KU meeting 20200602
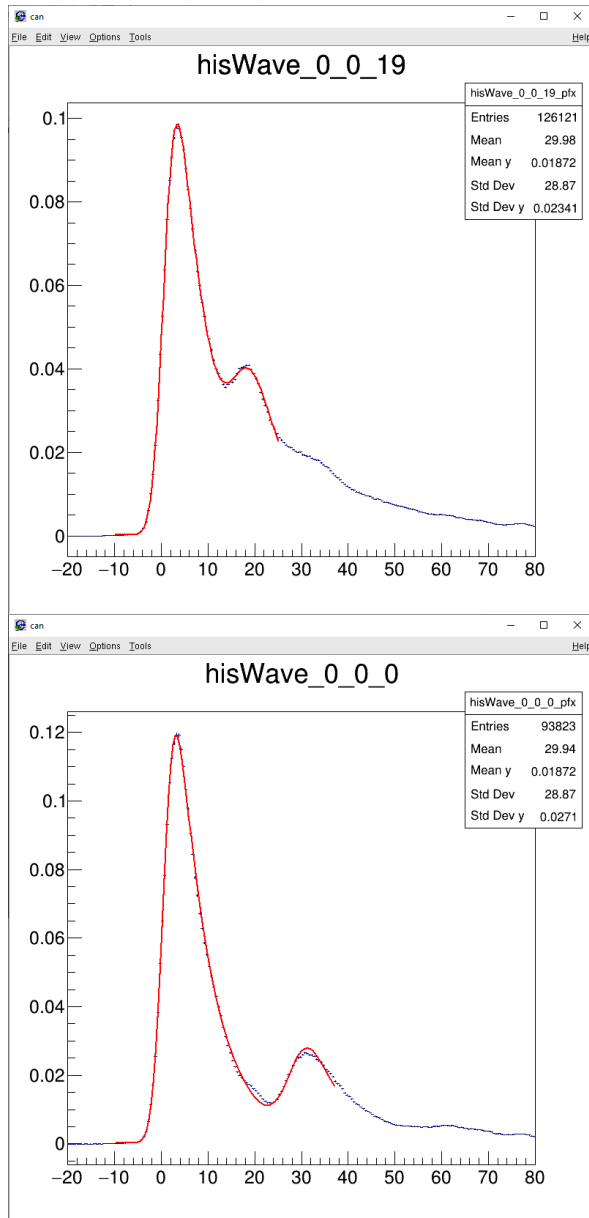
Lee Jong-won
