



Weekly

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23 May, 2016

Introduction

❖ **sample status**

- non-res: done!
- res: waiting for PMG approval;

❖ **hh→4W**

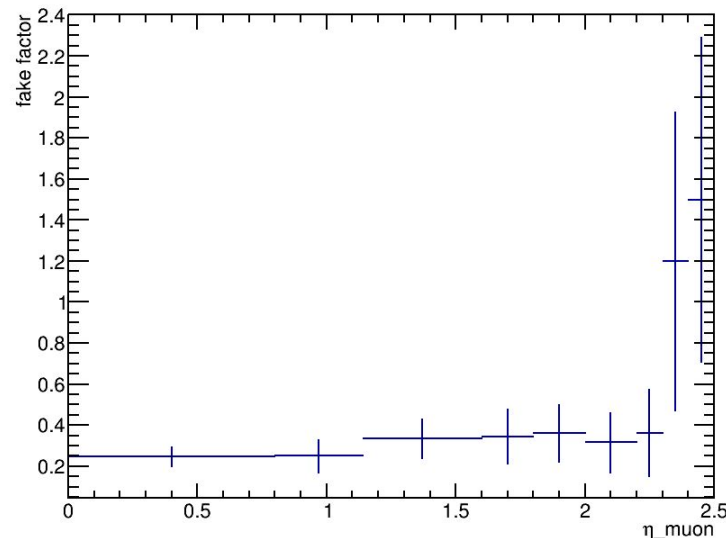
- fake factor closure test on mumu channel with MC;
- pheno side: almost final results given;

