d_2^n Big Bite Gas Cerenkov Analysis

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Outline

Big Bite Cerenkov Efficiency

Efficiency

- To determine the efficiency of a detector, we select good electrons in one detector, and then see how many show up in another detector.
- Thus efficiency is defined as:

$$\epsilon_{det2} = \frac{\eta_{det2}}{\eta_{det1}}$$

Cerenkov Efficiency

$$\epsilon_{Cer} = \frac{\eta_{Cer}}{\eta_{Shower}}$$

BB Cerenkov Good Electron Cuts

- First good electrons must be selected in the total shower, by plotting the BB preshower vs. shower.

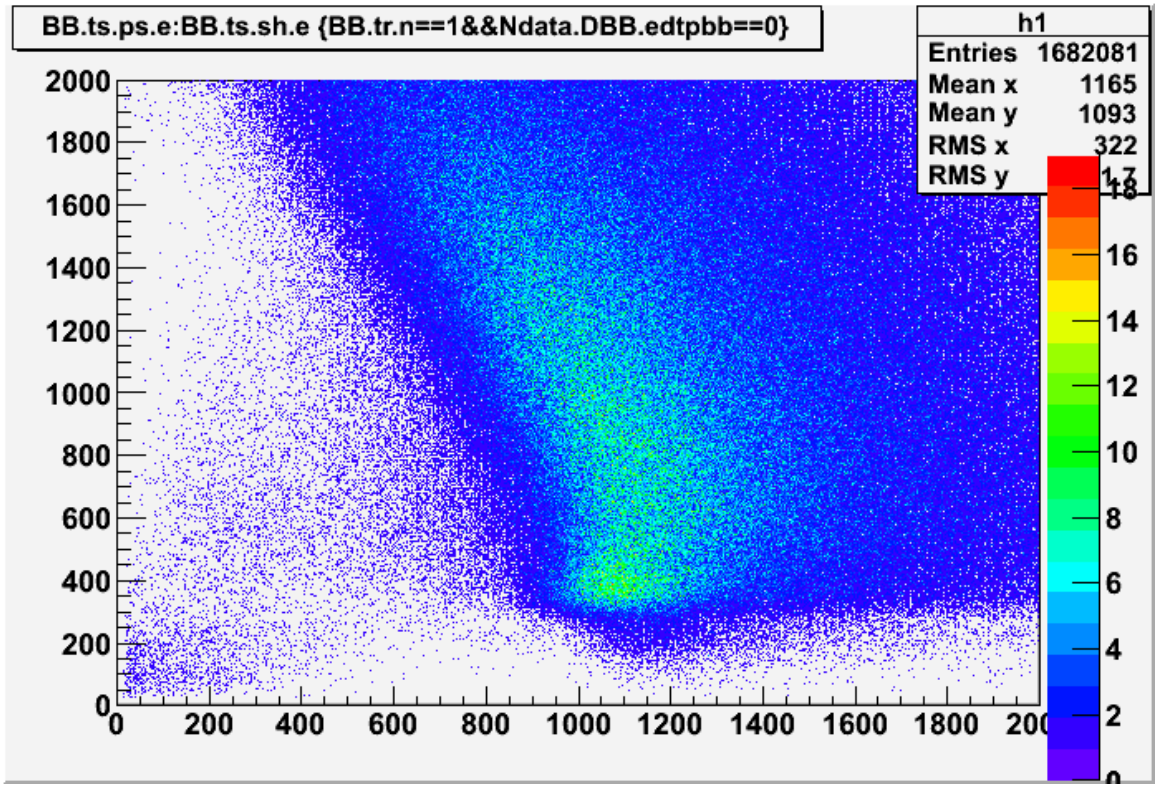


Figure 1: BB runs 2187-2189, requiring one track and no deadtime pulse cuts.

BB Cerenkov TDC Cuts on Shower

- Good electrons can be selected in the total shower by using Cerenkov cuts.
- The first hit of the multihit TDC was used for the TDC cuts.

