Asymmetry using weighted average

Calculating Weighted Asymmetry

Suppose the asymmetry for the i-th wire for data set with RFSF On state for dropped pulses is given by -

$$A_i^{\uparrow} = \bar{A}_i^{\uparrow} \pm \Delta\bar{A}_i^{\uparrow}$$

where $\Delta\bar{A}_i^{\uparrow}$ is calculated using,

$$\Delta\bar{A}_i^{\uparrow} = \frac{\sigma}{\sqrt{N}}$$

where σ is the standard deviation form i-th histogram and N is the number of samples (Up-down spin pairs) in the histogram.

Similarly for RFSF Off state –

$$A_i^{\downarrow} = \bar{A}_i^{\downarrow} \pm \Delta\bar{A}_i^{\downarrow}$$

Then, Weight,

$$w_i^{\uparrow} = \frac{1}{(\Delta\bar{A}_i^{\uparrow})^2}$$

$$w_i^{\downarrow} = \frac{1}{(\Delta\bar{A}_i^{\downarrow})^2}$$

And the weighted average,

$$\bar{A}_i^{weighted} = \frac{w_i^{\uparrow}\bar{A}_i^{\uparrow} + w_i^{\downarrow}\bar{A}_i^{\downarrow}}{w_i^{\uparrow} + w_i^{\downarrow}}$$

