Current BH2 Analysis

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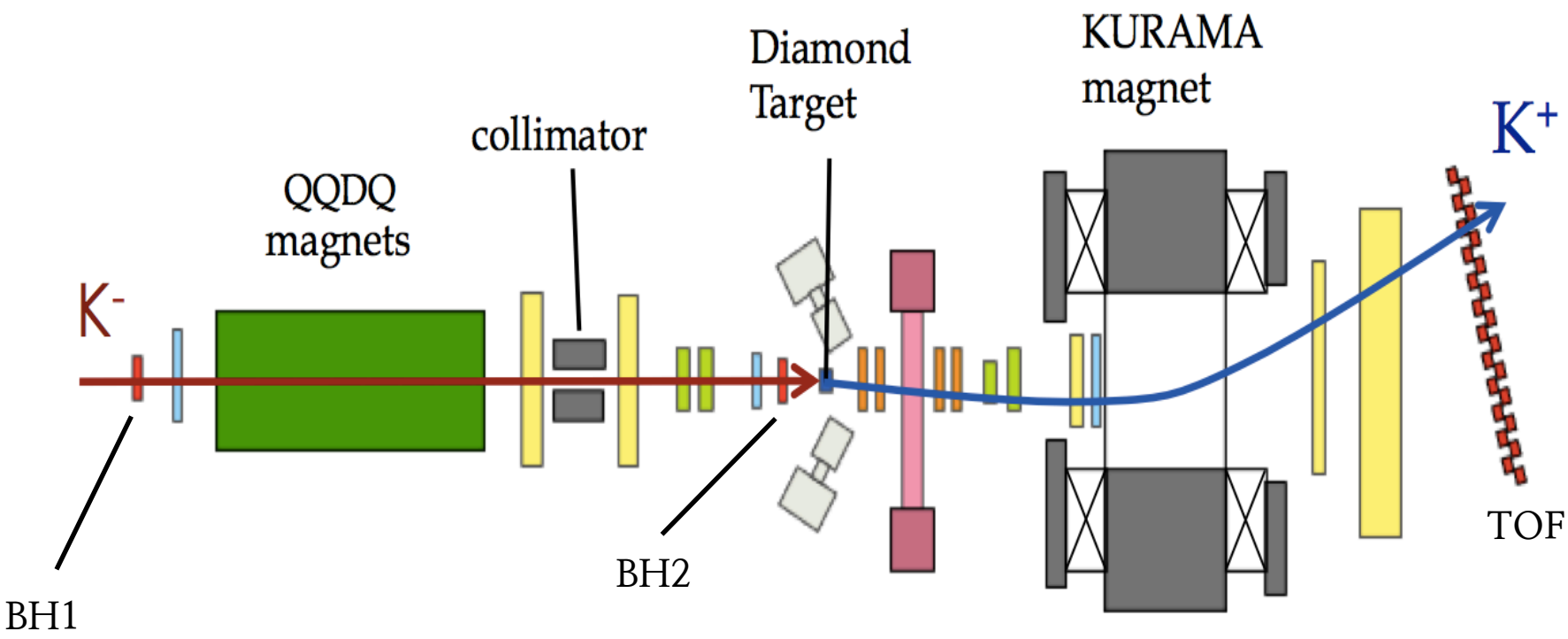
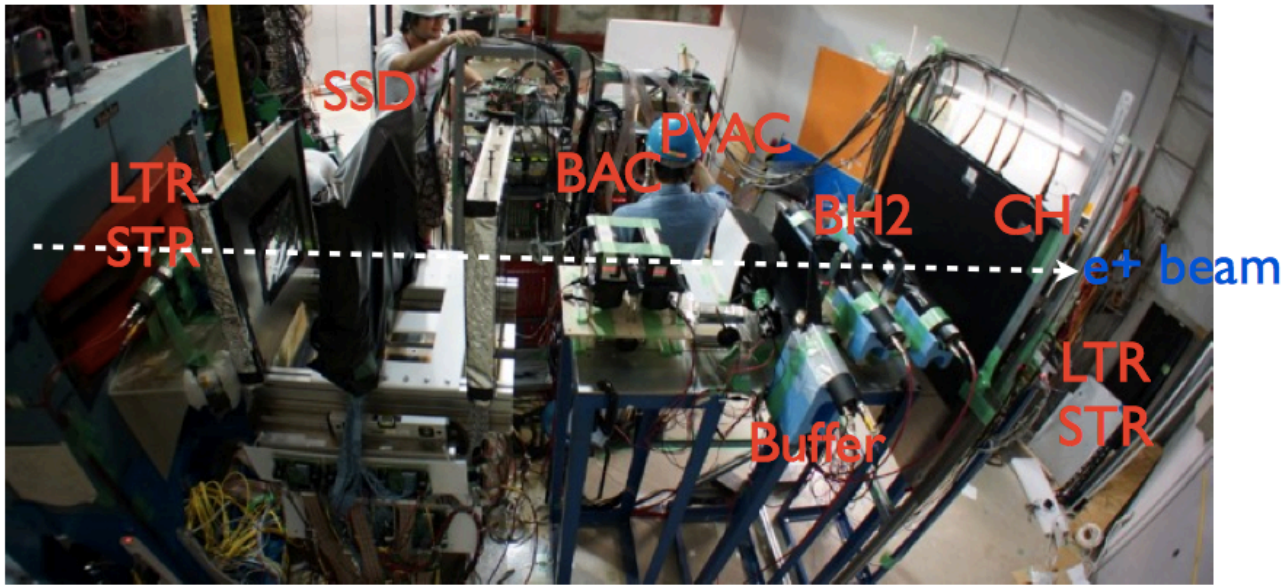
What is the BH2?



