Update on Monotop (Muon Channel)

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Samples Info

- Snowmass background samples with HT binning
  - ✓ /Snowmass/HTBinned/Delphes-3.0.9.1/NoPileUp/
- No PileUp scenario, √s = 14 TeV
- Monotop 0-jet sample: MG5 v1.5.14 (Generation) + Pythia8 (Hadronization) + Delphes-3.0.9 (Simulation) - to be consistent with background samples

BB-4p HT-bin	X-Sec. (pb)	BJ-4p HT-bin	X-Sec. (pb)	tt-4p HT-bin	X-Sec. (pb)
0-300	249.97710	0-300	34409.92339	0-600	530.89358
300-700	35.23062	300-600	2642.85309	600-1100	42.55351
700-1300	4.13743	600-1100	294.12311	1100-1700	4.48209
1300-2100	0.41702	1100-1800	25.95000	1700-2500	0.52795
2100-100000	0.04770	1800-2700	2.42111	2500-100000	0.05449
		2700-3700	0.22690		
		3700-100000	0.02767		

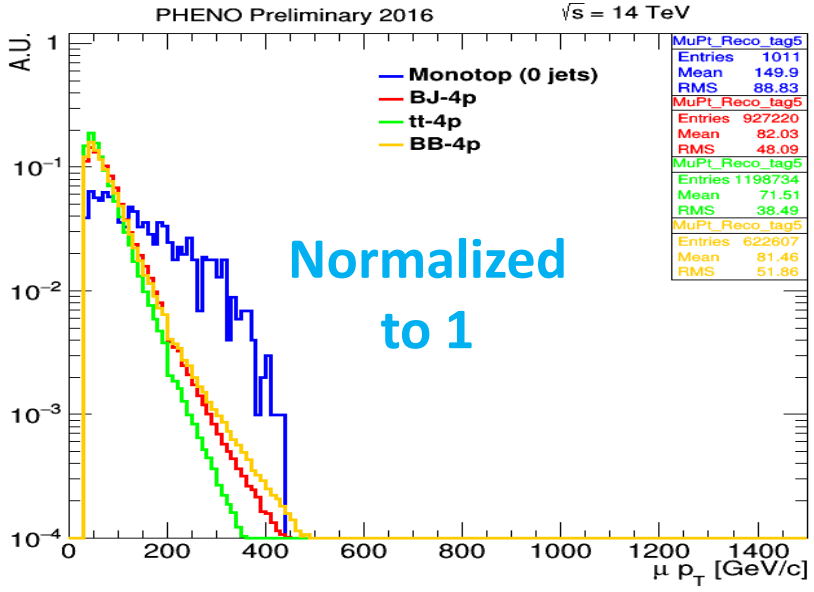
Selection Criteria

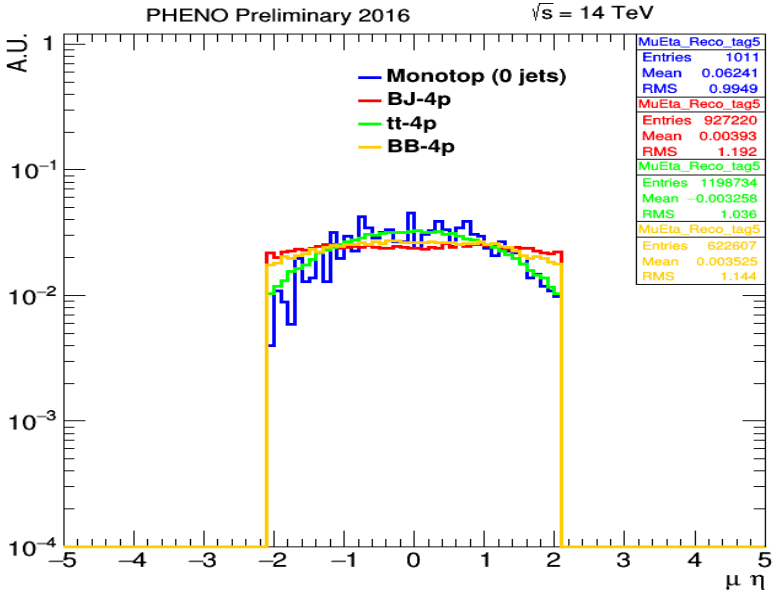
- Pre-Selections
  - ✓ Exactly one tight muon with $p_T > 20$ GeV, $|\eta| < 2.1$
  - ✓ Veto on other loose muons with $p_T > 10$ GeV, $|\eta| < 2.1$
  - ✓ Veto on electrons with $p_T > 10$ GeV, $|\eta| < 2.1$
  - ✓ At least one jet with $p_T > 70$ GeV, $|\eta| < 2.4$
  - ✓ $m_T^W > 40$ GeV

