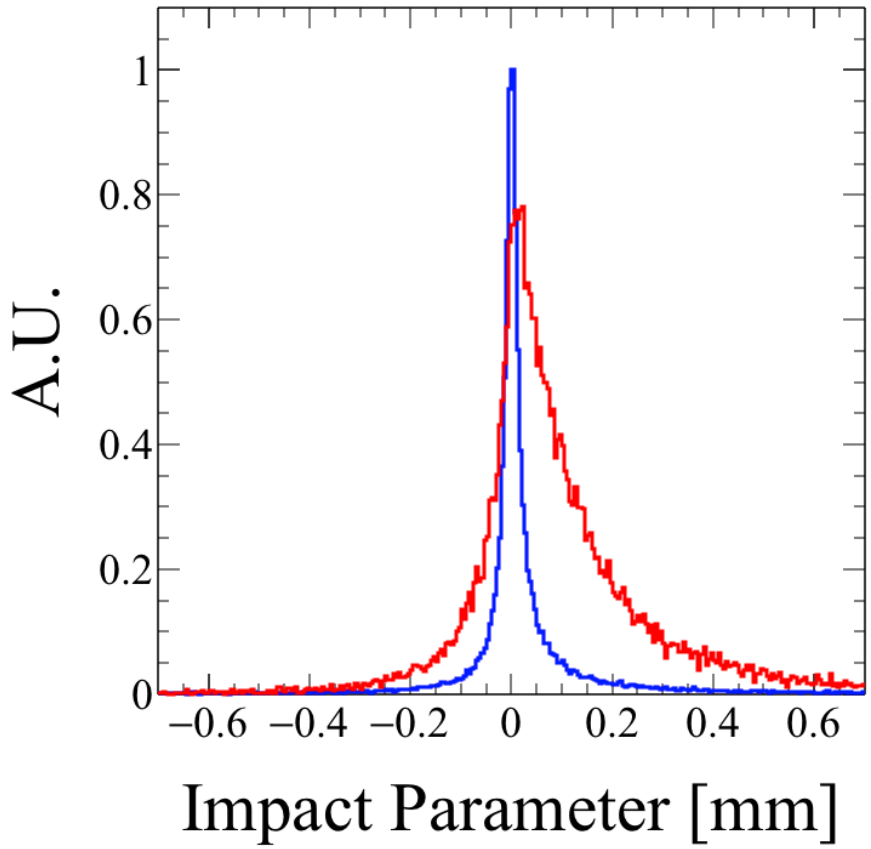
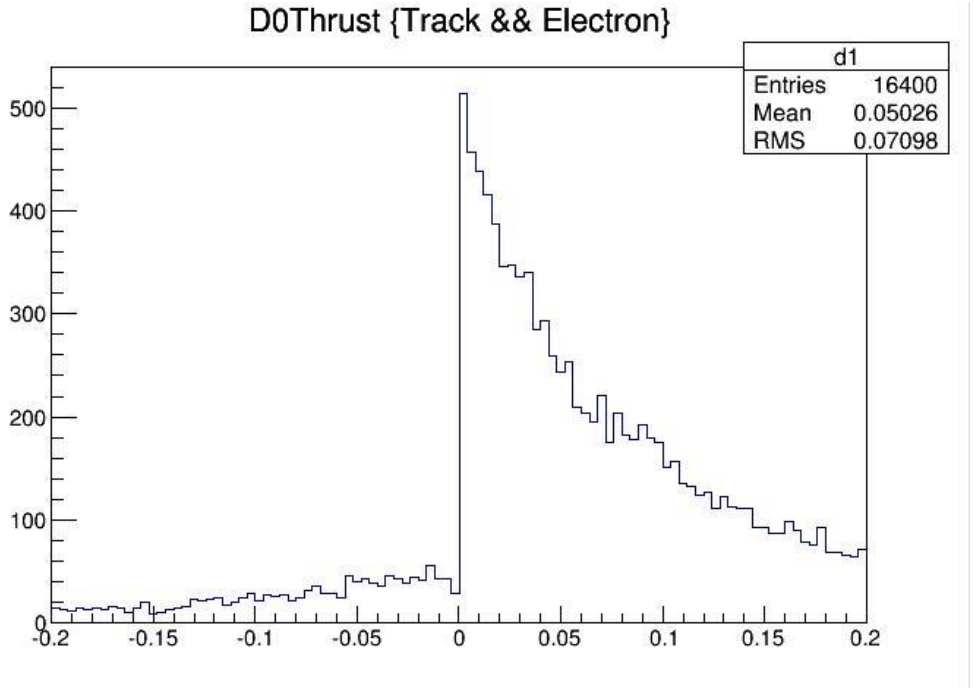
$B_c^+ \to \tau^+ \nu_\tau$ Analysis