BH2 will be used for K^- beam trigger.

ELPH Test



We tested detectors with positron beam at Tohoku University.

I took on BH2 with Shinhyung, Taejin and Dr.Hwang.

We expect time resolution at least better than 95 ps.

Objective for BH2

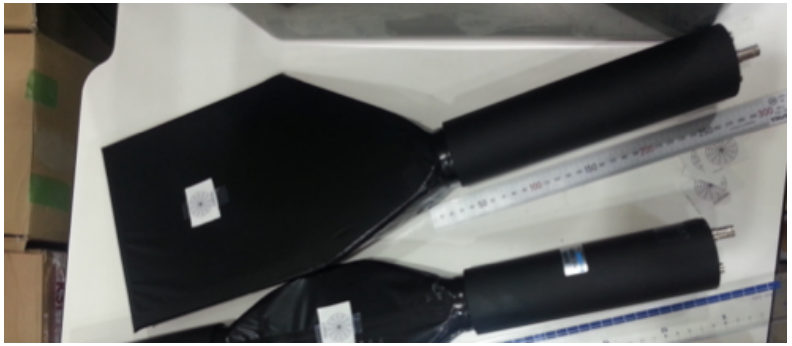
We have tested with following combinations for constituents of BH2.

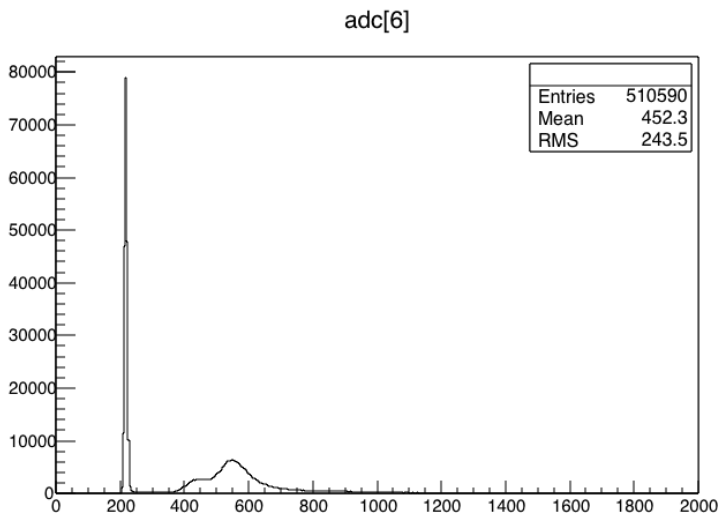
Scintillator	PMT	Reflector
EJ-212	H2431-50	Al mylar
EJ-228	H10570	Teflon
		Without

