

TDC Timing Studies

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Some information

- After Shuichi suggestion we put a cut for energy (2.5 GeV)
- We recreated our results.

HBHE Rechit Time (2.5 GeV energy cut)

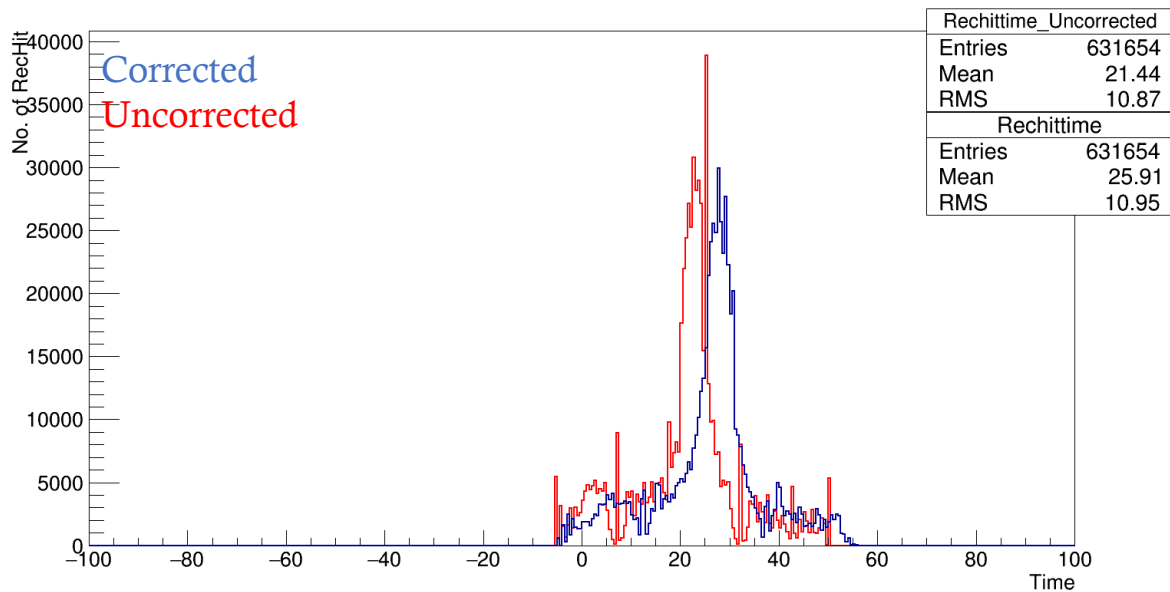
method0

Rechit Time

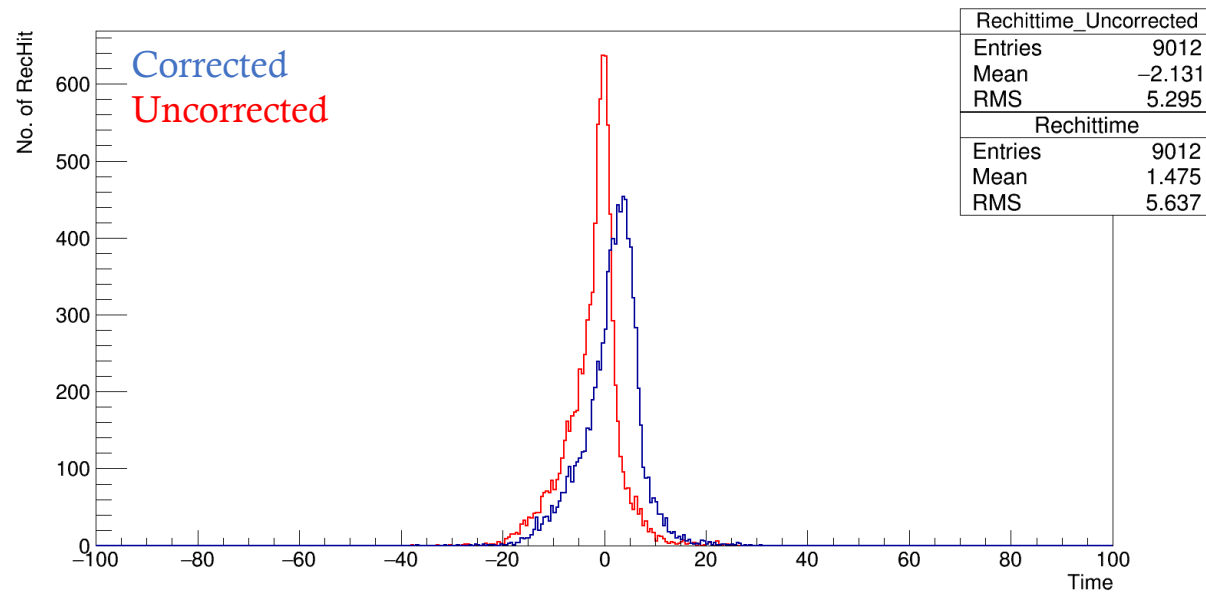
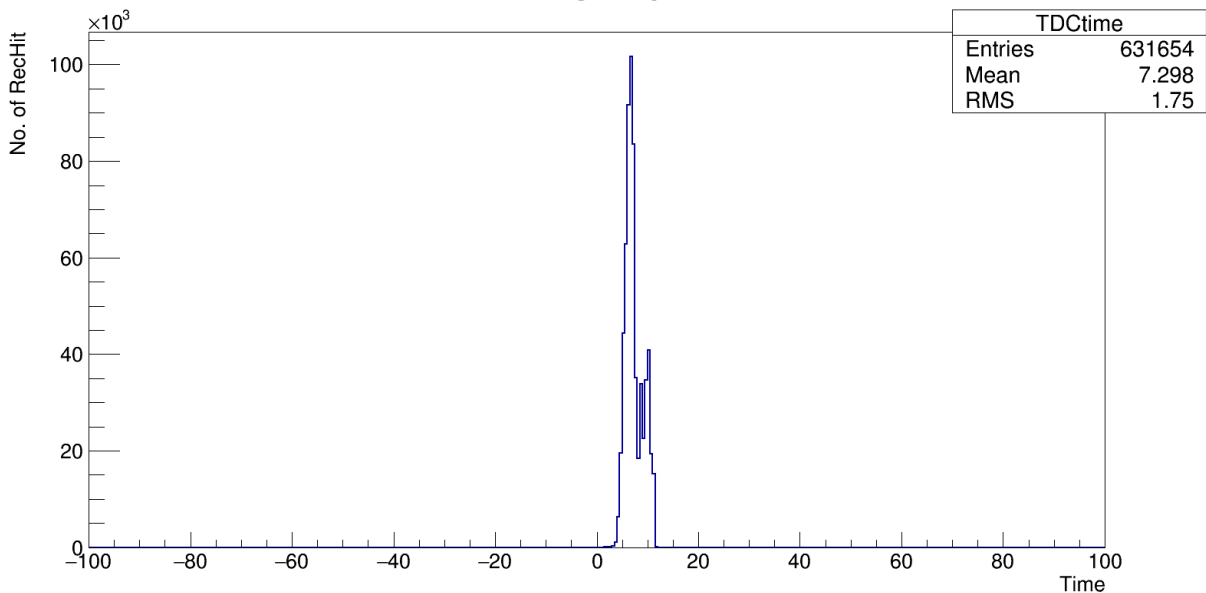
$$\text{Corrected} = \text{Uncorrected} - \text{TDC Time}$$

method2

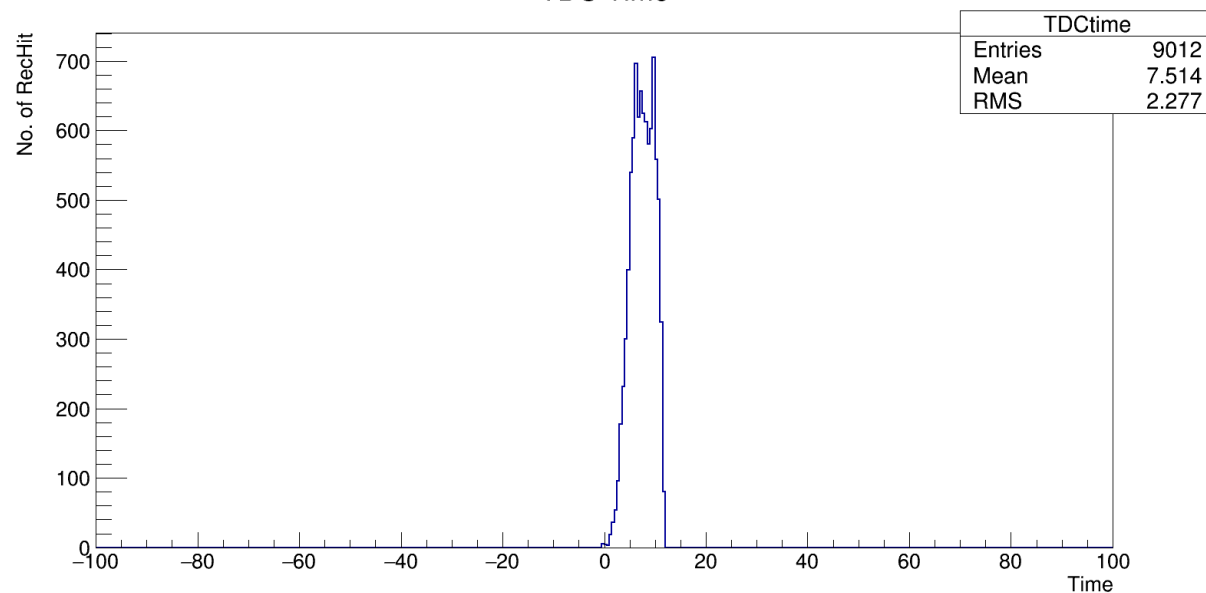
Rechit Time



TDC Time

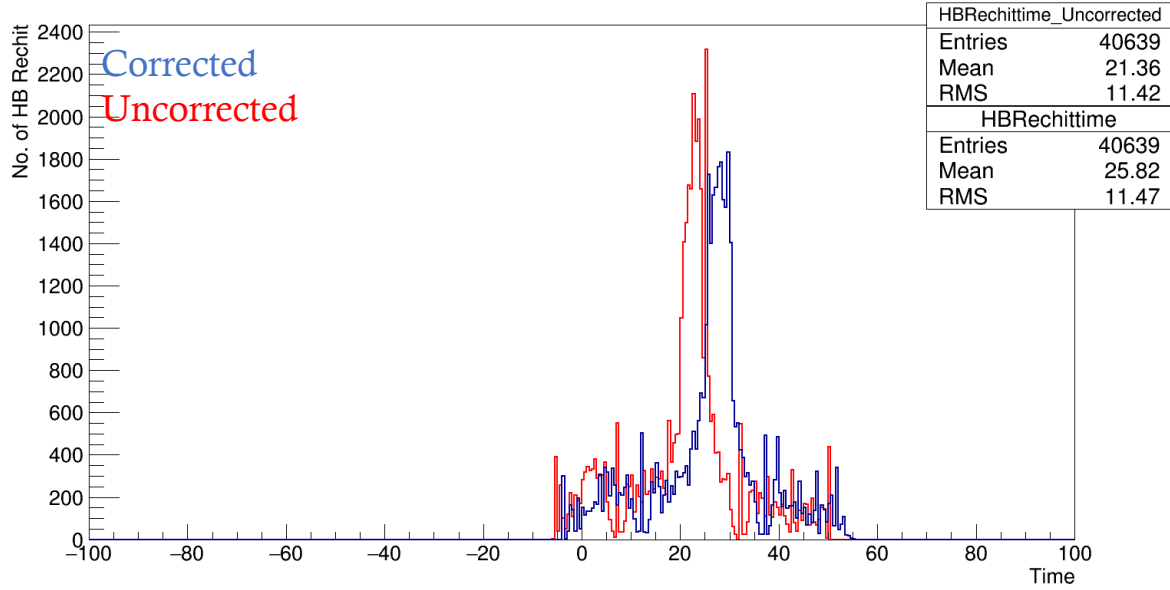


TDC Time

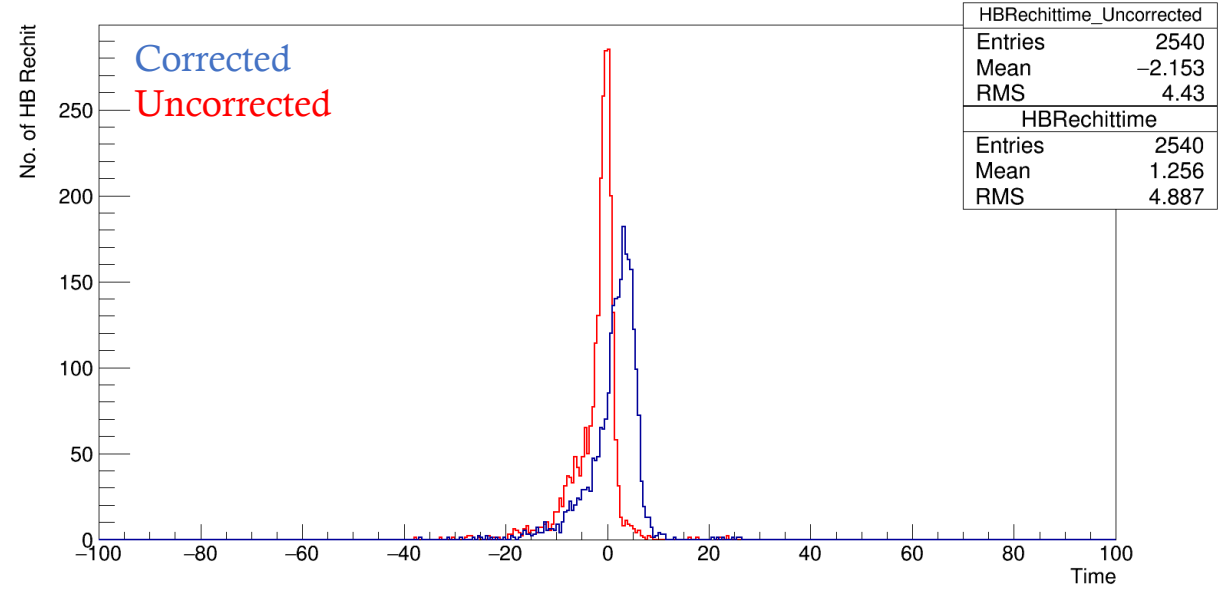


HB Rechit Time (2.5 GeV energy cut)

