

W Meeting Updates

09 / 20 / 2017

Cut Optimization

- Can We increase our W statistics while keeping a reasonable data / MC comparison and reasonable BG?

	W Algorithm Cuts (Event Selection / Isolation)
1	2x2 Cluster ET
2	2x2 / 4x4 ratio
3	2x2 / nearCone
4	sign Pt
5	away ET

W AL - Preliminary Cuts

- Run 13 Preliminary Cuts

Cut	Preliminary
2x2 ET	14 GeV
2x2 ET / 4x4 ET	0.95
2x2 / near Cone	0.88
signPT	14 GeV
away ET	11 GeV

W AL - Preliminary Cuts

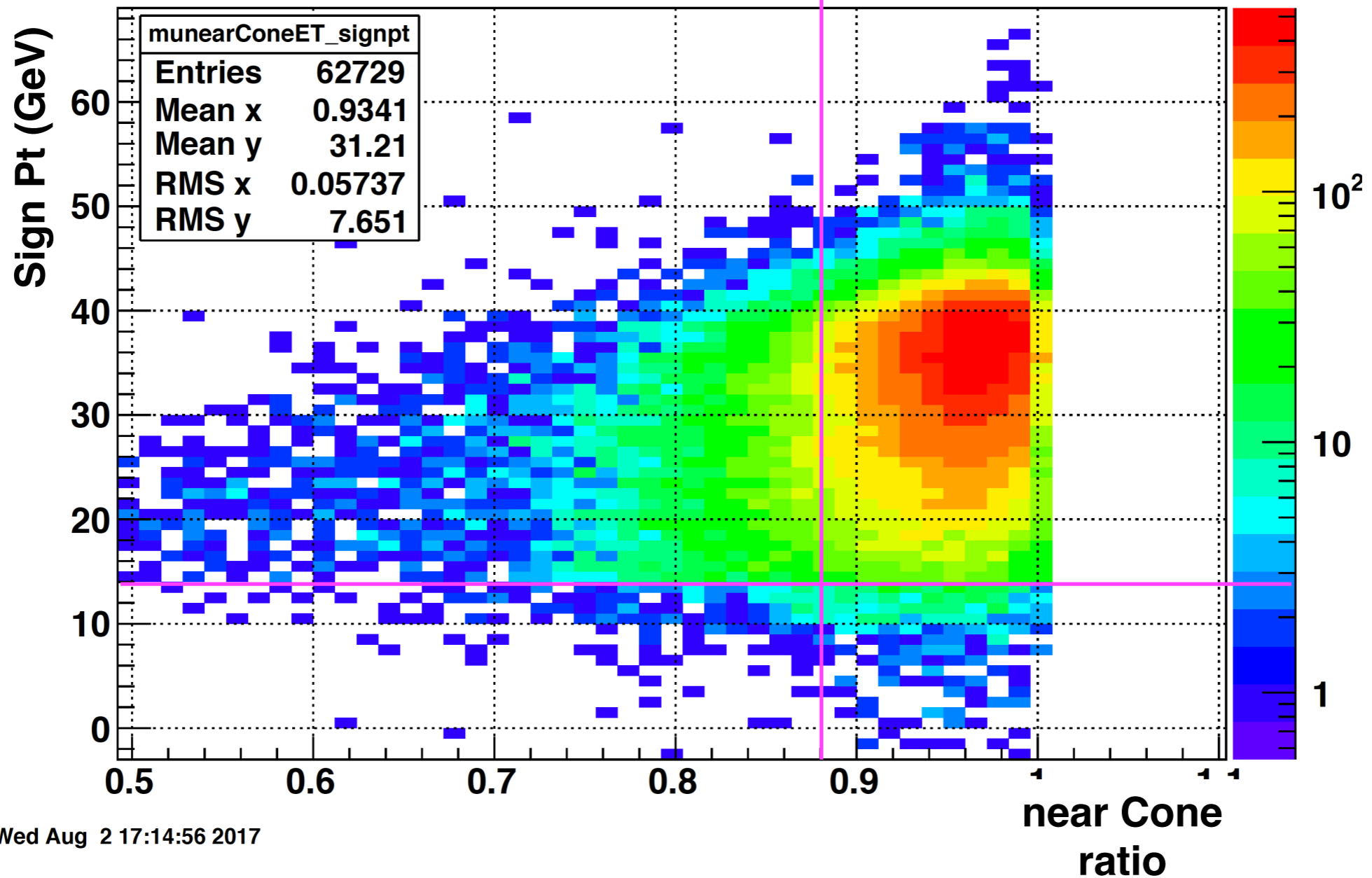
- Run 13 Preliminary Cuts

Cut	Preliminary
2x2 ET	14 GeV
2x2 ET / 4x4 ET	0.95
2x2 / near Cone	0.88 (Run 12 - 0.85)
signPT	14 GeV
away ET	11 GeV

2x2 / Near Cone cut

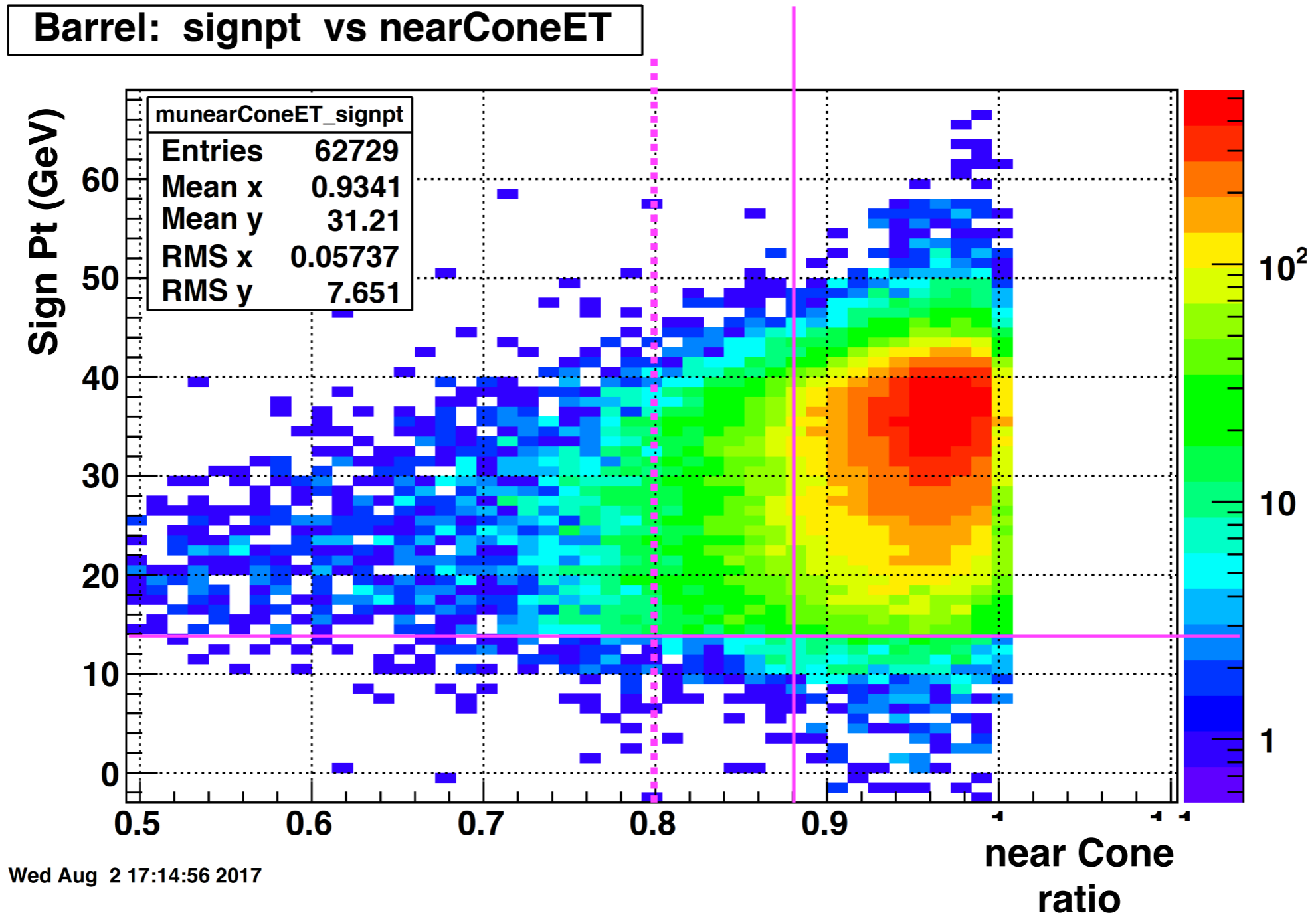
- Sign Pt Cut Vs 2x2 / nearCone cut - MC

Barrel: signpt vs nearConeET



2x2 / Near Cone cut

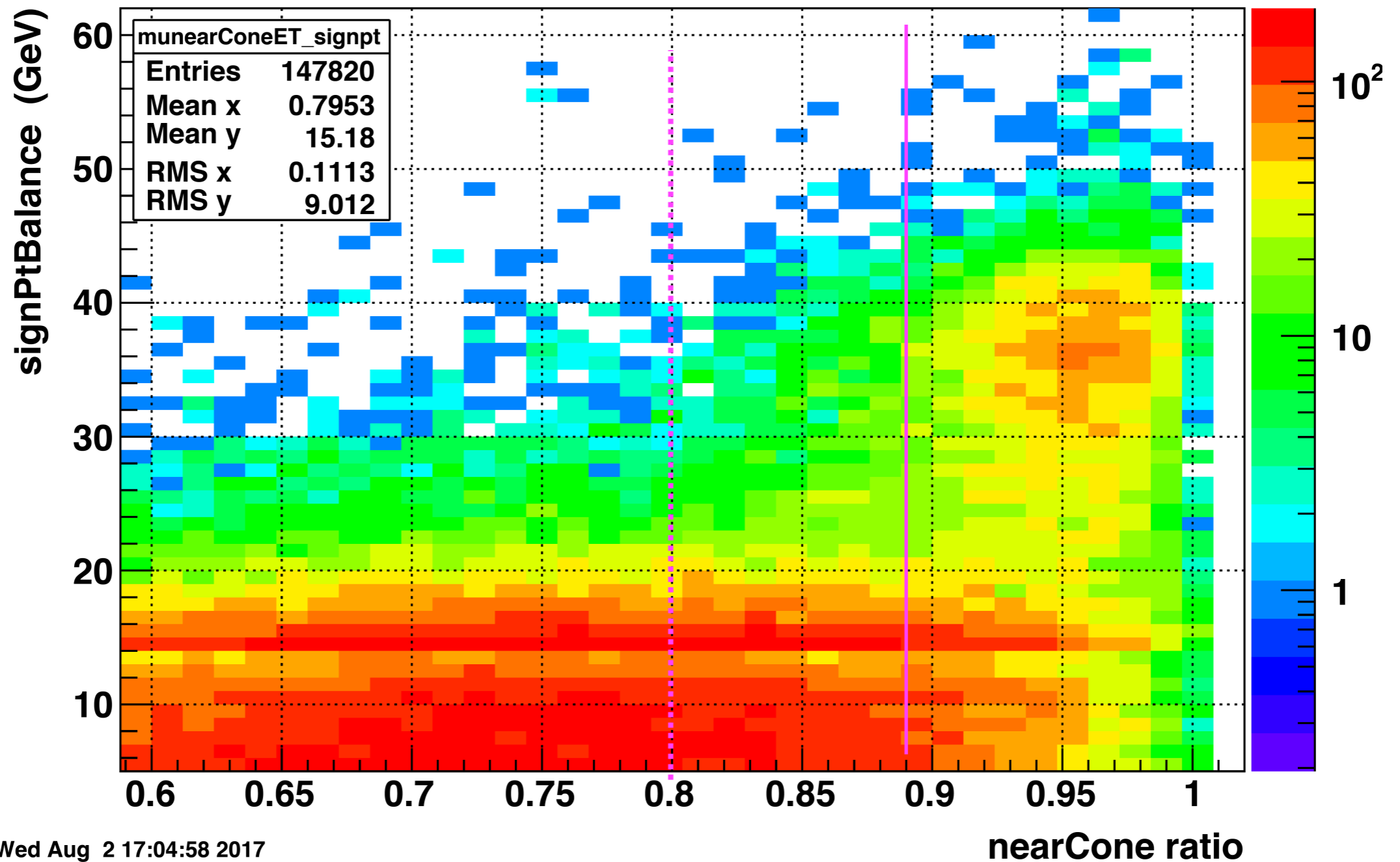
- Sign Pt Cut Vs 2x2 / nearCone cut - MC



