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1 Setup

1.1 Command history

```
ma5>set main.fastsim.package = delphes
ma5>set main.fastsim.detector = atlas
ma5># luminosity in fb^-1
ma5>set main.lumi = 12.9
ma5># set variable to normalize plots by
ma5>set main.normalize = lumi
ma5>set main.outputfile = "bkgtest.lhe"
ma5># import the signal/background files
ma5># W+jets and Z+jets account for 90% of total background in this DM process
ma5>import ./Input/ppWjets* as ppWjets
ma5>import ./Input/ppZjets* as ppZjets
ma5># declare the imported files as signal/background
ma5>set ppWjets.type = background
ma5>set ppZjets.type = background
ma5>define l = l+ l- #e mu mu_isol
ma5>plot MET 20 200 1000 [logY]
ma5>#plot PT(j) 20 0 1000 [logY]
ma5># apply cuts and plot histograms
ma5># plot <variable> <N_NBINS> <X_MIN> <X_MAX>
ma5># basically trial and error determining the number of bins
ma5>reject PT(j) < 100
ma5>reject MET < 200
ma5>reject ETA(j) > 2.5
ma5>reject PT(l) > 0
ma5>reject PT(b) > 0
ma5>plot MET 20 200 1000 [logY]
ma5># Output folder
ma5>submit bkgtest
```

1.2 Configuration

- MadAnalysis version 1.4 (2016/07/20).
- Histograms given for an integrated luminosity of 12.9fb^{-1} .

2 Datasets

2.1 ppwjets

- Sample consisting of: [background](#) events.
- Generated events: [978991](#) events.
- Normalization to the luminosity: [240243279+/- 0](#) events.
- **Ratio (event weight): 245 - warning: please generate more events (weight larger than 1)!**

Paths to the event files	Nr. of events	Cross section (pb)	Negative wgts (%)
Input/ppWjets1.hep.gz	50000	21449	0.0
Input/ppWjets10.hep.gz	50000	21449	0.0
Input/ppWjets11.hep.gz	50000	21449	0.0
Input/ppWjets12.hep.gz	50000	21449	0.0
Input/ppWjets13.hep.gz	50000	21449	0.0
Input/ppWjets14.hep.gz	50000	21449	0.0
Input/ppWjets15.hep.gz	50000	21449	0.0
Input/ppWjets16.hep.gz	50000	21449	0.0
Input/ppWjets17.hep.gz	50000	21449	0.0
Input/ppWjets18.hep.gz	50000	21449	0.0
Input/ppWjets19.hep.gz	50000	21449	0.0
Input/ppWjets2.hep.gz	49230	0.0 @ 0.0%	0.0
Input/ppWjets20.hep.gz	30531	0.0 @ 0.0%	0.0
Input/ppWjets3.hep.gz	50000	21449	0.0
Input/ppWjets4.hep.gz	50000	21449	0.0
Input/ppWjets5.hep.gz	49230	0.0 @ 0.0%	0.0
Input/ppWjets6.hep.gz	50000	21449	0.0
Input/ppWjets7.hep.gz	50000	21449	0.0
Input/ppWjets8.hep.gz	50000	21449	0.0
Input/ppWjets9.hep.gz	50000	21449	0.0
Sum	978991	18623	0.0

2.2 ppzjets

- Sample consisting of: [background](#) events.
- Generated events: [1000000](#) events.
- Normalization to the luminosity: [150501720+/- 0](#) events.

- Ratio (event weight): 150 - warning: please generate more events (weight larger than 1)!

Paths to the event files	Nr. of events	Cross section (pb)	Negative wgt (%)
Input/ppZjets1.hep.gz	50000	11666	0.0
Input/ppZjets10.hep.gz	50000	11666	0.0
Input/ppZjets11.hep.gz	50000	11666	0.0
Input/ppZjets12.hep.gz	50000	11666	0.0
Input/ppZjets13.hep.gz	50000	11666	0.0
Input/ppZjets14.hep.gz	50000	11666	0.0
Input/ppZjets15.hep.gz	50000	11666	0.0
Input/ppZjets16.hep.gz	50000	11666	0.0
Input/ppZjets17.hep.gz	50000	11666	0.0
Input/ppZjets18.hep.gz	50000	11666	0.0
Input/ppZjets19.hep.gz	50000	11666	0.0
Input/ppZjets2.hep.gz	50000	11666	0.0
Input/ppZjets20.hep.gz	50000	11666	0.0
Input/ppZjets3.hep.gz	50000	11666	0.0
Input/ppZjets4.hep.gz	50000	11666	0.0
Input/ppZjets5.hep.gz	50000	11666	0.0
Input/ppZjets6.hep.gz	50000	11666	0.0
Input/ppZjets7.hep.gz	50000	11666	0.0
Input/ppZjets8.hep.gz	50000	11666	0.0
Input/ppZjets9.hep.gz	50000	11666	0.0
Sum	1000000	11666	0.0

