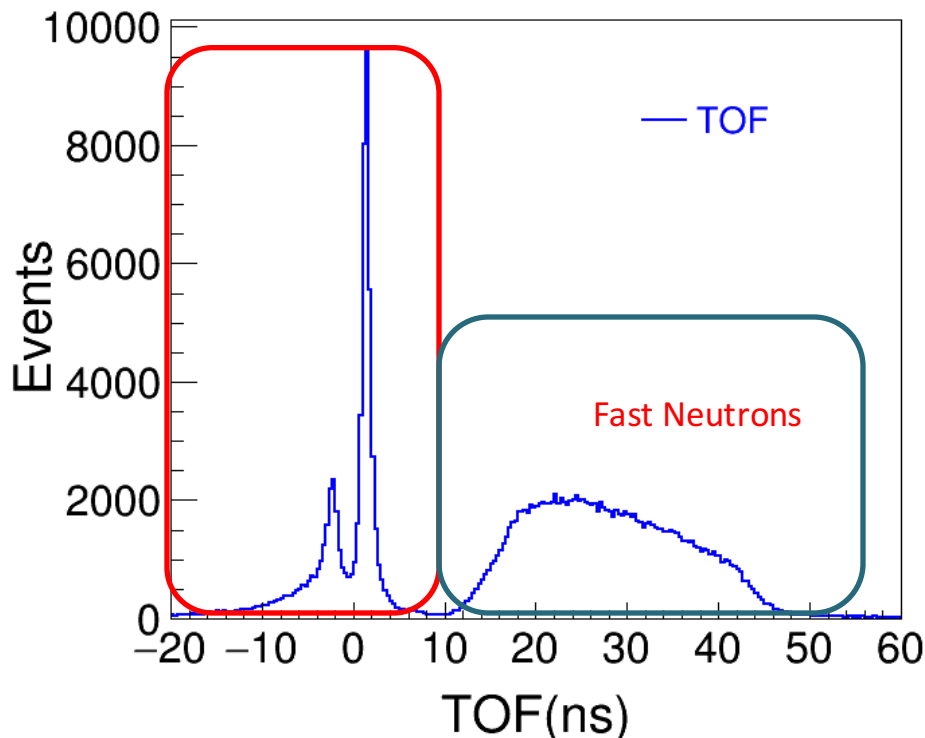


Neutron experiment

➤ Result of experimental setup 1

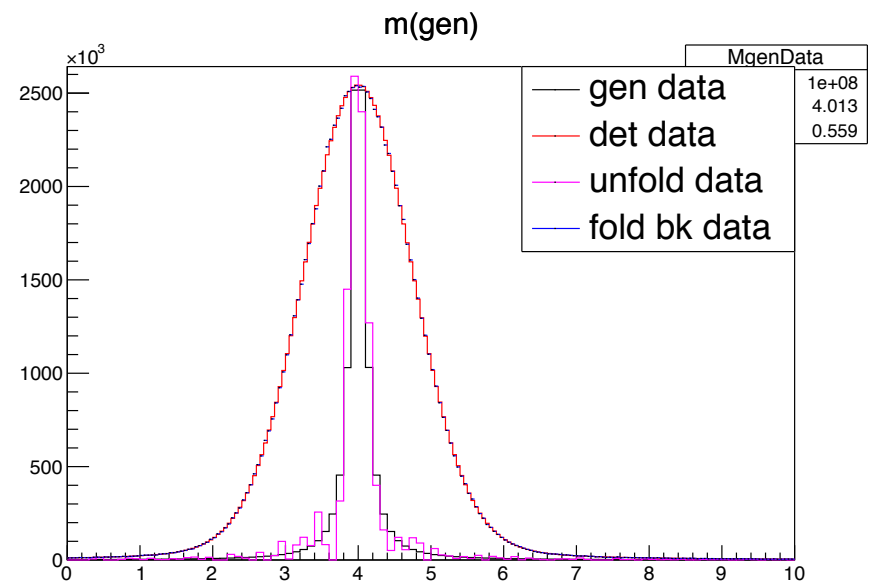
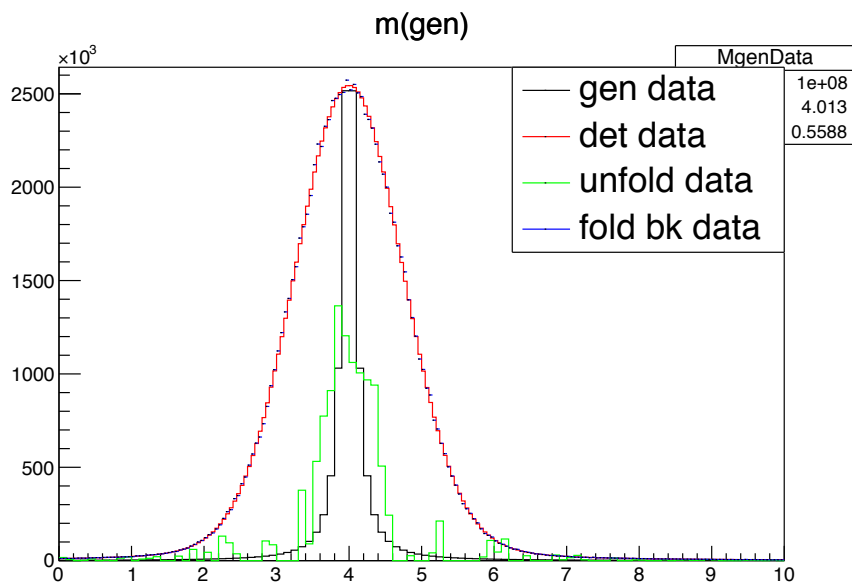
□ TOF distribution