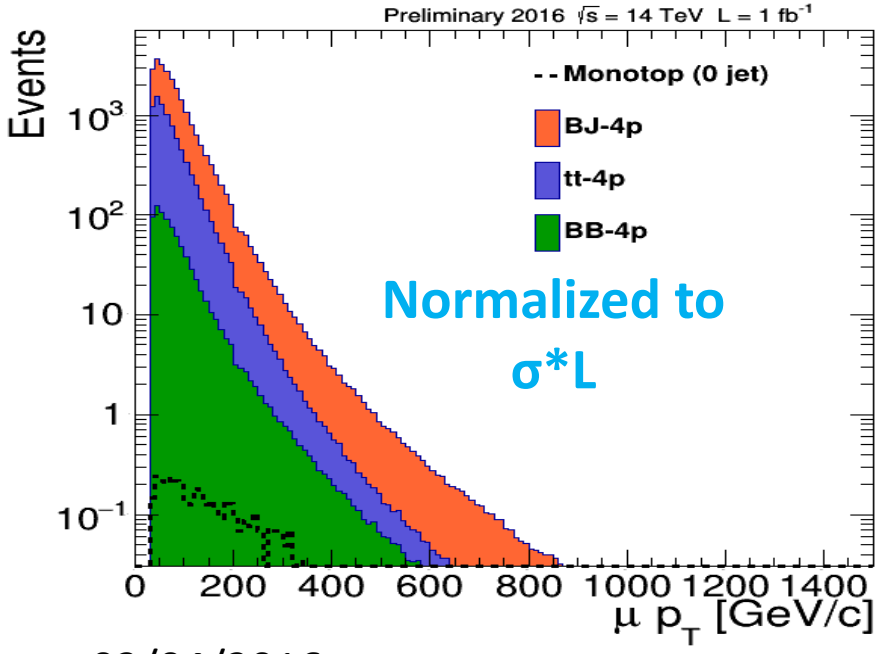
- Signal Selections
  - ✓ Exactly one tight jet with $p_T > 70$ GeV, $|\eta| < 2.4$
  - ✓ Veto on other loose jets with $p_T > 30$ GeV, $|\eta| < 2.4$
  - ✓ b-tag requirement on the tight jet
  - ✓ W p_T > 50 GeV
  - ✓ $\Delta\phi(\mu, \text{jet})| < 1.7$
  - ✓ MET > 100 GeV