3 Histos and cuts

3.1 Histogram 1

* Plot: MET

Table 1. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underf	%Overflow
ppwjets	240242542	1.0	13.1545	22.38	99.96	0.0
ppzjets	150501720	1.0	11.1555	23.74	99.9	0.0

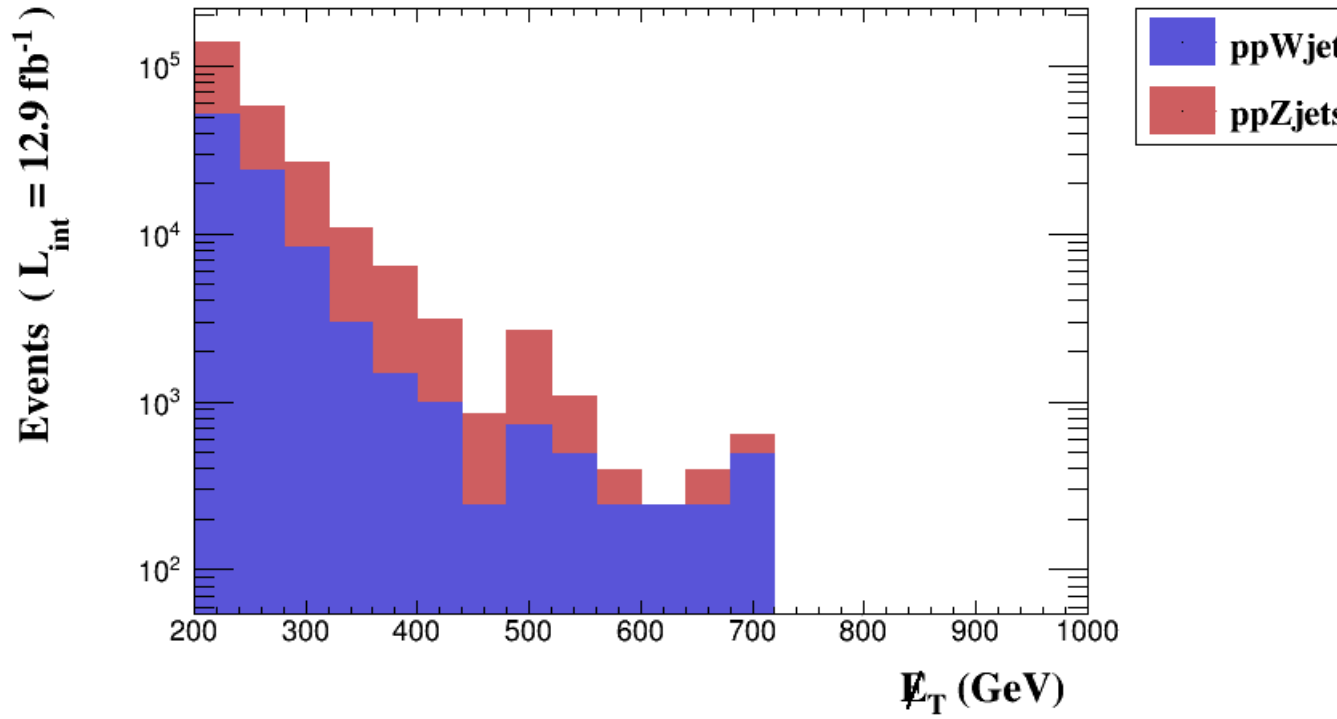


Figure 1.

3.2 Cut 1

Cut: reject $PT(j) < 100.0$

Dataset	Events kept: K	Rejected events: R	Efficiency: $K / (K + R)$	Cumul. effi- ciency: $K / \text{Initial}$
ppwjets	240243278	0.0 +/- 0.0	1.0	1.0
ppzjets	150501720	0.0 +/- 0.0	1.0	1.0

3.3 Cut 2

Cut: reject MET < 200.0

Dataset	Events kept: K	Rejected events: R	Efficiency: K /- (K + R)	Cumul. effi- ciency: K / Ini- tial
ppwjets	91534 +/- 302	240151744 +/- 302	3.81e-04 +/- 1.26e-06	3.81e-04 +/- 1.26e-06
ppzjets	156521 +/- 395	150345198 +/- 395	1.04e-03 +/- 2.63e-06	1.04e-03 +/- 2.63e-06

3.4 Cut 3

Cut: reject $\text{ETA}(\text{j}) > 2.5$

Dataset	Events kept: K	Rejected events: R	Efficiency: $K / (K + R)$	Cumul. effi- ciency: $K / \text{Initial}$
ppwjets	91534 +/- 302	0.0 +/- 0.0	1.0	3.81e-04 +/- 1.26e-06
ppzjets	156521 +/- 395	0.0 +/- 0.0	1.0	1.04e-03 +/- 2.63e-06

