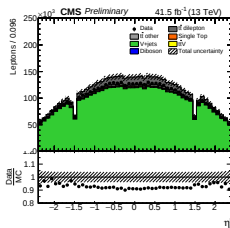


(c) Azimuthal angle of leading leptons (step 4/8)

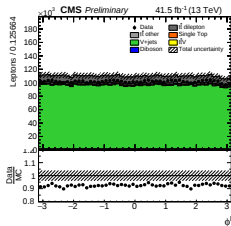
Control Plots with Combined Channels (24 of 43)



(a) Transverse momentum of 2nd leptons (step 4/8)

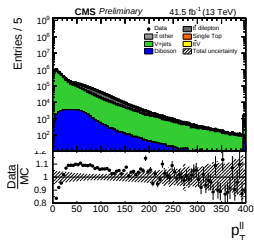


(b) Pseudorapidity of 2nd leptons (step 4/8)

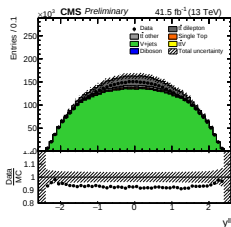


(c) Azimuthal angle of 2nd leptons (step 4/8)

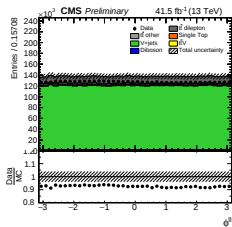
Control Plots with Combined Channels (25 of 43)



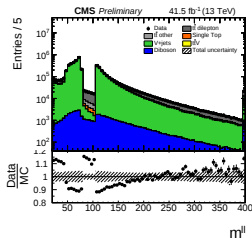
(a) Transverse momentum of di-leptons (step 4/8)



(b) Rapidity of di-leptons (step 4/8)

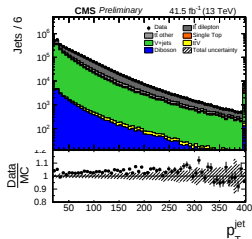


(c) Azimuthal angle of di-leptons (step 4/8)

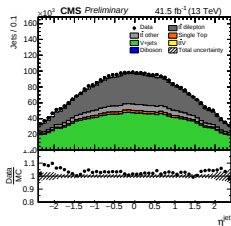


(d) Mass of di-leptons (step 4/8)

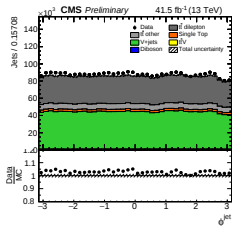
Control Plots with Combined Channels (26 of 43)



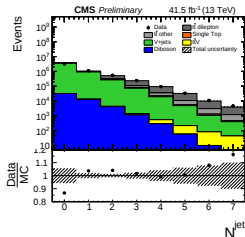
(a) Transverse momentum of jets (step 4/8)



(b) Pseudorapidity of jets (step 4/8)

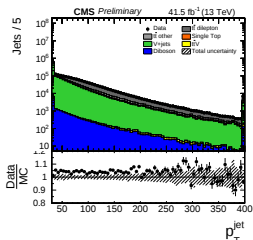


(c) Azimuthal angle of jets (step 4/8)

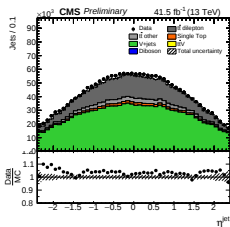


(d) Multiplicity of jets (step 4/8)

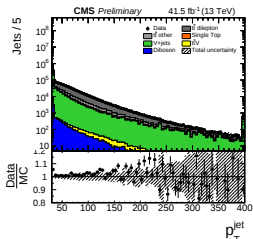
Control Plots with Combined Channels (27 of 43)



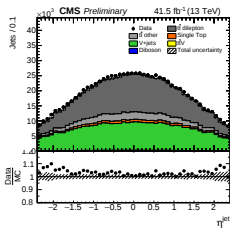
(a) Transverse momentum of leading jets (step 4/8)



(b) Pseudorapidity of leading jets (step 4/8)

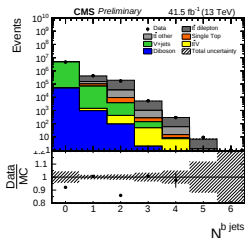


(c) Transverse momentum of subleading jets (step 4/8)

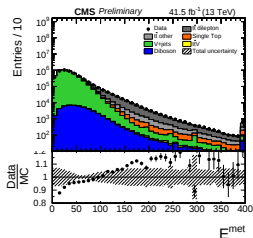


(d) Pseudorapidity of subleading jets (step 4/8)

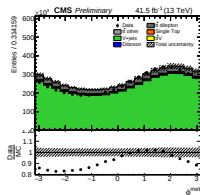
Control Plots with Combined Channels (28 of 43)



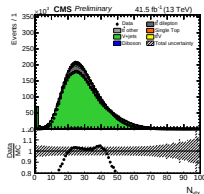
(a) Multiplicity of b-tagged jets (step 4/8)



(b) Missing transverse momentum (step 4/8)

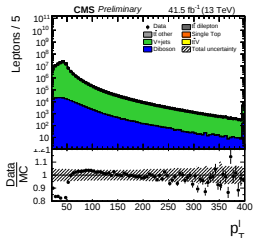


(c) Azimuthal angle of missing transverse momentum (step 4/8)

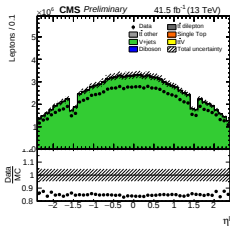


(d) Vertex multiplicity (pileup) (step 4/8)

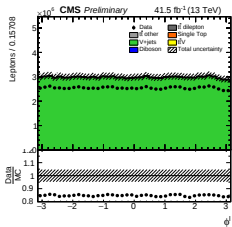
Control Plots with Combined Channels (29 of 43)



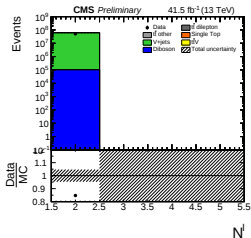
(a) Transverse momentum of leptons (step 3/8)



(b) Pseudorapidity of leptons
(step 3/8)

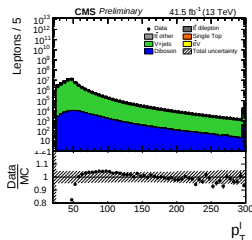


(c) Azimuthal angle of leptons (step 3/8)

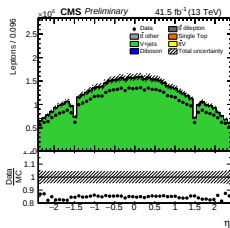


(d) Multiplicity of leptons
(step 3/8)

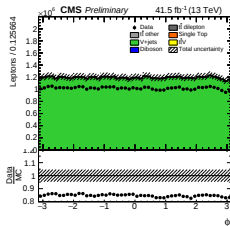
Control Plots with Combined Channels (30 of 43)



(a) Transverse momentum of leading leptons (step 3/8)

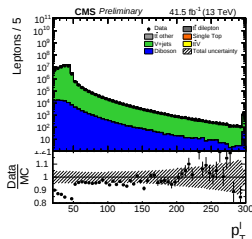


(b) Pseudorapidity of leading leptons (step 3/8)

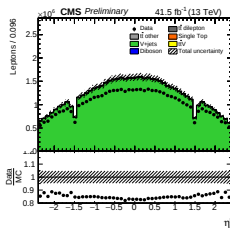


(c) Azimuthal angle of leading leptons (step 3/8)

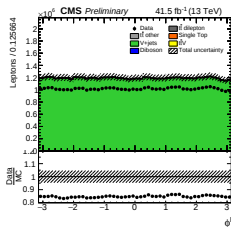
Control Plots with Combined Channels (31 of 43)



(a) Transverse momentum of 2nd leptons (step 3/8)

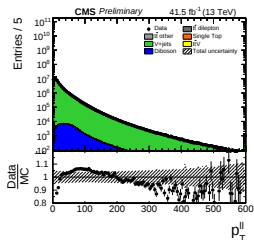


(b) Pseudorapidity of 2nd leptons (step 3/8)

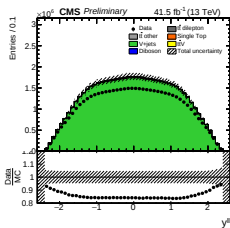


(c) Azimuthal angle of 2nd leptons (step 3/8)

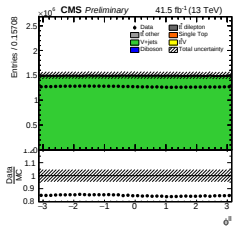
Control Plots with Combined Channels (32 of 43)



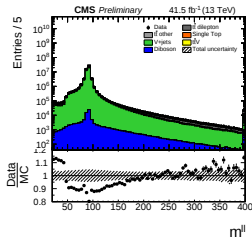
(a) Transverse momentum of di-leptons (step 3/8)



(b) Rapidity of di-leptons (step 3/8)

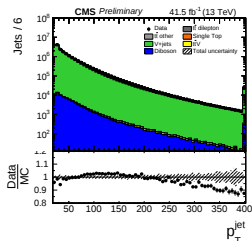


(c) Azimuthal angle of di-leptons (step 3/8)

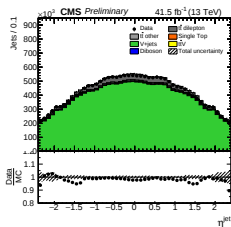


(d) Mass of di-leptons (step 3/8)

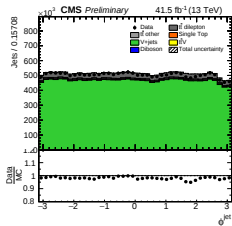
Control Plots with Combined Channels (33 of 43)



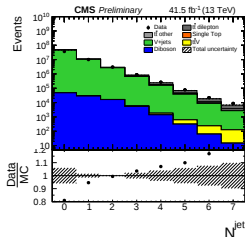
(a) Transverse momentum of jets (step 3/8)



(b) Pseudorapidity of jets (step 3/8)

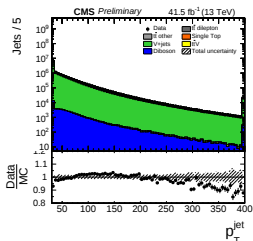


(c) Azimuthal angle of jets (step 3/8)

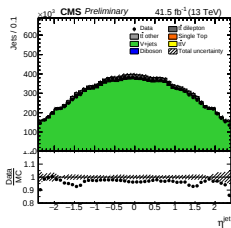


(d) Multiplicity of jets (step 3/8)

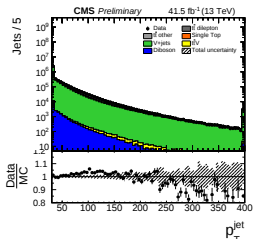
Control Plots with Combined Channels (34 of 43)



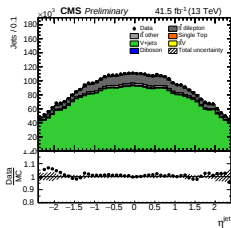
(a) Transverse momentum of leading jets (step 3/8)



(b) Pseudorapidity of leading jets (step 3/8)

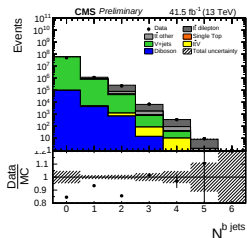


(c) Transverse momentum of subleading jets (step 3/8)

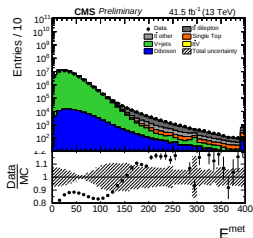


(d) Pseudorapidity of subleading jets (step 3/8)

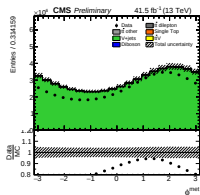
Control Plots with Combined Channels (35 of 43)



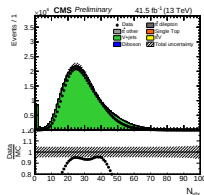
(a) Multiplicity of b-tagged jets (step 3/8)



(b) Missing transverse momentum (step 3/8)

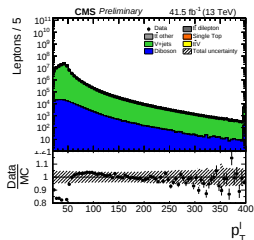


(c) Azimuthal angle of missing transverse momentum (step 3/8)

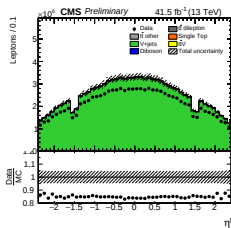


(d) Vertex multiplicity (pileup) (step 3/8)

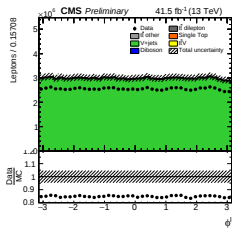
Control Plots with Combined Channels (36 of 43)



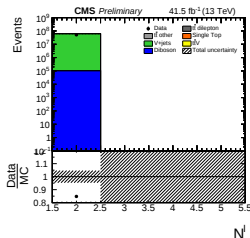
(a) Transverse momentum of leptons (step 2/8)



(b) Pseudorapidity of leptons (step 2/8)

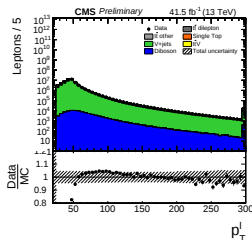


(c) Azimuthal angle of leptons (step 2/8)

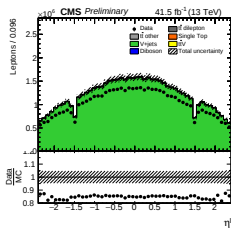


(d) Multiplicity of leptons (step 2/8)

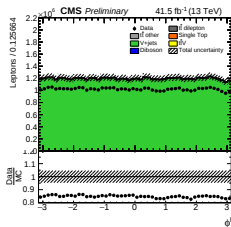
Control Plots with Combined Channels (37 of 43)



(a) Transverse momentum of leading leptons (step 2/8)

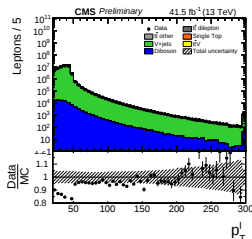


(b) Pseudorapidity of leading leptons (step 2/8)

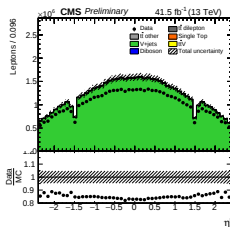


(c) Azimuthal angle of leading leptons (step 2/8)

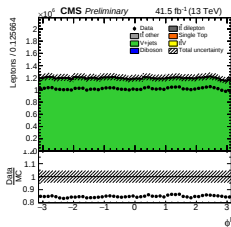
Control Plots with Combined Channels (38 of 43)



(a) Transverse momentum of 2nd leptons (step 2/8)

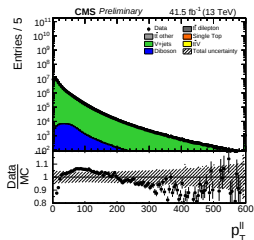


(b) Pseudorapidity of 2nd leptons (step 2/8)

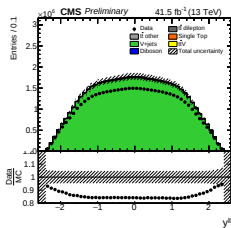


(c) Azimuthal angle of 2nd leptons (step 2/8)

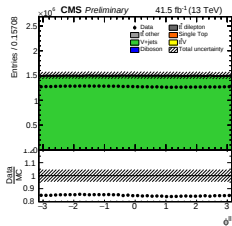
Control Plots with Combined Channels (39 of 43)



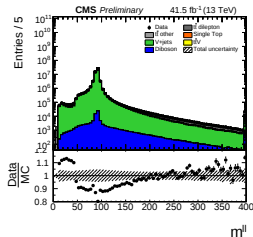
(a) Transverse momentum of di-leptons (step 2/8)



(b) Rapidity of di-leptons (step 2/8)

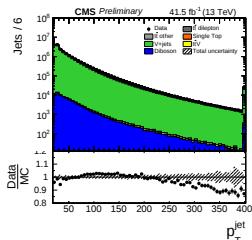


(c) Azimuthal angle of di-leptons (step 2/8)

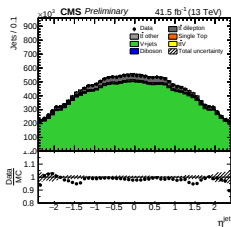


(d) Mass of di-leptons (step 2/8)

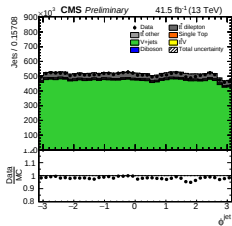
Control Plots with Combined Channels (40 of 43)



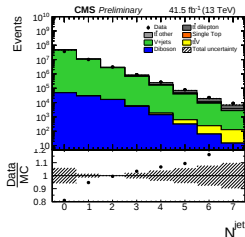
(a) Transverse momentum of jets (step 2/8)



(b) Pseudorapidity of jets (step 2/8)