Taifan

Problem we had in the last time…

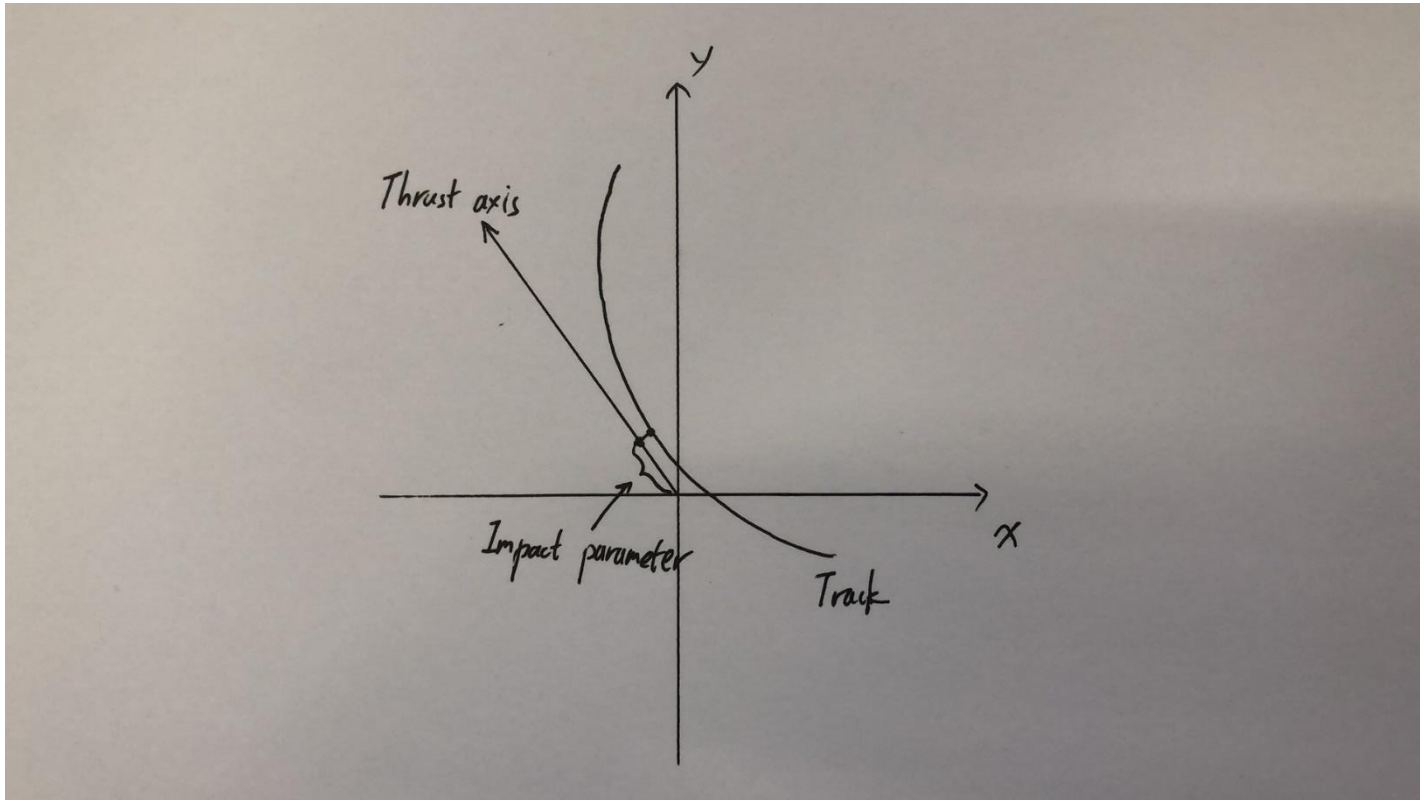


Fenfen’s plot



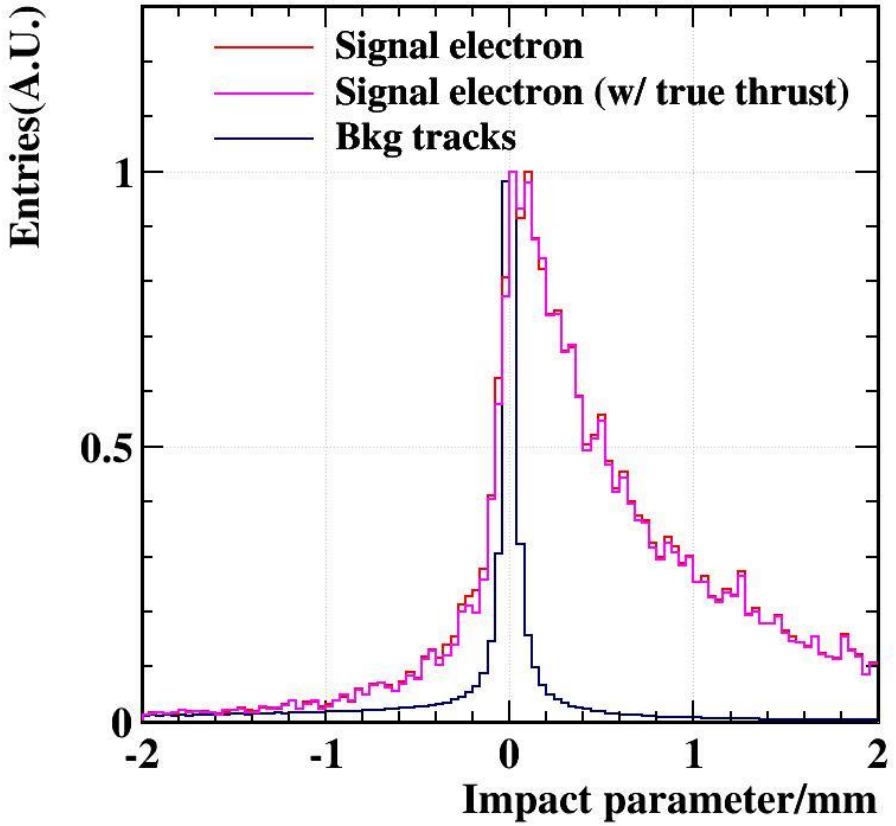
Mine

Impact parameter w.r.t the thrust axis in 3D

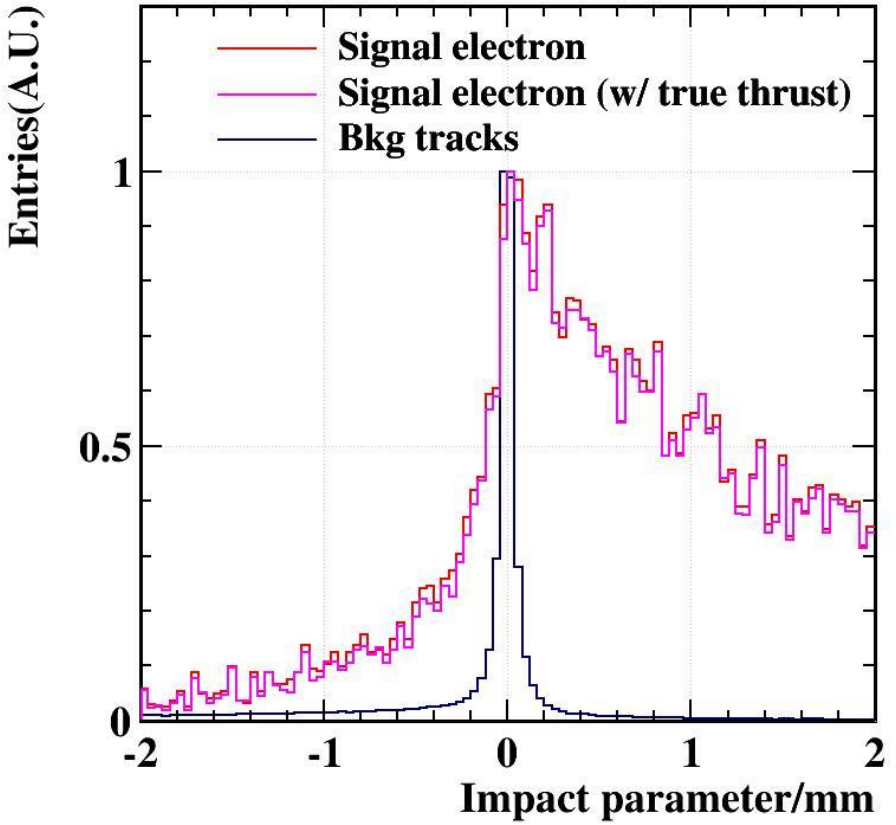


Find the point on the thrust axis closest to the track. The impact parameter is the distance between that point to the IP (I drew in 2D space but calculated in 3D space).

