

MAD *Analysis* **5** The LaTeX report

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1 Setup

1.1 Command history

```
ma5>import /eos/uscms/store/user/pjacome/mg5/SM_tttt_1muo_ver1_8TeV_10000ev_r*.lhe
as sm
ma5>import /eos/uscms/store/user/pjacome/mg5/GH400_GH_tttt_1muo_8TeV_10000ev_r01.lhe
as gh400
ma5>import /eos/uscms/store/user/pjacome/mg5/GH1000_GH_tttt_1muo_8TeV_10000ev_r04.lhe
as gh1000
ma5>set main.lumi = 19.7
ma5>set main.stacking_method = superimpose
ma5>set sm.title = 'pp > tttt > mu j j (SM)'
ma5>set sm.type = background
ma5>set gh400.title = 'pp > gh400 > tttt > mu j j'
ma5>set gh400.type = signal
ma5>set gh1000.title = 'pp > gh1000 > tttt > mu j j'
ma5>set gh1000.type = signal
ma5>plot NPID
ma5>set selection[1].statuscode = initialstate
ma5>set selection[1].titleX = 'initialstate'
ma5>plot NPID
ma5>set selection[2].statuscode = interstate
ma5>set selection[2].titleX = 'interstate'
ma5>plot NPID
ma5>set selection[3].statuscode = finalstate
ma5>set selection[3].titleX = 'finalstate'
ma5>plot MET 50 0 700
ma5>set selection[4].statuscode = finalstate
ma5>plot MHT 50 0 700
ma5>set selection[5].statuscode = finalstate
ma5>plot SQRTS 50 0 5000
ma5>set selection[6].statuscode = finalstate
ma5>plot TET 50 0 4000
ma5>set selection[7].statuscode = finalstate
ma5>plot THT 50 0 4000
ma5>set selection[8].statuscode = finalstate
ma5>#
ma5># This definition is very important to works
ma5>define mu = mu+ mu-
ma5>plot PT(mu)
ma5>set selection[9].statuscode = finalstate
ma5>plot ETA(mu)
ma5>set selection[10].statuscode = finalstate
```

```

ma5>plot PHI(mu)
ma5>set selection[11].statuscode = finalstate
ma5>#define alljet = j b b
ma5>#
ma5>define top = t t
ma5>plot PT(top) 50 0 1000
ma5>set selection[12].statuscode = interstate
ma5>plot ETA(top)
ma5>set selection[13].statuscode = interstate
ma5>plot PHI(top)
ma5>set selection[14].statuscode = interstate
ma5>plot M(top) 50 0 2000
ma5>set selection[15].statuscode = interstate
ma5>plot E(top) 50 0 2000
ma5>set selection[16].statuscode = interstate
ma5>#
ma5>define allquarksnotop = u d d s s c c b b
ma5>plot PT(allquarksnotop) 50 0 1000
ma5>set selection[17].statuscode = finalstate
ma5>plot ETA(allquarksnotop)
ma5>set selection[18].statuscode = finalstate
ma5>plot PHI(allquarksnotop)
ma5>set selection[19].statuscode = finalstate
ma5>plot M(allquarksnotop)
ma5>set selection[20].statuscode = interstate
ma5>plot E(allquarksnotop)
ma5>set selection[21].statuscode = interstate
ma5>#
ma5>define allparticles = j b b l+ l- vl vl
ma5>plot E(allparticles)
ma5>set selection[22].statuscode = finalstate
ma5>plot M(allparticles)
ma5>set selection[23].statuscode = finalstate
ma5>#
ma5>plot E(allparticles)
ma5>set selection[24].statuscode = interstate
ma5>plot M(allparticles)
ma5>set selection[25].statuscode = interstate
ma5>#
ma5>plot E(allparticles)
ma5>set selection[26].statuscode = allstate
ma5>plot M(allparticles)
ma5>set selection[27].statuscode = allstate

```

```
ma5>#  
ma5>#display selection  
ma5>submit pp-to-tttt-to-1mu_j
```

1.2 Configuration

- MadAnalysis version 1.1.11 (2014/07/17).
- Histograms given for an integrated luminosity of 19.7fb^{-1} .

2 Datasets

2.1 sm

- Samples stored in the directory: [/uscms_data/d3/pjacome/MadGraph5_v1_5_9/-madanalysis5](#) .
- Sample consisting of: [background](#) events.
- Generated events: [20000](#) events.
- Normalization to the luminosity: [0+/- 1](#) events.
- Ratio (event weight): [0.0](#) .

Paths to the event files	Nr. of events	Cross section (pb)	section	Negative wgts (%)
/eos/uscms/store/-user/pjacome/mg5/-SM_tttt_1muo_ver1_8TeV_1	10000	3.95e-05 0.27%	@	0.0
/eos/uscms/store/-user/pjacome/mg5/-SM_tttt_1muo_ver1_8TeV_1	10000	3.95e-05 0.35%	@	0.0
Sum	20000	3.95e-05 0.22%	@	0.0

2.2 gh400

- Samples stored in the directory: [/uscms_data/d3/pjacome/MadGraph5_v1_5_9/-madanalysis5](#) .
- Sample consisting of: [signal](#) events.
- Generated events: [10000](#) events.
- Normalization to the luminosity: [0+/- 1](#) events.
- Ratio (event weight): [0.0](#) .

2.3 gh1000

- Samples stored in the directory: [/uscms_data/d3/pjacome/MadGraph5_v1_5_9/-madanalysis5](#) .
- Sample consisting of: [signal](#) events.
- Generated events: [10000](#) events.

Path to the event file	Nr. of events	Cross section (pb)	Negative wghts (%)
/eos/uscms/store/- user/pjacome/mg5/- GH400_GH_tttt_1muo_8TeV	10000	1.44e-05 @ 0.28%	0.0

- Normalization to the luminosity: 0 ± 1 events.
- Ratio (event weight): 0.0 .

Path to the event file	Nr. of events	Cross section (pb)	Negative wghts (%)
/eos/uscms/store/- user/pjacome/mg5/- GH1000_GH_tttt_1muo_8TeV	10000	2.56e-06 @ 0.29%	0.0

3 Histos and cuts

3.1 Histogram 1

* Plot: NPID

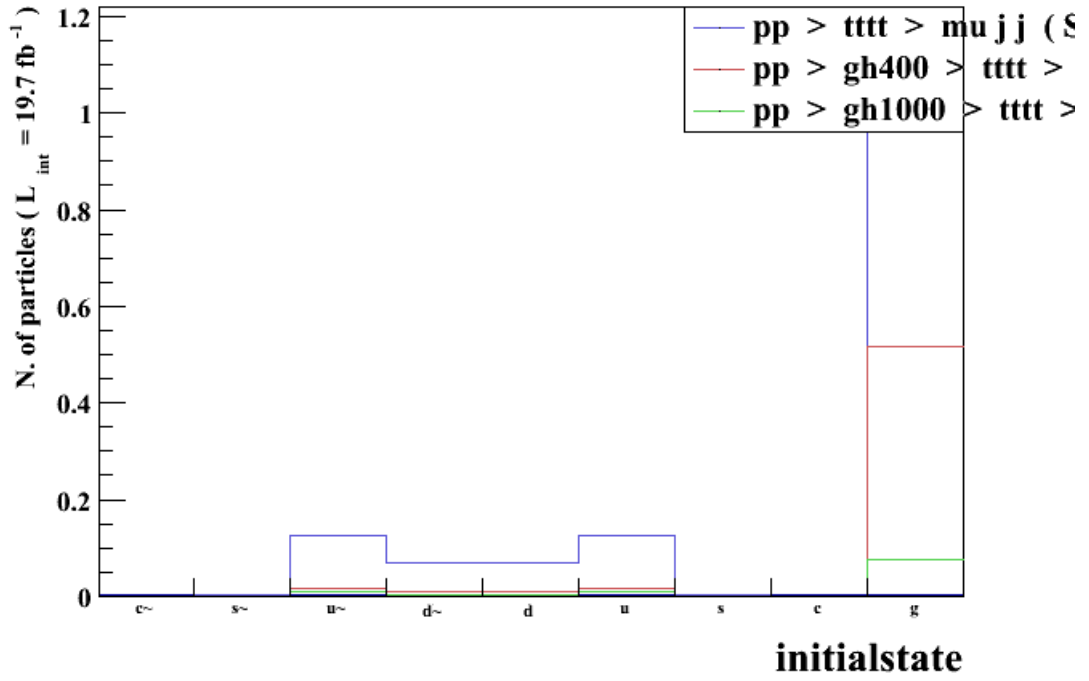


Figure 1.

3.2 Histogram 2

* Plot: NPID

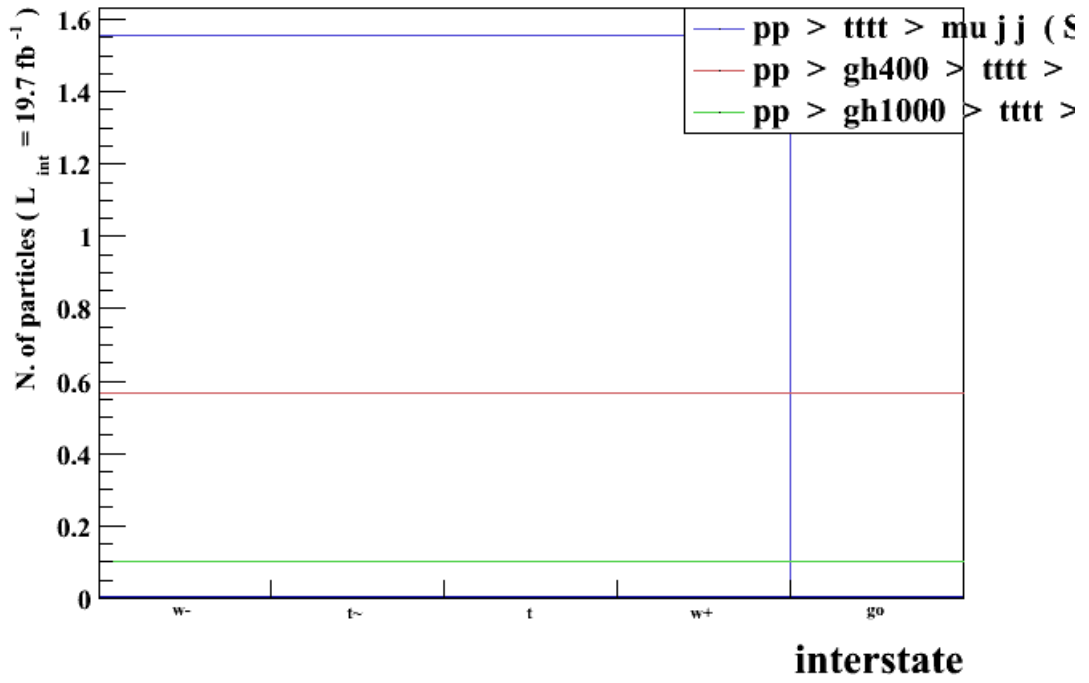


Figure 2.