❖ **Track seeding**

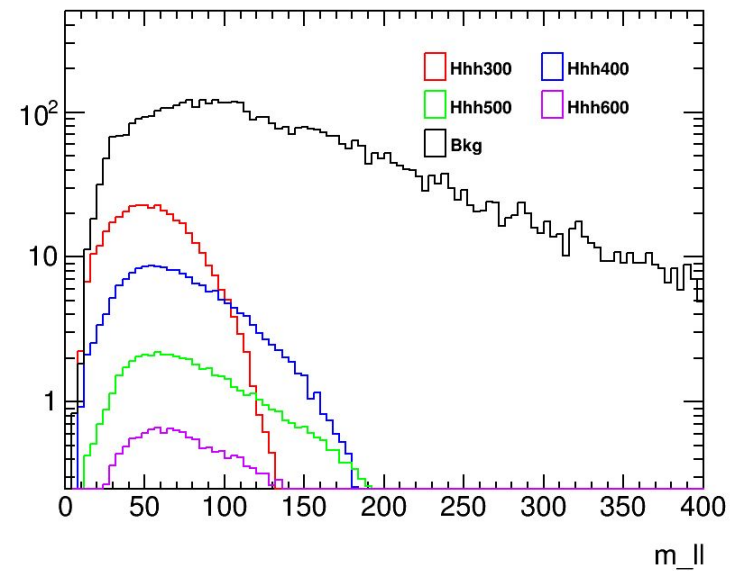
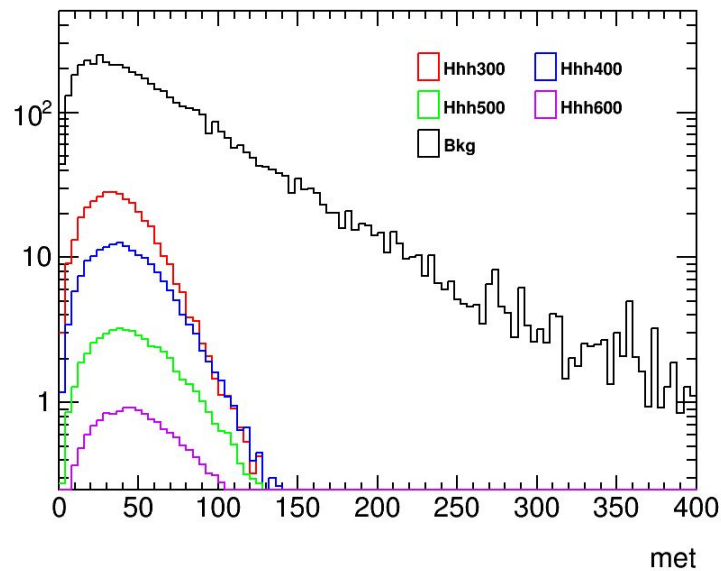
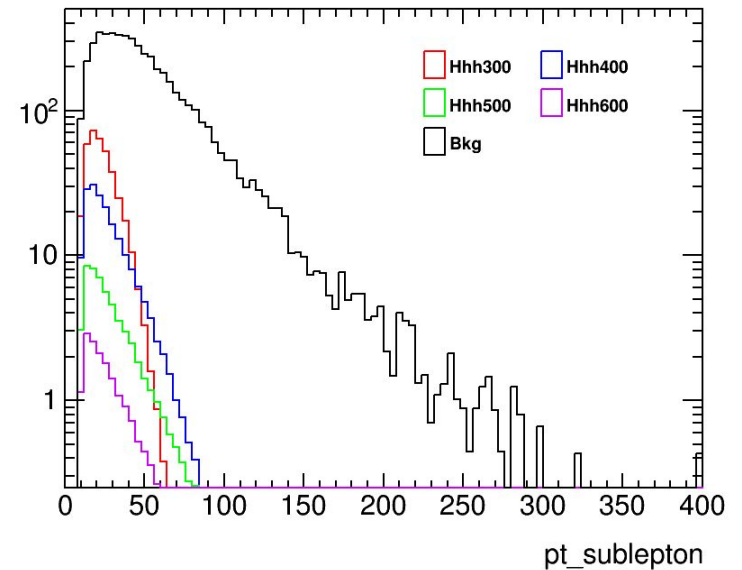
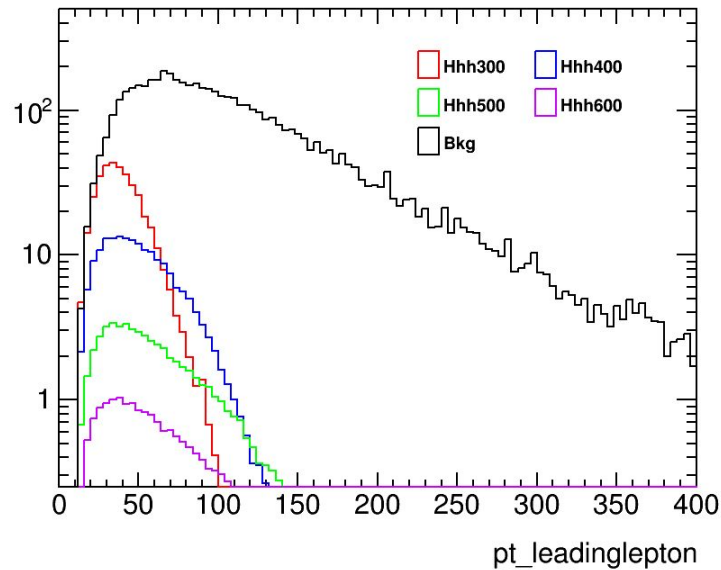
Closure test

- ❖ Perform the same procedure on ttbar samples for mumu channel, ignoring QmisID;
- ❖ Estimate fake factor from regions: $1 \leq N_{\text{jet}} < 3$;
- ❖ θ_{μ} Sys: 19.0%.

