Current BH2 Analysis

2014. 10. 06

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Combinations for BH2 we have tested

Choices for BH2 component are as follows, and we have tested six combinations at Tohoku Univ.

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

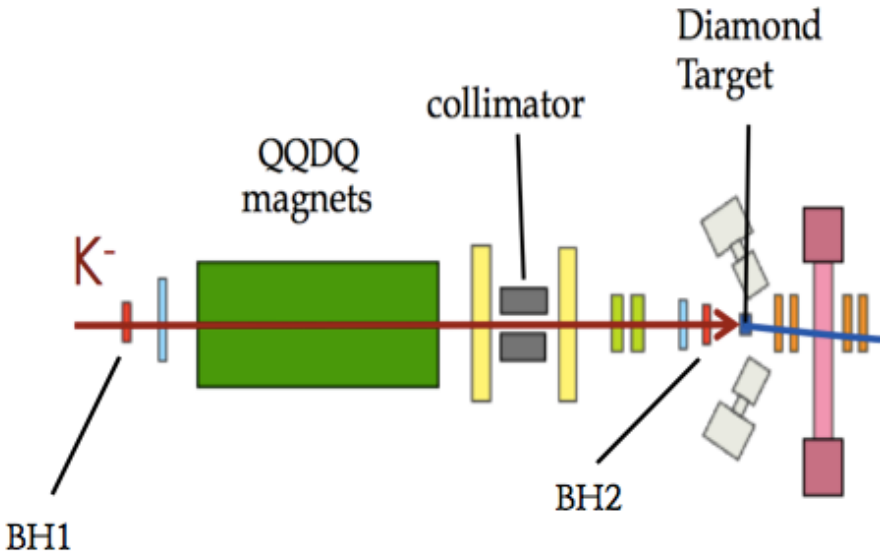
(1) Com.1: EJ-212 + H10570 + Al mylar
(2) Com.2: EJ-228 + H2431-50 + Al mylar
(3) Com.3: EJ-228 + H10570 + Al mylar
(4) Com.4: EJ-212 + H2431-50 + Al mylar
(5) Com.5: EJ-228 + H10570 + Teflon
(6) Com.6: EJ-212 + H2431-50 + Without

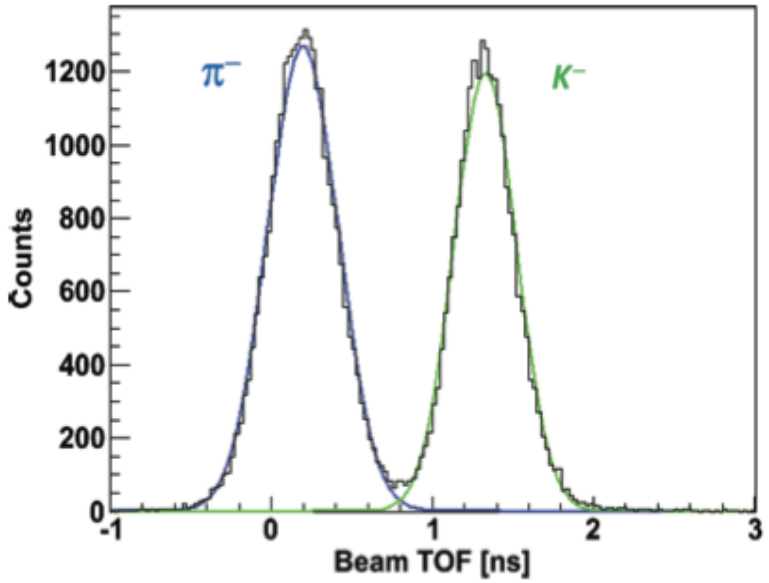
But there are not enough data with Com.3 and Com.4, so calculated resolutions of the rest four combinations.

Goal of ELPH test

BH2 will be used for K^- beam trigger and compared to past result, about 140 ps BH1 to BH2 TOF resolution is enough to distinguish K^- and π^-.

We expect at least better than 95 ps time resolution of BH2.



