Update on waveforms decoding

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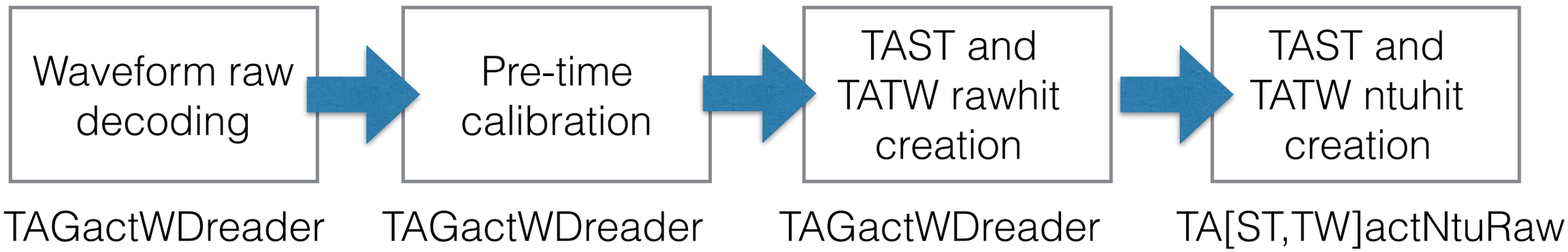
What changes in the new release

- Introduced TAGbaseWDparTime to store the WaveDream time calibrations (TASTparTime and TATWparTime removed)
- Introduced TAGbaseWDparMap to store the WaveDream mapping
- New code structure to the improve the code efficiency. Now a ToF pre-calibration (trigger cell correction and clock jitter evaluation and subtraction) is performed and applied to each waveform. Then, each hit is created by processing the properly calibrated waveform.



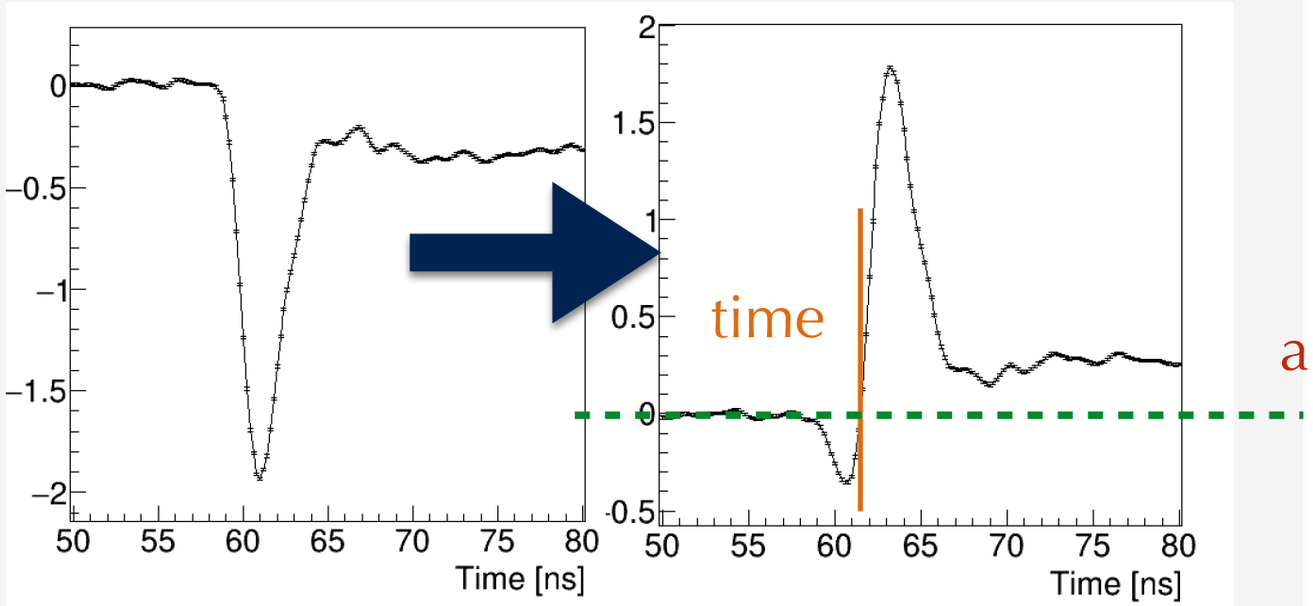
decoding rate ~ 50Hz (BM,ST,TW,VTX enabled)

What changes in the new release

- Added folder WDTimeCalibration in $FOOTLEVEL0/config and $FOOTLEVEL0/config/GSI. The folders contain the WD time calibration files for each run acquired @ GSI (tcalib<runid>.dat)
- The BaseReco classes has been updated in order to automatically load the proper calibration file accordingly to the run id.