2x2 / Near Cone cut

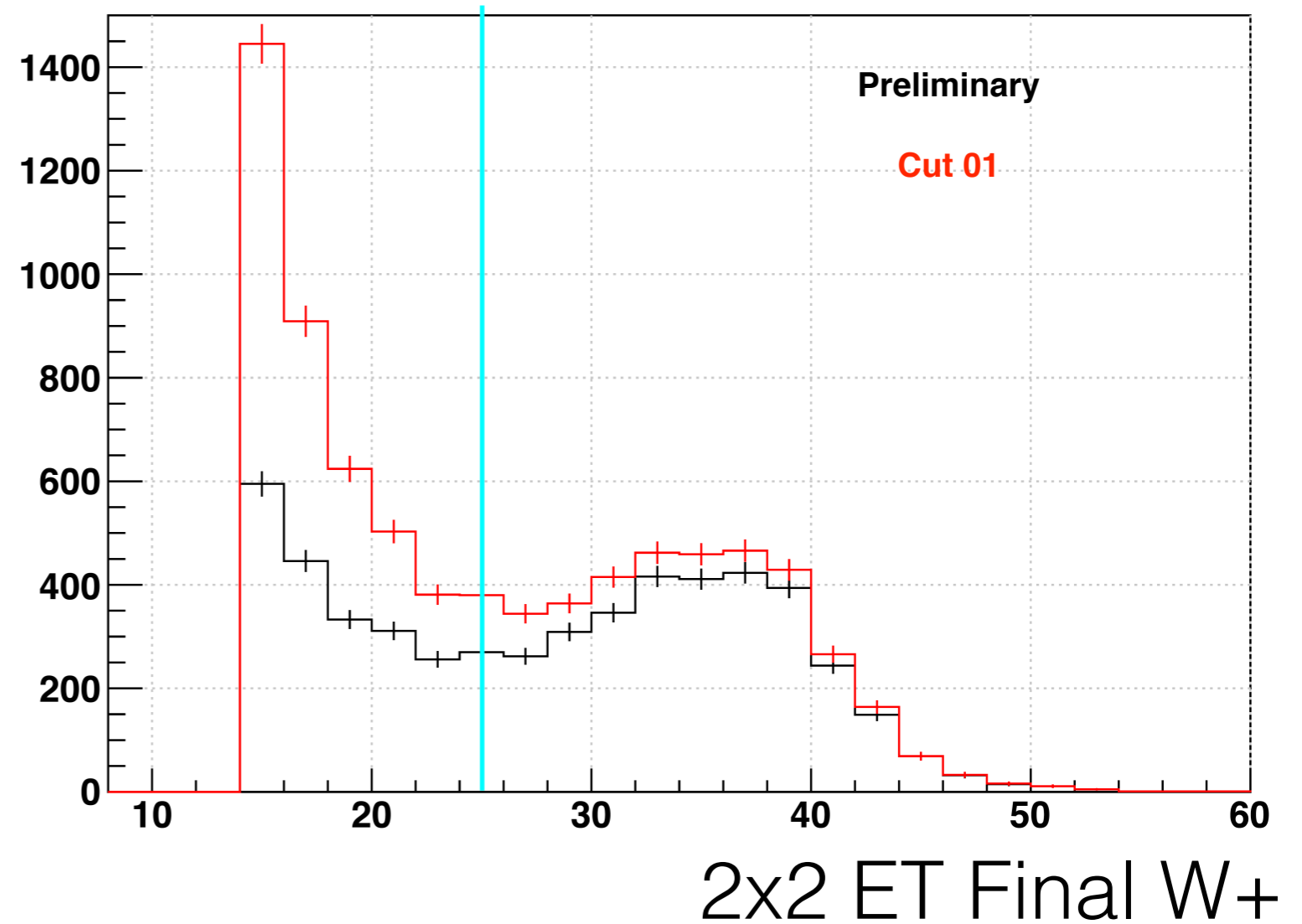
Data distribution.

Barrel: signpt vs nearConeET



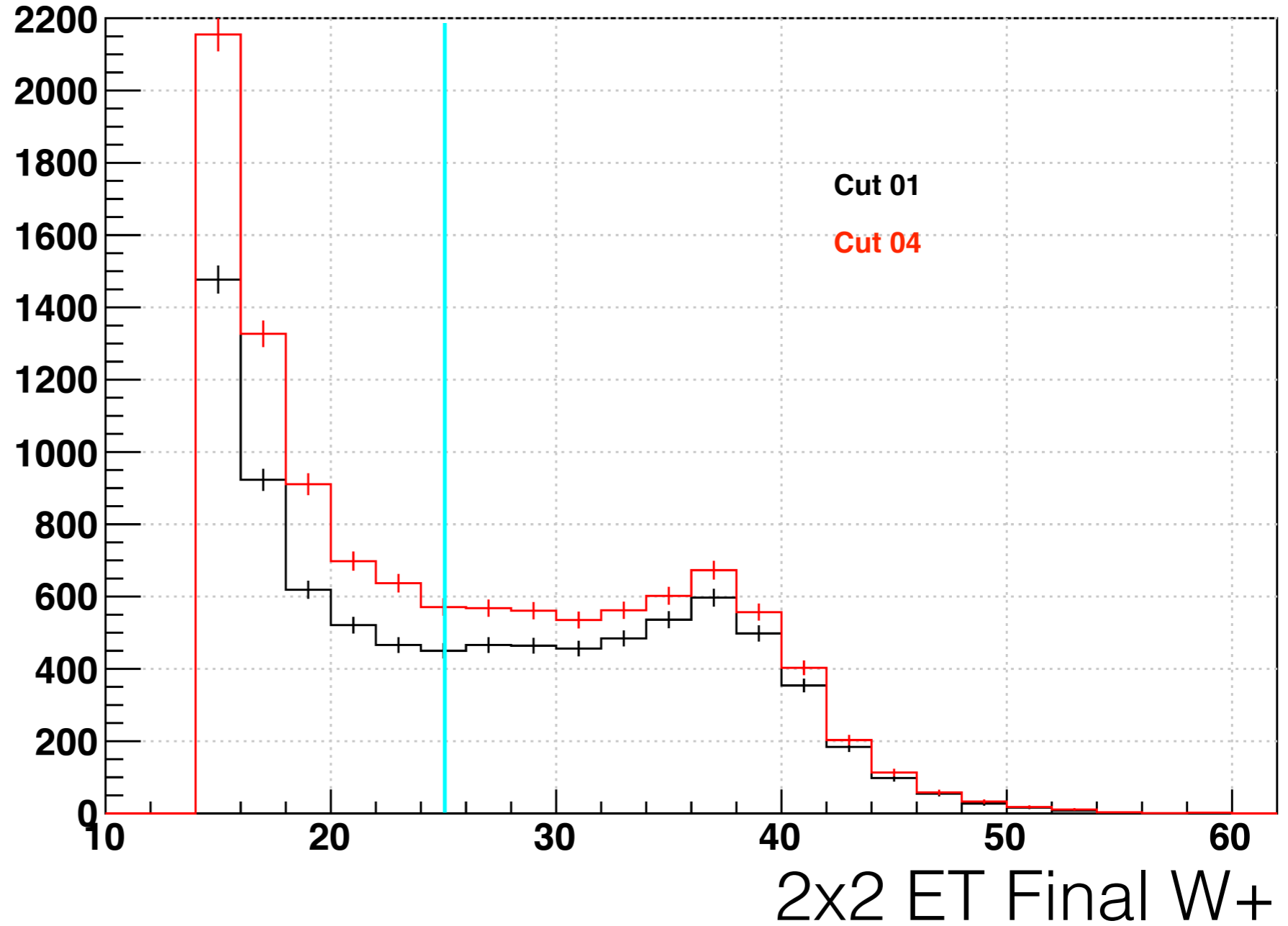
Cuts-Optimization - Impact of near Cone cut

Cut	Preliminary	Cut 01
2x2 ET	14	14 GeV
2x2 ET / 4x4 ET	0.95	0.95
2x2 / near Cone	0.88	0.80
signPT	14	14 GeV
away ET	11	11 GeV



Cuts-Optimization - Impact of change in 2x2 / 4x4 cut => Not good

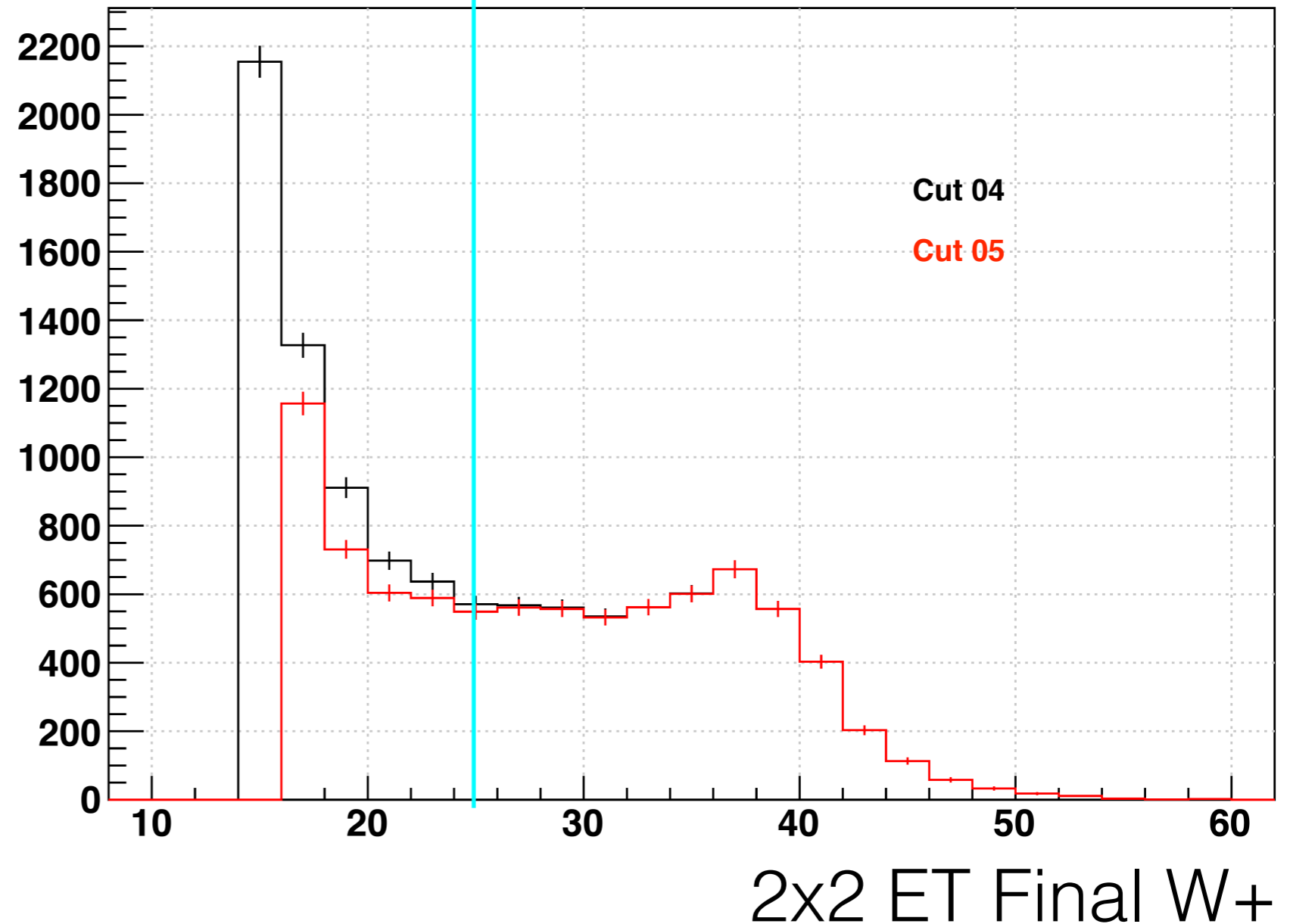
Cut	Cut 04	Cut 01
2x2 ET	14 GeV	14 GeV
2x2 ET / 4x4 ET	0.95	0.98
2x2 / near Cone	0.75	0.75
signPT	14 GeV	14 GeV
away ET	20 GeV	20 GeV



- Good amount of signal get lost => Don't change this cut significantly

Cuts-Optimization - Impact of signPt cut

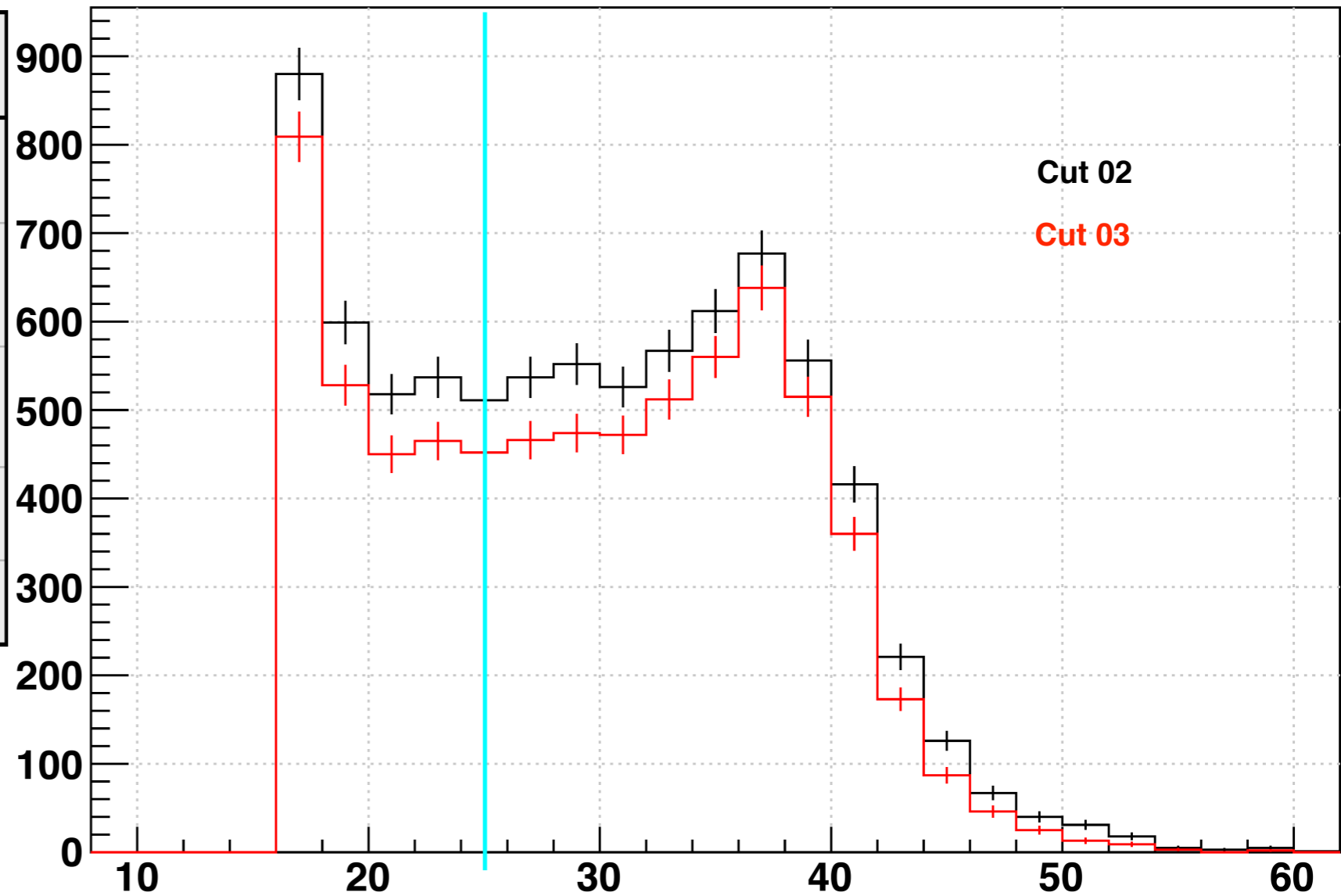
Cut	Cut 04	Cut 05
2x2 ET	14 GeV	16 GeV
2x2 ET / 4x4 ET	0.95	0.95
2x2 / near Cone	0.75	0.75
signPT	14 GeV	16 GeV
away ET	20 GeV	20 GeV



- Remove large QCD BG at low ET. Does not impact the signal region.