3.3 Histogram 3

* Plot: NPID

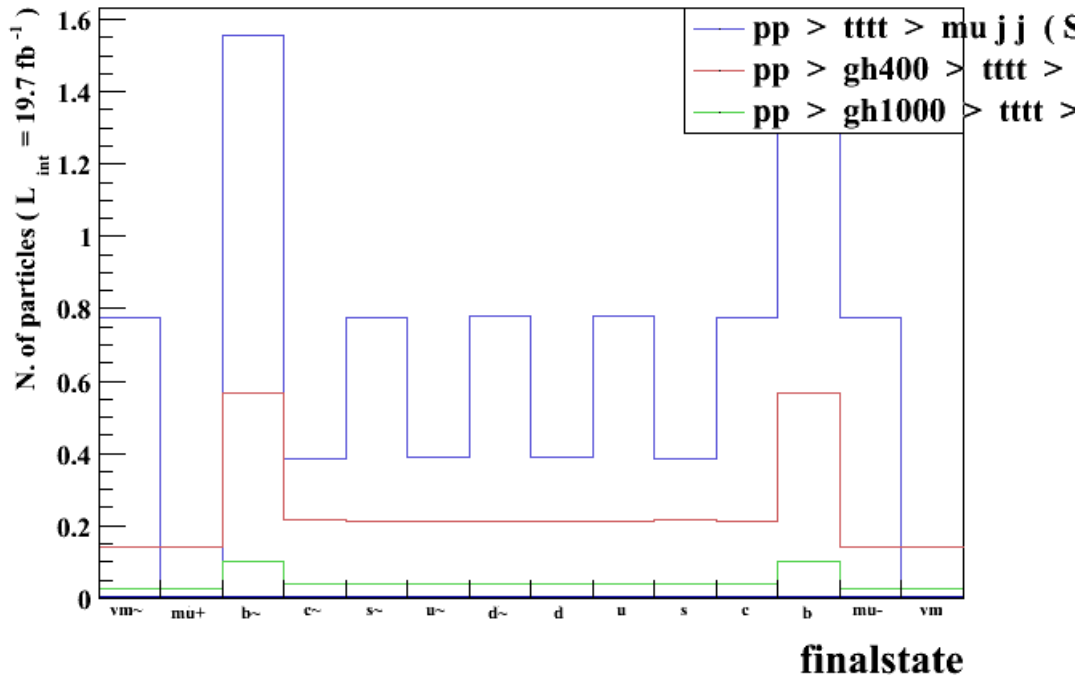


Figure 3.

3.4 Histogram 4

* Plot: MET

Table 1. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	79.7623	64.92	0.0	0.005001
gh400	0.283	1.0	64.071	44.12	0.0	0.0
gh1000	0.0504	1.0	151.0	121.9	0.0	0.18

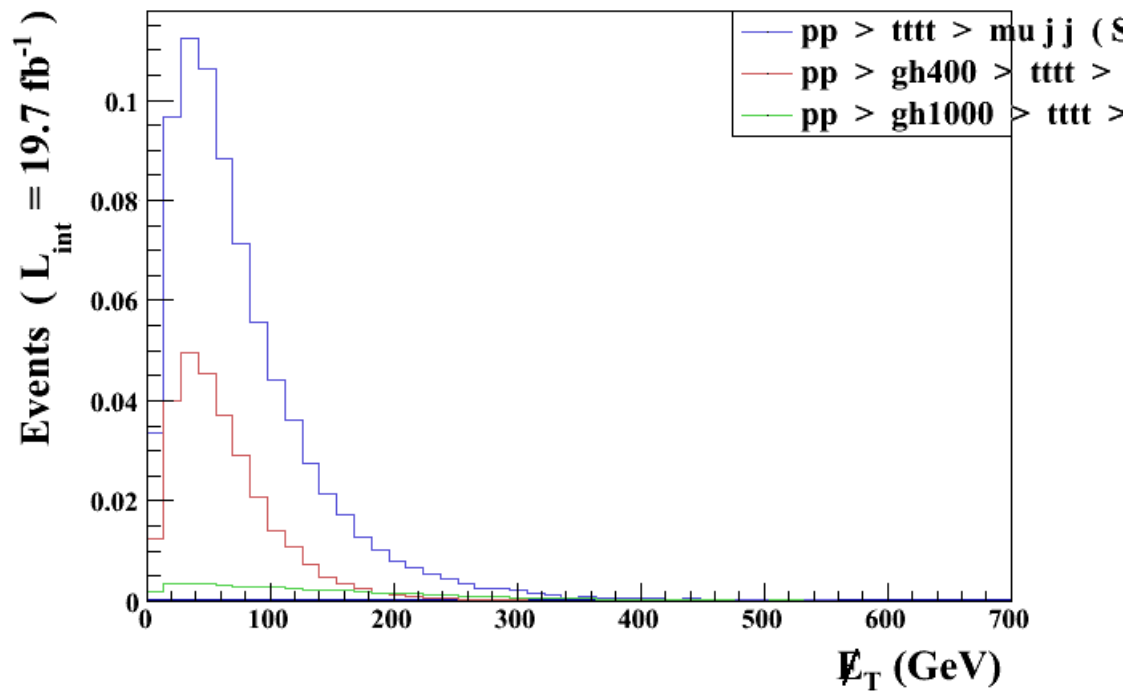


Figure 4.

3.5 Histogram 5

* Plot: MHT

Table 2. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	125.362	90.34	0.0	0.05001
gh400	0.283	1.0	94.7152	61.51	0.0	0.0
gh1000	0.0504	1.0	267.235	163.1	0.0	1.92

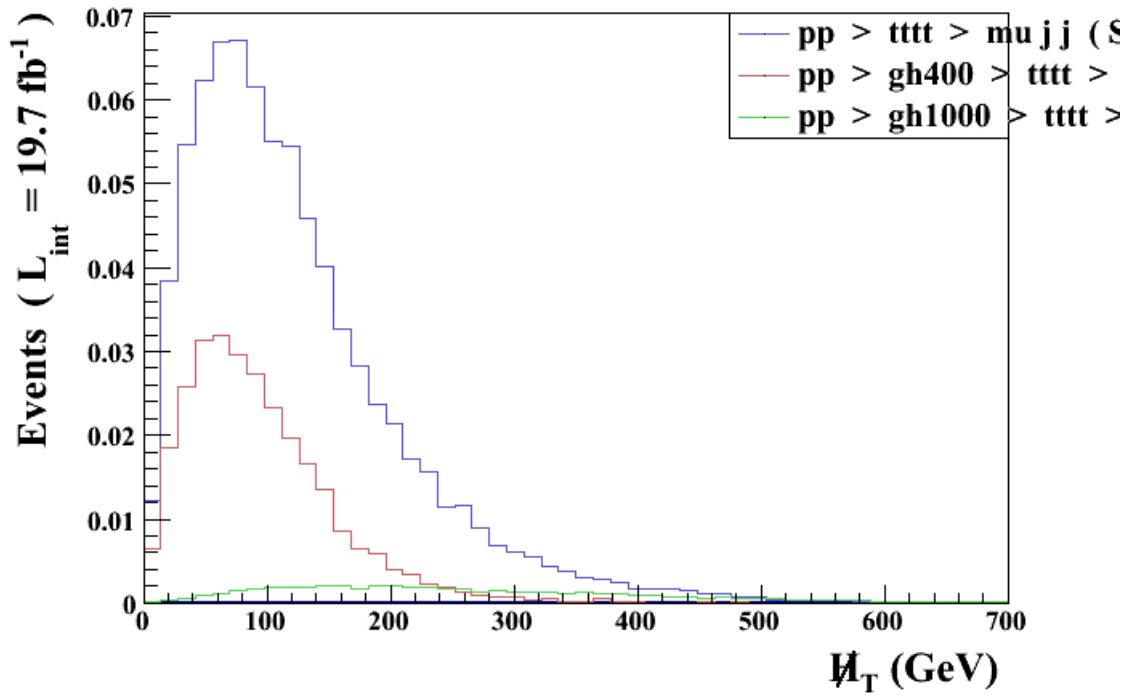


Figure 5.

