

# MC Samples Request

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# MC samples status

- Working on  $h \rightarrow \mu^+ \mu^-$  analysis at 500 GeV, 1600 fb<sup>-1</sup> (left-handed)
- Using all available samples with DBD configuration
  - As of 2016/Aug./2
  - ffh\_mumu, higgs\_ffh, 2f, 4f, aa\_4f, 5f
- Due to high target luminosity, statistics of some processes are small / too small.
  - Most terrible event weight is ~20 (~40 in TMVA analysis)

# For the request

- At least, unfortunately, we can't generate ALL processes until all processes satisfy event weight  $\lesssim 0.5$ .
- Lots of processes are completely suppressed at the level of my precuts
- I think we should apply some generator-level cuts to generate additional MC samples.

# Processes at precuts (higgs\_ffh, 2f, 4f)

	ID	process	beam pol.	# MC without cuts	# MC after precuts	weight	in TMVA
3							
4	106519	e2e2h	eL.pR	6000	3	0.8	1.6
5	106520	e2e2h	eR.pL	4000	2	0.1	0.2
6	106521	e3e3h	eL.pR	5998	0	0.8	1.6
7	106522	e3e3h	eR.pL	3999	1	0.1	0.2
8	106523	nnh	eL.pR	213125	2	1.2	2.4
9	106524	nnh	eR.pL	21558	0	0.1	0.2
10							
11	250106	2f_z_l	eL.pR	252100	47	20.5	41
12	250108	2f_z_l	eR.pL	202100	34	1.3	2.6
14	250014	4f_zz_sl	eL.pR	28300	2	20.1	40.2
15	250016	4f_zz_sl	eR.pL	13500	1	1.1	2.2
16	250018	4f_ww_sl	eL.pR	442800	3	20.1	40.2
17	250020	4f_ww_sl	eR.pL	2200	0	1.1	2.2
18	250022	4f_zz_l	eL.pR	2800	15	20	40
19	250024	4f_zz_l	eR.pL	1800	7	1.1	2.2
20	250026	4f_ww_l	eL.pR	36800	75	20.1	40.2
21	250028	4f_ww_l	eR.pL	200	2	1.1	2.2
22	250030	4f_zzorww_l	eL.pR	409910	3591	2	4
23	250032	4f_zzorww_l	eR.pL	8511	124	0.1	0.2
24	250033	4f_sze_l	eL.pL	1327300	177	2.6	5.2
25	250034	4f_sze_l	eL.pR	1348500	187	5.3	10.6
26	250035	4f_sze_l	eR.pR	1348100	188	0.5	1
27	250036	4f_sze_l	eR.pL	1349600	200	0.2	0.4
28	250054	4f_sznu_l	eL.pR	138399	689	1.8	3.6
29	250056	4f_sznu_l	eR.pL	7419	67	0.1	0.2

