

TB analysis

October (TIGER) + July (APV+VMM)

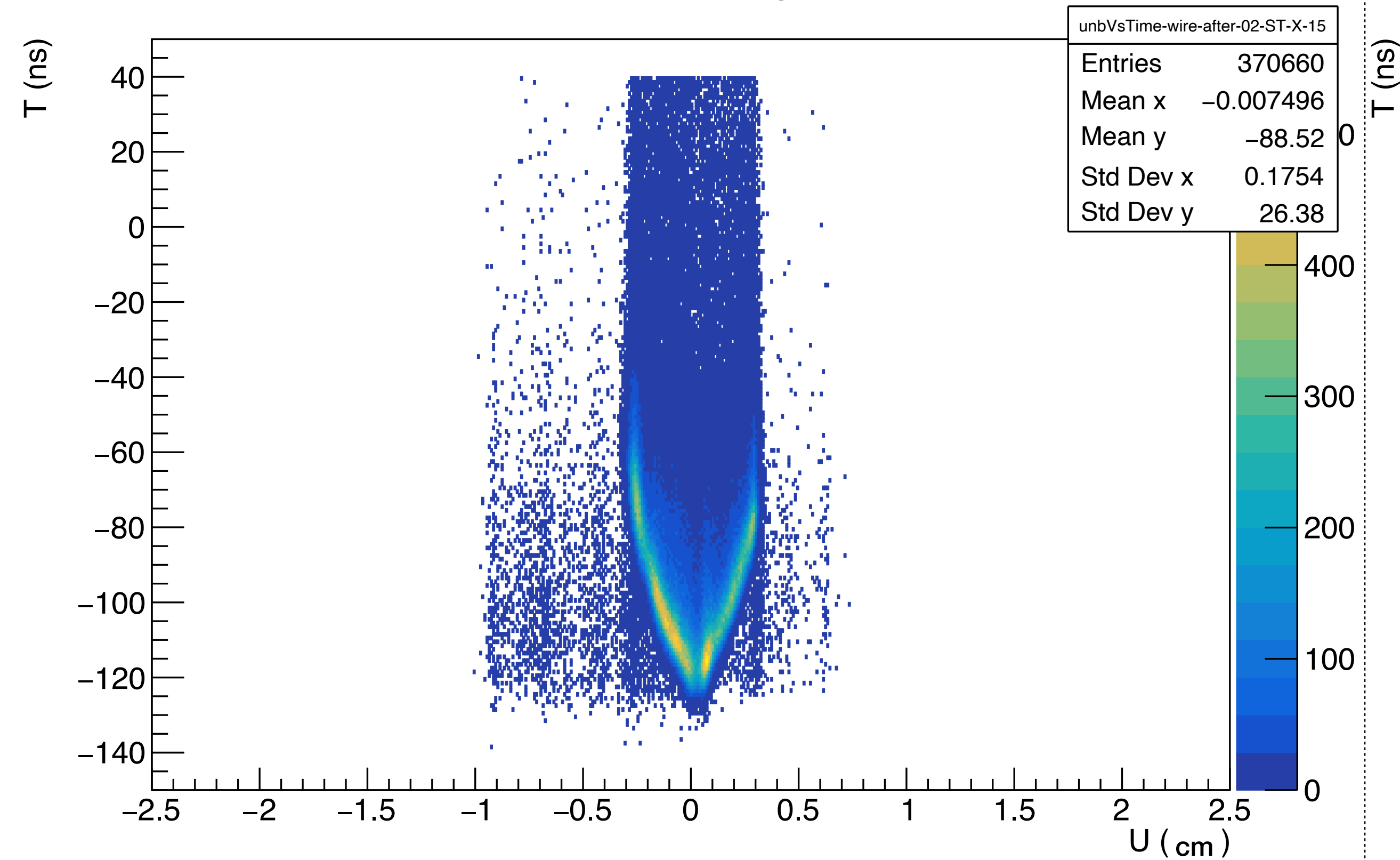
21/02/2023

October (TIGER)

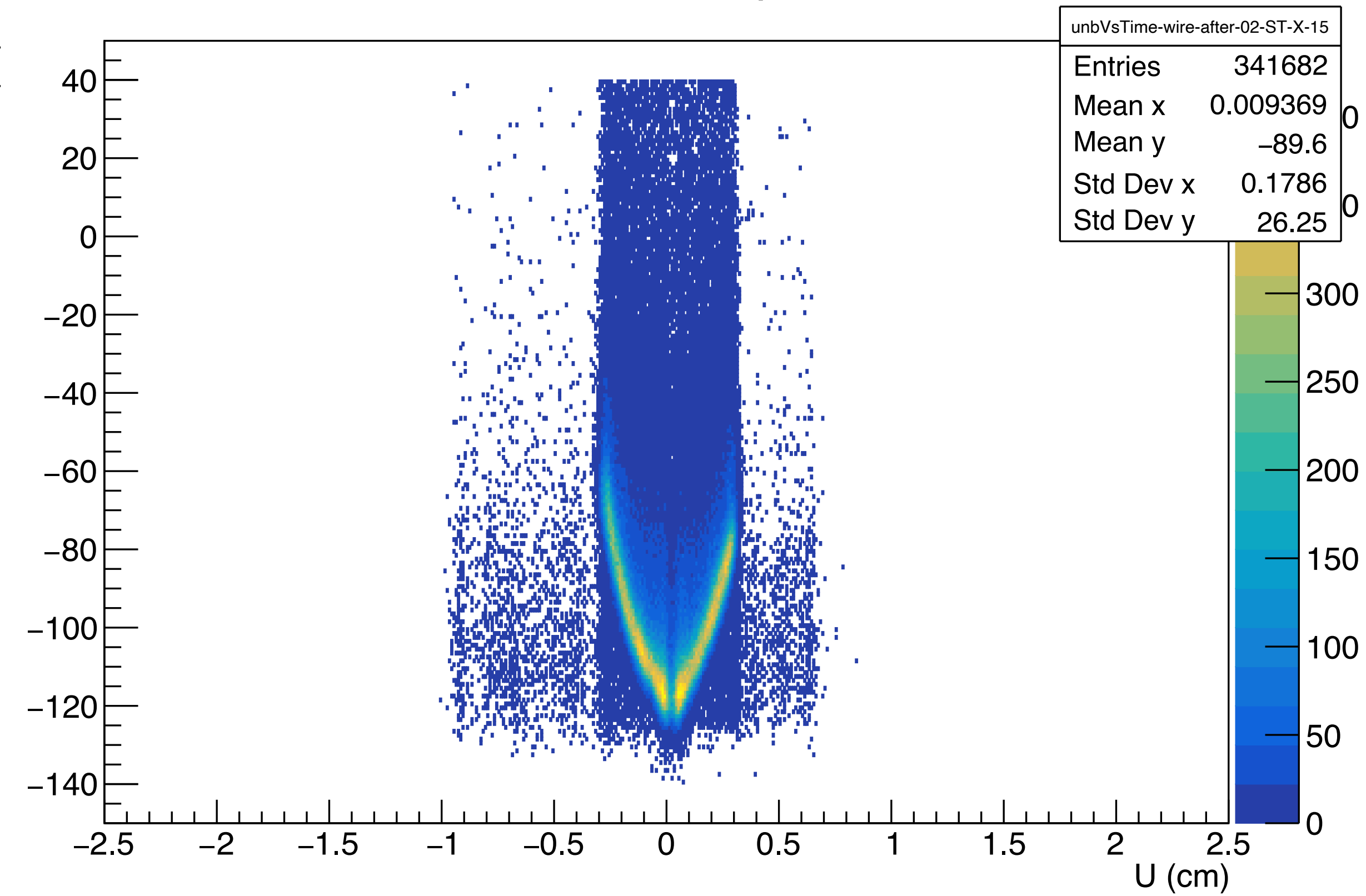
before rempping

after remapping

Initial vShape

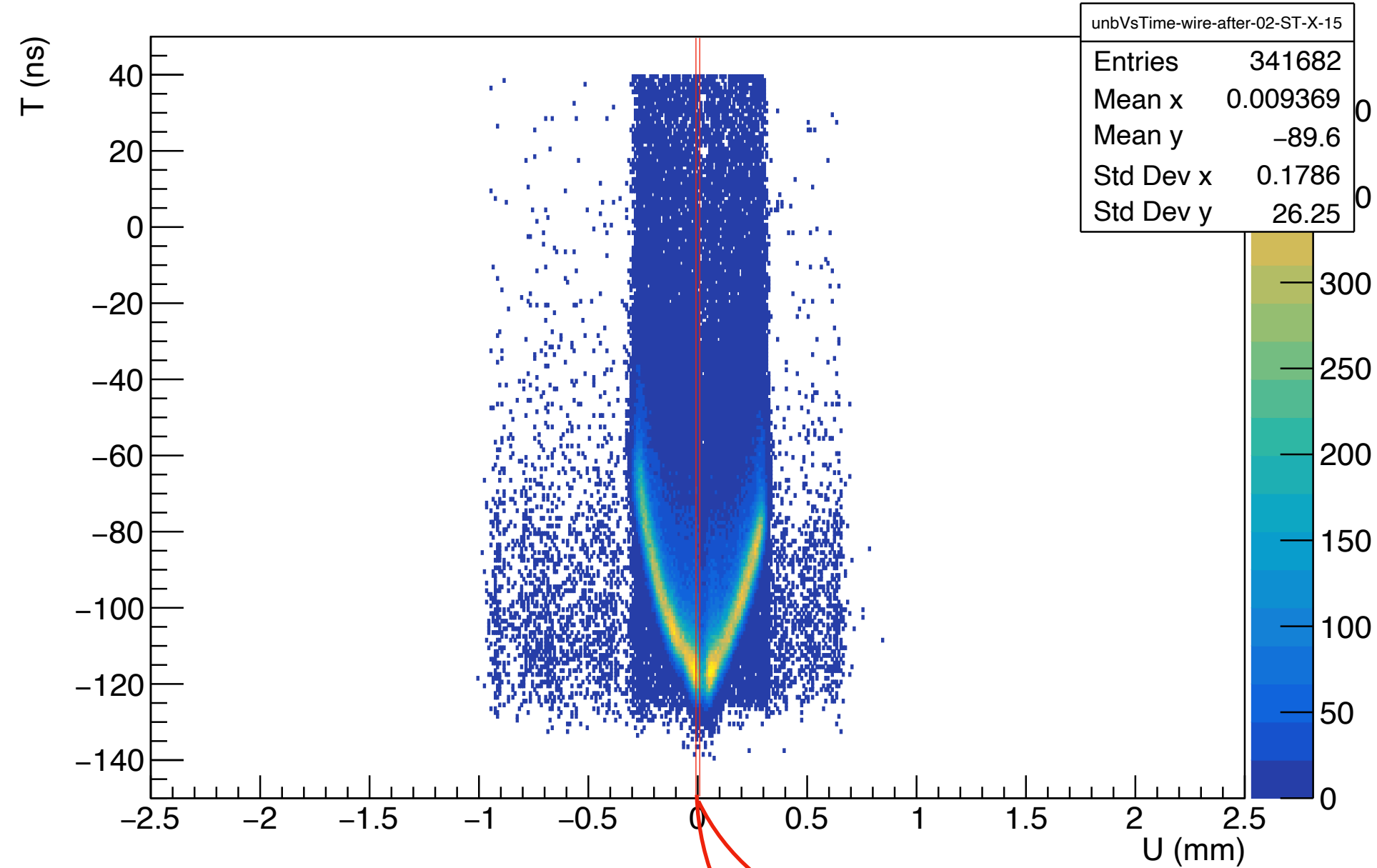


Initial vShape



Reminder

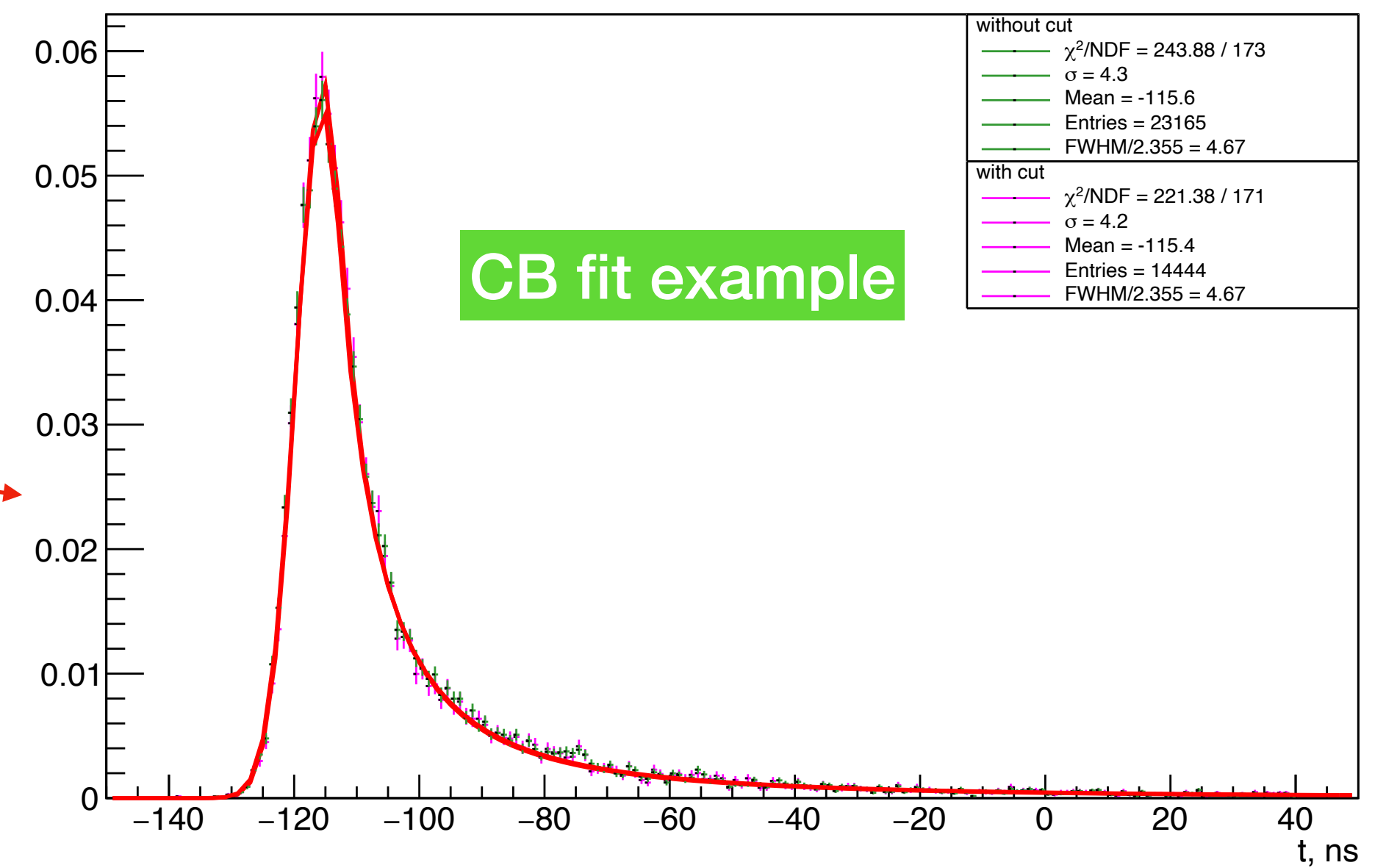
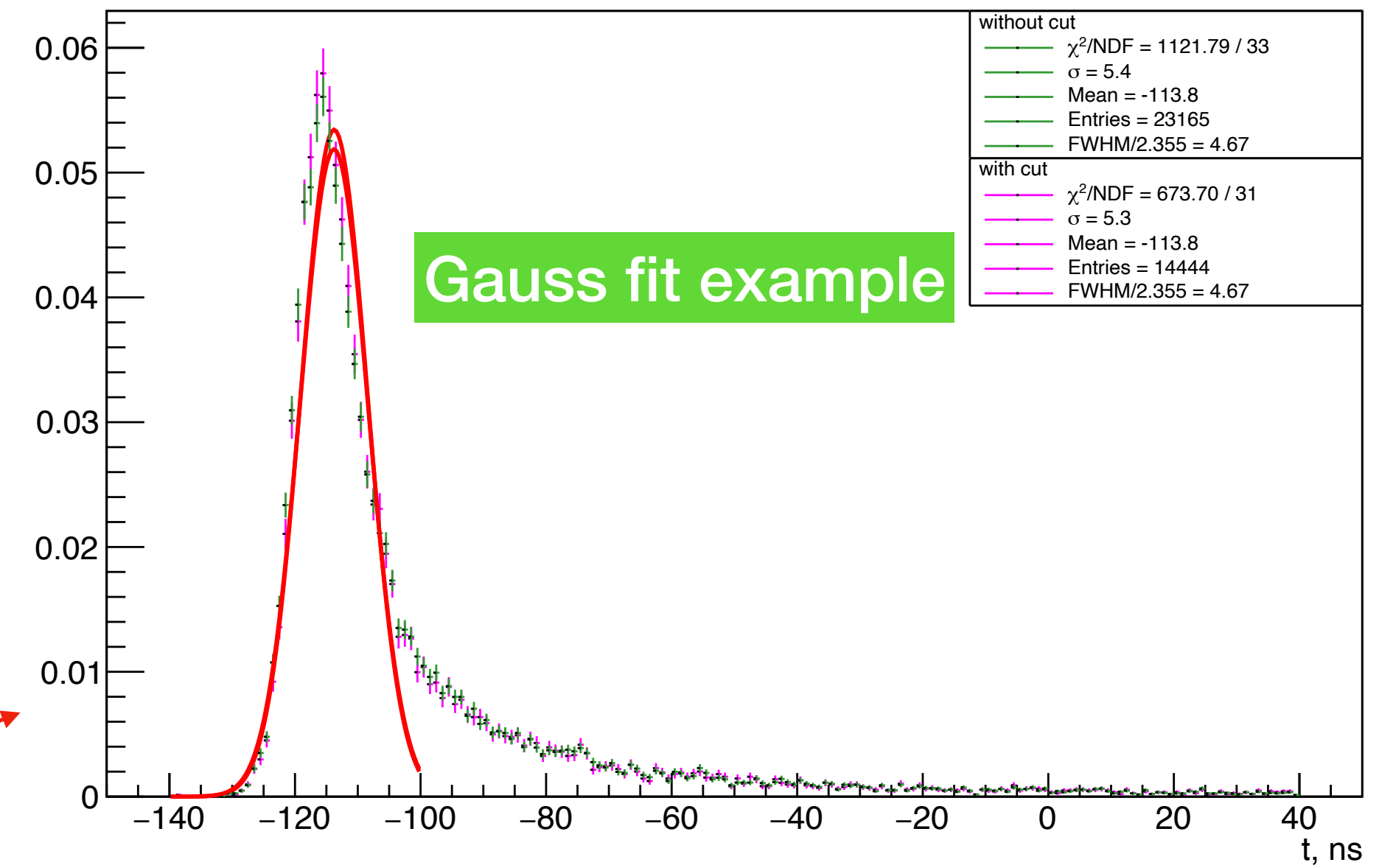
Initial vShape