Cuts-Optimization - Impact of change in away ET cut

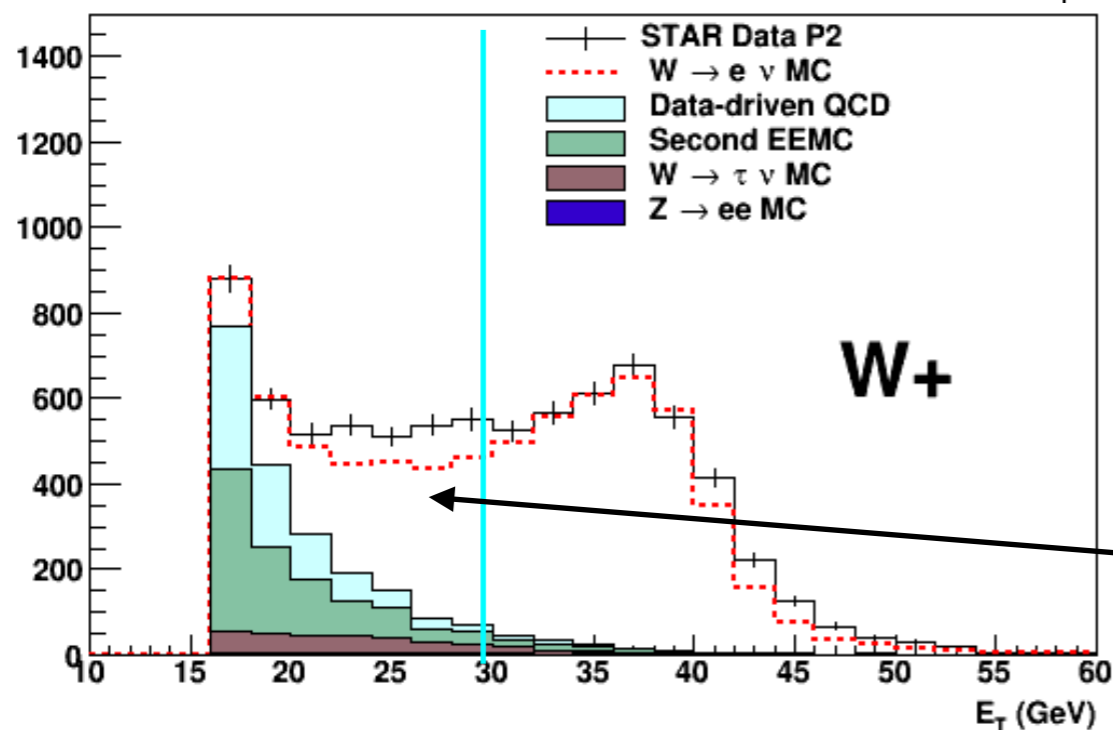
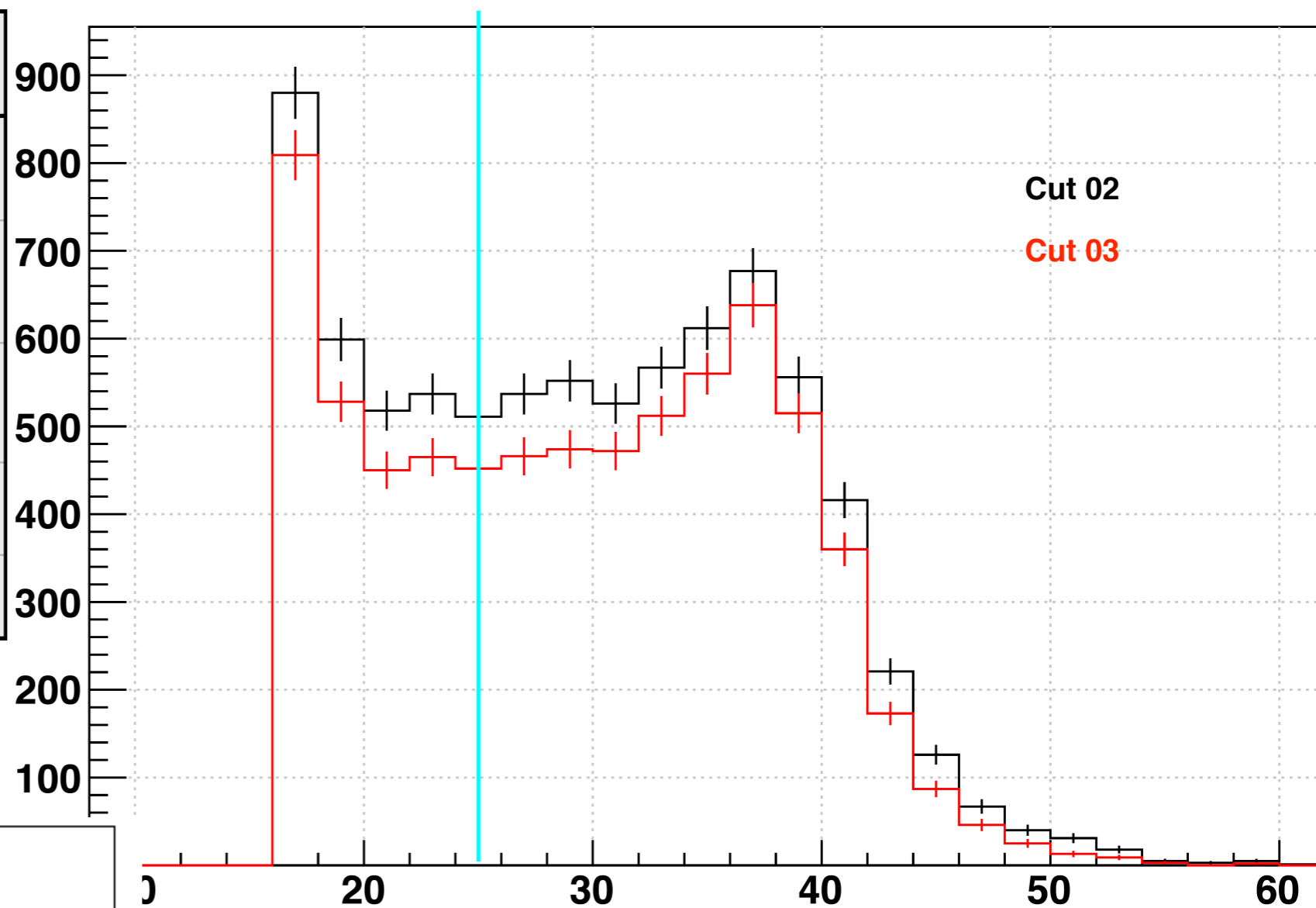
Cut	Cut 02	Cut 03
2x2 ET	16 GeV	16 GeV
2x2 ET / 4x4 ET	0.95	0.95
2x2 / near Cone	0.80	0.80
signPT	16 GeV	16 GeV
away ET	100 GeV	11 GeV



2x2 ET Final W+

Cuts-Optimization - Impact of change in away ET cut

Cut	Cut 02	Cut 03
2x2 ET	16 GeV	16 GeV
2x2 ET / 4x4 ET	0.95	0.95
2x2 / near Cone	0.80	0.80
signPT	16 GeV	16 GeV
away ET	100 GeV	11 GeV



