BIC calibration

Minho Kim
Argonne National Laboratory

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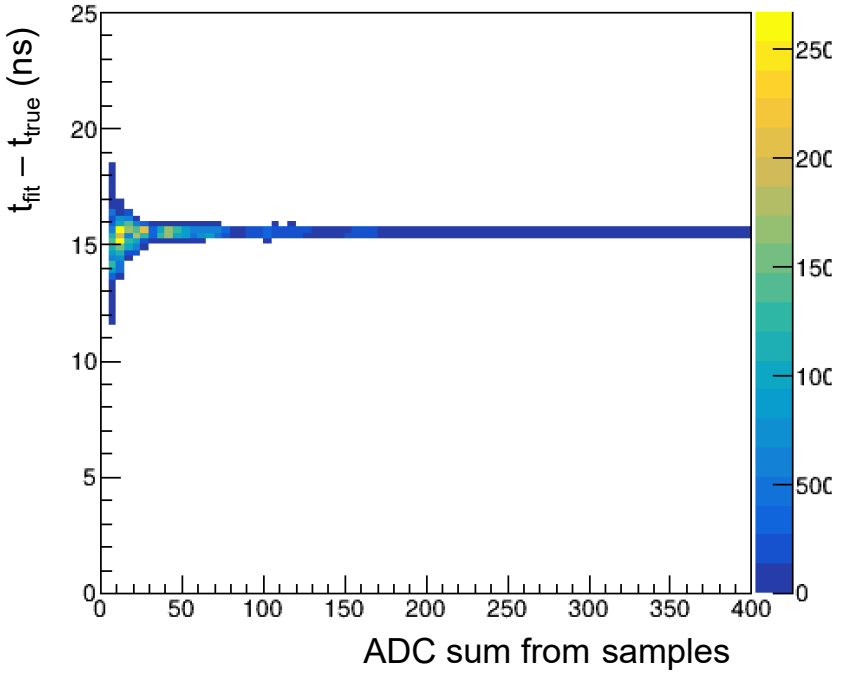
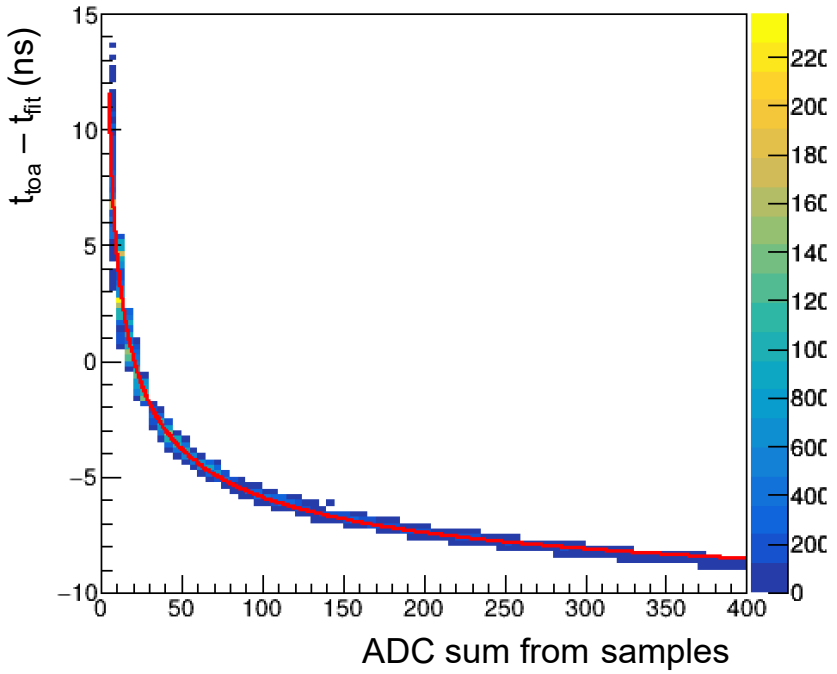
Time-walk correction