3.6 Histogram 6

* Plot: SQRTS

Table 3. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	1376.87	385.7	0.0	0.0
gh400	0.283	1.0	990.911	187.0	0.0	0.0
gh1000	0.0504	1.0	2326.61	282.2	0.0	0.0

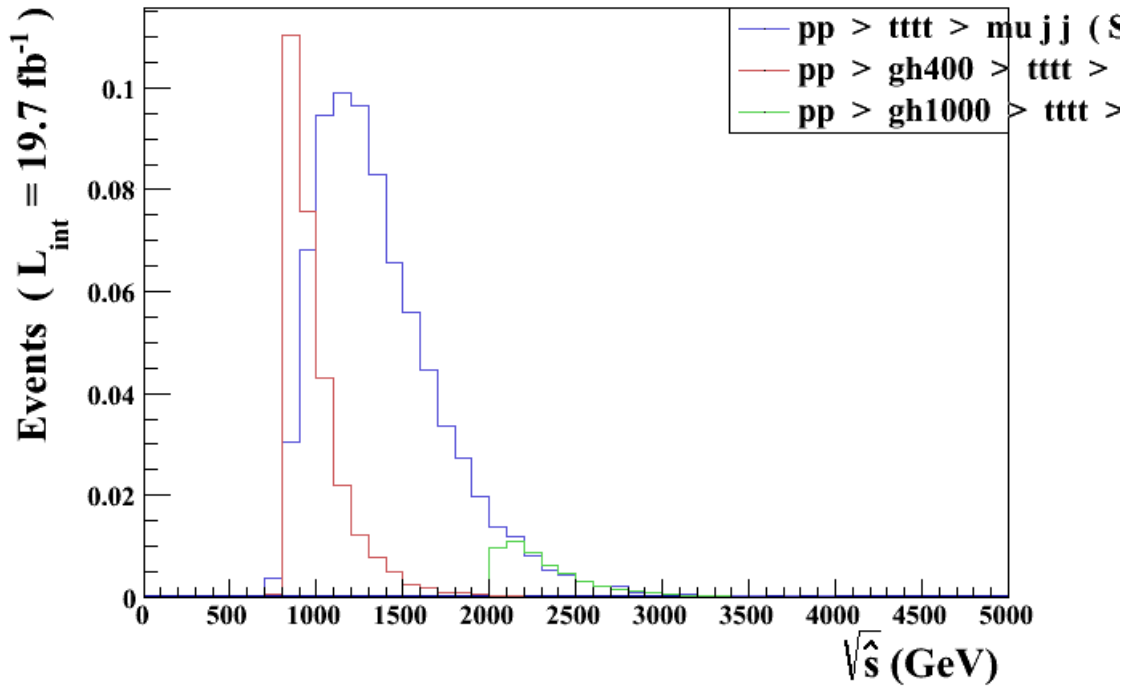


Figure 6.

3.7 Histogram 7

* Plot: TET

Table 4. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	865.264	243.9	0.0	0.0
gh400	0.283	1.0	706.409	168.5	0.0	0.0
gh1000	0.0504	1.0	1679.44	353.6	0.0	0.0

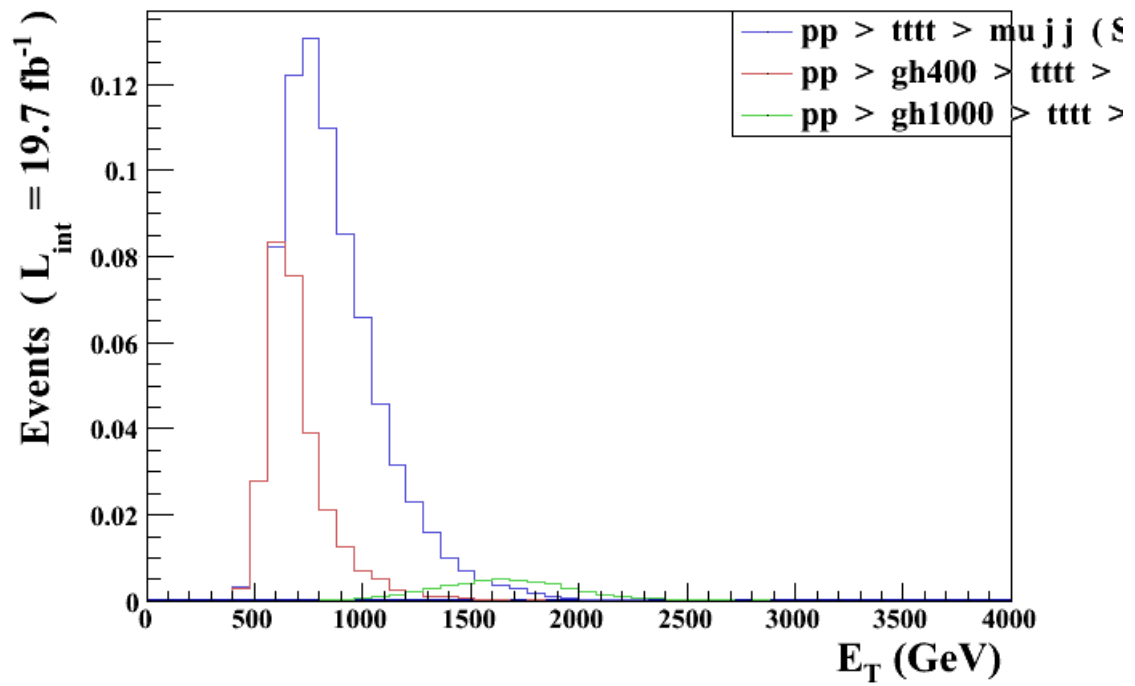


Figure 7.

3.8 Histogram 8

* Plot: THT

Table 5. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	800.501	230.4	0.0	0.0
gh400	0.283	1.0	653.474	158.1	0.0	0.0
gh1000	0.0504	1.0	1553.85	340.3	0.0	0.0

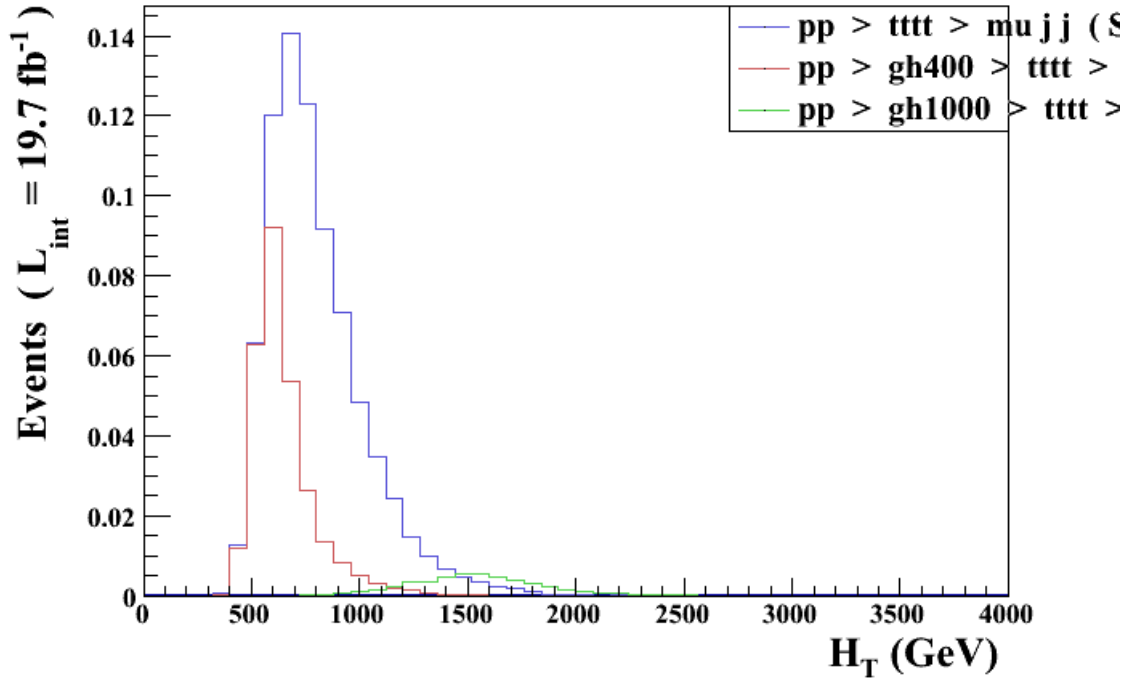


Figure 8.

3.9 Histogram 9

* Plot: PT (mu)

Table 6. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	64.7635	53.6	0.0	0.0
gh400	0.283	1.0	52.935	38.68	0.0	0.0
gh1000	0.0504	1.0	125.59	109.1	0.0	0.01

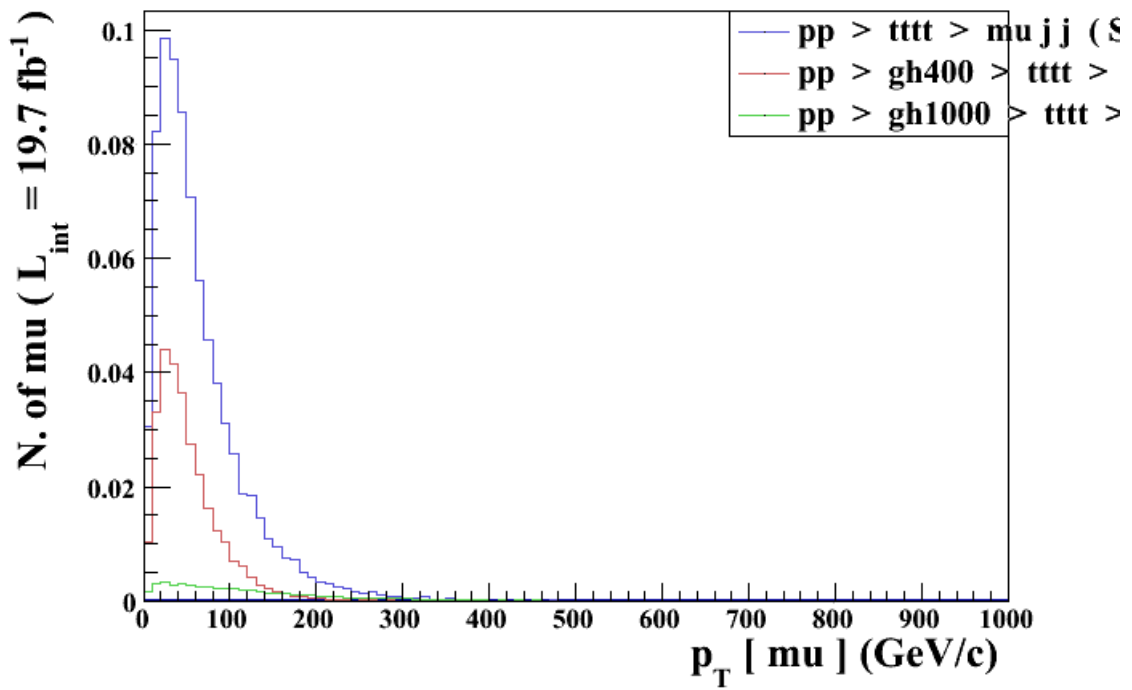


Figure 9.