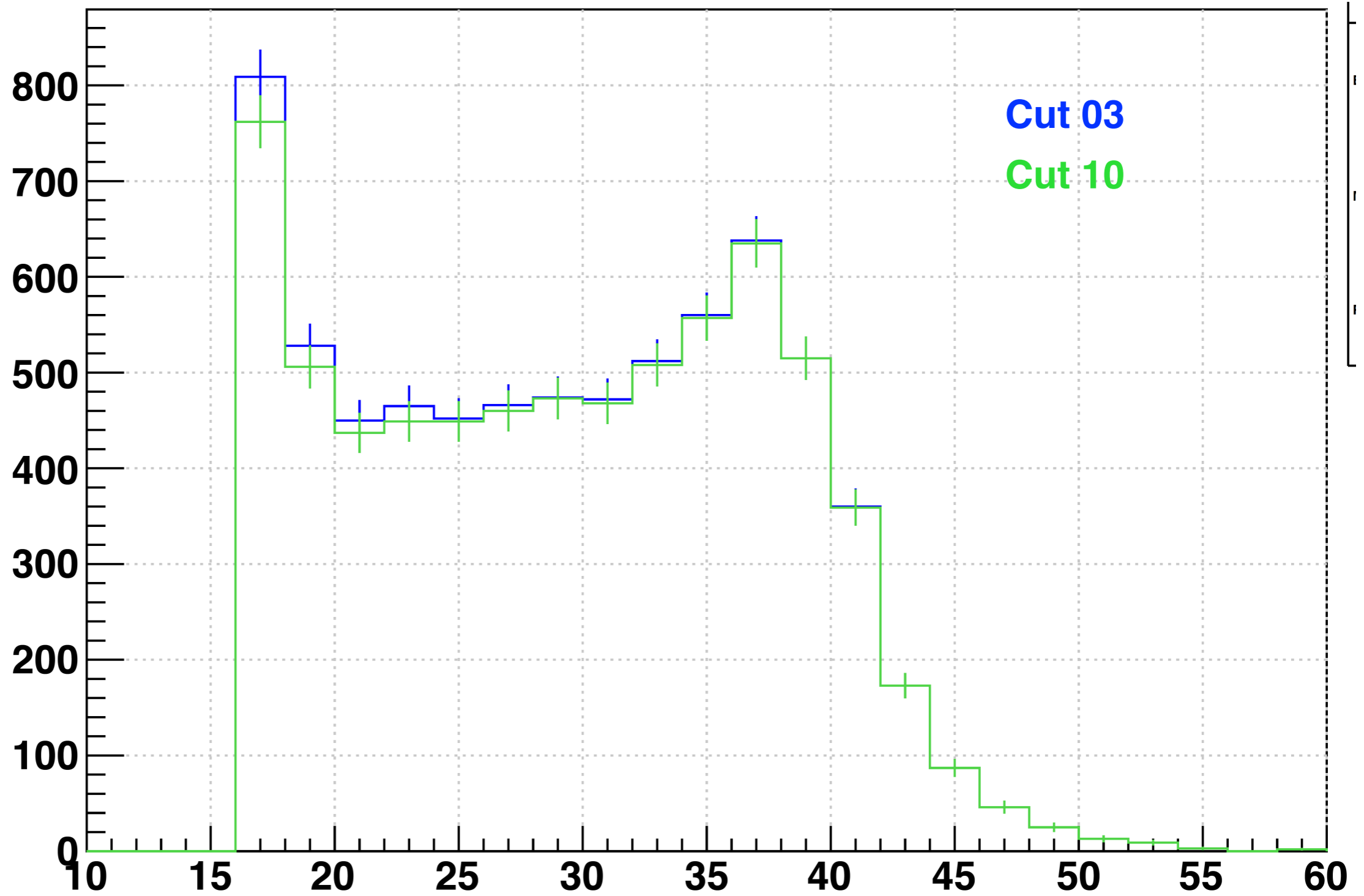
Bump in data / MC comparison

Cuts-Optimization - period 1 - Impact of 2x2/4x4 0.95->0.96

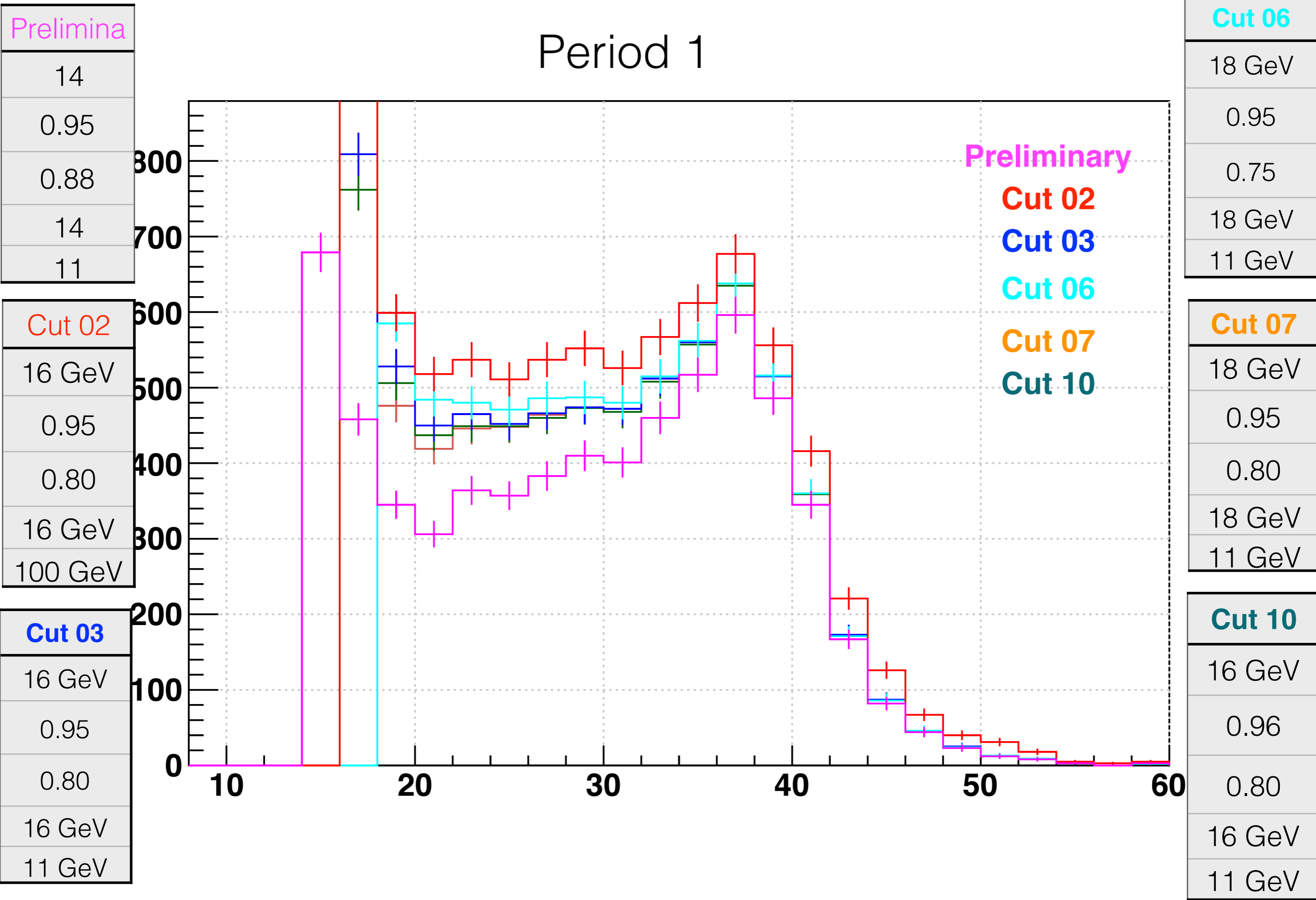
Period 1

Cut 03
16 GeV
0.95
0.80
16 GeV
11 GeV

Cut 10
16 GeV
0.96
0.80
16 GeV
11 GeV



Cuts-Optimization - period 1

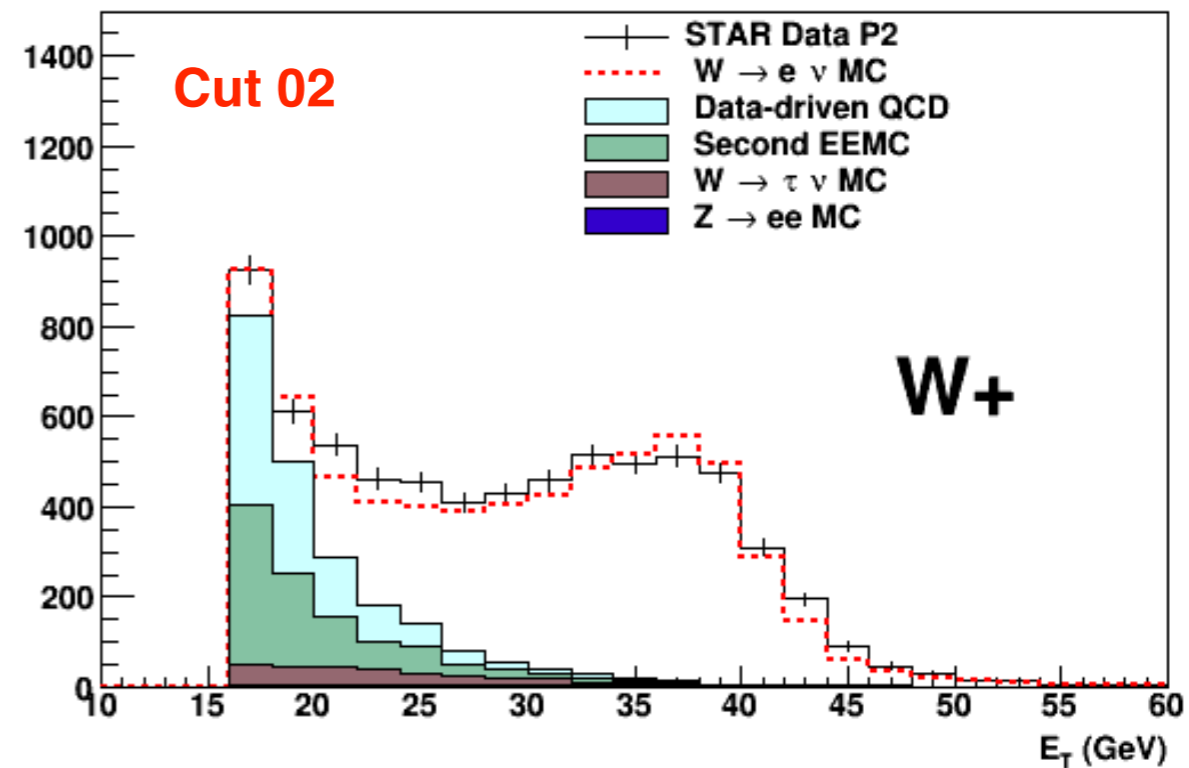
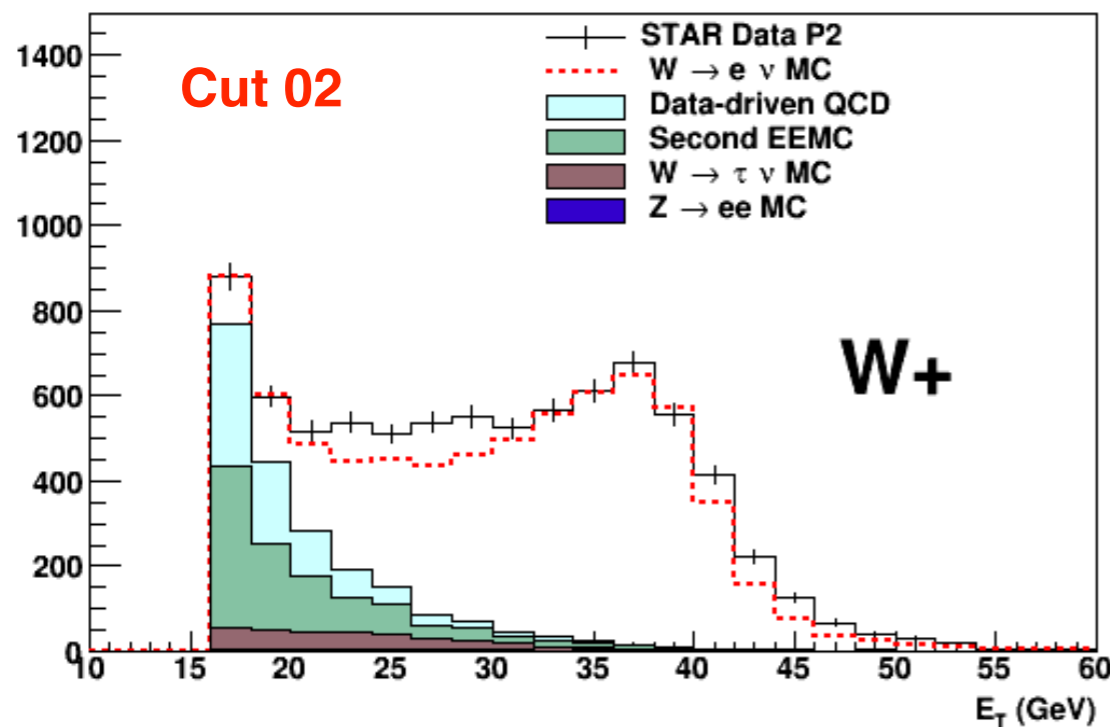


Cuts-Optimization - away ET cut - period 2 ?