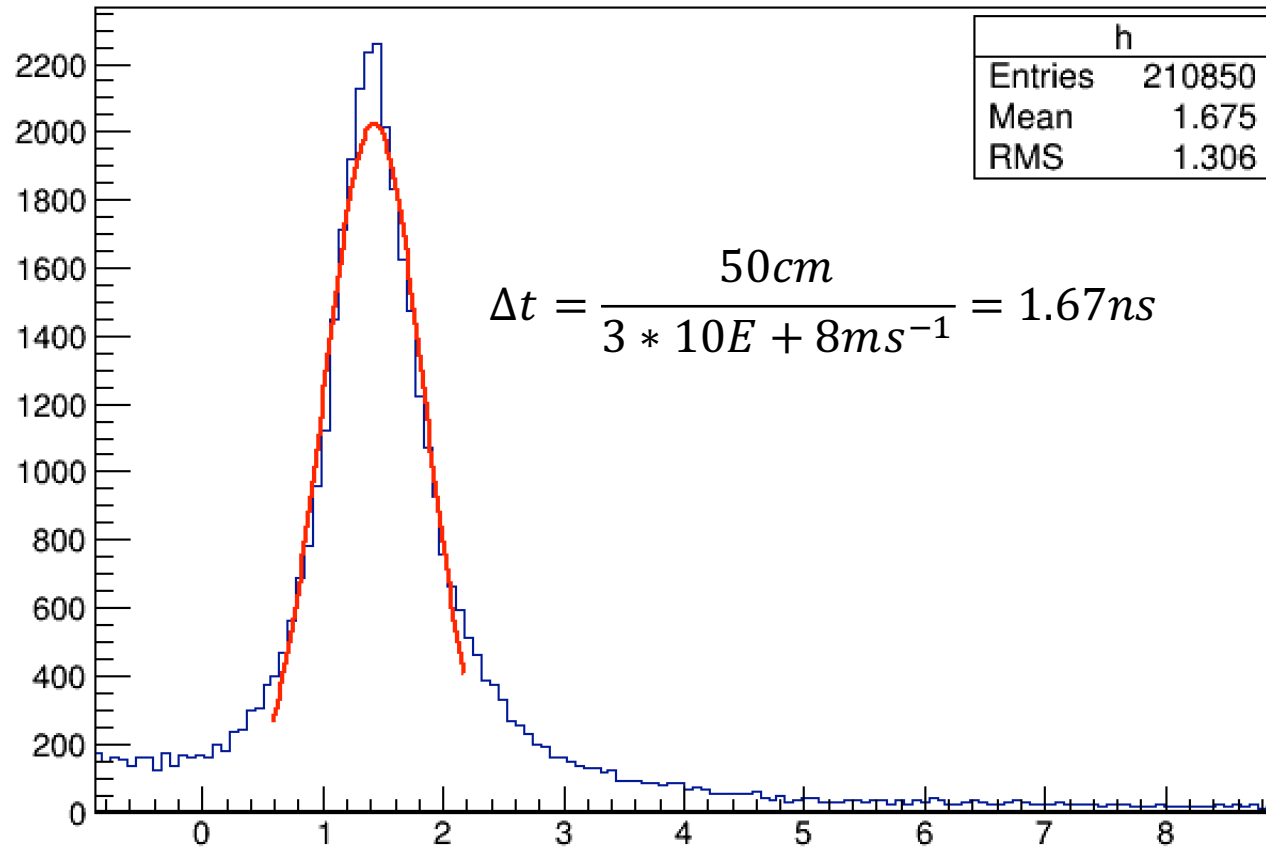
Delay time of four channels is same after time calibration.

Coincidence width is 40ns from the discriminator (Mod.N840)