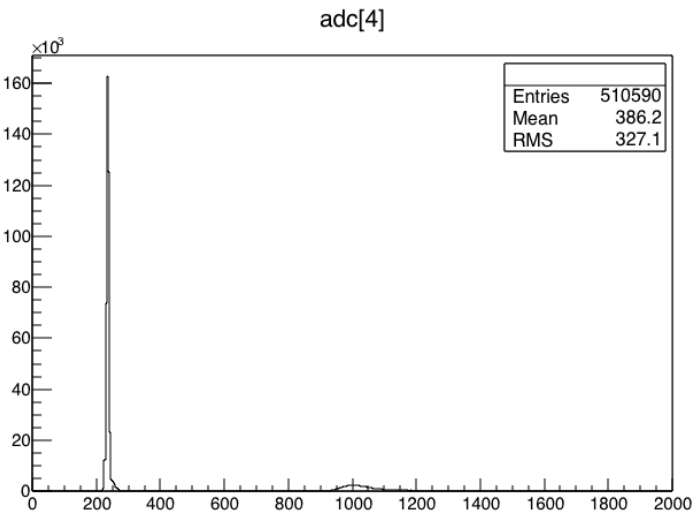
We want the BH2 combination with the smallest time resolution.

Analysis Procedure

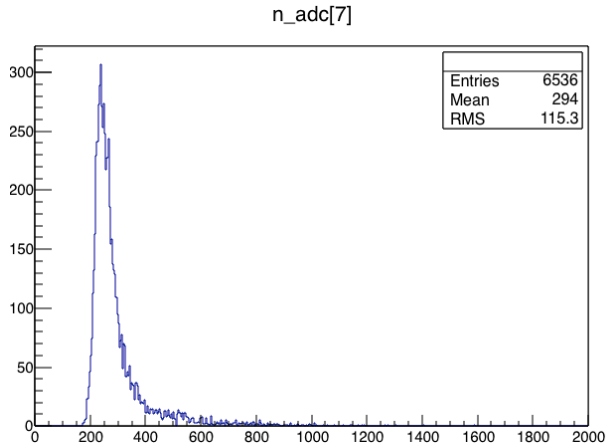
1. Choose good events.

