

1. Studies of signal and background separation using Mann-Whitney U test and some new methods

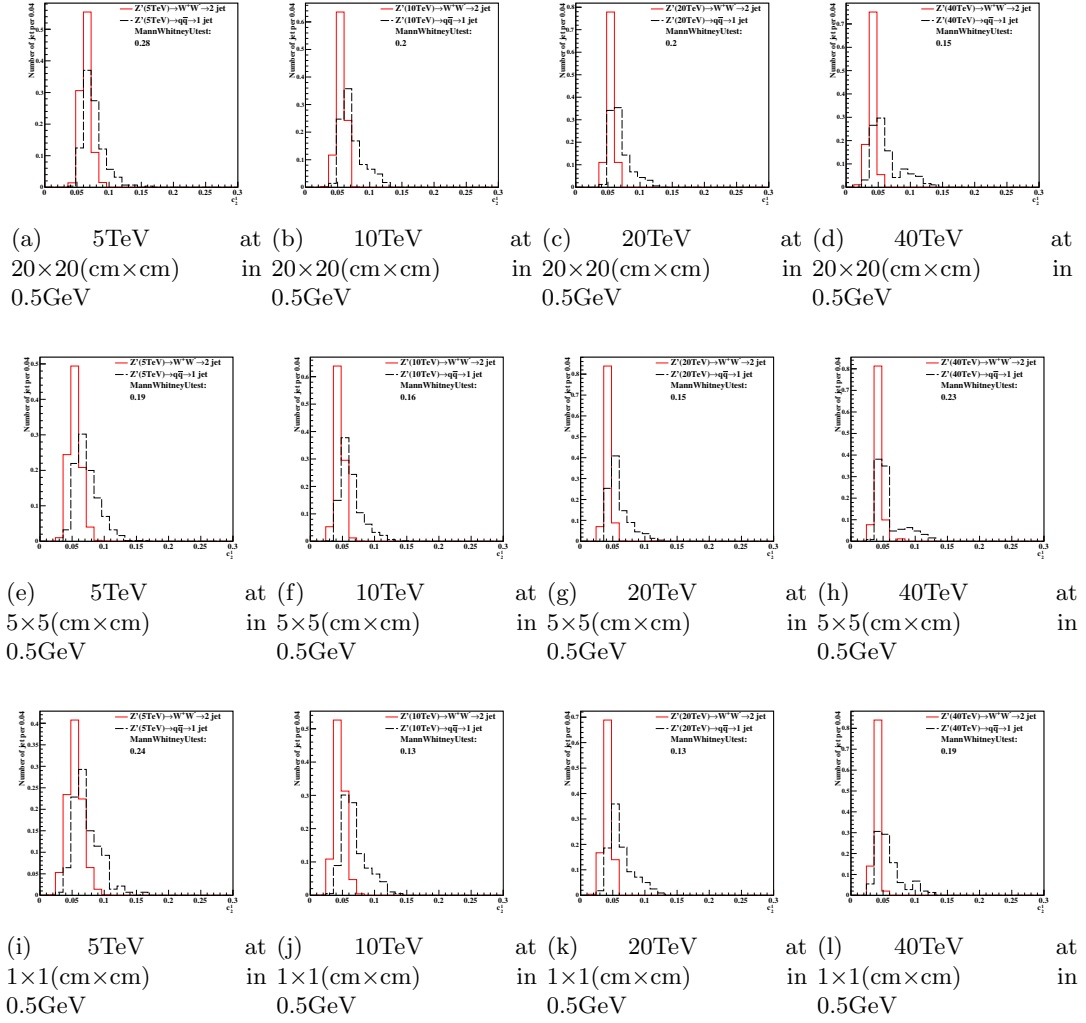
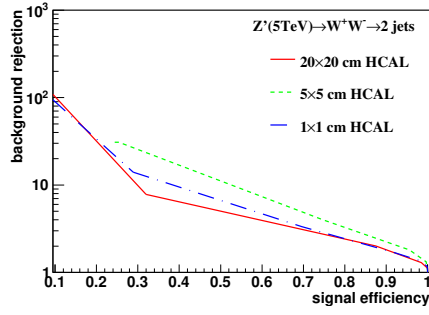
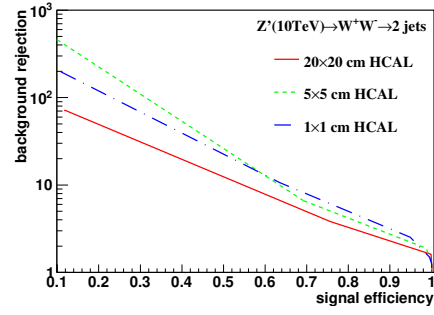