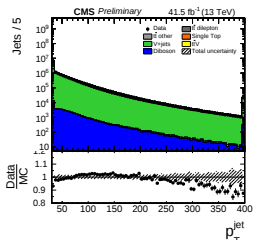


(c) Azimuthal angle of jets (step 2/8)

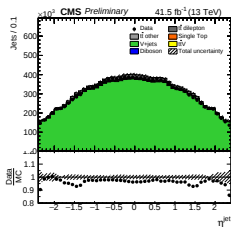


(d) Multiplicity of jets (step 2/8)

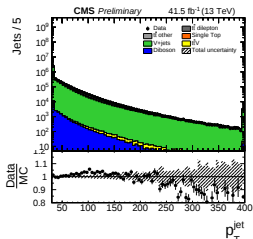
Control Plots with Combined Channels (41 of 43)



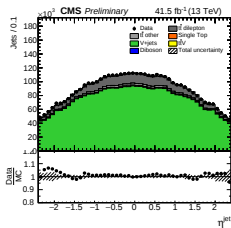
(a) Transverse momentum of leading jets (step 2/8)



(b) Pseudorapidity of leading jets (step 2/8)

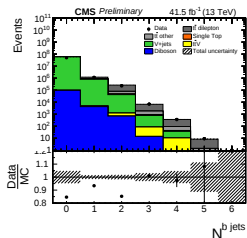


(c) Transverse momentum of subleading jets (step 2/8)

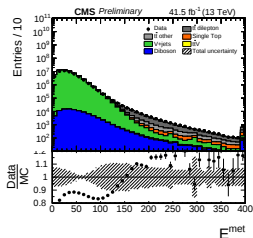


(d) Pseudorapidity of subleading jets (step 2/8)

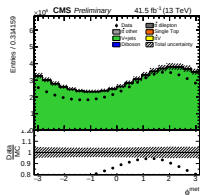
Control Plots with Combined Channels (42 of 43)



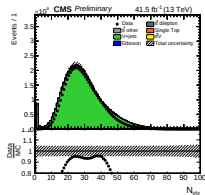
(a) Multiplicity of b-tagged jets (step 2/8)



(b) Missing transverse momentum (step 2/8)

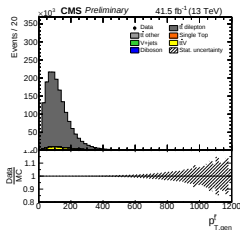


(c) Azimuthal angle of missing transverse momentum (step 2/8)

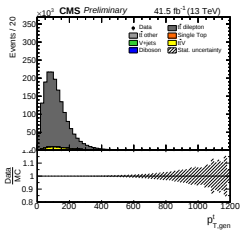


(d) Vertex multiplicity (pileup) (step 2/8)

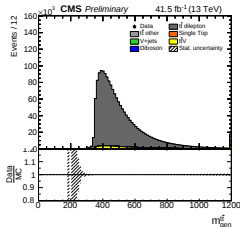
Control Plots with Combined Channels (43 of 43)



(a) Transverse momentum of antitop quark.

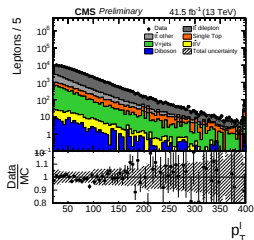


(b) Transverse momentum of top quark.

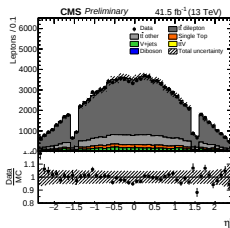


(c) Mass of $t\bar{t}$ system.

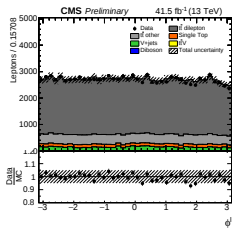
Control Plots with ee Channel (1 of 43)



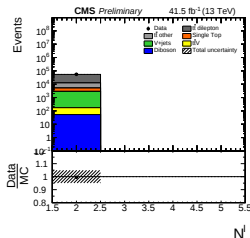
(a) Transverse momentum of leptons (step 7/8)



(b) Pseudorapidity of leptons (step 7/8)

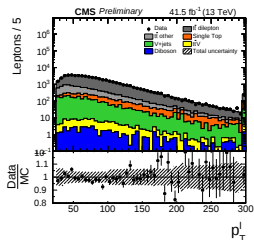


(c) Azimuthal angle of leptons (step 7/8)

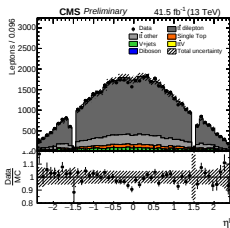


(d) Multiplicity of leptons (step 7/8)

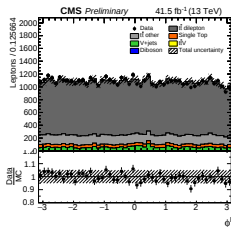
Control Plots with ee Channel (2 of 43)



(a) Transverse momentum of leading leptons (step 7/8)

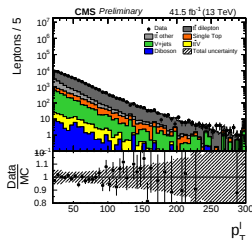


(b) Pseudorapidity of leading leptons (step 7/8)

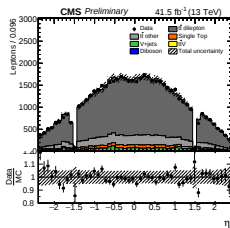


(c) Azimuthal angle of leading leptons (step 7/8)

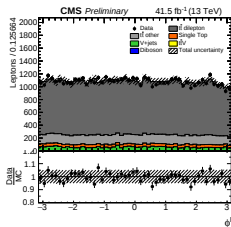
Control Plots with ee Channel (3 of 43)



(a) Transverse momentum of 2nd leptons (step 7/8)

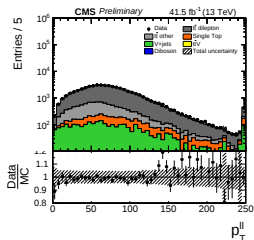


(b) Pseudorapidity of 2nd leptons (step 7/8)

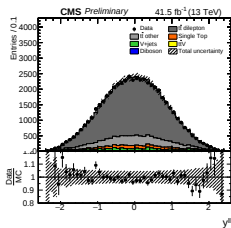


(c) Azimuthal angle of 2nd leptons (step 7/8)

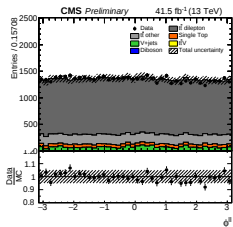
Control Plots with ee Channel (4 of 43)



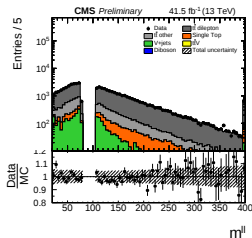
(a) Transverse momentum of di-leptons (step 7/8)



(b) Rapidity of di-leptons (step 7/8)

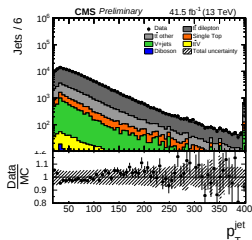


(c) Azimuthal angle of di-leptons (step 7/8)

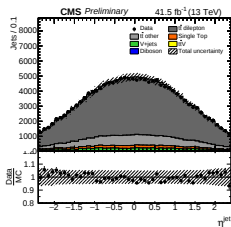


(d) Mass of di-leptons (step 7/8)

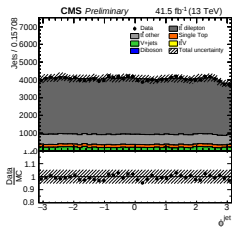
Control Plots with ee Channel (5 of 43)



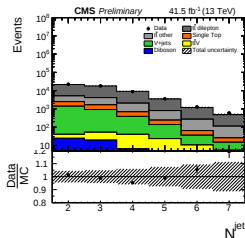
(a) Transverse momentum of jets (step 7/8)



(b) Pseudorapidity of jets (step 7/8)

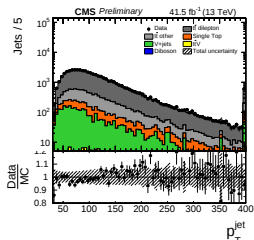


(c) Azimuthal angle of jets (step 7/8)

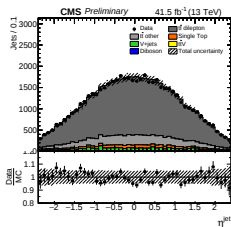


(d) Multiplicity of jets (step 7/8)

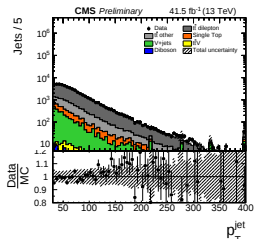
Control Plots with ee Channel (6 of 43)



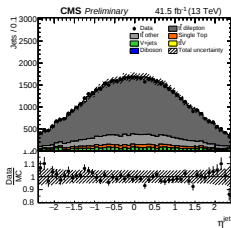
(a) Transverse momentum of leading jets (step 7/8)



(b) Pseudorapidity of leading jets (step 7/8)

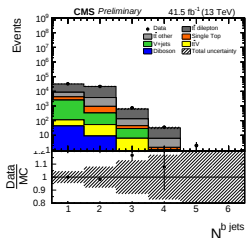


(c) Transverse momentum of subleading jets (step 7/8)

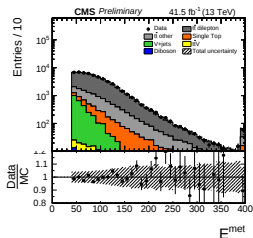


(d) Pseudorapidity of subleading jets (step 7/8)

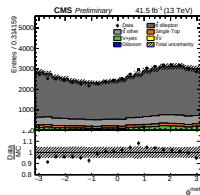
Control Plots with ee Channel (7 of 43)



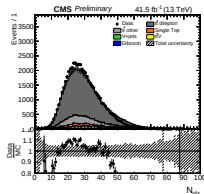
(a) Multiplicity of b-tagged jets (step 7/8)



(b) Missing transverse momentum (step 7/8)

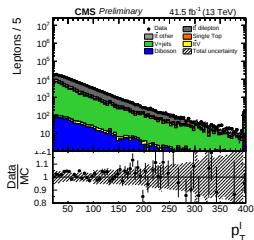


(c) Azimuthal angle of missing transverse momentum (step 7/8)

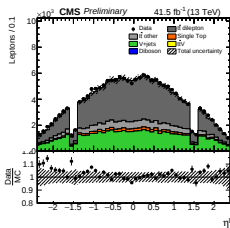


(d) Vertex multiplicity (pileup) (step 7/8)

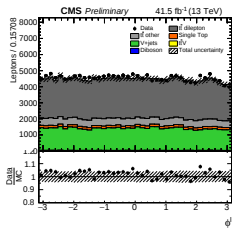
Control Plots with ee Channel (8 of 43)



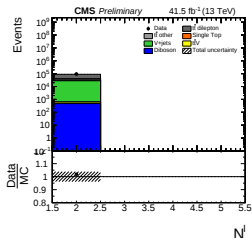
(a) Transverse momentum of leptons (step 6/8)



(b) Pseudorapidity of leptons (step 6/8)

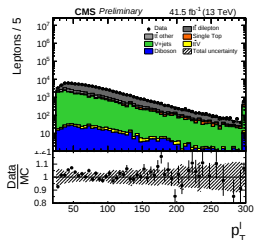


(c) Azimuthal angle of leptons (step 6/8)

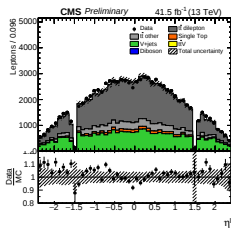


(d) Multiplicity of leptons (step 6/8)

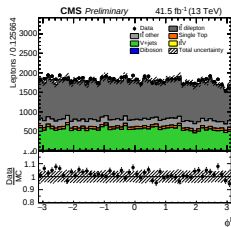
Control Plots with ee Channel (9 of 43)



(a) Transverse momentum of leading leptons (step 6/8)

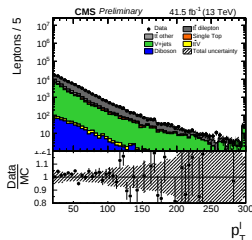


(b) Pseudorapidity of leading leptons (step 6/8)

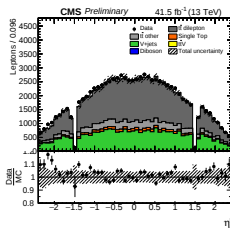


(c) Azimuthal angle of leading leptons (step 6/8)

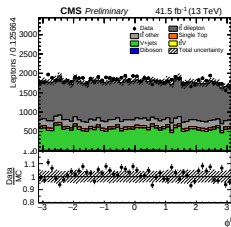
Control Plots with ee Channel (10 of 43)



(a) Transverse momentum of 2nd leptons (step 6/8)

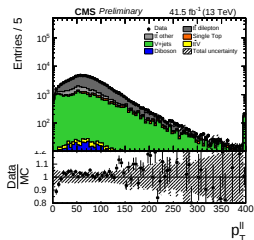


(b) Pseudorapidity of 2nd leptons (step 6/8)

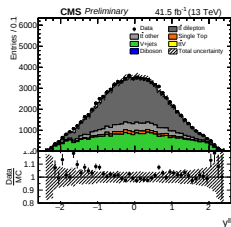


(c) Azimuthal angle of 2nd leptons (step 6/8)

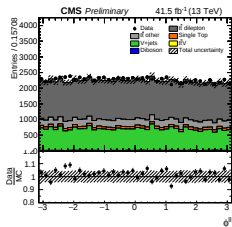
Control Plots with ee Channel (11 of 43)



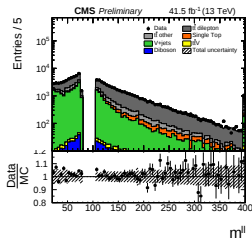
(a) Transverse momentum of di-leptons (step 6/8)



(b) Rapidity of di-leptons (step 6/8)

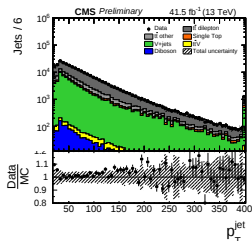


(c) Azimuthal angle of di-leptons (step 6/8)

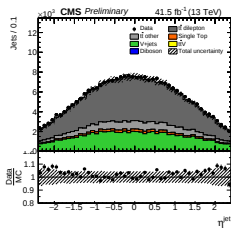


(d) Mass of di-leptons (step 6/8)

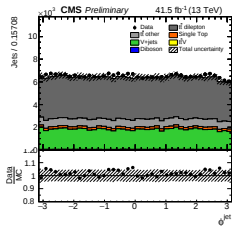
Control Plots with ee Channel (12 of 43)



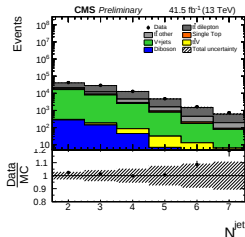
(a) Transverse momentum of jets (step 6/8)



(b) Pseudorapidity of jets (step 6/8)

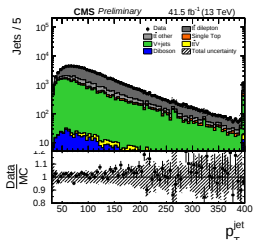


(c) Azimuthal angle of jets (step 6/8)

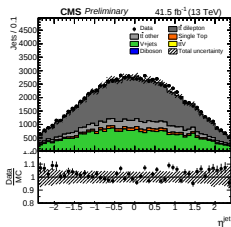


(d) Multiplicity of jets (step 6/8)

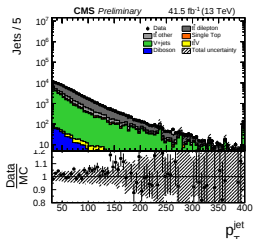
Control Plots with ee Channel (13 of 43)



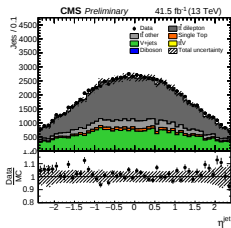
(a) Transverse momentum of leading jets (step 6/8)



(b) Pseudorapidity of leading jets (step 6/8)

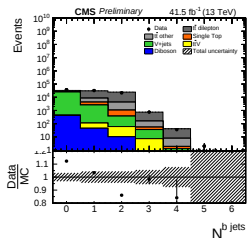


(c) Transverse momentum of subleading jets (step 6/8)

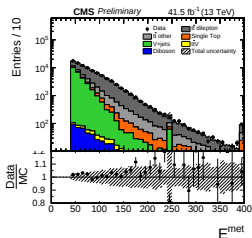


(d) Pseudorapidity of subleading jets (step 6/8)

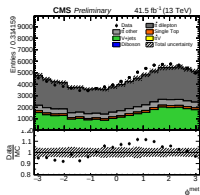
Control Plots with ee Channel (14 of 43)



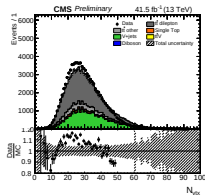
(a) Multiplicity of b-tagged jets (step 6/8)



(b) Missing transverse momentum (step 6/8)