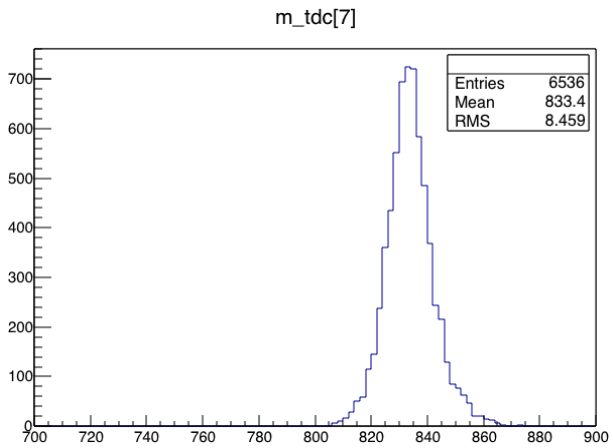




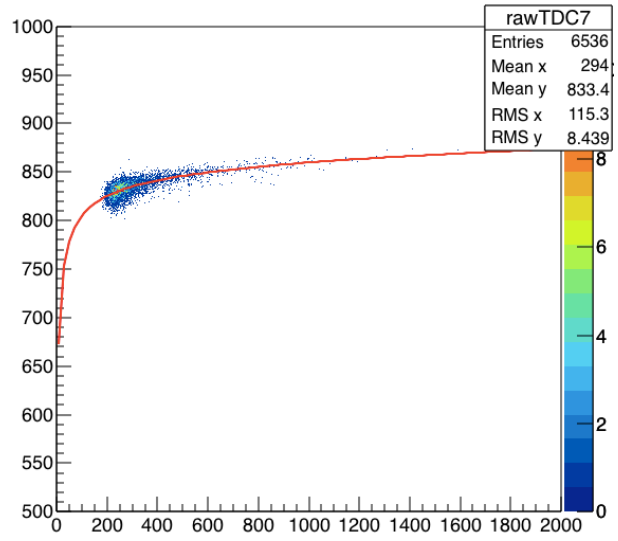


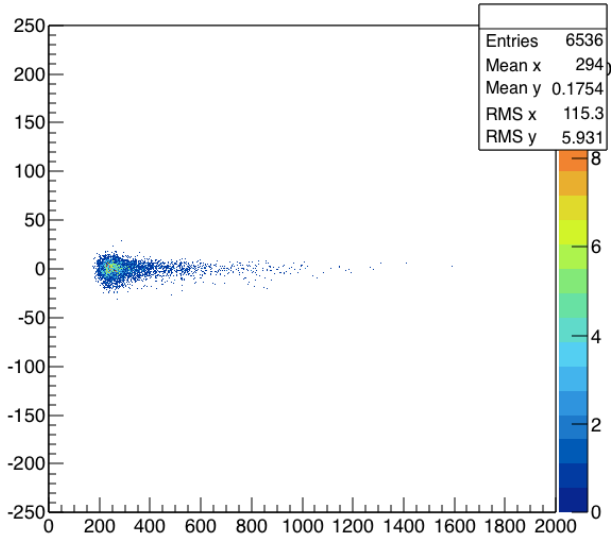
Analysis Procedure



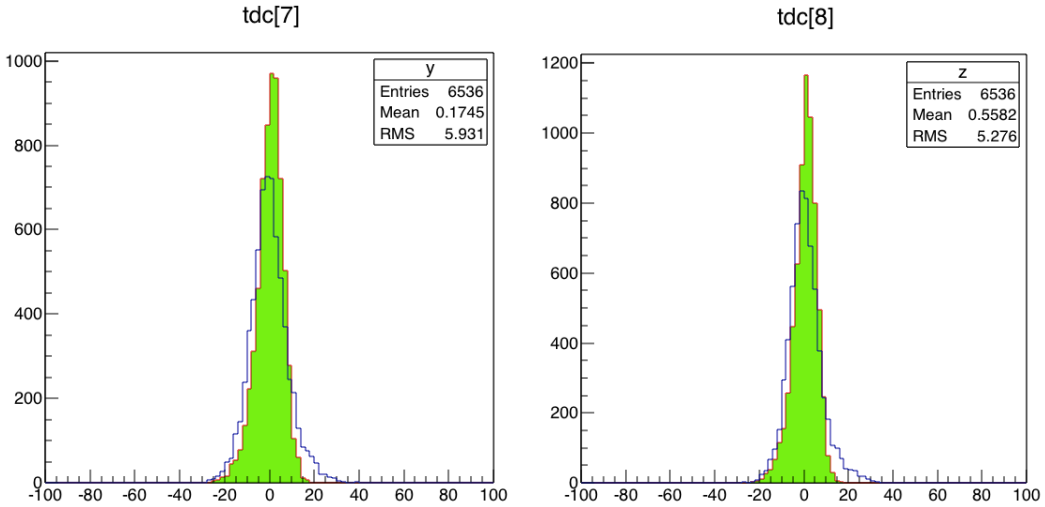


2. Slewing Correction(TDC = [0]√ADC+[1]/√ADC+[2]).

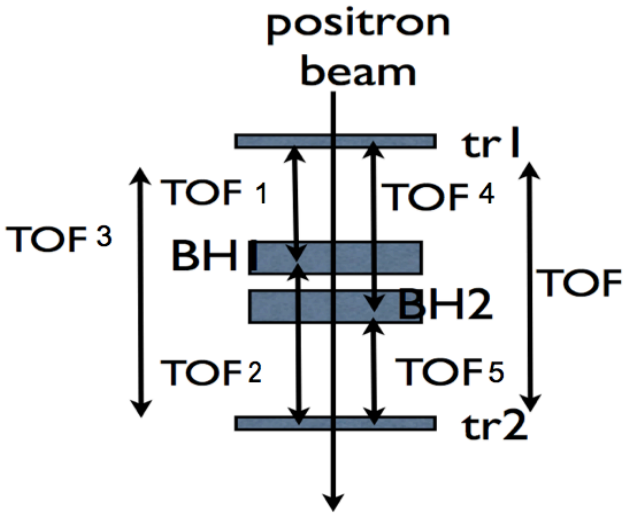




Analysis Procedure



3. Calculate the resolution of BH2 through ToF resolution.



$$\sqrt{\sigma_{TR1}^2+\sigma_{BH2}^2}=\sigma_1 \qquad \sqrt{(\sigma_1^2+\sigma_2^2+\sigma_3^2)/2-\sigma_3^2}=\sigma_{BH2}^2$$