Impact parameter w.r.t the thrust axis in 3D



B_c^+

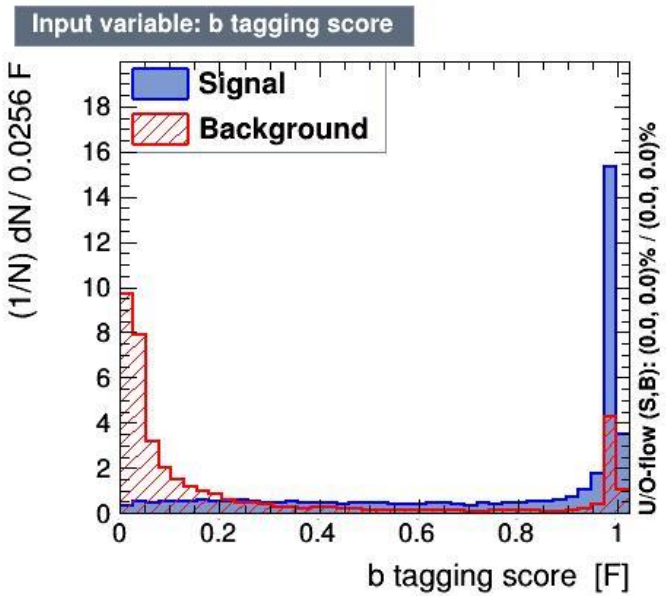


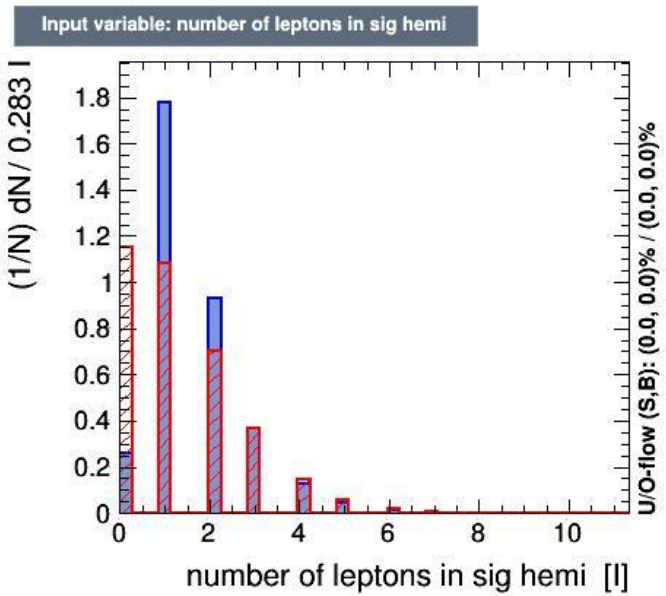
B^+

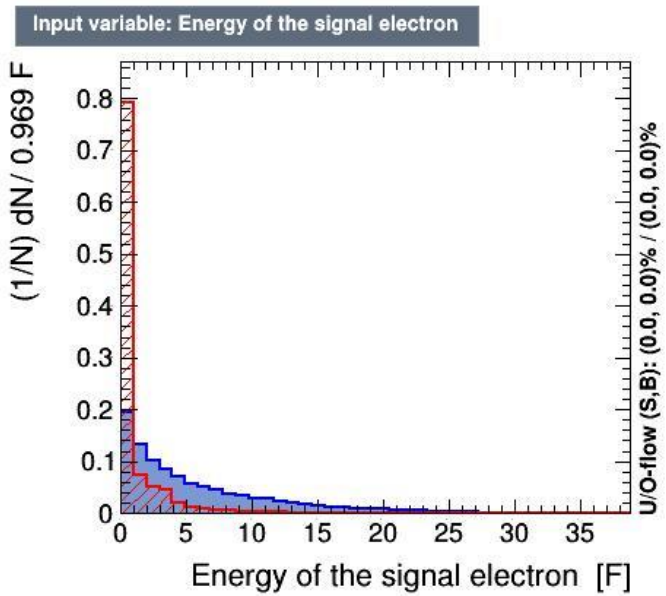
Cut chain of last time

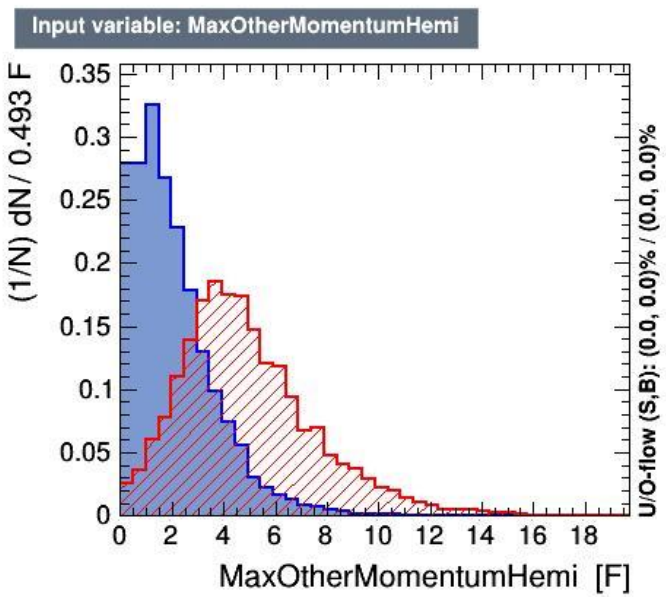
	$B_c^+ \to \tau^+\nu_\tau/\tau^+ \to e$	$B^+ \to \tau^+\nu_\tau/\tau^+ \to e$	$Z \to q\bar{q}$	$D_s^+ \to \tau^+\nu_\tau/\tau^+ \to e$
All	99858/17542	100000/19685	1219756	99600/19616
b-tag > 0.6	72180/12759	67368/13378	227786	53079/10175
N_{Lepton} in sig hemi == 1	27218/6546	25209/6616	72173	16274/3039
The lepton is e & its E is maximum in the hemi	3250/2997	3600/3371	1616	579/311
Electron $E > 1$ GeV	3189/2949	3570/3347	1610	577/310
Max other momenta in the hemi < 2 GeV	2669/2508	2469/2335	318	185/105
Max E of neutral cluster inside cone (angle w/ thrust < 0.5) < 0.5	1292/1280	770/762	1	2/0
B_c^+ energy > 30 GeV	1288/1276	769/761	1	2/0
Max impact para except e $(-\infty, 0.25]$ mm	1133/1123	667/662	1	2/0
Electron impact para [0.25, 4] mm	847/840	328/320	1	1/0

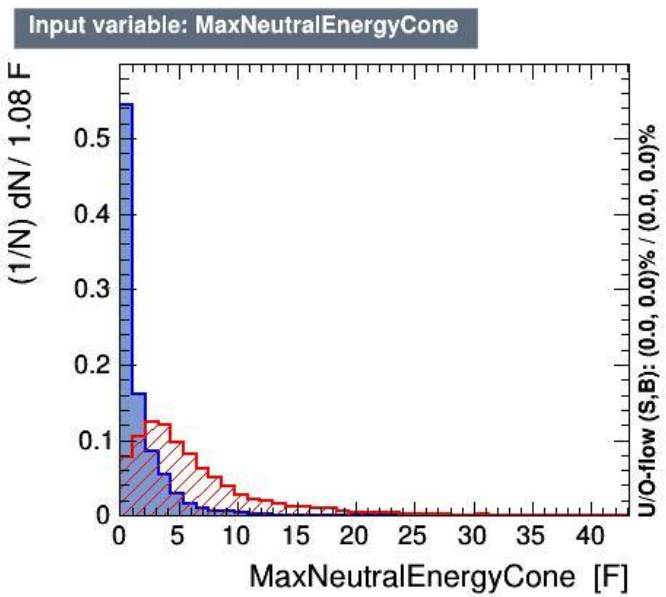
Value distribution ($B_c^+ \to \tau^+ \nu_\tau$ & $Z \to qq$)

