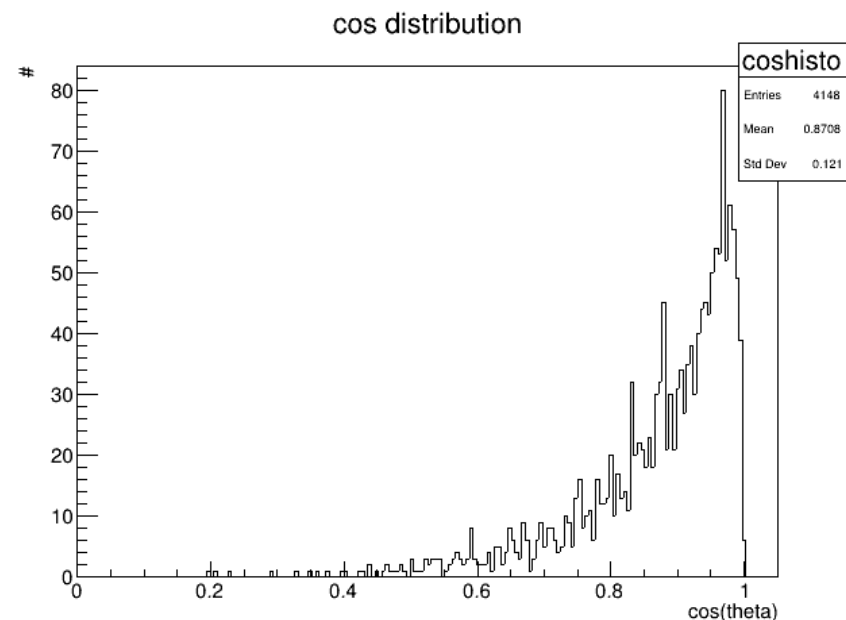
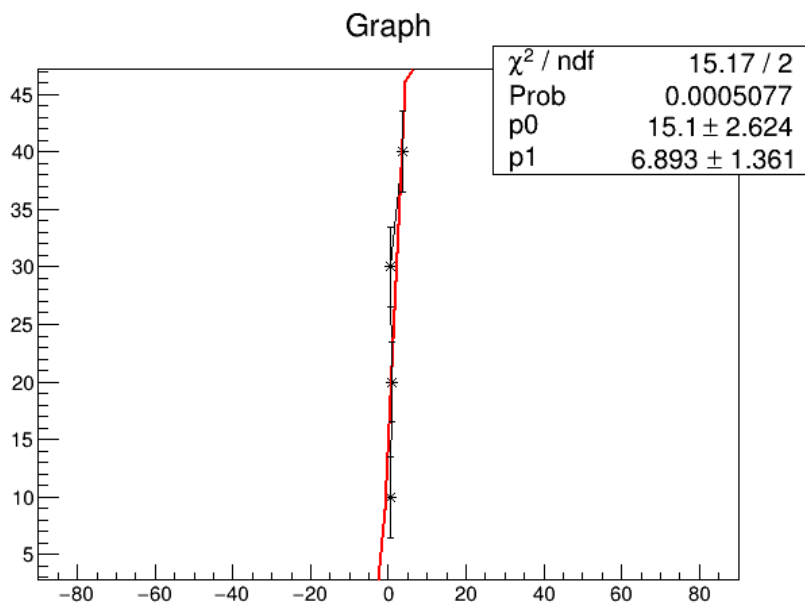


# Fitting Revisited

- ROOT fit the graph with no errors by assigning value 1 to errors.
- Set the 1 sigma to be about 70% of bar(10cm)
- Veto the event which satisfy  $P(\chi^2(obs) < \chi^2) < 0.05$