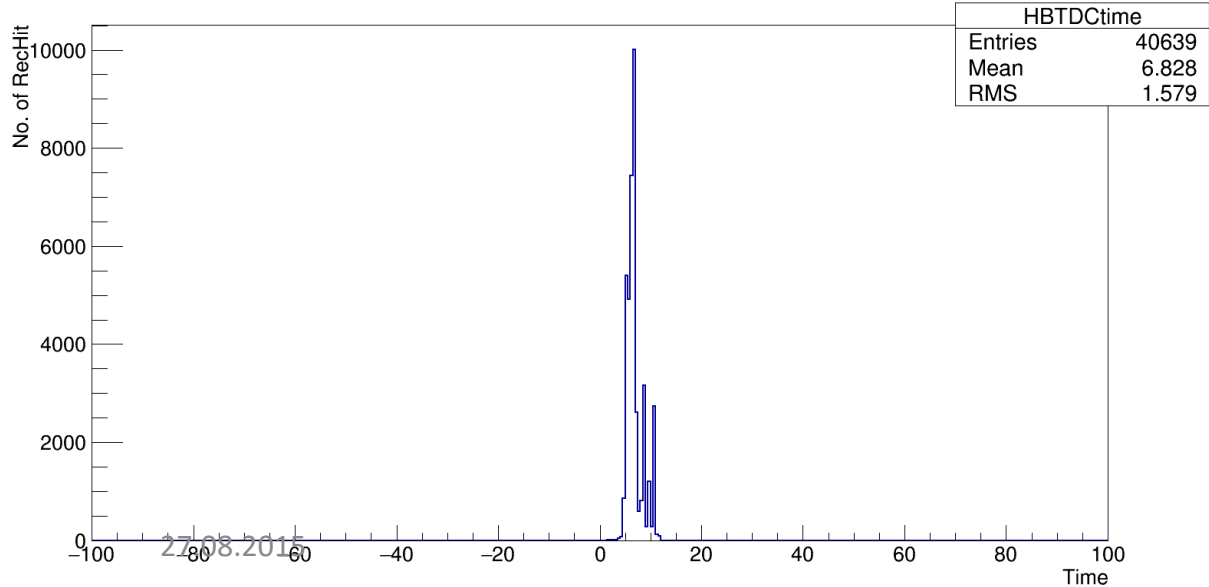
method0
HB Rechit time



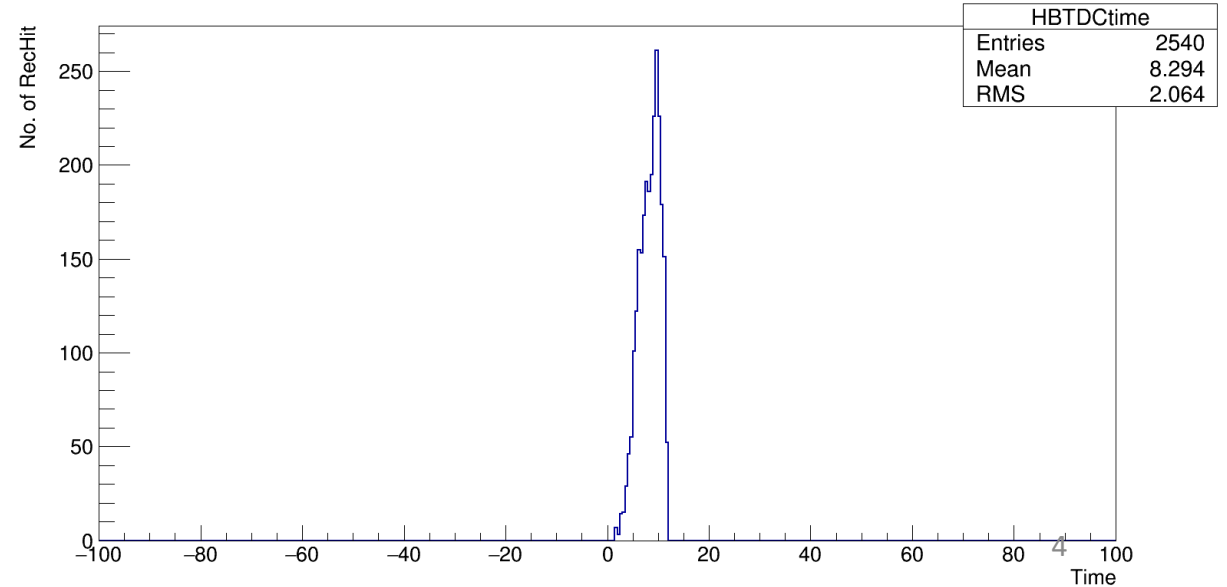
method2
HB Rechit time



HB TDC Time

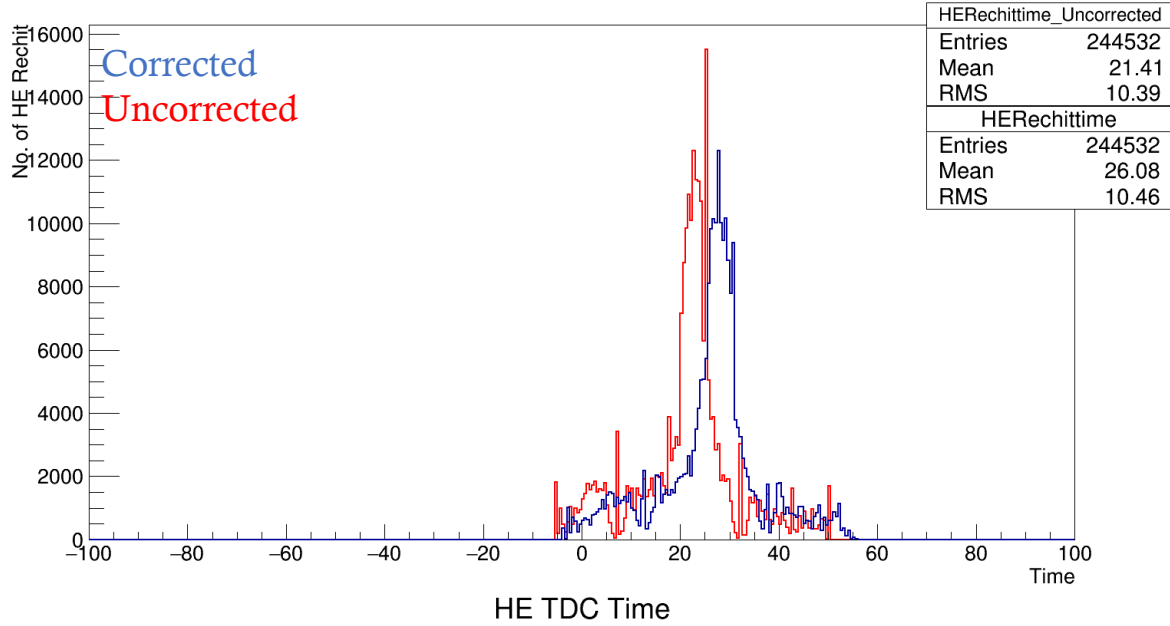


HB TDC Time

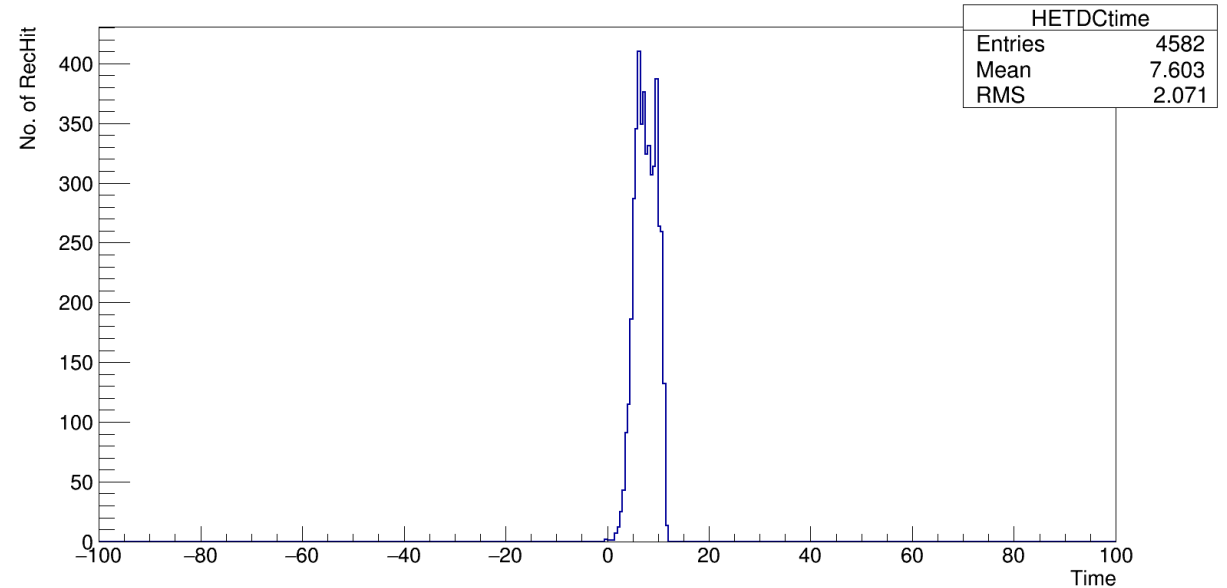
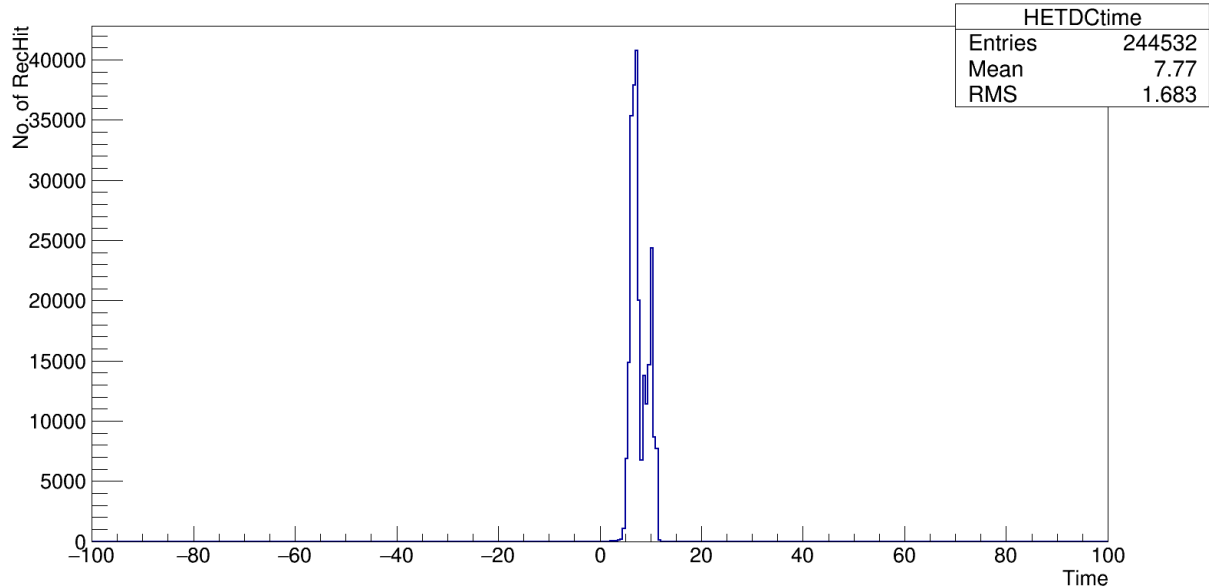
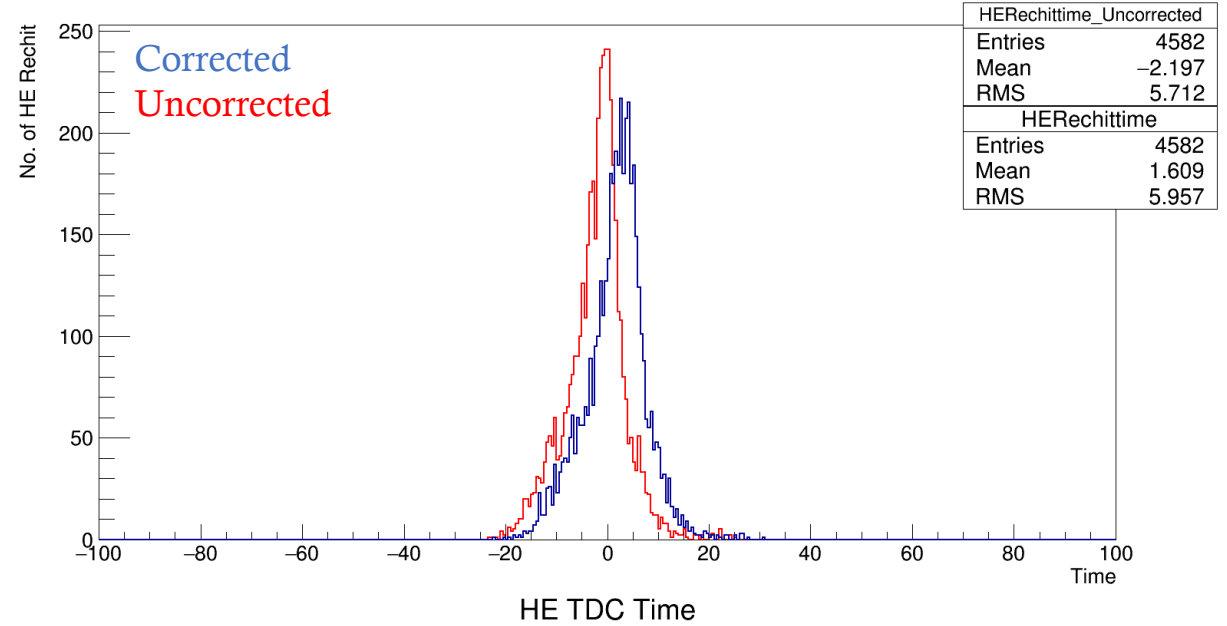


HE Rechit Time (2.5 GeV energy cut)

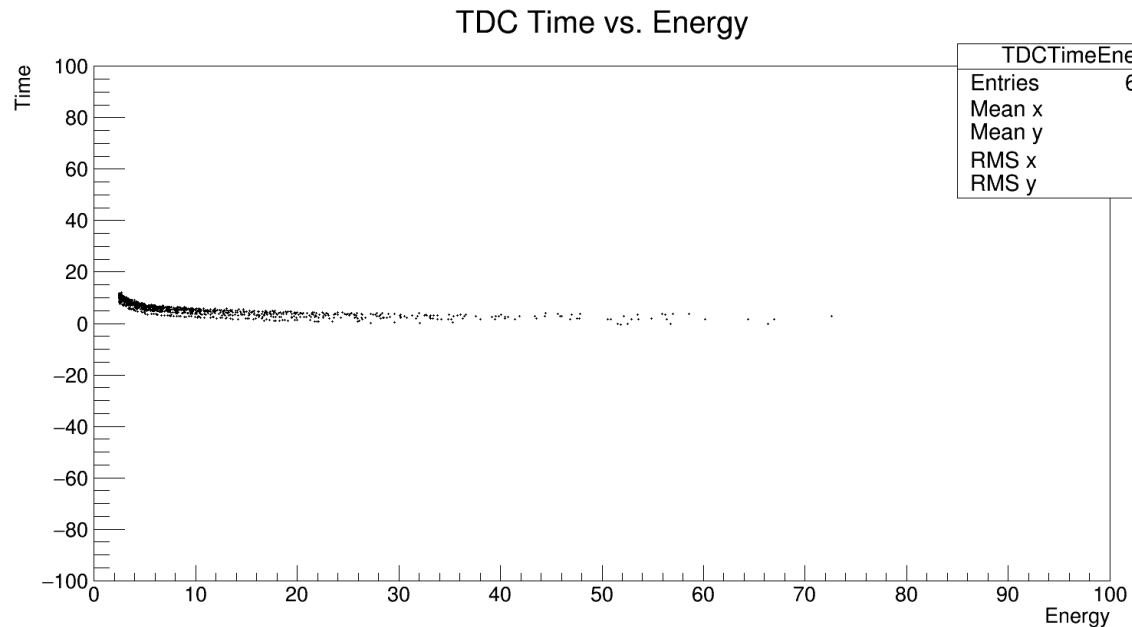
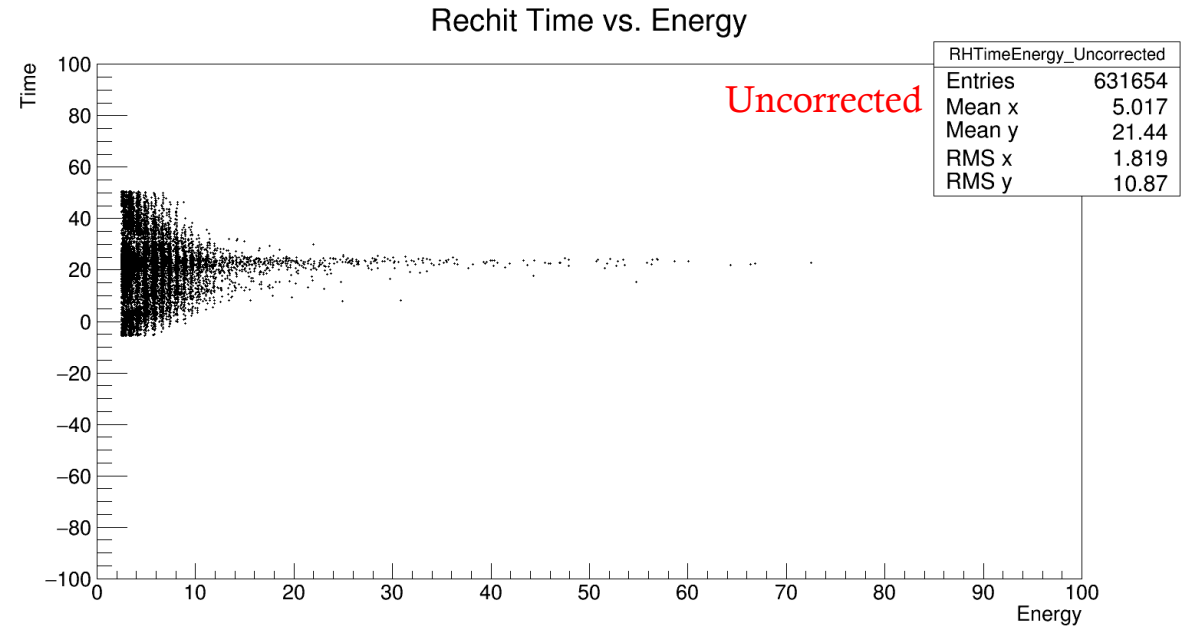
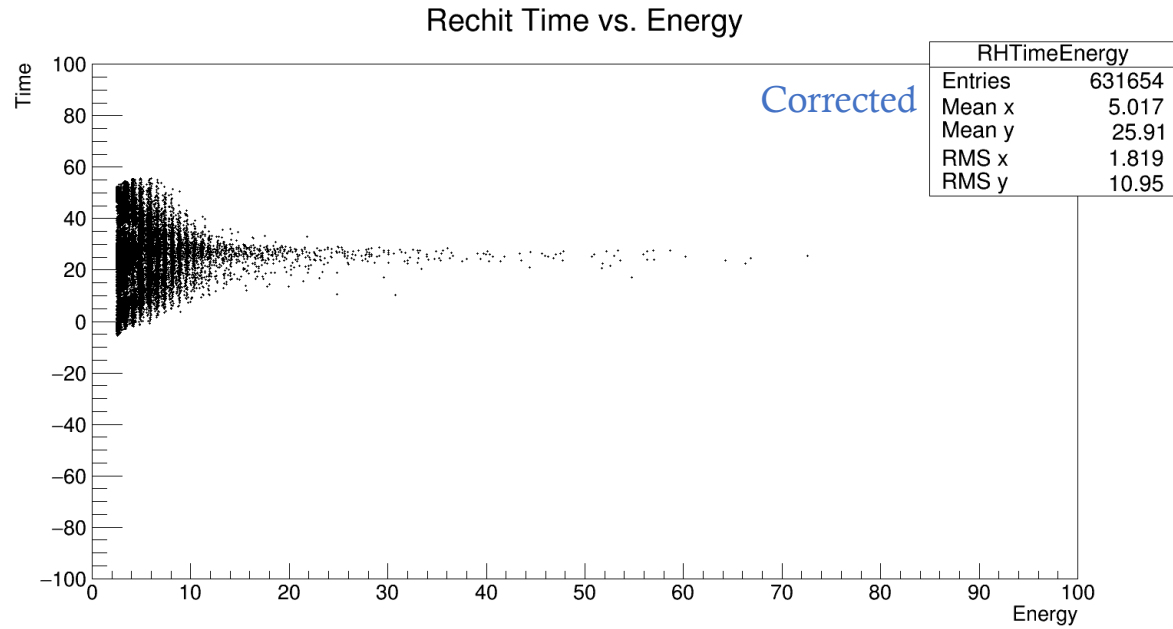
method0
HE Rechit time