3.10 Histogram 10

* Plot: ETA (mu)

Table 7. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	-0.00704709	1.197	0.0	0.0
gh400	0.283	1.0	0.00680627	1.1	0.0	0.0
gh1000	0.0504	1.0	0.00291288	0.9796	0.0	0.0

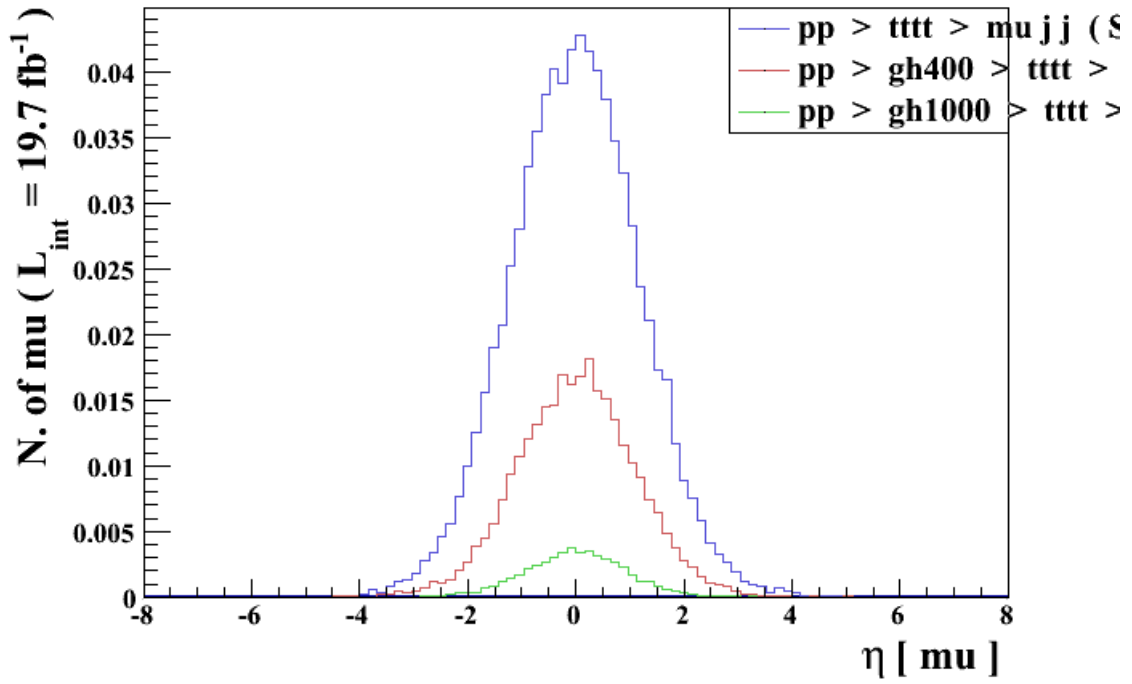


Figure 10.

3.11 Histogram 11

* Plot: PHI (mu)

Table 8. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.778	1.0	-0.0069854	1.801	0.0	0.0
gh400	0.283	1.0	0.0119016	1.82	0.0	0.0
gh1000	0.0504	1.0	0.00961037	1.812	0.0	0.0

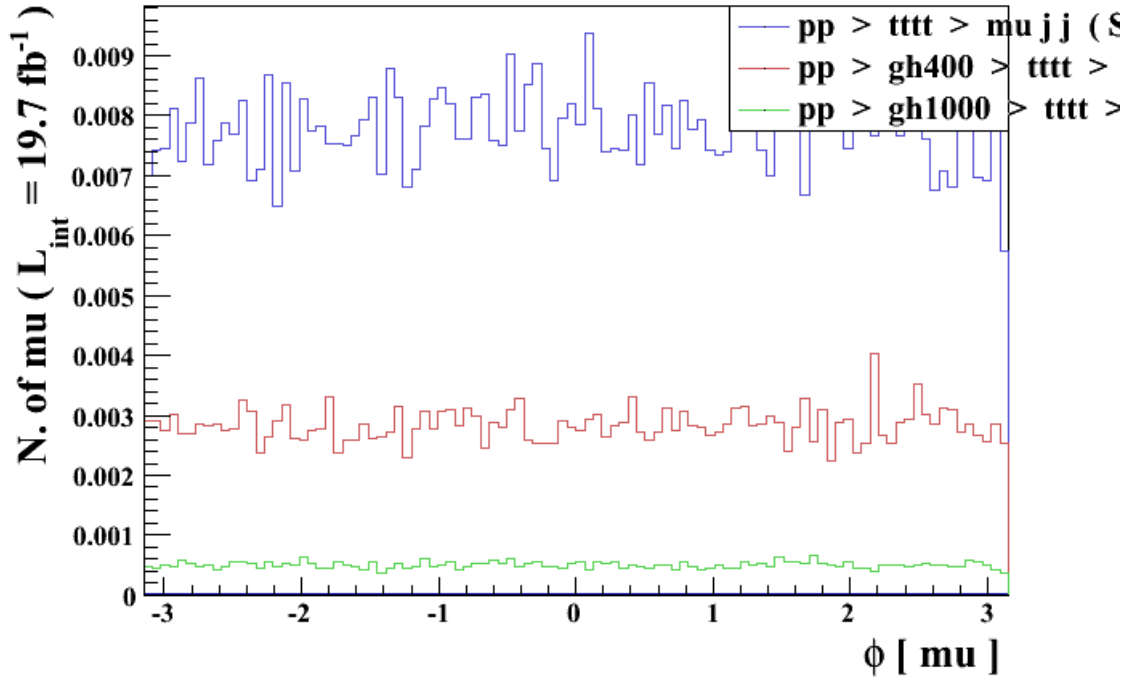


Figure 11.

3.12 Histogram 12

* Plot: PT (top)

Table 9. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	3.11	4.0	184.334	120.3	0.0	0.015
gh400	1.13	4.0	129.737	79.94	0.0	0.0
gh1000	0.202	4.0	434.914	199.9	0.0	1.202

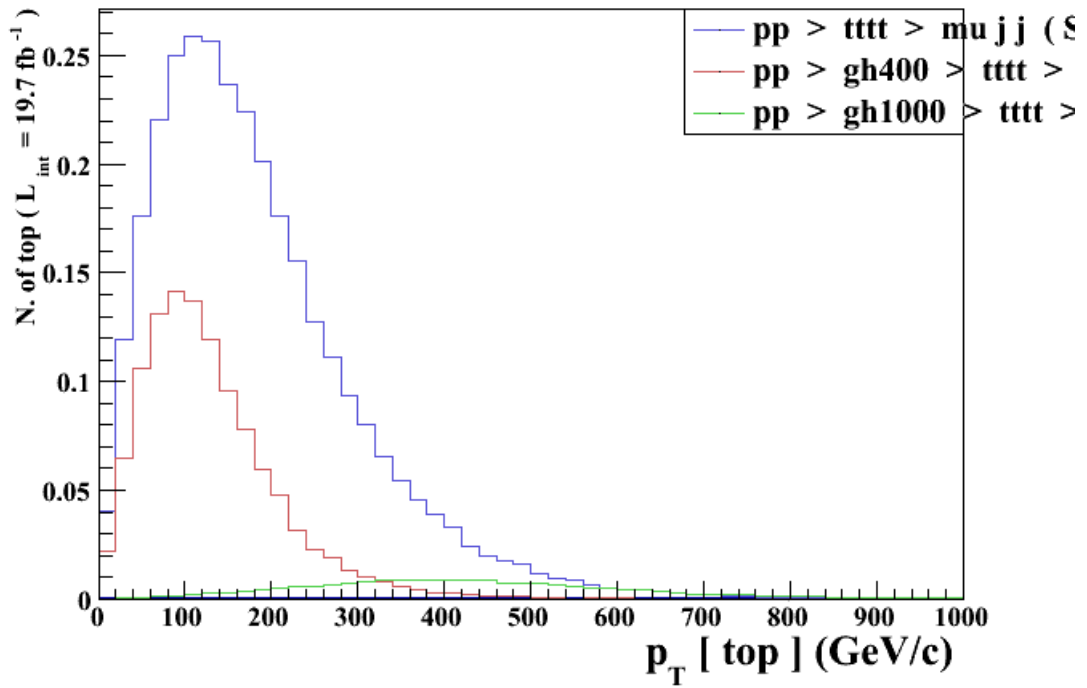


Figure 12.