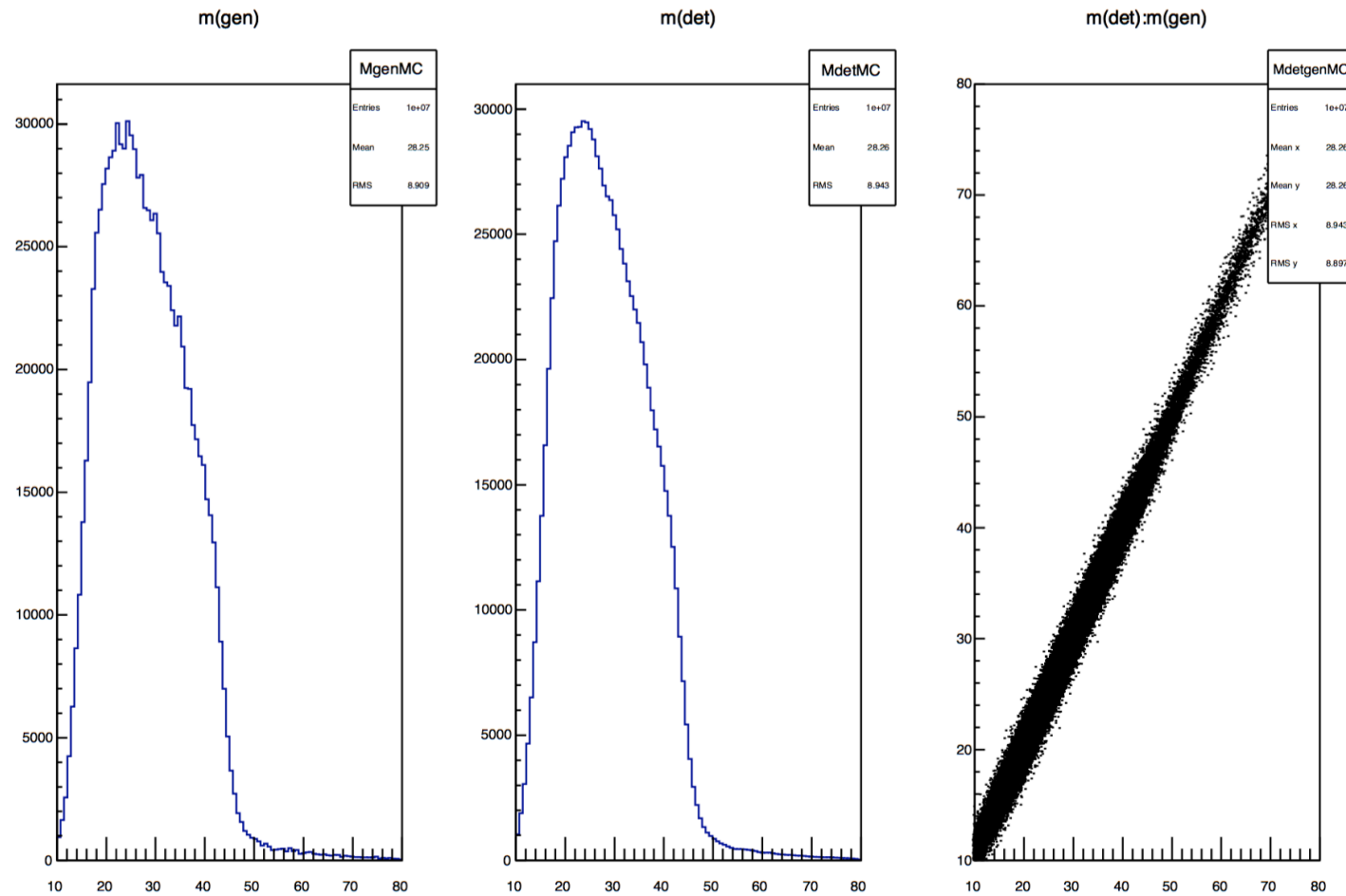
Unfold of TOF



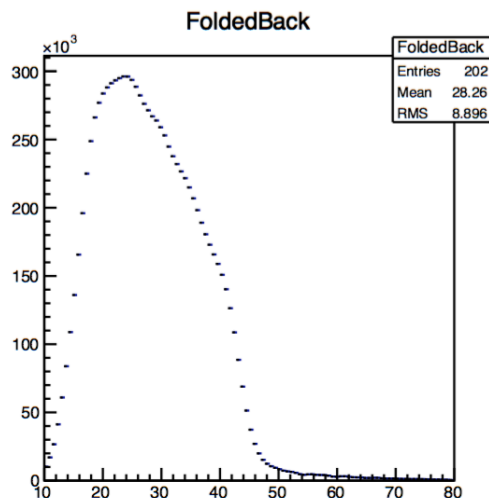
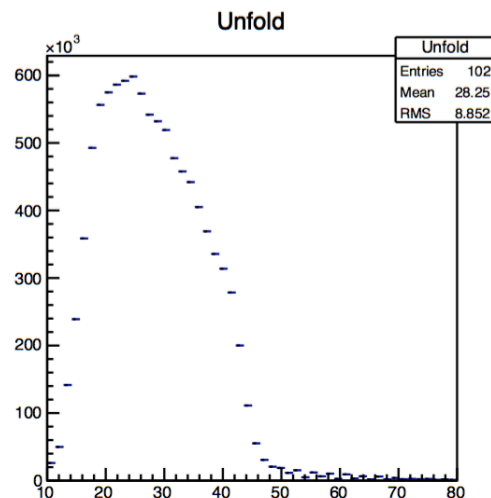
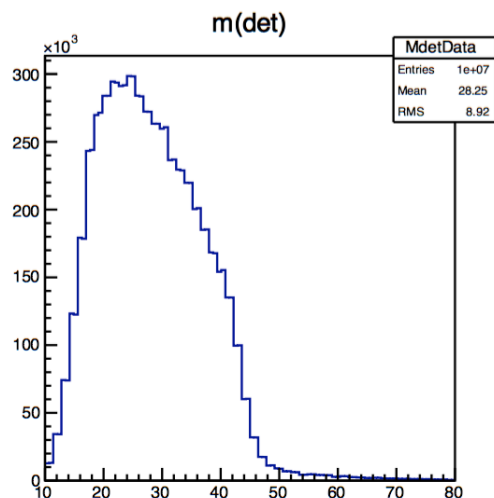
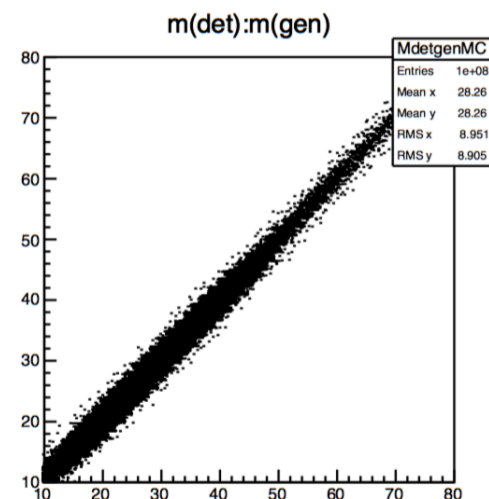
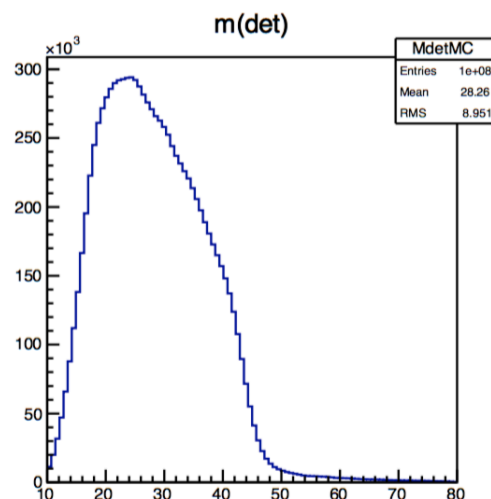
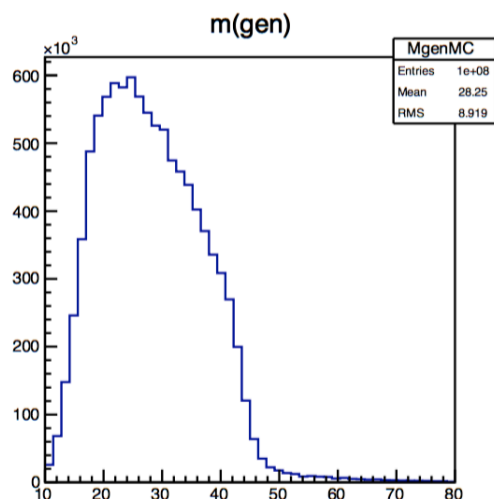
Fit to TOF of gamma