Preliminary	Cut 02
14	16 GeV
0.95	0.95
0.88	0.80
14	16 GeV
11	100 GeV

Period 1

Period 2

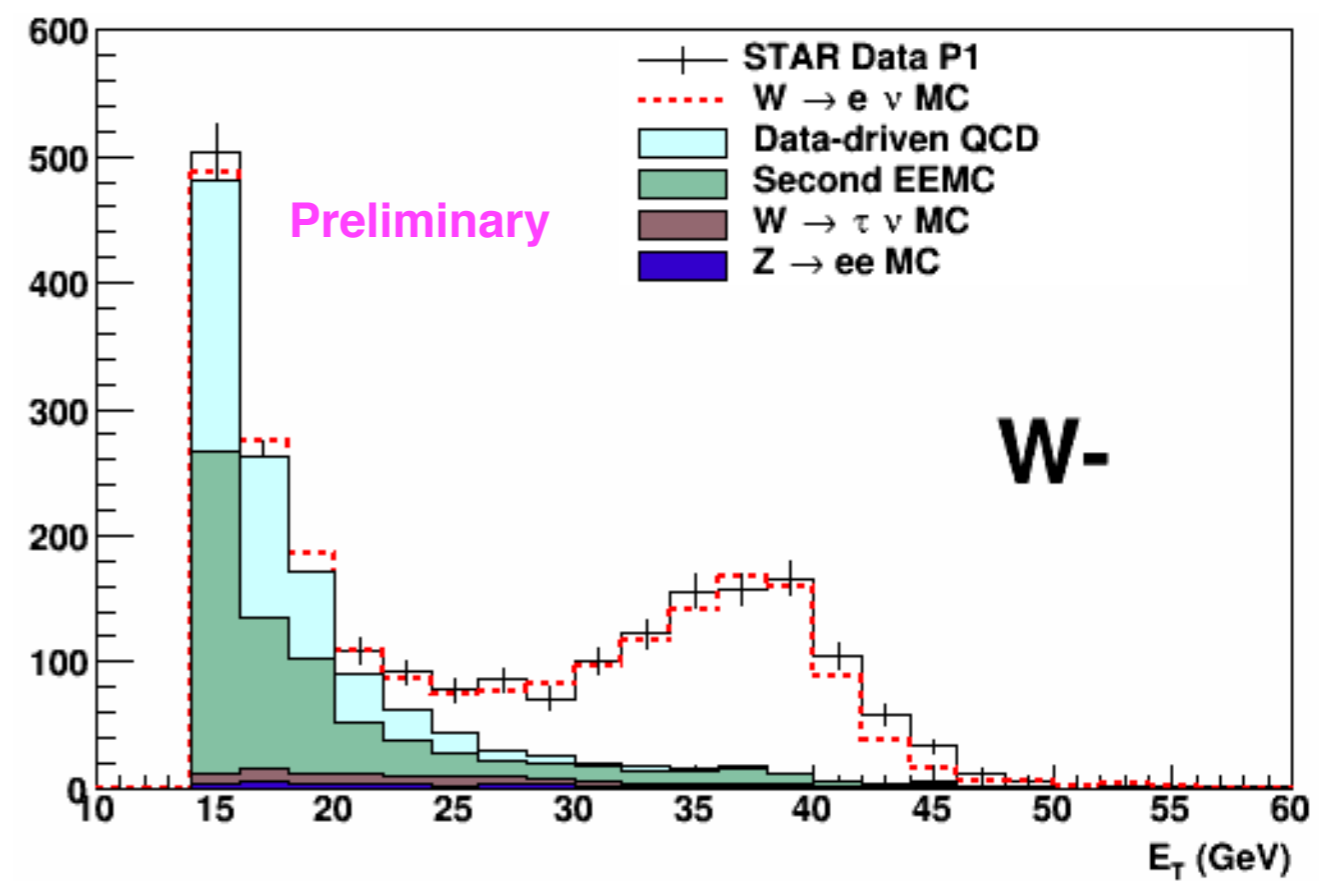
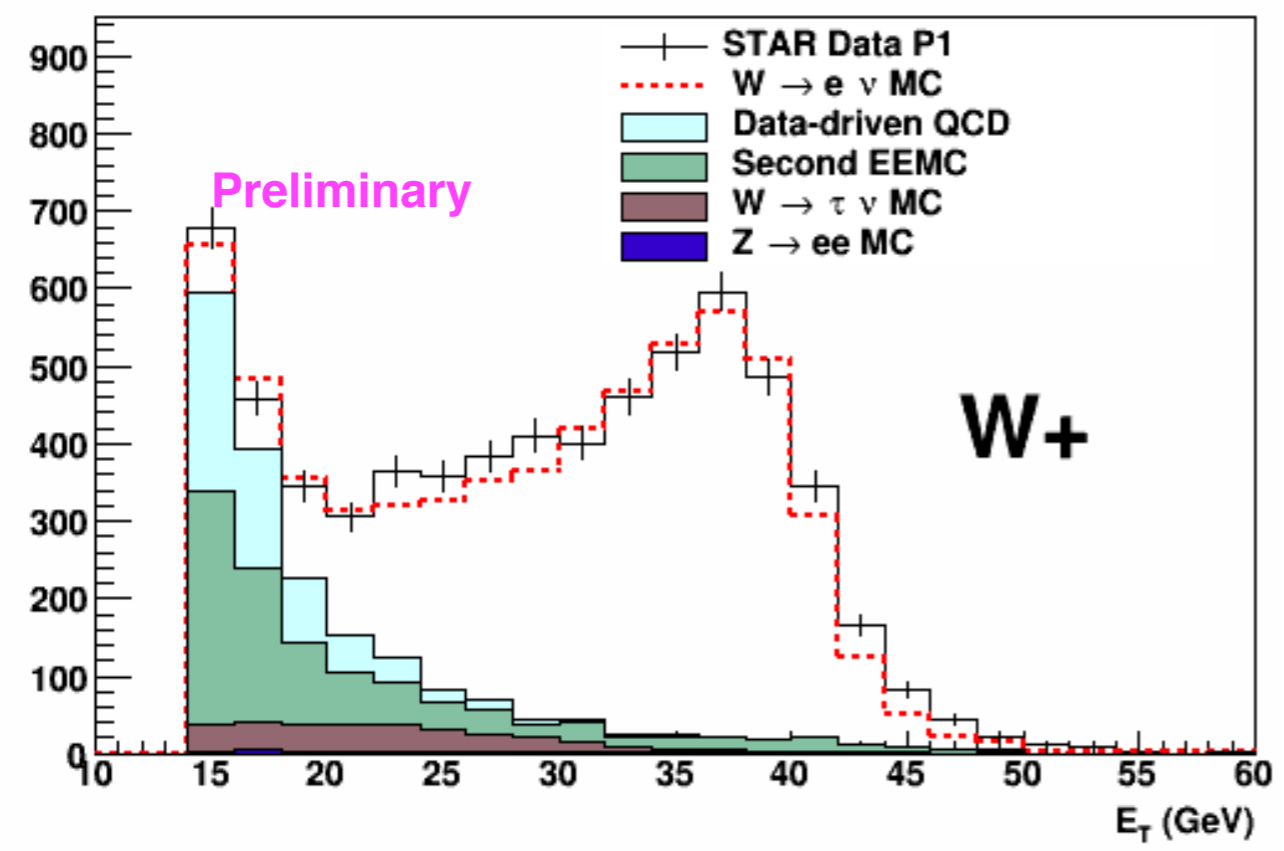
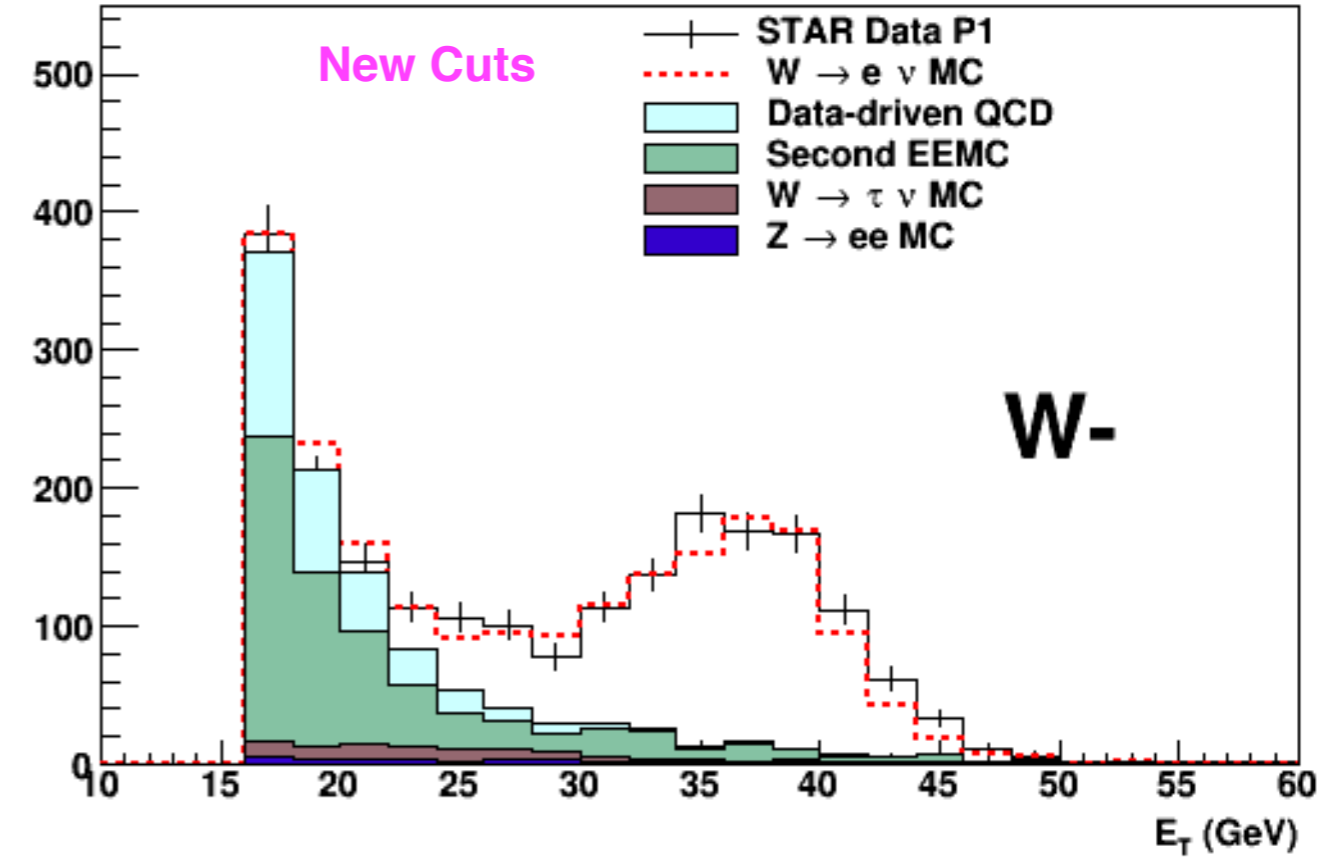
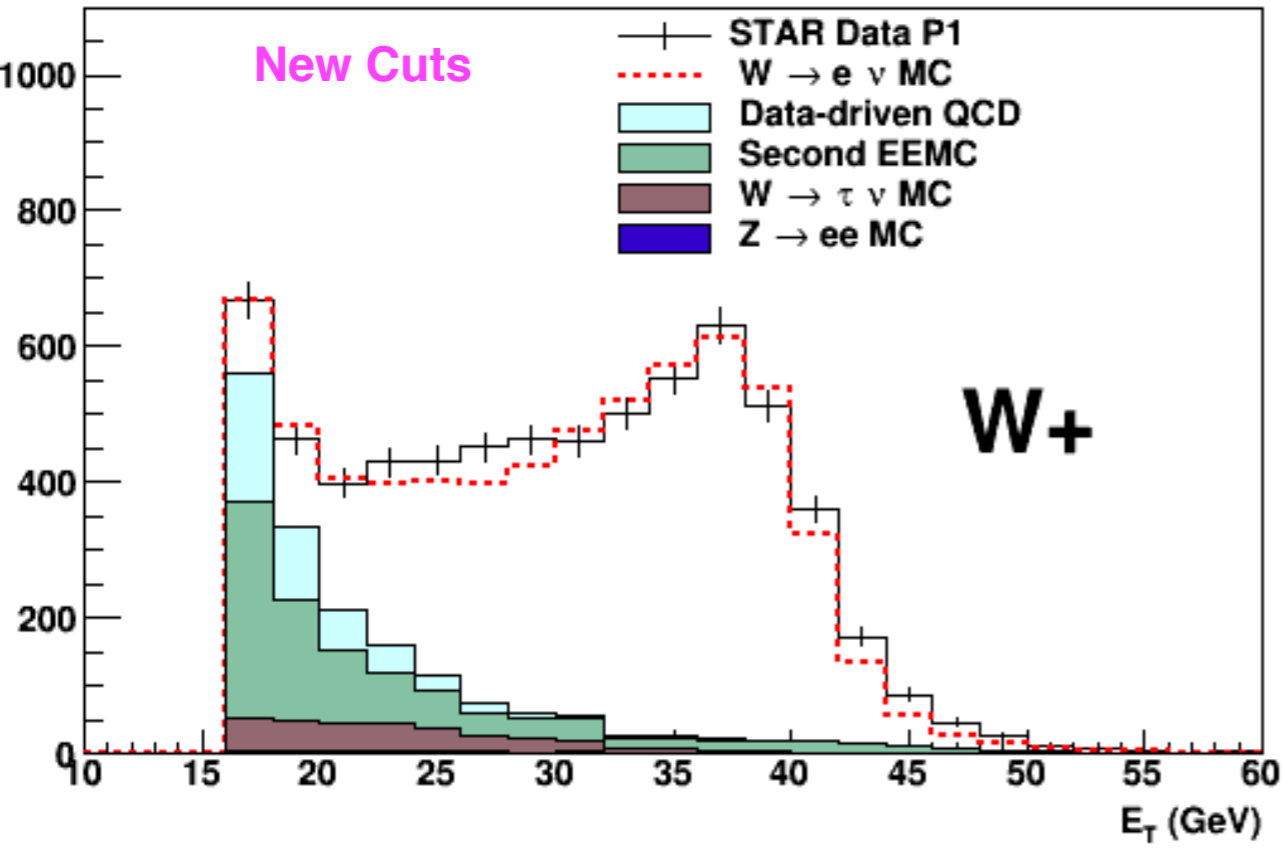


- There is no a significant “bump” pronounced in Period 2 similar to Period 1
- We do not need to use away ET cut for period 2.