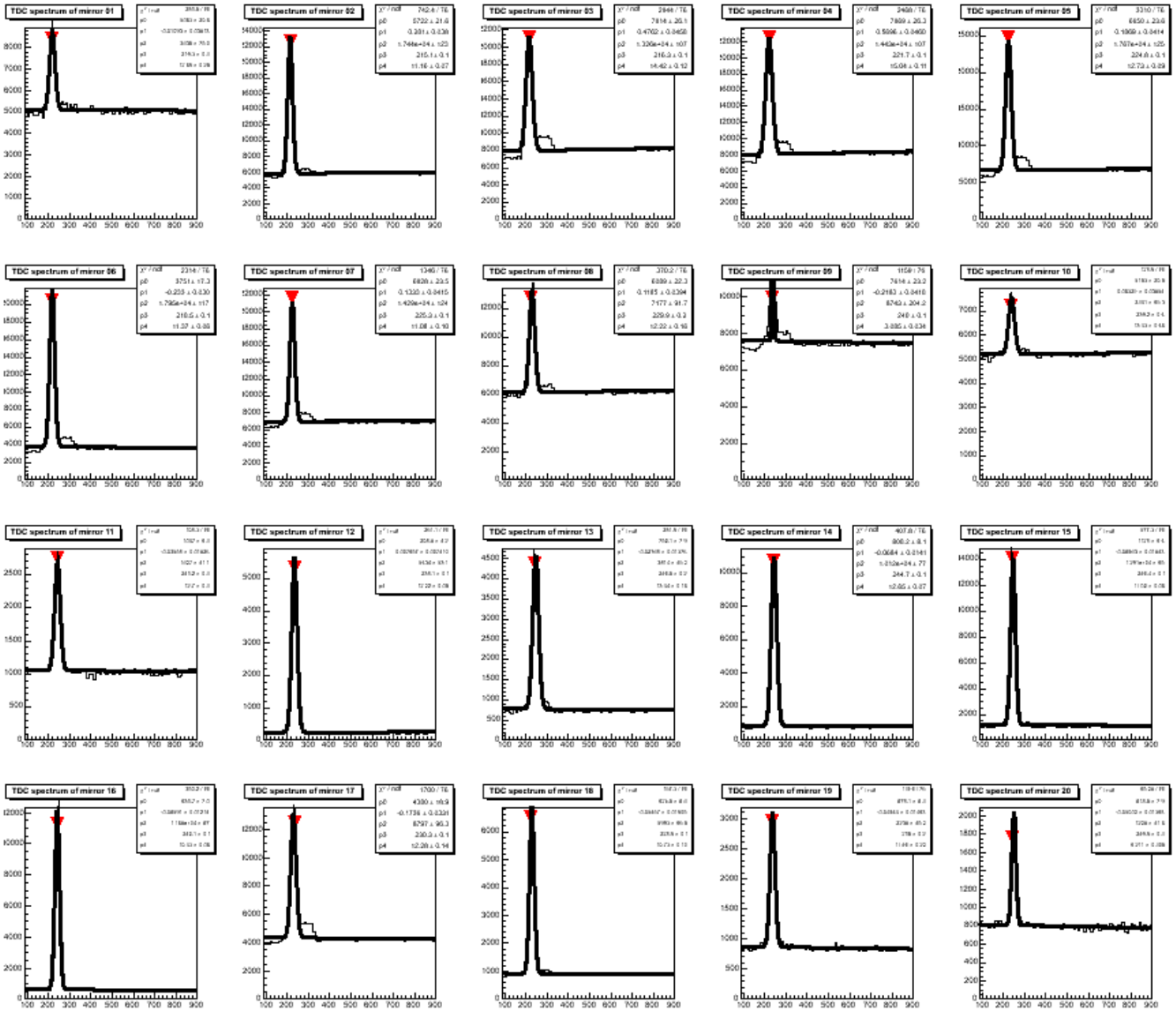


Figure 2: The total multihit TDCs for each PMT.