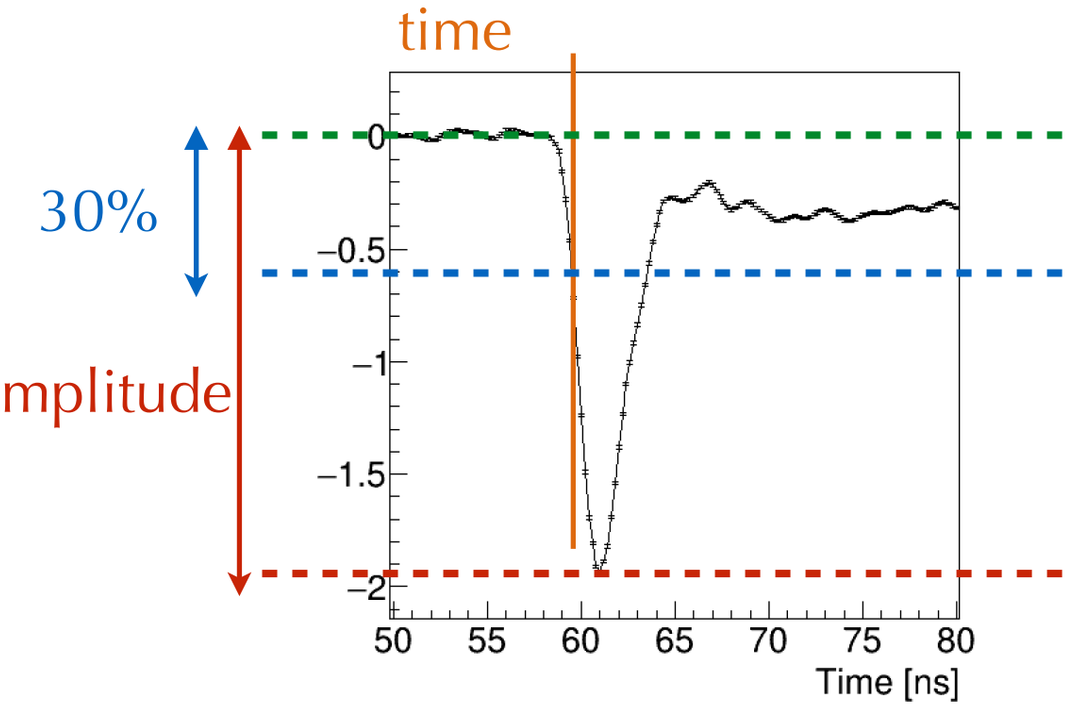
Alternative timestamp computation method

Digital CFD (already implemented)



$$v(t) = v(t - \tau_{\mathrm{del}}) - f \cdot v(t)$$

simple CFD



- A simple CFD method to compute the timestamp of each waveform has been added, to allow the implementation of the ToF calibration currently available, provided by the Pisa guys.
- The method consists of using linear interpolation to extract the time corresponding of the 30% of the amplitude.