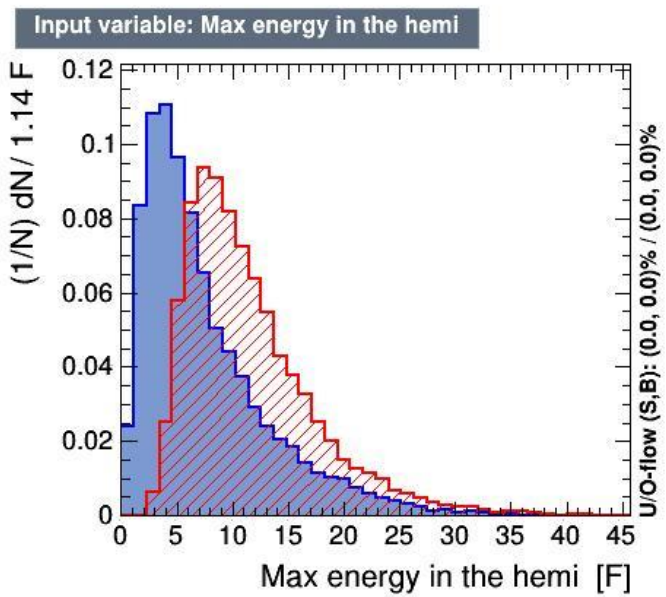




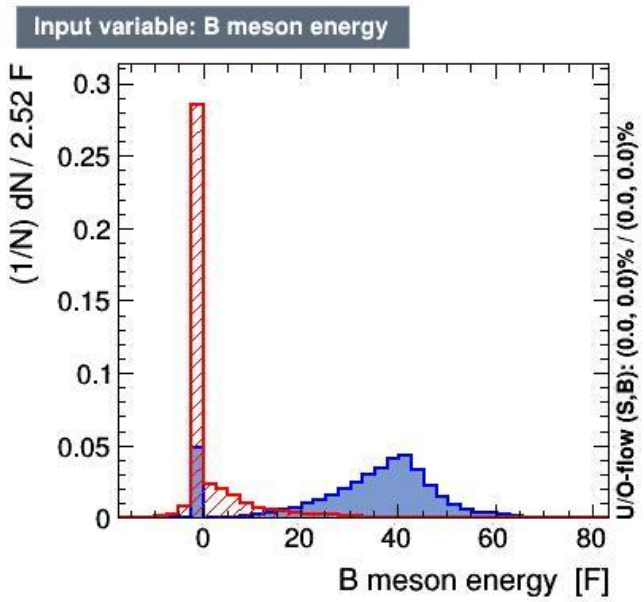


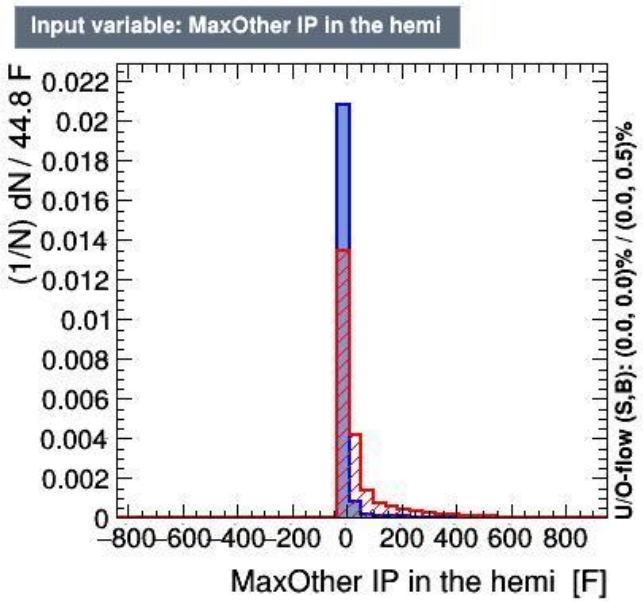


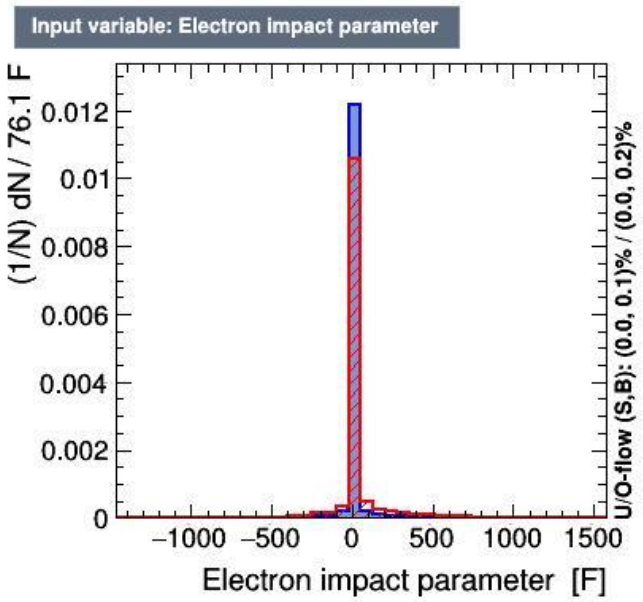


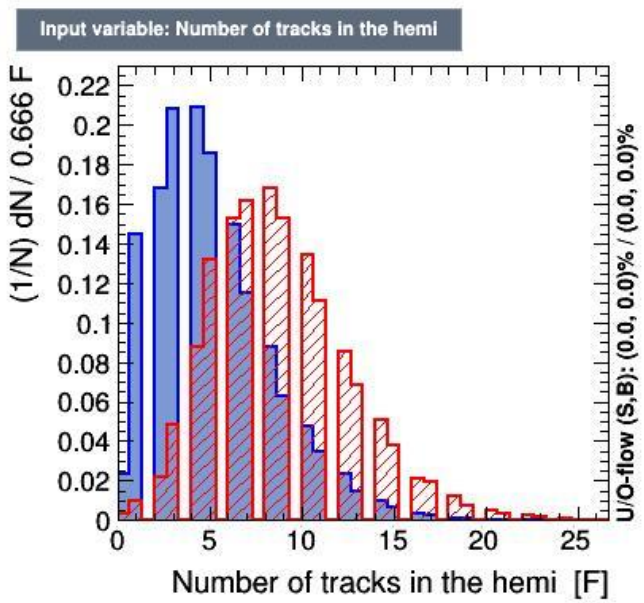


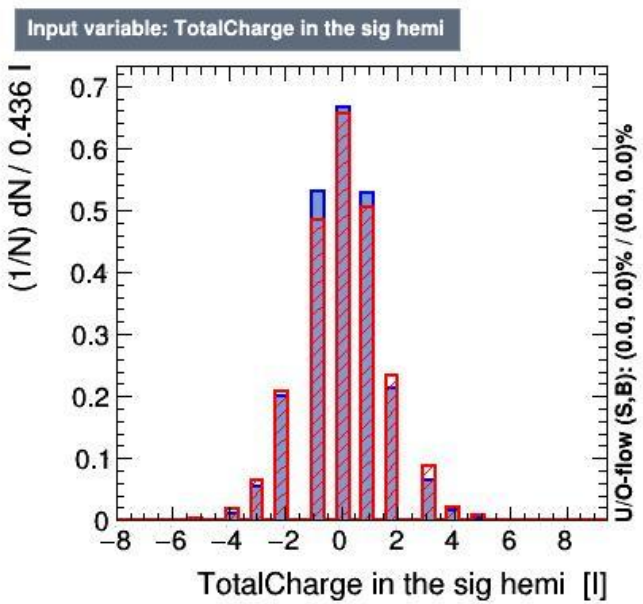
Value distribution ($B_c^+ \to \tau^+ \nu_\tau$ & $Z \to qq$)