3.13 Histogram 13

* Plot: ETA (top)

Table 10. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	3.11	4.0	- 0.00557018	1.39	0.0	0.0
gh400	1.13	4.0	- 0.00344495	1.31	0.0	0.0
gh1000	0.202	4.0	- 0.00351613	0.9747	0.0	0.0

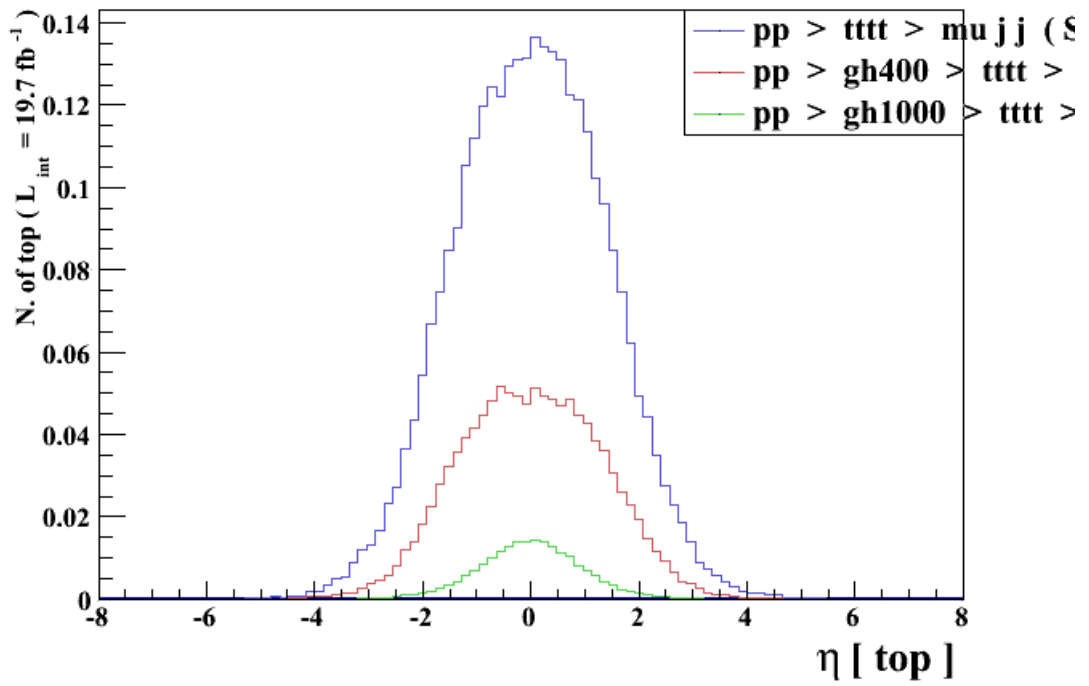


Figure 13.

3.14 Histogram 14

* Plot: PHI (top)

Table 11. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	3.11	4.0	0.00299198	1.812	0.0	0.0
gh400	1.13	4.0	0.00327569	1.815	0.0	0.0
gh1000	0.202	4.0	0.000462478	1.811	0.0	0.0

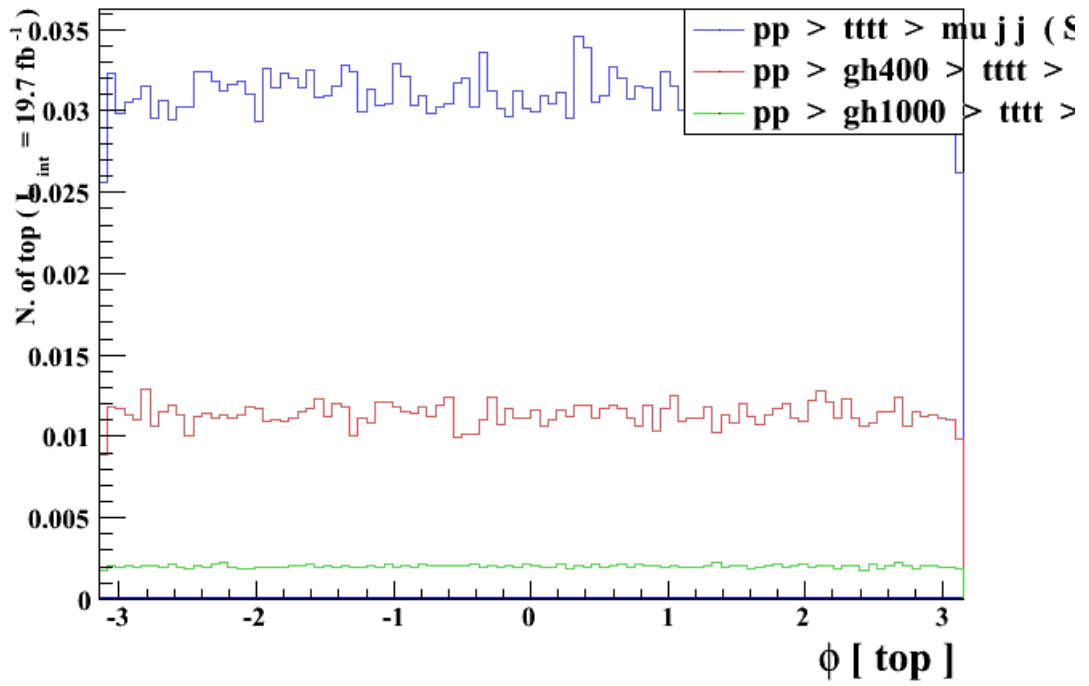


Figure 14.

3.15 Histogram 15

* Plot: M (top)

Table 12. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	3.11	4.0	173.108	3.191	0.0	0.0
gh400	1.13	4.0	171.941	3.16	0.0	0.0
gh1000	0.202	4.0	172.205	3.216	0.0	0.0

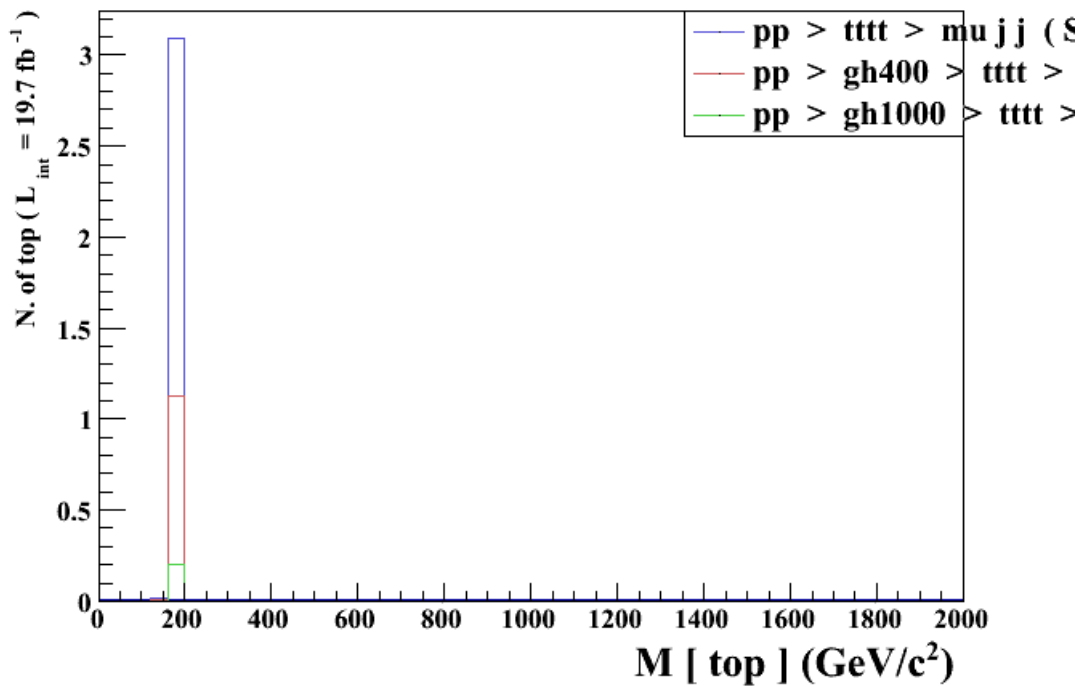


Figure 15.

3.16 Histogram 16

* Plot: E (top)

Table 13. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	3.11	4.0	395.395	213.8	0.0	0.03125
gh400	1.13	4.0	296.825	122.6	0.0	0.0
gh1000	0.202	4.0	619.0	230.2	0.0	0.0175

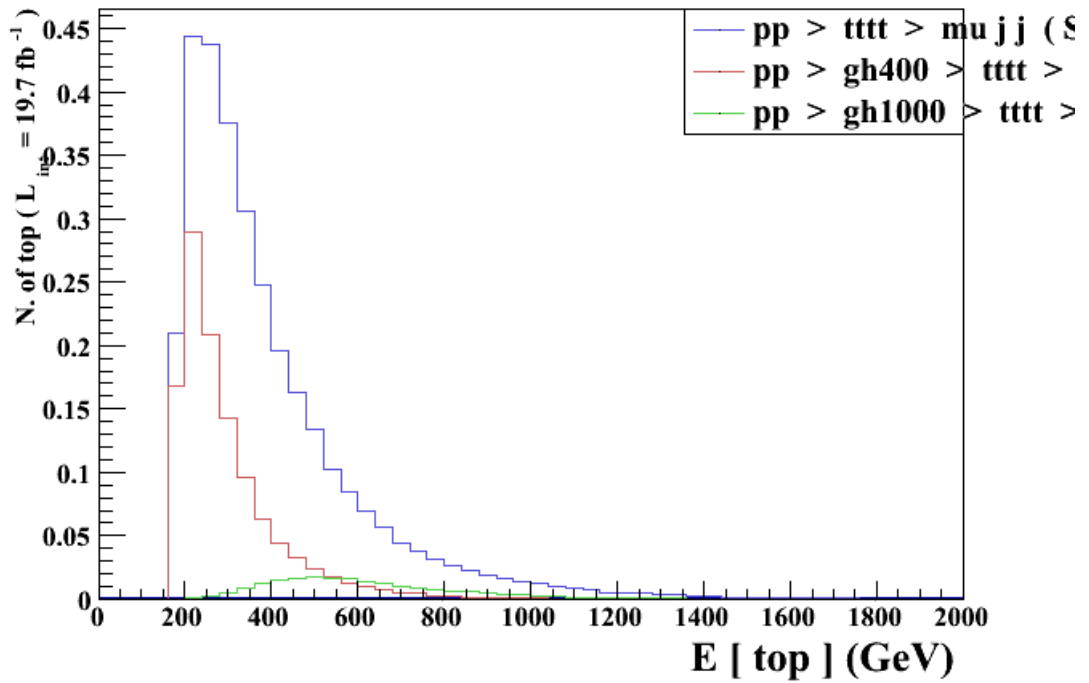


Figure 16.