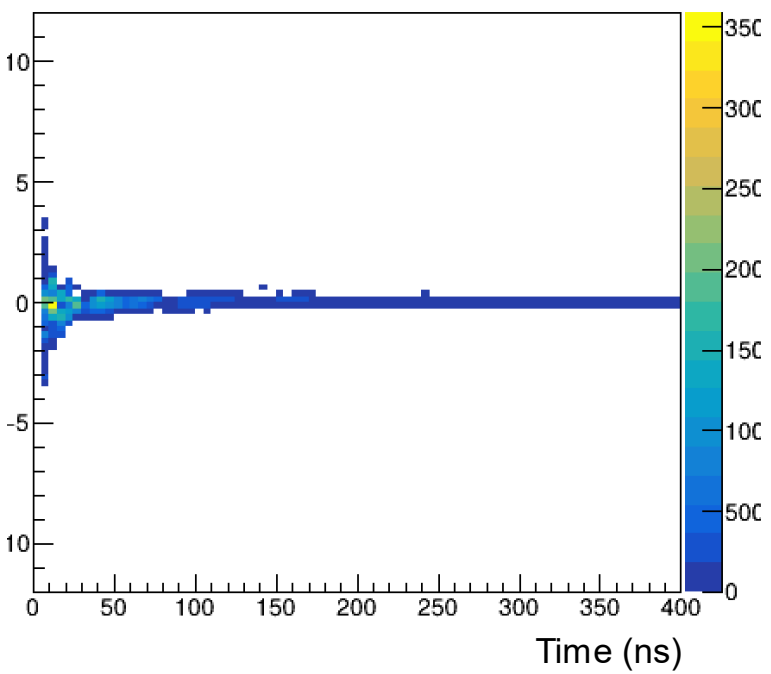
$t_{fit} - t_{true}$ vs. ADC



$t_{toa} - t_{fit}$ vs. ADC (before)



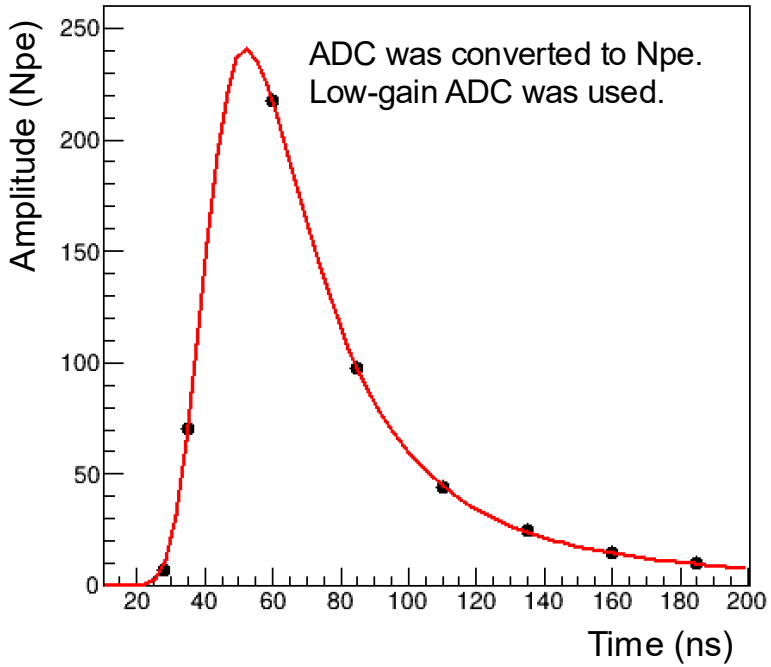
$t_{toa} - t_{fit}$ vs. ADC (after)