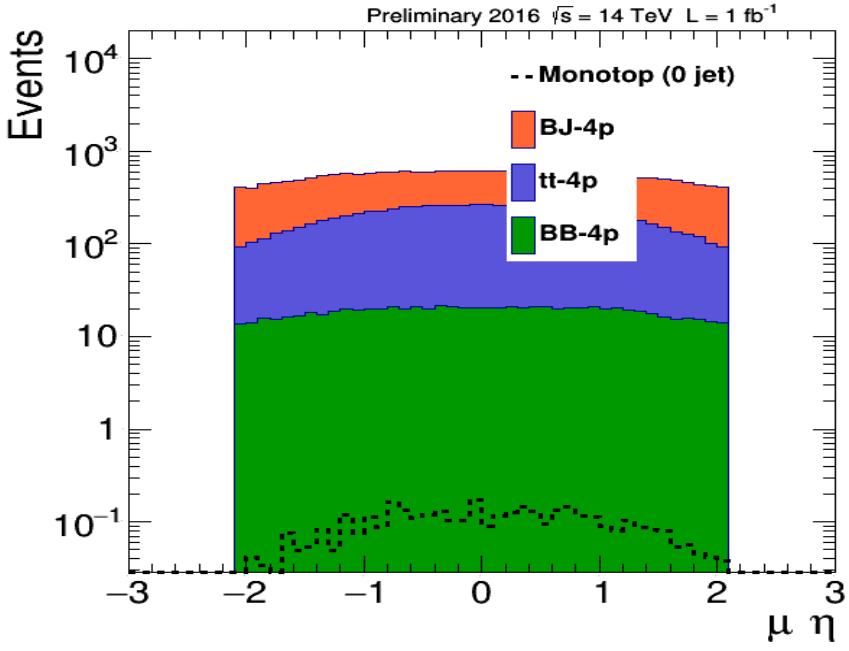
In sync with CMS AN-2014-279

Kinematic Distributions After Pre-selections









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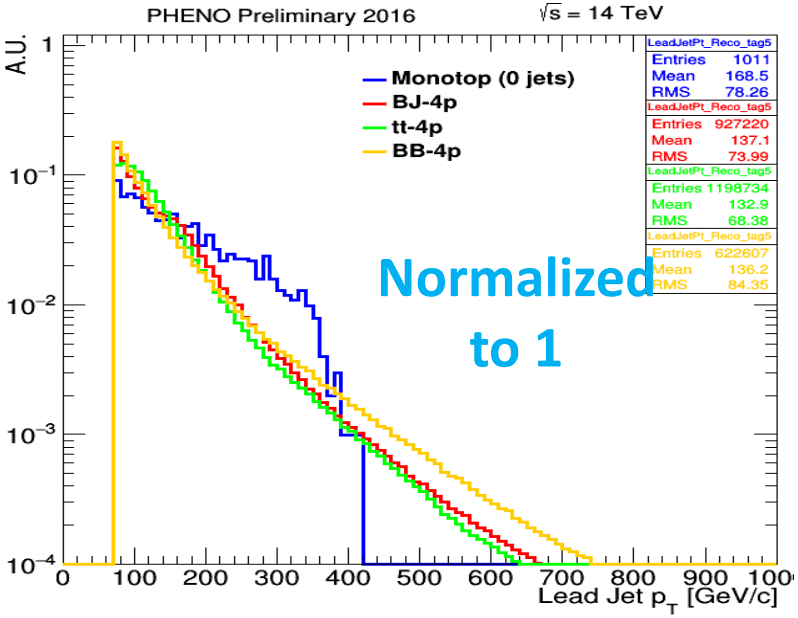