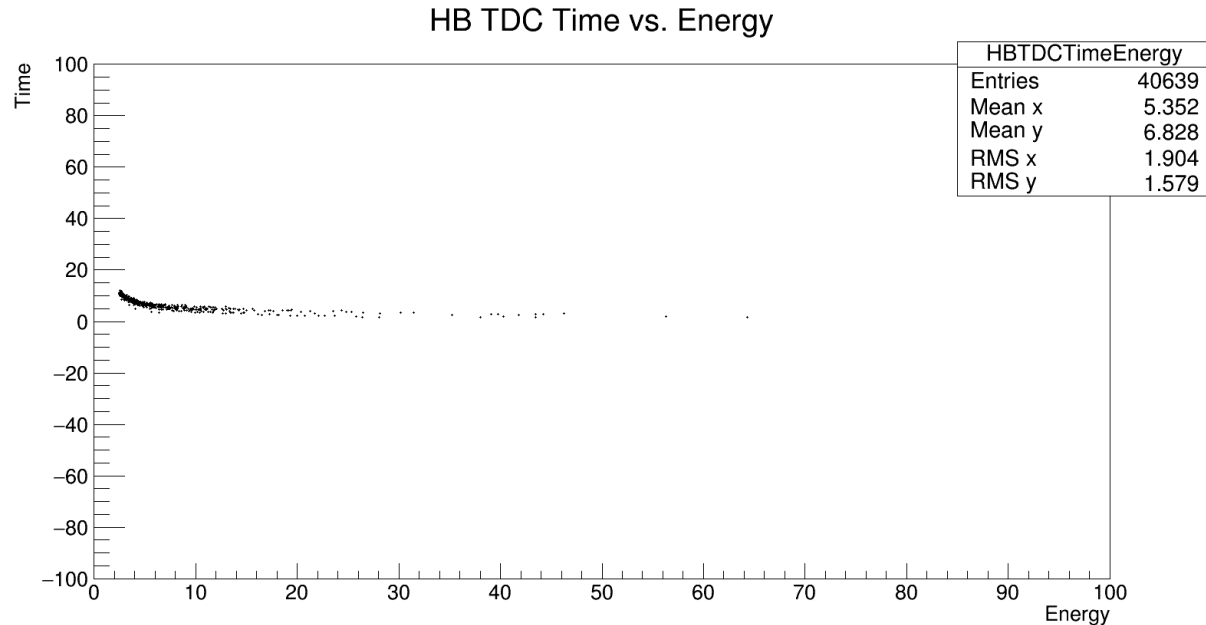
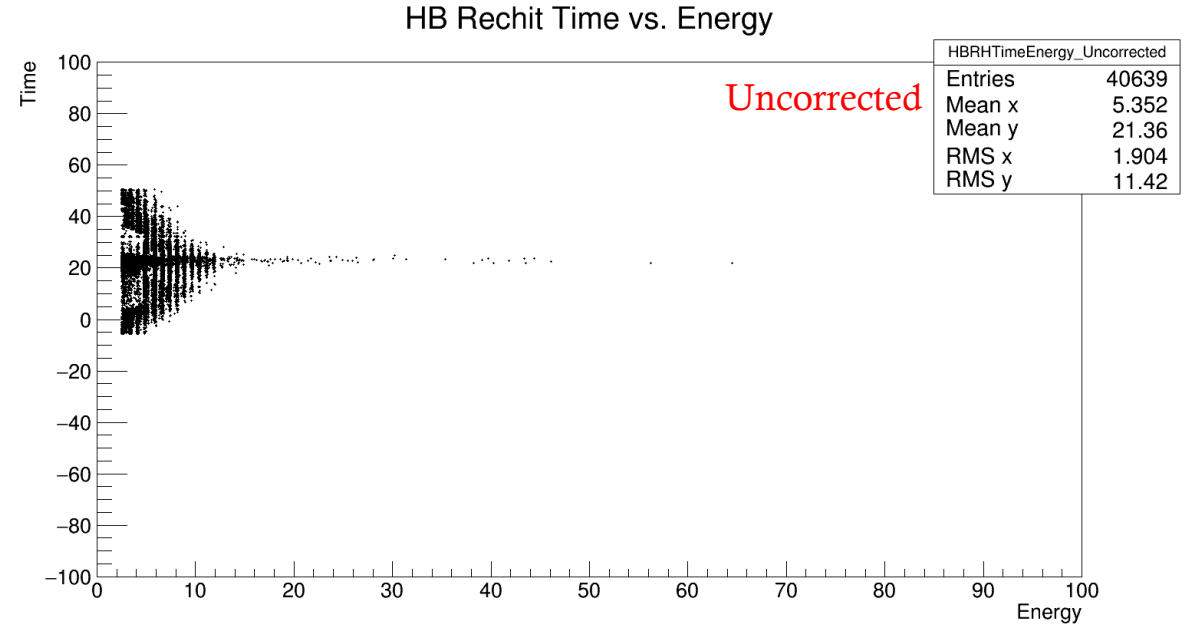
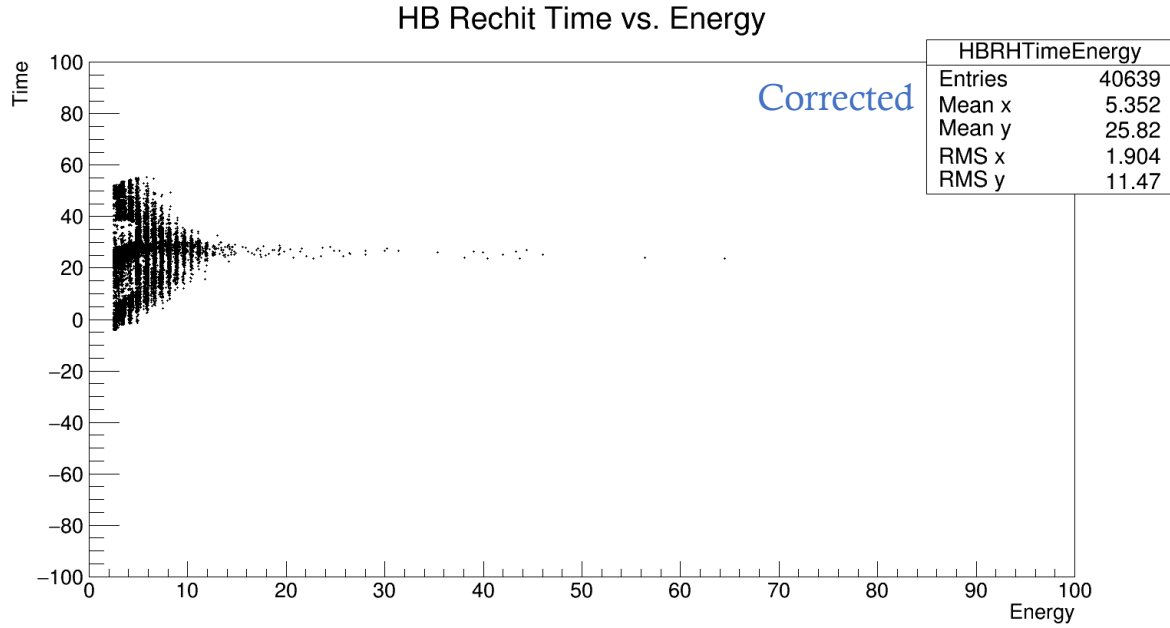
method2
HE Rechit time



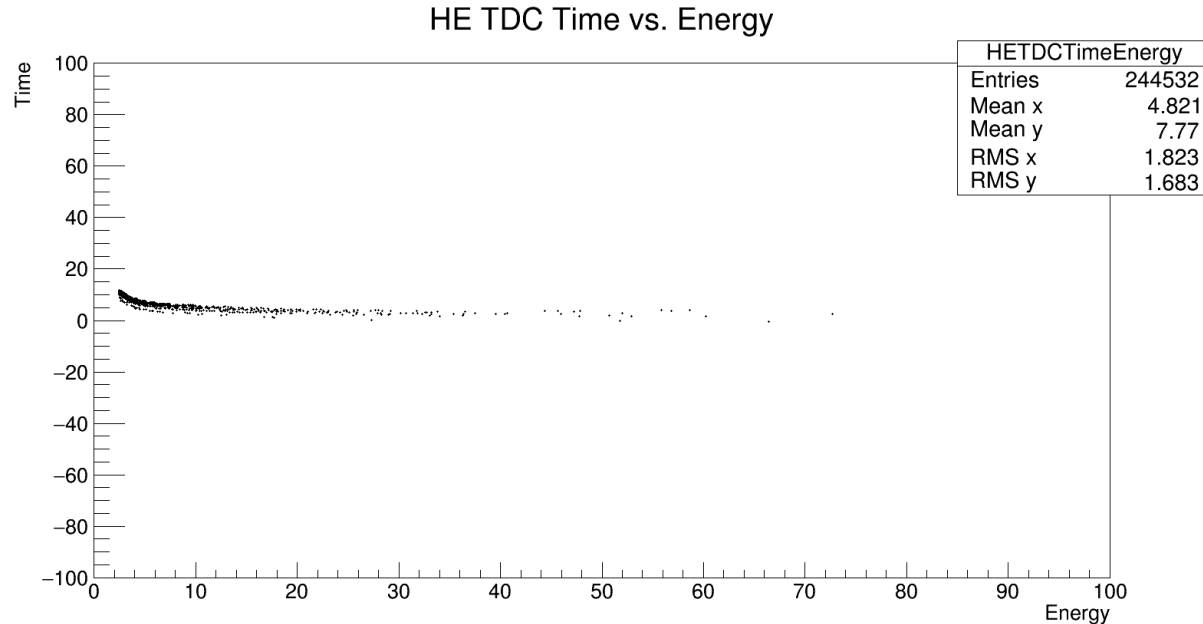
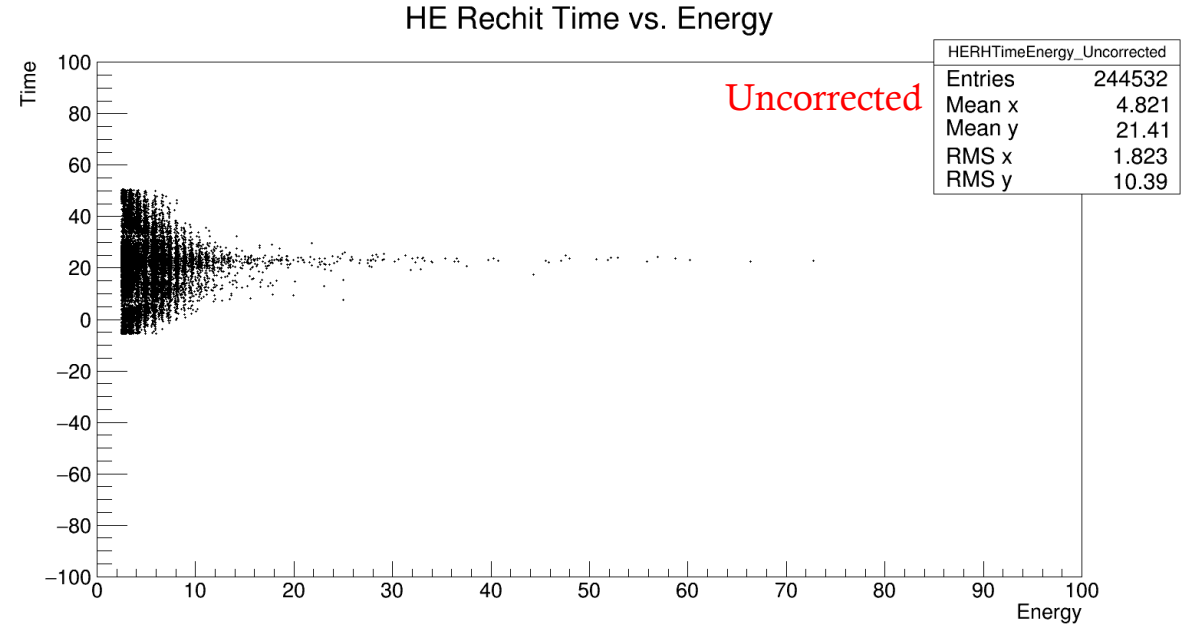
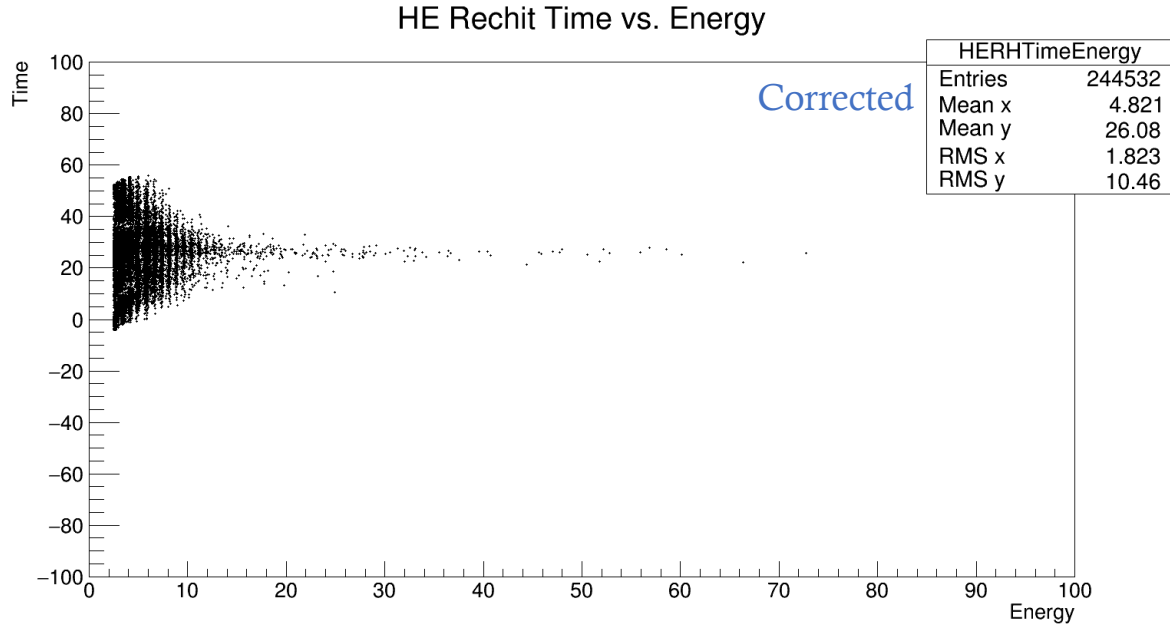
HBHE Rechit Time vs. Energy for **method0** (2.5 GeV energy cut)



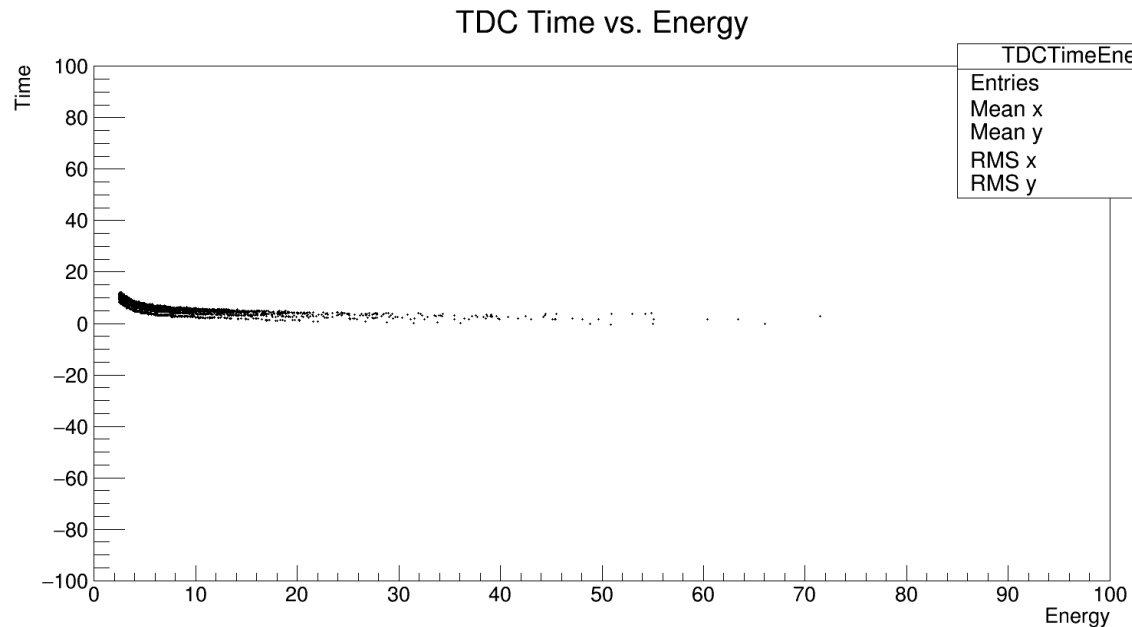
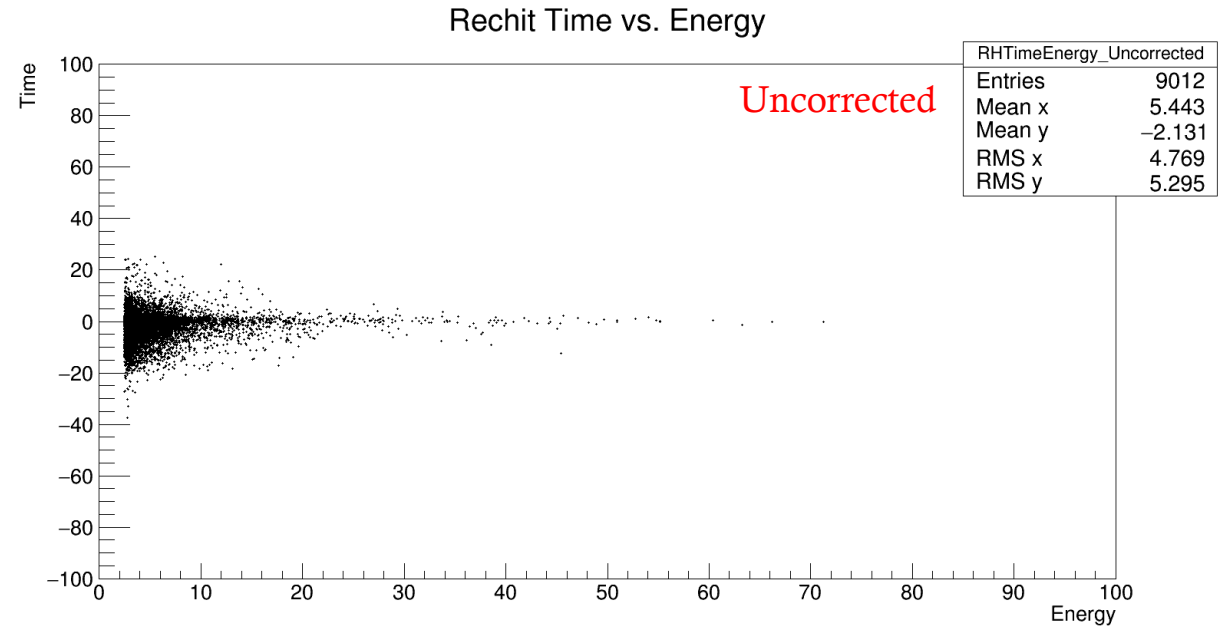
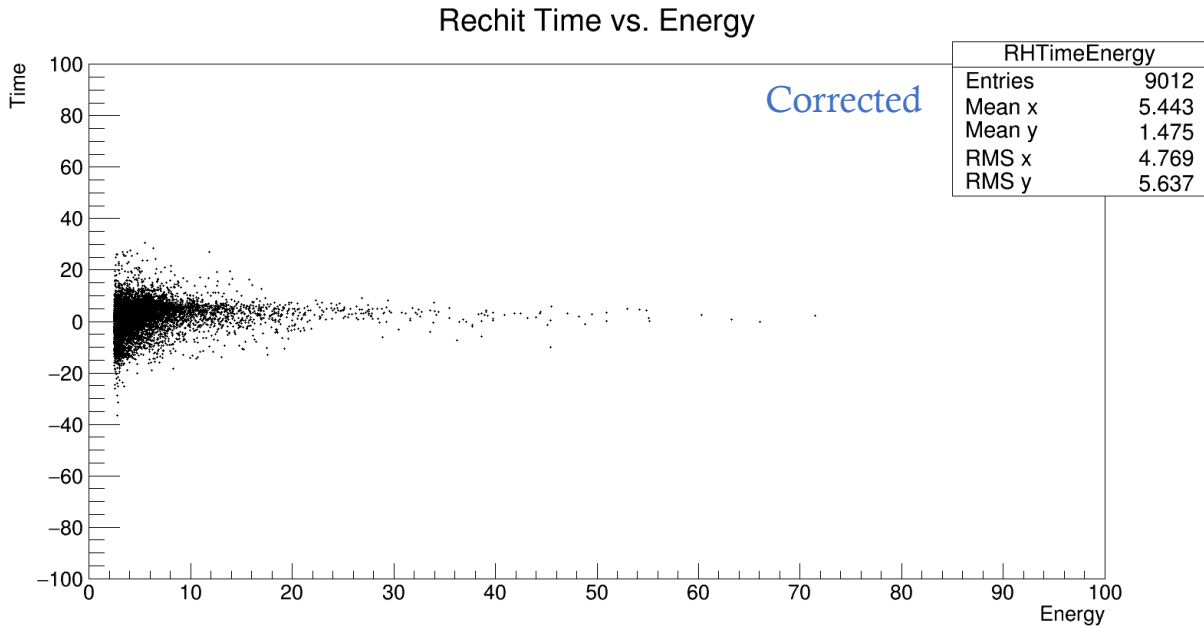
HB Rechit Time vs. Energy for **method0** (2.5 GeV energy cut)