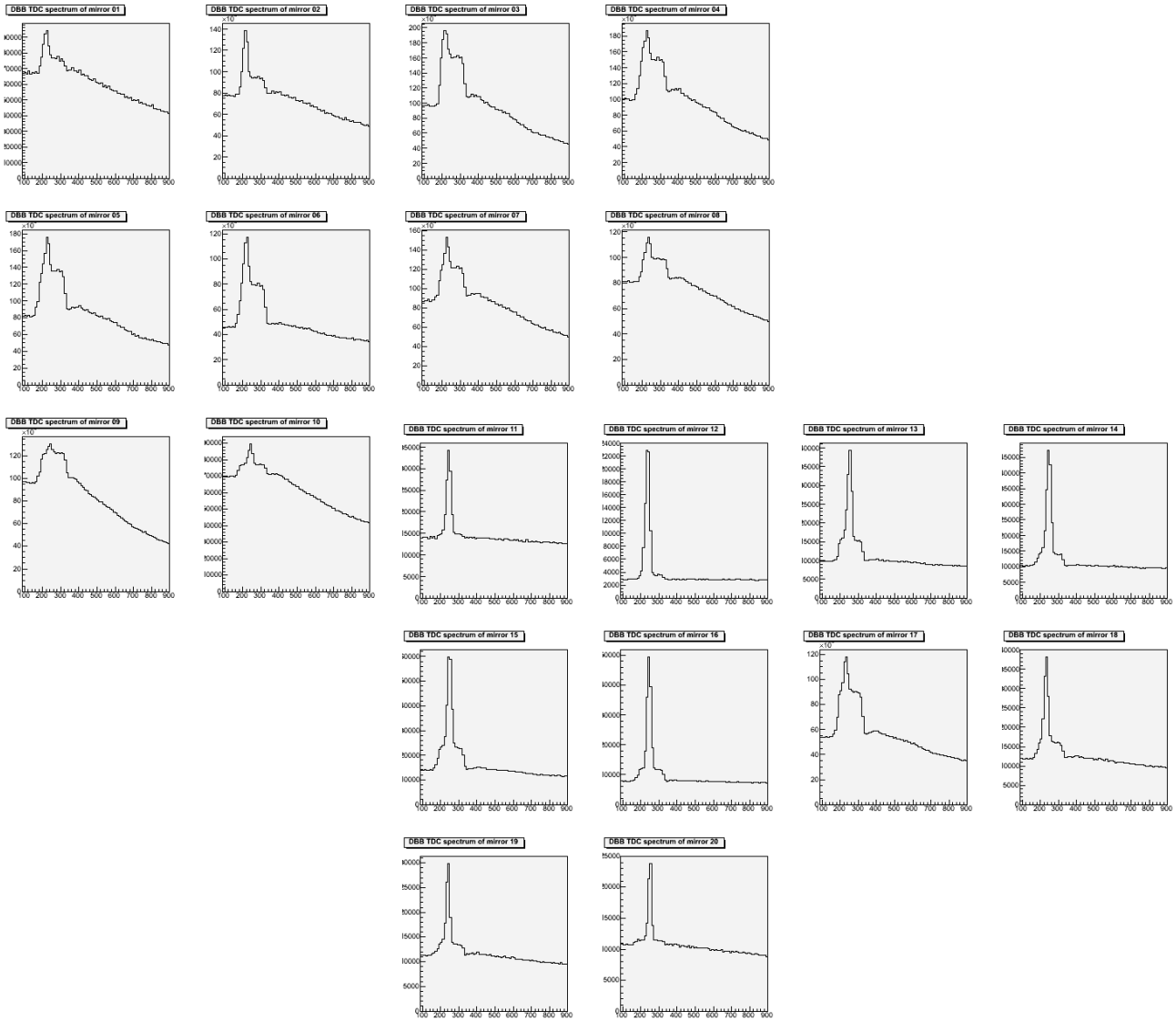


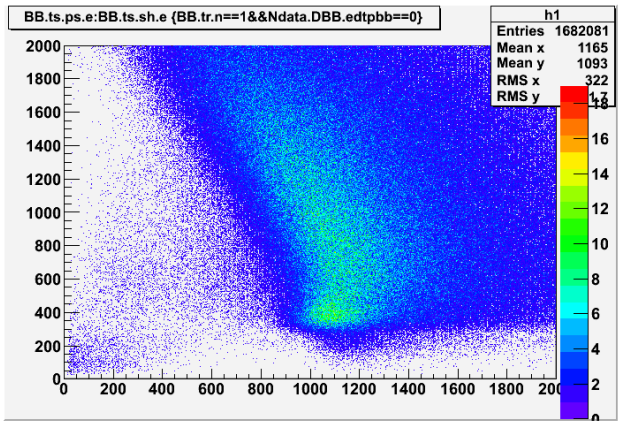
Figure 3: The first hit of the multihit TDCs for each PMT.

Cerenkov TDC Cuts

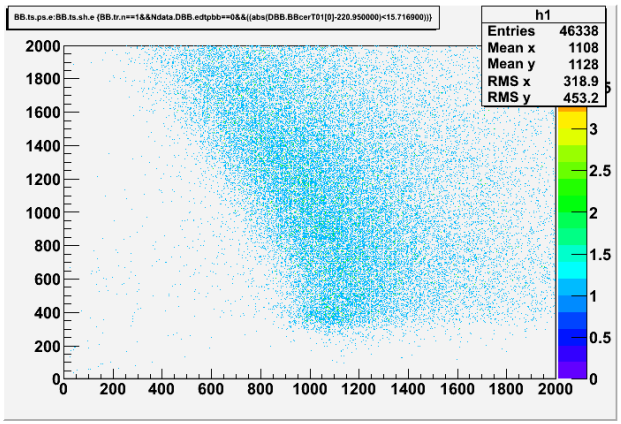
- There seems to be a problem when implementing the TDC cuts on the shower,the number of events is significantly reduced with each TDC cut.
- TDC cuts are defined as:

```
TString tdc_cut="&&(";
for(int i=0;i<20;i++){
    if(i==0){
        tdc_cut+=Form("abs(DBB.BBcerT%02d[0]-%f)<%f)",i+1,tdc_peak[i],tdc_sigma[i]);
    }else{
        tdc_cut+=Form("||(abs(DBB.BBcerT%02d[0]-%f)<%f)",i+1,tdc_peak[i],tdc_sigma[i]);
    }
}
tdc_cut+=")";
```