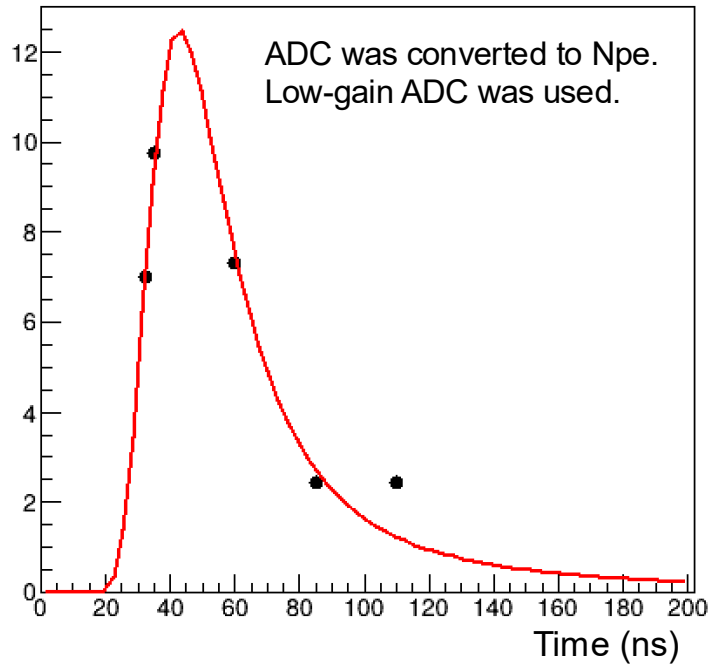
- Confirmed that t_{fit}, which is the time when the pulse reaches 30% of its maximum amplitude, is not affected by time-walk.
- Time-walk correction was applied by fitting the $t_{toa} - t_{fit}$ vs. ADC plot.
- Most of the events are concentrated in the middle region, but there are a couple of events with relatively large $t_{toa} - t_{fit}$ values.