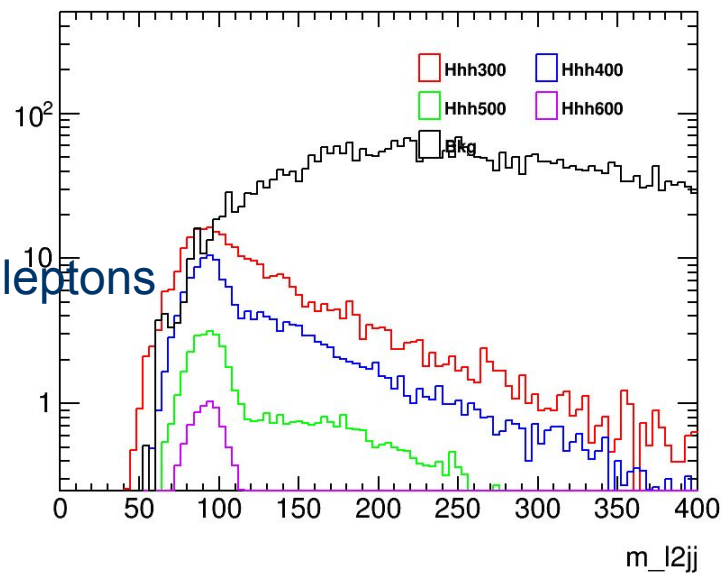
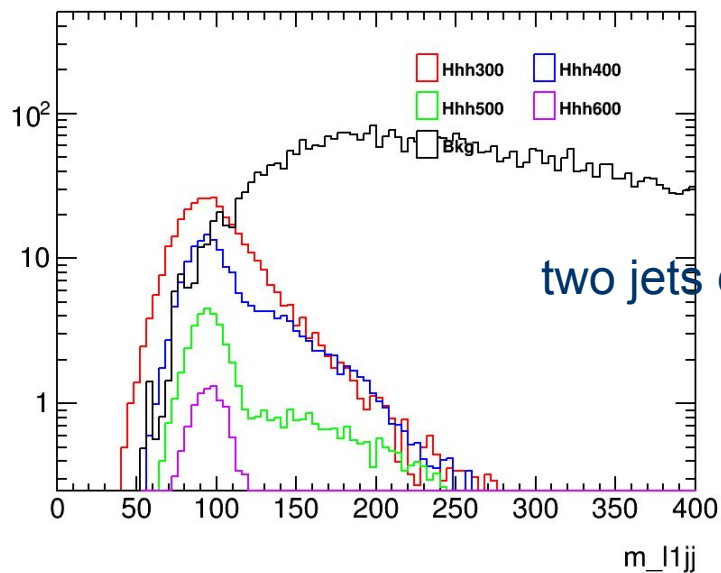
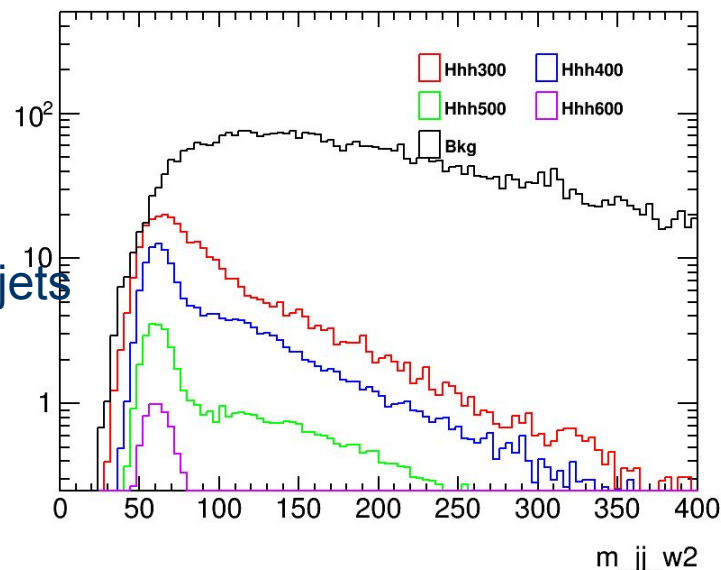
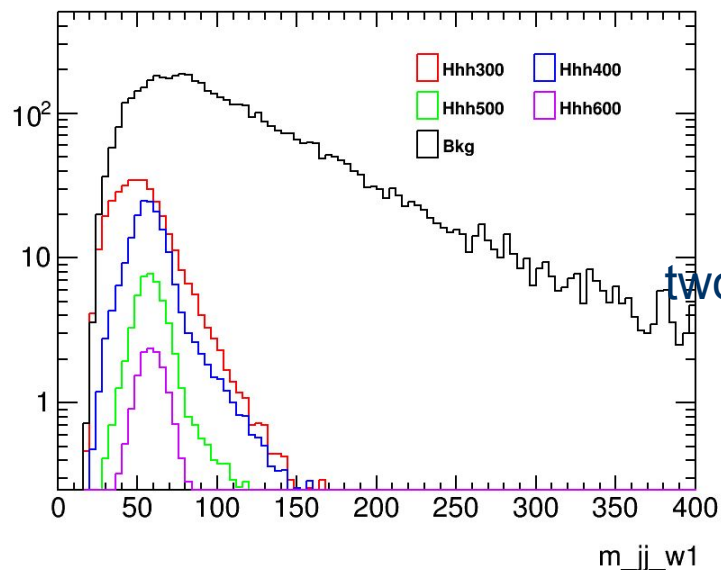
flavor	region	predicted	simulated	systematic
muon	==3 jet	127.23	103	19.0%



