

1. Soft drop method in future collider performance

In this section, we use the specific method about the soft-drop to study the performance of the detector in the different cell sizes. In the Figure , , , , are the distribution of the signal and background.

1.1. Analysis method

In this analysis, We fix the central at the median in signal distribution, and we use the different width to open the window to draw ROC curves.

1.2. The conclusion of the results

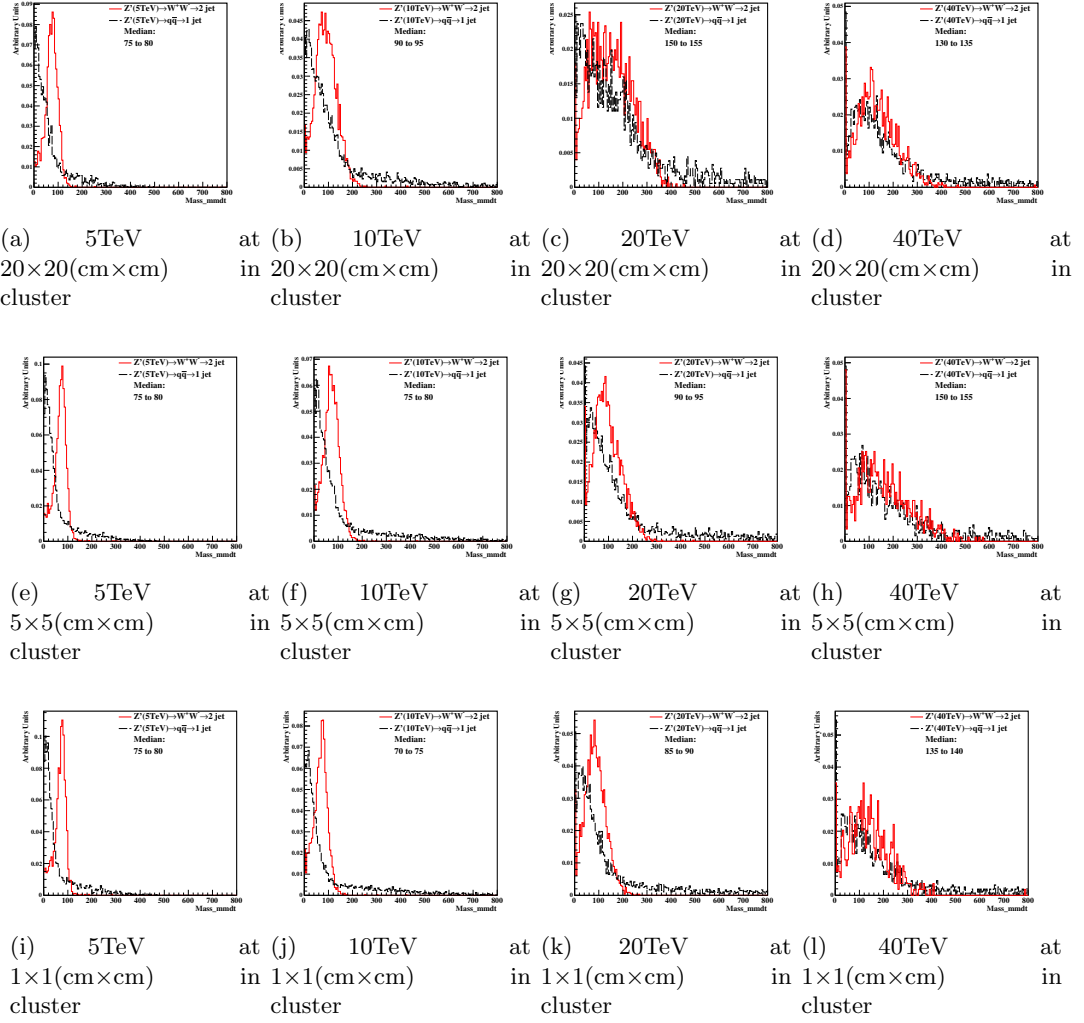
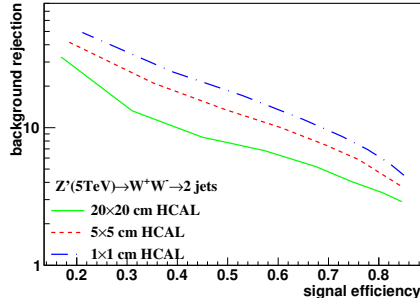
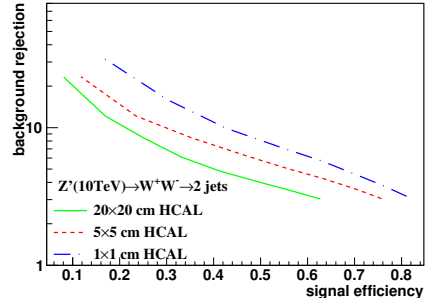


