Waveform Fitting
for
LAMPS Neutron detector

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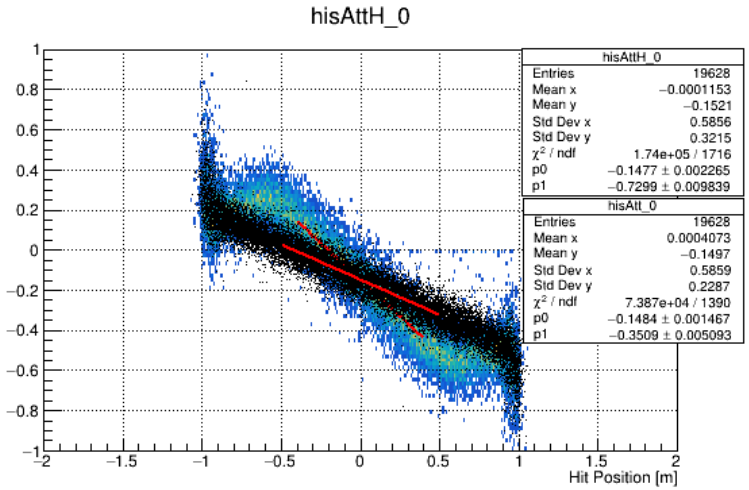
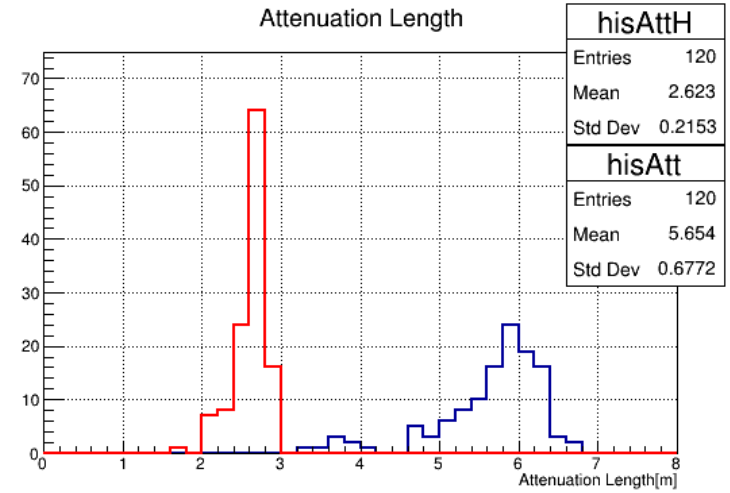
LAMPS