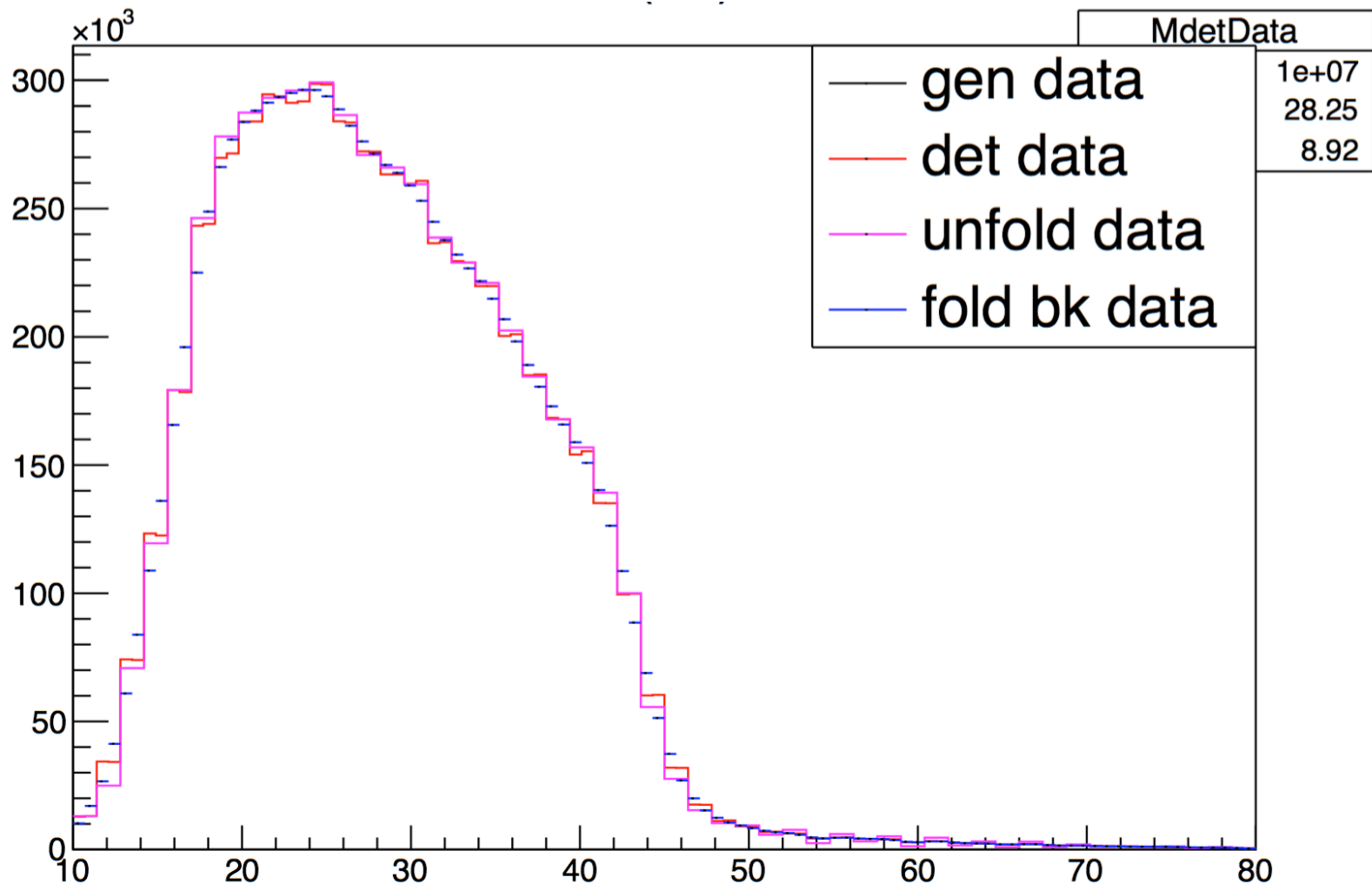
Matrix



Unfold of TOF for neutron



Unfold of TOF for neutron



TUnfold

The TUnfold package: user manual

Stefan Schmitt, DESY, Notkestraße 85, 22607 Hamburg

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http://www.desy.de/~sschmitt/TUnfold/tunfold_manual_v17.6.pdf

Abstract

TUnfold is a package with provides functionality for correcting migration and background effects for multi-dimensional distributions. This document gives a user-oriented technical description of the package, valid for the version number 17.6.

TUnfold

Brief recipe to use **TUnfold**:

- a matrix (truth,reconstructed) is given as a two-dimensional histogram as argument to the constructor of **TUnfold**
- a vector of measurements is given as one-dimensional histogram using the **SetInput()** method
- The unfolding is performed
- either once with a fixed parameter tau, method DoUnfold(tau)
- or multiple times in a scan to determine the best choice of tau, method ScanLCurve()
- Unfolding results are retrieved using various GetXXX() methods

Basic formulae:

$$\begin{aligned}\chi_A^2 &= (Ax - y)^T V_{yy}^{-1} (Ax - y) \\ \chi_L^2 &= (x - f * x_0)^T L^T L (x - f * x_0) \\ \chi_{unf}^2 &= \chi_A^2 + \tau^2 \chi_L^2 + \lambda \Sigma_i (Ax - y)_i\end{aligned}$$

- x :result,
- A :probabilities,
- y :data,
- V_{yy} :data covariance,
- f :bias scale,
- x_0 :bias,
- L :regularisation conditions,
- τ :regularisation strength,
- λ :Lagrangian multiplier.

<https://arxiv.org/pdf/hep-ph/9509307.pdf>

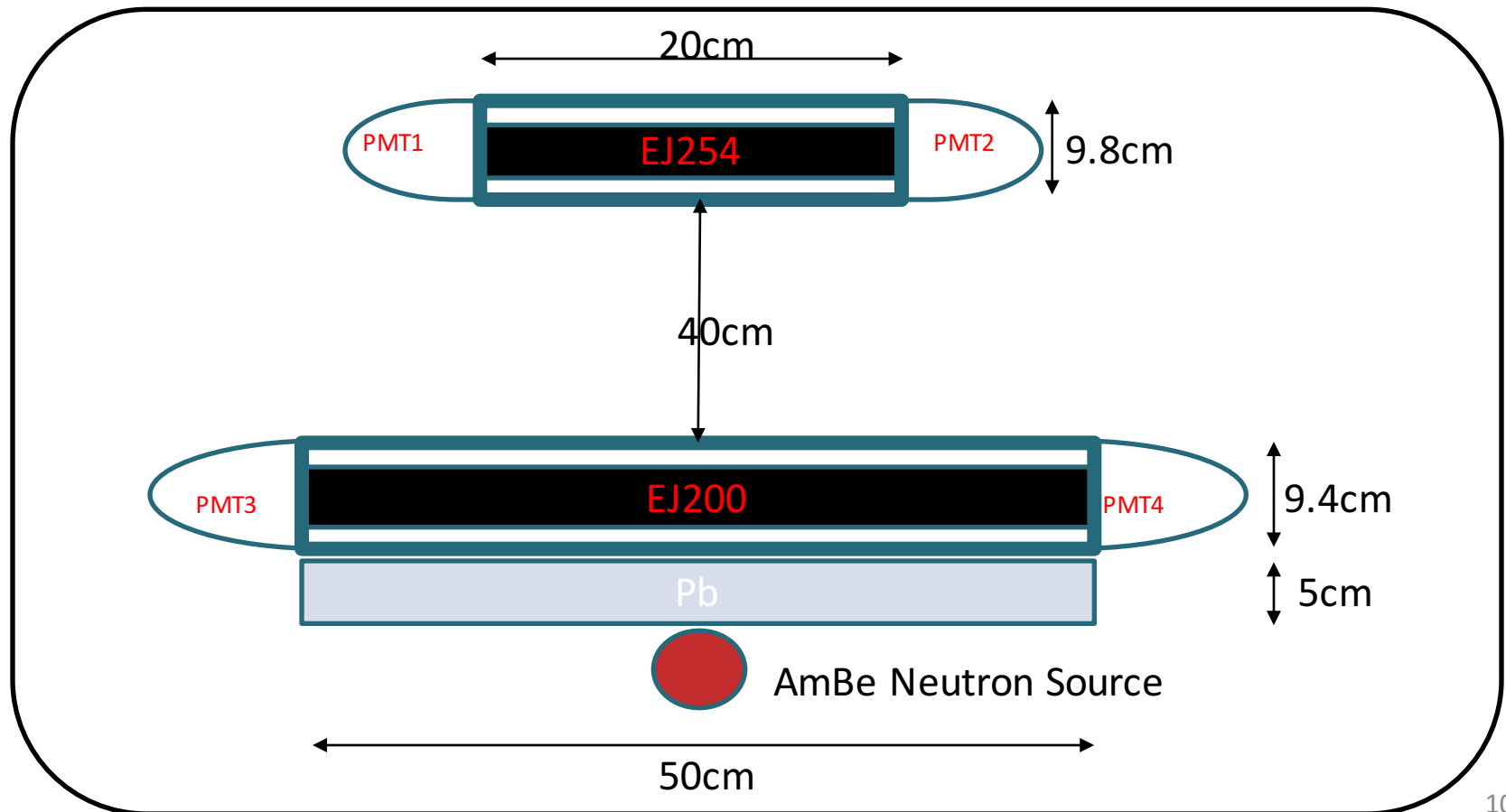
Without area constraint, λ is set to zero, and χ_{unf}^2 is minimized to determine x . With area constraint, both x and λ are determined.