$$\sqrt{\sigma_{BH2}^2+\sigma_{TR2}^2}=\sigma_2 \qquad \sqrt{(\sigma_1^2+\sigma_2^2+\sigma_3^2)/2-\sigma_2^2}=\sigma_{TR1}^2$$

$$\sqrt{\sigma_{TR1}^2+\sigma_{TR2}^2}=\sigma_3 \qquad \sqrt{(\sigma_1^2+\sigma_2^2+\sigma_3^2)/2-\sigma_1^2}=\sigma_{TR2}^2$$

$$\Rightarrow$$

$$\sqrt{\sigma_{TR1}^2+\sigma_{BH1}^2}=\sigma_4 \qquad \sqrt{(\sigma_4^2+\sigma_5^2+\sigma_3^2)/2-\sigma_3^2}=\sigma_{BH1}^2$$

$$\sqrt{\sigma_{BH1}^2+\sigma_{TR2}^2}=\sigma_5 \qquad \sqrt{(\sigma_4^2+\sigma_5^2+\sigma_3^2)/2-\sigma_5^2}=\sigma_{TR1}^2$$

$$\sqrt{\sigma_{TR1}^2+\sigma_{TR2}^2}=\sigma_3 \qquad \sqrt{(\sigma_4^2+\sigma_5^2+\sigma_3^2)/2-\sigma_4^2}=\sigma_{TR2}^2$$

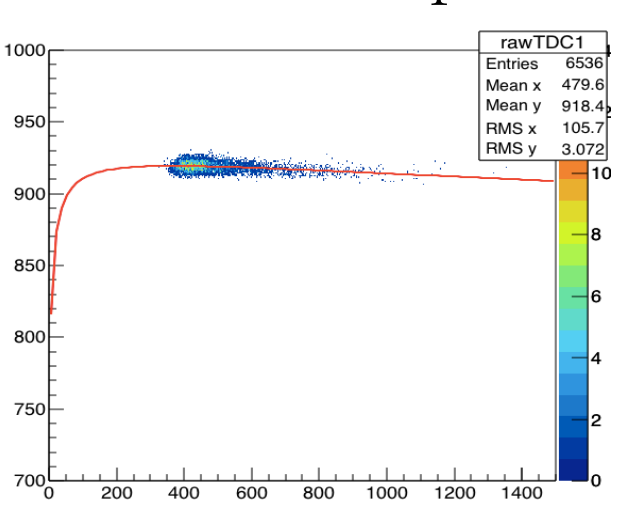
Result1

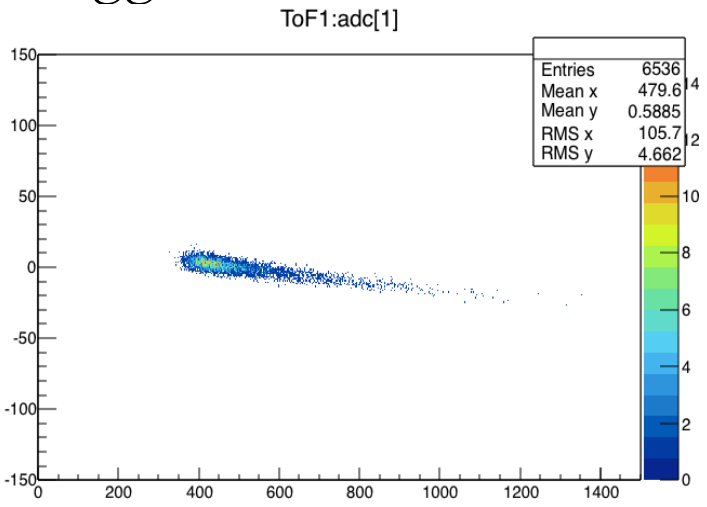
BH2(1)：EJ-212 + H10570 + Al　BH2(2)：EJ-228 + H2431-50 + Al

