

Status report

Tokyo Institute of Technology

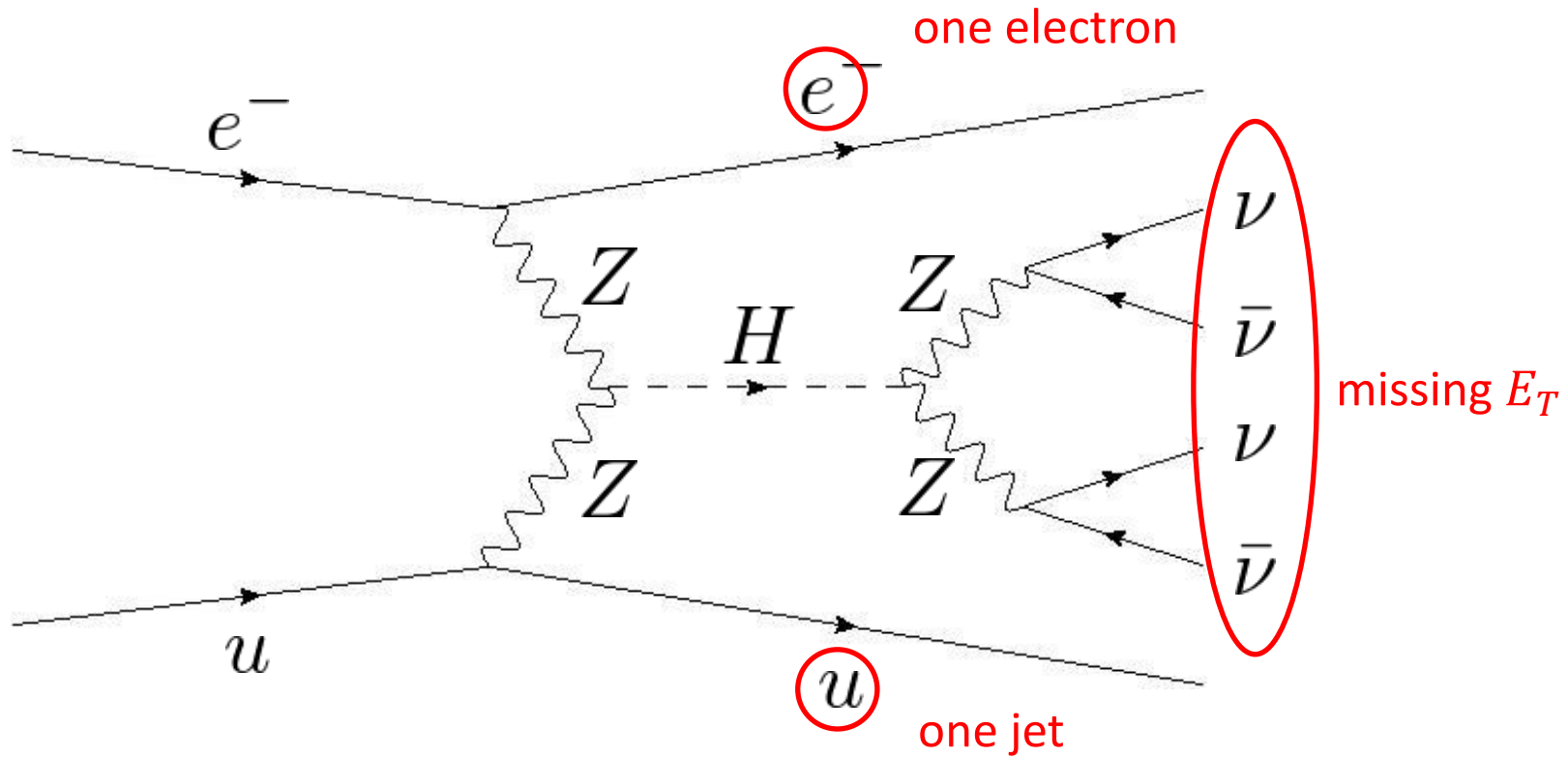
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- Analysis by “FCChh.tcl” in Delphes 3.4.0