Back up

Neutron experiment

➤ Time of Flight (TOF) method

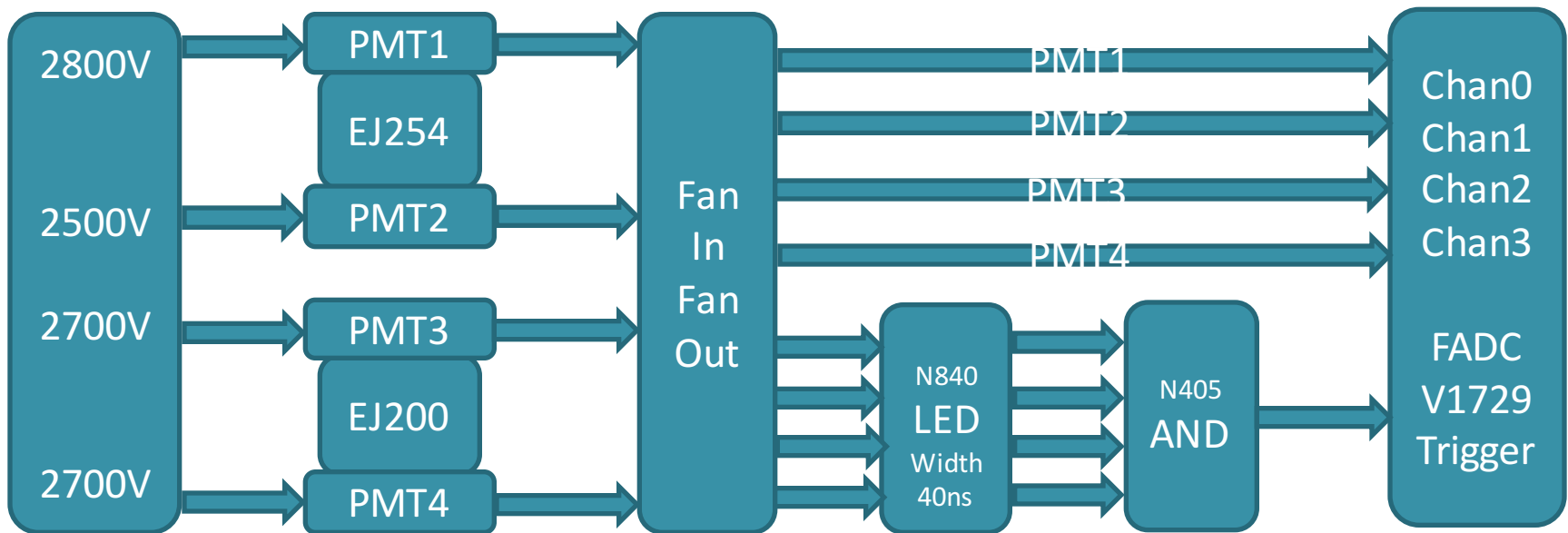
❑ Experimental setup 1



Neutron experiment

➤ Time of Flight (TOF) method

❑ Experimental setup 1



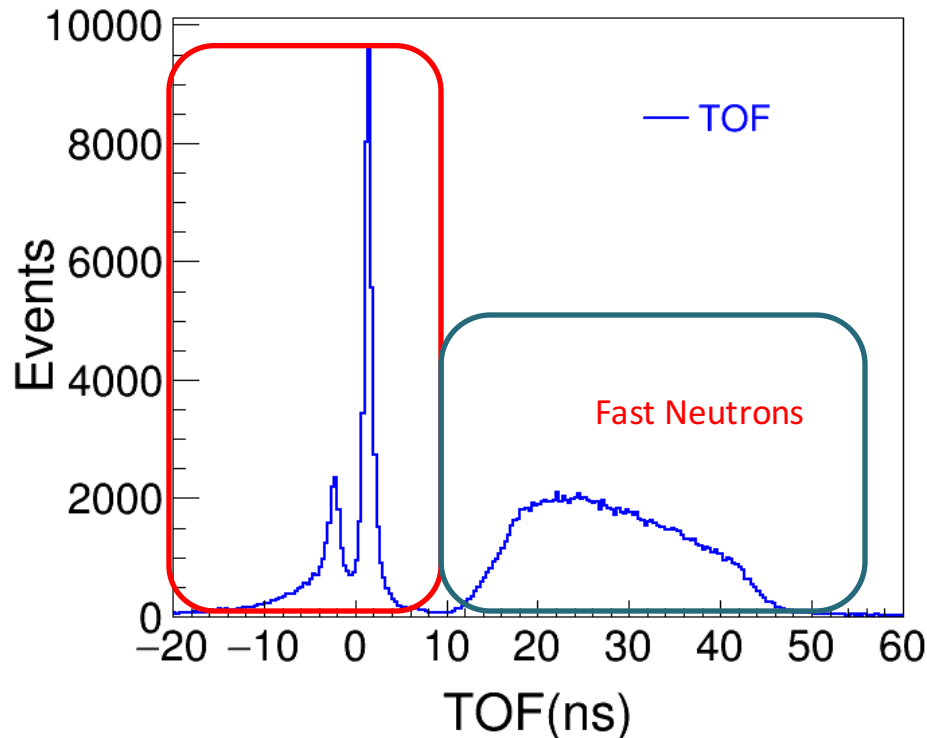
➤ Data Sets(Events=267000)

Date_Time: 2016-03-31-21:30 to 2016-04-01-14:22
Run_Number: run1_AmBe_V1729A_Threshold7F0_Events_267000/