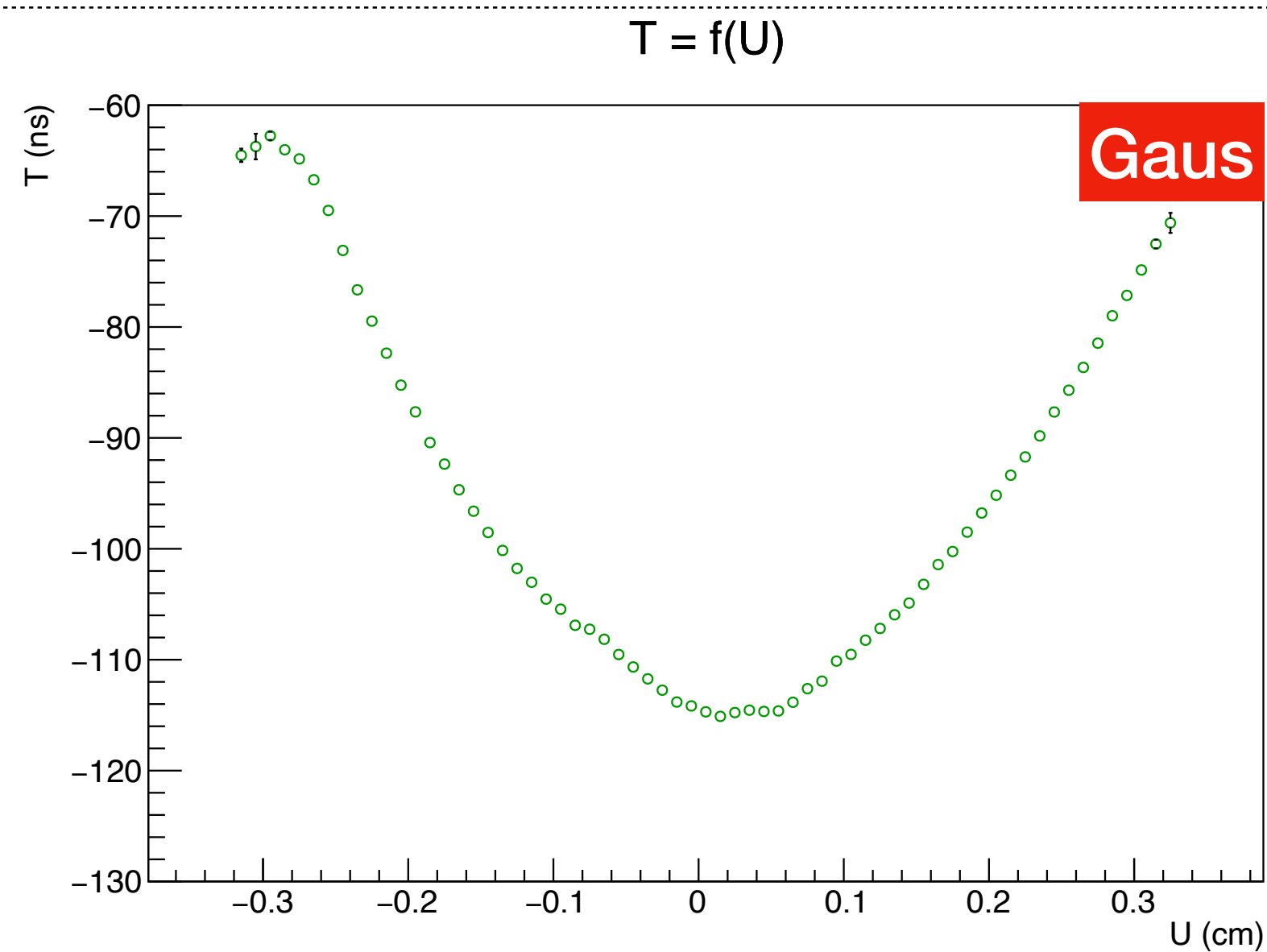
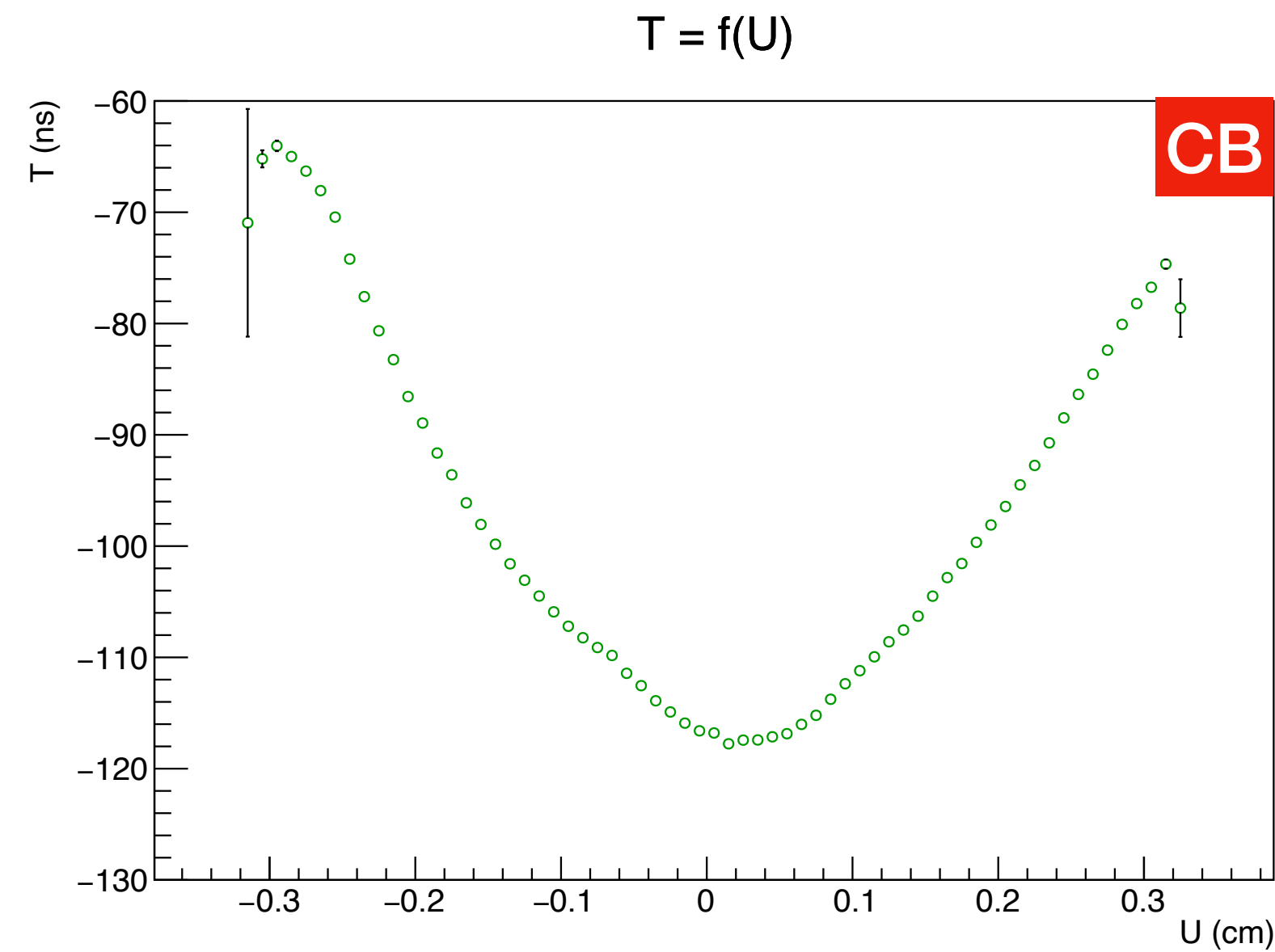
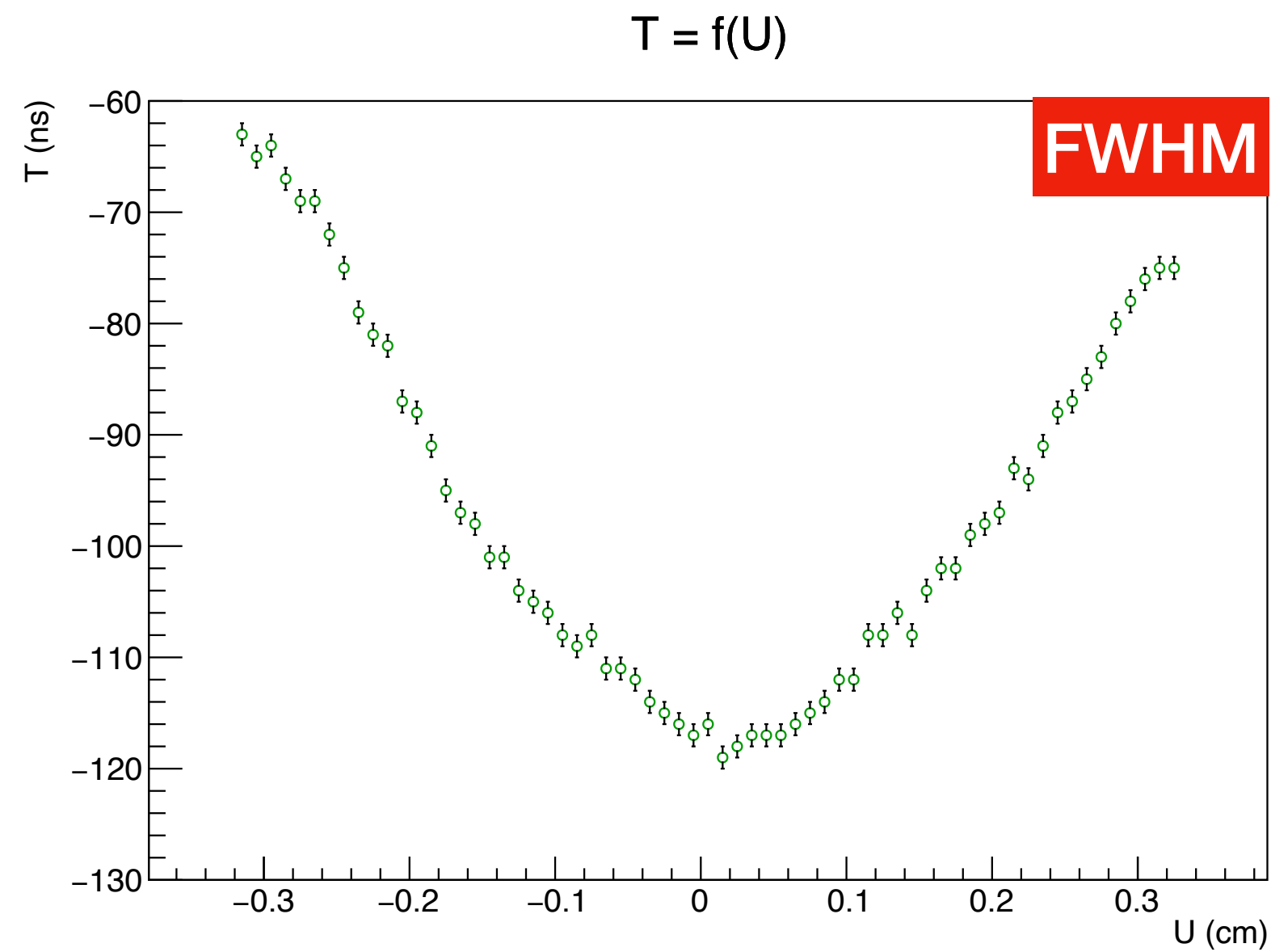
U bin = 100 μ m

Time distribution is fitted for the every U bin
 σ_T of the fit — Time resolution

0 mm from the apex



MEAN



The Crystal Ball function is given by:

$$f(x; \alpha, n, \bar{x}, \sigma) = N \cdot \begin{cases} \exp\left(-\frac{(x-\bar{x})^2}{2\sigma^2}\right), & \text{for } \frac{x-\bar{x}}{\sigma} > -\alpha \\ A \cdot \left(B - \frac{x-\bar{x}}{\sigma}\right)^{-n}, & \text{for } \frac{x-\bar{x}}{\sigma} \leq -\alpha \end{cases}$$

where

$$A = \left(\frac{n}{|\alpha|}\right)^n \cdot \exp\left(-\frac{|\alpha|^2}{2}\right),$$