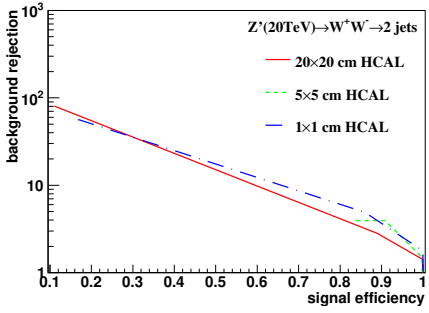
Figure 1: Distributions of Mann-Whitney value U in 5, 10, 20, 40TeV energy collision for c2b1 in different detector sizes. Cell Size in 20×20 , 5×5 , and $1 \times 1(\text{cm} \times \text{cm})$ are shown here.



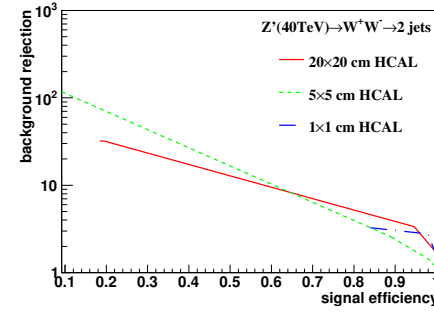
(a) 5 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(b) 10 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(c) 20 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(d) 40 TeV using Rawhit 0.5GeV cut method with New2 after cut Method

Figure 2: Signal efficiency versus background rejection rate using c2b1. The energies of collision at (a)5, (b)10, (c)20, (d)40TeV are shown here. In each picture, the three ROC curves correspond to different detector sizes.

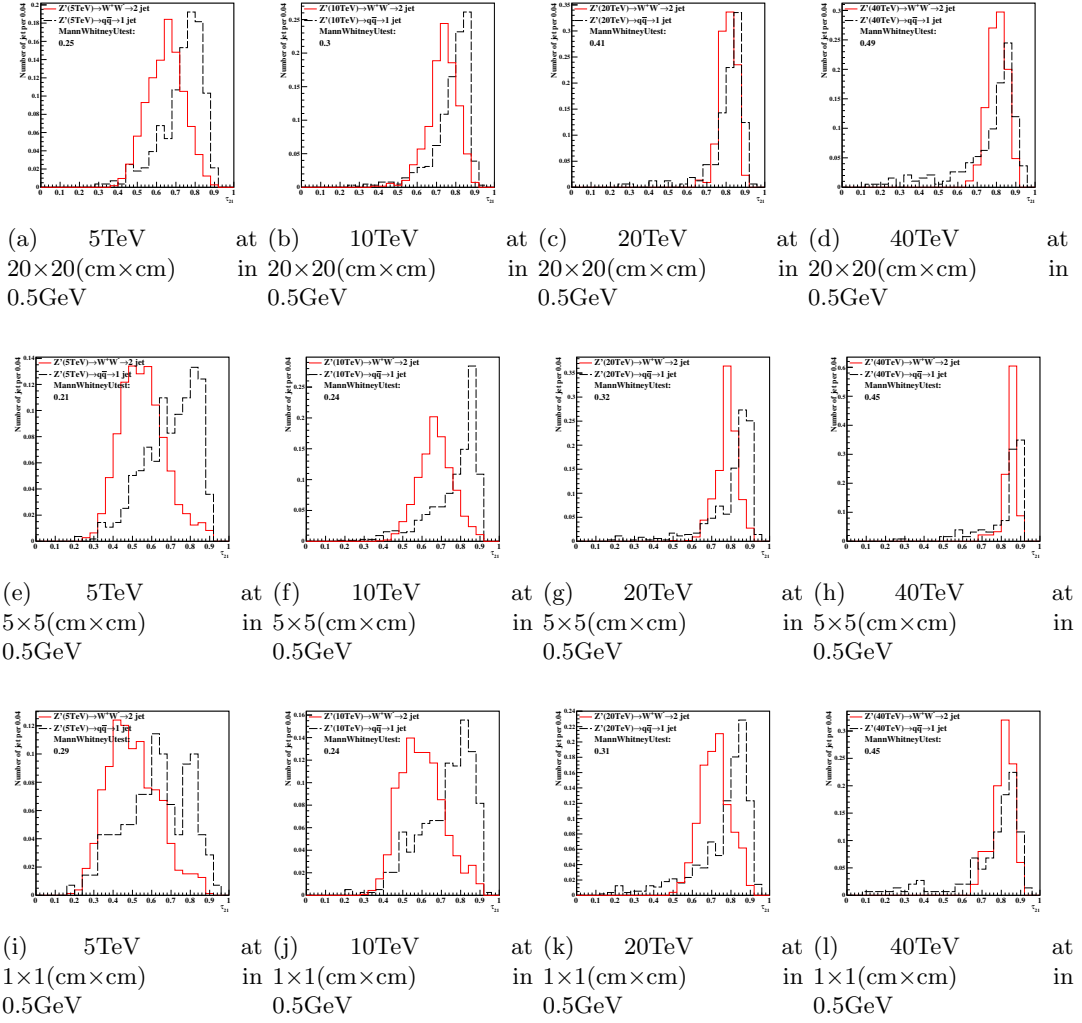
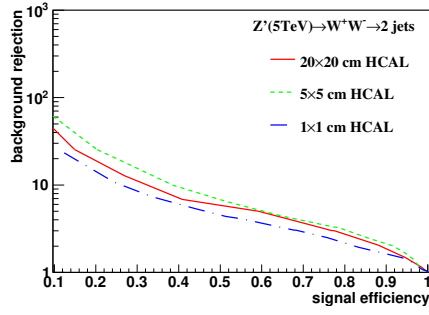
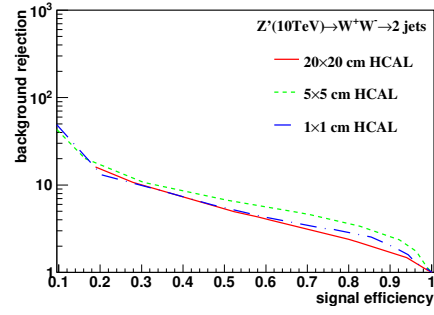