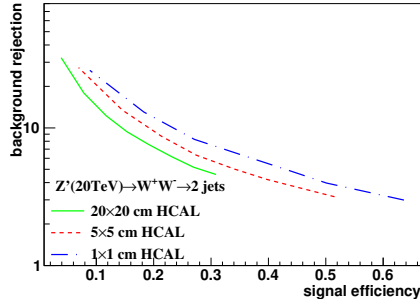
Figure 1: Distributions of mass soft drop at $\beta=0$, signal=ww, in 5,10TeV energy of collision in different detector sizes. Cell Size in 20×20, 5×5, and 1×1(cm×cm) are shown here.



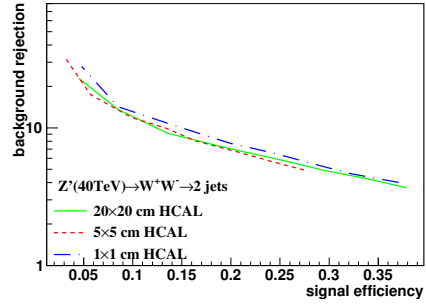
(a) Central at Median($20 \times 20 = 80, 5 \times 5 = 80, 1 \times 1 = 80$) change width in cluster at 5TeV



(b) Central at Median($20 \times 20 = 95, 5 \times 5 = 80, 1 \times 1 = 75$) change width in cluster at 10TeV



(c) Central at Median($20 \times 20 = 155, 5 \times 5 = 95, 1 \times 1 = 90$) change width in cluster at 20TeV



(d) Central at Median($20 \times 20 = 130, 5 \times 5 = 150, 1 \times 1 = 135$) change width in cluster at 40TeV

Figure 2: study of "fix central and change width" in mass soft drop at $\beta=0$, signal=ww, in 5, 10, 20, 40TeV energy of collision in different detector sizes. Cell Size in 20×20 , 5×5 , and 1×1 (cm \times cm) are shown in each picture.