$$B = \frac{n}{|\alpha|} - |\alpha|,$$

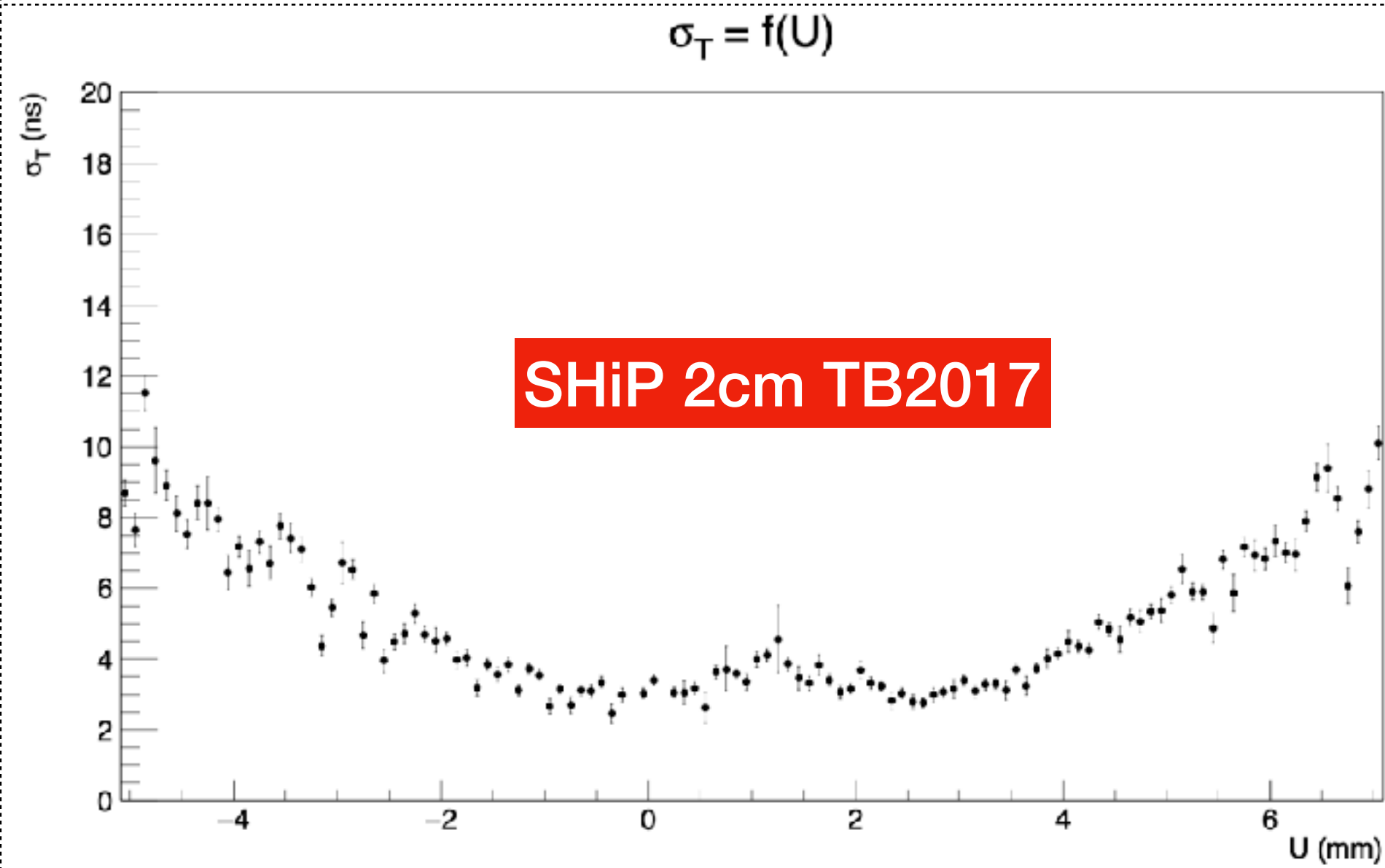
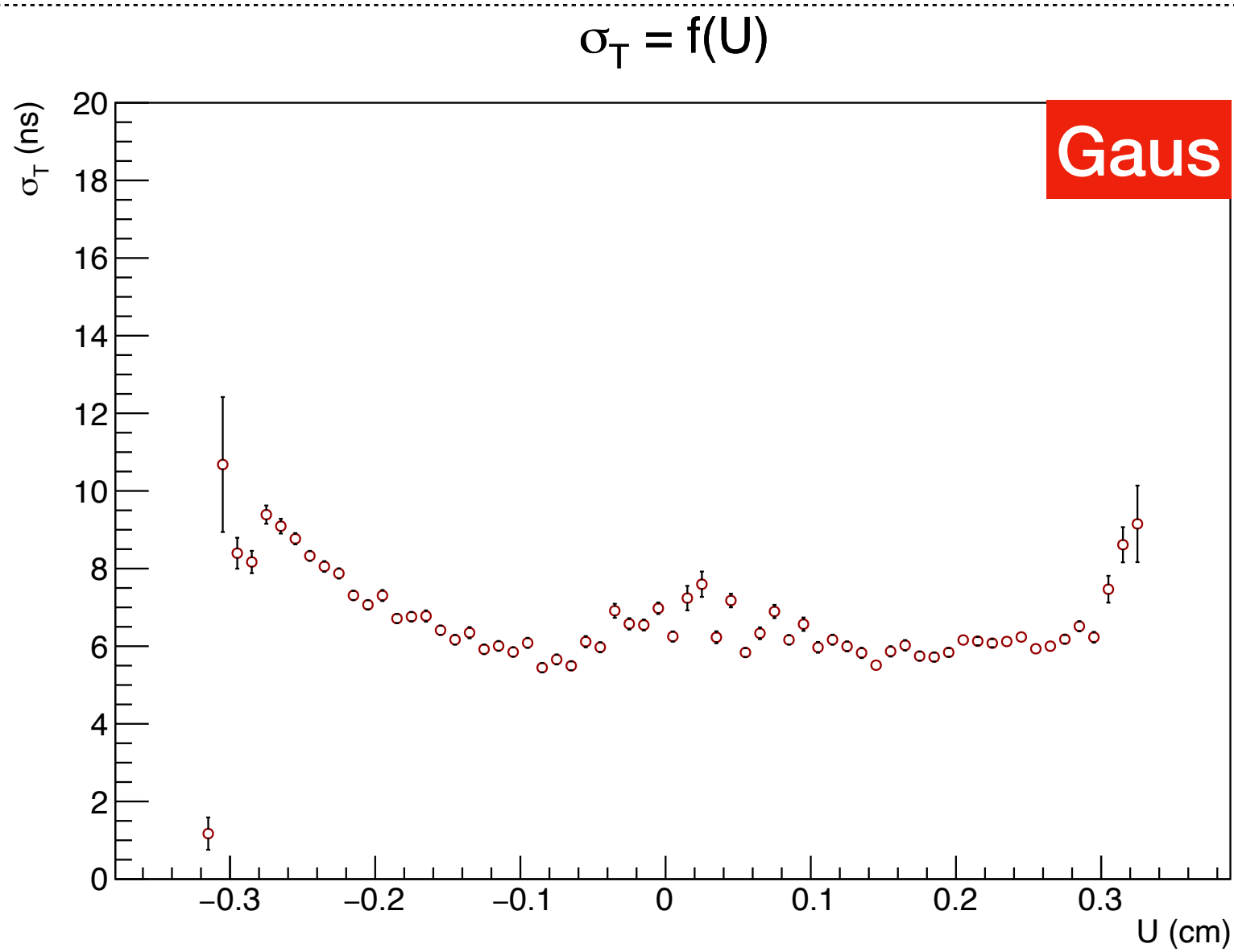
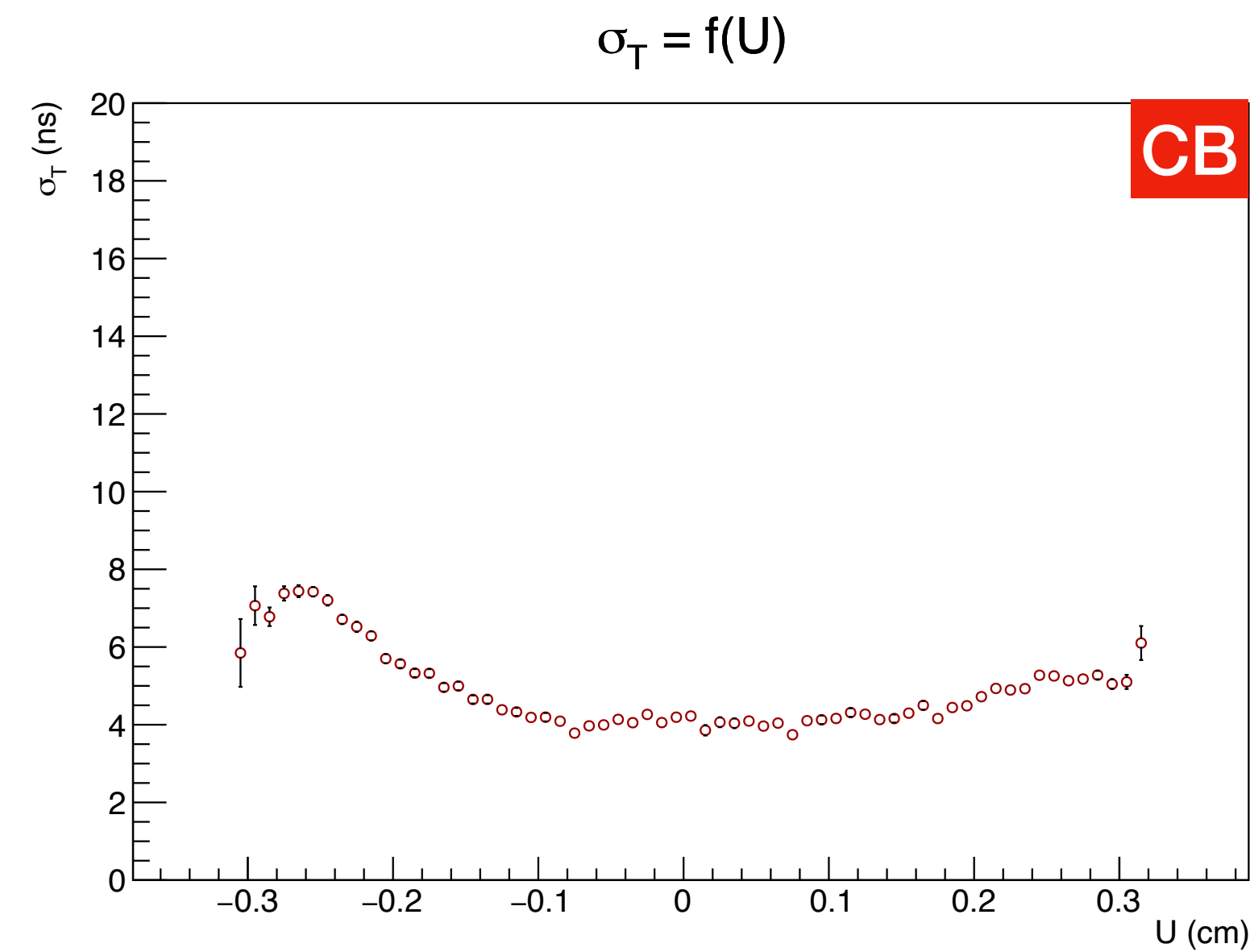
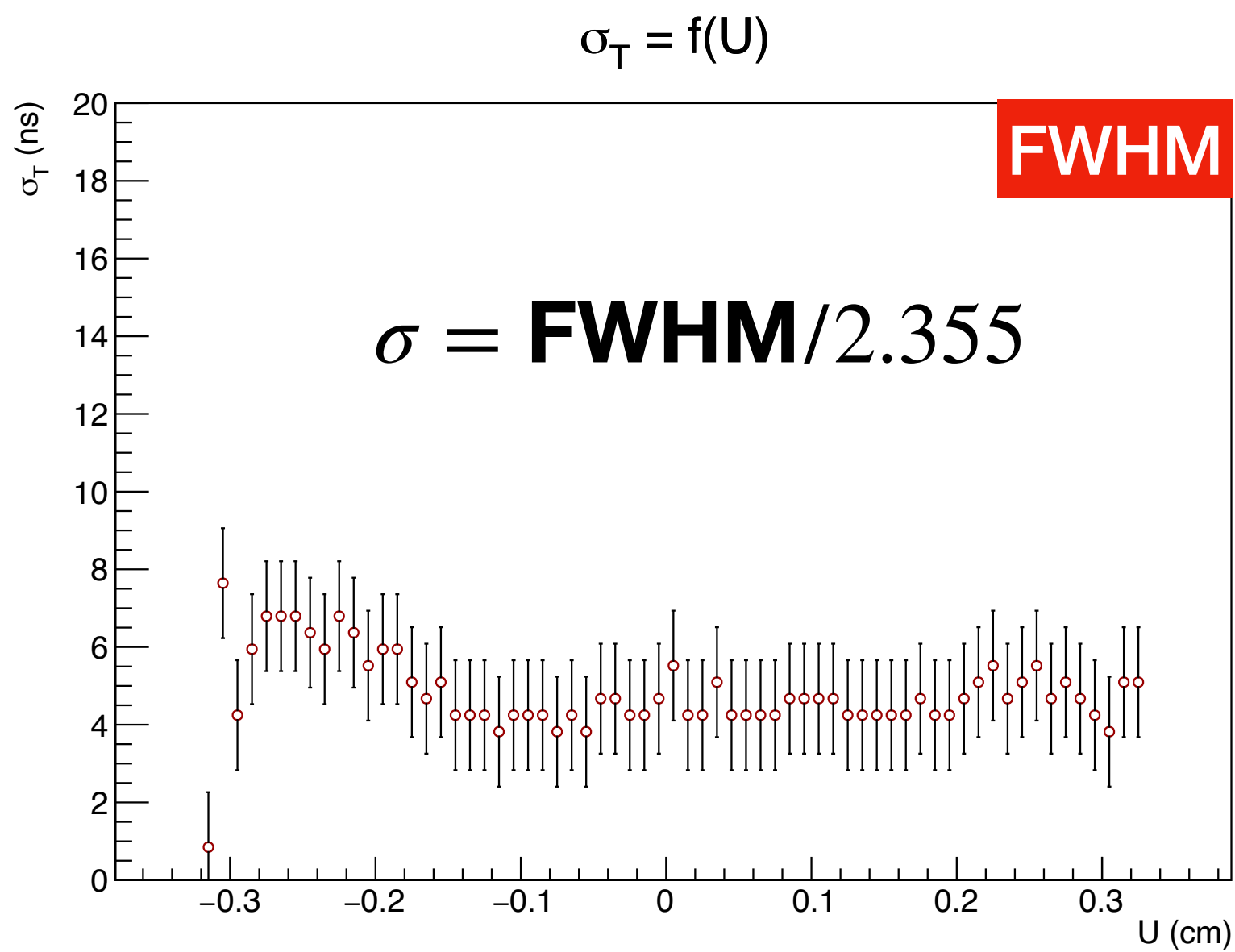
$$N = \frac{1}{\sigma(C + D)},$$

$$C = \frac{n}{|\alpha|} \cdot \frac{1}{n-1} \cdot \exp\left(-\frac{|\alpha|^2}{2}\right),$$

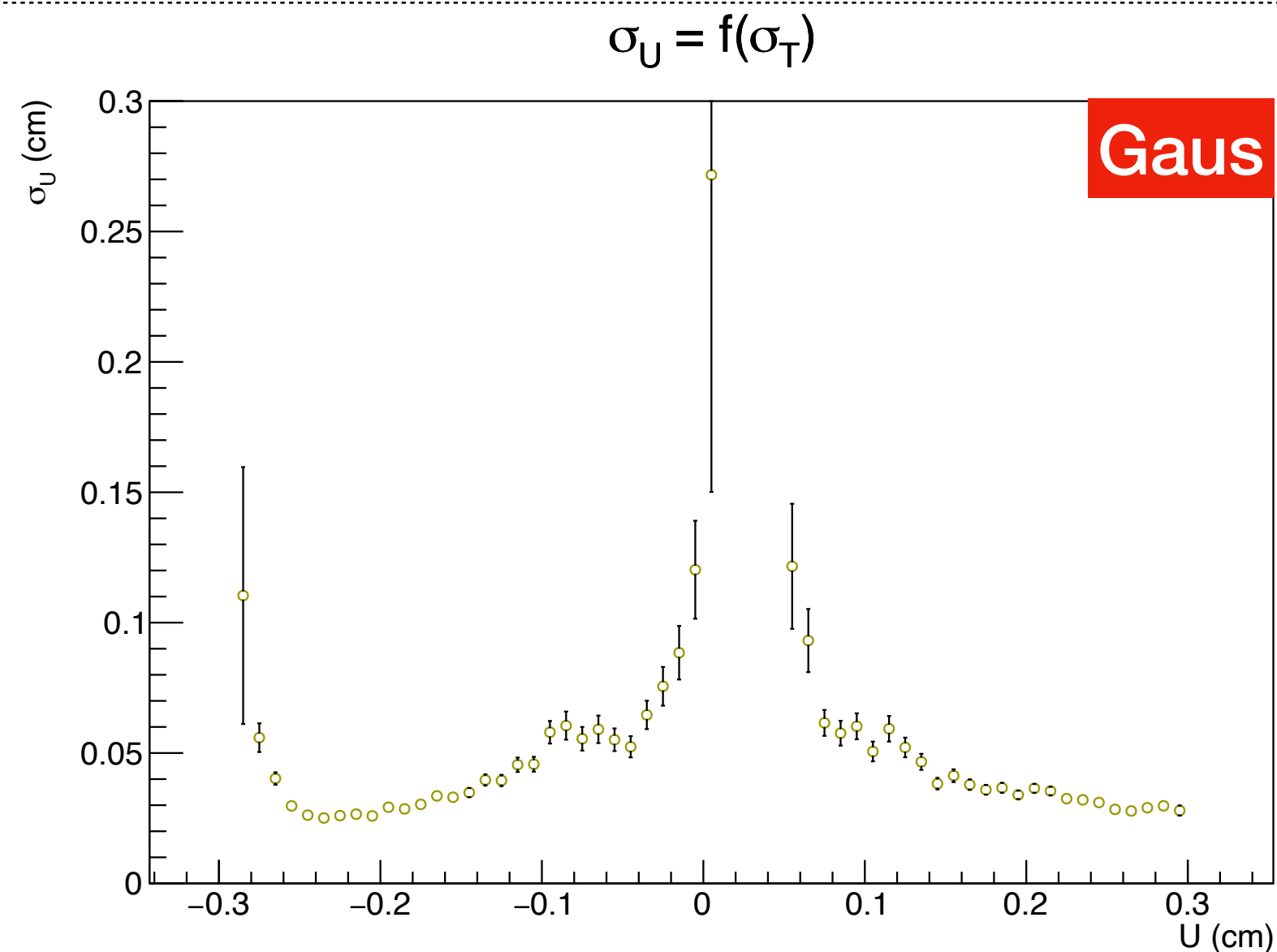
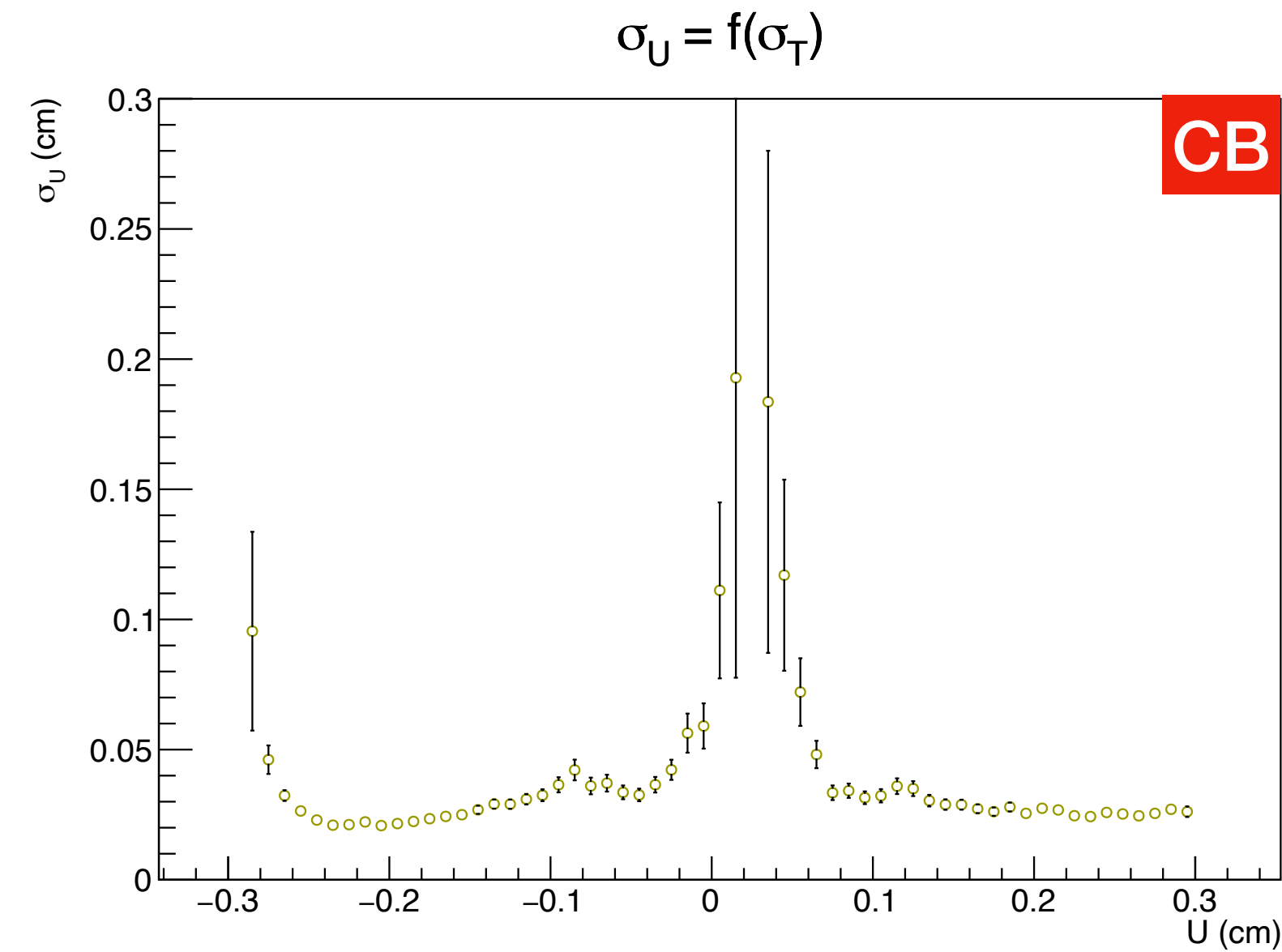
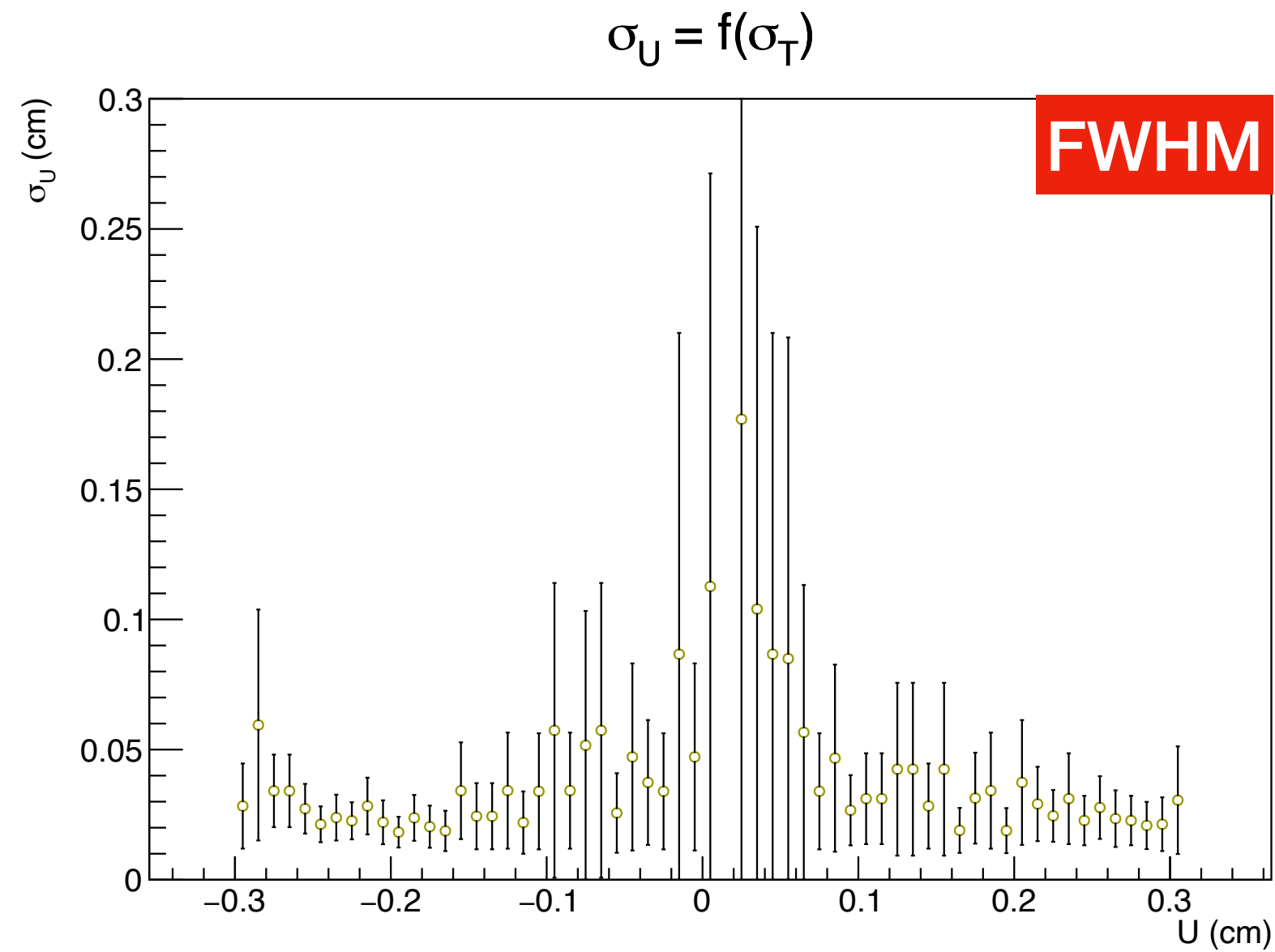
$$D = \sqrt{\frac{\pi}{2}} \left(1 + \operatorname{erf}\left(\frac{|\alpha|}{\sqrt{2}}\right)\right).$$