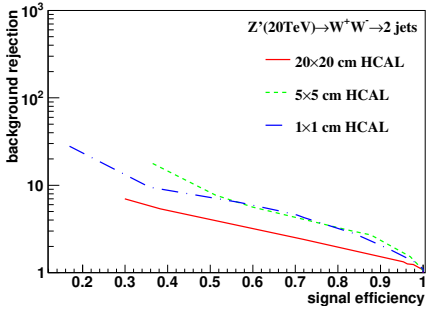
Figure 3: Distributions of Mann-Whitney value U in 5, 10, 20, 40TeV energy collision for τ_{21} in different detector sizes. Cell Size in 20 \times 20, 5 \times 5, and 1 \times 1(cm \times cm) are shown here.



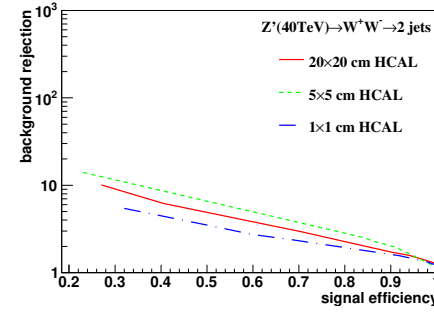
(a) 5 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(b) 10 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(c) 20 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(d) 40 TeV using Rawhit 0.5GeV cut method with New2 after cut Method

Figure 4: Signal efficiency versus background rejection rate using τ_{21} . The energies of collision at (a)5, (b)10, (c)20, (d)40TeV are shown here. In each picture, the three ROC curves correspond to different detector sizes.