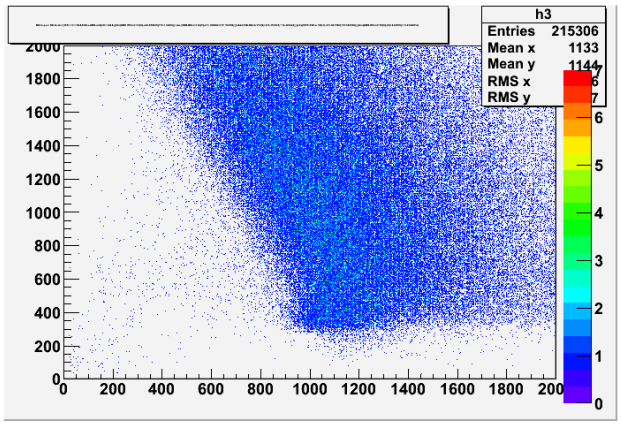
TDC Cuts Applied (1)



a.



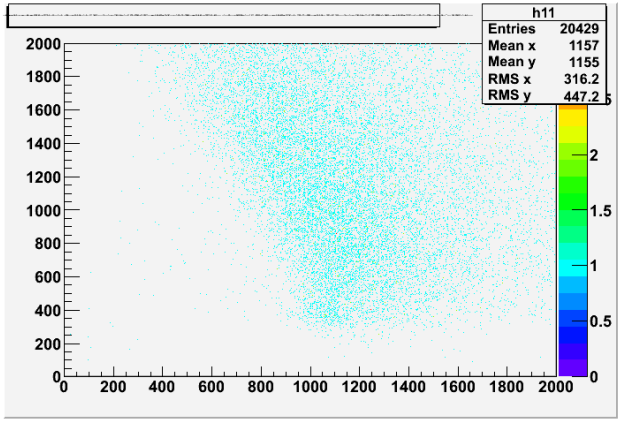
b.



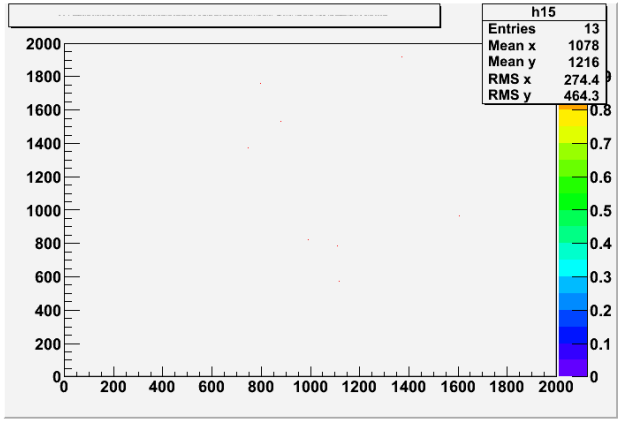
c.

Figure 4: shows BB.ts.ps.e:BB.ts.sh.e with one track,dead time pulse cut and a)no TDC cuts, b) 1 TDC cuts, c) 5 TDC cuts

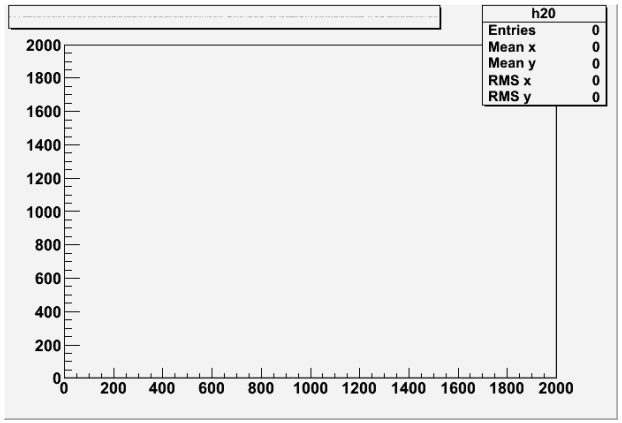
TDC Cuts Applied (2)



a.



b.



c.

Figure 5: shows BB.ts.ps.e:BB.ts.sh.e with one track,dead time pulse cut and a)11 TDC cuts, b) 15 TDC cuts, c) 20 TDC cuts

To-Do

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- Debug Cerenkov TDC cuts
  - Implement the BB.cer class.
- Determine efficiency