3.17 Histogram 17

* Plot: PT (allquarksnotop)

Table 14. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	7.0	9.0	80.2819	62.76	0.0	0.0
gh400	2.62	9.25	65.4003	44.21	0.0	0.0
gh1000	0.466	9.24	155.631	126.7	0.0	0.01298

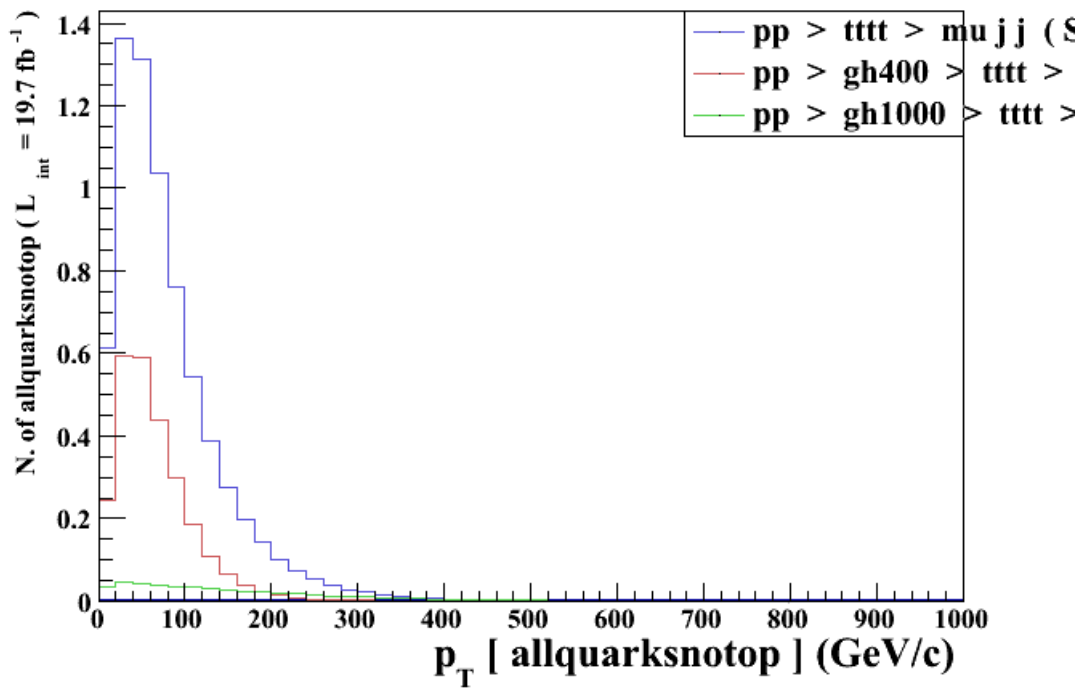


Figure 17.

3.18 Histogram 18

* Plot: ETA (allquarksnotop)

Table 15. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	7.0	9.0	- 0.00218111	1.194	0.0	0.0
gh400	2.62	9.25	0.000686554	1.103	0.0	0.0
gh1000	0.466	9.24	- 0.00394815	0.9699	0.0	0.0

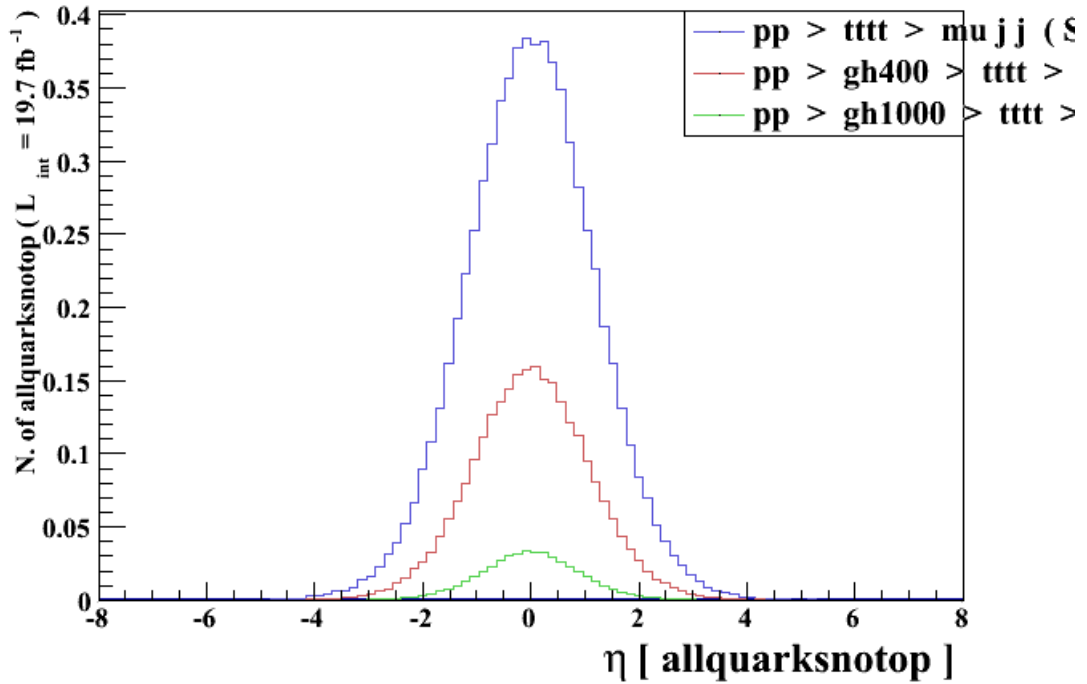


Figure 18.

3.19 Histogram 19

* Plot: PHI (allquarksnotop)

Table 16. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	7.0	9.0	0.003133	1.815	0.0	0.0
gh400	2.62	9.25	-0.0016201	1.812	0.0	0.0
gh1000	0.466	9.24	0.00175456	1.813	0.0	0.0

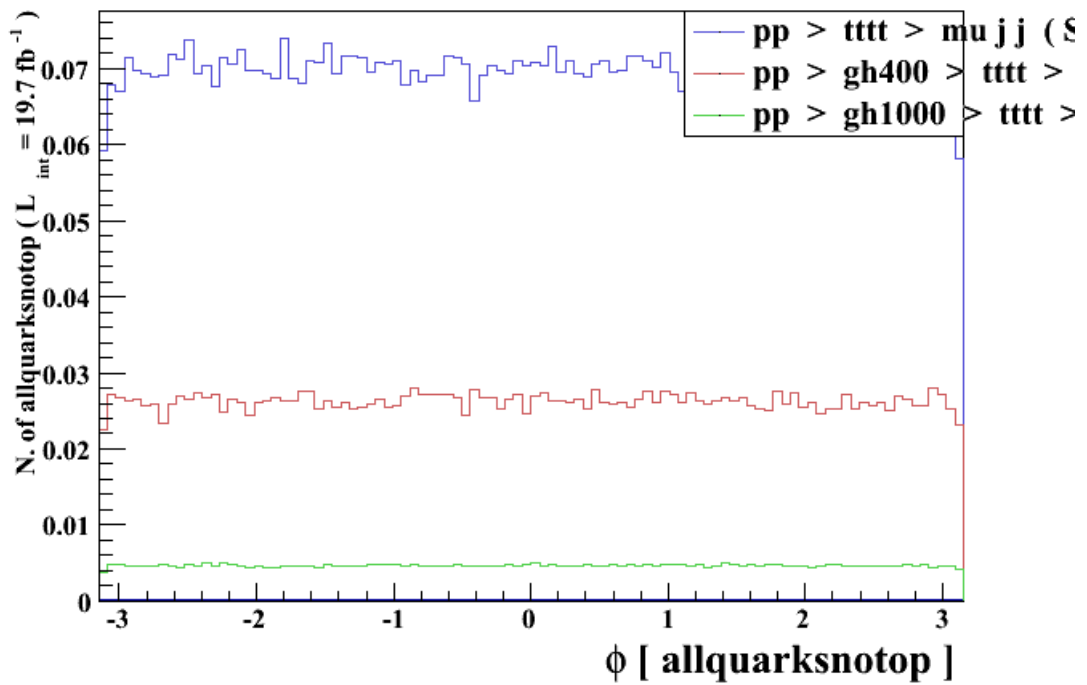


Figure 19.

3.20 Histogram 20

* Plot: M (allquarksnotop)

Table 17. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh400	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh1000	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0

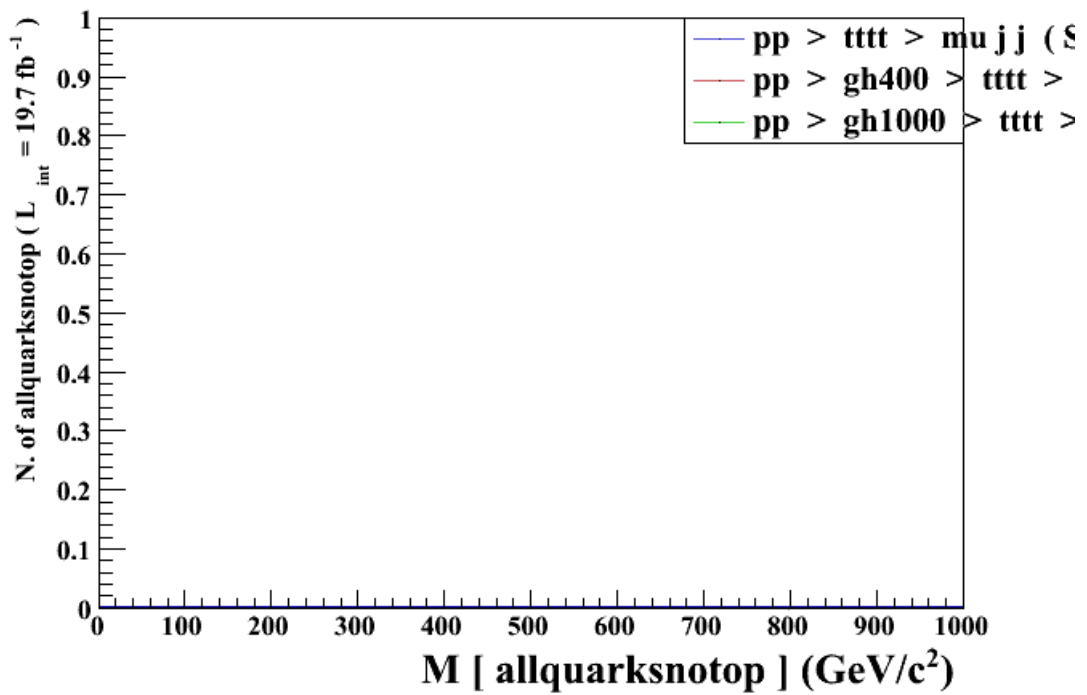


Figure 20.