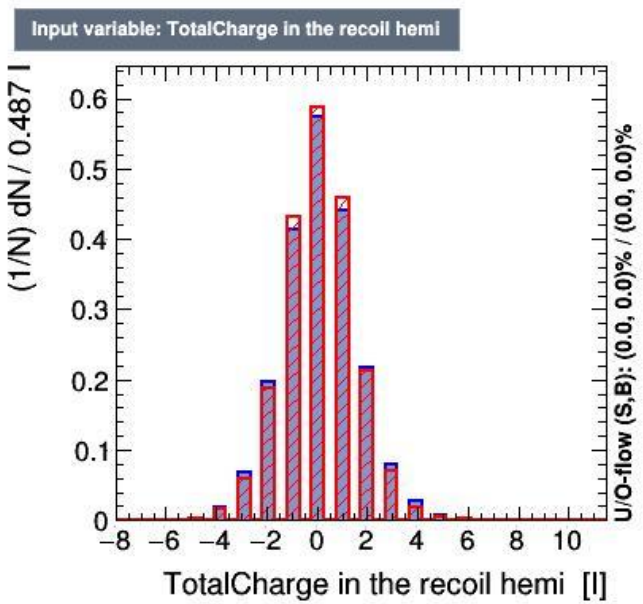




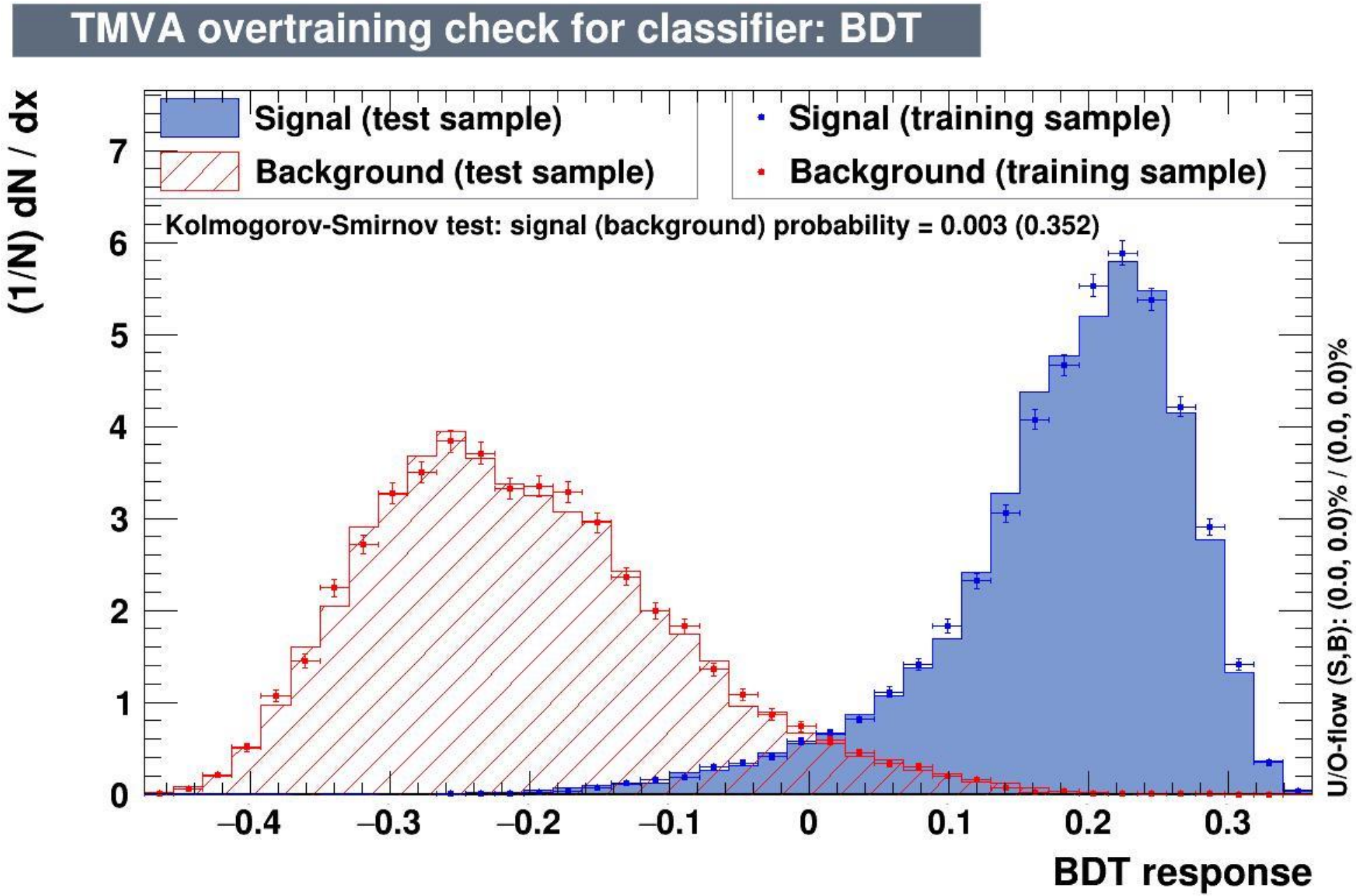




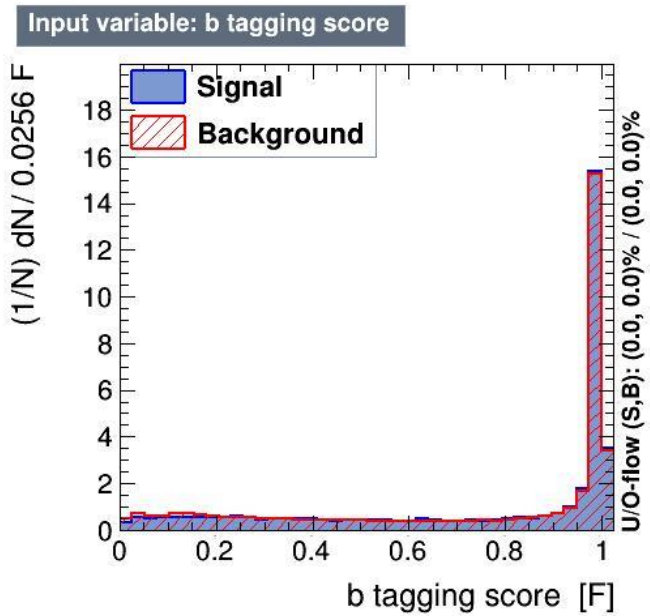


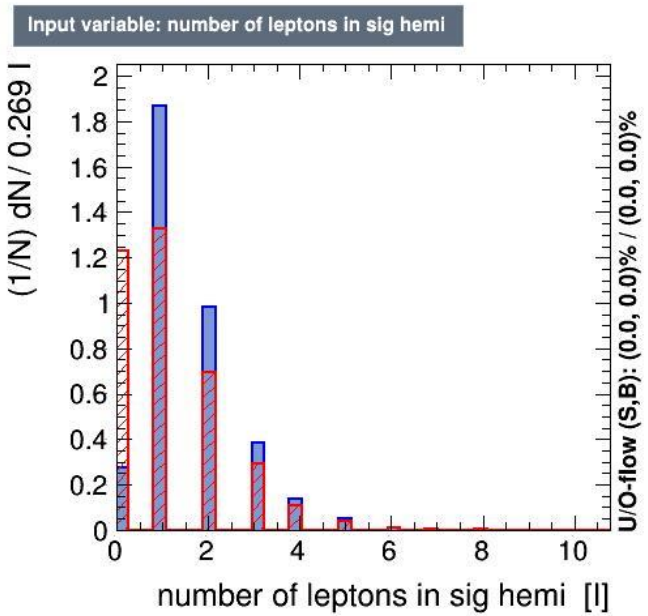


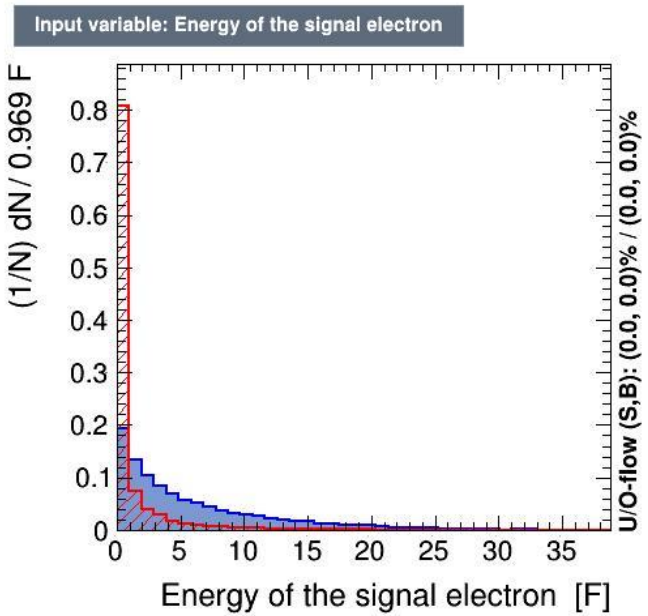