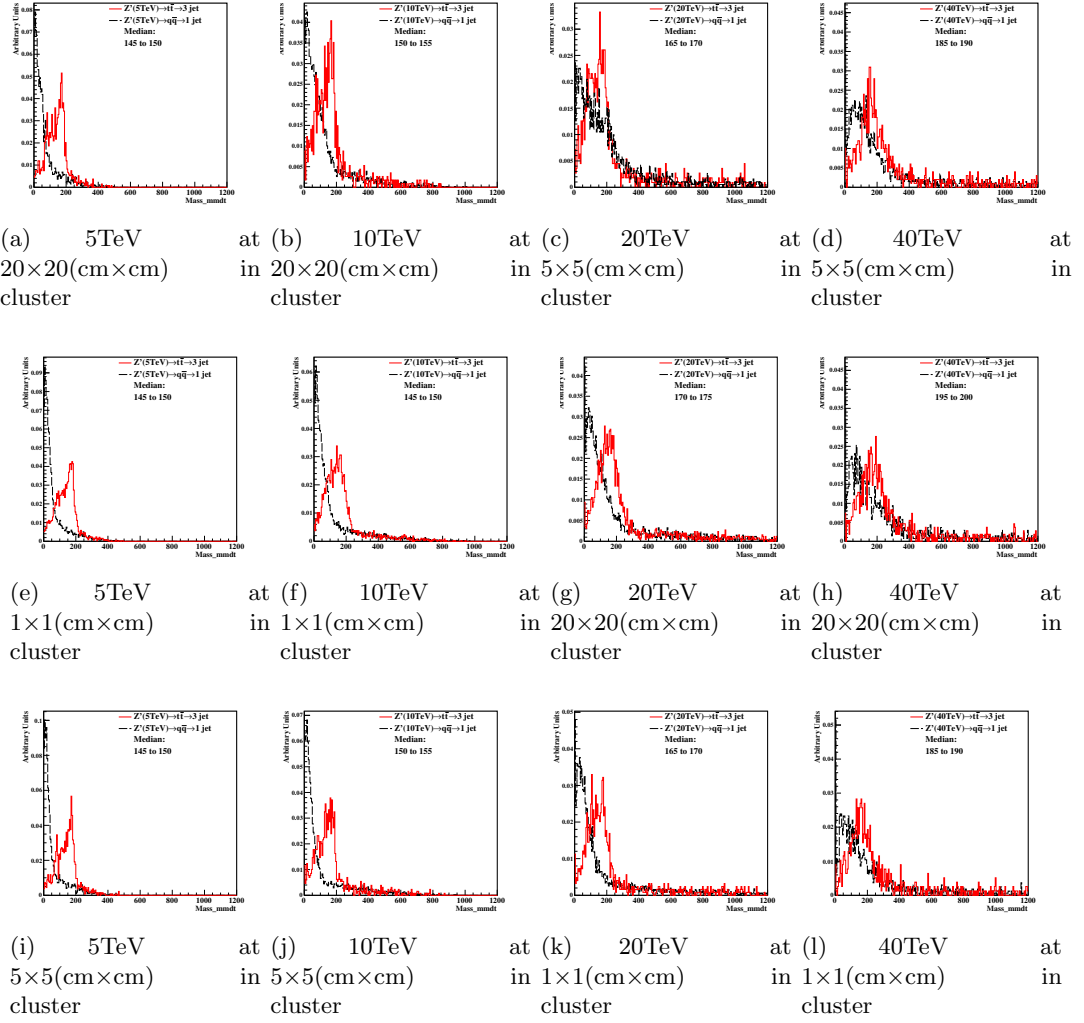
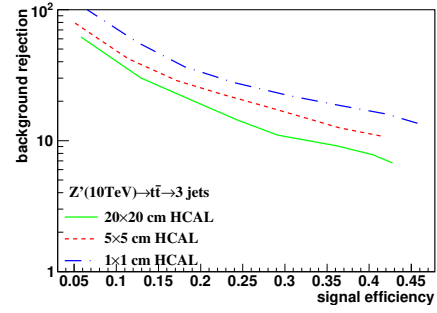
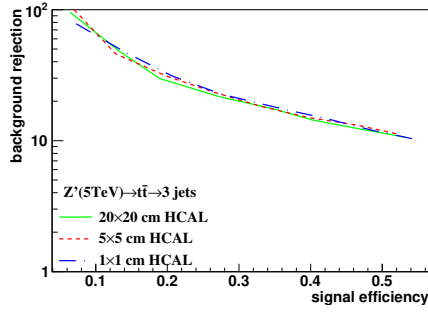
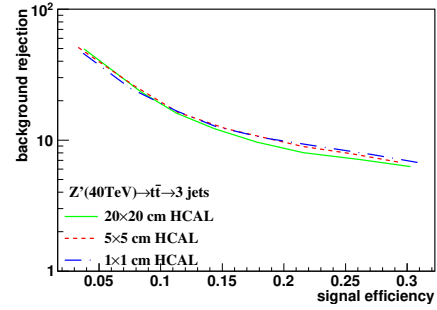
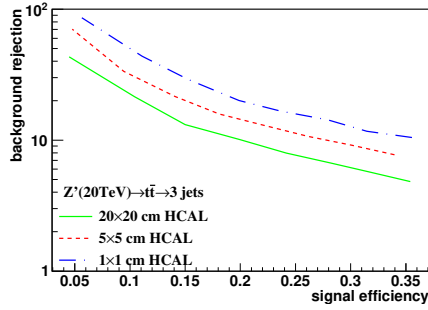


Figure 3: Distributions of mass soft drop at $\beta=0$, signal= tt , in 5,10TeV energy of collision in different detector sizes. Cell Size in 20x20, 5x5, and 1x1 (cm x cm) are shown here.



(a) Central at Median($20 \times 20=150, 5 \times 5=150, 1 \times 1=150$) change width in cluster at 5TeV

(b) Central at Median($20 \times 20=155, 5 \times 5=150, 1 \times 1=155$) change width in cluster at 10TeV



(c) Central at Median($20 \times 20=165, 5 \times 5=175, 1 \times 1=170$) change width in cluster at 20TeV

(d) Central at Median($20 \times 20=190, 5 \times 5=200, 1 \times 1=190$) change width in cluster at 40TeV

Figure 4: study of "fix central and change width" in mass soft drop at $\beta=0$, signal= $t\bar{t}$, in 5, 10, 20, 40TeV energy of collision in different detector sizes. Cell Size in 20×20 , 5×5 , and 1×1 (cm \times cm) are shown in each picture.