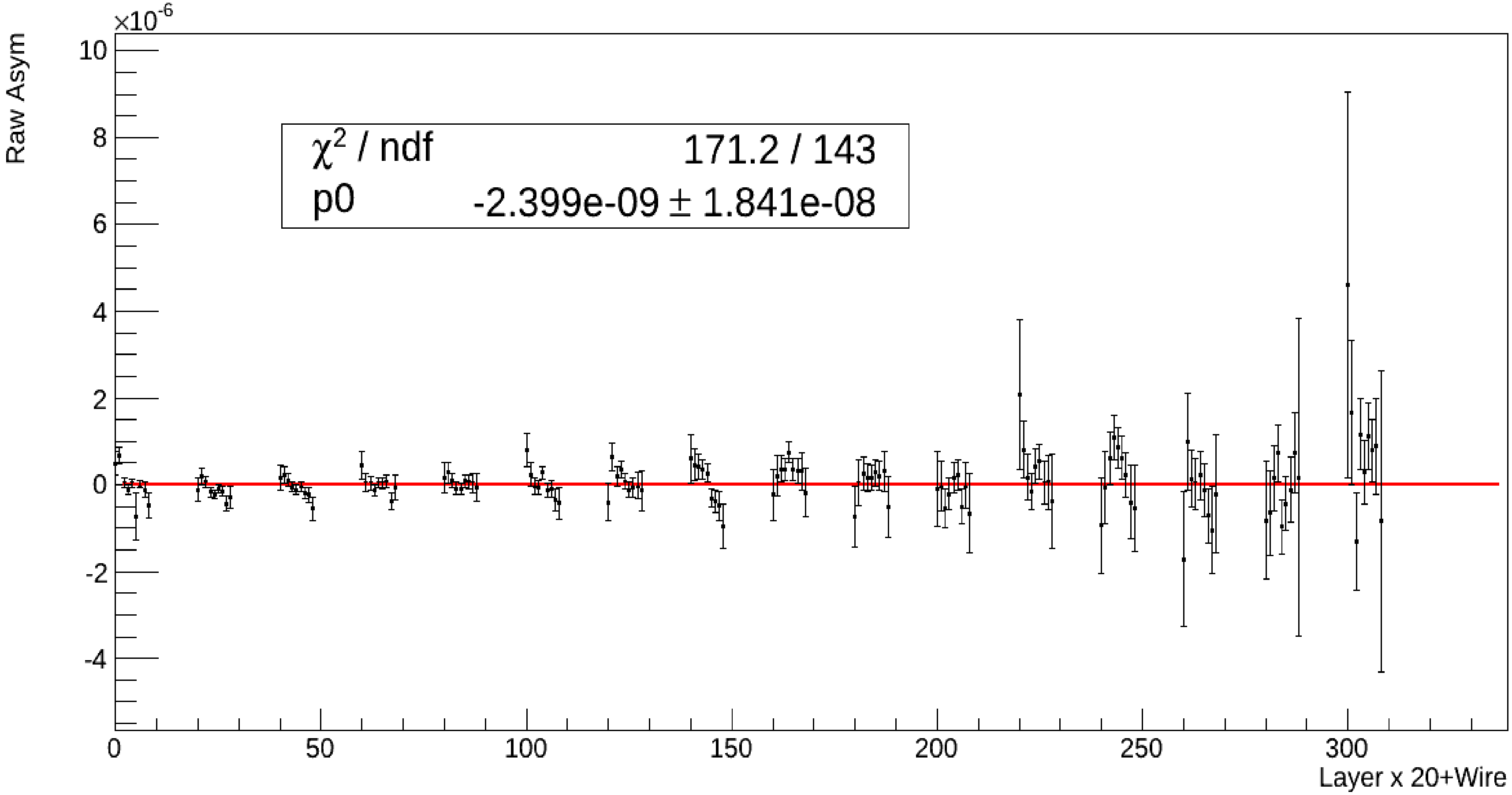
And the error is the weighted average,

$$\Delta\bar{A}_i^{weighted} = \frac{1}{\sqrt{w_i^{\uparrow} + w_i^{\downarrow}}}$$