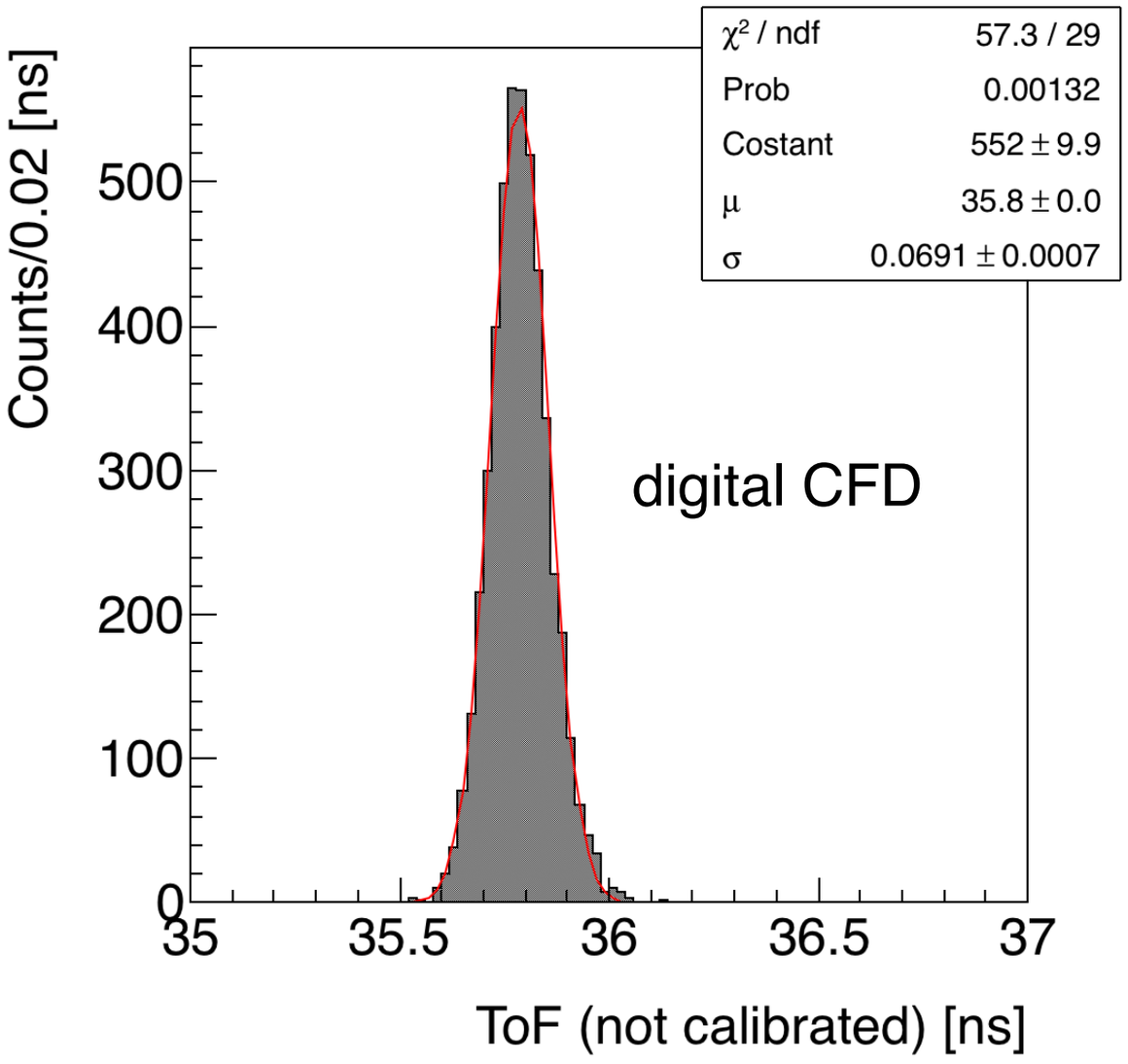
Alternative timestamp computation method