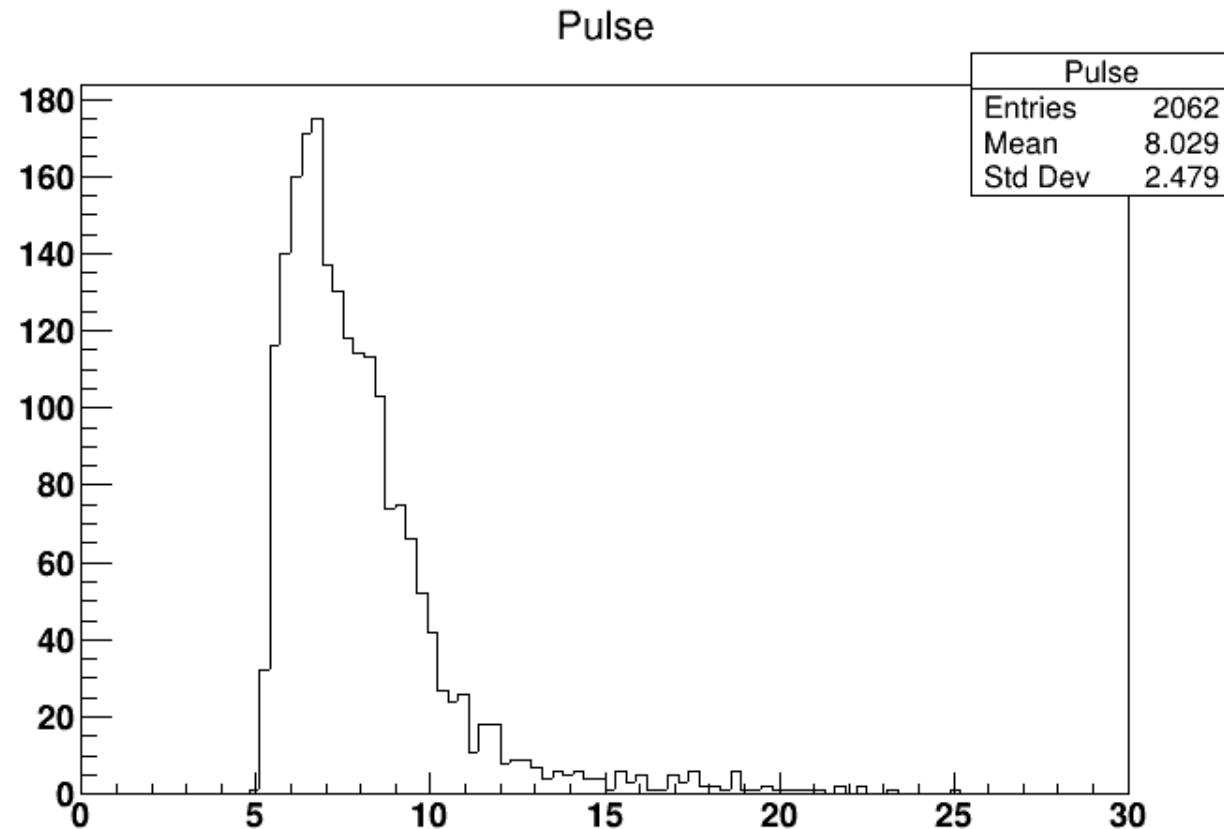
# Scintillation and PMT simulation

- Use the reference value of EJ200(GBAR scintillator)
- PMT(H7190) data is not enough to describe the physical constants of the simulation.
- It takes very long time to simulate.  
(so many photon tracks)
- Light yield of the picture on right  
= (1 photon/ 1 MeV)