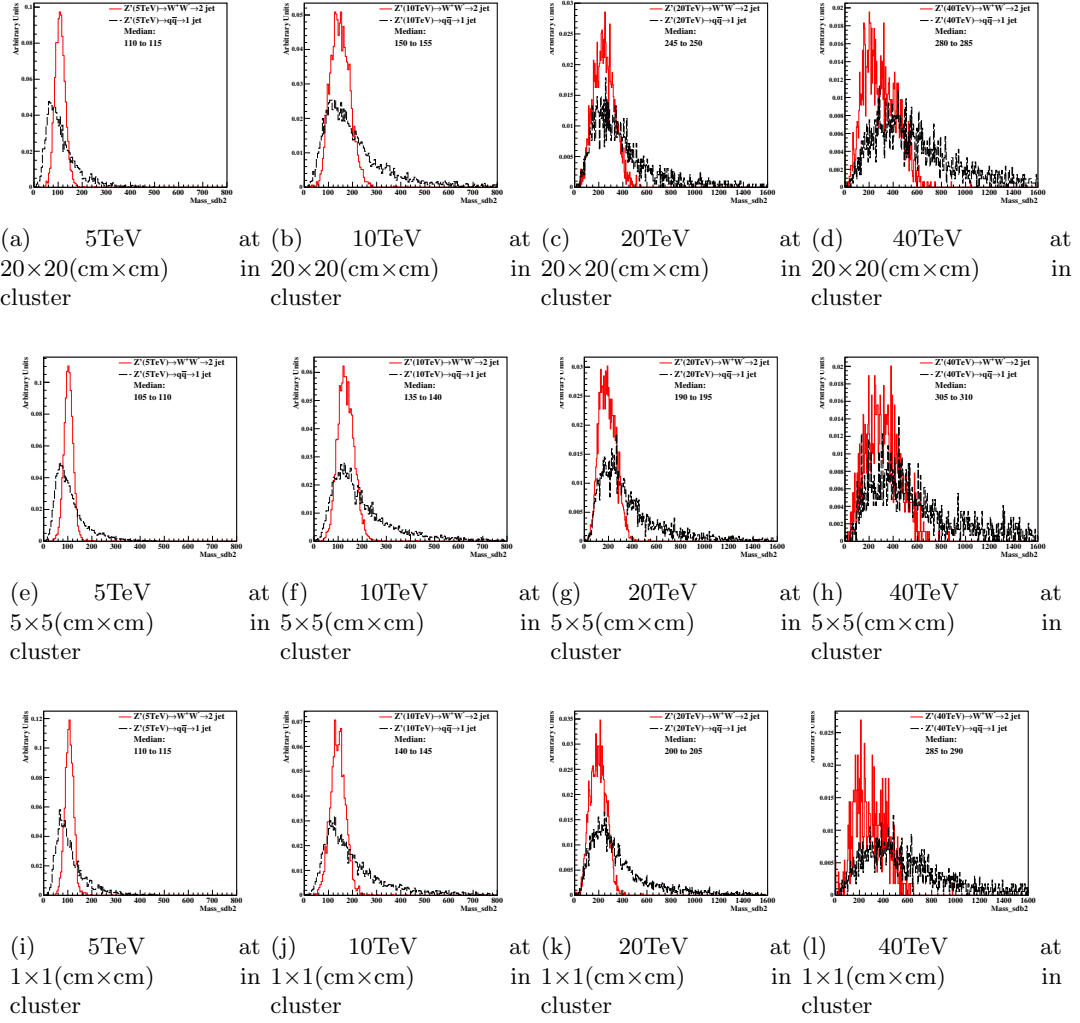
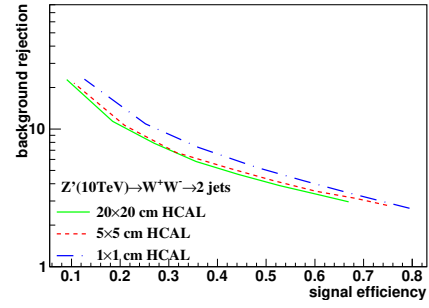
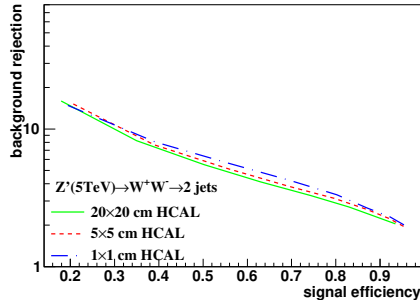
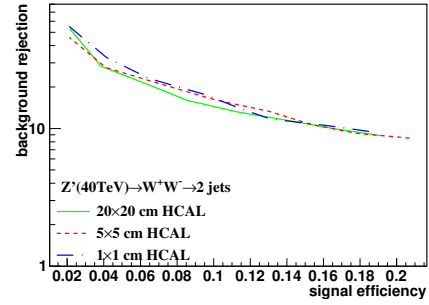
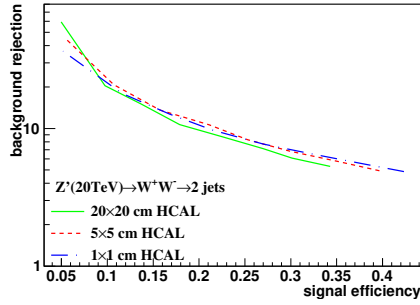