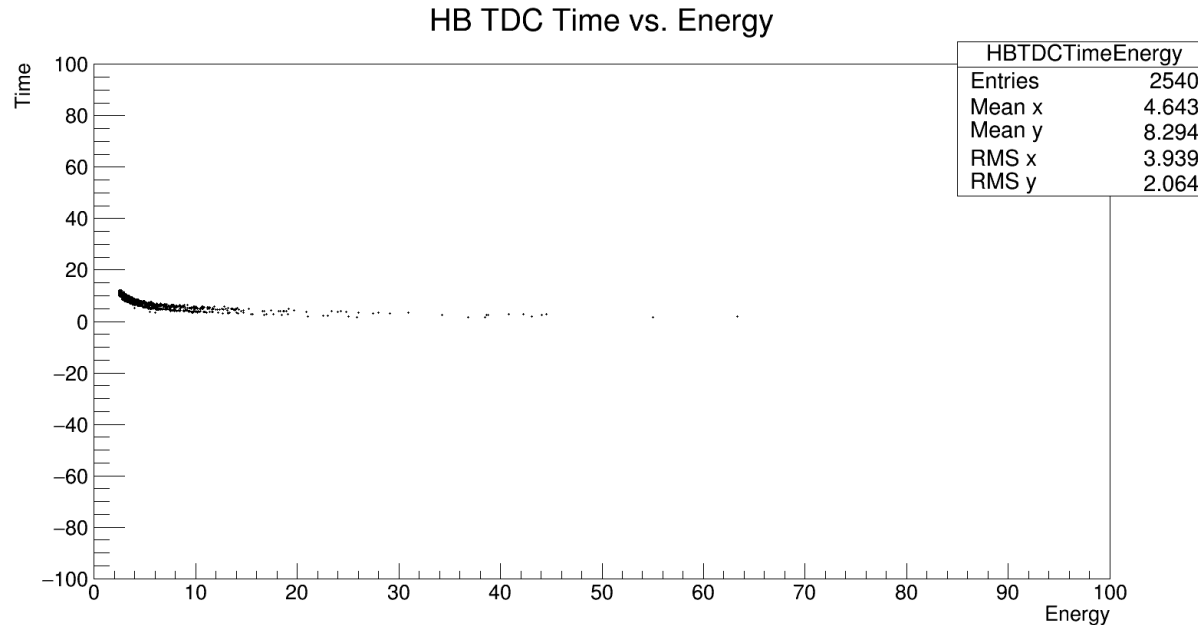
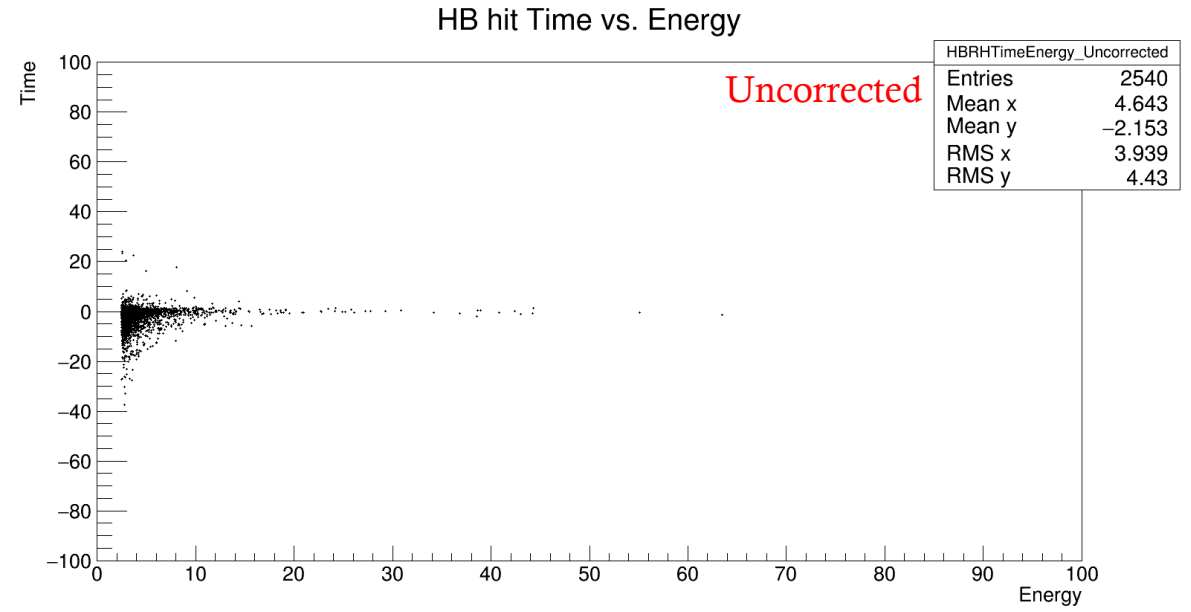
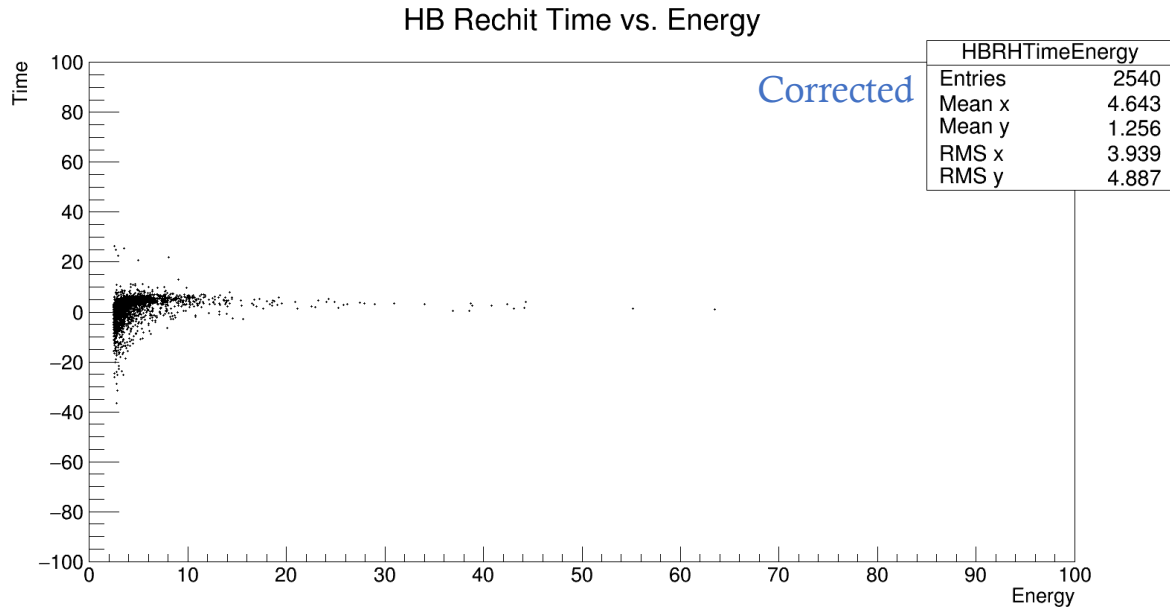
HE Rechit Time vs. Energy for **method0** (2.5 GeV energy cut)



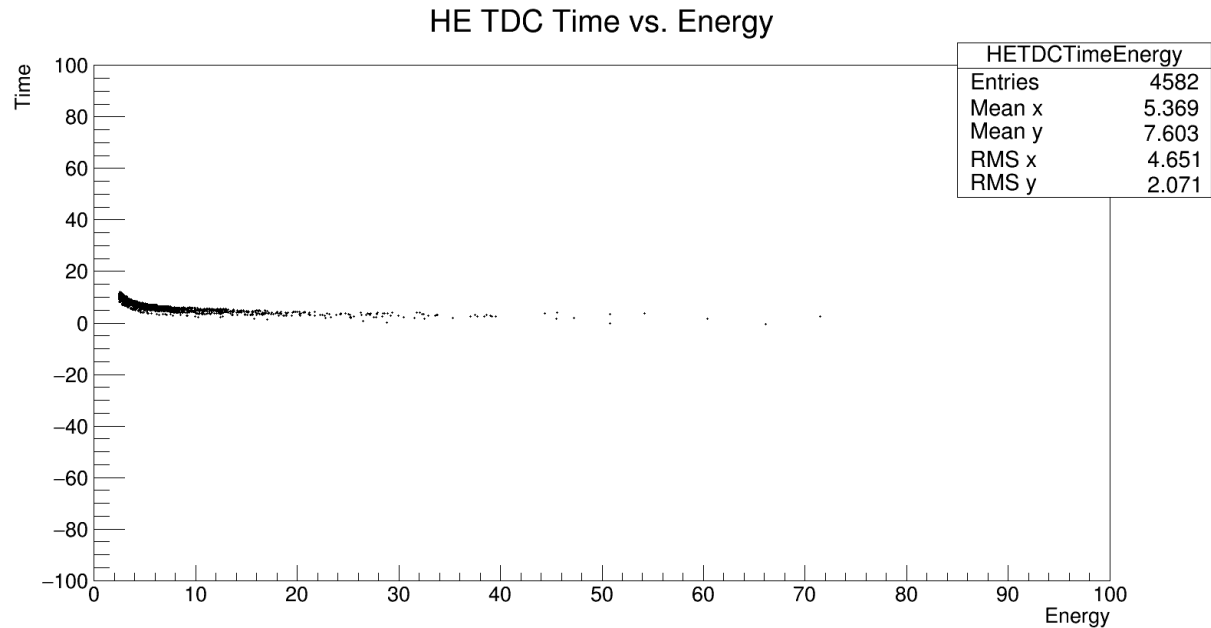
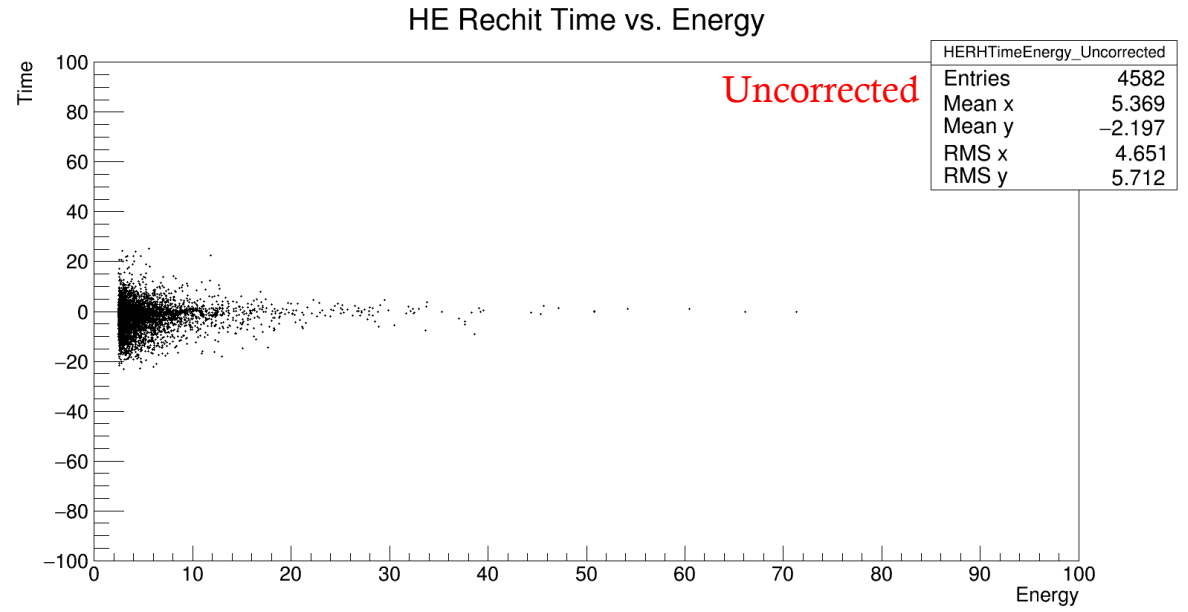
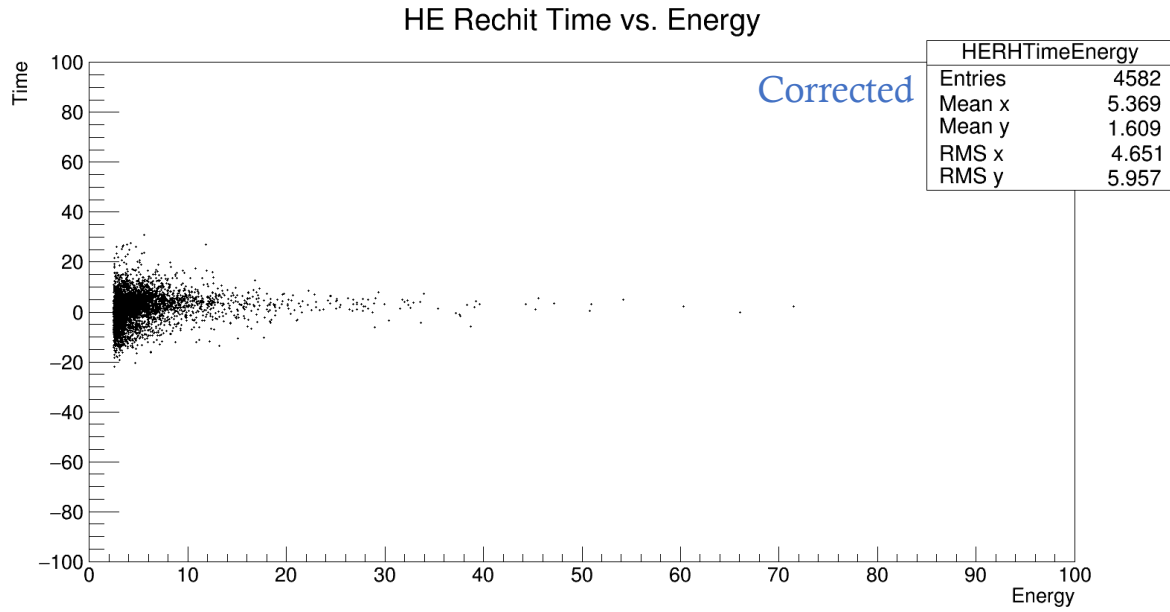
HBHE Rechit Time vs. Energy for **method2** (2.5 GeV energy cut)



HB Rechit Time vs. Energy for **method2** (2.5 GeV energy cut)



HE Rechit Time vs. Energy for **method2** (2.5 GeV energy cut)



Conclusion, Questions

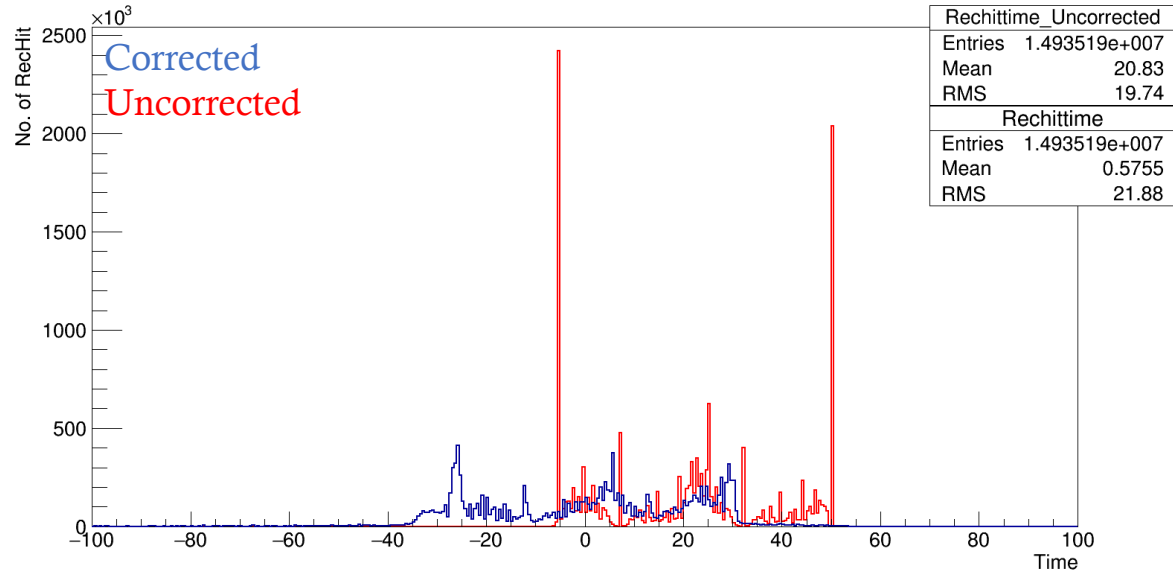
- We showed our plots for both method.
- After applying the cut, two additional peaks in Rehit time distribution disappeared but we still have wide tails.
- Now we are trying to plot uncorrected TDC Time. As soon as we get any results, we will let you know.