BDT training result ($B_c^+ \to \tau^+ \nu_\tau$ &$Z \to qq$)

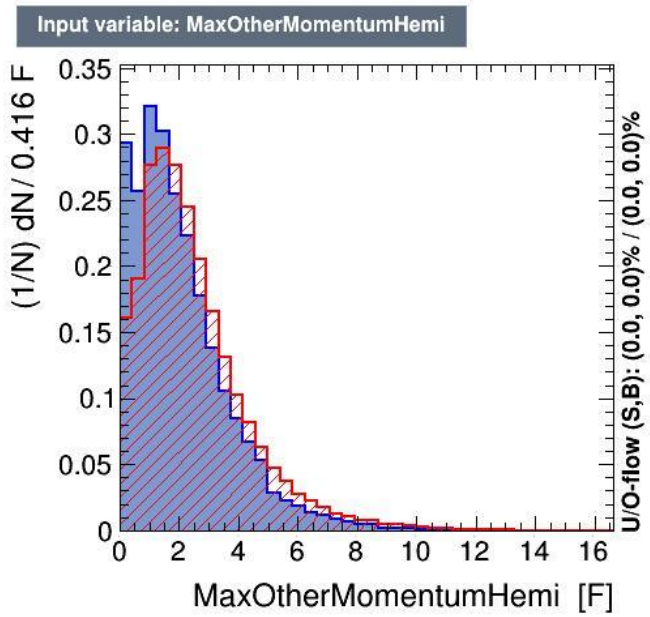


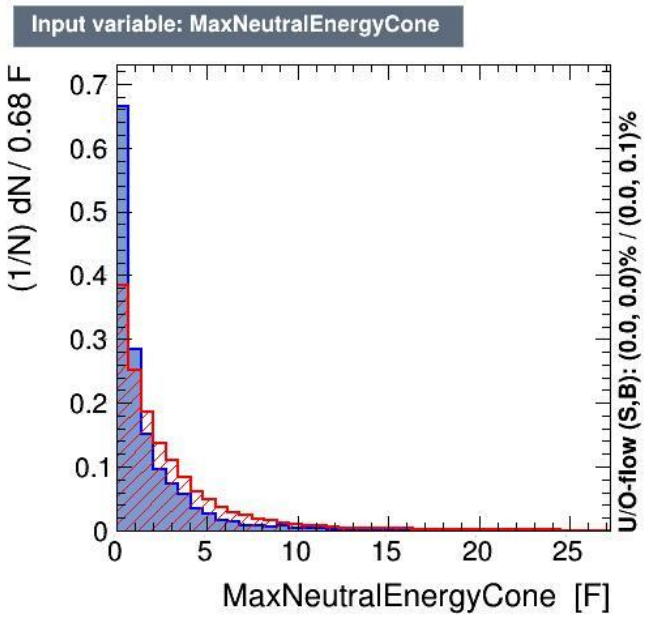
Value distribution ($B_c^+ \to \tau^+\nu_\tau$ & $B^+ \to \tau^+\nu_\tau$)

