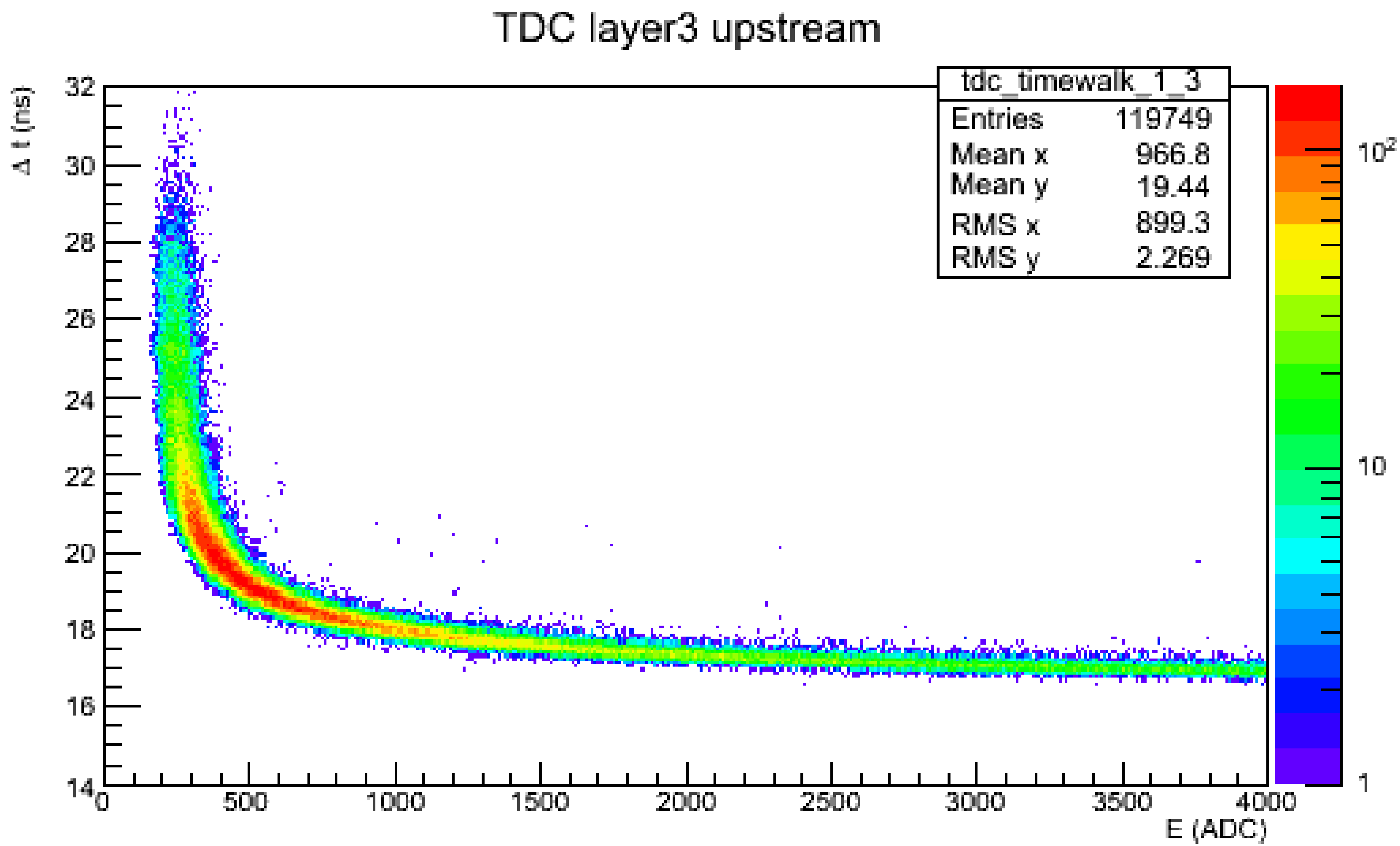