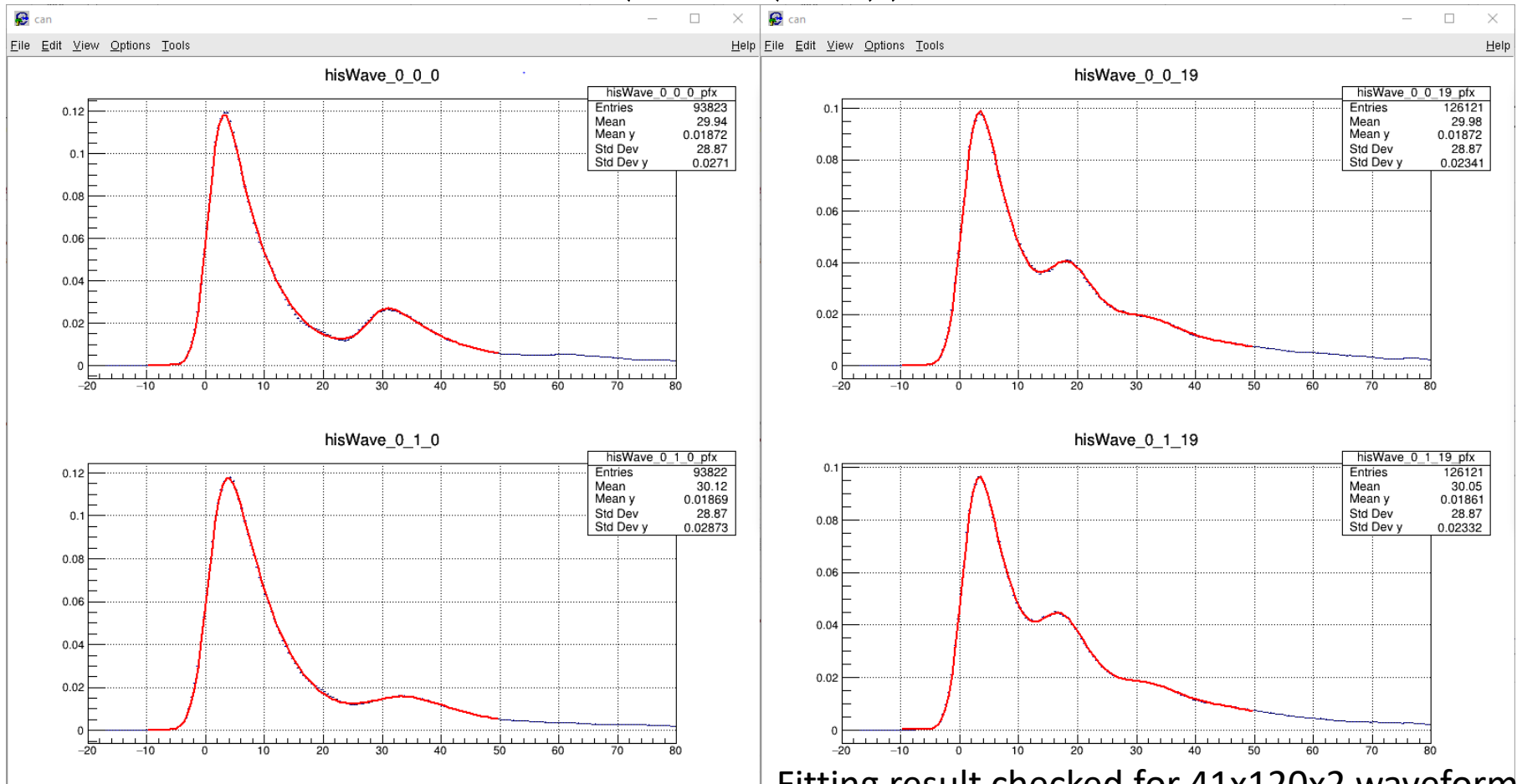
Neutron detector waveform fitting