ToF1	121.26 ps
ToF2	94.67 ps
ToF3	94.35 ps
ToF4	137.16 ps
ToF5	117.02 ps

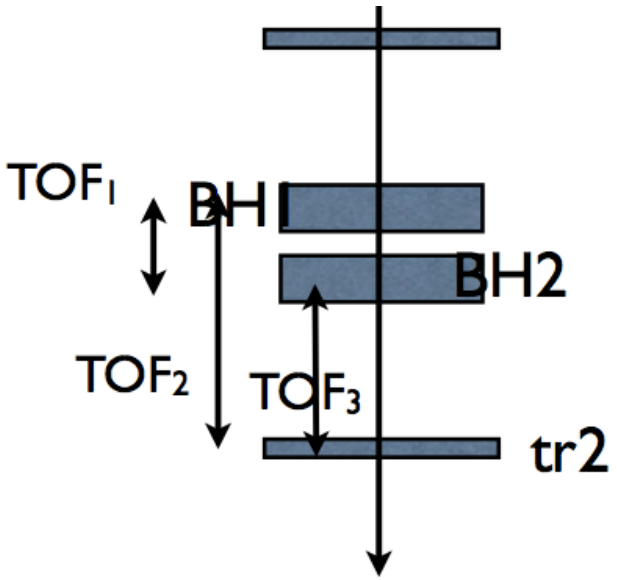
BH2(1)	85.64 ps
TR1	86.46 ps
TR2	40.21 ps
BH2(2)	112.64 ps
TR1	85.83 ps
TR2	41.53 ps

One PMT of upstream trigger showed weird curve.





Another Method



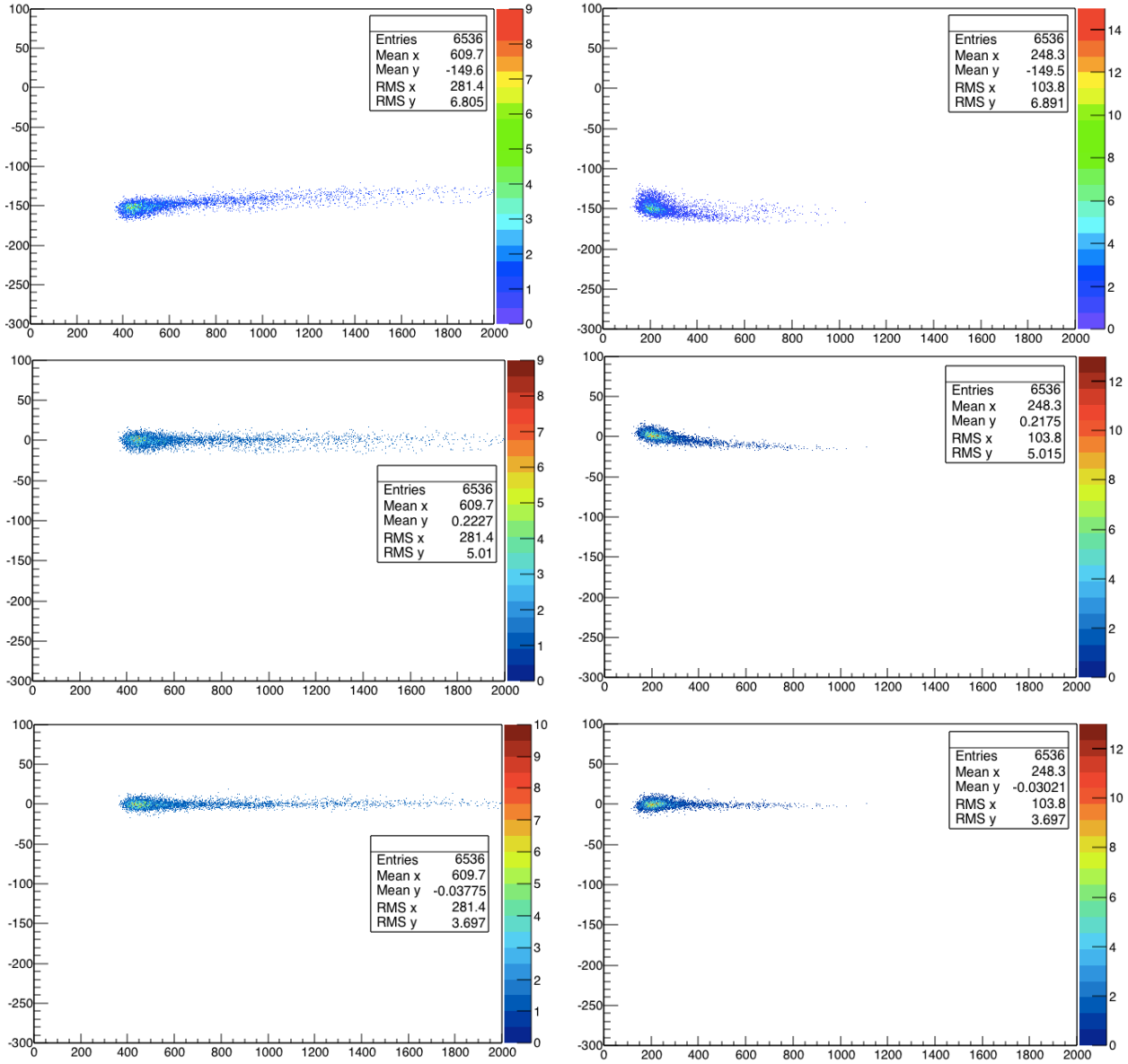
1. Excluding TR1.