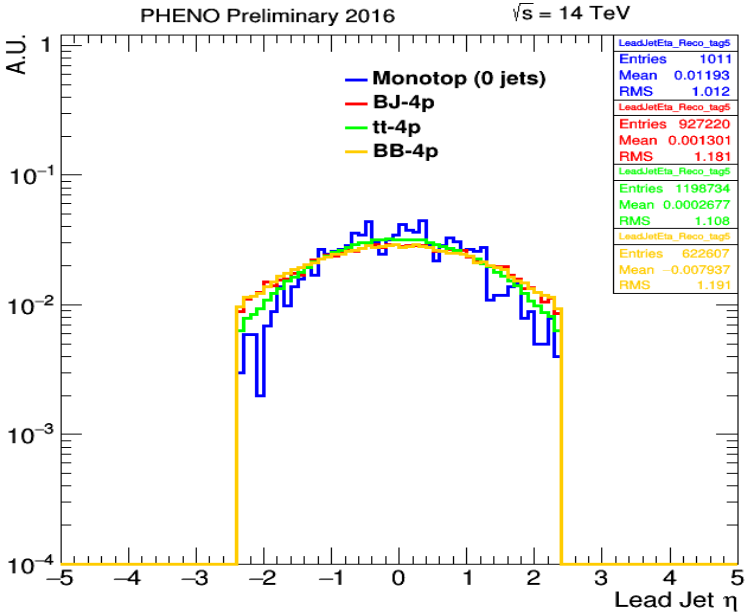

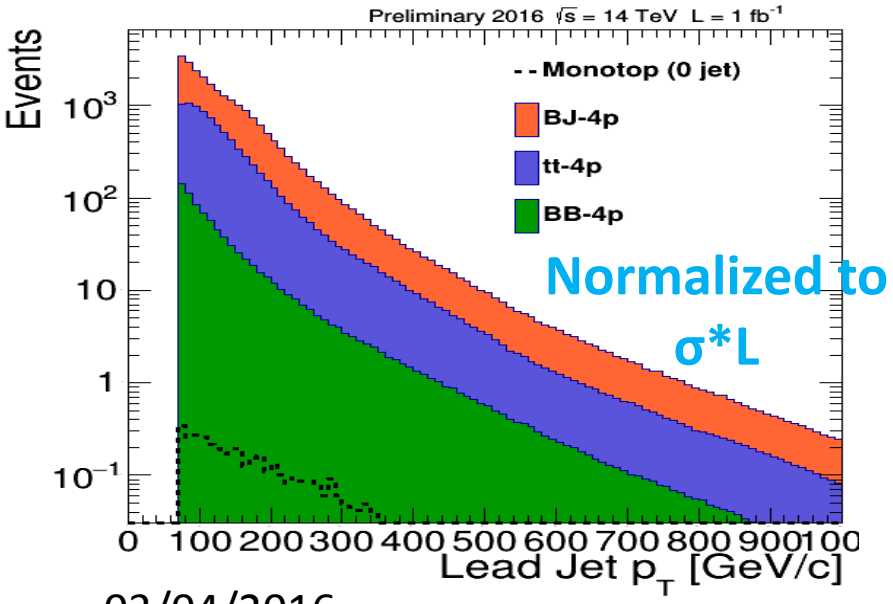

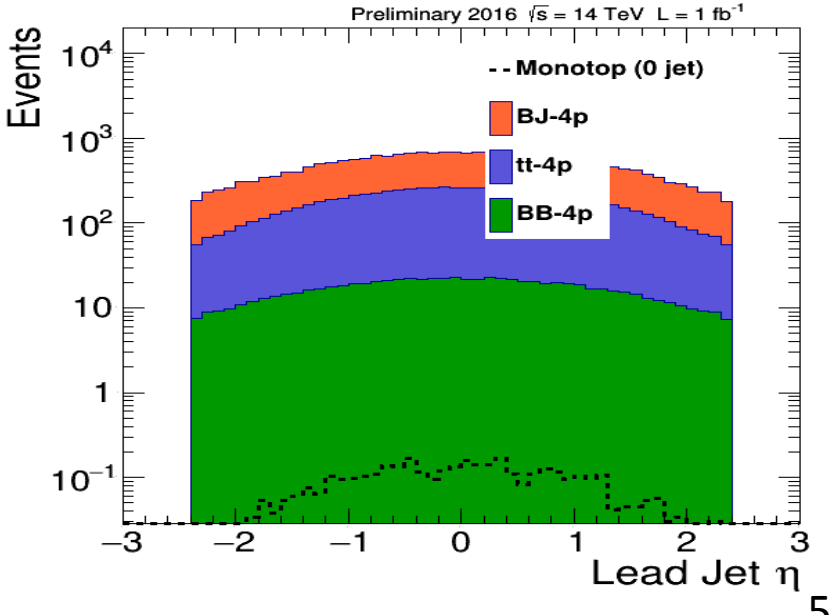

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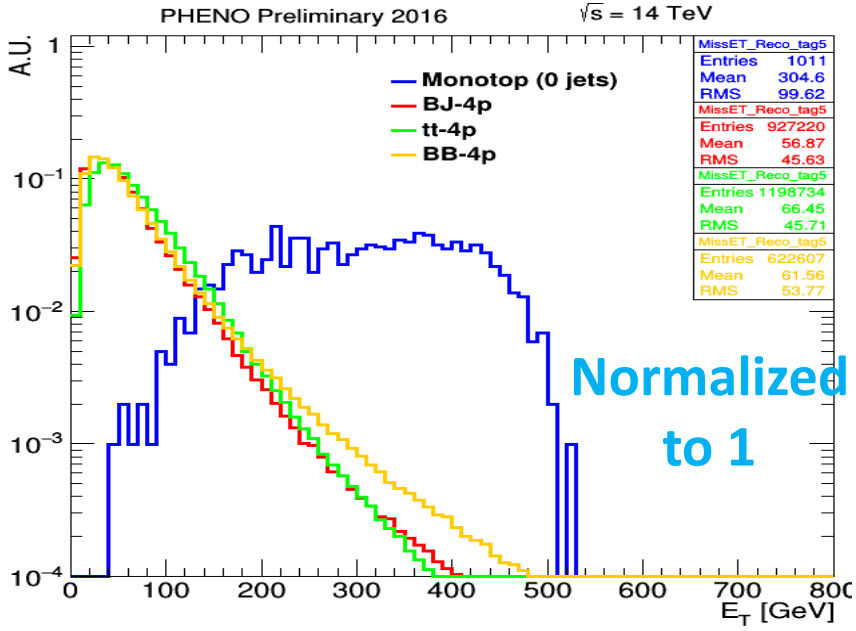