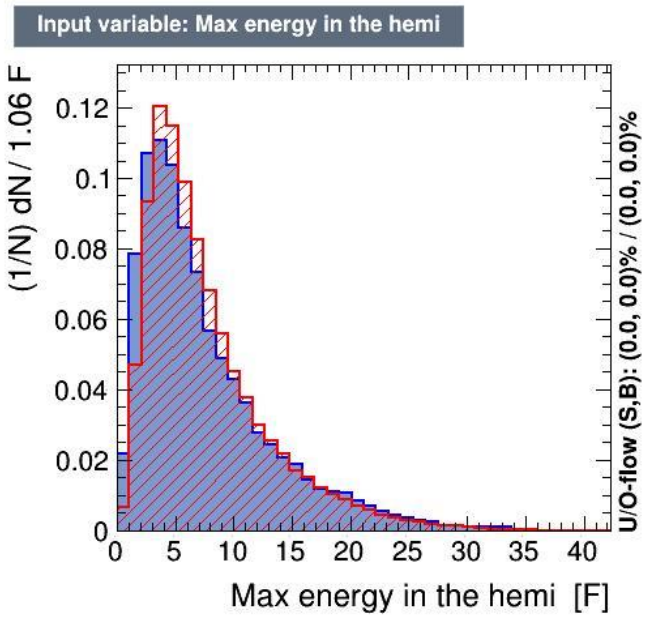




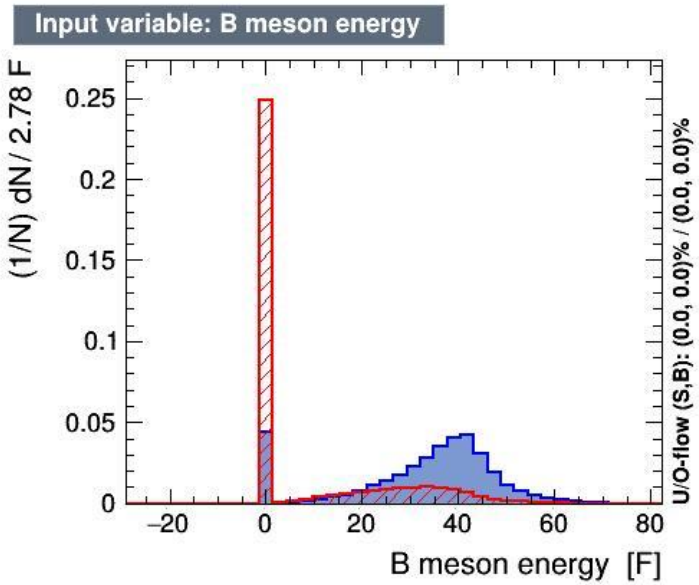


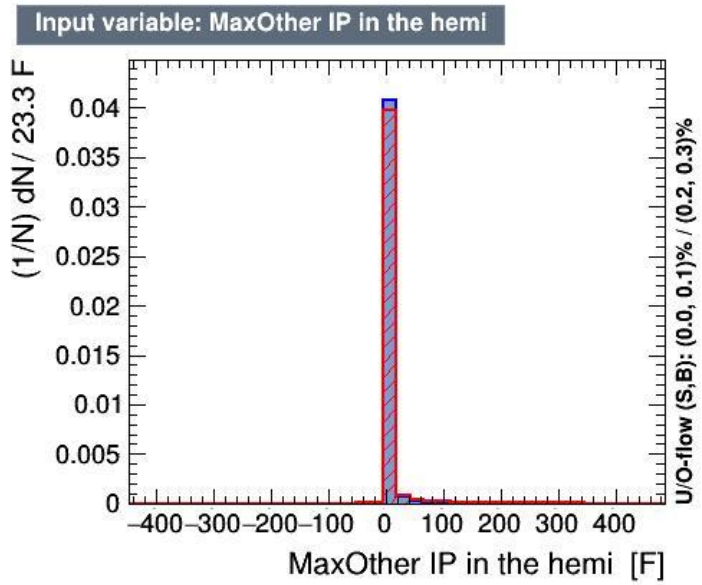


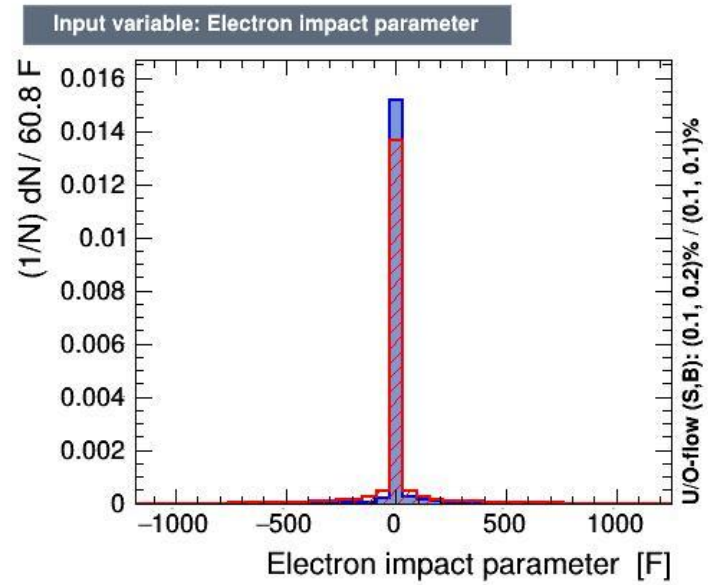


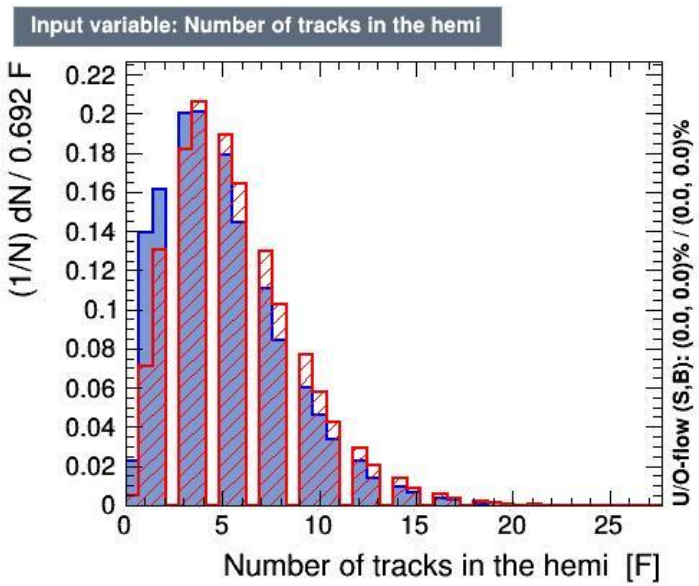


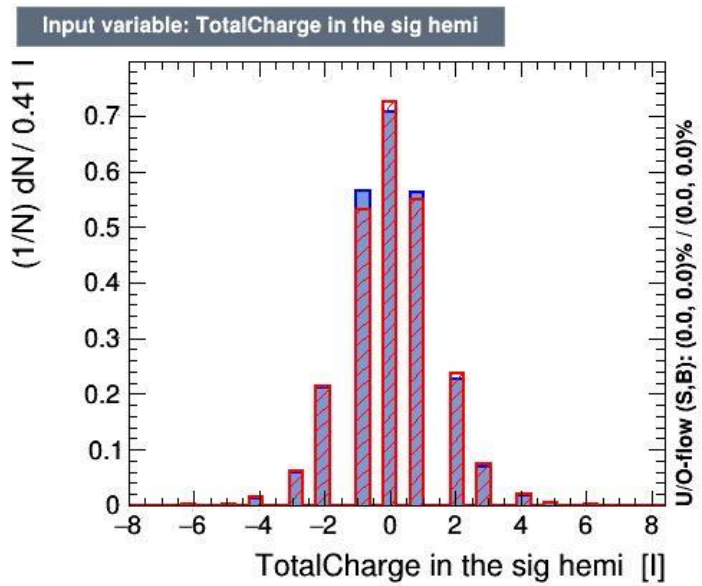
Value distribution ($B_c^+ \to \tau^+\nu_\tau$ & $B^+ \to \tau^+\nu_\tau$)

