Monte Carlo Rate Comparisons

Matt Solt

SLAC National Accelerator Laboratory

mrsolt@slac.stanford.edu

May 18, 2017

Introduction

- MC compared
  - MG5 tritrig
  - MG4 wabs
 - 10% 2015 Data
  - MG5 tritrig-wab-beam
  - MG4/5 wab-beam-tri

Cross Section Comparison

- Tritrig is consistantly a factor of 2 greater than data for me... why?
- Tritrig-wab-beam is consistantly a factor of 2 less than data for me... why?

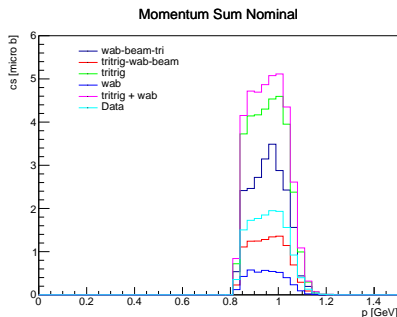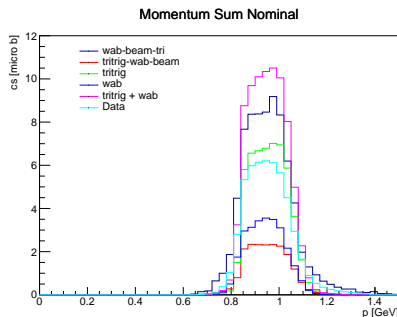|	Matt S.		Matt G.
	Vertexing Cuts	Minimal Cuts	Minimal Cuts
Data	14.2	51.5	41.7
tritrig	33.8	53.7	25.7
wabs	4	26.6	14.9
Wabs + tri	37.9	80.2	40.6
Wab-beam-tri	22.3	75.9	
Tritrig-wab-beam	10.1	19.3	

P Sum Comparison 1/2

- Minimal cuts - $P_{track} < 0.8E_{beam}$, opposite volume, $P > 0.8E_{beam}$, and $|\Delta t_{cl}| < 2$ ns
- Left is Matt S. Right is Matt G.
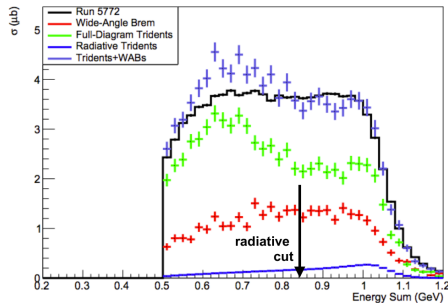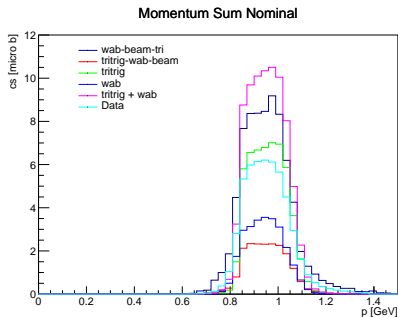
P Sum Comparison 2/2

▶ Left is minimal cuts. Right is full vertexing cuts.

Normalization Description

- tritrig $L = \frac{N_{gen}}{xs} * \alpha_{corr} = \frac{7,900,000}{1.3mB} * 0.78 = 4.74\frac{1}{nb}$

- wab-beam-tri $L = t_{beam}L_{rate} = 10s\frac{1200\frac{1}{nb}}{1.7days} = 0.0812\frac{1}{nb}$

- data $L = 120\frac{1}{nb}$

- wabs $L = \frac{N_{gen}}{xs} * \alpha_{corr} = \frac{1,151,800*200}{590.207mB} * 0.81 = 0.316\frac{1}{nb}$

- tritrig-wab-beam $L = \frac{N_{gen}}{xs} * \alpha_{corr} = \frac{200,000,000}{1.3mB} * 0.78 = 120\frac{1}{nb}$

MC Chain Comparison

▶ Why is the trigger rate so much lower for tritrig-wab-beam compared to tritrig?

	Tritrig-wab-beam				tritrig			
	L0		Nominal		L0		Nominal	
	Number of Events	Ratio	Number of Events	Ratio	Number of Events	Ratio	Number of Events	Ratio
Generated	200000000		200000000		26000000		7900000	
Triggered	8700000	0.0435	8700000	0.0435	3900000	0.15	1009383	0.12777
Recon Events		8249339 0.9481998851		8744501 1.005115057		3802000 0.974871795		1002636 0.993315719
V0 Particles after Tuple		32538100 3.9443281456		32165310 3.678347112		2970997 0.781430037		792990 0.790905174
After Vertexing Cuts	2235429	0.068701891	3110995	0.09671895		1405036 0.472917341		452392 0.570488909
After Radiative Cut		746604 0.3339868992		1016834 0.326851699		469992 0.334505308		144529 0.319477356
Calculated Luminosity	154 1/nb		154 1/nb		19 1/nb		6 1/nb	
Data	120 1/nb	1400000						