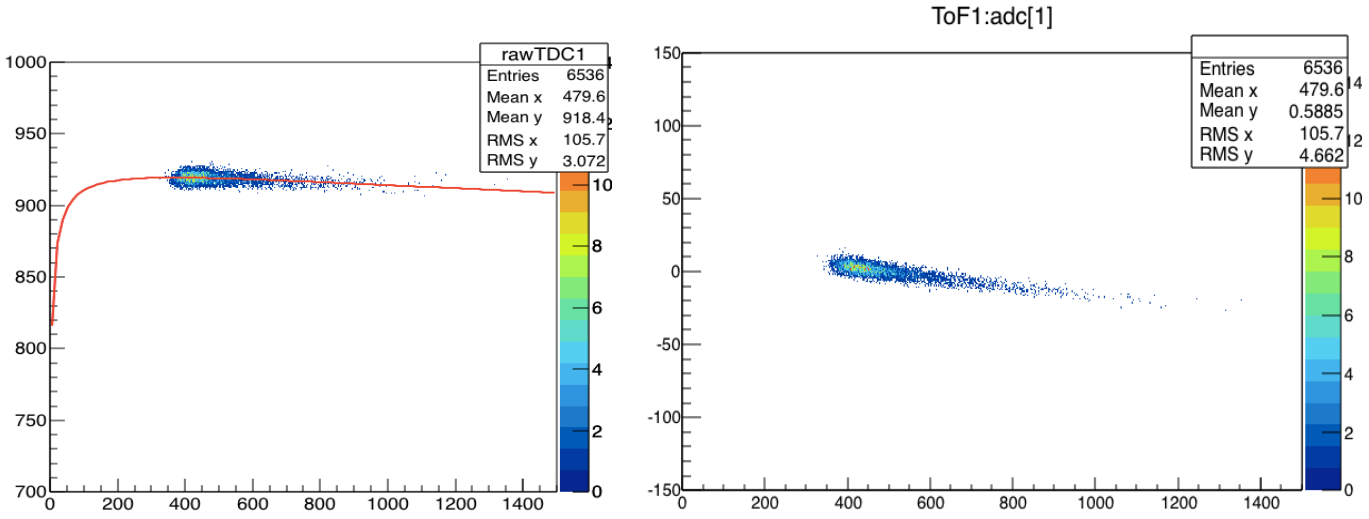


First result

BH2(1)	85.64 ps	**BH2(5)**	113.62 ps
TR1	86.46 ps	**TR1**	89.01 ps
TR2	40.21 ps	**TR2**	43.56 ps
BH2(2)	112.64 ps	**BH2(6)**	97.09 ps
TR1	85.83 ps	**TR1**	87.08 ps
TR2	41.53 ps	**TR2**	47.30 ps

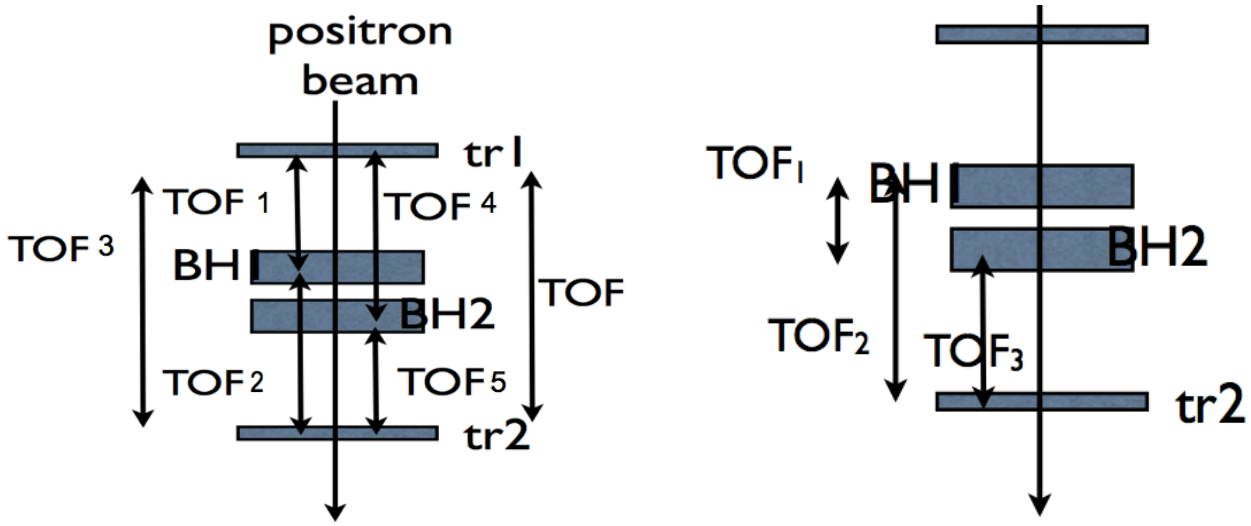
Resolutions of upstream and downstream trigger are unreasonably different.

