Selection	CompHEP	PYTHIA	CompHEP / PYTHIA
4 b-quarks with $p_T > 15\ GeV/c$; $\|\eta\| < 2.5$	26300 events $\sigma = 878\ fb$	25600 events $\sigma = 855\ fb$	1.03
ΔR(b,b) > 0.5 b-quarks not from top decay	15400 events 58% of prev. step	14300 events 56% of prev. step	1.07
one isolated lepton with $p_T > 10\ GeV/c$	13100 events 85% of prev. step	11800 events 82% of prev. step	1.12
calculation of $p_z(\nu)$ no missing E_T cut	10000 events 77% of prev. step	9600 events 82% of prev. step	1.05
at least six jets with $E_T > 10\ GeV$; $\|\eta\| < 2.5$	4900 events 48% of prev. step	7700 events 80% of prev. step	0.63

Table 1: CompHEP (ISR and FSR switched off) PYTHIA (default) comparison of $t\bar{t}b\bar{b}$ background for an integrated luminosity $L_{int} = 30\ fb^{-1}$ and PDF: CTEQ4L

Selection	CompHEP	PYTHIA	CompHEP / PYTHIA
4 b-quarks with $p_T > 15\ GeV/c$; $\|\eta\| < 2.5$	26900 events $\sigma = 897\ fb$	25600 events $\sigma = 855\ fb$	1.05
ΔR(b,b) > 0.5 b-quarks not from top decay	15800 events 59% of prev. step	14300 events 56% of prev. step	1.10
one isolated lepton with $p_T > 10\ GeV/c$	13100 events 83% of prev. step	11800 events 82% of prev. step	1.11
calculation of $p_z(\nu)$ no missing E_T cut	10200 events 78% of prev. step	9600 events 82% of prev. step	1.06
at least six jets with $E_T > 10\ GeV$; $\|\eta\| < 2.5$	7400 events 73% of prev. step	7700 events 80% of prev. step	0.97

Table 2: CompHEP (ISR and FSR included) PYTHIA (default) comparison of $t\bar{t}b\bar{b}$ background for an integrated luminosity $L_{int} = 30\ fb^{-1}$ and PDF: CTEQ4L