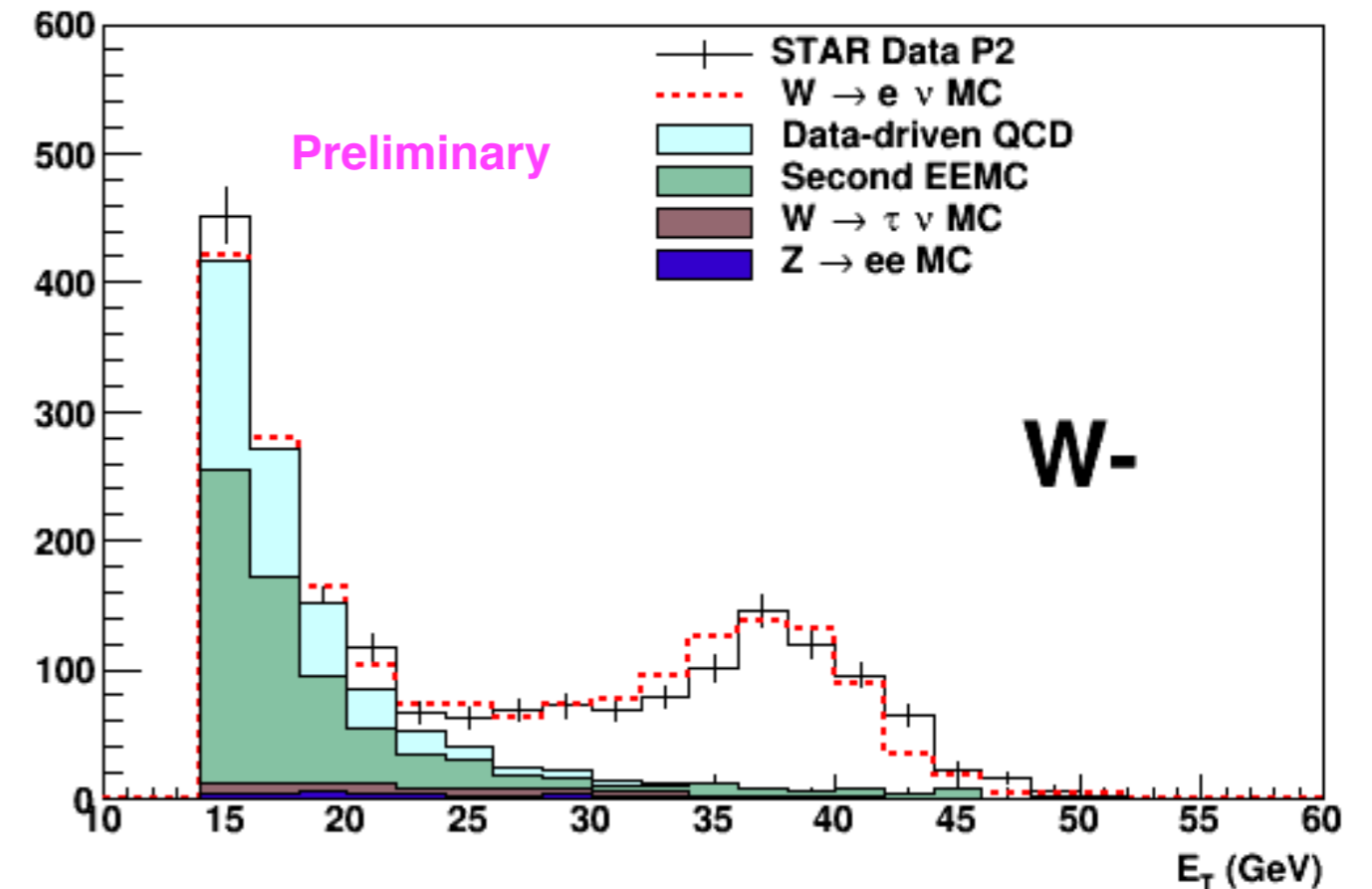
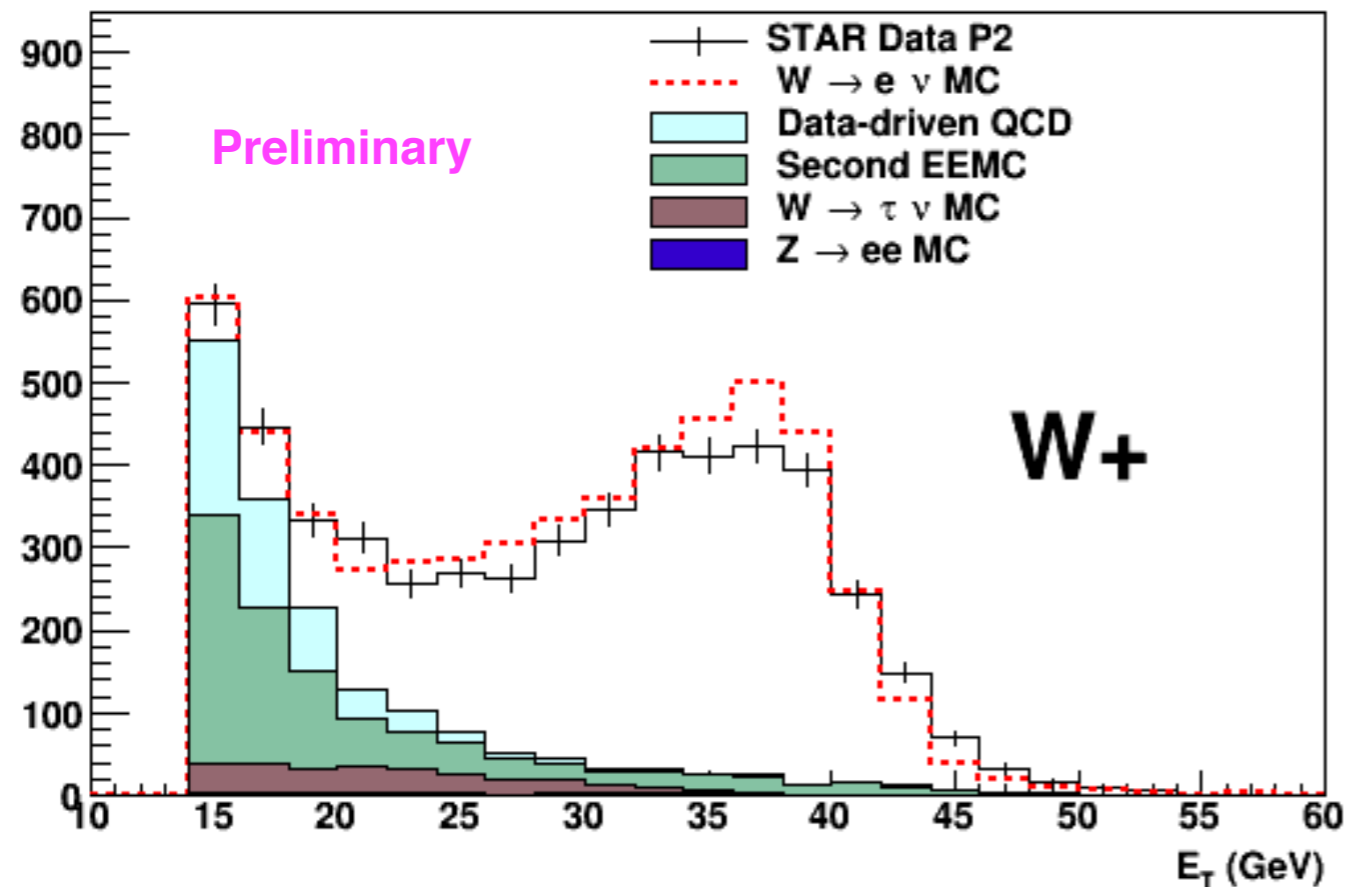
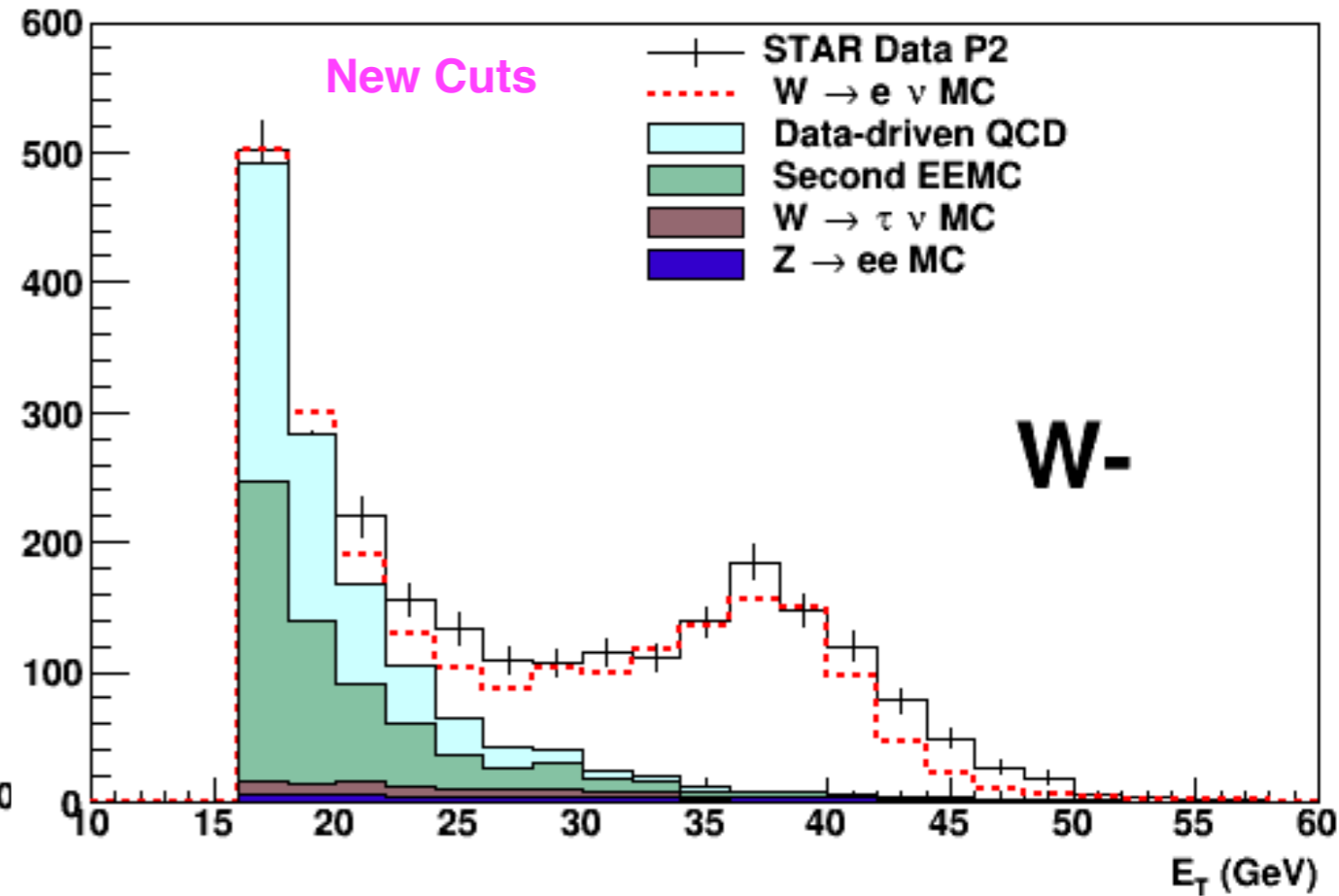
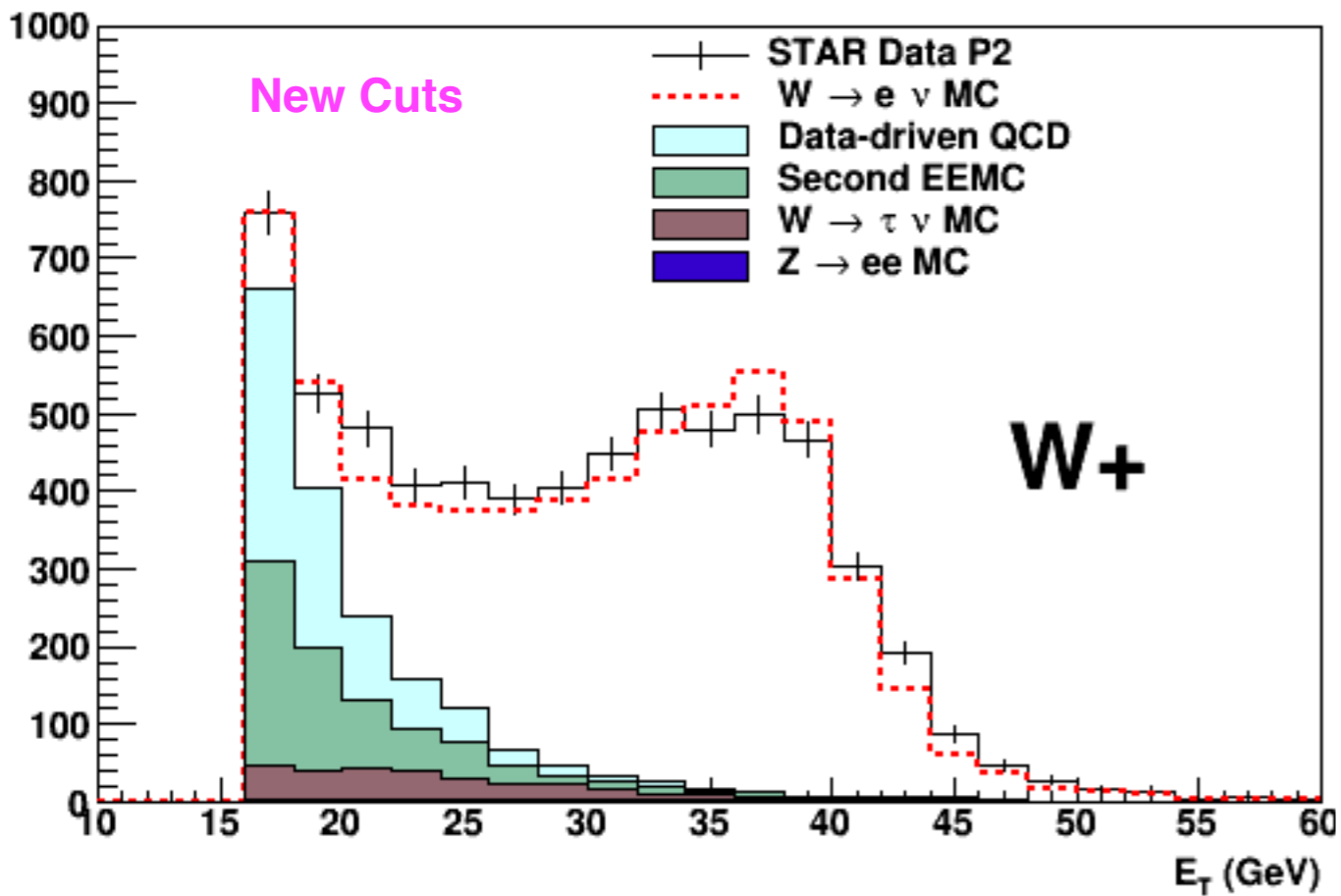
Suggested New Cuts

Cut	Preliminary	New cut Period 1	New cut Period 2
2x2 ET	14	16	16
2x2 ET / 4x4 ET	0.95	0.96	0.96
2x2 / near Cone	0.88	0.82	0.82
signPT	14	16	16
away ET	11	11	100

BG - Whole Barrel - Period 1



BG - Whole Barrel - Period 2



BG Count - Period 1

WN	background	summary:	yields	25<ET<50	GeV	New Cuts				
starPhys	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	274,	6.02,	21,	5.67,	6.40,	33.56,	240.44,	0.878	+/-	0.018,
2,	305,	11.70,	32,	7.68,	7.13,	52.14,	252.86,	0.835	+/-	0.020,
3,	294,	11.23,	36,	5.10,	8.57,	52.91,	241.09,	0.817	+/-	0.022,
4,	345,	12.95,	38,	4.05,	5.86,	55.44,	289.56,	0.852	+/-	0.019,
8,	1230,	35.57,	126,	22.22,	28.05,	183.79,	1046.21,	0.854	+/-	0.010,
WP	background	summary:	yields	25<ET<50	GeV					
starPhys	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	811,	10.65,	53,	3.65,	16.08,	67.77,	743.23,	0.916	+/-	0.009,
2,	1375,	13.76,	53,	9.42,	29.90,	76.94,	1298.06,	0.943	+/-	0.005,
3,	1420,	17.06,	70,	3.50,	30.44,	91.35,	1328.65,	0.937	+/-	0.006,
4,	862,	14.29,	47,	3.09,	16.72,	64.50,	797.50,	0.931	+/-	0.008,
8,	4478,	50.67,	226,	19.14,	93.60,	295.82,	4182.18,	0.935	+/-	0.003,