*it is for the 'left-sided'
we use the 'right-sided'

SIGMA



COORD RESOLUTION



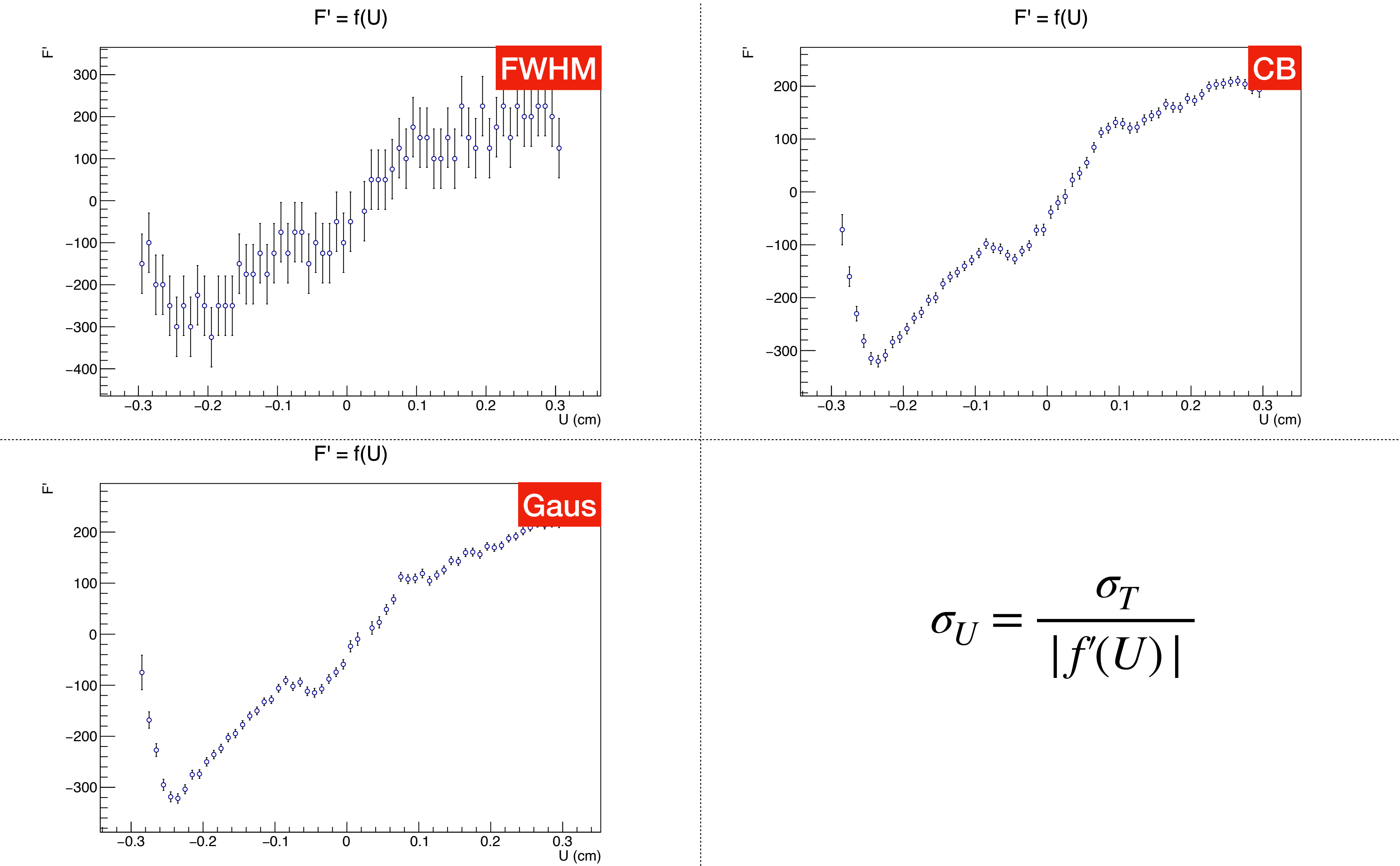
FWHM: (243 +/- 16) μm

CB: (253 +/- 2) μm

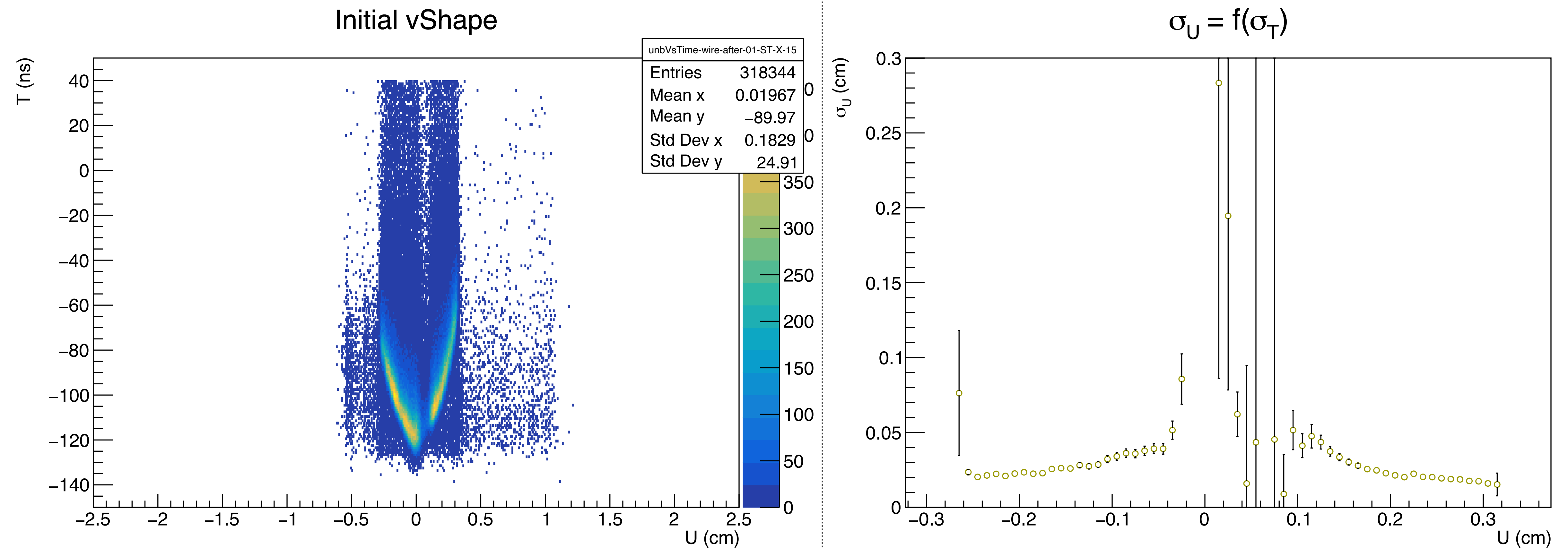
Gaus: (311 +/- 2) μm

**Resolution is a weighted mean
of such σ_U distributions**

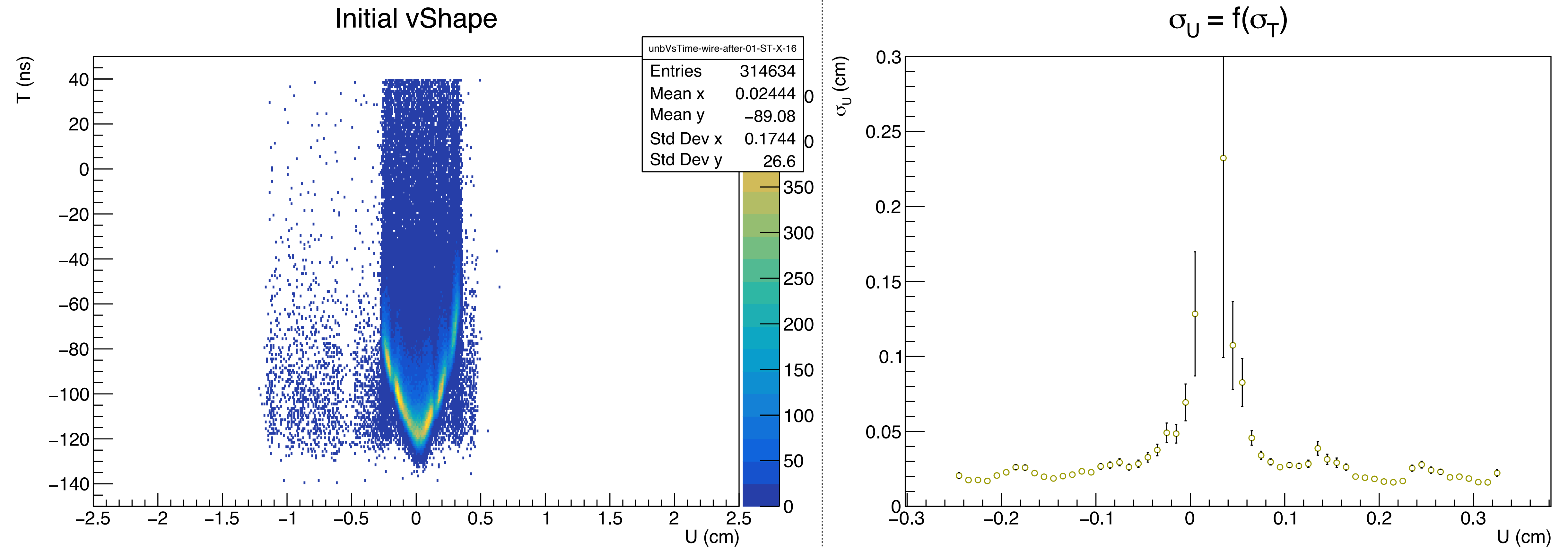
DERIVATIVE



ST 01: straw 15

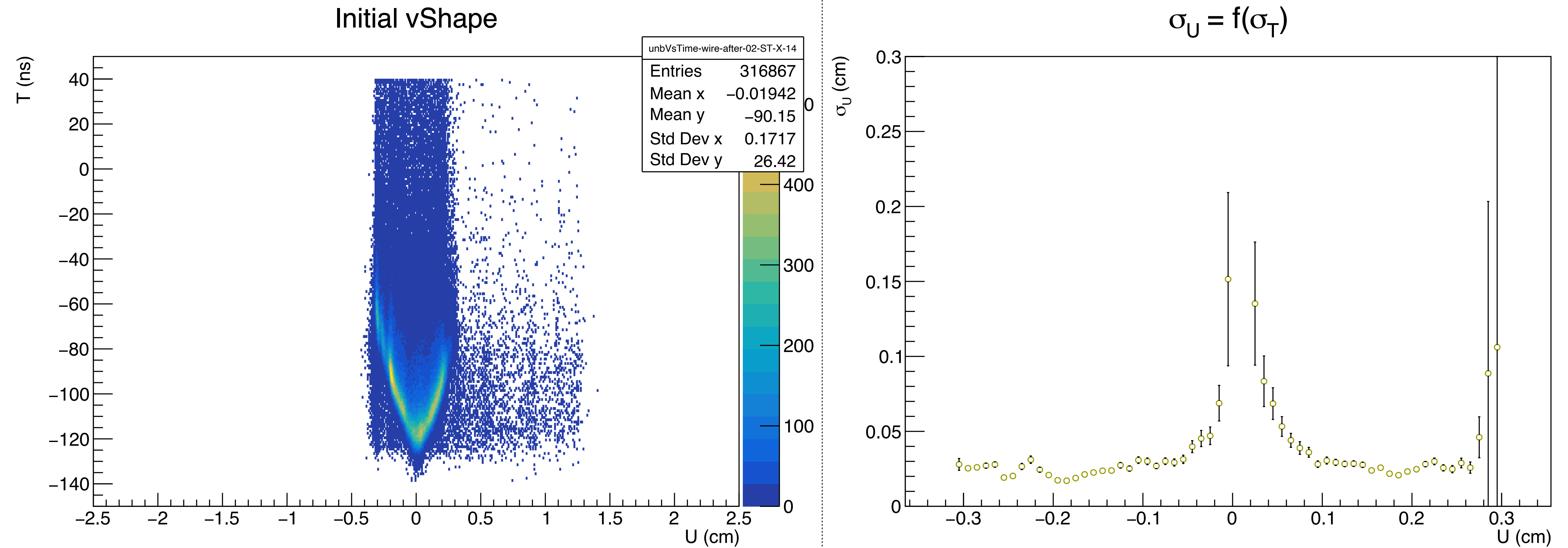


ST 01: straw 16

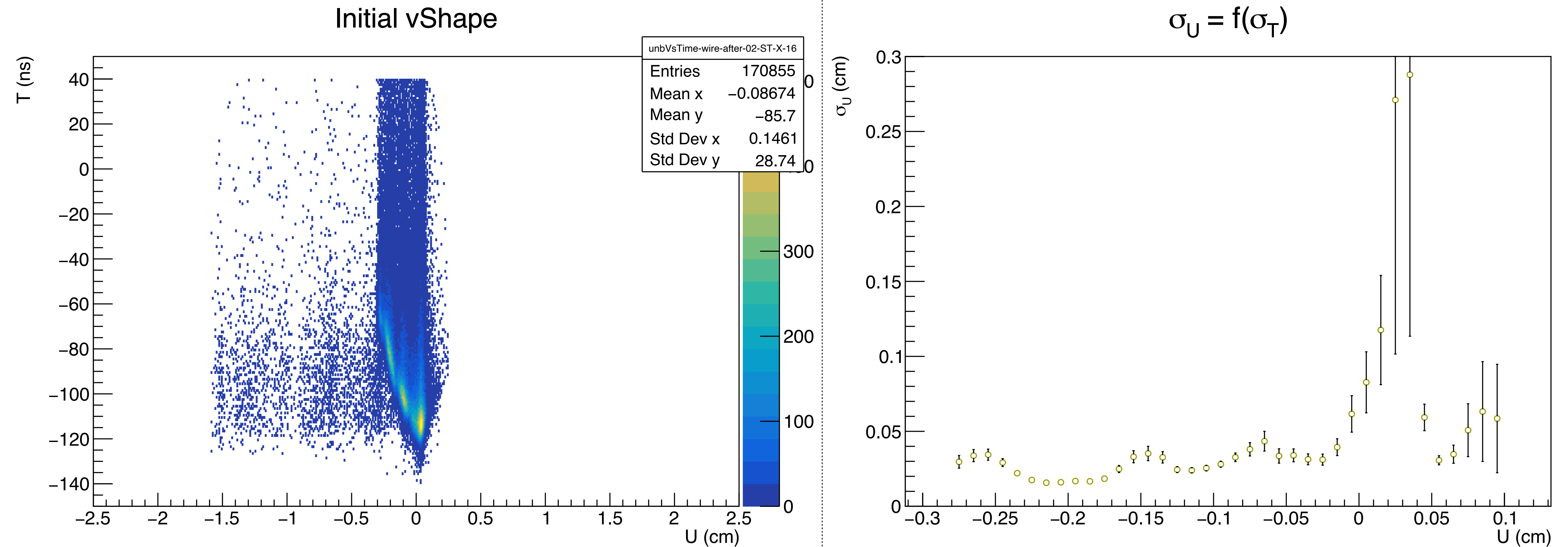


Resolution (198 +/- 2) μm

ST 02: straw 14



ST 02: straw 16



Resolution (192 +/- 3) μm

July (APV+VMM)
clustering with strips ($\text{maxQ} > 1600$)

Three types of cluster optimisation

- “Before” — find the last Time bin with $Q < 1600$ *before* the $T_{\max Q}$
- “After” — find the first Time bin with $Q < 1600$ *after* the $T_{\max Q}$
- “Without” — just *drop out* the strip(s) with $Q > 1600$ from the cluster

Cluster min size = 3, $Q_{\min} = 100$

L1 cluster center calculated as a **weighted mean**
without the overflow strip(s)

VS

L2 cluster center calculated as a **weighted mean**
without the overflow strip(s)

ideal

L1 cluster center calculated as a **weighted mean**
without the overflow strip(s)

VS

L2 cluster center calculated as a **weighted mean**
with the overflow strip(s) **optimised**

L1 cluster center calculated as a **weighted mean**
without the overflow strip(s)