3.21 Histogram 21

* Plot: E (allquarksnotop)

Table 18. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh400	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh1000	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0

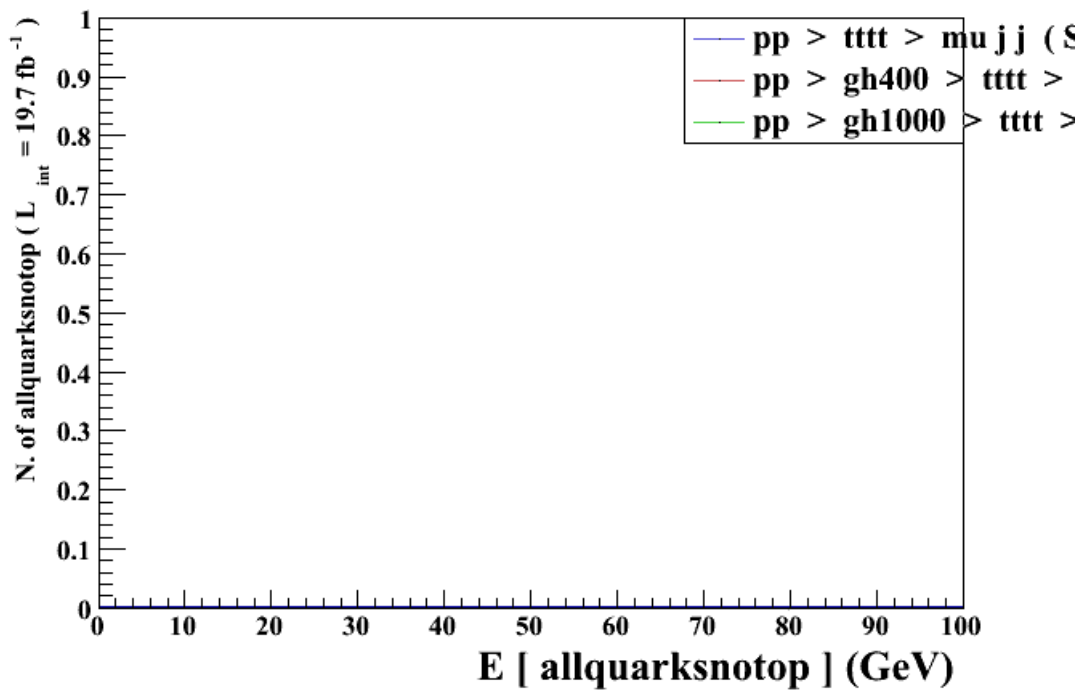


Figure 21.

3.22 Histogram 22

* Plot: E (allparticles)

Table 19. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	9.33	12.0	131.798	116.7	0.0	48.81
gh400	3.4	12.0	98.9416	74.25	0.0	36.68
gh1000	0.605	12.0	206.333	160.8	0.0	70.3

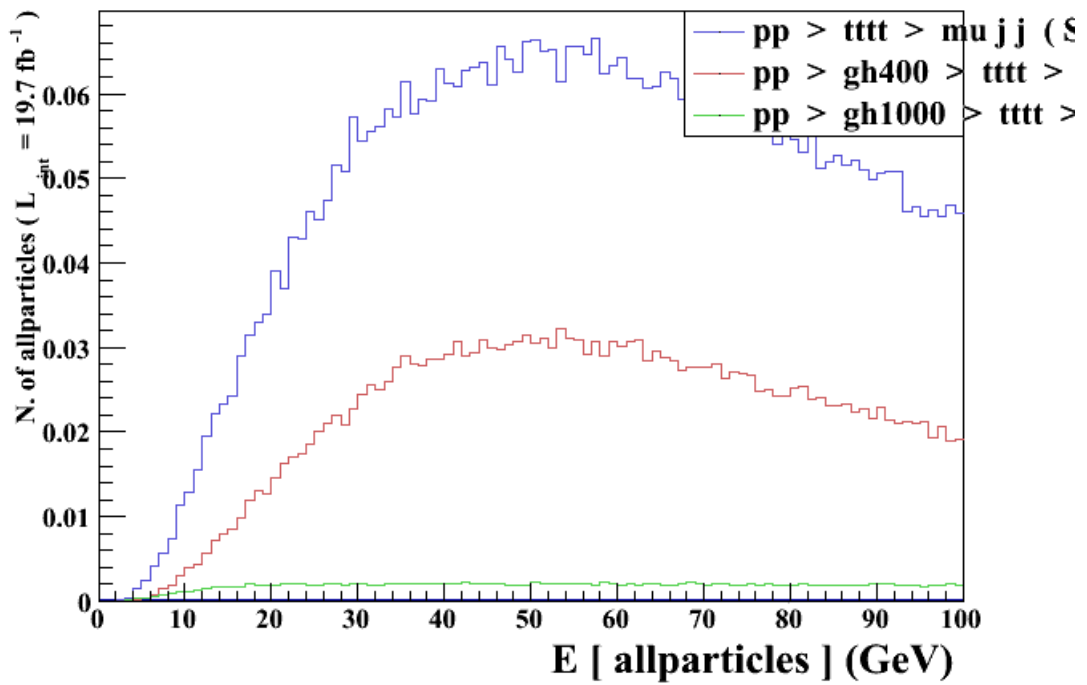


Figure 22.

3.23 Histogram 23

* Plot: M (allparticles)

Table 20. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	9.33	12.0	1.56666	2.216	33.45	0.0
gh400	3.4	12.0	1.76743	2.12	4.143	0.0
gh1000	0.605	12.0	1.76653	2.121	4.27	0.0

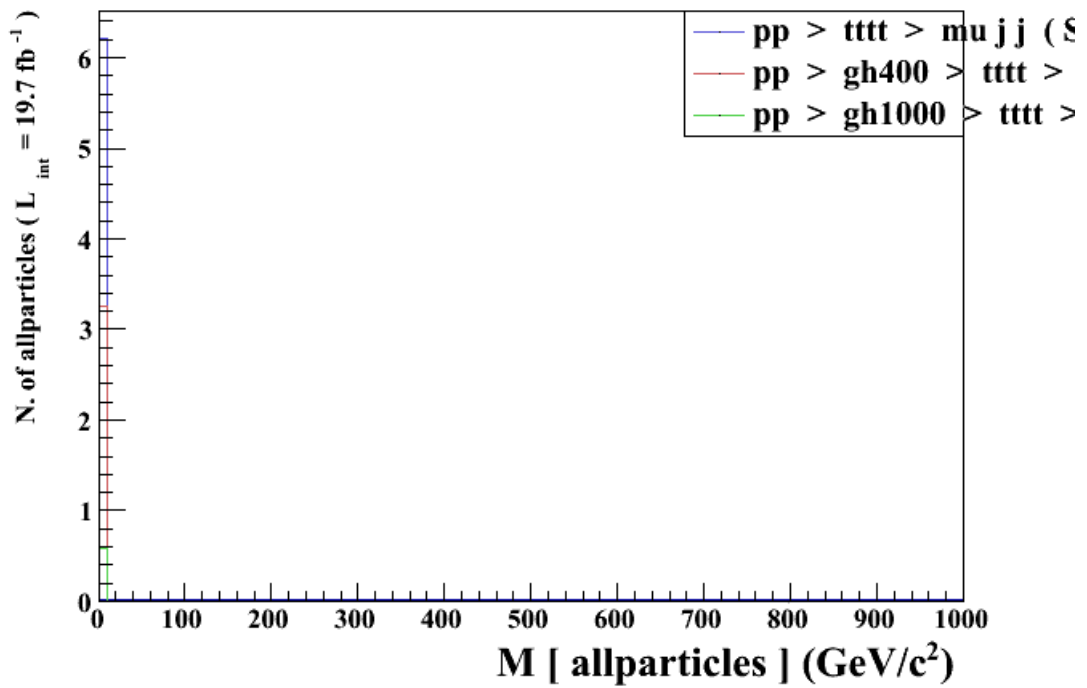


Figure 23.