CENuM

Height vs Sum

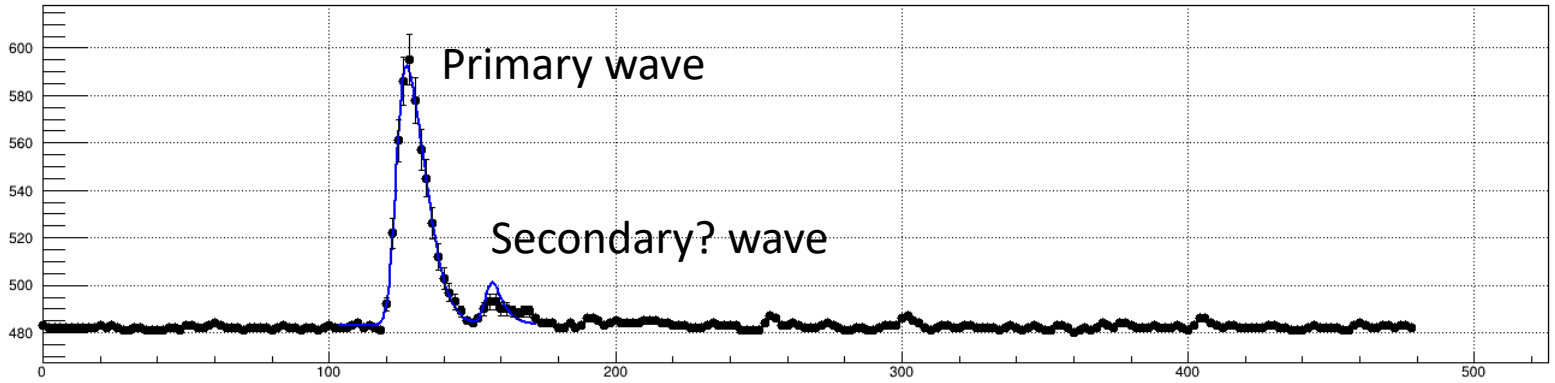




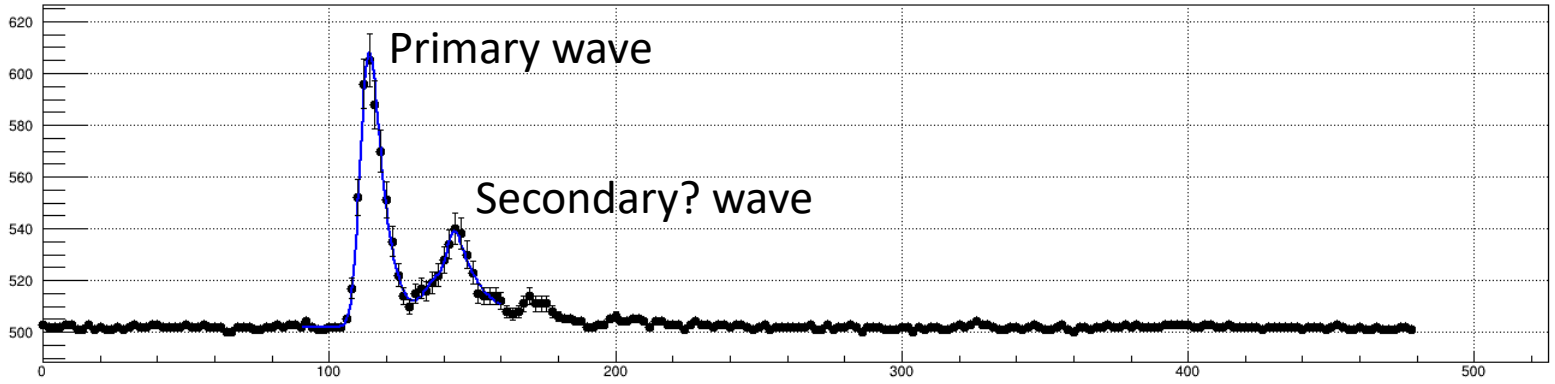
- Attenuation lengths from height base & Sum base were different (2.6 m vs 5.6 m)

어제 오후 문득 파형 fitting을 하고 싶어 졌습니다.

Module 0



Module 1



생각나는 함수형들 찾아보기

- 비 대칭 gaussian
  - Tmath::Gaus(x, mean, sigma(x)) , sigma(x) : a (x<mean) / a/(1+bx) (x>= mean)
  - 대개의 경우 rising 쪽이 안 맞음
- Gaussian x exponential
  - Tmath::Gaus(x, mean, sigma) * exp (- (x-mean)/lambda)
  - 잘 안 맞음.
- Multi exponential
  - A*Exp((x-mean) / lambda) + B*Exp ((x-mean')/lambda') +…
  - 잘 안 맞음.
- ….