# Processes at precuts (5f, aa\_4f)

31	37189	ea_ellvw	eL.pW	800	23	5	10
32	37190	ea_ellvw	eL.pB	200	9	4.2	8.4
33	37191	ea_ellvw	eR.pW	400	10	0.5	1
34	37192	ea_ellvw	eR.pB	200	4	0.2	0.4
35	37193	ea_lllvw	eL.pW	200	1	1.5	3
36	37194	ea_lllvw	eL.pB	200	1	0.4	0.8
37	37197	ea_llvxy	eL.pW	200	0	4.4	8.8
38	37198	ea_llvxy	eL.pB	200	0	1	2
39	37225	ea_evlxy	eL.pW	2000	1	5.7	11.4
40	37226	ea_evlxy	eL.pB	400	0	5.5	11
41	37227	ea_evlxy	eR.pW	1000	0	0.6	1.2
42	37228	ea_evlxy	eR.pB	300	0	0.4	0.8
43	37241	ea_ellxx	eL.pW	300	0	4.4	8.8
44	37242	ea_ellxx	eL.pB	300	1	4.8	9.6
45	37243	ea_ellxx	eR.pW	300	0	0.4	0.8
46	37244	ea_ellxx	eR.pB	300	0	0.5	1
47	37257	ea_eIIII	eL.pW	300	0	5.4	10.8
48	37258	ea_eIIII	eL.pB	400	1	4.8	9.6
49	37259	ea_eIIII	eR.pW	300	1	0.5	1
50	37260	ea_eIIII	eR.pB	400	0	0.5	1
51	37305	ae_ellvw	eW.pL	400	11	1.8	3.6
52	37306	ae_ellvw	eB.pL	200	4	0.8	1.6
53	37307	ae_ellvw	eW.pR	800	20	3.6	7.2
54	37308	ae_ellvw	eB.pR	200	5	3.1	6.2
55	37315	ae_llvxy	eW.pR	200	1	3.2	6.4
56	37316	ae_llvxy	eB.pR	200	0	0.7	1.4
57	37341	ae_evlxy	eW.pL	600	0	3.6	7.2
58	37342	ae_evlxy	eB.pL	300	0	1.5	3
59	37343	ae_evlxy	eW.pR	2000	0	4.1	8.2
60	37344	ae_evlxy	eB.pR	500	0	3.3	6.6
61	37357	ae_ellxx	eW.pL	300	0	1.6	3.2
62	37358	ae_ellxx	eB.pL	300	0	1.8	3.6
63	37359	ae_ellxx	eW.pR	300	0	3.1	6.2
64	37360	ae_ellxx	eB.pR	300	0	3.5	7
65	37373	ae_eIIII	eW.pL	300	0	2	4
66	37374	ae_eIIII	eB.pL	400	0	1.8	3.6
67	37375	ae_eIIII	eW.pR	300	0	3.9	7.8
68	37376	ae_eIIII	eB.pR	400	0	3.5	7
70	37401	aa_llvw	eW.pW	2100	43	3.1	6.2
71	37402	aa_llvw	eW.pB	500	9	2.9	5.8
72	37403	aa_llvw	eB.pW	500	6	3	6
73	37404	aa_llvw	eB.pB	200	0	0.4	0.8
74	37453	aa_IIII	eW.pW	2200	1	3.1	6.2
75	37454	aa_IIII	eW.pB	3100	0	3.1	6.2
76	37455	aa_IIII	eB.pW	3100	0	3.1	6.2
77	37456	aa_IIII	eB.pB	3800	0	3.1	6.2

# Request (1)

4	ID	process	beam pol.	# MC without cuts	# MC after precuts	weight	in TMVA		request total # MC	generated # MC in stdhep	comment
5	106519	e2e2h	eL.pR	6000	3	0.8	1.6		10k	10000	
6	106521	e3e3h	eL.pR	5998	0	0.8	1.6		10k	10000	
7	250016	4f_zz_sl	eR.pL	13500	1	1.1	2.2		30k	144181	
8	250020	4f_ww_sl	eR.pL	2200	0	1.1	2.2		5k	22789	
9	250028	4f_ww_l	eR.pL	200	2	1.1	2.2		500	2085	
10	37189	ea_ellvv	eL.pW	800	23	5	10		10k	10000	
11	37190	ea_ellvv	eL.pB	200	9	4.2	8.4		2k	10000	
12	37191	ea_ellvv	eR.pW	400	10	0.5	1		500	10000	
13	37193	ea_lllvv	eL.pW	200	1	1.5	3		1k	10000	
14	37197	ea_llvxy	eL.pW	200	0	4.4	8.8		2k	10000	
15	37198	ea_llvxy	eL.pB	200	0	1	2		500	10000	
16	37225	ea_evlxy	eL.pW	2000	1	5.7	11.4		25k	10000	more stdhep events are needed
17	37226	ea_evlxy	eL.pB	400	0	5.5	11		5k	10000	
18	37227	ea_evlxy	eR.pW	1000	0	0.6	1.2		1.5k	10000	
19	37241	ea_ellxx	eL.pW	300	0	4.4	8.8		3k	10000	
20	37242	ea_ellxx	eL.pB	300	1	4.8	9.6		3k	10000	
21	37244	ea_ellxx	eR.pB	300	0	0.5	1		500	10000	
22	37257	ea_ellll	eL.pW	300	0	5.4	10.8		4k	10000	
23	37258	ea_ellll	eL.pB	400	1	4.8	9.6		4k	10000	
24	37259	ea_ellll	eR.pW	300	1	0.5	1		500	10000	
25	37260	ea_ellll	eR.pB	400	0	0.5	1		500	10000	