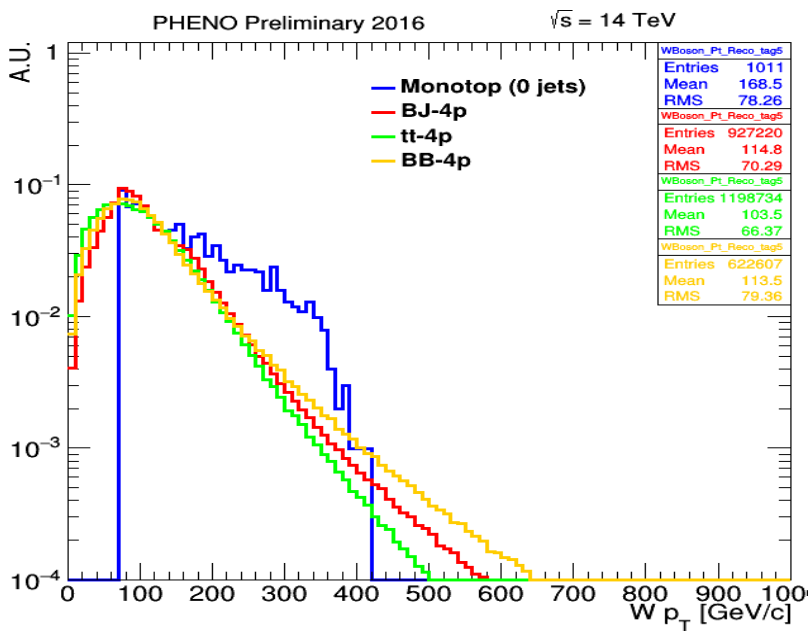

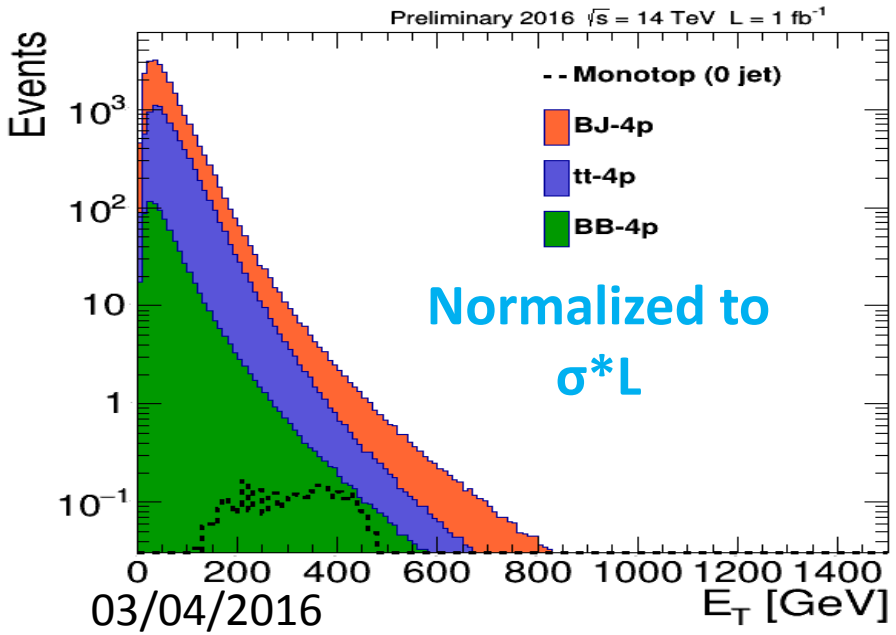

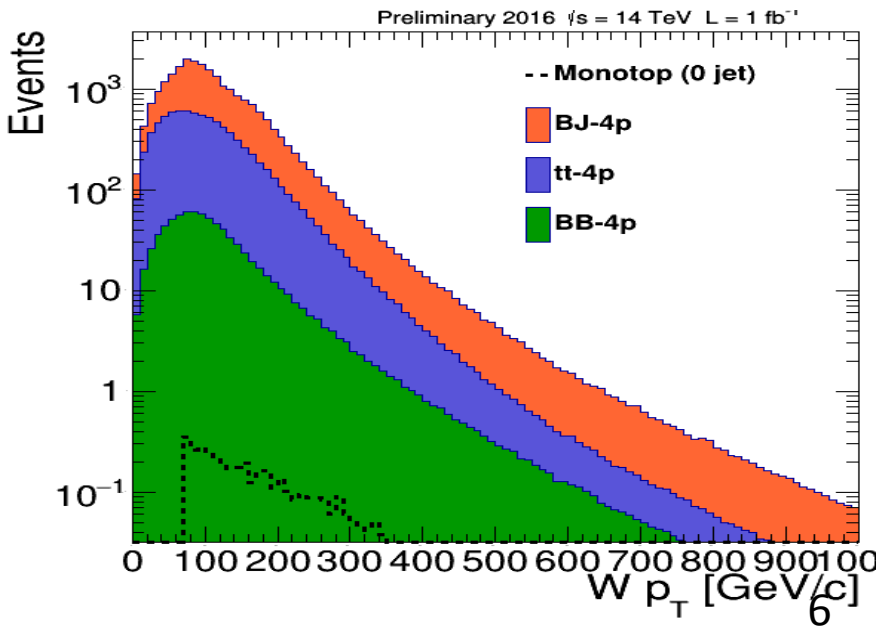