Neutron experiment

➤ Result of experimental setup 1

□ TOF distribution



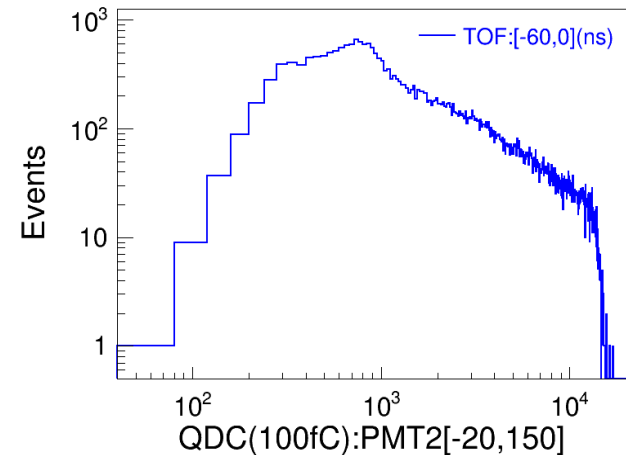
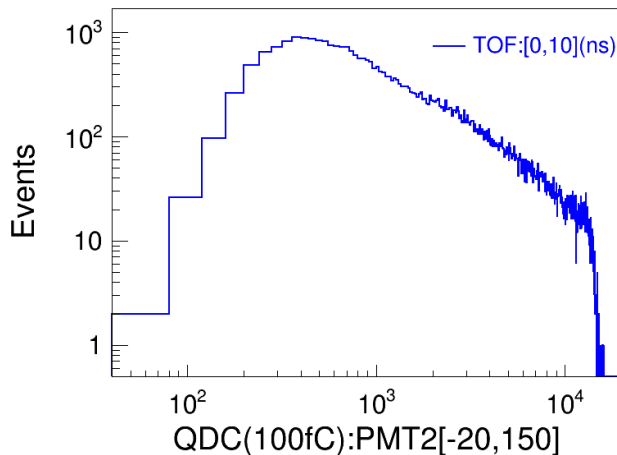
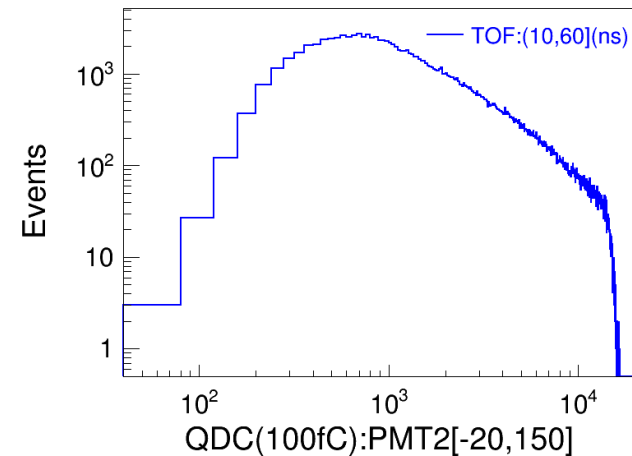
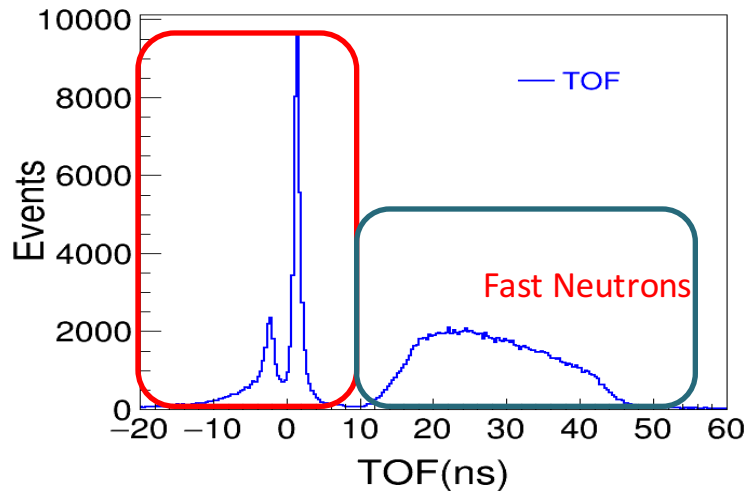
Delay time of four channels is same after time calibration.

Coincidence width is 40ns from the discriminator (Mod.N840)

Neutron experiment

➤ Result of experimental setup 1

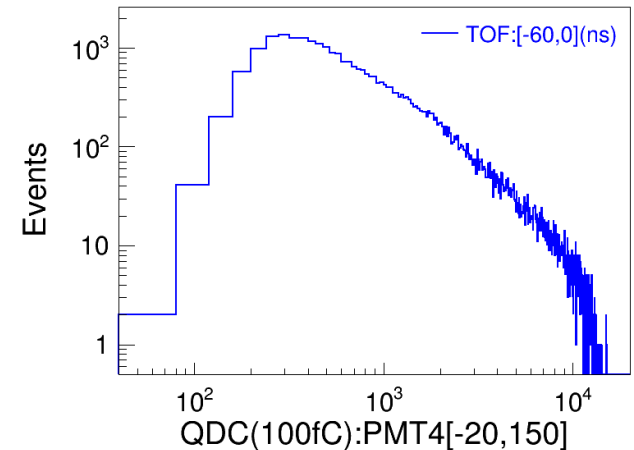
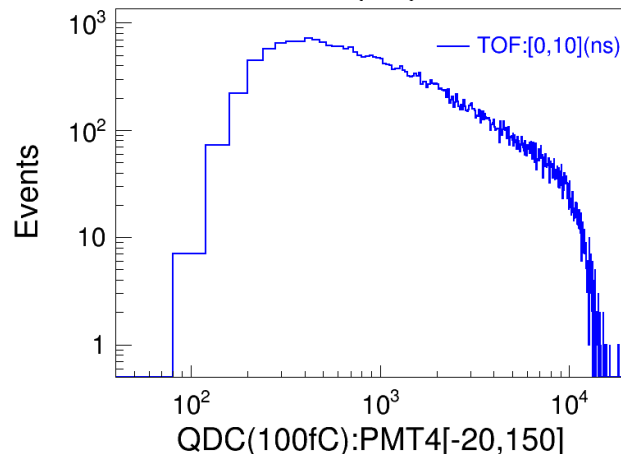
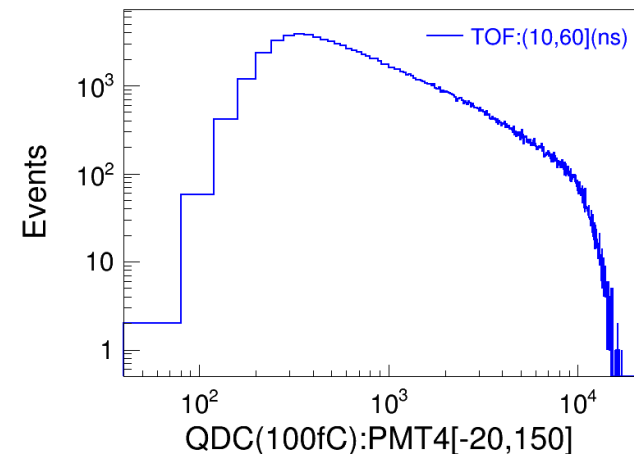
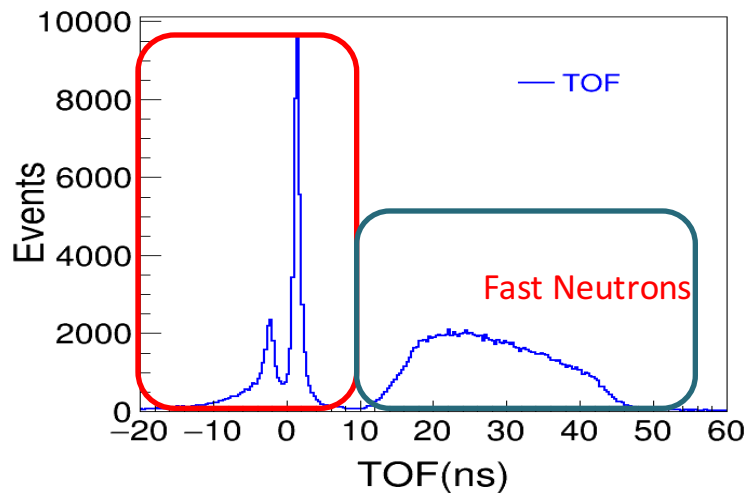
□ Energy distribution of PMT2(EJ254)