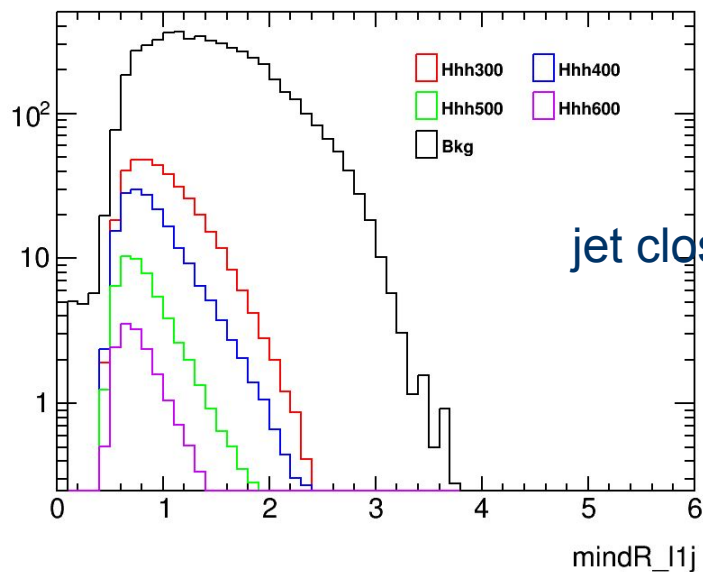
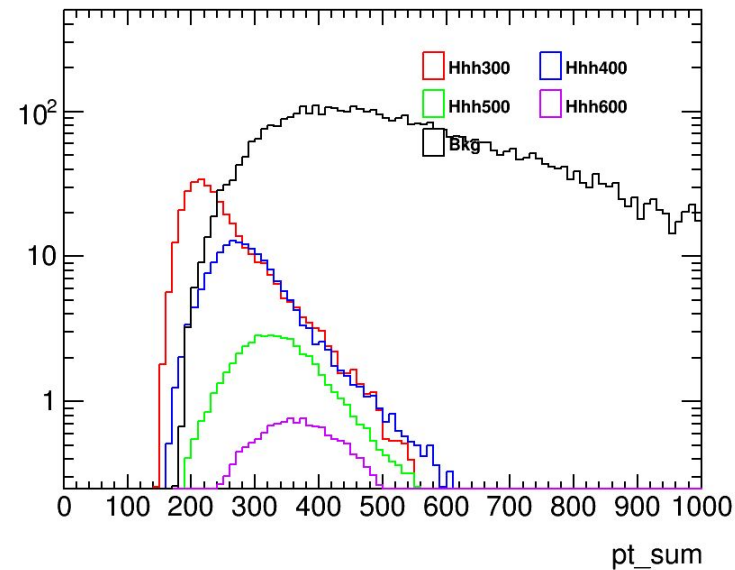
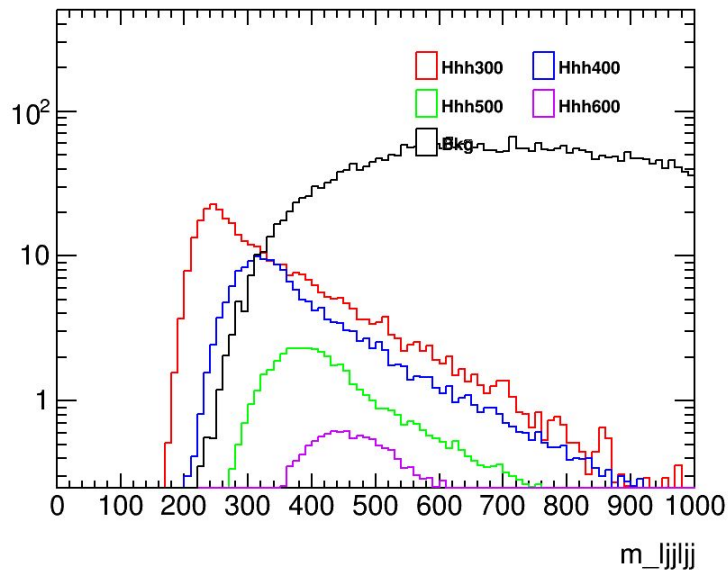
Discriminants-I