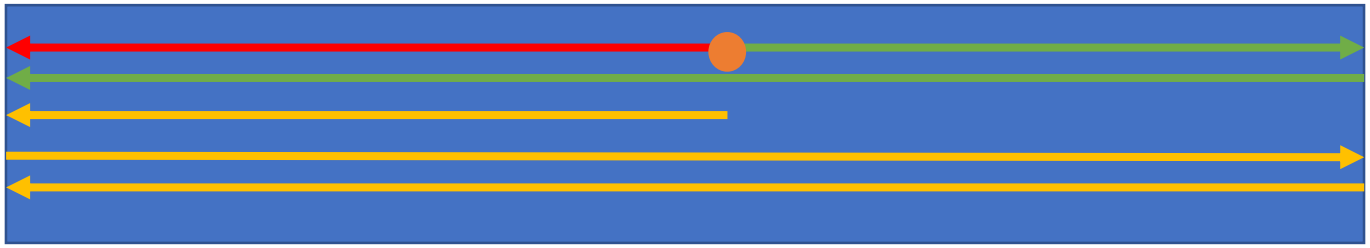
LAMPS 파형 Fitting 함수

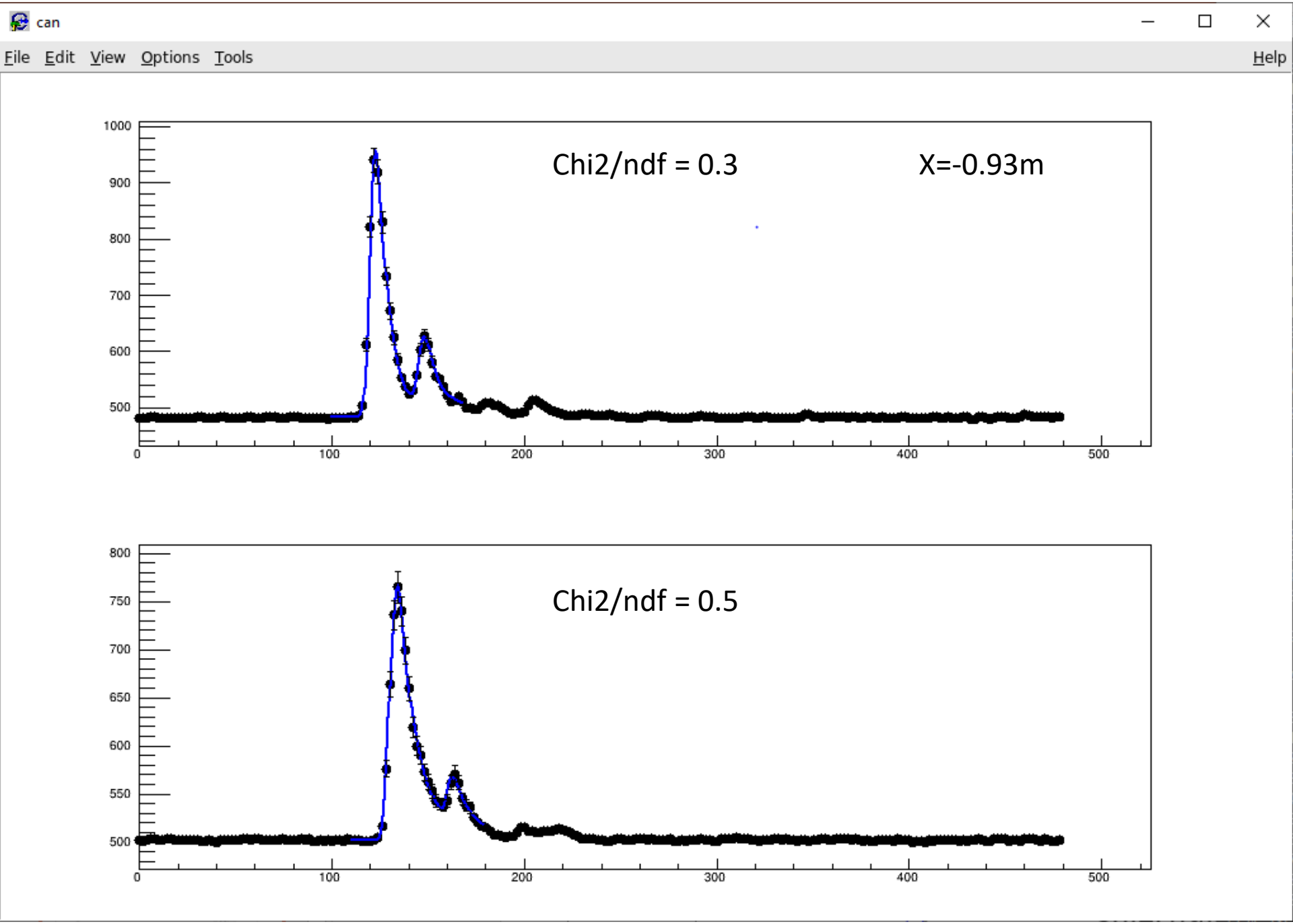
Error Function * Exponential

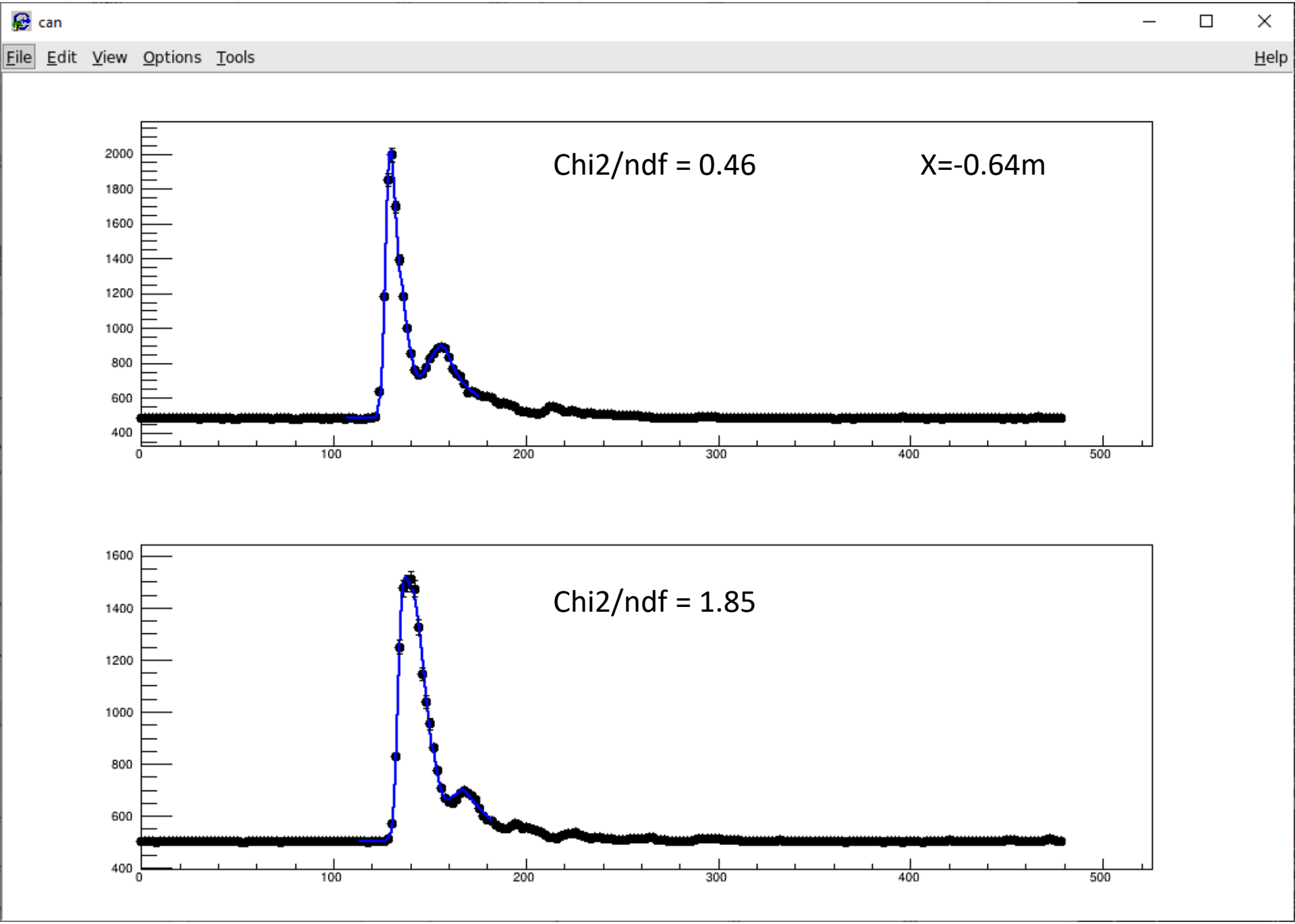
- [0] * {Tmath::Erf ((x –[1])/[2]) +1 } * Tmath::Exp(-(x-[1])/[3])
  - [0] : Signal Height equiv. value
  - [1] : Signal Timing
  - [2] : Rising constant
  - [3] : Decay constant