Neutron experiment

➤ Result of experimental setup 1

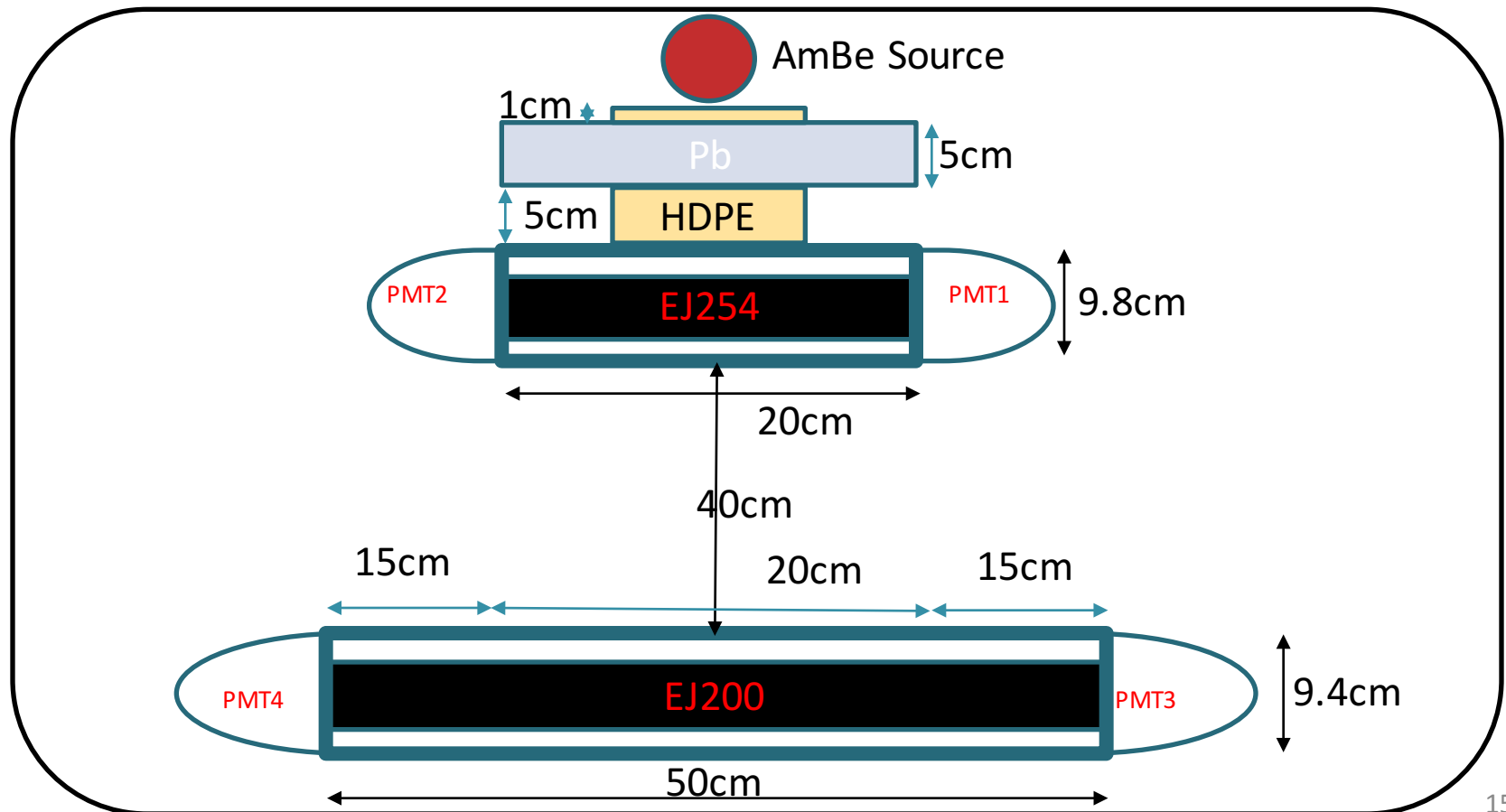
□ Energy distribution of PMT4(EJ200)