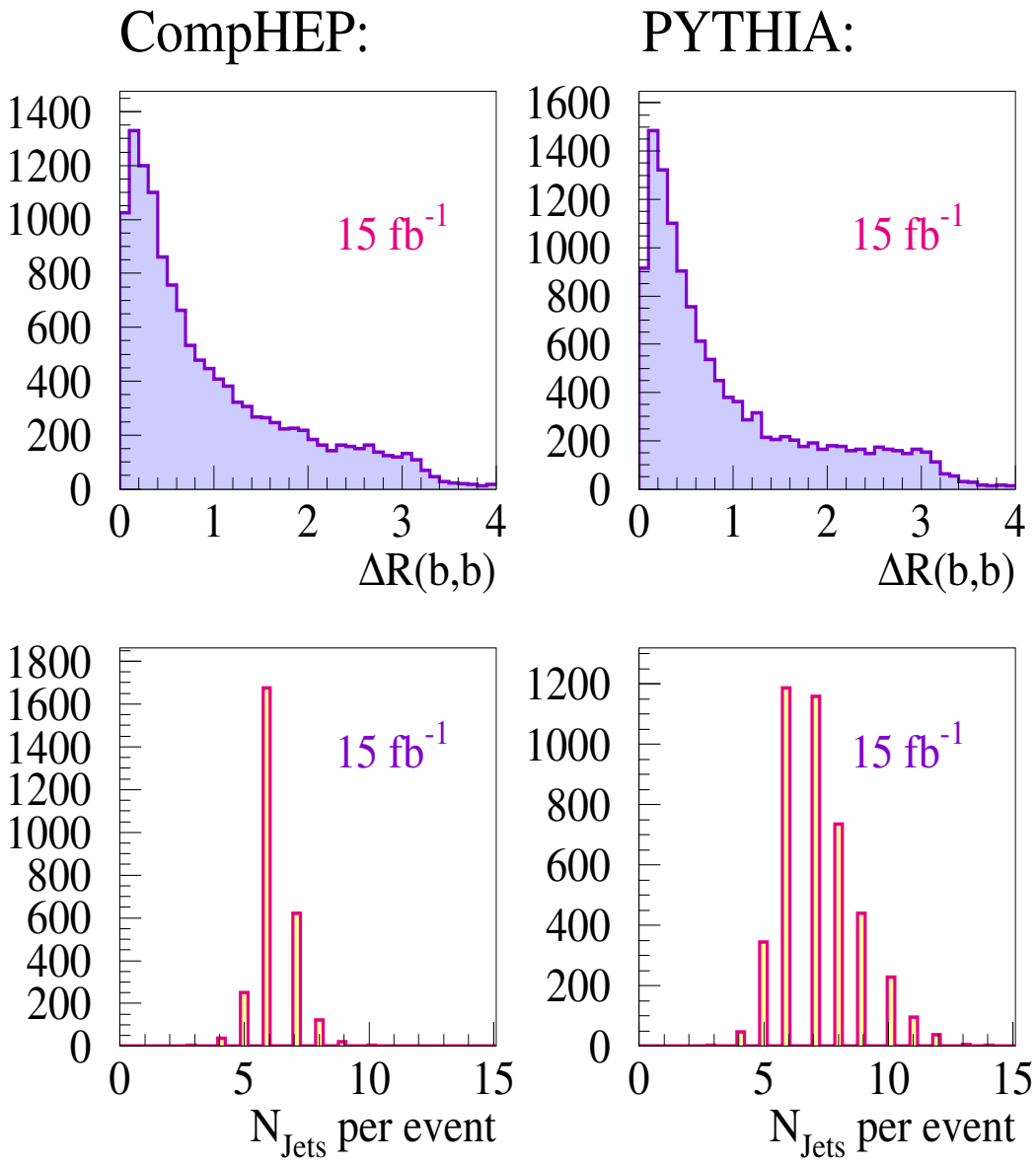

Fig. 1: CompHEP (ISR and FSR switched off) PYTHIA (default) comparison of $t\bar{t}b\bar{b}$ background for an integrated luminosity $L_{int} = 15\ fb^{-1}$

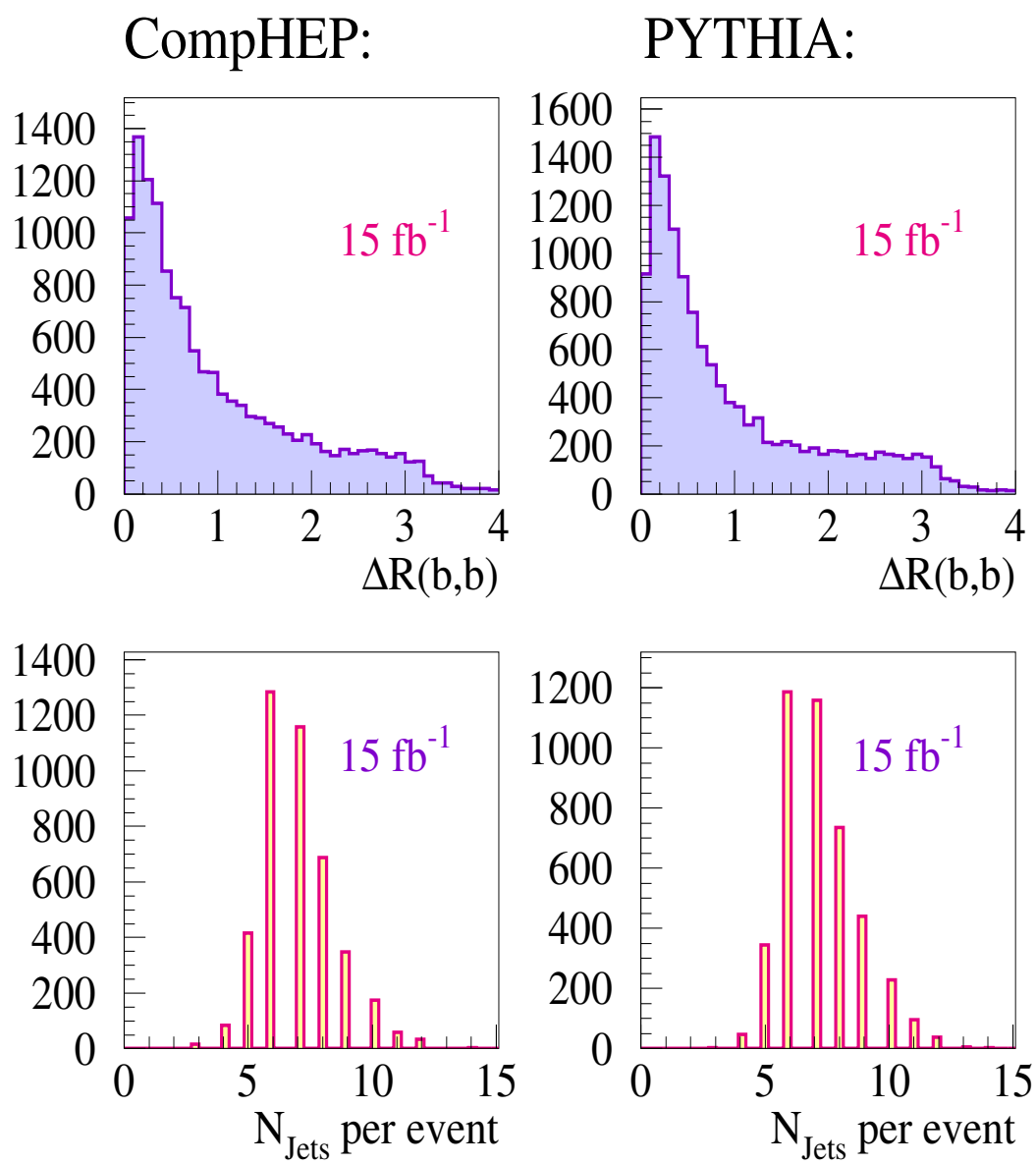

Fig. 2: CompHEP (ISR and FSR included) PYTHIA (default) comparison of $t\bar{t}b\bar{b}$ background for an integrated luminosity $L_{int} = 15\ fb^{-1}$