VS

L2 cluster center calculated as a **geom mean**
without the overflow strip(s)

ideal, but not so accurate

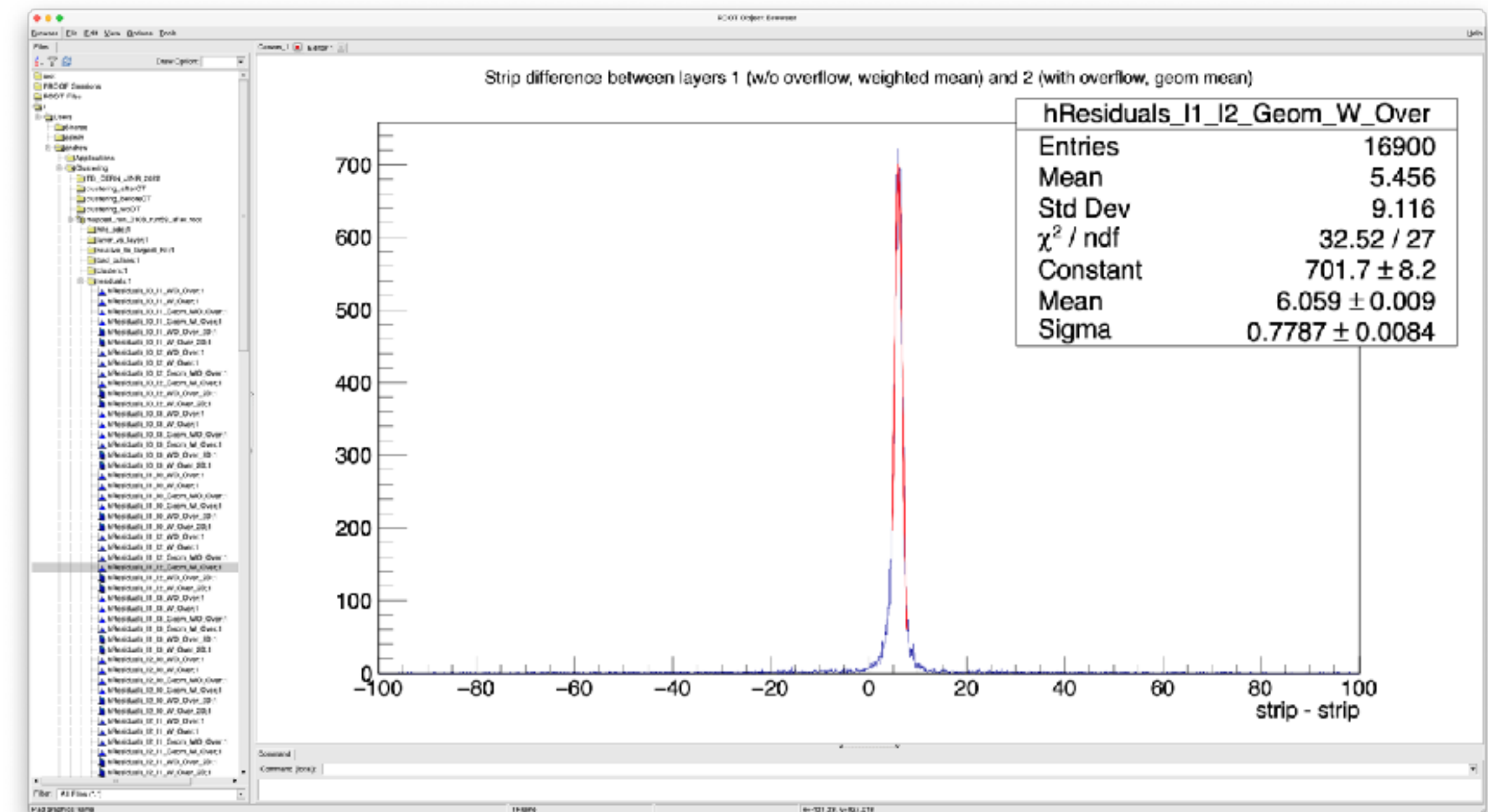
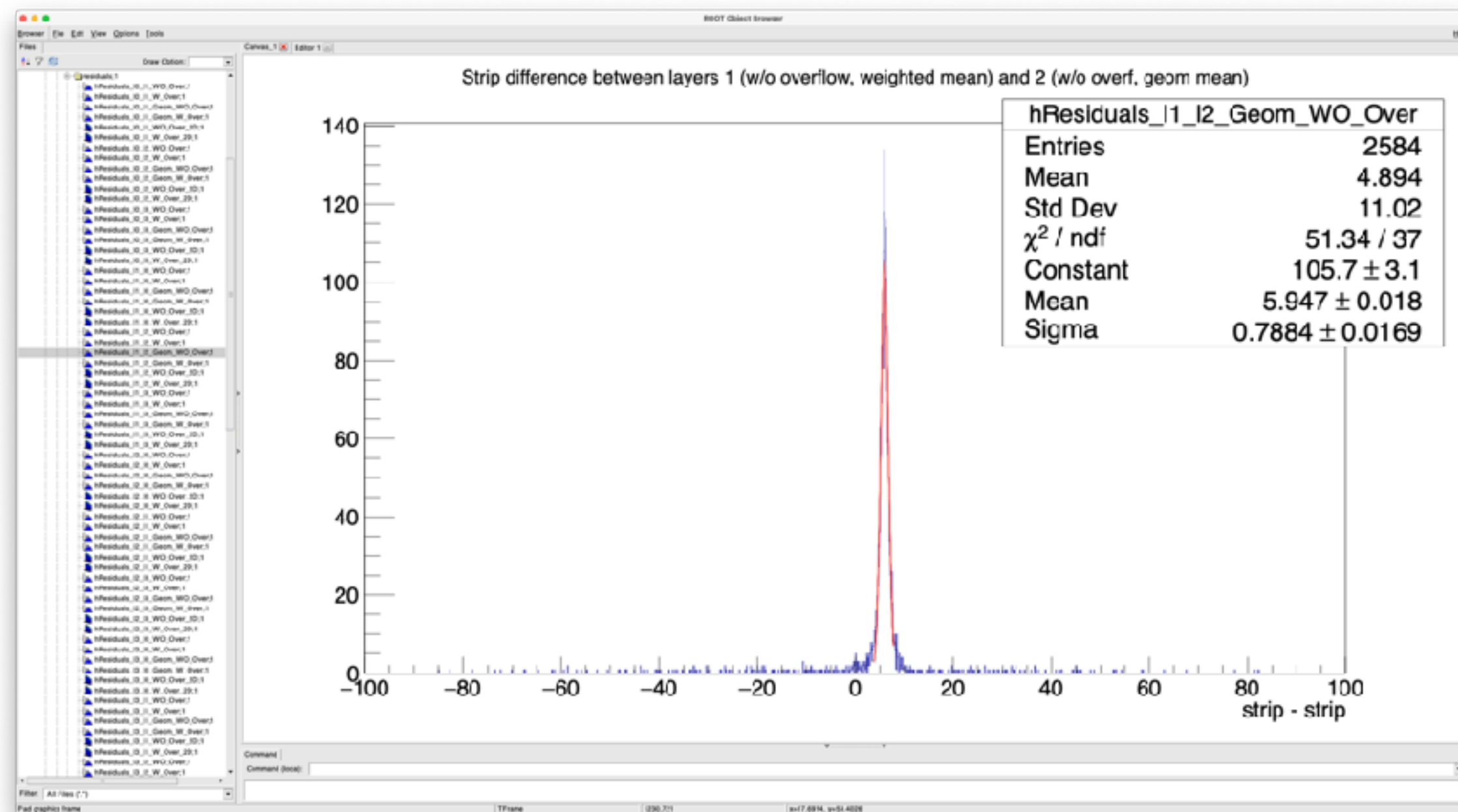
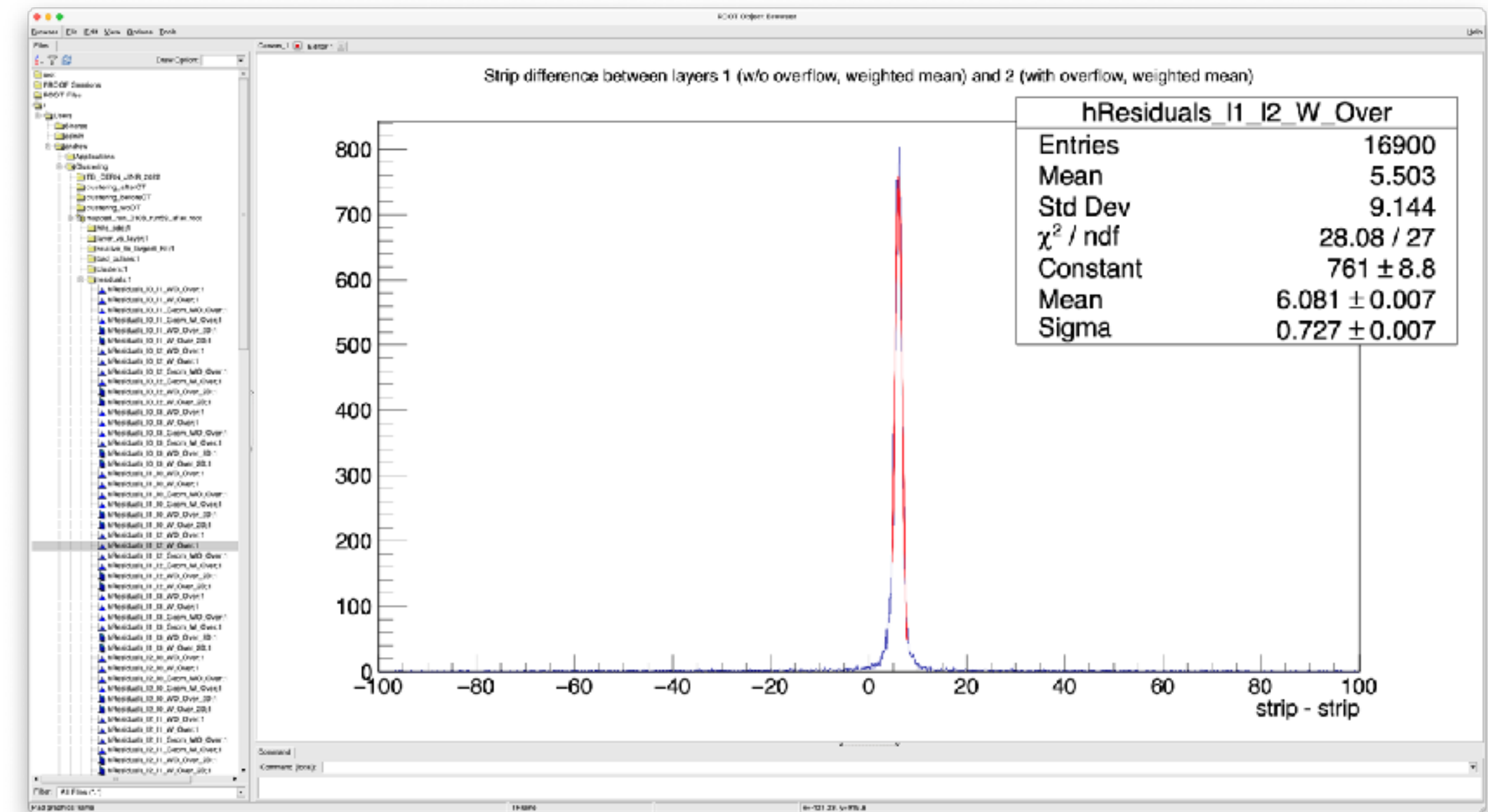
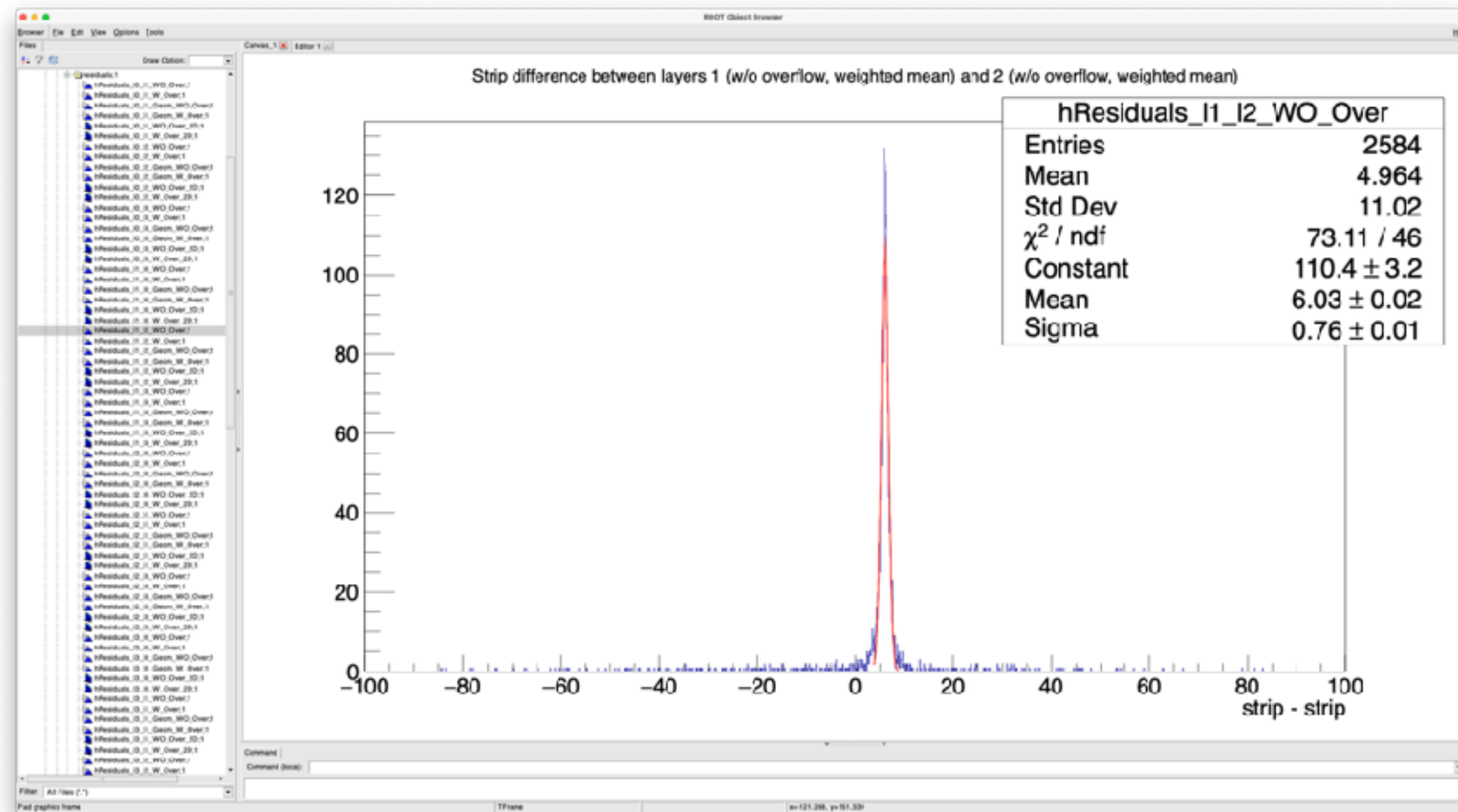
L1 cluster center calculated as a **weighted mean**
without the overflow strip(s)

VS

L2 cluster center calculated as a **geom mean**
with the overflow strip(s) **optimised**