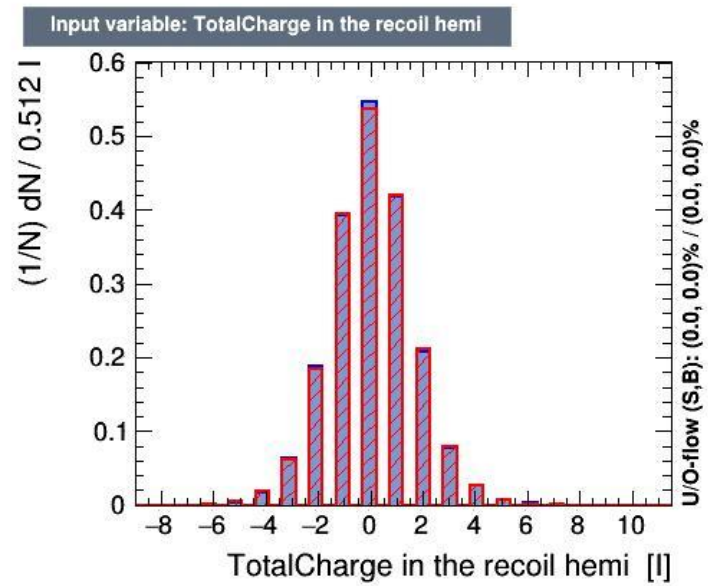




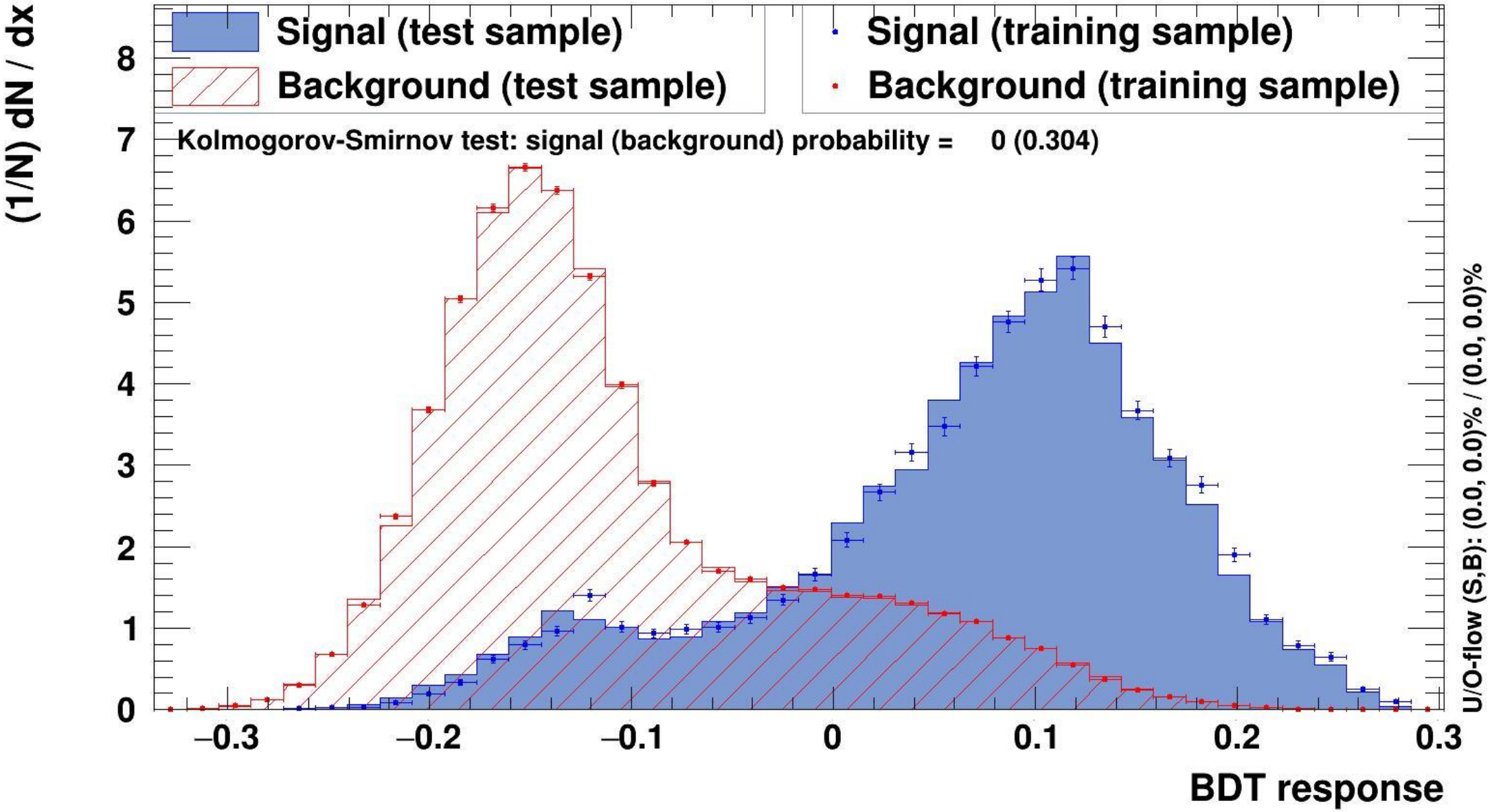






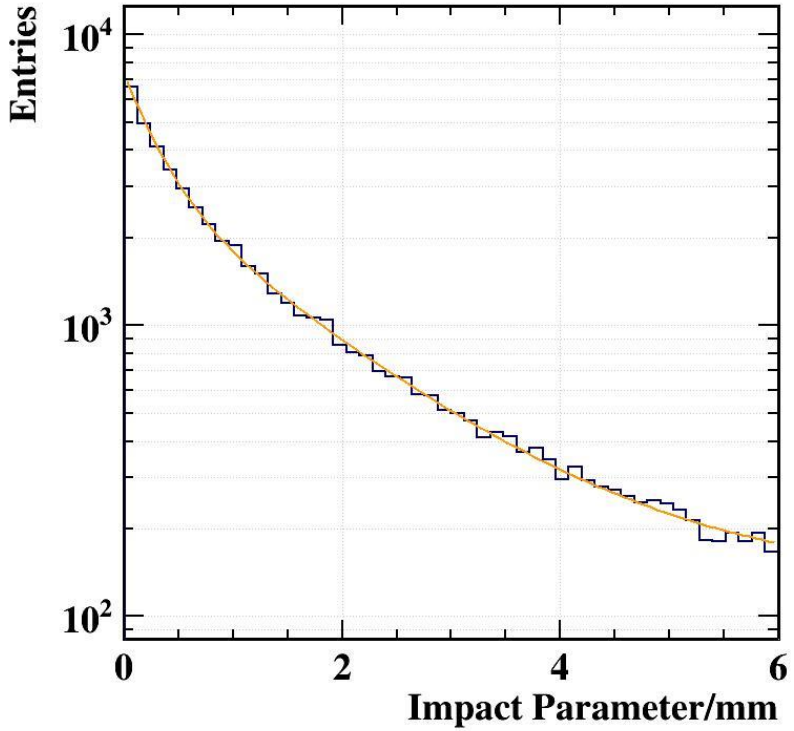


BDT training result ($B_c^+ \to \tau^+\nu_\tau$ & $B^+ \to \tau^+\nu_\tau$)



Fitting the impact parameter of electron in the signal hemisphere ($B_c^+ \to \tau^+\nu_\tau$ & $B^+ \to \tau^+\nu_\tau$)

- Only in for those events where τ decay into electron
- 35k $B_c^+ \to \tau^+\nu_\tau$ & 39.6k $B^+ \to \tau^+\nu_\tau$
- Fit the impact parameter with $C_1 \cdot e^{E_1 x} + C_2 \cdot e^{E_2 x} + C$



NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	C1	3.02217e+03	1.50640e+02	1.11793e-01	3.34450e-06
2	E1	-6.92572e-01	2.79298e-02	-1.13047e-05	5.93410e-03
3	C2	4.19363e+03	1.41546e+02	-2.07255e-03	-1.18038e-06
4	E2	-3.30417e+00	2.24250e-01	-7.83499e-05	3.77231e-03
5	C	1.30830e+02	1.03373e+01	7.68734e-04	-2.10790e-05