p_T Cuts	CompHEP	PYTHIA	CompHEP / PYTHIA
$p_T(b_{glu}) > 15\ GeV/c$	$\sigma = 3064\ fb$	$\sigma = 2927\ fb$	1.05
$p_T(b_{glu}) > 30\ GeV/c$	$\sigma = 1585\ fb$	$\sigma = 1189\ fb$	1.33
$p_T(b_{glu}) > 50\ GeV/c$	$\sigma = 792\ fb$	$\sigma = 431\ fb$	1.84
$p_T(b_{glu}) > 100\ GeV/c$	$\sigma = 205\ fb$	$\sigma = 53\ fb$	3.83
$p_T(b_{glu}) > 200\ GeV/c$	$\sigma = 24\ fb$	$\sigma = 2\ fb$	15.2
$p_T(b_{glu}) > 300\ GeV/c$	$\sigma = 5\ fb$	$\sigma = 0\ fb$	—-

Table 3: CompHEP (ISR and FSR included) PYTHIA (default) comparison of $t\bar{t}b\bar{b}$ background: the cross sections do not include any branching fractions (all decays are allowed). All four b-quarks are required to be within $|\eta| < 2.5$ and additional the b-quarks of the top decays have to satisfy $p_T(b_{top}) > 15\ GeV/c$. The $p_T(b_{glu})$ cut for both b-quarks not coming from the top decay is varied.

$\|\eta\|$ cuts for bs $*$ qs from $W^{\pm}$	$\|\eta_b\| < 2.4 * \|\eta_q\| < 2.4$	$\|\eta_b\| < 2.0 * \|\eta_q\| < 2.0$
$p_T^{(b,q)} > 15\ GeV/c$ (89.7%)	72.6% $*$ 90.3%	59.0% $*$ 83.4%
$p_T^{(b,q)} > 20\ GeV/c$ (87.2%)	72.8% $*$ 90.2%	59.1% $*$ 83.3%
$p_T^{(b,q)} > 25\ GeV/c$ (83.5%)	72.8% $*$ 90.1%	59.1% $*$ 83.2%

Table 4: Event acceptances for $pp \rightarrow H^0 t\bar{t} \rightarrow b\bar{b}b\bar{b}WW \rightarrow b\bar{b}b\bar{b}q\bar{q}l\nu$ as a function of quark p_T and $|\eta|$ of quarks. The acceptances of the p_T cut of the quarks include the lepton preselection ($p_T > 10\ GeV/c$, $|\eta| < 2.4$), no missing E_T selection. Assumed $m_{H^0} = 120\ GeV/c^2$.

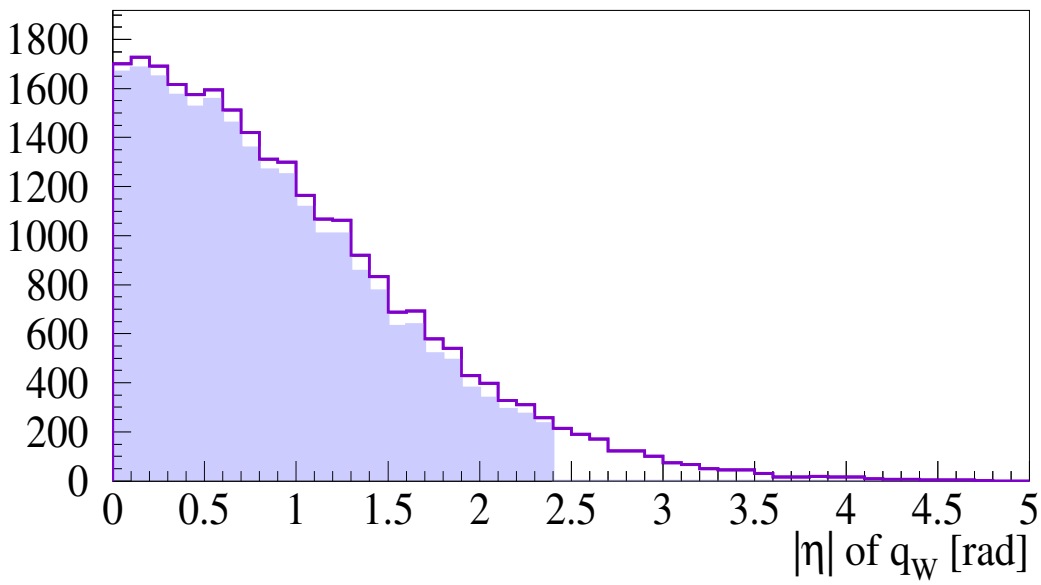

Fig. 3: Simulation for $m_{H^0} = 120\ GeV/c^2$; lepton selection: $p_T > 10\ GeV/c$, $|\eta| < 2.4$; quark selection: $p_T^{(b,q)} > 15\ GeV/c$ and $|\eta_b| < 2.4$; without (line dark) and with (full bright) $|\eta_q| < 2.4$ cut.