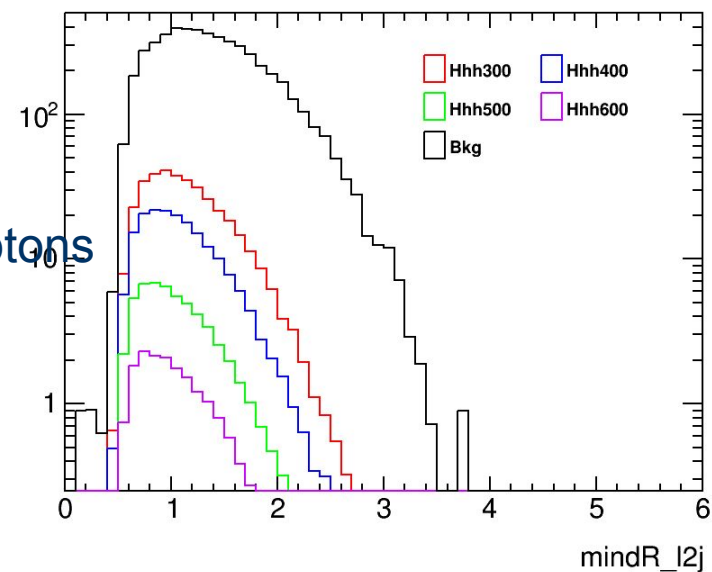
Discriminants-II



Discriminants-III



jet closet to leptons



H300

❖ **Lumi=300 fb⁻¹**

processes	xsec(fb)	basic cuts + event selection	b-veto	pt_l1 > 25GeV met>20	m_ljjljj < 350GeV
Hhh300	11.4	1.40	1.23	0.86	0.50
ttW	28.4	4.61	0.56	0.52	0.03
ttZ	21.7	1.68	0.22	0.20	0.005
WW4j	19.6	2.74	2.43	2.28	0.015
tth	12.6	2.00	0.28	0.25	0.02
Whjj	3.9	0.28	0.24	0.21	0.02
Zhjj	0.89	0.03	0.03	0.02	0.002
WZ4j	155	14.1	12.6	10.2	0.11
ZZ4j	6.3	0.57	0.50	0.23	0.002
S/sqrt(B)	12.5	4.7	5.2	4.0	19.3
Z ₀	12.4	4.0	5.1	4.0	14.7

H400

❖ **Lumi=300 fb⁻¹**

processes	xsec(fb)	basic cuts + event selection	b-veto	pt_l1 > 25GeV met>20	m_jj_w<100 m_ljj<150	m_ljjljj<400 mindR_lj<1.5
Hhh400	4.1	0.72	0.62	0.48	0.17	0.13
ttW	28.4	4.61	0.56	0.52	0.016	0.007
ttZ	21.7	1.68	0.22	0.20	0.003	0.001
WW4j	19.6	2.74	2.43	2.28	0.011	0.004
tth	12.6	2.00	0.28	0.25	0.01	0.005
Whjj	3.9	0.28	0.24	0.21	0.014	0.007
Zhjj	0.89	0.03	0.03	0.02	0.001	0.0006
WZ4j	155	14.1	12.6	10.2	0.06	0.02
ZZ4j	6.3	0.57	0.50	0.23	0.0005	0.0001
S/sqrt(B)	4.5	2.4	2.6	2.2	8.7	10.3
Z ₀	4.5	2.4	1.8	2.2	7.3	8.1

H500

❖ **Lumi=3000 fb⁻¹**

processes	xsec(fb)	basic cuts + event selection	b-veto	pt_l1 > 25GeV met>2 0	m_jj_w<100 m_ljj<150	m_ljjljj<450 mindR_lj<1.5
Hhh500	1.32	0.21	0.18	0.15	0.05	0.04
ttW	28.4	4.61	0.56	0.52	0.016	0.008
ttZ	21.7	1.68	0.22	0.20	0.003	0.002
WW4j	19.6	2.74	2.43	2.28	0.011	0.008
tth	12.6	2.00	0.28	0.25	0.01	0.006
Whjj	3.9	0.28	0.24	0.21	0.014	0.007
Zhjj	0.89	0.03	0.03	0.02	0.001	0.0008
WZ4j	155	14.1	12.6	10.2	0.06	0.03
ZZ4j	6.3	0.57	0.50	0.23	0.0005	0.0002
S/sqrt(B)	4.7	2.2	2.4	2.2	8.0	8.8
Z ₀	4.4	2.2	2.4	2.2	7.7	8.1

