Status report

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- Analysis by "delphes_card_LHeC_PK_V2_eFilter.tcl" in Delphes 3.4

Analysis ($E_e = 60\text{GeV}, E_p = 7\text{TeV}$)

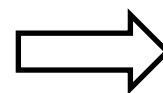We analyzed the signal and the backgrounds by cut-based analysis

Event	cut0	cut1	cut2	cut3	cut4	cut5	cut6	cut7
Signal (Br=100%)	13122	7958	4655	3370	2808	2567	2178	1337
$Wj\nu$	369769	216818	92509	7271	5592	4115	1105	669
Zje	33662	18569	6957	1750	1290	925	632	349
W^+je	365777	163554	43519	20234	10746	8371	6455	841
W^-je	377221	142107	16048	6464	3607	2791	2225	283
...								
Total background	1706357	840136	216956	38589	23106	17800	10514	2167

The number of events of the signal and the main backgrounds after application of each cut, assuming an integrated luminosity of 1ab^{-1}

Branching ratio calculated by $S/\sqrt{S+B}$:

$$Z = \frac{1337 \times \text{Br}(h \to \not{E}_T)}{\sqrt{1337 \times \text{Br}(h \to \not{E}_T) + 2167}}$$

In the case of 2σ

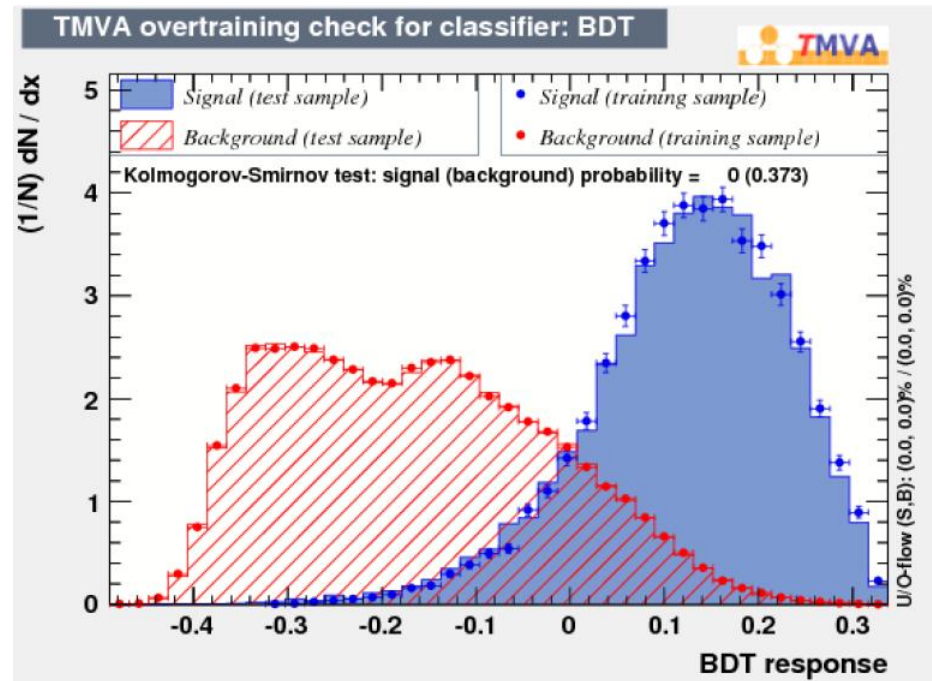$\Longrightarrow$ $\text{Br}(h \to \not{E}_T) \sim 7.11\%$

Analysis ($E_e = 60\text{GeV}, E_p = 7\text{TeV}$)

We analyzed the signal and the backgrounds by MVA.

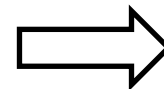| Score >	N_s	N_B	Br[%]
0	5200	61896	9.61
0.05	4626	34446	8.07
0.1	3721	15951	6.84
0.15	2568	6028	6.13
0.2	1471	1952	6.14
0.25	586	435	7.47
0.3	101	39	14.5

Branching ratio calculated by $S/\sqrt{S + B}$:

$$Z = \frac{2568 \times \text{Br}(h \to \not{E}_T)}{\sqrt{2568 \times \text{Br}(h \to \not{E}_T) + 6028}}$$

In the case of 2σ

$\Longrightarrow$ $\text{Br}(h \to \not{E}_T) \sim 6.13\%$

※$\text{Br}(h \to \not{E}_T) \sim 7.11\%$ (cut-base)

Summary

- When we analyzed by "delphes_card_LHeC_PK_V2_eFilter.tcl" in Delphes 3.4, $\mathrm{Br}(h \to \not{E}_T)$ is 7.11% (cut-base) and 6.13% (MVA).