BACKUP
no engery cut

HBHE Rechit Time (no energy cut)

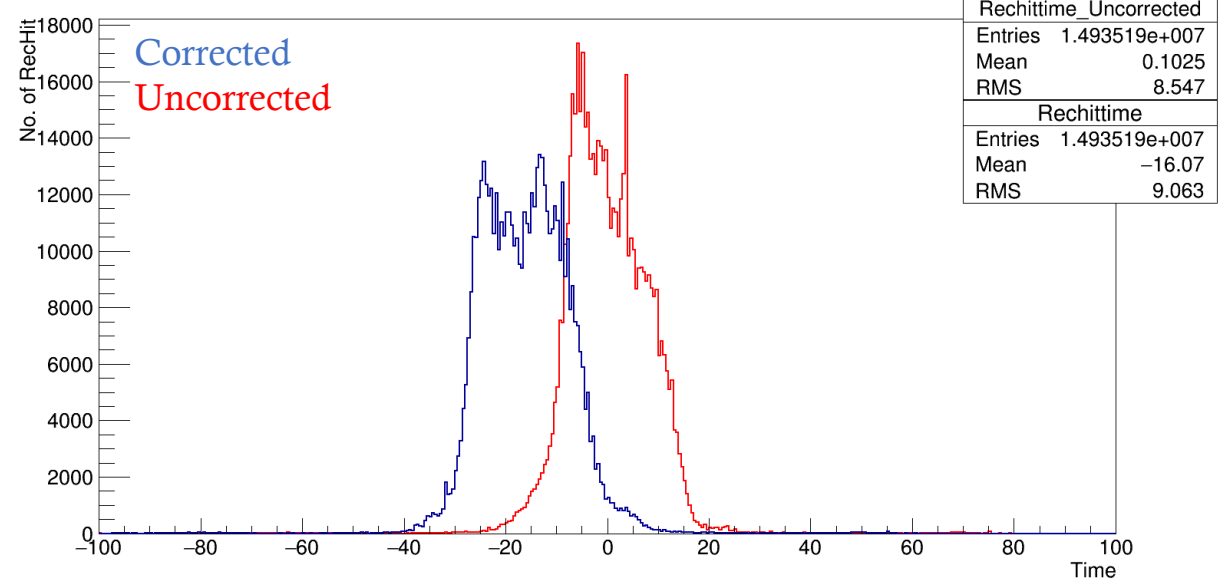
method0

Rechit Time

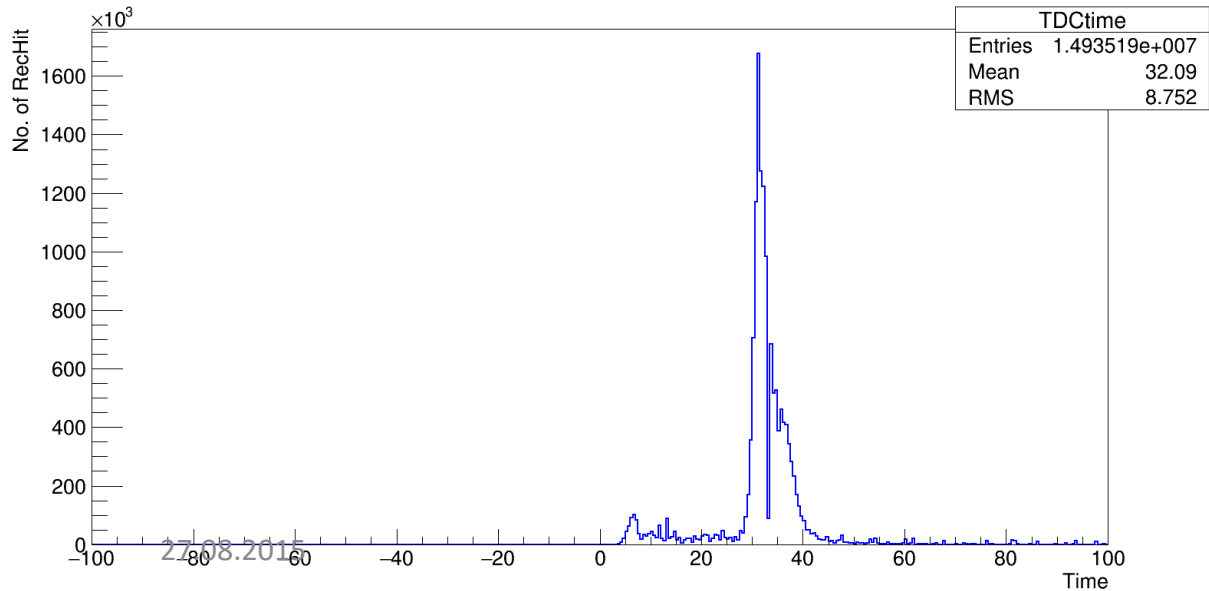


method2

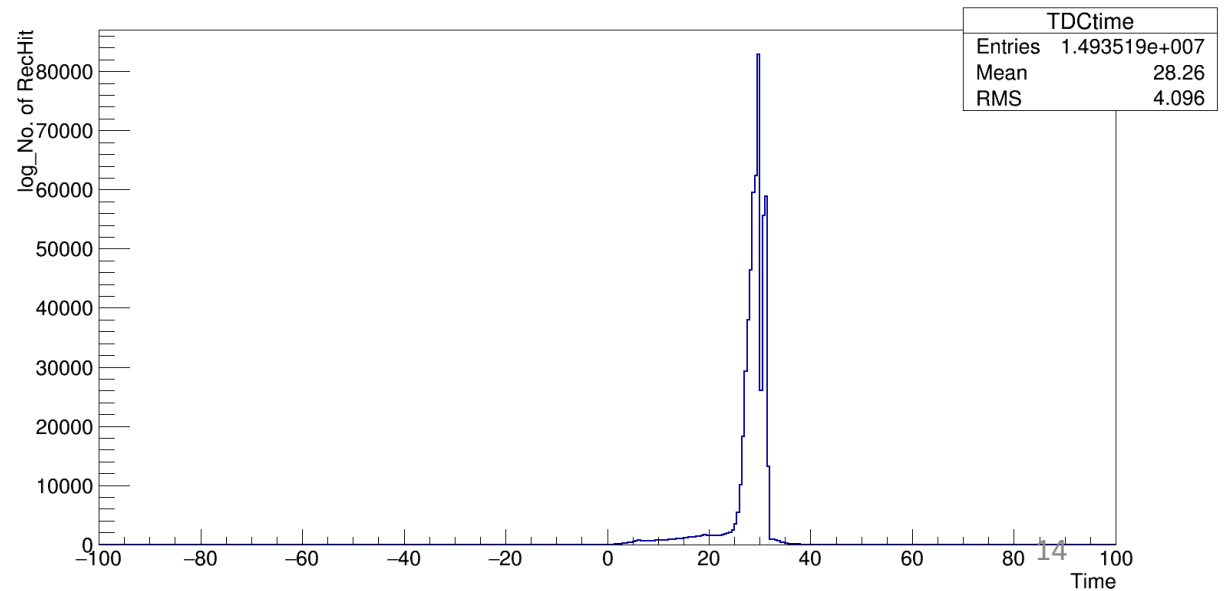
Rechit Time



TDC Time



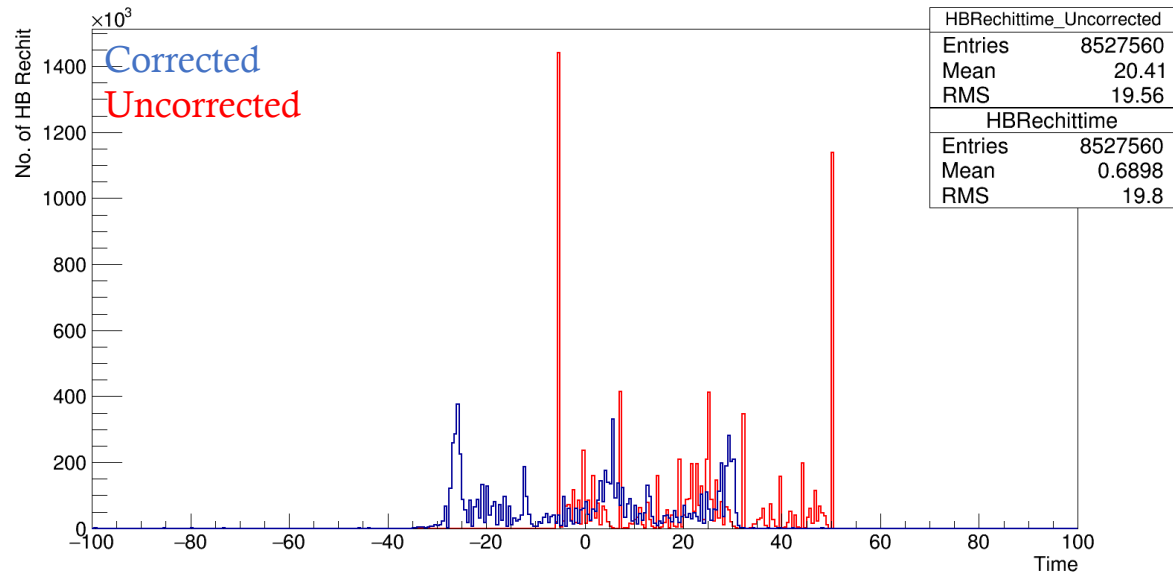
TDC Time



HB Rechit Time (no energy cut)

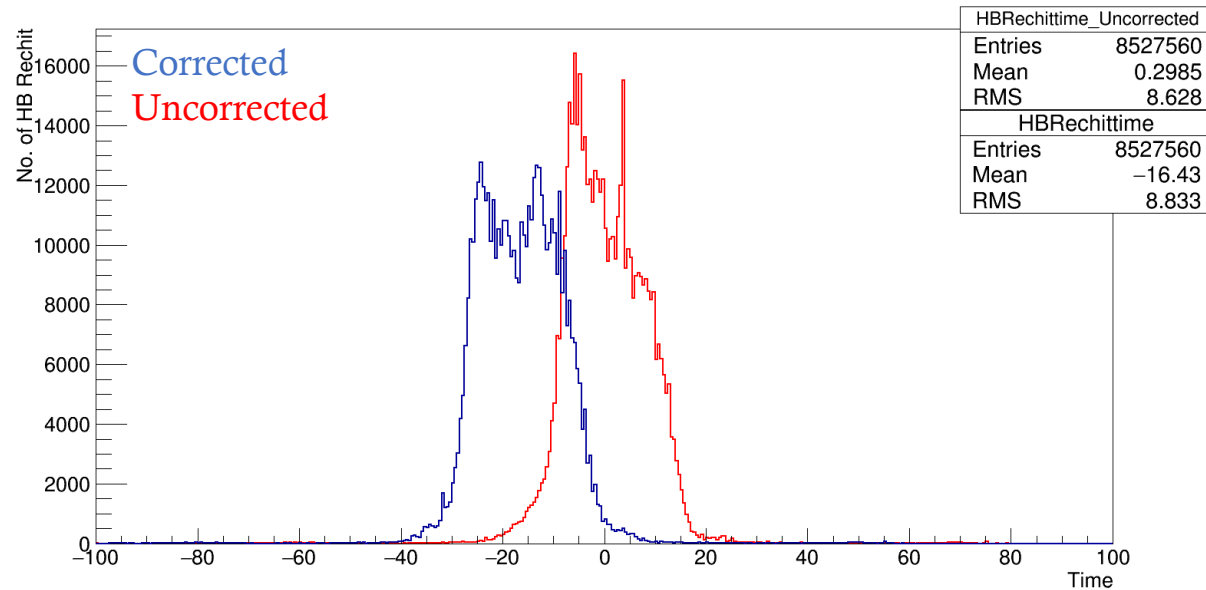
method0

HB Rechit time

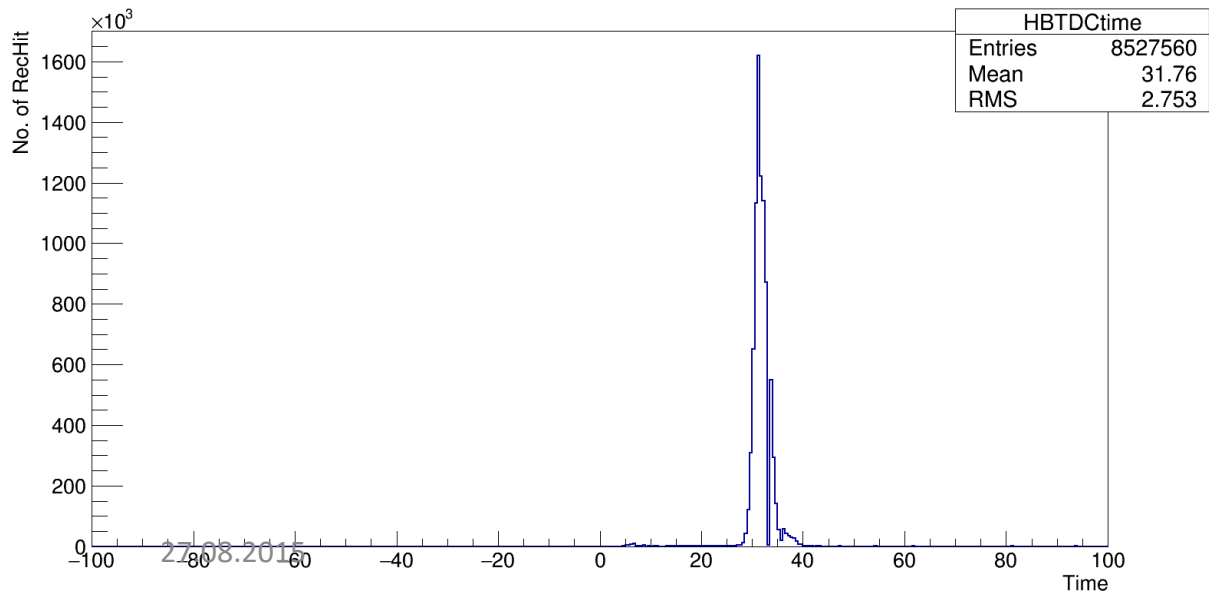


method2

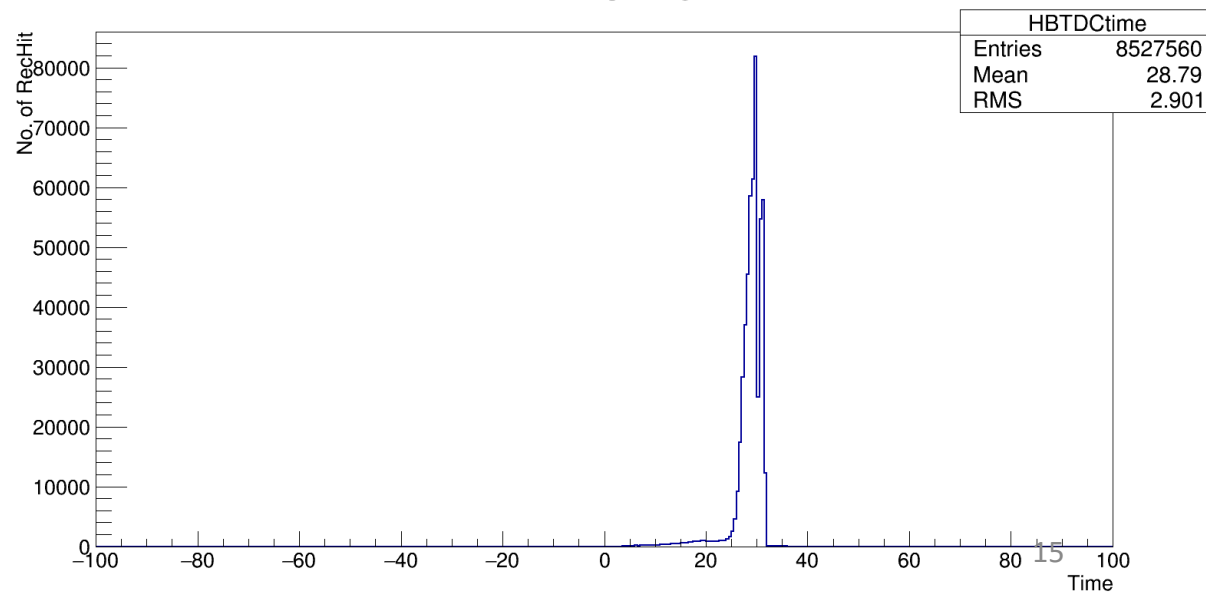
HB Rechit time



HB TDC Time



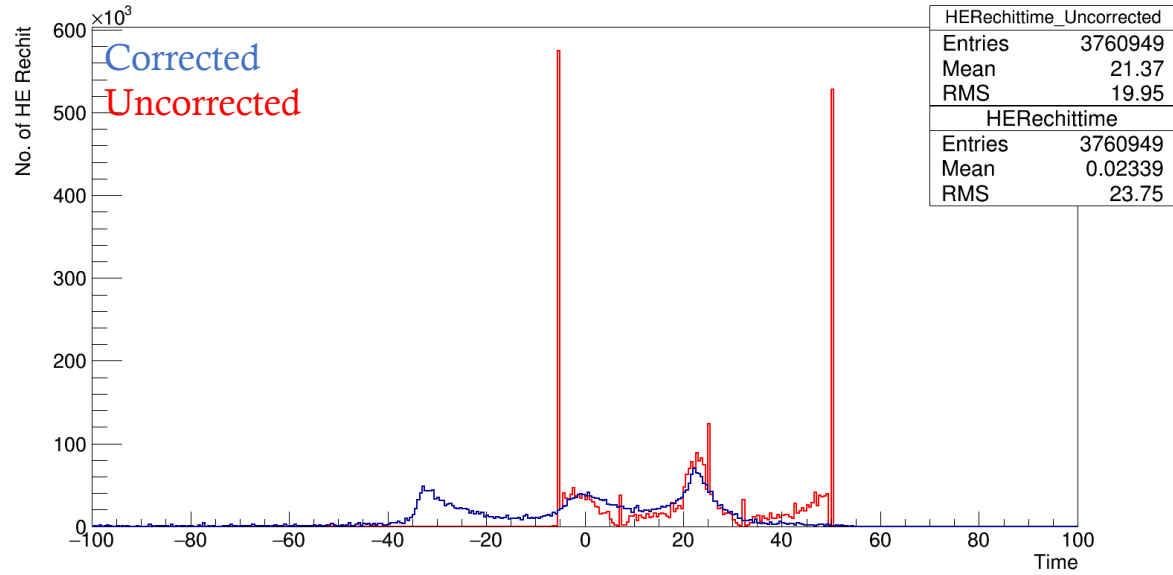
HB TDC Time



HE Rechit Time (2.5 GeV energy cut)