Figure 5: Distributions of mass soft drop at $\beta=2$, signal=ww, in 5,10TeV energy of collision in different detector sizes. Cell Size in 20x20, 5x5, and 1x1(cm \times cm) are shown here.



(a) Central at Median($20 \times 20=115,5 \times 5=110,1 \times 1=115$) change width in cluster at 5TeV (b) Central at Median($20 \times 20=155,5 \times 5=140,1 \times 1=145$) change width in cluster at 10TeV



(c) Central at Median($20 \times 20=250,5 \times 5=195,1 \times 1=205$) change width in cluster at 20TeV (d) Central at Median($20 \times 20=285,5 \times 5=310,1 \times 1=290$) change width in cluster at 40TeV

Figure 6: study of "fix central and change width" in mass soft drop at $\beta=2$, signal=ww, in 5, 10, 20, 40TeV energy of collision in different detector sizes. Cell Size in 20×20 , 5×5 , and 1×1 (cm \times cm) are shown in each picture.

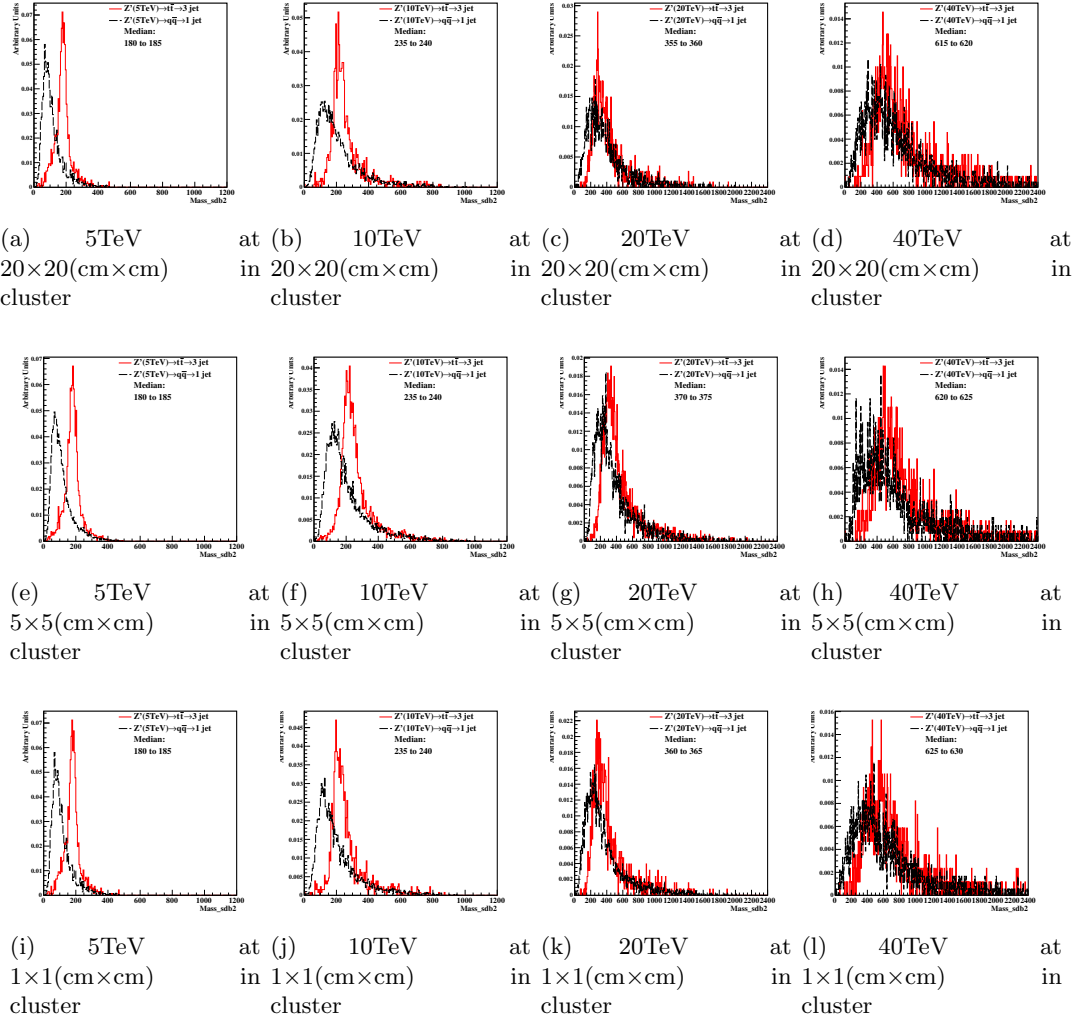
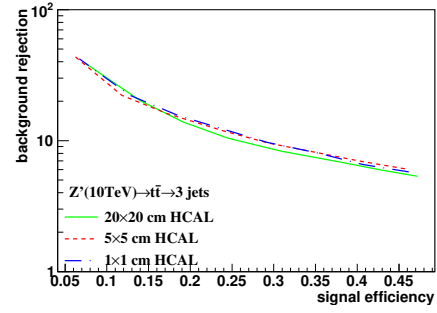