And one PMT of upstream trigger showed strange curve for TOF:ADC spectrum after correction, not horizontal shape(right Fig.).



Another method

So we tried to calculate resolutions excluding upstream trigger, only with two BH2 candidates and downstream trigger(right is original, second is new method.).



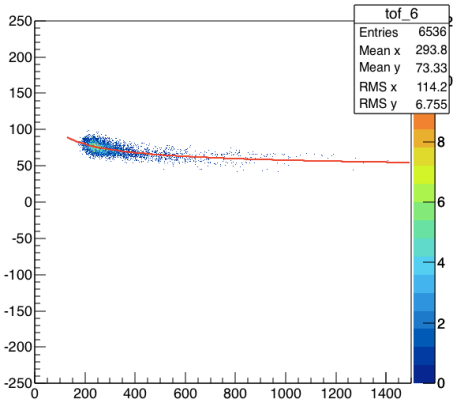
Or since we calculate resolutions with TOF resolutions, can do slewing correction with TOF:ADC from the beginning, not each TDC:ADC of all PMT,

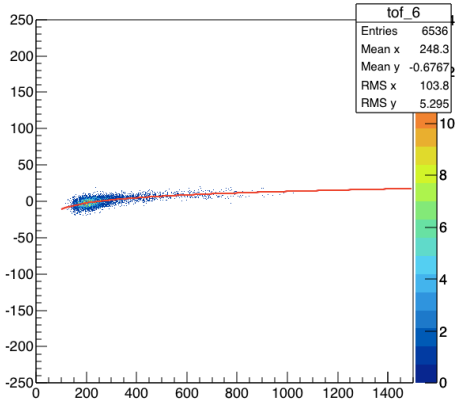
$$\mathrm{TOF1} = \frac{[9]+[10]}{2} - \frac{[7]+[8]}{2}$$

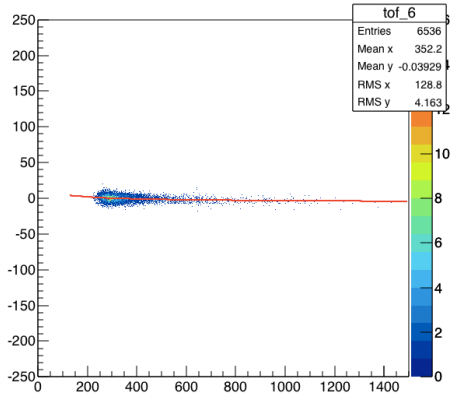
or can apply these two methods simultaneously.

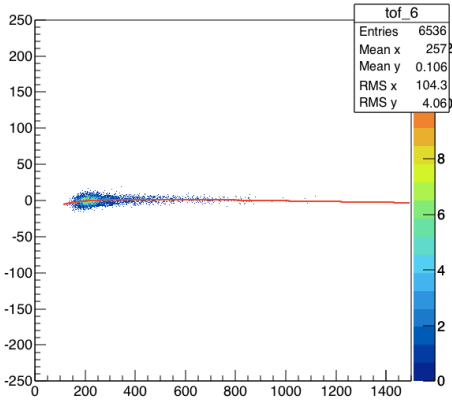
Another Method

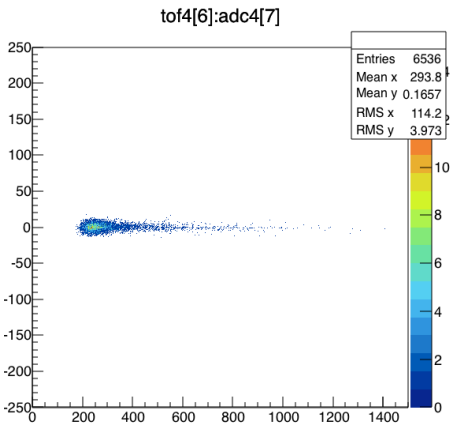
(Upper four graphs set is [7]→[9]→[8]→[10] slewing correction procedure.
Downward is TOF:ADC spectrum after all correction.)