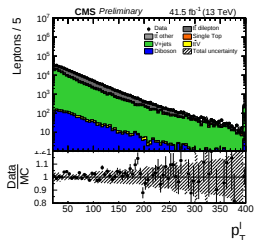


(c) Azimuthal angle of missing transverse momentum (step 6/8)

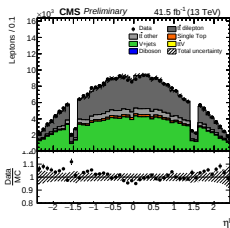


(d) Vertex multiplicity (pileup) (step 6/8)

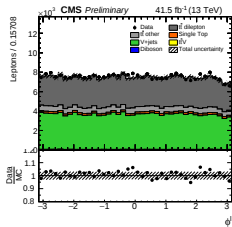
Control Plots with ee Channel (15 of 43)



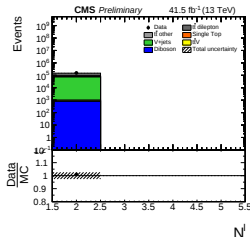
(a) Transverse momentum of leptons (step 5/8)



(b) Pseudorapidity of leptons (step 5/8)

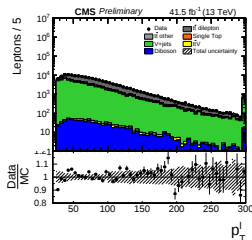


(c) Azimuthal angle of leptons (step 5/8)

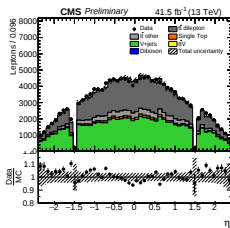


(d) Multiplicity of leptons (step 5/8)

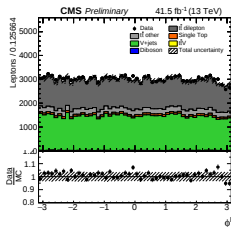
Control Plots with ee Channel (16 of 43)



(a) Transverse momentum of leading leptons (step 5/8)

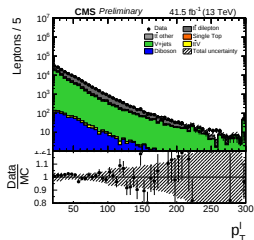


(b) Pseudorapidity of leading leptons (step 5/8)

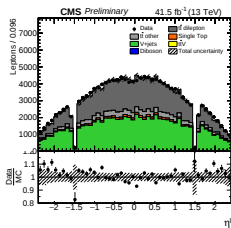


(c) Azimuthal angle of leading leptons (step 5/8)

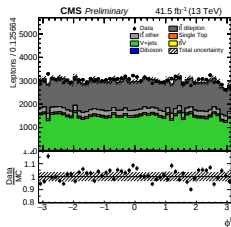
Control Plots with ee Channel (17 of 43)



(a) Transverse momentum of 2nd leptons (step 5/8)

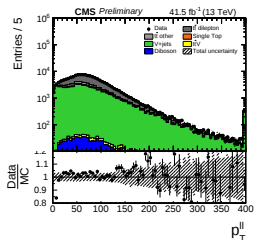


(b) Pseudorapidity of 2nd leptons (step 5/8)

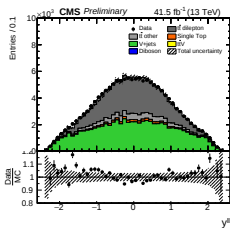


(c) Azimuthal angle of 2nd leptons (step 5/8)

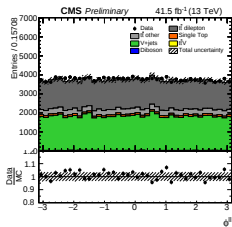
Control Plots with ee Channel (18 of 43)



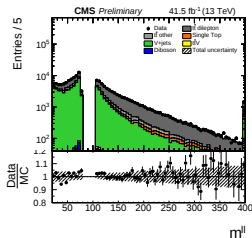
(a) Transverse momentum of di-leptons (step 5/8)



(b) Rapidity of di-leptons (step 5/8)

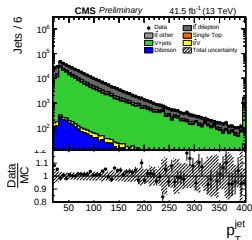


(c) Azimuthal angle of di-leptons (step 5/8)

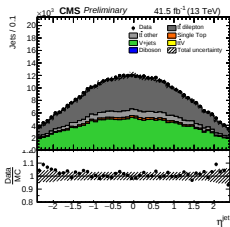


(d) Mass of di-leptons (step 5/8)

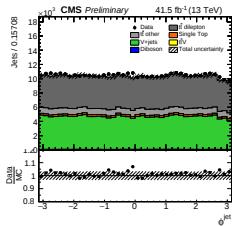
Control Plots with ee Channel (19 of 43)



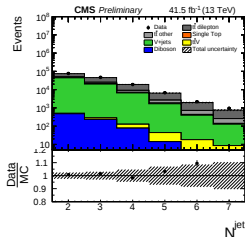
(a) Transverse momentum of jets (step 5/8)



(b) Pseudorapidity of jets (step 5/8)

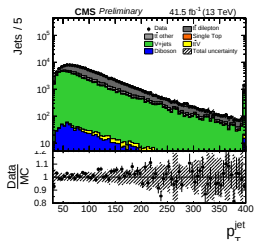


(c) Azimuthal angle of jets (step 5/8)

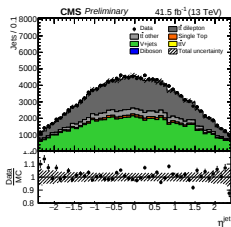


(d) Multiplicity of jets (step 5/8)

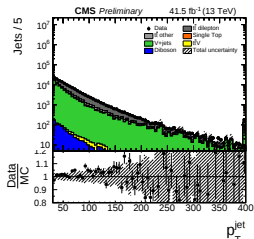
Control Plots with ee Channel (20 of 43)



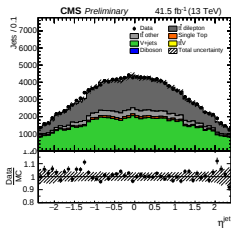
(a) Transverse momentum of leading jets (step 5/8)



(b) Pseudorapidity of leading jets (step 5/8)

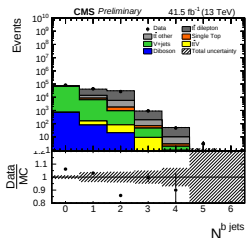


(c) Transverse momentum of subleading jets (step 5/8)

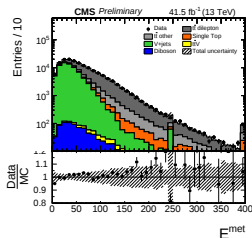


(d) Pseudorapidity of subleading jets (step 5/8)

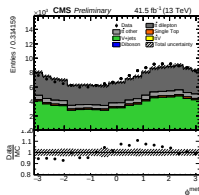
Control Plots with ee Channel (21 of 43)



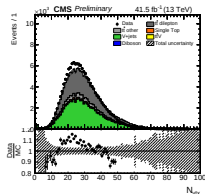
(a) Multiplicity of b-tagged jets (step 5/8)



(b) Missing transverse momentum (step 5/8)

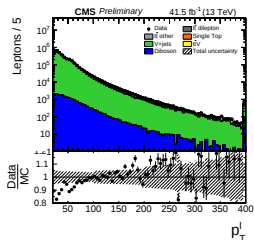


(c) Azimuthal angle of missing transverse momentum (step 5/8)

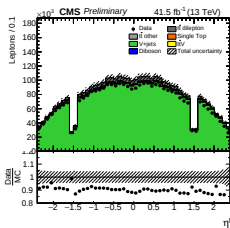


(d) Vertex multiplicity (pileup) (step 5/8)

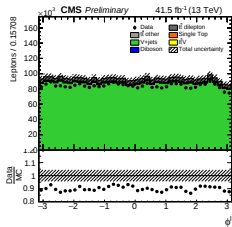
Control Plots with ee Channel (22 of 43)



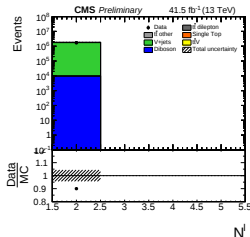
(a) Transverse momentum of leptons (step 4/8)



(b) Pseudorapidity of leptons (step 4/8)

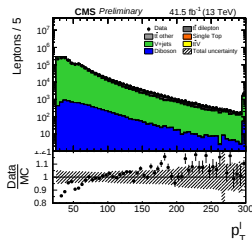


(c) Azimuthal angle of leptons (step 4/8)

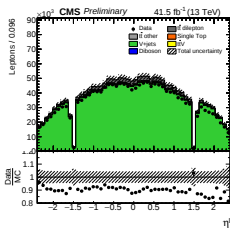


(d) Multiplicity of leptons (step 4/8)

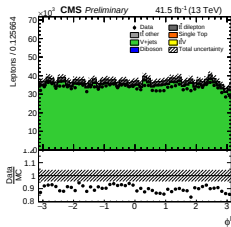
Control Plots with ee Channel (23 of 43)



(a) Transverse momentum of leading leptons (step 4/8)

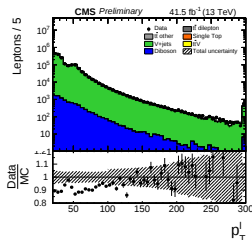


(b) Pseudorapidity of leading leptons (step 4/8)

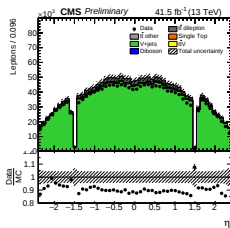


(c) Azimuthal angle of leading leptons (step 4/8)

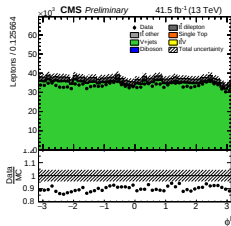
Control Plots with ee Channel (24 of 43)



(a) Transverse momentum of 2nd leptons (step 4/8)

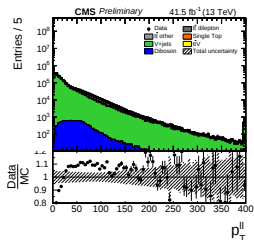


(b) Pseudorapidity of 2nd leptons (step 4/8)

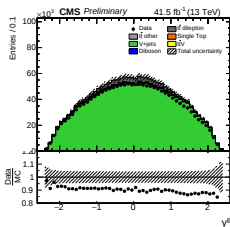


(c) Azimuthal angle of 2nd leptons (step 4/8)

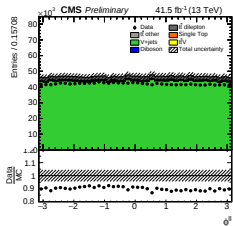
Control Plots with ee Channel (25 of 43)



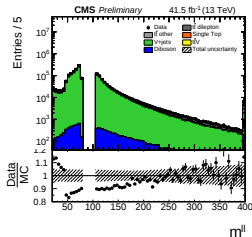
(a) Transverse momentum of di-leptons (step 4/8)



(b) Rapidity of di-leptons (step 4/8)

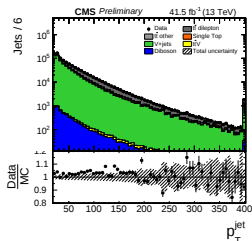


(c) Azimuthal angle of di-leptons (step 4/8)

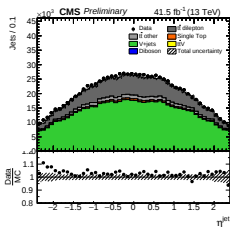


(d) Mass of di-leptons (step 4/8)

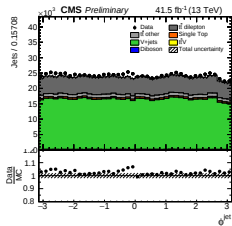
Control Plots with ee Channel (26 of 43)



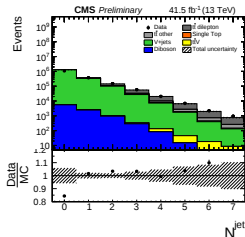
(a) Transverse momentum of jets (step 4/8)



(b) Pseudorapidity of jets (step 4/8)

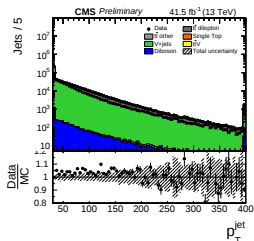


(c) Azimuthal angle of jets (step 4/8)

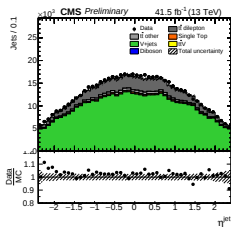


(d) Multiplicity of jets (step 4/8)

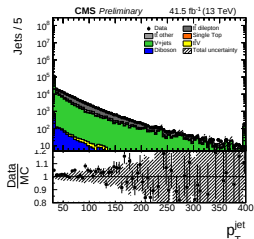
Control Plots with ee Channel (27 of 43)



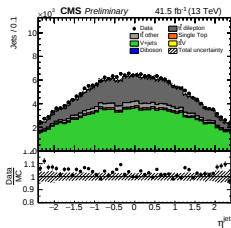
(a) Transverse momentum of leading jets (step 4/8)



(b) Pseudorapidity of leading jets (step 4/8)

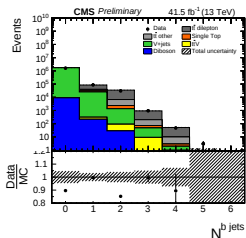


(c) Transverse momentum of subleading jets (step 4/8)

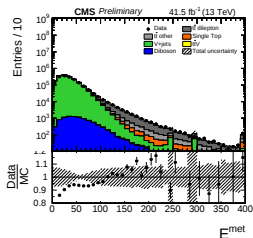


(d) Pseudorapidity of subleading jets (step 4/8)

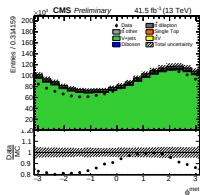
Control Plots with ee Channel (28 of 43)



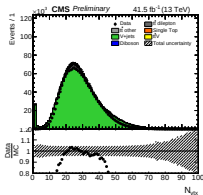
(a) Multiplicity of b-tagged jets (step 4/8)



(b) Missing transverse momentum (step 4/8)

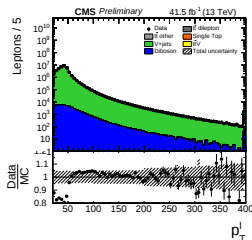


(c) Azimuthal angle of missing transverse momentum (step 4/8)

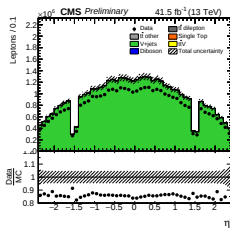


(d) Vertex multiplicity (pileup) (step 4/8)

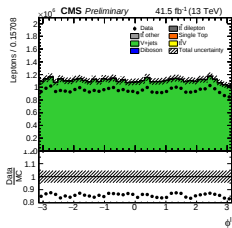
Control Plots with ee Channel (29 of 43)



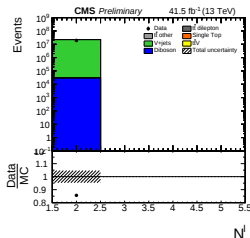
(a) Transverse momentum of leptons (step 3/8)



(b) Pseudorapidity of leptons (step 3/8)

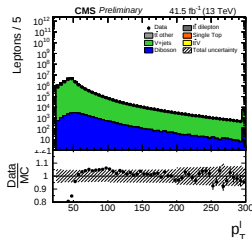


(c) Azimuthal angle of leptons (step 3/8)

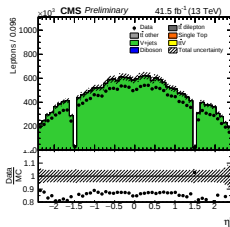


(d) Multiplicity of leptons (step 3/8)

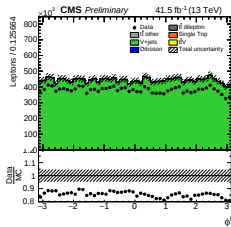
Control Plots with ee Channel (30 of 43)



(a) Transverse momentum of leading leptons (step 3/8)

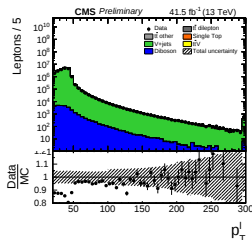


(b) Pseudorapidity of leading leptons (step 3/8)

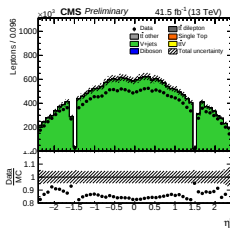


(c) Azimuthal angle of leading leptons (step 3/8)

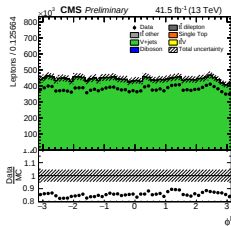
Control Plots with ee Channel (31 of 43)



(a) Transverse momentum of 2nd leptons (step 3/8)

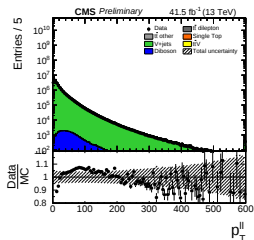


(b) Pseudorapidity of 2nd leptons (step 3/8)