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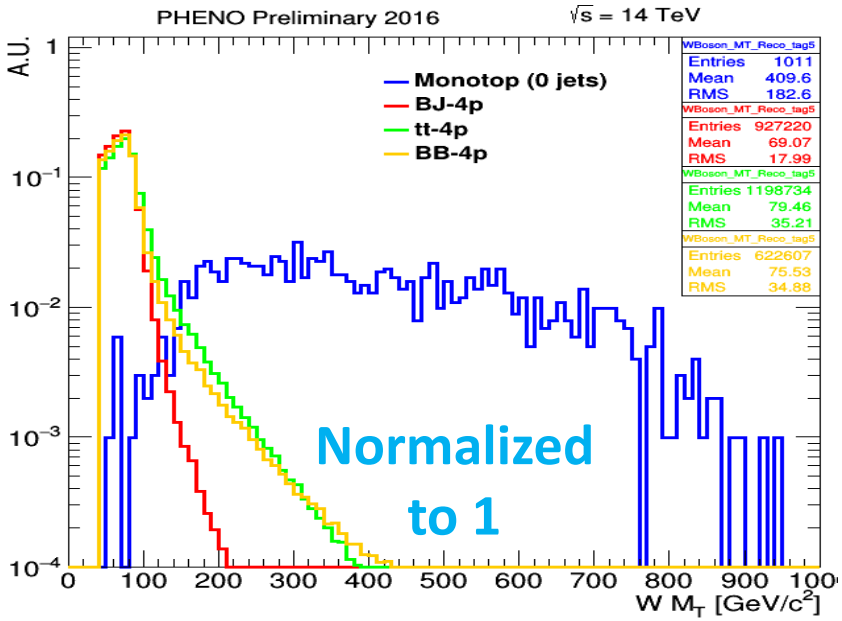