❖ **Lumi=3000 fb⁻¹**

processes	xsec(fb)	basic cuts + event selection	b-veto	pt_l1 > 25GeV met>20	m_jj_w<80 m_ljj<120	pt_sum<500 mindR_lj<1.5
Hhh600	0.51	0.07	0.06	0.05	0.009	0.008
ttW	28.4	4.61	0.56	0.52	0.002	0.001
ttZ	21.7	1.68	0.22	0.20	0.0003	0.0003
WW4j	19.6	2.74	2.43	2.28	0.004	0.002
tth	12.6	2.00	0.28	0.25	0.001	0.001
Whjj	3.9	0.28	0.24	0.21	0.003	0.002
Zhjj	0.89	0.03	0.03	0.02	0.0003	0.0002
WZ4j	155	14.1	12.6	10.2	0.01	0.006
ZZ4j	6.3	0.57	0.50	0.23	0.0002	0.0001
S/sqrt(B)	1.8	0.76	0.79	0.73	3.2	3.9
Z ₀	1.7	0.76	0.76	0.73	3.2	3.6

MVA on H600

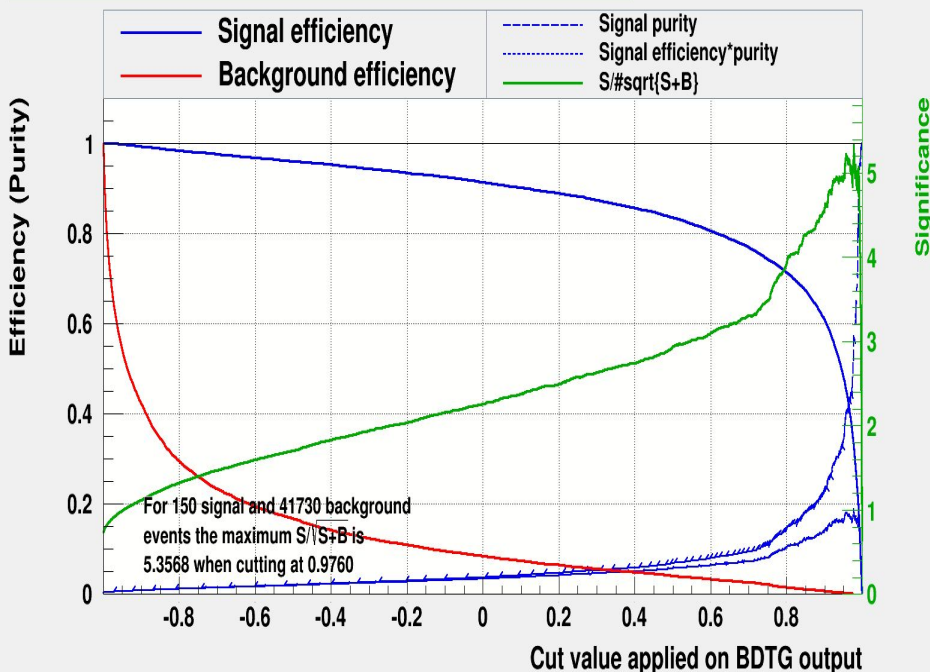