3.5 Cut 4

Cut: reject $PT(1) > 0.0$

Dataset	Events kept: K	Rejected events: R	Efficiency: $K / (K + R)$	Cumul. effi- ciency: $K / Initial$
ppwjets	13006 +/- 114	78527 +/- 280	0.14209 +/- 0.00115	5.41e-05 +/- 4.75e-07
ppzjets	85183 +/- 291	71337 +/- 267	0.54423 +/- 0.00126	5.66e-04 +/- 1.94e-06

3.6 Cut 5

Cut: reject $PT(b) > 0.0$

Dataset	Events kept: K	Rejected events: R	Efficiency: $K / (K + R)$	Cumul. effi- ciency: $K / \text{Initial}$
ppwjets	13006 +/- 114	0.0 +/- 0.0	1.0	5.41e-05 +/- 4.75e-07
ppzjets	85183 +/- 291	0.0 +/- 0.0	1.0	5.66e-04 +/- 1.94e-06

3.7 Histogram 2

* Plot: MET

Table 2. Statistics table

Dataset	Integral	Entries / events	Mean	RMS	%Underf	%Overflow
ppwjets	13006	1.0	246.99	60.39	0.0	0.0
ppzjets	85183	1.0	256.103	60.9	0.0	0.0

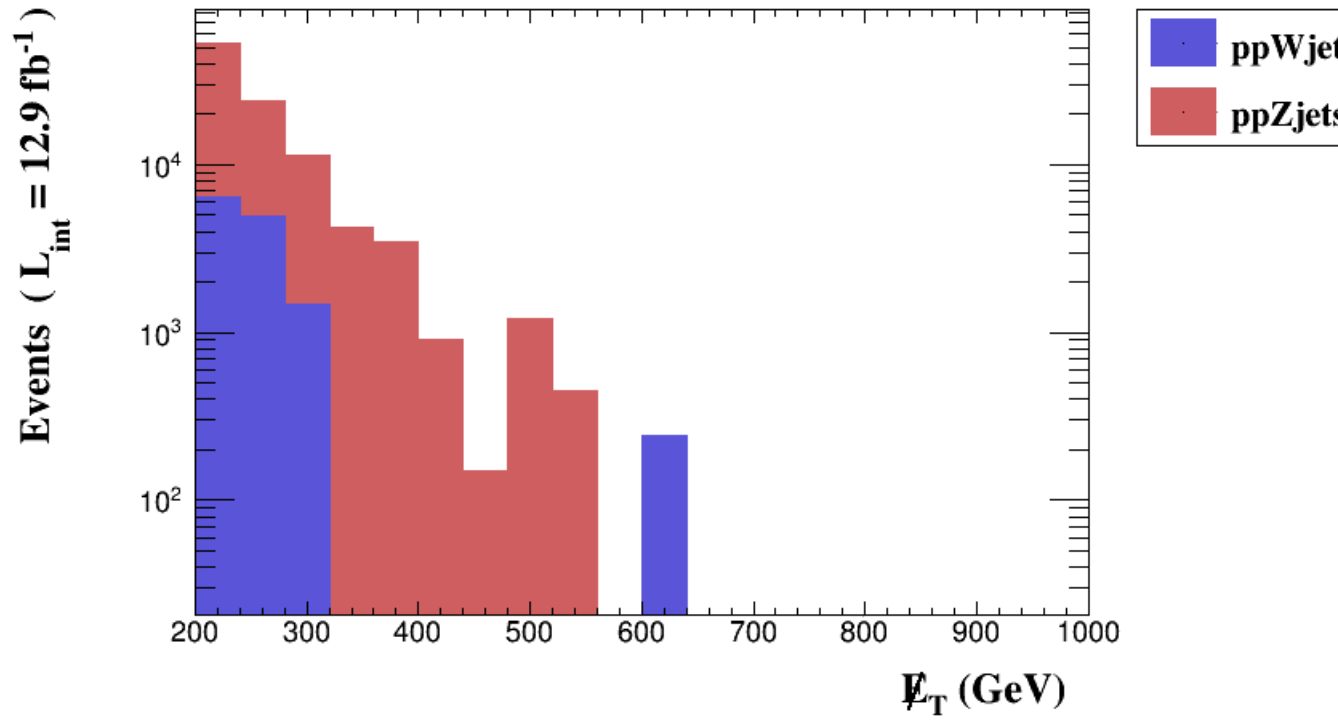


Figure 2.

4 Summary

4.1 Cut-flow chart

- How to compare signal (S) and background (B): $S/\sqrt{S+B}$.

Table 3. Signal and Background comparison

Cuts	Signal (S)	Background (B)	S vs B
Initial (no cut)		390744999	
Cut 1		390744999	
Cut 2		248055 +/- 497	
Cut 3		248055 +/- 497	
Cut 4		98190 +/- 313	
Cut 5		98190 +/- 313	