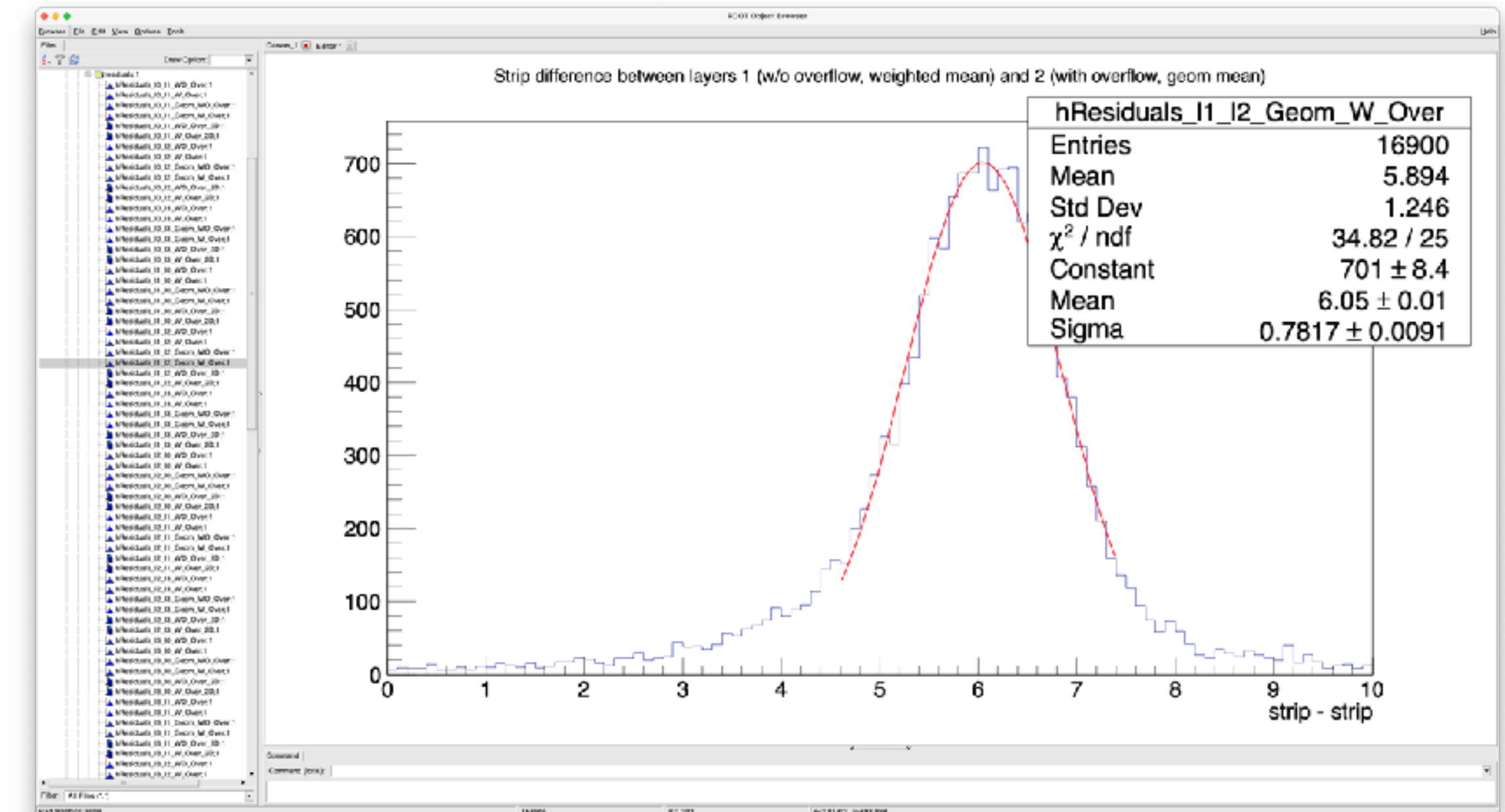
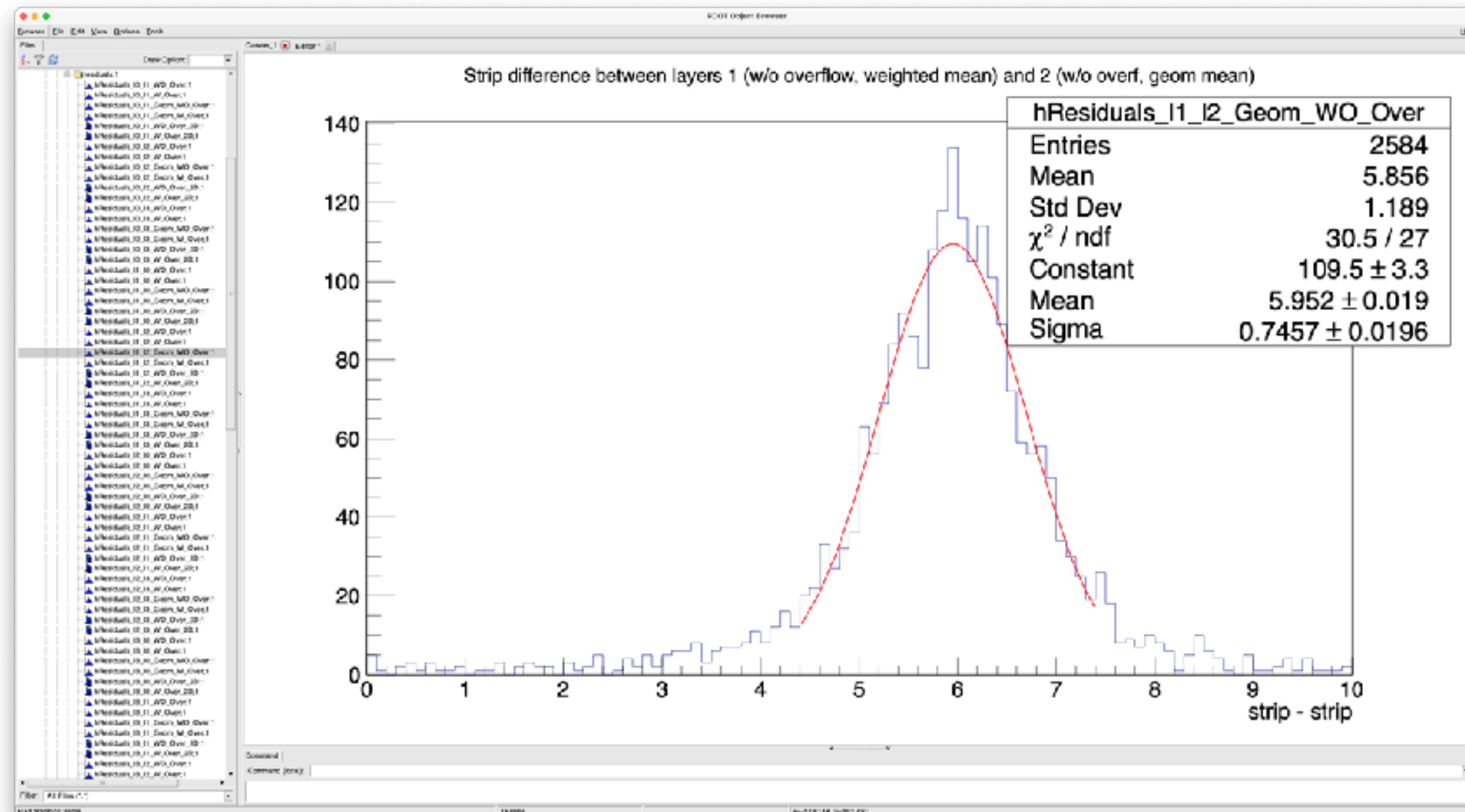
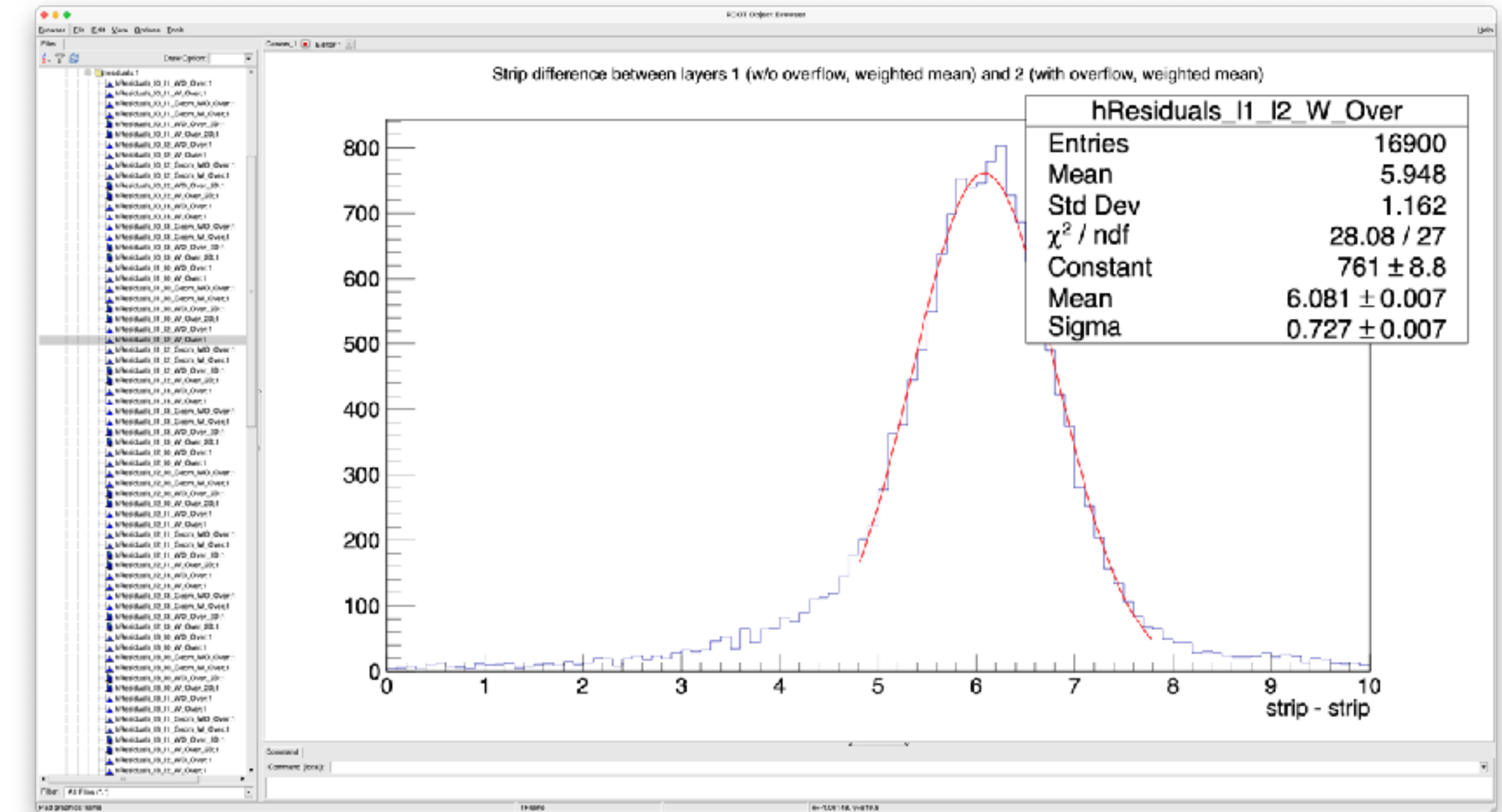
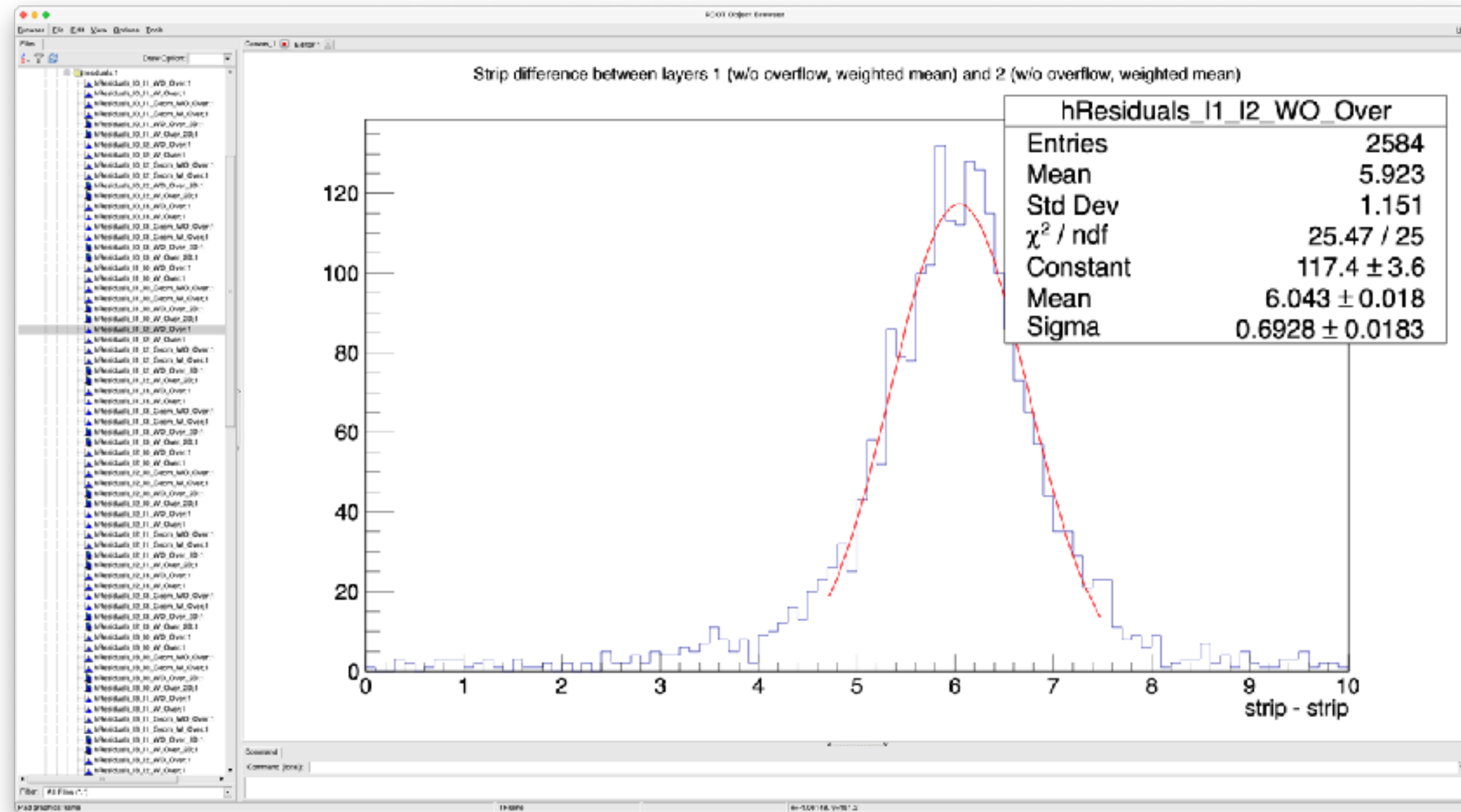
'AFTER' (first TimeBin after Tmax with no overflow Q)

15



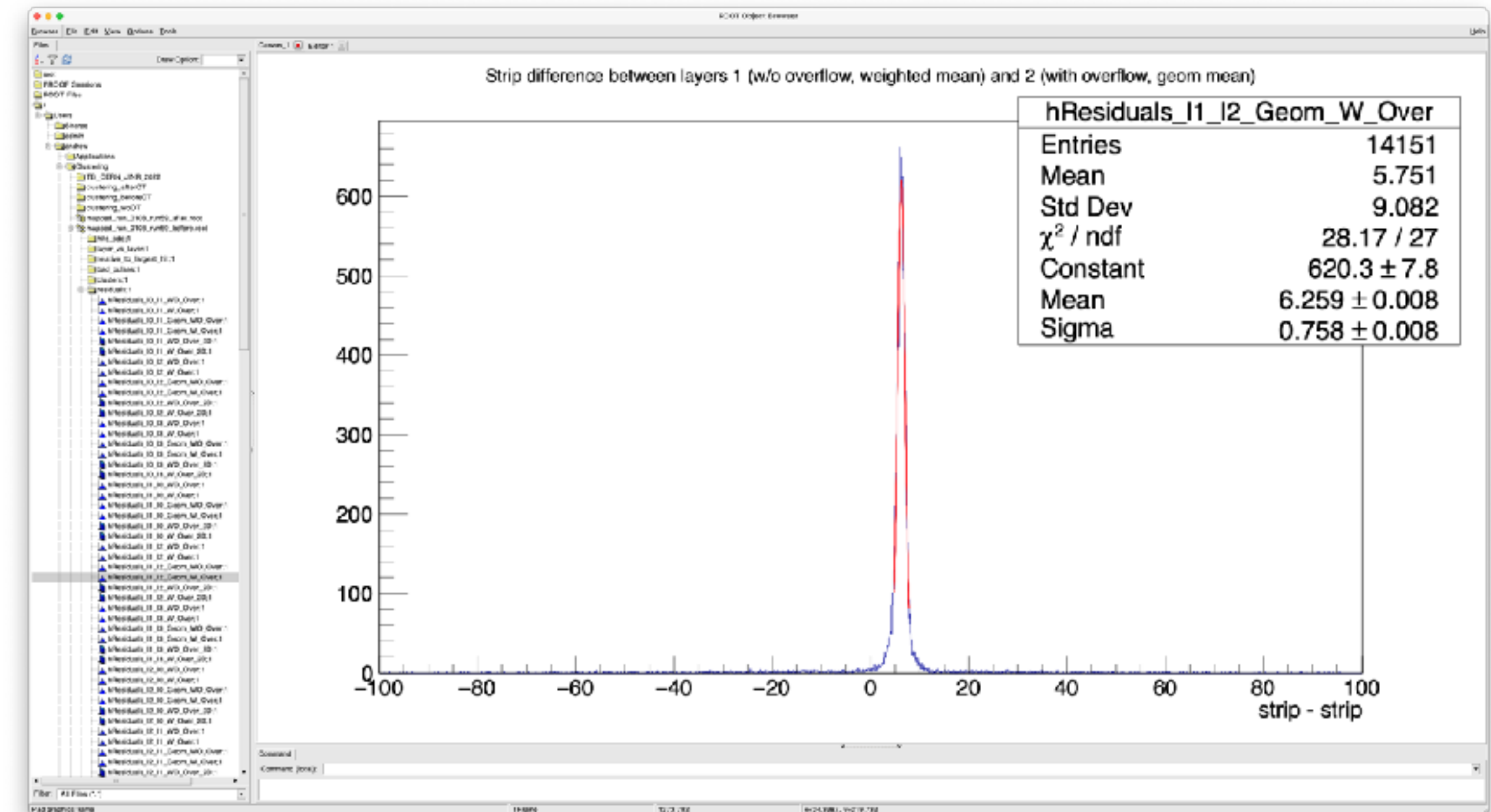
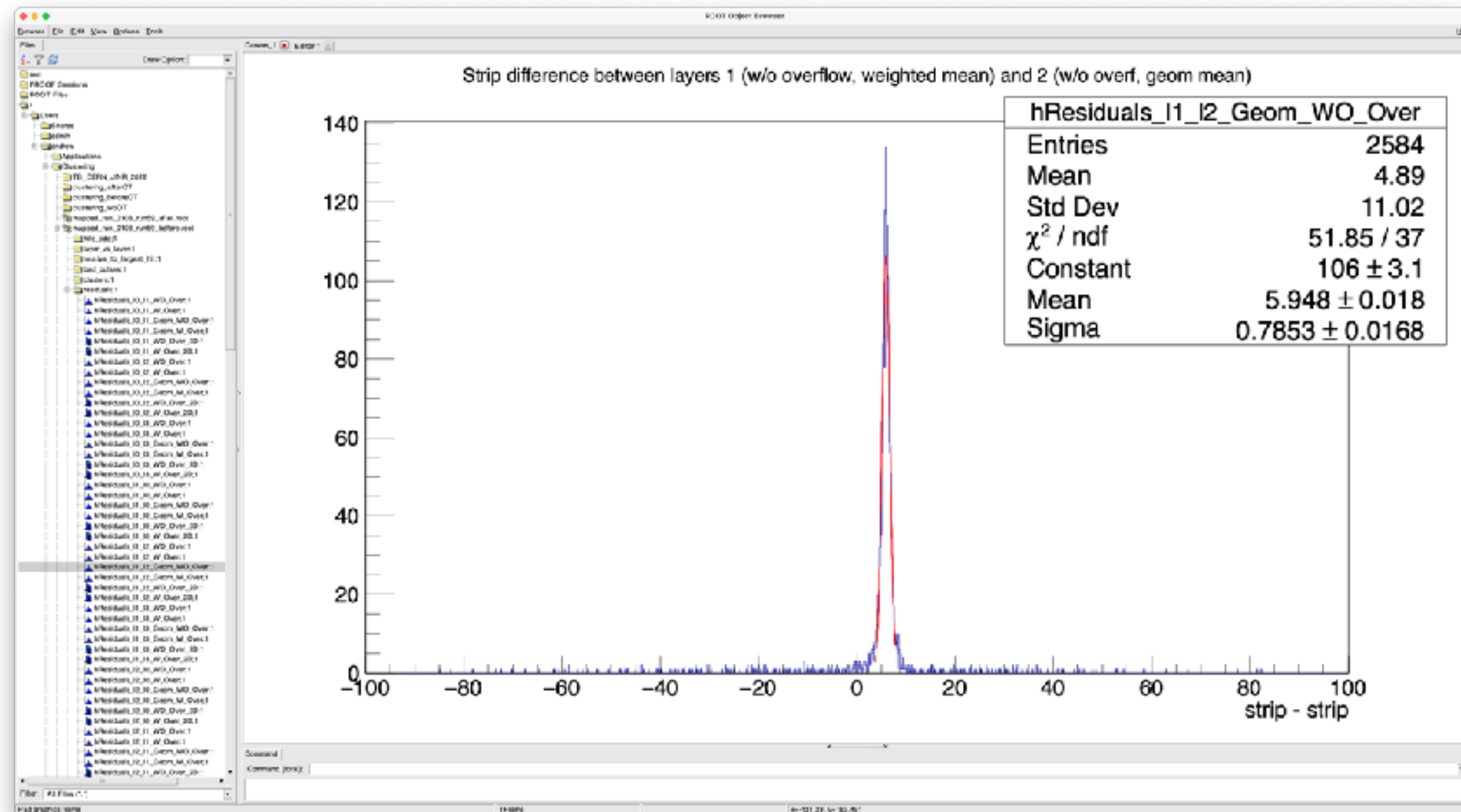
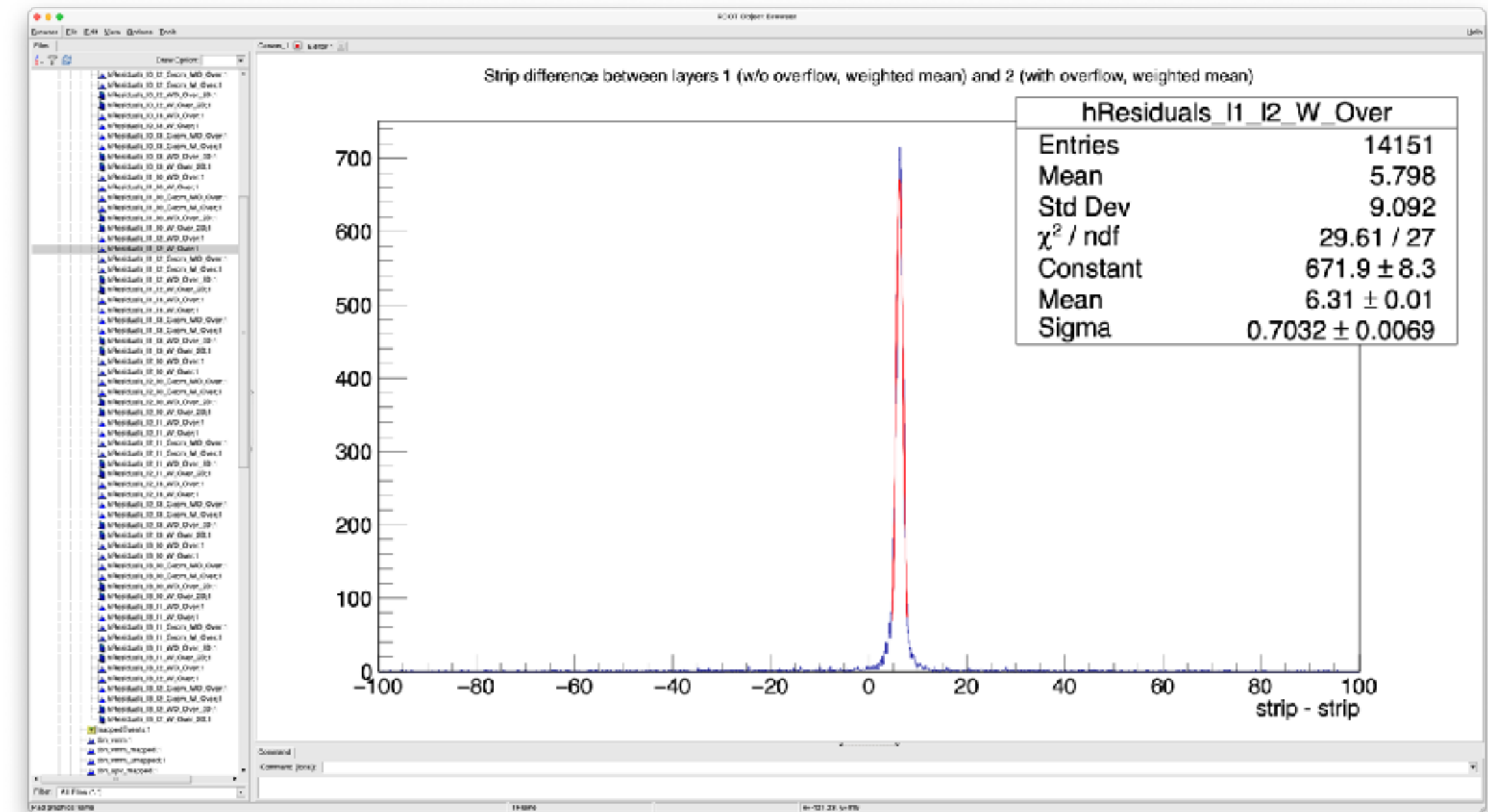
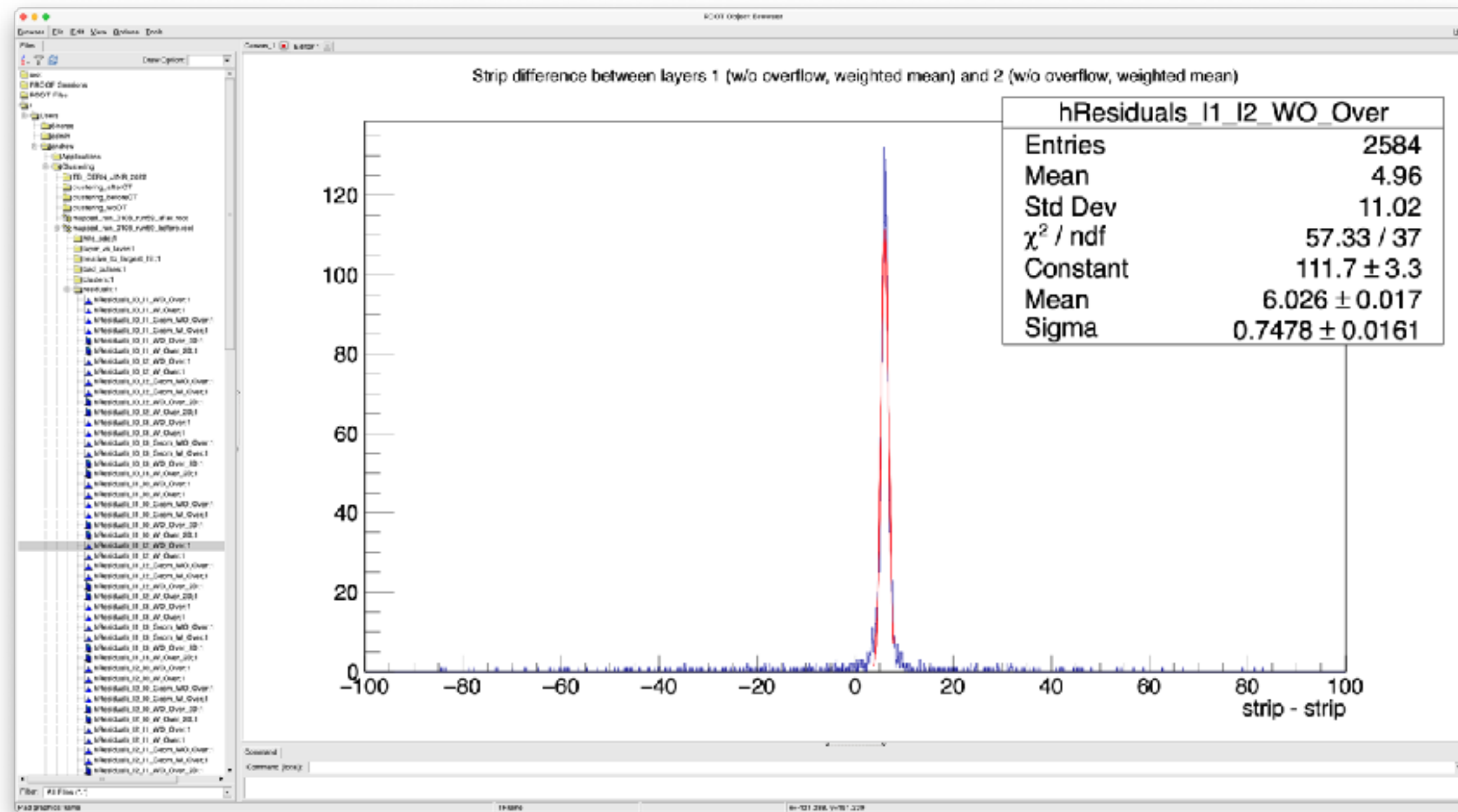
‘AFTER’ (first TimeBin after Tmax with no overflow Q)