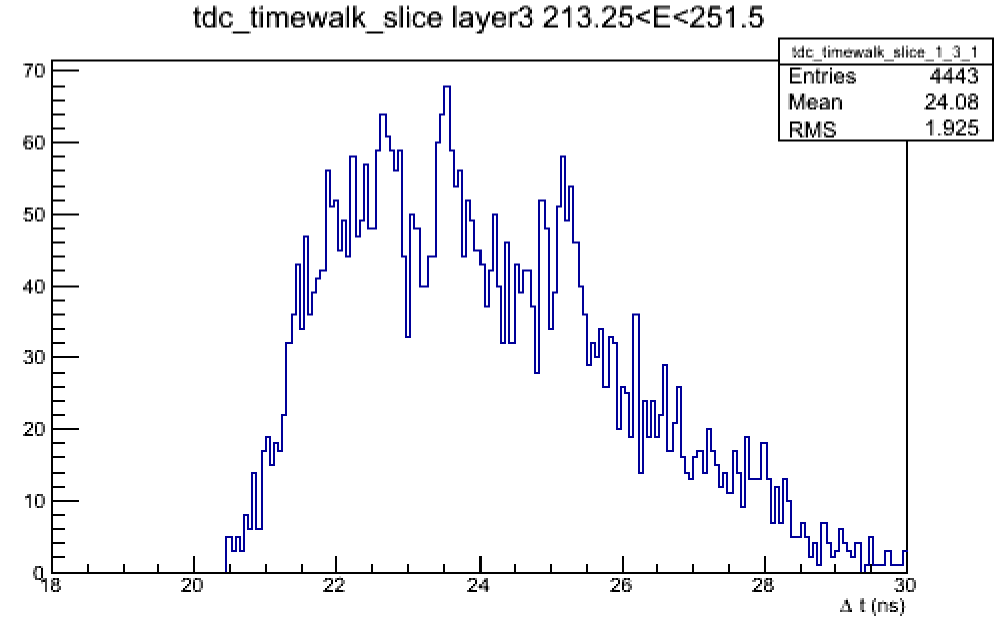
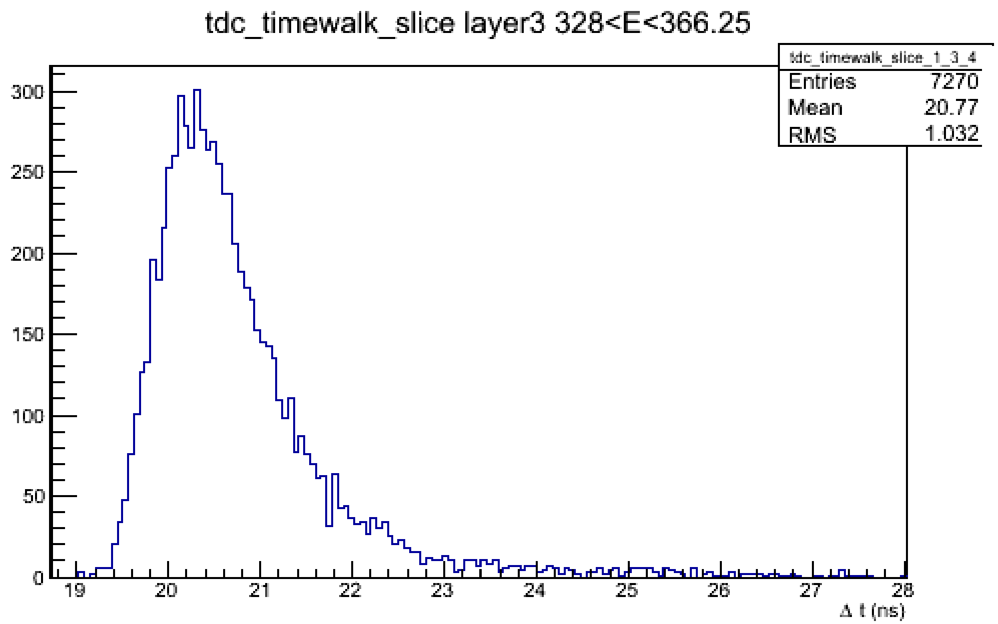