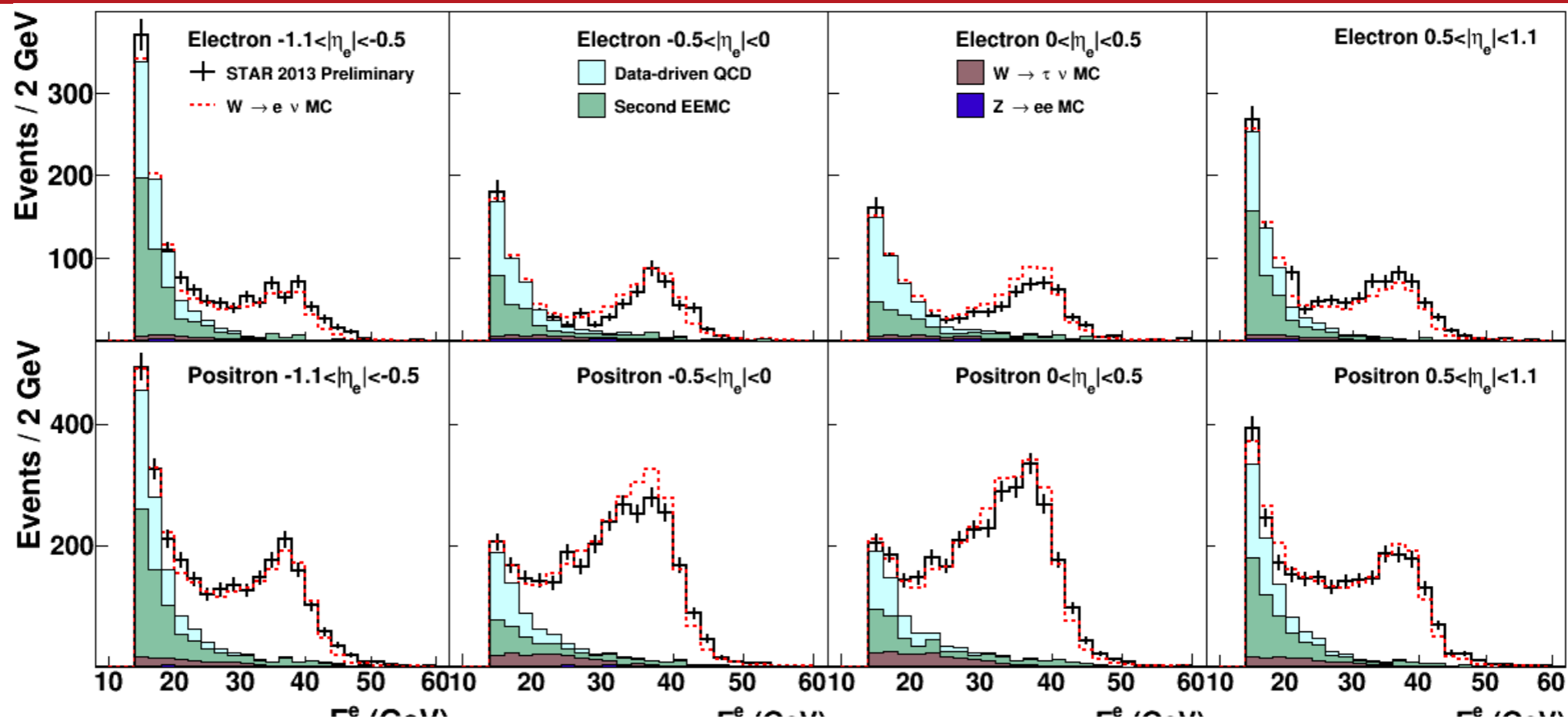
WN	background	summary:	yields	25<ET<50	GeV	Preliminary				
starPhysEt	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	258,	7.05,	23,	4.98,	5.86,	35.69,	222.31,	0.862	+/-	0.020,
2,	270,	11.40,	28,	7.07,	6.31,	46.68,	223.32,	0.827	+/-	0.021,
3,	259,	12.94,	23,	5.70,	7.31,	41.74,	217.26,	0.839	+/-	0.020,
4,	315,	8.52,	18,	4.46,	5.05,	31.68,	283.32,	0.899	+/-	0.014,
8,	1113,	34.44,	92,	21.33,	24.62,	147.77,	965.23,	0.867	+/-	0.009,
WP	background	summary:	yields	25<ET<50	GeV					
starPhysEt	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	781,	8.31,	60,	3.63,	13.65,	72.00,	709.00,	0.908	+/-	0.010,
2,	1246,	9.13,	50,	9.69,	26.75,	69.78,	1176.22,	0.944	+/-	0.006,
3,	1282,	12.20,	54,	4.44,	25.66,	71.64,	1210.36,	0.944	+/-	0.006,
4,	775,	16.59,	30,	2.96,	14.83,	50.35,	724.65,	0.935	+/-	0.007,
8,	4094,	41.10,	197,	20.85,	81.24,	258.96,	3835.04,	0.937	+/-	0.004,

BG Counts - Period 2

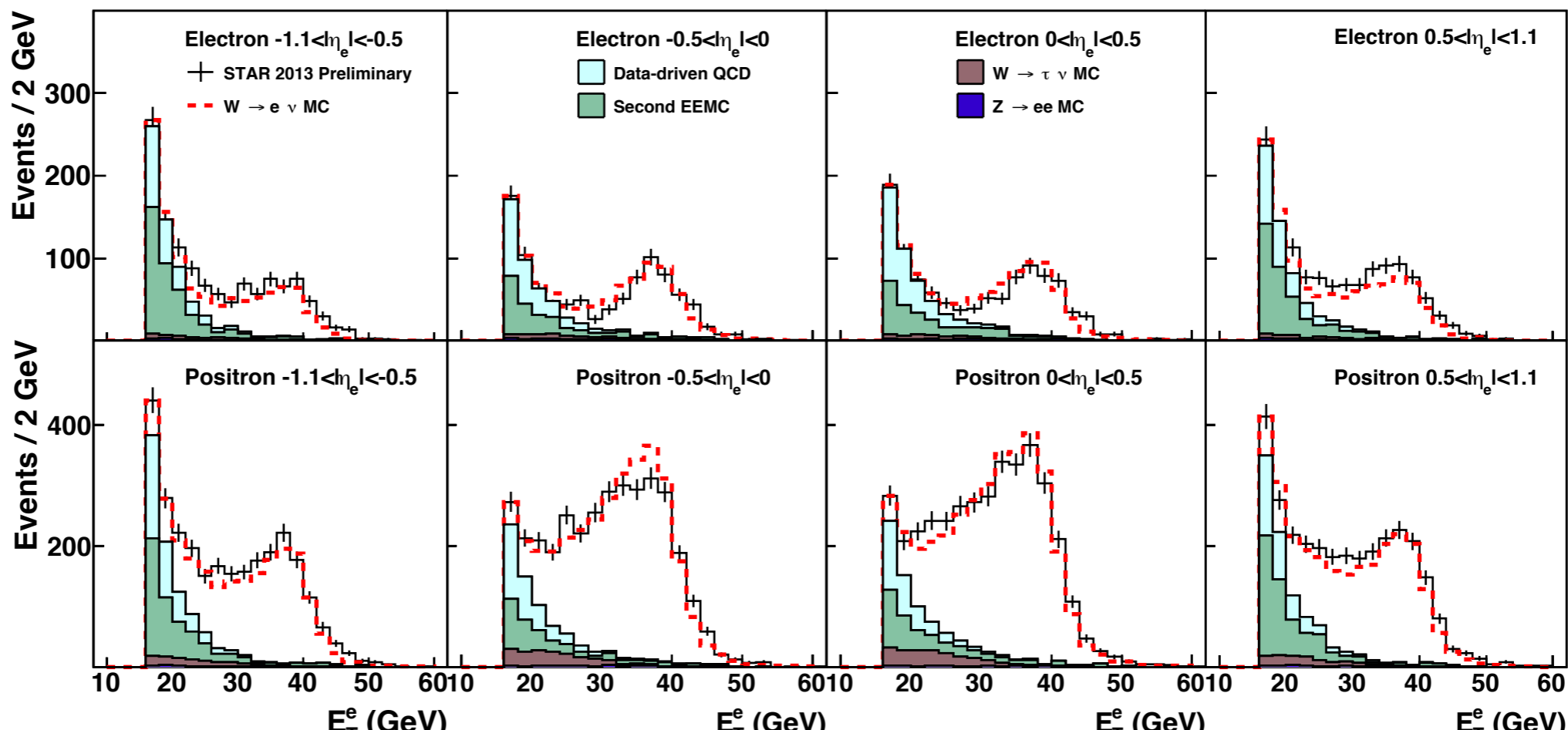
WN	background	summary:	yields	25<ET<50	GeV	New Cuts				
starPhysEtaBi	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	322,	14.60,	22,	6.66,	5.47,	43.94,	278.06,	0.869	+/-	0.016,
2,	276,	17.46,	15,	11.76,	7.61,	45.18,	230.82,	0.838	+/-	0.016,
3,	309,	21.60,	25,	14.09,	6.34,	61.65,	247.35,	0.807	+/-	0.018,
4,	361,	9.46,	17,	6.22,	6.26,	33.04,	327.96,	0.911	+/-	0.012,
8,	1280,	56.84,	81,	39.61,	25.68,	177.45,	1102.55,	0.865	+/-	0.008,
WP	background	summary:	yields	25<ET<50	GeV					
starPhysEtaBi	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	763,	25.28,	21,	7.18,	14.26,	53.52,	709.48,	0.933	+/-	0.007,
2,	1102,	24.70,	17,	8.11,	25.65,	50.45,	1051.55,	0.955	+/-	0.004,
3,	1276,	17.31,	20,	11.54,	30.75,	48.92,	1227.08,	0.961	+/-	0.004,
4,	904,	16.14,	33,	7.73,	16.17,	57.35,	846.65,	0.936	+/-	0.007,
8,	4052,	81.00,	87,	34.07,	87.08,	202.07,	3849.93,	0.95	+/-	0.002,
WN	background	summary:	yields	25<ET<50	GeV	Preliminary				
starPhysEtaBi	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	238,	9.69,	18,	3.86,	4.41,	32.03,	205.97,	0.865	+/-	0.019,
2,	185,	5.94,	17,	7.33,	6.17,	30.28,	154.72,	0.836	+/-	0.024,
3,	198,	7.84,	25,	7.64,	4.57,	41.44,	156.56,	0.791	+/-	0.028,
4,	245,	5.15,	13,	3.08,	4.25,	21.86,	223.14,	0.911	+/-	0.015,
8,	871,	25.68,	78,	20.88,	19.40,	124.56,	746.44,	0.857	+/-	0.011,
WP	background	summary:	yields	25<ET<50	GeV					
starPhysEtaBi	rawYield,	qcdBkgd,	secondEEMC,	zeeBkgd,	wTauYield,	totalBkgd,	wYield,	beta	+/-	err,
1,	581,	15.06,	42,	4.72,	12.37,	61.78,	519.22,	0.894	+/-	0.012,
2,	835,	12.30,	33,	5.12,	20.35,	50.62,	784.38,	0.939	+/-	0.007,
3,	998,	7.63,	41,	5.15,	23.85,	54.07,	943.93,	0.946	+/-	0.007,
4,	653,	6.57,	43,	3.39,	13.92,	53.36,	599.64,	0.918	+/-	0.010,
8,	3070,	38.41,	157,	17.82,	70.73,	213.24,	2856.76,	0.931	+/-	0.004,