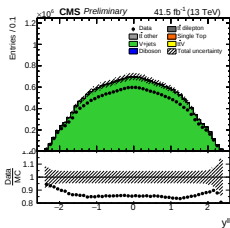


(c) Azimuthal angle of 2nd leptons (step 3/8)

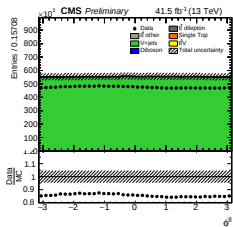
Control Plots with ee Channel (32 of 43)



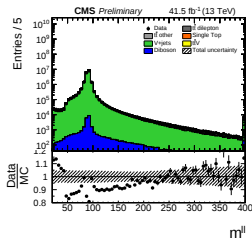
(a) Transverse momentum of di-leptons (step 3/8)



(b) Rapidity of di-leptons (step 3/8)

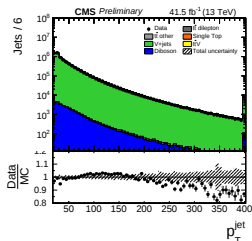


(c) Azimuthal angle of di-leptons (step 3/8)

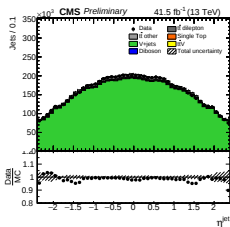


(d) Mass of di-leptons (step 3/8)

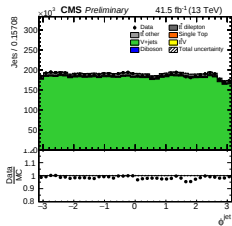
Control Plots with ee Channel (33 of 43)



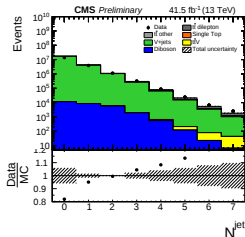
(a) Transverse momentum of jets (step 3/8)



(b) Pseudorapidity of jets (step 3/8)

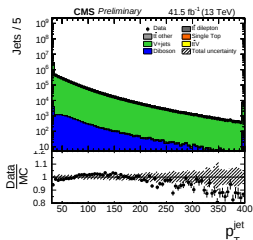


(c) Azimuthal angle of jets (step 3/8)

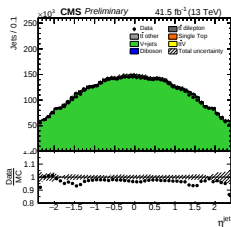


(d) Multiplicity of jets (step 3/8)

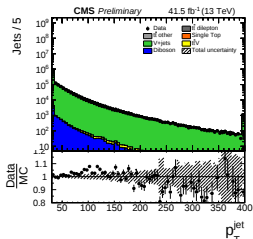
Control Plots with ee Channel (34 of 43)



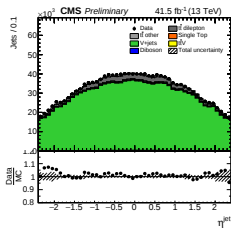
(a) Transverse momentum of leading jets (step 3/8)



(b) Pseudorapidity of leading jets (step 3/8)

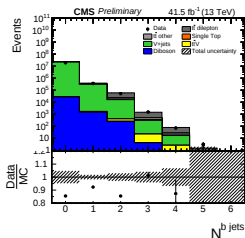


(c) Transverse momentum of subleading jets (step 3/8)

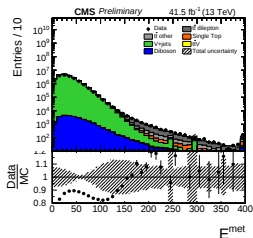


(d) Pseudorapidity of subleading jets (step 3/8)

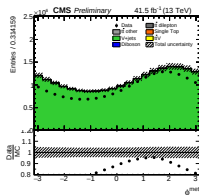
Control Plots with ee Channel (35 of 43)



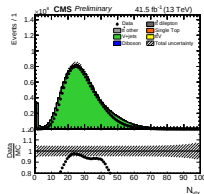
(a) Multiplicity of b-tagged jets (step 3/8)



(b) Missing transverse momentum (step 3/8)

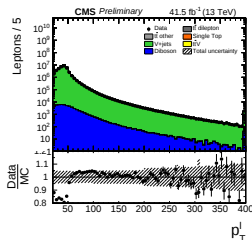


(c) Azimuthal angle of missing transverse momentum (step 3/8)

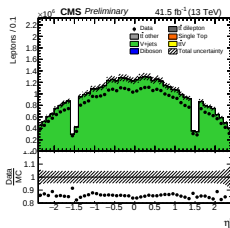


(d) Vertex multiplicity (pileup) (step 3/8)

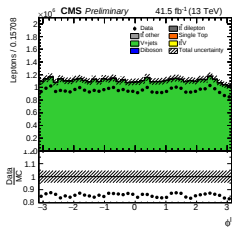
Control Plots with ee Channel (36 of 43)



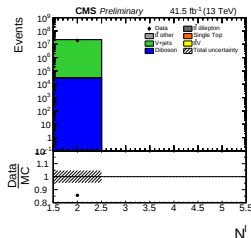
(a) Transverse momentum of leptons (step 2/8)



(b) Pseudorapidity of leptons (step 2/8)

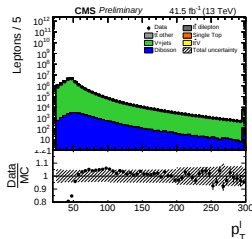


(c) Azimuthal angle of leptons (step 2/8)

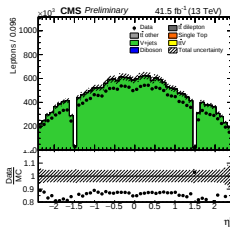


(d) Multiplicity of leptons (step 2/8)

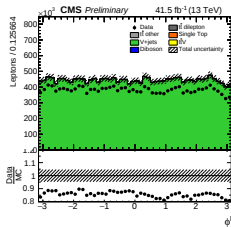
Control Plots with ee Channel (37 of 43)



(a) Transverse momentum of leading leptons (step 2/8)

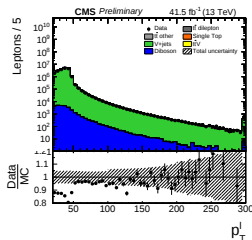


(b) Pseudorapidity of leading leptons (step 2/8)

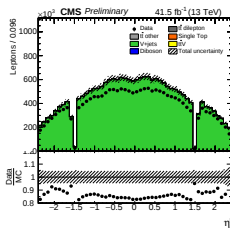


(c) Azimuthal angle of leading leptons (step 2/8)

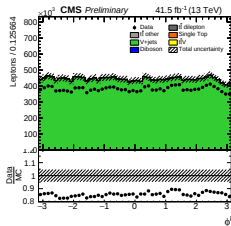
Control Plots with ee Channel (38 of 43)



(a) Transverse momentum of 2nd leptons (step 2/8)

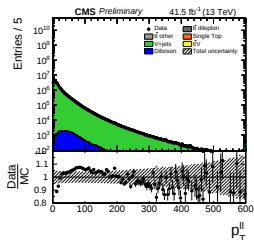


(b) Pseudorapidity of 2nd leptons (step 2/8)

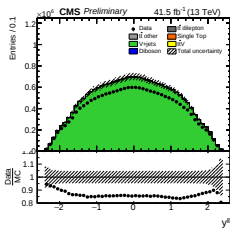


(c) Azimuthal angle of 2nd leptons (step 2/8)

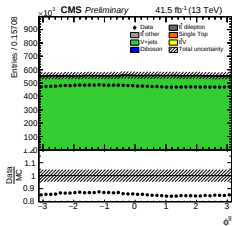
Control Plots with ee Channel (39 of 43)



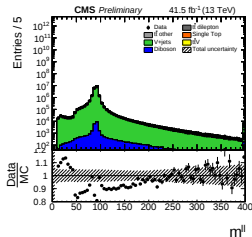
(a) Transverse momentum of di-leptons (step 2/8)



(b) Rapidity of di-leptons (step 2/8)

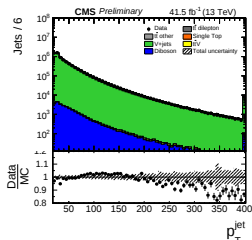


(c) Azimuthal angle of di-leptons (step 2/8)

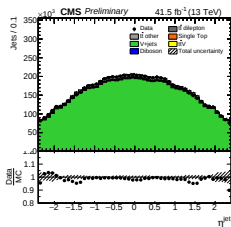


(d) Mass of di-leptons (step 2/8)

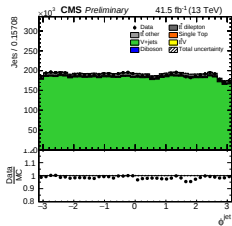
Control Plots with ee Channel (40 of 43)



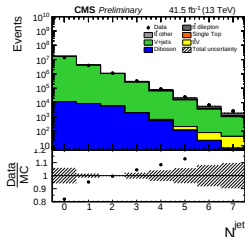
(a) Transverse momentum of jets (step 2/8)



(b) Pseudorapidity of jets (step 2/8)

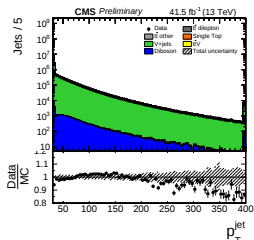


(c) Azimuthal angle of jets (step 2/8)

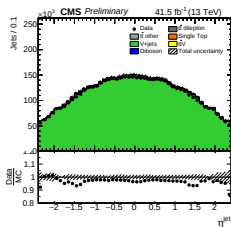


(d) Multiplicity of jets (step 2/8)

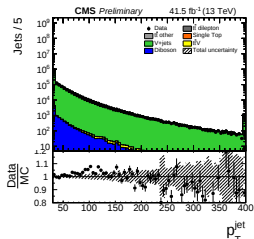
Control Plots with ee Channel (41 of 43)



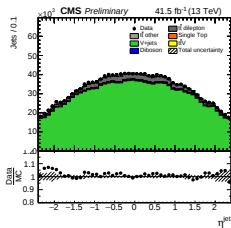
(a) Transverse momentum of leading jets (step 2/8)



(b) Pseudorapidity of leading jets (step 2/8)

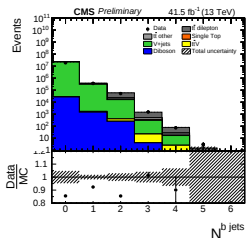


(c) Transverse momentum of subleading jets (step 2/8)

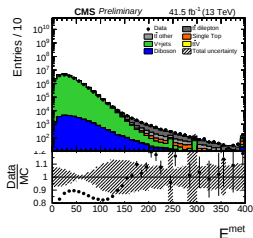


(d) Pseudorapidity of subleading jets (step 2/8)

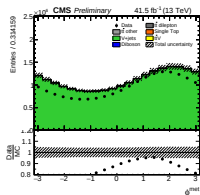
Control Plots with ee Channel (42 of 43)



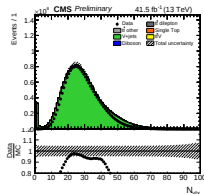
(a) Multiplicity of b-tagged jets (step 2/8)



(b) Missing transverse momentum (step 2/8)

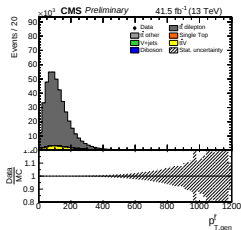


(c) Azimuthal angle of missing transverse momentum (step 2/8)

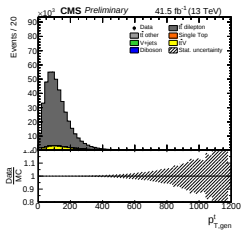


(d) Vertex multiplicity (pileup) (step 2/8)

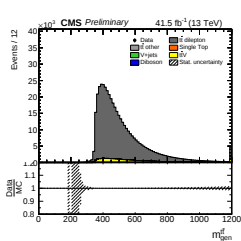
Control Plots with ee Channel (43 of 43)



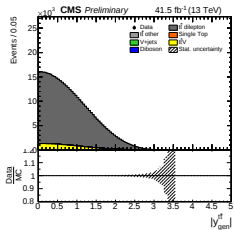
(a) Transverse momentum of antitop quark.



(b) Transverse momentum of top quark.

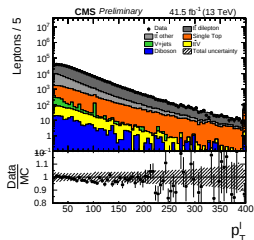


(c) Mass of $t\bar{t}$ system.

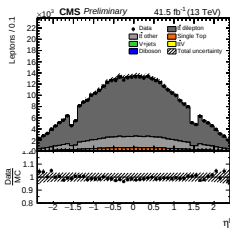


(d) Absolute rapidity of $t\bar{t}$ system.

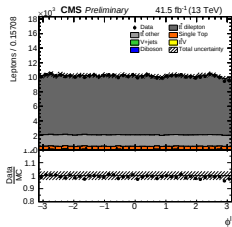
Control Plots with emu Channel (1 of 29)



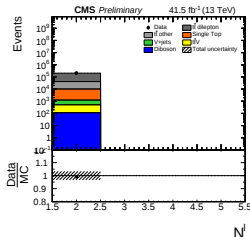
(a) Transverse momentum of leptons (step 7/8)



(b) Pseudorapidity of leptons (step 7/8)

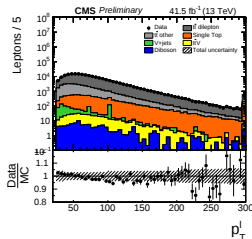


(c) Azimuthal angle of leptons (step 7/8)

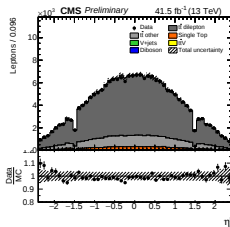


(d) Multiplicity of leptons (step 7/8)

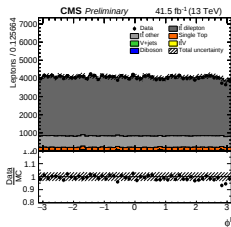
Control Plots with emu Channel (2 of 29)



(a) Transverse momentum of leading leptons (step 7/8)

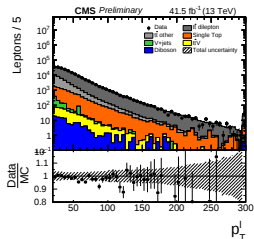


(b) Pseudorapidity of leading leptons (step 7/8)

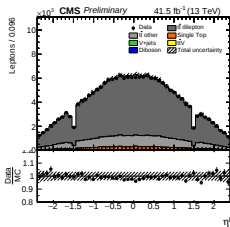


(c) Azimuthal angle of leading leptons (step 7/8)

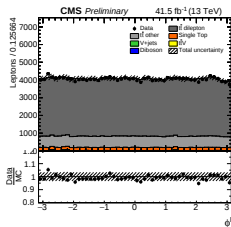
Control Plots with emu Channel (3 of 29)



(a) Transverse momentum of 2nd leptons (step 7/8)

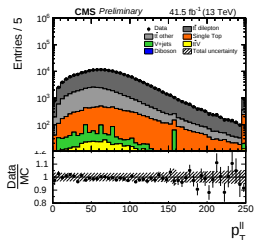


(b) Pseudorapidity of 2nd leptons (step 7/8)

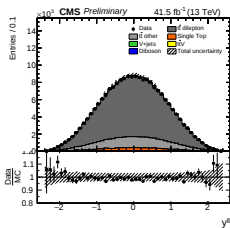


(c) Azimuthal angle of 2nd leptons (step 7/8)

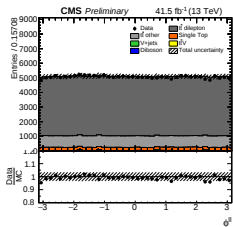
Control Plots with emu Channel (4 of 29)



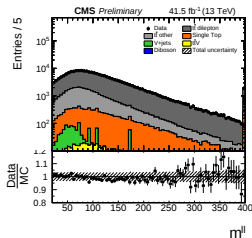
(a) Transverse momentum of di-leptons (step 7/8)



(b) Rapidity of di-leptons (step 7/8)

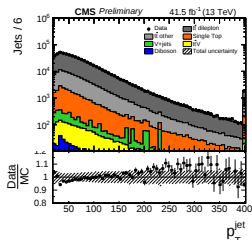


(c) Azimuthal angle of di-leptons (step 7/8)

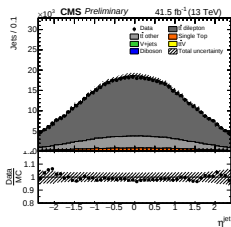


(d) Mass of di-leptons (step 7/8)

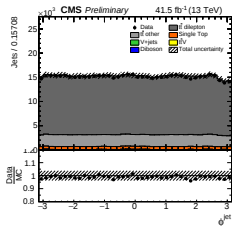
Control Plots with emu Channel (5 of 29)



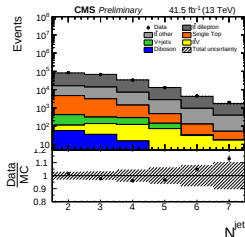
(a) Transverse momentum of jets (step 7/8)