Back up
(analysis by "delphes_card_LHeC_PK.tcl" in Delphes3.3.3)

Analysis ($E_e = 60\text{GeV}, E_p = 7\text{TeV}$)

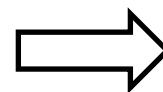We analyzed the signal and the backgrounds by cut-based analysis

Event	cut0	cut1	cut2	cut3	cut4	cut5	cut6	cut7
Signal (Br=100%)	11576	8283	5681	3254	2973	2846	2383	1602
$Wj\nu$	325820	229533	122232	4784	4154	3623	931	622
Zje	29033	18082	8808	1499	1305	1096	719	438
W^+je	299966	168467	70847	26077	18386	15999	12653	855
W^-je	308992	139570	36435	10529	7671	6685	5340	459
…								
Total background	1454209	856563	330904	45712	33972	29685	19820	2430

The number of events of the signal and the main backgrounds after application of each cut, assuming an integrated luminosity of 1ab^{-1}

Branching ratio calculated by $S/\sqrt{S+B}$:

$$Z = \frac{1602 \times \text{Br}(h \to \not{E}_T)}{\sqrt{1602 \times \text{Br}(h \to \not{E}_T) + 2430}}$$

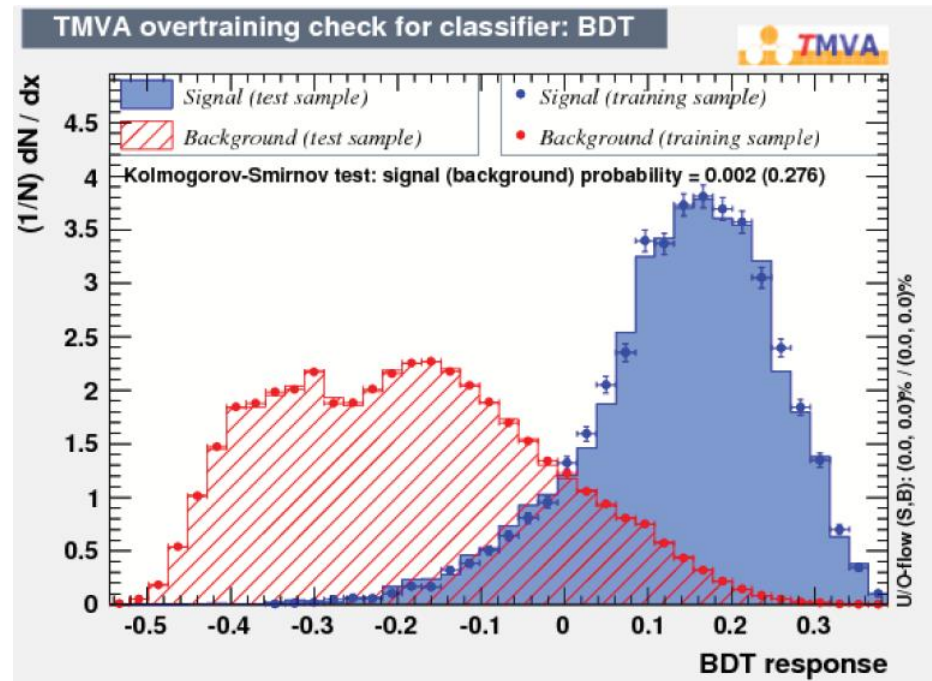In the case of 2σ $\Longrightarrow$ $\text{Br}(h \to \not{E}_T) \sim 6.28\%$

Analysis ($E_e = 60\text{GeV}, E_p = 7\text{TeV}$)

We analyzed the signal and the backgrounds by MVA.

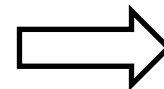| Score >	N_S	N_B	Br[%]
0	5830	60769	8.49
0.05	5324	38142	7.37
0.1	4471	20947	6.52
0.15	3279	9261	5.93
0.2	2062	3271	5.65
0.25	978	886	6.29
0.3	318	144	8.2

Branching ratio calculated by $S/\sqrt{S+B}$:

$$Z = \frac{2062 \times \text{Br}(h \to \not{E}_T)}{\sqrt{2062 \times \text{Br}(h \to \not{E}_T) + 3271}}$$

In the case of 2σ

$\Longrightarrow$ $\text{Br}(h \to \not{E}_T) \sim 5.65\%$

※$\text{Br}(h \to \not{E}_T) \sim 6.28\%$ (cut-base)