Neutron experiment

➤ Time of Flight (TOF) method

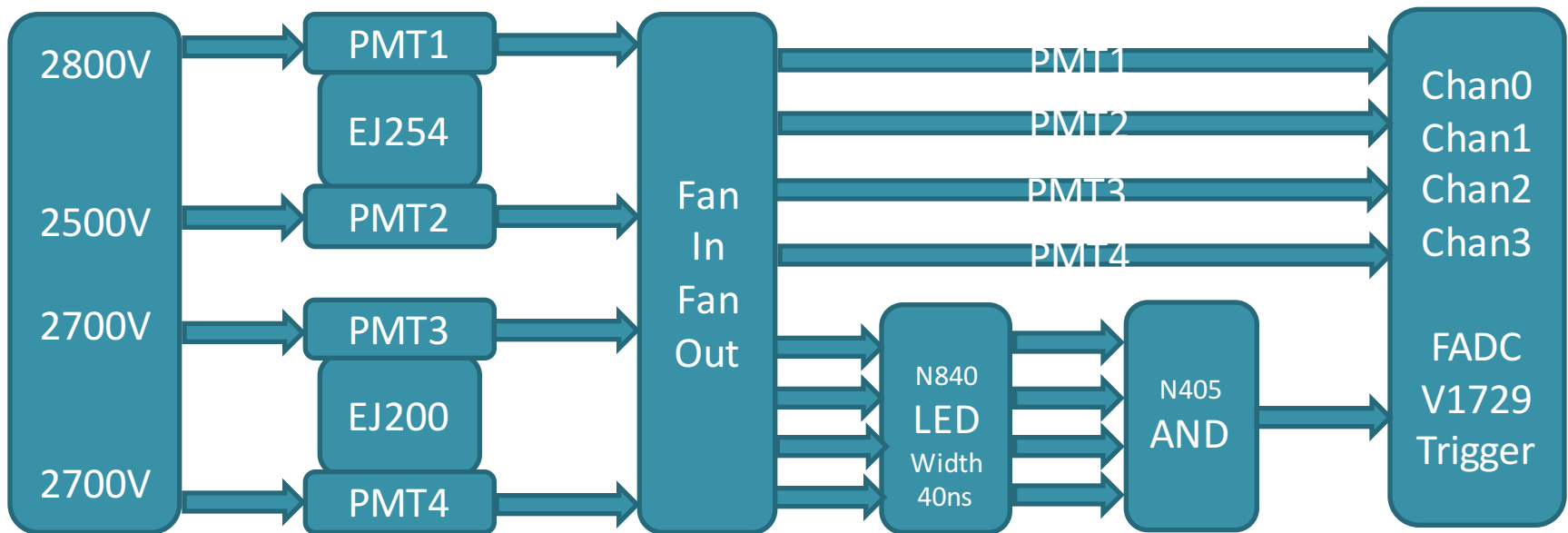
❑ Experimental setup 2



Neutron experiment

➤ Time of Flight (TOF) method

❑ Experimental setup 2



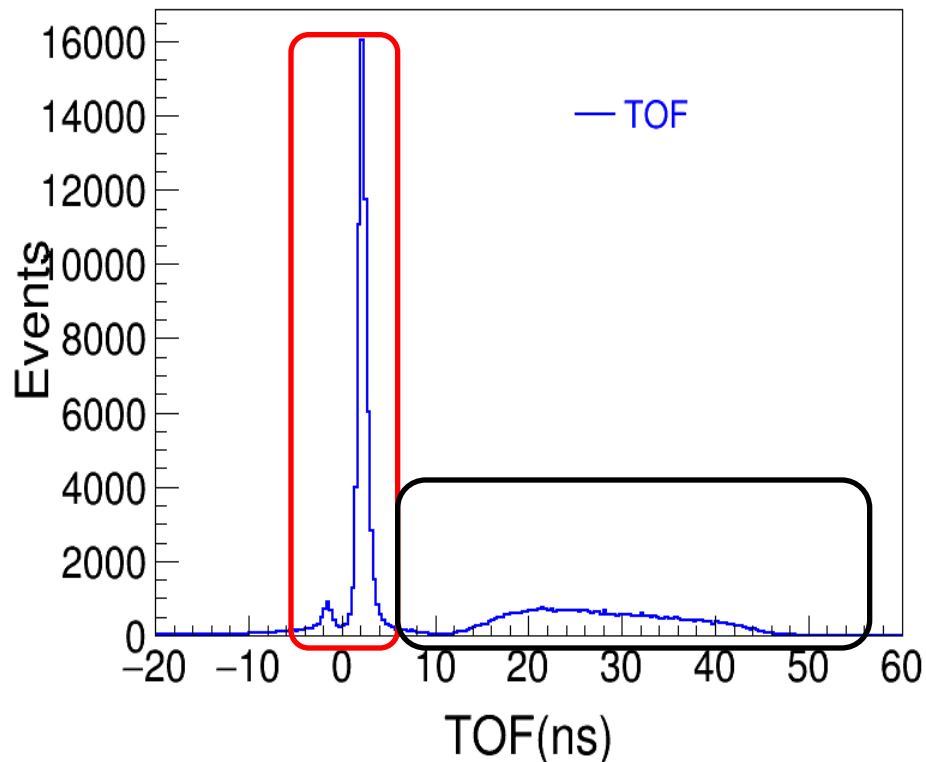
➤ Data Sets(Events=141000)

Date_Time: 2016-04-05-01:16 to 2016-04-05-12:15
Run_Number: run1_AmBe_0dB_Threshold_10mv_Width_40ns_Events_141000

Neutron experiment

➤ Result of experimental setup 2

□ TOF distribution



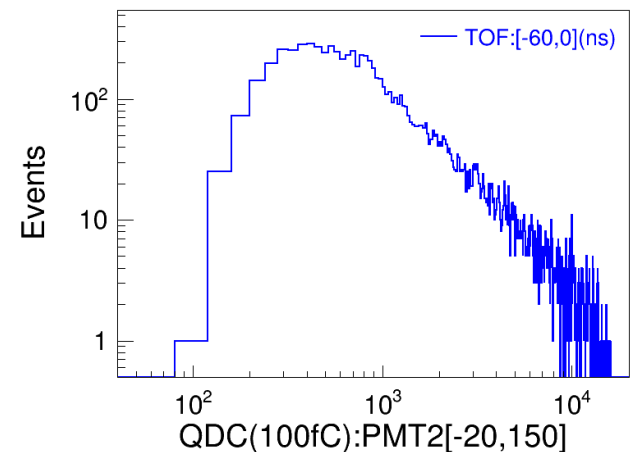
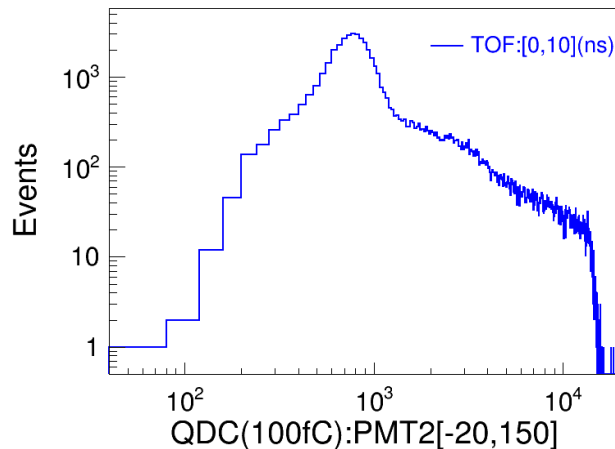
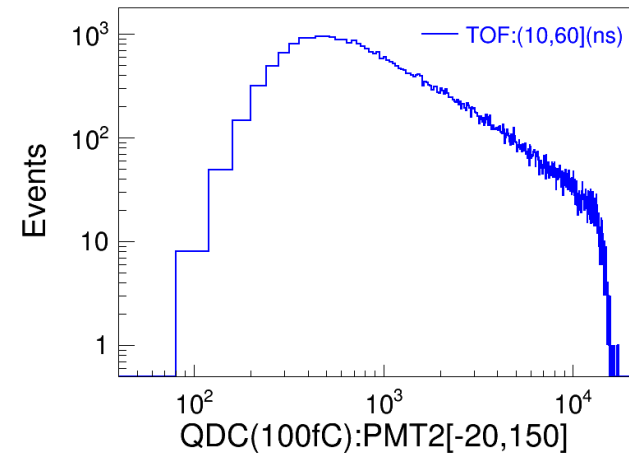
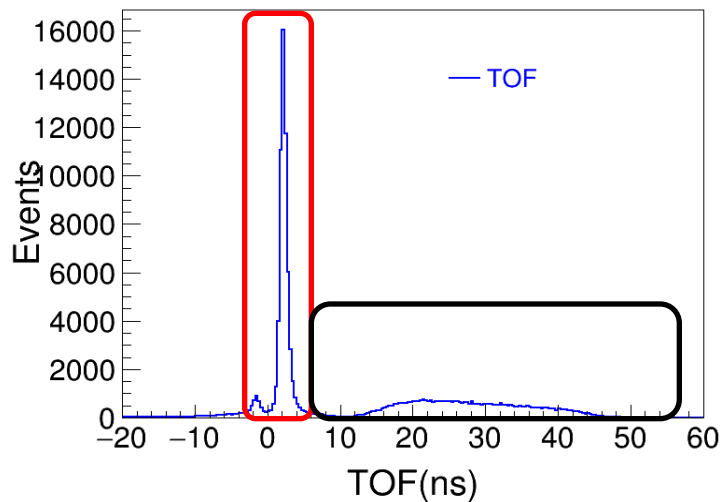
Delay time of four channels is same after time calibration.

Coincidence width is 40ns from the discriminator (Mod.N840)

Neutron experiment

➤ Result of experimental setup 2

□ Energy distribution of PMT2(EJ254)



Neutron experiment

➤ Result of experimental setup 2

□ Energy distribution of PMT4(EJ200)