(b) Pseudorapidity of jets (step 7/8)

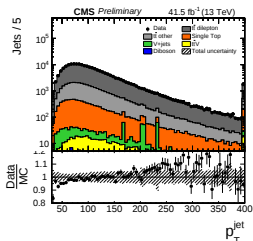


(c) Azimuthal angle of jets (step 7/8)

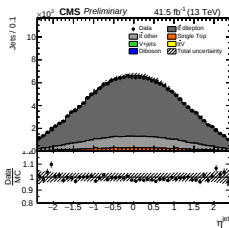


(d) Multiplicity of jets (step 7/8)

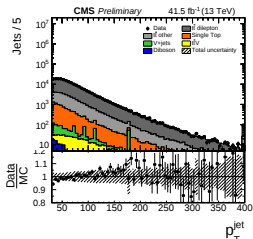
Control Plots with emu Channel (6 of 29)



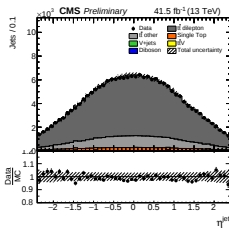
(a) Transverse momentum of leading jets (step 7/8)



(b) Pseudorapidity of leading jets (step 7/8)

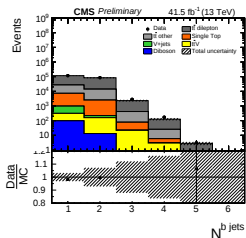


(c) Transverse momentum of subleading jets (step 7/8)

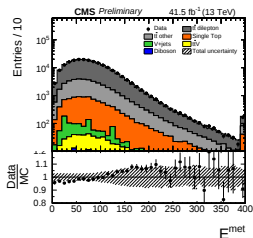


(d) Pseudorapidity of subleading jets (step 7/8)

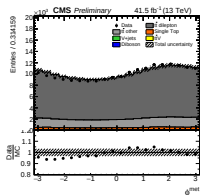
Control Plots with emu Channel (7 of 29)



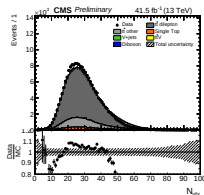
(a) Multiplicity of b-tagged jets (step 7/8)



(b) Missing transverse momentum (step 7/8)

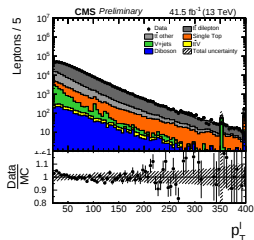


(c) Azimuthal angle of missing transverse momentum (step 7/8)

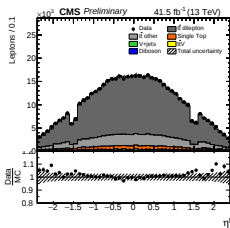


(d) Vertex multiplicity (pileup) (step 7/8)

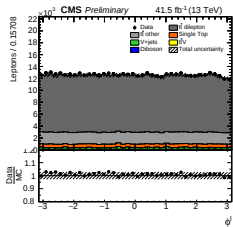
Control Plots with emu Channel (8 of 29)



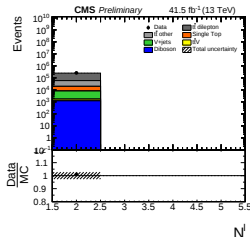
(a) Transverse momentum of leptons (step 5/8)



(b) Pseudorapidity of leptons (step 5/8)

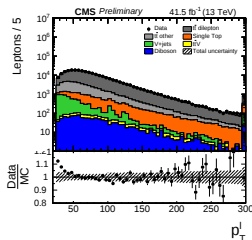


(c) Azimuthal angle of leptons (step 5/8)

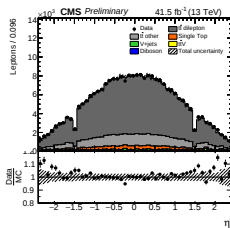


(d) Multiplicity of leptons (step 5/8)

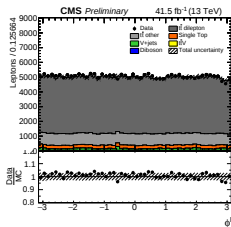
Control Plots with emu Channel (9 of 29)



(a) Transverse momentum of leading leptons (step 5/8)

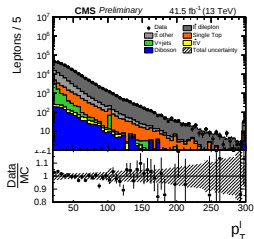


(b) Pseudorapidity of leading leptons (step 5/8)

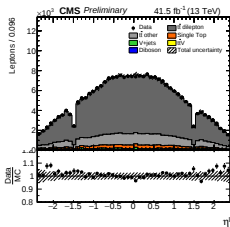


(c) Azimuthal angle of leading leptons (step 5/8)

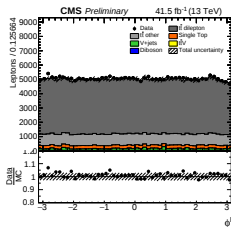
Control Plots with emu Channel (10 of 29)



(a) Transverse momentum of 2nd leptons (step 5/8)

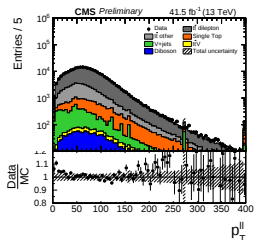


(b) Pseudorapidity of 2nd leptons (step 5/8)

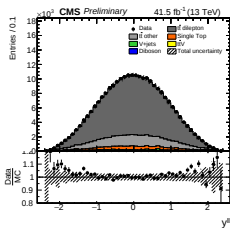


(c) Azimuthal angle of 2nd leptons (step 5/8)

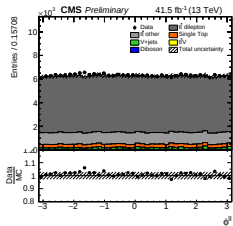
Control Plots with emu Channel (11 of 29)



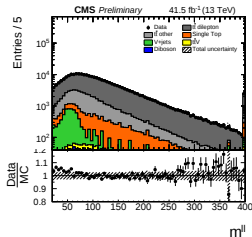
(a) Transverse momentum of di-leptons (step 5/8)



(b) Rapidity of di-leptons (step 5/8)

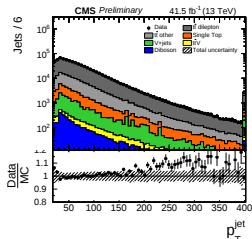


(c) Azimuthal angle of di-leptons (step 5/8)

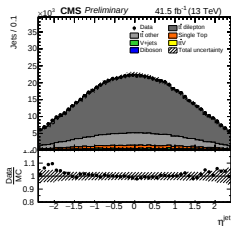


(d) Mass of di-leptons (step 5/8)

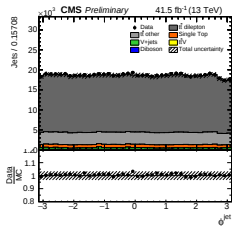
Control Plots with emu Channel (12 of 29)



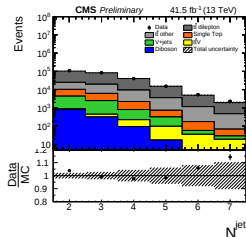
(a) Transverse momentum of jets (step 5/8)



(b) Pseudorapidity of jets (step 5/8)

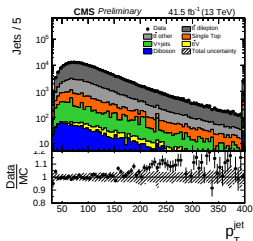


(c) Azimuthal angle of jets (step 5/8)

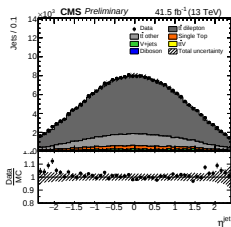


(d) Multiplicity of jets (step 5/8)

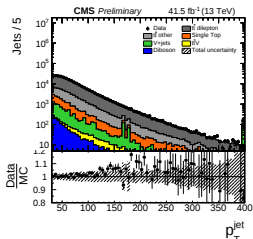
Control Plots with emu Channel (13 of 29)



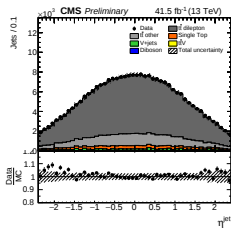
(a) Transverse momentum of leading jets (step 5/8)



(b) Pseudorapidity of leading jets (step 5/8)

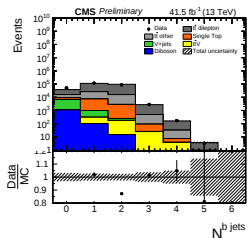


(c) Transverse momentum of subleading jets (step 5/8)

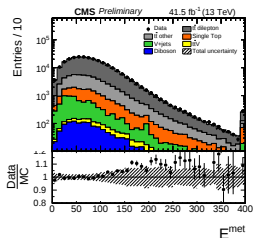


(d) Pseudorapidity of subleading jets (step 5/8)

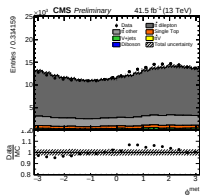
Control Plots with emu Channel (14 of 29)



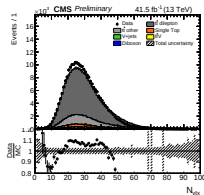
(a) Multiplicity of b-tagged jets (step 5/8)



(b) Missing transverse momentum (step 5/8)

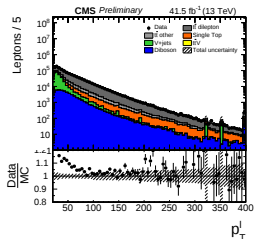


(c) Azimuthal angle of missing transverse momentum (step 5/8)

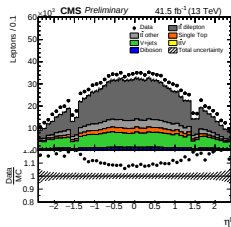


(d) Vertex multiplicity (pileup) (step 5/8)

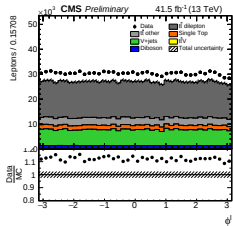
Control Plots with emu Channel (15 of 29)



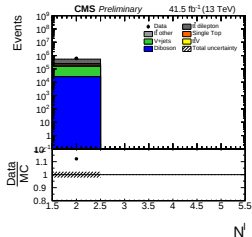
(a) Transverse momentum of leptons (step 3/8)



(b) Pseudorapidity of leptons (step 3/8)

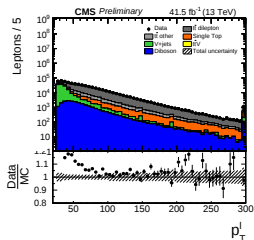


(c) Azimuthal angle of leptons (step 3/8)

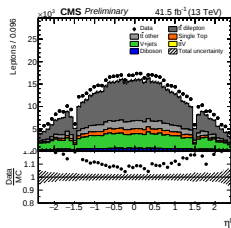


(d) Multiplicity of leptons (step 3/8)

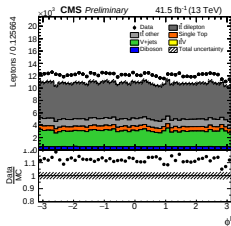
Control Plots with emu Channel (16 of 29)



(a) Transverse momentum of leading leptons (step 3/8)

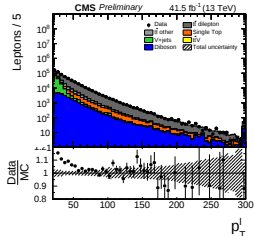


(b) Pseudorapidity of leading leptons (step 3/8)

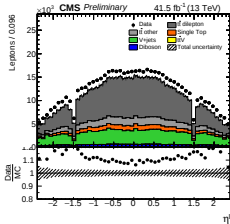


(c) Azimuthal angle of leading leptons (step 3/8)

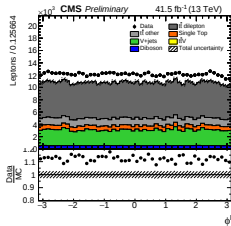
Control Plots with emu Channel (17 of 29)



(a) Transverse momentum of 2nd leptons (step 3/8)

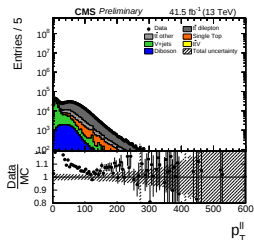


(b) Pseudorapidity of 2nd leptons (step 3/8)

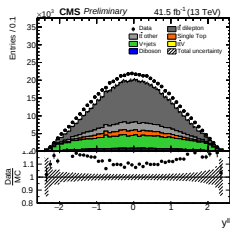


(c) Azimuthal angle of 2nd leptons (step 3/8)

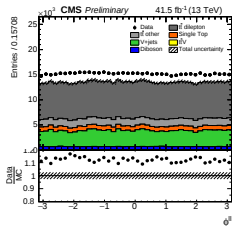
Control Plots with emu Channel (18 of 29)



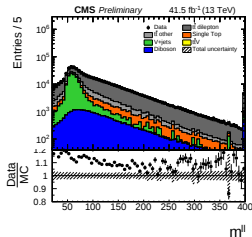
(a) Transverse momentum of di-leptons (step 3/8)



(b) Rapidity of di-leptons (step 3/8)

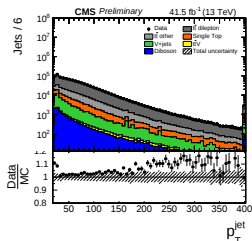


(c) Azimuthal angle of di-leptons (step 3/8)

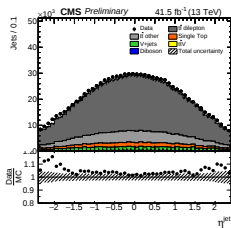


(d) Mass of di-leptons (step 3/8)

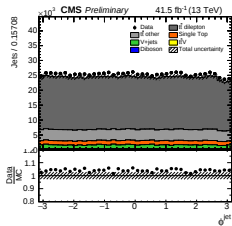
Control Plots with emu Channel (19 of 29)



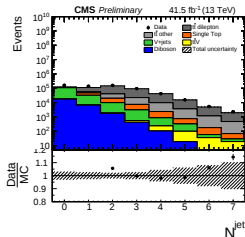
(a) Transverse momentum of jets (step 3/8)



(b) Pseudorapidity of jets (step 3/8)

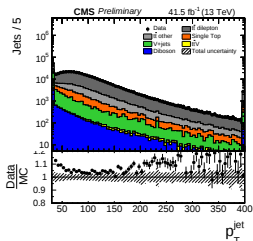


(c) Azimuthal angle of jets (step 3/8)

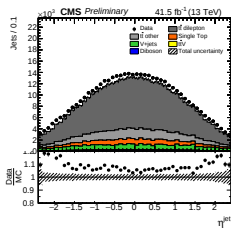


(d) Multiplicity of jets (step 3/8)

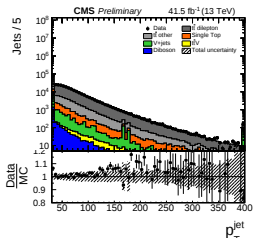
Control Plots with emu Channel (20 of 29)



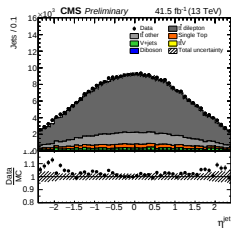
(a) Transverse momentum of leading jets (step 3/8)



(b) Pseudorapidity of leading jets (step 3/8)

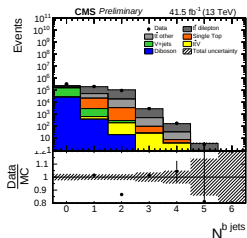


(c) Transverse momentum of subleading jets (step 3/8)

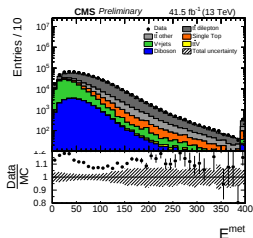


(d) Pseudorapidity of subleading jets (step 3/8)

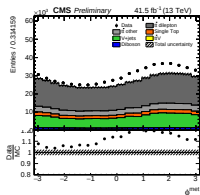
Control Plots with emu Channel (21 of 29)



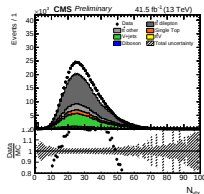
(a) Multiplicity of b-tagged jets (step 3/8)



(b) Missing transverse momentum (step 3/8)

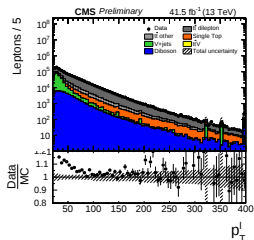


(c) Azimuthal angle of missing transverse momentum (step 3/8)

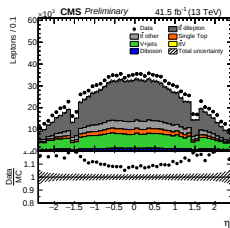


(d) Vertex multiplicity (pileup) (step 3/8)