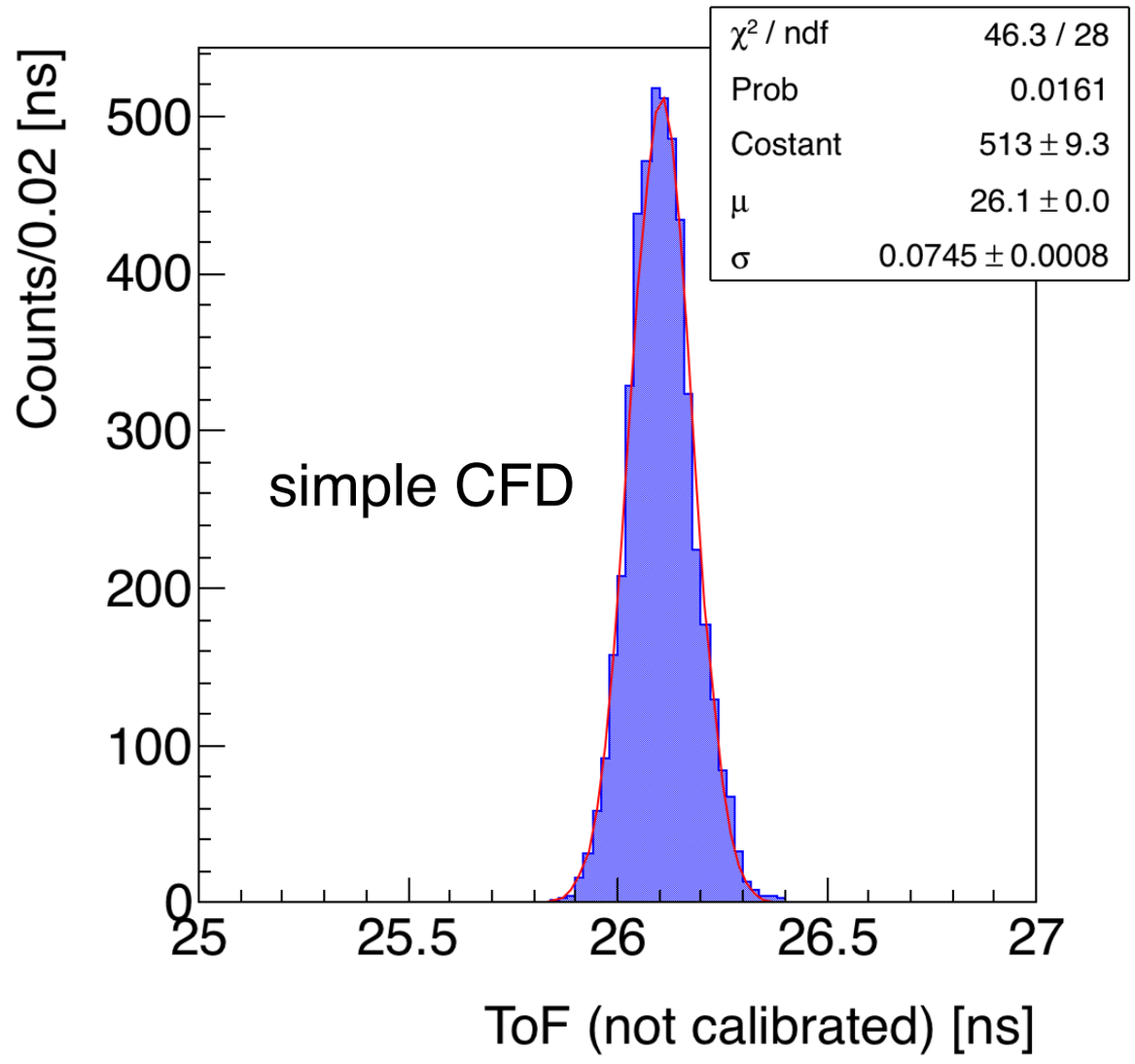
```
class TATWntuHit : public TAGobject {

private:
    Int_t    m_layer;
    Int_t    m_bar;
    Double_t m_de;                    // energy loss in the scint
    Double_t m_time;                  // timestamp digital CFD
    Double_t m_time_oth;              // timestamp simple CFD
    Double_t m_timeOfFlight;          // time of flight
    Double_t m_coordinate;            // x or y coordinate in the
    Double_t m_z;                     // z coordinate in the loca
    Int_t    m_chargeZ;               // atomic charge Z (tmp sol
    Double_t m_chargeCOM;             // Center of Mass evaluated
    TArrayI  m_MCindex;               // Id of the hit created in
    TArrayI  m_McTrackId;             // Id of the track created
    Double_t m_ChargeA;
    Double_t m_ChargeB;
    Double_t m_TimeA;
    Double_t m_TimeB;
   Double_t m_TimeA_oth;
    Double_t m_TimeB_oth;
```

The timestamps obtained with this method are flagged with the **oth** string in the name

- I decided to keep both the methods, waiting to know which is the most performing.

ToF resolution





- run 2212, 5k events, ToF of the 9th bar, layer0
- The “old” method seems to be a bit better. However, at present the ToF calibration is performed with the second method.