Event we used for the comparison



$$NC: H \rightarrow ZZ \rightarrow 4\nu$$

Setup and result

	New	Old
MadGraph	2.5.2	2.3.2
Pythia6	ep-modified	ep-modified
Delphes	3.4.0	3.1.2
Delphes_card	FCChh.tcl	delphes_card_FCCeh_PK.tcl
Events	150000	150000
Jet Size	1.738	1.458
Jet pT (GeV)	43.23	42.24
Jet eta	3.429	3.989
Electron Size	0.9662	1.061
Electron pT (GeV)	69.78	68.35
Electron eta	-0.06228	-0.03203
Missing ET (GeV)	97.57	86.88

✖ mean value

Analysis ($E_e = 60\text{GeV}$, $E_p = 50\text{TeV}$)

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

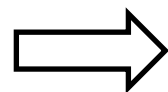
Event	cut0	cut1	cut2	cut3	cut4	cut5	cut6	cut7
Signal (Br=100%)	69454	41127	28224	17500	14217	13308	9984	5463
$Wj\nu$	2495982	1421490	652115	14987	9962	9028	1831	1018
Zje	112925	59742	25164	5192	3619	2797	1316	587
W^+je	1527667	631590	209167	82778	45196	38116	22353	2475
W^-je	1758093	625676	123859	43087	25165	20711	12718	1402
...								
Total background	9000669	4434384	1512718	153181	87958	74466	38387	5535

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 $S/\sqrt{S+B}$:

$$Z = \frac{5463 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{5463 \times \text{Br}(h \rightarrow \cancel{E}_T) + 5535}}$$

In the case of 2σ

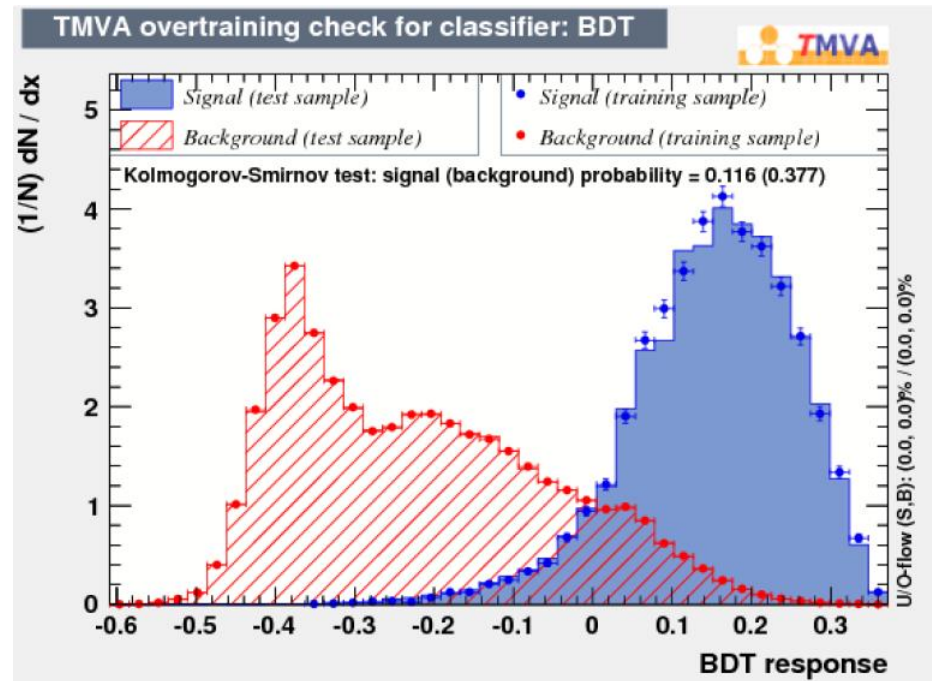


$$\text{Br}(h \rightarrow \cancel{E}_T) \sim 2.76\%$$

Analysis ($E_e = 60\text{GeV}$, $E_p = 50\text{TeV}$)

We analyzed the signal and the backgrounds by MVA.

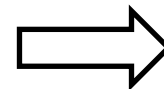
Score >	N_s	N_B	Br[%]
0	23974	246367	4.15
0.05	22062	149578	3.52
0.1	18631	73944	2.93
0.15	13909	31173	2.55
0.2	8905	10897	2.37
0.25	4308	3072	2.62
0.3	1291	527	3.71



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

$$Z = \frac{8905 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{8905 \times \text{Br}(h \rightarrow \cancel{E}_T) + 10897}}$$

In the case of 2σ



$$\text{Br}(h \rightarrow \cancel{E}_T) \sim 2.37\%$$

※ $\text{Br}(h \rightarrow \cancel{E}_T) \sim 2.76\%$ (cut-base)

Summary

- When we analyzed by “FCChh.tcl” in Delphes 3.4.0, $\text{Br}(h \rightarrow \cancel{E}_T)$ is 2.76% (cut-base) and 2.37% (MVA).