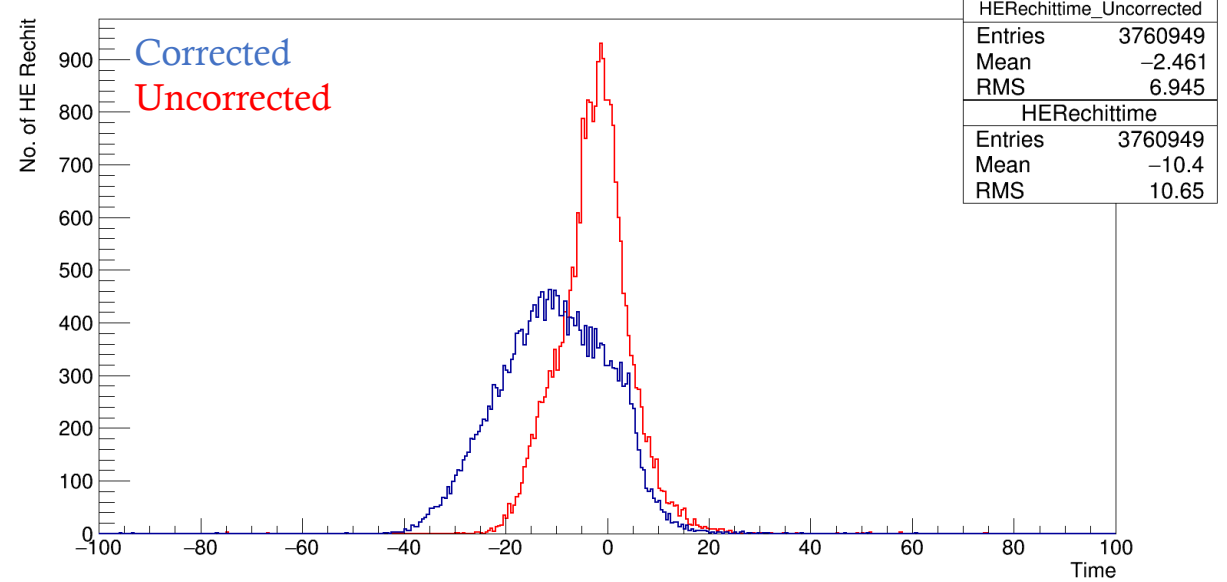
method0

HE Rechit time

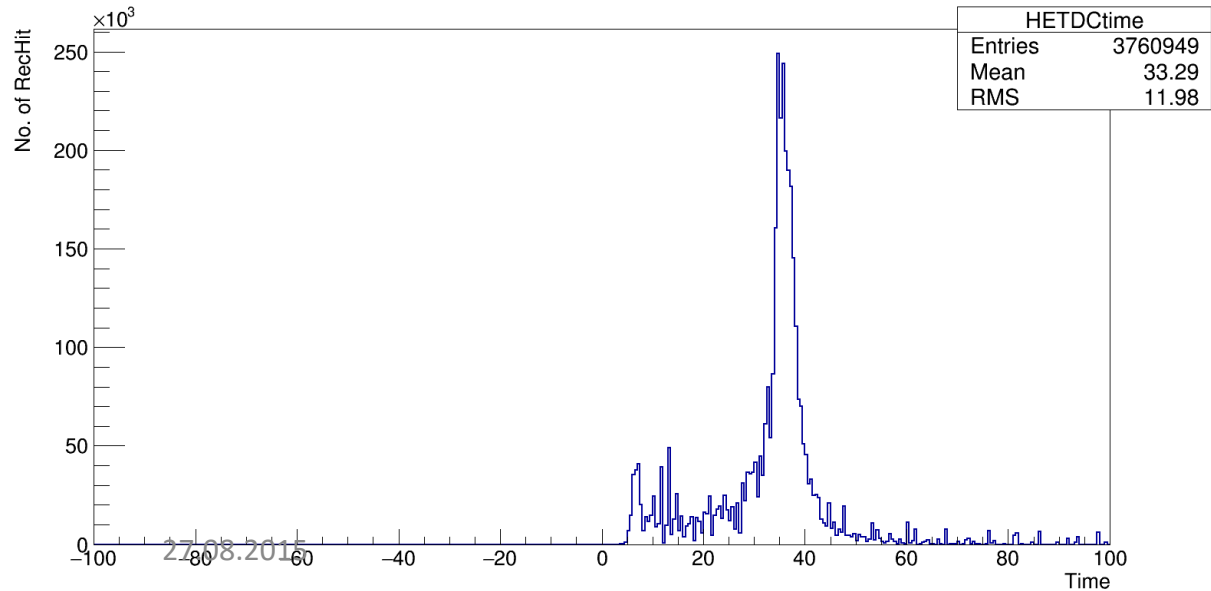


method2

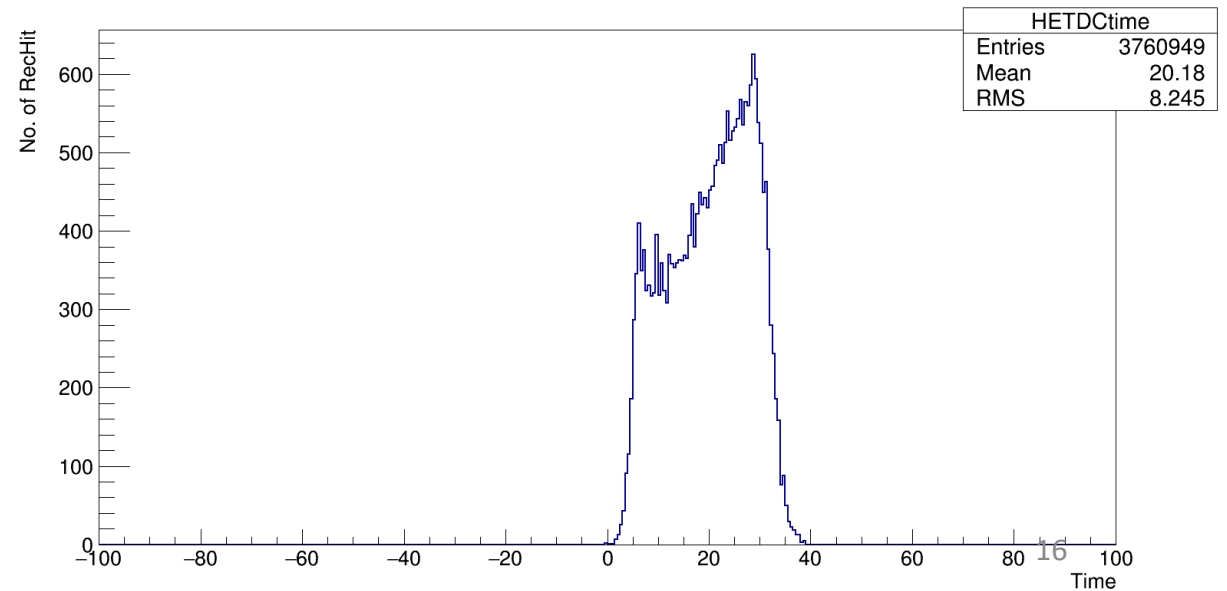
HE Rechit time



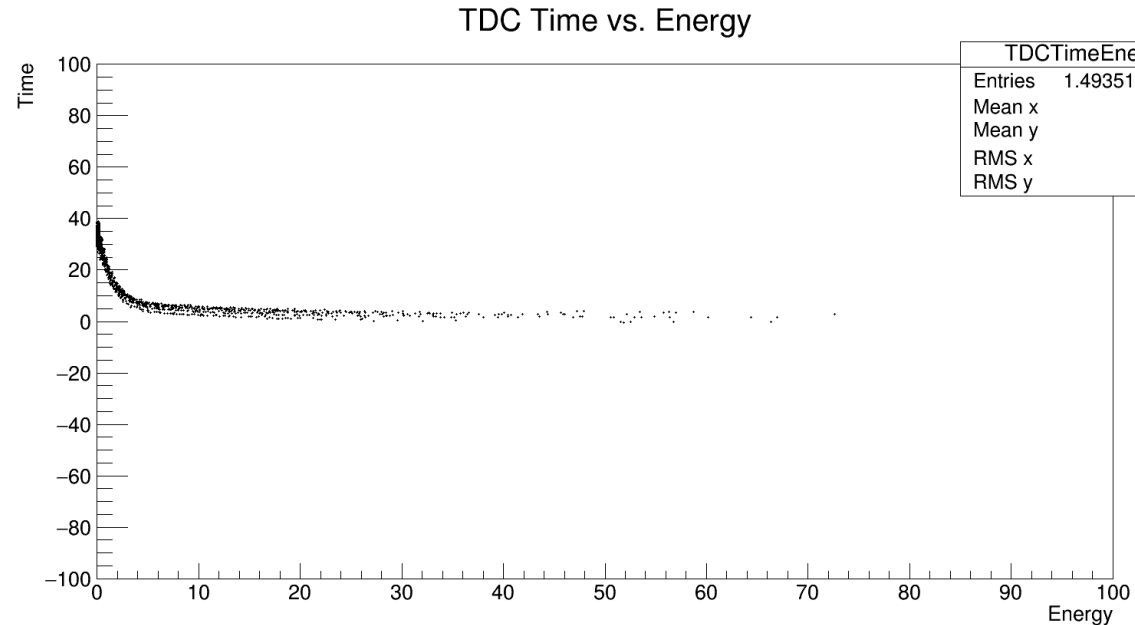
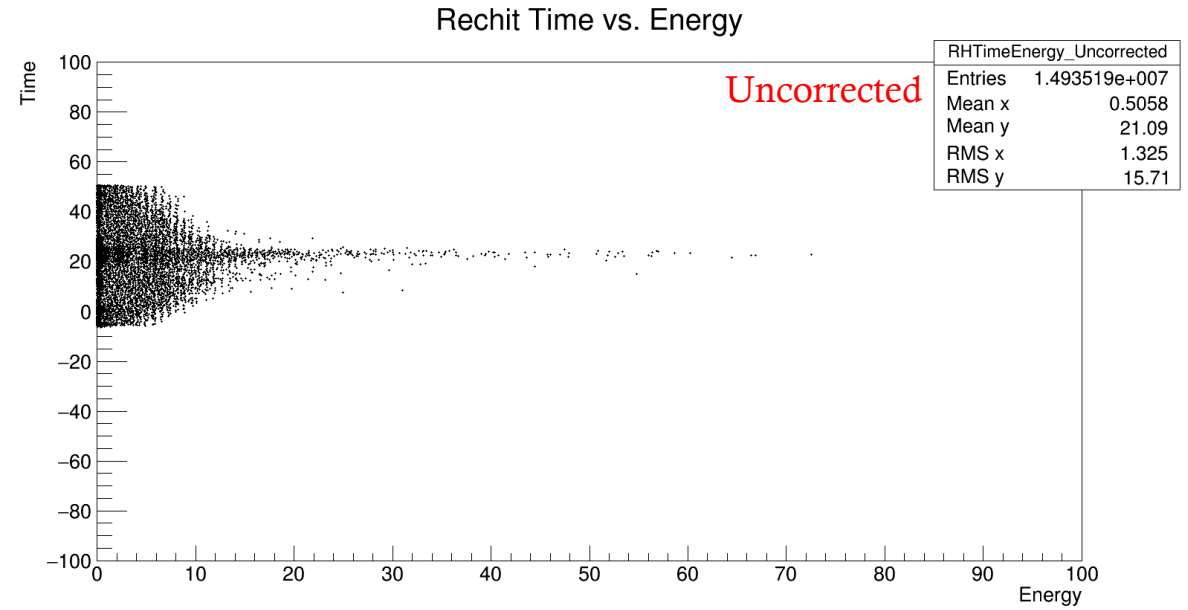
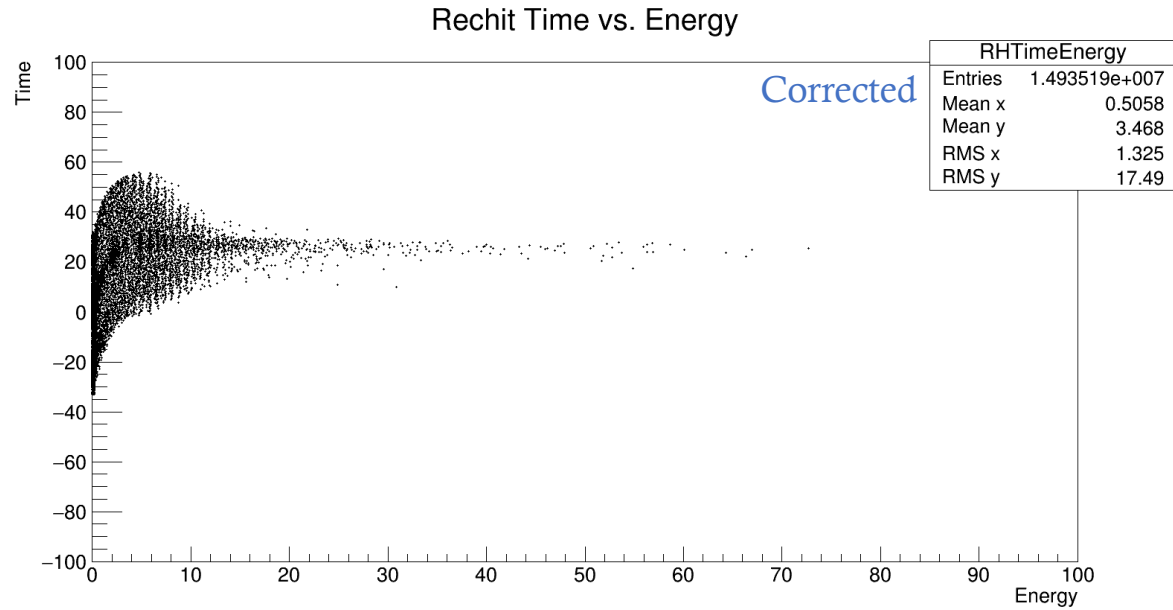
HE TDC Time