Events with large $t_{toa} - t_{fit}$ values

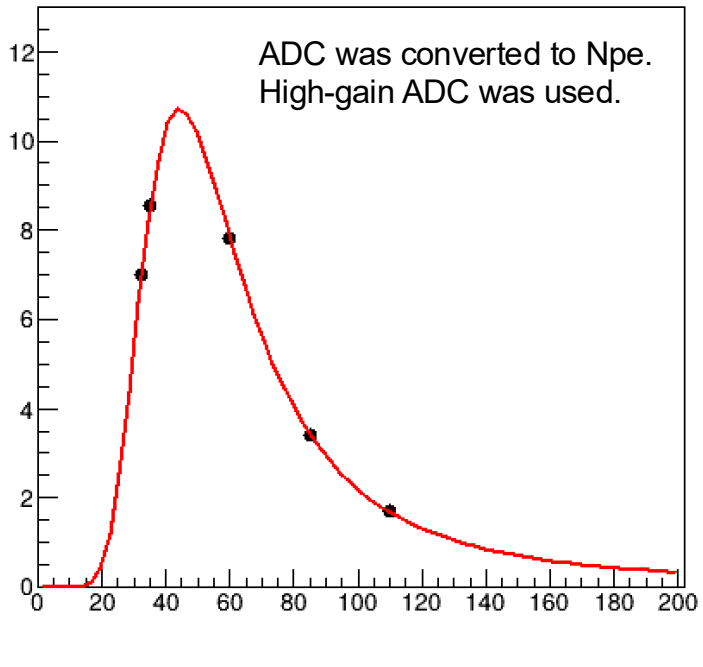
Npe = 242



Npe = 11

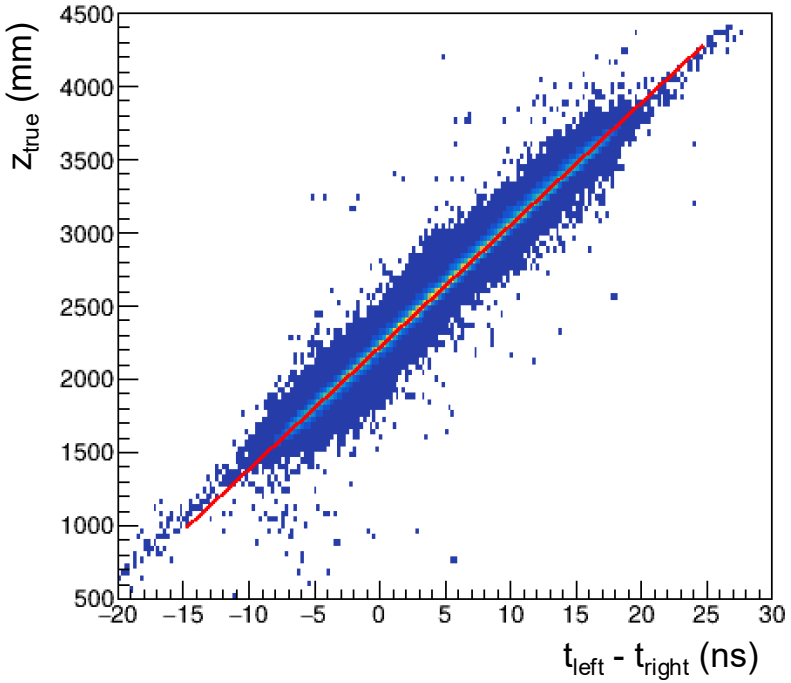


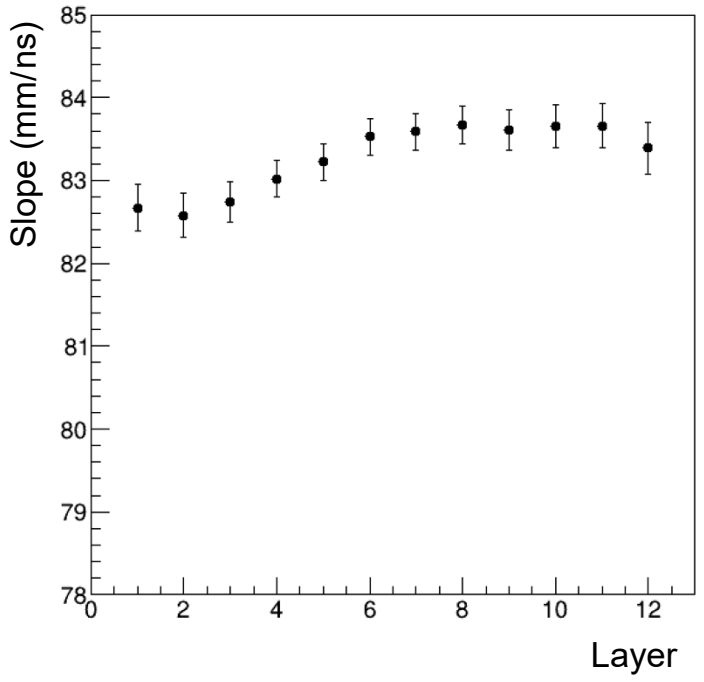
Npe = 11

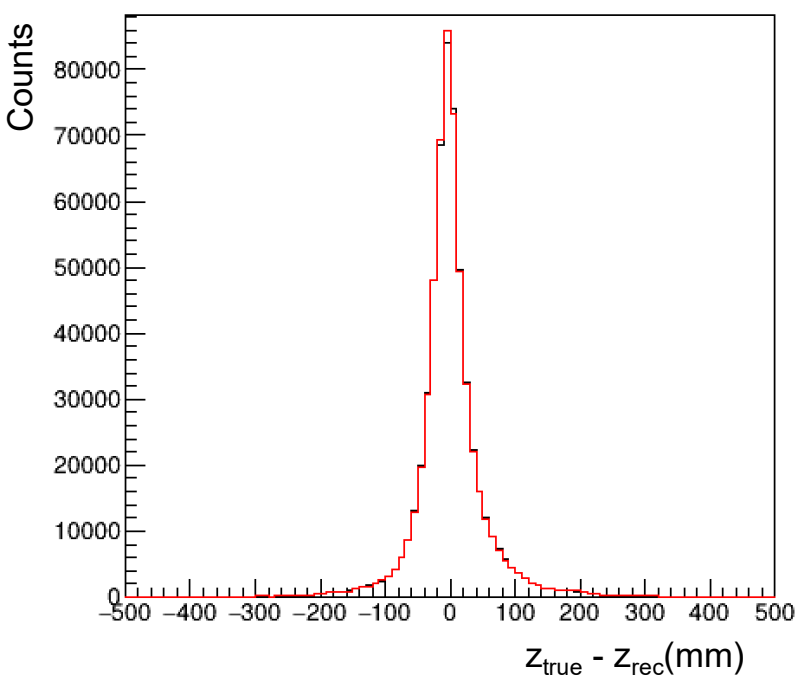


- In the above plots, ADC was converted to Npe. Dynamic range of low-gain ADC is 2500 Npe.
- Pulse with high Npe value is reconstructed well by low-gain ADC.
- However, granularity of low-gain ADC is coarse to low Npe value. → Sometimes, pulse is not reconstructed well if only the low-ADC gain is used.

z reconstruction from ScFi



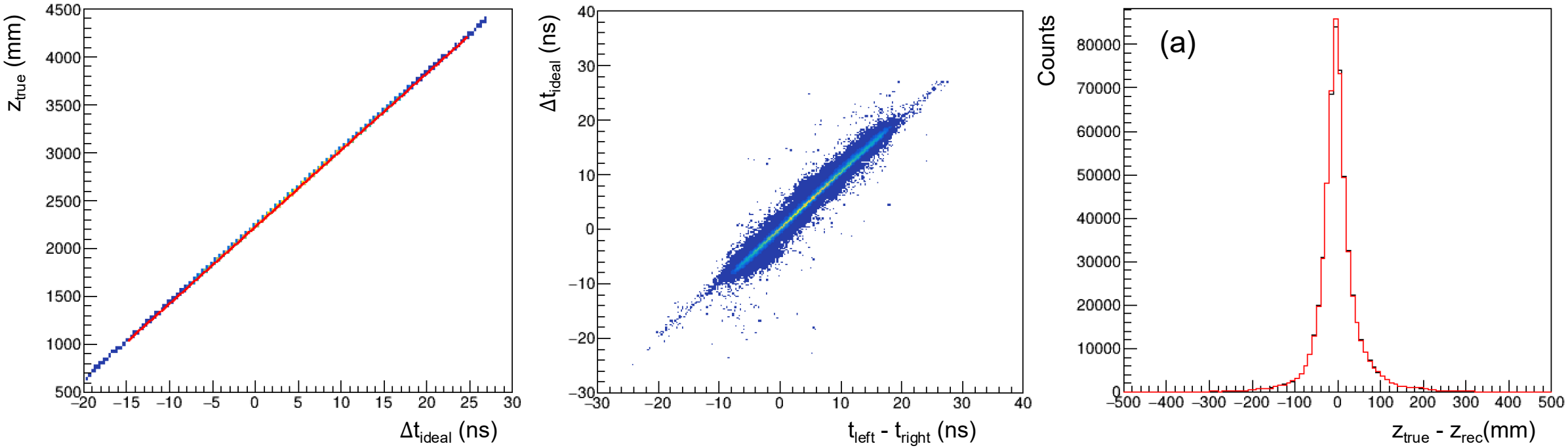




- The slope becomes larger in deeper layers due to increasing shower width.
- Although the z was reconstructed layer by layer, there was no visible improvement.

z reconstruction from ScFi

MIP-level



- Let's assume that we have Δt_{ideal} that doesn't have shower effect. → We'll have ideal z_{true} vs. Δt_{ideal} correlation and can correct t_{left} - t_{right} to Δt_{ideal} layer by layer.
- Even in that case, there was no visible improvement.
- Since we can't correct t_{left} - t_{right} event by event, the z reconstruction in Fig. (a) seems to be the best performance (σ~20 mm) if we reconstruct z using ScFi.