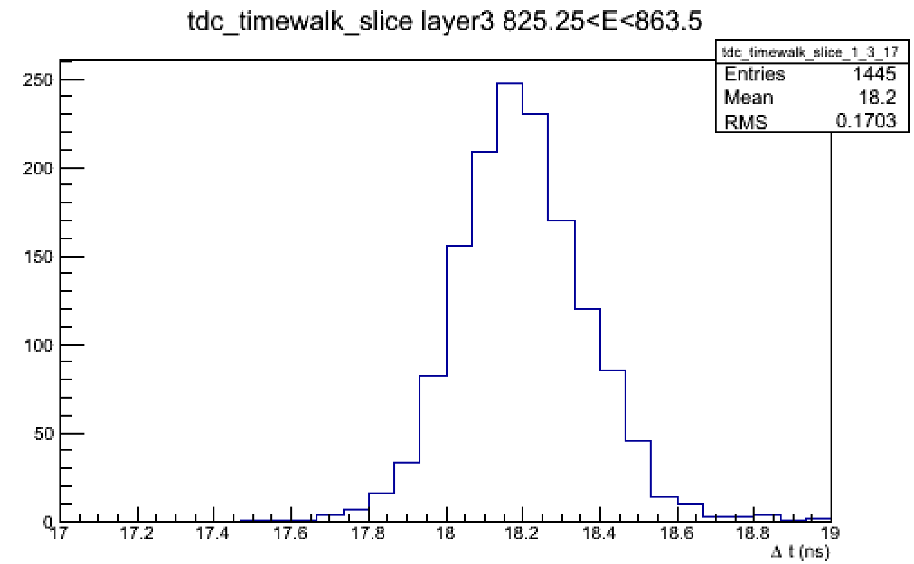