# Request (2)

25	37260	ea_eIII	eR.pB	400	0	0.5	1		500	10000	
26	37305	ae_ellv	eW.pL	400	11	1.8	3.6		1.5k	10000	
27	37306	ae_ellv	eB.pL	200	4	0.8	1.6		500	10000	
28	37307	ae_ellv	eW.pR	800	20	3.6	7.2		6k	10000	
29	37308	ae_ellv	eB.pR	200	5	3.1	6.2		1.5k	10000	
30	37315	ae_llvx	eW.pR	200	1	3.2	6.4		1.5k	10000	
31	37316	ae_llvx	eB.pR	200	0	0.7	1.4		500	10000	
32	37341	ae_evly	eW.pL	600	0	3.6	7.2		5k	10000	
33	37342	ae_evly	eB.pL	300	0	1.5	3		1k	10000	
34	37343	ae_evly	eW.pR	2000	0	4.1	8.2		20k	10000	more stdhep events are needed
35	37344	ae_evly	eB.pR	500	0	3.3	6.6		4k	10000	
36	37357	ae_ellx	eW.pL	300	0	1.6	3.2		1k	10000	
37	37358	ae_ellx	eB.pL	300	0	1.8	3.6		1.5k	10000	
38	37359	ae_ellx	eW.pR	300	0	3.1	6.2		2k	10000	
39	37360	ae_ellx	eB.pR	300	0	3.5	7		2.5k	10000	
40	37373	ae_eIII	eW.pL	300	0	2	4		1.5k	10000	
41	37374	ae_eIII	eB.pL	400	0	1.8	3.6		1.5k	10000	
42	37375	ae_eIII	eW.pR	300	0	3.9	7.8		2.5k	10000	
43	37376	ae_eIII	eB.pR	400	0	3.5	7		3k	10000	
44	37401	aa_llvv	eW.pW	2100	43	3.1	6.2		15k	10000	can add samples generated on 2016/Dec./20 but still need more more stdhep events are needed
45	37453	aa_III	eW.pW	2200	1	3.1	6.2		15k	10000	more stdhep events are needed
46	37454	aa_III	eW.pB	3100	0	3.1	6.2		20k	10000	more stdhep events are needed
47	37455	aa_III	eB.pW	3100	0	3.1	6.2		20k	10000	more stdhep events are needed
48	37456	aa_III	eB.pB	3800	0	3.1	6.2		25k	10000	more stdhep events are needed

# Request (3)

2												
3									request total # MC			
4	ID	process	beam pol.	# MC without cuts	# MC after precuts	weight	in TMVA		Million	Thousand	generated # MC in stdhep	comments
5	250106	2f_z_l	eL.pR	252100	47	20.5	41		11		2773791	more stdhep events are needed
6	250108	2f_z_l	eR.pL	202100	34	1.3	2.6			600	2172428	
7	250014	4f_zz_sl	eL.pR	28300	2	20.1	40.2		1	200	304285	more stdhep events are needed
8	250018	4f_ww_sl	eL.pR	442800	3	20.1	40.2		18		4760726	more stdhep events are needed
9	250022	4f_zz_l	eL.pR	2800	15	20	40			120	30011	more stdhep events are needed
10	250026	4f_ww_l	eL.pR	36800	75	20.1	40.2		1	500	395357	more stdhep events are needed
11	250030	4f_zzorww_l	eL.pR	409910	3591	2	4		2		409910	more stdhep events are needed
12	250033	4f_sze_l	eL.pL	1327300	177	2.6	5.2		7		3495504	more stdhep events are needed
13	250034	4f_sze_l	eL.pR	1348500	187	5.3	10.6		15		3628860	more stdhep events are needed
14	250035	4f_sze_l	eR.pR	1348100	188	0.5	1		1	500	3492500	
15	250054	4f_sznu_l	eL.pR	138399	689	1.8	3.6			500	139399	more stdhep events are needed



# Summary of request

- 55 different processes
- ~80% processes:
  - enough stdhep samples are already generated
  - small number of samples required (~10k)
  - not so problematic (I think)
- ~20% processes:
  - definitely problematic
  - need lots of stdhep events, CPU time, and storage space if I require event weight  $\lesssim 0.5$
  - some generator-level cuts are needed (or other solution?)

# Precuts

- exactly one  $\mu^+$  and one  $\mu^-$
- $\chi^2/\text{Ndf}(\mu^\pm) < 1.5$
- innermost hit ( $\mu^\pm$ )  $< 20$  mm
- $\sigma(M_{\mu\mu}) < 1$  GeV
- $N_{P_t > 5\text{GeV}} \leq 1$
- $125 < E_{\text{vis}} < 400$  GeV
- $100 < M_{\mu\mu} < 130$  GeV
- $\cos \theta_{\mu\mu} < 0.55$
- $|\cos \theta_{\text{miss}}| < 0.999$
- $P_t > 5$  GeV

probably useful hints for  
generator-level cuts

