Top-Yukawa coupling measurement

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New point

We have decided to use tbW event generator instead of tt in order to estimate background more realistically.

tbW generator includes tt event.

e+e- ->tt->bWbW   e+e- ->tbW->bWbW

89 fb   12 fb

tt generator
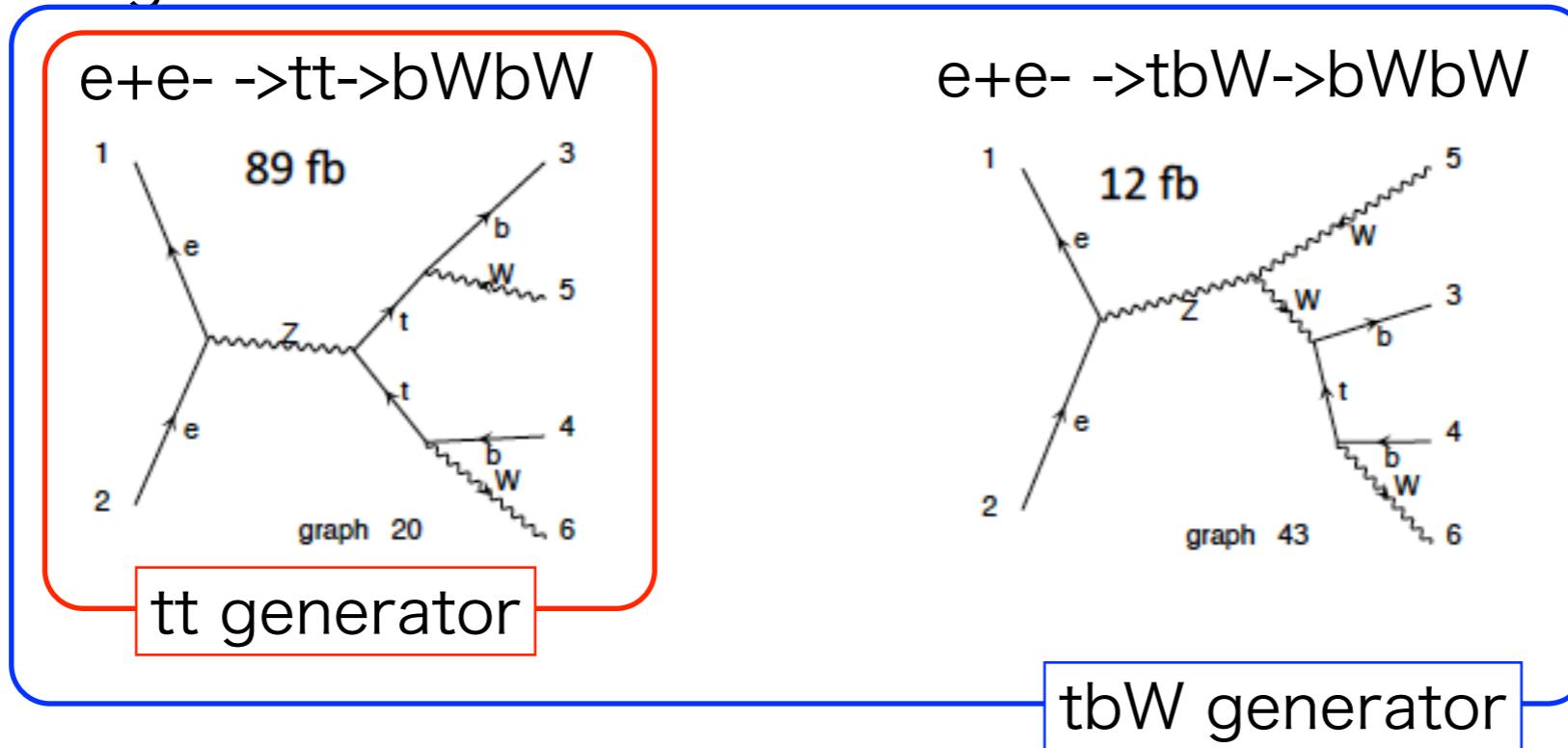
tbW generator

We have made tbW event generator, and produce 4419286 with electron-polarization(-1) and 4575641 with electron-polarization (+1) so far.

cut optimization

Cut value at IWLC 2010

Cut values

the following values were chosen to yield opt

6-Jet + lepton

\# of isolated lepton = 1

$Y_{5\rightarrow4}$ = 0.005

thrust > 0.85

b-tagging (at least 4 b-jet)

140 GeV < top mass < 205 GeV

90 GeV < higgs mass < 150 GeV

Significance become little bit higher with thrust > 0.75

$\longrightarrow$ thrust > 0.75 is better

The other cuts are not needed to be changed.

Comparison of new analysis with previous one

Cut flow (**6Jet + lepton**, lumi. = 1 ab^{-1}, unpolarized beams)

Blue numbers show new results

Cut	ttH(6J+L)	ttH (8J, 4J+2L)	tt tbW	ttZ	ttg* (g* -> bb)	significance
no cut	167	212	514076 583234	1340	697	0.25 0.22
Single isolated lepton	106.1	28.6	180112 204006	441	242	0.25 0.23
thrust < 0.85 thrust < 0.75	104 77.4	27.2 19.7	147518 67328	423 308	225 140	0.27 0.30
Y$_{5\to4}$ > 0.005	86.1 49.8	17.4 9.6	10407 1340	264 143	84.8 30.3	0.82 1.23
4×b-tagging	33.9 26.3	2.9 2.2	137 70.2	34.2 27.7	28.3 21.1	2.21 2.17
mass cut	28.5 22.2	1.0 0.9	27.4 10.7	23.6 19.6	11.3 8.5	2.97 2.83

H -> bb (68%) Z->bb (15%)
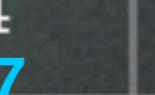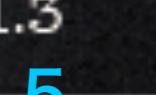
beam polarized case (e-,e+)=(-0.8,+0.3)

Cut	ttH		tbW	ttZ	ttg* (g*->bb)	significance
	(L+6J)	(2L+4J, 8J)				
No cut	282	358	979571	2407	1160	0.28
Single isolated lepton	180	49.0	339868	790	398	0.31
thrust < 0.75	131	33.9	106357	552	228	0.40
$Y_{5->4} > 0.005$	84.4	16.3	2252	255	48.4	1.64
4×b-tagging	44.3	3.8	110	48.6	33.6	2.86
mass cut	37.5	1.5	17.1	34.7	13.8	3.67

※ previous result
significance = 3.87

Next step

- combine with 8jet mode results
- estimate measurement accuracy of top-Yukawa coupling
- modify the paper