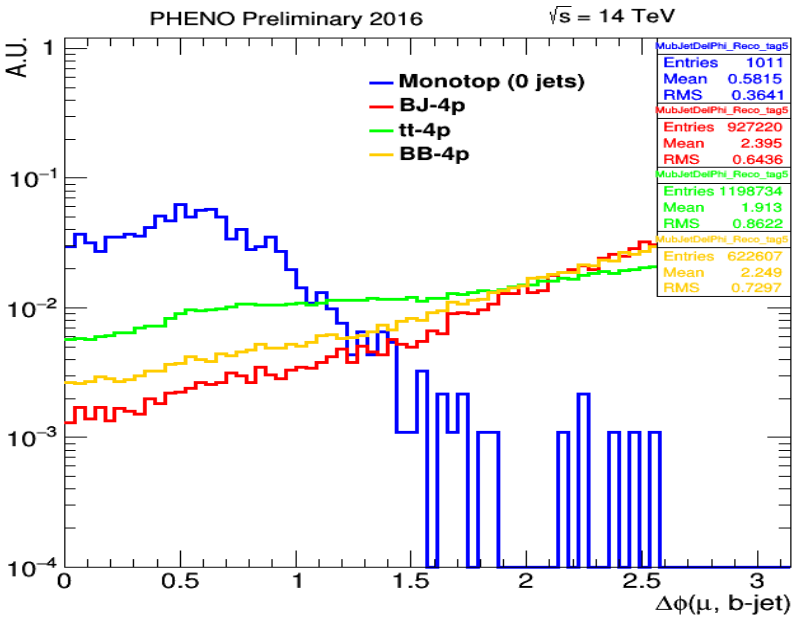

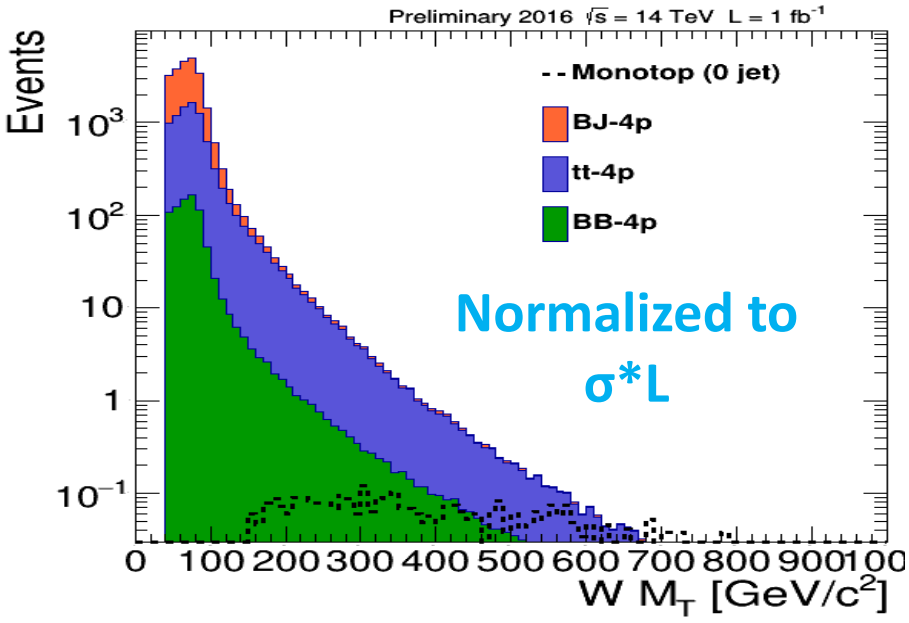

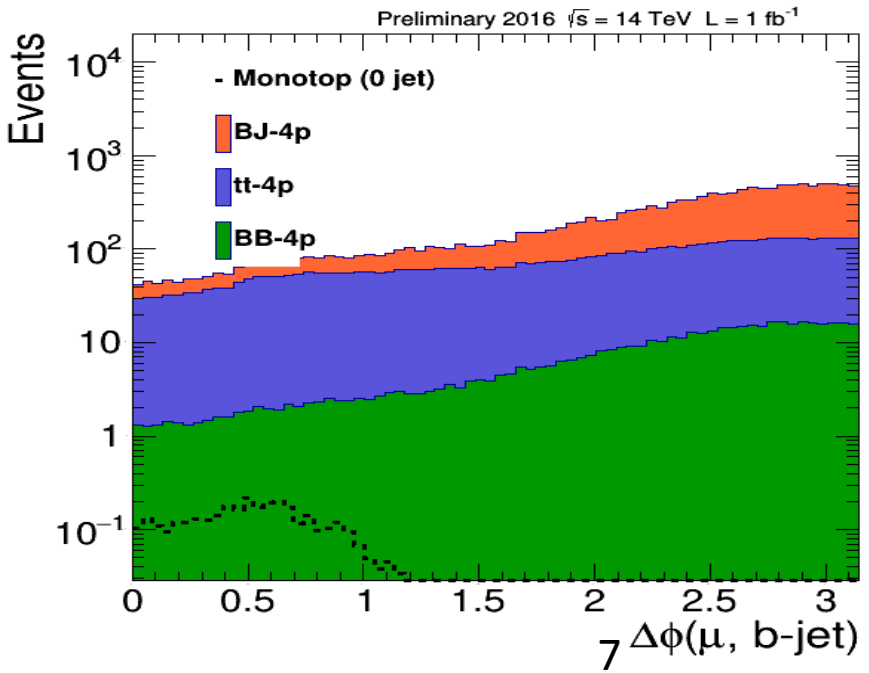

Cut Flow Efficiency Table

Efficiency (in %) →

Bkg.	Lead μ	Loose μ-Veto	Loose e-Veto	Lead Jet	W Mt > 40 GeV	1 Tight Jet	b-tagged jet	W Pt > 50 GeV	DelPhi (μ,jet)	MET > 100 GeV
BB-4p	7.27 +- 0.01	95.63 +- 0.14	93.61+- 0.14	84.71 +- 0.13	64.61 +- 0.12	14.40 +- 0.06	2.55 +- 0.06	95.58 +- 3.27	6.72 +- 0.65	52.68 +- 8.47
tt-4p	10.97 +- 0.01	98 +- 0.11	91.40 +- 0.11	96.02 +- 0.12	69.93 +- 0.09	2.24 +- 0.016	16.71 +- 0.30	91.96 +- 2.24	9.77 +- 0.58	57.78 +- 5.38
BJ-4p	3.25 +- 0.01	97.79 +- 0.14	99.84 +- 0.14	97.26 +- 0.14	62.88 +- 0.11	10.65 +- 0.04	2.11 +- 0.06	97.76 +- 3.80	2.44 +- 0.44	12.5 +- 6.63
Signal (0 Jet)	8.21 +- 0.21	100	100	58.67 +- 2.32	99.90 +- 4.44	100	21.96 +- 1.63	100	90.99 +- 8.85	100

Summary

- A study of kinematic distributions using Snowmass HT-binned background samples at √s = 14 TeV is performed

- Synchronized the selections cuts with CMS Analysis Note: CMS-AN-2014-279

- Investigated monotop (0 jet) signal events for a preliminary comparison between signal & background kinematics and corresponding cut efficiencies