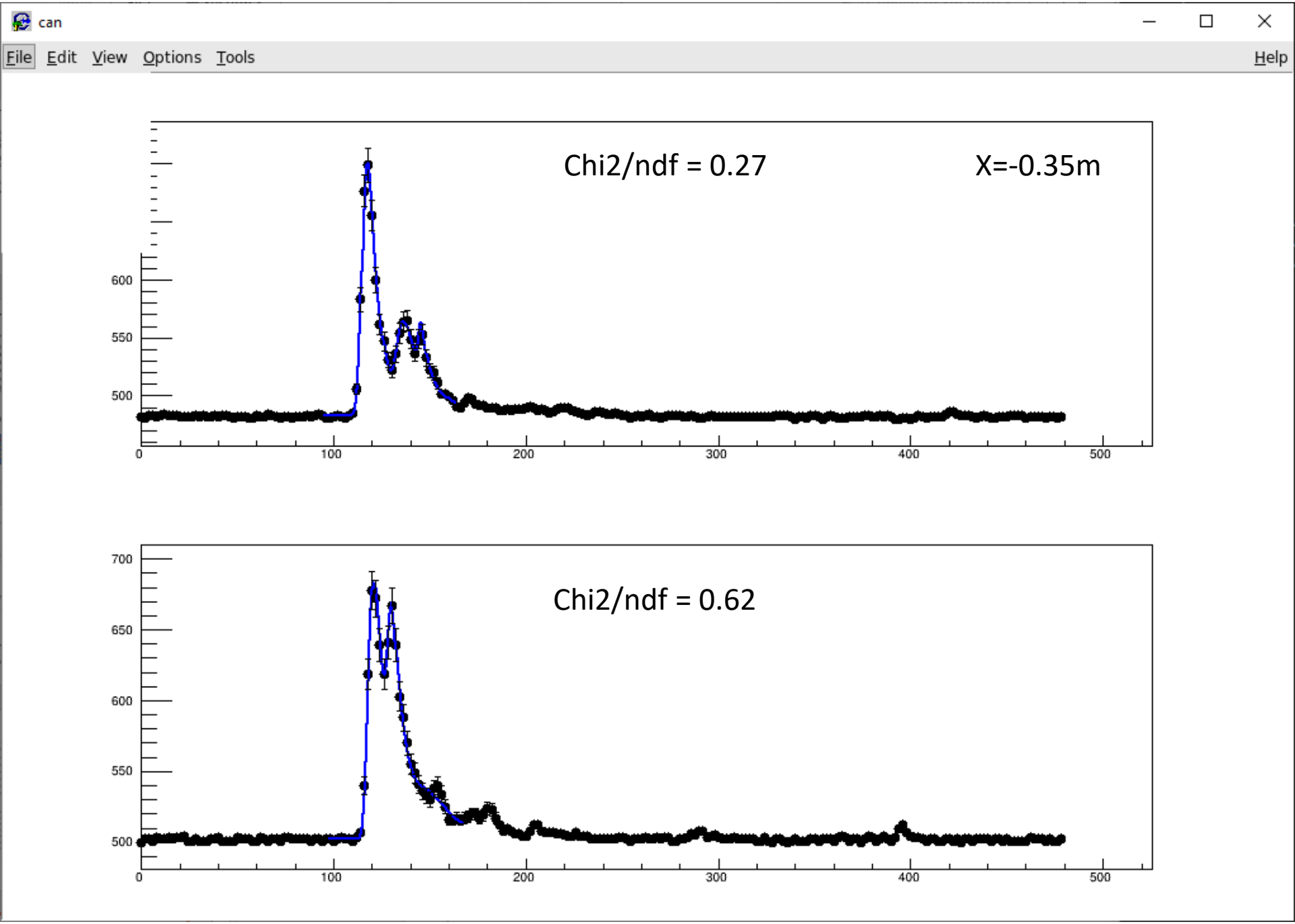
=>4 parameters / peak

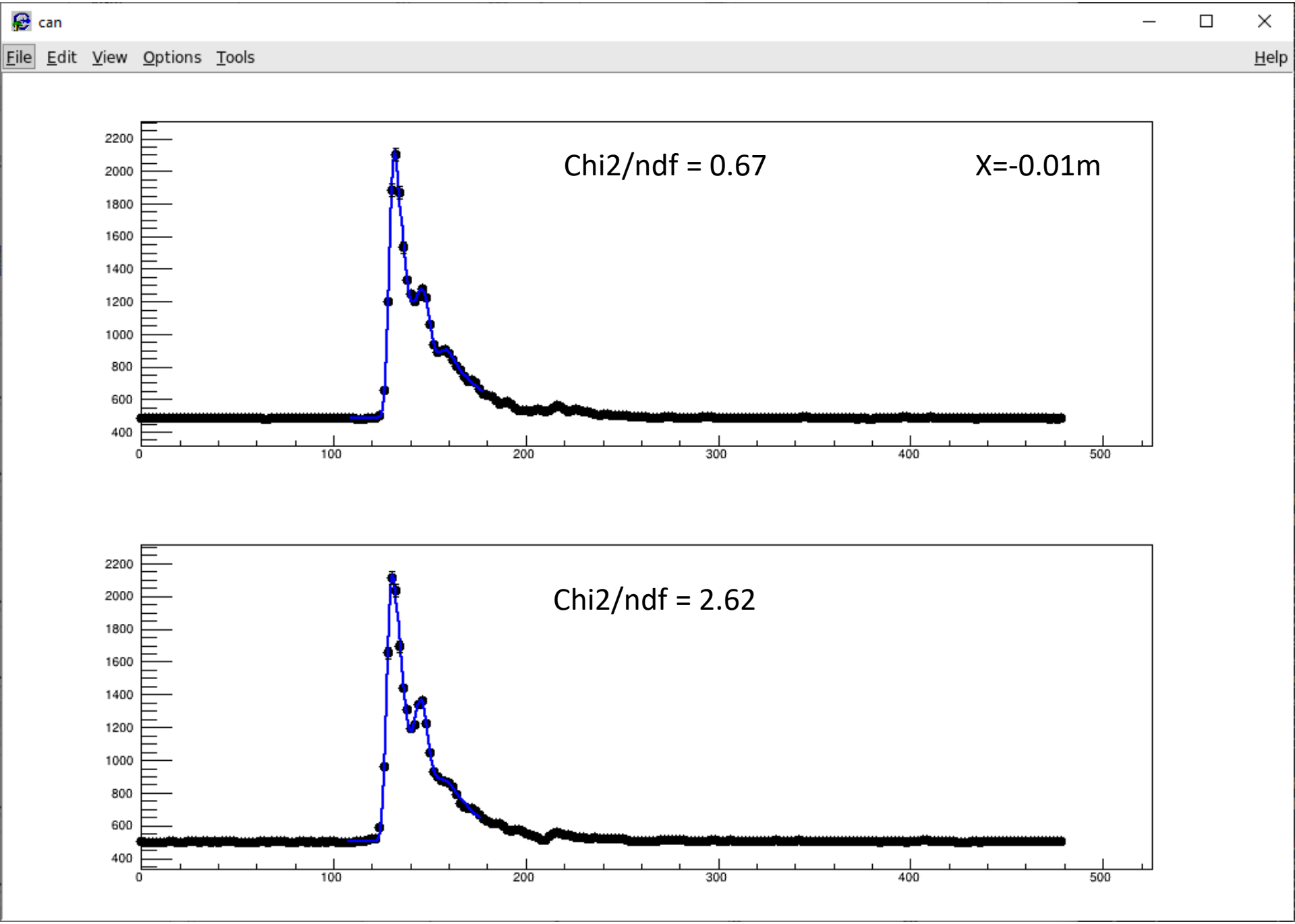
- 신호의 반사등의 Parameter
  - Attenuation
  - Delay
  - Reflection
  - Two time reflection
  - 13 parameters