BG Estimation

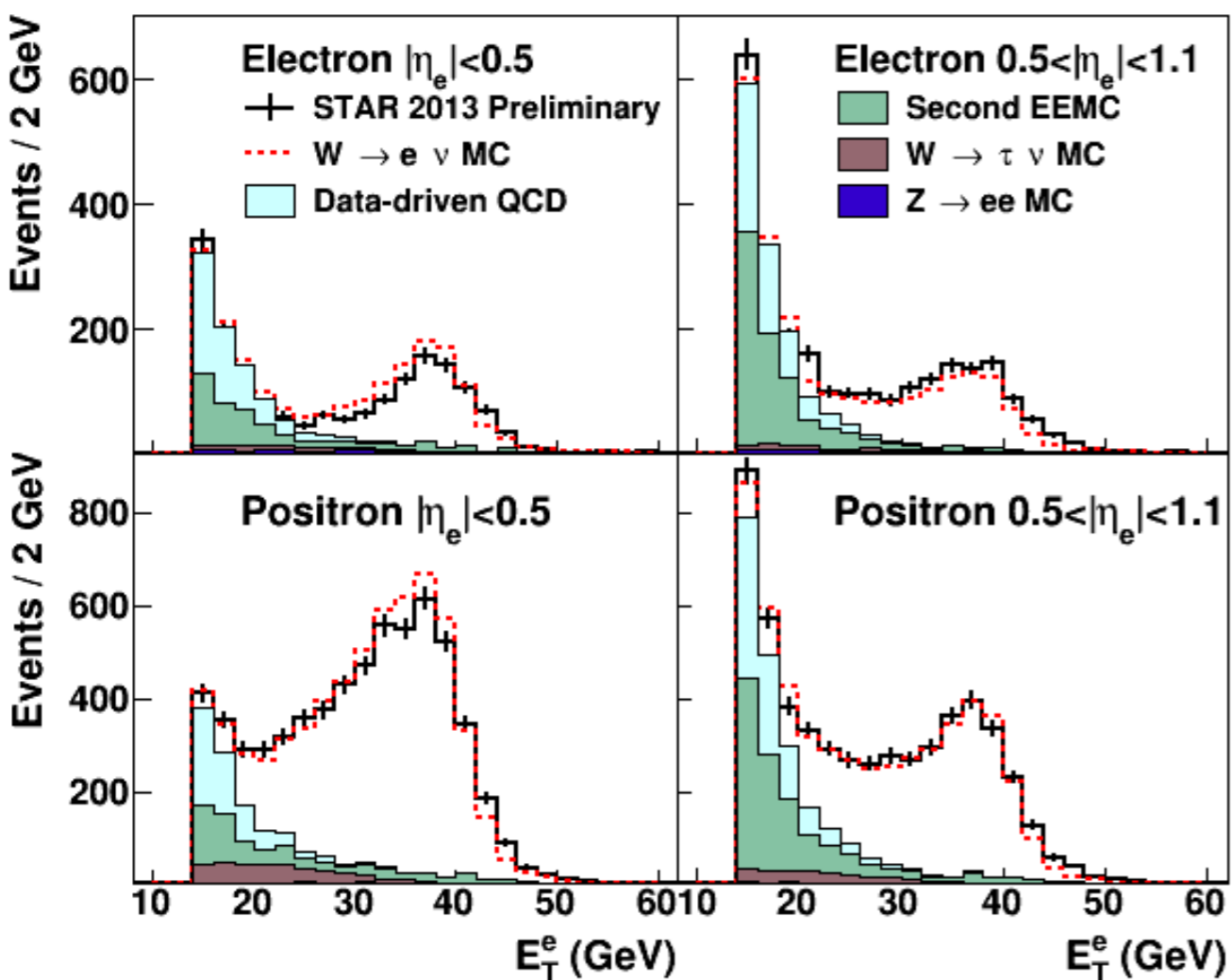
Preliminary



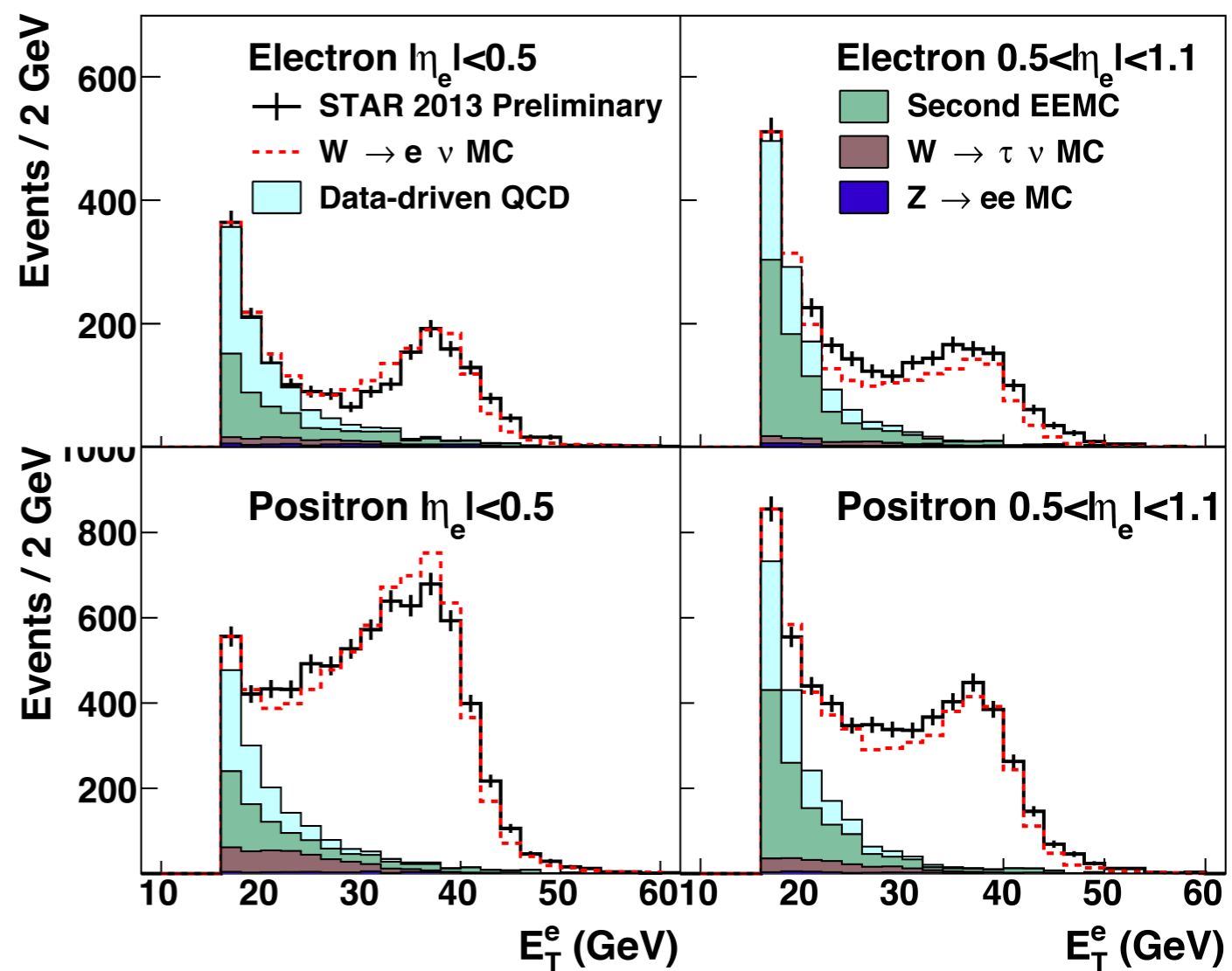
New Cuts



New Cuts

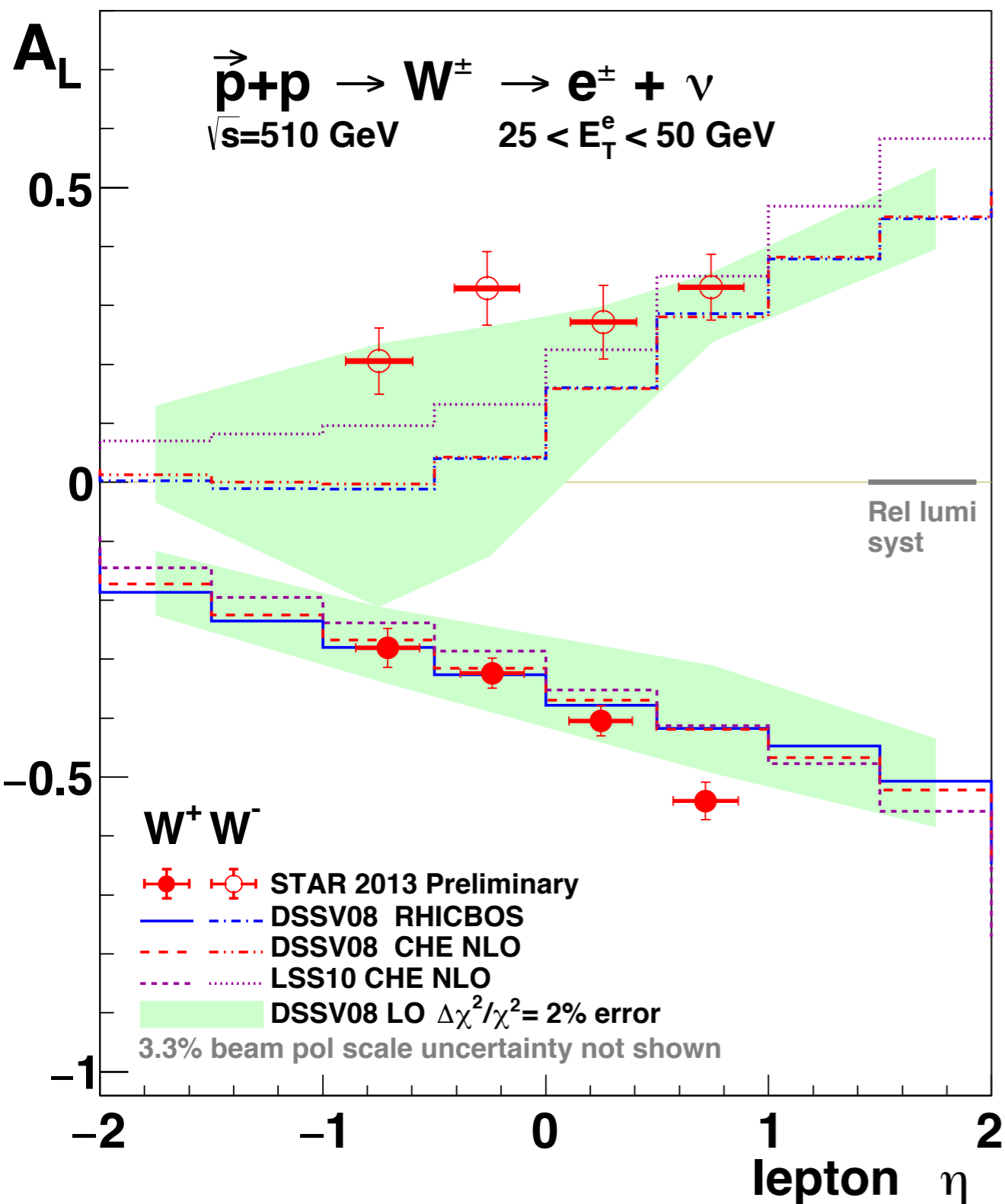


Preliminary

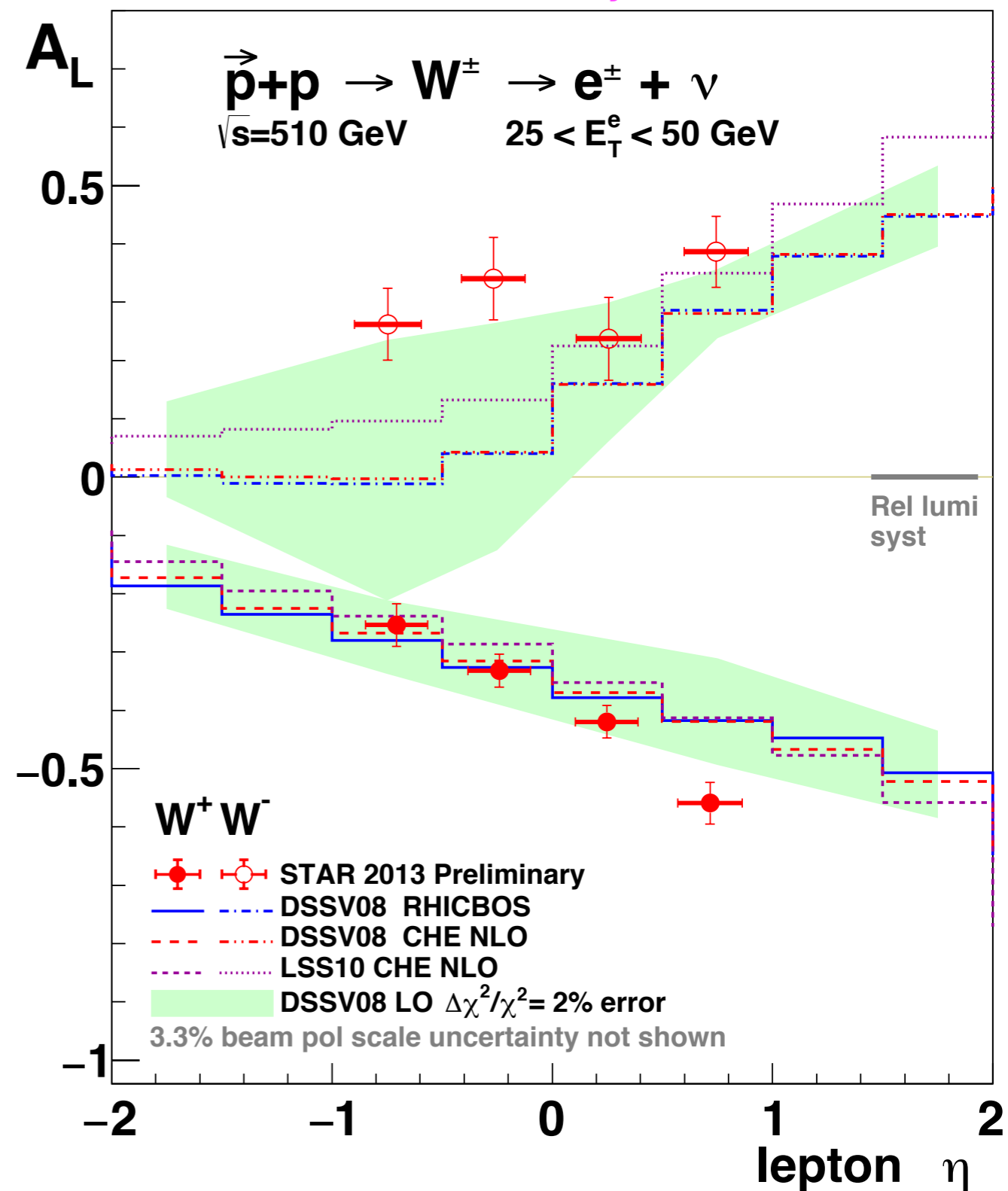


Results

New Cuts



Preliminary



Uncertainty

Preliminary

==== WP=====

Etabin1, AL+/-Err: -0.254+/-0.037

Etabin2, AL+/-Err: -0.332+/-0.028

Etabin3, AL+/-Err: -0.420+/-0.028

Etabin4, AL+/-Err: -0.559+/-0.036

==== WN=====

Etabin1, AL+/-Err: 0.262+/-0.062

Etabin2, AL+/-Err: 0.340+/-0.071

Etabin3, AL+/-Err: 0.237+/-0.071

Etabin4, AL+/-Err: 0.386+/-0.061

New Cuts

==== WP=====

Etabin1, AL+/-Err: -0.281+/-0.033

Etabin2, AL+/-Err: -0.324+/-0.026

Etabin3, AL+/-Err: -0.405+/-0.026

Etabin4, AL+/-Err: -0.540+/-0.032

==== WN=====

Etabin1, AL+/-Err: 0.206+/-0.056

Etabin2, AL+/-Err: 0.329+/-0.062

Etabin3, AL+/-Err: 0.272+/-0.062

Etabin4, AL+/-Err: 0.331+/-0.056

Uncertainty Reduction WN ~ 15 %

Uncertainty Reduction WP ~ 9 %

Summary

- New cuts set gives a reasonable data / MC comparison consist with preliminary results.
- New cuts set gives more statistics while keeping better signal / BG ratio.
- Uncertainty of results reduced by $\sim 10\%$ in comparison to preliminary results