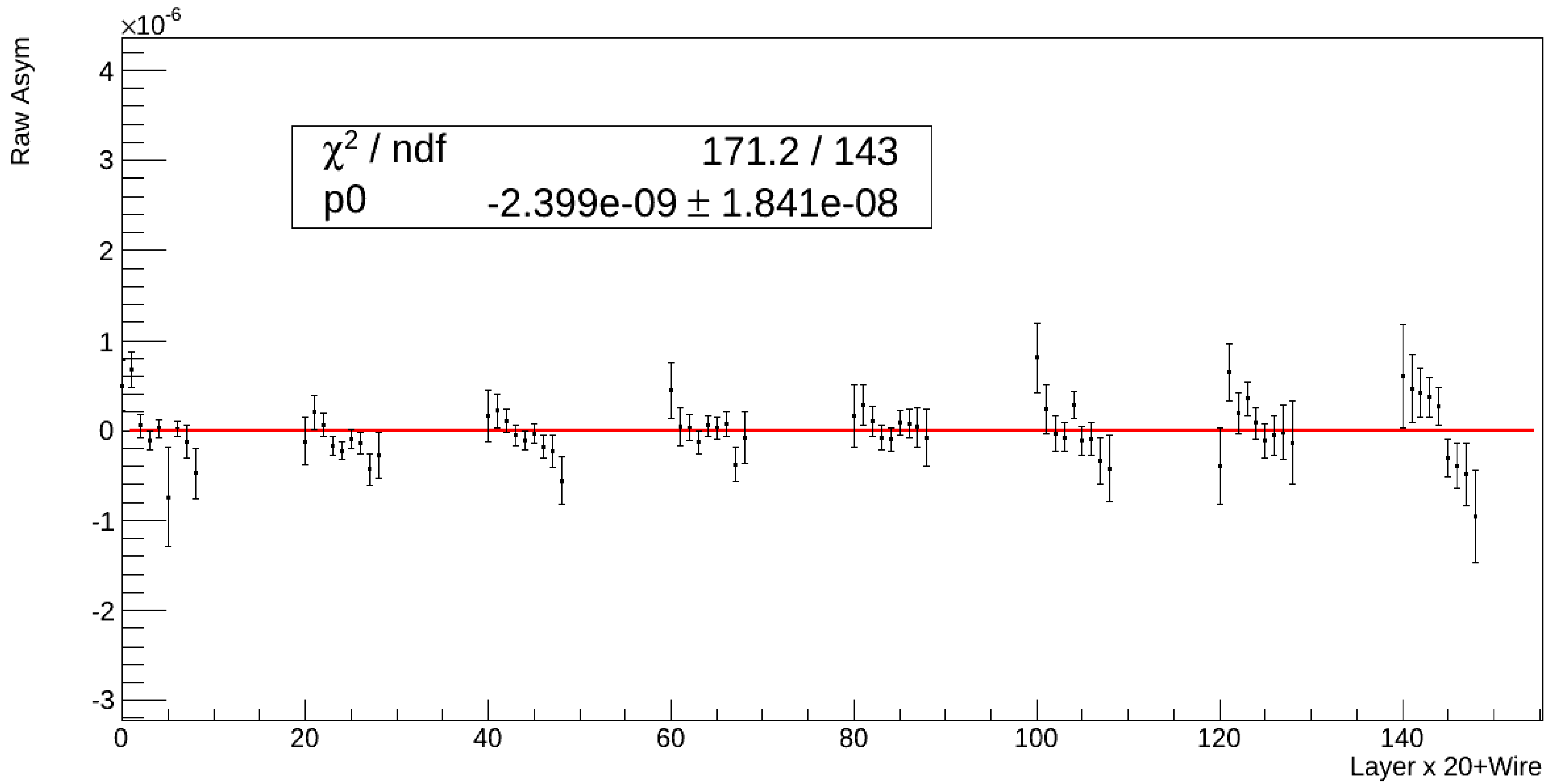
So on the plot each point represents –

$$A_i^{weighted} = \bar{A}_i^{weighted} \pm \Delta\bar{A}_i^{weighted}$$

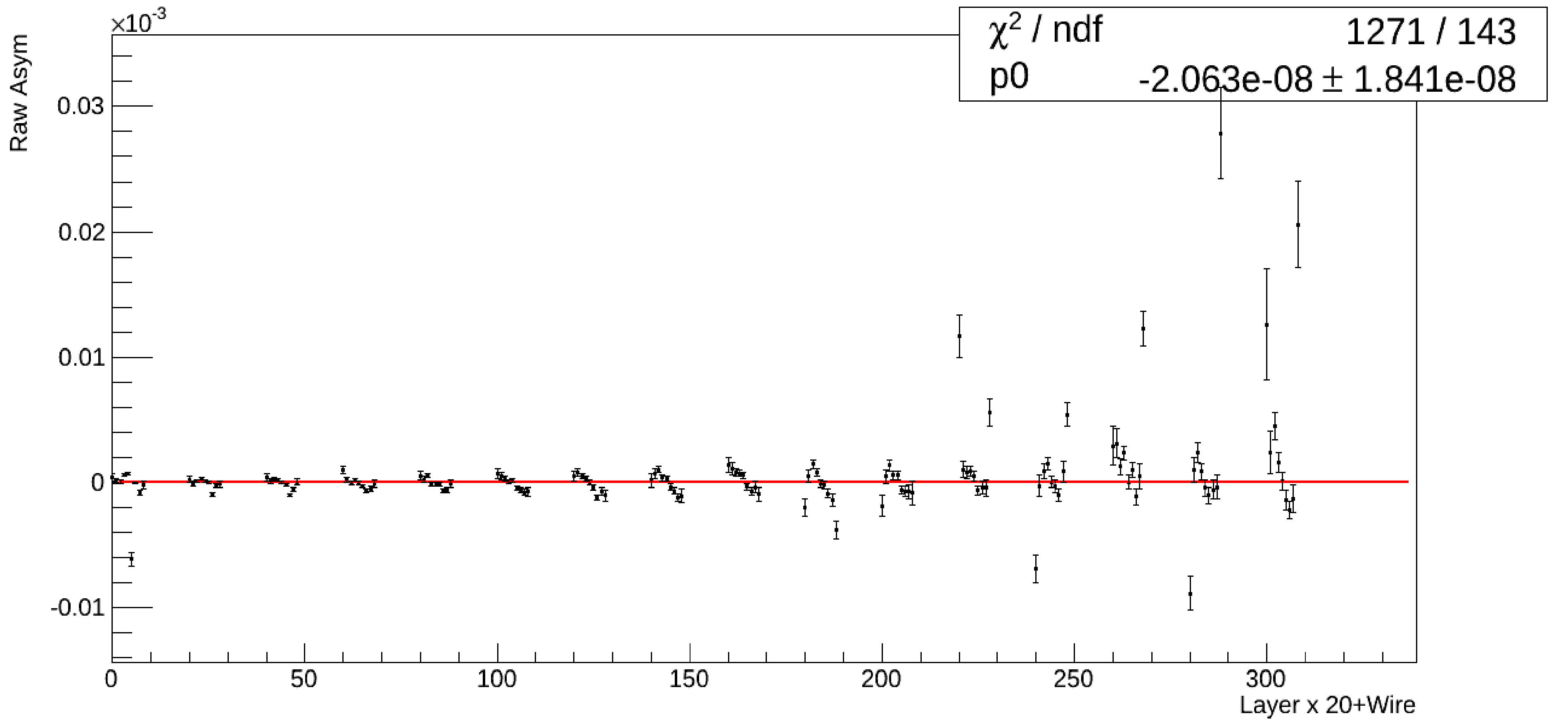