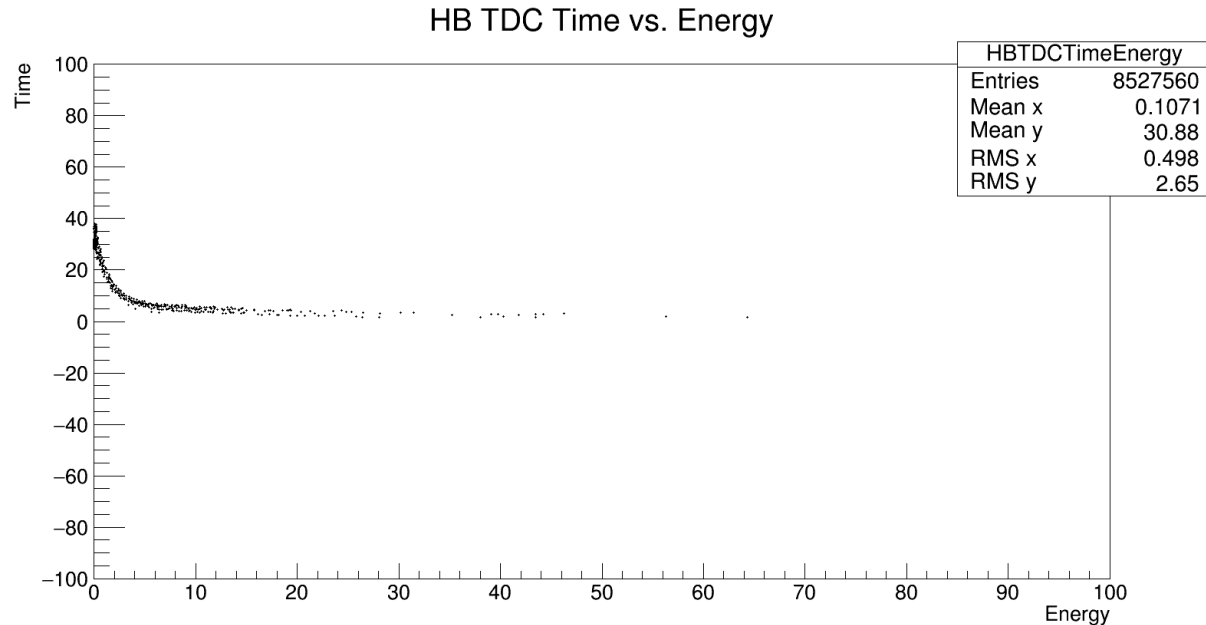
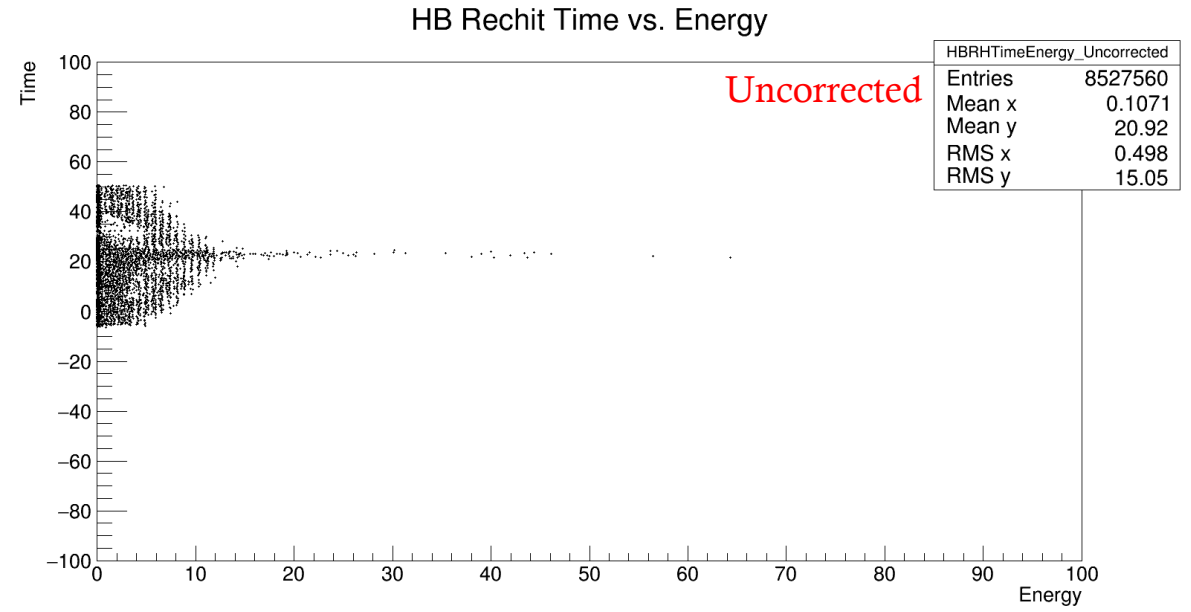
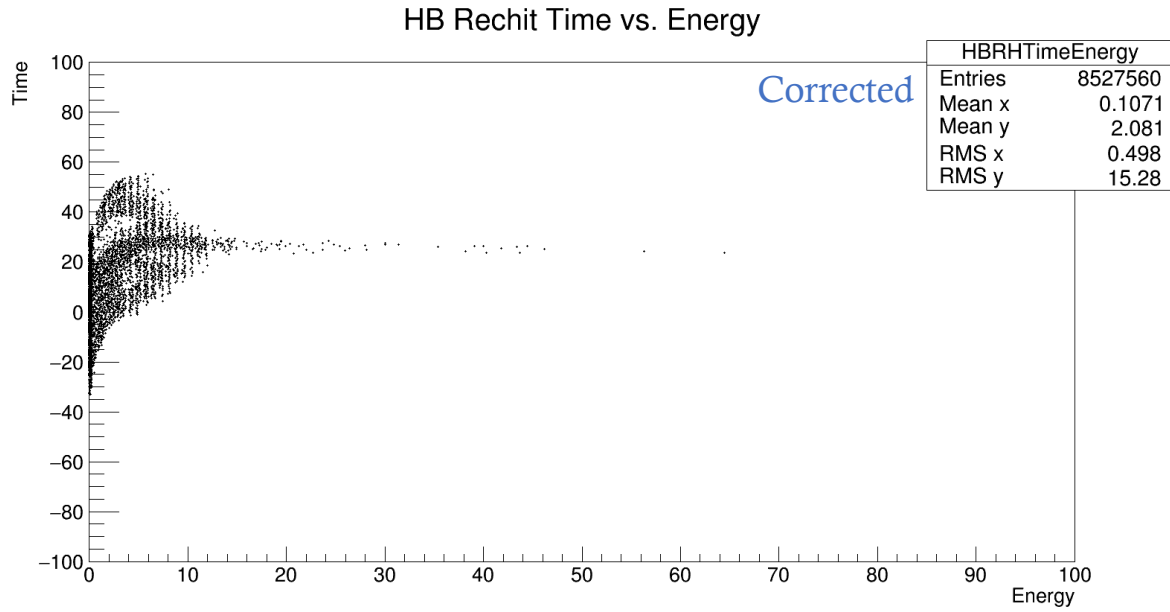
HE TDC Time



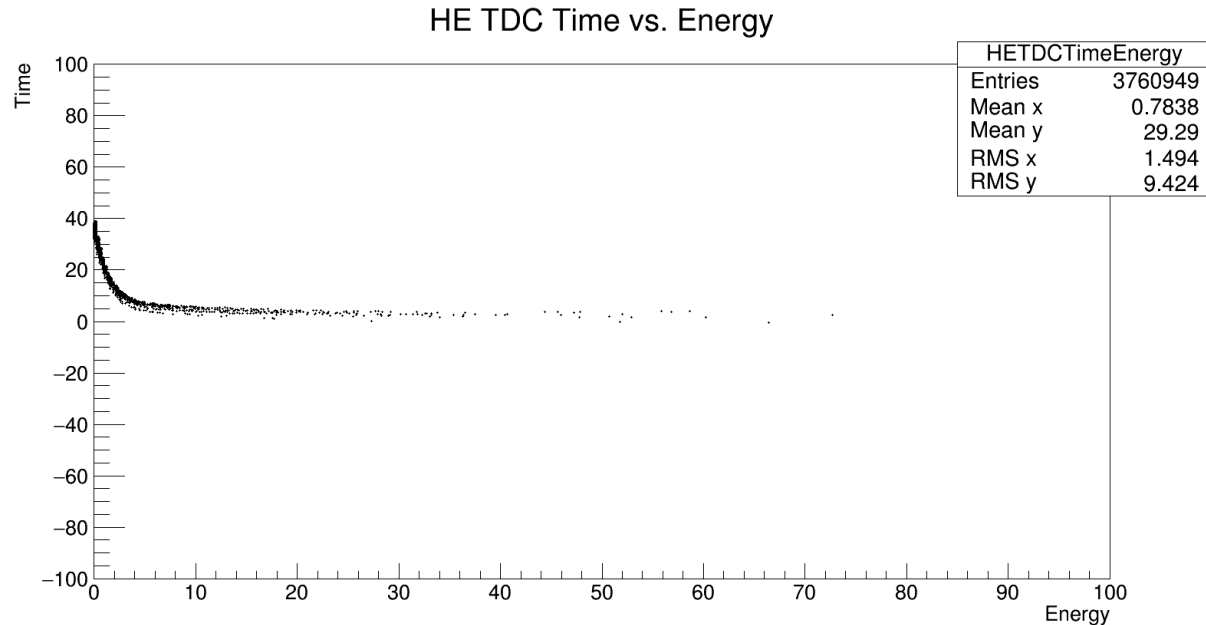
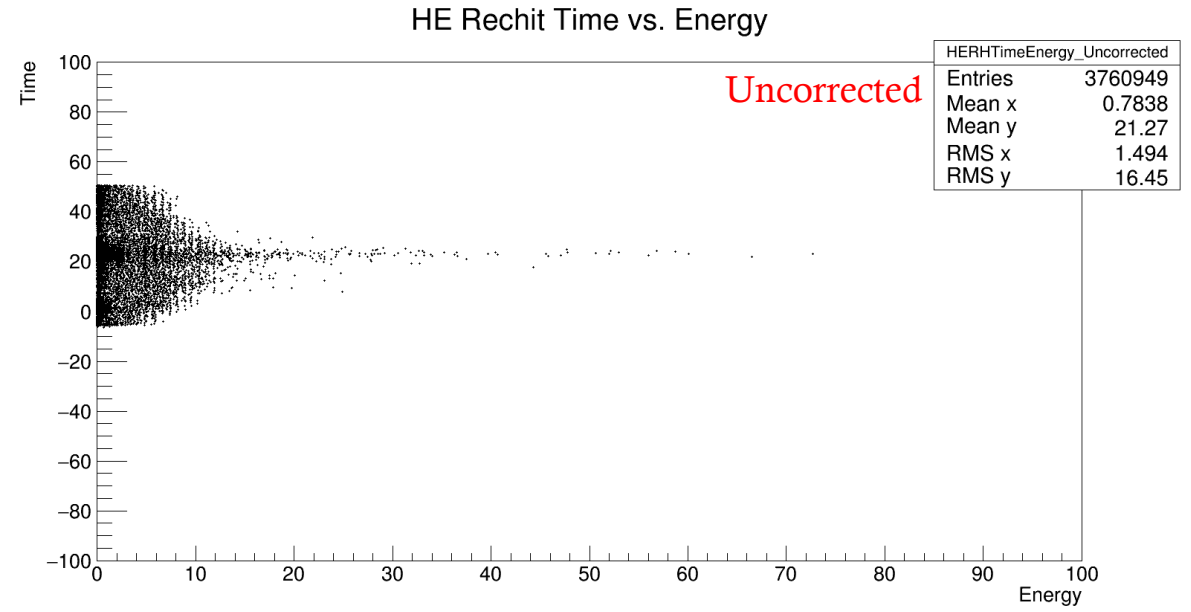
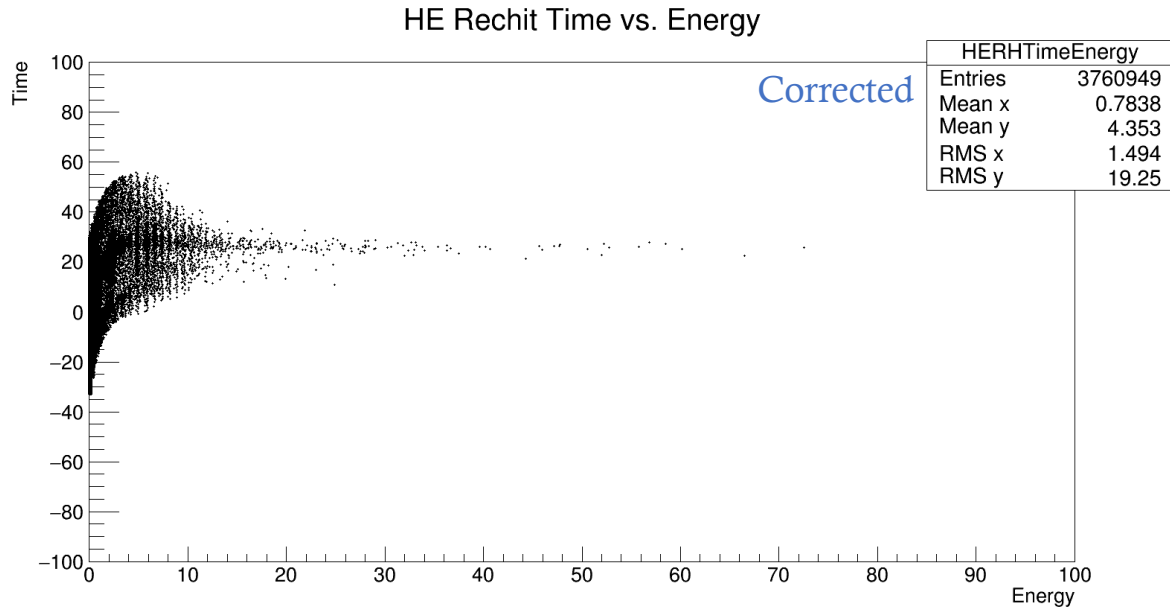
HBHE Rechit Time vs. Energy for **method0** (2.5 GeV energy cut)



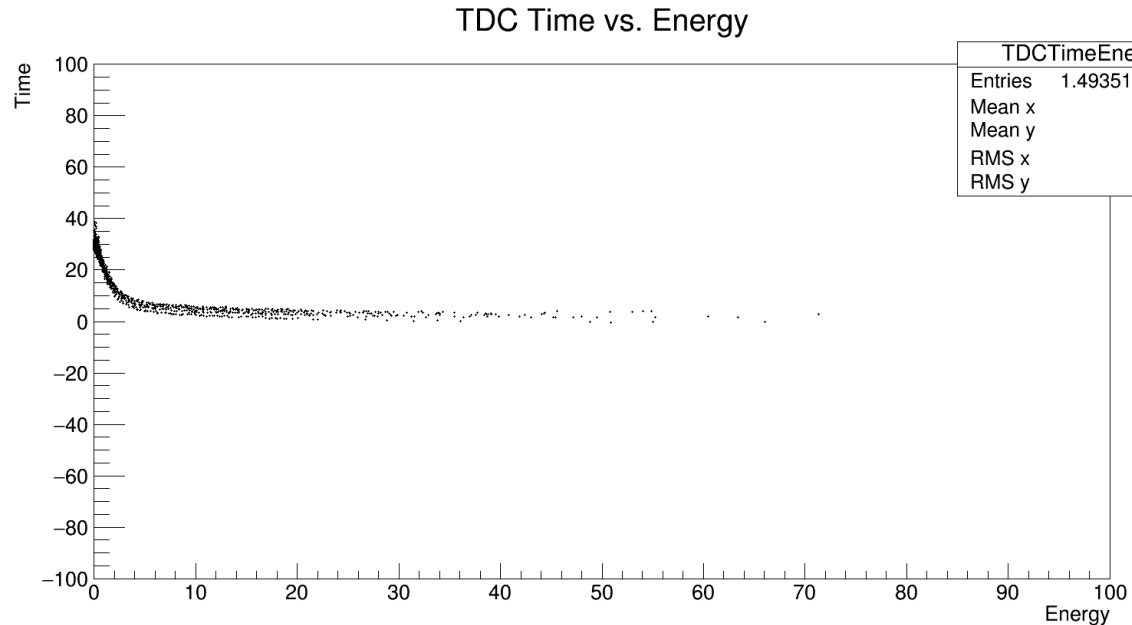
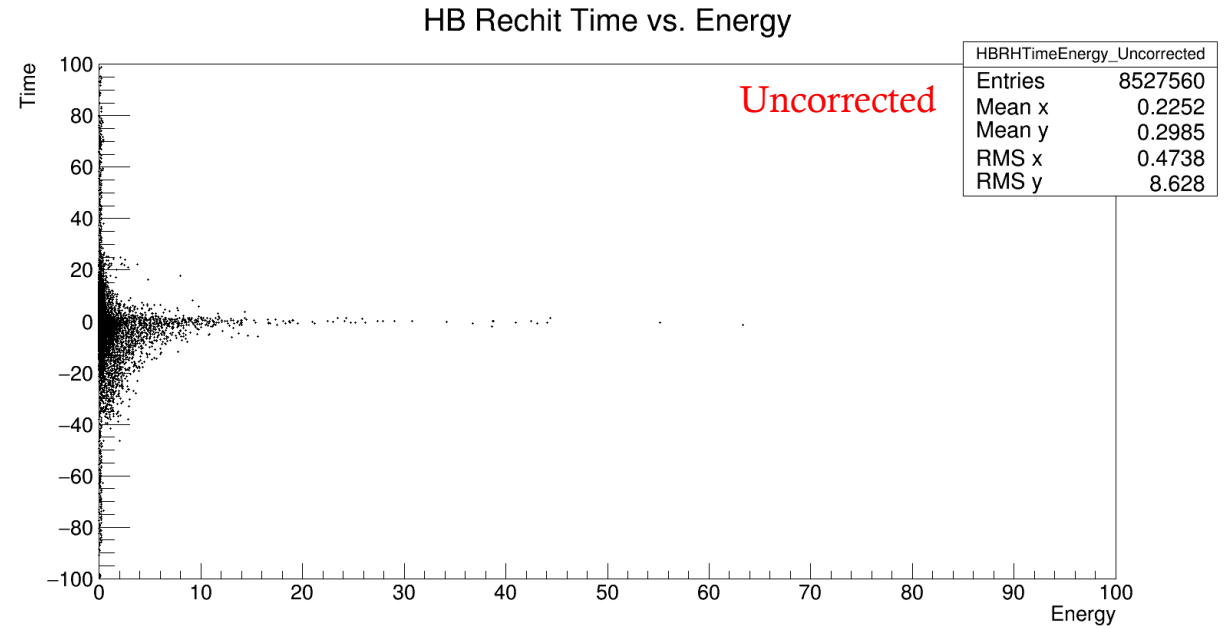
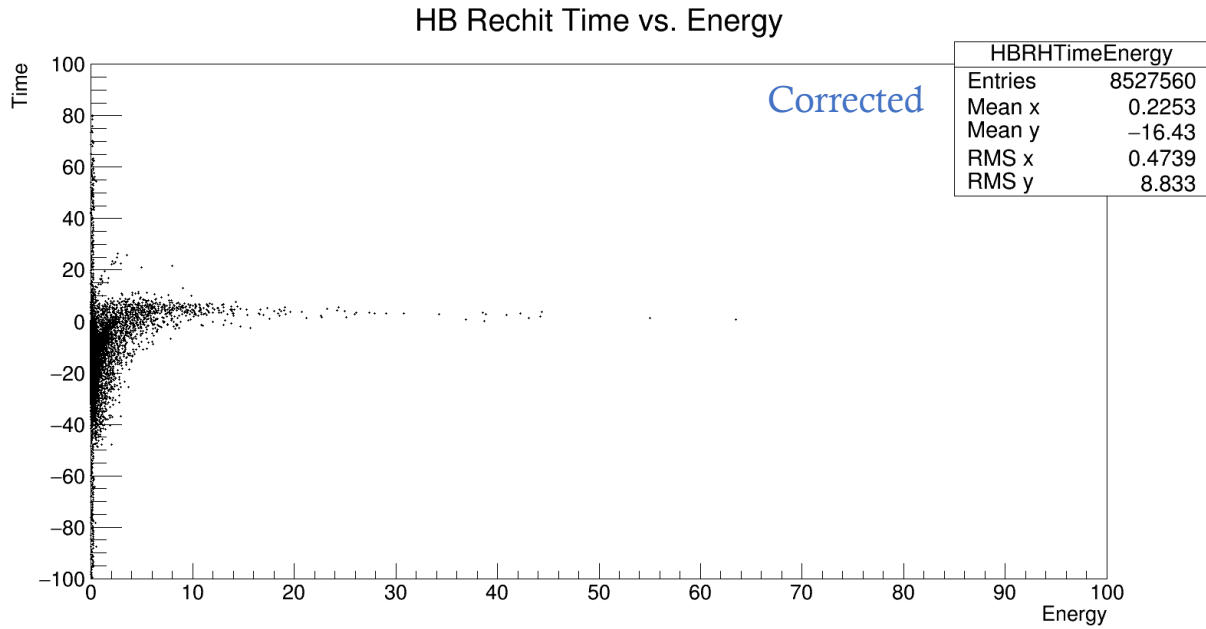
HB Rechit Time vs. Energy for **method0** (2.5 GeV energy cut)