TDC layer3 upstream
tdc_timewalk_1_3
Entries 119749
Mean x 966.8
Mean y 19.44
RMS x 899.3
RMS y 2.269
Δ t (ns)
E (ADC)
32
30
28
26
24
22
20
18
16
14
0
500
1000
1500
2000
2500
3000
3500
4000
10²
10
1

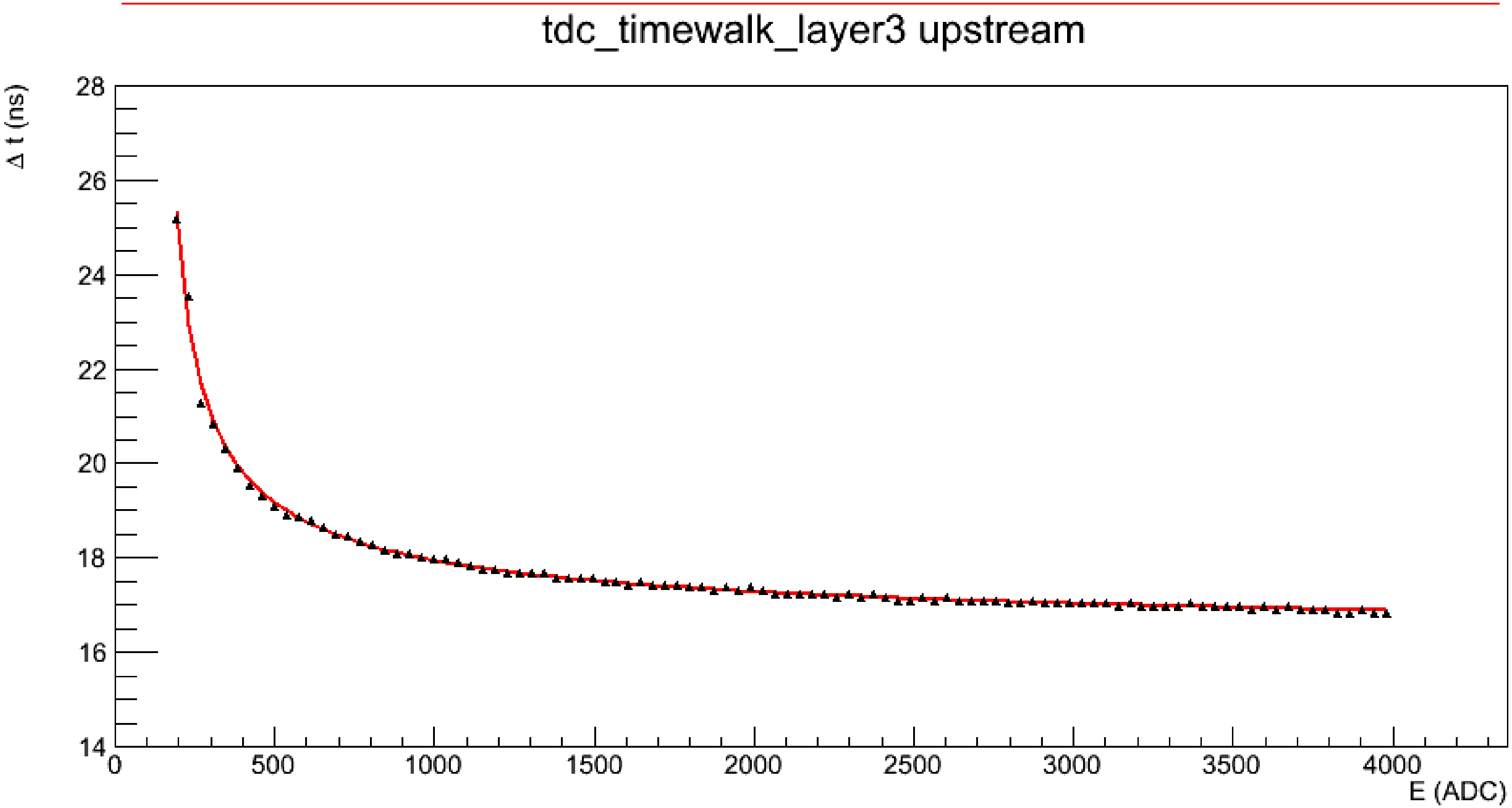
Histogram slices in E





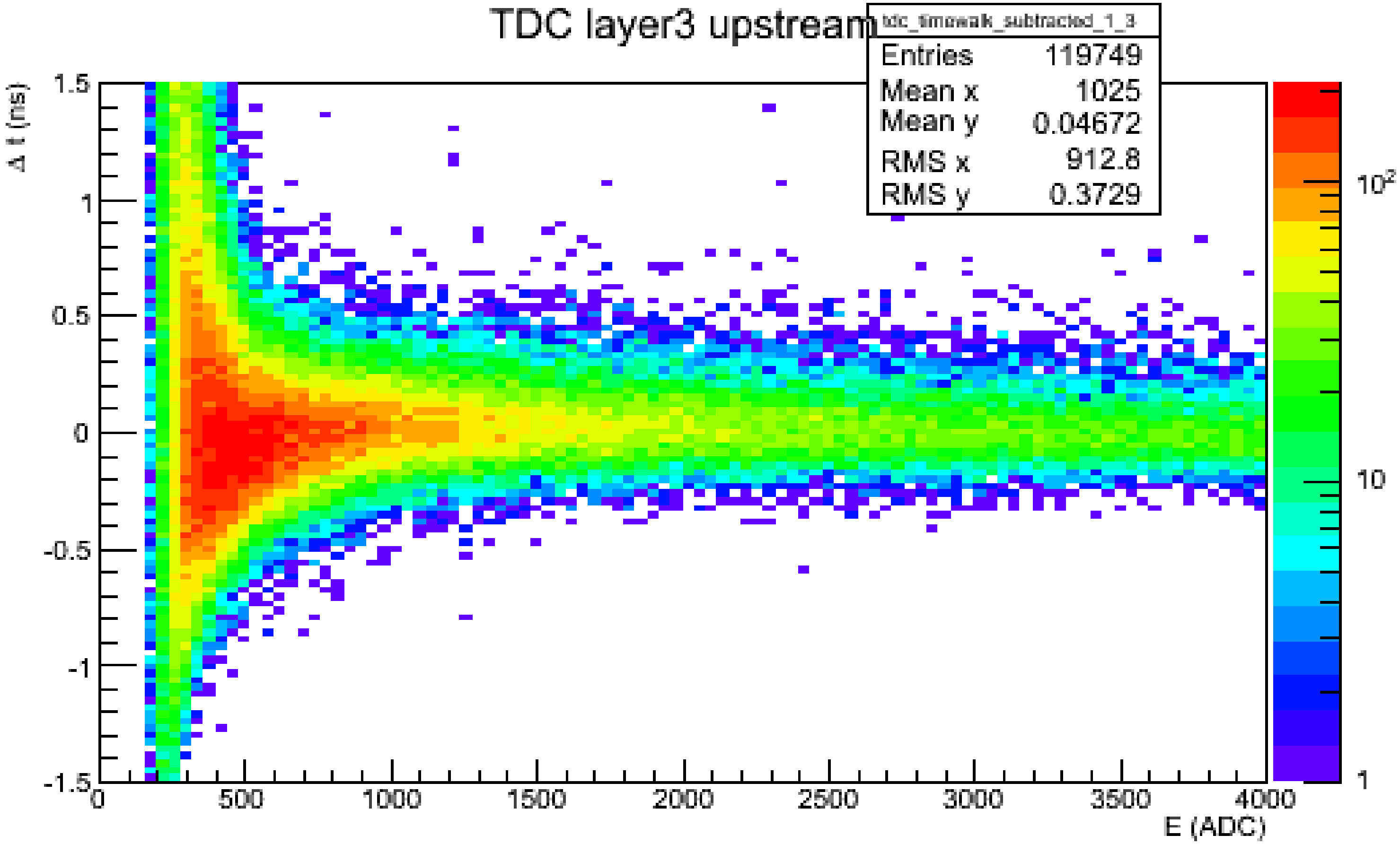


Plot maximum bin vs E

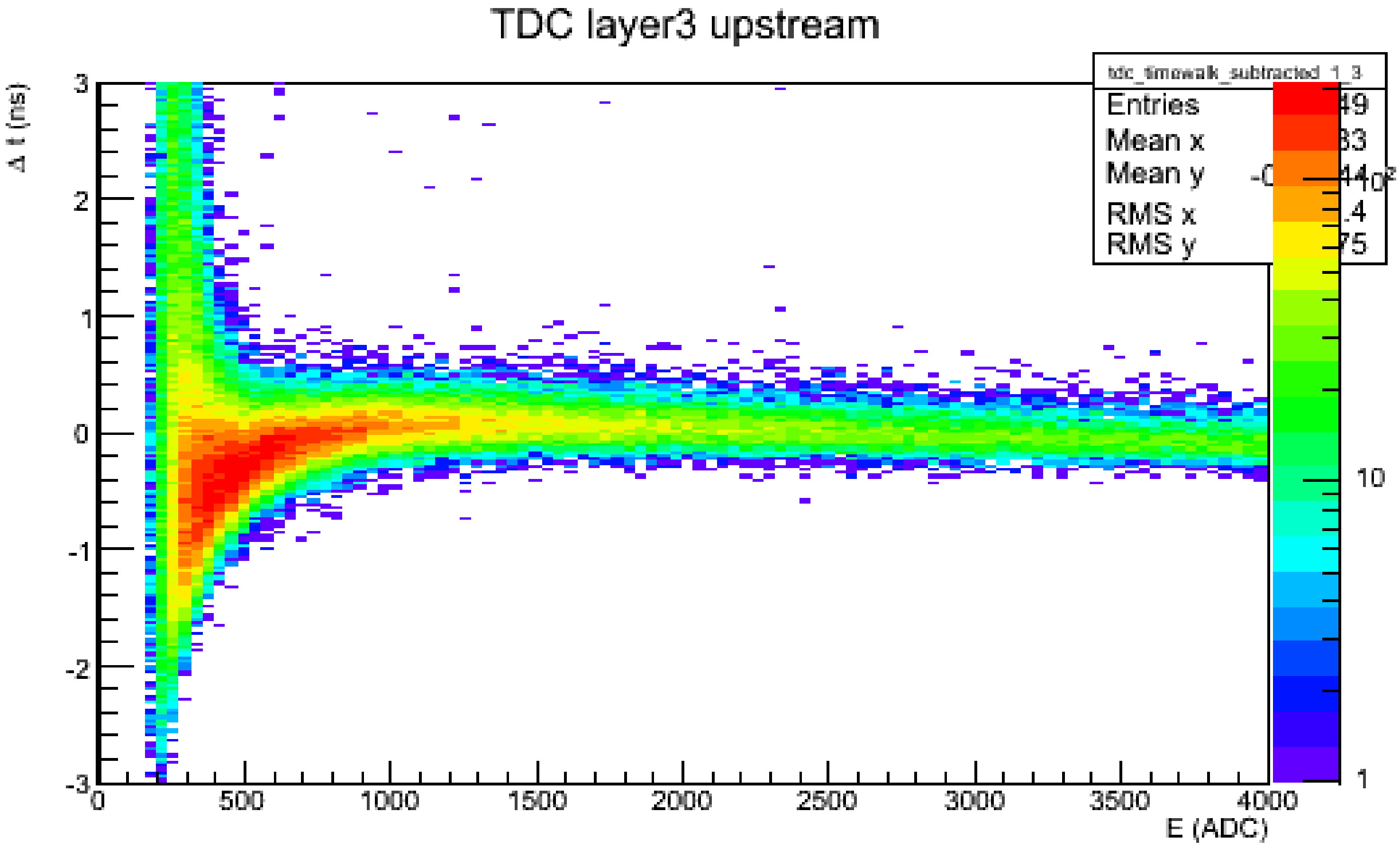


f(E)= $c_0 + \frac{c_1}{(E - c_3)^{c_2}}$

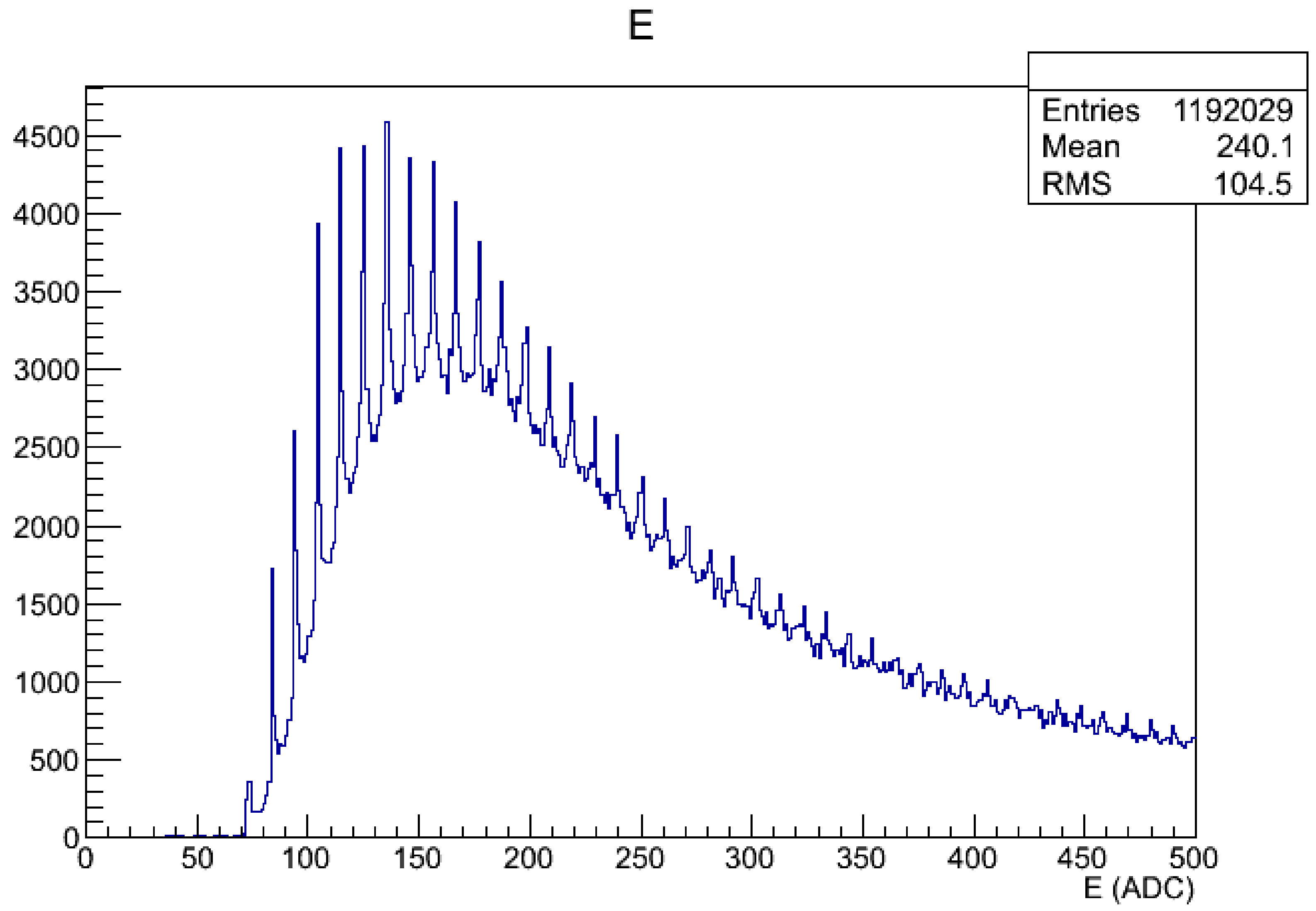