LR weighted sum



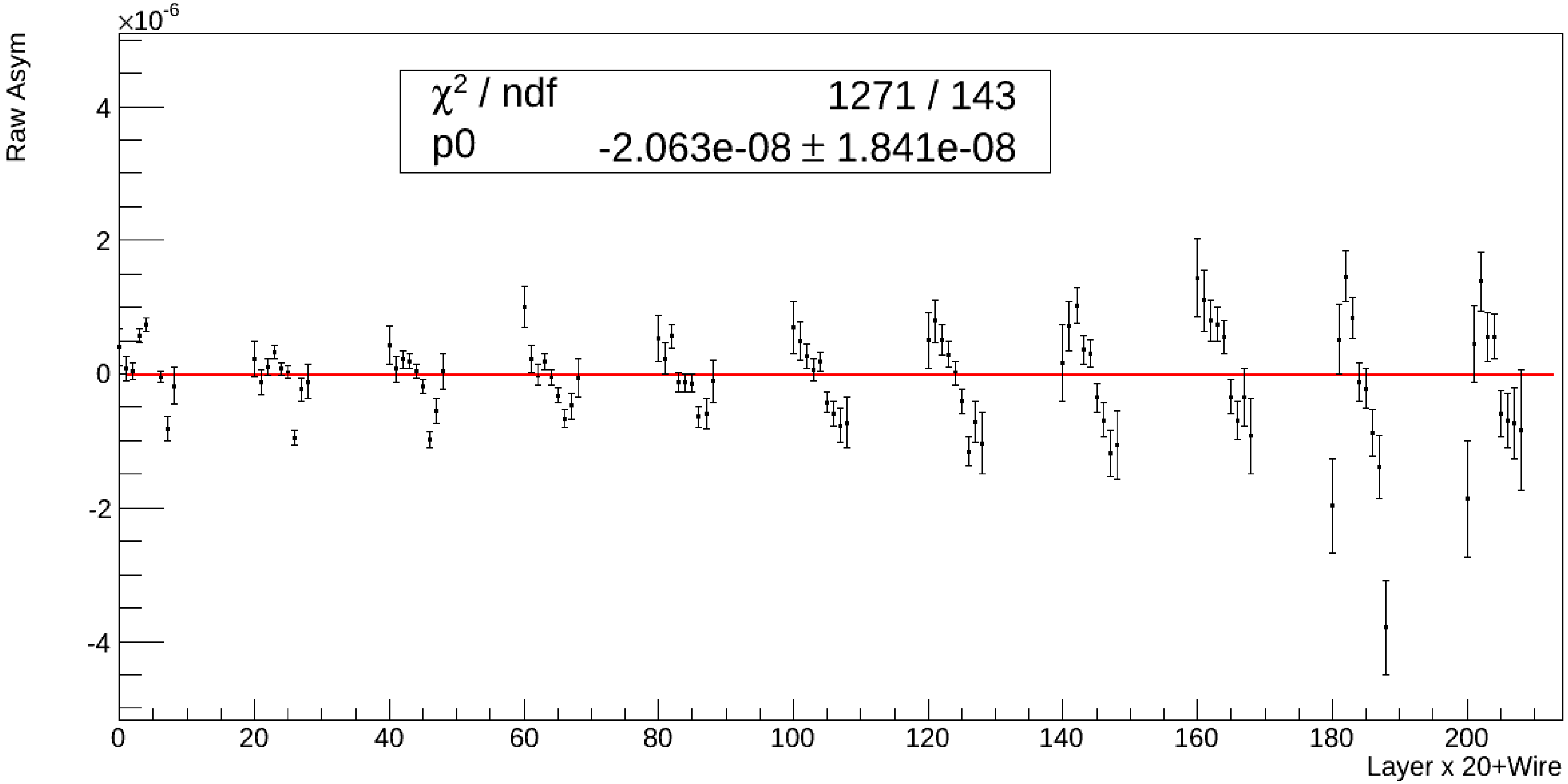
LR weighted sum front layers



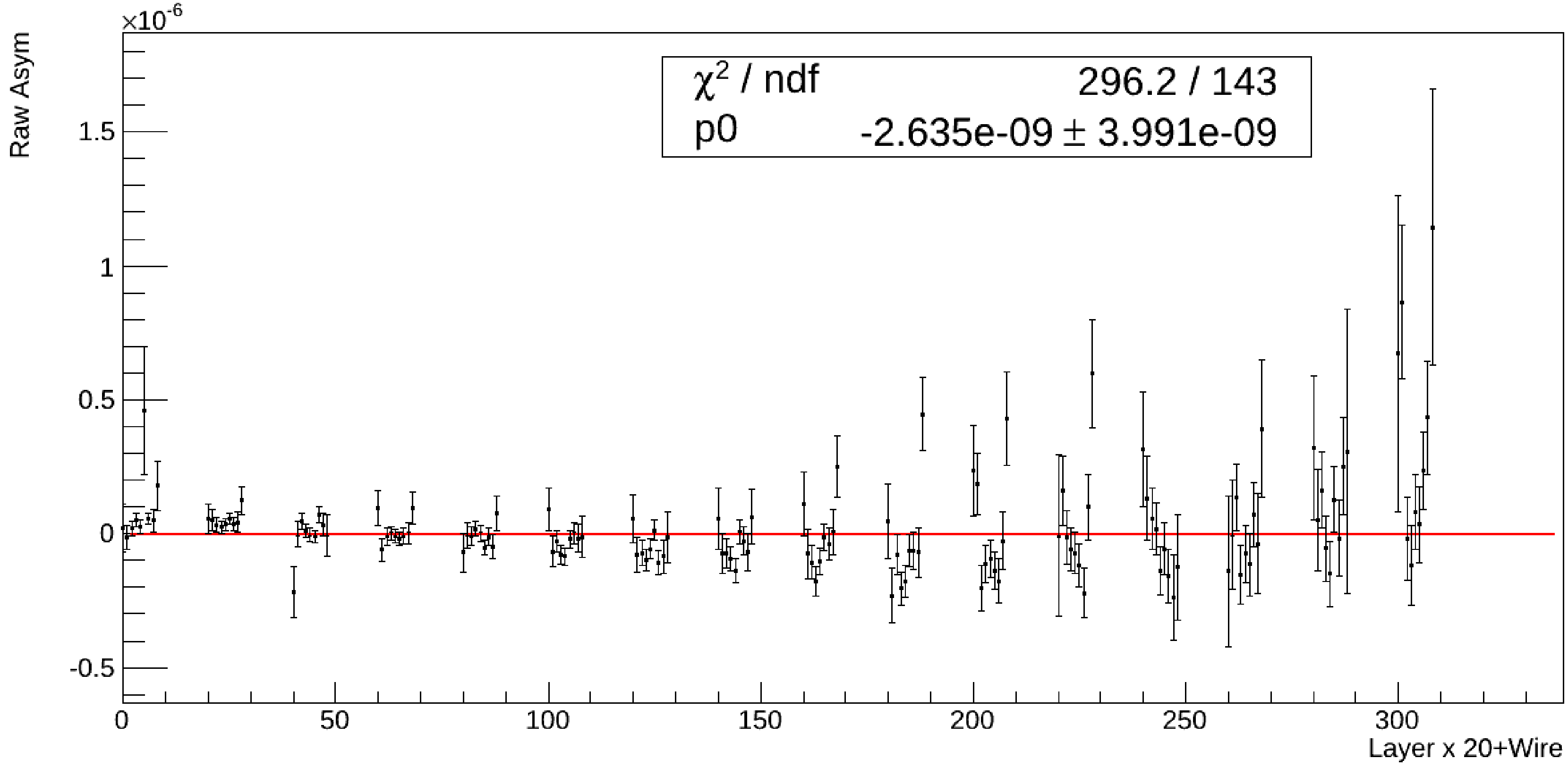
LR weighted difference



LR weighted difference (Front layers)



UD Sum



$\times10^{-6}$
Raw Asym
1.5
1
0.5
0
-0.5
χ^2 / ndf 296.2 / 143
p0 -2.635e-09 ± 3.991e-09
0
50
100
150
200
250
300
Layer x 20+Wire

UD difference