16



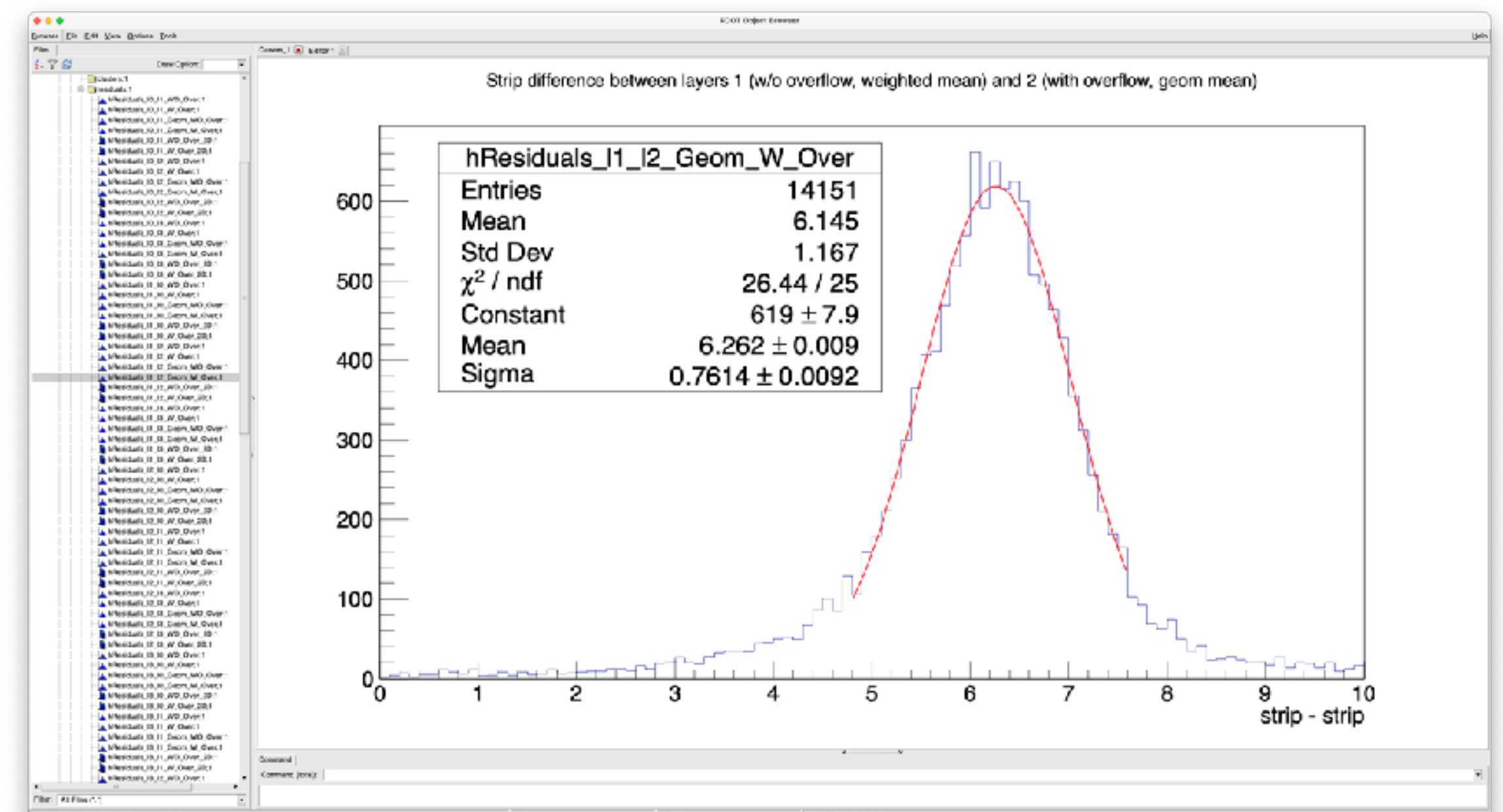
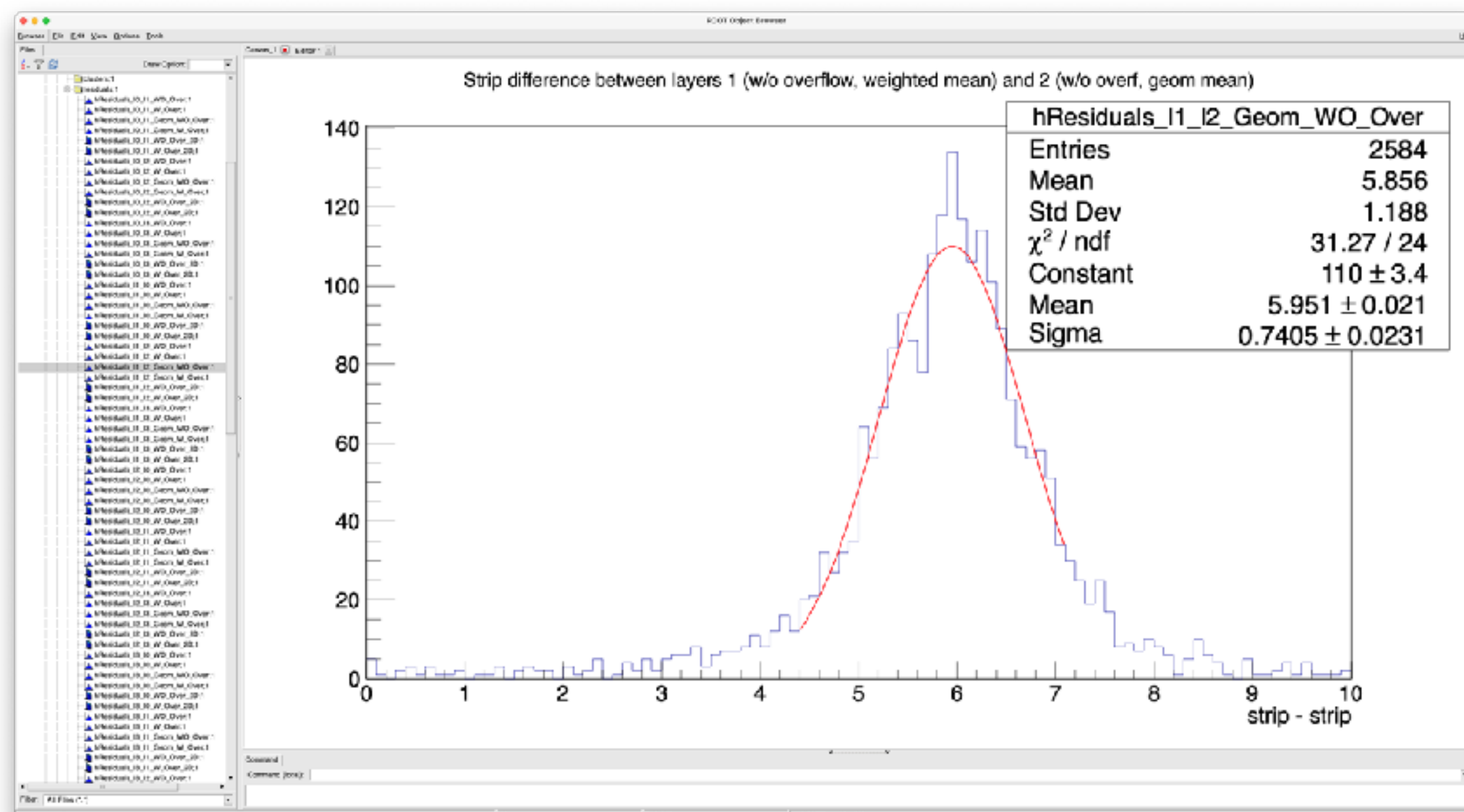
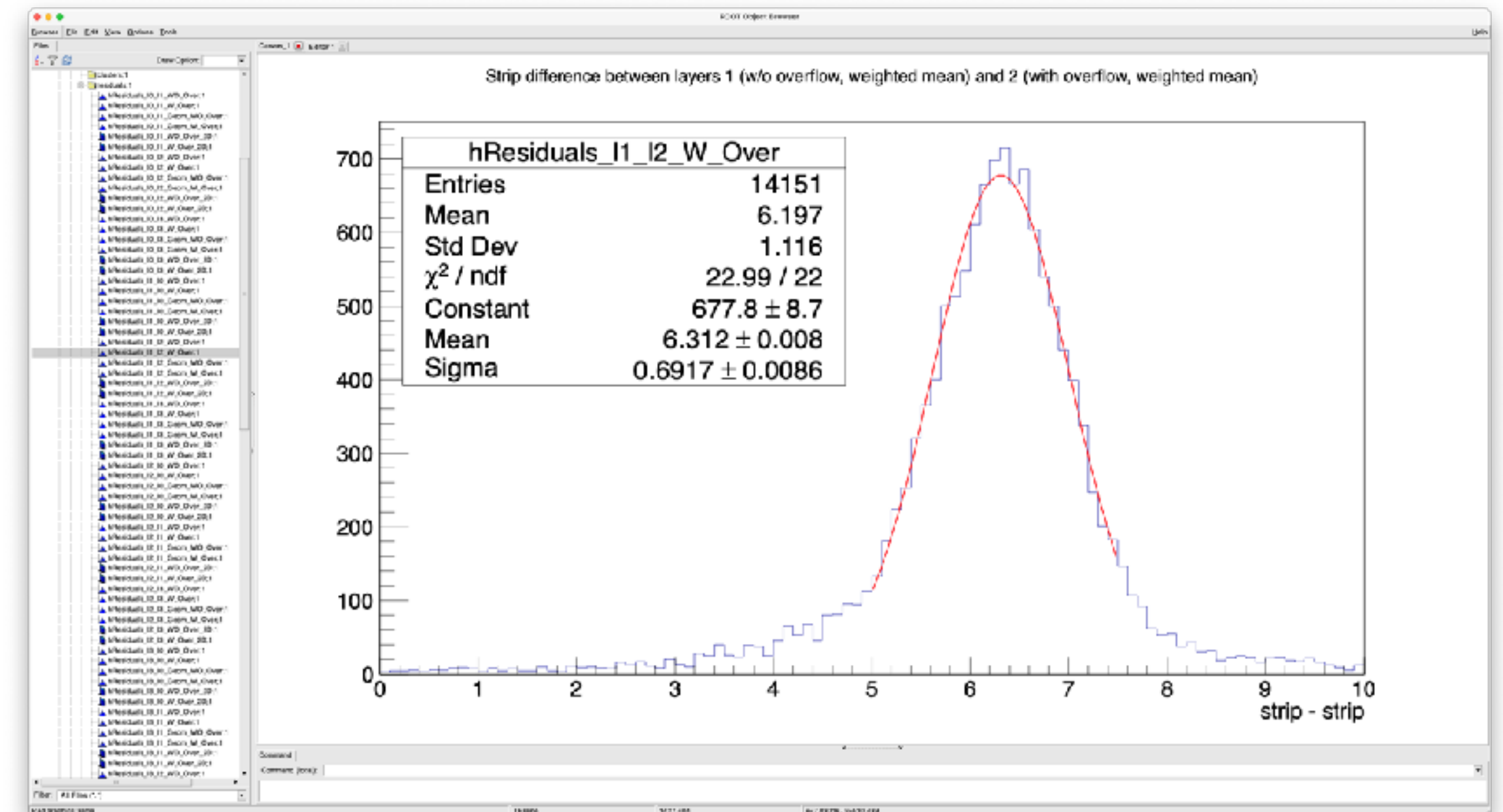
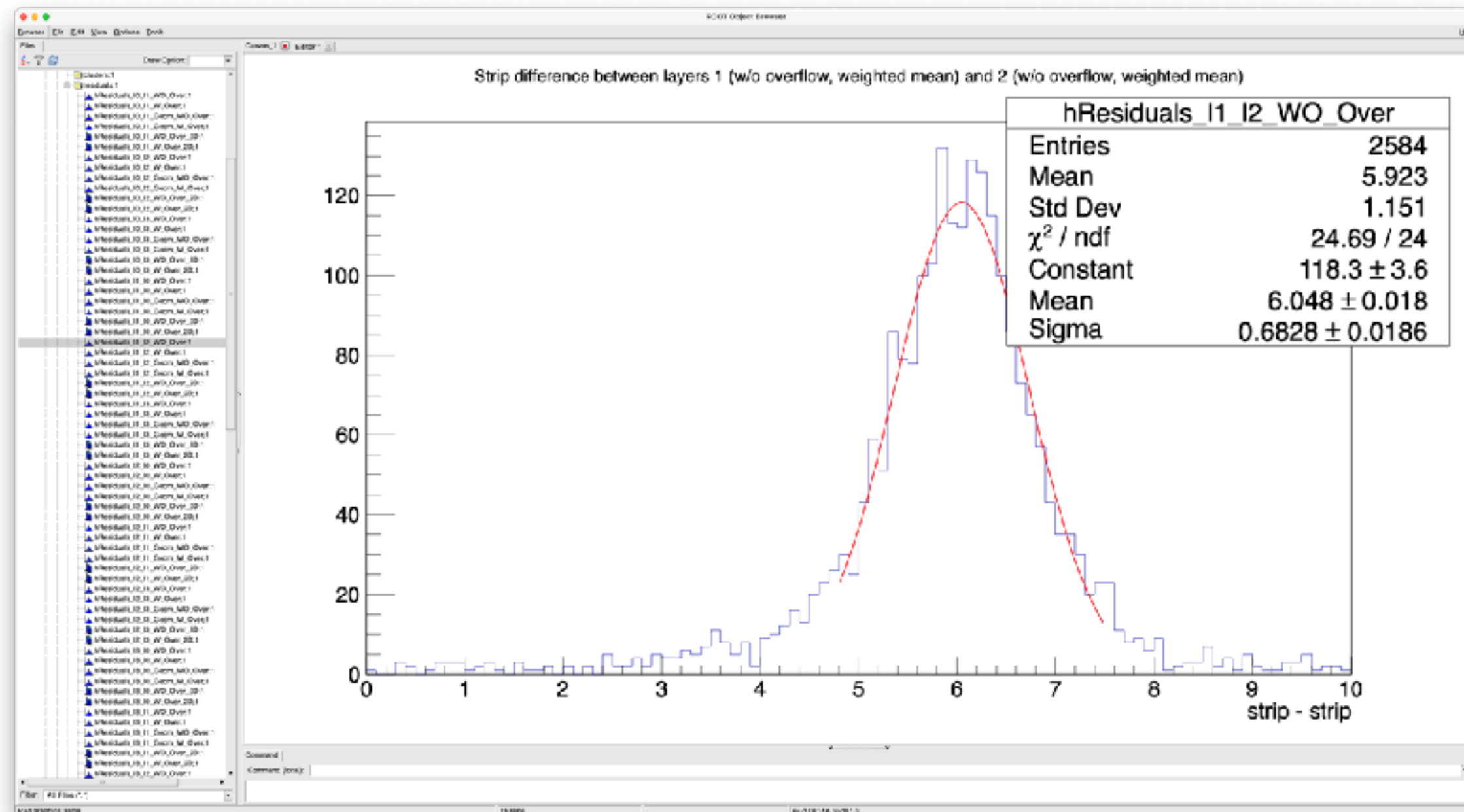
'BEFORE' (last TimeBin before Tmax with no overflow Q)