3.24 Histogram 24

* Plot: E (allparticles)

Table 21. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh400	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh1000	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0

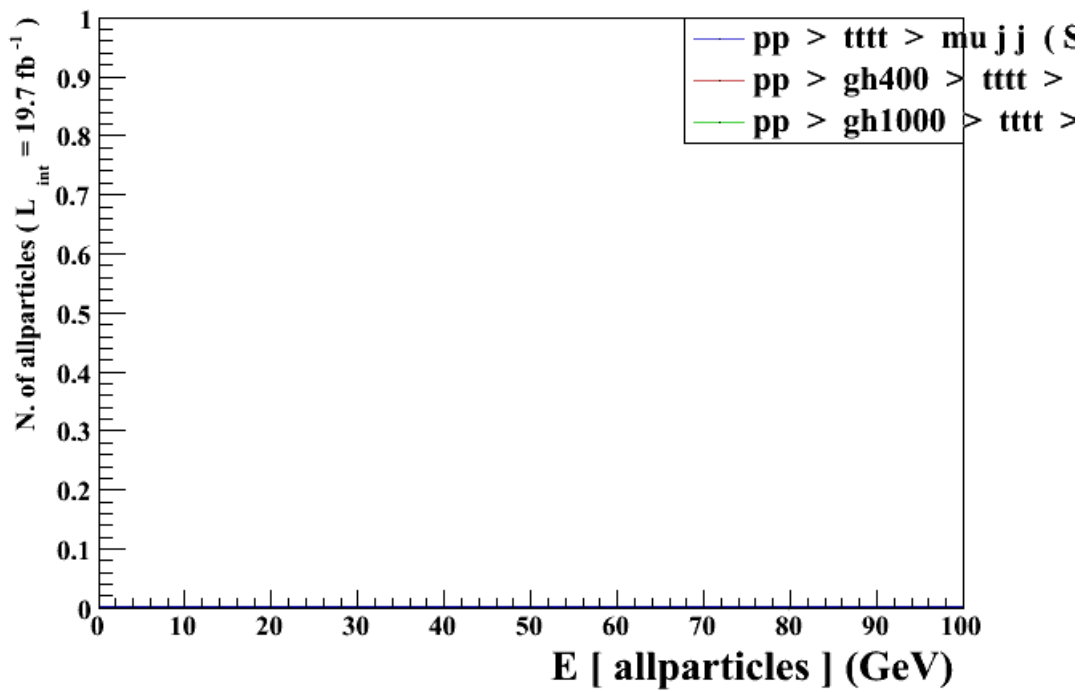


Figure 24.

3.25 Histogram 25

* Plot: M (allparticles)

Table 22. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh400	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0
gh1000	0.0 +/- 0.0	0.0	0.0	0.0	0.0	0.0

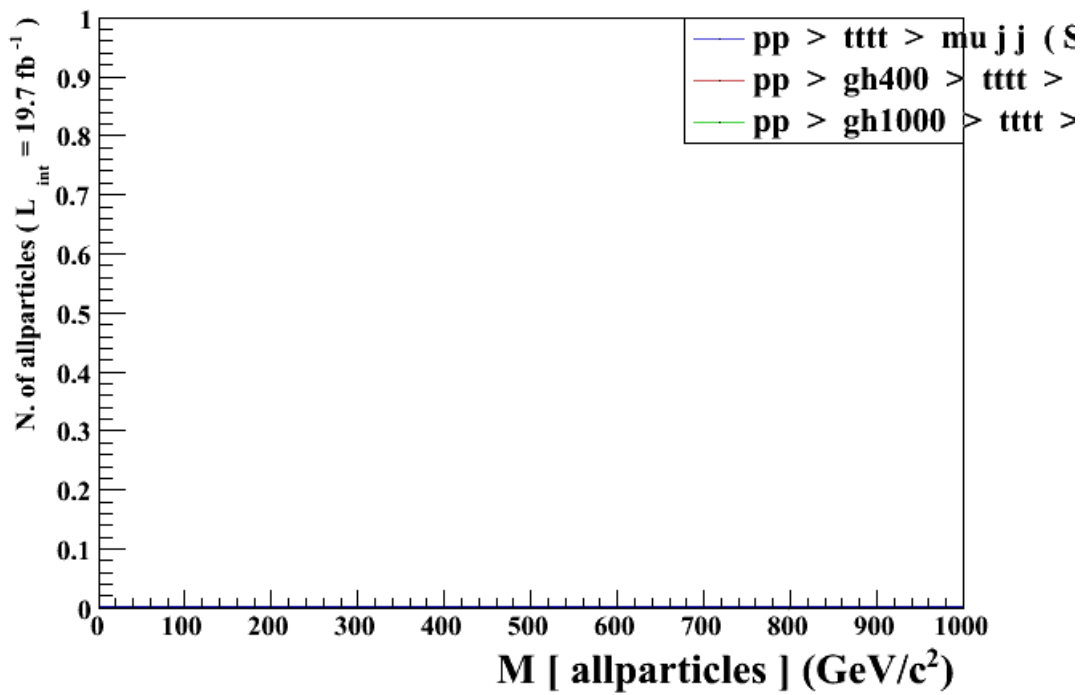


Figure 25.

3.26 Histogram 26

* Plot: E (allparticles)

Table 23. Statistics table

Dataset	Integral	Entries events	Mean	RMS	%Underflow	%Overflow
sm	10.9	14.0	225.94	309.8	0.0	56.1
gh400	3.97	14.0	169.614	236.8	0.0	45.67
gh1000	0.706	14.0	353.715	428.3	0.0	74.55

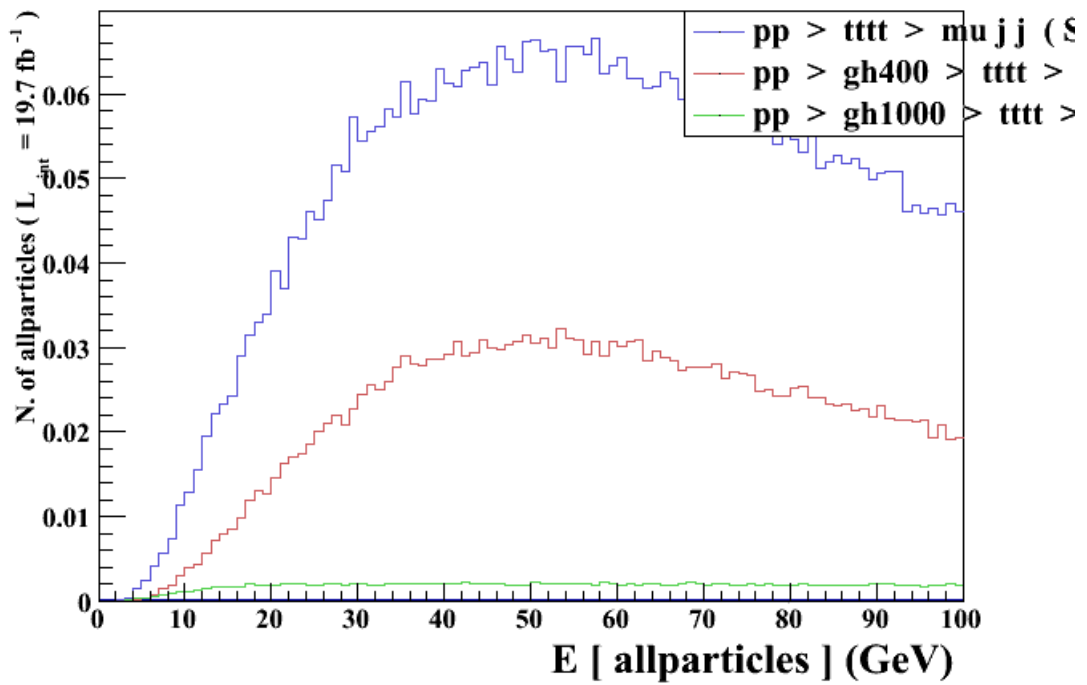


Figure 26.

3.27 Histogram 27

* Plot: M (allparticles)

Table 24. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underflow	%Overflow
sm	10.9	14.0	1.34286	2.123	28.67	0.0
gh400	3.97	14.0	1.51506	2.058	3.551	0.0
gh1000	0.706	14.0	1.51424	2.058	3.66	0.0

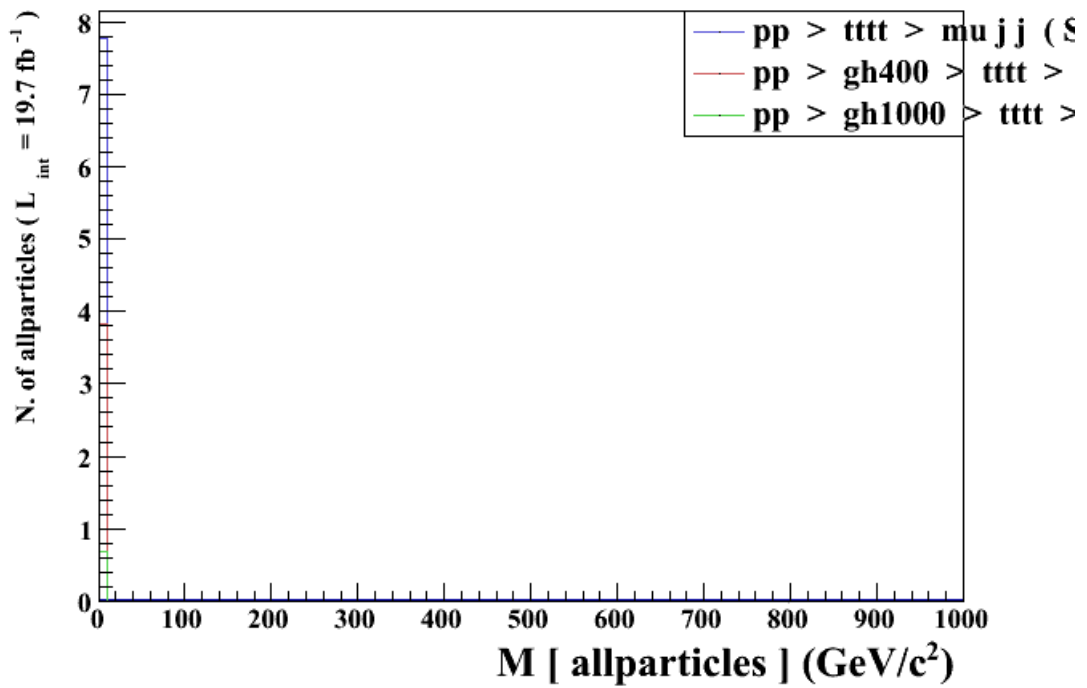


Figure 27.