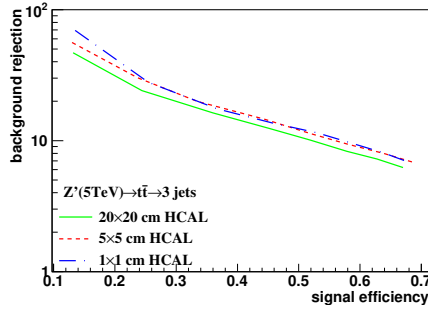
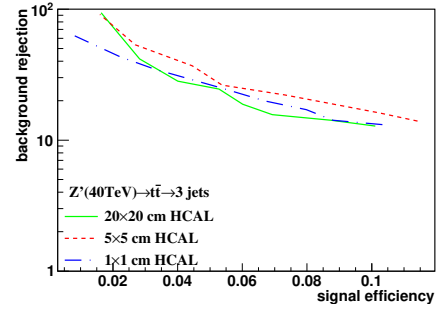
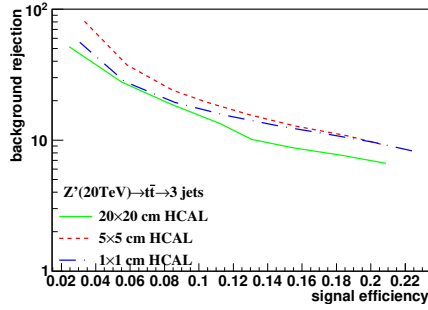


Figure 7: Distributions of mass soft drop at $\beta=2$, signal= tt , in 5,10TeV energy of collision in different detector sizes. Cell Size in 20×20, 5×5, and 1×1(cm×cm) are shown here.



(a) Central at Median($20 \times 20=185,5 \times 5=185,1 \times 1=185$) change width in cluster at 5TeV (b) Central at Median($20 \times 20=240,5 \times 5=240,1 \times 1=240$) change width in cluster at 10TeV



(c) Central at Median($20 \times 20=360,5 \times 5=375,1 \times 1=365$) change width in cluster at 20TeV (d) Central at Median($20 \times 20=620,5 \times 5=625,1 \times 1=630$) change width in cluster at 40TeV

Figure 8: study of "fix central and change width" in mass soft drop at $\beta=2$, signal= tt , in 5, 10, 20, 40TeV energy of collision in different detector sizes. Cell Size in 20×20 , 5×5 , and 1×1 (cm \times cm) are shown in each picture.