Timewalk minus corrections (fit to max)



Timewalk minus corrections (fit to mean)



Energy Spectrum (after mcsmear)



mcsmear

1. Input from hdgeant: time-spectra for each SiPM
   1. 100 ps bins
   2. Different spectra for different incident particles
   3. Units: “attenuated MeV”
2. Sampling fluctuations applied
3. Merge spectra from same SiPM, different incident particles
4. Photoelectrons/Poisson statistics
   1. Integrate spectrum, multiply integral by constant factor to convert MeV to mean # of photoelectrons
   2. Sample from Poisson distribution with this mean to get number of photoelectrons
   3. Scale spectrum by NPE/(mean NPE), so that spectrum corresponds to integral number of photoelectrons

mcsmear

5. Apply time jitter--energy integral remains constant
6. Add dark hits (for SiPMs with real hits)
7. Sum together SiPM readout by the same fADC
8. Add dark hits (for all other SiPMs)
9. Convolute spectrum with electronic pulse shape
    1. Units converted to mV
10. Find ADC hits
    1. Find threshold (=4 mV) crossing
    2. Integrate from t=-20 to 180 ns relative to threshold crossing time
    3. Convert mV to ADC units

mcsmear

11. Time smearing for fADC hits
12. Find TDC hit
    1. Time when rising edge crosses threshold (higher threshold than ADC)
    2. Can find multiple hits if separated by >20 ns