❖ optimal: BDTG > 0.9760

❖ $S/\sqrt{B}=8.2$

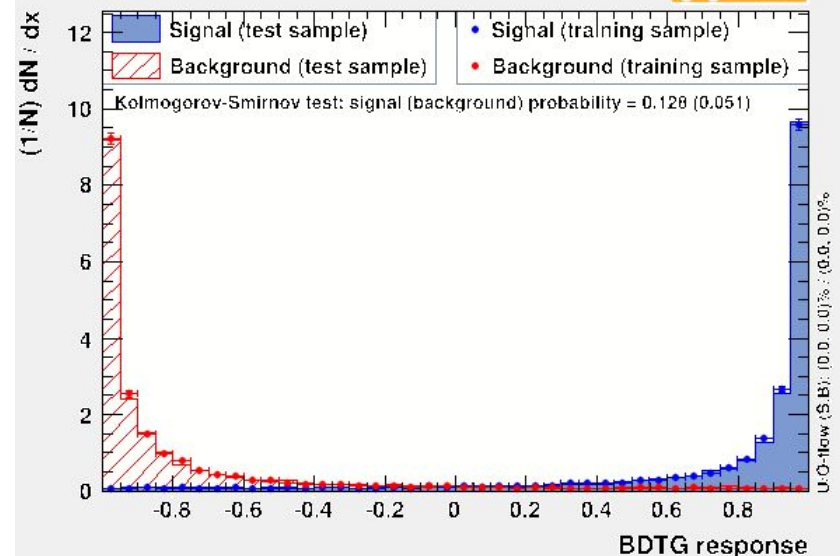
❖ Significance=7.0

Rank	Variable	Variable Importance
1	n_mindR_l1j	1.477e-01
2	n_mindR_l2j	1.340e-01
3	n_pt_sum	1.255e-01
4	n_m_jj_w2	1.244e-01
5	n_m_jj_w1	1.228e-01
6	n_m_l1	1.213e-01
7	n_m_l2jj	1.126e-01
8	n_m_l1jj	1.118e-01

Cut efficiencies and optimal cut value



TMVA overtraining check for classifier: BDTG



Track Seeding

- ❖ valid3 samples used;
- ❖ PPP in barrel;

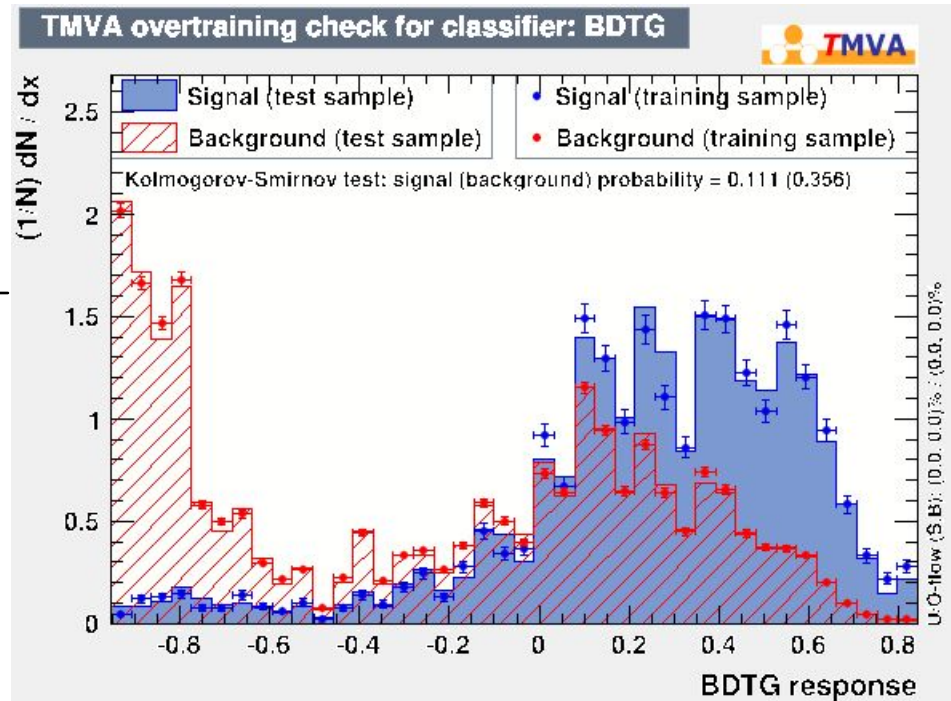
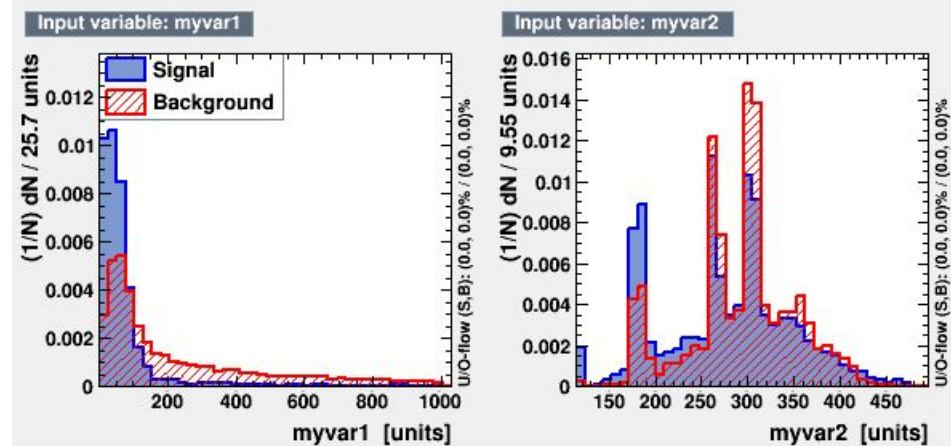
$$\text{var1} = \sqrt{(100d_0)^2 + (z_0)^2}$$