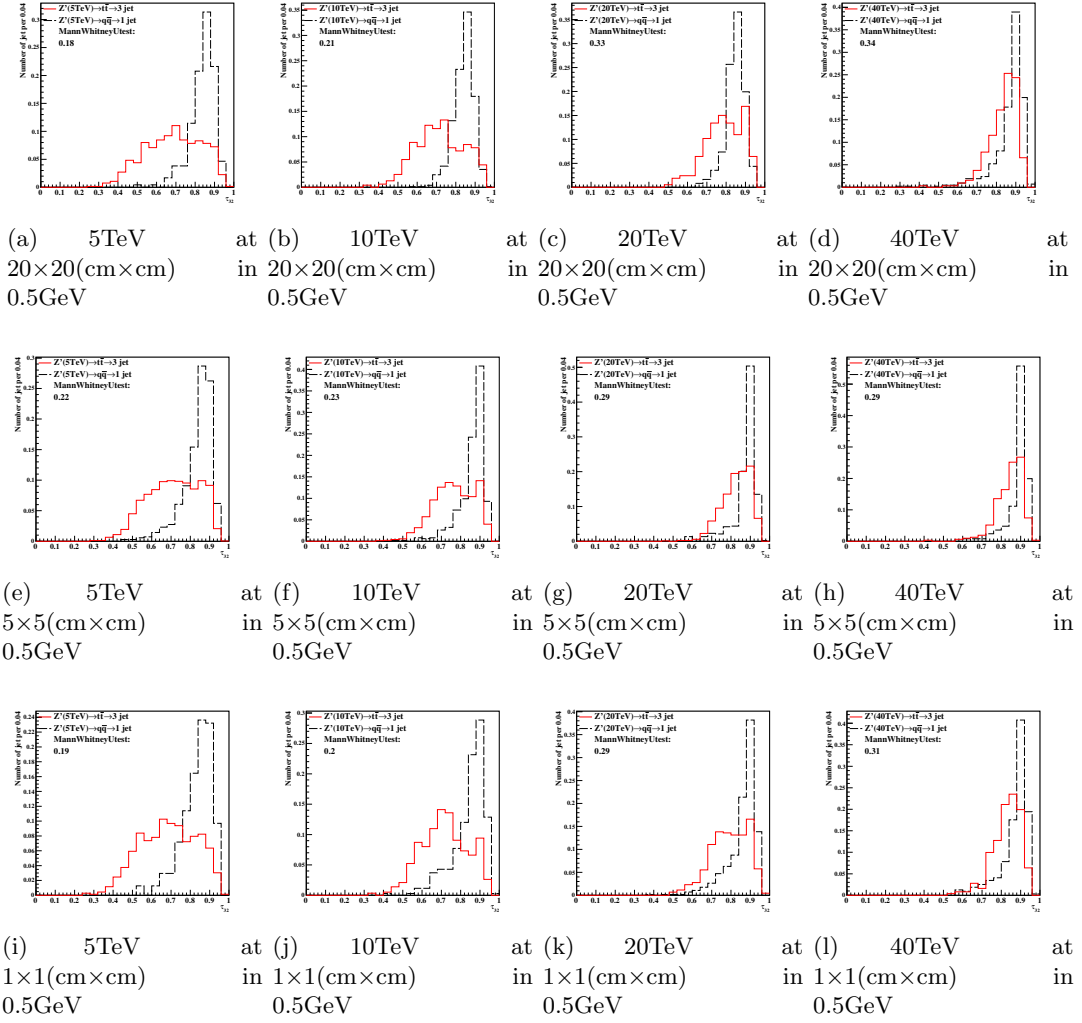
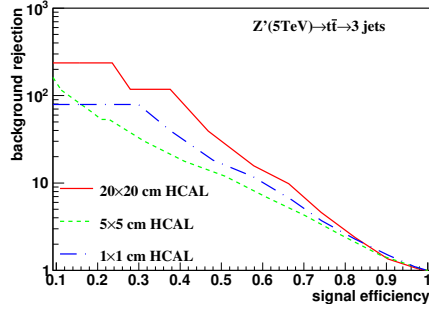
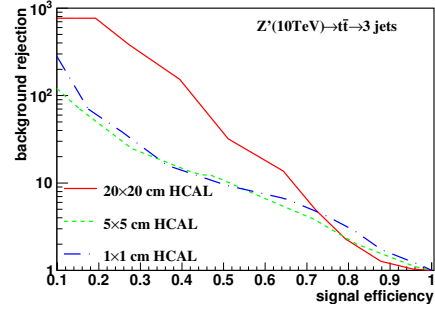


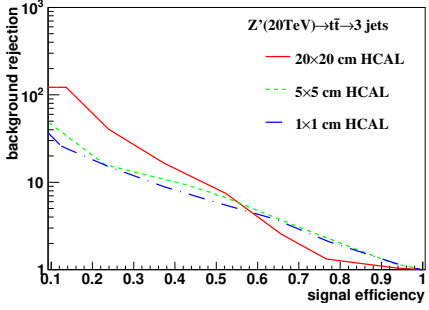
Figure 5: Distributions of Mann-Whitney value U in 5, 10, 20, 40TeV energy collision for τ_{32} in different detector sizes. Cell Size in 20×20, 5×5, and 1×1(cm×cm) are shown here.



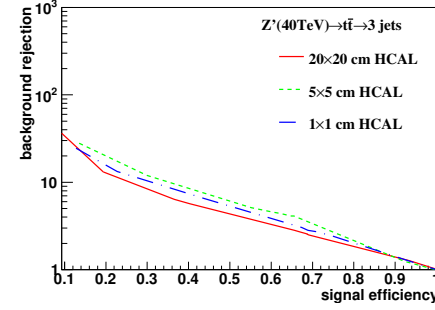
(a) 5 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(b) 10 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(c) 20 TeV using Rawhit 0.5GeV cut method with New2 after cut Method



(d) 40 TeV using Rawhit 0.5GeV cut method with New2 after cut Method

Figure 6: Signal efficiency versus background rejection rate using τ_{32} . The energies of collision at (a)5, (b)10, (c)20, (d)40TeV are shown here. In each picture, the three ROC curves correspond to different detector sizes.