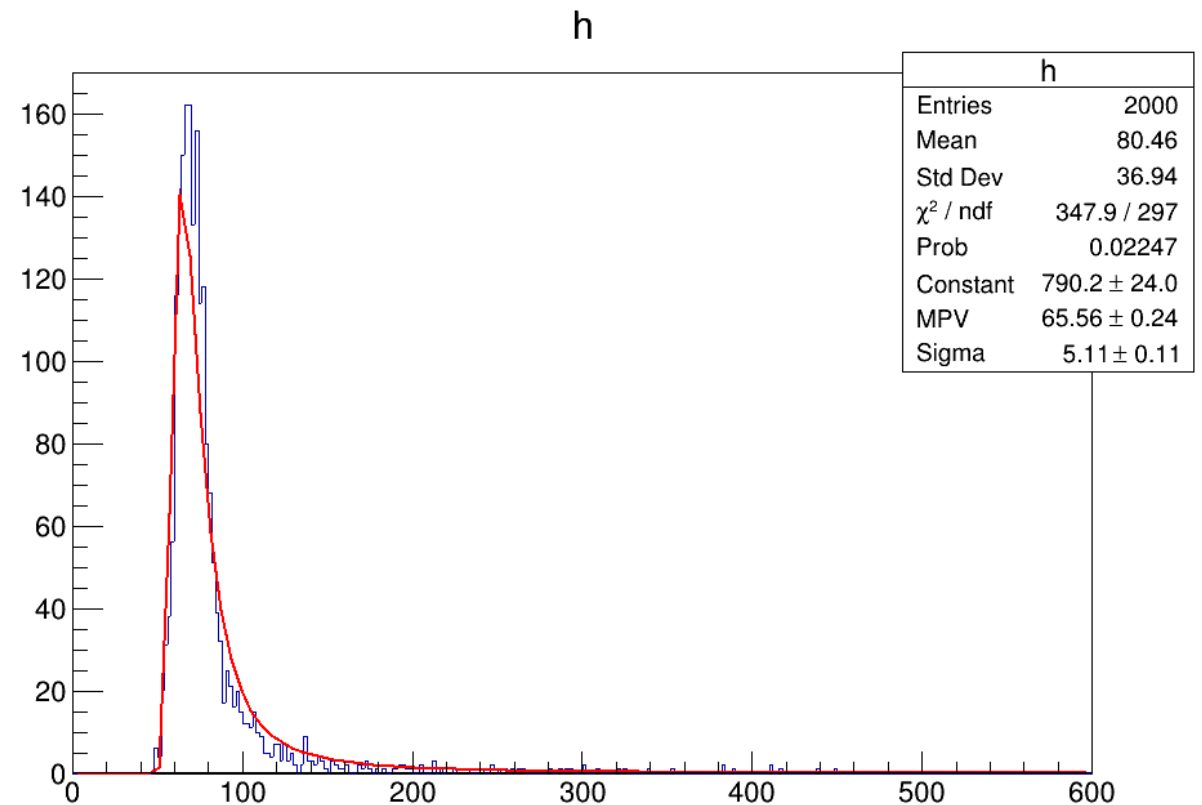
# Scintillation and PMT simulation

- Pulse shape (Light yield = 10000 / MeV -> Real value of EJ200)



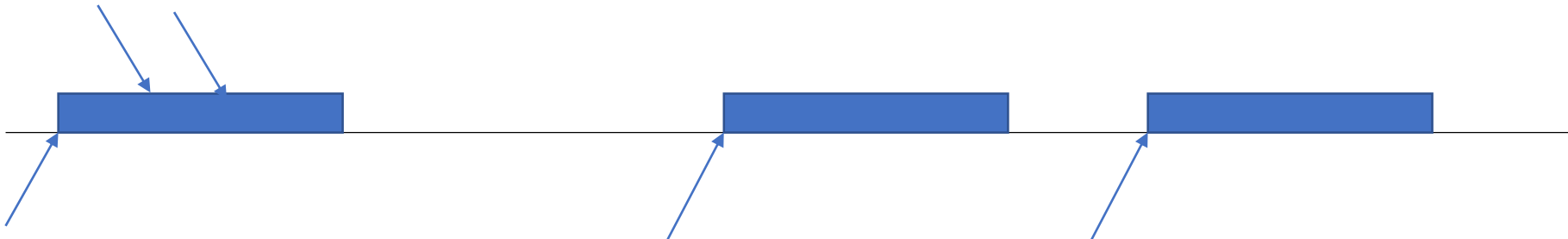
# Scintillation and PMT simulation

- To see the energy deposit, draw histogram.
- X axis =  $\sqrt{N_{ch1} * N_{ch2}}$
- (Light yield = 100 / MeV)



# About trigger

- 2) If any single hit is detected (either from a cosmic ray or from an anti-hydrogen annihilation), the DAQ system takes the data for the certain trigger window (about 100 ns) with the time stamp indicated by the timer in the module to measure the total time from the anti-hydrogen drop.
- In simulation, hit prompting trigger has no threshold.
- Tag the trigger 1,2,3 ...
- threshold is given when one analyze the trigger one by one.
- How to apply the trigger condition to the real situation?



# Back up

- 1) First, we select the triggers having Top-Bottom combination with two or more hits, which have at least one hit at Top and Bottom, each. Then, by checking the time difference between the earliest top hit and earliest bottom hit, we reject the trigger with a condition of  $\Delta t = T_{\text{bot}} - T_{\text{top}} > 2 \text{ ns}$  according to the distributions of cosmic-rays.
- 2) This algorithm is almost same as 1) but checking that the time differences of all possible combinations of a top hit and a bottom hit are less than 2 ns. If one of them, at least, is more than 2 ns, that trigger is rejected.
- 3) This algorithm is almost same as 2) but select the trigger with more than two hits at first.