- Fitting with two function
  - Make typical waveform by 5 cm width.(41 waveforms for single channel)
  - Looks good, some wave did not fit well.
  - Fitting is affected small components at 20~50 ns region.
  - The components changes by hit position.
  - But timing is same.
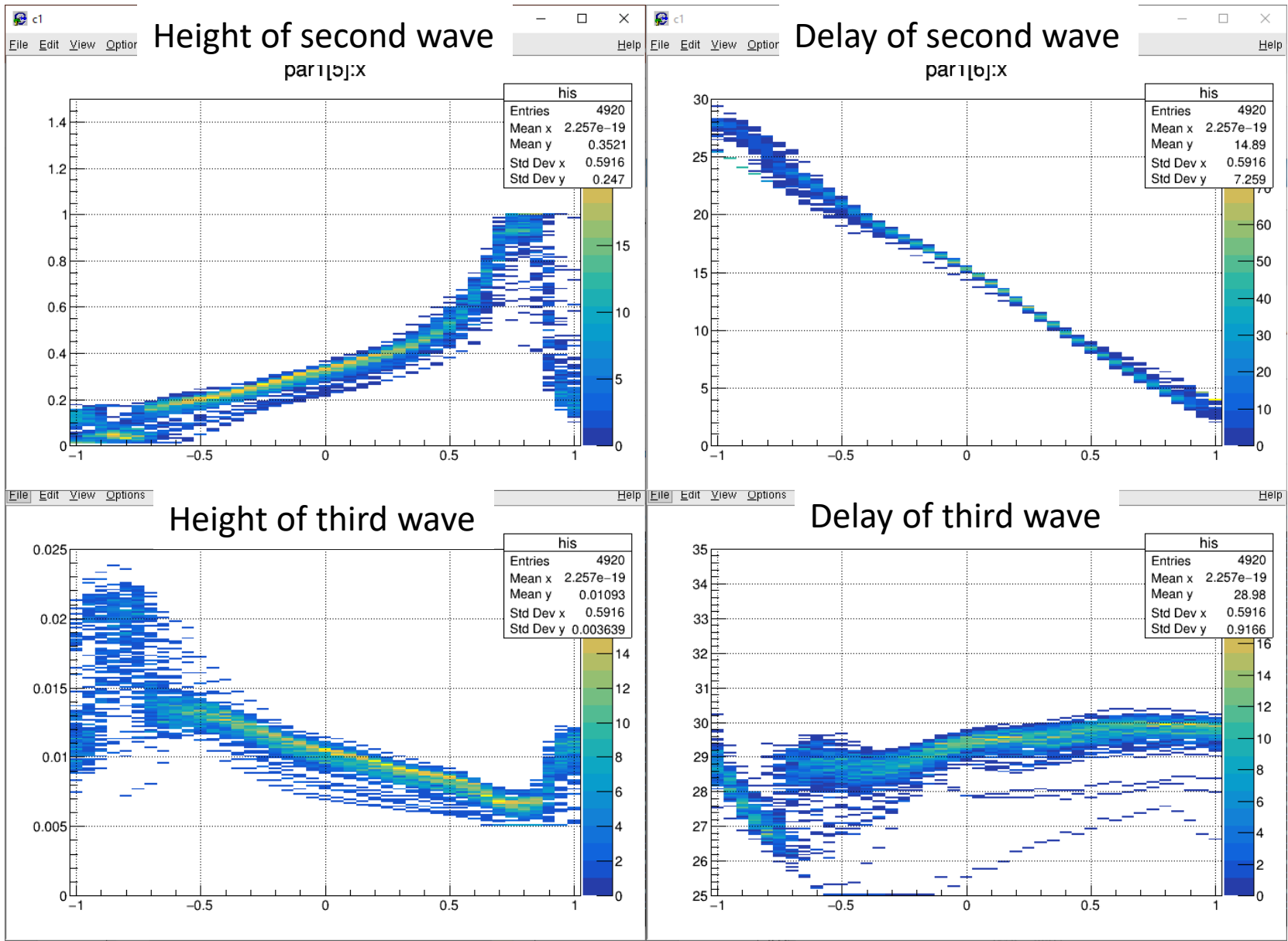 - Additional wave from light reflected two times? (4.x m difference)

New fitting function

$$H \times \{f(x, t, \sigma_r, \sigma_d) + h'f(x, t + t_d, \sigma_r', \sigma_d')\}$$
$$\underline{+H' \times \{f(x, t + t_4, \sigma_r + \Delta, \sigma_d + \Delta) + h'f(x, t + t_4, \sigma_r + \Delta, \sigma_d + \Delta)\}}$$

$$f(x, t, \sigma_r, \sigma_d) := \left(1 + \mathrm{erf}\left(\frac{x - t}{\sigma_r}\right)\right) \exp(\frac{x - t}{\sigma_d})$$

Fitting result checked for 41x120x2 waveforms

Fitting parameter distributions by x (120 modules)

Height of second wave

Delay of second wave

Height of third wave

Delay of third wave

Plan

- All parameters can be represented by functions of x.

- Using two signals from single module, get (initial) x and make fitting function.

- Fitting with function and searching additional signal.

- Check finding availability? for various energy combinations and timing difference.