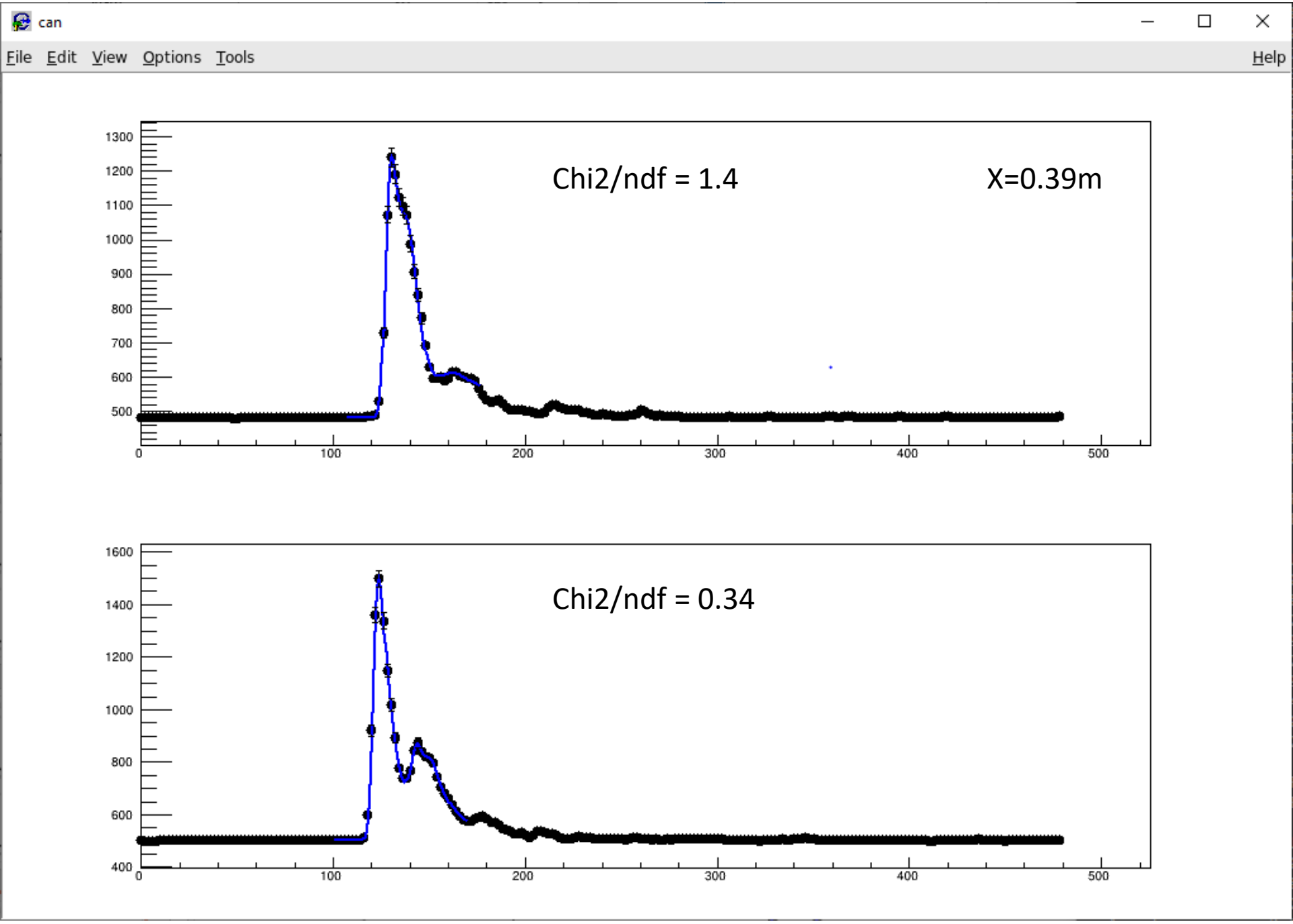


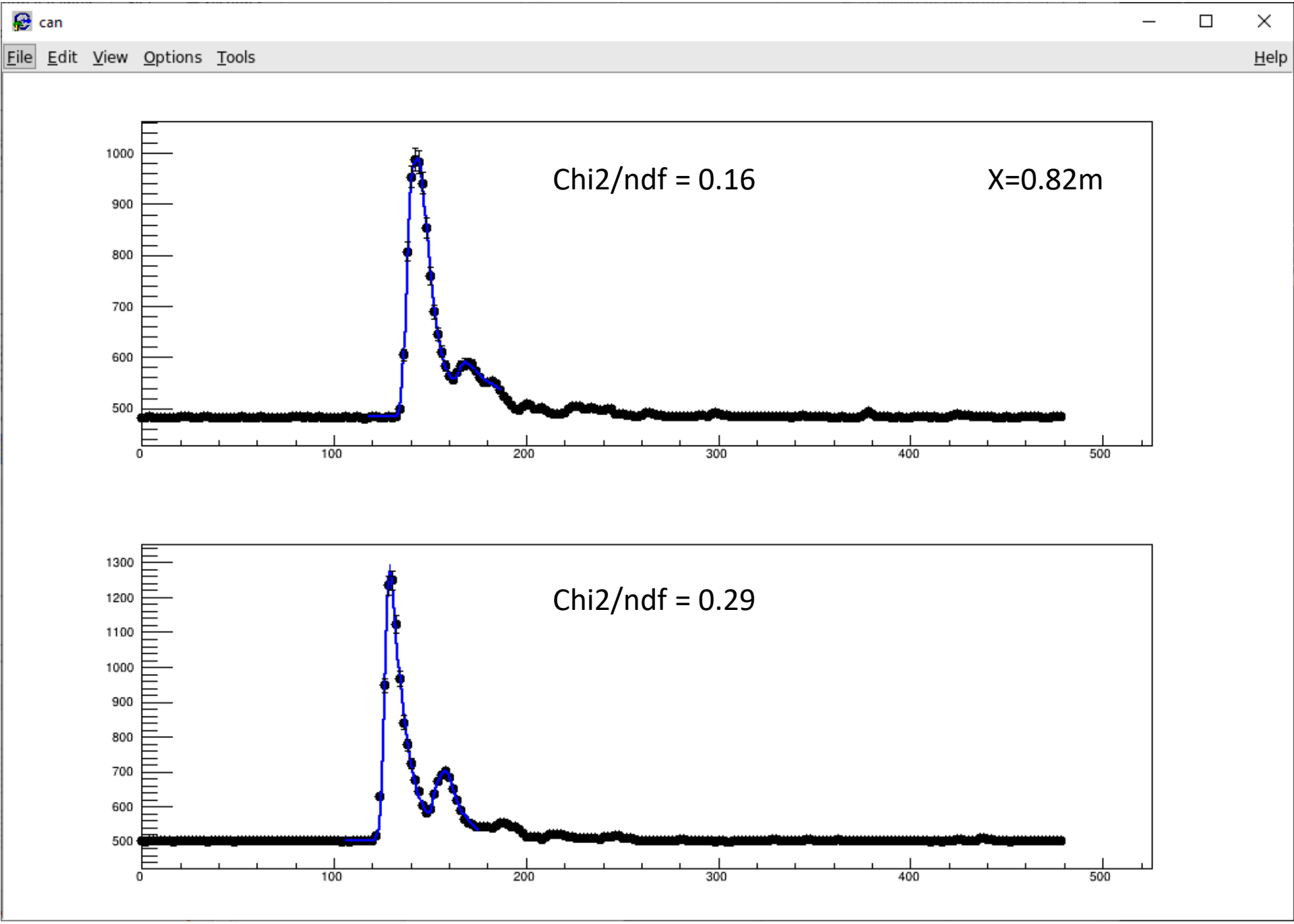

can
File Edit View Options Tools Help
Chi2/ndf = 0.3
X=-0.93m
Chi2/ndf = 0.5

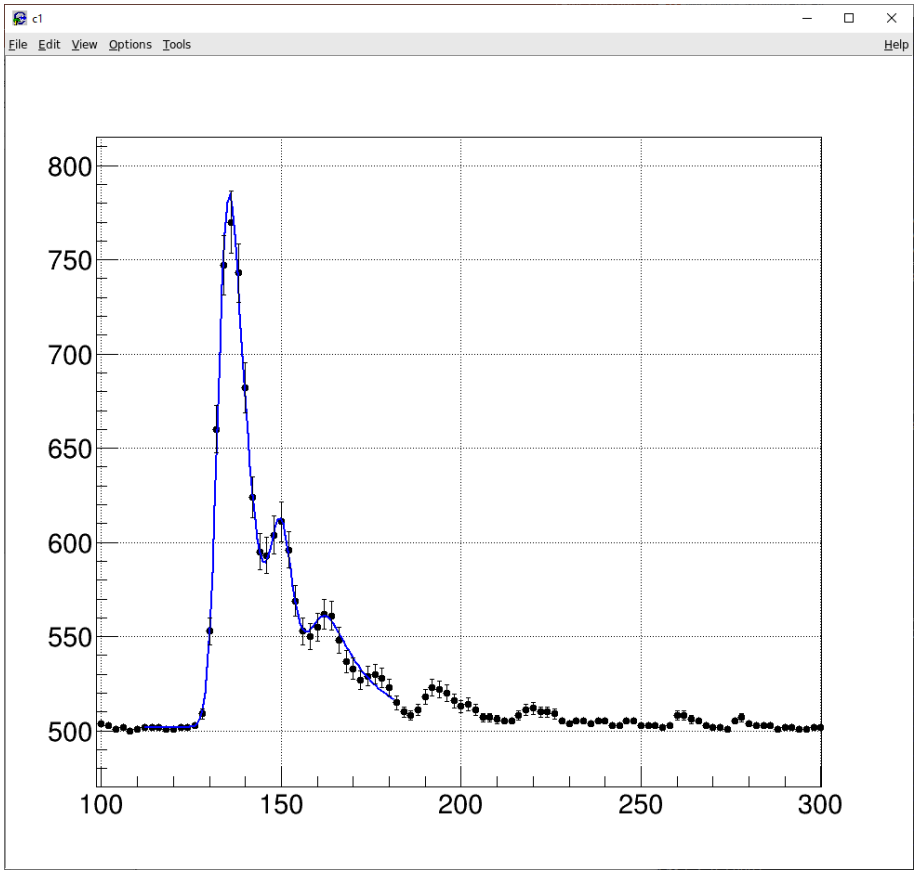

can
File Edit View Options Tools Help
Chi2/ndf = 0.46
X=-0.64m
Chi2/ndf = 1.85


can
File Edit View Options Tools Help
Chi2/ndf = 0.27
X=-0.35m
600
550
500
0
100
200
300
400
500
Chi2/ndf = 0.62
700
650
600
550
500
0
100
200
300
400
500


can
File Edit View Options Tools Help
Chi2/ndf = 0.67
X=-0.01m
Chi2/ndf = 2.62
2200
2000
1800
1600
1400
1200
1000
800
600
400
0
100
200
300
400
500


can
File Edit View Options Tools Help
Chi2/ndf = 1.4
X=0.39m
Chi2/ndf = 0.34


can
File Edit View Options Tools Help
Chi2/ndf = 0.16
X=0.82m
Chi2/ndf = 0.29



- Good Fitting result
- 14 parameters
  - ->How to reduce
  - ->How to convert to timing & energy
- Consumed heavy CPU power

DAQ status

- LAMPS Trigger electronics : Under debugging
  - TCB Triggering were stopped sometimes
- Semi-realtime data converter : done
- Semi-realtime event builder : done (for 120 crates)
- DAQ scripts for continues data taking : done (confirmed for 24 hr)
- Typical data rate : 4 MB / s