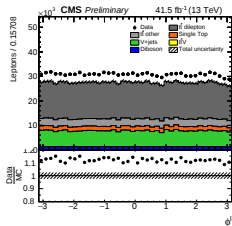
Control Plots with emu Channel (22 of 29)



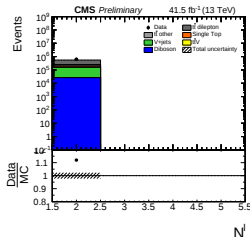
(a) Transverse momentum of leptons (step 2/8)



(b) Pseudorapidity of leptons (step 2/8)

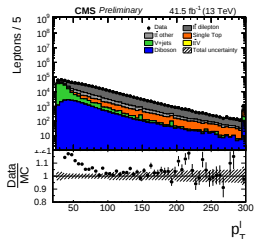


(c) Azimuthal angle of leptons (step 2/8)

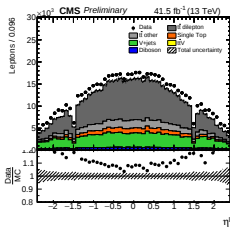


(d) Multiplicity of leptons (step 2/8)

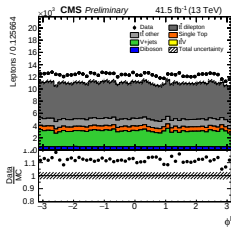
Control Plots with emu Channel (23 of 29)



(a) Transverse momentum of leading leptons (step 2/8)

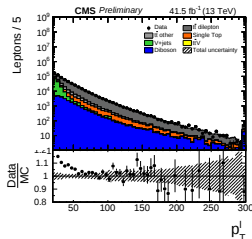


(b) Pseudorapidity of leading leptons (step 2/8)

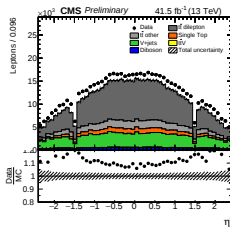


(c) Azimuthal angle of leading leptons (step 2/8)

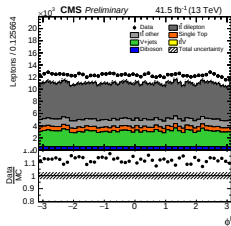
Control Plots with emu Channel (24 of 29)



(a) Transverse momentum of 2nd leptons (step 2/8)

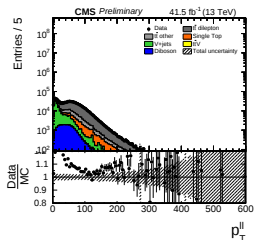


(b) Pseudorapidity of 2nd leptons (step 2/8)

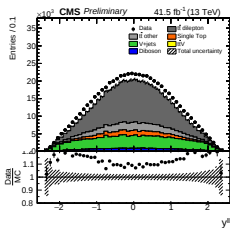


(c) Azimuthal angle of 2nd leptons (step 2/8)

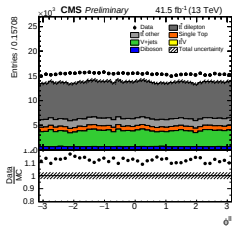
Control Plots with emu Channel (25 of 29)



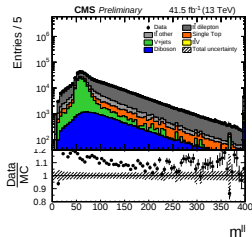
(a) Transverse momentum of di-leptons (step 2/8)



(b) Rapidity of di-leptons (step 2/8)

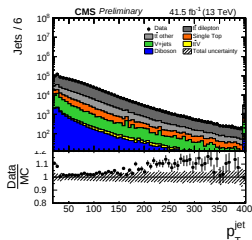


(c) Azimuthal angle of di-leptons (step 2/8)

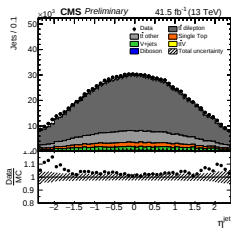


(d) Mass of di-leptons (step 2/8)

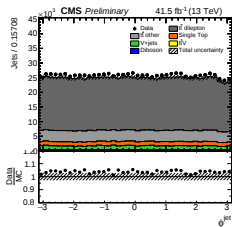
Control Plots with emu Channel (26 of 29)



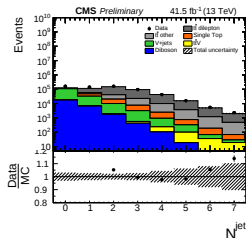
(a) Transverse momentum of jets (step 2/8)



(b) Pseudorapidity of jets (step 2/8)

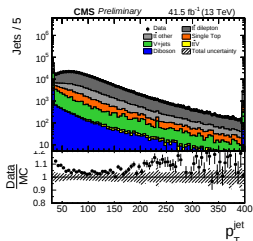


(c) Azimuthal angle of jets (step 2/8)

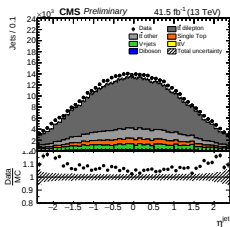


(d) Multiplicity of jets (step 2/8)

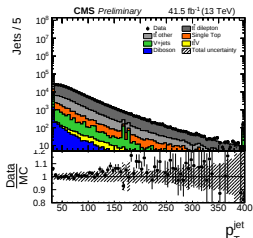
Control Plots with emu Channel (27 of 29)



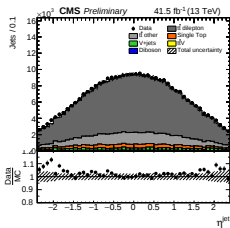
(a) Transverse momentum of leading jets (step 2/8)



(b) Pseudorapidity of leading jets (step 2/8)

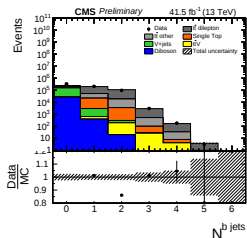


(c) Transverse momentum of subleading jets (step 2/8)

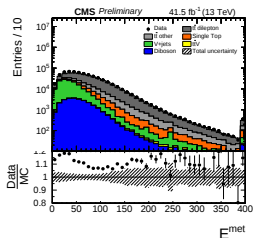


(d) Pseudorapidity of subleading jets (step 2/8)

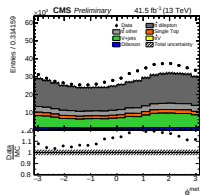
Control Plots with emu Channel (28 of 29)



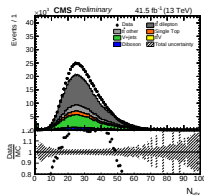
(a) Multiplicity of b-tagged jets (step 2/8)



(b) Missing transverse momentum (step 2/8)

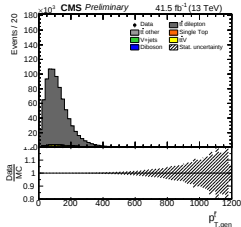


(c) Azimuthal angle of missing transverse momentum (step 2/8)

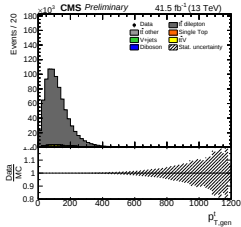


(d) Vertex multiplicity (pileup) (step 2/8)

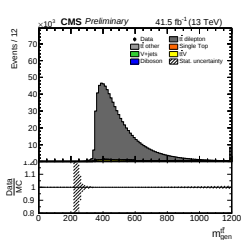
Control Plots with emu Channel (29 of 29)



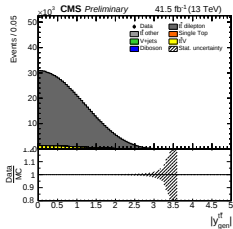
(a) Transverse momentum of antitop quark.



(b) Transverse momentum of top quark.

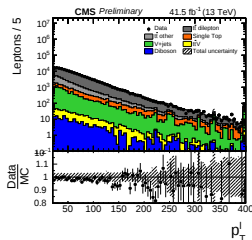


(c) Mass of $t\bar{t}$ system.

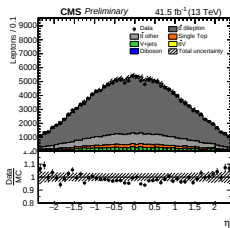


(d) Absolute rapidity of $t\bar{t}$ system.

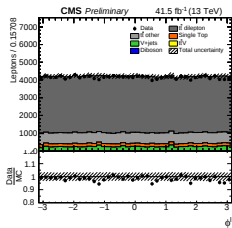
Control Plots with mumu Channel (1 of 43)



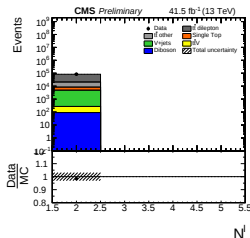
(a) Transverse momentum of leptons (step 7/8)



(b) Pseudorapidity of leptons (step 7/8)

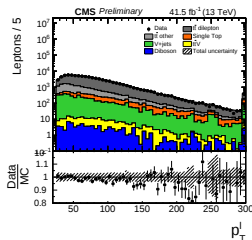


(c) Azimuthal angle of leptons (step 7/8)

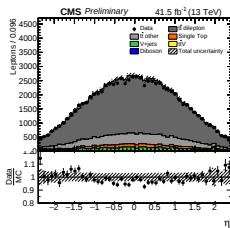


(d) Multiplicity of leptons (step 7/8)

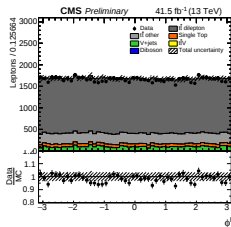
Control Plots with mumu Channel (2 of 43)



(a) Transverse momentum of leading leptons (step 7/8)

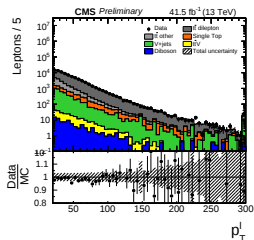


(b) Pseudorapidity of leading leptons (step 7/8)

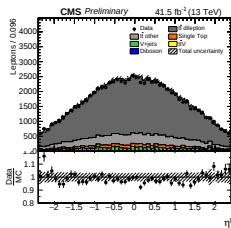


(c) Azimuthal angle of leading leptons (step 7/8)

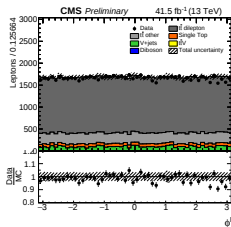
Control Plots with mumu Channel (3 of 43)



(a) Transverse momentum of 2nd leptons (step 7/8)

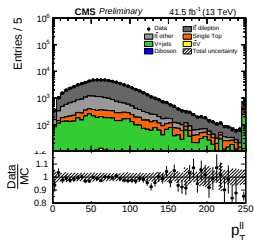


(b) Pseudorapidity of 2nd leptons (step 7/8)

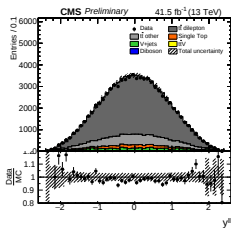


(c) Azimuthal angle of 2nd leptons (step 7/8)

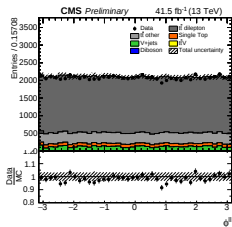
Control Plots with mumu Channel (4 of 43)



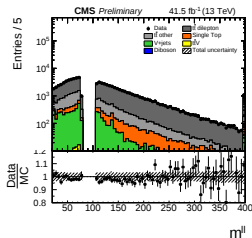
(a) Transverse momentum of di-leptons (step 7/8)



(b) Rapidity of di-leptons (step 7/8)

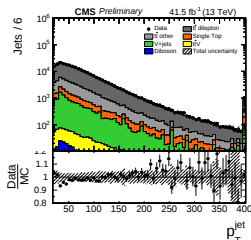


(c) Azimuthal angle of di-leptons (step 7/8)

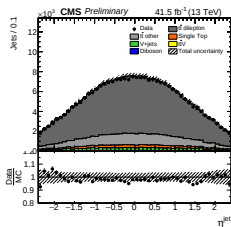


(d) Mass of di-leptons (step 7/8)

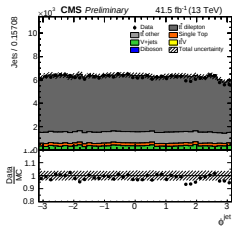
Control Plots with mumu Channel (5 of 43)



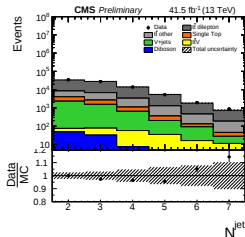
(a) Transverse momentum of jets (step 7/8)



(b) Pseudorapidity of jets (step 7/8)

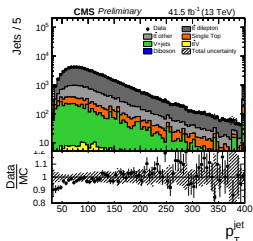


(c) Azimuthal angle of jets (step 7/8)

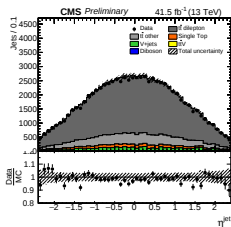


(d) Multiplicity of jets (step 7/8)

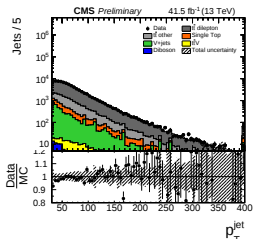
Control Plots with mumu Channel (6 of 43)



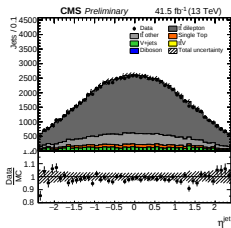
(a) Transverse momentum of leading jets (step 7/8)



(b) Pseudorapidity of leading jets (step 7/8)

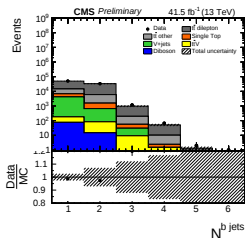


(c) Transverse momentum of subleading jets (step 7/8)

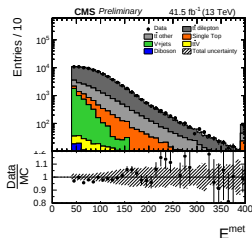


(d) Pseudorapidity of subleading jets (step 7/8)

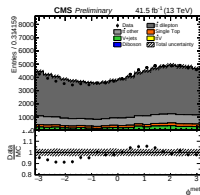
Control Plots with mumu Channel (7 of 43)



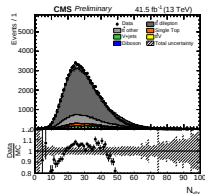
(a) Multiplicity of b-tagged jets (step 7/8)



(b) Missing transverse momentum (step 7/8)

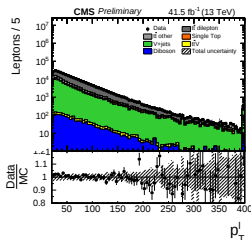


(c) Azimuthal angle of missing transverse momentum (step 7/8)

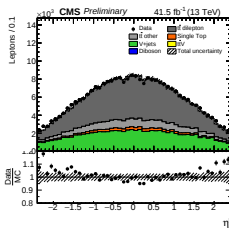


(d) Vertex multiplicity (pileup) (step 7/8)

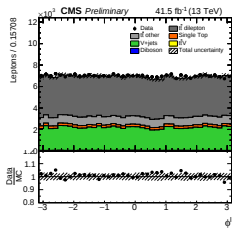
Control Plots with mumu Channel (8 of 43)



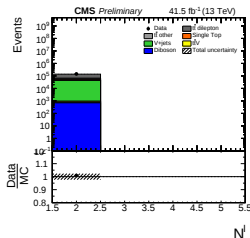
(a) Transverse momentum of leptons (step 6/8)



(b) Pseudorapidity of leptons (step 6/8)

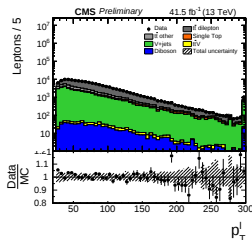


(c) Azimuthal angle of leptons (step 6/8)

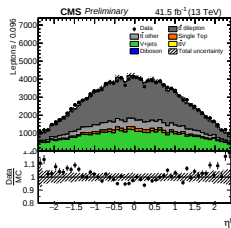


(d) Multiplicity of leptons (step 6/8)

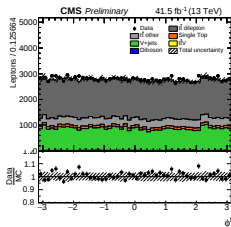
Control Plots with mumu Channel (9 of 43)



(a) Transverse momentum of leading leptons (step 6/8)

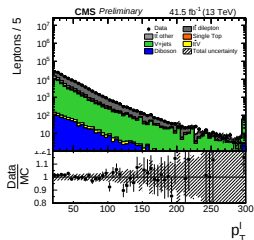


(b) Pseudorapidity of leading leptons (step 6/8)

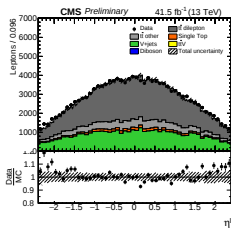


(c) Azimuthal angle of leading leptons (step 6/8)