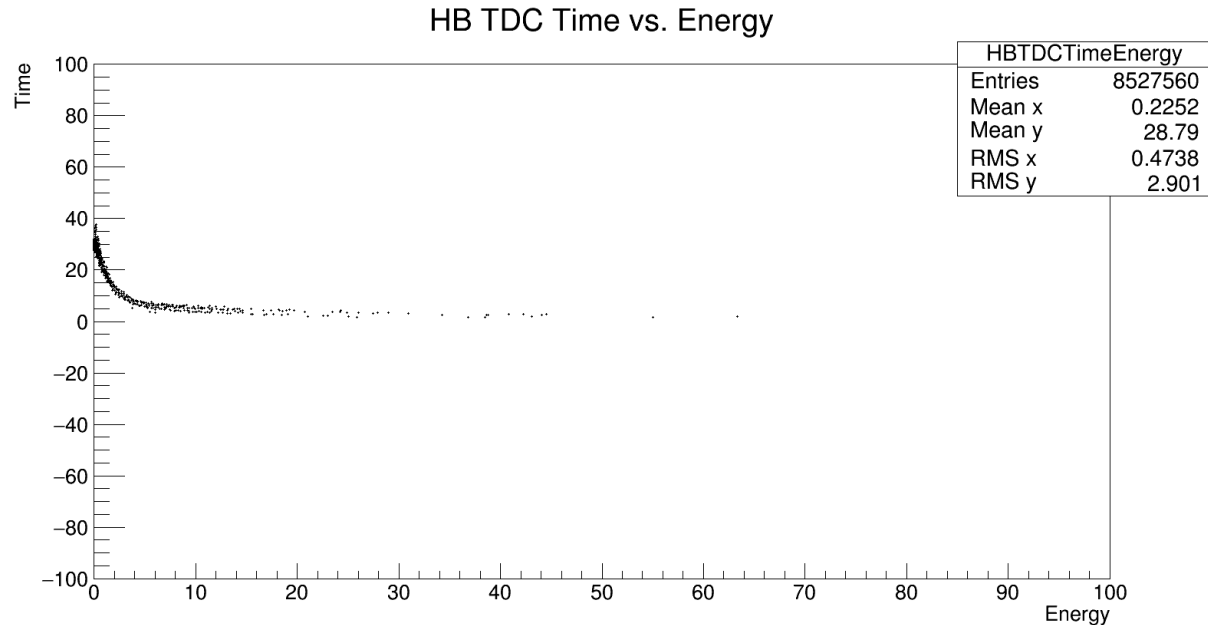
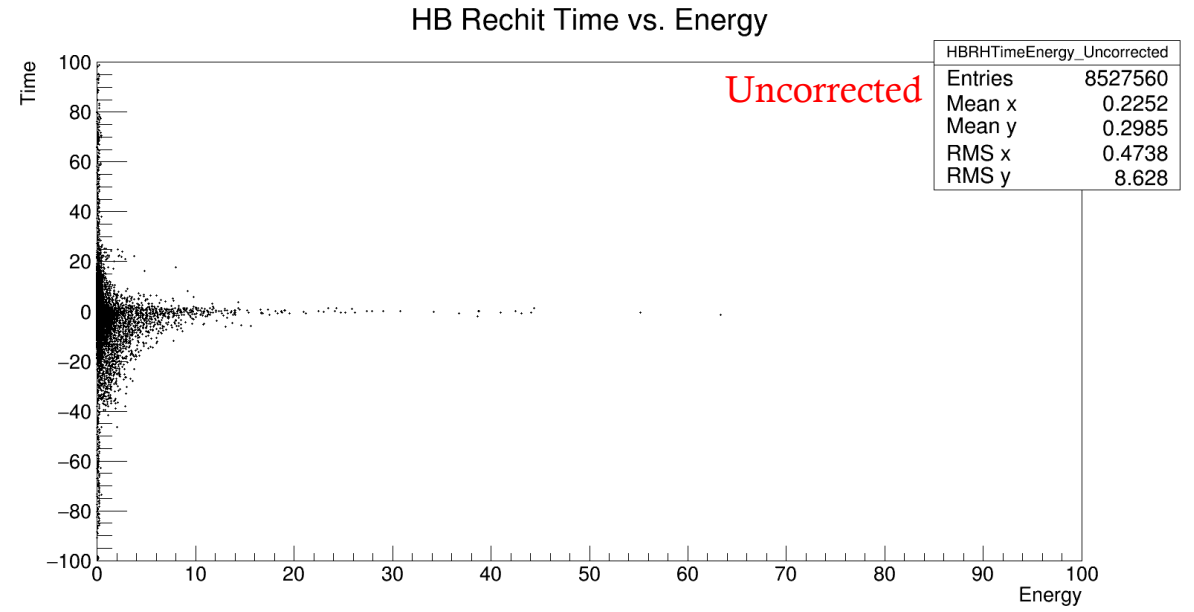
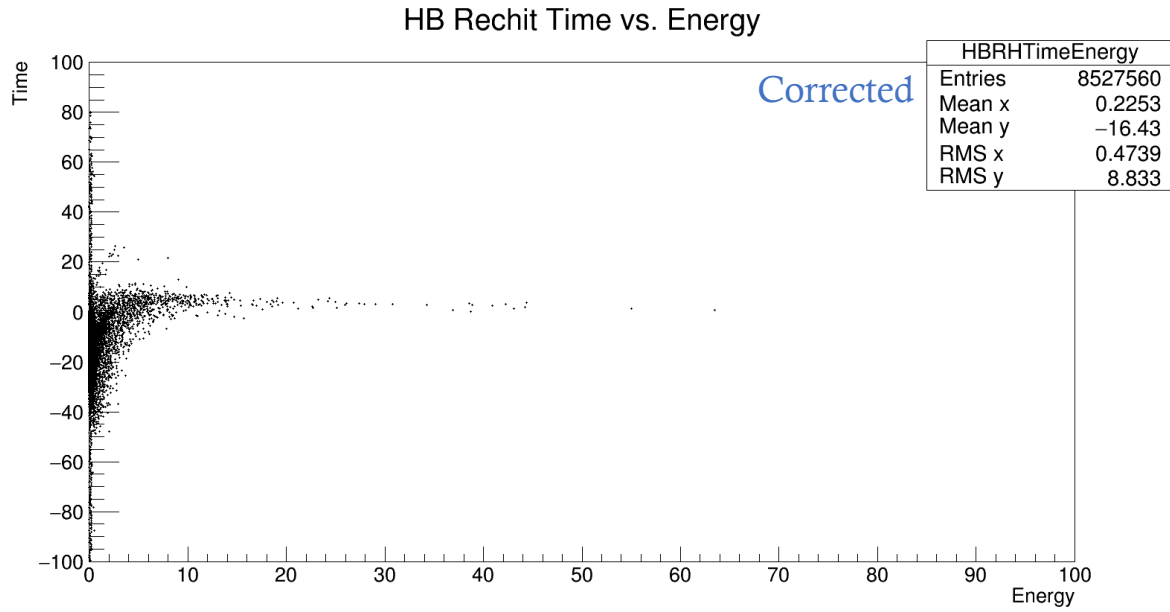
HE Rechit Time vs. Energy for **method0** (2.5 GeV energy cut)



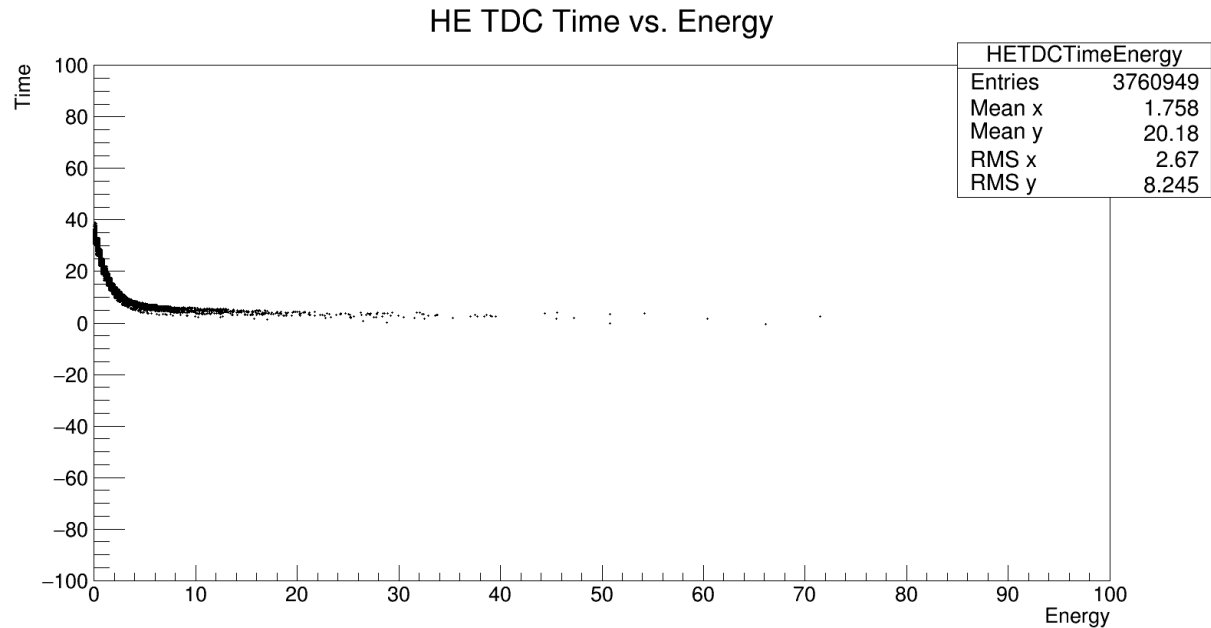
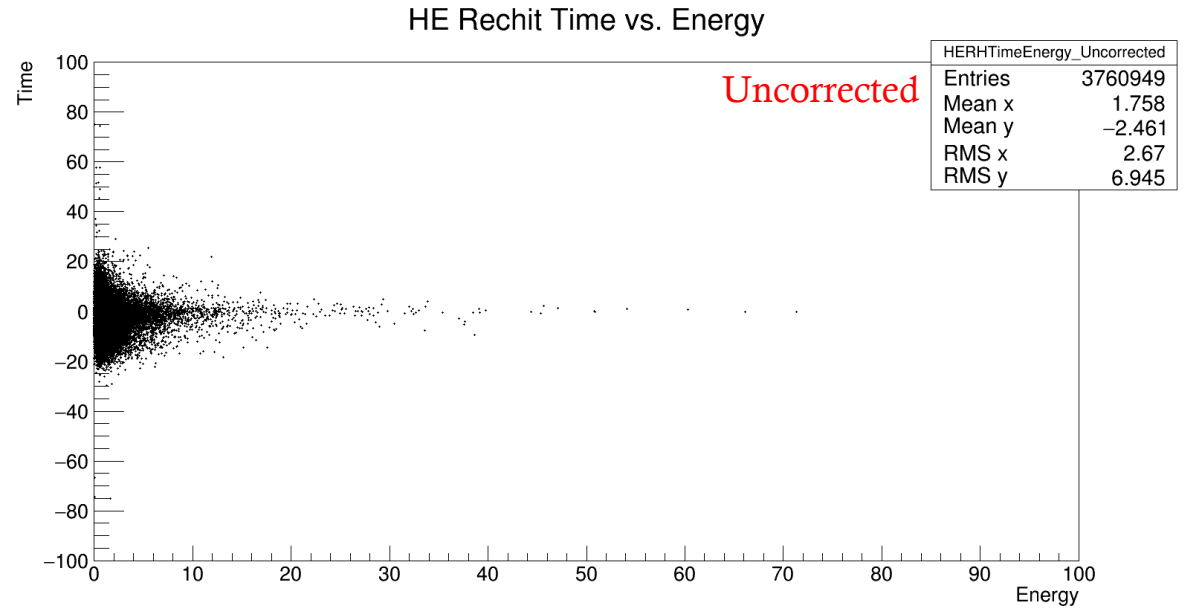
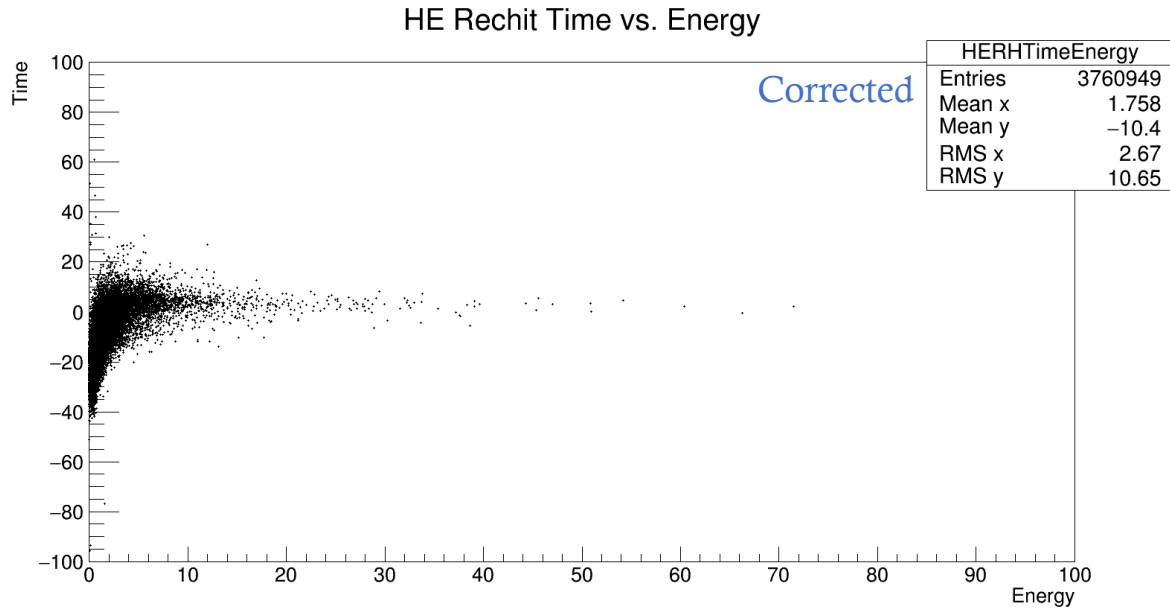
HBHE Rechit Time vs. Energy for **method2** (2.5 GeV energy cut)



HB Rechit Time vs. Energy for **method2** (2.5 GeV energy cut)

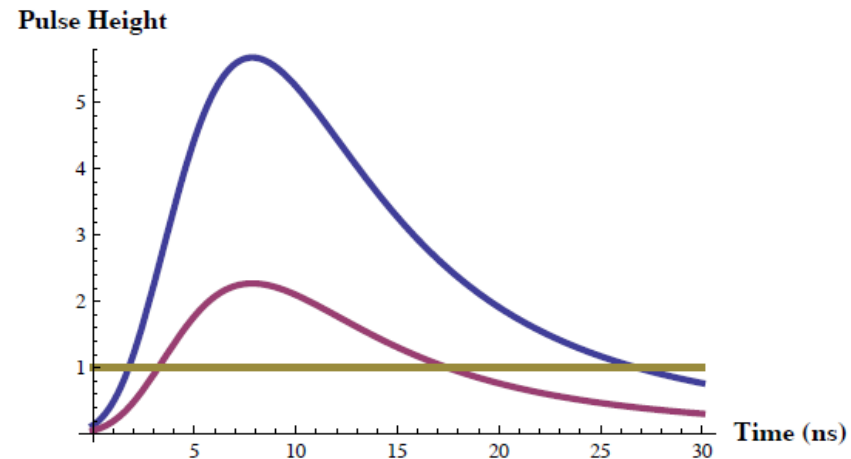


HE Rechit Time vs. Energy for **method2** (2.5 GeV energy cut)



What Does TDC Correction Mean? -1-

- The TDC collects time information associated with these hits by recording a digital value when the energy pulse in its channel has passed a certain threshold.



- The time value recorded for a lower energy pulse will be somewhat later, since it takes longer to pass the TDC threshold, despite the fact that it occurs at essentially the same time as the higher energy pulse in reality.

What Does TDC Correction Mean? -2-

- Once the correlation between hit energy and TDC-based time was observed, it's possible to fit the profile of the curve observed in the time vs. energy plane.
- With fit functions applied, we will be able to adjust the “late” time values recorded at lower energies.
- This calibration of the TDC-based time values for low-energy hits improves the time resolution.