$$\text{var2} = \sqrt{r_1^2 + r_2^2 + r_3^2}$$

- update to new samples
- goodness of seeds:

$$G = \frac{f_{\text{survival}}}{f_{\text{fake}}} = \frac{N_{\text{survival}}^{\text{good}}}{N^{\text{good}}} \div \frac{N^{\text{total}} - N^{\text{good}}}{N^{\text{total}}}$$

- how many associated good seeds survived for per truth particle



To do list

- ❖ **Non-res derivations, signal optimizations;**
- ❖ **Fix jet fakes excess in emu channel;**
- ❖ **Validate fake factor of electrons;**
- ❖ **Uncertainties.**

Back up

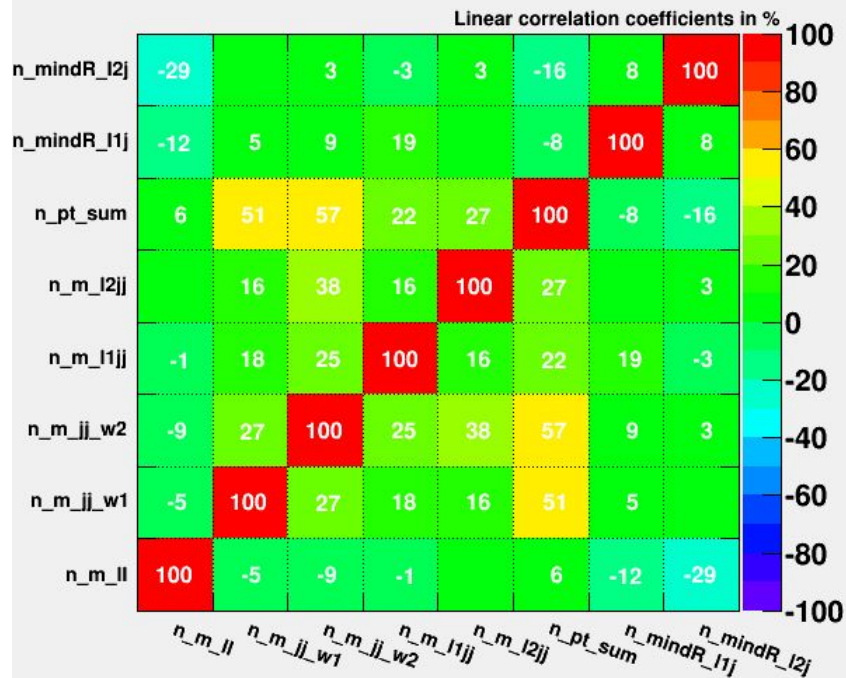
H700



processes	xsec(fb)	basic cuts + event selection	b-veto	pt_l1 > 25GeV met>20	
Hhh700	0.20	0.02	0.018	0.015	
ttW	28.4	4.61	0.56	0.52	
ttZ	21.7	1.68	0.22	0.20	
WW4j	19.6	2.74	2.43	2.28	
tth	12.6	2.00	0.28	0.25	
Whjj	3.9	0.28	0.24	0.21	
Zhjj	0.89	0.03	0.03	0.02	
WZ4j	155	14.1	12.6	10.2	
ZZ4j	6.3	0.57	0.50	0.23	
S/sqrt(B)				0.02	
Z ₀					

H600

Correlation Matrix (signal)



Correlation Matrix (background)