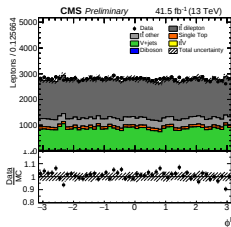
Control Plots with mumu Channel (10 of 43)



(a) Transverse momentum of 2nd leptons (step 6/8)

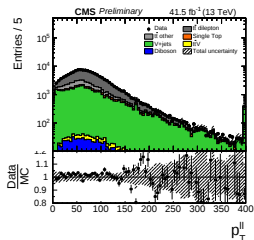


(b) Pseudorapidity of 2nd leptons (step 6/8)

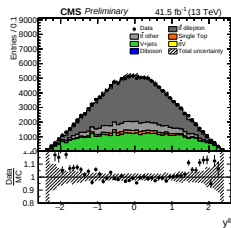


(c) Azimuthal angle of 2nd leptons (step 6/8)

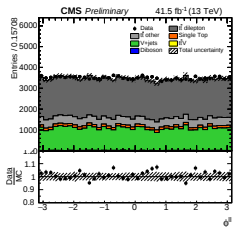
Control Plots with mumu Channel (11 of 43)



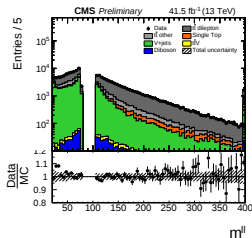
(a) Transverse momentum of di-leptons (step 6/8)



(b) Rapidity of di-leptons (step 6/8)

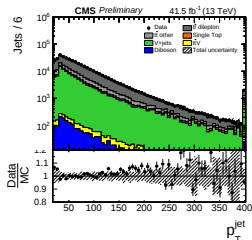


(c) Azimuthal angle of di-leptons (step 6/8)

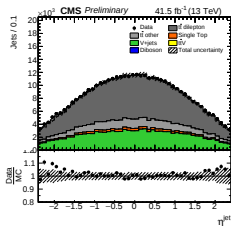


(d) Mass of di-leptons (step 6/8)

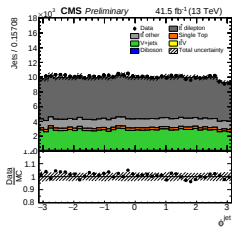
Control Plots with mumu Channel (12 of 43)



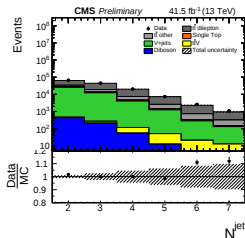
(a) Transverse momentum of jets (step 6/8)



(b) Pseudorapidity of jets (step 6/8)

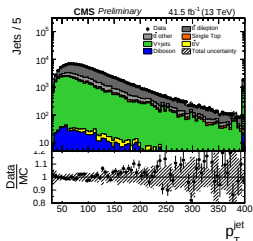


(c) Azimuthal angle of jets (step 6/8)

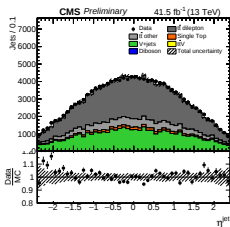


(d) Multiplicity of jets (step 6/8)

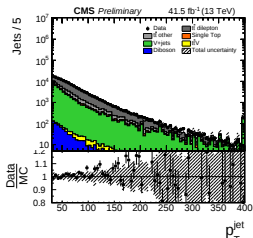
Control Plots with mumu Channel (13 of 43)



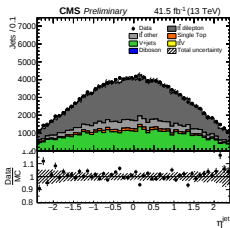
(a) Transverse momentum of leading jets (step 6/8)



(b) Pseudorapidity of leading jets (step 6/8)

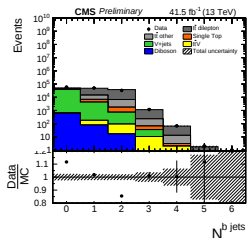


(c) Transverse momentum of subleading jets (step 6/8)

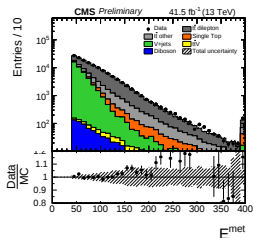


(d) Pseudorapidity of subleading jets (step 6/8)

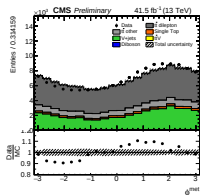
Control Plots with mumu Channel (14 of 43)



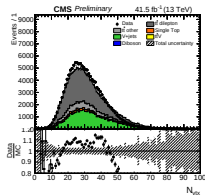
(a) Multiplicity of b-tagged jets (step 6/8)



(b) Missing transverse momentum (step 6/8)

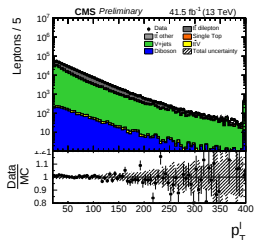


(c) Azimuthal angle of missing transverse momentum (step 6/8)

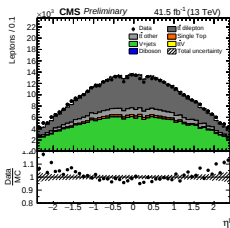


(d) Vertex multiplicity (pileup) (step 6/8)

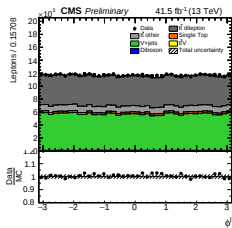
Control Plots with mumu Channel (15 of 43)



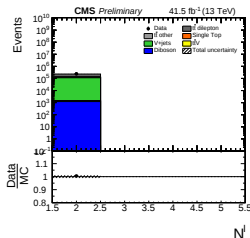
(a) Transverse momentum of leptons (step 5/8)



(b) Pseudorapidity of leptons (step 5/8)

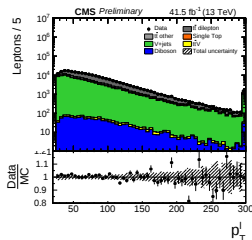


(c) Azimuthal angle of leptons (step 5/8)

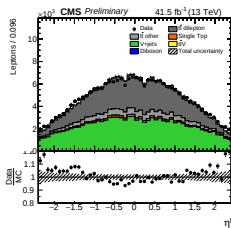


(d) Multiplicity of leptons (step 5/8)

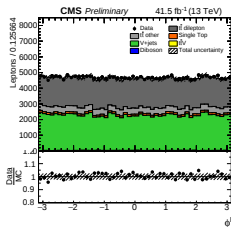
Control Plots with mumu Channel (16 of 43)



(a) Transverse momentum of leading leptons (step 5/8)

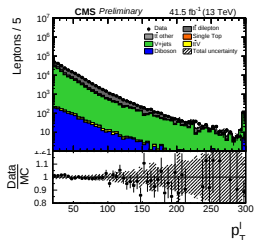


(b) Pseudorapidity of leading leptons (step 5/8)

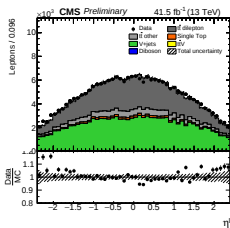


(c) Azimuthal angle of leading leptons (step 5/8)

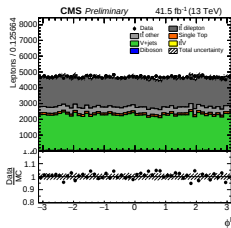
Control Plots with mumu Channel (17 of 43)



(a) Transverse momentum of 2nd leptons (step 5/8)

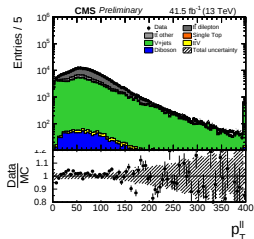


(b) Pseudorapidity of 2nd leptons (step 5/8)

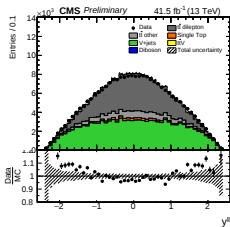


(c) Azimuthal angle of 2nd leptons (step 5/8)

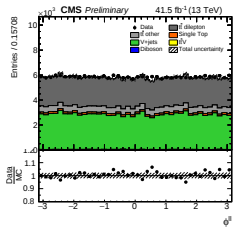
Control Plots with mumu Channel (18 of 43)



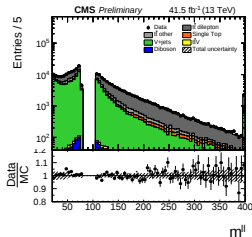
(a) Transverse momentum of di-leptons (step 5/8)



(b) Rapidity of di-leptons (step 5/8)

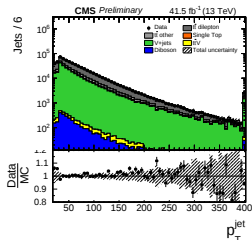


(c) Azimuthal angle of di-leptons (step 5/8)

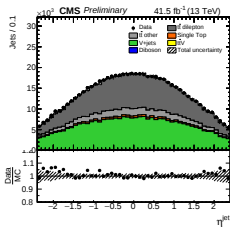


(d) Mass of di-leptons (step 5/8)

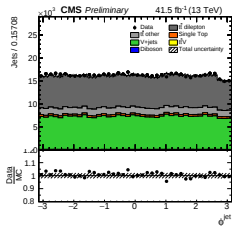
Control Plots with mumu Channel (19 of 43)



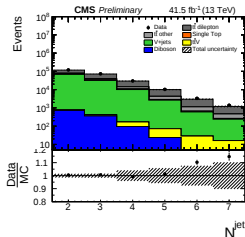
(a) Transverse momentum of jets (step 5/8)



(b) Pseudorapidity of jets (step 5/8)

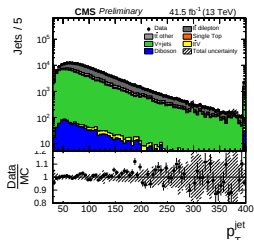


(c) Azimuthal angle of jets (step 5/8)

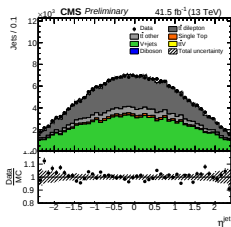


(d) Multiplicity of jets (step 5/8)

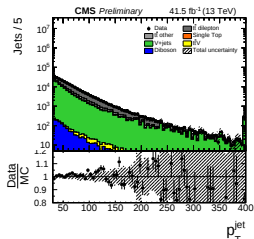
Control Plots with mumu Channel (20 of 43)



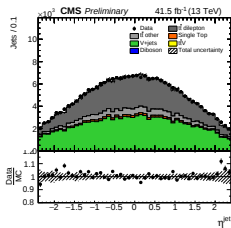
(a) Transverse momentum of leading jets (step 5/8)



(b) Pseudorapidity of leading jets (step 5/8)

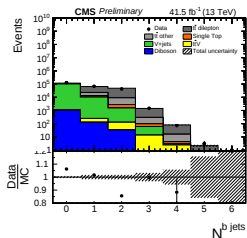


(c) Transverse momentum of subleading jets (step 5/8)

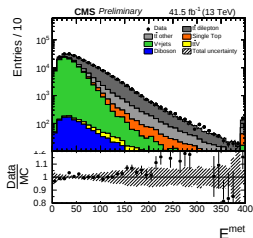


(d) Pseudorapidity of subleading jets (step 5/8)

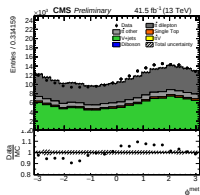
Control Plots with mumu Channel (21 of 43)



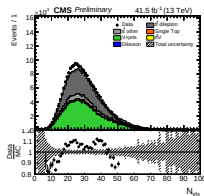
(a) Multiplicity of b-tagged jets (step 5/8)



(b) Missing transverse momentum (step 5/8)

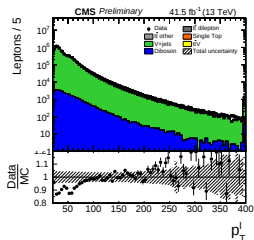


(c) Azimuthal angle of missing transverse momentum (step 5/8)

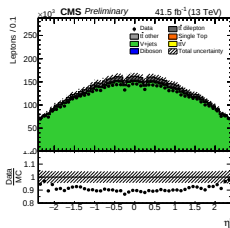


(d) Vertex multiplicity (pileup) (step 5/8)

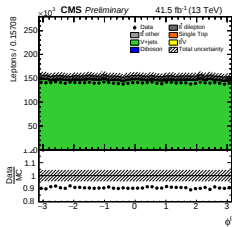
Control Plots with mumu Channel (22 of 43)



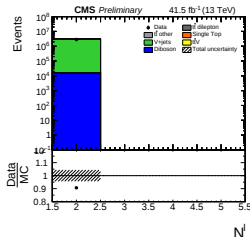
(a) Transverse momentum of leptons (step 4/8)



(b) Pseudorapidity of leptons (step 4/8)

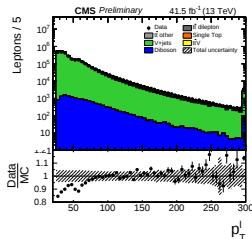


(c) Azimuthal angle of leptons (step 4/8)

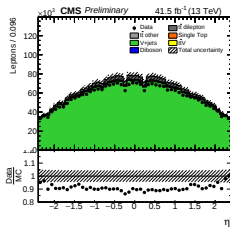


(d) Multiplicity of leptons (step 4/8)

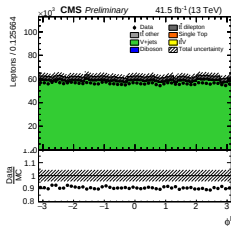
Control Plots with mumu Channel (23 of 43)



(a) Transverse momentum of leading leptons (step 4/8)

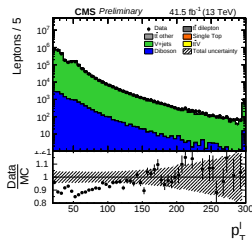


(b) Pseudorapidity of leading leptons (step 4/8)

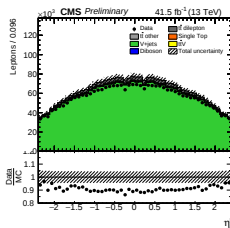


(c) Azimuthal angle of leading leptons (step 4/8)

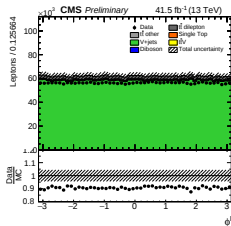
Control Plots with mumu Channel (24 of 43)



(a) Transverse momentum of 2nd leptons (step 4/8)

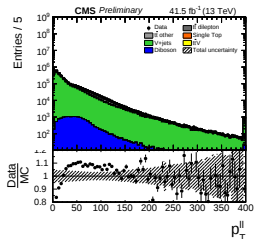


(b) Pseudorapidity of 2nd leptons (step 4/8)

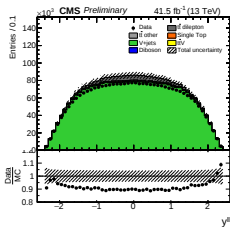


(c) Azimuthal angle of 2nd leptons (step 4/8)

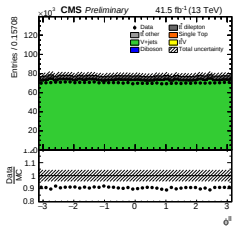
Control Plots with mumu Channel (25 of 43)



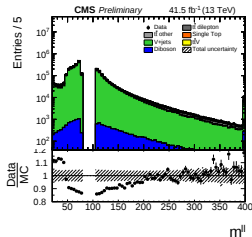
(a) Transverse momentum of di-leptons (step 4/8)



(b) Rapidity of di-leptons (step 4/8)

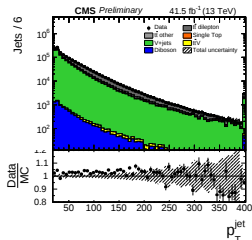


(c) Azimuthal angle of di-leptons (step 4/8)

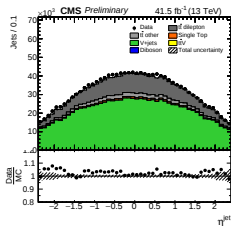


(d) Mass of di-leptons (step 4/8)

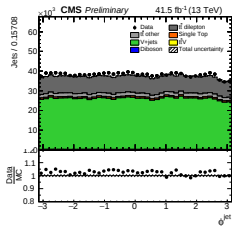
Control Plots with mumu Channel (26 of 43)



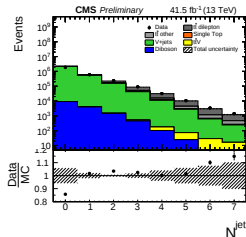
(a) Transverse momentum of jets (step 4/8)



(b) Pseudorapidity of jets (step 4/8)

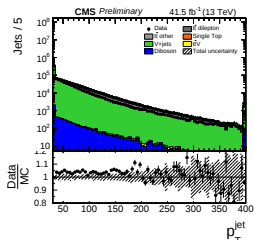


(c) Azimuthal angle of jets (step 4/8)