Back up

(analysis by “delphes_card_LHeC_PK.tcl” in Delphes3.3.3)

Analysis ($E_e = 60\text{GeV}$, $E_p = 50\text{TeV}$)

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

Event	cut0	cut1	cut2	cut3	cut4	cut5	cut6	cut7
Signal (Br=100%)	59730	39810	30602	22673	20259	19348	15340	8287
$Wj\nu$	2221572	1434387	800015	35958	28761	20826	4761	2544
Zje	99359	56054	30494	9407	7661	6456	3685	1814
W^+je	1226604	596798	287944	153842	106063	96095	68086	4643
W^-je	1429792	573264	207283	94095	67830	60944	44215	3206
...								
Total background	7719650	4299172	1997447	316155	228207	198202	121673	12544

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 $S/\sqrt{S+B}$:

$$Z = \frac{8287 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{8287 \times \text{Br}(h \rightarrow \cancel{E}_T) + 12544}}$$

In the case of 2σ

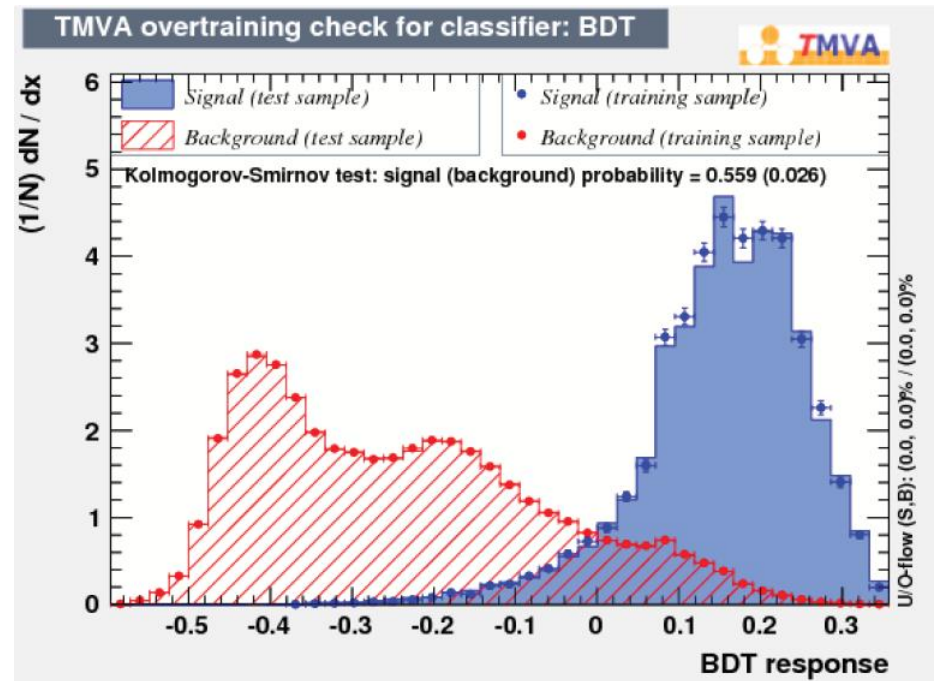
➡

 $\text{Br}(h \rightarrow \cancel{E}_T) \sim 2.73\%$

Analysis ($E_e = 60\text{GeV}$, $E_p = 50\text{TeV}$)

We analyzed the signal and the backgrounds by MVA.

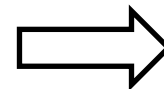
Score >	N_s	N_B	Br[%]
0	23528	215559	3.96
0.05	22139	149761	3.51
0.1	18966	84566	3.08
0.15	14206	38023	2.76
0.2	8881	13607	2.65
0.25	3758	3444	3.18
0.3	946	497	4.93



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

$$Z = \frac{8881 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{8881 \times \text{Br}(h \rightarrow \cancel{E}_T) + 13607}}$$

In the case of 2σ



$$\text{Br}(h \rightarrow \cancel{E}_T) \sim 2.65\%$$

※ $\text{Br}(h \rightarrow \cancel{E}_T) \sim 2.73\%$ (cut-base)