ToF1	135.79 ps	BH2(1)	82.27 ps
ToF2	117.37	BH2(2)	108.03 ps
ToF3	94.41 ps	TR2	45.89 ps

2. From the beginning, do ToF:ADC slewing correction.

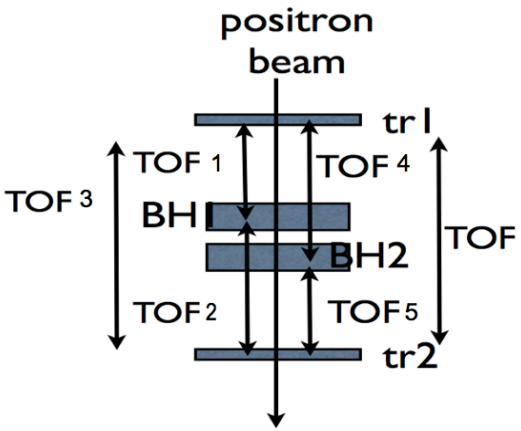
$$3 = \left(\frac{[2]+[3]}{2}\right) - \left(\frac{[9]+[10]}{2}\right)$$

Another Method



Another Method

(1) Including [1]

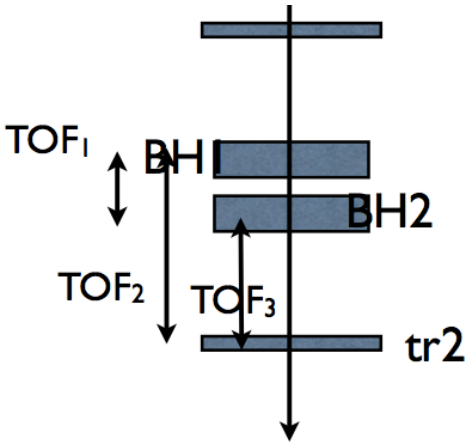


ToF1	104.36 ps
ToF2	101.28 ps
ToF3	65.99 ps
ToF4	121.77 ps
ToF5	124.21 ps

BH2(1)	89.92 ps
TR1	49.40 ps
TR2	45.15 ps

BH2(2)	111.44 ps
TR1	48.28 ps
TR2	46.35 ps

(2) Excluding [1]



ToF1	141.65 ps
ToF2	120.69 ps
ToF3	100.61 ps

BH2(1)	88.38 ps
BH2(2)	110.70 ps
TR2	48.09 ps

Next Plan

1. Solve the weird curve problem, and apply more precise analysis.

2. Also going to analyze other combinations and vertical position dependency.