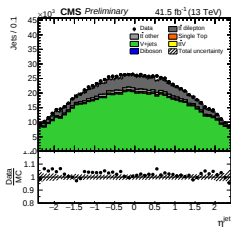


(d) Multiplicity of jets (step 4/8)

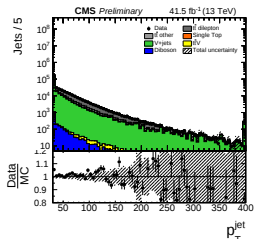
Control Plots with mumu Channel (27 of 43)



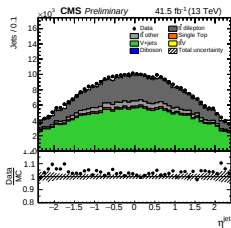
(a) Transverse momentum of leading jets (step 4/8)



(b) Pseudorapidity of leading jets (step 4/8)

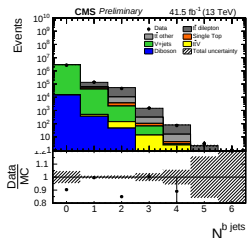


(c) Transverse momentum of subleading jets (step 4/8)

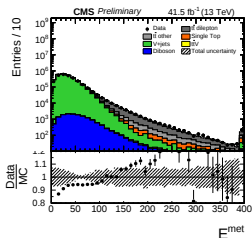


(d) Pseudorapidity of subleading jets (step 4/8)

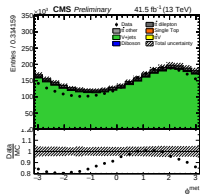
Control Plots with mumu Channel (28 of 43)



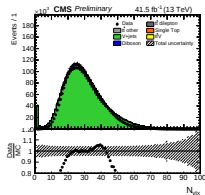
(a) Multiplicity of b-tagged jets (step 4/8)



(b) Missing transverse momentum (step 4/8)

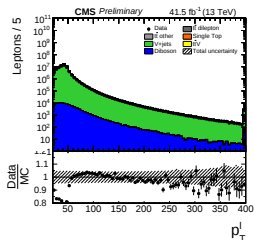


(c) Azimuthal angle of missing transverse momentum (step 4/8)

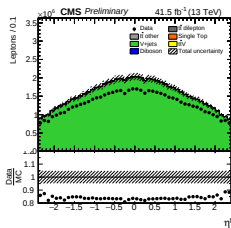


(d) Vertex multiplicity (pileup) (step 4/8)

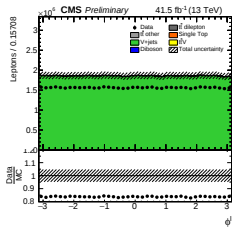
Control Plots with mumu Channel (29 of 43)



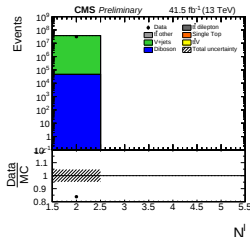
(a) Transverse momentum of leptons (step 3/8)



(b) Pseudorapidity of leptons (step 3/8)

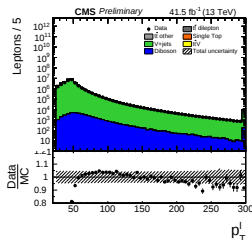


(c) Azimuthal angle of leptons (step 3/8)

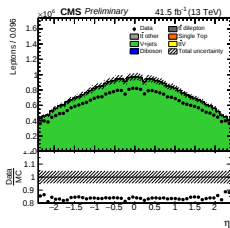


(d) Multiplicity of leptons (step 3/8)

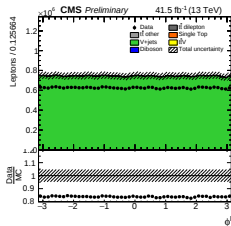
Control Plots with mumu Channel (30 of 43)



(a) Transverse momentum of leading leptons (step 3/8)

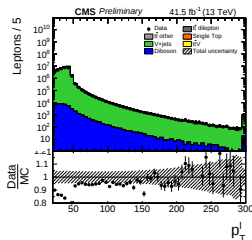


(b) Pseudorapidity of leading leptons (step 3/8)

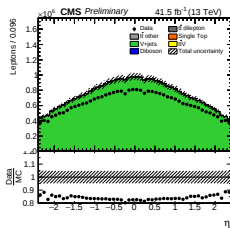


(c) Azimuthal angle of leading leptons (step 3/8)

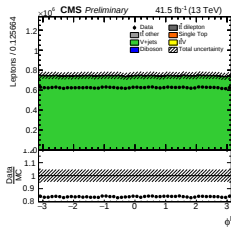
Control Plots with mumu Channel (31 of 43)



(a) Transverse momentum of 2nd leptons (step 3/8)

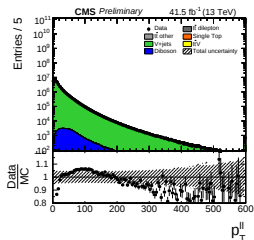


(b) Pseudorapidity of 2nd leptons (step 3/8)

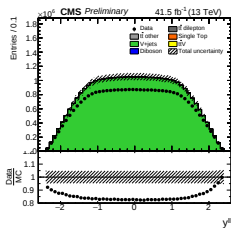


(c) Azimuthal angle of 2nd leptons (step 3/8)

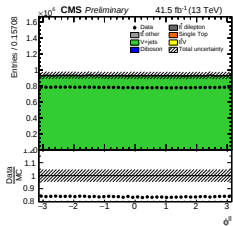
Control Plots with mumu Channel (32 of 43)



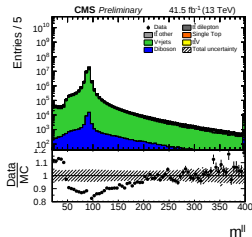
(a) Transverse momentum of di-leptons (step 3/8)



(b) Rapidity of di-leptons (step 3/8)

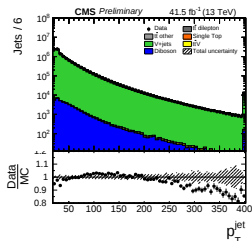


(c) Azimuthal angle of di-leptons (step 3/8)

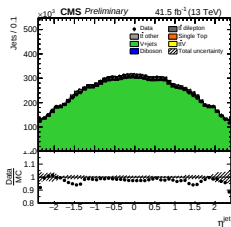


(d) Mass of di-leptons (step 3/8)

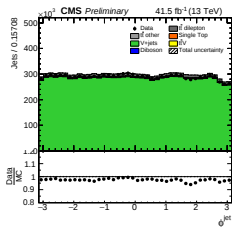
Control Plots with mumu Channel (33 of 43)



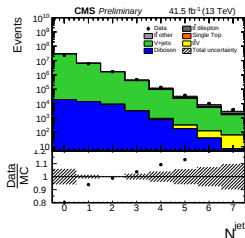
(a) Transverse momentum of jets (step 3/8)



(b) Pseudorapidity of jets (step 3/8)

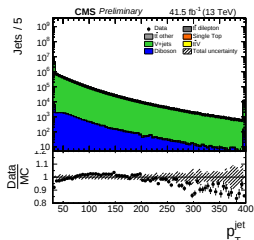


(c) Azimuthal angle of jets (step 3/8)

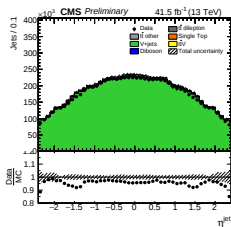


(d) Multiplicity of jets (step 3/8)

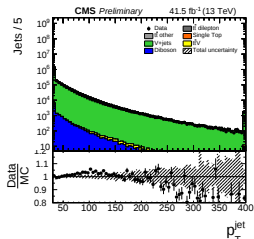
Control Plots with mumu Channel (34 of 43)



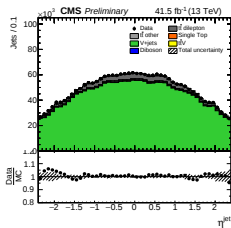
(a) Transverse momentum of leading jets (step 3/8)



(b) Pseudorapidity of leading jets (step 3/8)

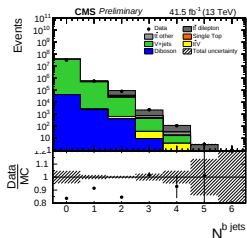


(c) Transverse momentum of subleading jets (step 3/8)

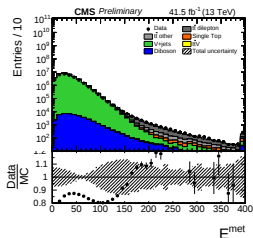


(d) Pseudorapidity of subleading jets (step 3/8)

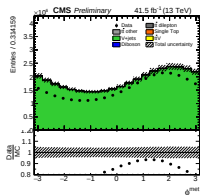
Control Plots with mumu Channel (35 of 43)



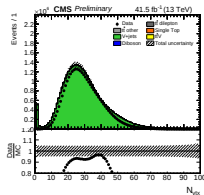
(a) Multiplicity of b-tagged jets (step 3/8)



(b) Missing transverse momentum (step 3/8)

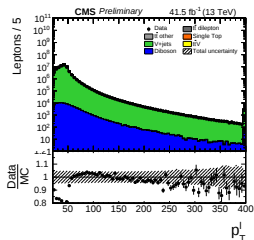


(c) Azimuthal angle of missing transverse momentum (step 3/8)

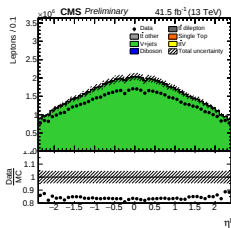


(d) Vertex multiplicity (pileup) (step 3/8)

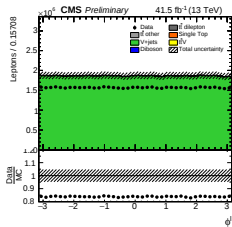
Control Plots with mumu Channel (36 of 43)



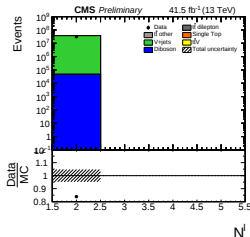
(a) Transverse momentum of leptons (step 2/8)



(b) Pseudorapidity of leptons (step 2/8)

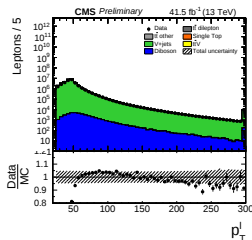


(c) Azimuthal angle of leptons (step 2/8)

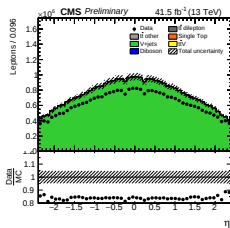


(d) Multiplicity of leptons (step 2/8)

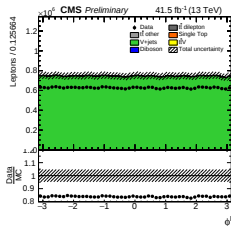
Control Plots with mumu Channel (37 of 43)



(a) Transverse momentum of leading leptons (step 2/8)

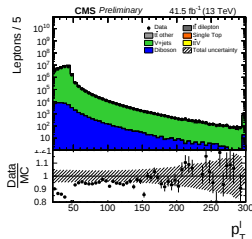


(b) Pseudorapidity of leading leptons (step 2/8)

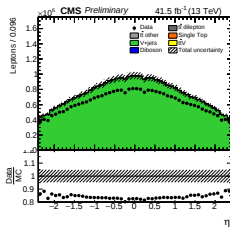


(c) Azimuthal angle of leading leptons (step 2/8)

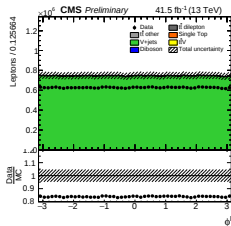
Control Plots with mumu Channel (38 of 43)



(a) Transverse momentum of 2nd leptons (step 2/8)

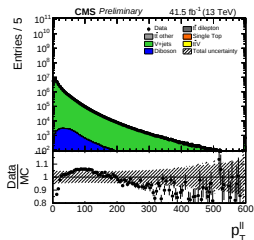


(b) Pseudorapidity of 2nd leptons (step 2/8)

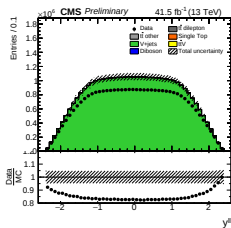


(c) Azimuthal angle of 2nd leptons (step 2/8)

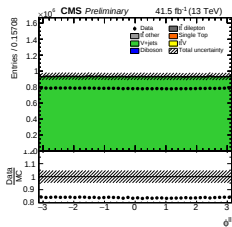
Control Plots with mumu Channel (39 of 43)



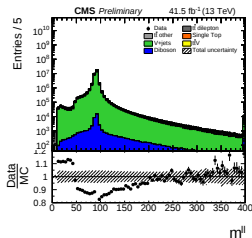
(a) Transverse momentum of di-leptons (step 2/8)



(b) Rapidity of di-leptons (step 2/8)

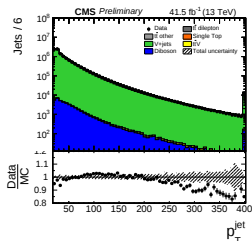


(c) Azimuthal angle of di-leptons (step 2/8)

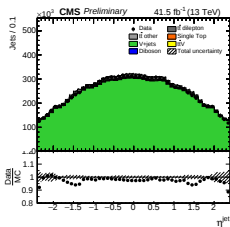


(d) Mass of di-leptons (step 2/8)

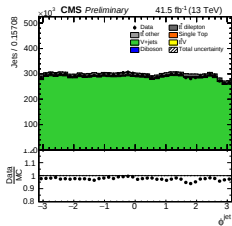
Control Plots with mumu Channel (40 of 43)



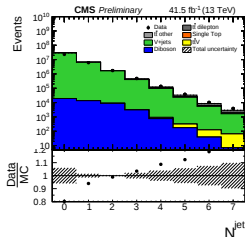
(a) Transverse momentum of jets (step 2/8)



(b) Pseudorapidity of jets (step 2/8)

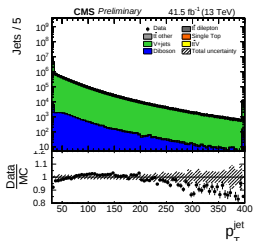


(c) Azimuthal angle of jets (step 2/8)

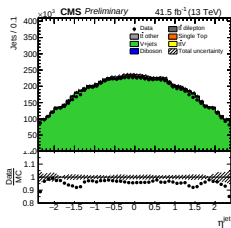


(d) Multiplicity of jets (step 2/8)

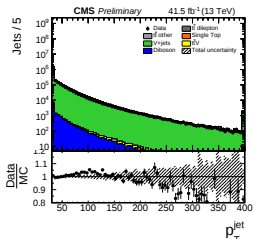
Control Plots with mumu Channel (41 of 43)



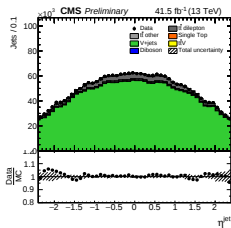
(a) Transverse momentum of leading jets (step 2/8)



(b) Pseudorapidity of leading jets (step 2/8)

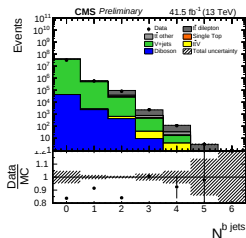


(c) Transverse momentum of subleading jets (step 2/8)

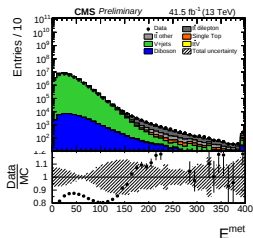


(d) Pseudorapidity of subleading jets (step 2/8)

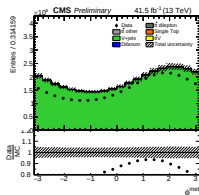
Control Plots with mumu Channel (42 of 43)



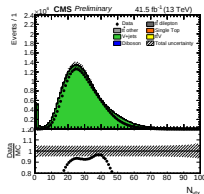
(a) Multiplicity of b-tagged jets (step 2/8)



(b) Missing transverse momentum (step 2/8)

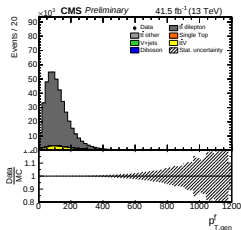


(c) Azimuthal angle of missing transverse momentum (step 2/8)

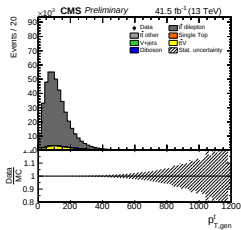


(d) Vertex multiplicity (pileup) (step 2/8)

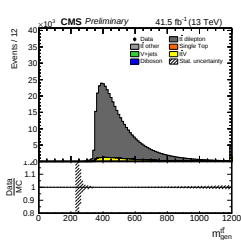
Control Plots with mumu Channel (43 of 43)



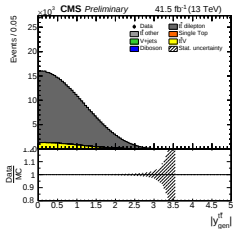
(a) Transverse momentum of antitop quark.



(b) Transverse momentum of top quark.



(c) Mass of $t\bar{t}$ system.



(d) Absolute rapidity of $t\bar{t}$ system.