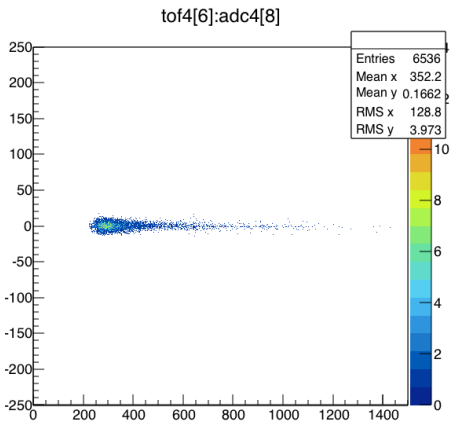


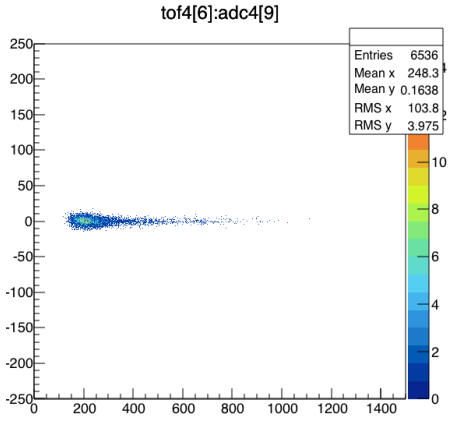


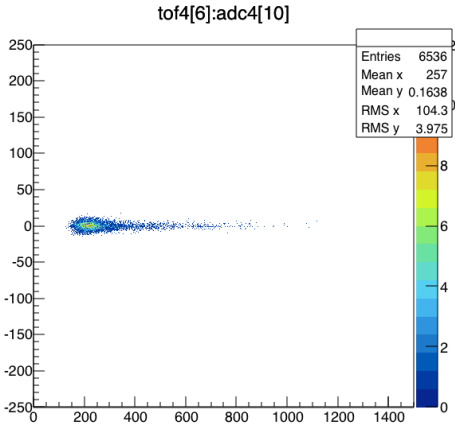












Result of another method

(1) TOF:ADC correction

BH2(1)	89.07 ps	**BH2(5)**	111.37 ps
TR1	46.51 ps	**TR1**	44.69 ps
TR2	47.55 ps	**TR2**	50.13 ps
BH2(2)	111.53 ps	**BH2(6)**	100.70 ps
TR1	43.05 ps	**TR1**	40.62 ps
TR2	50.70 ps	**TR2**	53.48 ps

(2) Excluding upstream trigger

BH2(1)	83.95 ps	**BH2(5)**	112.54 ps
BH2(2)	103.25 ps	**BH2(6)**	97.59 ps
TR2	49.07 ps	**TR2**	46.26 ps

(3) TOF:ADC + Excluding upstream

BH2(1)	84.12 ps	**BH2(5)**	111.64 ps
BH2(2)	109.05 ps	**BH2(6)**	102.68 ps
TR2	55.84 ps	**TR2**	49.55 ps

We can see Com.1 of BH2 is only suitable for K^- beam trigger and afterward I'm also going to calculate how BH2 resolution depends on vertical positions.

BACK - UP

2014. 10. 06

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BH2: 120×40×6 mm^3
trigger: 144×44×? mm^3(but thinner than BH2.)
So path to PMT is much shorter than BH2, keeping time information more precisely.

* Forward aerogel Čerenkov counter *
Čerenkov counter design + PMT efficiency to photons
The one, studying how to design the counter with reference.
The other, making a plan for experiment with reading article of similar subject.