17



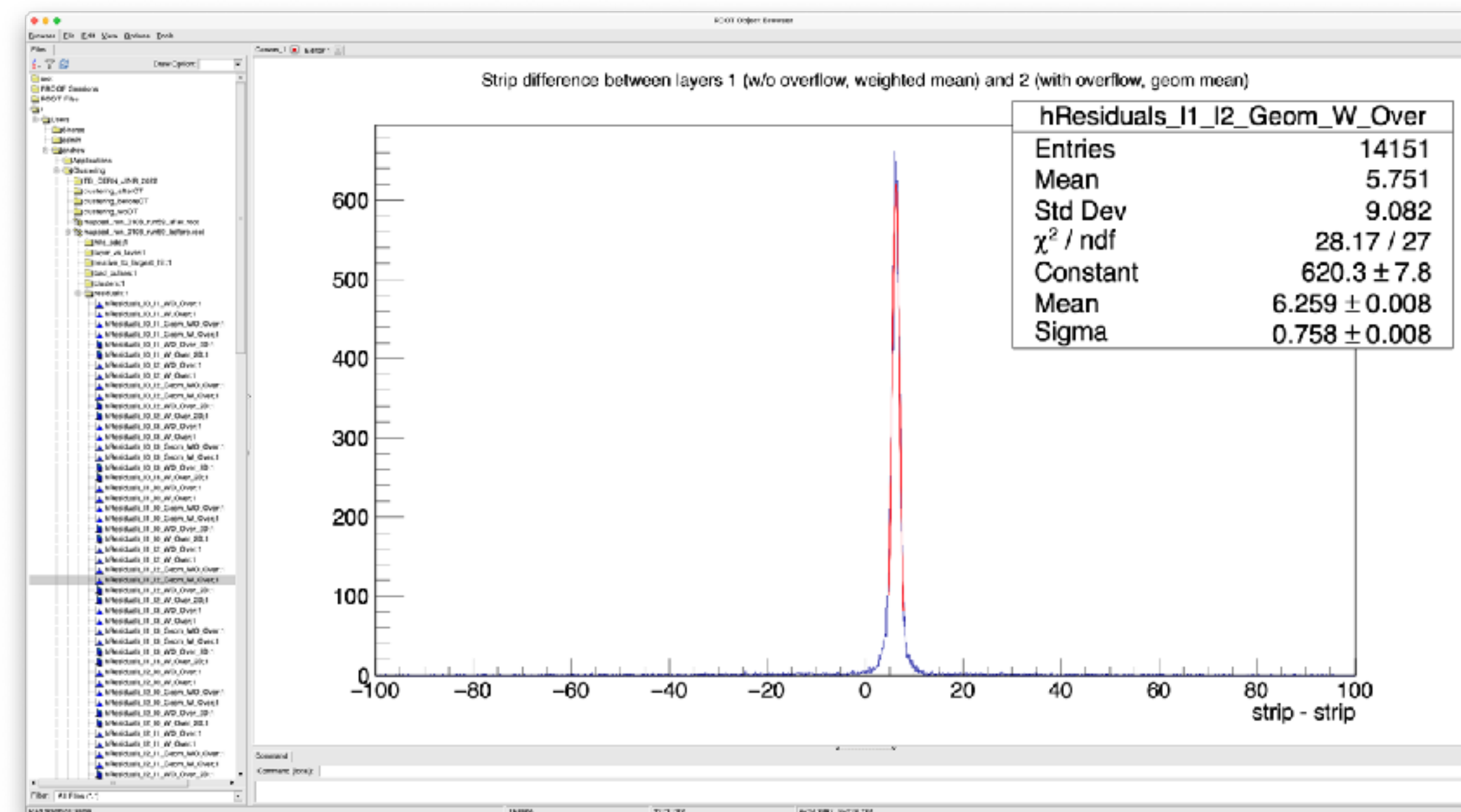
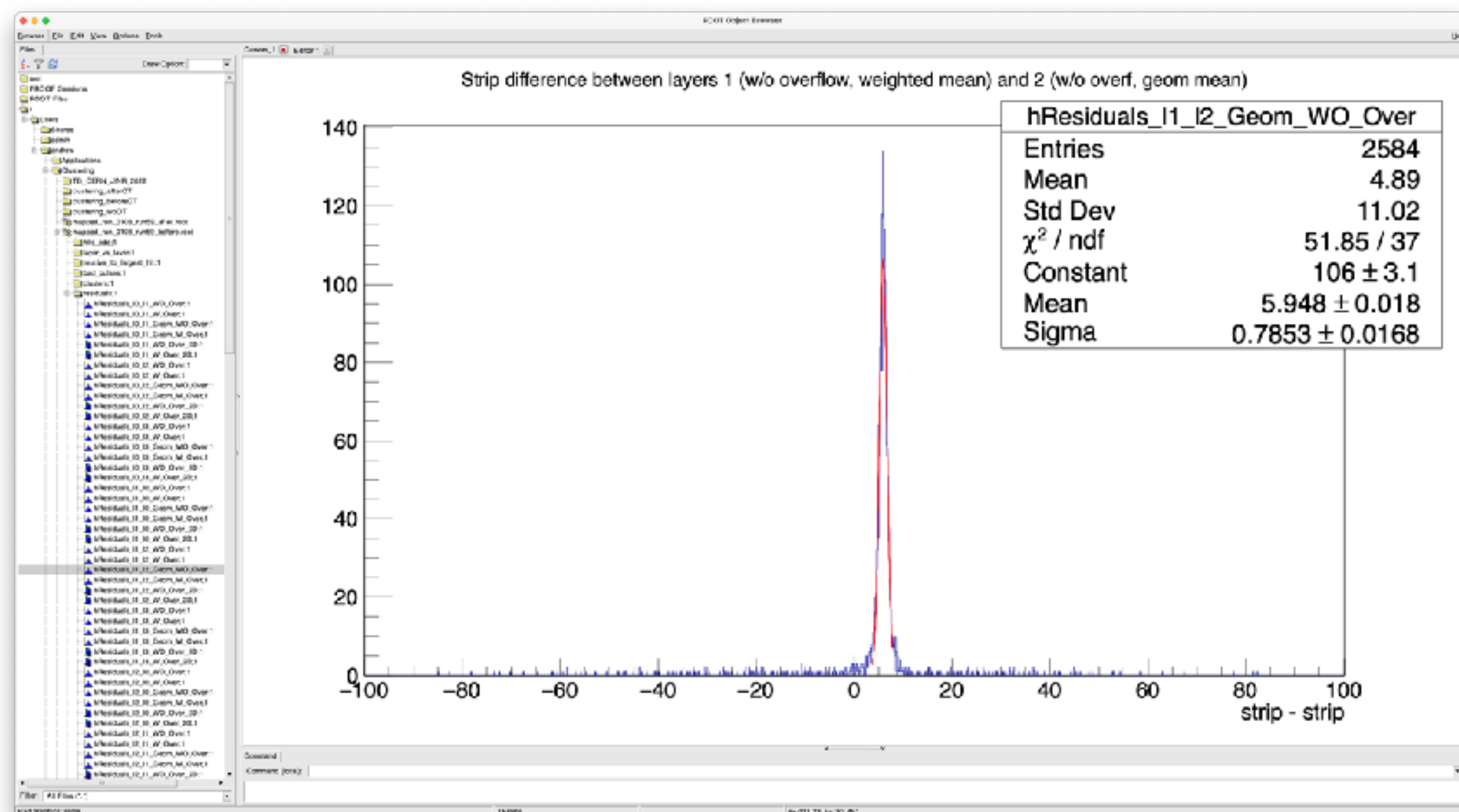
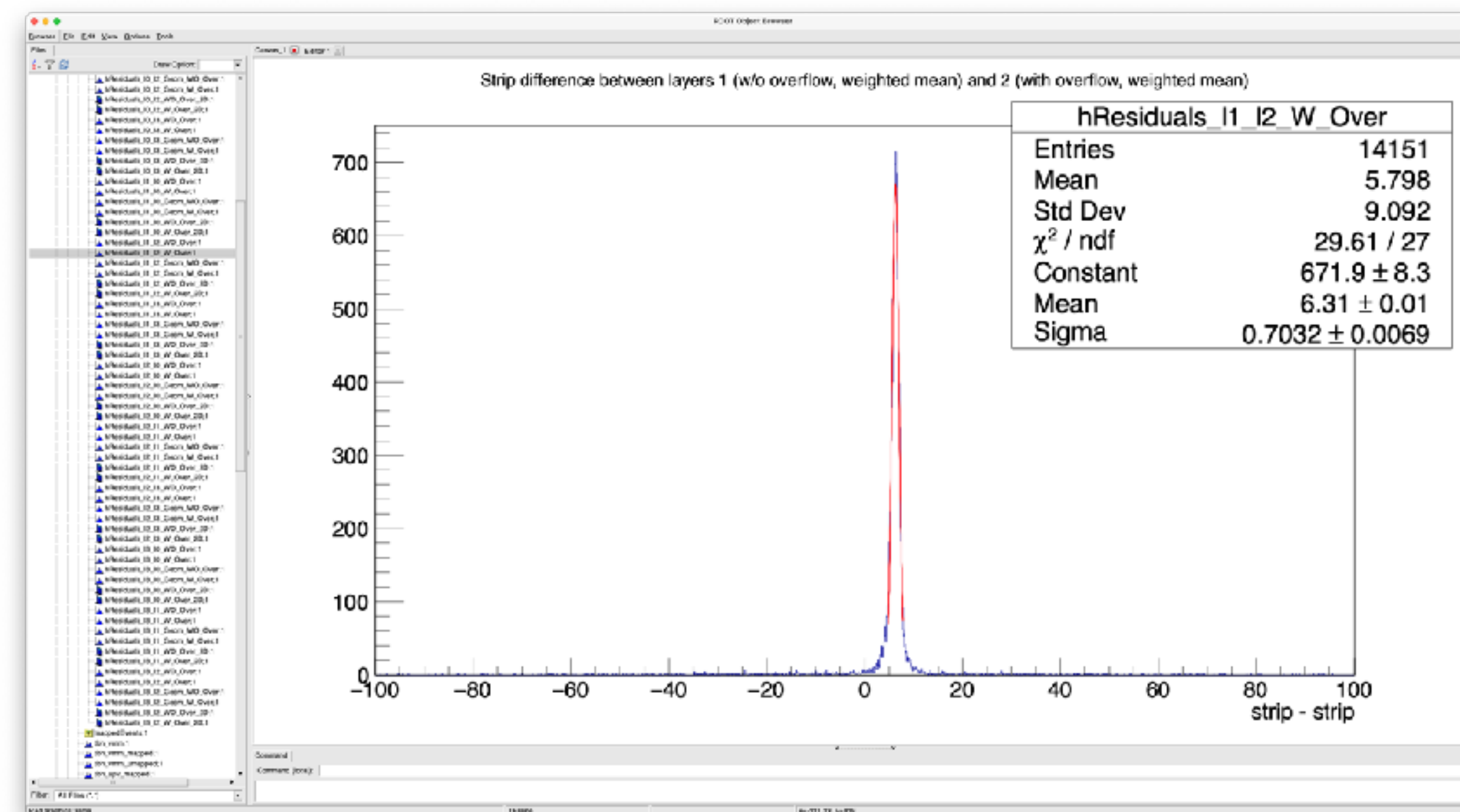
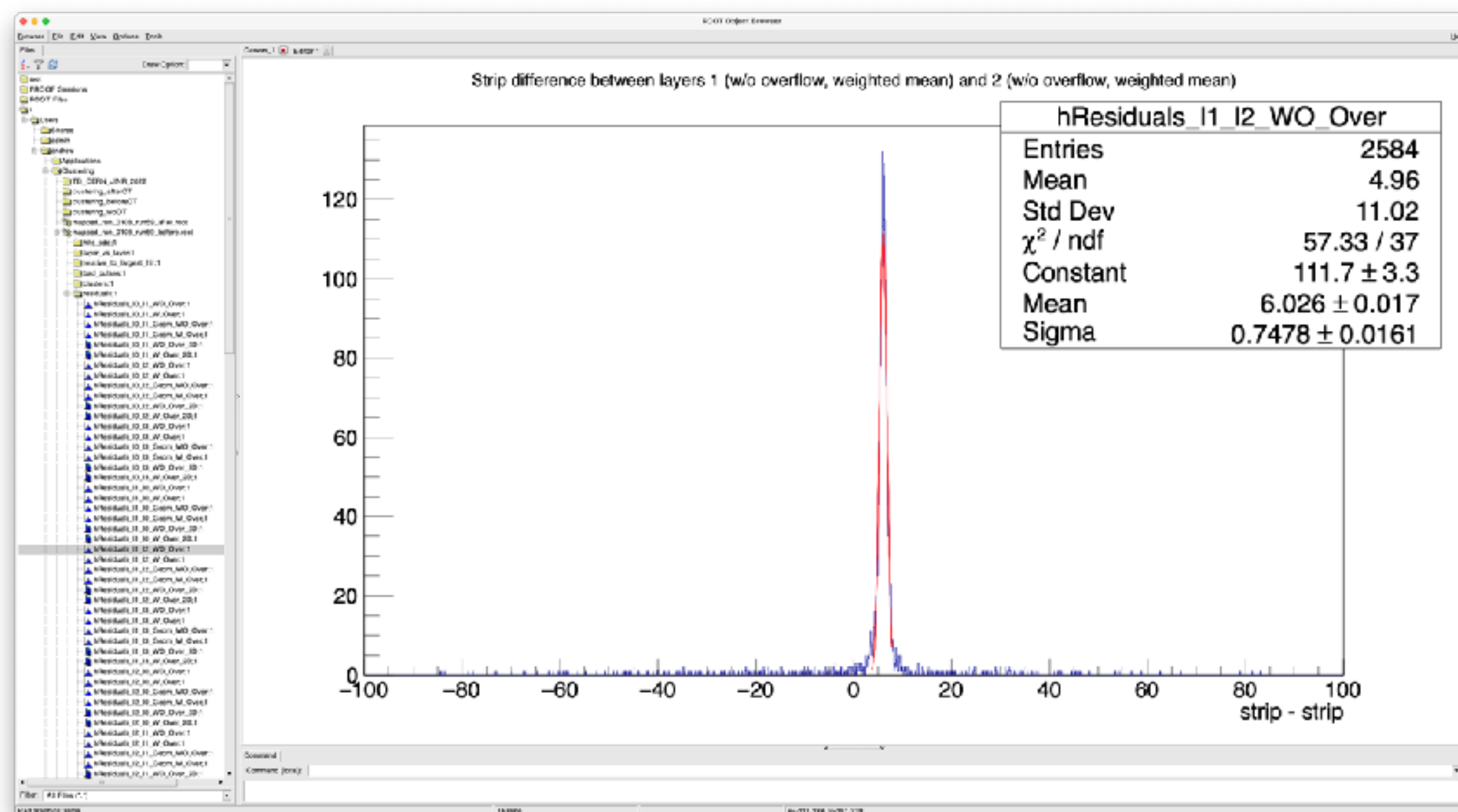
'BEFORE' (last TimeBin before Tmax with no overflow Q)

18



'WO' (Just drop out the strip with overflow)

19



'WO' (Just drop out the strip with overflow)

20

